



May 18, 2017

Mr. Phil Hamlin, REM, CSEM
Senior HSE Representative
Kerr-McGee Oil & Gas Onshore LP
1099 18th Street, Suite 1800
Denver, Colorado 80202

**RE: Sump Closure Report
Jeffers 42-35
API #05-123-23422
Location ID #305746
Remediation #10713
NWNE SEC 35-T4N-R68W
Weld County, Colorado**

Dear Mr. Hamlin:

LT Environmental, Inc. (LTE) was contracted by Kerr-McGee Oil & Gas Onshore LP (Kerr-McGee) to conduct environmental oversight activities at the above-referenced site. The oversight activities included field-screening soil, collecting soil samples, documenting field activities, and reviewing laboratory analytical results.

The objective of the soil sampling was to determine if petroleum hydrocarbon impact to subsurface soil resulted from Kerr-McGee operating a produced water sump at the site. The soil sampling activities, laboratory analytical results, and conclusions are summarized below. The general site layout, soil sample location, and sump excavation dimensions are depicted on the Excavation Site Map provided as Figure 1.

On March 30, 2017, following removal of the produced water sump, soil samples were collected from the sidewalls and base of the sump excavation. The soil samples were field-screened for volatile organic compounds using a photoionization detector (PID). Soil staining, odor, and/or elevated headspace readings were not observed or identified through PID screening; the highest PID reading recorded was 9.1 parts per million. Based on the field-screening results, the excavation base soil sample (B01@10') was submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total petroleum hydrocarbons (TPH)-gasoline range organics (GRO) by United States Environmental Protection Agency (USEPA) Method 8260C, TPH-diesel range organics (DRO) and oil range organics (ORO) by USEPA Method 8015C, pH by USEPA Method 9045D, and specific conductance (EC) by USEPA modified Method 9050A. Laboratory analytical results for soil sample B01@10' indicated that BTEX, TPH, pH, and EC levels were compliant with Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 allowable levels. The soil sample analytical results are summarized in Table 1, and the laboratory analytical report is attached.



The sump excavation measured approximately 17 feet north to south by 15 feet east to west and was completed to a depth of 10 feet below ground surface. Groundwater and impacted soil were not encountered in the excavation. A liner was not present beneath the sump at this site. The produced water sump at this facility has been permanently removed, and the excavation area was backfilled with clean fill and contoured to match pre-existing site conditions.

LTE appreciates the opportunity to provide environmental services to Kerr-McGee. Please contact us at (303) 433-9788 if you have any questions regarding this Sump Closure Report or if you require additional information.

Sincerely,

LT ENVIRONMENTAL, INC.

A handwritten signature in blue ink that reads "Katharine Howe".

Katharine Howe, E.I.
Staff Engineer

A handwritten signature in blue ink that reads "Brian Sulzberger".

Brian Sulzberger, P.E., P.G.
Senior Engineer

Attachments

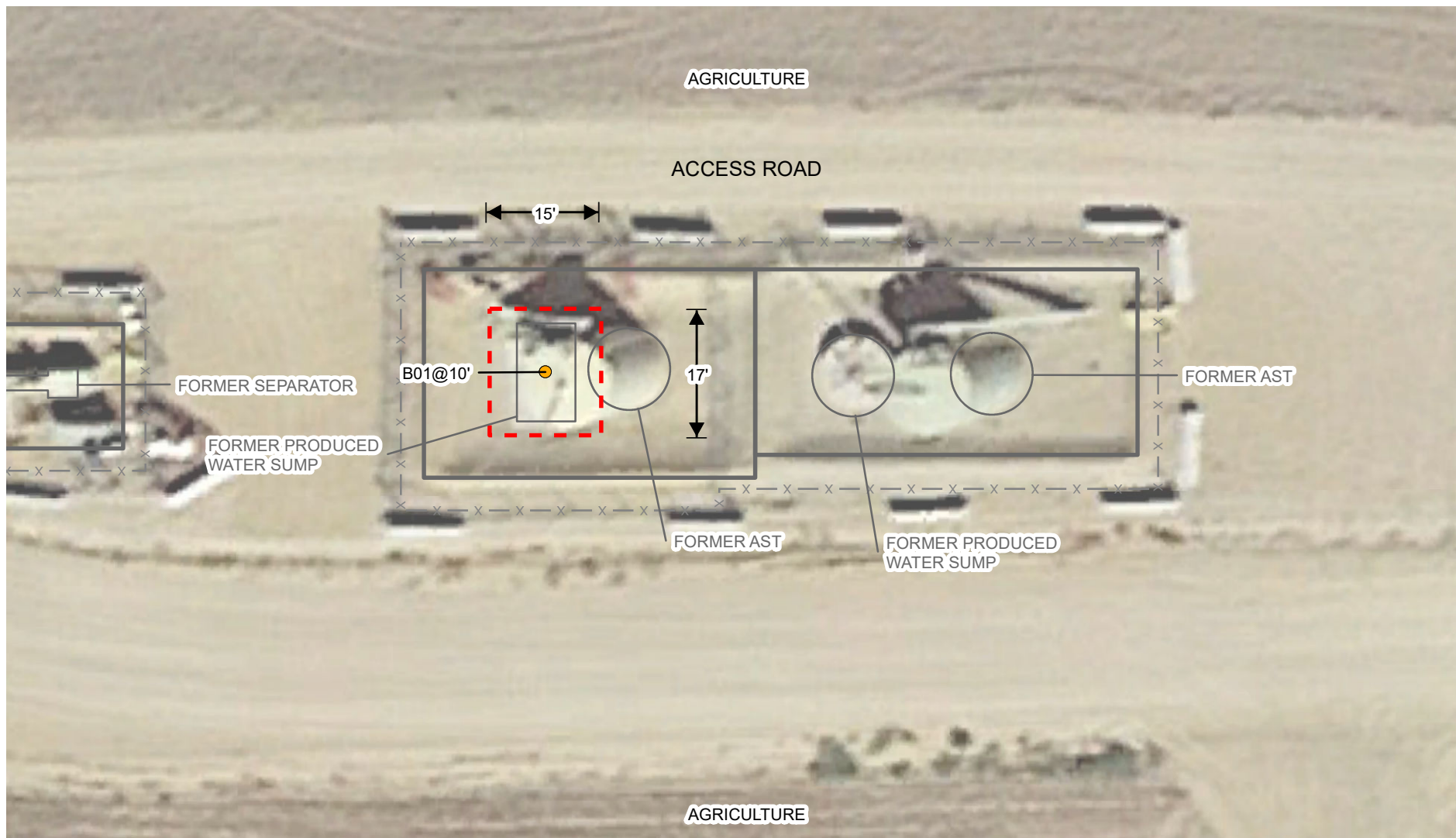


IMAGE COURTESY OF GOOGLE EARTH 2016

LEGEND

- SOIL SAMPLE
 - M FORMER METER HOUSE
 - x — x FORMER FENCE
 - EXCAVATION EXTENT
 - FORMER BERM
- AST: ABOVEGROUND STORAGE TANK

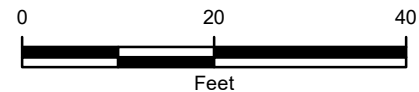


FIGURE 1
EXCAVATION SITE MAP
 JEFFERS 42-35
 NWNE SEC 35-T4N-R68W
 WELD COUNTY, COLORADO
 KERR-MCGEE OIL & GAS ONSHORE LP



TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
JEFFERS 42-35
WELD COUNTY, COLORADO
KERR-MCGEE OIL & GAS ONSHORE LP

Soil Sample ID	Depth (bgs)	Date	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	DRO (mg/kg)	GRO (mg/kg)	ORO (mg/kg)	pH (su)	Specific Conductance (mmhos/cm)
B01@10'	10'	03/30/2017	<0.050	<0.050	<0.050	<0.050	<25.0	<5.00	<100	8.19	0.859
COGCC Allowable Levels			0.17	85	100	175	500*	500*	500*	6-9	4

Notes: bgs - below ground surface

COGCC - Colorado Oil and Gas Conservation Commission

DRO - diesel range organics

GRO - gasoline range organics

mg/kg - milligrams per kilogram

mmhos/cm - millimhos per centimeter

NA - not analyzed/not available

ORO - oil range organics

su - standard units

TPH - total petroleum hydrocarbons

* - TPH standard applies to combined DRO-GRO-ORO

< - less than laboratory reporting limit

Bold indicates result exceeds allowable level.





March 31, 2017

LT Environmental, Inc.

Brian Sulzberger

4600 West 60th Avenue

Arvada

CO 80003

Project Name - KMG - Jeffers 41-35

Project Number - 014217064

Attached are your analytical results for KMG - Jeffers 41-35 received by Origins Laboratory, Inc. March 30, 2017. This project is associated with Origins project number Y703422-01.

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



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

LT Environmental, Inc.

4600 West 60th Avenue

Arvada CO 80003

Brian Sulzberger

Project Number: 014217064

Project: KMG - Jeffers 41-35

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01@10'	Y703422-01	Soil	March 30, 2017 13:15	03/30/2017 16:39

Origins Laboratory, Inc.



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.

Jen Pellegrini For Noelle Doyle Mathis, President

LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Brian Sulzberger
Project Number: 014217064
Project: KMG - Jeffers 41-35

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: 4703422

Client: LT E

Client Project ID: KMG - Jeffers 41-35

Checklist Completed by: Don Lee

Shipped Via: HS

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

Date/time completed: 3-30-17 1709

Airbill #: NA

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

Cooler Number/Temperature: 1 / 1.0 °C 1 / _____ °C 1 / _____ °C (Describe) _____ °C

Thermometer ID: T003

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 checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH</u>
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 checked="" type="checkbox"/>	<input 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) Don Lee

3-30-17 1709
Date/Time Reviewed

Origins Laboratory, Inc.

Jefe Pellegrini

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LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Brian Sulzberger
Project Number: 014217064
Project: KMG - Jeffers 41-35

B01@10'
3/30/2017 1:15:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y703422-01 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B7C3004	03/30/2017	03/30/2017	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 95.1 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	5.00	mg/kg	25	B7C3006	03/30/2017	03/30/2017	U
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	ND	0.050	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 92.4 % 70-130 " " "
Surrogate: Toluene-d8 108 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 99.5 % 70-130 " " "

pH in Soil by EPA 9045D

pH	8.19		pH Units	1	B7C2907	03/30/2017	03/30/2017	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.859		mmhos/cm	"	B7C3007	03/30/2017	03/30/2017	
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Origins Laboratory, Inc.



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LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Brian Sulzberger
Project Number: 014217064
Project: KMG - Jeffers 41-35

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 B7C3006 - EPA 5030 (soil)										
Blank (B7C3006-BLK1)					Prepared: 03/30/2017 Analyzed: 03/30/2017					
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	64		ug/kg	62.5		103	70-130			
Surrogate: Toluene-d8	65		"	62.5		104	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

Origins Laboratory, Inc.



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LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Brian Sulzberger
Project Number: 014217064
Project: KMG - Jeffers 41-35

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 B7C3006 - EPA 5030 (soil)										
LCS (B7C3006-BS1)					Prepared: 03/30/2017 Analyzed: 03/30/2017					
Benzene	0.092	0.002	mg/kg	0.100		92.4	77.1-124			
Toluene	0.100	0.002	"	0.100		99.9	74.5-128			
Ethylbenzene	0.105	0.002	"	0.100		105	66.4-127			
m,p-Xylene	0.214	0.004	"	0.200		107	76.6-124			
o-Xylene	0.105	0.002	"	0.100		105	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	64		ug/kg	62.5		102	70-130			
Surrogate: Toluene-d8	65		"	62.5		105	70-130			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		102	70-130			

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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 B7C3006 - EPA 5030 (soil)

Matrix Spike (B7C3006-MS1)		Source: Y703421-02			Prepared: 03/30/2017 Analyzed: 03/30/2017					
Benzene	0.085	0.002	mg/kg	0.100	ND	85.5	71.8-126			
Toluene	0.095	0.002	"	0.100	ND	95.4	65.1-130			
Ethylbenzene	0.103	0.002	"	0.100	ND	103	62.2-130			
m,p-Xylene	0.206	0.004	"	0.200	ND	103	46.5-137			
o-Xylene	0.102	0.002	"	0.100	ND	102	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	67		ug/kg	62.5		108	70-130			
Surrogate: Toluene-d8	66		"	62.5		106	70-130			
Surrogate: 4-Bromofluorobenzene	65		"	62.5		104	70-130			

Origins Laboratory, Inc.



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LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Brian Sulzberger
Project Number: 014217064
Project: KMG - Jeffers 41-35

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 B7C3006 - EPA 5030 (soil)

Matrix Spike Dup (B7C3006-MSD1)		Source: Y703421-02			Prepared: 03/30/2017 Analyzed: 03/30/2017					
Benzene	0.092	0.002	mg/kg	0.100	ND	92.3	71.8-126	7.70	11.3	
Toluene	0.102	0.002	"	0.100	ND	102	65.1-130	6.67	15.4	
Ethylbenzene	0.105	0.002	"	0.100	ND	105	62.2-130	1.90	19.6	
m,p-Xylene	0.211	0.004	"	0.200	ND	106	46.5-137	2.22	19.2	
o-Xylene	0.105	0.002	"	0.100	ND	105	54.2-134	3.61	17.9	
Surrogate: 1,2-Dichloroethane-d4	49		ug/kg	62.5		77.8	70-130			
Surrogate: Toluene-d8	66		"	62.5		106	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

Origins Laboratory, Inc.



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4600 West 60th Avenue
Arvada CO 80003

Brian Sulzberger
Project Number: 014217064
Project: KMG - Jeffers 41-35

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 B7C3004 - EPA 3580

Blank (B7C3004-BLK1)

Prepared: 03/30/2017 Analyzed: 03/30/2017

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	42		"	50.0		84.5	59-131			

LCS (B7C3004-BS1)

Prepared: 03/30/2017 Analyzed: 03/30/2017

Diesel (C10-C28)	754	50.0	mg/kg	1000		75.4	64-121			
Residual Range Organics (C28-C40)	779	200	"	1000		77.9	58-124			
Surrogate: o-Terphenyl	45		"	50.0		89.4	59-131			

Matrix Spike (B7C3004-MS1)

Source: Y703392-01

Prepared: 03/30/2017 Analyzed: 03/30/2017

Diesel (C10-C28)	1100	50.0	mg/kg	1000	316	78.7	53-125			
Residual Range Organics (C28-C40)	1010	200	"	1000	24.2	98.2	47-133			
Surrogate: o-Terphenyl	51		"	50.0		103	59-131			

Matrix Spike Dup (B7C3004-MSD1)

Source: Y703392-01

Prepared: 03/30/2017 Analyzed: 03/30/2017

Diesel (C10-C28)	1130	50.0	mg/kg	1000	316	81.4	53-125	3.36	20	
Residual Range Organics (C28-C40)	1050	200	"	1000	24.2	102	47-133	4.10	20	
Surrogate: o-Terphenyl	52		"	50.0		104	59-131			

Origins Laboratory, Inc.



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4600 West 60th Avenue
Arvada CO 80003

Brian Sulzberger
Project Number: 014217064
Project: KMG - Jeffers 41-35

Classical Chemistry Parameters - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B7C2907 - NO PREP										
Duplicate (B7C2907-DUP1)		Source: Y703393-01			Prepared: 03/29/2017 Analyzed: 03/30/2017					
pH	7.89		pH Units		7.89			0.00	25	
Batch B7C3007 - NO PREP										
Blank (B7C3007-BLK1)		Prepared: 03/30/2017 Analyzed: 03/30/2017								
Specific Conductance (EC)	0.00340		mmhos/cm							
Duplicate (B7C3007-DUP1)		Source: Y703421-02			Prepared: 03/30/2017 Analyzed: 03/30/2017					
Specific Conductance (EC)	0.881		mmhos/cm		0.814			7.91	25	

Origins Laboratory, Inc.



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LT Environmental, Inc.
4600 West 60th Avenue
Arvada CO 80003

Brian Sulzberger
Project Number: 014217064
Project: KMG - Jeffers 41-35

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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