





# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Anadarko Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Camenisch 11-2
<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 11-2	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<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 11-2					
Well Position	+N/-S	0.0 ft	Northing:	1,271,017.28 ft	Latitude:	40.075572
	+E/-W	0.0 ft	Easting:	3,178,075.18 ft	Longitude:	-104.863678
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	10/22/2012	8.71	66.73	52,806

<b>Design</b>	FINAL				
<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</b>	<b>+E/-W</b>	<b>Direction</b>	
	(ft)	(ft)	(ft)	(°)	
	0.0	0.0	0.0	43.88	

<b>Survey Program</b>	<b>Date</b>	10/22/2012			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
76.0	8,382.0	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	Legal Box 11
76.0	0.70	186.50	76.0	-0.5	-0.1	-0.4	0.92	0.92	
164.0	1.40	31.30	164.0	-0.1	0.4	0.3	2.34	0.80	
252.0	2.60	39.60	251.9	2.4	2.3	3.3	1.40	1.36	
339.0	3.60	44.00	338.8	5.9	5.4	8.0	1.18	1.15	
416.0	4.40	41.40	415.6	9.8	9.1	13.4	1.07	1.04	
507.0	5.40	40.90	506.3	15.7	14.2	21.1	1.10	1.10	
598.0	6.10	41.80	596.8	22.5	20.2	30.2	0.78	0.77	
688.0	6.70	50.80	686.3	29.4	27.5	40.2	1.30	0.67	
778.0	8.20	51.10	775.5	36.7	36.5	51.8	1.67	1.67	
868.0	9.90	43.30	864.4	46.4	46.8	65.9	2.33	1.89	
886.0	10.20	42.20	882.1	48.7	49.0	69.0	1.98	1.67	
945.0	9.80	42.30	940.2	56.3	55.8	79.3	0.68	-0.68	

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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 11-2	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<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
1,035.0	11.60	43.90	1,028.6	68.5	67.3	96.0	2.03	2.00	
1,126.0	11.60	46.80	1,117.8	81.3	80.3	114.3	0.64	0.00	
1,217.0	14.20	45.90	1,206.5	95.4	95.0	134.6	2.87	2.86	
1,308.0	13.00	41.80	1,294.9	110.8	109.8	156.0	1.69	-1.32	
1,398.0	14.20	37.00	1,382.4	127.1	123.2	177.0	1.83	1.33	
1,489.0	14.40	33.10	1,470.6	145.5	136.1	199.2	1.08	0.22	
1,580.0	13.80	30.60	1,558.9	164.4	147.8	220.9	0.94	-0.66	
1,670.0	14.20	35.60	1,646.2	182.6	159.7	242.3	1.42	0.44	
1,761.0	11.90	42.10	1,734.8	198.6	172.5	262.7	2.99	-2.53	
1,852.0	12.00	44.40	1,823.9	212.3	185.4	281.6	0.53	0.11	
1,943.0	12.20	53.10	1,912.8	224.9	199.7	300.5	2.01	0.22	
2,033.0	12.30	57.50	2,000.8	235.7	215.4	319.2	1.04	0.11	
2,124.0	13.50	52.00	2,089.5	247.5	231.9	339.1	1.89	1.32	
2,214.0	14.30	41.70	2,176.9	262.2	247.6	360.7	2.89	0.89	
2,305.0	12.90	40.60	2,265.3	278.3	261.7	382.0	1.56	-1.54	
2,396.0	13.40	47.40	2,353.9	293.2	276.1	402.7	1.79	0.55	
2,487.0	13.90	47.30	2,442.4	307.7	291.9	424.1	0.55	0.55	
2,577.0	13.10	46.30	2,529.9	322.1	307.2	445.1	0.93	-0.89	
2,668.0	11.10	44.00	2,618.9	335.5	320.7	464.2	2.26	-2.20	
2,759.0	10.60	41.50	2,708.2	348.1	332.4	481.3	0.75	-0.55	
2,849.0	11.10	50.90	2,796.6	359.8	344.6	498.2	2.04	0.56	
2,940.0	9.50	54.10	2,886.2	369.7	357.5	514.3	1.87	-1.76	
3,031.0	11.70	48.20	2,975.6	380.3	370.4	530.9	2.69	2.42	
3,121.0	13.00	44.40	3,063.5	393.6	384.3	550.1	1.70	1.44	
3,212.0	14.50	43.50	3,151.9	409.2	399.3	571.7	1.66	1.65	
3,303.0	14.70	44.40	3,240.0	425.7	415.2	594.6	0.33	0.22	
3,394.0	14.70	40.30	3,328.0	442.7	430.8	617.7	1.14	0.00	
3,484.0	13.80	41.00	3,415.2	459.5	445.2	639.8	1.02	-1.00	
3,575.0	13.20	44.10	3,503.7	475.2	459.6	661.1	1.03	-0.66	
3,666.0	13.10	39.00	3,592.3	490.7	473.3	681.7	1.28	-0.11	
3,757.0	13.10	48.50	3,681.0	505.5	487.5	702.3	2.36	0.00	
3,847.0	12.50	51.10	3,768.7	518.4	502.7	722.1	0.92	-0.67	
3,938.0	12.80	47.90	3,857.5	531.3	517.9	741.9	0.84	0.33	
4,029.0	12.00	51.70	3,946.4	544.0	532.8	761.4	1.26	-0.88	
4,119.0	12.00	64.10	4,034.5	553.8	548.5	779.4	2.86	0.00	
4,210.0	12.10	69.60	4,123.5	561.3	566.0	796.9	1.27	0.11	
4,301.0	10.30	74.80	4,212.7	566.8	582.8	812.5	2.27	-1.98	
4,391.0	11.90	78.30	4,301.0	570.8	599.6	827.0	1.93	1.78	
4,482.0	11.70	78.00	4,390.1	574.6	617.8	842.4	0.23	-0.22	
4,573.0	10.20	85.10	4,479.5	577.2	634.9	856.1	2.21	-1.65	
4,659.0	10.50	62.10	4,564.1	581.5	649.4	869.3	4.79	0.35	
4,749.0	11.10	52.50	4,652.5	590.6	663.5	885.6	2.10	0.67	
4,840.0	11.60	49.10	4,741.7	601.9	677.4	903.4	0.92	0.55	
4,931.0	11.30	53.50	4,830.9	613.2	691.5	921.3	1.01	-0.33	
5,022.0	12.70	45.40	4,919.9	625.6	705.8	940.1	2.40	1.54	
5,113.0	17.10	30.10	5,007.9	644.2	719.6	963.1	6.45	4.84	
5,203.0	14.50	25.10	5,094.5	665.8	731.0	986.6	3.26	-2.89	
5,294.0	13.20	24.30	5,182.8	685.6	740.1	1,007.2	1.44	-1.43	
5,385.0	12.30	20.20	5,271.6	704.2	747.8	1,025.9	1.40	-0.99	
5,475.0	11.20	21.00	5,359.7	721.3	754.2	1,042.7	1.24	-1.22	
5,566.0	12.00	27.90	5,448.8	737.9	761.8	1,059.9	1.76	0.88	
5,657.0	10.40	31.20	5,538.1	753.3	770.5	1,077.1	1.89	-1.76	
5,748.0	10.30	32.90	5,627.6	767.2	779.1	1,093.1	0.35	-0.11	

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<b>Well:</b>	Camenisch 11-2	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<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
5,838.0	8.80	30.80	5,716.4	779.9	787.0	1,107.7	1.71	-1.67	
5,929.0	8.20	25.90	5,806.4	791.7	793.4	1,120.6	1.03	-0.66	
6,019.0	7.60	14.40	5,895.5	803.2	797.7	1,131.9	1.87	-0.67	
6,110.0	6.90	10.30	5,985.8	814.4	800.2	1,141.7	0.96	-0.77	
6,201.0	5.40	8.10	6,076.3	824.0	801.8	1,149.7	1.67	-1.65	
6,292.0	3.90	7.80	6,167.0	831.3	802.8	1,155.7	1.65	-1.65	
6,383.0	2.60	6.00	6,257.8	836.5	803.4	1,159.8	1.43	-1.43	
6,473.0	2.50	6.00	6,347.7	840.5	803.9	1,163.0	0.11	-0.11	
6,564.0	1.90	2.70	6,438.7	843.9	804.1	1,165.7	0.67	-0.66	
6,655.0	1.60	10.40	6,529.6	846.7	804.4	1,167.9	0.42	-0.33	
6,747.0	1.30	22.10	6,621.6	848.9	805.1	1,169.9	0.46	-0.33	
6,837.0	1.10	22.90	6,711.6	850.7	805.8	1,171.7	0.22	-0.22	
6,927.0	0.60	57.80	6,801.6	851.7	806.5	1,172.9	0.78	-0.56	
7,018.0	0.60	61.70	6,892.6	852.2	807.3	1,173.9	0.04	0.00	
7,109.0	0.70	65.50	6,983.6	852.6	808.3	1,174.8	0.12	0.11	
7,200.0	0.80	54.80	7,074.6	853.2	809.3	1,176.0	0.19	0.11	
7,290.0	1.00	60.00	7,164.5	854.0	810.5	1,177.3	0.24	0.22	
7,381.0	0.90	65.00	7,255.5	854.7	811.8	1,178.8	0.14	-0.11	
7,472.0	0.70	143.50	7,346.5	854.5	812.8	1,179.3	1.13	-0.22	
7,563.0	1.30	144.60	7,437.5	853.3	813.7	1,179.1	0.66	0.66	
7,653.0	1.80	145.40	7,527.5	851.3	815.1	1,178.6	0.56	0.56	
7,744.0	2.40	140.50	7,618.4	848.6	817.1	1,178.1	0.69	0.66	
7,835.0	2.40	141.60	7,709.3	845.7	819.5	1,177.6	0.05	0.00	
7,925.0	2.30	137.30	7,799.3	842.9	821.9	1,177.2	0.23	-0.11	
8,016.0	1.90	139.60	7,890.2	840.4	824.2	1,177.0	0.45	-0.44	
8,107.0	1.20	151.40	7,981.2	838.4	825.6	1,176.5	0.84	-0.77	
8,198.0	1.10	148.80	8,072.1	836.8	826.5	1,176.0	0.12	-0.11	
8,288.0	1.50	129.30	8,162.1	835.3	827.9	1,175.9	0.66	0.44	Last Cathedral Survey @ 8,288' MD - Camenisch Projection to Bit @ 8,382' MD
8,382.0	1.50	130.13	8,256.1	833.7	829.7	1,176.1	0.02	0.00	

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 11-2 PBHL (	0.00	0.00	8,202.0	958.1	921.2	1,271,981.95	3,178,989.49	40.078202	-104.860386
- actual wellpath misses target center by 159.3ft at 8288.0ft MD (8162.1 TVD, 835.3 N, 827.9 E)									
- Circle (radius 50.0)									
Legal Box 11	0.00	0.00	-10,000.0	958.5	887.7	1,271,982.09	3,178,955.98	40.078203	-104.860506
- actual wellpath misses target center by 10085.0ft at 0.0ft MD (0.0 TVD, 0.0 N, 0.0 E)									
- Rectangle (sides W400.0 H400.0 D0.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
8,288.0	8,162.1	835.3	827.9	Last Cathedral Survey @ 8,288' MD	
8,382.0	8,256.1	833.7	829.7	Projection to Bit @ 8,382' MD	

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