

## **Groundwater and Soil Vapor Sampling Results**

**District Six C6**

**Facility ID 286487**

**NENE Section 20, Township 5 North, Range 65 West**



**EXTRACTION OIL & GAS INC.**

370 17<sup>th</sup> Street, Suite 5300

Denver, Colorado 80202

**Preparation Date**

March 5, 2020

## INTRODUCTION

Apex Companies, LLC (Apex) has been contracted by Extraction Oil & Gas Inc (Extraction) to complete monitoring activities, provide data review services, and to prepare reports detailing the results and findings of monitoring activities. The following document is the initial installation and monitoring report for activities conducted during the 3rd and 4th quarters of 2019 to support the site investigation of the plugged and abandoned well District Six C6 following a mechanical integrity test failure.

Per the site investigation and remediation workplan #13928 conditions of approval, a monitoring well was installed, and sample analyzed for all constituents in Table 7-1 of the Colorado Oil and Gas Conservation Commission (COGCC) Model Sample and Analysis Plan (SAP) with the exception of biological activity reaction tests (BART). Laboratory results will be uploaded into the Colorado Environmental (COENV) database and identified impacts will be reported, as required for each discovery, and a Form 19 will be submitted. In addition, eight soil vapor monitoring points were installed, and field screened for methane. A subsequent Form 27 will be submitted following work completion.

## WELL INSTALLATION

### Groundwater Monitoring Well

A groundwater monitoring well was installed on August 28, 2019, using an auger drilling rig. The well is located in the NENE Section 20, Township 5 North, Range 65 West, Weld County, Colorado. See **Attachment A** for a well location map.

The groundwater monitoring well, identified as 59993\_MH\_MW\_1, was permitted through the Division of Water Resources - Permit #59993-MH, Receipt #0059993. See **Attachment B** for well permit records.

The well was advanced to bedrock 85-feet below ground surface (bgs) using an 8-inch hollow stem auger. The two-inch casing was set with a 40-feet of screen from 45 to 85-feet bgs. The well has a total depth of 85-feet. During installation, soils were logged and field screened. A perched groundwater layer was encountered at approximately 30-feet bgs, sitting on top of a confining clay layer that appeared to be at least 10 feet thick. Saturated interbedded clays and fine sands were encountered from approximately 48 to 85-feet bgs, and after setting the well and letting groundwater stabilize over three-days, water was observed in the casing at 37-feet bgs. The well is completed at the surface with a flush-mounted well box and is set in a 2-foot by 2-foot by 6-inch concrete pad, with stakes and caution tape erected around the well.

See **Attachment C** for well borehole logs and monitoring well completion reports.

Immediately upon installation of the well, positive pressure and emitting vapors were reported at the well site. Photoionization detector (PID) readings collected from just below the mouth of the casing had a reading of approximately 30 parts-per-million (ppm). All PID readings collected using a MiniRae 2000 device calibrated to 100 ppm Isobutylene. No readings were detected above the casing using the PID.

## Soil Vapor Monitoring Wells

Eight soil vapor monitoring wells were installed on August 28, 2019. The wells are dual-nested into four casings and are radially located, approximately 5-feet from the District Six C6 production well. See **Attachment A** for a well location map.

The soil vapor monitoring wells are all 1/4-inch polyurethane tubing and are identified as:

- SVP-1-5
- SVP-1-30
- SVP-2-5
- SVP-2-30
- SVP-3-5
- SVP-3-30
- SVP-4-5
- SVP-4-30

Soil vapor probes SVP-1 through SVP-4 were each advanced to 30-feet bgs using a hollow stem auger rig equipped with 6-inch augers. Probes were installed at each location at approximately 5 and 30-foot bgs. Each probe was completed at the surface with 2" PVC set in bentonite. The probe depths are differentiated at the surface using different lengths of stick-up, with the longer tubing flagged with duct tape associated with the 30-foot probe and the shorter tubing associated with the 5-foot probe.

See **Attachment D** for the Soil Vapor Monitoring Probe Construction Diagram

## GROUNDWATER MONITORING WELL DEVELOPMENT

The groundwater monitoring well was first developed on August 30, 2019, using 5/8-inch plastic tubing on a 1-inch surge block / check valve assembly. Site Services Drilling manually ran the tubing, block, and valve up and down the casing to surge the 40-foot of screen, then set the valve at the base of the casing and attached an actuator (Watera HL1345) to mechanically pump fine particles to the surface. A total of 4 drums (approximately 200 gallons) of water was removed from the well during initial development.

Positive pressuring during the well development was observed to be less than after well installation. A landfill gas meter collecting readings from the mouth of the well casing during development activities detected methane (% volume air) ranging from 3 to 20%; oxygen (O<sub>2</sub>) stayed at 19-20% air, and there was no carbon dioxide (CO<sub>2</sub>) detected. PID readings ranged from 5 to 25 ppm during the various field activities (i.e., surging the tubing up and down the well screen pushed vapors up to the surface and highest readings); however, pressure readings remained low during the purging process.

Well development was re-completed on October 15, 2019, to confirm parameter stabilization using a low-flow purge method. Per *U.S EPA Environmental Response Standard Operating Procedures for Monitoring Well Development* (2001), the well shall be considered developed upon parameter stabilization or once the turbidity is below 50 Nephelometric Turbidity Units (NTU). During the well development, turbidity never reached values of less than 100 NTU; however, field parameters values did stabilize per ASTM D4448-01 (Reapproved 2019) Standard Guide for Sampling Ground-Water Monitoring Wells guidance. No positive pressure values of concerns were noted.

## FIELD MEASUREMENTS AND LABORATORY DATA SUMMARY

The initial groundwater sampling and subsequent soil vapor monitoring events were completed on October 17, 2019. A summary of the laboratory data and vapor readings including the initial and all subsequent sampling events is provided in **Table 1-1** and **Table 1-2**. See **Attachment E** for laboratory reports.

### FIELD AND LABORATORY ACTIVITIES

#### Groundwater Monitoring Well

The water samples were collected in laboratory-supplied containers and submitted to Summit Scientific Inc. (Summit) in Golden, Colorado for analysis of the required water quality parameters. The results from Summit are listed in the attached Monitoring Well Sample Results summary table, **Table 1-1**, and laboratory reports, **Attachment E**. For comparison purposes, a regulatory limit for each analyte is included in the summary table where applicable. The regulatory limit shown is the Colorado Oil & Gas Conservation Commission (COGCC) Table 910-1 allowable limits.

Additional stable isotope analysis of hydrocarbon gases C1 through C5 was analyzed of the dissolved gas from the initial sample event. The isotopic analysis indicates the stable isotope distribution for methane in this sample plots in the thermogenic range (-47.46, -243.8).

#### Groundwater Isotopic Interpretation

The 59993\_MW\_MW\_1 isotopic water data was compared to the a District Six C6 bradenhead sample (Sample ID 606506), gathered from the COGCC Environmental Database. The data indicates that the 59993\_MH\_MW\_1 sample could be related to the bradenhead sample. The methane, ethane, and propane have the same thermogenic source and there was no appreciable mixing of methane from alternative sources. The likely source would be consistent with gas from the J-Sand / Codell / Niobrara production zone. Variations in mole % (MOL) can be explained by solubility and dilution effects that are acting on the 59993\_MH\_MW\_1 sample, but not on the bradenhead sample. Hydrocarbons tend to have low solubilities in water and water solubilities tend to decrease with hydrocarbon mass, thus the expectation is progressively less of the heavier hydrocarbons dissolve in water for aqueous samples that are in equilibrium with gas. Therefore, it is expected to see much less butane, pentane and C6+ in the 59993\_MH\_MW\_1 sample than we see in the bradenhead gas. The lower BTU of the MW-1 sample is also explainable by this effect.

Isotope ratio plots, see **Attachment F**, indicate the bradenhead plots almost coincident with the MW-1 sample with variation of <5%. Variations for d13C2 and d13C3 between the two samples are even lower (within 2%) as expected due to reduced chance for any minor mixing with biogenic methane in the area

#### Soil Vapor Monitoring Wells

PID and gas readings were collected from each soil vapor well during the initial groundwater development on August 30, September 10, and October 15, 2019. The gas reading were collected with a Landtec GEM 5000 landfill meter equipped with methane (CH<sub>4</sub>), hydrogen sulfide (H<sub>2</sub>S), carbon monoxide (CO), and O<sub>2</sub> sensors. The field reported results are listed in the attached Soil Vapor Monitoring Point Results summary table, **Table 1-2**.

### **LIST OF TABLES**

- 1-1. Analytical Summary Monitoring Well Sample Results
- 1-2. Field Summary Vapor Monitoring Point Measurements

### **LIST OF APPENDICES**

- A. Groundwater and Soil Vapor Locations Map
- B. Groundwater Well Permit Records
- C. Groundwater Well Borehole and Completion Logs
- D. Soil Vapor Monitoring Probe Construction Diagram
- E. Groundwater Laboratory Reports
- F. Groundwater Isotope Ratio Plots

**TABLE 1-1: ANALYTICAL SUMMARY  
GROUNDWATER MONITORING WELL SAMPLE RESULTS**

Parameter	Units	Standard	Source	
Date Sampled	-	-	-	10/17/19
<b>ALKALINITY AS CALCIUM CARBONATE - SM2320B</b>				
Total Alkalinity	mg/l	None	-	260
Bicarbonate	mg/l	None	-	260
Carbonate	mg/l	None	-	ND
<b>BTEX - SW8260B</b>				
Benzene	µg/l	5	910-1	0.16
Toluene	µg/l	560	910-1	0.058
Ethylbenzene	µg/l	700	910-1	0.040
Xylenes (Total)	µg/l	1,400	910-1	0.049
M+P-Xylene	µg/l	None	-	0.040
O-Xylene	µg/l	None	-	0.0089
<b>TPH-DRO/GRO - SW8015M/SW8015</b>				
TPH - DRO	mg/l	None	-	ND
TPH - GRO	mg/l	None	-	0.67
<b>DISSOLVED GASES - RSK 175</b>				
Dissolved Methane	µg/l	None	-	14
Dissolved Ethane	µg/l	None	-	4.8
Dissolved Propane	µg/l	None	-	1.7
<b>IONS - EPA 300.0</b>				
Bromide	mg/l	None	-	9.64
Chloride	mg/l	250	Reg 41	<b>771</b>
Fluoride	mg/l	4	Reg 41	0.899
Nitrate + Nitrite as N	mg/l	10	Reg 41	1.87
Nitrate as N	mg/l	10	Reg 41	1.87
Nitrite as N	mg/l	1	Reg 41	ND
Sulfate	mg/l	250	Reg 41	105
<b>METALS EPA 200.8</b>				
Dissolved Barium	mg/l	2	Reg 41	0.125
Dissolved Boron	mg/l	0.4	RSL	0.0751
Dissolved Calcium	mg/l	None	-	150
Dissolved Iron	mg/l	0.3	Reg 41	ND
Dissolved Magnesium	mg/l	None	-	88.5
Dissolved Manganese	mg/l	0.05	Reg 41	<b>1.43</b>
Dissolved Potassium	mg/l	None	-	3.88
Dissolved Selenium	mg/l	0.05	Reg 41	0.00131
Dissolved Sodium	mg/l	None	-	104
Dissolved Strontium	mg/l	1.2	RSL	<b>1.9</b>
<b>WATER QUALITY</b>				
pH	s.u.	6-9	910-1	7.25
Specific Conductivity	µmhos/cm	None	-	1910
Total Dissolved Solids	mg/l	1.25 X background	910-1	942
Total Phosphorous	mg/l	None	-	0.0940

Notes:

COGCC - Colorado Oil and Gas Conservation Commission  
µg/l - micrograms per liter  
Bolded concentrations exceed regulatory comparison value.  
E - Analyte detection exceeds the upper level of the calibration range.  
910-1 - Regulatory comparison value taken from concentration levels as presented in COGCC Table 910-1  
Reg 41 - Regulatory comparison value taken from Colorado Department of Health and Environment, Water Quality Control Commission, Regulation 41, The Basic Standards for Ground Water.  
< - Analyte was not detected above the laboratory detection limit.  
RSL - Regulatory comparison value taken from EPA Regional Screening Levels, June 2015.  
s.u. - standard units  
µmhos/cm - micromhos per centimeter  
MEK - Methyl Ethyl Ketone  
ND - None of the analytes were detected above the laboratory detection limit.  
NI - Compound Not Identified in Laboratory TIC Report  
\* - Dissolved gas content measured greater than 1.0 ppm, therefore the sample was further analyzed for gas composition.  
mg/l - milligrams per liter  
NA - not analyzed  
TPH - Total Petroleum Hydrocarbons  
DRO - Diesel Range Organics  
GRO - Gasoline Range Organics  
EPA - Environmental Protection Agency  
Lab qualifiers (i.e. letters next to result) are defined in the lab report

**TABLE 1-2: FIELD SUMMARY  
 SOIL VAPOR MONITORING WELL SAMPLE RESULTS**

Probe ID	Sample Date	Units	Balance	CH <sub>4</sub>	CO <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> S	CO	PID
			%	%	%	%	ppm	ppm	ppm
SVP-1-5'	8/30/19		96.3	3.6	0.0	0.1	NA	NA	6.3
SVP-1-5'	9/10/19		80.7	0.2	5.2	13.9	0.0	0.0	30.5
SVP-1-5'	10/15/19		80.5	0.0	2.1	17.3	0.0	1.0	0.0
SVP-1-30'	8/30/19		81.1	8.1	10.8	0.0	NA	NA	5.3
SVP-1-30'	9/10/19		68.5	18.9	12.6	0.0	0.0	0.0	68
SVP-1-30'	10/15/19		60.3	29.6	13.1	0.0	0.0	1.0	5.3
SVP-2-5'	8/30/19		93.8	3.2	0.0	3.0	NA	NA	3.5
SVP-2-5'	9/10/19		80.1	0.4	4.1	15.4	0.0	0.0	0.0
SVP-2-5'	10/15/19		79.3	0.0	2.2	18.5	0.0	1.0	1.3
SVP-2-30'	8/30/19		67.1	22.2	10.7	0.0	NA	NA	9.8
SVP-2-30'	9/10/19		0.0	87.8	12.2	0.0	0.0	0.0	5.5
SVP-2-30'	10/15/19		0.0	87.6	12.4	0.0	0.0	1.0	23.1
SVP-3-5'	8/30/19		92.0	8.0	0.0	0.0	NA	NA	19.2
SVP-3-5'	9/10/19		79.4	0.4	4.8	15.4	0.0	0.0	416
SVP-3-5'	10/15/19		78.4	0.0	2.3	19.3	0.0	1.0	2.3
SVP-3-30'	8/30/19		39.7	51.0	9.3	0.0	NA	NA	59.1
SVP-3-30'	9/10/19		0.0	89.4	10.2	0.4	0.0	0.0	782
SVP-3-30'	10/15/19		0.0	89.2	10.8	0.0	1.0	2.0	39
SVP-4-5'	8/30/19		85.9	0.7	0.0	13.3	NA	NA	0.2
SVP-4-5'	9/10/19		91.3	1.4	1.2	6.1	0.0	0.0	250
SVP-4-5'	10/15/19		88.5	0.0	4.3	7.2	0.0	1.0	0.1
SVP-4-30'	8/30/19		74.2	15.3	10.5	0.0	NA	NA	6.3
SVP-4-30'	9/10/19		60.8	27.1	11.7	0.4	0.0	0.0	819
SVP-4-30'	10/15/19		57.9	33.5	12.7	0.0	0.0	1.0	13

Notes:  
 1background reading was collected prior to soil vapor well monitoring

**ATTACHMENT A**  
**Groundwater Well Location Map**

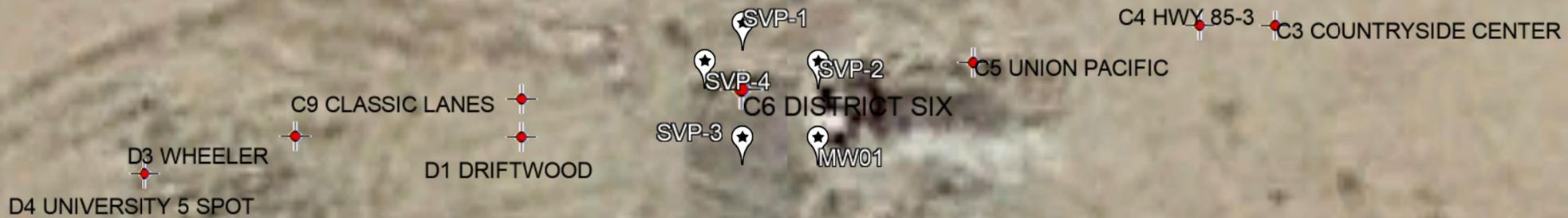


District Six C6  
(Location ID: 286487)  
59993-MH MW-1





District Six C6  
(Location ID: 286487)  
59993-MH MW-1



**ATTACHMENT B**  
**Groundwater Well Permit Records**

# NOTICE OF INTENT TO CONSTRUCT MONITORING HOLE(S)

Please type or print legibly in black or blue ink or file online, [dwrpermitsonline@state.co.us](mailto:dwrpermitsonline@state.co.us)

State of Colorado, Office of the State Engineer 1313 Sherman St, Room 821,  
Denver, CO 80203 Phone 303-866-3581 [www.water.state.co.us](http://www.water.state.co.us)

RECEIVED

AUG 23 2019

WATER RESOURCES  
STATE ENGINEER  
COLO

Well Owner Name(s): Extraction Oil and Gas, LLC  
Address: 370 17th Street, Suite 5300, Denver, CO 80202  
Phone: (970) 778-5956  
Email: bford@extractionOG.com

Landowner's Name: Extraction Oil and Gas LLC

Please check one and complete as indicated including contact info:

Water Well Driller Licensed in Colorado - Lic. No. \_\_\_\_\_

Professional Engineer Registered in Colorado - Reg. No. \_\_\_\_\_

Professional Geologist per C.R.S. 23-41-208(b)

Other - anyone directly employed by or under the supervision of a licensed driller, registered professional engineer or professional geologist

Contact / Company Maggie Graham/Apex Companies LLC

Address 1746 Cole Blvd, Suite 250, Building 21

City, State & Zip Lakewood, Colorado 80401

Phone (720) 501-5065

Email maggie.graham@apexc.com

Print Name: Maggie Graham

Signature or enter full name here: Maggie Graham

Location: Section 20  
Township 5  N  S, Range 65  E  W, 6 PM  
County: Weld

Subdivision: NENE  
Lot: \_\_\_\_\_ Block: \_\_\_\_\_ Filing: \_\_\_\_\_

Site/Property Address \_\_\_\_\_  
40.391325°, -104.681889°

GPS Location in UTM format if known:  
Set GPS unit to true north, datum NAD83, and use meters for the distance units,  Zone 12 or  Zone 13.  
Easting 526998.24 Northing 4471240.51

# of Monitoring Holes to be constructed in Section: 1  
Estimated Depth 90 Ft., Aquifer Type III/II

Purpose of Monitoring Hole(s) \_\_\_\_\_  
Groundwater monitoring

Anticipated Date of Construction: 08/26/2019

Date Notice Submitted: 08/23/2019  
(Must be at least 3 days prior to construction)

## ACKNOWLEDGEMENT FROM STATE ENGINEER'S OFFICE FOR OFFICE USE ONLY

059993 - MH  
Div. 1 WD 2 BAS \_\_\_\_\_ MD \_\_\_\_\_

PROCESSED BY [Signature]  
DATE ACKNOWLEDGED 8/23/2019

### CONDITIONS OF MONITORING HOLE ACKNOWLEDGEMENT

A COPY OF THE WRITTEN NOTICE OR ACKNOWLEDGEMENT SHALL BE AVAILABLE AT THE DRILLING SITE.

- 1) Notice was provided to the State Engineer at least 72 hours prior to construction of monitoring & observation hole(s).
- 2) Construction of the hole(s) must be completed within 90 days of the date notice was given to the State Engineer. Testing and/or pumping shall not exceed a total of 200 hours unless prior written approval is obtained from the State Engineer. Water diverted during testing must not be used for beneficial purposes. The owner of the hole(s) is responsible for obtaining permit(s) and complying with all rules and regulations pertaining to the discharge of fluids produced during testing.
- 3) All work must comply with the Water Well Construction Rules, 2 CCR 402-2. Standard permit application and work report forms are found on the DWR website at <http://www.water.state.co.us>. Well Construction and Yield Estimate Reports (GWS-31) must be completed for each hole drilled. The licensed contractor or authorized individual must submit the completed forms to this office within 60 days of monitoring hole completion. Aquifer testing information must be submitted on Well Yield Test Report (GWS-39).
- 4) Unless a well permit is obtained or variance approved, the hole(s) must be plugged and sealed within eighteen (18) months after construction. An Abandonment Report (GWS-09) must be submitted within 60 days of plugging & sealing. The above MH acknowledgement number, owner's structure name, and owner's name and address must be provided on all well permit application(s), well construction and abandonment reports.
- 5) A MONITORING HOLE CANNOT BE CONVERTED TO A PRODUCTION WATER WELL, except for purposes of remediation (recovery) or as a permanent dewatering system, if constructed in accordance with the Water Well Construction Rules and policies of the State Engineer.
- 6) IF HOLES WILL NOT BE CONSTRUCTED UNDER THIS NOTICE WITHIN 90 DAYS, PLEASE WRITE "NO HOLES CONSTRUCTED" ON A COPY OF THE ACKNOWLEDGED NOTICE WITH THE FILE NUMBER AND EMAIL TO THE DIVISION OF WATER RESOURCES AT [DWRpermitsonline@state.co.us](mailto:DWRpermitsonline@state.co.us).

THIS ACKNOWLEDGEMENT OF NOTICE DOES NOT INDICATE THAT WELL PERMIT(S) CAN BE APPROVED.  
Incomplete forms or Notice provided less than 72 hours prior to well construction will not be acknowledged



STATE OF COLORADO

DWRPermitsOnline, DNR <dnr\_dwrpermitsonline@state.co.us>

# Notice of Intent to Construct Monitoring Hole - APEX Companies LLC - Greeley Directional location

1 message

Maggie Graham <Maggie.Graham@apexcos.com>

Fri, Aug 23, 2019 at 1:10 PM

To: "dwrpermitsonline@state.co.us" <dwrpermitsonline@state.co.us>

Cc: Denver Remediation <DenverRemediation@apexcos.onmicrosoft.com>, Kevin Ambrose <Kevin.Ambrose@apexcos.com>, Maggie Graham <Maggie.Graham@apexcos.com>

Good Afternoon,

Please find attached a Notice of Intent to construct 1 (one) Monitoring Hole at the location referenced within.

Kind Regards,

Maggie Graham

RECEIVED

AUG 23 2019

WATER RESOURCES  
STATE ENGINEER  
COLO

Maggie Graham

Sr Project Manager

1746 Cole Blvd Bldg 21, Ste 250

Lakewood, CO 80401



O) 720-501-5065

Add me to your contact list!





**ATTACHMENT C**

**Groundwater Well Borehole and Completion Logs**

## WELL CONSTRUCTION LOG

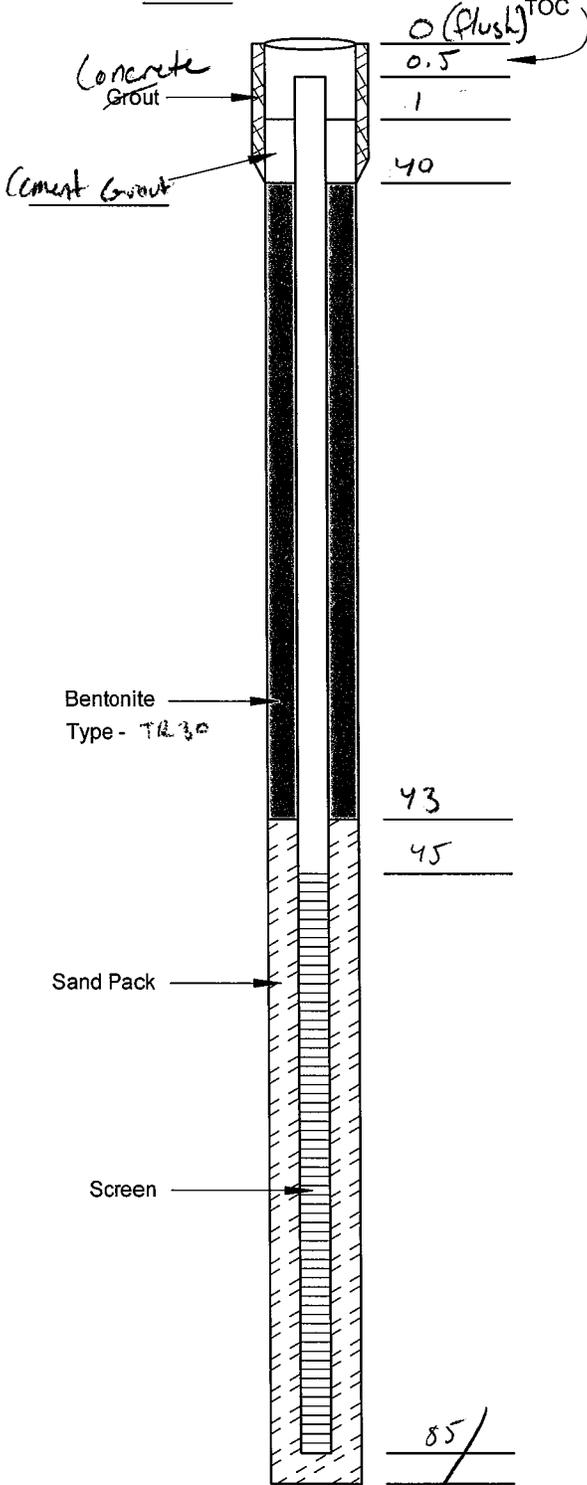
### Well Completion Detail

Project 744,1864.01  
 Number 332837A

Well Number MW-1

Street Box  
 Diam. = 8"

Surveyed Dif.  
 Btwn. GS and  
 TOC



### Drilling Summary

Total Depth of Hole: 85'  
 Hole Diameter: 8"  
 Drilling Company: Site Services Drilling LLC  
 Driller: Jason A  
 Rig Type: CME-75  
 Bits: \_\_\_\_\_  
 Geologist: Kevin Ambrose

### Time Log

	Start		Finish	
	Date	Time	Date	Time
Drilling:	<u>8/26</u>	_____	<u>8/27</u>	_____
Well Completion:	<u>8/27</u>	_____	<u>8/27</u>	_____
Grouting:	<u>8/28</u>	_____	<u>8/28</u>	_____

### Depth to Water (Below TOC)

Depth: 38.51 Date: 10/15/19 Time: 9:50

### Well Construction Materials

	Grout	Seals	Filter
Quantity:	<u>800 lbs</u>	<u>100 lbs</u>	<u>750 lbs</u>
Type:	<u>Portland</u>	<u>Bent. Pellets</u>	<u>10-20 Sand</u>
Screen			
Size:	<u>2" Sch 40</u>	Config.: _____	
Area/Ft.:	<u>0.16 sq ft</u>	Comp.: <u>PVC</u>	
Inside Diam.:	<u>2"</u>	Outside Diam.: <u>2.3"</u>	

### Comments

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\* Measuring Point is Below Ground Surface (bgs)

Total Depth from TOC = 85'





PROJECT NAME AND SITE ADDRESS: Greeley Directional

BORING LOCATION (AT SITE):

PROJECT NO.:

TIME	SAMPLE INTERVAL	BLOW COUNTS	PID (ppmV)	DEPTH	USCS LITHOLOGY	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES APPROXIMATE UNLESS STATED OTHERWISE	WELL CONST.
1230	2 5 6 7		3.5	38 40	CL SM	brown clay, stiff, medium plasticity, slight he order c 38-38.5 w/ black streaks, trace (5-10% fine sand), wet + driller notes water on side of sampler & can hear it coming into borehole. Pull augers 10' to allow water to enter, take lunch, & check stabilized data	20
1335	2 6 13 17		0.4	48 50 52	SP SP SP	fine sand, brown, wet, m. dense saturated, brown, m. stiff, m. plasticity, 10-20% fine sand saturated, brown, fine sand, m. dense	25
1440	2 10 15 20		2.4	58 60	SP	Saturated, dense, fine-med sand w/ 5% coarse gravel stabilized water c 37.70 1530 - auger gets stuck @ ~65' due to bearing sands	30
1540	6 12 14		2.7	70 72	SP	med-coarse sand w/ 20% coarse gravel, saturated, brown, m. dense fine sand (4") in shoe, m. dense, saturated, brown	35
915	1 5 8 10		6.3	80 82	SM CL	Saturated, fine sand, m. dense, brown stiff, saturated, brown, medium plasticity clay, trace fine sand	40
						@ 85' - driller's encounter bedrock @ 85'. Stop drilling & call in to client & project manager. Wait for water to stabilize, to collect multiple readings @ 59.5' bgs. Set well screen @ 75 to 85' bgs (20' above or below assumed breach @ 65')	45

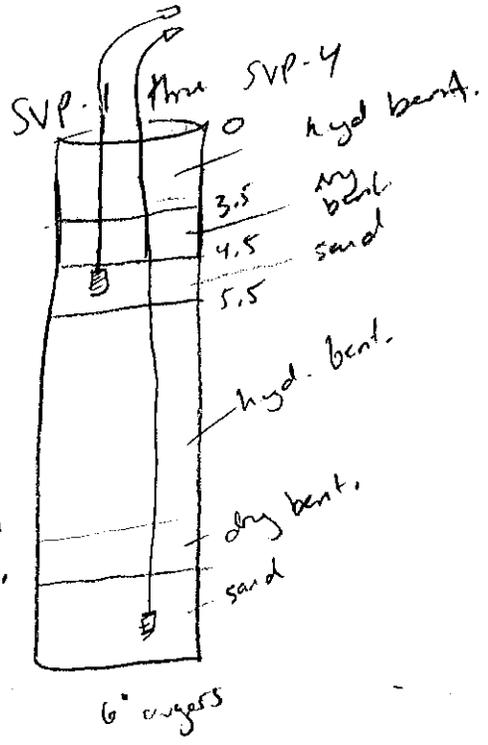
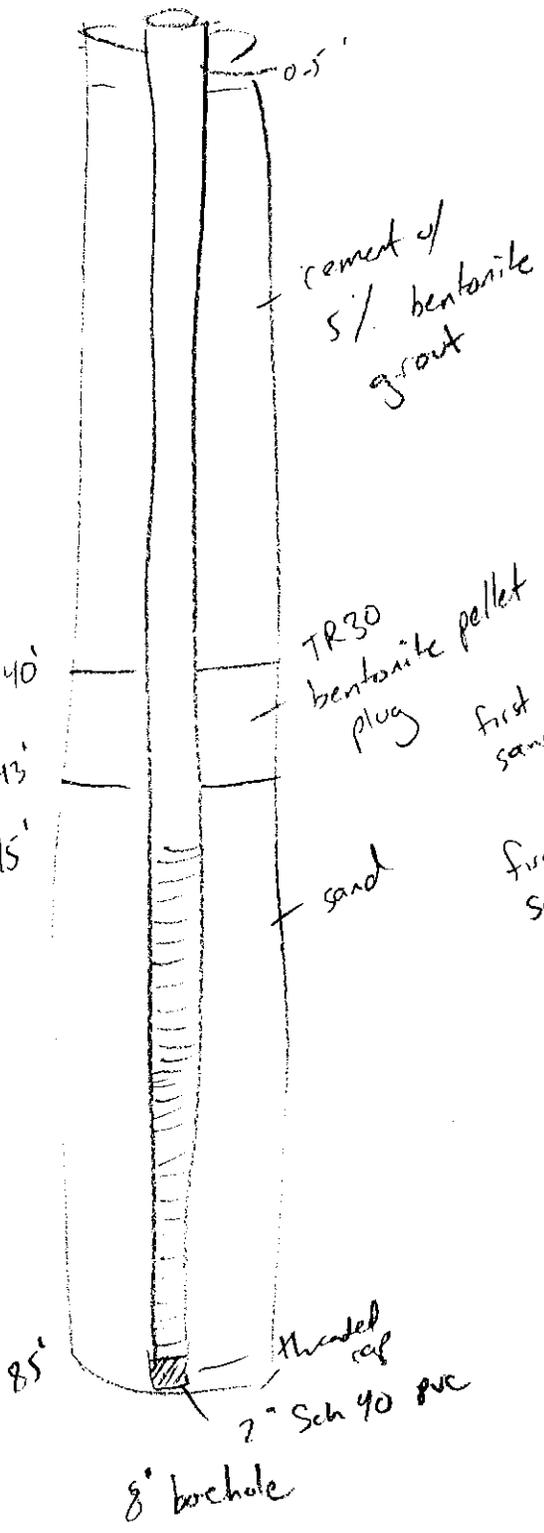
clay

107

**ATTACHMENT D**

**Soil Vapor Monitoring Probe Construction Diagram**

Mw-1



first water on samples (~ 38'-40')

first saturated sample = 48'-50' run

water in borehole 9/24 @ 1530 = 37.7' (current auger depth 70')

water in borehole 8/27 @ 1130 = 59.5' (auger depth 95' [bedrock])

stabilized water in well 9/30 @ 900 = 37.64

**ATTACHMENT E**  
**Groundwater Laboratory Reports**

# Summit Scientific

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4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

November 21, 2019

Heather Shideman

Extraction Oil&Gas

370 17th Street Suite 5300

Denver, CO 80202

RE: Ground\_Water/GWA\_District\_Six\_C6

Work Order # 1910212

Enclosed are the results of analyses for samples received by Summit Scientific on 10/17/19 16:42. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large initial "M" and a long, sweeping underline.

Muri Premer For Ben Shrewsbury

Laboratory Manager



Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GW_59993_MH_MW_1	1910212-01	Water	10/17/19 14:45	10/17/19 16:42

Summit Scientific

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1910212

# Summit Scientific

S<sub>2</sub>

741 Corporate Circle, Suite J ♦ Golden, Colorado 80401  
303-277-9310 ♦ 303-374-5933

Client: Extraction Oil and Gas (XOG) Report to: Apex Companies, LLC Project Manager: Heather Shideman  
 Address: 2234 117th Ave, Ste 106 E-Mail: Rochelle.Carliste@apexcos.com, Heather.Shideman@apexcos.com  
 City/State/Zip: Greeley, CO 8063 4 cc: bford@extractionog.com  
 Phone: (970) 576- 3446 Project Name: Ground\_Water/GWA\_Greeley-Directional-District Six CG  
 Sampler Name: Josue Sanchez Project No.: Alloc-421 930, 88 Facility ID 762176

ID	Field ID / Point of Collection	Date Sampled	Time Sampled	# of containers	Preservative				Matrix			Analysis Requested				Special Instructions			
					HCl	HNO3	None	Other (Specify)	Ground Water	Soil	Air-Canister #	Other (Specify)	COGCC 609	No BART					
1	GW_5_999_M#1_M_W1 NENE_20_5N_65W	10/17/19	1445	12	6	1	4	1	X				X	X					Sample Frequency: IN
		Temperature, field: 16.8 °C																	
		pH, field: 7.61 s.u.																	
		Conductivity, field: 1663 uS/cm																	
		ORP, field: -7.1 mV																	
		Dissolved Oxygen, field: 0.19 mg/L																	
		Turbidity, field: 270.13 NTU																	
Relinquished by: <i>[Signature]</i>		Date/Time: 10/17/19 1842 PM		Received by: <i>[Signature]</i>		Date/Time: 10/17/19 1642		Turn Around Time (Check)		Same Day		24 hours		48 hours		72 hours <u>X</u>		Notes: Standard	
Relinquished by:		Date/Time:		Received by:		Date/Time:		Sample Integrity:		Temperature Upon Receipt: 2.8		Intact: <u>Yes</u>		No					
Relinquished by:		Date/Time:		Received by:		Date/Time:													

**Sample Receipt Checklist**

S2 Work Order 1910212

District Six\_C6

Client: APEX COMPANIES LLC

Client Project ID: GROUND\_WATER/GWA - ~~Graber~~

DIRECTIONAL

Shipped Via:  H.D./P.U./FedEx/UPS/USPS/Other

Airbill #: \_\_\_\_\_

MP 11/21/2019

Matrix (check all that apply):  Air  Soil/Solid  Water  Other: \_\_\_\_\_  
(Describe)

Temp (°C)	2.8
-----------	-----

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C <sup>(1)</sup> ? NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	✓			On Ice
Were all samples received intact <sup>(1)</sup> ?	✓			
Was adequate sample volume provided <sup>(1)</sup> ?	✓			
If custody seals are present, are they intact <sup>(1)</sup> ?			✓	
Are samples with holding times due within 48 hours sample due within 48 hours present?	✓			pH, anions
Is a chain-of-custody (COC) form present and filled out completely <sup>(1)</sup> ?	✓			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	✓			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	✓			
Is the COC properly relinquished by the client w/ date and time recorded <sup>(1)</sup> ?	✓			
For volatiles in water – is there headspace present? <b>If yes, contact client and note in narrative.</b>		✓		
Are samples preserved that require preservation (excluding cooling) <sup>(1)</sup> ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect	✓			NaOH HCl HNO3 H2SO4
If samples are acid preserved for metals, is the pH ≤ 2 <sup>(1)</sup> ? Record the pH in Comments.	✓			pH 1
If dissolved metals are requested, were samples field filtered?		✓		
Additional Comments (if any):  				
<b><sup>(1)</sup> If NO, then contact the client before proceeding with analysis and note in case narrative.</b>				

RZ  
Custodian Printed Name or Initials

Rz  
Signature of Custodian

10/17/19  
Date/Time



Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**GW\_59993\_MH\_MW\_1**  
**NENE\_20\_5N\_65W**  
**1910212-01 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>0.16</b>	0.0010	mg/L	1	1910290	10/21/19	10/26/19	EPA 8260B	
<b>Toluene</b>	<b>0.058</b>	0.0010	"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>0.040</b>	0.0010	"	"	"	"	"	"	
<b>m,p-Xylene</b>	<b>0.040</b>	0.0020	"	"	"	"	"	"	
<b>o-Xylene</b>	<b>0.0089</b>	0.0010	"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>0.049</b>	0.0020	"	"	"	"	"	"	
<b>Gasoline Range Hydrocarbons</b>	<b>0.67</b>	0.050	"	"	"	"	"	"	

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		105 %	23-173		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		91.1 %	20-170		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		101 %	21-167		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	0.100	mg/L	1	1910334	10/23/19	10/24/19	EPA 8015M	

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: o-Terphenyl</i>		114 %	44.8-129		"	"	"	"	

**Dissolved Gases by RSK-175**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Methane</b>	<b>14</b>	1.0	mg/L	100	1910279	10/18/19	10/21/19	RSK-175 mod	

Summit Scientific

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Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**GW\_59993\_MH\_MW\_1**  
**NENE\_20\_5N\_65W**  
**1910212-01 (Water)**

**Summit Scientific**

**Dissolved Gases by RSK-175**

Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Ethane	4.8	1.0	mg/L	100	1910279	10/18/19	10/21/19	RSK-175 mod	
Propane	1.7	1.0	"	"	"	"	"	"	

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: Ethene		88.2 %	70-130		"	"	"	"	

**Total Metals by EPA Method 200.8**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Uranium	0.00942	0.000500	mg/L	1	1910293	10/21/19	10/21/19	EPA 200.8	
Arsenic	0.007311	0.0006000	"	"	"	"	"	"	
Chromium	ND	0.00100	"	"	"	"	10/21/19	"	
Copper	0.00349	0.00100	"	"	"	"	"	"	
Lead	0.000640	0.000500	"	"	"	"	"	"	

**Dissolved Metals by EPA Method 200.8**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	150	0.0500	mg/L	1	1910295	10/21/19	10/21/19	EPA 200.8	
Iron	ND	0.0100	"	"	"	"	"	"	
Magnesium	88.5	0.0500	"	"	"	"	"	"	
Manganese	1.43	0.00100	"	"	"	"	"	"	
Potassium	3.88	0.0500	"	"	"	"	"	"	
Sodium	104	0.0500	"	"	"	"	"	"	
Barium	0.125	0.00100	"	"	"	"	"	"	
Boron	0.0751	0.0100	"	"	"	"	"	"	
Selenium	0.00131	0.00100	"	"	"	"	"	"	
Strontium	1.90	0.0100	"	"	"	"	"	"	

**Total Mercury by EPA 245.1**

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370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**GW\_59993\_MH\_MW\_1**  
**NENE\_20\_5N\_65W**  
**1910212-01 (Water)**

**Summit Scientific**

**Total Mercury by EPA 245.1**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Mercury	ND	0.000200	mg/L	1	1910339	10/23/19	10/24/19	EPA 245.1	

**Anions by EPA Method 300.0**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Bromide</b>	<b>9.64</b>	0.200	mg/L	1	1910273	10/18/19	10/18/19	EPA 300.0	
<b>Chloride</b>	<b>771</b>	10.0	"	100	"	"	"	"	
<b>Fluoride</b>	<b>0.899</b>	0.200	"	1	"	"	"	"	
<b>Sulfate</b>	<b>105</b>	0.300	"	"	"	"	"	"	
<b>Nitrate as N</b>	<b>1.87</b>	0.100	"	"	"	"	"	"	
Nitrite as N	ND	0.100	"	"	"	"	"	"	
<b>Nitrate/Nitrite as N</b>	<b>1.87</b>	0.200	"	"	"	"	"	"	

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Total Alkalinity</b>	<b>260</b>	10.0	mg/L as CaCO3	1	1910268	10/18/19	10/22/19	SM2320-B	
Carbonate	ND	10.0	"	"	"	"	"	"	
<b>Bicarbonate</b>	<b>260</b>	10.0	"	"	"	"	"	"	

**Conventional Chemistry Parameters by APHA/EPA Methods**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Phosphorus - Total</b>	<b>0.0940</b>	0.0500	mg/L	1	1910338	10/23/19	10/24/19	SM4500-P-E	
Sulfide as H2S	ND	0.200	"	"	1910369	10/24/19	10/24/19	SM4500 S2 F	

**Specific Conductance by SM2510B**

Summit Scientific

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Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**GW\_59993\_MH\_MW\_1**  
**NENE\_20\_5N\_65W**  
**1910212-01 (Water)**

**Summit Scientific**

**Specific Conductance by SM2510B**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Specific Conductance (EC)	<b>1910</b>	1.00	umhos/cm	1	1910267	10/18/19	10/18/19	SM2510B	

**Total Dissolved Solids by SM2540C**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Total Dissolved Solids	<b>942</b>	10.0	mg/L	1	1910266	10/18/19	10/18/19	SM2540C	

**pH by SM4500**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
pH	<b>7.25</b>	1.00	pH Units	1	1910292	10/17/19	10/21/19	SM4500-H+ B	

**Field Data**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Specific Conductance (EC)	<b>1663</b>		uS/cm	1	1910259	10/17/19	10/17/19	Field Method	
Temperature	<b>16.8</b>		Degrees C	"	"	"	"	"	
Turbidity	<b>270.13</b>		NTU	"	"	"	"	"	
Oxidation/Reduction Potential	<b>-7.1</b>		mv	"	"	"	"	"	
Dissolved Oxygen	<b>0.19</b>		mg/L	"	"	"	"	"	
pH	<b>7.61</b>		SU	"	"	"	"	"	

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Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

### Volatile Organic Compounds by EPA Method 8260B - Quality Control

#### Summit Scientific

Analyte	Reporting			Spike	Source	%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

#### Batch 1910290 - EPA 5030 Water MS

##### Blank (1910290-BLK1)

Prepared: 10/21/19 Analyzed: 10/23/19

Benzene	ND	0.0010	mg/L							
Toluene	ND	0.0010	"							
Ethylbenzene	ND	0.0010	"							
m,p-Xylene	ND	0.0020	"							
o-Xylene	ND	0.0010	"							
Xylenes (total)	ND	0.0020	"							
Gasoline Range Hydrocarbons	ND	0.050	"							

Surrogate: 1,2-Dichloroethane-d4	0.0149		"	0.0133		111	23-173
Surrogate: Toluene-d8	0.0132		"	0.0133		98.6	20-170
Surrogate: 4-Bromofluorobenzene	0.0128		"	0.0133		96.4	21-167

##### LCS (1910290-BS1)

Prepared: 10/21/19 Analyzed: 10/23/19

Benzene	0.0274	0.0010	mg/L	0.0333		82.3	51-132
Toluene	0.0270	0.0010	"	0.0333		80.9	51-138
Ethylbenzene	0.0282	0.0010	"	0.0333		84.6	58-146
m,p-Xylene	0.0542	0.0020	"	0.0667		81.2	57-144
o-Xylene	0.0268	0.0010	"	0.0333		80.4	53-146

Surrogate: 1,2-Dichloroethane-d4	0.0155		"	0.0133		116	23-173
Surrogate: Toluene-d8	0.0134		"	0.0133		101	20-170
Surrogate: 4-Bromofluorobenzene	0.0134		"	0.0133		100	21-167

##### Matrix Spike (1910290-MS1)

Source: 1910192-01

Prepared: 10/21/19 Analyzed: 10/23/19

Benzene	0.0279	0.0010	mg/L	0.0333	ND	83.8	34-141
Toluene	0.0270	0.0010	"	0.0333	ND	81.0	27-151
Ethylbenzene	0.0285	0.0010	"	0.0333	ND	85.4	29-160
m,p-Xylene	0.0543	0.0020	"	0.0667	ND	81.4	20-166
o-Xylene	0.0270	0.0010	"	0.0333	ND	80.9	33-159

Surrogate: 1,2-Dichloroethane-d4	0.0146		"	0.0133		110	23-173
Surrogate: Toluene-d8	0.0134		"	0.0133		100	20-170
Surrogate: 4-Bromofluorobenzene	0.0134		"	0.0133		101	21-167

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370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**

**Summit Scientific**

Analyte	Reporting			Spike	Source	%REC			RPD	Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

**Batch 1910290 - EPA 5030 Water MS**

<b>Matrix Spike Dup (1910290-MSD1)</b>	<b>Source: 1910192-01</b>			Prepared: 10/21/19 Analyzed: 10/23/19						
Benzene	0.0276	0.0010	mg/L	0.0333	ND	83.0	34-141	0.972	32	
Toluene	0.0268	0.0010	"	0.0333	ND	80.3	27-151	0.893	25	
Ethylbenzene	0.0278	0.0010	"	0.0333	ND	83.5	29-160	2.27	50	
m,p-Xylene	0.0526	0.0020	"	0.0667	ND	78.8	20-166	3.20	36	
o-Xylene	0.0264	0.0010	"	0.0333	ND	79.3	33-159	2.02	26	
Surrogate: 1,2-Dichloroethane-d4	0.0164		"	0.0133		123	23-173			
Surrogate: Toluene-d8	0.0132		"	0.0133		98.9	20-170			
Surrogate: 4-Bromofluorobenzene	0.0134		"	0.0133		100	21-167			

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Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Extractable Petroleum Hydrocarbons by 8015 - Quality Control**  
**Summit Scientific**

Analyte	Result	Reporting		Spike Level	Source		%REC		RPD		Notes
		Limit	Units		Result	%REC	Limits	RPD	Limit		

**Batch 1910334 - EPA 3520B**

**Blank (1910334-BLK1)**

Prepared: 10/23/19 Analyzed: 10/24/19

C10-C28 (DRO)	ND	0.100	mg/L								
Surrogate: <i>o</i> -Terphenyl	0.0268		"	0.0250		107	44.8-129				

**LCS (1910334-BS1)**

Prepared: 10/23/19 Analyzed: 10/24/19

C10-C28 (DRO)	0.824	0.100	mg/L	1.00		82.4	70-130				
Surrogate: <i>o</i> -Terphenyl	0.0256		"	0.0250		102	44.8-129				

**LCS Dup (1910334-BSD1)**

Prepared: 10/23/19 Analyzed: 10/24/19

C10-C28 (DRO)	0.749	0.100	mg/L	1.00		74.9	70-130	9.50	200		
Surrogate: <i>o</i> -Terphenyl	0.0287		"	0.0250		115	44.8-129				

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Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Dissolved Gases by RSK-175 - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source	%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

**Batch 1910279 - GC**

**Blank (1910279-BLK1)**

Prepared: 10/18/19 Analyzed: 10/21/19

Methane	ND	0.010	mg/L							
Ethane	ND	0.010	"							
Propane	ND	0.010	"							
Surrogate: Ethene	0.0431		"	0.0364		118	70-130			

**LCS (1910279-BS1)**

Prepared: 10/18/19 Analyzed: 10/21/19

Methane	0.046	0.010	mg/L	0.0428		108	70-130			
Ethane	0.087	0.010	"	0.0798		109	70-130			
Propane	0.13	0.010	"	0.139		91.0	70-130			
Surrogate: Ethene	0.0846		"	0.0728		116	70-130			

**Duplicate (1910279-DUP1)**

Source: 1910212-01

Prepared: 10/18/19 Analyzed: 10/21/19

Methane	13	1.0	mg/L		14			1.78	30	
Ethane	4.9	1.0	"		4.8			2.90	30	
Propane	1.8	1.0	"		1.7			3.49	30	
Surrogate: Ethene	0.0304		"	0.0364		83.5	70-130			

**Matrix Spike (1910279-MS1)**

Source: 1910212-01

Prepared: 10/18/19 Analyzed: 10/21/19

Methane	13	1.0	mg/L	0.0428	14	NR	70-130			QM-07
Ethane	4.9	1.0	"	0.0798	4.8	238	70-130			QM-07
Propane	1.9	1.0	"	0.139	1.7	130	70-130			
Surrogate: Ethene	0.0627		"	0.0728		86.1	70-130			

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Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Total Metals by EPA Method 200.8 - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit		

**Batch 1910293 - EPA 200.8**

**Blank (1910293-BLK1)**

Prepared & Analyzed: 10/21/19

Uranium	ND	0.000500	mg/L							
Arsenic	ND	0.0006000	"							
Chromium	ND	0.00100	"							
Copper	ND	0.00100	"							
Lead	ND	0.000500	"							

**LCS (1910293-BS1)**

Prepared & Analyzed: 10/21/19

Uranium	0.270	0.000500	mg/L	0.250	108	85-115			
Arsenic	0.5317	0.0006000	"	0.500	106	85-115			
Chromium	0.478	0.00100	"	0.500	95.6	85-115			
Copper	0.524	0.00100	"	0.500	105	85-115			
Lead	0.266	0.000500	"	0.250	107	85-115			

**Duplicate (1910293-DUP1)**

Source: 1910224-01

Prepared & Analyzed: 10/21/19

Uranium	ND	0.000500	mg/L	ND					20
Arsenic	0.001169	0.0006000	"	0.001037			11.9		20
Chromium	ND	0.00100	"	ND					20
Copper	0.0221	0.00100	"	0.0210			4.79		20
Lead	0.00517	0.000500	"	0.00529			2.24		20

**Matrix Spike (1910293-MS1)**

Source: 1910224-01

Prepared & Analyzed: 10/21/19

Uranium	0.274	0.000500	mg/L	0.250	ND	110	70-130		
Arsenic	0.5445	0.0006000	"	0.500	0.001037	109	70-130		
Chromium	0.486	0.00100	"	0.500	ND	97.2	70-130		
Copper	0.519	0.00100	"	0.500	0.0210	99.5	70-130		
Lead	0.264	0.000500	"	0.250	0.00529	104	70-130		

**Matrix Spike Dup (1910293-MSD1)**

Source: 1910224-01

Prepared & Analyzed: 10/21/19

Uranium	0.269	0.000500	mg/L	0.250	ND	108	70-130	1.66	25
Arsenic	0.5462	0.0006000	"	0.500	0.001037	109	70-130	0.320	25
Chromium	0.484	0.00100	"	0.500	ND	96.7	70-130	0.510	25
Copper	0.528	0.00100	"	0.500	0.0210	101	70-130	1.71	25
Lead	0.263	0.000500	"	0.250	0.00529	103	70-130	0.608	25

Summit Scientific

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Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Dissolved Metals by EPA Method 200.8 - Quality Control**  
**Summit Scientific**

Analyte	Result	Reporting		Spike Level	Source Result	%REC		RPD		Notes
		Limit	Units			Limits	RPD	Limit		

**Batch 1910295 - EPA 200.8**

**Blank (1910295-BLK1)**

Prepared & Analyzed: 10/21/19

Calcium	ND	0.0500	mg/L						
Iron	ND	0.0100	"						
Magnesium	ND	0.0500	"						
Manganese	ND	0.00100	"						
Potassium	ND	0.0500	"						
Sodium	ND	0.0500	"						
Barium	ND	0.00100	"						
Boron	ND	0.0100	"						
Selenium	ND	0.00100	"						
Strontium	ND	0.0100	"						

**LCS (1910295-BS1)**

Prepared & Analyzed: 10/21/19

Calcium	5.24	0.0500	mg/L	5.00	105	85-115
Iron	4.82	0.0100	"	5.00	96.4	85-115
Magnesium	5.16	0.0500	"	5.00	103	85-115
Manganese	0.524	0.00100	"	0.500	105	85-115
Potassium	5.43	0.0500	"	5.00	109	85-115
Sodium	5.40	0.0500	"	5.00	108	85-115
Barium	0.525	0.00100	"	0.500	105	85-115
Boron	2.58	0.0100	"	2.50	103	85-115
Selenium	0.0540	0.00100	"	0.0500	108	85-115
Strontium	0.536	0.0100	"	0.500	107	85-115

**Duplicate (1910295-DUP1)**

Source: 1910212-01

Prepared & Analyzed: 10/21/19

Calcium	140	0.0500	mg/L	150	6.97	20
Iron	ND	0.0100	"	ND		20
Magnesium	92.0	0.0500	"	88.5	3.88	20
Manganese	1.42	0.00100	"	1.43	0.591	20
Potassium	3.98	0.0500	"	3.88	2.70	20
Sodium	106	0.0500	"	104	2.36	20
Barium	0.114	0.00100	"	0.125	9.42	20
Boron	0.0657	0.0100	"	0.0751	13.4	20
Selenium	0.00151	0.00100	"	0.00131	14.7	20
Strontium	1.72	0.0100	"	1.90	9.79	20

Summit Scientific

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Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Dissolved Metals by EPA Method 200.8 - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit		

**Batch 1910295 - EPA 200.8**

**Matrix Spike (1910295-MS1)**

Source: 1910212-01

Prepared & Analyzed: 10/21/19

Calcium	156	0.0500	mg/L	5.00	150	111	70-130			
Iron	5.03	0.0100	"	5.00	ND	101	70-130			
Magnesium	94.0	0.0500	"	5.00	88.5	110	70-130			
Manganese	1.97	0.00100	"	0.500	1.43	108	70-130			
Potassium	9.98	0.0500	"	5.00	3.88	122	70-130			
Sodium	109	0.0500	"	5.00	104	106	70-130			
Barium	0.658	0.00100	"	0.500	0.125	107	70-130			
Boron	2.58	0.0100	"	2.50	0.0751	100	70-130			
Selenium	0.0519	0.00100	"	0.0500	0.00131	101	70-130			
Strontium	2.53	0.0100	"	0.500	1.90	126	70-130			

**Matrix Spike Dup (1910295-MSD1)**

Source: 1910212-01

Prepared & Analyzed: 10/21/19

Calcium	157	0.0500	mg/L	5.00	150	127	70-130	0.532	25
Iron	4.98	0.0100	"	5.00	ND	99.6	70-130	1.04	25
Magnesium	94.1	0.0500	"	5.00	88.5	111	70-130	0.0503	25
Manganese	1.91	0.00100	"	0.500	1.43	96.5	70-130	2.85	25
Potassium	9.74	0.0500	"	5.00	3.88	117	70-130	2.38	25
Sodium	108	0.0500	"	5.00	104	79.3	70-130	1.25	25
Barium	0.644	0.00100	"	0.500	0.125	104	70-130	2.28	25
Boron	2.52	0.0100	"	2.50	0.0751	97.9	70-130	2.28	25
Selenium	0.0598	0.00100	"	0.0500	0.00131	117	70-130	14.2	25
Strontium	2.43	0.0100	"	0.500	1.90	107	70-130	3.86	25

Summit Scientific

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Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Total Mercury by EPA 245.1 - Quality Control**  
**Summit Scientific**

Analyte	Result	Reporting		Spike Level	Source Result	%REC		RPD		Notes
		Limit	Units			%REC	Limits	RPD	Limit	

**Batch 1910339 - EPA 245.1**

**Blank (1910339-BLK1)**

Prepared: 10/23/19 Analyzed: 10/24/19

Mercury ND 0.000200 mg/L

**LCS (1910339-BS1)**

Prepared: 10/23/19 Analyzed: 10/24/19

Mercury 0.00265 0.000200 mg/L 0.00250 106 85-115

**Duplicate (1910339-DUP1)**

**Source: 1910212-01**

Prepared: 10/23/19 Analyzed: 10/24/19

Mercury ND 0.000200 mg/L ND 20

**Matrix Spike (1910339-MS1)**

**Source: 1910212-01**

Prepared: 10/23/19 Analyzed: 10/24/19

Mercury 0.00282 0.000200 mg/L 0.00250 ND 113 70-130

**Matrix Spike Dup (1910339-MSD1)**

**Source: 1910212-01**

Prepared: 10/23/19 Analyzed: 10/24/19

Mercury 0.00278 0.000200 mg/L 0.00250 ND 111 70-130 1.43 20

Summit Scientific

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Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Anions by EPA Method 300.0 - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source	%REC			RPD	Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

**Batch 1910273 - General Preparation**

**Blank (1910273-BLK1)**

Prepared & Analyzed: 10/18/19

Bromide	ND	0.200	mg/L							
Chloride	ND	0.100	"							
Fluoride	ND	0.200	"							
Sulfate	ND	0.300	"							
Nitrate as N	ND	0.100	"							
Nitrite as N	ND	0.100	"							
Nitrate/Nitrite as N	ND	0.200	"							

**LCS (1910273-BS1)**

Prepared & Analyzed: 10/18/19

Bromide	10.2	0.200	mg/L	10.0	102	90-110				
Chloride	2.88	0.100	"	3.00	95.9	90-110				
Fluoride	2.16	0.200	"	2.00	108	90-110				
Sulfate	15.3	0.300	"	15.0	102	90-110				
Nitrate as N	3.21	0.100	"	3.00	107	90-110				
Nitrite as N	3.26	0.100	"	3.00	109	90-110				

**Duplicate (1910273-DUP1)**

Source: 1910212-01

Prepared & Analyzed: 10/18/19

Bromide	9.60	0.200	mg/L	9.64	0.426	20				
Chloride	ND	0.100	"	771		20				QM-02
Fluoride	0.885	0.200	"	0.899	1.57	20				
Sulfate	105	0.300	"	105	0.337	20				
Nitrate as N	1.86	0.100	"	1.87	0.376	20				
Nitrite as N	ND	0.100	"	ND		20				
Nitrate/Nitrite as N	ND	0.200	"	1.87		20				

**Matrix Spike (1910273-MS1)**

Source: 1910212-01

Prepared & Analyzed: 10/18/19

Bromide	20.7	0.200	mg/L	10.0	9.64	111	80-120			
Chloride	ND	0.100	"	3.00	771	NR	80-120			QM-02
Fluoride	3.02	0.200	"	2.00	0.899	106	80-120			
Sulfate	118	0.300	"	15.0	105	86.9	80-120			
Nitrate as N	5.06	0.100	"	3.00	1.87	106	80-120			
Nitrite as N	3.12	0.100	"	3.00	ND	104	80-120			

Summit Scientific

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Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Physical Parameters by APHA/ASTM/EPA Methods - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source	%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

**Batch 1910268 - General Preparation**

**Blank (1910268-BLK1)**

Prepared: 10/18/19 Analyzed: 10/22/19

Total Alkalinity	ND	10.0	mg/L as CaCO3							
Carbonate	ND	10.0	"							
Bicarbonate	ND	10.0	"							

**LCS (1910268-BS1)**

Prepared: 10/18/19 Analyzed: 10/22/19

Total Alkalinity	110	10.0	mg/L as CaCO3	100		110	80-120			
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**Duplicate (1910268-DUP1)**

Source: 1910212-01

Prepared: 10/18/19 Analyzed: 10/22/19

Total Alkalinity	260	10.0	mg/L as CaCO3		260			0.00	20	
Carbonate	ND	10.0	"		ND				20	
Bicarbonate	260	10.0	"		260			0.00	20	

**Matrix Spike (1910268-MS1)**

Source: 1910212-01

Prepared: 10/18/19 Analyzed: 10/22/19

Total Alkalinity	360	10.0	mg/L as CaCO3	100	260	100	70-130			
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**Matrix Spike Dup (1910268-MSD1)**

Source: 1910212-01

Prepared: 10/18/19 Analyzed: 10/22/19

Total Alkalinity	360	10.0	mg/L as CaCO3	100	260	100	70-130	0.00	20	
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Summit Scientific

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Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

**Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit		

**Batch 1910338 - General Preparation**

<b>Blank (1910338-BLK1)</b>				Prepared: 10/23/19 Analyzed: 10/24/19							
Phosphorus - Total	ND	0.0500	mg/L								
<b>LCS (1910338-BS1)</b>				Prepared: 10/23/19 Analyzed: 10/24/19							
Phosphorus - Total	1.01	0.0500	mg/L	1.00	101	80-120					
<b>Duplicate (1910338-DUP1)</b>				Source: 1910212-01 Prepared: 10/23/19 Analyzed: 10/24/19							
Phosphorus - Total	0.0950	0.0500	mg/L	0.0940			1.06	20			
<b>Matrix Spike (1910338-MS1)</b>				Source: 1910212-01 Prepared: 10/23/19 Analyzed: 10/24/19							
Phosphorus - Total	1.04	0.0500	mg/L	1.00	0.0940	94.6	70-130				
<b>Matrix Spike Dup (1910338-MSD1)</b>				Source: 1910212-01 Prepared: 10/23/19 Analyzed: 10/24/19							
Phosphorus - Total	1.04	0.0500	mg/L	1.00	0.0940	94.6	70-130	0.00	20		

**Batch 1910369 - General Preparation**

<b>Blank (1910369-BLK1)</b>				Prepared & Analyzed: 10/24/19							
Sulfide as H2S	ND	0.200	mg/L								
<b>LCS (1910369-BS1)</b>				Prepared & Analyzed: 10/24/19							
Sulfide as H2S	1.02	0.200	mg/L	1.00	102	80-120					
<b>Matrix Spike (1910369-MS1)</b>				Source: 1910212-01 Prepared & Analyzed: 10/24/19							
Sulfide as H2S	1.09	0.200	mg/L	1.00	ND	109	75-125				
<b>Matrix Spike Dup (1910369-MSD1)</b>				Source: 1910212-01 Prepared & Analyzed: 10/24/19							
Sulfide as H2S	1.09	0.200	mg/L	1.00	ND	109	75-125	0.00	20		

Summit Scientific

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Extraction Oil&Gas  
 370 17th Street Suite 5300  
 Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
 Project Manager: Heather Shideman

**Reported:**  
 11/21/19 09:31

**Specific Conductance by SM2510B - Quality Control**  
**Summit Scientific**

Analyte	Result	Reporting		Spike Level	Source Result	%REC		RPD		Notes
		Limit	Units			%REC	Limits	RPD	Limit	

**Batch 1910267 - General Preparation**

**Blank (1910267-BLK1)**

Prepared & Analyzed: 10/18/19

Specific Conductance (EC)                      ND                      1.00    umhos/cm

**Duplicate (1910267-DUP1)**

**Source: 1910212-01**

Prepared & Analyzed: 10/18/19

Specific Conductance (EC)                      1920                      1.00    umhos/cm                      1910                      0.314                      20

Summit Scientific

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Extraction Oil&Gas  
 370 17th Street Suite 5300  
 Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
 Project Manager: Heather Shideman

**Reported:**  
 11/21/19 09:31

**Total Dissolved Solids by SM2540C - Quality Control**  
**Summit Scientific**

Analyte	Result	Reporting		Spike	Source	%REC			RPD	Notes
		Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

**Batch 1910266 - General Preparation**

**Blank (1910266-BLK1)**

Prepared & Analyzed: 10/18/19

Total Dissolved Solids      ND      10.0      mg/L

**Duplicate (1910266-DUP1)**

Source: 1910210-01

Prepared & Analyzed: 10/18/19

Total Dissolved Solids      664      10.0      mg/L      656      1.30      20

Summit Scientific

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Extraction Oil&Gas  
 370 17th Street Suite 5300  
 Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
 Project Manager: Heather Shideman

**Reported:**  
 11/21/19 09:31

**pH by SM4500 - Quality Control**  
**Summit Scientific**

Analyte	Result	Reporting		Spike	Source	%REC		RPD		Notes
		Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

**Batch 1910292 - General Preparation**

**LCS (1910292-BS1)**

Prepared: 10/17/19 Analyzed: 10/21/19

pH	9.18	1.00	pH Units	9.18	100	90-110
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**Duplicate (1910292-DUP1)**

Source: 1910220-02

Prepared: 10/17/19 Analyzed: 10/21/19

pH	7.47	1.00	pH Units	7.41	0.806	20
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Summit Scientific

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Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Ground\_Water/GWA\_District\_Six\_C6

Project Number: Alloc 421 930.88  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 09:31

### Notes and Definitions

- QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS/LCSD recovery.
- QM-02 The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference

# Summit Scientific

---

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

November 21, 2019

Heather Shideman

Extraction Oil&Gas

370 17th Street Suite 5300

Denver, CO 80202

RE: Trip\_Blank/GWA\_District\_Six\_C6

Work Order # 1910213

Enclosed are the results of analyses for samples received by Summit Scientific on 10/17/19 16:42. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large initial "M".

Muri Premer For Ben Shrewsbury

Laboratory Manager



Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Trip\_Blank/GWA\_District\_Six\_C6

Project Number: Alloc 421  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 13:19

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GW_59993_MH_MW_1_Trip_Blank	1910213-01	Water	10/17/19 14:45	10/17/19 16:42

Summit Scientific

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**Sample Receipt Checklist**

S2 Work Order 1910213

Trip\_Blank/GWA\_District\_Six\_C6 MP 11/21/2019

Client: APEX COMPANIES

Client Project ID: TRIP-BLANKS/GWA-GREELEY

Shipped Via: H.D./P.U./FedEx/UPS/USPS/Other \_\_\_\_\_ Airbill #: \_\_\_\_\_  
 H.D.  P.U.  FedEx  UPS  USPS  Other

Matrix (check all that apply):  Air  Soil/Solid  Water  Other: \_\_\_\_\_  
 (Describe)

Temp (°C)	2.8
-----------	-----

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C <sup>(1)</sup> ? NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	✓			
Were all samples received intact <sup>(1)</sup> ?	✓			
Was adequate sample volume provided <sup>(1)</sup> ?	✓			
If custody seals are present, are they intact <sup>(1)</sup> ?	✓			
Are samples with holding times due within 48 hours sample due within 48 hours present?		✓		
Is a chain-of-custody (COC) form present and filled out completely <sup>(1)</sup> ?	✓			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	✓			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	✓			
Is the COC properly relinquished by the client w/ date and time recorded <sup>(1)</sup> ?	✓			
For volatiles in water – is there headspace present? <b>If yes, contact client and note in narrative.</b>		✓		
Are samples preserved that require preservation <b>(excluding cooling)</b> <sup>(1)</sup> ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect			✓	
If samples are acid preserved for metals, is the pH ≤ 2 <sup>(1)</sup> ? Record the pH in Comments.			✓	
If dissolved metals are requested, were samples field filtered?			✓	

Additional Comments (if any):

<sup>(1)</sup> If NO, then contact the client before proceeding with analysis and note in case narrative.

RZ  
 \_\_\_\_\_  
 Custodian Printed Name or Initials

*RZ*  
 \_\_\_\_\_  
 Signature of Custodian

10/17/19  
 \_\_\_\_\_  
 Date/Time



Extraction Oil&Gas  
 370 17th Street Suite 5300  
 Denver CO, 80202

Project: Trip\_Blank/GWA\_District\_Six\_C6

Project Number: Alloc 421  
 Project Manager: Heather Shideman

**Reported:**  
 11/21/19 13:19

**GW\_5993\_MH\_MW\_1\_Trip\_Blank**

**1910213-01 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1910288	10/21/19	10/23/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/17/19 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		89.9 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.2 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.1 %	21-167		"	"	"	"	

Summit Scientific

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*



Extraction Oil&Gas  
370 17th Street Suite 5300  
Denver CO, 80202

Project: Trip\_Blank/GWA\_District\_Six\_C6

Project Number: Alloc 421  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 13:19

### Volatile Organic Compounds by EPA Method 8260B - Quality Control

#### Summit Scientific

Analyte	Result	Reporting		Spike Level	Source Result	%REC		RPD		Notes
		Limit	Units			Limits	RPD	Limit		

#### Batch 1910288 - EPA 5030 Water MS

##### Blank (1910288-BLK1)

Prepared: 10/21/19 Analyzed: 10/22/19

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.1		"	13.3		98.3		23-173		
Surrogate: Toluene-d8	12.6		"	13.3		94.1		20-170		
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.0		21-167		

##### LCS (1910288-BS1)

Prepared: 10/21/19 Analyzed: 10/22/19

Benzene	29.1	1.0	ug/l	33.3		87.4		51-132		
Toluene	34.7	1.0	"	33.3		104		51-138		
Ethylbenzene	37.9	1.0	"	33.3		114		58-146		
m,p-Xylene	71.2	2.0	"	66.7		107		57-144		
o-Xylene	35.8	1.0	"	33.3		107		53-146		
Surrogate: 1,2-Dichloroethane-d4	11.5		"	13.3		86.4		23-173		
Surrogate: Toluene-d8	12.9		"	13.3		96.8		20-170		
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		96.2		21-167		

##### Matrix Spike (1910288-MS1)

Source: 1910193-01

Prepared: 10/21/19 Analyzed: 10/22/19

Benzene	31.4	1.0	ug/l	33.3	ND	94.1		34-141		
Toluene	39.5	1.0	"	33.3	ND	119		27-151		
Ethylbenzene	42.0	1.0	"	33.3	ND	126		29-160		
m,p-Xylene	79.2	2.0	"	66.7	ND	119		20-166		
o-Xylene	39.9	1.0	"	33.3	ND	120		33-159		
Surrogate: 1,2-Dichloroethane-d4	11.7		"	13.3		87.7		23-173		
Surrogate: Toluene-d8	13.3		"	13.3		99.7		20-170		
Surrogate: 4-Bromofluorobenzene	12.5		"	13.3		94.0		21-167		

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370 17th Street Suite 5300  
Denver CO, 80202

Project: Trip\_Blank/GWA\_District\_Six\_C6

Project Number: Alloc 421  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 13:19

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Result	Reporting		Spike Level	Source		%REC		RPD		Notes
		Limit	Units		Result	%REC	Limits	RPD	Limit		

**Batch 1910288 - EPA 5030 Water MS**

<b>Matrix Spike Dup (1910288-MSD1)</b>	<b>Source: 1910193-01</b>			Prepared: 10/21/19 Analyzed: 10/22/19							
Benzene	33.5	1.0	ug/l	33.3	ND	100	34-141	6.57	30		
Toluene	37.4	1.0	"	33.3	ND	112	27-151	5.54	30		
Ethylbenzene	42.5	1.0	"	33.3	ND	127	29-160	1.09	30		
m,p-Xylene	79.9	2.0	"	66.7	ND	120	20-166	0.943	30		
o-Xylene	39.8	1.0	"	33.3	ND	119	33-159	0.276	30		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>12.5</i>		<i>"</i>	<i>13.3</i>		<i>93.9</i>	<i>23-173</i>				
<i>Surrogate: Toluene-d8</i>	<i>12.8</i>		<i>"</i>	<i>13.3</i>		<i>95.6</i>	<i>20-170</i>				
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.7</i>		<i>"</i>	<i>13.3</i>		<i>95.0</i>	<i>21-167</i>				

Summit Scientific

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370 17th Street Suite 5300  
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Project: Trip\_Blank/GWA\_District\_Six\_C6

Project Number: Alloc 421  
Project Manager: Heather Shideman

**Reported:**  
11/21/19 13:19

### Notes and Definitions

DET Analyte DETECTED  
ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
dry Sample results reported on a dry weight basis  
RPD Relative Percent Difference

Lab #: 742479      Job #: 43498      IS-99230      Co. Job#:   
 Sample Name: GW\_59993\_MH\_MW\_1      Co. Lab#:   
 Company: Extraction Oil and Gas   
 API/Well:   
 Container: IsoFlask   
 Field/Site Name: BWSE/GWA\_District\_Six\_C6   
 Location: NENE\_20\_5N\_65W   
 Formation/Depth: IN   
 Sampling Point: 762176   
 Date Sampled: 10/17/2019 14:45      Date Received: 11/22/2019      Date Reported: 1/08/2020

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	0.213					
Oxygen -----	2.74					
Nitrogen -----	15.63					
Carbon Dioxide -----	2.37					
Methane -----	65.45	-47.46	-243.8		50	33
Ethane -----	10.19	-32.23			8.4	10
Ethylene -----	nd					
Propane -----	2.67	-27.87			2.1	3.8
Propylene -----	nd					
Iso-butane -----	0.273					
N-butane -----	0.326					
Iso-pentane -----	0.0667					
N-pentane -----	0.0404					
Hexanes + -----	0.0324					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.50

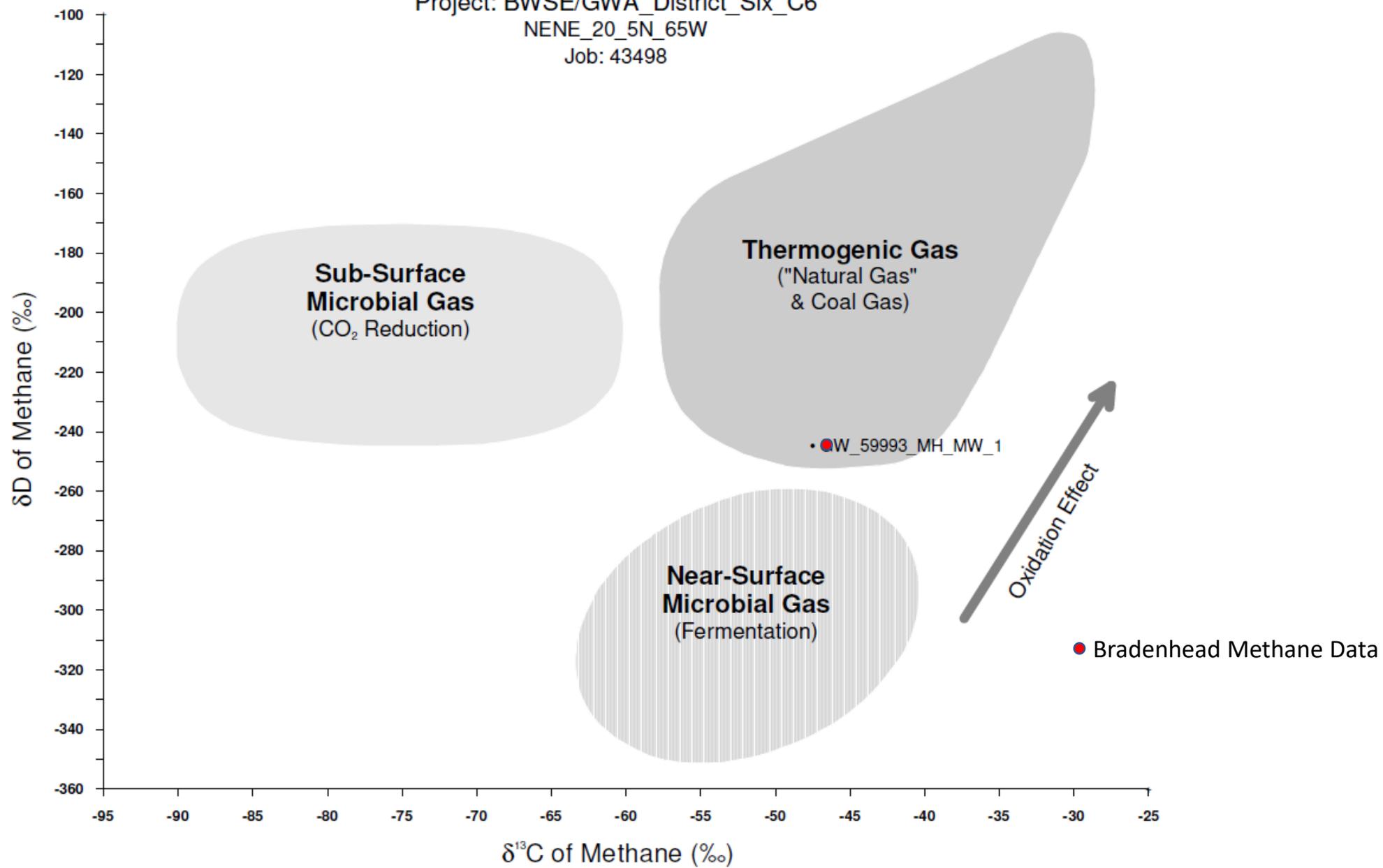
\*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen. Insufficient sample volume/concentrations for butane and pentane isotopic analysis.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

**ATTACHMENT F**

**Groundwater Isotope Ratio Plots**

Project: BWSE/GWA\_District\_Six\_C6  
NENE\_20\_5N\_65W  
Job: 43498



This plot is a visual representation of data and not intended to be an interpretation of results.