# Groundwater Monitoring & Corrective Action Report

# CCR Landfill - Hunter Power Plant Castle Dale, Utah

# January 2020







**Prepared For:** Hunter Power Plant Highway 10, S of Castle Dale Castle Dale, UT 84513

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Attachment B:	Field Summary Report – August 2019 Event



## 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, sitespecific 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

, T		wer Plant - As							Appendix I	11									Арре	endix IV						
						-																				
SAMPLE ID	WELL TYPE	COLLECTION DATE	TOC AMSL (ft)	DTW (ft)	GWE AMSL (ft)	В	Ca	CI	F	рН	SO <sub>4</sub>	TDS	Sb	As	Ва	Ве	Cd	Cr	Co	Pb	Li	Hg	Мо	Se	ті	Radium
																						_				226+228
						mg/L	Q mg/L (	Q mg/L Q	mg/L Q	s.u Q	mg/L Q n	ng/L Q	mg/L Q	mg/L	Q mg/L	Q mg/L C	Q mg/L	Q mg/L (	Q mg/L	Q mg/L (	Q mg/L Q	mg/L Q	mg/L Q	mg/L (	) mg/L Q	pCi/L Q
		9/18/2015	5669.55	84.43	5585.12		t enough wate		0, 4		0, 4	0, 4	0, 4	0,	- U		, <u>o</u> ,		. 0,			0, 4	- <del>-</del> -	,		
		11/10/2015		NM	NM		t enough wate																			
		12/1/2015		84.41	5585.14		t enough wate																			
		1/12/2016 2/2/2016		84.25 84.14	5585.30 5585.41		t enough wate t enough wate																			
		3/9/2016		84.14 NM	NM		t enough wate																			
		4/6/2016		83.45	5586.10		t enough wate																			
ELF-1D	Background	5/4/2016		83.60	5585.95	NS - Not	t enough wate	er																		
		5/9/2017		82.60	5586.95		t enough wate																			
		8/2/2017		82.35	5587.20	NS - Not	t enough wate	er					0.00000									0.000450				
		2/15/2018 5/30/2018		98.82 99.87	5570.73 5569.68	NA NS - Not	t enough wate	or					<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
		5/8/2019		81.81	5587.74	2.23	-	6880	<0.100	7.02	7730 26	6800	<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-		<0.200			7000	< 0.00400	< 0.00200	0.00842	<0.00200	<0.000500	<0.00200	< 0.00400	<0.00200	2.19	<0.0000900 UJ		< 0.00200	<0.00200	1.09
1		9/18/2015	5612.02	20.20	5591.82	3.31	419	469	0.5	7.30	8150 12	1400	<0.001	<0.001	<0.05	<0.001	<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			1300	<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				1500	<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 2/2/2016		21.29 21.43	5590.73 5590.59	3.38 3.50	420	473 471	0.277 0.100			2300 2000	<0.002 <0.002	<0.002 <0.002	0.0207	<0.002 <0.002	<0.0005 <0.0005	<0.002	0.0114	<0.002	4.08	<0.00015 <0.00015	0.00431 0.00310	0.499	<0.002 <0.002	1.99 1.25
( I		3/9/2016		21.43	5590.46	3.48	395	430	<0.1			1400	<0.002	<0.002	0.0119	<0.002	< 0.0005	<0.002	0.00301	<0.002	2.14	<0.00015	0.00310	0.451	<0.002	2.87
( I		4/7/2016		21.50	5590.35	3.33	404	457	<0.1			2400	<0.002	<0.002	0.0130	<0.002	< 0.0005	0.011	< 0.004	<0.002	1.34	<0.00015	0.00505	0.463	<0.002	0.94
ELF-2	Background	5/4/2016		21.69	5590.33	3.15	364	439	0.103			1700	<0.002	< 0.002	0.00951	<0.002	<0.0005	<0.002	< 0.004	<0.002	1.45	<0.00015	0.0030	0.398	<0.002	0.85
( I		9/8/2016		22.12	5589.90	3.25	428	446	0.299	7.30	7950 12	2300	<0.002	<0.002	0.00849	<0.002	<0.0005	<0.002	< 0.004	<0.002	3.50	<0.00015	0.00288	0.366	<0.002	0.61
		5/9/2017		22.21	5589.81	-	t enough wate																			
( I		8/2/2017		22.14	5589.88	3.11	383	363	<0.100	7.42	7950 12	1600	<0.00200	<0.00200	0.012	<0.00200	<0.000500	<0.00200	0.00565	<0.00200	1.54	<0.000150	0.00321	0.198	<0.00200	1.37
( I		2/15/2018		22.30 22.24	5589.72	NA 3.58		245	0.102	7 1 2	<u></u>	2000	<0.00200	<0.00200	0.0113	<0.00200	<0.000500	<0.00200	0.00677	<0.00200	1.61	<0.000150	0.00305	0.0879	<0.00200	2.29 0.99
( I		5/30/2018 5/8/2019		22.24	5589.78 5589.49	3.58	430	- 245 222				2000 2200	<0.00100 <0.00400	<0.00200 <0.00200	0.00998	<0.00200 <0.00200	<0.000500 <0.000500	<0.00200	<0.00400 <0.00400	<0.00200		<0.000150 J- <0.0000900	0.00255	0.0766 0.0319	<0.00200 <0.00200	0.99
( I		8/20/2019		22.33	5589.30	3.53						2600	< 0.00400	<0.00200	0.00835	<0.00200	<0.000500	< 0.00238	< 0.00400	<0.00200	1.52	<0.0000900 UJ	_	0.0313	<0.00200	1.49
		9/18/2015	5661.00	NM	NM		t enough wate		.01200	7110	0,00 1	2000	10100100	.0100200	0.00000	.0100200	.010000000	10100200	10100 100	10100200	1.01	1010000000000000	0.00255	01001	10100200	1110
		11/10/2015		NM	NM	NS - Not	t enough wate	er																		
( I		12/1/2015		NM	NM		t enough wate																			
( I		1/12/2016		51.14	5609.86		t enough wate		Lessel					[ ]					1 1				1 I			1 1
( I		2/2/2016 3/9/2016		36.85 23.63	5624.15 5637.37	<5.00 1.61	166 84.2	284 469	0.276			420 1900	<0.002 <0.002	0.00499 0.00674	0.0794 0.0411	<0.002 <0.002	<0.0005 <0.0005	0.0157	<0.004 <0.004	0.00435	2.48	<0.00015 <0.00015	0.0983 0.158	0.00424 <0.002	<0.002 <0.002	1.14 1.15
( I		4/7/2016		23.65	5637.51	1.35	112	316	<0.1			0400	<0.002	0.00674	0.0411	<0.002	< 0.0005	0.00557	0.00498	0.00549	0.724	<0.00015	0.138	<0.002	<0.002	2.6
		5/4/2016		23.45	5637.53	1.30	64.6	282	1.29			0100	<0.002	0.00546	0.0323	<0.002	<0.0005	0.00359	< 0.00430	<0.002	1.03	<0.00015	0.122	<0.002	<0.002	0.64
ELF-9	Background	9/8/2016		23.40	5637.60	1.36		352	1.65			0600	<0.002	0.00524	0.0189	<0.002	< 0.0005	<0.002	<0.004	<0.002	1.60	<0.00015	0.123	<0.002	<0.002	0.66
( I		5/9/2017		23.39	5637.61	NS - Not	t enough wate	er																		
( I		8/2/2017		31.38	5629.62	1.32	91.9	446	1.27			2000	<0.00200	0.01140	0.102	<0.00200	0.000532	0.02010	0.0052	0.00768	0.748	<0.000150	0.141	<0.00200	<0.00200	1.84
( I		8/29/2017		22.01	5638.99	1.50	53.9	391				0500	<0.00200	0.00622	0.0165	<0.00200	<0.000500	<0.00200	< 0.00400	<0.00200	0.801	< 0.000150	0.106	<0.00200	<0.00200	2.23
( I		9/15/2017		23.32	5637.68	1.39 NA	60.3	359	1.84	8.06	5600 12	1900	<0.00200	0.00762	0.0348		<0.000500		<0.00400		0.783	<0.000150		<0.00200	<0.00200	1.92 1.38
		2/15/2018 5/30/2018		22.81 23.25	5638.19 5637.75	1.57	52.7 J	- 416	1.19	7.89	5460 11	1200	<0.00200 <0.00100	0.0117	0.0767	<0.00200 <0.00200	<0.000500 <0.000500	0.0137 <0.00200	<0.00400 <0.00400	0.00489	0.74 1.1 J-	<0.000150 <0.000150 J-	0.127	<0.00200 <0.00200	<0.00200 <0.00200	0.7
		5/8/2019		23.23	5637.76	1.87		527				0300	<0.00100	0.0096	0.0137	<0.00200	<0.000500	<0.00200	< 0.00400	<0.00200		<0.0000900	0.103	<0.00200	<0.00200	1.34
		8/20/2019	1	23.25	5637.75	+ +						0700	< 0.00400	0.00663	0.0134	<0.00200	<0.000500	<0.00200	< 0.00400	< 0.00200	0.888	<0.0000900 UJ		<0.00200	<0.00200	1.5
				23.25	3037.73	1.91	57.7 J-	+ 3/1	<0.200				10.00400												·····	
•		9/18/2015	5620.57	50.64	5569.93	NS - Not	t enough wate	er					10.00400										· · ·			
		9/18/2015 11/10/2015	5620.57	50.64 43.09	5569.93 5577.48	NS - Not 1.56	t enough wate 446	er 6790	<0.1	7.10	19900 37	7200	<0.002	0.00292	0.0501	<0.002	0.000563	0.00569	0.00788	0.00318	4.59	<0.00015	0.115	0.41	<0.002	0.7
		9/18/2015 11/10/2015 12/1/2015	5620.57	50.64 43.09 44.21	5569.93 5577.48 5576.36	NS - Not 1.56 1.68	t enough wate 446 457	er 6790 7530	<0.1 3.98	7.10 7.21	19900 37 20100 40	7200 0300	<0.002 <0.002	0.00292 <0.002	0.0329	<0.002	0.000511	<0.002	0.0055	<0.002	3.49	<0.00015	0.124	0.29	<0.002	14.2 J+
		9/18/2015 11/10/2015 12/1/2015 1/12/2016	5620.57	50.64 43.09 44.21 46.50	5569.93 5577.48 5576.36 5574.07	NS - Not 1.56 1.68 1.62	t enough wate 446 457 484	er 6790 7530 7670	<0.1 3.98	7.10 7.21	19900 37 20100 40	7200	<0.002	0.00292												
		9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016	5620.57	50.64 43.09 44.21 46.50 46.09	5569.93 5577.48 5576.36 5574.07 5574.48	NS - Not 1.56 1.68 1.62 NS - Not	t enough wate 446 457	er 6790 7530 7670 er	<0.1 3.98	7.10 7.21	19900 37 20100 40	7200 0300	<0.002 <0.002	0.00292 <0.002	0.0329	<0.002	0.000511	<0.002	0.0055	<0.002	3.49	<0.00015	0.124	0.29	<0.002	14.2 J+
		9/18/2015 11/10/2015 12/1/2015 1/12/2016	5620.57	50.64 43.09 44.21 46.50	5569.93 5577.48 5576.36 5574.07	NS - Not 1.56 1.68 1.62 NS - Not NS - Not	t enough wate 446 457 484 t enough wate	er 6790 7530 7670 er er	<0.1 3.98 4.36	7.10       7.21       7.41	19900 37 20100 40	7200 0300 0100	<0.002 <0.002	0.00292 <0.002	0.0329	<0.002	0.000511	<0.002	0.0055	<0.002 <0.002	3.49	<0.00015	0.124	0.29	<0.002	14.2 J+
		9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016 3/9/2016	5620.57	50.64 43.09 44.21 46.50 46.09 47.82	5569.93 5577.48 5576.36 5574.07 5574.48 5572.75	NS - Not           1.56           1.68           1.62           NS - Not           NS - Not           1.54	t enough wate 446 457 484 t enough wate t enough wate	er 6790 7530 7670 er er 7120	<0.1 3.98 4.36 3.97	7.10       7.21       7.41       7.15	19900 37 20100 40 19800 40	7200 0300 0100 8400	<0.002 <0.002 <0.002	0.00292 <0.002 <0.002	0.0329	<0.002 <0.002	0.000511 0.000576	<0.002 <0.002	0.0055	<0.002 <0.002	3.49 3.60	<0.00015 <0.00015	0.124 0.124	0.29 0.157	<0.002 <0.002	14.2 J+ 1.14
ELF-10	Background	9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016 3/9/2016 4/7/2016 5/4/2016 9/8/2016	5620.57	50.64 43.09 44.21 46.50 46.09 47.82 47.35 48.73 48.05	5569.93 5577.48 5576.36 5574.07 5574.48 5572.75 5573.22 5571.84 5572.52	NS - Not           1.56           1.68           1.62           NS - Not           NS - Not           1.54           1.48           NS - Not	t enough wate 446 457 484 t enough wate t enough wate 479 470 t enough wate	er 6790 7530 7670 er er 7120 7530 7530 er	<0.1 3.98 4.36 3.97	7.10       7.21       7.41       7.15	19900 33 20100 40 19800 40 20700 38	7200 0300 0100 8400	<0.002 <0.002 <0.002 <0.002 <0.002	0.00292 <0.002 <0.002 <0.002	0.0329 0.0353 0.0519	<0.002 <0.002 <0.002	0.000511 0.000576 0.000595	<0.002 <0.002 0.00497	0.0055 0.00493 0.00444	<0.002 <0.002 0.00325	3.49 3.60 0.841	<0.00015 <0.00015 <0.00015	0.124 0.124 0.118	0.29 0.157 0.146	<0.002 <0.002 <0.002	14.2 J+ 1.14 2.66
ELF-10	Background	9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016 3/9/2016 4/7/2016 5/4/2016 9/8/2016 5/9/2017	5620.57	50.64 43.09 44.21 46.50 46.09 47.82 47.35 48.73 48.05 45.41	5569.93 5577.48 5576.36 5574.07 5574.48 5572.75 5573.22 5571.84 5572.52 5575.16	NS - Not           1.56           1.68           1.62           NS - Not           1.54           1.48           NS - Not           NS - Not	t enough wate 446 457 484 t enough wate t enough wate 479 470 t enough wate t enough wate	er 6790 7530 7670 er 7670 er 7120 7530 er	<0.1 3.98 4.36 3.97 3.87	7.10 7.21 7.41 7.15 8.37	19900 33 20100 4( 19800 4( 20700 38 19300 33	7200   0300   0100   8400   7800	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002	0.00292 <0.002 <0.002 0.00366 0.00929	0.0329 0.0353 0.0519 0.08627	<0.002 <0.002 <0.002 <0.002 <0.002	0.000511 0.000576 0.000595 0.0011	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>0.00497</li> <li>0.0164</li> </ul>	0.0055 0.00493 0.00444 0.00793	<pre>&lt;0.002 &lt;0.002 0.00325 0.012</pre>	3.49           3.60           0.841           1.12	<0.00015 <0.00015 <0.00015 <0.00015	0.124 0.124 0.118 0.117	0.29 0.157 0.146 0.105	<0.002 <0.002 <0.002 <0.002 <0.002	14.2 J+ 1.14 2.66 3.1
ELF-10	Background	9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016 3/9/2016 4/7/2016 5/4/2016 9/8/2016 5/9/2017 8/2/2017	5620.57	50.64 43.09 44.21 46.50 46.09 47.82 47.35 48.73 48.73 48.05 45.41 46.80	5569.93 5577.48 5576.36 5574.07 5574.48 5572.75 5573.22 5571.84 5572.52 5575.16 5573.77	NS - Not           1.56           1.68           1.62           NS - Not           1.54           1.48           NS - Not           1.54           1.48           NS - Not           1.64	t enough wate 446 457 484 t enough wate 479 470 t enough wate t enough wate 509	er 6790 7530 7670 er 7720 7120 7530 er er 7150	<0.1 3.98 4.36 3.97 3.87	7.10 7.21 7.41 7.15 8.37 7.00	19900 33 20100 4( 19800 4( 20700 38 19300 33 17300 38	7200 0 0300 0 0100 0 8400 0 7800 0 8600 0	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002	0.00292 <0.002 <0.002 <0.002 0.00366 0.00929 <0.00929	0.0329 0.0353 0.0519 0.08627 0.0391	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002	0.000511 0.000576 0.000595 0.0011 0.000563	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>0.00497</li> <li>0.0164</li> <li>0.00841</li> </ul>	0.0055 0.00493 0.00444 0.00793 0.00793	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>0.00325</li> <li>0.012</li> <li>0.00217</li> </ul>	3.49 3.60 0.841 1.12 2.09	<0.00015 <0.00015 <0.00015 <0.00015 <0.00015 <0.000150	0.124 0.124 0.118 0.107 0.0871	0.29 0.157 0.146 0.105 0.00903	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002	14.2         J+           1.14
ELF-10	Background	9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016 3/9/2016 4/7/2016 5/4/2016 5/4/2016 5/9/2017 8/2/2017 8/29/2017	5620.57	50.64 43.09 44.21 46.50 46.09 47.82 47.35 48.73 48.73 48.05 45.41 46.80 48.10	5569.93 5577.48 5576.36 5574.07 5574.48 5572.75 5573.22 5571.84 5572.52 5575.16 5573.77 5572.47	NS - Not           1.56           1.68           1.62           NS - Not           1.54           1.48           NS - Not           NS - Not           1.64           1.84	t enough wate 446 457 484 t enough wate 479 470 t enough wate t enough wate 509 500	er 6790 7530 7670 er 7120 7530 er 7120 7530 er 7120 7530 6960	<0.1 3.98 4.36 3.97 3.87	7.10       7.21       7.41       7.15       8.37       7.00       7.28	19900 33 20100 44 19800 44 20700 38 19300 33 17300 38 16800 38	7200 0300 0100 8400 7800 8600 8200	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200	0.00292 <0.002 <0.002 0.00366 0.00929 <0.00929 <0.00200	0.0329 0.0353 0.0519 0.08627 0.0391 0.0205	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200	0.000511 0.000576 0.000595 0.0011 0.000163 <0.000563	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>0.00497</li> <li>0.0164</li> <li>0.00841</li> <li>0.00204</li> </ul>	0.0055 0.00493 0.00444 0.00793 0.00411 <0.00401	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>&lt;0.00325</li> <li>0.012</li> <li></li> <li></li>&lt;</ul>	3.49 3.60 0.841 1.12 2.09 1.53	<0.00015 <0.00015 <0.00015 <0.00015 <0.00015 <0.000150 <0.000150	0.124 0.124 0.118 0.107 0.0871 0.0855	0.29 0.157 0.146 0.105 0.00903 0.00903	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200	14.2         J+           1.14
ELF-10	Background	9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016 3/9/2016 4/7/2016 5/4/2016 9/8/2016 5/9/2017 8/29/2017 8/29/2017 9/15/2017	5620.57	50.64 43.09 44.21 46.50 46.09 47.82 47.35 48.73 48.05 45.41 46.80 48.10 51.74	5569.93 5577.48 5576.36 5574.07 5574.48 5572.75 5573.22 5571.84 5572.52 5575.16 5573.77 5572.47 5568.83	NS - Not           1.56           1.68           1.62           NS - Not           1.54           1.48           NS - Not           1.64           1.84           1.6	t enough wate 446 457 484 t enough wate 479 470 t enough wate t enough wate 509 500	er 6790 7530 7670 er 7720 7120 7530 er er 7150	<0.1 3.98 4.36 3.97 3.87	7.10       7.21       7.41       7.15       8.37       7.00       7.28	19900 33 20100 44 19800 44 20700 38 19300 33 17300 38 16800 38	7200 0 0300 0 0100 0 8400 0 7800 0 8600 0	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200	0.00292 <0.002 <0.002 <0.002 0.00366 0.00929 //	0.0329 0.0353 0.0519 0.08627 0.0391 0.0205 0.0601	<0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200 <0.00200	0.000511 0.000576 0.000595 0.0011 0.000563 <0.000500 <0.000500	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>&lt;0.00497</li> <li>0.0164</li> <li>0.00841</li> <li>0.00204</li> <li>0.00648</li> </ul>	0.0055 0.00493 0.00444 0.00793 0.00411 <0.00400 <0.00400	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>&lt;0.00325</li> <li>0.012</li> <li></li> <li></li>&lt;</ul>	3.49 3.60 0.841 1.12 2.09 1.53 2.20	<0.00015 <0.00015 <0.00015 <0.00015 <0.000150 <0.000150 <0.000150	0.124 0.124 0.118 0.107 0.0871 0.0855 0.0795	0.29 0.157 0.146 0.105 0.00903 0.00821 0.0105	<0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200 <0.00200	14.2         J+           1.14
ELF-10	Background	9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016 3/9/2016 4/7/2016 5/4/2016 9/8/2016 5/9/2017 8/29/2017 8/29/2017 9/15/2017 2/15/2018	5620.57	50.64 43.09 44.21 46.50 46.09 47.82 47.35 48.73 48.73 48.73 48.05 45.41 46.80 48.10 51.74 49.84	5569.93 5577.48 5576.36 5574.07 5574.48 5572.75 5573.22 5571.84 5572.52 5575.16 5573.77 5572.47 5568.83 5570.73	NS - Not           1.56           1.68           1.62           NS - Not           1.54           1.48           NS - Not           1.64           1.84           1.6	t enough wate 446 457 484 t enough wate 479 470 t enough wate t enough wate 509 500 445	er 6790 7530 7670 er 7120 7530 7530 7530 7530 7550 6960 5710	<0.1 3.98 4.36 3.97 3.87	7.10       7.21       7.41       7.15       8.37       7.00       7.28       7.23	19900 33 20100 4(1 19800 4(1 20700 38 19300 33 19300 33 11300 38 16800 38 13100 38	7200 0300 0100 8400 7800 8600 8200 9600	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200 <0.00200	0.00292 <0.002 <0.002 0.00366 0.00929 //>	0.0329 0.0353 0.0519 0.08627 0.08627 0.0391 0.0205 0.0601 0.0679	<0.002 <0.002	0.000511 0.000576 0.000595 0.0011 0.0011 0.000563 <0.000500 <0.000500 <0.000500	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>&lt;0.00497</li> <li>0.0164</li> <li>0.00841</li> <li>0.00204</li> <li>0.00648</li> <li>0.00518</li> </ul>	0.0055 0.00493 0.00493 0.00444 0.00793 0.00401 <0.00400 <0.00400 0.00429	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>&lt;0.00325</li> <li>0.012</li> <li></li> <li<< li=""> <li></li> <li></li> <li<< li=""> <li></li></li<<></li<<></ul>	3.49 3.60 0.841 1.12 2.09 1.53 2.20 1.88	<0.00015 <0.00015 <0.00015 <0.00015 <0.000150 <0.000150 <0.000150 <0.000150	0.124 0.124 0.118 0.107 0.0871 0.0855 0.0795 0.0618	0.29 0.157 0.146 0.105 0.00903 0.00821 0.0105 <0.00200	<0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200 <0.00200 <0.00200	14.2         J+           1.14
ELF-10	Background	9/18/2015 11/10/2015 12/1/2015 1/12/2016 2/2/2016 3/9/2016 4/7/2016 5/4/2016 9/8/2016 5/9/2017 8/29/2017 8/29/2017 9/15/2017	5620.57	50.64 43.09 44.21 46.50 46.09 47.82 47.35 48.73 48.05 45.41 46.80 48.10 51.74	5569.93 5577.48 5576.36 5574.07 5574.48 5572.75 5573.22 5571.84 5572.52 5575.16 5573.77 5572.47 5568.83	NS - Not           1.56           1.68           1.62           NS - Not           1.54           1.48           NS - Not           1.64           1.84           1.6	t enough wate 446 457 484 t enough wate 479 470 t enough wate t enough wate 509 500 445	er 6790 7530 7670 er 7120 7530 er 7120 7530 er 7120 7530 6960	<0.1 3.98 4.36 3.97 3.87	7.10       7.21       7.41       7.15       8.37       7.00       7.28       7.23	19900         33           20100         40           19800         40           20700         33           19300         33           19300         33           17300         33           16800         33           13100         35           10000         35	7200 0300 0100 8400 7800 8600 8200	<0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200	0.00292 <0.002 <0.002 <0.002 0.00366 0.00929 //	0.0329 0.0353 0.0519 0.08627 0.0391 0.0205 0.0601	<0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200 <0.00200	0.000511 0.000576 0.000595 0.0011 0.000563 <0.000500 <0.000500	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>&lt;0.00497</li> <li>0.0164</li> <li>0.00841</li> <li>0.00204</li> <li>0.00648</li> </ul>	0.0055 0.00493 0.00444 0.00793 0.00411 <0.00400 <0.00400	<ul> <li>&lt;0.002</li> <li>&lt;0.002</li> <li>&lt;0.00325</li> <li>0.012</li> <li></li> <li></li>&lt;</ul>	3.49 3.60 0.841 1.12 2.09 1.53 2.20 1.88 2.17 J-	<0.00015 <0.00015 <0.00015 <0.00015 <0.000150 <0.000150 <0.000150 <0.000150	0.124 0.124 0.118 0.107 0.0871 0.0855 0.0795	0.29 0.157 0.146 0.105 0.00903 0.00821 0.0105	<0.002 <0.002 <0.002 <0.002 <0.002 <0.00200 <0.00200 <0.00200	14.2         J+           1.14

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

									Appendix	III									Appe	ndix IV						
SAMPLE ID	WELL TYPE	COLLECTION DATE	TOC AMSL (ft)	DTW (ft)	GWE AMSL (ft)	В	Ca	CI	F	рН	SO4	TDS	Sb	As	Ва	Ве	Cd	Cr	Co	Pb	Li	Hg	Мо	Se	ті	Radium 226+228
		0/10/2015	F C 0 4 70	24.27	FF70.44				Q mg/L C	l 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 mg/L	Q pCi/L Q
		9/18/2015 11/10/2015	5604.78	34.37 NM	5570.41 NM		enough wa enough wa																			
		12/1/2015		34.40	5570.38		enough wa																			
		1/12/2016		34.30	5570.48		enough wa																			
		2/2/2016		34.25	5570.53	NS - Not e	enough wa	iter																		
		3/9/2016		NM	NM		enough wa																			
		4/7/2016		34.30	5570.48		enough wa																			
ELF-3	Downgradient	5/4/2016		NM 24.02	NM		enough wa enough wa																			
		9/8/2016 5/9/2017		34.02 33.43	5570.76 5571.35		enough wa																			
		8/2/2017		33.32	5571.46		492		<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		005	.01200		00000		< 0.00200	<0.00200	0.0118	<0.00200	<0.000500	<0.00200	< 0.00400	<0.00200		< 0.000150	0.0335	0.125	<0.00200	2.22
		5/30/2018		34.80	5569.98	NS - Not e	enough wa	iter							1		1 1	<u> </u>				<u> </u>	<u> </u>	<u> </u>	<u> </u>	
		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		<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		0.617	<0.00200	3.04
		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	+ <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 2/2/2016		15.22 15.25	5566.28 5566.25	5.02 5.19	514 495	2500 2170	3.93 4.25	7.52	5900 5410	12400 11500	<0.002	<0.002	0.0155	<0.002	<0.0005 <0.0005	<0.002 <0.002	<0.004	<0.002 <0.002	4.43 4.39	<0.00015 <0.00015	0.00297 0.00252	0.00471 0.00352	<0.002 <0.002	1.39 3.6
		3/9/2016		15.36	5566.14	4.96	496	2240	4.06	7.03	5290	11200	<0.002	<0.002	0.0113	<0.002	<0.0005	<0.002	0.00729	<0.002	2.37	<0.00015	0.00308	0.00352	<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
ELF-4	Downgradient	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 e	enough wa						- <b>I I</b>	- I - I		- I - I			- <u>+</u> +							
		5/9/2017		16.05	5565.45	NS - Not e	enough wa	iter																		
		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		<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		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 J+ 1840	0.187	7.06	4800	11800	<0.00400	<0.00200	0.0118	<0.00200	<0.000500	<0.00200	0.00593	<0.00200		<0.0000900	0.00272	<0.00200	<0.00200	1.72
		8/20/2019 9/18/2015	5577.79	16.88 16.61	5564.62 5561.18	4.98 5.44	464	4250	0.941	7.22	4890 11200	12200 21000	<0.00400 <0.001	<0.00200 <0.001	0.0103 <0.05	<0.00200 <0.001	<0.000500 <0.001	<0.00200 0.004	0.00637	<0.00200 <0.001	1.71 3.70	<0.000900 UJ <0.0001	0.0024	<0.00200	<0.00200	2.73
		11/10/2015	5577.75	16.20	5561.59	5.89	404	4110	<0.1	6.98	11200	22600	<0.001	<0.001	0.0131	<0.001	<0.001	<0.004	<0.003	<0.001	13.7	<0.0001	0.002	0.0453	<0.0003	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
ELF-5	Downgradient	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		enough wa																			
		8/2/2017 2/15/2018	<u> </u>	NM 18.00	NM 5559.79	NS - NOT e	enough wa	iter					<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	5559.79	7.61	459	J- 4420	0.104	7.04	11100	27800	<0.00200	<0.00200	0.0103	<0.00200	<0.000500	<0.00200	0.00400	<0.00200		<0.000150 J-		0.0181	<0.00200	2.37
		5/8/2019	1	18.58	5559.21	6.06	489	3180	0.104	7.09	8640	21600	<0.00100	<0.00200	0.0138	<0.00200	<0.000500	<0.00200	0.0102	<0.00200		<0.000130 J	0.00486	0.00913	<0.00200	2.85
		8/20/2019		18.69	5559.10	8.7		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		0.0127	<0.00200	2.77
		9/18/2015	5579.61	15.97	5563.64	14.3	531	5650	0.6	7.20	9470	22100	<0.001	<0.002	<0.05	<0.001	<0.001	0.001	J+ 0.027	< 0.001	5.80	<0.0001	<0.001	0.284	< 0.0005	4.7
		11/10/2015		16.02	5563.59	16.0	518	4670	<0.10	6.78	9130	19500	<0.002	<0.002	0.0102	<0.002	<0.0005	<0.002	0.0226	<0.002	18.7	<0.00015	<0.002	0.0797	<0.002	1.4
		12/1/2015		16.09	5563.52	14.4	454	4850	4.03	7.03	10300	19500	<0.002	<0.002	0.00936	<0.002	<0.0005	<0.002	0.0208	<0.002	14.6	<0.00015	<0.002	0.0887	<0.002	33.62 J+
		1/12/2016		16.20	5563.41	14.6	505	NA	NA	NA	NA	NA	<0.002	<0.002	0.0105	<0.002	<0.0005	<0.002	0.0208	<0.002	15.1	<0.00015	<0.002	0.0892	<0.002	1.68
		2/2/2016		16.29	5563.32	13.6	493	4060	5.13	6.94	8800	20100	< 0.002	< 0.002	0.00932	< 0.002	< 0.0005	< 0.002	0.0191	< 0.002	14.2	<0.00015	<0.002	0.0828	< 0.002	2.26
		3/9/2016		16.26	5563.35	15.7	500	1190	5.07	6.90	930	20800	<0.002	< 0.002	0.0109	< 0.002	< 0.0005	< 0.002	0.0206	< 0.002	7.20	<0.00015	<0.002	0.0959	<0.002	2.7
ELF-6	Downgradient	4/6/2016		16.30	5563.31	13.3	491	4890	4.87	7.04	9910 8400	20200	< 0.002	<0.002	0.00885	<0.002	<0.0005	<0.002	0.0178	<0.002	1.63	<0.00015	<0.002	0.0951	<0.002	1.93 1.53
ELF-0	Downgraulent	5/4/2016 9/8/2016	<u> </u>	16.12 NM	5563.49 NM		491 enough wa	4630	<0.1	7.40	8400	19600	<0.002	<0.002	0.0115	<0.002	<0.0005	<0.002	0.0186	<0.002	7.92	<0.00015	<0.002	0.0917	<0.002	1.53
		5/9/2017		16.52	5563.09		enough wa																			
		8/2/2017	1	NM	NM		enough wa																			
		2/15/2018		16.30	5563.31	NA	<b>J</b>						<0.00200	<0.00200	0.00994	<0.00200	<0.000500	<0.00200	0.0147	<0.00200	5.5	<0.000150	0.0024	0.0924	<0.00200	1.76
		5/30/2018		17.87	5561.74	NS - Not e	enough wa	iter							· · · · · · · · · · · · · · · · · · ·		· · ·	· · ·				· · ·	• • • • •	• • • • • • • • • • • • • • • • • • •		<u> </u>
		5/50/2010																								
		5/8/2019		17.62	5561.99	12.4	539	3810	0.139	7.06	7840	23700	< 0.00400	<0.00200	0.0159	<0.00200	<0.000500	< 0.00200	0.0358	< 0.00200	5.56 J+	<0.0000900	< 0.00200	0.00795	<0.00200	5.23

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

									Appendix	: 111							_		Appen	lix IV						
SAMPLE ID	WELL TYPE	COLLECTION DATE	TOC AMSL (ft)	DTW (ft)	GWE AMSL (ft)	В	Ca	сі	F	рН	SO₄	TDS	Sb	As	Ва	Ве	Cd	Cr	Co	Pb	Li	Hg	Мо	Se	т	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 (	) mg/L	Q pCi/L Q
		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	< 0.001	<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		2910	4.36	7.11		14900	<0.002	<0.002	0.0126		<0.0005	<0.002	0.00604	<0.002	5.67		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		<0.0005	<0.002	0.00428	<0.002	5.35		0.00212	0.373	<0.002	3.84
		3/9/2016		13.77	5566.04	1.79		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		0.00295	0.383	<0.002	2.9
		4/6/2016		13.76	5566.05	1.70		2850	3.19	6.94	9580	16500	< 0.002	< 0.002	0.00925		0.000502	< 0.002	0.00447	<0.002	2.64		0.00226	0.421	< 0.002	1.39
ELF-7	Downgradient	5/4/2016		13.87	5565.94	1.58	445	2650	<0.1	7.16	8680	16900	<0.002	< 0.002	0.00983		< 0.0005	<0.002	0.00483	<0.002	0.639		0.00209	0.36	<0.002	1.64
		9/8/2016 5/9/2017		14.12 16.27	5565.69 5563.54	1.84	458 t enough water	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
		8/2/2017		16.27	5565.44	1.72		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		14.37	5565.10	1.72 NA	470	2460	<0.100	7.15	8080	17800	<0.00200	<0.00200	0.0124	<0.00200	<0.000500	<0.00200	0.00613	<0.00200	2.12		0.00234	0.233	<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		0.00249	0.136	<0.00200	1.63
		5/8/2019		14.86	5564.95	1.86	471	2710	0.132	7.03	8260	17200	<0.00100	<0.00200	0.00947	<0.00200	<0.000500	<0.00200	0.0053	<0.00200		+ <0.0000900	0.00245	0.0662	<0.00200	2.26
		8/20/2019		15.22	5564.59	2.24	459 J+		3.88	7.19	9480	19500	< 0.00400	<0.00200	0.0119	<0.00200	<0.000500	<0.00200	<0.00400	<0.00200	2.23		0.00272	0.0819	<0.00200	2.22
		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
ELF-8	Downgradient	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		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		0.00294	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		11	1 1	1 1		1 I	<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-		0.975	7.47	2820	7920	<0.00100	<0.00200	0.0114		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		9400	<0.00400	< 0.00200	0.011	<0.00200	0.00195	<0.00200	0.201	0.00643		+ <0.0000900	0.399	<0.00200	<0.00200	2.25
		8/20/2019	5507.22	9.17	5575.33	30.2			<0.100	7.41		8,240	< 0.00400	< 0.00200	0.0124		0.00174	<0.00200	0.19	0.00762	3.42 3.20	<0.0000900 UJ		< 0.00200	<0.00200	2.15
		9/18/2015 11/10/2015	5597.32	28.03 28.09	5569.29 5569.23	14.4 16.3		1230 1180	0.50 <0.1	7.50		14300 15200	<0.001 <0.002	<0.001 <0.002	<0.05 0.0203	<0.001 <0.002	<0.001 <0.0005	<0.001 <0.002	0.017	<0.001 <0.002	10.2	<0.0001 <0.00015	0.016	0.007	<0.0005 <0.002	1.2
		12/1/2015		28.09	5568.87	17.0		1290	<0.1	7.40	10900	17600	<0.002	<0.002	0.0203		<0.0005	<0.002	0.0153	<0.002	8.58	<0.00015	0.0233	0.00753	<0.002	31.52 J+
		1/12/2016		28.43	5568.90		t enough water		<b>\U.1</b>	7.55	10300	17000	<0.002	<b>N0.002</b>	0.0189	<0.002	<0.0003	<0.002	0.0155	<0.002	8.58	<0.00015	0.021	0.00733	<b>&lt;0.002</b>	31.32 J+
		2/2/2016		28.38	5568.94	16.3		952	<0.100	7.24	7910	15600	<0.002	<0.002	0.0139	<0.002	<0.0005	<0.002	0.0143	<0.002	8.49	<0.00015	0.0174	0.00739	<0.002	2.12
		3/9/2016		28.46	5568.86	18.1	413	4290	<0.100	7.32	9020	15700	< 0.002	<0.002	0.0224		< 0.0005	<0.002	0.0131	<0.002	4.33	<0.00015	0.0241	0.00545	<0.002	3.23
		4/6/2016		28.41	5568.91	15.2		1230	<0.1	7.28	11100	15800	< 0.002	< 0.002	0.0191	< 0.002	< 0.0005	< 0.002	0.0147	< 0.002	3.29	<0.00015	0.0214	0.007	< 0.002	1.24
ELF-11	Downgradient	5/4/2016		28.31	5569.01	14.9	399	1170	<0.1	8.01	10000	15700	< 0.002	<0.002	0.0245	<0.002	<0.0005	<0.002	0.014	<0.002	4.31	<0.00015	0.0205	0.00666	< 0.002	2.78
		9/8/2016		28.20	5569.12	17.3	434	1180	<0.1	7.24	10000	16200	< 0.002	<0.002	0.0163	<0.002	< 0.0005	<0.002	0.0126	<0.002	6.44	<0.00015	0.0201	0.00885	<0.002	0.95
		5/9/2017		28.13	5569.19	NS - No	t enough water	-					•													
		8/2/2017		28.36	5568.96	NS - No	t enough wate	-																		
		2/15/2018		28.20	5569.12	NA							< 0.00200	< 0.00200	0.0193	<0.00200	< 0.000500	< 0.00200	0.0154	< 0.00200	3.43	<0.000150	0.022	0.0556	< 0.00200	2.03
		5/30/2018		28.19	5569.13	18.8	406 J-	993	0.136	7.23	8780	16700	< 0.00100	<0.00200	0.0168	<0.00200	< 0.000500	<0.00200	0.0202	<0.00200	3.99 J	- <0.000150 J-	0.0201	0.0727	<0.00200	1.83
		5/8/2019		28.10	5569.22	17.8	436	1100	0.173	7.23	9980	16800	< 0.00400	<0.00200	0.0142	<0.00200	< 0.000500	< 0.00200	0.0146	< 0.00200	3.49 J	+ <0.0000900	0.0183	0.0649	<0.00200	1.88
		8/20/2019		28.31	5569.01	17.8			<0.100	8.02	9910	17000	< 0.00400	<0.00200	0.0151	<0.00200	<0.000500	<0.00200	0.0151	<0.00200	3.36	<0.0000900 UJ	0.0186	0.0627	<0.00200	2.48
		11/2/2018	5569.99	19.35	5550.64		J+ 225 J-		0.26	7.65	11400	21700	<0.00400	<0.00200	0.0207	<0.00200	<0.000500	<0.00200	<0.00400	<0.00200	0.82		<0.00200	<0.00200	<0.00200	4.8
ELF-12	Downgradient	5/8/2019		19.59	5550.40	1.68		500	0.34	7.55		20100	<0.00400	<0.00200	0.0192	<0.00200	<0.000500	<0.00200	<0.00400	<0.00200			<0.00200	<0.00200	<0.00200	2.25
		8/20/2019		NM		1.68	169 J+		<0.100	7.73	11400	19900	<0.00400	<0.00200	0.0165		<0.000500	<0.00200	<0.00400	<0.00200	0.792		<0.00200	<0.00200	<0.00200	2.83
		11/2/2018	5559.43	3.82	5555.61		J+ 471 J-		<0.100	7.24		17900	<0.00400	<0.00200	0.0573		<0.000500	<0.00200	0.00471	< 0.00200	1.72		<0.00200	<0.00200	<0.00200	2.26
ELF-13	Downgradient	5/8/2019		3.10	5556.33	0.703		2730	<0.100	7.03		16700	< 0.00400	<0.00200	0.0111		<0.000500	<0.00200	<0.00400	<0.00200			<0.00200	<0.00200	<0.00200	1.58
		8/20/2019	55.00.01	NM		0.732			0.798	7.25		17300	< 0.00400	<0.00200	0.011	<0.00200	<0.000500	<0.00200	0.00407	< 0.00200	1.86	<0.0000900 UJ		< 0.00200	< 0.00200	2.07
<b>FIE</b> 44	December 1	11/2/2018	5560.91	6.30	5554.61		J+ 532 J-		0.173	7.56		20500	<0.00400	<0.00200	0.0464		< 0.000500	<0.00200	0.0131	<0.00200	4.01		< 0.00520	0.00401	<0.00200	1.6
ELF-14	Downgradient	5/8/2019		6.07	5554.84	2.4		5070	<0.100	7.13		19700	< 0.00400	< 0.00200	0.0327	<0.00200	< 0.000500	0.00888	0.00976	0.00241			0.00387	0.00512	<0.00200	2.58
		8/20/2019		NM		3.09	496 J+	3640	0.589	7.49	7280	19800	< 0.00400	<0.00200	0.0137	<0.00200	<0.000500	<0.00200	0.00912	<0.00200	4.58	<0.0000900 UJ	0.00431	0.00664	< 0.00200	2.69

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



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 2a. Summary of Groundwater	Quality Comparisons – May 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**

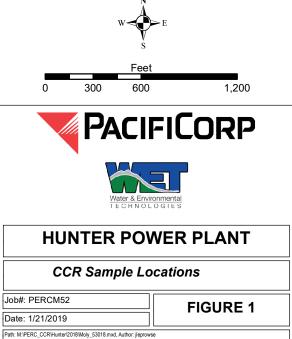
- EPA 2017. National Functional Guidelines for Inorganic Superfund Methods Data Review, EPA-540-R-201 7-001, January 2017.
- EPA 2010. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater from Monitoring Wells, EPASOP-GW 001, January 2010.
- EPA 1989. Risk Assessment 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**









## 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
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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:

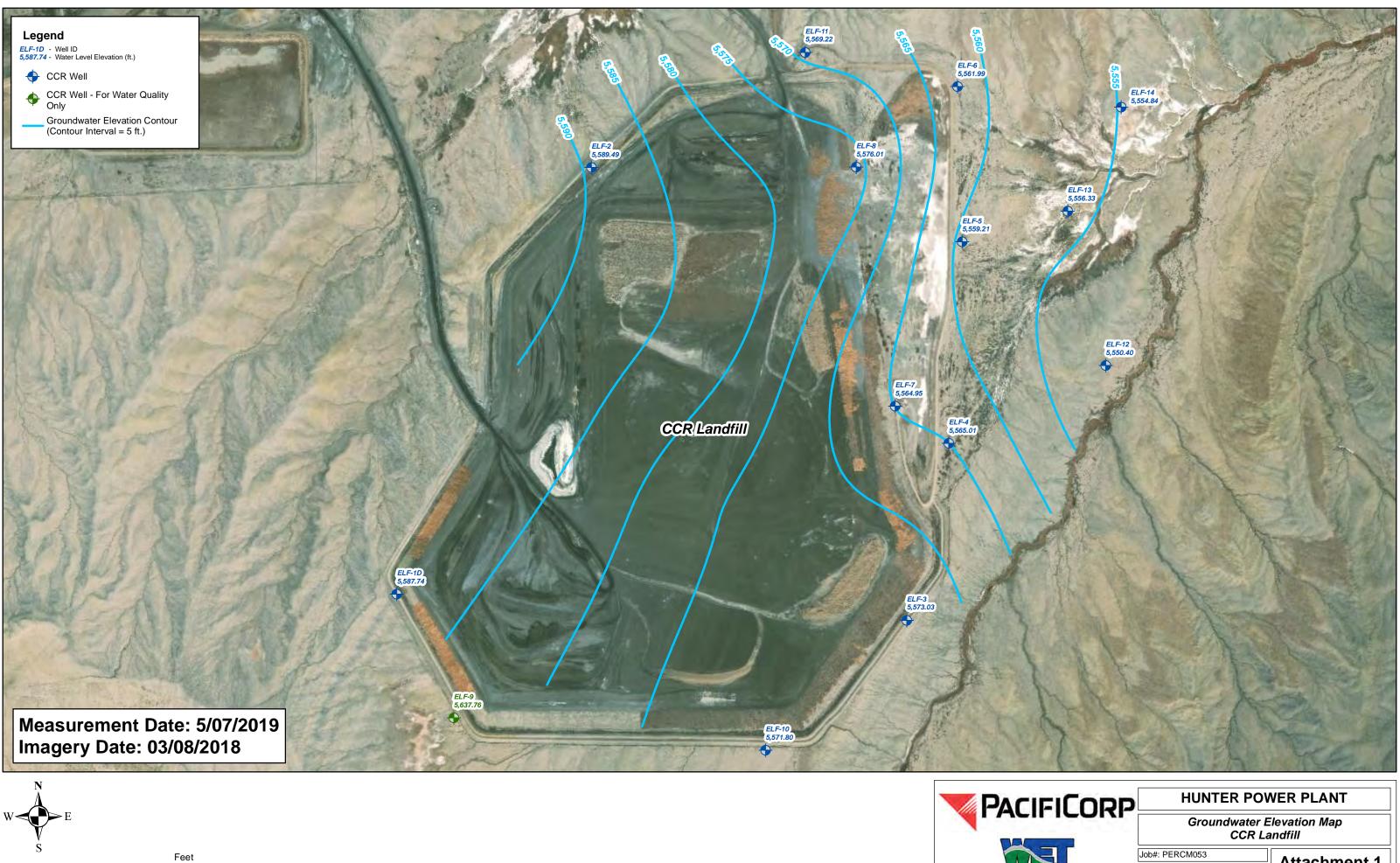
- Attachment A: Groundwater Contour Map
- Attachment B: Data Validation Summary
- Attachment C: Statistical Analysis
- Attachment D: Field Data Sheets
- Attachment E: Laboratory Analytical Reports

#### SAP DEVIATIONS. None.



#### Attachment A:

Groundwater Contour Map



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

Job#: PERCM053 Date: 8/12/2019

Water & Environmental TECHNOLOG ES

Attachment 1

Path: M:\PERC\_CCR\2019\_CCR\_Sampling\2019\_CCR\_GW\_Contour Maps.mxd, Author: brutherford



#### Attachment B:

Data Validation Summary

Facility Name:	Hunter 05/09/2	019 Landfill					
Validator:		Tim Driscoll 06/13/2019					
Reviewer:	Pat Seccomb 0						
Laboratory:		t Analytical Laboratories					
Laboratory Work Order#:	1905216						
Sample Media:	Groundwater						
Analytical Parameters:	Appendix III:	B, Ca, Cl, <sup>1</sup> F, pH, S0 <sub>4</sub> , TDS					
Review Element:	Complete /         Criteria         Met?         (Yes/No)						
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:							

Lithium was qualified J+ in the following samples due to a high matrix spike recovery:

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.

No other qualifications were assigned.

Facility Name:	Hunter Landfil	1 5/18/2019				
Validator:	Marcus Hollan	Marcus Holland 7/11/2019				
Reviewer:	Pat Seccomb 7	-16-19				
Laboratory:	American Wes	t Analytical Laboratories				
Laboratory Work Order#:	1905216					
Sample Media:	Groundwater					
Analytical Parameters:	Appendix IV: Ra <sup>226</sup>					
Review Element:	Complete /         Criteria         Met?         (Yes/No)					
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.						

Facility Name:	ne: Hunter Landfill 5/18/2019					
Validator:	Marcus Hollan	Marcus Holland 7/11/2019				
Reviewer:	Pat Seccomb 0	7-16-19				
Laboratory:	American Wes	t Analytical Laboratories				
Laboratory Work Order#:	1905216					
Sample Media:	Groundwater					
Analytical Parameters:	Appendix IV: Ra <sup>228</sup>					
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:	Overall Assessment:					
No qualifications were required.						

Facility Name:	Hunter 05/09/2019 Landfill						
Validator:	Tim Driscoll 0	6/13/2019					
Reviewer:	Pat Seccomb 0	6-28-19					
Laboratory:	American Wes	t Analytical Laboratories					
Laboratory Work Order#:	1905215						
Sample Media:	Groundwater						
Analytical Parameters:	Appendix III:	B, Ca, Cl, <sup>1</sup> F, pH, S0 <sub>4</sub> , TDS					
Review Element:	Complete /         Criteria         Met?         (Yes/No)						
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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- Table C.4A. Appendix III, comparison of downgradient wells to background.
- Table C.4B. Appendix IV, comparison of downgradient wells to background.

#### 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):

$$\overline{x} = \frac{\sum_{i=1}^{n} x_i}{n} \tag{1}$$

Where:

 $\overline{x}$  = 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):

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

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

Where:

s = standard deviation

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

#### 2.1.4 Quartiles and the Five Number Summary

The five-number summary is a set of five numbers that are used to assess the spread of the data. It consists of the minimum value, first quartile, median, third quartile, and maximum of the data value. The first quartile is the 25<sup>th</sup> percentile of the data, the median is the 50<sup>th</sup> percentile of the data, and the third quartile is the 75<sup>th</sup> percentile of the data. The 25<sup>th</sup> percentile of the data is the

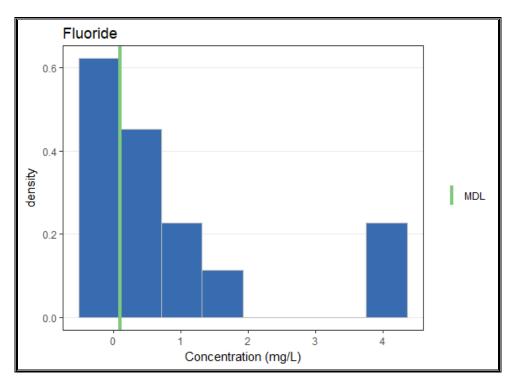
number such that 25% of the data are less than that number and 75% of the data are above the 25<sup>th</sup> percentile. The median and third quartiles are found in a similar manner.

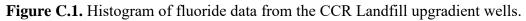
## 2.2 Visual Tools

It is difficult to review numerical summary statistics and identify the degree of symmetry or normality of data without the aid of visual tools. In completing the statistical analysis for the CCR Landfill, histograms and normal-quantile plots were developed for each of the analytes with at least on detectable observation. All graphs were developed using the R Statistical Package (R Core Team 2018).

## 2.2.1 Histograms

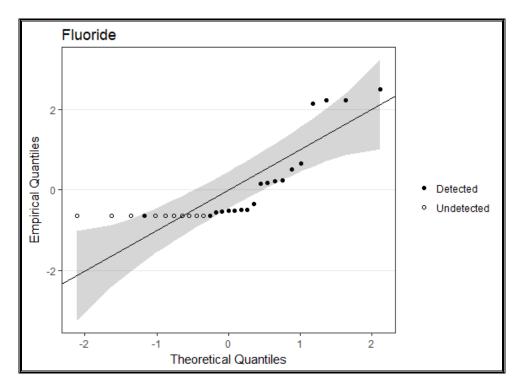
Histograms display the distribution and symmetry of the data. The data are displayed in such a way, that deviations from a normal (i.e., bell shaped) distribution can easily be observed. Outliers are also often identifiable in a histogram. Histograms for the upgradient wells were generated using both 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.

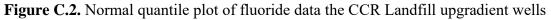




#### 2.2.2 Normal-Quantile Plots

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.





#### 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 nondetects, 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.

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

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 (%)
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%
pН	ELF-10	10	10	7.18	7.26	0.42	6%
pН	ELF-1D	1	1	NA	NA	NA	NA
pН	ELF-2	12	12	7.22	7.27	0.17	2%
pН	ELF-9	10	10	7.94	7.93	0.10	1%
pН	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.

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

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)
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
pН	ELF-10	6.88	7.00	7.18	7.28	8.37
pН	ELF-1D	7.02	7.02	7.02	7.02	7.02
pН	ELF-2	7.12	7.17	7.22	7.30	7.76
pН	ELF-9	7.75	7.86	7.94	8.03	8.06
pН	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 UPGRADIENT AND DOWNGRADIENT WELL COMPARISON

Groundwater quality was assessed using upper tolerance limits (UTLs) and the Maximum Contaminant Levels (MCL) for each of the Appendix III and IV analytes. The data measured from the upgradient/background wells, was used to compute a UTL, which serves as the background value. The larger of the UTL and MCL was used as the groundwater protection limit (GWPL). Data obtained from the downgradient wells were compared point-by-point to the GWPLs to determine if the site complies with the *Final Rule*. The software package Sanitas<sup>©</sup> 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:

- $\overline{X}$  = the average of the background data
- $\kappa$  = multiplier from EPA Unified Guidance, March 2009
- S = standard deviation of the background data

#### 3.1.1 Normal Distribution

Histograms and 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.

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
pН	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

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

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 nondetects, 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.

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.4A. Appendix III, 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

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

# 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**

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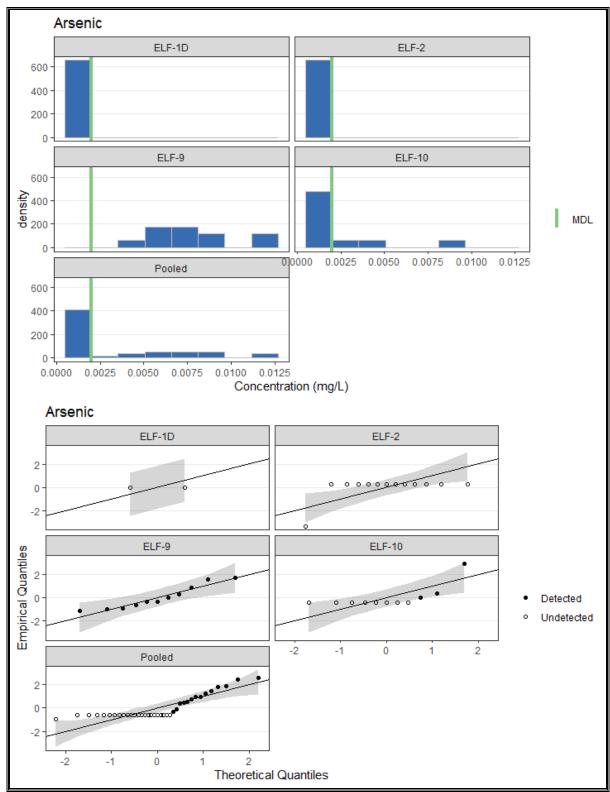


Figure C.3. Summary statistics plots for the CCR Landfill.

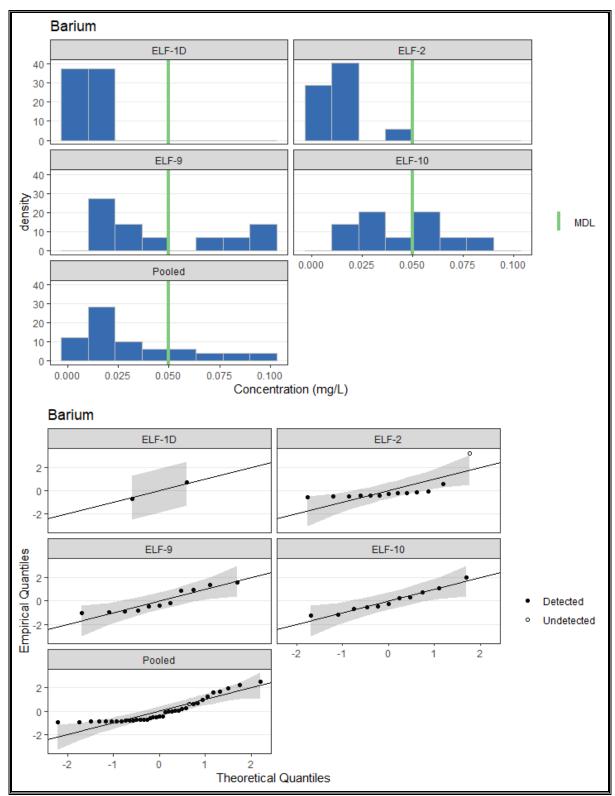


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

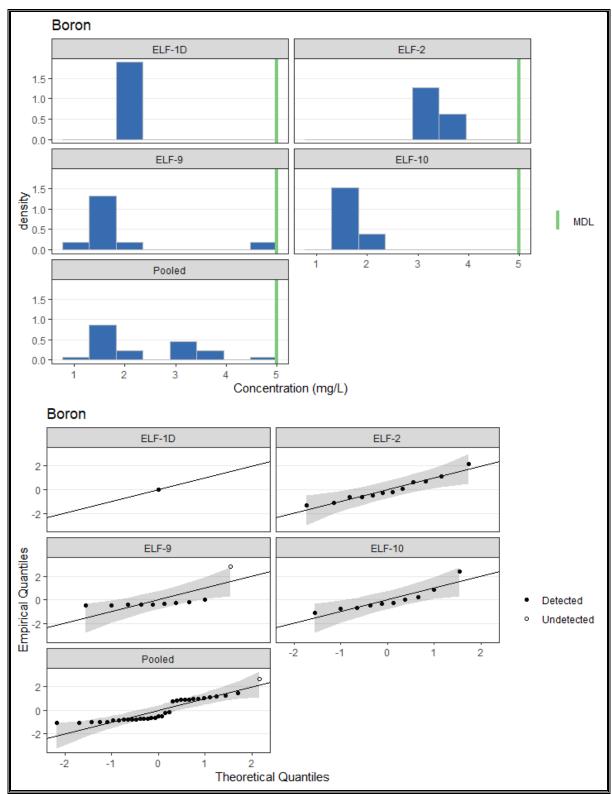


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

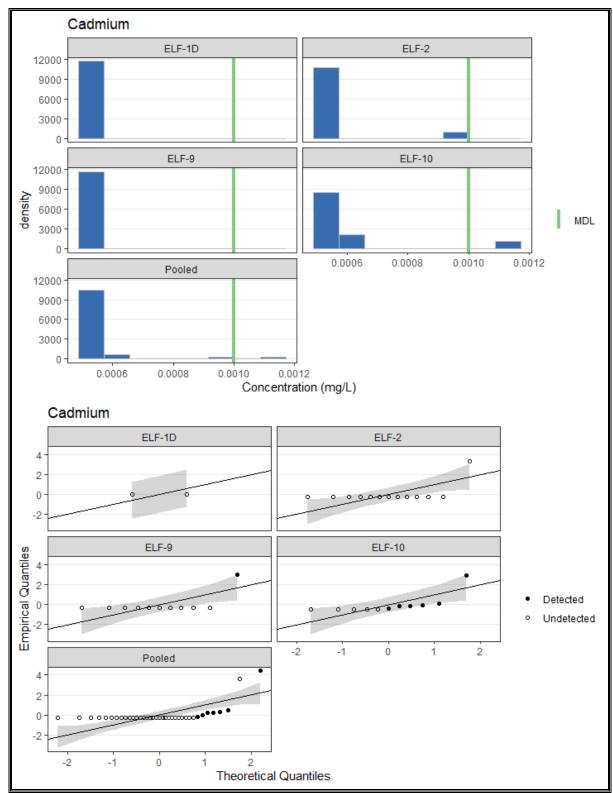


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

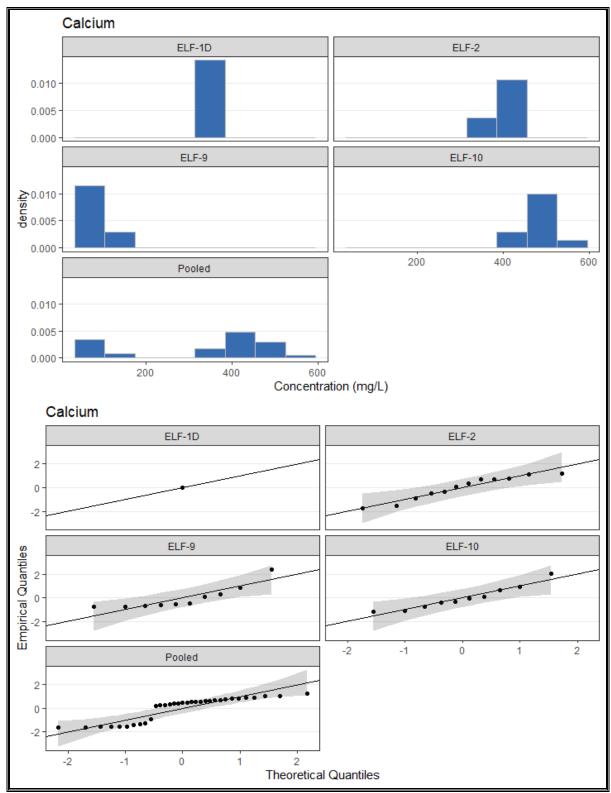


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

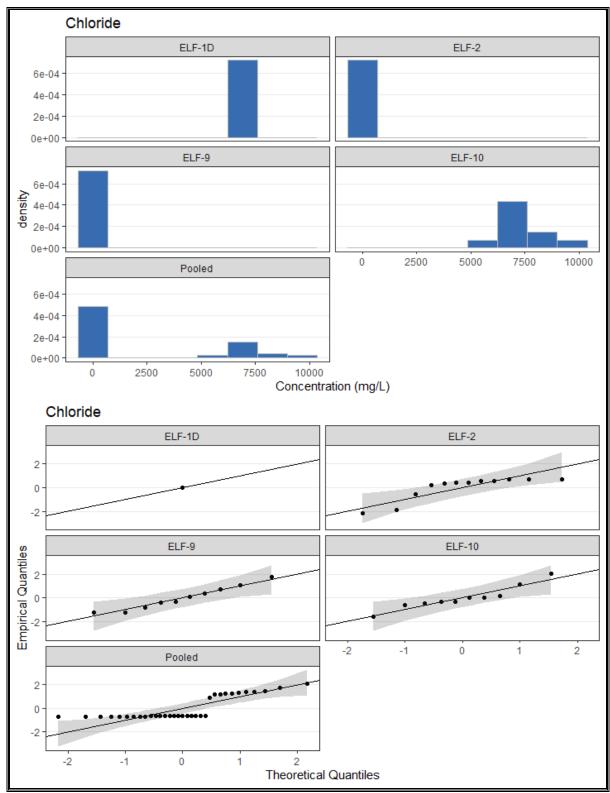


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

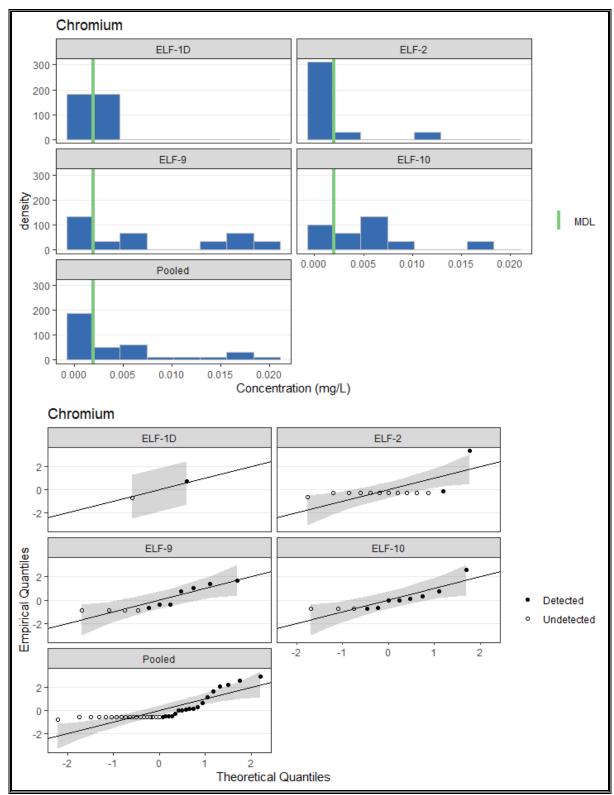


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

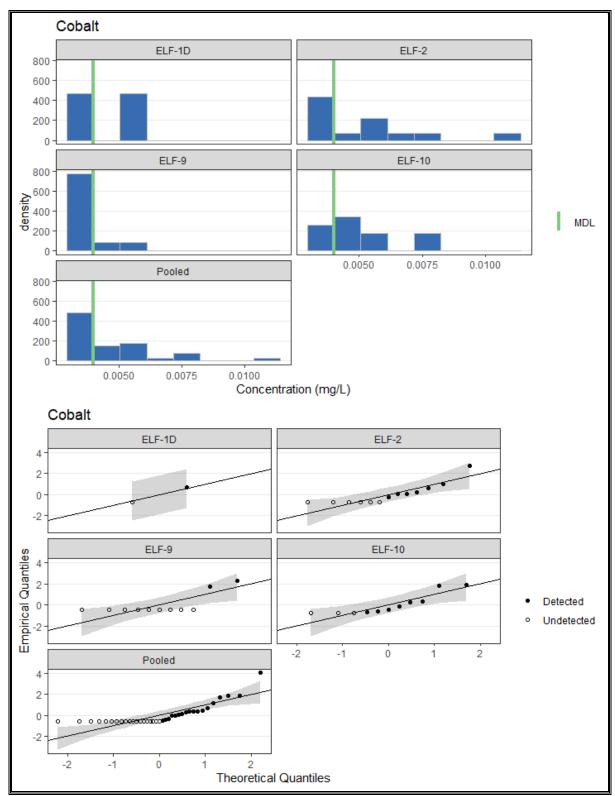


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

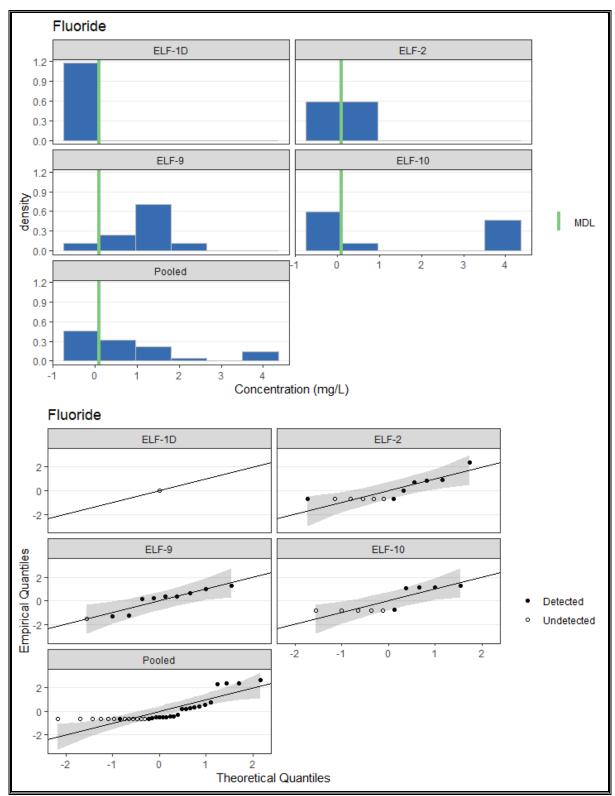


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

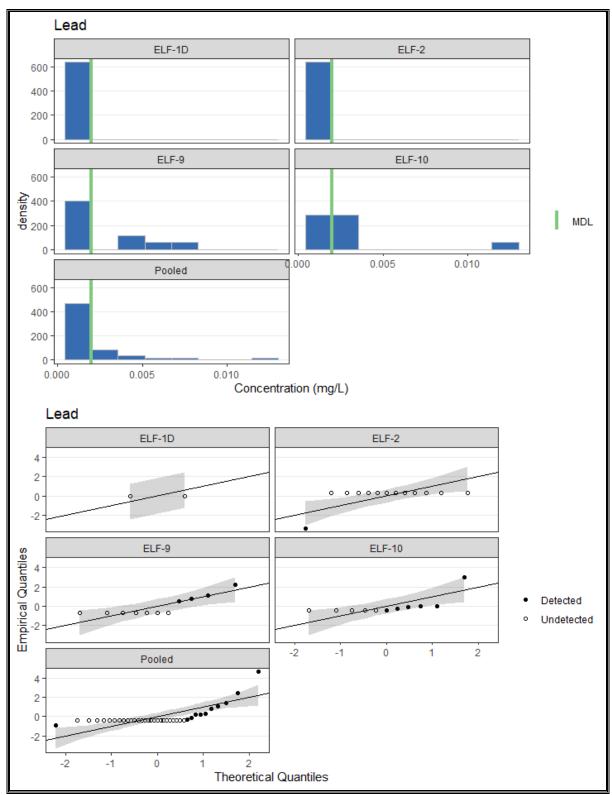


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

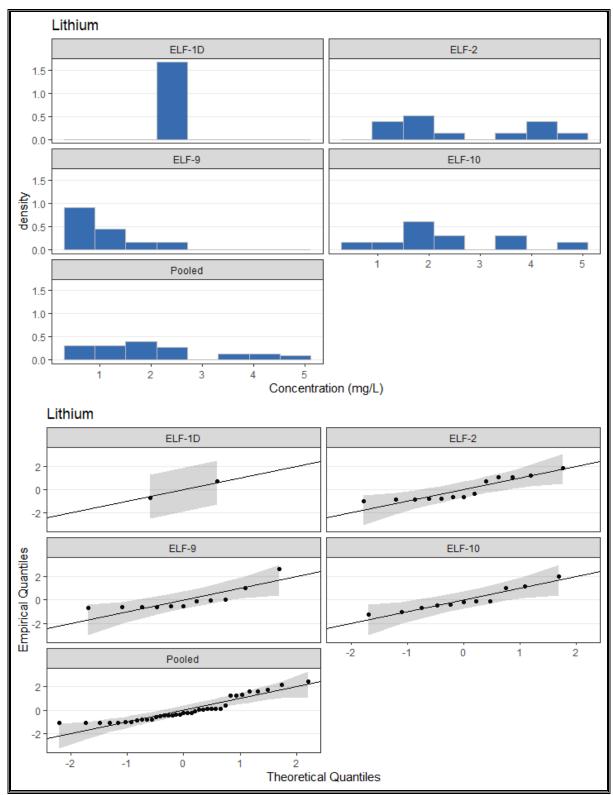


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

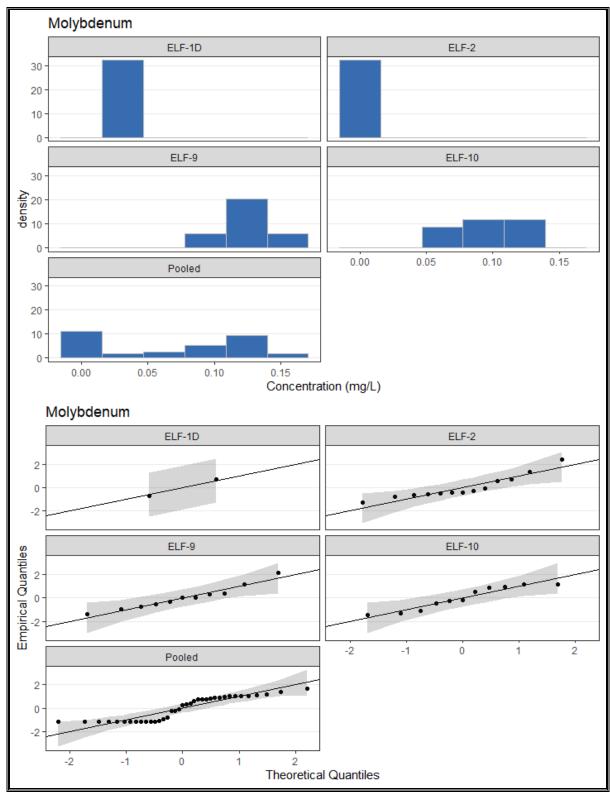


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

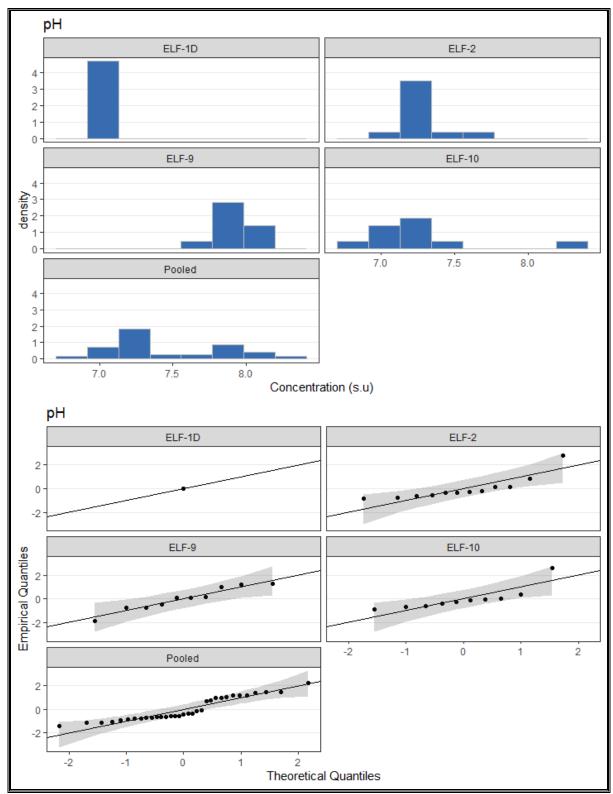


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

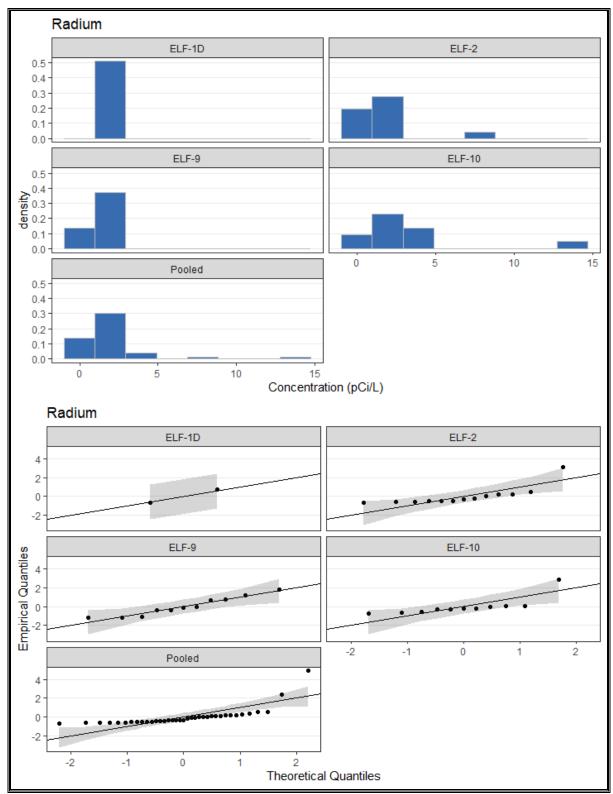


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

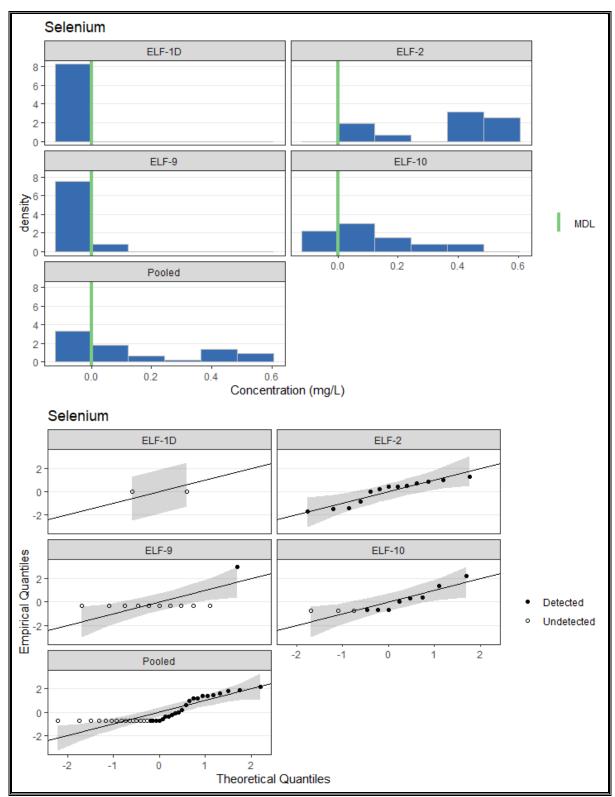


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

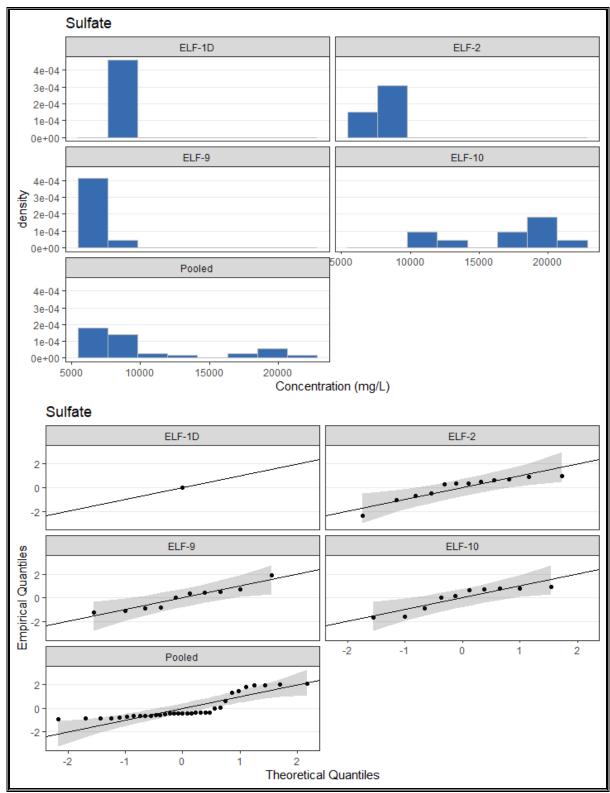


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

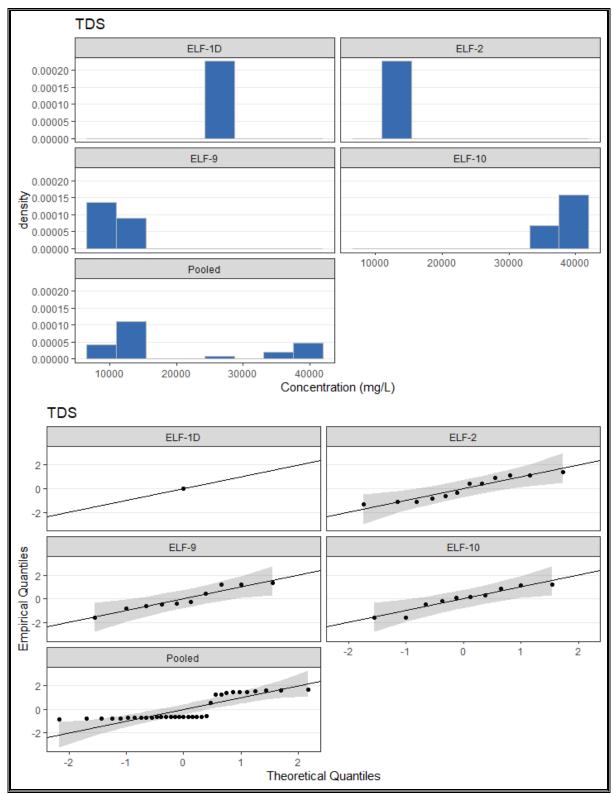


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

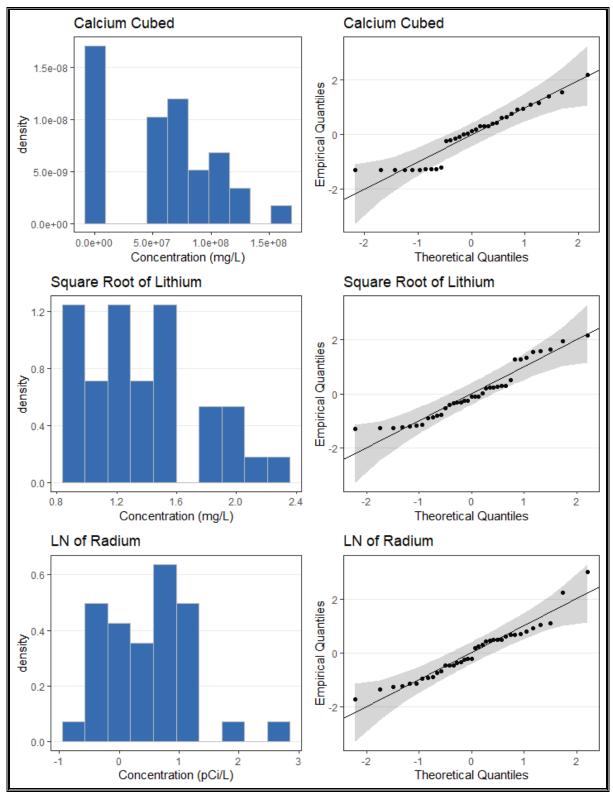


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

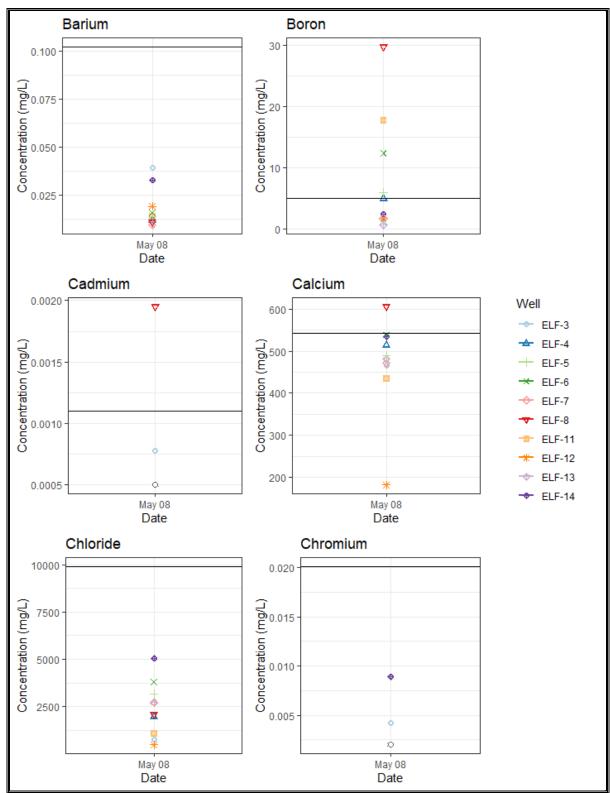


Figure C.4. Upper tolerance limit plots for the CCR Landfill.

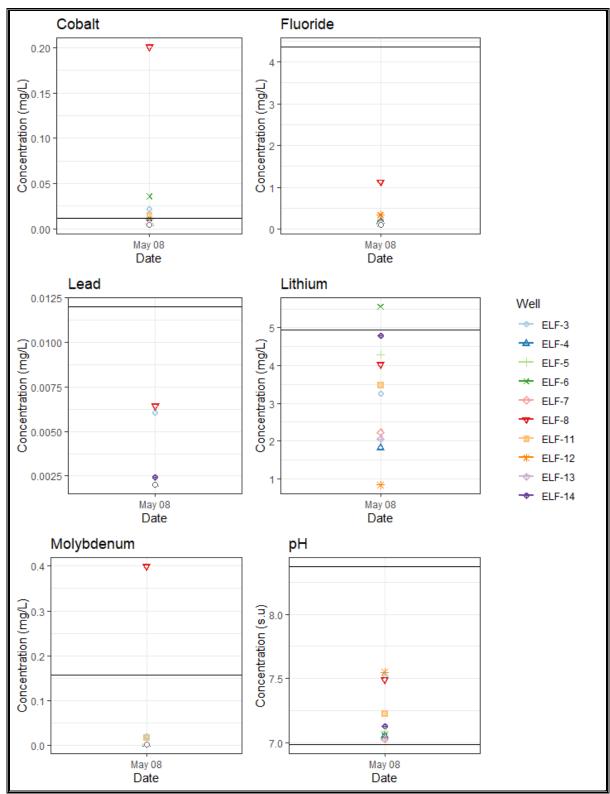


Figure C.4 (cont). Upper tolerance limit plots for the CCR Landfill.

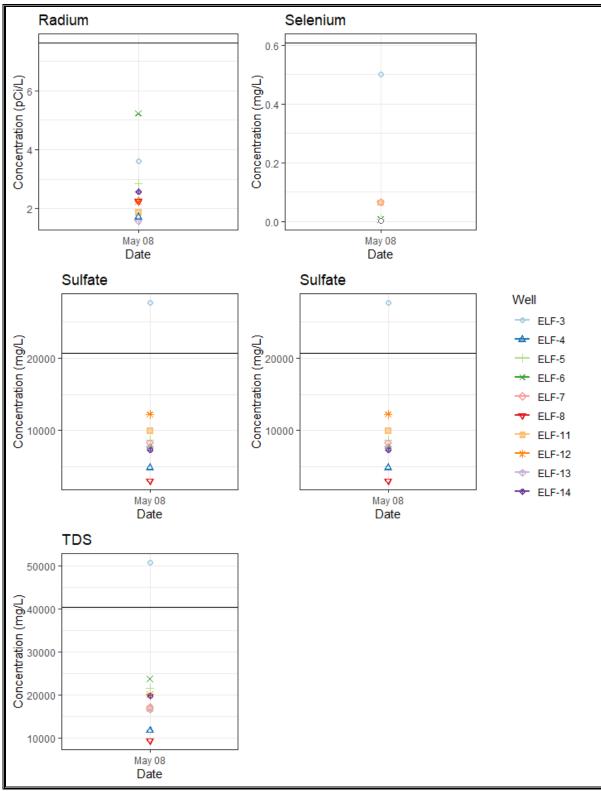


Figure C.4 (cont). Upper tolerance limit plots for the CCR Landfill.



# Attachment D:

Field Data Sheets



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)	ТЕМР (С)	SC (uS)	DO (mg/l)	рН (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

opendix: 3_4 Sample T		Sample Time:	ple Time: 09:15		
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:**

Percent DO recorded instead of mg/l



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)	рН (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				
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	7	



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)	рН (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							
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	7		



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)	рН (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						
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		



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	-	<u>.</u>		
Depth to Water (ft):	8.49				

FIELD PARAMETERS						
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	рН (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:				
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			



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)			ORP (mv)	Turb. (NTU)	

ppendix:	ppendix: 3_4 Sample T			nple Time: 12:30			
Containers		Preservatives		Analytes/Comments			
(1) 1/2 gal poly		HNO3		Radium 226 + 228			
(1) 250 mL poly		HNO3		Total metals, Total mercury			
(1) 250 mL poly		H2SO4		Nitrate + Nitrite			
(1) 1-L poly		None		TDS, pH, anions, fluoride, alkalinity	7		

#### Comments/Observations:

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



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)	рН (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				
Containers		Preservatives		Analytes/Comments		
(1) 1/2 gal poly HNO3		HNO3		Radium 226 + 228		
(1) 250 mL poly	1	HNO3		Total metals, Total mercury		
(1) 250 mL poly	1	H2SO4		Nitrate + Nitrite		
(1) 1-L poly		None		TDS, pH, anions, fluoride, alkalinity	7	



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)	рН (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					
Containers		Preservatives		Analytes/Comments	
(1) 1/2 gal poly	(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	



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)	рН (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:** 



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)	рН (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

ppendix:	andix: 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.



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)	рН (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	7	

### 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



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)	рН (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

ppendix:	ppendix: 3_4		ample 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:** 



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 PARAME	ETERS		
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	рН (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

			SAMPI	LE 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



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 PARAMI	ETERS		
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	рН (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

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.
- 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.

yee 1 men Pik Yee Yuen

Radiochemistry Primary Data Reviewer

M.W-

Radiochemistry Final Data Reviewer

<u>6/6/19</u> Date

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	est					CHAIN	CHAIN OF CUSTODY		Musay
Analyucal Laboratories 3440.5.700 W. Salt Lake City. UT 84119 Phone # (801) 263-8585 Toil Free # (858) 253-8586	atories r 84119 888) 263-8686		II	analysis y repoi	will be conducted using rting limits (PQL) unles	g NELAP accredited meth ss specifically requested of	ods and all data will herwise on this Cha	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.	AWAL Lab Sample Set # Pace 1 of 2
Fax # (801) 263-8687 Email awal@awal-labs.com	awal-labs.com			ð	QC Level:	Tum Aro	Turn Around Time:	Unless other arrangements have been made, signed	Due Date:
www.awal-labs.com	в				2+	Standard	lard	reports will be emailed by 5:00 ptm on the day they are due.	
Client: American West Analytical Laboratories				┝─				C Report down to the MDL	Laboratory Use Only
Address: 3440 S. 700 W.									CTOT Taxes West
City, State, Zip: Salt Lake City , UT 84119								Field Filtered For:	1 Present on Outer Package
Contact: Elona Hayward									2 Unhmken im Outer Parkase
Phone #: (801) 263-8686 Cell #:									A N NA
E-mail: elona@awal-labs.com; denise@awal-labs.com					pəui				3 Present on Sample
Project Name: Hunter CCR Groundwater Sampling									Turbutur an Court
Project #: PERCM052				0 00	23.87			D Non Compliance	
PO#: 1905216			\$		7 PUE			Cher:	Samples Were
Sampler Name:			tənistr	xinteN	: 526			Known Hararde	1 Shipped or hand delivered
	Date	Time	roD		wnt				2 Ambient or Chilled
Sample ID:	Sampled	Sampled	30 <b>#</b>	_	D & M			Sample Comments	103 Temperature
ELF-1D	5/8/2019	16:35	1	× M	×				Preceived Inhact
ELF-2	5/8/2019	17:30	2	M	×				
3 ELF-3	5/8/2019	14:30	2	M	×				
▲ ELF-4	5/8/2019	13:30	2	M	×				5 Property Preserved Y N Checked at bench
S ELF-5	5/8/2019	12:45	2	M	×				
© ELF-6	5/8/2019	12:30	-	3	×				
Z ELF-7	5/8/2019	14:00	-	3	×				6 Received Within Holdine Times
S ELF-8	5/8/2019	11:45	ы	3	×				N N
ELF-9	5/8/2019	16:30	2	3	×				
ÉLF-10	5/8/2019	15:00	2	3	×				
n ELF-11	5/8/2019	11:15	2	3	×				Sample Labets and COC Record Match?
BLF-12	5/8/2019	10:45	2	3	×				×
<b>J</b> LF-13	5/8/2019	10:00	2	3	×				
jt.F-14	5/8/2019	9:15	2	3	×				
13 Dur	5/7/2019	15:20	-	3	×				
Retinguished by KUMAQAPAQA		Received by: Signature		NL	2		5-13-10	Special Instructions:	
Print Name ILEMSE BOLIND	06', pm	Print Name:	KEL		- AFRI SHIT		77mm	QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS,	gate, recoveries, MB, LCS,
celinquished by: signature		Received by: Signature		ľ			Date:	MS/MSD performed on customer sample	r sample
trint Name.		Print Name.					Time:		
telinquished by: Signature	Date:	Received by: Signature					Date:	Samples sent to ALS - Ft. Collins.	
Print Name.	Time:	Print Name:			· ·		Time:		

American West Analytical Laboratories	est atories				CHA]	CHAIN OF CUSTODY	CUST(		1905134
3440 S. 700 W. Salt Lake City, UT 84119 Phone # (801) 263-8686 Toll Free # (888) 263-8686	T 84119 888) 26 <del>3-8</del> 686	•	All analy r	sis will be conducted porting limits (PQL)	l using NELAP accredite unless specifically requ	d methods and sted otherwise	all data will be on this Chain e	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.	AWAL Lab Sample Set # Page 2 of 2
Fax # (801) 263-8657 Email aval@awai-labs.com	awal-labs.com			QC Level:	Тип	Tum Around Time:	ime	Unless other arrangements have been made, signed reports will be emailed by	Due Da
www.awal-labs.com	E			2+		Standard		5:00 pm on the day they are due.	
Client: American West Analytical Laboratories								Report down to the MDL     Include FDD.	Laboratory Use Only
Address: 3440 S. 700 W.								□ Lab Filter for:	
City, State, Zip: Salt Lake City , UT 84119								Field Filtered For:	1 Present on Outer Package
Contact: Elona Hayward									uter Packa
Phone #: (801) 263-8686 Cell #:								For Compliance With:	
E-mail: elona@awal-labs.com; denise@awal-labs.com				bəni					3 Present on Sample Y
Project Name: Hunter CCR Groundwater Sampling				qwo					4 Unbroten on Samula
Project #. PERCM052				C) 827					
PO.F. 1905216				z put					Samiles Weere
Sampler Name:			rəninər XirteM	977 1				Known Hazarde	1 Shipped or hand delivered
	Date	Time		muit					2 Ambient or Chilled
Sample ID:	Sampled	Sampled	_	Rad				Sample Comments	3 Temperature
16)38 Hord Alla	`	14:00	2 W	x					4 Received Intact
	6/8/16	1200							×
							_		
									5 Properly Preserved Y N Checked at bench
- 8									
									6 Received Within Holding Times
									Ζ.
0			_						
							_		Sample Labels and COC Record Match?
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			-						
Retinguished by: XU MI A WY W		Received by: Signature			5	Ň	S:R· 9	Special Instructions:	
<u>ل</u> ل			KELI-	JEAN SHITH	114	$T^{ime}$	Time D 850	QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS	ite, recoveries, MB, LCS,
Relinquished by: Berndure		Received by: Signature	4444			Date:		MS/MSD performed on customer sample	ample
Quit Name:		Print Name:				Time			
Scinquished by: Scrature		Received by: Signature				Date:			
Print Name:	Time.	Print Name:				Time			



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

(ALS)			IALC	171	
Client:	AWAL	Workorder No:	1905	134	_
Project Manager:	KMD	Initials:	Date:	\$13.19	-
Are airbills / shipping	documents present and/or removable?		DROP	OFF YES	NO
Are custody seals on sl	hipping containers intact?	· · · · · · · · · · · · · · · · · · ·	NON	VE YES	NO *
Are custody seals on s	ample containers intact?	· · ·	NON	VE YES	NO *
Is there a COC (chain-	of-custody) present?	· · · · · · · · ·		YES	NO *
Is the COC in agreeme matrix, requested analy	nt with samples received? (IDs, dates, t yses, etc.)	times, # of samples, #	of containers	YES	NO
Are short-hold samples	s present?			YES	NO
Are all samples within	holding times for the requested analys	es?		TES	• NO *
Were all sample contai	iners received intact? (not broken or le	eaking)		YES	NO *
Is there sufficient samp	ble for the requested analyses?			YES	NO *
0. Are all samples in the	proper containers for the requested ana	lyses?		(YES)	NO *
11. Are all aqueous sample	es preserved correctly, if required? (exe	cluding volatiles)	N//	A YES	(M)
2. Are all aqueous non-pr	eserved samples pH 4-9?		N/2	A YES	NO *
Are all samples requiri > 6 mm (1/4 inch) diam	ng no headspace (VOC, GRO, RSK/M neter? (i.e. size of green pea)	IEE, radon) free of bu	ibbles N/2	yes	NO
4. Were the samples ship	ped on ice?			YES (	NO
5. Were cooler temperatu	res measured at 0.1-6.0°C?	#1 #3	#4 ONL		NO
	Cooler #: 2				
	Temperature (°C): TMB TMB				
No. of custo	bdy seals on cooler:				
DOT Survey	rnal $\mu$ R/hr reading: $10$ $10$				
Information	bund $\mu$ R/hr reading: $1$				
-	two times background and within DOT acceptance of	criteria? YES NO / NA	(If no. see Form (	)()8.)	
	e for NO responses to gray boxes above - fo				 gi <b>n</b> .
<) Samples	1-14 both bothes in	sitten label	date	= 517	F/19
) 11	2C3 printed label de	te = 5 8	19	Correct	
Sinde 1	le written label time	date = 120	0 58		collet
<u> </u>	ac iprinted label -	fineldate=	MÓOI	5/7/19	
<u>\</u>	· · · · · · · · · · · · · · · · · · ·	. ( ·	<i>l</i>		
1) initial pH.	3 top:	initial ptt	4 tre!	S	+
	stilled 2ml the 182345	<u></u> 世10	bottle	{ Inl 1	TNU3,
<u></u>	ml jof 19 dec	#15		) /ot 1	9734
#12 bottle2	/ mu para				ade
	$\sim$	ttle ID's vs ALS lab	ID's double	-checked by	r LLA
f applicable, was the client cor	ntacted? (ES) NO / NA Contact:	ma Itayward	Dat	e/Time: <u>}</u>	19013
Project Manager Signatur	e / Date:	- S/13/19			



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# 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 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 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 +/- 0.20	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:

 ${\sf U}~$  - 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

# 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 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: 30 minutes Final Aliquot: 993 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	0.04 +/- 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:

 ${\sf U}~$  - 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

# 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 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 Result Units: pCi/l File Name: Manual Entry

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

# **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.

### Data Package ID: RE1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

# 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 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 Result Units: pCi/l File Name: Manual Entry

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

# **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.

### Data Package ID: RE1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

# Radium-226 by Radon Emanation - Method 903.1 PAI 783 Rev 13

FAI 103 KEV 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 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 Result Units: pCi/l File Name: Manual Entry

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

# **Chemical Yield Summary**

Ca	rrier/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.

### Data Package ID: RE1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

# 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 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 Result Units: pCi/l File Name: Manual Entry

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

# **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.

### Data Package ID: RE1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

# 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		Date Collected: 21-May Date Prepared: 21-May	Prep SOP: PAI 783 Rev 13 Date Collected: 21-May-19		Batch: RE190521-11 tchID: RE190521-11-1 un ID: RE190521-11A Time: 15 minutes	Moisture(% Result Unit	i <b>s:</b> Unfiltered 6): NA		
CASNO	Analyte	Sample Result +/- 2 s TPU	e MDC	Flags	Dupli Result +/- 2 s TPU	cate MDC	Flags	DER	DER Lim
								1	1

#### **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

### Data Package ID: RE1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Page 1 of 2

# 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: R	E190521-2LCSD	Sample Matrix: WATER Prep SOP: PAI 783 Date Collected: 21-May- Date Prepared: 21-May- Date Analyzed: 30-May-	Rev 13 19 19	QCBat R	Batch: RE190521-2 tchID: RE190521-2-1 un ID: RE190521-2A Time: 15 minutes	Moisture(% Result Unit	i <b>s:</b> Unfiltered 6): NA		
CASNO	Analyte	Sample Result +/- 2 s TPU	e MDC	Flags	Dupli Result +/- 2 s TPU	cate MDC	Flags	DER	DER Lim

#### **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

### Data Package ID: RE1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Page 2 of 2

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-11	Final Aliquot: 993 ml
Lab ID:	1905234-1	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-11-1 Run ID: RE190521-11A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 30 minutes	Result Units: pCi/l
		Date Analyzed: 03-Jun-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	0.13 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 945 ml
Lab ID:	1905234-2	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-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	0.12 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 945 ml
Lab ID:	1905234-3	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-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	0.24 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 995 ml
Lab ID:	1905234-4	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-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	0.16 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 995 ml
Lab ID:	1905234-5	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-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	0.86 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-11	Final Aliquot: 993 ml
Lab ID:	1905234-6	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-11-1 Run ID: RE190521-11A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 30 minutes	Result Units: pCi/l
_		Date Analyzed: 03-Jun-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	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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-11	Final Aliquot: 993 ml
Lab ID:	1905234-7	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-11-1 Run ID: RE190521-11A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 30 minutes	Result Units: pCi/l
		Date Analyzed: 03-Jun-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	0.87 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 995 ml
Lab ID:	1905234-8	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-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	0.75 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 995 ml
Lab ID:	1905234-9	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-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	0.29 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 995 ml
Lab ID: 1905234-10	Prep SOP: PAI 783 Rev 13	QCBatchID: RE190521-2-1	Prep Basis: Unfiltered
	Date Collected: 08-May-19	Run ID: RE190521-2A	Moisture(%): NA
	Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
	Date Analyzed: 30-May-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	0.49 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 995 ml
Lab ID:	1905234-11	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-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	0.35 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 955 ml
Lab ID:	1905234-12	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-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 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 935 ml
Lab ID: 1905234-13	Prep SOP: PAI 783 Rev 13	QCBatchID: RE190521-2-1	Prep Basis: Unfiltered
	Date Collected: 08-May-19	Run ID: RE190521-2A	Moisture(%): NA
	Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
	Date Analyzed: 30-May-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	0.12 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 995 ml	
Lab ID:	1905234-14	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA	
		Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l	
		Date Analyzed: 30-May-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	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

# 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	Sample Matrix: WATER	Prep Batch: RE190521-11	Final Aliquot: 993 ml
Lab ID:	1905234-15	Prep SOP: PAI 783 Rev 13 Date Collected: 07-May-19	QCBatchID: RE190521-11-1 Run ID: RE190521-11A	Prep Basis: Unfiltered Moisture(%): NA
		Date Prepared: 21-May-19	Count Time: 30 minutes	Result Units: pCi/l
		Date Analyzed: 03-Jun-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	0.53 +/- 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

# 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	Sample Matrix: WATER	Prep Batch: RE190521-2	Final Aliquot: 995 ml
Lab ID: 1905234-16	Prep SOP: PAI 783 Rev 13 Date Collected: 08-May-19	QCBatchID: RE190521-2-1 Run ID: RE190521-2A	Prep Basis: Unfiltered Moisture(%): NA
	Date Prepared: 21-May-19	Count Time: 15 minutes	Result Units: pCi/l
	Date Analyzed: 30-May-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	0.02 +/- 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

ALS

QUALITY ASSURANCE SUMMARY SHEET	(secol
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TEST Radden - Reaciv	es Radas woon-
METHOD Prep	
SOP/REV (PREP)	
SOP/REV (ANAL)	
Briefly document any QA or other problems or deviations associated with the analysis amples. Problems could result from: log-in, color, odor, dilution, consistency, acheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.	of
<ol> <li>After Na 220 was plantatered plantatered</li></ol>	
2. One mL of lead carrier, a transfer piperce of photosphere $18N H_2SO_4$ were added to the cup on a stirring hotplate.	
2. 6N H.SO, was added from a squeeze bottle until a pink color was achieved.	
4. Additional 6N $H_2SO_4$ was added slowly until the pH dropped enough that	
the phenoinhthalein lost color.	
The pH was checked to ensure that the sample solution was slightly acidic.	
<ol><li>After stirring for five minutes, the stir bar was removed, and the sample</li></ol>	
was allowed to settle for two hours.	161
<ul> <li>7. The supernatant was decanted, and the precipitate was transferred with</li> </ul>	'zhilib
$0.1N H_2SO_4$ to a 50mL centrifuge tube.	Spiono
8. The precipitate was spun down, and the supernatant discarded.	
<ol> <li>The resultant precipitate was dissolved in 25mL of EDTA.</li> <li>The resultant precipitate was dissolved in 25mL of EDTA.</li> </ol>	
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	•
11. The barium recovery specific to the 220 by fiducities and 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 1SmL 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 nom	
the sample to calculate out a new "final aliquet" on the benchsheet.	-
1 801.1 DATE 3/2	6/16
TECHNICIAN/ANALYST	elle
DEPARTMENT MANAGER	

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# 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.
- The samples were analyzed for the presence of <sup>228</sup>Ra by low background gas flow proportional counting of <sup>228</sup>Ac, which is the ingrown progeny of <sup>228</sup>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.

100 iner Pik Yee Yuen

Radiochemistry Primary Data Reviewer

M

Radiochemistry Final Data Reviewer

<u>6/6/19</u> Date

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	est					CHAIN	CHAIN OF CUSTODY		Musay
Analyucal Laboratories 3440.5.700 W. Salt Lake City. UT 84119 Phone # (801) 263-8585 Toil Free # (858) 253-8586	atories r 84119 888) 263-8686		II	analysis y repoi	will be conducted using rting limits (PQL) unles	g NELAP accredited meth ss specifically requested of	ods and all data will herwise on this Cha	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.	AWAL Lab Sample Set # Pace 1 of 2
Fax # (801) 263-8687 Email awal@awal-labs.com	awal-labs.com			ð	QC Level:	Tum Aro	Turn Around Time:	Unless other arrangements have been made, signed	Due Date:
www.awal-labs.com	в				2+	Standard	lard	reports will be emailed by 5:00 ptm on the day they are due.	
Client: American West Analytical Laboratories				┝─				C Report down to the MDL	Laboratory Use Only
Address: 3440 S. 700 W.									CTOT Taxes West
City, State, Zip: Salt Lake City , UT 84119								Field Filtered For:	1 Present on Outer Package
Contact: Elona Hayward									2 Unhmken im Outer Parkase
Phone #: (801) 263-8686 Cell #:									A N NA
E-mail: elona@awal-labs.com; denise@awal-labs.com					pəui				3 Present on Sample
Project Name: Hunter CCR Groundwater Sampling									Turbutur an Court
Project #: PERCM052				0 00	23.87			D Non Compliance	
PO#: 1905216			\$		7 PUE			Cher:	Samples Were
Sampler Name:			tənistr	xinteN	: 526			Known Hararde	1 Shipped or hand delivered
	Date	Time	roD		wnt				2 Ambient or Chilled
Sample ID:	Sampled	Sampled	30 <b>#</b>	_	D & M			Sample Comments	103 Temperature
ELF-1D	5/8/2019	16:35	1	× M	×				Preceived Inhact
ELF-2	5/8/2019	17:30	2	M	×				
3 ELF-3	5/8/2019	14:30	2	M	×				
▲ ELF-4	5/8/2019	13:30	2	M	×				5 Property Preserved Y N Checked at bench
S ELF-5	5/8/2019	12:45	2	M	×				
© ELF-6	5/8/2019	12:30	-	3	×				
Z ELF-7	5/8/2019	14:00	-	3	×				6 Received Within Holdine Times
S ELF-8	5/8/2019	11:45	ы	3	×				N N
ELF-9	5/8/2019	16:30	2	3	×				
ÉLF-10	5/8/2019	15:00	2	3	×				
n ELF-11	5/8/2019	11:15	2	3	×				Sample Labets and COC Record Match?
BLF-12	5/8/2019	10:45	2	3	×				×
<b>J</b> LF-13	5/8/2019	10:00	2	3	×				
jt.F-14	5/8/2019	9:15	2	3	×				
13 Dur	5/7/2019	15:20	-	3	×				
Retinguished by KUMAQAPAQA		Received by: Signature		NL	2		5-13-10	Special Instructions:	
Print Name ILEMSE BOLUN	06', pm	Print Name:	KEL		- AFRI SHIT		Time6850	QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS,	gate, recoveries, MB, LCS,
celinquished by: signature		Received by: Signature		ľ			Date:	MS/MSD performed on customer sample	r sample
trint Name.		Print Name.					Time:		
telinquished by: Signature	Date:	Received by: Signature					Date:	Samples sent to ALS - Ft. Collins.	
Print Name.	Time:	Print Name:			· ·		Time:		

American West Analytical Laboratories	est atories				CHA]	CHAIN OF CUSTODY	CUST(		1905134
3440 S. 700 W. Salt Lake City, UT 84119 Phone # (801) 263-8686 Toll Free # (888) 263-8686	T 84119 888) 26 <del>3-8</del> 686	•	All analy r	sis will be conducted porting limits (PQL)	l using NELAP accredite unless specifically requ	d methods and sted otherwise	all data will be on this Chain e	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.	AWAL Lab Sample Set # Page 2 of 2
Fax # (801) 263-8657 Email aval@awai-labs.com	awal-labs.com			QC Level:	Тип	Tum Around Time:	ime	Unless other arrangements have been made, signed reports will be emailed by	Due Da
www.awal-labs.com	E			2+		Standard		5:00 pm on the day they are due.	
Client: American West Analytical Laboratories								Report down to the MDL     Include FDD.	Laboratory Use Only
Address: 3440 S. 700 W.								□ Lab Filter for:	
City, State, Zip: Salt Lake City , UT 84119								Field Filtered For:	1 Present on Outer Package
Contact: Elona Hayward									uter Packa
Phone #: (801) 263-8686 Cell #:								For Compliance With:	
E-mail: elona@awal-labs.com; denise@awal-labs.com				bəni					3 Present on Sample Y
Project Name: Hunter CCR Groundwater Sampling				qwo					4 Unbroten on Samula
Project #. PERCM052				C) 827					
PO.F. 1905216				Z PUR					Samiles Weere
Sampler Name:			rəninər XirteM	977 1				Known Hazarde	1 Shipped or hand delivered
	Date	Time		muit					2 Ambient or Chilled
Sample ID:	Sampled	Sampled	_	Rad				Sample Comments	3 Temperature
16)38 Honda 10	`	14:00	2 W	x					4 Received Intact
	6/8/16	1200							×
							_		
									5 Properly Preserved Y N Checked at bench
- 8									
									6 Received Within Holding Times
									Ζ.
0			_						
							_		Sample Labels and COC Record Match?
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Retinguished by: XU MI A WY W		Received by: Signature			5	Ň	S:R· 9	Special Instructions:	
<u>ل</u> ل			KELI-	JEAN SHITH	114	$T^{ime}$	Time D 850	QC 2+ = Final Report, COC, surrogate, recoveries, MB, LCS	ite, recoveries, MB, LCS,
Relinquished by: Berndure		Received by: Signature				Date:		MS/MSD performed on customer sample	ample
Quit Name:		Print Name:				Time			
Scinquished by: Scrature		Received by: Signature				Date:			
Print Name:	Time.	Print Name:				Time			



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

(ALS)			IALC	171	
Client:	AWAL	Workorder No:	1905	134	_
Project Manager:	KMD	Initials:	Date:	\$13.19	-
Are airbills / shipping	documents present and/or removable?		DROP	OFF YES	NO
Are custody seals on sl	hipping containers intact?	· · · · · · · · · · · · · · · · · · ·	NON	VE YES	NO *
Are custody seals on s	ample containers intact?	· · ·	NON	VE YES	NO *
Is there a COC (chain-	of-custody) present?	· · · · · · · · ·		YES	NO *
Is the COC in agreeme matrix, requested analy	nt with samples received? (IDs, dates, t yses, etc.)	times, # of samples, #	of containers	YES	NO
Are short-hold samples	s present?			YES	NO
Are all samples within	holding times for the requested analys	es?		TES	• NO *
Were all sample contai	iners received intact? (not broken or le	eaking)		YES	NO *
Is there sufficient samp	ble for the requested analyses?			YES	NO *
0. Are all samples in the	proper containers for the requested ana	lyses?		(YES)	NO *
11. Are all aqueous sample	es preserved correctly, if required? (exe	cluding volatiles)	N//	A YES	(M)
2. Are all aqueous non-pr	eserved samples pH 4-9?		N/2	A YES	NO *
Are all samples requiri > 6 mm (1/4 inch) diam	ng no headspace (VOC, GRO, RSK/M neter? (i.e. size of green pea)	IEE, radon) free of bu	ibbles N/2	yes	NO
4. Were the samples ship	ped on ice?			YES (	NO
5. Were cooler temperatu	res measured at 0.1-6.0°C?	#1 #3	#4 ONL		NO
	Cooler #: 2				
	Temperature (°C): TMB TMB				
No. of custo	bdy seals on cooler:				
DOT Survey	rnal $\mu$ R/hr reading: $10$ $10$				
Information	bund $\mu$ R/hr reading: $1$				
-	two times background and within DOT acceptance of	criteria? YES NO / NA	(If no. see Form (	)()8.)	
	e for NO responses to gray boxes above - fo				 gi <b>n</b> .
<) Samples	1-14 both bothes in	sitten label	date	= 517	F/19
) 11	2C3 printed label de	te = 5 8	19	Correct	
Sinde 1	le written label time	date = 120	0 58		collet
<u> </u>	ac iprinted label -	fineldate=	MÓOI	5/7/19	
<u>\</u>	· · · · · · · · · · · · · · · · · · ·	. ( ·	<i>l</i>		
1) initial pH.	3 top:	initial ptt	4 tre!	S	+
	stilled 2ml the 182345	<u></u> 世10	bottle	{ Inl 1	TNU3,
<u></u>	ml jof 19 dec	#15		) /ot 1	9734
#12 bottle2	/ mu para				ade
	$\sim$	ttle ID's vs ALS lab	ID's double	-checked by	ri KA
f applicable, was the client cor	ntacted? (ES) NO / NA Contact:	ma Itayward	Dat	e/Time: <u>}</u>	19013
Project Manager Signatur	e / Date:	- S/13/19			



•

# 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:

 ${\sf U}~$  - 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

# 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:

 ${\sf U}~$  - 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

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		Contro I 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.

### Data Package ID: RA1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

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		Contro I 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.

### Data Package ID: RA1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

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	Contro I Limits	Lab Qualifier
15262-20-1	Ra-228	14.3 +/- 3.4	0.8	14.36	99.8	70 - 130	Р

### **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.

### Data Package ID: RA1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

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		Contro I Limits	Lab Qualifier
15262-20-1	Ra-228	14.6 +/- 3.4	0.8	14.34	102	70 - 130	Р

### **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.

### Data Package ID: RA1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

PAI 724 Rev 13 Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Ra-228

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

14.5 +/- 3.5

Field ID: Lab ID: R/	A190521-11LCSD	Sample Matrix: WATER Prep SOP: SOP749 Rev 5 Date Collected: 21-May-19 Date Prepared: 21-May-19 Date Analyzed: 28-May-19	QCBa R	Batch: RA190521-11 atchID: RA190521-11-1 aun ID: RA190521-11A Time: 60 minutes	Final Aliquot: 997 ml Prep Basis: Unfiltered Moisture(%): NA Result Units: pCi/l File Name: RAC0528			
CASNO	Analyte	Sample Result +/- 2 s TPU MDC	Flags	Dup Result +/- 2 s TPU	licate J MDC	Flags	DER	DER Lim

P,M3

14.5 +/- 3.6

1.1

### **Comments:**

15262-20-1

#### 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.

11 - Loo Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

### Data Package ID: RA1905234-1

Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

1.2

P,M3

0.0106

2.13

BDL - Below Detection Limit

NR - Not Reported

Page 1 of 2

PAI 724 Rev 13 Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Ra-228

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

14.3 +/- 3.4

Field ID: Lab ID: R	A190522-5LCSD	Sample Matrix: WATER Prep SOP: SOP749 Rev 5 Date Collected: 22-May-19 Date Prepared: 22-May-19 Date Analyzed: 03-Jun-19	QCBat Rt	atch: RA190522-5 chID: RA190522-5-2 in ID: RA190522-5A Fime: 150 minutes	Moisture(% Result Unit	is: Unfiltered		
CASNO	Analyte	Sample Result +/- 2 s TPU MDC	Flags	Duplic Result +/- 2 s TPU	ate MDC	Flags	DER	DER Lim

Ρ

14.6 +/- 3.4

0.8

### **Comments:**

15262-20-1

#### 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.

11 - Loo Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

### N - Matrix Spike Recovery outside control limits

### Data Package ID: RA1905234-1

#### Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

0.8

Ρ

0.0575

2.13

**BDL** - Below Detection Limit

NR - Not Reported

Page 2 of 2

### 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	Sample Matrix: WATER	Prep Batch: RA190521-11	Final Aliquot: 997 ml
	Prep SOP: SOP749 Rev 5	QCBatchID: RA190521-11-1	Prep Basis: Unfiltered
Lab ID: 1905234-1	Date Collected: 08-May-19	Run ID: RA190521-11A	Moisture(%): NA
	Date Prepared: 21-May-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 03-Jun-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml
1 -1 ID 4005004.0	Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered
Lab ID: 1905234-2	Date Collected: 08-May-19	Run ID: RA190522-5A Moisture(%): NA	
	Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
	Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
Lab ID: 1905234-3	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
	Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml
		Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered
Lab ID:	<b>D:</b> 1905234-4	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA
		Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l
		Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### Lab Name: ALS -- Fort Collins

Work Order Number: 1905234

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: E	LF-5	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
		Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
	1905234-5	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
		Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
		Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190521-11	Final Aliquot: 997 ml
	Prep SOP: SOP749 Rev 5	QCBatchID: RA190521-11-1	Prep Basis: Unfiltered
Lab ID: 1905234-6	Date Collected: 08-May-19	Run ID: RA190521-11A	Moisture(%): NA
	Date Prepared: 21-May-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 03-Jun-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190521-11	Final Aliquot: 997 ml
Lab ID: 1905234-7	Prep SOP: SOP749 Rev 5	QCBatchID: RA190521-11-1	Prep Basis: Unfiltered
	Date Collected: 08-May-19	Run ID: RA190521-11A	Moisture(%): NA
	Date Prepared: 21-May-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 03-Jun-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
Lab ID: 1905234-8	Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
Lab ID: 1905234-8	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
	Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
Lab ID: 1905234-9	Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
Lab ID: 1903234-9	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
	Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
	Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
Lab ID: 1905234-10	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
	Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
		Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
Lab ID:	1905234-11	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
		Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
		Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
	Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
Lab ID: 1905234-12	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
	Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
		Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered Moisture(%): NA	
Lab ID: 1905	5234-13	Date Collected: 08-May-19	Run ID: RA190522-5A		
		Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
		Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 499 ml	
	1905234-14	Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
Lab ID: 1908		Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
		Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
		Date Analyzed: 30-May-19	Report Basis: Unfiltered	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

### 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	Sample Matrix: WATER	Prep Batch: RA190521-11	Final Aliquot: 997 ml	
Lab ID: 1005004.45	Prep SOP: SOP749 Rev 5	QCBatchID: RA190521-11-1	Prep Basis: Unfiltered	
Lab ID: 1905234-15	Date Collected: 07-May-19	Run ID: RA190521-11A	Moisture(%): NA	
	Date Prepared: 21-May-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 03-Jun-19	Report Basis: Unfiltered	File Name: RAC0528	

CASNO			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

### 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	Sample Matrix: WATER	Prep Batch: RA190522-5	Final Aliquot: 997 ml	
Lab ID: 1905234-1	Prep SOP: SOP749 Rev 5	QCBatchID: RA190522-5-2	Prep Basis: Unfiltered	
	Date Collected: 08-May-19	Run ID: RA190522-5A	Moisture(%): NA	
	Date Prepared: 22-May-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 03-Jun-19	Report Basis: Unfiltered	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

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or non-sequential Ra-er	n samples that are replanch	etted:			-
1. Use the superna	tant fraction from SOP 749	step 8.1.26.			
	tant fraction from SOP 749 that is in a cup, transfer to a 5	•	ube and add 1ml	Yttrium carrier.	Der Mar
2. If the supernatar <del>3. Shake for ~36 ุhc</del>	nt is in a cup, transfer to a 5 <del>ours and replan</del> chett for Ra2	0mL centrifuge t <del>28 analysis per s</del>	step 8.1.25.		Kir South
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2</del> set, the previous planchette	OmL centrifuge t <del>28 analysis per s</del> d decay date/tir	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
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<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2</del> set, the previous planchette	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2 set, the previous planchette</del> new decay date/time will be	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2 set, the previous planchette</del> new decay date/time will be	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2 set, the previous planchette</del> new decay date/time will be	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2 set, the previous planchette</del> new decay date/time will be	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2 set, the previous planchette</del> new decay date/time will be	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2 set, the previous planchette</del> new decay date/time will be	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 <del>ours and replan</del> ch <del>ett for Ra2 set, the previous planchette</del> new decay date/time will be	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth	
<ol> <li>If the supernatar</li> <li>Shake for ~36 hc</li> <li>On the benchshadate/time. The</li> </ol>	nt is in a cup, transfer to a 5 purs and replanchett for Ra2 set, the previous planchette new decay date/time will be RbS 9	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	step 8.1.25. ne will become the solution of th	he new ingrowth ed in step 8.1,26.	
<ol> <li>If the supernatar</li> <li>Shake for ~36 ho</li> <li>4. On the benchsha</li> </ol>	nt is in a cup, transfer to a 5 purs and replanchett for Ra2 set, the previous planchette new decay date/time will be RbS 9	OmL centrifuge t <del>28 analysis per s</del> <del>d decay date/tir</del> e the new replan	<del>step 8.1.25. ne will become tl</del>	he new ingrowth ed in step 8.1,26.	

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Ĩ.



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 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 Phone: (801) 263-8686 Environmental Laboratory Accreditation Program (NELAP) in Utah and Texas; and is Toll Free: (888) 263-8686 state accredited in Colorado, Idaho, New Mexico, Wyoming, and Missouri. Fax: (801) 263-8687 All analyses were performed in accordance to the NELAP protocols unless noted e-mail: awal@awal-labs.com otherwise. Accreditation scope documents are available upon request. If you have any questions or concerns regarding this report please feel free to call. web: www.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 Kyle F. Gross purging efficiency. The "Reporting Limit" found on the report is equivalent to the Laboratory Director 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 Jose Rocha figures for quality control and calculation purposes. **QA** Officer

Thank You,

Approved by:

Laboratory Director or designee

All analyses 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 processe 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 accordance to other.



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 1

 Lab Sample ID:
 1905215-001
 1

 Client Sample ID:
 ELF-1D
 1

 Collection Date:
 5/8/2019
 1635h

 Received Date:
 5/9/2019
 721h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West
Salt Lake City, UT 84119

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

<sup>2</sup> - 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

#### Report Date: 5/23/2019 Page 2 of 45



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-002Client Sample ID:ELF-2Collection Date:5/8/20191730hReceived Date:5/9/2019721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	3.77 430	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

> > Report Date: 5/23/2019 Page 3 of 45



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-003Client Sample ID:ELF-3Collection Date:5/8/20191430hReceived Date:5/9/2019721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	1.51 465	

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> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 4 of 45



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521905215-004Lab Sample ID:1905215-004ELF-4Client Sample ID:ELF-4Image: Collection Date:5/8/2019Received Date:5/9/2019721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	5.00 515	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 5 of 45



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-005Client Sample ID:ELF-5Collection Date:5/8/20191245hReceived Date:5/9/2019721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	6.06 489	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 6 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Sample ID:
 1905215-006

 Client Sample ID:
 ELF-6
 Image: Contact Sample ID:
 1230h

 Received Date:
 5/9/2019
 721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	12.4 539	

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> Jose Rocha QA Officer

> > Report Date: 5/23/2019 Page 7 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Con

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	1.86 471	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 8 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Sample ID:
 1905215-008

 Client Sample ID:
 ELF-8
 Image: Contact Sample ID:
 1145h

 Received Date:
 5/9/2019
 721h
 Image: Contact Sample ID:
 Image: Contact Sample ID:

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	5.00 10.0	29.8 606	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

> > Report Date: 5/23/2019 Page 9 of 45



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521905215-009Lab Sample ID:1905215-009ELF-9Collection Date:5/8/20191630hReceived Date:5/9/2019721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	1.87 58.7	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 10 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 1005215-010

 Lab Sample ID:
 1905215-010
 1500h

 Collection Date:
 5/8/2019
 1500h

 Received Date:
 5/9/2019
 721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	2.12 543	

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> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 11 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	17.8 436	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 12 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	1.68 182	

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#### Report Date: 5/23/2019 Page 13 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	0.703 481	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 14 of 45



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-014Client Sample ID:ELF-14Collection Date:5/8/2019915hReceived Date:5/9/2019721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L	5/13/2019 1648h		E200.7	0.500 10.0	2.42	
		mg/L	5/13/2019 1648h	5/22/2019 192/h	E200.7	10.0	534	

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> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 15 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Sample ID:
 1905215-015

 Lab Sample ID:
 DUP
 DUP
 Image: Contact Sample ID:
 1520h

 Received Date:
 5/9/2019
 721h
 Image: Contact Sample ID:
 Image: Contact Sample ID:

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 10.0	1.65 425	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 16 of 45



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-016Client Sample ID:FBCollection Date:5/7/20191400hReceived Date:5/9/2019721h

**Analytical Results** 

TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Boron Calcium	mg/L mg/L	5/13/2019 1648h 5/13/2019 1648h		E200.7 E200.7	0.500 1.00	< 0.500 < 1.00	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 17 of 45



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

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	
рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.02	Н
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	

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H - Sample was received outside of the holding time.

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-002Client Sample ID:ELF-2Collection Date:5/8/20191730hReceived Date:5/9/2019721h

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

Vest	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
119	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	
	рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.17	Н
3686	Sulfate	mg/L		5/16/2019 2337h	E300.0	375	6,950	
8686	Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	100	12,200	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521905215-003Lab Sample ID:1905215-003ELF-3Client Sample ID:ELF-3Ital Sample ID:5/8/2019Keceived Date:5/9/2019721h

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

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	
рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.52	Н
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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H - Sample was received outside of the holding time.

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521905215-004Lab Sample ID:1905215-004ELF-4Client Sample ID:ELF-4Image: Collection Date:5/8/2019Received Date:5/9/2019721h

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

Vest	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
119	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	
	рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.06	Н
(0)	Sulfate	mg/L		5/17/2019 010h	E300.0	375	4,800	
686 686	Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	100	11,800	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer





Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-005Client Sample ID:ELF-5Collection Date:5/8/20191245hReceived Date:5/9/2019721h

#### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

Vest	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
119	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	Н
3686	Sulfate	mg/L		5/17/2019 100h	E300.0	750	8,640	
2686	Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	500	21,600	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-006Client Sample ID:ELF-6Collection Date:5/8/20191230hReceived Date:5/9/2019721h

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

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	
рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.06	Н
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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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Con

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

Vest	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
119	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	
	рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.03	Н
686	Sulfate	mg/L		5/17/2019 1605h	E300.0	375	8,260	
080 686	Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	100	17,200	

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H - Sample was received outside of the holding time.

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-008Client Sample ID:ELF-8Collection Date:5/8/20191145hReceived Date:5/9/2019721h

#### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

Vest	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
119	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	
	рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.49	Н
3686	Sulfate	mg/L		5/17/2019 1621h	E300.0	150	2,980	
8686	Total Dissolved Solids	mg/L		5/9/2019 1350h	SM2540C	100	9,400	

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H - Sample was received outside of the holding time.

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-009Client Sample ID:ELF-9Collection Date:5/8/20191630hReceived Date:5/9/2019721h

#### **Analytical Results**

3440 South 700 West Salt Lake City, UT 84119

Date Method Reporting Date Analytical Compound Units Prepared Analyzed Used Limit Result Oual Chloride mg/L 5/20/2019 1534h E300.0 10.0 527 Fluoride 0.100 mg/L 5/18/2019 239h E300.0 1.43 pH @ 25° C SM4500-H+B 1.00 7.95 Н pH Units 5/9/2019 1412h 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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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

All analyses 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 in connection many is in good faith and according to the rules of the trade and of science.



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 1

 Lab Sample ID:
 1905215-010
 1

 Client Sample ID:
 ELF-10
 1

 Collection Date:
 5/8/2019
 1500h

 Received Date:
 5/9/2019
 721h

#### **Analytical Results**

3440 South 700 West Salt Lake City, UT 84119

Date Method Reporting Date Analytical Compound Units Prepared Analyzed Used Limit Result Oual Chloride mg/L 5/17/2019 1239h E300.0 200 9,900 Fluoride 0.100 < 0.100mg/L 5/18/2019 255h E300.0 pH @ 25° C SM4500-H+B 1.00 6.88 pH Units 5/9/2019 1412h Η 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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Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-011Client Sample ID:ELF-11Collection Date:5/8/20191115hReceived Date:5/9/2019721h

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

Vest	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
119	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	
	рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.23	Н
8686	Sulfate	mg/L		5/17/2019 1406h	E300.0	750	9,980	
686	Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	16,800	

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Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
4119	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	
	рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.55	Н
8686	Sulfate	mg/L		5/17/2019 1548h	E300.0	750	12,200	
8686	Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	20,100	

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> Jose Rocha QA Officer



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

Vest	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
119	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	
	рН @ 25° С	pH Units		5/9/2019 1412h	SM4500-H+B	1.00	7.03	Н
3686	Sulfate	mg/L		5/17/2019 1422h	E300.0	750	7,730	
8686	Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	16,700	

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> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905215-014Client Sample ID:ELF-14Collection Date:5/8/2019915hReceived Date:5/9/2019721h

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

Vest	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
4119	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	Н
	Sulfate	mg/L		5/17/2019 1638h	E300.0	750	7,280	
8686	Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	19,700	

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> Jose Rocha QA Officer



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

### **Analytical Results**

3440 South 700 Wes Salt Lake City, UT 84119

West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
4119	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	
	рН @ 25° С	pH Units		5/9/2019 1730h	SM4500-H+B	1.00	7.02	Н
8686	Sulfate	mg/L		5/17/2019 1728h	E300.0	375	9,910	
8686	Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	100	35,100	

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 Client:
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 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Con

### **Analytical Results**

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West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
4119	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	
	рН @ 25° С	pH Units		5/9/2019 1730h	SM4500-H+B	1.00	7.97	Н
8686	Sulfate	mg/L		5/17/2019 1745h	E300.0	0.750	< 0.750	
8686	Total Dissolved Solids	mg/L		5/10/2019 1250h	SM2540C	10.0	12.0	

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> Jose Rocha QA Officer



Calcium

9.95

mg/L

#### 3440 South 700 West

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

### Jose Rocha QA Officer

### **QC SUMMARY REPORT**

Lab Set ID: 1	acifiCorp 905215 Iunter CCR Ground		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: Test Code:	<b>LCS-62590</b> 200.7-W	Date Analyzed: Date Prepared:	05/22/20 05/13/20											
Boron		1.11	mg/L	E200.7	0.0633	0.500	1.000	0	111	85 - 115				

1.00

10.00

0

99.5

85 - 115

0.0937

E200.7

Report Date: 5/23/2019 Page 34 of 45



#### 3440 South 700 West

Salt Lake City, UT 84119

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### Jose Rocha QA Officer

American West<br/>ANALYTICAL LABORATORIESQC SUMMARY REPORTClient:PacifiCorpContact:Jeff TuckerLab Set ID:1905215Dept:MEProject:Hunter CCR Groundwater Sampling / PERCM052QC 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:	05/22/201	9 1842h										
Test Code:	200.7-W	Date Prepared:	05/13/201	9 1648h										
Boron		< 0.500	mg/L	E200.7	0.0633	0.500								
Calcium		< 1.00	mg/L	E200.7	0.0937	1.00								

Report Date: 5/23/2019 Page 35 of 45



Boron

#### 3440 South 700 West

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Jose Rocha QA Officer

### **QC SUMMARY REPORT**

Client:	PacifiCorp						<b>Contact:</b>	Jeff Tuck	er					
Lab Set ID:	1905215						Dept:	ME						
Project:	Hunter CCR Groundw	rater Sampling / PI	ERCM052				QC Type	e: MS						
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample II	D: 1905215-001BMS	Date Analyzed:	05/22/20	19 1849h										
Test Code:	200.7-W	Date Prepared:	05/13/202	19 1648h										
Calcium		377	mg/L	E200.7	0.937	10.0	10.00	377	-7.32	70 - 130				2
Lab Sample II	D: 1905215-001BMS	Date Analyzed:	05/22/20	19 2045h										
Test Code:	200.7-W	Date Prepared:	05/13/202	19 1648h										

0.500

0.0633

2.23

119

70 - 130

1.000

E200.7

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

3.42

mg/L

Report Date: 5/23/2019 Page 36 of 45



Boron

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Jose Rocha QA Officer

2.52

20

3.42

### **QC SUMMARY REPORT**

Client:	PacifiCorp						<b>Contact:</b>	Jeff Tuck	er					
Lab Set ID:	1905215						Dept:	ME						
Project:	Hunter CCR Groundwa	ter Sampling / PI	ERCM052				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 II	): 1905215-001BMSD	Date Analyzed:	05/22/20	19 1851h										
Test Code:	200.7-W	Date Prepared:	05/13/20	19 1648h										
Test Code: Calcium	200.7-W	Date Prepared: 406	05/13/20 mg/L	19 1648h E200.7	0.937	10.0	10.00	377	289	70 - 130	377	7.58	20	2

0.500

2.23

127

70 - 130

1.000

0.0633

E200.7

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

3.51

mg/L

Report Date: 5/23/2019 Page 37 of 45



pH @ 25° C

Test Code:

Test Code:

Test Code:

Test Code:

Test Code:

Total Dissolved Solids

Total Dissolved Solids

Total Dissolved Solids

pH @ 25° C

pH @ 25° C

Lab Sample ID: 1905215-010ADUP

Lab Sample ID: 1905215-015ADUP

Lab Sample ID: 1905215-001ADUP

Lab Sample ID: 1905215-009ADUP

Lab Sample ID: 1905217-001ADUP

PH-4500H+B

PH-4500H+B

**TDS-W-2540C** 

TDS-W-2540C

TDS-W-2540C

3440 South 700 West

Salt Lake City, UT 84119

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Kyle F. Gross Laboratory Director

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

### Jose Rocha **OA** Officer

7.95

6.88

7.02

26800

10300

8980

0.377

0.290

0.426

0.743

1.54

0.666

5

5

5

5

5

5

Η

Η

Η

# **OC SUMMARY REPORT**

Client: Lab Set ID:	PacifiCorp : 1905215						Contact: Dept:	Jeff Tucko WC	er					
Project:	Hunter CCR Groundwa	ater Sampling / I	PERCM052				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 I Test Code:	<b>D: 1905215-001ADUP</b> PH-4500H+B	Date Analyzed	1: 05/09/20	19 1412h										
pH @ 25° C		7.02	pH Units	SM4500-H+B	1.00	1.00					7.02	0	5	Н

1.00

1.00

1.00

500

100

100

1.00

1.00

1.00

400

80.0

80.0

SM4500-H+B

SM4500-H+B

SM4500-H+B

SM2540C

SM2540C

SM2540C

7.98

6.90

7.05

27,000

10,500

9,040

Date Analyzed:

pH Units

pH Units

pH Units

mg/L

mg/L Date Analyzed: 05/10/2019 1250h

mg/L

05/10/2019 1250h

Date Analyzed: 05/09/2019 1412h

Date Analyzed: 05/09/2019 1730h

Date Analyzed: 05/09/2019 1350h

H - Sample was received outside of the holding time.

Report Date: 5/23/2019 Page 38 of 45



Salt Lake City, UT 84119

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Kyle F. Gross Laboratory Director

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### Jose Rocha QA Officer

# **QC SUMMARY REPORT**

		Reporting	Amount	Snike Ref.	RPD Ref.	RPD
<b>Project:</b>	Hunter CCR Groundwater Sampling / PERCM052		QC Type:	LCS		
Lab Set ID:	: 1905215		Dept:	WC		
Client:	PacifiCorp		Contact:	Jeff Tucker		

Lab Sample ID:         LCS-R125986 300.0-W         Date Analyzed:         05/16/2019 23/03h           Chioride Fluoride Suffate         4.96 5.07 mg/L         mg/L E300.0         0.0386 0.0240         0.100 5.000         5.000         0         99.2         90 - 110           Suffate         5.07 mg/L         E300.0         0.0386         0.100         5.000         0         95.3         90 - 110           Suffate         4.76         mg/L         E300.0         0.0240         0.100         5.000         0         95.3         90 - 110           Lab Sample ID:         LCS-R125988 Test Code:         300.0-W         E300.0         0.0240         0.100         5.000         0         104         90 - 110           Suffate         5.02         mg/L         E300.0         0.0240         0.100         5.000         0         104         90 - 110           Suffate         5.02         mg/L         E300.0         0.0240         0.100         5.000         0         103         90 - 110           Suffate         5.16         mg/L         E300.0         0.0386         0.100         5.000         0         102         90 - 110           Suffate         5.12         mg/L         E300.0	yte	Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Fluoride Sulfate       5.07 4.76       mg/L mg/L       E300.0 E300.0       0.0240 0.0557       0.750       5.000       0       101       90 - 110         Los Sample Di Sulfate       LCS-R125998 300.0-W       Date Analyzed       05/17/2019 1148h $=$ </td <td>-</td> <td>Date Analyzed:</td> <td>05/16/20</td> <td>019 2303h</td> <td></td>	-	Date Analyzed:	05/16/20	019 2303h										
Autor         Autor <th< td=""><td>ide</td><td>4.96</td><td>mg/L</td><td>E300.0</td><td>0.0386</td><td>0.100</td><td>5.000</td><td>0</td><td>99.2</td><td>90 - 110</td><td></td><td></td><td></td><td></td></th<>	ide	4.96	mg/L	E300.0	0.0386	0.100	5.000	0	99.2	90 - 110				
Lab Sample ID: Test Code:         LCS-R12598 300.0-W         Date Analyzed:         05/17/2019 1148h           Fluoride Sulfate         5.22         mg/L         E300.0         0.0240         0.100         5.000         0         104         90 - 110           Lab Sample ID: Sulfate         5.22         mg/L         E300.0         0.0240         0.100         5.000         0         104         90 - 110           Lab Sample ID: Sulfate         LCS-R125990         Date Analyzed:         05/17/2019 1925h         U         U         U         U         U         90 - 110           Lab Sample ID: Fluoride         LCS-R125990         Date Analyzed:         05/17/2019 1925h         U         U         S.10         mg/L         E300.0         0.0386         0.100         5.000         0         103         90 - 110           Lab Sample ID: Fluoride         LCS-R126074 300.0-W         Date Analyzed:         05/20/2019 1411h         U         100         5.000         0         101         90 - 110           Lab Sample ID: Fest Code:         LCS-R126673 300.0-W         Date Analyzed:         05/20/2019 1412h         E         U         E         U         U         90 - 110           Lab Sample ID: PH @ 25° C         LCS-R125660 Pld Sinther         Pld I	ide	5.07	mg/L	E300.0	0.0240	0.100	5.000	0	101	90 - 110				
Test Code       30.0-W         Fluoride Sulfate       5.22 5.02       mg/L mg/L       E30.0 E30.0       0.0240 0.0557       0.100 0.750       5.000       0       104       90 - 110         Lab Sample Di Sulfate       CS-R125990 30.0-W       Date Analyzet       0/17/2019 US-N       Sulfate       0.0100       5.000       0       103       90 - 110         Choride Fluoride       S.16       mg/L       E30.0       0.0386       0.100       5.000       0       103       90 - 110         Choride Fluoride       S.16       mg/L       E30.0       0.0386       0.100       5.000       0       103       90 - 110         Sulfate       S.16       mg/L       E30.0       0.0386       0.100       5.000       0       103       90 - 110         Sulfate       S.12       mg/L       E30.0       0.0240       0.100       5.000       0       102       90 - 110         Sulfate       S.12       mg/L       E30.0       0.0240       0.100       5.000       0       102       90 - 110         Sulfate       S.12       mg/L       E30.0       0.0386       0.100       5.000       0       101       90 - 110         Sulfate       S.05 </td <td>te</td> <td>4.76</td> <td>mg/L</td> <td>E300.0</td> <td>0.0557</td> <td>0.750</td> <td>5.000</td> <td>0</td> <td>95.3</td> <td>90 - 110</td> <td></td> <td></td> <td></td> <td></td>	te	4.76	mg/L	E300.0	0.0557	0.750	5.000	0	95.3	90 - 110				
Inflit         Ing         Ing         Ing         Inflit         Inflit <thinflit< th="">         Inflit         Inflit</thinflit<>	-	Date Analyzed:	05/17/20	)19 1148h										
Lab         Los         Los <thlos< th=""> <thlos< th=""> <thlos< th=""></thlos<></thlos<></thlos<>	ide	5.22	mg/L	E300.0	0.0240	0.100	5.000	0	104	90 - 110				
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       E       E       E       E       E         Chloride       5.05       mg/L       E300.0       0.0386       0.100       5.000       0       102       90 - 110         Lab Sample ID:       LCS-R126074       Date Analyzed:       05/20/2019 1411h       E       E       E       E       E         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       E       E       E       E       E       E         pH @ 25° C       9.05       pH Units       SM4500-H+B       1.00       1	te	5.02	mg/L	E300.0	0.0557	0.750	5.000	0	100	90 - 110				
Fluoride       5.12       mg/L       E30.0       0.0240       0.100       5.000       0       102       90 - 110         Sulfate       5.12       mg/L       E30.0       0.0557       0.750       5.000       0       102       90 - 110         Lab Sample ID:       LCS-R126074       Date Analyzed:       05/20/2019 1411h       E30.0       0.0386       0.100       5.000       0       101       90 - 110         Lab Sample ID:       LCS-R126637       Date Analyzed:       05/20/2019 1411h       E30.0       0.0386       0.100       5.000       0       101       90 - 110         Lab Sample ID:       LCS-R125653       Date Analyzed:       05/20/2019 1412h       E	-	Date Analyzed:	05/17/20	)19 1925h										
Sulfate         5.12         mg/L         E300.0         0.0557         0.750         5.000         0         102         90 - 110           Lab Sample ID: Test Code:         LCS-R126074 300.0-W         Date Analyzed:         05/20/2019 1411h         E	ide	5.16	mg/L	E300.0	0.0386	0.100	5.000	0	103	90 - 110				
Loss Sample ID:       LCSs-R126074 300.0-W       Date Analyzed:       05/20/2019 1411h         Test Code:       300.0-W       5.05       mg/L       E300.0       0.0386       0.100       5.000       0       101       90 - 110         Lob Sample ID:       LCS-R125653 PH-4500H+B       Date Analyzed:       05/09/2019 1412h       E300.0       0.0386       0.100       5.000       0       101       90 - 110         pH @ 25° C       PH -4500H+B       9.05       pH Units       SM4500-H+B       1.00       1.00       9.000       0       101       98 - 102         Lab Sample ID:       LCS-R125660 PH -4500H+B       Date Analyzed:       05/09/2019 1730h       EXERCISE       EXERCISE <td>ide</td> <td>5.12</td> <td>mg/L</td> <td>E300.0</td> <td>0.0240</td> <td>0.100</td> <td>5.000</td> <td>0</td> <td>102</td> <td>90 - 110</td> <td></td> <td></td> <td></td> <td></td>	ide	5.12	mg/L	E300.0	0.0240	0.100	5.000	0	102	90 - 110				
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: Test Code:       LCS-R125653 PH-4500H+B       Date Analyzet       05/09/2019 1412h	te	5.12	mg/L	E300.0	0.0557	0.750	5.000	0	102	90 - 110				
Lab Sample ID:       LCS-R125653       Date Analyzed:       05/09/2019 1412h         Test Code:       PH-4500H+B       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       I.00       1.00       9.000       0       101       98 - 102         Lab Sample ID:       PH-4500H+B       Date Analyzed:       05/09/2019 1730h       I.00       I.00 <t< td=""><td>-</td><td>Date Analyzed:</td><td>05/20/20</td><td>)19 1411h</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	-	Date Analyzed:	05/20/20	)19 1411h										
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       V	ride	5.05	mg/L	E300.0	0.0386	0.100	5.000	0	101	90 - 110				
Lab Sample ID:     LCS-R125660     Date Analyzed:     05/09/2019 1730h       Test Code:     PH-4500H+B	•	Date Analyzed:	05/09/20	)19 1412h										
Test Code: PH-4500H+B	) 25° C	9.05	pH Units	SM4500-H+B	1.00	1.00	9.000	0	101	98 - 102				
	•	Date Analyzed:	05/09/20	)19 1730h										
pH@25°C 9.09 pH Units SM4500-H+B 1.00 1.00 9.000 0 101 98 - 102	) 25° C	9.09	pH Units	SM4500-H+B	1.00	1.00	9.000	0	101	98 - 102				

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Total Dissolved Solids

### 3440 South 700 West

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### Jose Rocha QA Officer

# **QC SUMMARY REPORT**

Lab Set ID:	PacifiCorp 1905215 Hunter CCR Groundy	votor Sompling / DI	PCM05	,			Contact Dept: QC Typ	WC	er					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample II Test Code:	D: LCS-R125700 TDS-W-2540C	Date Analyzed:	05/09/20	19 1350h										
Total Dissolve	ed Solids	182	mg/L	SM2540C	8.00	10.0	205.0	0	88.8	80 - 120				
Lab Sample II Test Code:	D: LCS-R125749 TDS-W-2540C	Date Analyzed:	05/10/20	19 1250h										

10.0

205.0

0

93.7

80 - 120

SM2540C

8.00

192

mg/L

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# **QC SUMMARY REPORT**

Jose Rocha QA Officer

# Client: PacifiCorp Contact: Jeff Tucker Lab Set ID: 1905215 Dept: WC Project: Hunter CCR Groundwater Sampling / PERCM052 QC Type: MBLK

Analyte		Result	Units	Method	MDL	Limit	Spiked	Amount	%REC	Limits	Amt	% RPD	Limit	Qual
Lab Sample ID: Test Code:	<b>MB-R125986</b> 300.0-W	Date Analyzed:	05/16/201	19 2247h										
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: Test Code:	<b>MB-R125988</b> 300.0-W	Date Analyzed:	05/17/201	19 1132h										
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: Test Code:	<b>MB-R125990</b> 300.0-W	Date Analyzed:	05/17/201	19 1908h										
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: Test Code:	<b>MB-R126074</b> 300.0-W	Date Analyzed:	05/20/201	19 1354h										
Chloride		< 0.100	mg/L	E300.0	0.0386	0.100								
Lab Sample ID: Test Code:	<b>MB-R125700</b> TDS-W-2540C	Date Analyzed:	05/09/201	19 1350h										
Total Dissolved	Solids	< 10.0	mg/L	SM2540C	8.00	10.0								
Lab Sample ID: Test Code:	<b>MB-R125749</b> TDS-W-2540C	Date Analyzed:	05/10/201	19 1250h										
Total Dissolved	Solids	< 10.0	mg/L	SM2540C	8.00	10.0								

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### Jose Rocha QA Officer

# **QC SUMMARY REPORT**

		Reporting Amount	Spike Ref.	RPD Ref.	RPD
<b>Project:</b>	Hunter CCR Groundwater Sampling / PERCM052	QC Type	: MS		
Lab Set ID:	1905215	Dept:	WC		
Client:	PacifiCorp	Contact:	Jeff Tucker		

Analyte		Result	Units	Method	MDL	Limit	Spiked	Amount	%REC	Limits	Amt	% RPD	Limit	Qual
Lab Sample ID: Test Code:	<b>1905215-004AMS</b> 300.0-W	Date Analyzed:	05/17/20	19 027h										
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: Test Code:	<b>1905215-014AMS</b> 300.0-W	Date Analyzed:	05/17/20	19 1655h										
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: Test Code:	<b>1905217-003AMS</b> 300.0-W	Date Analyzed:	05/17/20	19 2032h										
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: Test Code:	<b>1905217-007AMS</b> 300.0-W	Date Analyzed:	05/17/20	19 2245h										
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: Test Code:	<b>1905215-013AMS</b> 300.0-W	Date Analyzed:	05/17/20	19 1439h										
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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Jose Rocha **QA** Officer

# **QC SUMMARY REPORT**

Lab Set ID:	PacifiCorp 1905215 Hunter CCR Groundw	ater Sampling / Pl	ERCM052	2			Contact Dept: QC Typ	WC	ter					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID Test Code:	<b>1905215-009AMS</b> 300.0-W	Date Analyzed:	05/20/20	19 1551h										
Chloride		1,560	mg/L	E300.0	7.72	20.0	1,000	527	103	90 - 110				
Lab Sample ID Test Code:	<b>1905217-007AMS</b> 300.0-W	Date Analyzed:	05/20/20	19 1731h										
Chloride		756	mg/L	E300.0	3.86	10.0	500.0	253	101	90 - 110				



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### Jose Rocha QA Officer

# **QC SUMMARY REPORT**

		Reporting	Amount	Spike Ref.	RPD Ref.	RPD
Project:	Hunter CCR Groundwater Sampling / PERCM052		QC Type:	MSD		
Lab Set ID:	1905215		Dept:	WC		
Client:	PacifiCorp		Contact:	Jeff Tucker		

Analyte		Result	Units	Method	MDL	Limit	Spiked	Amount	%REC	Limits	Amt	% RPD	Limit	Qual
Lab Sample ID: Test Code:	<b>1905215-004AMSD</b> 300.0-W	Date Analyzed:	05/17/20	19 043h										
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: Test Code:	<b>1905215-014AMSD</b> 300.0-W	Date Analyzed:	05/17/20	19 1711h										
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: Test Code:	<b>1905217-003AMSD</b> 300.0-W	Date Analyzed:	05/17/20	19 2048h										
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: Test Code:	<b>1905217-007AMSD</b> 300.0-W	Date Analyzed:	05/17/20	19 2302h										
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: Test Code:	<b>1905215-013AMSD</b> 300.0-W	Date Analyzed:	05/17/20	19 1455h										
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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Jose Rocha QA Officer

### **QC SUMMARY REPORT** Jeff Tucker **Client:** PacifiCorp **Contact:** Lab Set ID: 1905215 Dept: WC Hunter CCR Groundwater Sampling / PERCM052 QC Type: MSD **Project:** Reporting Spike Ref. **RPD Ref.** RPD Amount Method MDL %REC % RPD Limit Qual Result Units Limit Spiked Limits Analyte Amount Amt Lab Sample ID: 1905215-009AMSD 05/20/2019 1608h Date Analyzed: Test Code: 300.0-W Chloride 1,570 E300.0 7.72 20.0 1,000 527 104 90 - 110 1560 0.431 20 mg/L

		<u>)</u>	0										-
Lab Sample ID:	1905217-007AMSD	Date Analyzed:	05/20/201	9 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

Report Date: 5/23/2019 Page 45 of 45

America	n West Analytical Lab	oratories			Rpt Emai		HC icEDD QC
	RDER Summary	· .			Wor	k Order: <b>1905215</b>	Page 1 of 4
Client:	PacifiCorp				D	ue Date: 5/23/2019	
Client ID:	PAC900		Contact	Jeff Tucker			
Project:	Hunter CCR Groundwater Sam	pling / PERCM052	QC Leve	el: II+	v	VO Type: Project	
Comments:	QC2+. Include EDD. Cc: mhollar received outside of hold.;	nd@waterenvtech.com. R	eport Fluoride res	sults on set 1905216 also. N			ort, pH
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	<b>300.0-W</b> 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
1005015 0040		••••••••••••••••••••••••••••••••••••••		TDS-W-2540C		DF-WC	
1905215-001B				200.7-W		DF-Metals	
		a		2 SEL Analytes: B CA			
				200.7-W-PR		DF-Metals	
905215-002A	ELF-2	5/8/2019 1730h	5/9/2019 0721h	<b>300.0-W</b> 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	1
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1905215-002B				200.7-W		DF-Metals	
	· · · · · · · · · · · · · · · · · · ·			2 SEL Analytes: B CA			
N				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	
1005015 0000				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	<b>300.0-W</b> 3 SEL Analytes: CL F SO4	Aqueous	DF-WC	:
				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	

1

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WORK OR	DER Sumn	nary					Work Order: 1905215	Page 2 of 4
Client:	PacifiCorp						Due Date: 5/23/2019	
Sample ID	Client Sample I	D	Collected Date	Received Date	Test Code	Matrix	Sel Storage	<u>11960</u> -
905215-005A	ELF-5		5/8/2019 1245h	5/9/2019 0721h	300.0-W	Aqueous	DF-WC	]
					3 SEL Analytes: CL F SO4		DF-WC	
					PH-4500H+B TDS-W-2540C		DF-WC	
1905215-005B					200.7-W		DF-WC DF-Metals	·····
1905215-005B					200.7-W 2 SEL Analytes: B CA		Dr-metais	
					200.7-W-PR		DF-Metals	
1905215-006A	ELF-6		5/8/2019 1230h	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	
1905215-006B					200.7-W		DF-Metals	
					2 SEL Analytes: B CA			
					200.7-W-PR		DF-Metals	
1905215-007A	ELF-7		5/8/2019 1400h	5/9/2019 0721h	300.0-W	Aqueous	DF-WC	]
					3 SEL Analytes: CL F SO4			
					PH-4500H+B		DF-WC	
		· · · · · · · · · · · · · · · · · · ·			TDS-W-2540C		DF-WC	
1905215-007B					200.7-W		DF-Metals	
					2 SEL Analytes: B CA			
					200.7-W-PR		DF-Metals	
1905215-008A	ELF-8		5/8/2019 1145h	5/9/2019 0721h	300.0-W	Aqueous	DF-WC	:
					3 SEL Analytes: CL F SO4			
		····			PH-4500H+B		DF-WC	
1905215-008B	. <u>.</u>				TDS-W-2540C	· · · · · / IA 1999 ( PAL ) · · ·	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	Aqueous	DF-WC	
					3 SEL Analytes: CL F SO4			
		• • • • • • • • • • • • • • • • • • •			PH-4500H+B		DF-WC	1-72000-00-0
			·····		TDS-W-2540C		DF-WC	
1905215-009B					200.7-W		DF-Metals	
					2 SEL Analytes: B CA			
					200.7-W-PR		DF-Metals	
Printed: 05/09/19 12:55	L	ABORATORY CHECK: %M	RT 🖸 CN 🗌	TAT 🗌 🛛 QC 🗌		HOK	HOK COC Emailed	

WORK OR Client:	<b>RDER Summary</b> PacifiCorp	, ***				Work Order: <b>1905215</b> Due Date: 5/23/2019	Page 3 of 4
Sample ID	Client Sample ID	Collected Da	nte Received Da	e Test Code	Matrix	Sel Storage	
1905215-010A	ELF-10	5/8/2019 1500	h 5/9/2019 0721	n <b>300.0-W</b> 3 SEL Analytes: CL F SC	Aqueous	DF-WC	]
				PH-4500H+B		DF-WC	
	••			TDS-W-2540C		DF-WC	······
1905215-010B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA			
				200.7-W-PR		DF-Metals	
1905215-011A	ELF-11	5/8/2019 1115	5h 5/9/2019 0721		Aqueous	DF-WC	]
				3 SEL Analytes: CL F SC	)4		
				PH-4500H+B		DF-WC	
1905215-011B				TDS-W-2540C 200.7-W		DF-WC	
1905215-0115				200.7-W 2 SEL Analytes: B CA		DF-Metals	
				200.7-W-PR		DF-Metals	
1905215-012A	ELF-12	5/8/2019 1045	5h 5/9/2019 0721		Aqueous	DF-WC	
				3 SEL Analytes: CL F So PH-4500H+B	04	DF-WC	
	· · · · · · · · · · · · · · · · · · ·	N		TDS-W-2540C		DF-WC	
1905215-012B				200.7-W		DF-We DF-Metals	
1,00210 0120				2 SEL Analytes: B CA		Di -iviciais	
				200.7-W-PR		DF-Metals	
1905215-013A	ELF-13	5/8/2019 100	0h 5/9/2019 072	h <b>300.0-W</b>	Aqueous	DF-WC	
				3 SEL Analytes: CL F S	04		
			· · · · · · · · · · · · · · · · · · ·	PH-4500H+B		DF-WC	
		· · · · · · · · · · · · · · · · · · ·		TDS-W-2540C		DF-WC	
1905215-013B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA		DEM	
	N			200.7-W-PR		DF-Metals	
1905215-014A	ELF-14	5/8/2019 091	5h 5/9/2019 072	h <b>300.0-W</b> 3 SEL Analytes: CL F S	Aqueous	DF-WC	
				PH-4500H+B	04	DF-WC	
	APRIL 2 (0.2.1)			TDS-W-2540C		DF-WC	
1905215-014B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA			
				200.7-W-PR		DF-Metals	

WORK O Client:	RDER Summary PacifiCorp					Work Order: <b>1905215</b> Due Date: 5/23/2019	Page 4 of 4
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	1
				3 SEL Analytes: CL F SO4			
				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	1
				3 SEL Analytes: CL F SO4			
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1905215-016B				200.7-W		DF-Metals	and denote a strange.
				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 We Analytical Labora 3440 S. 700 W. Salt Lake City, U Phone # (801) 263-8686 Toll Free # 0		All analysis will be conducted using NELAP accredited methods and all data will be reported using AWAL's standard analyte lists and reportin limits (PQL) unless specifically requested otherwise on this Chain of Custody and/or attached documentation.										vorted using AWAL's standard analyte lists and reporting	Page 1 of 2		
	Fax = (801) 263-8687 Email awaler www.awal-labs.com				1	$\langle \rangle$	evel:						und Ti 5 (St	2	Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.	Due Date: 5 · 23
Address: City, State, Zip: Contact: Phone #: E-mail: Project Name:	PACIFICORP-UT		Time Sampled 16:35 17:30 14:30 13:30 12:45 12:30 14:00 11:45 16:30 15:00 11:15	4         4         4           7         4         7           8         6         Containers	1       M <t< td=""><td>2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2</td><td>+) 3</td><td>3+</td><td></td><td></td><td></td><td></td><td></td><td></td><td>5:00 pm on the day they are due.    Report down to the MDL  Include EDD: Lab Filter for:  For Compliance With:  NELAP CWA SDWA ELAP/A2LA CWA SDWA ELAP/A2LA Other:  Known Hazards &amp; Sample Comments</td><td>Laboratory Use Only CCC 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 telivored 2 Ambient or Chilled 3 Temperature 2 Ambient or Chilled 3 Temperature C Y N Checked at bench 6 Received Within Holding Times Y N Checked at bench 6 Received Within Holding Times Y N Checked at bench C Ambient of C Ambi</td></t<>	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	+) 3	3+							5:00 pm on the day they are due.    Report down to the MDL  Include EDD: Lab Filter for:  For Compliance With:  NELAP CWA SDWA ELAP/A2LA CWA SDWA ELAP/A2LA Other:  Known Hazards & Sample Comments	Laboratory Use Only CCC 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 telivored 2 Ambient or Chilled 3 Temperature 2 Ambient or Chilled 3 Temperature C Y N Checked at bench 6 Received Within Holding Times Y N Checked at bench 6 Received Within Holding Times Y N Checked at bench C Ambient of C Ambi
12 ELF-12		5/8/2019	10:45	4	w	x										Sample Labels and COC Record Match?
13 ELF-13 14 ELF-14		5/8/2019 5/8/2019	10:00 9:15	4	w w	x x										-
			ļ,													
Relinquished pr Signature Print Name: Relinquished by: Signature Print Name: Signature Print Name:	Jea ne Shirley	Date: Time: Date: Time: Date: Time: Time:	Received by: Signature Print Name: Received by: Signature Print Name: Received by: Signature Print Name: Print Name:	At	- 1 n			nee	M	γių			an1 -	0979 7:21	Special Instructions: PLEASE SEND A COPY OF THE ANAL TO MARCUS HOLLAND AT: MHOLLAND@WATERENVTEC PLEASE RUN AT LEAST ONE LA THIS SAMPLE SET.	H.COM

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

		American Wo Analytical Labor 3440 S. 700 W. Salt Lake City, U Phone # (801) 263-8686 Toll Free # 0	atories		All an	alysis w				NELAP	occredite	d meth	ods and a	ll data will	be repo	ODY orted using AWAL's standard analyte lists and reporting ustody and/or attached documentation.	AWAL Lab Sample Set #
		Fax # (801) 263-8687 Email awal www.awal-labs.co					- (	evel:	3+				<b>Around</b> 3 4 5	Stng		Unless other arrangements have been made, signed reports will be emailed by 5:00 pm on the day they are due.	Due Date: 5 - 23
<b>15</b> <b>16</b> <b>7</b> <b>8</b> <b>9</b> <b>11</b> <b>12</b> <b>13</b> <b>14</b> <b>15</b> <b>14</b> <b>15</b> <b>16</b> <b>1</b> <b>1</b> <b>16</b> <b>1</b> <b>16</b> <b>1</b> <b>16</b> <b>1</b> <b>16</b> <b>1</b> <b>16</b> <b>1</b> <b>16</b> <b>16</b>	Address: City, State, Zip: Contact: Phone #: E-mail: Project Name: Project #: PO #: Sampler Name: DUP FB	JEFF TUCKER Cell #: JEFF.TUCKER@PACIFICORP.COM HUNTER CCR GROUNDWATER SAMPLI PERCM052		Time Sampled 15:20 14:00	+   +     +   +	≤     ≤     Sample Matrix										Report down to the MDL         Include EDD:         Lab Filter for:         Field Filtered For:         NELAP         NELAP         RCRA         CWA         ELAP / A2LA         NULAP         Non-Compliance         Other:         Sample Comments	Laboratory Use Only COC Tapo 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 5 Molecular of chilles 3 Temperature 4 Preserved Y N 5 Molecular of Checked at bench 6 Received Within Halding Times Y N Checked at bench 7 N 1 Sampler babels and COC Record Match? N
1.	Relinquished		Date: 75 6019	Received by: K Signature	<u> </u>		6	<u>u</u>	h	,Y				5-09		Special Instructions:	J
	Relinquished by:	2 Shir ley	Time Date:	Print Name: Received by: Signature	<u>) (</u>	yr	<u>مر '</u>	6.	L-	-h	l/		Tim Dat	" " "	4	PLEASE SEND A COPY OF THE ANAY MARCUS HOLLAND AT:	LITCAL REPORT TO
	Signature Print Name: Relinquished by:		Time: Date:	Signature Print Name: Received by:									Tim Dat			MHOLLAND@WATERENVTEC	
	Reimquished by: Signature Print Name:	· · · · · · · · · · · · · · · · · · ·	Date: Time:	Received by: Signature Print Name:									L)ar Tim			PLEASE RUN AT LEAST ONE LA THIS SAMPLE SET	BORATORY SPIKE FOR

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

Constitue	nts Analyzed
Appendix III	Appendix IV
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
рН	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

Analysis	Preservative	-001 -	-00Z	-003	-004	-005	-006	-007	-005	-009	-010	-011 -	OIZ	-013	-014	-015	-016	
Ammonia	$pH < 2H_2SO_4$																	 
COD	pH <2 H <sub>2</sub> SO <sub>4</sub>																	 
Cyanide	pH>12 NaOH																	 
Metals	pH <2 HNO <sub>3</sub>	ves	Ves	Ves	Ves	Ves	Jes	VPS	Ves	Ves	Ves	ves	ves	Ves	ves	Ves	res	
NO <sub>2</sub> & NO <sub>3</sub>	pH <2 H <sub>2</sub> SO <sub>4</sub>	l	ı	1	/	1	/	,	1	1	1	7-2-	7	1	1-3	7-0	7-5	
O&G	pH <2 HCL																-	 
Phenols	pH <2 H <sub>2</sub> SO <sub>4</sub>																	
Sulfide	pH >9 NaOH, Zn Acetate																	
TKN	pH <2 H <sub>2</sub> SO <sub>4</sub>																	
T PO <sub>4</sub>	$pH < 2H_2SO_4$															· · · · · · · · · · · · · · · · · · ·		 
	· · · · · · · · · · · · · · · · · · ·																	 
· · · · · · · · · · · · · · · · · · ·																	1	 

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. American West Analytical Laboratories (AWAL) is accredited by The National Phone: (801) 263-8686 Environmental Laboratory Accreditation Program (NELAP) in Utah and Texas; and is Toll Free: (888) 263-8686 state accredited in Colorado, Idaho, New Mexico, Wyoming, and Missouri. Fax: (801) 263-8687 All analyses were performed in accordance to the NELAP protocols unless noted e-mail: awal@awal-labs.com otherwise. Accreditation scope documents are available upon request. If you have any questions or concerns regarding this report please feel free to call. web: www.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 Kyle F. Gross purging efficiency. The "Reporting Limit" found on the report is equivalent to the Laboratory Director 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 Jose Rocha figures for quality control and calculation purposes. **QA** Officer

Thank You,

Approved by:

Laboratory Director or designee

Sample(s) were subcontracted for the following analyses:

Radiological Testing



**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

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>Dhomes</b> $(901)$ 262 9696	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	0.00234	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00400	< 0.00400	
e-mail: awal@awal-labs.com	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
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 826h	E200.8	0.00200	< 0.00200	
Laboration D'action			·					

Laboratory Director <sup>1</sup> - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

### Jose Rocha

**QA** Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-002Client Sample ID:ELF-2Collection Date:5/8/20191730hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>D1</b>	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	0.00238	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00400	< 0.00400	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 841h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 3 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-003Client Sample ID:ELF-3Collection Date:5/8/20191430hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
Dhamas (001) 2(2,000)	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.000500	0.000779	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	0.00422	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00400	0.0214	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 844h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 4 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-004Client Sample ID:ELF-4Collection Date:5/8/20191330hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
DL	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00400	0.00593	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 847h	E200.8	0.00200	< 0.00200	
								-

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 5 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-005Client Sample ID:ELF-5Collection Date:5/8/20191245hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>DI</b>	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00400	0.0102	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1059h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 6 of 41



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 1905216-006

 Lab Sample ID:
 1905216-006
 1905216-006

 Client Sample ID:
 ELF-6
 1230h

 Received Date:
 5/9/2019
 722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>D1</b>	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00400	0.0358	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1102h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 7 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-007Client Sample ID:ELF-7Collection Date:5/8/20191400hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>DI</b>	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00400	0.00530	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1105h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 8 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-008Client Sample ID:ELF-8Collection Date:5/8/20191145hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
DL	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.000500	0.00195	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/20/2019 1551h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00400	0.201	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1147h	E200.8	0.00200	< 0.00200	
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Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 9 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-009Client Sample ID:ELF-9Collection Date:5/8/20191630hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
Dhamar (901) 262 9696	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/20/2019 1554h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00400	< 0.00400	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1150h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 10 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-010Client Sample ID:ELF-10Collection Date:5/8/20191500hReceived Date:5/9/2019722h

### **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 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	
	Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Lead Lithium Mercury Molybdenum Selenium	Antimonymg/LArsenicmg/LBariummg/LBerylliummg/LCadmiummg/LChromiummg/LCobaltmg/LLeadmg/LLithiummg/LMercurymg/LMolybdenummg/LSeleniummg/L	Compound         Units         Prepared           Antimony         mg/L         5/13/2019         1648h           Arsenic         mg/L         5/13/2019         1648h           Barium         mg/L         5/13/2019         1648h           Beryllium         mg/L         5/13/2019         1648h           Cadmium         mg/L         5/13/2019         1648h           Chromium         mg/L         5/13/2019         1648h           Lead         mg/L         5/13/2019         1648h           Lithium         mg/L         5/13/2019         1648h           Mercury         mg/L         5/13/2019         1648h           Molybdenum         mg/L         5/13/2019         1648h	CompoundUnitsPreparedAnalyzedAntimonymg/L5/13/20191648h5/20/20191557hArsenicmg/L5/13/20191648h5/14/20191153hBariummg/L5/13/20191648h5/14/20191153hBerylliummg/L5/13/20191648h5/14/20191153hCadmiummg/L5/13/20191648h5/14/20191153hCadmiummg/L5/13/20191648h5/14/20191153hChromiummg/L5/13/20191648h5/14/20191153hLeadmg/L5/13/20191648h5/14/20191153hLithiummg/L5/13/20191648h5/14/20191153hMercurymg/L5/13/20191648h5/14/20191153hMolybdenummg/L5/13/20191648h5/14/20191153hSeleniummg/L5/13/20191648h5/14/20191153h	CompoundUnitsPreparedAnalyzedUsedAntimonymg/L5/13/20191648h5/20/20191557hE200.8Arsenicmg/L5/13/20191648h5/14/20191153hE200.8Bariummg/L5/13/20191648h5/14/20191153hE200.8Berylliummg/L5/13/20191648h5/14/20191153hE200.8Cadmiummg/L5/13/20191648h5/14/20191153hE200.8Chromiummg/L5/13/20191648h5/14/20191153hE200.8Cobaltmg/L5/13/20191648h5/14/20191153hE200.8Leadmg/L5/13/20191648h5/14/20191153hE200.8Lithiummg/L5/13/20191648h5/14/20191153hE200.8Leadmg/L5/13/20191648h5/14/20191153hE200.8Lithiummg/L5/13/20191648h5/14/20191153hE200.8Lithiummg/L5/13/20191648h5/14/20191153hE200.8Seleniummg/L5/13/20191648h5/14/2019822hE245.1	CompoundUnitsPreparedAnalyzedUsedLimitAntimonymg/L5/13/20191648h5/20/20191557hE200.80.00400Arsenicmg/L5/13/20191648h5/14/20191153hE200.80.00200Bariummg/L5/13/20191648h5/14/20191153hE200.80.00200Berylliummg/L5/13/20191648h5/14/20191153hE200.80.00200Cadmiummg/L5/13/20191648h5/14/20191153hE200.80.00200Cadmiummg/L5/13/20191648h5/14/20191153hE200.80.00200Cobaltmg/L5/13/20191648h5/14/20191153hE200.80.00200Leadmg/L5/13/20191648h5/14/20191153hE200.80.00200Lithiummg/L5/13/20191648h5/14/20191153hE200.80.00200Mercurymg/L5/13/20191648h5/14/20191153hE200.80.00200Molybdenummg/L5/13/20191648h5/14/20191153hE200.71.00Mercurymg/L5/13/20191648h5/14/2019821h0.0000000Molybdenummg/L5/13/20191648h5/14/2019820h0.00200Molybdenummg/L5/13/20191648h5/14/2019820h0.00200	CompoundUnitsPreparedAnalyzedUsedLimitResultAntimony $mg/L$ $5/13/2019$ 1648h $5/20/2019$ 1557hE200.8 $0.00400$ < $0.00400$ Arsenic $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.00200$ Barium $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.0184$ Beryllium $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.00200$ Cadmium $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.00200$ Cadmium $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.00200$ Cobalt $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.00200$ Cobalt $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.00200$ Lead $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.00200$ Lithium $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.00200$ Lead $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.000200$ Lithium $mg/L$ $5/13/2019$ 1648h $5/14/2019$ 1153hE200.8 $0.00200$ < $0.0000900$

Laboratory Director

Jose Rocha QA Officer

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Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-011Client Sample ID:ELF-11Collection Date:5/8/20191115hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
DL	Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1516h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/20/2019 1516h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00400	0.0146	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1156h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 12 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-012Client Sample ID:ELF-12Collection Date:5/8/20191045hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>DI</b>	Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1527h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/20/2019 1527h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00400	< 0.00400	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1159h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 13 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-013Client Sample ID:ELF-13Collection Date:5/8/20191000hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>DI</b>	Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1530h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/20/2019 1530h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00400	< 0.00400	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1202h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 14 of 41



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-014Client Sample ID:ELF-14Collection Date:5/8/2019915hReceived Date:5/9/2019722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>DI</b>	Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1533h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/20/2019 1533h	E200.8	0.00200	0.00888	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00400	0.00976	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 1205h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 15 of 41



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 1

 Lab Sample ID:
 1905216-015
 1

 Client Sample ID:
 DUP
 1

 Collection Date:
 5/7/2019
 1520h

 Received Date:
 5/9/2019
 722h

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>D</b> hama $(901) 262,9696$	Beryllium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00400	0.00451	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 905h	E200.8	0.00200	< 0.00200	
T I DI								

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 16 of 41



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Con

### **Analytical Results**

### TOTAL METALS

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	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	
<b>D1</b>	Beryllium	mg/L	5/13/2019 1648h	5/20/2019 1536h	E200.8	0.00200	< 0.00200	
Phone: (801) 263-8686	Cadmium	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.000500	< 0.000500	
Toll Free: (888) 263-8686	Chromium	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	
Fax: (801) 263-8687	Cobalt	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00400	< 0.00400	
e-mail: awal@awal-labs.com	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	
web: www.awal-labs.com	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	
Kyle F. Gross	Thallium	mg/L	5/13/2019 1648h	5/14/2019 909h	E200.8	0.00200	< 0.00200	

Laboratory Director

Jose Rocha QA Officer

### Report Date: 5/23/2019 Page 17 of 41

# American West

# **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521905216-001Lab Sample ID:1905216-001ELF-1DClient Sample ID:ELF-1D5/8/2019Collection Date:5/8/20191635hReceived Date:5/9/2019722h

### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/17/2019 240h	E300.0	0.100	< 0.100	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/17/2019 257h	E300.0	0.100	0.310	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

# American West

# **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521Lab Sample ID:1905216-0031Client Sample ID:ELF-3Collection Date:5/8/20191430hReceived Date:5/9/2019722h

### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/17/2019 314h	E300.0	0.100	< 0.100	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-004Client Sample ID:ELF-4Collection Date:5/8/20191330hReceived Date:5/9/2019722h

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/17/2019 330h	E300.0	0.100	0.187	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

## MERICAN VVES

## **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**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/17/2019 347h	E300.0	0.100	0.108	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha **QA** Officer



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Sample ID:
 1905216-006

 Client Sample ID:
 ELF-6
 Image: Contact Sample ID:
 S/8/2019
 1230h

 Received Date:
 5/9/2019
 722h
 Image: Contact Sample ID:
 Image: Contact Sample ID:

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/17/2019 404h	E300.0	0.100	0.139	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

## American West

## **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521Lab Sample ID:1905216-0071Client Sample ID:ELF-7Collection Date:5/8/20191400hReceived Date:5/9/2019722h

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/18/2019 205h	E300.0	0.100	0.132	

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web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

## American West

## **INORGANIC ANALYTICAL REPORT**

 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Sample ID:
 1905216-008

 Client Sample ID:
 ELF-8
 Image: Contact Sample ID:
 S/8/2019
 1145h

 Received Date:
 5/9/2019
 722h
 Image: Contact Sample ID:
 Image: Contact Sample ID:

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/18/2019 222h	E300.0	0.100	1.13	

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web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521905216-009Lab Sample ID:1905216-009ELF-9Collection Date:5/8/20191630hReceived Date:5/9/2019722h

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/18/2019 239h	E300.0	0.100	1.43	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

## American West

## **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521905216-010Lab Sample ID:1905216-010ELF-10Client Sample ID:5/8/20191500hReceived Date:5/9/2019722h

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/18/2019 255h	E300.0	0.100	< 0.100	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



**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**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L	5	5/18/2019 312h	E300.0	0.100	0.173	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha **QA** Officer

# American West

## **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521005216-012Lab Sample ID:1905216-012Image: Contact in the second se

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L	:	5/18/2019 329h	E300.0	0.100	0.341	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1905216-013Client Sample ID:ELF-13Collection Date:5/8/20191000hReceived Date:5/9/2019722h

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/18/2019 345h	E300.0	0.100	< 0.100	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

## American West

## **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM0521905216-014Lab Sample ID:1905216-014ELF-14Client Sample ID:ELF-141905216-014Collection Date:5/8/2019915hReceived Date:5/9/2019722h

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/18/2019 402h	E300.0	0.100	< 0.100	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact Con

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L		5/18/2019 510h	E300.0	0.100	< 0.100	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 Image: Contact in the sample ID in the sam

#### **Analytical Results**

3440 South 700 West	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Salt Lake City, UT 84119	Fluoride	mg/L	5	5/17/2019 1745h	E300.0	0.100	< 0.100	

Phone: (801) 263-8686 Toll Free: (888) 263-8686 Fax: (801) 263-8687 e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross Laboratory Director

> Jose Rocha QA Officer

#### Report Date: 5/23/2019 Page 33 of 41



#### 3440 South 700 West

Salt Lake City, UT 84119

Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687

Kyle F. Gross Laboratory Director

Jose Rocha QA Officer

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

## **QC SUMMARY REPORT**

Lab Set ID: 1905216	Dent: ME
	Dept: ME
Project: Hunter CCR Groundwater Sampling / PERCM052	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:	05/22/201	9 1844h										
Test Code:	200.7-W	Date Prepared:	05/13/201	9 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:	05/14/201	9 823h										
Test Code:	200.8-W	Date Prepared:	05/13/201	9 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:	05/17/201	9 1641h										
Test Code:	200.8-W	Date Prepared:	05/13/201	9 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:	05/14/201	9 747h										
Test Code:	HG-DW-245.1	Date Prepared:	05/13/201	9 1430h										
Mercury		0.00350	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	105	85 - 115				

Report Date: 5/23/2019 Page 34 of 41



Mercury

< 0.0000900

mg/L

E245.1

0.0000396

#### 3440 South 700 West

Salt Lake City, UT 84119

Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687

Kyle F. Gross Laboratory Director

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

### Jose Rocha QA Officer

## **QC SUMMARY REPORT**

ANALYTICAL LABO	DRATORIES			<u>v</u>	SUMMA	ANINC								
Client: P	acifiCorp						<b>Contact:</b>	Jeff Tuck	er					
Lab Set ID: 1	905216						Dept:	ME						
Project: H	Iunter CCR Ground	water Sampling / PE	ERCM052				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:	05/22/201	19 1842h										
Test Code:	200.7-W	Date Prepared:	05/13/201	9 1648h										
Lithium		< 0.100	mg/L	E200.7	0.0140	0.100								
Lab Sample ID:	<b>MB-62588</b>	Date Analyzed:	05/14/201	19 820h										
Test Code:	200.8-W	Date Prepared:	05/13/201	9 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:	<b>MB-62588</b>	Date Analyzed:	05/17/201	19 1638h										
Test Code:	200.8-W	Date Prepared:	05/13/201	9 1648h										
Antimony		< 0.00400	mg/L	E200.8	0.000668	0.00400								
Lab Sample ID:	MB-62587	Date Analyzed:	05/14/201	19 745h										
Test Code:	HG-DW-245.1	Date Prepared:	05/13/201	9 1430h										

All analyses 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.

0.0000900



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### Jose Rocha QA Officer

## **QC SUMMARY REPORT**

NALYTICAL LAG	BORATORIES			$\chi v$										
Client:	PacifiCorp						<b>Contact:</b>	Jeff Tuck	er					
Lab Set ID:	1905216						Dept:	ME						
Project:	Hunter CCR Groundw	ater Sampling / Pl	ERCM052				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	D: 1905216-001BMS	Date Analyzed:	05/22/20	19 1849h										
Test Code:	200.7-W	Date Prepared:	05/13/202	19 1648h										
Lithium		3.29	mg/L	E200.7	0.140	1.00	1.000	2.2	109	75 - 125				
Lab Sample ID	D: 1905216-001BMS	Date Analyzed:	05/14/20	19 835h										
Test Code:	200.8-W	Date Prepared:	05/13/202	19 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							
		0.00287	mg/L	E245.1	0.0000396	0.0000900	0.003330	<u>,</u>	86.3	80 - 120	

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Analyte	Res	ılt Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RP
<b>Project:</b>	Hunter CCR Groundwater Samp	ling / PERCM05	52			<b>QC Тур</b>	e: MSD				
Lab Set ID:	1905216					Dept:	ME				
Client:	PacifiCorp					Contact	: Jeff Tuck	er			

Analyte		Result	Units	Method	MDL	Limit	Spiked	Amount	%REC	Limits	Amt	% RPD	Limit	Qual
Lab Sample ID: Test Code:	<b>1905216-001BMSD</b> 200.7-W	Date Analyzed: Date Prepared:	05/22/201 05/13/201											
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: Test Code:	<b>1905216-001BMSD</b> 200.8-W	Date Analyzed: Date Prepared:	05/14/201 05/13/201											
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: Test Code:	<b>1905216-001BMSD</b> 200.8-W	Date Analyzed: Date Prepared:	05/17/201 05/13/201											
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: Test Code:	<b>1905216-001BMSD</b> HG-DW-245.1	Date Analyzed: Date Prepared:	05/14/201 05/13/201											
Mercury		0.00279	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	83.8	80 - 120	0.00287	2.88	20	

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

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Fluoride

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## **QC SUMMARY REPORT**

Lab Set ID: 1	PacifiCorp 1905216 Hunter CCR Ground	water Sampling / PI	ERCM052				Contact Dept: QC Typ	: Jeff Tuck WC pe: LCS	er					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: Test Code:	<b>LCS-R125987</b> 300.0-W	Date Analyzed:	05/16/20	19 2303h										
Fluoride		5.07	mg/L	E300.0	0.0240	0.100	5.000	0	101	90 - 110				
Lab Sample ID: Test Code:	LCS-R125989 300.0-W	Date Analyzed:	05/17/20	19 1148h										
Fluoride		5.22	mg/L	E300.0	0.0240	0.100	5.000	0	104	90 - 110				
Lab Sample ID: Test Code:	<b>LCS-R125991</b> 300.0-W	Date Analyzed:	05/17/20	19 1925h										

0.100

5.000

0

102

90 - 110

E300.0

0.0240

5.12

mg/L



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### **QC SUMMARY REPORT**

INALYTICAL LAB	ORATORIES													
Client:	PacifiCorp						<b>Contact:</b>	Jeff Tuck	er					
Lab Set ID:	1905216						Dept:	WC						
Project:	Hunter CCR Ground	water Sampling / PI	ERCM052				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 Test Code:	: MB-R125987 300.0-W	Date Analyzed:	05/16/202	19 2247h										
Fluoride		< 0.100	mg/L	E300.0	0.0240	0.100								
Lab Sample ID Test Code:	: MB-R125989 300.0-W	Date Analyzed:	05/17/203	19 1132h										
Fluoride		< 0.100	mg/L	E300.0	0.0240	0.100								
Lab Sample ID Test Code:	: MB-R125991 300.0-W	Date Analyzed:	05/17/203	19 1908h										
Fluoride		< 0.100	mg/L	E300.0	0.0240	0.100								



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## QC SUMMARY REPORT

Client: P	acifiCorp						Contact	: Jeff Tuck	ter					
Lab Set ID: 1	905216						Dept:	WC						
Project: H	Iunter CCR Groundwa	ater Sampling / PI	ERCM052	2			QC Тур	e: MS						
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qua
Lab Sample ID: Test Code:	<b>1905216-004AMS</b> 300.0-W	Date Analyzed:	05/17/20	19 027h										
Fluoride		2,510	mg/L	E300.0	12.0	50.0	2,500	0.187	101	90 - 110				
Lab Sample ID: Test Code:	<b>1905216-014AMS</b> 300.0-W	Date Analyzed:	05/17/20	19 1655h										
Fluoride		5,000	mg/L	E300.0	24.0	100	5,000	0.0971	100	90 - 110				
	1005216 0124346	Dete Aveland	05/17/20	10 1 4201										

Lab Sample ID:	1905216-013AMS	Date Analyzed:	05/1//201	9 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: Test Code:	<b>1905219-003AMS</b> 300.0-W	Date Analyzed:	05/17/201	9 2032h							
Fluoride		1,020	mg/L	E300.0	4.80	20.0	1,000	2.91	102	90 - 110	 
Lab Sample ID: Test Code:	<b>1905219-007AMS</b> 300.0-W	Date Analyzed:	05/17/201	9 2245h							
Fluoride		524	mg/L	E300.0	2.40	10.0	500.0	0.144	105	90 - 110	

Report Date: 5/23/2019 Page 40 of 41



Fluoride

Test Code:

Fluoride

Test Code:

Fluoride

Test Code:

Fluoride

Lab Sample ID: 1905216-013AMSD

Lab Sample ID: 1905219-003AMSD

Lab Sample ID: 1905219-007AMSD

300.0-W

300.0-W

300.0-W

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3.44

0.245

0.829

1.66

5000

5230

1020

524

20

20

20

20

### **QC SUMMARY REPORT**

Client:	PacifiCorp						Contact:	Jeff Tuck	er				
Lab Set ID:	1905216						Dept:	WC					
Project:	Hunter CCR Groundwa	ter Sampling / P	ERCM052	2			<b>QC Туре</b>	: MSD					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit
Lab Sample II Test Code:	<b>D: 1905216-004AMSD</b> 300.0-W	Date Analyzed:	05/17/20	19 043h									
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 II Test Code:	<b>D: 1905216-014AMSD</b> 300.0-W	Date Analyzed:	05/17/20	19 1711h									

24.0

24.0

4.80

2.40

100

100

20.0

10.0

5,000

5,000

1,000

500.0

0.0971

0.0471

2.91

0.144

104

105

103

103

90 - 110

90 - 110

90 - 110

90 - 110

E300.0

E300.0

E300.0

E300.0

5,180

5,240

1,030

515

Date Analyzed:

Date Analyzed:

Date Analyzed:

mg/L

mg/L

mg/L

mg/L

05/17/2019 1455h

05/17/2019 2048h

05/17/2019 2302h

Report Date: 5/23/2019 Page 41 of 41

American	West Analytical Laborat	ories			Rpt Emailed: OL:	Gener	HC ricEDD QC
WORK OF	RDER Summary				Work Order:	1905216	Page 1 of 6
Client:	PacifiCorp					5/23/2019	U
Client ID:	PAC900		Contact	Jeff Tucker		0,20,2019	
Project:	Hunter CCR Groundwater Sampling / ]	PFRCM052	QC Leve		WO Type	· Project	
Comments:	QC2+. Include EDD. RADS sent to ALS-		-			•	
comments.	mholland@waterenvtech.com.;	Treomis. Rep	on Phonice result	s also oli set 1905215. iv	iciais share with set 1903213.		D
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	
					BA BE CD CR CO PB MO SE TL		
		· · · · · · · · · · · · · · · · · · ·		200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals DF-Metals	
1905216-001C	· · · · · · · · · · · · · · · · · · ·			HG-DW-PR OUTSIDE LAB		ALS	2
	ELE A	5/0/2010 17201	5/0/2010 07221		Second 1		_
1905216-002A	ELF-2	5/8/2019 1730h	5/9/2019 0722h	<b>300.0-W</b> 1 SEL Analytes: F	Aqueous	DF-WC	1
1905216-002B				200.7-W		DF-Metals	
				1 SEL Analytes: LI			
				200.7-W-PR	n <u>n n n n n n n n n n n n n n n n n n </u>	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	
100501( 0000				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			
	·····	AF 94 E POSIDA E		200.7-W-PR		DF-Metals	
				200.8-W 11 SEL Analytes: SR AS	BA BE CD CR CO PB MO SE TL	DF-Metals	
				200.8-W-PR		DF-Metals	
Printed: 05/09/19 13:0	5 LABORATORY CHECK: %M		TAT 🗌 QC 🗌		НОК НОК	COC Emailed_	

WORK O	RDER Summary					Work Order:	1905216	Page 2 of
Client:	PacifiCorp					Due Date:	5/23/2019	
Sample ID	Client Sample ID	Collected Date	<b>Received Date</b>	Test Code	Matrix		Sel Storage	
1905216-003B	ELF-3	5/8/2019 1430h	5/9/2019 0722h	HG-DW-245.1	Aqueous		DF-Metals	
				HG-DW-PR			DF-Metals	
1905216-003C				OUTSIDE LAB			ALS	
1905216-004A	ELF-4	5/8/2019 1330h	5/9/2019 0722h	<b>300.0-W</b> 1 SEL Analytes: F	Aqueous		DF-WC	
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 I	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	
905216-004C				OUTSIDE LAB			ALS	dan kiringan di kala mangan
905216-005A	ELF-5	5/8/2019 1245h	5/9/2019 0722h	<b>300.0-W</b> 1 SEL Analytes: F	Aqueous		DF-WC	
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 CC	PB MO SE TL		
		· · · · · · · · · · · · · · · · · · ·	<del> </del>	200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals DF-Metals	
1005216 0050				HG-DW-PR			ALS	
1905216-005C				OUTSIDE LAB			ALS	
1905216-006A	ELF-6	5/8/2019 1230h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	
				1 SEL Analytes: F			DELCO	
1905216-006B				200.7-W			DF-Metals	
				1 SEL Analytes: LI			DF-Metals	
				200.7-W-PR			DF-Metals	
				200.8-W 11 SEL Analytes: SB AS	RA RE CD CR C	O PR MO SE TI	Dr-Metais	
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-245.1 HG-DW-PR			DF-Metals	
1905216-006C		·····		OUTSIDE LAB			ALS	

WORK O	<b>RDER Summary</b>				Work	Order: 1905216	Page 3 of
Client:	PacifiCorp				Du	e Date: 5/23/2019	
Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel Storage	
905216-007A	ELF-7	5/8/2019 1400h	5/9/2019 0722h	<b>300.0-W</b> 1 SEL Analytes: F	Aqueous	DF-WC	
905216-007B				200.7-W 1 SEL Analytes: LI		DF-Metals	
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	·
					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	
1905216-008A	ELF-8	5/8/2019 1145h	5/9/2019 0722h	300.0-W	Aqueous	DF-WC	
				1 SEL Analytes: F			
.905216-008B				<b>200.7-W</b> 1 SEL Analytes: LI		DF-Metals	
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				11 SEL Analytes: SB AS	BA BE CD CR CO PB MC	SE TL	
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
1905216-008C				OUTSIDE LAB		ALS	
1905216-009A	ELF-9	5/8/2019 1630h	5/9/2019 0722h	300.0-W	Aqueous	DF-WC	
				1 SEL Analytes: F			
1905216-009B				200.7-W		DF-Metals	
				1 SEL Analytes: LI			
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
					S BA BE CD CR CO PB MC	DF-Metals	
				200.8-W-PR		DF-Metals	
				HG-DW-245.1 HG-DW-PR		DF-Metals	
1905216-009C	······			OUTSIDE LAB		ALS	
1905216-010A	ELF-10	5/8/2019 1500h	5/9/2019 0722h	<b>300.0-W</b> 1 SEL Analytes: F	Aqueous	DF-WC	

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COC Emailed

WORK O	RDER Summary				Work	Order: 1905216	Page 4 of 6
Client:	PacifiCorp				Du	e Date: 5/23/2019	1
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	
			NEW-1-1	200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
		ALIVE TO THE ALIVE ALIVE THE ALIVE ALIVE ALIVE ALIVE ALIVE ALIVE ALIVE ALIVE		HG-DW-PR		DF-Metals	S
1905216-010C				OUTSIDE LAB		ALS	
1905216-011A	ELF-11	5/8/2019 1115h	5/9/2019 0722h	300.0-W	Aqueous	DF-WC	
1905216-011B				1 SEL Analytes: F		DEMAN	
1903210-011B				200.7-W 1 SEL Analytes: LI		DF-Metals	
	·			200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
					BA BE CD CR CO PB MC		
			·	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	<b>300.0-W</b> 1 SEL Analytes: F	Aqueous	DF-WC	
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 MC	O 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	<b>300.0-W</b> 1 SEL Analytes: F	Aqueous	DF-WC	
1905216-013B				200.7-W 1 SEL Analytes: LI		DF-Metals	¥.
				200.7-W-PR		DF-Metals	

WORK OR	DER Summary				v	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	]
				11 SEL Analytes: SB AS	BA BE CD CR CO P	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	
1905216-014A	ELF-14	5/8/2019 0915h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	
				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 I	PB MO SE TL		
				200.8-W-PR			DF-Metals	
			11-11-11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	HG-DW-245.1			DF-Metals	
	· · · · · · · · · · · · · · · · · · ·			HG-DW-PR			DF-Metals	
1905216-014C				OUTSIDE LAB			ALS	
1905216-015A	DUP	5/7/2019 1520h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	
				1 SEL Analytes: F				
1905216-015B				200.7-W			DF-Metals	
				I SEL Analytes: LI		12		
		1		200.7-W-PR			DF-Metals	
				200.8-W 11 SEL Analytes: SB AS	RA BE CD CR CO	PR MO SE TL	DF-Metals	
				200.8-W-PR			DF-Metals	
				HG-DW-245.1			DF-Metals	
				HG-DW-PR			DF-Metals	
1905216-015C		· · · · · · · · · · · · · · · · · · ·		OUTSIDE LAB		·······	ALS	
1905216-016A	FB	5/7/2019 1400h	5/9/2019 0722h	300.0-W	Aqueous		DF-WC	
				1 SEL Analytes: F	1			
1905216-016B				200.7-W			DF-Metals	
				1 SEL Analytes: LI				
				200.7-W-PR			DF-Metals	
				200.8-W			DF-Metals	
		8483-315 · · · · · · · · · · · · · · · · · · ·		11 SEL Analytes: SB AS	S BA BE CD CR CO	PB MO SE TL		
				200.8-W-PR			DF-Metals	
Printed: 05/09/19 13:05					HOK	HOK	COC Emailed	

LABORATORY CHECK: %M 🗌 RT 🗌 CN 🗌 TAT 🗌 QC 🗌 LUO 🗌 HOK\_\_\_\_\_ HOK\_\_\_\_\_ HOK\_\_\_\_\_ HOK\_\_\_\_\_ COC Emailed\_

WORK O	RDER Summary				Worl	Order: 1905216	Page 6 of 6
Client:	PacifiCorp				Di	ue Date: 5/23/2019	
Sample ID	Client Sample ID	Collected Date	<b>Received</b> 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

\_\_\_\_ COC Emailed\_

	American W Analytical Labor 3440 S. 700 W. Salt Lake City, U Phone # (801) 263-S656 Toll Free #	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.											AWAL Lab Sample Set # Page 1 of 2			
	Fax # (801) 263-8687 Email awale	eawal-labs.com				QC L	-						und Time: Unless other arrangements have been made, signed reports will be emailed by			Due Date:
	www.awal-labs.co	om			1	2 6	+)3	3+			12	34	5 gind	)	5:00 pm on the day they are due.	5.25
Address City, State, Zig Contact Phone # E-mail Project Name Project # PO # Sampler Name 1 ELF-1D 2 ELF-2 3 ELF-3 4 ELF-4 5 ELF-5	JEFF TUCKER	Date Sampled 5/8/2019 5/8/2019 5/8/2019 5/8/2019 5/8/2019	Time Sampled 16:35 17:30 14:30 13:30 12:45	$\begin{array}{c} 1 \\ 2 \\ 1 \\ 2 \\ 1 \\ 2 \\ 1 \\ 1 \\ 2 \\ 1 \\ $	<td< td=""><td>× × × × APPENDIX IV</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Report down to the MDL  Include EDD: Lab Filter for: Field Filtered For: For Compliance With: NELAP CWA CWA SDWA CWA SDWA ELAP/A2LA NLLAP Non-Compliance Other: Known Hazards &amp; Sample Comments Conly I bottle for RADS</td><td>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 5 Samples Were: 1 Shipped or hand delivered 2 Ambient or Chillid 3 TemperatureC 4 Creceived Intact Y N Set Property Preserved Y N Checked at bench</td></td<>	× × × × APPENDIX IV									Report down to the MDL  Include EDD: Lab Filter for: Field Filtered For: For Compliance With: NELAP CWA CWA SDWA CWA SDWA ELAP/A2LA NLLAP Non-Compliance Other: Known Hazards & Sample Comments Conly I bottle for RADS	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 5 Samples Were: 1 Shipped or hand delivered 2 Ambient or Chillid 3 TemperatureC 4 Creceived Intact Y N Set Property Preserved Y N Checked at bench
6 ELF-6		5/8/2019 5/8/2019	12:30 14:00	31	w	x x									only lost for RADS	6 Received Within
7 ELF-7 8 ELF-8		5/8/2019	14:00	<b>3</b> 4	w	x									Only 1 bottle For PNDS	Y Times
9 ELF-9		5/8/2019	16:30	4	w	x										pHoutot
10 ELF-10		5/8/2019	15:00	4	w	x										held - Biall
11 ELF-11	·	5/8/2019	11:15	4	w	х								-	· · · · · · · · · · · · · · · · · · ·	Sample Labels and COC Record Match?
12 ELF-12		5/8/2019	10:45	4	w	х										N Y N
13 ELF-13		5/8/2019	10:00	4	w	х										
14 ELF-14		5/8/2019	9:15	4	w	х										
1×		1														
Relinquished by: Signature		579/2019	Received by: Signature	hz	n	_	Gr	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	hi	11			Date:	19	Special Instructions:	
Print Name:	ce shirle y	0722	Print Name:	1h)	4				er /	( <sup>-</sup>	1		Time:	n	PLEASE SEND A COPY OF THE ANALY	YTICAL REPORT
Relinquished by: Date: Received by: I Signature Signature										1		Date: TO MARCUS HOLLAND AT:			-	
Print Name:													Time: MHOLLAND@WATERENVTECH			
Relinquished by: Signature	Relinquished by: Date: Received by: Signature Signature												Date: PLEASE RUN AT LEAST ONE LABORATORY SPIKE			SORATORY SPIKE FOR
		Time:											Time:		THIS SAMPLE SET.	

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

		American We Analytical Labora 3440 S. 700 W. Sali Lake City, U Phone # (801) 263-8686 Toll Free # 0		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.											19052fLp           AWAL Lab Sample Set #           Page         2         of         2	
		Fax # (801) 263-8687 Email awale	awal-labs.com					evel:			Т	urn A	round	nd Time: Unless other arrangements have been made, signe reports will be emailed by		Due Dote:
		www.awal-labs.com	m			1	2 (2	+)3 :	3+		1	23	45	Stnd	5:00 pm on the day they are due.	5-23
	Client:	PACIFICORP-UT													<ul> <li>Report down to the MDL</li> <li>Include EDD:</li> </ul>	Laboratory Use Only
	Address:											Ì			Lab Filter for:	COC Tape Was:
	City, State, Zip:														Field Filtered For:	1 Present on Outer Package Y N NA
	Contact:	JEFF TUCKER													For Compliance With:	2 Unbroken on Outer Package Y N NA
	Phone #:	Cell #:													□ NELAP □ RCRA	3 Present on Sample
	E-mail:	JEFF.TUCKER@PACIFICORP.COM													CWA SDWA	YNA
	,	HUNTER CCR GROUNDWATER SAMPLIN	NG												<ul> <li>ELAP / A2LA</li> <li>NLLAP</li> </ul>	4 Unbroken on Sample Y N NA
		PERCM052													<ul> <li>Non-Compliance</li> <li>Other:</li> </ul>	
	PO #: Sampler Name:				iners	atrix	APPENDIX IV									Samples Were: 1 Shippod or hand delivered
	Sampler Name:		Date	Time	Container	Sample Matrix	END								Known Hazards &	2 Ambient or Chilled
		Sample ID:	Sampled	Sampled	# of	Sam	APP								Sample Comments	3 Temperature
15	DUP		5/7/2019	15:20	34	w	x					_			only I bottle for RADS	4 Received Intact
16	FB		5/7/2019	14:00	4	w	X									
l							<u> </u>						_	+-+		5 Property Preserved
4												+		+		Y N Checked at bench
6																
7							<b> </b>	$\left  \right $								6 Received Within
. 8															-	N N
9																
1	) 															
1	1															Sample sabels and COC Record Match?
1	2															Y N
1	3						<b>_</b>									
ŀ	4						<u> </u>									4
1	5												Date			
	Relinquished by: Signature	<u>laes</u>	5 (9 Dais	Received by: Signature	m	i –	(a	d-	1	ul	<u>(</u>	: 1	Date	5-09	Special Instructions:	
	Print Name: Mi Relinquished by:	Nike Shirley Date: Received by:				I lynn Green WU						<u>V</u>	Date	7:22	PLEASE SEND A COPY OF THE ANAY	LITCAL REPORT TO
	Signature	Signature Time:											Time		MARCUS HOLLAND AT: MHOLLAND@WATERENVTEC	НСОМ
	Print Name: Relinquished by:	H by: Date: Received by:											Date	;	BORATORY SPIKE FOR	
	Signature	Time:											Tim	<b>.</b>	THIS SAMPLE SET.	

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

Constitue	ents Analyzed
Appendix III	Appendix IV
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
рН	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 twide. 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

Analysis	Preservative	-001 -	-002	-003	-004	-005	-006	-007	-005	-009	-010	-011	-012	-013	-014	-015	-016		
Ammonia	$pH < 2H_2SO_4$								a the fighter of the state of the second										
COD	pH <2 H <sub>2</sub> SO <sub>4</sub>																		
Cyanide	pH>12 NaOH																		· · · · · · · · · · · · · · · · · · ·
Metals	pH <2 HNO <sub>3</sub>	1125	ves	Ves	ves	NRS	Ves	Ves	ves	VRS	Ves	ves	ves	Ves	ves	VPS	Ves		
NO <sub>2</sub> & NO <sub>3</sub>	рН <2 Н <sub>2</sub> SO <sub>4</sub>	Y	1	1	1	7	7	1	/	1-2	100	1	1	7-2	7-5	100	75		
0 & G	pH <2 HCL																		
Phenols	pH <2 H <sub>2</sub> SO <sub>4</sub>																		
Sulfide	pH >9 NaOH, Zn Acetate																		
TKN	pH <2 H <sub>2</sub> SO <sub>4</sub>																		
T PO <sub>4</sub>	$pH < 2H_2SO_4$																		
															· · · ·				
																1			
																1			
																			· · · · · · · · · · · · · · · · · · ·
																		· · ·	

Procedure:

1) Pour a small amount of sample in the sample lid

Pour sample from lid gently over wide range pH paper 2) 3)

Do Not dip the pH paper in the sample bottle or lid

If sample is not preserved, properly list its extension and receiving pH in the appropriate column above 4)

5) Flag COC, notify client if requested

6) Place client conversation on COC

Samples may be adjusted 7)

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 Eggensperger

**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:

٠	ELF-1D	٠	ELF-6
٠	ELF-2	٠	ELF-7
•	ELF-9	•	ELF-8
•	ELF-10	•	ELF-11
•	ELF-3	•	ELF-12
•	ELF-4	٠	ELF-13
•	ELF-5	٠	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.

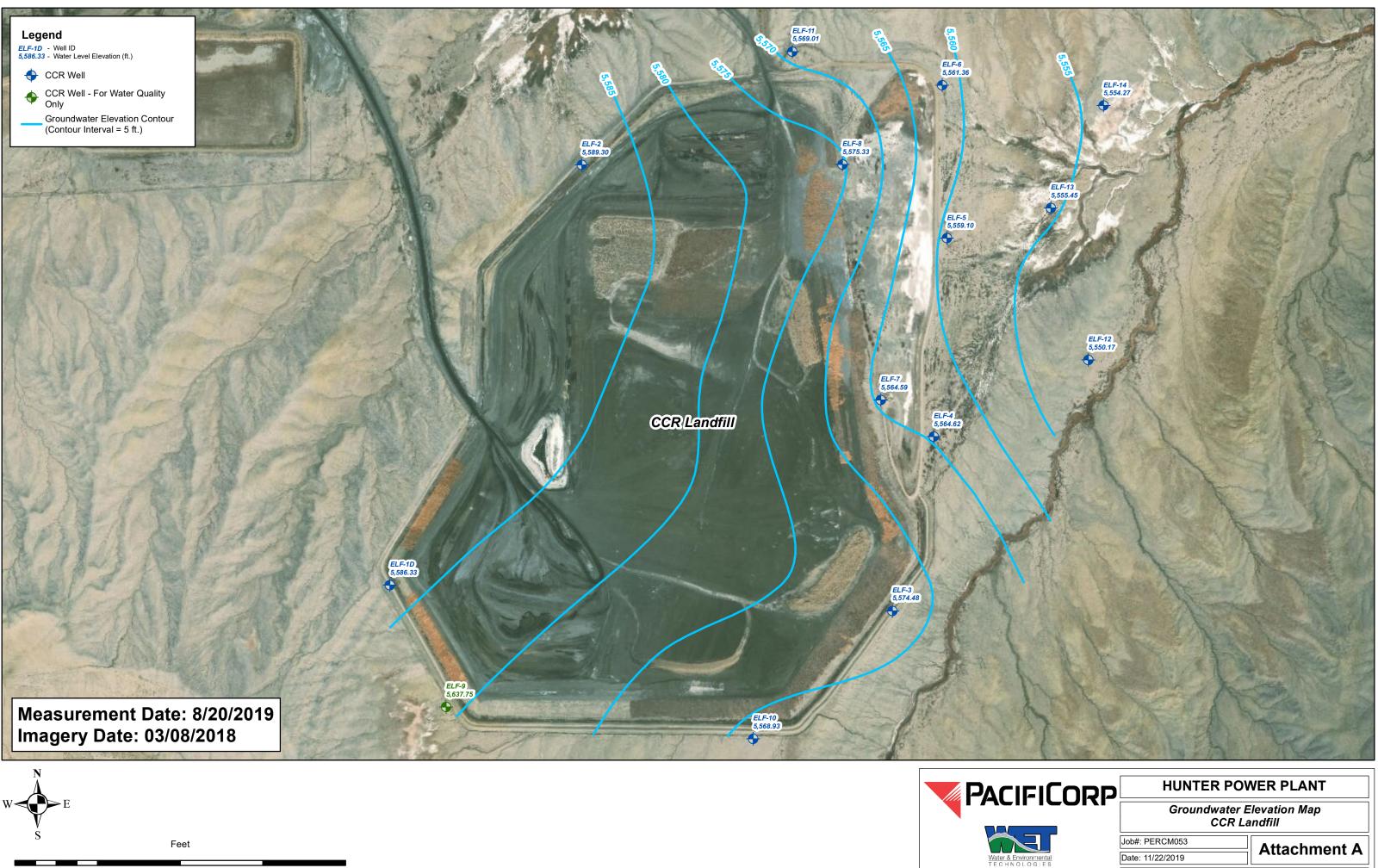


Wells ELF-11, ELF-12, ELF-13, and ELF-14 were added to the sampling network for the purpose of Nature and Extent Investigations.



Attachment A:

Groundwater Contour Map



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

Path: M:\PERC\_CCR\2019\_CCR\_Sampling\2019\_CCR\_GW\_Contour Maps.mxd, Author: brutherford



### Attachment B:

Data Validation Summary

Facility Name:	Hunter Landfill 08/20/2019						
Validator:	Tim Driscoll 1	Tim Driscoll 10/25/2019					
Reviewer:	Janelle Garza 1	0/30/2019					
Laboratory:	American Wes	t Analytical Laboratories					
Laboratory Work Order#:	1908532						
Sample Media:	Groundwater						
Analytical Parameters:	Appendix IV:	Ra <sup>226</sup>					
Review Element:	Complete / Criteria Met? If no, describe: (Yes/No)						
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.							

Facility Name:	Hunter Landfill 08/20/2019					
Validator:	Tim Driscoll 1	0/25/2019				
Reviewer:	Janelle Garza 1	0/30/2019				
Laboratory:	American Wes	t Analytical Laboratory				
Laboratory Work Order#:	1908622					
Sample Media:	Groundwater					
Analytical Parameters:	Appendix IV:	Ra <sup>228</sup>				
Review Element:	Complete / Criteria Met? (Yes/No)					
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.						

Facility Name:	Hunter Landfil	Hunter Landfill 08/20/2019					
Validator:	Tim Driscoll 1	Tim Driscoll 10/24/2019					
Reviewer:	Janelle Garza 1	0/30/2019					
Laboratory:	American Wes	t Analytical Laboratories					
Laboratory Work Order#:	1908531						
Sample Media:	Groundwater						
Analytical Parameters:	Appendix III:	B, Ca, Cl, <sup>1</sup> F, pH, S0 <sub>4</sub> , TDS					
Review Element:	Complete /         Criteria         Met?         If no, describe:         (Yes/No)						
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	Yes There was a high recovery of calcium in a laboratory matrix spike, resulting in J+ qualifications detailed below.					
<b>Overall Assessment:</b>	Overall Assessment:						
Calcium was qualified J+ in sa ELF-11, ELF-12, ELF-13, EL	•	ELF-2, ELF-3, ELF-4, ELF-5, ELF-7, ELF-8, ELF-9,					

Facility Name:	Hunter Landfil	1 08/20/2019					
Validator:	Tim Driscoll 10/25/2019						
Reviewer:	Janelle Garza 1						
Laboratory:		t Analytical Laboratories					
Laboratory Work Order#:	1908532						
Sample Media:	Groundwater						
Analytical Parameters:	Appendix IV:	Appendix IV: Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li, Hg, Mo, Se, Tl, Ra <sup>226</sup> + Ra <sup>228</sup>					
Review Element:	Complete / Criteria Met? If no, describe: (Yes/No)						
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					
Overall Assessment:							
Mercury was qualified UJ in s ELF-11, ELF-12, ELF-13, EL	1	, ELF-2, ELF-3, ELF-4, ELF-5, ELF-7, ELF-8, ELF-9,					



## Attachment C:

Statistical Analysis

1.0	INTE	RODUC	TION	
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	2.1	Data A	nalysis Techniques	1
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		2.1.2	Standard Deviation	2
		2.1.3	Coefficient of Variance	2
		2.1.4	Quartiles and the Five Number Summary	2
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		2.2.1	Histograms	
		2.2.2	Normal-Quantile Plots	
		2.2.3	Outliers	
		2.2.4	Treatment of Non-Detects	
	2.3	Summa	ary Results	5
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	3.1	Ground	dwater Protection Standards	
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		3.1.2	Upper Tolerance Limits and Groundwater Protection Standard	
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5.0	REF	ERENCI	ES	

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- Figure C.1. Histogram of fluoride data from the CCR Landfill upgradient wells
- Figure C.2. Normal quantile plot of fluoride data the CCR Landfill upgradient wells
- Figure C.3. Summary statistics plots for the CCR Landfill
- Figure C.4. Groundwater Protection Standard plots for the CCR Landfill

### LIST OF TABLES

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

$$\overline{x} = \frac{\sum_{i=1}^{n} x_{i}}{n}$$
(1)

Where:

 $\overline{x}$  = 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):

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

Where:

- s =standard deviation
- n = number of observations

 $x_i = i^{th}$  observation

 $\overline{x}$  = 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):

$$CV = \frac{s}{\overline{X}} \times 100\% \tag{3}$$

Where:

s = standard deviation

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

#### 2.1.4 Quartiles and the Five Number Summary

The five-number summary is a set of five numbers that are used to assess the spread of the data. It consists of the minimum value, first quartile, median, third quartile, and maximum of the data value. The first quartile is the 25<sup>th</sup> percentile of the data, the median is the 50<sup>th</sup> percentile of the data, and the third quartile is the 75<sup>th</sup> percentile of the data. The 25<sup>th</sup> percentile of the data is the

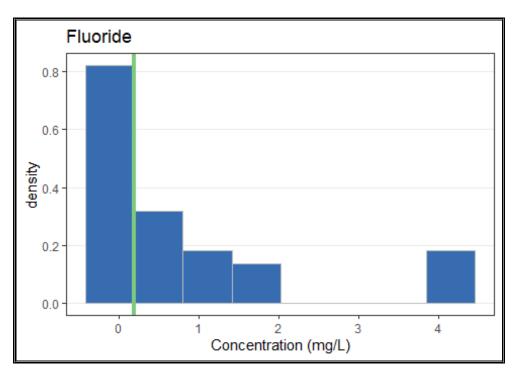
number such that 25% of the data are less than that number and 75% of the data are above the 25<sup>th</sup> percentile. The median and third quartiles are found in a similar manner.

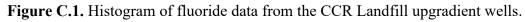
# 2.2 Visual Tools

It is difficult to review numerical summary statistics and identify the degree of symmetry or normality of data without the aid of visual tools. In completing the statistical analysis for the CCR Landfill, histograms and 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.





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.

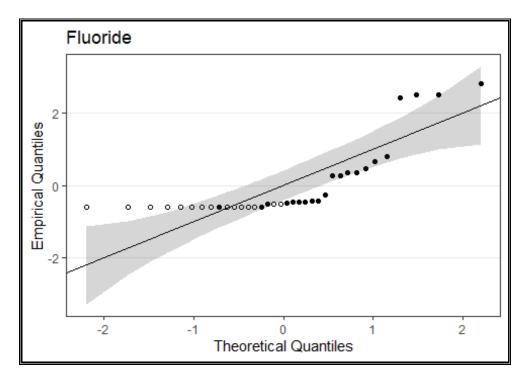


Figure C.2. Normal quantile plot of fluoride data the CCR Landfill upgradient wells

### 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 nondetects, 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.

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%

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	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%
pН	ELF-10	10	10	7.18	7.26	0.42	6%
pН	ELF-1D	2	2	7.15	7.15	0.18	2%
pН	ELF-2	13	13	7.22	7.28	0.17	2%
pН	ELF-9	11	11	7.94	7.89	0.16	2%
pН	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.

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

 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)
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
pН	ELF-10	6.88	7.00	7.18	7.28	8.37
pН	ELF-1D	7.02	7.02	7.15	7.27	7.27
pН	ELF-2	7.12	7.17	7.22	7.30	7.76
pН	ELF-9	7.51	7.86	7.94	7.99	8.06
pН	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 UPGRADIENT AND DOWNGRADIENT WELL COMPARISON

Groundwater quality was assessed using upper tolerance limits (UTLs) and the Maximum Contaminant Levels (MCL) for each of the Appendix III and IV analytes. The data measured from the upgradient/background wells, was used to compute a UTL, which serves as the background value. The larger of the UTL and MCL was used as the Groundwater Protection 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:

- $\overline{X}$  = the average of the background data
- $\kappa$  = multiplier from EPA Unified Guidance, March 2009
- S = standard deviation of the background data

### 3.1.1 Normal Distribution

Histograms and 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.

Analyte	Well	W-Statistic	<b>P-Value</b>	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
pН	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

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

# 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 nondetects, 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.

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

Table C 4	Commonian	of down and i	ant malla to th	Crown drugton	Protection Standard
1 able C.4.	Comparison	l of downgradi		le Gloundwaler	FIGLECTION Standard

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 compelted 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**

- 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*, <u>https://www.R-project.org</u>, R Foundation for Statistical Computing, Vienna, Austria.

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

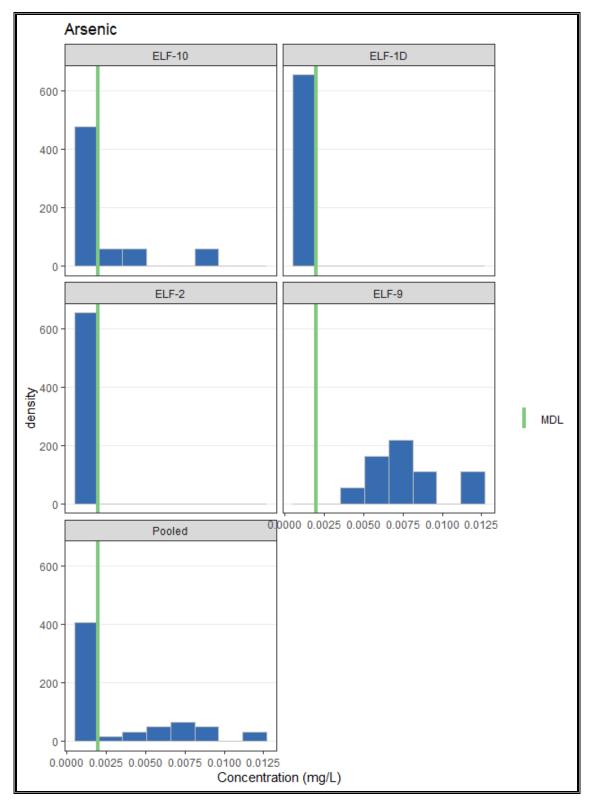


Figure C.3. Summary statistics plots for the CCR Landfill.

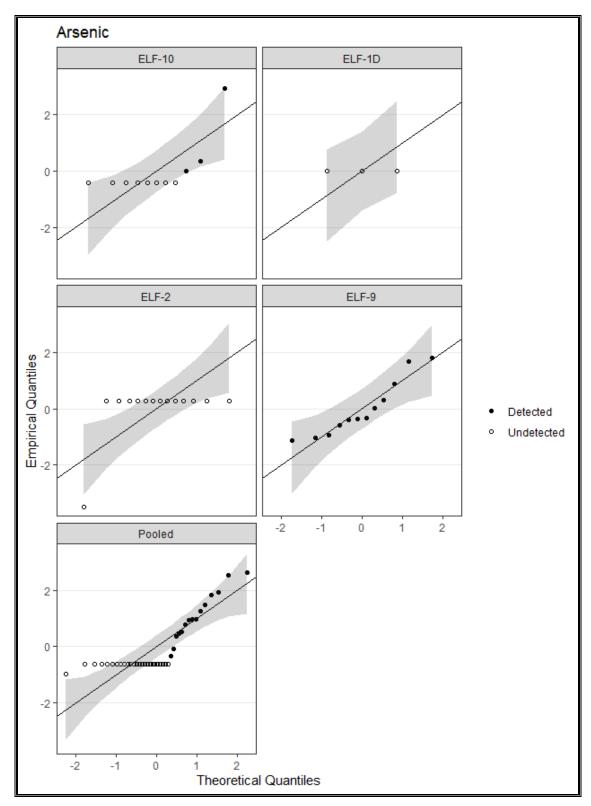


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

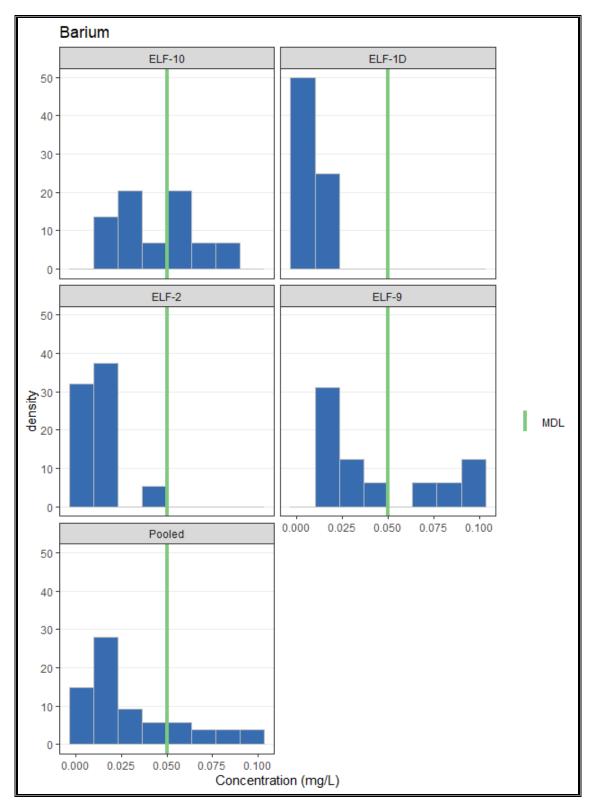


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

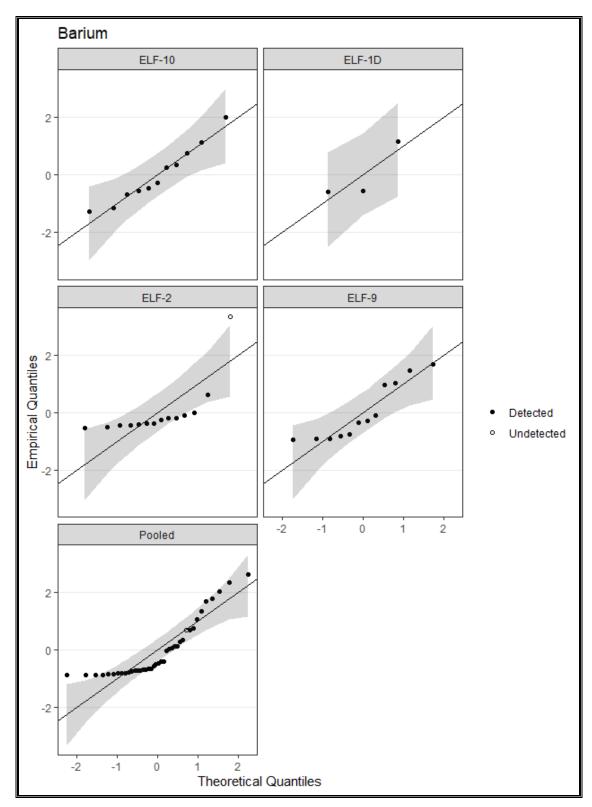


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

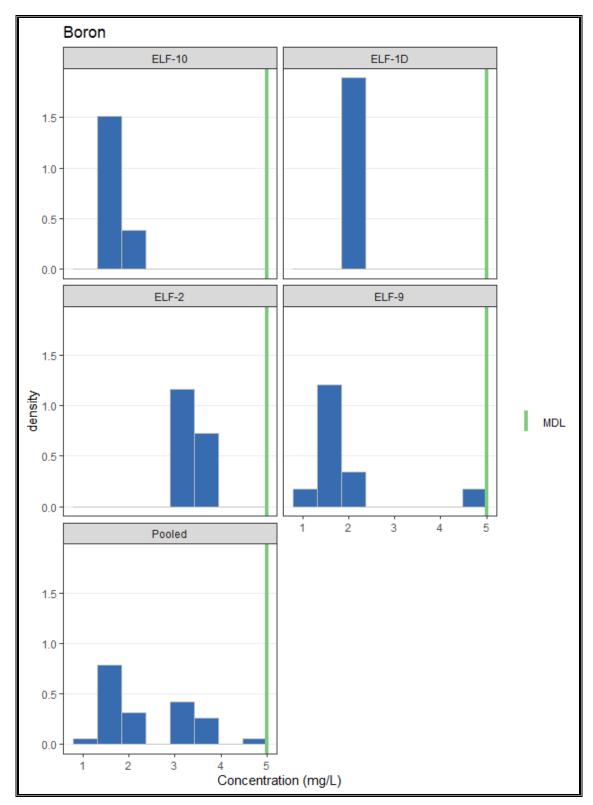


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

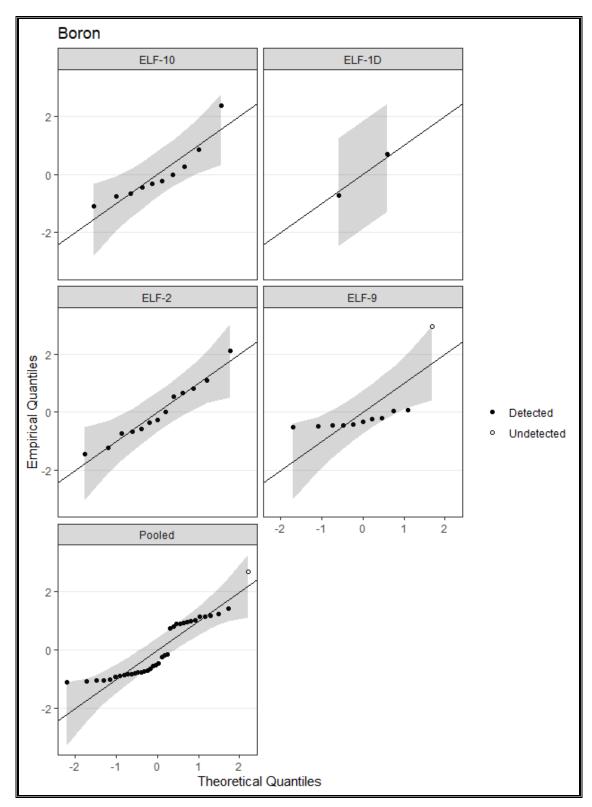


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

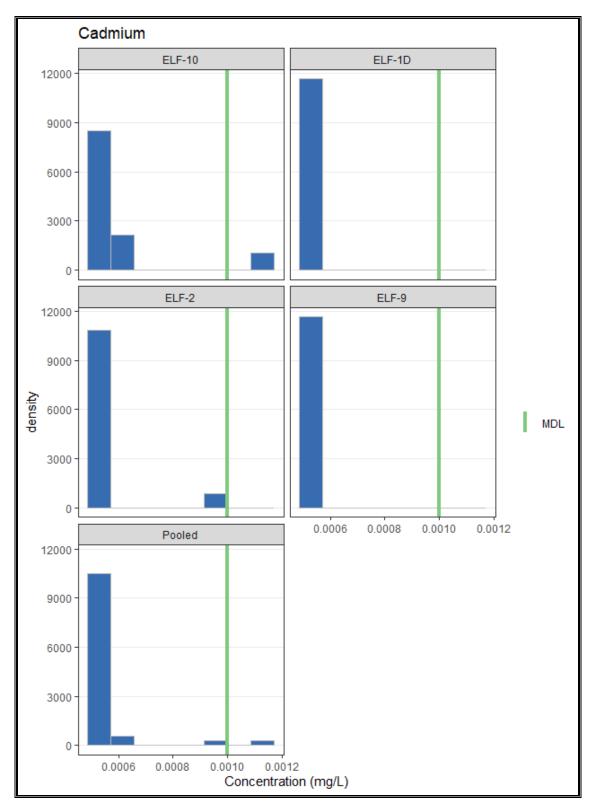


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

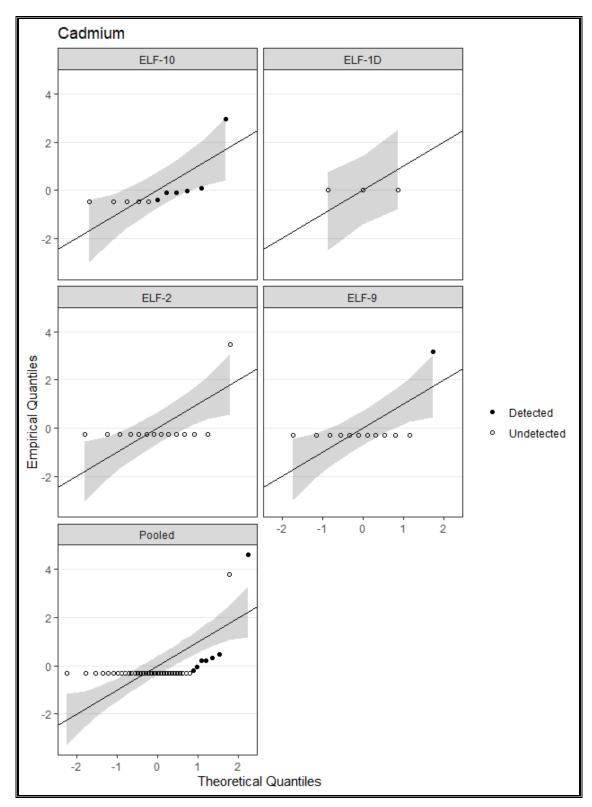


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

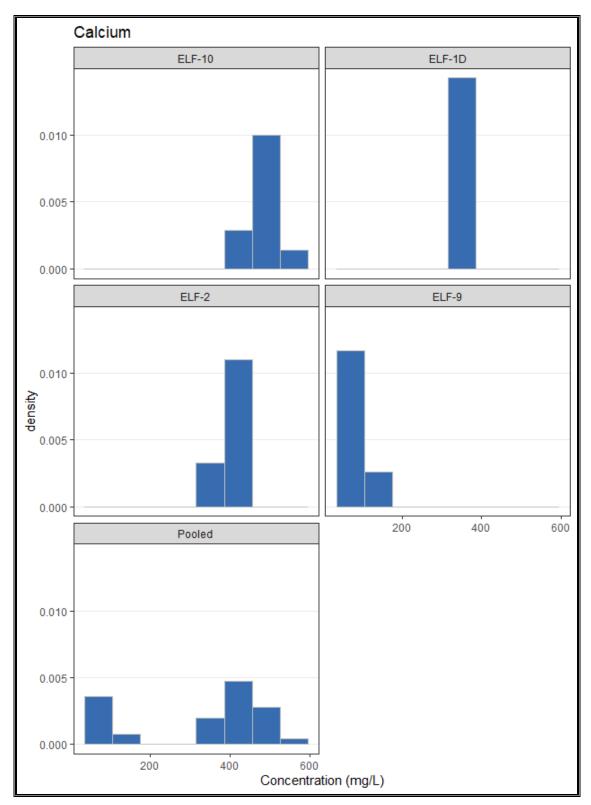


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

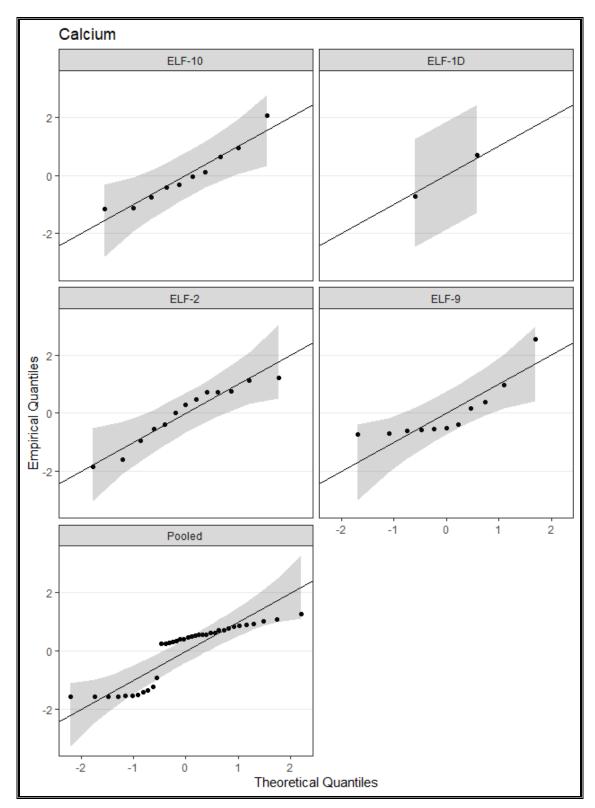


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

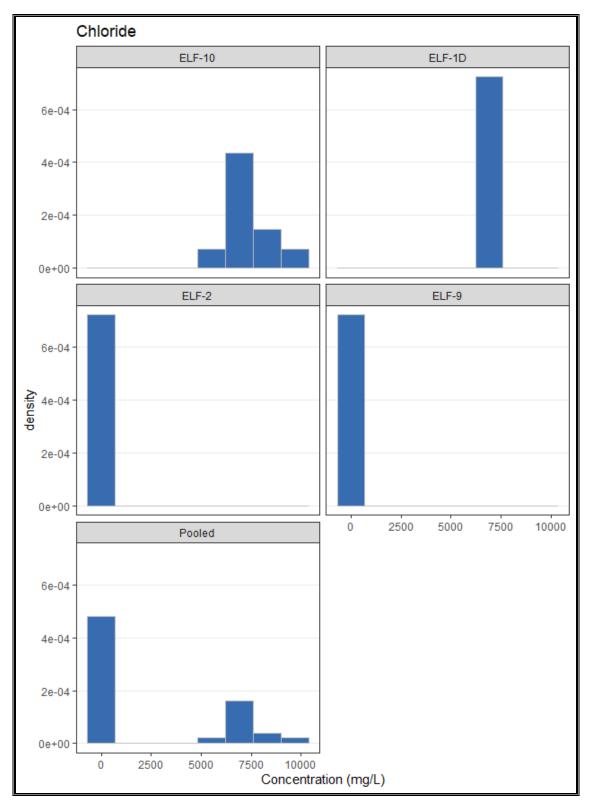


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

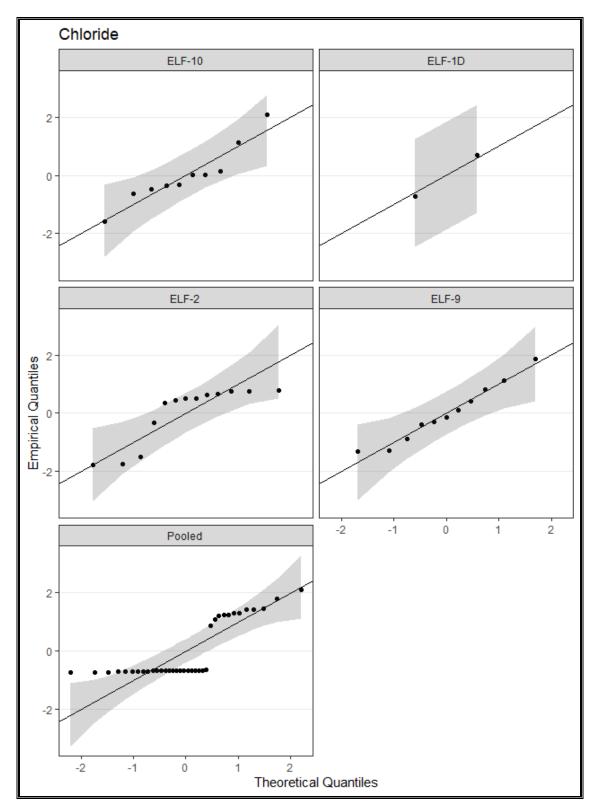


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

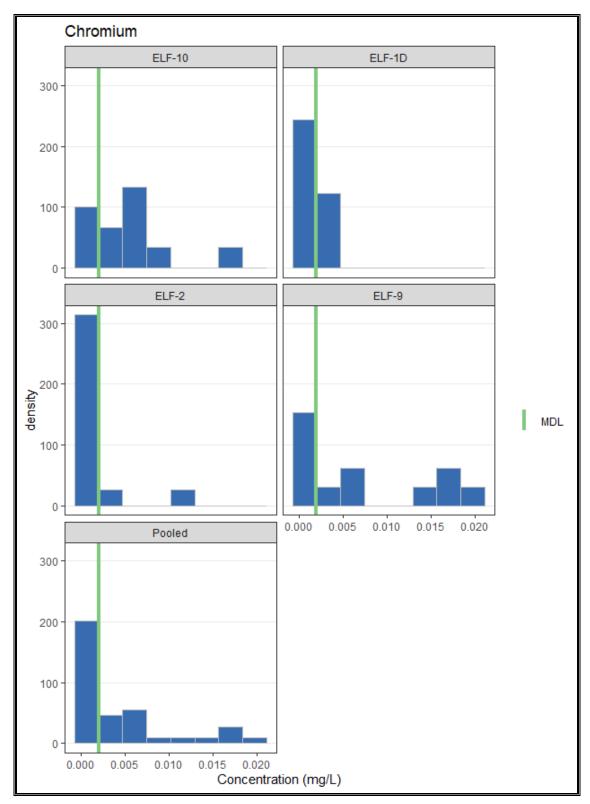


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

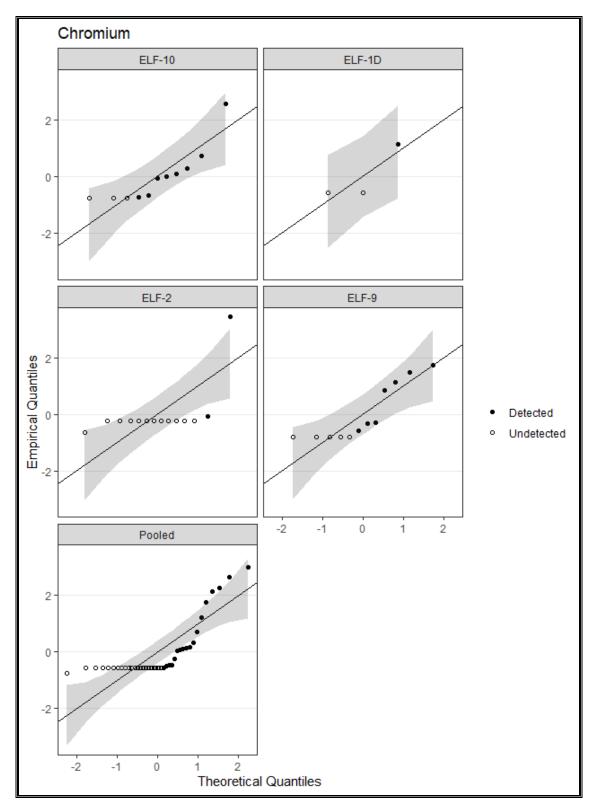


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

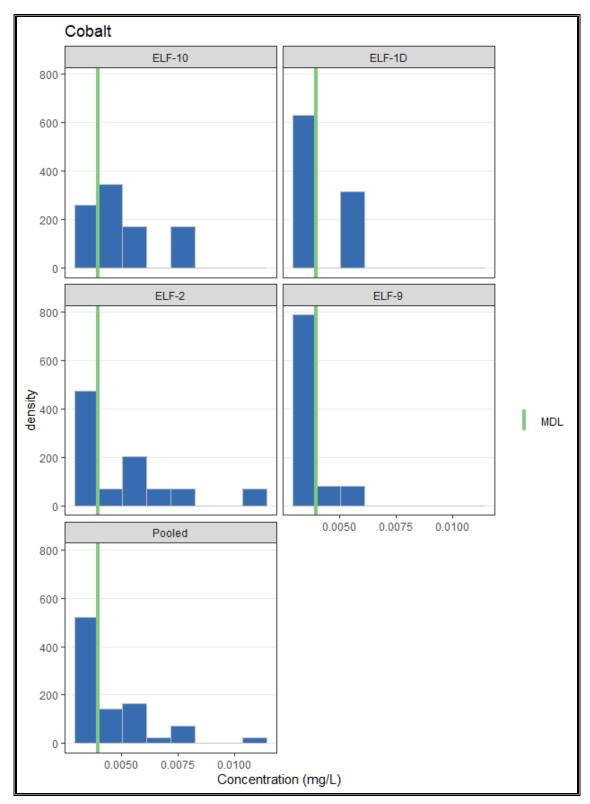


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

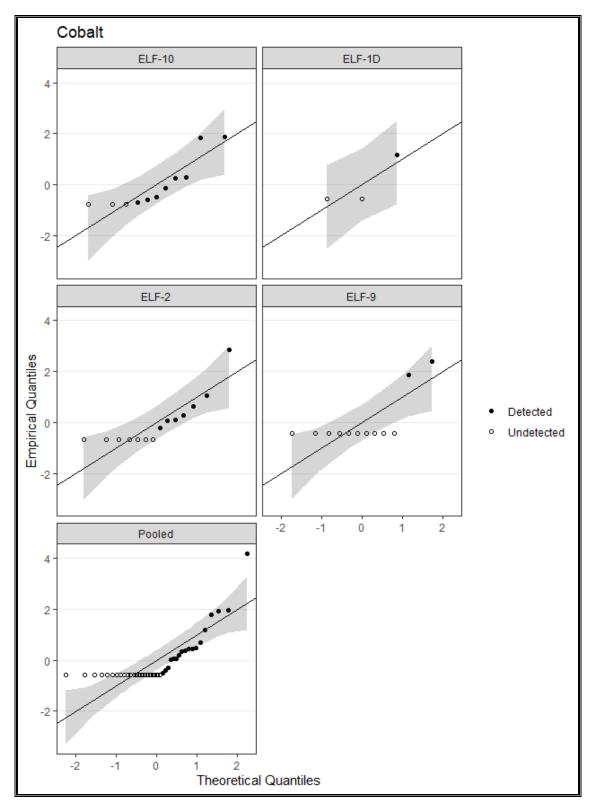


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

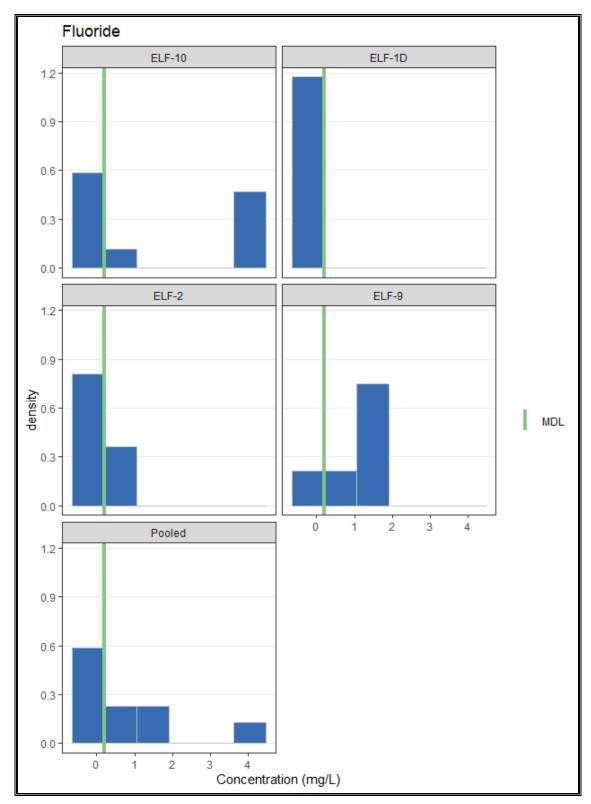


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

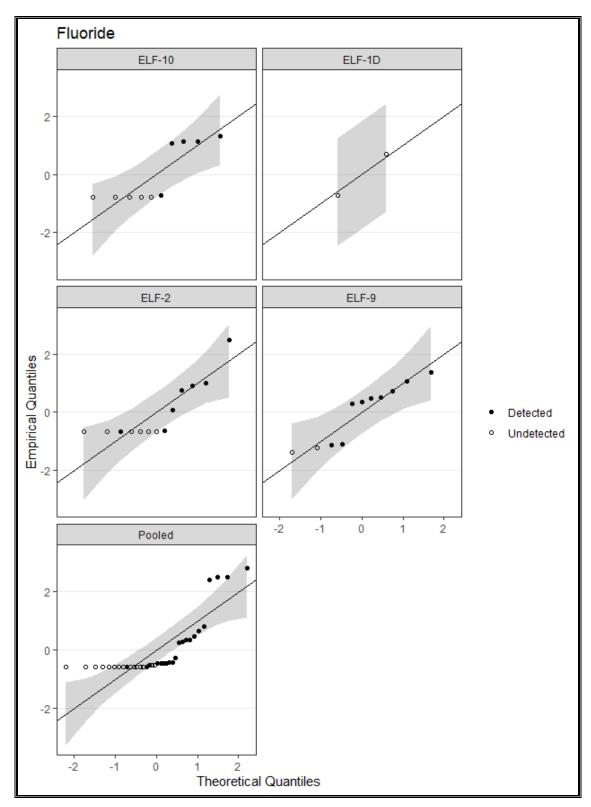


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

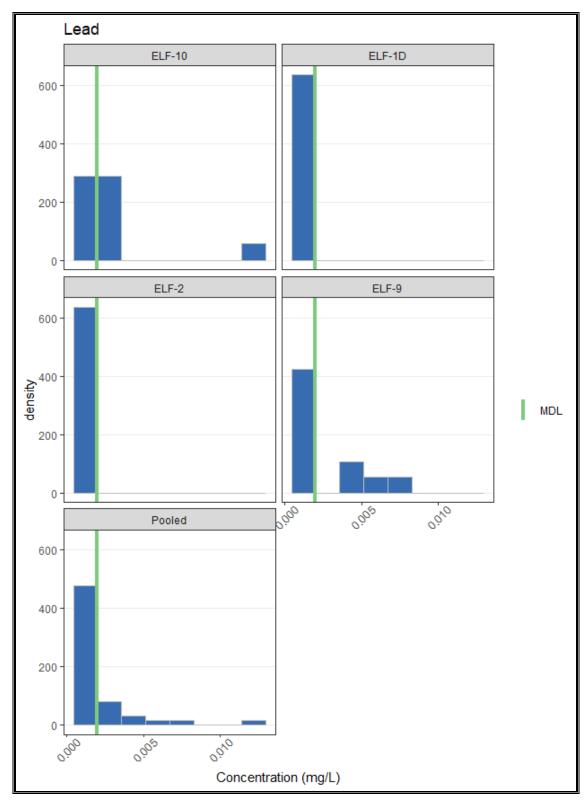


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

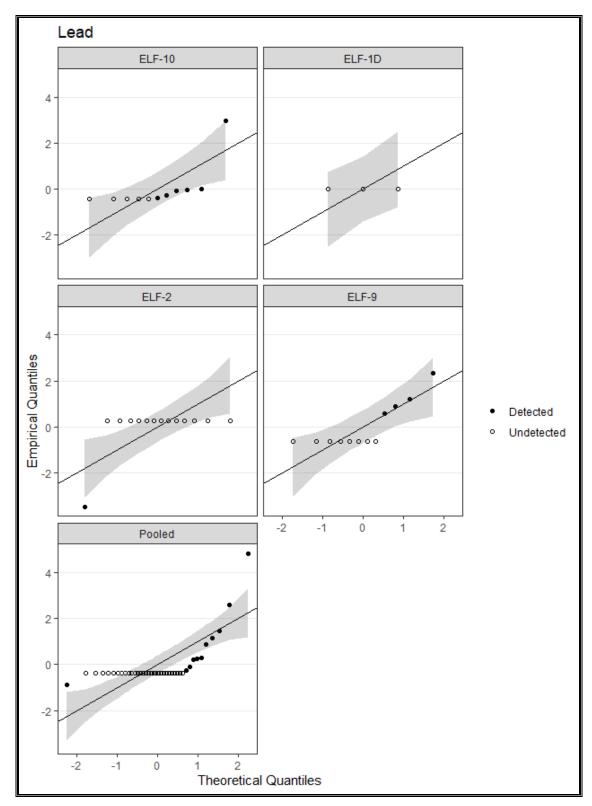


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

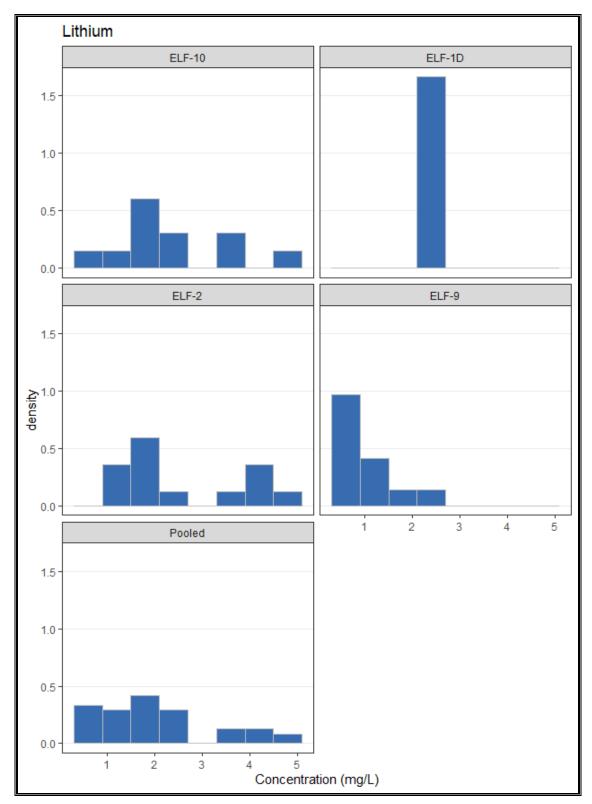


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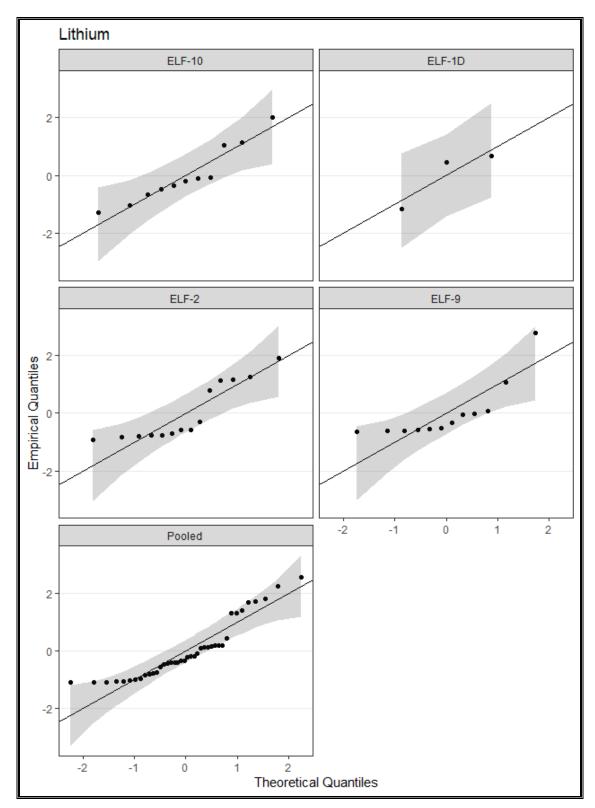


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

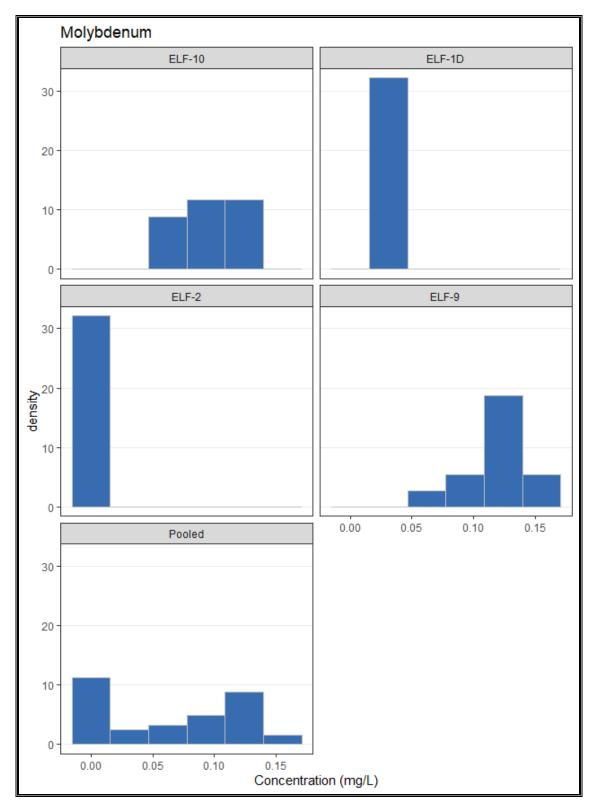


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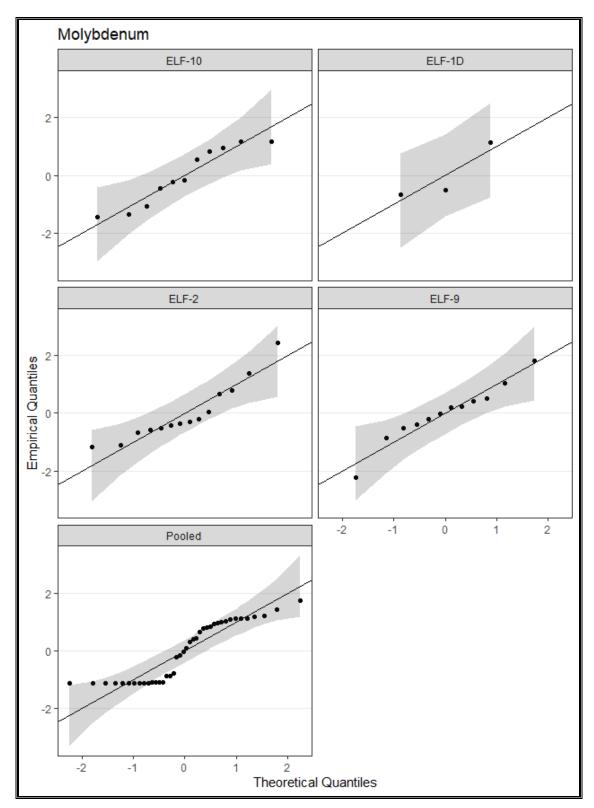


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

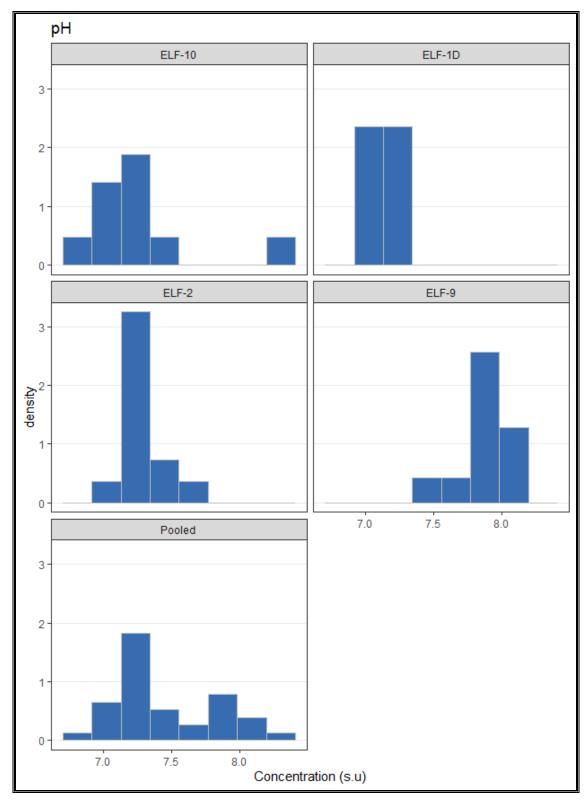


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

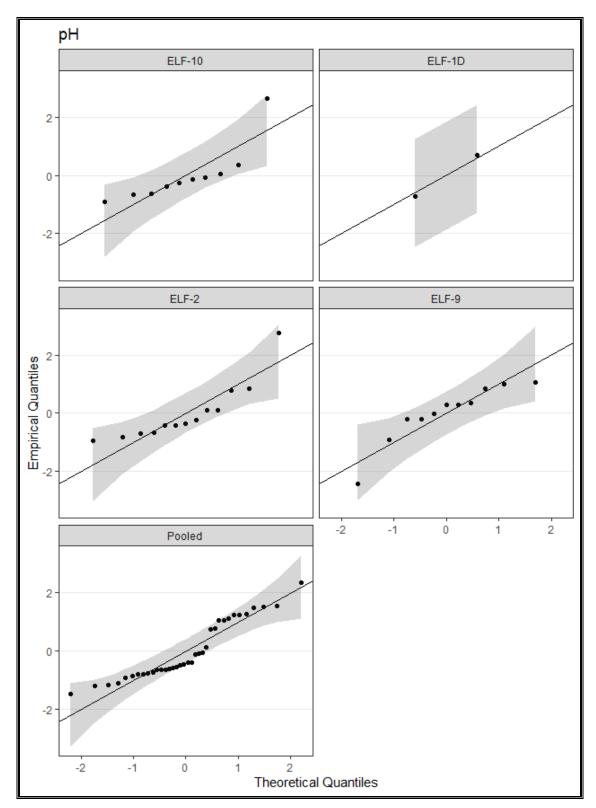


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

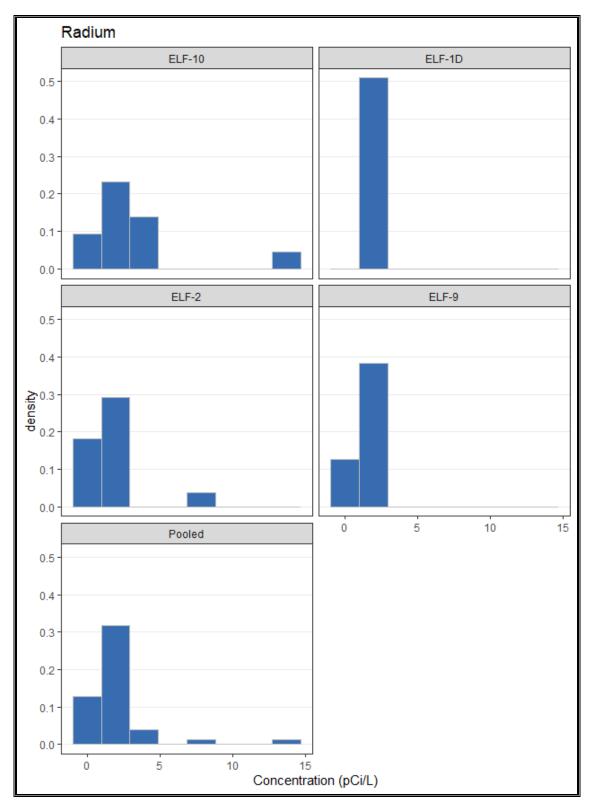


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

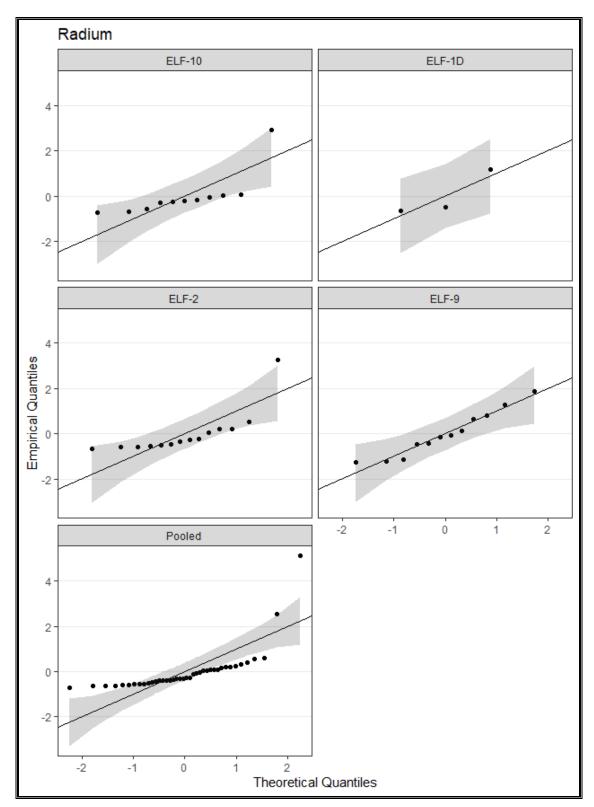


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

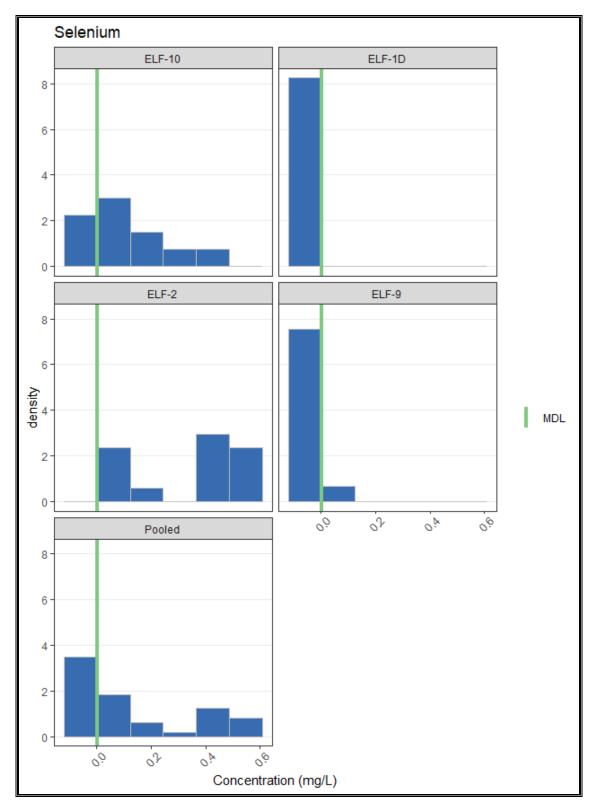


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

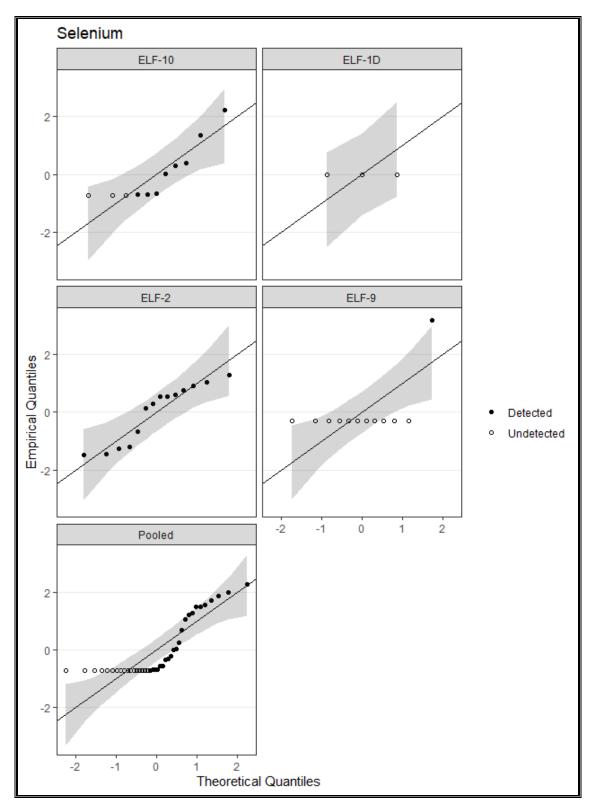


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

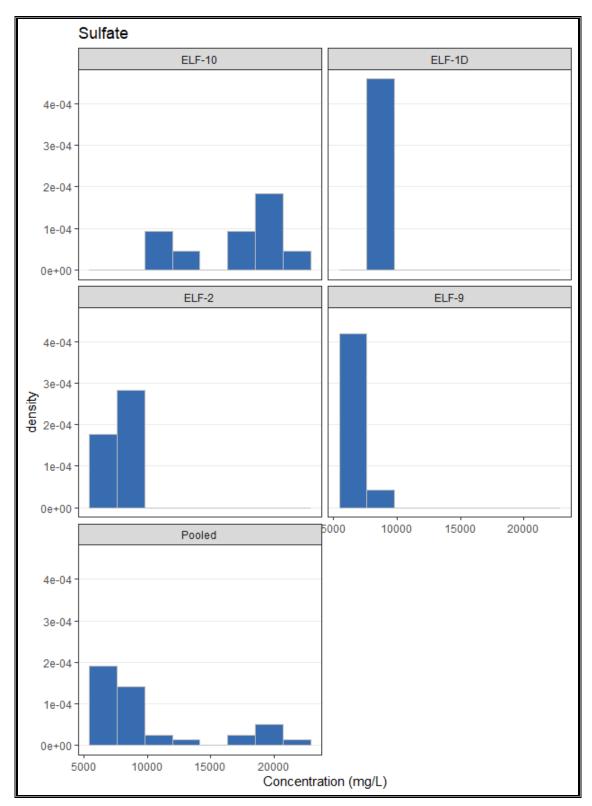


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

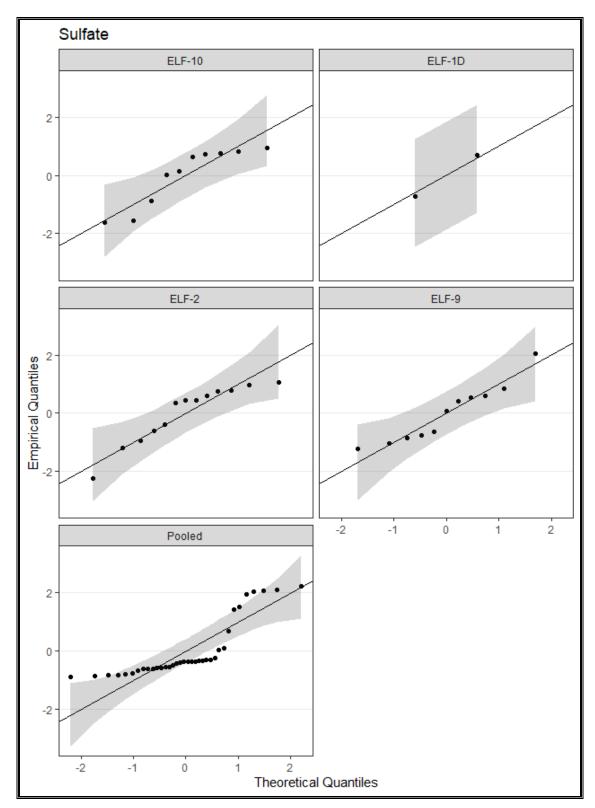


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

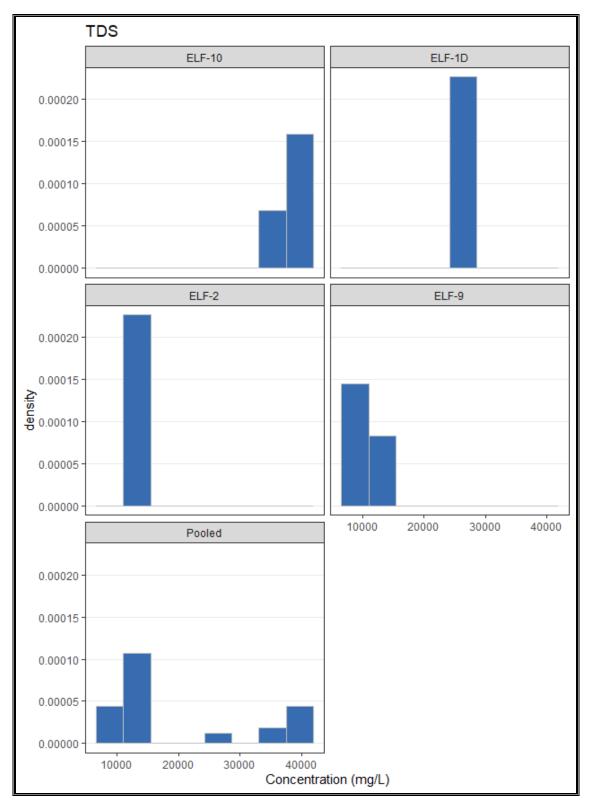


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

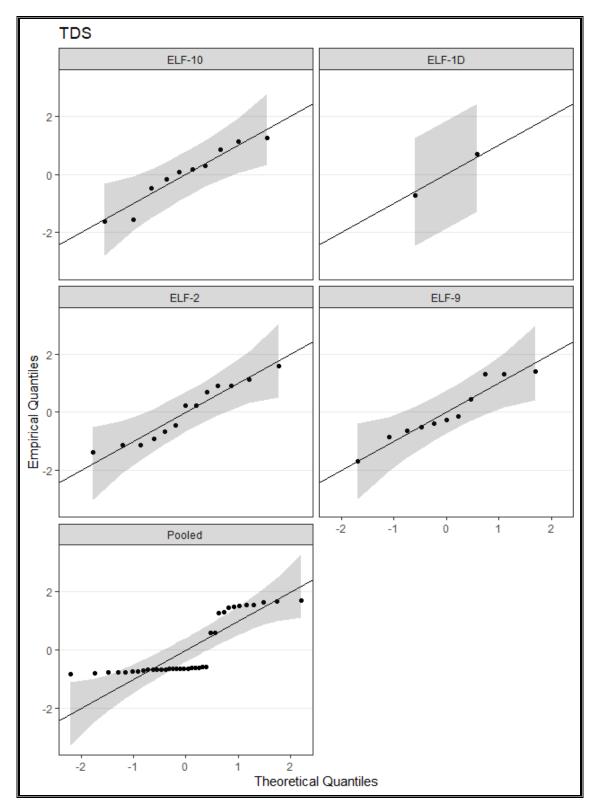


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

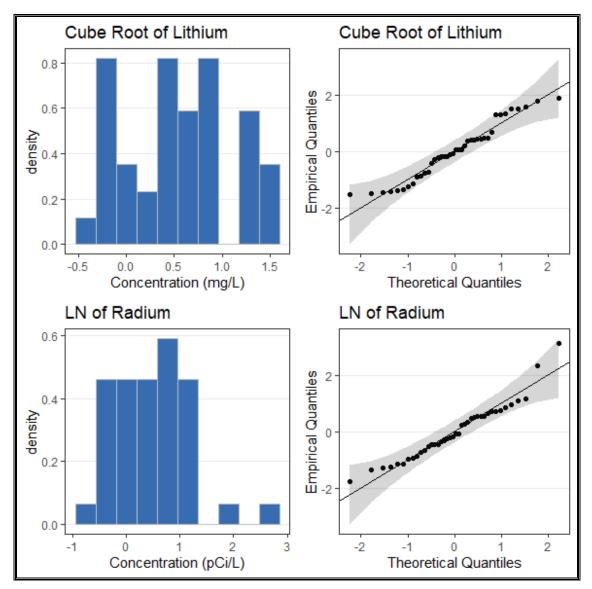


Figure C.3 (cont). Summary statistics plots for the CCR Landfill.

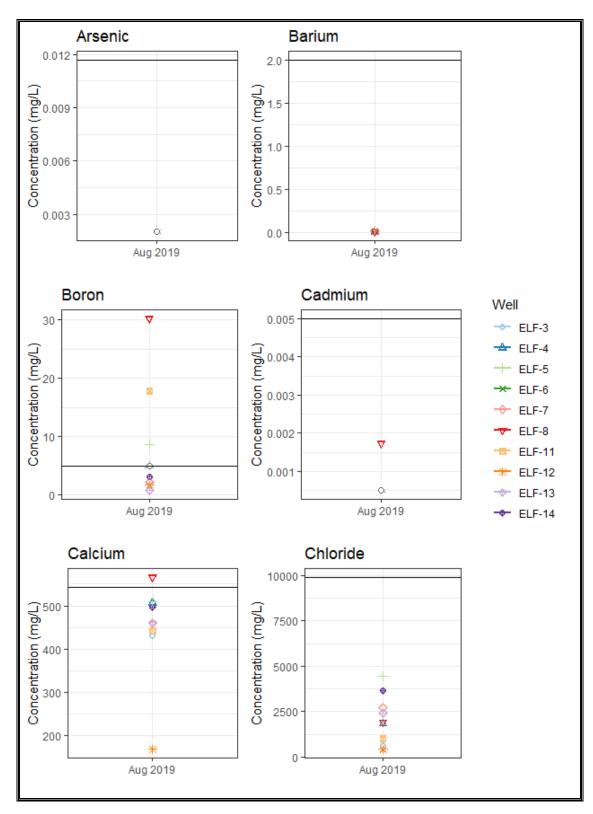


Figure C.4. Groundwater Protection Standard plots for the CCR Landfill.

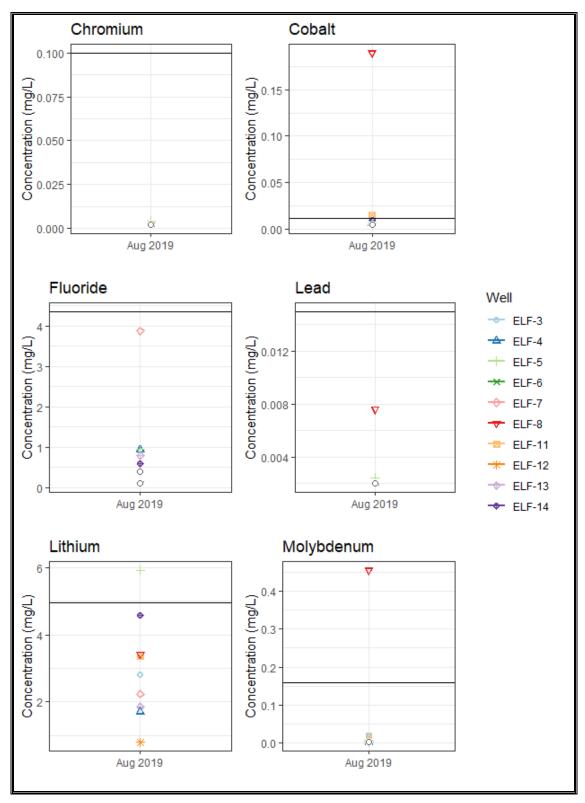


Figure C.4 (cont.). Groundwater Protection Standard plots for the CCR Landfill.

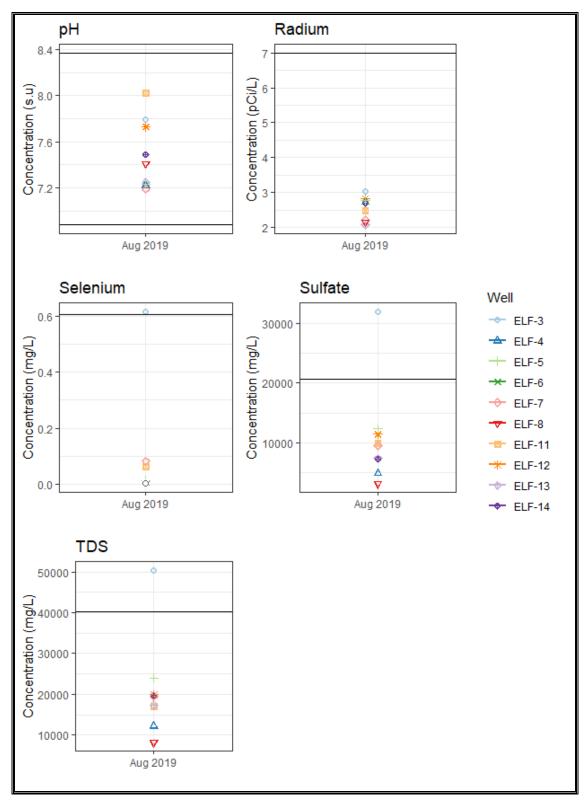


Figure C.4 (cont.). Groundwater Protection Standard plots for the CCR Landfill.



# Attachment D:

Field Data Sheets



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)	рН (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 Samp		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			



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)	рН (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							
ppendix: 3_4 Sample Time:			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			



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)	рН (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							
ppendix: 3_4 Sample Time:			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	7		



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)	рН (s.u.)	ORP (mv)	Turb. (NTU)	

SAMPLE COLLECTION							
ppendix: 3_4 Sample Time:		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



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 PARAME	ETERS		
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	рН (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



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 PARAMI	ETERS		
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	рН (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

			SAMPI	E 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	7

#### **Comments/Observations:**

WELL HAS HISTORICALLY GONE DRY DURING SAMPLING. SAMPLE TAKEN FIRST, THEN PARAMETERS MEASURED



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)	ТЕМР (C)	SC (uS)	DO (mg/l)	рН (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

			SAMPI	E 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	7



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 PARAMI	ETERS		
TIME (min)	TEMP (C)	SC (uS)	DO (mg/l)	рН (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		
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



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)	рН (s.u.)	ORP (mv)	Turb. (NTU)

Appendix:	3_4		Sample Time:	: 11:14		
Containers	-	Preservatives		Analytes/Comments	]	
(1) 1/2 gal poly	1	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	7	

## Comments/Observations:

Could not sample due to low water level



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)	рН (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	]	



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)	рН (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		



## 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)	рН (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								
ppendix: 3_4 Sample Time: 10:32								
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



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 							

	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



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)	ТЕМР (С)	SC (uS)	DO (mg/l)	рН (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:	pendix: 3_4 Sample Time: 09:26								
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 Salt Lake City, UT 84116

WEST TEL: (801) 220-2989

ANALYTICAL

## LABORATORIES 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 Jose Rocha presented in the following report.

QA Officer

American West Analytical Laboratories (AWAL) is accredited by The National Environmental Laboratory Accreditation Program (NELAP) in Utah and Texas: and is 3440 South 700 West state accredited in Colorado, Idaho, New Mexico, Wyoming, and Missouri. 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 (801) 263-8686 questions or concerns regarding this report please feel free to call.

Toll Free (888) 263-8686

Fax (801) 263-8687 The abbreviation "Surr" found in organic reports indicates a surrogate compound that is awal@awal-labs.com 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

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908532-001Client Sample ID:ELF-1DCollection Date:8/20/2019ANALYTICAL8/21/2019

LABORATORIES Analytical Results

TOTAL METALS

Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Antimony	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00400	< 0.00400	
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	
Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.000500	< 0.000500	
Chromium	mg/L	8/30/2019 1331h	9/3/2019 1141h	E200.8	0.00200	< 0.00200	
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	
Lithium	mg/L	8/22/2019 750h	8/30/2019 1505h	E200.7	0.100	2.19	
Mercury	mg/L	8/26/2019 1838h	8/27/2019 1054h	E245.1	0.0000900	< 0.0000900	1
Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1551h	E200.8	0.00200	0.0161	
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	
	Antimony Arsenic Barium Beryllium Cadmium Chromium Chromium Cobalt Lead Lithium Mercury Molybdenum Selenium	Antimonymg/LArsenicmg/LBariummg/LBerylliummg/LCadmiummg/LChromiummg/LCobaltmg/LLeadmg/LLithiummg/LMercurymg/LMolybdenummg/LSeleniummg/L	Compound         Units         Prepared           Antimony         mg/L         \$/30/2019         1331h           Arsenic         mg/L         \$/30/2019         1331h           Barium         mg/L         \$/30/2019         1331h           Barium         mg/L         \$/30/2019         1331h           Beryllium         mg/L         \$/30/2019         1331h           Cadmium         mg/L         \$/30/2019         1331h           Chromium         mg/L         \$/30/2019         1331h           Cobalt         mg/L         \$/30/2019         1331h           Lead         mg/L         \$/30/2019         1331h           Lithium         mg/L         \$/30/2019         1331h           Mercury         mg/L         \$/30/2019         1331h           Molybdenum         mg/L         \$/30/2019         1331h	Compound         Units         Prepared         Analyzed           Antimony         mg/L         8/30/2019         1331h         9/3/2019         1141h           Arsenic         mg/L         8/30/2019         1331h         9/3/2019         1141h           Barium         mg/L         8/30/2019         1331h         9/3/2019         1141h           Beryllium         mg/L         8/30/2019         1331h         9/3/2019         1141h           Cadmium         mg/L         8/30/2019         1331h         9/3/2019         1141h           Chromium         mg/L         8/30/2019         1331h         9/3/2019         1141h           Chromium         mg/L         8/30/2019         1331h         9/3/2019         1141h           Cobalt         mg/L         8/30/2019         1331h         9/3/2019         1141h           Lead         mg/L         8/30/2019         1331h         9/3/2019         1141h           Lithium         mg/L         8/30/2019         1331h         9/3/2019         1141h           Lead         mg/L         8/30/2019         1331h         9/3/2019         1141h           Mercury         mg/L         8/20/2019         1838h	Compound         Units         Prepared         Analyzed         Used           Antimony         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Arsenic         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Barium         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Beryllium         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Cadmium         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Chromium         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Cobalt         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Lead         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Lithium         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.8           Lithium         mg/L         \$/30/2019         1331h         9/3/2019         1141h         E200.7	CompoundUnitsPreparedAnalyzedUsedLimitAntimonymg/L8/30/2019 1331h9/3/2019 1141hE200.80.00400Arsenicmg/L8/30/2019 1331h9/3/2019 1141hE200.80.00200Bariummg/L8/30/2019 1331h9/3/2019 1141hE200.80.00200Berylliummg/L8/30/2019 1331h9/3/2019 1141hE200.80.00200Cadmiummg/L8/30/2019 1331h9/3/2019 1141hE200.80.00200Cadmiummg/L8/30/2019 1331h9/3/2019 1141hE200.80.00200Chromiummg/L8/30/2019 1331h9/3/2019 1141hE200.80.00200Cobaltmg/L8/30/2019 1331h9/3/2019 1141hE200.80.00200Lithiummg/L8/30/2019 1331h9/3/2019 1141hE200.80.00200Mercurymg/L8/22/2019 750h8/30/2019 1505hE200.70.100Mercurymg/L8/26/2019 1838h8/27/2019 1054hE245.10.0000900Molybdenummg/L8/30/2019 1331h9/3/2019 1551hE200.80.002200	CompoundUnitsPreparedAnalyzedUsedLimitResultAntimony $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00400$ $< 0.00400$ Arsenic $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00200$ $< 0.00200$ Barium $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00200$ $< 0.00200$ Barium $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00200$ $< 0.00200$ Cadmium $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00200$ $< 0.00200$ Cadmium $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00200$ $< 0.00200$ Chromium $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00200$ $< 0.00200$ Cobalt $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00200$ $< 0.00200$ Lead $mg/L$ $8/30/2019 1331h$ $9/3/2019 1141h$ $E200.8$ $0.00200$ $< 0.00200$ Lithium $mg/L$ $8/22/2019 750h$ $8/30/2019 1141h$ $E200.7$ $0.100$ $2.19$ Mercury $mg/L$ $8/26/2019 138h$ $8/27/2019 155h$ $E200.7$ $0.00200$ $< 0.0000900$ Molybdenum $mg/L$ $8/30/2019 1331h$ $9/3/2019 155h$ $E200.8$ $0.00200$ $< 0.0000900$ Molybdenum $mg/L$ $8/30/2019 1331h$ $9/3/2019 155h$ $E200.8$ $0.00200$ $< 0.00200$

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

#### Report Date: 9/5/2019 Page 2 of 39

**Client:** PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 Lab Sample ID: 1908532-002 AMERICAN WEST ANALYTICAL ABOR ATOPHEC 8/20/2019 1430h 8/21/2019 1445h

# LABORATORIES Analytical Results

#### TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	< 0.00200	
QA Officer	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	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah	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	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1507h	E200.7	0.100	1.52	
Toll Free (888) 263-8686 Fax (801) 263-8687	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	
awal@awal-labs.com	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1445h	E200.8	0.00200	< 0.00200	

#### Report Date: 9/5/2019 Page 3 of 39

# **Client: Project:**

## **INORGANIC ANALYTICAL REPORT**

Contact: Jeff Tucker PacifiCorp Hunter CCR Groundwater Sampling / PERCM052 Lab Sample ID: 1908532-003 AMERICAN Collection Collection 8/20/2019 1315h 8/21/2019 1445h

AIVIENICATN WEST ANALYTICAL LABORATORIES Analytical Results **Collection Date:** 

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	< 0.00200	
QA Officer		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	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah		mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	0.00253	
84119	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	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1651h	E200.7	1.00	2.81	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1106h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687	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	
awal@awal-labs.com	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1448h	E200.8	0.00200	< 0.00200	

#### Report Date: 9/5/2019 Page 4 of 39

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908532-004Client Sample ID:ELF-4Collection Date:8/20/2019ANALYTICAL8/21/2019

LABORATORIES Analytical Results

## TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1451h	E200.8	0.00200	< 0.00200	
QA Officer	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	
	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) 263-8686	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1606h	E200.8	0.00200	0.00240	
awal@awal-labe.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	

#### Report Date: 9/5/2019 Page 5 of 39

**Client:** PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 Lab Sample ID: 1908532-005 AMERICAN WEST ANALYTICAL LABORATORIES Analytical Results 8/20/2019 1130h 8/21/2019 1445h

### TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	0.00212	
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	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah	Chromium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	0.00436	
	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	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1114h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687 M	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	
	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1454h	E200.8	0.00200	< 0.00200	

Report Date: 9/5/2019 Page 6 of 39

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908532-006Client Sample ID:ELF-7Collection Date:8/20/2019ANALYTICAL8/21/2019

LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00400	< 0.00400	-
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.00200	< 0.00200	
QA Officer	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	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1457h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah	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	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1516h	E200.7	0.100	2.23	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1116h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687	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	

#### Report Date: 9/5/2019 Page 7 of 39

# Client: Project

## **INORGANIC ANALYTICAL REPORT**

Contact: Jeff Tucker

 Client:
 PacifiCorp
 Control of the c

WEST Collection Date: ANALYTICAL LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	< 0.00200	
QA Officer		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	
-	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 <sup>M</sup> S	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1626h	E200.8	0.00200	0.455	
	Selenium	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	< 0.00200	
awal@awal-labs.com	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1501h	E200.8	0.00200	< 0.00200	

#### Report Date: 9/5/2019 Page 8 of 39



AMERICAN

ANALYTICAL

## **INORGANIC ANALYTICAL REPORT**

 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 1

 Lab Sample ID:
 1908532-008
 1

 Client Sample ID:
 ELF-9
 1

 Collection Date:
 8/20/2019
 1345h

 Received Date:
 8/21/2019
 1445h

LABORATORIES Analytical Results

WEST

TOTAL METALS

0.4.00
0400
663
134
0200
00500
0200
0400
0200
88
00900
679
0200
0200

#### Report Date: 9/5/2019 Page 9 of 39



 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 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

AMERICAN WEST ANALYTICAL LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1507h	E200.8	0.00200	< 0.00200	
QA Officer		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	
-	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	
S Sawal@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	

#### Report Date: 9/5/2019 Page 10 of 39

 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

LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	< 0.00200	
QA Officer	Barium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	0.0165	
۰. ۱۹۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰ - ۲۰۰۰	Beryllium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.00200	< 0.00200	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1510h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah	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	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1533h	E200.7	0.100	0.792	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1124h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687 <sup>M</sup> S	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	

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Contact: Jeff Tucker

**Client:** PacifiCorp **Project:** Hunter CCR Groundwater Sampling / PERCM052 Lab Sample ID: 1908532-011 AMERICAN Client Sample ID: ELF-13 **Collection Date:** 8/20/2019 1130h **Received Date:** 8/21/2019 1445h

ANALYTICAL LABORATORIES Analytical Results

WEST

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1524h	E200.8	0.00200	< 0.00200	
QA Officer	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	
	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 <sup>N</sup> S	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1638h	E200,8	0.00200	< 0.00200	
	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	

#### Report Date: 9/5/2019 Page 12 of 39



Contact: Jeff Tucker

**Client:** PacifiCorp Hunter CCR Groundwater Sampling / PERCM052 **Project:** Lab Sample ID: 1908532-012 AMERICAN Client Sample ID: ELF-14 **Collection Date:** 8/20/2019 1045h **Received Date:** 8/21/2019 1445h

ANALYTICAL LABORATORIES Analytical Results

WEST

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	< 0.00200	
QA Officer	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	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah	Chromium	mg/L	8/30/2019 1331h	9/3/2019 1527h	E200.8	0.00200	< 0.00200	
2	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	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1537h	E200.7	0.100	4.58	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1128h	E245.1	0.0000900	< 0.0000900	
10111100 (000) 200-0000	Molybdenum	mg/L	8/30/2019 1331h	9/3/2019 1641h	E200,8	0.00200	0.00431	
awal@awal-labs.com	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	



 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

WEST Received Date: ANALYTICAL LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	< 0.00200	
QA Officer	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	
	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	1
	Thallium	mg/L	8/30/2019 1331h	9/3/2019 1531h	E200.8	0.00200	< 0.00200	

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

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Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908532-014Client Sample ID:FBCollection Date:8/20/2019ANALYTICAL8/21/2019

LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Antimony	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00400	< 0.00400	
Jose Rocha	Arsenic	mg/L	8/30/2019 <sup>-</sup> 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	
• QA Officer	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	
3440 South 700 West	Cadmium	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.000500	< 0.000500	
Salt Lake City, Utah	Chromium	mg/L	8/30/2019 1331h	9/3/2019 1540h	E200.8	0.00200	< 0.00200	
84119	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	
(801) 263-8686	Lithium	mg/L	8/22/2019 750h	8/30/2019 1542h	E200.7	0.100	< 0.100	
Toll Free (888) 263-8686	Mercury	mg/L	8/26/2019 1838h	8/27/2019 1132h	E245.1	0.0000900	< 0.0000900	
Fax (801) 263-8687 <sup>M</sup> S	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	

#### Report Date: 9/5/2019 Page 15 of 39

**Client:** PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 1908532-001 Lab Sample ID: AMERICAN Client Sample ID: ELF-1D **Collection Date:** 8/20/2019 1330h WEST ANALYTICAL Received Date: LABORATORIES Analytical Results **Received Date:** 8/21/2019 1445h

Kyle F. Gross Laboratory Director		Units mg/L	Date Prepared	Date Analyzed	Method Used E300.0	Reporting Limit	Analytical Result	Qual
<b>Jose Rocha</b> QA Officer	* - The reporting limits		ample matrix inte			0.200	< 0.200	
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								



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908532-002Client Sample ID:ELF-2Collection Date:8/20/2019ANALYTICAL8/21/2019ARCENTICAL8/21/2019

LABORATORIES Analytical Results

Kyla H ("roce	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/31/2019 403h	E300.0	0.100	< 0.100	
<b>Jose Rocha</b> 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

	Lab Sample ID:	1908532-00	Groundwater Sampling / PERCM 3	<b>Contact:</b> 1052	Jeff Tucker
AMEDICANI	Client Sample ID:	ELF-3			
AMERICAN WEST	<b>Collection Date:</b>	8/20/2019	1315h		
ANALYTICAL			1445h		
LABORATORIES	Analytical Results				•

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		9/3/2019 2031h	E300.0	0.400	< 0.400	*
Jose Rocha QA Officer		were raised due to s	ample matrix inte	erferences.				
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				ş.				

Λ		<u>INO</u>	RGANI	C ANALYT	ICAL R	REPORT
	Client:	PacifiCorp			Contact:	Jeff Tucker
	Project:	Hunter CCH	R Groundwate	r Sampling / PERCN	/1052	
	Lab Sample ID:	1908532-00	)4			
	<b>Client Sample ID:</b>	ELF-4				
AMERICAN	<b>Collection Date:</b>	8/20/2019	1215h			
ANALYTICAL	Received Date:	8/21/2019	1445h			
LABORATORIES	Analytical Results					

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/31/2019 437h	E300.0	0.100	0.941	
<b>Jose Rocha</b> 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

Report Date: 9/5/2019 Page 19 of 39

**Client:** PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 1908532-005 Lab Sample ID: AMERICAN Client Sample ID: ELF-5 **Collection Date:** WEST ANALYTICAL LABORATORIES Analytical Results 8/20/2019 1130h 8/21/2019 1445h

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/31/2019 454h	E300.0	0.100	0.962	
<b>Jose Rocha</b> 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								

Report Date: 9/5/2019 Page 20 of 39

# Independence Independence Image: Stress of the s

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/31/2019 510h	E300.0	0.100	3.88	
Jose Rocha QA Officer								
3440 South 700 West Salt Lake City, Utah 84119	L							
(801) 263-8686								

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	Client:	PacifiCorp		<b>Contact:</b>	Jeff Tucker
the second second	Project:	Hunter CCR	R Groundwater Sampling / PERCM	1052	
	Lab Sample ID:	1908532-00	17		
	<b>Client Sample ID:</b>	ELF-8			
ANIENICAN	<b>Collection Date:</b>	8/20/2019	1032h		
AMERICAN WEST ANALYTICAL LABORATORIES	Received Date:	8/21/2019	1445h		
	Analytical Results				

								· · · · · · · · · · · · · · · · · · ·		
Kyle F. Gross			Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual	
Laboratory Director	Fluoride	.*	mg/L	-	8/31/2019 527h	E300.0	0.100	< 0.100		
<b>Jose Rocha</b> QA Officer										
3440 South 700 West Salt Lake City, Utah 84119										
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awal@awal-labs.com										

	Client:	PacifiCorp		Contact:	Jeff Tucker	
	Project:	Hunter CCR	R Groundwater Sampling / PERCM	1052		
	· · · · · · · · · · · · · · · · · · ·	1908532-00				
	<b>Client Sample ID:</b>	ELF-9				
AWERICAN	<b>Collection Date:</b>	8/20/2019	1345h			
AMERICAN WEST ANALYTICAL	<b>Received Date:</b>	8/21/2019	1445h			
A NALI HCAL						

LABORATORIES Analytical Results

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		9/3/2019 2048h	E300.0	0.200	< 0.200	*
<b>Jose Rocha</b> QA Officer		vere raised due to s	ample matrix inte	erferences.				
3440 South 700 West Salt Lake City, Utah 84119								
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#### **INORGANIC ANALYTICAL REPORT Client:** PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 Lab Sample ID: 1908532-009 AMERICAN Client Sample ID: ELF-11 **Collection Date:** 8/20/2019 926h WEST **Received Date:** 8/21/2019 1445h ANALYTICAL LABORATORIES Analytical Results

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/31/2019 600h	E300.0	0.100	< 0.100	
<b>Jose Rocha</b> QA Officer								
3440 South 700 West Salt Lake City, Utah 84119								
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Reporting

Analytical

**Client:** PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 Lab Sample ID: 1908532-010 Client Sample ID: ELF-12 AMERICAN **Collection Date:** 8/20/2019 1215h WEST **Received Date:** 8/21/2019 1445h ANALYTICAL LABORATORIES Analytical Results

Date Date Method Kyle F. Gross

QA Officer

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Report Date: 9/5/2019 Page 25 of 39

	Client:	PacifiCorp		Contact:	Jeff Tucker
	Project:	Hunter CCR	Groundwater Sampling / PERCM	052	
	Lab Sample ID:	1908532-01	1		
	Client Sample ID:	ELF-13			
AMENICAN	<b>Collection Date:</b>	8/20/2019	1130h		
AMERICAN WEST ANALYTICAL	<b>Received Date:</b>	8/21/2019	1445h		
LABORATORIES	Analytical Results				

Kyle F. Gross		Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/31/2019 707h	E300.0	0.100	0.798	
Jose Rocha QA Officer								
3440 South 700 West Salt Lake City, Utah 84119								
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# Image: Description of the section o

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/31/2019 724h	E300.0	0.100	0.589	
<b>Jose Rocha</b> 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								

PacifiCorp **Client:** Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 **Project:** Lab Sample ID: 1908532-013 Client Sample ID: DUP AMERICAN **Collection Date:** 8/20/2019 920h WEST ANALYTICAL Received Date: LABORATORIES Analytical Results **Received Date:** 8/21/2019 1445h

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/31/2019 741h	E300.0	0.100	< 0.100	
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								

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	Client:	PacifiCorp		Contact:	Jeff Tucker
	Project:	Hunter CCR	Groundwater Sampling / PERCM	1052	
	Lab Sample ID:				
	<b>Client Sample ID:</b>	FB			
AMERICAN	<b>Collection Date:</b>	8/20/2019	1445h		
AMERICAN WEST ANALYTICAL	Received Date:	8/21/2019	1445h		
ABORATORIES					

LABORATORIES Analytical Results

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Fluoride	mg/L		8/30/2019 1819h	E300.0	0.100	< 0.100	
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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Kyle F. Gross Laboratory Director

Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Lab Set ID: 1		water Sampling / PE	ERCM052				Contact: Dept: QC Type	Jeff Tuck ME : LCS	er					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: Test Code:	<b>LCS-64600</b> 200.7-W	Date Analyzed: Date Prepared:	08/30/201 08/22/201											
Lithium		1.02	mg/L	E200.7	0.0114	0.100	1.000	0	102	80 - 120				
Lab Sample ID: Test Code:	LCS-64783 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201									<u> </u>		
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Lead Selenium Thallium		0.191 0.188 0.188 0.192 0.190 0.192 0.194 0.194 0.187 0.188 0.187	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	E200.8 E200.8 E200.8 E200.8 E200.8 E200.8 E200.8 E200.8 E200.8 E200.8 E200.8 E200.8	0.000668 0.000298 0.000688 0.000198 0.0000858 0.00191 0.000300 0.000448 0.000574 0.000154	0.00400 0.00200 0.00200 0.00200 0.000500 0.00200 0.00400 0.00200 0.00200 0.00200	0.2000 0.2000 0.2000 0.2000 0.2000 0.2000 0.2000 0.2000 0.2000 0.2000	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	95.6 94.1 93.9 95.9 95.2 96.1 96.8 93.5 94.1 93.3	85 - 115 85 - 115				
Lab Sample ID: Test Code: Molybdenum	LCS-64783 200.8-W	Date Analyzed: Date Prepared: 0.195	09/03/201 08/30/201 mg/L		0.000652	0.00200	0.2000	0	97.3	85 - 115				
Lab Sample ID: Test Code:	<b>LCS-64690</b> HG <b>-</b> DW-245.1	Date Analyzed: Date Prepared:	08/27/201 08/26/201	9 1052h				~						
Mercury		0.00353	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	106	85 - 115				

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Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Analyte Lab Sample ID:	 Result Date Analyzed	Units	<b>Method</b> 19 1454h	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
	 Result	Units	Method	MDL	Limit	Spiked	Amount	%REC	Limits	Amt	% RPD	Limit	Qual

Lithium		< 0.100	mg/L	E200.7	0.0114	0.100			
Lab Sample ID:	MB-64783	Date Analyzed:	09/03/201	9 1132h				 	
Test Code:	200.8-W	Date Prepared:	08/30/201	9 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:	09/03/201	9 1544h					
Test Code:	200.8-W	Date Prepared:	08/30/201	9 1331h					
Molybdenum		< 0.00200	mg/L	E200.8	0.000652	0.00200			
Lab Sample ID:	MB-64690	Date Analyzed:	08/27/201	9 1050h					
Test Code:	HG-DW-245.1	Date Prepared:	08/26/201	9 1838h					
Mercury		< 0.0000900	mg/L	E245.1	0.0000396	0.0000900			

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**Jose Rocha** QA Officer

## **QC SUMMARY REPORT**

Lab Set ID: 19	acifiCorp 908532 unter CCR Groundwa	ter Sampling / PE	ERCM052				Contact: Dept: QC Type:	Jeff Tuck ME : MS	er					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: Test Code:	<b>1908532-014AMS</b> 200. <b>7-</b> W	Date Analyzed: Date Prepared:	08/30/201 08/22/201		· · · · · · · · · · · · · · · · · · ·									
Lithium		1.02	mg/L	E200.7	0.0114	0.100	1.000	0	102	75 - 125				
Lab Sample ID: Test Code:	<b>1908532-001AMS</b> 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201											
Antimony Arsenic		1.86 1.97	mg/L mg/L	E200.8 E200.8	0.00668 0.00298	0.0400 0.0200	2.000 2.000	0.00114 0.00108	.93.0 98.2	75 - 125 75 - 125				
Barium Beryllium Cadmium		1.83 1.80	mg/L mg/L	E200.8 E200.8	0.00688	0.0200	2.000 2.000	0.00842	91.1 89.9	75 - 125 75 - 125				-
Chromium Cobalt		1.84 1.82 1.82	mg/L mg/L mg/L	E200.8 E200.8 E200.8	0.000858 0.0191 0.00300	0.00500 0.0200 0.0400	2.000 2.000 2.000	0.000113 0 0.00291	92.2 90.8 90.7	75 - 125 75 - 125 75 - 125				
Lead Selenium		1.79	mg/L mg/L	E200.8 E200.8	0.00448 0.00574	0.0200	2.000 2.000	0.000891	89.3 94.8	75 - 125 75 - 125 75 - 125				
Thallium		1.77	mg/L	E200.8	0.00154	0.0200	2.000	0	88.5	75 - 125				
Lab Sample ID: Test Code:	<b>1908532-0013AMS</b> 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201						÷					
Antimony Arsenic		0.194 0.216	mg/L mg/L	E200.8 E200.8	0.000668 0.000298	0.00400 0.00200	0.2000 0.2000	0 0	97.1 108	75 - 125 75 - 125				
Barium Beryllium		0.200 0.176	mg/L mg/L	E200.8 E200.8	0.000688 0.000198	0.00200 0.00200	0.2000 0.2000	0 0	100 87.8	75 - 125 75 - 125				
Cadmium Chromium		0.192 0.193	mg/L mg/L	E200.8 E200.8	0.0000858 0.00191	0.000500 0.00200	0.2000 0.2000	0 0	95.9 96.5	75 - 125 75 - 125				
Cobalt Lead	·	0.207 0.179 0.284	mg/L mg/L	E200.8 E200.8	0.000300 0.000448	0.00400	0.2000	· 0 0	103 89.7	75 - 125 75 - 125				1
Selenium Thallium		0.284 0.179	mg/L mg/L	E200.8 E200.8	0.000574 0.000154	0.00200 0.00200	0.2000 0.2000	0 0	142 89.6	75 - 125 75 - 125				I

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Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Lab Set ID: 1	acifiCorp 908532 Junter CCR Groundwa	ter Sampling / PI	ERCM052				Contact: Dept: QC Type	Jeff Tuck ME : 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: Test Code:	<b>1908532-001AMS</b> 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201					<u></u>						
Molybdenum		2.03	mg/L	E200.8	0.00652	0.0200	2.000	0.0161	101	75 - 125				
Lab Sample ID: Test Code:	<b>1908532-0013AMS</b> 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201										-	
Molybdenum		0.210	mg/L	E200.8	0.000652	0.00200	0.2000	0.0176	96.2	75 - 125				
Lab Sample ID: Test Code:	<b>1908532-001AMS</b> HG-DW-245.1	Date Analyzed: Date Prepared:	08/27/201 08/26/201			· · · ·								
Mercury		0.00276	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	83.0	80 - 120				

<sup>1</sup> - 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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Kyle F. Gross Laboratory Director

Jose Rocha OA Officer

## **QC SUMMARY REPORT**

Client: Lab Set ID:	PacifiCorp 1908532						Contact: Dept:	Jeff Tuck ME	er					
Project:	Hunter CCR Groundwa	ter Sampling / PF	ERCM052				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 Test Code:	<b>1908532-014AMSD</b> 200.7-W	Date Analyzed: Date Prepared:	08/30/201 08/22/201											
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 Test Code:	<b>1908532-001AMSD</b> 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201									···		
Antimony Arsenic		1.88 1.97	mg/L mg/L	E200.8 E200.8	0.00668	0.0400 0.0200	2.000 2.000	0.00114 0.00108	93.9 98.6	75 - 125 75 - 125	1.86 1.97	0.927 0.390	20 20	
Barium Beryllium		1.85 1.85	mg/L mg/L	E200.8 E200.8	0.00688 0.00198	0.0200 0.0200	2.000 2.000	0.00842 0	91.9 92.4	75 - 125 75 - 125	1.83 1.8	0.885 2.80	20 20	
Cadmium Chromium		1.85 1.80	mg/L mg/L	E200.8 E200.8	0.000858 0.0191	0.00500 0.0200	2.000 2.000	0.000113	92.3 90.2	75 - 125 75 - 125	1.84 1.82	0.130 0.599	20 20	
Cobalt Lead		1.81 1.81	mg/L mg/L	E200.8 E200.8	0.00300 0.00448	0.0400 0.0200	2.000 2.000	0.00291 0	90.5 90.3	75 - 125 75 - 125	1.82 1.79	0.238 1.16	20 20	
Selenium Thallium		1.89 1.79	mg/L mg/L	E200.8 E200.8	0.00574 0.00154	0.0200 0.0200	2.000 2.000	0.000891 0	94.6 89.5	75 - 125 75 - 125	1.9 1.77	0.226 1.15	20 20	
Lab Sample ID Test Code:	: 1908532-0013AMSD 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201											
Antimony Arsenic		0.201 0.214	mg/L mg/L	E200.8 E200.8	0.000668 0.000298	0.00400 0.00200	0.2000 0.2000	0.000784 0.00102	100 107	75 - 125 75 - 125	0.194 0.216	3.29 0.610	20 20	
Barium Beryllium		0.206 0.180	mg/L mg/L	E200.8 E200.8	0.000688 0.000198	0.00200 0.00200	0.2000	0.0151 0	95.4 90.2	75 - 125 75 - 125	0.2 0.176	2.84 2.69	20 20	
Cadmium Chromium		0.197	mg/L mg/L	E200.8 E200.8	0.0000858	0.000500	0.2000	0.000164 0	98.4 96.5	75 - 125 75 - 125	0.192 0.193	2.71 0.0299	20 20	
Cobalt		0.207	mg/L mg/L	E200.8 E200.8	0.000300 0.000448	0.00400	0.2000	0.0167 0.000694	95.1 92.4	75 - 125 75 - 125	0.207 0.179	0.0293	· 20 20	
Selenium Thallium		0.273 0.184	mg/L mg/L	E200.8 E200.8	0.000574 0.000154	0.00200 0.00 <b>2</b> 00	0.2000 0.2000	0.0648 0	104 91.9	75 - 125 75 - 125	0.284 0.179	3.93 2.52	20 20	

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Kyle F. Gross . Laboratory Director

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Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Lab Set ID: 19	acifiCorp 908532 unter CCR Groundwa	ter Sampling / Pl	ERCM052				Contact: Dept: QC Type	ME	er					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: Test Code:	<b>1908532-001AMSD</b> 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201									7. in . in .		
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: Test Code:	<b>1908532-0013AMSD</b> 200.8-W	Date Analyzed: Date Prepared:	09/03/201 08/30/201											n <del></del>
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: Test Code:	<b>1908532-001AMSD</b> HG-DW-245.1	Date Analyzed: Date Prepared:	08/27/201 08/26/201											
Mercury		0.00264	mg/L	E245.1	0.0000396	0.0000900	0.003330	0	79.2	80 - 120	0.00277	4.75	20	1

<sup>1</sup> - 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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Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Lab Set ID:	PacifiCorp 1908532 Hunter CCR Ground	water Sampling / PI	ERCM052	!			Contact: Dept: QC Typ	WC	er					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID Test Code:	D: LCS-R129816 300.0-W	Date Analyzed:	08/30/20	19 1606h										
Fluoride		5.15	mg/L	E300.0	0.0240	0.100	5.000	0	103	90 - 110				
Lab Sample ID Test Code:	D: LCS-R129822 300.0-W	Date Analyzed:	09/03/20	19 1123h										
Fluoride		5.01	mg/L	E300.0	0.0240	0.100	5.000	0	100	90 - 110				

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Kyle F. Gross Laboratory Director

Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Lab Set ID: 1		water Sampling / PF	ERCM052	2			Contact Dept: QC Typ	: Jeff Tuck WC e: MBLK	cer				
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit Qual
Lab Sample ID: Test Code:	<b>MB-R129816</b> 300.0-W	Date Analyzed:	08/30/20	19 1549h									
Fluoride		< 0.100	mg/L	E300.0	0.0240	0.100							
Lab Sample ID: Test Code:	<b>MB-R129822</b> 300.0-W	Date Analyzed:	09/03/20	19 1106h									
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: P	PacifiCorp						<b>Contact:</b>	Jeff Tuck	er					
Lab Set ID: 1	.908532						Dept:	WC						
Project: H	Iunter CCR Groundwa	ter Sampling / PI	ERCM052				<b>QC Type</b>	: 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: Test Code:	<b>1908532-002CMS</b> 300.0-W	Date Analyzed:	08/30/201	9 1943h										
Fluoride		10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110				
Lab Sample ID: Test Code:	<b>1908532-003CMS</b> 300.0-W	Date Analyzed:	08/30/201	9 2033h				,						
Fluoride		10,300	mg/L	E300.0	48.0	200	10,000	0	103	90 - 110				
Lab Sample ID: Test Code:	<b>1908534-001CMS</b> 300.0-W	Date Analyzed:	09/03/201	9 1323h										
Fluoride		10,100	mg/L	E300.0	48.0	200	10,000	0	101	90 - 110				
Lab Sample ID: Test Code:	<b>1908534-005CMS</b> 300.0-W	Date Analyzed:	09/03/201	9 1541h										
Fluoride		10,400	mg/L	E300.0	48.0	200	10,000	1.52	104	90 - 110				

A

## AMERICAN WEST ANALYTICAL LABORATORIES

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Kyle F. Gross Laboratory Director

**Jose Rocha** QA Officer

## **QC SUMMARY REPORT**

Lab Set ID: 190	ifiCorp 8532 nter CCR Groundwat	er Sampling / PI	ERCM052				Contact: Dept: QC Type	Jeff Tuck WC : MSD	er					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
•	1908532-002CMSD 300.0-W	Date Analyzed:	08/30/2019	1959h										
Fluoride		10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110	10200	0.363	20	
•	1908532-003CMSD 300.0-W	Date Analyzed:	08/30/2019	2049h										
Fluoride		10,400	mg/L	E300.0	48.0	200	10,000	0	104	90 - 110	10300	0.809	20	
-	908534-001CMSD	Date Analyzed:	09/03/2019	1341h										
Fluoride		10,200	mg/L	E300.0	48.0	200	10,000	0	102	90 - 110	10100	0.694	20	
	908534-005CMSD 00.0-W	Date Analyzed:	09/03/2019	1558h				•	,		• • •			
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

Americal	n West Analytical La	Doratories			Rpt Emaile OL:		HC icEDD QC
<b>WORK O</b>	<b>RDER Summary</b>				Work	Order: <b>1908532</b>	Page 1 of 5
Client:	PacifiCorp					Date: 9/5/2019	1450101
Client ID:	PAC900		Contact	Jeff Tucker	Duc	Date. 9/3/2019	
			Contact:				
Project:	Hunter CCR Groundwater Sa		QC Leve			) Type: Project	
Comments:	QC2+. Include EDD. Report Flu Report to derickson@waterenvte	uoride from set 1908531; it ech.com and mholland@wat	is the same sampl terenvtech.com;	e. Metals share with 1	908531. Sample for RAI	DS sent to ALS-Ft Collin	is. cc:
Sample ID	Client Sample ID	Collected Date	<b>Received Date</b>	Test Code	Matrix	Sel Storage	U
908532-001A	ELF-1D	8/20/2019 1330h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	
				1 SEL Analytes: LI			
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
		NW12			AS BA BE CD CR CO PB MO		
				200.8-W-PR		DF-Metals	
				HG-DW-245.1 HG-DW-PR		DF-Metals	
908532-001B				OUTSIDE LAB		DF-Metals ALS	
908532-001C				300.0-W		df - wc	
				1 SEL Analytes: F		ui - wc	
908532-002A	ELF-2	8/20/2019 1430h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	
				1 SEL Analytes: LI	· · · · · · · · · · · · · · · · · · ·		
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
					AS BA BE CD CR CO PB MO		
				200.8-W-PR HG-DW-245.1		DF-Metals DF-Metals	
				HG-DW-245.1 HG-DW-PR		DF-Metals	
908532-002B				OUTSIDE LAB		ALS	
1908532-002C				300.0-W		df - wc	
				1 SEL Analytes: F			
908532-003A	ELF-3	8/20/2019 1315h	8/21/2019 1445h	<b>200.7-W</b> I SEL Analytes: LI	Aqueous	DF-Metals	
				200.7-W-PR	2002-1-1-1-)	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	

	RDER Summary					Order: 1908532	Page 2 of 5
Client:	PacifiCorp				Due	e Date: 9/5/2019	
Sample ID	Client Sample ID	Collected Date	<b>Received Date</b>	Test Code	Matrix	Sel Storage	
1908532-003B	ELF-3	8/20/2019 1315h	8/21/2019 1445h	OUTSIDE LAB	Aqueous	ALS	
1908532-003C				300.0-W		df - wc	
				1 SEL Analytes: F			
1908532-004A	ELF-4	8/20/2019 1215h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	
				1 SEL Analytes: LI			
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
				200.8-W-PR	BA BE CD CR CO PB MO	DF-Metals	
		1		HG-DW-245.1	ana	DF-Metals	
				HG-DW-PR		DF-Metals	
1908532-004B				OUTSIDE LAB		ALS	
1908532-004C				300.0-W		df - wc	
				1 SEL Analytes: F			
1908532-005A	ELF-5	8/20/2019 1130h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	
		·		1 SEL Analytes: LI	-		
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
					BA BE CD CR CO PB MO	1	
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
1908532-005B				HG-DW-PR		DF-Metals	
1908532-005E				OUTSIDE LAB 300.0-W		ALS df - wc	
1908932-0090				I SEL Analytes: F		ai - wc	
1908532-006A	ELF-7	8/20/2019 1245h	8/21/2019 1445h	200.7-W	Aguaous	DF-Metals	_
1900332 00011		0/20/2019 124511	6/21/2017 144511	1 SEL Analytes: LI	Aqueous	Di-Miciais	
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
					BA BE CD CR CO PB MO		
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
1908532-006B				OUTSIDE LAB		ALS	
1908532-006C				300.0-W		df - wc	
				1 SEL Analytes: F			

WORK OI	RDER Summary				Work	Order: 1908532	Page 3 of 5
Client:	PacifiCorp				Du	e 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 SEL Analytes: LI	Aqueous	DF-Metals	
				200.7-W-PR		DF-Metals	
	· · · · · · · · · · · · · · · · · · ·			200.8-W	· · · · · · · · · · · · · · · · · · ·	DF-Metals	
				11 SEL Analytes: SB A.	S BA BE CD CR CO PB MO	SE TL	
	N.E			200.8-W-PR		DF-Metals	
	<u> </u>			HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
1908532-007B				OUTSIDE LAB		ALS	
1908532-007C				300.0-W		df - wc	
				1 SEL Analytes: F			
1908532-008A	ELF-9	8/20/2019 1345h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	
				1 SEL Analytes: LI			
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
					S BA BE CD CR CO PB MC		
				200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
1000500 0000				HG-DW-PR		DF-Metals	
1908532-008B				OUTSIDE LAB		ALS	
1908532-008C				<b>300.0-W</b> 1 SEL Analytes: F		df - wc	
1908532-009A	ELF-11	8/20/2019 0926h	8/21/2019 1445h	200.7-W	A queque	DF-Metals	
1908332-009A		8/20/2019 09201	8/21/2019 14431	1 SEL Analytes: LI	Aqueous	Dr-Metais	
				200.7-W-PR		DF-Metals	
				200.8-W		DF-Metals	
					IS BA BE CD CR CO PB MO		
	- Tayle (Baskada)			200.8-W-PR		DF-Metals	
				HG-DW-245.1		DF-Metals	
				HG-DW-PR		DF-Metals	
1908532-009B	·			OUTSIDE LAB		ALS	
1908532-009C	an a	· · · · · · · · · · · · · · · · · · ·		300.0-W		df - wc	
				1 SEL Analytes: F	· · · · · · · · · · · · · · · · · · ·		
1908532-010A	ELF-12	8/20/2019 1215h	8/21/2019 1445h	200.7-W 1 SEL Analytes: LI	Aqueous	DF-Metals	
	·····			200.7-W-PR		DF-Metals	
	6 LABORATOR	?Y CHECK: %M □ RT □ CN □					

					rder: 1908532	Page 4 of 5
PacifiCorp					Date: 9/5/2019	-
Client Sample ID	Collected Date	<b>Received Date</b>	Test Code	Matrix	Sel Storage	
ELF-12	8/20/2019 1215h	8/21/2019 1445h	200.8-W	Aqueous	DF-Metals	
			200.8-W-PR	JAS DA DE CD CK CO I D MO SE	DF-Metals	
<u></u>		***	HG-DW-245.1		DF-Metals	
			HG-DW-PR		DF-Metals	
		,	OUTSIDE LAB		ALS	
			300.0-W		df - wc	
			1 SEL Analytes: F			
ELF-13	8/20/2019 1130h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	1
					DEMati	
					terror terror	
				R 4S R4 RE CD CR CO PR MO SH		
				D ND DN DE CE CI CO I D MO DE		
			HG-DW-245.1		DF-Metals	
			HG-DW-PR		DF-Metals	
			OUTSIDE LAB		ALS	
			<b>300.0-W</b> 1 SEL Analytes: F		df - wc	
ELF-14	8/20/2019 1045h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	······································
				D AS DA DE CD CK CO FB MO SI		
		<u> </u>				
					ALS	
			300.0-W		df - wc	
· · · · · · · · · · · · · · · · · · ·			1 SEL Analytes: F			
DUP	8/20/2019 0920h	8/21/2019 1445h	200.7-W	Aqueous	DF-Metals	
					DF-Metals	
			200.8-W		DF-Metals	
				SB AS BA BE CD CR CO PB MO SI		
			200.8-W-PR		DF-Metals	
	Client Sample ID         ELF-12	Client Sample ID       Collected Date         ELF-12       8/20/2019 1215h	Client Sample ID       Collected Date       Received Date         ELF-12       \$/20/2019 1215h       \$/21/2019 1445h	Client Sample ID         Collected Date         Received Date         Test Code           ELF-12         8/20/2019 1215h         8/21/2019 1445h         200.8-W           II SEL Analytes: S         200.8-W-PR         HG-DW-245.1           HG-DW-245.1         HG-DW-245.1         300.0-W           ISEL Analytes: F         300.0-W         1 SEL Analytes: F           ELF-13         8/20/2019 1130h         8/21/2019 1445h         200.7-W           200.8-W-PR         200.7-W-PR         200.7-W-PR           200.8-W-PR         1 SEL Analytes: I         200.7-W-PR           200.8-W-PR         11 SEL Analytes: S         200.8-W-PR           200.8-W-PR         200.8-W-PR         11 SEL Analytes: S           200.8-W         11 SEL Analytes: S         200.8-W-PR           200.8-W-PR         11 SEL Analytes: S         200.8-W-PR           300.0-W         1 SEL Analytes: S         200.8-W-PR           200.8-W-PR         11 SEL Analytes: S         200.8-W-PR           11 SEL Analytes: S         200.8-W-PR         11 SEL Analytes: S           200.7-W-PR         200.8-W-PR         11 SEL Analytes: S           200.7-W-PR         200.8-W-PR         11 SEL Analytes: S           200.8-W-PR         11 SEL Analytes: S         200.7-W-	Client Sample ID         Collected Date         Received Date         Test Code         Matrix           ELF-12         8/20/2019 1215h         8/21/2019 1445h         200.8-W         Aqueous           11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE         200.8-W         Received Date         11 SEL Analytes: SB AS BA BE CD CR CO PB MO SE           200.8-W-PR	Client Sample ID         Collected Date         Received Date         Test Code         Matrix         Sel         Storage           ELF-12         8/20/2019 1215h         8/21/2019 1445h         200.8-W         Aqueous         DF-Media           1/1 SEL Analytes: SB AS BA DE CD CR CO PB MO SE TL         200.8-W         Aqueous         DF-Media           1/1 G-DW-245.1         DF-Media         DF-Media         DF-Media           1/1 G-DW-245.1         DF-Media         AAS         DF-Media           2/00.7W-PR         DF-Media         AAS         AAS           3/00.0-W         df-we         1         SEL Analytes: F         df-we           ELF-13         8/20/2019 1130h         8/21/2019 1445h         200.7.W         Aqueous         DF-Media           2/00.7.W-PR         DF-Media         1         SEL Analytes: SF AS BA DE CD CR CO PB MO SE TL         DF-Media           2/00.7.W-PR         DF-Media         DF-Media         DF-Media         DF-Media           2/00.7.W-PR         DF-Media         DF-Media         DF-Media         DF-Media           2/00.7.W-PR         DF-Media         DF-Media         Advecus         DF-Media           2/00.7.W-PR         DF-Media         Advecus         DF-Media         Advecus         <

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WORK O	<b>RDER Summary</b>				Work	Order: 1908532	Page 5 of 5
Client:	PacifiCorp					le Date: 9/5/2019	Ū.
Sample ID	Client Sample ID	Collected Date	<b>Received Date</b>	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 MC	O 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			

Analytical Labora 3440 S. 700 W. Salt Lake City, U	American West Analytical Laboratories 3440 S. 700 W. Sait Lake City, UT 84119 Phone # (801) 263-8686 Toll Free # (888) 263-8686						sing NELA	P accredited		all data will t	ODY pe reported using AWAL's standard analyte lists and n of Custody and/or attached documentation.	AWAL Lab Sample Set # Page / of /
Fax # (801) 263-8687 Email awal@	Pawal-labs.com			Q	C Leve	el:		Turn	Around T	ime:	Unless other arrangements have been made, signed	Due Date:
www.awal-labs.co	m			1 2	2+ 3	3 3+		12	3 4 5 S	tnd	reports will be emailed by <b>5:00 pm</b> on the day they are due.	9/5/19
Client: Pacificorp Address: City, State, Zip: Contact: Jeff Tucker Phone #: Cell #: E-mail: jeff. tucker @ paci Project Name: Hunter CCP GW Project #: Perc.M $\phi$ 52 PO #: Sampler Name: MLS & CE Sample ID: 1 ELF - 1D 2 ELF - 2 3 ELF - 3	h. Ti cove	Time Sampled 1330 1430 1315	# of Containers		Appendix IV						5:00 pm on the day they are due.         Report down to the MDL         Include EDD:         Lab Filter for:         Field Filtered For:         RCRA         CWA         SDWA         ELAP / A2LA         NILLAP         Non-Compliance         Other:         Known Hazards         &         Sample Comments	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 N NA 4 Unbroken on Sample Y N NA 5 Amples Were: 1 Shipped rhand delivered 3 Temperature 4 Received Intact Y N N
$ \begin{array}{c} 4 \\ ELF-4 \\ 5 \\ ELF-5 \\ 6 \\ ELF-7 \\ 7 \\ ELF-8 \\ 8 \\ 10 \\ ELF-11 \\ 10 \\ ELF-12 \\ 10 \\ 10 \\ ELF-12 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10$		1215 1130 1245 1032 1345 0926 1215										5 Y N Checked at bench 6 Received Within Y N Y N 100ting Times Y N
$ \begin{array}{c}     11 \\             ELF - 13 \\             FLF - 14 \\             DUP \\             FB \\             Is \\             FB \\             FB \\           $		1130 1045 0920 1445				0					*bottles read 9:40	Sample Labels and COC Record Match? N
Relinquished by Signature Print Name: Micke Shift leff Relinquished by: Signature Print Name: Signature Print Name: Print Name:	B <sup>ee</sup> /21/21 <sup>e</sup> Time:U5 2 Date: Time: Date: Time:	Received by: Signature Print Name: Received by: Signature Print Name: Received by: Signature Print Name: Print Name:			se	B	ru ru	) in	Date: Time: Date: Time: Date: Time:		report to	CC analytical waterenvtech.com

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

Constituer	nts Analyzed
Appendix III	Appendix IV
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
рН	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:	908532	
pH Lot #:	6085	

#### **Preservation Check Sheet**

Sample Set Extension and pH

	T	1					*			· · · ·			T				 _
Analysis	Preservative	-001	-002	-003	-004	-005	-006	-007	-008	-009	-010	-011	-012	-013	~014		
Ammonia	pH <2 H <sub>2</sub> SO <sub>4</sub>														•		
COD	pH <2 H <sub>2</sub> SO <sub>4</sub>																
Cyanide	pH>12 NaOH																
Metals	pH <2 HNO <sub>3</sub>	Ves	res	Ves	VPS	Yes	Yes										
NO <sub>2</sub> /NO <sub>3</sub>	pH <2 H <sub>2</sub> SO <sub>4</sub>	1		1	l	1	1	1	1	7	7	1		l	ŀ		
0&G	pH <2 HCL																
Phenols	pH <2 H <sub>2</sub> SO <sub>4</sub>																
Sulfide	pH >9 NaOH,				,												
Sunde	Zn Acetate																
TKN	pH <2 H <sub>2</sub> SO <sub>4</sub>																
T PO <sub>4</sub>	$pH < 2 H_2SO_4$																
Cr VI+	pH >9 (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>																
	(													· · ·		 	
															1		
															1		 
L	L	E	1					L						L	1		 

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
То:	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.
- 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.

nderon Jeah Anderson

Radiochemistry Primary Data Reviewer

M . W-

Radiochemistry Final Data Reviewer

<u>9/20/19</u> Date

<u>9/22/19</u> 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 # (868) 263-8686 Fax # (801) 263-8687 Email awal@awal-labs.com www.awal-labs.com						All analysis will be conducted using NELAP accredited methor						reports will be emailed by			AWAL Lab Sample Set # Page 1 of 1	
•	3440 S. 700 W. Salt Lake City , UT 84119			Containers	Matrix	1 226 and 228 Combined									Report down to the MDL  Include EDD: Lab Filter for: Field Filtered For: For Compliance With: RCRA CWA SDWA ELAP / A2LA NLLAP NLLAP Non-Compliance Other: Known Hazards	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 N 4 Unbroken on Sample Y N NA 5 Samples Were: 1 Shipped or hand delivered	
1 ELF-1D 2 ELF-2 3 ELF-3	Sample ID:	Date Sampled 8/20/2019 8/20/2019 8/20/2019	Time Sampled 13:30 14:30 13:15	0) jo # 02 2 2	E 🛛 E Sample Matrix	× × × Radium									& Sample Comments	2 Ambient or Chilled     3 Temperature^C     4 Received Intact     Y N	
4 ELF-4 5 ELF-5 6 ELF-7 7 ELF-8		8/20/2019 8/20/2019 8/20/2019 8/20/2019	12:15 11:30 12:45 10:32	2 2 2 2 2	: > > > > > >	x x x x										5 Property Preserved Y N Checked at bench 6 Received Within	
<ul> <li>* ELF-9</li> <li>9 ELF-11</li> <li>10 ELF-12</li> <li>11 ELF-13</li> </ul>		8/20/2019 8/20/2019 8/20/2019 8/20/2019	13:45 9:26 12:15 11:30	2 2 2 2 2	w	x x x										Holding Times Y N	
12 ELF-14 13 DUP 14 FB		8/20/2019 8/20/2019 8/20/2019 8/20/2019	10:45 9:20 14:45	2 2 2 2 2	* * *	x x x x										Sample Labels and COC Record Match? Y N	
	ense Brun Denise Brunn	8 22 19 Time Date: Time Date: Time:	Received by: Signature Print Name: Received by: Signature Print Name: Received by: Signature Print Name:				2	<u> </u>	- 5 < (	~		Dai Tin Dai Tin Dai Tin	ne: 16: ne: te:				



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

(ALS) Client: An west Analytica Workorder No: (	10062	2	-
Project Manager: KMD Initials: TEM	Date: 08/2	<u>eli</u>	<u>~</u>
Are airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
Are custody seals on shipping containers intact?	NONE	YES	NO *
Are custody seals on sample containers intact?	NONE	YES	NO *
Is there a COC (chain-of-custody) present?		YES	NO *
Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # matrix, requested analyses, etc.)	of containers,	YES	
Are short-hold samples present?		YES	NO
Are all samples within holding times for the requested analyses?		YES	NO *
Were all sample containers received intact? (not broken or leaking)	c	YES	NO *
Is there sufficient sample for the requested analyses?		YES	NO *
Are all samples in the proper containers for the requested analyses?		YES	NO *
Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES 🖌	NO *
Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO *
Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bu > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	ubbles N/A	YES	NO
Were the samples shipped on ice?		YES	NO
Were cooler temperatures measured at 0.1-6.0°C?	#4 RAD	YES	(NO
	#4		$\underline{}$
Temperature (°C): $\underline{aub} \underline{aub} \underline{aub}$			<b></b>
Acceptance External µR/hr reading: 12 12			
Background μR/hr reading: <u>3</u>			
Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance criteria <sup>2</sup> /TES NO / NA			
Please provide details here for NO responses to gray boxes above - for 2 thru 5 & 7 thru 12,	Ţ	-	çin.
5.) sample from for DUP 182	State "	l'i uo	~
better and A:20 on LOC			
			T
11.) 22 of 28 bother mergunel	pht a	5 ~ 1	2-5
HNO, meder to be added in	, vare	L v	
amounts are continued liet	400	am 7	~
addeed and group + both	re un	~ ~~	~
HNUZ Lot 197345 2			
All client bottle ID's vs ALS lab		A*	
applicable, was the client contacted? (ESDNO NA Contact: Elma Hoy MA	Date/Tin	ne: <b>8 2</b>	YM()

Page 1 of  $\frac{2}{5}$  of 25

ALS	ALS Environments CONDITION OF SAMPLE		
(ALS) Client:	Am. west. Analy	Achworkorder No:	203622
Project Manager:	кмо	Initials: TE	M Date: <u>Rlzul</u> (a

## **Additional Information:**

Sur of HNO 2: added added Imb of HNDZ: 1-2, 2-2, 5-1, 5-2, 6-2, 9-2, 10-2, 11-1, 11-2, 13-2 ald. - of 4ND3; 1.5. · Le-1, Z-1, B-2, Rol, 10-1, 1-1, 2-1, 3-1, 3-12-1 If applicable, was the client contacted? YES / NO / NA, Contact: Date/Time: 1.1 27/19 0 Project Manager Signature / Date: \_

Page  $\frac{1}{2}$  of  $\frac{1}{6}$  of 25

### Iedal Internet Shipping: View/Print Label

print the label. print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to 1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the

affix the folded label using clear plastic shipping tape over the entire 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,

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

Locations' Quick link at ups.com. (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS

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.

S 0097 3 698 **THE UPS STORE** MT Prcess Point

UPS Access Point<sup>TM</sup>

SALT LAKE CITY, UT 84107

SALT LAKE CITY, UT 84106 2223 S HIGHLAND DR **EXAMPLE SHORE**  FOLD HERE

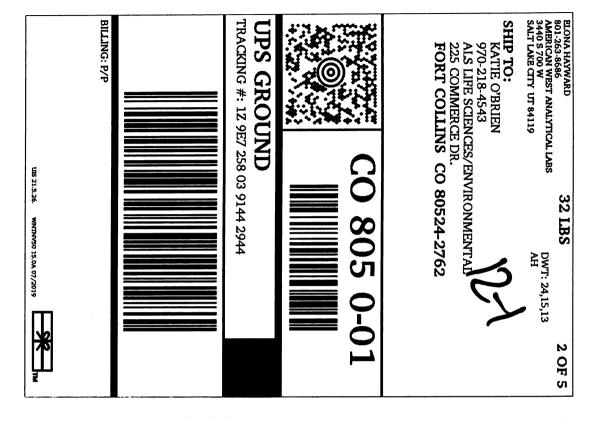
TAYLORSVILLE, UT 84129

S 0027 M 9061

**THE UPS STORE** 

UPS Access Point<sup>MT</sup>

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## 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:

 ${\sf U}~$  - 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

## Radium-226 by Radon Emanation - Method 903.1 PAI 783 Rev 14

PAI / 63 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		Contro I Limits	Lab Qualifier
13982-63-3	Ra-226	38.7 +/- 9.8	0.5	46.48	83.3	67 - 120	Р

## **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.

## Data Package ID: RE1908622-1

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

## 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		Contro I Limits	Lab Qualifier
13982-63-3	Ra-226	47 +/- 12	0	46.48	100	67 - 120	Р

## **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.

## Data Package ID: RE1908622-1

Abbreviations: TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

## 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

Ra-226

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

38.7 +/- 9.8

Field ID: Lab ID: R	E190906-1LCSD	Sample Matrix: WATER Prep SOP: PAI 783 Rev 14 Date Collected: 06-Sep-19 Date Prepared: 06-Sep-19 Date Analyzed: 18-Sep-19	QCBa R	Batch: RE190906-1 ttchID: RE190906-1-1 un ID: RE190906-1A Time: 15 minutes	Moisture(% Result Uni	is: Unfiltered %): NA		
CASNO	Analyte	Sample Result +/- 2 s TPU MDC	Flags	Dupl Result +/- 2 s TPU	icate MDC	Flags	DER	DER Lim

Ρ

47 +/- 12

0.5

### **Comments:**

13982-63-3

#### 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.

11 - Loo Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

#### N - Matrix Spike Recovery outside control limits

## Data Package ID: RE1908622-1

#### Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

0

Ρ

0.518

2.13

BDL - Below Detection Limit

NR - Not Reported

Page 1 of 1

### 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	Sample Matrix: WATER Prep SOP: PAI 783 Rev 14	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-1	Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.15 +/- 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

### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-2	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.32 +/- 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

### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-3	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.23 +/- 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

### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-4	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.34 +/- 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

### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 955 ml
Lab ID:	1908622-5	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.76 +/- 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

### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-6	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.55 +/- 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

### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-7	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.64 +/- 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

### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 955 ml
Lab ID:	1908622-8	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.31 +/- 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

### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID: 1908622-9	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	0.12 +/- 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

#### 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	Sample Matrix: WATER Prep SOP: PAI 783 Rev 14	Prep Batch: RE190906-1 QCBatchID: RE190906-1-1	Final Aliquot: 995 ml Prep Basis: Unfiltered
Lab ID: 1908622-10	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	0.25 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-11	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.41 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-12	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.40 +/- 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

#### 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	Sample Matrix: WATER	Prep Batch: RE190906-1	Final Aliquot: 995 ml
Lab ID:	1908622-13	Prep SOP: PAI 783 Rev 14 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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	0.19 +/- 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

#### 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 Date Collected: 20-Aug-19	QCBatchID: RE190906-1-1 Run ID: RE190906-1A	Prep Basis: Unfiltered 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



# 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 <sup>228</sup>Ra by low background gas flow proportional counting of <sup>228</sup>Ac, which is the ingrown progeny of <sup>228</sup>Ra, according to the current revision of SOP 724. The analyses were completed on09/17/2019.
- 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.

dewon

Jean Anderson Radiochemistry Primary Data Reviewer

Radiochemistry Final Data Reviewer

<u>9/20/19</u> Date

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

Contact       Elba Hayward       Elba	NA
Address     3440 5.700 W.     Context     Bina Hayward     Context     Elona Hayward     Context     Context     Elona Hayward     Context     Context     Mathematication     Context     Context     Elona Hayward     For Compliance With:     2     Unbroken on Outer Packar       Propert Name     Hunter CCR Groundwater Sampling	••••••••••••••••••••••••••••••••••••••
City, State, Zip       Sain Lake City, UT 84119       I       I       I       I       Present Value       I       I       Present Value       I       I       Present Value       I </td <td>30 NA</td>	30 NA
Contact       Elona Hayward	30 NA
Phone #:       601/203-8080	NA
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Sampler Name:       Date       Time       Nampled       Sampled	NA
Sampler Name:       Date       Time       Sampled	
Sampler Name:       Date       Time       Nampled       Sampled	
Sample ID:         Sampled	
1       ELF-1D       8/20/2019       13:30       2       W       X       V       V       X       V       V       X       V       V       X       V       V       V       X       V	
1       ELF-1D       8/20/2019       13:30       2       W       X       I	~
2       ELF-2       8/20/2019       14:30       2       W       X       I	— `
4       ELF-4       8/20/2019       12:15       2       W       X       I       I       I       I       I       I       S       Property Preserved       S       Property Preserved       Y       N       Check       Check       S       Property Preserved       Y       N       Check       S	
Image: Second	
S ELF-3       8/20/2019       11:30       2       W       X       I	ed at bench
Production     Received Within Holding Times       *     ELF-9       *     B/20/2019       13:45     2       W     X       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V       *     V	a al bench
* ELF-9         8/20/2019         13:45         2         W         X         Image: Constraint of the second seco	
8 ELF-9 8/20/2019 13:45 2 W X Y N	
10 ELF-12 8/20/2019 12:15 2 W X	
11 ELF-13 8/20/2019 11:30 2 W X Sample Labels and COC Record	Match?
12 ELF-14 8/20/2019 10:45 2 W X	MatCitt
13 DUP 8/20/2019 9:20 2 W X	
14 FB 8/20/2019 14:45 2 W X 9	
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Relinquished by: Date: Burn Brund B 22 19 Received by: Signature Burn Burn Special Instructions:	
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#### ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM

Are all samples within holding times for the requested analyses?       YES         Were all sample containers received intact? (not broken or leaking)       YES         Is there sufficient sample for the requested analyses?       YES         Are all samples in the proper containers for the requested analyses?       YES         Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A       YES         Are all aqueous non-preserved samples pH 4-9?       N/A       YES         Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A       YES         > 6 mm (1/4 inch) diameter? (i.e. size of green pea)       N/A       YES         Were the samples shipped on ice?       YES       YES         Were cooler temperatures measured at 0.1-6.0°C?       IR gun used*: #1 #3 #4       YES         No. of custody seals on cooler:       \lambda lambda lam	<u> </u>
Are custody seals on shipping containers intact?       NONE         Are custody seals on sample containers intact?       NONE         YES       Is there a COC (chain-of-custody) present?       YES         Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)       YES         Are short-hold samples present?       YES         Are all sample containers received intact? (not broken or leaking)       YES         Were all sample containers received intact? (not broken or leaking)       YES         Are all samples in the proper containers for the requested analyses?       YES         Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A         YES       Are all aqueous non-preserved samples pH 4-9?       YES         Are all aqueous non-preserved samples pH 4-9?       YES         Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A         YES       YES         Were cooler temperature? (i.e. size of green pea)       YES         No. of custody seals on cooler:       1         YES       Are all samples shipped on ice?       YES         No. of custody seals on cooler:       1       YES         No. of custody seals on cooler:       1       YES         No. of custody seals on co	Y NO
Are custody seals on sample containers intact?       NOTS       YES         Is there a COC (chain-of-custody) present?       YES         Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)       YES         Are short-hold samples present?       YES         Are all sample containers received intact? (not broken or leaking)       YES         Were all sample containers received intact? (not broken or leaking)       YES         Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A         YES       Are all aqueous non-preserved samples pt 4-9?       YES         Are all aqueous non-preserved samples pt 4-9?       N/A       YES         > Are all aqueous non-preserved samples pt 4-9?       N/A       YES         > 6 mm (1/4 inch) diameter? (i.e. size of green pea)       N/A       YES         Were the samples shipped on ice?       YES       YES         Cooler #:       2       3       YES         No. of custody seals on cooler:       1       1       YES         No. of custody seals on cooler:       1       1       YES         No. of custody seals on cooler:       1       1       YES         No. of custody seals on cooler:       1       1       YES	NO ·
Is there a COC (chain-of-custody) present?       YES         Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)       YES         Are short-hold samples present?       YES         Are all samples within holding times for the requested analyses?       YES         Were all sample containers received intact? (not broken or leaking)       YES         Are all samples in the proper containers for the requested analyses?       YES         Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A         Are all aqueous non-preserved samples pH 4-9?       N/A         Are all aqueous non-preserved samples pH 4-9?       N/A         Are all samples one headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A         YES       Were the samples shipped on ice?       YES         Were cooler temperatures measured at 0.1-6.0°C?       IR gun used*: #1 #3 #4       #A         YES       Cooler #:       3       Temperature (°C):       XES         No. of custody seals on cooler:       \lambda analyses       Amage       YES         No. of custody seals on cooler:       \lambda analyses       XES       Amage         No. of custody seals on cooler:       \lambda analyses       XES       Amage         Were external µR/hr reading:	NO *
Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)       YES         Are short-hold samples present?       YES         Are all samples within holding times for the requested analyses?       YES         Were all sample containers received intact? (not broken or leaking)       YES         Is there sufficient sample for the requested analyses?       YES         Are all agroups preserved correctly, if required? (excluding volatiles)       N/A         YES       Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A         YES       Are all aqueous non-preserved samples pH 4-9?       N/A         Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A         YES       Are all samples shipped on ice?       YES         Were cooler temperatures measured at 0.1-6.0°C?       IR gun used*: #1 #3 #4       #A         Were cooler temperature (°C):       Area       Area       YES         No. of custody seals on cooler:       \lambda area       \lambda area       Area         Mere external µR/hr reading:       \lambda area       \lambda area       Area         No. of custody seals on cooler:       \lambda area       \lambda area       Area         Were external µR/hr reading:       \lambda area       \lambd	) NO *
matrix, requested analyses, etc.)       YES         Are short-hold samples present?       YES         Are all samples within holding times for the requested analyses?       YES         Were all sample containers received intact? (not broken or leaking)       YES         Is there sufficient sample for the requested analyses?       YES         Are all samples in the proper containers for the requested analyses?       YES         Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A         YES       Are all aqueous non-preserved samples pH 4-9?       YES         Are all aqueous non-preserved samples pH 4-9?       YES         Are all aqueous non-preserved samples pH 4-9?       YES         Are all aqueous non-preserved samples pH 4-9?       YES         Are all aqueous non-preserved samples pH 4-9?       YES         Are all aqueous non-preserved samples pH 4-9?       YES         Are all aqueous non-preserved samples pH 4-9?       YES         Are all samples shipped on ice?       YES         Were the samples shipped on ice?       YES         Were cooler temperatures measured at 0.1-6.0°C?       IR gun used** #1 #3 #4       War         No. of custody seals on cooler:       \lambda and within DOT acceptance criteria       NO / NA (If no, see Form 008.)         Ploor Survey       External µR/hr readi	
Are all samples within holding times for the requested analyses?       YES         Were all sample containers received intact? (not broken or leaking)       YES         Is there sufficient sample for the requested analyses?       YES         • Are all samples in the proper containers for the requested analyses?       YES         • Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A         • Are all aqueous non-preserved samples pH 4-9?       N/A         • Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A         • Are all samples shipped on ice?       YES         • Were the samples shipped on ice?       YES         • Were cooler temperatures measured at 0.1-6.0°C?       IR gun used #1 #3 #4         • Were       YES         • Cooler #:       2	CNO *
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P. Are all samples in the proper containers for the requested analyses?       YES         P. Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A       YES         P. Are all aqueous non-preserved samples pH 4-9?       TVD       YES         Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A       YES         Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A       YES         Are the samples shipped on ice?       YES       YES         Were the samples shipped on ice?       YES       YES         S. Were cooler temperatures measured at 0.1-6.0°C?       IR gun used*: #1 #3 #4       RAD         YES       Cooler #:       7       3         Temperature (°C):       2       2       2         No. of custody seals on cooler:       1       1       1         No. of custody seals on cooler:       1       1       1         Were external µR/hr reading:       2       2       2       2         Mere external µR/hr readings ≤ two times background and within DOT acceptance criteria?       YES 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/ I         S. Sample       Sample       Sample       Sample	) NO *
Image: Are all aqueous samples preserved correctly, if required? (excluding volatiles)       N/A       YES         Image: Are all aqueous non-preserved samples pH 4-9?       Image: Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       YES         Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A       YES         > 6 mm (1/4 inch) diameter? (i.e. size of green pea)       YES         4 Were the samples shipped on ice?       YES         5 Were cooler temperatures measured at 0.1-6.0°C?       IR gun used*: #1       #3       #4       Image: YES         Cooler #:       2       3       Temperature (°C):       Image: Analysis       YES         No. of custody seals on cooler:       1       1       X       YES         Mere external µR/hr reading:       2       1       X       YES         Were external µR/hr reading:       3       1       X       YES         Mere external µR/hr reading:       3       1       1       X       YES         Were external µR/hr reading:       3       1       1       X       YES         Mere external µR/hr readings ≤ two times background and within DOT acceptance criteria?       YES       NO / NA (If no, see Form 008.)         Please provide details here for NO responses to gray boxes above - fo	> NO *
2. Are all aqueous non-preserved samples pH 4-9? 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) 4. Were the samples shipped on ice? 5. Were cooler temperatures measured at 0.1-6.0°C? $IR gun_{used^*: \#1 \#3 \#4}$ Cooler #: Temperature (°C): No. of custody seals on cooler: No. of custody seals on cooler: No. of custody seals on cooler: I = I = I = I = I = I = I = I = I = I =	> NO+
Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles       N/A       YES         > 6 mm (1/4 inch) diameter? (i.e. size of green pea)       YES         Were the samples shipped on ice?       YES         * Were cooler temperatures measured at 0.1-6.0°C?       IR gun used*: #1       #3       #4       RAD OVA       YES         * Were cooler temperatures measured at 0.1-6.0°C?       IR gun used*: #1       #3       #4       OVA       YES         Cooler #:       2       3	NO.
$\frac{N/A}{V} = \frac{1}{V}$ Were the samples shipped on ice? Were cooler temperatures measured at 0.1-6.0°C? Were cooler temperatures measured at 0.1-6.0°C? $\frac{IR gun}{used*} = \frac{1}{43} = \frac{1}{43}$ $\frac{RAD}{VES} = \frac{VES}{VES}$ $\frac{VES}{VES} = \frac{1}{2} = \frac{3}{2}$ Temperature (°C): No. of custody seals on cooler: No. of custody seals on cooler: External μR/hr reading: $\frac{1}{2} = \frac{1}{2} = \frac{1}{2}$ Were external μR/hr reading: $\frac{1}{3} = \frac{1}{2}$ Were external μR/hr reading: $\frac{1}{3} = \frac{1}{2}$ Were external μR/hr reading: $\frac{1}{3} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2}$ Were external μR/hr reading: $\frac{1}{3} = \frac{1}{2} =$	NO *
Se Were cooler temperatures measured at 0.1-6.0°C? $\begin{array}{c c} IR gun\\ used*: #1 #3 #4 \\ \hline OM \end{array} YES \\ \hline Cooler #:  Temperature (°C):  No. of custody seals on cooler:  No. of custody seals on cooler:  No. of custody seals on cooler:  External μR/hr reading:  Mere external μR/hr reading:  Were external μR/hr reading:  Were external μR/hr reading:  Sector acceptance criteria? TES NO / NA (If no, see Form 008.)  Please provide details here for NO responses to gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thru 12, notify PM & continue w/ 1 Sector acceptance for 2 thru 5 & 7 thr$	NO
Were cooler temperatures measured at 0.1-6.0°C? $\begin{array}{c c} IR gun \\ used*: #1 #3 #4 \\ \hline \end{tabular} YES \\ \hline \end{tabular} Cooler #:  Temperature (°C):  No. of custody seals on cooler:  No. of custody seals on cooler:  No. of custody seals on cooler:  External µR/hr reading:  Background µR/hr reading:  Were external µR/hr reading:  Were external µR/hr reading:  Solution:  Hease provide details here for NO responses to gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/l  Solution:  Solut$	NO
Temperature (°C):         No. of custody seals on cooler:         No. of custody seals on cooler:       I         DOT Survey/ Acceptance Information       External $\mu$ R/hr reading:       IZ       IZ         Background $\mu$ R/hr reading:       IZ       IZ       IZ         Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance criteria?       TESP 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/I         S. )       Sample       for       DUP       12, as the set of thru 12	(NO
No. of custody seals on cooler: $ \begin{array}{c c}                                    $	
No. of custody seals on cooler: $ \begin{array}{c c}                                    $	
DOT Survey Acceptance Information Background $\mu$ R/hr reading: <u>2</u> Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance criteria? TES 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/ $\leq$ .) $\leq$ ample for NO responses to gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ $\leq$ .) $\leq$ ample for AC = $\int$	_
$\begin{array}{c c} \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? TES 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/ S.) Sample from for DOP 182 Shale a: ~ Settice and 6:20 on COC	
Please provide details here for NO responses to gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ S.) sample free for DUP 1RZ state a: ~ Sette and A:20 on COC	
5.) sample times for DUP 182 state ain better and 6:20 on COC	login.
11.) 22 of 23 bother merguneel ptt of - HNO, meded to be added in varial	
11.) 22 of 23 bother mergunel pt of - HNO, merled to be added in varial	
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amounts; see continued list for an	$\mathbf{\dot{\mathbf{x}}}$
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All client bottle ID's vs ALS lab ID's double-checked b	oy: Y
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roject Manager Signature / Date:	

ALS	ALS Environments CONDITION OF SAMPLE		
(ALS) Client:	Am. west. Analy	Achworkorder No:	203622
Project Manager:	кмо	Initials: TE	M Date: <u>Rlzul</u> (a

#### **Additional Information:**

Sur of HNO 2: added added Imb of HNDZ: 1-2, 2-2, 5-1, 5-2, 6-2, 9-2, 10-2, 11-1, 11-2, 13-2 ald. - of 4ND3; 1.5. . Le-1, Z-1, B-2, Rol, 10-1, 1-1, 2-1, 3-1, 3-12-1 If applicable, was the client contacted? YES / NO / NA, Contact: Date/Time: 1.1 27/19 Project Manager Signature / Date: \_ 0

Page  $\frac{1}{2}$  of  $\frac{1}{5}$  of 32

#### Ieda Internet Shipping: View/Print Label

print the label. print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to 1. Ensure there are no other shipping or tracking labels attached to your package. Select the Print button on the

affix the folded label using clear plastic shipping tape over the entire 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,

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

Locations' Quick link at ups.com. (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS

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.

SALT LAKE CITY, UT 84107 S 0097 3 698 **THE UPS STORE** MT Prcess Point

SALT LAKE CITY, UT 84106 UPS Access Point<sup>TM</sup>

2223 S HIGHLAND DR **EXAMPLE SHORE**  FOLD HERE

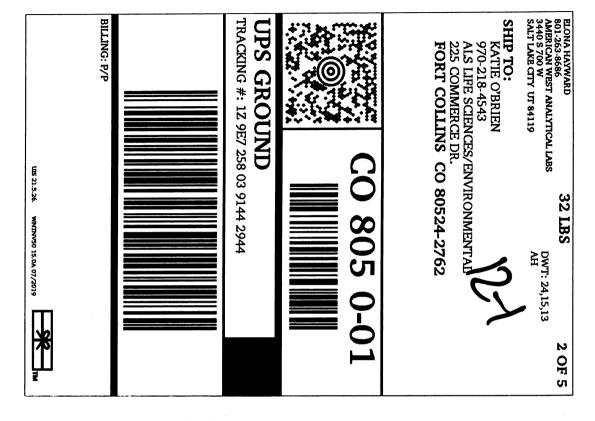
TAYLORSVILLE, UT 84129

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**THE UPS STORE** 

UPS Access Point<sup>MT</sup>

1900022



## 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:

 ${\sf U}~$  - 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

## 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:

 ${\sf U}~$  - 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

## 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:

 ${\sf U}~$  - 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

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		Contro I 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.

#### Data Package ID: RA1908622-1

Abbreviations: TPU - Total Propagated Uncertainty

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		Contro I 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.

#### Data Package ID: RA1908622-1

TPU - Total Propagated Uncertainty

Abbreviations:

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	Contro I Limits	Lab Qualifier
15262-20-1	Ra-228	15.5 +/- 3.7	0.7	13.85	112	70 - 130	Р

## **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.

#### Data Package ID: RA1908622-1

Abbreviations:

TPU - Total Propagated Uncertainty

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	Contro I Limits	Lab Qualifier
15262-20-1	Ra-228	15.4 +/- 3.6	0.7	13.85	111	70 - 130	Р

## **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.

#### Data Package ID: RA1908622-1

Abbreviations:

TPU - Total Propagated Uncertainty

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	Contro I Limits	Lab Qualifier
15262-20-1	Ra-228	15.3 +/- 3.6	0.7	13.85	111	70 - 130	Р

## **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.

#### Data Package ID: RA1908622-1

Abbreviations:

TPU - Total Propagated Uncertainty

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	Contro I Limits	Lab Qualifier
15262-20-1	Ra-228	14.5 +/- 3.4	0.7	13.85	105	70 - 130	Р

## **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.

#### Data Package ID: RA1908622-1

Abbreviations:

TPU - Total Propagated Uncertainty

PAI 724 Rev 13 Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Ra-228

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

15.2 +/- 3.9

Field ID: Lab ID: R.	A190906-1LCSD	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 Result +/- 2 s TPU MDC	Flags	Dupli Result +/- 2 s TPU	cate MDC	Flags	DER	DER Lim

P,M3

14.2 +/- 3.7

1.5

#### **Comments:**

15262-20-1

#### 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

 $\ensuremath{\mathsf{LT}}\xspace$  - 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

#### Data Package ID: RA1908622-1

Abbreviations:

TPU - Total Propagated Uncertainty

P,M3

1.6

0.18

2.13

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Page 1 of 3

PAI 724 Rev 13 Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Ra-228

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

15.5 +/- 3.7

CASNO		Date Collected: 11-Sep-19 Date Prepared: 11-Sep-19 Date Analyzed: 16-Sep-19	 <b>ID:</b> RA190911-1A <b>me:</b> 150 minutes			DED
CASNO	Analyte	Sample	Dupl	cate	DER	DER

Ρ

15.4 +/- 3.6

0.7

#### **Comments:**

15262-20-1

#### 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

#### Data Package ID: RA1908622-1

Abbreviations:

TPU - Total Propagated Uncertainty

Ρ

0.7

0.0177

2.13

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Page 2 of 3

PAI 724 Rev 13 Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Ra-228

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

15.3 +/- 3.6

Field ID: Lab ID: R	A190912-1LCSD	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		hID: RA190912-1-1         Prep Basis: Unf           n ID: RA190912-1A         Moisture(%): NA			
CASNO	Analyte	Sample Result +/- 2 s TPU MDC	Flags	Duplic Result +/- 2 s TPU	cate	Flags	DER	DER Lim

Ρ

14.5 +/- 3.4

0.7

#### **Comments:**

15262-20-1

#### 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

#### Data Package ID: RA1908622-1

Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

0.7

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0.157

2.13

BDL - Below Detection Limit

NR - Not Reported

Page 3 of 3

#### Lab Name: ALS -- Fort Collins

Work Order Number: 1908622

Client Name: American West Analytical Labs

ClientProject ID: Hunter CCR Groundwater Sampling PERCM052

Field ID: E	LF-1D	Sample Matrix: WATER	Prep Batch: RA190906-1	Final Aliquot: 997 ml
		Prep SOP: SOP749 Rev 6	QCBatchID: RA190906-1-2	Prep Basis: Unfiltered
Lab ID: 1908622-1	908622-1	Date Collected: 20-Aug-19	Run ID: RA190906-1A	Moisture(%): NA
		Date Prepared: 06-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
		Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190906-1	Final Aliquot: 997 ml
	Prep SOP: SOP749 Rev 6	QCBatchID: RA190906-1-2	Prep Basis: Unfiltered
Lab ID: 1908622-2	Date Collected: 20-Aug-19	Run ID: RA190906-1A	Moisture(%): NA
	Date Prepared: 06-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190906-1	Final Aliquot: 997 ml	
	Prep SOP: SOP749 Rev 6	QCBatchID: RA190906-1-2	Prep Basis: Unfiltered	
Lab ID: 1908622-3	Date Collected: 20-Aug-19	Run ID: RA190906-1A	Moisture(%): NA	
	Date Prepared: 06-Sep-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190906-1	Final Aliquot: 997 ml	
	1008622 /	Prep SOP: SOP749 Rev 6	QCBatchID: RA190906-1-2	Prep Basis: Unfiltered	
Lab ID:	1908622-4	Date Collected: 20-Aug-19	Run ID: RA190906-1A	Moisture(%): NA	
		Date Prepared: 06-Sep-19	Count Time: 150 minutes	Result Units: pCi/l	
		Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190906-1	Final Aliquot: 997 ml	
	1908622-5	Prep SOP: SOP749 Rev 6	QCBatchID: RA190906-1-2	Prep Basis: Unfiltered	
Lab ID:	1908622-5	Date Collected: 20-Aug-19	Run ID: RA190906-1A	Moisture(%): NA	
		Date Prepared: 06-Sep-19	Count Time: 150 minutes	Result Units: pCi/l	
		Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190911-1	Final Aliquot: 997 ml
Lab ID: 1908622-6	Prep SOP: SOP749 Rev 6 Date Collected: 20-Aug-19	QCBatchID: RA190911-1-2 Run ID: RA190911-1A	Prep Basis: Unfiltered Moisture(%): NA
	Date Prepared: 11-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190911-1	Final Aliquot: 997 ml
		Prep SOP: SOP749 Rev 6	QCBatchID: RA190911-1-2	Prep Basis: Unfiltered
Lab ID: 1908	1908622-7	Date Collected: 20-Aug-19	Run ID: RA190911-1A	Moisture(%): NA
		Date Prepared: 11-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
		Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190911-1	Final Aliquot: 997 ml
		Prep SOP: SOP749 Rev 6	QCBatchID: RA190911-1-2	Prep Basis: Unfiltered
Lab ID:	1908622-8	Date Collected: 20-Aug-19	Run ID: RA190911-1A	Moisture(%): NA
		Date Prepared: 11-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
		Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190912-1	Final Aliquot: 997 ml
Lab ID: 1908622-9	Prep SOP: SOP749 Rev 6	QCBatchID: RA190912-1-1	Prep Basis: Unfiltered
Lab ID: 1908622-9	Date Collected: 20-Aug-19	Run ID: RA190912-1A	Moisture(%): NA
	Date Prepared: 12-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190912-1	Final Aliquot: 997 ml
Lab ID: 1908622-10	Prep SOP: SOP749 Rev 6	QCBatchID: RA190912-1-1	Prep Basis: Unfiltered
Lab ID: 1908622-10	Date Collected: 20-Aug-19	Run ID: RA190912-1A	Moisture(%): NA
	Date Prepared: 12-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190912-1	Final Aliquot: 997 ml
Lab ID: 1908622-11	Prep SOP: SOP749 Rev 6	QCBatchID: RA190912-1-1	Prep Basis: Unfiltered
Lab ID: 1908622-11	Date Collected: 20-Aug-19	Run ID: RA190912-1A	Moisture(%): NA
	Date Prepared: 12-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190912-1	Final Aliquot: 997 ml	
Lab ID: 1009000 10	Prep SOP: SOP749 Rev 6	QCBatchID: RA190912-1-1	Prep Basis: Unfiltered	
Lab ID: 1908622-12	Date Collected: 20-Aug-19	Run ID: RA190912-1A	Moisture(%): NA	
	Date Prepared: 12-Sep-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

#### 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	Sample Matrix: WATER	Prep Batch: RA190912-1	Final Aliquot: 997 ml	
	Prep SOP: SOP749 Rev 6	QCBatchID: RA190912-1-1	Prep Basis: Unfiltered	
Lab ID: 1908622-13	Date Collected: 20-Aug-19	Run ID: RA190912-1A	Moisture(%): NA	
	Date Prepared: 12-Sep-19	Count Time: 150 minutes	Result Units: pCi/l	
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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

## 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	Sample Matrix: WATER	Prep Batch: RA190912-1	Final Aliquot: 997 ml
Lab ID: 1008622.14	Prep SOP: SOP749 Rev 6	QCBatchID: RA190912-1-1	Prep Basis: Unfiltered
Lab ID: 1908622-14	Date Collected: 20-Aug-19	Run ID: RA190912-1A	Moisture(%): NA
	Date Prepared: 12-Sep-19	Count Time: 150 minutes	Result Units: pCi/l
	Date Analyzed: 18-Sep-19	Report Basis: Unfiltered	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



PacifiCorp 1407 West North Temple, #280

AMERICAN Salt Lake City, UT 84116

Jeff Tucker

WEST TEL: (801) 220-2989

ANALYTICAL

LABORATORIES 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 **Jose Rocha** presented in the following report.

QA Officer

American West Analytical Laboratories (AWAL) is accredited by The National Environmental Laboratory Accreditation Program (NELAP) in Utah and Texas; and is 3440 South 700 West state accredited in Colorado, Idaho, New Mexico, Wyoming, and Missouri.

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

(801) 263-8686 questions or concerns regarding this report please feel free to call. Toll Free (888) 263-8686

Fax (801) 263-8687 The abbreviation "Surr" found in organic reports indicates a surrogate compound that is awal@awal-labs.com 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 b boratory Director or designee

#### **INORGANIC ANALYTICAL REPORT Client:** PacifiCorp Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 **Project:** Lab Sample ID: 1908531-001 Client Sample ID: ELF-1D **AMERICAN Collection Date:** 8/20/2019 1330h WEST **Received Date:** 8/21/2019 1445h ANALYTICAL LABORATORIES Analytical Results TOTAL METALS

	T kinaly treat ites and							
Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	mg/L	8/22/2019 1045h	9/3/2019 1237h	E200.7	0.500	2.19	
Jose Rocha OA Officer	Calcium	mg/L	8/22/2019 1045h	8/30/2019 1256h	E200.7	10.0	366	

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

#### Report Date: 9/5/2019 Page 2 of 38

#### **INORGANIC ANALYTICAL REPORT Client:** PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 1908531-002 Lab Sample ID: Client Sample ID: ELF-2 8/20/2019 1430h WEST **Received Date:** 8/21/2019 1445h ANALYTICAL LABORATORIES Analytical Results TOTAL METALS

K WIG H ( LTOSS	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	mg/L	8/22/2019 1045h	9/3/2019 1249h	E200.7	0.500	3,53	
Jose Rocha	Calcium	mg/L	8/22/2019 1045h	8/30/2019 1303h	E200.7	10.0	414	
QA Officer			· .				:	
3440 South 700 West					·			

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Salt Lake City, Utah

84119

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Report Date: 9/5/2019 Page 3 of 38



ANALYTICAL

## **INORGANIC ANALYTICAL REPORT**

**Client:** PacifiCorp Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 **Project:** Lab Sample ID: 1908531-003 AMERICAN Collection Date: 8/20/2019 1315h **Received Date:** 8/21/2019 1445h

LABORATORIES Analytical Results

WEST

TOTAL METALS

Kyle H (Linge	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	mg/L	8/22/2019 1045h	9/3/2019 1559h	E200.7	5.00	< 5.00	
Jose Rocha	Calcium	mg/L	8/22/2019 1045h	8/30/2019 1305h	E200.7	10.0	431	
QA Officer						••.		
		·						
3440 South 700 West								
Salt Lake City, Utah 84119								
		•	•					
(801) 263-8686								
Toll Free (888) 263-8686 Fax (801) 263-8687			•	<ul> <li>A second sec second second sec</li></ul>				
awal@awal-labs.com	•	•						
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Report Date: 9/5/2019 Page 4 of 38

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 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

 ANALYTICAL
 8/21/2019
 1445h

LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross			Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron		mg/L	8/22/2019 1045h	9/3/2019 1301h	E200.7	0.500	4.98	
Jose Rocha	Calcium		mg/L	8/22/2019 1045h	8/30/2019 1308h	E200.7	10.0	507	
QA Officer						• •			
3440 South 700 West									
Salt Lake City, Utah									
San Lake City, Utan 84119									
04117				<b>.</b>					
			1. 	· · · ·		•			
(801) 263-8686									
Toll Free (888) 263-8686			1						
Fax (801) 263-8687	·	· · ·		· • • •	•				· ·
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Report Date: 9/5/2019 Page 5 of 38

		INORGANIC ANALYTICAL REPORT	
	Client:	PacifiCorp Contact: Jeff Tucker	
	Project:	Hunter CCR Groundwater Sampling / PERCM052	
	Lab Sample ID:	1908531-005	
	<b>Client Sample ID:</b>	: ELF-5	
AMERICAN		8/20/2019 1130h	
WEST ANALYTICAL	<b>Received Date:</b>	8/21/2019 1445h	
LABORATORIES	Analytical Results	s T	ΌΤΑ

Analytical Results TOTAL METALS

 Date
 Date
 Method
 Reporting
 Analytical

 Compound
 Units
 Prepared
 Analyzed
 Used
 Limit
 Result
 Qua

Kyle F. Gross	Compound		Units	Prepared	Analyzed	Used	Limit	Result	Qual
Laboratory Director	Boron		mg/L	8/22/2019 1045h	9/3/2019 1303h	E200.7	0.500	8.70	
Jose Rocha	Calcium	· · · ·	mg/L	8/22/2019 1045h	8/30/2019 1310h	E200.7	10.0	510	
OA Officer									

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Report Date: 9/5/2019 Page 6 of 38

## **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

 ANALLYTICAL
 8/21/2019
 1445h

## LABORATORIES Analytical Results

#### TOTAL METALS

Kyle F. Gross	Compound		Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	an An An	mg/L	8/22/2019 1045h	9/3/2019 1306h	E200.7	0,500	2,24	
<b>Jose Rocha</b> OA Officer	Calcium	· · ·	mg/L	8/22/2019 1045h	8/30/2019 1318h	E200.7	10.0	459	··

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#### Report Date: 9/5/2019 Page 7 of 38



ANALYTICAL

## **INORGANIC ANALYTICAL REPORT**

Client: PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 1908531-007 Lab Sample ID: AMERICAN Collect 8/20/2019 1032h **Received Date:** 8/21/2019 1445h

LABORATORIES Analytical Results

WEST

TOTAL METALS

Kyle F. Gross	Compound		Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron		mg/L	8/22/2019 1045h	9/3/2019 1601h	E200.7	5.00	30.2	
Jose Rocha	Calcium	····	mg/L	8/22/2019 1045h	8/30/2019 1321h	E200.7	10.0	566	
QA Officer									•
	•								
3440 South 700 West									

Salt Lake City, Utah 84119

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Report Date: 9/5/2019 Page 8 of 38

-	Client:
	Project:

AMERICAN

ANALYTICAL

## **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908531-008Client Sample ID:ELF-9Collection Date:8/20/20198/21/20191345h

LABORATORIES Analytical Results

WEST

TOTAL METALS

Kyle F. Gross		Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	mg/L	8/22/2019 1045h	9/3/2019 1311h	E200.7	0.500	1.91	
Jose Rocha	Calcium	mg/L	8/22/2019 1045h	8/30/2019 1323h	E200.7	10.0	57.7	
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	* e	· · ·						

#### **INORGANIC ANALYTICAL REPORT Client:** PacifiCorp Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 **Project:** Lab Sample ID: 1908531-009 AMERICAN Collection 8/20/2019 926h WEST **Received Date:** 8/21/2019 1445h ANALYTICAL LABORATORIES Analytical Results TOTAL METALS

Kyle F. Gross	Compound Units Prepa		Date Date Prepared Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	mg/L	8/22/2019 1045h 9/3/2019 1313h	E200.7	0.500	17.8	
Jose Rocha	Calcium mg/L 8/22/2019 10451	8/22/2019 1045h 8/30/2019 1325h	E200.7	10.0	442		
QA Officer			······································	······			
3440 South 700 West	:				•		
Salt Lake City, Utah	L						
84119	1						

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Report Date: 9/5/2019 Page 10 of 38

	Client:	PacifiCorp				Contact:	Jeff Tucker	
	Project:	Hunter CCI	R Groundw	ater Sampling	PERCM	[052		
	Lab Sample ID:	1908531-01	10					
	Client Sample ID:	ELF-12						
AIVIEKICAIN	<b>Collection Date:</b>	8/20/2019	1215h					
ANALYTICAL	Received Date:	8/21/2019	1445h					
PODATODICC								

LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross			Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	¢	mg/L	8/22/2019 1045h	9/3/2019 1316h	E200.7	0.500	1.68	
Jose Rocha	Calcium		mg/L	8/22/2019 1045h	8/30/2019 1327h	E200.7	10.0	169	
QA Officer									

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Report Date: 9/5/2019 Page 11 of 38



PacifiCorp Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 Lab Sample ID: 1908531-011 AMERICAN Client Sample ID: ELF-13 8/20/2019 1130h **Received Date:** 8/21/2019 1445h

ANALYTICAL LABORATORIES Analytical Results

WEST

TOTAL METALS

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	mg/L	8/22/2019 1045h	9/3/2019 1318h	E200.7	0.500	0.732	
Jose Rocha	Calcium	mg/L	8/22/2019 1045h	8/30/2019 1330h	E200.7	10.0	461	
QA Officer						· · · · · ·		
3440 South 700 West								
Salt Lake City, Utah								
84119								
(801) 263-8686								
Toll Free (888) 263-8686			e National de la companya de la company	·				

Fax (801) 263-8687

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#### **INORGANIC ANALYTICAL REPORT Client:** PacifiCorp Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 **Project:** Lab Sample ID: 1908531-012 Client Sample ID: ELF-14 AMERICAN **Collection Date:** 8/20/2019 1045h WEST **Received Date:** 8/21/2019 1445h ANALYTICAL LABORATORIES Analytical Results

TOTAL METALS

Kyle F. Gross	Compound	-	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron		mg/L	8/22/2019 1045h	9/3/2019 1320h	E200.7	0.500	3.09	
<b>Jose Rocha</b> OA Officer	Calcium		mg/L	8/22/2019 1045h	8/30/2019 1332h	E200.7	10.0	496	•

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#### Report Date: 9/5/2019 Page 13 of 38

		INORGANIC ANALY	TICAL F	<u>REPORT</u>
	Client:	PacifiCorp	Contact:	Jeff Tucker
	Project:	Hunter CCR Groundwater Sampling / PE	RCM052	
	Lab Sample ID:	1908531-013		
	<b>Client Sample ID:</b>	DUP		
AMERICAN	<b>Collection Date:</b>	8/20/2019 920h		
WEST	<b>Received Date:</b>	8/21/2019 1445h		
LABORATORIES	Analytical Results			TOTAL METALS.

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	mg/L	8/22/2019 1045h	9/3/2019 1323h	E200.7	0.500	18.5	
Jose Rocha	Calcium	mg/L	8/22/2019 1045h	8/30/2019 1334h	E200.7	10.0	449	
QA Officer								
3440 South 700 West Salt Lake City, Utah 84119								

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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

WEST Received Date: 8/21/2019 1445h ANALYTICAL

LABORATORIES Analytical Results

84119

TOTAL METALS

Kyle F. Gross	Compound		Date Units Prepared		Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Boron	· · · · ·	mg/L	-8/22/2019 1045h	9/3/2019 1338h	E200.7	0.500	< 0.500	
<b>Jose Rocha</b> QA Officer	Calcium		mg/L	8/22/2019 1045h	9/3/2019 1338h	E200.7	1.00	< 1.00	. <u></u>
3440 South 700 West Salt Lake City, Utah									

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Report Date: 9/5/2019 Page 15 of 38

## **Client: Project:**

## **INORGANIC ANALYTICAL REPORT**

PacifiCorp Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 1908531-001 Lab Sample ID: Client Sample ID: ELF-1D AMERICAN Collection Date: 8/20/2019 1330h 8/21/2019 1445h

ANALYTICAL LABORATORIES Analytical Results

WEST

**Received Date:** 

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride	mg/L		8/30/2019 1909h	E300,0	100	6,430	
Jose Rocha	Fluoride	mg/L		9/3/2019 2014h	E300.0	0.200	< 0.200	*
	рН @ 25° С	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.27	Н
	Sulfate	mg/L		8/30/2019 1909h	E300.0	750	8,640	
3440 South 700 West	Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	27,000	

Salt Lake City, Utah \* - The reporting limits were raised due to sample matrix interferences.

84119 H - Sample was received outside of the holding time.

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Report Date: 9/5/2019 Page 16 of 38



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908531-002Client Sample ID:ELF-2Collection Date:8/20/2019ANALYTICAL8/21/2019

## LABORATORIES Analytical Results

Kyle F. Gross	Compound		Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride		mg/L		8/31/2019 150h	E300.0	10.0	218	
Jose Rocha	Fluoride		mg/L ·		8/31/2019 403h	E300.0	0.100	< 0.100	
	рН @ 25° С		pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.43	Η
·***	Sulfate		mg/L	· · · · · · ·	8/30/2019 1926h	E300.0	750	6,780	÷.,
3440 South 700 West	Total Dissolved	Solids	mg/L		8/22/2019 1120h	SM2540C	100	12,600	÷ .
Calt Lake City Hitch			de of the holding	na timo					

Salt Lake City, Utah H - Sample was received outside of the holding time. 84119

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#### Report Date: 9/5/2019 Page 17 of 38

**Client:** PacifiCorp Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 **Project:** Lab Sample ID: 1908531-003 AMERICAN Collection Date: Client Sample ID: ELF-3 8/20/2019 1315h **Received Date:** 8/21/2019 1445h

ANALYTICAL LABORATORIES Analytical Results

WEST

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride	mg/L	· · ·	8/31/2019 207h	E300.0	10.0	642	
Jose Rocha	Fluoride	mg/L		9/3/2019 2031h	E300.0	0.400	< 0.400	*
	рН @ 25° С	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.79	Н
- <b>1</b> 26 - 1	Sulfate	mg/L		9/3/2019 1140h	E300.0	3,750	32,000	
3440 South 700 West	Total Dissolved Solids	mg/L	· · · · · · · · · · · ·	8/22/2019 1120h	SM2540C	500	50,400	î

Salt Lake City, Utah \* - The reporting limits were raised due to sample matrix interferences.

84119 H - Sample was received outside of the holding time.

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**AMERICAN** 

## **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908531-004Client Sample ID:ELF-4Collection Date:8/20/20191215hReceived Date:8/21/20191445h

ANALYTICAL Received Date: LABORATORIES Analytical Results

WEST

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride	mg/L		8/30/2019 2230h	E300.0	100	1,840	
Jose Rocha	Fluoride	mg/L		8/31/2019 437h	E300.0	0.100	0.941	
QA Officer	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	
 3440 South 700 West	Total Dissolved Solids	mg/L	· •.	8/22/2019 1120h	SM2540C	100	12,200	

Salt Lake City, Utah H - Sample was received outside of the holding time. 84119

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Report Date: 9/5/2019 Page 19 of 38

AMERICAN

## **INORGANIC ANALYTICAL REPORT**

 Client:
 PacifiCorp
 Contact:
 Jeff Tucker

 Project:
 Hunter CCR Groundwater Sampling / PERCM052
 1908531-005

 Lab Sample ID:
 1908531-005
 1908531-005

 Client Sample ID:
 ELF-5
 1908531-005

 Collection Date:
 8/20/2019
 1130h

 Received Date:
 8/21/2019
 1445h

ANALYTICAL Received Date: LABORATORIES Analytical Results

WEST

	Kyle F. Gross		Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
	Laboratory Director	Chloride	mg/L	•	8/30/2019 2246h	E300.0	200	4,440	
	Jose Rocha	Fluoride	mg/L		8/31/2019 454h	E300.0	0.100	0.962	
	QA Officer	рН @ 25° С	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.23	Н
	r = 1 + 1	Sulfate	mg/L,	· .	8/30/2019 2246h	E300.0	1,500	12,300	
È.	3440 South 700 West	Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	500	24,000	. · ·

Salt Lake City, Utah H - Sample was received outside of the holding time. 84119

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#### Report Date: 9/5/2019 Page 20 of 38



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908531-006Client Sample ID:ELF-7Collection Date:8/20/20198/21/20191245h

AMERICAN WEST ANALYTICAL LABORATORIES Analytical Results

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director		mg/L		8/30/2019 2303h	E300.0	100	2,720	
Jose Rocha	Fluoride	mg/L		8/31/2019 510h	E300.0	0.100	3.88	
QA Officer	pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.19	н
	Sulfate	mg/L	•	8/30/2019 2303h	E300.0	750	9,480	
3440 South 700 West	Total Dissolved Solids	mg/L	- · · · · · · · · · · · · · · · · · · ·	8/22/2019 1120h	SM2540C	100	19,500	

Salt Lake City, Utah H - Sample was received outside of the holding time. 84119

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#### Report Date: 9/5/2019 Page 21 of 38



PacifiCorp Contact: Jeff Tucker Hunter CCR Groundwater Sampling / PERCM052 1908531-007 Client Sample ID: ELF-8 8/20/2019 1032h 8/21/2019 1445h

**Received Date:** ANALYTICAL

**AMERICAN** 

## LABORATORIES Analytical Results

WEST

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride	mg/L		8/30/2019 2320h	E300.0	100	1,920	
Jose Rocha	Fluoride	mg/L		8/31/2019 527h	E300.0	0.100	< 0.100	
QA Officer	pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.41	н
	Sulfate	mg/L		8/30/2019 2320h	E300.0	750	3,130	
3440 South 700 West	Total Dissolved Solids	mg/L	· · · . ·	8/22/2019 1120h	SM2540C	100	8,240	

Salt Lake City, Utah H - Sample was received outside of the holding time.

**Collection Date:** 

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Report Date: 9/5/2019 Page 22 of 38

## **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

LABORATORIES Analytical Results

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride	mg/L		8/31/2019 223h	E300.0	10.0	371	
Jose Rocha	Fluoride	mg/L		9/3/2019 2048h	E300.0	0.200	< 0.200	*
QA Officer	pH @ 25° C	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.51	H
ugen in de la companya de la company	Sulfate	mg/L		8/30/2019 2336h	E300.0	750	5,930	•
3440 South 700 West	Total Dissolved Solids	mg/L	• • •	8/22/2019 1120h	SM2540C	100	10,700	

Salt Lake City, Utah \* - The reporting limits were raised due to sample matrix interferences.

84119 H - Sample was received outside of the holding time.

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#### Report Date: 9/5/2019 Page 23 of 38



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908531-009Client Sample ID:ELF-11Collection Date:8/20/2019926hReceived Date:8/21/20191445h

AMERICAN WEST ANALYTICAL LABORATORIES Analytical Results

	Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
	Laboratory Director	Chloride	mg/L		9/3/2019 1231h	E300.0	100	1,010	
	Jose Rocha	Fluoride	mg/L .		8/31/2019 600h	E300.0	0.100	< 0.100	
	QA Officer	рН @ 25° С	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	8.02	н
Ş		Sulfate	mg/L	· · ·	9/3/2019 1231h	E300.0	750	9,910	
	3440 South 700 West	Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	17,000	

Salt Lake City, Utah H - Sample was received outside of the holding time.

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#### Report Date: 9/5/2019 Page 24 of 38



Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908531-010Client Sample ID:ELF-12Collection Date:8/20/20191215hReceived Date:8/21/20191445h

AMERICAN WEST ANALYTICAL LABORATORIES Analytical Results

Date Date Method Reporting Analytical Compound Units Prepared Analyzed Used Limit Result Qual **Kyle F. Gross** Laboratory Director Chloride 8/31/2019 240h E300.0 10.0 428 mg/L Jose Rocha Fluoride mg/L 8/31/2019 617h E300.0 0.100 < 0.100 QA Officer pH @ 25° C pH Units 1.00 8/21/2019 1832h SM4500-H+B 7.73 Η Sulfate mg/L 1,500 8/31/2019 010h E300.0 11,400 3440 South 700 West Total Dissolved Solids mg/L 8/22/2019 1120h SM2540C 100 19,900

Salt Lake City, Utah H - Sample was received outside of the holding time. 84119

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#### Report Date: 9/5/2019 Page 25 of 38

 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

 ANALYTICAL
 8/21/2019
 1445h

## LABORATORIES Analytical Results

Kyle F. Gross	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride	mg/L	• . •	8/31/2019 026h	E300.0	100	2,420	
Jose Rocha	Fluoride	mg/L		8/31/2019 707h	E300.0	0.100	0.798	
QA Officer	рН @ 25° С	pH Units		8/21/2019 1832h	SM4500-H+B	1.00	7.25	н
	Sulfate	mg/L		8/31/2019 026h	E300.0	750	7,370	
3440 South 700 West	Total Dissolved Solids	mg/L	n etti si ta	8/22/2019 1120h	SM2540C	100	17,300	

Salt Lake City, Utah H - Sample was received outside of the holding time.

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LABORATORIES Analytical Results

Kyle F. Gross		Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride	mg/L		8/31/2019 043h	E300.0	100	3,640	·
Jose Rocha	Fluoride	mg/L		8/31/2019 724h	E300.0	0.100	0.589	
QA Officer	рН @ 25° С	pH Units		8/21/2019 2005h	SM4500-H+B	1.00	7.49	н
	Sulfate	mg/L	·	8/31/2019 043h	E300.0	750	7,280	4
, 3440 South 700 West	Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	19,800	•

Salt Lake City, Utah H - Sample was received outside of the holding time.

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#### Report Date: 9/5/2019 Page 27 of 38



AMERICAN

ANALYTICAL

## **INORGANIC ANALYTICAL REPORT**

Client:PacifiCorpContact:Jeff TuckerProject:Hunter CCR Groundwater Sampling / PERCM052Lab Sample ID:1908531-013Client Sample ID:DUPCollection Date:8/20/20198/21/20191445h

LABORATORIES Analytical Results

WEST

	Compound	Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Oual
Kyle F. Gross Laboratory Director		mg/L	· •	9/3/2019 1248h	E300.0	100	1,010	
Jose Rocha		mg/L		8/31/2019 741h	E300.0	0.100	< 0.100	•
QA Officer	рН @ 25° С	pH Units		8/21/2019 2005h	SM4500-H+B	1.00	7.47	н
	Sulfate	mg/L		9/3/2019 1248h	E300.0	750	9,900	
3440 South 700 West	Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	100	18,000	·

Salt Lake City, Utah H - Sample was received outside of the holding time.

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#### Report Date: 9/5/2019 Page 28 of 38



**Client:** PacifiCorp Contact: Jeff Tucker **Project:** Hunter CCR Groundwater Sampling / PERCM052 1908531-014 Lab Sample ID: AMERICAN Client Sample ID: FB **Collection Date:** 8/20/2019 1445h **Received Date:** 8/21/2019 1445h

ANALYTICAL LABORATORIES Analytical Results

WEST

Kyle F. Gross		Units	Date Prepared	Date Analyzed	Method Used	Reporting Limit	Analytical Result	Qual
Laboratory Director	Chloride	mg/L		8/30/2019 1819h	E300.0	0.100	< 0.100	
Jose Rocha	Fluoride	mg/L		8/30/2019 1819h	E300.0	0.100	< 0.100	
QA Officer	рН @ 25° С	pH Units		8/21/2019 2005h	SM4500-H+B	1.00	8.20	н
	Sulfate	mg/L		8/30/2019 1819h	E300.0	0.750	< 0.750	
 3440 South 700 West	Total Dissolved Solids	mg/L		8/22/2019 1120h	SM2540C	10.0	< 10.0	

Salt Lake City, Utah H - Sample was received outside of the holding time.

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Kyle F. Gross Laboratory Director

Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Lab Set ID:		dwater Sampling / PP	ERCM052				Contact:Jeff TuckerDept:MEQC 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 Test Code:	<b>EXECS-64604</b> 200.7-W	Date Analyzed: Date Prepared:	08/30/20 08/22/20		,									
Calcium		9.81	mg/L	E200.7	0.102	1.00	10.00	0	98.1	85 - 115				
Lab Sample ID Test Code:	<b>EXECS-64604</b> 200.7-W	Date Analyzed: Date Prepared:	09/03/20 08/22/20											
Boron		1.08	mg/L	E200.7	0.114	0.500	1.000	0	108	85 - 115				

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#### Kyle F. Gross Laboratory Director

**Jose Rocha** QA Officer

### **QC SUMMARY REPORT**

Client: Lab Set ID: Project:	PacifiCorp 1908531 Hunter CCR Ground	iwater Sampling / Pl	ERCM052	2			Contact Dept: QC Typ	: Jeff Tuck ME e: MBLK	er					
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample I Test Code:	D: MB-64604 200.7-W	Date Analyzed: Date Prepared:		19 1252h 19 1045h		<u> </u>			-					
Calcium		< 1.00	mg/L	E200.7	0.102	1.00								
Lab Sample I Test Code:	<b>D: MB-64604</b> 200.7-W	Date Analyzed: Date Prepared:		19 1232h 19 1045h										
Boron	•	< 0.500	mg/L	E200.7	0.114	0.500				•				

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<b>[</b> -	

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Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Client:	PacifiCorp			<b>Contact:</b>	Jeff Tucker		
Lab Set ID	: 1908531			Dept:	ME		
Project:	Hunter CCR Groundwater Sampling / PERCM052	•		QC Type:	MS		
·	· · ·		Reporting	Amount	Snike Ref.	RPD Ref.	RPD

	Result	Units	Method	MDL	Limit	Spiked	Amount	%REC	Limits	Amt	% RPD	Limit	Qual
<b>1908531-001BMS</b> 200.7-W	Date Analyzed: Date Prepared:										· · · · · · · · · · · · · · · · · · ·		
	390	mg/L	E200.7	1.02	10.0	10.00	366	244	70 - 130				1
<b>1908531-001BMS</b> 200.7-W	Date Prepared:	08/22/201	9 1045h	0.114	0.500	1.000	2.10	100		·····	· · · <b>· ·</b> · ·	· · · · ·	
1000521 01 (D) //				0.114	0.500	1.000	2.19	120	70 - 130				
200.7-W	Date Analyzed: Date Prepared:					<u>.</u>							
	1.12 10.3	mg/L mg/L	E200.7 E200.7	0.114 0.102	0.500 1.00	1.000	0 • 0	112 103	70 - 130 70 - 130				
	200.7-W 1908531-001BMS 200.7-W 1908531-014BMS	1908531-001BMS         Date Analyzed:           200.7-W         Date Prepared:           390         390           1908531-001BMS         Date Analyzed:           200.7-W         Date Prepared:           390         390           1908531-001BMS         Date Analyzed:           200.7-W         Date Prepared:           3.39         390           1908531-014BMS         Date Analyzed:           200.7-W         Date Prepared:           1.12         1.12	1908531-001BMS         Date Analyzed:         08/30/201           200.7-W         Date Prepared:         08/22/201           390         mg/L           1908531-001BMS         Date Analyzed:         09/03/201           200.7-W         Date Prepared:         08/22/201           1908531-001BMS         Date Analyzed:         09/03/201           200.7-W         Date Prepared:         08/22/201           3.39         mg/L         1908531-014BMS         Date Analyzed:         09/03/201           200.7-W         Date Prepared:         08/22/201         08/22/201           1908531-014BMS         Date Analyzed:         09/03/201           200.7-W         112         mg/L	1908531-001BMS       Date Analyzed:       08/30/2019 1258h         200.7-W       Date Prepared:       08/22/2019 1045h         390       mg/L       E200.7         1908531-001BMS       Date Analyzed:       09/03/2019 1244h         200.7-W       Date Prepared:       08/22/2019 1045h         1908531-001BMS       Date Analyzed:       09/03/2019 1244h         200.7-W       Date Prepared:       08/22/2019 1045h         1908531-014BMS       Date Analyzed:       09/03/2019 1340h         200.7-W       Date Prepared:       08/22/2019 1045h         112       mg/L       E200.7	1908531-001BMS         Date Analyzed:         08/30/2019 1258h           200.7-W         Date Prepared:         08/22/2019 1045h           390         mg/L         E200.7           1908531-001BMS         Date Analyzed:         09/03/2019 1244h           200.7-W         Date Analyzed:         09/03/2019 1244h           200.7-W         Date Prepared:         08/22/2019 1045h           3.39         mg/L         E200.7           0.114         09/03/2019 1340h           200.7-W         Date Analyzed:         09/03/2019 1340h           200.7-W         Date Prepared:         08/22/2019 1045h           1.102         mg/L         E200.7         0.114	Result         Units         Method         MDL         Limit           1908531-001BMS         Date Analyzed:         08/30/2019 1258h	Result         Units         Method         MDL         Limit         Spiked           1908531-001BMS         Date Analyzed:         08/30/2019 1258h <td>Result         Units         Method         MDL         Limit         Spiked         Amount           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/22/2019 1045h  <td< td=""><td>Result         Units         Method         MDL         Limit         Spiked         Amount         %REC           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/22/2019 1045h</td><td>Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/22/2019 1045h</td><td>1908531-001BMS         Date Analyzed:         08/30/2019 1258h           200.7-W         Date Prepared:         08/22/2019 1045h           390         mg/L         E200.7         1.02         10.0         10.00         366         244         70 - 130           1908531-001BMS         Date Analyzed:         09/03/2019 1244h         E200.7         1.02         10.00         10.00         366         244         70 - 130           1908531-001BMS         Date Analyzed:         09/03/2019 1244h         E200.7         0.114         0.500         1.000         2.19         120         70 - 130           1908531-014BMS         Date Analyzed:         09/03/2019 1340h         0.500         1.000         2.19         120         70 - 130           1908531-014BMS         Date Prepared:         08/22/2019 1340h         0.500         1.000         0         112         70 - 130</td><td>Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits         Amt         % RPD           1908531-001BMS 200.7-W         Date Analyzed:         08/30/2019 1258h 08/22/2019 1045h         08/30/2019 1258h        </td><td>Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits         Amt         % RPD         Limit           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/30/2019 1045h         -</td></td<></td>	Result         Units         Method         MDL         Limit         Spiked         Amount           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/22/2019 1045h <td< td=""><td>Result         Units         Method         MDL         Limit         Spiked         Amount         %REC           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/22/2019 1045h</td><td>Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/22/2019 1045h</td><td>1908531-001BMS         Date Analyzed:         08/30/2019 1258h           200.7-W         Date Prepared:         08/22/2019 1045h           390         mg/L         E200.7         1.02         10.0         10.00         366         244         70 - 130           1908531-001BMS         Date Analyzed:         09/03/2019 1244h         E200.7         1.02         10.00         10.00         366         244         70 - 130           1908531-001BMS         Date Analyzed:         09/03/2019 1244h         E200.7         0.114         0.500         1.000         2.19         120         70 - 130           1908531-014BMS         Date Analyzed:         09/03/2019 1340h         0.500         1.000         2.19         120         70 - 130           1908531-014BMS         Date Prepared:         08/22/2019 1340h         0.500         1.000         0         112         70 - 130</td><td>Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits         Amt         % RPD           1908531-001BMS 200.7-W         Date Analyzed:         08/30/2019 1258h 08/22/2019 1045h         08/30/2019 1258h        </td><td>Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits         Amt         % RPD         Limit           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/30/2019 1045h         -</td></td<>	Result         Units         Method         MDL         Limit         Spiked         Amount         %REC           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/22/2019 1045h	Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/22/2019 1045h	1908531-001BMS         Date Analyzed:         08/30/2019 1258h           200.7-W         Date Prepared:         08/22/2019 1045h           390         mg/L         E200.7         1.02         10.0         10.00         366         244         70 - 130           1908531-001BMS         Date Analyzed:         09/03/2019 1244h         E200.7         1.02         10.00         10.00         366         244         70 - 130           1908531-001BMS         Date Analyzed:         09/03/2019 1244h         E200.7         0.114         0.500         1.000         2.19         120         70 - 130           1908531-014BMS         Date Analyzed:         09/03/2019 1340h         0.500         1.000         2.19         120         70 - 130           1908531-014BMS         Date Prepared:         08/22/2019 1340h         0.500         1.000         0         112         70 - 130	Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits         Amt         % RPD           1908531-001BMS 200.7-W         Date Analyzed:         08/30/2019 1258h 08/22/2019 1045h         08/30/2019 1258h	Result         Units         Method         MDL         Limit         Spiked         Amount         %REC         Limits         Amt         % RPD         Limit           1908531-001BMS         Date Analyzed:         08/30/2019 1258h         08/30/2019 1045h         -

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

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Kyle F. Gross Laboratory Director

Jose Rocha QA Officer

### **QC SUMMARY REPORT**

## Client:PacifiCorpContact:Jeff TuckerLab Set ID:1908531Dept:MEProject:Hunter CCR Groundwater Sampling / PERCM052QC 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: Test Code:	<b>1908531-001BMSD</b> 200.7-W	Date Analyzed: Date Prepared:	08/30/201 08/22/201					÷						
Calcium		377	mg/L	E200.7	1.02	10.0	10.00	366	108	70 - 130	390	3.56	20	
Lab Sample ID: Test Code:	<b>1908531-001BMSD</b> 200.7-W	Date Analyzed: Date Prepared:	09/03/201 08/22/201					-						
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: Test Code:	<b>1908531-014BMSD</b> 200.7-W	Date Analyzed: Date Prepared:	09/03/201 08/22/201										•	
Boron Calcium		1.10 10.2	mg/L mg/L	E200.7 E200.7	0.114 0.102	0.500 1.00	1.000 10.00	0 • 0	110 102	70 - 130 70 - 130	1.12 10.3	1.52 1.40	20 20	

#### Report Date: 9/5/2019 Page 33 of 38

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Kyle F. Gross Laboratory Director

Jose Rocha QA Officer

### **QC SUMMARY REPORT**

Client: P Lab Set ID: 1	PacifiCorp 908531						Contact: Dept:	Jeff Tucker WC					·
	Hunter CCR Groundwater	Sampling / PF	ERCM052				QC Type:						
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount %	REC Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample ID: Test Code:	<b>1908531-002ADUP</b> PH-4500H+B	Date Analyzed:	08/21/201	9 1832h					1				
pH @ 25° C		7.40	pH Units	SM4500-H+B	1.00	1.00	- 			7.43	0.405	5	Н
Lab Sample ID: Test Code:	<b>1908531-003ADUP</b> PH-4500H+B	Date Analyzed:	08/21/201	9 1832h									
pH @ 25° C		7.75	pH Units	SM4500-H+B	. 1.00	1.00			·	7.79	0.515	5 .	Н
Lab Sample ID: Test Code:	<b>1908531-012ADUP</b> PH-4500H+B	Date Analyzed:	08/21/201	9 2005h		· • • • • •	· · · · · · · · · · · · · · · · · · ·			· ·			
pH @ 25° C		7.44	pH Units	SM4500-H+B	1.00	1.00		· · · · · · · · · · · · · · · · · · ·		7.49	0.670	5	н
Lab Sample ID: Test Code:	<b>1908533-007ADUP</b> PH-4500H+B	Date Analyzed:	08/21/2019	9 2005h				•		-			
pH @ 25° C		7.15	pH Units	SM4500-H+B	1.00	1.00				7.16	0.140	5	
Lab Sample ID: Test Code:	<b>1908531-001ADUP</b> TDS-W-2540C	Date Analyzed:	08/22/2019	9 1120h		•							
Total Dissolved	Solids	26,800	mg/L	SM2540C	80.0	100			· · · ·	27000	0.446	5	

H - Sample was received outside of the holding time.

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Kyle F. Gross Laboratory Director

Jose Rocha QA Officer

## **QC SUMMARY REPORT**

Client:	PacifiCorp						Contact:	Jeff Tuck	er					
Lab Set ID:	1908531						Dept:	WC						
Project:	Hunter CCR Groundw	vater Sampling / Pl	ERCM052	i an ta			QC Type	e: LCS						
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample I Test Code:	D: LCS-R129815 300.0-W	Date Analyzed:	08/30/20	19 1606h										
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 I Test Code:	D: LCS-R129821 300.0-W	Date Analyzed:	09/03/20	19 1123h				· · ·				· · · · · ·	•	
Chloride		4.89	mg/L	E300.0	0.0386	0.100	5.000	0	97.9	90 - 110				

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	the second s
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	Ó	_ 101	98 - 102	
Lab Sample ID:	LCS-R129401	Date Analyzed:	08/21/2019	2005h							· ·
Test Code:	PH-4500H+B			1					•	· · · ·	
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				.1		والارتدارة بالوبعا الهجر	
Test Code:	TDS-W-2540C					· · · · ·				·	
Total Dissolved S	olids	206	mg/L	SM2540C	8.00	10.0	205.0	0	100	80 - 120	·

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#### Kyle F. Gross Laboratory Director

**Jose Rocha** QA Officer

## **QC SUMMARY REPORT**

alvte		Result	Units	Method	MDI	Reporting	Amount Sniked	Spike Ref.	%REC	Limits	RPD Ref.	% RPD	RPD Limit	Onal
ect:	Hunter CCR Groundw	ater Sampling /	PERCM052		-		QC Type:	: MBLK						
Set ID:	1908531						Dept:	WC						
nt: 🔅	PacifiCorp						<b>Contact:</b>	Jeff Tucke	r .					

Analyte		Result	Units	Method	MDL	Limit	Spiked	Amount	%REC	Limits	Amt	% RPD Li	mit Qual
Lab Sample ID: Test Code:	<b>MB-R129815</b> 300.0-W	Date Analyzed:	08/30/201	19 1549h			•	·····		-			
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:	09/03/201	19 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:	08/22/201	19 1120h		and the second secon	•		•				
Test Code:	TDS-W-2540C		•							•			
Total Dissolved S	olids	< 10.0	mg/L	SM2540C	8.00	10.0							

#### Report Date: 9/5/2019 Page 36 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

## **QC SUMMARY REPORT**

Client: Lab Set ID: Project:	PacifiCorp 1908531 Hunter CCR Ground	water Sampling / PE	RCM052				Contact: Dept: QC Type:	Jeff Tuck WC MS	er			·	•	
Analyte		Result	Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample II Test Code:	D: 1908531-002AMS 300.0-W	Date Analyzed:	08/30/2019	9 1943h						-		ler.		
Chloride Fluoride Sulfate		10,200 10,200 17,100	mg/L mg/L mg/L	E300.0 E300.0 E300.0	77.2 48.0 348	200 200 1,500	10,000 10,000 10,000	218 0 6780	99.6 102 103	90 - 110 90 - 110 90 - 110		- -		
Lab Sample II Test Code:	D: 1908531-003AMS 300.0-W	Date Analyzed:	08/30/2019	9 2033h									jan M	· · · ·
Chloride Fluoride		10,600 10,300	mg/L mg/L	E300.0 E300.0	77.2 48.0	200 200	10,000 10,000	642 0	99.9 103	90 - 110 90 - 110			;	
Lab Sample II Test Code:	D: 1908531-003AMS 300.0-W	Date Analyzed:	09/03/2019	9 1157h				•	•	· · · · · ·			•••	
Chloride Sulfate		25,400 57,700	mg/L mg/L	E300.0 E300.0	193 870	500 3,750	25,000 25,000	876 32000	97.9 102	90 - 110 90 - 110	;			
Lab Sample II Test Code:	D: 1908533-001AMS 300.0-W	Date Analyzed:	09/03/2019	9 1323h		• • • • • • • • • • • • • •				- -				
Chloride Fluoride Sulfate		18,600 10,100 10,600	mg/L mg/L mg/L	E300.0 E300.0 E300.0	77.2 48.0 348	200 200 1,500	10,000 10,000 10,000	8290 0 496	103 101 101	90 - 110 90 - 110 90 - 110			·	
Lab Sample II Test Code:	D: 1908533-005AMS 300.0-W	Date Analyzed:	09/03/2019	9 1541h						•	• .			
Chloride Fluoride Sulfate		11,800 10,400 14,500	mg/L mg/L mg/L	E300.0 E300.0 E300.0	77.2 48.0 348	200 200 1,500	10,000 10,000 10,000	1630 69.3 4360	101 103 102	90 - 110 90 - 110 90 - 110				

#### Report Date: 9/5/2019 Page 37 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.

**Jose Rocha** QA Officer

#### AMERICAN WEST ANALYTICAL LABORATORIES

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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: Lab Set ID: Project:		water Sampling / PERCM	052			Contact: Dept: QC Type:	Jeff Tucke WC MSD	<b>r</b>					; <u>;</u> ,
Analyte	· · · · ·	Result Units	Method	MDL	Reporting Limit	Amount Spiked	Spike Ref. Amount	%REC	Limits	RPD Ref. Amt	% RPD	RPD Limit	Qual
Lab Sample II Test Code:	D: 1908531-002AMSD 300.0-W	Date Analyzed: 08/3	0/2019 1959h	- - -		• •	e galeri		· •	- <b>**</b>			1
Chloride Fluoride Sulfate		10,200 mg/I 10,200 mg/I 17,100 mg/I	E300.0	77.2 48.0 348	200 200 1,500	10,000 10,000 10,000	218 0 6780	99.6 102 103	90 - 110 90 - 110 90 - 110	10200 10200 17100	0.00462 0.363 0.331	20 20 20	
Lab Sample II Test Code:	D: 1908531-003AMSD 300.0-W	Date Analyzed: 08/3	0/2019 2049h		t a construction and								· · · · · ·
Chloride Fluoride		10,600 mg/L 10,400 mg/L	1	77.2 48.0	200 200	10,000 10,000	642 0	99.5 104	90 - 110 90 - 110	10600 10300	0.361 0.809	20 20	
Lab Sample II Test Code:	D: 1908531-003AMSD 300.0-W	Date Analyzed: 09/0	3/2019 1214h										
Chloride Sulfate		25,500 mg/L 57,500 mg/L		193 870	500 3,750	25,000 25,000	876 32000	98.3 102	90 - 110 90 - 110	25400 57700	0.389 0.290	20 20	
Lab Sample II Test Code:	D: 1908533-001AMSD 300.0-W	Date Analyzed: 09/0	3/2019 1341h									<u></u>	
Chloride Fluoride Sulfate		18,600 mg/L 10,200 mg/L 10,700 mg/L	E300.0	77.2 48.0 348	200 200 1,500	10,000 10,000 10,000	8290 0 496	103 102 102	90 - 110 90 - 110 90 - 110	18600 10100 10600	0.289 0.694 0.621	20 20 20	
Lab Sample II Test Code:	D: 1908533-005AMSD 300.0-W	Date Analyzed: 09/0	3/2019 1558h										
Chloride Fluoride Sulfate		11,700 mg/L 10,300 mg/L 14,300 mg/L	E300.0	77.2 48.0 348	200 200 1,500	10,000 10,000 10,000	1630 69.3 4360	101 102 99.4	90 - 110 90 - 110 90 - 110	11800 10400 14500		20 20 20	

#### Report Date: 9/5/2019 Page 38 of 38

	RDER Summary					1908531	Page 1 of 4
Client:	PacifiCorp				Due Date:	9/5/2019	
Client ID:	PAC900		Contact:	Jeff Tucker			
Project:	Hunter CCR Groundwater Sa		l: II+	WO Type	•		
Comments:	QC2+. Include EDD. Metals sh mholland@waterenvtech.com;	nare with set 1908532. Footi	note report, pH re	ceived outside of hold. cc: l	Report to derickson@wate	renvtech.com and	A
Sample ID	Client Sample ID	Collected Date	Received Date	Test Code	Matrix	Sel Storage	
908531-001A	ELF-1D	8/20/2019 1330h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	- Teli
				3 SEL Analytes: CL F SO4			
			~	PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1908531-001B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA			· · · · · · · · · · · · · · · · · · ·
				200.7-W-PR		DF-Metals	
908531-002A	ELF-2	8/20/2019 1430h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
				3 SEL Analytes: CL F SO4			
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1908531-002B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA 200.7-W-PR		DF-Metals	
				200./-₩-FK		Dr-Metals	
1908531-003A	ELF-3	8/20/2019 1315h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
		·····		3 SEL Analytes: CL F SO4			
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1908531-003B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA 200.7-W-PR		DF-Metals	
				200./-W-IK		Dr-Metals	
1908531-004A	ELF-4	8/20/2019 1215h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
				3 SEL Analytes: CL F SO4			
				PH-4500H+B	<u> </u>	DF-WC	···-
				TDS-W-2540C		DF-WC	
1908531-004B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA 200.7-W-PR		DF-Metals	
				200.7-W-PK		DF-Metals	
				,			

e î

WORK O	RDER Summary					Work Order: <b>1908531</b>	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	
908531-005A	ELF-5	8/20/2019 1130h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	1
				3 SEL Analytes: CL F SO4			
			· · · · · · · · · · · · · · · · · · ·	PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
908531-005B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA			
				200.7-W-PR		DF-Metals	
908531-006A	ELF-7	8/20/2019 1245h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	1
		a and a second sec		3 SEL Analytes: CL F SO4			
				PH-4500H+B		DF-WC	- 69
				TDS-W-2540C		DF-WC	100
1908531-006B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA			
				200.7-W-PR		DF-Metals	
908531-007A	ELF-8	8/20/2019 1032h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	]
				3 SEL Analytes: CL F SO4			
				PH-4500H+B		DF-WC	
	-	·		TDS-W-2540C		DF-WC	
1908531-007B				200.7-W		DF-Metals	
		AL		2 SEL Analytes: B CA			
				200.7-W-PR		DF-Metals	
1908531-008A	ELF-9	8/20/2019 1345h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	1
				3 SEL Analytes: CL F SO4	-		
				PH-4500H+B		DF-WC	
				TDS-W-2540C		DF-WC	
1908531-008B				200.7-W		DF-Metals	
	• 10 5 (0) 7			2 SEL Analytes: B CA			
		•		200.7-W-PR		DF-Metals	
1908531-009A	ELF-11	8/20/2019 0926h	8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
				3 SEL Analytes: CL F SO4	•	-	
				PH-4500H+B	18	DF-WC	
				TDS-W-2540C		DF-WC	
1908531-009B				200.7-W		DF-Metals	
				2 SEL Analytes: B CA			
		· · · · · · · · · · · · · · · · · · ·		200.7-W-PR		DF-Metals	

WORK OF	RDER Summ	ary					Work Order: <b>1908531</b>	Page 3 of 4
Client:	PacifiCorp						Due Date: 9/5/2019	
Sample ID	Client Sample ID		Collected Date	e Received Date	Test Code	Matrix	Sel Storage	
1908531-010A	ELF-12		8/20/2019 1215	a 8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
					3 SEL Analytes: CL F SO4 PH-4500H+B		DF-WC	
		······································	····· ,		TDS-W-2540C		DF-WC	
1908531-010B					200.7-W		DF-Metals	
					2 SEL Analytes: B CA			
					200.7-W-PR		DF-Metals	
1908531-011A	ELF-13		8/20/2019 1130	n 8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
	480 YEAR / / /	. Martin and the state of the second state of			3 SEL Analytes: CL F SO4			
					PH-4500H+B		DF-WC	
1000001 0115					TDS-W-2540C		DF-WC	
1908531-011B					200.7-W 2 SEL Analytes: B CA		DF-Metals	
	what share a significant in the second se				2 SEL Analytes: B CA 200.7-W-PR		DF-Metals	
					200.7-11-11		DI-Michais	
1908531-012A	ELF-14		8/20/2019 1045	h 8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
					3 SEL Analytes: CL F SO4 PH-4500H+B		DF-WC	
				200 T.S.	TDS-W-2540C	- 1914 I	DF-WC DF-WC	
1908531-012B		······			200.7-W		DF-Metals	
					2 SEL Analytes: B CA			
					200.7-W-PR		DF-Metals	
1908531-013A	DUP		8/20/2019 0920	h 8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
					3 SEL Analytes: CL F SO4			
					PH-4500H+B		DF-WC	
1000521 0125					TDS-W-2540C		DF-WC	
1908531-013B					<b>200.7-W</b> 2 SEL Analytes: B CA		DF-Metals	
					2 SEL Analyles: B CA 200.7-W-PR		DF-Metals	
1908531-014A	FB		8/20/2019 1445	h 8/21/2019 1445h	300.0-W	Aqueous	DF-WC	
					3 SEL Analytes: CL F SO4			
					PH-4500H+B		DF-WC	
					TDS-W-2540C		DF-WC	
1908531-014B					200.7-W		DF-Metals	
					2 SEL Analytes: B CA			
					200.7-W-PR		DF-Metals	
Dint 1 00/01/10 10 0								
Printed: 08/21/19 19:2	lo LAE	BORATORY CHECK: %M				HOK	HOK COC Emailed	

## WORK ORDER Summary

Client: PacifiCorp

AWAL Use Only - One or more samples expired upon receipt: Test Code PH-4500H+B Work Order: **1908531** Page 4 of 4

Due Date: 9/5/2019

American We Analytical Labora 3440 S. 700 W. Salt Lake City, UT Phone # (801) 263-8686 Toll Free # (8	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.										AWAL Lab Sample Set # Page of						
Fax # (801) 263-8687 Email awal@	QC Level: Turn Arou					Turi	1 Arot	ınd Ti	me:	Unless other arrangements have been made, signe reports will be emailed by	Due Date,						
www.awal-labs.com				1 2 2+ 3 3+ 1 2 3 4					12	34	5(St	nd	<b>5:00 pm</b> on the day they are due.	9/5/19			
Client: Recification Address:													<ul> <li>Report down to the MDL</li> <li>Include EDD:</li> <li>Lab Filter for:</li> <li>Field Filtered For:</li> </ul>	Laboratory Use Only COC Tape Was: 1 Present on Outer Package Y N NA			
Contact: Deff Tullier Phone #: E-mail: Deff, Tucker@PacificerP.Com Project Name: Hunter CCR Groundwater Sampling Project #: PERCIMO52					///	- - - - - -							For Compliance With:  NELAP RCRA CWA SDWA ELAP/A2LA NLLAP NOn-Compliance Other:	2 Unbroken on Outer Package Y N NA 3 Present on Sample Y N A 4 Unbroken on Sample Y NA			
PO #: Sampler Name: MLS & CE Sample ID:	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Appendix	-							Known Hazards & Sample Comments	Samples Were: 1 Shipped or nand delivered 2 Ambient r Chilled			
	B/2012019	1330	5	Ĵ	X								cumple comments	3 Temperature °C 4 Received Intact			
$^{2}ELF-A$	1	1430	F	7	1									Y N			
3 ELF-3		(315															
4 <u>FLF-4</u>		1215	$\square$											5 Peoperly Preserved Y N Checked at bench			
<sup>s</sup> ELY-S		1130	$\square$						_								
		1245		$\square$										6 Received Within			
7 <del>E</del> L F - 8		1032	$\square$	$\square$					_					Holding Times			
* <u>E4-7</u>		1345		$\square$				_	_					- These pulling the			
· E27-11		0926	$\square$											Some ph out			
10 ELF-12		1215	Ш											of hold			
II F-LF-43		1130	Ц											Sample Labels and COC Record Match?			
12 ELF-14		1045	Ш		Ľ									$\left( \begin{array}{c} Y \end{array} \right) $ N			
<sup>13</sup> DUP		0920*	1,										Bottles read 9:40				
14 FB	V	1445	$\mathbb{V}$	12	1												
15						h											
Relinquished in the second signature	Date 8/21/2019	Received by: Signature	D	11	N	ak	171	n			Dag	21/19	Special Instructions: Please CC	Anglytical Appart to			
Print Name: Mille ShirleN	Time HS_	Print Name:	)P			2F					Time:	:45	DErickson @weteren	vtech, com and			
Relinquished by:	Date:	Received by:		<u>* v</u>		<u> </u>	4	<u></u>	~		Date:		MHolland Queteron	stech ( DM			
Signature Print Name:	Time:	Signature									Time:		I TO THE CARACTER OF	- CONILON X			
Relinquished by:	Date:	Print Name: Received by:									Date:	artha a	·				
Signature Print Name:	Time:	Signature Print Name:				····					Time:						

Constituents Analyzed									
Appendix III	Appendix IV								
Boron	Antimony								
Calcium	Arsenic								
Chloride	Barium								
Fluoride	Beryllium								
рН	Cadmium								
Sulfate	Chromium								
Total Dissolved Solids (TDS)	Cobalt								
	Fluoride								
	Lead								
۵ ا	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 #:	6085

#### **Preservation Check Sheet**

Sample Set Extension and pH

Analysis	Preservative	-001	-002	-003	-004			-007			-010	-011	-012	-013	-014		
Ammonia	pH <2 H <sub>2</sub> SO <sub>4</sub>	[															
COD	pH <2 H <sub>2</sub> SO <sub>4</sub>																 
Cyanide	pH>12 NaOH																 
Metals	pH <2 HNO <sub>3</sub>	Ves	ves	ves	ves	Ves	Ves	Ves	Ves	ves	VPS	ves	Ves	Ves	Ves		
NO <sub>2</sub> /NO <sub>3</sub>	pH <2 H <sub>2</sub> SO <sub>4</sub>	17	1	7	7	1	1	1	1	7	1	1	1	1	1		
O&G	pH <2 HCL																
Phenols	pH <2 H <sub>2</sub> SO <sub>4</sub>																
Sulfide	pH >9 NaOH, Zn Acetate																
TKN	pH <2 H <sub>2</sub> SO <sub>4</sub>																
T PO <sub>4</sub>	pH <2 H <sub>2</sub> SO <sub>4</sub>																
Cr VI+	pH >9 (NH4)2SO4																
	-																
		ļ															
							-					ļ	ļ				
		1															

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: Sent: To: Subject: Attachments: Marcus Holland [mholland@waterenvtech.com] Monday, August 12, 2019 4:18 PM Elona Hayward Appendix III and IV constituents CCR - Appendix III & Appendix IV Constituents.pdf

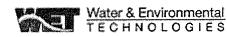
Hi Elona,

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



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