



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
Warren Chad True #1 Production Facility
API: 05-123-11384
Facility ID: 446859
Legal: SENW Sec 29-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 25, 2017, following removal of the produced water sump. The final extent of the excavation measured approximately 20 feet by 15 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

Soil 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', written in a cursive style.

Mike Jahn, PG
Senior Geologist

Attachments:

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

Table

TABLE 1
WARREN CHAD TRUE 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)
COGCC standards for soil (mg/kg) ⁽¹⁾			0.17	85	100	175	500			4 mmhos/cm or 2x BG	6-9
E01@5'	09/25/17	5	<0.002	<0.002	<0.002	<0.002	<0.200	<25.0	<100	0.386	7.91

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



B01@5'
B < 0.002 mg/kg
TPH < 100 mg/kg

Legend

-  Excavation extent (surveyed by Tasman Geosciences, Inc.)
-  Earthen berm
-  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
Warren Chad True #1 – Production Facility
 SENW Sec. 29-T3N-R67W
 Weld County, Colorado

Sample Location
 Map

FIGURE
1

Attachment A

September 26, 2017

Tasman Geosciences

Bob Cornez

6899 Pecos Street, Unit C

Denver CO 80211

Project Name - KMG - Warren Chad True 1 FP

Project Number - [none]

Attached are your analytical results for KMG - Warren Chad True 1 FP received by Origins Laboratory, Inc. September 25, 2017. This project is associated with Origins project number Y709333-01.

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



Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Warren Chad True 1 FP

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01@5'	Y709333-01	Soil	September 25, 2017 14:45	09/25/2017 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.

Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Warren Chad True 1 FP

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y709333

Client: Tasman Geosciences
 Client Project ID: Warren Chad True 1 FP

Checklist Completed by: Joe Henderson
 Date/time completed: 9/25/17 1725

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

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

Cooler Number/Temperature: 1 / 3.9 °C _____ / _____ °C _____ / _____ °C (Describe)

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"/>			pH
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation and was it checked ⁽¹⁾ ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH <2 for samples preserved with HNO3, HCL, H2SO4) / (pH >10 for samples preserved with NaAsO2+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 9/25/17

Origins Laboratory, Inc.

[Signature]

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Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Warren Chad True 1 FP

B01@5'
9/25/2017 2:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y709333-01 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	25.0	mg/kg	1	B712502	09/25/2017	09/25/2017	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 74.7 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B712501	"	09/25/2017	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 109 % 70-130 " " "
Surrogate: Toluene-d8 93.6 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 102 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.91		pH Units	1	B712503	09/25/2017	09/25/2017	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.386		mmhos/cm	"	B712504	"	"	
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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 - Warren Chad True 1 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
Batch B712501 - EPA 5030 (soil)										
Blank (B712501-BLK1)										
					Prepared: 09/25/2017 Analyzed: 09/25/2017					
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	60		ug/kg	62.5		95.3	70-130			
Surrogate: Toluene-d8	61		"	62.5		98.3	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.7	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 - Warren Chad True 1 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 B712501 - EPA 5030 (soil)

LCS (B712501-BS1)

Prepared: 09/25/2017 Analyzed: 09/25/2017

Benzene	0.108	0.002	mg/kg	0.100		108	77.1-124			
Toluene	0.100	0.002	"	0.100		99.5	74.5-128			
Ethylbenzene	0.096	0.002	"	0.100		96.2	66.4-127			
m,p-Xylene	0.184	0.004	"	0.200		92.2	76.6-124			
o-Xylene	0.092	0.002	"	0.100		92.4	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	56		ug/kg	62.5		89.0	70-130			
Surrogate: Toluene-d8	60		"	62.5		96.3	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.6	70-130			

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 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Warren Chad True 1 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 B712501 - EPA 5030 (soil)

Matrix Spike (B712501-MS1)	Source: Y709311-03			Prepared: 09/25/2017 Analyzed: 09/25/2017						
Benzene	0.094	0.002	mg/kg	0.100	ND	94.2	71.8-126			
Toluene	0.086	0.002	"	0.100	ND	85.8	65.1-130			
Ethylbenzene	0.081	0.002	"	0.100	ND	80.6	62.2-130			
m,p-Xylene	0.156	0.004	"	0.200	ND	78.1	46.5-137			
o-Xylene	0.077	0.002	"	0.100	ND	76.8	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	59		ug/kg	62.5		94.6	70-130			
Surrogate: Toluene-d8	60		"	62.5		96.3	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.6	70-130			

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 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Warren Chad True 1 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 B712501 - EPA 5030 (soil)

Matrix Spike Dup (B712501-MSD1)	Source: Y709311-03			Prepared: 09/25/2017 Analyzed: 09/25/2017						
Benzene	0.095	0.002	mg/kg	0.100	ND	95.0	71.8-126	0.824	11.3	
Toluene	0.087	0.002	"	0.100	ND	87.4	65.1-130	1.82	15.4	
Ethylbenzene	0.082	0.002	"	0.100	ND	81.7	62.2-130	1.33	19.6	
m,p-Xylene	0.157	0.004	"	0.200	ND	78.3	46.5-137	0.268	19.2	
o-Xylene	0.078	0.002	"	0.100	ND	78.5	54.2-134	2.16	17.9	
Surrogate: 1,2-Dichloroethane-d4	57		ug/kg	62.5		92.0	70-130			
Surrogate: Toluene-d8	60		"	62.5		96.5	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.4	70-130			

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Tasman Geosciences
 6899 Pecos Street, Unit C
 Denver CO 80211

Bob Cornez
 Project Number: [none]
 Project: KMG - Warren Chad True 1 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 B712502 - EPA 3550B

Blank (B712502-BLK1)

Prepared: 09/25/2017 Analyzed: 09/25/2017

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	40		"	50.0		79.7	59-131			

LCS (B712502-BS1)

Prepared: 09/25/2017 Analyzed: 09/25/2017

Diesel (C10-C28)	996	50.0	mg/kg	1000		99.6	64-121			
Residual Range Organics (C28-C40)	1020	200	"	1000		102	58-124			
Surrogate: o-Terphenyl	49		"	50.0		97.4	59-131			

Matrix Spike (B712502-MS1)

Source: Y709311-03

Prepared: 09/25/2017 Analyzed: 09/25/2017

Diesel (C10-C28)	930	50.0	mg/kg	1000	ND	93.0	53-125			
Residual Range Organics (C28-C40)	1030	200	"	1000	12.3	102	47-133			
Surrogate: o-Terphenyl	47		"	50.0		93.4	59-131			

Matrix Spike Dup (B712502-MSD1)

Source: Y709311-03

Prepared: 09/25/2017 Analyzed: 09/25/2017

Diesel (C10-C28)	937	50.0	mg/kg	1000	ND	93.7	53-125	0.750	20	
Residual Range Organics (C28-C40)	1010	200	"	1000	12.3	100	47-133	2.13	20	
Surrogate: o-Terphenyl	46		"	50.0		92.5	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 - Warren Chad True 1 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
Batch B712503 - NO PREP										
Duplicate (B712503-DUP1)		Source: Y709311-03			Prepared: 09/25/2017 Analyzed: 09/25/2017					
pH	7.86		pH Units		7.81			0.638	25	
Batch B712504 - NO PREP										
Blank (B712504-BLK1)		Prepared: 09/25/2017 Analyzed: 09/25/2017								
Specific Conductance (EC)	0.00480		mmhos/cm							
Duplicate (B712504-DUP1)		Source: Y709311-03			Prepared: 09/25/2017 Analyzed: 09/25/2017					
Specific Conductance (EC)	0.143		mmhos/cm		0.157			9.31	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 - Warren Chad True 1 FP

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.

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President