



February 8, 2018

Mr. Erik Mickelson
Senior HSE Representative
Kerr-McGee Oil & Gas Onshore LP
1099 18th Street, Suite 1800
Denver, Colorado 80202

**Re: Sump Closure Summary Report
Cannon Land UPRR 42-35 Tank Battery
Location ID: 327362
SENE 35 3N66W
COGCC eForm 27 Initial Remediation #10981**

Dear Mr. Mickelson:

Apex Companies, LLC (Apex) is providing Kerr-McGee Oil & Gas Onshore LP (Kerr-McGee) with this Sump Closure Summary Report (Report) to document sampling activities and the results of environmental testing at the tank battery associated with the Cannon Land UPRR 42-35 well. In accordance with the Initial eForm 27 - Remediation Number 10981 as approved by the COGCC, this form is being submitted to document produced water vessel closure activities. Apex provided the environmental services at the site, that included the collection of confirmation samples from the excavation and documentation of field activities, as described below.

Site Assessment Activities

The field activities described herein were performed on November 14, 2017, with the purpose of assessing potential hydrocarbon impacts at the site related to the closure of a produced water vessel (sump). Soil sampling activities, laboratory analytical results, and conclusions are presented below. The general site layout and sample locations are provided on Figure 1.

The final extent of the excavation measured approximately 12 feet by 13 feet, at an approximate depth of 6 feet below ground surface (bgs). Impacted soil was not encountered in the excavation. Groundwater was not encountered in the excavation.

Confirmation soil samples were collected from the sidewalls of the excavation area at approximately 3 to 4 feet bgs, and from the base of the excavation, beneath the location of the former produced water vessel, at approximately 6 feet bgs. Soil samples were field-screened for volatile organic compound concentrations using a photoionization detector. The soil sample collected beneath the former produced water vessel location (B01@6') was submitted to Origins Laboratory in Denver, Colorado and analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX), total petroleum hydrocarbons (TPH) – gasoline range organics (GRO) by United States Environmental Protection Agency (USEPA) Method 8260, TPH – diesel range and residual range organics (DRO and RRO, respectively) by USEPA Method 8015, electrical conductivity (EC), and pH. Soil analytical data are summarized in Table 1, and the laboratory analytical report is provided in Attachment A.

Results

Analytical results from soil sample B01@6' indicate that BTEX and TPH concentrations are below the applicable COGCC Table 910-1 standards. For both EC and pH, analytical results indicate that concentrations are within COGCC Table 910-1 allowable concentrations. The remaining soil samples, collected from the sidewalls of the excavation area, were not submitted for laboratory analysis as analytical data from the sample collected beneath the location of the former produced water vessel confirmed the absence of petroleum hydrocarbon impacts above COGCC Table 910-1 standards.

Conclusions

Analytical results described herein confirm BTEX and TPH impacts are not present at concentrations above applicable regulatory standards at the former sump location. Consequently, no further site assessment or remedial activity is necessary. Prior to site assessment activities, the sump was permanently removed.

Please contact me at (720) 501-5052 if you have any questions regarding this report or require additional information.

Sincerely,

Apex Companies, LLC



Chandler E Cole
Project Manager

Attachments:

Figure 1 – Cannon Land UPRR 42-35 Tank Battery - Facility Layout & Analytical Results
Table 1 – Soil Sample Analytical Results
Attachment A – Laboratory Analytical Report



Table 1 - Soil Sample Analytical Results

Kerr-McGee Oil & Gas Onshore LP Location Name:
Cannon Land UPRR 42-35 Tank Battery
Location ID: 327362
County: Weld

Sample ID	Sample Date	Sample Depth (feet bgs)	Organics in Soil							Inorganics in Soil	
			TPH-GRO (mg/kg)	TPH-DRO (mg/kg)	TPH-RRO (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes - total (mg/kg)	Electrical Conductivity (mmhos/cm) <small>(<4 or 2x background)</small>	pH <small>(6-9)</small>
B01@6'	11/14/17	6	<0.200	< 25.0	<100	<0.002	<0.002	<0.002	<0.002	0.159	8.73

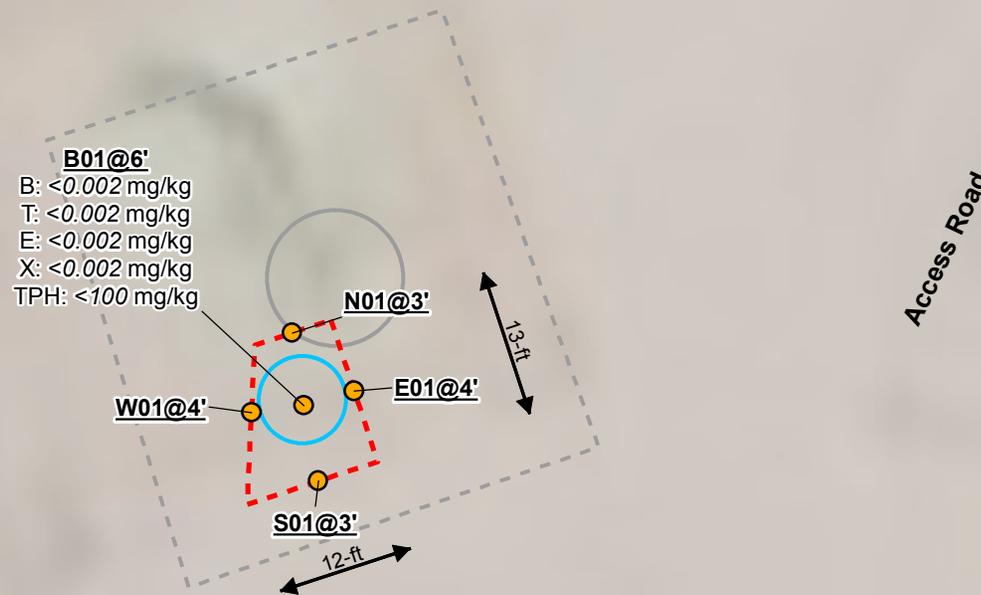
Notes:

- | | | | |
|-------------|--|----------|--|
| TPH | Total petroleum hydrocarbons | bgs | below ground surface |
| GRO | Gasoline range hydrocarbons (C6 - C10) | mg/kg | milligrams per kilogram |
| DRO | Diesel range organics (C10 - C28) | mmhos/cm | millimhos per centimeter |
| RRO | Residual range organics (C28 - C40) | NA | Not analyzed / not available |
| Bold | cell indicates result exceeded COGCC Table 910-1 | COGCC | Colorado Oil and Gas Conservation Commission |
- allowable concentration for the contaminant / inorganic of concern



**Figure 1
Cannon Land UPRR 42-35
Tank Battery -
Facility Layout &
Analytical Results**

Non-Crop Land



Legend

- Soil Sample
- Former Crude Oil Tank
- Former Produced Water Tank
- Former Secondary Containment
- Excavation Extent

Sample Location

- B: benzene
- T: toluene
- E: ethylbenzene
- X: xylenes
- TPH: total petroleum hydrocarbons

Bold values exceed COGCC Table
910-1 allowable concentrations

Site Characteristics

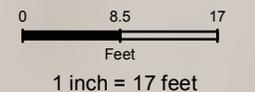
Legal Location: SENE Sec 35, T3N R66W
County: Weld
Land Use: Non-Crop Land
Topography: 0-3% Slopes
Run-Off Risk: Very low
Soil Type: Vona loamy sand

REVISED	BY	COMMENT
12/4/2017	BJB	Figure 1



Apex Companies, LLC
beau.bergstrom@apexco.com
M:\Projects\Anadarko\DJ_Basin\Remediation\Cannon_Land_UPRR_42-35\Projects\Cannon_Land_UPRR_42-35_Fig1_dig_20171204.mxd

For illustration purposes, spatial data in this diagram (e.g. sample points, excavation perimeter) is representative of field observations, and for illustration purposes may have been adjusted to align with aerial imagery and other pictured spatial data. Apex also collects spatial data using GPS units with real-time differential correction and sub-meter accuracy. Spatial data (e.g. ESRI shapefiles, Google Earth KMZ) provided separately from this diagram, may not be consistent with what is presented in this site diagram, due to adjustments made for illustrative purposes.



Attachment A

Laboratory Analytical Report



November 15, 2017

Apex Companies, LLC
Chandler Cole
4150 Darley Avenue, Suite 1
Boulder CO 80305

Project Name - KMG - Cannon Land UPRR 42-35 Project Number - [none]

Attached are your analytical results for KMG - Cannon Land UPRR 42-35 received by Origins Laboratory, Inc. November 14, 2017. This project is associated with Origins project number Y711207-01.

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

Apex Companies, LLC
4150 Darley Avenue, Suite 1
Boulder CO 80305

Chandler Cole
Project Number: [none]
Project: KMG - Cannon Land UPRR 42-35

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01@6'	Y711207-01	Soil	November 14, 2017 13:54	11/14/2017 15:24

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.

Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Chandler Cole
 Project Number: [none]
 Project: KMG - Cannon Land UPRR 42-35

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: 1711207 Client: Apex Co.
 Client Project ID: KMG - Cannon Land UPRR 42-35
 Checklist Completed by: DL Shipped Via: HL
 Date/time completed: 8-14-12 1550 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: N/A
 Matrix(s) Received: (Check all that apply): Soil/Solid Water Other: _____ (Describe)
 Cooler Number/Temperature: 1 12.1 °C 1 °C 1 °C 1 °C
 Thermometer ID: 6083

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"/>		sampled some dry
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 ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input checked="" type="checkbox"/>			pH
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<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 ⁽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 checked="" 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) [Signature] Date/Time Reviewed 8-14-12 1550

Origins Laboratory, Inc.

Jefe Pellegrini

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.

Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Chandler Cole
 Project Number: [none]
 Project: KMG - Cannon Land UPRR 42-35

B01@6'

11/14/2017 1:54:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y711207-01 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B7K1404	11/14/2017	11/14/2017	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 88.6 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B7K1403	11/14/2017	11/14/2017	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 117 % 70-130 " " "
Surrogate: Toluene-d8 102 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 110 % 70-130 " " "

pH in Soil by EPA 9045D

pH	8.73		pH Units	1	B7K1406	11/14/2017	11/14/2017	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.159		mmhos/cm	"	B7K1407	11/14/2017	"	
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Origins Laboratory, Inc.



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Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Chandler Cole
 Project Number: [none]
 Project: KMG - Cannon Land UPRR 42-35

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 B7K1403 - EPA 5030 (soil)

Blank (B7K1403-BLK1)

Prepared: 11/14/2017 Analyzed: 11/14/2017

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	57		ug/kg	62.5		91.5	70-130			
Surrogate: Toluene-d8	68		"	62.5		109	70-130			
Surrogate: 4-Bromofluorobenzene	69		"	62.5		111	70-130			

Origins Laboratory, Inc.



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Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Chandler Cole
 Project Number: [none]
 Project: KMG - Cannon Land UPRR 42-35

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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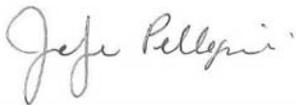
Batch B7K1403 - EPA 5030 (soil)

LCS (B7K1403-BS1)

Prepared: 11/14/2017 Analyzed: 11/14/2017

Benzene	0.083	0.002	mg/kg	0.100		82.8	77.1-124			
Toluene	0.105	0.002	"	0.100		105	74.5-128			
Ethylbenzene	0.104	0.002	"	0.100		104	66.4-127			
m,p-Xylene	0.207	0.004	"	0.200		104	76.6-124			
o-Xylene	0.099	0.002	"	0.100		99.0	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	63		ug/kg	62.5		100	70-130			
Surrogate: Toluene-d8	67		"	62.5		107	70-130			
Surrogate: 4-Bromofluorobenzene	68		"	62.5		108	70-130			

Origins Laboratory, Inc.



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Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Chandler Cole
 Project Number: [none]
 Project: KMG - Cannon Land UPRR 42-35

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 B7K1403 - EPA 5030 (soil)

Matrix Spike (B7K1403-MS1)	Source: Y711207-01			Prepared: 11/14/2017 Analyzed: 11/14/2017						
Benzene	0.082	0.002	mg/kg	0.100	ND	81.8	71.8-126			
Toluene	0.090	0.002	"	0.100	ND	90.1	65.1-130			
Ethylbenzene	0.085	0.002	"	0.100	ND	84.8	62.2-130			
m,p-Xylene	0.176	0.004	"	0.200	ND	88.0	46.5-137			
o-Xylene	0.094	0.002	"	0.100	ND	94.1	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	58		ug/kg	62.5		92.7	70-130			
Surrogate: Toluene-d8	68		"	62.5		108	70-130			
Surrogate: 4-Bromofluorobenzene	67		"	62.5		107	70-130			

Origins Laboratory, Inc.



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Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Chandler Cole
 Project Number: [none]
 Project: KMG - Cannon Land UPRR 42-35

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 B7K1403 - EPA 5030 (soil)

Matrix Spike Dup (B7K1403-MSD1)	Source: Y711207-01			Prepared: 11/14/2017 Analyzed: 11/14/2017						
Benzene	0.071	0.002	mg/kg	0.100	ND	71.5	71.8-126	13.4	11.3	QM-07, QR-03
Toluene	0.076	0.002	"	0.100	ND	75.5	65.1-130	17.7	15.4	QR-02
Ethylbenzene	0.071	0.002	"	0.100	ND	70.9	62.2-130	17.8	19.6	
m,p-Xylene	0.162	0.004	"	0.200	ND	80.9	46.5-137	8.40	19.2	
o-Xylene	0.092	0.002	"	0.100	ND	91.8	54.2-134	2.52	17.9	
Surrogate: 1,2-Dichloroethane-d4	64		ug/kg	62.5		102	70-130			
Surrogate: Toluene-d8	65		"	62.5		104	70-130			
Surrogate: 4-Bromofluorobenzene	65		"	62.5		104	70-130			

Origins Laboratory, Inc.



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Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Chandler Cole
 Project Number: [none]
 Project: KMG - Cannon Land UPRR 42-35

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 B7K1404 - EPA 3580

Blank (B7K1404-BLK1)

Prepared: 11/14/2017 Analyzed: 11/14/2017

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	42		"	50.0		83.5	59-131			

LCS (B7K1404-BS1)

Prepared: 11/14/2017 Analyzed: 11/14/2017

Diesel (C10-C28)	785	50.0	mg/kg	1000		78.5	64-121			
Residual Range Organics (C28-C40)	835	200	"	1000		83.5	58-124			
Surrogate: o-Terphenyl	48		"	50.0		97.0	59-131			

Matrix Spike (B7K1404-MS1)

Source: Y711204-01

Prepared: 11/14/2017 Analyzed: 11/14/2017

Diesel (C10-C28)	726	50.0	mg/kg	1000	ND	72.6	53-125			
Residual Range Organics (C28-C40)	738	200	"	1000	ND	73.8	47-133			
Surrogate: o-Terphenyl	43		"	50.0		85.5	59-131			

Matrix Spike Dup (B7K1404-MSD1)

Source: Y711204-01

Prepared: 11/14/2017 Analyzed: 11/14/2017

Diesel (C10-C28)	765	50.0	mg/kg	1000	ND	76.5	53-125	5.24	20	
Residual Range Organics (C28-C40)	772	200	"	1000	ND	77.2	47-133	4.53	20	
Surrogate: o-Terphenyl	45		"	50.0		89.8	59-131			

Origins Laboratory, Inc.



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Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Chandler Cole
 Project Number: [none]
 Project: KMG - Cannon Land UPRR 42-35

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 B7K1406 - NO PREP										
Duplicate (B7K1406-DUP1)		Source: Y711207-01			Prepared: 11/14/2017 Analyzed: 11/14/2017					
pH	8.86		pH Units		8.73			1.48	25	
Batch B7K1407 - NO PREP										
Blank (B7K1407-BLK1)		Prepared: 11/14/2017 Analyzed: 11/14/2017								
Specific Conductance (EC)	0.00510		mmhos/cm							
Duplicate (B7K1407-DUP1)		Source: Y711207-01			Prepared: 11/14/2017 Analyzed: 11/14/2017					
Specific Conductance (EC)	0.167		mmhos/cm		0.159			4.66	25	

Origins Laboratory, Inc.



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Apex Companies, LLC
4150 Darley Avenue, Suite 1
Boulder CO 80305

Chandler Cole
Project Number: [none]
Project: KMG - Cannon Land UPRR 42-35

Notes and Definitions

U Sample is Non-Detect.

QR-03 The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.

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.

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.

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.



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.