

Groundwater Monitoring & Corrective Action Report

CCR Landfill - Hunter Power Plant
Castle Dale, Utah

January 2020



Prepared For:

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ACRONYMS

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

1.0 INTRODUCTION

The Hunter Power Plant is located in Emery County, approximately three miles south of Castle Dale, Utah. The Hunter Power Plant is a three-unit, coal-fired electrical generation plant owned by PacifiCorp. After dewatering and treatment, Flue Gas De-sulfurization (FGD) waste, fly ash and bottom ash are disposed of in the CCR Landfill. As a result, it is considered a CCR unit.

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*).

1.1 Summary of Previous Work

Detection monitoring was initiated in September of 2015 to ensure a minimum of eight independent measurements were acquired, prior to the October 17, 2017 requirement in the *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 CCR Landfill (WET 2018).

The results of detection monitoring revealed all Appendix III constituents exceeded site-specific background concentrations. Based on these findings, the CCR Landfill monitoring program transitioned to assessment monitoring in 2018. Two rounds of sampling were completed in 2018, groundwater protection standards were established for the CCR Landfill, and assessment monitoring results were compared to these standards. These comparisons revealed Appendix IV constituents: lithium and molybdenum exceeded the groundwater protection standards. As a result, a nature and extent investigation to assess groundwater impacts was initiated in 2018 and completed in 2019.

1.2 Report Purpose and Organization

The following sections provide a status update for activities initiated or completed at the Hunter Power Plant CCR Landfill, during the 2019 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 (Section 2.0);
- Summarize key actions completed (Section 5.0);
- Describe any problems encountered (Section 7.0);
- Discuss actions taken to resolve problems (Section 7.0); and
- Define key activities for the upcoming year (Section 8.0).

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 2.1 and 2.2).
- 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 3.0 and Table 1).
- A narrative discussion of any transition between monitoring programs (i.e. transitioning from detection monitoring to assessment monitoring) - in addition to identifying constituents detected at a statistically significant increase over background levels (Section 3.1).
- Other information required to be included as specified in § 257.90 through § 257.98 of the *Final Rule* not listed above, is also included in the report.

2.0 GROUNDWATER MONITORING NETWORK

The monitoring network wells for the CCR Landfill 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 monitoring wells for the CCR Landfill utilized to conduct detection and assessment monitoring between 2015 and 2019 include four background wells and seven downgradient wells. The background wells include four locations spanning the extent of the CCR Landfill east to west, and include: ELF-1D, ELF-2, ELF-9, and ELF-10. The background well spacing and distribution were developed to comply with the requirements of the *Final Rule*. Monitoring results from these locations indicate they are not being influenced by groundwater passing waste in the CCR unit, providing results representative of background concentrations for the site.

Downgradient monitoring wells for the CCR Landfill include seven locations placed to capture groundwater as it passes the waste unit boundary. 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 west to east as it passes across the CCR Landfill. The downgradient monitoring wells include the following: ELF-3, ELF-4, ELF-5, ELF-6, ELF-7, ELF-8, and ELF-11.

2.1 Monitoring Well Decommissioning & Replacement in 2019

No wells were replaced or decommissioned for the Hunter Landfill monitoring network in 2019.

2.2 Additions to the Monitoring Network in 2019

To support an evaluation of the nature and extent of past releases at the CCR Landfill, three new wells were installed in November of 2018 east and downgradient of the CCR Landfill. The three new wells included: ELF-12, ELF-13, and ELF-14 (Figure 1). These wells were incorporated into the groundwater monitoring program in 2019 and will continue to undergo semi-annual monitoring in accordance with the *Final Rule* throughout remedy selection and implementation.

3.0 GROUNDWATER MONITORING

The CCR Landfill was transitioned to assessment monitoring in 2018. Two rounds of sampling and analysis were completed in 2019 to comply with the *Final Rule*, and statistical analyses were completed comparing downgradient well results with groundwater protection standards. All of the samples underwent analysis in accordance with the requirements defined in the *Final Rule*. In addition, water level and field data were acquired each time the wells were sampled, in accordance with the SAP. Table 1 provides 2019 assessment monitoring data collected for the CCR Landfill. Attachments A and B contain groundwater contour maps, data validation, statistical analyses, field data sheets, and laboratory data packages for each event.

3.1 Continuation - Assessment Monitoring

In accordance with the *Final Rule*, the CCR Landfill remains in assessment monitoring while PacifiCorp prepares to implement corrective measures. To support ongoing monitoring, site-specific background (UTL) concentrations were combined with *EPA National Primary Drinking Water Standards* to create groundwater protection standards for the CCR Landfill. After updating the statistics to incorporate the 2019 monitoring data for upgradient wells, the higher of these values was adopted as the groundwater protection standard. These comparisons for the two 2019 monitoring events are provided in Tables 2a and 2b below.

Table 2a indicates cobalt, lithium, and molybdenum exhibited statistically significant increases (SSIs) above their groundwater protection standards for the May 2019 event. Table 2b indicates cobalt, lithium, molybdenum, and selenium exhibited SSIs above groundwater protection standards for the August 2019 event. The remaining Appendix IV constituents were below groundwater protection standards.

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

SAMPLE ID	WELL TYPE	COLLECTION DATE	TOC AMSL (ft)	DTW (ft)	GWE AMSL (ft)	Appendix III										Appendix IV																															
						B		Ca		Cl		F		pH		SO ₄		TDS		Sb		As		Ba		Be		Cd		Cr		Co		Pb		Li		Hg		Mo		Se		Tl		Radium 226+228	
						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	mg/L	Q	mg/L	Q	pCi/L	Q		
ELF-1D	Background	9/18/2015	5669.55	84.43	5585.12	NS - Not enough water																																									
		11/10/2015		NM	NM	NS - Not enough water																																									
		12/1/2015		84.41	5585.14	NS - Not enough water																																									
		1/12/2016		84.25	5585.30	NS - Not enough water																																									
		2/2/2016		84.14	5585.41	NS - Not enough water																																									
		3/9/2016		NM	NM	NS - Not enough water																																									
		4/6/2016		83.45	5586.10	NS - Not enough water																																									
		5/4/2016		83.60	5585.95	NS - Not enough water																																									
		5/9/2017		82.60	5586.95	NS - Not enough water																																									
		8/2/2017		82.35	5587.20	NS - Not enough water																																									
ELF-2	Background	2/15/2018	5612.02	98.82	5570.73	NA										<0.00200		<0.00200		0.0103		<0.00200		<0.000500		<0.00200		0.00542		<0.00200		2.12		<0.000150		0.0165		<0.00200		<0.00200		2.63					
		5/30/2018		99.87	5569.68	NS - Not enough water																																									
		5/8/2019		81.81	5587.74	2.23		377		6880		<0.100		7.02		7730		26800		<0.00400		<0.00200		0.00846		<0.00200		<0.000500		0.00234		<0.00400		<0.00200		2.2	J+	<0.0000900		0.0207		<0.00200		<0.00200		1.23	
		8/20/2019		83.22	5586.33	2.19		366	J+	6430		<0.200		7.27		8640		27000		<0.00400		<0.00200		0.00842		<0.00200		<0.000500		<0.00200		<0.00400		<0.00200		2.19		<0.0000900	UJ	0.0161		<0.00200		<0.00200		1.09	
		9/18/2015		20.20	5591.82	3.31		419		469		0.5		7.30		8150		11400		<0.001		<0.001		<0.05		<0.001		<0.001		0.006		0.001		1.50		<0.0001		0.0030		0.608		<0.0005		2.3			
		11/10/2015		20.65	5591.37	3.27		419		444		<0.1		7.22		7870		11300		<0.002		<0.002		0.00915		<0.002		<0.0005		<0.002		<0.004		<0.002		4.93		<0.00015		0.00337		0.556		<0.002		0.8	
		12/1/2015		21.02	5591.00	3.24		392		461		<0.1		7.21		8320		11500		<0.002		<0.002		0.0128		<0.002		<0.0005		<0.002		0.00559		<0.002		3.97		<0.00015		0.00381		0.53		<0.002		8.1	J+
		1/12/2016		21.29	5590.73	3.38		420		473		0.277		7.24		8180		12300		<0.002		<0.002		0.0207		<0.002		<0.0005		<0.002		0.0114		<0.002		4.08		<0.00015		0.00431		0.499		<0.002		1.99	
		2/2/2016		21.43	5590.59	3.50		410		471		0.100		7.14		7350		12000		<0.002		<0.002		0.0119		<0.002		<0.0005		<0.002		0.00501		<0.002		3.93		<0.00015		0.00310		0.450					

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

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

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

SAMPLE ID	WELL TYPE	COLLECTION DATE	TOC AMSL (ft)	DTW (ft)	GWE AMSL (ft)	Appendix III												Appendix IV																																
						B		Ca		Cl		F		pH		SO ₄		TDS		Sb		As		Ba		Be		Cd		Cr		Co		Pb		Li		Hg		Mo		Se		Tl		Radium 226+228				
						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	mg/L	Q	mg/L	Q	pCi/L	Q					
ELF-3	Downgradient	9/18/2015	5604.78	34.37	5570.41	NS - Not enough water																																												
		11/10/2015		NM	NM	NS - Not enough water																																												
		12/1/2015		34.40	5570.38	NS - Not enough water																																												
		1/12/2016		34.30	5570.48	NS - Not enough water																																												
		2/2/2016		34.25	5570.53	NS - Not enough water																																												
		3/9/2016		NM	NM	NS - Not enough water																																												
		4/7/2016		34.30	5570.48	NS - Not enough water																																												
		5/4/2016		NM	NM	NS - Not enough water																																												
		9/8/2016		34.02	5570.76	NS - Not enough water																																												
		5/9/2017		33.43	5571.35	NS - Not enough water																																												
		8/2/2017		33.32	5571.46	1.01		492		609		<0.100		7.79		33000		47700		<0.00200		<0.00200		0.015		<0.00200		<0.000500		<0.00200		0.00455		<0.00200		4.20		<0.000150		0.032		0.169		<0.00200		3.76				
		2/15/2018		34.04	5570.74	NA												<0.00200		<0.00200		0.0118		<0.00200		<0.000500		<0.00200		<0.00400		<0.00200		2.67		<0.000150		0.0335		0.125		<0.00200		2.22						
		5/30/2018		34.80	5569.98	NS - Not enough water																																												
		5/8/2019		31.75	5573.03	1.51		465		768		<0.100		7.52		27700		50700		<0.00400		0.00205		0.0391		<0.00200		0.000779		0.00422		0.0214		0.00605		3.26	J+	<0.0000900		0.0209		0.502		<0.00200		3.61				
		8/20/2019		30.30	5574.48	<5.00		431	J+	642		<0.400		7.79		32000		50400		<0.00400		<0.00200		0.0111		<0.00200		<0.000500		0.00253		<0.00400		<0.00200		2.81		<0.0000900	UJ	0.0187		0.617		<0.00200		3.04				
ELF-4	Downgradient	9/18/2015	5581.50	15.03	5566.47	4.66		526		2320		0.3		7.20		5790		10400		<0.001		<0.001		<0.05		<0.001		<0.001		0.002	J+	0.008		<0.001		1.70		<0.0001		0.001		0.004	J+	<0.0005		2.1				
		11/10/2015		14.97	5566.53	4.93		486		2040		4.46		6.94		5350		11200		<0.002		<0.002		0.0116		<0.002		<0.0005		<0.002		0.00583		<0.002		5.41		<0.00015		0.00256		0.00496		<0.002		1.6				
		12/1/2015		15.12	5566.38	4.88		482		2370		3.67		7.01		6240		11400		<0.002		<0.002		0.0118		<0.002		<0.0005		<0.002		0.00591		<0.002		4.31		<0.00015		0.00256		0.00486		<0.002		11.59	J+			
		1/12/2016		15.22	5566.28	5.02		514		2500		3.93		7.52		5900		12400		<0.002		<0.002		0.0155		<0.002		<0.0005		<0.002		<0.004		<0.002		4.43		<0.00015		0.00297		0.00471		<0.002		1.39				
		2/2/2016		15.25	5566.25	5.19		495		2170		4.25		6.97		5410		11500		<0.002		<0.002		0.0119		<0.002		<0.0005		<0.002		0.00582		<0.002		4.39		<0.00015		0.00252		0.00352		<0.002		3.6				
		3/9/2016		15.36	5566.14	4.96		496		2240		4.06		7.03		5290		11200		<0.002		<0.002		0.0153		<0.002		<0.0005		<0.002		0.00729		<0.002		2.37		<0.00015		0.00308		0.0036		<0.002		2.2				
		4/6/2016		15.38	5566.12	4.77		519		2320		3.63		6.97		6110		11300		<0.002		<0.002		0.0139		<0.002		<0.0005		<0.002		0.00675		<0.002		2.96		<0.00015		0.00260		0.00365		<0.002		0.62				
		5/4/2016		14.41	5567.09	4.42		476		2280		<0.1		7.16		6010		11600		<0.002		<0.002		0.0123		<0.002		<0.0005		<0.002		0.00637		<0.002		1.40		<0.00015		0.00236		0.00281		<0.002		1.98				
		9/8/2016		NM	NM	NS - Not enough water																																												
		5/9/2017		16.05	5565.45	NS - Not enough water																																												
		8/2/2017		16.25	5565.25	4.35		483		2240		<0.100		7.21		5750		11600		<0.00200		<0.00200		0.0115		<0.00200		<0.000500		<0.00200		0.00611		<0.00200		1.65		<0.000150		0.00266		0.00255		<0.00200		2.57				
		2/15/2018		16.52	5564.98	NA												<0.00200		<0.00200		0.0141		<0.00200		<0.000500		0.00435		0.00833		<0.00200		1.71		<0.000150		0.00261		<0.00200		<0.00200		1.57						
		5/30/2018		16.53	5564.97	4.88		456	J-	2200		0.339		6.98		5290		11700		<0.00100		<0.00200		0.0116		<0.00200		<0.000500		<0.00200		0.00666		<0.00200		1.78	J-	<0.000150	J-	0.00278		<0.00200		<0.00200		1.81				
		5/8/2019		16.49	5565.01	5.00		515		1980		0.187		7.06		4800		11800		<0.00400		<0.00200		0.0118		<0.00200		<0.000500		<0.00200		0.00593		<0.00200		1.82	J+	<0.0000900		0.00272		<0.00200		<0.00200		1.72				
		8/20/2019		16.88	5564.62	4.98		507	J+	1840		0.941		7.22		4890		12200		<0.00400		<0.00200		0.0103		<0.00200		<0.000500		<0.00200		0.00637		<0.00200		1.71		<0.0000900	UJ	0.0024		<0.00200		<0.00200		2.73				
		ELF-5	Downgradient	9/18/2015	5577.79	16.61	5561.18	5.44		464		4250		0.4		7.20		11200		21000		<0.001		<0.001		<0.05		<0.001		<0.001		0.004		<0.005		<0.001		3.70		<0.0001		0.002		0.052	J+	<0.0005		3.2		
				11/10/2015		16.20	5561.59	5.89		499		4110		<0.1		6.98		11100		22600		<0.002		<0.002		0.0131		<0.002		<0.0005		<0.002		<0.004		<0.002		13.7		<0.00015		0.00446		0.0453		<0.002		1.7		
				12/2/2015		16.74	5561.05	5.53		480		4150		3.49		6.99		11200		21000		<0.002		<0.002		0.00971		<0.002		<0.0005		<0.002		<0.004		<0.002		9.96		<0.00015		0.0044		0.0376		<0.002		10.36	J+	
				1/12/2016		16.85	5560.94	6.20		503		4210		4.85		7.26		11100		21300		<0.002		<0.002		0.0112		<0.002		<0.0005		<0.002		0.00402		<0.002		11.7		<0.00015		0.00451		0.0364		<0.002		1.56		
				2/2/2016		16.52	5561.27	6.10		481		3750		3.96		7.04		9890		21000		<0.002		<0.002		0.0097		<0.002		<0.0005		<0.002		<0.004		<0.002		10.6		<0.00015		0.00458		0.0325		<0.002		1.61		
3/9/2016				16.47	5561.32	6.55		492		4170		4.62		7.05		10300		22300		<0.002		<0.002		0.0123		<0.002		<0.0005		<0.002		0.00413		<0.002		5.83		<0.00015		0.00497		0.0297		<0.002		2.89				
4/6/2016				16.31	5561.48	5.35		476		3700		3.53		7.10		11200		19200		<0.002		<0.002		0.0179		<0.002		<0.0005		0.00215		0.00457		<0.002		3.10		<0.00015		0.00446		0.0337		<0.002		3.7				
5/4/2016				15.35	5562.44	5.99		465		3900		<0.1		7.19		10700		21100		<0.002		<0.002		0.0151		<0.002		<0.0005		<0.002		0.00424		<0.002		5.68		<0.00015		0.00439		0.0306		<0.002		1.75				
9/8/2016				17.30	5560.49	6.03		491		3980		<0.1		7.03		10300		20600		<0.002		<0.002		0.017		<0.002		<0.0005		0.00232		0.00409		<0.002		8.64		<0.00015		0.00417		0.0397		<0.002		2.02				
5/9/2017				17.13	5560.66	NS - Not enough water																																												
8/2/2017				NM	NM	NS - Not enough water																																												
2/15/2018				18.00	5559.79	NA												<0.00200		<0.00200		0.0103		<0.00200		<0.000500		<0.00200		<0.00400		<0.00200		4.35		<0.000150		0.00457		0.0181		<0.00200		1.81						
5/30/2018				17.98	5559.81	7.61		459	J-	4420		0.104		7.04		11100		27800		<0.00100		<0.00200		0.0117		<0.00200		<0.000500		<0.00200		0.0043		<0.00200		6.85	J-	<0.000150	J-	0.00497		0.025		<0.00200		2.37				
5/8/2019				18.58	5559.21	6.06		489		3180		0.108		7.09		8640		21600		<0.00400		<0.00200		0.0138		<0.00200		<0.000500		<0.00200		0.0102		<0.00200		4.29	J+	<0.0000900		0.00486		0.00913		<0.00200		2.85				
8/20/2019				18.69	5559.10	8.7		510	J+	4440		0.962		7.23		12300		24000		<0.00400		0.00212		0.0267		<0.00200		<0.000500		0.00436		0.00618		0.00246		5.93		<0.0000900	UJ	0.00716		0.0127		<0.00200		2.77				
ELF-6	Downgradient			9/18/2015	5579.61	15.97	5563.64	14.3		531		5650		0.6		7.20																																		

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

SAMPLE ID	WELL TYPE	COLLECTION DATE	TOC AMSL (ft)	DTW (ft)	GWE AMSL (ft)	Appendix III												Appendix IV																															
						B		Ca		Cl		F		pH		SO ₄		TDS		Sb		As		Ba		Be		Cd		Cr		Co		Pb		Li		Hg		Mo		Se		TI		Radium 226+228			
						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	mg/L	Q	mg/L	Q	pCi/L	Q				
ELF-7	Downgradient	9/18/2015	5579.81	13.24	5566.57	1.72		496		2800		0.4		7.10		8720		15300		<0.001		<0.001		<0.05		<0.001		<0.001		<0.005		<0.001		2.00		<0.0001		<0.001		0.455		<0.0005		3.0					
		11/10/2015		13.42	5566.39	1.86		480		2600		4.00		6.93		8650		19200		<0.002		<0.002		0.0101		<0.002		<0.0005		<0.002		0.00529		<0.002		6.83		<0.00015		0.00236		0.392		<0.002		1.5			
		12/1/2015		13.60	5566.21	1.98		471		2790		3.12		6.99		9050		16800		<0.002		<0.002		0.0112		<0.002		<0.0005		<0.002		0.00508		<0.002		5.41		<0.00015		0.00275		0.408		<0.002		9.8	J+		
		1/12/2016		13.68	5566.13	1.79		480		2910		4.36		7.11		9140		14900		<0.002		<0.002		0.0126		<0.002		<0.0005		<0.002		0.00604		<0.002		5.67		<0.00015		0.00256		0.400		<0.002		1.27			
		2/2/2016		13.67	5566.14	1.81		469		2660		4.63		6.13		8250		17100		<0.002		<0.002		0.0100		<0.002		<0.0005		<0.002		0.00428		<0.002		5.35		<0.00015		0.00212		0.373		<0.002		3.84			
		3/9/2016		13.77	5566.04	1.79		443		2710		3.37		7.01		8180		16800		<0.002		<0.002		0.012		<0.002		<0.0005		<0.002		0.00668		<0.002		2.73		<0.00015		0.00295		0.383		<0.002		2.9			
		4/6/2016		13.76	5566.05	1.70		485		2850		3.19		6.94		9580		16500		<0.002		<0.002		0.00925		<0.002		0.000502		<0.002		0.00447		<0.002		2.64		<0.00015		0.00226		0.421		<0.002		1.39			
		5/4/2016		13.87	5565.94	1.58		445		2650		<0.1		7.16		8680		16900		<0.002		<0.002		0.00983		<0.002		<0.0005		<0.002		0.00483		<0.002		0.639		<0.00015		0.00209		0.36		<0.002		1.64			
		9/8/2016		14.12	5565.69	1.84		458		2660		<0.1		7.07		8640		18100		<0.002		<0.002		0.00957		<0.002		<0.0005		<0.002		0.00498		<0.002		4.59		<0.00015		0.00241		0.36		<0.002		2.34			
		5/9/2017		16.27	5563.54	NS - Not enough water																																											
		8/2/2017		14.37	5565.44	1.72		476		2480		<0.100		7.13		8680		17800		<0.00200		<0.00200		0.0124		<0.00200		<0.000500		<0.00200		0.00816		<0.00200		2.12		<0.000150		0.00254		0.253		<0.00200		2.28			
		2/15/2018		14.71	5565.10	NA														<0.00200		<0.00200		0.0107		<0.00200		<0.000500		<0.00200		0.00613		<0.00200		2.13		<0.000150		0.00249		0.175		<0.00200		1.35			
		5/30/2018		14.25	5565.56	1.86		444	J-	2590		0.329		6.99		8460		17200		<0.00100		<0.00200		0.0088		<0.00200		<0.000500		<0.00200		<0.00400		<0.00200		2.49	J-	<0.000150	J-	0.00249		0.136		<0.00200		1.63			
		5/8/2019		14.86	5564.95	1.86		471		2710		0.132		7.03		8260		17200		<0.00400		<0.00200		0.00947		<0.00200		<0.000500		<0.00200		0.0053		<0.00200		2.23	J+	<0.0000900		0.00228		0.0662		<0.00200		2.26			
		8/20/2019		15.22	5564.59	2.24		459	J+	2720		3.88		7.19		9480		19500		<0.00400		<0.00200		0.0119		<0.00200		<0.000500		<0.00200		<0.00400		<0.00200		2.23		<0.0000900	UJ	0.00272		0.0819		<0.00200		2.22			
ELF-8	Downgradient	9/18/2015	5584.50	8.37	5576.13	26.6		628		2320		1.40		7.60		3120		7430		<0.001		0.002		0.07		<0.001		0.01		0.013		0.196		0.012		3.50		<0.0001		0.437		<0.004		<0.002		3.6			
		11/10/2015		8.15	5576.35	30.4		577		2160		<0.1		7.30		3140		7690		<0.002		<0.002		0.0163		<0.002		0.000729		<0.002		0.147		0.00527		10.7		<0.00015		0.522		<0.002		<0.002		2.2			
		12/1/2015		8.29	5576.21	30.2		586		2370		0.874		7.52		3410		8070		<0.002		<0.002		0.0275		<0.002		0.000896		0.0035		0.15		0.00536		8.59		<0.00015		0.488		<0.002		<0.002		18.9	J+		
		1/12/2016		8.32	5576.18	29.7		623		2380	J+	1.04		7.62		3130		8340		<0.002		<0.002		0.0218		<0.002		0.000992		0.00216		0.200		0.00473		9.43		<0.00015		0.459		<0.002		<0.002		1.8			
		2/2/2016		8.14	5576.36	27.2		579		2180		<0.100		7.47		2970		7860		<0.002		<0.002		0.0140		<0.002		<0.0005		<0.002		0.0143		<0.002		8.79		<0.00015		0.0173		0.00716		<0.002		1.98			
		3/9/2016		8.26	5576.24	26.6		590		2240		0.837		7.48		2950		7580		<0.002		0.00299		0.0533		<0.002		0.00113		0.00887		0.202		0.00682		5.09		<0.00015		0.433		<0.002		<0.002		3.7			
		4/6/2016		8.40	5576.10	25.4		609		2300		<0.1		7.46		3390		7440		<0.002		<0.002		0.0244		<0.002		0.00114		0.00293		0.166		0.00545		<0.1		<0.00015		0.481		<0.002		<0.002		2.6			
		5/4/2016		8.45	5576.05	25.4		588		2190		0.946		7.61		3170		7900		<0.002		0.00224		0.0507		<0.002		0.00105		0.00966		0.172		0.00657		4.40		<0.00015		0.431		<0.002		<0.002		2.4			
		9/8/2016		8.66	5575.84	27.4		595		2350		1.33		7.53		3280		8010		<0.002		<0.002		0.012		<0.002		0.0017		<0.002		0.145		0.00628		7.77		<0.00015		0.471		<0.002		<0.002		2.1			
		5/9/2017		8.60	5575.90	NS - Not enough water																																											
		8/2/2017		8.79	5575.71	31.6		623		2110		1.69		7.54		3260		8420		<0.00200		<0.00200		0.0212		<0.00200		0.00294		0.0023		0.161		0.0126		3.54		<0.000150		0.478		<0.00200		<0.00200		1.07			
		2/15/2018		8.56	5575.94	NA														<0.00200		<0.00200		0.013		<0.00200		0.00332		<0.00200		0.197		0.00633		3.68		<0.000150		0.431		<0.00200		<0.00200		1.24			
		5/30/2018		8.81	5575.69	28.7		537	J-	1940		0.975		7.47		2820		7920		<0.00100		<0.00200		0.0114		<0.00200		0.00199		<0.00200		0.188		0.00737		3.95	J-	<0.000150	J-	0.441		<0.00200		<0.00200		1.98			
		5/8/2019		8.49	5576.01	29.8		606		2100		1.13		7.49		2980		9400		<0.00400		<0.00200		0.011		<0.00200		0.00195		<0.00200		0.201		0.00643		4.03	J+	<0.0000900		0.399		<0.00200							

Table 2a. Summary of Groundwater Quality Comparisons – May 2019 Event

Analyte	Background Upper Tolerance Limit (mg/L)	MCL (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells Exceeding the Groundwater Protection Standard
Antimony	0.004	0.006	0.006	None Exceed
Arsenic	0.012	0.01	0.012	None Exceed
Barium	0.10	2.00	2.00	None Exceed
Beryllium	0.002	0.004	0.004	None Exceed
Cadmium	0.001	0.005	0.005	None Exceed
Chromium	0.020	0.1	0.1	None Exceed
Cobalt	0.011	0.006	0.011	ELF-11, ELF-3, ELF-6, ELF-8
Fluoride	4.36	4	4.36	None Exceed
Lead	0.012	0.015	0.015	None Exceed
Lithium	4.94	0.04	4.94	ELF-6
Mercury	0.0002	0.002	0.002	None Exceed
Molybdenum	0.16	0.1	0.16	ELF-8
Radium	7.62	5.0	7.62	None Exceed
Selenium	0.61	0.05	0.61	None Exceed
Thallium	0.002	0.002	0.002	None Exceed

Table 2b. Summary of Groundwater Quality Comparisons – August 2019 Event

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells that Exceed Groundwater Protection Standard
Antimony	0.004	0.006	0.006	None Exceed
Arsenic	0.0117	0.01	0.0117	None Exceed
Barium	0.10	2.00	2.00	None Exceed
Beryllium	0.002	0.004	0.004	None Exceed
Cadmium	0.0011	0.005	0.005	None Exceed
Chromium	0.0201	0.1	0.1	None Exceed
Cobalt	0.0114	0.006	0.0114	ELF-11, ELF-8
Fluoride	4.36	4.0	4.36	None Exceed
Lead	0.012	0.015	0.015	None Exceed
Lithium	4.957	0.04	4.957	ELF-5
Mercury	0.00015	0.002	0.002	None Exceed

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells that Exceed Groundwater Protection Standard
Molybdenum	0.158	0.1	0.158	ELF-8
Radium	7.00	5.0	7.00	None Exceed
Selenium	0.608	0.05	0.608	ELF-3
Thallium	0.002	0.002	0.002	None Exceed

4.0 NATURE AND EXTENT INVESTIGATION

The results of assessment monitoring completed in 2018, revealed SSIs above the groundwater protection standard for Appendix IV constituents: lithium and molybdenum. Based on these findings, a nature and extent investigation was initiated in 2018 and completed in 2019.

The investigation included the placement of three new wells (ELF-12, ELF-13, and ELF-14) at the plant boundary to comply with the *Final Rule* and determine if past releases have migrated to the boundary and/or offsite. The data indicates that the release associated with the CCR Landfill has been bounded spatially, as all of the constituents exhibiting SSIs in 2018 and 2019, are below their established groundwater protection standards in each of new downgradient wells during this period (Table 1).

5.0 ASSESSMENT OF CORRECTIVE MEASURES

In parallel with the nature and extent investigation, an assessment of corrective measures was completed April 15, 2019 for the CCR Landfill (WET 2019). The assessment incorporated site-specific conditions and considered a wide range of remedial alternatives to address groundwater impacts. This evaluation indicates current waste management practices coupled with horizontal wells installed to capture groundwater beneath the landfill, have resulted in effective containment of groundwater impacts. Optimization of the existing horizontal wells and/or installation of new wells coupled with a pump and treat system, is estimated to reduce the time to attainment by approximately 10 years. Based on this, enhanced horizontal wells and a pump and treatment system is the preferred option to actively treat the impacted groundwater, as removal of the landfill will have no impact on contamination already in groundwater. The following two alternatives were proposed in 2019 for the Hunter CCR Landfill:

1. Alternative 1 – Maintain Current Corrective Measures
2. Alternative 2 – Maintain Current Corrective Measures with a Pump and Treat Groundwater Treatment System

5.1 Public Meeting

A public meeting was held in Castle Dale, Utah to discuss the corrective measures on July 23, 2019. Comments received from stakeholders are being incorporated into the remedy selection report.

6.0 SELECTION OF REMEDY

Following the public meeting in July of 2019 and receipt of stakeholder input, PacifiCorp began evaluating the feasibility of the proposed alternative. An initial inspection of the existing horizontal wells was conducted in September of 2019 to determine if scale build-up or other obstructions have developed in the wells that may prevent them from operating at an optimal level. The Remedy Selection was initiated in 2019 and will be completed in 2020.

7.0 PROBLEMS & RESOLUTIONS

Neither monitoring well ELF-1D or ELF-3 have produced sufficient water during detection or assessment monitoring to support sampling. As a result, neither has been used in developing statistical analyses for the site. Water levels, when available, have been used to develop site-specific groundwater elevation maps.

8.0 UPCOMING YEAR

During 2020, it is anticipated PacifiCorp will complete the following activities at the CCR Landfill:

Semi-Annual Monitoring

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

Corrective Measures

- Complete remedy selection report;
- Implement corrective action groundwater monitoring plan;
- Continue optimization and operation of existing horizontal wells to collect leachate and impacted groundwater.
- Evaluate need for additional remedial activities

9.0 REFERENCES

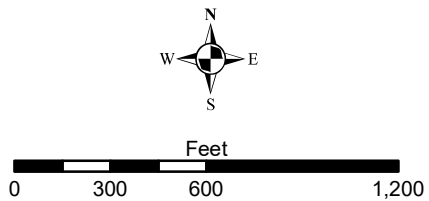
- EPA 2017. National Functional Guidelines for Inorganic Superfund Methods Data Review, EPA-540-R-201 7-001, January 2017.
- EPA 2010. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater from Monitoring Wells, EPASOP-GW 001, January 2010.
- EPA 1989. Risk Assessment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

FIGURES



Legend

MasterWells



HUNTER POWER PLANT

CCR Sample Locations

Job#: PERCM52

Date: 1/21/2019

Path: M:\PERC_CCR\Hunter\2018\Moly_53018.mxd, Author: jeprowse

FIGURE 1

ATTACHMENT A:

Field Summary Report – May 2019 Event

Facility Name: Hunter Power Plant – CCR Landfill
Event Description: Assessment Monitoring
Event Dates: May 8, 2019
Field Personnel: Mike Shirley

ACTIVITY SUMMARY. WET personnel arrived onsite May 8, 2019 and performed groundwater sampling at Hunter CCR Landfill. Prior to collecting samples, field instruments were calibrated, followed by the collection of water levels in the CCR monitoring wells. After recording water levels, the wells were purged in accordance with the EPA low-flow method. Field parameters were monitored during well purging in accordance with the site-specific sampling and analysis plan (SAP). Once field parameters met the SAP stabilization requirements, groundwater samples were collected for Appendix III and Appendix IV constituents. All calibration data and field measurements were recorded on the WET electronic field form. The wells that underwent sampling during this sampling event included:

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

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

- Date fieldwork completed: 5/8/2019
- Dates unvalidated lab data received: 6/12/2019
- Data validation completion date: 7/11/2019

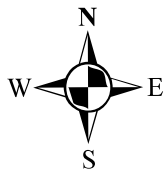
After collection, the samples were preserved in accordance with the SAP, placed on ice, chain of custody forms were completed, and the samples were transported to Energy Laboratories in Casper, WY for analysis. Samples arrived at American West Analytical Laboratories on 5/9/2019. The following information 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. None.

Attachment A:

Groundwater Contour Map



Feet

0 300 600 1,200 1,800 2,400



HUNTER POWER PLANT

Groundwater Elevation Map
CCR Landfill

Job#: PERCM053

Date: 8/12/2019

Path: M:\PERC_CCR\2019_CCR_Sampling\2019_CCR_GW_Contour Maps.mxd, Author: brutherford

Attachment 1

Attachment B:

Data Validation Summary

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Hunter 05/09/2019 Landfill	
Validator:	Tim Driscoll 06/13/2019	
Reviewer:	Pat Seccomb 06-28-19	
Laboratory:	American West Analytical Laboratories	
Laboratory Work Order#:	1905216	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix III: B, Ca, Cl, ¹ F, pH, SO ₄ , TDS	
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:	No	Lithium was recovered above the upper control limit in the matrix spike, resulting in J+ qualifications.
Overall Assessment:		
<p>Lithium was qualified J+ in the following samples due to a high matrix spike recovery:</p> <p>ELF-1D, ELF-2, ELF-3, ELF-4, ELF-5, ELF-6, ELF-7, ELF-8, ELF-9, ELF-10, ELF-11, ELF-12, ELF-13, ELF-14 and DUP.</p> <p>No other qualifications were assigned.</p>		

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Hunter Landfill 5/18/2019	
Validator:	Marcus Holland 7/11/2019	
Reviewer:	Pat Seccomb 7-16-19	
Laboratory:	American West Analytical Laboratories	
Laboratory Work Order#:	1905216	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix IV: Ra ²²⁶	
Review Element:	Complete / Criteria Met? (Yes/No)	If no, describe:
Chain of Custody:	Yes	Samples were subcontracted for analysis by AWAL to ALS. COCs had conflicting dates when compared to samples. Because all results were acquired within hold times, no actions were required.
Field Documentation:	Yes	
Holding Times & Sample Preservation:	Yes	ELF-3, ELF-6, ELF-10, ELF-12, and DUP had pH values out of range, but ≤ 4 upon receipt at the laboratory. ALS added additional acid to adjust the pH in accordance with the method, Functional Guidelines. No action was warranted.
Calibrations:	Yes	
Blanks:	Yes	
Laboratory Control Sample:	Yes	
Laboratory Duplicate:	Yes	
Matrix Spike:	Yes	
Overall Assessment:		
No qualifications were required.		

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Hunter Landfill 5/18/2019	
Validator:	Marcus Holland 7/11/2019	
Reviewer:	Pat Seccomb 07-16-19	
Laboratory:	American West Analytical Laboratories	
Laboratory Work Order#:	1905216	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix IV: Ra ²²⁸	
Review Element:	Complete / Criteria Met? (Yes/No)	If no, describe:
Chain of Custody:	Yes	Samples were subcontracted for analysis by AWAL to ALS. COCs had conflicting dates when compared to samples. Because all results were acquired within hold times, no actions were required.
Field Documentation:	Yes	
Holding Times & Sample Preservation:	Yes	ELF-3, ELF-6, ELF-10, ELF-12, and DUP had pH values out of range, but ≤ 4 upon receipt at the laboratory. ALS added additional acid to adjust the pH in accordance with the method, Functional Guidelines. No action was warranted.
Calibrations:	Yes	
Blanks:	Yes	
Laboratory Control Sample:	Yes	
Laboratory Duplicate:	Yes	
Matrix Spike:	Yes	
Overall Assessment:		
No qualifications were required.		

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Hunter 05/09/2019 Landfill	
Validator:	Tim Driscoll 06/13/2019	
Reviewer:	Pat Seccomb 06-28-19	
Laboratory:	American West Analytical Laboratories	
Laboratory Work Order#:	1905215	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix III: B, Ca, Cl, ¹ F, pH, SO ₄ , TDS	
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:
Statistical Analysis

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1.0 INTRODUCTION

This appendix contains a statistical analysis of the data collected from the groundwater monitoring wells associated with the CCR Landfill at the Hunter Power Plant in Castle Dale, Utah. Methods used to compare upgradient with downgradient wells vary depending on the characteristics of the upgradient well data. Upgradient well data were analyzed for outliers, normality, non-detects, and other characteristics that affect the comparison measures. A comprehensive statistical analysis is presented 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 been impacted by the CCR Landfill. 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 CCR Landfill.

2.1.1 Mean

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

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

Where:

\bar{x} = mean

n = number of observations

x_i = i^{th} observation.

2.1.2 Standard Deviation

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

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

Where:

s = standard deviation

n = number of observations

x_i = i^{th} observation

\bar{x} = mean of the observations.

2.1.3 Coefficient of Variance

The coefficient of variance (CV) is a relative measure of variation in the sample data which expresses the standard deviation relative to the mean. The CV is expressed as a percentage and provides a direct comparison to the standard deviations of two different data sets. It is important to note the mean of the data may be very close to or very far away from zero and the spread may be independent of the distance from the mean to zero. Therefore, no firm guidelines have been established for interpreting the CV. The CV was calculated for each detected analyte in each data grouping using Equation (3):

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

Where:

s = standard deviation

\bar{X} = mean of the observations

2.1.4 Quartiles and the Five Number Summary

The five-number summary is a set of five numbers that are used to assess the spread of the data. It consists of the minimum value, first quartile, median, third quartile, and maximum of the data value. The first quartile is the 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 CCR Landfill, 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 largest MDL on the graph. Figure C.1 below is a histogram of fluoride data for the upgradient wells for the CCR Landfill. It is provided here to illustrate data distribution using a histogram. All of the histograms used to examine the analytes from the CCR Landfill upgradient well data, are provided in at the end of this appendix in Figure C.3.

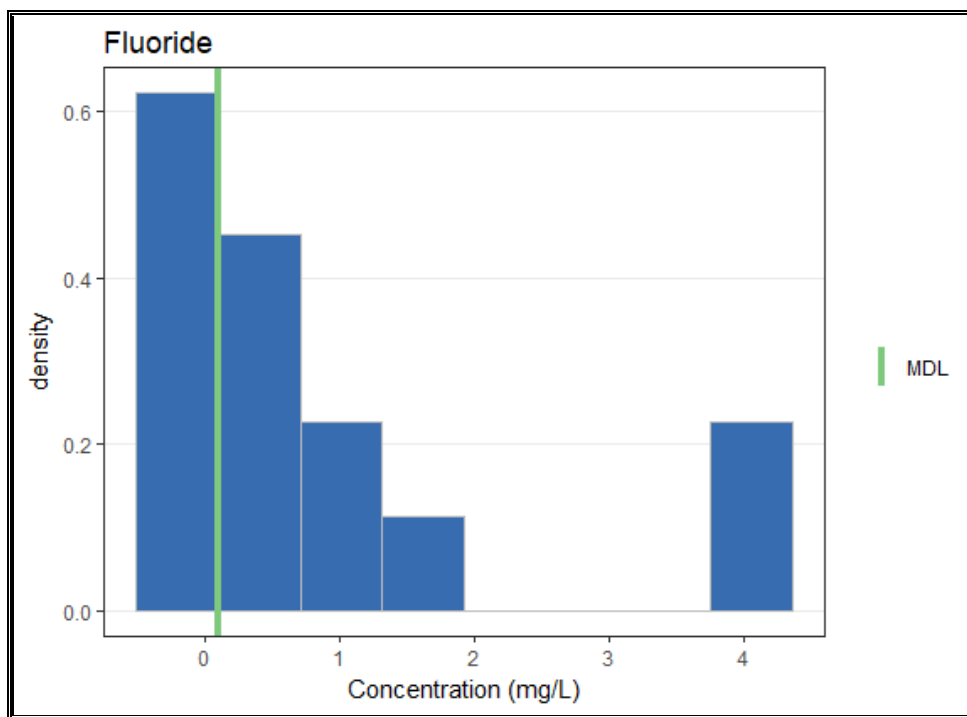


Figure C.1. Histogram of fluoride data from the CCR Landfill upgradient wells.

2.2.2 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 fluoride data points used to develop the Figure C.1. Several of the points fall outside of the gray region. This indicates that the data are not normally distributed. All of the normal-quantile plots used to examine the CCR Landfill upgradient well data are provided at the end of this appendix in Figure C.3.

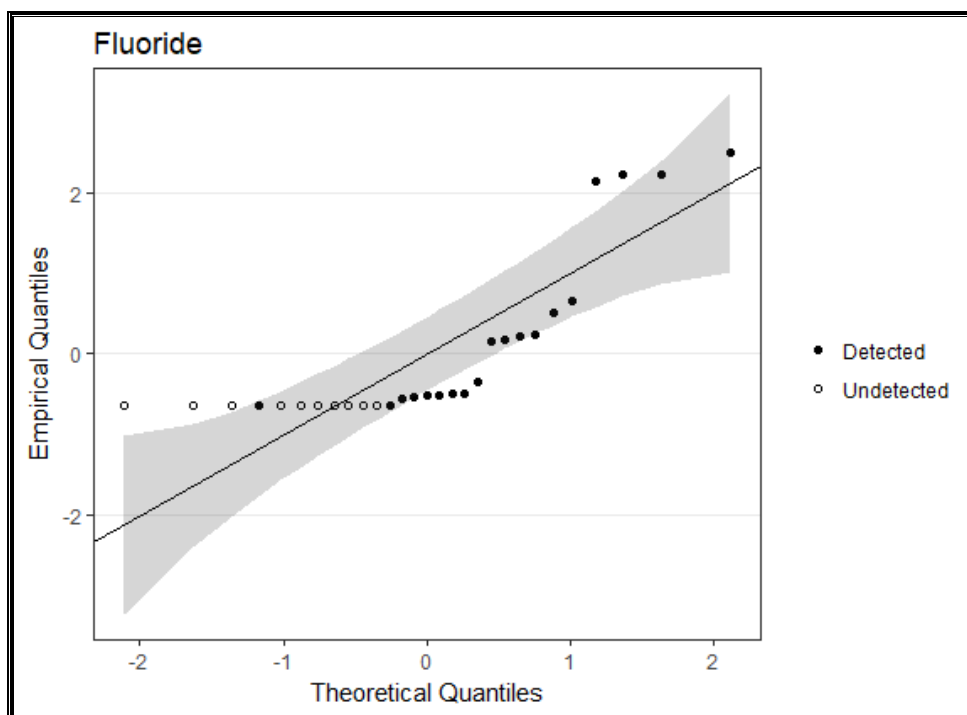


Figure C.2. Normal quantile plot of fluoride data the CCR Landfill upgradient wells

2.2.3 Outliers

Outliers are data points that are notably larger or smaller than the rest of the data set and may indicate a problem with the data point or the data set as a whole. Examples which may be indicative of outliers include: 1) a misreported or erroneous concentration, 2) analytical error(s), or 3) natural variations in groundwater concentrations. Outliers are generally not omitted from project data simply because they are outliers. Rather, the result is examined individually or by project, to ensure the outlier does not represent an erroneous result or another concern warranting

either additional sampling or omission of the outlier from the data analysis. There are reasonable situations when it is appropriate to remove outliers. For example, if outliers which represent exceedingly low concentrations are used to compute background concentrations, they may result in background levels which are too conservative. Conversely, use of excessively high outlier concentrations to compute background values, may result in an overestimation of background concentrations resulting in false-negative comparisons for downgradient groundwater quality. Outliers were detected in the cadmium, lead, and radium data CCR Landfill data. However, none of the outliers are extreme enough to warrant removal from 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. The arsenic, cadmium, chromium, cobalt, and lead data have more than 50% non-detects. Antimony, beryllium, mercury, and thallium were not detected in any of the samples. Thus, statistical analysis cannot be done for those analytes. The fluoride and selenium data have more than 15% non-detects, but more than half of the data are detected. As a result, Kaplan-Meier was used to compute means, standard deviations, and statistical limits used to compare the upgradient downgradient water quality for fluoride and selenium.

2.3 Summary Results

Table C.1 provides summary statistics for the CCR Landfill upgradient well data. Although the data from the upgradient wells were combined when compared to the downgradient wells, the summary statistics presented in this section are separated by well and are presented as pooled data. The data are presented in this way, due to observed differences between the different wells for many of the analytes. These tables in conjunction with the histograms and normal-quantile plots, provide information about differences between wells and the data properties of the combined data. Analytes that were not detected in any upgradient well samples are not listed in Table C.1.

Table C.1. Summary statistics for the CCR Landfill upgradient wells

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Arsenic	ELF-10	11	3	NA	NA	NA	NA
Arsenic	ELF-1D	2	0	NA	NA	NA	NA
Arsenic	ELF-2	13	0	NA	NA	NA	NA
Arsenic	ELF-9	11	11	0.007	0.008	0.002	31%
Arsenic	Pooled	37	14	NA	NA	NA	NA
Barium	ELF-10	11	11	0.039	0.045	0.021	46%
Barium	ELF-1D	2	2	NA	NA	NA	NA
Barium	ELF-2	13	12	0.010	0.012	0.003	30%
Barium	ELF-9	11	11	0.035	0.048	0.034	72%
Barium	Pooled	37	36	0.019	0.032	0.027	85%
Boron	ELF-10	10	10	1.63	1.68	0.18	11%
Boron	ELF-1D	1	1	NA	NA	NA	NA
Boron	ELF-2	12	12	3.32	3.36	0.19	6%
Boron	ELF-9	10	9	1.39	1.47	0.20	13%
Boron	Pooled	33	32	1.73	2.27	0.90	40%
Cadmium	ELF-10	11	6	0.0005	0.0006	0.0002	31%
Cadmium	ELF-1D	2	0	NA	NA	NA	NA
Cadmium	ELF-2	13	0	NA	NA	NA	NA
Cadmium	ELF-9	11	1	NA	NA	NA	NA
Cadmium	Pooled	37	7	NA	NA	NA	NA
Calcium	ELF-10	10	10	475	480	31	6%
Calcium	ELF-1D	1	1	NA	NA	NA	NA
Calcium	ELF-2	12	12	407	403	22	6%
Calcium	ELF-9	10	10	62	80	36	45%
Calcium	Pooled	33	33	404	328	171	52%
Chloride	ELF-10	10	10	7340	7515	1141	15%
Chloride	ELF-1D	1	1	NA	NA	NA	NA
Chloride	ELF-2	12	12	445	410	88	21%
Chloride	ELF-9	10	10	375	384	81	21%
Chloride	Pooled	33	33	461	2751	3435	125%
Chromium	ELF-10	11	8	0.005	0.005	0.004	84%
Chromium	ELF-1D	2	1	NA	NA	NA	NA
Chromium	ELF-2	13	2	NA	NA	NA	NA
Chromium	ELF-9	11	7	0.005	0.009	0.007	78%
Chromium	Pooled	37	18	NA	NA	NA	NA

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Cobalt	ELF-10	11	8	0.004	0.005	0.001	29%
Cobalt	ELF-1D	2	1	NA	NA	NA	NA
Cobalt	ELF-2	13	7	0.01	0.01	0.00	31%
Cobalt	ELF-9	11	2	NA	NA	NA	NA
Cobalt	Pooled	37	18		0.01	0.00	31%
Fluoride	ELF-10	10	5		1.8	2.1	118%
Fluoride	ELF-1D	1	0	NA	NA	NA	NA
Fluoride	ELF-2	12	7	0.1	0.2	0.13	71%
Fluoride	ELF-9	10	9	1.2	1.1	0.59	56%
Fluoride	Pooled	33	21	0.3	0.9	1.3	145%
Lead	ELF-10	11	6	0.002	0.003	0.003	90%
Lead	ELF-1D	2	0	NA	NA	NA	NA
Lead	ELF-2	13	1	NA	NA	NA	NA
Lead	ELF-9	11	4	NA	NA	NA	NA
Lead	Pooled	37	11	NA	NA	NA	NA
Lithium	ELF-10	11	11	2.09	2.30	1.14	50%
Lithium	ELF-1D	2	2	2.16	2.16	0.06	3%
Lithium	ELF-2	13	13	1.76	2.58	1.29	50%
Lithium	ELF-9	11	11	0.80	1.07	0.53	50%
Lithium	Pooled	37	37	1.75	2.02	1.19	59%
Molybdenum	ELF-10	11	11	0.087	0.092	0.028	30%
Molybdenum	ELF-1D	2	2	0.019	0.019	0.003	16%
Molybdenum	ELF-2	13	13	0.003	0.003	0.001	20%
Molybdenum	ELF-9	11	11	0.122	0.122	0.017	14%
Molybdenum	Pooled	37	37	0.080	0.066	0.055	83%
pH	ELF-10	10	10	7.18	7.26	0.42	6%
pH	ELF-1D	1	1	NA	NA	NA	NA
pH	ELF-2	12	12	7.22	7.27	0.17	2%
pH	ELF-9	10	10	7.94	7.93	0.10	1%
pH	Pooled	33	33	7.28	7.46	0.41	5%
Radium	ELF-10	11	11	2.47	3.29	3.76	114%
Radium	ELF-1D	2	2	NA	NA	NA	NA
Radium	ELF-2	13	13	1.25	1.94	1.98	102%
Radium	ELF-9	11	11	1.34	1.42	0.66	46%
Radium	Pooled	37	37	1.38	2.19	2.44	112%

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Selenium	ELF-10	11	8	NA	NA	NA	NA
Selenium	ELF-1D	2	0	NA	NA	NA	NA
Selenium	ELF-2	13	13	0.45	0.36	0.20	54%
Selenium	ELF-9	11	1	NA	NA	NA	NA
Selenium	Pooled	37	22	NA	NA	NA	NA
Sulfate	ELF-10	10	10	18300	16730	4128	25%
Sulfate	ELF-1D	1	1	NA	NA	NA	NA
Sulfate	ELF-2	12	12	7950	7696	692	9%
Sulfate	ELF-9	10	10	6610	6472	811	13%
Sulfate	Pooled	33	33	7950	10064	5033	50%
TDS	ELF-10	10	10	38300	38070	1782	5%
TDS	ELF-1D	1	1	NA	NA	NA	NA
TDS	ELF-2	12	12	11850	11842	403	3%
TDS	ELF-9	10	10	10550	10832	878	8%
TDS	Pooled	33	33	12000	19937	12485	63%

Table C.2 provides the five-number summaries for the CCR Landfill upgradient wells. As with the summary statistics, a five-number summary was computed for each well as well as for the pooled data. If a minimum or a quartile falls within the range of non-detects it is denoted using a less-than (<) symbol. Analytes that were not detected in any of the upgradient well samples are not listed in Table C.2.

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

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Arsenic	ELF-10	<0.002	<0.002	<0.002	0.002	0.009
Arsenic	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	ELF-2	<0.001	<0.002	<0.002	<0.002	<0.002
Arsenic	ELF-9	0.005	0.006	0.007	0.009	0.012
Arsenic	Pooled	<0.001	<0.002	<0.002	0.005	0.012
Barium	ELF-10	0.0184	0.0317	0.0391	0.0560	0.0863
Barium	ELF-1D	0.0085	0.0085	0.0094	0.0103	0.0103
Barium	ELF-2	<0.00849	0.0095	0.0113	0.0128	0.0500
Barium	ELF-9	0.0126	0.0177	0.0348	0.0781	0.1020
Barium	Pooled	<0.00846	0.0119	0.0205	0.0500	0.1020

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Boron	ELF-10	1.48	1.56	1.63	1.73	2.12
Boron	ELF-1D	2.23	2.23	2.23	2.23	2.23
Boron	ELF-2	3.11	3.25	3.32	3.49	3.77
Boron	ELF-9	<1.3	1.35	1.45	1.61	5.00
Boron	Pooled	<1.3	1.56	1.84	3.27	5.00
Cadmium	ELF-10	<0.0005	<0.0005	0.0005	0.0006	0.0011
Cadmium	ELF-1D	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cadmium	ELF-2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0010
Cadmium	ELF-9	<0.0005	<0.0005	<0.0005	<0.0005	0.0005
Cadmium	Pooled	<0.0005	<0.0005	<0.0005	<0.0005	0.0011
Calcium	ELF-10	445	457	475	500	543
Calcium	ELF-1D	377	377	377	377	377
Calcium	ELF-2	364	388	407	420	430
Calcium	ELF-9	52.7	57.2	62.5	91.9	166
Calcium	Pooled	52.7	112	404	446	543
Chloride	ELF-10	5710	6960	7340	7670	9900
Chloride	ELF-1D	6880	6880	6880	6880	6880
Chloride	ELF-2	222	396.5	445	465	473
Chloride	ELF-9	282	316	375	446	527
Chloride	Pooled	222	391	461	6880	9900
Chromium	ELF-10	<0.002	<0.002	0.005	0.006	0.016
Chromium	ELF-1D	<0.002	<0.002	<0.002	0.002	0.002
Chromium	ELF-2	<0.001	<0.002	<0.002	<0.002	0.011
Chromium	ELF-9	<0.002	<0.002	0.005	0.015	0.020
Chromium	Pooled	<0.001	<0.002	<0.002	0.006	0.020
Cobalt	ELF-10	<0.004	<0.004	0.0044	0.0055	0.0079
Cobalt	ELF-1D	<0.004	<0.004	<0.005	0.0054	0.0054
Cobalt	ELF-2	<0.004	<0.004	0.0050	0.0060	0.0114
Cobalt	ELF-9	<0.004	<0.004	<0.004	<0.004	0.0052
Cobalt	Pooled	<0.004	<0.004	<0.004	0.0055	0.0114
Fluoride	ELF-10	<0.1	<0.1	<0.172	3.97	4.36
Fluoride	ELF-1D	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	ELF-2	<0.1	<0.1	0.102	0.288	0.500
Fluoride	ELF-9	<0.1	0.276	1.23	1.43	1.84
Fluoride	Pooled	<0.1	<0.1	0.26	1.27	4.36
Lead	ELF-10	<0.002	<0.002	0.0022	0.0031	0.012

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Lead	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Lead	ELF-2	<0.001	<0.002	<0.002	<0.002	0.0020
Lead	ELF-9	<0.002	<0.002	<0.002	0.0046	0.0077
Lead	Pooled	<0.001	<0.002	<0.002	0.0022	0.012
Lithium	ELF-10	0.841	1.65	2.09	2.85	4.59
Lithium	ELF-1D	2.12	2.12	2.16	2.20	2.20
Lithium	ELF-2	1.34	1.54	1.76	3.93	4.93
Lithium	ELF-9	0.724	0.754	0.801	1.08	2.48
Lithium	Pooled	0.724	1.100	1.75	2.20	4.93
Molybdenum	ELF-10	0.0516	0.0707	0.0871	0.1165	0.1240
Molybdenum	ELF-1D	0.0165	0.0165	0.0186	0.0207	0.0207
Molybdenum	ELF-2	0.0026	0.0030	0.0031	0.0038	0.0051
Molybdenum	ELF-9	0.0983	0.1110	0.1220	0.1280	0.1580
Molybdenum	Pooled	0.0026	0.0038	0.0795	0.1170	0.1580
pH	ELF-10	6.88	7.00	7.18	7.28	8.37
pH	ELF-1D	7.02	7.02	7.02	7.02	7.02
pH	ELF-2	7.12	7.17	7.22	7.30	7.76
pH	ELF-9	7.75	7.86	7.94	8.03	8.06
pH	Pooled	6.88	7.16	7.28	7.86	8.37
Radium	ELF-10	0.46	1.67	2.47	3.26	14.2
Radium	ELF-1D	1.23	1.23	1.93	2.63	2.63
Radium	ELF-2	0.61	0.85	1.25	2.29	8.10
Radium	ELF-9	0.64	0.92	1.34	1.88	2.60
Radium	Pooled	0.46	0.94	1.38	2.47	14.2
Selenium	ELF-10	<0.002	<0.005	0.011	0.152	0.410
Selenium	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Selenium	ELF-2	0.0319	0.198	0.450	0.499	0.608
Selenium	ELF-9	<0.002	<0.002	<0.002	<0.002	0.004
Selenium	Pooled	<0.002	<0.002	0.011	0.366	0.608
Sulfate	ELF-10	10000	13100	18300	19900	20700
Sulfate	ELF-1D	7730	7730	7730	7730	7730
Sulfate	ELF-2	6030	7270	7950	8165	8370
Sulfate	ELF-9	5460	5750	6610	6900	8030
Sulfate	Pooled	5460	6900	7950	10300	20700
TDS	ELF-10	35200	37200	38300	39600	40300
TDS	ELF-1D	26800	26800	26800	26800	26800

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
TDS	ELF-2	11300	11450	11850	12250	12400
TDS	ELF-9	9420	10300	10550	11900	12000
TDS	Pooled	9420	11400	12000	35300	40300

3.0 UPGRAIDENT AND DOWNGRAIDENT WELL COMPARISON

Groundwater quality was assessed using upper tolerance limits (UTLs) and the Maximum Contaminant Levels (MCL) for each of the Appendix III and IV analytes. The data measured from the upgradient/background wells, 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 outliers are present in the cadmium, lead, and radium data. The Shapiro-Wilk test was used to assess normality in conjunction with the normal quantile plots. If the p-value associated with the test was greater than or equal to 0.05, the data are considered normally distributed and a parametric UTL was computed using the upgradient measurements. If the p-value is less than 0.05, then the maximum detectable value was used as the UTL.

Note: The 0.05 p-value is not a hard and fast rule. Parametric UTLs were computed for analytes whose p-values were 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 detects. An appropriate transformation was found for calcium, lithium, and radium. Non-parametric UTLs were computed for all of the analytes except for calcium, lithium, and radium.

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

Analyte	Well	W-Statistic	P-Value	Normal
Barium	Pooled	0.8284	0.0001	Not Normal
Boron	Pooled	0.8396	0.0002	Not Normal
Calcium	Pooled	0.7948	<0.0001	Not Normal
Calcium Cubed	Pooled	0.9122	0.0112	Normal
Chloride	Pooled	0.6771	<0.0001	Not Normal
Fluoride	Pooled	0.6586	<0.0001	Not Normal
Lithium	Pooled	0.8742	0.0006	Not Normal
Square Root of Lithium	Pooled	0.9240	0.0147	Normal
Molybdenum	Pooled	0.8334	0.0001	Not Normal
pH	Pooled	0.8868	0.0025	Not Normal
Radium	Pooled	0.5598	<0.0001	Not Normal
LN of Radium	Pooled	0.9469	0.0769	Normal
Selenium	Pooled	0.7491	<0.0001	Not Normal
Sulfate	Pooled	0.7417	<0.0001	Not Normal

Analyte	Well	W-Statistic	P-Value	Normal
TDS	Pooled	0.6812	<0.0001	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 larger MDL and maximum detected value was used as the UTL.
- If all of the upgradient samples were non-detects, the largest MDL was used as the UTL.
- The larger of the MCL and the UTL was used as the 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 gray 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, boron, calcium, cobalt, lithium, molybdenum, 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). UTL plots are not provided for analytes that were not detected in any downgradient samples.

Table C.4A. Appendix III, comparison of downgradient wells to background.

Analyte	Background Upper Tolerance Limit (mg/L)	Downgradient Wells Exceeding Background
Boron	5.0	ELF-11, ELF-5, ELF-6, ELF-8
Calcium	544	ELF-8
Chloride	9,900	Within Limit
Fluoride	4.36	Within Limit
pH Basic Range	8.37	Within Limit
pH Acidic Range	6.99	Within Limit
Sulfate	20,700	ELF-3
TDS	40,300	ELF-3

Table C.4B. Appendix IV, comparison of downgradient wells to background.

Analyte	Background Upper Tolerance Limit (mg/L)	MCL (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells Exceeding the Groundwater Protection Standard
Antimony	0.004	0.006	0.006	Within Limit
Arsenic	0.012	0.01	0.012	Within Limit
Barium	0.10	2.00	2.00	Within Limit
Beryllium	0.002	0.004	0.004	Within Limit
Cadmium	0.001	0.005	0.005	Within Limit
Chromium	0.020	0.1	0.1	Within Limit
Cobalt	0.011	0.006	0.011	ELF-11, ELF-3, ELF-6, ELF-8
Fluoride	4.36	4	4.36	Within Limit
Lead	0.012	0.015	0.015	Within Limit
Lithium	4.94	0.04	4.94	ELF-6
Mercury	0.0002	0.002	0.002	Within Limit
Molybdenum	0.16	0.1	0.16	ELF-8
Radium	7.62	5.0	7.62	Within Limit
Selenium	0.61	0.05	0.61	Within Limit
Thallium	0.002	0.002	0.002	Within Limit

4.0 CONCLUSIONS

Groundwater data was collected from CCR Landfill monitoring network on the Hunter Power Plant. A comprehensive data analysis was completed on the upgradient wells to ensure that comparisons between upgradient and downgradient wells were done correctly. Statistically significant increases above background were noted for Appendix III constituents: boron, calcium, sulfate, and TDS. Appendix IV constituents, cobalt, lithium, and molybdenum exceeded their groundwater protection standards in wells downgradient of the CCR Landfill.

5.0 REFERENCES

EPA, 2009, “Statistical Analysis Of Groundwater Monitoring Data At RCRA Facilities Unified Guidance,” EPA 530/R-09-007, U.S. Environmental Protection Agency, March 2009.

Helsel, Dennis, 2004, *Nondetects and Data Analysis: Statistic for Censored Environmental Data*, New York: Wiley Interscience.

R Core Team, 2018, *R: A Language and Environment for Statistical Computing*, <https://www.R-project.org>, R Foundation for Statistical Computing, Vienna, Austria.

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

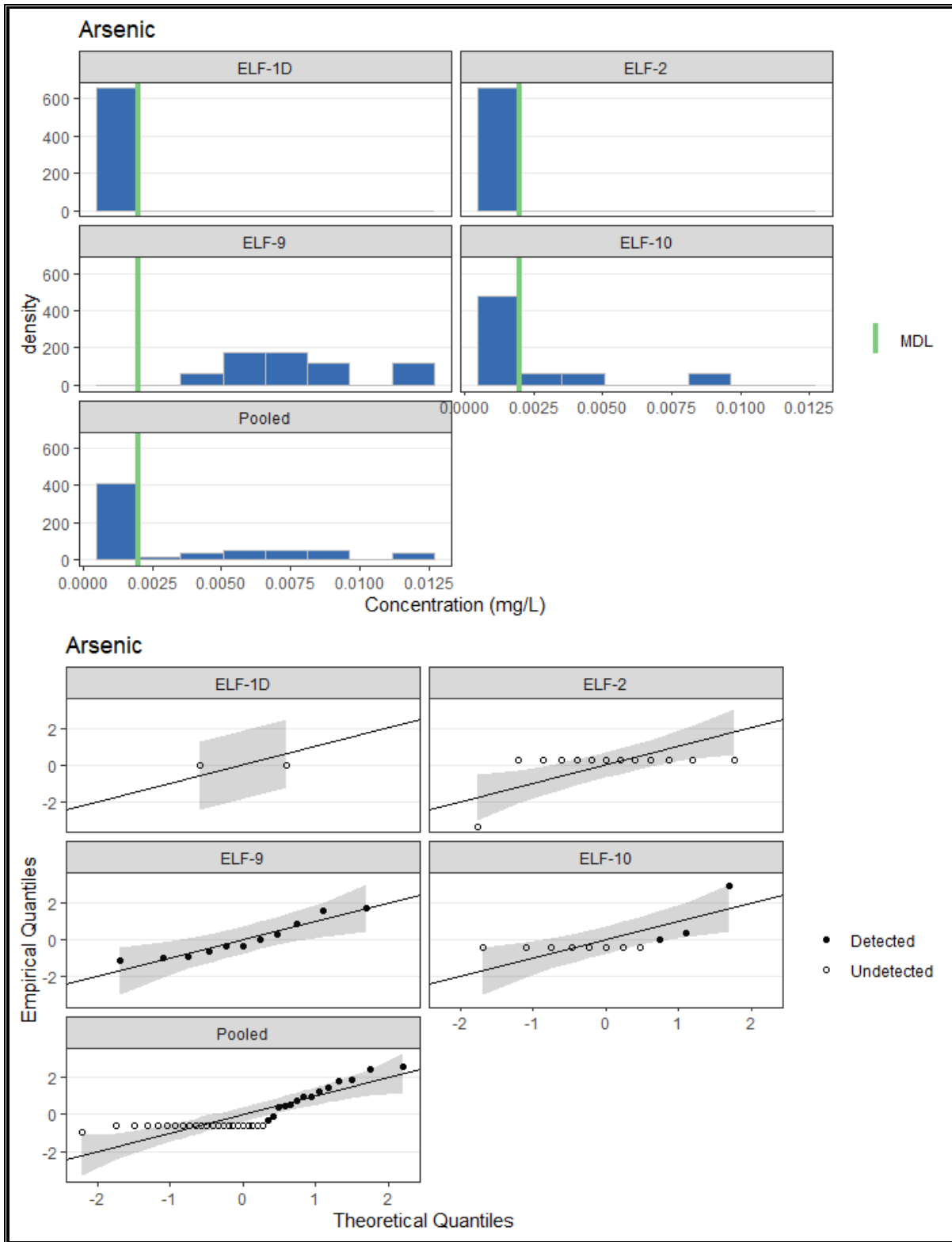


Figure C.3. Summary statistics plots for the CCR Landfill.

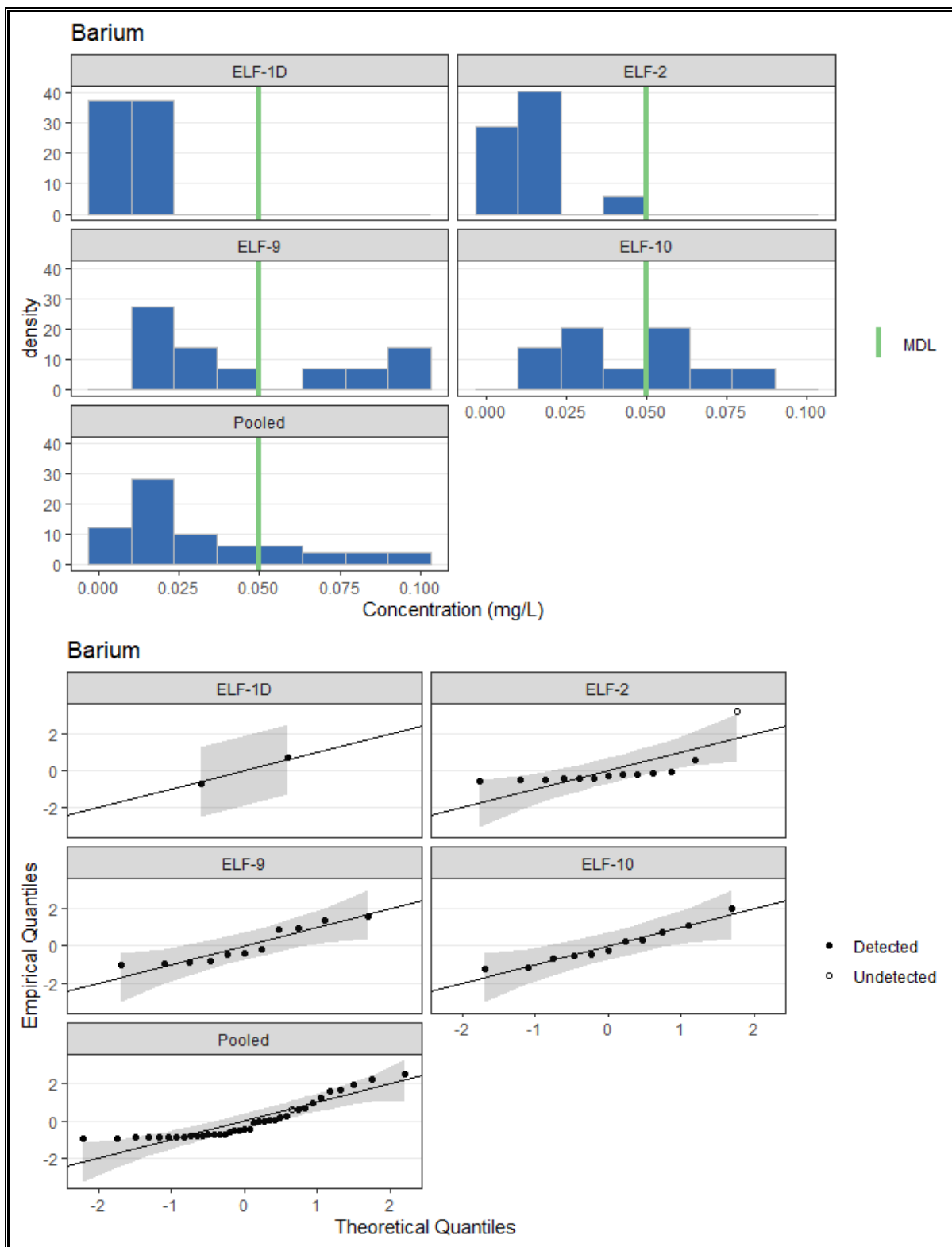


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

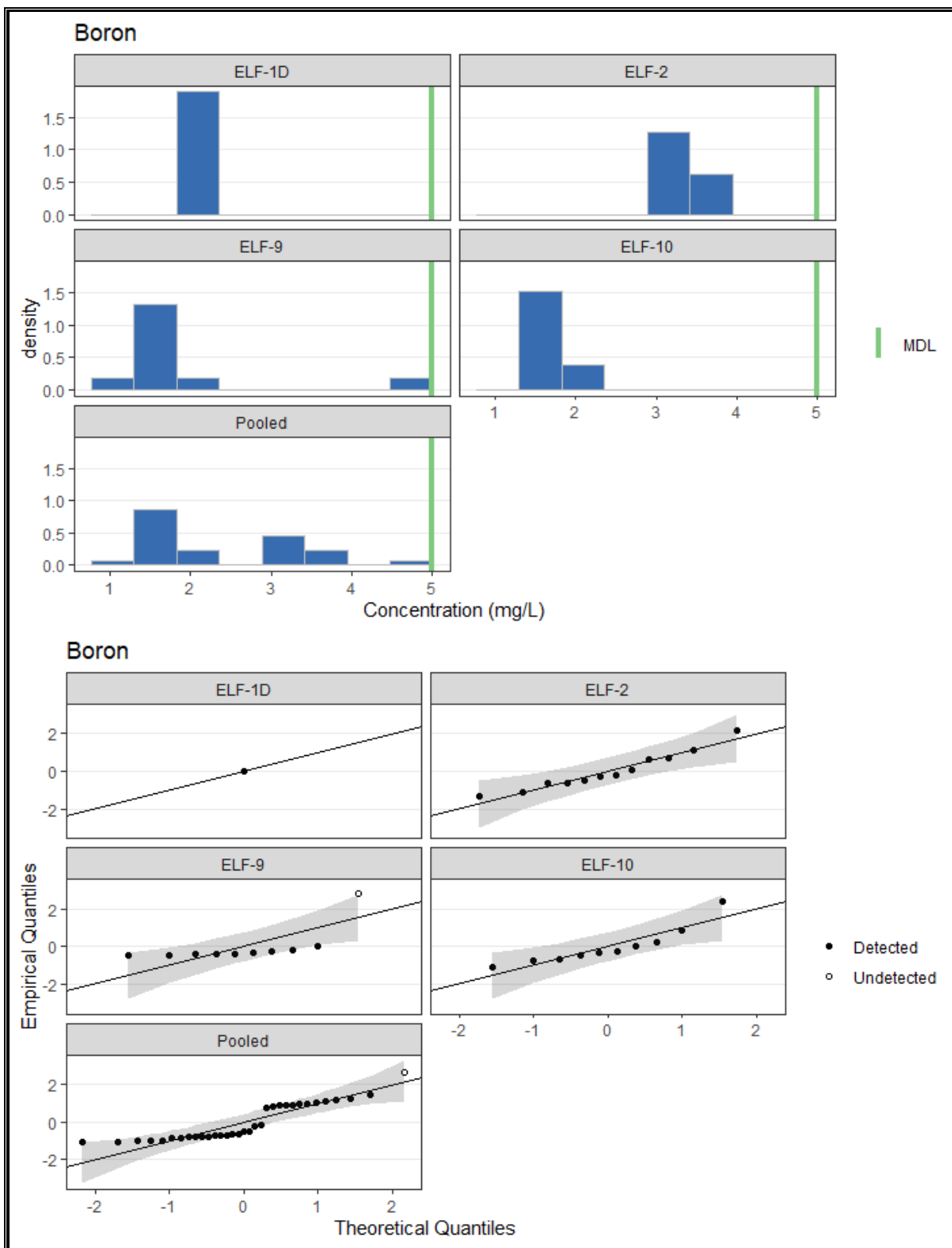


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

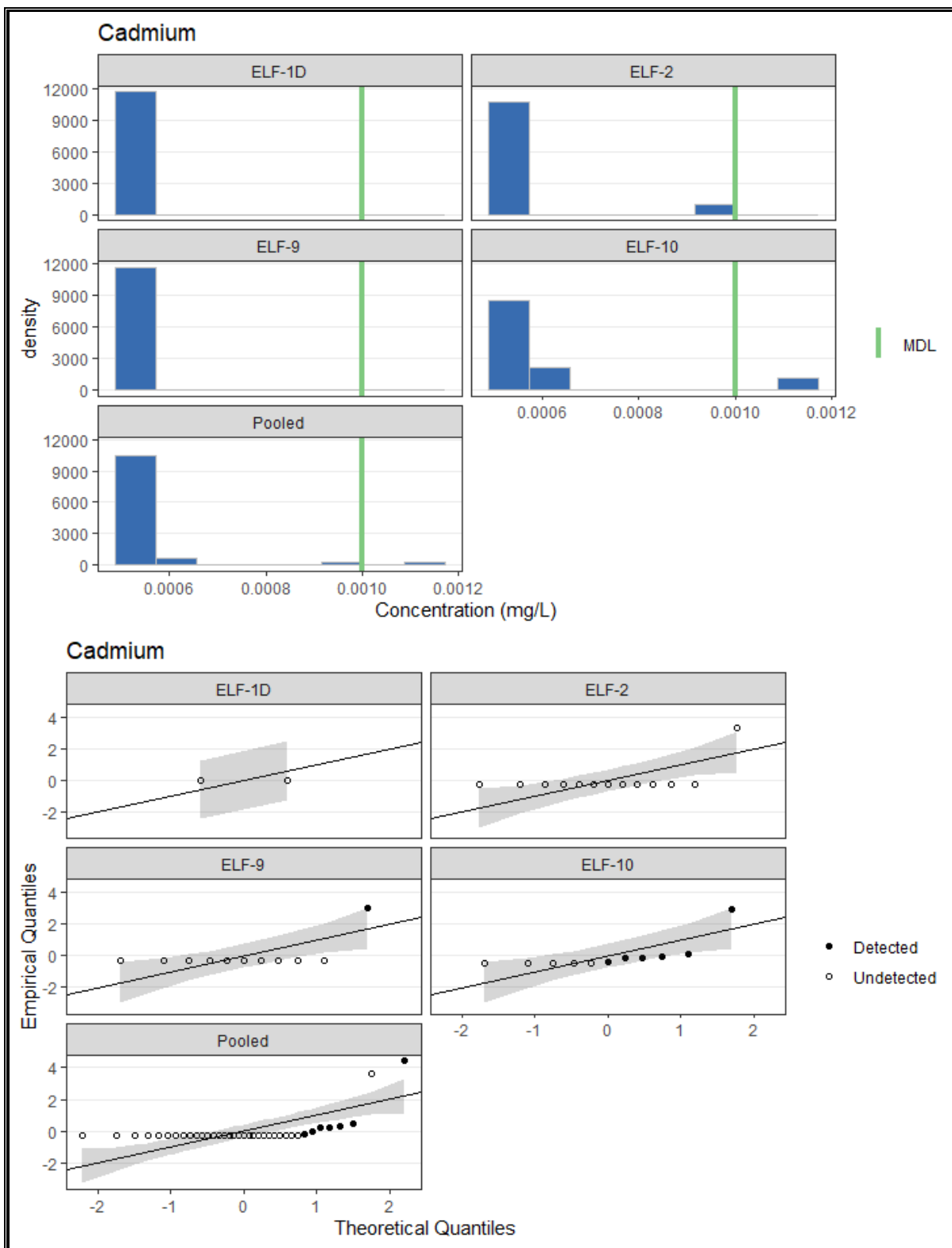


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

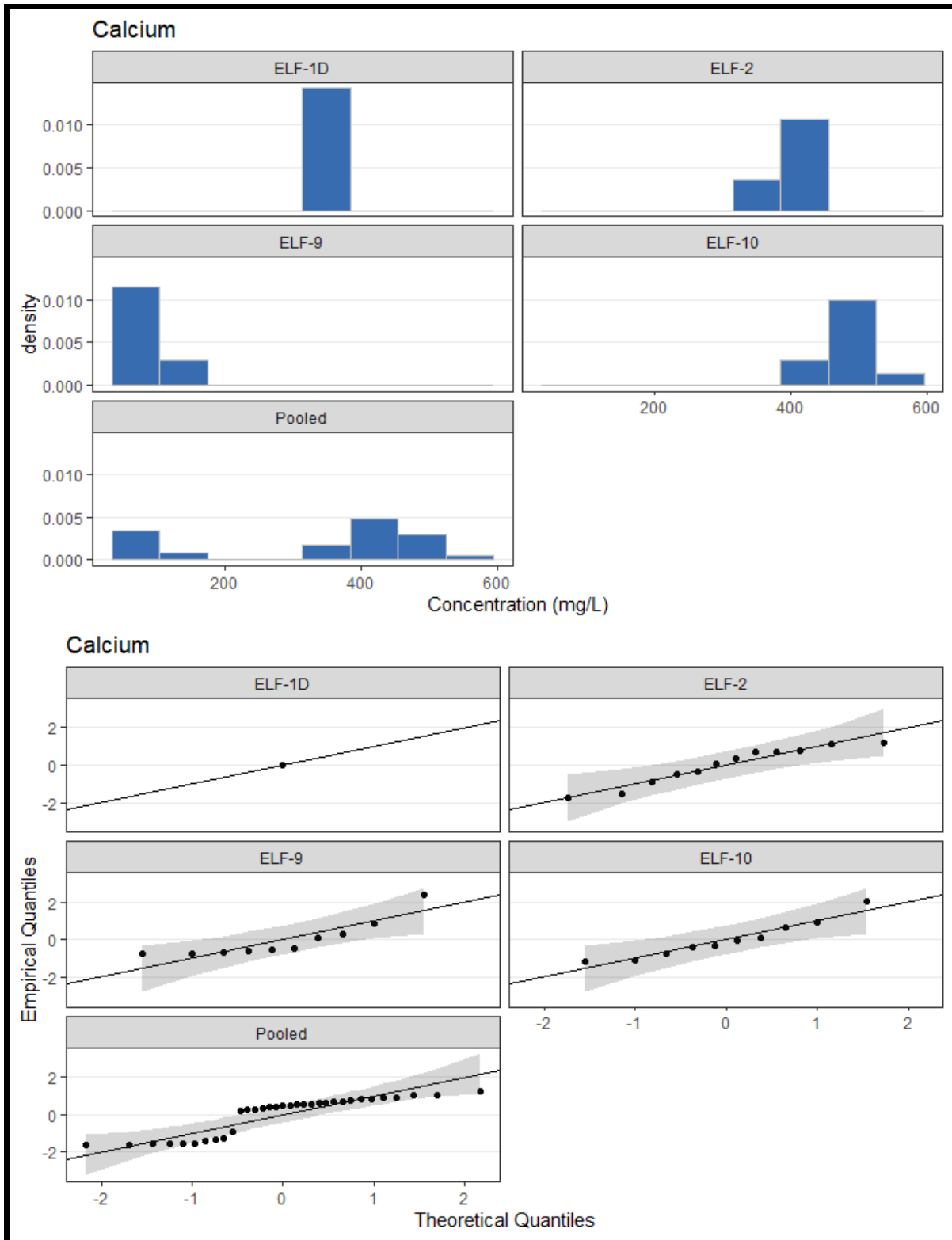


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

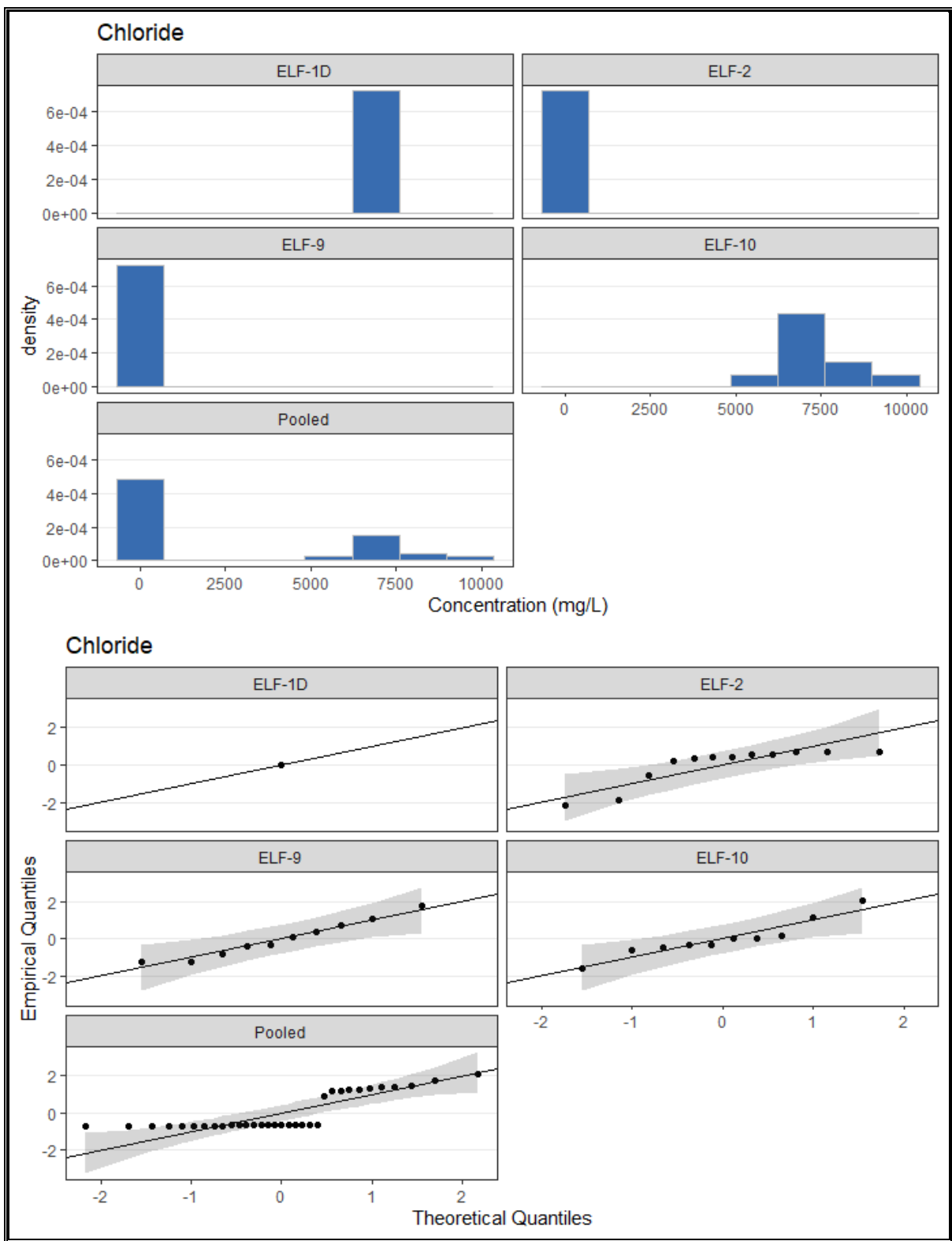


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

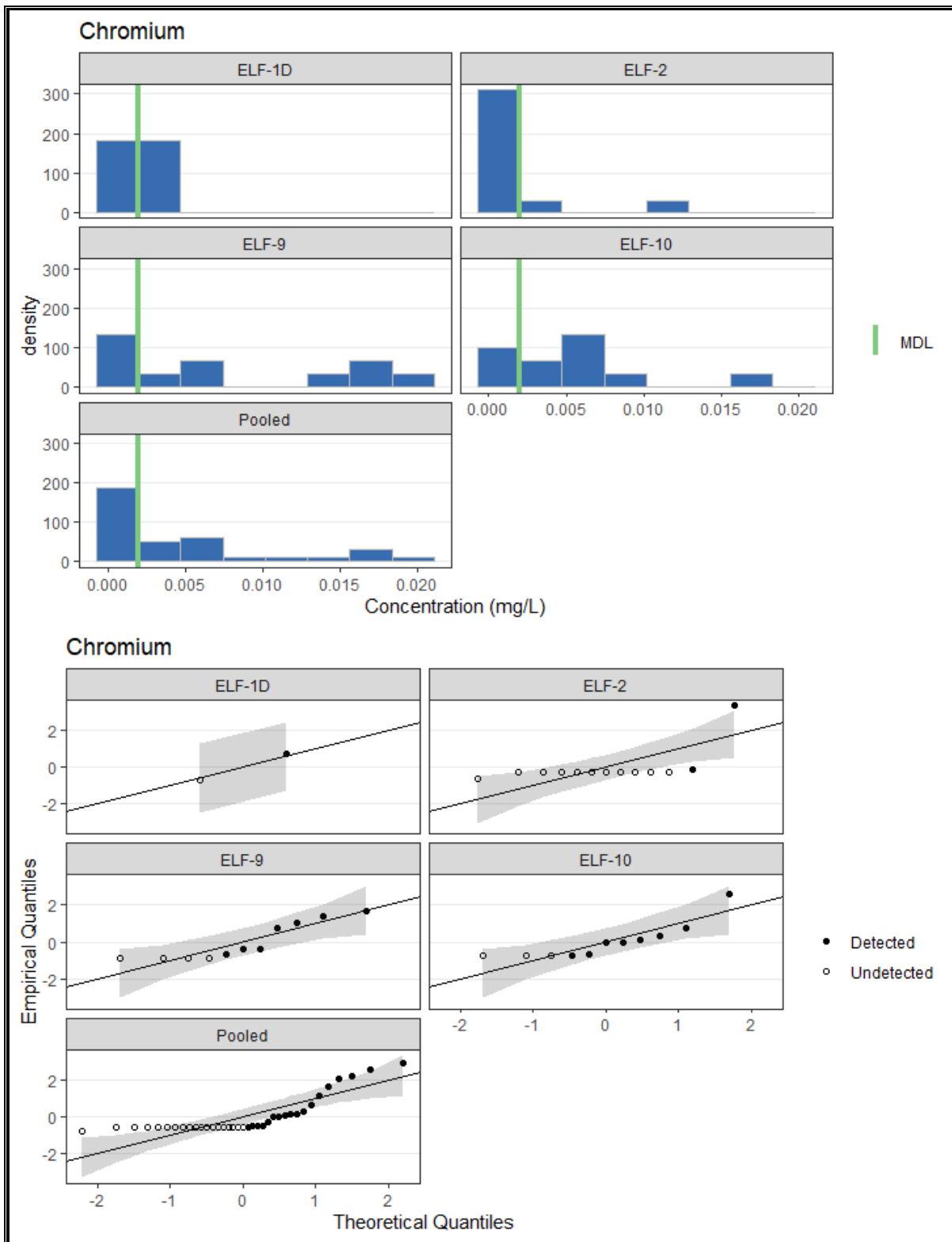


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

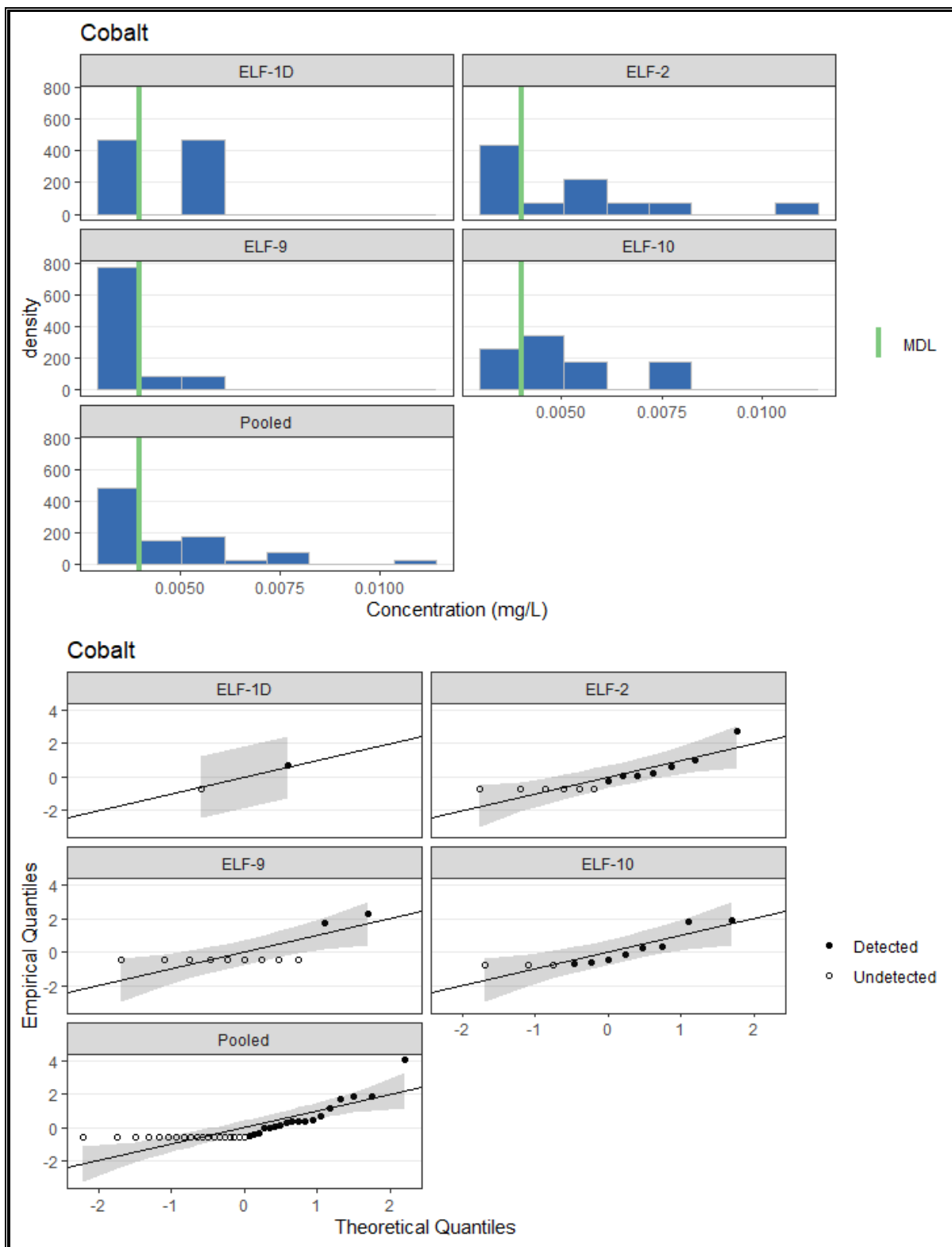


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

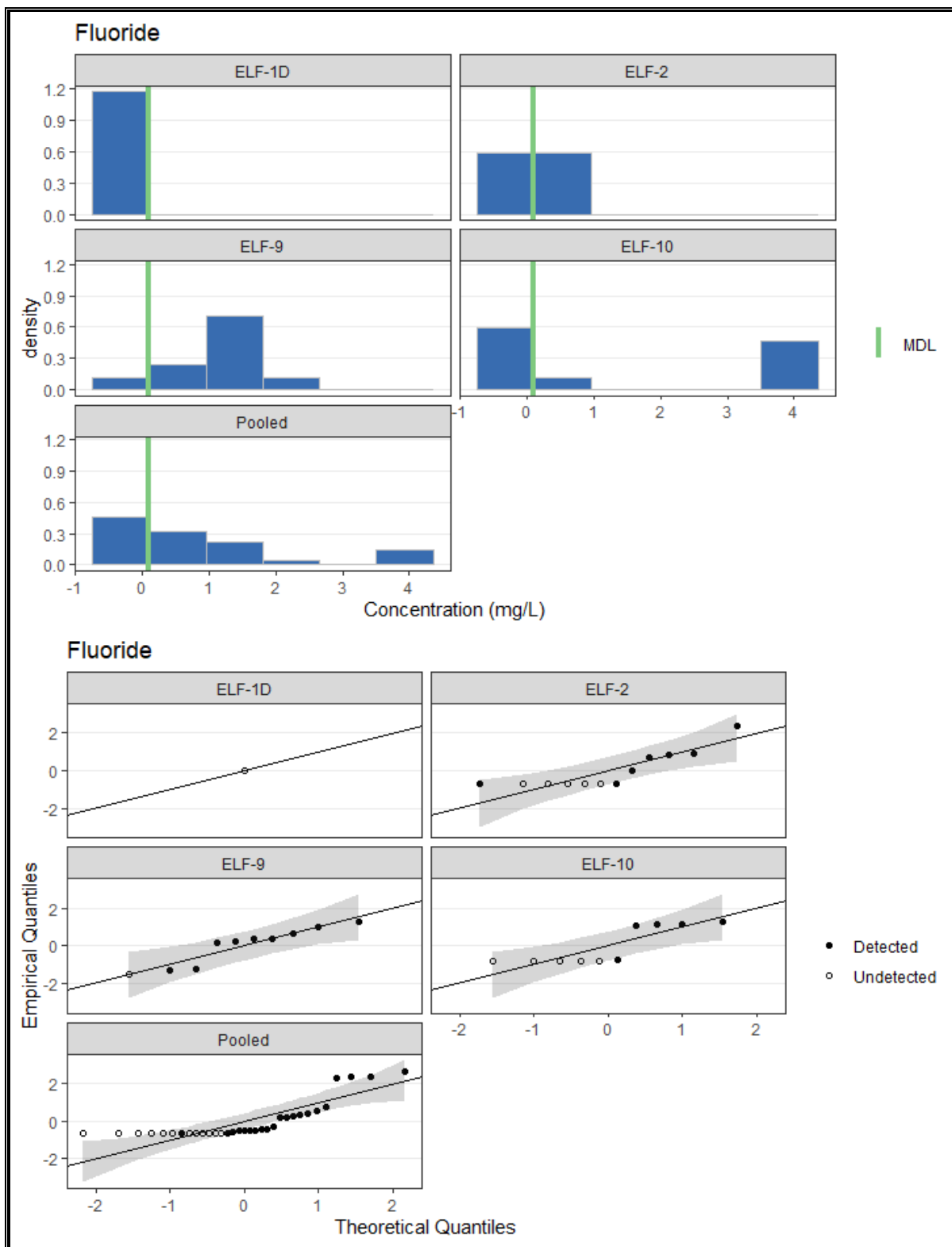


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

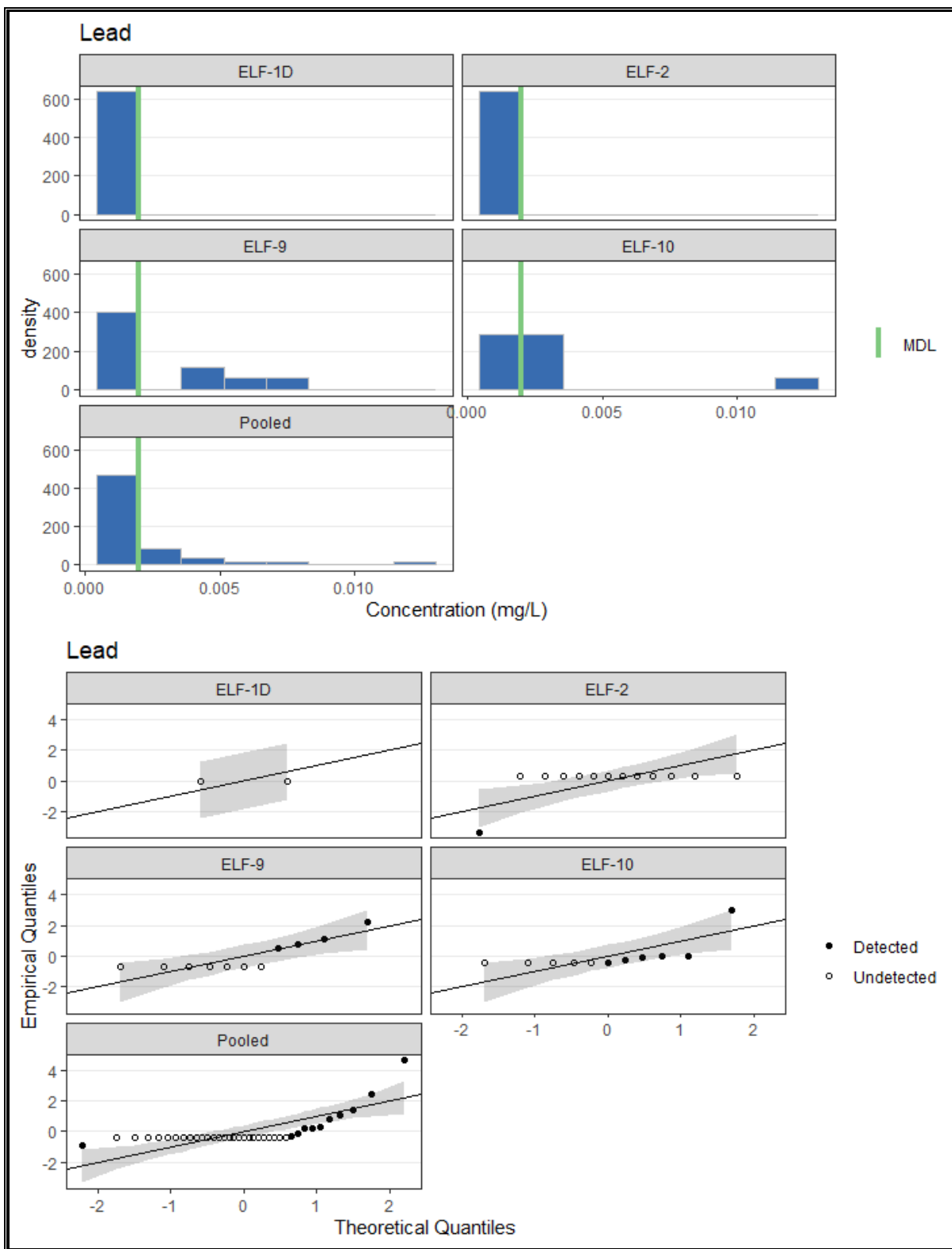


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

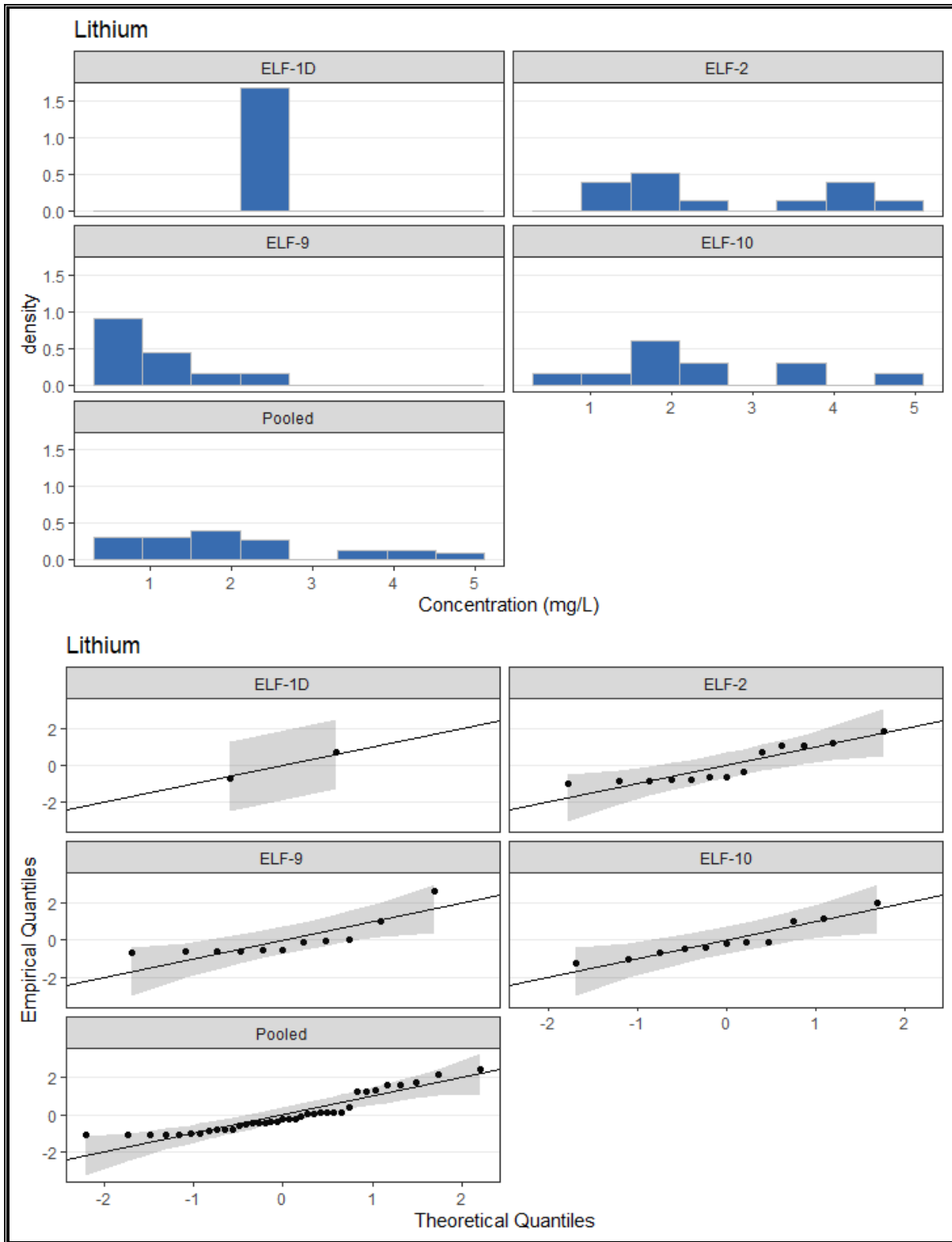


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

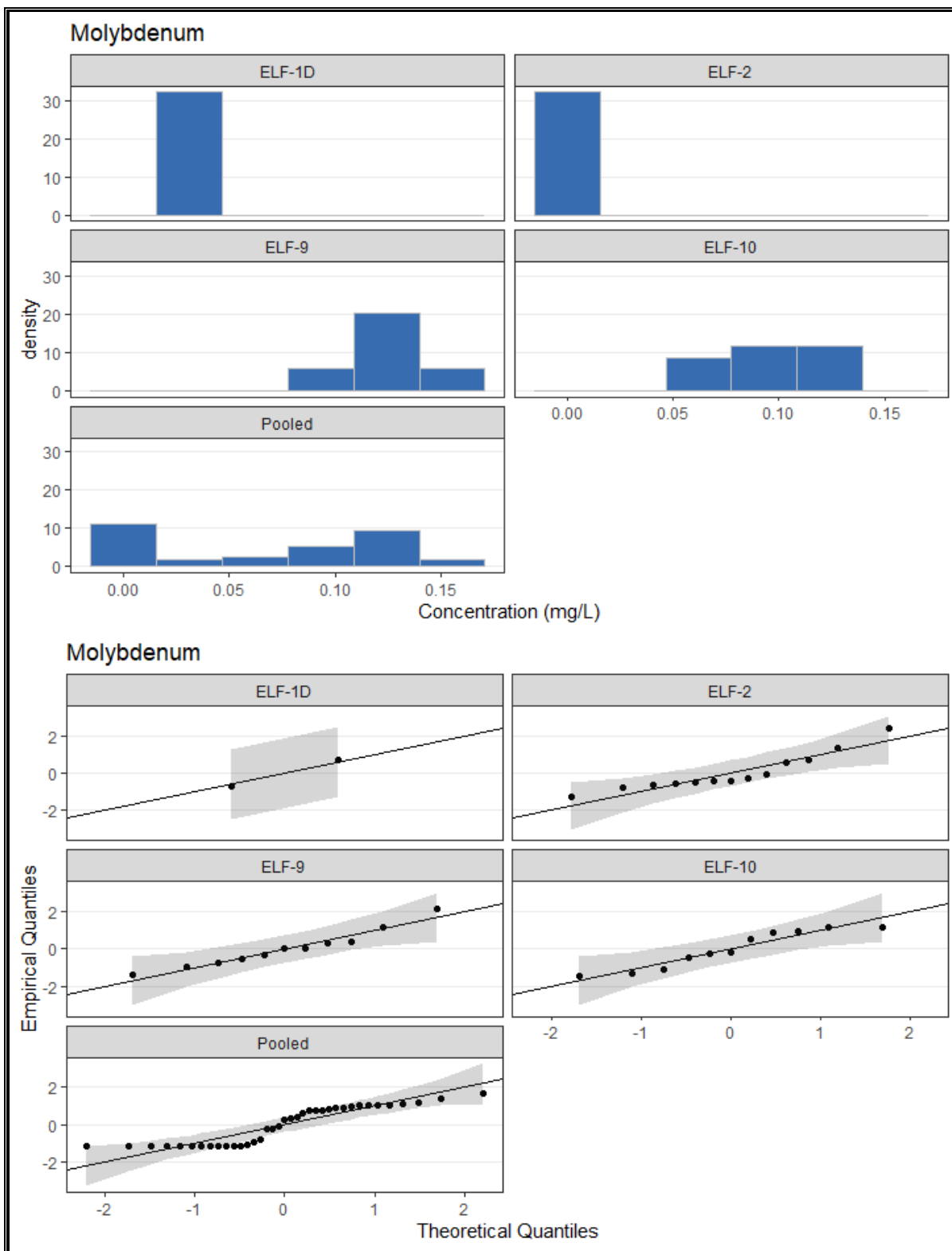


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

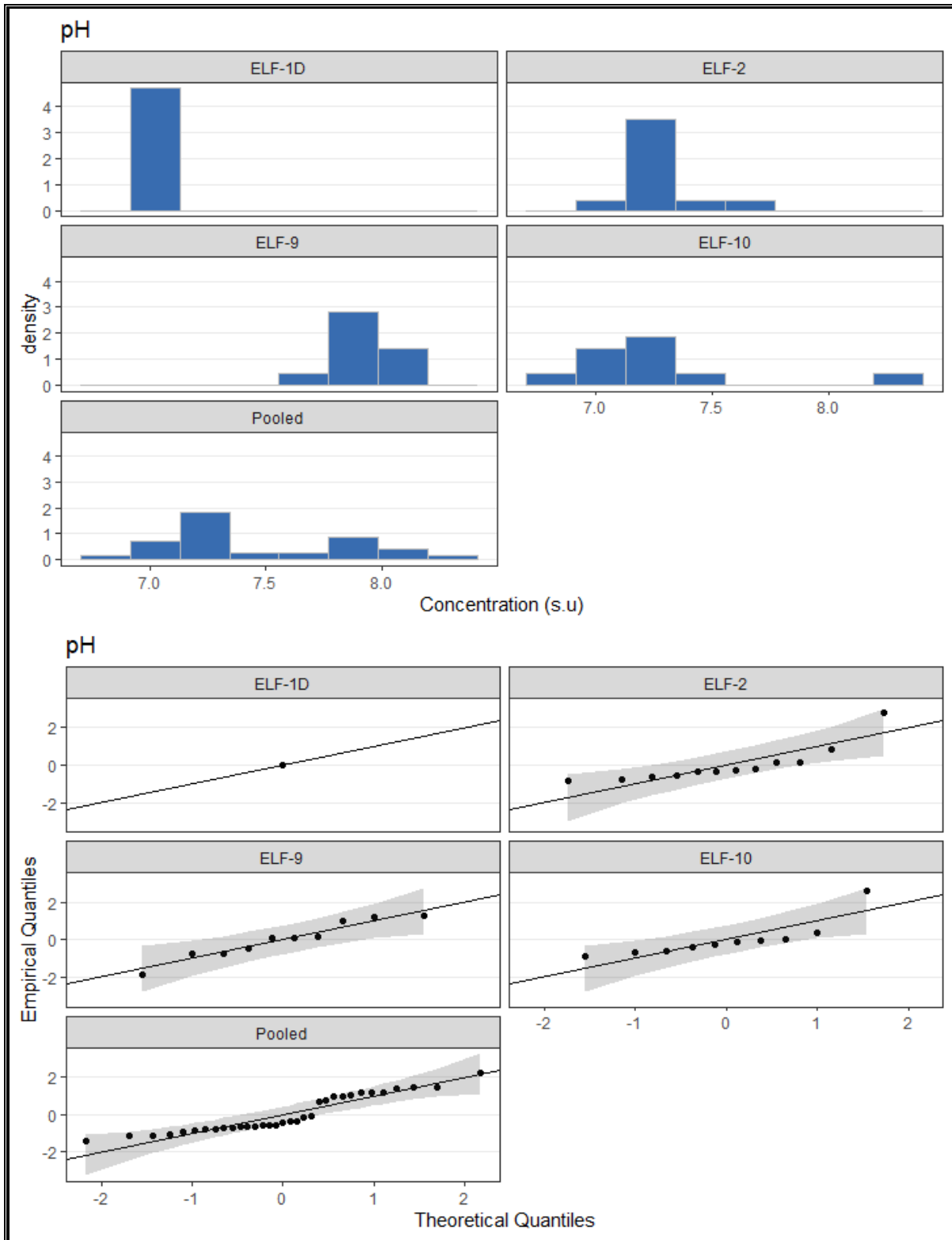


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

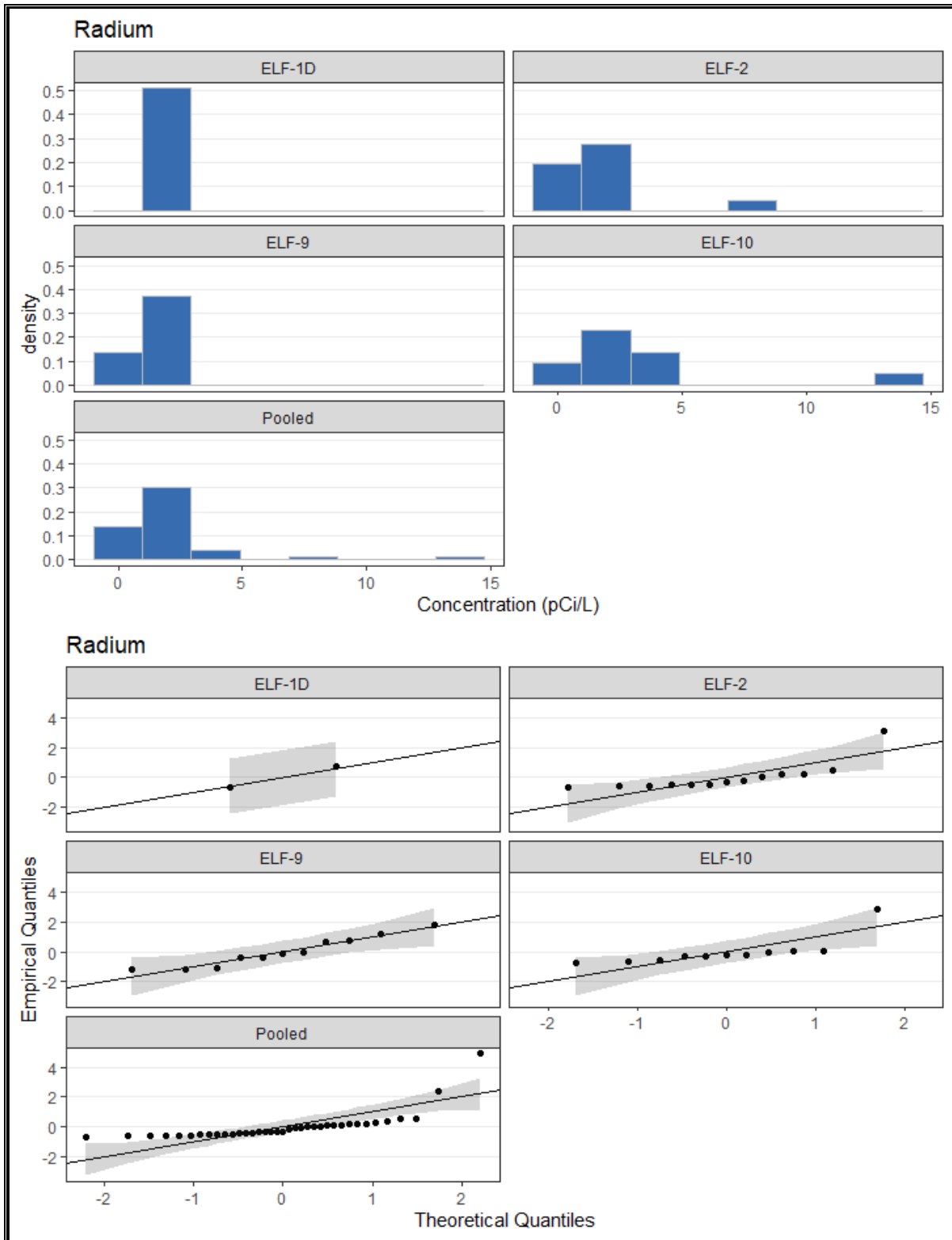


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

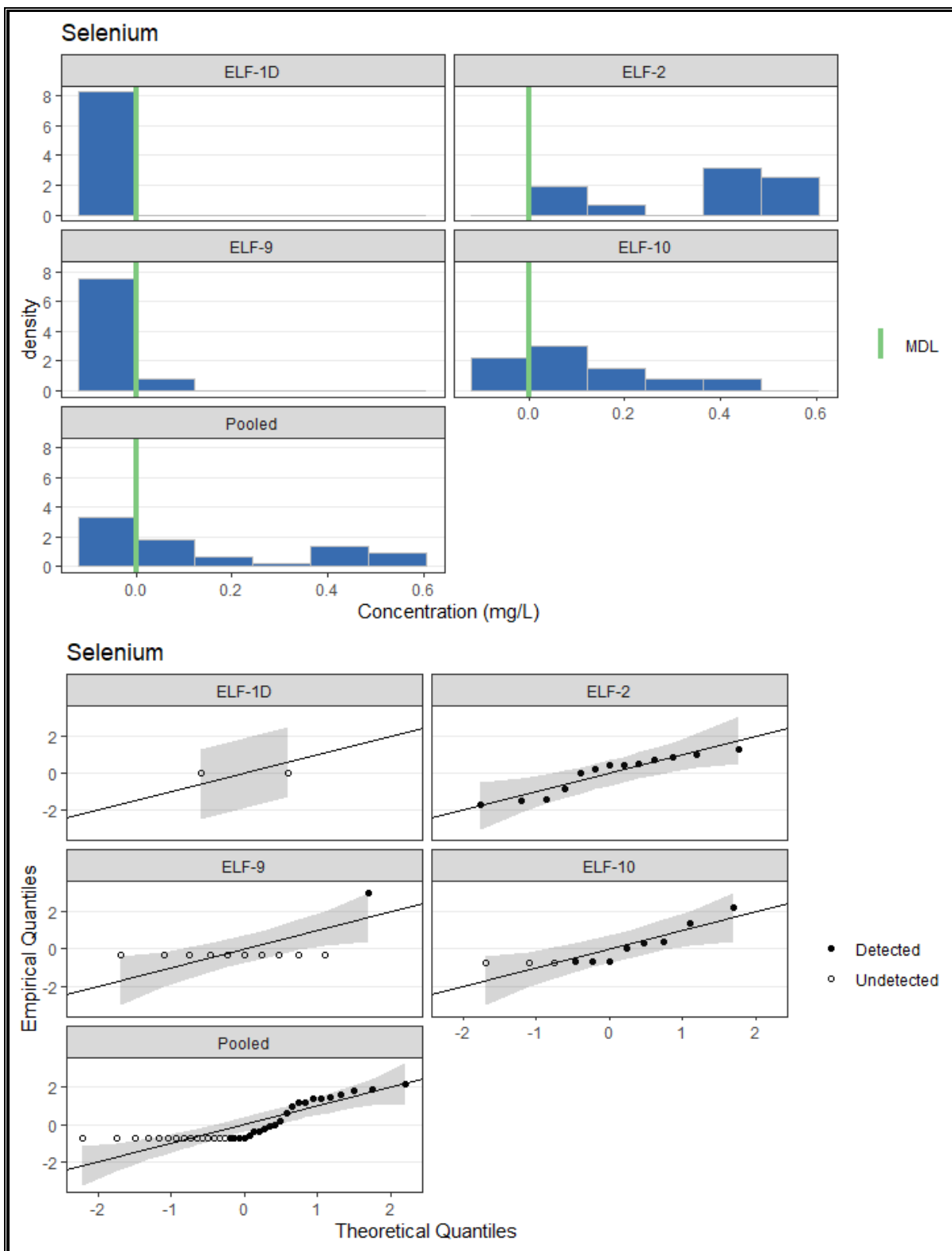


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

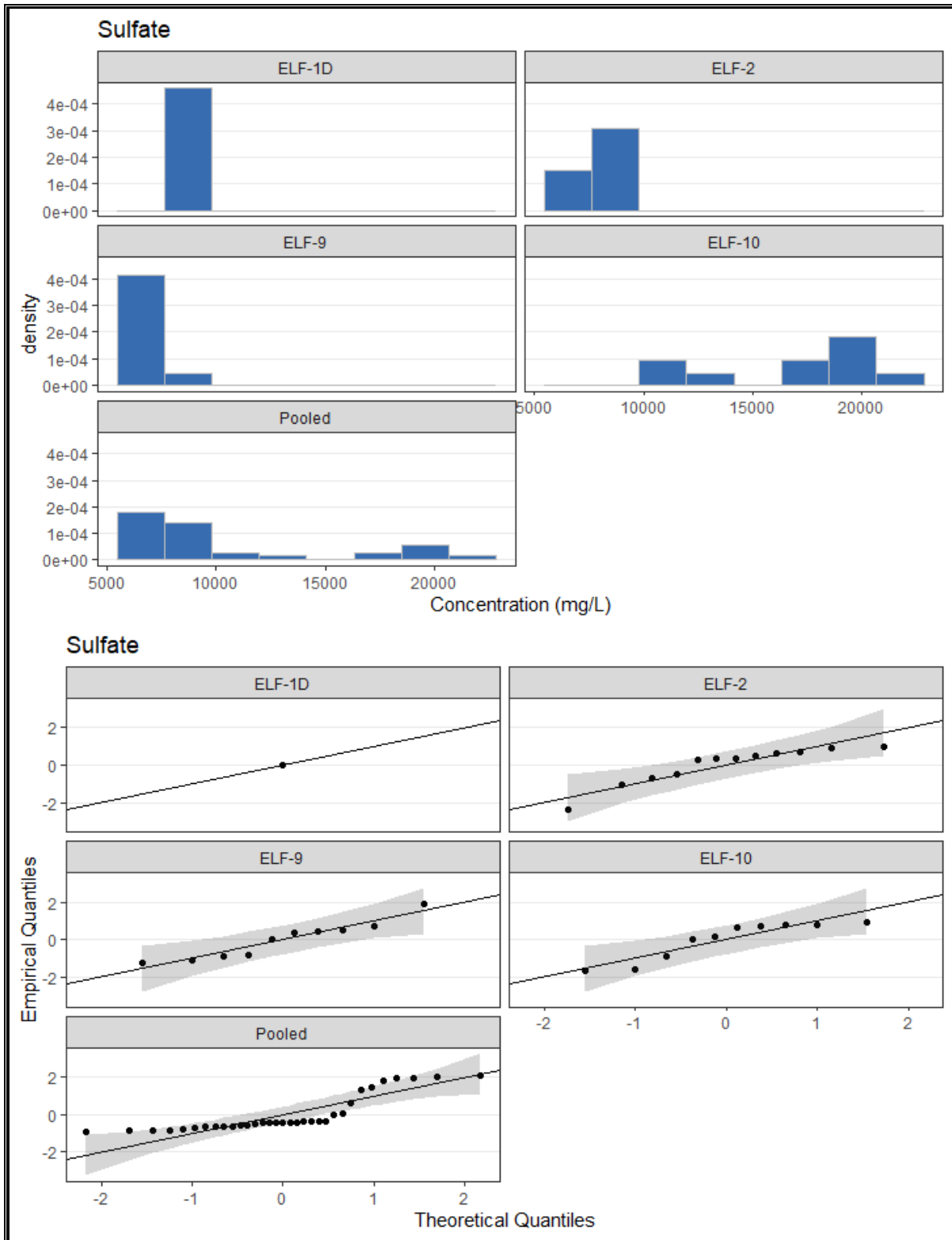


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

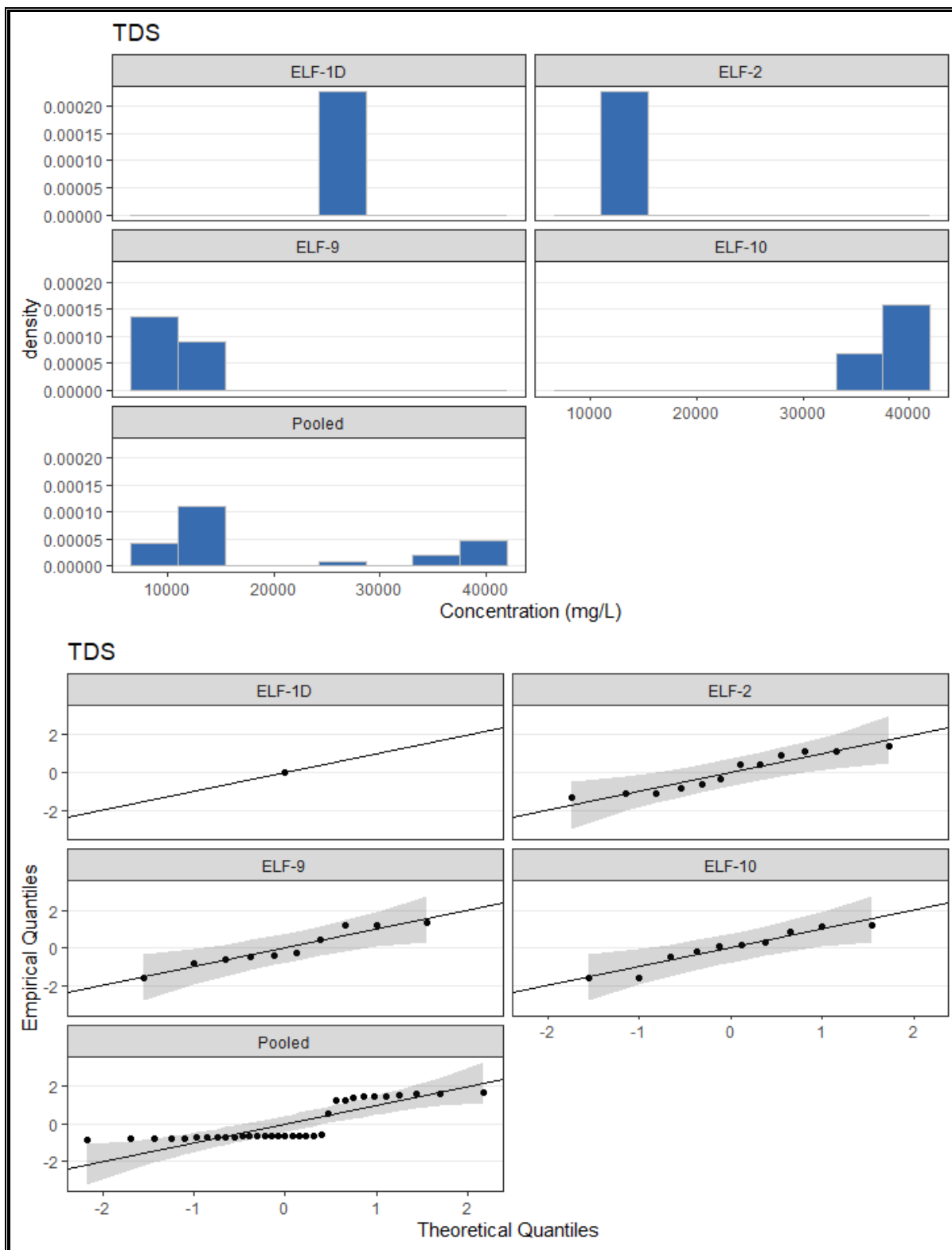


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

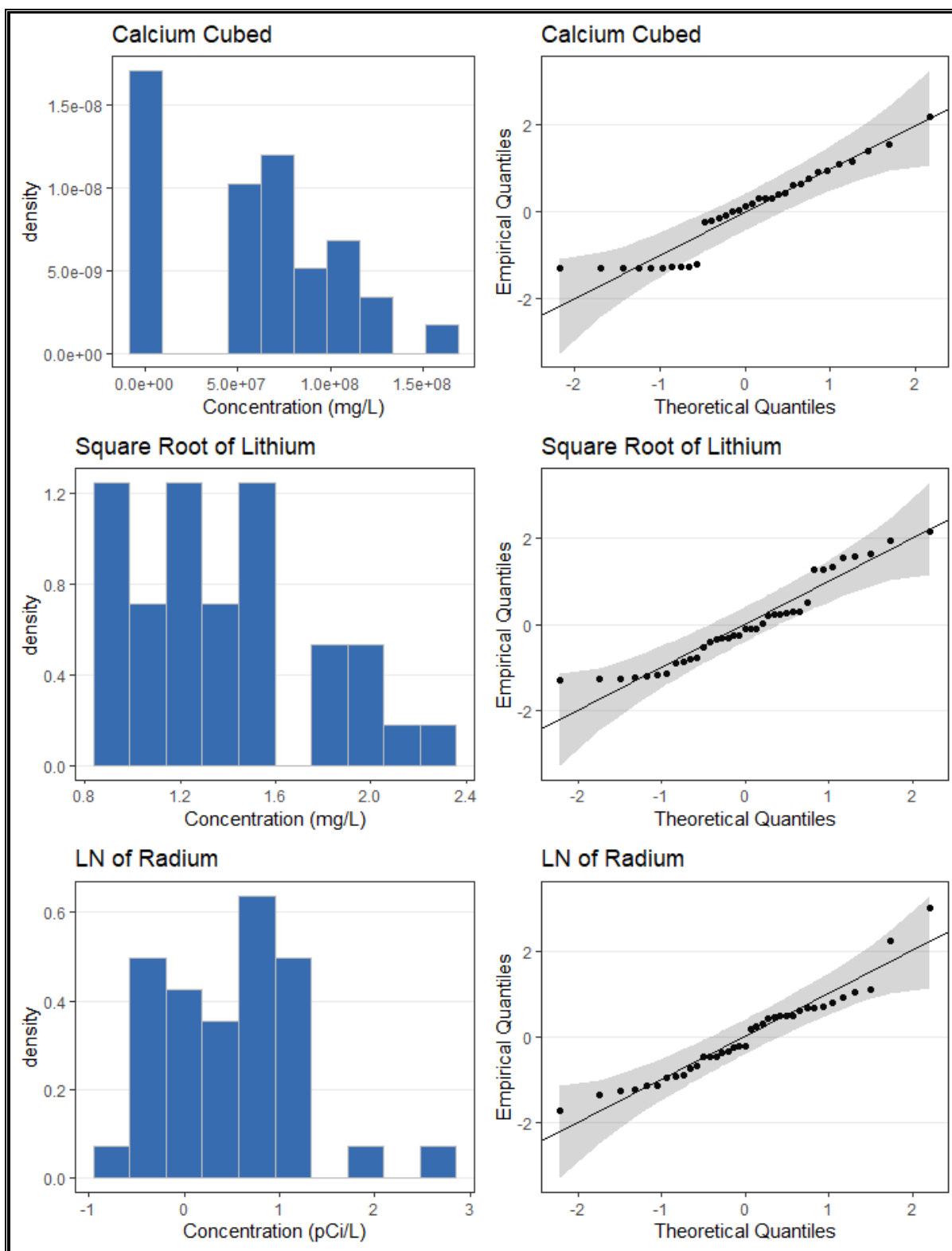


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

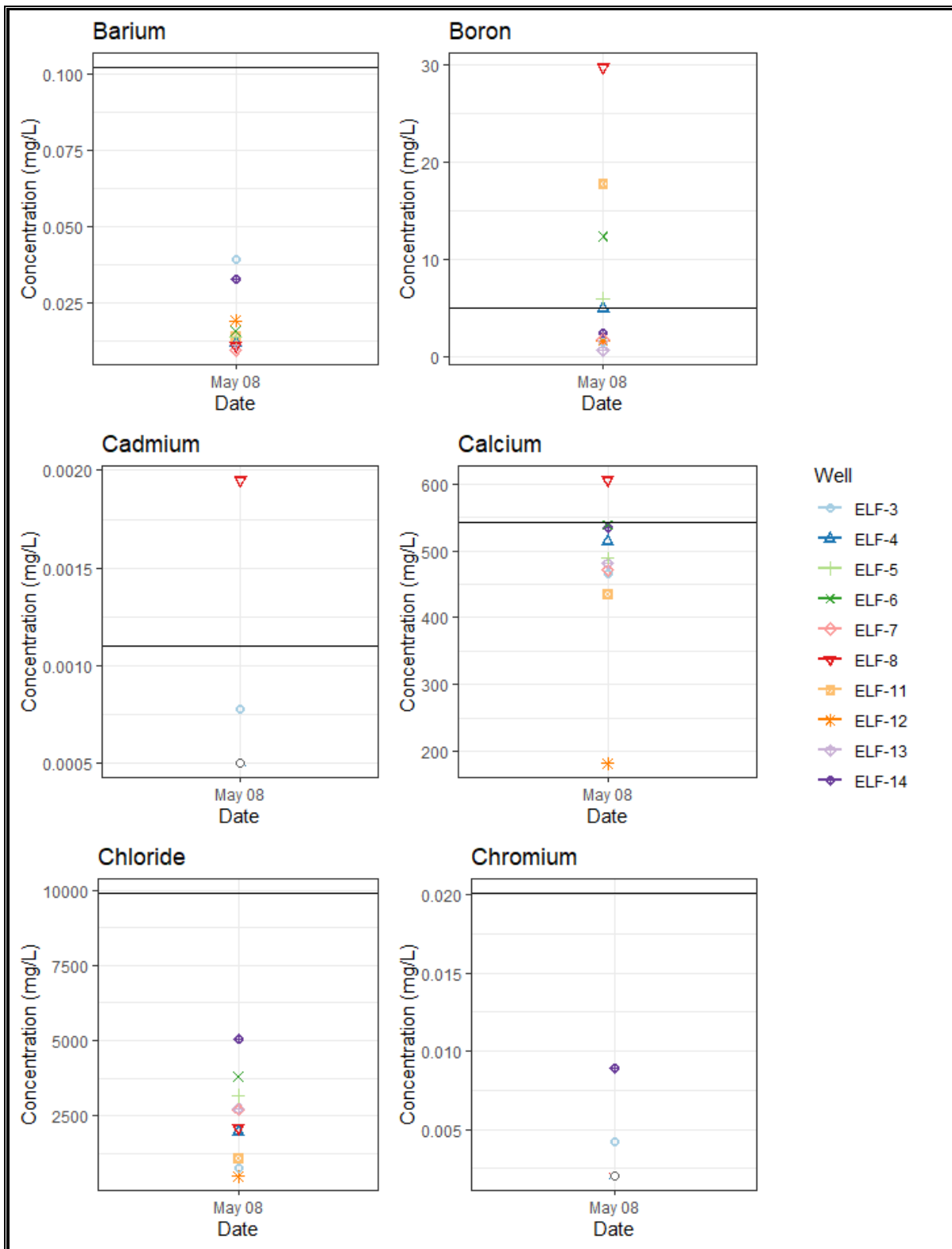


Figure C.4. Upper tolerance limit plots for the CCR Landfill.

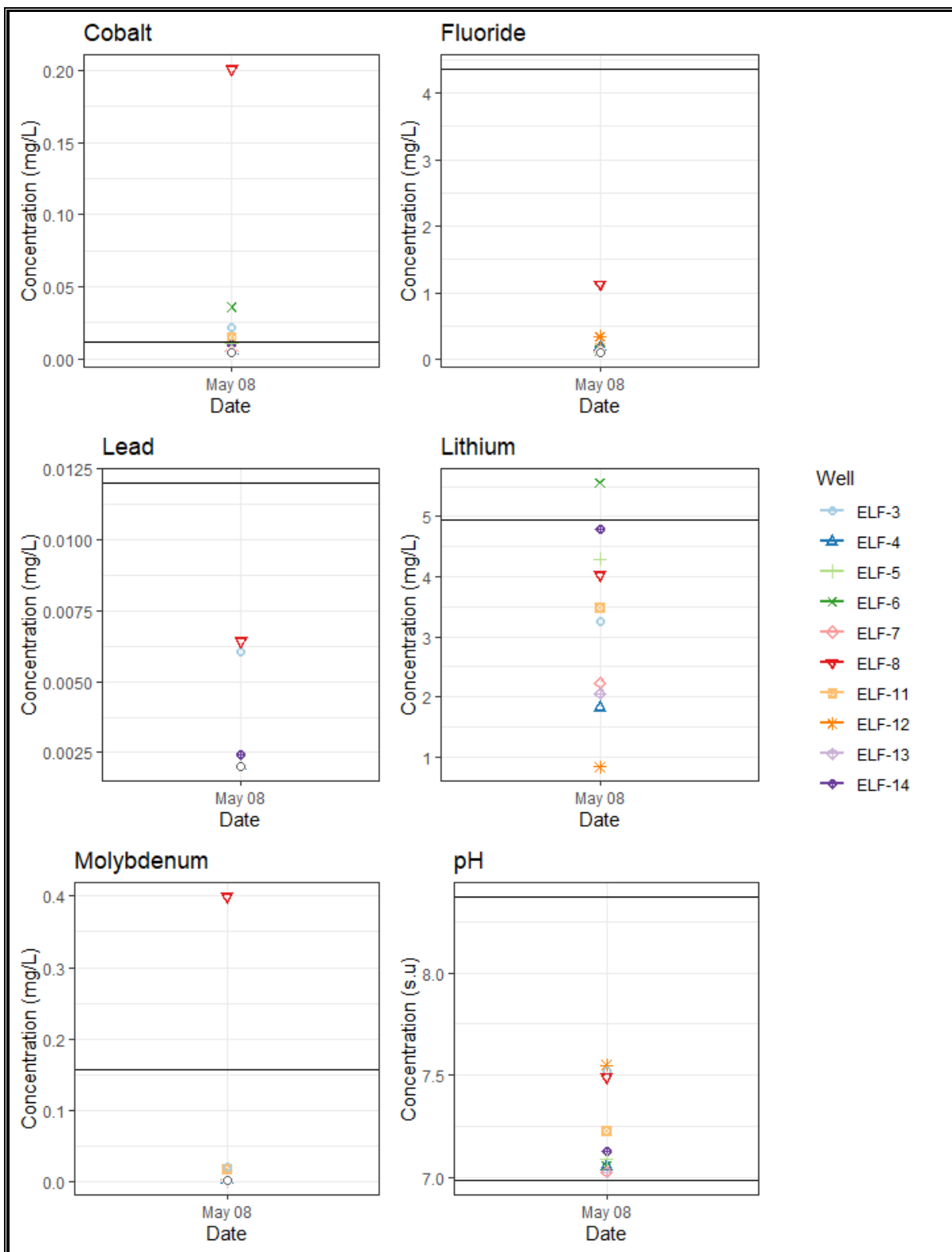


Figure C.4 (cont). Upper tolerance limit plots for the CCR Landfill.

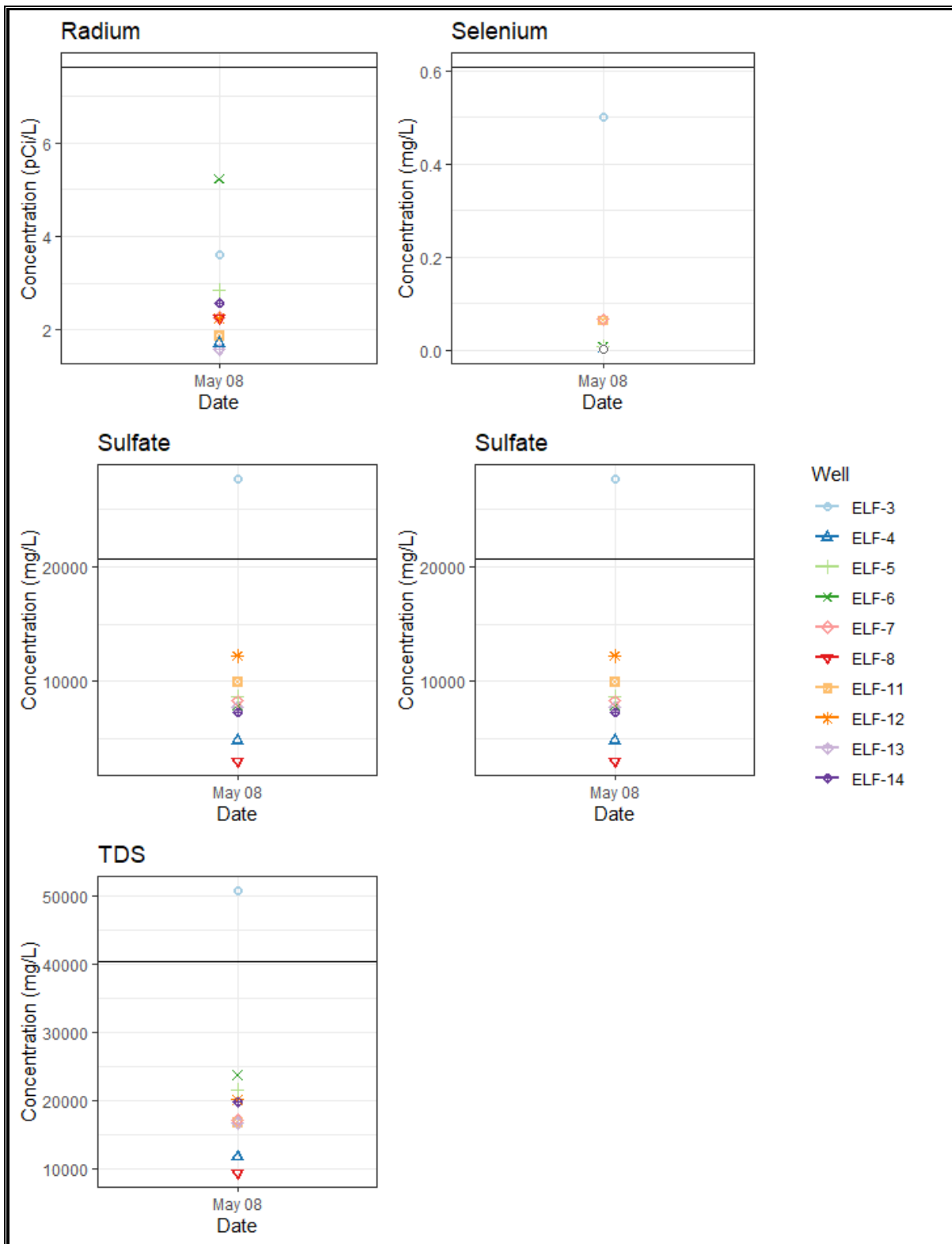


Figure C.4 (cont). Upper tolerance limit plots for the CCR Landfill.

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:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-14	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Partly cloudy 50 degrees F		
Depth to Water (ft):	6.07		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	9.00	23,676	61.30	6.52	216.80	999.00
2	9.00	23,923	55.60	6.72	215.00	999.00
5	8.90	24,041	53.50	6.78	212.30	999.00
8	9.00	24,219	48.80	6.83	208.00	999.00
11	9.00	24,248	46.20	6.84	204.00	999.00

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	09:15
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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:

Percent DO recorded instead of mg/l



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-13	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny 58 degrees F and clear skies		
Depth to Water (ft):	3.10		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	8.30	20,411	2.76	6.38	204.10	13.80
2	8.30	20,396	1.89	6.48	202.50	13.80
6	8.40	20,398	1.63	6.52	199.50	3.00

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	10:00
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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:

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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-12	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny 70 F clear skies		
Depth to Water (ft):	19.59		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	11.40	22,583	0.45	6.94	77.80	218.00
3	11.40	22,586	0.72	7.01	53.30	218.00
6	11.30	22,584	0.57	7.03	31.50	71.00

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	10:45
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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:



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-11	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny 70 degrees some clouds		
Depth to Water (ft):	28.10		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	12.80	18,400	0.64	6.63	136.60	88.70
3	12.90	16,482	0.48	6.68	133.70	88.70
6	12.90	16,744	0.24	6.69	132.00	53.70

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	11:15
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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:



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-8	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy 70 F		
Depth to Water (ft):	8.49		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	11.50	11,319	0.07	6.21	138.20	53.70
2	11.00	11,162	0.13	6.66	137.70	53.70
6	10.90	11,171	0.09	6.77	136.80	3.72

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	11:45
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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:

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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-6	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Overcast, WINDY		
Depth to Water (ft):	17.62		

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:	12:30
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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:

WATER LEVEL AT VERY BOTTOM OF WELL. VERY SLOW PUMPING. WELL MIGHT NEED TO BE DEEPENED



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-5	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudytrce rain 55 F		
Depth to Water (ft):	18.58		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	11.10	24,996	3.04	6.48	27.80	9.48
2	11.00	24,555	2.33	6.54	21.50	9.48
7	10.90	24,038	2.10	6.58	17.30	2.45

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	12:45
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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:



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-4	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Overcast 60 F		
Depth to Water (ft):	16.49		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	10.90	14,871	0.82	6.26	113.90	20.60
2	10.90	14,860	0.43	6.39	112.20	20.60
7	10.90	14,861	0.31	6.43	111.00	9.72

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	13:30
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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:

--



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-7	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny clear skies 70F		
Depth to Water (ft):	14.86		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	11.20	21,688	1.49	6.37	133.40	110.00
2	11.20	21,727	0.50	6.42	132.10	110.00
4	60.90	21,726	0.33	6.45	131.00	40.40
6	11.10	21,707	0.24	6.46	130.20	35.30

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:



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-3	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Cloudy 60F		
Depth to Water (ft):	31.75		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	12.70	43,859	6.28	6.39	149.30	124.00
	12.40	44,418	5.45	6.77	151.70	124.00
4	12.20	53,675	4.18	6.85	152.20	74.20
6	12.20	44,478	4.28	6.89	152.20	58.10

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	14:30
-----------	-----	--------------	-------

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:

Samples taken before parameters stabilized due to high likelihood of well going dry during pumping.



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	DB	Project Number:	PERCM052
Sample ID:	ELF-10	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	OVERCAST, WINDY		
Depth to Water (ft):	48.77		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	12.00	45,260	2.46	6.32	160.40	409.00
2	12.00	45,259	1.34	6.33	159.50	409.00
6	12.00	45,308	0.95	6.32	157.90	419.00

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:

Duplicate sample taken at 1520. Tagged top of pump for final depth to water. Well was barely able to produce a duplicate sample. Was pumping very slowly



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-9	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	OVERCAST, WINDY		
Depth to Water (ft):	23.24		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	11.20	13,370	5.16	6.54	119.80	352.00
2	11.20	15,710	0.62	6.98	68.60	352.00
4	11.20	15,029	0.37	7.11	75.60	33.30
6	11.10	14,555	0.27	7.18	18.00	8.50

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	16:30
------------------	-----	---------------------	-------

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:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELD-1D	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	OVERCAST, RAINY		
Depth to Water (ft):	81.81		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	12.10	34,027	1.15	6.22	144.80	33.60
2	12.00	34,259	0.60	6.40	139.20	33.60
4	12.00	34,294	0.49	6.43	136.30	6.99
6	12.00	34,307	0.45	6.46	133.30	6.02

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	16:35
------------------	-----	---------------------	-------

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:

BOTTLES FIILLED FIRST, THEN PARAMETERS WERW TAKEN IN ANTICIPATION OF WELL GOING DRY FEOM HISTORICAL EXPERIENCE WITH THIS WELL. TAGGED TOP OF PUMP FOR FINAL DTW. WELL WAS PRODUCING VERY SLOWLY



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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-2	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	5/7/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	OVERCAST, WINDY		
Depth to Water (ft):	22.53		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	11.90	13,516	1.42	6.30	120.10	56.30
2	11.90	13,507	0.98	6.42	120.40	56.30
4	11.90	13,507	0.76	6.57	120.50	4.56
6	11.90	13,509	0.70	6.58	120.30	4.93

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	17:30
------------------	-----	---------------------	-------

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:

Attachment E:

Laboratory Analytical Reports



Radium-226

Case Narrative

American West Analytical Labs

Hunter CCR Groundwater Sampling – PERCM052

Work Order Number: 1905234

1. This report consists of the analytical results for 16 water samples received by ALS on 05/13/2019.
2. These samples were prepared and analyzed according to the current revision of SOP 783. Modifications were made to the method for samples 1905234-1, -6, -7, and -15 as described on QASS 458103. The analyses were completed on 06/03/2019.
3. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
4. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate in both batches.
5. ALS uses the following convention for reporting significant digits in the TPU and MDC results. The TPU value is rounded to two significant digits. The MDC value is rounded to the same decimal place as the TPU value. In practice, this could result in an MDC reported value of zero for samples with significant activity, including the batch laboratory control sample.
6. No anomalous situations were encountered during the preparation or analysis of these samples. All quality control criteria were met.



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

Pik Yee Yuen
Pik Yee Yuen
Radiochemistry Primary Data Reviewer

6/6/19
Date

Kath M. W.
Radiochemistry Final Data Reviewer

6/10/19
Date

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1905234

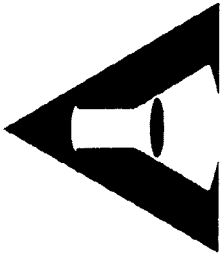
Client Name: American West Analytical Labs

Client Project Name: Hunter CCR Groundwater Sampling

Client Project Number: PERCM052

Client PO Number: 1905216

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
ELF-1D	1905234-1		WATER	08-May-19	16:35
ELF-2	1905234-2		WATER	08-May-19	17:30
ELF-3	1905234-3		WATER	08-May-19	14:30
ELF-4	1905234-4		WATER	08-May-19	13:30
ELF-5	1905234-5		WATER	08-May-19	12:45
ELF-6	1905234-6		WATER	08-May-19	12:30
ELF-7	1905234-7		WATER	08-May-19	14:00
ELF-8	1905234-8		WATER	08-May-19	11:45
ELF-9	1905234-9		WATER	08-May-19	16:30
ELF-10	1905234-10		WATER	08-May-19	15:00
ELF-11	1905234-11		WATER	08-May-19	11:15
ELF-12	1905234-12		WATER	08-May-19	10:45
ELF-13	1905234-13		WATER	08-May-19	10:00
ELF-14	1905234-14		WATER	08-May-19	9:15
DUP	1905234-15		WATER	07-May-19	15:20
FB	1905234-16		WATER	08-May-19	12:00



American West
Analytical Laboratories
3440 S. 700 W. Salt Lake City, UT 84119
Phone # (801) 263-8686 Toll Free # (888) 263-8686
Fax # (801) 263-8687 Email awal@awal-labs.com
www.awal-labs.com

Client: American West Analytical Laboratories
Address: 3440 S. 700 W.
City, State, Zip: Salt Lake City, UT 84119
Contact: Elona Hayward
Phone #: (801) 263-8686 Cell #:
E-mail: elona@awal-labs.com; denise@awal-labs.com
Project Name: Hunter CCR Groundwater Sampling
Project #: PERCM052
PO #: 1905216
Sampler Name:

	Sample ID:	Date Sampled	Time Sampled
1	ELF-1D	5/8/2019	16:35
2	ELF-2	5/8/2019	17:30
3	ELF-3	5/8/2019	14:30
4	ELF-4	5/8/2019	13:30
5	ELF-5	5/8/2019	12:45
6	ELF-6	5/8/2019	12:30
7	ELF-7	5/8/2019	14:00
8	ELF-8	5/8/2019	11:45
9	ELF-9	5/8/2019	16:30
10	ELF-10	5/8/2019	15:00
11	ELF-11	5/8/2019	11:15
12	ELF-12	5/8/2019	10:45
13	ELF-13	5/8/2019	10:00
14	ELF-14	5/8/2019	9:15
15	DUP	5/7/2019	15:20

Relinquished by: Denise Brown 5/10/18
Signature: Denise Brown Time: 9:30
Relinquished by: _____ Date: _____
Signature: _____ Time: _____
Relinquished by: _____ Date: _____
Signature: _____ Time: _____
Relinquished by: _____ Date: _____
Signature: _____ Time: _____

QC Level:

2+

Turn Around Time:

Standard

Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.

☐ Report down to the MDL
☐ Include EDD:
☐ Lab Filter for:
☐ Field Filtered For:

For Compliance With:
☐ NELAP
☐ RCRA
☐ CWA
☐ SDWA
☐ ELAP / A2LA
☐ NLLAP
☐ Non-Compliance
☐ Other:

Known Hazards
&
Sample Comments

of Containers
Sample Matrix
Radium 226 and 228 Combined

☐ Report down to the MDL
☐ Include EDD:
☐ Lab Filter for:
☐ Field Filtered For:

For Compliance With:
☐ NELAP
☐ RCRA
☐ CWA
☐ SDWA
☐ ELAP / A2LA
☐ NLLAP
☐ Non-Compliance
☐ Other:

Laboratory Use Only

COC Tags Was:
1 Present on Outer Package Y N NA
2 Unbroken on Outer Package Y N NA

3 Present on Sample Y N
4 Unbroken on Sample Y N NA

Samples Were:
1 Shipped or hand delivered
2 Ambient or Chilled
3 Temperature _____ °C
4 Received Intact Y N
5 Properly Preserved Y N Checked at bench
6 Received Within Holding Times Y N

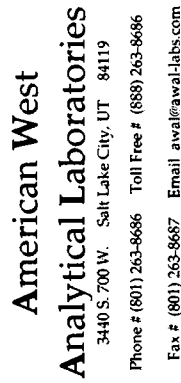
Sample Labels and COC Record Match?
Y N

Special Instructions:

QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS,

MS/MSD performed on customer sample

Samples sent to ALS - Ft. Collins.



CHAIN OF CUSTODY

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

AWAL Lab Sample Set #

Page 2 of 2

Fax # (801) 263-8687 Email awal@awal-labs.com

Fax # (801) 263-8687 Email awal@awal-labs.com

www.awal-labs.com

Client: American West Analytical Laboratories

Address: **3440 S. 700 W.**

City, State, Zip: **Salt Lake City, UT 84119**

Contact:
Elona Hayward

Phone #: **(801) 263-8686**

Phone #: (801) 263-8686 Cell #:

E-mail: elona@awal-labs.com; denise@awal-labs.com

Project Name: **Hunter CCR Groundwater Sampling**

Project #: PERCM052

PO #. 1905216

Sampler Name:[illegible]

Relinquished by: Signature	Denise Bruun
Print Name:	Denise Bruun
Relinquished by: Signature	
Print Name:	
Relinquished by: Signature	
Print Name:	

Received by: Signature		Date: 5.12.19
Print Name:	NELLI-JEAN SMITH	Time: 0850
Received by: Signature		Date:
Print Name:		Time:
Received by: Signature		Date:
Print Name:		Time:

[illegible]

Special Instructions:
QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS,
MS/MSD performed on customer sample

1905234



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: AWAL

Workorder No: 1905234

Project Manager: KMO

Initials: KJ

Date: 5/13/19

1. Are airbills / shipping documents present and/or removable?	DROP OFF	<u>YES</u>	NO
2. Are custody seals on shipping containers intact?	NONE	<u>YES</u>	NO *
3. Are custody seals on sample containers intact?	<u>NONE</u>	<u>YES</u>	NO *
4. Is there a COC (chain-of-custody) present?		<u>YES</u>	NO *
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		<u>YES</u>	<u>NO *</u>
6. Are short-hold samples present?		<u>YES</u>	<u>NO</u>
7. Are all samples within holding times for the requested analyses?		<u>YES</u>	NO *
8. Were all sample containers received intact? (not broken or leaking)		<u>YES</u>	NO *
9. Is there sufficient sample for the requested analyses?		<u>YES</u>	NO *
10. Are all samples in the proper containers for the requested analyses?		<u>YES</u>	NO *
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	<u>YES</u>	<u>NO *</u>
12. Are all aqueous non-preserved samples pH 4-9?	<u>N/A</u>	<u>YES</u>	NO *
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	<u>N/A</u>	<u>YES</u>	NO
14. Were the samples shipped on ice?		<u>YES</u>	<u>NO</u>
15. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*: #1 #3 #4	<u>YES</u>	<u>NO</u>
Cooler #: <u>1</u> <u>2</u>			
Temperature (°C): <u>AMB</u> <u>AMB</u>			
No. of custody seals on cooler: <u>1</u> <u>1</u>			
DOT Survey/ Acceptance Information	External µR/hr reading: <u>10</u> <u>10</u>		
	Background µR/hr reading: <u>11</u>		
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <u>YES</u> / NO / NA (If no, see Form 008.)			

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

5) Samples 1-14 both bottles written label date = 5/7/19
LOC: printed label date = 5/8/19 - correct
Sample 16 written label time/date = 1200 / 5/8/19 correct
COC: printed label time/date = 1100 / 5/7/19

11) initial pH 3 fix: #3 both bottles } 2ml } #13 197345
#6 } 1ml } 10197345
#12 bottle 2 } 1ml } added
initial pH 4 fix: #10 bottle 1 } 1ml } #13 197345
#15 } 1ml } 10197345
added

All client bottle ID's vs ALS lab ID's double-checked by: KJ

If applicable, was the client contacted? YES / NO / NA Contact: Elma Hayward Date/Time: 5/13/19 1340

Project Manager Signature / Date: [Signature] 5/13/19

1405234

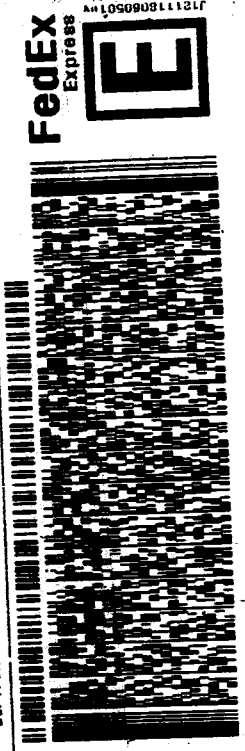
SHIP DATE: 10MAY19
ACTWT: 39.85 LB
CAD: 192107/CAFE3211

ORIGIN ID: NPHA (800) 356-9135
SHIPPING DEPT
ALS ENVIRONMENTAL GRP
960 H LEVODY DR
SALT LAKE CITY, UT 84123
UNITED STATES US

BILL SENDER

TO **SAMPLING RECEIVING**
ALS ENVIRONMENTAL - FORT COLLINS
225 COMMERCE DRIVE
10-1

FORT COLLINS CO 80524
REF: SALT LAKE SHIPPING
(970) 490-1511
DEPT: SALT LAKE SHIPPING



TRK# 4914 1221 5741
[0201]
MON - 13 MAY 10:30A
PRIORITY OVERNIGHT

CJ FTCA
80524
CO-US
DEN

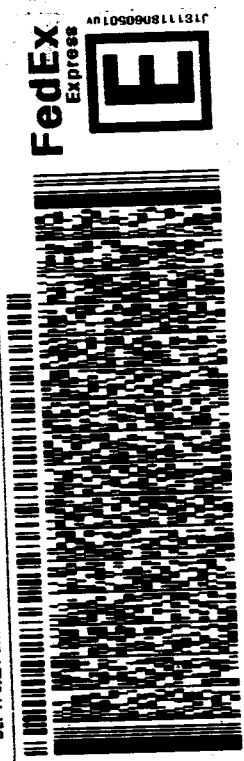


Part # 156148V-434 RIT2APV EXP 12/17

ORIGIN ID: NPHA (800) 356-9135
SHIPPING DEPT
ALS ENVIRONMENTAL GRP
960 H LEVODY DR
SALT LAKE CITY, UT 84123
UNITED STATES US

TO **SAMPLING RECEIVING**
ALS ENVIRONMENTAL
225 COMMERCE DRIVE
10-1

FORT COLLINS CO 80524
REF: SALT LAKE SHIPPING
(970) 490-1511
DEPT: SALT LAKE SHIPPING



TRK# 4914 1221 5720
[0201]
MON - 13 MAY 10:30A
PRIORITY OVERNIGHT

CJ FTCA
80524
CO-US
DEN



Part # 156148V-434 RIT2APV EXP 12/17

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190521-2MB

Sample Matrix: WATER

Prep Batch: RE190521-2

Final Aliquot: 995 ml

Prep SOP: PAI 783 Rev 13

QCBatchID: RE190521-2-1

Result Units: pCi/l

Date Collected: 21-May-19

Run ID: RE190521-2A

File Name: Manual Entry

Date Prepared: 21-May-19

Count Time: 15 minutes

Date Analyzed: 30-May-19

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.12 +/- 0.20	0.33	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16450	15790	ug	96.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: RE1905234-1

Date Printed: Thursday, June 06, 2019

ALS -- Fort Collins

LIMS Version: 6.897

Page 1 of 2

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190521-11MB

Sample Matrix: WATER

Prep Batch: RE190521-11

Final Aliquot: 993 ml

Prep SOP: PAI 783 Rev 13

QCBatchID: RE190521-11-1

Result Units: pCi/l

Date Collected: 21-May-19

Run ID: RE190521-11A

File Name: Manual Entry

Date Prepared: 21-May-19

Count Time: 30 minutes

Date Analyzed: 03-Jun-19

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.04 +/- 0.21	0.39	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	33680	29180	ug	86.6	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190521-11LCS

Sample Matrix: WATER

Prep Batch: RE190521-11

Final Aliquot: 993 ml

Prep SOP: PAI 783 Rev 13

QCBatchID: RE190521-11-1

Result Units: pCi/l

Date Collected: 21-May-19

Run ID: RE190521-11A

File Name: Manual Entry

Date Prepared: 21-May-19

Count Time: 15 minutes

Date Analyzed: 03-Jun-19

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	56 +/- 14	0	47.86	116	67 - 120	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	33680	29030	ug	86.2	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE1905234-1

Date Printed: Thursday, June 06, 2019

ALS -- Fort Collins

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LIMS Version: 6.897

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190521-11LCSD

Sample Matrix: WATER

Prep Batch: RE190521-11

Final Aliquot: 993 ml

Prep SOP: PAI 783 Rev 13

QCBatchID: RE190521-11-1

Result Units: pCi/l

Date Collected: 21-May-19

Run ID: RE190521-11A

File Name: Manual Entry

Date Prepared: 21-May-19

Count Time: 15 minutes

Date Analyzed: 03-Jun-19

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	50 +/- 13	0	47.86	104	67 - 120	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	33680	29330	ug	87.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190521-2LCS

Sample Matrix: WATER

Prep Batch: RE190521-2

Final Aliquot: 995 ml

Prep SOP: PAI 783 Rev 13

QCBatchID: RE190521-2-1

Result Units: pCi/l

Date Collected: 21-May-19

Run ID: RE190521-2A

File Name: Manual Entry

Date Prepared: 21-May-19

Count Time: 15 minutes

Date Analyzed: 30-May-19

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	52 +/- 13	0	47.86	109	67 - 120	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16450	15720	ug	95.6	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE1905234-1

Date Printed: Thursday, June 06, 2019

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LIMS Version: 6.897

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190521-2LCSD

Sample Matrix: WATER

Prep Batch: RE190521-2

Final Aliquot: 995 ml

Prep SOP: PAI 783 Rev 13

QCBatchID: RE190521-2-1

Result Units: pCi/l

Date Collected: 21-May-19

Run ID: RE190521-2A

File Name: Manual Entry

Date Prepared: 21-May-19

Count Time: 15 minutes

Date Analyzed: 30-May-19

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	42 +/- 10	0	47.86	87.4	67 - 120	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	15720	ug	95.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:
Lab ID: RE190521-11LCSD

Sample Matrix: WATER
Prep SOP: PAI 783 Rev 13
Date Collected: 21-May-19
Date Prepared: 21-May-19
Date Analyzed: 03-Jun-19

Prep Batch: RE190521-11
QCBatchID: RE190521-11-1
Run ID: RE190521-11A
Count Time: 15 minutes

Final Aliquot: 993 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: Manual Entry

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
13982-63-3	Ra-226	56 +/-	14	0	P	50 +/-	13	0	P	0.315	2.13

Comments:

Duplicate Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:
Lab ID: RE190521-2LCSD

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 21-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
13982-63-3	Ra-226	52 +/- 13		0	P	42 +/- 10		0	P	0.626	2.13

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2.13

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

M - Requested MDC not met.

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

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Data Package ID: RE1905234-1

Date Printed: Thursday, June 06, 2019

ALS -- Fort Collins

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Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-1D

Lab ID: 1905234-1

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 03-Jun-19

Prep Batch: RE190521-11

QCBatchID: RE190521-11-1

Run ID: RE190521-11A

Count Time: 30 minutes

Report Basis: Unfiltered

Final Aliquot: 993 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.13 +/- 0.21	0.36	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	33690	26860	ug	79.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:	ELF-2
Lab ID:	1905234-2

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 945 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.12 +/- 0.19	0.32	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	15880	ug	96.4	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-3
Lab ID: 1905234-3

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 945 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.24 +/- 0.32	0.52	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16480	15760	ug	95.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:	ELF-4
Lab ID:	1905234-4

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.16 +/- 0.26	0.43	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	15570	ug	94.6	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:	ELF-5
Lab ID:	1905234-5

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.86 +/- 0.43	0.33	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16470	15820	ug	96.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-6
Lab ID: 1905234-6

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 03-Jun-19

Prep Batch: RE190521-11

QCBatchID: RE190521-11-1

Run ID: RE190521-11A

Count Time: 30 minutes

Report Basis: Unfiltered

Final Aliquot: 993 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	1.13 +/- 0.49	0.45	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	33700	27670	ug	82.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-7
Lab ID: 1905234-7

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 03-Jun-19

Prep Batch: RE190521-11

QCBatchID: RE190521-11-1

Run ID: RE190521-11A

Count Time: 30 minutes

Report Basis: Unfiltered

Final Aliquot: 993 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.87 +/- 0.40	0.36	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	33690	28050	ug	83.2	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-8
Lab ID: 1905234-8

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.75 +/- 0.34	0.20	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16470	15910	ug	96.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-9
Lab ID: 1905234-9

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.29 +/- 0.21	0.24	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16470	15830	ug	96.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:	ELF-10
Lab ID:	1905234-10

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.49 +/- 0.29	0.29	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16480	15800	ug	95.9	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-11

Lab ID: 1905234-11

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.35 +/- 0.26	0.29	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16470	15700	ug	95.3	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-12

Lab ID: 1905234-12

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 955 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0 +/- 0.24	0.48	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16470	15720	ug	95.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-13

Lab ID: 1905234-13

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 935 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.12 +/- 0.21	0.37	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16480	15740	ug	95.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-14

Lab ID: 1905234-14

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	1.01 +/- 0.43	0.28	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16500	15430	ug	93.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: DUP

Lab ID: 1905234-15

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 07-May-19

Date Prepared: 21-May-19

Date Analyzed: 03-Jun-19

Prep Batch: RE190521-11

QCBatchID: RE190521-11-1

Run ID: RE190521-11A

Count Time: 30 minutes

Report Basis: Unfiltered

Final Aliquot: 993 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.53 +/- 0.29	0.24	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	33700	28310	ug	84.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:	FB
Lab ID:	1905234-16

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 13

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 30-May-19

Prep Batch: RE190521-2

QCBatchID: RE190521-2-1

Run ID: RE190521-2A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.02 +/- 0.15	0.30	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	17640	16030	ug	90.9	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1905234-1

ALS

QUALITY ASSURANCE SUMMARY SHEET

ALS W.O. # / BATCH

Ra226em (Generic Sequential prep w/ Ra228)

TEST

Ra226em - Receives Ra228 waste

METHOD

Prep

SOP/REV (PREP)

NA

SOP/REV (ANAL)

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

1. After Ra-228 was plancheted, the 40mL of sample in EDTA and 18M NaOH was diluted in a 200ml cup to approximately 150mL with DI water.
2. One mL of lead carrier, a transfer pipette of phenolphthalein, and 10mL of 18N H₂SO₄ were added to the cup on a stirring hotplate.
3. 6N H₂SO₄ was added from a squeeze bottle until a pink color was achieved.
4. Additional 6N H₂SO₄ was added slowly until the pH dropped enough that the phenolphthalein lost color.
5. The pH was checked to ensure that the sample solution was slightly acidic.
6. After stirring for five minutes, the stir bar was removed, and the sample was allowed to settle for two hours.
7. The supernatant was decanted, and the precipitate was transferred with 0.1N H₂SO₄ to a 50mL centrifuge tube.
8. The precipitate was spun down, and the supernatant discarded.
9. The resultant precipitate was dissolved in 25mL of EDTA.
10. A new final ICP aliquot of .1mL was taken and diluted to 10mL with ICP solution.
11. The barium recovery specific to Ra-226 by Radon Emanation was calculated from this new final ICP.
12. Due to LIMS limitations on the ICP calculation worksheet, the "final ICP aliquot" must be entered as 0.15mL to account for the final ICP aliquots taken for both Ra228 and Ra226em batches. The "final ICP dilution volume" must be entered as 15mL for LIMS to calculate out the correct mass using a 100 fold dilution factor. By changing these values on the ICP calculation worksheet, LIMS can now account for all aliquots taken from the sample to calculate out a new "final aliquot" on the benchsheet.

TECHNICIAN/ANALYST

DEPARTMENT MANAGER

DATE

3/26/16

DATE

3/26/16



Radium-228

Case Narrative

American West Analytical Labs

Hunter CCR Groundwater Sampling – PERCM052

Work Order Number: 1905234

1. This report consists of the analytical results for 16 water samples received by ALS on 05/13/2019.
2. These samples were prepared according to the current revision of SOP 749, with procedure modifications outlined in QASS 452599 for samples 1905234-16 and RA190522-5LCSD.
3. The samples were analyzed for the presence of ^{228}Ra by low background gas flow proportional counting of ^{228}Ac , which is the ingrown progeny of ^{228}Ra , according to the current revision of SOP 724. The analyses were completed on 06/03/2019.
4. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
5. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate in both batches.
6. To reduce matrix interference, a reduced aliquot was used for the preparation of sample 1905234-14. Consequently, the requested MDC was not met for this sample. The reported activity exceeds the achieved MDC. This sample is identified with an "M3" qualifier on the final report.
7. No further anomalous situations were noted during the preparation and analysis of these samples. All quality control criteria were met.



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

Pik Yee Yuen
Pik Yee Yuen
Radiochemistry Primary Data Reviewer

6/6/19
Date

Kath M. W.
Radiochemistry Final Data Reviewer

6/10/19
Date

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1905234

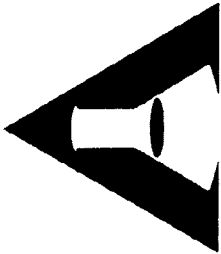
Client Name: American West Analytical Labs

Client Project Name: Hunter CCR Groundwater Sampling

Client Project Number: PERCM052

Client PO Number: 1905216

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
ELF-1D	1905234-1		WATER	08-May-19	16:35
ELF-2	1905234-2		WATER	08-May-19	17:30
ELF-3	1905234-3		WATER	08-May-19	14:30
ELF-4	1905234-4		WATER	08-May-19	13:30
ELF-5	1905234-5		WATER	08-May-19	12:45
ELF-6	1905234-6		WATER	08-May-19	12:30
ELF-7	1905234-7		WATER	08-May-19	14:00
ELF-8	1905234-8		WATER	08-May-19	11:45
ELF-9	1905234-9		WATER	08-May-19	16:30
ELF-10	1905234-10		WATER	08-May-19	15:00
ELF-11	1905234-11		WATER	08-May-19	11:15
ELF-12	1905234-12		WATER	08-May-19	10:45
ELF-13	1905234-13		WATER	08-May-19	10:00
ELF-14	1905234-14		WATER	08-May-19	9:15
DUP	1905234-15		WATER	07-May-19	15:20
FB	1905234-16		WATER	08-May-19	12:00



American West
Analytical Laboratories
3440 S. 700 W. Salt Lake City, UT 84119
Phone # (801) 263-8686 Toll Free # (888) 263-8686
Fax # (801) 263-8687 Email awal@awal-labs.com
www.awal-labs.com

Client: American West Analytical Laboratories
Address: 3440 S. 700 W.
City, State, Zip: Salt Lake City, UT 84119
Contact: Elona Hayward
Phone #: (801) 263-8686 Cell #:
E-mail: elona@awal-labs.com; denise@awal-labs.com
Project Name: Hunter CCR Groundwater Sampling
Project #: PERCM052
PO #: 1905216
Sampler Name:

	Sample ID:	Date Sampled	Time Sampled
1	ELF-1D	5/8/2019	16:35
2	ELF-2	5/8/2019	17:30
3	ELF-3	5/8/2019	14:30
4	ELF-4	5/8/2019	13:30
5	ELF-5	5/8/2019	12:45
6	ELF-6	5/8/2019	12:30
7	ELF-7	5/8/2019	14:00
8	ELF-8	5/8/2019	11:45
9	ELF-9	5/8/2019	16:30
10	ELF-10	5/8/2019	15:00
11	ELF-11	5/8/2019	11:15
12	ELF-12	5/8/2019	10:45
13	ELF-13	5/8/2019	10:00
14	ELF-14	5/8/2019	9:15
15	DUP	5/7/2019	15:20

Relinquished by: Denise Brown 5/10/18
Signature: Denise Brown Time: 9:30
Relinquished by: _____ Date: _____
Signature: _____ Time: _____
Relinquished by: _____ Date: _____
Signature: _____ Time: _____
Relinquished by: _____ Date: _____
Signature: _____ Time: _____

QC Level:

2+

Turn Around Time:

Standard

Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.

☐ Report down to the MDL
☐ Include EDD:
☐ Lab Filter for:
☐ Field Filtered For:

For Compliance With:
☐ NELAP
☐ RCRA
☐ CWA
☐ SDWA
☐ ELAP / A2LA
☐ NLLAP
☐ Non-Compliance
☐ Other:

Known Hazards & Sample Comments

of Containers
Sample Matrix
Radium 226 and 228 Combined

☐ Report down to the MDL
☐ Include EDD:
☐ Lab Filter for:
☐ Field Filtered For:

For Compliance With:
☐ NELAP
☐ RCRA
☐ CWA
☐ SDWA
☐ ELAP / A2LA
☐ NLLAP
☐ Non-Compliance
☐ Other:

Laboratory Use Only

COC Tags Was:
1 Present on Outer Package Y N NA
2 Unbroken on Outer Package Y N NA

3 Present on Sample Y N
4 Unbroken on Sample Y N NA

Samples Were:
1 Shipped or hand delivered
2 Ambient or Chilled
3 Temperature _____ °C
4 Received Intact Y N
5 Properly Preserved Y N Checked at bench
6 Received Within Holding Times Y N

Sample Labels and COC Record Match?
Y N

Special Instructions:

QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS,

MS/MSD performed on customer sample

Samples sent to ALS - Ft. Collins.

405934

CHAIN OF CUSTODY

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



CHAIN OF CUSTODY

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

AWAL Lab Sample Set #

Page 2 of 2

www.awal-labs.com

Client: American West Analytical Laboratories

Address: **3440 S. 700 W.**

City, State, Zip: **Salt Lake City, UT 84119**

Contact:
Elona Hayward

Phone #. **(801) 263-8686**

Phone #: (801) 263-8686
Cell #:

E-mail: elona@awal-labs.com; denise@awal-labs.com

Project Name: **Hunter CCR Groundwater Sampling**

Project #: PERCM052

PO #. 1905216

Sampler Name:[illegible]

Relinquished by:
Signature Denise Bruun

Print Name:
Denise Bruun

Relinquished by:
Signature

Print Name:

Relinquished by:
Signature

Print Name:

Received by: Signature		Date: 5.12.19
Print Name:	NELLI-JEAN SMITH	Time: 0850
Received by: Signature		Date:
Print Name:		Time:
Received by: Signature		Date:
Print Name:		Time:

QC Level:		Turn Around Time:		Due Date:	
2+		Standard		5:00 pm on the day they are due.	
Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.		<div> <div> <div> <div> <div>Report down to the MDL</div> <div> <input type="checkbox"/> Include EDD:</div> <div> <input type="checkbox"/> Lab Filter for:</div> <div> <input type="checkbox"/> Field Filtered For:</div> </div> </div> <div> <div>For Compliance With:</div> <div> <input type="checkbox"/> NELAP <input type="checkbox"/> RCRA <input type="checkbox"/> CWA <input type="checkbox"/> SDWA <input type="checkbox"/> ELAP / A2LA <input type="checkbox"/> NLLAP <input type="checkbox"/> Non-Compliance <input type="checkbox"/> Other: </div> </div> </div> </div>			
Known Hazards & Sample Comments					
Samples Were: <div> 1 Shipped or hand delivered 2 Ambient or Chilled 3 Temperature _____ °C 4 Received Intact 5 Properly Preserved 6 Received Within Holding Times </div>					
Sample Labels and COC Record Match?					

Special Instructions:	QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS,
	MS/MSD performed on customer sample



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: AWAL

Workorder No: 1905234

Project Manager: KMO

Initials: KJ

Date: 5/13/19

1. Are airbills / shipping documents present and/or removable?	DROP OFF	<u>YES</u>	NO
2. Are custody seals on shipping containers intact?	NONE	<u>YES</u>	NO *
3. Are custody seals on sample containers intact?	<u>NONE</u>	<u>YES</u>	NO *
4. Is there a COC (chain-of-custody) present?		<u>YES</u>	NO *
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	<u>NO *</u>
6. Are short-hold samples present?		YES	<u>NO</u>
7. Are all samples within holding times for the requested analyses?		<u>YES</u>	NO *
8. Were all sample containers received intact? (not broken or leaking)		<u>YES</u>	NO *
9. Is there sufficient sample for the requested analyses?		<u>YES</u>	NO *
10. Are all samples in the proper containers for the requested analyses?		<u>YES</u>	NO *
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	<u>NO *</u>
12. Are all aqueous non-preserved samples pH 4-9?	<u>N/A</u>	YES	NO *
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	<u>N/A</u>	YES	NO
14. Were the samples shipped on ice?		YES	<u>NO</u>
15. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*: #1 #3 #4	<u>RAD ONLY</u>	YES <u>NO</u>
Cooler #: <u>1 2</u>			
Temperature (°C): <u>AMB AMB</u>			
No. of custody seals on cooler: <u>1 1</u>			
DOT Survey/ Acceptance Information	External µR/hr reading: <u>10 10</u>		
	Background µR/hr reading: <u>11</u>		
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <u>YES</u> / NO / NA (If no, see Form 008.)			

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

5) Samples 1-14 both bottles written label date = 5/7/19
LOC: printed label date = 5/8/19 - correct
Sample 16 written label time/date = 1200 / 5/8/19 correct
COC: printed label time/date = 1100 / 5/7/19

11) initial pH 3 fix: #3 both bottles } 2ml } #13 197345
#6 } 1ml } 10/197345
#12 bottle 2 } 1ml } added
initial pH 4 fix: #10 bottle 1 } 1ml } #13 197345
#15 } 1ml } 10/197345
added

All client bottle ID's vs ALS lab ID's double-checked by: KJ

If applicable, was the client contacted? YES / NO / NA Contact: Elma Hayward Date/Time: 5/13/19 1340

Project Manager Signature / Date: [Signature] 5/13/19

1405234

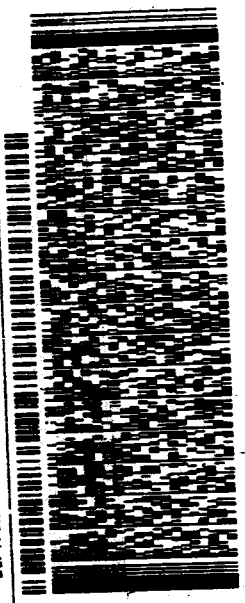
SHIP DATE: 10MAY19
ACTWT: 39.85 LB
CAD: 192107/CAFE3211

ORIGIN ID: NPHA (800) 356-9135
SHIPPING DEPT
ALS ENVIRONMENTAL GRP
960 H LEVODY DR
SALT LAKE CITY, UT 84123
UNITED STATES US

BILL SENDER

TO **SAMPLING RECEIVING**
ALS ENVIRONMENTAL - FORT COLLINS
225 COMMERCE DRIVE
10-1

FORT COLLINS CO 80524
REF: SALT LAKE SHIPPING
(970) 490-1511
DEPT: SALT LAKE SHIPPING

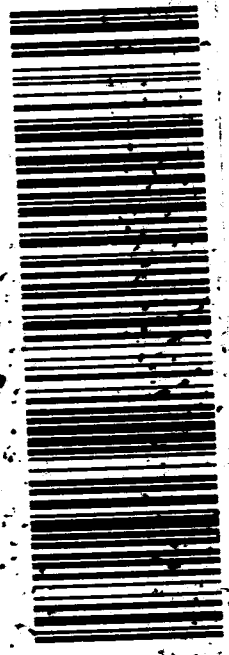


FedEx
Express
E

MON - 13 MAY 10:30A
PRIORITY OVERNIGHT

TRK# 4914 1221 5741
[0201]

CJ FTCA
80524
DEN
CO-US

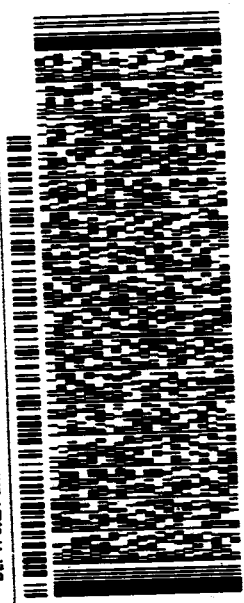


Part # 156148V-434 RIT2APV EXP 12/17

ORIGIN ID: NPHA (800) 356-9135
SHIPPING DEPT
ALS ENVIRONMENTAL GRP
960 H LEVODY DR
SALT LAKE CITY, UT 84123
UNITED STATES US

TO **SAMPLING RECEIVING**
ALS ENVIRONMENTAL - FORT COLLINS
225 COMMERCE DRIVE
10-1

FORT COLLINS CO 80524
REF: SALT LAKE SHIPPING
(970) 490-1511
DEPT: SALT LAKE SHIPPING

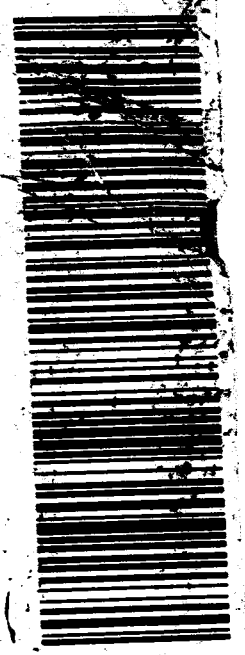


FedEx
Express
E

MON - 13 MAY 10:30A
PRIORITY OVERNIGHT

TRK# 4914 1221 5720
[0201]

CJ FTCA
80524
DEN
CO-US



Part # 156148V-434 RIT2APV EXP 12/17

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190521-11MB

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 21-May-19

Date Prepared: 21-May-19

Date Analyzed: 28-May-19

Prep Batch: RA190521-11

QCBatchID: RA190521-11-1

Run ID: RA190521-11A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0528

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
15262-20-1	Ra-228	-0.02 +/- 0.34	0.78	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34150	31860	ug	93.3	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: RA1905234-1

Date Printed: Thursday, June 06, 2019

ALS -- Fort Collins

LIMS Version: 6.897

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Radium-228 Analysis by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190522-5MB

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 22-May-19

Date Prepared: 22-May-19

Date Analyzed: 30-May-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
15262-20-1	Ra-228	0.14 +/- 0.37	0.80	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32480	30470	ug	93.8	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: RA1905234-1

Date Printed: Thursday, June 06, 2019

ALS -- Fort Collins

LIMS Version: 6.897

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Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190521-11LCS

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 21-May-19

Date Prepared: 21-May-19

Date Analyzed: 28-May-19

Prep Batch: RA190521-11

QCBatchID: RA190521-11-1

Run ID: RA190521-11A

Count Time: 60 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0528A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	14.5 +/- 3.5	1.1	14.37	101	70 - 130	P,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34150	33860	ug	99.2	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1905234-1

Date Printed: Thursday, June 06, 2019

ALS -- Fort Collins

LIMS Version: 6.897

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Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190521-11LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 21-May-19

Date Prepared: 21-May-19

Date Analyzed: 28-May-19

Prep Batch: RA190521-11

QCBatchID: RA190521-11-1

Run ID: RA190521-11A

Count Time: 60 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0528A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	14.5 +/- 3.6	1.2	14.37	101	70 - 130	P,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34150	31700	ug	92.8	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1905234-1

Date Printed: Thursday, June 06, 2019

ALS -- Fort Collins

LIMS Version: 6.897

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Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190522-5LCS

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 22-May-19

Date Prepared: 22-May-19

Date Analyzed: 30-May-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0530

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	14.3 +/- 3.4	0.8	14.36	99.8	70 - 130	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	29650	ug	91.3	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190522-5LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 22-May-19

Date Prepared: 22-May-19

Date Analyzed: 03-Jun-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0603A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	14.6 +/- 3.4	0.8	14.34	102	70 - 130	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32450	29890	ug	92.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:
Lab ID: RA190521-11LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 21-May-19

Date Prepared: 21-May-19

Date Analyzed: 28-May-19

Prep Batch: RA190521-11

QCBatchID: RA190521-11-1

Run ID: RA190521-11A

Count Time: 60 minutes

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0528A

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15262-20-1	Ra-228	14.5 +/-	3.5	1.1	P,M3	14.5 +/-	3.6	1.2	P,M3	0.0106	2.13

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2.13

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

M - Requested MDC not met.

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

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:
Lab ID: RA190522-5LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 22-May-19

Date Prepared: 22-May-19

Date Analyzed: 03-Jun-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0603A

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15262-20-1	Ra-228	14.3 +/-	3.4	0.8	P	14.6 +/-	3.4	0.8	P	0.0575	2.13

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2.13

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

M - Requested MDC not met.

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

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-1D

Lab ID: 1905234-1

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 08-May-19

Date Prepared: 21-May-19

Date Analyzed: 03-Jun-19

Prep Batch: RA190521-11

QCBatchID: RA190521-11-1

Run ID: RA190521-11A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0528

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.23	0.8	1	NA	
15262-20-1	Ra-228	1.23 +/- 0.51	0.80	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34160	29030	ug	85.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-2
Lab ID: 1905234-2

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 22-May-19
Date Analyzed: 30-May-19

Prep Batch: RA190522-5
QCBatchID: RA190522-5-2
Run ID: RA190522-5A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	0.82	0.76	1	NA	
15262-20-1	Ra-228	0.82 +/- 0.43	0.76	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	29660	ug	91.4	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-3
Lab ID: 1905234-3

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 22-May-19
Date Analyzed: 30-May-19

Prep Batch: RA190522-5
QCBatchID: RA190522-5-2
Run ID: RA190522-5A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	3.61	0.84	1	NA	
15262-20-1	Ra-228	3.61 +/- 0.99	0.84	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32500	28080	ug	86.4	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-4
Lab ID: 1905234-4

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 22-May-19
Date Analyzed: 30-May-19

Prep Batch: RA190522-5
QCBatchID: RA190522-5-2
Run ID: RA190522-5A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.72	0.75	1	NA	
15262-20-1	Ra-228	1.72 +/- 0.58	0.75	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	29910	ug	92.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-5
Lab ID: 1905234-5

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 22-May-19
Date Analyzed: 30-May-19

Prep Batch: RA190522-5
QCBatchID: RA190522-5-2
Run ID: RA190522-5A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.85	0.79	1	NA	
15262-20-1	Ra-228	1.99 +/- 0.64	0.79	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	29260	ug	90.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-6
Lab ID: 1905234-6

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 21-May-19
Date Analyzed: 03-Jun-19

Prep Batch: RA190521-11
QCBatchID: RA190521-11-1
Run ID: RA190521-11A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0528

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	5.23	0.8	1	NA	
15262-20-1	Ra-228	4.1 +/- 1.1	0.8	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34170	28270	ug	82.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-7
Lab ID: 1905234-7

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 21-May-19
Date Analyzed: 03-Jun-19

Prep Batch: RA190521-11
QCBatchID: RA190521-11-1
Run ID: RA190521-11A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0528

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.26	0.81	1	NA	
15262-20-1	Ra-228	1.39 +/- 0.54	0.81	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34160	28590	ug	83.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-8
Lab ID: 1905234-8

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 22-May-19
Date Analyzed: 30-May-19

Prep Batch: RA190522-5
QCBatchID: RA190522-5-2
Run ID: RA190522-5A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.25	0.8	1	NA	
15262-20-1	Ra-228	1.50 +/- 0.55	0.80	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	30100	ug	92.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-9
Lab ID: 1905234-9

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 22-May-19
Date Analyzed: 30-May-19

Prep Batch: RA190522-5
QCBatchID: RA190522-5-2
Run ID: RA190522-5A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.34	0.87	1	NA	
15262-20-1	Ra-228	1.05 +/- 0.50	0.87	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	28240	ug	87.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-10

Lab ID: 1905234-10

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 08-May-19

Date Prepared: 22-May-19

Date Analyzed: 30-May-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.47	0.83	1	NA	
15262-20-1	Ra-228	1.98 +/- 0.65	0.83	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32510	27370	ug	84.2	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-11

Lab ID: 1905234-11

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 08-May-19

Date Prepared: 22-May-19

Date Analyzed: 30-May-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.88	0.78	1	NA	
15262-20-1	Ra-228	1.53 +/- 0.55	0.78	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	29950	ug	92.2	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-12

Lab ID: 1905234-12

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 08-May-19

Date Prepared: 22-May-19

Date Analyzed: 30-May-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.25	0.76	1	NA	
15262-20-1	Ra-228	2.25 +/- 0.69	0.76	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32480	30630	ug	94.3	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-13

Lab ID: 1905234-13

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 08-May-19

Date Prepared: 22-May-19

Date Analyzed: 30-May-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.58	0.78	1	NA	
15262-20-1	Ra-228	1.58 +/- 0.56	0.78	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	30110	ug	92.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-14

Lab ID: 1905234-14

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 08-May-19

Date Prepared: 22-May-19

Date Analyzed: 30-May-19

Prep Batch: RA190522-5

QCBatchID: RA190522-5-2

Run ID: RA190522-5A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 499 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0530

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.58	1.55	1	NA	
15262-20-1	Ra-228	1.57 +/- 0.85	1.55	1	NA	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32470	29830	ug	91.9	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: DUP

Lab ID: 1905234-15

Sample Matrix: WATER

Prep SOP: SOP749 Rev 5

Date Collected: 07-May-19

Date Prepared: 21-May-19

Date Analyzed: 03-Jun-19

Prep Batch: RA190521-11

QCBatchID: RA190521-11-1

Run ID: RA190521-11A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0528

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.99	0.86	1	NA	
15262-20-1	Ra-228	1.46 +/- 0.57	0.86	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34170	27360	ug	80.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: FB
Lab ID: 1905234-16

Sample Matrix: WATER
Prep SOP: SOP749 Rev 5
Date Collected: 08-May-19
Date Prepared: 22-May-19
Date Analyzed: 03-Jun-19

Prep Batch: RA190522-5
QCBatchID: RA190522-5-2
Run ID: RA190522-5A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0603A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	0	0.72	1	NA	U
15262-20-1	Ra-228	0.20 +/- 0.34	0.72	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32460	30780	ug	94.8	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1905234-1

ALS

QUALITY ASSURANCE SUMMARY SHEET

ALS W.O. # / BATCH Generic replanchetting 228
TEST Ra 228
METHOD prep
SOP/REV (PREP) 749
SOP/REV (ANAL) _____

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

R/S 9/4/18

For non-sequential Ra-em samples that are replanchetted:

1. Use the supernatant fraction from SOP 749 step 8.1.26.
2. If the supernatant is in a cup, transfer to a 50mL centrifuge tube and add 1mL Yttrium carrier.
3. Shake for ~36 hours and replanchett for Ra228 analysis per step 8.1.25.
4. On the benchsheet, the previous planchett decay date/time will become the new ingrowth date/time. The new decay date/time will be the new replanchet time as listed in step 8.1.26.

R/S 9/4/18

TECHNICIAN/ANALYST

Reilly Stockton

DATE

9/4/18

DEPARTMENT MANAGER

DATE

9/4/18



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

RE: Hunter CCR Groundwater Sampling / PERCM052

Dear Jeff Tucker:

Lab Set ID: 1905215

3440 South 700 West
Salt Lake City, UT 84119

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web: www.awal-labs.com

American West Analytical Laboratories received sample(s) on 5/9/2019 for the analyses presented in the following report.

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

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

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

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Thank You,

Approved by: _____
Laboratory Director or designee



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-001
Client Sample ID: ELF-1D
Collection Date: 5/8/2019 1635h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2038h	E200.7	0.500	2.23	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1846h	E200.7	10.0	377	²

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

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-002
Client Sample ID: ELF-2
Collection Date: 5/8/2019 1730h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2049h	E200.7	0.500	3.77	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1853h	E200.7	10.0	430	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-003
Client Sample ID: ELF-3
Collection Date: 5/8/2019 1430h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2052h	E200.7	0.500	1.51	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1855h	E200.7	10.0	465	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-004
Client Sample ID: ELF-4
Collection Date: 5/8/2019 1330h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2054h	E200.7	0.500	5.00	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1858h	E200.7	10.0	515	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-005
Client Sample ID: ELF-5
Collection Date: 5/8/2019 1245h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2056h	E200.7	0.500	6.06	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1900h	E200.7	10.0	489	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-006
Client Sample ID: ELF-6
Collection Date: 5/8/2019 1230h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2059h	E200.7	0.500	12.4	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1902h	E200.7	10.0	539	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-007
Client Sample ID: ELF-7
Collection Date: 5/8/2019 1400h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2107h	E200.7	0.500	1.86	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1911h	E200.7	10.0	471	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-008
Client Sample ID: ELF-8
Collection Date: 5/8/2019 1145h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 1913h	E200.7	5.00	29.8	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1913h	E200.7	10.0	606	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-009
Client Sample ID: ELF-9
Collection Date: 5/8/2019 1630h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2112h	E200.7	0.500	1.87	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1915h	E200.7	10.0	58.7	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-010
Client Sample ID: ELF-10
Collection Date: 5/8/2019 1500h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2115h	E200.7	0.500	2.12	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1918h	E200.7	10.0	543	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-011
Client Sample ID: ELF-11
Collection Date: 5/8/2019 1115h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2117h	E200.7	0.500	17.8	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1920h	E200.7	10.0	436	

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Jose Rocha
QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-012
Client Sample ID: ELF-12
Collection Date: 5/8/2019 1045h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2119h	E200.7	0.500	1.68	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1922h	E200.7	10.0	182	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-013
Client Sample ID: ELF-13
Collection Date: 5/8/2019 1000h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2122h	E200.7	0.500	0.703	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1925h	E200.7	10.0	481	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-014
Client Sample ID: ELF-14
Collection Date: 5/8/2019 915h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2124h	E200.7	0.500	2.42	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1927h	E200.7	10.0	534	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-015
Client Sample ID: DUP
Collection Date: 5/7/2019 1520h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2126h	E200.7	0.500	1.65	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 1929h	E200.7	10.0	425	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-016
Client Sample ID: FB
Collection Date: 5/7/2019 1400h
Received Date: 5/9/2019 721h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	5/13/2019 1648h	5/22/2019 2129h	E200.7	0.500	< 0.500	
Calcium	mg/L	5/13/2019 1648h	5/22/2019 2129h	E200.7	1.00	< 1.00	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-001
Client Sample ID: ELF-1D
Collection Date: 5/8/2019 1635h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/20/2019 1428h	E300.0	50.0	6,880	
Fluoride	mg/L		5/17/2019 240h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.02	H
Sulfate	mg/L		5/17/2019 1205h	E300.0	375	7,730	
Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	500	26,800	

H - Sample was received outside of the holding time.

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-002
Client Sample ID: ELF-2
Collection Date: 5/8/2019 1730h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/16/2019 2337h	E300.0	50.0	222	
Fluoride	mg/L		5/17/2019 257h	E300.0	0.100	0.310	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.17	H
Sulfate	mg/L		5/16/2019 2337h	E300.0	375	6,950	
Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	100	12,200	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-003
Client Sample ID: ELF-3
Collection Date: 5/8/2019 1430h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/20/2019 1444h	E300.0	10.0	768	
Fluoride	mg/L		5/17/2019 314h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.52	H
Sulfate	mg/L		5/16/2019 2353h	E300.0	1,500	27,700	
Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	500	50,700	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-004
Client Sample ID: ELF-4
Collection Date: 5/8/2019 1330h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 010h	E300.0	50.0	1,980	
Fluoride	mg/L		5/17/2019 330h	E300.0	0.100	0.187	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.06	H
Sulfate	mg/L		5/17/2019 010h	E300.0	375	4,800	
Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	100	11,800	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-005
Client Sample ID: ELF-5
Collection Date: 5/8/2019 1245h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 100h	E300.0	100	3,180	
Fluoride	mg/L		5/17/2019 347h	E300.0	0.100	0.108	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.09	H
Sulfate	mg/L		5/17/2019 100h	E300.0	750	8,640	
Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	500	21,600	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-006
Client Sample ID: ELF-6
Collection Date: 5/8/2019 1230h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 117h	E300.0	100	3,810	
Fluoride	mg/L		5/17/2019 404h	E300.0	0.100	0.139	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.06	H
Sulfate	mg/L		5/17/2019 117h	E300.0	750	7,840	
Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	500	23,700	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-007
Client Sample ID: ELF-7
Collection Date: 5/8/2019 1400h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/20/2019 1501h	E300.0	50.0	2,710	
Fluoride	mg/L		5/18/2019 205h	E300.0	0.100	0.132	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.03	H
Sulfate	mg/L		5/17/2019 1605h	E300.0	375	8,260	
Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	100	17,200	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-008
Client Sample ID: ELF-8
Collection Date: 5/8/2019 1145h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/21/2019 1013h	E300.0	50.0	2,100	
Fluoride	mg/L		5/18/2019 222h	E300.0	0.100	1.13	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.49	H
Sulfate	mg/L		5/17/2019 1621h	E300.0	150	2,980	
Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	100	9,400	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-009
Client Sample ID: ELF-9
Collection Date: 5/8/2019 1630h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/20/2019 1534h	E300.0	10.0	527	
Fluoride	mg/L		5/18/2019 239h	E300.0	0.100	1.43	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.95	H
Sulfate	mg/L		5/17/2019 1222h	E300.0	375	5,750	
Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	10,300	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-010
Client Sample ID: ELF-10
Collection Date: 5/8/2019 1500h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 1239h	E300.0	200	9,900	
Fluoride	mg/L		5/18/2019 255h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	6.88	H
Sulfate	mg/L		5/17/2019 1239h	E300.0	1,500	10,300	
Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	35,200	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-011
Client Sample ID: ELF-11
Collection Date: 5/8/2019 1115h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 1406h	E300.0	100	1,100	
Fluoride	mg/L		5/18/2019 312h	E300.0	0.100	0.173	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.23	H
Sulfate	mg/L		5/17/2019 1406h	E300.0	750	9,980	
Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	16,800	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-012
Client Sample ID: ELF-12
Collection Date: 5/8/2019 1045h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 1818h	E300.0	10.0	500	
Fluoride	mg/L		5/18/2019 329h	E300.0	0.100	0.341	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.55	H
Sulfate	mg/L		5/17/2019 1548h	E300.0	750	12,200	
Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	20,100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-013
Client Sample ID: ELF-13
Collection Date: 5/8/2019 1000h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 1422h	E300.0	100	2,730	
Fluoride	mg/L		5/18/2019 345h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.03	H
Sulfate	mg/L		5/17/2019 1422h	E300.0	750	7,730	
Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	16,700	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-014
Client Sample ID: ELF-14
Collection Date: 5/8/2019 915h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/20/2019 1624h	E300.0	100	5,070	
Fluoride	mg/L		5/18/2019 402h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.13	H
Sulfate	mg/L		5/17/2019 1638h	E300.0	750	7,280	
Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	19,700	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-015
Client Sample ID: DUP
Collection Date: 5/7/2019 1520h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 1728h	E300.0	50.0	9,610	
Fluoride	mg/L		5/18/2019 510h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		5/9/2019 1730h	SM4500-H+B	1.00	7.02	H
Sulfate	mg/L		5/17/2019 1728h	E300.0	375	9,910	
Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	35,100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905215-016
Client Sample ID: FB
Collection Date: 5/7/2019 1400h
Received Date: 5/9/2019 721h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		5/17/2019 1745h	E300.0	0.100	0.147	
Fluoride	mg/L		5/17/2019 1745h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		5/9/2019 1730h	SM4500-H+B	1.00	7.97	H
Sulfate	mg/L		5/17/2019 1745h	E300.0	0.750	< 0.750	
Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	10.0	12.0	

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: LCS-62590	Date Analyzed:	05/22/2019 1844h											
Test Code: 200.7-W	Date Prepared:	05/13/2019 1648h											
Boron	1.11	mg/L	E200.7	0.0633	0.500	1.000	0	111	85 - 115				
Calcium	9.95	mg/L	E200.7	0.0937	1.00	10.00	0	99.5	85 - 115				



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Jose Rocha

QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: MB-62590	Date Analyzed:	05/22/2019	1842h										
Test Code:	Date Prepared:	05/13/2019	1648h										
Boron	< 0.500	mg/L	E200.7	0.0633	0.500								
Calcium	< 1.00	mg/L	E200.7	0.0937	1.00								



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905215-001BMS	Date Analyzed:	05/22/2019 1849h											
Test Code:	200.7-W	Date Prepared:	05/13/2019 1648h										
Calcium	377	mg/L	E200.7	0.937	10.0	10.00	377	-7.32	70 - 130				²
Lab Sample ID: 1905215-001BMS	Date Analyzed:	05/22/2019 2045h											
Test Code:	200.7-W	Date Prepared:	05/13/2019 1648h										
Boron	3.42	mg/L	E200.7	0.0633	0.500	1.000	2.23	119	70 - 130				

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



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905215-001BMSD	Date Analyzed:	05/22/2019 1851h											
Test Code:	200.7-W	Date Prepared:	05/13/2019 1648h										
Calcium	406	mg/L	E200.7	0.937	10.0	10.00	377	289	70 - 130	377	7.58	20	²
Lab Sample ID: 1905215-001BMSD	Date Analyzed:	05/22/2019 2047h											
Test Code:	200.7-W	Date Prepared:	05/13/2019 1648h										
Boron	3.51	mg/L	E200.7	0.0633	0.500	1.000	2.23	127	70 - 130	3.42	2.52	20	

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



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: DUP

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905215-001ADUP Test Code: PH-4500H+B	Date Analyzed: 05/09/2019 1412h												
pH @ 25° C	7.02	pH Units	SM4500-H+B	1.00	1.00					7.02	0	5	H
Lab Sample ID: 1905215-009ADUP Test Code: PH-4500H+B	Date Analyzed: 05/09/2019 1412h												
pH @ 25° C	7.98	pH Units	SM4500-H+B	1.00	1.00					7.95	0.377	5	H
Lab Sample ID: 1905215-010ADUP Test Code: PH-4500H+B	Date Analyzed: 05/09/2019 1412h												
pH @ 25° C	6.90	pH Units	SM4500-H+B	1.00	1.00					6.88	0.290	5	H
Lab Sample ID: 1905215-015ADUP Test Code: PH-4500H+B	Date Analyzed: 05/09/2019 1730h												
pH @ 25° C	7.05	pH Units	SM4500-H+B	1.00	1.00					7.02	0.426	5	H
Lab Sample ID: 1905215-001ADUP Test Code: TDS-W-2540C	Date Analyzed: 05/09/2019 1350h												
Total Dissolved Solids	27,000	mg/L	SM2540C	400	500					26800	0.743	5	
Lab Sample ID: 1905215-009ADUP Test Code: TDS-W-2540C	Date Analyzed: 05/10/2019 1250h												
Total Dissolved Solids	10,500	mg/L	SM2540C	80.0	100					10300	1.54	5	
Lab Sample ID: 1905217-001ADUP Test Code: TDS-W-2540C	Date Analyzed: 05/10/2019 1250h												
Total Dissolved Solids	9,040	mg/L	SM2540C	80.0	100					8980	0.666	5	

H - Sample was received outside of the holding time.



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: LCS-R125986 Date Analyzed: 05/16/2019 2303h													
Test Code: 300.0-W													
Chloride	4.96	mg/L	E300.0	0.0386	0.100	5.000	0	99.2	90 - 110				
Fluoride	5.07	mg/L	E300.0	0.0240	0.100	5.000	0	101	90 - 110				
Sulfate	4.76	mg/L	E300.0	0.0557	0.750	5.000	0	95.3	90 - 110				
Lab Sample ID: LCS-R125988 Date Analyzed: 05/17/2019 1148h													
Test Code: 300.0-W													
Fluoride	5.22	mg/L	E300.0	0.0240	0.100	5.000	0	104	90 - 110				
Sulfate	5.02	mg/L	E300.0	0.0557	0.750	5.000	0	100	90 - 110				
Lab Sample ID: LCS-R125990 Date Analyzed: 05/17/2019 1925h													
Test Code: 300.0-W													
Chloride	5.16	mg/L	E300.0	0.0386	0.100	5.000	0	103	90 - 110				
Fluoride	5.12	mg/L	E300.0	0.0240	0.100	5.000	0	102	90 - 110				
Sulfate	5.12	mg/L	E300.0	0.0557	0.750	5.000	0	102	90 - 110				
Lab Sample ID: LCS-R126074 Date Analyzed: 05/20/2019 1411h													
Test Code: 300.0-W													
Chloride	5.05	mg/L	E300.0	0.0386	0.100	5.000	0	101	90 - 110				
Lab Sample ID: LCS-R125653 Date Analyzed: 05/09/2019 1412h													
Test Code: PH-4500H+B													
pH @ 25° C	9.05	pH Units	SM4500-H+B	1.00	1.00	9.000	0	101	98 - 102				
Lab Sample ID: LCS-R125660 Date Analyzed: 05/09/2019 1730h													
Test Code: PH-4500H+B													
pH @ 25° C	9.09	pH Units	SM4500-H+B	1.00	1.00	9.000	0	101	98 - 102				



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: LCS

Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID:	LCS-R125700	Date Analyzed:	05/09/2019 1350h											
Test Code:	TDS-W-2540C													
Total Dissolved Solids		182	mg/L	SM2540C	8.00	10.0	205.0	0	88.8	80 - 120				
Lab Sample ID:	LCS-R125749	Date Analyzed:	05/10/2019 1250h											
Test Code:	TDS-W-2540C													
Total Dissolved Solids		192	mg/L	SM2540C	8.00	10.0	205.0	0	93.7	80 - 120				



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: MB-R125986													
Date Analyzed:		05/16/2019 2247h											
Test Code:		300.0-W											
Chloride	< 0.100	mg/L	E300.0	0.0386	0.100								
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								
Sulfate	< 0.750	mg/L	E300.0	0.0557	0.750								
Lab Sample ID: MB-R125988													
Date Analyzed:		05/17/2019 1132h											
Test Code:		300.0-W											
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								
Sulfate	< 0.750	mg/L	E300.0	0.0557	0.750								
Lab Sample ID: MB-R125990													
Date Analyzed:		05/17/2019 1908h											
Test Code:		300.0-W											
Chloride	< 0.100	mg/L	E300.0	0.0386	0.100								
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								
Sulfate	< 0.750	mg/L	E300.0	0.0557	0.750								
Lab Sample ID: MB-R126074													
Date Analyzed:		05/20/2019 1354h											
Test Code:		300.0-W											
Chloride	< 0.100	mg/L	E300.0	0.0386	0.100								
Lab Sample ID: MB-R125700													
Date Analyzed:		05/09/2019 1350h											
Test Code:		TDS-W-2540C											
Total Dissolved Solids	< 10.0	mg/L	SM2540C	8.00	10.0								
Lab Sample ID: MB-R125749													
Date Analyzed:		05/10/2019 1250h											
Test Code:		TDS-W-2540C											
Total Dissolved Solids	< 10.0	mg/L	SM2540C	8.00	10.0								



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905215-004AMS Date Analyzed: 05/17/2019 027h													
Test Code: 300.0-W													
Chloride	4,480	mg/L	E300.0	19.3	50.0	2,500	1980	99.7	90 - 110				
Fluoride	2,510	mg/L	E300.0	12.0	50.0	2,500	0	101	90 - 110				
Sulfate	7,190	mg/L	E300.0	27.8	375	2,500	4800	95.8	90 - 110				
Lab Sample ID: 1905215-014AMS Date Analyzed: 05/17/2019 1655h													
Test Code: 300.0-W													
Fluoride	5,000	mg/L	E300.0	24.0	100	5,000	0	100	90 - 110				
Sulfate	12,400	mg/L	E300.0	55.7	750	5,000	7280	102	90 - 110				
Lab Sample ID: 1905217-003AMS Date Analyzed: 05/17/2019 2032h													
Test Code: 300.0-W													
Chloride	2,620	mg/L	E300.0	7.72	20.0	1,000	1610	101	90 - 110				
Fluoride	1,020	mg/L	E300.0	4.80	20.0	1,000	2.91	102	90 - 110				
Sulfate	1,570	mg/L	E300.0	11.1	150	1,000	565	100	90 - 110				
Lab Sample ID: 1905217-007AMS Date Analyzed: 05/17/2019 2245h													
Test Code: 300.0-W													
Fluoride	524	mg/L	E300.0	2.40	10.0	500.0	0	105	90 - 110				
Sulfate	1,340	mg/L	E300.0	5.57	75.0	500.0	821	103	90 - 110				
Lab Sample ID: 1905215-013AMS Date Analyzed: 05/17/2019 1439h													
Test Code: 300.0-W													
Chloride	7,920	mg/L	E300.0	38.6	100	5,000	2730	104	90 - 110				
Fluoride	5,230	mg/L	E300.0	24.0	100	5,000	0	105	90 - 110				
Sulfate	12,900	mg/L	E300.0	55.7	750	5,000	7730	103	90 - 110				



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905215-009AMS													
Date Analyzed:		05/20/2019 1551h											
Test Code:		300.0-W											
Chloride	1,560	mg/L	E300.0	7.72	20.0	1,000	527	103	90 - 110				
Lab Sample ID: 1905217-007AMS													
Date Analyzed:		05/20/2019 1731h											
Test Code:		300.0-W											
Chloride	756	mg/L	E300.0	3.86	10.0	500.0	253	101	90 - 110				



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905215-004AMSD Date Analyzed: 05/17/2019 043h													
Test Code: 300.0-W													
Chloride	4,430	mg/L	E300.0	19.3	50.0	2,500	1980	97.9	90 - 110	4480	1.03	20	
Fluoride	2,490	mg/L	E300.0	12.0	50.0	2,500	0	99.7	90 - 110	2510	0.845	20	
Sulfate	7,200	mg/L	E300.0	27.8	375	2,500	4800	96.3	90 - 110	7190	0.193	20	
Lab Sample ID: 1905215-014AMSD Date Analyzed: 05/17/2019 1711h													
Test Code: 300.0-W													
Fluoride	5,180	mg/L	E300.0	24.0	100	5,000	0	104	90 - 110	5000	3.44	20	
Sulfate	12,700	mg/L	E300.0	55.7	750	5,000	7280	109	90 - 110	12400	2.57	20	
Lab Sample ID: 1905217-003AMSD Date Analyzed: 05/17/2019 2048h													
Test Code: 300.0-W													
Chloride	2,660	mg/L	E300.0	7.72	20.0	1,000	1610	105	90 - 110	2620	1.42	20	
Fluoride	1,030	mg/L	E300.0	4.80	20.0	1,000	2.91	103	90 - 110	1020	0.829	20	
Sulfate	1,540	mg/L	E300.0	11.1	150	1,000	565	97.4	90 - 110	1570	1.76	20	
Lab Sample ID: 1905217-007AMSD Date Analyzed: 05/17/2019 2302h													
Test Code: 300.0-W													
Fluoride	515	mg/L	E300.0	2.40	10.0	500.0	0	103	90 - 110	524	1.66	20	
Sulfate	1,320	mg/L	E300.0	5.57	75.0	500.0	821	99.7	90 - 110	1340	1.31	20	
Lab Sample ID: 1905215-013AMSD Date Analyzed: 05/17/2019 1455h													
Test Code: 300.0-W													
Chloride	8,000	mg/L	E300.0	38.6	100	5,000	2730	105	90 - 110	7920	1.10	20	
Fluoride	5,240	mg/L	E300.0	24.0	100	5,000	0	105	90 - 110	5230	0.245	20	
Sulfate	12,600	mg/L	E300.0	55.7	750	5,000	7730	98.1	90 - 110	12900	1.96	20	



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905215

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905215-009AMSD													
Date Analyzed:		05/20/2019 1608h											
Test Code:		300.0-W											
Chloride	1,570	mg/L	E300.0	7.72	20.0	1,000	527	104	90 - 110	1560	0.431	20	
Lab Sample ID: 1905217-007AMSD													
Date Analyzed:		05/20/2019 1748h											
Test Code:		300.0-W											
Chloride	762	mg/L	E300.0	3.86	10.0	500.0	253	102	90 - 110	756	0.731	20	

WORK ORDER Summary

Work Order: **1905215**

Page 1 of 4

Client: PacifiCorp

Client ID: PAC900

Contact: Jeff Tucker

Due Date: 5/23/2019

Project: Hunter CCR Groundwater Sampling / PERCM052

QC Level: II+

WO Type: Project

Comments: QC2+. Include EDD. Cc: mholland@waterenvtech.com. Report Fluoride results on set 1905216 also. Metals share with set 1905216. Footnote report, pH received outside of hold.;

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage	
1905215-001A	ELF-1D	5/8/2019 1635h	5/9/2019 0721h	300.0-W	Aqueous		DF-WC	1
				3 SEL Analytes: CL F SO4				
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
1905215-001B				200.7-W			DF-Metals	
				2 SEL Analytes: B CA				
				200.7-W-PR			DF-Metals	
1905215-002A	ELF-2	5/8/2019 1730h	5/9/2019 0721h	300.0-W	Aqueous		DF-WC	1
				3 SEL Analytes: CL F SO4				
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
1905215-002B				200.7-W			DF-Metals	
				2 SEL Analytes: B CA				
				200.7-W-PR			DF-Metals	
1905215-003A	ELF-3	5/8/2019 1430h	5/9/2019 0721h	300.0-W	Aqueous		DF-WC	1
				3 SEL Analytes: CL F SO4				
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
1905215-003B				200.7-W			DF-Metals	
				2 SEL Analytes: B CA				
				200.7-W-PR			DF-Metals	
1905215-004A	ELF-4	5/8/2019 1330h	5/9/2019 0721h	300.0-W	Aqueous		DF-WC	1
				3 SEL Analytes: CL F SO4				
				PH-4500H+B			DF-WC	
				TDS-W-2540C			DF-WC	
1905215-004B				200.7-W			DF-Metals	
				2 SEL Analytes: B CA				
				200.7-W-PR			DF-Metals	

WORK ORDER Summary

Work Order: **1905215**

Page 2 of 4

Client: PacifiCorp

Due Date: 5/23/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1905215-005A	ELF-5	5/8/2019 1245h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-005B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1905215-006A	ELF-6	5/8/2019 1230h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-006B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1905215-007A	ELF-7	5/8/2019 1400h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-007B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1905215-008A	ELF-8	5/8/2019 1145h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-008B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1905215-009A	ELF-9	5/8/2019 1630h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-009B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals

WORK ORDER Summary

Work Order: **1905215**

Page 3 of 4

Client: PacifiCorp

Due Date: 5/23/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1905215-010A	ELF-10	5/8/2019 1500h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-010B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1905215-011A	ELF-11	5/8/2019 1115h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-011B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1905215-012A	ELF-12	5/8/2019 1045h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-012B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1905215-013A	ELF-13	5/8/2019 1000h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-013B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1905215-014A	ELF-14	5/8/2019 0915h	5/9/2019 0721h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-014B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals

WORK ORDER Summary

Work Order: **1905215** Page 4 of 4

Client: PacifiCorp

Due Date: 5/23/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1905215-015A	DUP	5/7/2019 1520h	5/9/2019 0721h	300.0-W	Aqueous		DF-WC
				3 SEL Analytes: CL F SO4			1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-015B				200.7-W			DF-Metals
				2 SEL Analytes: B CA			
				200.7-W-PR			DF-Metals
1905215-016A	FB	5/7/2019 1400h	5/9/2019 0721h	300.0-W	Aqueous		DF-WC
				3 SEL Analytes: CL F SO4			1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1905215-016B				200.7-W			DF-Metals
				2 SEL Analytes: B CA			
				200.7-W-PR			DF-Metals

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

Test Code

PH-4500H+B

American West
Analytical Laboratories

3440 S. 700 W. Salt Lake City, UT 84119
Phone #: (801) 263-8686 Toll Free #: (888) 263-SoSe
Fax #: (801) 263-8687 Email: awal@awal-labs.com

www.awal-labs.com

CHAIN OF CUSTODY

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

1965 215

AWAL Lab Sample Set #

Page 1 of 2

Client: **PACIFICORP-UT**

Address:

City, State, Zip:

Contact: **JEFF TUCKER**

Phone #: _____ Cell #: _____

E-mail: JEFF.TUCKER@PACIFICORP.COM

Project Name: **HUNTER CCR GROUNDWATER SAMPLING**

Project #: PERCM052

PO #:

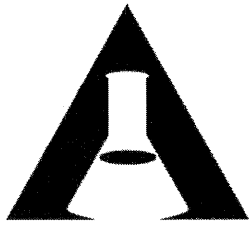
Sampler Name:

[illegible]

Relinquished by: Signature: <i>[Signature]</i>	Date: <i>5/16/2019</i>	Received by: Signature: <i>[Signature]</i>	Date: <i>5-09-19</i>	Special Instructions: PLEASE SEND A COPY OF THE ANALYTICAL REPORT TO MARCUS HOLLAND AT: <u>MHOLLAND@WATERENVTECH.COM</u> PLEASE RUN AT LEAST ONE LABORATORY SPIKE FOR THIS SAMPLE SET.
Print Name: <i>Mike Shirley</i>	Time: <i>0721</i>	Print Name: <i>Olyna Greenhill</i>	Time: <i>7:21</i>	
Relinquished by: Signature:	Date:	Received by: Signature:	Date:	
Print Name:	Time:	Print Name:	Time:	
Relinquished by: Signature:	Date:	Received by: Signature:	Date:	
Print Name:	Time:	Print Name:	Time:	

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

REV 11-21-18



American West
Analytical Laboratories

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CHAIN OF CUSTODY

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

1905215

AWAL Lab Sample Set #

Page 2 of 2

QC Level:			Turn Around Time:			Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.			Due Date:						
1	2	2+	3	3+	1	2	3	4	5	5 Std	5-23				
# of Containers	Sample Matrix	APPENDIX III										<div><input type="checkbox"/> Report down to the MDL <input type="checkbox"/> Include EDD: <input type="checkbox"/> Lab Filter for: <input type="checkbox"/> Field Filtered For: For Compliance With: <input type="checkbox"/> NELAP <input type="checkbox"/> RCRA <input type="checkbox"/> CWA <input type="checkbox"/> SDWA <input type="checkbox"/> ELAP / A2LA <input type="checkbox"/> NLLAP <input type="checkbox"/> Non-Compliance <input type="checkbox"/> Other: Known Hazards & Sample Comments</div>			

Laboratory Use Only		
COC Tape Was:		
1 Present on Outer Package	Y	N
2 Unbroken on Outer Package	Y	N
3 Present on Sample	Y	N
4 Unbroken on Sample	Y	N
Samples Were:		
1 Shipped or hand delivered	Hand Delivered	
2 Ambient or Chilled	Chilled	
3 Temperature	16 °C	
4 Received Intact	Y	
5 Properly Preserved	Y	
6 Received Within Holding Times	N	
Sample labels and COC Record Match?		
Y		

Relinquished by Signature	Date	Received by Signature	Date	Special Instructions:
Mike Shirley	5/7/2019	Lynn Granth	5-9-19	PLEASE SEND A COPY OF THE ANALYTICAL REPORT TO
	07:21		07:21	MARCUS HOLLAND AT:
				MHOLLAND@WATERENVTECH.COM
				PLEASE RUN AT LEAST ONE LABORATORY SPIKE FOR
				THIS SAMPLE SET

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

Constituents Analyzed	
Appendix III	Appendix IV
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
pH	Cadmium
Sulfate	Chromium
Total Dissolved Solids (TDS)	Cobalt
	Fluoride
	Lead
	Lithium
	Mercury
	Molybdenum
	Selenium
	Thallium
	Radium 226 and 228 Combined

Fluoride is included in both Appendix III and Appendix IV analyte lists. All wells have undergone analysis for both analyte lists for each event. Fluoride was not analyzed twice. The results are reported once under Appendix III constituents for each sample / each event.

Lab Set ID: 1905215
pH Lot #: 5912

Preservation Check Sheet

Sample Set Extension and pH

[illegible]

Procedure:

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

Frequency:

All samples requiring preservation

- * The sample required additional preservative upon receipt.
- + The sample was received unpreserved.
- ▲ The sample was received unpreserved and therefore preserved upon receipt.
- # The sample pH was unadjustable to a pH < 2 due to the sample matrix.
- The sample pH was unadjustable to a pH > ____ due to the sample matrix interference.



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

RE: Hunter CCR Groundwater Sampling / PERCM052

Dear Jeff Tucker:

Lab Set ID: 1905216

3440 South 700 West
Salt Lake City, UT 84119

American West Analytical Laboratories received sample(s) on 5/9/2019 for the analyses presented in the following report.

Phone: (801) 263-8686
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web: www.awal-labs.com

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

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

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

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

Thank You,

Approved by: _____
Laboratory Director or designee

Sample(s) were subcontracted for the following analyses:

Radiological Testing



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-001
Client Sample ID: ELF-1D
Collection Date: 5/8/2019 1635h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1644h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	0.00846	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	0.00234	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00400	< 0.00400	
Lead	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1846h	E200.7	1.00	2.20	¹
Mercury	mg/L	5/13/2019 1430h	5/14/2019 801h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	0.0207	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	< 0.00200	

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-002
Client Sample ID: ELF-2
Collection Date: 5/8/2019 1730h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Salt Lake City, UT 84119

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1653h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	0.00989	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	0.00238	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00400	< 0.00400	
Lead	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1853h	E200.7	1.00	1.76	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 811h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	0.00314	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	0.0319	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-003
Client Sample ID: ELF-3
Collection Date: 5/8/2019 1430h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/20/2019 1548h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	0.00205	
Barium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	0.0391	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.000500	0.000779	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	0.00422	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00400	0.0214	
Lead	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	0.00605	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1855h	E200.7	1.00	3.26	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 813h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	0.0209	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	0.502	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	< 0.00200	

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Salt Lake City, UT 84119

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web: www.awal-labs.com

Kyle F. Gross

Laboratory Director

Jose Rocha

QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-004
Client Sample ID: ELF-4
Collection Date: 5/8/2019 1330h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Salt Lake City, UT 84119

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1700h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	0.0118	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00400	0.00593	
Lead	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1858h	E200.7	1.00	1.82	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 815h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	0.00272	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-005
Client Sample ID: ELF-5
Collection Date: 5/8/2019 1245h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

3440 South 700 West
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Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1703h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	0.0138	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00400	0.0102	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1900h	E200.7	1.00	4.29	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 817h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	0.00486	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	0.00913	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-006
Client Sample ID: ELF-6
Collection Date: 5/8/2019 1230h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

3440 South 700 West
Salt Lake City, UT 84119

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web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1706h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	0.0159	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00400	0.0358	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1902h	E200.7	1.00	5.56	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 819h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	0.00795	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-007
Client Sample ID: ELF-7
Collection Date: 5/8/2019 1400h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1718h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	0.00947	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00400	0.00530	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1911h	E200.7	1.00	2.23	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 821h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	0.00228	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	0.0662	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	< 0.00200	

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Laboratory Director

Jose Rocha

QA Officer



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-008
Client Sample ID: ELF-8
Collection Date: 5/8/2019 1145h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Jose Rocha
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1721h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	0.0110	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.000500	0.00195	
Chromium	mg/L	5/13/2019 1648h	5/20/2019 1551h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00400	0.201	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	0.00643	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1913h	E200.7	1.00	4.03	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 828h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	0.399	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-009
Client Sample ID: ELF-9
Collection Date: 5/8/2019 1630h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1724h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	0.00960	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	0.0126	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/20/2019 1554h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00400	< 0.00400	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/23/2019 1125h	E200.7	0.100	0.759	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 830h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	0.113	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-010
Client Sample ID: ELF-10
Collection Date: 5/8/2019 1500h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/20/2019 1557h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.00200	0.0184	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/20/2019 1557h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.00400	0.00558	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1918h	E200.7	1.00	1.76	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 832h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.00200	0.0516	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1153h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-011
Client Sample ID: ELF-11
Collection Date: 5/8/2019 1115h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1731h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00200	0.0142	
Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1516h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/20/2019 1516h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00400	0.0146	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1920h	E200.7	1.00	3.49	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 834h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00200	0.0183	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00200	0.0649	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-012
Client Sample ID: ELF-12
Collection Date: 5/8/2019 1045h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1734h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00200	0.0192	
Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1527h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/20/2019 1527h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00400	< 0.00400	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/23/2019 1127h	E200.7	0.100	0.839	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 836h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-013
Client Sample ID: ELF-13
Collection Date: 5/8/2019 1000h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1737h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00200	0.0111	
Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1530h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/20/2019 1530h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00400	< 0.00400	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1925h	E200.7	1.00	2.06	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 838h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-014
Client Sample ID: ELF-14
Collection Date: 5/8/2019 915h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1740h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00200	0.0327	
Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1533h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/20/2019 1533h	E200.8	0.00200	0.00888	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00400	0.00976	
Lead	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00200	0.00241	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1927h	E200.7	1.00	4.79	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 840h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00200	0.00387	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00200	0.00512	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-015
Client Sample ID: DUP
Collection Date: 5/7/2019 1520h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1743h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	0.0215	
Beryllium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00400	0.00451	
Lead	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/22/2019 1929h	E200.7	1.00	1.37	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 842h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	0.0389	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-016
Client Sample ID: FB
Collection Date: 5/7/2019 1400h
Received Date: 5/9/2019 722h

Analytical Results

TOTAL METALS

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	5/13/2019 1648h	5/17/2019 1746h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	
Barium	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	
Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1536h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00400	< 0.00400	
Lead	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	5/13/2019 1648h	5/23/2019 1130h	E200.7	0.100	< 0.100	
Mercury	mg/L	5/13/2019 1430h	5/14/2019 848h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-001
Client Sample ID: ELF-1D
Collection Date: 5/8/2019 1635h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/17/2019 240h	E300.0	0.100	< 0.100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-002
Client Sample ID: ELF-2
Collection Date: 5/8/2019 1730h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/17/2019 257h	E300.0	0.100	0.310	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-003
Client Sample ID: ELF-3
Collection Date: 5/8/2019 1430h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/17/2019 314h	E300.0	0.100	< 0.100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-004
Client Sample ID: ELF-4
Collection Date: 5/8/2019 1330h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/17/2019 330h	E300.0	0.100	0.187	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-005
Client Sample ID: ELF-5
Collection Date: 5/8/2019 1245h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/17/2019 347h	E300.0	0.100	0.108	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-006
Client Sample ID: ELF-6
Collection Date: 5/8/2019 1230h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/17/2019 404h	E300.0	0.100	0.139	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-007
Client Sample ID: ELF-7
Collection Date: 5/8/2019 1400h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 205h	E300.0	0.100	0.132	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-008
Client Sample ID: ELF-8
Collection Date: 5/8/2019 1145h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 222h	E300.0	0.100	1.13	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-009
Client Sample ID: ELF-9
Collection Date: 5/8/2019 1630h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 239h	E300.0	0.100	1.43	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-010
Client Sample ID: ELF-10
Collection Date: 5/8/2019 1500h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 255h	E300.0	0.100	< 0.100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-011
Client Sample ID: ELF-11
Collection Date: 5/8/2019 1115h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 312h	E300.0	0.100	0.173	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-012
Client Sample ID: ELF-12
Collection Date: 5/8/2019 1045h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 329h	E300.0	0.100	0.341	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-013
Client Sample ID: ELF-13
Collection Date: 5/8/2019 1000h
Received Date: 5/9/2019 722h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 345h	E300.0	0.100	< 0.100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-014
Client Sample ID: ELF-14
Collection Date: 5/8/2019 915h
Received Date: 5/9/2019 722h

Analytical Results

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 402h	E300.0	0.100	< 0.100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-015
Client Sample ID: DUP
Collection Date: 5/7/2019 1520h
Received Date: 5/9/2019 722h

Analytical Results

3440 South 700 West
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/18/2019 510h	E300.0	0.100	< 0.100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1905216-016
Client Sample ID: FB
Collection Date: 5/7/2019 1400h
Received Date: 5/9/2019 722h

Analytical Results

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		5/17/2019 1745h	E300.0	0.100	< 0.100	

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905216

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: LCS-62582	Date Analyzed:	05/22/2019 1844h											
Test Code:	200.7-W	Date Prepared:	05/13/2019 1648h										
Lithium	1.13	mg/L	E200.7	0.0140	0.100	1.000	0	113	80 - 120				
Lab Sample ID: LCS-62588	Date Analyzed:	05/14/2019 823h											
Test Code:	200.8-W	Date Prepared:	05/13/2019 1648h										
Arsenic	0.189	mg/L	E200.8	0.000298	0.00200	0.2000	0	94.6	85 - 115				
Barium	0.191	mg/L	E200.8	0.000688	0.00200	0.2000	0	95.5	85 - 115				
Beryllium	0.192	mg/L	E200.8	0.000198	0.00200	0.2000	0	96.0	85 - 115				
Cadmium	0.186	mg/L	E200.8	0.0000858	0.000500	0.2000	0	93.0	85 - 115				
Chromium	0.190	mg/L	E200.8	0.00191	0.00200	0.2000	0	95.0	85 - 115				
Cobalt	0.189	mg/L	E200.8	0.000300	0.00400	0.2000	0	94.7	85 - 115				
Lead	0.188	mg/L	E200.8	0.000448	0.00200	0.2000	0	93.9	85 - 115				
Molybdenum	0.193	mg/L	E200.8	0.000652	0.00200	0.2000	0	96.5	85 - 115				
Selenium	0.192	mg/L	E200.8	0.000574	0.00200	0.2000	0	95.8	85 - 115				
Thallium	0.189	mg/L	E200.8	0.000154	0.00200	0.2000	0	94.4	85 - 115				
Lab Sample ID: LCS-62588	Date Analyzed:	05/17/2019 1641h											
Test Code:	200.8-W	Date Prepared:	05/13/2019 1648h										
Antimony	0.189	mg/L	E200.8	0.000668	0.00400	0.2000	0	94.4	85 - 115				
Lab Sample ID: LCS-62587	Date Analyzed:	05/14/2019 747h											
Test Code:	HG-DW-245.1	Date Prepared:	05/13/2019 1430h										
Mercury	0.00350	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	105	85 - 115				



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905216

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: MB-62582	Date Analyzed:	05/22/2019 1842h											
Test Code:	200.7-W	Date Prepared:	05/13/2019 1648h										
Lithium	< 0.100	mg/L	E200.7	0.0140	0.100								
Lab Sample ID: MB-62588	Date Analyzed:	05/14/2019 820h											
Test Code:	200.8-W	Date Prepared:	05/13/2019 1648h										
Arsenic	< 0.00200	mg/L	E200.8	0.000298	0.00200								
Barium	< 0.00200	mg/L	E200.8	0.000688	0.00200								
Beryllium	< 0.00200	mg/L	E200.8	0.000198	0.00200								
Cadmium	< 0.000500	mg/L	E200.8	0.0000858	0.000500								
Chromium	< 0.00200	mg/L	E200.8	0.00191	0.00200								
Cobalt	< 0.00400	mg/L	E200.8	0.000300	0.00400								
Lead	< 0.00200	mg/L	E200.8	0.000448	0.00200								
Molybdenum	< 0.00200	mg/L	E200.8	0.000652	0.00200								
Selenium	< 0.00200	mg/L	E200.8	0.000574	0.00200								
Thallium	< 0.00200	mg/L	E200.8	0.000154	0.00200								
Lab Sample ID: MB-62588	Date Analyzed:	05/17/2019 1638h											
Test Code:	200.8-W	Date Prepared:	05/13/2019 1648h										
Antimony	< 0.00400	mg/L	E200.8	0.000668	0.00400								
Lab Sample ID: MB-62587	Date Analyzed:	05/14/2019 745h											
Test Code:	HG-DW-245.1	Date Prepared:	05/13/2019 1430h										
Mercury	< 0.0000900	mg/L	E245.1	0.0000396	0.0000900								



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905216

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905216-001BMS	Date Analyzed:	05/22/2019 1849h											
Test Code:	200.7-W	Date Prepared:	05/13/2019 1648h										
Lithium	3.29	mg/L	E200.7	0.140	1.00	1.000	2.2	109	75 - 125				
Lab Sample ID: 1905216-001BMS	Date Analyzed:	05/14/2019 835h											
Test Code:	200.8-W	Date Prepared:	05/13/2019 1648h										
Arsenic	0.216	mg/L	E200.8	0.000298	0.00200	0.2000	0.00112	107	75 - 125				
Barium	0.195	mg/L	E200.8	0.000688	0.00200	0.2000	0.00846	93.1	75 - 125				
Beryllium	0.193	mg/L	E200.8	0.000198	0.00200	0.2000	0	96.5	75 - 125				
Cadmium	0.191	mg/L	E200.8	0.0000858	0.000500	0.2000	0.000141	95.5	75 - 125				
Chromium	0.189	mg/L	E200.8	0.00191	0.00200	0.2000	0.00234	93.6	75 - 125				
Cobalt	0.182	mg/L	E200.8	0.000300	0.00400	0.2000	0.00284	89.8	75 - 125				
Lead	0.174	mg/L	E200.8	0.000448	0.00200	0.2000	0	87.1	75 - 125				
Molybdenum	0.232	mg/L	E200.8	0.000652	0.00200	0.2000	0.0207	106	75 - 125				
Selenium	0.210	mg/L	E200.8	0.000574	0.00200	0.2000	0.000762	105	75 - 125				
Thallium	0.176	mg/L	E200.8	0.000154	0.00200	0.2000	0	87.9	75 - 125				
Lab Sample ID: 1905216-001BMS	Date Analyzed:	05/17/2019 1647h											
Test Code:	200.8-W	Date Prepared:	05/13/2019 1648h										
Antimony	0.208	mg/L	E200.8	0.000668	0.00400	0.2000	0.00112	103	75 - 125				
Lab Sample ID: 1905216-001BMS	Date Analyzed:	05/14/2019 807h											
Test Code:	HG-DW-245.1	Date Prepared:	05/13/2019 1430h										
Mercury	0.00287	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	86.3	80 - 120				



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905216

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905216-001BMSD	Date Analyzed:	05/22/2019 1851h											
Test Code:	200.7-W	Date Prepared:	05/13/2019 1648h										
Lithium	3.52	mg/L	E200.7	0.140	1.00	1.000	2.2	131	75 - 125	3.29	6.55	20	¹
Lab Sample ID: 1905216-001BMSD	Date Analyzed:	05/14/2019 838h											
Test Code:	200.8-W	Date Prepared:	05/13/2019 1648h										
Arsenic	0.215	mg/L	E200.8	0.000298	0.00200	0.2000	0.00112	107	75 - 125	0.216	0.371	20	
Barium	0.196	mg/L	E200.8	0.000688	0.00200	0.2000	0.00846	93.8	75 - 125	0.195	0.688	20	
Beryllium	0.193	mg/L	E200.8	0.000198	0.00200	0.2000	0	96.5	75 - 125	0.193	0.0425	20	
Cadmium	0.192	mg/L	E200.8	0.0000858	0.000500	0.2000	0.000141	95.9	75 - 125	0.191	0.348	20	
Chromium	0.188	mg/L	E200.8	0.00191	0.00200	0.2000	0.00234	92.9	75 - 125	0.189	0.739	20	
Cobalt	0.180	mg/L	E200.8	0.000300	0.00400	0.2000	0.00284	88.6	75 - 125	0.182	1.25	20	
Lead	0.174	mg/L	E200.8	0.000448	0.00200	0.2000	0	86.8	75 - 125	0.174	0.359	20	
Molybdenum	0.232	mg/L	E200.8	0.000652	0.00200	0.2000	0.0207	105	75 - 125	0.232	0.0773	20	
Selenium	0.209	mg/L	E200.8	0.000574	0.00200	0.2000	0.000762	104	75 - 125	0.21	0.497	20	
Thallium	0.176	mg/L	E200.8	0.000154	0.00200	0.2000	0	88.2	75 - 125	0.176	0.298	20	
Lab Sample ID: 1905216-001BMSD	Date Analyzed:	05/17/2019 1650h											
Test Code:	200.8-W	Date Prepared:	05/13/2019 1648h										
Antimony	0.207	mg/L	E200.8	0.000668	0.00400	0.2000	0.00112	103	75 - 125	0.208	0.362	20	
Lab Sample ID: 1905216-001BMSD	Date Analyzed:	05/14/2019 809h											
Test Code:	HG-DW-245.1	Date Prepared:	05/13/2019 1430h										
Mercury	0.00279	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	83.8	80 - 120	0.00287	2.88	20	

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905216

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: LCS

Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID:	LCS-R125987	Date Analyzed:	05/16/2019 2303h											
Test Code:	300.0-W													
Fluoride		5.07	mg/L	E300.0	0.0240	0.100	5.000	0	101	90 - 110				
Lab Sample ID:	LCS-R125989	Date Analyzed:	05/17/2019 1148h											
Test Code:	300.0-W													
Fluoride		5.22	mg/L	E300.0	0.0240	0.100	5.000	0	104	90 - 110				
Lab Sample ID:	LCS-R125991	Date Analyzed:	05/17/2019 1925h											
Test Code:	300.0-W													
Fluoride		5.12	mg/L	E300.0	0.0240	0.100	5.000	0	102	90 - 110				



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Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905216

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: MB-R125987	Date Analyzed:	05/16/2019	2247h										
Test Code:	300.0-W												
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								
Lab Sample ID: MB-R125989	Date Analyzed:	05/17/2019	1132h										
Test Code:	300.0-W												
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								
Lab Sample ID: MB-R125991	Date Analyzed:	05/17/2019	1908h										
Test Code:	300.0-W												
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								



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Kyle F. Gross

Laboratory Director

Jose Rocha

QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905216

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905216-004AMS	Date Analyzed:	05/17/2019 027h											
Test Code:	300.0-W												
Fluoride	2,510	mg/L	E300.0	12.0	50.0	2,500	0.187	101	90 - 110				
Lab Sample ID: 1905216-014AMS	Date Analyzed:	05/17/2019 1655h											
Test Code:	300.0-W												
Fluoride	5,000	mg/L	E300.0	24.0	100	5,000	0.0971	100	90 - 110				
Lab Sample ID: 1905216-013AMS	Date Analyzed:	05/17/2019 1439h											
Test Code:	300.0-W												
Fluoride	5,230	mg/L	E300.0	24.0	100	5,000	0.0471	105	90 - 110				
Lab Sample ID: 1905219-003AMS	Date Analyzed:	05/17/2019 2032h											
Test Code:	300.0-W												
Fluoride	1,020	mg/L	E300.0	4.80	20.0	1,000	2.91	102	90 - 110				
Lab Sample ID: 1905219-007AMS	Date Analyzed:	05/17/2019 2245h											
Test Code:	300.0-W												
Fluoride	524	mg/L	E300.0	2.40	10.0	500.0	0.144	105	90 - 110				



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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1905216

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1905216-004AMSD													
Date Analyzed:		05/17/2019 043h											
Test Code:		300.0-W											
Fluoride	2,490	mg/L	E300.0	12.0	50.0	2,500	0.187	99.7	90 - 110	2510	0.845	20	
Lab Sample ID: 1905216-014AMSD													
Date Analyzed:		05/17/2019 1711h											
Test Code:		300.0-W											
Fluoride	5,180	mg/L	E300.0	24.0	100	5,000	0.0971	104	90 - 110	5000	3.44	20	
Lab Sample ID: 1905216-013AMSD													
Date Analyzed:		05/17/2019 1455h											
Test Code:		300.0-W											
Fluoride	5,240	mg/L	E300.0	24.0	100	5,000	0.0471	105	90 - 110	5230	0.245	20	
Lab Sample ID: 1905219-003AMSD													
Date Analyzed:		05/17/2019 2048h											
Test Code:		300.0-W											
Fluoride	1,030	mg/L	E300.0	4.80	20.0	1,000	2.91	103	90 - 110	1020	0.829	20	
Lab Sample ID: 1905219-007AMSD													
Date Analyzed:		05/17/2019 2302h											
Test Code:		300.0-W											
Fluoride	515	mg/L	E300.0	2.40	10.0	500.0	0.144	103	90 - 110	524	1.66	20	

WORK ORDER SummaryWork Order: **1905216**

Page 1 of 6

Client: PacifiCorp

Client ID: PAC900

Contact: Jeff Tucker

Due Date: 5/23/2019

Project: Hunter CCR Groundwater Sampling / PERCM052

QC Level: II+

WO Type: Project

Comments: QC2+. Include EDD. RADS sent to ALS-Ft Collins. Report Fluoride results also on set 1905215. Metals share with set 1905215. Cc: mholland@waterenvtech.com.;

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage	
1905216-001A	ELF-1D	5/8/2019 1635h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1
				1 SEL Analytes: F				
1905216-001B				200.7-W			DF-Metals	
				1 SEL Analytes: LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL				
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
1905216-001C				OUTSIDE LAB			ALS	2
1905216-002A	ELF-2	5/8/2019 1730h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1
				1 SEL Analytes: F				
1905216-002B				200.7-W			DF-Metals	
				1 SEL Analytes: LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL				
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
1905216-002C				OUTSIDE LAB			ALS	2
1905216-003A	ELF-3	5/8/2019 1430h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1
				1 SEL Analytes: F				
1905216-003B				200.7-W			DF-Metals	
				1 SEL Analytes: LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL				
				200.8-W-PR			DF-Metals	

WORK ORDER Summary

Work Order: **1905216**

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Client: PacifiCorp

Due Date: 5/23/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1905216-003B	ELF-3	5/8/2019 1430h	5/9/2019 0722h	HG-DW-245.1	Aqueous		DF-Metals 1
				HG-DW-PR			DF-Metals
1905216-003C				OUTSIDE LAB			ALS 2
1905216-004A	ELF-4	5/8/2019 1330h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC 1
				1 SEL Analytes: F			
1905216-004B				200.7-W			DF-Metals
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
	1905216-004C			HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
				OUTSIDE LAB			ALS 2
1905216-005A	ELF-5	5/8/2019 1245h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC 1
				1 SEL Analytes: F			
1905216-005B				200.7-W			DF-Metals
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
	1905216-005C			HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
				OUTSIDE LAB			ALS 2
1905216-006A	ELF-6	5/8/2019 1230h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC 1
				1 SEL Analytes: F			
1905216-006B				200.7-W			DF-Metals
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
	1905216-006C			HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
				OUTSIDE LAB			ALS 2

WORK ORDER Summary

Work Order: **1905216**

Page 3 of 6

Client: PacifiCorp

Due Date: 5/23/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage		
1905216-007A	ELF-7	5/8/2019 1400h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1	
1905216-007B				1 SEL Analytes: F					
				200.7-W			DF-Metals		
				1 SEL Analytes: LI					
				200.7-W-PR			DF-Metals		
				200.8-W			DF-Metals		
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL					
				200.8-W-PR			DF-Metals		
				HG-DW-245.1			DF-Metals		
HG-DW-PR		DF-Metals							
1905216-007C				OUTSIDE LAB		ALS	2		
1905216-008A	ELF-8	5/8/2019 1145h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1	
1905216-008B				1 SEL Analytes: F					
				200.7-W			DF-Metals		
				1 SEL Analytes: LI					
				200.7-W-PR			DF-Metals		
				200.8-W			DF-Metals		
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL					
				200.8-W-PR			DF-Metals		
				HG-DW-245.1			DF-Metals		
HG-DW-PR		DF-Metals							
1905216-008C				OUTSIDE LAB		ALS	2		
1905216-009A	ELF-9	5/8/2019 1630h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1	
1905216-009B				1 SEL Analytes: F					
				200.7-W			DF-Metals		
				1 SEL Analytes: LI					
				200.7-W-PR			DF-Metals		
				200.8-W			DF-Metals		
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL					
				200.8-W-PR			DF-Metals		
				HG-DW-245.1			DF-Metals		
HG-DW-PR		DF-Metals							
1905216-009C				OUTSIDE LAB		ALS	2		
1905216-010A	ELF-10	5/8/2019 1500h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1	
				1 SEL Analytes: F					

WORK ORDER Summary

Work Order: **1905216**

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Client: PacifiCorp

Due Date: 5/23/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1905216-010B	ELF-10	5/8/2019 1500h	5/9/2019 0722h	200.7-W	Aqueous		DF-Metals
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1905216-010C				OUTSIDE LAB			ALS
1905216-011A	ELF-11	5/8/2019 1115h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC
				1 SEL Analytes: F			
1905216-011B				200.7-W			DF-Metals
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1905216-011C				OUTSIDE LAB			ALS
1905216-012A	ELF-12	5/8/2019 1045h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC
				1 SEL Analytes: F			
1905216-012B				200.7-W			DF-Metals
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1905216-012C				OUTSIDE LAB			ALS
1905216-013A	ELF-13	5/8/2019 1000h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC
				1 SEL Analytes: F			
1905216-013B				200.7-W			DF-Metals
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals

WORK ORDER Summary

Work Order: **1905216**

Page 5 of 6

Client: PacifiCorp

Due Date: 5/23/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage		
1905216-013B	ELF-13	5/8/2019 1000h	5/9/2019 0722h	200.8-W	Aqueous		DF-Metals	1	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL					
				200.8-W-PR			DF-Metals		
				HG-DW-245.1			DF-Metals		
				HG-DW-PR			DF-Metals		
1905216-013C				OUTSIDE LAB			ALS	2	
1905216-014A	ELF-14	5/8/2019 0915h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1	
				1 SEL Analytes: F					
1905216-014B				200.7-W			DF-Metals		
				1 SEL Analytes: LI					
				200.7-W-PR			DF-Metals		
				200.8-W			DF-Metals		
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL					
				200.8-W-PR			DF-Metals		
				HG-DW-245.1			DF-Metals		
				HG-DW-PR			DF-Metals		
1905216-014C				OUTSIDE LAB			ALS	2	
1905216-015A	DUP	5/7/2019 1520h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1	
				1 SEL Analytes: F					
1905216-015B				200.7-W			DF-Metals		
				1 SEL Analytes: LI					
				200.7-W-PR			DF-Metals		
				200.8-W			DF-Metals		
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL					
				200.8-W-PR			DF-Metals		
				HG-DW-245.1			DF-Metals		
				HG-DW-PR			DF-Metals		
1905216-015C				OUTSIDE LAB			ALS	2	
1905216-016A	FB	5/7/2019 1400h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	1	
				1 SEL Analytes: F					
1905216-016B				200.7-W			DF-Metals		
				1 SEL Analytes: LI					
				200.7-W-PR			DF-Metals		
				200.8-W			DF-Metals		
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL					
				200.8-W-PR			DF-Metals		

WORK ORDER Summary

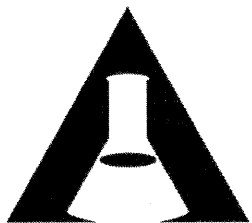
Work Order: **1905216**

Page 6 of 6

Client: PacifiCorp

Due Date: 5/23/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1905216-016B	FB	5/7/2019 1400h	5/9/2019 0722h	HG-DW-245.1	Aqueous		DF-Metals 1
				HG-DW-PR			DF-Metals
1905216-016C				OUTSIDE LAB			ALS 2



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CHAIN OF CUSTODY

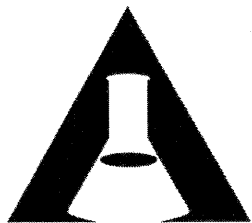
All analysis will be conducted using NELAP accredited methods and all data will be reported using AWAL's standard analyte lists and reporting limits (PQL) unless specifically requested otherwise on this Chain of Custody and/or attached documentation.

1905216

AWAL Lab Sample Set #

Page 1 of 2

QC Level:		Turn Around Time:		Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.		Due Date:																																									
1	2	2+	3	3+	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12							
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American West Analytical Laboratories

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Fax # (801) 263-9687 Email: awal@awal-labs.com

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CHAIN OF CUSTODY

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

1905244

AWAL Lab Sample Set #

Page 2 of 2

QC Level:		Turn Around Time:		Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.		Due Date:	
1	2 <u>2+</u> 3 3+	1	2 3 4 5 <u>5nd</u>			5-23	
15 16 4 5 6 7 8 9 10 11 12 13 14 15	Sample ID:	Date Sampled	Time Sampled	# of Containers	Sample Matrix	APPENDIX IV	Known Hazards & Sample Comments
	DUP	5/7/2019	15:20	3+	W	X	only 1 bottle for RADS
	FB	5/7/2019	14:00	4	W	X	

☐ Report down to the MDL
☐ Include EDD:
☐ Lab Filter for:
☐ Field Filtered For:

For Compliance With:

☐ NELAP
☐ RCRA
☐ CWA
☐ SDWA
☐ ELAP / A2LA
☐ NLLAP
☐ Non-Compliance
☐ Other:

Laboratory Use Only

COC Tape Was:

1 Present on Outer Packaging Y N NA

2 Unbroken on Outer Packaging Y N NA

3 Present on Sample Y N NA

4 Unbroken on Sample Y N NA

Samples Were:

1 Shipped or hand delivered 5-6

2 Ambient or Chilled 5-6

3 Temperature 5-6 °C

4 Received Intact Y N

5 Properly Preserved Y N Checked at bench

6 Received Within Holding Times Y N

Sample Labels and COC Record Match? Y N

Relinquished by: Signature: <u>Mike Shirley</u>	Date: <u>5/9/2019</u>	Received by: Signature: <u>Myra Greenwell</u>	Date: <u>5-8-19</u>
Print Name: <u>Mike Shirley</u>	Time: <u>0720</u>	Print Name: <u>Myra Greenwell</u>	Time: <u>2:12</u>
Relinquished by: Signature:	Date:	Received by: Signature:	Date:
Print Name:	Time:	Print Name:	Time:
Relinquished by: Signature:	Date:	Received by: Signature:	Date:
Print Name:	Time:	Print Name:	Time:

Special Instructions:

PLEASE SEND A COPY OF THE ANALYTICAL REPORT TO

MARCUS HOLLAND AT:

MHOLLAND@WATERENVTECH.COM

PLEASE RUN AT LEAST ONE LABORATORY SPIKE FOR THIS SAMPLE SET.

Constituents Analyzed	
Appendix III	Appendix IV
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
pH	Cadmium
Sulfate	Chromium
Total Dissolved Solids (TDS)	Cobalt
	Fluoride
	Lead
	Lithium
	Mercury
	Molybdenum
	Selenium
	Thallium
	Radium 226 and 228 Combined

Fluoride is included in both Appendix III and Appendix IV analyte lists. All wells have undergone analysis for both analyte lists for each event. Fluoride was not analyzed twice. The results are reported once under Appendix III constituents for each sample / each event.

Lab Set ID: 1905216
pH Lot #: 5912

Preservation Check Sheet

Sample Set Extension and pH

[illegible]

Procedure:

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

Frequency: All samples requiring preservation

- * The sample required additional preservative upon receipt.
- + The sample was received unpreserved.
- ▲ The sample was received unpreserved and therefore preserved upon receipt.
- # The sample pH was unadjustable to a pH < 2 due to the sample matrix.
- The sample pH was unadjustable to a pH > due to the sample matrix interference.

ATTACHMENT B:

Field Summary Report – August Event

Facility Name: Hunter Power Plant – CCR Landfill
Event Description: Assessment Monitoring
Event Dates: August 20, 2019
Field Personnel: Mike Shirley, Christina Eggersperger

ACTIVITY SUMMARY. WET personnel arrived onsite August 20, 2019 and performed groundwater sampling at Hunter CCR Landfill. Prior to collecting samples, field instruments were calibrated, followed by the collection of water levels in the CCR monitoring wells. After recording water levels, the wells were purged in accordance with the EPA low-flow method. Field parameters were monitored during well purging in accordance with the site-specific sampling and analysis plan (SAP). Once field parameters met the SAP stabilization requirements, groundwater samples were collected for Appendix III and Appendix IV constituents. All calibration data and field measurements were recorded on the WET electronic field form. The wells that underwent sampling during this sampling event included:

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

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

- Date fieldwork completed: 8/20/2019
- Dates unvalidated lab data received: 9/23/2019
- Data validation completion date: 10/24/2019

After collection, the samples were preserved in accordance with the SAP, placed on ice, chain of custody forms were completed, and the samples were transported to American West Analytical Laboratories (AWAL) in Salt Lake City, Utah for analysis. Samples arrived at AWAL on 8/21/2019. AWAL subcontracted Radium analyses to ALS Global in Fort Collins, Colorado. Samples arrived at ALS on 8/26/2019. The following information is attached to this summary as a supplement:

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

SAP DEVIATIONS. Wells ELF-6 and ELF-10 did not produce enough water to take full sample sets.

Wells ELF-1D, ELF-3, and ELF-5 are known to be poor producers and had sample bottles filled before attempting to take parameters.

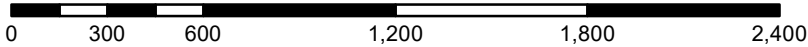
Wells ELF-11, ELF-12, ELF-13, and ELF-14 were added to the sampling network for the purpose of Nature and Extent Investigations.

Attachment A:

Groundwater Contour Map



Feet



HUNTER POWER PLANT

**Groundwater Elevation Map
CCR Landfill**

Job#: PERCM053

Date: 11/22/2019

Path: M:\PERC_CCR\2019_CCR_Sampling\2019_CCR_GW_Contour Maps.mxd, Author: brutherford

Attachment A

Attachment B:

Data Validation Summary

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Hunter Landfill 08/20/2019	
Validator:	Tim Driscoll 10/25/2019	
Reviewer:	Janelle Garza 10/30/2019	
Laboratory:	American West Analytical Laboratories	
Laboratory Work Order#:	1908532	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix IV: Ra ²²⁶	
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.		

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Hunter Landfill 08/20/2019	
Validator:	Tim Driscoll 10/25/2019	
Reviewer:	Janelle Garza 10/30/2019	
Laboratory:	American West Analytical Laboratory	
Laboratory Work Order#:	1908622	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix IV: 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.		

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Hunter Landfill 08/20/2019	
Validator:	Tim Driscoll 10/24/2019	
Reviewer:	Janelle Garza 10/30/2019	
Laboratory:	American West Analytical Laboratories	
Laboratory Work Order#:	1908531	
Sample Media:	Groundwater	
Analytical Parameters:	Appendix III: B, Ca, Cl, ¹ F, pH, SO ₄ , TDS	
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	There was a high recovery of calcium in a laboratory matrix spike, resulting in J+ qualifications detailed below.
Overall Assessment:		
Calcium was qualified J+ in samples ELF-1D, ELF-2, ELF-3, ELF-4, ELF-5, ELF-7, ELF-8, ELF-9, ELF-11, ELF-12, ELF-13, ELF-14, and DUP.		

**DATA VALIDATION SUMMARY
CCR COMPLIANCE SAMPLING**

Facility Name:	Hunter Landfill 08/20/2019	
Validator:	Tim Driscoll 10/25/2019	
Reviewer:	Janelle Garza 10/30/2019	
Laboratory:	American West Analytical Laboratories	
Laboratory Work Order#:	1908532	
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	There was a low recovery of mercury in a laboratory matrix spike, resulting in UJ qualifications detailed below.
Overall Assessment:		
Mercury was qualified UJ in samples ELF-1D, ELF-2, ELF-3, ELF-4, ELF-5, ELF-7, ELF-8, ELF-9, ELF-11, ELF-12, ELF-13, ELF-14, and DUP.		

Attachment C:
Statistical Analysis

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Figure C.3. Summary statistics plots for the CCR Landfill

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

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

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

1.0 INTRODUCTION

This appendix contains a statistical analysis of the data collected from the groundwater monitoring wells associated with the CCR Landfill at the Hunter Power Plant in Castle Dale, Utah. Methods used to compare upgradient with downgradient wells vary depending on the characteristics of the upgradient well data. Upgradient well data were analyzed for outliers, normality, non-detects, and other characteristics that affect the comparison measures. A comprehensive statistical analysis is presented along with a discussion of the methods used to compare upgradient with downgradient water quality.

2.0 PRELIMINARY DATA ANALYSIS

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

2.1 Data Analysis Techniques

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

2.1.1 Mean

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

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

Where:

\bar{x} = mean

n = number of observations

x_i = i^{th} observation.

2.1.2 Standard Deviation

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

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

Where:

- s = standard deviation
- n = number of observations
- x_i = i^{th} observation
- \bar{x} = mean of the observations.

2.1.3 Coefficient of Variance

The coefficient of variance (CV) is a relative measure of variation in the sample data which expresses the standard deviation relative to the mean. The CV is expressed as a percentage and provides a direct comparison to the standard deviations of two different data sets. It is important to note the mean of the data may be very close to or very far away from zero and the spread may be independent of the distance from the mean to zero. Therefore, no firm guidelines have been established for interpreting the CV. The CV was calculated for each detected analyte in each data grouping using Equation (3):

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

Where:

- s = standard deviation
- \bar{X} = mean of the observations

2.1.4 Quartiles and the Five Number Summary

The five-number summary is a set of five numbers that are used to assess the spread of the data. It consists of the minimum value, first quartile, median, third quartile, and maximum of the data value. The first quartile is the 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 CCR Landfill, 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 largest method detection limit (MDL) is plotted on the histogram for non-detect observations. Figure C.1 below is a histogram of fluoride data for the upgradient wells for the CCR Landfill. It is provided here to illustrate data distribution using a histogram. All of the histograms used to examine the analytes from the CCR Landfill upgradient well data, are provided at the end of this appendix in Figure C.3.

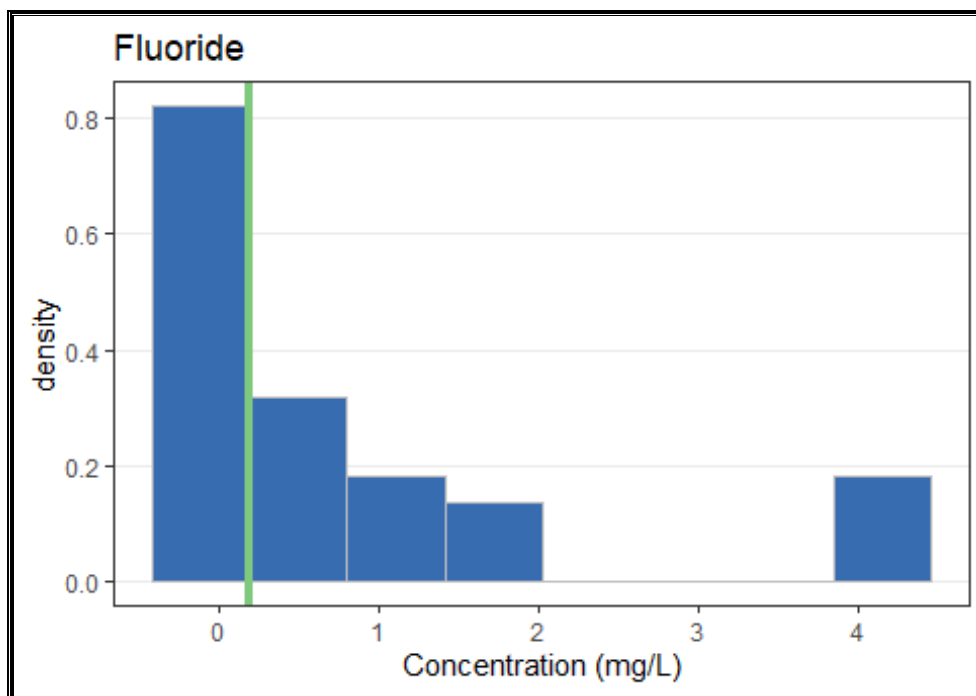


Figure C.1. Histogram of fluoride data from the CCR Landfill upgradient wells.

2.2.2 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 fluoride data points used to develop the Figure C.1. Several of the points fall outside of the gray region. This indicates that the data are not normally distributed. All of the normal-quantile plots used to examine the CCR Landfill upgradient well data are provided at the end of this appendix in Figure C.3.

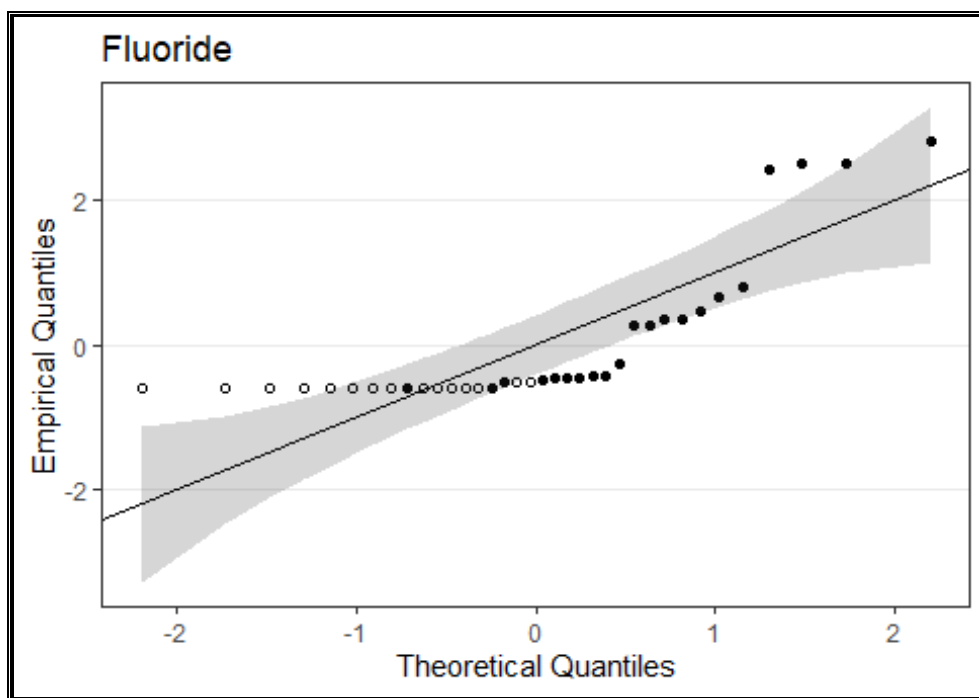


Figure C.2. Normal quantile plot of fluoride data the CCR Landfill upgradient wells

2.2.3 Outliers

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

in background levels which are too conservative. Conversely, use of excessively high outlier concentrations to compute background values, may result in an overestimation of background concentrations resulting in false-negative comparisons for downgradient groundwater quality. Outliers were detected in the cadmium, cobalt, lead, and radium data CCR Landfill data. However, none of the outliers are extreme enough to warrant removal from the dataset.

2.2.4 Treatment of Non-Detects

Non-detect values are common in environmental data. When present in data sets, non-detects produce difficulties in computing statistical metrics because reliable values cannot be assigned. Substituting a value such as the MDL or one-half of the MDL for non-detects are common practices. However, use of the detection limit, or one-half of the detection limit, can produce unstable or unreliable results (EPA 2009). Statistical methods, such as Kaplan-Meier (Helsel 2004), can be used to appropriately evaluate data sets containing significant quantities of non-detects, by producing estimates of the survival probability function for non-detects. These estimates can then be used to compute summary statistics on the data set. However, Kaplan-Meier does not perform well if more than 50% of the results are non-detects or if fewer than eight detections are available for evaluation. The arsenic, cadmium, chromium, cobalt, and lead data have more than 50% non-detects. Antimony, beryllium, mercury, and thallium were not detected in any of the samples. Thus, statistical analysis cannot be done for those analytes. The barium, boron, fluoride, and selenium data have more than 15% non-detects, but more than half of the data are detected. As a result, Kaplan-Meier was used to compute means, standard deviations, and statistical limits used to compare the upgradient downgradient water quality for barium, boron, fluoride, and selenium.

2.3 Summary Results

Table C.1 provides summary statistics for the CCR Landfill upgradient well data. Although the data from the upgradient wells were combined when compared to the downgradient wells, the summary statistics presented in this section are separated by well and are presented as pooled data. The data are presented in this way, due to observed differences between the different wells for many of the analytes. These tables in conjunction with the histograms and normal-quantile plots, provide information about differences between wells and the data properties of the combined data. Analytes that were not detected in any upgradient well samples are not listed in Table C.1.

Table C.1. Summary statistics for the CCR Landfill upgradient wells

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Arsenic	ELF-10	11	3	<0.002	NA	NA	NA
Arsenic	ELF-1D	3	0	<0.002	NA	NA	NA
Arsenic	ELF-2	14	0	<0.002	NA	NA	NA
Arsenic	ELF-9	12	12	0.007	0.008	0.002	30%

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Arsenic	Pooled	40	15	<0.002	NA	NA	NA
Barium	ELF-10	11	11	0.0391	0.0448	0.0208	46%
Barium	ELF-1D	3	3	0.0085	0.0091	0.0011	12%
Barium	ELF-2	14	13	<0.0106	0.0113	0.0034	30%
Barium	ELF-9	12	12	0.0335	0.0447	0.0340	76%
Barium	Pooled	40	39	<0.0186	0.0305	0.0270	88%
Boron	ELF-10	10	10	1.63	1.68	0.18	11%
Boron	ELF-1D	2	2	2.21	2.21	0.03	1%
Boron	ELF-2	13	13	3.33	3.38	0.19	6%
Boron	ELF-9	11	10	<1.50	1.52	0.23	15%
Boron	Pooled	36	35	<1.89	2.29	0.89	39%
Cadmium	ELF-10	11	6	0.0005	NA	NA	NA
Cadmium	ELF-1D	3	0	<0.0005	NA	NA	NA
Cadmium	ELF-2	14	0	<0.0005	NA	NA	NA
Cadmium	ELF-9	12	1	<0.0005	NA	NA	NA
Cadmium	Pooled	40	7	<0.0005	NA	NA	NA
Calcium	ELF-10	10	10	475	480	31	6%
Calcium	ELF-1D	2	2	372	372	7.8	2%
Calcium	ELF-2	13	13	410	404	22	5%
Calcium	ELF-9	11	11	60	78	35	44%
Calcium	Pooled	36	36	400	324	171	53%
Chloride	ELF-10	10	10	7340	7515	1141	15%
Chloride	ELF-1D	2	2	6655	6655	318	5%
Chloride	ELF-2	13	13	444	395	99	25%
Chloride	ELF-9	11	11	371	383	77	20%
Chloride	Pooled	36	36	459	2717	3394	125%
Chromium	ELF-10	11	8	0.005	0.005	0.004	84%
Chromium	ELF-1D	3	1	<0.002	NA	NA	NA
Chromium	ELF-2	14	2	<0.002	NA	NA	NA
Chromium	ELF-9	12	7	0.004	NA	NA	NA
Chromium	Pooled	40	18	<0.002	NA	NA	NA
Cobalt	ELF-10	11	8	0.004	0.005	0.001	29%
Cobalt	ELF-1D	3	1	<0.004	NA	NA	NA
Cobalt	ELF-2	14	7	0.005	NA	NA	NA
Cobalt	ELF-9	12	2	<0.004	NA	NA	NA

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Cobalt	Pooled	40	18	<0.004	NA	NA	NA
Fluoride	ELF-10	10	5	0.2	NA	NA	NA
Fluoride	ELF-1D	2	0	<0.2	NA	NA	NA
Fluoride	ELF-2	13	7	<0.1	NA	NA	NA
Fluoride	ELF-9	11	9	1.2	1.0	0.6	62%
Fluoride	Pooled	36	21	0.2	0.8	1.3	152%
Lead	ELF-10	11	6	0.002	NA	NA	NA
Lead	ELF-1D	3	0	<0.002	NA	NA	NA
Lead	ELF-2	14	1	<0.002	NA	NA	NA
Lead	ELF-9	12	4	<0.002	NA	NA	NA
Lead	Pooled	40	11	<0.002	NA	NA	NA
Lithium	ELF-10	11	11	2.09	2.30	1.14	50%
Lithium	ELF-1D	3	3	2.19	2.17	0.04	2%
Lithium	ELF-2	14	14	1.76	2.50	1.27	51%
Lithium	ELF-9	12	12	0.84	1.06	0.51	48%
Lithium	Pooled	40	40	1.68	1.99	1.16	58%
Molybdenum	ELF-10	11	11	0.0871	0.0916	0.0276	30%
Molybdenum	ELF-1D	3	3	0.0165	0.0178	0.0025	14%
Molybdenum	ELF-2	14	14	0.0031	0.0034	0.0007	21%
Molybdenum	ELF-9	12	12	0.1195	0.1176	0.0224	19%
Molybdenum	Pooled	40	40	0.0648	0.0630	0.0540	86%
pH	ELF-10	10	10	7.18	7.26	0.42	6%
pH	ELF-1D	2	2	7.15	7.15	0.18	2%
pH	ELF-2	13	13	7.22	7.28	0.17	2%
pH	ELF-9	11	11	7.94	7.89	0.16	2%
pH	Pooled	36	36	7.29	7.46	0.39	5%
Radium	ELF-10	11	11	2.47	3.29	3.76	114%
Radium	ELF-1D	3	3	1.23	1.65	0.85	52%
Radium	ELF-2	14	14	1.31	1.91	1.91	100%
Radium	ELF-9	12	12	1.36	1.43	0.63	44%
Radium	Pooled	40	40	1.44	2.12	2.36	111%
Selenium	ELF-10	11	8	0.011	0.105	0.139	132%
Selenium	ELF-1D	3	0	<0.002	NA	NA	NA
Selenium	ELF-2	14	14	0.424	0.339	0.208	61%
Selenium	ELF-9	12	1	<0.002	NA	NA	NA

Analyte	Well	Number of Samples	Samples Detected	Median (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
Selenium	Pooled	40	23	0.010	0.149	0.204	137%
Sulfate	ELF-10	10	10	18300	16730	4128	25%
Sulfate	ELF-1D	2	2	8185	8185	643	8%
Sulfate	ELF-2	13	13	7950	7625	710	9%
Sulfate	ELF-9	11	11	6470	6423	786	12%
Sulfate	Pooled	36	36	7950	9818	4894	50%
TDS	ELF-10	10	10	38300	38070	1782	5%
TDS	ELF-1D	2	2	26900	26900	141	1%
TDS	ELF-2	13	13	12000	11900	440	4%
TDS	ELF-9	11	11	10600	10820	834	8%
TDS	Pooled	36	36	12000	19673	12159	62%

Table C.2 provides the five-number summaries for the CCR Landfill upgradient wells. As with the summary statistics, a five-number summary was computed for each well as well as for the pooled data. If a minimum or a quartile falls within the range of non-detects it is denoted using a less-than (<) symbol. Analytes that were not detected in any of the upgradient well samples are not listed in Table C.2.

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

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Arsenic	ELF-10	<0.002	<0.002	<0.002	0.003	0.0093
Arsenic	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	ELF-2	<0.001	<0.002	<0.002	<0.002	<0.002
Arsenic	ELF-9	0.005	0.0058	0.0068	0.0089	0.0117
Arsenic	Pooled	<0.001	<0.002	<0.002	0.0058	0.0117
Barium	ELF-10	0.0184	0.0316	0.0391	0.0560	0.0863
Barium	ELF-1D	0.0084	0.0084	0.0085	0.0094	0.0103
Barium	ELF-2	<0.0084	<0.0092	<0.0106	<0.0128	<0.0500
Barium	ELF-9	0.0126	0.0151	0.0335	0.0781	0.1020
Barium	Pooled	<0.0084	<0.0108	<0.0186	<0.0456	0.1020
Boron	ELF-10	1.48	1.56	1.63	1.73	2.12
Boron	ELF-1D	2.19	2.19	2.21	2.23	2.23
Boron	ELF-2	3.11	3.25	3.33	3.50	3.77
Boron	ELF-9	<1.30	<1.355	<1.50	<1.74	<5.00

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Boron	Pooled	<1.30	<1.565	<1.89	<3.29	<5.00
Cadmium	ELF-10	<0.0005	<0.0005	0.0005	0.0006	0.0011
Cadmium	ELF-1D	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cadmium	ELF-2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0010
Cadmium	ELF-9	<0.0005	<0.0005	<0.0005	<0.0005	0.0005
Cadmium	Pooled	<0.0005	<0.0005	<0.0005	<0.0005	0.0011
Calcium	ELF-10	445	457	475	500	543
Calcium	ELF-1D	366	366	372	377	377
Calcium	ELF-2	364	392	410	419	430
Calcium	ELF-9	52.7	57.5	60.3	88.1	166
Calcium	Pooled	52.7	102	400	446	543
Chloride	ELF-10	5710	6960	7340	7670	9900
Chloride	ELF-1D	6430	6430	6655	6880	6880
Chloride	ELF-2	218	363	444	461	473
Chloride	ELF-9	282	334	371	431	527
Chloride	Pooled	218	367	459	6835	9900
Chromium	ELF-10	<0.002	0.002	0.005	0.0061	0.0164
Chromium	ELF-1D	<0.002	<0.002	<0.002	0.0022	0.0023
Chromium	ELF-2	<0.001	<0.002	<0.002	<0.002	0.0110
Chromium	ELF-9	<0.002	<0.002	0.0044	0.0147	0.0201
Chromium	Pooled	<0.001	<0.002	<0.002	0.0054	0.0201
Cobalt	ELF-10	<0.004	0.0041	0.0044	0.0055	0.0079
Cobalt	ELF-1D	<0.004	<0.004	<0.004	0.0047	0.0054
Cobalt	ELF-2	<0.004	<0.004	0.005	0.0060	0.0114
Cobalt	ELF-9	<0.004	<0.004	<0.004	<0.004	0.0052
Cobalt	Pooled	<0.004	<0.004	<0.004	0.0055	0.0114
Fluoride	ELF-10	<0.1	<0.1	0.17	3.97	4.36
Fluoride	ELF-1D	<0.1	<0.1	<0.15	<0.2	<0.2
Fluoride	ELF-2	<0.1	<0.1	<0.1	0.28	0.50
Fluoride	ELF-9	<0.1	0.27	1.19	1.36	1.84
Fluoride	Pooled	<0.1	<0.1	0.22	1.23	4.36
Lead	ELF-10	<0.002	<0.002	0.0022	0.0031	0.0120
Lead	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Lead	ELF-2	<0.001	<0.002	<0.002	<0.002	<0.002
Lead	ELF-9	<0.002	<0.002	<0.002	0.0046	0.0077
Lead	Pooled	<0.001	<0.002	<0.002	0.0021	0.0120

Analyte	Well	Minimum (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum (mg/L)
Lithium	ELF-10	0.841	1.65	2.09	2.85	4.59
Lithium	ELF-1D	2.12	2.16	2.19	2.20	2.20
Lithium	ELF-2	1.34	1.52	1.76	3.93	4.93
Lithium	ELF-9	0.724	0.754	0.845	1.08	2.48
Lithium	Pooled	0.724	1.08	1.68	2.20	4.93
Molybdenum	ELF-10	0.0516	0.0706	0.0871	0.1165	0.1240
Molybdenum	ELF-1D	0.0161	0.0163	0.0165	0.0186	0.0207
Molybdenum	ELF-2	0.0026	0.0030	0.0031	0.0038	0.0050
Molybdenum	ELF-9	0.0679	0.1075	0.1195	0.1280	0.1580
Molybdenum	Pooled	0.0026	0.0036	0.0648	0.1160	0.1580
pH	ELF-10	6.88	7.00	7.18	7.28	8.37
pH	ELF-1D	7.02	7.02	7.15	7.27	7.27
pH	ELF-2	7.12	7.17	7.22	7.30	7.76
pH	ELF-9	7.51	7.86	7.94	7.99	8.06
pH	Pooled	6.88	7.17	7.29	7.86	8.37
Radium	ELF-10	0.46	1.67	2.47	3.26	14.2
Radium	ELF-1D	1.09	1.16	1.23	1.93	2.63
Radium	ELF-2	0.61	0.85	1.31	2.29	8.10
Radium	ELF-9	0.64	0.92	1.36	1.88	2.60
Radium	Pooled	0.46	0.97	1.44	2.39	14.2
Selenium	ELF-10	<0.002	0.0051	0.0105	0.1515	0.410
Selenium	ELF-1D	<0.002	<0.002	<0.002	<0.002	<0.002
Selenium	ELF-2	0.0319	0.0879	0.424	0.499	0.608
Selenium	ELF-9	<0.002	<0.002	<0.002	<0.002	0.0042
Selenium	Pooled	<0.002	<0.002	0.0098	0.328	0.608
Sulfate	ELF-10	10000	13100	18300	19900	20700
Sulfate	ELF-1D	7730	7730	8185	8640	8640
Sulfate	ELF-2	6030	7190	7950	8150	8370
Sulfate	ELF-9	5460	5790	6470	6875	8030
Sulfate	Pooled	5460	6815	7950	10150	20700
TDS	ELF-10	35200	37200	38300	39600	40300
TDS	ELF-1D	26800	26800	26900	27000	27000
TDS	ELF-2	11300	11500	12000	12300	12600
TDS	ELF-9	9420	10350	10600	11550	12000
TDS	Pooled	9420	11350	12000	35250	40300

3.0 UPGRAIDENT AND DOWNGRAIDENT WELL COMPARISON

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

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

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

3.1 Groundwater Protection Standards

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

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

Where:

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

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

Note: The 0.05 p-value is not a hard and fast rule. Parametric UTLs were computed for analytes whose p-values were 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 detects. An appropriate transformation was found for lithium and radium. Non-parametric UTLs were computed for all of the analytes except for lithium and radium.

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

Analyte	Well	W-Statistic	P-Value	Normal
Barium	Pooled	0.8082	<0.0001	Not Normal
Boron	Pooled	0.8517	0.0002	Not Normal
Calcium	Pooled	0.7948	<0.0001	Not Normal
Chloride	Pooled	0.6789	<0.0001	Not Normal
Fluoride	Pooled	0.635	<0.0001	Not Normal
Lithium	Pooled	0.8703	0.0003	Not Normal
Cube Root of Lithium	Pooled	0.9488	0.0688	Normal
Molybdenum	Pooled	0.8383	<0.0001	Not Normal
pH	Pooled	0.901	0.0036	Not Normal
Radium	Pooled	0.5471	<0.0001	Not Normal
LN of Radium	Pooled	0.9482	0.0658	Normal
Selenium	Pooled	0.7286	<0.0001	Not Normal
Sulfate	Pooled	0.7296	<0.0001	Not Normal
TDS	Pooled	0.691	<0.0001	Not Normal

3.1.2 Upper Tolerance Limits and Groundwater Protection Standard

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

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

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

Figure C.4 shows graphs that were constructed for each of the analytes that had at least one detectable measurement in the downgradient wells. The graphs illustrate the GWPS as a horizontal line with the measurements from each of the downgradient wells plotted on the same graph. Non-detects are represented by hollow gray circles on the graphs. These graphs clearly depict how the downgradient measurements compare to the GWPS. Results above the GWPS line represent values exceeding the GWPS. As the graphs illustrate, boron, calcium, cobalt, lithium, molybdenum, selenium, sulfate, and total dissolved solids exceed the GWPS. Table C.4 list the GWPSs and the wells that exceed the GWPS for each analyte (Figure C.4). GWPS plots are not provided for analytes that were not detected in any downgradient samples.

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

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells that Exceed Groundwater Protection Standard
Antimony	0.004	0.006	0.006	Within Limit
Arsenic	0.0117	0.01	0.0117	Within Limit
Barium	0.10	2.00	2.00	Within Limit
Beryllium	0.002	0.004	0.004	Within Limit
Boron	5.0	NA	5.0	ELF-11, ELF-5, ELF-8
Cadmium	0.0011	0.005	0.005	Within Limit
Calcium	543	NA	543	ELF-8
Chloride	9900	NA	9900	Within Limit
Chromium	0.0201	0.1	0.1	Within Limit
Cobalt	0.0114	0.006	0.0114	ELF-11, ELF-8
Fluoride (App III & IV)	4.36	4.0	4.36	Within Limit
Lead	0.012	0.015	0.015	Within Limit
Lithium	4.957	0.04	4.957	ELF-5
Mercury	0.00015	0.002	0.002	Within Limit
Molybdenum	0.158	0.1	0.158	ELF-8
pH Acidic Range	6.88	NA	6.88	Within Limit

Analyte	Upper Tolerance Limit (mg/L)	Maximum Contaminant Level (mg/L)	Groundwater Protection Standard (mg/L)	Downgradient Wells that Exceed Groundwater Protection Standard
pH Basic Range	8.37	NA	8.37	Within Limit
Radium	7.00	5.0	7.00	Within Limit
Selenium	0.608	0.05	0.608	ELF-3
Sulfate	20700	NA	20700	ELF-3
TDS	40300	NA	40300	ELF-3
Thallium	0.002	0.002	0.002	Within Limit

4.0 CONCLUSIONS

Data were collected from the CCR Landfill monitoring wells at the Hunter Power Plant. A comprehensive data analysis was completed on the upgradient wells to ensure comparisons between upgradient and downgradient wells were performed correctly. Boron, calcium, cobalt, lithium, molybdenum, selenium, sulfate, and total dissolved solids exhibited statistically significant increases above background or their groundwater protection standards in the wells downgradient of the CCR Landfill.

5.0 REFERENCES

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

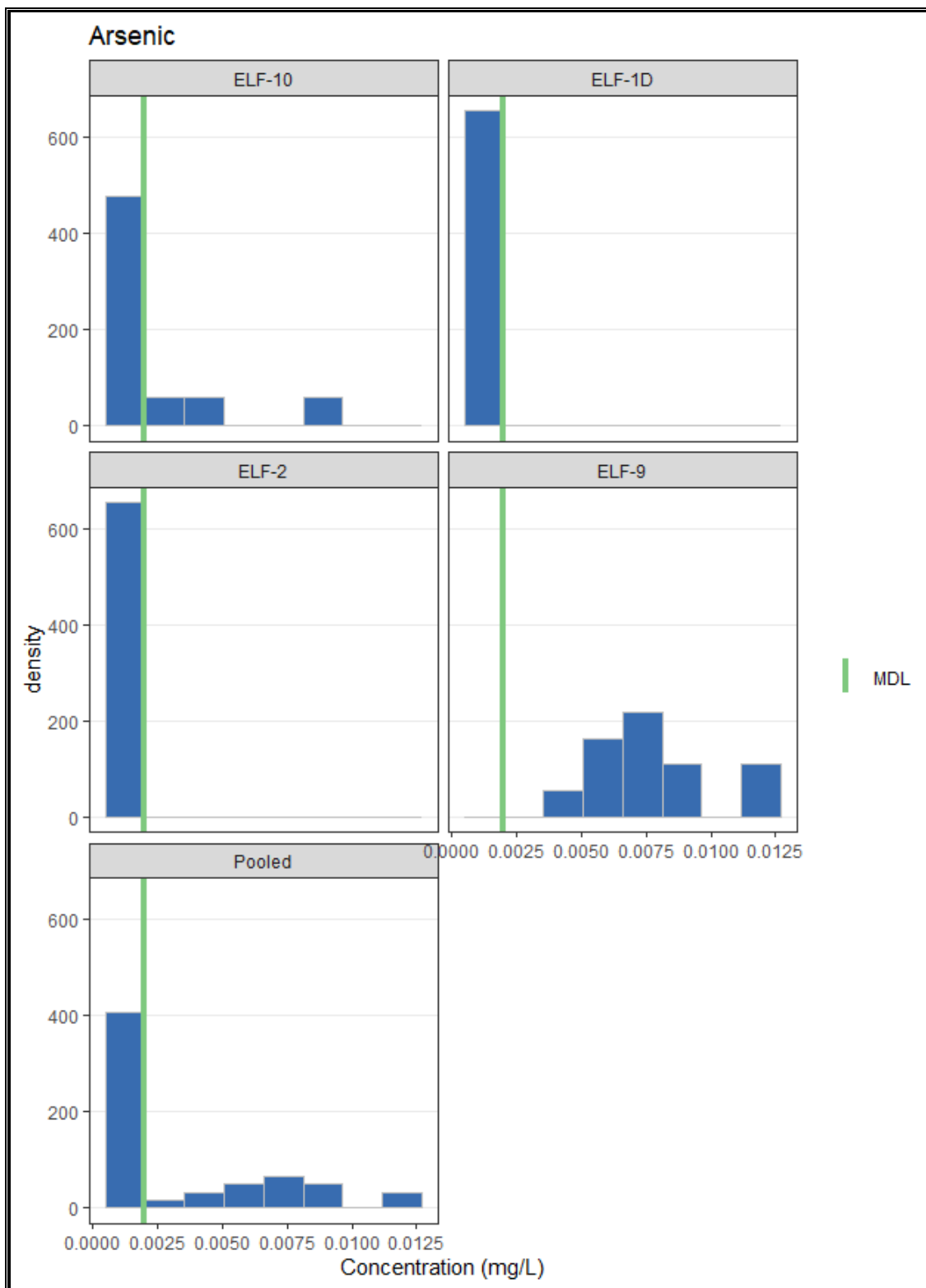


Figure C.3. Summary statistics plots for the CCR Landfill.

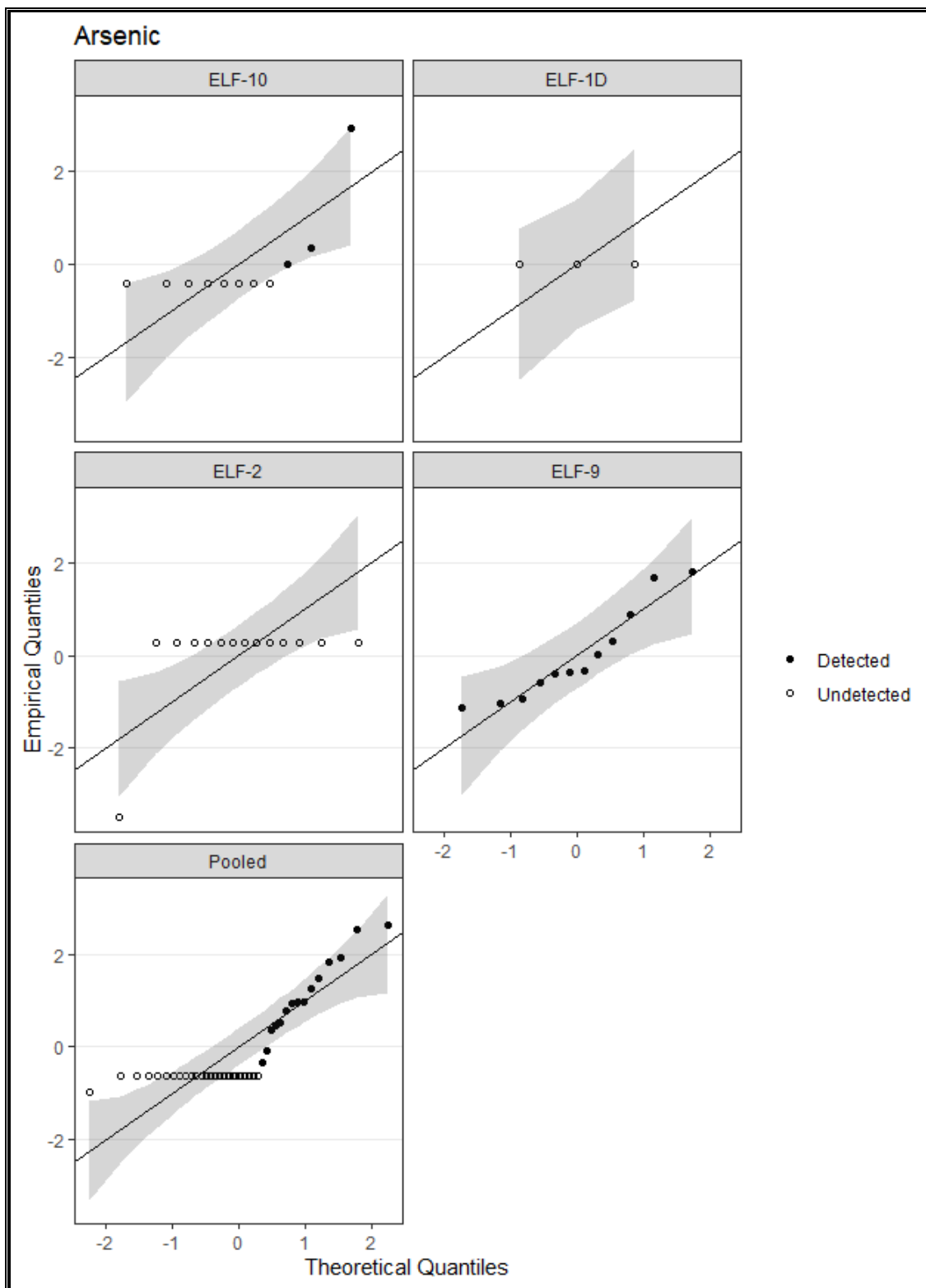


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

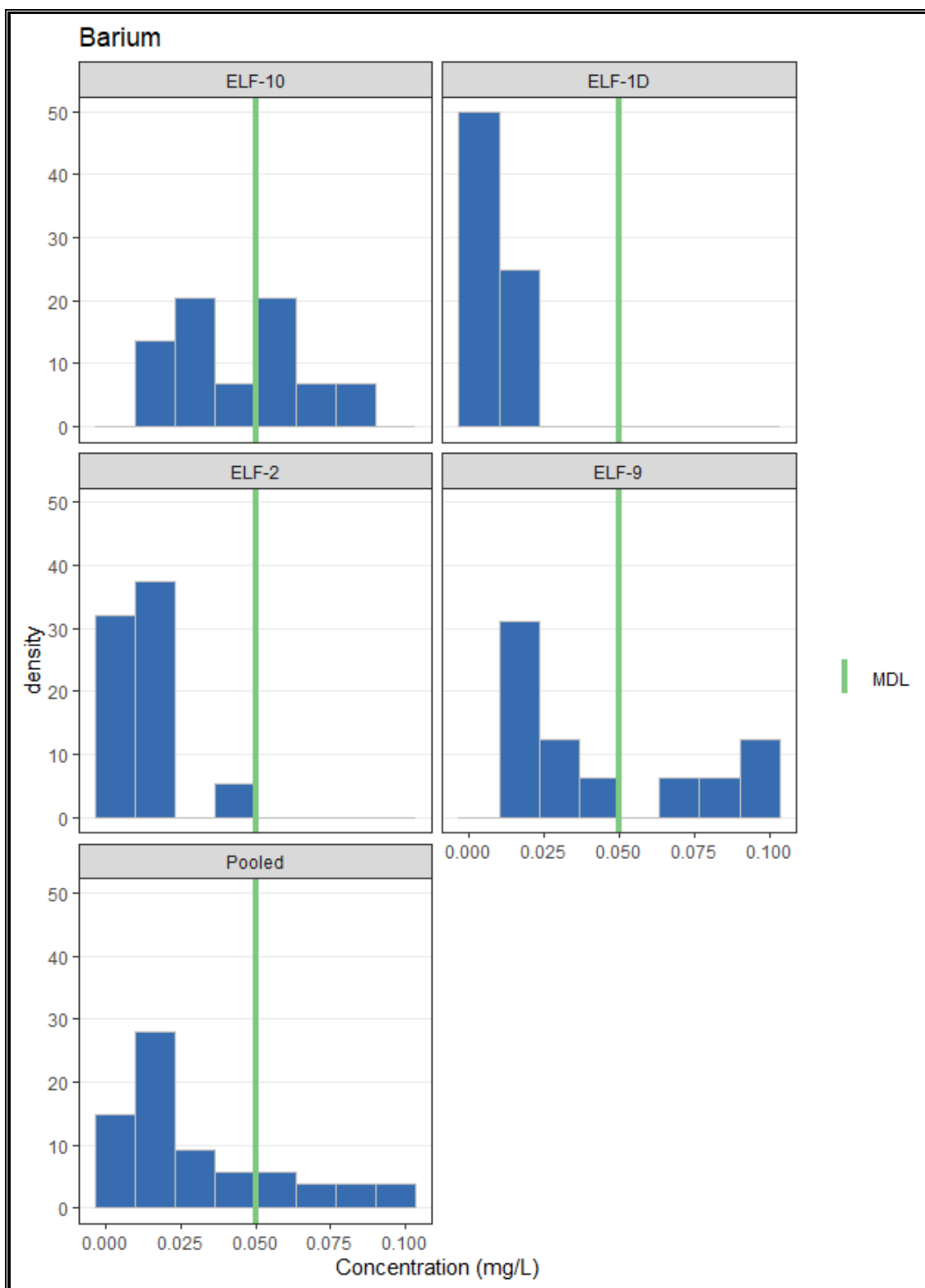


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

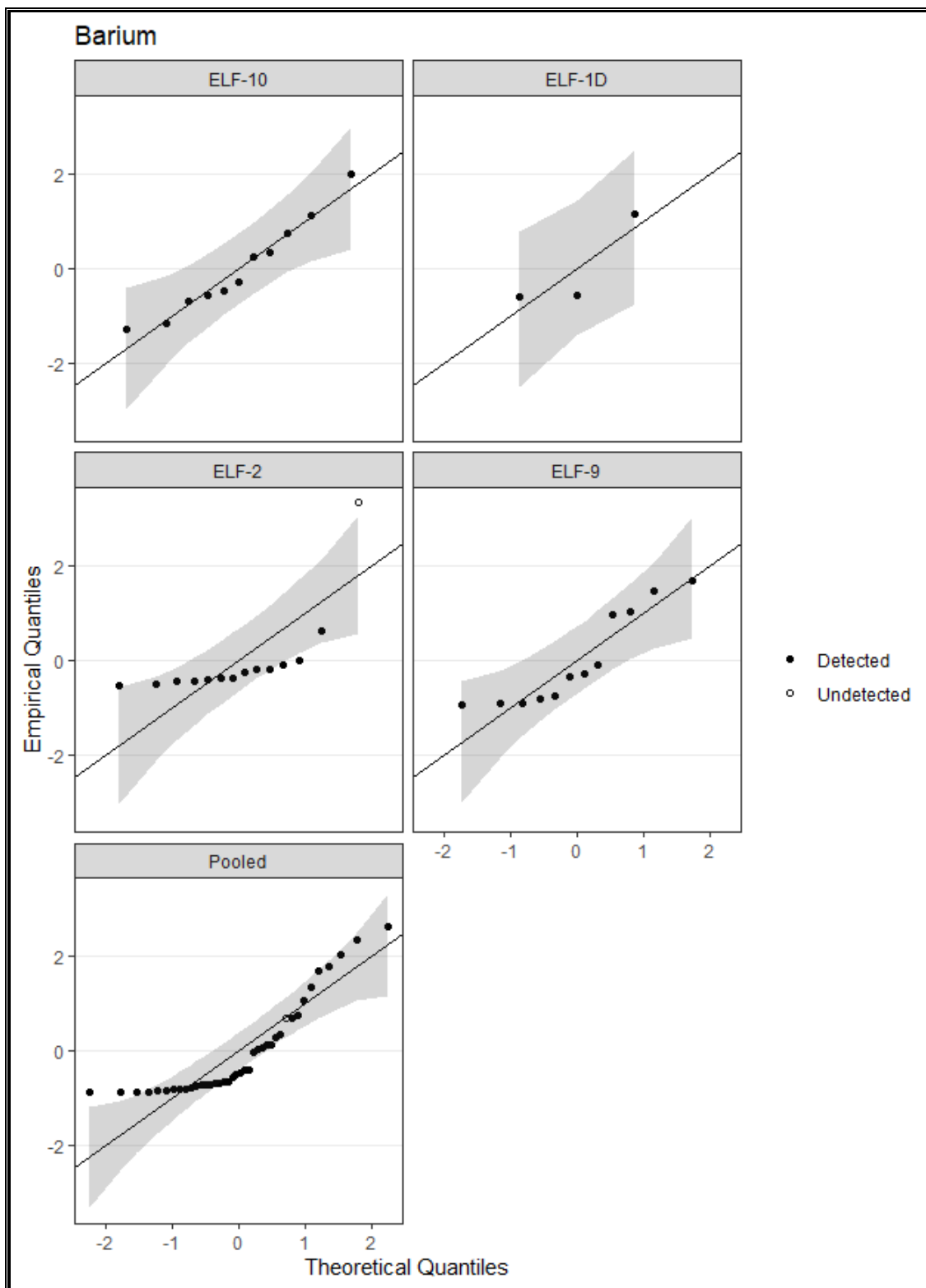


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

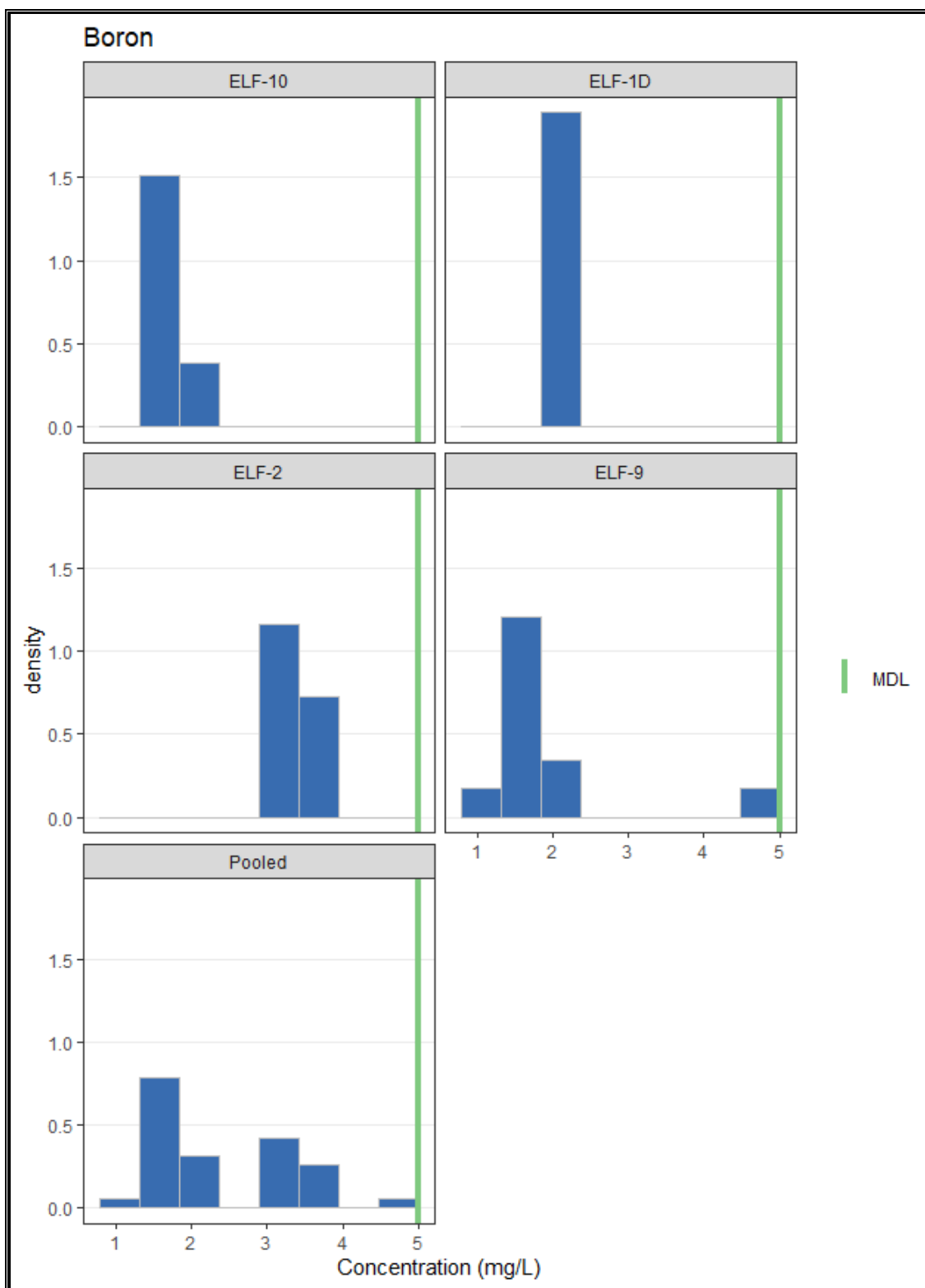


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

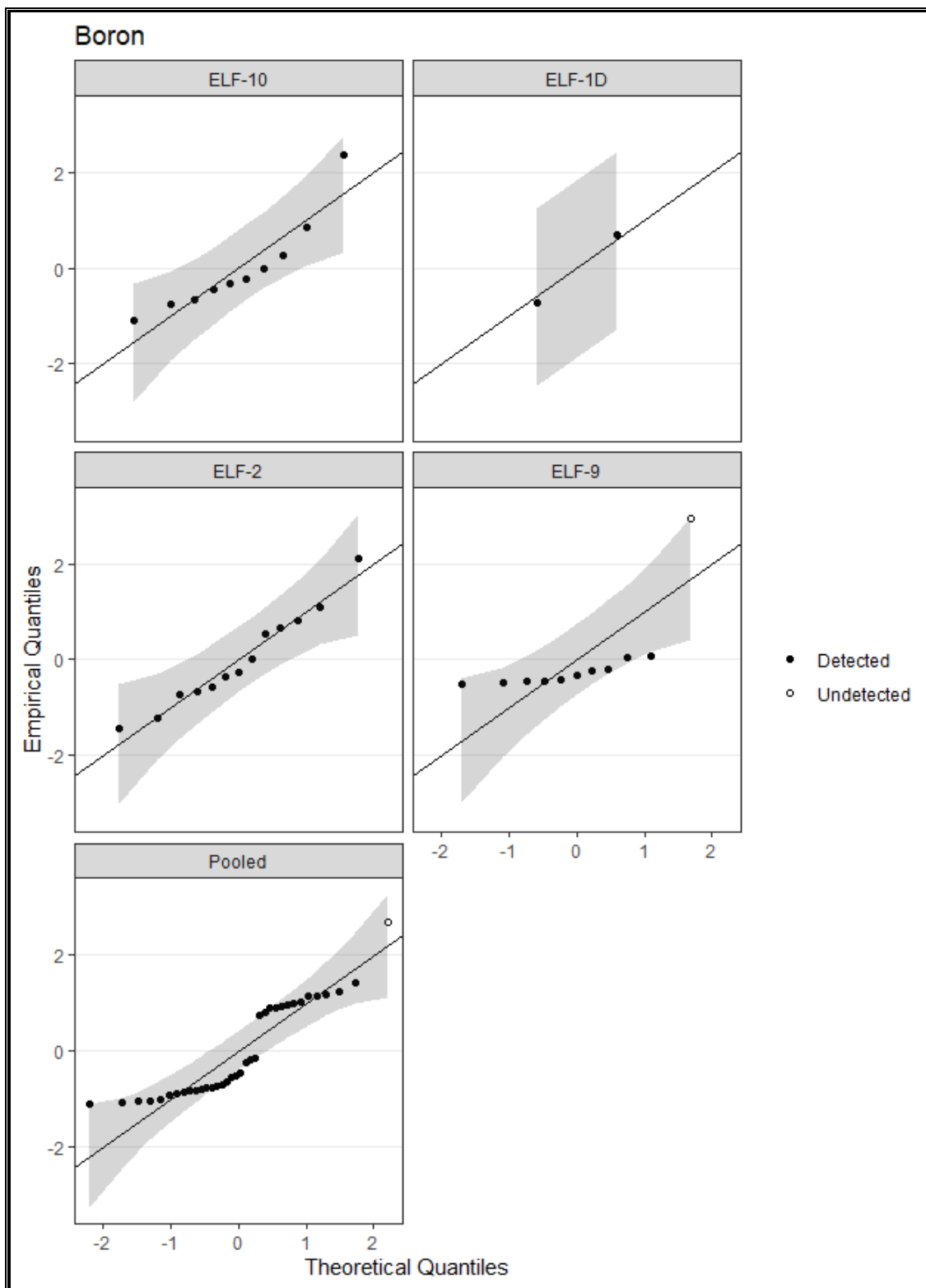


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

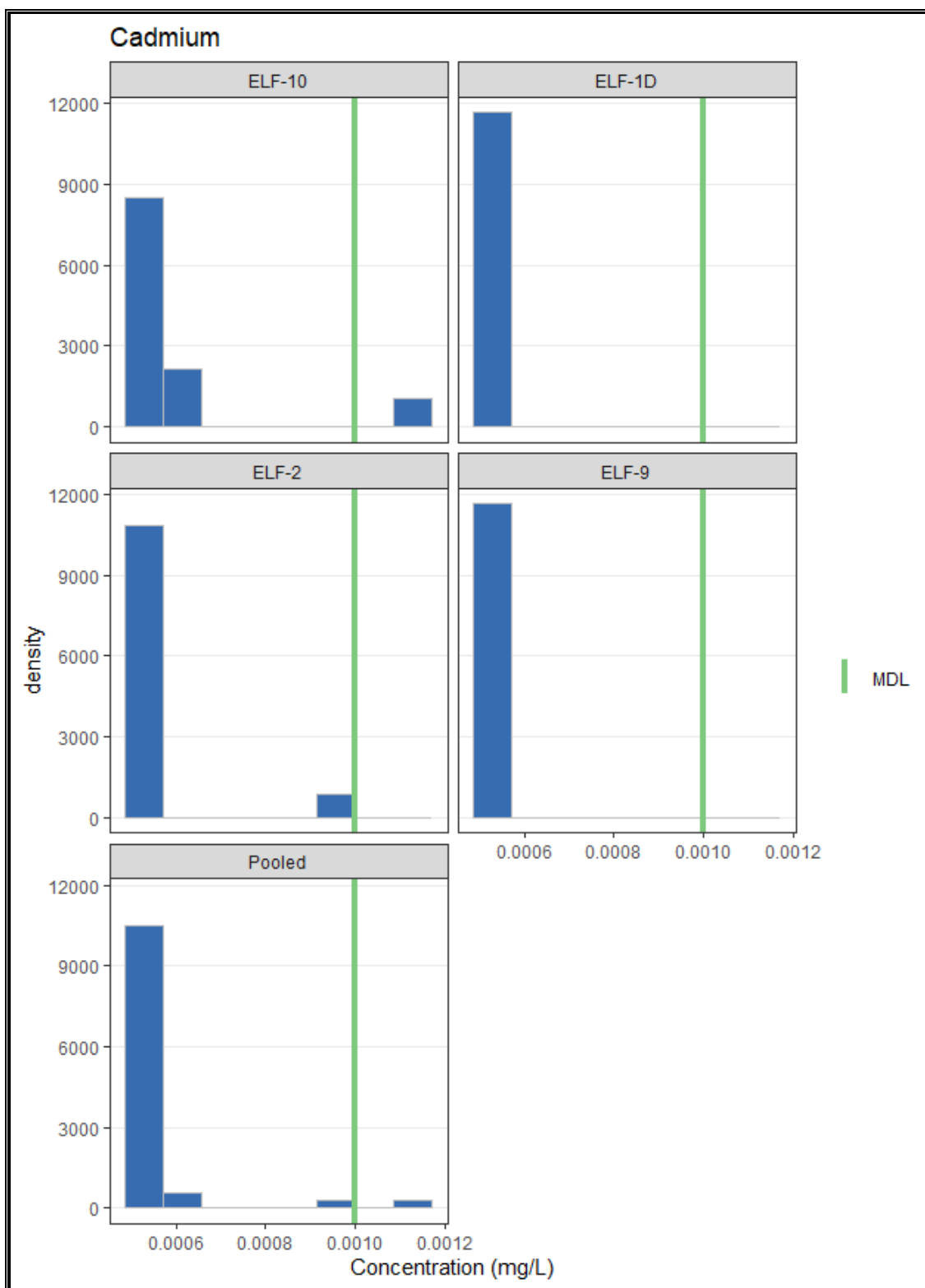


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

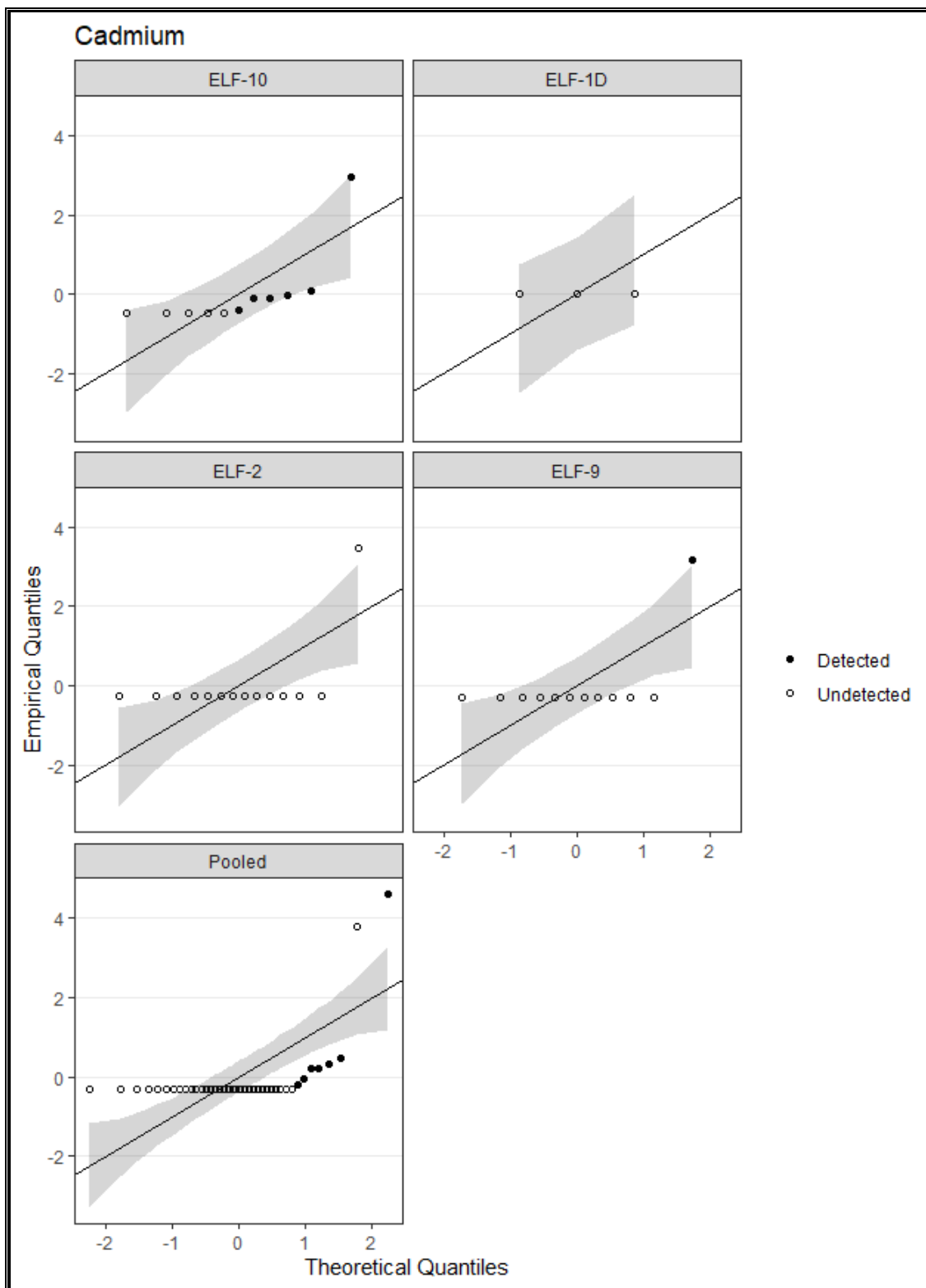


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

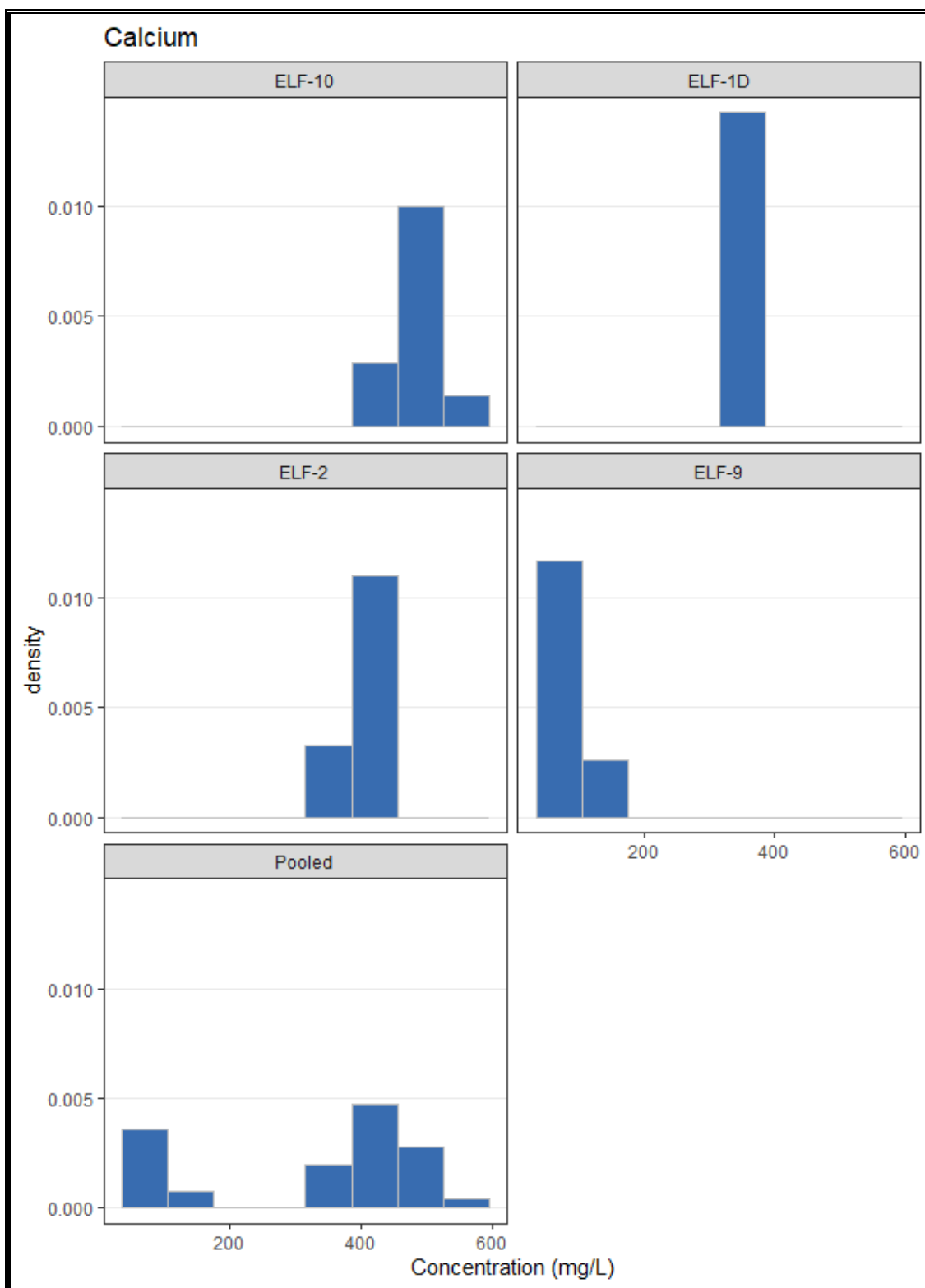


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

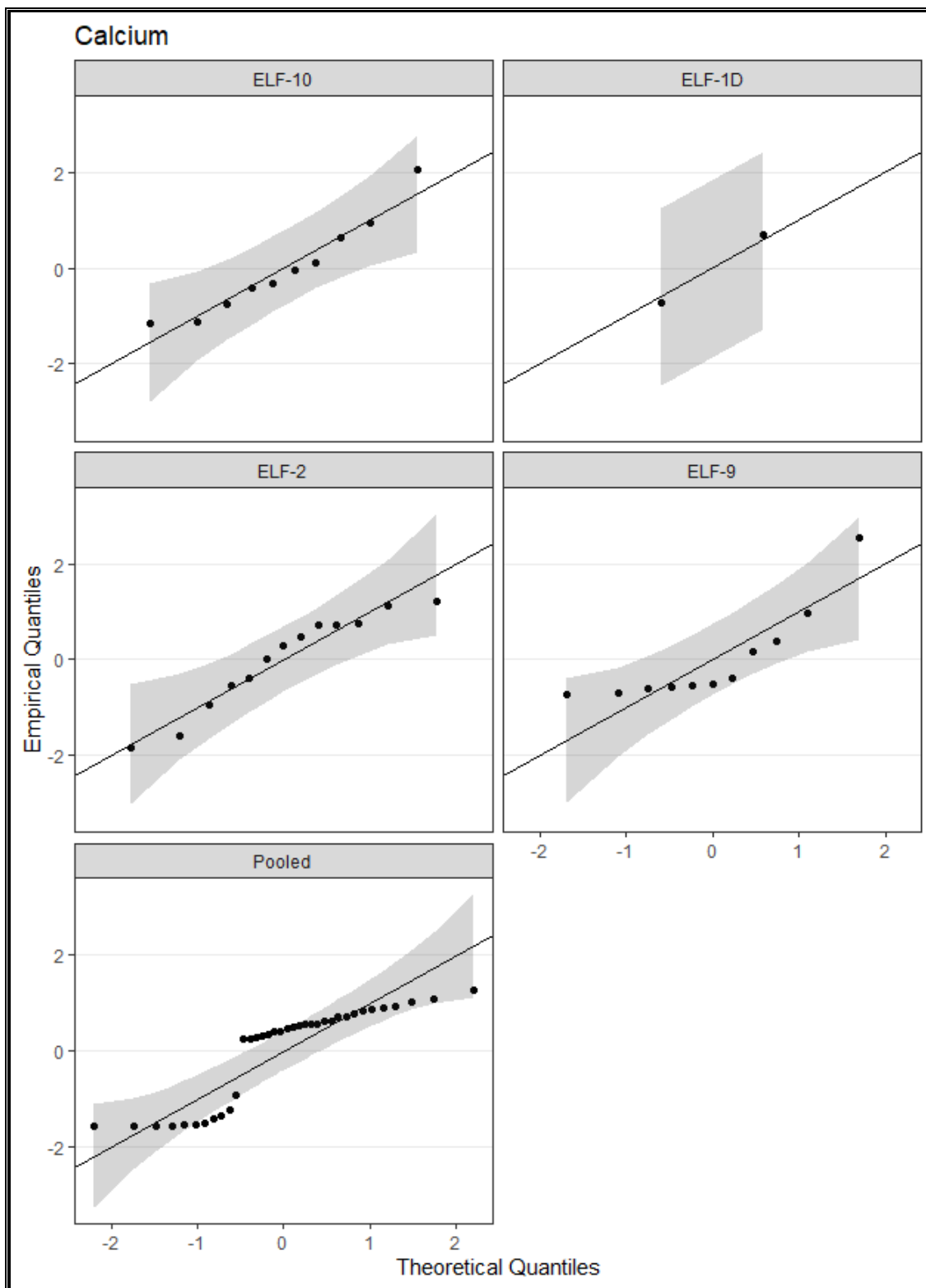


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

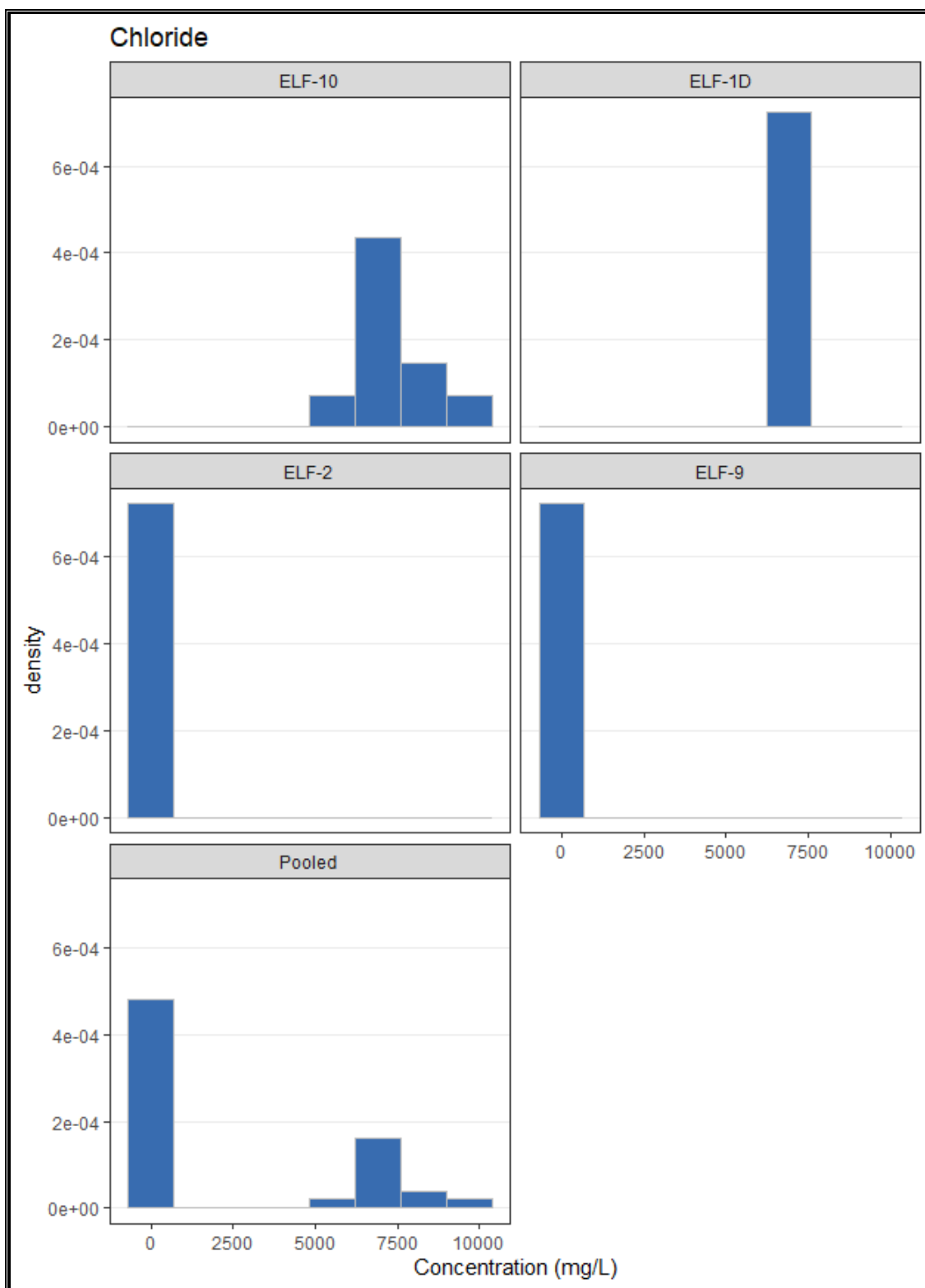


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

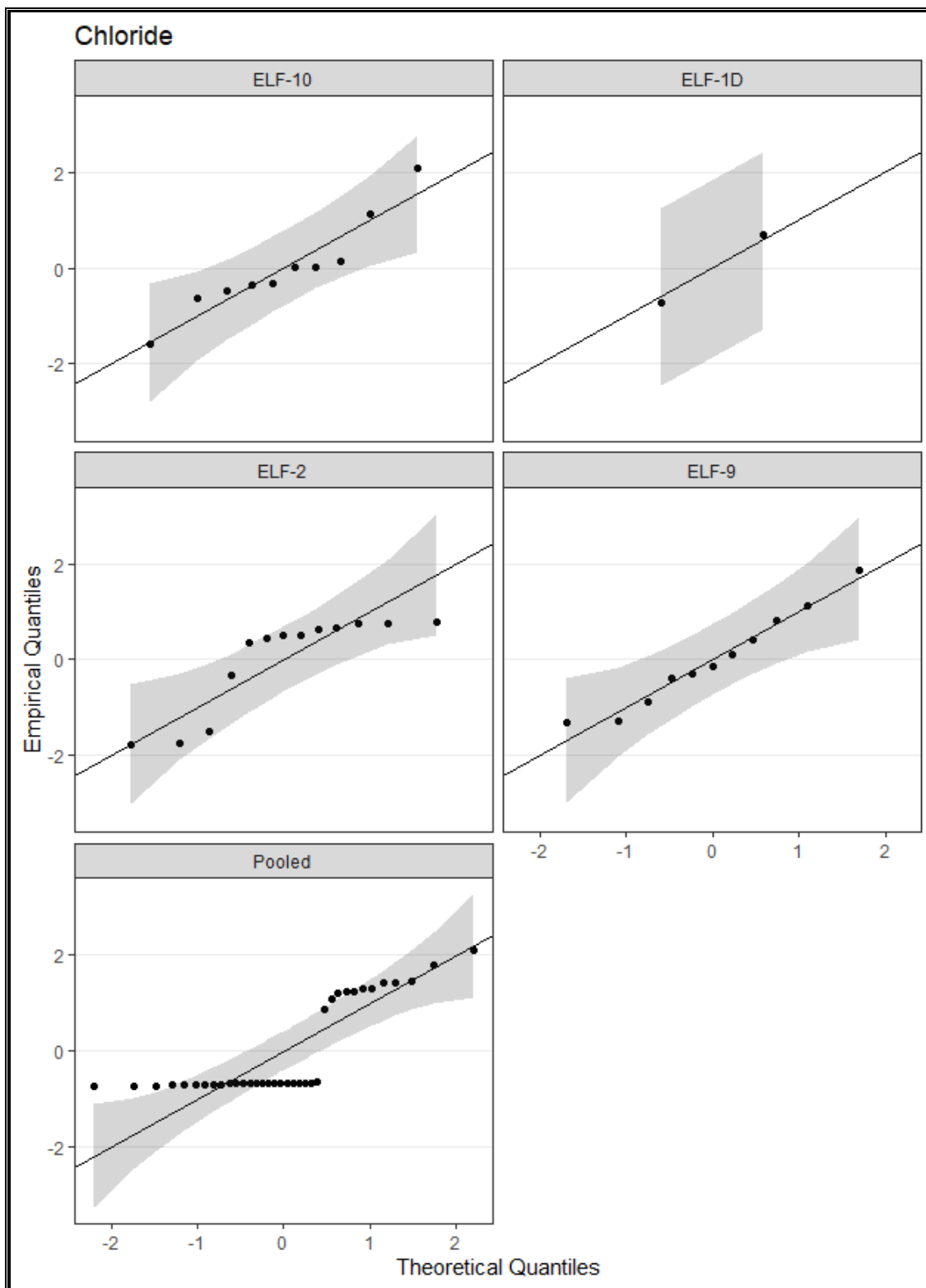


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

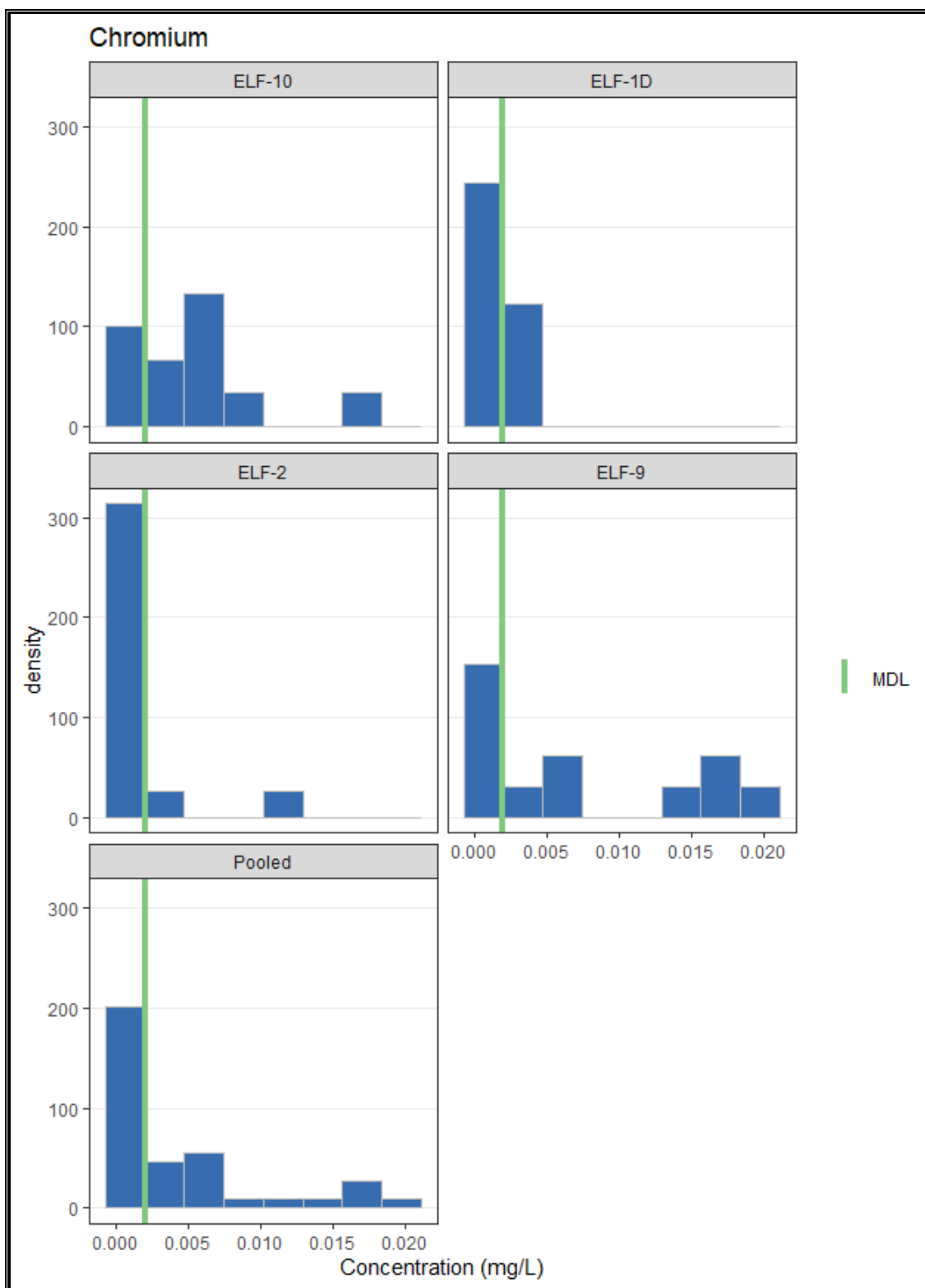


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

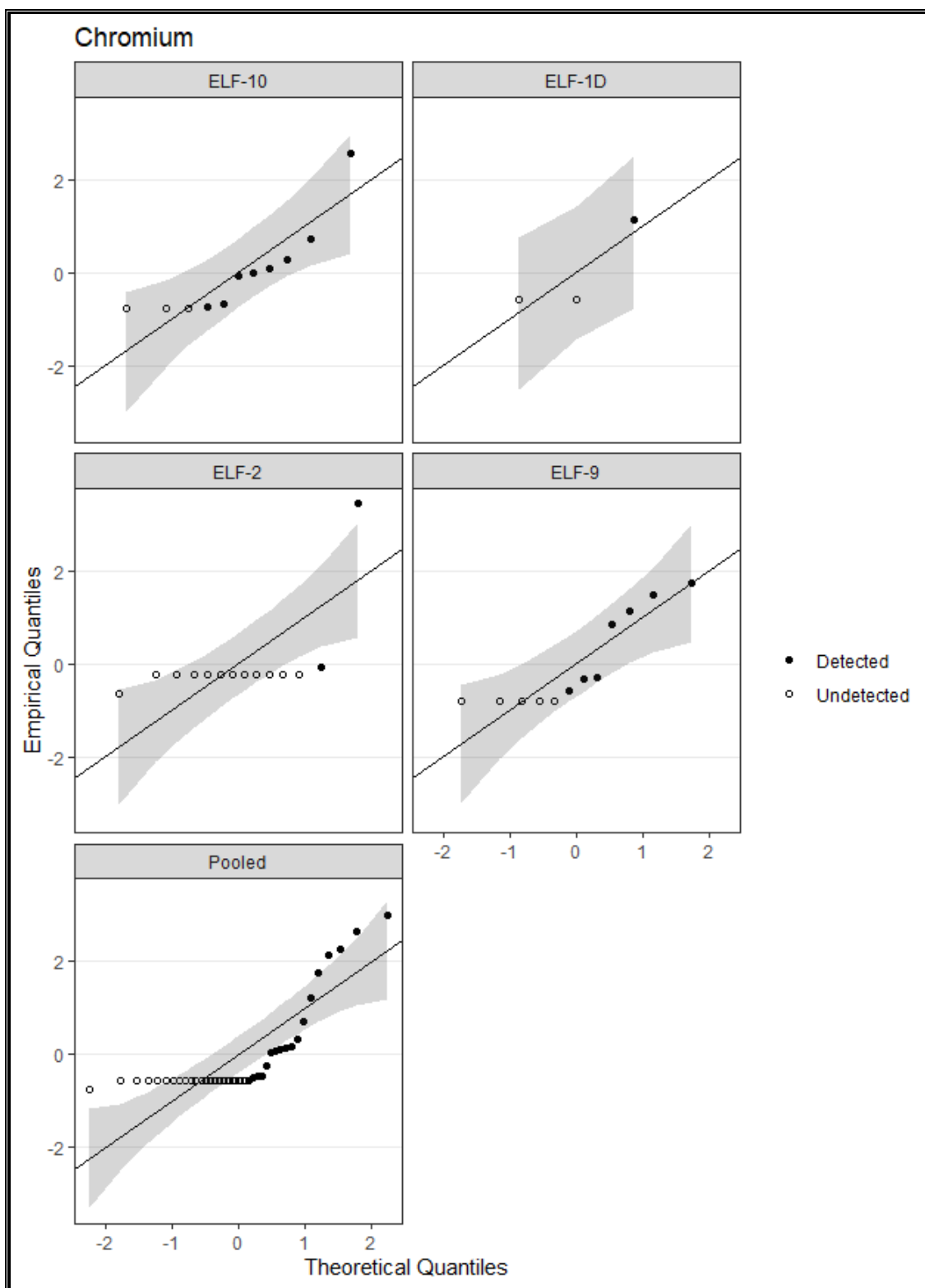


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

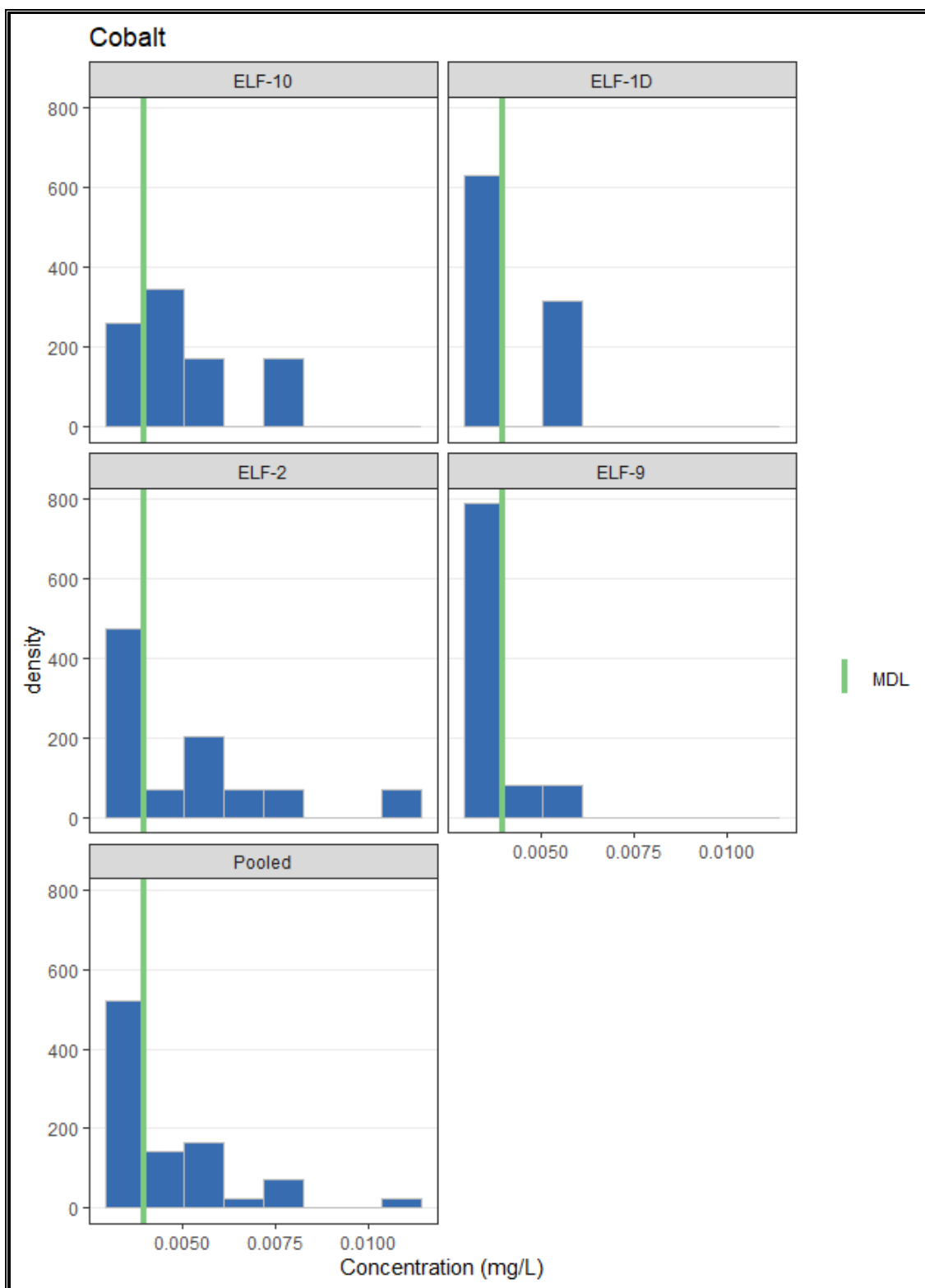


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

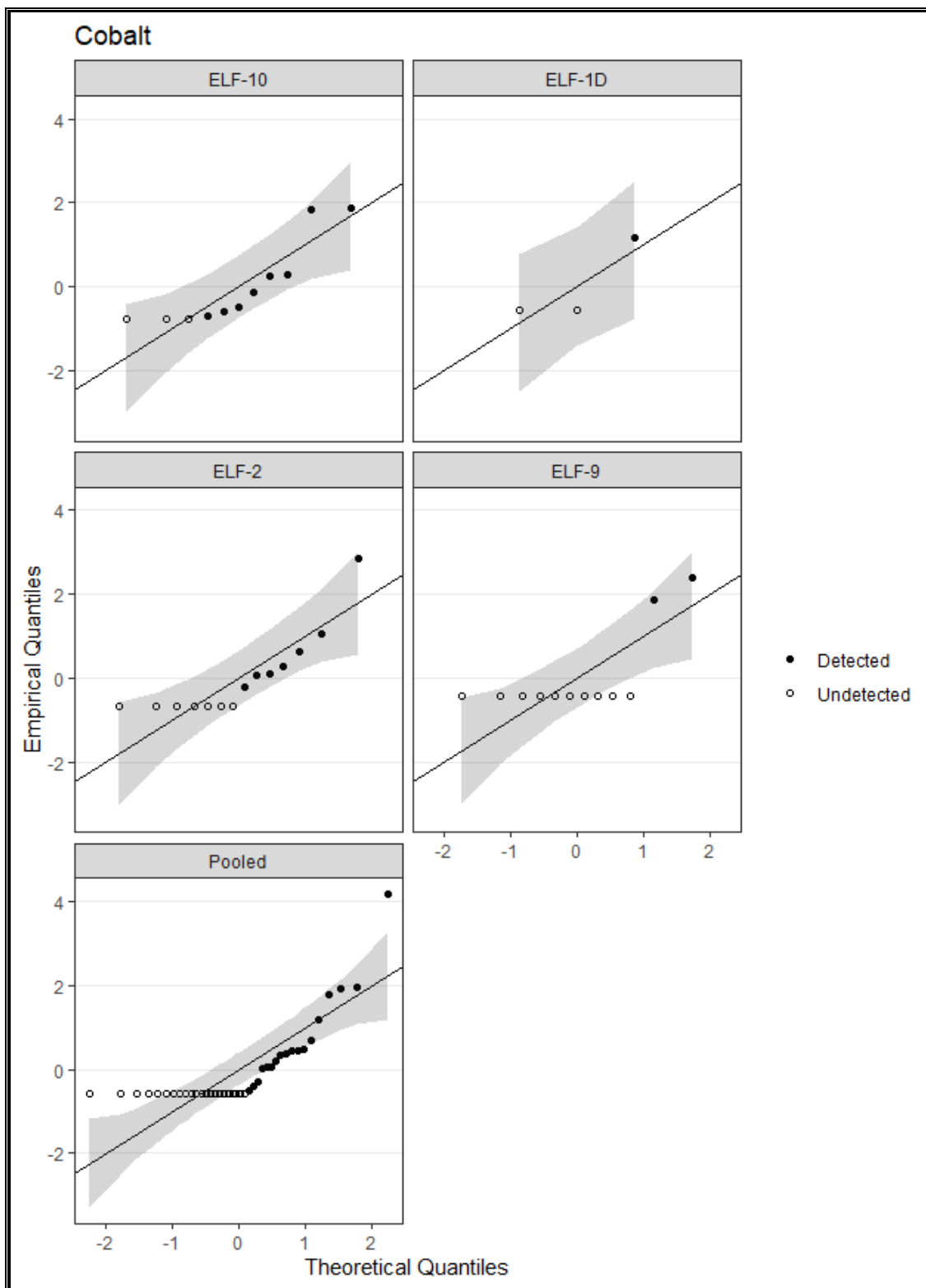


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

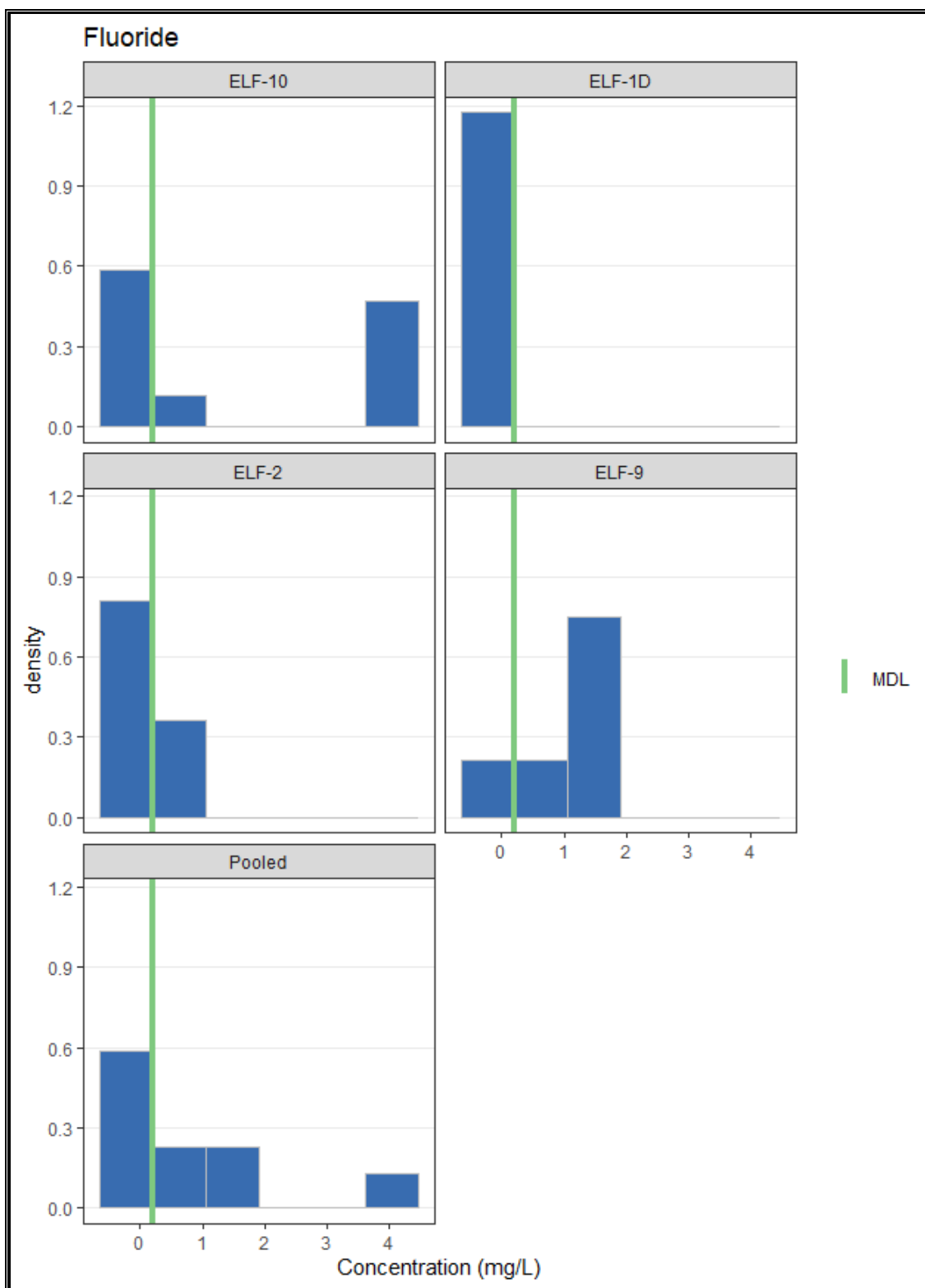


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

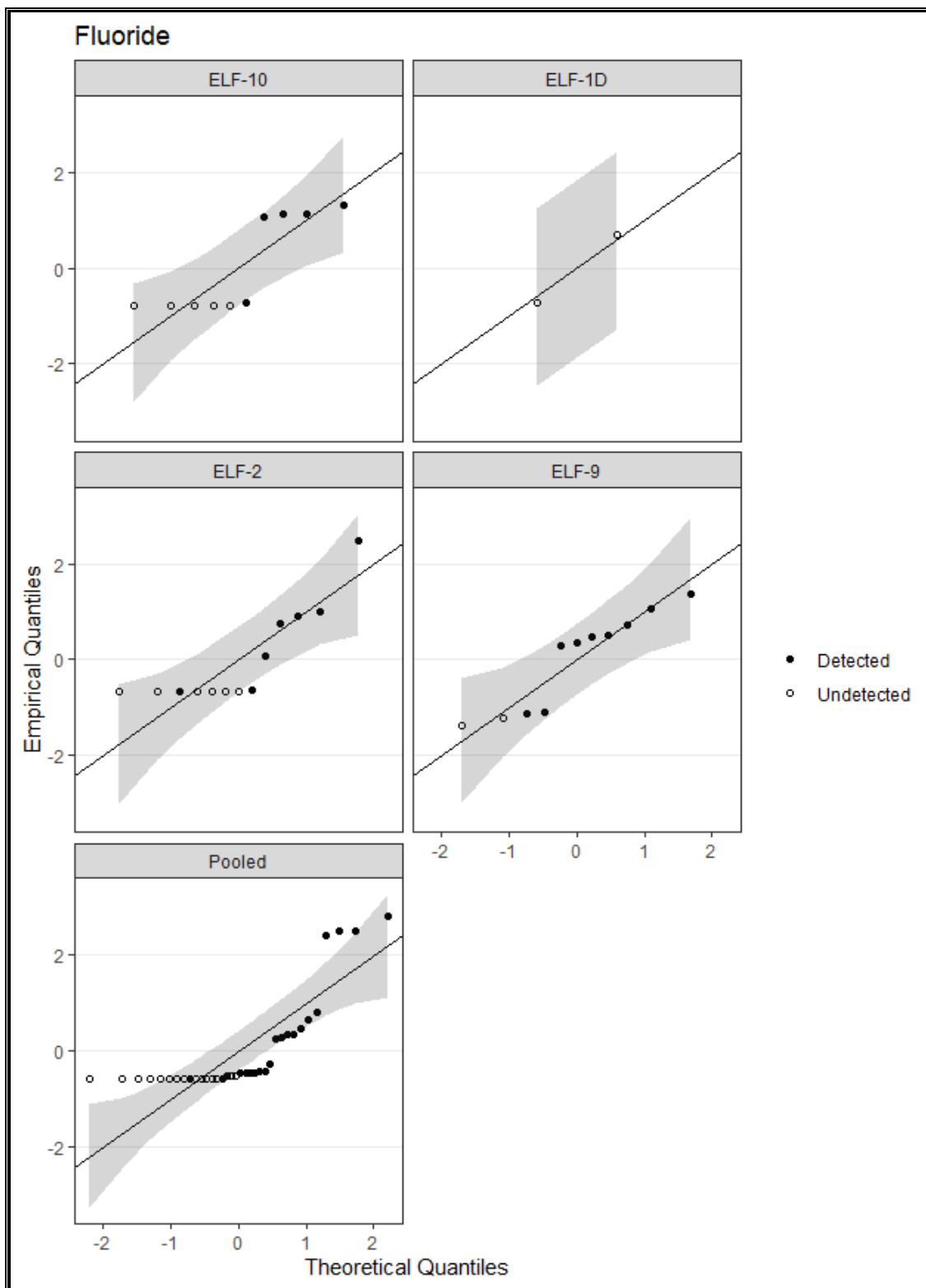


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

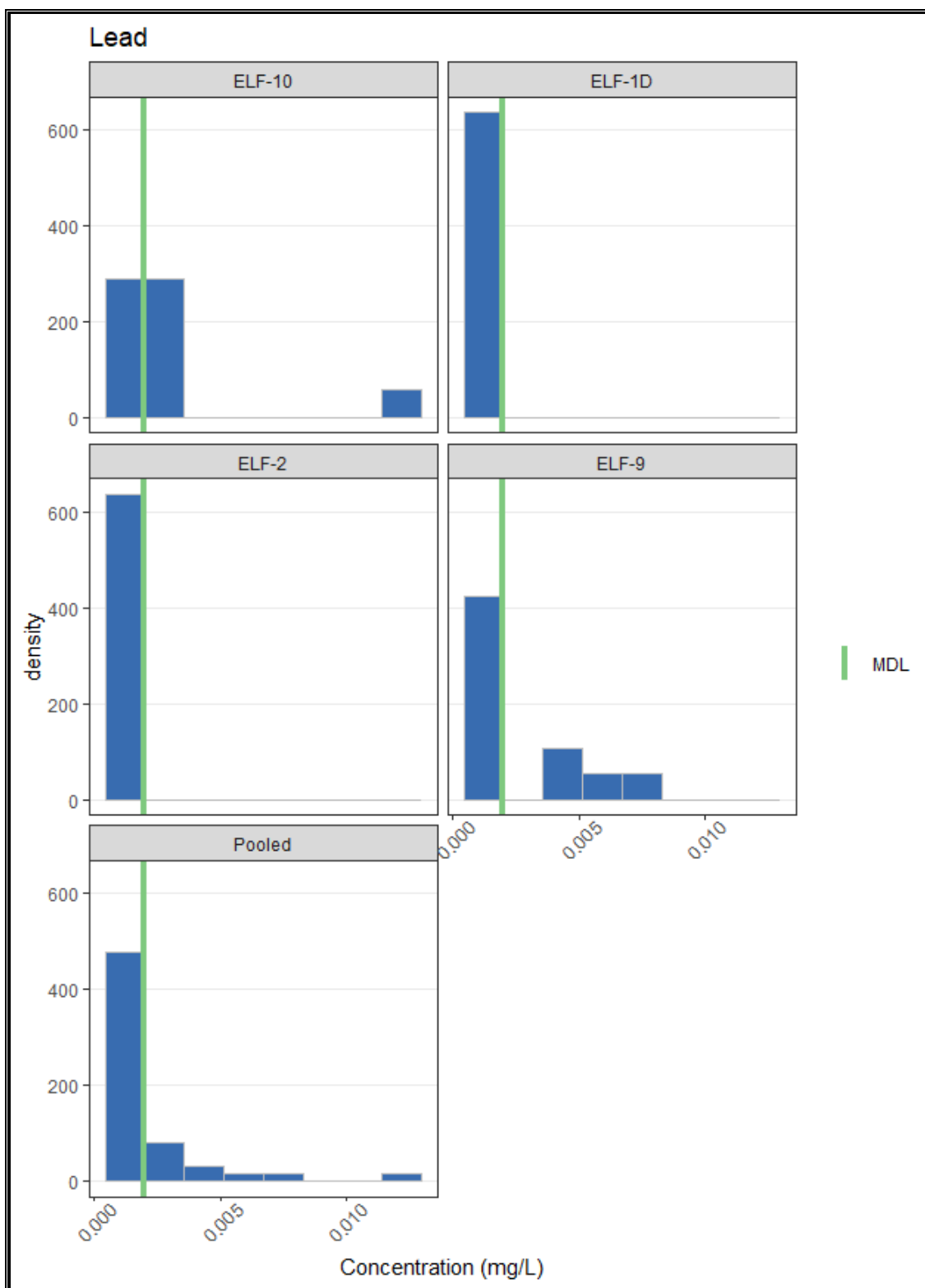


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

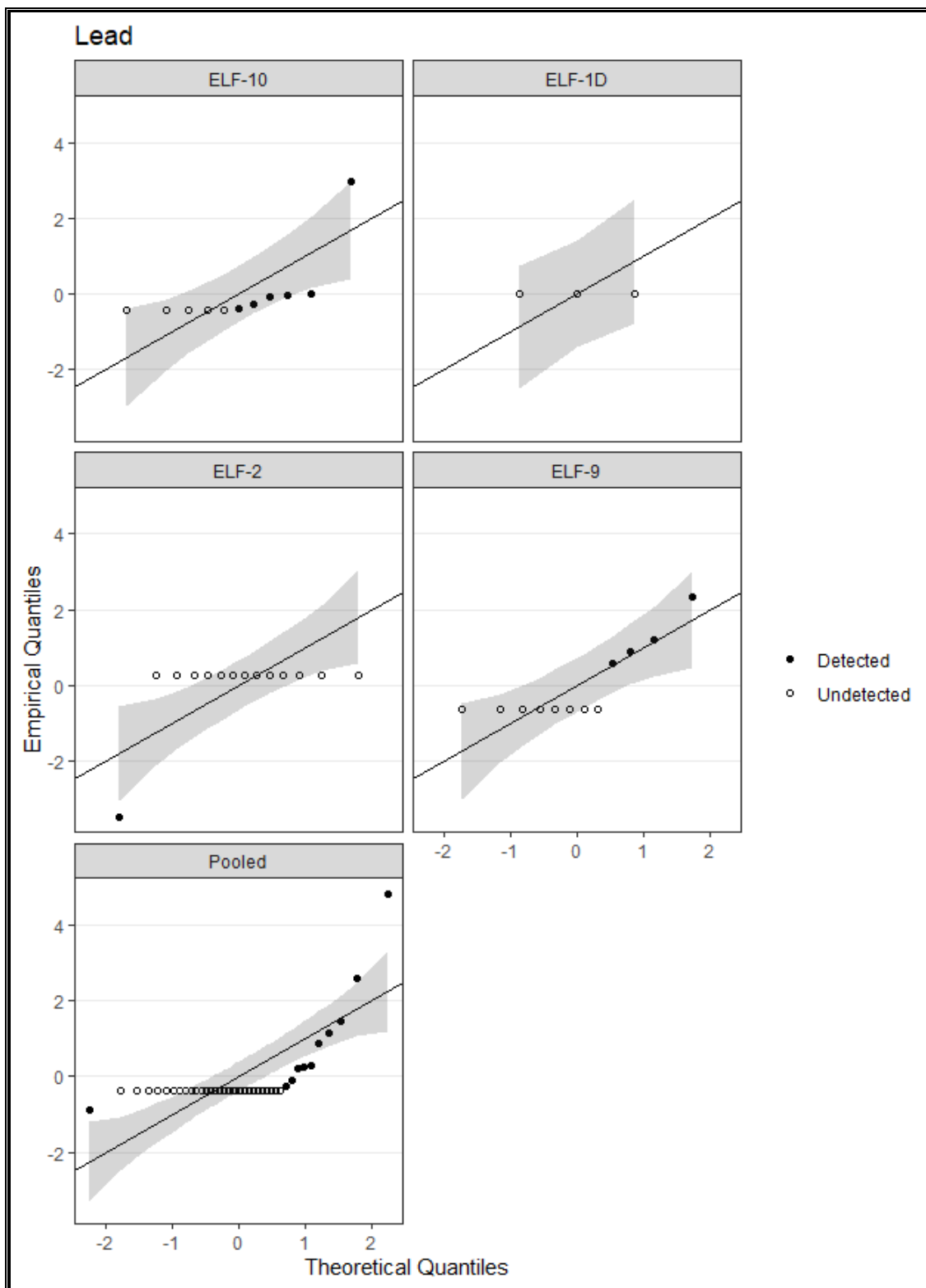


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

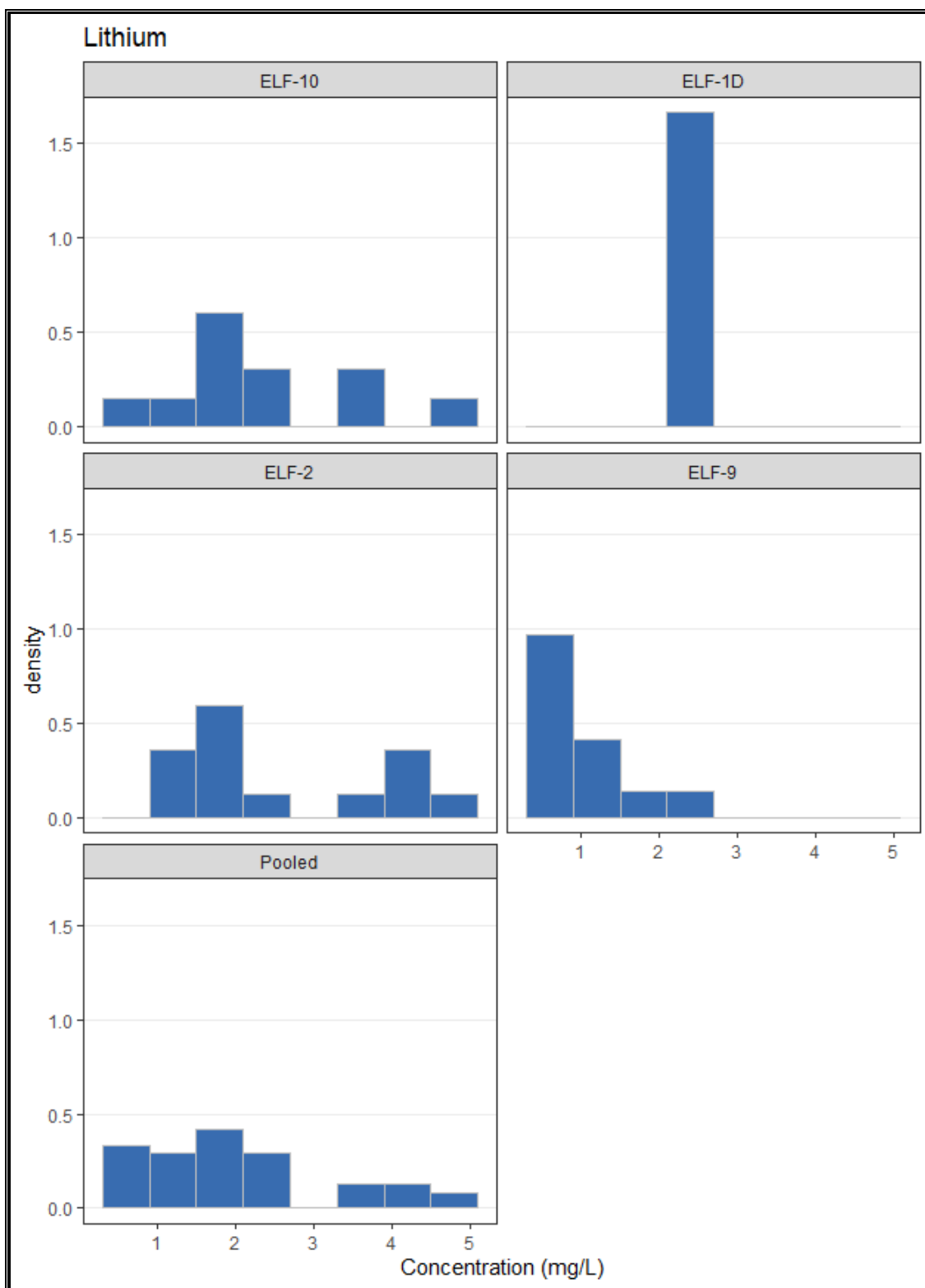


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

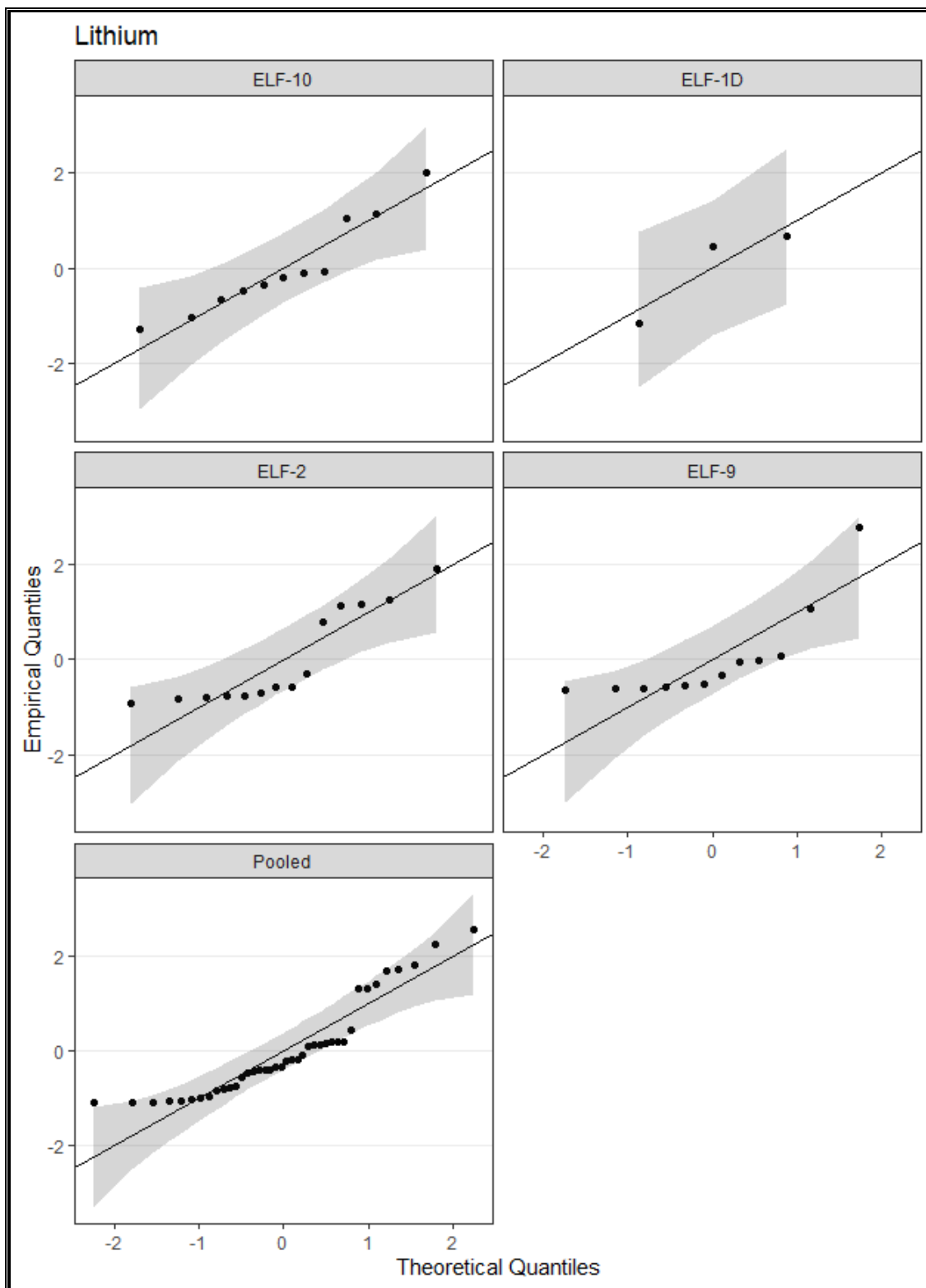


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

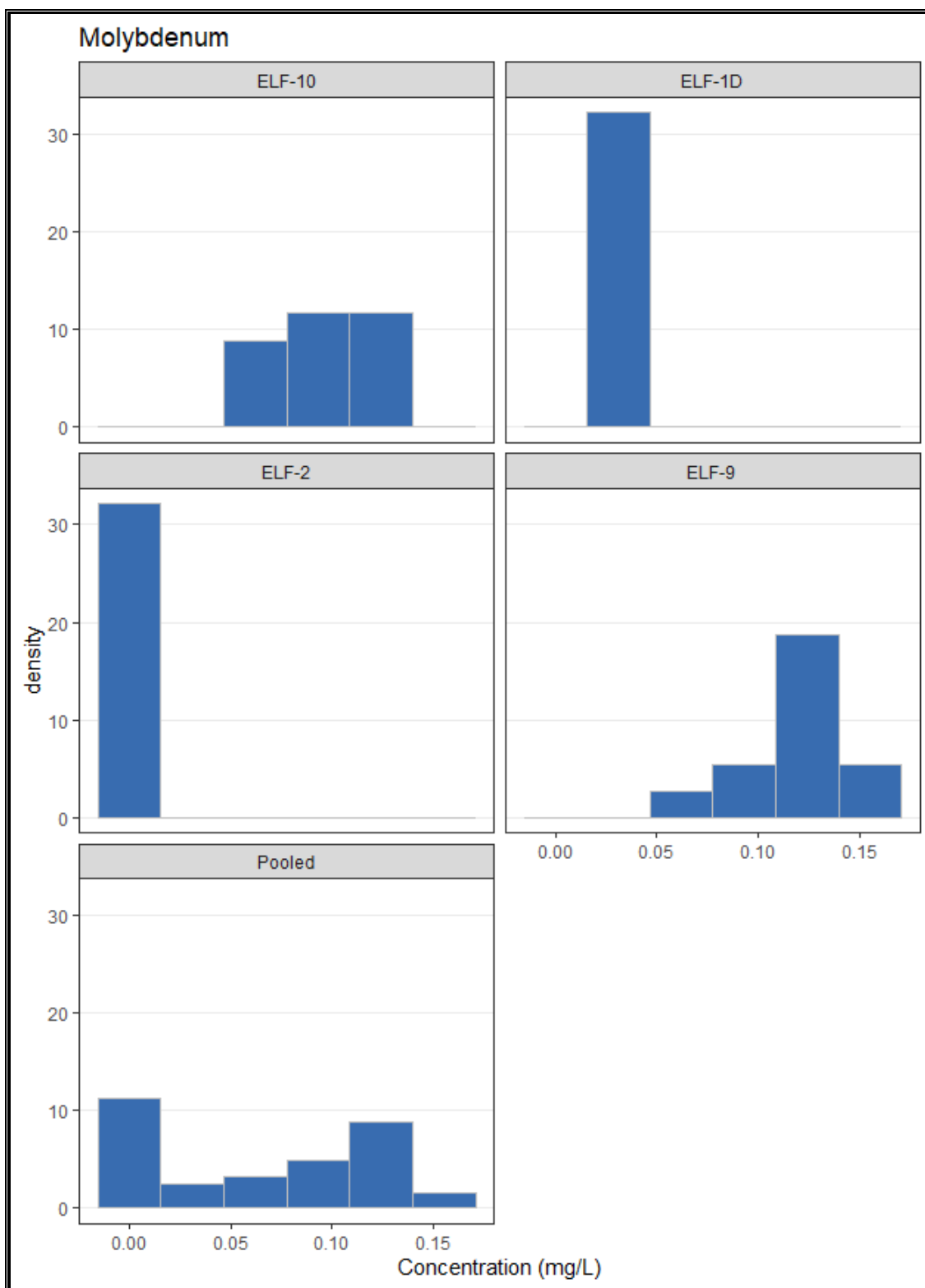


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

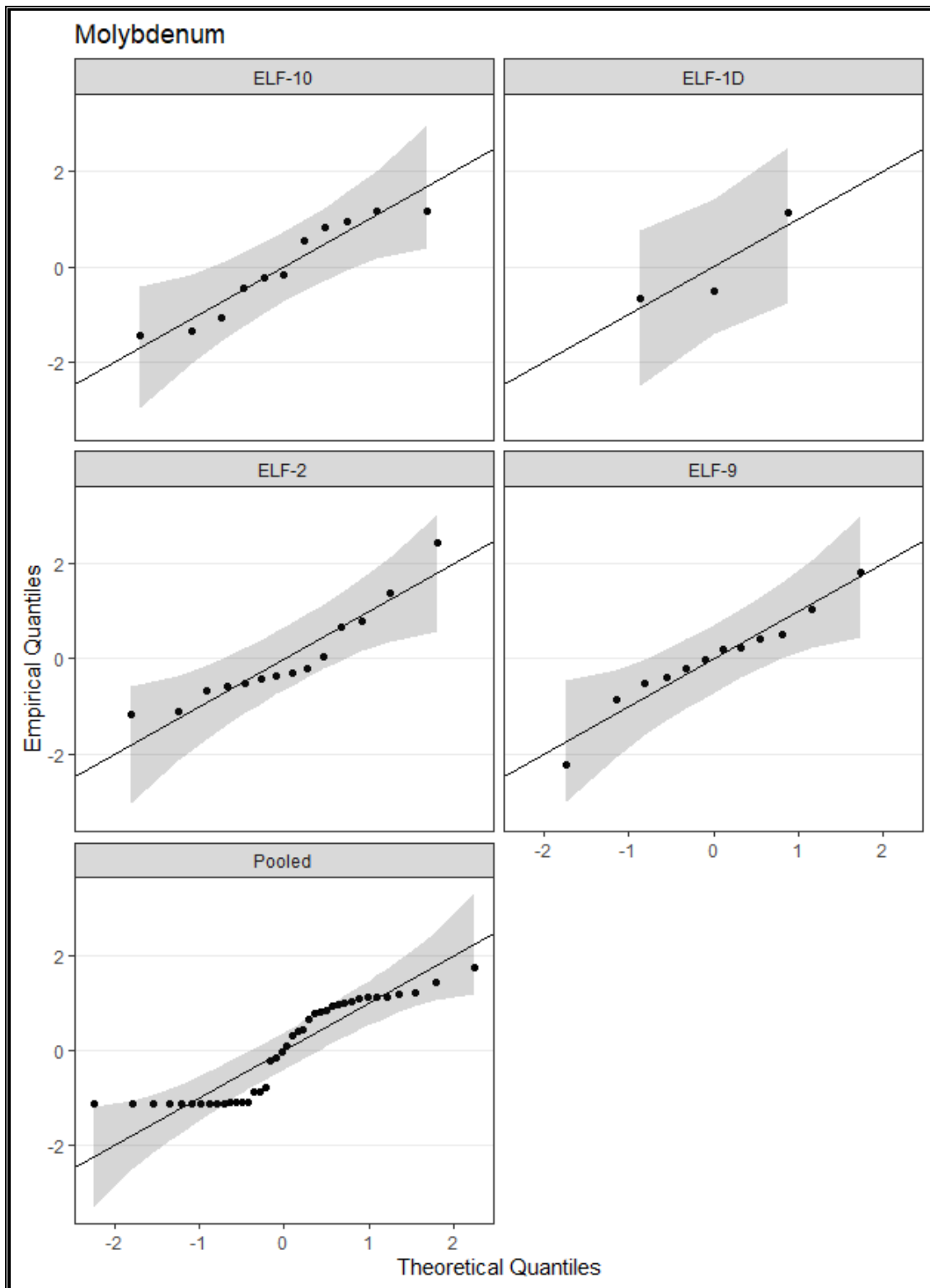


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

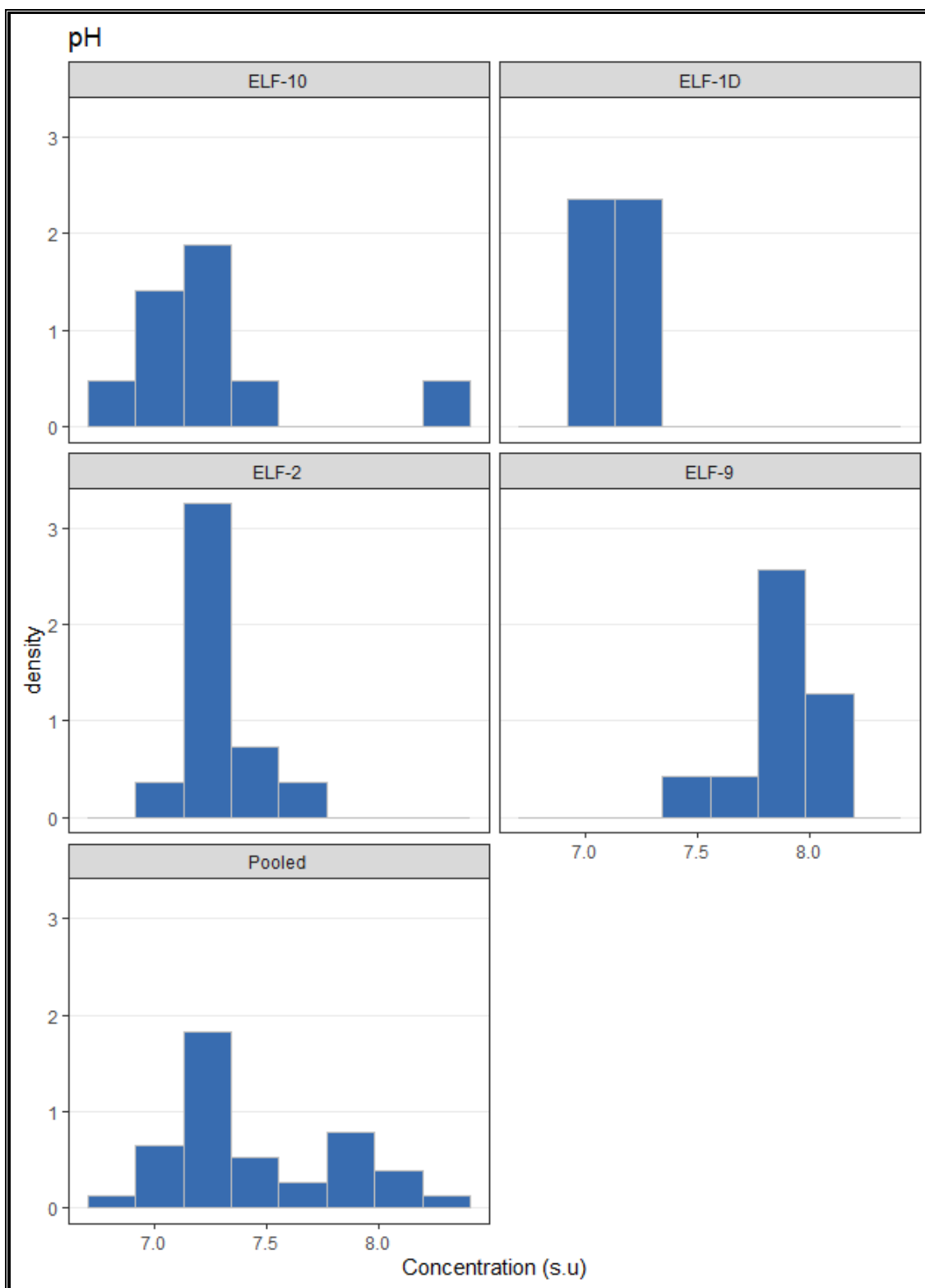


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

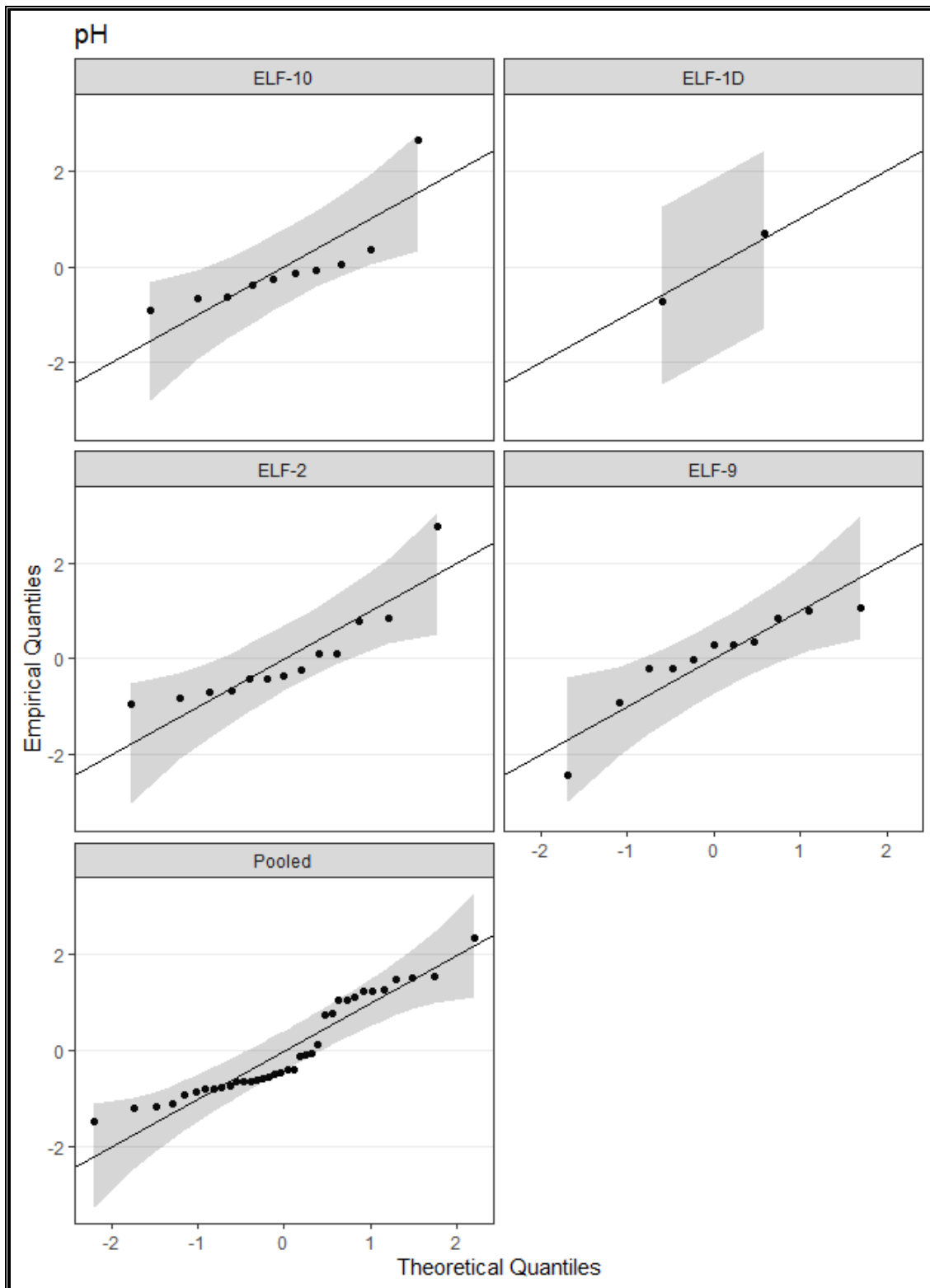


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

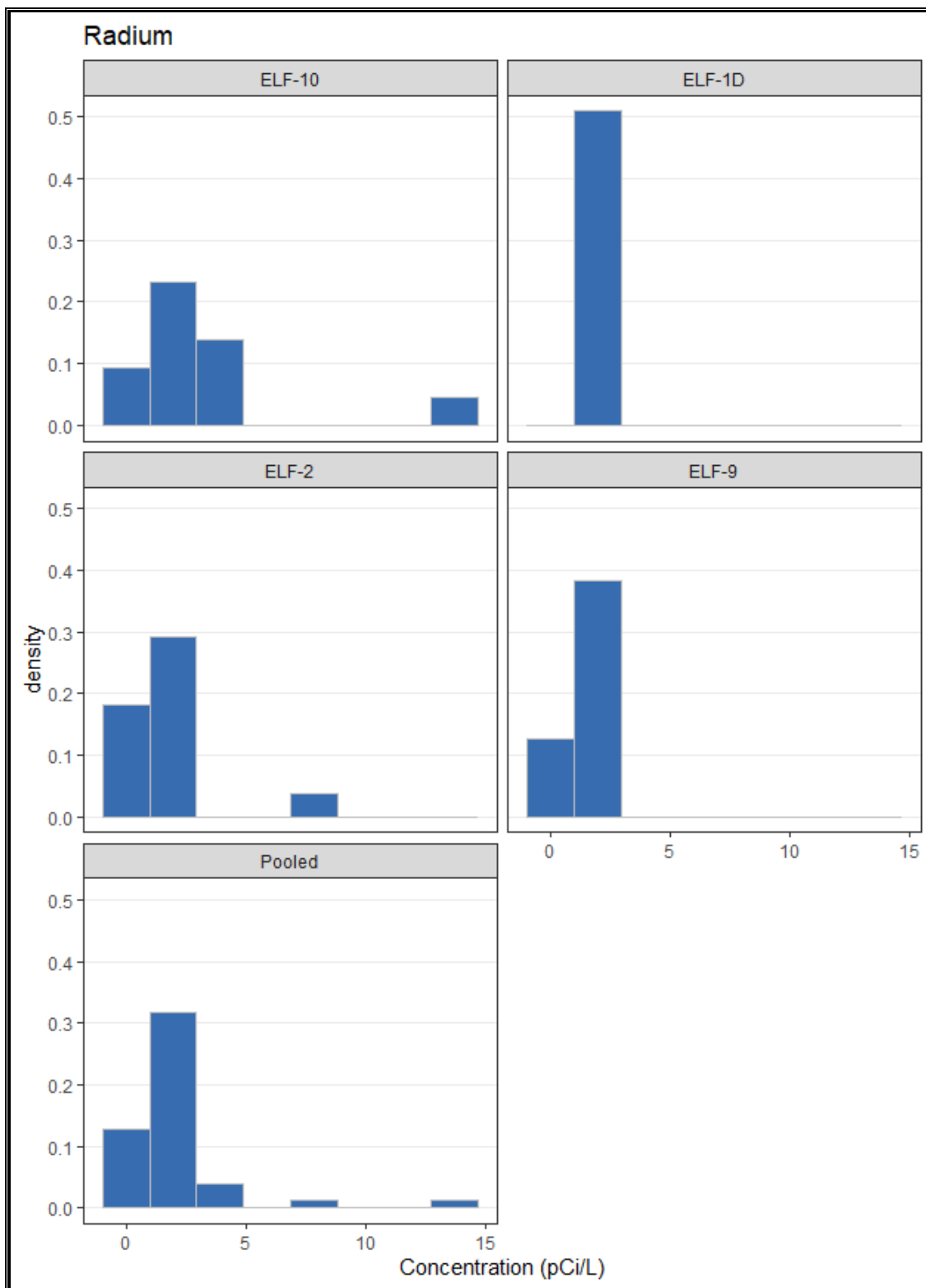


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

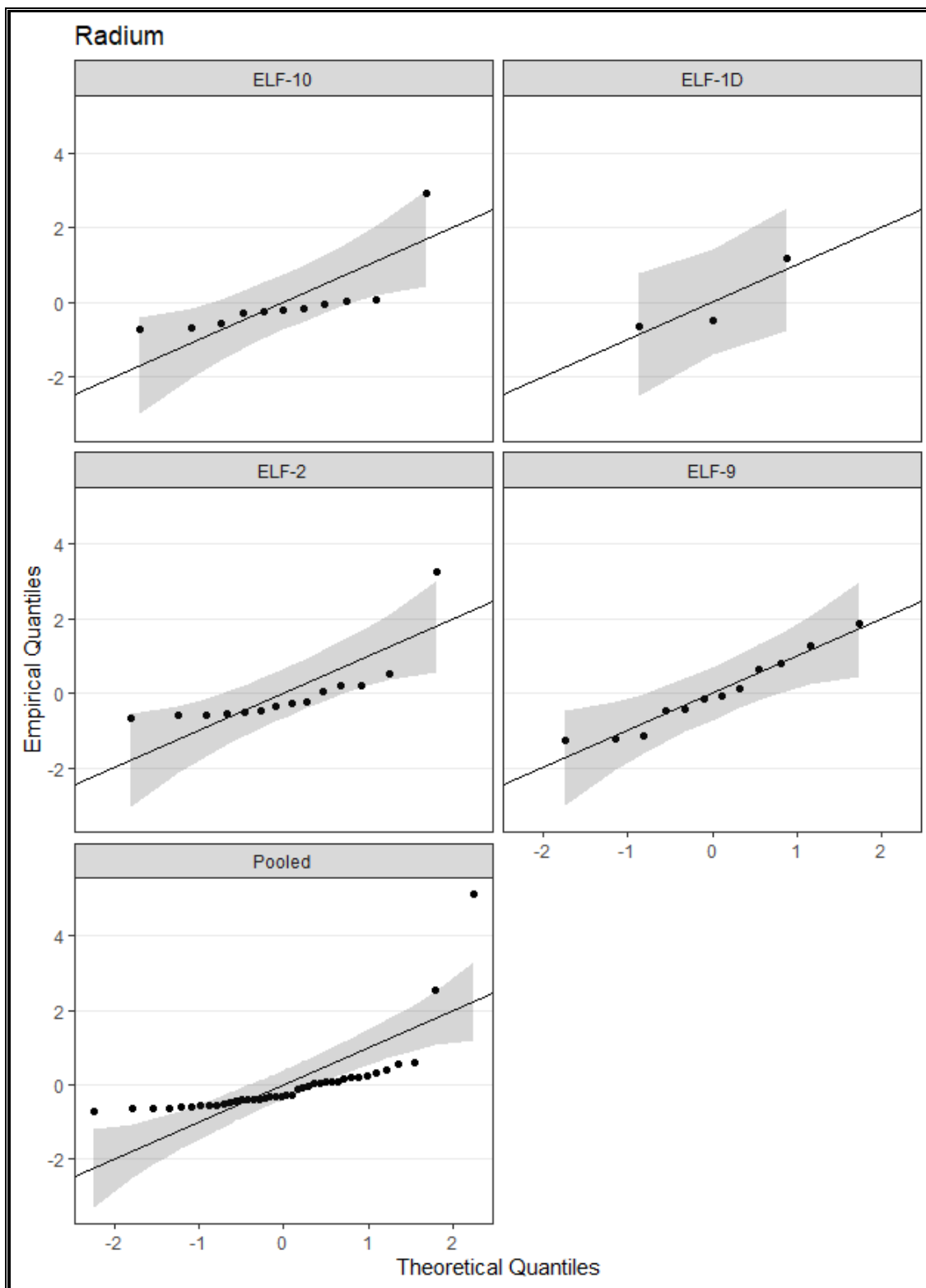


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

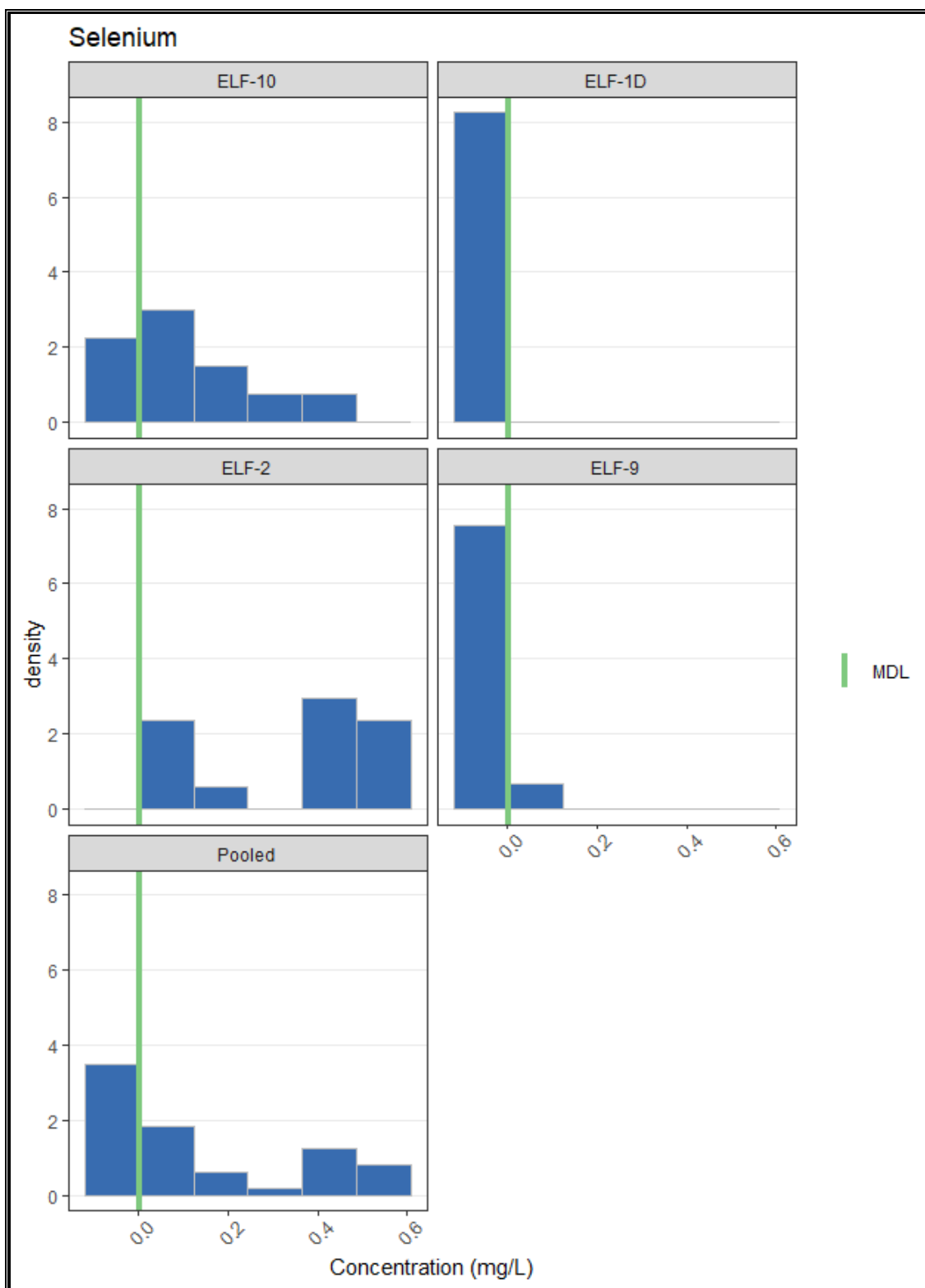


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

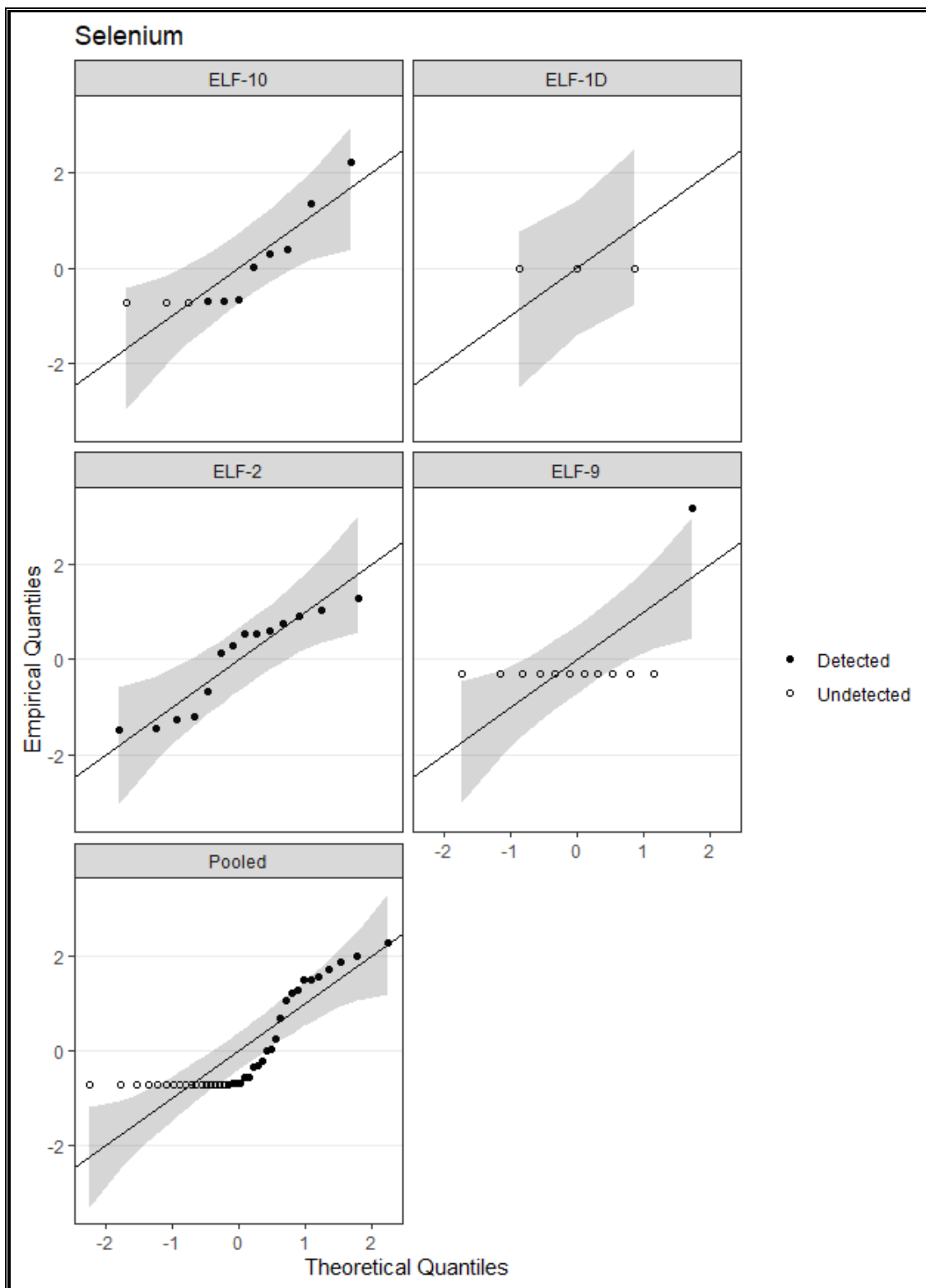


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

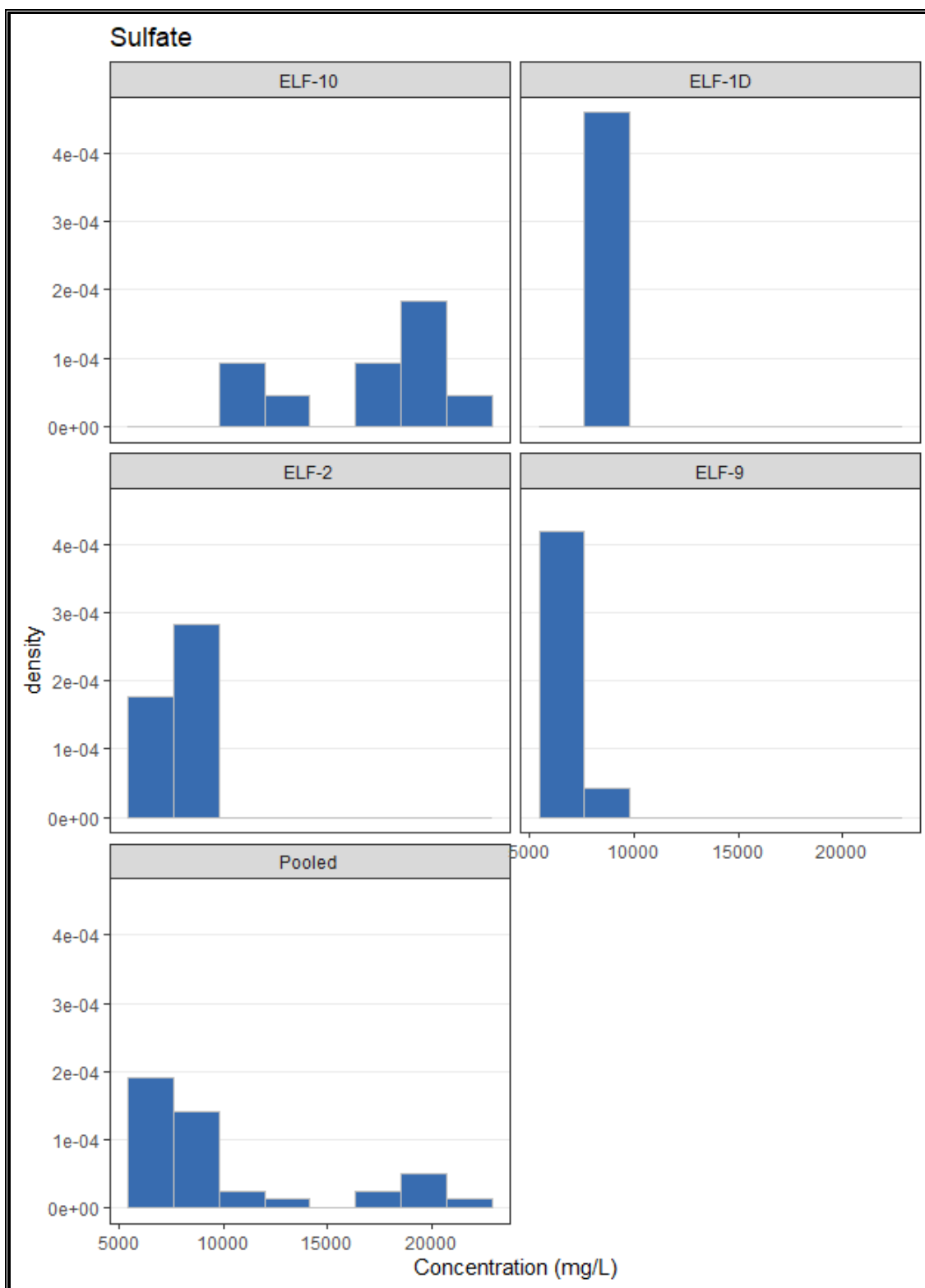


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

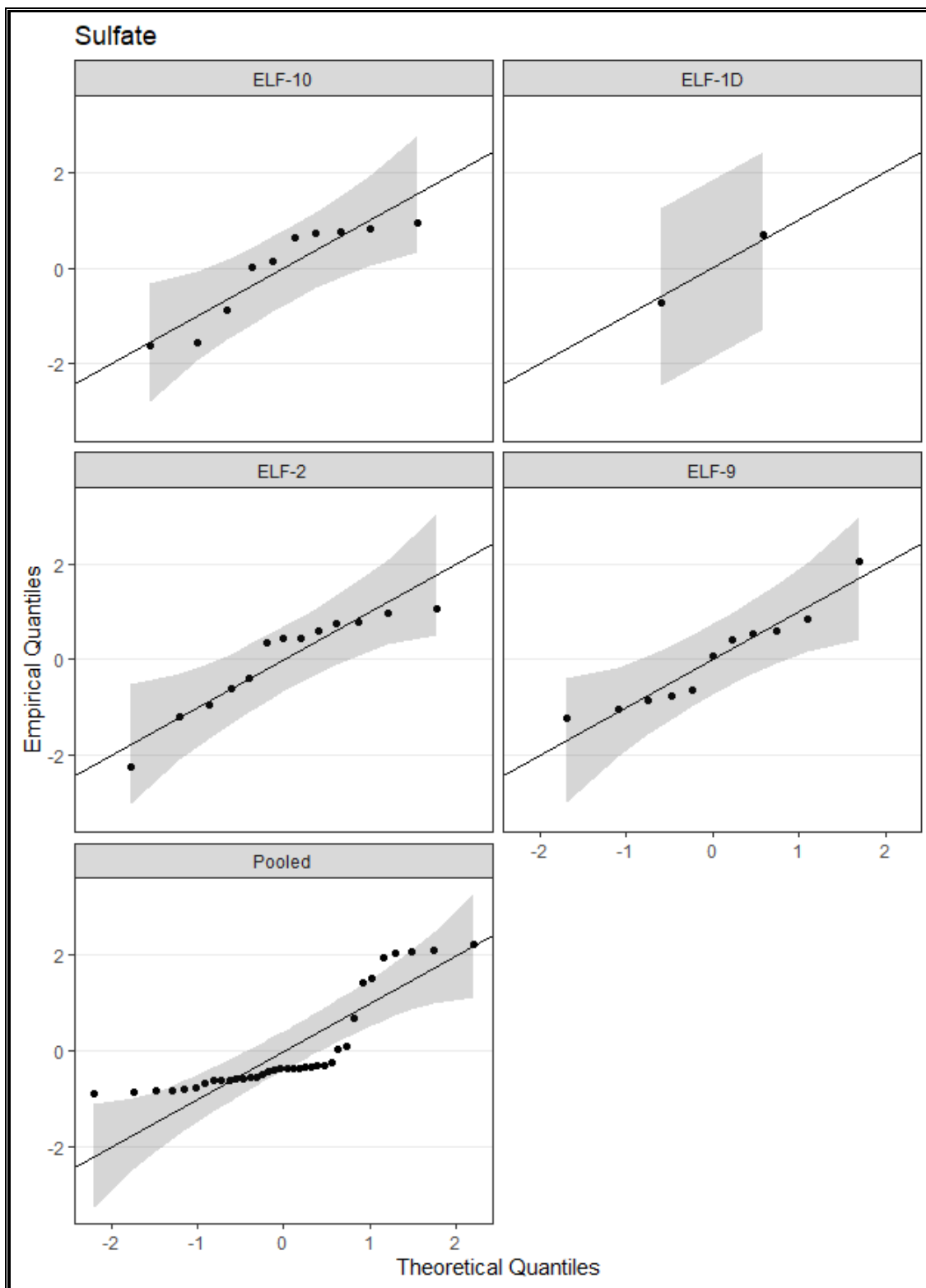


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

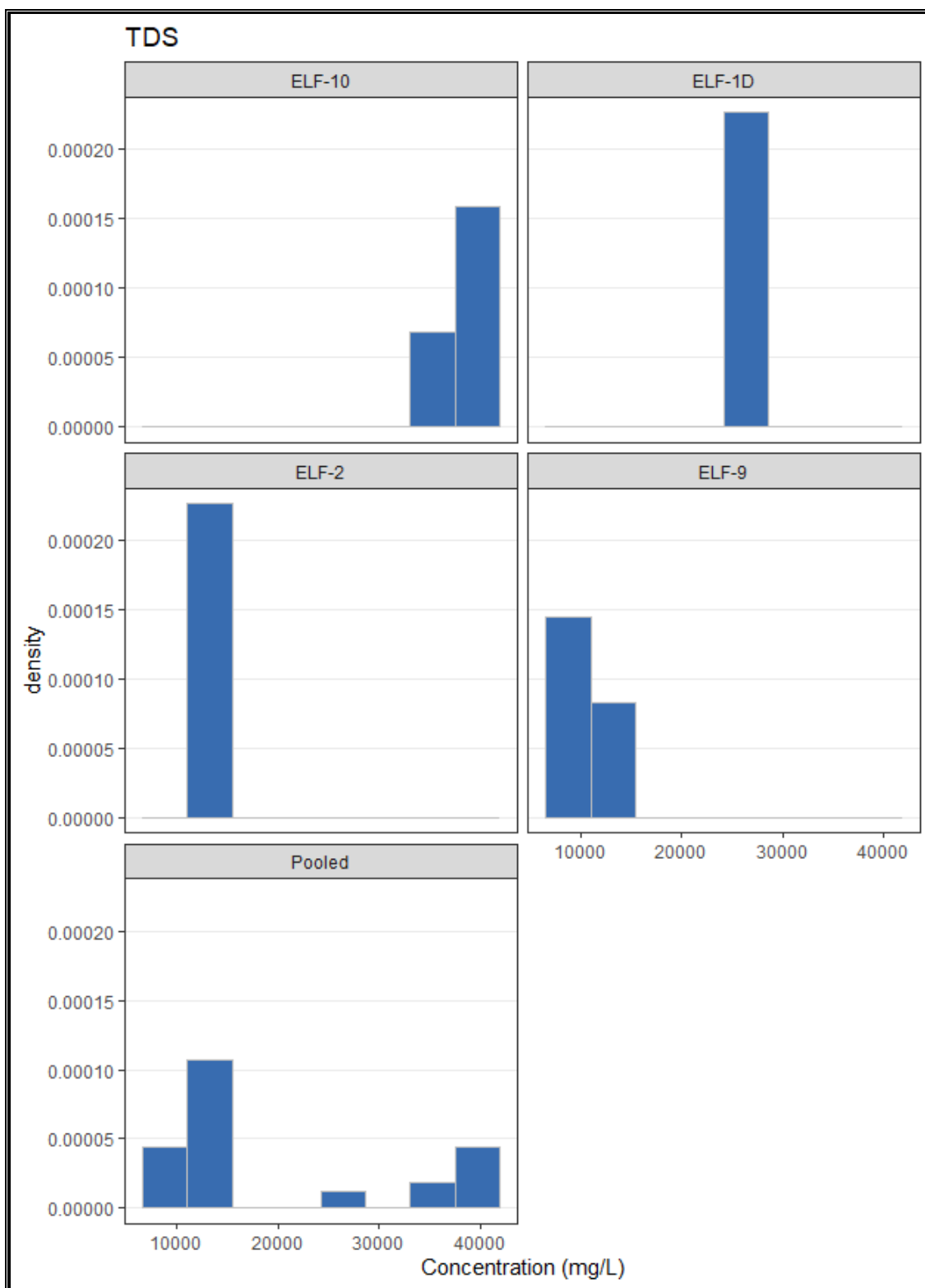


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

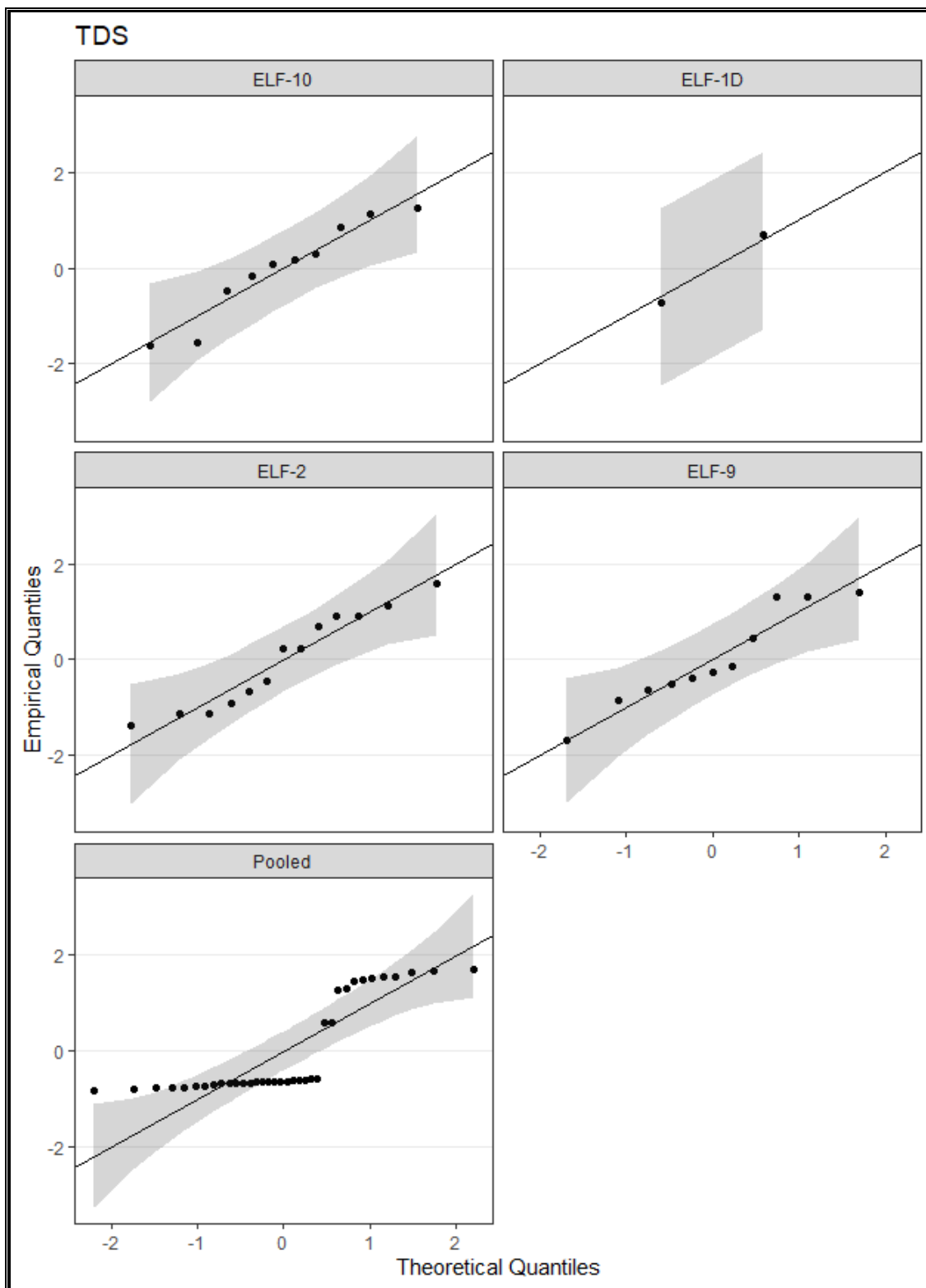


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

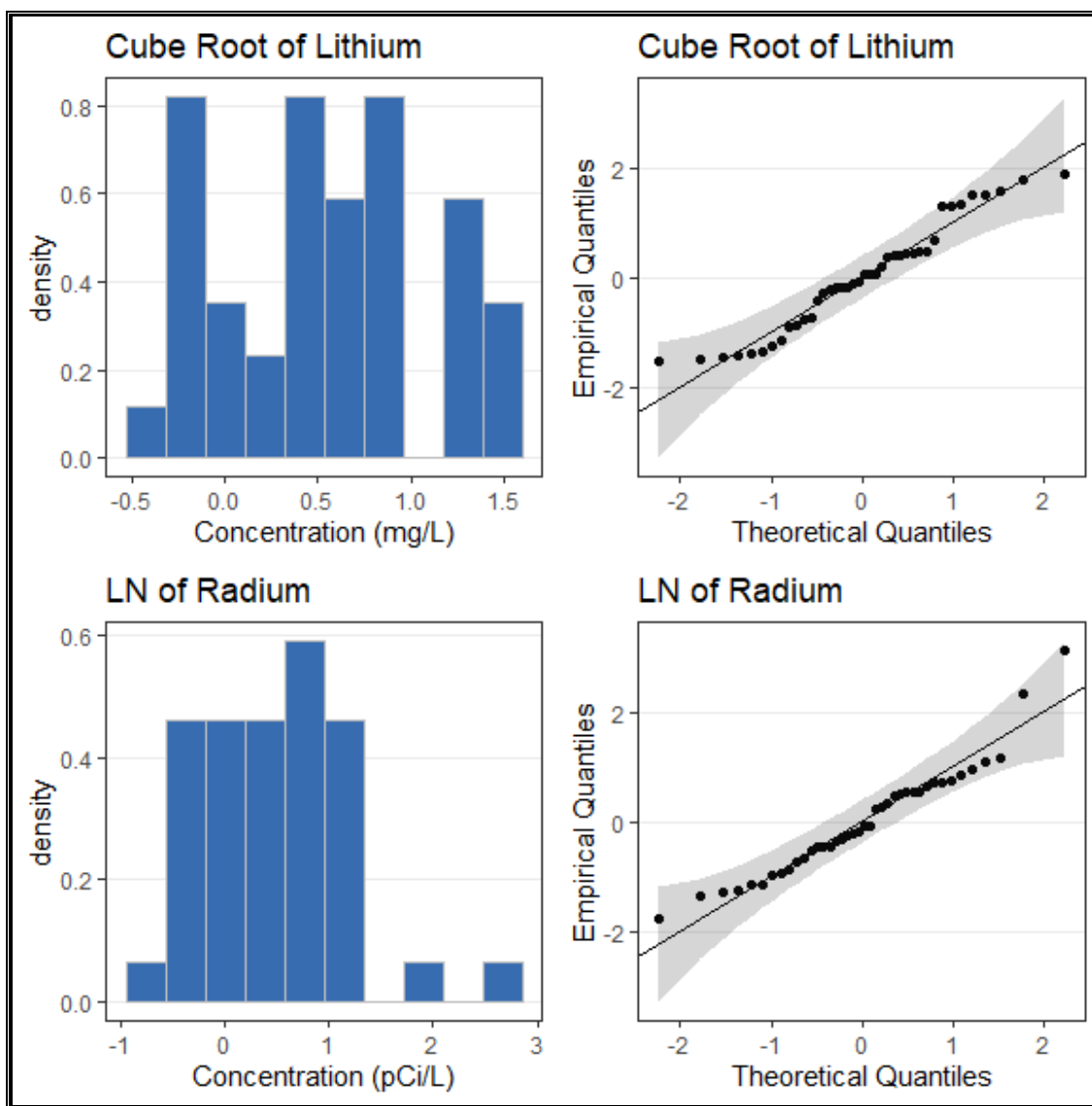


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

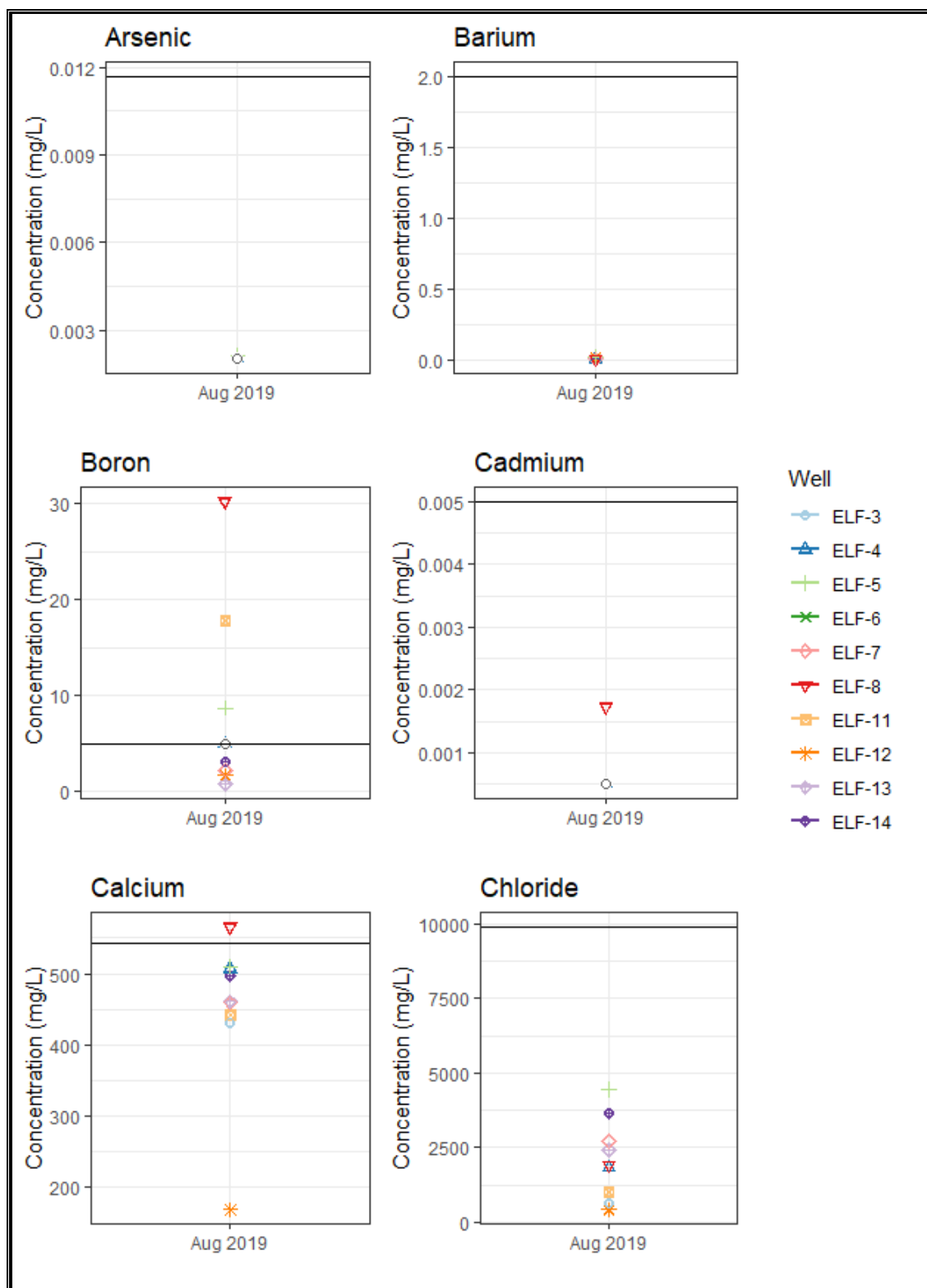


Figure C.4. Groundwater Protection Standard plots for the CCR Landfill.

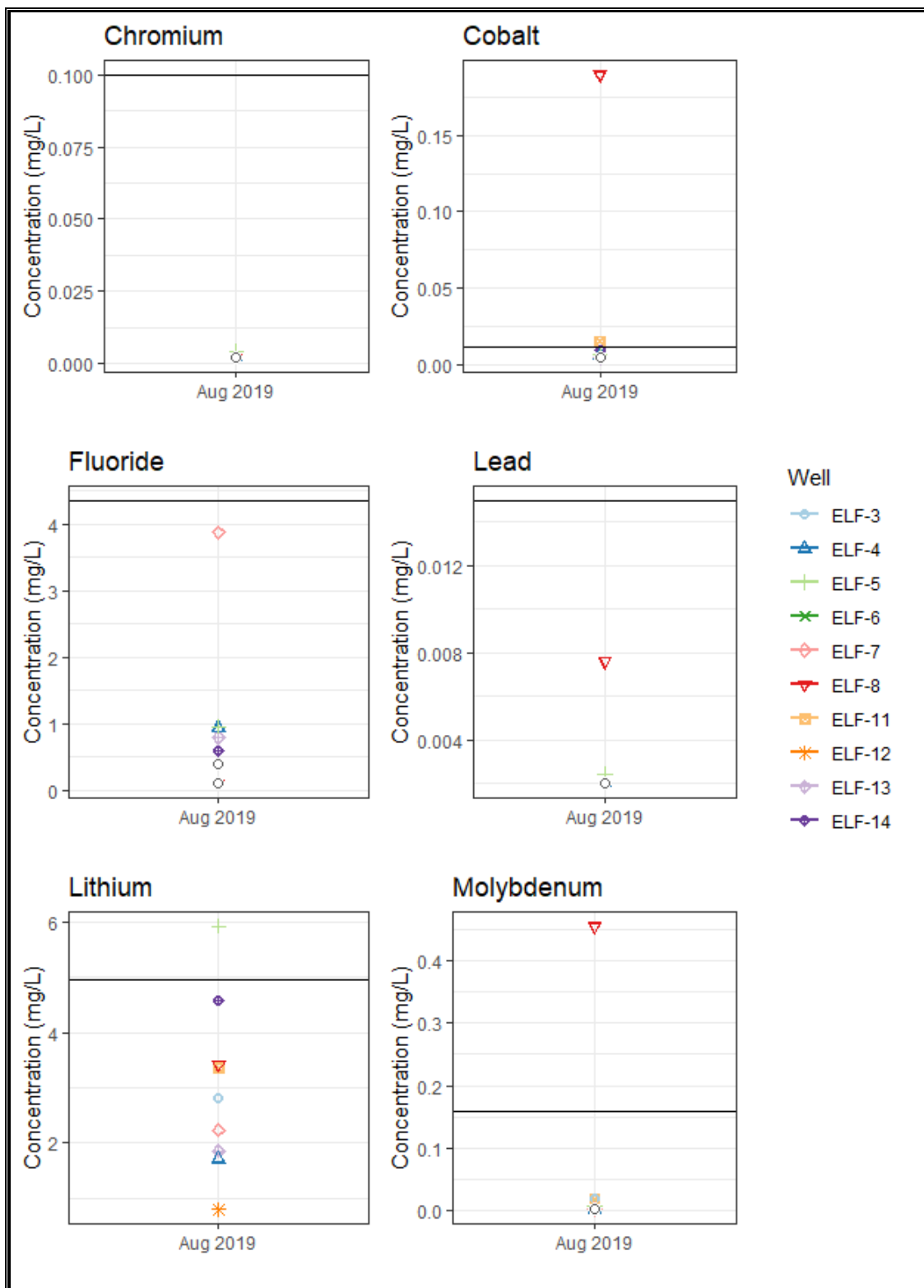


Figure C.4 (cont.). Groundwater Protection Standard plots for the CCR Landfill.

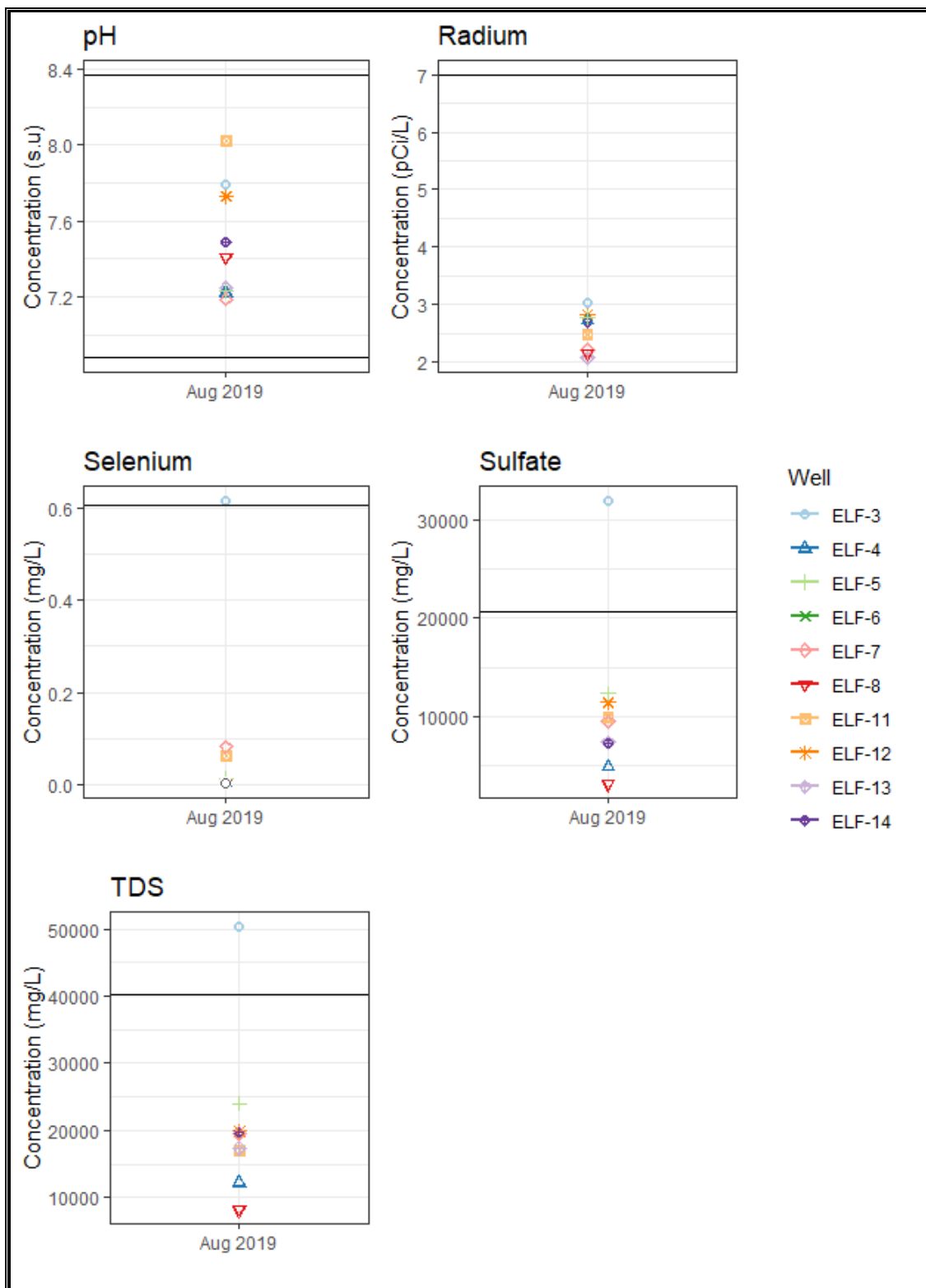


Figure C.4 (cont.). Groundwater Protection Standard plots for the CCR Landfill.

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:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-13	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY, CLEAR		
Depth to Water (ft):	3.98		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	11.90	19,552	0.13	6.75	287.40	7.57
2	11.80	19,551	0.10	6.77	286.80	3.88
4	11.80	19,480	0.08	6.77	284.30	6.39
6	11.80	19,435	0.06	6.76	281.30	12.50

SAMPLE COLLECTION			
Appendix:	3_4	Sample Time:	11:30

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

Project Name:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-12	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY, CLEAR		
Depth to Water (ft):	19.82		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	12.90	21,329	0.06	7.26	105.70	397.00
2	13.00	21,321	0.06	7.25	103.90	109.00
4	13.30	21,259	0.07	7.24	100.20	69.60
6	13.10	21,334	0.45	7.23	90.80	62.20

SAMPLE COLLECTION			
Appendix:	3_4	Sample Time:	12:15
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:	Hunter Power Plant CCR Monitoring		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-14	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY, CLEAR		
Depth to Water (ft):	6.64		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	14.40	23,053	0.34	6.94	222.20	78.90
2	14.70	23,039	0.31	6.94	230.10	33.50
4	14.90	23,065	0.15	6.94	243.10	18.80
6	15.00	23,068	0.11	6.94	249.00	15.30

SAMPLE COLLECTION			
Appendix:	3_4	Sample Time:	10:45
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
 480 East Park Street
 Butte, Montana 59701
 Phone: 406-782-5220
 Fax: 406-723-1537

Project Name:	Hunter		
Sampler Initials:	CE	Project Number:	PERCM052
Sample ID:	ELF-1D	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny 80s		
Depth to Water (ft):	83.22		

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:	13:30

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:

Poor producer, filled sample bottles first, MS came and could not get parameters through flow through cell, no parameters



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

Project Name:	Hunter		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-2	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY, CLEAR		
Depth to Water (ft):	22.72		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	14.40	13,033	1.03	6.85	187.40	10.10
2	14.40	13,025	0.94	6.83	187.00	5.18
4	14.00	13,030	0.83	6.82	185.60	0.69
6	14.30	13,020	0.70	6.83	184.30	0.65

SAMPLE COLLECTION			
Appendix:	3_4	Sample Time:	14:30

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:

FIELD BLANK TAKEN AT 1445



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

Project Name:	Hunter		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-3	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY, CLEAR		
Depth to Water (ft):	30.30		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	15.30	42,966	3.69	7.19	238.80	12.40
2	15.00	42,960	3.32	7.16	237.10	22.90
4	15.00	43,389	3.24	7.13	234.30	30.50
6	14.90	43,356	3.22	7.12	232.50	31.50

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	13:15
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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:

WELL HAS HISTORICALLY GONE DRY DURING SAMPLING. SAMPLE TAKEN FIRST, THEN PARAMETERS MEASURED



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

Project Name:	Hunter		
Sampler Initials:	CE	Project Number:	PERCM052
Sample ID:	ELF-4	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny 81 degrees		
Depth to Water (ft):	16.88		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
1205	13.20	14,706	5.85	11.28	180.40	73.30
1207	13.20	14,677	5.22	11.94	178.90	23.50
1209	13.20	14,690	4.83	12.16	177.50	14.50
1211	13.20	14,690	3.87	12.20	176.70	13.60
1213	13.40	14,690	3.16	12.10	175.70	10.90

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	12:15
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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:



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

Project Name:	Hunter		
Sampler Initials:	CE	Project Number:	PERCM052
Sample ID:	ELF-5	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY 81 degrees		
Depth to Water (ft):	18.69		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
1144	18.30	25,960	6.01	9.03	219.40	83.10
1046	16.20	25,791	5.40	9.61	218.10	46.10
1048	15.90	25,625	4.85	9.87	215.30	29.70
1150	15.70	24,591	4.38	9.97	212.30	20.10

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	11:30
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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:

Not enough water- filled bottles first then took parameters



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

Project Name:	Hunter		
Sampler Initials:	CE	Project Number:	PERCM052
Sample ID:	ELF-6	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny 73 degrees		
Depth to Water (ft):	18.25		

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:	11:14

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:

Could not sample due to low water level



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

Project Name:	Hunter		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-7	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY, CLEAR		
Depth to Water (ft):	15.22		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	15.30	22,381	0.50	6.77	223.90	102.00
2	15.00	22,383	0.42	6.76	223.10	48.50
4	15.00	22,300	0.36	6.75	222.60	29.10
6	1.60	22,210	0.45	6.75	221.90	22.30

SAMPLE COLLECTION

Appendix:	3_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
 480 East Park Street
 Butte, Montana 59701
 Phone: 406-782-5220
 Fax: 406-723-1537

Project Name:	Hunter		
Sampler Initials:	MLS	Project Number:	PERCM052
Sample ID:	ELF-9	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY, CLEAR		
Depth to Water (ft):	23.25		

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
0	13.20	14,377	0.06	7.44	89.80	16.20
2	14.20	13,672	0.02	7.44	120.70	12.10
4	13.20	13,576	0.02	7.49	87.70	8.00
6	13.10	13,261	0.02	7.48	81.10	3.17

SAMPLE COLLECTION			
Appendix:	3_4	Sample Time:	13:45
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:

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

Project Name:	Hunter		
Sampler Initials:	CE	Project Number:	PERCM052
Sample ID:	ELF-8	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny 73 degrees		
Depth to Water (ft):	9.17		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
1022	15.50	11,171	2.01	10.77	185.70	OOR
1024	15.40	11,109	1.01	11.18	185.10	88.50
1026	15.40	11,101	0.73	11.33	184.70	34.50
1028	15.30	11,076	0.49	11.49	183.70	24.00
1030	15.30	11,070	0.40	11.53	183.10	18.60

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	10:32
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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:

1st turbidity reading over range



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

Project Name:	Hunter		
Sampler Initials:	CE	Project Number:	PERCM052
Sample ID:	ELF-10	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	SUNNY 80s		
Depth to Water (ft):	51.64		

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:	13:15

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:

Poor producer, filled two bottles then well went dry, no sample, no parameters



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

Project Name:	Hunter		
Sampler Initials:	CE/MS	Project Number:	PERCM052
Sample ID:	ELF-11	Project Location:	Castle Dale UT
Water Disposal:	Ground	Sample Date:	8/20/2019
Sample Method:	Low Flow Bladder Pump	Decon Method:	Dedicated Equipment
Field Conditions:	Sunny clear high 60s		
Depth to Water (ft):	28.31		

FIELD PARAMETERS

TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	pH (s.u.)	ORP (mv)	Turb. (NTU)
919	14.80	18,664	0.97	10.26	210.70	33.70
921	14.80	18,601	0.73	10.74	209.10	32.50
923	14.80	18,464	0.82	10.85	208.50	38.20
925	14.80	18,287	0.91	11.17	207.50	40.60

SAMPLE COLLECTION

Appendix:	3_4	Sample Time:	09:26
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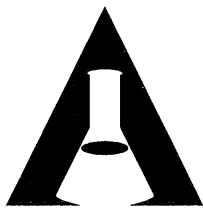
Containers	Preservatives	Analytes/Comments
(1) 1/2 gal poly	HNO3	Radium 226 + 228
(1) 250 mL poly	HNO3	Total metals, Total mercury
(1) 250 mL poly	H2SO4	Nitrate + Nitrite
(1) 1-L poly	None	TDS, pH, anions, fluoride, alkalinity

Comments/Observations:

Dup-08-20-19 @ 0940

Attachment E:

Laboratory Analytical Reports



Jeff Tucker
PacifiCorp
1407 West North Temple, # 280

AMERICAN WEST ANALYTICAL LABORATORIES
Salt Lake City, UT 84116
TEL: (801) 220-2989
RE: Hunter CCR Groundwater Sampling / PERCM052

Dear Jeff Tucker:

Lab Set ID: 1908532

Kyle F. Gross
Laboratory Director

American West Analytical Laboratories received sample(s) on 8/21/2019 for the analyses presented in the following report.

Jose Rocha
QA Officer

3440 South 700 West
Salt Lake City, Utah
84119

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

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

(801) 263-8686
Toll Free (888) 263-8686

Fax (801) 263-8687
awal@awal-labs.com

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

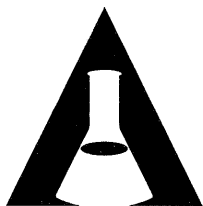
Thank You,

Approved by:


Laboratory Director or designee

Sample(s) were subcontracted for the following analyses:

Radiological Testing



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-001
Client Sample ID: ELF-1D
Collection Date: 8/20/2019 1330h
Received Date: 8/21/2019 1445h

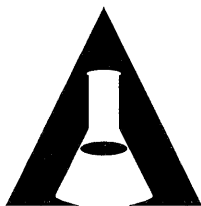
Contact: Jeff Tucker

Analytical Results

TOTAL METALS

		Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Kyle F. Gross Laboratory Director		Antimony	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00400	< 0.00400	
Jose Rocha QA Officer		Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00200	< 0.00200	
		Barium	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00200	0.00842	
		Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00200	< 0.00200	
3440 South 700 West		Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah		Chromium	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00200	< 0.00200	
84119		Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00400	< 0.00400	
		Lead	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00200	< 0.00200	
(801) 263-8686		Lithium	mg/L	8/22/2019 750h	8/30/2019 1505h	E200.7	0.100	2.19	
Toll Free (888) 263-8686		Mercury	mg/L	8/26/2019 1838h	8/27/2019 1054h	E245.1	0.0000900	< 0.0000900	1
Fax (801) 263-8687		Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1551h	E200.8	0.00200	0.0161	
awal@awal-labs.com		Selenium	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00200	< 0.00200	
		Thallium	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00200	< 0.00200	

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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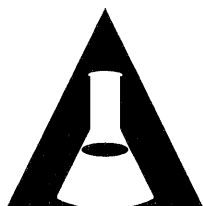
INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-002
Client Sample ID: ELF-2
Collection Date: 8/20/2019 1430h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

Kyle F. Gross Laboratory Director	Compound	Units	Date		Method Used	Reporting Limit	Analytical Result	Qual
			Prepared	Analyzed				
Jose Rocha QA Officer 3440 South 700 West Salt Lake City, Utah 84119 (801) 263-8686 Toll Free (888) 263-8686 Fax (801) 263-8687 awal@awal-labs.com	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00400	< 0.00400	
	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	< 0.00200	
	Barium	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	0.00835	
	Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	< 0.00200	
	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.000500	< 0.000500	
	Chromium	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	< 0.00200	
	Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00400	< 0.00400	
	Lead	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	< 0.00200	
	Lithium	mg/L	8/22/2019 750h	8/30/2019 1507h	E200.7	0.100	1.52	
	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1104h	E245.1	0.0000900	< 0.0000900	
	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1600h	E200.8	0.00200	0.00259	
	Selenium	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	0.0340	
	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	< 0.00200	



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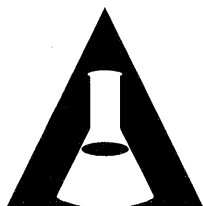
INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-003
Client Sample ID: ELF-3
Collection Date: 8/20/2019 1315h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

Kyle F. Gross Laboratory Director	Compound	Units	Date		Method Used	Reporting Limit	Analytical Result	Qual
			Prepared	Analyzed				
3440 South 700 West Salt Lake City, Utah 84119 (801) 263-8686 Toll Free (888) 263-8686 Fax (801) 263-8687 awal@awal-labs.com	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00400	< 0.00400	
	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	< 0.00200	
	Barium	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	0.0111	
	Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	< 0.00200	
	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.000500	< 0.000500	
	Chromium	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	0.00253	
	Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00400	< 0.00400	
	Lead	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	< 0.00200	
	Lithium	mg/L	8/22/2019 750h	8/30/2019 1651h	E200.7	1.00	2.81	
	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1106h	E245.1	0.0000900	< 0.0000900	
Jose Rocha QA Officer	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1603h	E200.8	0.00200	0.0187	
	Selenium	mg/L	8/30/2019 1331h	9/3/2019 1603h	E200.8	0.00200	0.617	
	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp Contact: Jeff Tucker

Project: Hunter CCR Groundwater Sampling / PERCM052

Lab Sample ID: 1908532-004

Client Sample ID: ELF-4

Collection Date: 8/20/2019 1215h

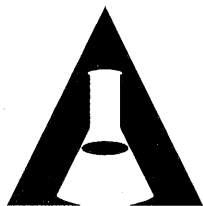
Received Date: 8/21/2019 1445h

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Analytical Results

TOTAL METALS

	Compound	Units	Date		Method	Reporting	Analytical	Qual
			Prepared	Analyzed		Limit	Result	
Kyle F. Gross Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00400	< 0.00400	
Jose Rocha QA Officer	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00200	< 0.00200	
	Barium	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00200	0.0103	
	Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00200	< 0.00200	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah	Chromium	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00200	< 0.00200	
84119	Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00400	0.00637	
	Lead	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00200	< 0.00200	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1512h	E200.7	0.100	1.71	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1108h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1606h	E200.8	0.00200	0.00240	
awal@awal-labs.com	Selenium	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00200	< 0.00200	
	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-005

Contact: Jeff Tucker

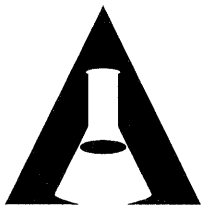
Client Sample ID: ELF-5
Collection Date: 8/20/2019 1130h
Received Date: 8/21/2019 1445h

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LABORATORIES

Analytical Results

TOTAL METALS

		Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Kyle F. Gross Laboratory Director		Antimony	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00400	< 0.00400	
		Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	0.00212	
Jose Rocha QA Officer		Barium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	0.0267	
		Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	< 0.00200	
3440 South 700 West Salt Lake City, Utah		Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.000500	< 0.000500	
		Chromium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	0.00436	
84119		Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00400	0.00618	
		Lead	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	0.00246	
(801) 263-8686		Lithium	mg/L	8/22/2019 750h	8/30/2019 1514h	E200.7	0.100	5.93	
		Mercury	mg/L	8/26/2019 1838h	8/27/2019 1114h	E245.1	0.0000900	< 0.0000900	
Toll Free (888) 263-8686		Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1609h	E200.8	0.00200	0.00716	
		Selenium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	0.0127	
Fax (801) 263-8687 awal@awal-labs.com		Thallium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	< 0.00200	



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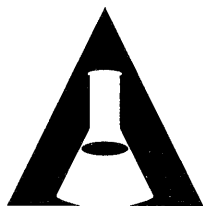
INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-006
Client Sample ID: ELF-7
Collection Date: 8/20/2019 1245h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

Compound	Units	Date		Method	Reporting	Analytical	Qual
		Prepared	Analyzed			Result	
Antimony	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00200	< 0.00200	
Barium	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00200	0.0119	
Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00400	< 0.00400	
Lead	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	8/22/2019 750h	8/30/2019 1516h	E200.7	0.100	2.23	
Mercury	mg/L	8/26/2019 1838h	8/27/2019 1116h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1612h	E200.8	0.00200	0.00272	
Selenium	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00200	0.0819	
Thallium	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-007

Contact: Jeff Tucker

Client Sample ID: ELF-8

Collection Date: 8/20/2019 1032h

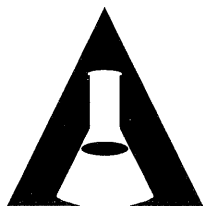
Received Date: 8/21/2019 1445h

AMERICAN
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LABORATORIES

Analytical Results

TOTAL METALS

	Compound	Units	Date		Method	Reporting	Analytical	Qual
			Prepared	Analyzed				
Kyle F. Gross Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00400	< 0.00400	
Jose Rocha QA Officer	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	< 0.00200	
	Barium	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	0.0124	
	Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	< 0.00200	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.000500	0.00174	
Salt Lake City, Utah	Chromium	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	< 0.00200	
84119	Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00400	0.190	
	Lead	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	0.00762	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1519h	E200.7	0.100	3.42	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1118h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1626h	E200.8	0.00200	0.455	
awal@awal-labs.com	Selenium	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	< 0.00200	
	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	< 0.00200	



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-008
Client Sample ID: ELF-9
Collection Date: 8/20/2019 1345h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

3440 South 700 West
Salt Lake City, Utah
84119

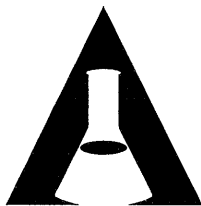
(801) 263-8686

Toll Free (888) 263-8686

Fax (801) 263-8687

awal@awal-labs.com

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00200	0.00663	
Barium	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00200	0.0134	
Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00400	< 0.00400	
Lead	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	8/22/2019 750h	8/30/2019 1521h	E200.7	0.100	0.888	
Mercury	mg/L	8/26/2019 1838h	8/27/2019 1120h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1629h	E200.8	0.00200	0.0679	
Selenium	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	8/30/2019 1331h	9/3/2019 1504h	E200.8	0.00200	< 0.00200	



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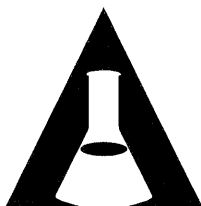
INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Contact: Jeff Tucker
Lab Sample ID: 1908532-009
Client Sample ID: ELF-11
Collection Date: 8/20/2019 926h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

		Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Kyle F. Gross Laboratory Director		Antimony	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00400	< 0.00400	
Jose Rocha QA Officer		Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00200	< 0.00200	
		Barium	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00200	0.0151	
		Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00200	< 0.00200	
3440 South 700 West		Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah		Chromium	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00200	< 0.00200	
84119		Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00400	0.0151	
		Lead	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00200	< 0.00200	
(801) 263-8686		Lithium	mg/L	8/22/2019 750h	8/30/2019 1530h	E200.7	0.100	3.36	
Toll Free (888) 263-8686		Mercury	mg/L	8/26/2019 1838h	8/27/2019 1122h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687		Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1632h	E200.8	0.00200	0.0186	
awal@awal-labs.com		Selenium	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00200	0.0627	
		Thallium	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00200	< 0.00200	



INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-010

Contact: Jeff Tucker

Client Sample ID: ELF-12
Collection Date: 8/20/2019 1215h
Received Date: 8/21/2019 1445h

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LABORATORIES

Analytical Results

TOTAL METALS

Compound	Units	Date		Method	Reporting	Analytical	Qual
		Prepared	Analyzed			Result	
Antimony	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	< 0.00200	
Barium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	0.0165	
Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00400	< 0.00400	
Lead	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	8/22/2019 750h	8/30/2019 1533h	E200.7	0.100	0.792	
Mercury	mg/L	8/26/2019 1838h	8/27/2019 1124h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1635h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	< 0.00200	

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

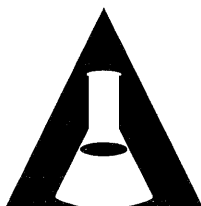
3440 South 700 West
Salt Lake City, Utah
84119

(801) 263-8686

Toll Free (888) 263-8686

Fax (801) 263-8687

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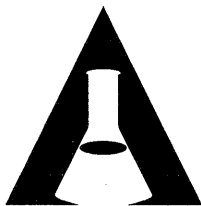
INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-011
Client Sample ID: ELF-13
Collection Date: 8/20/2019 1130h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

	Compound	Units	Date		Method	Reporting	Analytical	Qual
			Prepared	Analyzed		Limit	Result	
Kyle F. Gross Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00400	< 0.00400	
Jose Rocha QA Officer	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00200	< 0.00200	
	Barium	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00200	0.0110	
	Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00200	< 0.00200	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah	Chromium	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00200	< 0.00200	
84119	Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00400	0.00407	
	Lead	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00200	< 0.00200	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1535h	E200.7	0.100	1.86	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1126h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1638h	E200.8	0.00200	< 0.00200	
awal@awal-labs.com	Selenium	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00200	< 0.00200	
	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00200	< 0.00200	



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Contact: Jeff Tucker
Lab Sample ID: 1908532-012
Client Sample ID: ELF-14
Collection Date: 8/20/2019 1045h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

3440 South 700 West
Salt Lake City, Utah

84119

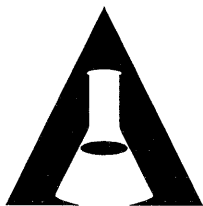
(801) 263-8686

Toll Free (888) 263-8686

Fax (801) 263-8687

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	< 0.00200	
Barium	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	0.0137	
Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00400	0.00912	
Lead	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	8/22/2019 750h	8/30/2019 1537h	E200.7	0.100	4.58	
Mercury	mg/L	8/26/2019 1838h	8/27/2019 1128h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1641h	E200.8	0.00200	0.00431	
Selenium	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	0.00664	
Thallium	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	< 0.00200	



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INORGANIC ANALYTICAL REPORT

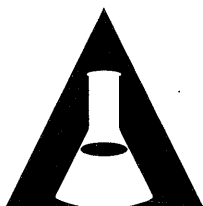
Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-013
Client Sample ID: DUP
Collection Date: 8/20/2019 920h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

		Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Kyle F. Gross Laboratory Director		Antimony	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00400	< 0.00400	
Jose Rocha QA Officer		Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	< 0.00200	
		Barium	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	0.0151	
		Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	< 0.00200	
3440 South 700 West		Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah		Chromium	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	< 0.00200	
84119		Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00400	0.0167	
		Lead	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	< 0.00200	
(801) 263-8686		Lithium	mg/L	8/22/2019 750h	8/30/2019 1540h	E200.7	0.100	3.48	
Toll Free (888) 263-8686		Mercury	mg/L	8/26/2019 1838h	8/27/2019 1130h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687		Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1644h	E200.8	0.00200	0.0176	
awal@awal-labs.com		Selenium	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	0.0648	
		Thallium	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	< 0.00200	

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Contact: Jeff Tucker
Lab Sample ID: 1908532-014
Client Sample ID: FB
Collection Date: 8/20/2019 1445h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

3440 South 700 West
Salt Lake City, Utah
84119

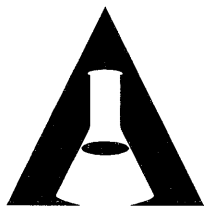
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Toll Free (888) 263-8686

Fax (801) 263-8687

awal@awal-labs.com

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00400	< 0.00400	
Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	
Barium	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	
Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	
Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	
Cobalt	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00400	< 0.00400	
Lead	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	
Lithium	mg/L	8/22/2019 750h	8/30/2019 1542h	E200.7	0.100	< 0.100	
Mercury	mg/L	8/26/2019 1838h	8/27/2019 1132h	E245.1	0.0000900	< 0.0000900	
Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1653h	E200.8	0.00200	< 0.00200	
Selenium	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	
Thallium	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	



AMERICAN
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-001
Client Sample ID: ELF-1D
Collection Date: 8/20/2019 1330h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

Kyle F. Gross
Laboratory Director

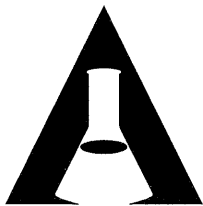
Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		9/3/2019 2014h	E300.0	0.200	< 0.200	*

* - The reporting limits were raised due to sample matrix interferences.

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-002
Client Sample ID: ELF-2
Collection Date: 8/20/2019 1430h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

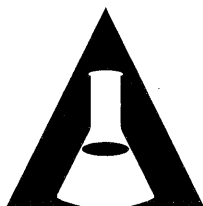
Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 403h	E300.0	0.100	< 0.100	

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

3440 South 700 West
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Toll Free (888) 263-8686
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AMERICAN
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ANALYTICAL
LABORATORIES

INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-003
Client Sample ID: ELF-3
Collection Date: 8/20/2019 1315h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

Kyle F. Gross
Laboratory Director

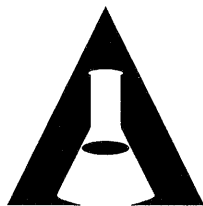
Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		9/3/2019 2031h	E300.0	0.400	< 0.400	*

* - The reporting limits were raised due to sample matrix interferences.

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Salt Lake City, Utah
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LABORATORIES

INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-004
Client Sample ID: ELF-4
Collection Date: 8/20/2019 1215h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

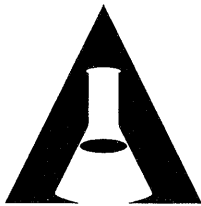
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

3440 South 700 West
Salt Lake City, Utah
84119

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Toll Free (888) 263-8686
Fax (801) 263-8687
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 437h	E300.0	0.100	0.941	



AMERICAN
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-005
Client Sample ID: ELF-5
Collection Date: 8/20/2019 1130h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

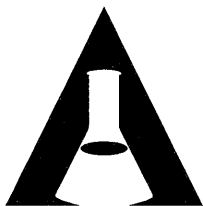
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Jose Rocha
QA Officer

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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 454h	E300.0	0.100	0.962	



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-006
Client Sample ID: ELF-7
Collection Date: 8/20/2019 1245h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

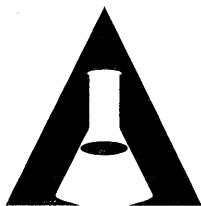
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 510h	E300.0	0.100	3.88	



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Contact: Jeff Tucker
Lab Sample ID: 1908532-007
Client Sample ID: ELF-8
Collection Date: 8/20/2019 1032h
Received Date: 8/21/2019 1445h

Analytical Results

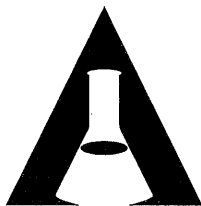
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 527h	E300.0	0.100	< 0.100	



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-008
Client Sample ID: ELF-9
Collection Date: 8/20/2019 1345h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

Kyle F. Gross
Laboratory Director

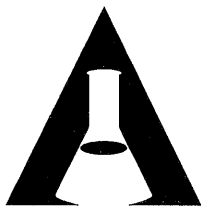
Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		9/3/2019 2048h	E300.0	0.200	< 0.200	*

* - The reporting limits were raised due to sample matrix interferences.

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-009
Client Sample ID: ELF-11
Collection Date: 8/20/2019 926h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

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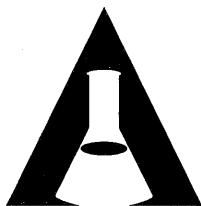
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 600h	E300.0	0.100	< 0.100	



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-010
Client Sample ID: ELF-12
Collection Date: 8/20/2019 1215h
Received Date: 8/21/2019 1445h

Analytical Results

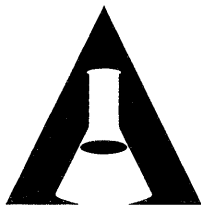
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 617h	E300.0	0.100	< 0.100	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-011
Client Sample ID: ELF-13
Collection Date: 8/20/2019 1130h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

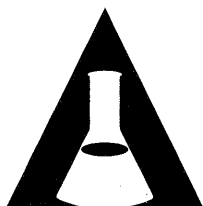
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 707h	E300.0	0.100	0.798	



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-012
Client Sample ID: ELF-14
Collection Date: 8/20/2019 1045h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

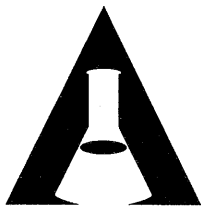
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 724h	E300.0	0.100	0.589	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-013
Client Sample ID: DUP
Collection Date: 8/20/2019 920h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

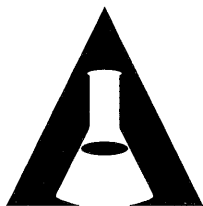
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Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/31/2019 741h	E300.0	0.100	< 0.100	



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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908532-014
Client Sample ID: FB
Collection Date: 8/20/2019 1445h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Fluoride	mg/L		8/30/2019 1819h	E300.0	0.100	< 0.100	

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: LCS-64600													
Date Analyzed:		08/30/2019 1502h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 750h											
Lithium	1.02	mg/L	E200.7	0.0114	0.100	1.000	0	102	80 - 120				
Lab Sample ID: LCS-64783													
Date Analyzed:		09/03/2019 1135h											
Test Code:		200.8-W											
Date Prepared:		08/30/2019 1331h											
Antimony	0.191	mg/L	E200.8	0.000668	0.00400	0.2000	0	95.6	85 - 115				
Arsenic	0.188	mg/L	E200.8	0.000298	0.00200	0.2000	0	94.1	85 - 115				
Barium	0.188	mg/L	E200.8	0.000688	0.00200	0.2000	0	93.9	85 - 115				
Beryllium	0.192	mg/L	E200.8	0.000198	0.00200	0.2000	0	95.9	85 - 115				
Cadmium	0.190	mg/L	E200.8	0.0000858	0.000500	0.2000	0	95.2	85 - 115				
Chromium	0.192	mg/L	E200.8	0.00191	0.00200	0.2000	0	96.1	85 - 115				
Cobalt	0.194	mg/L	E200.8	0.000300	0.00400	0.2000	0	96.8	85 - 115				
Lead	0.187	mg/L	E200.8	0.000448	0.00200	0.2000	0	93.5	85 - 115				
Selenium	0.188	mg/L	E200.8	0.000574	0.00200	0.2000	0	94.1	85 - 115				
Thallium	0.187	mg/L	E200.8	0.000154	0.00200	0.2000	0	93.3	85 - 115				
Lab Sample ID: LCS-64783													
Date Analyzed:		09/03/2019 1548h											
Test Code:		200.8-W											
Date Prepared:		08/30/2019 1331h											
Molybdenum	0.195	mg/L	E200.8	0.000652	0.00200	0.2000	0	97.3	85 - 115				
Lab Sample ID: LCS-64690													
Date Analyzed:		08/27/2019 1052h											
Test Code:		HG-DW-245.1											
Date Prepared:		08/26/2019 1838h											
Mercury	0.00353	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	106	85 - 115				

Report Date: 9/5/2019 Page 30 of 39

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QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MBLK

Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID:	MB-64600	Date Analyzed:	08/30/2019 1454h											
Test Code:	200.7-W	Date Prepared:	08/22/2019 750h											
Lithium		< 0.100	mg/L	E200.7	0.0114	0.100								
Lab Sample ID:	MB-64783	Date Analyzed:	09/03/2019 1132h											
Test Code:	200.8-W	Date Prepared:	08/30/2019 1331h											
Antimony		< 0.00400	mg/L	E200.8	0.000668	0.00400								
Arsenic		< 0.00200	mg/L	E200.8	0.000298	0.00200								
Barium		< 0.00200	mg/L	E200.8	0.000688	0.00200								
Beryllium		< 0.00200	mg/L	E200.8	0.000198	0.00200								
Cadmium		< 0.000500	mg/L	E200.8	0.0000858	0.000500								
Chromium		< 0.00200	mg/L	E200.8	0.00191	0.00200								
Cobalt		< 0.00400	mg/L	E200.8	0.000300	0.00400								
Lead		< 0.00200	mg/L	E200.8	0.000448	0.00200								
Selenium		< 0.00200	mg/L	E200.8	0.000574	0.00200								
Thallium		< 0.00200	mg/L	E200.8	0.000154	0.00200								
Lab Sample ID:	MB-64783	Date Analyzed:	09/03/2019 1544h											
Test Code:	200.8-W	Date Prepared:	08/30/2019 1331h											
Molybdenum		< 0.00200	mg/L	E200.8	0.000652	0.00200								
Lab Sample ID:	MB-64690	Date Analyzed:	08/27/2019 1050h											
Test Code:	HG-DW-245.1	Date Prepared:	08/26/2019 1838h											
Mercury		< 0.0000900	mg/L	E245.1	0.0000396	0.0000900								

Report Date: 9/5/2019 Page 31 of 39

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908532-014AMS													
Date Analyzed:		08/30/2019 1548h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 750h											
Lithium	1.02	mg/L	E200.7	0.0114	0.100	1.000	0	102	75 - 125				
Lab Sample ID: 1908532-001AMS													
Date Analyzed:		09/03/2019 1151h											
Test Code:		200.8-W											
Date Prepared:		08/30/2019 1331h											
Antimony	1.86	mg/L	E200.8	0.00668	0.0400	2.000	0.00114	93.0	75 - 125				
Arsenic	1.97	mg/L	E200.8	0.00298	0.0200	2.000	0.00108	98.2	75 - 125				
Barium	1.83	mg/L	E200.8	0.00688	0.0200	2.000	0.00842	91.1	75 - 125				
Beryllium	1.80	mg/L	E200.8	0.00198	0.0200	2.000	0	89.9	75 - 125				
Cadmium	1.84	mg/L	E200.8	0.000858	0.00500	2.000	0.000113	92.2	75 - 125				
Chromium	1.82	mg/L	E200.8	0.0191	0.0200	2.000	0	90.8	75 - 125				
Cobalt	1.82	mg/L	E200.8	0.00300	0.0400	2.000	0.00291	90.7	75 - 125				
Lead	1.79	mg/L	E200.8	0.00448	0.0200	2.000	0	89.3	75 - 125				
Selenium	1.90	mg/L	E200.8	0.00574	0.0200	2.000	0.000891	94.8	75 - 125				
Thallium	1.77	mg/L	E200.8	0.00154	0.0200	2.000	0	88.5	75 - 125				
Lab Sample ID: 1908532-0013AMS													
Date Analyzed:		09/03/2019 1534h											
Test Code:		200.8-W											
Date Prepared:		08/30/2019 1331h											
Antimony	0.194	mg/L	E200.8	0.000668	0.00400	0.2000	0	97.1	75 - 125				
Arsenic	0.216	mg/L	E200.8	0.000298	0.00200	0.2000	0	108	75 - 125				
Barium	0.200	mg/L	E200.8	0.000688	0.00200	0.2000	0	100	75 - 125				
Beryllium	0.176	mg/L	E200.8	0.000198	0.00200	0.2000	0	87.8	75 - 125				
Cadmium	0.192	mg/L	E200.8	0.0000858	0.000500	0.2000	0	95.9	75 - 125				
Chromium	0.193	mg/L	E200.8	0.00191	0.00200	0.2000	0	96.5	75 - 125				
Cobalt	0.207	mg/L	E200.8	0.000300	0.00400	0.2000	0	103	75 - 125				
Lead	0.179	mg/L	E200.8	0.000448	0.00200	0.2000	0	89.7	75 - 125				
Selenium	0.284	mg/L	E200.8	0.000574	0.00200	0.2000	0	142	75 - 125				
Thallium	0.179	mg/L	E200.8	0.000154	0.00200	0.2000	0	89.6	75 - 125				

Report Date: 9/5/2019 Page 32 of 39

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908532-001AMS	Date Analyzed:	09/03/2019 1554h											
Test Code: 200.8-W	Date Prepared:	08/30/2019 1331h											
Molybdenum	2.03	mg/L	E200.8	0.00652	0.0200	2.000	0.0161	101	75 - 125				
Lab Sample ID: 1908532-0013AMS	Date Analyzed:	09/03/2019 1647h											
Test Code: 200.8-W	Date Prepared:	08/30/2019 1331h											
Molybdenum	0.210	mg/L	E200.8	0.000652	0.00200	0.2000	0.0176	96.2	75 - 125				
Lab Sample ID: 1908532-001AMS	Date Analyzed:	08/27/2019 1100h											
Test Code: HG-DW-245.1	Date Prepared:	08/26/2019 1838h											
Mercury	0.00276	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	83.0	80 - 120				

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

1908532-001AMS: Insufficient sample amount was provided to allow for a full amount analysis of the MS/MSD. Reduced sample volume for the MS/MSD was used as a result.



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908532-014AMSD													
Date Analyzed:		08/30/2019 1557h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 750h											
Lithium	1.01	mg/L	E200.7	0.0114	0.100	1.000	0	101	75 - 125	1.02	1.03	20	
Lab Sample ID: 1908532-001AMSD													
Date Analyzed:		09/03/2019 1154h											
Test Code:		200.8-W											
Date Prepared:		08/30/2019 1331h											
Antimony	1.88	mg/L	E200.8	0.00668	0.0400	2.000	0.00114	93.9	75 - 125	1.86	0.927	20	
Arsenic	1.97	mg/L	E200.8	0.00298	0.0200	2.000	0.00108	98.6	75 - 125	1.97	0.390	20	
Barium	1.85	mg/L	E200.8	0.00688	0.0200	2.000	0.00842	91.9	75 - 125	1.83	0.885	20	
Beryllium	1.85	mg/L	E200.8	0.00198	0.0200	2.000	0	92.4	75 - 125	1.8	2.80	20	
Cadmium	1.85	mg/L	E200.8	0.000858	0.00500	2.000	0.000113	92.3	75 - 125	1.84	0.130	20	
Chromium	1.80	mg/L	E200.8	0.0191	0.0200	2.000	0	90.2	75 - 125	1.82	0.599	20	
Cobalt	1.81	mg/L	E200.8	0.00300	0.0400	2.000	0.00291	90.5	75 - 125	1.82	0.238	20	
Lead	1.81	mg/L	E200.8	0.00448	0.0200	2.000	0	90.3	75 - 125	1.79	1.16	20	
Selenium	1.89	mg/L	E200.8	0.00574	0.0200	2.000	0.000891	94.6	75 - 125	1.9	0.226	20	
Thallium	1.79	mg/L	E200.8	0.00154	0.0200	2.000	0	89.5	75 - 125	1.77	1.15	20	
Lab Sample ID: 1908532-0013AMSD													
Date Analyzed:		09/03/2019 1537h											
Test Code:		200.8-W											
Date Prepared:		08/30/2019 1331h											
Antimony	0.201	mg/L	E200.8	0.000668	0.00400	0.2000	0.000784	100	75 - 125	0.194	3.29	20	
Arsenic	0.214	mg/L	E200.8	0.000298	0.00200	0.2000	0.00102	107	75 - 125	0.216	0.610	20	
Barium	0.206	mg/L	E200.8	0.000688	0.00200	0.2000	0.0151	95.4	75 - 125	0.2	2.84	20	
Beryllium	0.180	mg/L	E200.8	0.000198	0.00200	0.2000	0	90.2	75 - 125	0.176	2.69	20	
Cadmium	0.197	mg/L	E200.8	0.0000858	0.000500	0.2000	0.000164	98.4	75 - 125	0.192	2.71	20	
Chromium	0.193	mg/L	E200.8	0.00191	0.00200	0.2000	0	96.5	75 - 125	0.193	0.0299	20	
Cobalt	0.207	mg/L	E200.8	0.000300	0.00400	0.2000	0.0167	95.1	75 - 125	0.207	0.0293	20	
Lead	0.185	mg/L	E200.8	0.000448	0.00200	0.2000	0.000694	92.4	75 - 125	0.179	3.33	20	
Selenium	0.273	mg/L	E200.8	0.000574	0.00200	0.2000	0.0648	104	75 - 125	0.284	3.93	20	
Thallium	0.184	mg/L	E200.8	0.000154	0.00200	0.2000	0	91.9	75 - 125	0.179	2.52	20	

Report Date: 9/5/2019 Page 34 of 39

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Kyle E. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908532-001AMSD	Date Analyzed:	09/03/2019 1557h											
Test Code:	200.8-W	Date Prepared:	08/30/2019 1331h										
Molybdenum	1.99	mg/L	E200.8	0.00652	0.0200	2.000	0.0161	98.7	75 - 125	2.03	1.92	20	
Lab Sample ID: 1908532-0013AMSD	Date Analyzed:	09/03/2019 1650h											
Test Code:	200.8-W	Date Prepared:	08/30/2019 1331h										
Molybdenum	0.232	mg/L	E200.8	0.000652	0.00200	0.2000	0.0176	107	75 - 125	0.21	10.0	20	
Lab Sample ID: 1908532-001AMSD	Date Analyzed:	08/27/2019 1102h											
Test Code:	HG-DW-245.1	Date Prepared:	08/26/2019 1838h										
Mercury	0.00264	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	79.2	80 - 120	0.00277	4.75	20	¹

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

1908532-001AMSD: Insufficient sample amount was provided to allow for a full amount analysis of the MS/MSD. Reduced sample volume for the MS/MSD was used as a result.



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: LCS-R129816 Date Analyzed: 08/30/2019 1606h													
Test Code: 300.0-W													
Fluoride	5.15	mg/L	E300.0	0.0240	0.100	5.000	0	103	90 - 110				
Lab Sample ID: LCS-R129822 Date Analyzed: 09/03/2019 1123h													
Test Code: 300.0-W													
Fluoride	5.01	mg/L	E300.0	0.0240	0.100	5.000	0	100	90 - 110				

Report Date: 9/5/2019 Page 36 of 39

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: MB-R129816													
Date Analyzed: 08/30/2019 1549h													
Test Code: 300.0-W													
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								
Lab Sample ID: MB-R129822													
Date Analyzed: 09/03/2019 1106h													
Test Code: 300.0-W													
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								

Report Date: 9/5/2019 Page 37 of 39

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908532-002CMS Date Analyzed: 08/30/2019 1943h													
Test Code: 300.0-W													
Fluoride	10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110				
Lab Sample ID: 1908532-003CMS Date Analyzed: 08/30/2019 2033h													
Test Code: 300.0-W													
Fluoride	10,300	mg/L	E300.0	48.0	200	10,000	0	103	90 - 110				
Lab Sample ID: 1908534-001CMS Date Analyzed: 09/03/2019 1323h													
Test Code: 300.0-W													
Fluoride	10,100	mg/L	E300.0	48.0	200	10,000	0	101	90 - 110				
Lab Sample ID: 1908534-005CMS Date Analyzed: 09/03/2019 1541h													
Test Code: 300.0-W													
Fluoride	10,400	mg/L	E300.0	48.0	200	10,000	1.52	104	90 - 110				

Report Date: 9/5/2019 Page 38 of 39

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908532

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908532-002CMSD Date Analyzed: 08/30/2019 1959h													
Test Code: 300.0-W													
Fluoride	10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110	10200	0.363	20	
Lab Sample ID: 1908532-003CMSD Date Analyzed: 08/30/2019 2049h													
Test Code: 300.0-W													
Fluoride	10,400	mg/L	E300.0	48.0	200	10,000	0	104	90 - 110	10300	0.809	20	
Lab Sample ID: 1908534-001CMSD Date Analyzed: 09/03/2019 1341h													
Test Code: 300.0-W													
Fluoride	10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110	10100	0.694	20	
Lab Sample ID: 1908534-005CMSD Date Analyzed: 09/03/2019 1558h													
Test Code: 300.0-W													
Fluoride	10,300	mg/L	E300.0	48.0	200	10,000	1.52	103	90 - 110	10400	1.05	20	

Report Date: 9/5/2019 Page 39 of 39

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WORK ORDER Summary

Work Order: **1908532**

Page 1 of 5

Client: PacifiCorp

Client ID: PAC900

Contact: Jeff Tucker

Due Date: 9/5/2019

Project: Hunter CCR Groundwater Sampling / PERCM052

QC Level: II+

WO Type: Project

Comments: QC2+. Include EDD. Report Fluoride from set 1908531; it is the same sample. Metals share with 1908531. Sample for RADS sent to ALS-Ft Collins. cc: Report to derickson@waterenvtech.com and mholland@waterenvtech.com;

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel Storage	
1908532-001A	ELF-1D	8/20/2019 1330h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	1
				1 SEL Analytes: LI			
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
1908532-001B				OUTSIDE LAB		ALS	2
1908532-001C				300.0-W		df - wc	1
				1 SEL Analytes: F			
1908532-002A	ELF-2	8/20/2019 1430h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	1
				1 SEL Analytes: LI			
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
1908532-002B				OUTSIDE LAB		ALS	2
1908532-002C				300.0-W		df - wc	1
				1 SEL Analytes: F			
1908532-003A	ELF-3	8/20/2019 1315h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	1
				1 SEL Analytes: LI			
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	

WORK ORDER Summary

Work Order: **1908532**

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Client: PacifiCorp

Due Date: 9/5/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage	
1908532-003B	ELF-3	8/20/2019 1315h	8/21/2019 1445h	OUTSIDE LAB	Aqueous		ALS	2
1908532-003C				300.0-W			df - wc	1
				1 SEL Analytes: F				
1908532-004A	ELF-4	8/20/2019 1215h	8/21/2019 1445h	200.7-W	Aqueous		DF-Metals	1
				1 SEL Analytes: LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL				
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
1908532-004B				OUTSIDE LAB			ALS	2
1908532-004C				300.0-W			df - wc	1
	1 SEL Analytes: F							
1908532-005A	ELF-5	8/20/2019 1130h	8/21/2019 1445h	200.7-W	Aqueous		DF-Metals	1
				1 SEL Analytes: LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL				
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
1908532-005B				OUTSIDE LAB			ALS	2
1908532-005C				300.0-W			df - wc	1
	1 SEL Analytes: F							
1908532-006A	ELF-7	8/20/2019 1245h	8/21/2019 1445h	200.7-W	Aqueous		DF-Metals	1
				1 SEL Analytes: LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL				
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
1908532-006B				OUTSIDE LAB			ALS	2
1908532-006C				300.0-W			df - wc	1
	1 SEL Analytes: F							

WORK ORDER Summary

Work Order: **1908532**

Page 3 of 5

Client: PacifiCorp

Due Date: 9/5/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1908532-007A	ELF-8	8/20/2019 1032h	8/21/2019 1445h	200.7-W <i>1 SEL Analytes: LI</i>	Aqueous		DF-Metals 1
				200.7-W-PR			DF-Metals
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1908532-007B				OUTSIDE LAB			ALS 2
1908532-007C				300.0-W <i>1 SEL Analytes: F</i>			df - wc 1
1908532-008A	ELF-9	8/20/2019 1345h	8/21/2019 1445h	200.7-W <i>1 SEL Analytes: LI</i>	Aqueous		DF-Metals 1
				200.7-W-PR			DF-Metals
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1908532-008B				OUTSIDE LAB			ALS 2
1908532-008C				300.0-W <i>1 SEL Analytes: F</i>			df - wc 1
1908532-009A	ELF-11	8/20/2019 0926h	8/21/2019 1445h	200.7-W <i>1 SEL Analytes: LI</i>	Aqueous		DF-Metals 1
				200.7-W-PR			DF-Metals
				200.8-W <i>11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL</i>			DF-Metals
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1908532-009B				OUTSIDE LAB			ALS 2
1908532-009C				300.0-W <i>1 SEL Analytes: F</i>			df - wc 1
1908532-010A	ELF-12	8/20/2019 1215h	8/21/2019 1445h	200.7-W <i>1 SEL Analytes: LI</i>	Aqueous		DF-Metals 1
				200.7-W-PR			DF-Metals

WORK ORDER Summary

Work Order: **1908532**

Page 4 of 5

Client: PacifiCorp

Due Date: 9/5/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1908532-010A	ELF-12	8/20/2019 1215h	8/21/2019 1445h	200.8-W	Aqueous		DF-Metals 1
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1908532-010B				OUTSIDE LAB			ALS 2
1908532-010C				300.0-W			df - wc 1
				1 SEL Analytes: F			
1908532-011A	ELF-13	8/20/2019 1130h	8/21/2019 1445h	200.7-W	Aqueous		DF-Metals 1
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1908532-011B				OUTSIDE LAB			ALS 2
1908532-011C				300.0-W			df - wc 1
				1 SEL Analytes: F			
1908532-012A	ELF-14	8/20/2019 1045h	8/21/2019 1445h	200.7-W	Aqueous		DF-Metals 1
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals
				HG-DW-245.1			DF-Metals
				HG-DW-PR			DF-Metals
1908532-012B				OUTSIDE LAB			ALS 2
1908532-012C				300.0-W			df - wc 1
				1 SEL Analytes: F			
1908532-013A	DUP	8/20/2019 0920h	8/21/2019 1445h	200.7-W	Aqueous		DF-Metals 1
				1 SEL Analytes: LI			
				200.7-W-PR			DF-Metals
				200.8-W			DF-Metals
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR			DF-Metals

WORK ORDER Summary

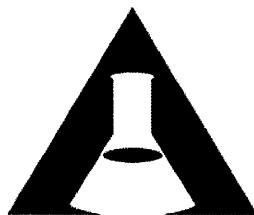
Work Order: **1908532**

Page 5 of 5

Client: PacifiCorp

Due Date: 9/5/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1908532-013A	DUP	8/20/2019 0920h	8/21/2019 1445h	HG-DW-245.1	Aqueous	DF-Metals	1
				HG-DW-PR		DF-Metals	
1908532-013B				OUTSIDE LAB		ALS	2
1908532-013C				300.0-W		df - wc	1
				1 SEL Analytes: F			
1908532-014A	FB	8/20/2019 1445h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	1
				1 SEL Analytes: LI			
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE TL			
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
1908532-014B				OUTSIDE LAB		ALS	2
1908532-014C				300.0-W		df - wc	1
				1 SEL Analytes: F			



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www.awal-labs.com

CHAIN OF CUSTODY

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

1908532

AWAL Lab Sample Set #

Page 1 of 1

Client: Pacificorp
Address: _____
City, State, Zip: _____
Contact: Jeff Tucker
Phone #: _____ Cell #: _____
E-mail: jeff.tucker@pacificorps.com
Project Name: Hunter CCR GW sampling
Project #: PercM052
PO #: _____
Sampler Name: MLS & CF

QC Level:		Turn Around Time:		Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.		Due Date:						
1	2	2+	3	3+	1	2	3	4	5	Std	9/5/19	
# of Containers	Sample Matrix	Appendix IV									<input type="checkbox"/> Report down to the MDL <input type="checkbox"/> Include EDD: <input type="checkbox"/> Lab Filter for: <input type="checkbox"/> Field Filtered For: For Compliance With: <input type="checkbox"/> NELAP <input type="checkbox"/> RCRA <input type="checkbox"/> CWA <input type="checkbox"/> SDWA <input type="checkbox"/> ELAP / AZLA <input type="checkbox"/> NLLAP <input type="checkbox"/> Non-Compliance <input type="checkbox"/> Other:	
											Known Hazards & Sample Comments	
											COC Tape Was: 1 Present on Outer Package Y N NA 2 Unbroken on Outer Package Y N NA 3 Present on Sample Y NA 4 Unbroken on Sample Y N NA	
											Samples Were: 1 Shipped <u>hand delivered</u> 2 Ambient <u>Chilled</u> 3 Temperature <u>1.1</u> °C 4 Received Intact Y N 5 Properly Preserved Y N Checked at bench 6 Received Within Holding Times Y N	
											Sample Labels and COC Record Match? Y N	
											*bottles read 9:40	

Sample ID:	Date Sampled	Time Sampled	# of Containers	Sample Matrix
1 ELF-1D	8-20-19	1330	5	W X
2 ELF-2		1430		
3 ELF-3		1315		
4 ELF-4		1215		
5 ELF-5		1130		
6 ELF-7		1245		
7 ELF-8		1032		
8 ELF-9		1345		
9 ELF-11		0926		
10 ELF-12		1215		
11 ELF-13		1130		
12 ELF-14		1045		
13 DUP		0920*		
14 FB		1445		
15				

Relinquished by: <u>Mike Shirley</u> Signature: _____ Print Name: <u>Mike Shirley</u>	Date: <u>8/21/19</u> Time: <u>1452</u>	Received by: <u>Denise Brown</u> Signature: _____ Print Name: <u>Denise Brown</u>	Date: <u>8/21/19</u> Time: <u>14:45</u>	Special Instructions: <u>Please CC analytical report to derickson@waterenvtech.com & mholland@</u>
Relinquished by: _____ Signature: _____ Print Name: _____	Date: _____ Time: _____	Received by: _____ Signature: _____ Print Name: _____	Date: _____ Time: _____	
Relinquished by: _____ Signature: _____ Print Name: _____	Date: _____ Time: _____	Received by: _____ Signature: _____ Print Name: _____	Date: _____ Time: _____	
Relinquished by: _____ Signature: _____ Print Name: _____	Date: _____ Time: _____	Received by: _____ Signature: _____ Print Name: _____	Date: _____ Time: _____	

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

REV 11-21-18

Constituents Analyzed	
Appendix III	Appendix IV
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
pH	Cadmium
Sulfate	Chromium
Total Dissolved Solids (TDS)	Cobalt
	Fluoride
	Lead
	Lithium
	Mercury
	Molybdenum
	Selenium
	Thallium
	Radium 226 and 228 Combined

Fluoride is included in both Appendix III and Appendix IV analyte lists. All wells have undergone analysis for both analyte lists for each event. Fluoride was not analyzed twice. The results are reported once under Appendix III constituents for each sample / each event.

Lab Set ID: 1908532

pH Lot #: 60085

Preservation Check Sheet

Sample Set Extension and pH

[illegible]

Procedure:

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

Frequency:

All samples requiring preservation

- * The sample required additional preservative upon receipt.
- + The sample was received unpreserved.
- ▲ The sample was received unpreserved and therefore preserved upon receipt.
- # The sample pH was unadjustable to a pH < 2 due to the sample matrix.
- The sample pH was unadjustable to a pH > due to the sample matrix interference.

Elona Hayward

From: Marcus Holland [mholland@waterenvtech.com]
Sent: Monday, August 12, 2019 4:18 PM
To: Elona Hayward
Subject: Appendix III and IV constituents
Attachments: CCR - Appendix III & Appendix IV Constituents.pdf

Hi Elona,

Attached is a list of constituents we will need bottles and analyses for.

I forgot to mention this on the phone, but can we have the reports for these split by Appendices? So two reports for PERCM052 (one Appendix III constituents, one Appendix IV constituents) and two reports for PERCM053 (one Appendix III, one Appendix IV).

Let me know if you have any questions.

Thank you,



Marcus Holland, EI

Staff Engineer

P: (406) 723-1533

C: (406) 498-5402

waterenvtech.com





Radium-226

Case Narrative

American West Analytical Labs

Hunter CCR Groundwater Sampling - PERCM052

Work Order Number: 1908622

1. This report consists of the analytical results for 14 water samples received by ALS on 08/26/2019.
2. These samples were prepared and analyzed according to the current revisions of SOP 783 and SOP 736. The analyses were completed on 09/18/2019.
3. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
4. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate.
5. ALS uses the following convention for reporting significant digits in the TPU and MDC results. The TPU value is rounded to two significant digits. The MDC value is rounded to the same decimal place as the TPU value. In practice, this could result in an MDC reported value of zero for samples with significant activity, including the batch laboratory control sample.
6. No anomalous situations were encountered during the preparation or analysis of these samples. All quality control criteria were met.



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

Jean Anderson
Jean Anderson
Radiochemistry Primary Data Reviewer

9/20/19
Date

Kath M. W.
Radiochemistry Final Data Reviewer

9/22/19
Date

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1908622

Client Name: American West Analytical Labs

Client Project Name: Hunter CCR Groundwater Sampling

Client Project Number: PERCM052

Client PO Number: 1908532

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
ELF-1D	1908622-1		WATER	20-Aug-19	13:30
ELF-2	1908622-2		WATER	20-Aug-19	14:30
ELF-3	1908622-3		WATER	20-Aug-19	13:15
ELF-4	1908622-4		WATER	20-Aug-19	12:15
ELF-5	1908622-5		WATER	20-Aug-19	11:30
ELF-7	1908622-6		WATER	20-Aug-19	12:45
ELF-8	1908622-7		WATER	20-Aug-19	10:32
ELF-9	1908622-8		WATER	20-Aug-19	13:45
ELF-11	1908622-9		WATER	20-Aug-19	9:26
ELF-12	1908622-10		WATER	20-Aug-19	12:15
ELF-13	1908622-11		WATER	20-Aug-19	11:30
ELF-14	1908622-12		WATER	20-Aug-19	10:45
DUP	1908622-13		WATER	20-Aug-19	9:20
FB	1908622-14		WATER	20-Aug-19	14:45

**American West
Analytical Laboratories**

3440 S. 700 W. Salt Lake City, UT 84119

Phone # (801) 263-8686 Toll Free # (888) 263-8686

Fax # (801) 263-8687 Email awal@awal-labs.com

www.awal-labs.com

CHAIN OF CUSTODY

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

1908622

AWAL Lab Sample Set #

Page 1 of 1

Client: American West Analytical Laboratories

Address: **3440 S. 700 W.**

City, State, Zip: **Salt Lake City, UT 84119**

Contact: **Elona Hayward**

Phone #: **(801) 263-8686**

Cell #:

E-mail: elona@awal-labs.com; denise@awal-labs.com

Project Name: **Hunter CCR Groundwater Sampling**Project #: **PERCM052**

PO #: **1908532**

Sampler Name:

Sample ID:		Date Sampled	Time Sampled	# of Cont	Sample Matrix	Radium												Known Hazards & Sample Comments
1	ELF-1D	8/20/2019	13:30	2	W	X												2 Ambient or Chilled 3 Temperature _____ °C
2	ELF-2	8/20/2019	14:30	2	W	X												4 Received Intact Y N
3	ELF-3	8/20/2019	13:15	2	W	X												5 Properly Preserved Y N Checked at bench
4	ELF-4	8/20/2019	12:15	2	W	X												6 Received Within Holding Times Y N
5	ELF-5	8/20/2019	11:30	2	W	X												
6	ELF-7	8/20/2019	12:45	2	W	X												
7	ELF-8	8/20/2019	10:32	2	W	X												
8	ELF-9	8/20/2019	13:45	2	W	X												
9	ELF-11	8/20/2019	9:26	2	W	X												
10	ELF-12	8/20/2019	12:15	2	W	X												
11	ELF-13	8/20/2019	11:30	2	W	X												
12	ELF-14	8/20/2019	10:45	2	W	X												Sample Labels and COC Record Match? Y N
13	DUP	8/20/2019	9:20	2	W	X												
14	FB	8/20/2019	14:45	2	W	X												
15																		

Relinquished by:
Denise Bruun
Signature

Print Name: Denise Bruun

Relinquished by:
[Signature]
Signature

Print Name:

8/22/19
Time: 16:45

Date:

Time:

Received by:
Tyler Moscar
Signature

Print Name: Tyler Moscar

Received by:
[Signature]
Signature

Print Name:

Date: 8/26
Time: 8/26

Date:

Time:

Special Instructions:

QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS,
MS/MSD performed on customer sample

Samples sent to ALS - Ft. Collins.



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: Am. West Analytical Workorder No: 100622

Project Manager: KNO

Initials: TEM

Date: 08/26/19

1. Are airbills / shipping documents present and/or removable?		DROP OFF	<u>YES</u>	NO
2. Are custody seals on shipping containers intact?		NONE	<u>YES</u>	NO *
3. Are custody seals on sample containers intact?		<u>NONE</u>	YES	NO *
4. Is there a COC (chain-of-custody) present?			<u>YES</u>	NO *
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)			YES	<u>NO *</u>
6. Are short-hold samples present?			YES	<u>NO</u>
7. Are all samples within holding times for the requested analyses?			<u>YES</u>	NO *
8. Were all sample containers received intact? (not broken or leaking)			<u>YES</u>	NO *
9. Is there sufficient sample for the requested analyses?			<u>YES</u>	NO *
10. Are all samples in the proper containers for the requested analyses?			<u>YES</u>	NO *
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		N/A	YES	<u>NO *</u>
12. Are all aqueous non-preserved samples pH 4-9?		<u>N/A</u>	YES	NO *
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)		<u>N/A</u>	YES	NO
14. Were the samples shipped on ice?			YES	<u>NO</u>
15. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*:	#1	#3	#4
				<u>RAD ONLY</u>
				YES
				<u>NO</u>
Cooler #:	<u>1</u>	<u>2</u>	<u>3</u>	
Temperature (°C):	<u>amb</u>	<u>amb</u>	<u>amb</u>	
No. of custody seals on cooler:	<u>1</u>	<u>1</u>	<u>1</u>	
External µR/hr reading:	<u>12</u>	<u>12</u>	<u>12</u>	
Background µR/hr reading:	<u>13</u>			
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <u>YES</u> / NO / NA (If no, see Form 008.)				

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

5.) sample times for DUP 122 state a:uo on bottles and a:20 on COC

11.) 22 of 23 bottles measured pH of ~2.5 HNO₃ needed to be added in varied amounts: see continued list for amt. added and group + bottle number

HNO₃ lot 197345

All client bottle ID's vs ALS lab ID's double-checked by: [Signature]

If applicable, was the client contacted? YES / NO / NA Contact: Elana Haggard

Date/Time: 8/27/19 1:10

Project Manager Signature / Date: [Signature] 8/27/19



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: Am. West. Analytical Workorder No: 1008622
Project Manager: KMO Initials: TEM Date: 8/26/19

Additional Information:

added .5 mL of HNO₃:
- 12-2

added 1 mL of HNO₃:
1-2, 2-2, 5-1, 5-2, 6-2, 9-2, 10-2, 11-1, 11-2,
13-1, 13-2

added 1.5 mL of HNO₃:
1-1, 2-1, 3-1, 3-2, 6-1, 8-1, 8-2, 9-1, 10-1,
12-1

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

Project Manager Signature / Date: [Signature] 8/27/19

1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. Fold the printed label at the solid line below. Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. GETTING YOUR SHIPMENT TO UPS

Customers with a Daily Pickup

Your driver will pickup your shipment(s) as usual.

Customers without a Daily Pickup

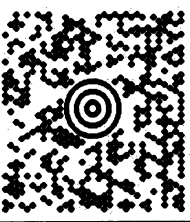

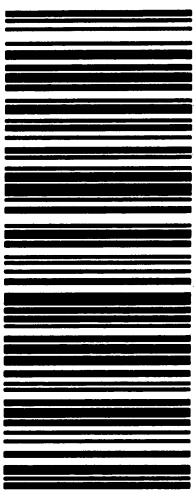

Take your package to any location of The UPS Store®, UPS Access Point™ location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the "Find Locations" Quick link at ups.com. Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages. Hand the package to any UPS driver in your area.

UPS Access Point™
THE UPS STORE
1905 W 4700 S
TAYLORSVILLE, UT 84129

UPS Access Point™
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869 E 4500 S
SALT LAKE CITY, UT 84107

UPS Access Point™
THE UPS STORE
2223 S HIGHLAND DR
SALT LAKE CITY, UT 84106

FOLD HERE

ELONA HAYWARD 801-263-8686 AMERICAN WEST ANALYTICAL LABS 3440 S 700 W SALT LAKE CITY UT 84119		32 LBS	DWT: 24.15.13 AH	2 OF 5
SHIP TO: KATIE O'BRIEN 970-218-4543 ALS LIFE SCIENCES/ENVIRONMENTAL 225 COMMERCE DR. FORT COLLINS CO 80524-2762				
				
CO 805 0-01				
				
UPS GROUND				
TRACKING #: 1Z 9E7 258 03 9144 2944				
				
BILLING: P/P				
US 21.5.26. WNTNVS0 15.0A.07/2019				
				

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190906-1MB

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 06-Sep-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 30 minutes

Final Aliquot: 995 ml

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.10 +/- 0.11	0.16	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16440	16060	ug	97.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: RE1908622-1

Date Printed: Friday, September 20, 2019

ALS -- Fort Collins

LIMS Version: 6.909

Page 1 of 1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190906-1LCS

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 06-Sep-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Final Aliquot: 995 ml

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	38.7 +/- 9.8	0.5	46.48	83.3	67 - 120	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16440	15740	ug	95.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RE190906-1LCSD

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 06-Sep-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Final Aliquot: 995 ml

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13982-63-3	Ra-226	47 +/- 12	0	46.48	100	67 - 120	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16440	15770	ug	95.9	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:
Lab ID: RE190906-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 783 Rev 14
Date Collected: 06-Sep-19
Date Prepared: 06-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1
QCBatchID: RE190906-1-1
Run ID: RE190906-1A
Count Time: 15 minutes

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

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
13982-63-3	Ra-226	38.7 +/- 9.8		0.5	P	47 +/- 12		0	P	0.518	2.13

Comments:

Duplicate Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-1D

Lab ID: 1908622-1

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.15 +/- 0.16	0.23	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16450	15750	ug	95.8	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-2
Lab ID: 1908622-2

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.32 +/- 0.23	0.27	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16450	15790	ug	96.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-3
Lab ID: 1908622-3

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.23 +/- 0.25	0.38	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16450	15810	ug	96.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-4
Lab ID: 1908622-4

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.34 +/- 0.25	0.30	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16450	15890	ug	96.6	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-5
Lab ID: 1908622-5

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 955 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.76 +/- 0.34	0.19	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	15800	ug	96.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-7
Lab ID: 1908622-6

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.55 +/- 0.29	0.27	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16450	15730	ug	95.6	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-8
Lab ID: 1908622-7

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.64 +/- 0.33	0.30	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16470	16230	ug	98.6	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:	ELF-9
Lab ID:	1908622-8

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 955 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.31 +/- 0.23	0.27	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	16230	ug	98.6	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-11
Lab ID: 1908622-9

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.12 +/- 0.15	0.22	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	15540	ug	94.4	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-12

Lab ID: 1908622-10

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.25 +/- 0.21	0.27	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	15950	ug	96.9	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-13

Lab ID: 1908622-11

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.41 +/- 0.28	0.32	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16450	15790	ug	96.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-14

Lab ID: 1908622-12

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.40 +/- 0.27	0.28	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	15820	ug	96.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: DUP

Lab ID: 1908622-13

Sample Matrix: WATER

Prep SOP: PAI 783 Rev 14

Date Collected: 20-Aug-19

Date Prepared: 06-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RE190906-1

QCBatchID: RE190906-1-1

Run ID: RE190906-1A

Count Time: 15 minutes

Report Basis: Unfiltered

Final Aliquot: 995 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.19 +/- 0.23	0.36	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16460	15840	ug	96.3	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1

Radium-226 by Radon Emanation - Method 903.1

PAI 783 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: FB	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 955 ml
Lab ID: 1908622-14	Prep SOP: PAI 783 Rev 14	QCBatchID: RE190906-1-1	Prep Basis: Unfiltered
	Date Collected: 20-Aug-19	Run ID: RE190906-1A	Moisture(%): NA
	Date Prepared: 06-Sep-19	Count Time: 15 minutes	Result Units: pCi/l
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13982-63-3	Ra-226	0.47 +/- 0.25	0.17	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	16440	15480	ug	94.2	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RE1908622-1



Radium-228

Case Narrative

American West Analytical Labs

Hunter CCR Groundwater Sampling - PERCM052

Work Order Number: 1908622

1. This report consists of the analytical results for 14 water samples received by ALS on 08/26/2019.
2. These samples were prepared according to the current revision of SOP 749.
3. The samples were analyzed for the presence of ^{228}Ra by low background gas flow proportional counting of ^{228}Ac , which is the ingrown progeny of ^{228}Ra , according to the current revision of SOP 724. The analyses were completed on 09/17/2019.
4. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
5. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate for all three batches.
6. No anomalous situations were noted during the preparation and analysis of these samples. All quality control criteria were met.

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

Jean Anderson
Radiochemistry Primary Data Reviewer

9/20/19

Date

Kath M. W.
Radiochemistry Final Data Reviewer

9/22/19

Date

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1908622

Client Name: American West Analytical Labs

Client Project Name: Hunter CCR Groundwater Sampling

Client Project Number: PERCM052

Client PO Number: 1908532

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
ELF-1D	1908622-1		WATER	20-Aug-19	13:30
ELF-2	1908622-2		WATER	20-Aug-19	14:30
ELF-3	1908622-3		WATER	20-Aug-19	13:15
ELF-4	1908622-4		WATER	20-Aug-19	12:15
ELF-5	1908622-5		WATER	20-Aug-19	11:30
ELF-7	1908622-6		WATER	20-Aug-19	12:45
ELF-8	1908622-7		WATER	20-Aug-19	10:32
ELF-9	1908622-8		WATER	20-Aug-19	13:45
ELF-11	1908622-9		WATER	20-Aug-19	9:26
ELF-12	1908622-10		WATER	20-Aug-19	12:15
ELF-13	1908622-11		WATER	20-Aug-19	11:30
ELF-14	1908622-12		WATER	20-Aug-19	10:45
DUP	1908622-13		WATER	20-Aug-19	9:20
FB	1908622-14		WATER	20-Aug-19	14:45

**American West
Analytical Laboratories**

3440 S. 700 W. Salt Lake City, UT 84119

Phone # (801) 263-8686 Toll Free # (888) 263-8686

Fax # (801) 263-8687 Email awal@awal-labs.com

www.awal-labs.com

CHAIN OF CUSTODY

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

1908622

AWAL Lab Sample Set #

Page 1 of 1

Client: American West Analytical Laboratories

Address: **3440 S. 700 W.**

City, State, Zip: **Salt Lake City, UT 84119**

Contact: **Elona Hayward**

Phone #: **(801) 263-8686**

Cell #:

E-mail: elona@awal-labs.com; denise@awal-labs.com

Project Name: **Hunter CCR Groundwater Sampling**Project #: **PERCM052**

PO #: **1908532**

Sampler Name:

Sample ID:	Date Sampled	Time Sampled	# of Cont	Sample M	Radium											Known Hazards & Sample Comments	2 Ambient or Chilled
1 ELF-1D	8/20/2019	13:30	2	W	X												3 Temperature _____ °C
2 ELF-2	8/20/2019	14:30	2	W	X												4 Received Intact Y N
3 ELF-3	8/20/2019	13:15	2	W	X												5 Properly Preserved Y N Checked at bench
4 ELF-4	8/20/2019	12:15	2	W	X												6 Received Within Holding Times Y N
5 ELF-5	8/20/2019	11:30	2	W	X												
6 ELF-7	8/20/2019	12:45	2	W	X												
7 ELF-8	8/20/2019	10:32	2	W	X												
8 ELF-9	8/20/2019	13:45	2	W	X												
9 ELF-11	8/20/2019	9:26	2	W	X												
10 ELF-12	8/20/2019	12:15	2	W	X												
11 ELF-13	8/20/2019	11:30	2	W	X												
12 ELF-14	8/20/2019	10:45	2	W	X												Sample Labels and COC Record Match? Y N
13 DUP	8/20/2019	9:20	2	W	X												
14 FB	8/20/2019	14:45	2	W	X												
15																	

Relinquished by:
Denise Bruun
Signature

Print Name: Denise Bruun

Relinquished by:
[Signature]
Signature

Print Name:

Relinquished by:
[Signature]
Signature

Print Name:

8/22/19
Time: 16:45

Date:

Time:

Date:

Time:

Date:

Time:

Received by:
Tyler Moscar
Signature

Print Name: Tyler Moscar

Received by:
[Signature]
Signature

Print Name:

Received by:
[Signature]
Signature

Print Name:

Date: 8/26

Time: 8/26

Date:

Time:

Date:

Time:

Special Instructions:

QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS,

MS/MSD performed on customer sample

Samples sent to ALS - Ft. Collins.



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: Am. West Analytical Workorder No: 1208622

Project Manager: KNO

Initials: TEM

Date: 08/26/19

1. Are airbills / shipping documents present and/or removable?		DROP OFF	<u>YES</u>	NO
2. Are custody seals on shipping containers intact?		NONE	<u>YES</u>	NO *
3. Are custody seals on sample containers intact?		<u>NONE</u>	YES	NO *
4. Is there a COC (chain-of-custody) present?			<u>YES</u>	NO *
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)			YES	<u>NO *</u>
6. Are short-hold samples present?			YES	<u>NO</u>
7. Are all samples within holding times for the requested analyses?			<u>YES</u>	NO *
8. Were all sample containers received intact? (not broken or leaking)			<u>YES</u>	NO *
9. Is there sufficient sample for the requested analyses?			<u>YES</u>	NO *
10. Are all samples in the proper containers for the requested analyses?			<u>YES</u>	NO *
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		N/A	YES	<u>NO *</u>
12. Are all aqueous non-preserved samples pH 4-9?		<u>N/A</u>	YES	NO *
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)		<u>N/A</u>	YES	NO
14. Were the samples shipped on ice?			YES	<u>NO</u>
15. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*:	#1	#3	#4
				<u>RAD ONLY</u>
			YES	<u>NO</u>
Cooler #:	<u>1</u>	<u>2</u>	<u>3</u>	
Temperature (°C):	<u>amb</u>	<u>amb</u>	<u>amb</u>	
No. of custody seals on cooler:	<u>1</u>	<u>1</u>	<u>1</u>	
External µR/hr reading:	<u>12</u>	<u>12</u>	<u>12</u>	
Background µR/hr reading:	<u>13</u>			
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <u>YES</u> / NO / NA (If no, see Form 008.)				

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

5.) sample times for DUP 122 state a:uo on bottles and a:20 on COC

11.) 22 of 23 bottles measured pH of ~2.5 HNO₃ needed to be added in varied amounts: see continued list for amt. added and group + bottle number

HNO₃ lot 197345

All client bottle ID's vs ALS lab ID's double-checked by: [Signature]

If applicable, was the client contacted? YES / NO / NA Contact: Elana Haggard

Date/Time: 8/27/19 1:10

Project Manager Signature / Date: [Signature] 8/27/19



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: Am. West. Analytical Workorder No: 1008622
Project Manager: KMO Initials: TEM Date: 8/26/19

Additional Information:

added .5 mL of HNO₃:
- 12-2

added 1 mL of HNO₃:
1-2, 2-2, 5-1, 5-2, 6-2, 9-2, 10-2, 11-1, 11-2,
13-1, 13-2

added 1.5 mL of HNO₃:
1-1, 2-1, 3-1, 3-2, 6-1, 8-1, 8-2, 9-1, 10-1,
12-1

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

Project Manager Signature / Date: [Signature] 8/27/19

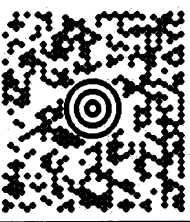

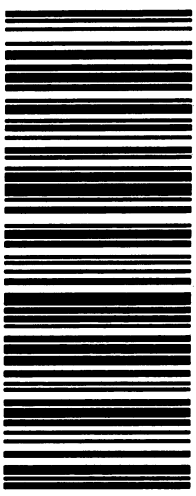

1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.
2. Fold the printed label at the solid line below.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

UPS Access Point™
THE UPS STORE
1905 W 4700 S
TAYLORSVILLE, UT 84129

UPS Access Point™
THE UPS STORE
869 E 4500 S
SALT LAKE CITY, UT 84107

UPS Access Point™
THE UPS STORE
2223 S HIGHLAND DR
SALT LAKE CITY, UT 84106

FOLD HERE

ELONA HAYWARD 801-263-8686 AMERICAN WEST ANALYTICAL LABS 3440 S 700 W SALT LAKE CITY UT 84119		32 LBS	DWT: 24.15.13 AH	2 OF 5
SHIP TO: KATIE O'BRIEN 970-218-4543 ALS LIFE SCIENCES/ENVIRONMENTAL 225 COMMERCE DR. FORT COLLINS CO 80524-2762				
				
CO 805 0-01				
				
UPS GROUND				
TRACKING #: 1Z 9E7 258 03 9144 2944				
				
BILLING: P/P				
US 21.5.26. WNTNVS0 15.0A.07/2019				

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190906-1MB

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 06-Sep-19

Date Prepared: 06-Sep-19

Date Analyzed: 13-Sep-19

Prep Batch: RA190906-1

QCBatchID: RA190906-1-2

Run ID: RA190906-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0913

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
15262-20-1	Ra-228	0.29 +/- 0.37	0.78	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34200	31630	ug	92.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190911-1MB

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 11-Sep-19

Date Prepared: 11-Sep-19

Date Analyzed: 16-Sep-19

Prep Batch: RA190911-1

QCBatchID: RA190911-1-2

Run ID: RA190911-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0916

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
15262-20-1	Ra-228	0.34 +/- 0.35	0.73	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34550	33450	ug	96.8	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190912-1MB

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 12-Sep-19

Date Prepared: 12-Sep-19

Date Analyzed: 17-Sep-19

Prep Batch: RA190912-1

QCBatchID: RA190912-1-1

Run ID: RA190912-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0917

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
15262-20-1	Ra-228	0.42 +/- 0.37	0.75	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34210	31150	ug	91.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190906-1LCS

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 06-Sep-19

Date Prepared: 06-Sep-19

Date Analyzed: 13-Sep-19

Prep Batch: RA190906-1

QCBatchID: RA190906-1-2

Run ID: RA190906-1A

Count Time: 30 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0913A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	15.2 +/- 3.9	1.5	13.86	109	70 - 130	P,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34200	31630	ug	92.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190906-1LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 06-Sep-19

Date Prepared: 06-Sep-19

Date Analyzed: 13-Sep-19

Prep Batch: RA190906-1

QCBatchID: RA190906-1-2

Run ID: RA190906-1A

Count Time: 30 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0913A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	14.2 +/- 3.7	1.6	13.86	103	70 - 130	P,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34200	31290	ug	91.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190911-1LCS

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 11-Sep-19

Date Prepared: 11-Sep-19

Date Analyzed: 16-Sep-19

Prep Batch: RA190911-1

QCBatchID: RA190911-1-2

Run ID: RA190911-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0916

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	15.5 +/- 3.7	0.7	13.85	112	70 - 130	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34550	33430	ug	96.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190911-1LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 11-Sep-19

Date Prepared: 11-Sep-19

Date Analyzed: 16-Sep-19

Prep Batch: RA190911-1

QCBatchID: RA190911-1-2

Run ID: RA190911-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0916

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	15.4 +/- 3.6	0.7	13.85	111	70 - 130	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34550	32940	ug	95.3	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190912-1LCS

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 12-Sep-19

Date Prepared: 12-Sep-19

Date Analyzed: 17-Sep-19

Prep Batch: RA190912-1

QCBatchID: RA190912-1-1

Run ID: RA190912-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0917

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	15.3 +/- 3.6	0.7	13.85	111	70 - 130	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34210	33100	ug	96.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Lab ID: RA190912-1LCSD

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 12-Sep-19

Date Prepared: 12-Sep-19

Date Analyzed: 17-Sep-19

Prep Batch: RA190912-1

QCBatchID: RA190912-1-1

Run ID: RA190912-1A

Count Time: 150 minutes

Final Aliquot: 997 ml

Result Units: pCi/l

File Name: RAC0917

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
15262-20-1	Ra-228	14.5 +/- 3.4	0.7	13.85	105	70 - 130	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34220	33520	ug	98.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:
Lab ID: RA190906-1LCSD

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 06-Sep-19
Date Prepared: 06-Sep-19
Date Analyzed: 13-Sep-19

Prep Batch: RA190906-1
QCBatchID: RA190906-1-2
Run ID: RA190906-1A
Count Time: 30 minutes

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0913A

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15262-20-1	Ra-228	15.2 +/- 3.9		1.5	P,M3	14.2 +/- 3.7		1.6	P,M3	0.18	2.13

Comments:

Duplicate Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:
Lab ID: RA190911-1LCSD

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 11-Sep-19
Date Prepared: 11-Sep-19
Date Analyzed: 16-Sep-19

Prep Batch: RA190911-1
QCBatchID: RA190911-1-2
Run ID: RA190911-1A
Count Time: 150 minutes

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0916

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15262-20-1	Ra-228	15.5 +/- 3.7		0.7	P	15.4 +/- 3.6		0.7	P	0.0177	2.13

Comments:

Duplicate Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID:
Lab ID: RA190912-1LCSD

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 12-Sep-19
Date Prepared: 12-Sep-19
Date Analyzed: 17-Sep-19

Prep Batch: RA190912-1
QCBatchID: RA190912-1-1
Run ID: RA190912-1A
Count Time: 150 minutes

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0917

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15262-20-1	Ra-228	15.3 +/-	3.6	0.7	P	14.5 +/-	3.4	0.7	P	0.157	2.13

Comments:

Duplicate Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-1D
Lab ID: 1908622-1

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190906-1
QCBatchID: RA190906-1-2
Run ID: RA190906-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0913

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.09	0.75	1	NA	
15262-20-1	Ra-228	1.09 +/- 0.46	0.75	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34200	32030	ug	93.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-2
Lab ID: 1908622-2

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190906-1
QCBatchID: RA190906-1-2
Run ID: RA190906-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0913

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.49	0.76	1	NA	
15262-20-1	Ra-228	1.17 +/- 0.48	0.76	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34200	31880	ug	93.2	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-3
Lab ID: 1908622-3

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190906-1
QCBatchID: RA190906-1-2
Run ID: RA190906-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0913

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	3.04	0.77	1	NA	
15262-20-1	Ra-228	3.04 +/- 0.85	0.77	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34200	30880	ug	90.3	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-4
Lab ID: 1908622-4

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190906-1
QCBatchID: RA190906-1-2
Run ID: RA190906-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0913

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.73	0.81	1	NA	
15262-20-1	Ra-228	2.39 +/- 0.73	0.81	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34890	32040	ug	91.8	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-5
Lab ID: 1908622-5

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190906-1
QCBatchID: RA190906-1-2
Run ID: RA190906-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0913

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.77	0.92	1	NA	
15262-20-1	Ra-228	2.01 +/- 0.69	0.92	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34480	27040	ug	78.4	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-7
Lab ID: 1908622-6

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 11-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190911-1
QCBatchID: RA190911-1-2
Run ID: RA190911-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0916

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.22	0.7	1	NA	
15262-20-1	Ra-228	1.67 +/- 0.55	0.70	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34550	33660	ug	97.4	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-8
Lab ID: 1908622-7

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 11-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190911-1
QCBatchID: RA190911-1-2
Run ID: RA190911-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0916

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.15	0.76	1	NA	
15262-20-1	Ra-228	1.51 +/- 0.54	0.76	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34550	33170	ug	96.0	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-9
Lab ID: 1908622-8

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 11-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190911-1
QCBatchID: RA190911-1-2
Run ID: RA190911-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0916

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	1.5	0.74	1	NA	
15262-20-1	Ra-228	1.19 +/- 0.48	0.74	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34560	33150	ug	95.9	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-11
Lab ID: 1908622-9

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 12-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190912-1
QCBatchID: RA190912-1-1
Run ID: RA190912-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0917

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.48	0.72	1	NA	
15262-20-1	Ra-228	2.48 +/- 0.72	0.72	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34240	32480	ug	94.9	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-12

Lab ID: 1908622-10

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 20-Aug-19

Date Prepared: 12-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RA190912-1

QCBatchID: RA190912-1-1

Run ID: RA190912-1A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0917

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.83	0.86	1	NA	
15262-20-1	Ra-228	2.83 +/- 0.83	0.86	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34210	29040	ug	84.9	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-13

Lab ID: 1908622-11

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 20-Aug-19

Date Prepared: 12-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RA190912-1

QCBatchID: RA190912-1-1

Run ID: RA190912-1A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0917

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.07	0.75	1	NA	
15262-20-1	Ra-228	1.66 +/- 0.57	0.75	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34210	32790	ug	95.8	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: ELF-14

Lab ID: 1908622-12

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 20-Aug-19

Date Prepared: 12-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RA190912-1

QCBatchID: RA190912-1-1

Run ID: RA190912-1A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0917

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.69	0.83	1	NA	
15262-20-1	Ra-228	2.29 +/- 0.71	0.83	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34220	30700	ug	89.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: DUP

Lab ID: 1908622-13

Sample Matrix: WATER

Prep SOP: SOP749 Rev 6

Date Collected: 20-Aug-19

Date Prepared: 12-Sep-19

Date Analyzed: 18-Sep-19

Prep Batch: RA190912-1

QCBatchID: RA190912-1-1

Run ID: RA190912-1A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 997 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: RAC0917

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	2.86	0.82	1	NA	
15262-20-1	Ra-228	2.86 +/- 0.83	0.82	1	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34210	28870	ug	84.4	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1

Radium-228 Analysis by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: FB
Lab ID: 1908622-14

Sample Matrix: WATER
Prep SOP: SOP749 Rev 6
Date Collected: 20-Aug-19
Date Prepared: 12-Sep-19
Date Analyzed: 18-Sep-19

Prep Batch: RA190912-1
QCBatchID: RA190912-1-1
Run ID: RA190912-1A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 997 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: RAC0917

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
	COMBINED RA (226+228)	0	0.73	1	NA	U
15262-20-1	Ra-228	0.64 +/- 0.39	0.73	1	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	34210	33080	ug	96.7	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

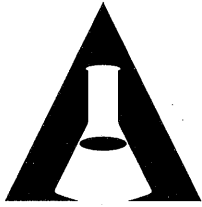
TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: RA1908622-1



Jeff Tucker
PacifiCorp
1407 West North Temple, # 280

AMERICAN WEST ANALYTICAL
LABORATORIES
Salt Lake City, UT 84116
TEL: (801) 220-2989
RE: Hunter CCR Groundwater Sampling / PERCM052

Dear Jeff Tucker:

Lab Set ID: 1908531

Kyle F. Gross
Laboratory Director

American West Analytical Laboratories received sample(s) on 8/21/2019 for the analyses presented in the following report.

Jose Rocha
QA Officer

American West Analytical Laboratories (AWAL) is accredited by The National Environmental Laboratory Accreditation Program (NELAP) in Utah and Texas; and is state accredited in Colorado, Idaho, New Mexico, Wyoming, and Missouri.
3440 South 700 West
Salt Lake City, Utah
84119

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

(801) 263-8686

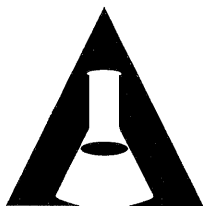
Toll Free (888) 263-8686

Fax (801) 263-8687
awal@awal-labs.com

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

Thank You,

Approved by: 
Laboratory Director or designee



AMERICAN
WEST
ANALYTICAL
LABORATORIES

INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-001
Client Sample ID: ELF-1D
Collection Date: 8/20/2019 1330h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

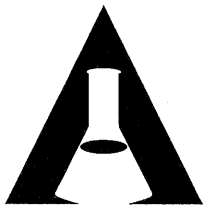
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1237h	E200.7	0.500	2.19	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1256h	E200.7	10.0	366	

3440 South 700 West
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awal@awal-labs.com



AMERICAN
WEST
ANALYTICAL
LABORATORIES

INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-002
Client Sample ID: ELF-2
Collection Date: 8/20/2019 1430h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

TOTAL METALS

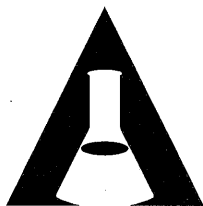
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1249h	E200.7	0.500	3.53	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1303h	E200.7	10.0	414	

3440 South 700 West
Salt Lake City, Utah
84119

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AMERICAN
WEST
ANALYTICAL
LABORATORIES

INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-003
Client Sample ID: ELF-3
Collection Date: 8/20/2019 1315h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

TOTAL METALS

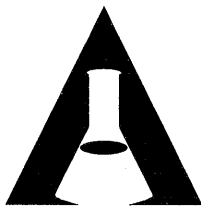
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1559h	E200.7	5.00	< 5.00	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1305h	E200.7	10.0	431	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-004
Client Sample ID: ELF-4
Collection Date: 8/20/2019 1215h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

TOTAL METALS

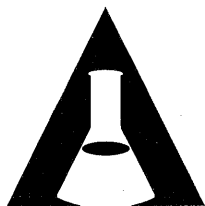
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1301h	E200.7	0.500	4.98	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1308h	E200.7	10.0	507	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-005
Client Sample ID: ELF-5
Collection Date: 8/20/2019 1130h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

TOTAL METALS

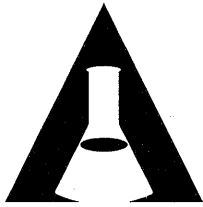
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1303h	E200.7	0.500	8.70	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1310h	E200.7	10.0	510	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-006
Client Sample ID: ELF-7
Collection Date: 8/20/2019 1245h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

TOTAL METALS

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1306h	E200.7	0.500	2.24	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1318h	E200.7	10.0	459	

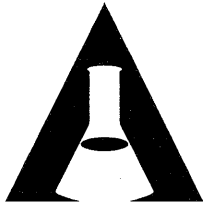
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-007
Client Sample ID: ELF-8
Collection Date: 8/20/2019 1032h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

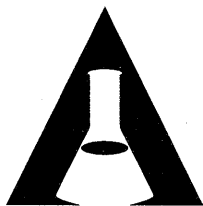
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1601h	E200.7	5.00	30.2	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1321h	E200.7	10.0	566	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-008
Client Sample ID: ELF-9
Collection Date: 8/20/2019 1345h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

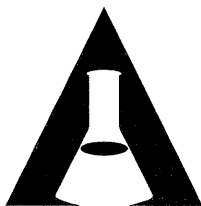
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1311h	E200.7	0.500	1.91	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1323h	E200.7	10.0	57.7	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-009
Client Sample ID: ELF-11
Collection Date: 8/20/2019 926h
Received Date: 8/21/2019 1445h

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Analytical Results

TOTAL METALS

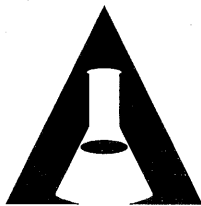
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1313h	E200.7	0.500	17.8	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1325h	E200.7	10.0	442	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-010
Client Sample ID: ELF-12
Collection Date: 8/20/2019 1215h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

TOTAL METALS

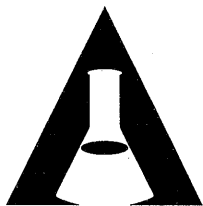
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1316h	E200.7	0.500	1.68	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1327h	E200.7	10.0	169	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-011
Client Sample ID: ELF-13
Collection Date: 8/20/2019 1130h
Received Date: 8/21/2019 1445h

Analytical Results

TOTAL METALS

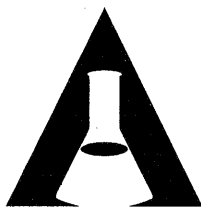
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1318h	E200.7	0.500	0.732	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1330h	E200.7	10.0	461	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-012
Client Sample ID: ELF-14
Collection Date: 8/20/2019 1045h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

TOTAL METALS

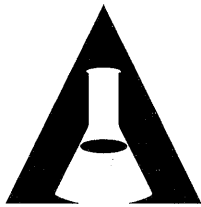
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1320h	E200.7	0.500	3.09	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1332h	E200.7	10.0	496	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-013
Client Sample ID: DUP
Collection Date: 8/20/2019 920h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

TOTAL METALS.

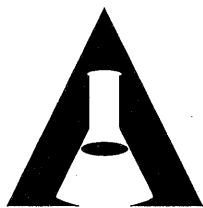
Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1323h	E200.7	0.500	18.5	
Calcium	mg/L	8/22/2019 1045h	8/30/2019 1334h	E200.7	10.0	449	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker

Project: Hunter CCR Groundwater Sampling / PERCM052

Lab Sample ID: 1908531-014

Client Sample ID: FB

Collection Date: 8/20/2019 1445h

Received Date: 8/21/2019 1445h

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Analytical Results

TOTAL METALS

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Boron	mg/L	8/22/2019 1045h	9/3/2019 1338h	E200.7	0.500	< 0.500	
Calcium	mg/L	8/22/2019 1045h	9/3/2019 1338h	E200.7	1.00	< 1.00	

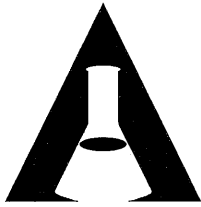
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-001
Client Sample ID: ELF-1D
Collection Date: 8/20/2019 1330h
Received Date: 8/21/2019 1445h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/30/2019 1909h	E300.0	100	6,430	
Fluoride	mg/L		9/3/2019 2014h	E300.0	0.200	< 0.200	*
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.27	H
Sulfate	mg/L		8/30/2019 1909h	E300.0	750	8,640	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	27,000	

* - The reporting limits were raised due to sample matrix interferences.

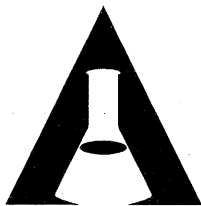
H - Sample was received outside of the holding time.

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052

Lab Sample ID: 1908531-002

Client Sample ID: ELF-2

Collection Date: 8/20/2019 1430h

Received Date: 8/21/2019 1445h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/31/2019 150h	E300.0	10.0	218	
Fluoride	mg/L		8/31/2019 403h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.43	H
Sulfate	mg/L		8/30/2019 1926h	E300.0	750	6,780	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	12,600	

H - Sample was received outside of the holding time.

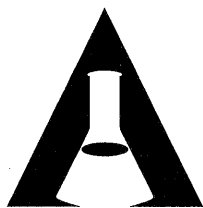
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-003
Client Sample ID: ELF-3
Collection Date: 8/20/2019 1315h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Kyle F. Gross Laboratory Director	Chloride	mg/L		8/31/2019 207h	E300.0	10.0	642	
Jose Rocha QA Officer	Fluoride	mg/L		9/3/2019 2031h	E300.0	0.400	< 0.400	*
	pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.79	H
	Sulfate	mg/L		9/3/2019 1140h	E300.0	3,750	32,000	
3440 South 700 West Salt Lake City, Utah 84119	Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	500	50,400	

* - The reporting limits were raised due to sample matrix interferences.

H - Sample was received outside of the holding time.

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker

Project: Hunter CCR Groundwater Sampling / PERCM052

Lab Sample ID: 1908531-004

Client Sample ID: ELF-4

Collection Date: 8/20/2019 1215h

Received Date: 8/21/2019 1445h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/30/2019 2230h	E300.0	100	1,840	
Fluoride	mg/L		8/31/2019 437h	E300.0	0.100	0.941	
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.22	H
Sulfate	mg/L		8/30/2019 2230h	E300.0	750	4,890	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	12,200	

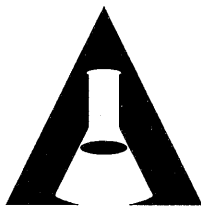
H - Sample was received outside of the holding time.

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp **Contact:** Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-005
Client Sample ID: ELF-5
Collection Date: 8/20/2019 1130h
Received Date: 8/21/2019 1445h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/30/2019 2246h	E300.0	200	4,440	
Fluoride	mg/L		8/31/2019 454h	E300.0	0.100	0.962	
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.23	H
Sulfate	mg/L		8/30/2019 2246h	E300.0	1,500	12,300	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	500	24,000	

H - Sample was received outside of the holding time.

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

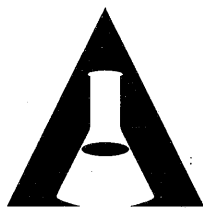
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-006
Client Sample ID: ELF-7
Collection Date: 8/20/2019 1245h
Received Date: 8/21/2019 1445h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/30/2019 2303h	E300.0	100	2,720	
Fluoride	mg/L		8/31/2019 510h	E300.0	0.100	3.88	
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.19	H
Sulfate	mg/L		8/30/2019 2303h	E300.0	750	9,480	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	19,500	

H - Sample was received outside of the holding time.

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp Contact: Jeff Tucker

Project: Hunter CCR Groundwater Sampling / PERCM052

Lab Sample ID: 1908531-007

Client Sample ID: ELF-8

Collection Date: 8/20/2019 1032h

Received Date: 8/21/2019 1445h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/30/2019 2320h	E300.0	100	1,920	
Fluoride	mg/L		8/31/2019 527h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.41	H
Sulfate	mg/L		8/30/2019 2320h	E300.0	750	3,130	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	8,240	

H - Sample was received outside of the holding time.

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-008
Client Sample ID: ELF-9
Collection Date: 8/20/2019 1345h
Received Date: 8/21/2019 1445h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/31/2019 223h	E300.0	10.0	371	
Fluoride	mg/L		9/3/2019 2048h	E300.0	0.200	< 0.200	*
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.51	H
Sulfate	mg/L		8/30/2019 2336h	E300.0	750	5,930	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	10,700	

* - The reporting limits were raised due to sample matrix interferences.

H - Sample was received outside of the holding time.

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

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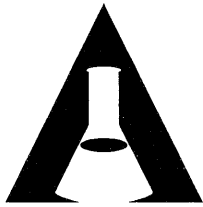
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-009
Client Sample ID: ELF-11
Collection Date: 8/20/2019 926h
Received Date: 8/21/2019 1445h

Contact: Jeff Tucker

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		9/3/2019 1231h	E300.0	100	1,010	
Fluoride	mg/L		8/31/2019 600h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	8.02	H
Sulfate	mg/L		9/3/2019 1231h	E300.0	750	9,910	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	17,000	

H - Sample was received outside of the holding time.

Kyle F. Gross

Laboratory Director

Jose Rocha

QA Officer

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-010
Client Sample ID: ELF-12
Collection Date: 8/20/2019 1215h
Received Date: 8/21/2019 1445h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/31/2019 240h	E300.0	10.0	428	
Fluoride	mg/L		8/31/2019 617h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.73	H
Sulfate	mg/L		8/31/2019 010h	E300.0	1,500	11,400	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	19,900	

H - Sample was received outside of the holding time.

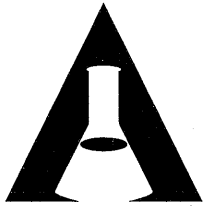
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-011
Client Sample ID: ELF-13
Collection Date: 8/20/2019 1130h
Received Date: 8/21/2019 1445h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/31/2019 026h	E300.0	100	2,420	
Fluoride	mg/L		8/31/2019 707h	E300.0	0.100	0.798	
pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.25	H
Sulfate	mg/L		8/31/2019 026h	E300.0	750	7,370	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	17,300	

H - Sample was received outside of the holding time.

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

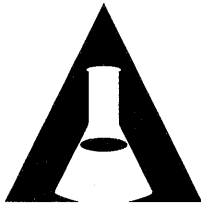
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-012
Client Sample ID: ELF-14
Collection Date: 8/20/2019 1045h
Received Date: 8/21/2019 1445h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/31/2019 043h	E300.0	100	3,640	
Fluoride	mg/L		8/31/2019 724h	E300.0	0.100	0.589	
pH @ 25° C	pH Units		8/21/2019 2005h	SM4500-H+B	1.00	7.49	H
Sulfate	mg/L		8/31/2019 043h	E300.0	750	7,280	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	19,800	

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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp
Contact: Jeff Tucker
Project: Hunter CCR Groundwater Sampling / PERCM052
Lab Sample ID: 1908531-013
Client Sample ID: DUP
Collection Date: 8/20/2019 920h
Received Date: 8/21/2019 1445h

Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		9/3/2019 1248h	E300.0	100	1,010	
Fluoride	mg/L		8/31/2019 741h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		8/21/2019 2005h	SM4500-H+B	1.00	7.47	H
Sulfate	mg/L		9/3/2019 1248h	E300.0	750	9,900	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	18,000	

H - Sample was received outside of the holding time.

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QA Officer

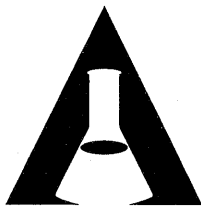
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INORGANIC ANALYTICAL REPORT

Client: PacifiCorp Contact: Jeff Tucker

Project: Hunter CCR Groundwater Sampling / PERCM052

Lab Sample ID: 1908531-014

Client Sample ID: FB

Collection Date: 8/20/2019 1445h

Received Date: 8/21/2019 1445h

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Analytical Results

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Chloride	mg/L		8/30/2019 1819h	E300.0	0.100	< 0.100	
Fluoride	mg/L		8/30/2019 1819h	E300.0	0.100	< 0.100	
pH @ 25° C	pH Units		8/21/2019 2005h	SM4500-H+B	1.00	8.20	H
Sulfate	mg/L		8/30/2019 1819h	E300.0	0.750	< 0.750	
Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	10.0	< 10.0	

H - Sample was received outside of the holding time.

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: LCS-64604	Date Analyzed:	08/30/2019 1254h											
Test Code: 200.7-W	Date Prepared:	08/22/2019 1045h											
Calcium	9.81	mg/L	E200.7	0.102	1.00	10.00	0	98.1	85 - 115				
Lab Sample ID: LCS-64604	Date Analyzed:	09/03/2019 1234h											
Test Code: 200.7-W	Date Prepared:	08/22/2019 1045h											
Boron	1.08	mg/L	E200.7	0.114	0.500	1.000	0	108	85 - 115				

Report Date: 9/5/2019 Page 30 of 38

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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: MB-64604	Date Analyzed:	08/30/2019 1252h											
Test Code: 200.7-W	Date Prepared:	08/22/2019 1045h											
Calcium	< 1.00	mg/L	E200.7	0.102	1.00								
Lab Sample ID: MB-64604	Date Analyzed:	09/03/2019 1232h											
Test Code: 200.7-W	Date Prepared:	08/22/2019 1045h											
Boron	< 0.500	mg/L	E200.7	0.114	0.500								

Report Date: 9/5/2019 Page 31 of 38



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908531-001BMS													
Date Analyzed:		08/30/2019 1258h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 1045h											
Calcium	390	mg/L	E200.7	1.02	10.0	10.00	366	244	70 - 130				1
Lab Sample ID: 1908531-001BMS													
Date Analyzed:		09/03/2019 1244h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 1045h											
Boron	3.39	mg/L	E200.7	0.114	0.500	1.000	2.19	120	70 - 130				
Lab Sample ID: 1908531-014BMS													
Date Analyzed:		09/03/2019 1340h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 1045h											
Boron	1.12	mg/L	E200.7	0.114	0.500	1.000	0	112	70 - 130				
Calcium	10.3	mg/L	E200.7	0.102	1.00	10.00	0	103	70 - 130				

¹ - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: ME

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908531-001BMSD													
Date Analyzed:		08/30/2019 1301h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 1045h											
Calcium	377	mg/L	E200.7	1.02	10.0	10.00	366	108	70 - 130	390	3.56	20	
Lab Sample ID: 1908531-001BMSD													
Date Analyzed:		09/03/2019 1246h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 1045h											
Boron	3.40	mg/L	E200.7	0.114	0.500	1.000	2.19	121	70 - 130	3.39	0.495	20	
Lab Sample ID: 1908531-014BMSD													
Date Analyzed:		09/03/2019 1343h											
Test Code:		200.7-W											
Date Prepared:		08/22/2019 1045h											
Boron	1.10	mg/L	E200.7	0.114	0.500	1.000	0	110	70 - 130	1.12	1.52	20	
Calcium	10.2	mg/L	E200.7	0.102	1.00	10.00	0	102	70 - 130	10.3	1.40	20	

Report Date: 9/5/2019 Page 33 of 38

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Laboratory DirectorJose Rocha
QA OfficerQC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: DUP

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908531-002ADUP	Date Analyzed: 08/21/2019 1832h												
Test Code: PH-4500H+B													
pH @ 25° C	7.40	pH Units	SM4500-H+B	1.00	1.00					7.43	0.405	5	H
Lab Sample ID: 1908531-003ADUP	Date Analyzed: 08/21/2019 1832h												
Test Code: PH-4500H+B													
pH @ 25° C	7.75	pH Units	SM4500-H+B	1.00	1.00					7.79	0.515	5	H
Lab Sample ID: 1908531-012ADUP	Date Analyzed: 08/21/2019 2005h												
Test Code: PH-4500H+B													
pH @ 25° C	7.44	pH Units	SM4500-H+B	1.00	1.00					7.49	0.670	5	H
Lab Sample ID: 1908533-007ADUP	Date Analyzed: 08/21/2019 2005h												
Test Code: PH-4500H+B													
pH @ 25° C	7.15	pH Units	SM4500-H+B	1.00	1.00					7.16	0.140	5	
Lab Sample ID: 1908531-001ADUP	Date Analyzed: 08/22/2019 1120h												
Test Code: TDS-W-2540C													
Total Dissolved Solids	26,800	mg/L	SM2540C	80.0	100					27000	0.446	5	

H - Sample was received outside of the holding time.

Report Date: 9/5/2019 Page 34 of 38

All analysis applicable to the CWA, SDWA, and RCRA are performed in accordance to NELAC protocols. Pertinent sampling information is located on the attached COC. CONFIDENTIAL BUSINESS INFORMATION: This report is provided for the exclusive use of the addressee. Privileges of subsequent use of the name of this company or any member of its staff, or reproduction of this report in connection with the advertisement. Promotion or sale of any product or process, or in connection with the re-publication of this report for any purpose other than for the addressee will be granted only on contact. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.



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QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: LCS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: LCS-R129815 Date Analyzed: 08/30/2019 1606h													
Test Code: 300.0-W													
Chloride	5.01	mg/L	E300.0	0.0386	0.100	5.000	0	100	90 - 110				
Fluoride	5.15	mg/L	E300.0	0.0240	0.100	5.000	0	103	90 - 110				
Sulfate	5.07	mg/L	E300.0	0.174	0.750	5.000	0	101	90 - 110				
Lab Sample ID: LCS-R129821 Date Analyzed: 09/03/2019 1123h													
Test Code: 300.0-W													
Chloride	4.89	mg/L	E300.0	0.0386	0.100	5.000	0	97.9	90 - 110				
Fluoride	5.01	mg/L	E300.0	0.0240	0.100	5.000	0	100	90 - 110				
Sulfate	5.10	mg/L	E300.0	0.174	0.750	5.000	0	102	90 - 110				
Lab Sample ID: LCS-R129400 Date Analyzed: 08/21/2019 1832h													
Test Code: PH-4500H+B													
pH @ 25° C	9.10	pH Units	SM4500-H+B	1.00	1.00	9.000	0	101	98 - 102				
Lab Sample ID: LCS-R129401 Date Analyzed: 08/21/2019 2005h													
Test Code: PH-4500H+B													
pH @ 25° C	9.07	pH Units	SM4500-H+B	1.00	1.00	9.000	0	101	98 - 102				
Lab Sample ID: LCS-R129478 Date Analyzed: 08/22/2019 1120h													
Test Code: TDS-W-2540C													
Total Dissolved Solids	206	mg/L	SM2540C	8.00	10.0	205.0	0	100	80 - 120				

Report Date: 9/5/2019 Page 35 of 38

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Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MBLK

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: MB-R129815 Date Analyzed: 08/30/2019 1549h													
Test Code: 300.0-W													
Chloride	< 0.100	mg/L	E300.0	0.0386	0.100								
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								
Sulfate	< 0.750	mg/L	E300.0	0.174	0.750								
Lab Sample ID: MB-R129821 Date Analyzed: 09/03/2019 1106h													
Test Code: 300.0-W													
Chloride	< 0.100	mg/L	E300.0	0.0386	0.100								
Fluoride	< 0.100	mg/L	E300.0	0.0240	0.100								
Sulfate	< 0.750	mg/L	E300.0	0.174	0.750								
Lab Sample ID: MB-R129478 Date Analyzed: 08/22/2019 1120h													
Test Code: TDS-W-2540C													
Total Dissolved Solids	< 10.0	mg/L	SM2540C	8.00	10.0								

Report Date: 9/5/2019 Page 36 of 38

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Laboratory DirectorJose Rocha
QA OfficerQC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MS

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908531-002AMS Date Analyzed: 08/30/2019 1943h													
Test Code: 300.0-W													
Chloride	10,200	mg/L	E300.0	77.2	200	10,000	218	99.6	90 - 110				
Fluoride	10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110				
Sulfate	17,100	mg/L	E300.0	348	1,500	10,000	6780	103	90 - 110				
Lab Sample ID: 1908531-003AMS Date Analyzed: 08/30/2019 2033h													
Test Code: 300.0-W													
Chloride	10,600	mg/L	E300.0	77.2	200	10,000	642	99.9	90 - 110				
Fluoride	10,300	mg/L	E300.0	48.0	200	10,000	0	103	90 - 110				
Lab Sample ID: 1908531-003AMS Date Analyzed: 09/03/2019 1157h													
Test Code: 300.0-W													
Chloride	25,400	mg/L	E300.0	193	500	25,000	876	97.9	90 - 110				
Sulfate	57,700	mg/L	E300.0	870	3,750	25,000	32000	102	90 - 110				
Lab Sample ID: 1908533-001AMS Date Analyzed: 09/03/2019 1323h													
Test Code: 300.0-W													
Chloride	18,600	mg/L	E300.0	77.2	200	10,000	8290	103	90 - 110				
Fluoride	10,100	mg/L	E300.0	48.0	200	10,000	0	101	90 - 110				
Sulfate	10,600	mg/L	E300.0	348	1,500	10,000	496	101	90 - 110				
Lab Sample ID: 1908533-005AMS Date Analyzed: 09/03/2019 1541h													
Test Code: 300.0-W													
Chloride	11,800	mg/L	E300.0	77.2	200	10,000	1630	101	90 - 110				
Fluoride	10,400	mg/L	E300.0	48.0	200	10,000	69.3	103	90 - 110				
Sulfate	14,500	mg/L	E300.0	348	1,500	10,000	4360	102	90 - 110				

Report Date: 9/5/2019 Page 37 of 38



AMERICAN WEST ANALYTICAL LABORATORIES

3440 South 700 West
Salt Lake City, Utah 84119
(801) 263-8686 Toll Free (888) 263-8686 Fax (801) 263-8687
awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

QC SUMMARY REPORT

Client: PacifiCorp

Lab Set ID: 1908531

Project: Hunter CCR Groundwater Sampling / PERCM052

Contact: Jeff Tucker

Dept: WC

QC Type: MSD

Analyte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: 1908531-002AMSD Date Analyzed: 08/30/2019 1959h													
Test Code: 300.0-W													
Chloride	10,200	mg/L	E300.0	77.2	200	10,000	218	99.6	90 - 110	10200	0.00462	20	
Fluoride	10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110	10200	0.363	20	
Sulfate	17,100	mg/L	E300.0	348	1,500	10,000	6780	103	90 - 110	17100	0.331	20	
Lab Sample ID: 1908531-003AMSD Date Analyzed: 08/30/2019 2049h													
Test Code: 300.0-W													
Chloride	10,600	mg/L	E300.0	77.2	200	10,000	642	99.5	90 - 110	10600	0.361	20	
Fluoride	10,400	mg/L	E300.0	48.0	200	10,000	0	104	90 - 110	10300	0.809	20	
Lab Sample ID: 1908531-003AMSD Date Analyzed: 09/03/2019 1214h													
Test Code: 300.0-W													
Chloride	25,500	mg/L	E300.0	193	500	25,000	876	98.3	90 - 110	25400	0.389	20	
Sulfate	57,500	mg/L	E300.0	870	3,750	25,000	32000	102	90 - 110	57700	0.290	20	
Lab Sample ID: 1908533-001AMSD Date Analyzed: 09/03/2019 1341h													
Test Code: 300.0-W													
Chloride	18,600	mg/L	E300.0	77.2	200	10,000	8290	103	90 - 110	18600	0.289	20	
Fluoride	10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110	10100	0.694	20	
Sulfate	10,700	mg/L	E300.0	348	1,500	10,000	496	102	90 - 110	10600	0.621	20	
Lab Sample ID: 1908533-005AMSD Date Analyzed: 09/03/2019 1558h													
Test Code: 300.0-W													
Chloride	11,700	mg/L	E300.0	77.2	200	10,000	1630	101	90 - 110	11800	0.149	20	
Fluoride	10,300	mg/L	E300.0	48.0	200	10,000	69.3	102	90 - 110	10400	1.05	20	
Sulfate	14,300	mg/L	E300.0	348	1,500	10,000	4360	99.4	90 - 110	14500	1.57	20	

Report Date: 9/5/2019 Page 38 of 38

WORK ORDER Summary

Work Order: **1908531**

Page 1 of 4

Client: PacifiCorp

Client ID: PAC900

Contact: Jeff Tucker

Due Date: 9/5/2019

Project: Hunter CCR Groundwater Sampling / PERCM052

QC Level: II+

WO Type: Project

Comments: QC2+. Include EDD. Metals share with set 1908532. Footnote report, pH received outside of hold. cc: Report to derickson@waterenvtech.com and mholland@waterenvtech.com;

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel Storage	
1908531-001A	ELF-1D	8/20/2019 1330h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1908531-001B				200.7-W 2 SEL Analytes: B CA		DF-Metals	
				200.7-W-PR		DF-Metals	
1908531-002A	ELF-2	8/20/2019 1430h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1908531-002B				200.7-W 2 SEL Analytes: B CA		DF-Metals	
				200.7-W-PR		DF-Metals	
1908531-003A	ELF-3	8/20/2019 1315h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1908531-003B				200.7-W 2 SEL Analytes: B CA		DF-Metals	
				200.7-W-PR		DF-Metals	
1908531-004A	ELF-4	8/20/2019 1215h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1908531-004B				200.7-W 2 SEL Analytes: B CA		DF-Metals	
				200.7-W-PR		DF-Metals	

WORK ORDER Summary

Work Order: **1908531**

Page 2 of 4

Client: PacifiCorp

Due Date: 9/5/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1908531-005A	ELF-5	8/20/2019 1130h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-005B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1908531-006A	ELF-7	8/20/2019 1245h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-006B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1908531-007A	ELF-8	8/20/2019 1032h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-007B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1908531-008A	ELF-9	8/20/2019 1345h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-008B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1908531-009A	ELF-11	8/20/2019 0926h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-009B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals

WORK ORDER Summary

Work Order: **1908531**

Page 3 of 4

Client: PacifiCorp

Due Date: 9/5/2019

Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel	Storage
1908531-010A	ELF-12	8/20/2019 1215h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-010B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1908531-011A	ELF-13	8/20/2019 1130h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-011B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1908531-012A	ELF-14	8/20/2019 1045h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-012B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1908531-013A	DUP	8/20/2019 0920h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-013B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals
1908531-014A	FB	8/20/2019 1445h	8/21/2019 1445h	300.0-W 3 SEL Analytes: CL F SO4	Aqueous		DF-WC 1
				PH-4500H+B			DF-WC
				TDS-W-2540C			DF-WC
1908531-014B				200.7-W 2 SEL Analytes: B CA			DF-Metals
				200.7-W-PR			DF-Metals

WORK ORDER Summary

Work Order: **1908531**

Page 4 of 4

Client: PacifiCorp

Due Date: 9/5/2019

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

Test Code

PH-4500H+B

American West
Analytical Laboratories

3440 S. 700 W. Salt Lake City, UT 84119
Phone # (801) 263-8686 Toll Free # (888) 263-8686
Fax # (801) 263-8687 Email awal@awal-labs.com

www.awal-labs.com

CHAIN OF CUSTODY

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

1908531

AWAL Lab Sample Set #

Page 2 of 7

Client:

Address:

City, State, Zip:

Contact:

Phone #:

Cell #:

E-mail:

Project Name:

Project #:

PO #:

Sampler Name:

 Fax # (801) 263-8687 Email awal@awal-labs.com www.awal-labs.com		QC Level:		Turn Around Time:		Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.		Due Date: 9/5/19			
		1 2 2+ 3 3+		1 2 3 4 5 Std							
Client: <u>Pacificorp</u> Address: _____ City, State, Zip: _____ Contact: <u>Jeff Tucker</u> Phone #: _____ Cell #: _____ E-mail: <u>Jeff.Tucker@Pacificorp.com</u> Project Name: <u>Hunter CCR Groundwater Sampling</u> Project #: <u>PERCm052</u> PO #: _____ Sampler Name: <u>MCS & CE</u>								<input type="checkbox"/> Report down to the MDL <input type="checkbox"/> Include EDD: <input type="checkbox"/> Lab Filter for: <input type="checkbox"/> Field Filtered For: For Compliance With: <input type="checkbox"/> NELAP <input type="checkbox"/> RCRA <input type="checkbox"/> CWA <input type="checkbox"/> SDWA <input type="checkbox"/> ELAP / A2LA <input type="checkbox"/> NLLAP <input type="checkbox"/> Non-Compliance <input type="checkbox"/> Other:		Laboratory Use Only	
										COC Tape Was: 1 Present on Outer Package Y N NA 2 Unbroken on Outer Package Y N NA 3 Present on Sample Y NA 4 Unbroken on Sample Y N NA	
				Known Hazards & Sample Comments		Samples Were: 1 Shipped or hand delivered 2 Ambient or Chilled 3 Temperature <u>1.1</u> °C 4 Received Intact Y N 5 Properly Preserved Y N Checked at bench 6 Received Within Holding Times <u>8/21/19</u> N <u>some pH out of hold</u> Sample Labels and COC Record Match? Y N					
Sample ID:	Date Sampled	Time Sampled	# of Containers	Sample Matrix							
1 ELF-1D	B/20/2019	1330	5	X							
2 ELF-2	↓	1430									
3 ELF-3		1315									
4 ELF-4		1215									
5 ELF-5		1130									
6 ELF-7		1245									
7 ELF-8		1032									
8 ELF-9		1345									
9 ELF-11		0926									
10 ELF-12		1215									
11 ELF-13		1130									
12 ELF-14		1045									
13 DUP			0920 *								
14 FB			1445								
Relinquished by Signature: <u>[Signature]</u> Print Name: <u>Mike Shirley</u>			Date: <u>8/21/2019</u> Time: <u>1453</u> Received by: Signature: <u>[Signature]</u> Print Name: <u>Denise Bruun</u>			Date: <u>8/21/19</u> Time: <u>14:45</u>			Special Instructions: Please CC Analytical Report to DERickson@waterenvtech.com and MHolland@waterenvtech.com		
Relinquished by Signature: _____			Received by: Signature: _____			Date: _____					
Print Name: _____			Print Name: _____			Date: _____					
Relinquished by Signature: _____			Received by: Signature: _____			Date: _____					
Print Name: _____			Print Name: _____			Date: _____					
Relinquished by Signature: _____			Received by: Signature: _____			Date: _____					
Print Name: _____			Print Name: _____			Date: _____					

Constituents Analyzed	
Appendix III	Appendix IV
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
pH	Cadmium
Sulfate	Chromium
Total Dissolved Solids (TDS)	Cobalt
	Fluoride
	Lead
	Lithium
	Mercury
	Molybdenum
	Selenium
	Thallium
	Radium 226 and 228 Combined

Fluoride is included in both Appendix III and Appendix IV analyte lists. All wells have undergone analysis for both analyte lists for each event. Fluoride was not analyzed twice. The results are reported once under Appendix III constituents for each sample / each event.

Lab Set ID: 1908531
pH Lot #: 10085

Preservation Check Sheet

Sample Set Extension and pH

[illegible]

Procedure:

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

Frequency: All samples requiring preservation

- * The sample required additional preservative upon receipt.
- + The sample was received unpreserved.
- ▲ The sample was received unpreserved and therefore preserved upon receipt.
- # The sample pH was unadjustable to a pH < 2 due to the sample matrix.
- The sample pH was unadjustable to a pH > ____ due to the sample matrix interference.

Elona Hayward

From: Marcus Holland [mholland@waterenvtech.com]
Sent: Monday, August 12, 2019 4:18 PM
To: Elona Hayward
Subject: Appendix III and IV constituents
Attachments: CCR - Appendix III & Appendix IV Constituents.pdf

Hi Elona,

Attached is a list of constituents we will need bottles and analyses for.

I forgot to mention this on the phone, but can we have the reports for these split by Appendices? So two reports for PERCM052 (one Appendix III constituents, one Appendix IV constituents) and two reports for PERCM053 (one Appendix III, one Appendix IV).

Let me know if you have any questions.

Thank you,



Marcus Holland, EI

Staff Engineer

P: (406) 723-1533

C: (406) 498-5402

waterenvtech.com

