





Cathedral Energy Services

Survey Report

Company:	Anadarko Petroleum Corporation	Local Co-ordinate Reference:	Well Camenisch 32-2
Project:	DJ Wattenberg	TVD Reference:	WELL @ 5046.0ft (Xtreme 11)
Site:	S2-T1N-R67W (Camenisch 19-2-9F)	MD Reference:	WELL @ 5046.0ft (Xtreme 11)
Well:	Camenisch 32-2	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		S2-T1N-R67W (Camenisch 19-2-9F)			
Site Position:		Northing:	1,271,017.29 ft	Latitude:	40.075572
From:	Lat/Long	Easting:	3,178,075.18 ft	Longitude:	-104.863678
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.41 °

Well	Camenisch 32-2					
Well Position	+N/-S	0.0 ft	Northing:	1,270,987.41 ft	Latitude:	40.075490
	+E/-W	0.0 ft	Easting:	3,178,075.67 ft	Longitude:	-104.863677
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,031.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/6/2012	8.71	66.73	52,810

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	329.22	

Survey Program	Date	10/14/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
107.0	8,600.0	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	
107.0	0.70	153.40	107.0	-0.6	0.3	-0.7	0.65	0.65	
195.0	0.80	334.20	195.0	-0.5	0.3	-0.6	1.70	0.11	
283.0	2.70	326.90	282.9	1.8	-1.1	2.1	2.17	2.16	
371.0	5.00	339.20	370.7	7.1	-3.6	8.0	2.76	2.61	
463.0	5.80	337.90	462.3	15.2	-6.8	16.5	0.88	0.87	
554.0	8.00	341.20	552.7	25.4	-10.6	27.2	2.46	2.42	
645.0	9.70	339.40	642.6	38.6	-15.3	41.0	1.89	1.87	
735.0	12.40	340.90	730.9	54.8	-21.1	57.9	3.02	3.00	
826.0	13.50	340.50	819.6	74.1	-27.9	77.9	1.21	1.21	
889.0	13.40	340.60	880.9	87.9	-32.8	92.3	0.16	-0.16	
945.0	13.50	338.60	935.3	100.1	-37.3	105.1	0.85	0.18	
1,035.0	15.10	338.60	1,022.5	120.8	-45.4	127.0	1.78	1.78	

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Well:	Camenisch 32-2	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
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
1,126.0	17.00	337.50	1,110.0	144.1	-54.8	151.9	2.11	2.09	
1,217.0	19.90	339.40	1,196.3	170.9	-65.4	180.3	3.25	3.19	
1,308.0	21.40	339.50	1,281.5	201.0	-76.6	211.9	1.65	1.65	
1,399.0	22.10	341.40	1,366.0	232.7	-87.9	244.9	1.09	0.77	
1,489.0	23.20	342.40	1,449.0	265.7	-98.7	278.7	1.29	1.22	
1,580.0	24.70	344.00	1,532.2	301.0	-109.3	314.6	1.80	1.65	
1,671.0	24.60	344.40	1,614.9	337.6	-119.7	351.3	0.21	-0.11	
1,761.0	23.60	341.00	1,697.1	372.6	-130.6	387.0	1.90	-1.11	
1,852.0	22.20	341.00	1,780.9	406.1	-142.1	421.6	1.54	-1.54	
1,943.0	21.20	341.50	1,865.4	438.0	-152.9	454.5	1.12	-1.10	
2,034.0	21.40	337.20	1,950.2	468.9	-164.6	487.1	1.73	0.22	
2,125.0	20.20	337.00	2,035.3	498.7	-177.1	519.1	1.32	-1.32	
2,215.0	20.00	336.80	2,119.8	527.1	-189.3	549.7	0.23	-0.22	
2,305.0	20.70	335.80	2,204.2	555.8	-201.9	580.8	0.87	0.78	
2,397.0	22.30	336.70	2,289.8	586.6	-215.4	614.2	1.78	1.74	
2,488.0	22.90	337.30	2,373.8	618.8	-229.1	648.9	0.71	0.66	
2,578.0	22.20	337.30	2,456.9	650.7	-242.4	683.1	0.78	-0.78	
2,669.0	23.60	331.70	2,540.8	682.6	-257.7	718.3	2.84	1.54	
2,760.0	23.60	333.80	2,624.2	714.9	-274.4	754.7	0.92	0.00	
2,851.0	22.80	329.20	2,707.8	746.4	-291.4	790.4	2.18	-0.88	
2,942.0	23.40	324.70	2,791.5	776.3	-310.9	826.1	2.05	0.66	
3,032.0	22.20	320.40	2,874.5	804.0	-332.1	860.7	2.28	-1.33	
3,123.0	22.00	322.20	2,958.8	830.7	-353.5	894.6	0.78	-0.22	
3,214.0	21.90	323.70	3,043.2	857.9	-374.0	928.4	0.63	-0.11	
3,304.0	23.70	322.00	3,126.2	885.7	-395.1	963.1	2.13	2.00	
3,395.0	23.90	323.40	3,209.4	914.9	-417.3	999.6	0.66	0.22	
3,486.0	23.20	324.30	3,292.9	944.2	-438.8	1,035.8	0.86	-0.77	
3,577.0	23.00	324.30	3,376.6	973.2	-459.6	1,071.3	0.22	-0.22	
3,668.0	21.90	322.60	3,460.7	1,001.1	-480.3	1,105.9	1.40	-1.21	
3,758.0	21.80	321.90	3,544.2	1,027.6	-500.8	1,139.2	0.31	-0.11	
3,849.0	22.20	322.50	3,628.6	1,054.6	-521.7	1,173.0	0.50	0.44	
3,939.0	23.40	323.70	3,711.5	1,082.5	-542.6	1,207.7	1.43	1.33	
4,030.0	22.30	322.70	3,795.4	1,110.8	-563.8	1,242.8	1.28	-1.21	
4,121.0	22.70	320.80	3,879.5	1,138.1	-585.3	1,277.3	0.91	0.44	
4,212.0	23.40	320.20	3,963.2	1,165.6	-608.0	1,312.5	0.81	0.77	
4,302.0	22.10	321.00	4,046.2	1,192.5	-630.1	1,347.0	1.48	-1.44	
4,393.0	22.70	323.90	4,130.3	1,220.0	-651.2	1,381.4	1.38	0.66	
4,484.0	22.20	322.70	4,214.4	1,247.8	-672.0	1,415.9	0.75	-0.55	
4,575.0	23.90	323.10	4,298.2	1,276.3	-693.5	1,451.4	1.88	1.87	
4,665.0	23.40	322.60	4,380.6	1,305.0	-715.3	1,487.2	0.60	-0.56	
4,756.0	23.50	323.40	4,464.1	1,334.0	-737.0	1,523.2	0.37	0.11	
4,847.0	20.70	322.20	4,548.4	1,361.2	-757.7	1,557.3	3.12	-3.08	
4,937.0	20.60	324.10	4,632.6	1,386.6	-776.8	1,588.8	0.75	-0.11	
5,028.0	22.50	321.50	4,717.3	1,413.2	-797.0	1,622.0	2.34	2.09	
5,119.0	21.60	324.20	4,801.6	1,440.4	-817.6	1,656.0	1.49	-0.99	
5,210.0	22.60	327.70	4,885.9	1,468.8	-836.8	1,690.1	1.82	1.10	
5,300.0	24.30	327.50	4,968.5	1,499.0	-856.0	1,725.9	1.89	1.89	
5,391.0	23.50	326.10	5,051.7	1,529.9	-876.1	1,762.8	1.08	-0.88	
5,482.0	20.70	326.50	5,136.0	1,558.4	-895.1	1,796.9	3.08	-3.08	
5,573.0	18.30	325.00	5,221.8	1,583.5	-912.2	1,827.3	2.69	-2.64	
5,663.0	16.90	324.90	5,307.5	1,605.8	-927.8	1,854.4	1.56	-1.56	
5,754.0	14.20	320.30	5,395.2	1,625.2	-942.6	1,878.6	3.26	-2.97	
5,845.0	12.00	318.10	5,483.8	1,640.8	-956.0	1,898.9	2.48	-2.42	

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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
5,936.0	10.60	316.30	5,573.1	1,653.9	-968.1	1,916.4	1.59	-1.54	
6,027.0	8.50	316.20	5,662.8	1,664.8	-978.6	1,931.1	2.31	-2.31	
6,117.0	7.80	316.20	5,751.9	1,674.0	-987.4	1,943.5	0.78	-0.78	
6,208.0	6.30	311.40	5,842.2	1,681.8	-995.4	1,954.3	1.77	-1.65	
6,299.0	6.10	326.60	5,932.7	1,689.1	-1,001.8	1,963.9	1.81	-0.22	
6,390.0	4.90	322.00	6,023.3	1,696.2	-1,006.9	1,972.5	1.40	-1.32	
6,481.0	4.60	323.90	6,113.9	1,702.2	-1,011.4	1,980.0	0.37	-0.33	
6,571.0	4.40	319.10	6,203.7	1,707.7	-1,015.8	1,987.0	0.47	-0.22	
6,662.0	4.00	306.30	6,294.4	1,712.3	-1,020.7	1,993.4	1.12	-0.44	
6,753.0	4.70	272.00	6,385.2	1,714.3	-1,026.9	1,998.3	2.91	0.77	
6,844.0	5.30	270.40	6,475.8	1,714.4	-1,034.9	2,002.5	0.68	0.66	
6,934.0	4.80	264.20	6,565.5	1,714.1	-1,042.8	2,006.3	0.82	-0.56	
7,030.0	4.20	256.60	6,661.2	1,712.9	-1,050.2	2,009.0	0.88	-0.62	
7,121.0	2.90	248.70	6,752.0	1,711.3	-1,055.6	2,010.4	1.52	-1.43	
7,211.0	1.80	247.60	6,841.9	1,709.9	-1,059.0	2,011.0	1.22	-1.22	
7,302.0	1.60	250.60	6,932.9	1,708.9	-1,061.5	2,011.4	0.24	-0.22	
7,392.0	1.20	128.90	7,022.9	1,707.9	-1,062.0	2,010.8	2.73	-0.44	
7,483.0	2.20	59.80	7,113.8	1,708.2	-1,059.7	2,009.9	2.30	1.10	
7,573.0	2.50	55.60	7,203.8	1,710.2	-1,056.6	2,010.0	0.38	0.33	
7,664.0	2.90	43.00	7,294.7	1,713.0	-1,053.4	2,010.8	0.78	0.44	
7,755.0	2.60	44.00	7,385.6	1,716.1	-1,050.4	2,011.9	0.33	-0.33	
7,891.0	1.80	46.70	7,521.5	1,719.8	-1,046.7	2,013.2	0.59	-0.59	
7,982.0	1.50	38.80	7,612.4	1,721.7	-1,044.9	2,013.9	0.41	-0.33	
8,072.0	1.10	35.10	7,702.4	1,723.4	-1,043.7	2,014.7	0.45	-0.44	
8,163.0	0.70	48.40	7,793.4	1,724.4	-1,042.8	2,015.2	0.49	-0.44	
8,254.0	0.50	71.70	7,884.4	1,724.9	-1,042.0	2,015.2	0.34	-0.22	
8,344.0	0.70	34.90	7,974.4	1,725.5	-1,041.3	2,015.3	0.47	0.22	
8,435.0	0.80	53.20	8,065.4	1,726.4	-1,040.5	2,015.6	0.28	0.11	
8,526.0	1.50	8.40	8,156.3	1,727.9	-1,039.8	2,016.6	1.20	0.77	
8,545.0	1.50	9.30	8,175.3	1,728.4	-1,039.7	2,017.0	0.12	0.00	Last Cathedral Survey @ 8,545' MD - Camenisch
8,600.0	1.50	9.30	8,230.3	1,729.8	-1,039.5	2,018.1	0.00	0.00	Projection to Bit @ 8600' MD

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									
Camenisch 32-2 PBHL (0.00	0.00	8,201.0	1,707.0	-1,016.6	1,272,687.11	3,177,046.84	40.080176	-104.867310
- actual wellpath misses target center by 40.6ft at 8545.0ft MD (8175.3 TVD, 1728.4 N, -1039.7 E)									
- Circle (radius 50.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
8,545.0	8,175.3	1,728.4	-1,039.7	Last Cathedral Survey @ 8,545' MD	
8,600.0	8,230.3	1,729.8	-1,039.5	Projection to Bit @ 8600' MD	

Checked By: _____ Approved By: _____ Date: _____