



November 16, 2015

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

**Re: Sump Replacement Summary Letter Report  
Butterball 37N-10HZ (Strear 21-10)  
API: 05-123-33788  
Facility ID: 319164  
Legal: NWNE Sec 10-T2N-R67W  
Remediation Project #8961**

Dear Mr. LaRue:

On behalf of Kerr-McGee Oil & Gas Onshore LP (Kerr-McGee), Tasman Geosciences, Inc. (Tasman) has prepared this Sump Replacement Summary Letter Report (Report) to document sampling activities and the results of environmental testing at the above-referenced site. This Report is being submitted under the Form 27 Management Plan for Closure/Replacement of Produced Water Vessels, which has been assigned Remediation #8961 by the COGCC. Tasman provided environmental services at the site that included collection of confirmation soil samples from the excavation and documentation of field activities, 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 on March 17, 2015. Soil sampling activities, laboratory analytical results, and conclusions are presented below. The general site layout and sample locations are provided in the attached site map (Attachment A)

The final extent of the excavation measured approximately 23 feet by 23 feet with an approximate depth of 4 feet below ground surface (bgs). No impacted material was removed during the replacement of the produced water sump at this location. A liner was present at the location, and groundwater was not encountered in the excavation.

Confirmation soil samples were collected from the base and sidewalls of the excavation area at approximately 4 feet and 3 feet bgs, respectively. Soil samples were field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). The confirmation soil sample collected from the base of the excavation area 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. Soil analytical data is summarized in Table 1 and laboratory analytical reports are provided in Attachment B.

## **Results**

Soil analytical results from the sample collected from the base of the final extent of the excavation area indicated that BTEX and TPH concentrations were below the applicable COGCC Table 910-1 standards. The remaining four soil samples collected from the sidewalls of the excavation area were not submitted for laboratory analysis as analytical data confirmed the absence of petroleum hydrocarbon impacts above regulatory standards.

## **Conclusions**

Analytical results described herein confirm BTEX and TPH impacts are not present at concentrations above applicable regulatory standards in the former sump location. Consequently, no further site assessment or remedial activity is recommended at this time. Following site assessment activities, the produced water sump was replaced and the excavation area was backfilled and contoured to match pre-existing site conditions. The production facility remains operational.

Please contact me at (720) 409-8791 if you have any questions regarding this report or require additional information.

Sincerely,

A handwritten signature in blue ink that reads 'Christine Wasko'.

Christine Wasko  
Project Scientist

## **Attachments:**

Table 1 – Soil Sample Results Summary Table  
Attachment A – Site Map  
Attachment B – Laboratory Analytical Report

## **Table**

**TABLE 1**  
**BUTTERBALL 37N-10HZ (STREAR 21-10)**  
**SOIL SAMPLE RESULTS SUMMARY TABLE**  
**KERR-McGEE OIL AND GAS ONSHORE LP**

Sample ID	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>COGCC standards for soil (mg/kg) <sup>(1)</sup></b>			<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>500</b>			<b>4 or 2x BG</b>	<b>6-9</b>
B01@4'	03/17/15	4.0	<0.002	<0.002	<0.002	<0.002	<0.200	<50	<200	0.0686	8.52

**Notes:**

1. Standards for soil are taken from 2 CCR 404-1, Table 910-1, effective February 1, 2014.

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

BG = Background

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.

**Attachment A**

**B01@4'**  
**B <0.002 mg/kg**  
**TPH <200 mg/kg**



**Legend**

- Excavation Extent
- Steel Berm
- Soil Sample Location
- Existing Infrastructure

**Notes**  
 All Locations are Approximate Unless Otherwise Noted.

B – Benzene  
 TPH – Total Petroleum Hydrocarbons  
 mg/kg – Milligrams Per Kilogram

0 ft.      7.5 ft.      15 ft.

Image Source: Google Earth 2015

DATE:	November 16, 2015
DESIGNED BY:	B. Nelson
DRAWN BY:	B. Nelson



**Kerr-McGee Oil and Gas Onshore, LP**  
**Butterball 37N-10HZ (Strear 21-10)**  
 NWNE, Section 10, Township 2 North, Range 67 West  
 Weld County, Colorado

Sample Location  
 Map

FIGURE  
 1

**Attachment B**

March 18, 2015

Tasman Geosciences

Christine Wasko

6899 Pecos Street, Unit C

Denver CO 80211

Project Name - KMG - Strear 21-10

Project Number - [none]

Attached are your analytical results for KMG - Strear 21-10 received by Origins Laboratory, Inc. March 17, 2015. This project is associated with Origins project number X503202-01.

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

Christine Wasko  
Project Number: [none]  
Project: KMG - Strear 21-10

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B01 @ 4'	X503202-01	Soil	March 17, 2015 12:35	03/17/2015 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

Christine Wasko  
 Project Number: [none]  
 Project: KMG - Strear 21-10

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: X503202

Client: Tasman

Client Project ID: Strear 21-10

Checklist Completed by: Jeff Smith

Shipped Via: Pick up

Date/time completed: 3/17/15

(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Airbill #: NA

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

Cooler Number/Temperature: 1 / 4.1 °C \_\_\_\_\_ / \_\_\_\_\_ °C \_\_\_\_\_ / \_\_\_\_\_ °C (Describe)

Thermometer ID: T603

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"/>			PH
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? If yes, contact client and note in narrative.			<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.

Jeff Smith  
 Reviewed by (Project Manager)

3/17/15  
 Date/Time Reviewed

Origins Laboratory, Inc.



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Tasman Geosciences  
 6899 Pecos Street, Unit C  
 Denver CO 80211

Christine Wasko  
 Project Number: [none]  
 Project: KMG - Strear 21-10

**B01 @ 4'**  
**3/17/2015 12:35:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X503202-01 (Soil)**

**DRO/RRO by EPA8015C**

Diesel (C10-C28)	ND	50	mg/kg	1	5C17005	03/17/2015	03/17/2015	
Residual Range Organics (C28-C36)	ND	200	"	"	"	"	"	

*Surrogate: o-Terphenyl* 64.5 % 59-131 " " "

**GBTEX by EPA 8260C**

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	5C16006	03/17/2015	03/18/2015	
Benzene	ND	0.002	"	"	"	"	"	
Toluene	ND	0.002	"	"	"	"	"	
Ethylbenzene	ND	0.002	"	"	"	"	"	
Xylenes, total	ND	0.002	"	"	"	"	"	

*Surrogate: 1,2-Dichloroethane-d4* 105 % 70-130 " " "  
*Surrogate: Toluene-d8* 105 % 70-130 " " "  
*Surrogate: 4-Bromofluorobenzene* 90.8 % 70-130 " " "

**pH in Soil by EPA 9045D**

pH	8.52		pH Units	1	5C16008	03/16/2015	03/17/2015	
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**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0686		mmhos/cm	"	5C16009	"	03/17/2015	
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Tasman Geosciences  
 6899 Pecos Street, Unit C  
 Denver CO 80211

Christine Wasko  
 Project Number: [none]  
 Project: KMG - Strear 21-10

**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 5C16006 - EPA 5030 (soil)**

**Blank (5C16006-BLK1)**

Prepared: 03/16/2015 Analyzed: 03/17/2015

Gasoline Range Hydrocarbons	ND	0.200	mg/kg							
Benzene	ND	0.002	"							
Toluene	ND	0.002	"							
Ethylbenzene	ND	0.002	"							
Xylenes, total	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	65.7		ug/kg	62.5		105	70-130			
Surrogate: Toluene-d8	59.6		"	62.5		95.3	70-130			
Surrogate: 4-Bromofluorobenzene	58.4		"	62.5		93.4	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences  
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 Denver CO 80211

Christine Wasko  
 Project Number: [none]  
 Project: KMG - Strear 21-10

**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 5C16006 - EPA 5030 (soil)**

**LCS (5C16006-BS1)**

Prepared: 03/16/2015 Analyzed: 03/17/2015

Benzene	0.122	0.002	mg/kg	0.100		122	77.1-124			
Toluene	0.100	0.002	"	0.100		100	74.5-128			
Ethylbenzene	0.090	0.002	"	0.100		89.9	66.4-127			
m,p-Xylene	0.173	0.004	"	0.200		86.4	76.6-124			
o-Xylene	0.092	0.002	"	0.100		91.6	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	80.0		ug/kg	62.5		128	70-130			
Surrogate: Toluene-d8	72.1		"	62.5		115	70-130			
Surrogate: 4-Bromofluorobenzene	64.2		"	62.5		103	70-130			

Origins Laboratory, Inc.



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 Denver CO 80211

Christine Wasko  
 Project Number: [none]  
 Project: KMG - Strear 21-10

**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 5C16006 - EPA 5030 (soil)**

Matrix Spike (5C16006-MS1)	Source: X503152-01			Prepared: 03/16/2015 Analyzed: 03/17/2015						
Benzene	0.106	0.002	mg/kg	0.100	ND	106	71.8-126			
Toluene	0.082	0.002	"	0.100	ND	81.8	65.1-130			
Ethylbenzene	0.088	0.002	"	0.100	ND	87.9	62.2-130			
m,p-Xylene	0.175	0.004	"	0.200	ND	87.5	46.5-137			
o-Xylene	0.093	0.002	"	0.100	ND	92.8	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	69.0		ug/kg	62.5		110	70-130			
Surrogate: Toluene-d8	57.5		"	62.5		92.0	70-130			
Surrogate: 4-Bromofluorobenzene	63.9		"	62.5		102	70-130			

Origins Laboratory, Inc.



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 6899 Pecos Street, Unit C  
 Denver CO 80211

Christine Wasko  
 Project Number: [none]  
 Project: KMG - Strear 21-10

**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 5C16006 - EPA 5030 (soil)**

<b>Matrix Spike Dup (5C16006-MSD1)</b>	<b>Source: X503152-01</b>			<b>Prepared: 03/16/2015 Analyzed: 03/17/2015</b>						
Benzene	0.115	0.002	mg/kg	0.100	ND	115	71.8-126	8.40	11.3	
Toluene	0.088	0.002	"	0.100	ND	88.2	65.1-130	7.51	15.4	
Ethylbenzene	0.079	0.002	"	0.100	ND	79.5	62.2-130	10.1	19.6	
m,p-Xylene	0.168	0.004	"	0.200	ND	84.2	46.5-137	3.80	19.2	
o-Xylene	0.088	0.002	"	0.100	ND	88.1	54.2-134	5.20	17.9	
Surrogate: 1,2-Dichloroethane-d4	77.5		ug/kg	62.5		124	70-130			
Surrogate: Toluene-d8	62.4		"	62.5		99.8	70-130			
Surrogate: 4-Bromofluorobenzene	66.0		"	62.5		106	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences  
 6899 Pecos Street, Unit C  
 Denver CO 80211

Christine Wasko  
 Project Number: [none]  
 Project: KMG - Strear 21-10

**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 5C17005 - EPA 3580**

**Blank (5C17005-BLK1)**

Prepared: 03/17/2015 Analyzed: 03/17/2015

Diesel (C10-C28)	ND	50	mg/kg							
Residual Range Organics (C28-C36)	ND	200	"							
Surrogate: o-Terphenyl	37		"	50.0		74.4	59-131			

**LCS (5C17005-BS1)**

Prepared: 03/17/2015 Analyzed: 03/17/2015

Diesel (C10-C28)	710	50	mg/kg	1000		71.0	64-121			
Residual Range Organics (C28-C36)	710	200	"	1000		70.5	58-124			
Surrogate: o-Terphenyl	34		"	50.0		68.7	59-131			

**Matrix Spike (5C17005-MS1)**

Source: X503184-01

Prepared: 03/17/2015 Analyzed: 03/17/2015

Diesel (C10-C28)	840	50	mg/kg	1000	24	81.1	53-125			
Residual Range Organics (C28-C36)	820	200	"	1000	5.8	81.9	47-133			
Surrogate: o-Terphenyl	35		"	50.0		70.2	59-131			

**Matrix Spike Dup (5C17005-MSD1)**

Source: X503184-01

Prepared: 03/17/2015 Analyzed: 03/17/2015

Diesel (C10-C28)	900	50	mg/kg	1000	24	87.5	53-125	7.37	20	
Residual Range Organics (C28-C36)	940	200	"	1000	5.8	93.3	47-133	12.9	20	
Surrogate: o-Terphenyl	38		"	50.0		75.0	59-131			

Origins Laboratory, Inc.



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Tasman Geosciences  
 6899 Pecos Street, Unit C  
 Denver CO 80211

Christine Wasko  
 Project Number: [none]  
 Project: KMG - Strear 21-10

**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 5C16008 - NO PREP</b>										
<b>Duplicate (5C16008-DUP1)</b>		<b>Source: X503154-01</b>			Prepared: 03/16/2015 Analyzed: 03/17/2015					
pH	8.57		pH Units		8.48			1.06	25	
<b>Batch 5C16009 - NO PREP</b>										
<b>Blank (5C16009-BLK1)</b>		Prepared: 03/16/2015 Analyzed: 03/17/2015								
Specific Conductance (EC)	0.00270		mmhos/cm							
<b>Duplicate (5C16009-DUP1)</b>		<b>Source: X503154-01</b>			Prepared: 03/16/2015 Analyzed: 03/17/2015					
Specific Conductance (EC)	1.09		mmhos/cm		1.11			2.18	25	

Origins Laboratory, Inc.



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Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Christine Wasko  
Project Number: [none]  
Project: KMG - Strear 21-10

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**Notes and Definitions**

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