Water Quality Monitoring Data Review

Facility Name **Rohrschneider 3671854B** Facility ID **755330** Permit **299469**
Lab Sample ID **BW_Rohrschneider_3671854B** Date Sampled **12/22/17** Sampler **Claire Baker**
Lat **40.06023979** Long **-105.0548048042** QtrQtr **SWSW** Sec **7** Twn **1N** Rng **68W**
Site Address **4150 NE County Line Road, Erie, Colorado 80516**
Oil & Gas Well **GWA - Woolley-Sosa-Becky/7H-E168** Location/API# **305447**

Field Sheet Review

1. Was the well/spring properly purged? **Yes**
   a. *Please provide purge volume if applicable:*
2. Was the flow rate reduced prior to sampling? **Yes**
3. Were field parameters measured prior to sampling? **No**
4. Did field parameters stabilize prior to sampling? **Yes**
5. Did site conditions or other factors suggest that the samples may not be representative of groundwater? **No**
   a. *If yes, please describe:*

Laboratory Data Review

6. Were the samples received at the recommended temperature of ≤ 6°C? **Yes**
7. Were the samples properly preserved? **Yes**
   a. *If no, please explain:*
8. Was proper chain-of-custody maintained? **Yes**
   a. *If no, please explain:*
9. Were all samples analyzed for the requested analyses? **Yes**
   a. *If no, please explain, can the remaining sample be analyzed within the recommended hold time?*
10. Were the proper methods used? **Yes**
    a. *If no, please explain, can the remaining sample be re-analyzed within the recommended holding time?*
    Deviations to the COGCC Model SAP Table 7-1 methods were approved by the COGCC. The case narrative is available upon request.
11. Were all sample holding time limits met? **Yes**
    a. *If no, please explain:*
12. Were the correct reporting limits used? **Yes**
    a. *If no, please explain:*
    Deviations to the COGCC Model SAP Table 7-1 reporting limits were approved by the COGCC. The case narrative is available upon request.
13. Were laboratory quality assurance samples collected and analyzed *(ie matrix spikes & matrix spike duplicates)* according to laboratory methods? **Yes**
    a. *If no, please explain:*

14. Were laboratory quality assurance sample results within acceptance limits? **Yes**
    a. *If no, please describe:*

Field Control Samples

15. Were **field duplicate** samples submitted? **No**
    a. *If no, proceed to trip blank questions.*

16. Were the original and duplicate samples ≥ 5x the practical quantitation limit (PQL) **N/A**

17. Was the Relative Percent Difference (RPD) ≤ 20%? **N/A**
    a. *If no, please describe:*

18. Were **trip blanks** submitted? **Yes**
    a. *If no, proceed to equipment blank question.*

19. If trip blanks were submitted, were the VOC constituent concentration results below method detection limits? **Yes**

20. If **equipment blanks** were submitted, did the results meet the equipment blank data quality objectives specified in the Sampling and Analysis Plan? **N/A**

21. If **field blanks** were submitted, did the results meet the field blank data quality objectives specified in the Sampling and Analysis Plan? **N/A**

Corrective Actions

22. Are corrective actions required to remedy any data quality issues? **No**
    a. *If yes, please describe:*

23. Date by when corrective actions must be completed: _____

24. Summary of Corrective Actions (once completed)

Data Suitability Statement

Based upon this data quality review and your professional judgment, have the data been collected and analyzed in general accordance with the COGCC Model Sampling and Analysis Plan? **Yes**

Are the data suitable for release for incorporation into the Colorado Oil and Gas Conservation Commission environmental database? **Yes**

Data Quality Reviewer's Name: **Heather Shideman** (Print) Company: **Apex Companies, LLC**

Data Quality Reviewer's Signature: _____ Heather Shideman _____ Date: **2/15/18**

APEX

Field Equipment and PPE

PPE	✓
Hard Hat	✓
Steel Toed Boots	✓
Safety Glasses	✓
FR Clothing	✓
Disposable Gloves	✓
Other	✓

Calibration Fluid Information

Standard	Manufacturer	Lot No.	Exp. Date
pH 4	Geotech	7GD788	Apr 19
pH 7		7GE282	May 19
pH 10		6GK360	NOV 18
EC 447		6GL682	Dec 17
EC 1413		7GE530	May 18
EC 8974		6GL030	Dec 17
ORP		7GJ540	Jul 18

Manufacturer	Name	Serial Number
In-Situ	SMARTROLL MP	366369

Date	Time	Calibration / Post Check	pH (std.units) 4.0	pH 7.0	pH 10.0	Specific Conductance (µmhos/cm² @ 25°C) 447	1413	8974	ORP 220 mV	DO 100%	Temp (°C)	Initials	Comments
12/22/17	0750	cal	4.02	7.07	10.00	438.0	1409.9	79308	220.3	100.0	22.82	CB	calORP@220.3mV@22.82°C
12/22/17	1385	post	4.04	7.08	10.01	520.9	1362.6	77463	224.2	100.2	20.40	CB	
12/28/17	0746	Cal	4.02	7.010	10.02	431.0	1382.2	82265	220.2	100.3	23.03	CB	calORP@220.2mV@23.03°C
12/28/17	1721	post	4.05	6.98	10.02	427.7	1403.9	82145	241.1	100.5	11.11	CB	
1/29/18	0835	cal	4.02	7.06	10.00	445.3	1412.1	81499	220.0	100.1	21.09	CB	calORP@220mV@21.09°C
1/29/18	1627	post	4.15	7.17	10.19	444.6	1405.0	85241	213.5	100.7	21.71	AD	

Manufacturer	Name	Serial Number
HACH	2100P	

Date	Time	Calibration / Post Check	Turbidity (NTU) 20.0	100.0	800.0
12/22/17	0750	cal	19.2	98.8	804
12/22/17	1335	post	21.0	102	802
12/28/17	0746	cal	21.5	103	800
12/28/17	1721	post	19.7	99.8	772
1/29/18	0835	cal	19.4	99.4	793
1/29/18	1627	post	19.8	99.4	792

Manufacturer	Name	Serial Number
Industrial Scientific	iBrid	

Date	Time	Cal	Span	Zero	Bump	Comments

BW — Four gas

Date	Time	Cal	Span	Zero	Bump	Comments

Comments:

APEX

Baseline Water Monitoring Fieldsheet

Sample Date 12/22/2017

Samplers Baker, Claire

Client(s) Crestone Peak Resources Operating, LLC (GWA - Woolley-Sosa-Becky / 7H-E168)

Initial ☐ **1st Subsequent** ☒ **2nd Subsequent** ☐ **Response** ☐ **Annual** ☐ **Bi-Annual** ☐ **Frequency**

O&G Well **API** **Spud Date** **Completed Date**

Regulation 318A.f **Distance from Well (ft)** **Billing #**

Well Parameters

Well / Facility Name Rohrschneider 3671854B **Permit** 299469 **Receipt** 3671854B **ID** 755330

Map No. **Project** 125.1601.01 305447 **QQ** SWSW **Sec** 7 **Twn** 1N **Rng** 68W **Use** Domestic

County Weld **State** CO **Elev** 1510 **UTM Easting** 495326.04 **UTM Northing** 4434444.72 **Zone** 13

Latitude 40.06023979 **Longitude** -105.0548048042 **NAD** 83

Directions UTMs from GPS. Previously sampled by Crestone 10/5/2016.

Owner Information

Rohrschneider, Michelle Narciso & Reuben

Mailing Address:
4150 NE County Line Road
Erie, Colorado 80516

Physical Address:
4150 NE County Line Road
Erie, Colorado 80516

Individuals Present During Sampling

Phone: 4045125155
Cell:
Alt Contact: reubenrr1@gmail.com

Well Information

CAN/ABA No **Refused Sample** No **Reported Water Level** **Reported Total Depth** 105 **Surface Casing Diameter** 6.000

Well House No **Vault** No **Pitless** No **Surf. Discharge Pipe** No **Confined Space** No **Airline Installed** UNK

Well Seal Yes **Type/Manufacturer** Martinson **Vented** No **Gas Flow from Vent** UNK **Access for WL** Yes

Storage Tank No **Storage Tank Volume (gal)** **Pressure Tank** Yes **Pressure Tank Volume (gal)** 30

Ground Slope Away from Well? Yes Away **Area Desc/Proximity** Approximately 30' north of house, behind old well house.

Condition of well Good.

LEL(%) 0 **x0.05= Methane Concentration** 0 **%** **LEL Sample Location** Spigot

Measured Flow Rate (gpm) 0.33 **Time** 10:10 **Sampling Flow Rate** 0.5

Measured Water Level NaN **Time** **Instrument**

Pump Specifications & Power

Pump Type Submersible **Pump Manufacturer** Unknown **HP** **Phase** 1 **Fused Shut Off** No

Fuse Time on Time Off **Breaker** Time On Time Off

Timer Time on Time Off **Other** Time On Time Off **Other Description**

Mini-Test Data

Clock Time	Elapsed Time	Water Level	Flow Rate (calc)	Flow (gal/sec)		Temp (°C)	pH	EC (uS/cm)	ORP (mV)	DO (mg/L)	Turbidity	Color	Odor	Sediment	Bubbles / Effervescence	CH4 (%)
09:45	0:00		0.33	1	180	11.2	7.73	954.8	99.1	10.83	11.9	green	None	sand	scence	0
09:50	0:05		0.41	1	148	11.85	7.78	960.1	69.5	8.43	2.01	green	None	sand	scence	0
09:55	0:10		0.29	1	204	11.81	7.81	957.3	64.7	7	2.63	green	None	sand	scence	0
10:00	0:15		0.26	1	232	11.59	7.8	942.2	62.4	6.09	3.21	green	None	sand	scence	0
10:05	0:20		0.47	1	128	11.78	7.79	953.4	55.2	7.74	2.52	green	None	sand	scence	0
10:10	0:25		0.37	1	164	11.93	7.81	949.2	50.1	7.67	0.59	green	None	sand	scence	0

Sample Yes **No Sample Reason**

Sample Location Spigot

Sampling Before Tank Yes **Flow Cell Used** Yes **Purge Volume** 9 **gal = (Pumped** 25 **min @** 0.36 **gpm)**

Well Volume = **gal (Radius** 9 **in) Squared * Water Column** ***0.163** **Casing Volumes Removed**

Sample/Visit Time 09:00 **Weather** 30s/Sunny/Calm **Field Conditions** Snow on ground

Comment Arrived on site at 9:00 am 12/22/17. Reuben Rohrschneider was home and directed me to the location of the wellhead and spigot. The wellhead was located approximately 30' north of the house, behind the old yellow wellhouse, and the spigot was located east of the wellhouse along the fence. Reuben informed me that they had been using the water all morning and confirmed that the water does not flow through the pressure tank before reaching the spigot outside. The water is also used for drinking, along with all domestic purposes. For these reasons only 5 gallons were purged before conducing mini-tests, to remove stagnant water in the line to the spigot. A total of 14 gallons were purged before collecting samples from the red handled spigot. Because the water had been used all morning, pulsatile flow was observed throughout mini-tests and sampling. Reuben noted that this has been a problem in the past with regards to water quantity. GPS points were collected using a Trimble R1 unit.

CPR/BWQ

BW_Rohrschneider_3671854B

SWSW_7_14_68W

495326.04/4434444.72

1510.72

12/22/17 1010

CB

Pre Post

CPR/BWQ

BW_Rohrschneider_36718548

SWSW_7_IN_68W

495326.04/4434444.72

1510.72

12/22/17

CB

1010

Post


CPR/BWQ
BW_Rohrschneider_36718548
SWSW_7_LN_68W
495326.04/4434444.72
1510.72
12/22/17 1018
CB
Pre
Post

CPR/BWQ

BW_Rohrschneider_3671854B

SWSW-7-14-68W

495326.04/4434444.72

1510.72

1010

22/17

CB

ANALYTICAL REPORT

January 04, 2018

Crestone Peak Resources

Sample Delivery Group:	L959725
Samples Received:	12/23/2017
Project Number:	
Description:	BWSE/GWA_Woolley_Sosa_Becky_7H_E168
Site:	755330
Report To:	Heather Shideman 1801 California Street Denver, CO 80202

Entire Report Reviewed By:

Shane Gambill
Technical Service Representative

TABLE OF CONTENTS

BW_ROHRSCHNEIDER_3671854B SWSW_7_1N_68W GW L959725-01

Collected by	Collected date/time	Received date/time
Claire Baker	12/22/17 10:10	12/23/17 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Microbiology by Method BART	WG1057458	1	01/02/18 15:04	01/02/18 15:04	ARM
Gravimetric Analysis by Method 2540 C-2011	WG1057774	1	12/28/17 10:58	12/28/17 12:07	BS
Wet Chemistry by Method 2320 B-2011	WG1057708	1	12/29/17 08:22	12/29/17 08:22	MCG
Wet Chemistry by Method 353.2	WG1057784	1	12/28/17 13:02	12/28/17 13:02	JER
Wet Chemistry by Method 365.4	WG1058934	1	12/30/17 09:29	01/02/18 13:23	KK
Wet Chemistry by Method 9040C	WG1057424	1	12/26/17 15:00	12/26/17 15:00	GB
Wet Chemistry by Method 9050A	WG1058008	1	12/28/17 16:32	12/28/17 16:32	TH
Wet Chemistry by Method 9056A	WG1056828	1	12/23/17 16:03	12/23/17 16:03	DR
Wet Chemistry by Method 9056A	WG1057222	5	12/27/17 00:33	12/27/17 00:33	KCF
Wet Chemistry by Method 9056A	WG1057749	1	12/27/17 21:02	12/27/17 21:02	DR
Metals (ICP) by Method 6010B	WG1057826	1	12/28/17 09:45	12/28/17 18:47	TRB
Metals (ICPMS) by Method 6020	WG1057965	1	12/28/17 11:02	12/28/17 22:06	LAT
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1058258	1	12/29/17 14:38	12/29/17 14:38	BMB
Volatile Organic Compounds (GC) by Method RSK175	WG1057272	1	12/26/17 11:05	12/26/17 11:05	BG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1057185	1	12/24/17 15:49	12/24/17 15:49	ACE
Semi-Volatile Organic Compounds (GC) by Method 3511/8015	WG1057266	1	12/26/17 07:28	12/28/17 14:48	LM

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Shane Gambill
Technical Service Representative

Project Narrative

The following reactions were observed on one or more samples within this SDG.

BC Brown Cloudy
BL Blackened Liquid
BR Brown Ring
FO Foam
SR Slime Ring around Ball
PB Pale Blue Glow in UV Light

NO2/NO3 the COGCC SAP requires method 353.3. – ESC reports by 353.2 /T.Phos the COGCC SAP requires method 365.3 – ESC reports by 365.4/Total ALK, Bicarb, carbonate the COGCC SAP requires a limit of 10 mg/l – ESC reporting limit is 20 mg/l /BR the COGCC SAP require a limit of 0.2 mg/l – ESC reporting limit is 1.0 mg/l /CL the COGCC SAP require a limit of 0.1 mg/l – ESC reporting limit is 1.0 mg/l /T.Phos the COGCC SAP require a limit of 0.05 mg/l – ESC reporting limit is 0.1 mg/l /Methane the COGCC SAP require a limit of 0.005 mg/l – ESC reporting limit is 0.01 mg/l /Ethane the COGCC SAP require a limit of 0.005 mg/l – ESC reporting limit is 0.013 mg/l /Propane the COGCC SAP require a limit of 0.005 – ESC reporting limit is 0.0186 mg/l /BA the COGCC SAP require a limit of 0.001 mg/l – ESC reporting limit is 0.005 mg/l /SE the COGCC SAP require a limit of 0.001 mg/l - ESC reporting limit is 0.002 mg/l /DRO (C10-C28) the COGCC SAP require a limit of 0.5 mg/l - ESC reporting limit is 0.5 mg/l /GRO (C6-C10) the COGCC SAP require a limit of 0.05 mg/l - ESC reporting limit is 0.1 mg/l

Additional Information

Analyte	Result	Units
pH (On Site)	7.81	su
Temperature (on-site)	11.93	
Specific Conductance	949.2	
Dissolved Oxygen (on-site)	7.67	
Turbidity (on-site)	0.59	NTU

Sample Narrative:

L959725-01 : Redox (on-site) = 50.1 mV

Microbiology by Method BART

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Iron Related Bacteria	Present		1	01/02/2018 15:04	WG1057458
Slime Forming Bacteria	Present		1	01/02/2018 15:04	WG1057458
Sulfate Reducing Bacteria	Absent		1	01/02/2018 15:04	WG1057458

Sample Narrative:

L959725-01 WG1057458: Approximate IRB Population Estimate= 9000CFU/ml;Reactions=FO/BC/BR/BL

L959725-01 WG1057458: Approximate SLYM Population Estimate= 500CFU/ml;Reactions=SR/PB

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	631		10.0	1	12/28/2017 12:07	WG1057774

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	288		20.0	1	12/29/2017 08:22	WG1057708
Alkalinity,Bicarbonate	284		20.0	1	12/29/2017 08:22	WG1057708
Alkalinity,Carbonate	ND		20.0	1	12/29/2017 08:22	WG1057708

Sample Narrative:

L959725-01 WG1057708: Endpoint pH 4.5

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	ND		0.100	1	12/28/2017 13:02	WG1057784

Wet Chemistry by Method 365.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Phosphorus,Total	ND		0.100	1	01/02/2018 13:23	WG1058934

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.06	T8	1	12/26/2017 15:00	WG1057424

Sample Narrative:

L959725-01 WG1057424: 8.06 at 11.4C

Wet Chemistry by Method 9050A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	umhos/cm		umhos/cm		date / time	
Specific Conductance	1200		10.0	1	12/28/2017 16:32	WG1058008

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/23/2017 16:03	WG1056828
Chloride	19.0		1.00	1	12/23/2017 16:03	WG1056828
Fluoride	1.49		0.100	1	12/27/2017 21:02	WG1057749
Nitrate as (N)	ND		0.100	1	12/23/2017 16:03	WG1056828
Nitrite as (N)	ND		0.100	1	12/23/2017 16:03	WG1056828
Sulfate	230		25.0	5	12/27/2017 00:33	WG1057222

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium,Dissolved	0.0182		0.00500	1	12/28/2017 18:47	WG1057826
Boron,Dissolved	0.208		0.200	1	12/28/2017 18:47	WG1057826
Calcium,Dissolved	28.3		1.00	1	12/28/2017 18:47	WG1057826
Iron,Dissolved	0.345		0.100	1	12/28/2017 18:47	WG1057826
Magnesium,Dissolved	17.9		1.00	1	12/28/2017 18:47	WG1057826
Manganese,Dissolved	0.0274		0.0100	1	12/28/2017 18:47	WG1057826
Potassium,Dissolved	3.60		1.00	1	12/28/2017 18:47	WG1057826
Sodium,Dissolved	194		1.00	1	12/28/2017 18:47	WG1057826
Strontium,Dissolved	0.701		0.0100	1	12/28/2017 18:47	WG1057826

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Selenium,Dissolved	ND		0.00200	1	12/28/2017 22:06	WG1057965

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
TPH (GC/FID) Low Fraction	ND		0.100	1	12/29/2017 14:38	WG1058258
(S) a,a,a-Trifluorotoluene(FID)	*99.5*		*77.0-122*		*12/29/2017 14:38*	WG1058258

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Methane	ND		0.0100	1	12/26/2017 11:05	WG1057272
Ethane	ND		0.0130	1	12/26/2017 11:05	WG1057272
Ethene	ND		0.0130	1	12/26/2017 11:05	WG1057272
Propane	ND		0.0200	1	12/26/2017 11:05	WG1057272

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	12/24/2017 15:49	WG1057185
Toluene	ND		0.00100	1	12/24/2017 15:49	WG1057185
Ethylbenzene	ND		0.00100	1	12/24/2017 15:49	WG1057185
Total Xylenes	ND		0.00300	1	12/24/2017 15:49	WG1057185
o-Xylene	ND		0.00100	1	12/24/2017 15:49	WG1057185
m&p-Xylene	ND		0.00200	1	12/24/2017 15:49	WG1057185

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
(S) Toluene-d8	*101*		*80.0-120*		*12/24/2017 15:49*	WG1057185
(S) Dibromofluoromethane	*98.7*		*76.0-123*		*12/24/2017 15:49*	WG1057185
(S) a,a,a-Trifluorotoluene	*119*		*80.0-120*		*12/24/2017 15:49*	WG1057185
(S) 4-Bromofluorobenzene	*85.0*		*80.0-120*		*12/24/2017 15:49*	WG1057185

Semi-Volatile Organic Compounds (GC) by Method 3511/8015

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	ND		0.100	1	12/28/2017 14:48	WG1057266
(S) o-Terphenyl	*89.4*		*31.0-160*		*12/28/2017 14:48*	WG1057266

Method Blank (MB)

(MB) R3276821-1 12/28/17 12:07

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Dissolved Solids	U		2.82	10.0

L959481-39 Original Sample (OS) • Duplicate (DUP)

(OS) L959481-39 12/28/17 12:07 • (DUP) R3276821-4 12/28/17 12:07

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	1340	1380	1	2.65		5

L959481-40 Original Sample (OS) • Duplicate (DUP)

(OS) L959481-40 12/28/17 12:07 • (DUP) R3276821-5 12/28/17 12:07

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Dissolved Solids	1190	1180	1	0.847		5

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276821-2 12/28/17 12:07 • (LCSD) R3276821-3 12/28/17 12:07

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Dissolved Solids	8800	8480	8510	96.4	96.7	85.0-115			0.353	5

L959470-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959470-01 12/29/17 04:54 • (DUP) R3276502-5 12/29/17 05:01

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	ND	0.000	1	0.000		20
Alkalinity,Bicarbonate	ND	0.000	1	0.000		20
Alkalinity,Carbonate	ND	0.000	1	0.000		20

Sample Narrative:
OS: Initial pH <4.5
DUP: Endpoint pH 4.5

L959393-05 Original Sample (OS) • Duplicate (DUP)

(OS) L959393-05 12/28/17 19:04 • (DUP) R3276502-1 12/28/17 19:10

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	62.1	61.9	1	0.332		20
Alkalinity,Bicarbonate	62.1	61.9	1	0.332		20
Alkalinity,Carbonate	ND	0.000	1	0.000		20

Sample Narrative:
OS: Endpoint pH 4.5
DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276502-4 12/28/17 20:10 • (LCSD) R3276502-6 12/29/17 05:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alkalinity	100	103	101	103	101	85.0-115			2.38	20

Sample Narrative:
LCS: Endpoint pH 4.5
LCSD: Endpoint pH 4.5

Method Blank (MB)

(MB) R3276291-1 12/28/17 12:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L958786-01 Original Sample (OS) • Duplicate (DUP)

(OS) L958786-01 12/28/17 12:36 • (DUP) R3276291-4 12/28/17 12:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	4.64	4.64	1	0.108		20

L959903-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959903-01 12/28/17 13:05 • (DUP) R3276291-6 12/28/17 13:06

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.589	0.591	1	0.339		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276291-2 12/28/17 12:33 • (LCSD) R3276291-3 12/28/17 12:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Nitrate-Nitrite	5.00	4.08	4.15	102	104	90-110			1.53	20

L959203-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L959203-01 12/28/17 12:38 • (MS) R3276291-5 12/28/17 12:39

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	0.178	2.72	102	1	90-110	

L959983-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L959983-01 12/28/17 13:07 • (MS) R3276291-7 12/28/17 13:09 • (MSD) R3276291-8 12/28/17 13:10

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate-Nitrite	2.50	0.224	2.64	2.63	96.5	96.2	1	90-110			0.266	20

Method Blank (MB)

(MB) R3276994-1 01/02/18 13:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Phosphorus,Total	U		0.035	0.100

L959999-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959999-01 01/02/18 13:28 • (DUP) R3276994-4 01/02/18 13:30

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Phosphorus,Total	78.0	86.0	50	9.76		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276994-2 01/02/18 13:21 • (LCSD) R3276994-3 01/02/18 13:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Phosphorus,Total	2.00	1.80	1.86	90	93	90-110			3.28	20

L959712-04 Original Sample (OS) • Duplicate (DUP)

(OS) L959712-04 12/26/17 15:00 • (DUP) R3275735-3 12/26/17 15:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.62	6.63	1	0.151		1

Sample Narrative:

OS: 6.62 at 10.3C

DUP: 6.63 at 10.5C

L959856-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959856-01 12/26/17 15:00 • (DUP) R3275735-4 12/26/17 15:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.71	7.70	1	0.130		1

Sample Narrative:

OS: 7.71 at 16.7C

DUP: 7.7 at 16.9C

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3275735-1 12/26/17 15:00 • (LCSD) R3275735-2 12/26/17 15:00

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
pH	6.38	6.45	6.43	101	101	98.4-102			0.311	1

Sample Narrative:

LCS: 6.45 at 18.7C

LCSD: 6.43 at 18.6C

Method Blank (MB)

(MB) WG1058008-1 12/28/17 16:32

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	umhos/cm		umhos/cm	umhos/cm
Specific Conductance	U		10.0	10.0

L959394-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959394-01 12/28/17 16:32 • (DUP) WG1058008-4 12/28/17 16:32

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	umhos/cm	umhos/cm		%		%
Specific Conductance	78200	78100	1	0.128		20

L960034-01 Original Sample (OS) • Duplicate (DUP)

(OS) L960034-01 12/28/17 16:32 • (DUP) WG1058008-5 12/28/17 16:32

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	umhos/cm	umhos/cm		%		%
Specific Conductance	34.5	34.5	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG1058008-2 12/28/17 16:32 • (LCSD) WG1058008-3 12/28/17 16:32

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	umhos/cm	umhos/cm	umhos/cm	%	%	%			%	%
Specific Conductance	559	552	551	98.7	98.6	85.0-115			0.181	20

Method Blank (MB)

(MB) R3275514-1 12/23/17 07:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.079	1.00
Chloride	U		0.0519	1.00
Nitrate	U		0.0227	0.100
Nitrite	U		0.0277	0.100

L959725-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959725-01 12/23/17 16:03 • (DUP) R3275514-4 12/23/17 16:17

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0		15
Chloride	19.0	18.1	1	4.89		15
Nitrate	ND	0.000	1	0		15
Nitrite	ND	0.000	1	0		15

L959393-04 Original Sample (OS) • Duplicate (DUP)

(OS) L959393-04 12/23/17 18:55 • (DUP) R3275514-6 12/23/17 19:09

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0		15
Chloride	4.81	3.73	1	25.3	P1	15
Nitrate	0.439	0.470	1	6.88		15
Nitrite	ND	0.000	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3275514-2 12/23/17 07:25 • (LCSD) R3275514-3 12/23/17 07:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromide	40.0	39.8	40.0	99.6	99.9	80-120			0.384	15
Chloride	40.0	39.9	40.0	99.8	100	80-120			0.245	15
Nitrate	8.00	8.27	8.32	103	104	80-120			0.65	15
Nitrite	8.00	8.08	8.10	101	101	80-120			0.25	15

L959725-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L959725-01 12/23/17 16:03 • (MS) R3275514-5 12/23/17 16:30

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	47.5	95	1	80-120	
Chloride	50.0	19.0	70.7	103	1	80-120	
Nitrate	5.00	ND	5.05	101	1	80-120	
Nitrite	5.00	ND	5.16	103	1	80-120	

L959393-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L959393-04 12/23/17 18:55 • (MS) R3275514-7 12/23/17 19:48 • (MSD) R3275514-8 12/23/17 20:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	ND	49.8	50.1	99.6	100	1	80-120			0.618	15
Chloride	50.0	4.81	56.2	55.1	103	100	1	80-120			1.97	15
Nitrate	5.00	0.439	5.55	5.60	102	103	1	80-120			0.937	15
Nitrite	5.00	ND	5.19	5.17	104	103	1	80-120			0.367	15

Method Blank (MB)

(MB) R3275857-1 12/26/17 16:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.0774	5.00

L959494-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959494-01 12/26/17 22:57 • (DUP) R3275857-4 12/26/17 23:08

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	24.4	23.2	1	5		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3275857-2 12/26/17 17:10 • (LCSD) R3275857-3 12/26/17 17:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Sulfate	40.0	40.8	41.0	102	103	80-120			0	15

L959494-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L959494-01 12/26/17 22:57 • (MS) R3275857-5 12/26/17 23:18 • (MSD) R3275857-6 12/26/17 23:29

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50.0	24.4	73.8	73.8	99	99	1	80-120			0	15

Method Blank (MB)

(MB) R3276323-1 12/27/17 08:43

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Fluoride	U		0.0099	0.100

L959730-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959730-01 12/27/17 21:12 • (DUP) R3276323-4 12/27/17 21:23

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Fluoride	1.64	1.61	1	2		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276323-2 12/27/17 08:54 • (LCSD) R3276323-3 12/27/17 09:04

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Fluoride	8.00	8.40	8.39	105	105	80-120			0	15

L959730-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L959730-01 12/27/17 21:12 • (MS) R3276323-5 12/27/17 21:34 • (MSD) R3276323-6 12/27/17 21:44

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Fluoride	5.00	1.64	6.68	6.39	101	95	1	80-120			4	15

Method Blank (MB)

(MB) R3276448-1 12/28/17 17:11

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium,Dissolved	U		0.0017	0.00500
Boron,Dissolved	U		0.0126	0.200
Calcium,Dissolved	U		0.0463	1.00
Iron,Dissolved	U		0.0141	0.100
Magnesium,Dissolved	U		0.0111	1.00
Manganese,Dissolved	U		0.0012	0.0100
Potassium,Dissolved	U		0.102	1.00
Sodium,Dissolved	U		0.0985	1.00
Strontium,Dissolved	U		0.0017	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276448-2 12/28/17 17:14 • (LCSD) R3276448-3 12/28/17 17:17

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Barium,Dissolved	1.00	0.991	0.996	99.1	99.6	80-120			0.503	20
Boron,Dissolved	1.00	0.984	0.995	98.4	99.5	80-120			1.1	20
Calcium,Dissolved	10.0	9.33	9.42	93.3	94.2	80-120			1.04	20
Iron,Dissolved	10.0	9.65	9.73	96.5	97.3	80-120			0.867	20
Magnesium,Dissolved	10.0	9.47	9.63	94.7	96.3	80-120			1.66	20
Manganese,Dissolved	1.00	0.923	0.933	92.3	93.3	80-120			1.08	20
Potassium,Dissolved	10.0	9.72	9.81	97.2	98.1	80-120			0.934	20
Sodium,Dissolved	10.0	9.39	9.44	93.9	94.4	80-120			0.545	20
Strontium,Dissolved	1.00	0.932	0.944	93.2	94.4	80-120			1.19	20

L959412-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L959412-03 12/28/17 17:21 • (MS) R3276448-5 12/28/17 17:27 • (MSD) R3276448-6 12/28/17 17:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium,Dissolved	1.00	4.95	5.77	5.76	81.8	80.6	1	75-125			0.213	20
Boron,Dissolved	1.00	2.44	3.35	3.37	91.1	92.7	1	75-125			0.465	20
Calcium,Dissolved	10.0	91.8	99.4	99.7	75.9	78.9	1	75-125			0.3	20
Iron,Dissolved	10.0	0.139	9.74	9.75	96	96.1	1	75-125			0.0813	20
Magnesium,Dissolved	10.0	78.3	85.5	85.8	71.5	74.6	1	75-125	V	V	0.361	20
Manganese,Dissolved	1.00	0.878	1.77	1.76	88.9	88.6	1	75-125			0.152	20
Potassium,Dissolved	10.0	9.26	18.6	18.9	93.1	96.4	1	75-125			1.77	20
Sodium,Dissolved	10.0	151	155	155	42.6	43.5	1	75-125	V	V	0.0572	20
Strontium,Dissolved	1.00	7.35	8.08	8.14	73.1	79.1	1	75-125	V		0.74	20

Method Blank (MB)

(MB) R3276381-1 12/28/17 15:53

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Selenium,Dissolved	U		0.00038	0.00200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276381-2 12/28/17 15:56 • (LCSD) R3276381-3 12/28/17 16:00

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Selenium,Dissolved	0.0500	0.0490	0.0500	98.1	100	80-120			1.98	20

L958700-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L958700-01 12/28/17 16:04 • (MS) R3276381-5 12/28/17 16:12 • (MSD) R3276381-6 12/28/17 16:15

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Selenium,Dissolved	0.0500	0.00633	0.0544	0.0556	96.2	98.5	1	75-125			2.09	20

Method Blank (MB)

(MB) R3276789-5 12/29/17 11:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID)	*99.5*			*77.0-122*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276789-3 12/29/17 10:35 • (LCSD) R3276789-4 12/29/17 10:57

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.09	6.09	111	111	71.0-136			0.0545	20
(S) a,a,a-Trifluorotoluene(FID)				*106*	*107*	*77.0-122*				

L959688-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L959688-01 12/29/17 13:54 • (MS) R3276789-8 12/29/17 12:47 • (MSD) R3276789-9 12/29/17 13:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.63	56.3	63.6	90.3	104	10	18.0-160			12.2	20
(S) a,a,a-Trifluorotoluene(FID)					*102*	*101*		*77.0-122*				

Method Blank (MB)

(MB) R3275644-1 12/26/17 08:33

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Methane	U		0.00291	0.0100
Ethane	U		0.00407	0.0130
Ethene	U		0.00426	0.0130
Propane	U		0.00414	0.0200

L959429-04 Original Sample (OS) • Duplicate (DUP)

(OS) L959429-04 12/26/17 09:56 • (DUP) R3275644-2 12/26/17 10:12

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Methane	U	0.000	1	0.000		20
Ethane	U	0.000	1	0.000		20
Ethene	U	0.000	1	0.000		20
Propane	U	0.000	1	0.000		20

L959684-01 Original Sample (OS) • Duplicate (DUP)

(OS) L959684-01 12/26/17 11:02 • (DUP) R3275644-3 12/26/17 11:28

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Methane	ND	0.000	1	0.000		20
Ethane	ND	0.000	1	0.000		20
Ethene	ND	0.000	1	0.000		20
Propane	ND	0.000	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3275644-4 12/26/17 11:32 • (LCSD) R3275644-5 12/26/17 11:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Methane	0.0678	0.0725	0.0762	107	112	85.0-115			5.01	20
Ethane	0.129	0.110	0.110	85.0	85.0	85.0-115			0.0389	20
Ethene	0.127	0.113	0.113	89.0	88.8	85.0-115			0.168	20
Propane	0.186	0.180	0.181	97.0	97.2	85.0-115			0.174	20

Method Blank (MB)

(MB) R3276097-3 12/24/17 14:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
Xylenes, Total	U		0.00106	0.00300
o-Xylene	U		0.000341	0.00100
m&p-Xylenes	U		0.000719	0.00200
(S) Toluene-d8	*105*			*80.0-120*
(S) Dibromofluoromethane	*102*			*76.0-123*
(S) a,a,a-Trifluorotoluene	*119*			*80.0-120*
(S) 4-Bromofluorobenzene	*88.6*			*80.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276097-1 12/24/17 13:49 • (LCSD) R3276097-2 12/24/17 14:09

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0227	0.0225	91.0	90.0	69.0-123			1.04	20
Ethylbenzene	0.0250	0.0263	0.0263	105	105	77.0-120			0.305	20
Toluene	0.0250	0.0241	0.0232	96.4	92.8	77.0-120			3.76	20
Xylenes, Total	0.0750	0.0789	0.0779	105	104	77.0-120			1.28	20
o-Xylene	0.0250	0.0276	0.0275	111	110	78.0-120			0.656	20
m&p-Xylenes	0.0500	0.0513	0.0504	103	101	77.0-120			1.84	20
(S) Toluene-d8				*101*	*101*	*80.0-120*				
(S) Dibromofluoromethane				*101*	*103*	*76.0-123*				
(S) a,a,a-Trifluorotoluene				*110*	*116*	*80.0-120*				
(S) 4-Bromofluorobenzene				*86.3*	*87.7*	*80.0-120*				

Method Blank (MB)

(MB) R3276677-1 12/29/17 13:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) High Fraction	U		0.0247	0.100
(S) o-Terphenyl	*91.0*			*31.0-160*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3276677-2 12/29/17 13:29 • (LCSD) R3276677-3 12/29/17 13:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) High Fraction	1.50	1.68	1.67	112	111	50.0-150			0.631	20
(S) o-Terphenyl				*100*	*97.3*	*31.0-160*				

Guide to Reading and Understanding Your Laboratory Report

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Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [n/a] Accreditation not applicable

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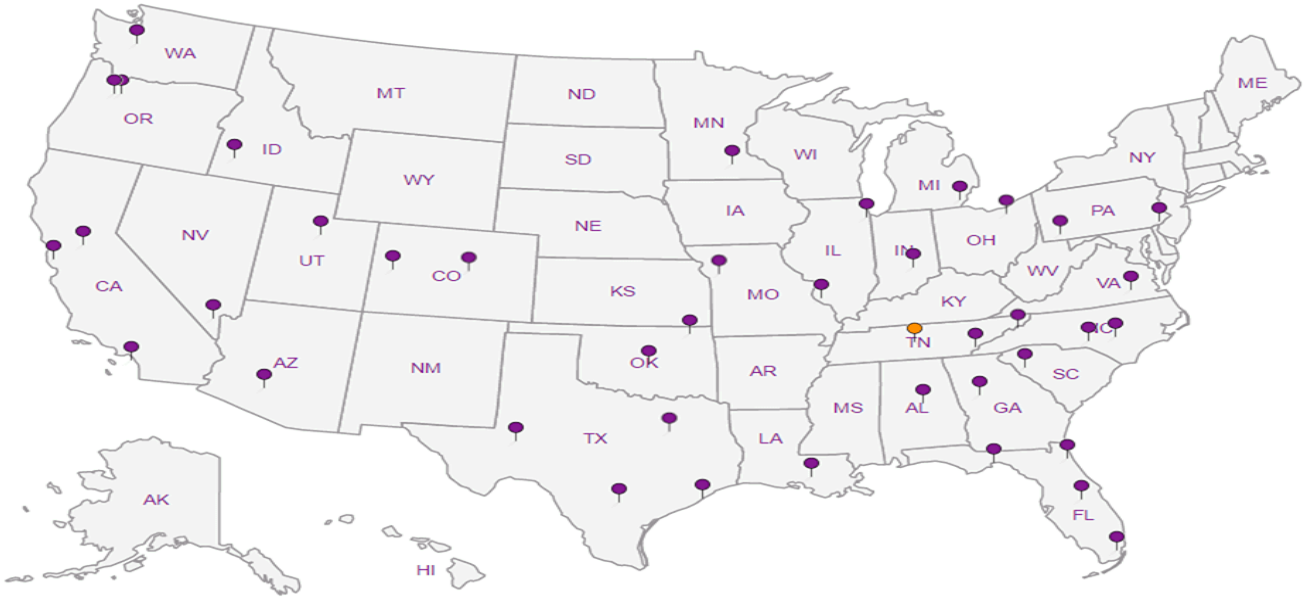

Crestone Peak Resources (CPR) 10188 E I-25 Frontage Road Firestone, CO 80504	Billing Information: Crestone Peak Resources (CPR) Tarah Garza 10188 E I-25 Frontage Road Firestone, CO 80504	Pres Chk
Report to: Apex Companies, LLC	Email to: Heather.Shideman@apexcos.com; Kolbi.Olson@apexcos.com; Rochelle.Carlisle@apexcos.com	

Project Description: BWSE/GWA_Woolley_Sosa_Becky_7H_E168		City/State Collected: Erie, CO
Phone: 307-620-0117 (H. Shideman)	Client Project #	Lab Project #
Collected by (print): ~~Brian Gibson~~ Claire Baker	Site/Facility ID#: 755330	P.O. #
Collected by (signature): Immediately Packed on Ice N___ Y___	Rush? (Lab MUST be Notified) ___Same Day ___Five Day ___Next Day ___5 Day (Rad Only) ___Two Day ___10 Day (Rad Only) ___Three Day	Quote # APEXCWY0310175 Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	ALK, ALKBI,ALKCA, 250mlHDPE-NoPres	B, Cl, SO4, NO2,NO3 250mlHDPE-NoPres	DROLVI 40mlAmb-HCl-BT	GRO 40mlAMB HCl	IRB, SLYM, SRB Microbiological	Metals dissolved 250mlHDPE-HNO3	NO2NO3, PT 250mlHDPE-H2SO4	RSK175 40mlAmb-HCl	V8260BTEX 40mlAmb-HCl	V8260BTEX-TB 40mlAmb-HCl	Remarks	Sample # (lab only)
BW_Rohrschneider_36718548		GW		12/22/17	1010	13	X	X	X	X	X	X	X	X	X		Sample Frequency: 1SUB	-01
SWSW_7_1N_68W																		
Temperature, field	11.93	°C																
pH, field	7.81	s.u.																
Conductivity, field	949.2	uS/cm																
Oxidation Reduction Potential, field	50.1	mV																
Dissolved Oxygen, field	7.107	mg/L																
Turbidity, field	0.59	NTU																

Pres Chk marks: C7 (Metals dissolved), C7 (NO2NO3, PT)

Chain of Custody Page 1 of ___

ESC LAB SCIENCES — YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L959725

B016

Acctnum: CPEPEAFCO
Template: T124281
Prelogin: P607760
TSR: 728 - Shane Gambill
PB:
Shipped Via: FedEx -Ground

* Matrix:
SS - Soil
GW - Groundwater
WW - Waste Water
DW - Drinking Water
OT - Other ______
AIR - Air
F - Filter
B - Bioassay

Remarks: metals list: Ca,Fe,Mg,MN,K,NA,Ba,B,St by 6010 - SE by 6020
Report - Anion/Cation Balance
COGCC Compatible EDD, Lab Filter

Bubbles + effervesecnce

pH ______ Temp ______
Flow ______ Other ______

Samples returned via: ___UPS X FedEx ___Courier ______

Tracking # 6617 3608 7660

Sample Receipt Checklist
COC Seal Present / Intact: _NP ✓Y _N
COC Signed / Accurate: ✓Y _N
Bottles arrive intact: ✓Y _N
Correct bottles used: ✓Y _N
Sufficient volume sent: ✓Y _N
If Applicable
VOA Zero Headspace: _Y _N
Preservation Correct / Checked: _Y _N

Relinquished by : (Signature)	Date:	Time:	Received by by : (Signature)	Trip Blank Received: Yes / No HCl / MeoH TBR
[signature]	12/22/17			
Relinquished by : (Signature)	Date:	Time:	Received by by : (Signature)	Temp: 2.0°C Bottles Received: 14
Relinquished by : (Signature)	Date:	Time:	Received for lab by : (Signature) [signature]	Date: 12/23/17 Time: 1015

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

Input Water Quality

Cation				Anion			
	mg/L		meq/L	mg/L			meq/L
Ca^{++}	28	as Ca	1.4	Alk	288	as $CaCO_3$	5.8
Mg^{++}	17.9	as Mg	1.5	Cl^{-}	19	as Cl	0.5
Na^{+}	194	as Na	8.4	$SO4^{=}$	230	as SO_4	4.8
K^{+}	3.6	as K	0.1	$NO3^{-}$	0.0	as NO_3	0.0
Fe^{++}	0.3	as Fe	0.0				
Ba^{++}	0.0	as Ba	0.0				
Mn^{++}	0.0	As Mn	0.0				
		Scations =	11.45			Sanions =	11.09

Other Measurements

(Temp. should be temp. which pH and E.C. measurements were made)

Temp	11.4	°C
pH	8.06	-log [H+]
TDS	631	mg/L

Errors in Analysis

	% Error	Acceptable?
Electroneutralit		Less than 10%?
Cations are in exe	1.6%	O.K.
Total Dissolved		Less than 10%?
Calc. TDS 666	-5.5%	O.K.

1. Purpose - This spreadsheet is designed to check the quality of a mineral analysis
2. Procedure - enter water quality measurements in yellow boxes. Model will balance the cations and anions, calculate the TDS and compare it to the measured TDS.

Instructions:

yellow boxes are for **data input**

Blue boxes are for **output only**

ANALYTICAL REPORT

January 04, 2018

Crestone Peak Resources

Sample Delivery Group:	L959863
Samples Received:	12/23/2017
Project Number:	
Description:	BWSE/GWA_Woolley_Sosa_Becky_7H_E168
Site:	755330
Report To:	Heather Shideman 1801 California Street Denver, CO 80202

Entire Report Reviewed By:

Shane Gambill
Technical Service Representative

TABLE OF CONTENTS

BW_ROHRSCHNEIDER_3671854B_TRIP_BLANK L959863-01 GW

Collected by	Collected date/time	Received date/time
Claire Baker	12/22/17 10:10	12/23/17 10:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1057185	1	12/24/17 15:09	12/24/17 15:09	ACE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Shane Gambill
Technical Service Representative

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	12/24/2017 15:09	WG1057185
Toluene	ND		0.00100	1	12/24/2017 15:09	WG1057185
Ethylbenzene	ND		0.00100	1	12/24/2017 15:09	WG1057185
Total Xylenes	ND		0.00300	1	12/24/2017 15:09	WG1057185
o-Xylene	ND		0.00100	1	12/24/2017 15:09	WG1057185
m&p-Xylene	ND		0.00200	1	12/24/2017 15:09	WG1057185
(S) Toluene-d8	*100*		*80.0-120*		*12/24/2017 15:09*	WG1057185
(S) Dibromofluoromethane	*104*		*76.0-123*		*12/24/2017 15:09*	WG1057185
(S) a,a,a-Trifluorotoluene	*123*	J1	*80.0-120*		*12/24/2017 15:09*	WG1057185
(S) 4-Bromofluorobenzene	*83.1*		*80.0-120*		*12/24/2017 15:09*	WG1057185

Method Blank (MB)

(MB) R3276097-3 12/24/17 14:49

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Qualifier	Description
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.

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Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
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Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
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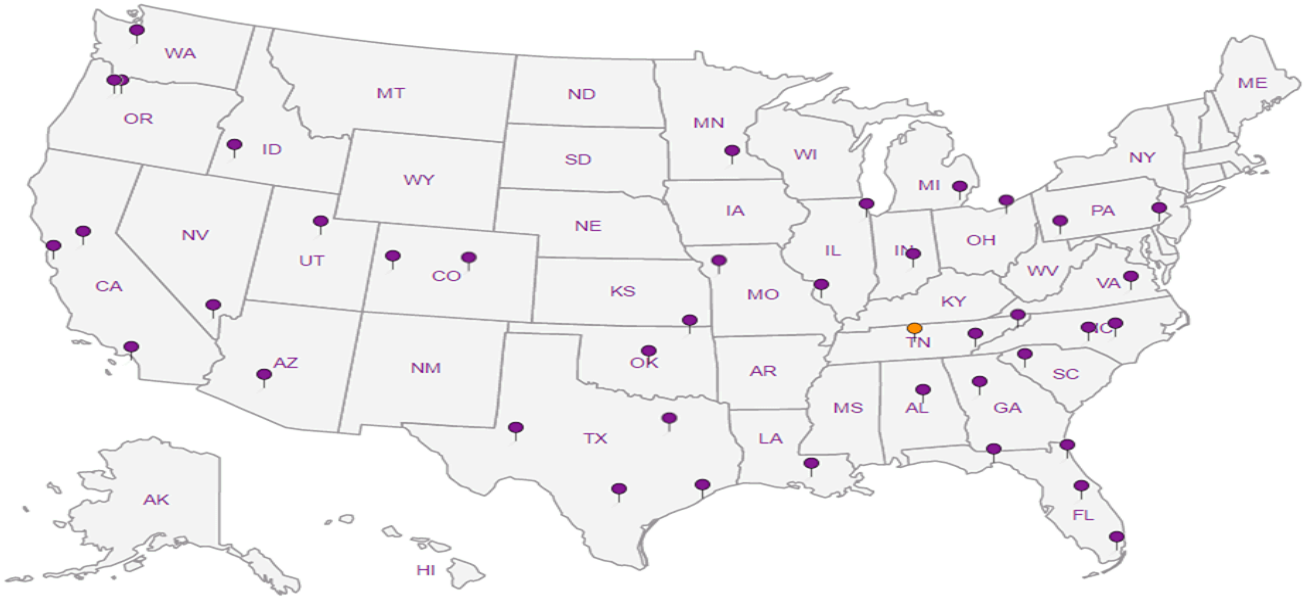

L959863

Crestone Peak Resources (CPR) 10188 E I-25 Frontage Road Firestone, CO 80504	Billing Information: **Crestone Peak Resources (CPR)** Tarah Garza 10188 E I-25 Frontage Road Firestone, CO 80504
Report to: **Apex Companies, LLC**	Email to: Heather.Shideman@apexcos.com; Kolbi.Olson@apexcos.com; Rochelle.Carlisle@apexcos.com
Project Description: Trip_Blank/GWA_Woolley_Sosa_Becky_7H_E168	City/State Collected: Erie, CO

Phone: 307-620-0117 (H. Shideman)	Client Project #	Lab Project #
Collected by (print): ~~Brian Gibson~~ Claire Baker	Site/Facility ID#: 755330	P.O. #
Collected by (signature): Immediately Packed on Ice N___ Y___	Rush? (Lab MUST be Notified) __Same Day __Five Day __Next Day __5 Day (Rad Only) __Two Day __10 Day (Rad Only) __Three Day	Quote #: APEXCWY031017S Date Results Needed

Pres Chk

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	V8260BTEX-TB 40mlAmb-HCl	Remarks	Sample # (lab only)
BW_Rohrschneider_3671854B_Trip_Blank		GW		12/22/17	1010	1	X	Sample Frequency: 1SUB	-01

Chain of Custody Page 1 of 1

ESC LAB SCIENCES

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 959925
Table # B016
Acctnum: CPEPEAFCO
Template: T124231
Prelogin: P607780
TSR: 728 - Shane Gambill
PB:
Shipped Via: FedEx -Ground

* Matrix:
SS - Soil
AIR - Air
F - Filter
GW - Groundwater
B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ________

Remarks: COGCC Compatible EDD, Log Trip Blank on seperate SDG

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__UPS X FedEx __Courier ________

1061 3008 7016ee

Sample Receipt Checklist
COC Seal Present / Intact: NP Y N
COC Signed / Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct / Checked: Y N

Relinquished by : (Signature) [signature]	Date: 12/22/17	Time:	Received by by : (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by by : (Signature)	Temp: 2.0 °C	Bottles Received: 19
Relinquished by : (Signature)	Date:	Time:	Received by by : (Signature) [signature]	Date: 12/23/17	Time: 1105

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK