



March 8, 2019

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

**Re: Sump Closure Summary Letter Report  
Varra 31-6L FP Production Facility  
API: 05-123-16648  
Facility ID: 446267  
Legal: SENW Sec 31-T3N-R67W  
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 closure 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 12 feet by 12 feet with an approximate depth of 5 feet below ground surface (bgs). Excavated material was not removed from the Site during excavation and sump closure activities. A liner was not present at the location. Groundwater was not encountered during excavation activities.

Five soil samples were collected from the sidewalls and base of the final extent of the sump excavation area at approximately 4 feet and 5 feet bgs, respectively. The soil samples were field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). Based on the field screening results, the excavation base soil sample (B01@5') 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 base sample results.

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

## **Results**

Analytical results for base soil sample B01@5' 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 and the excavation area was backfilled and contoured to match pre-existing conditions.

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**  
**VARRA 31-6L FP - 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)
<b>OGCC standards for soil (mg/kg)</b>			<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>500</b>			<b>4 mmhos/cm or 2x BG</b>	<b>6-9</b>
B01@5'	09/19/17	5	<0.050	0.154	0.826	1.75	120	169	<100	0.0733	9.07*

**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

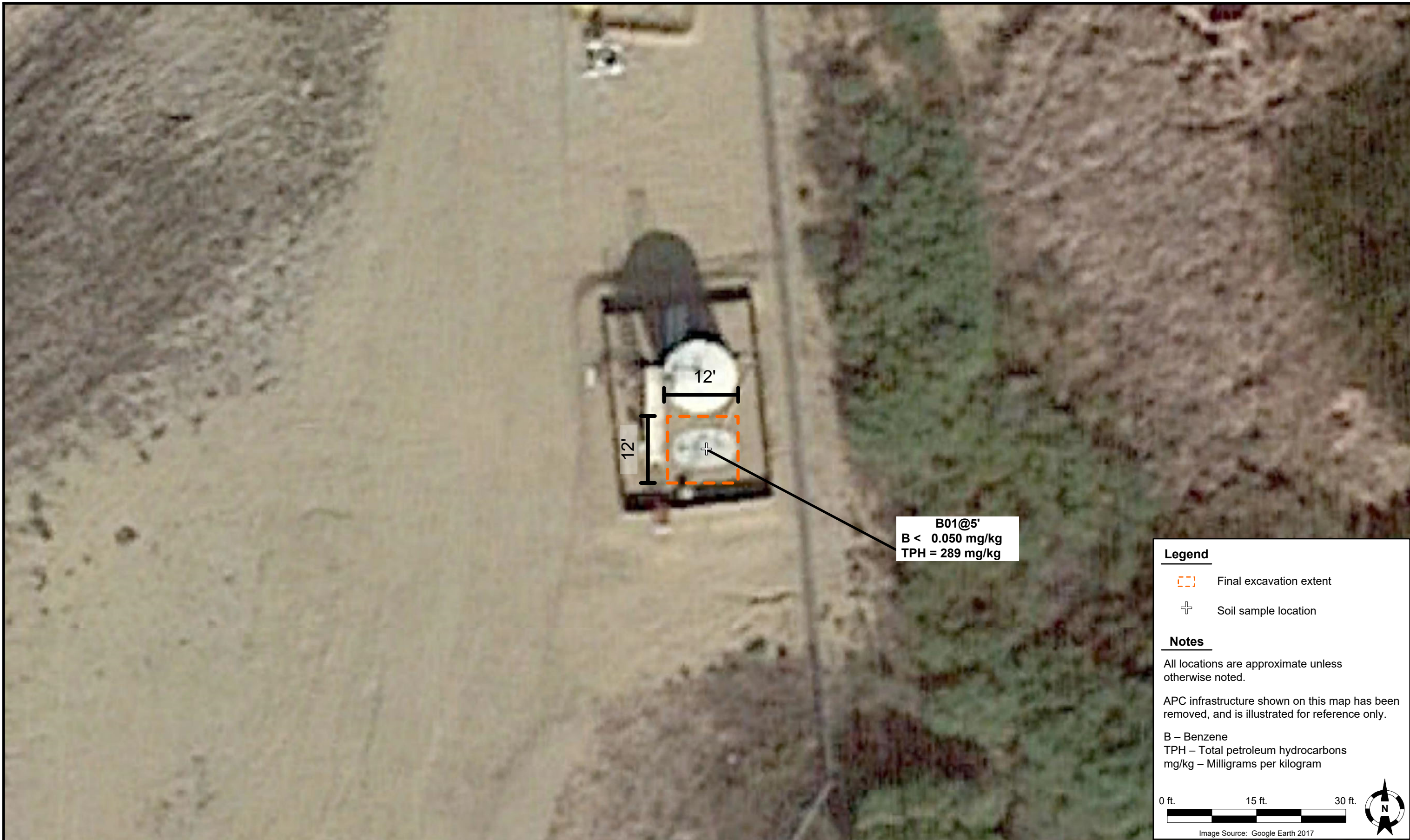
mg/kg = Milligrams per kilogram.

ft. bgs = Feet below ground surface.

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



\* pH sample was collected below the designated root zone (>3' bgs)

**Figure**



**B01@5'**  
**B < 0.050 mg/kg**  
**TPH = 289 mg/kg**

**Legend**

-  Final excavation extent
-  Soil sample location

**Notes**

All locations are approximate unless otherwise noted.

APC infrastructure shown on this map has been removed, and is illustrated for reference only.

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

0 ft.                      15 ft.                      30 ft.




Image Source: Google Earth 2017

DATE:	August 7, 2018
DESIGNED BY:	M. Rianda
DRAWN BY:	M. Rianda



**Kerr-McGee Oil and Gas Onshore LP**  
**Varra 31-6L – Production Facility**  
 SENW Sec. 31-T3N-R67W  
 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 - Varra 31-6L FP

Project Number - [none]

Attached are your analytical results for KMG - Varra 31-6L FP received by Origins Laboratory, Inc. September 19, 2017. This project is associated with Origins project number Y709253-05.

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 - Varra 31-6L FP

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01@5'	Y709253-05	Soil	September 19, 2017 14:38	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 - Varra 31-6L FP

Origins Laboratory

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

**Sample Receipt Checklist**

Origins Work Order: 1709253 Client: Tasman  
 Client Project ID: KMG - Varra 31-6L FP  
 Checklist Completed by: Jim C Shipped Via: HD  
 Date/time completed: 9-19-12 1803 (UPS, FedEx, Hand Delivered, Pick-up, etc.)  
 Airbill #: NA  
 Matrix(s) Received: (Check all that apply):  Soil/Solid  Water  Other: \_\_\_\_\_  
 Cooler Number/Temperature: 154 °C / \_\_\_\_\_ °C / \_\_\_\_\_ °C (Describe) \_\_\_\_\_ °C  
 Thermometer ID: 7003

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Were all samples received intact <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			pit
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? <b>If yes, contact client and note in narrative.</b>			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation and was it checked <sup>(1)</sup> ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH <2 for samples preserved with HNO <sub>3</sub> , HCL, H <sub>2</sub> SO <sub>4</sub> ) / (pH >10 for samples preserved with NaAsO <sub>2</sub> +NaOH, ZnAc+NaOH)		<input checked="" type="checkbox"/>		
Additional Comments (if any):				

<sup>(1)</sup>If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) [Signature] Date/Time Reviewed 9-19-12 1803

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 - Varra 31-6L FP

**B01@5'**  
**9/19/2017 2:38:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y709253-05 (Soil)**

**DRO/RRO by EPA8015C**

Diesel (C10-C28)	169	25.0	mg/kg	1	B71902	09/19/2017	09/19/2017	
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: *o*-Terphenyl 101 % 59-131 " " "

**GBTEX by EPA 8260C**

Gasoline Range Hydrocarbons	120	50.0	mg/kg	250	B71901	09/19/2017	09/19/2017	
Benzene	ND	0.050	"	25	"	"	09/20/2017	U
Toluene	0.154	0.050	"	"	"	"	"	
Ethylbenzene	0.826	0.050	"	"	"	"	"	
Xylenes, total	1.75	0.050	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4 88.8 % 70-130 " " "  
 Surrogate: Toluene-d8 92.1 % 70-130 " " "  
 Surrogate: 4-Bromofluorobenzene 106 % 70-130 " " "

**pH in Soil by EPA 9045D**

pH	9.07		pH Units	1	B71903	09/19/2017	09/20/2017	
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**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0733		mmhos/cm	"	B71904	"	"	
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Tasman Geosciences  
 6899 Pecos Street, Unit C  
 Denver CO 80211

Bob Cornez  
 Project Number: [none]  
 Project: KMG - Varra 31-6L FP

**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			

Origins Laboratory, Inc.



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 Denver CO 80211

Bob Cornez  
 Project Number: [none]  
 Project: KMG - Varra 31-6L FP

**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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 Denver CO 80211

Bob Cornez  
 Project Number: [none]  
 Project: KMG - Varra 31-6L FP

**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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Bob Cornez  
 Project Number: [none]  
 Project: KMG - Varra 31-6L FP

**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 - Varra 31-6L FP

**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 - Varra 31-6L FP

**Classical Chemistry Parameters - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B711903 - NO PREP</b>										
<b>Duplicate (B711903-DUP1)</b>		<b>Source: Y709211-01</b>			Prepared: 09/19/2017 Analyzed: 09/19/2017					
pH	6.72		pH Units		6.95			3.37	25	
<b>Batch B711904 - NO PREP</b>										
<b>Blank (B711904-BLK1)</b>		Prepared: 09/19/2017 Analyzed: 09/19/2017								
Specific Conductance (EC)	0.00550		mmhos/cm							
<b>Duplicate (B711904-DUP1)</b>		<b>Source: Y709211-01</b>			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 - Varra 31-6L FP

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### 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