

HOBBS OCD

JAN 28 2020

Marathon Oil

Cave Lion 5 TB Federal 8H

This survey is correct to the best of my knowledge and is supported by actual field data.

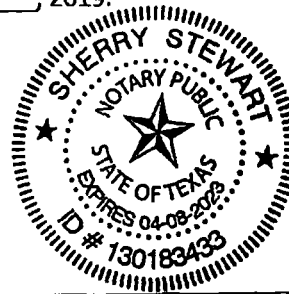
Notarized this data 19th of December, 2019.

Sherry Stewart

Notary Signature

County of Midland

State of Texas



Scientific Drilling

The

In Wellbore Placement

Double
Sided



Marathon Oil Permian, LLC

Lea County, NM (NAD27-NME)

Cave Lion Pad

Cave Lion 5 TB Federal #8H

OH

Design: OH

Standard Survey Report

19 December, 2019



www.scientificdrilling.com



Scientific Drilling, Intl

Survey Report



Company: Marathon Oil Permian, LLC
Project: Lea County, NM (NAD27-NME)
Site: Cave Lion Pad
Well: Cave Lion 5 TB Federal #8H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Cave Lion 5 TB Federal #8H
TVD Reference: KB=26.5 @ 3288.50usft
MD Reference: KB=26.5 @ 3288.50usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland

Project	Lea County, NM (NAD27-NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		Using geodetic scale factor

Site	Cave Lion Pad				
Site Position:		Northing:	388,917.09 usft	Latitude:	32° 3' 56.703 N
From:	Map	Easting:	791,664.75 usft	Longitude:	103° 23' 30.513 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.50 °

Well	Cave Lion 5 TB Federal #8H				
Well Position	+N/-S	0.00 usft	Northing:	388,917.06 usft	Latitude: 32° 3' 56.698 N
	+E/-W	0.00 usft	Easting:	791,724.71 usft	Longitude: 103° 23' 29.817 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	0.00 usft	Ground Level: 3,262.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	5/20/2019	6.58	59.68	47,709.90000000

Design	OH				
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 (bearing)	
	0.00	0.00	0.00		359.41

Survey Program	Date 5/29/2019				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
183.00	1,065.00	SDI MWD - Surface (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,247.00	11,727.00	SDI MWD - Intermediate (OH)	MWD+HRGM	OWSG MWD + HRGM	
11,826.00	12,959.00	SDI MWD - Curve (OH)	MWD+HRGM	OWSG MWD + HRGM	
13,053.00	17,261.00	SDI MWD - Lateral (OH)	MWD+HRGM	OWSG MWD + HRGM	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	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	
183.00	1.12	250.66	182.99	-0.59	-1.69	-0.57	0.61	0.61	0.00	
244.00	0.83	260.10	243.98	-0.87	-2.69	-0.84	0.54	-0.48	15.48	
335.00	0.77	275.72	334.97	-0.92	-3.94	-0.88	0.25	-0.07	17.16	
426.00	0.67	264.27	425.96	-0.91	-5.08	-0.86	0.19	-0.11	-12.58	
518.00	0.49	280.18	517.96	-0.89	-6.00	-0.83	0.26	-0.20	17.29	
608.00	0.47	280.86	607.96	-0.76	-6.74	-0.69	0.02	-0.02	0.76	
700.00	0.77	305.03	699.95	-0.33	-7.62	-0.25	0.43	0.33	26.27	



Scientific Drilling, Intl Survey Report



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Survey Calculation Method: Minimum Curvature
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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
792.00	0.86	298.29	791.94	0.35	-8.74	0.44	0.14	0.10	-7.33
884.00	0.95	300.20	883.93	1.06	-10.00	1.16	0.10	0.10	2.08
974.00	1.08	304.37	973.92	1.92	-11.35	2.03	0.17	0.14	4.63
1,065.00	0.93	320.34	1,064.90	2.97	-12.53	3.10	0.35	-0.16	17.55
1,247.00	1.02	308.68	1,246.88	5.12	-14.73	5.27	0.12	0.05	-6.41
1,341.00	0.47	147.16	1,340.87	5.32	-15.18	5.47	1.57	-0.59	-171.83
1,436.00	1.24	141.37	1,435.86	4.19	-14.33	4.33	0.81	0.81	-6.09
1,530.00	1.70	143.20	1,529.83	2.28	-12.85	2.41	0.49	0.49	1.95
1,624.00	1.45	144.81	1,623.79	0.19	-11.33	0.30	0.27	-0.27	1.71
1,719.00	1.52	150.82	1,718.76	-1.90	-10.03	-1.79	0.18	0.07	6.33
1,813.00	1.50	145.85	1,812.73	-4.00	-8.73	-3.91	0.14	-0.02	-5.29
1,907.00	1.17	138.58	1,906.70	-5.74	-7.40	-5.66	0.39	-0.35	-7.73
2,002.00	0.95	131.05	2,001.69	-6.98	-6.17	-6.92	0.27	-0.23	-7.93
2,096.00	0.62	129.20	2,095.68	-7.82	-5.19	-7.76	0.35	-0.35	-1.97
2,190.00	0.69	163.00	2,189.67	-8.68	-4.63	-8.63	0.41	0.07	35.96
2,285.00	0.50	140.92	2,284.67	-9.55	-4.20	-9.50	0.31	-0.20	-23.24
2,379.00	1.03	122.45	2,378.66	-10.32	-3.23	-10.29	0.61	0.56	-19.65
2,474.00	0.36	152.75	2,473.65	-11.04	-2.37	-11.02	0.78	-0.71	31.89
2,568.00	0.30	104.75	2,567.65	-11.37	-2.00	-11.35	0.29	-0.06	-51.06
2,662.00	0.62	146.58	2,661.65	-11.86	-1.48	-11.84	0.47	0.34	44.50
2,757.00	0.51	78.81	2,756.64	-12.20	-0.78	-12.19	0.67	-0.12	-71.34
2,851.00	0.89	73.25	2,850.64	-11.91	0.33	-11.91	0.41	0.40	-5.91
2,945.00	0.71	52.35	2,944.63	-11.35	1.49	-11.36	0.36	-0.19	-22.23
3,040.00	0.71	90.79	3,039.62	-10.99	2.54	-11.02	0.49	0.00	40.46
3,134.00	0.17	210.38	3,133.62	-11.12	3.06	-11.15	0.86	-0.57	127.22
3,228.00	1.52	227.90	3,227.61	-12.08	2.06	-12.10	1.45	1.44	18.64
3,323.00	2.51	219.03	3,322.55	-14.54	-0.18	-14.54	1.09	1.04	-9.34
3,417.00	3.81	225.83	3,416.40	-18.31	-3.72	-18.28	1.44	1.38	7.23
3,512.00	4.82	232.16	3,511.13	-22.96	-9.14	-22.87	1.17	1.06	6.66
3,606.00	6.09	233.54	3,604.70	-28.35	-16.27	-28.18	1.36	1.35	1.47
3,701.00	7.31	234.63	3,699.05	-34.84	-25.25	-34.58	1.29	1.28	1.15
3,795.00	9.06	232.50	3,792.09	-42.81	-36.00	-42.44	1.89	1.86	-2.27
3,890.00	10.58	226.17	3,885.70	-53.40	-48.22	-52.90	1.96	1.60	-6.66
3,984.00	11.14	227.72	3,978.02	-65.49	-61.17	-64.86	0.67	0.60	1.65
4,079.00	11.49	226.52	4,071.17	-78.17	-74.82	-77.40	0.44	0.37	-1.26
4,173.00	11.29	226.35	4,163.32	-90.97	-88.27	-90.05	0.22	-0.21	-0.18
4,267.00	11.23	225.33	4,255.51	-103.75	-101.44	-102.70	0.22	-0.06	-1.09
4,362.00	11.15	225.90	4,348.70	-116.65	-114.62	-115.46	0.14	-0.08	0.60
4,456.00	9.91	228.67	4,441.12	-128.32	-127.22	-127.00	1.42	-1.32	2.95
4,550.00	8.20	226.30	4,533.95	-138.29	-138.14	-136.86	1.86	-1.82	-2.52
4,645.00	6.50	222.52	4,628.16	-146.93	-146.67	-145.42	1.86	-1.79	-3.98
4,739.00	5.62	223.22	4,721.64	-154.21	-153.42	-152.62	0.94	-0.94	0.74
4,834.00	4.22	219.73	4,816.28	-160.29	-158.84	-158.64	1.51	-1.47	-3.67



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Survey Report



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Well: Cave Lion 5 TB Federal #8H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Cave Lion 5 TB Federal #8H
TVD Reference: KB=26.5 @ 3288.50usft
MD Reference: KB=26.5 @ 3288.50usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,928.00	2.96	208.23	4,910.10	-165.09	-162.20	-163.41	1.54	-1.34	-12.23
5,023.00	3.21	205.51	5,004.96	-169.65	-164.50	-167.95	0.30	0.26	-2.86
5,117.00	2.94	206.69	5,098.83	-174.18	-166.72	-172.45	0.30	-0.29	1.26
5,212.00	2.84	240.53	5,193.71	-177.51	-169.86	-175.75	1.77	-0.11	35.62
5,306.00	2.91	256.71	5,287.59	-179.21	-174.21	-177.40	0.86	0.07	17.21
5,385.00	2.98	256.32	5,366.49	-180.15	-178.16	-178.31	0.09	0.09	-0.49
5,490.00	1.90	276.78	5,471.40	-180.59	-182.54	-178.70	1.31	-1.03	19.49
5,585.00	0.81	348.08	5,566.37	-179.75	-184.24	-177.84	1.91	-1.15	75.05
5,680.00	0.82	354.61	5,661.36	-178.42	-184.45	-176.51	0.10	0.01	6.87
5,774.00	0.41	351.26	5,755.36	-177.41	-184.56	-175.50	0.44	-0.44	-3.56
5,868.00	0.24	164.23	5,849.36	-177.27	-184.56	-175.36	0.69	-0.18	184.01
5,963.00	0.20	164.57	5,944.36	-177.62	-184.46	-175.71	0.04	-0.04	0.36
6,057.00	0.24	164.26	6,038.36	-177.97	-184.36	-176.06	0.04	0.04	-0.33
6,152.00	0.27	143.56	6,133.35	-178.34	-184.18	-176.44	0.10	0.03	-21.79
6,246.00	0.15	138.23	6,227.35	-178.61	-183.96	-176.71	0.13	-0.13	-5.67
6,340.00	0.17	175.86	6,321.35	-178.84	-183.87	-176.94	0.11	0.02	40.03
6,435.00	0.09	236.78	6,416.35	-179.02	-183.92	-177.12	0.16	-0.08	64.13
6,529.00	0.05	254.15	6,510.35	-179.08	-184.02	-177.17	0.05	-0.04	18.48
6,624.00	0.03	264.07	6,605.35	-179.09	-184.09	-177.18	0.02	-0.02	10.44
6,718.00	0.07	346.38	6,699.35	-179.04	-184.13	-177.13	0.08	0.04	87.56
6,813.00	0.08	290.11	6,794.35	-178.96	-184.20	-177.05	0.08	0.01	-59.23
6,907.00	0.13	350.67	6,888.35	-178.83	-184.28	-176.92	0.12	0.05	64.43
7,002.00	0.08	316.28	6,983.35	-178.68	-184.35	-176.77	0.08	-0.05	-36.20
7,096.00	0.10	73.98	7,077.35	-178.61	-184.31	-176.70	0.16	0.02	125.21
7,190.00	0.31	119.65	7,171.35	-178.71	-184.01	-176.80	0.27	0.22	48.59
7,285.00	0.51	126.44	7,266.35	-179.09	-183.45	-177.19	0.22	0.21	7.15
7,379.00	0.57	132.53	7,360.35	-179.65	-182.77	-177.76	0.09	0.06	6.48
7,473.00	0.69	124.88	7,454.34	-180.29	-181.96	-178.41	0.16	0.13	-8.14
7,568.00	0.86	119.68	7,549.33	-180.97	-180.87	-179.10	0.19	0.18	-5.47
7,662.00	0.96	123.04	7,643.32	-181.75	-179.60	-179.89	0.12	0.11	3.57
7,757.00	0.97	127.60	7,738.31	-182.67	-178.29	-180.83	0.08	0.01	4.80
7,851.00	0.94	113.82	7,832.29	-183.47	-176.96	-181.64	0.25	-0.03	-14.66
7,946.00	0.41	105.20	7,927.29	-183.88	-175.92	-182.05	0.57	-0.56	-9.07
8,040.00	0.56	127.77	8,021.28	-184.24	-175.23	-182.43	0.26	0.16	24.01
8,134.00	0.66	130.76	8,115.28	-184.88	-174.45	-183.07	0.11	0.11	3.18
8,229.00	0.19	202.47	8,210.27	-185.38	-174.10	-183.58	0.66	-0.49	75.48
8,323.00	0.96	293.46	8,304.27	-185.21	-174.88	-183.40	1.04	0.82	96.80
8,418.00	1.08	288.04	8,399.25	-184.62	-176.46	-182.79	0.16	0.13	-5.71
8,512.00	0.88	298.11	8,493.24	-184.00	-177.94	-182.16	0.28	-0.21	10.71
8,607.00	0.91	304.65	8,588.23	-183.23	-179.21	-181.38	0.11	0.03	6.88
8,701.00	0.75	308.90	8,682.22	-182.42	-180.30	-180.55	0.18	-0.17	4.52
8,795.00	0.63	327.19	8,776.21	-181.60	-181.06	-179.73	0.27	-0.13	19.46
8,890.00	0.81	336.49	8,871.21	-180.55	-181.61	-178.67	0.23	0.19	9.79
8,984.00	0.95	333.89	8,965.19	-179.24	-182.22	-177.35	0.15	0.15	-2.77

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9,079.00	0.76	331.42	9,060.18	-177.98	-182.87	-176.08	0.20	-0.20	-2.60
9,173.00	0.81	327.08	9,154.17	-176.87	-183.53	-174.97	0.08	0.05	-4.64
9,268.00	0.66	323.81	9,249.17	-175.87	-184.21	-173.96	0.16	-0.16	-3.63
9,362.00	0.55	315.50	9,343.16	-175.11	-184.85	-173.20	0.15	-0.12	-8.63
9,456.00	0.66	318.79	9,437.16	-174.38	-185.53	-172.46	0.12	0.12	3.50
9,550.00	0.64	338.59	9,531.15	-173.48	-186.07	-171.56	0.24	-0.02	21.06
9,644.00	0.90	319.87	9,625.14	-172.43	-186.74	-170.50	0.38	0.28	-19.91
9,739.00	1.53	319.82	9,720.12	-170.89	-188.04	-168.95	0.66	0.66	-0.05
9,833.00	0.98	297.34	9,814.10	-169.56	-189.56	-167.60	0.77	-0.59	-23.91
9,928.00	0.85	273.90	9,909.09	-169.14	-190.99	-167.17	0.41	-0.14	-24.67
10,022.00	0.83	298.50	10,003.08	-168.85	-192.14	-166.86	0.41	-0.23	26.17
10,116.00	0.70	262.01	10,097.07	-168.68	-193.16	-166.68	0.45	0.07	-38.82
10,211.00	0.07	236.25	10,192.07	-168.79	-193.78	-166.79	0.67	-0.66	-27.12
10,305.00	0.24	115.42	10,286.07	-168.91	-193.65	-166.91	0.30	0.18	-128.54
10,399.00	0.83	333.64	10,380.07	-168.39	-193.78	-166.38	1.10	0.63	-150.83
10,494.00	1.36	328.94	10,475.05	-166.80	-194.67	-164.79	0.57	0.56	-4.95
10,588.00	1.25	316.16	10,569.03	-165.11	-195.95	-163.08	0.33	-0.12	-13.60
10,683.00	1.82	305.08	10,663.99	-163.49	-197.90	-161.45	0.67	0.60	-11.66
10,777.00	3.28	301.16	10,757.90	-161.24	-201.43	-159.16	1.56	1.55	-4.17
10,872.00	3.49	307.54	10,852.73	-158.08	-206.04	-155.95	0.45	0.22	6.72
10,966.00	3.74	315.69	10,946.54	-154.14	-210.46	-151.96	0.81	0.27	8.67
11,061.00	2.64	317.42	11,041.39	-150.31	-214.10	-148.10	1.16	-1.16	1.82
11,155.00	1.49	317.39	11,135.33	-147.82	-216.39	-145.58	1.22	-1.22	-0.03
11,249.00	1.38	58.58	11,229.31	-146.29	-216.27	-144.06	2.33	-0.12	105.52
11,343.00	0.94	14.44	11,323.30	-144.92	-215.14	-142.70	0.99	-0.47	-44.83
11,438.00	0.85	306.57	11,418.29	-143.85	-215.38	-141.82	0.97	-0.31	-71.44
11,532.00	0.98	200.46	11,512.28	-144.28	-216.09	-142.05	1.40	0.35	-112.88
11,627.00	1.83	174.08	11,607.25	-146.55	-216.21	-144.32	1.10	0.89	-27.77
11,721.00	2.06	218.36	11,701.21	-149.37	-217.11	-147.13	1.58	0.24	47.11
11,727.00	2.10	220.06	11,707.20	-149.54	-217.24	-147.30	1.23	0.67	28.33
11,826.00	2.65	258.68	11,806.12	-151.38	-220.66	-149.10	1.67	0.56	39.01
11,921.00	3.28	327.63	11,901.02	-149.51	-224.27	-147.20	3.57	0.66	72.58
11,987.01	10.61	330.15	11,966.50	-142.64	-228.31	-140.28	11.11	11.10	3.82
FTP[CL#8H]									
12,015.00	13.72	330.41	11,993.86	-137.52	-231.23	-135.13	11.11	11.11	0.92
12,110.00	21.89	356.09	12,084.37	-109.96	-238.02	-107.51	11.74	8.60	27.03
12,205.00	35.30	3.17	12,167.61	-64.67	-237.71	-62.22	14.54	14.12	7.45
12,299.00	45.12	4.55	12,239.31	-4.20	-233.56	-1.80	10.49	10.45	1.47
12,393.00	51.09	3.94	12,302.05	65.54	-228.40	67.89	6.37	6.35	-0.65
12,487.00	59.01	4.05	12,355.86	142.34	-223.03	144.63	8.43	8.43	0.12
12,582.00	67.04	4.64	12,398.92	226.69	-216.60	228.91	8.47	8.45	0.62
12,676.00	74.18	4.48	12,430.10	315.02	-209.56	317.16	7.60	7.60	-0.17
12,770.00	83.29	3.05	12,448.45	406.92	-203.53	408.99	9.81	9.69	-1.52

Company:	Marathon Oil Permian, LLC	Local Co-ordinate Reference:	Well Cave Lion 5 TB Federal #8H
Project:	Lea County, NM (NAD27-NME)	TVD Reference:	KB=26.5 @ 3288.50usft
Site:	Cave Lion Pad	MD Reference:	KB=26.5 @ 3288.50usft
Well:	Cave Lion 5 TB Federal #8H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Midland

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,864.00	86.37	0.62	12,456.92	500.47	-200.54	502.51	4.17	3.28	-2.59
12,959.00	89.03	359.26	12,460.73	595.38	-200.64	597.41	3.14	2.80	-1.43
13,053.00	88.46	358.51	12,462.79	689.34	-202.47	691.39	1.00	-0.61	-0.80
13,147.00	90.94	358.31	12,463.28	783.29	-205.08	785.36	2.65	2.64	-0.21
13,241.00	90.27	357.63	12,462.29	877.23	-208.41	879.33	1.02	-0.71	-0.72
13,336.00	92.04	359.97	12,460.37	972.18	-210.40	974.29	3.09	1.86	2.46
13,430.00	92.25	359.85	12,456.86	1,066.11	-210.54	1,068.22	0.26	0.22	-0.13
13,524.00	91.68	359.84	12,453.63	1,160.06	-210.80	1,162.16	0.61	-0.61	-0.01
13,619.00	90.50	0.32	12,451.83	1,255.04	-210.67	1,257.14	1.34	-1.24	0.51
13,714.00	90.34	0.35	12,451.13	1,350.03	-210.11	1,352.12	0.17	-0.17	0.03
13,808.00	89.83	1.04	12,450.99	1,444.02	-208.97	1,446.10	0.91	-0.54	0.73
13,903.00	90.74	1.06	12,450.52	1,539.01	-207.23	1,541.06	0.96	0.96	0.02
13,997.00	91.64	0.82	12,448.57	1,632.97	-205.69	1,635.00	0.99	0.96	-0.26
14,092.00	92.62	1.17	12,445.03	1,727.89	-204.04	1,729.90	1.10	1.03	0.37
14,186.00	91.17	1.03	12,441.93	1,821.82	-202.24	1,823.81	1.55	-1.54	-0.15
14,280.00	89.93	0.38	12,441.02	1,915.81	-201.08	1,917.77	1.49	-1.32	-0.69
14,375.00	89.90	0.95	12,441.17	2,010.80	-199.98	2,012.75	0.60	-0.03	0.60
14,469.00	89.97	0.43	12,441.27	2,104.79	-198.84	2,106.73	0.56	0.07	-0.55
14,564.00	90.27	0.03	12,441.07	2,199.79	-198.46	2,201.72	0.53	0.32	-0.42
14,658.00	91.48	1.43	12,439.64	2,293.77	-197.27	2,295.68	1.97	1.29	1.49
14,752.00	90.94	1.89	12,437.65	2,387.71	-194.54	2,389.58	0.75	-0.57	0.49
14,847.00	90.74	0.05	12,436.26	2,482.68	-192.94	2,484.53	1.95	-0.21	-1.94
14,941.00	90.23	357.79	12,435.46	2,576.65	-194.71	2,578.52	2.46	-0.54	-2.40
15,036.00	89.87	357.88	12,435.38	2,671.58	-198.30	2,673.48	0.39	-0.38	0.09
15,130.00	89.66	357.58	12,435.77	2,765.51	-202.02	2,767.44	0.39	-0.22	-0.32
15,225.00	89.83	358.95	12,436.19	2,860.46	-204.90	2,862.42	1.45	0.18	1.44
15,319.00	90.44	358.62	12,435.97	2,954.44	-206.89	2,956.41	0.74	0.65	-0.35
15,414.00	91.11	359.13	12,434.68	3,049.41	-208.75	3,051.40	0.89	0.71	0.54
15,509.00	90.87	0.01	12,433.04	3,144.39	-209.47	3,146.39	0.96	-0.25	0.93
15,603.00	90.70	358.74	12,431.75	3,238.38	-210.49	3,240.37	1.36	-0.18	-1.35
15,698.00	90.10	359.01	12,431.09	3,333.36	-212.36	3,335.37	0.69	-0.63	0.28
15,792.00	90.07	359.85	12,430.95	3,427.35	-213.29	3,429.37	0.89	-0.03	0.89
15,886.00	89.36	359.66	12,431.42	3,521.35	-213.69	3,523.36	0.78	-0.76	-0.20
15,981.00	88.43	357.65	12,433.25	3,616.30	-215.92	3,618.33	2.33	-0.98	-2.12
16,074.00	88.99	357.99	12,435.34	3,709.21	-219.46	3,711.27	0.70	0.60	0.37
16,168.00	89.63	357.90	12,436.48	3,803.14	-222.83	3,805.23	0.69	0.68	-0.10
16,262.00	91.68	357.52	12,435.40	3,897.05	-226.59	3,899.18	2.22	2.18	-0.40
16,357.00	92.45	357.63	12,431.98	3,991.91	-230.60	3,994.07	0.82	0.81	0.12
16,452.00	92.11	356.99	12,428.20	4,086.73	-235.06	4,088.93	0.76	-0.36	-0.67
16,546.00	92.08	357.45	12,424.76	4,180.55	-239.61	4,182.80	0.49	-0.03	0.49
16,641.00	91.78	357.72	12,421.56	4,275.41	-243.61	4,277.70	0.42	-0.32	0.28
16,735.00	91.94	357.87	12,418.51	4,369.29	-247.23	4,371.61	0.23	0.17	0.16
16,829.00	92.21	359.03	12,415.11	4,463.20	-249.77	4,465.53	1.27	0.29	1.23



Scientific Drilling, Intl

Survey Report



Company: Marathon Oil Permian, LLC
Project: Lea County, NM (NAD27-NME)
Site: Cave Lion Pad
Well: Cave Lion 5 TB Federal #8H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Cave Lion 5 TB Federal #8H
TVD Reference: KB=26.5 @ 3288.50usft
MD Reference: KB=26.5 @ 3288.50usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
16,923.00	91.71	359.49	12,411.89	4,557.13	-250.98	4,559.48	0.72	-0.53	0.49
17,018.00	91.41	358.62	12,409.31	4,652.08	-252.55	4,654.44	0.97	-0.32	-0.92
17,112.00	91.17	358.51	12,407.19	4,746.03	-254.90	4,748.40	0.28	-0.26	-0.12
17,204.00	91.11	359.07	12,405.36	4,837.99	-256.85	4,840.38	0.61	-0.07	0.61
SDI MWD									
17,261.00	91.11	359.07	12,404.26	4,894.97	-257.77	4,897.37	0.00	0.00	0.00
Bit Projection - BHL[CL#8H]									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
17,204.00	12,405.36	4,837.99	-256.85	SDI MWD
17,261.00	12,404.26	4,894.97	-257.77	Bit Projection

Checked By: _____ Approved By: _____ Date: _____