



Cathedral Energy Services

Survey Report

Company:	Anadarko Petroleum Corporation	Local Co-ordinate Reference:	Well Ricks 13-15
Project:	DJ Wattenberg	TVD Reference:	KBE @ 4890.0ft (Original Well Elev)
Site:	SWSW Sec15-2N-R65W (Ricks)	MD Reference:	KBE @ 4890.0ft (Original Well Elev)
Well:	Ricks 13-15	North Reference:	Grid
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 Sec15-2N-R65W (Ricks)			
Site Position:		Northing:	1,292,048.25 ft	Latitude:	40.131989
From:	Lat/Long	Easting:	3,235,497.23 ft	Longitude:	-104.657780
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.54 °

Well	Ricks 13-15					
Well Position	+N/-S	0.0 ft	Northing:	1,292,048.24 ft	Latitude:	40.131989
	+E/-W	0.0 ft	Easting:	3,235,497.23 ft	Longitude:	-104.657780
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,875.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/13/2011	8.77	66.85	52,994

Design	DD				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.0	0.0	0.0	0.82	

Survey Program	Date	8/9/2011			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
78.0	7,172.0	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		
78.0	0.10	220.26	78.0	-0.1	0.0	-0.1	0.13	0.13		
172.0	0.10	23.46	172.0	0.0	-0.1	0.0	0.21	0.00		
265.0	0.20	345.96	265.0	0.2	-0.1	0.2	0.15	0.11		
358.0	1.00	3.96	358.0	1.2	-0.1	1.2	0.87	0.86		
446.0	1.50	357.46	446.0	3.1	-0.1	3.1	0.59	0.57		
535.0	2.20	7.36	534.9	5.9	0.1	5.9	0.86	0.79		
623.0	3.00	4.16	622.8	9.9	0.5	9.9	0.92	0.91		
712.0	4.00	0.06	711.7	15.3	0.7	15.3	1.16	1.12		
800.0	5.40	358.16	799.4	22.5	0.5	22.5	1.60	1.59		
886.0	6.20	359.46	884.9	31.2	0.4	31.2	0.94	0.93		
982.0	6.00	2.66	980.4	41.4	0.5	41.4	0.41	-0.21		
1,070.0	7.70	356.26	1,067.8	51.9	0.4	51.9	2.11	1.93		

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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
1,158.0	8.60	353.86	1,154.9	64.3	-0.7	64.3	1.09	1.02	
1,247.0	9.70	359.66	1,242.7	78.4	-1.5	78.4	1.61	1.24	
1,335.0	11.30	0.66	1,329.3	94.5	-1.4	94.4	1.83	1.82	
1,423.0	13.30	3.36	1,415.2	113.2	-0.7	113.2	2.36	2.27	
1,510.0	13.10	2.86	1,499.9	133.0	0.4	133.0	0.26	-0.23	
1,598.0	13.00	2.56	1,585.7	152.9	1.3	152.9	0.14	-0.11	
1,687.0	13.70	2.86	1,672.3	173.4	2.3	173.4	0.79	0.79	
1,777.0	13.30	1.86	1,759.8	194.4	3.1	194.4	0.51	-0.44	
1,865.0	12.30	0.16	1,845.6	213.9	3.5	213.9	1.21	-1.14	
1,954.0	11.00	2.16	1,932.7	231.9	3.8	231.9	1.53	-1.46	
2,042.0	9.60	5.56	2,019.3	247.6	4.9	247.6	1.73	-1.59	
2,130.0	7.90	3.56	2,106.3	260.9	5.9	261.0	1.96	-1.93	
2,218.0	6.40	2.16	2,193.6	271.8	6.5	271.9	1.72	-1.70	
2,307.0	5.10	359.36	2,282.2	280.8	6.6	280.8	1.49	-1.46	
2,394.0	4.30	8.86	2,368.9	287.8	7.1	287.9	1.28	-0.92	
2,482.0	2.70	28.86	2,456.7	292.9	8.6	293.0	2.26	-1.82	
2,572.0	1.60	30.66	2,546.6	295.9	10.3	296.0	1.22	-1.22	
2,661.0	1.50	71.26	2,635.6	297.3	12.0	297.4	1.21	-0.11	
2,748.0	0.20	194.06	2,722.6	297.5	13.0	297.7	1.86	-1.49	
2,834.0	0.30	145.96	2,808.6	297.2	13.1	297.3	0.26	0.12	
2,923.0	0.40	184.56	2,897.6	296.7	13.2	296.8	0.28	0.11	
3,012.0	0.30	207.26	2,986.6	296.2	13.1	296.3	0.19	-0.11	
3,101.0	0.20	215.86	3,075.6	295.8	12.9	296.0	0.12	-0.11	
3,191.0	0.20	121.66	3,165.6	295.6	13.0	295.8	0.33	0.00	
3,279.0	0.10	54.96	3,253.6	295.6	13.2	295.7	0.21	-0.11	
3,368.0	0.00	346.26	3,342.6	295.6	13.2	295.8	0.11	-0.11	
3,458.0	0.40	39.06	3,432.6	295.9	13.4	296.0	0.44	0.44	
3,544.0	0.30	68.86	3,518.6	296.2	13.8	296.4	0.24	-0.12	
3,632.0	0.50	76.96	3,606.6	296.4	14.4	296.5	0.24	0.23	
3,720.0	0.40	52.76	3,694.6	296.6	15.0	296.8	0.24	-0.11	
3,809.0	0.40	75.76	3,783.6	296.9	15.6	297.1	0.18	0.00	
3,897.0	0.30	51.16	3,871.6	297.1	16.0	297.3	0.20	-0.11	
3,985.0	0.60	29.96	3,959.6	297.7	16.5	297.9	0.38	0.34	
4,072.0	0.90	26.06	4,046.6	298.7	17.0	298.9	0.35	0.34	
4,161.0	1.10	39.16	4,135.6	300.0	17.8	300.2	0.34	0.22	
4,249.0	1.50	41.26	4,223.6	301.5	19.1	301.7	0.46	0.45	
4,337.0	2.60	44.46	4,311.5	303.8	21.3	304.0	1.26	1.25	
4,425.0	2.70	67.06	4,399.4	306.0	24.6	306.3	1.18	0.11	
4,514.0	1.50	81.36	4,488.3	307.0	27.7	307.4	1.46	-1.35	
4,602.0	1.30	76.26	4,576.3	307.4	29.8	307.8	0.27	-0.23	
4,692.0	0.90	91.96	4,666.3	307.6	31.5	308.0	0.55	-0.44	
4,781.0	1.00	157.86	4,755.3	306.9	32.5	307.3	1.16	0.11	
4,871.0	0.00	278.26	4,845.3	306.2	32.8	306.6	1.11	-1.11	
4,960.0	0.40	119.56	4,934.3	306.0	33.0	306.4	0.45	0.45	
5,048.0	0.10	278.26	5,022.3	305.9	33.2	306.3	0.56	-0.34	
5,138.0	0.10	336.46	5,112.3	305.9	33.1	306.4	0.11	0.00	
5,224.0	0.30	40.16	5,198.3	306.2	33.2	306.6	0.32	0.23	
5,311.0	0.60	307.76	5,285.3	306.6	33.0	307.1	0.78	0.34	
5,399.0	0.20	305.66	5,373.3	307.0	32.5	307.4	0.45	-0.45	
5,488.0	0.40	290.46	5,462.3	307.2	32.1	307.6	0.24	0.22	
5,575.0	0.20	259.46	5,549.3	307.3	31.7	307.7	0.29	-0.23	
5,665.0	0.40	242.26	5,639.3	307.1	31.2	307.5	0.24	0.22	
5,753.0	0.70	250.56	5,727.3	306.8	30.5	307.2	0.35	0.34	

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Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
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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
5,841.0	0.90	222.56	5,815.3	306.1	29.5	306.5	0.49	0.23	
5,929.0	0.90	215.16	5,903.3	305.0	28.6	305.4	0.13	0.00	
6,019.0	0.90	218.86	5,993.2	303.9	27.8	304.3	0.06	0.00	
6,107.0	0.80	205.06	6,081.2	302.8	27.1	303.2	0.26	-0.11	
6,195.0	0.80	201.46	6,169.2	301.7	26.6	302.0	0.06	0.00	
6,283.0	0.90	190.56	6,257.2	300.4	26.2	300.8	0.22	0.11	
6,371.0	1.10	179.86	6,345.2	298.9	26.1	299.2	0.31	0.23	
6,457.0	1.00	179.86	6,431.2	297.3	26.1	297.7	0.12	-0.12	
6,546.0	1.00	184.76	6,520.2	295.8	26.1	296.1	0.10	0.00	
6,636.0	0.80	194.76	6,610.2	294.4	25.8	294.7	0.28	-0.22	
6,725.0	0.90	194.86	6,699.2	293.1	25.5	293.4	0.11	0.11	
6,815.0	0.90	178.26	6,789.1	291.7	25.3	292.0	0.29	0.00	
6,904.0	0.60	166.76	6,878.1	290.6	25.5	290.9	0.38	-0.34	
6,994.0	0.80	124.76	6,968.1	289.7	26.1	290.1	0.59	0.22	
7,082.0	0.50	151.76	7,056.1	289.1	26.8	289.4	0.48	-0.34	
7,172.0	0.40	134.96	7,146.1	288.5	27.2	288.8	0.18	-0.11	Last Cathedral Survey @ 7,172' 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									
Ricks 13-15 PBHL	0.00	359.46	7,325.0	294.0	4.2	1,292,342.27	3,235,501.42	40.132796	-104.657755
- survey misses target center by 180.4ft at 7172.0ft MD (7146.1 TVD, 288.5 N, 27.2 E)									
- Circle (radius 50.0)									

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
7,172.0	7,146.1	288.5	27.2	Last Cathedral Survey @ 7,172' MD	

Checked By: _____ Approved By: _____ Date: _____