

30-025-44087



Marathon Oil Corporation

Marathon Oil
Lea County, NM
Cave Lion 5 Federal 26 35 5 TB
#1H
Plan #3 - FINAL PVA
GL: 3271' + KB: 25' (H&P423)

US State Plane 1927 (Exact solution)
NAD 1927 (NADCON CONUS)
Clarke 1866
New Mexico East 3001
Mean Sea Level

RKB Elevation: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))

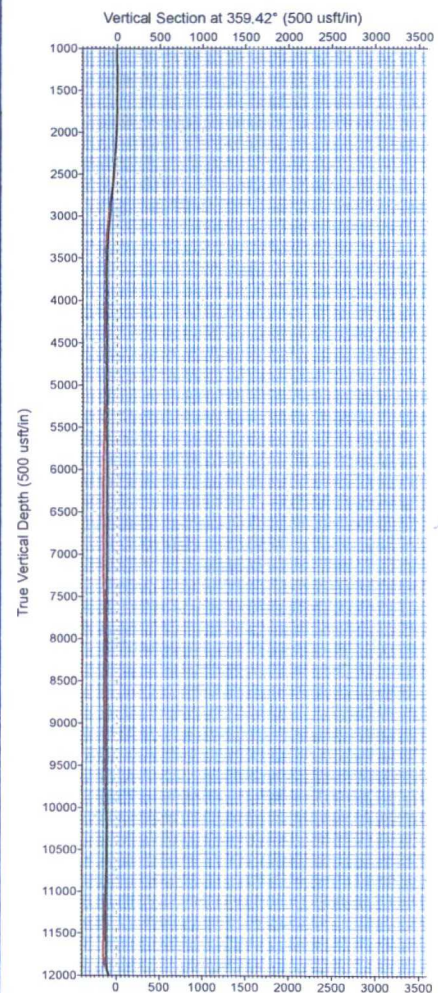
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Spot
0.00	0.00	388805.07	790215.00	32.065478	-103.396492	

SECTION DETAILS

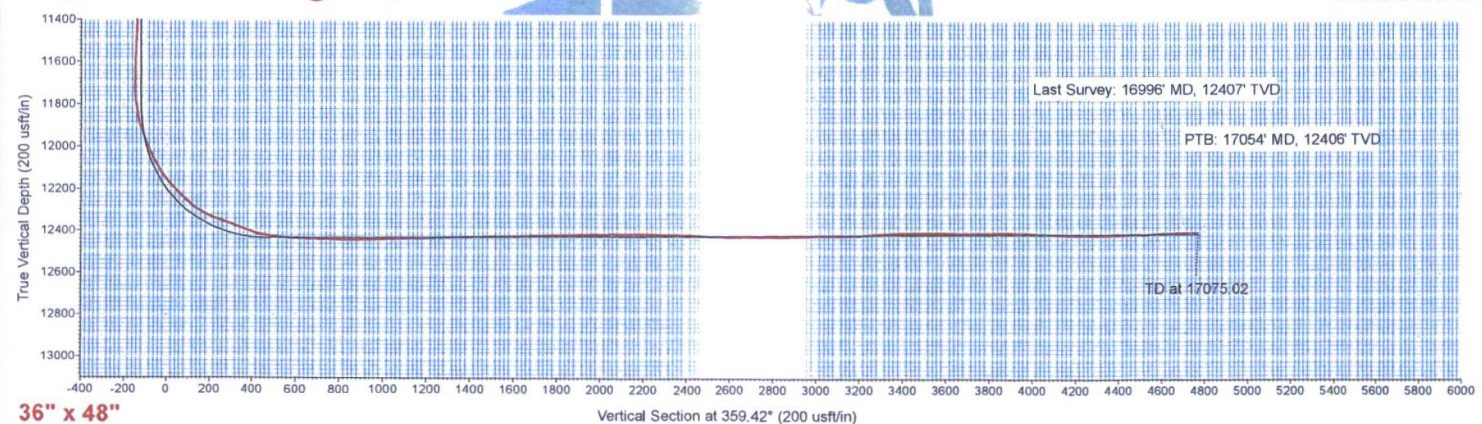
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	VSect
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00
3	2500.00	5.00	194.93	2498.73	-42.13	-11.24	0.50	-42.02
4	3174.48	5.00	194.93	3170.65	-98.93	-26.38	0.00	-98.66
5	3674.48	0.00	0.00	3670.01	-120.00	-32.00	1.00	-119.67
6	11786.74	0.00	0.00	11782.27	-120.00	-32.00	0.00	-119.67
7	11985.91	11.95	2.40	11980.00	-99.32	-31.13	6.00	-99.00
8	12769.41	90.30	2.40	12434.31	463.72	-7.53	10.00	463.76
9	12868.66	90.30	359.42	12433.79	562.95	-5.96	3.00	562.99
10	17075.02	90.30	359.42	12412.03	4769.04	-48.37	0.00	4769.29

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

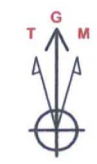
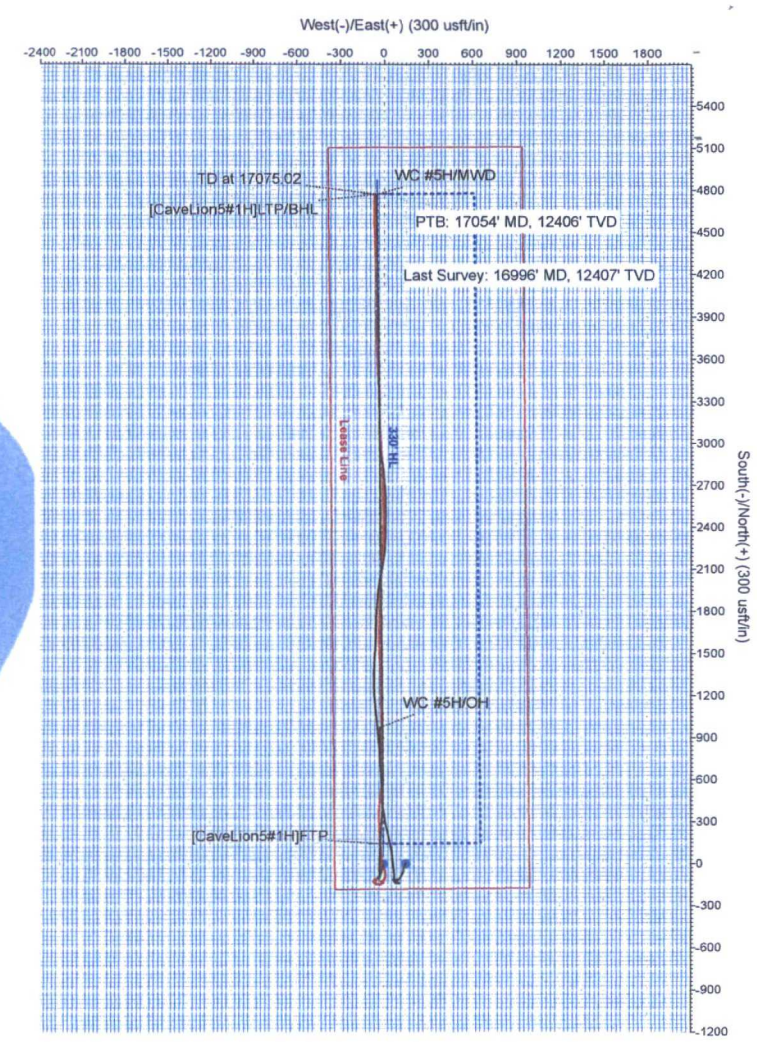
Name	TVD	+N/-S	+E/-W	Northing	Easting
[CaveLion5#1H]FTP	0.00	144.97	-1.41	388950.04	790213.59
[CaveLion5#1H]LTP/BHL	12412.03	4769.04	-48.37	393574.11	790166.63



Target Line: 12437' TVD @ 0° VS, 90.3° INC



36" x 48"



Azimuths to Grid North
True North: -0.50°
Magnetic North: 6.25°

Magnetic Field
Strength: 48008.1nT
Dip Angle: 59.82°
Date: 10/31/2017
Model: USER DEFINED

Azimuth Corrections
Total Magnetic Corr. (M to G): 6.25°
Declination (M to T): 6.75° East



Marathon Oil

Lea County, NM

Cave Lion 5 Federal

BC #1H

OH

Design: MWD 220'-16996' PTB 17054'

Survey Report

31 December, 2017



Company: Marathon Oil
Project: Lea County, NM
Site: Cave Lion 5 Federal
Well: BC #1H
Wellbore: OH
Design: MWD 220'-16996' PTB 17054'

Local Co-ordinate Reference: Well BC #1H
TVD Reference: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
MD Reference: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Project Lea County, NM

Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site Cave Lion 5 Federal

Site Position:	Northing:	388,805.07 usft	Latitude:	32.065478
From: Map	Easting:	790,215.00 usft	Longitude:	-103.396492
Position Uncertainty: 0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.50 °

Well BC #1H

Well Position	+N/-S	0.00 usft	Northing:	388,805.07 usft	Latitude:	32.065478
	+E/-W	0.00 usft	Easting:	790,215.00 usft	Longitude:	-103.396492
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,271.00 usft

Wellbore OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	10/31/2017	6.75	59.82	48,008.10

Design MWD 220'-16996' PTB 17054'

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	359.42

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Database: WellPlanner1

Survey Program Date 12/31/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
220.00	1,120.00	Survey #1 (OH)	GYRO-NS-CT	OWSG XYZ Accel with XY Static and Continuous Gyro
1,147.00	17,054.00	Survey #2 (OH)	MWD+IFR1	OWSG MWD + IFR1

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	388,805.07	790,215.00
220.00	0.40	126.30	220.00	-0.46	-0.45	0.62	0.77	126.30	388,804.62	790,215.62
315.00	0.40	124.30	315.00	-0.85	-0.84	1.16	1.43	125.84	388,804.23	790,216.16
410.00	0.30	170.00	409.99	-1.28	-1.27	1.48	1.95	130.68	388,803.80	790,216.48
500.00	0.40	195.00	499.99	-1.82	-1.81	1.44	2.31	141.48	388,803.26	790,216.44
590.00	0.20	228.30	589.99	-2.23	-2.21	1.24	2.54	150.77	388,802.86	790,216.24
680.00	0.40	268.00	679.99	-2.34	-2.33	0.81	2.46	160.89	388,802.74	790,215.81
770.00	0.50	277.00	769.99	-2.29	-2.29	0.10	2.29	177.42	388,802.78	790,215.10
865.00	0.40	275.00	864.98	-2.21	-2.21	-0.64	2.30	196.10	388,802.86	790,214.36
960.00	0.50	275.00	959.98	-2.13	-2.15	-1.38	2.55	212.76	388,802.92	790,213.62
1,054.00	0.60	279.00	1,053.98	-2.01	-2.03	-2.28	3.05	228.21	388,803.04	790,212.72
1,120.00	0.50	282.00	1,119.97	-1.89	-1.92	-2.90	3.48	236.48	388,803.15	790,212.10
1,147.00	0.70	282.10	1,146.97	-1.83	-1.86	-3.18	3.68	239.63	388,803.21	790,211.82
1,242.00	0.90	301.00	1,241.96	-1.31	-1.36	-4.38	4.59	252.81	388,803.71	790,210.62
1,336.00	1.00	294.90	1,335.95	-0.57	-0.63	-5.76	5.79	263.76	388,804.44	790,209.24
1,431.00	0.80	302.10	1,430.94	0.14	0.07	-7.07	7.07	270.58	388,805.14	790,207.93
1,525.00	0.90	293.60	1,524.93	0.80	0.72	-8.31	8.34	274.93	388,805.79	790,206.69
1,620.00	1.00	291.70	1,619.92	1.42	1.32	-9.76	9.85	277.71	388,806.39	790,205.24
1,714.00	0.90	210.80	1,713.91	1.10	0.99	-10.90	10.94	275.19	388,806.06	790,204.10
1,809.00	1.30	197.90	1,808.89	-0.56	-0.68	-11.61	11.63	266.67	388,804.39	790,203.39
1,904.00	2.00	181.00	1,903.85	-3.24	-3.36	-11.97	12.44	254.33	388,801.71	790,203.03

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Wellbore: OH
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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)
2,093.00	3.50	159.50	2,092.63	-11.96	-12.06	-10.01	15.67	219.69	388,793.01	790,204.99
2,187.00	4.40	155.50	2,186.41	-17.95	-18.03	-7.51	19.53	202.61	388,787.04	790,207.49
2,282.00	4.00	155.10	2,281.15	-24.30	-24.35	-4.60	24.78	190.71	388,780.72	790,210.40
2,376.00	3.40	153.90	2,374.96	-29.81	-29.83	-2.00	29.90	183.83	388,775.24	790,213.00
2,471.00	3.90	153.70	2,469.76	-35.26	-35.25	0.67	35.26	178.91	388,769.82	790,215.67
2,566.00	5.70	158.50	2,564.43	-42.58	-42.54	3.83	42.71	174.85	388,762.53	790,218.83
2,661.00	7.40	162.60	2,658.80	-52.84	-52.77	7.39	53.28	172.02	388,752.30	790,222.39
2,850.00	7.30	171.60	2,846.26	-76.39	-76.26	12.79	77.33	170.48	388,728.81	790,227.79
2,944.00	6.50	177.60	2,939.58	-87.62	-87.49	13.88	88.58	170.98	388,717.58	790,228.88
3,039.00	6.10	197.20	3,034.01	-97.81	-97.68	12.61	98.49	172.64	388,707.39	790,227.61
3,134.00	5.60	203.70	3,128.52	-106.84	-106.75	9.26	107.15	175.04	388,698.32	790,224.26
3,228.00	4.30	208.90	3,222.17	-114.09	-114.03	5.71	114.18	177.13	388,691.04	790,220.71
3,322.00	3.30	226.90	3,315.96	-118.98	-118.97	2.03	118.99	179.02	388,686.10	790,217.03
3,418.00	2.20	220.20	3,411.85	-122.25	-122.26	-1.17	122.27	180.55	388,682.81	790,213.83
3,512.00	1.00	189.40	3,505.81	-124.42	-124.45	-2.47	124.48	181.14	388,680.62	790,212.53
3,607.00	0.40	190.60	3,600.81	-125.56	-125.59	-2.67	125.62	181.22	388,679.48	790,212.33
3,701.00	0.10	234.70	3,694.80	-125.93	-125.96	-2.80	126.00	181.27	388,679.11	790,212.20
3,796.00	0.20	209.60	3,789.80	-126.12	-126.16	-2.95	126.19	181.34	388,678.91	790,212.05
3,891.00	0.20	190.30	3,884.80	-126.43	-126.46	-3.06	126.50	181.38	388,678.61	790,211.94
3,986.00	0.40	210.50	3,979.80	-126.87	-126.91	-3.25	126.95	181.47	388,678.16	790,211.75
4,081.00	0.80	222.30	4,074.80	-127.64	-127.69	-3.87	127.75	181.74	388,677.38	790,211.13
4,176.00	1.20	237.30	4,169.78	-128.66	-128.72	-5.15	128.82	182.29	388,676.35	790,209.85
4,271.00	1.50	249.70	4,264.76	-129.61	-129.69	-7.16	129.88	183.16	388,675.38	790,207.84
4,366.00	2.00	263.70	4,359.71	-130.19	-130.30	-9.97	130.68	184.38	388,674.77	790,205.03
4,460.00	2.30	270.70	4,453.65	-130.31	-130.46	-13.49	131.15	185.90	388,674.61	790,201.51
4,555.00	1.60	295.50	4,548.59	-129.69	-129.86	-16.59	130.92	187.28	388,675.21	790,198.41
4,744.00	0.70	78.10	4,737.57	-128.30	-128.49	-17.84	129.72	187.91	388,676.58	790,197.16

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Wellbore: OH
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North Reference: Grid
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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)
4,839.00	0.50	54.50	4,832.57	-127.95	-128.13	-16.94	129.24	187.53	388,676.94	790,198.06
4,934.00	1.40	95.70	4,927.55	-127.84	-128.00	-15.44	128.93	186.88	388,677.07	790,199.56
5,028.00	2.50	109.10	5,021.50	-128.65	-128.79	-12.36	129.38	185.48	388,676.28	790,202.64
5,123.00	2.80	112.70	5,116.40	-130.27	-130.36	-8.27	130.62	183.63	388,674.71	790,206.73
5,218.00	1.80	137.30	5,211.32	-132.29	-132.35	-5.11	132.45	182.21	388,672.72	790,209.89
5,313.00	1.70	158.10	5,306.28	-134.71	-134.76	-3.58	134.80	181.52	388,670.31	790,211.42
5,369.00	1.60	157.00	5,362.25	-136.21	-136.25	-2.96	136.28	181.24	388,668.82	790,212.04
5,500.00	1.50	165.10	5,493.21	-139.56	-139.59	-1.81	139.60	180.74	388,665.48	790,213.19
5,595.00	1.90	232.70	5,588.17	-141.71	-141.74	-2.74	141.77	181.11	388,663.33	790,212.26
5,690.00	2.20	238.90	5,683.11	-143.58	-143.64	-5.55	143.75	182.21	388,661.43	790,209.45
5,785.00	2.40	241.70	5,778.04	-145.43	-145.52	-8.86	145.79	183.49	388,659.55	790,206.14
5,880.00	2.20	240.00	5,872.96	-147.25	-147.38	-12.20	147.88	184.73	388,657.69	790,202.80
6,069.00	1.80	240.70	6,061.84	-150.46	-150.65	-17.93	151.71	186.79	388,654.42	790,197.07
6,164.00	2.20	246.00	6,156.78	-151.90	-152.12	-20.89	153.55	187.82	388,652.95	790,194.11
6,259.00	2.20	244.10	6,251.71	-153.40	-153.66	-24.20	155.55	188.95	388,651.41	790,190.80
6,353.00	2.40	282.30	6,345.64	-153.73	-154.02	-27.74	156.50	190.21	388,651.05	790,187.26
6,448.00	2.90	287.00	6,440.54	-152.57	-152.90	-31.99	156.21	191.82	388,652.17	790,183.01
6,542.00	3.00	289.20	6,534.42	-151.01	-151.39	-36.58	155.75	193.58	388,653.68	790,178.42
6,637.00	3.00	279.60	6,629.29	-149.73	-150.16	-41.38	155.76	195.41	388,654.91	790,173.62
6,732.00	3.00	272.70	6,724.16	-149.15	-149.63	-46.32	156.63	197.20	388,655.44	790,168.68
6,826.00	1.30	259.40	6,818.09	-149.20	-149.71	-49.82	157.78	198.41	388,655.36	790,165.18
6,920.00	0.80	288.90	6,912.07	-149.16	-149.69	-51.49	158.30	198.98	388,655.38	790,163.51
7,015.00	0.80	289.10	7,007.06	-148.72	-149.26	-52.75	158.31	199.46	388,655.81	790,162.25
7,110.00	0.80	295.60	7,102.06	-148.20	-148.76	-53.97	158.25	199.94	388,656.31	790,161.03
7,204.00	0.80	300.30	7,196.05	-147.58	-148.14	-55.13	158.07	200.41	388,656.93	790,159.87
7,299.00	1.40	347.30	7,291.03	-146.10	-146.68	-55.96	156.99	200.88	388,658.39	790,159.04
7,394.00	1.60	345.30	7,386.00	-143.68	-144.26	-56.55	154.95	201.40	388,660.81	790,158.45

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7,488.00	1.50	345.80	7,479.96	-141.21	-141.80	-57.18	152.90	201.96	388,663.27	790,157.82
7,583.00	0.90	26.40	7,574.94	-139.34	-139.93	-57.16	151.15	202.22	388,665.14	790,157.84
7,677.00	0.70	28.60	7,668.93	-138.18	-138.76	-56.55	149.84	202.17	388,666.31	790,158.45
7,772.00	0.60	39.90	7,763.93	-137.29	-137.87	-55.96	148.79	202.09	388,667.20	790,159.04
7,867.00	0.70	39.30	7,858.92	-136.47	-137.04	-55.27	147.76	201.96	388,668.03	790,159.73
7,962.00	0.40	331.40	7,953.92	-135.73	-136.30	-55.06	147.00	202.00	388,668.77	790,159.94
8,057.00	0.50	289.90	8,048.92	-135.30	-135.87	-55.61	146.81	202.26	388,669.20	790,159.39
8,151.00	0.50	280.80	8,142.91	-135.07	-135.65	-56.40	146.91	202.58	388,669.42	790,158.60
8,246.00	0.60	241.70	8,237.91	-135.22	-135.81	-57.24	147.38	202.86	388,669.26	790,157.76
8,341.00	0.90	227.30	8,332.90	-135.95	-136.55	-58.23	148.45	203.09	388,668.52	790,156.77
8,436.00	0.80	235.60	8,427.89	-136.82	-137.43	-59.32	149.69	203.35	388,667.64	790,155.68
8,530.00	0.90	245.60	8,521.88	-137.49	-138.11	-60.54	150.79	203.67	388,666.96	790,154.46
8,625.00	0.80	239.80	8,616.87	-138.11	-138.75	-61.79	151.89	204.01	388,666.32	790,153.21
8,720.00	0.80	53.20	8,711.87	-138.05	-138.68	-61.83	151.84	204.03	388,666.39	790,153.17
8,815.00	0.90	39.70	8,806.86	-137.09	-137.71	-60.83	150.55	203.83	388,667.36	790,154.17
8,910.00	0.80	13.60	8,901.85	-135.88	-136.49	-60.19	149.18	203.80	388,668.58	790,154.81
9,004.00	0.60	346.30	8,995.84	-134.76	-135.38	-60.16	148.14	203.96	388,669.69	790,154.84
9,099.00	0.70	327.60	9,090.83	-133.78	-134.41	-60.58	147.43	204.26	388,670.66	790,154.42
9,193.00	0.80	313.60	9,184.82	-132.84	-133.47	-61.37	146.90	204.69	388,671.60	790,153.63
9,288.00	1.00	308.50	9,279.81	-131.85	-132.49	-62.50	146.49	205.25	388,672.58	790,152.50
9,383.00	1.30	308.10	9,374.79	-130.66	-131.31	-63.99	146.08	205.98	388,673.76	790,151.01
9,477.00	1.80	304.50	9,468.76	-129.14	-129.82	-66.05	145.66	206.97	388,675.25	790,148.95
9,572.00	0.40	352.80	9,563.74	-127.96	-128.64	-67.32	145.19	207.62	388,676.43	790,147.68
9,666.00	0.70	336.40	9,657.74	-127.10	-127.79	-67.59	144.57	207.87	388,677.28	790,147.41
9,761.00	1.20	73.40	9,752.73	-126.29	-126.98	-66.87	143.51	207.77	388,678.09	790,148.13
9,856.00	1.60	57.20	9,847.70	-125.31	-125.97	-64.80	141.66	207.22	388,679.10	790,150.20
9,951.00	1.50	51.40	9,942.66	-123.84	-124.48	-62.71	139.39	206.74	388,680.59	790,152.29

Company: Marathon Oil
Project: Lea County, NM
Site: Cave Lion 5 Federal
Well: BC #1H
Wellbore: OH
Design: MWD 220'-16996' PTB 17054'

Local Co-ordinate Reference: Well BC #1H
TVD Reference: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
MD Reference: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
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)
10,045.00	1.50	33.70	10,036.63	-122.06	-122.69	-61.07	137.05	206.46	388,682.38	790,153.93
10,140.00	1.80	12.60	10,131.59	-119.58	-120.20	-60.06	134.37	206.55	388,684.87	790,154.94
10,234.00	1.60	22.10	10,225.55	-116.94	-117.54	-59.24	131.63	206.75	388,687.53	790,155.76
10,329.00	0.80	352.20	10,320.53	-115.05	-115.66	-58.83	129.76	206.96	388,689.41	790,156.17
10,424.00	1.00	286.50	10,415.52	-114.15	-114.76	-59.72	129.37	207.49	388,690.31	790,155.28
10,518.00	0.90	265.90	10,509.51	-113.96	-114.58	-61.24	129.92	208.12	388,690.49	790,153.76
10,613.00	1.40	146.90	10,604.50	-114.98	-115.61	-61.35	130.88	207.95	388,689.46	790,153.65
10,708.00	2.00	67.60	10,699.47	-115.34	-115.95	-59.18	130.18	207.04	388,689.12	790,155.82
10,803.00	1.90	171.60	10,794.44	-116.29	-116.88	-57.42	130.22	206.16	388,688.19	790,157.58
10,898.00	2.00	171.50	10,889.38	-119.49	-120.07	-56.94	132.89	205.37	388,685.00	790,158.06
10,993.00	1.90	168.40	10,984.33	-122.68	-123.26	-56.38	135.54	204.58	388,681.81	790,158.62
11,087.00	2.00	165.20	11,078.27	-125.80	-126.37	-55.65	138.08	203.77	388,678.70	790,159.35
11,182.00	2.10	170.80	11,173.21	-129.13	-129.69	-54.95	140.85	202.96	388,675.38	790,160.05
11,276.00	1.70	176.70	11,267.16	-132.22	-132.78	-54.59	143.57	202.35	388,672.29	790,160.41
11,371.00	2.00	181.50	11,362.11	-135.28	-135.85	-54.55	146.39	201.88	388,669.22	790,160.45
11,466.00	2.10	175.90	11,457.05	-138.68	-139.24	-54.47	149.51	201.37	388,665.83	790,160.53
11,560.00	2.40	188.10	11,550.98	-142.34	-142.90	-54.63	152.99	200.92	388,662.17	790,160.37
11,655.00	2.30	205.90	11,645.90	-146.02	-146.59	-55.74	156.83	200.82	388,658.48	790,159.26
11,749.00	2.10	327.50	11,739.86	-146.24	-146.83	-57.49	157.69	201.38	388,658.24	790,157.51
11,785.00	4.80	348.30	11,775.80	-144.20	-144.80	-58.15	156.04	201.88	388,660.27	790,156.85
11,884.00	15.00	27.90	11,873.27	-128.83	-129.37	-52.98	139.80	202.27	388,675.70	790,162.02
11,931.00	22.40	29.30	11,917.76	-115.70	-116.17	-45.74	124.85	201.49	388,688.90	790,169.26
11,978.00	21.70	30.90	11,961.33	-100.52	-100.90	-36.89	107.43	200.08	388,704.17	790,178.11
12,025.00	26.40	18.80	12,004.26	-83.23	-83.53	-29.06	88.44	199.18	388,721.54	790,185.94
12,072.00	27.30	14.60	12,046.20	-62.97	-63.21	-22.97	67.25	199.97	388,741.86	790,192.03
12,119.00	28.50	14.60	12,087.73	-41.75	-41.93	-17.43	45.40	202.57	388,763.14	790,197.57
12,167.00	33.80	4.00	12,128.83	-17.35	-17.49	-13.60	22.16	217.87	388,787.58	790,201.40

Company: Marathon Oil
Project: Lea County, NM
Site: Cave Lion 5 Federal
Well: BC #1H
Wellbore: OH
Design: MWD 220'-16996' PTB 17054'

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:
Well BC #1H
Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
Grid
Minimum Curvature
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)
12,214.00	42.10	357.50	12,165.87	11.49	11.35	-13.38	17.55	310.32	388,816.42	790,201.62
12,261.00	43.60	354.10	12,200.33	43.38	43.22	-15.73	45.99	340.00	388,848.29	790,199.27
12,308.00	44.80	354.60	12,234.03	76.01	75.83	-18.96	78.16	345.96	388,880.90	790,196.04
12,356.00	47.30	355.60	12,267.34	110.47	110.25	-21.90	112.41	348.76	388,915.32	790,193.10
12,403.00	55.00	356.90	12,296.80	146.99	146.75	-24.27	148.74	350.61	388,951.82	790,190.73
12,450.00	63.90	357.40	12,320.67	187.39	187.14	-26.27	188.97	352.01	388,992.21	790,188.73
12,497.00	68.50	359.00	12,339.63	230.37	230.11	-27.61	231.76	353.16	389,035.18	790,187.39
12,544.00	69.20	358.20	12,356.59	274.20	273.93	-28.68	275.42	354.02	389,079.00	790,186.32
12,591.00	69.10	357.60	12,373.31	318.11	317.82	-30.29	319.26	354.56	389,122.89	790,184.71
12,639.00	68.00	0.20	12,390.87	362.78	362.48	-31.16	363.82	355.09	389,167.55	790,183.84
12,686.00	71.20	5.70	12,407.26	406.72	406.45	-28.87	407.47	355.94	389,211.52	790,186.13
12,734.00	79.00	6.00	12,419.59	452.78	452.55	-24.14	453.20	356.95	389,257.62	790,190.86
12,781.00	82.20	5.60	12,427.27	498.85	498.68	-19.46	499.06	357.77	389,303.75	790,195.54
12,828.00	85.00	3.60	12,432.51	545.36	545.23	-15.71	545.46	358.35	389,350.30	790,199.29
12,875.00	88.00	1.30	12,435.38	592.20	592.09	-13.71	592.25	358.67	389,397.16	790,201.29
12,923.00	88.80	2.10	12,436.72	640.14	640.05	-12.29	640.17	358.90	389,445.12	790,202.71
13,017.00	88.30	0.30	12,439.10	734.06	734.00	-10.32	734.07	359.19	389,539.07	790,204.68
13,112.00	88.90	359.00	12,441.42	829.03	828.96	-10.90	829.03	359.25	389,634.03	790,204.10
13,134.00	88.90	359.10	12,441.84	851.03	850.96	-11.26	851.03	359.24	389,656.03	790,203.74
13,228.00	92.00	359.00	12,441.10	945.01	944.93	-12.82	945.02	359.22	389,750.00	790,202.18
13,322.00	92.20	359.00	12,437.66	1,038.94	1,038.85	-14.46	1,038.95	359.20	389,843.92	790,200.54
13,417.00	91.70	358.90	12,434.43	1,133.89	1,133.78	-16.20	1,133.90	359.18	389,938.85	790,198.80
13,511.00	91.50	358.30	12,431.80	1,227.84	1,227.71	-18.50	1,227.85	359.14	390,032.78	790,196.50
13,605.00	90.90	358.20	12,429.83	1,321.80	1,321.65	-21.37	1,321.82	359.07	390,126.72	790,193.63
13,700.00	90.90	358.10	12,428.34	1,416.76	1,416.59	-24.43	1,416.80	359.01	390,221.66	790,190.57
13,794.00	90.40	357.90	12,427.27	1,510.73	1,510.52	-27.71	1,510.78	358.95	390,315.59	790,187.29
13,888.00	91.40	0.20	12,425.80	1,604.71	1,604.49	-29.27	1,604.76	358.95	390,409.56	790,185.73

Company: Marathon Oil
Project: Lea County, NM
Site: Cave Lion 5 Federal
Well: BC #1H
Wellbore: OH
Design: MWD 220'-16996' PTB 17054'

Local Co-ordinate Reference:
TVD Reference: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
MD Reference: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
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)
13,982.00	90.80	0.20	12,423.99	1,698.68	1,698.47	-28.94	1,698.72	359.02	390,503.54	790,186.06
14,077.00	91.80	0.40	12,421.84	1,793.64	1,793.45	-28.45	1,793.67	359.09	390,598.52	790,186.55
14,171.00	90.70	1.70	12,419.79	1,887.58	1,887.41	-26.72	1,887.59	359.19	390,692.48	790,188.28
14,265.00	92.30	2.00	12,417.33	1,981.46	1,981.32	-23.69	1,981.46	359.31	390,786.39	790,191.31
14,360.00	89.60	3.30	12,415.75	2,076.28	2,076.20	-19.30	2,076.29	359.47	390,881.27	790,195.70
14,453.00	90.70	3.70	12,415.51	2,169.05	2,169.02	-13.62	2,169.06	359.64	390,974.09	790,201.38
14,548.00	87.70	2.40	12,416.83	2,263.83	2,263.86	-8.57	2,263.88	359.78	391,068.93	790,206.43
14,641.00	89.10	3.30	12,419.43	2,356.63	2,356.71	-3.95	2,356.71	359.90	391,161.78	790,211.05
14,736.00	88.00	359.80	12,421.84	2,451.52	2,451.63	-1.38	2,451.63	359.97	391,256.70	790,213.62
14,830.00	87.60	357.90	12,425.44	2,545.44	2,545.53	-3.26	2,545.54	359.93	391,350.60	790,211.74
14,925.00	89.70	358.20	12,427.68	2,640.38	2,640.45	-6.49	2,640.46	359.86	391,445.52	790,208.51
15,019.00	90.30	358.70	12,427.68	2,734.36	2,734.41	-9.04	2,734.43	359.81	391,539.48	790,205.96
15,113.00	89.90	358.30	12,427.52	2,828.35	2,828.38	-11.50	2,828.40	359.77	391,633.45	790,203.50
15,207.00	91.20	356.80	12,426.62	2,922.29	2,922.29	-15.51	2,922.33	359.70	391,727.36	790,199.49
15,301.00	90.60	356.20	12,425.14	3,016.16	3,016.10	-21.25	3,016.17	359.60	391,821.17	790,193.75
15,395.00	90.10	356.10	12,424.57	3,110.00	3,109.88	-27.56	3,110.01	359.49	391,914.95	790,187.44
15,489.00	93.30	358.20	12,421.78	3,203.87	3,203.71	-32.24	3,203.87	359.42	392,008.78	790,182.76
15,583.00	93.60	358.60	12,416.12	3,297.68	3,297.50	-34.86	3,297.69	359.39	392,102.57	790,180.14
15,677.00	91.20	358.40	12,412.18	3,391.58	3,391.38	-37.31	3,391.58	359.37	392,196.45	790,177.69
15,771.00	91.70	358.40	12,409.81	3,485.54	3,485.31	-39.94	3,485.54	359.34	392,290.38	790,175.06
15,865.00	88.50	357.90	12,409.64	3,579.50	3,579.25	-42.97	3,579.51	359.31	392,384.32	790,172.03
15,959.00	88.00	356.90	12,412.51	3,673.40	3,673.11	-47.23	3,673.41	359.26	392,478.18	790,167.77
16,053.00	92.60	0.00	12,412.02	3,767.35	3,767.04	-49.78	3,767.37	359.24	392,572.11	790,165.22
16,148.00	89.40	0.00	12,410.36	3,862.32	3,862.01	-49.78	3,862.33	359.26	392,667.08	790,165.22
16,243.00	88.70	359.80	12,411.94	3,957.30	3,957.00	-49.94	3,957.31	359.28	392,762.07	790,165.06
16,338.00	88.00	359.20	12,414.67	4,052.26	4,051.95	-50.77	4,052.27	359.28	392,857.02	790,164.23
16,432.00	87.30	358.80	12,418.53	4,146.18	4,145.86	-52.41	4,146.19	359.28	392,950.93	790,162.59

Company: Marathon Oil
Project: Lea County, NM
Site: Cave Lion 5 Federal
Well: BC #1H
Wellbore: OH
Design: MWD 220'-16996' PTB 17054'

Local Co-ordinate Reference: Well BC #1H
TVD Reference: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
MD Reference: Well @ 3296.00usft (GL: 3271' + KB: 25' (H&P423))
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)
16,528.00	90.00	359.10	12,420.79	4,242.14	4,241.81	-54.17	4,242.15	359.27	393,046.88	790,160.83
16,623.00	90.80	358.80	12,420.13	4,337.13	4,336.79	-55.91	4,337.15	359.26	393,141.86	790,159.09
16,718.00	91.60	358.30	12,418.14	4,432.10	4,431.73	-58.31	4,432.12	359.25	393,236.80	790,156.69
16,812.00	92.70	358.10	12,414.61	4,526.01	4,525.62	-61.26	4,526.03	359.22	393,330.69	790,153.74
16,906.00	92.40	0.10	12,410.43	4,619.91	4,619.51	-62.74	4,619.94	359.22	393,424.58	790,152.26
16,996.00	91.50	359.70	12,407.36	4,709.85	4,709.46	-62.89	4,709.88	359.23	393,514.53	790,152.11
Last Survey: 16996' MD, 12407' TVD										
17,054.00	91.50	359.70	12,405.85	4,767.83	4,767.44	-63.20	4,767.86	359.24	393,572.51	790,151.80
PTB: 17054' MD, 12406' TVD										

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
16,996.00	12,407.36	4,709.46	-62.89	Last Survey: 16996' MD, 12407' TVD
17,054.00	12,405.85	4,767.44	-63.20	PTB: 17054' MD, 12406' TVD