

May 23, 2022

**Absaroka**

**Max Moran**

**112 High St.**

**Buffalo**

**WY**

**82834**

**Project Name - Refuge to Pintail Flowline  
Investigation**

**Project Number - CIT.CO.0607.01**

Attached are your analytical results for Refuge to Pintail Flowline Investigation received by Origins Laboratory, Inc. May 06, 2022. This project is associated with Origins project number Y205180-01.

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, Inc.  
303.433.1322  
o-squad@oelabinc.com



Absaroka  
112 High St.  
Buffalo WY 82834

Max Moran  
Project Number: CIT.CO.0607.01  
Project: Refuge to Pintail Flowline Investigation

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
D90-RP-SS-01	Y205180-01	Soil	May 5, 2022 13:30	05/06/2022 11:27
D90-RP-SS-02	Y205180-02	Soil	May 5, 2022 11:00	05/06/2022 11:27
D90-RP-SS-BG-01	Y205180-03	Soil	May 5, 2022 12:50	05/06/2022 11:27
D90-RP-SS-BG-02	Y205180-04	Soil	May 5, 2022 14:50	05/06/2022 11:27

Origins Laboratory, Inc.



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Max Moran  
 Project Number: CIT.CO.0607.01  
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170518

page 1 of 1

Client: Absaroka Energy and Environmental Solutions  
 Address: 112 High St. Buffalo, WY 82834  
 Telephone Number: 720.352.5326  
 Email Address: Max.Moran@absarokasolutions.com

Project Manager: Max Moran  
 Project Name: Refuge to Pintail Flowline Investigation  
 Project Number: CIT.CO.0607.01  
 Samples Collected By: Max Moran

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analyst	Sample Instructions	
				Unpreserved	HCl	HNO <sub>3</sub>	Other	Groundwater	Soil	Air/Surface			Other
D90_RP_SS_01	5/5/22	1330	4	X				X				CO607 Table 915-1, Soil Parameters	1
D90_RP_SS_02	5/5/22	1100	4	X				X				CO607 Table 915-1, Soil Parameters	2
D90_RP_SS_BG_01	5/5/22	1250	2	X				X				EC, SAR, Boron, pH, Metals	3
D90_RP_SS_BG_02	5/5/22	1415	2	X				X				EC, SAR, Boron, pH, Metals	4
													5
													6
													7
													8
													9
													10

Relinquished by: [Signature] Date: 5/6/22 Time: 1127  
 Relinquished by: [Signature] Date: 5/6/22 Time: 1127

Received By: [Signature] Date: 5/6/22 Time: 1127  
 Received By: [Signature] Date: 5/6/22 Time: 1127

Turnaround Time: Same Day  24 Hr  48 Hr  72 Hr  Standard

Date Results Needed

3.8

Origins Laboratory, Inc.

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Buffalo WY 82834

Max Moran  
Project Number: CIT.CO.0607.01  
Project: Refuge to Pintail Flowline Investigation

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

**Sample Receipt Checklist**

Origins Work Order: Y205180 Client: Absaroka  
Client Project ID: Refuge to Pintail

Checklist Completed by: JG Shipped Via: HS  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)  
Date/Time completed: 5/9/22 Airbill #: N/A

Matrix(s) Received: (Check all that apply):  Soil/Solid  Water  Other: \_\_\_\_\_

Cooler Number/Temperature: 1 3.8 °C  °C  °C (Describe) \_\_\_\_\_ °C

Thermometer ID: T004

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C <sup>(1)</sup> ?	<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 <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	<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 <sup>(1)</sup> ? (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 <sub>3</sub> , HCL, H <sub>2</sub> SO <sub>4</sub> ) / ( pH > 10 for samples preserved with NaAsO <sub>2</sub> +NaOH, ZnAc+NaOH)			<input checked="" type="checkbox"/>	
Additional Comments (if any):				

<sup>(1)</sup>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) MS Date/Time Reviewed 5-10-22

Origins Laboratory, Inc.

*J. Bynon*

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Absaroka  
 112 High St.  
 Buffalo WY 82834

Max Moran  
 Project Number: CIT.CO.0607.01  
 Project: Refuge to Pintail Flowline Investigation

**D90-RP-SS-01**

**5/5/2022 1:30:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y205180-01 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	0.122		0.102	mg/L	1	B2E1014	05/10/2022	05/11/2022	
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**DRO/ORO by EPA 8015D**

Diesel (C10-C28)	ND		25.0	mg/kg	1	B2E1004	05/10/2022	05/13/2022	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: *o*-Terphenyl 75.7 % 50-150 " " "

**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B2E0916	05/09/2022	05/10/2022	U
1,3,5-Trimethylbenzene	ND		0.00200	"	"	"	"	"	U
Benzene	ND		0.00200	"	"	"	"	"	U
Ethylbenzene	ND		0.00200	"	"	"	"	"	U
Toluene	ND		0.00200	"	"	"	"	"	U
Xylenes, total	ND		0.00200	"	"	"	"	"	U
Gasoline Range Hydrocarbons	ND		0.200	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 94.9 % 70-130 " " "

Origins Laboratory, Inc.



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**D90-RP-SS-01**

**5/5/2022 1:30:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y205180-01 (Soil)**

**GBTEX+TMBs by 8260D**

Surrogate: Toluene-d8	94.6 %		70-130			B2E09 16	05/09/2022	05/10/2022	
Surrogate: 4-Bromofluorobenzene	98.1 %		70-130			"	"	"	

**Metals by Saturated Paste by EPA 6010**

Calcium	10.2		0.499	meq/L	10	[CALC]	05/10/2022	05/11/2022	
Magnesium	7.47		0.823	"	"	"	"	"	
Sodium	64.1		0.435	"	"	"	"	"	

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.000364	0.00067	mg/Kg	1	L616483	05/17/2022	05/17/2022	
2-Methylnaphthalene	ND	0.000645	0.00067	"	"	"	"	"	
Acenaphthene	ND	0.000304	0.00067	"	"	"	"	"	
Anthracene	ND	0.000334	0.00067	"	"	"	"	"	
Benzo(a)anthracene	ND	0.000493	0.00067	"	"	"	"	"	
Benzo(a)pyrene	ND	0.000468	0.00067	"	"	"	"	"	
Benzo(b)fluoranthene	ND	0.000585	0.00067	"	"	"	"	"	
Benzo(k)fluoranthene	ND	0.000437	0.00067	"	"	"	"	"	
Chrysene	ND	0.000624	0.00067	"	"	"	"	"	
Dibenz(a,h)anthracene	ND	0.000614	0.00067	"	"	"	"	"	
Fluoranthene	ND	0.000394	0.00067	"	"	"	"	"	

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Project: Refuge to Pintail Flowline Investigation

**D90-RP-SS-01**

**5/5/2022 1:30:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Waypoint Analytical, Inc.**  
**Y205180-01 (Soil)**

**PAH by 8270D SIM**

Fluorene	ND	0.000286	0.00067	mg/Kg	1	L616483	05/17/2022	05/17/2022	
Indeno(1,2,3-cd)pyrene	ND	0.000627	0.00067	"	"	"	"	"	
Naphthalene	ND	0.000484	0.00067	"	"	"	"	"	
Pyrene	ND	0.000643	0.00067	"	"	"	"	"	

Surrogate: 2-Fluorobiphenyl	56.1 %		33-115			"	"	"	
Surrogate: 4-Terphenyl-d14	74.8 %		33-122			"	"	"	
Surrogate: Nitrobenzene-d5	64.8 %		29-110			"	"	"	

**pH in Soil by 9045D**

pH	8.07			pH Units	1	B2E1013	05/10/2022	05/11/2022	
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**SAR by 20B Saturated Paste**

SAR	21.5			SAR	1	B2E1012	05/10/2022	05/11/2022	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	7.23		0.00500	mmhos/cm	1	B2E1013	05/10/2022	05/11/2022	
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**Total Metals by 6020B**

Arsenic	0.761	0.0855	0.25	mg/Kg	5	L615564	05/11/2022	05/19/2022	
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**D90-RP-SS-01**  
**5/5/2022 1:30:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Waypoint Analytical, Inc.**  
**Y205180-01 (Soil)**

**Total Metals by 6020B**

Barium	165	0.042	0.25	mg/Kg	5	L615564	05/11/2022	05/19/2022	
Cadmium	0.0798	0.0259	0.25	"	"	"	"	"	J
Copper	14.9	0.0806	0.25	"	"	"	"	"	
Lead	7.64	0.031	0.25	"	"	"	"	"	
Nickel	18	0.0633	0.25	"	"	"	"	"	
Selenium	0.531	0.103	0.25	"	"	"	"	"	
Silver	0.0334	0.0067	0.25	"	"	"	"	"	J
Zinc	58	0.534	2.5	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L616389	05/05/2022	05/16/2022	
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**D90-RP-SS-02**  
**5/5/2022 11:00:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y205180-02 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	ND		0.100	mg/L	1	B2E1014	05/10/2022	05/11/2022	
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**DRO/ORO by EPA 8015D**

Diesel (C10-C28)	ND		25.0	mg/kg	1	B2E1004	05/10/2022	05/13/2022	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: *o*-Terphenyl 76.0 % 50-150 " " "

**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B2E0916	05/09/2022	05/10/2022	U
1,3,5-Trimethylbenzene	ND		0.00200	"	"	"	"	"	U
Benzene	ND		0.00200	"	"	"	"	"	U
Ethylbenzene	ND		0.00200	"	"	"	"	"	U
Toluene	ND		0.00200	"	"	"	"	"	U
Xylenes, total	ND		0.00200	"	"	"	"	"	U
Gasoline Range Hydrocarbons	ND		0.200	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 93.5 % 70-130 " " "

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 Project: Refuge to Pintail Flowline Investigation

**D90-RP-SS-02**  
**5/5/2022 11:00:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y205180-02 (Soil)**

**GBTEX+TMBs by 8260D**

Surrogate: Toluene-d8	94.4 %		70-130			B2E09 16	05/09/2022	05/10/2022	
Surrogate: 4-Bromofluorobenzene	98.3 %		70-130			"	"	"	

**Metals by Saturated Paste by EPA 6010**

Calcium	3.64		0.499	meq/L	10	[CALC]	05/10/2022	05/11/2022	
Magnesium	2.40		0.823	"	"	"	"	"	
Sodium	32.7		0.435	"	"	"	"	"	

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.000364	0.00067	mg/Kg	1	L616483	05/17/2022	05/17/2022	
2-Methylnaphthalene	ND	0.000645	0.00067	"	"	"	"	"	
Acenaphthene	ND	0.000304	0.00067	"	"	"	"	"	
Anthracene	ND	0.000334	0.00067	"	"	"	"	"	
Benzo(a)anthracene	ND	0.000493	0.00067	"	"	"	"	"	
Benzo(a)pyrene	ND	0.000468	0.00067	"	"	"	"	"	
Benzo(b)fluoranthene	ND	0.000585	0.00067	"	"	"	"	"	
Benzo(k)fluoranthene	ND	0.000437	0.00067	"	"	"	"	"	
Chrysene	ND	0.000624	0.00067	"	"	"	"	"	
Dibenz(a,h)anthracene	ND	0.000614	0.00067	"	"	"	"	"	
Fluoranthene	ND	0.000394	0.00067	"	"	"	"	"	

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**D90-RP-SS-02**  
**5/5/2022 11:00:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Waypoint Analytical, Inc.**  
**Y205180-02 (Soil)**

**PAH by 8270D SIM**

Fluorene	ND	0.000286	0.00067	mg/Kg	1	L616483	05/17/2022	05/17/2022	
Indeno(1,2,3-cd)pyrene	ND	0.000627	0.00067	"	"	"	"	"	
Naphthalene	ND	0.000484	0.00067	"	"	"	"	"	
Pyrene	ND	0.000643	0.00067	"	"	"	"	"	

Surrogate: 2-Fluorobiphenyl	42.6 %		33-115			"	"	"	
Surrogate: 4-Terphenyl-d14	56.2 %		33-122			"	"	"	
Surrogate: Nitrobenzene-d5	46.8 %		29-110			"	"	"	

**pH in Soil by 9045D**

pH	8.33			pH Units	1	B2E1013	05/10/2022	05/11/2022	
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**SAR by 20B Saturated Paste**

SAR	18.8			SAR	1	B2E1012	05/10/2022	05/11/2022	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	3.89		0.00500	mmhos/cm	1	B2E1013	05/10/2022	05/11/2022	
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**Total Metals by 6020B**

Arsenic	0.922	0.0855	0.25	mg/Kg	5	L615564	05/11/2022	05/19/2022	
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Max Moran  
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 Project: Refuge to Pintail Flowline Investigation

**D90-RP-SS-02**  
**5/5/2022 11:00:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Waypoint Analytical, Inc.**  
**Y205180-02 (Soil)**

**Total Metals by 6020B**

Barium	102	0.042	0.25	mg/Kg	5	L615564	05/11/2022	05/19/2022	
Cadmium	9.02	0.104	1	"	20	"	"	"	
Copper	15.7	0.0806	0.25	"	5	"	"	"	
Lead	6.64	0.031	0.25	"	"	"	"	"	
Nickel	16.7	0.0633	0.25	"	"	"	"	"	
Selenium	0.393	0.103	0.25	"	"	"	"	"	
Silver	0.0342	0.0067	0.25	"	"	"	"	"	J
Zinc	53.7	0.534	2.5	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.488	1	mg/Kg	2	L616389	05/05/2022	05/16/2022	
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 Project: Refuge to Pintail Flowline Investigation

**D90-RP-SS-BG-01**  
**5/5/2022 12:50:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y205180-03 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	ND		0.985	mg/L	10	B2E1014	05/10/2022	05/11/2022	
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**Metals by Saturated Paste by EPA 6010**

Calcium	3.65		0.499	meq/L	"	[CALC]	05/10/2022	05/11/2022	
Magnesium	2.88		0.823	"	"	"	"	"	
Sodium	57.9		0.435	"	"	"	"	"	

**pH in Soil by 9045D**

pH	6.31			pH Units	1	B2E1013	05/10/2022	05/11/2022	
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**SAR by 20B Saturated Paste**

SAR	32.0			SAR	1	B2E1012	05/10/2022	05/11/2022	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	4.16		0.00500	mmhos/cm	1	B2E1013	05/10/2022	05/11/2022	
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**Total Metals by 6020B**

Arsenic	2.27	0.0855	0.25	mg/Kg	5	L615564	05/11/2022	05/19/2022	
Barium	97.7	0.042	0.25	"	"	"	"	"	
Cadmium	0.48	0.0259	0.25	"	"	"	"	"	
Copper	65.2	0.322	1	"	20	"	"	"	

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Absaroka  
 112 High St.  
 Buffalo WY 82834

Max Moran  
 Project Number: CIT.CO.0607.01  
 Project: Refuge to Pintail Flowline Investigation

**D90-RP-SS-BG-01**  
**5/5/2022 12:50:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Waypoint Analytical, Inc.**  
**Y205180-03 (Soil)**

**Total Metals by 6020B**

Lead	15.1	0.031	0.25	mg/Kg	5	L615564	05/11/2022	05/19/2022	
Nickel	30.1	0.0633	0.25	"	"	"	"	"	
Selenium	6.64	0.103	0.25	"	"	"	"	"	
Silver	0.155	0.0067	0.25	"	"	"	"	"	J
Zinc	67.6	0.534	2.5	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	24.4	50	mg/Kg	100	L616389	05/05/2022	05/16/2022	
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 Project: Refuge to Pintail Flowline Investigation

**D90-RP-SS-BG-02**  
**5/5/2022 2:50:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y205180-04 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	ND		0.0985	mg/L	1	B2E1014	05/10/2022	05/11/2022	
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**Metals by Saturated Paste by EPA 6010**

Calcium	8.67		0.499	meq/L	10	[CALC]	05/10/2022	05/11/2022	
Magnesium	3.50		0.823	"	"	"	"	"	
Sodium	48.2		0.435	"	"	"	"	"	

**pH in Soil by 9045D**

pH	8.27			pH Units	1	B2E1013	05/10/2022	05/11/2022	
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**SAR by 20B Saturated Paste**

SAR	19.6			SAR	1	B2E1012	05/10/2022	05/11/2022	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	5.70		0.00500	mmhos/cm	1	B2E1013	05/10/2022	05/11/2022	
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**Total Metals by 6020B**

Arsenic	0.92	0.0855	0.25	mg/Kg	5	L615564	05/11/2022	05/19/2022	
Barium	60.6	0.042	0.25	"	"	"	"	"	
Cadmium	0.107	0.0259	0.25	"	"	"	"	"	J
Copper	9.23	0.0806	0.25	"	"	"	"	"	

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Max Moran  
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 Project: Refuge to Pintail Flowline Investigation

**D90-RP-SS-BG-02**  
**5/5/2022 2:50:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Waypoint Analytical, Inc.**  
**Y205180-04 (Soil)**

**Total Metals by 6020B**

Lead	4.5	0.031	0.25	mg/Kg	5	L615564	05/11/2022	05/19/2022	
Nickel	9.83	0.0633	0.25	"	"	"	"	"	
Selenium	0.294	0.103	0.25	"	"	"	"	"	
Silver	0.0317	0.0067	0.25	"	"	"	"	"	J
Zinc	33.4	0.534	2.5	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L616389	05/05/2022	05/16/2022	
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 Project: Refuge to Pintail Flowline Investigation

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B2E0916 - EPA 5030 (soil)**

**Blank (B2E0916-BLK1)**

Prepared: 05/09/2022 Analyzed: 05/09/2022

1,2,4-Trimethylbenzene	ND	0.00200	mg/kg							U
1,3,5-Trimethylbenzene	ND	0.00200	"							U
Benzene	ND	0.00200	"							U
Ethylbenzene	ND	0.00200	"							U
Naphthalene	ND	0.0100	"							U
Toluene	ND	0.00200	"							U
Xylenes, total	ND	0.00200	"							U
Gasoline Range Hydrocarbons	ND	0.200	"							U
Surrogate: 1,2-Dichloroethane-d4	0.14		"	0.125	108		70-130			
Surrogate: Toluene-d8	0.13		"	0.125	101		70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125	98.8		70-130			

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Max Moran  
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 Project: Refuge to Pintail Flowline Investigation

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B2E0916 - EPA 5030 (soil)

**LCS (B2E0916-BS1)**

Prepared: 05/09/2022 Analyzed: 05/09/2022

1,2,4-Trimethylbenzene	0.100	0.00200	mg/kg	0.100		100	70-130			
1,3,5-Trimethylbenzene	0.0997	0.00200	"	0.100		99.7	70-130			
Benzene	0.104	0.00200	"	0.100		104	70-130			
Ethylbenzene	0.0989	0.00200	"	0.100		98.9	70-130			
Naphthalene	0.0972	0.0100	"	0.100		97.2	70-130			
Toluene	0.101	0.00200	"	0.100		101	70-130			
o-Xylene	0.0981	0.00200	"	0.100		98.1	70-130			
m,p-Xylene	0.198	0.00400	"	0.200		99.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		105	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		92.2	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		103	70-130			

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Max Moran  
 Project Number: CIT.CO.0607.01  
 Project: Refuge to Pintail Flowline Investigation

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B2E0916 - EPA 5030 (soil)

Matrix Spike (B2E0916-MS1)	Source: Y205174-01			Prepared: 05/09/2022 Analyzed: 05/09/2022						
1,2,4-Trimethylbenzene	0.0993	0.00200	mg/kg	0.100	ND	99.3	70-130			
1,3,5-Trimethylbenzene	0.0992	0.00200	"	0.100	ND	99.2	70-130			
Benzene	0.105	0.00200	"	0.100	ND	105	70-130			
Ethylbenzene	0.100	0.00200	"	0.100	ND	100	70-130			
Naphthalene	0.0997	0.0100	"	0.100	ND	99.7	70-130			
Toluene	0.106	0.00200	"	0.100	ND	106	70-130			
o-Xylene	0.101	0.00200	"	0.100	ND	101	70-130			
m,p-Xylene	0.202	0.00400	"	0.200	ND	101	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.14		"	0.125		111	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		95.4	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		104	70-130			

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 Project: Refuge to Pintail Flowline Investigation

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B2E0916 - EPA 5030 (soil)

Matrix Spike Dup (B2E0916-MSD1)	Source: Y205174-01			Prepared: 05/09/2022 Analyzed: 05/09/2022						
1,2,4-Trimethylbenzene	0.0829	0.00200	mg/kg	0.100	ND	82.9	70-130	18.0	20	
1,3,5-Trimethylbenzene	0.0825	0.00200	"	0.100	ND	82.5	70-130	18.4	20	
Benzene	0.0909	0.00200	"	0.100	ND	90.9	70-130	14.1	20	
Ethylbenzene	0.0820	0.00200	"	0.100	ND	82.0	70-130	20.3	20	QM-07
Naphthalene	0.0852	0.0100	"	0.100	ND	85.2	70-130	15.8	20	
Toluene	0.0875	0.00200	"	0.100	ND	87.5	70-130	18.7	20	
o-Xylene	0.0830	0.00200	"	0.100	ND	83.0	70-130	19.3	20	
m,p-Xylene	0.165	0.00400	"	0.200	ND	82.7	70-130	20.0	20	
Surrogate: 1,2-Dichloroethane-d4	0.14		"	0.125		111	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		93.0	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		102	70-130			

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 Project: Refuge to Pintail Flowline Investigation

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B2E1004 - EPA 3580</b>										
<b>Blank (B2E1004-BLK1)</b>										
					Prepared: 05/10/2022 Analyzed: 05/13/2022					
Diesel (C10-C28)	ND	25.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	100	"							U
Surrogate: o-Terphenyl	27		"	24.9		109	50-150			

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Max Moran  
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 Project: Refuge to Pintail Flowline Investigation

**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B2E1004 - EPA 3580**

**LCS (B2E1004-BS1)**

Prepared: 05/10/2022 Analyzed: 05/13/2022

Diesel (C10-C28)	963	50.0	mg/kg	1000		96.3	70-130			
Residual Range Organics (C28-C40)	1130	200	"	1000		113	70-130			
Surrogate: o-Terphenyl	48		"	49.8		95.9	50-150			

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 Project: Refuge to Pintail Flowline Investigation

**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B2E1004 - EPA 3580**

<b>Matrix Spike (B2E1004-MS1)</b>	<b>Source: Y205174-01</b>			<b>Prepared: 05/10/2022 Analyzed: 05/13/2022</b>						
Diesel (C10-C28)	979	50.0	mg/kg	1000	ND	97.9	70-130			
Residual Range Organics (C28-C40)	1130	200	"	1000	ND	113	70-130			
Surrogate: o-Terphenyl	47		"	49.8		93.7	50-150			

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Max Moran  
 Project Number: CIT.CO.0607.01  
 Project: Refuge to Pintail Flowline Investigation

**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B2E1004 - EPA 3580**

<b>Matrix Spike Dup (B2E1004-MSD1)</b>	<b>Source: Y205174-01</b>		<b>Prepared: 05/10/2022 Analyzed: 05/13/2022</b>							
Diesel (C10-C28)	840	50.0	mg/kg	1000	ND	84.0	70-130	15.3	35	
Residual Range Organics (C28-C40)	916	200	"	1000	ND	91.6	70-130	21.2	35	
Surrogate: o-Terphenyl	41		"	49.8		82.4	50-150			

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**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Saturated Paste - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B2E1013 - NO PREP**

**Blank (B2E1013-BLK1)**

Prepared: 05/10/2022 Analyzed: 05/11/2022

Specific Conductance (EC) 0.00110 0.0300 mmhos/cm  
 pH 0.00 pH Units

**Duplicate (B2E1013-DUP1)**

**Source: Y205175-06**

Prepared: 05/10/2022 Analyzed: 05/11/2022

pH 8.12 pH Units 8.16 0.491 25  
 Specific Conductance (EC) 1.84 0.0300 mmhos/cm 1.89 2.42 25

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 Project: Refuge to Pintail Flowline Investigation

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch L616483 - 3550B**

<b>MSD (L 91162-MSD-L616483)</b>		<b>Source: 91162</b>			<b>Prepared: 05/17/2022 Analyzed: 05/17/2022</b>					
Anthracene	0.0977	0.00167	mg/Kg	0.165	91162	59.2	30-130	7.3	30	
Naphthalene	0.0873	0.00242	"	0.165	91162	52.9	30-130	16.8	30	
Indeno(1,2,3-cd)pyrene	0.0494	0.00314	"	0.165	91162	29.9	30-130	6.9	30	*
Fluorene	0.0824	0.00143	"	0.165	91162	49.9	30-130	20.9	30	
Fluoranthene	0.0937	0.00197	"	0.165	91162	56.7	30-130	6.9	30	
Dibenz(a,h)anthracene	0.0795	0.00307	"	0.165	91162	48.1	30-130	7	30	
Chrysene	0.109	0.00312	"	0.165	91162	66	30-130	11.6	30	
Benzo(k)fluoranthene	0.115	0.00219	"	0.165	0.00283	67.9	30-130	11	30	
Acenaphthene	0.0901	0.00152	"	0.165	0.00167	53.5	30-130	17.6	30	
2-Methylnaphthalene	0.0773	0.00323	"	0.165	91162	46.8	30-130	26.8	30	
1-Methylnaphthalene	0.107	0.00182	"	0.165	91162	64.8	30-130	12.6	30	
Benzo(b)fluoranthene	0.0619	0.00293	"	0.165	91162	37.5	30-130	25.7	30	
Benzo(a)pyrene	0.1	0.00234	"	0.165	91162	60.6	30-130	13.5	30	
Benzo(a)anthracene	0.0893	0.00247	"	0.165	91162	54.1	30-130	12.1	30	
Pyrene	0.0943	0.00322	"	0.165	91162	57.1	30-130	12	30	
Surrogate: Nitrobenzene-d5	58.4		"	0.33	211	58.4	29-110			
Surrogate: 4-Terphenyl-d14	63.3		"	0.33	214	63.3	33-122			
Surrogate: 2-Fluorobiphenyl	51.2		"	0.33	172	51.2	33-115			

<b>MS (L 91162-MS-L616483)</b>		<b>Source: 91162</b>			<b>Prepared: 05/17/2022 Analyzed: 05/17/2022</b>					
Pyrene	0.0836	0.00322	mg/Kg	0.163	91162	51.2	30-130			
Naphthalene	0.0737	0.00242	"	0.163	91162	45.2	30-130			
Indeno(1,2,3-cd)pyrene	0.0461	0.00314	"	0.163	91162	28.2	30-130			*
Fluorene	0.0668	0.00143	"	0.163	91162	40.9	30-130			
Fluoranthene	0.0874	0.00197	"	0.163	91162	53.6	30-130			
Dibenz(a,h)anthracene	0.0741	0.00307	"	0.163	91162	45.4	30-130			
Chrysene	0.097	0.00312	"	0.163	91162	59.5	30-130			

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 Project: Refuge to Pintail Flowline Investigation

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch L616483 - 3550B**

MS (L 91162-MS-L616483)	Source: 91162			Prepared: 05/17/2022 Analyzed: 05/17/2022						
Benzo(k)fluoranthene	0.103	0.00219	mg/Kg	0.163	0.00283	61.4	30-130			
Benzo(b)fluoranthene	0.0478	0.00293	"	0.163	91162	29.3	30-130			*
1-Methylnaphthalene	0.0943	0.00182	"	0.163	91162	57.8	30-130			
Benzo(a)pyrene	0.0873	0.00234	"	0.163	91162	53.5	30-130			
Benzo(a)anthracene	0.0791	0.00247	"	0.163	91162	48.5	30-130			
Anthracene	0.0908	0.00167	"	0.163	91162	55.7	30-130			
Acenaphthene	0.0755	0.00152	"	0.163	0.00167	45.2	30-130			
2-Methylnaphthalene	0.059	0.00323	"	0.163	91162	36.1	30-130			
Surrogate: Nitrobenzene-d5	53.2		"	0.327	211	53.2	29-110			
Surrogate: 4-Terphenyl-d14	56.8		"	0.327	214	56.8	33-122			
Surrogate: 2-Fluorobiphenyl	42.8		"	0.327	172	42.8	33-115			

LCS (LCS-L616483)	Prepared: 05/17/2022 Analyzed: 05/17/2022									
Benzo(b)fluoranthene	0.0937	0.000585	mg/Kg	0.167		56.1	30-130			
Benzo(a)pyrene	0.0997	0.000468	"	0.167		59.7	30-130			
Benzo(a)anthracene	0.0935	0.000493	"	0.167		55.9	30-130			
Anthracene	0.0922	0.000334	"	0.167		55.2	30-130			
Acenaphthene	0.0845	0.000304	"	0.167		50.5	30-130			
1-Methylnaphthalene	0.0801	0.000364	"	0.167		47.9	30-130			
2-Methylnaphthalene	0.08	0.000645	"	0.167		47.9	30-130			
Fluoranthene	0.0931	0.000394	"	0.167		55.7	30-130			
Pyrene	0.0935	0.000643	"	0.167		55.9	30-130			
Dibenz(a,h)anthracene	0.112	0.000614	"	0.167		67	30-130			
Fluorene	0.0844	0.000286	"	0.167		50.5	30-130			
Indeno(1,2,3-cd)pyrene	0.0955	0.000627	"	0.167		57.1	30-130			
Naphthalene	0.0809	0.000484	"	0.167		48.4	30-130			
Benzo(k)fluoranthene	0.0999	0.000437	"	0.167		59.8	30-130			

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Absaroka  
 112 High St.  
 Buffalo WY 82834

Max Moran  
 Project Number: CIT.CO.0607.01  
 Project: Refuge to Pintail Flowline Investigation

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch L616483 - 3550B**

**LCS (LCS-L616483)**

Prepared: 05/17/2022 Analyzed: 05/17/2022

Chrysene	0.0993	0.000624	mg/Kg	0.167		59.4	30-130			
Surrogate: 2-Fluorobiphenyl	49.5		"	0.333		49.5	33-115			
Surrogate: 4-Terphenyl-d14	66.9		"	0.333		66.9	33-122			
Surrogate: Nitrobenzene-d5	58.8		"	0.333		58.8	29-110			

**LRB (LRB-L616483)**

Prepared: 05/17/2022 Analyzed: 05/17/2022

Benzo(a)pyrene	ND	0.00067	mg/Kg				-			
2-Methylnaphthalene	ND	0.00067	"				-			
Benzo(a)anthracene	ND	0.00067	"				-			
Anthracene	ND	0.00067	"				-			
Fluorene	ND	0.00067	"				-			
Acenaphthene	ND	0.00067	"				-			
Benzo(k)fluoranthene	ND	0.00067	"				-			
Chrysene	ND	0.00067	"				-			
Fluoranthene	ND	0.00067	"				-			
Indeno(1,2,3-cd)pyrene	ND	0.00067	"				-			
Naphthalene	ND	0.00067	"				-			
1-Methylnaphthalene	ND	0.00067	"				-			
Pyrene	ND	0.00067	"				-			
Dibenz(a,h)anthracene	ND	0.00067	"				-			
Benzo(b)fluoranthene	ND	0.00067	"				-			
Surrogate: 2-Fluorobiphenyl	57.9		"	0.333		57.9	33-115			
Surrogate: 4-Terphenyl-d14	72.6		"	0.333		72.6	33-122			
Surrogate: Nitrobenzene-d5	63.9		"	0.333		63.9	29-110			

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**Total Metals by 6020B - Quality Control**  
**Waypoint Analytical, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch L615564 - 3050B**

<b>MSD (L 89061-MSD-L615564)</b>		<b>Source: 89061</b>			Prepared: 05/11/2022 Analyzed: 05/19/2022					
Nickel	9.3	0.0633	mg/Kg	2.3	7.43	81	75-125	4.1	80	
Zinc	48.7	0.534	"	23	27.9	90	75-125	5.2	80	
Selenium	4.17	0.103	"	4.6	0.371	83	75-125	7.1	80	
Lead	7.67	0.031	"	2.3	6.59	47	75-125	2.8	80	*
Copper	8.45	0.0806	"	2.3	6.35	91	75-125	0.8	80	
Cadmium	0.564	0.0259	"	0.46	0.107	99	75-125	1.9	80	
Barium	110	0.042	"	4.6	108	43	75-125	4.4	80	*
Arsenic	4.94	0.0855	"	2.3	3.45	65	75-125	7	80	*
Silver	0.48	0.0067	"	0.46	0.024	99	75-125	3	80	

<b>MS (L 89061-MS-L615564)</b>		<b>Source: 89061</b>			Prepared: 05/11/2022 Analyzed: 05/19/2022					
Arsenic	5.3	0.0855	mg/Kg	2.36	3.45	78	75-125			
Barium	115	0.042	"	4.72	108	148	75-125			*
Cadmium	0.575	0.0259	"	0.472	0.107	99	75-125			
Copper	8.52	0.0806	"	2.36	6.35	92	75-125			
Lead	7.89	0.031	"	2.36	6.59	55	75-125			*
Nickel	9.69	0.0633	"	2.36	7.43	96	75-125			
Selenium	4.48	0.103	"	4.72	0.371	87	75-125			
Silver	0.495	0.0067	"	0.472	0.024	100	75-125			
Zinc	51.3	0.534	"	23.6	27.9	99	75-125			

<b>LCS (LCS-L615564)</b>		Prepared: 05/11/2022 Analyzed: 05/19/2022								
Silver	0.495	0.0067	mg/Kg	0.5		99	80-120			
Arsenic	2.46	0.0855	"	2.5		98	80-120			
Barium	4.97	0.042	"	5		99	80-120			
Cadmium	0.506	0.0259	"	0.5		101	80-120			
Copper	2.43	0.0806	"	2.5		97	80-120			

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**Total Metals by 6020B - Quality Control**  
**Waypoint Analytical, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch L615564 - 3050B**

**LCS (LCS-L615564)**

Prepared: 05/11/2022 Analyzed: 05/19/2022

Lead	2.38	0.031	mg/Kg	2.5		95	80-120			
Nickel	2.42	0.0633	"	2.5		97	80-120			
Zinc	24.9	0.534	"	25		100	80-120			
Selenium	5.01	0.103	"	5		100	80-120			

**LRB (LRB-L615564)**

Prepared: 05/11/2022 Analyzed: 05/19/2022

Nickel	ND	0.25	mg/Kg				-			
Arsenic	ND	0.25	"				-			
Barium	ND	0.25	"				-			
Cadmium	ND	0.25	"				-			
Copper	ND	0.25	"				-			
Lead	ND	0.25	"				-			
Zinc	ND	2.5	"				-			
Silver	ND	0.25	"				-			
Selenium	ND	0.25	"				-			

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**Total Metals by 7196A - Quality Control**  
**Waypoint Analytical, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch L616389 -</b>										
<b>DUP (L 89057-DUP)</b>		<b>Source: Y205180-01</b>			Prepared: Analyzed: 05/16/2022					
Chromium, Hexavalent	ND	0.244	mg/Kg		89057		-	0	20	
<b>MS (L 89057-MS)</b>		<b>Source: Y205180-01</b>			Prepared: Analyzed: 05/16/2022					
Chromium, Hexavalent	4.54	0.244	mg/Kg	7.81	89057	58	75-125			*
<b>LCS (LCS)</b>					Prepared: Analyzed: 05/16/2022					
Chromium, Hexavalent	7.4	0.244	mg/Kg	8		93	75-125			
<b>LRB (LRB)</b>					Prepared: Analyzed: 05/16/2022					
Chromium, Hexavalent	ND	0.5	mg/Kg				-			

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Max Moran  
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Project: Refuge to Pintail Flowline Investigation

**Notes and Definitions**

- U Sample is Non-Detect.
  
- S-GC Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.
  
- QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
  
- J Estimated Value. Analyte below reported quantitation limit.
  
- \* QC Failure
  
- 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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