





Cathedral Energy Services

Survey Report

Company:	Anadarko Petroleum Corporation	Local Co-ordinate Reference:	Well Lambrecht 41-2
Project:	DJ Wattenberg	TVD Reference:	Well @ 4953.0ft (Xtreme 11)
Site:	S2-T1N-R67W (Lambrecht)	MD Reference:	Well @ 4953.0ft (Xtreme 11)
Well:	Lambrecht 41-2	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		S2-T1N-R67W (Lambrecht)			
Site Position:		Northing:	1,274,774.66 ft	Latitude:	40.085813
From:	Lat/Long	Easting:	3,181,757.64 ft	Longitude:	-104.850421
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.42 °

Well	Lambrecht 41-2					
Well Position	+N/-S	0.0 ft	Northing:	1,274,731.65 ft	Latitude:	40.085694
	+E/-W	0.0 ft	Easting:	3,181,805.24 ft	Longitude:	-104.850252
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,938.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/18/2012	8.74	66.74	52,841

Design	DD			
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	151.17

Survey Program	Date	7/21/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
105.0	8,200.0	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		
100.0	0.76	311.30	100.0	0.4	-0.5	-0.6	0.76	0.76		
200.0	0.51	225.75	200.0	0.6	-1.4	-1.2	0.88	-0.26		
300.0	1.49	165.90	300.0	-0.9	-1.4	0.1	1.31	0.98		
400.0	3.12	154.95	399.9	-4.6	0.0	4.0	1.68	1.63		
500.0	4.87	149.34	499.6	-10.7	3.4	11.0	1.79	1.75		
600.0	6.58	149.11	599.1	-19.3	8.4	21.0	1.71	1.71		
700.0	8.43	147.09	698.3	-30.3	15.3	34.0	1.86	1.84		
800.0	9.09	150.95	797.1	-43.6	23.6	49.5	0.89	0.66		
900.0	9.28	150.16	895.8	-57.6	31.2	65.5	0.23	0.19		
1,000.0	9.01	152.63	994.5	-71.7	38.9	81.6	0.48	-0.27		
1,100.0	8.93	151.79	1,093.4	-85.1	45.7	96.6	0.16	-0.08		
1,200.0	9.60	147.33	1,192.0	-99.4	54.2	113.2	0.98	0.67		

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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
1,300.0	8.82	144.56	1,290.7	-112.6	63.2	129.2	0.89	-0.77	
1,400.0	9.94	151.29	1,389.4	-125.7	71.8	144.7	1.57	1.12	
1,500.0	10.68	157.01	1,487.7	-142.2	79.7	163.0	1.26	0.73	
1,600.0	10.07	156.82	1,586.1	-158.9	86.6	181.0	0.61	-0.61	
1,700.0	9.20	154.10	1,684.7	-174.2	93.6	197.7	0.98	-0.87	
1,800.0	8.06	153.26	1,783.5	-187.6	100.2	212.6	1.15	-1.14	
1,900.0	7.32	151.24	1,882.6	-199.6	106.5	226.2	0.78	-0.74	
2,000.0	6.45	153.46	1,982.0	-209.6	111.8	237.5	0.91	-0.87	
2,100.0	7.98	154.06	2,081.1	-221.1	117.3	250.3	1.53	1.53	
2,200.0	7.69	151.71	2,180.1	-233.7	123.8	264.4	0.43	-0.29	
2,300.0	7.32	142.07	2,279.3	-244.4	130.4	277.0	1.31	-0.38	
2,400.0	8.28	145.55	2,378.4	-254.9	138.9	290.3	1.07	0.97	
2,500.0	7.30	150.24	2,477.4	-266.9	146.2	304.3	1.17	-0.98	
2,600.0	6.36	145.01	2,576.7	-276.9	152.4	316.0	1.13	-0.94	
2,700.0	6.46	147.68	2,676.1	-286.1	158.6	327.1	0.32	0.10	
2,800.0	5.01	158.20	2,775.6	-294.8	163.0	336.8	1.79	-1.45	
2,900.0	6.18	157.50	2,875.2	-303.7	166.6	346.4	1.17	1.17	
3,000.0	7.89	157.60	2,974.4	-315.0	171.5	358.7	1.71	1.71	
3,100.0	8.67	157.07	3,073.3	-328.7	176.7	373.2	0.79	0.78	
3,200.0	9.33	150.47	3,172.1	-342.4	183.8	388.6	1.22	0.66	
3,300.0	9.96	152.01	3,270.7	-357.2	192.2	405.6	0.68	0.63	
3,400.0	11.24	150.45	3,369.0	-373.1	200.6	423.6	1.32	1.28	
3,500.0	10.70	148.19	3,467.1	-389.9	210.6	443.1	0.69	-0.54	
3,600.0	10.22	151.91	3,565.5	-405.5	219.7	461.2	0.83	-0.48	
3,700.0	10.69	155.90	3,663.8	-421.8	227.6	479.3	0.87	0.47	
3,800.0	10.49	151.94	3,762.1	-438.3	235.6	497.6	0.76	-0.20	
3,900.0	10.14	145.71	3,860.4	-453.7	245.2	515.7	1.17	-0.35	
4,000.0	9.40	147.58	3,959.1	-467.3	254.4	532.1	0.80	-0.73	
4,100.0	10.60	151.54	4,057.6	-482.4	263.2	549.5	1.38	1.19	
4,200.0	10.71	151.81	4,155.8	-499.1	271.9	568.3	0.13	0.12	
4,300.0	10.79	151.33	4,254.1	-515.2	280.8	586.7	0.12	0.08	
4,400.0	9.51	151.49	4,352.4	-531.1	289.4	604.8	1.28	-1.28	
4,500.0	7.37	149.67	4,451.3	-543.9	296.5	619.5	2.15	-2.13	
4,600.0	5.66	156.20	4,550.7	-553.9	301.9	630.8	1.86	-1.71	
4,700.0	6.26	160.56	4,650.1	-563.5	305.6	641.1	0.75	0.60	
4,800.0	5.79	167.17	4,749.6	-573.4	308.4	651.1	0.84	-0.47	
4,900.0	7.00	163.67	4,849.0	-584.3	311.1	661.9	1.27	1.21	
5,000.0	7.76	155.13	4,948.1	-596.4	315.6	674.7	1.33	0.76	
5,100.0	7.82	150.79	5,047.2	-608.5	322.3	688.5	0.59	0.06	
5,200.0	6.81	153.82	5,146.3	-619.9	328.2	701.3	1.08	-1.00	
5,300.0	5.63	153.42	5,245.7	-629.6	332.9	712.1	1.19	-1.18	
5,400.0	4.76	153.54	5,345.3	-637.6	337.0	721.1	0.87	-0.87	
5,500.0	3.12	154.38	5,445.1	-644.0	340.1	728.1	1.64	-1.64	
5,600.0	2.51	155.57	5,545.0	-648.3	342.1	732.9	0.62	-0.62	
5,700.0	1.76	159.66	5,644.9	-651.7	343.5	736.6	0.76	-0.75	
5,800.0	1.45	161.43	5,744.9	-654.2	344.3	739.2	0.32	-0.31	
5,900.0	1.93	149.37	5,844.8	-657.1	345.8	742.4	0.59	0.48	
6,000.0	1.03	140.42	5,944.8	-659.2	347.2	744.9	0.92	-0.90	
6,100.0	0.46	125.30	6,044.8	-660.1	348.2	746.2	0.60	-0.57	
6,200.0	0.14	9.86	6,144.8	-660.2	348.4	746.4	0.54	-0.32	
6,300.0	0.50	336.12	6,244.8	-659.6	348.3	745.8	0.39	0.35	
6,400.0	0.31	14.26	6,344.8	-658.9	348.1	745.1	0.32	-0.18	
6,500.0	0.29	353.63	6,444.8	-658.4	348.2	744.7	0.11	-0.02	

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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
6,600.0	0.70	15.18	6,544.8	-657.6	348.3	744.0	0.44	0.40	
6,700.0	0.69	355.52	6,644.8	-656.4	348.4	743.1	0.24	-0.01	
6,800.0	0.65	349.52	6,744.7	-655.3	348.1	742.0	0.08	-0.04	
6,900.0	0.97	27.46	6,844.7	-653.8	348.5	740.9	0.61	0.32	
7,000.0	0.46	45.51	6,944.7	-652.8	349.3	740.4	0.55	-0.51	
7,100.0	0.20	54.00	7,044.7	-652.6	349.6	740.3	0.27	-0.26	
7,200.0	0.30	49.40	7,144.7	-652.3	350.0	740.2	0.10	0.10	
7,300.0	0.24	110.96	7,244.7	-652.1	350.4	740.2	0.28	-0.06	
7,400.0	0.38	117.71	7,344.7	-652.4	350.8	740.7	0.14	0.14	
7,500.0	0.40	130.33	7,444.7	-652.8	351.4	741.3	0.09	0.02	
7,600.0	0.50	113.90	7,544.7	-653.2	352.1	742.0	0.16	0.10	
7,700.0	0.68	126.03	7,644.7	-653.7	353.0	742.9	0.22	0.18	
7,800.0	0.48	130.79	7,744.7	-654.4	353.7	743.8	0.21	-0.20	
7,900.0	0.38	115.94	7,844.7	-654.8	354.3	744.5	0.15	-0.10	
8,000.0	0.35	97.66	7,944.7	-654.9	355.0	744.9	0.12	-0.03	
8,100.0	0.23	72.20	8,044.7	-655.0	355.5	745.2	0.18	-0.13	
8,145.0	0.30	31.60	8,089.7	-654.9	355.6	745.2	0.43	0.16	Last Cathedral Survey @ 8,145' MD - Lambrecht Projection to Bit @ 8,200' MD
8,200.0	0.30	31.60	8,144.7	-654.6	355.8	745.0	0.00	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									
Lambrecht 41-2 PBHL	0.00	0.00	8,107.0	-647.7	356.5	1,274,086.60	3,182,166.45	40.083916	-104.848978
- actual wellpath misses target center by 18.8ft at 8145.0ft MD (8089.7 TVD, -654.9 N, 355.6 E)									
- Circle (radius 50.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
8,145.0	8,089.7	-654.9	355.6	Last Cathedral Survey @ 8,145' MD	
8,200.0	8,144.7	-654.6	355.8	Projection to Bit @ 8,200' MD	

Checked By: _____ Approved By: _____ Date: _____