

# Summit Scientific

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4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

May 28, 2019

Heather Shideman

Extraction Oil&Gas

370 17th Street Suite 5300

Denver, CO 80202

RE: BWSE/GWA\_Ferguson\_43\_35

Work Order # 1905198

Enclosed are the results of analyses for samples received by Summit Scientific on 05/16/19 17:07. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Paul Shrewsbury For Ben Shrewsbury

Laboratory Manager



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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BW_FergusonFarms47109_NESE_35_5N_65W	1905198-01	Water	05/16/19 11:10	05/16/19 17:07

Summit Scientific

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# Summit Scientific

S<sub>2</sub>

1905198

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

<b>Client:</b> Extraction Oil and Gas (XOG)	<b>Report to:</b> Apex Companies, LLC	<b>Project Manager:</b> Heather Shideman
<b>Address:</b> 2234 117th Ave, Ste 106	<b>E-Mail:</b> Rochelle.Carlisle@apexcos.com, Heather.Shideman@apexcos.com	
<b>City/State/Zip:</b> Greeley, CO 80634	<b>cc:</b> bford@extractionog.com	
<b>Phone:</b> (970) 576-3446	<b>Project Name:</b> BWSE/GWA_Ferguson_43_35	
<b>Sampler Name:</b> Josui Socher	<b>Project No.:</b> AFE # 16227	<b>Facility ID</b> 754337

ID	Field ID / Point of Collection	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested				Special Instructions		
					HCl	HNO3	None	Other (Specify)	Groundwater	Soil	Air-Canister #	Other (Specify)	COGCC 609 minus Isotopes						
1	BW_FergusonFarms47109 NESE_35_5N_65W	5/16/19	1110	11	6	1	4		X				X	X	X				Sample Frequency: A
	Temperature, field:	13.13	°C																
	pH, field:	7.45	s.u.																
	Conductivity, field:	2071.6	uS/cm																
	ORP, field:	90.1	mV																
	Dissolved Oxygen, field:	2.55	mg/L																
	Turbidity, field:	2.37	NTU																
Relinquished by:		Date/Time:		Received by:		Date/Time:		Turn Around Time (Check)				Notes:							
<i>Josui Socher</i>		5/16/19 5:07pm		<i>Chris R...</i>		5-16-19 17:07		Same Day <input type="checkbox"/> 72 hours <input type="checkbox"/>				24 hours <input checked="" type="checkbox"/> Standard							
Relinquished by:		Date/Time:		Received by:		Date/Time:		48 hours <input type="checkbox"/>				Sample Integrity:							
Relinquished by:		Date/Time:		Received by:		Date/Time:		Temperature Upon Receipt: 10.8°				Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							

1905198

Sample Receipt Checklist

S2 Work Order \_\_\_\_\_

Client: Apex / XOG Client Project ID: BWSE / GWA - Ferguson 43-35

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

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

Temp (°C)	10.8°
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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
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	✓			HCl, HNO3
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.

AT  
Custodian Printed Name or Initials

[Signature]  
Signature of Custodian

5-16-19 17:07  
Date/Time



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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337  
Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

**BW\_FergusonFarms47109\_NESE\_35\_5N\_65W**  
**1905198-01 (Water)**

**Summit Scientific**

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

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0010	mg/L	1	1905297	05/22/19	05/25/19	EPA 8260B	
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	"	"	"	"	"	"	

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		93.5 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.0 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	21-167		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	0.100	mg/L	1	1905307	05/22/19	05/23/19	EPA 8015M	

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		91.6 %	44.8-129		"	"	"	"	

**Dissolved Gases by RSK-175**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Summit Scientific

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370 17th Street Suite 5300  
Denver CO, 80202

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

Reported:

05/28/19 06:50

**BW\_FergusonFarms47109\_NESE\_35\_5N\_65W**  
**1905198-01 (Water)**

**Summit Scientific**

**Dissolved Gases by RSK-175**

Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Methane	ND	0.010	mg/L	1	1905249	05/17/19	05/20/19	RSK-175 mod	
Ethane	ND	0.010	"	"	"	"	"	"	
Propane	ND	0.010	"	"	"	"	"	"	

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: Ethene		97.0 %	70-130		"	"	"	"	

**Dissolved Metals by EPA Method 200.8**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	135	0.0500	mg/L	1	1905263	05/20/19	05/20/19	EPA 200.8	
Iron	ND	0.0100	"	"	"	"	"	"	
Magnesium	77.6	0.0500	"	"	"	"	"	"	
Manganese	0.0129	0.00100	"	"	"	"	"	"	
Potassium	9.70	0.0500	"	"	"	"	"	"	
Sodium	313	0.0500	"	"	"	"	"	"	
Barium	0.0272	0.00100	"	"	"	"	"	"	
Boron	0.502	0.0100	"	"	"	"	"	"	
Selenium	ND	0.00100	"	"	"	"	"	"	
Strontium	2.71	0.0100	"	"	"	"	"	"	

**Anions by EPA Method 300.0**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bromide	0.413	0.200	mg/L	1	1905241	05/17/19	05/17/19	EPA 300.0	
Chloride	263	10.0	"	100	"	"	"	"	
Fluoride	3.48	0.200	"	1	"	"	"	"	
Sulfate	376	30.0	"	100	"	"	"	"	
Nitrate as N	0.342	0.100	"	1	"	"	"	"	
Nitrite as N	ND	0.100	"	"	"	"	"	"	
Nitrate/Nitrite as N	0.342	0.200	"	"	"	"	"	"	

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**

05/28/19 06:50

**BW\_FergusonFarms47109\_NESE\_35\_5N\_65W  
1905198-01 (Water)**

**Summit Scientific**

**Anions by EPA Method 300.0**

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

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Total Alkalinity</b>	<b>460</b>	10.0	mg/L as CaCO3	1	1905310	05/23/19	05/23/19	SM2320-B	
Carbonate	ND	10.0	"	"	"	"	"	"	
<b>Bicarbonate</b>	<b>460</b>	10.0	"	"	"	"	"	"	

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

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Phosphorus - Total</b>	<b>0.0850</b>	0.0500	mg/L	1	1905303	05/22/19	05/23/19	SM4500-P-E	

**Specific Conductance by SM2510B**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Specific Conductance (EC)</b>	<b>2620</b>	1.00	umhos/cm	1	1905288	05/22/19	05/22/19	SM2510B	

**Total Dissolved Solids by SM2540C**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Total Dissolved Solids</b>	<b>1300</b>	10.0	mg/L	1	1905255	05/17/19	05/17/19	SM2540C	

**pH by SM4500**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

**BW\_FergusonFarms47109\_NESE\_35\_5N\_65W**  
**1905198-01 (Water)**

**Summit Scientific**

**pH by SM4500**

<b>pH</b>	<b>7.38</b>	1.00	pH Units	1	1905245	05/16/19	05/16/19	SM4500-H+ B
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**Biological Activity Reaction Test**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Iron Related Bacteria</b>	<b>35000</b>	25.0	CFU/ml	1	1905248	05/17/19	05/20/19	BART	
<b>Sulfate Reducing Bacteria</b>	<b>115000</b>	200	"	"	"	"	"	"	
<b>Slime Forming Bacteria</b>	<b>13000</b>	500	"	"	"	"	"	"	

**Field Data**

Date Sampled: **05/16/19 11:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Specific Conductance (EC)</b>	<b>2071.6</b>		uS/cm	1	1905235	05/16/19	05/16/19	Field Method	
<b>Temperature</b>	<b>13.13</b>		Degrees C	"	"	"	"	"	
<b>Oxidation/Reduction Potential</b>	<b>90.1</b>		mv	"	"	"	"	"	
<b>Dissolved Oxygen</b>	<b>2.55</b>		mg/L	"	"	"	"	"	
<b>Turbidity</b>	<b>2.37</b>		NTU	"	"	"	"	"	
<b>pH</b>	<b>7.45</b>		SU	"	"	"	"	"	

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Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

### 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 1905297 - EPA 5030 Water MS

##### Blank (1905297-BLK1)

Prepared: 05/22/19 Analyzed: 05/25/19

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	0.0120		"	0.0133		90.2		23-173			
Surrogate: Toluene-d8	0.0132		"	0.0133		98.9		20-170			
Surrogate: 4-Bromofluorobenzene	0.0136		"	0.0133		102		21-167			

##### LCS (1905297-BS1)

Prepared: 05/22/19 Analyzed: 05/25/19

Benzene	0.0334	0.0010	mg/L	0.0333		100		51-132			
Toluene	0.0347	0.0010	"	0.0333		104		51-138			
Ethylbenzene	0.0380	0.0010	"	0.0333		114		58-146			
m,p-Xylene	0.0725	0.0020	"	0.0667		109		57-144			
o-Xylene	0.0343	0.0010	"	0.0333		103		53-146			
Surrogate: 1,2-Dichloroethane-d4	0.0127		"	0.0133		95.0		23-173			
Surrogate: Toluene-d8	0.0133		"	0.0133		99.6		20-170			
Surrogate: 4-Bromofluorobenzene	0.0140		"	0.0133		105		21-167			

##### Matrix Spike (1905297-MS1)

Source: 1905196-01

Prepared: 05/22/19 Analyzed: 05/25/19

Benzene	0.0339	0.0010	mg/L	0.0333	ND	102		34-141			
Toluene	0.0350	0.0010	"	0.0333	ND	105		27-151			
Ethylbenzene	0.0378	0.0010	"	0.0333	ND	113		29-160			
m,p-Xylene	0.0724	0.0020	"	0.0667	ND	109		20-166			
o-Xylene	0.0346	0.0010	"	0.0333	ND	104		33-159			
Surrogate: 1,2-Dichloroethane-d4	0.0129		"	0.0133		96.7		23-173			
Surrogate: Toluene-d8	0.0134		"	0.0133		100		20-170			
Surrogate: 4-Bromofluorobenzene	0.0133		"	0.0133		100		21-167			

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Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

**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 1905297 - EPA 5030 Water MS**

**Matrix Spike Dup (1905297-MSD1)**

Source: 1905196-01

Prepared: 05/22/19 Analyzed: 05/25/19

Benzene	0.0341	0.0010	mg/L	0.0333	ND	102	34-141	0.530	32	
Toluene	0.0357	0.0010	"	0.0333	ND	107	27-151	1.90	25	
Ethylbenzene	0.0388	0.0010	"	0.0333	ND	117	29-160	2.85	50	
m,p-Xylene	0.0745	0.0020	"	0.0667	ND	112	20-166	2.83	36	
o-Xylene	0.0353	0.0010	"	0.0333	ND	106	33-159	2.15	26	
Surrogate: 1,2-Dichloroethane-d4	0.0139		"	0.0133		104	23-173			
Surrogate: Toluene-d8	0.0135		"	0.0133		101	20-170			
Surrogate: 4-Bromofluorobenzene	0.0140		"	0.0133		105	21-167			

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Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337  
Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

**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 1905307 - EPA 3520B**

**Blank (1905307-BLK1)**

Prepared: 05/22/19 Analyzed: 05/23/19

C10-C28 (DRO)	ND	0.100	mg/L								
Surrogate: o-Terphenyl	0.0220		"	0.0250		88.0	44.8-129				

**LCS (1905307-BS1)**

Prepared: 05/22/19 Analyzed: 05/23/19

C10-C28 (DRO)	1.14	0.100	mg/L	1.00		114	70-130				
Surrogate: o-Terphenyl	0.0299		"	0.0250		120	44.8-129				

**Matrix Spike (1905307-MS1)**

Source: 1905196-01

Prepared: 05/22/19 Analyzed: 05/23/19

C10-C28 (DRO)	0.862	0.100	mg/L	1.00	ND	86.2	10-159				
Surrogate: o-Terphenyl	0.0229		"	0.0250		91.5	44.8-129				

**Matrix Spike Dup (1905307-MSD1)**

Source: 1905196-01

Prepared: 05/22/19 Analyzed: 05/23/19

C10-C28 (DRO)	0.817	0.100	mg/L	1.00	ND	81.7	10-159	5.33	20		
Surrogate: o-Terphenyl	0.0219		"	0.0250		87.6	44.8-129				

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Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

**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 1905249 - GC**

**Blank (1905249-BLK1)**

Prepared: 05/17/19 Analyzed: 05/20/19

Methane	ND	0.010	mg/L								
Ethane	ND	0.010	"								
Propane	ND	0.010	"								
Surrogate: Ethene	0.0442		"	0.0364		121	70-130				

**LCS (1905249-BS1)**

Prepared: 05/17/19 Analyzed: 05/20/19

Methane	0.040	0.010	mg/L	0.0428		93.1	70-130				
Ethane	0.074	0.010	"	0.0798		92.6	70-130				
Propane	0.11	0.010	"	0.139		77.8	70-130				
Surrogate: Ethene	0.0712		"	0.0728		97.8	70-130				

**Duplicate (1905249-DUP1)**

Source: 1905196-01

Prepared: 05/17/19 Analyzed: 05/20/19

Methane	ND	0.010	mg/L		ND					30	
Ethane	ND	0.010	"		ND					30	
Propane	ND	0.010	"		ND					30	
Surrogate: Ethene	0.0351		"	0.0364		96.4	70-130				

**Matrix Spike (1905249-MS1)**

Source: 1905196-01

Prepared: 05/17/19 Analyzed: 05/20/19

Methane	0.034	0.010	mg/L	0.0428	ND	79.0	70-130				
Ethane	0.065	0.010	"	0.0798	ND	81.3	70-130				
Propane	0.093	0.010	"	0.139	ND	67.1	70-130				QM-07
Surrogate: Ethene	0.0664		"	0.0728		91.2	70-130				

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Project Number: AFE# 16227 Fac ID: 754337  
Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

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

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

**Batch 1905263 - EPA 200.8**

**Blank (1905263-BLK1)**

Prepared & Analyzed: 05/20/19

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 (1905263-BS1)**

Prepared & Analyzed: 05/20/19

Calcium	5.47	0.0500	mg/L	5.00	109	85-115				
Iron	5.13	0.0100	"	5.00	103	85-115				
Magnesium	5.04	0.0500	"	5.00	101	85-115				
Manganese	0.511	0.00100	"	0.500	102	85-115				
Potassium	5.37	0.0500	"	5.00	107	85-115				
Sodium	5.26	0.0500	"	5.00	105	85-115				
Barium	0.522	0.00100	"	0.500	104	85-115				
Boron	2.65	0.0100	"	2.50	106	85-115				
Selenium	0.0539	0.00100	"	0.0500	108	85-115				
Strontium	0.513	0.0100	"	0.500	103	85-115				

**Duplicate (1905263-DUP1)**

Source: 1905196-01

Prepared & Analyzed: 05/20/19

Calcium	269	0.0500	mg/L	277	3.00	20				
Iron	0.00984	0.0100	"	0.00888	10.3	20				
Magnesium	240	0.0500	"	242	1.14	20				
Manganese	0.176	0.00100	"	0.181	2.56	20				
Potassium	5.65	0.0500	"	5.81	2.84	20				
Sodium	206	0.0500	"	206	0.0984	20				
Barium	0.0299	0.00100	"	0.0314	4.89	20				
Boron	0.310	0.0100	"	0.330	6.06	20				
Selenium	0.0152	0.00100	"	0.0129	16.8	20				
Strontium	5.34	0.0100	"	5.43	1.65	20				

Summit Scientific

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

**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 1905263 - EPA 200.8**

**Matrix Spike (1905263-MS1)**

Source: 1905196-01

Prepared & Analyzed: 05/20/19

Calcium	269	0.0500	mg/L	5.00	277	NR	70-130				QM-02
Iron	5.03	0.0100	"	5.00	0.00888	100	70-130				
Magnesium	248	0.0500	"	5.00	242	113	70-130				
Manganese	0.683	0.00100	"	0.500	0.181	100	70-130				
Potassium	9.60	0.0500	"	5.00	5.81	75.8	70-130				
Sodium	210	0.0500	"	5.00	206	81.6	70-130				
Barium	0.527	0.00100	"	0.500	0.0314	99.0	70-130				
Boron	2.82	0.0100	"	2.50	0.330	99.7	70-130				
Selenium	0.0628	0.00100	"	0.0500	0.0129	99.9	70-130				
Strontium	6.01	0.0100	"	0.500	5.43	116	70-130				

**Matrix Spike Dup (1905263-MSD1)**

Source: 1905196-01

Prepared & Analyzed: 05/20/19

Calcium	276	0.0500	mg/L	5.00	277	NR	70-130	2.61	25		QM-02
Iron	4.89	0.0100	"	5.00	0.00888	97.7	70-130	2.73	25		
Magnesium	246	0.0500	"	5.00	242	80.3	70-130	0.665	25		
Manganese	0.700	0.00100	"	0.500	0.181	104	70-130	2.47	25		
Potassium	9.63	0.0500	"	5.00	5.81	76.4	70-130	0.312	25		
Sodium	211	0.0500	"	5.00	206	86.9	70-130	0.126	25		
Barium	0.551	0.00100	"	0.500	0.0314	104	70-130	4.43	25		
Boron	2.78	0.0100	"	2.50	0.330	97.9	70-130	1.61	25		
Selenium	0.0690	0.00100	"	0.0500	0.0129	112	70-130	9.34	25		
Strontium	6.06	0.0100	"	0.500	5.43	127	70-130	0.881	25		

Summit Scientific

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337  
Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

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

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

**Batch 1905241 - General Preparation**

**Blank (1905241-BLK1)**

Prepared & Analyzed: 05/17/19

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 (1905241-BS1)**

Prepared & Analyzed: 05/17/19

Bromide	9.23	0.200	mg/L	10.0	92.3	90-110				
Chloride	2.95	0.100	"	3.00	98.5	90-110				
Fluoride	1.96	0.200	"	2.00	98.0	90-110				
Sulfate	15.1	0.300	"	15.0	101	90-110				
Nitrate as N	2.74	0.100	"	3.00	91.5	90-110				
Nitrite as N	2.96	0.100	"	3.00	98.7	90-110				

**Duplicate (1905241-DUP1)**

Source: 1905196-01

Prepared & Analyzed: 05/17/19

Bromide	0.342	0.200	mg/L	0.312			9.17	20		
Chloride	ND	0.100	"	68.5				20		QM-02
Fluoride	0.735	0.200	"	0.696			5.45	20		
Sulfate	ND	0.300	"	1290				20		QM-02
Nitrate as N	15.1	0.100	"	15.3			1.18	20		
Nitrite as N	ND	0.100	"	ND				20		
Nitrate/Nitrite as N	ND	0.200	"	15.3				20		

**Matrix Spike (1905241-MS1)**

Source: 1905196-01

Prepared & Analyzed: 05/17/19

Bromide	9.07	0.200	mg/L	10.0	0.312	87.6	80-120			
Chloride	ND	0.100	"	3.00	68.5	NR	80-120			QM-02
Fluoride	2.77	0.200	"	2.00	0.696	104	80-120			
Sulfate	ND	0.300	"	15.0	1290	NR	80-120			QM-02
Nitrate as N	18.2	0.100	"	3.00	15.3	97.4	80-120			
Nitrite as N	2.92	0.100	"	3.00	ND	97.5	80-120			

Summit Scientific

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337  
Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

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

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

**Batch 1905310 - General Preparation**

**Blank (1905310-BLK1)**

Prepared & Analyzed: 05/23/19

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

**LCS (1905310-BS1)**

Prepared & Analyzed: 05/23/19

Total Alkalinity	110	10.0	mg/L as CaCO3	100	110	80-120				
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**Duplicate (1905310-DUP1)**

Source: 1905196-01

Prepared & Analyzed: 05/23/19

Total Alkalinity	470	10.0	mg/L as CaCO3		470		0.00	20		
Carbonate	ND	10.0	"		ND			20		
Bicarbonate	470	10.0	"		470		0.00	20		

**Matrix Spike (1905310-MS1)**

Source: 1905196-01

Prepared & Analyzed: 05/23/19

Total Alkalinity	550	10.0	mg/L as CaCO3	100	470	80.0	70-130			
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**Matrix Spike Dup (1905310-MSD1)**

Source: 1905196-01

Prepared & Analyzed: 05/23/19

Total Alkalinity	550	10.0	mg/L as CaCO3	100	470	80.0	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: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

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

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

**Batch 1905303 - General Preparation**

**Blank (1905303-BLK1)**

Prepared: 05/22/19 Analyzed: 05/23/19

Phosphorus - Total ND 0.0500 mg/L

**LCS (1905303-BS1)**

Prepared: 05/22/19 Analyzed: 05/23/19

Phosphorus - Total 0.910 0.0500 mg/L 1.00 91.0 80-120

**Duplicate (1905303-DUP1)**

**Source: 1905196-01**

Prepared: 05/22/19 Analyzed: 05/23/19

Phosphorus - Total 0.0320 0.0500 mg/L 0.0310 3.17 20

**Matrix Spike (1905303-MS1)**

**Source: 1905196-01**

Prepared: 05/22/19 Analyzed: 05/23/19

Phosphorus - Total 0.990 0.0500 mg/L 1.00 0.0310 95.9 70-130

**Matrix Spike Dup (1905303-MSD1)**

**Source: 1905196-01**

Prepared: 05/22/19 Analyzed: 05/23/19

Phosphorus - Total 0.976 0.0500 mg/L 1.00 0.0310 94.5 70-130 1.42 20

Summit Scientific

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
 05/28/19 06:50

**Specific Conductance by SM2510B - Quality Control**

**Summit Scientific**

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

**Batch 1905288 - General Preparation**

**Blank (1905288-BLK1)**

Prepared & Analyzed: 05/22/19

Specific Conductance (EC) ND 1.00 umhos/cm

**Duplicate (1905288-DUP1)**

Source: 1905196-01

Prepared & Analyzed: 05/22/19

Specific Conductance (EC) 3550 1.00 umhos/cm 3510 1.08 20

Summit Scientific

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
 05/28/19 06:50

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

**Summit Scientific**

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

**Batch 1905255 - General Preparation**

**Blank (1905255-BLK1)**

Prepared & Analyzed: 05/17/19

Total Dissolved Solids                      ND                      10.0                      mg/L

**Duplicate (1905255-DUP1)**

**Source: 1905196-01**

Prepared & Analyzed: 05/17/19

Total Dissolved Solids                      1740                      10.0                      mg/L                      1740                      0.173                      20

Summit Scientific

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
 05/28/19 06:50

**pH by SM4500 - Quality Control**

**Summit Scientific**

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

**Batch 1905245 - General Preparation**

**LCS (1905245-BS1)**

Prepared & Analyzed: 05/16/19

pH	9.39	1.00	pH Units	9.23	102	90-110
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**Duplicate (1905245-DUP1)**

Source: 1905198-01

Prepared & Analyzed: 05/16/19

pH	7.41	1.00	pH Units	7.38	0.406	20
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Summit Scientific

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
 05/28/19 06:50

**Biological Activity Reaction Test - Quality Control**

**Summit Scientific**

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

**Batch 1905248 - General Preparation**

**Blank (1905248-BLK1)**

Prepared: 05/17/19 Analyzed: 05/20/19

Iron Related Bacteria	ND	25.0	CFU/ml								
Sulfate Reducing Bacteria	ND	200	"								
Slime Forming Bacteria	ND	500	"								

Summit Scientific

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

Project: BWSE/GWA\_Ferguson\_43\_35

Project Number: AFE# 16227 Fac ID: 754337

Project Manager: Heather Shideman

**Reported:**  
05/28/19 06:50

### 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