

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

May 05, 2022

Vince DeCianne

Whiting Oil & Gas

retail

Denver, CO 80215

RE: Emerald 147 Closure

Work Order #2204261

Enclosed are the results of analyses for samples received by Summit Scientific on 04/18/22 10:20. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. Shrewsbury', with a stylized, cursive script.

Paul Shrewsbury

President



Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
20220414_Emerald147_WH@2ft	2204261-01	Soil	04/14/22 15:30	04/18/22 10:20
20220414_Emerald147_AOC@4ft	2204261-02	Soil	04/14/22 15:40	04/18/22 10:20
20220414_Emerald147_TP_Comp	2204261-03	Soil	04/14/22 15:45	04/18/22 10:20
20220414_Emerald147_TP_Dis	2204261-04	Soil	04/14/22 15:50	04/18/22 10:20

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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.

S_2

2204261

4653 Table Mountain Drive ♦ Golden, Colorado 80403

303-277-9310 ♦ 303-374-5933 (f)

Page: 1 of 1

Client: Whiting Oil & Gas

Project Manager: Vince DeCianne

Address: 707 17th Street, Suite 3000

E-Mail: jveith@kleinfelder.com

City/State/Zip: Denver, CO 80202


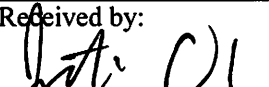
kyle.waggoner@whiting.com

Phone: 970-309-6553

Project Name: Emerald 147 Closure

Sampler Name: Jordan Veith

Project Number: 20221740.001A

					Preservative				Matrix				Analysis Requested										Special Instructions		
ID	Sample Description	Date Sampled	Time Sampled	# of containers	HCl	HNO3	None	Other	Water	Soil	Air-Canister #	Other	COGCC Table 915-1	Arsenic, EC, pH, SAR	EC	SAR	pH	Arsenic	COGCC Table 915-1	MINUS PAHs					
1	20220414_Emerald 147_WH@2ft	4/14/2022	15:30	3			X			X										X					
2	20220414_Emerald 147_AOC@4ft	4/14/2022	15:40	3			X			X										X					
3	20220414_Emerald 147_TP_COMP	4/14/2022	15:45	3			X			X										X					
4	20220414_Emerald 147_TP_DIS	4/14/2022	15:50	3			X			X										X					
5																									
6																									
7																									
8																									
9																									
10																									
Relinquished by: 					Date/Time: _____					Received by: 					Date/Time: <u>4/14/22 10:40</u>					Turn Around Time (Check) _____					Notes: _____
Relinquished by: _____					Date/Time: _____					Received by: _____					Date/Time: _____					Day _____ 72 hours _____ 24 hours _____					
Relinquished by: _____					Date/Time: _____					Received by: _____					Date/Time: _____					Standard _____ 48 hours _____					
Relinquished by: _____					Date/Time: _____					Received by: _____					Date/Time: _____					Sample Integrity: _____					
Relinquished by: _____					Date/Time: _____					Received by: _____					Date/Time: _____					Temperature Upon Receipt: <u>0.7</u> Samples					
Relinquished by: _____					Date/Time: _____					Received by: _____					Date/Time: _____					Intact: <u>Yes</u> No					

S₂

Sample Receipt Checklist

S2 Work Order# 2204261Client: Whiting Client Project ID: Emerald 147 closureShipped Via: H.D./P.U./FedEx/UPS/USPS/Other Airbill #: _____

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Matrix (Check all that apply) Air ☐ Soil/Solid ☒ Water ☐ Other ☐Temp (°C) 0.7Thermometer # 02

	Yes	No	N/A	Comments (if any)
If samples require cooling, is the temperature < 6 °C ⁽¹⁾ ? NOTE: If samples are delivered the same day of sampling, this requirement is met if there is evidence that cooling has begun.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	On ice.
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 type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples due within 48 hours present?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are water samples with short hold times present? Note the short hold analysis in the comments column - pH, Nitrate/Nitrite, Ferrous Iron (Fe ²⁺), Hexavalent Chromium (Cr ⁶⁺ , Cr VI), COD/BOD, Total Coliform, E. Coli, Total Residual Chlorine (TRC), Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the comments column – HCl, H ₂ SO ₄ , NaOH, HNO ₃ , etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
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.				

JB

Custodian Printed Name

4/18/22

Date/Time



Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

20220414_Emerald147_WH@2ft
2204261-01 (Soil)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0020	mg/kg	1	BFD0445	04/21/22	04/22/22	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
Naphthalene	ND	0.0038	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		95.9 %	50-150		"	"	"	"	
Surrogate: Toluene-d8		102 %	50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.8 %	50-150		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	BFD0448	04/21/22	04/22/22	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		97.0 %	30-150		"	"	"	"	

Total Metals by EPA 6020B Hot Water Soluble Extraction

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Project Manager: Vince DeCianne

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05/05/22 11:09

**20220414_Emerald147_WH@2ft
2204261-01 (Soil)**

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Total Metals by EPA 6020B Hot Water Soluble Extraction

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Boron	0.170	0.0100	mg/L	1	BFD0523	04/25/22	04/30/22	EPA 6020B	

Total Metals by EPA 6020B

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Arsenic	6.83	0.242	mg/kg dry	1	BFD0538	04/25/22	04/30/22	EPA 6020B	
Barium	129	0.484	"	"	"	"	"	"	
Cadmium	0.365	0.242	"	"	"	"	"	"	
Copper	12.1	0.484	"	"	"	"	"	"	
Lead	9.57	0.242	"	"	"	"	"	"	
Nickel	13.5	0.484	"	"	"	"	"	"	
Selenium	0.816	0.315	"	"	"	"	"	"	
Silver	0.0718	0.0242	"	"	"	"	"	"	
Zinc	51.7	0.484	"	"	"	"	"	"	

Hexavalent Chromium by EPA Method 7196

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BFD0624	04/28/22	04/28/22	EPA 7196A	

Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Calcium	281	0.0605	mg/L dry	1	BFD0562	04/26/22	05/02/22	EPA 6020B	
Magnesium	263	0.0605	"	"	"	"	"	"	
Sodium	687	0.0605	"	"	"	"	"	"	

Calculated Analysis

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

20220414_Emerald147_WH@2ft
2204261-01 (Soil)

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Calculated Analysis

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	7.08	0.00100	units	1	BFE0018	05/02/22	05/02/22	Calculation	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	82.6		%	1	BFD0495	04/22/22	04/26/22	Calculation	

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	6.40	0.0100	mmhos/cm	1	BFD0591	04/27/22	04/27/22	EPA 120.1	

Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction

Date Sampled: **04/14/22 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	7.80		pH Units	1	BFD0589	04/27/22	04/27/22	EPA 9045D	

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

20220414_Emerald147_AOC@4ft
2204261-02 (Soil)

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Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	0.0020	mg/kg	1	BFD0445	04/21/22	04/22/22	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
Naphthalene	ND	0.0038	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		102 %	50-150		"	"	"	"	
Surrogate: Toluene-d8		103 %	50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		100 %	50-150		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
C10-C28 (DRO)	ND	50	mg/kg	1	BFD0448	04/21/22	04/22/22	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: o-Terphenyl		101 %	30-150		"	"	"	"	

Total Metals by EPA 6020B Hot Water Soluble Extraction

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Project Manager: Vince DeCianne

Reported:
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20220414_Emerald147_AOC@4ft
2204261-02 (Soil)

Summit Scientific

Total Metals by EPA 6020B Hot Water Soluble Extraction

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Boron	0.393	0.0100	mg/L	1	BFD0523	04/25/22	04/30/22	EPA 6020B	

Total Metals by EPA 6020B

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Arsenic	8.29	0.238	mg/kg dry	1	BFD0538	04/25/22	04/30/22	EPA 6020B	
Barium	82.2	0.476	"	"	"	"	"	"	
Cadmium	0.250	0.238	"	"	"	"	"	"	
Copper	12.1	0.476	"	"	"	"	"	"	
Lead	16.9	0.238	"	"	"	"	"	"	
Nickel	17.3	0.476	"	"	"	"	"	"	
Selenium	1.50	0.310	"	"	"	"	"	"	
Silver	0.103	0.0238	"	"	"	"	"	"	
Zinc	78.4	0.476	"	"	"	"	"	"	

Hexavalent Chromium by EPA Method 7196

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BFD0624	04/28/22	04/28/22	EPA 7196A	

Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Calcium	202	0.0595	mg/L dry	1	BFD0562	04/26/22	05/02/22	EPA 6020B	
Magnesium	368	0.0595	"	"	"	"	"	"	
Sodium	624	0.0595	"	"	"	"	"	"	

Calculated Analysis

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Project: Emerald 147 Closure
Project Number: 20221740.001A
Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

20220414_Emerald147_AOC@4ft
2204261-02 (Soil)

Summit Scientific

Calculated Analysis

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	6.04	0.00100	units	1	BFE0018	05/02/22	05/02/22	Calculation	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	84.0		%	1	BFD0495	04/22/22	04/26/22	Calculation	

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	6.77	0.0100	mmhos/cm	1	BFD0591	04/27/22	04/27/22	EPA 120.1	

Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction

Date Sampled: **04/14/22 15:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	7.78		pH Units	1	BFD0589	04/27/22	04/27/22	EPA 9045D	

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

20220414_Emerald147_TP_Comp
2204261-03 (Soil)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	0.0020	mg/kg	1	BFD0445	04/21/22	04/22/22	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
Naphthalene	ND	0.0038	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		97.1 %	50-150		"	"	"	"	
Surrogate: Toluene-d8		101 %	50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.0 %	50-150		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
C10-C28 (DRO)	ND	50	mg/kg	1	BFD0448	04/21/22	04/22/22	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: o-Terphenyl		84.9 %	30-150		"	"	"	"	

Total Metals by EPA 6020B Hot Water Soluble Extraction

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Project Number: 20221740.001A

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Reported:
05/05/22 11:09

20220414_Emerald147_TP_Comp
2204261-03 (Soil)

Summit Scientific

Total Metals by EPA 6020B Hot Water Soluble Extraction

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Boron	0.197	0.0100	mg/L	1	BFD0523	04/25/22	04/30/22	EPA 6020B	

Total Metals by EPA 6020B

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Arsenic	6.07	0.230	mg/kg dry	1	BFD0538	04/25/22	04/30/22	EPA 6020B	
Barium	73.4	0.461	"	"	"	"	"	"	
Cadmium	0.244	0.230	"	"	"	"	"	"	
Copper	6.79	0.461	"	"	"	"	"	"	
Lead	8.97	0.230	"	"	"	"	"	"	
Nickel	8.83	0.461	"	"	"	"	"	"	
Selenium	0.761	0.299	"	"	"	"	"	"	
Silver	0.0523	0.0230	"	"	"	"	"	"	
Zinc	39.1	0.461	"	"	"	"	"	"	

Hexavalent Chromium by EPA Method 7196

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BFD0624	04/28/22	04/28/22	EPA 7196A	

Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Calcium	207	0.0576	mg/L dry	1	BFD0562	04/26/22	05/02/22	EPA 6020B	
Magnesium	122	0.0576	"	"	"	"	"	"	
Sodium	222	0.0576	"	"	"	"	"	"	

Calculated Analysis

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retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

20220414_Emerald147_TP_Comp
2204261-03 (Soil)

Summit Scientific

Calculated Analysis

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	3.03	0.00100	units	1	BFE0018	05/02/22	05/02/22	Calculation	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	86.8		%	1	BFD0495	04/22/22	04/26/22	Calculation	

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	3.06	0.0100	mmhos/cm	1	BFD0591	04/27/22	04/27/22	EPA 120.1	

Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction

Date Sampled: **04/14/22 15:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	7.83		pH Units	1	BFD0589	04/27/22	04/27/22	EPA 9045D	

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

**20220414_Emerald147_TP_Dis
2204261-04 (Soil)**

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	0.0020	mg/kg	1	BFD0445	04/21/22	04/22/22	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
Naphthalene	ND	0.0038	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		93.4 %	50-150		"	"	"	"	
Surrogate: Toluene-d8		103 %	50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.6 %	50-150		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
C10-C28 (DRO)	ND	50	mg/kg	1	BFD0448	04/21/22	04/22/22	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: o-Terphenyl		92.7 %	30-150		"	"	"	"	

Total Metals by EPA 6020B Hot Water Soluble Extraction

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:

05/05/22 11:09

**20220414_Emerald147_TP_Dis
2204261-04 (Soil)**

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Total Metals by EPA 6020B Hot Water Soluble Extraction

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Boron	0.212	0.0100	mg/L	1	BFD0523	04/25/22	04/30/22	EPA 6020B	

Total Metals by EPA 6020B

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Arsenic	6.06	0.258	mg/kg dry	1	BFD0538	04/25/22	04/30/22	EPA 6020B	
Barium	84.1	0.517	"	"	"	"	"	"	
Cadmium	ND	0.258	"	"	"	"	"	"	
Copper	8.94	0.517	"	"	"	"	"	"	
Lead	11.7	0.258	"	"	"	"	"	"	
Nickel	11.6	0.517	"	"	"	"	"	"	
Selenium	0.970	0.336	"	"	"	"	"	"	
Silver	0.0634	0.0258	"	"	"	"	"	"	
Zinc	53.2	0.517	"	"	"	"	"	"	

Hexavalent Chromium by EPA Method 7196

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BFD0624	04/28/22	04/28/22	EPA 7196A	

Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Calcium	193	0.0646	mg/L dry	1	BFD0562	04/26/22	05/02/22	EPA 6020B	
Magnesium	136	0.0646	"	"	"	"	"	"	
Sodium	321	0.0646	"	"	"	"	"	"	

Calculated Analysis

Summit Scientific

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

**20220414_Emerald147_TP_Dis
2204261-04 (Soil)**

Summit Scientific

Calculated Analysis

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	4.33	0.00100	units	1	BFE0018	05/02/22	05/02/22	Calculation	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	77.4		%	1	BFD0495	04/22/22	04/26/22	Calculation	

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	3.38	0.0100	mmhos/cm	1	BFD0591	04/27/22	04/27/22	EPA 120.1	

Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction

Date Sampled: **04/14/22 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	7.92		pH Units	1	BFD0589	04/27/22	04/27/22	EPA 9045D	

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:

05/05/22 11:09

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch BFD0445 - EPA 5030 Soil MS

Blank (BFD0445-BLK1)

Prepared: 04/21/22 Analyzed: 04/22/22

Benzene	ND	0.0020	mg/kg							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.010	"							
1,2,4-Trimethylbenzene	ND	0.0050	"							
1,3,5-Trimethylbenzene	ND	0.0050	"							
Naphthalene	ND	0.0038	"							
Gasoline Range Hydrocarbons	ND	0.50	"							
Surrogate: 1,2-Dichloroethane-d4	0.0414		"	0.0400		103	50-150			
Surrogate: Toluene-d8	0.0409		"	0.0400		102	50-150			
Surrogate: 4-Bromofluorobenzene	0.0383		"	0.0400		95.7	50-150			

LCS (BFD0445-BS1)

Prepared: 04/21/22 Analyzed: 04/22/22

Benzene	0.0583	0.0020	mg/kg	0.0750		77.7	70-130			
Toluene	0.0611	0.0050	"	0.0750		81.4	70-130			
Ethylbenzene	0.0586	0.0050	"	0.0750		78.2	70-130			
m,p-Xylene	0.123	0.010	"	0.150		81.8	70-130			
o-Xylene	0.0702	0.0050	"	0.0750		93.6	70-130			
1,2,4-Trimethylbenzene	0.0666	0.0050	"	0.0750		88.8	70-130			
1,3,5-Trimethylbenzene	0.0626	0.0050	"	0.0750		83.4	70-130			
Naphthalene	0.0867	0.0038	"	0.0750		116	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.0399		"	0.0400		99.8	50-150			
Surrogate: Toluene-d8	0.0404		"	0.0400		101	50-150			
Surrogate: 4-Bromofluorobenzene	0.0405		"	0.0400		101	50-150			

Matrix Spike (BFD0445-MS1)

Source: 2204254-01

Prepared: 04/21/22 Analyzed: 04/22/22

Benzene	0.0589	0.0020	mg/kg	0.0750	ND	78.5	70-130			
Toluene	0.0619	0.0050	"	0.0750	ND	82.5	70-130			
Ethylbenzene	0.0568	0.0050	"	0.0750	ND	75.8	70-130			
m,p-Xylene	0.121	0.010	"	0.150	ND	80.4	70-130			
o-Xylene	0.0681	0.0050	"	0.0750	ND	90.8	70-130			
1,2,4-Trimethylbenzene	0.0656	0.0050	"	0.0750	ND	87.5	70-130			
1,3,5-Trimethylbenzene	0.0600	0.0050	"	0.0750	ND	80.0	70-130			
Naphthalene	0.0891	0.0038	"	0.0750	ND	119	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.0426		"	0.0400		106	50-150			
Surrogate: Toluene-d8	0.0417		"	0.0400		104	50-150			
Surrogate: 4-Bromofluorobenzene	0.0402		"	0.0400		101	50-150			

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Project: Emerald 147 Closure
Project Number: 20221740.001A
Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

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

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

Batch BFD0445 - EPA 5030 Soil MS

Matrix Spike Dup (BFD0445-MSD1)		Source: 2204254-01			Prepared: 04/21/22 Analyzed: 04/22/22					
Benzene	0.0571	0.0020	mg/kg	0.0750	ND	76.1	70-130	3.16	30	
Toluene	0.0613	0.0050	"	0.0750	ND	81.8	70-130	0.877	30	
Ethylbenzene	0.0576	0.0050	"	0.0750	ND	76.8	70-130	1.31	30	
m,p-Xylene	0.123	0.010	"	0.150	ND	81.8	70-130	1.75	30	
o-Xylene	0.0700	0.0050	"	0.0750	ND	93.4	70-130	2.78	30	
1,2,4-Trimethylbenzene	0.0655	0.0050	"	0.0750	ND	87.4	70-130	0.137	30	
1,3,5-Trimethylbenzene	0.0618	0.0050	"	0.0750	ND	82.4	70-130	2.96	30	
Naphthalene	0.0937	0.0038	"	0.0750	ND	125	70-130	5.09	30	
<hr/>										
Surrogate: 1,2-Dichloroethane-d4	0.0404		"	0.0400		101	50-150			
Surrogate: Toluene-d8	0.0406		"	0.0400		102	50-150			
Surrogate: 4-Bromofluorobenzene	0.0394		"	0.0400		98.6	50-150			

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Extractable Petroleum Hydrocarbons by 8015 - Quality Control
Summit Scientific

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

Batch BFD0448 - EPA 3550A

Blank (BFD0448-BLK1)

Prepared: 04/21/22 Analyzed: 04/22/22

C10-C28 (DRO)	ND	50	mg/kg
C28-C36 (ORO)	ND	50	"

LCS (BFD0448-BS1)

Prepared: 04/21/22 Analyzed: 04/22/22

C10-C28 (DRO)	450	50	mg/kg	500	90.0	70-130
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Matrix Spike (BFD0448-MS1)

Source: 2204254-01

Prepared: 04/21/22 Analyzed: 04/22/22

C10-C28 (DRO)	405	50	mg/kg	500	9.41	79.1	70-130
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Matrix Spike Dup (BFD0448-MSD1)

Source: 2204254-01

Prepared: 04/21/22 Analyzed: 04/22/22

C10-C28 (DRO)	388	50	mg/kg	500	9.41	75.8	70-130	4.17	20
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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:

05/05/22 11:09

Total Metals by EPA 6020B Hot Water Soluble Extraction - Quality Control

Summit Scientific

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

Batch BFD0523 - EPA 3050B

Blank (BFD0523-BLK1)

Prepared: 04/25/22 Analyzed: 04/30/22

Boron ND 0.0100 mg/L

LCS (BFD0523-BS1)

Prepared: 04/25/22 Analyzed: 04/30/22

Boron 4.54 0.0100 mg/L 5.00 90.8 80-120

Duplicate (BFD0523-DUP1)

Source: 2204253-01

Prepared: 04/25/22 Analyzed: 04/30/22

Boron 0.675 0.0100 mg/L 0.709 4.81 20

Matrix Spike (BFD0523-MS1)

Source: 2204253-01

Prepared: 04/25/22 Analyzed: 04/30/22

Boron 5.48 0.0100 mg/L 5.00 0.709 95.5 75-125

Matrix Spike Dup (BFD0523-MSD1)

Source: 2204253-01

Prepared: 04/25/22 Analyzed: 04/30/22

Boron 5.39 0.0100 mg/L 5.00 0.709 93.6 75-125 1.68 25

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Project: Emerald 147 Closure
Project Number: 20221740.001A
Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Total Metals by EPA 6020B - Quality Control
Summit Scientific

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

Batch BFD0538 - EPA 3050B

Blank (BFD0538-BLK1)

Prepared: 04/25/22 Analyzed: 04/30/22

Arsenic	ND	0.200	mg/kg wet
Barium	ND	0.400	"
Cadmium	ND	0.200	"
Copper	ND	0.400	"
Lead	ND	0.200	"
Nickel	ND	0.400	"
Selenium	ND	0.260	"
Silver	ND	0.0200	"
Zinc	ND	0.400	"

LCS (BFD0538-BS1)

Prepared: 04/25/22 Analyzed: 04/30/22

Arsenic	45.2	0.200	mg/kg wet	40.0	113	80-120
Barium	39.4	0.400	"	40.0	98.5	80-120
Cadmium	2.28	0.200	"	2.00	114	80-120
Copper	41.0	0.400	"	40.0	103	80-120
Lead	20.9	0.200	"	20.0	105	80-120
Nickel	40.3	0.400	"	40.0	101	80-120
Selenium	4.00	0.260	"	4.00	100	80-120
Silver	2.06	0.0200	"	2.00	103	80-120
Zinc	44.6	0.400	"	40.0	112	80-120

Duplicate (BFD0538-DUP1)

Source: 2204029-08

Prepared: 04/25/22 Analyzed: 04/30/22

Arsenic	3.08	0.224	mg/kg dry	3.03	1.84	20
Barium	155	0.448	"	159	2.02	20
Cadmium	0.160	0.224	"	0.168	4.88	20
Copper	4.36	0.448	"	4.49	2.90	20
Lead	7.68	0.224	"	7.89	2.69	20
Nickel	3.58	0.448	"	3.70	3.33	20
Selenium	0.763	0.291	"	0.761	0.200	20
Silver	0.0448	0.0224	"	0.0508	12.5	20
Zinc	16.6	0.448	"	16.7	0.551	20

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Total Metals by EPA 6020B - Quality Control

Summit Scientific

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

Batch BFD0538 - EPA 3050B

Matrix Spike (BFD0538-MS1)	Source: 2204029-08			Prepared: 04/25/22 Analyzed: 04/30/22						
Arsenic	57.1	0.224	mg/kg dry	44.8	3.03	121	75-125			
Barium	238	0.448	"	44.8	159	176	75-125			QM-05
Cadmium	2.78	0.224	"	2.24	0.168	117	75-125			
Copper	47.0	0.448	"	44.8	4.49	94.9	75-125			
Lead	32.5	0.224	"	22.4	7.89	110	75-125			
Nickel	50.2	0.448	"	44.8	3.70	104	75-125			
Selenium	5.31	0.291	"	4.48	0.761	102	75-125			
Silver	2.38	0.0224	"	2.24	0.0508	104	75-125			
Zinc	70.9	0.448	"	44.8	16.7	121	75-125			

Matrix Spike Dup (BFD0538-MSD1)	Source: 2204029-08			Prepared: 04/25/22 Analyzed: 04/30/22						
Arsenic	61.4	0.224	mg/kg dry	44.8	3.03	130	75-125	7.35	25	QM-05
Barium	228	0.448	"	44.8	159	156	75-125	3.98	25	QM-05
Cadmium	2.72	0.224	"	2.24	0.168	114	75-125	2.24	25	
Copper	49.0	0.448	"	44.8	4.49	99.3	75-125	4.09	25	
Lead	31.5	0.224	"	22.4	7.89	105	75-125	3.34	25	
Nickel	51.5	0.448	"	44.8	3.70	107	75-125	2.65	25	
Selenium	5.32	0.291	"	4.48	0.761	102	75-125	0.112	25	
Silver	2.28	0.0224	"	2.24	0.0508	99.2	75-125	4.35	25	
Zinc	75.8	0.448	"	44.8	16.7	132	75-125	6.72	25	QM-05

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Project: Emerald 147 Closure
Project Number: 20221740.001A
Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Hexavalent Chromium by EPA Method 7196 - Quality Control
Summit Scientific

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

Batch BFD0624 - 3060A Mod

Blank (BFD0624-BLK1)

Prepared & Analyzed: 04/28/22

Chromium, Hexavalent ND 0.30 mg/kg wet

LCS (BFD0624-BS1)

Prepared & Analyzed: 04/28/22

Chromium, Hexavalent 25.2 0.30 mg/kg wet 25.0 101 80-120

Duplicate (BFD0624-DUP1)

Source: 2204261-01

Prepared & Analyzed: 04/28/22

Chromium, Hexavalent ND 0.30 mg/kg dry ND 20

Matrix Spike (BFD0624-MS1)

Source: 2204261-01

Prepared & Analyzed: 04/28/22

Chromium, Hexavalent 32.5 0.30 mg/kg dry 30.3 ND 107 75-125

Matrix Spike Dup (BFD0624-MSD1)

Source: 2204261-01

Prepared & Analyzed: 04/28/22

Chromium, Hexavalent 34.9 0.30 mg/kg dry 30.3 ND 115 75-125 7.37 20

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:

05/05/22 11:09

Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction - Quality Control

Summit Scientific

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

Batch BFD0562 - General Preparation

Blank (BFD0562-BLK1)

Prepared: 04/26/22 Analyzed: 05/02/22

Calcium	ND	0.0500	mg/L wet
Magnesium	ND	0.0500	"
Sodium	ND	0.0500	"

LCS (BFD0562-BS1)

Prepared: 04/26/22 Analyzed: 05/02/22

Calcium	4.99	0.0500	mg/L wet	5.00	99.7	70-130
Magnesium	5.39	0.0500	"	5.00	108	70-130
Sodium	5.27	0.0500	"	5.00	105	70-130

Summit Scientific

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Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Physical Parameters by APHA/ASTM/EPA Methods - Quality Control

Summit Scientific

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

Batch BFD0495 - General Preparation

Duplicate (BFD0495-DUP1)

Source: 2204254-01

Prepared: 04/22/22 Analyzed: 04/26/22

% Solids	79.3	%	79.1	0.239	20
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Summit Scientific

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Specific Conductance by EPA Method 120.1, Saturated Paste Extraction - Quality Control

Summit Scientific

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

Batch BFD0591 - General Preparation

Blank (BFD0591-BLK1)

Prepared & Analyzed: 04/27/22

Specific Conductance (EC) ND 0.0100 mmhos/cm

LCS (BFD0591-BS1)

Prepared & Analyzed: 04/27/22

Specific Conductance (EC) 0.153 0.0100 mmhos/cm 0.150 102 95-105

Duplicate (BFD0591-DUP1)

Source: 2204254-01

Prepared & Analyzed: 04/27/22

Specific Conductance (EC) 2.40 0.0100 mmhos/cm 2.43 1.24 20

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Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction - Quality Control

Summit Scientific

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

Batch BFD0589 - General Preparation

LCS (BFD0589-BS1)

Prepared & Analyzed: 04/27/22

pH	9.12	pH Units	9.18	99.3	95-105
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Duplicate (BFD0589-DUP1)

Source: 2204254-01

Prepared & Analyzed: 04/27/22

pH	7.68	pH Units	7.66	0.261	20
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Notes and Definitions

QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The associated LCS and/or LCSD were within acceptance limits, therefore the data are considered valid.
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