





## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Cook Carpenter 20-3A (PB-20)
<b>Project:</b>	S. Piceance (Parachute)	<b>TVD Reference:</b>	KBE @ 5665.0ft (Nabors M13)
<b>Site:</b>	PB-20 Pad	<b>MD Reference:</b>	KBE @ 5665.0ft (Nabors M13)
<b>Well:</b>	Cook Carpenter 20-3A (PB-20)	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	S. Piceance (Parachute), Garfield County, CO		
<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 Central Zone		

Site		PB-20 Pad			
Site Position:		Northing:	1,590,537.58 ft	Latitude:	39.427690
From:	Lat/Long	Easting:	2,288,393.21 ft	Longitude:	-108.019530
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.59 °

Well	Cook Carpenter 20-3A (PB-20)					
Well Position	+N/-S	0.0 ft	Northing:	1,590,527.86 ft	Latitude:	39.427661
	+E/-W	0.0 ft	Easting:	2,288,362.70 ft	Longitude:	-108.019637
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,643.0 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	3/28/2012	10.25	65.66	52,133

<b>Design</b>	DD				
<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	308.62	

<b>Survey Program</b>	<b>Date</b>	4/9/2012			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
82.0	6,712.0	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		
82.0	0.50	331.90	82.0	0.3	-0.2	0.3	0.61	0.61		
113.0	1.00	333.80	113.0	0.7	-0.4	0.7	1.61	1.61		
143.0	1.10	337.00	143.0	1.2	-0.6	1.2	0.39	0.33		
173.0	2.20	324.60	173.0	1.9	-1.0	2.0	3.83	3.67		
204.0	2.80	313.40	203.9	2.9	-1.9	3.3	2.49	1.94		
235.0	3.50	310.50	234.9	4.1	-3.2	5.0	2.32	2.26		
266.0	3.70	310.70	265.8	5.3	-4.7	7.0	0.65	0.65		
297.0	4.00	308.40	296.8	6.6	-6.3	9.0	1.09	0.97		
389.0	6.60	309.60	388.4	12.0	-12.9	17.5	2.83	2.83		
482.0	9.20	313.30	480.5	20.5	-22.4	30.3	2.85	2.80		
573.0	10.60	304.60	570.1	30.3	-34.6	45.9	2.25	1.54		
665.0	11.60	304.30	660.4	40.3	-49.2	63.6	1.09	1.09		

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<b>Site:</b>	PB-20 Pad	<b>MD Reference:</b>	KBE @ 5665.0ft (Nabors M13)
<b>Well:</b>	Cook Carpenter 20-3A (PB-20)	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<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
758.0	12.70	303.10	751.3	51.1	-65.5	83.1	1.21	1.18	
850.0	12.10	303.50	841.2	62.0	-82.0	102.7	0.66	-0.65	
941.0	12.10	309.40	930.2	73.3	-97.3	121.8	1.36	0.00	
1,028.0	13.10	309.20	1,015.1	85.3	-112.0	140.8	1.15	1.15	
1,167.0	13.50	309.50	1,150.3	105.6	-136.7	172.7	0.29	0.29	
1,263.0	13.60	310.40	1,243.7	120.0	-154.0	195.2	0.24	0.10	
1,358.0	13.50	309.70	1,336.0	134.3	-171.0	217.5	0.20	-0.11	
1,453.0	13.10	310.50	1,428.5	148.4	-187.7	239.3	0.46	-0.42	
1,549.0	12.70	309.50	1,522.0	162.2	-204.1	260.7	0.48	-0.42	
1,644.0	12.40	311.50	1,614.8	175.6	-219.8	281.4	0.56	-0.32	
1,739.0	12.00	311.30	1,707.6	188.9	-234.9	301.4	0.42	-0.42	
1,835.0	10.70	310.90	1,801.7	201.3	-249.1	320.3	1.36	-1.35	
1,930.0	11.80	312.20	1,894.9	213.6	-263.0	338.8	1.19	1.16	
2,026.0	11.20	310.00	1,989.0	226.2	-277.4	357.9	0.77	-0.62	
2,122.0	11.70	305.60	2,083.1	237.8	-292.5	377.0	1.05	0.52	
2,217.0	10.70	305.10	2,176.3	248.5	-307.5	395.4	1.06	-1.05	
2,312.0	11.30	306.60	2,269.5	259.1	-322.2	413.5	0.70	0.63	
2,407.0	12.00	311.00	2,362.6	271.2	-337.1	432.6	1.19	0.74	
2,503.0	11.50	308.60	2,456.6	283.7	-352.1	452.2	0.73	-0.52	
2,598.0	11.70	311.20	2,549.6	295.9	-366.8	471.3	0.59	0.21	
2,694.0	11.30	309.50	2,643.7	308.3	-381.4	490.4	0.55	-0.42	
2,789.0	10.90	310.70	2,736.9	320.1	-395.4	508.7	0.49	-0.42	
2,884.0	10.80	310.10	2,830.2	331.7	-409.0	526.6	0.16	-0.11	
2,979.0	10.00	311.50	2,923.7	342.9	-422.0	543.7	0.88	-0.84	
3,075.0	10.50	306.10	3,018.1	353.6	-435.3	560.8	1.13	0.52	
3,170.0	11.40	309.00	3,111.4	364.6	-449.6	578.8	1.11	0.95	
3,265.0	11.80	310.00	3,204.5	376.7	-464.3	597.9	0.47	0.42	
3,361.0	12.00	311.20	3,298.4	389.6	-479.3	617.7	0.33	0.21	
3,456.0	11.20	310.70	3,391.5	402.2	-493.8	636.8	0.85	-0.84	
3,551.0	11.10	306.20	3,484.7	413.6	-508.1	655.1	0.92	-0.11	
3,646.0	11.00	307.80	3,577.9	424.5	-522.7	673.3	0.34	-0.11	
3,742.0	11.30	307.70	3,672.1	435.9	-537.3	691.9	0.31	0.31	
3,837.0	11.60	308.10	3,765.2	447.5	-552.2	710.7	0.33	0.32	
3,932.0	11.80	306.70	3,858.2	459.2	-567.5	730.0	0.37	0.21	
4,028.0	11.30	304.80	3,952.3	470.4	-583.1	749.2	0.65	-0.52	
4,123.0	11.40	305.70	4,045.4	481.2	-598.4	767.9	0.21	0.11	
4,219.0	9.60	307.10	4,139.8	491.6	-612.5	785.3	1.89	-1.87	
4,314.0	7.70	309.70	4,233.7	500.4	-623.7	799.6	2.04	-2.00	
4,409.0	7.50	307.20	4,327.9	508.2	-633.5	812.2	0.41	-0.21	
4,505.0	6.60	313.50	4,423.2	515.8	-642.5	824.0	1.23	-0.94	
4,600.0	4.80	322.60	4,517.7	522.7	-648.9	833.2	2.11	-1.89	
4,695.0	2.10	329.60	4,612.5	527.4	-652.2	838.7	2.87	-2.84	
4,791.0	0.10	349.00	4,708.5	529.0	-653.1	840.4	2.09	-2.08	
4,805.4	0.24	11.17	4,722.9	529.0	-653.1	840.5	1.07	0.99	Cook Carpenter 20-3A (PB-20) TGT
4,886.0	1.10	22.20	4,803.5	529.9	-652.8	840.8	1.07	1.06	
4,982.0	1.00	48.80	4,899.5	531.3	-651.8	840.9	0.51	-0.10	
5,077.0	0.70	44.20	4,994.5	532.3	-650.8	840.7	0.32	-0.32	
5,172.0	0.00	17.20	5,089.5	532.7	-650.4	840.6	0.74	-0.74	
5,267.0	0.40	297.60	5,184.5	532.8	-650.7	840.9	0.42	0.42	
5,362.0	1.20	339.20	5,279.5	533.9	-651.3	842.1	0.99	0.84	
5,457.0	1.20	324.30	5,374.4	535.7	-652.2	843.9	0.33	0.00	
5,551.0	1.20	306.50	5,468.4	537.1	-653.6	845.9	0.39	0.00	
5,646.0	1.00	283.80	5,563.4	537.8	-655.2	847.6	0.50	-0.21	

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<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<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
5,742.0	0.30	239.30	5,659.4	537.9	-656.2	848.5	0.85	-0.73	
5,837.0	0.40	246.70	5,754.4	537.7	-656.8	848.7	0.12	0.11	
5,932.0	0.50	236.60	5,849.4	537.3	-657.4	849.0	0.13	0.11	
6,028.0	0.70	238.00	5,945.4	536.8	-658.3	849.3	0.21	0.21	
6,123.0	0.90	235.30	6,040.4	536.0	-659.4	849.7	0.21	0.21	
6,218.0	0.90	238.10	6,135.4	535.2	-660.6	850.2	0.05	0.00	
6,312.0	1.50	243.40	6,229.3	534.3	-662.3	850.9	0.65	0.64	
6,408.0	2.00	240.80	6,325.3	532.9	-664.9	852.1	0.53	0.52	
6,503.0	2.40	236.90	6,420.2	531.0	-668.0	853.4	0.45	0.42	
6,599.0	2.20	233.80	6,516.1	528.8	-671.2	854.5	0.25	-0.21	
6,662.0	2.50	230.20	6,579.1	527.2	-673.2	855.1	0.53	0.48	Last Cathedral Survey @ 6662' MD - Cook Carp Projection to Bit @ 6712' MD
6,712.0	2.50	230.20	6,629.0	525.8	-674.9	855.5	0.00	0.00	

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
Cook Carpenter 20-3A (I - actual wellpath misses target center by 5.8ft at 4805.4ft MD (4722.9 TVD, 529.0 N, -653.1 E) - Circle (radius 25.0)	0.00	0.00	4,723.0	524.2	-656.2	1,591,070.01	2,287,721.31	39.429100	-108.021960
Cook Carpenter 20-3A (I - actual wellpath misses target center by 18.0ft at 6662.0ft MD (6579.1 TVD, 527.2 N, -673.2 E) - Circle (radius 25.0)	0.00	0.00	6,584.0	524.2	-656.2	1,591,070.01	2,287,721.31	39.429100	-108.021960

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
6,662.0	6,579.1	527.2	-673.2	Last Cathedral Survey @ 6662' MD	
6,712.0	6,629.0	525.8	-674.9	Projection to Bit @ 6712' MD	

Checked By: _____	Approved By: _____	Date: _____
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