

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

February 13, 2020

Heather Shideman

Extraction Oil&Gas

370 17th Street Suite 5300

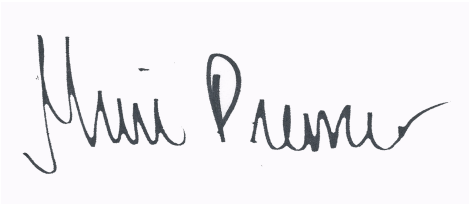
Denver, CO 80202

RE: BWSE/GWA_Rinn_Valley_East

Work Order # 2001391

Enclosed are the results of analyses for samples received by Summit Scientific on 01/31/20 17:05. 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 Paul Shrewsbury

President



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

Project: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BW_Hannon_260310	2001391-01	Water	01/31/20 16:25	01/31/20 17:05

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.

Sample Receipt Checklist

S2 Work Order 2001391

Client: APEX COMPANIES Client Project ID: BWSE GWA RINN

Shipped Via: H.D./P.U./FedEx/UPS/USPS/Other Airbill #: VALLEY EAST

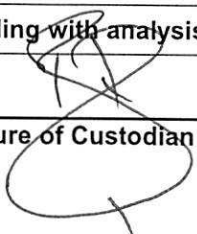
Matrix (check all that apply): Air Soil/Solid Water Other: _____
(Describe)

Temp (°C)	3.2
-----------	-----

Thermometer ID: 61857155-K

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

RZ
Custodian Printed Name or Initials


Signature of Custodian

1/31/20
Date/Time



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

Project: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

BW_Hannon_260310
NWSE_17_2N_68W
2001391-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	0.0010		mg/L	1	2002050	02/05/20	02/06/20	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: **01/31/20 16:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		66.4 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		87.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		82.5 %		21-167		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
C10-C28 (DRO)	ND	0.100		mg/L	1	2002066	02/06/20	02/07/20	EPA 8015M	

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: o-Terphenyl		81.6 %		44.8-129		"	"	"	"	

Dissolved Gases by RSK-175

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

BW_Hannon_260310
NWSE_17_2N_68W
2001391-01 (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	2002014	02/03/20	02/03/20	RSK-175 mod	
Ethane	ND	0.010	"	"	"	"	"	"	
Propane	ND	0.010	"	"	"	"	"	"	

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: Ethene		89.8 %	70-130		"	"	"	"	

Dissolved Metals by EPA Method 200.8

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	73.0	0.0500	mg/L	1	2002017	02/03/20	02/03/20	EPA 200.8	
Iron	ND	0.0100	"	"	"	"	"	"	
Magnesium	61.3	0.0500	"	"	"	"	"	"	
Manganese	0.00399	0.00100	"	"	"	"	"	"	
Potassium	2.61	0.0500	"	"	"	"	"	"	
Sodium	88.1	0.0500	"	"	"	"	"	"	
Barium	0.0498	0.00100	"	"	"	"	"	"	
Boron	0.227	0.0100	"	"	"	"	"	"	
Selenium	0.00511	0.00100	"	"	"	"	"	"	
Strontium	1.67	0.0100	"	"	"	"	"	"	

Anions by EPA Method 300.0

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Bromide	0.304	0.200	mg/L	1	2002021	02/02/20	02/02/20	EPA 300.0	
Chloride	35.3	10.0	"	100	"	"	"	"	
Fluoride	0.786	0.200	"	1	"	"	"	"	
Sulfate	157	30.0	"	100	"	"	"	"	
Nitrate as N	4.44	0.100	"	1	"	"	"	"	
Nitrite as N	ND	0.100	"	"	"	"	"	"	
Nitrate/Nitrite as N	4.44	0.200	"	"	"	"	"	"	

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

BW_Hannon_260310
NWSE_17_2N_68W
2001391-01 (Water)

Summit Scientific

Anions by EPA Method 300.0

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Total Alkalinity	300	10.0	mg/L as CaCO3	1	2002116	02/12/20	02/13/20	SM2320-B	
Carbonate	ND	10.0	"	"	"	"	"	"	
Bicarbonate	300	10.0	"	"	"	"	"	"	

Conventional Chemistry Parameters by APHA/EPA Methods

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Phosphorus - Total	ND	0.0500	mg/L	1	2002078	02/06/20	02/13/20	SM4500-P-E	

Specific Conductance by SM2510B

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	888	1.00	umhos/cm	1	2002047	02/05/20	02/05/20	SM2510B	

Total Dissolved Solids by SM2540C

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Total Dissolved Solids	433	10.0	mg/L	1	2002046	02/05/20	02/05/20	SM2540C	

pH by SM4500

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
---------	--------	-----------------	-------	----------	-------	----------	----------	--------	-------

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

BW_Hannon_260310
NWSE_17_2N_68W
2001391-01 (Water)

Summit Scientific

pH by SM4500

pH	7.08	1.00	pH Units	1	2002074	01/31/20	02/03/20	SM4500-H+ B
-----------	-------------	------	----------	---	---------	----------	----------	-------------

Biological Activity Reaction Test

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting			Batch	Prepared	Analyzed	Method	Notes
		Limit	Units	Dilution					
Iron Related Bacteria	35000	25.0	CFU/ml	1	2002022	02/03/20	02/12/20	BART	
Sulfate Reducing Bacteria	ND	200	"	"	"	"	"	"	
Slime Forming Bacteria	ND	500	"	"	"	"	"	"	

Field Data

Date Sampled: **01/31/20 16:25**

Analyte	Result	Reporting			Batch	Prepared	Analyzed	Method	Notes
		Limit	Units	Dilution					
Specific Conductance (EC)	1198		uS/cm	1	2002001	01/31/20	01/31/20	Field Method	
Temperature	14.5		Degrees C	"	"	"	"	"	
Oxidation/Reduction Potential	163		mv	"	"	"	"	"	
Dissolved Oxygen	4.84		mg/L	"	"	"	"	"	
Turbidity	1.15		NTU	"	"	"	"	"	
pH	7.48		SU	"	"	"	"	"	

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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 2002050 - EPA 5030 Water MS

Blank (2002050-BLK1)

Prepared & Analyzed: 02/05/20

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	0.00831		"	0.0133		62.3			23-173	
Surrogate: Toluene-d8	0.0116		"	0.0133		86.6			20-170	
Surrogate: 4-Bromofluorobenzene	0.0108		"	0.0133		81.0			21-167	

LCS (2002050-BS1)

Prepared & Analyzed: 02/05/20

Benzene	0.0252	0.0010	mg/L	0.0333		75.7			51-132	
Toluene	0.0226	0.0010	"	0.0333		67.6			51-138	
Ethylbenzene	0.0281	0.0010	"	0.0333		84.4			58-146	
m,p-Xylene	0.0515	0.0020	"	0.0667		77.3			57-144	
o-Xylene	0.0253	0.0010	"	0.0333		76.0			53-146	
Surrogate: 1,2-Dichloroethane-d4	0.00691		"	0.0133		51.8			23-173	
Surrogate: Toluene-d8	0.0113		"	0.0133		85.0			20-170	
Surrogate: 4-Bromofluorobenzene	0.0101		"	0.0133		75.5			21-167	

Matrix Spike (2002050-MS1)

Source: 2001392-01

Prepared & Analyzed: 02/05/20

Benzene	0.0246	0.0010	mg/L	0.0333	ND	73.8			34-141	
Toluene	0.0256	0.0010	"	0.0333	ND	76.9			27-151	
Ethylbenzene	0.0293	0.0010	"	0.0333	ND	87.9			29-160	
m,p-Xylene	0.0556	0.0020	"	0.0667	ND	83.4			20-166	
o-Xylene	0.0270	0.0010	"	0.0333	ND	81.1			33-159	
Surrogate: 1,2-Dichloroethane-d4	0.00771		"	0.0133		57.8			23-173	
Surrogate: Toluene-d8	0.0127		"	0.0133		95.0			20-170	
Surrogate: 4-Bromofluorobenzene	0.0105		"	0.0133		79.0			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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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 2002050 - EPA 5030 Water MS

Matrix Spike Dup (2002050-MSD1)	Source: 2001392-01			Prepared & Analyzed: 02/05/20						
Benzene	0.0253	0.0010	mg/L	0.0333	ND	75.8	34-141	2.69	32	
Toluene	0.0244	0.0010	"	0.0333	ND	73.1	27-151	5.04	25	
Ethylbenzene	0.0278	0.0010	"	0.0333	ND	83.4	29-160	5.18	50	
m,p-Xylene	0.0518	0.0020	"	0.0667	ND	77.8	20-166	6.94	36	
o-Xylene	0.0254	0.0010	"	0.0333	ND	76.1	33-159	6.30	26	
Surrogate: 1,2-Dichloroethane-d4	0.0108		"	0.0133		80.7	23-173			
Surrogate: Toluene-d8	0.0120		"	0.0133		89.6	20-170			
Surrogate: 4-Bromofluorobenzene	0.0105		"	0.0133		78.9	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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

Extractable Petroleum Hydrocarbons by 8015 - Quality Control
Summit Scientific

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

Batch 2002066 - EPA 3520B

Blank (2002066-BLK1)

Prepared: 02/06/20 Analyzed: 02/07/20

C10-C28 (DRO)	ND	0.100	mg/L							
Surrogate: <i>o</i> -Terphenyl	0.0240		"	0.0250		95.8	44.8-129			

LCS (2002066-BS1)

Prepared: 02/06/20 Analyzed: 02/07/20

C10-C28 (DRO)	1.05	0.100	mg/L	1.00		105	70-130			
Surrogate: <i>o</i> -Terphenyl	0.0257		"	0.0250		103	44.8-129			

LCS Dup (2002066-BSD1)

Prepared: 02/06/20 Analyzed: 02/07/20

C10-C28 (DRO)	1.14	0.100	mg/L	1.00		114	70-130	8.29	200	
Surrogate: <i>o</i> -Terphenyl	0.0278		"	0.0250		111	44.8-129			

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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 2002014 - GC

Blank (2002014-BLK1)

Prepared & Analyzed: 02/03/20

Methane	ND	0.010	mg/L							
Ethane	ND	0.010	"							
Propane	ND	0.010	"							
Surrogate: Ethene	0.0410		"	0.0364		113	70-130			

LCS (2002014-BS1)

Prepared & Analyzed: 02/03/20

Methane	0.030	0.010	mg/L	0.0428		70.6	70-130			
Ethane	0.080	0.010	"	0.0798		100	70-130			
Propane	0.12	0.010	"	0.139		85.9	70-130			
Surrogate: Ethene	0.0768		"	0.0728		105	70-130			

Duplicate (2002014-DUP1)

Source: 2001391-01

Prepared & Analyzed: 02/03/20

Methane	ND	0.010	mg/L		ND				30	
Ethane	ND	0.010	"		ND				30	
Propane	ND	0.010	"		ND				30	
Surrogate: Ethene	0.0326		"	0.0364		89.6	70-130			

Matrix Spike (2002014-MS1)

Source: 2001391-01

Prepared & Analyzed: 02/03/20

Methane	0.026	0.010	mg/L	0.0428	ND	61.5	70-130			QM-07
Ethane	0.075	0.010	"	0.0798	ND	94.0	70-130			
Propane	0.11	0.010	"	0.139	ND	79.4	70-130			
Surrogate: Ethene	0.0723		"	0.0728		99.3	70-130			

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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 2002017 - EPA 200.8

Blank (2002017-BLK1)

Prepared & Analyzed: 02/03/20

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 (2002017-BS1)

Prepared & Analyzed: 02/03/20

Calcium	5.18	0.0500	mg/L	5.00	104	85-115				
Iron	5.44	0.0100	"	5.00	109	85-115				
Magnesium	5.28	0.0500	"	5.00	106	85-115				
Manganese	0.537	0.00100	"	0.500	107	85-115				
Potassium	5.28	0.0500	"	5.00	106	85-115				
Sodium	5.16	0.0500	"	5.00	103	85-115				
Barium	0.545	0.00100	"	0.500	109	85-115				
Boron	2.54	0.0100	"	2.50	102	85-115				
Selenium	0.0539	0.00100	"	0.0500	108	85-115				
Strontium	0.558	0.0100	"	0.500	112	85-115				

Duplicate (2002017-DUP1)

Source: 2001387-01

Prepared & Analyzed: 02/03/20

Calcium	102	0.0500	mg/L	100	1.75	20				
Iron	0.112	0.0100	"	0.109	2.21	20				
Magnesium	42.2	0.0500	"	41.4	1.87	20				
Manganese	0.252	0.00100	"	0.246	2.22	20				
Potassium	4.09	0.0500	"	4.00	2.26	20				
Sodium	99.2	0.0500	"	98.5	0.781	20				
Barium	0.0483	0.00100	"	0.0462	4.45	20				
Boron	0.140	0.0100	"	0.144	2.89	20				
Selenium	ND	0.00100	"	0.000124		20				
Strontium	1.63	0.0100	"	1.61	1.49	20				

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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 2002017 - EPA 200.8

Matrix Spike (2002017-MS1)

Source: 2001387-01

Prepared & Analyzed: 02/03/20

Calcium	105	0.0500	mg/L	5.00	100	90.8	70-130			
Iron	6.01	0.0100	"	5.00	0.109	118	70-130			
Magnesium	46.9	0.0500	"	5.00	41.4	111	70-130			
Manganese	0.778	0.00100	"	0.500	0.246	106	70-130			
Potassium	9.94	0.0500	"	5.00	4.00	119	70-130			
Sodium	103	0.0500	"	5.00	98.5	94.0	70-130			
Barium	0.588	0.00100	"	0.500	0.0462	108	70-130			
Boron	2.84	0.0100	"	2.50	0.144	108	70-130			
Selenium	0.0515	0.00100	"	0.0500	0.000124	103	70-130			
Strontium	2.15	0.0100	"	0.500	1.61	108	70-130			

Matrix Spike Dup (2002017-MSD1)

Source: 2001387-01

Prepared & Analyzed: 02/03/20

Calcium	105	0.0500	mg/L	5.00	100	88.9	70-130	0.0915	25
Iron	5.89	0.0100	"	5.00	0.109	116	70-130	1.97	25
Magnesium	46.3	0.0500	"	5.00	41.4	98.4	70-130	1.34	25
Manganese	0.768	0.00100	"	0.500	0.246	104	70-130	1.36	25
Potassium	9.74	0.0500	"	5.00	4.00	115	70-130	2.06	25
Sodium	102	0.0500	"	5.00	98.5	76.1	70-130	0.870	25
Barium	0.557	0.00100	"	0.500	0.0462	102	70-130	5.41	25
Boron	2.81	0.0100	"	2.50	0.144	107	70-130	1.12	25
Selenium	0.0560	0.00100	"	0.0500	0.000124	112	70-130	8.38	25
Strontium	2.13	0.0100	"	0.500	1.61	104	70-130	0.829	25

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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 2002021 - General Preparation

Blank (2002021-BLK1)

Prepared & Analyzed: 02/02/20

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 (2002021-BS1)

Prepared & Analyzed: 02/02/20

Bromide	9.85	0.200	mg/L	10.0		98.5	90-110			
Chloride	3.03	0.100	"	3.00		101	90-110			
Fluoride	2.19	0.200	"	2.00		110	90-110			
Sulfate	14.6	0.300	"	15.0		97.0	90-110			
Nitrate as N	3.10	0.100	"	3.00		103	90-110			
Nitrite as N	2.98	0.100	"	3.00		99.4	90-110			

Duplicate (2002021-DUP1)

Source: 2001391-01

Prepared & Analyzed: 02/02/20

Bromide	0.303	0.200	mg/L		0.304			0.329	20	
Chloride	36.7	0.100	"		35.3			3.87	20	
Fluoride	0.792	0.200	"		0.786			0.760	20	
Sulfate	185	0.300	"		157			16.2	20	
Nitrate as N	4.44	0.100	"		4.44			0.0676	20	
Nitrite as N	ND	0.100	"		ND				20	
Nitrate/Nitrite as N	4.44	0.200	"		4.44			0.0676	20	

Matrix Spike (2002021-MS1)

Source: 2001391-01

Prepared & Analyzed: 02/02/20

Bromide	10.6	0.200	mg/L	10.0	0.304	103	80-120			
Chloride	37.4	0.100	"	3.00	35.3	70.5	80-120			QM-02
Fluoride	2.91	0.200	"	2.00	0.786	106	80-120			
Sulfate	194	0.300	"	15.0	157	245	80-120			QM-02
Nitrate as N	7.66	0.100	"	3.00	4.44	108	80-120			
Nitrite as N	2.74	0.100	"	3.00	ND	91.5	80-120			

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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 2002116 - General Preparation

Blank (2002116-BLK1)

Prepared: 02/12/20 Analyzed: 02/13/20

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

LCS (2002116-BS1)

Prepared: 02/12/20 Analyzed: 02/13/20

Total Alkalinity	100	10.0	mg/L as CaCO3	100		100	80-120			
------------------	-----	------	---------------	-----	--	-----	--------	--	--	--

Duplicate (2002116-DUP1)

Source: 2001391-01

Prepared: 02/12/20 Analyzed: 02/13/20

Total Alkalinity	310	10.0	mg/L as CaCO3		300			3.28	20	
Carbonate	ND	10.0	"		ND				20	
Bicarbonate	310	10.0	"		300			3.28	20	

Matrix Spike (2002116-MS1)

Source: 2001391-01

Prepared: 02/12/20 Analyzed: 02/13/20

Total Alkalinity	370	10.0	mg/L as CaCO3	100	300	70.0	70-130			
------------------	-----	------	---------------	-----	-----	------	--------	--	--	--

Matrix Spike Dup (2002116-MSD1)

Source: 2001391-01

Prepared: 02/12/20 Analyzed: 02/13/20

Total Alkalinity	370	10.0	mg/L as CaCO3	100	300	70.0	70-130	0.00	20	
------------------	-----	------	---------------	-----	-----	------	--------	------	----	--

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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 2002078 - General Preparation

Blank (2002078-BLK1)

Prepared: 02/06/20 Analyzed: 02/13/20

Phosphorus - Total ND 0.0500 mg/L

LCS (2002078-BS1)

Prepared: 02/06/20 Analyzed: 02/13/20

Phosphorus - Total 1.09 0.0500 mg/L 1.00 109 80-120

Duplicate (2002078-DUP1)

Source: 2001391-01

Prepared: 02/06/20 Analyzed: 02/13/20

Phosphorus - Total ND 0.0500 mg/L ND 20

Matrix Spike (2002078-MS1)

Source: 2001391-01

Prepared: 02/06/20 Analyzed: 02/13/20

Phosphorus - Total 1.05 0.0500 mg/L 1.00 ND 105 70-130

Matrix Spike Dup (2002078-MSD1)

Source: 2001391-01

Prepared: 02/06/20 Analyzed: 02/13/20

Phosphorus - Total 1.06 0.0500 mg/L 1.00 ND 106 70-130 0.285 20

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: BWSE/GWA_Rinn_Valley_East Project Number: AFE#1800312 Project Manager: Heather Shideman	Reported: 02/13/20 16:56
--	--	------------------------------------

Specific Conductance by SM2510B - Quality Control
Summit Scientific

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

Batch 2002047 - General Preparation

Blank (2002047-BLK1)		Prepared & Analyzed: 02/05/20									
Specific Conductance (EC)	ND	1.00	umhos/cm								
Duplicate (2002047-DUP1)		Source: 2001391-01		Prepared & Analyzed: 02/05/20							
Specific Conductance (EC)	890	1.00	umhos/cm		888			0.191		20	

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
 Project Manager: Heather Shideman

Reported:
 02/13/20 16:56

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 2002046 - General Preparation

Blank (2002046-BLK1)

Prepared & Analyzed: 02/05/20

Total Dissolved Solids ND 10.0 mg/L

Duplicate (2002046-DUP1)

Source: 2001391-01

Prepared & Analyzed: 02/05/20

Total Dissolved Solids 435 10.0 mg/L 433 0.438 20

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
 Project Manager: Heather Shideman

Reported:
 02/13/20 16:56

pH by SM4500 - Quality Control
Summit Scientific

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

Batch 2002074 - General Preparation

LCS (2002074-BS1)

Prepared: 01/31/20 Analyzed: 02/03/20

pH	9.15	1.00	pH Units	9.18	99.7	90-110
----	------	------	----------	------	------	--------

Duplicate (2002074-DUP1)

Source: 2001394-01

Prepared: 01/31/20 Analyzed: 02/03/20

pH	6.43	1.00	pH Units	6.44	0.155	20
----	------	------	----------	------	-------	----

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: BWSE/GWA_Rinn_Valley_East Project Number: AFE#1800312 Project Manager: Heather Shideman	Reported: 02/13/20 16:56
--	--	------------------------------------

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 2002022 - General Preparation

Blank (2002022-BLK1)

Prepared: 02/03/20 Analyzed: 02/12/20

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

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: BWSE/GWA_Rinn_Valley_East

Project Number: AFE#1800312
Project Manager: Heather Shideman

Reported:
02/13/20 16:56

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