



December 9, 2014

Mr. Paul Schwarz  
HSE Representative  
Kerr-McGee Oil & Gas Onshore LP  
1099 18<sup>th</sup> Street, Suite 1800  
Denver, Colorado 80202

**Re: Sump Excavation Summary Letter Report  
Reynolds 4-24  
API# 05-123-24156  
NWNW 24-T3N-R68W**

Dear Mr. Schwarz:

LT Environmental, Inc. (LTE) was contracted by Kerr-McGee Oil & Gas Onshore LP (Kerr-McGee) to perform environmental oversight activities at the above referenced site. The oversight activities included collection of a confirmation soil sample from the sump excavation, documentation of field activities, and analytical results review.

The objective of the soil sampling was to determine if petroleum hydrocarbon impacts to subsurface soil resulted from Kerr-McGee operating two produced water sumps at the site. The produced water sumps were situated immediately adjacent to one another. The soil sampling activities, laboratory analytical results, and conclusions are summarized below. The general site layout, sump excavation dimensions, and soil sample location are shown on the attached hand-sketched map.

After removing the produced water sumps, two representative confirmation soil samples (B01@6' and B02@6') were collected from the soil directly beneath each water sump. The soil samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8260 and total petroleum hydrocarbons (TPH) by EPA Methods 8015 and 8260. The laboratory analytical results are summarized in Table 1 and provided in the attached laboratory analytical report.

The sump excavation measured approximately 25 feet north to south by 35 feet east to west to an approximate depth of 6 feet below ground surface. No indication of petroleum hydrocarbon impacts, including soil staining or odor was observed beneath the water sumps. In addition, TPH and BTEX concentrations were below Colorado Oil and Gas Conservation Commission allowable levels in soil samples B01@6' and B02@6'. Based on the field and analytical results, no remedial action is required at this site.



Please call us at (303) 433-9788 if you have any questions regarding this Sump Excavation Summary Letter Report or if you require additional information.

Sincerely,  
LT ENVIRONMENTAL, INC.

A blue ink handwritten signature of Jeremy Espinoza. The signature is fluid and cursive, with the first name 'Jeremy' and last name 'Espinoza' clearly legible.

Jeremy Espinoza  
Staff Geologist

Reviewed by

A blue ink handwritten signature of Kelly L. Kenyon. The signature is cursive and elegant, with the first name 'Kelly' and last name 'Kenyon' clearly legible.

Kelly L. Kenyon  
Project Environmental Scientist

Attachments



PROJECT Reynolds 4-24  
PROJECT MANAGER J. Cocroft  
JOB No. 014214367  
LOCATION NWNW 24-T3N-R68W

DATE 11/13/2014

CONT. No.

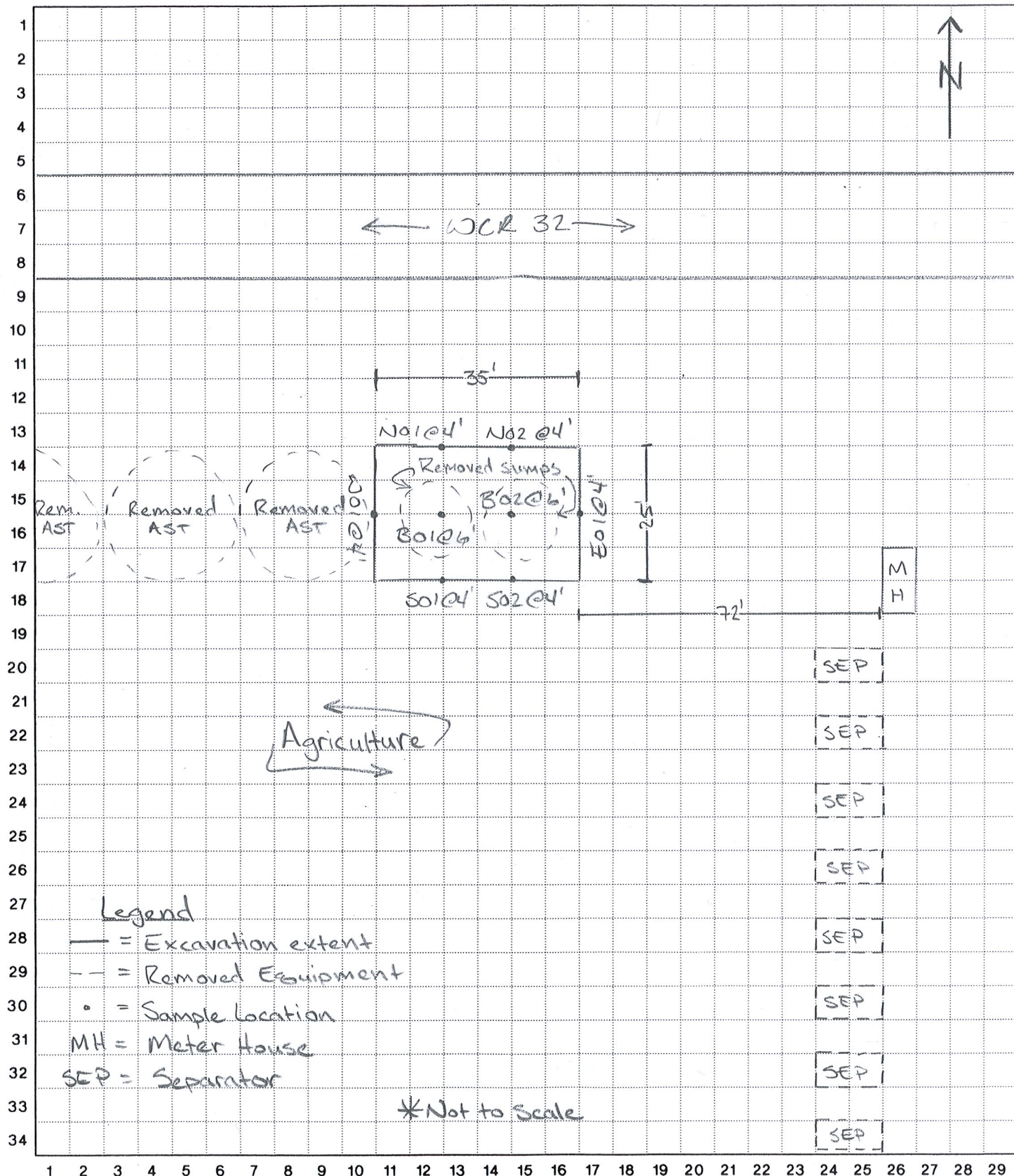
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**TABLE 1**  
**SOIL SAMPLE ANALYTICAL RESULTS**  
**REYNOLDS 4-24**  
**WELD COUNTY, COLORADO**  
**KERR-MCGEE OIL & GAS ONSHORE LP**

Soil Sample ID	Depth (bgs)	Date	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	DRO (mg/kg)	GRO (mg/kg)	ORO (mg/kg)
B01 @ 6'	6'	10/20/2014	<0.002	<0.002	<0.002	<0.002	101	<50.0	204
B02 @ 6'	6'	10/20/2014	<0.002	<0.002	<0.002	<0.002	<50.0	<50.0	<200
<b>COGCC Standards</b>			<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>500*</b>	<b>500*</b>	<b>500*</b>

Notes: bgs - below ground surface

< - less than

DRO - Diesel Range Organics

ORO - Oil Range Organics

GRO - Gasoline Range Organics

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

mg/kg - milligrams per kilogram

NA - Not Analyzed/Not Available

Bold numbers indicate result equaled or exceeded standard.

COGCC - Colorado Oil and Gas Conservation Commission





October 21, 2014

LT Environmental, Inc.

John Cocroft

4600 West 60th Avenue

Arvada

CO 80003

**Project Name - KMG - Reynolds 4-24**

**Project Number - 014214**

Attached are your analytical results for KMG - Reynolds 4-24 received by Origins Laboratory, Inc. October 20, 2014. This project is associated with Origins project number X410213-01.

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

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01 @ 6'	X410213-01	Soil	October 20, 2014 13:00	10/20/2014 16:30
B02 @ 6'	X410213-02	Soil	October 20, 2014 13:05	10/20/2014 16:30

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.*





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

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

Origins Laboratory

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

## Sample Receipt Checklist

Origins Work Order: X410213

Client: UE

Client Project ID: Reynolds 4-24

Checklist Completed by: Jon Pellegrini

Shipped Via: H/D  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 10-21-14

Airbill #: 214

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

Cooler Number/Temperature: 1 4.4 °C / \_\_\_\_\_ °C / \_\_\_\_\_ °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"/>			
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) Jeff Smith

Date/Time Reviewed 10/21/14

Origins Laboratory, Inc.

*Jon Pellegrini*

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

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

**B01 @ 6'**

**10/20/2014 1:00:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X410213-01 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND	0.002	mg/kg	1	4J20010	10/20/2014	10/21/2014
Toluene	ND	0.002	"	"	"	"	"
Ethylbenzene	ND	0.002	"	"	"	"	"
Xylenes, total	ND	0.002	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	82.2 %	70-130			"	"	"
Surrogate: Toluene-d8	98.8 %	70-130			"	"	"
Surrogate: 4-Bromofluorobenzene	99.2 %	70-130			"	"	"

**TPH-Carbon Chain by EPA Method 8015C**

Gasoline (C6-C10)	ND	50.0	mg/kg	1	4J20009	10/20/2014	10/21/2014
Diesel (C10-C28)	101	50.0	"	"	"	"	"
Residual Range Organics (C28-C36)	204	200	"	"	"	"	"

Surrogate: o-Terphenyl	96.7 %	65-146			"	"	"
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Origins Laboratory, Inc.



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

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

**B02 @ 6'**

**10/20/2014 1:05:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X410213-02 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND	0.002	mg/kg	1	4J20010	10/20/2014	10/21/2014
Toluene	ND	0.002	"	"	"	"	"
Ethylbenzene	ND	0.002	"	"	"	"	"
Xylenes, total	ND	0.002	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	82.6 %	70-130			"	"	"
Surrogate: Toluene-d8	98.4 %	70-130			"	"	"
Surrogate: 4-Bromofluorobenzene	102 %	70-130			"	"	"

**TPH-Carbon Chain by EPA Method 8015C**

Gasoline (C6-C10)	ND	50.0	mg/kg	1	4J20009	10/20/2014	10/21/2014
Diesel (C10-C28)	ND	50.0	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	200	"	"	"	"	"

Surrogate: o-Terphenyl	103 %	65-146			"	"	"
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Origins Laboratory, Inc.



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

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

**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 4J20010 - EPA 5030 (soil)**

**Blank (4J20010-BLK1)**

Prepared: 10/20/2014 Analyzed: 10/20/2014

Benzene	ND	0.002	mg/kg							
Toluene	ND	0.002	"							
Ethylbenzene	ND	0.002	"							
Xylenes, total	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	55		ug/kg	62.5		87.4	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.6	70-130			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		102	70-130			

Origins Laboratory, Inc.



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4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

**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 4J20010 - EPA 5030 (soil)**

**LCS (4J20010-BS1)**

Prepared: 10/20/2014 Analyzed: 10/20/2014

Benzene	0.10	0.002	mg/kg	0.100		97.7	77.1-124			
Toluene	0.10	0.002	"	0.100		98.5	74.5-128			
Ethylbenzene	0.10	0.002	"	0.100		100	66.4-127			
m,p-Xylene	0.20	0.004	"	0.200		100	76.6-124			
o-Xylene	0.10	0.002	"	0.100		102	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	55		ug/kg	62.5		87.5	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	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

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

**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 4J20010 - EPA 5030 (soil)**

Matrix Spike (4J20010-MS1)		Source: X410205-01			Prepared: 10/20/2014 Analyzed: 10/20/2014					
Benzene	0.09	0.002	mg/kg	0.100	ND	93.9	71.8-126			
Toluene	0.09	0.002	"	0.100	ND	92.9	65.1-130			
Ethylbenzene	0.09	0.002	"	0.100	ND	91.2	62.2-130			
m,p-Xylene	0.18	0.004	"	0.200	ND	89.9	46.5-137			
o-Xylene	0.09	0.002	"	0.100	ND	91.1	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	54		ug/kg	62.5		85.7	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.1	70-130			
Surrogate: 4-Bromofluorobenzene	65		"	62.5		103	70-130			

Origins Laboratory, Inc.



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John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

**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 4J20010 - EPA 5030 (soil)**

Matrix Spike Dup (4J20010-MSD1)		Source: X410205-01			Prepared: 10/20/2014 Analyzed: 10/20/2014					
Benzene	0.09	0.002	mg/kg	0.100	ND	86.4	71.8-126	8.36	11.3	
Toluene	0.08	0.002	"	0.100	ND	84.9	65.1-130	9.02	15.4	
Ethylbenzene	0.08	0.002	"	0.100	ND	81.8	62.2-130	10.8	19.6	
m,p-Xylene	0.16	0.004	"	0.200	ND	80.3	46.5-137	11.2	19.2	
o-Xylene	0.08	0.002	"	0.100	ND	81.1	54.2-134	11.6	17.9	
Surrogate: 1,2-Dichloroethane-d4	53		ug/kg	62.5		84.1	70-130			
Surrogate: Toluene-d8	62		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		103	70-130			

Origins Laboratory, Inc.



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

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

**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 8015M - 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 4J20009 - EPA 3580**

**Blank (4J20009-BLK1)**

Prepared: 10/20/2014 Analyzed: 10/20/2014

Gasoline (C6-C10)	ND	50.0	mg/kg							
Diesel (C10-C28)	ND	50.0	"							
Residual Range Organics (C28-C36)	ND	200	"							
TPH - Carbon Chain Total	ND	50.0	"							

Surrogate: o-Terphenyl 47 g 50.0 94.5 65-146

**LCS (4J20009-BS1)**

Prepared: 10/20/2014 Analyzed: 10/20/2014

Gasoline (C6-C10)	931	50.0	mg/kg	1000		93.1	66.7-119			
Diesel (C10-C28)	900	50.0	"	1000		90.0	70.1-127			
Residual Range Organics (C28-C36)	554	200	"	1000		55.4	54.5-139			

Surrogate: o-Terphenyl 46 g 50.0 92.6 65-146

**Matrix Spike (4J20009-MS1)**

**Source: X410206-01**

Prepared: 10/20/2014 Analyzed: 10/20/2014

Gasoline (C6-C10)	979	50.0	mg/kg	1000	ND	97.9	56.4-132			
Diesel (C10-C28)	965	50.0	"	1000	32.7	93.3	57.4-138			
Residual Range Organics (C28-C36)	616	200	"	1000	65.3	55.1	47.7-129			

Surrogate: o-Terphenyl 49 g 50.0 98.4 65-146

**Matrix Spike Dup (4J20009-MSD1)**

**Source: X410206-01**

Prepared: 10/20/2014 Analyzed: 10/20/2014

Gasoline (C6-C10)	937	50.0	mg/kg	1000	ND	93.7	56.4-132	4.40	22	
Diesel (C10-C28)	960	50.0	"	1000	32.7	92.7	57.4-138	0.611	18.3	
Residual Range Organics (C28-C36)	622	200	"	1000	65.3	55.6	47.7-129	0.841	30.1	

Origins Laboratory, Inc.



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

John Cocroft  
Project Number: 014214  
Project: KMG - Reynolds 4-24

**Extractable Petroleum Hydrocarbons by 8015M - 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 4J20009 - EPA 3580

Matrix Spike Dup (4J20009-MSD1)

Source: X410206-01

Prepared: 10/20/2014 Analyzed: 10/20/2014

Surrogate: o-Terphenyl	46		g	50.0		92.0	65-146			
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Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

LT Environmental, Inc.

4600 West 60th Avenue

Arvada CO 80003

John Cocroft

Project Number: 014214

Project: KMG - Reynolds 4-24

### 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