



August 25, 2015

Mr. Sam LaRue  
Senior HSE Representative  
Kerr-McGee Oil & Gas Onshore LP  
501 North Division Boulevard  
Platteville, Colorado 80651

**RE: Sump Excavation Report  
WCLI USX S 33-15P  
Weld County, Colorado  
API #05-123-31524  
Location ID #416948  
SWSE Sec 33-T4N-R68W  
Remediation #8961**

Dear Mr. LaRue:

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 soils using a photo-ionization detector (PID), collecting confirmation soil samples from the sump excavation, documenting field activities, and laboratory analytical results review.

The objective of the soil sampling was to determine if petroleum hydrocarbon impacts 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, sump excavation dimensions, and soil sample locations are depicted on the Excavation Site Map attached as Figure 1.

On July 27, 2015, after removing the produced water sump, confirmation soil samples were collected from the sidewalls of the excavation at approximately 4 feet below ground surface (bgs), and a base soil sample was collected at 4.5 feet bgs. LTE personnel observed geo-synthetic liner exposed at the northern sidewall of the excavation. A confirmation sidewall soil sample was not collected from the north extent of the excavation due to the presence of the geo-synthetic liner and no sample material present. Soil samples were field screened for volatile organic compounds using a PID. LTE personnel did not observe soil staining or odor in any of the confirmation soil samples. The confirmation soil sample collected from the base of the excavation (B01@4.5') was submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by United States Environmental Protection Agency (USEPA) Method 8260C, total petroleum hydrocarbons (TPH) by USEPA Method 8015C, pH by USEPA Method 9045D, and specific conductance (EC) by USEPA Method 9050A. Laboratory analytical results for confirmation soil sample B01@4.5' indicated that BTEX, TPH and EC levels were less than or within COGCC Table 910-1 allowable levels. Confirmation base soil sample B01@4.5'



exceeded the allowable pH concentration range of 6-9 with a pH concentration of 9.03; however, the soil sample was collected below the 3 foot root zone threshold, and no further action is required. The soil sample laboratory analytical results are summarized in Table 1 and the laboratory analytical report is attached.

The final sump excavation measured approximately 15 feet north to south by 15 feet east to west to an approximate depth of 4.5 feet bgs. Soil was not excavated per the direction of Kerr-McGee. The produced water sump at this facility will be replaced.

Please contact LTE at (303) 433-9788 if you have any questions regarding this Sump Excavation Report or if you require additional information.

Sincerely,

LT ENVIRONMENTAL, INC.

A handwritten signature in blue ink that reads 'RYAN ZERNIS'. The signature is stylized with a large, looping 'R' and 'Z'.

Ryan Zernis  
Staff Geologist

A handwritten signature in blue ink that reads 'Michael J. Furtaw'. The signature is written in a cursive, flowing style.

Michael J. Furtaw, P.G.  
Project Geologist

Attachments:

**ATTACHMENTS**

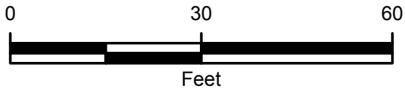




IMAGE COURTESY OF GOOGLE EARTH 2014

**LEGEND**

- SOIL SAMPLE
- EXCAVATION EXTENT
- BERM



**FIGURE 1**  
**EXCAVATION SITE MAP**  
 WCLI USX S 33-15P  
 SWSE SEC 33-T4N-R68W  
 WELD COUNTY, COLORADO  
**KERR-MCGEE OIL & GAS ONSHORE LP**



**TABLE 1**  
**SOIL SAMPLE ANALYTICAL RESULTS**  
**WCLI USX S 33-15P**  
**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 @ 4.5'	4.5'	07/27/2015	<0.002	<0.002	<0.002	<0.002	<50	<50	<200	9.03 †	0.0421
<b>COGCC Allowable Levels</b>			<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>500*</b>	<b>500*</b>	<b>500*</b>	<b>6-9</b>	<b>4</b>

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

† - Sample was collected at a depth greater than 3 feet bgs

\* - Standard applies to combined DRO-GRO-ORO

< - less than laboratory reporting limit

Bold indicates result exceeds allowable level





July 28, 2015

LT Environmental, Inc.

John Cocroft

4600 West 60th Avenue

Arvada CO 80003

Project Name - KMG - WCLI USX S 33-15P

Project Number - 014215151

Attached are your analytical results for KMG - WCLI USX S 33-15P received by Origins Laboratory, Inc. July 27, 2015. This project is associated with Origins project number X507360-03.

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

John Cocroft  
Project Number: 014215151  
Project: KMG - WCLI USX S 33-15P

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01 @ 4.5'	X507360-03	Soil	July 27, 2015 15:45	07/27/2015 19:12

Origins Laboratory, Inc.



Jen Pellegrini For Noelle Doyle Mathis, President

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

John Cocroft  
 Project Number: 014215151  
 Project: KMG - WCLI USX S 33-15P

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

**Sample Receipt Checklist**

Origins Work Order: X507360 Client: LTE  
 Client Project ID: WCLI USX S33-15P  
 Checklist Completed by: Jeff Smith Shipped Via: HD  
 Date/time completed: 7/27/15 (UPS, FedEx, Hand Delivered, Pick-up, etc.)  
 Airbill #: N/A  
 Matrix(s) Received: (Check all that apply):  Soil/Solid  Water  Other: \_\_\_\_\_  
 Cooler Number/Temperature: 1 / 3.4 °C \_\_\_\_\_ / \_\_\_\_\_ °C \_\_\_\_\_ / \_\_\_\_\_ °C (Describe) \_\_\_\_\_ °C  
 Thermometer ID: TG53

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 5°C <sup>(1)</sup> ?	X			
Is there ice present (document if blue ice is used)	X			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		✓		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		✓		
Were all samples received intact <sup>(1)</sup> ?	✓			
Was adequate sample volume provided <sup>(1)</sup> ?	✓			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?	X			PH
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	X			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	✓			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	✓			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	✓			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.			✓	
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 HNO3, HCL, H2SO4) / ( pH >10 for samples preserved with NaAsO2+NaOH, ZnAc+NaOH)			✓	
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) [Signature] Date/Time Reviewed 7/28/15

Origins Laboratory, Inc.

[Signature]

Jen Pellegrini For Noelle Doyle Mathis, President

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 Arvada CO 80003

John Cocroft  
 Project Number: 014215151  
 Project: KMG - WCLI USX S 33-15P

**B01 @ 4.5'**

**7/27/2015 3:45:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X507360-03 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND		0.002	mg/kg	1	5G27005	07/27/2015	07/28/2015	
Toluene	ND		0.002	"	"	"	"	"	
Ethylbenzene	ND		0.002	"	"	"	"	"	
Xylenes, total	ND		0.002	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	111 %		70-130			"	"	"	
Surrogate: Toluene-d8	101 %		70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	103 %		70-130			"	"	"	

**pH in Soil by EPA 9045D**

pH	9.03			pH Units	1	5G27007	07/27/2015	07/27/2015	
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**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0421			mmhos/cm	"	5G27008	07/27/2015	07/27/2015	
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**TPH-Carbon Chain by EPA Method 8015C**

Gasoline (C6-C10)	ND	17	50	mg/kg	1	5G27006	07/27/2015	07/28/2015	
Diesel (C10-C28)	29	13	50	"	"	"	"	"	
Residual Range Organics (C28-C36)	ND	4.6	200	"	"	"	"	"	
Surrogate: o-Terphenyl	85.3 %		65-146			"	"	"	

Origins Laboratory, Inc.



Jen Pellegrini For Noelle Doyle Mathis, President

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

John Cocroft  
 Project Number: 014215151  
 Project: KMG - WCLI USX S 33-15P

**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 5G27005 - EPA 5030 (soil)**

**Blank (5G27005-BLK1)**

Prepared: 07/27/2015 Analyzed: 07/27/2015

Benzene	ND	0.002	mg/kg							
Toluene	ND	0.002	"							
Ethylbenzene	ND	0.002	"							
Xylenes, total	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	71		ug/kg	62.5		113	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	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 5G27005 - EPA 5030 (soil)**

**LCS (5G27005-BS1)**

Prepared: 07/27/2015 Analyzed: 07/27/2015

Benzene	0.096	0.002	mg/kg	0.100		96.1	77.1-124			
Toluene	0.102	0.002	"	0.100		102	74.5-128			
Ethylbenzene	0.098	0.002	"	0.100		98.2	66.4-127			
m,p-Xylene	0.204	0.004	"	0.200		102	76.6-124			
o-Xylene	0.104	0.002	"	0.100		104	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	72		ug/kg	62.5		116	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		100	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 5G27005 - EPA 5030 (soil)

Matrix Spike (5G27005-MS1)	Source: X507351-01			Prepared: 07/27/2015 Analyzed: 07/27/2015						
Benzene	0.085	0.002	mg/kg	0.100	ND	85.3	71.8-126			
Toluene	0.090	0.002	"	0.100	0.002	87.8	65.1-130			
Ethylbenzene	0.084	0.002	"	0.100	ND	84.5	62.2-130			
m,p-Xylene	0.163	0.004	"	0.200	0.002	80.6	46.5-137			
o-Xylene	0.085	0.002	"	0.100	0.0004	84.3	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	76		ug/kg	62.5		121	70-130			
Surrogate: Toluene-d8	65		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	65		"	62.5		104	70-130			

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 Arvada CO 80003

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 Project: KMG - WCLI USX S 33-15P

**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 5G27005 - EPA 5030 (soil)

Matrix Spike Dup (5G27005-MSD1)	Source: X507351-01			Prepared: 07/27/2015 Analyzed: 07/27/2015						
Benzene	0.099	0.002	mg/kg	0.100	ND	99.0	71.8-126	14.9	11.3	QR-02
Toluene	0.101	0.002	"	0.100	0.002	99.5	65.1-130	12.2	15.4	
Ethylbenzene	0.091	0.002	"	0.100	ND	91.4	62.2-130	7.87	19.6	
m,p-Xylene	0.190	0.004	"	0.200	0.002	94.5	46.5-137	15.7	19.2	
o-Xylene	0.096	0.002	"	0.100	0.0004	95.6	54.2-134	12.5	17.9	
Surrogate: 1,2-Dichloroethane-d4	77		ug/kg	62.5		123	70-130			
Surrogate: Toluene-d8	63		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.9	70-130			

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 Arvada CO 80003

John Cocroft  
 Project Number: 014215151  
 Project: KMG - WCLI USX S 33-15P

**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 5G27006 - EPA 3580**

**Blank (5G27006-BLK1)**

Prepared: 07/27/2015 Analyzed: 07/27/2015

Gasoline (C6-C10)	ND	50	mg/kg							
Diesel (C10-C28)	23	50	"							
Residual Range Organics (C28-C36)	ND	200	"							
Surrogate: o-Terphenyl	43.8		"	50.0		87.7	65-146			

**LCS (5G27006-BS1)**

Prepared: 07/27/2015 Analyzed: 07/27/2015

Gasoline (C6-C10)	1000	50	mg/kg	1000		103	66.7-119			
Diesel (C10-C28)	850	50	"				70.1-127			
Residual Range Organics (C28-C36)	990	200	"	1000		99.3	54.5-139			
Surrogate: o-Terphenyl	47.5		"	50.0		95.1	65-146			

**Matrix Spike (5G27006-MS1)**

Source: X507351-01

Prepared: 07/27/2015 Analyzed: 07/27/2015

Gasoline (C6-C10)	950	50	mg/kg	1000	ND	95.4	56.4-132			
Diesel (C10-C28)	780	50	"		21		57.4-138			
Residual Range Organics (C28-C36)	900	200	"	1000	ND	90.1	47.7-129			
Surrogate: o-Terphenyl	44.4		"	50.0		88.8	65-146			

**Matrix Spike Dup (5G27006-MSD1)**

Source: X507351-01

Prepared: 07/27/2015 Analyzed: 07/27/2015

Gasoline (C6-C10)	1000	50	mg/kg	1000	ND	102	56.4-132	6.90	22	
Diesel (C10-C28)	830	50	"		21		57.4-138	7.06	18.3	
Residual Range Organics (C28-C36)	950	200	"	1000	ND	94.8	47.7-129	5.09	30.1	
Surrogate: o-Terphenyl	46.5		"	50.0		93.0	65-146			

Origins Laboratory, Inc.



Jen Pellegrini For Noelle Doyle Mathis, President

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 Arvada CO 80003

John Cocroft  
 Project Number: 014215151  
 Project: KMG - WCLI USX S 33-15P

**Classical Chemistry Parameters - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 5G27007 - NO PREP</b>										
<b>Duplicate (5G27007-DUP1)</b>		<b>Source: X507321-01</b>			Prepared: 07/27/2015 Analyzed: 07/27/2015					
pH	7.98		pH Units		7.96			0.251	25	
<b>Batch 5G27008 - NO PREP</b>										
<b>Blank (5G27008-BLK1)</b>		Prepared: 07/27/2015 Analyzed: 07/27/2015								
Specific Conductance (EC)	0.00360		mmhos/cm							
<b>Duplicate (5G27008-DUP1)</b>		<b>Source: X507321-01</b>			Prepared: 07/27/2015 Analyzed: 07/27/2015					
Specific Conductance (EC)	0.171		mmhos/cm		0.180			4.84	25	

Origins Laboratory, Inc.



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John Cocroft  
Project Number: 014215151  
Project: KMG - WCLI USX S 33-15P

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### Notes and Definitions

QR-02 The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported on a wet weight basis.

Origins Laboratory, Inc.



Jen Pellegrini For Noelle Doyle Mathis, President

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