

December 20, 2018

Olsson Associates

Jason Davidson

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Carlson 33-18 Tank Pull

Project Number - [none]

Attached are your analytical results for Carlson 33-18 Tank Pull received by Origins Laboratory, Inc. December 11, 2018. This project is associated with Origins project number Y812163-01.

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



Olsson Associates

1525 Raleigh St, Suite 400

Denver CO 80204

Jason Davidson

Project Number: [none]

Project: Carlson 33-18 Tank Pull

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Carlson base @ 4	Y812163-01	Soil	December 11, 2018 9:30	12/11/2018 15:40
Carlson SWNorth @ 4	Y812163-02	Soil	December 11, 2018 9:35	12/11/2018 15:40
Carlson SWEast @ 4	Y812163-03	Soil	December 11, 2018 9:40	12/11/2018 15:40
Carlson SWSouth @ 4	Y812163-04	Soil	December 11, 2018 9:45	12/11/2018 15:40
Carlson SWWest @ 4	Y812163-05	Soil	December 11, 2018 9:50	12/11/2018 15:40

Per the phone call with Trent, GRO and DRO were added to all samples.

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y812163

Client: Olsson Assoc.

Client Project ID: Carlson 33-18 Tank Pull

Checklist Completed by: Dan Lee

Shipped Via: HD

(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 12-12-12

Airbill #: RA

Matrix(s) Received: (Check all that apply): ☒ Soil/Solid ☐ Water ☐ Other: _____

Cooler Number/Temperature: 1 / 4.6 °C 1 / _____ °C 1 / _____ °C 1 / _____ °C (Describe)

Thermometer ID: 6063

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"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples preserved that require preservation 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 type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Additional Comments (if any):				

⁽¹⁾If NO, then contact the client before proceeding with analysis and note 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) [Signature]

Date/Time/Reviewed 12/13/12

Origins Laboratory, Inc.

[Signature]

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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Carlson base @ 4
12/11/2018 9:30:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y812163-01 (Soil)

Diesel Range Organics (DRO/TEPH) by EPA 8015C

Diesel (C10-C28)	ND	50.0	mg/kg	1	B8L1802	KDK	12/18/2018	12/18/2018	U
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Surrogate: o-Terphenyl	81.2 %	59-131			"	"	"		
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GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B8L1303	KDK	12/13/2018	12/14/2018	U
Benzene	ND	0.002	"	"	"	KDK	"	"	U
Toluene	ND	0.002	"	"	"	KDK	"	"	U
Ethylbenzene	ND	0.002	"	"	"	KDK	"	"	U
Xylenes, total	ND	0.002	"	"	"	KDK	"	"	U

Surrogate: 1,2-Dichloroethane-d4	112 %	70-130			"	"	"		
Surrogate: Toluene-d8	96.0 %	70-130			"	"	"		
Surrogate: 4-Bromofluorobenzene	95.3 %	70-130			"	"	"		

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Carlson SWNorth @ 4
12/11/2018 9:35:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y812163-02 (Soil)

Diesel Range Organics (DRO/TEPH) by EPA 8015C

Diesel (C10-C28)	ND	50.0	mg/kg	1	B8L1802	KDK	12/18/2018	12/18/2018	U
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Surrogate: o-Terphenyl	80.8 %	59-131			"	"	"		
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GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B8L1303	KDK	12/13/2018	12/14/2018	U
Benzene	ND	0.002	"	"	"	KDK	"	"	U
Toluene	ND	0.002	"	"	"	KDK	"	"	U
Ethylbenzene	ND	0.002	"	"	"	KDK	"	"	U
Xylenes, total	ND	0.002	"	"	"	KDK	"	"	U

Surrogate: 1,2-Dichloroethane-d4	114 %	70-130			"	"	"		
Surrogate: Toluene-d8	94.9 %	70-130			"	"	"		
Surrogate: 4-Bromofluorobenzene	94.5 %	70-130			"	"	"		

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Carlson SWEast @ 4
12/11/2018 9:40:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y812163-03 (Soil)

Diesel Range Organics (DRO/TEPH) by EPA 8015C

Diesel (C10-C28)	ND	50.0	mg/kg	1	B8L1802	KDK	12/18/2018	12/18/2018	U
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Surrogate: o-Terphenyl	80.9 %	59-131			"	"	"		
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GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B8L1303	JTD	12/13/2018	12/17/2018	U
Benzene	ND	0.002	"	"	"	JTD	"	"	U
Toluene	ND	0.002	"	"	"	JTD	"	"	U
Ethylbenzene	ND	0.002	"	"	"	JTD	"	"	U
Xylenes, total	ND	0.002	"	"	"	JTD	"	"	U

Surrogate: 1,2-Dichloroethane-d4	108 %	70-130			"	"	"		
Surrogate: Toluene-d8	93.2 %	70-130			"	"	"		
Surrogate: 4-Bromofluorobenzene	93.6 %	70-130			"	"	"		

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Carlson SWSouth @ 4
12/11/2018 9:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y812163-04 (Soil)

Diesel Range Organics (DRO/TEPH) by EPA 8015C

Diesel (C10-C28)	ND	50.0	mg/kg	1	B8L1802	KDK	12/18/2018	12/18/2018	U
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Surrogate: o-Terphenyl	78.9 %	59-131			"	"	"		
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GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B8L1303	KDK	12/13/2018	12/14/2018	U
Benzene	ND	0.002	"	"	"	KDK	"	"	U
Toluene	0.002	0.002	"	"	"	KDK	"	"	
Ethylbenzene	ND	0.002	"	"	"	KDK	"	"	U
Xylenes, total	ND	0.002	"	"	"	KDK	"	"	U

Surrogate: 1,2-Dichloroethane-d4	113 %	70-130			"	"	"		
Surrogate: Toluene-d8	95.2 %	70-130			"	"	"		
Surrogate: 4-Bromofluorobenzene	96.2 %	70-130			"	"	"		

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Carlson SWWest @ 4
12/11/2018 9:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y812163-05 (Soil)

Diesel Range Organics (DRO/TEPH) by EPA 8015C

Diesel (C10-C28)	ND	50.0	mg/kg	1	B8L1802	KDK	12/18/2018	12/18/2018	U
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Surrogate: o-Terphenyl	79.0 %	59-131			"	"	"		
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GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	0.900	0.200	mg/kg	1	B8L1303	KDK	12/13/2018	12/14/2018	
Benzene	ND	0.002	"	"	"	KDK	"	"	U
Toluene	0.007	0.002	"	"	"	KDK	"	"	
Ethylbenzene	0.004	0.002	"	"	"	KDK	"	"	
Xylenes, total	0.041	0.002	"	"	"	KDK	"	"	

Surrogate: 1,2-Dichloroethane-d4	113 %	70-130			"	"	"		
Surrogate: Toluene-d8	95.0 %	70-130			"	"	"		
Surrogate: 4-Bromofluorobenzene	96.1 %	70-130			"	"	"		

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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8L1303 - EPA 5030 (soil)										
Blank (B8L1303-BLK1)					Prepared: 12/13/2018 Analyzed: 12/14/2018					
Gasoline Range Hydrocarbons	ND	0.200	mg/kg							U
Benzene	ND	0.002	"							U
Toluene	ND	0.002	"							U
Ethylbenzene	ND	0.002	"							U
Xylenes, total	ND	0.002	"							U
Surrogate: 1,2-Dichloroethane-d4	0.14		"	0.125		112	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		96.5	70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125		95.3	70-130			

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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8L1303 - EPA 5030 (soil)										
LCS (B8L1303-BS1)					Prepared: 12/13/2018 Analyzed: 12/14/2018					
Benzene	0.123	0.002	mg/kg	0.100		123	77.1-124			
Toluene	0.111	0.002	"	0.100		111	74.5-128			
Ethylbenzene	0.108	0.002	"	0.100		108	66.4-127			
m,p-Xylene	0.223	0.004	"	0.200		111	76.6-124			
o-Xylene	0.105	0.002	"	0.100		105	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		106	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		97.2	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		101	70-130			

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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Volatile Organic Compounds by GC/MS SW846 8260C - 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 B8L1303 - EPA 5030 (soil)

Matrix Spike (B8L1303-MS1)		Source: Y812163-01			Prepared: 12/13/2018 Analyzed: 12/14/2018					
Benzene	0.112	0.002	mg/kg	0.100	ND	112	71.8-126			
Toluene	0.100	0.002	"	0.100	0.001	99.1	65.1-130			
Ethylbenzene	0.096	0.002	"	0.100	0.0007	94.9	62.2-130			
m,p-Xylene	0.196	0.004	"	0.200	0.002	96.8	46.5-137			
o-Xylene	0.094	0.002	"	0.100	0.001	92.8	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		108	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		95.8	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		100	70-130			

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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Volatile Organic Compounds by GC/MS SW846 8260C - 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 B8L1303 - EPA 5030 (soil)

Matrix Spike Dup (B8L1303-MSD1)		Source: Y812163-01			Prepared: 12/13/2018 Analyzed: 12/14/2018					
Benzene	0.111	0.002	mg/kg	0.100	ND	111	71.8-126	0.377	11.3	
Toluene	0.099	0.002	"	0.100	0.001	98.2	65.1-130	0.883	15.4	
Ethylbenzene	0.094	0.002	"	0.100	0.0007	93.7	62.2-130	1.26	19.6	
m,p-Xylene	0.194	0.004	"	0.200	0.002	95.7	46.5-137	1.14	19.2	
o-Xylene	0.094	0.002	"	0.100	0.001	92.4	54.2-134	0.468	17.9	
Surrogate: 1,2-Dichloroethane-d4	0.14		"	0.125		110	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		95.5	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		100	70-130			

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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Jason Davidson
Project Number: [none]
Project: Carlson 33-18 Tank Pull

Volatile Organic Compounds by GC/MS SW846 8260C - 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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Extractable Petroleum Hydrocarbons by 8015C - 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 B8L1802 - EPA 3550B

Blank (B8L1802-BLK1)

Prepared: 12/18/2018 Analyzed: 12/18/2018

Diesel (C10-C28)	ND	50.0	mg/kg							U
Surrogate: o-Terphenyl	41		"	50.0		81.2	59-131			

LCS (B8L1802-BS1)

Prepared: 12/18/2018 Analyzed: 12/18/2018

Diesel (C10-C28)	1140	50.0	mg/kg	1000		114	64-121			
Surrogate: o-Terphenyl	55		"	50.0		110	59-131			

Matrix Spike (B8L1802-MS1)

Source: Y812163-01

Prepared: 12/18/2018 Analyzed: 12/18/2018

Diesel (C10-C28)	1200	50.0	mg/kg	1000	ND	120	53-125			
Surrogate: o-Terphenyl	56		"	50.0		112	59-131			

Matrix Spike Dup (B8L1802-MSD1)

Source: Y812163-01

Prepared: 12/18/2018 Analyzed: 12/18/2018

Diesel (C10-C28)	1150	50.0	mg/kg	1000	ND	115	53-125	4.37	20	
Surrogate: o-Terphenyl	56		"	50.0		112	59-131			

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates

1525 Raleigh St, Suite 400

Denver CO 80204

Jason Davidson

Project Number: [none]

Project: Carlson 33-18 Tank Pull

Notes and Definitions

U Sample is Non-Detect.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager