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Directional Survey**

**NM OIL CONSERVATION
ARTESIA DISTRICT**

FEB 25 2019

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Marathon Oil

30-015-44501

Marathon Oil

**Eddy County, NM
Hermes Fee 23-28-30
WA #1H
OH**

Design: MWD 164'-14143' PTB 14203'

Survey Report

02 February, 2018





Professional Directional
Survey Report



Company:	Marathon Oil	Local Co-ordinate Reference:	Well WA #1H
Project:	Eddy County, NM	TVD Reference:	Well @ 3143.50usft (GL: 3117' + KB: 26.5' (H&P480))
Site:	Hermes Fee 23-28-30	MD Reference:	Well @ 3143.50usft (GL: 3117' + KB: 26.5' (H&P480))
Well:	WA #1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	MWD 164'-14143' PTB 14203'	Database:	WellPlanner1

Project	Eddy County, NM	System Datum:	Mean Sea Level
Map System:	US State Plane 1927 (Exact solution)		
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Hermes Fee 23-28-30		
Site Position:		Northing:	461,896.31 usft
From:	Lat/Long	Eastng:	565,002.00 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32.269695
		Longitude:	-104.123028
		Grid Convergence:	0.11 "

Well	WA #1H					
Well Position	+N-S	0.00 usft	Northing:	461,896.34 usft	Latitude:	32.269695
	+E-W	0.00 usft	Eastng:	565,052.01 usft	Longitude:	-104.122866
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,117.00 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	User Defined	12/9/2017	7.40	60.04	48,014.50

Design	MWD 164'-14143' PTB 14203'			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	
		Tie On Depth:	0.00	
Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	359.93

Survey Program	Date	2/2/2018		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
164.00	14,203.00	Survey #1 (OH)	MWD+IFR1	OWSG MWD + IFR1



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Site:	Hermes Fee 23-28-30	MD Reference:	Well @ 3143.50usft (GL: 3117' + KB: 26.5' (H&P480))
Well:	WA #1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	MWD 184'-14143' PTB 14203'	Database:	WellPlanner1

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
5,108.00	9.20	233.80	5,091.16	-151.67	-151.89	-184.09	238.67	230.47	461,744.45	564,887.92
5,202.00	11.50	234.50	5,183.63	-161.53	-161.78	-197.79	255.52	230.72	461,734.56	564,854.22
5,296.00	10.50	234.00	5,275.90	-171.99	-172.25	-212.34	273.42	230.95	461,724.09	564,839.67
5,391.00	10.20	233.30	5,369.35	-182.09	-182.37	-226.09	290.47	231.11	461,713.97	564,825.92
5,486.00	9.40	231.50	5,462.96	-191.93	-192.22	-238.91	306.64	231.18	461,704.12	564,813.10
5,580.00	8.50	227.70	5,555.82	-201.37	-201.68	-250.05	321.25	231.11	461,694.66	564,801.96
5,675.00	9.60	229.70	5,649.64	-211.21	-211.53	-261.29	336.18	231.01	461,684.81	564,790.72
5,769.00	8.80	228.90	5,742.43	-220.99	-221.32	-272.68	351.20	230.94	461,675.02	564,779.33
5,864.00	8.40	232.60	5,836.36	-229.97	-230.31	-283.67	365.40	230.93	461,666.03	564,768.34
5,958.00	7.80	240.80	5,929.42	-237.24	-237.60	-294.70	378.55	231.12	461,656.74	564,757.31
6,052.00	6.90	242.10	6,022.65	-242.98	-243.35	-305.25	390.38	231.44	461,652.99	564,746.76
6,147.00	5.80	238.40	6,117.07	-248.15	-248.54	-314.39	400.76	231.67	461,647.80	564,737.62
6,241.00	5.40	243.50	6,210.62	-252.61	-253.00	-322.39	409.81	231.88	461,643.34	564,729.62
6,336.00	3.30	248.10	6,305.34	-255.61	-256.01	-328.93	418.82	232.11	461,640.33	564,723.08
6,430.00	2.20	233.20	6,399.23	-257.70	-258.10	-332.88	421.22	232.21	461,638.24	564,719.13
6,525.00	1.80	251.40	6,494.17	-259.26	-259.67	-335.76	424.46	232.28	461,636.67	564,716.25
6,619.00	0.70	336.10	6,588.16	-259.21	-259.62	-337.39	425.72	232.42	461,636.72	564,714.62
6,714.00	2.50	32.50	6,683.12	-256.93	-257.34	-338.51	423.63	232.59	461,639.00	564,715.50
6,808.00	1.90	35.80	6,777.05	-253.94	-254.35	-334.50	420.22	232.75	461,641.99	564,717.51
6,903.00	1.60	305.10	6,872.02	-251.90	-252.31	-334.66	419.12	232.99	461,644.03	564,717.35
6,997.00	4.20	297.80	6,965.89	-249.53	-249.95	-338.78	421.01	233.58	461,646.39	564,713.23
7,092.00	2.70	297.60	7,060.72	-246.87	-247.29	-343.84	423.53	234.28	461,649.05	564,708.17
7,186.00	1.90	268.10	7,154.64	-245.89	-246.31	-347.36	425.83	234.66	461,650.03	564,704.65
7,281.00	2.40	254.20	7,249.58	-246.48	-246.91	-350.85	429.02	234.86	461,649.43	564,701.16
7,375.00	3.00	260.10	7,343.47	-247.43	-247.87	-355.17	433.11	235.09	461,648.47	564,696.84
7,470.00	2.80	261.80	7,438.35	-248.18	-248.62	-359.91	437.44	235.36	461,647.72	564,692.10
7,564.00	1.60	255.10	7,532.28	-248.84	-249.29	-363.45	440.73	235.55	461,647.05	564,688.56



Professional Directional Survey Report



Company: Marathon Oil
Project: Eddy County, NM
Site: Hermes Fee 23-28-30
Well: WA #1H
Wellbore: OH
Design: MWD 184'-14143' PTB 14203'

Local Co-ordinate Reference: Well WA #1H
TVD Reference: Well @ 3143.50usft (GL: 3117' + KB: 26.5' (H&P480))
MD Reference: Well @ 3143.50usft (GL: 3117' + KB: 26.5' (H&P480))
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)	
7,658.00	0.50	301.80	7,626.26	-248.98	-249.41	-365.07	442.13	235.66	461,646.93	564,686.94	
7,753.00	1.00	313.80	7,721.25	-248.17	-248.62	-368.02	442.47	235.81	461,647.72	564,685.99	
7,847.00	1.50	313.20	7,815.23	-248.76	-247.21	-387.51	442.92	236.07	461,649.13	564,684.50	
7,942.00	1.50	307.80	7,910.20	-245.14	-245.59	-369.40	443.59	236.38	461,650.75	564,682.61	
8,036.00	2.30	267.60	8,004.15	-244.46	-244.92	-372.28	445.60	236.66	461,651.42	564,679.75	
8,131.00	2.30	252.90	8,099.08	-245.10	-245.56	-375.98	449.07	236.85	461,650.78	564,678.03	
8,225.00	0.70	218.10	8,193.04	-246.10	-246.57	-378.14	451.42	236.89	461,649.77	564,673.87	
8,320.00	0.30	95.50	8,288.04	-246.58	-247.05	-378.25	451.78	236.85	461,649.29	564,673.76	
8,414.00	3.00	60.90	8,381.99	-245.41	-245.87	-375.86	449.13	236.81	461,650.47	564,676.15	
8,509.00	1.90	68.30	8,476.90	-243.63	-244.08	-372.22	445.11	236.75	461,652.26	564,679.79	
8,603.00	1.00	51.50	8,570.87	-242.54	-243.00	-370.13	442.77	236.71	461,653.34	564,681.88	
8,698.00	1.50	287.20	8,665.86	-241.66	-242.11	-370.67	442.73	236.85	461,654.23	564,681.34	
8,793.00	1.90	256.00	8,760.82	-241.67	-242.13	-373.38	445.02	237.04	461,654.21	564,678.83	
8,887.00	2.20	259.00	8,854.76	-242.39	-242.85	-376.67	448.17	237.19	461,653.49	564,675.34	
8,981.00	1.80	244.90	8,948.70	-243.35	-243.82	-379.78	451.31	237.30	461,652.52	564,672.23	
9,075.00	2.70	311.40	9,042.65	-242.51	-242.98	-382.77	453.38	237.59	461,653.36	564,669.24	
9,107.00	5.80	336.00	9,074.56	-240.53	-241.00	-384.00	453.36	237.89	461,655.34	564,668.01	
9,138.00	10.10	342.90	9,105.25	-236.50	-236.97	-385.43	452.45	238.42	461,659.37	564,666.58	
9,169.00	14.20	347.80	9,135.55	-230.18	-230.65	-387.04	450.56	239.21	461,665.69	564,664.97	
9,201.00	18.80	350.40	9,166.23	-221.25	-221.73	-388.73	447.52	240.30	461,674.61	564,663.28	
9,232.00	22.00	350.90	9,195.28	-210.59	-211.07	-390.48	443.87	241.61	461,685.27	564,661.53	
9,264.00	25.10	350.80	9,224.61	-197.97	-198.45	-392.51	439.83	243.18	461,697.89	564,659.50	
9,295.00	28.30	353.00	9,252.30	-184.18	-184.66	-394.48	435.54	244.91	461,711.68	564,657.55	
9,327.00	31.90	358.10	9,279.99	-168.19	-168.67	-395.67	430.12	246.91	461,727.67	564,656.34	
9,358.00	35.60	1.70	9,305.76	-150.88	-151.46	-395.67	423.67	249.05	461,744.88	564,656.34	
9,390.00	38.70	3.20	9,331.26	-131.67	-132.16	-394.84	416.37	251.49	461,764.18	564,657.17	
9,422.00	41.20	2.90	9,355.79	-111.16	-111.64	-393.74	409.26	254.17	461,784.70	564,658.27	



Marathon Oil

Professional Directional
Survey Report



Company: Marathon Oil
Project: Eddy County, NM
Site: Hermes Fee 23-28-30
Well: WA #1H
Wellbore: OH
Design: MMD 164-14143 PTB 14203

Local Co-ordinate Reference: Well WA #1H
TVD Reference: Well @ 3143.50uH (CL: 3117' + KB: 28.5' (H&P480))
MD Reference: Well @ 3143.50uH (CL: 3117' + KB: 28.5' (H&P480))
North Reference: GCD
Survey Calculation Method: Minimum Curvature
Database: Wellplaner1

Survey	MD (uH)	Inc (°)	Asl (eclimH) (°)	TVD (uH)	V. Sec (uH)	N/S (uH)	E/W (uH)	Closure Distance (uH)	Closure Azimuth (°)	Northing (uH)	Easting (uH)
	11,148.00	90.10	356.70	9,609.02	1,541.43	1,540.85	-394.42	1,590.63	345.64	483,437.29	564,657.59
	11,242.00	90.50	356.10	9,608.53	1,635.25	1,634.77	-400.33	1,683.07	346.24	483,531.11	564,651.68
	11,337.00	90.60	359.70	9,607.62	1,730.17	1,729.68	-403.81	1,776.19	346.66	483,626.02	564,648.20
	11,432.00	90.40	0.10	9,606.78	1,825.17	1,824.68	-403.87	1,868.86	347.52	483,721.02	564,648.04
	11,526.00	90.50	0.30	9,606.05	1,919.17	1,918.68	-403.84	1,960.67	348.12	483,815.02	564,648.37
	11,621.00	89.50	0.30	9,606.05	2,014.18	2,013.67	-403.15	2,053.63	348.69	483,910.01	564,648.88
	11,715.00	89.80	358.80	9,606.54	2,108.16	2,107.67	-403.80	2,146.00	348.15	484,004.01	564,648.21
	11,809.00	89.60	356.30	9,606.95	2,202.13	2,201.64	-406.10	2,238.78	348.55	484,097.88	564,645.81
	11,904.00	90.90	356.70	9,606.54	2,297.10	2,296.60	-408.59	2,332.66	348.91	484,192.94	564,643.42
	11,998.00	90.00	358.60	9,605.79	2,392.07	2,391.57	-410.82	2,426.60	350.25	484,287.81	564,641.19
	12,093.00	88.70	357.40	9,606.88	2,486.01	2,485.50	-414.10	2,518.76	350.54	484,381.84	564,637.81
	12,187.00	91.40	355.60	9,606.78	2,579.83	2,578.32	-418.84	2,613.26	350.75	484,475.66	564,632.17
	12,282.00	91.00	356.20	9,604.78	2,674.67	2,674.15	-424.98	2,707.71	350.87	484,570.49	564,627.03
	12,377.00	90.70	359.00	9,603.38	2,769.63	2,769.11	-427.30	2,801.88	351.23	484,665.45	564,624.71
	12,471.00	91.60	359.60	9,601.48	2,863.60	2,863.08	-428.45	2,894.96	351.49	484,759.42	564,623.96
	12,566.00	80.80	359.80	9,599.50	2,958.56	2,958.06	-428.94	2,988.00	351.75	484,854.40	564,623.07
	12,660.00	91.20	0.40	9,597.68	3,052.56	3,052.04	-428.78	3,082.02	352.00	484,948.38	564,623.23
	12,755.00	89.80	359.70	9,597.03	3,147.56	3,147.04	-428.70	3,176.10	352.24	485,043.38	564,623.31
	12,849.00	91.50	0.60	9,595.97	3,241.55	3,241.03	-428.45	3,269.22	352.47	485,137.37	564,623.86
	12,944.00	91.40	1.00	9,593.56	3,336.50	3,335.99	-427.13	3,363.22	352.70	485,232.33	564,624.88
	13,038.00	91.40	1.00	9,591.27	3,430.46	3,429.94	-425.49	3,456.23	352.93	485,326.28	564,626.52
	13,133.00	92.20	1.80	9,588.28	3,525.38	3,524.87	-423.17	3,550.18	353.15	485,421.21	564,628.84
	13,227.00	90.90	1.70	9,585.74	3,619.30	3,618.79	-420.30	3,643.11	353.38	485,515.13	564,631.71
	13,322.00	88.70	0.50	9,586.07	3,714.27	3,713.76	-418.47	3,737.26	353.57	485,610.10	564,633.54
	13,417.00	88.90	356.90	9,586.72	3,809.18	3,808.66	-418.67	3,831.66	353.72	485,705.02	564,633.04
	13,511.00	86.40	356.30	9,586.03	3,902.95	3,902.44	-421.28	3,925.11	353.84	485,798.78	564,630.75
	13,606.00	88.20	357.10	9,601.33	3,997.72	3,997.20	-425.07	4,018.74	353.93	485,893.54	564,628.94



Professional Directional Survey Report



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Project: Eddy County, NM
Site: Hermes Fee 23-28-30
Well: WA #1H
Wellbore: OH
Design: MWD 164'-14143' PTB 14203'

Local Co-ordinate Reference: Well WA #1H
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MD Reference: Well @ 3143.50usft (GL: 3117' + KB: 26.5' (H&P480))
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
13,700.00	89.80	357.20	9,602.97	4,091.59	4,091.07	-429.74	4,113.58	354.00	465,987.41	564,622.27
13,795.00	92.90	357.40	9,600.73	4,186.45	4,185.93	-434.21	4,208.39	354.08	466,082.27	564,617.80
13,889.00	92.80	357.60	9,596.06	4,280.25	4,279.72	-438.31	4,302.11	354.15	466,178.06	564,613.70
13,984.00	92.30	357.30	9,591.83	4,375.07	4,374.53	-442.53	4,396.86	354.22	466,270.87	564,609.48
14,078.00	92.20	357.60	9,588.14	4,468.91	4,468.37	-446.71	4,490.64	354.29	466,364.71	564,605.30
14,143.00	92.30	357.60	9,585.59	4,533.81	4,533.26	-449.43	4,555.48	354.34	466,429.60	564,602.58
Last Survey: 14143' MD, 9586' TVD										
14,203.00	92.30	357.60	9,583.18	4,593.71	4,593.16	-451.94	4,615.34	354.38	466,489.50	564,600.07
PTB: 14203' MD, 9583' TVD										

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
14,143.00	9,585.59	4,533.26	-449.43	Last Survey: 14143' MD, 9586' TVD
14,203.00	9,583.18	4,593.16	-451.94	PTB: 14203' MD, 9583' TVD