



Marathon Oil

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Marathon Oil

Lea County, NM

Colibri Fed 23-32-10

AV #24H

OH

Design: MWD 179'-14163' PTB 14237'

Standard Survey Report

17 October, 2018



PRODIRECTIONAL

Company:	Marathon Oil	Local Co-ordinate Reference:	Well AV #24H
Project:	Lea County, NM	TVD Reference:	Well @ 3736.50usft (GL: 3710' + KB: 26.5' (H&P480))
Site:	Colibri Fed 23-32-10	MD Reference:	Well @ 3736.50usft (GL: 3710' + KB: 26.5' (H&P480))
Well:	AV #24H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	MWD 179'-14163' PTB 14237'	Database:	WellPlanner1

Project	Lea County, NM		
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		

Site	Colibri Fed 23-32-10		
Site Position:		Northing:	482,871.52 usft
From:	Map	Easting:	707,780.82 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32.325737
		Longitude:	-103.660679
		Grid Convergence:	0.36 °

Well	AV #24H		
Well Position	+N/-S	0.00 usft	Northing: 482,898.56 usft
	+E/-W	0.00 usft	Easting: 709,124.78 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32.325788
		Longitude:	-103.656328
		Ground Level:	3,710.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	User Defined	9/20/2018	6.93
			Dip Angle (°) 60.06
			Field Strength (nT) 48,093.80

Design	MWD 179'-14163' PTB 14237'		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.00	0.00	0.00
			Direction (°) 179.62

Survey Program	Date	10/17/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
179.00	14,237.00	Survey #1 (OH)	MWD+IFR1	OWSG MWD + IFR1

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
179.00	0.30	250.80	179.00	-0.15	-0.44	0.15	0.17	0.17	0.00
239.00	0.60	253.00	239.00	-0.30	-0.89	0.29	0.50	0.50	3.67
330.00	0.70	236.80	329.99	-0.74	-1.81	0.73	0.23	0.11	-17.80
422.00	0.70	234.30	421.98	-1.38	-2.74	1.36	0.03	0.00	-2.72
514.00	0.50	220.90	513.98	-2.01	-3.46	1.99	0.26	-0.22	-14.57
605.00	0.60	201.90	604.98	-2.75	-3.90	2.72	0.23	0.11	-20.88
697.00	0.50	204.00	696.97	-3.56	-4.24	3.54	0.11	-0.11	2.28
788.00	0.50	216.70	787.97	-4.25	-4.64	4.21	0.12	0.00	13.96

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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)
880.00	0.30	180.10	879.97	-4.81	-4.88	4.78	0.34	-0.22	-39.78
972.00	0.30	221.10	971.96	-5.23	-5.04	5.20	0.23	0.00	44.57
1,063.00	0.10	136.00	1,062.96	-5.47	-5.14	5.43	0.34	-0.22	-93.52
1,164.00	0.30	120.80	1,163.96	-5.67	-4.85	5.63	0.20	0.20	-15.05
1,276.00	0.30	136.90	1,275.96	-6.03	-4.40	6.00	0.08	0.00	14.38
1,337.00	0.30	129.40	1,336.96	-6.25	-4.16	6.22	0.06	0.00	-12.30
1,432.00	0.40	209.40	1,431.96	-6.69	-4.14	6.67	0.48	0.11	84.21
1,526.00	0.10	203.80	1,525.96	-7.06	-4.33	7.03	0.32	-0.32	-5.96
1,621.00	0.70	208.10	1,620.96	-7.64	-4.64	7.61	0.63	0.63	4.53
1,715.00	0.60	217.90	1,714.95	-8.54	-5.21	8.50	0.16	-0.11	10.43
1,810.00	0.40	199.80	1,809.95	-9.24	-5.63	9.21	0.27	-0.21	-19.05
1,904.00	0.40	207.80	1,903.94	-9.84	-5.89	9.80	0.06	0.00	8.51
1,999.00	0.20	193.60	1,998.94	-10.30	-6.08	10.26	0.22	-0.21	-14.95
2,093.00	0.20	200.90	2,092.94	-10.61	-6.18	10.57	0.03	0.00	7.77
2,188.00	0.30	163.90	2,187.94	-11.00	-6.17	10.96	0.19	0.11	-38.95
2,282.00	0.20	116.00	2,281.94	-11.31	-5.96	11.27	0.24	-0.11	-50.96
2,377.00	0.30	127.00	2,376.94	-11.53	-5.61	11.50	0.12	0.11	11.56
2,471.00	0.30	127.90	2,470.94	-11.83	-5.22	11.80	0.01	0.00	0.96
2,566.00	0.40	114.10	2,565.94	-12.12	-4.72	12.09	0.14	0.11	-14.53
2,660.00	0.30	89.70	2,659.93	-12.25	-4.17	12.23	0.19	-0.11	-25.96
2,755.00	0.40	111.60	2,754.93	-12.37	-3.62	12.35	0.17	0.11	23.05
2,849.00	0.30	80.00	2,848.93	-12.45	-3.07	12.43	0.23	-0.11	-33.62
2,943.00	0.40	96.40	2,942.93	-12.45	-2.50	12.43	0.15	0.11	17.45
3,038.00	0.60	97.40	3,037.93	-12.55	-1.68	12.54	0.21	0.21	1.05
3,132.00	0.60	94.00	3,131.92	-12.65	-0.70	12.64	0.04	0.00	-3.62
3,227.00	0.70	82.40	3,226.91	-12.60	0.37	12.61	0.17	0.11	-12.21
3,321.00	0.80	96.90	3,320.91	-12.61	1.59	12.62	0.23	0.11	15.43
3,416.00	0.80	88.00	3,415.90	-12.66	2.91	12.68	0.13	0.00	-9.37
3,510.00	0.80	76.70	3,509.89	-12.49	4.21	12.52	0.17	0.00	-12.02
3,605.00	1.30	89.30	3,604.87	-12.32	5.93	12.36	0.58	0.53	13.26
3,699.00	1.70	94.10	3,698.84	-12.41	8.39	12.46	0.45	0.43	5.11
3,794.00	1.00	107.60	3,793.81	-12.76	10.58	12.83	0.80	-0.74	14.21
3,888.00	0.70	123.60	3,887.80	-13.33	11.84	13.41	0.40	-0.32	17.02
3,983.00	1.00	115.50	3,982.79	-14.00	13.08	14.09	0.34	0.32	-8.53
4,077.00	1.60	110.50	4,076.77	-14.82	15.05	14.92	0.65	0.64	-5.32
4,172.00	2.00	120.90	4,171.72	-16.13	17.71	16.25	0.54	0.42	10.95
4,266.00	2.00	133.40	4,265.66	-18.10	20.31	18.24	0.46	0.00	13.30
4,361.00	1.80	130.70	4,360.61	-20.21	22.65	20.36	0.23	-0.21	-2.84
4,455.00	1.30	143.30	4,454.58	-22.03	24.40	22.19	0.64	-0.53	13.40
4,549.00	2.00	140.70	4,548.54	-24.16	26.08	24.33	0.75	0.74	-2.77
4,644.00	2.60	141.00	4,643.46	-27.11	28.48	27.30	0.63	0.63	0.32
4,738.00	2.50	147.00	4,737.37	-30.49	30.94	30.69	0.30	-0.11	6.38

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4,817.00	2.20	149.10	4,816.30	-33.24	32.66	33.45	0.40	-0.38	2.66
4,910.00	2.00	147.70	4,909.24	-36.14	34.44	36.37	0.22	-0.22	-1.51
5,005.00	1.00	253.60	5,004.22	-37.78	34.53	38.00	2.60	-1.05	111.47
5,099.00	2.20	341.50	5,098.19	-36.30	33.17	36.51	2.54	1.28	93.51
5,194.00	4.50	7.30	5,193.03	-30.87	33.07	31.09	2.84	2.42	27.16
5,288.00	6.50	20.50	5,286.59	-22.23	35.40	22.46	2.50	2.13	14.04
5,383.00	8.40	31.10	5,380.79	-11.25	40.87	11.52	2.46	2.00	11.16
5,477.00	10.40	47.90	5,473.54	0.32	50.71	0.01	3.59	2.13	17.87
5,572.00	11.00	49.60	5,566.89	11.95	63.98	-11.52	0.71	0.63	1.79
5,666.00	10.70	50.00	5,659.21	23.37	77.49	-22.85	0.33	-0.32	0.43
5,761.00	11.20	58.20	5,752.48	33.90	92.09	-33.29	1.72	0.53	8.63
5,855.00	11.30	58.70	5,844.68	43.49	107.72	-42.78	0.15	0.11	0.53
5,949.00	11.30	58.30	5,936.86	53.12	123.42	-52.30	0.08	0.00	-0.43
6,044.00	11.00	67.20	6,030.07	61.52	139.70	-60.59	1.84	-0.32	9.37
6,138.00	11.10	68.10	6,122.33	68.37	156.36	-67.33	0.21	0.11	0.96
6,233.00	11.40	68.50	6,215.50	75.22	173.58	-74.07	0.33	0.32	0.42
6,327.00	9.50	74.60	6,307.94	80.69	189.71	-79.43	2.34	-2.02	6.49
6,422.00	7.10	75.50	6,401.94	84.24	202.95	-82.89	2.53	-2.53	0.95
6,516.00	5.40	63.20	6,495.38	87.69	212.52	-86.28	2.29	-1.81	-13.09
6,610.00	3.70	40.70	6,589.09	91.99	218.45	-90.54	2.59	-1.81	-23.94
6,705.00	2.40	5.80	6,683.96	96.29	220.65	-94.82	2.33	-1.37	-36.74
6,799.00	2.40	359.90	6,777.88	100.22	220.85	-98.75	0.26	0.00	-6.28
6,894.00	2.50	0.10	6,872.79	104.28	220.85	-102.81	0.11	0.11	0.21
6,988.00	0.60	22.20	6,966.75	106.78	221.04	-105.31	2.08	-2.02	23.51
7,083.00	0.20	355.40	7,061.75	107.41	221.21	-105.94	0.45	-0.42	-28.21
7,177.00	0.30	280.90	7,155.75	107.62	220.96	-106.15	0.33	0.11	-79.26
7,271.00	0.30	230.30	7,249.75	107.51	220.52	-106.04	0.27	0.00	-53.83
7,366.00	0.30	211.40	7,344.75	107.14	220.20	-105.67	0.10	0.00	-19.89
7,461.00	0.50	199.50	7,439.74	106.53	219.94	-105.07	0.23	0.21	-12.53
7,555.00	0.40	192.70	7,533.74	105.83	219.73	-104.37	0.12	-0.11	-7.23
7,650.00	0.60	180.90	7,628.74	105.01	219.65	-103.55	0.24	0.21	-12.42
7,744.00	0.80	172.70	7,722.73	103.86	219.72	-102.40	0.24	0.21	-8.72
7,839.00	0.90	172.00	7,817.72	102.47	219.91	-101.01	0.11	0.11	-0.74
7,933.00	0.90	176.60	7,911.71	101.00	220.06	-99.54	0.08	0.00	4.89
8,028.00	0.90	179.80	8,006.70	99.51	220.10	-98.05	0.05	0.00	3.37
8,122.00	1.00	187.00	8,100.68	97.96	220.01	-96.49	0.17	0.11	7.66
8,217.00	1.00	185.90	8,195.67	96.31	219.82	-94.85	0.02	0.00	-1.16
8,311.00	0.50	142.30	8,289.66	95.17	219.99	-93.71	0.77	-0.53	-46.38
8,406.00	0.50	146.20	8,384.66	94.49	220.47	-93.03	0.04	0.00	4.11
8,500.00	0.60	150.20	8,478.65	93.73	220.94	-92.26	0.11	0.11	4.26
8,594.00	0.80	151.40	8,572.65	92.72	221.50	-91.25	0.21	0.21	1.28
8,689.00	0.90	156.80	8,667.64	91.46	222.11	-89.98	0.13	0.11	5.68

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8,783.00	0.90	151.90	8,761.62	90.13	222.75	-88.65	0.08	0.00	-5.21
8,878.00	0.90	156.30	8,856.61	88.78	223.40	-87.30	0.07	0.00	4.63
8,972.00	1.30	150.20	8,950.60	87.18	224.23	-85.69	0.44	0.43	-6.49
9,087.00	1.00	139.00	9,045.58	85.62	225.31	-84.13	0.39	-0.32	-11.79
9,161.00	8.70	176.40	9,139.18	77.90	226.30	-78.39	8.43	8.19	39.79
9,256.00	20.40	177.30	9,230.97	54.10	227.53	-52.59	12.32	12.32	0.95
9,350.00	30.60	171.70	9,315.71	13.95	231.77	-12.42	11.14	10.85	-5.96
9,444.00	38.60	176.60	9,393.04	-39.09	236.97	40.66	9.00	8.51	5.21
9,539.00	47.80	182.10	9,462.24	-104.00	237.44	105.57	10.46	9.68	5.79
9,633.00	57.80	183.40	9,519.01	-178.69	233.80	180.23	10.69	10.64	1.38
9,728.00	64.80	183.00	9,564.80	-261.83	229.16	263.35	7.38	7.37	-0.42
9,822.00	69.80	181.70	9,600.86	-348.45	225.62	349.94	5.47	5.32	-1.38
9,916.00	74.60	180.30	9,629.59	-437.91	224.07	439.38	5.30	5.11	-1.49
10,011.00	79.90	184.20	9,650.56	-530.44	220.40	531.89	6.87	5.58	4.11
10,105.00	88.20	184.10	9,660.29	-623.61	213.65	625.01	8.83	8.83	-0.11
10,128.00	88.00	183.20	9,661.06	-646.55	212.18	647.94	4.01	-0.87	-3.91
10,222.00	89.80	179.40	9,662.86	-740.48	210.05	741.86	4.47	1.91	-4.04
10,317.00	91.50	178.80	9,661.78	-835.46	211.54	836.85	1.90	1.79	-0.63
10,411.00	91.40	178.90	9,659.41	-929.41	213.43	930.81	0.15	-0.11	0.11
10,505.00	89.70	179.00	9,658.50	-1,023.39	215.15	1,024.79	1.81	-1.81	0.11
10,600.00	90.20	179.50	9,658.59	-1,118.38	216.39	1,119.79	0.74	0.53	0.53
10,694.00	91.30	179.50	9,657.36	-1,212.37	217.21	1,213.78	1.17	1.17	0.00
10,789.00	90.80	180.50	9,655.61	-1,307.35	217.21	1,308.76	1.18	-0.53	1.05
10,883.00	88.90	181.30	9,655.86	-1,401.33	215.74	1,402.73	2.19	-2.02	0.85
10,978.00	88.90	180.50	9,657.68	-1,496.30	214.25	1,497.69	0.84	0.00	-0.84
11,072.00	90.10	180.70	9,658.50	-1,590.29	213.26	1,591.67	1.29	1.28	0.21
11,167.00	89.10	180.10	9,659.17	-1,685.29	212.60	1,686.66	1.23	-1.05	-0.63
11,261.00	88.80	178.50	9,660.89	-1,779.26	213.75	1,780.64	1.73	-0.32	-1.70
11,356.00	89.80	178.00	9,662.05	-1,874.21	216.65	1,875.60	1.18	1.05	-0.53
11,450.00	89.30	178.70	9,662.79	-1,968.17	219.35	1,969.58	0.92	-0.53	0.74
11,545.00	89.70	179.40	9,663.62	-2,063.15	220.93	2,064.57	0.85	0.42	0.74
11,639.00	88.30	178.40	9,665.26	-2,157.11	222.73	2,158.54	1.83	-1.49	-1.06
11,734.00	88.50	178.70	9,667.91	-2,252.05	225.14	2,253.49	0.38	0.21	0.32
11,828.00	89.80	178.50	9,669.31	-2,346.00	227.43	2,347.46	1.40	1.38	-0.21
11,923.00	89.80	179.30	9,669.64	-2,440.99	229.26	2,442.45	0.84	0.00	0.84
12,017.00	91.40	179.50	9,668.65	-2,534.97	230.24	2,536.44	1.72	1.70	0.21
12,112.00	90.80	179.60	9,666.83	-2,629.95	230.99	2,631.43	0.64	-0.63	0.11
12,206.00	91.10	179.40	9,665.27	-2,723.94	231.81	2,725.41	0.38	0.32	-0.21
12,301.00	90.30	179.40	9,664.11	-2,818.92	232.80	2,820.40	0.84	-0.84	0.00
12,395.00	90.60	179.30	9,663.37	-2,912.91	233.87	2,914.40	0.34	0.32	-0.11
12,490.00	89.50	179.20	9,663.29	-3,007.90	235.11	3,009.40	1.16	-1.16	-0.11
12,584.00	89.50	179.00	9,664.11	-3,101.89	236.59	3,103.39	0.21	0.00	-0.21

Company:	Marathon Oil	Local Co-ordinate Reference:	Well AV #24H
Project:	Lea County, NM	TVD Reference:	Well @ 3736.50usft (GL: 3710' + KB: 26.5' (H&P480))
Site:	Colibri Fed 23-32-10	MD Reference:	Well @ 3736.50usft (GL: 3710' + KB: 26.5' (H&P480))
Well:	AV #24H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	MWD 179'-14163' PTB 14237'	Database:	WellPlanner1

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)	
12,679.00	90.40	178.80	9,664.19	-3,196.87	238.41	3,198.38	0.97	0.95	-0.21	
12,773.00	89.10	180.30	9,664.60	-3,290.86	239.15	3,292.37	2.11	-1.38	1.60	
12,867.00	88.80	180.60	9,666.32	-3,384.84	238.41	3,386.35	0.45	-0.32	0.32	
12,961.00	90.00	180.60	9,667.31	-3,478.83	237.43	3,480.33	1.28	1.28	0.00	
13,056.00	88.00	179.70	9,668.97	-3,573.81	237.18	3,575.30	2.31	-2.11	-0.95	
13,150.00	87.90	179.40	9,672.33	-3,667.75	237.92	3,669.24	0.34	-0.11	-0.32	
13,245.00	89.50	180.10	9,674.49	-3,762.72	238.33	3,764.22	1.84	1.68	0.74	
13,339.00	90.30	180.20	9,674.65	-3,856.72	238.08	3,858.21	0.86	0.85	0.11	
13,434.00	89.70	178.70	9,674.65	-3,951.71	239.00	3,953.21	1.70	-0.63	-1.58	
13,528.00	89.80	178.00	9,675.06	-4,045.67	241.70	4,047.18	0.75	0.11	-0.74	
13,622.00	90.70	178.00	9,674.65	-4,139.61	244.98	4,141.14	0.96	0.96	0.00	
13,717.00	91.50	177.50	9,672.83	-4,234.52	248.71	4,236.07	0.99	0.84	-0.53	
13,811.00	91.10	178.20	9,670.69	-4,328.43	252.24	4,330.00	0.86	-0.43	0.74	
13,906.00	91.90	179.10	9,668.21	-4,423.37	254.48	4,424.96	1.27	0.84	0.95	
14,000.00	92.00	180.20	9,665.01	-4,517.31	255.05	4,518.90	1.17	0.11	1.17	
14,094.00	92.40	180.90	9,661.40	-4,611.23	254.15	4,612.82	0.86	0.43	0.74	
14,163.00	93.30	181.20	9,657.97	-4,680.14	252.89	4,681.71	1.37	1.30	0.43	
Last Survey: 14163' MD, 9658' TVD										
14,237.00	93.30	181.20	9,653.71	-4,754.00	251.34	4,755.56	0.00	0.00	0.00	
PTB: 14237' MD, 9654' TVD										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
14,163.00	9,657.97	-4,680.14	252.89	Last Survey: 14163' MD, 9658' TVD	
14,237.00	9,653.71	-4,754.00	251.34	PTB: 14237' MD, 9654' TVD	



Marathon Oil
Lea County, NM
Colibri Fed 23-32-10
AV #24H
Plan #2
GL: 3710' + KB: 26.5' (H&P480)

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

RKB Elevation: Well @ 3738.50usft (GL: 3710' + KB: 26.5' (H&P480))

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Spot
0.00	0.00	482898.56	709124.78	32.325788	-103.656328	

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	VSecl
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5000.00	0.00	0.00	5000.00	0.00	0.00	0.00	0.00
3	5500.00	10.00	65.18	5497.47	18.28	39.50	2.00	-18.02
4	6369.48	10.00	65.18	6353.72	81.72	178.50	0.00	-80.54
5	6889.48	0.00	0.00	6851.18	100.00	218.00	2.00	-98.57
6	9110.28	0.00	0.00	9092.00	100.00	218.00	0.00	-98.57
7	10010.27	90.00	179.62	9864.86	-472.94	219.80	10.00	474.39
8	14291.76	90.00	179.62	9865.00	-4754.33	248.20	0.00	4755.87

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting
[ColibriAV#24H]FTP	0.00	-129.15	217.42	482789.41	709342.20
[ColibriAV#24H]KOP	9092.00	100.00	218.00	482898.56	709340.78
[ColibriAV#24H]LTP/BHL	9865.00	-4754.33	248.20	478144.23	709372.98



PRODIRECTIONAL



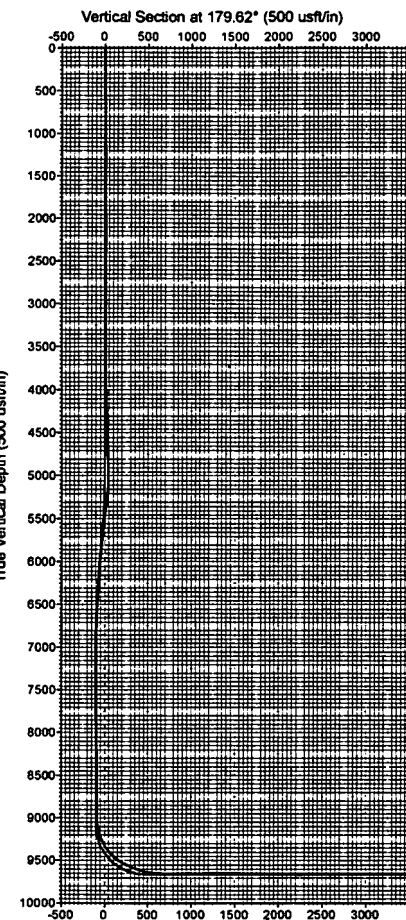
Azimuths to Grid North
True North: -0.36°
Magnetic North: 6.57°

Magnetic Field
Strength: 48093.8nT
Dip Angle: 60.06°
Date: 9/22/2018
Model: USER DEFINED

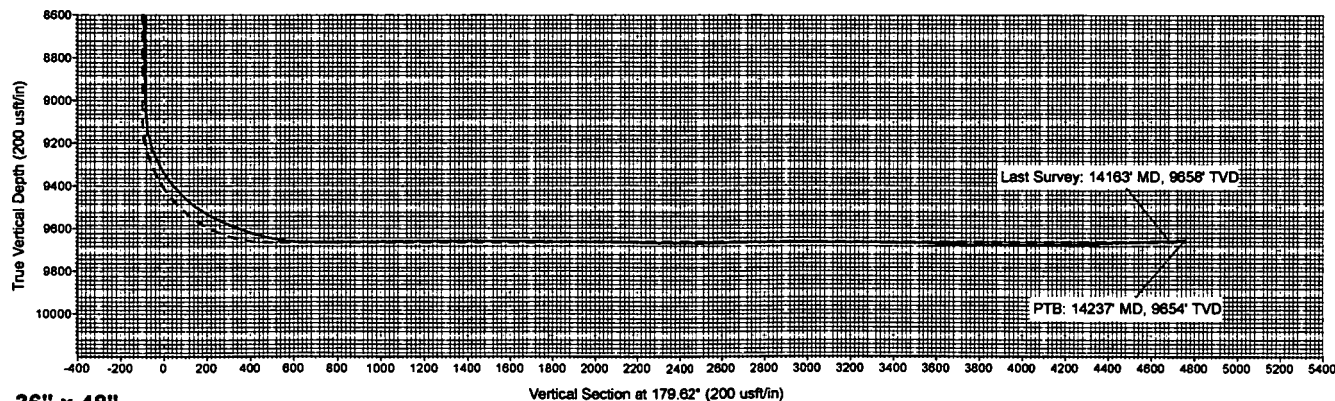
Azimuth Corrections

Total Magnetic Corr. (M to G): 6.57°

Declination (M to T): 6.93° East



Target Line: 9665' TVD @ 0° VS :: 90° INC



36" x 48"

