



April 8, 2015

Mr. Sam LaRue  
Senior HSE Representative  
Kerr-McGee Oil & Gas Onshore LP  
501 N. Division Blvd  
Platteville, CO 80651

**Re: Sump Excavation Letter Report  
Appel Heirs W 32-5DI  
API# 05-123-19736  
SWNW 32-T2N-R66W  
Remediation Project #8961**

Dear Mr. LaRue:

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 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 location are displayed on the attached hand-sketched map.

After removing the produced water sump, one representative confirmation soil sample (B01@5') was collected from the base of the excavation. The soil sample 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. The laboratory analytical results are summarized in Table 1 and the laboratory analytical report is attached.

The sump excavation measured approximately 20 feet north to south by 15 feet east to west to an approximate depth of 5 feet below ground surface (bgs). No indication of petroleum hydrocarbon impact, including soil staining or odor was observed beneath the water sump. In addition, TPH, BTEX, and EC levels were below or within Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 allowable levels in soil sample B01@5'. The pH level in soil sample B01@5' exceeded the upper limit of the



COGCC Table 910-1 allowable range. However, based on the sample collection depth (>3 feet bgs), field observations and laboratory 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 Letter Report or if you require additional information.

Sincerely,  
LT ENVIRONMENTAL, INC.

Reviewed by

A handwritten signature in black ink that reads 'R. ZERNIS'.

A handwritten signature in blue ink that reads 'Kelly L. Kenyon'.

Ryan Zernis  
Staff Geologist

Kelly Kenyon  
Project Environmental Scientist

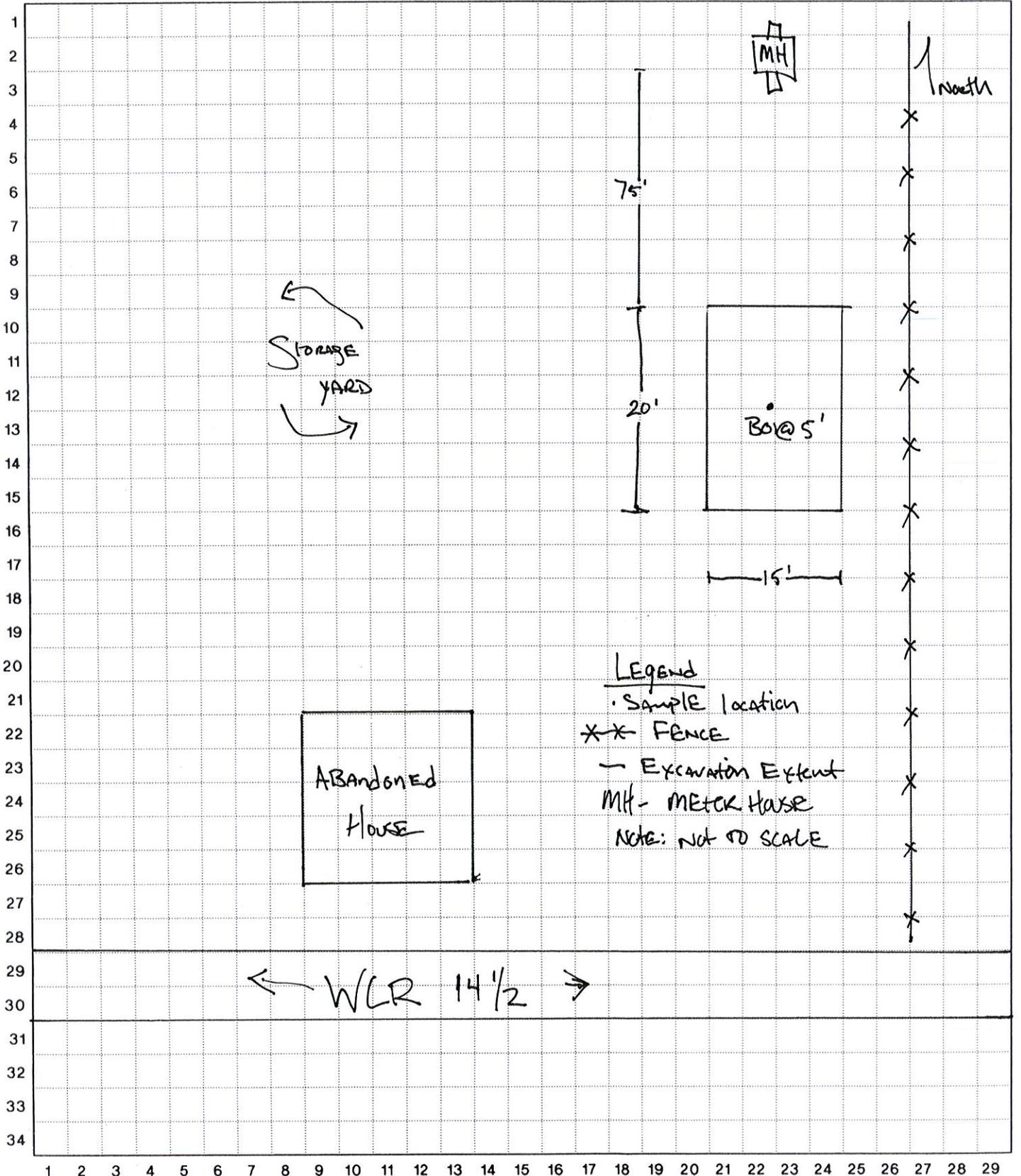
Attachments



PROJECT APPEL HEIRS W32-SDI  
 PROJECT MANAGER John Cocraft  
 JOB No. OH215061  
 LOCATION SWNW 32-T2N-R66W

DATE 3/26/15  
 CONT. No.  
 BY KS CHK'D  
 SHEET No. 1 OF 1

95LT0038 10/1997



LEGEND  
 • SAMPLE location  
 \* \* FENCE  
 — EXCAVATION Extent  
 MH - METER HOUSE  
 NOTE: NOT TO SCALE

**TABLE 1**  
**SOIL SAMPLE ANALYTICAL RESULTS**  
**APPEL HEIRS W 32-5 DI**  
**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)	pH (su)	Specific Conductance (mmhos/cm)
B01 @ 5'	5'	03/26/2015	<0.002	<0.002	<0.002	<0.002	<50	<50	<200	9.55	0.0531
<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>	<b>6-9</b>	<b>4</b>

Notes: bgs - below ground surface  
mg/kg - milligrams per kilogram  
DRO - Diesel Range Organics  
GRO - Gasoline Range Organics  
ORO - Oil Range Organics  
su - standard units

mmhos/cm - millimhos per centimeter  
< - less than laboratory reporting limit  
Bold numbers indicate result equaled or exceeded standard.  
NA - Not Analyzed/Not Available  
COGCC - Colorado Oil and Gas Conservation Commission  
\* - Standard applies to combined DRO-GRO-ORO



March 27, 2015

LT Environmental, Inc.

John Cocroft

4600 West 60th Avenue

Arvada CO 80003

Project Name - KMG - Apple-Heirs W32-5DI

Project Number - 014215061

Attached are your analytical results for KMG - Apple-Heirs W32-5DI received by Origins Laboratory, Inc. March 26, 2015. This project is associated with Origins project number X503341-01.

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: 014215061  
Project: KMG - Apple-Heirs W32-5DI

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01 @ 5'	X503341-01	Soil	March 26, 2015 15:10	03/26/2015 17:10

Origins Laboratory, Inc.



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

John Cocroft  
 Project Number: 014215061  
 Project: KMG - Apple-Heirs W32-5DI

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: X505341

Client: LTE

Client Project ID: Apple-Heirs W32-5DI

Checklist Completed by: J. E. Smith

Shipped Via: Dixie WD

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

Date/time completed: 3/26/15

Airbill #: N/A

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

Cooler Number/Temperature: 1 / 15.2 °C 1 / \_\_\_\_\_ °C 1 / \_\_\_\_\_ °C (Describe)

Thermometer ID: 7053

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"/>			DH
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? <b>If yes, contact client and note in narrative.</b>			<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. E. Smith  
 Reviewed by (Project Manager)

3/26/15  
 Date/Time Reviewed

Origins Laboratory, Inc.



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

John Cocroft  
 Project Number: 014215061  
 Project: KMG - Apple-Heirs W32-5DI

**B01 @ 5'**  
**3/26/2015 3:10:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X503341-01 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND	0.002	mg/kg	1	5C26006	03/26/2015	03/26/2015	
Toluene	ND	0.002	"	"	"	"	"	
Ethylbenzene	ND	0.002	"	"	"	"	"	
Xylenes, total	ND	0.002	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	108 %	70-130			"	"	"	
Surrogate: Toluene-d8	98.3 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	101 %	70-130			"	"	"	

**pH in Soil by EPA 9045D**

pH	9.55		pH Units	1	5C26010	03/26/2015	03/26/2015	
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**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0531		mmhos/cm	"	5C26011	"	03/26/2015	
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**TPH-Carbon Chain by EPA Method 8015C**

Gasoline (C6-C10)	ND	50	mg/kg	1	5C26005	03/26/2015	03/26/2015	
Diesel (C10-C28)	ND	50	"	"	"	"	"	
Residual Range Organics (C28-C36)	ND	200	"	"	"	"	"	

Surrogate: o-Terphenyl	93.8 %	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: 014215061  
 Project: KMG - Apple-Heirs W32-5DI

**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 5C26006 - EPA 5030 (soil)**

**Blank (5C26006-BLK1)**

Prepared: 03/26/2015 Analyzed: 03/26/2015

Benzene	ND	0.002	mg/kg							
Toluene	ND	0.002	"							
Ethylbenzene	ND	0.002	"							
Xylenes, total	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	67		ug/kg	62.5	108		70-130			
Surrogate: Toluene-d8	61		"	62.5	98.0		70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5	102		70-130			

Origins Laboratory, Inc.



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 Project: KMG - Apple-Heirs W32-5DI

**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 5C26006 - EPA 5030 (soil)**

**LCS (5C26006-BS1)**

Prepared: 03/26/2015 Analyzed: 03/26/2015

Benzene	0.104	0.002	mg/kg	0.100		104	77.1-124			
Toluene	0.102	0.002	"	0.100		102	74.5-128			
Ethylbenzene	0.100	0.002	"	0.100		100	66.4-127			
m,p-Xylene	0.201	0.004	"	0.200		101	76.6-124			
o-Xylene	0.103	0.002	"	0.100		103	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	63		ug/kg	62.5		101	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.3	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.2	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 5C26006 - EPA 5030 (soil)**

<b>Matrix Spike (5C26006-MS1)</b>	<b>Source: X503327-01</b>			<b>Prepared: 03/26/2015 Analyzed: 03/26/2015</b>						
Benzene	0.103	0.002	mg/kg	0.100	ND	103	71.8-126			
Toluene	0.100	0.002	"	0.100	ND	100	65.1-130			
Ethylbenzene	0.101	0.002	"	0.100	ND	101	62.2-130			
m,p-Xylene	0.202	0.004	"	0.200	ND	101	46.5-137			
o-Xylene	0.102	0.002	"	0.100	ND	102	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		105	70-130			
Surrogate: Toluene-d8	61		"	62.5		97.6	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		100	70-130			

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John Cocroft  
 Project Number: 014215061  
 Project: KMG - Apple-Heirs W32-5DI

**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 5C26006 - EPA 5030 (soil)**

<b>Matrix Spike Dup (5C26006-MSD1)</b>	<b>Source: X503327-01</b>			<b>Prepared: 03/26/2015 Analyzed: 03/26/2015</b>						
Benzene	0.097	0.002	mg/kg	0.100	ND	96.7	71.8-126	6.60	11.3	
Toluene	0.094	0.002	"	0.100	ND	94.5	65.1-130	5.93	15.4	
Ethylbenzene	0.093	0.002	"	0.100	ND	93.1	62.2-130	7.82	19.6	
m,p-Xylene	0.186	0.004	"	0.200	ND	92.9	46.5-137	8.18	19.2	
o-Xylene	0.094	0.002	"	0.100	ND	94.5	54.2-134	7.22	17.9	
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		106	70-130			
Surrogate: Toluene-d8	62		"	62.5		98.7	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.9	70-130			

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 4600 West 60th Avenue  
 Arvada CO 80003

John Cocroft  
 Project Number: 014215061  
 Project: KMG - Apple-Heirs W32-5DI

**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 5C26005 - EPA 3580**

**Blank (5C26005-BLK1)**

Prepared: 03/26/2015 Analyzed: 03/26/2015

Gasoline (C6-C10)	ND	50	mg/kg							
Diesel (C10-C28)	ND	50	"							
Residual Range Organics (C28-C36)	ND	200	"							

Surrogate: o-Terphenyl 53.2 " 50.0 106 65-146

**LCS (5C26005-BS1)**

Prepared: 03/26/2015 Analyzed: 03/26/2015

Gasoline (C6-C10)	1100	50	mg/kg	1000		108	66.7-119			
Diesel (C10-C28)	1000	50	"				70.1-127			
Residual Range Organics (C28-C36)	1100	200	"	1000		113	54.5-139			

Surrogate: o-Terphenyl 47.7 " 50.0 95.3 65-146

**Matrix Spike (5C26005-MS1)**

Source: X503336-01

Prepared: 03/26/2015 Analyzed: 03/26/2015

Gasoline (C6-C10)	1100	50	mg/kg	1000	20	105	56.4-132			
Diesel (C10-C28)	1100	50	"		22		57.4-138			
Residual Range Organics (C28-C36)	1100	200	"	1000	17	113	47.7-129			

Surrogate: o-Terphenyl 47.1 " 50.0 94.2 65-146

**Matrix Spike Dup (5C26005-MSD1)**

Source: X503336-01

Prepared: 03/26/2015 Analyzed: 03/26/2015

Gasoline (C6-C10)	1100	50	mg/kg	1000	20	104	56.4-132	0.660	22	
Diesel (C10-C28)	1100	50	"		22		57.4-138	0.281	18.3	
Residual Range Organics (C28-C36)	1100	200	"	1000	17	113	47.7-129	0.0278	30.1	

Surrogate: o-Terphenyl 46.7 " 50.0 93.4 65-146

Origins Laboratory, Inc.



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 4600 West 60th Avenue  
 Arvada CO 80003

John Cocroft  
 Project Number: 014215061  
 Project: KMG - Apple-Heirs W32-5DI

**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 5C26010 - NO PREP</b>										
<b>Duplicate (5C26010-DUP1)</b>		<b>Source: X503341-01</b>			Prepared: 03/26/2015 Analyzed: 03/26/2015					
pH	9.58		pH Units		9.55			0.314	25	
<b>Batch 5C26011 - NO PREP</b>										
<b>Blank (5C26011-BLK1)</b>		Prepared: 03/26/2015 Analyzed: 03/26/2015								
Specific Conductance (EC)	0.00270		mmhos/cm							
<b>Duplicate (5C26011-DUP1)</b>		<b>Source: X503341-01</b>			Prepared: 03/26/2015 Analyzed: 03/26/2015					
Specific Conductance (EC)	0.0526		mmhos/cm		0.0531			0.946	25	

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4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: 014215061  
Project: KMG - Apple-Heirs W32-5DI

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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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