



State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303)894-2100 Fax (303)894-2109

FOR OGCC USE ONLY

SITE INVESTIGATION AND REMEDIATION WORKPLAN

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever applicable. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

OGCC Employee: _____

Spill Complaint

Inspection NOAV

Tracking No: _____

CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

Spill or Release Plug & Abandon Central Facility Closure Site/Facility Closure Other (describe): _____

GENERAL INFORMATION

OGCC Operator Number: _____	Contact Name and Telephone
Name of Operator: <u>Kerr-McGee Oil and Gas Onshore LP</u>	Name: <u>Erik Mickelson</u>
Address: <u>PO Box 173779</u>	No: <u>720-929-4306</u>
City: <u>Denver</u> State: <u>CO</u> Zip: <u>80217</u>	Fax: _____
API/Facility No: <u>05-123-21892</u>	County: <u>Weld</u>
Facility Name: _____	Facility Number: <u>445876</u>
Well Name: <u>Cannon Land</u>	Well Number: <u>16-3A</u>
Location: (QtrQtr, Sec, Twp, Rng, Meridian): <u>SESE Sec. 3 2N 65W 6</u>	Latitude: <u>40.161837</u> Longitude: <u>-104.641005</u>

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc): Oil, condensate, and produced water (historical release)

Site Conditions: Is location within a sensitive area (according to Rule 901e)? Y N If yes, attach evaluation.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Crop land

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Road base

Potential receptors (water wells within 1/4 mi, surface waters, etc.): 2 water wells (one well approx. 730' NNE and one well approx. 1,020' NE) and surface water- irrigation ditch (approx. 700' E)

Description of Impact (if previously provided, refer to that form or document):

Impacted Media (check):	Extent of Impact:	How Determined:
<input type="checkbox"/> Soils	_____	_____
<input type="checkbox"/> Vegetation	_____	_____
<input checked="" type="checkbox"/> Groundwater	<u>See attached data</u>	<u>Sampling of GW within the excavation</u>
<input type="checkbox"/> Surface Water	_____	_____

REMEDATION WORKPLAN

Describe initial action taken (if previously provided, refer to that form or document):

During construction activities associated with a partially buried produced water sump, which had been displaced by shallow groundwater, stained soils were encountered at the Cannon Land 62N65W/3SESE facility (Location ID 332142). When removed, the sump was intact and there were no signs of active leaking. During excavation activities to remove the stained soils, a hole was discovered in the buried liner. This made it possible for shallow groundwater to infiltrate fill material within secondary containment. A groundwater sample was collected from the base of the excavation, and results from that sample, received on May 25, 2016, indicated that impacts were present above the COGCC Table 910-1 allowable level for benzene. On May 26, an Initial Form 19 was submitted to the COGCC and on June 3, a Supplemental Form 19 was submitted to the COGCC. The COGCC issued Spill Tracking number 445876 for this release. A regional topographic facility location map is provided as Figure 1.

Describe how source is to be removed:

Between May 19 and 24, 2016, soil excavation and groundwater extraction activities were conducted. The final extent of the excavation spanned approximately 24 feet (west-east) by 27 feet (north-south). Approximately 20 cubic yards of impacted soil was removed via hydro-vacuum, and transported to the Kerr-McGee Oil & Gas Onshore, LP's Aggregate Recycling Facility in Weld County, Colorado, for disposal. Approximately 160 barrels of groundwater were removed via vacuum truck, and transported to a licensed injection facility for disposal. On May 24, four confirmation soil samples (West 1@3', South 1@3', North 1@3', and East 1@3') were collected at the final extent of the excavation, at 3 feet below ground surface (bgs). Also on May 24, groundwater sample Groundwater 1@3' was collected from the excavation, at 3 feet bgs. All samples were submitted to Origins Laboratory in Denver, Colorado, for analysis. Groundwater samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX), by USEPA Method 8260. Soil samples were analyzed for BTEX and total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by USEPA 8260, TPH - diesel and residual range organics (DRO and RRO) by USEPA 8015, electrical conductivity (EC), and pH. For the soil samples, laboratory analytical results indicated that BTEX and TPH were below laboratory detection limits and EC and pH were within COGCC allowable levels. Analytical results of sample Groundwater 1@3' indicated that benzene exceeded the applicable COGCC Table 910-1 standard for groundwater, at 146 micrograms per liter (µg/L). The general facility layout, excavation location, and laboratory results are shown in Figure 2. Analytical results are summarized in Table 1 and Table 2, and laboratory reports are provided as Attachment A.

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oil vegetation, etc.:

Impacted soil was excavated and transported to the Kerr-McGee Oil & Gas Onshore, LP's Aggregate Recycling Facility in Weld County, Colorado, for disposal. Impacted groundwater was removed via a vacuum truck and transported to a licensed injection facility for disposal. Groundwater monitoring measures are described hereafter.

State of Colorado
Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801, Denver, Colorado 80203
(303)894-2100 Fax (303)894-2109



Tracking Number: _____
Name of Operator: _____
OGCC Operator No: _____
Received Date: _____
Well Name & No: _____
Facility Name & No: _____

OGCC Employee: _____

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):
Based on the analytical results from the groundwater sample, a subsurface assessment will be conducted at the facility, to determine if shallow groundwater has been impacted outside of the lined secondary containment. In an attempt to determine the extent and magnitude of impacts, a minimum of four groundwater monitoring wells will be installed. Groundwater monitoring will be conducted on a quarterly basis. Collected groundwater samples will be submitted for laboratory analysis of BTEX by USEPA Method 8260. Quarterly groundwater monitoring at the location will continue until BTEX concentrations remain below COGCC Table 910-1 groundwater standards in all wells for four consecutive quarters. If necessary, additional monitoring wells will be installed to characterize the extent of the hydrocarbon plume.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.
A new secondary containment liner was installed and the excavation was backfilled with clean sand and soil, and graded to match the adjacent topography. Kerr-McGee's tank battery and associated components remain at the facility location. Future reclamation activities at the facility location will be compliant with COGCC regulations.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.
Is further site investigation required? Y N If yes, describe:
Groundwater monitoring wells will be installed to delineate the dissolved-phase hydrocarbon plume. Quarterly groundwater monitoring will be conducted to determine the extent and magnitude of dissolved-phase hydrocarbon impacts. The need for future remediation activities will be based on the results from the groundwater assessment activities.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):
Impacted soil was excavated and transported to the Kerr-McGee Oil & Gas Onshore, LP's Aggregate Recycling Facility in Weld County, Colorado, for disposal. Impacted groundwater was removed via a vacuum truck and transported to a licensed injection facility for disposal.

IMPLEMENTATION SCHEDULE

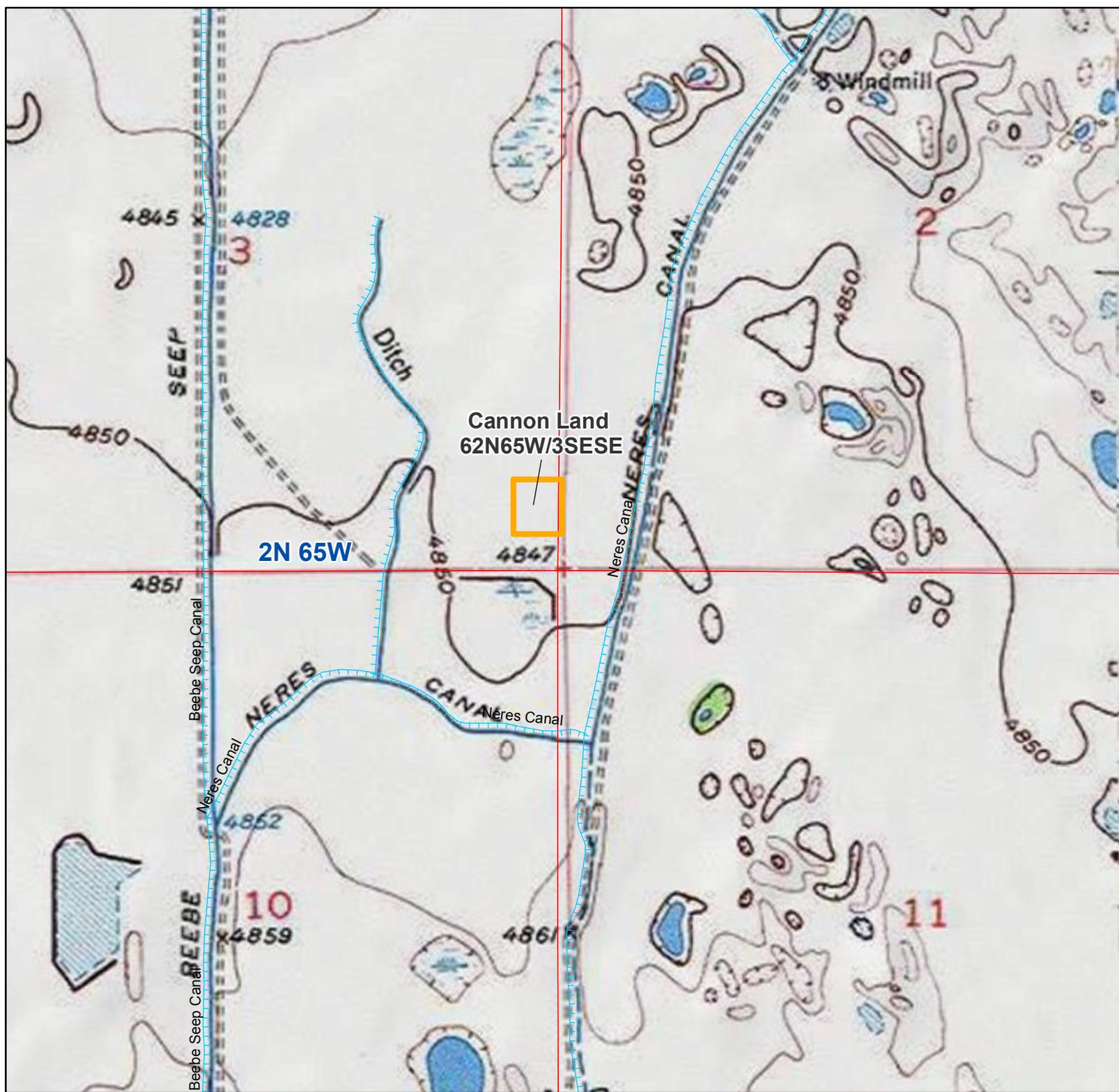
Date Site Investigation Began: <u>5/19/2016</u>	Date Site Investigation Completed: <u>Active</u>	Remediation Plan Submitted: _____
Remediation Start Date: <u>5/19/2016</u>	Anticipated Completion Date: <u>To be determined</u>	Actual Completion Date: _____

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.
Print Name: Erik Mickelson

Signed: Title: Senior HSE Representative Date: 7/25/16

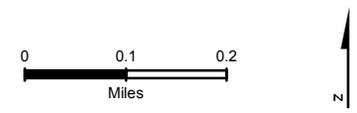
OGCC Approved: _____ Title: _____ Date: _____

**Figure 1
Cannon Land
62N65W/3SESE
Regional Map**



Legend

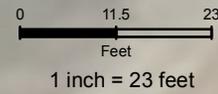
- Site Location
- Section Lines
- Irrigation Ditch



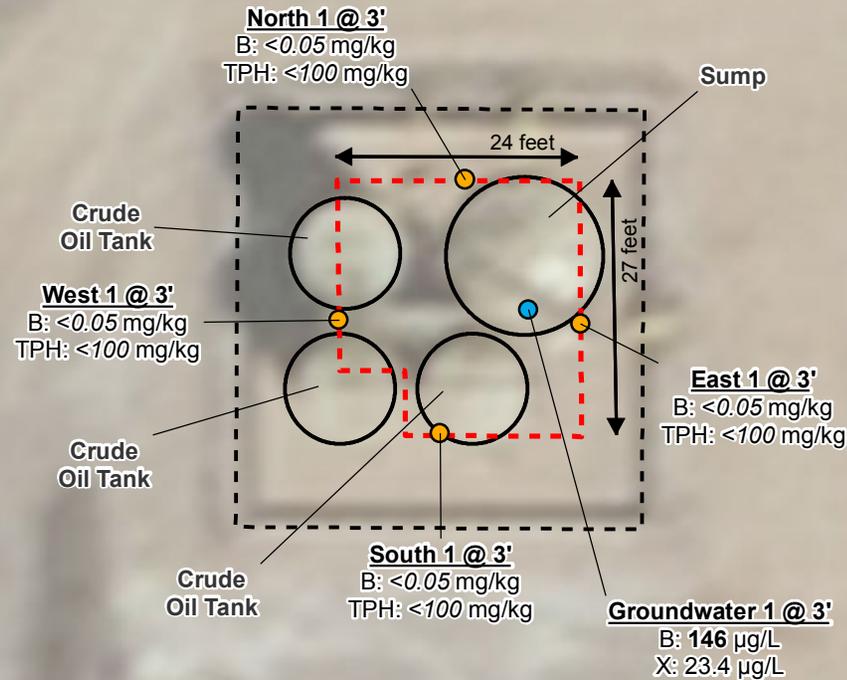
Site Characteristics

Legal Location: SESE, Sec 3, T2N R65W
County: Weld
Land Use: Cropland
Topography: NA
Run-Off Risk: Very low
Soil Type: Aquolls and Aquepts, flooded

REVISED	BY	COMMENT
5/25/2016	BJB	Figure 1



**Figure 2
Cannon Land
62N65W/3SESE
Facility Layout &
Analytical Results**



Legend

- Soil Sample
- Groundwater Sample
- Excavation Extent
- Existing Equipment
- Secondary Containment

Sample Location

- B: benzene
- X: xylenes
- TPH: total petroleum hydrocarbons

Bold values exceed COGCC Table 910-1 allowable concentrations

Site Characteristics

Legal Location: SESE, Sec 3, T2N R65W
County: Weld
Land Use: Cropland
Topography: NA
Run-Off Risk: Very low
Soil Type: Aquolls and Aquepts, flooded

Cropland

REVISED	BY	COMMENT
6/28/2016	BJB	Figure 2



Apex Companies, LLC
 beau.bergstrom@apexcos.com
 M:\Projects\Anadarko\DJ_Basin\Remediation\Cannon_Land_62N65W_3SESE\Projects\CL_62N65W_3SESE_Fig2_dlg_20160601.mxd

Table 1 - Soil Sample Analytical Results



Kerr-McGee Oil and Gas Onshore LP

Location Name: Cannon Land 62N65W/3SESE

Location ID: 332142

API #: 05-123-21892

County: Weld

Sample ID	Sample Date	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) (<4 or 2x background)	pH (6-9)
			500			0.17	85	100	175		
North 1 @ 3'	05/24/16	3'	<5.0	<25	<100	<0.05	<0.05	<0.05	<0.05	0.235	7.49
West 1 @ 3'	05/24/16	3'	<5.0	<25	<100	<0.05	<0.05	<0.05	<0.05	0.293	7.04
South 1 @ 3'	05/24/16	3'	<5.0	<25	<100	<0.05	<0.05	<0.05	<0.05	0.150	7.68
East 1 @ 3'	05/24/16	3'	<5.0	<25	<100	<0.05	<0.05	<0.05	<0.05	0.367	7.29

Notes:

TPH Total petroleum hydrocarbons
 GRO Gasoline range hydrocarbons (C6 - C10)
 DRO Diesel range organics (C10 - C28)
 RRO Residual range organics (C28 - C36)
Bold cell indicates result exceeded COGCC Table 910-1
 allowable concentration for the contaminant / inorganic of concern

bgs below ground surface
 mg/kg milligrams per kilogram
 mmhos/cm millimhos per centimeter
 NA Not analyzed / not available
 COGCC Colorado Oil and Gas Conservation Commission

Table 2 - Groundwater Sample Analytical Results



Kerr-McGee Oil and Gas Onshore LP
Location Name: Cannon Land 62N65W/3SESE
Location ID: 332142
API #: 05-123-21892
County: Weld

Sample ID	Sample Date	Depth (feet bgs)	Organics in Groundwater			
			Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes - total (µg/L)
			5	560	700	10,000
Groundwater 1 @ 3'	05/24/16	3'	146	<4.0	<4.0	23.4

Notes:

- bgs below ground surface
- µg/L micrograms per liter
- NA Not analyzed / not available
- COGCC Colorado Oil and Gas Conservation Commission
- Bold** cell indicates result exceeded COGCC Table 910-1 allowable concentration for the contaminant of concern

Attachment A
Laboratory Reports

June 24, 2016

Apex Companies, LLC

Jake Hildebrand

4150 Darley Avenue, Suite 1

Boulder CO 80305

**Project Name - KMG - Cannonland 62N65W
3SESE**

Project Number - 89065657

Attached are your analytical results for KMG - Cannonland 62N65W 3SESE received by Origins Laboratory, Inc. May 24, 2016. This project is associated with Origins project number X605290-01.

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



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

Jake Hildebrand
Project Number: 89065657
Project: KMG - Cannonland 62N65W 3SESE

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
North 1 @ 3'	X605290-01	Soil	May 24, 2016 12:59	05/24/2016 16:50
West 1 @ 3'	X605290-02	Soil	May 24, 2016 13:01	05/24/2016 16:50
South 1 @ 3'	X605290-03	Soil	May 24, 2016 13:03	05/24/2016 16:50
East 1 @ 3'	X605290-04	Soil	May 24, 2016 13:05	05/24/2016 16:50
Groundwater 1 @ 3'	X605290-06	Water	May 24, 2016 13:24	05/24/2016 16:50

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

Jake Hildebrand
 Project Number: 89065657
 Project: KMG - Cannonland 62N65W 3SESE

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: X605290

Client: Apex

Client Project ID: Cannonland 62N65W

Checklist Completed by: Jeff Smith

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

Date/time completed: 5/24/16

Airbill #: DN

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

Cooler Number/Temperature: 1 / 14.6 °C _____ / _____ °C _____ / _____ °C (Describe)

Thermometer ID: 1003

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"/>		<i>Sample Same Day</i>
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"/>			<i>PH</i>
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 Na ₂ SO 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.

JMS
 Reviewed by (Project Manager)

5/24/16
 Date/Time Reviewed

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

Jake Hildebrand
 Project Number: 89065657
 Project: KMG - Cannonland 62N65W 3SESE

North 1 @ 3'
5/24/2016 12:59:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X605290-01 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B6E2405	05/24/2016	05/24/2016	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 79.4 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	5.00	mg/kg	25	B6E2311	05/24/2016	05/24/2016	U
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	ND	0.050	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 111 % 70-130 " " "
Surrogate: Toluene-d8 101 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 104 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.49		pH Units	1	B6E2406	05/24/2016	05/24/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.235		mmhos/cm	"	B6E2407	05/24/2016	05/24/2016	
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Origins Laboratory, Inc.



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

Jake Hildebrand
 Project Number: 89065657
 Project: KMG - Cannonland 62N65W 3SESE

West 1 @ 3'
5/24/2016 1:01:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X605290-02 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B6E2405	05/24/2016	05/24/2016	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 69.5 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	5.00	mg/kg	25	B6E2311	05/24/2016	05/24/2016	U
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	ND	0.050	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 106 % 70-130 " " "
Surrogate: Toluene-d8 101 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 101 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.04		pH Units	1	B6E2406	05/24/2016	05/24/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.293		mmhos/cm	"	B6E2407	05/24/2016	05/24/2016	
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Origins Laboratory, Inc.



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

Jake Hildebrand
 Project Number: 89065657
 Project: KMG - Cannonland 62N65W 3SESE

South 1 @ 3'
5/24/2016 1:03:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X605290-03 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B6E2405	05/24/2016	05/24/2016	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 61.0 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	5.00	mg/kg	25	B6E2311	05/24/2016	05/24/2016	U
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	ND	0.050	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 103 % 70-130 " " "
Surrogate: Toluene-d8 96.3 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 101 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.68		pH Units	1	B6E2406	05/24/2016	05/24/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.150		mmhos/cm	"	B6E2407	05/24/2016	05/24/2016	
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Apex Companies, LLC
 4150 Darley Avenue, Suite 1
 Boulder CO 80305

Jake Hildebrand
 Project Number: 89065657
 Project: KMG - Cannonland 62N65W 3SESE

East 1 @ 3'
5/24/2016 1:05:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X605290-04 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B6E2405	05/24/2016	05/24/2016	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 75.1 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	5.00	mg/kg	25	B6E2311	05/24/2016	05/24/2016	U
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	ND	0.050	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 102 % 70-130 " " "
Surrogate: Toluene-d8 94.3 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 102 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.29		pH Units	1	B6E2406	05/24/2016	05/24/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.367		mmhos/cm	"	B6E2407	05/24/2016	05/24/2016	
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Origins Laboratory, Inc.



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

Jake Hildebrand
 Project Number: 89065657
 Project: KMG - Cannonland 62N65W 3SESE

Groundwater 1 @ 3'
5/24/2016 1:24:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X605290-06 (Water)

BTEX by EPA 8260C

Benzene	146	4.00	ug/L	4	B6E2401	05/24/2016	05/24/2016	
Toluene	ND	4.00	"	"	"	"	"	U
Ethylbenzene	ND	4.00	"	"	"	"	"	U
Xylenes, total	23.4	4.00	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	91.5 %	84-121			"	"	"	
Surrogate: Toluene-d8	102 %	85-115			"	"	"	
Surrogate: 4-Bromofluorobenzene	97.3 %	84-114			"	"	"	

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 Boulder CO 80305

Jake Hildebrand
 Project Number: 89065657
 Project: KMG - Cannonland 62N65W 3SESE

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 B6E2311 - EPA 5030 (soil)

Blank (B6E2311-BLK1)

Prepared: 05/23/2016 Analyzed: 05/24/2016

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	69		ug/kg	62.5		110	70-130			
Surrogate: Toluene-d8	61		"	62.5		98.3	70-130			
Surrogate: 4-Bromofluorobenzene	66		"	62.5		105	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 B6E2311 - EPA 5030 (soil)

Blank (B6E2311-BLK2)

Prepared: 05/23/2016 Analyzed: 05/24/2016

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	68		ug/kg	62.5		109	70-130			
Surrogate: Toluene-d8	63		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	66		"	62.5		106	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 B6E2311 - EPA 5030 (soil)

LCS (B6E2311-BS1)

Prepared: 05/23/2016 Analyzed: 05/24/2016

Benzene	0.119	0.002	mg/kg	0.100		119	77.1-124			
Toluene	0.115	0.002	"	0.100		115	74.5-128			
Ethylbenzene	0.114	0.002	"	0.100		114	66.4-127			
m,p-Xylene	0.248	0.004	"	0.200		124	76.6-124			
o-Xylene	0.119	0.002	"	0.100		119	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	69		ug/kg	62.5		111	70-130			
Surrogate: Toluene-d8	62		"	62.5		98.5	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.9	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 B6E2311 - EPA 5030 (soil)

LCS (B6E2311-BS2)

Prepared: 05/23/2016 Analyzed: 05/24/2016

Benzene	0.102	0.002	mg/kg	0.100		102	77.1-124			
Toluene	0.092	0.002	"	0.100		92.1	74.5-128			
Ethylbenzene	0.089	0.002	"	0.100		88.7	66.4-127			
m,p-Xylene	0.182	0.004	"	0.200		90.8	76.6-124			
o-Xylene	0.094	0.002	"	0.100		93.7	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		105	70-130			
Surrogate: Toluene-d8	62		"	62.5		98.5	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.4	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 B6E2311 - EPA 5030 (soil)

Matrix Spike (B6E2311-MS1)	Source: X605258-08			Prepared: 05/23/2016 Analyzed: 05/24/2016						
Benzene	0.116	0.002	mg/kg	0.100	0.001	114	71.8-126			
Toluene	0.110	0.002	"	0.100	ND	110	65.1-130			
Ethylbenzene	0.109	0.002	"	0.100	0.002	107	62.2-130			
m,p-Xylene	0.212	0.004	"	0.200	0.005	104	46.5-137			
o-Xylene	0.112	0.002	"	0.100	ND	112	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	72		ug/kg	62.5		116	70-130			
Surrogate: Toluene-d8	61		"	62.5		97.0	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.5	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B6E2311 - EPA 5030 (soil)

Matrix Spike (B6E2311-MS2)	Source: X605289-01			Prepared: 05/23/2016 Analyzed: 05/24/2016						
Benzene	0.079	0.002	mg/kg	0.100	ND	78.9	71.8-126			
Toluene	0.081	0.002	"	0.100	ND	80.6	65.1-130			
Ethylbenzene	0.091	0.002	"	0.100	ND	90.9	62.2-130			
m,p-Xylene	0.186	0.004	"	0.200	ND	92.9	46.5-137			
o-Xylene	0.091	0.002	"	0.100	ND	91.4	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	70		ug/kg	62.5		112	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
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B6E2311 - EPA 5030 (soil)

Matrix Spike Dup (B6E2311-MSD1)	Source: X605258-08			Prepared: 05/23/2016 Analyzed: 05/24/2016						
Benzene	0.109	0.002	mg/kg	0.100	0.001	108	71.8-126	5.91	11.3	
Toluene	0.101	0.002	"	0.100	ND	101	65.1-130	8.68	15.4	
Ethylbenzene	0.098	0.002	"	0.100	0.002	95.6	62.2-130	10.8	19.6	
m,p-Xylene	0.190	0.004	"	0.200	0.005	92.9	46.5-137	10.8	19.2	
o-Xylene	0.102	0.002	"	0.100	ND	102	54.2-134	9.34	17.9	
Surrogate: 1,2-Dichloroethane-d4	74		ug/kg	62.5		119	70-130			
Surrogate: Toluene-d8	60		"	62.5		95.9	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.7	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 B6E2311 - EPA 5030 (soil)

Matrix Spike Dup (B6E2311-MSD2)	Source: X605289-01			Prepared: 05/23/2016 Analyzed: 05/24/2016						
Benzene	0.086	0.002	mg/kg	0.100	ND	85.8	71.8-126	8.28	11.3	
Toluene	0.085	0.002	"	0.100	ND	85.0	65.1-130	5.36	15.4	
Ethylbenzene	0.091	0.002	"	0.100	ND	90.5	62.2-130	0.397	19.6	
m,p-Xylene	0.184	0.004	"	0.200	ND	91.8	46.5-137	1.15	19.2	
o-Xylene	0.090	0.002	"	0.100	ND	90.0	54.2-134	1.57	17.9	
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		105	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.3	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
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B6E2401 - EPA 5030B (Water)

Blank (B6E2401-BLK1)

Prepared: 05/24/2016 Analyzed: 05/24/2016

Benzene	ND	1.00	ug/L							U
Toluene	ND	1.00	"							U
Ethylbenzene	ND	1.00	"							U
Xylenes, total	ND	1.00	"							U
Surrogate: 1,2-Dichloroethane-d4	59		"	62.5	95.2		84-121			
Surrogate: Toluene-d8	61		"	62.5	97.7		85-115			
Surrogate: 4-Bromofluorobenzene	67		"	62.5	107		84-114			

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 Project: KMG - Cannonland 62N65W 3SESE

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 B6E2401 - EPA 5030B (Water)

LCS (B6E2401-BS1)

Prepared: 05/24/2016 Analyzed: 05/24/2016

Benzene	52.5	1.00	ug/L	50.0		105	73.3-129			
Toluene	50.6	1.00	"	50.0		101	76.2-123			
Ethylbenzene	47.2	1.00	"	50.0		94.5	73.6-130			
m,p-Xylene	89.7	2.00	"	100		89.7	76.1-126			
o-Xylene	50.4	1.00	"	50.0		101	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	61		"	62.5		98.2	84-121			
Surrogate: Toluene-d8	63		"	62.5		101	85-115			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	84-114			

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 Project: KMG - Cannonland 62N65W 3SESE

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 B6E2401 - EPA 5030B (Water)

Matrix Spike (B6E2401-MS1)	Source: X605266-01			Prepared: 05/24/2016 Analyzed: 05/24/2016						
Benzene	59.2	1.00	ug/L	50.0	ND	118	74-130			
Toluene	62.5	1.00	"	50.0	ND	125	73-131			
Ethylbenzene	61.6	1.00	"	50.0	ND	123	76-132			
m,p-Xylene	114	2.00	"	100	ND	114	69-139			
o-Xylene	56.2	1.00	"	50.0	ND	112	74-131			
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		96.6	84-121			
Surrogate: Toluene-d8	64		"	62.5		102	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.8	84-114			

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Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B6E2401 - EPA 5030B (Water)

Matrix Spike Dup (B6E2401-MSD1)	Source: X605266-01			Prepared: 05/24/2016 Analyzed: 05/24/2016						
Benzene	56.4	1.00	ug/L	50.0	ND	113	74-130	4.93	20	
Toluene	59.6	1.00	"	50.0	ND	119	73-131	4.73	20	
Ethylbenzene	60.3	1.00	"	50.0	ND	121	76-132	2.07	20	
m,p-Xylene	120	2.00	"	100	ND	120	69-139	5.04	20	
o-Xylene	57.8	1.00	"	50.0	ND	116	74-131	2.84	20	
Surrogate: 1,2-Dichloroethane-d4	59		"	62.5		95.2	84-121			
Surrogate: Toluene-d8	63		"	62.5		100	85-115			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		102	84-114			

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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 B6E2405 - EPA 3580

Blank (B6E2405-BLK1)

Prepared: 05/24/2016 Analyzed: 05/24/2016

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	45		"	50.0		90.0	59-131			

Blank (B6E2405-BLK2)

Prepared: 05/24/2016 Analyzed: 05/24/2016

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	43		"	50.0		86.1	59-131			

LCS (B6E2405-BS1)

Prepared: 05/24/2016 Analyzed: 05/24/2016

Diesel (C10-C28)	729	50.0	mg/kg	1000		72.9	64-121			
Residual Range Organics (C28-C40)	871	200	"	1000		87.1	58-124			
Surrogate: o-Terphenyl	40		"	50.0		79.2	59-131			

LCS (B6E2405-BS2)

Prepared: 05/24/2016 Analyzed: 05/24/2016

Diesel (C10-C28)	862	50.0	mg/kg	1000		86.2	64-121			
Residual Range Organics (C28-C40)	1020	200	"	1000		102	58-124			
Surrogate: o-Terphenyl	47		"	50.0		93.5	59-131			

Matrix Spike (B6E2405-MS1)

Source: X605272-05

Prepared: 05/24/2016 Analyzed: 05/24/2016

Diesel (C10-C28)	838	50.0	mg/kg	1000	ND	83.8	53-125			
Residual Range Organics (C28-C40)	920	200	"	1000	12.4	90.8	47-133			

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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
Batch B6E2405 - EPA 3580										
Matrix Spike (B6E2405-MS1)		Source: X605272-05			Prepared: 05/24/2016 Analyzed: 05/24/2016					
Surrogate: o-Terphenyl	44		mg/kg	50.0		87.1	59-131			
Matrix Spike (B6E2405-MS2)		Source: X605289-01			Prepared: 05/24/2016 Analyzed: 05/24/2016					
Diesel (C10-C28)	842	50.0	mg/kg	1000	ND	84.2	53-125			
Residual Range Organics (C28-C40)	943	200	"	1000	12.7	93.0	47-133			
Surrogate: o-Terphenyl	49		"	50.0		97.0	59-131			
Matrix Spike Dup (B6E2405-MSD1)		Source: X605272-05			Prepared: 05/24/2016 Analyzed: 05/24/2016					
Diesel (C10-C28)	762	50.0	mg/kg	1000	ND	76.2	53-125	9.49	20	
Residual Range Organics (C28-C40)	849	200	"	1000	12.4	83.7	47-133	8.15	20	
Surrogate: o-Terphenyl	42		"	50.0		84.0	59-131			
Matrix Spike Dup (B6E2405-MSD2)		Source: X605289-01			Prepared: 05/24/2016 Analyzed: 05/24/2016					
Diesel (C10-C28)	950	50.0	mg/kg	1000	ND	95.0	53-125	12.1	20	
Residual Range Organics (C28-C40)	1040	200	"	1000	12.7	103	47-133	9.73	20	
Surrogate: o-Terphenyl	51		"	50.0		102	59-131			

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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 B6E2406 - NO PREP										
Duplicate (B6E2406-DUP1)		Source: X605289-01			Prepared: 05/24/2016 Analyzed: 05/24/2016					
pH	7.10		pH Units		7.12			0.281	25	
Batch B6E2407 - NO PREP										
Blank (B6E2407-BLK1)		Prepared: 05/24/2016 Analyzed: 05/24/2016								
Specific Conductance (EC)	0.00230		mmhos/cm							
Duplicate (B6E2407-DUP1)		Source: X605289-01			Prepared: 05/24/2016 Analyzed: 05/24/2016					
Specific Conductance (EC)	0.0906		mmhos/cm		0.0966			6.41	25	

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Jake Hildebrand
Project Number: 89065657
Project: KMG - Cannonland 62N65W 3SESE

Notes and Definitions

U Sample is Non-Detect.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

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Jen Pellegrini For Noelle Doyle Mathis, President