

**APPROVED***By CHernandez at 2:01 pm, Oct 22, 2018*

In the interests of resolving **1RP-5094**, NMOCD approves the proposed remediation plan as outlined on September 17, 2018 with the following conditions : Provide both bottom and sidewall confirmation samples at no greater than 50 ft. intervals. Please be advised to excavate further at BH18-01 until permissible chloride levels are reached or submit a variance requesting to utilize a liner. Submit dated photo documentation of the remedial activities, including placement of liner if one is used. Submit scaled map with the confirmation sample locations in relation to the delineation sample points and indicate location of release point.

August 24, 2018

Spill Remediation Plan: Nighthawk State Com 3H (Section 20 T18S R33E)
API: 30-025-41950

Prepared For: **Marathon Oil Permian LLC.**
2423 Bonita Street
Carlsbad, NM 88220

NMOCD District 1
1625 North French Drive
Hobbs, New Mexico 88240

Ms. Olivia Yu,

Marathon Oil Permian LLC., requested that Vertex Resource Services Inc. (Vertex) conduct a Spill Assessment and Remediation for a release at Nighthawk State Com 3H, API: 30-025-41950 (hereafter referred to as "site"). The Initial C-141 Report is included in Attachment 1 and the Site Schematic can be found in Attachment 2 as per the lab results. This letter provides a description of the remediation plan to achieve spill closure at the site.

General Information

Client:	<u>Marathon Oil Permian LLC.</u>	Site Location:	<u>Nighthawk State Com 3H</u>
Date:	<u>August 20, 2018</u>	Project #:	<u>18E-02112</u>
Client Contact:	<u>Callie Karrigan</u>	Phone #:	<u>405-202-1028</u>
Vertex PM:	<u>Dhugal Hanton</u>	Phone #:	<u>832-588-0674</u>
Field Personnel:	<u>Robyn Fisher</u>	Phone #:	<u>575-361-7290</u>
Field Personnel:	<u>Jason Crabtree</u>	Phone #:	<u>432-250-3456</u>
Contractor:	<u>Wescom - Kevin Waliezer</u>	Phone #:	<u>701-580-7614</u>

Objective

The objective is to conduct an excavation of material and meet the 600 mg/kg total chlorides requirement. Based on existing results, it is assumed that most of the excavation extent will be at a depth of 4 feet. Vertex will conduct sampling at 4 feet and if the excavation base fails for chloride, a 30 mil liner will be installed. Vertex will source local caliche and backfill for the excavation.

Groundwater, Point of Diversion and Site Ranking

The New Mexico State Engineer website (New Mexico Water Rights Reporting System – Water Column Report) indicates that the nearest groundwater data available for Section 11, T17S, R36E is approximately 1,000 feet from the site. The ground water in the area is reported to be at an average depth of 78 feet below ground surface (BGS). The referenced groundwater data are presented in Attachment 3.

The New Mexico State Engineer website (New Mexico Water Rights Reporting System – Active & Inactive Points of Diversion) indicates that there no diversions within 1,000 feet. (Attachment 4).

The Ranking Criteria for Depth to Ground Water at the site is ranked 10 based on the *Guidelines for Remediation of Leaks, Spills and Releases* (New Mexico Oil Conservation Division (NMOCD), August 13, 1993) and the specific site information listed below:

Ranking Criteria	Distance	Ranking
Depth to Groundwater	78 ft.	10
Wellhead Protection Area	> 1,000 ft. from a water source	0
Distance to Surface Water Body	>1,000 ft.	0
Total Ranking		10

The following are recommended remediation action levels used for final closure efforts.

Recommended Remediation Action Level	
Benzene (ppm)	10
BTEX (ppm)	50
TPH (ppm)	1000
Chlorides (ppm)	600

Initial Site Assessment

The initial spill assessment was conducted on May 30, 2018. Six surface samples were taken to investigate and characterize the soil conditions. Chloride, Benzene and Total Petroleum Hydrocarbons results of the initial investigation are presented below in Table 1. A secondary surface scraping samples of the area were taken on July 15, 2018, these samples were sent to the lab to assess the current soil conditions. Results of the secondary sampling are presented below in Table 1. The lab results are included in Attachment 5.

Table 1. Soil Characterization - July 7, 2018 and July 15, 2018									
Sample Description			Petroleum Hydrocarbons						Inorganic Chloride
Sample ID	Depth (ft.)	Date	Volatile		Extractable				
			Benzene	BTEX (Total)	Gasoline Range Organics (GRO)	Diesel Range Organics (DRO)	Oil Range Organics (ORO)	Total Petroleum Hydrocarbons (TPH)	
BH18-01	0	5/30/2018	ND	ND	ND	ND	ND	ND	23900
BH18-01	2	5/30/2018	ND	ND	ND	ND	ND	ND	387
BH18-01	4	5/30/2018	–	–	–	–	–	–	2480
BH18-02	0	5/30/2018	ND	ND	ND	ND	ND	ND	1050
BH18-02	2	5/30/2018	ND	ND	ND	ND	ND	ND	411
BH18-03	0	5/30/2018	ND	ND	ND	48.9	ND	48.9	4360
BH18-03	2	5/30/2018	ND	ND	ND	ND	ND	ND	518
BH18-04	0	5/30/2018	ND	0.336	29.8	23.3	ND	53.1	109
BH18-04	2	5/30/2018	ND	ND	ND	ND	ND	ND	33.9
BH18-04	4	5/30/2018	–	–	–	–	–	–	21.3
BH18-05	0	5/30/2018	ND	ND	ND	ND	ND	ND	89
BH18-05	2	5/30/2018	ND	ND	ND	ND	ND	ND	48.4
BH18-06	0	5/30/2018	0.00202	0.00578	22.6	43.1	ND	65.7	26.4
BH18-06	2	5/30/2018	ND	ND	ND	ND	ND	ND	12.9
BH18-01	4	7/15/2018	ND	ND	ND	ND	ND	ND	2830
BH18-02	1	7/15/2018	ND	ND	ND	ND	ND	ND	2240
BH18-03	1	7/15/2018	ND	ND	ND	ND	ND	ND	2160

Excavation

The excavation will include removing impacted soils with a backhoe and sampling the soil at 4 feet. The soil sampling protocol is designed and implemented to identify and determine changes in soil condition within the vertical and lateral profiles. Soils will be classified utilizing the Unified Soil Classification system as described in *American Society for Testing and Materials D2488* (Standard Practice of Description and Identification of Soils (Visual-Manual Procedure) 2000). Laboratory analysis on select samples will be performed according the following methods:

- Chloride (Method 300)

As benzene and TPH are below NMOCD Recommended Remedial Action Levels, Vertex will be sampling only for chlorides.

Should you have any questions or concerns, please do not hesitate to contact the undersigned at 832.588.0674 or dhanton@vertex.ca.

Sincerely,



Dhugal Hanton, B.Sc., P.Ag., SR/WA, P.Biol.
VICE PRESIDENT – US OPERATIONS

Attachments

- Attachment 1. Initial C-141 Report
- Attachment 2. Figure
- Attachment 3. Groundwater Information
- Attachment 4. Diversion Information
- Attachment 5. Laboratory Results

Limitations

This report has been prepared for the sole benefit of Marathon Oil Permian LLC. This document may not be used by any other person or entity, with the exception of the New Mexico Oil Conservation Division, without the express written consent of Vertex Resource Services Inc. (Vertex) and Marathon Oil Permian LLC. Any use of this report by a third party, or any reliance on decisions made based on it, or damages suffered as a result of the use of this report are the sole responsibility of the user.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgement of Vertex based on the data collected during the assessment. Due to the nature of the assessment and the data available, Vertex cannot warrant against undiscovered environmental liabilities. Conclusions and recommendations presented in this report should not be considered legal advice.

ATTACHMENT 1

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised April 3, 2017

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Marathon Oil Permian LLC	Contact: Callie Karrigan
Address: 2423 Bonita St, Carlsbad, NM 88220	Telephone No. 405-202-1028 (cell) 575-297-0956 (office)
Facility Name: Nighthawk State Com 3H	Facility Type: oil well

Surface Owner: State	Mineral Owner: State	API No 30-025-41950
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LOCATION OF RELEASE

Unit Letter O	Section 20	Township 18S	Range 35E	Feet from the 240	North/South Line South	Feet from the 2310	East/West Line East	County Lea
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Latitude 32.72660771 Longitude -103.47803946 NAD83

NATURE OF RELEASE

Type of Release: produced water	Volume of Release: 10 bbl	Volume Recovered: 6 bbl
Source of Release: heater treater	Date and Hour of Occurrence unknown	Date and Hour of Discovery 3/14/18 10:15 am
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Olivia Yu – Lea County	
By Whom? Callie Karrigan	Date and Hour:	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse. N/A	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.*
Operator arrived onsite for daily rounds and observed a gasket leak from the treater. A mist from the treater released approximately 10 bbls of produced water in secondary containment. Approximately 6 barrels was contained in containment and an additional 4 barrels was released outside of containment due to heavy misting and spray. The mist traveled approximately 20 feet off the pad.

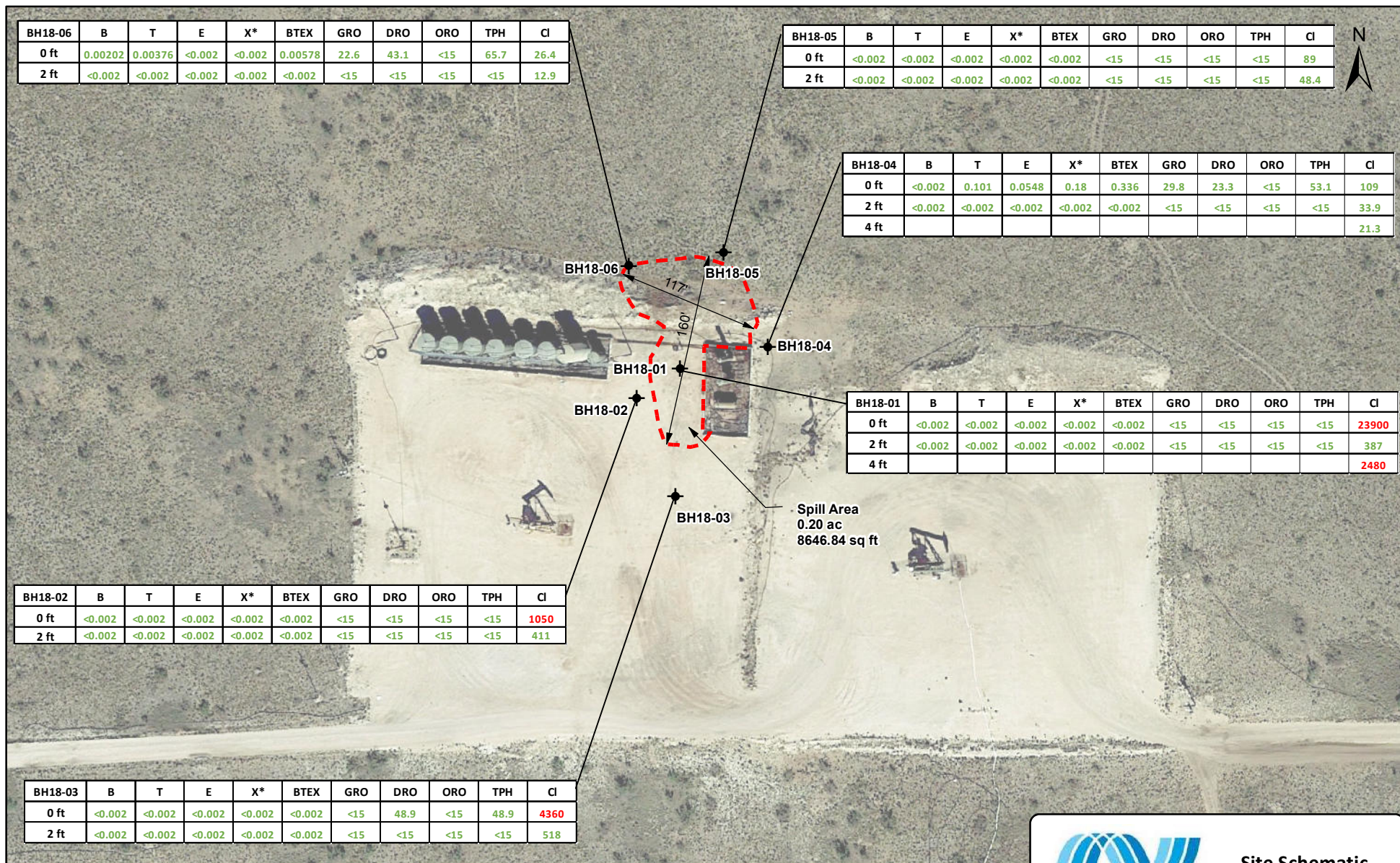
Describe Area Affected and Cleanup Action Taken.*
A vac truck was dispatched to recover standing fluids in and outside of containment. The well was shut-in pending gasket repairs by a 3rd party. Facility containment was then power washed and used absorbent materials to recover remaining liquids. The liner integrity was also assessed to confirm the liner will continue to contain liquids if another release occurs. Offsite release will be assessed by a 3rd party and a clean-up plan will be submitted.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: <i>Callie Karrigan</i>		<u>OIL CONSERVATION DIVISION</u>	
		Approved by Environmental Specialist:	
Printed Name: Callie Karrigan			
Title: HES Professional		Approval Date:	Expiration Date:
E-mail Address: cnkarrigan@marathonoil.com		Conditions of Approval:	
Date: 3/28/18 Phone: 405-202-1028		Attached ☐	

* Attach Additional Sheets If Necessary

ATTACHMENT 2



Legend

- Borehole
- Spill Area

NMOCD Environmental Quality Guidelines (ppm or mg/kg)										
	B	T	E	BTEX	GRO	DRO	ORO	TPH	CI	
Minimum Detection	<0.00202	<0.00202	<0.00202	<0.00202	<15	<15	<15	<15	0	
Above Criteria	10			50				100	1000	

0 25 50 100 ft
SCALE 1:1,400



Site Schematic
Nighthawk 3H



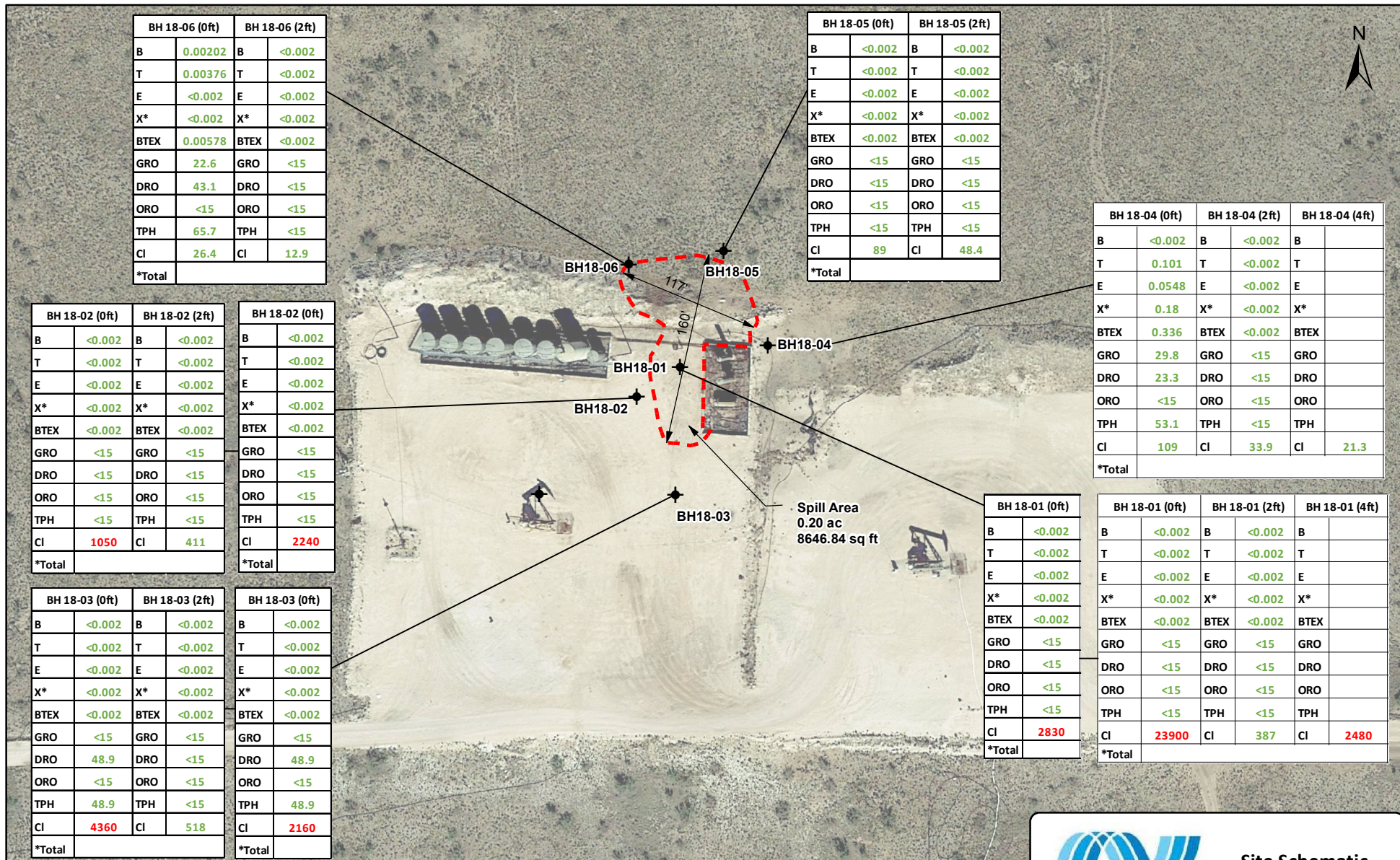
DRAWN: PS
APPROVED: DH
DATE: JUN 27/18

FIGURE:

1

VERSATILITY. EXPERTISE.

Notes: Aerial Image from Google Earth, 2017



Legend

- Borehole
- Spill Area

NMOCD Environmental Quality Guidelines (ppm or mg/kg) Site Ranking is 10									
B	T	E	BTEX	GRO	DRO	ORO	TPH	CI	
<0.00202	<0.00202	<0.00202	<0.00202	<15	<15	<15	<15	0	Minimum Detection
10			50					1000	Above Criteria

0 25 50 100 ft
SCALE 1:1,400



Site Schematic
Nighthawk 3H



DRAWN: JG
APPROVED: RF
DATE: JUL 24/18

FIGURE:
1

VERSATILITY. EXPERTISE.

Notes: Aerial Image from Google Earth, 2017

ATTACHMENT 3



New Mexico Office of the State Engineer

Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	POD Sub-Code	basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
L 02053	L	LE					20	18S	35E	642464	3622723*	727	175	78	97
L 04562	L	LE		3	1	29	18S	35E	641874	3621315*	983	156	95	61	
L 02357	L	LE		2	20	18S	35E	642855	3623137*	1166	170	77	93		
L 03171	L	LE		3	3	17	18S	35E	641835	3623734*	1881	170	150	20	
L 02679	L	LE		4	4	21	18S	35E	644680	3622151*	2109	200	68	132	
L 02679	R	L	LE	4	4	21	18S	35E	644680	3622151*	2109	200	68	132	
L 07928	L	LE		4	4	1	19	18S	35E	640639	3622915	2140	175		
L 02680	L	LE		1	2	21	18S	35E	644257	3623357*	2157	190	59	131	
L 09742	L	LE		1	4	17	18S	35E	642474	3624312	2310	200			
L 02052	L	LE					17	18S	35E	642438	3624337*	2336	190	72	118
L 09588	L	LE		4	3	4	16	18S	35E	644349	3623659*	2425	155	84	71
L 03772	L	LE		2	2	21	18S	35E	644659	3623361*	2485	130	60	70	
L 03888	L	LE		3	1	19	18S	35E	640253	3622912*	2493	107	70	37	
L 03866	L	LE		3	3	22	18S	35E	645082	3622155*	2510	127	65	62	
L 04399	L	LE		3	3	22	18S	35E	645082	3622155*	2510	90	75	15	
L 05156	L	LE		4	1	17	18S	35E	642224	3624545*	2564	150	90	60	
L 12926 POD1	L	LE		2	2	3	25	18S	34E	639839	3621631	2761	182	117	65
L 03721	L	LE		3	3	18	18S	35E	640241	3623717*	2895	161	90	71	
L 05810	L	LE		2	3	22	18S	35E	645479	3622564*	2956	145	95	50	
L 05444	L	LE		4	3	32	18S	35E	642319	3618899*	3115	80	58	22	
L 09762	L	LE		3	3	33	18S	35E	643526	3618913*	3233	160	80	80	
L 03783	L	LE					27	18S	35E	645710	3621138*	3251	115	65	50
L 02678	L	LE		3	4	22	18S	35E	645890	3622166*	3318	200	58	142	
L 02678	R	L	LE	3	4	22	18S	35E	645890	3622166*	3318	200	58	142	
L 02678 POD2	R	L	LE	3	4	22	18S	35E	645890	3622166*	3318	185	58	127	
L 02678 POD3	L	LE		3	4	22	18S	35E	645890	3622166*	3318	190	154	36	

*UTM location was derived from PLSS - see Help

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	POD Sub-Code	basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
L 03963	L	LE		1	2	27	18S	35E		645896	3621762*	3328	127	70	57
L 14371 POD1	L	LE		1	1	2	05	19S	35E	642616	3618661	3343	172	60	112
L 06047	L	LE		2	2	1	16	18S	35E	643927	3625066*	3346	122	65	57
L 00493	L	LE		1	2	1	05	19S	35E	642290	3618663	3353	100		
L 14200 POD1	L	LE		2	2	2	05	19S	35E	642952	3618666	3358	180	60	120
L 02676	L	LE		1	2	16	18S	35E		644231	3624972*	3398	175	60	115
L 14200 POD2	L	LE		2	2	2	05	19S	35E	643294	3618646	3433	180	60	120
L 02679 POD2	L	LE		3	2	22	18S	35E		645876	3622973*	3439	187	65	122
L 02350	L	LE		4	1	3	08	18S	35E	641897	3625650*	3708	216	105	111
L 02677	L	LE		3	4	15	18S	35E		645863	3623780*	3736	194	54	140
L 04794	L	LE			4	07	18S	35E		641200	3625540*	3794	150	95	55
L 02349 POD2	L	LE		4	1	4	07	18S	35E	641091	3625641*	3928	214	85	129
L 02349 POD3	L	LE		4	1	4	07	18S	35E	641091	3625641	3928	220	142	78
L 02348	L	LE		3	1	4	09	18S	35E	644116	3625679*	3984	215	105	110
L 10304	L	LE		1	4	4	09	18S	35E	644526	3625479*	3984	170	72	98
L 05178	L	LE		4	4	2	05	19S	35E	643185	3618063	3988	142	85	57
L 02349	R	L	LE	3	1	4	07	18S	35E	640891	3625641*	4008	207	85	122
L 09428	L	LE		3	4	1	05	19S	35E	642231	3617997*	4022	130		
L 09373	L	LE		3	1	1	26	18S	35E	646580	3621579	4026	120	60	60
L 05172	L	LE		3	3	07	18S	35E		640214	3625331*	4079	161	85	76
L 04906	L	LE			3	07	18S	35E		640415	3625532*	4136	155	87	68
L 07129	L	LE		4	3	3	34	18S	35E	645237	3618830*	4142	60	40	20
L 02675	L	LE		3	2	15	18S	35E		645850	3624587*	4170	197	47	150
L 01667	L	LE		1	1	4	05	19S	35E	642640	3617799*	4205	103	37	66
L 03887	L	LE		2	2	4	05	19S	35E	643242	3617804	4252	90	55	35
L 09347	L	LE		2	2	4	05	19S	35E	643242	3617804*	4252	94	55	39
L 06869	L	LE		1	3	26	18S	35E		646717	3620966*	4269	125	60	65
L 04975	L	LE		2	2	3	07	18S	35E	640688	3625837*	4272	152	105	47
L 09767	L	LE		3	3	13	18S	34E		638636	3623688*	4284	182	96	86

*UTM location was derived from PLSS - see Help

(A CLW##### in the
POD suffix indicates the
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(R=POD has
been replaced,
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(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	POD Sub-Code	basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
L 10613	L	LE		2	4	05	19S	35E		643143	3617705*	4336	100	100	0
L 11281	L	LE		4	2	4	05	19S	35E	643304	3617707	4358	102		
L 04931 X	L	LE		1	3	07	18S	35E		640208	3625735*	4418	212	105	107
L 04762	L	LE					06	19S	35E	640945	3617872*	4442	175	130	45
L 13988 POD1	L	LE		1	3	4	34	18S	35E	645839	3618945	4472	110	38	72
L 05220	L	LE		1	4	06	19S	35E		641131	3617681*	4558	100	55	45
L 02520	L	LE		4	1	23	18S	35E		647088	3622989*	4618	134	78	56
L 06868	L	LE		1	4	3	26	18S	35E	647026	3620666*	4646	110	57	53
L 04777	L	LE		1	2	2	07	18S	35E	641279	3626653*	4826	145	85	60
L 01614	L	LE		3	1	4	12	18S	34E	639305	3625618*	4874	204	85	119
L 04211	L	LE		1	3	06	19S	35E		640337	3617672*	4876	130	60	70
L 08973	L	LE		1	3	4	04	19S	35E	644257	3617416*	4886	140	95	45
L 09077	L	LE		2	3	4	04	19S	35E	644457	3617416*	4958	144	95	49
L 04778	L	LE		2	1	07	18S	35E		640575	3626545*	4962	150	75	75
L 04851	L	LE		4	2	12	18S	34E		639801	3626130*	4972	155	95	60

Average Depth to Water: **78 feet**

Minimum Depth: **37 feet**

Maximum Depth: **154 feet**

Record Count: 70

Basin/County Search:

Basin: Lea County

UTMNAD83 Radius Search (in meters):

Easting (X): 642575.91

Northing (Y): 3622004.27

Radius: 5000

*UTM location was derived from PLSS - see Help

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

ATTACHMENT 4



(acre ft per annum)

ACTIVE & INACTIVE POINTS OF DIVERSION

ATTACHMENT 5



Certificate of Analysis Summary 587900

Marathon Oil Company, Tulsa, OK

Project Name: Nighthawk #3H



Project Id:

Contact: Callie Karrigan

Project Location: Lea County, New Mexico

Date Received in Lab: Fri Jun-01-18 01:30 pm

Report Date: 15-JUN-18

Project Manager: Jessica Kramer

Analysis Requested	Lab Id:	587900-001	587900-002	587900-003	587900-004	587900-005	587900-006
	Field Id:	BH-18-01 Depth 0 ft	BH-18-01 Depth 2 ft	BH-18-01 Depth 4 ft	BH-18-02 Depth 0 ft	BH-18-02 Depth 2 ft	BH-18-03 Depth 0 ft
	Depth:						
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled:	May-30-18 00:00	May-30-18 00:00	May-30-18 00:00	May-30-18 00:00	May-30-18 00:00	May-30-18 00:00
BTEX by EPA 8021B	Extracted:	Jun-07-18 16:00	Jun-08-18 16:40		Jun-08-18 16:40	Jun-08-18 16:40	Jun-08-18 16:40
	Analyzed:	Jun-08-18 15:53	Jun-09-18 17:10		Jun-09-18 17:46	Jun-09-18 16:52	Jun-09-18 17:28
	Units/RL:	mg/kg RL	mg/kg RL		mg/kg RL	mg/kg RL	mg/kg RL
Benzene		<0.00199 0.00199	<0.00200 0.00200		<0.00200 0.00200	<0.00202 0.00202	<0.00199 0.00199
Toluene		<0.00199 0.00199	<0.00200 0.00200		<0.00200 0.00200	<0.00202 0.00202	<0.00199 0.00199
Ethylbenzene		<0.00199 0.00199	<0.00200 0.00200		<0.00200 0.00200	<0.00202 0.00202	<0.00199 0.00199
m,p-Xylenes		<0.00398 0.00398	<0.00401 0.00401		<0.00401 0.00401	<0.00403 0.00403	<0.00398 0.00398
o-Xylene		<0.00199 0.00199	<0.00200 0.00200		<0.00200 0.00200	<0.00202 0.00202	<0.00199 0.00199
Total Xylenes		<0.00199 0.00199	<0.00200 0.00200		<0.00200 0.00200	<0.00202 0.00202	<0.00199 0.00199
Total BTEX		<0.00199 0.00199	<0.00200 0.00200		<0.00200 0.00200	<0.00202 0.00202	<0.00199 0.00199
Chloride by EPA 300	Extracted:	Jun-06-18 09:00	Jun-06-18 09:00	Jun-06-18 17:45	Jun-06-18 17:45	Jun-06-18 17:45	Jun-06-18 17:45
	Analyzed:	Jun-06-18 15:20	Jun-06-18 15:25	Jun-06-18 22:35	Jun-06-18 22:08	Jun-06-18 22:40	Jun-06-18 22:56
	Units/RL:	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Chloride		23900 246	387 4.98	2480 24.8	1050 4.93	411 4.96	4360 50.0
TPH By SW8015 Mod	Extracted:	Jun-02-18 15:00	Jun-02-18 15:00		Jun-02-18 15:00	Jun-02-18 15:00	Jun-02-18 15:00
	Analyzed:	Jun-03-18 11:21	Jun-03-18 13:28		Jun-03-18 13:48	Jun-03-18 14:09	Jun-03-18 14:29
	Units/RL:	mg/kg RL	mg/kg RL		mg/kg RL	mg/kg RL	mg/kg RL
Gasoline Range Hydrocarbons (GRO)		<15.0 15.0	<15.0 15.0		<15.0 15.0	<15.0 15.0	<14.9 14.9
Diesel Range Organics (DRO)		<15.0 15.0	<15.0 15.0		<15.0 15.0	<15.0 15.0	48.9 14.9
Oil Range Hydrocarbons (ORO)		<15.0 15.0	<15.0 15.0		<15.0 15.0	<15.0 15.0	<14.9 14.9
Total TPH		<15.0 15.0	<15.0 15.0		<15.0 15.0	<15.0 15.0	48.9 14.9

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Jessica Kramer

Jessica Kramer
Project Assistant



Certificate of Analysis Summary 587900

Marathon Oil Company, Tulsa, OK

Project Name: Nighthawk #3H



Project Id:

Contact: Callie Karrigan

Project Location: Lea County, New Mexico

Date Received in Lab: Fri Jun-01-18 01:30 pm

Report Date: 15-JUN-18

Project Manager: Jessica Kramer

Analysis Requested	Lab Id:	587900-007		587900-008		587900-009		587900-010		587900-011		587900-012	
	Field Id:	BH-18-03 Depth 2 ft		BH-18-04 Depth 0 ft		BH-18-04 Depth 2 ft		BH-18-04 Depth 4 ft		BH-18-05 Depth 0 ft		BH-18-05 Depth 2 ft	
	Depth:												
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	Sampled:	May-30-18 00:00		May-30-18 00:00		May-30-18 00:00		May-30-18 00:00		May-30-18 11:40		May-30-18 11:45	
BTEX by EPA 8021B	Extracted:	Jun-08-18 16:30		Jun-07-18 16:00		Jun-07-18 16:00				Jun-07-18 12:00		Jun-07-18 16:00	
	Analyzed:	Jun-08-18 21:24		Jun-08-18 16:37		Jun-08-18 13:40				Jun-07-18 22:35		Jun-08-18 09:45	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL			mg/kg	RL	mg/kg	RL
Benzene		<0.00200	0.00200	<0.00201	0.00201	<0.00199	0.00199			<0.00201	0.00201	<0.00200	0.00200
Toluene		<0.00200	0.00200	0.101	0.00201	<0.00199	0.00199			<0.00201	0.00201	<0.00200	0.00200
Ethylbenzene		<0.00200	0.00200	0.0548	0.00201	<0.00199	0.00199			<0.00201	0.00201	<0.00200	0.00200
m,p-Xylenes		<0.00401	0.00401	0.137	0.00402	<0.00398	0.00398			<0.00402	0.00402	<0.00399	0.00399
o-Xylene		<0.00200	0.00200	0.0430	0.00201	<0.00199	0.00199			<0.00201	0.00201	<0.00200	0.00200
Total Xylenes		<0.00200	0.00200	0.180	0.00201	<0.00199	0.00199			<0.00201	0.00201	<0.00200	0.00200
Total BTEX		<0.00200	0.00200	0.336	0.00201	<0.00199	0.00199			<0.00201	0.00201	<0.00200	0.00200
Chloride by EPA 300	Extracted:	Jun-06-18 17:45		Jun-06-18 17:45		Jun-06-18 17:45		Jun-06-18 17:45		Jun-06-18 17:45		Jun-06-18 17:45	
	Analyzed:	Jun-06-18 23:02		Jun-06-18 23:07		Jun-06-18 23:12		Jun-07-18 12:23		Jun-06-18 23:23		Jun-06-18 23:39	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Chloride		518	4.91	109	4.96	33.9	4.99	21.3	4.97	89.0	4.99	48.4	4.97
TPH By SW8015 Mod	Extracted:	Jun-02-18 15:00		Jun-02-18 15:00		Jun-02-18 15:00				Jun-02-18 15:00		Jun-02-18 15:00	
	Analyzed:	Jun-03-18 14:50		Jun-03-18 15:11		Jun-03-18 15:31				Jun-03-18 15:52		Jun-03-18 16:12	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL			mg/kg	RL	mg/kg	RL
Gasoline Range Hydrocarbons (GRO)		<14.9	14.9	29.8	15.0	<15.0	15.0			<15.0	15.0	<15.0	15.0
Diesel Range Organics (DRO)		<14.9	14.9	23.3	15.0	<15.0	15.0			<15.0	15.0	<15.0	15.0
Oil Range Hydrocarbons (ORO)		<14.9	14.9	<15.0	15.0	<15.0	15.0			<15.0	15.0	<15.0	15.0
Total TPH		<14.9	14.9	53.1	15.0	<15.0	15.0			<15.0	15.0	<15.0	15.0

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Jessica Kramer

Jessica Kramer
Project Assistant



Certificate of Analysis Summary 587900

Marathon Oil Company, Tulsa, OK

Project Name: Nighthawk #3H



Project Id:

Contact: Callie Karrigan

Project Location: Lea County, New Mexico

Date Received in Lab: Fri Jun-01-18 01:30 pm

Report Date: 15-JUN-18

Project Manager: Jessica Kramer

Analysis Requested	Lab Id:	587900-013	587900-014				
	Field Id:	BH-18-06 Depth 0 ft	BH-18-06 Depth 2 ft				
	Depth:						
	Matrix:	SOIL	SOIL				
	Sampled:	May-30-18 12:00	May-30-18 12:05				
BTEX by EPA 8021B	Extracted:	Jun-07-18 16:00	Jun-08-18 16:40				
	Analyzed:	Jun-08-18 10:03	Jun-09-18 18:04				
	Units/RL:	mg/kg RL	mg/kg RL				
	Benzene	0.00202 0.00200	<0.00201 0.00201				
	Toluene	0.00376 0.00200	<0.00201 0.00201				
Ethylbenzene		<0.00200 0.00200	<0.00201 0.00201				
m,p-Xylenes		<0.00401 0.00401	<0.00402 0.00402				
o-Xylene		<0.00200 0.00200	<0.00201 0.00201				
Total Xylenes		<0.00200 0.00200	<0.00201 0.00201				
Total BTEX		0.00578 0.00200	<0.00201 0.00201				
Chloride by EPA 300	Extracted:	Jun-06-18 17:45	Jun-06-18 17:45				
	Analyzed:	Jun-06-18 23:45	Jun-07-18 00:01				
	Units/RL:	mg/kg RL	mg/kg RL				
	Chloride	26.4 5.00	12.9 4.97				
TPH By SW8015 Mod	Extracted:	Jun-02-18 15:00	Jun-02-18 15:00				
	Analyzed:	Jun-03-18 17:14	Jun-03-18 17:34				
	Units/RL:	mg/kg RL	mg/kg RL				
	Gasoline Range Hydrocarbons (GRO)	22.6 15.0	<15.0 15.0				
	Diesel Range Organics (DRO)	43.1 15.0	<15.0 15.0				
Oil Range Hydrocarbons (ORO)		<15.0 15.0	<15.0 15.0				
Total TPH		65.7 15.0	<15.0 15.0				

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Jessica Kramer

Jessica Kramer
Project Assistant

Analytical Report 587900

for Marathon Oil Company

Project Manager: Callie Karrigan

Nighthawk #3H

15-JUN-18

Collected By: Client



1211 W. Florida Ave, Midland TX 79701

Xenco-Houston (EPA Lab Code: TX00122):

Texas (T104704215-18-26), Arizona (AZ0765), Florida (E871002-24), Louisiana (03054)
Oklahoma (2017-142)

Xenco-Dallas (EPA Lab Code: TX01468):

Texas (T104704295-17-16), Arizona (AZ0809), Arkansas (17-063-0)

Xenco-El Paso (EPA Lab Code: TX00127): Texas (T104704221-17-12)

Xenco-Lubbock (EPA Lab Code: TX00139): Texas (T104704219-17-16)

Xenco-Odessa (EPA Lab Code: TX00158): Texas (T104704400-18-15)

Xenco-San Antonio (EPA Lab Code: TNI02385): Texas (T104704534-17-3)

Xenco Phoenix (EPA Lab Code: AZ00901): Arizona (AZ0757)

Xenco-Phoenix Mobile (EPA Lab Code: AZ00901): Arizona (AZM757)

Xenco-Atlanta (LELAP Lab ID #04176)

Xenco-Tampa: Florida (E87429)

Xenco-Lakeland: Florida (E84098)



15-JUN-18

Project Manager: **Callie Karrigan**

Marathon Oil Company

P. O. Box 22164

Tulsa, OK 74121-2164

Reference: XENCO Report No(s): **587900**

Nighthawk #3H

Project Address: Lea County, New Mexico

Callie Karrigan:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 587900. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 587900 will be filed for 45 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Jessica Kramer

Project Assistant

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Sample Cross Reference 587900



Marathon Oil Company, Tulsa, OK

Nighthawk #3H

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
BH-18-01 Depth 0 ft	S	05-30-18 00:00		587900-001
BH-18-01 Depth 2 ft	S	05-30-18 00:00		587900-002
BH-18-01 Depth 4 ft	S	05-30-18 00:00		587900-003
BH-18-02 Depth 0 ft	S	05-30-18 00:00		587900-004
BH-18-02 Depth 2 ft	S	05-30-18 00:00		587900-005
BH-18-03 Depth 0 ft	S	05-30-18 00:00		587900-006
BH-18-03 Depth 2 ft	S	05-30-18 00:00		587900-007
BH-18-04 Depth 0 ft	S	05-30-18 00:00		587900-008
BH-18-04 Depth 2 ft	S	05-30-18 00:00		587900-009
BH-18-04 Depth 4 ft	S	05-30-18 00:00		587900-010
BH-18-05 Depth 0 ft	S	05-30-18 11:40		587900-011
BH-18-05 Depth 2 ft	S	05-30-18 11:45		587900-012
BH-18-06 Depth 0 ft	S	05-30-18 12:00		587900-013
BH-18-06 Depth 2 ft	S	05-30-18 12:05		587900-014



CASE NARRATIVE

Client Name: Marathon Oil Company

Project Name: Nighthawk #3H

Project ID:
Work Order Number(s): 587900

Report Date: 15-JUN-18
Date Received: 06/01/2018

Sample receipt non conformances and comments:

None

Sample receipt non conformances and comments per sample:

None

Analytical non conformances and comments:

Batch: LBA-3052588 Inorganic Anions by EPA 300

Lab Sample ID 587900-011 was randomly selected for Matrix Spike/Matrix Spike Duplicate (MS/MSD). Chloride recovered below QC limits in the Matrix Spike Duplicate. Outlier/s are due to possible matrix interference. Samples in the analytical batch are: 587900-003, -004, -005, -006, -007, -008, -009, -010, -011, -012, -013, -014.

The Laboratory Control Sample for Chloride is within laboratory Control Limits, therefore the data was accepted.

Batch: LBA-3052795 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3052812 BTEX by EPA 8021B

Ethylbenzene, m,p-Xylenes, o-Xylene Relative Percent Difference (RPD) between matrix spike and duplicate were above quality control limits.

Samples in the analytical batch are: 587900-001, -008, -009, -012, -013

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Lab Sample ID 587900-012 was randomly selected for Matrix Spike/Matrix Spike Duplicate (MS/MSD). Benzene, Ethylbenzene, Toluene, m,p-Xylenes, o-Xylene recovered below QC limits in the Matrix Spike and Matrix Spike Duplicate. Outlier/s are due to possible matrix interference. Samples in the analytical batch are: 587900-001, -008, -009, -012, -013.

The Laboratory Control Sample for Toluene, Benzene, m,p-Xylenes, Ethylbenzene, o-Xylene is within laboratory Control Limits, therefore the data was accepted.

Batch: LBA-3052863 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3052930 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-01 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-001

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 09.00

Basis: Wet Weight

Seq Number: 3052575

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	23900	246	mg/kg	06.06.18 15.20		50

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	06.03.18 11.21	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	06.03.18 11.21	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 11.21	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	06.03.18 11.21	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	86	%	70-135	06.03.18 11.21		
o-Terphenyl	84-15-1	93	%	70-135	06.03.18 11.21		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-01 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-001

Date Collected: 05.30.18 00.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.07.18 16.00

Basis: Wet Weight

Seq Number: 3052812

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00199	0.00199	mg/kg	06.08.18 15.53	U	1
Toluene	108-88-3	<0.00199	0.00199	mg/kg	06.08.18 15.53	U	1
Ethylbenzene	100-41-4	<0.00199	0.00199	mg/kg	06.08.18 15.53	U	1
m,p-Xylenes	179601-23-1	<0.00398	0.00398	mg/kg	06.08.18 15.53	U	1
o-Xylene	95-47-6	<0.00199	0.00199	mg/kg	06.08.18 15.53	U	1
Total Xylenes	1330-20-7	<0.00199	0.00199	mg/kg	06.08.18 15.53	U	1
Total BTEX		<0.00199	0.00199	mg/kg	06.08.18 15.53	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	128	%	70-130	06.08.18 15.53		
1,4-Difluorobenzene	540-36-3	99	%	70-130	06.08.18 15.53		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK

Nighthawk #3H

Sample Id: **BH-18-01 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-002

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 09.00

Basis: Wet Weight

Seq Number: 3052575

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	387	4.98	mg/kg	06.06.18 15.25		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	06.03.18 13.28	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	06.03.18 13.28	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 13.28	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	06.03.18 13.28	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	105	%	70-135	06.03.18 13.28	
o-Terphenyl	84-15-1	111	%	70-135	06.03.18 13.28	



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-01 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-002

Date Collected: 05.30.18 00.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.08.18 16.40

Basis: Wet Weight

Seq Number: 3052930

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	06.09.18 17.10	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	06.09.18 17.10	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	06.09.18 17.10	U	1
m,p-Xylenes	179601-23-1	<0.00401	0.00401	mg/kg	06.09.18 17.10	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	06.09.18 17.10	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	06.09.18 17.10	U	1
Total BTEX		<0.00200	0.00200	mg/kg	06.09.18 17.10	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	83	%	70-130	06.09.18 17.10		
4-Bromofluorobenzene	460-00-4	86	%	70-130	06.09.18 17.10		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-01 Depth 4 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-003

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	2480	24.8	mg/kg	06.06.18 22.35		5



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-02 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-004

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	1050	4.93	mg/kg	06.06.18 22.08		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	06.03.18 13.48	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	06.03.18 13.48	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 13.48	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	06.03.18 13.48	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	91	%	70-135	06.03.18 13.48		
o-Terphenyl	84-15-1	95	%	70-135	06.03.18 13.48		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-02 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-004

Date Collected: 05.30.18 00.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.08.18 16.40

Basis: Wet Weight

Seq Number: 3052930

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	06.09.18 17.46	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	06.09.18 17.46	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	06.09.18 17.46	U	1
m,p-Xylenes	179601-23-1	<0.00401	0.00401	mg/kg	06.09.18 17.46	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	06.09.18 17.46	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	06.09.18 17.46	U	1
Total BTEX		<0.00200	0.00200	mg/kg	06.09.18 17.46	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	96	%	70-130	06.09.18 17.46		
4-Bromofluorobenzene	460-00-4	97	%	70-130	06.09.18 17.46		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-02 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-005

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	411	4.96	mg/kg	06.06.18 22.40		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	06.03.18 14.09	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	06.03.18 14.09	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 14.09	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	06.03.18 14.09	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	94	%	70-135	06.03.18 14.09		
o-Terphenyl	84-15-1	100	%	70-135	06.03.18 14.09		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-02 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-005

Date Collected: 05.30.18 00.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.08.18 16.40

Basis: Wet Weight

Seq Number: 3052930

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00202	0.00202	mg/kg	06.09.18 16.52	U	1
Toluene	108-88-3	<0.00202	0.00202	mg/kg	06.09.18 16.52	U	1
Ethylbenzene	100-41-4	<0.00202	0.00202	mg/kg	06.09.18 16.52	U	1
m,p-Xylenes	179601-23-1	<0.00403	0.00403	mg/kg	06.09.18 16.52	U	1
o-Xylene	95-47-6	<0.00202	0.00202	mg/kg	06.09.18 16.52	U	1
Total Xylenes	1330-20-7	<0.00202	0.00202	mg/kg	06.09.18 16.52	U	1
Total BTEX		<0.00202	0.00202	mg/kg	06.09.18 16.52	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	115	%	70-130	06.09.18 16.52		
1,4-Difluorobenzene	540-36-3	107	%	70-130	06.09.18 16.52		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-03 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-006

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	4360	50.0	mg/kg	06.06.18 22.56		10

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<14.9	14.9	mg/kg	06.03.18 14.29	U	1
Diesel Range Organics (DRO)	C10C28DRO	48.9	14.9	mg/kg	06.03.18 14.29		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<14.9	14.9	mg/kg	06.03.18 14.29	U	1
Total TPH	PHC635	48.9	14.9	mg/kg	06.03.18 14.29		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	98	%	70-135	06.03.18 14.29	
o-Terphenyl	84-15-1	101	%	70-135	06.03.18 14.29	



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-03 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-006

Date Collected: 05.30.18 00.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.08.18 16.40

Basis: Wet Weight

Seq Number: 3052930

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00199	0.00199	mg/kg	06.09.18 17.28	U	1
Toluene	108-88-3	<0.00199	0.00199	mg/kg	06.09.18 17.28	U	1
Ethylbenzene	100-41-4	<0.00199	0.00199	mg/kg	06.09.18 17.28	U	1
m,p-Xylenes	179601-23-1	<0.00398	0.00398	mg/kg	06.09.18 17.28	U	1
o-Xylene	95-47-6	<0.00199	0.00199	mg/kg	06.09.18 17.28	U	1
Total Xylenes	1330-20-7	<0.00199	0.00199	mg/kg	06.09.18 17.28	U	1
Total BTEX		<0.00199	0.00199	mg/kg	06.09.18 17.28	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	97	%	70-130	06.09.18 17.28		
4-Bromofluorobenzene	460-00-4	106	%	70-130	06.09.18 17.28		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-03 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-007

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	518	4.91	mg/kg	06.06.18 23.02		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<14.9	14.9	mg/kg	06.03.18 14.50	U	1
Diesel Range Organics (DRO)	C10C28DRO	<14.9	14.9	mg/kg	06.03.18 14.50	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<14.9	14.9	mg/kg	06.03.18 14.50	U	1
Total TPH	PHC635	<14.9	14.9	mg/kg	06.03.18 14.50	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	95	%	70-135	06.03.18 14.50		
o-Terphenyl	84-15-1	99	%	70-135	06.03.18 14.50		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-03 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-007

Date Collected: 05.30.18 00.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.08.18 16.30

Basis: Wet Weight

Seq Number: 3052863

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	06.08.18 21.24	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	06.08.18 21.24	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	06.08.18 21.24	U	1
m,p-Xylenes	179601-23-1	<0.00401	0.00401	mg/kg	06.08.18 21.24	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	06.08.18 21.24	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	06.08.18 21.24	U	1
Total BTEX		<0.00200	0.00200	mg/kg	06.08.18 21.24	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	105	%	70-130	06.08.18 21.24		
1,4-Difluorobenzene	540-36-3	88	%	70-130	06.08.18 21.24		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-04 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-008

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	109	4.96	mg/kg	06.06.18 23.07		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	29.8	15.0	mg/kg	06.03.18 15.11		1
Diesel Range Organics (DRO)	C10C28DRO	23.3	15.0	mg/kg	06.03.18 15.11		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 15.11	U	1
Total TPH	PHC635	53.1	15.0	mg/kg	06.03.18 15.11		1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	99	%	70-135	06.03.18 15.11		
o-Terphenyl	84-15-1	95	%	70-135	06.03.18 15.11		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-04 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-008

Date Collected: 05.30.18 00.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.07.18 16.00

Basis: Wet Weight

Seq Number: 3052812

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00201	0.00201	mg/kg	06.08.18 16.37	U	1
Toluene	108-88-3	0.101	0.00201	mg/kg	06.08.18 16.37		1
Ethylbenzene	100-41-4	0.0548	0.00201	mg/kg	06.08.18 16.37		1
m,p-Xylenes	179601-23-1	0.137	0.00402	mg/kg	06.08.18 16.37		1
o-Xylene	95-47-6	0.0430	0.00201	mg/kg	06.08.18 16.37		1
Total Xylenes	1330-20-7	0.180	0.00201	mg/kg	06.08.18 16.37		1
Total BTEX		0.336	0.00201	mg/kg	06.08.18 16.37		1
Surrogate	Cas Number	% Recovery		Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	84		%	70-130	06.08.18 16.37	
1,4-Difluorobenzene	540-36-3	83		%	70-130	06.08.18 16.37	



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-04 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-009

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	33.9	4.99	mg/kg	06.06.18 23.12		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	06.03.18 15.31	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	06.03.18 15.31	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 15.31	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	06.03.18 15.31	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	92	%	70-135	06.03.18 15.31		
o-Terphenyl	84-15-1	96	%	70-135	06.03.18 15.31		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-04 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-009

Date Collected: 05.30.18 00.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.07.18 16.00

Basis: Wet Weight

Seq Number: 3052812

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00199	0.00199	mg/kg	06.08.18 13.40	U	1
Toluene	108-88-3	<0.00199	0.00199	mg/kg	06.08.18 13.40	U	1
Ethylbenzene	100-41-4	<0.00199	0.00199	mg/kg	06.08.18 13.40	U	1
m,p-Xylenes	179601-23-1	<0.00398	0.00398	mg/kg	06.08.18 13.40	U	1
o-Xylene	95-47-6	<0.00199	0.00199	mg/kg	06.08.18 13.40	U	1
Total Xylenes	1330-20-7	<0.00199	0.00199	mg/kg	06.08.18 13.40	U	1
Total BTEX		<0.00199	0.00199	mg/kg	06.08.18 13.40	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	98	%	70-130	06.08.18 13.40		
4-Bromofluorobenzene	460-00-4	103	%	70-130	06.08.18 13.40		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK

Nighthawk #3H

Sample Id: **BH-18-04 Depth 4 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-010

Date Collected: 05.30.18 00.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	21.3	4.97	mg/kg	06.07.18 12.23		1



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-05 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-011

Date Collected: 05.30.18 11.40

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	89.0	4.99	mg/kg	06.06.18 23.23		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	06.03.18 15.52	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	06.03.18 15.52	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 15.52	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	06.03.18 15.52	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	94	%	70-135	06.03.18 15.52		
o-Terphenyl	84-15-1	98	%	70-135	06.03.18 15.52		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-05 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-011

Date Collected: 05.30.18 11.40

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.07.18 12.00

Basis: Wet Weight

Seq Number: 3052795

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00201	0.00201	mg/kg	06.07.18 22.35	U	1
Toluene	108-88-3	<0.00201	0.00201	mg/kg	06.07.18 22.35	U	1
Ethylbenzene	100-41-4	<0.00201	0.00201	mg/kg	06.07.18 22.35	U	1
m,p-Xylenes	179601-23-1	<0.00402	0.00402	mg/kg	06.07.18 22.35	U	1
o-Xylene	95-47-6	<0.00201	0.00201	mg/kg	06.07.18 22.35	U	1
Total Xylenes	1330-20-7	<0.00201	0.00201	mg/kg	06.07.18 22.35	U	1
Total BTEX		<0.00201	0.00201	mg/kg	06.07.18 22.35	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	95	%	70-130	06.07.18 22.35		
1,4-Difluorobenzene	540-36-3	108	%	70-130	06.07.18 22.35		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-05 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-012

Date Collected: 05.30.18 11.45

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	48.4	4.97	mg/kg	06.06.18 23.39		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	06.03.18 16.12	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	06.03.18 16.12	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 16.12	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	06.03.18 16.12	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	104	%	70-135	06.03.18 16.12		
o-Terphenyl	84-15-1	110	%	70-135	06.03.18 16.12		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-05 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-012

Date Collected: 05.30.18 11.45

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.07.18 16.00

Basis: Wet Weight

Seq Number: 3052812

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	06.08.18 09.45	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	06.08.18 09.45	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	06.08.18 09.45	U	1
m,p-Xylenes	179601-23-1	<0.00399	0.00399	mg/kg	06.08.18 09.45	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	06.08.18 09.45	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	06.08.18 09.45	U	1
Total BTEX		<0.00200	0.00200	mg/kg	06.08.18 09.45	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	99	%	70-130	06.08.18 09.45		
1,4-Difluorobenzene	540-36-3	103	%	70-130	06.08.18 09.45		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-06 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-013

Date Collected: 05.30.18 12.00

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	26.4	5.00	mg/kg	06.06.18 23.45		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	22.6	15.0	mg/kg	06.03.18 17.14		1
Diesel Range Organics (DRO)	C10C28DRO	43.1	15.0	mg/kg	06.03.18 17.14		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 17.14	U	1
Total TPH	PHC635	65.7	15.0	mg/kg	06.03.18 17.14		1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	90	%	70-135	06.03.18 17.14		
o-Terphenyl	84-15-1	89	%	70-135	06.03.18 17.14		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-06 Depth 0 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-013

Date Collected: 05.30.18 12.00

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.07.18 16.00

Basis: Wet Weight

Seq Number: 3052812

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	0.00202	0.00200	mg/kg	06.08.18 10.03		1
Toluene	108-88-3	0.00376	0.00200	mg/kg	06.08.18 10.03		1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	06.08.18 10.03	U	1
m,p-Xylenes	179601-23-1	<0.00401	0.00401	mg/kg	06.08.18 10.03	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	06.08.18 10.03	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	06.08.18 10.03	U	1
Total BTEX		0.00578	0.00200	mg/kg	06.08.18 10.03		1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	99	%	70-130	06.08.18 10.03		
1,4-Difluorobenzene	540-36-3	97	%	70-130	06.08.18 10.03		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-06 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-014

Date Collected: 05.30.18 12.05

Analytical Method: Chloride by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 06.06.18 17.45

Basis: Wet Weight

Seq Number: 3052588

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	12.9	4.97	mg/kg	06.07.18 00.01		1

Analytical Method: TPH By SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 06.02.18 15.00

Basis: Wet Weight

Seq Number: 3052160

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	06.03.18 17.34	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	06.03.18 17.34	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	06.03.18 17.34	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	06.03.18 17.34	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	88	%	70-135	06.03.18 17.34		
o-Terphenyl	84-15-1	92	%	70-135	06.03.18 17.34		



Certificate of Analytical Results 587900



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH-18-06 Depth 2 ft**

Matrix: Soil

Date Received: 06.01.18 13.30

Lab Sample Id: 587900-014

Date Collected: 05.30.18 12.05

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 06.08.18 16.40

Basis: Wet Weight

Seq Number: 3052930

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00201	0.00201	mg/kg	06.09.18 18.04	U	1
Toluene	108-88-3	<0.00201	0.00201	mg/kg	06.09.18 18.04	U	1
Ethylbenzene	100-41-4	<0.00201	0.00201	mg/kg	06.09.18 18.04	U	1
m,p-Xylenes	179601-23-1	<0.00402	0.00402	mg/kg	06.09.18 18.04	U	1
o-Xylene	95-47-6	<0.00201	0.00201	mg/kg	06.09.18 18.04	U	1
Total Xylenes	1330-20-7	<0.00201	0.00201	mg/kg	06.09.18 18.04	U	1
Total BTEX		<0.00201	0.00201	mg/kg	06.09.18 18.04	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	101	%	70-130	06.09.18 18.04		
1,4-Difluorobenzene	540-36-3	95	%	70-130	06.09.18 18.04		

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the quantitation limit and above the detection limit.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

SMP Client Sample **BLK** Method Blank

BKS/LCS Blank Spike/Laboratory Control Sample **BKSD/LCSD** Blank Spike Duplicate/Laboratory Control Sample Duplicate

MD/SD Method Duplicate/Sample Duplicate **MS** Matrix Spike **MSD:** Matrix Spike Duplicate

+ NELAC certification not offered for this compound.

* (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

Marathon Oil Company
Nighthawk #3H

Analytical Method: Chloride by EPA 300

Seq Number: 3052575

MB Sample Id: 7656087-1-BLK

Matrix: Solid

LCS Sample Id: 7656087-1-BKS

Prep Method: E300P

Date Prep: 06.06.18

LCSD Sample Id: 7656087-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<5.00	250	274	110	274	110	90-110	0	20	mg/kg	06.06.18 12:49	

Analytical Method: Chloride by EPA 300

Seq Number: 3052588

MB Sample Id: 7656154-1-BLK

Matrix: Solid

LCS Sample Id: 7656154-1-BKS

Prep Method: E300P

Date Prep: 06.06.18

LCSD Sample Id: 7656154-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<5.00	250	267	107	265	106	90-110	1	20	mg/kg	06.06.18 21:57	

Analytical Method: Chloride by EPA 300

Seq Number: 3052575

Parent Sample Id: 587892-007

Matrix: Soil

MS Sample Id: 587892-007 S

Prep Method: E300P

Date Prep: 06.06.18

MSD Sample Id: 587892-007 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	15.3	247	298	114	291	112	90-110	2	20	mg/kg	06.06.18 13:05	X

Analytical Method: Chloride by EPA 300

Seq Number: 3052575

Parent Sample Id: 587892-017

Matrix: Soil

MS Sample Id: 587892-017 S

Prep Method: E300P

Date Prep: 06.06.18

MSD Sample Id: 587892-017 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<4.91	246	228	93	232	94	90-110	2	20	mg/kg	06.06.18 14:21	

Analytical Method: Chloride by EPA 300

Seq Number: 3052588

Parent Sample Id: 587900-004

Matrix: Soil

MS Sample Id: 587900-004 S

Prep Method: E300P

Date Prep: 06.06.18

MSD Sample Id: 587900-004 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	1050	247	1290	97	1270	89	90-110	2	20	mg/kg	06.06.18 22:13	X

MS/MSD Percent Recovery
Relative Percent Difference
LCS/LCSD Recovery
Log Difference $[D] = 100 * (C - A) / B$
 $RPD = 200 * |(C - E) / (C + E)|$
 $[D] = 100 * (C) / [B]$
Log Diff. = Log(Sample Duplicate) - Log(Original Sample)LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD ResultMS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec



QC Summary 587900

Marathon Oil Company Nighthawk #3H

Analytical Method: Chloride by EPA 300

Seq Number: 3052588

Parent Sample Id: 587900-011

Matrix: Soil

MS Sample Id: 587900-011 S

Prep Method: E300P

Date Prep: 06.06.18

MSD Sample Id: 587900-011 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	89.0	250	359	108	365	110	90-110	2	20	mg/kg	06.06.18 23:29	

Analytical Method: TPH By SW8015 Mod

Seq Number: 3052160

MB Sample Id: 7655909-1-BLK

Matrix: Solid

LCS Sample Id: 7655909-1-BKS

Prep Method: TX1005P

Date Prep: 06.02.18

LCSD Sample Id: 7655909-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Gasoline Range Hydrocarbons (GRO)	<15.0	1000	918	92	931	93	70-135	1	20	mg/kg	06.03.18 10:40	
Diesel Range Organics (DRO)	<15.0	1000	964	96	987	99	70-135	2	20	mg/kg	06.03.18 10:40	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	99		122		119		70-135	%	06.03.18 10:40
o-Terphenyl	105		114		118		70-135	%	06.03.18 10:40

Analytical Method: TPH By SW8015 Mod

Seq Number: 3052160

Parent Sample Id: 587900-001

Matrix: Soil

MS Sample Id: 587900-001 S

Prep Method: TX1005P

Date Prep: 06.02.18

MSD Sample Id: 587900-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Gasoline Range Hydrocarbons (GRO)	<15.0	998	895	90	924	93	70-135	3	20	mg/kg	06.03.18 12:48	
Diesel Range Organics (DRO)	<15.0	998	992	99	1010	101	70-135	2	20	mg/kg	06.03.18 12:48	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	113		114		70-135	%	06.03.18 12:48
o-Terphenyl	102		105		70-135	%	06.03.18 12:48

MS/MSD Percent Recovery
Relative Percent Difference
LCS/LCSD Recovery
Log Difference

$[D] = 100 * (C - A) / B$
 $RPD = 200 * |(C - E) / (C + E)|$
 $[D] = 100 * (C) / [B]$
 $\text{Log Diff.} = \text{Log}(\text{Sample Duplicate}) - \text{Log}(\text{Original Sample})$

LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD Result

MS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec

Marathon Oil Company
Nighthawk #3H

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052795

MB Sample Id: 7656286-1-BLK

Matrix: Solid

LCS Sample Id: 7656286-1-BKS

Prep Method: SW5030B

Date Prep: 06.07.18

LCSD Sample Id: 7656286-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00200	0.100	0.0915	92	0.0903	91	70-130	1	35	mg/kg	06.07.18 18:04	
Toluene	<0.00200	0.100	0.0987	99	0.0948	95	70-130	4	35	mg/kg	06.07.18 18:04	
Ethylbenzene	<0.00200	0.100	0.0962	96	0.0946	95	70-130	2	35	mg/kg	06.07.18 18:04	
m,p-Xylenes	<0.00401	0.200	0.201	101	0.197	99	70-130	2	35	mg/kg	06.07.18 18:04	
o-Xylene	<0.00200	0.100	0.0943	94	0.0907	91	70-130	4	35	mg/kg	06.07.18 18:04	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	97		97		103		70-130	%	06.07.18 18:04
4-Bromofluorobenzene	97		100		102		70-130	%	06.07.18 18:04

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052812

MB Sample Id: 7656308-1-BLK

Matrix: Solid

LCS Sample Id: 7656308-1-BKS

Prep Method: SW5030B

Date Prep: 06.07.18

LCSD Sample Id: 7656308-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00200	0.100	0.0782	78	0.0826	83	70-130	5	35	mg/kg	06.08.18 02:47	
Toluene	<0.00200	0.100	0.0810	81	0.0878	88	70-130	8	35	mg/kg	06.08.18 02:47	
Ethylbenzene	<0.00200	0.100	0.0813	81	0.0859	86	70-130	6	35	mg/kg	06.08.18 02:47	
m,p-Xylenes	<0.00401	0.200	0.168	84	0.179	90	70-130	6	35	mg/kg	06.08.18 02:47	
o-Xylene	<0.00200	0.100	0.0805	81	0.0861	86	70-130	7	35	mg/kg	06.08.18 02:47	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	95		103		93		70-130	%	06.08.18 02:47
4-Bromofluorobenzene	98		84		87		70-130	%	06.08.18 02:47

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052863

MB Sample Id: 7656325-1-BLK

Matrix: Solid

LCS Sample Id: 7656325-1-BKS

Prep Method: SW5030B

Date Prep: 06.08.18

LCSD Sample Id: 7656325-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00202	0.101	0.0941	93	0.0936	94	70-130	1	35	mg/kg	06.08.18 18:07	
Toluene	<0.00202	0.101	0.0986	98	0.0970	97	70-130	2	35	mg/kg	06.08.18 18:07	
Ethylbenzene	<0.00202	0.101	0.0962	95	0.0990	99	70-130	3	35	mg/kg	06.08.18 18:07	
m,p-Xylenes	<0.00403	0.202	0.201	100	0.206	102	70-130	2	35	mg/kg	06.08.18 18:07	
o-Xylene	<0.00202	0.101	0.100	99	0.0989	99	70-130	1	35	mg/kg	06.08.18 18:07	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	94		94		104		70-130	%	06.08.18 18:07
4-Bromofluorobenzene	95		91		102		70-130	%	06.08.18 18:07

MS/MSD Percent Recovery
Relative Percent Difference
LCS/LCSD Recovery
Log Difference $[D] = 100 * (C - A) / B$
 $RPD = 200 * |(C - E) / (C + E)|$
 $[D] = 100 * (C) / [B]$
 $\text{Log Diff.} = \text{Log}(\text{Sample Duplicate}) - \text{Log}(\text{Original Sample})$ LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD ResultMS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec

Marathon Oil Company
Nighthawk #3H

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052930

MB Sample Id: 7656351-1-BLK

Matrix: Solid

LCS Sample Id: 7656351-1-BKS

Prep Method: SW5030B

Date Prep: 06.08.18

LCSD Sample Id: 7656351-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00200	0.100	0.0836	84	0.0828	82	70-130	1	35	mg/kg	06.09.18 09:58	
Toluene	<0.00200	0.100	0.0876	88	0.0895	89	70-130	2	35	mg/kg	06.09.18 09:58	
Ethylbenzene	<0.00200	0.100	0.0863	86	0.0863	85	70-130	0	35	mg/kg	06.09.18 09:58	
m,p-Xylenes	<0.00401	0.200	0.179	90	0.179	89	70-130	0	35	mg/kg	06.09.18 09:58	
o-Xylene	<0.00200	0.100	0.0870	87	0.0844	84	70-130	3	35	mg/kg	06.09.18 09:58	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	91		101		101		70-130	%	06.09.18 09:58
4-Bromofluorobenzene	96		95		97		70-130	%	06.09.18 09:58

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052795

Parent Sample Id: 587962-001

Matrix: Soil

MS Sample Id: 587962-001 S

Prep Method: SW5030B

Date Prep: 06.07.18

MSD Sample Id: 587962-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00201	0.100	0.0530	53	0.0655	66	70-130	21	35	mg/kg	06.07.18 18:40	X
Toluene	<0.00201	0.100	0.0530	53	0.0685	69	70-130	26	35	mg/kg	06.07.18 18:40	X
Ethylbenzene	<0.00201	0.100	0.0516	52	0.0662	66	70-130	25	35	mg/kg	06.07.18 18:40	X
m,p-Xylenes	<0.00402	0.201	0.107	53	0.138	69	70-130	25	35	mg/kg	06.07.18 18:40	X
o-Xylene	<0.00201	0.100	0.0512	51	0.0662	66	70-130	26	35	mg/kg	06.07.18 18:40	X

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	101		95		70-130	%	06.07.18 18:40
4-Bromofluorobenzene	105		100		70-130	%	06.07.18 18:40

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052812

Parent Sample Id: 587900-012

Matrix: Soil

MS Sample Id: 587900-012 S

Prep Method: SW5030B

Date Prep: 06.07.18

MSD Sample Id: 587900-012 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00200	0.0998	0.0497	50	0.0459	45	70-130	8	35	mg/kg	06.08.18 08:25	X
Toluene	<0.00200	0.0998	0.0468	47	0.0374	37	70-130	22	35	mg/kg	06.08.18 08:25	X
Ethylbenzene	<0.00200	0.0998	0.0386	39	0.0243	24	70-130	45	35	mg/kg	06.08.18 08:25	XF
m,p-Xylenes	<0.00399	0.200	0.0787	39	0.0476	24	70-130	49	35	mg/kg	06.08.18 08:25	XF
o-Xylene	<0.00200	0.0998	0.0412	41	0.0245	24	70-130	51	35	mg/kg	06.08.18 08:25	XF

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	93		97		70-130	%	06.08.18 08:25
4-Bromofluorobenzene	95		104		70-130	%	06.08.18 08:25

MS/MSD Percent Recovery
Relative Percent Difference
LCS/LCSD Recovery
Log Difference $[D] = 100 * (C - A) / B$
 $RPD = 200 * |(C - E) / (C + E)|$
 $[D] = 100 * (C) / [B]$
 $\text{Log Diff.} = \text{Log}(\text{Sample Duplicate}) - \text{Log}(\text{Original Sample})$ LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD ResultMS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec

Marathon Oil Company
Nighthawk #3H

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052863

Parent Sample Id: 588647-001

Matrix: Soil

MS Sample Id: 588647-001 S

Prep Method: SW5030B

Date Prep: 06.08.18

MSD Sample Id: 588647-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00199	0.0996	0.0710	71	0.0672	67	70-130	5	35	mg/kg	06.08.18 18:43	X
Toluene	<0.00199	0.0996	0.0749	75	0.0721	71	70-130	4	35	mg/kg	06.08.18 18:43	
Ethylbenzene	<0.00199	0.0996	0.0736	74	0.0700	69	70-130	5	35	mg/kg	06.08.18 18:43	X
m,p-Xylenes	<0.00398	0.199	0.154	77	0.146	73	70-130	5	35	mg/kg	06.08.18 18:43	
o-Xylene	<0.00199	0.0996	0.0815	82	0.0704	70	70-130	15	35	mg/kg	06.08.18 18:43	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	99		105		70-130	%	06.08.18 18:43
4-Bromofluorobenzene	103		108		70-130	%	06.08.18 18:43

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052930

Parent Sample Id: 588112-001

Matrix: Soil

MS Sample Id: 588112-001 S

Prep Method: SW5030B

Date Prep: 06.08.18

MSD Sample Id: 588112-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00200	0.0998	0.0565	57	0.0447	45	70-130	23	35	mg/kg	06.09.18 10:35	X
Toluene	<0.00200	0.0998	0.0558	56	0.0496	50	70-130	12	35	mg/kg	06.09.18 10:35	X
Ethylbenzene	<0.00200	0.0998	0.0483	48	0.0461	46	70-130	5	35	mg/kg	06.09.18 10:35	X
m,p-Xylenes	<0.00399	0.200	0.0960	48	0.0949	47	70-130	1	35	mg/kg	06.09.18 10:35	X
o-Xylene	<0.00200	0.0998	0.0537	54	0.0469	47	70-130	14	35	mg/kg	06.09.18 10:35	X

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	108		92		70-130	%	06.09.18 10:35
4-Bromofluorobenzene	104		96		70-130	%	06.09.18 10:35

MS/MSD Percent Recovery
Relative Percent Difference
LCS/LCSD Recovery
Log Difference $[D] = 100 * (C - A) / B$
 $RPD = 200 * |(C - E) / (C + E)|$
 $[D] = 100 * (C) / [B]$
Log Diff. = Log(Sample Duplicate) - Log(Original Sample)LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD ResultMS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec

Analysis Request of Chain of Custody Record

587900

ANALYSIS REQUEST

(Circle or Specify Method No.)

Client Name:		Marathon Oil		Site Manager:	
Project Name:		Nighthawk #3H			
Project Location:		Lea County, New Mexico		Project #:	
(county, state)					
Invoice to:		Calle Karigan at Marathon Oil Permian LLC			
		5555 San Felipe St., Houston, TX 77056			
Receiving Laboratory:		Midland, TX		Sampler Signature:	
Comments:					

LAB # (LAB USE ONLY)	SAMPLE IDENTIFICATION	SAMPLING		MATRIX		PRESERVATIVE METHOD				# CONTAINERS	FILTERED (Y/N)	LAB USE ONLY	REMARKS:	
		YEAR: 2018		WATER	SOIL	HCL	HNO ₃	ICE						
		DATE	TIME											
	BH18-01 Depth 0 ft	05/30/2018		X				X			2		X	
	BH18-01 Depth 2 ft	05/30/2018		X				X			2		X	
	BH18-01 Depth 4 ft	05/30/2018		X				X			2		X	
	BH18-02 Depth 0 ft	05/30/2018		X				X			2		X	
	BH18-02 Depth 2 ft	05/30/2018		X				X			2		X	
	BH18-03 Depth 0 ft	05/30/2018		X				X			2		X	
	BH18-03 Depth 2 ft	05/30/2018		X				X			2		X	
	BH18-04 Depth 0 ft	05/30/2018		X				X			2		X	
	BH18-04 Depth 2 ft	05/30/2018		X				X			2		X	
	BH18-04 Depth 4 ft	05/30/2018		X				X			2		X	

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	5/31/18	2:30	Received by:	5/31/18	14:30
Relinquished by:	5/31	15:30	Received by:	6/1/18	13:30

Sample Temperature	2.7 R8
LAB USE ONLY	0.0

REMARKS:	
☐ RUSH: Same Day 24 hr 48 hr 72 hr ☐ Rush Charges Authorized ☐ Special Report Limits or TRRP Report	

ORIGINAL COPY

(Circle) HAND DELIVERED FEDEX UPS Tracking #



XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In



Client: Marathon Oil Company

Date/ Time Received: 06/01/2018 01:30:00 PM

Work Order #: 587900

Acceptable Temperature Range: 0 - 6 degC

Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : R8

Sample Receipt Checklist

Comments

#1 *Temperature of cooler(s)?	2.7
#2 *Shipping container in good condition?	Yes
#3 *Samples received on ice?	Yes
#4 *Custody Seals intact on shipping container/ cooler?	Yes
#5 Custody Seals intact on sample bottles?	N/A
#6 *Custody Seals Signed and dated?	N/A
#7 *Chain of Custody present?	N/A
#8 Any missing/extra samples?	No
#9 Chain of Custody signed when relinquished/ received?	Yes
#10 Chain of Custody agrees with sample labels/matrix?	Yes
#11 Container label(s) legible and intact?	Yes
#12 Samples in proper container/ bottle?	Yes
#13 Samples properly preserved?	Yes
#14 Sample container(s) intact?	Yes
#15 Sufficient sample amount for indicated test(s)?	Yes
#16 All samples received within hold time?	Yes
#17 Subcontract of sample(s)?	No
#18 Water VOC samples have zero headspace?	N/A

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst:

PH Device/Lot#:

Checklist completed by:

Katie Lowe

Date: 06/01/2018

Checklist reviewed by:

Jessica Kramer

Date: 06/01/2018



Certificate of Analysis Summary 592471

Marathon Oil Company, Tulsa, OK

Project Name: Nighthawk 3



Project Id:

Contact: Callie Karrigan

Project Location: Eddy County, New Mexico

Date Received in Lab: Tue Jul-17-18 10:48 am

Report Date: 23-JUL-18

Project Manager: Jessica Kramer

Analysis Requested	Lab Id:	592471-001	592471-002	592471-003			
	Field Id:	Nighthawk 3-BH18-01	Nighthawk 3-BH18-02	Nighthawk 3-BH18-03			
	Depth:						
	Matrix:	SOIL	SOIL	SOIL			
	Sampled:	Jul-15-18 10:45	Jul-15-18 10:55	Jul-15-18 11:05			
BTEX by EPA 8021B	Extracted:	Jul-17-18 16:00	Jul-17-18 16:00	Jul-17-18 16:00			
	Analyzed:	Jul-18-18 08:58	Jul-18-18 09:16	Jul-18-18 09:35			
	Units/RL:	mg/kg RL	mg/kg RL	mg/kg RL			
Benzene		<0.00201 0.00201	<0.00202 0.00202	<0.00200 0.00200			
Toluene		<0.00201 0.00201	<0.00202 0.00202	<0.00200 0.00200			
Ethylbenzene		<0.00201 0.00201	<0.00202 0.00202	<0.00200 0.00200			
m,p-Xylenes		<0.00402 0.00402	<0.00404 0.00404	<0.00401 0.00401			
o-Xylene		<0.00201 0.00201	<0.00202 0.00202	<0.00200 0.00200			
Total Xylenes		<0.00201 0.00201	<0.00202 0.00202	<0.00200 0.00200			
Total BTEX		<0.00201 0.00201	<0.00202 0.00202	<0.00200 0.00200			
Inorganic Anions by EPA 300	Extracted:	Jul-18-18 16:00	Jul-18-18 16:00	Jul-18-18 16:00			
	Analyzed:	Jul-18-18 18:56	Jul-18-18 19:18	Jul-18-18 19:23			
	Units/RL:	mg/kg RL	mg/kg RL	mg/kg RL			
Chloride		2830 25.3	2240 24.8	2160 24.8			
TPH by SW8015 Mod	Extracted:	Jul-19-18 12:00	Jul-19-18 12:00	Jul-19-18 12:00			
	Analyzed:	Jul-19-18 13:48	Jul-19-18 14:49	Jul-19-18 15:09			
	Units/RL:	mg/kg RL	mg/kg RL	mg/kg RL			
Gasoline Range Hydrocarbons (GRO)		<15.0 15.0	<15.0 15.0	<15.0 15.0			
Diesel Range Organics (DRO)		<15.0 15.0	<15.0 15.0	<15.0 15.0			
Oil Range Hydrocarbons (ORO)		<15.0 15.0	<15.0 15.0	<15.0 15.0			
Total TPH		<15.0 15.0	<15.0 15.0	<15.0 15.0			

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Houston - Dallas - San Antonio - Atlanta - Tampa - Boca Raton - Latin America - Odessa - Corpus Christi

Jessica Kramer

Jessica Kramer
Project Assistant

Analytical Report 592471

for Marathon Oil Company

Project Manager: Callie Karrigan

Nighthawk 3

23-JUL-18

Collected By: Client



1211 W. Florida Ave, Midland TX 79701

Xenco-Houston (EPA Lab Code: TX00122):

Texas (T104704215-18-26), Arizona (AZ0765), Florida (E871002-24), Louisiana (03054)
Oklahoma (2017-142)

Xenco-Dallas (EPA Lab Code: TX01468):

Texas (T104704295-17-16), Arizona (AZ0809), Arkansas (17-063-0)

Xenco-El Paso (EPA Lab Code: TX00127): Texas (T104704221-17-12)

Xenco-Lubbock (EPA Lab Code: TX00139): Texas (T104704219-17-16)

Xenco-Odessa (EPA Lab Code: TX00158): Texas (T104704400-18-15)

Xenco-San Antonio (EPA Lab Code: TNI02385): Texas (T104704534-17-3)

Xenco Phoenix (EPA Lab Code: AZ00901): Arizona (AZ0757)

Xenco-Phoenix Mobile (EPA Lab Code: AZ00901): Arizona (AZM757)

Xenco-Atlanta (LELAP Lab ID #04176)

Xenco-Tampa: Florida (E87429)

Xenco-Lakeland: Florida (E84098)



23-JUL-18

Project Manager: **Callie Karrigan**

Marathon Oil Company

P. O. Box 22164

Tulsa, OK 74121-2164

Reference: XENCO Report No(s): **592471**

Nighthawk 3

Project Address: Eddy County, New Mexico

Callie Karrigan:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 592471. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 592471 will be filed for 45 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Jessica Kramer

Project Assistant

Recipient of the Prestigious Small Business Administration Award of Excellence in 1994.

Certified and approved by numerous States and Agencies.

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Houston - Dallas - Midland - San Antonio - Phoenix - Oklahoma - Latin America



Sample Cross Reference 592471



Marathon Oil Company, Tulsa, OK

Nighthawk 3

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
Nighthawk 3-BH18-01	S	07-15-18 10:45		592471-001
Nighthawk 3-BH18-02	S	07-15-18 10:55		592471-002
Nighthawk 3-BH18-03	S	07-15-18 11:05		592471-003



CASE NARRATIVE

Client Name: *Marathon Oil Company*

Project Name: *Nighthawk 3*

Project ID:

Work Order Number(s): 592471

Report Date: 23-JUL-18

Date Received: 07/17/2018

Sample receipt non conformances and comments:

None

Sample receipt non conformances and comments per sample:

None

Analytical non conformances and comments:

Batch: LBA-3056801 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.



Certificate of Analytical Results 592471



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-BH18-01**

Matrix: Soil

Date Received: 07.17.18 10.48

Lab Sample Id: 592471-001

Date Collected: 07.15.18 10.45

Analytical Method: Inorganic Anions by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 07.18.18 16.00

Basis: Wet Weight

Seq Number: 3056961

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	2830	25.3	mg/kg	07.18.18 18.56		5

Analytical Method: TPH by SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 07.19.18 12.00

Basis: Wet Weight

Seq Number: 3057120

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.19.18 13.48	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.19.18 13.48	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.19.18 13.48	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.19.18 13.48	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	98	%	70-135	07.19.18 13.48	
o-Terphenyl	84-15-1	102	%	70-135	07.19.18 13.48	



Certificate of Analytical Results 592471



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-BH18-01**

Matrix: Soil

Date Received: 07.17.18 10.48

Lab Sample Id: 592471-001

Date Collected: 07.15.18 10.45

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 07.17.18 16.00

Basis: Wet Weight

Seq Number: 3056801

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00201	0.00201	mg/kg	07.18.18 08.58	U	1
Toluene	108-88-3	<0.00201	0.00201	mg/kg	07.18.18 08.58	U	1
Ethylbenzene	100-41-4	<0.00201	0.00201	mg/kg	07.18.18 08.58	U	1
m,p-Xylenes	179601-23-1	<0.00402	0.00402	mg/kg	07.18.18 08.58	U	1
o-Xylene	95-47-6	<0.00201	0.00201	mg/kg	07.18.18 08.58	U	1
Total Xylenes	1330-20-7	<0.00201	0.00201	mg/kg	07.18.18 08.58	U	1
Total BTEX		<0.00201	0.00201	mg/kg	07.18.18 08.58	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	101	%	70-130	07.18.18 08.58		
1,4-Difluorobenzene	540-36-3	118	%	70-130	07.18.18 08.58		



Certificate of Analytical Results 592471



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-BH18-02**

Matrix: Soil

Date Received: 07.17.18 10.48

Lab Sample Id: 592471-002

Date Collected: 07.15.18 10.55

Analytical Method: Inorganic Anions by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 07.18.18 16.00

Basis: Wet Weight

Seq Number: 3056961

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	2240	24.8	mg/kg	07.18.18 19.18		5

Analytical Method: TPH by SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 07.19.18 12.00

Basis: Wet Weight

Seq Number: 3057120

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.19.18 14.49	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.19.18 14.49	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.19.18 14.49	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.19.18 14.49	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	100	%	70-135	07.19.18 14.49		
o-Terphenyl	84-15-1	103	%	70-135	07.19.18 14.49		



Certificate of Analytical Results 592471



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-BH18-02**

Matrix: Soil

Date Received: 07.17.18 10.48

Lab Sample Id: 592471-002

Date Collected: 07.15.18 10.55

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 07.17.18 16.00

Basis: Wet Weight

Seq Number: 3056801

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00202	0.00202	mg/kg	07.18.18 09.16	U	1
Toluene	108-88-3	<0.00202	0.00202	mg/kg	07.18.18 09.16	U	1
Ethylbenzene	100-41-4	<0.00202	0.00202	mg/kg	07.18.18 09.16	U	1
m,p-Xylenes	179601-23-1	<0.00404	0.00404	mg/kg	07.18.18 09.16	U	1
o-Xylene	95-47-6	<0.00202	0.00202	mg/kg	07.18.18 09.16	U	1
Total Xylenes	1330-20-7	<0.00202	0.00202	mg/kg	07.18.18 09.16	U	1
Total BTEX		<0.00202	0.00202	mg/kg	07.18.18 09.16	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	115	%	70-130	07.18.18 09.16		
4-Bromofluorobenzene	460-00-4	95	%	70-130	07.18.18 09.16		



Certificate of Analytical Results 592471



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-BH18-03**

Matrix: Soil

Date Received: 07.17.18 10.48

Lab Sample Id: 592471-003

Date Collected: 07.15.18 11.05

Analytical Method: Inorganic Anions by EPA 300

Prep Method: E300P

Tech: SCM

% Moisture:

Analyst: SCM

Date Prep: 07.18.18 16.00

Basis: Wet Weight

Seq Number: 3056961

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	2160	24.8	mg/kg	07.18.18 19.23		5

Analytical Method: TPH by SW8015 Mod

Prep Method: TX1005P

Tech: ARM

% Moisture:

Analyst: ARM

Date Prep: 07.19.18 12.00

Basis: Wet Weight

Seq Number: 3057120

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.19.18 15.09	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.19.18 15.09	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.19.18 15.09	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.19.18 15.09	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	95	%	70-135	07.19.18 15.09		
o-Terphenyl	84-15-1	100	%	70-135	07.19.18 15.09		



Certificate of Analytical Results 592471



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-BH18-03**

Matrix: Soil

Date Received: 07.17.18 10.48

Lab Sample Id: 592471-003

Date Collected: 07.15.18 11.05

Analytical Method: BTEX by EPA 8021B

Prep Method: SW5030B

Tech: ALJ

% Moisture:

Analyst: ALJ

Date Prep: 07.17.18 16.00

Basis: Wet Weight

Seq Number: 3056801

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	07.18.18 09.35	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	07.18.18 09.35	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	07.18.18 09.35	U	1
m,p-Xylenes	179601-23-1	<0.00401	0.00401	mg/kg	07.18.18 09.35	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	07.18.18 09.35	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	07.18.18 09.35	U	1
Total BTEX		<0.00200	0.00200	mg/kg	07.18.18 09.35	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	112	%	70-130	07.18.18 09.35		
4-Bromofluorobenzene	460-00-4	113	%	70-130	07.18.18 09.35		

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the quantitation limit and above the detection limit.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

SMP Client Sample **BLK** Method Blank

BKS/LCS Blank Spike/Laboratory Control Sample **BKSD/LCSD** Blank Spike Duplicate/Laboratory Control Sample Duplicate

MD/SD Method Duplicate/Sample Duplicate **MS** Matrix Spike **MSD:** Matrix Spike Duplicate

+ NELAC certification not offered for this compound.

* (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation



QC Summary 592471

Marathon Oil Company Nighthawk 3

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056961

MB Sample Id: 7658662-1-BLK

Matrix: Solid

LCS Sample Id: 7658662-1-BKS

Prep Method: E300P

Date Prep: 07.18.18

LCSD Sample Id: 7658662-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<5.00	250	251	100	250	100	90-110	0	20	mg/kg	07.18.18 17:35	

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056961

Parent Sample Id: 592018-006

Matrix: Soil

MS Sample Id: 592018-006 S

Prep Method: E300P

Date Prep: 07.18.18

MSD Sample Id: 592018-006 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	282	250	532	100	522	96	90-110	2	20	mg/kg	07.18.18 17:51	

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056961

Parent Sample Id: 592472-001

Matrix: Soil

MS Sample Id: 592472-001 S

Prep Method: E300P

Date Prep: 07.18.18

MSD Sample Id: 592472-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	83.3	248	334	101	334	101	90-110	0	20	mg/kg	07.18.18 19:07	

Analytical Method: TPH by SW8015 Mod

Seq Number: 3057120

MB Sample Id: 7658750-1-BLK

Matrix: Solid

LCS Sample Id: 7658750-1-BKS

Prep Method: TX1005P

Date Prep: 07.19.18

LCSD Sample Id: 7658750-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Gasoline Range Hydrocarbons (GRO)	<15.0	1000	958	96	969	97	70-135	1	20	mg/kg	07.19.18 13:08	
Diesel Range Organics (DRO)	<15.0	1000	986	99	1000	100	70-135	1	20	mg/kg	07.19.18 13:08	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	95		122		123		70-135	%	07.19.18 13:08
o-Terphenyl	101		113		114		70-135	%	07.19.18 13:08

MS/MSD Percent Recovery
Relative Percent Difference
LCS/LCSD Recovery
Log Difference

$[D] = 100 * (C-A) / B$
 $RPD = 200 * |(C-E) / (C+E)|$
 $[D] = 100 * (C) / [B]$
Log Diff. = Log(Sample Duplicate) - Log(Original Sample)

LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD Result

MS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec



QC Summary 592471

Marathon Oil Company Nighthawk 3

Analytical Method: TPH by SW8015 Mod

Seq Number: 3057120

Parent Sample Id: 592471-001

Matrix: Soil

MS Sample Id: 592471-001 S

Prep Method: TX1005P

Date Prep: 07.19.18

MSD Sample Id: 592471-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Gasoline Range Hydrocarbons (GRO)	<15.0	998	912	91	923	92	70-135	1	20	mg/kg	07.19.18 14:09	
Diesel Range Organics (DRO)	<15.0	998	941	94	957	96	70-135	2	20	mg/kg	07.19.18 14:09	

Surrogate

	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	124		125		70-135	%	07.19.18 14:09
o-Terphenyl	112		118		70-135	%	07.19.18 14:09

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056801

MB Sample Id: 7658578-1-BLK

Matrix: Solid

LCS Sample Id: 7658578-1-BKS

Prep Method: SW5030B

Date Prep: 07.17.18

LCSD Sample Id: 7658578-1-BSL

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00200	0.0998	0.0944	95	0.110	110	70-130	15	35	mg/kg	07.18.18 02:10	
Toluene	<0.00200	0.0998	0.0972	97	0.106	106	70-130	9	35	mg/kg	07.18.18 02:10	
Ethylbenzene	<0.00200	0.0998	0.0942	94	0.103	103	70-130	9	35	mg/kg	07.18.18 02:10	
m,p-Xylenes	<0.00399	0.200	0.195	98	0.212	105	70-130	8	35	mg/kg	07.18.18 02:10	
o-Xylene	<0.00200	0.0998	0.0908	91	0.0994	99	70-130	9	35	mg/kg	07.18.18 02:10	

Surrogate

	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	101		90		96		70-130	%	07.18.18 02:10
4-Bromofluorobenzene	102		104		101		70-130	%	07.18.18 02:10

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056801

Parent Sample Id: 592472-001

Matrix: Soil

MS Sample Id: 592472-001 S

Prep Method: SW5030B

Date Prep: 07.17.18

MSD Sample Id: 592472-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00199	0.0996	0.0740	74	0.0723	72	70-130	2	35	mg/kg	07.18.18 02:46	
Toluene	<0.00199	0.0996	0.0693	70	0.0777	78	70-130	11	35	mg/kg	07.18.18 02:46	
Ethylbenzene	<0.00199	0.0996	0.0660	66	0.0651	65	70-130	1	35	mg/kg	07.18.18 02:46	X
m,p-Xylenes	<0.00398	0.199	0.136	68	0.136	68	70-130	0	35	mg/kg	07.18.18 02:46	X
o-Xylene	<0.00199	0.0996	0.0642	64	0.0658	66	70-130	2	35	mg/kg	07.18.18 02:46	X

Surrogate

	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	103		97		70-130	%	07.18.18 02:46
4-Bromofluorobenzene	73		89		70-130	%	07.18.18 02:46

MS/MSD Percent Recovery
Relative Percent Difference
LCS/LCSD Recovery
Log Difference

$[D] = 100 * (C - A) / B$
 $RPD = 200 * |(C - E) / (C + E)|$
 $[D] = 100 * (C) / [B]$
 $\text{Log Diff.} = \text{Log}(\text{Sample Duplicate}) - \text{Log}(\text{Original Sample})$

LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD Result

MS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec

Page 1 of 1

592471

(Circle or Specify Method No.)

Hold

REMARKS:

☐ **RUSH:** Same Day 24 hr 48 hr 72 hr

☐ Rush Charges Authorized

☐ Special Report Limits or TRRP Report

(Circle) HAND DELIVERED **FEDEX** UPS Tracking #: **72719461687**

ORIGIN ID:MAFA (806) 794-1296
XENCO
XENCO
1211 W. FLORIDA AVE
MIDLAND, TX 79701
UNITED STATES US

SHIP DATE: 16JUL18
ACTWGT: 31.00 LB
CAD: 101813706/NET3980
DIMS: 26x14x14 IN
BILL RECIPIENT

TO XENCO

XENCO

1211 W. FLORIDA AVE

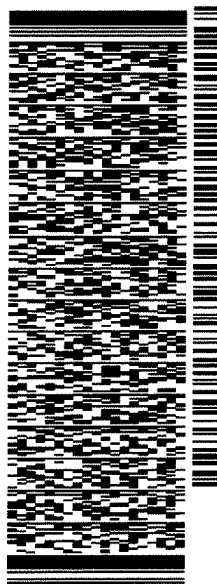
MIDLAND TX 79701

(806) 794-1296

REF:

PO:

DEPT:



J181118012801uz

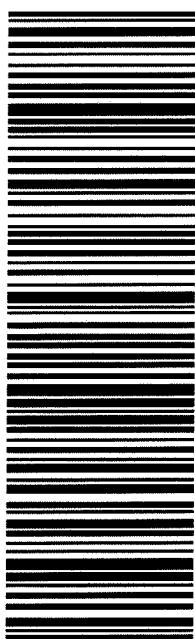
552J2B532/DCA5

TRK# 7727 1946 1682
0201

TUE - 17 JUL 3:00P
STANDARD OVERNIGHT

41 MAFA

79701
TX-US LBB



After printing this label:

1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In



Client: Marathon Oil Company

Date/ Time Received: 07/17/2018 10:48:00 AM

Work Order #: 592471

Acceptable Temperature Range: 0 - 6 degC

Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : R8

Sample Receipt Checklist

Comments

#1 *Temperature of cooler(s)?	1.3
#2 *Shipping container in good condition?	Yes
#3 *Samples received on ice?	Yes
#4 *Custody Seals intact on shipping container/ cooler?	N/A
#5 Custody Seals intact on sample bottles?	N/A
#6 *Custody Seals Signed and dated?	N/A
#7 *Chain of Custody present?	Yes
#8 Any missing/extra samples?	No
#9 Chain of Custody signed when relinquished/ received?	Yes
#10 Chain of Custody agrees with sample labels/matrix?	Yes
#11 Container label(s) legible and intact?	Yes
#12 Samples in proper container/ bottle?	Yes
#13 Samples properly preserved?	Yes
#14 Sample container(s) intact?	Yes
#15 Sufficient sample amount for indicated test(s)?	Yes
#16 All samples received within hold time?	Yes
#17 Subcontract of sample(s)?	No
#18 Water VOC samples have zero headspace?	N/A

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst:

PH Device/Lot#:

Checklist completed by:

Katie Lowe

Date: 07/17/2018

Checklist reviewed by:

Jessica Kramer

Date: 07/17/2018

From: [Hernandez, Christina, EMNRD](#)
To: ["Mann, Ryan"; "Karrigan, Callie N. \(MRO\)"; Yu, Olivia, EMNRD](#)
Cc: [Dhugal Hanton](#)
Subject: RE: 1RP-5094 Work Plan
Date: Monday, October 22, 2018 2:14:00 PM
Attachments: [Approved5094Nighthawk State Com 3H Excavation Work Plan Final.pdf](#)

Dear Ms. Karrigan:

Please be aware that:

1. The depth data in Table 1 does not match the data presented in Figure 1. JUL 24/18.
2. The RRAL's (NMOCD Environmental Quality Guidelines) are inconsistent throughout the report.
3. The incorrect C-141 incident form was included in the report. The correct form is for the incident that occurred on 5/30/2018.
4. Utilization of liners now necessitates a variance submission that must include justification and/or demonstrations that the proposed variance will afford reasonable protection against contamination of fresh water, human health and the environment.
5. The appropriate revised C-141 form must be included when requisites are submitted. The revised C-141 form is available at:
<http://www.emnrd.state.nm.us/OCD/forms.html>

In the interests of resolving **1RP-5094**, NMOCD approves the proposed remediation plan as outlined on September 17, 2018 with the following conditions :

- Provide both bottom and sidewall confirmation samples at no greater than 50 ft. intervals.
- Please be advised to excavate further at BH18-01 until permissible chloride levels are reached or submit a variance requesting to utilize a liner.
- Submit dated photo documentation of the remedial activities, including placement of liner if one is used.
- Submit scaled map with the confirmation sample locations in relation to the delineation sample points and indicate location of release point.

Please inform if clarification is needed.

Thanks,
Christina Hernandez
EMNRD-OCD
Environmental Specialist
1625 N. French Drive
Hobbs, NM 88240
575-393-6161 x111
Christina.Hernandez@state.nm.us

OCD approval does not relieve the operator of liability should their operations fail to adequately investigate and remediate contamination that may pose a threat to ground water, surface water, human health or the environment. In addition, OCD approval does not relieve the operator of responsibility for compliance with any other federal, state, local laws and/or regulations.

From: Mann, Ryan <rmann@slo.state.nm.us>
Sent: Friday, October 19, 2018 2:31 PM
To: 'Karrigan, Callie N. (MRO)' <cnkarrigan@marathonoil.com>; Yu, Olivia, EMNRD <Olivia.Yu@state.nm.us>; Hernandez, Christina, EMNRD <Christina.Hernandez@state.nm.us>
Cc: Dhugal Hanton <DHanton@vertex.ca>
Subject: [EXT] RE: 1RP-5094 Work Plan

NMSLO approves of the plan with the following conditions: 1) Confirmation samples are taken in area that are not lined 2) The northern off pad portion is backfilled with top soil similar to the surrounding area, not caliche; and revegetated at the appropriate time.

Let me know if you have any questions.

Ryan Mann
Remediation Specialist
Field Operation Division
(575) 392-3697
(505) 699-1989
New Mexico State Land Office
2827 N. Dal Paso Suite 117
Hobbs, NM 88240

From: Karrigan, Callie N. (MRO) [<mailto:cnkarrigan@marathonoil.com>]
Sent: Monday, September 17, 2018 12:54 PM
To: Yu, Olivia, EMNRD <Olivia.Yu@state.nm.us>; Hernandez, Christina, EMNRD <Christina.Hernandez@state.nm.us>; Mann, Ryan <rmann@slo.state.nm.us>
Cc: Dhugal Hanton <DHanton@vertex.ca>
Subject: 1RP-5094 Work Plan

Good afternoon,

Please see the attached work plan for 1RP-5094.

Thank you,

Callie Karrigan

HES Professional – Environmental

Office: 575-297-0956

Cell: 405-202-1028

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For more information please visit <http://www.symanteccloud.com>

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For more information please visit https://clicktime.symantec.com/a/1/D8vtTgwbvOMKuUjIRikYik4IyA9glXk0jYS34Ie47Agk=?d=OiudriRQNm5Qm0_J19OWDUcZeCyWStz86q4QOp4bMfdtqskfxOiPp3DzwE41PseHA1wflCzajiR40rpiVtcpatiDRR9PCLB0VkyTagvZmNeiuCveKny2sg3ftcTZt15hKlpgaAJIQ-8kMwofBfBW_Td-e6Q1QB9k5wzxS_jUeM4Vk7Uil_vh3zyfix15hcGNuflp45W50QUadSQewvc3K3zYTt6uKcHi-ReW6t40F-d0y-rLhRbs2JgPE3l_88NcP2SoVnInYwc-vbQOBgoeThTO6Ypbcu9M72FpYblqZuDhjSvYd-ndDFlc8E-ODqwgfPOsvJsEFJHls22Nri8R1CsiohHwB63bJ_CANM17HjYp&u=http%3A%2F%2Fwww.symanteccloud.com
