

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](http://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, 88220Project: 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

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damage including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

MARATHON OIL COMPANY  
4111 TIDWELL ROAD  
CARLSBAD NM, 88220

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

Reported:  
13-Apr-18 11:51

### SAMPLE 1 H800977-01 (Soil)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
---------	--------	-----	-----------------	-------	----------	-------	---------	----------	--------	-------

#### 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	
----------	------	--	------	-----------	----	---------	-----	-----------	----------	--

Cardinal Laboratories

\*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damage including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

MARATHON OIL COMPANY  
4111 TIDWELL ROAD  
CARLSBAD NM, 88220

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

Reported:  
13-Apr-18 11:51

### SAMPLE 2 H800977-02 (Soil)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
---------	--------	-----	-----------------	-------	----------	-------	---------	----------	--------	-------

#### 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)			94.5 %	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*	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	
Surrogate: 1-Chlorooctane			80.8 %	41-142		8041004	MS	10-Apr-18	8015B	
Surrogate: 1-Chlorooctadecane			89.5 %	37.6-147		8041004	MS	10-Apr-18	8015B	

#### Green Analytical Laboratories

#### Soluble (DI Water Extraction)

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

Cardinal Laboratories

\*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damage including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

MARATHON OIL COMPANY  
4111 TIDWELL ROAD  
CARLSBAD NM, 88220

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

Reported:  
13-Apr-18 11:51

### 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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

#### 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							
Surrogate: 4-Bromofluorobenzene (PID)	0.0945		mg/kg	0.100		94.5	72-148			

##### 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			
Surrogate: 4-Bromofluorobenzene (PID)	0.0933		mg/kg	0.100		93.3	72-148			

##### 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	
Surrogate: 4-Bromofluorobenzene (PID)	0.0938		mg/kg	0.100		93.8	72-148			

Cardinal Laboratories

\*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damage including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



Celey D. Keene, Lab Director/Quality Manager

### Analytical Results For:

MARATHON OIL COMPANY  
4111 TIDWELL ROAD  
CARLSBAD NM, 88220

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

Reported:  
13-Apr-18 11:51

### 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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

#### Batch 8041004 - General Prep - Organics

##### Blank (8041004-BLK1)

Prepared &amp; 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							
Surrogate: 1-Chlorooctane	53.4		mg/kg	50.0		107	41-142			
Surrogate: 1-Chlorooctadecane	57.7		mg/kg	50.0		115	37.6-147			

##### LCS (8041004-BS1)

Prepared &amp; 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			
Surrogate: 1-Chlorooctane	52.7		mg/kg	50.0		105	41-142			
Surrogate: 1-Chlorooctadecane	60.1		mg/kg	50.0		120	37.6-147			

##### LCS Dup (8041004-BSD1)

Prepared &amp; 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	
Surrogate: 1-Chlorooctane	52.8		mg/kg	50.0		106	41-142			
Surrogate: 1-Chlorooctadecane	58.4		mg/kg	50.0		117	37.6-147			

Cardinal Laboratories

\*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damage including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



Celey D. Keene, Lab Director/Quality Manager

**Analytical Results For:**

 MARATHON OIL COMPANY  
 4111 TIDWELL ROAD  
 CARLSBAD NM, 88220

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

 Reported:  
 13-Apr-18 11:51

**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
---------	--------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------	-------

**Batch B804083 - General Prep - Wet Chem**
**Blank (B804083-BLK1)**

Prepared &amp; Analyzed: 11-Apr-18

Chloride	ND	10.0	mg/kg wet							
----------	----	------	-----------	--	--	--	--	--	--	--

**LCS (B804083-BS1)**

Prepared &amp; Analyzed: 11-Apr-18

Chloride	244	10.0	mg/kg wet	250		97.7	85-115			
----------	-----	------	-----------	-----	--	------	--------	--	--	--

**LCS Dup (B804083-BSD1)**

Prepared &amp; Analyzed: 11-Apr-18

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

Cardinal Laboratories

\*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damage including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



Celey D. Keene, Lab Director/Quality Manager

**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

---

Cardinal Laboratories

\*=Accredited Analyte

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damage including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of the services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



---

Celey D. Keene, Lab Director/Quality Manager



## Page 9 of 9

(Circle) HAND DELIVERED FEDEX UPS Tracking #: \_\_\_\_\_

corrected - 15%