





# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Anadarko Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Camenisch 22-2
<b>Project:</b>	DJ Wattenberg	<b>TVD Reference:</b>	WELL @ 5047.0ft (Xtreme 11)
<b>Site:</b>	S2-T1N-R67W (Camenisch 19-2-9F)	<b>MD Reference:</b>	WELL @ 5047.0ft (Xtreme 11)
<b>Well:</b>	Camenisch 22-2	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	DJ Wattenberg		
<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 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 22-2					
Well Position	+N/-S	0.0 ft	Northing:	1,271,047.51 ft	Latitude:	40.075655
	+E/-W	0.0 ft	Easting:	3,178,074.68 ft	Longitude:	-104.863679
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,032.0 ft

<b>Wellbore</b>	DD				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	10/27/2012	8.70	66.73	52,804

<b>Design</b>	DD				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	10.50	

<b>Survey Program</b>	<b>Date</b>	11/28/2012			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
77.0	8,472.0	Survey #1 (DD)	MWD	Geolink MWD	

<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>Formations / Comments</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
77.0	1.00	192.00	77.0	-0.7	-0.1	-0.7	1.30	1.30		
164.0	0.30	335.80	164.0	-1.2	-0.4	-1.2	1.44	-0.80		
253.0	1.90	4.30	253.0	0.5	-0.4	0.4	1.85	1.80		
340.0	3.60	6.90	339.9	4.6	0.1	4.6	1.96	1.95		
417.0	5.30	11.20	416.6	10.5	1.0	10.5	2.25	2.21		
507.0	6.90	11.30	506.1	19.9	2.9	20.1	1.78	1.78		
598.0	9.00	8.40	596.2	32.3	5.0	32.7	2.35	2.31		
689.0	11.00	7.40	685.9	48.0	7.2	48.5	2.21	2.20		
779.0	13.80	11.60	773.8	67.0	10.4	67.8	3.27	3.11		
884.0	14.50	11.80	875.6	92.1	15.6	93.4	0.67	0.67		
945.0	13.90	10.30	934.7	106.8	18.5	108.4	1.15	-0.98		
1,036.0	16.00	12.30	1,022.6	129.8	23.1	131.9	2.38	2.31		

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<b>Site:</b>	S2-T1N-R67W (Camenisch 19-2-9F)	<b>MD Reference:</b>	WELL @ 5047.0ft (Xtreme 11)
<b>Well:</b>	Camenisch 22-2	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	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
1,127.0	16.40	7.60	1,110.0	154.8	27.5	157.2	1.51	0.44	
1,218.0	18.40	9.10	1,196.8	181.7	31.5	184.4	2.25	2.20	
1,309.0	17.50	7.70	1,283.4	209.5	35.6	212.5	1.10	-0.99	
1,400.0	17.10	11.80	1,370.3	236.1	40.2	239.5	1.41	-0.44	
1,490.0	16.90	11.10	1,456.4	261.9	45.4	265.8	0.32	-0.22	
1,581.0	16.70	10.10	1,543.5	287.8	50.2	292.1	0.39	-0.22	
1,672.0	16.80	8.40	1,630.6	313.7	54.4	318.3	0.55	0.11	
1,763.0	18.60	9.60	1,717.3	341.0	58.8	346.0	2.02	1.98	
1,853.0	18.00	6.40	1,802.8	368.9	62.7	374.2	1.30	-0.67	
1,944.0	17.20	9.00	1,889.5	396.2	66.4	401.7	1.23	-0.88	
2,035.0	16.70	9.90	1,976.5	422.4	70.8	428.2	0.62	-0.55	
2,125.0	16.80	12.80	2,062.7	447.8	75.9	454.1	0.94	0.11	
2,216.0	15.90	10.60	2,150.0	472.9	81.1	479.7	1.20	-0.99	
2,307.0	17.00	12.80	2,237.3	498.1	86.3	505.5	1.39	1.21	
2,397.0	17.40	14.20	2,323.3	524.0	92.5	532.1	0.64	0.44	
2,488.0	15.70	11.70	2,410.5	549.2	98.4	558.0	2.03	-1.87	
2,579.0	16.90	9.40	2,497.9	574.3	103.0	583.5	1.50	1.32	
2,670.0	18.50	7.80	2,584.6	601.7	107.1	611.1	1.84	1.76	
2,761.0	18.00	9.00	2,671.0	629.9	111.3	639.6	0.69	-0.55	
2,851.0	17.80	7.50	2,756.6	657.3	115.3	667.3	0.56	-0.22	
2,942.0	18.50	10.20	2,843.1	685.3	119.6	695.6	1.20	0.77	
3,033.0	18.80	7.90	2,929.3	714.0	124.2	724.7	0.87	0.33	
3,124.0	18.80	8.30	3,015.5	743.0	128.3	754.0	0.14	0.00	
3,215.0	17.10	14.00	3,102.0	770.5	133.7	782.0	2.68	-1.87	
3,305.0	16.70	13.10	3,188.2	796.0	139.8	808.1	0.53	-0.44	
3,396.0	16.50	11.30	3,275.4	821.4	145.3	834.1	0.61	-0.22	
3,487.0	17.00	8.80	3,362.5	847.2	149.9	860.3	0.96	0.55	
3,578.0	17.00	7.30	3,449.5	873.5	153.6	886.9	0.48	0.00	
3,668.0	16.50	7.10	3,535.7	899.3	156.9	912.8	0.56	-0.56	
3,759.0	16.10	7.80	3,623.0	924.6	160.2	938.3	0.49	-0.44	
3,850.0	17.80	13.10	3,710.1	950.6	165.0	964.8	2.52	1.87	
3,940.0	17.80	5.60	3,795.8	977.7	169.5	992.2	2.55	0.00	
4,031.0	17.00	5.70	3,882.6	1,004.8	172.2	1,019.4	0.88	-0.88	
4,122.0	17.00	4.00	3,969.7	1,031.3	174.4	1,045.8	0.55	0.00	
4,213.0	14.50	12.80	4,057.2	1,055.7	177.9	1,070.4	3.79	-2.75	
4,303.0	16.50	10.60	4,144.0	1,079.3	182.7	1,094.5	2.32	2.22	
4,394.0	17.20	12.30	4,231.1	1,105.1	188.0	1,120.9	0.94	0.77	
4,485.0	18.80	15.50	4,317.6	1,132.4	194.8	1,148.9	2.07	1.76	
4,576.0	18.10	12.80	4,403.9	1,160.3	201.8	1,177.6	1.21	-0.77	
4,666.0	17.70	10.70	4,489.6	1,187.4	207.4	1,205.3	0.84	-0.44	
4,757.0	16.80	12.40	4,576.5	1,213.8	212.8	1,232.3	1.13	-0.99	
4,848.0	17.90	12.30	4,663.3	1,240.3	218.6	1,259.4	1.21	1.21	
4,939.0	18.20	12.10	4,749.9	1,267.9	224.6	1,287.6	0.34	0.33	
5,029.0	18.00	12.50	4,835.4	1,295.2	230.6	1,315.5	0.26	-0.22	
5,120.0	18.90	14.40	4,921.7	1,323.2	237.3	1,344.3	1.19	0.99	
5,211.0	18.00	19.00	5,008.1	1,350.8	245.5	1,372.9	1.88	-0.99	
5,302.0	16.90	15.90	5,094.9	1,376.8	253.7	1,400.0	1.58	-1.21	
5,392.0	16.90	8.10	5,181.0	1,402.3	259.1	1,426.1	2.52	0.00	
5,483.0	14.50	3.80	5,268.6	1,426.8	261.8	1,450.6	2.93	-2.64	
5,574.0	14.20	6.90	5,356.8	1,449.2	263.9	1,473.1	0.91	-0.33	
5,665.0	12.40	12.20	5,445.3	1,469.9	267.3	1,494.0	2.39	-1.98	
5,755.0	9.60	8.70	5,533.7	1,486.7	270.4	1,511.1	3.20	-3.11	
5,846.0	6.90	5.80	5,623.7	1,499.7	272.1	1,524.2	3.00	-2.97	

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<b>Well:</b>	Camenisch 22-2	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	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
5,937.0	6.60	14.90	5,714.1	1,510.2	274.0	1,534.8	1.22	-0.33	
6,028.0	5.30	13.80	5,804.6	1,519.3	276.4	1,544.2	1.43	-1.43	
6,118.0	3.20	15.10	5,894.3	1,525.8	278.0	1,550.9	2.34	-2.33	
6,209.0	2.20	36.30	5,985.2	1,529.6	279.7	1,555.0	1.54	-1.10	
6,300.0	1.70	50.50	6,076.2	1,531.9	281.8	1,557.6	0.76	-0.55	
6,390.0	1.60	42.90	6,166.1	1,533.7	283.7	1,559.7	0.27	-0.11	
6,481.0	0.40	243.10	6,257.1	1,534.5	284.3	1,560.6	2.18	-1.32	
6,572.0	0.30	273.00	6,348.1	1,534.3	283.7	1,560.3	0.23	-0.11	
6,663.0	0.40	309.50	6,439.1	1,534.5	283.3	1,560.5	0.26	0.11	
6,753.0	0.30	270.40	6,529.1	1,534.7	282.8	1,560.6	0.28	-0.11	
6,844.0	0.20	307.80	6,620.1	1,534.8	282.4	1,560.6	0.20	-0.11	
6,935.0	0.30	353.00	6,711.1	1,535.2	282.3	1,560.9	0.23	0.11	
7,026.0	0.60	337.00	6,802.1	1,535.8	282.1	1,561.5	0.35	0.33	
7,116.0	1.00	317.90	6,892.1	1,536.9	281.3	1,562.4	0.53	0.44	
7,207.0	1.30	311.80	6,983.1	1,538.1	280.0	1,563.4	0.36	0.33	
7,298.0	1.10	29.60	7,074.1	1,539.6	279.7	1,564.8	1.66	-0.22	
7,389.0	2.30	45.10	7,165.0	1,541.6	281.4	1,567.1	1.40	1.32	
7,479.0	2.20	51.30	7,255.0	1,544.0	284.1	1,569.9	0.29	-0.11	
7,616.0	2.60	72.80	7,391.9	1,546.6	289.1	1,573.3	0.71	0.29	
7,707.0	1.90	79.80	7,482.8	1,547.4	292.5	1,574.8	0.82	-0.77	
7,797.0	1.60	90.20	7,572.7	1,547.7	295.3	1,575.6	0.48	-0.33	
7,888.0	1.30	106.00	7,663.7	1,547.4	297.5	1,575.7	0.55	-0.33	
8,024.0	1.20	101.80	7,799.7	1,546.7	300.4	1,575.5	0.10	-0.07	
8,115.0	1.20	120.00	7,890.7	1,546.0	302.2	1,575.2	0.42	0.00	
8,206.0	1.10	143.30	7,981.6	1,544.8	303.5	1,574.3	0.52	-0.11	
8,297.0	1.10	171.70	8,072.6	1,543.3	304.1	1,572.9	0.59	0.00	
8,417.0	1.00	152.70	8,192.6	1,541.2	304.8	1,570.9	0.30	-0.08	Last Cathedral Survey @ 8417' MD
8,472.0	1.00	152.70	8,247.6	1,540.3	305.2	1,570.2	0.00	0.00	Projection to Bit @ 8472' 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 22-2 PBHL (	0.00	0.00	8,202.0	1,540.5	285.4	1,272,590.06	3,178,349.04	40.079884	-104.862659
- survey misses target center by 21.5ft at 8417.0ft MD (8192.6 TVD, 1541.2 N, 304.8 E)									
- Circle (radius 50.0)									

### Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
8,417.0	8,192.6	1,541.2	304.8	Last Cathedral Survey @ 8417' MD Projection to Bit @ 8472' MD
8,472.0	8,247.6	1,540.3	305.2	

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