

Summit Scientific

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,



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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S₂

2109175

4653 Table Mountain Drive ♦ Golden, Colorado 80403
303-277-9310 ♦ 303-374-5933 (f)

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	HNO3	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	W			X			X				X						
2	20210908_Emerald #155_WH@ 3ft	9/9/2021	9:50	W			X			X				X						
3	20210908_Emerald #155_TP@ 2ft	9/9/2021	10:10	W			X			X				X						
4	20210908_Emerald #155_TP 15ft	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: _____	Date/Time: _____	Turn Around Time (Check):	Notes:
Relinquished by: _____	Date/Time: _____	Received by: <i>John Br</i>	Date/Time: 9/13/21 1200	Same Day _____	(Check) 72 hours _____ hours _____ <u>Standard</u> 48 hours _____ 24 Sample Integrity: <u>2V</u> Temperature _____ Upon Receipt: <u>14.8</u> Samples Intact: _____ (Yes) No
Relinquished by: _____	Date/Time: _____	Received by: _____	Date/Time: _____	_____	

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 ⁽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"/>	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 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 ⁽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, 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 ⁽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 or Initials


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

PAH by EPA Method 8270D SIM

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Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
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**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
Boron	0.468	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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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

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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**20210909_Emerald#155_AOC@3ft
2109175-01 (Soil)**

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

PAH by EPA Method 8270D SIM

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Project Number: 20221740.001A

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
Boron	0.326	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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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

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

PAH by EPA Method 8270D SIM

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

**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	0.108	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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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

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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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

**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 Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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 Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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 Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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 Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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
Boron	0.164	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

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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	

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

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	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0418</i>		<i>"</i>	<i>0.0400</i>		<i>105</i>		<i>23-173</i>		
<i>Surrogate: Toluene-d8</i>	<i>0.0431</i>		<i>"</i>	<i>0.0400</i>		<i>108</i>		<i>20-170</i>		
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0360</i>		<i>"</i>	<i>0.0400</i>		<i>90.0</i>		<i>21-167</i>		

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		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0420</i>		<i>"</i>	<i>0.0400</i>		<i>105</i>		<i>23-173</i>		
<i>Surrogate: Toluene-d8</i>	<i>0.0414</i>		<i>"</i>	<i>0.0400</i>		<i>103</i>		<i>20-170</i>		
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0394</i>		<i>"</i>	<i>0.0400</i>		<i>98.5</i>		<i>21-167</i>		

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		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0414</i>		<i>"</i>	<i>0.0400</i>		<i>103</i>		<i>23-173</i>		
<i>Surrogate: Toluene-d8</i>	<i>0.0402</i>		<i>"</i>	<i>0.0400</i>		<i>101</i>		<i>20-170</i>		
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0382</i>		<i>"</i>	<i>0.0400</i>		<i>95.6</i>		<i>21-167</i>		

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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		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

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			

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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		Notes
		Limit	Units		Result	%REC	Limits	RPD	Limit		

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

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

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	Source	%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

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		
<i>Surrogate: 2-Methylnaphthalene-d10</i>	<i>0.0179</i>		<i>"</i>	<i>0.0333</i>		<i>53.6</i>	<i>40-150</i>		
<i>Surrogate: Fluoranthene-d10</i>	<i>0.0195</i>		<i>"</i>	<i>0.0333</i>		<i>58.5</i>	<i>40-150</i>		

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
<i>Surrogate: 2-Methylnaphthalene-d10</i>	<i>0.0182</i>		<i>"</i>	<i>0.0333</i>		<i>54.6</i>	<i>40-150</i>		
<i>Surrogate: Fluoranthene-d10</i>	<i>0.0199</i>		<i>"</i>	<i>0.0333</i>		<i>59.8</i>	<i>40-150</i>		

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

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	Source	%REC			RPD	Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD		

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		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit		

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		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit		

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 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 Result	%REC		RPD		Notes
		Limit	Units			%REC	Limits	RPD	Limit	

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	Source	%REC			RPD	Notes
		Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

Batch BEI0305 - General Preparation

Duplicate (BEI0305-DUP1)

Source: 2109174-01

Prepared & Analyzed: 09/15/21

% Solids	88.1		%		88.3			0.225	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

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

Summit Scientific

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

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	Source	%REC		RPD		Notes
		Limit	Units	Level	Result	%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