

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

May 05, 2022

Vince DeCianne
Whiting Oil & Gas
retail
Denver, CO 80215

RE: Emerald 147 Closure
Work Order #2204261

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

Sincerely,



Paul Shrewsbury
President



Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

ANALYTICAL REPORT FOR SAMPLES

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

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S₂

Sample Receipt Checklist

S2 Work Order# 2204261Client: Whiting Client Project ID: Emerald 147 closure

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

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Matrix (Check all that apply) Air Soil/Solid Water Other Temp (°C) Thermometer #

	Yes	No	N/A	Comments (if any)
If samples require cooling, is the temperature < 6 °C ⁽¹⁾ ? NOTE: If samples are delivered the same day of sampling, this requirement is met if there is evidence that cooling has begun.	<input checked="" type="checkbox"/>			On ice.
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
If custody seals are present, are they intact ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Are samples due within 48 hours present?			<input checked="" type="checkbox"/>	
Are water samples with short hold times present? Note the short hold analysis in the comments column - pH, Nitrate/Nitrite, Ferrous Iron (Fe ²⁺), Hexavalent Chromium (Cr ⁶⁺ , Cr VI), COD/BOD, Total Coliform, E. Coli, Total Residual Chlorine (TRC), Dissolved Oxygen			<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the comments column – HCl, H ₂ SO ₄ , NaOH, HNO ₃ , etc.			<input checked="" type="checkbox"/>	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.			<input checked="" type="checkbox"/>	
If dissolved metals are requested, were samples field filtered?			<input checked="" type="checkbox"/>	

Additional Comments (if any):

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

Custodian Printed Name

4/18/22

Date/Time



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retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

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

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

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

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

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

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

Extractable Petroleum Hydrocarbons by 8015

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

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

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

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

Total Metals by EPA 6020B Hot Water Soluble Extraction

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2204261-01 (Soil)**

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Total Metals by EPA 6020B Hot Water Soluble Extraction

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

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

Total Metals by EPA 6020B

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

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

Hexavalent Chromium by EPA Method 7196

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

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

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

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

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

Calculated Analysis

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2204261-01 (Soil)**

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Calculated Analysis

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

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

Physical Parameters by APHA/ASTM/EPA Methods

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

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

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

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

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

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

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

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

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**20220414_Emerald147_AOC@4ft
2204261-02 (Soil)**

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

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

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

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

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

Extractable Petroleum Hydrocarbons by 8015

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

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

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

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

Total Metals by EPA 6020B Hot Water Soluble Extraction

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2204261-02 (Soil)**

Summit Scientific

Total Metals by EPA 6020B Hot Water Soluble Extraction

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

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

Total Metals by EPA 6020B

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

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

Hexavalent Chromium by EPA Method 7196

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

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

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

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

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

Calculated Analysis

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**20220414_Emerald147_AOC@4ft
2204261-02 (Soil)**

Summit Scientific

Calculated Analysis

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

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

Physical Parameters by APHA/ASTM/EPA Methods

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

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

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

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

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

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

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

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

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

**20220414_Emerald147_TP_Comp
2204261-03 (Soil)**

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

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

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

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

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

Extractable Petroleum Hydrocarbons by 8015

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

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

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

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

Total Metals by EPA 6020B Hot Water Soluble Extraction

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2204261-03 (Soil)**

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Total Metals by EPA 6020B Hot Water Soluble Extraction

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

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

Total Metals by EPA 6020B

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

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

Hexavalent Chromium by EPA Method 7196

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

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

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

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

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

Calculated Analysis

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**20220414_Emerald147_TP_Comp
2204261-03 (Soil)**

Summit Scientific

Calculated Analysis

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

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

Physical Parameters by APHA/ASTM/EPA Methods

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

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

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

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

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

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

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

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

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Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

20220414_Emerald147_TP_Dis
2204261-04 (Soil)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

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

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

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

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

Extractable Petroleum Hydrocarbons by 8015

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

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

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

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

Total Metals by EPA 6020B Hot Water Soluble Extraction

Summit Scientific

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Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

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

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Total Metals by EPA 6020B Hot Water Soluble Extraction

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

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

Total Metals by EPA 6020B

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

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

Hexavalent Chromium by EPA Method 7196

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

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

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

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

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

Calculated Analysis

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

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

Summit Scientific

Calculated Analysis

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

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

Physical Parameters by APHA/ASTM/EPA Methods

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

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

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

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

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

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

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

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

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Whiting Oil & Gas
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Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A
Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch BFD0445 - EPA 5030 Soil MS

Blank (BFD0445-BLK1)

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

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

LCS (BFD0445-BS1)

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

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

Matrix Spike (BFD0445-MS1)

Source: 2204254-01

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

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

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Whiting Oil & Gas
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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch BFD0445 - EPA 5030 Soil MS

Matrix Spike Dup (BFD0445-MSD1)

Source: 2204254-01

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

Benzene	0.0571	0.0020	mg/kg	0.0750	ND	76.1	70-130	3.16	30	
Toluene	0.0613	0.0050	"	0.0750	ND	81.8	70-130	0.877	30	
Ethylbenzene	0.0576	0.0050	"	0.0750	ND	76.8	70-130	1.31	30	
m,p-Xylene	0.123	0.010	"	0.150	ND	81.8	70-130	1.75	30	
o-Xylene	0.0700	0.0050	"	0.0750	ND	93.4	70-130	2.78	30	
1,2,4-Trimethylbenzene	0.0655	0.0050	"	0.0750	ND	87.4	70-130	0.137	30	
1,3,5-Trimethylbenzene	0.0618	0.0050	"	0.0750	ND	82.4	70-130	2.96	30	
Naphthalene	0.0937	0.0038	"	0.0750	ND	125	70-130	5.09	30	
Surrogate: 1,2-Dichloroethane-d4	0.0404		"	0.0400		101	50-150			
Surrogate: Toluene-d8	0.0406		"	0.0400		102	50-150			
Surrogate: 4-Bromofluorobenzene	0.0394		"	0.0400		98.6	50-150			

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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Extractable Petroleum Hydrocarbons by 8015 - Quality Control

Summit Scientific

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

Batch BFD0448 - EPA 3550A

Blank (BFD0448-BLK1)

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

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

LCS (BFD0448-BS1)

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

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

Source: 2204254-01

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

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

Source: 2204254-01

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

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

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

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

Summit Scientific

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

Batch BFD0523 - EPA 3050B

Blank (BFD0523-BLK1)

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

Boron ND 0.0100 mg/L

LCS (BFD0523-BS1)

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

Boron 4.54 0.0100 mg/L 5.00 90.8 80-120

Duplicate (BFD0523-DUP1)

Source: 2204253-01

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

Boron 0.675 0.0100 mg/L 0.709 4.81 20

Matrix Spike (BFD0523-MS1)

Source: 2204253-01

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

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

Matrix Spike Dup (BFD0523-MSD1)

Source: 2204253-01

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

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

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Whiting Oil & Gas
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Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A
Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Total Metals by EPA 6020B - Quality Control
Summit Scientific

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

Batch BFD0538 - EPA 3050B

Blank (BFD0538-BLK1)

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

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

LCS (BFD0538-BS1)

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

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

Duplicate (BFD0538-DUP1)

Source: 2204029-08

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

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

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Whiting Oil & Gas
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Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Total Metals by EPA 6020B - Quality Control

Summit Scientific

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

Batch BFD0538 - EPA 3050B

Matrix Spike (BFD0538-MS1)

Source: 2204029-08

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

Arsenic	57.1	0.224	mg/kg dry	44.8	3.03	121	75-125				
Barium	238	0.448	"	44.8	159	176	75-125				QM-05
Cadmium	2.78	0.224	"	2.24	0.168	117	75-125				
Copper	47.0	0.448	"	44.8	4.49	94.9	75-125				
Lead	32.5	0.224	"	22.4	7.89	110	75-125				
Nickel	50.2	0.448	"	44.8	3.70	104	75-125				
Selenium	5.31	0.291	"	4.48	0.761	102	75-125				
Silver	2.38	0.0224	"	2.24	0.0508	104	75-125				
Zinc	70.9	0.448	"	44.8	16.7	121	75-125				

Matrix Spike Dup (BFD0538-MSD1)

Source: 2204029-08

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

Arsenic	61.4	0.224	mg/kg dry	44.8	3.03	130	75-125	7.35	25		QM-05
Barium	228	0.448	"	44.8	159	156	75-125	3.98	25		QM-05
Cadmium	2.72	0.224	"	2.24	0.168	114	75-125	2.24	25		
Copper	49.0	0.448	"	44.8	4.49	99.3	75-125	4.09	25		
Lead	31.5	0.224	"	22.4	7.89	105	75-125	3.34	25		
Nickel	51.5	0.448	"	44.8	3.70	107	75-125	2.65	25		
Selenium	5.32	0.291	"	4.48	0.761	102	75-125	0.112	25		
Silver	2.28	0.0224	"	2.24	0.0508	99.2	75-125	4.35	25		
Zinc	75.8	0.448	"	44.8	16.7	132	75-125	6.72	25		QM-05

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Whiting Oil & Gas
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Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Hexavalent Chromium by EPA Method 7196 - Quality Control

Summit Scientific

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

Batch BFD0624 - 3060A Mod

Blank (BFD0624-BLK1)

Prepared & Analyzed: 04/28/22

Chromium, Hexavalent ND 0.30 mg/kg wet

LCS (BFD0624-BS1)

Prepared & Analyzed: 04/28/22

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

Duplicate (BFD0624-DUP1)

Source: 2204261-01

Prepared & Analyzed: 04/28/22

Chromium, Hexavalent ND 0.30 mg/kg dry ND 20

Matrix Spike (BFD0624-MS1)

Source: 2204261-01

Prepared & Analyzed: 04/28/22

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

Matrix Spike Dup (BFD0624-MSD1)

Source: 2204261-01

Prepared & Analyzed: 04/28/22

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

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Whiting Oil & Gas
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Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

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

Summit Scientific

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

Batch BFD0562 - General Preparation

Blank (BFD0562-BLK1)

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

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

LCS (BFD0562-BS1)

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

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

Summit Scientific

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Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

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

Summit Scientific

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

Batch BFD0495 - General Preparation

Duplicate (BFD0495-DUP1)

Source: 2204254-01

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

% Solids	79.3		%		79.1			0.239		20	
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Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

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

Summit Scientific

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

Batch BFD0591 - General Preparation

Blank (BFD0591-BLK1)

Prepared & Analyzed: 04/27/22

Specific Conductance (EC) ND 0.0100 mmhos/cm

LCS (BFD0591-BS1)

Prepared & Analyzed: 04/27/22

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

Duplicate (BFD0591-DUP1)

Source: 2204254-01

Prepared & Analyzed: 04/27/22

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

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Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

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

Summit Scientific

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

Batch BFD0589 - General Preparation

LCS (BFD0589-BS1)

Prepared & Analyzed: 04/27/22

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

Source: 2204254-01

Prepared & Analyzed: 04/27/22

pH	7.68		pH Units	7.66	0.261	20
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The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Whiting Oil & Gas
retail
Denver CO, 80215

Project: Emerald 147 Closure

Project Number: 20221740.001A

Project Manager: Vince DeCianne

Reported:
05/05/22 11:09

Notes and Definitions

- QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The associated LCS and/or LCSD were within acceptance limits, therefore the data are considered valid.
- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference