



Cathedral Energy Services

Survey Report

Company:	Anadarko Petroleum Corporation	Local Co-ordinate Reference:	Well Copy of Xcel 13-27
Project:	DJ Wattenberg	TVD Reference:	KB=15' @ 5041.0ft (Xtreme 11)
Site:	SWSW Sec27-T1N-R67W (Xcel 13-27)	MD Reference:	KB=15' @ 5041.0ft (Xtreme 11)
Well:	Copy of Xcel 13-27	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	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		SWSW Sec27-T1N-R67W (Xcel 13-27)			
Site Position:		Northing:	1,249,558.43 ft	Latitude:	40.016771
From:	Lat/Long	Easting:	3,172,622.55 ft	Longitude:	-104.883695
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.40 °

Well	Copy of Xcel 13-27					
Well Position	+N/-S	0.0 ft	Northing:	1,249,412.12 ft	Latitude:	40.016370
	+E/-W	0.0 ft	Easting:	3,172,592.20 ft	Longitude:	-104.883807
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,026.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/3/2012	8.71	66.67	52,769

Design	DD				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	0.00	

Survey Program	Date	11/27/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
77.0	7,922.0	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	0.50	256.20	77.0	-0.1	-0.3	-0.1	0.65	0.65		
164.0	0.60	283.00	164.0	-0.1	-1.1	-0.1	0.31	0.11		
253.0	0.40	285.80	253.0	0.1	-1.9	0.1	0.23	-0.22		
340.0	0.70	259.00	340.0	0.1	-2.7	0.1	0.45	0.34		
417.0	1.80	230.60	417.0	-0.8	-4.1	-0.8	1.60	1.43		
508.0	2.00	233.60	507.9	-2.6	-6.5	-2.6	0.25	0.22		
599.0	2.50	241.80	598.8	-4.5	-9.5	-4.5	0.65	0.55		
689.0	3.40	245.70	688.7	-6.5	-13.7	-6.5	1.02	1.00		
780.0	4.40	243.70	779.5	-9.2	-19.3	-9.2	1.11	1.10		
871.0	4.20	249.10	870.3	-11.9	-25.5	-11.9	0.50	-0.22		
962.0	3.80	250.00	961.0	-14.1	-31.5	-14.1	0.44	-0.44		
1,052.0	3.50	247.20	1,050.9	-16.2	-36.8	-16.2	0.39	-0.33		

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Well:	Copy of Xcel 13-27	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	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
1,138.0	3.20	250.70	1,136.7	-18.0	-41.5	-18.0	0.42	-0.35	
1,222.0	2.50	255.20	1,220.6	-19.3	-45.5	-19.3	0.87	-0.83	
1,312.0	2.50	281.80	1,310.5	-19.4	-49.3	-19.4	1.28	0.00	
1,403.0	2.40	277.10	1,401.4	-18.7	-53.1	-18.7	0.25	-0.11	
1,494.0	2.00	282.90	1,492.4	-18.1	-56.5	-18.1	0.50	-0.44	
1,584.0	4.00	269.40	1,582.2	-17.8	-61.2	-17.8	2.34	2.22	
1,675.0	3.70	264.00	1,673.0	-18.2	-67.3	-18.2	0.52	-0.33	
1,765.0	3.90	241.30	1,762.8	-19.9	-72.9	-19.9	1.67	0.22	
1,856.0	2.30	241.00	1,853.7	-22.3	-77.2	-22.3	1.76	-1.76	
1,947.0	1.80	239.50	1,944.7	-23.9	-80.0	-23.9	0.55	-0.55	
2,038.0	1.80	271.00	2,035.6	-24.6	-82.7	-24.6	1.07	0.00	
2,128.0	2.80	258.10	2,125.5	-25.0	-86.3	-25.0	1.24	1.11	
2,219.0	2.50	281.00	2,216.4	-25.1	-90.4	-25.1	1.20	-0.33	
2,310.0	1.40	256.00	2,307.4	-25.0	-93.4	-25.0	1.50	-1.21	
2,401.0	0.80	219.40	2,398.4	-25.8	-94.9	-25.8	0.98	-0.66	
2,492.0	0.40	265.20	2,489.4	-26.3	-95.6	-26.3	0.65	-0.44	
2,582.0	0.30	320.30	2,579.4	-26.1	-96.1	-26.1	0.37	-0.11	
2,673.0	0.50	35.30	2,670.4	-25.6	-96.0	-25.6	0.56	0.22	
2,764.0	0.70	1.30	2,761.4	-24.7	-95.7	-24.7	0.44	0.22	
2,855.0	0.30	46.50	2,852.4	-24.0	-95.6	-24.0	0.59	-0.44	
2,945.0	0.40	39.60	2,942.4	-23.6	-95.2	-23.6	0.12	0.11	
3,036.0	0.60	84.00	3,033.4	-23.3	-94.5	-23.3	0.46	0.22	
3,127.0	0.20	98.70	3,124.3	-23.3	-93.9	-23.3	0.45	-0.44	
3,218.0	0.00	141.60	3,215.3	-23.3	-93.7	-23.3	0.22	-0.22	
3,308.0	0.60	230.20	3,305.3	-23.6	-94.1	-23.6	0.67	0.67	
3,399.0	1.20	214.30	3,396.3	-24.7	-95.0	-24.7	0.71	0.66	
3,490.0	1.10	201.60	3,487.3	-26.3	-95.8	-26.3	0.30	-0.11	
3,580.0	1.30	217.50	3,577.3	-27.9	-96.8	-27.9	0.43	0.22	
3,671.0	1.10	236.70	3,668.3	-29.2	-98.1	-29.2	0.49	-0.22	
3,762.0	1.10	229.60	3,759.3	-30.3	-99.5	-30.3	0.15	0.00	
3,853.0	1.10	242.90	3,850.2	-31.2	-101.0	-31.2	0.28	0.00	
3,944.0	0.70	254.40	3,941.2	-31.8	-102.3	-31.8	0.48	-0.44	
4,034.0	1.10	256.10	4,031.2	-32.1	-103.7	-32.1	0.45	0.44	
4,125.0	1.40	253.10	4,122.2	-32.7	-105.6	-32.7	0.34	0.33	
4,216.0	2.30	215.00	4,213.2	-34.5	-107.7	-34.5	1.62	0.99	
4,307.0	1.30	219.20	4,304.1	-36.8	-109.4	-36.8	1.11	-1.10	
4,397.0	0.60	176.10	4,394.1	-38.0	-110.0	-38.0	1.06	-0.78	
4,488.0	1.00	216.40	4,485.1	-39.2	-110.4	-39.2	0.73	0.44	
4,579.0	1.00	32.80	4,576.1	-39.1	-110.5	-39.1	2.20	0.00	
4,670.0	1.20	39.70	4,667.1	-37.7	-109.4	-37.7	0.26	0.22	
4,760.0	0.90	28.10	4,757.1	-36.4	-108.5	-36.4	0.41	-0.33	
4,851.0	0.70	10.60	4,848.0	-35.2	-108.1	-35.2	0.34	-0.22	
4,942.0	0.80	329.40	4,939.0	-34.1	-108.3	-34.1	0.59	0.11	
5,032.0	1.20	302.70	5,029.0	-33.1	-109.4	-33.1	0.67	0.44	
5,123.0	0.40	171.90	5,120.0	-32.9	-110.2	-32.9	1.64	-0.88	
5,214.0	1.30	17.80	5,211.0	-32.2	-109.8	-32.2	1.83	0.99	
5,305.0	1.60	6.30	5,302.0	-30.0	-109.3	-30.0	0.46	0.33	
5,395.0	1.80	1.80	5,391.9	-27.3	-109.2	-27.3	0.27	0.22	
5,486.0	2.20	351.10	5,482.9	-24.1	-109.4	-24.1	0.60	0.44	
5,577.0	2.30	350.20	5,573.8	-20.6	-110.0	-20.6	0.12	0.11	
5,667.0	0.80	355.90	5,663.8	-18.2	-110.3	-18.2	1.67	-1.67	
5,758.0	1.00	116.20	5,754.8	-17.9	-109.7	-17.9	1.72	0.22	
5,849.0	0.60	103.10	5,845.8	-18.4	-108.5	-18.4	0.48	-0.44	

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Design:	DD	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
5,940.0	0.10	80.80	5,936.8	-18.5	-107.9	-18.5	0.56	-0.55	
6,031.0	0.10	2.60	6,027.8	-18.4	-107.9	-18.4	0.14	0.00	
6,121.0	0.10	278.70	6,117.8	-18.3	-107.9	-18.3	0.15	0.00	
6,212.0	0.40	307.10	6,208.8	-18.1	-108.3	-18.1	0.35	0.33	
6,303.0	0.70	153.80	6,299.8	-18.4	-108.3	-18.4	1.18	0.33	
6,394.0	0.40	150.10	6,390.8	-19.2	-107.9	-19.2	0.33	-0.33	
6,485.0	0.30	269.10	6,481.8	-19.4	-107.9	-19.4	0.67	-0.11	
6,575.0	0.40	301.50	6,571.8	-19.3	-108.4	-19.3	0.24	0.11	
6,666.0	0.10	278.70	6,662.8	-19.1	-108.8	-19.1	0.34	-0.33	
6,757.0	0.10	190.10	6,753.8	-19.2	-108.9	-19.2	0.15	0.00	
6,848.0	0.40	98.70	6,844.8	-19.3	-108.6	-19.3	0.46	0.33	
6,938.0	0.90	94.30	6,934.7	-19.4	-107.6	-19.4	0.56	0.56	
7,029.0	1.00	94.90	7,025.7	-19.5	-106.1	-19.5	0.11	0.11	
7,120.0	1.10	103.40	7,116.7	-19.8	-104.4	-19.8	0.20	0.11	
7,210.0	1.20	100.10	7,206.7	-20.2	-102.7	-20.2	0.13	0.11	
7,301.0	2.00	106.50	7,297.7	-20.8	-100.2	-20.8	0.90	0.88	
7,392.0	2.50	94.90	7,388.6	-21.4	-96.7	-21.4	0.74	0.55	
7,483.0	1.40	79.30	7,479.5	-21.4	-93.6	-21.4	1.33	-1.21	
7,573.0	3.30	40.20	7,569.5	-19.2	-90.9	-19.2	2.65	2.11	
7,664.0	2.20	98.20	7,660.4	-17.4	-87.5	-17.4	3.11	-1.21	
7,755.0	2.90	82.40	7,751.3	-17.4	-83.4	-17.4	1.08	0.77	
7,867.0	1.90	122.60	7,863.2	-18.0	-79.1	-18.0	1.69	-0.89	Last Cathedral Survey @ 7867' MD
7,922.0	1.40	135.60	7,918.2	-19.0	-77.8	-19.0	1.13	-0.91	Projection to Bit @ 7922' MD

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
Xcel 13-27 Drillers TGT - survey misses target center by 14.0ft at 7899.6ft MD (7895.8 TVD, -18.6 N, -78.3 E) - Circle (radius 10.0)	0.00	0.00	7,896.0	-23.0	-91.5	1,249,388.53	3,172,500.84	40.016307	-104.884134
Legal Box #13, Sec 27 - survey misses target center by 5001.0ft at 0.0ft MD (0.0 TVD, 0.0 N, 0.0 E) - Rectangle (sides W400.0 H400.0 D0.0)	0.00	0.00	-5,000.0	95.9	25.4	1,249,508.17	3,172,616.94	40.016633	-104.883716
Xcel 13-27 PBHL - survey misses target center by 51.7ft at 7899.5ft MD (7895.7 TVD, -18.6 N, -78.3 E) - Circle (radius 50.0)	0.00	0.00	7,896.0	-52.1	-117.6	1,249,359.23	3,172,474.93	40.016227	-104.884227

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
7,867.0	7,863.2	-18.0	-79.1	Last Cathedral Survey @ 7867' MD	
7,922.0	7,918.2	-19.0	-77.8	Projection to Bit @ 7922' MD	

Checked By: _____ Approved By: _____ Date: _____