



March 8, 2019

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

**Re: Sump Closure Summary Letter Report
Dolph 15C-1HZ Production Facility
API: 05-123-39332
Facility ID: 442155
Legal: NENW Sec 1-T2N-R66W
Remediation Project #12507**

Dear Mr. Hamilton:

On behalf of Kerr-McGee Oil & Gas Onshore LP (Kerr-McGee), Tasman Geosciences, Inc. (Tasman) has prepared this Sump Closure Summary Letter Report (Report) to document site assessment activities and the results of environmental testing at the above-referenced site (Site). This Report is being submitted under Form 27 Site Investigation and Remediation Workplan Remediation Project # 12507. Tasman provided environmental services at the Site that included collection of confirmation samples from the excavation, documentation of field activities, and review of analytical data as described below.

Site Assessment Activities

The field activities described herein were performed with the purpose of assessing potential hydrocarbon impacts at the Site related to the replacement of the produced water sump. Soil sampling activities, laboratory analytical results, and conclusions are presented below.

Excavation activities were initiated on September 19, 2017, following removal of the produced water sump. The final extent of the excavation measured approximately 25 feet by 20 feet with an approximate depth of 4 feet below ground surface (bgs). Excavated material was not removed from the Site during excavation and sump replacement activities. An intact liner was present at this location. Groundwater was not encountered during excavation activities.

Four soil samples were collected from the sidewalls of the final lateral extent of the excavation area at approximately 3 feet bgs. Due to the presence of an intact liner, no base sample was collected. The soil samples were field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). Based on the field screening results, the east sidewall soil sample (E01@3') was submitted to Origins Laboratory in Denver, Colorado, for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), total petroleum hydrocarbons (TPH) – gasoline range organics (GRO) by United States Environmental

Protection Agency (USEPA) Method 8260C, TPH – diesel range and oil range organics (DRO and ORO) by USEPA Method 8015, electrical conductivity (EC), and pH. The remaining samples were placed on hold pending sample results.

The general Site layout, sample location and approximate final extent of the excavation are illustrated on Figure 1.

Results

Analytical results for soil sample E01@3' indicated that constituent concentrations were in full compliance with State standards. Based on these results, the remaining soil samples were not analyzed. Soil analytical data are provided in Table 1. The laboratory analytical report is provided as Attachment A.

Conclusions

Analytical results described herein confirm that BTEX and TPH impacts are not present at concentrations above applicable regulatory standards at the former produced water sump location. Therefore, no further Site assessment or remedial activity is recommended at this time. Following Site assessment activities, the produced water sump was removed, the excavation area was backfilled and contoured to match pre-existing conditions, and a replacement produced water sump was installed.

Please contact me at (303) 487-1228 if you have any questions regarding this report or require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read 'MJahn', is positioned above the typed name.

Mike Jahn, PG
Project Manager

Attachments:

Table 1 – Soil Sample Results Summary Table
Figure 1 – Sample Location Map
Attachment A – Laboratory Analytical Report

Table

TABLE 1
DOLPH 15C-1HZ - PRODUCTION FACILITY
SOIL SAMPLE RESULTS SUMMARY TABLE
KERR-McGEE OIL AND GAS ONSHORE LP

Sample Location	Date	Depth (ft. bgs)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	TVPH-GRO (mg/kg)	TEPH-DRO (mg/kg)	TEPH-ORO (mg/kg)	EC (mmhos/cm)	pH (units)
COGCC standards for soil (mg/kg) ⁽¹⁾			0.17	85	100	175	500			4 mmhos/cm or 2x BG	6-9
E01@3'	09/19/17	3	<0.002	<0.002	<0.002	<0.002	<0.200	<25.0	<100	0.0781	8.82

Notes:

(1) Standards for soil are taken from 2 CCR 404-1, Table 910-1, effective January 30, 2015.

COGCC = Colorado Oil and Gas Conservation Commission

(<) = Analytical result is less than the indicated laboratory reporting limit.

TVPH - GRO = Total volatile petroleum hydrocarbons - gasoline range organics

TEPH - DRO = Total extractable petroleum hydrocarbons - diesel range organics

TEPH - ORO = Total extractable petroleum hydrocarbons - oil range organics

EC = Electrical conductivity

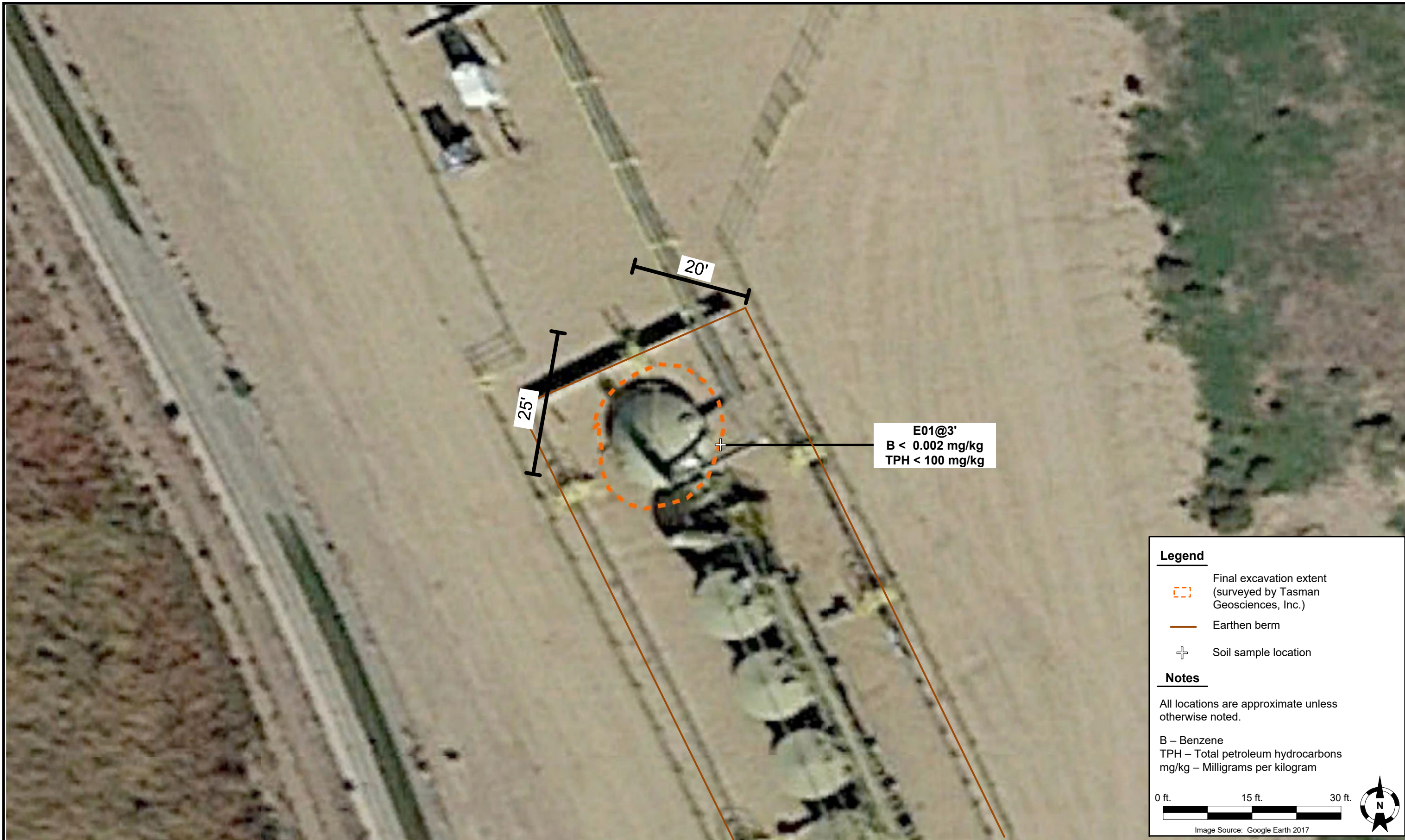
mmhos/cm = Millimhos per centimeter

mg/kg = Milligrams per kilogram.

ft. bgs = Feet below ground surface.

BOLD = Analytical result is in exceedance of COGCC Table 910-1 soil standards.

Figure



Legend

- Final excavation extent (surveyed by Tasman Geosciences, Inc.)
- Earthen berm
- Soil sample location

Notes

All locations are approximate unless otherwise noted.

B – Benzene
 TPH – Total petroleum hydrocarbons
 mg/kg – Milligrams per kilogram

0 ft. 15 ft. 30 ft.

Image Source: Google Earth 2017

DATE:	January 3, 2019
DESIGNED BY:	M. Jahn
DRAWN BY:	M. Jahn



Kerr-McGee Oil and Gas Onshore LP
Dolph 15C-1HZ Production Facility
 NENW Sec. 01-T2N-R66W
 Weld County, Colorado

Sample Location
 Map

FIGURE
 1

Attachment A

September 20, 2017

Tasman Geosciences

Bob Cornez

6899 Pecos Street, Unit C

Denver CO 80211

Project Name - KMG - Dolph 15C-1HZ

Project Number - [none]

Attached are your analytical results for KMG - Dolph 15C-1HZ received by Origins Laboratory, Inc. September 19, 2017. This project is associated with Origins project number Y709252-03.

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



Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Dolph 15C-1HZ

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
E01@3'	Y709252-03	Soil	September 19, 2017 16:04	09/19/2017 17:45

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.

Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

www.originslaboratory.com



page 1 of 1

Client: ARC
 Project Manager: Bob Cornez
 Project Name: Dolph 15C-1HZ
 Address: _____
 Project Number: _____
 Telephone Number: _____
 Samples Collected By: Alex Cuyin
 Email Address: RCORNEZ@tasman-geo.com

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analysis	Sample Instructions	
				Unpreserved	HCl	HNO ₃	Other	Groundwater	Soil	Air Summ #			Other
N01e3'	9/19/17	1600	2									ON HOLD	1
S01e3'		1602	2									ON HOLD	2
E01e3'		1604	2										3
W01e3'		1606	2									ON HOLD	4
B01e6"		1608	2									ON HOLD	5
													6
													7
													8
													9
													10

Relinquished By: <u>Madge</u>	Date: 9/19/17	Time: 1745	Received By: <u>[Signature]</u>	Date: 9-19-17	Time: 1145
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Temp Received: 54 Date Results Needed

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.

Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: 1709252

Client: Tasman

Client Project ID: KMG Dolph 15C-1HZ

Checklist Completed by: DM

Shipped Via: HD
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 9-19-17 1753

Airbill #: N/A

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

Cooler Number/Temperature: 1 / 5.4 °C 1 / _____ °C 1 / _____ °C (Describe) _____ °C

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"/>			
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"/>			<u>pH</u>
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.

Reviewed by (Project Manager) [Signature]

Date/Time Reviewed 9-19-17 1753

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.

Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

E01@3'
9/19/2017 4:04:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y709252-03 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B71902	09/19/2017	09/19/2017	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 83.6 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B71901	09/19/2017	09/19/2017	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 91.0 % 70-130 " " "
Surrogate: Toluene-d8 100 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 101 % 70-130 " " "

pH in Soil by EPA 9045D

pH	8.82		pH Units	1	B71903	09/19/2017	09/20/2017	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0781		mmhos/cm	"	B71904	"	"	
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Origins Laboratory, Inc.



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Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

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 B711901 - EPA 5030 (soil)

Blank (B711901-BLK1)

Prepared: 09/19/2017 Analyzed: 09/19/2017

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	54		ug/kg	62.5		86.0	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.7	70-130			

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Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

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 B711901 - EPA 5030 (soil)

LCS (B711901-BS1)

Prepared: 09/19/2017 Analyzed: 09/19/2017

Benzene	0.099	0.002	mg/kg	0.100		99.0	77.1-124			
Toluene	0.097	0.002	"	0.100		96.9	74.5-128			
Ethylbenzene	0.091	0.002	"	0.100		91.0	66.4-127			
m,p-Xylene	0.173	0.004	"	0.200		86.3	76.6-124			
o-Xylene	0.087	0.002	"	0.100		87.0	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	51		ug/kg	62.5		82.1	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		94.7	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

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 B711901 - EPA 5030 (soil)

Matrix Spike (B711901-MS1)	Source: Y709211-02			Prepared: 09/19/2017 Analyzed: 09/19/2017						
Benzene	0.104	0.002	mg/kg	0.100	ND	104	71.8-126			
Toluene	0.101	0.002	"	0.100	ND	101	65.1-130			
Ethylbenzene	0.094	0.002	"	0.100	ND	93.6	62.2-130			
m,p-Xylene	0.178	0.004	"	0.200	ND	88.9	46.5-137			
o-Xylene	0.089	0.002	"	0.100	ND	88.6	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	51		ug/kg	62.5		82.4	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		95.0	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

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 B711901 - EPA 5030 (soil)

Matrix Spike Dup (B711901-MSD1)	Source: Y709211-02			Prepared: 09/19/2017 Analyzed: 09/19/2017						
Benzene	0.100	0.002	mg/kg	0.100	ND	99.7	71.8-126	4.07	11.3	
Toluene	0.099	0.002	"	0.100	ND	98.7	65.1-130	2.68	15.4	
Ethylbenzene	0.093	0.002	"	0.100	ND	93.0	62.2-130	0.600	19.6	
m,p-Xylene	0.176	0.004	"	0.200	ND	87.9	46.5-137	1.13	19.2	
o-Xylene	0.090	0.002	"	0.100	ND	89.6	54.2-134	1.10	17.9	
Surrogate: 1,2-Dichloroethane-d4	53		ug/kg	62.5		85.3	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.2	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

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 B711902 - EPA 3550B

Blank (B711902-BLK1)

Prepared: 09/19/2017 Analyzed: 09/19/2017

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	49		"	50.0		97.4	59-131			

LCS (B711902-BS1)

Prepared: 09/19/2017 Analyzed: 09/19/2017

Diesel (C10-C28)	1130	50.0	mg/kg	1000		113	64-121			
Residual Range Organics (C28-C40)	966	200	"	1000		96.6	58-124			
Surrogate: o-Terphenyl	60		"	50.0		120	59-131			

Matrix Spike (B711902-MS1)

Source: Y709211-02

Prepared: 09/19/2017 Analyzed: 09/19/2017

Diesel (C10-C28)	1010	50.0	mg/kg	1000	ND	101	53-125			
Residual Range Organics (C28-C40)	895	200	"	1000	15.4	88.0	47-133			
Surrogate: o-Terphenyl	55		"	50.0		110	59-131			

Matrix Spike Dup (B711902-MSD1)

Source: Y709211-02

Prepared: 09/19/2017 Analyzed: 09/19/2017

Diesel (C10-C28)	884	50.0	mg/kg	1000	ND	88.4	53-125	13.5	20	
Residual Range Organics (C28-C40)	731	200	"	1000	15.4	71.6	47-133	20.5	20	QR-02
Surrogate: o-Terphenyl	46		"	50.0		91.4	59-131			

Origins Laboratory, Inc.



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Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Dolph 15C-1HZ

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 B711903 - NO PREP										
Duplicate (B711903-DUP1)		Source: Y709211-01			Prepared: 09/19/2017 Analyzed: 09/19/2017					
pH	6.72		pH Units		6.95			3.37	25	
Batch B711904 - NO PREP										
Blank (B711904-BLK1)					Prepared: 09/19/2017 Analyzed: 09/19/2017					
Specific Conductance (EC)	0.00550		mmhos/cm							
Duplicate (B711904-DUP1)		Source: Y709211-01			Prepared: 09/19/2017 Analyzed: 09/19/2017					
Specific Conductance (EC)	0.0299		mmhos/cm		0.0324			8.03	25	

Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Dolph 15C-1HZ

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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