



October 30, 2015

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

**RE: Sump Excavation Report  
MCHALE-62N67W/5NWNE  
Weld County, Colorado  
NWNE SEC 5-T2N-R67W  
API #05-123-23494  
Location ID #305798  
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 soil 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 September 24, 2015, after removing the produced water sump, confirmation soil samples were collected from the excavation sidewalls at approximately 2.5 feet below ground surface (bgs) and from the excavation base at 3.5 feet bgs, per the direction of Kerr-McGee. Soil samples were field screened for volatile organic compounds using a PID. LTE personnel did not observe soil staining or odor in the confirmation soil samples. The confirmation soil sample collected from the base of the excavation (B01@3.5') 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 Methods 8015C and 8260C, pH by USEPA Method 9045D, and specific conductance (EC) by USEPA Method 9050A. Laboratory analytical results for confirmation soil sample B01@3.5' indicated that BTEX, TPH, pH, and EC levels were less than or within COGCC Table 910-1 allowable levels. The soil sample laboratory analytical results are summarized in Table 1 and the laboratory analytical report is attached.



The final sump excavation measured approximately 17 feet north to south by 17 feet east to west to an approximate depth of 3.5 feet bgs. No soil was excavated during the process of removing the produced water sump. 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 blue ink signature of Kristofer Shepherd, written in a cursive style.

Kristofer Shepherd  
Staff Geologist

A blue ink signature of Kelly Kenyon, written in a cursive style.

Kelly Kenyon  
Project Scientist

Attachments

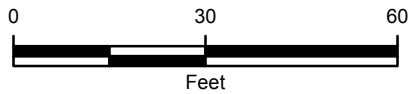


IMAGE COURTESY OF ESRI

**LEGEND**

- SOIL SAMPLE
- M METER HOUSE
- IRRIGATION DITCH
- EXCAVATION EXTENT
- BERM

AST: ABOVEGROUND STORAGE TANK



**FIGURE 1**  
**EXCAVATION SITE MAP**  
 MCHALE-62N67W/5NWNE  
 NWNE SEC 5-T2N-R67W  
 WELD COUNTY, COLORADO  
**KERR-MCGEE OIL & GAS ONSHORE LP**



**TABLE 1**  
**SOIL SAMPLE ANALYTICAL RESULTS**  
**MCHALE-62N67W/5NWNE**  
**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 @ 3.5'	3.5'	09/24/2015	<0.002	<0.002	<0.002	<0.002	<25	<0.200	<100	8.41	0.0838
<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  
\* - Standard applies to combined DRO-GRO-ORO  
< - less than laboratory reporting limit  
Bold indicates result exceeds allowable level



October 22, 2015

LT Environmental, Inc.

John Cocroft

4600 West 60th Avenue

Arvada CO 80003

**Project Name - KMG - MCHALE-62N67W/5NWNE    Project Number - 014215177**

Attached are your analytical results for KMG - MCHALE-62N67W/5NWNE received by Origins Laboratory, Inc. September 24, 2015. This project is associated with Origins project number X509323-01.

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



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

John Cocroft  
Project Number: 014215177  
Project: KMG - MCHALE-62N67W/5NWNE

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01 @ 3.5'	X509323-01	Soil	September 24, 2015 14:40	09/24/2015 16:45

Origins Laboratory, Inc.



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

John Cocroft  
 Project Number: 014215177  
 Project: KMG - MCHALE-62N67W/5NWNE

Origins Laboratory

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

**Sample Receipt Checklist**

Origins Work Order: XSOA323

Client: LTE

Client Project ID: Mchale 2+7-5

Checklist Completed by: J. Pellegrini

Shipped Via: HD  
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 9/24/15 1750

Airbill #: NA

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

Cooler Number/Temperature: 1 194 °c 1 °c 1 °c 1 °c (Describe)

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 <sup>(1)</sup> ?	<input checked="" type="checkbox"/> <u>Sh</u>	<input checked="" type="checkbox"/>		<u>24 hours</u>
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.

J. Pellegrini  
 Reviewed by (Project Manager)

9/24/15 1751  
 Date/Time Reviewed

Origins Laboratory, Inc.

*Jefe Pellegrini*

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

John Cocroft  
 Project Number: 014215177  
 Project: KMG - MCHALE-62N67W/5NWNE

**B01 @ 3.5'**  
**9/24/2015 2:40:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X509323-01 (Soil)**

**DRO/RRO by EPA8015C**

Diesel (C10-C28)	ND	25	mg/kg	1	5124008	09/24/2015	09/24/2015	
Residual Range Organics (C28-C36)	ND	100	"	"	"	"	"	

*Surrogate: o-Terphenyl* 94.4 % 59-131 " " "

**GBTEX by EPA 8260C**

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	5124009	09/24/2015	09/24/2015	
Benzene	ND	0.002	"	"	"	"	"	
Toluene	ND	0.002	"	"	"	"	"	
Ethylbenzene	ND	0.002	"	"	"	"	"	
Xylenes, total	ND	0.002	"	"	"	"	"	

*Surrogate: 1,2-Dichloroethane-d4* 109 % 70-130 " " "  
*Surrogate: Toluene-d8* 98.9 % 70-130 " " "  
*Surrogate: 4-Bromofluorobenzene* 98.8 % 70-130 " " "

**pH in Soil by EPA 9045D**

pH	8.41		pH Units	1	5124012	09/24/2015	09/25/2015	
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**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0838		mmhos/cm	"	5124013	09/24/2015	"	
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LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

John Cocroft  
 Project Number: 014215177  
 Project: KMG - MCHALE-62N67W/5NWNE

**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 5124009 - EPA 5030 (soil)**

**Blank (5124009-BLK1)**

Prepared: 09/24/2015 Analyzed: 09/24/2015

Gasoline Range Hydrocarbons	ND	0.200	mg/kg							
Benzene	ND	0.002	"							
Toluene	ND	0.002	"							
Ethylbenzene	ND	0.002	"							
Xylenes, total	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	59.9		ug/kg	62.5		95.9	70-130			
Surrogate: Toluene-d8	61.2		"	62.5		97.9	70-130			
Surrogate: 4-Bromofluorobenzene	61.4		"	62.5		98.3	70-130			

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John Cocroft  
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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 5124009 - EPA 5030 (soil)**

**LCS (5124009-BS1)**

Prepared: 09/24/2015 Analyzed: 09/24/2015

Benzene	0.090	0.002	mg/kg	0.100		90.4	77.1-124			
Toluene	0.093	0.002	"	0.100		93.4	74.5-128			
Ethylbenzene	0.090	0.002	"	0.100		90.1	66.4-127			
m,p-Xylene	0.183	0.004	"	0.200		91.6	76.6-124			
o-Xylene	0.094	0.002	"	0.100		94.5	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	58.1		ug/kg	62.5		93.0	70-130			
Surrogate: Toluene-d8	60.5		"	62.5		96.8	70-130			
Surrogate: 4-Bromofluorobenzene	52.8		"	62.5		84.4	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 5124009 - EPA 5030 (soil)

Matrix Spike (5124009-MS1)	Source: X509299-01			Prepared: 09/24/2015 Analyzed: 09/24/2015						
Benzene	0.095	0.002	mg/kg	0.100	ND	95.2	71.8-126			
Toluene	0.085	0.002	"	0.100	ND	84.6	65.1-130			
Ethylbenzene	0.091	0.002	"	0.100	ND	91.4	62.2-130			
m,p-Xylene	0.179	0.004	"	0.200	ND	89.4	46.5-137			
o-Xylene	0.091	0.002	"	0.100	ND	90.7	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	60.1		ug/kg	62.5		96.2	70-130			
Surrogate: Toluene-d8	58.6		"	62.5		93.7	70-130			
Surrogate: 4-Bromofluorobenzene	60.0		"	62.5		96.1	70-130			

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John Cocroft  
 Project Number: 014215177  
 Project: KMG - MCHALE-62N67W/5NWNE

**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 5124009 - EPA 5030 (soil)

Matrix Spike Dup (5124009-MSD1)	Source: X509299-01			Prepared: 09/24/2015 Analyzed: 09/24/2015						
Benzene	0.090	0.002	mg/kg	0.100	ND	89.6	71.8-126	6.04	11.3	
Toluene	0.089	0.002	"	0.100	ND	88.9	65.1-130	4.93	15.4	
Ethylbenzene	0.090	0.002	"	0.100	ND	90.3	62.2-130	1.30	19.6	
m,p-Xylene	0.183	0.004	"	0.200	ND	91.6	46.5-137	2.34	19.2	
o-Xylene	0.091	0.002	"	0.100	ND	91.2	54.2-134	0.506	17.9	
Surrogate: 1,2-Dichloroethane-d4	61.9		ug/kg	62.5		99.0	70-130			
Surrogate: Toluene-d8	60.4		"	62.5		96.7	70-130			
Surrogate: 4-Bromofluorobenzene	59.5		"	62.5		95.2	70-130			

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 Arvada CO 80003

John Cocroft  
 Project Number: 014215177  
 Project: KMG - MCHALE-62N67W/5NWNE

**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 5124008 - EPA 3580**

**Blank (5124008-BLK1)**

Prepared: 09/24/2015 Analyzed: 09/24/2015

Diesel (C10-C28)	ND	50	mg/kg							
Residual Range Organics (C28-C36)	ND	200	"							
Surrogate: o-Terphenyl	41		"	50.0		81.2	59-131			

**LCS (5124008-BS1)**

Prepared: 09/24/2015 Analyzed: 09/24/2015

Diesel (C10-C28)	910	50	mg/kg	1000		90.7	64-121			
Residual Range Organics (C28-C36)	970	200	"	1000		96.9	58-124			
Surrogate: o-Terphenyl	49		"	50.0		98.3	59-131			

**Matrix Spike (5124008-MS1)**

Source: X509320-01

Prepared: 09/24/2015 Analyzed: 09/24/2015

Diesel (C10-C28)	840	50	mg/kg	1000	ND	84.3	53-125			
Residual Range Organics (C28-C36)	900	200	"	1000	22	88.3	47-133			
Surrogate: o-Terphenyl	47		"	50.0		94.6	59-131			

**Matrix Spike Dup (5124008-MSD1)**

Source: X509320-01

Prepared: 09/24/2015 Analyzed: 09/24/2015

Diesel (C10-C28)	770	50	mg/kg	1000	ND	77.3	53-125	8.61	20	
Residual Range Organics (C28-C36)	790	200	"	1000	22	76.7	47-133	13.8	20	
Surrogate: o-Terphenyl	43		"	50.0		86.0	59-131			

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 Arvada CO 80003

John Cocroft  
 Project Number: 014215177  
 Project: KMG - MCHALE-62N67W/5NWNE

**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 5I24012 - NO PREP</b>										
<b>Duplicate (5I24012-DUP1)</b>		<b>Source: X509318-01</b>			Prepared: 09/24/2015 Analyzed: 09/24/2015					
pH	8.63		pH Units		8.64			0.116	25	
<b>Batch 5I24013 - NO PREP</b>										
<b>Blank (5I24013-BLK1)</b>		Prepared: 09/24/2015 Analyzed: 09/24/2015								
Specific Conductance (EC)	0.00460		mmhos/cm							
<b>Duplicate (5I24013-DUP1)</b>		<b>Source: X509318-01</b>			Prepared: 09/24/2015 Analyzed: 09/24/2015					
Specific Conductance (EC)	0.0791		mmhos/cm		0.0735			7.34	25	

Origins Laboratory, Inc.



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John Cocroft  
Project Number: 014215177  
Project: KMG - MCHALE-62N67W/5NWNE

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**Notes and Definitions**

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 For Noelle Doyle Mathis, President