

April 13, 2018

CALLIE KARRIGAN
MARATHON OIL COMPANY
4111 TIDWELL ROAD
CARLSBAD, NM 88220

RE: SOUTHERN COMFORT 25 36 STATE X NO 001H

Enclosed are the results of analyses for samples received by the laboratory on 04/10/18 9:30.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-17-10. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/ga/lab_accred_certif.html.

Cardinal Laboratories is accredited through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Total Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Cardinal Laboratories is accredited through the State of New Mexico Environment Department for:

Method SM 9223-B	Total Coliform and E. coli (Colilert MMO-MUG)
Method EPA 524.2	Regulated VOCs and Total Trihalomethanes (TTHM)
Method EPA 552.2	Total Haloacetic Acids (HAA-5)

Accreditation applies to public drinking water matrices for State of Colorado and New Mexico.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Celey D. Keene
Lab Director/Quality Manager

Analytical Results For:

 MARATHON OIL COMPANY
 4111 TIDWELL ROAD
 CARLSBAD NM, 88220

 Project: SOUTHERN COMFORT 25 36 STATI
 Project Number: NOT GIVEN
 Project Manager: CALLIE KARRIGAN
 Fax To:

 Reported:
 13-Apr-18 11:51

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SAMPLE 1	H800977-01	Soil	05-Apr-18 09:00	10-Apr-18 09:30
SAMPLE 2	H800977-02	Soil	05-Apr-18 09:45	10-Apr-18 09:30

Cardinal Laboratories

* = Accredited Analyte

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SAMPLE 1
H800977-01 (Soil)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
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Cardinal Laboratories
Volatile Organic Compounds by EPA Method 8021

Benzene*	<0.050		0.050	mg/kg	50	8041003	MS	11-Apr-18	8021B	
Toluene*	<0.050		0.050	mg/kg	50	8041003	MS	11-Apr-18	8021B	
Ethylbenzene*	<0.050		0.050	mg/kg	50	8041003	MS	11-Apr-18	8021B	
Total Xylenes*	<0.150		0.150	mg/kg	50	8041003	MS	11-Apr-18	8021B	
Total BTEX	<0.300		0.300	mg/kg	50	8041003	MS	11-Apr-18	8021B	

Surrogate: 4-Bromofluorobenzene (PID) 96.9 % 72-148 8041003 MS 11-Apr-18 8021B

Petroleum Hydrocarbons by GC FID

GRO C6-C10*	<10.0		10.0	mg/kg	1	8041004	MS	10-Apr-18	8015B	
DRO >C10-C28*	<10.0		10.0	mg/kg	1	8041004	MS	10-Apr-18	8015B	
EXT DRO >C28-C36	<10.0		10.0	mg/kg	1	8041004	MS	10-Apr-18	8015B	

Surrogate: 1-Chlorooctane 79.9 % 41-142 8041004 MS 10-Apr-18 8015B

Surrogate: 1-Chlorooctadecane 80.7 % 37.6-147 8041004 MS 10-Apr-18 8015B

Green Analytical Laboratories
Soluble (DI Water Extraction)

Chloride	31.4		10.0	mg/kg wet	10	B804083	JDA	11-Apr-18	EPA300.0	
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Cardinal Laboratories

*=Accredited Analyte

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SAMPLE 2
H800977-02 (Soil)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
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Cardinal Laboratories
Volatile Organic Compounds by EPA Method 8021

Benzene*	<0.050		0.050	mg/kg	50	8041003	MS	11-Apr-18	8021B	
Toluene*	<0.050		0.050	mg/kg	50	8041003	MS	11-Apr-18	8021B	
Ethylbenzene*	<0.050		0.050	mg/kg	50	8041003	MS	11-Apr-18	8021B	
Total Xylenes*	<0.150		0.150	mg/kg	50	8041003	MS	11-Apr-18	8021B	
Total BTEX	<0.300		0.300	mg/kg	50	8041003	MS	11-Apr-18	8021B	
<i>Surrogate: 4-Bromofluorobenzene (PID)</i>			<i>94.5 %</i>	<i>72-148</i>		<i>8041003</i>	<i>MS</i>	<i>11-Apr-18</i>	<i>8021B</i>	

Petroleum Hydrocarbons by GC FID

GRO C6-C10*	<10.0		10.0	mg/kg	1	8041004	MS	10-Apr-18	8015B	
DRO >C10-C28*	77.8		10.0	mg/kg	1	8041004	MS	10-Apr-18	8015B	
EXT DRO >C28-C36	23.1		10.0	mg/kg	1	8041004	MS	10-Apr-18	8015B	
<i>Surrogate: 1-Chlorooctane</i>			<i>80.8 %</i>	<i>41-142</i>		<i>8041004</i>	<i>MS</i>	<i>10-Apr-18</i>	<i>8015B</i>	
<i>Surrogate: 1-Chlorooctadecane</i>			<i>89.5 %</i>	<i>37.6-147</i>		<i>8041004</i>	<i>MS</i>	<i>10-Apr-18</i>	<i>8015B</i>	

Green Analytical Laboratories
Soluble (DI Water Extraction)

Chloride	88.9		50.0	mg/kg wet	50	B804083	JDA	11-Apr-18	EPA300.0	
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*=Accredited Analyte

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Volatile Organic Compounds by EPA Method 8021 - Quality Control
Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 8041003 - Volatiles
Blank (8041003-BLK1)

Prepared & Analyzed: 10-Apr-18

Benzene	ND	0.050	mg/kg							
Toluene	ND	0.050	mg/kg							
Ethylbenzene	ND	0.050	mg/kg							
Total Xylenes	ND	0.150	mg/kg							
Total BTEX	ND	0.300	mg/kg							
<i>Surrogate: 4-Bromofluorobenzene (PID)</i>	<i>0.0945</i>		mg/kg	<i>0.100</i>		<i>94.5</i>	<i>72-148</i>			

LCS (8041003-BS1)

Prepared & Analyzed: 10-Apr-18

Benzene	2.01	0.050	mg/kg	2.00		100	79.5-124			
Toluene	1.99	0.050	mg/kg	2.00		99.7	75.5-127			
Ethylbenzene	1.97	0.050	mg/kg	2.00		98.6	77.7-125			
Total Xylenes	6.03	0.150	mg/kg	6.00		101	70.9-124			
<i>Surrogate: 4-Bromofluorobenzene (PID)</i>	<i>0.0933</i>		mg/kg	<i>0.100</i>		<i>93.3</i>	<i>72-148</i>			

LCS Dup (8041003-BSD1)

Prepared & Analyzed: 10-Apr-18

Benzene	2.04	0.050	mg/kg	2.00		102	79.5-124	1.45	6.5	
Toluene	2.00	0.050	mg/kg	2.00		100	75.5-127	0.263	7.02	
Ethylbenzene	2.02	0.050	mg/kg	2.00		101	77.7-125	2.28	7.83	
Total Xylenes	6.15	0.150	mg/kg	6.00		103	70.9-124	2.01	7.78	
<i>Surrogate: 4-Bromofluorobenzene (PID)</i>	<i>0.0938</i>		mg/kg	<i>0.100</i>		<i>93.8</i>	<i>72-148</i>			

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Petroleum Hydrocarbons by GC FID - Quality Control
Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 8041004 - General Prep - Organics
Blank (8041004-BLK1)

Prepared & Analyzed: 10-Apr-18

GRO C6-C10	ND	10.0	mg/kg							
DRO >C10-C28	ND	10.0	mg/kg							
EXT DRO >C28-C35	ND	10.0	mg/kg							
EXT DRO >C28-C36	ND	10.0	mg/kg							
Total TPH C6-C28	ND	10.0	mg/kg							
<i>Surrogate: 1-Chlorooctane</i>	53.4		mg/kg	50.0		107	41-142			
<i>Surrogate: 1-Chlorooctadecane</i>	57.7		mg/kg	50.0		115	37.6-147			

LCS (8041004-BS1)

Prepared & Analyzed: 10-Apr-18

GRO C6-C10	228	10.0	mg/kg	200		114	76.5-133			
DRO >C10-C28	241	10.0	mg/kg	200		120	72.9-138			
Total TPH C6-C28	469	10.0	mg/kg	400		117	78-132			
<i>Surrogate: 1-Chlorooctane</i>	52.7		mg/kg	50.0		105	41-142			
<i>Surrogate: 1-Chlorooctadecane</i>	60.1		mg/kg	50.0		120	37.6-147			

LCS Dup (8041004-BSD1)

Prepared & Analyzed: 10-Apr-18

GRO C6-C10	230	10.0	mg/kg	200		115	76.5-133	0.777	20.6	
DRO >C10-C28	242	10.0	mg/kg	200		121	72.9-138	0.610	20.6	
Total TPH C6-C28	472	10.0	mg/kg	400		118	78-132	0.691	18	
<i>Surrogate: 1-Chlorooctane</i>	52.8		mg/kg	50.0		106	41-142			
<i>Surrogate: 1-Chlorooctadecane</i>	58.4		mg/kg	50.0		117	37.6-147			

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Soluble (DI Water Extraction) - Quality Control
Green Analytical Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B804083 - General Prep - Wet Chem
Blank (B804083-BLK1)

Prepared & Analyzed: 11-Apr-18

Chloride	ND	10.0	mg/kg wet							
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LCS (B804083-BS1)

Prepared & Analyzed: 11-Apr-18

Chloride	244	10.0	mg/kg wet	250		97.7	85-115			
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LCS Dup (B804083-BSD1)

Prepared & Analyzed: 11-Apr-18

Chloride	246	10.0	mg/kg wet	250		98.5	85-115	0.762	20	
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Notes and Definitions

- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference
- ** Samples not received at proper temperature of 6°C or below.
- *** Insufficient time to reach temperature.
- Chloride by SM4500Cl-B does not require samples be received at or below 6°C
Samples reported on an as received basis (wet) unless otherwise noted on report

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