

# Summit Scientific

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4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

September 22, 2021

Vince DeCianne

Whiting Oil & Gas

retail

Denver, CO 80215

RE: Emerald #155 Closure

Work Order #2109175

Enclosed are the results of analyses for samples received by Summit Scientific on 09/13/21 12:00. 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 #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

#### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
20210909_Emerald#155_AOC@3ft	2109175-01	Soil	09/09/21 10:00	09/13/21 12:00
20210909_Emerald#155_WH@3ft	2109175-02	Soil	09/09/21 09:50	09/13/21 12:00
20210909_Emerald#155_TP_Comp	2109175-03	Soil	09/09/21 10:10	09/13/21 12:00
20210909_Emerald#155_TP_Dis	2109175-04	Soil	09/09/21 10:20	09/13/21 12:00

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# Summit Scientific

S<sub>2</sub>

2109175

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 #155 Closure

Sampler Name: Jordan Veith

Project Number: 20221740.001A

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested							Special Instructions
					HCl	HNO <sub>3</sub>	None	Other	Water	Soil	Air-Canister #	Other	COGCC Table 915-1	Arsenic, EC, pH, SAR	EC	SAR	pH	Arsenic		
1	20210908_Emerald #155_AOC@ 3ft	9/9/2021	10:00	3			X			X				X						
2	20210908_Emerald #155_WH@ 3ft	9/9/2021	9:50	3			X			X				X						
3	20210908_Emerald #155_TPM	9/9/2021	10:10	3			X			X				X						
4	20210908_Emerald #155_TPM	9/9/2021	10:20	3			X			X				X						
5																				
6																				
7																				
8																				
9																				
10																				

  

Relinquished by: <i>Jordan Veith</i>	Date/Time: 9/9/2021 1730	Received by: <i>Jordan Veith</i>	Date/Time: 9/9/2021	Turn Around Time (Check) Same Day _____ 72 hours _____ hours _____ Standard <u>24</u> hours	Notes:
Relinquished by: <i>Jordan Veith</i>	Date/Time: 9/13/21 1200	Received by: <i>Jordan Veith</i>	Date/Time: 9/13/21 1200	Integrity: <u>24</u> Sample Temperature	
Relinquished by: <i>Jordan Veith</i>	Date/Time: 9/13/21 1200	Received by: <i>Jordan Veith</i>	Date/Time: 9/13/21 1200	Upon Receipt: <u>14.8</u> Samples Intact: <u>14.8</u>	

# Sample Receipt Checklist

2109175

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

Client: Whiting Client Project ID: Emerald #155 closure

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

☐ ☐ ☒ ☐ ☐

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

Temp (°C)	14.8
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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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	On ice.
Were all samples received intact <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If custody seals are present, are they intact <sup>(1)</sup> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples with holding times due within 48 hours sample due within 48 hours present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	48 hours.
Is a chain-of-custody (COC) form present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace present? <b>If yes, contact client and note in narrative.</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
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	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If samples are acid preserved for metals, is the pH ≤ 2 <sup>(1)</sup> ? 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):

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

JB  
Custodian Printed Name or Initials

[Signature]  
Signature of Custodian

9/13/21  
Date/Time



Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_AOC@3ft  
2109175-01 (Soil)**

**Summit Scientific**

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

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Benzene	ND	0.0020	mg/kg	1	BEI0290	09/14/21	09/14/21	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: **09/09/21 10:00**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Surrogate: 1,2-Dichloroethane-d4		105 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		90.0 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.1 %	21-167		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
C10-C28 (DRO)	ND	50	mg/kg	1	BEI0291	09/14/21	09/15/21	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Surrogate: o-Terphenyl		121 %	30-150		"	"	"	"	

**PAH by EPA Method 8270D SIM**

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Project: Emerald #155 Closure  
Project Number: 20221740.001A  
Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_AOC@3ft  
2109175-01 (Soil)**

**Summit Scientific**

**PAH by EPA Method 8270D SIM**

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acenaphthene	ND	0.00500	mg/kg	1	BEI0279	09/14/21	09/16/21	EPA 8270D SIM	
Anthracene	ND	0.00500	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.00500	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.00500	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.00500	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.00500	"	"	"	"	"	"	
Chrysene	ND	0.00500	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.00500	"	"	"	"	"	"	
Fluoranthene	ND	0.00500	"	"	"	"	"	"	
Fluorene	ND	0.00500	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.00500	"	"	"	"	"	"	
Pyrene	ND	0.00500	"	"	"	"	"	"	
1-Methylnaphthalene	ND	0.00500	"	"	"	"	"	"	
2-Methylnaphthalene	ND	0.00500	"	"	"	"	"	"	

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 2-Methylnaphthalene-d10		50.2 %	40-150		"	"	"	"	
Surrogate: Fluoranthene-d10		54.5 %	40-150		"	"	"	"	

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Boron</b>	<b>0.468</b>	0.0100	mg/L	1	BEI0313	09/15/21	09/17/21	EPA 6020B	

**Total Metals by EPA 6020B**

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

**20210909\_Emerald#155\_AOC@3ft  
2109175-01 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Arsenic	5.86	0.225	mg/kg dry	1	BEI0406	09/20/21	09/21/21	EPA 6020B
Barium	74.2	0.451	"	"	"	"	"	"
Cadmium	ND	0.225	"	"	"	"	"	"
Copper	11.0	0.451	"	"	"	"	"	"
Lead	12.5	0.225	"	"	"	"	"	"
Nickel	14.5	0.451	"	"	"	"	"	"
Selenium	1.85	0.293	"	"	"	"	"	"
Silver	0.0917	0.0225	"	"	"	"	"	"
Zinc	72.8	0.451	"	"	"	"	"	"

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BEI0362	09/16/21	09/16/21	EPA 7196A	

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

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	38.7	0.0563	mg/L dry	1	BEI0350	09/16/21	09/21/21	EPA 6020B	
Magnesium	9.89	0.0563	"	"	"	"	"	"	
Sodium	15.7	0.0563	"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	0.583	0.00100	units	1	BEI0475	09/22/21	09/22/21	Calculation	

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

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

**20210909\_Emerald#155\_AOC@3ft  
2109175-01 (Soil)**

**Summit Scientific**

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

% Solids	88.7	%	1	BEI0305	09/15/21	09/15/21	Calculation
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**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	3.54	0.0100	mmhos/cm	1	BEI0351	09/16/21	09/17/21	EPA 120.1	

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

Date Sampled: **09/09/21 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	8.28		pH Units	1	BEI0352	09/16/21	09/17/21	EPA 9045D	

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Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_WH@3ft**  
**2109175-02 (Soil)**

**Summit Scientific**

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

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	0.0020	mg/kg	1	BEI0290	09/14/21	09/14/21	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: **09/09/21 09:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		120 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		103 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.2 %	21-167		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
C10-C28 (DRO)	ND	50	mg/kg	1	BEI0291	09/14/21	09/15/21	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: o-Terphenyl		125 %	30-150		"	"	"	"	

**PAH by EPA Method 8270D SIM**

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Project: Emerald #155 Closure

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Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

**20210909\_Emerald#155\_WH@3ft  
2109175-02 (Soil)**

**Summit Scientific**

**PAH by EPA Method 8270D SIM**

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acenaphthene	ND	0.00500	mg/kg	1	BEI0279	09/14/21	09/16/21	EPA 8270D SIM	
Anthracene	ND	0.00500	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.00500	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.00500	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.00500	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.00500	"	"	"	"	"	"	
Chrysene	ND	0.00500	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.00500	"	"	"	"	"	"	
Fluoranthene	ND	0.00500	"	"	"	"	"	"	
Fluorene	ND	0.00500	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.00500	"	"	"	"	"	"	
Pyrene	ND	0.00500	"	"	"	"	"	"	
1-Methylnaphthalene	ND	0.00500	"	"	"	"	"	"	
2-Methylnaphthalene	ND	0.00500	"	"	"	"	"	"	

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 2-Methylnaphthalene-d10		57.5 %	40-150		"	"	"	"	
Surrogate: Fluoranthene-d10		68.1 %	40-150		"	"	"	"	

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Boron</b>	<b>0.326</b>	0.0100	mg/L	1	BEI0313	09/15/21	09/17/21	EPA 6020B	

**Total Metals by EPA 6020B**

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_WH@3ft  
2109175-02 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Arsenic	7.12	0.229	mg/kg dry	1	BEI0406	09/20/21	09/21/21	EPA 6020B
Barium	52.8	0.458	"	"	"	"	"	"
Cadmium	0.282	0.229	"	"	"	"	"	"
Copper	12.2	0.458	"	"	"	"	"	"
Lead	12.9	0.229	"	"	"	"	"	"
Nickel	16.2	0.458	"	"	"	"	"	"
Selenium	2.23	0.298	"	"	"	"	"	"
Silver	0.0678	0.0229	"	"	"	"	"	"
Zinc	81.1	0.458	"	"	"	"	"	"

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BEI0362	09/16/21	09/16/21	EPA 7196A	

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

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	306	0.0573	mg/L dry	1	BEI0350	09/16/21	09/21/21	EPA 6020B	
Magnesium	5.06	0.0573	"	"	"	"	"	"	
Sodium	1.25	0.0573	"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	0.0194	0.00100	units	1	BEI0475	09/22/21	09/22/21	Calculation	

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

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_WH@3ft  
2109175-02 (Soil)**

**Summit Scientific**

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

% Solids	87.3	%	1	BEI0305	09/15/21	09/15/21	Calculation
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**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	1.80	0.0100	mmhos/cm	1	BEI0351	09/16/21	09/17/21	EPA 120.1	

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

Date Sampled: **09/09/21 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	7.85		pH Units	1	BEI0352	09/16/21	09/17/21	EPA 9045D	

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_TP\_Comp  
2109175-03 (Soil)**

**Summit Scientific**

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

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	0.0020	mg/kg	1	BEI0290	09/14/21	09/14/21	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: **09/09/21 10:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		104 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		91.3 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.4 %	21-167		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
C10-C28 (DRO)	ND	50	mg/kg	1	BEI0291	09/14/21	09/15/21	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: o-Terphenyl		124 %	30-150		"	"	"	"	

**PAH by EPA Method 8270D SIM**

Summit Scientific

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Whiting Oil & Gas  
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Denver CO, 80215

Project: Emerald #155 Closure  
Project Number: 20221740.001A  
Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_TP\_Comp  
2109175-03 (Soil)**

**Summit Scientific**

**PAH by EPA Method 8270D SIM**

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acenaphthene	ND	0.00500	mg/kg	1	BEI0279	09/14/21	09/16/21	EPA 8270D SIM	
Anthracene	ND	0.00500	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.00500	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.00500	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.00500	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.00500	"	"	"	"	"	"	
Chrysene	ND	0.00500	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.00500	"	"	"	"	"	"	
Fluoranthene	ND	0.00500	"	"	"	"	"	"	
Fluorene	ND	0.00500	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.00500	"	"	"	"	"	"	
Pyrene	ND	0.00500	"	"	"	"	"	"	
1-Methylnaphthalene	ND	0.00500	"	"	"	"	"	"	
2-Methylnaphthalene	ND	0.00500	"	"	"	"	"	"	

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 2-Methylnaphthalene-d10		42.7 %	40-150		"	"	"	"	
Surrogate: Fluoranthene-d10		63.7 %	40-150		"	"	"	"	

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Boron	<b>0.108</b>	0.0100	mg/L	1	BEI0313	09/15/21	09/17/21	EPA 6020B	

**Total Metals by EPA 6020B**

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Whiting Oil & Gas  
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Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_TP\_Comp  
2109175-03 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Arsenic	6.23	0.216	mg/kg dry	1	BEI0406	09/20/21	09/21/21	EPA 6020B
Barium	97.5	0.431	"	"	"	"	"	"
Cadmium	0.345	0.216	"	"	"	"	"	"
Copper	9.77	0.431	"	"	"	"	"	"
Lead	12.2	0.216	"	"	"	"	"	"
Nickel	12.6	0.431	"	"	"	"	"	"
Selenium	1.02	0.280	"	"	"	"	"	"
Silver	0.0592	0.0216	"	"	"	"	"	"
Zinc	60.4	0.431	"	"	"	"	"	"

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BEI0362	09/16/21	09/16/21	EPA 7196A	

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

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	14.3	0.0539	mg/L dry	1	BEI0350	09/16/21	09/21/21	EPA 6020B	
Magnesium	2.61	0.0539	"	"	"	"	"	"	
Sodium	1.85	0.0539	"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	0.118	0.00100	units	1	BEI0475	09/22/21	09/22/21	Calculation	

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

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_TP\_Comp  
2109175-03 (Soil)**

**Summit Scientific**

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

% Solids	92.7	%	1	BEI0305	09/15/21	09/15/21	Calculation
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**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	1.63	0.0100	mmhos/cm	1	BEI0351	09/16/21	09/17/21	EPA 120.1	

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

Date Sampled: **09/09/21 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	7.91		pH Units	1	BEI0352	09/16/21	09/17/21	EPA 9045D	

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Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_TP\_Dis  
2109175-04 (Soil)**

**Summit Scientific**

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

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	0.0020	mg/kg	1	BEI0290	09/14/21	09/14/21	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: **09/09/21 10:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		100 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		106 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.9 %	21-167		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
C10-C28 (DRO)	ND	50	mg/kg	1	BEI0291	09/14/21	09/15/21	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: o-Terphenyl		124 %	30-150		"	"	"	"	

**PAH by EPA Method 8270D SIM**

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Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

**20210909\_Emerald#155\_TP\_Dis  
2109175-04 (Soil)**

**Summit Scientific**

**PAH by EPA Method 8270D SIM**

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acenaphthene	ND	0.00500	mg/kg	1	BEI0279	09/14/21	09/16/21	EPA 8270D SIM	
Anthracene	ND	0.00500	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.00500	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.00500	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.00500	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.00500	"	"	"	"	"	"	
Chrysene	ND	0.00500	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.00500	"	"	"	"	"	"	
Fluoranthene	ND	0.00500	"	"	"	"	"	"	
Fluorene	ND	0.00500	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.00500	"	"	"	"	"	"	
Pyrene	ND	0.00500	"	"	"	"	"	"	
1-Methylnaphthalene	ND	0.00500	"	"	"	"	"	"	
2-Methylnaphthalene	ND	0.00500	"	"	"	"	"	"	

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 2-Methylnaphthalene-d10		49.9 %	40-150		"	"	"	"	
Surrogate: Fluoranthene-d10		61.5 %	40-150		"	"	"	"	

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Boron</b>	<b>0.164</b>	0.0100	mg/L	1	BEI0313	09/15/21	09/17/21	EPA 6020B	

**Total Metals by EPA 6020B**

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_TP\_Dis  
2109175-04 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Arsenic	6.27	0.217	mg/kg dry	1	BEI0406	09/20/21	09/21/21	EPA 6020B
Barium	101	0.433	"	"	"	"	"	"
Cadmium	0.272	0.217	"	"	"	"	"	"
Copper	10.2	0.433	"	"	"	"	"	"
Lead	11.9	0.217	"	"	"	"	"	"
Nickel	13.4	0.433	"	"	"	"	"	"
Selenium	1.20	0.282	"	"	"	"	"	"
Silver	0.0617	0.0217	"	"	"	"	"	"
Zinc	63.7	0.433	"	"	"	"	"	"

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BEI0362	09/16/21	09/16/21	EPA 7196A	

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

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	13.0	0.0542	mg/L dry	1	BEI0350	09/16/21	09/21/21	EPA 6020B	
Magnesium	2.60	0.0542	"	"	"	"	"	"	
Sodium	1.62	0.0542	"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	0.107	0.00100	units	1	BEI0475	09/22/21	09/22/21	Calculation	

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

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Whiting Oil & Gas  
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Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**20210909\_Emerald#155\_TP\_Dis  
2109175-04 (Soil)**

**Summit Scientific**

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

% Solids	92.3	%	1	BEI0305	09/15/21	09/15/21	Calculation
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**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	1.37	0.0100	mmhos/cm	1	BEI0351	09/16/21	09/17/21	EPA 120.1	

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

Date Sampled: **09/09/21 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	7.97		pH Units	1	BEI0352	09/16/21	09/17/21	EPA 9045D	

Summit Scientific

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Whiting Oil & Gas  
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Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

## 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 BEI0290 - EPA 5030 Soil MS

##### Blank (BEI0290-BLK1)

Prepared & Analyzed: 09/14/21

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	0.0418		"	0.0400		105	23-173			
Surrogate: Toluene-d8	0.0431		"	0.0400		108	20-170			
Surrogate: 4-Bromofluorobenzene	0.0360		"	0.0400		90.0	21-167			

##### LCS (BEI0290-BS1)

Prepared & Analyzed: 09/14/21

Benzene	0.0628	0.0020	mg/kg	0.0750		83.7	70-130			
Toluene	0.0801	0.0050	"	0.0750		107	70-130			
Ethylbenzene	0.0779	0.0050	"	0.0750		104	70-130			
m,p-Xylene	0.155	0.010	"	0.150		103	70-130			
o-Xylene	0.0822	0.0050	"	0.0750		110	70-130			
1,2,4-Trimethylbenzene	0.0821	0.0050	"	0.0750		109	70-130			
1,3,5-Trimethylbenzene	0.0772	0.0050	"	0.0750		103	70-130			
Naphthalene	0.0766	0.0038	"	0.0750		102	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.0420		"	0.0400		105	23-173			
Surrogate: Toluene-d8	0.0414		"	0.0400		103	20-170			
Surrogate: 4-Bromofluorobenzene	0.0394		"	0.0400		98.5	21-167			

##### Matrix Spike (BEI0290-MS1)

Source: 2109172-01

Prepared & Analyzed: 09/14/21

Benzene	0.0635	0.0020	mg/kg	0.0750	ND	84.7	70-130			
Toluene	0.0777	0.0050	"	0.0750	ND	104	70-130			
Ethylbenzene	0.0758	0.0050	"	0.0750	ND	101	70-130			
m,p-Xylene	0.150	0.010	"	0.150	ND	100	70-130			
o-Xylene	0.0800	0.0050	"	0.0750	ND	107	70-130			
1,2,4-Trimethylbenzene	0.0805	0.0050	"	0.0750	ND	107	70-130			
1,3,5-Trimethylbenzene	0.0752	0.0050	"	0.0750	ND	100	70-130			
Naphthalene	0.0914	0.0038	"	0.0750	ND	122	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.0414		"	0.0400		103	23-173			
Surrogate: Toluene-d8	0.0402		"	0.0400		101	20-170			
Surrogate: 4-Bromofluorobenzene	0.0382		"	0.0400		95.6	21-167			

Summit Scientific

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Whiting Oil & Gas  
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Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

## 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 BEI0290 - EPA 5030 Soil MS

Matrix Spike Dup (BEI0290-MSD1)	Source: 2109172-01			Prepared & Analyzed: 09/14/21						
Benzene	0.0657	0.0020	mg/kg	0.0750	ND	87.6	70-130	3.39	30	
Toluene	0.0802	0.0050	"	0.0750	ND	107	70-130	3.19	30	
Ethylbenzene	0.0742	0.0050	"	0.0750	ND	99.0	70-130	2.16	30	
m,p-Xylene	0.146	0.010	"	0.150	ND	97.4	70-130	2.72	30	
o-Xylene	0.0801	0.0050	"	0.0750	ND	107	70-130	0.0375	30	
1,2,4-Trimethylbenzene	0.0815	0.0050	"	0.0750	ND	109	70-130	1.30	30	
1,3,5-Trimethylbenzene	0.0742	0.0050	"	0.0750	ND	99.0	70-130	1.32	30	
Naphthalene	0.0982	0.0038	"	0.0750	ND	131	70-130	7.28	30	
Surrogate: 1,2-Dichloroethane-d4	0.0437		"	0.0400		109	23-173			
Surrogate: Toluene-d8	0.0411		"	0.0400		103	20-170			
Surrogate: 4-Bromofluorobenzene	0.0388		"	0.0400		96.9	21-167			

Summit Scientific

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Denver CO, 80215

Project: Emerald #155 Closure  
Project Number: 20221740.001A  
Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**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 BEI0291 - EPA 3550A**

**Blank (BEI0291-BLK1)**

Prepared & Analyzed: 09/14/21

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

**LCS (BEI0291-BS1)**

Prepared & Analyzed: 09/14/21

C10-C28 (DRO)	554	50	mg/kg	500	111	70-130
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**Matrix Spike (BEI0291-MS1)**

Source: 2109172-01

Prepared & Analyzed: 09/14/21

C10-C28 (DRO)	597	50	mg/kg	500	14.9	116	70-130
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**Matrix Spike Dup (BEI0291-MSD1)**

Source: 2109172-01

Prepared & Analyzed: 09/14/21

C10-C28 (DRO)	655	50	mg/kg	500	14.9	128	70-130	9.39	20
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Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure  
Project Number: 20221740.001A  
Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

## PAH by EPA Method 8270D SIM - Quality Control

### Summit Scientific

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

#### Batch BEI0279 - EPA 5030 Soil MS

##### Blank (BEI0279-BLK1)

Prepared: 09/14/21 Analyzed: 09/15/21

Acenaphthene	ND	0.00500	mg/kg							
Anthracene	ND	0.00500	"							
Benzo (a) anthracene	ND	0.00500	"							
Benzo (a) pyrene	ND	0.00500	"							
Benzo (b) fluoranthene	ND	0.00500	"							
Benzo (k) fluoranthene	ND	0.00500	"							
Chrysene	ND	0.00500	"							
Dibenz (a,h) anthracene	ND	0.00500	"							
Fluoranthene	ND	0.00500	"							
Fluorene	ND	0.00500	"							
Indeno (1,2,3-cd) pyrene	ND	0.00500	"							
Pyrene	ND	0.00500	"							
1-Methylnaphthalene	ND	0.00500	"							
2-Methylnaphthalene	ND	0.00500	"							
Surrogate: 2-Methylnaphthalene-d10	0.0274		"	0.0333		82.1	40-150			
Surrogate: Fluoranthene-d10	0.0257		"	0.0333		77.0	40-150			

##### LCS (BEI0279-BS1)

Prepared: 09/14/21 Analyzed: 09/15/21

Acenaphthene	0.0322	0.00500	mg/kg	0.0333		96.7	31-137			
Anthracene	0.0309	0.00500	"	0.0333		92.8	30-120			
Benzo (a) anthracene	0.0271	0.00500	"	0.0333		81.4	30-120			
Benzo (a) pyrene	0.0332	0.00500	"	0.0333		99.7	30-120			
Benzo (b) fluoranthene	0.0241	0.00500	"	0.0333		72.2	30-120			
Benzo (k) fluoranthene	0.0156	0.00500	"	0.0333		46.9	30-120			
Chrysene	0.0261	0.00500	"	0.0333		78.3	30-120			
Dibenz (a,h) anthracene	0.0156	0.00500	"	0.0333		46.9	30-120			
Fluoranthene	0.0294	0.00500	"	0.0333		88.1	30-120			
Fluorene	0.0350	0.00500	"	0.0333		105	30-120			
Indeno (1,2,3-cd) pyrene	0.0144	0.00500	"	0.0333		43.2	30-120			
Pyrene	0.0358	0.00500	"	0.0333		107	35-142			
1-Methylnaphthalene	0.0297	0.00500	"	0.0333		89.0	35-142			
2-Methylnaphthalene	0.0346	0.00500	"	0.0333		104	35-142			
Surrogate: 2-Methylnaphthalene-d10	0.0268		"	0.0333		80.4	40-150			
Surrogate: Fluoranthene-d10	0.0277		"	0.0333		83.2	40-150			

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

## PAH by EPA Method 8270D SIM - Quality Control

### Summit Scientific

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

#### Batch BEI0279 - EPA 5030 Soil MS

##### Matrix Spike (BEI0279-MS1)

Source: 2109172-01

Prepared: 09/14/21 Analyzed: 09/15/21

Acenaphthene	0.0208	0.00500	mg/kg	0.0333	ND	62.3	31-137		
Anthracene	0.0205	0.00500	"	0.0333	ND	61.5	30-120		
Benzo (a) anthracene	0.0194	0.00500	"	0.0333	ND	58.3	30-120		
Benzo (a) pyrene	0.0230	0.00500	"	0.0333	ND	69.1	30-120		
Benzo (b) fluoranthene	0.0300	0.00500	"	0.0333	ND	89.9	30-120		
Benzo (k) fluoranthene	0.0334	0.00500	"	0.0333	ND	100	30-120		
Chrysene	0.0188	0.00500	"	0.0333	ND	56.5	30-120		
Dibenz (a,h) anthracene	0.0119	0.00500	"	0.0333	ND	35.7	30-120		
Fluoranthene	0.0211	0.00500	"	0.0333	ND	63.4	30-120		
Fluorene	0.0227	0.00500	"	0.0333	ND	68.1	30-120		
Indeno (1,2,3-cd) pyrene	0.0102	0.00500	"	0.0333	ND	30.6	30-120		
Pyrene	0.0272	0.00500	"	0.0333	ND	81.5	35-142		
1-Methylnaphthalene	0.0178	0.00500	"	0.0333	ND	53.3	15-130		
2-Methylnaphthalene	0.0223	0.00500	"	0.0333	ND	67.0	15-130		
Surrogate: 2-Methylnaphthalene-d10	0.0179		"	0.0333		53.6	40-150		
Surrogate: Fluoranthene-d10	0.0195		"	0.0333		58.5	40-150		

##### Matrix Spike Dup (BEI0279-MSD1)

Source: 2109172-01

Prepared: 09/14/21 Analyzed: 09/15/21

Acenaphthene	0.0219	0.00500	mg/kg	0.0333	ND	65.6	31-137	5.21	30
Anthracene	0.0215	0.00500	"	0.0333	ND	64.4	30-120	4.56	30
Benzo (a) anthracene	0.0194	0.00500	"	0.0333	ND	58.3	30-120	0.0172	30
Benzo (a) pyrene	0.0253	0.00500	"	0.0333	ND	75.8	30-120	9.13	30
Benzo (b) fluoranthene	0.0365	0.00500	"	0.0333	ND	109	30-120	19.6	30
Benzo (k) fluoranthene	0.0306	0.00500	"	0.0333	ND	91.9	30-120	8.64	30
Chrysene	0.0188	0.00500	"	0.0333	ND	56.3	30-120	0.411	30
Dibenz (a,h) anthracene	0.0153	0.00500	"	0.0333	ND	45.8	30-120	24.6	30
Fluoranthene	0.0218	0.00500	"	0.0333	ND	65.3	30-120	2.94	30
Fluorene	0.0238	0.00500	"	0.0333	ND	71.5	30-120	4.79	30
Indeno (1,2,3-cd) pyrene	0.0135	0.00500	"	0.0333	ND	40.5	30-120	27.8	30
Pyrene	0.0276	0.00500	"	0.0333	ND	82.9	35-142	1.62	30
1-Methylnaphthalene	0.0166	0.00500	"	0.0333	ND	49.7	15-130	7.02	50
2-Methylnaphthalene	0.0223	0.00500	"	0.0333	ND	66.8	15-130	0.296	50
Surrogate: 2-Methylnaphthalene-d10	0.0182		"	0.0333		54.6	40-150		
Surrogate: Fluoranthene-d10	0.0199		"	0.0333		59.8	40-150		

Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

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

**Summit Scientific**

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

**Batch BEI0313 - EPA 3050B**

**Blank (BEI0313-BLK1)**

Prepared: 09/15/21 Analyzed: 09/17/21

Boron ND 0.0100 mg/L

**LCS (BEI0313-BS1)**

Prepared: 09/15/21 Analyzed: 09/17/21

Boron 5.04 0.0100 mg/L 5.00 101 80-120

**Duplicate (BEI0313-DUP1)**

**Source: 2109170-01**

Prepared: 09/15/21 Analyzed: 09/17/21

Boron 0.0823 0.0100 mg/L 0.0889 7.73 20

**Matrix Spike (BEI0313-MS1)**

**Source: 2109170-01**

Prepared: 09/15/21 Analyzed: 09/17/21

Boron 5.34 0.0100 mg/L 5.00 0.0889 105 75-125

**Matrix Spike Dup (BEI0313-MSD1)**

**Source: 2109170-01**

Prepared: 09/15/21 Analyzed: 09/17/21

Boron 5.16 0.0100 mg/L 5.00 0.0889 101 75-125 3.50 25

Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure  
Project Number: 20221740.001A  
Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**Total Metals by EPA 6020B - Quality Control**  
**Summit Scientific**

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

**Batch BEI0406 - EPA 3050B**

**Blank (BEI0406-BLK1)**

Prepared: 09/20/21 Analyzed: 09/21/21

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 (BEI0406-BS1)**

Prepared: 09/20/21 Analyzed: 09/21/21

Arsenic	46.8	0.200	mg/kg wet	40.0	117	80-120
Barium	40.9	0.400	"	40.0	102	80-120
Cadmium	2.35	0.200	"	2.00	118	80-120
Copper	42.4	0.400	"	40.0	106	80-120
Lead	20.3	0.200	"	20.0	101	80-120
Nickel	41.6	0.400	"	40.0	104	80-120
Selenium	3.78	0.260	"	4.00	94.6	80-120
Silver	1.92	0.0200	"	2.00	96.1	80-120
Zinc	43.4	0.400	"	40.0	109	80-120

**Duplicate (BEI0406-DUP1)**

Source: 2109172-01

Prepared: 09/20/21 Analyzed: 09/21/21

Arsenic	5.77	0.214	mg/kg dry	5.86	1.69	20
Barium	27.6	0.427	"	32.4	15.8	20
Cadmium	0.179	0.214	"	0.176	1.69	20
Copper	12.2	0.427	"	12.5	2.38	20
Lead	13.9	0.214	"	13.9	0.0536	20
Nickel	17.1	0.427	"	16.2	5.40	20
Selenium	1.68	0.278	"	1.77	5.08	20
Silver	0.0991	0.0214	"	0.0999	0.794	20
Zinc	91.3	0.427	"	91.6	0.345	20

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

### 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 BEI0406 - EPA 3050B

##### Matrix Spike (BEI0406-MS1)

Source: 2109172-01

Prepared: 09/20/21 Analyzed: 09/21/21

Arsenic	48.3	0.214	mg/kg dry	42.7	5.86	99.3	75-125
Barium	68.9	0.427	"	42.7	32.4	85.5	75-125
Cadmium	2.65	0.214	"	2.14	0.176	116	75-125
Copper	59.3	0.427	"	42.7	12.5	109	75-125
Lead	31.6	0.214	"	21.4	13.9	82.9	75-125
Nickel	64.6	0.427	"	42.7	16.2	113	75-125
Selenium	5.89	0.278	"	4.27	1.77	96.4	75-125
Silver	2.02	0.0214	"	2.14	0.0999	90.0	75-125
Zinc	136	0.427	"	42.7	91.6	104	75-125

##### Matrix Spike Dup (BEI0406-MSD1)

Source: 2109172-01

Prepared: 09/20/21 Analyzed: 09/21/21

Arsenic	57.7	0.214	mg/kg dry	42.7	5.86	121	75-125	17.8	25
Barium	83.5	0.427	"	42.7	32.4	120	75-125	19.2	25
Cadmium	2.71	0.214	"	2.14	0.176	119	75-125	2.41	25
Copper	55.7	0.427	"	42.7	12.5	101	75-125	6.30	25
Lead	33.1	0.214	"	21.4	13.9	90.0	75-125	4.66	25
Nickel	62.4	0.427	"	42.7	16.2	108	75-125	3.44	25
Selenium	5.29	0.278	"	4.27	1.77	82.3	75-125	10.8	25
Silver	2.08	0.0214	"	2.14	0.0999	92.7	75-125	2.72	25
Zinc	133	0.427	"	42.7	91.6	97.8	75-125	2.01	25

Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

### 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 BEI0362 - 3060A Mod

##### Blank (BEI0362-BLK1)

Prepared & Analyzed: 09/16/21

Chromium, Hexavalent ND 0.30 mg/kg wet

##### LCS (BEI0362-BS1)

Prepared & Analyzed: 09/16/21

Chromium, Hexavalent 24.0 0.30 mg/kg wet 25.0 96.0 80-120

##### Duplicate (BEI0362-DUP1)

Source: 2108245-02

Prepared & Analyzed: 09/16/21

Chromium, Hexavalent ND 0.30 mg/kg dry ND 20

##### Matrix Spike (BEI0362-MS1)

Source: 2108245-02

Prepared & Analyzed: 09/16/21

Chromium, Hexavalent 30.9 0.30 mg/kg dry 27.6 ND 112 75-125

##### Matrix Spike Dup (BEI0362-MSD1)

Source: 2108245-02

Prepared & Analyzed: 09/16/21

Chromium, Hexavalent 30.3 0.30 mg/kg dry 27.6 ND 110 75-125 1.80 20

Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

**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 BEI0350 - General Preparation**

**Blank (BEI0350-BLK1)**

Prepared: 09/16/21 Analyzed: 09/21/21

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

**LCS (BEI0350-BS1)**

Prepared: 09/16/21 Analyzed: 09/21/21

Calcium	5.50	0.0500	mg/L wet	5.00	110	70-130
Magnesium	5.11	0.0500	"	5.00	102	70-130
Sodium	4.96	0.0500	"	5.00	99.2	70-130

Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

**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 BEI0305 - General Preparation**

Duplicate (BEI0305-DUP1)		Source: 2109174-01			Prepared & Analyzed: 09/15/21					
% Solids	88.1		%		88.3		0.225		20	

Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

**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 BEI0351 - General Preparation**

**Blank (BEI0351-BLK1)**

Prepared: 09/16/21 Analyzed: 09/17/21

Specific Conductance (EC) ND 0.0100 mmhos/cm

**LCS (BEI0351-BS1)**

Prepared: 09/16/21 Analyzed: 09/17/21

Specific Conductance (EC) 0.161 0.0100 mmhos/cm 0.150 107 90-110

**Duplicate (BEI0351-DUP1)**

**Source: 2109173-01**

Prepared: 09/16/21 Analyzed: 09/17/21

Specific Conductance (EC) 4.08 0.0100 mmhos/cm 4.08 0.00 20

Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**

09/22/21 12:38

**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 BEI0352 - General Preparation**

**LCS (BEI0352-BS1)**

Prepared: 09/16/21 Analyzed: 09/17/21

pH	9.27	pH Units	9.21	101	95-105
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**Duplicate (BEI0352-DUP1)**

**Source: 2109173-01**

Prepared: 09/16/21 Analyzed: 09/17/21

pH	8.31	pH Units	8.31	0.00	20
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Summit Scientific

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Whiting Oil & Gas  
retail  
Denver CO, 80215

Project: Emerald #155 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

**Reported:**  
09/22/21 12:38

### Notes and Definitions

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