



Absaroka
Joel Mason
112 High St.

September 10, 2024

Buffalo WY 82834

Project Name - FEO - Hebron/Marr 7 Delineation Project Number - [none]

Attached are your analytical results for FEO - Hebron/Marr 7 Delineation received by Origins Laboratory August 06, 2024. This project is associated with Origins project number Y408143-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory
303.433.1322
projectmanager@originslab.com



1725 Elk Place, Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645

Absaroka
112 High St.
Buffalo WY 82834

Joel Mason
Project Number: [none]
Project: FEO - Hebron/Marr 7 Delineation

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS-02@7	Y408143-01	Soil	May 22, 2024 11:00	08/06/2024 13:24

Origins Laboratory



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Origins Laboratory

F-012207-01-R1
Effective Date: 01/09/12

Sample Receipt Checklist

Origins Work Order: 4403143 Client: Absaroka
 Checklist Completed by: TJM/2HD Client Project ID: Hebron/Marr
 Date/time completed: 8/16/11 Shipped Via: TUD
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Matrix(s) Received: (Check all that apply): Soil/Solid Water Other: _____
 Cooler Number/Temperature: 1, 20 °c / _____ °c / _____ °c (Describe) _____ °c
 Thermometer ID: 7005

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?		<input checked="" type="checkbox"/>		
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)			<input checked="" type="checkbox"/>	
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)			<input checked="" type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) 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 with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation and was it checked ⁽¹⁾ ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity) (pH ≤ 2 for samples preserved with HNO ₃ , HCL, H ₂ SO ₄ / (pH > 10 for samples preserved with NaAsO ₂ +NaOH, ZnAc+NaOH)			<input checked="" type="checkbox"/>	
Additional Comments (if any): <u>OK TO RUN OUT OF TEMP AND OUT OF HOLD PER CLIENT - email on 8/16/11</u>				

⁽¹⁾If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) AS

8/17/11
Date/Time Reviewed

Origins Laboratory



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Project: FEO - Hebron/Marr 7 Delineation

SS-02@7

5/22/2024 11:00:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory
Y408143-01 (Soil)**

Boron (DTPA Sorbitol)

Boron	0.400		0.0999	mg/L	1	B4H0705	08/07/2024	08/08/2024	
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DRO/ORO by EPA 8015D

Diesel (C10-C28)	1480		25.0	mg/kg	1	B4H0702	08/07/2024	08/08/2024	I-02
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	I-02, Ua

Surrogate: o-Terphenyl	138 %		50-150			"	"	"	I-02
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GBTEX+TMBs by 8260D

I-02

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B4H0630	08/06/2024	08/07/2024	Ua
1,3,5-Trimethylbenzene	ND		0.00200	"	"	"	"	"	Ua
Benzene	ND		0.00200	"	"	"	"	"	Ua
Ethylbenzene	ND		0.00200	"	"	"	"	"	Ua
Toluene	0.00260		0.00200	"	"	"	"	"	
Xylenes, total	ND		0.00200	"	"	"	"	"	Ua
Gasoline Range Hydrocarbons	186		5.00	"	25	"	"	08/09/2024	

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SS-02@7

5/22/2024 11:00:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory
Y408143-01 (Soil)

GBTEX+TMBs by 8260D

I-02

Surrogate: 1,2-Dichloroethane-d4	106 %		70-130			B4H06 30	08/06/2024	08/07/2024	
Surrogate: Toluene-d8	92.5 %		70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	107 %		70-130			"	"	"	

Metals by Saturated Paste by EPA 6010

Calcium	4.64		0.499	meq/L	10	[CALC]	08/07/2024	08/09/2024	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	0.874		0.435	"	"	"	"	"	

PAH by EPA 8270E

O-05

1-Methylnaphthalene	0.052		0.002	mg/kg	1	B4H0822	08/08/2024	08/09/2024	
2-Methylnaphthalene	0.095		0.002	"	"	"	"	"	
Acenaphthene	ND		0.020	"	"	"	"	"	Ua
Anthracene	0.066		0.020	"	"	"	"	"	
Benzo (a) anthracene	ND		0.005	"	"	"	"	"	Ua
Benzo (a) pyrene	ND		0.020	"	"	"	"	"	Ua
Benzo (b) fluoranthene	ND		0.020	"	"	"	"	"	Ua

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5/22/2024 11:00:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory
Y408143-01 (Soil)**

PAH by EPA 8270E

O-05

Benzo (k) fluoranthene	ND		0.020	mg/kg	1	B4H0822	08/08/2024	08/09/2024	Ua
Chrysene	ND		0.020	"	"	"	"	"	Ua
Dibenz (a,h) anthracene	ND		0.020	"	"	"	"	"	Ua
Fluoranthene	ND		0.020	"	"	"	"	"	Ua
Fluorene	0.077		0.020	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND		0.020	"	"	"	"	"	Ua
Naphthalene	ND		0.002	"	"	"	"	"	Ua
Pyrene	0.155		0.020	"	"	"	"	"	

Surrogate: Fluorene-d10	101 %		60-130			"	"	"	
Surrogate: Anthracene-d10	114 %		60-130			"	"	"	
Surrogate: Pyrene-d10	94.4 %		60-130			"	"	"	
Surrogate: Benzo (a) pyrene-d12	97.6 %		60-130			"	"	"	

pH in Soil by 9045D

pH	10.7			pH Units	1	B4H0714	08/07/2024	08/08/2024	
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SAR by 20B Saturated Paste

SAR	0.574		0.0100	SAR	1	B4H0708	08/07/2024	08/09/2024	
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5/22/2024 11:00:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory
Y408143-01 (Soil)

Specific Conductance Mod. 9050A

Specific Conductance (EC)	1.18	0.00500	mmhos/cm	1	B4H0714	08/07/2024	08/08/2024
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Table 915 metals by EPA 6020B

Arsenic	2.42	0.254	mg/kg	10	B4H0626	08/06/2024	08/07/2024
Barium	151	8.77	"	"	"	"	"
Cadmium	0.122	0.0877	"	"	"	"	"
Copper	ND	8.77	"	"	"	"	"
Lead	4.03	0.877	"	"	"	"	"
Nickel	7.92	0.877	"	"	"	"	"
Selenium	ND	0.228	"	"	"	"	"
Silver	ND	0.0877	"	"	"	"	"
Zinc	ND	32.5	"	"	"	"	"

Total Metals 7196A

Hexavalent Chromium	ND	0.177	0.441	mg/kg dry	1	2665193	08/30/2024	09/06/2024	hU
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Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0630 - EPA 5030 (soil)

Blank (B4H0630-BLK1)

Prepared: 08/06/2024 Analyzed: 08/07/2024

1,2,4-Trimethylbenzene	ND	0.00200	mg/kg							Ua
1,3,5-Trimethylbenzene	ND	0.00200	"							Ua
Benzene	ND	0.00200	"							Ua
Ethylbenzene	ND	0.00200	"							Ua
Naphthalene	ND	0.00380	"							Ua
Toluene	ND	0.00200	"							Ua
Xylenes, total	ND	0.00200	"							Ua
Gasoline Range Hydrocarbons	ND	0.200	"							Ua
Surrogate: 1,2-Dichloroethane-d4	0.11		"	0.125	89.1		70-130			
Surrogate: Toluene-d8	0.12		"	0.125	98.7		70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125	106		70-130			

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Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0630 - EPA 5030 (soil)

LCS (B4H0630-BS1)

Prepared: 08/06/2024 Analyzed: 08/07/2024

1,2,4-Trimethylbenzene	0.103	0.00200	mg/kg	0.100		103	70-130			
1,3,5-Trimethylbenzene	0.102	0.00200	"	0.100		102	70-130			
Benzene	0.0913	0.00200	"	0.100		91.3	70-130			
Ethylbenzene	0.0940	0.00200	"	0.100		94.0	70-130			
Naphthalene	0.116	0.00380	"	0.100		116	70-130			
Toluene	0.0903	0.00200	"	0.100		90.3	70-130			
o-Xylene	0.0973	0.00200	"	0.100		97.3	70-130			
m,p-Xylene	0.192	0.00400	"	0.200		95.8	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		98.5	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		99.3	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		102	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0630 - EPA 5030 (soil)

Matrix Spike (B4H0630-MS1)	Source: Y408131-01			Prepared: 08/06/2024 Analyzed: 08/07/2024						
1,2,4-Trimethylbenzene	0.0979	0.00200	mg/kg	0.100	ND	97.9	70-130			
1,3,5-Trimethylbenzene	0.0970	0.00200	"	0.100	ND	97.0	70-130			
Benzene	0.0910	0.00200	"	0.100	ND	91.0	70-130			
Ethylbenzene	0.0909	0.00200	"	0.100	ND	90.9	70-130			
Naphthalene	0.0918	0.00380	"	0.100	0.000880	90.9	70-130			
Toluene	0.0907	0.00200	"	0.100	ND	90.7	70-130			
o-Xylene	0.0936	0.00200	"	0.100	ND	93.6	70-130			
m,p-Xylene	0.185	0.00400	"	0.200	ND	92.7	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		97.1	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		98.6	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		101	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0630 - EPA 5030 (soil)

Matrix Spike Dup (B4H0630-MSD1)	Source: Y408131-01			Prepared: 08/06/2024 Analyzed: 08/07/2024						
1,2,4-Trimethylbenzene	0.0852	0.00200	mg/kg	0.100	ND	85.2	70-130	13.8	20	
1,3,5-Trimethylbenzene	0.0828	0.00200	"	0.100	ND	82.8	70-130	15.8	20	
Benzene	0.0824	0.00200	"	0.100	ND	82.4	70-130	9.99	20	
Ethylbenzene	0.0791	0.00200	"	0.100	ND	79.1	70-130	13.9	20	
Naphthalene	0.0865	0.00380	"	0.100	0.000880	85.6	70-130	5.94	20	
Toluene	0.0796	0.00200	"	0.100	ND	79.6	70-130	13.0	20	
o-Xylene	0.0809	0.00200	"	0.100	ND	80.9	70-130	14.6	20	
m,p-Xylene	0.161	0.00400	"	0.200	ND	80.6	70-130	14.1	20	
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		99.6	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		97.1	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		101	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B4H0702 - EPA 3550B										
Blank (B4H0702-BLK1)										
					Prepared: 08/07/2024 Analyzed: 08/08/2024					
Diesel (C10-C28)	ND	25.0	mg/kg							Ua
Residual Range Organics (C28-C40)	ND	100	"							Ua
Surrogate: o-Terphenyl	21		"	24.9		86.3	50-150			

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Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0702 - EPA 3550B

LCS (B4H0702-BS1)

Prepared: 08/07/2024 Analyzed: 08/08/2024

Diesel (C10-C28)	998	50.0	mg/kg	1000		99.8	70-130			
Residual Range Organics (C28-C40)	1110	200	"	1000		111	70-130			
Surrogate: o-Terphenyl	45		"	49.8		89.5	50-150			

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Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0702 - EPA 3550B

Matrix Spike (B4H0702-MS1)	Source: Y408103-01			Prepared: 08/07/2024 Analyzed: 08/08/2024						
Diesel (C10-C28)	1040	50.0	mg/kg	1000	ND	104	70-130			
Residual Range Organics (C28-C40)	1190	200	"	1000	ND	119	70-130			
Surrogate: o-Terphenyl	44		"	49.8		87.8	50-150			

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Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B4H0702 - EPA 3550B										
Matrix Spike Dup (B4H0702-MSD1)		Source: Y408103-01			Prepared: 08/07/2024 Analyzed: 08/08/2024					
Diesel (C10-C28)	1150	50.0	mg/kg	1000	ND	115	70-130	9.51	35	
Residual Range Organics (C28-C40)	1300	200	"	1000	ND	130	70-130	8.77	35	
Surrogate: o-Terphenyl	60		"	49.8		120	50-150			

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Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Metals by EPA 6000/7000 Series Methods - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0626 - EPA 3050B

Blank (B4H0626-BLK1)

Prepared: 08/06/2024 Analyzed: 08/07/2024

Arsenic	ND	0.290	mg/kg
Barium	ND	10.0	"
Cadmium	ND	0.100	"
Copper	ND	10.0	"
Lead	ND	1.00	"
Nickel	ND	1.00	"
Selenium	ND	0.260	"
Silver	ND	0.100	"
Zinc	ND	37.0	"

LCS (B4H0626-BS1)

Prepared: 08/06/2024 Analyzed: 08/07/2024

Arsenic	5.56	0.290	mg/kg	5.00	111	80-120
Barium	559	10.0	"	500	112	80-120
Cadmium	5.62	0.100	"	5.00	112	80-120
Copper	60.0	10.0	"	50.0	120	80-120
Lead	5.64	1.00	"	5.00	113	80-120
Nickel	5.74	1.00	"	5.00	115	80-120
Selenium	5.64	0.260	"	5.00	113	80-120
Silver	5.74	0.100	"	5.00	115	80-120
Zinc	56.5	37.0	"	50.0	113	80-120

Matrix Spike (B4H0626-MS1)

Source: Y408104-02

Prepared: 08/06/2024 Analyzed: 08/07/2024

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 Buffalo WY 82834

Joel Mason
 Project Number: [none]
 Project: FEO - Hebron/Marr 7 Delineation

Metals by EPA 6000/7000 Series Methods - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0626 - EPA 3050B

Matrix Spike (B4H0626-MS1)		Source: Y408104-02			Prepared: 08/06/2024 Analyzed: 08/07/2024					
Arsenic	8.12	0.255	mg/kg	4.39	3.56	104	75-125			
Barium	560	8.78	"	439	75.7	110	75-125			
Cadmium	4.96	0.0878	"	4.39	0.105	111	75-125			
Copper	56.1	8.78	"	43.9	6.24	114	75-125			
Lead	11.2	0.878	"	4.39	6.68	103	75-125			
Nickel	10.9	0.878	"	4.39	5.77	118	75-125			
Selenium	4.96	0.228	"	4.39	0.148	110	75-125			
Silver	4.95	0.0878	"	4.39	0.0245	112	75-125			
Zinc	74.3	32.5	"	43.9	26.5	109	75-125			
Matrix Spike Dup (B4H0626-MSD1)		Source: Y408104-02			Prepared: 08/06/2024 Analyzed: 08/07/2024					
Arsenic	22.0	0.264	mg/kg	4.55	3.56	405	75-125	92.2	20	QM-07, QR-DUP
Barium	618	9.11	"	455	75.7	119	75-125	9.83	20	
Cadmium	5.45	0.0911	"	4.55	0.105	117	75-125	9.28	20	
Copper	62.9	9.11	"	45.5	6.24	124	75-125	11.4	20	
Lead	13.4	0.911	"	4.55	6.68	147	75-125	17.7	20	QM-07
Nickel	12.8	0.911	"	4.55	5.77	154	75-125	15.6	20	QM-07
Selenium	5.31	0.237	"	4.55	0.148	113	75-125	6.81	20	
Silver	5.41	0.0911	"	4.55	0.0245	118	75-125	8.84	20	
Zinc	83.8	33.7	"	45.5	26.5	126	75-125	12.0	20	QM-07

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Absaroka
 112 High St.
 Buffalo WY 82834

Joel Mason
 Project Number: [none]
 Project: FEO - Hebron/Marr 7 Delineation

EPA 8270E (SW846) - Semivolatile Organic Compounds - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0822 - EPA 3580

Blank (B4H0822-BLK1)

Prepared: 08/08/2024 Analyzed: 08/09/2024

1-Methylnaphthalene	ND	0.002	mg/kg							Ua
2-Methylnaphthalene	ND	0.002	"							Ua
Acenaphthene	ND	0.020	"							Ua
Anthracene	ND	0.020	"							Ua
Benzo (a) anthracene	ND	0.005	"							Ua
Benzo (a) pyrene	ND	0.020	"							Ua
Benzo (b) fluoranthene	ND	0.020	"							Ua
Benzo (g,h,i) perylene	ND	0.020	"							Ua
Benzo (k) fluoranthene	ND	0.020	"							Ua
Chrysene	ND	0.020	"							Ua
Dibenz (a,h) anthracene	ND	0.020	"							Ua
Fluoranthene	ND	0.020	"							Ua
Fluorene	ND	0.020	"							Ua
Indeno (1,2,3-cd) pyrene	ND	0.020	"							Ua
Naphthalene	ND	0.002	"							Ua
Phenanthrene	ND	0.020	"							Ua
Pyrene	ND	0.020	"							Ua

Surrogate: Fluorene-d10	190		ug/kg	200	95.6	60-130
Surrogate: Anthracene-d10	180		"	200	88.1	60-130
Surrogate: Pyrene-d10	210		"	200	103	60-130
Surrogate: Benzo (a) pyrene-d12	200		"	200	101	60-130

LCS (B4H0822-BS1)

Prepared: 08/08/2024 Analyzed: 08/09/2024

1-Methylnaphthalene	0.178	0.002	mg/kg	0.200	88.8	70-130
2-Methylnaphthalene	0.179	0.002	"	0.200	89.3	70-130
Acenaphthene	0.179	0.020	"	0.200	89.7	70-130
Anthracene	0.164	0.020	"	0.200	82.0	70-130

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Joel Mason
Project Number: [none]
Project: FEO - Hebron/Marr 7 Delineation

EPA 8270E (SW846) - Semivolatile Organic Compounds - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0822 - EPA 3580

LCS (B4H0822-BS1)

Prepared: 08/08/2024 Analyzed: 08/09/2024

Benzo (a) anthracene	0.177	0.005	mg/kg	0.200		88.7	70-130			
Benzo (a) pyrene	0.175	0.020	"	0.200		87.6	70-130			
Benzo (b) fluoranthene	0.202	0.020	"	0.200		101	70-130			
Benzo (g,h,i) perylene	0.192	0.020	"	0.200		96.1	70-130			
Benzo (k) fluoranthene	0.182	0.020	"	0.200		90.8	70-130			
Chrysene	0.190	0.020	"	0.200		94.9	70-130			
Dibenz (a,h) anthracene	0.187	0.020	"	0.200		93.3	70-130			
Fluoranthene	0.187	0.020	"	0.200		93.3	70-130			
Fluorene	0.183	0.020	"	0.200		91.6	70-130			
Indeno (1,2,3-cd) pyrene	0.217	0.020	"	0.200		109	70-130			
Naphthalene	0.180	0.002	"	0.200		89.8	70-130			
Phenanthrene	0.172	0.020	"	0.200		86.1	70-130			
Pyrene	0.186	0.020	"	0.200		92.9	70-130			
Surrogate: Fluorene-d10	190		ug/kg	200		96.0	60-130			
Surrogate: Anthracene-d10	190		"	200		93.4	60-130			
Surrogate: Pyrene-d10	210		"	200		103	60-130			
Surrogate: Benzo (a) pyrene-d12	200		"	200		102	60-130			

Matrix Spike (B4H0822-MS1)

Source: Y408144-01

Prepared: 08/08/2024 Analyzed: 08/09/2024

1-Methylnaphthalene	0.566	0.002	mg/kg	0.200	0.383	91.8	70-130			
2-Methylnaphthalene	0.857	0.002	"	0.200	0.653	102	70-130			
Acenaphthene	0.354	0.020	"	0.200	ND	177	70-130			QM-07
Anthracene	0.300	0.020	"	0.200	0.053	124	70-130			
Benzo (a) anthracene	0.226	0.005	"	0.200	0.011	108	70-130			
Benzo (a) pyrene	0.194	0.020	"	0.200	0.013	90.9	70-130			
Benzo (b) fluoranthene	0.157	0.020	"	0.200	0.014	71.3	70-130			
Benzo (g,h,i) perylene	0.465	0.020	"	0.200	0.272	96.6	70-130			

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Buffalo WY 82834

Joel Mason
Project Number: [none]
Project: FEO - Hebron/Marr 7 Delineation

EPA 8270E (SW846) - Semivolatile Organic Compounds - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0822 - EPA 3580

Matrix Spike (B4H0822-MS1)		Source: Y408144-01			Prepared: 08/08/2024 Analyzed: 08/09/2024					
Benzo (k) fluoranthene	0.152	0.020	mg/kg	0.200	0.005	73.4	70-130			
Chrysene	0.255	0.020	"	0.200	0.033	111	70-130			
Dibenz (a,h) anthracene	0.265	0.020	"	0.200	ND	132	70-130			QM-07
Fluoranthene	0.197	0.020	"	0.200	0.025	85.9	70-130			
Fluorene	0.400	0.020	"	0.200	0.241	79.3	70-130			
Indeno (1,2,3-cd) pyrene	0.361	0.020	"	0.200	0.017	172	70-130			QM-07
Naphthalene	0.288	0.002	"	0.200	0.115	86.4	70-130			
Phenanthrene	0.453	0.020	"	0.200	0.307	72.9	70-130			
Pyrene	0.468	0.020	"	0.200	0.387	40.1	70-130			QM-07
Surrogate: Fluorene-d10	200		ug/kg	200		99.9	60-130			
Surrogate: Anthracene-d10	220		"	200		108	60-130			
Surrogate: Pyrene-d10	160		"	200		80.6	60-130			
Surrogate: Benzo (a) pyrene-d12	220		"	200		112	60-130			

Matrix Spike Dup (B4H0822-MSD1)		Source: Y408144-01			Prepared: 08/08/2024 Analyzed: 08/09/2024					
1-Methylnaphthalene	0.597	0.002	mg/kg	0.200	0.383	107	70-130	5.27	20	
2-Methylnaphthalene	0.838	0.002	"	0.200	0.653	92.3	70-130	2.29	20	
Acenaphthene	0.319	0.020	"	0.200	ND	159	70-130	10.6	20	QM-07
Anthracene	0.281	0.020	"	0.200	0.053	114	70-130	6.61	20	
Benzo (a) anthracene	0.262	0.005	"	0.200	0.011	125	70-130	14.6	20	
Benzo (a) pyrene	0.193	0.020	"	0.200	0.013	90.1	70-130	0.829	20	
Benzo (b) fluoranthene	0.139	0.020	"	0.200	0.014	62.6	70-130	11.8	20	QM-07
Benzo (g,h,i) perylene	0.443	0.020	"	0.200	0.272	85.5	70-130	4.90	20	
Benzo (k) fluoranthene	0.135	0.020	"	0.200	0.005	64.6	70-130	12.3	20	QM-07
Chrysene	0.253	0.020	"	0.200	0.033	110	70-130	0.776	20	
Dibenz (a,h) anthracene	0.256	0.020	"	0.200	ND	128	70-130	3.40	20	
Fluoranthene	0.226	0.020	"	0.200	0.025	100	70-130	13.7	20	

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Project: FEO - Hebron/Marr 7 Delineation

EPA 8270E (SW846) - Semivolatile Organic Compounds - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0822 - EPA 3580

Matrix Spike Dup (B4H0822-MSD1)	Source: Y408144-01			Prepared: 08/08/2024 Analyzed: 08/09/2024						
Fluorene	0.431	0.020	mg/kg	0.200	0.241	94.8	70-130	7.46	20	
Indeno (1,2,3-cd) pyrene	0.328	0.020	"	0.200	0.017	156	70-130	9.36	20	QM-07
Naphthalene	0.308	0.002	"	0.200	0.115	96.5	70-130	6.83	20	
Phenanthrene	0.504	0.020	"	0.200	0.307	98.1	70-130	10.5	20	
Pyrene	0.476	0.020	"	0.200	0.387	44.3	70-130	1.77	20	QM-07
Surrogate: Fluorene-d10	220		ug/kg	200		111	60-130			
Surrogate: Anthracene-d10	260		"	200		129	60-130			
Surrogate: Pyrene-d10	180		"	200		89.9	60-130			
Surrogate: Benzo (a) pyrene-d12	210		"	200		104	60-130			

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Joel Mason
 Project Number: [none]
 Project: FEO - Hebron/Marr 7 Delineation

Classical Chemistry Parameters - Quality Control
Origins Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0705 - DTPA Sorbitol Preparation

Blank (B4H0705-BLK1)

Prepared: 08/07/2024 Analyzed: 08/08/2024

Boron ND 0.100 mg/L

Duplicate (B4H0705-DUP1)

Source: Y408133-01

Prepared: 08/07/2024 Analyzed: 08/08/2024

Boron 0.0556 0.101 mg/L 0.0614 9.76 50

Batch B4H0708 - Saturated Paste Metals

Blank (B4H0708-BLK1)

Prepared: 08/07/2024 Analyzed: 08/09/2024

Calcium PPM ND 10.0 mg/L

SAR ND 0.0100 SAR

Magnesium PPM ND 10.0 mg/L

Sodium PPM ND 10.0 "

Duplicate (B4H0708-DUP1)

Source: Y408133-01

Prepared: 08/07/2024 Analyzed: 08/09/2024

SAR ND 0.0100 SAR 0.295 200

Calcium PPM 12.6 10.0 mg/L 12.5 0.478 50

Magnesium PPM 7.96 10.0 " 7.59 4.76 50

Sodium PPM 4.54 10.0 " 5.36 16.6 50

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Joel Mason
 Project Number: [none]
 Project: FEO - Hebron/Marr 7 Delineation

Saturated Paste - Quality Control
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B4H0714 - Saturated Paste pH/EC

Blank (B4H0714-BLK1)

Prepared: 08/07/2024 Analyzed: 08/08/2024

Specific Conductance (EC) ND 0.00500 mmhos/cm

Duplicate (B4H0714-DUP1)

Source: Y408133-01

Prepared: 08/07/2024 Analyzed: 08/08/2024

pH	7.89		pH Units	8.09			2.50	25	
Specific Conductance (EC)	0.164	0.00500	mmhos/cm	0.173			5.59	25	

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 Project Number: [none]
 Project: FEO - Hebron/Marr 7 Delineation

Total Metals 7196A - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2665193 - SW846 3060A										
BLANK (1205840092-BLK)					Prepared: 08/30/2024 Analyzed: 09/06/2024					
Hexavalent Chromium	ND	0.294	mg/kg				-			U
LCS (1205840093-BKS)					Prepared: 08/30/2024 Analyzed: 09/06/2024					
Hexavalent Chromium	3.87	0.392	mg/kg	3.92		98.7	80-120			
DUP (1205840094 D)					Source: 679391001 Prepared: 08/30/2024 Analyzed: 09/06/2024					
Hexavalent Chromium	ND	0.370	mg/kg dry		<0.148		0-50	N/A	50	U
MS (1205840095 S)					Source: 679391001 Prepared: 08/30/2024 Analyzed: 09/06/2024					
Hexavalent Chromium	2.39	0.325	mg/kg dry	3.25	<0.130	73.3	75-125			
DUP (1205840096 D)					Source: 679391002 Prepared: 08/30/2024 Analyzed: 09/06/2024					
Hexavalent Chromium	ND	0.302	mg/kg dry		<0.121		0-50	N/A	50	U
MS (1205840097 S)					Source: 679391002 Prepared: 08/30/2024 Analyzed: 09/06/2024					
Hexavalent Chromium	2.44	0.296	mg/kg dry	2.96	<0.118	80.7	75-125			
ILCS (1205840098-ILCS)					Prepared: 08/30/2024 Analyzed: 09/06/2024					
Hexavalent Chromium	6.64	0.313	mg/kg	6.28		106	80-120			

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112 High St.
Buffalo WY 82834

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Project Number: [none]
Project: FEO - Hebron/Marr 7 Delineation

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

QR-DUP RPD exceeds QC acceptance criteria, this indicates source sample is not homogenous.

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.

O-05 This sample was extracted outside of the EPA recommended holding time.

I-02 This result was analyzed outside of the EPA recommended holding time.

hU [Undefined]

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported on a wet weight basis.

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