



NM OIL CONSERVATION
ARTESIA DISTRICT

APR 06 2018

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Marathon Oil EF LLC

Eddy County, NM (NAD83)

Kyle 34 Federal

#5H

30-015-43295

OH / Job #60399

Design: Surveys (Patterson 244)

Standard Survey Report

02 July, 2017



Company: Marathon Oil EF LLC
Project: Eddy County, NM (NAD83)
Site: Kyle 34 Federal
Well: #5H
Wellbore: OH / Job #60399
Design: Surveys (Patterson 244)

Local Co-ordinate Reference: Well #5H
TVD Reference: GL + KB @ 3021.50usft (Patterson 244)
MD Reference: GL + KB @ 3021.50usft (Patterson 244)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass 5000 GCR

Project	Eddy County, NM (NAD83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Kyle 34 Federal			
Site Position:		Northing:	424,643.00 usft	Latitude: 32° 10' 1.72920 N
From: Map		Easting:	622,917.10 usft	Longitude: 104° 4' 10.86310 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence: 0.14 °

Well	#5H			
Well Position	+N/-S	0.00 usft	Northing:	424,643.00 usft
	+E/-W	0.00 usft	Easting:	622,917.10 usft
Position Uncertainty	0.00 usft		Wellhead Elevation:	0.00 usft
			Ground Level:	2,993.00 usft

Wellbore	OH / Job #60399				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/30/2017	7.25	59.98	48,095

Design	Surveys (Patterson 244)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	359.26	

Survey Program	Date 7/2/2017				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
118.00	460.00	Phoenix Gyro Surveys (OH / Job #60399)	PHX_SPT_GTD	PHX Continuous north-seeking gyro	
536.00	2,604.00	Phoenix MWD Surveys (IFR + MSA) (OH	MWD+IFR1+MS	OWSG Rev. 2 MWD + IFR1 + Multi-Station Corre	
2,736.00	14,337.00	Phoenix MWD Surveys (HDGM+MSA) (OI	MWD+HDGM+MS	OWSG Rev.2 MWD + HDGM + Multi-Station Cor	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
118.00	0.41	224.78	118.00	-0.30	-0.30	-0.30	0.35	0.35	0.00
210.00	0.86	343.37	210.00	0.13	-0.73	0.14	1.21	0.49	128.90
302.00	1.01	344.30	301.98	1.57	-1.14	1.59	0.16	0.16	1.01
393.00	0.32	287.37	392.98	2.42	-1.60	2.44	0.96	-0.76	-62.56
460.00	0.69	192.10	459.98	2.08	-1.87	2.10	1.17	0.55	-142.19
Tie In									
536.00	0.56	161.65	535.97	1.28	-1.85	1.30	0.46	-0.17	-40.07

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First Phoenix MWD Survey									
598.00	0.63	188.66	597.97	0.66	-1.80	0.68	0.46	0.11	43.56
690.00	0.90	187.91	689.96	-0.56	-1.98	-0.53	0.29	0.29	-0.82
781.00	0.69	188.20	780.95	-1.81	-2.15	-1.78	0.23	-0.23	0.32
873.00	1.03	209.82	872.94	-3.08	-2.64	-3.04	0.50	0.37	23.50
965.00	0.89	228.16	964.93	-4.27	-3.59	-4.22	0.36	-0.15	19.93
1,056.00	1.09	224.66	1,055.91	-5.36	-4.72	-5.30	0.23	0.22	-3.85
1,147.00	1.30	254.52	1,146.90	-6.25	-6.33	-6.17	0.71	0.23	32.81
1,239.00	2.51	264.58	1,238.84	-6.72	-9.34	-6.60	1.36	1.32	10.93
1,331.00	0.23	330.78	1,330.81	-6.75	-11.43	-6.60	2.64	-2.48	71.96
1,423.00	0.93	81.27	1,422.81	-6.47	-10.78	-6.33	1.12	0.76	120.10
1,515.00	0.96	84.72	1,514.80	-6.29	-9.28	-6.17	0.07	0.03	3.75
1,609.00	0.97	66.30	1,608.78	-5.90	-7.77	-5.79	0.33	0.01	-19.60
1,702.00	0.93	81.43	1,701.77	-5.47	-6.30	-5.38	0.27	-0.04	16.27
1,797.00	0.86	61.80	1,796.76	-5.01	-4.91	-4.95	0.33	-0.07	-20.66
1,891.00	1.10	87.69	1,890.75	-4.65	-3.39	-4.60	0.53	0.26	27.54
1,986.00	1.88	85.06	1,985.71	-4.47	-0.92	-4.46	0.82	0.82	-2.77
2,080.00	1.67	168.27	2,079.68	-5.68	0.89	-5.69	2.51	-0.22	88.52
2,174.00	2.36	190.41	2,173.62	-8.93	0.82	-8.94	1.09	0.73	23.55
2,269.00	1.80	110.01	2,268.58	-11.36	1.87	-11.39	2.86	-0.59	-84.63
2,364.00	3.19	101.78	2,363.49	-12.41	5.86	-12.49	1.51	1.46	-8.66
2,458.00	0.90	192.50	2,457.43	-13.67	8.26	-13.77	3.54	-2.44	96.51
2,552.00	1.37	228.71	2,551.42	-15.13	7.26	-15.22	0.89	0.50	38.52
2,604.00	1.27	224.04	2,603.40	-15.95	6.39	-16.04	0.28	-0.19	-8.98
2,736.00	1.70	218.81	2,735.36	-18.53	4.15	-18.58	0.34	0.33	-3.96
2,831.00	2.33	223.12	2,830.30	-21.04	1.94	-21.06	0.68	0.66	4.54
2,925.00	2.98	210.29	2,924.20	-24.54	-0.60	-24.53	0.93	0.69	-13.65
3,020.00	3.69	209.46	3,019.04	-29.34	-3.35	-29.29	0.75	0.75	-0.87
3,114.00	4.53	193.47	3,112.80	-35.58	-5.70	-35.51	1.50	0.89	-17.01
3,208.00	5.64	190.51	3,206.42	-43.73	-7.41	-43.63	1.21	1.18	-3.15
3,303.00	5.39	192.35	3,300.99	-52.68	-9.21	-52.56	0.32	-0.26	1.94
3,397.00	5.85	185.97	3,394.53	-61.76	-10.65	-61.62	0.82	0.49	-6.79
3,491.00	4.92	186.62	3,488.12	-70.53	-11.62	-70.37	0.99	-0.99	0.69
3,585.00	6.03	186.99	3,581.69	-79.43	-12.68	-79.26	1.18	1.18	0.39
3,680.00	5.74	188.66	3,676.19	-89.08	-14.00	-88.89	0.35	-0.31	1.76
3,775.00	5.68	187.33	3,770.72	-98.44	-15.32	-98.23	0.15	-0.06	-1.40
3,869.00	5.35	186.54	3,864.28	-107.41	-16.41	-107.19	0.36	-0.35	-0.84
3,964.00	5.06	185.54	3,958.89	-115.98	-17.32	-115.74	0.32	-0.31	-1.05
4,059.00	4.74	187.58	4,053.54	-124.04	-18.24	-123.79	0.38	-0.34	2.15
4,154.00	4.72	188.34	4,148.22	-131.80	-19.33	-131.54	0.07	-0.02	0.80
4,249.00	4.65	188.41	4,242.90	-139.47	-20.46	-139.20	0.07	-0.07	0.07
4,343.00	4.70	191.00	4,336.59	-147.02	-21.75	-146.73	0.23	0.05	2.76
4,437.00	3.92	193.07	4,430.32	-153.93	-23.21	-153.62	0.85	-0.83	2.20
4,531.00	2.99	184.36	4,524.15	-159.51	-24.12	-159.18	1.13	-0.99	-9.27

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4,626.00	2.26	172.53	4,619.05	-163.84	-24.07	-163.51	0.95	-0.77	-12.45
4,720.00	0.99	144.56	4,713.01	-166.34	-23.36	-166.02	1.55	-1.35	-29.76
4,814.00	1.07	145.33	4,807.00	-167.72	-22.39	-167.42	0.09	0.09	0.82
4,908.00	0.57	103.46	4,900.99	-168.55	-21.43	-168.26	0.80	-0.53	-44.54
5,003.00	0.23	128.55	4,995.99	-168.78	-20.83	-168.50	0.39	-0.36	26.41
5,097.00	0.35	145.96	5,089.98	-169.13	-20.52	-168.85	0.16	0.13	18.52
5,192.00	0.25	150.77	5,184.98	-169.56	-20.25	-169.28	0.11	-0.11	5.06
5,286.00	0.37	214.44	5,278.98	-169.99	-20.32	-169.71	0.36	0.13	67.73
5,381.00	0.41	226.61	5,373.98	-170.47	-20.75	-170.19	0.10	0.04	12.81
5,475.00	0.51	201.49	5,467.98	-171.09	-21.14	-170.80	0.24	0.11	-26.72
5,569.00	0.26	319.68	5,561.98	-171.32	-21.43	-171.03	0.72	-0.27	125.73
5,664.00	0.27	315.06	5,656.97	-171.00	-21.73	-170.70	0.02	0.01	-4.86
5,758.00	0.01	37.93	5,750.97	-170.83	-21.88	-170.53	0.29	-0.28	88.16
5,852.00	0.27	303.98	5,844.97	-170.70	-22.06	-170.40	0.29	0.28	-99.95
5,946.00	0.05	206.14	5,938.97	-170.62	-22.26	-170.31	0.30	-0.23	-104.09
6,041.00	0.46	165.60	6,033.97	-171.02	-22.19	-170.72	0.45	0.43	-42.67
6,135.00	0.35	187.32	6,127.97	-171.67	-22.13	-171.37	0.20	-0.12	23.11
6,230.00	0.69	197.08	6,222.97	-172.51	-22.33	-172.20	0.37	0.36	10.27
6,324.00	0.34	256.55	6,316.96	-173.11	-22.77	-172.80	0.63	-0.37	63.27
6,418.00	0.59	257.97	6,410.96	-173.28	-23.52	-172.96	0.27	0.27	1.51
6,512.00	0.70	295.14	6,504.95	-173.14	-24.51	-172.80	0.45	0.12	39.54
6,606.00	0.88	300.23	6,598.94	-172.53	-25.65	-172.18	0.21	0.19	5.41
6,700.00	1.61	321.62	6,692.92	-171.13	-27.10	-170.76	0.91	0.78	22.76
6,794.00	0.98	312.83	6,786.90	-169.55	-28.51	-169.16	0.70	-0.67	-9.35
6,888.00	0.88	301.77	6,880.89	-168.62	-29.71	-168.22	0.22	-0.11	-11.77
6,981.00	2.30	319.18	6,973.85	-166.83	-31.54	-166.41	1.60	1.53	18.72
7,076.00	2.54	334.66	7,068.76	-163.49	-33.68	-163.04	0.73	0.25	16.29
7,170.00	2.34	334.62	7,162.68	-159.87	-35.40	-159.40	0.21	-0.21	-0.04
7,264.00	0.79	279.11	7,256.64	-158.04	-36.86	-157.54	2.13	-1.65	-59.05
7,358.00	0.68	221.42	7,350.64	-158.35	-37.87	-157.85	0.76	-0.12	-61.37
7,453.00	1.13	228.04	7,445.63	-159.40	-38.94	-158.88	0.49	0.47	6.97
7,547.00	0.33	303.75	7,539.62	-159.87	-39.85	-159.34	1.17	-0.85	80.54
7,641.00	1.85	5.97	7,633.60	-158.21	-39.92	-157.68	1.83	1.62	66.19
7,735.00	2.80	32.83	7,727.53	-154.77	-38.52	-154.26	1.51	1.01	28.57
7,831.00	0.29	40.92	7,823.48	-152.62	-37.09	-152.12	2.62	-2.61	8.43
7,925.00	0.55	94.65	7,917.48	-152.47	-36.48	-151.99	0.47	0.28	57.16
8,019.00	1.32	76.21	8,011.47	-152.25	-34.98	-151.79	0.87	0.82	-19.62
8,114.00	1.70	117.06	8,106.44	-152.63	-32.66	-152.20	1.17	0.40	43.00
8,208.00	1.60	138.00	8,200.40	-154.24	-30.54	-153.83	0.65	-0.11	22.28
8,302.00	1.44	140.00	8,294.37	-156.12	-28.91	-155.73	0.18	-0.17	2.13
8,396.00	1.55	178.06	8,388.34	-158.30	-28.10	-157.92	1.04	0.12	40.49
8,490.00	1.18	192.31	8,482.31	-160.51	-28.27	-160.13	0.53	-0.39	15.16
8,585.00	1.79	173.42	8,577.28	-162.94	-28.31	-162.56	0.82	0.64	-19.88

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8,679.00	2.23	177.76	8,671.22	-166.23	-28.07	-165.85	0.49	0.47	4.62
8,773.00	1.25	105.87	8,765.18	-168.34	-27.01	-167.97	2.33	-1.04	-76.48
8,868.00	2.67	104.81	8,860.13	-169.19	-23.87	-168.86	1.50	1.49	-1.12
8,962.00	1.75	120.90	8,954.06	-170.48	-20.52	-170.20	1.17	-0.98	17.12
8,974.00	1.75	126.69	8,966.05	-170.69	-20.22	-170.41	1.47	0.00	48.25
9,021.00	1.68	116.05	9,013.03	-171.42	-19.02	-171.16	0.69	-0.15	-22.64
9,068.00	2.87	85.23	9,059.99	-171.62	-17.23	-171.38	3.55	2.53	-65.57
9,115.00	6.46	17.94	9,106.86	-169.01	-15.24	-168.80	12.70	7.64	-143.17
9,162.00	11.94	358.65	9,153.24	-161.62	-14.54	-161.42	13.22	11.66	-41.04
9,209.00	17.86	356.53	9,198.64	-149.56	-15.09	-149.35	12.65	12.60	-4.51
9,256.00	23.29	359.00	9,242.63	-133.06	-15.69	-132.85	11.70	11.55	5.26
9,303.00	28.25	0.26	9,284.94	-112.64	-15.81	-112.42	10.62	10.55	2.68
9,350.00	32.53	0.38	9,325.48	-88.87	-15.67	-88.65	9.11	9.11	0.26
9,397.00	37.69	358.36	9,363.91	-61.85	-16.00	-61.64	11.25	10.98	-4.30
9,445.00	43.14	358.15	9,400.45	-30.75	-16.95	-30.53	11.36	11.35	-0.44
9,492.00	46.65	358.34	9,433.73	2.40	-17.96	2.63	7.47	7.47	0.40
9,539.00	50.42	0.26	9,464.85	37.61	-18.38	37.84	8.58	8.02	4.09
9,586.00	54.43	0.60	9,493.51	74.85	-18.09	75.08	8.55	8.53	0.72
9,622.00	57.80	0.31	9,513.58	104.73	-17.86	104.95	9.38	9.36	-0.80
FTP									
9,633.00	58.83	0.23	9,519.35	114.09	-17.81	114.31	9.38	9.36	-0.76
9,680.00	61.94	359.93	9,542.58	154.94	-17.76	155.16	6.64	6.62	-0.64
9,727.00	64.50	359.43	9,563.75	196.90	-17.99	197.11	5.53	5.45	-1.06
9,808.00	68.35	359.20	9,596.14	271.12	-18.88	271.34	4.76	4.75	-0.28
9,855.00	71.77	359.59	9,612.17	315.29	-19.35	315.52	7.32	7.28	0.83
9,902.00	74.35	358.03	9,625.86	360.24	-20.29	360.47	6.34	5.49	-3.32
9,949.00	79.11	355.71	9,636.65	405.90	-22.79	406.16	11.21	10.13	-4.94
9,996.00	82.37	356.92	9,644.21	452.18	-25.77	452.48	7.39	6.94	2.57
10,043.00	86.94	356.80	9,648.59	498.89	-28.33	499.22	9.73	9.72	-0.26
10,090.00	89.72	357.20	9,649.96	545.80	-30.79	546.16	5.98	5.91	0.85
10,185.00	88.76	358.34	9,651.22	640.72	-34.49	641.11	1.57	-1.01	1.20
10,278.00	90.34	358.88	9,651.95	733.69	-36.74	734.10	1.80	1.70	0.58
10,373.00	90.16	2.28	9,651.53	828.67	-35.78	829.06	3.58	-0.19	3.58
10,467.00	89.83	2.66	9,651.54	922.58	-31.73	922.91	0.54	-0.35	0.40
10,560.00	91.71	3.07	9,650.29	1,015.45	-27.08	1,015.72	2.07	2.02	0.44
10,655.00	90.18	2.62	9,648.72	1,110.32	-22.37	1,110.52	1.68	-1.61	-0.47
10,749.00	88.72	359.69	9,649.63	1,204.28	-20.47	1,204.45	3.48	-1.55	-3.12
10,843.00	88.76	359.50	9,651.69	1,298.26	-21.14	1,298.42	0.21	0.04	-0.20
10,937.00	89.90	358.24	9,652.79	1,392.23	-22.99	1,392.41	1.81	1.21	-1.34
11,031.00	88.47	357.51	9,654.13	1,486.15	-26.48	1,486.37	1.71	-1.52	-0.78
11,125.00	89.74	358.85	9,655.60	1,580.09	-29.46	1,580.34	1.96	1.35	1.43
11,218.00	90.25	359.14	9,655.61	1,673.07	-31.09	1,673.34	0.63	0.55	0.31
11,312.00	90.82	358.75	9,654.73	1,767.05	-32.82	1,767.33	0.73	0.61	-0.41

Company: Marathon Oil EF LLC
Project: Eddy County, NM (NAD83)
Site: Kyle 34 Federal
Well: #5H
Wellbore: OH / Job #60399
Design: Surveys (Patterson 244)

Local Co-ordinate Reference: Well #5H
TVD Reference: GL + KB @ 3021.50usft (Patterson 244)
MD Reference: GL + KB @ 3021.50usft (Patterson 244)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass 5000 GCR

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,406.00	89.71	0.16	9,654.29	1,861.04	-33.72	1,861.33	1.91	-1.18	1.50
11,500.00	89.12	359.21	9,655.25	1,955.04	-34.23	1,955.32	1.19	-0.63	-1.01
11,595.00	90.50	0.15	9,655.57	2,050.03	-34.76	2,050.31	1.76	1.45	0.99
11,689.00	91.84	0.90	9,653.65	2,144.01	-33.90	2,144.26	1.63	1.43	0.80
11,783.00	89.80	359.37	9,652.30	2,237.99	-33.68	2,238.24	2.71	-2.17	-1.63
11,877.00	90.57	359.02	9,652.00	2,331.98	-35.00	2,332.23	0.90	0.82	-0.37
11,972.00	90.50	356.71	9,651.11	2,426.90	-38.54	2,427.20	2.43	-0.07	-2.43
12,066.00	91.05	356.95	9,649.84	2,520.75	-43.74	2,521.10	0.64	0.59	0.26
12,160.00	90.92	358.85	9,648.23	2,614.67	-47.18	2,615.06	2.03	-0.14	2.02
12,254.00	87.78	359.99	9,649.29	2,708.64	-48.14	2,709.04	3.55	-3.34	1.21
12,349.00	87.22	0.15	9,653.44	2,803.55	-48.02	2,803.94	0.61	-0.59	0.17
12,443.00	88.88	356.92	9,656.64	2,897.45	-50.42	2,897.86	3.86	1.77	-3.44
12,537.00	90.01	357.60	9,657.55	2,991.34	-54.92	2,991.80	1.40	1.20	0.72
12,631.00	89.81	359.01	9,657.69	3,085.29	-57.70	3,085.78	1.52	-0.21	1.50
12,726.00	89.88	358.69	9,657.95	3,180.27	-59.60	3,180.78	0.34	0.07	-0.34
12,821.00	90.29	358.28	9,657.81	3,275.24	-62.11	3,275.77	0.61	0.43	-0.43
12,915.00	89.59	357.82	9,657.91	3,369.18	-65.31	3,369.75	0.89	-0.74	-0.49
13,010.00	89.15	357.21	9,658.95	3,464.09	-69.43	3,464.70	0.79	-0.46	-0.64
13,103.00	90.52	0.41	9,659.22	3,557.05	-71.36	3,557.68	3.74	1.47	3.44
13,198.00	90.40	0.08	9,658.46	3,652.05	-70.96	3,652.66	0.37	-0.13	-0.35
13,293.00	90.70	0.32	9,657.55	3,747.04	-70.62	3,747.64	0.40	0.32	0.25
13,387.00	90.22	359.66	9,656.79	3,841.04	-70.64	3,841.63	0.87	-0.51	-0.70
13,481.00	89.93	0.00	9,656.67	3,935.04	-70.92	3,935.63	0.48	-0.31	0.36
13,576.00	89.41	358.86	9,657.22	4,030.03	-71.86	4,030.62	1.32	-0.55	-1.20
13,670.00	89.97	356.54	9,657.72	4,123.95	-75.64	4,124.58	2.54	0.60	-2.47
13,765.00	89.36	356.39	9,658.28	4,218.76	-81.49	4,219.47	0.66	-0.64	-0.16
13,859.00	89.06	354.70	9,659.58	4,312.47	-88.79	4,313.26	1.83	-0.32	-1.80
13,953.00	88.85	353.87	9,661.29	4,405.98	-98.15	4,406.89	0.91	-0.22	-0.88
14,047.00	91.32	357.70	9,661.15	4,499.71	-105.06	4,500.69	4.85	2.63	4.07
14,142.00	91.57	2.60	9,658.75	4,594.65	-104.81	4,595.62	5.16	0.26	5.16
14,236.00	91.24	4.19	9,656.45	4,688.45	-99.25	4,689.34	1.73	-0.35	1.69
14,291.00	89.77	2.82	9,655.96	4,743.34	-95.89	4,744.19	3.65	-2.67	-2.49
Final Phoenix MWD Survey									
14,337.00	89.77	2.82	9,656.15	4,789.29	-93.62	4,790.10	0.00	0.00	0.00
Projection to TD									

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Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
460.00	459.98	2.08	-1.87	Tie In
536.00	535.97	1.28	-1.85	First Phoenix MWD Survey
9,622.00	9,513.58	104.73	-17.86	FTP
14,291.00	9,655.96	4,743.34	-95.89	Final Phoenix MWD Survey
14,337.00	9,656.15	4,789.29	-93.62	Projection to TD