



Cathedral Energy Services

Survey Report

Company:	Anadarko Petroleum Corporation	Local Co-ordinate Reference:	Well Saddleback 29-29
Project:	DJ Wattenberg	TVD Reference:	WELL @ 5029.0ft (Xtreme 11)
Site:	S29-T2N-R67W (Saddleback)	MD Reference:	WELL @ 5029.0ft (Xtreme 11)
Well:	Saddleback 29-29	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Project	DJ Wattenberg		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		S29-T2N-R67W (Saddleback)			
Site Position:		Northing:	1,284,564.16 ft	Latitude:	40.113055
From:	Lat/Long	Easting:	3,162,379.27 ft	Longitude:	-104.919448
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.38 °

Well		Saddleback 29-29				
Well Position	+N/-S	0.0 ft	Northing:	1,284,614.06 ft	Latitude:	40.113192
	+E/-W	0.0 ft	Easting:	3,162,379.22 ft	Longitude:	-104.919447
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,014.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/19/2012	8.76	66.75	52,838

Design	FINAL			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	5.32

Survey Program	Date	9/12/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
77.0	8,314.0	Survey #1 (DD)	MWD	Geolink MWD	

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
77.0	0.40	201.50	77.0	-0.3	-0.1	-0.3	0.52	0.52	
164.0	1.10	14.80	164.0	0.3	0.0	0.3	1.72	0.80	
253.0	2.20	50.10	253.0	2.2	1.5	2.3	1.63	1.24	
340.0	2.50	26.10	339.9	5.0	3.6	5.3	1.17	0.34	
417.0	3.90	4.50	416.8	9.1	4.6	9.5	2.37	1.82	
508.0	5.10	8.10	507.5	16.2	5.4	16.6	1.35	1.32	
599.0	7.70	5.90	597.9	26.3	6.6	26.7	2.87	2.86	
689.0	9.60	4.40	686.9	39.7	7.8	40.3	2.13	2.11	
780.0	12.20	4.20	776.2	56.9	9.1	57.5	2.86	2.86	
840.0	11.70	2.90	834.9	69.3	9.9	69.9	0.95	-0.83	
910.0	12.00	3.50	903.4	83.6	10.7	84.3	0.46	0.43	
1,017.0	12.70	3.90	1,008.0	106.5	12.1	107.1	0.66	0.65	

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Design:	FINAL	Database:	USA EDM 5000 Multi Users 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)	Formations / Comments
1,108.0	11.50	2.40	1,096.9	125.5	13.2	126.2	1.36	-1.32	
1,199.0	12.50	3.10	1,186.0	144.4	14.1	145.1	1.11	1.10	
1,290.0	14.20	5.30	1,274.5	165.4	15.7	166.1	1.95	1.87	
1,380.0	14.20	4.80	1,361.7	187.4	17.6	188.2	0.14	0.00	
1,471.0	14.50	5.70	1,449.9	209.8	19.7	210.7	0.41	0.33	
1,562.0	13.90	7.10	1,538.1	232.0	22.2	233.1	0.76	-0.66	
1,652.0	13.20	6.50	1,625.6	252.9	24.7	254.1	0.79	-0.78	
1,743.0	12.40	5.10	1,714.4	273.0	26.7	274.3	0.94	-0.88	
1,834.0	11.60	4.70	1,803.4	291.8	28.3	293.2	0.88	-0.88	
1,924.0	11.60	9.60	1,891.5	309.8	30.6	311.3	1.09	0.00	
2,015.0	12.90	4.50	1,980.5	328.9	32.9	330.6	1.86	1.43	
2,106.0	11.90	7.40	2,069.3	348.4	34.9	350.1	1.29	-1.10	
2,196.0	12.60	3.70	2,157.3	367.4	36.7	369.2	1.17	0.78	
2,287.0	11.90	3.30	2,246.2	386.6	37.9	388.5	0.77	-0.77	
2,378.0	11.50	2.70	2,335.3	405.1	38.9	406.9	0.46	-0.44	
2,468.0	11.60	3.20	2,423.5	423.1	39.8	424.9	0.16	0.11	
2,559.0	11.60	6.70	2,512.6	441.3	41.4	443.2	0.77	0.00	
2,650.0	12.30	6.80	2,601.7	460.0	43.6	462.1	0.77	0.77	
2,740.0	13.10	0.40	2,689.5	479.7	44.8	481.8	1.80	0.89	
2,831.0	11.80	1.80	2,778.3	499.3	45.2	501.4	1.47	-1.43	
2,922.0	12.70	4.00	2,867.3	518.6	46.2	520.7	1.11	0.99	
3,013.0	14.00	8.90	2,955.8	539.5	48.6	541.6	1.89	1.43	
3,103.0	12.70	7.20	3,043.4	560.0	51.5	562.4	1.51	-1.44	
3,194.0	11.20	7.70	3,132.4	578.7	53.9	581.2	1.65	-1.65	
3,285.0	11.90	10.10	3,221.5	596.7	56.8	599.4	0.93	0.77	
3,375.0	12.30	7.60	3,309.5	615.3	59.7	618.2	0.73	0.44	
3,466.0	11.60	5.40	3,398.6	634.1	61.8	637.1	0.92	-0.77	
3,557.0	11.90	1.20	3,487.7	652.6	62.9	655.6	1.00	0.33	
3,647.0	13.20	5.50	3,575.5	672.1	64.0	675.1	1.78	1.44	
3,738.0	11.20	2.70	3,664.5	691.2	65.4	694.3	2.29	-2.20	
3,829.0	10.40	7.90	3,753.9	708.2	67.0	711.4	1.38	-0.88	
3,919.0	11.40	6.70	3,842.2	725.1	69.1	728.4	1.14	1.11	
4,010.0	11.10	4.90	3,931.5	742.7	70.9	746.1	0.51	-0.33	
4,101.0	10.00	6.00	4,020.9	759.3	72.5	762.8	1.23	-1.21	
4,191.0	10.70	7.20	4,109.5	775.4	74.4	778.9	0.81	0.78	
4,282.0	13.60	5.90	4,198.4	794.4	76.5	798.1	3.20	3.19	
4,373.0	14.10	6.80	4,286.8	816.1	79.0	819.9	0.60	0.55	
4,463.0	13.90	3.50	4,374.1	837.7	80.9	841.6	0.91	-0.22	
4,554.0	12.20	3.70	4,462.8	858.2	82.2	862.2	1.87	-1.87	
4,644.0	12.30	4.20	4,550.7	877.3	83.5	881.3	0.16	0.11	
4,735.0	11.60	3.20	4,639.7	896.1	84.7	900.1	0.80	-0.77	
4,826.0	13.10	3.20	4,728.6	915.5	85.8	919.5	1.65	1.65	
4,917.0	12.10	1.20	4,817.4	935.4	86.6	939.4	1.20	-1.10	
5,007.0	11.40	8.00	4,905.6	953.6	88.0	957.7	1.72	-0.78	
5,098.0	11.40	8.80	4,994.8	971.4	90.7	975.6	0.17	0.00	
5,189.0	11.90	3.30	5,083.9	989.6	92.6	994.0	1.34	0.55	
5,280.0	12.00	5.40	5,172.9	1,008.4	94.0	1,012.8	0.49	0.11	
5,370.0	11.20	7.20	5,261.1	1,026.4	96.0	1,030.9	0.98	-0.89	
5,461.0	11.00	4.10	5,350.4	1,043.8	97.7	1,048.4	0.69	-0.22	
5,552.0	10.00	9.50	5,439.8	1,060.3	99.6	1,065.0	1.54	-1.10	
5,642.0	10.50	6.20	5,528.4	1,076.2	101.8	1,081.0	0.86	0.56	
5,733.0	11.00	6.80	5,617.8	1,093.0	103.7	1,097.9	0.56	0.55	
5,824.0	10.80	4.60	5,707.2	1,110.1	105.4	1,115.1	0.51	-0.22	

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Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
5,915.0	11.30	2.40	5,796.5	1,127.5	106.5	1,132.6	0.72	0.55	
6,005.0	9.40	0.10	5,885.0	1,143.7	106.9	1,148.7	2.16	-2.11	
6,096.0	7.90	359.40	5,975.0	1,157.4	106.8	1,162.3	1.65	-1.65	
6,187.0	5.90	8.90	6,065.3	1,168.3	107.5	1,173.2	2.52	-2.20	
6,278.0	4.20	354.90	6,156.0	1,176.2	107.9	1,181.2	2.29	-1.87	
6,368.0	3.00	0.20	6,245.8	1,181.8	107.6	1,186.7	1.38	-1.33	
6,459.0	1.30	36.40	6,336.7	1,185.1	108.3	1,190.0	2.30	-1.87	
6,550.0	2.20	25.30	6,427.7	1,187.5	109.6	1,192.5	1.05	0.99	
6,641.0	0.50	331.70	6,518.7	1,189.4	110.2	1,194.5	2.14	-1.87	
6,732.0	0.70	33.70	6,609.7	1,190.2	110.3	1,195.3	0.70	0.22	
6,822.0	1.10	46.70	6,699.6	1,191.3	111.2	1,196.4	0.50	0.44	
6,913.0	1.80	41.90	6,790.6	1,192.9	112.8	1,198.2	0.78	0.77	
7,004.0	1.30	357.00	6,881.6	1,195.0	113.7	1,200.4	1.40	-0.55	
7,095.0	2.40	12.00	6,972.5	1,197.9	114.1	1,203.3	1.31	1.21	
7,186.0	2.90	316.60	7,063.4	1,201.5	112.9	1,206.7	2.75	0.55	
7,276.0	2.40	281.80	7,153.4	1,203.5	109.5	1,208.5	1.84	-0.56	
7,367.0	2.20	281.20	7,244.3	1,204.2	105.9	1,208.9	0.22	-0.22	
7,458.0	2.00	137.90	7,335.3	1,203.4	105.2	1,208.0	4.38	-0.22	
7,549.0	2.60	89.70	7,426.2	1,202.2	108.4	1,207.1	2.15	0.66	Last Cathedral Survey @ 7,549' MD
8,314.0	2.60	89.70	8,190.4	1,202.4	143.1	1,210.5	0.00	0.00	Projection to TD @ 8,314' MD - Saddleback 29-2

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
Saddleback 29-29 PBHL	0.00	0.00	8,195.0	1,199.2	111.6	1,285,813.98	3,162,482.96	40.116484	-104.919048
- actual wellpath misses target center by 32.0ft at 8314.0ft MD (8190.4 TVD, 1202.4 N, 143.1 E)									
- Circle (radius 50.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
7,549.0	7,426.2	1,202.2	108.4	Last Cathedral Survey @ 7,549' MD	
8,314.0	8,190.4	1,202.4	143.1	Projection to TD @ 8,314' MD	

Checked By: _____ Approved By: _____ Date: _____