



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well NP EF14B-27 P27 595
Project:	North Piceance	TVD Reference:	well @ 6671.0ft (Patterson #303)
Site:	P27 595 (S27-T5S-R95W)	MD Reference:	well @ 6671.0ft (Patterson #303)
Well:	NP EF14B-27 P27 595	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	Database:	USA EDM 5000 Multi Users DB

Project	North Piceance		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site		P27 595 (S27-T5S-R95W)			
Site Position:		Northing:	1,645,842.89 ft	Latitude:	39° 34' 45.45 N
From:	Lat/Long	Easting:	2,286,079.88 ft	Longitude:	108° 1' 59.43 W
Position Uncertainty:	0.0 ft	Slot Radius:	0.000 in	Grid Convergence:	-1.60 °

Well	NP EF14B-27 P27 595					
Well Position	+N/-S	0.0 ft	Northing:	1,645,899.96 ft	Latitude:	39° 34' 46.01 N
	+E/-W	0.0 ft	Easting:	2,286,049.98 ft	Longitude:	108° 1' 59.83 W
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	6,649.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/1/2012	10.26	65.77	52,188

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	277.33	

Survey Program	Date	6/10/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
50.0	137.0	Survey #1 (DD)	Gyro	Gyro	
172.0	10,730.0	Survey #3 (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		
50.0	0.38	10.81	50.0	0.2	0.0	0.0	0.76	0.76		
100.0	0.60	5.00	100.0	0.6	0.1	0.0	0.45	0.44		
137.0	0.50	35.80	137.0	0.9	0.2	-0.1	0.83	-0.27	Last Gyro Survey @ 137' MD	
172.0	1.00	318.30	172.0	1.3	0.1	0.1	2.90	1.43		
203.0	1.20	305.00	203.0	1.7	-0.4	0.6	1.04	0.65		
233.0	1.80	300.70	233.0	2.1	-1.0	1.3	2.03	2.00		
264.0	2.80	300.10	264.0	2.7	-2.1	2.4	3.23	3.23		
295.0	3.30	295.70	294.9	3.5	-3.6	4.0	1.78	1.61		
325.0	4.20	290.80	324.8	4.2	-5.4	5.9	3.18	3.00		
356.0	4.50	291.20	355.8	5.1	-7.6	8.1	0.97	0.97		
387.0	5.20	289.10	386.6	6.0	-10.0	10.7	2.33	2.26		

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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
417.0	6.10	278.50	416.5	6.7	-12.9	13.6	4.58	3.00	
448.0	6.80	277.60	447.3	7.1	-16.3	17.1	2.28	2.26	
479.0	7.70	274.60	478.1	7.5	-20.2	21.0	3.15	2.90	
509.0	8.60	273.90	507.8	7.9	-24.5	25.3	3.02	3.00	
557.0	9.80	273.10	555.1	8.3	-32.1	32.9	2.51	2.50	
603.0	11.30	275.50	600.4	9.0	-40.5	41.3	3.40	3.26	
649.0	12.10	274.60	645.4	9.8	-49.8	50.6	1.78	1.74	
695.0	13.20	274.00	690.3	10.5	-59.9	60.7	2.41	2.39	
741.0	14.40	274.80	735.0	11.4	-70.8	71.7	2.64	2.61	
786.0	15.60	277.60	778.4	12.7	-82.4	83.3	3.11	2.67	
832.0	17.20	279.20	822.5	14.6	-95.2	96.3	3.61	3.48	
878.0	18.90	277.90	866.3	16.7	-109.3	110.5	3.80	3.70	
924.0	20.80	278.90	909.5	19.0	-124.8	126.2	4.20	4.13	
969.0	22.80	277.60	951.3	21.4	-141.3	142.9	4.57	4.44	
1,015.0	24.30	277.30	993.5	23.7	-159.5	161.2	3.27	3.26	
1,061.0	24.60	276.90	1,035.4	26.1	-178.4	180.3	0.74	0.65	
1,107.0	24.90	274.20	1,077.1	27.9	-197.6	199.5	2.54	0.65	
1,153.0	25.50	274.30	1,118.8	29.4	-217.1	219.1	1.31	1.30	
1,244.0	25.60	275.40	1,200.9	32.7	-256.2	258.3	0.53	0.11	
1,336.0	25.30	275.20	1,283.9	36.4	-295.6	297.8	0.34	-0.33	
1,427.0	25.90	276.90	1,366.0	40.5	-334.7	337.1	1.04	0.66	
1,519.0	26.70	279.80	1,448.5	46.5	-375.0	377.9	1.64	0.87	
1,610.0	27.10	278.40	1,529.6	53.0	-415.6	419.0	0.82	0.44	
1,702.0	28.30	279.10	1,611.1	59.5	-457.9	461.8	1.35	1.30	
1,794.0	29.20	280.20	1,691.8	66.9	-501.5	506.0	1.13	0.98	
1,897.0	28.80	275.30	1,781.9	73.6	-551.0	555.9	2.34	-0.39	
1,988.0	28.70	273.00	1,861.6	76.8	-594.6	599.6	1.22	-0.11	
2,080.0	28.00	275.90	1,942.6	80.2	-638.2	643.2	1.68	-0.76	
2,171.0	29.20	278.50	2,022.5	85.7	-681.4	686.7	1.90	1.32	
2,263.0	28.60	277.70	2,103.0	91.9	-725.4	731.2	0.78	-0.65	
2,354.0	28.70	279.40	2,182.9	98.4	-768.5	774.8	0.90	0.11	
2,446.0	27.20	277.50	2,264.2	104.8	-811.2	817.9	1.90	-1.63	
2,537.0	27.80	280.30	2,344.9	111.3	-852.7	859.9	1.57	0.66	
2,629.0	29.40	283.30	2,425.7	120.3	-895.8	903.8	2.34	1.74	
2,720.0	32.00	283.80	2,503.9	131.2	-940.9	950.0	2.87	2.86	
2,812.0	31.00	284.70	2,582.4	143.0	-987.5	997.7	1.20	-1.09	
2,904.0	32.30	282.50	2,660.7	154.4	-1,034.4	1,045.7	1.89	1.41	
2,995.0	33.00	279.90	2,737.3	163.9	-1,082.6	1,094.6	1.72	0.77	
3,087.0	32.40	277.30	2,814.7	171.3	-1,131.7	1,144.3	1.66	-0.65	
3,178.0	31.60	276.70	2,891.9	177.2	-1,179.6	1,192.5	0.95	-0.88	
3,270.0	30.60	274.70	2,970.7	181.9	-1,226.8	1,240.0	1.56	-1.09	
3,361.0	28.80	277.40	3,049.7	186.7	-1,271.7	1,285.1	2.46	-1.98	
3,453.0	29.80	278.00	3,129.9	192.7	-1,316.3	1,330.1	1.13	1.09	
3,544.0	30.20	277.40	3,208.8	198.8	-1,361.4	1,375.6	0.55	0.44	
3,636.0	29.20	276.80	3,288.7	204.4	-1,406.6	1,421.2	1.13	-1.09	
3,727.0	27.60	275.60	3,368.7	209.1	-1,449.6	1,464.5	1.87	-1.76	
3,819.0	28.10	276.70	3,450.1	213.7	-1,492.4	1,507.4	0.78	0.54	
3,910.0	30.40	279.10	3,529.4	219.9	-1,536.4	1,551.9	2.84	2.53	
4,002.0	29.10	278.30	3,609.3	226.8	-1,581.5	1,597.5	1.48	-1.41	
4,093.0	27.90	277.30	3,689.3	232.7	-1,624.5	1,640.9	1.42	-1.32	
4,185.0	29.40	277.40	3,770.0	238.3	-1,668.3	1,685.0	1.63	1.63	
4,276.0	27.90	277.70	3,849.9	244.0	-1,711.5	1,728.7	1.66	-1.65	
4,368.0	28.80	278.60	3,930.8	250.2	-1,754.8	1,772.4	1.08	0.98	

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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
4,459.0	29.50	277.90	4,010.3	256.6	-1,798.6	1,816.7	0.86	0.77	
4,551.0	31.30	279.20	4,089.7	263.5	-1,844.7	1,863.2	2.08	1.96	
4,642.0	31.30	275.90	4,167.4	269.7	-1,891.5	1,910.5	1.88	0.00	
4,734.0	30.00	275.90	4,246.6	274.6	-1,938.2	1,957.4	1.41	-1.41	
4,826.0	28.40	275.10	4,326.9	278.9	-1,982.8	2,002.2	1.79	-1.74	
4,917.0	29.80	276.80	4,406.4	283.5	-2,026.9	2,046.5	1.79	1.54	
5,008.0	28.30	276.30	4,485.9	288.5	-2,070.8	2,090.6	1.67	-1.65	
5,100.0	29.40	277.50	4,566.5	293.9	-2,114.8	2,135.0	1.35	1.20	
5,191.0	28.00	276.60	4,646.3	299.2	-2,158.2	2,178.7	1.61	-1.54	
5,283.0	25.70	274.40	4,728.4	303.2	-2,199.5	2,220.2	2.72	-2.50	
5,375.0	26.30	275.00	4,811.1	306.5	-2,239.7	2,260.5	0.71	0.65	
5,466.0	24.60	274.50	4,893.3	309.8	-2,278.7	2,299.6	1.88	-1.87	
5,558.0	23.00	277.10	4,977.5	313.5	-2,315.6	2,336.7	2.08	-1.74	
5,649.0	21.30	276.20	5,061.7	317.5	-2,349.7	2,371.0	1.90	-1.87	
5,741.0	19.60	275.60	5,147.9	320.8	-2,381.7	2,403.1	1.86	-1.85	
5,832.0	19.00	278.90	5,233.8	324.6	-2,411.5	2,433.2	1.37	-0.66	
5,924.0	17.90	277.80	5,321.1	328.8	-2,440.3	2,462.3	1.25	-1.20	
6,016.0	16.00	280.30	5,409.1	333.0	-2,466.8	2,489.1	2.21	-2.07	
6,107.0	14.70	276.00	5,496.9	336.5	-2,490.6	2,513.2	1.90	-1.43	
6,199.0	12.00	274.00	5,586.4	338.4	-2,511.8	2,534.4	2.98	-2.93	
6,290.0	10.10	271.00	5,675.7	339.1	-2,529.2	2,551.8	2.18	-2.09	
6,382.0	7.70	267.50	5,766.6	339.0	-2,543.4	2,565.9	2.67	-2.61	
6,473.0	7.40	268.80	5,856.8	338.6	-2,555.4	2,577.7	0.38	-0.33	
6,565.0	5.80	274.10	5,948.2	338.8	-2,565.9	2,588.2	1.86	-1.74	
6,657.0	4.40	269.60	6,039.8	339.1	-2,574.1	2,596.3	1.58	-1.52	
6,748.0	3.50	288.70	6,130.6	340.0	-2,580.2	2,602.5	1.74	-0.99	
6,840.0	1.30	311.40	6,222.5	341.6	-2,583.7	2,606.1	2.56	-2.39	
6,932.0	1.20	322.40	6,314.5	343.1	-2,585.0	2,607.7	0.28	-0.11	
7,023.0	1.10	315.00	6,405.4	344.4	-2,586.2	2,609.0	0.20	-0.11	
7,115.0	1.10	306.10	6,497.4	345.6	-2,587.6	2,610.5	0.19	0.00	
7,206.0	0.90	309.50	6,588.4	346.5	-2,588.8	2,611.9	0.23	-0.22	
7,298.0	0.80	312.30	6,680.4	347.4	-2,589.8	2,613.0	0.12	-0.11	
7,389.0	0.70	294.00	6,771.4	348.1	-2,590.8	2,614.1	0.28	-0.11	
7,481.0	1.10	268.80	6,863.4	348.3	-2,592.2	2,615.5	0.60	0.43	
7,572.0	1.50	258.80	6,954.4	348.1	-2,594.3	2,617.5	0.50	0.44	
7,664.0	1.40	255.30	7,046.3	347.5	-2,596.5	2,619.7	0.15	-0.11	
7,756.0	1.10	339.60	7,138.3	348.1	-2,597.9	2,621.1	1.84	-0.33	
7,847.0	1.00	353.00	7,229.3	349.7	-2,598.3	2,621.7	0.29	-0.11	
7,939.0	0.50	328.10	7,321.3	350.8	-2,598.6	2,622.2	0.64	-0.54	
8,030.0	0.90	326.40	7,412.3	351.8	-2,599.2	2,622.9	0.44	0.44	
8,122.0	1.50	248.40	7,504.3	351.9	-2,600.8	2,624.4	1.72	0.65	
8,213.0	2.30	239.10	7,595.2	350.5	-2,603.4	2,626.9	0.94	0.88	
8,304.0	1.00	268.10	7,686.2	349.6	-2,605.8	2,629.1	1.65	-1.43	
8,396.0	1.00	261.90	7,778.2	349.4	-2,607.4	2,630.7	0.12	0.00	
8,488.0	0.80	148.40	7,870.2	348.8	-2,607.9	2,631.0	1.64	-0.22	
8,579.0	0.90	153.00	7,961.2	347.6	-2,607.2	2,630.2	0.13	0.11	
8,671.0	0.80	181.90	8,053.1	346.3	-2,606.9	2,629.8	0.47	-0.11	
8,762.0	1.20	198.50	8,144.1	344.8	-2,607.2	2,629.9	0.54	0.44	
8,854.0	1.40	205.20	8,236.1	342.8	-2,608.0	2,630.4	0.27	0.22	
8,945.0	0.90	215.80	8,327.1	341.3	-2,608.9	2,631.1	0.59	-0.55	
9,037.0	0.80	144.90	8,419.1	340.1	-2,608.9	2,631.0	1.08	-0.11	
9,128.0	0.60	157.80	8,510.1	339.2	-2,608.4	2,630.4	0.28	-0.22	
9,220.0	0.30	105.40	8,602.1	338.7	-2,608.0	2,629.9	0.52	-0.33	

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9,311.0	0.40	95.40	8,693.1	338.6	-2,607.4	2,629.3	0.13	0.11	
9,403.0	0.20	180.30	8,785.1	338.4	-2,607.1	2,629.0	0.47	-0.22	
9,495.0	0.30	177.70	8,877.1	338.0	-2,607.1	2,628.9	0.11	0.11	
9,586.0	0.90	40.50	8,968.1	338.3	-2,606.6	2,628.5	1.25	0.66	
9,678.0	0.80	62.20	9,060.1	339.1	-2,605.6	2,627.6	0.36	-0.11	
9,769.0	0.40	138.40	9,151.1	339.2	-2,604.8	2,626.8	0.88	-0.44	
9,861.0	0.30	205.80	9,243.1	338.7	-2,604.7	2,626.6	0.43	-0.11	
9,952.0	0.70	240.00	9,334.0	338.2	-2,605.3	2,627.2	0.53	0.44	
10,044.0	0.70	249.00	9,426.0	337.8	-2,606.3	2,628.1	0.12	0.00	
10,136.0	0.90	264.00	9,518.0	337.5	-2,607.6	2,629.3	0.31	0.22	
10,227.0	1.50	246.30	9,609.0	336.9	-2,609.4	2,631.0	0.77	0.66	
10,319.0	2.00	227.70	9,701.0	335.4	-2,611.6	2,633.1	0.82	0.54	
10,410.0	2.20	228.40	9,791.9	333.1	-2,614.1	2,635.3	0.22	0.22	
10,502.0	2.40	223.00	9,883.8	330.6	-2,616.8	2,637.6	0.32	0.22	
10,594.0	2.70	225.60	9,975.7	327.6	-2,619.6	2,640.0	0.35	0.33	
10,680.0	2.70	231.00	10,061.6	324.9	-2,622.6	2,642.7	0.30	0.00	Last Cathedral Survey @ 10,680' MD
10,730.0	2.70	231.00	10,111.6	323.5	-2,624.5	2,644.3	0.00	0.00	Projection to Bit @ 10,730'

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									
P27 595 EF14B-27 BHL	0.00	0.00	10,046.0	338.9	-2,606.2	1,646,311.42	2,283,454.23	39° 34' 49.35 N	108° 2' 33.12 W
- actual wellpath misses target center by 20.8ft at 10663.4ft MD (10045.0 TVD, 325.4 N, -2622.0 E)									
- Rectangle (sides W30.0 H50.0 D0.0)									
P27 595 EF14B-27 TGT	0.00	0.00	6,486.0	348.9	-2,589.2	1,646,320.95	2,283,471.51	39° 34' 49.45 N	108° 2' 32.90 W
- actual wellpath misses target center by 3.9ft at 7103.6ft MD (6486.1 TVD, 345.4 N, -2587.4 E)									
- Point									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
137.0	137.0	0.9	0.2	Last Gyro Survey @ 137' MD
10,680.0	10,061.6	324.9	-2,622.6	Last Cathedral Survey @ 10,680' MD
10,730.0	10,111.6	323.5	-2,624.5	Projection to Bit @ 10,730'

Checked By: _____ Approved By: _____ Date: _____