



Approved with
conditions. See
email
correspondence.

October 31, 2018

Spill Remediation Plan: Nighthawk State Com 3H (Section 20 T18S R33E)
API: 30-025-41950
Incident Number: 1RP-5094

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>May 30, 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 in order to 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 chlorides the vertical extent of these impacts will be delineated. In the event that chloride impacts are found below 4 feet, Vertex requests a variance to install a liner on the base of the excavation. If approved, a 30 mil liner will be installed and local caliche will be sourced to backfill 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 22, T18S, R35E is approximately 1,200 feet from the site. The groundwater 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 are no diversions within 1,000 feet. (Attachment 4).

The Ranking Criteria for Depth to Ground Water at the site is ranked **20** 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
Well head Protection Area	> 1,000 ft. from a water source	0
Distance to Surface Water Body	200 -1,000 ft.	10
Total Ranking		20

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

Recommended Remediation Action Level	
Benzene (ppm)	10
BTEX (ppm)	50
TPH (ppm)	100
Chlorides (ppm)	600

Initial Site Assessment

The initial spill assessment was conducted on May 30, 2018. An Initial sample 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. Secondary samples, at five locations, were collected in the area on July 7, 2018. These samples were sent to the lab to assess the 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 – May 30, 2018 and July 7, 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	56.4	592	6210	15,000	118	21,300	2970
BH18-01	0	07/07/2018	<0.00202	<0.00202	<15.0	68.9	<15.0	68.9	5910
BH18-01	2	07/07/2018	<0.00201	<0.00201	<14.9	<14.9	<14.9	<14.9	1700
BH18-01	4	07/07/2018	<0.00199	<0.00199	<15.0	40.2	<15.0	40.2	1630
BH18-02	0	07/07/2018	<0.00198	<0.00198	<15.0	18.5	<15.0	18.5	408
BH18-02	2	07/07/2018	<0.00202	<0.00202	<15.0	129	<15.0	129	2310
BH18-02	4	07/07/2018	<0.00202	<0.00202	<15.0	181	<15.0	181	1450
BH18-03	0	07/07/2018	<0.00200	<0.00200	<15.0	<15.0	<15.0	<15.0	3160
BH18-03	2	07/07/2018	<0.00201	<0.00201	<15.0	<15.0	<15.0	<15.0	2460
BH18-03	4	07/07/2018	<0.00201	<0.00201	<15.0	<15.0	<15.0	<15.0	1610
BH18-04	0	07/07/2018	<0.00200	<0.00200	<15.0	<15.0	<15.0	<15.0	310
BH18-04	2	07/07/2018	<0.00199	<0.00199	<15.0	64.4	<15.0	64.4	419
BH18-04	4	07/07/2018	<0.00200	<0.00200	<15.0	53.0	<15.0	53.0	552
BH18-05	0	07/07/2018	<0.00201	<0.00201	<15.0	<15.0	<15.0	<15.0	1250
BH18-05	2	07/07/2018	<0.00202	<0.00202	<14.9	<14.9	<14.9	<14.9	1060
BH18-05	4	07/07/2018	<0.00200	<0.00200	<15.0	<15.0	<15.0	<15.0	890

RRALs - 50 mg/kg BTEX, 10 mg/kg Benzene, 100 mg/kg TPH, 600 mg/kg Chloride

Excavation

The excavation will include removing impacted soils with a backhoe and include sampling the soil on the walls and base. Additional delineation samples will be required below 4 feet as identified through field screening. Field screening for both hydrocarbons (PID) and chlorides (High/Low limit Quantabs) will be utilized to guide excavation activity. Final confirmatory samples will be obtained once the limits of the impact are found and submitted for laboratory analysis. Laboratory analysis on select samples will be performed according the following methods:

- Chloride (Method 300)
- TPH (EPA SW-846 or Method 8015M)
- BTEX (EPA SW-846 or Method 8021B/8260B)
- Benzene (EPA SW-846 or Method 8021B/8260B)

As benzene and TPH exceedances are localized around sample point BH18-01 from May 30, 2018, Vertex will request analysis solely for chloride concentration.

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

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
------------------	---------------	-----------------	--------------	----------------------	---------------------------	-----------------------	------------------------	---------------

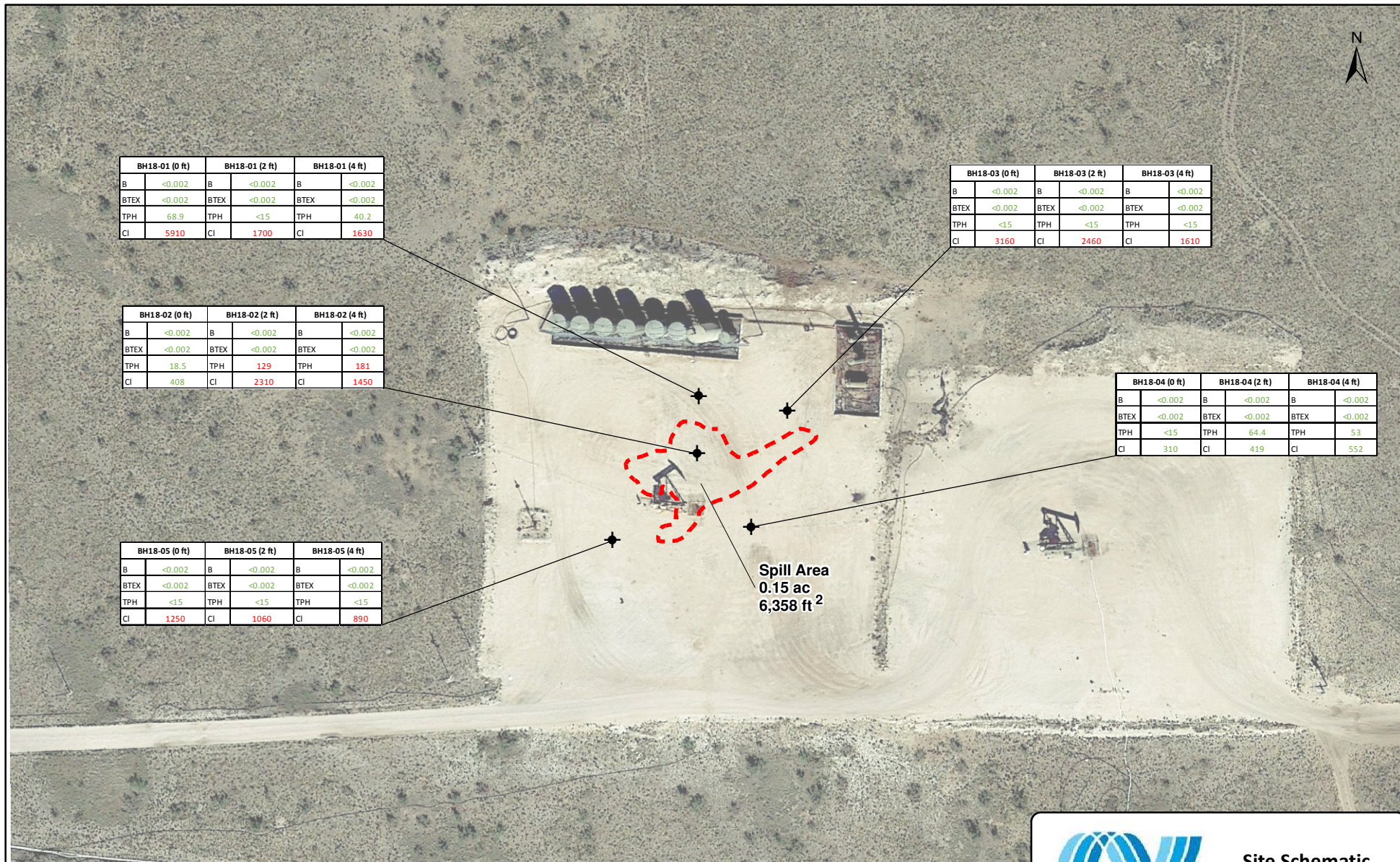
Latitude 32.72660771 Longitude -103.47803946 NAD83

NATURE OF RELEASE

Type of Release: crude oil	Volume of Release: 22 bbl	Volume Recovered: 16 bbl
Source of Release: poly flowline at wellhead	Date and Hour of Occurrence unknown	Date and Hour of Discovery 5/30/2018 09:00 am
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Olivia Yu – Lea County, Ryann Mann – SLO	
By Whom? Callie Karrigan	Date and Hour: 5/30/2018 11:18 am	
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 the flowline had ruptured and released approximately 22 barrels of oil. The well was immediately shut-in. Upon further investigation, the poly line had about a 1" hole and the release surfaced immediately.		
Describe Area Affected and Cleanup Action Taken.* A vac truck recovered standing fluids. The polyline was removed from service and will be replaced. Saturated soils near the source of the rupture were removed and taken for disposal. The release area is currently being assessed, initial soil samples taken and a work plan will be submitted for remaining clean-up.		
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>		OIL CONSERVATION DIVISION
Printed Name: Callie Karrigan		
Title: HES Professional	Approval Date:	Expiration Date:
E-mail Address: cnkarrigan@marathonoil.com	Conditions of Approval:	
Date: 6/13/18 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	BTEX	TPH	CI	
<0.00202	<0.00202	<15	0	Minimum Detection
10	50	100	600	Above Criteria
Depth to Groundwater			78 Feet	

0 25 50 100 ft
SCALE 1:1,400



Site Schematic
Nighthawk 3H



DRAWN: PS
APPROVED: DH
DATE: OCT 31/18

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																
Sub-		Q Q Q										Depth Depth Water				
POD Number	Code	basin	County	64	16	4	Sec	Tws	Rng	X	Y	Distance	Well	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
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 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



New Mexico Office of the State Engineer

Active & Inactive Points of Diversion

(with Ownership Information)

(acre ft per annum)										(R=POD has been replaced and no longer serves this file, (quarters are 1=NW 2=NE 3=SW 4=SE) C=the file is closed) (quarters are smallest to largest) (NAD83 UTM in meters)									
WR File Nbr	Sub basin	Use	Diversion	Owner	County	POD Number	Code	Grant	Source	q	q	q	q	Sec	Tws	Rng	X	Y	Distance
LRG 12048		DOM		3 RICHARD OR LISA NEAL	DA	LRG 12048				1	1	2	16	18S	04E		355884	3624503*	 2913
T 00613	LT	EXP		0 WHITE SANDS MISSILE RANGE	DA	T 00613				4	4	4	12	18S	04E		361319	3624635*	 4736

Record Count: 2

UTMNAD83 Radius Search (in meters):

Easting (X): 357380.86

Northing (Y): 3622003.56

Radius: 5000

Sorted by: Distance

*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 5



Certificate of Analysis Summary 587894

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: 11-JUN-18

Project Manager: Jessica Kramer

Analysis Requested	Lab Id:	587894-001					
	Field Id:	BH18-01, Spill Conformation					
	Depth:						
	Matrix:	SOIL					
	Sampled:	May-30-18 17:50					
BTEX by EPA 8021B	Extracted:	Jun-10-18 08:30					
	Analyzed:	Jun-10-18 23:59					
	Units/RL:	mg/kg RL					
Benzene		56.4 2.00					
Toluene		224 2.00					
Ethylbenzene		132 2.00					
m,p-Xylenes		129 4.01					
o-Xylene		50.9 2.00					
Total Xylenes		180 2.00					
Total BTEX		592 2.00					
Chloride by EPA 300	Extracted:	Jun-05-18 15:00					
	Analyzed:	Jun-05-18 18:50					
	Units/RL:	mg/kg RL					
Chloride		2970 25.0					
TPH By SW8015 Mod	Extracted:	Jun-01-18 16:00					
	Analyzed:	Jun-02-18 06:14					
	Units/RL:	mg/kg RL					
Gasoline Range Hydrocarbons (GRO)		6210 74.9					
Diesel Range Organics (DRO)		15000 74.9					
Oil Range Hydrocarbons (ORO)		118 74.9					
Total TPH		21300 74.9					

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.

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

Jessica Kramer

Jessica Kramer
Project Assistant

Analytical Report 587894

for Marathon Oil Company

Project Manager: Callie Karrigan

Nighthawk #3H

11-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 (T104704400-18-14)

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)



11-JUN-18

Project Manager: **Callie Karrigan**

Marathon Oil Company

P. O. Box 22164

Tulsa, OK 74121-2164

Reference: XENCO Report No(s): **587894**

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) 587894. 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. 587894 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.

A Small Business and Minority Status Company that delivers SERVICE and QUALITY

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



Sample Cross Reference 587894



Marathon Oil Company, Tulsa, OK

Nighthawk #3H

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
BH18-01, Spill Conformation Sample, Depth	S	05-30-18 17:50		587894-001



CASE NARRATIVE

Client Name: Marathon Oil Company

Project Name: Nighthawk #3H

Project ID:

Work Order Number(s): 587894

Report Date: 11-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-3052154 TPH By SW8015 Mod

Diesel Range Organics (DRO), Gasoline Range Hydrocarbons (GRO) RPD was outside laboratory control limits.

Samples in the analytical batch are: 587894-001

The sample used as the MS/MSD, 587820-001, was a non-detect sample and is within both RPD and passing percentage to emulate the BKS/BSD. This sample therefore demonstrates the data provided is in control.

Batch: LBA-3052970 BTEX by EPA 8021B

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



Certificate of Analytical Results 587894



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH18-01, Spill Conformation Sample, Dep** Matrix: Soil Date Received: 06.01.18 13.30
Lab Sample Id: 587894-001 Date Collected: 05.30.18 17.50
Analytical Method: Chloride by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 06.05.18 15.00 Basis: Wet Weight
Seq Number: 3052395

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	2970	25.0	mg/kg	06.05.18 18.50		5

Analytical Method: TPH By SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 06.01.18 16.00 Basis: Wet Weight
Seq Number: 3052154

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	6210	74.9	mg/kg	06.02.18 06.14		5
Diesel Range Organics (DRO)	C10C28DRO	15000	74.9	mg/kg	06.02.18 06.14		5
Oil Range Hydrocarbons (ORO)	PHCG2835	118	74.9	mg/kg	06.02.18 06.14		5
Total TPH	PHC635	21300	74.9	mg/kg	06.02.18 06.14		5

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	112	%	70-135	06.02.18 06.14	
o-Terphenyl	84-15-1	79	%	70-135	06.02.18 06.14	



Certificate of Analytical Results 587894



Marathon Oil Company, Tulsa, OK Nighthawk #3H

Sample Id: **BH18-01, Spill Conformation Sample, Dep** Matrix: Soil Date Received: 06.01.18 13.30
Lab Sample Id: 587894-001 Date Collected: 05.30.18 17.50
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 06.10.18 08.30 Basis: Wet Weight
Seq Number: 3052970

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	56.4	2.00	mg/kg	06.10.18 23.59		1000
Toluene	108-88-3	224	2.00	mg/kg	06.10.18 23.59		1000
Ethylbenzene	100-41-4	132	2.00	mg/kg	06.10.18 23.59		1000
m,p-Xylenes	179601-23-1	129	4.01	mg/kg	06.10.18 23.59		1000
o-Xylene	95-47-6	50.9	2.00	mg/kg	06.10.18 23.59		1000
Total Xylenes	1330-20-7	180	2.00	mg/kg	06.10.18 23.59		1000
Total BTEX		592	2.00	mg/kg	06.10.18 23.59		1000
Surrogate	Cas Number	% Recovery		Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	84		%	70-130	06.10.18 23.59	
1,4-Difluorobenzene	540-36-3	78		%	70-130	06.10.18 23.59	

- 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 587894

Marathon Oil Company Nighthawk #3H

Analytical Method: Chloride by EPA 300

Seq Number: 3052395

MB Sample Id: 7656041-1-BLK

Matrix: Solid

LCS Sample Id: 7656041-1-BKS

Prep Method: E300P

Date Prep: 06.05.18

LCSD Sample Id: 7656041-1-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	263	105	256	102	90-110	3	20	mg/kg	06.05.18 16:24	

Analytical Method: Chloride by EPA 300

Seq Number: 3052395

Parent Sample Id: 587837-010

Matrix: Soil

MS Sample Id: 587837-010 S

Prep Method: E300P

Date Prep: 06.05.18

MSD Sample Id: 587837-010 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<4.95	248	266	107	260	105	90-110	2	20	mg/kg	06.05.18 16:40	

Analytical Method: Chloride by EPA 300

Seq Number: 3052395

Parent Sample Id: 587927-003

Matrix: Soil

MS Sample Id: 587927-003 S

Prep Method: E300P

Date Prep: 06.05.18

MSD Sample Id: 587927-003 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	914	249	1160	99	1120	83	90-110	4	20	mg/kg	06.05.18 17:56	X

Analytical Method: TPH By SW8015 Mod

Seq Number: 3052154

MB Sample Id: 7655905-1-BLK

Matrix: Solid

LCS Sample Id: 7655905-1-BKS

Prep Method: TX1005P

Date Prep: 06.01.18

LCSD Sample Id: 7655905-1-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	884	88	1160	116	70-135	27	20	mg/kg	06.01.18 22:14	F
Diesel Range Organics (DRO)	<15.0	1000	946	95	1230	123	70-135	26	20	mg/kg	06.01.18 22:14	F

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	84		115		128		70-135	%	06.01.18 22:14
o-Terphenyl	90		114		126		70-135	%	06.01.18 22:14

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 587894

Marathon Oil Company Nighthawk #3H

Analytical Method: TPH By SW8015 Mod

Seq Number: 3052154

Parent Sample Id: 587820-001

Matrix: Soil

MS Sample Id: 587820-001 S

Prep Method: TX1005P

Date Prep: 06.01.18

MSD Sample Id: 587820-001 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	981	98	911	91	70-135	7	20	mg/kg	06.01.18 23:18	
Diesel Range Organics (DRO)	<15.0	998	1080	108	996	100	70-135	8	20	mg/kg	06.01.18 23:18	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	107		102		70-135	%	06.01.18 23:18
o-Terphenyl	107		97		70-135	%	06.01.18 23:18

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052970

MB Sample Id: 7656395-1-BLK

Matrix: Solid

LCS Sample Id: 7656395-1-BKS

Prep Method: SW5030B

Date Prep: 06.10.18

LCSD Sample Id: 7656395-1-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	0.0879	88	0.0862	85	70-130	2	35	mg/kg	06.10.18 19:28	
Toluene	<0.00200	0.100	0.0934	93	0.0907	90	70-130	3	35	mg/kg	06.10.18 19:28	
Ethylbenzene	<0.00200	0.100	0.0917	92	0.0893	88	70-130	3	35	mg/kg	06.10.18 19:28	
m,p-Xylenes	<0.00401	0.200	0.189	95	0.185	92	70-130	2	35	mg/kg	06.10.18 19:28	
o-Xylene	<0.00200	0.100	0.0921	92	0.0897	89	70-130	3	35	mg/kg	06.10.18 19:28	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	93		99		94		70-130	%	06.10.18 19:28
4-Bromofluorobenzene	87		98		94		70-130	%	06.10.18 19:28

Analytical Method: BTEX by EPA 8021B

Seq Number: 3052970

Parent Sample Id: 588647-004

Matrix: Soil

MS Sample Id: 588647-004 S

Prep Method: SW5030B

Date Prep: 06.10.18

MSD Sample Id: 588647-004 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.00202	0.101	0.0756	75	0.0760	75	70-130	1	35	mg/kg	06.10.18 20:04	
Toluene	<0.00202	0.101	0.0813	80	0.0797	79	70-130	2	35	mg/kg	06.10.18 20:04	
Ethylbenzene	<0.00202	0.101	0.0814	81	0.0819	81	70-130	1	35	mg/kg	06.10.18 20:04	
m,p-Xylenes	<0.00404	0.202	0.167	83	0.171	85	70-130	2	35	mg/kg	06.10.18 20:04	
o-Xylene	<0.00202	0.101	0.0767	76	0.0782	77	70-130	2	35	mg/kg	06.10.18 20:04	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	98		98		70-130	%	06.10.18 20:04
4-Bromofluorobenzene	104		106		70-130	%	06.10.18 20:04

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

ORIGINAL COPY



XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In



Client: Marathon Oil Company

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

Work Order #: 587894

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?	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: 06/01/2018

Checklist reviewed by:

Jessica Kramer

Date: 06/01/2018



Certificate of Analysis Summary 591662

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-10-18 11:14 am

Report Date: 17-JUL-18

Project Manager: Jessica Kramer

<i>Analysis Requested</i>	<i>Lab Id:</i>	591662-001	591662-002	591662-003	591662-004	591662-005	591662-006
	<i>Field Id:</i>	Nighthawk 3-S1 0'	Nighthawk 3-S1 2'	Nighthawk 3-S1 4'	Nighthawk 3-S2 0'	Nighthawk 3-S2 2'	Nighthawk 3-S2 4'
	<i>Depth:</i>						
	<i>Matrix:</i>	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	<i>Sampled:</i>	Jul-07-18 10:45	Jul-07-18 10:55	Jul-07-18 11:05	Jul-07-18 11:10	Jul-07-18 11:20	Jul-07-18 11:30
BTEX by EPA 8021B	<i>Extracted:</i>	Jul-11-18 16:30	Jul-11-18 16:30	Jul-11-18 16:30	Jul-13-18 16:00	Jul-12-18 11:00	Jul-13-18 11:00
	<i>Analyzed:</i>	Jul-12-18 05:40	Jul-12-18 05:57	Jul-12-18 06:13	Jul-14-18 00:03	Jul-12-18 18:02	Jul-13-18 13:53
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Benzene		<0.00202 0.00202	<0.00201 0.00201	<0.00199 0.00199	<0.00198 0.00198	<0.00202 0.00202	<0.00202 0.00202
Toluene		<0.00202 0.00202	<0.00201 0.00201	<0.00199 0.00199	<0.00198 0.00198	<0.00202 0.00202	<0.00202 0.00202
Ethylbenzene		<0.00202 0.00202	<0.00201 0.00201	<0.00199 0.00199	<0.00198 0.00198	<0.00202 0.00202	<0.00202 0.00202
m,p-Xylenes		<0.00403 0.00403	<0.00402 0.00402	<0.00398 0.00398	<0.00397 0.00397	<0.00403 0.00403	<0.00403 0.00403
o-Xylene		<0.00202 0.00202	<0.00201 0.00201	<0.00199 0.00199	<0.00198 0.00198	<0.00202 0.00202	<0.00202 0.00202
Total Xylenes		<0.00202 0.00202	<0.00201 0.00201	<0.00199 0.00199	<0.00198 0.00198	<0.00202 0.00202	<0.00202 0.00202
Total BTEX		<0.00202 0.00202	<0.00201 0.00201	<0.00199 0.00199	<0.00198 0.00198	<0.00202 0.00202	<0.00202 0.00202
Inorganic Anions by EPA 300	<i>Extracted:</i>	Jul-13-18 15:15	Jul-13-18 15:15	Jul-13-18 15:15	Jul-13-18 15:15	Jul-13-18 15:15	Jul-13-18 15:15
	<i>Analyzed:</i>	Jul-13-18 17:39	Jul-13-18 17:45	Jul-13-18 18:01	Jul-13-18 18:06	Jul-13-18 18:12	Jul-13-18 18:17
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Chloride		5910 50.0	1700 24.8	1630 25.0	408 5.00	2310 24.5	1450 24.8
TPH by SW8015 Mod	<i>Extracted:</i>	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00
	<i>Analyzed:</i>	Jul-12-18 11:16	Jul-12-18 12:16	Jul-12-18 12:36	Jul-12-18 12:56	Jul-12-18 13:16	Jul-12-18 13:36
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Gasoline Range Hydrocarbons (GRO)		<15.0 15.0	<14.9 14.9	<15.0 15.0	<15.0 15.0	<15.0 15.0	<15.0 15.0
Diesel Range Organics (DRO)		68.9 15.0	<14.9 14.9	40.2 15.0	18.5 15.0	129 15.0	181 15.0
Oil Range Hydrocarbons (ORO)		<15.0 15.0	<14.9 14.9	<15.0 15.0	<15.0 15.0	<15.0 15.0	<15.0 15.0
Total TPH		68.9 15.0	<14.9 14.9	40.2 15.0	18.5 15.0	129 15.0	181 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



Certificate of Analysis Summary 591662

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-10-18 11:14 am

Report Date: 17-JUL-18

Project Manager: Jessica Kramer

Analysis Requested	Lab Id:	591662-007	591662-008	591662-009	591662-010	591662-011	591662-012
	Field Id:	Nighthawk 3-S3 0'	Nighthawk 3-S3 2'	Nighthawk 3-S3 4'	Nighthawk 3-S4 0'	Nighthawk 3-S4 2'	Nighthawk 3-S4 4'
	Depth:						
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled:	Jul-07-18 11:40	Jul-07-18 11:50	Jul-07-18 12:00	Jul-07-18 12:10	Jul-07-18 12:15	Jul-07-18 12:20
BTEX by EPA 8021B	Extracted:	Jul-13-18 16:00	Jul-13-18 16:00	Jul-13-18 11:00	Jul-13-18 11:00	Jul-13-18 11:00	Jul-13-18 11:00
	Analyzed:	Jul-13-18 23:27	Jul-13-18 23:45	Jul-13-18 19:32	Jul-13-18 18:01	Jul-13-18 19:13	Jul-13-18 18:55
	Units/RL:	mg/kg 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	<0.00201 0.00201	<0.00200 0.00200	<0.00199 0.00199	<0.00200 0.00200
Toluene		<0.00200 0.00200	<0.00201 0.00201	<0.00201 0.00201	<0.00200 0.00200	<0.00199 0.00199	<0.00200 0.00200
Ethylbenzene		<0.00200 0.00200	<0.00201 0.00201	<0.00201 0.00201	<0.00200 0.00200	<0.00199 0.00199	<0.00200 0.00200
m,p-Xylenes		<0.00399 0.00399	<0.00402 0.00402	<0.00402 0.00402	<0.00401 0.00401	<0.00398 0.00398	<0.00399 0.00399
o-Xylene		<0.00200 0.00200	<0.00201 0.00201	<0.00201 0.00201	<0.00200 0.00200	<0.00199 0.00199	<0.00200 0.00200
Total Xylenes		<0.00200 0.00200	<0.00201 0.00201	<0.00201 0.00201	<0.00200 0.00200	<0.00199 0.00199	<0.00200 0.00200
Total BTEX		<0.00200 0.00200	<0.00201 0.00201	<0.00201 0.00201	<0.00200 0.00200	<0.00199 0.00199	<0.00200 0.00200
Inorganic Anions by EPA 300	Extracted:	Jul-13-18 15:15	Jul-13-18 15:15	Jul-13-18 15:15	Jul-13-18 15:45	Jul-13-18 15:45	Jul-13-18 15:45
	Analyzed:	Jul-13-18 18:23	Jul-13-18 18:28	Jul-13-18 18:33	Jul-13-18 19:22	Jul-13-18 19:06	Jul-13-18 19:27
	Units/RL:	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Chloride		3160 24.9	2460 24.9	1610 24.9	310 4.98	419 4.96	552 4.98
TPH by SW8015 Mod	Extracted:	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00
	Analyzed:	Jul-12-18 13:56	Jul-13-18 07:00	Jul-12-18 14:36	Jul-12-18 14:57	Jul-12-18 15:57	Jul-12-18 16:18
	Units/RL:	mg/kg 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	<15.0 15.0	<15.0 15.0
Diesel Range Organics (DRO)		<15.0 15.0	<15.0 15.0	<15.0 15.0	<15.0 15.0	64.4 15.0	53.0 15.0
Oil Range Hydrocarbons (ORO)		<15.0 15.0	<15.0 15.0	<15.0 15.0	<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	<15.0 15.0	64.4 15.0	53.0 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



Certificate of Analysis Summary 591662

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-10-18 11:14 am

Report Date: 17-JUL-18

Project Manager: Jessica Kramer

<i>Analysis Requested</i>	<i>Lab Id:</i>	591662-013	591662-014	591662-015			
	<i>Field Id:</i>	Nighthawk 3-S5 0'	Nighthawk 3-S5 2'	Nighthawk 3-S5 4'			
	<i>Depth:</i>						
	<i>Matrix:</i>	SOIL	SOIL	SOIL			
	<i>Sampled:</i>	Jul-07-18 12:30	Jul-07-18 12:35	Jul-07-18 12:40			
BTEX by EPA 8021B	<i>Extracted:</i>	Jul-13-18 11:00	Jul-13-18 11:00	Jul-11-18 16:30			
	<i>Analyzed:</i>	Jul-13-18 18:37	Jul-13-18 18:19	Jul-12-18 04:29			
	<i>Units/RL:</i>	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	<0.00399 0.00399			
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	<i>Extracted:</i>	Jul-13-18 15:45	Jul-13-18 15:45	Jul-13-18 15:45			
	<i>Analyzed:</i>	Jul-13-18 19:33	Jul-13-18 19:38	Jul-13-18 19:54			
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL			
Chloride		1250 4.91	1060 4.93	890 5.00			
TPH by SW8015 Mod	<i>Extracted:</i>	Jul-12-18 07:00	Jul-12-18 07:00	Jul-12-18 07:00			
	<i>Analyzed:</i>	Jul-12-18 16:38	Jul-12-18 16:59	Jul-12-18 17:19			
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL			
Gasoline Range Hydrocarbons (GRO)		<15.0 15.0	<14.9 14.9	<15.0 15.0			
Diesel Range Organics (DRO)		<15.0 15.0	<14.9 14.9	<15.0 15.0			
Oil Range Hydrocarbons (ORO)		<15.0 15.0	<14.9 14.9	<15.0 15.0			
Total TPH		<15.0 15.0	<14.9 14.9	<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 591662

for Marathon Oil Company

Project Manager: Callie Karrigan

Nighthawk 3

17-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)



17-JUL-18

Project Manager: **Callie Karrigan**

Marathon Oil Company

P. O. Box 22164

Tulsa, OK 74121-2164

Reference: XENCO Report No(s): **591662**

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) 591662. 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. 591662 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.

A Small Business and Minority Status Company that delivers SERVICE and QUALITY

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

Marathon Oil Company, Tulsa, OK

Nighthawk 3

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
Nighthawk 3-S1 0'	S	07-07-18 10:45		591662-001
Nighthawk 3-S1 2'	S	07-07-18 10:55		591662-002
Nighthawk 3-S1 4'	S	07-07-18 11:05		591662-003
Nighthawk 3-S2 0'	S	07-07-18 11:10		591662-004
Nighthawk 3-S2 2'	S	07-07-18 11:20		591662-005
Nighthawk 3-S2 4'	S	07-07-18 11:30		591662-006
Nighthawk 3-S3 0'	S	07-07-18 11:40		591662-007
Nighthawk 3-S3 2'	S	07-07-18 11:50		591662-008
Nighthawk 3-S3 4'	S	07-07-18 12:00		591662-009
Nighthawk 3-S4 0'	S	07-07-18 12:10		591662-010
Nighthawk 3-S4 2'	S	07-07-18 12:15		591662-011
Nighthawk 3-S4 4'	S	07-07-18 12:20		591662-012
Nighthawk 3-S5 0'	S	07-07-18 12:30		591662-013
Nighthawk 3-S5 2'	S	07-07-18 12:35		591662-014
Nighthawk 3-S5 4'	S	07-07-18 12:40		591662-015



CASE NARRATIVE

Client Name: Marathon Oil Company

Project Name: Nighthawk 3

Project ID:
Work Order Number(s): 591662

Report Date: 17-JUL-18
Date Received: 07/10/2018

Sample receipt non conformance and comments:

None

Sample receipt non conformance and comments per sample:

None

Analytical non conformance and comments:

Batch: LBA-3056273 BTEX by EPA 8021B

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

Lab Sample ID 591662-015 was randomly selected for Matrix Spike/Matrix Spike Duplicate (MS/MSD). m,p-Xylenes recovered below QC limits in the Matrix Spike. Benzene, Ethylbenzene, o-Xylene recovered below QC limits in the Matrix Spike and Matrix Spike Duplicate. Toluene recovered below QC limits in the Matrix Spike Duplicate. Outlier/s are due to possible matrix interference. Samples in the analytical batch are: 591662-001, -002, -003, -015.

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-3056376 BTEX by EPA 8021B

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

Batch: LBA-3056541 BTEX by EPA 8021B

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

Batch: LBA-3056549 BTEX by EPA 8021B

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

Benzene, Ethylbenzene, Toluene, 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: 591662-004, -007, -008

Lab Sample ID 591662-008 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. Outlier/s are due to possible matrix interference. Samples in the analytical batch are: 591662-004, -007, -008.

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



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S1 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-001 Date Collected: 07.07.18 10.45
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	5910	50.0	mg/kg	07.13.18 17.39		10

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 11.16	U	1
Diesel Range Organics (DRO)	C10C28DRO	68.9	15.0	mg/kg	07.12.18 11.16		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 11.16	U	1
Total TPH	PHC635	68.9	15.0	mg/kg	07.12.18 11.16		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	124	%	70-135	07.12.18 11.16	
o-Terphenyl	84-15-1	129	%	70-135	07.12.18 11.16	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S1 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-001 Date Collected: 07.07.18 10.45
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.11.18 16.30 Basis: Wet Weight
Seq Number: 3056273

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00202	0.00202	mg/kg	07.12.18 05.40	U	1
Toluene	108-88-3	<0.00202	0.00202	mg/kg	07.12.18 05.40	U	1
Ethylbenzene	100-41-4	<0.00202	0.00202	mg/kg	07.12.18 05.40	U	1
m,p-Xylenes	179601-23-1	<0.00403	0.00403	mg/kg	07.12.18 05.40	U	1
o-Xylene	95-47-6	<0.00202	0.00202	mg/kg	07.12.18 05.40	U	1
Total Xylenes	1330-20-7	<0.00202	0.00202	mg/kg	07.12.18 05.40	U	1
Total BTEX		<0.00202	0.00202	mg/kg	07.12.18 05.40	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	89	%	70-130	07.12.18 05.40		
1,4-Difluorobenzene	540-36-3	89	%	70-130	07.12.18 05.40		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S1 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-002 Date Collected: 07.07.18 10.55
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	1700	24.8	mg/kg	07.13.18 17.45		5

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<14.9	14.9	mg/kg	07.12.18 12.16	U	1
Diesel Range Organics (DRO)	C10C28DRO	<14.9	14.9	mg/kg	07.12.18 12.16	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<14.9	14.9	mg/kg	07.12.18 12.16	U	1
Total TPH	PHC635	<14.9	14.9	mg/kg	07.12.18 12.16	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	120	%	70-135	07.12.18 12.16		
o-Terphenyl	84-15-1	124	%	70-135	07.12.18 12.16		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S1 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-002 Date Collected: 07.07.18 10.55
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.11.18 16.30 Basis: Wet Weight
Seq Number: 3056273

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00201	0.00201	mg/kg	07.12.18 05.57	U	1
Toluene	108-88-3	<0.00201	0.00201	mg/kg	07.12.18 05.57	U	1
Ethylbenzene	100-41-4	<0.00201	0.00201	mg/kg	07.12.18 05.57	U	1
m,p-Xylenes	179601-23-1	<0.00402	0.00402	mg/kg	07.12.18 05.57	U	1
o-Xylene	95-47-6	<0.00201	0.00201	mg/kg	07.12.18 05.57	U	1
Total Xylenes	1330-20-7	<0.00201	0.00201	mg/kg	07.12.18 05.57	U	1
Total BTEX		<0.00201	0.00201	mg/kg	07.12.18 05.57	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	85	%	70-130	07.12.18 05.57		
1,4-Difluorobenzene	540-36-3	78	%	70-130	07.12.18 05.57		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S1 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-003 Date Collected: 07.07.18 11.05
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	1630	25.0	mg/kg	07.13.18 18.01		5

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 12.36	U	1
Diesel Range Organics (DRO)	C10C28DRO	40.2	15.0	mg/kg	07.12.18 12.36		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 12.36	U	1
Total TPH	PHC635	40.2	15.0	mg/kg	07.12.18 12.36		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	124	%	70-135	07.12.18 12.36	
o-Terphenyl	84-15-1	128	%	70-135	07.12.18 12.36	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S1 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-003 Date Collected: 07.07.18 11.05
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.11.18 16.30 Basis: Wet Weight
Seq Number: 3056273

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00199	0.00199	mg/kg	07.12.18 06.13	U	1
Toluene	108-88-3	<0.00199	0.00199	mg/kg	07.12.18 06.13	U	1
Ethylbenzene	100-41-4	<0.00199	0.00199	mg/kg	07.12.18 06.13	U	1
m,p-Xylenes	179601-23-1	<0.00398	0.00398	mg/kg	07.12.18 06.13	U	1
o-Xylene	95-47-6	<0.00199	0.00199	mg/kg	07.12.18 06.13	U	1
Total Xylenes	1330-20-7	<0.00199	0.00199	mg/kg	07.12.18 06.13	U	1
Total BTEX		<0.00199	0.00199	mg/kg	07.12.18 06.13	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	87	%	70-130	07.12.18 06.13		
4-Bromofluorobenzene	460-00-4	82	%	70-130	07.12.18 06.13		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S2 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-004 Date Collected: 07.07.18 11.10
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	408	5.00	mg/kg	07.13.18 18.06		1

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 12.56	U	1
Diesel Range Organics (DRO)	C10C28DRO	18.5	15.0	mg/kg	07.12.18 12.56		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 12.56	U	1
Total TPH	PHC635	18.5	15.0	mg/kg	07.12.18 12.56		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	130	%	70-135	07.12.18 12.56	
o-Terphenyl	84-15-1	130	%	70-135	07.12.18 12.56	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S2 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-004 Date Collected: 07.07.18 11.10
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 16.00 Basis: Wet Weight
Seq Number: 3056549

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00198	0.00198	mg/kg	07.14.18 00.03	U	1
Toluene	108-88-3	<0.00198	0.00198	mg/kg	07.14.18 00.03	U	1
Ethylbenzene	100-41-4	<0.00198	0.00198	mg/kg	07.14.18 00.03	U	1
m,p-Xylenes	179601-23-1	<0.00397	0.00397	mg/kg	07.14.18 00.03	U	1
o-Xylene	95-47-6	<0.00198	0.00198	mg/kg	07.14.18 00.03	U	1
Total Xylenes	1330-20-7	<0.00198	0.00198	mg/kg	07.14.18 00.03	U	1
Total BTEX		<0.00198	0.00198	mg/kg	07.14.18 00.03	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	97	%	70-130	07.14.18 00.03		
1,4-Difluorobenzene	540-36-3	124	%	70-130	07.14.18 00.03		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S2 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-005 Date Collected: 07.07.18 11.20
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	2310	24.5	mg/kg	07.13.18 18.12		5

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 13.16	U	1
Diesel Range Organics (DRO)	C10C28DRO	129	15.0	mg/kg	07.12.18 13.16		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 13.16	U	1
Total TPH	PHC635	129	15.0	mg/kg	07.12.18 13.16		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	129	%	70-135	07.12.18 13.16	
o-Terphenyl	84-15-1	129	%	70-135	07.12.18 13.16	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S2 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-005 Date Collected: 07.07.18 11.20
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.12.18 11.00 Basis: Wet Weight
Seq Number: 3056376

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00202	0.00202	mg/kg	07.12.18 18.02	U	1
Toluene	108-88-3	<0.00202	0.00202	mg/kg	07.12.18 18.02	U	1
Ethylbenzene	100-41-4	<0.00202	0.00202	mg/kg	07.12.18 18.02	U	1
m,p-Xylenes	179601-23-1	<0.00403	0.00403	mg/kg	07.12.18 18.02	U	1
o-Xylene	95-47-6	<0.00202	0.00202	mg/kg	07.12.18 18.02	U	1
Total Xylenes	1330-20-7	<0.00202	0.00202	mg/kg	07.12.18 18.02	U	1
Total BTEX		<0.00202	0.00202	mg/kg	07.12.18 18.02	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	74	%	70-130	07.12.18 18.02		
4-Bromofluorobenzene	460-00-4	94	%	70-130	07.12.18 18.02		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S2 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-006 Date Collected: 07.07.18 11.30
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	1450	24.8	mg/kg	07.13.18 18.17		5

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 13.36	U	1
Diesel Range Organics (DRO)	C10C28DRO	181	15.0	mg/kg	07.12.18 13.36		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 13.36	U	1
Total TPH	PHC635	181	15.0	mg/kg	07.12.18 13.36		1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	123	%	70-135	07.12.18 13.36		
o-Terphenyl	84-15-1	129	%	70-135	07.12.18 13.36		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S2 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-006 Date Collected: 07.07.18 11.30
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 11.00 Basis: Wet Weight
Seq Number: 3056541

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00202	0.00202	mg/kg	07.13.18 13.53	U	1
Toluene	108-88-3	<0.00202	0.00202	mg/kg	07.13.18 13.53	U	1
Ethylbenzene	100-41-4	<0.00202	0.00202	mg/kg	07.13.18 13.53	U	1
m,p-Xylenes	179601-23-1	<0.00403	0.00403	mg/kg	07.13.18 13.53	U	1
o-Xylene	95-47-6	<0.00202	0.00202	mg/kg	07.13.18 13.53	U	1
Total Xylenes	1330-20-7	<0.00202	0.00202	mg/kg	07.13.18 13.53	U	1
Total BTEX		<0.00202	0.00202	mg/kg	07.13.18 13.53	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	102	%	70-130	07.13.18 13.53		
4-Bromofluorobenzene	460-00-4	74	%	70-130	07.13.18 13.53		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S3 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-007 Date Collected: 07.07.18 11.40
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	3160	24.9	mg/kg	07.13.18 18.23		5

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 13.56	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.12.18 13.56	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 13.56	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.12.18 13.56	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	129	%	70-135	07.12.18 13.56		
o-Terphenyl	84-15-1	129	%	70-135	07.12.18 13.56		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S3 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-007 Date Collected: 07.07.18 11.40
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 16.00 Basis: Wet Weight
Seq Number: 3056549

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	07.13.18 23.27	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	07.13.18 23.27	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	07.13.18 23.27	U	1
m,p-Xylenes	179601-23-1	<0.00399	0.00399	mg/kg	07.13.18 23.27	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	07.13.18 23.27	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	07.13.18 23.27	U	1
Total BTEX		<0.00200	0.00200	mg/kg	07.13.18 23.27	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	89	%	70-130	07.13.18 23.27		
1,4-Difluorobenzene	540-36-3	107	%	70-130	07.13.18 23.27		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S3 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-008 Date Collected: 07.07.18 11.50
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	2460	24.9	mg/kg	07.13.18 18.28		5

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.13.18 07.00	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.13.18 07.00	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.13.18 07.00	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.13.18 07.00	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	127	%	70-135	07.13.18 07.00	
o-Terphenyl	84-15-1	130	%	70-135	07.13.18 07.00	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S3 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-008 Date Collected: 07.07.18 11.50
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 16.00 Basis: Wet Weight
Seq Number: 3056549

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00201	0.00201	mg/kg	07.13.18 23.45	U	1
Toluene	108-88-3	<0.00201	0.00201	mg/kg	07.13.18 23.45	U	1
Ethylbenzene	100-41-4	<0.00201	0.00201	mg/kg	07.13.18 23.45	U	1
m,p-Xylenes	179601-23-1	<0.00402	0.00402	mg/kg	07.13.18 23.45	U	1
o-Xylene	95-47-6	<0.00201	0.00201	mg/kg	07.13.18 23.45	U	1
Total Xylenes	1330-20-7	<0.00201	0.00201	mg/kg	07.13.18 23.45	U	1
Total BTEX		<0.00201	0.00201	mg/kg	07.13.18 23.45	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	84	%	70-130	07.13.18 23.45		
4-Bromofluorobenzene	460-00-4	111	%	70-130	07.13.18 23.45		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S3 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-009 Date Collected: 07.07.18 12.00
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.15 Basis: Wet Weight
Seq Number: 3056522

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	1610	24.9	mg/kg	07.13.18 18.33		5

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 14.36	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.12.18 14.36	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 14.36	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.12.18 14.36	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	117	%	70-135	07.12.18 14.36	
o-Terphenyl	84-15-1	122	%	70-135	07.12.18 14.36	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S3 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-009 Date Collected: 07.07.18 12.00
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 11.00 Basis: Wet Weight
Seq Number: 3056541

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00201	0.00201	mg/kg	07.13.18 19.32	U	1
Toluene	108-88-3	<0.00201	0.00201	mg/kg	07.13.18 19.32	U	1
Ethylbenzene	100-41-4	<0.00201	0.00201	mg/kg	07.13.18 19.32	U	1
m,p-Xylenes	179601-23-1	<0.00402	0.00402	mg/kg	07.13.18 19.32	U	1
o-Xylene	95-47-6	<0.00201	0.00201	mg/kg	07.13.18 19.32	U	1
Total Xylenes	1330-20-7	<0.00201	0.00201	mg/kg	07.13.18 19.32	U	1
Total BTEX		<0.00201	0.00201	mg/kg	07.13.18 19.32	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	93	%	70-130	07.13.18 19.32		
1,4-Difluorobenzene	540-36-3	84	%	70-130	07.13.18 19.32		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S4 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-010 Date Collected: 07.07.18 12.10
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.45 Basis: Wet Weight
Seq Number: 3056525

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	310	4.98	mg/kg	07.13.18 19.22		1

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 14.57	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.12.18 14.57	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 14.57	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.12.18 14.57	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	120	%	70-135	07.12.18 14.57	
o-Terphenyl	84-15-1	124	%	70-135	07.12.18 14.57	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S4 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-010 Date Collected: 07.07.18 12.10
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 11.00 Basis: Wet Weight
Seq Number: 3056541

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	07.13.18 18.01	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	07.13.18 18.01	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	07.13.18 18.01	U	1
m,p-Xylenes	179601-23-1	<0.00401	0.00401	mg/kg	07.13.18 18.01	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	07.13.18 18.01	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	07.13.18 18.01	U	1
Total BTEX		<0.00200	0.00200	mg/kg	07.13.18 18.01	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	102	%	70-130	07.13.18 18.01		
1,4-Difluorobenzene	540-36-3	112	%	70-130	07.13.18 18.01		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S4 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-011 Date Collected: 07.07.18 12.15
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.45 Basis: Wet Weight
Seq Number: 3056525

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	419	4.96	mg/kg	07.13.18 19.06		1

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 15.57	U	1
Diesel Range Organics (DRO)	C10C28DRO	64.4	15.0	mg/kg	07.12.18 15.57		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 15.57	U	1
Total TPH	PHC635	64.4	15.0	mg/kg	07.12.18 15.57		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	115	%	70-135	07.12.18 15.57	
o-Terphenyl	84-15-1	121	%	70-135	07.12.18 15.57	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S4 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-011 Date Collected: 07.07.18 12.15
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 11.00 Basis: Wet Weight
Seq Number: 3056541

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00199	0.00199	mg/kg	07.13.18 19.13	U	1
Toluene	108-88-3	<0.00199	0.00199	mg/kg	07.13.18 19.13	U	1
Ethylbenzene	100-41-4	<0.00199	0.00199	mg/kg	07.13.18 19.13	U	1
m,p-Xylenes	179601-23-1	<0.00398	0.00398	mg/kg	07.13.18 19.13	U	1
o-Xylene	95-47-6	<0.00199	0.00199	mg/kg	07.13.18 19.13	U	1
Total Xylenes	1330-20-7	<0.00199	0.00199	mg/kg	07.13.18 19.13	U	1
Total BTEX		<0.00199	0.00199	mg/kg	07.13.18 19.13	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	106	%	70-130	07.13.18 19.13		
1,4-Difluorobenzene	540-36-3	79	%	70-130	07.13.18 19.13		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S4 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-012 Date Collected: 07.07.18 12.20
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.45 Basis: Wet Weight
Seq Number: 3056525

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	552	4.98	mg/kg	07.13.18 19.27		1

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 16.18	U	1
Diesel Range Organics (DRO)	C10C28DRO	53.0	15.0	mg/kg	07.12.18 16.18		1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 16.18	U	1
Total TPH	PHC635	53.0	15.0	mg/kg	07.12.18 16.18		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	113	%	70-135	07.12.18 16.18	
o-Terphenyl	84-15-1	118	%	70-135	07.12.18 16.18	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S4 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-012 Date Collected: 07.07.18 12.20
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 11.00 Basis: Wet Weight
Seq Number: 3056541

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	07.13.18 18.55	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	07.13.18 18.55	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	07.13.18 18.55	U	1
m,p-Xylenes	179601-23-1	<0.00399	0.00399	mg/kg	07.13.18 18.55	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	07.13.18 18.55	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	07.13.18 18.55	U	1
Total BTEX		<0.00200	0.00200	mg/kg	07.13.18 18.55	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1,4-Difluorobenzene	540-36-3	101	%	70-130	07.13.18 18.55		
4-Bromofluorobenzene	460-00-4	82	%	70-130	07.13.18 18.55		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S5 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-013 Date Collected: 07.07.18 12.30
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.45 Basis: Wet Weight
Seq Number: 3056525

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	1250	4.91	mg/kg	07.13.18 19.33		1

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 16.38	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.12.18 16.38	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 16.38	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.12.18 16.38	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	115	%	70-135	07.12.18 16.38	
o-Terphenyl	84-15-1	118	%	70-135	07.12.18 16.38	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S5 0'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-013 Date Collected: 07.07.18 12.30
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 11.00 Basis: Wet Weight
Seq Number: 3056541

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00201	0.00201	mg/kg	07.13.18 18.37	U	1
Toluene	108-88-3	<0.00201	0.00201	mg/kg	07.13.18 18.37	U	1
Ethylbenzene	100-41-4	<0.00201	0.00201	mg/kg	07.13.18 18.37	U	1
m,p-Xylenes	179601-23-1	<0.00402	0.00402	mg/kg	07.13.18 18.37	U	1
o-Xylene	95-47-6	<0.00201	0.00201	mg/kg	07.13.18 18.37	U	1
Total Xylenes	1330-20-7	<0.00201	0.00201	mg/kg	07.13.18 18.37	U	1
Total BTEX		<0.00201	0.00201	mg/kg	07.13.18 18.37	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	84	%	70-130	07.13.18 18.37		
1,4-Difluorobenzene	540-36-3	76	%	70-130	07.13.18 18.37		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S5 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-014 Date Collected: 07.07.18 12.35
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.45 Basis: Wet Weight
Seq Number: 3056525

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	1060	4.93	mg/kg	07.13.18 19.38		1

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<14.9	14.9	mg/kg	07.12.18 16.59	U	1
Diesel Range Organics (DRO)	C10C28DRO	<14.9	14.9	mg/kg	07.12.18 16.59	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<14.9	14.9	mg/kg	07.12.18 16.59	U	1
Total TPH	PHC635	<14.9	14.9	mg/kg	07.12.18 16.59	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
1-Chlorooctane	111-85-3	109	%	70-135	07.12.18 16.59		
o-Terphenyl	84-15-1	114	%	70-135	07.12.18 16.59		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S5 2'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-014 Date Collected: 07.07.18 12.35
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.13.18 11.00 Basis: Wet Weight
Seq Number: 3056541

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00202	0.00202	mg/kg	07.13.18 18.19	U	1
Toluene	108-88-3	<0.00202	0.00202	mg/kg	07.13.18 18.19	U	1
Ethylbenzene	100-41-4	<0.00202	0.00202	mg/kg	07.13.18 18.19	U	1
m,p-Xylenes	179601-23-1	<0.00404	0.00404	mg/kg	07.13.18 18.19	U	1
o-Xylene	95-47-6	<0.00202	0.00202	mg/kg	07.13.18 18.19	U	1
Total Xylenes	1330-20-7	<0.00202	0.00202	mg/kg	07.13.18 18.19	U	1
Total BTEX		<0.00202	0.00202	mg/kg	07.13.18 18.19	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	91	%	70-130	07.13.18 18.19		
1,4-Difluorobenzene	540-36-3	89	%	70-130	07.13.18 18.19		



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S5 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-015 Date Collected: 07.07.18 12.40
Analytical Method: Inorganic Anions by EPA 300 Prep Method: E300P
Tech: SCM % Moisture:
Analyst: SCM Date Prep: 07.13.18 15.45 Basis: Wet Weight
Seq Number: 3056525

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	890	5.00	mg/kg	07.13.18 19.54		1

Analytical Method: TPH by SW8015 Mod Prep Method: TX1005P
Tech: ARM % Moisture:
Analyst: ARM Date Prep: 07.12.18 07.00 Basis: Wet Weight
Seq Number: 3056389

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Gasoline Range Hydrocarbons (GRO)	PHC610	<15.0	15.0	mg/kg	07.12.18 17.19	U	1
Diesel Range Organics (DRO)	C10C28DRO	<15.0	15.0	mg/kg	07.12.18 17.19	U	1
Oil Range Hydrocarbons (ORO)	PHCG2835	<15.0	15.0	mg/kg	07.12.18 17.19	U	1
Total TPH	PHC635	<15.0	15.0	mg/kg	07.12.18 17.19	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1-Chlorooctane	111-85-3	111	%	70-135	07.12.18 17.19	
o-Terphenyl	84-15-1	116	%	70-135	07.12.18 17.19	



Certificate of Analytical Results 591662



Marathon Oil Company, Tulsa, OK Nighthawk 3

Sample Id: **Nighthawk 3-S5 4'** Matrix: Soil Date Received: 07.10.18 11.14
Lab Sample Id: 591662-015 Date Collected: 07.07.18 12.40
Analytical Method: BTEX by EPA 8021B Prep Method: SW5030B
Tech: ALJ % Moisture:
Analyst: ALJ Date Prep: 07.11.18 16.30 Basis: Wet Weight
Seq Number: 3056273

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.00200	0.00200	mg/kg	07.12.18 04.29	U	1
Toluene	108-88-3	<0.00200	0.00200	mg/kg	07.12.18 04.29	U	1
Ethylbenzene	100-41-4	<0.00200	0.00200	mg/kg	07.12.18 04.29	U	1
m,p-Xylenes	179601-23-1	<0.00399	0.00399	mg/kg	07.12.18 04.29	U	1
o-Xylene	95-47-6	<0.00200	0.00200	mg/kg	07.12.18 04.29	U	1
Total Xylenes	1330-20-7	<0.00200	0.00200	mg/kg	07.12.18 04.29	U	1
Total BTEX		<0.00200	0.00200	mg/kg	07.12.18 04.29	U	1
Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag	
4-Bromofluorobenzene	460-00-4	83	%	70-130	07.12.18 04.29		
1,4-Difluorobenzene	540-36-3	112	%	70-130	07.12.18 04.29		

- 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 591662

Marathon Oil Company Nighthawk 3

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056522

MB Sample Id: 7658399-1-BLK

Matrix: Solid

LCS Sample Id: 7658399-1-BKS

Prep Method: E300P

Date Prep: 07.13.18

LCSD Sample Id: 7658399-1-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	257	103	258	103	90-110	0	20	mg/kg	07.13.18 15:27	

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056522

MB Sample Id: 7658400-1-BLK

Matrix: Solid

LCS Sample Id: 7658400-1-BKS

Prep Method: E300P

Date Prep: 07.13.18

LCSD Sample Id: 7658400-1-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	252	101	251	100	90-110	0	20	mg/kg	07.13.18 18:55	

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056522

Parent Sample Id: 591573-001

Matrix: Solid

MS Sample Id: 591573-001 S

Prep Method: E300P

Date Prep: 07.13.18

MSD Sample Id: 591573-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	194	250	435	96	448	102	90-110	3	20	mg/kg	07.13.18 15:43	

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056522

Parent Sample Id: 591661-006

Matrix: Soil

MS Sample Id: 591661-006 S

Prep Method: E300P

Date Prep: 07.13.18

MSD Sample Id: 591661-006 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	19.7	250	279	104	278	103	90-110	0	20	mg/kg	07.13.18 17:29	

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056522

Parent Sample Id: 591662-011

Matrix: Soil

MS Sample Id: 591662-011 S

Prep Method: E300P

Date Prep: 07.13.18

MSD Sample Id: 591662-011 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	419	248	665	99	664	99	90-110	0	20	mg/kg	07.13.18 19:11	

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



QC Summary 591662

Marathon Oil Company Nighthawk 3

Analytical Method: Inorganic Anions by EPA 300

Seq Number: 3056525

Parent Sample Id: 591793-001

Matrix: Soil

MS Sample Id: 591793-001 S

Prep Method: E300P

Date Prep: 07.13.18

MSD Sample Id: 591793-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<4.99	250	270	108	272	109	90-110	1	20	mg/kg	07.13.18 20:27	

Analytical Method: TPH by SW8015 Mod

Seq Number: 3056389

MB Sample Id: 7658319-1-BLK

Matrix: Solid

LCS Sample Id: 7658319-1-BKS

Prep Method: TX1005P

Date Prep: 07.12.18

LCSD Sample Id: 7658319-1-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	1040	104	995	100	70-135	4	20	mg/kg	07.12.18 10:36	
Diesel Range Organics (DRO)	<15.0	1000	1090	109	1030	103	70-135	6	20	mg/kg	07.12.18 10:36	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	106		125		128		70-135	%	07.12.18 10:36
o-Terphenyl	114		125		118		70-135	%	07.12.18 10:36

Analytical Method: TPH by SW8015 Mod

Seq Number: 3056389

Parent Sample Id: 591662-001

Matrix: Soil

MS Sample Id: 591662-001 S

Prep Method: TX1005P

Date Prep: 07.12.18

MSD Sample Id: 591662-001 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	999	961	96	987	99	70-135	3	20	mg/kg	07.12.18 11:36	
Diesel Range Organics (DRO)	68.9	999	1040	97	1090	102	70-135	5	20	mg/kg	07.12.18 11:36	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1-Chlorooctane	128		128		70-135	%	07.12.18 11:36
o-Terphenyl	117		120		70-135	%	07.12.18 11:36

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 3

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056273

MB Sample Id: 7658269-1-BLK

Matrix: Solid

LCS Sample Id: 7658269-1-BKS

Prep Method: SW5030B

Date Prep: 07.11.18

LCSD Sample Id: 7658269-1-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	0.0856	86	0.0797	80	70-130	7	35	mg/kg	07.12.18 02:42	
Toluene	<0.00200	0.100	0.0872	87	0.0819	82	70-130	6	35	mg/kg	07.12.18 02:42	
Ethylbenzene	<0.00200	0.100	0.0854	85	0.0784	79	70-130	9	35	mg/kg	07.12.18 02:42	
m,p-Xylenes	<0.00401	0.200	0.178	89	0.161	81	70-130	10	35	mg/kg	07.12.18 02:42	
o-Xylene	<0.00200	0.100	0.0822	82	0.0767	77	70-130	7	35	mg/kg	07.12.18 02:42	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	105		95		76		70-130	%	07.12.18 02:42
4-Bromofluorobenzene	71		85		78		70-130	%	07.12.18 02:42

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056376

MB Sample Id: 7658332-1-BLK

Matrix: Solid

LCS Sample Id: 7658332-1-BKS

Prep Method: SW5030B

Date Prep: 07.12.18

LCSD Sample Id: 7658332-1-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	0.0998	0.0917	92	0.0880	88	70-130	4	35	mg/kg	07.12.18 13:56	
Toluene	<0.00200	0.0998	0.0913	91	0.109	109	70-130	18	35	mg/kg	07.12.18 13:56	
Ethylbenzene	<0.00200	0.0998	0.0860	86	0.0926	93	70-130	7	35	mg/kg	07.12.18 13:56	
m,p-Xylenes	<0.00399	0.200	0.188	94	0.189	95	70-130	1	35	mg/kg	07.12.18 13:56	
o-Xylene	<0.00200	0.0998	0.0886	89	0.101	101	70-130	13	35	mg/kg	07.12.18 13:56	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	116		81		109		70-130	%	07.12.18 13:56
4-Bromofluorobenzene	110		94		78		70-130	%	07.12.18 13:56

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056541

MB Sample Id: 7658433-1-BLK

Matrix: Solid

LCS Sample Id: 7658433-1-BKS

Prep Method: SW5030B

Date Prep: 07.13.18

LCSD Sample Id: 7658433-1-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	0.0940	94	0.0941	93	70-130	0	35	mg/kg	07.13.18 12:04	
Toluene	<0.00200	0.100	0.0961	96	0.0947	94	70-130	1	35	mg/kg	07.13.18 12:04	
Ethylbenzene	<0.00200	0.100	0.0959	96	0.0940	93	70-130	2	35	mg/kg	07.13.18 12:04	
m,p-Xylenes	<0.00401	0.200	0.201	101	0.197	98	70-130	2	35	mg/kg	07.13.18 12:04	
o-Xylene	<0.00200	0.100	0.0980	98	0.0846	84	70-130	15	35	mg/kg	07.13.18 12:04	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	105		98		90		70-130	%	07.13.18 12:04
4-Bromofluorobenzene	97		78		84		70-130	%	07.13.18 12:04

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



QC Summary 591662

Marathon Oil Company Nighthawk 3

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056549

MB Sample Id: 7658437-1-BLK

Matrix: Solid

LCS Sample Id: 7658437-1-BKS

Prep Method: SW5030B

Date Prep: 07.13.18

LCSD Sample Id: 7658437-1-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	0.0922	91	0.0886	88	70-130	4	35	mg/kg	07.13.18 21:39	
Toluene	<0.00202	0.101	0.0929	92	0.0863	85	70-130	7	35	mg/kg	07.13.18 21:39	
Ethylbenzene	<0.00202	0.101	0.0938	93	0.0907	90	70-130	3	35	mg/kg	07.13.18 21:39	
m,p-Xylenes	<0.00404	0.202	0.195	97	0.187	93	70-130	4	35	mg/kg	07.13.18 21:39	
o-Xylene	<0.00202	0.101	0.0913	90	0.0849	84	70-130	7	35	mg/kg	07.13.18 21:39	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	78		111		106		70-130	%	07.13.18 21:39
4-Bromofluorobenzene	81		97		86		70-130	%	07.13.18 21:39

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056273

Parent Sample Id: 591662-015

Matrix: Soil

MS Sample Id: 591662-015 S

Prep Method: SW5030B

Date Prep: 07.11.18

MSD Sample Id: 591662-015 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	0.100	0.0535	54	0.0654	66	70-130	20	35	mg/kg	07.12.18 03:17	X
Toluene	<0.00200	0.100	0.0733	73	0.0663	67	70-130	10	35	mg/kg	07.12.18 03:17	X
Ethylbenzene	<0.00200	0.100	0.0636	64	0.0660	66	70-130	4	35	mg/kg	07.12.18 03:17	X
m,p-Xylenes	<0.00401	0.200	0.129	65	0.139	70	70-130	7	35	mg/kg	07.12.18 03:17	X
o-Xylene	<0.00200	0.100	0.0601	60	0.0650	65	70-130	8	35	mg/kg	07.12.18 03:17	X

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	88		88		70-130	%	07.12.18 03:17
4-Bromofluorobenzene	97		104		70-130	%	07.12.18 03:17

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056376

Parent Sample Id: 591573-001

Matrix: Solid

MS Sample Id: 591573-001 S

Prep Method: SW5030B

Date Prep: 07.12.18

MSD Sample Id: 591573-001 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	0.0744	74	0.0697	69	70-130	7	35	mg/kg	07.12.18 14:49	X
Toluene	0.00634	0.100	0.0547	48	0.0641	57	70-130	16	35	mg/kg	07.12.18 14:49	X
Ethylbenzene	0.0368	0.100	0.0684	32	0.0616	25	70-130	10	35	mg/kg	07.12.18 14:49	X
m,p-Xylenes	0.115	0.201	0.157	21	0.151	18	70-130	4	35	mg/kg	07.12.18 14:49	X
o-Xylene	0.0453	0.100	0.0685	23	0.0693	24	70-130	1	35	mg/kg	07.12.18 14:49	X

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	82		86		70-130	%	07.12.18 14:49
4-Bromofluorobenzene	119		92		70-130	%	07.12.18 14:49

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



QC Summary 591662

Marathon Oil Company Nighthawk 3

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056541

Parent Sample Id: 591961-006

Matrix: Soil

MS Sample Id: 591961-006 S

Prep Method: SW5030B

Date Prep: 07.13.18

MSD Sample Id: 591961-006 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	0.0643	65	0.0844	84	70-130	27	35	mg/kg	07.13.18 12:41	X
Toluene	<0.00199	0.0996	0.0660	66	0.0838	84	70-130	24	35	mg/kg	07.13.18 12:41	X
Ethylbenzene	<0.00199	0.0996	0.0572	57	0.0793	79	70-130	32	35	mg/kg	07.13.18 12:41	X
m,p-Xylenes	<0.00398	0.199	0.118	59	0.162	81	70-130	31	35	mg/kg	07.13.18 12:41	X
o-Xylene	<0.00199	0.0996	0.0578	58	0.0701	70	70-130	19	35	mg/kg	07.13.18 12:41	X

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	92		111		70-130	%	07.13.18 12:41
4-Bromofluorobenzene	82		114		70-130	%	07.13.18 12:41

Analytical Method: BTEX by EPA 8021B

Seq Number: 3056549

Parent Sample Id: 591662-008

Matrix: Soil

MS Sample Id: 591662-008 S

Prep Method: SW5030B

Date Prep: 07.13.18

MSD Sample Id: 591662-008 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	0.0994	0.0616	62	0.0955	96	70-130	43	35	mg/kg	07.13.18 22:15	XF
Toluene	<0.00199	0.0994	0.0632	64	0.104	104	70-130	49	35	mg/kg	07.13.18 22:15	XF
Ethylbenzene	<0.00199	0.0994	0.0627	63	0.0949	95	70-130	41	35	mg/kg	07.13.18 22:15	XF
m,p-Xylenes	<0.00398	0.199	0.122	61	0.198	99	70-130	48	35	mg/kg	07.13.18 22:15	XF
o-Xylene	<0.00199	0.0994	0.0604	61	0.0950	95	70-130	45	35	mg/kg	07.13.18 22:15	XF

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,4-Difluorobenzene	72		128		70-130	%	07.13.18 22:15
4-Bromofluorobenzene	108		96		70-130	%	07.13.18 22:15

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

Analysis Request of Chain of Custody Record

591642

Page 1 of 1

Client Name:		Marathon Oil Company		Site Manager:		Caille Karrigan				
Project Name:		Nighthawk 3		Project #:						
Project Location: (county, state)		Eddy County, New Mexico		Project #:						
Invoice to:		Caille Karrigan (ckarrigan@marathonoil.com)		Project #:						
Receiving Laboratory:		Xenco		Sampler Signature:						
Comments:										
LAB # (LAB USE ONLY)	SAMPLE IDENTIFICATION	SAMPLING		MATRIX		PRESERVATIVE METHOD		# CONTAINERS	FILTERED (Y/N)	
		YEAR:	DATE	TIME	WATER	SOIL	HCL			HNO ₃
	Nighthawk 3- S1 0'		07/07/2018	10:45	X		X		2 N	X
	Nighthawk 3- S1 2'		07/07/2018	10:55	X		X		2 N	X
	Nighthawk 3- S1 4'		07/07/2018	11:05	X		X		2 N	X
	Nighthawk 3- S2 0'		07/07/2018	11:10	X		X		2 N	X
	Nighthawk 3- S2 2'		07/07/2018	11:20	X		X		2 N	X
	Nighthawk 3- S2 4'		07/07/2018	11:30	X		X		2 N	X
	Nighthawk 3- S3 0'		07/07/2018	11:40	X		X		2 N	X
	Nighthawk 3- S3 2'		07/07/2018	11:50	X		X		2 N	X
	Nighthawk 3- S3 4'		07/07/2018	12:00	X		X		2 N	X
Relinquished by:		Date:	Time:	Received by:		Date:	Time:	LAB USE ONLY		REMARKS:
Caille Karrigan		7-9-2018	14:30	Caille Karrigan		7-9-2018	14:30	LAB USE ONLY		
Relinquished by:		Date:	Time:	Received by:		Date:	Time:	LAB USE ONLY		REMARKS:
Caille Karrigan		7-9-2018	15:30	Caille Karrigan		7-9-2018	15:30	LAB USE ONLY		
Relinquished by:		Date:	Time:	Received by:		Date:	Time:	LAB USE ONLY		REMARKS:
Caille Karrigan		7-9-2018	15:30	Caille Karrigan		7-9-2018	15:30	LAB USE ONLY		

LAB USE ONLY

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

LAB USE ONLY

Sample Temperature 32.0
128

LAB USE ONLY

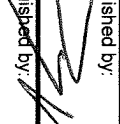
REMARKS:

ANALYSIS REQUEST
(Circle or Specify Method No.)

BTEX 8021B	BTEX 8260B
TPH TX1005 (Ext to C35)	
TPH 8015M (GRO - DRO - MRO)	
PAH 8270C	
Total Metals Ag As Ba Cd Cr Pb Se Hg	
TCLP Metals Ag As Ba Cd Cr Pb Se Hg	
TCLP Volatiles	
TCLP Semi Volatiles	
RCI	
GC/MS Vol. 8260B / 624	
GC/MS Semi. Vol. 8270C/625	
PCB's 8082 / 608	
NORM	
PLM (Asbestos)	
Chloridem (method 300)	
Chloride Sulfate TDS	
General Water Chemistry (see attached list)	
Anion/Cation Balance	

Hold

ORIGINAL COPY

Client Name: Marathon Oil Company		Site Manager: Calle Karrigan							
Project Name: Nighthawk 3									
Project Location: Eddy County, New Mexico (county, state)		Project #:							
Invoice to: Calle Karrigan (cnkarrigan@marathonoil.com)									
Receiving Laboratory: Xenco		Sampler Signature: 							
Comments:									
LAB # (LAB USE ONLY)	SAMPLE IDENTIFICATION	SAMPLING		MATRIX	PRESERVATIVE METHOD	# CONTAINERS	FILTERED (Y/N)		
		YEAR	DATE					TIME	
	Nighthawk 3- S4 0'	07/07/2018	12:10	X		X		2 N	
	Nighthawk 3- S4 2'	07/07/2018	12:15	X		X		2 N	
	Nighthawk 3- S4 4'	07/07/2018	12:20	X		X		2 N	
	Nighthawk 3- S5 0'	07/07/2018	12:30	X		X		2 N	
	Nighthawk 3- S5 2'	07/07/2018	12:35	X		X		2 N	
	Nighthawk 3- S5 4'	07/07/2018	12:40	X		X		2 N	
Relinquished by: Calle Karrigan		Date: 7-9-2018	Time: 14:30	Received by: 		Date: 7-9-2018	Time: 14:30		
Relinquished by: 		Date: 7/9	Time: 15:30	Received by: 		Date: 7/10	Time: 1030		
Relinquished by:		Date:	Time:	Received by:		Date:	Time:		

LAB USE ONLY		REMARKS:	
Sample Temperature	3.2/0.0		
	18		
☐ RUSH: Same Day	24 hr		
☐ Rush Charges Authorized			
☐ Special Report Limits or TRRP Report			

ORIGINAL COPY

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

SHIP DATE: 09 JUL 18
 ACTWGT: 44.00 LB
 CAD: 101813706/NET3980
 DIMS: 24x16x14 IN
 BILL RECIPIENT

TO XENCO

XENCO

1211 W. FLORIDA AVE

MIDLAND TX 79701

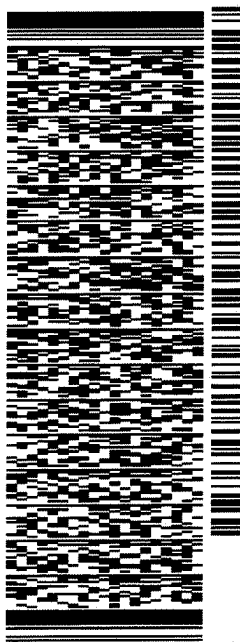
(806) 794-1296

REF:

PO:

DEPT:

552J2/6532/DCA5



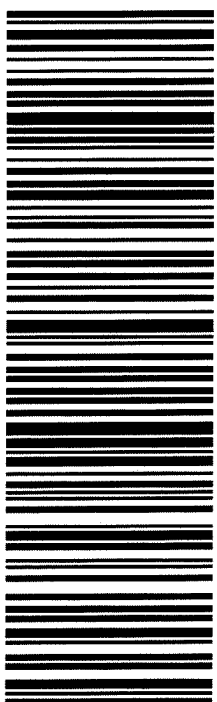
J181118012801ur

TRK# 7726 6345 6301
 0201

TUE - 10 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.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible for any claim in excess of \$100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of \$100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is \$1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our Service Guide. Written claims must be filed within strict time limits, see current FedEx Service Guide.



XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In



Client: Marathon Oil Company

Date/ Time Received: 07/10/2018 11:14:23 AM

Work Order #: 591662

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)?	3.2
#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)?	N/A
#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: Brianna Teel
Brianna Teel

Date: 07/10/2018

Checklist reviewed by: Jessica Kramer
Jessica Kramer

Date: 07/10/2018