



January 18, 2019

Greg Hamilton
Sr. Staff HSE Representative
Kerr-McGee Oil & Gas Onshore, LP
1099 18th Street, Suite 1800
Denver, Colorado 80202

**Re: Sump Closure Summary Report
Dinnel #14-1K TANK BATTERY
Location ID: 328645
NENE - Sec14 – T3N - 66W
COGCC Remediation Number 12301**

Dear Mr. Hamilton:

Apex Companies, LLC (Apex) is providing Kerr-McGee Oil & Gas Onshore, LP (Kerr-McGee) with this Sump Closure Summary Report to document sampling activities and the results of environmental testing at the tank battery associated with the Dinnel #14-1K well. This report documents the activities related to the closure of a produced-water sump under Remediation Number 12301, as approved by the COGCC. Apex provided the environmental services at the site that included a collection of confirmation samples from the sump removal excavation, and documentation of field activities, as described below.

Site Assessment Activities

The field activities described herein were performed on December 17, 2018, with the purpose of assessing potential hydrocarbon impacts at the site related to the closure of a partially-buried produced-water sump. Soil sampling activities, laboratory analytical results, and conclusions are presented below. The general site layout and sample locations are provided in Figure 1.

The final extent of excavation measured approximately 20 feet by 21 feet, at an approximate depth of 5 feet below ground surface (bgs). As a best management practice, one truck load of soil was removed from the excavation prior to sampling based on observed staining. No groundwater was encountered within the excavation.

Confirmation soil samples were collected from the excavation in relation to the removed sump. A total of six soil samples were collected from the site: four samples from the excavation sidewalls at 4 feet bgs, one from the base location at 5 feet bgs, and one background sample. No liner was present. All samples were field-screened using a calibrated photoionization detector (PID). The PID readings were low for all six of the samples. Based on these results, the base sample (B01@5') was submitted to Origins Laboratory in Denver, Colorado for testing. The sample was analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) and 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 the confirmation soil sample (B01@5') collected from the final extent of the excavation indicate that BTEX, TPH, EC, and pH concentrations were in full compliance with COGCC Table 910-1 allowable levels. The remaining samples collected from the excavation area were not submitted for laboratory analysis, as analytical data from the submitted sample 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 partially-buried produced-water sump location. Consequently, no further site assessment or remedial activity is warranted at this time. The produced-water sump was removed and will be not replaced. Following site assessment activities, the excavation area was backfilled and contoured to match pre-development conditions and will be reclaimed according to Series 1000 regulations.

Please contact me at (720) 501-5065 if you have any questions regarding this report or require additional information.

Sincerely,
Apex Companies, LLC

Maggie Graham

Maggie Graham
Senior Project Manager

Attachments:

Figure 1 – Dinnel #14-1K Tank Battery - Facility Layout & Sample Locations
Table 1 – Soil Sample Analytical Results
Attachment A – Laboratory Analytical Report



Figure 1
Dinnet #14-1K Battery -
Facility Layout &
Sample Locations

Legend

- Soil Sample (12/17/2018)
- Former Produced Water Sump
- Former Crude Oil Tank
- Former Secondary Containment
- Excavation Extent (12/17/2018)

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: NENE, Sec 14, T3N R66W
County: Weld
Land Use: Non-cropland
Topography: 3-9% Slopes
Run-Off Risk: Low
Soil Type: Valent sand

REVISED	BY	COMMENT
12/19/2018	BJB	Figure 1



B01@5'
 B: <0.002 mg/kg
 T: <0.002 mg/kg
 E: <0.002 mg/kg
 X: <0.002 mg/kg
 TPH: <100 mg/kg

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.

Table 1 - Soil Sample Analytical Results

Kerr-McGee Oil and Gas Onshore LP
 Location Name: Dinnel #14-1K
 Location ID: 328645
 County: Weld

COGCC Allowable Concentration (Soil) -->			Organics (mg/kg)								
			500	0.17	85	100	175	4	(6-9)		
Sample ID:	Sample Date:	Sample Depth:	TPH-GRO (C6-C10) Low Fraction	TPH-DRO (C10-C28) High Fraction	TPH-RRO (C28-C40) High Fraction	Benzene	Toluene	Ethylbenzene	Xylenes - total	EC (<4 mmhos/cm or 2x background)	pH (unit)
* B01@5'	12/17/18	5'	<0.200	<25.0	<100	<0.002	<0.002	<0.002	<0.002	0.0765	8.07

Notes:

TPH Total Petroleum Hydrocarbons
 GRO Gasoline Range Organics (C6-C10)
 DRO Diesel Range Organics (C10-C28)
 RRO Residual Range Organics (C28-C36)

bgs below ground surface
 mg/kg milligrams per kilogram
 mmhos/cm millimhos per centimeter
 NA Not analyzed/ Not applicable
 COGCC Colorado Oil and Gas Conservation Commission
 * Sample was collected below the designated root zone (>3' bgs)

Attachment A

Laboratory Analytical Report



December 18, 2018

Apex Companies, LLC

Maggie Graham

4150 Darley Avenue, Suite 1

Boulder CO 80305

Project Name - KMG - Dinnel #14-1K

Project Number - COT0144

Attached are your analytical results for KMG - Dinnel #14-1K received by Origins Laboratory, Inc. December 17, 2018. This project is associated with Origins project number Y812263-01.

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

Maggie Graham
Project Number: COT0144
Project: KMG - Dinnel #14-1K

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01@5'	Y812263-01	Soil	December 17, 2018 15:07	12/17/2018 17:30

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.

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

Maggie Graham
 Project Number: COT0144
 Project: KMG - Dinnel #14-1K

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: 142263

Client: Apex
 Client Project ID: KMG - Dinnel 14-1K

Checklist Completed by: JG
 Date/time completed: 12/17/2018

Shipped Via: HD
 (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 15.3 °C / _____ °C / _____ °C / _____ °C

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 ⁽¹⁾ ?	<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 ⁽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"/>		
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 12/17/18

Origins Laboratory, Inc.

Jefe Pellegrini

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

Maggie Graham
 Project Number: COT0144
 Project: KMG - Dinnel #14-1K

B01@5'

12/17/2018 3:07:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y812263-01 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B8L1705	JTD	12/17/2018	12/17/2018	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	JTD	"	"	U

Surrogate: o-Terphenyl 87.8 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B8L1704	JTD	12/17/2018	12/17/2018	U
Benzene	ND	0.002	"	"	"	JTD	"	"	U
Toluene	ND	0.002	"	"	"	JTD	"	"	U
Ethylbenzene	ND	0.002	"	"	"	JTD	"	"	U
Xylenes, total	ND	0.002	"	"	"	JTD	"	"	U

Surrogate: 1,2-Dichloroethane-d4 110 % 70-130 " " "
Surrogate: Toluene-d8 92.7 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 95.1 % 70-130 " " "

pH in Soil by EPA 9045D

pH	8.07		pH Units	1	B8L1711	OLAB	12/17/2018	12/17/2018	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0765	0.00500	mmhos/cm	"	B8L1712	OLAB	12/17/2018	"	
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Origins Laboratory, Inc.



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

Maggie Graham
 Project Number: COT0144
 Project: KMG - Dinnel #14-1K

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 B8L1704 - EPA 5030 (soil)

Blank (B8L1704-BLK1)

Prepared: 12/17/2018 Analyzed: 12/17/2018

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	0.13		"	0.125		102	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		94.5	70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125		95.2	70-130			

Origins Laboratory, Inc.



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 Boulder CO 80305

Maggie Graham
 Project Number: COT0144
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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 B8L1704 - EPA 5030 (soil)

LCS (B8L1704-BS1)

Prepared: 12/17/2018 Analyzed: 12/17/2018

Benzene	0.118	0.002	mg/kg	0.100		118	77.1-124			
Toluene	0.112	0.002	"	0.100		112	74.5-128			
Ethylbenzene	0.102	0.002	"	0.100		102	66.4-127			
m,p-Xylene	0.208	0.004	"	0.200		104	76.6-124			
o-Xylene	0.099	0.002	"	0.100		99.4	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		96.8	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		94.3	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		101	70-130			

Origins Laboratory, Inc.



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 Boulder CO 80305

Maggie Graham
 Project Number: COT0144
 Project: KMG - Dinnel #14-1K

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 B8L1704 - EPA 5030 (soil)

Matrix Spike (B8L1704-MS1)	Source: Y812195-01			Prepared: 12/17/2018 Analyzed: 12/17/2018						
Benzene	0.098	0.002	mg/kg	0.100	ND	97.5	71.8-126			
Toluene	0.085	0.002	"	0.100	ND	84.9	65.1-130			
Ethylbenzene	0.082	0.002	"	0.100	ND	82.0	62.2-130			
m,p-Xylene	0.167	0.004	"	0.200	ND	83.5	46.5-137			
o-Xylene	0.080	0.002	"	0.100	ND	80.1	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		101	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		93.3	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		101	70-130			

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Maggie Graham
 Project Number: COT0144
 Project: KMG - Dinnel #14-1K

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 B8L1704 - EPA 5030 (soil)

Matrix Spike Dup (B8L1704-MSD1)	Source: Y812195-01			Prepared: 12/17/2018 Analyzed: 12/17/2018						
Benzene	0.109	0.002	mg/kg	0.100	ND	109	71.8-126	11.5	11.3	QR-02
Toluene	0.093	0.002	"	0.100	ND	93.2	65.1-130	9.39	15.4	
Ethylbenzene	0.090	0.002	"	0.100	ND	89.8	62.2-130	8.99	19.6	
m,p-Xylene	0.183	0.004	"	0.200	ND	91.7	46.5-137	9.33	19.2	
o-Xylene	0.088	0.002	"	0.100	ND	88.3	54.2-134	9.64	17.9	
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		99.5	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		93.1	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		100	70-130			

Origins Laboratory, Inc.



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

Maggie Graham
 Project Number: COT0144
 Project: KMG - Dinnel #14-1K

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 B8L1705 - EPA 3580

Blank (B8L1705-BLK1)

Prepared: 12/17/2018 Analyzed: 12/17/2018

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	40		"	50.0		80.6	59-131			

Blank (B8L1705-BLK2)

Prepared: 12/17/2018 Analyzed: 12/17/2018

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	43		"	50.0		87.0	59-131			

LCS (B8L1705-BS1)

Prepared: 12/17/2018 Analyzed: 12/17/2018

Diesel (C10-C28)	941	50.0	mg/kg	1000		94.1	64-121			
Residual Range Organics (C28-C40)	942	200	"	1000		94.2	58-124			
Surrogate: o-Terphenyl	47		"	50.0		94.8	59-131			

LCS (B8L1705-BS2)

Prepared: 12/17/2018 Analyzed: 12/17/2018

Diesel (C10-C28)	915	50.0	mg/kg	1000		91.5	64-121			
Residual Range Organics (C28-C40)	900	200	"	1000		90.0	58-124			
Surrogate: o-Terphenyl	44		"	50.0		87.8	59-131			

Matrix Spike (B8L1705-MS1)

Source: Y812237-01

Prepared: 12/17/2018 Analyzed: 12/17/2018

Diesel (C10-C28)	900	50.0	mg/kg	1000	55.5	84.4	53-125			
Residual Range Organics (C28-C40)	848	200	"	1000	5.96	84.2	47-133			

Origins Laboratory, Inc.



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

Maggie Graham
 Project Number: COT0144
 Project: KMG - Dinnel #14-1K

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 B8L1705 - EPA 3580										
Matrix Spike (B8L1705-MS1)		Source: Y812237-01			Prepared: 12/17/2018 Analyzed: 12/17/2018					
Surrogate: o-Terphenyl	39		mg/kg	50.0		78.1	59-131			
Matrix Spike (B8L1705-MS2)		Source: Y812253-13			Prepared: 12/17/2018 Analyzed: 12/17/2018					
Diesel (C10-C28)	906	50.0	mg/kg	1000	14.3	89.2	53-125			
Residual Range Organics (C28-C40)	897	200	"	1000	11.8	88.5	47-133			
Surrogate: o-Terphenyl	41		"	50.0		82.5	59-131			
Matrix Spike Dup (B8L1705-MSD1)		Source: Y812237-01			Prepared: 12/17/2018 Analyzed: 12/17/2018					
Diesel (C10-C28)	1000	50.0	mg/kg	1000	55.5	94.4	53-125	11.2	20	
Residual Range Organics (C28-C40)	919	200	"	1000	5.96	91.4	47-133	8.18	20	
Surrogate: o-Terphenyl	41		"	50.0		82.7	59-131			
Matrix Spike Dup (B8L1705-MSD2)		Source: Y812253-13			Prepared: 12/17/2018 Analyzed: 12/17/2018					
Diesel (C10-C28)	904	50.0	mg/kg	1000	14.3	89.0	53-125	0.264	20	
Residual Range Organics (C28-C40)	863	200	"	1000	11.8	85.2	47-133	3.86	20	
Surrogate: o-Terphenyl	40		"	50.0		80.5	59-131			

Origins Laboratory, Inc.



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

Maggie Graham
 Project Number: COT0144
 Project: KMG - Dinnel #14-1K

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 B8L1711 - NO PREP										
Duplicate (B8L1711-DUP1)		Source: Y812262-01			Prepared: 12/17/2018 Analyzed: 12/17/2018					
pH	7.23		pH Units		7.98			9.86	25	
Batch B8L1712 - NO PREP										
Blank (B8L1712-BLK1)					Prepared: 12/17/2018 Analyzed: 12/17/2018					
Specific Conductance (EC)	0.00420	0.00500	mmhos/cm							
Duplicate (B8L1712-DUP1)		Source: Y812262-01			Prepared: 12/17/2018 Analyzed: 12/17/2018					
Specific Conductance (EC)	0.109	0.00500	mmhos/cm		0.0925			16.6	25	

Origins Laboratory, Inc.



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

Maggie Graham
Project Number: COT0144
Project: KMG - Dinnel #14-1K

Notes and Definitions

U Sample is Non-Detect.

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.

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