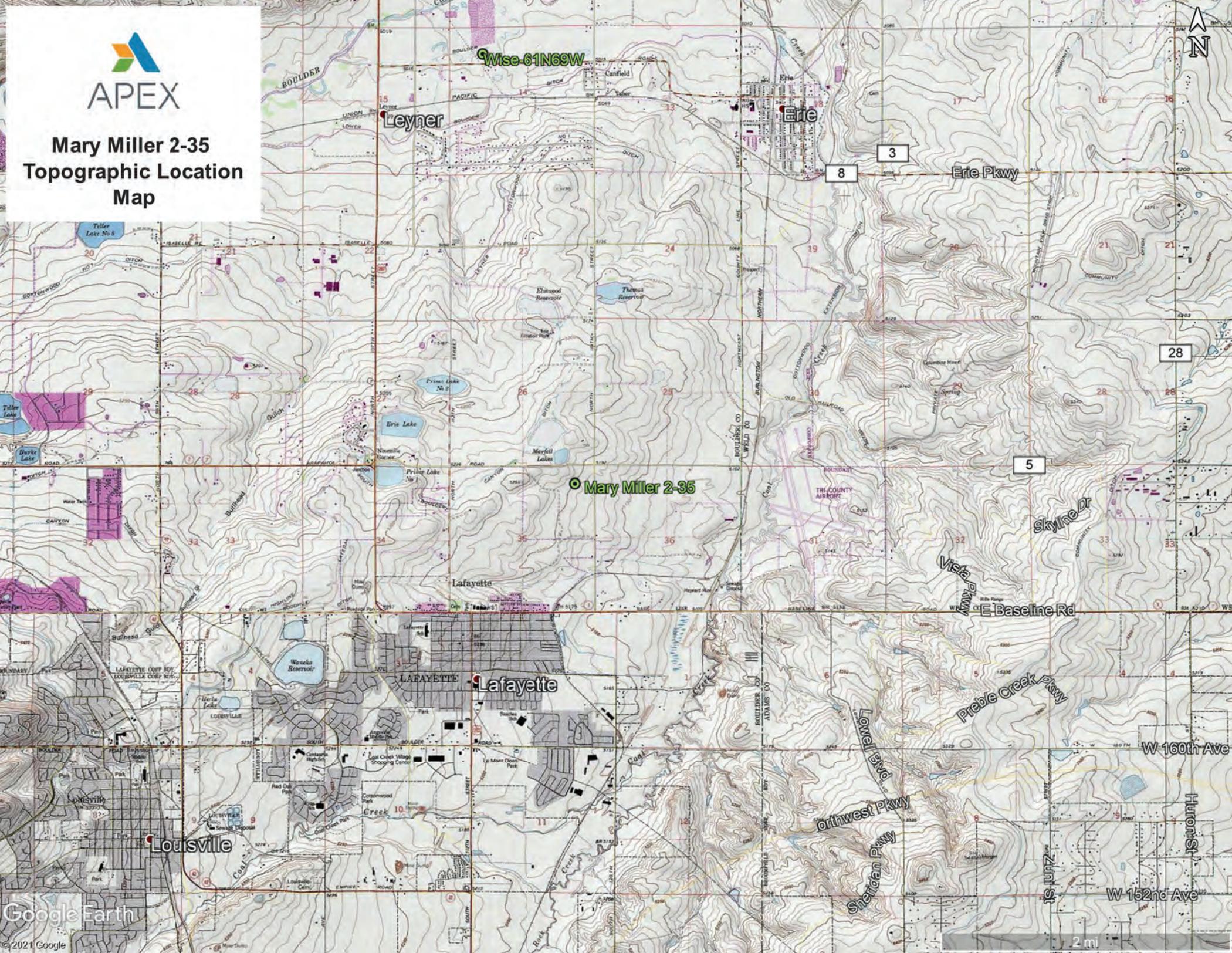




Mary Miller 2-35
Topographic Location
Map



Wisc 61N69W

Leyner

Erie

8 3

Erie Pkwy

Mary Miller 2-35

5

28

Lafayette

LAFAYETTE

Lafayette

Louisville

W 160th Ave

Northwest Pkwy

Sheridan Pkwy

Preble Creek Pkwy

Vista Pkwy

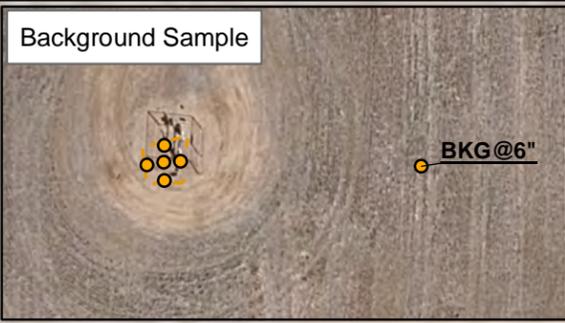
Skyline Dr

E Baseline Rd

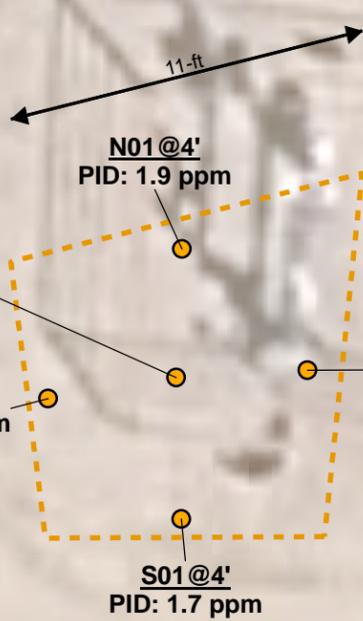
W 152nd Ave

2 mi

Background Sample



B01@7'
 TPH: ND
 B: ND
 T: ND
 E: ND
 X: ND
 TMB 1,2,4: ND
 TMB 1,3,5: ND
 N: ND
 PID: 2.9 ppm



S01@4'
 PID: 1.7 ppm

Extraction Oil & Gas

**Mary Miller 2-35 Wellhead
 COGCC Location ID: 321363
 Site Diagram**

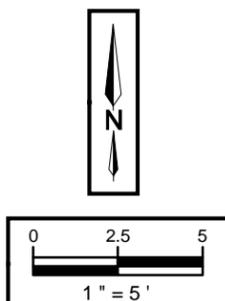
Legal Description: NENE, Sec 35, T1N R69W
County: Boulder
Land Use: Cropland
Topography: 3-5% Slopes
Run-Off Risk: Low
Soil Type: Ascalon sandy loam
Receiving Waters: South Boulder Canyon Ditch

● Soil Sample (2/18/2021)
 - - - Excavation Extent (2/18/2021)

ND: non-detect
 TPH: total petroleum hydrocarbons
 B: benzene
 T: toluene
 E: ethylbenzene
 X: total xylenes
 TMB 1,2,4: 1,2,4 trimethylbenzene
 TMB 1,3,5: 1,3,5 trimethylbenzene
 N: naphthalene



Sample ID	Latitude NAD83	Longitude NAD83
N01@4'	40.013041	-105.076858
E01@4'	40.013031	-105.076844
S01@4'	40.013019	-105.076858
W01@4'	40.013029	-105.076872
B01@7'	40.013031	-105.076858
BKG@6"	40.013028	-105.076649



		SOIL SAMPLE RESULTS							
		Organic Compounds in Soils (mg/kg)							
COGCC Allowable Concentration (Soil) -->		500	1.2/0.0026(M)	490/0.69(M)	5.8/0.78(M)	58/9.9(M)	30/0.0081(R)	27/0.0087(R)	2/0.0038(R)
Sample Date	Sample ID	TPH (total volatile [C6-C10] and extractable [C10-C36] hydrocarbons)	Benzene	Toluene	Ethylbenzene	Xylenes (sum of o-, m- and p- isomers = total xylenes)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Naphthalene
2/18/2021	B01@7	<50	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038

Spatial data collected for this project was acquired using a GPS with submeter accuracy. Illustration discrepancies may be present in this diagram due to the inherent limitations of data accuracy for both project data and the underlying aerial imagery. To accurately reflect field conditions, illustrated data may have been manually corrected in order to fit with the aerial imagery reference points and other collected data points.

Wellhead Closure Checklist

COGCC Rule 911.a.(4) Environmental Site Closure Assessment Field Form

Additional attachments (optional)	Pit Closure	Tank Battery Closure	Flowline Closure	Partially Buried Vault Closure
-----------------------------------	-------------	----------------------	------------------	--------------------------------

Site Name & COGCC Facility Number: **Mary Miller 2-35 321363** Date: **2/18/21** Remediation Project #: **16496**

Associated Wells: **N/A** Age of Site: **71992** Number of Photos Attached: **2**

Location: (GPS coordinates of wellhead or southeastern most wellhead for multiple) **40.013040, -105.076870** Estimated Facility Size (acres):

General Condition of Site: (General observations regarding housekeeping, corrosion, waste management, etc.)
No noted staining or odor

USCS Soil Type: **Sm** Estimated Depth to Groundwater: **720ft**

Hydrocarbon Impacted Soils / Spills: (Note estimated size and if impact appears to be surficial or extends to an unknown depth)
N/A - none noted

Salt Crusted Soils or Impacted Vegetation: (Note estimated size and if impact appears to be surficial or extends to an unknown depth)
N/A - none noted

Wellhead(s)

Well API	Age	Condition of surface around wellhead	Condition of subsurface (determine necessary)	Sample taken? Location Sample ID:	Photo Number(s)
05-013-06273	71992	Clean	Clean	Base @ 7' SW @ 4'	1 + 2
		see diagram	see diagram		

Other observations regarding wellheads:
N/A

Summary

Was impacted soil identified? No Yes - less than 10 cubic yards Yes - more than 10 cubic yards

Total number of samples field screened: **6** Total number of samples collected: **6**

Highest PID Reading: **2.9** Total number of samples submitted to lab for analysis: **2**

If more than 10 cubic yards of impacted soil were observed:

Vertical extent: **N/A** Estimated spill volume: **N/A**

Lateral extent: **N/A** Volume of soil removed: **N/A**

Is additional investigation required? **No**

Was groundwater encountered during the investigation? No Yes - not impacted or in contact with impacted soils Yes - groundwater impacted and/or in contact with impacted soils

Measured depth to groundwater: **N/A** Was remedial groundwater removal conducted? **N/A** Yes No

Date Groundwater was encountered: **N/A** Commencement date of removal: **N/A**

Sheen on groundwater? **N/A** Yes No Volume of groundwater removed prior to sampling: **N/A**

Free product observed? **N/A** Yes No Volume of groundwater removed post sampling: **N/A**

Total number of samples collected: **N/A** Total Volume of groundwater removed: **N/A**

Total number of samples submitted to lab for analysis: **N/A**



Latitude: 40.01304
Longitude: -105.076821
Elevation: 1584.67 m
Accuracy: 0.6 m
Azimuth: 326° (NW)
Pitch: -28.3°
Time: 02-18-2021 14:18
Note: Mary Miller wellhead

Description:

Mary Miller 2-35 Wellhead excavation.



Description:

Mary Miller 2-35 Wellhead excavation base



Laboratory Results Summary Table
Mary Miller 2-35
Soil Samples - Organics

			Organic Compounds in Soils (mg/kg)										
COGCC Allowable Concentration (Soil) -->			500				1.2/0.0026(M)	490/0.69(M)	5.8/0.78(M)	58/9.9(M)	30/0.0081(R)	27/0.0087(R)	2/0.0038(R)
Location	Sample Date	Sample ID	TPH (total volatile [C6-C10] and extractable [C10-C36] hydrocarbons)	TPH-GRO (C6-C10) Low Fraction	TPH-DRO (C10-C28) High Fraction	TPH-ORO (C28-C36) High Fraction	Benzene	Toluene	Ethylbenzene	Xylenes (sum of o-, m- and p- isomers = total xylenes)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Naphthalene
Mary Miller 2-35	2/18/2021	B01@7	<50	<0.50	<50	<50	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038
Mary Miller 2-35	2/18/2021	BKG@6"	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Legend:
 COGCC - Colorado Oil and Gas Conservation Commission
 Orange Highlight - COGCC Table 915-1 TPH, BTEX, organic, metal exceedance
 Yellow Highlight - COGCC Table 915-1 inorganic exceedance
 Grey Highlight - below laboratory detection limit
 Light Blue Highlight - exceedance of protection of groundwater soil screening level
 concentrations risk based (R) or MCL based (M)
 MCL - maximum contaminant level
 NA - not analyzed
 mg/kg - milligrams per kilogram
 mmhos/cm - millimhos per centimeter



Laboratory Results Summary Table
Mary Miller 2-35
Soil Samples - PAHs

			Organic Compounds in Soils (mg/kg)													
COGCC Allowable Concentration (Soil) -->			360/0.55(R)	1800/5.8(R)	1.1/0.011(R)	1.1/0.3(R)	11/2.9(R)	0.11/0.24(M)	110/9(R)	0.11/0.096(R)	240/8.9(R)	240/0.54(R)	1.1/0.98(R)	18/0.006(R)	24/0.019(R)	180/1.3(R)
Location	Sample Date	Sample ID	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Pyrene
Mary Miller 2-35	2/18/2021	B01@7	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500
Mary Miller 2-35	2/18/2021	BKG@6"	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Legend:
 COGCC - Colorado Oil and Gas Conservation Commission
 Orange Highlight - COGCC Table 915-1 TPH, BTEX, organic, metal exceedance
 Yellow Highlight - COGCC Table 915-1 inorganic exceedance
 Grey Highlight - below laboratory detection limit
 Light Blue Highlight - exceedance of protection of groundwater soil screening level concentrations risk based (R) or MCL based (M)
 MCL - maximum contaminant level
 NA - not analyzed
 mg/kg - milligrams per kilogram
 mmhos/cm - millimhos per centimeter



Laboratory Results Summary Table Mary Miller 2-35 Soil Samples - Inorganics

			Soil Suitability for Reclamation				Metals in Soils (mg/kg)									
COGCC Allowable Concentration (Soil) -->			<4	<6	(6-8.3)	2	0.68/0.29(M)	15000/82(M)	71/0.38(M)	0.3/0.00067(R)	3100/46(M)	400/14(M)	1500/26(R)	390/0.26(M)	390/0.8(R)	23000/370(R)
Location	Sample Date	Sample ID	Electrical Conductivity (EC) (by saturated paste method) (mmhos/cm)	Sodium Adsorption Ratio (SAR) (by saturated paste method) (Calculation)	pH (by saturated paste method) (pH Units)	Boron (hot water soluble soil extract) (mg/L)	Arsenic	Barium	Cadmium	Chromium (VI)	Copper	Lead	Nickel	Selenium	Silver	Zinc
Mary Miller 2-35	2/18/2021	B01@7	0.642	2.17	8.53	0.262	5.22	163	0.29	<0.30	22.9	16.7	21.1	0.775	0.0942	70.0
Mary Miller 2-35	2/18/2021	BKG@6"	0.43	1.33	8.33	0.149	3.72	203	<0.234	<0.30	13.5	10.2	15.4	0.566	0.0670	48.9

Legend:
 COGCC - Colorado Oil and Gas Conservation Commission
 Orange Highlight - COGCC Table 915-1 TPH, BTEX, organic, metal exceedance
 Yellow Highlight - COGCC Table 915-1 inorganic exceedance
 Grey Highlight - below laboratory detection limit
 Light Blue Highlight - exceedance of protection of groundwater soil screening level concentrations risk based (R) or MCL based (M)
 MCL - maximum contaminant level
 NA - not analyzed
 mg/kg - milligrams per kilogram
 mmhos/cm - millimhos per centimeter

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

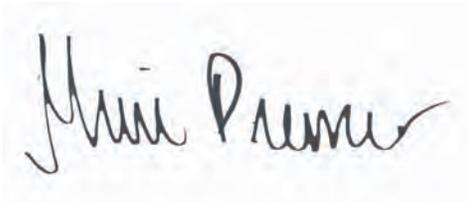
303.277.9310

February 24, 2021

Maggie Graham
Extraction Oil&Gas
370 17th Street Suite 5300
Denver, CO 80202
RE: Mary Miller 2-35
Work Order #2102229

Enclosed are the results of analyses for samples received by Summit Scientific on 02/18/21 15:35. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large initial "M" and a long, sweeping underline.

Muri Premer For Paul Shrewsbury
President



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

Project: Mary Miller 2-35

Project Number: [none]

Project Manager: Maggie Graham

Reported:
02/24/21 14:24

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01@7	2102229-01	Soil	02/18/21 13:15	02/18/21 15:35
BKG@6"	2102229-02	Soil	02/18/21 13:57	02/18/21 15:35

Summit Scientific

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

Sample Receipt Checklist

S2 Work Order 2102229

Client: Apex/XGG Client Project ID: Mary Miller 2-3S

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

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

Temp (°C)	4.3
-----------	-----

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.	—			on ice
Were all samples received intact ⁽¹⁾ ?	—			
Was adequate sample volume provided ⁽¹⁾ ?	—			
If custody seals are present, are they intact ⁽¹⁾ ?			—	
Are samples with holding times due within 48 hours sample due within 48 hours present?	—			Same Day
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	—			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	—			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	—			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	—			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.			—	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect			—	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.			—	
If dissolved metals are requested, were samples field filtered?			—	
Additional Comments (if any):				
(1) If NO, then contact the client before proceeding with analysis and note in case narrative.				

AT
Custodian Printed Name or Initials

[Signature]
Signature of Custodian

2-18-21
Date/Time



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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

B01@7
2102229-01 (Soil)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	0.0020		mg/kg	1	BEB0287	02/18/21	02/18/21	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: **02/18/21 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		98.0 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		92.0 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.0 %		21-167		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
C10-C28 (DRO)	ND	50		mg/kg	1	BEB0288	02/18/21	02/18/21	EPA 8015M	
C28-C36 (ORO)	ND	50		"	"	"	"	"	"	

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: o-Terphenyl		98.5 %		30-150		"	"	"	"	

PAH by EPA Method 8270D SIM

Summit Scientific

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

B01@7
2102229-01 (Soil)

Summit Scientific

PAH by EPA Method 8270D SIM

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acenaphthene	ND	0.00500	mg/kg	1	BEB0296	02/19/21	02/21/21	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: **02/18/21 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 2-Methylnaphthalene-d10		48.0 %	40-150		"	"	"	"	
Surrogate: Fluoranthene-d10		44.8 %	40-150		"	"	"	"	

Total Metals by EPA 6020B Hot Water Soluble Extraction

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Arsenic	5.22	0.238	mg/kg dry	1	BEB0264	02/18/21	02/18/21	EPA 6020B	
Barium	163	0.475	"	"	"	"	"	"	
Boron	0.262	0.0100	mg/L	"	BEB0284	02/18/21	02/19/21	"	
Cadmium	0.290	0.238	mg/kg dry	"	BEB0264	02/18/21	02/18/21	"	
Copper	22.9	0.475	"	"	"	"	"	"	
Lead	16.7	0.238	"	"	"	"	"	"	
Nickel	21.1	0.475	"	"	"	"	"	"	

Summit Scientific

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

B01@7
2102229-01 (Soil)

Summit Scientific

Total Metals by EPA 6020B Hot Water Soluble Extraction

Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Selenium	0.775	0.309	mg/kg dry	1	BEB0264	02/18/21	02/18/21	EPA 6020B	
Silver	0.0942	0.0238	"	"	"	"	"	"	
Zinc	70.0	0.475	"	"	"	"	"	"	

Hexavalent Chromium by EPA Method 7196

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BEB0333	02/23/21	02/24/21	EPA 7196A	

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

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	47.6	0.0594	mg/L dry	1	BEB0326	02/22/21	02/24/21	EPA 6020B	
Magnesium	38.4	0.0594	"	"	"	"	"	"	
Sodium	82.9	0.0594	"	"	"	"	"	"	

Calculated Analysis

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	2.17	0.100	units	1	BEB0366	02/24/21	02/24/21	Calculation	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	84.1		%	1	BEB0276	02/18/21	02/18/21	Calculation	

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

Summit Scientific

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



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

Project: Mary Miller 2-35

Project Number: [none]
 Project Manager: Maggie Graham

Reported:
 02/24/21 14:24

B01@7
2102229-01 (Soil)

Summit Scientific

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Specific Conductance (EC)	0.642	0.0100		mmhos/cm	1	BEB0345	02/23/21	02/23/21	EPA 120.1	

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

Date Sampled: **02/18/21 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
pH	8.53			pH Units	1	BEB0346	02/23/21	02/23/21	EPA 9045D	

Summit Scientific

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



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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

BKG@6"
2102229-02 (Soil)

Summit Scientific

Total Metals by EPA 6020B Hot Water Soluble Extraction

Date Sampled: **02/18/21 13:57**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Arsenic	3.72	0.234	mg/kg dry	1	BEB0264	02/18/21	02/18/21	EPA 6020B	
Barium	203	0.468	"	"	"	"	"	"	
Cadmium	ND	0.234	"	"	"	"	"	"	
Boron	0.149	0.0100	mg/L	"	BEB0284	02/18/21	02/19/21	"	
Copper	13.5	0.468	mg/kg dry	"	BEB0264	02/18/21	02/18/21	"	
Lead	10.2	0.234	"	"	"	"	"	"	
Nickel	15.4	0.468	"	"	"	"	"	"	
Selenium	0.566	0.304	"	"	"	"	"	"	
Silver	0.0670	0.0234	"	"	"	"	"	"	
Zinc	48.9	0.468	"	"	"	"	"	"	

Hexavalent Chromium by EPA Method 7196

Date Sampled: **02/18/21 13:57**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Chromium, Hexavalent	ND	0.30	mg/kg dry	1	BEB0333	02/23/21	02/24/21	EPA 7196A	

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

Date Sampled: **02/18/21 13:57**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Calcium	28.2	0.0585	mg/L dry	1	BEB0326	02/22/21	02/24/21	EPA 6020B	
Magnesium	21.5	0.0585	"	"	"	"	"	"	
Sodium	38.4	0.0585	"	"	"	"	"	"	

Calculated Analysis

Date Sampled: **02/18/21 13:57**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Sodium Adsorption Ratio	1.33	0.100	units	1	BEB0366	02/24/21	02/24/21	Calculation	

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

BKG@6"
2102229-02 (Soil)

Summit Scientific

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **02/18/21 13:57**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	85.5		%	1	BEB0276	02/18/21	02/18/21	Calculation	

Specific Conductance by EPA Method 120.1, Saturated Paste Extraction

Date Sampled: **02/18/21 13:57**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	0.430	0.0100	mmhos/cm	1	BEB0345	02/23/21	02/23/21	EPA 120.1	

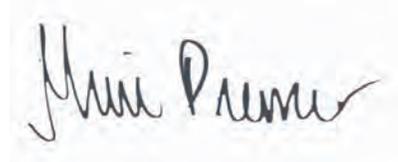
Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction

Date Sampled: **02/18/21 13:57**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	8.33		pH Units	1	BEB0346	02/23/21	02/23/21	EPA 9045D	

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

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 BEB0287 - EPA 5030 Soil MS

Blank (BEB0287-BLK1)

Prepared: 02/18/21 Analyzed: 02/19/21

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	0.0262		"	0.0400		65.4	23-173			
Surrogate: Toluene-d8	0.0494		"	0.0400		123	20-170			
Surrogate: 4-Bromofluorobenzene	0.0416		"	0.0400		104	21-167			

LCS (BEB0287-BS1)

Prepared: 02/18/21 Analyzed: 02/19/21

Benzene	0.0766	0.0020	mg/kg	0.100		76.6	70-130			
Toluene	0.0847	0.0050	"	0.100		84.7	70-130			
Ethylbenzene	0.0924	0.0050	"	0.100		92.4	70-130			
m,p-Xylene	0.178	0.010	"	0.200		88.8	70-130			
o-Xylene	0.0888	0.0050	"	0.100		88.8	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.0278		"	0.0400		69.6	23-173			
Surrogate: Toluene-d8	0.0399		"	0.0400		99.8	20-170			
Surrogate: 4-Bromofluorobenzene	0.0391		"	0.0400		97.6	21-167			

Matrix Spike (BEB0287-MS1)

Source: 2102230-01

Prepared: 02/18/21 Analyzed: 02/19/21

Benzene	0.0808	0.0020	mg/kg	0.100	ND	80.8	70-130			
Toluene	0.0781	0.0050	"	0.100	ND	78.1	70-130			
Ethylbenzene	0.0939	0.0050	"	0.100	ND	93.9	70-130			
m,p-Xylene	0.178	0.010	"	0.200	ND	89.2	70-130			
o-Xylene	0.0889	0.0050	"	0.100	ND	88.9	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.0312		"	0.0400		78.0	23-173			
Surrogate: Toluene-d8	0.0356		"	0.0400		89.0	20-170			
Surrogate: 4-Bromofluorobenzene	0.0374		"	0.0400		93.5	21-167			

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

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 BEB0287 - EPA 5030 Soil MS

Matrix Spike Dup (BEB0287-MSD1)	Source: 2102230-01			Prepared: 02/18/21 Analyzed: 02/19/21						
Benzene	0.0842	0.0020	mg/kg	0.100	ND	84.2	70-130	4.11	30	
Toluene	0.0830	0.0050	"	0.100	ND	83.0	70-130	6.07	30	
Ethylbenzene	0.0961	0.0050	"	0.100	ND	96.1	70-130	2.37	30	
m,p-Xylene	0.183	0.010	"	0.200	ND	91.6	70-130	2.69	30	
o-Xylene	0.0927	0.0050	"	0.100	ND	92.7	70-130	4.13	30	
Surrogate: 1,2-Dichloroethane-d4	0.0314		"	0.0400		78.6	23-173			
Surrogate: Toluene-d8	0.0367		"	0.0400		91.8	20-170			
Surrogate: 4-Bromofluorobenzene	0.0384		"	0.0400		96.0	21-167			

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

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 BEB0288 - EPA 3550A

Blank (BEB0288-BLK1)

Prepared: 02/18/21 Analyzed: 02/19/21

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

LCS (BEB0288-BS1)

Prepared: 02/18/21 Analyzed: 02/19/21

C10-C28 (DRO)	536	50	mg/kg	500	107	70-130				
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Matrix Spike (BEB0288-MS1)

Source: 2102230-01

Prepared: 02/18/21 Analyzed: 02/19/21

C10-C28 (DRO)	528	50	mg/kg	500	17.2	102	70-130			
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Matrix Spike Dup (BEB0288-MSD1)

Source: 2102230-01

Prepared: 02/18/21 Analyzed: 02/19/21

C10-C28 (DRO)	485	50	mg/kg	500	17.2	93.5	70-130	8.68	20	
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Extraction Oil&Gas
370 17th Street Suite 5300
Denver CO, 80202

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

PAH by EPA Method 8270D SIM - Quality Control

Summit Scientific

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

Batch BEB0296 - EPA 5030 Soil MS

Blank (BEB0296-BLK1)

Prepared: 02/19/21 Analyzed: 02/20/21

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	0.0215		"	0.0333		64.4	40-150			
Surrogate: Fluoranthene-d10	0.0207		"	0.0333		62.1	40-150			

LCS (BEB0296-BS1)

Prepared: 02/19/21 Analyzed: 02/20/21

Acenaphthene	0.0291	0.00500	mg/kg	0.0333		87.4	31-137			
Anthracene	0.0318	0.00500	"	0.0333		95.5	30-120			
Benzo (a) anthracene	0.0288	0.00500	"	0.0333		86.4	30-120			
Benzo (a) pyrene	0.0245	0.00500	"	0.0333		73.4	30-120			
Benzo (b) fluoranthene	0.0239	0.00500	"	0.0333		71.8	30-120			
Benzo (k) fluoranthene	0.0239	0.00500	"	0.0333		71.8	30-120			
Chrysene	0.0268	0.00500	"	0.0333		80.4	30-120			
Dibenz (a,h) anthracene	0.0221	0.00500	"	0.0333		66.2	30-120			
Fluoranthene	0.0276	0.00500	"	0.0333		82.7	30-120			
Fluorene	0.0288	0.00500	"	0.0333		86.3	30-120			
Indeno (1,2,3-cd) pyrene	0.0160	0.00500	"	0.0333		48.1	30-120			
Pyrene	0.0265	0.00500	"	0.0333		79.4	35-142			
1-Methylnaphthalene	0.0305	0.00500	"	0.0333		91.5	35-142			
2-Methylnaphthalene	0.0285	0.00500	"	0.0333		85.5	35-142			
Surrogate: 2-Methylnaphthalene-d10	0.0351		"	0.0333		105	40-150			
Surrogate: Fluoranthene-d10	0.0353		"	0.0333		106	40-150			

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

PAH by EPA Method 8270D SIM - Quality Control

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

Batch BEB0296 - EPA 5030 Soil MS

Matrix Spike (BEB0296-MS1)	Source: 2102125-05			Prepared: 02/19/21 Analyzed: 02/20/21					
Acenaphthene	0.0274	0.00500	mg/kg	0.0333	ND	82.3	31-137		
Anthracene	0.0310	0.00500	"	0.0333	ND	93.0	30-120		
Benzo (a) anthracene	0.0262	0.00500	"	0.0333	ND	78.6	30-120		
Benzo (a) pyrene	0.0227	0.00500	"	0.0333	ND	68.2	30-120		
Benzo (b) fluoranthene	0.0227	0.00500	"	0.0333	ND	68.2	30-120		
Benzo (k) fluoranthene	0.0228	0.00500	"	0.0333	ND	68.3	30-120		
Chrysene	0.0255	0.00500	"	0.0333	ND	76.6	30-120		
Dibenz (a,h) anthracene	0.0206	0.00500	"	0.0333	ND	61.7	30-120		
Fluoranthene	0.0256	0.00500	"	0.0333	ND	76.8	30-120		
Fluorene	0.0273	0.00500	"	0.0333	ND	82.0	30-120		
Indeno (1,2,3-cd) pyrene	0.0146	0.00500	"	0.0333	ND	43.9	30-120		
Pyrene	0.0258	0.00500	"	0.0333	ND	77.5	35-142		
1-Methylnaphthalene	0.0284	0.00500	"	0.0333	ND	85.2	15-130		
2-Methylnaphthalene	0.0260	0.00500	"	0.0333	ND	78.1	15-130		
<i>Surrogate: 2-Methylnaphthalene-d10</i>	<i>0.0348</i>		"	<i>0.0333</i>		<i>104</i>	<i>40-150</i>		
<i>Surrogate: Fluoranthene-d10</i>	<i>0.0339</i>		"	<i>0.0333</i>		<i>102</i>	<i>40-150</i>		

Matrix Spike Dup (BEB0296-MSD1)	Source: 2102125-05			Prepared: 02/19/21 Analyzed: 02/20/21					
Acenaphthene	0.0253	0.00500	mg/kg	0.0333	ND	75.9	31-137	8.11	30
Anthracene	0.0282	0.00500	"	0.0333	ND	84.5	30-120	9.61	30
Benzo (a) anthracene	0.0239	0.00500	"	0.0333	ND	71.6	30-120	9.26	30
Benzo (a) pyrene	0.0210	0.00500	"	0.0333	ND	63.1	30-120	7.66	30
Benzo (b) fluoranthene	0.0209	0.00500	"	0.0333	ND	62.7	30-120	8.51	30
Benzo (k) fluoranthene	0.0209	0.00500	"	0.0333	ND	62.7	30-120	8.47	30
Chrysene	0.0232	0.00500	"	0.0333	ND	69.5	30-120	9.73	30
Dibenz (a,h) anthracene	0.0189	0.00500	"	0.0333	ND	56.6	30-120	8.56	30
Fluoranthene	0.0241	0.00500	"	0.0333	ND	72.3	30-120	6.04	30
Fluorene	0.0258	0.00500	"	0.0333	ND	77.4	30-120	5.65	30
Indeno (1,2,3-cd) pyrene	0.0137	0.00500	"	0.0333	ND	41.2	30-120	6.20	30
Pyrene	0.0239	0.00500	"	0.0333	ND	71.7	35-142	7.71	30
1-Methylnaphthalene	0.0267	0.00500	"	0.0333	ND	80.1	15-130	6.23	50
2-Methylnaphthalene	0.0259	0.00500	"	0.0333	ND	77.7	15-130	0.518	50
<i>Surrogate: 2-Methylnaphthalene-d10</i>	<i>0.0331</i>		"	<i>0.0333</i>		<i>99.3</i>	<i>40-150</i>		
<i>Surrogate: Fluoranthene-d10</i>	<i>0.0312</i>		"	<i>0.0333</i>		<i>93.5</i>	<i>40-150</i>		

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

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

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

Batch BEB0264 - EPA 3050B

Blank (BEB0264-BLK1)

Prepared: 02/17/21 Analyzed: 02/18/21

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 (BEB0264-BS1)

Prepared: 02/17/21 Analyzed: 02/18/21

Arsenic	45.0	0.200	mg/kg wet	40.0	112	80-120
Barium	38.9	0.400	"	40.0	97.2	80-120
Cadmium	2.05	0.200	"	2.00	103	80-120
Copper	43.3	0.400	"	40.0	108	80-120
Lead	20.0	0.200	"	20.0	99.9	80-120
Nickel	42.9	0.400	"	40.0	107	80-120
Selenium	4.31	0.260	"	4.00	108	80-120
Silver	2.03	0.0200	"	2.00	101	80-120
Zinc	46.2	0.400	"	40.0	115	80-120

Duplicate (BEB0264-DUP1)

Source: 2101283-02

Prepared: 02/17/21 Analyzed: 02/18/21

Arsenic	5.43	0.250	mg/kg dry	5.35	1.52	30
Barium	100	0.500	"	74.8	29.1	30
Cadmium	0.155	0.250	"	0.151	2.49	30
Copper	7.66	0.500	"	7.58	1.05	30
Lead	5.73	0.250	"	5.22	9.37	30
Nickel	7.88	0.500	"	7.86	0.165	30
Selenium	0.540	0.325	"	0.490	9.58	30
Silver	0.0287	0.0250	"	0.0266	7.57	30
Zinc	31.4	0.500	"	30.3	3.40	30

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

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

Summit Scientific

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

Batch BEB0264 - EPA 3050B

Matrix Spike (BEB0264-MS1)

Source: 2101283-02

Prepared: 02/17/21 Analyzed: 02/18/21

Arsenic	57.1	0.250	mg/kg dry	50.0	5.35	104	75-125			
Barium	130	0.500	"	50.0	74.8	110	75-125			
Cadmium	2.62	0.250	"	2.50	0.151	98.7	75-125			
Copper	62.8	0.500	"	50.0	7.58	111	75-125			
Lead	26.4	0.250	"	25.0	5.22	85.0	75-125			
Nickel	58.5	0.500	"	50.0	7.86	101	75-125			
Selenium	5.52	0.325	"	5.00	0.490	101	75-125			
Silver	2.42	0.0250	"	2.50	0.0266	95.7	75-125			
Zinc	90.3	0.500	"	50.0	30.3	120	75-125			

Matrix Spike Dup (BEB0264-MSD1)

Source: 2101283-02

Prepared: 02/17/21 Analyzed: 02/18/21

Arsenic	54.6	0.250	mg/kg dry	50.0	5.35	98.6	75-125	4.52	25
Barium	120	0.500	"	50.0	74.8	90.4	75-125	7.67	25
Cadmium	2.53	0.250	"	2.50	0.151	95.2	75-125	3.35	25
Copper	54.7	0.500	"	50.0	7.58	94.2	75-125	13.9	25
Lead	24.9	0.250	"	25.0	5.22	78.9	75-125	5.93	25
Nickel	55.1	0.500	"	50.0	7.86	94.5	75-125	6.00	25
Selenium	5.04	0.325	"	5.00	0.490	91.0	75-125	9.22	25
Silver	2.36	0.0250	"	2.50	0.0266	93.4	75-125	2.39	25
Zinc	87.0	0.500	"	50.0	30.3	114	75-125	3.65	25

Batch BEB0284 - EPA 3050B

Blank (BEB0284-BLK1)

Prepared & Analyzed: 02/18/21

Boron	ND	0.0100	mg/L						
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LCS (BEB0284-BS1)

Prepared & Analyzed: 02/18/21

Boron	5.02	0.0100	mg/L	5.00		100	80-120		
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Extraction Oil&Gas
 370 17th Street Suite 5300
 Denver CO, 80202

Project: Mary Miller 2-35

Project Number: [none]
 Project Manager: Maggie Graham

Reported:
 02/24/21 14:24

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 BEB0284 - EPA 3050B

Duplicate (BEB0284-DUP1)		Source: 2102122-01			Prepared & Analyzed: 02/18/21						
Boron	0.486	0.0100	mg/L	0.480					1.19	20	
Matrix Spike (BEB0284-MS1)		Source: 2102122-01			Prepared & Analyzed: 02/18/21						
Boron	5.54	0.0100	mg/L	5.00	0.480	101	75-125				
Matrix Spike Dup (BEB0284-MSD1)		Source: 2102122-01			Prepared & Analyzed: 02/18/21						
Boron	5.59	0.0100	mg/L	5.00	0.480	102	75-125	0.834	25		

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

Project: Mary Miller 2-35

Project Number: [none]
Project Manager: Maggie Graham

Reported:
02/24/21 14:24

Hexavalent Chromium by EPA Method 7196 - Quality Control
Summit Scientific

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

Batch BEB0333 - 3060A Mod

Blank (BEB0333-BLK1)

Prepared: 02/23/21 Analyzed: 02/24/21

Chromium, Hexavalent ND 0.30 mg/kg wet

LCS (BEB0333-BS1)

Prepared: 02/23/21 Analyzed: 02/24/21

Chromium, Hexavalent 23.0 0.30 mg/kg wet 25.0 91.8 80-120

Duplicate (BEB0333-DUP1)

Source: 2101298-03

Prepared: 02/23/21 Analyzed: 02/24/21

Chromium, Hexavalent ND 0.30 mg/kg dry ND 20

Matrix Spike (BEB0333-MS1)

Source: 2101298-03

Prepared: 02/23/21 Analyzed: 02/24/21

Chromium, Hexavalent 26.2 0.30 mg/kg dry 28.8 ND 91.0 75-125

Matrix Spike Dup (BEB0333-MSD1)

Source: 2101298-03

Prepared: 02/23/21 Analyzed: 02/24/21

Chromium, Hexavalent 26.1 0.30 mg/kg dry 28.8 ND 90.6 75-125 0.441 20

Summit Scientific

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

Project: Mary Miller 2-35

Project Number: [none]
 Project Manager: Maggie Graham

Reported:
 02/24/21 14:24

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 BEB0326 - General Preparation

Blank (BEB0326-BLK1)

Prepared: 02/22/21 Analyzed: 02/24/21

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

LCS (BEB0326-BS1)

Prepared: 02/22/21 Analyzed: 02/24/21

Calcium	3.83	0.0500	mg/L wet	5.00	76.6	70-130
Magnesium	5.30	0.0500	"	5.00	106	70-130
Sodium	4.95	0.0500	"	5.00	99.0	70-130

Summit Scientific

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

Project: Mary Miller 2-35

Project Number: [none]
 Project Manager: Maggie Graham

Reported:
 02/24/21 14:24

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 BEB0276 - General Preparation

Duplicate (BEB0276-DUP1)

Source: 2102025-01

Prepared & Analyzed: 02/18/21

% Solids	83.5		%		85.6			2.45		20	
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Summit Scientific

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

Project: Mary Miller 2-35

Project Number: [none]
 Project Manager: Maggie Graham

Reported:
 02/24/21 14:24

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			Limit	RPD	Limit	RPD	

Batch BEB0345 - General Preparation

Blank (BEB0345-BLK1)

Prepared & Analyzed: 02/23/21

Specific Conductance (EC) ND 0.0100 mmhos/cm

LCS (BEB0345-BS1)

Prepared & Analyzed: 02/23/21

Specific Conductance (EC) 0.147 0.0100 mmhos/cm 0.150 98.1 90-110

Duplicate (BEB0345-DUP1)

Source: 2101305-01

Prepared & Analyzed: 02/23/21

Specific Conductance (EC) 0.735 0.0100 mmhos/cm 0.744 1.20 20

Summit Scientific

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

Project: Mary Miller 2-35

Project Number: [none]
 Project Manager: Maggie Graham

Reported:
 02/24/21 14:24

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 BEB0346 - General Preparation

LCS (BEB0346-BS1)

Prepared & Analyzed: 02/23/21

pH 9.23 pH Units 9.21 100 95-105

Duplicate (BEB0346-DUP1)

Source: 2101305-01

Prepared & Analyzed: 02/23/21

pH 8.51 pH Units 8.50 0.118 20

Summit Scientific

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

Project: Mary Miller 2-35

Project Number: [none]

Project Manager: Maggie Graham

Reported:
02/24/21 14:24

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



Arsenic Concentrations in Soil

Risk management guidance for evaluating

reviewed/ revised July 2014

Regulatory Limitation

This guidance does not modify, replace, or pre-empt any existing statutory or regulatory requirements, enforcement actions, agreements, policies or other legal mechanisms that may govern actions within the Hazardous Materials and Waste Management Division’s (the “division’s”) various remedial programs. In the event of a conflict between this guidance and existing risk assessment guidance and other programmatic requirements, this guidance defers to the various legal and operating mechanisms of those remedial programs.

This guidance was developed with the division’s remedial programs in mind. Other state and federal agencies are not obligated to use the process outlined herein, although the same analysis could apply to other sites undergoing investigation and cleanup where testing for arsenic is required and it may be present in sampled environmental media. Parties wanting to use this guidance at their site must seek approval to do so from the regulatory agency responsible for overseeing their remedial activities.

Purpose

The division has prepared this guidance for the purpose of making preliminary determinations when screening data collected from sites that don’t necessarily have a reason to believe arsenic contamination may be present, such as a routine Phase II investigation conducted prior to a property transaction. This guidance is simply meant to inform the regulated community of their responsibilities in managing arsenic risks: it is not regulation, nor does it constitute an enforceable standard that must be complied with.

Background

Arsenic is naturally occurring in some geologic environments in Colorado due to weathering and erosion of bedrock and soil, including highly mineralized areas that are mined for metal ores. It is present in more than 200 different minerals, the most common of which is called arsenopyrite. It may also be present in the environment due to a number of anthropogenic activities including: military operations and firing ranges; mining, especially sulfide ores; smelting copper, gold and lead ores; preservation of wood (CCA); chicken feed operations and associated manures (CAFO) due to arsenic-containing growth promoters; tanning and taxidermy operations; coal-burning emissions and ash-derived residues from power plants; and may be present in landfills and landfill-derived leachate. Arsenic may also be found due to the manufacture, use and disposal of: ammunition; fireworks; pigments (paint, paper, ceramics, etc.); older herbicides, insecticides, and pesticides (examples: monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA) and lead-arsenate); electronics containing Gallium-Arsenide-Selenium (GAS) semi-conductors; lead acid battery plates; glass; and some pharmaceuticals. Other anthropogenic arsenic sources may likely exist. Arsenic contamination in soil is of public health concern due to its toxic effects as a carcinogen and a non-carcinogen. Making risk management decisions about arsenic can be difficult because natural occurring concentrations in soil often exceed carcinogenic risk based exposure values.

This guidance was prepared by the division using a data set of background arsenic concentrations developed by the U.S. EPA Region 8. The data set includes over 2,700 samples from 44 counties in Colorado. The areas sampled included: native grasslands; agricultural areas; urban mixed land use; and mining. A summary of the data set is presented in the table below. The complete data set may be found on the U.S. EPA Region 8’s website at <http://www2.epa.gov/region8/hh-exposure-assessment>.

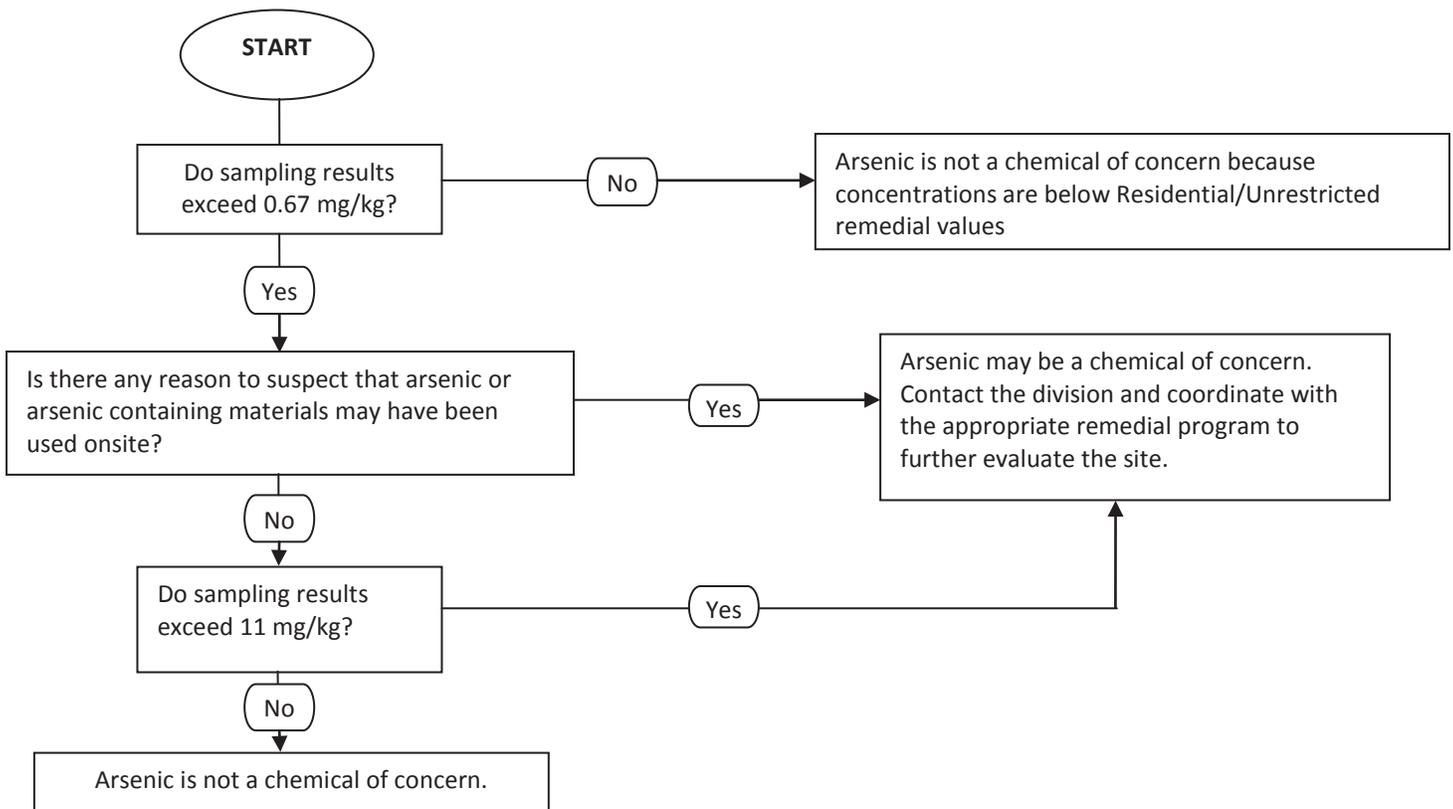
Region 8 U.S. EPA 95% UCLM Background Soil Arsenic Concentrations in Colorado

Land Use	Concentration (mg/kg)
Native Grassland, Rangeland, or Agriculture	3-14
Urban Mixed Use	6-19
Mining	10
Average of all land uses	11

Division Guidance Regarding Background Arsenic Concentration

The division’s approach to evaluating arsenic in soil is depicted in the following flowchart. This guidance assumes that, based upon the size, history and environmental concerns associated with a particular site, an adequate amount of arsenic data has been obtained to make a determination regarding arsenic concentrations in soil. It isn’t meant to be a guide on how to conduct a background study for risk assessment and/or site closure purposes. Guidance on the subject of data collection and analysis needs for conducting a background study should be sought from other published sources. Soil samples should be collected and analyzed for arsenic if the site history suggests it may be present as a result of anthropogenic activities. However, since arsenic is one of the chemicals included as part of a standard “metals” analysis package from a laboratory, you may already have obtained arsenic data for your site.

The current residential/unrestricted land use remedial objective for inorganic arsenic is 0.67 mg/kg (U.S. EPA regional screening level). If arsenic concentrations at your site are lower than 0.67 mg/kg, the division will require no further action to address arsenic in soil. If arsenic concentrations are lower than 11 mg/kg (the average of the 95% UCLM of background concentrations found by the U.S. EPA in Colorado), and releases of arsenic could not have occurred at the site, based on historical data or process knowledge, the division will require no further action to address arsenic in soil. If arsenic concentrations are greater than 0.67 mg/kg, and the available information suggests that a release of arsenic could have occurred at the site, the division will require additional evaluation of the data and possibly additional sampling to determine whether corrective measures for arsenic are required. This evaluation may include a site specific background study with sampling from offsite locations, and/or additional sampling in areas of the site where activities that could have contributed to environmental contamination never occurred. Please consult with the division prior to performing any background study. If it can be demonstrated that arsenic concentrations in soil are unrelated to site activities, the division will require no further action regarding arsenic. It should be noted that material such as arsenic-bearing mine tailings or oil and gas drill cuttings, although derived from a naturally occurring source material, are not considered to be naturally occurring background once they have been generated through human activity. Therefore, mine tailings and drill cuttings may be subject to remediation if ecological or health-based concentrations are exceeded.



For more information please contact:

Colorado Department of Public Health and Environment
 Hazardous Materials and Waste Management Division
 4300 Cherry Creek Drive South
 Denver, Colorado 80246-1530

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