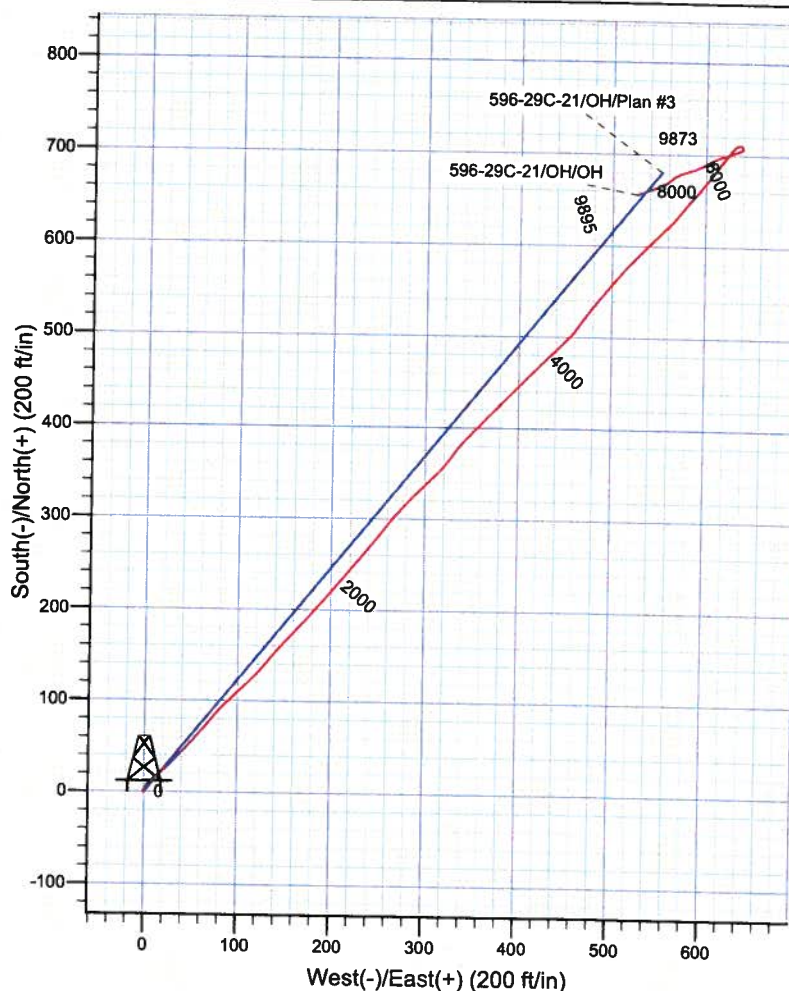
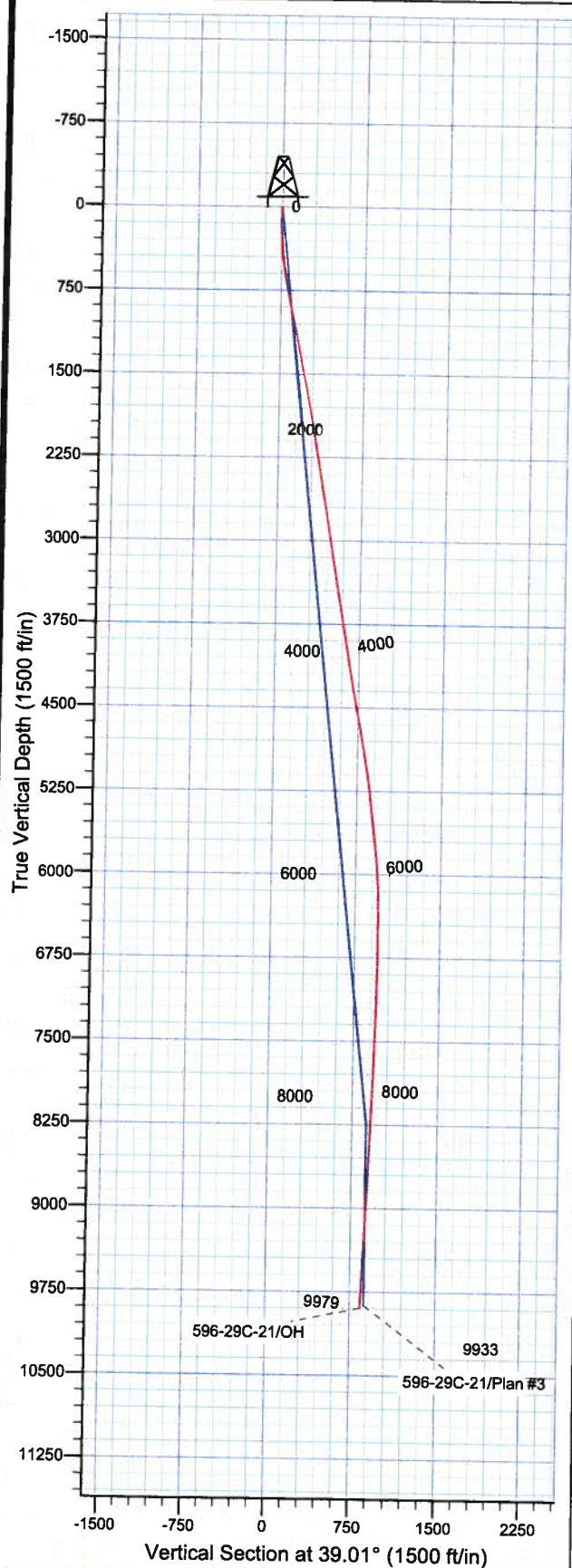




**Scientific Drilling**  
Rocky Mountain Operations

Project: Garfield County, CO NAD 83  
Site: 596-29C Pad  
Well: 596-29C-21  
Wellbore: OH  
Design: OH

**Marathon Oil Co.**



#### WELL DETAILS: 596-29C-21

Ground Level: GL 8180' & RKB 24' @ 8204.00ft (H&P 324)  
Northing Easting Latitude Longitude  
0.00 0.00 1648780.94 2239927.96 39° 35' 1.381 N 108° 11' 49.680 W E

#### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well 596-29C-21 - Slot E, True North  
Vertical (TVD) Reference: GL 8180' & RKB 24' @ 8204.00ft (H&P 324)  
Section (VS) Reference: Slot - E(0.00N, 0.00E)  
Measured Depth Reference: GL 8180' & RKB 24' @ 8204.00ft (H&P 324)  
Calculation Method: Minimum Curvature  
Local North: True  
Location: Sec 29 T5S R96W

#### PROJECT DETAILS: Garfield County, CO NAD 83

Geodetic System: US State Plane 1983  
Datum: North American Datum 1983  
Ellipsoid: GRS 1980  
Zone: Colorado Central Zone

#### Design: OH (596-29C-21/OH)

Created By: Julie Cruse Date: 2009-11-06



**Scientific Drilling**  
Rocky Mountain Operations

## **Marathon Oil Co.**

**Garfield County, CO NAD 83**

**596-29C Pad**

**596-29C-21 - Slot E**

**OH**

**Design: OH**

## **Standard Survey Report**

**06 November, 2009**

## Scientific Drilling

### Survey Report

<b>Company:</b>	Marathon Oil Co.	<b>Local Co-ordinate Reference:</b>	Well 596-29C-21 - Slot E
<b>Project:</b>	Garfield County, CO NAD 83	<b>TVD Reference:</b>	GL 8180' & RKB 24' @ 8204.00ft (H&P 324)
<b>Site:</b>	596-29C Pad	<b>MD Reference:</b>	GL 8180' & RKB 24' @ 8204.00ft (H&P 324)
<b>Well:</b>	596-29C-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	EDM 2003.16 Multi User Db

<b>Project</b>	Garfield County, CO NAD 83		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Central Zone		

Site		596-29C Pad, Sec 29 T5S R96W			
Site Position:		Northing:	1,648,785.82 ft	Latitude:	39° 35' 1.414 N
From:	Map	Easting:	2,239,878.11 ft	Longitude:	108° 11' 50.318 W
Position Uncertainty:	0.00 ft	Slot Radius:	in	Grid Convergence:	-1.70 °

Well	596-29C-21 - Slot E					
Well Position	+N/-S	0.00 ft	Northing:	1,648,780.94 ft	Latitude:	39° 35' 1.381 N
	+E/-W	0.00 ft	Easting:	2,239,927.96 ft	Longitude:	108° 11' 49.680 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	8,180.00 ft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2005-10	2008-10-24	10.78	65.85	52,610

<b>Design</b>	OH				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S</b>	<b>+E/-W</b>	<b>Direction</b>	
	(ft)	(ft)	(ft)	(°)	
	0.00	0.00	0.00	39.01	

<b>Survey Program</b>	<b>Date</b>	2009-11-06			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
28.70	132.66	Survey #1 Slot G Conductor Gyro (OH)	Standard Keeper	Standard Wireline Keeper ver 1.0.2	
158.00	280.00	Survey #2 - Wireline Gyro 14 3/4" Hole (O	Standard Keeper	Standard Wireline Keeper ver 1.0.2	
329.00	2,190.00	Survey #3 - 14 3/4" Hole (OH)	MWD SDI	MWD - Standard ver 1.0.1	
2,313.00	9,979.00	Survey #4 - Production (OH)	MWD SDI	MWD - Standard ver 1.0.1	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
28.70	0.38	276.42	28.70	0.01	-0.09	-0.05	1.32	1.32	0.00	
30.00	0.37	280.13	30.00	0.01	-0.10	-0.06	2.02	-0.77	285.38	
40.00	0.30	293.27	40.00	0.03	-0.16	-0.08	1.04	-0.70	131.40	
50.00	0.26	280.81	50.00	0.04	-0.21	-0.10	0.73	-0.40	-124.60	
60.00	0.27	272.71	60.00	0.05	-0.25	-0.12	0.39	0.10	-81.00	
70.00	0.30	275.06	70.00	0.05	-0.30	-0.15	0.32	0.30	23.50	
80.00	0.31	281.07	80.00	0.06	-0.35	-0.18	0.34	0.10	60.10	
90.00	0.26	291.48	90.00	0.07	-0.40	-0.20	0.72	-0.50	104.10	
100.00	0.26	286.50	100.00	0.09	-0.44	-0.21	0.23	0.00	-49.80	



## Scientific Drilling

### Survey Report

<b>Company:</b>	Marathon Oil Co.	<b>Local Co-ordinate Reference:</b>	Well 596-29C-21 - Slot E
<b>Project:</b>	Garfield County, CO NAD 83	<b>TVD Reference:</b>	GL 8180' & RKB 24' @ 8204.00ft (H&P 324)
<b>Site:</b>	596-29C Pad	<b>MD Reference:</b>	GL 8180' & RKB 24' @ 8204.00ft (H&P 324)
<b>Well:</b>	596-29C-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	EDM 2003.16 Multi User Db

#### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Bulld Rate (°/100ft)	Turn Rate (°/100ft)
110.00	0.33	273.76	110.00	0.10	-0.49	-0.24	0.96	0.70	-127.40
120.00	0.34	281.31	120.00	0.10	-0.55	-0.27	0.45	0.10	75.50
130.00	0.27	286.59	130.00	0.12	-0.60	-0.29	0.75	-0.70	52.80
132.66	0.25	287.95	132.66	0.12	-0.62	-0.29	0.79	-0.75	51.13
<b>Last SDI Conductor Gyro Survey</b>									
158.00	0.26	321.27	158.00	0.18	-0.70	-0.30	0.58	0.04	131.49
<b>First SDI Wireline Gyro Survey</b>									
189.00	0.60	2.91	189.00	0.40	-0.74	-0.16	1.42	1.10	134.32
219.00	1.07	19.97	218.99	0.82	-0.64	0.24	1.76	1.57	56.87
250.00	1.74	23.04	249.98	1.52	-0.35	0.96	2.17	2.16	9.90
280.00	2.41	27.28	279.96	2.50	0.11	2.02	2.29	2.23	14.13
<b>Last SDI Wireline Gyro Survey</b>									
329.00	3.58	30.40	328.90	4.74	1.36	4.54	2.41	2.39	6.37
<b>First SDI Surface MWD Survey</b>									
360.00	4.09	37.43	359.83	6.45	2.52	6.60	2.23	1.65	22.68
391.00	4.99	36.55	390.73	8.41	4.00	9.05	2.91	2.90	-2.84
422.00	5.67	43.48	421.60	10.61	5.85	11.93	3.02	2.19	22.35
513.00	8.76	49.71	511.87	18.35	14.24	23.22	3.50	3.40	6.85
605.00	9.71	45.93	602.67	28.28	25.15	37.81	1.22	1.03	-4.11
697.00	10.70	42.54	693.22	39.97	36.50	54.03	1.26	1.08	-3.68
789.00	11.84	42.74	783.44	53.19	48.68	71.98	1.24	1.24	0.22
881.00	11.77	40.21	873.50	67.29	61.15	90.78	0.57	-0.08	-2.75
973.00	12.05	39.40	963.52	81.88	73.30	109.76	0.35	0.30	-0.88
1,064.00	11.29	44.45	1,052.64	95.58	85.57	128.13	1.40	-0.84	5.55
1,159.00	12.05	46.62	1,145.67	109.03	99.29	147.21	0.92	0.80	2.28
1,251.00	11.45	45.88	1,235.74	121.98	112.82	165.80	0.67	-0.65	-0.80
1,346.00	10.94	40.39	1,328.94	135.41	125.43	184.17	1.24	-0.54	-5.78
1,439.00	11.60	39.45	1,420.15	149.35	137.09	202.35	0.74	0.71	-1.01
1,534.00	11.85	41.40	1,513.16	164.04	149.61	221.64	0.49	0.26	2.05
1,628.00	10.75	44.60	1,605.34	177.53	162.15	240.01	1.35	-1.17	3.40
1,723.00	11.10	43.23	1,698.62	190.50	174.64	257.95	0.46	0.37	-1.44
1,817.00	10.95	39.60	1,790.89	203.97	186.52	275.90	0.76	-0.16	-3.86
1,912.00	11.03	39.81	1,884.14	217.90	198.09	294.01	0.09	0.08	0.22
2,006.00	10.88	40.33	1,976.43	231.57	209.59	311.87	0.19	-0.16	0.55
2,101.00	10.95	40.07	2,069.71	245.31	221.20	329.85	0.09	0.07	-0.27
2,190.00	9.51	40.70	2,157.29	257.36	231.44	345.66	1.62	-1.62	0.71
<b>Last SDI Surface MWD Survey</b>									
2,313.00	8.95	36.97	2,278.70	272.70	243.82	365.37	0.67	-0.46	-3.03
<b>First Survey in 8 3/4" Hole</b>									
2,407.00	9.33	39.02	2,371.51	284.47	253.01	380.30	0.53	0.40	2.18
2,501.00	9.42	36.55	2,464.25	296.57	262.39	395.61	0.44	0.10	-2.63
2,595.00	10.18	43.90	2,556.89	308.73	272.73	411.57	1.56	0.81	7.82
2,690.00	10.16	41.05	2,650.39	321.10	284.06	428.31	0.53	-0.02	-3.00
2,784.00	9.99	47.96	2,742.95	332.81	295.56	444.65	1.30	-0.18	7.35
2,878.00	9.41	44.09	2,835.60	343.79	306.96	460.36	0.93	-0.62	-4.12
2,973.00	8.38	43.91	2,929.46	354.36	317.17	474.99	1.08	-1.08	-0.19
3,066.00	8.15	34.46	3,021.50	364.67	325.60	488.31	1.48	-0.25	-10.16
3,161.00	8.05	36.12	3,115.55	375.60	333.33	501.67	0.27	-0.11	1.75
3,255.00	10.30	44.09	3,208.35	386.95	343.06	516.62	2.74	2.39	8.48
3,350.00	9.61	44.30	3,301.92	398.73	354.50	532.97	0.73	-0.73	0.22
3,444.00	8.67	42.82	3,394.72	409.54	364.80	547.85	1.03	-1.00	-1.57
3,539.00	10.15	45.09	3,488.44	420.70	375.60	563.32	1.61	1.56	2.39
3,634.00	8.98	45.09	3,582.12	431.85	386.77	579.02	1.23	-1.23	0.00
3,728.00	9.33	42.58	3,674.92	442.64	397.13	593.92	0.56	0.37	-2.67

## Scientific Drilling

### Survey Report

<b>Company:</b>	Marathon Oil Co.	<b>Local Co-ordinate Reference:</b>	Well 596-29C-21 - Slot E
<b>Project:</b>	Garfield County, CO NAD 83	<b>TVD Reference:</b>	GL 8180' & RKB 24' @ 8204.00ft (H&P 324)
<b>Site:</b>	596-29C Pad	<b>MD Reference:</b>	GL 8180' & RKB 24' @ 8204.00ft (H&P 324)
<b>Well:</b>	596-29C-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	EDM 2003.16 Multi User Db

#### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
3,823.00	10.77	45.69	3,768.46	454.51	408.69	610.42	1.62	1.52	3.27
3,917.00	10.42	45.99	3,860.86	466.55	421.09	627.58	0.38	-0.37	0.32
4,012.00	9.72	46.18	3,954.39	478.07	433.05	644.07	0.74	-0.74	0.20
4,107.00	8.70	45.78	4,048.17	488.64	443.99	659.16	1.08	-1.07	-0.42
4,200.00	8.65	43.82	4,140.10	498.59	453.87	673.11	0.32	-0.05	-2.11
4,295.00	10.26	35.73	4,233.82	510.61	463.76	688.68	2.19	1.69	-8.52
4,389.00	9.43	33.79	4,326.43	523.81	472.93	704.71	0.95	-0.88	-2.06
4,483.00	11.78	40.86	4,418.82	537.47	483.49	721.97	2.85	2.50	7.52
4,578.00	11.12	39.02	4,511.93	551.92	495.60	740.82	0.79	-0.69	-1.94
4,673.00	9.75	38.99	4,605.36	565.29	506.43	758.03	1.44	-1.44	-0.03
4,767.00	10.46	44.15	4,697.90	577.60	517.39	774.49	1.22	0.76	5.49
4,862.00	9.16	43.61	4,791.51	589.26	528.61	790.61	1.37	-1.37	-0.57
4,956.00	10.47	44.21	4,884.13	600.80	539.73	806.58	1.40	1.39	0.64
5,050.00	10.13	45.85	4,976.62	612.68	551.61	823.29	0.48	-0.36	1.74
5,145.00	9.09	44.82	5,070.28	623.82	562.90	839.05	1.11	-1.09	-1.08
5,240.00	8.04	38.00	5,164.22	634.38	572.28	853.16	1.54	-1.11	-7.18
5,334.00	6.01	34.67	5,257.51	643.61	579.12	864.64	2.20	-2.16	-3.54
5,429.00	5.07	45.78	5,352.07	650.63	584.96	873.77	1.50	-0.99	11.69
5,523.00	6.70	38.32	5,445.58	657.83	591.34	883.38	1.91	1.73	-7.94
5,618.00	7.60	38.49	5,539.84	667.10	598.69	895.20	0.95	0.95	0.18
5,712.00	6.57	37.97	5,633.12	676.20	605.86	906.80	1.10	-1.10	-0.55
5,807.00	6.77	35.15	5,727.47	685.06	612.43	917.82	0.40	0.21	-2.97
5,902.00	5.08	38.05	5,821.96	692.95	618.25	927.61	1.81	-1.78	3.05
5,996.00	4.39	37.39	5,915.64	699.09	623.00	935.37	0.74	-0.73	-0.70
6,091.00	4.07	37.84	6,010.38	704.64	627.27	942.37	0.34	-0.34	0.47
6,184.00	2.81	47.99	6,103.21	708.77	630.99	947.92	1.50	-1.35	10.91
6,279.00	1.37	87.51	6,198.15	710.38	633.86	950.98	2.06	-1.52	41.60
6,374.00	0.87	81.75	6,293.13	710.53	635.71	952.26	0.54	-0.53	-6.06
6,467.00	0.64	89.57	6,386.13	710.64	636.92	953.11	0.27	-0.25	8.41
6,561.00	0.58	67.81	6,480.12	710.82	637.89	953.86	0.25	-0.06	-23.15
6,655.00	0.30	172.66	6,574.12	710.76	638.36	954.10	0.76	-0.30	111.54
6,748.00	0.96	178.16	6,667.11	709.74	638.42	953.35	0.71	0.71	5.91
6,841.00	0.86	162.00	6,760.10	708.30	638.66	952.38	0.29	-0.11	-17.38
6,936.00	0.55	136.73	6,855.09	707.29	639.19	951.93	0.45	-0.33	-26.60
7,030.00	0.31	218.41	6,949.09	706.76	639.34	951.61	0.63	-0.26	86.89
7,125.00	0.78	237.46	7,044.09	706.21	638.64	950.74	0.52	0.49	20.05
7,219.00	1.40	248.41	7,138.07	705.44	637.03	949.14	0.69	0.66	11.65
7,314.00	1.55	246.94	7,233.04	704.51	634.77	946.99	0.16	0.16	-1.55
7,408.00	1.49	255.44	7,327.01	703.71	632.42	944.88	0.25	-0.06	9.04
7,502.00	1.80	248.20	7,420.97	702.85	629.86	942.61	0.40	0.33	-7.70
7,597.00	2.69	247.83	7,515.89	701.46	626.41	939.35	0.94	0.94	-0.39
7,690.00	3.05	246.61	7,608.78	699.65	622.12	935.25	0.39	0.39	-1.31
7,785.00	1.38	266.95	7,703.70	698.59	618.66	932.24	1.92	-1.76	21.41
7,879.00	1.55	249.94	7,797.67	698.09	616.33	930.40	0.49	0.18	-18.10
7,974.00	1.61	249.05	7,892.64	697.17	613.88	928.14	0.07	0.06	-0.94
8,068.00	2.24	246.39	7,986.58	695.96	610.96	925.36	0.68	0.67	-2.83
8,163.00	2.39	241.96	8,081.51	694.29	607.51	921.89	0.25	0.16	-4.66
8,257.00	2.59	238.75	8,175.42	692.27	603.97	918.09	0.26	0.21	-3.41
8,352.00	2.69	241.65	8,270.32	690.09	600.17	914.01	0.18	0.11	3.05
8,446.00	2.61	243.47	8,364.22	688.09	596.32	910.03	0.12	-0.09	1.94
8,541.00	2.90	246.47	8,459.11	686.16	592.18	905.92	0.34	0.31	3.16
8,635.00	2.76	244.30	8,552.99	684.23	587.96	901.77	0.19	-0.15	-2.31
8,728.00	2.96	252.10	8,645.88	682.52	583.66	897.73	0.47	0.22	8.39
8,821.00	2.79	252.50	8,738.76	681.11	579.21	893.83	0.18	-0.18	0.43

**Company:** Marathon Oil Co.  
**Project:** Garfield County, CO NAD 83  
**Site:** 596-29C Pad  
**Well:** 596-29C-21  
**Wellbore:** OH  
**Design:** OH

**Local Co-ordinate Reference:** Well 596-29C-21 - Slot E  
**TVD Reference:** GL 8180' & RKB 24' @ 8204.00ft (H&P 324)  
**MD Reference:** GL 8180' & RKB 24' @ 8204.00ft (H&P 324)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 2003.16 Multi User Db

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
8,915.00	2.60	251.70	8,832.66	679.75	575.01	890.13	0.21	-0.20	-0.85
9,009.00	2.84	246.40	8,926.55	678.15	570.85	886.27	0.37	0.26	-5.64
9,104.00	2.41	234.84	9,021.45	676.05	567.06	882.26	0.72	-0.45	-12.17
9,197.00	2.69	230.23	9,114.36	673.53	563.78	878.23	0.37	0.30	-4.96
9,289.00	2.90	232.95	9,206.25	670.75	560.26	873.86	0.27	0.23	2.96
9,384.00	2.23	236.00	9,301.15	668.27	556.81	869.76	0.72	-0.71	3.21
9,478.00	2.78	248.24	9,395.06	666.40	553.18	866.02	0.81	0.59	13.02
9,573.00	3.13	246.34	9,489.94	664.51	548.67	861.71	0.38	0.37	-2.00
9,667.00	3.20	247.99	9,583.79	662.49	543.88	857.13	0.12	0.07	1.76
9,761.00	3.16	249.10	9,677.65	660.58	539.03	852.59	0.08	-0.04	1.18
9,855.00	3.36	248.16	9,771.50	658.64	534.05	847.95	0.22	0.21	-1.00
9,925.00	3.69	251.73	9,841.36	657.17	530.01	844.26	0.57	0.47	5.10
9,979.00	3.69	251.73	9,895.25	656.08	526.71	841.34	0.00	0.00	0.00

Projection to TD

**Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
596-29C-21 PBHL - actual wellpath misses target center by 28.72ft at 9955.05ft MD (9871.35 TVD, 656.56 N, 528.17 E) - Rectangle (sides W100.00 H200.00 D0.00)	0.00	0.00	9,873.00	676.93	548.35	1,649,441.29	2,240,496.16	39° 35' 8.071 N	108° 11' 42.676 W

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_