



Azimuths to True North
 Magnetic North: 10.32°

Magnetic Field
 Strength: 52215.2snT
 Dip Angle: 65.84°
 Date: 6/22/2012
 Model: IGRF2010

DD 8516B-21 N22 496 125417/163155 (MH) 125182/147055 (SH); SC						
WELL @ 7602.0ft (Patterson #306) North American Datum 1983 Well 8516B-21 N22 496, True North						
Type User	Target No Target (Freehand)	Azimuth 266.76	Origin Type Slot	N/S 0.0	E/W 0.0	From TVD 0.0
Name	TV	+N/-S	+E/-W	Latitude		Longitude
8516B-21 N22 496 TGT (Column)	7162.0	-179.4	-3202.4	39° 40' 59.71 N		108° 10' 7.15 W
8516B-21 N22 496 PBHL (Column)	0822.0	-189.3	-3219.4	39° 40' 59.61 N		108° 10' 7.36 W

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well 8516B-21 N22 496
Project:	Story Gulch	TVD Reference:	WELL @ 7602.0ft (Patterson #306)
Site:	S22-T4S-R96W (N22 496) (Column Pattern)	MD Reference:	WELL @ 7602.0ft (Patterson #306)
Well:	8516B-21 N22 496	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	Database:	USA EDM 5000 Multi Users DB

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

Site		S22-T4S-R96W (N22 496) (Column Pattern)			
Site Position:		Northing:	1,685,048.56 ft	Latitude:	39° 41' 3.24 N
From:	Lat/Long	Easting:	2,252,316.79 ft	Longitude:	108° 9' 25.11 W
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.68 °

Well	8516B-21 N22 496					
Well Position	+N/-S	0.0 ft	Northing:	1,684,873.74 ft	Latitude:	39° 41' 1.48 N
	+E/-W	0.0 ft	Easting:	2,252,227.62 ft	Longitude:	108° 9' 26.18 W
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,569.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/22/2012	10.32	65.84	52,215

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	266.76	

Survey Program	Date	7/4/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
207.0	2,045.0	Survey #1 (DD)	MWD	Geolink MWD	
2,166.0	11,809.0	Survey #2 (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		
207.0	1.90	277.40	207.0	0.4	-3.4	3.4	0.92	0.92		
238.0	2.90	280.50	237.9	0.7	-4.7	4.6	3.25	3.23		
268.0	3.90	278.50	267.9	0.9	-6.4	6.4	3.36	3.33		
299.0	5.20	267.20	298.8	1.0	-8.9	8.8	5.07	4.19		
330.0	6.00	262.10	329.6	0.7	-11.9	11.8	3.04	2.58		
422.0	9.20	261.40	420.8	-1.0	-23.9	24.0	3.48	3.48		
513.0	11.30	267.10	510.4	-2.6	-40.0	40.1	2.56	2.31		
608.0	13.10	268.10	603.2	-3.4	-60.1	60.2	1.91	1.89		
700.0	16.40	266.90	692.2	-4.4	-83.5	83.6	3.60	3.59		
791.0	18.50	266.50	779.0	-6.0	-110.7	110.9	2.31	2.31		
883.0	21.20	266.60	865.5	-7.9	-141.9	142.1	2.94	2.93		

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Survey Report

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Site:	S22-T4S-R96W (N22 496) (Column Pattern)	MD Reference:	WELL @ 7602.0ft (Patterson #306)
Well:	8516B-21 N22 496	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
974.0	24.50	270.60	949.4	-8.7	-177.2	177.4	4.01	3.63	
1,065.0	27.60	270.00	1,031.1	-8.5	-217.2	217.3	3.42	3.41	
1,157.0	29.50	267.20	1,111.9	-9.6	-261.1	261.2	2.53	2.07	
1,249.0	29.30	265.00	1,192.1	-12.7	-306.2	306.4	1.19	-0.22	
1,340.0	28.50	265.20	1,271.7	-16.4	-350.0	350.3	0.89	-0.88	
1,432.0	27.10	264.90	1,353.1	-20.1	-392.7	393.2	1.53	-1.52	
1,523.0	27.60	265.10	1,433.9	-23.8	-434.4	435.0	0.56	0.55	
1,614.0	29.30	266.80	1,513.9	-26.8	-477.6	478.4	2.07	1.87	
1,706.0	28.10	266.00	1,594.6	-29.6	-521.7	522.5	1.37	-1.30	
1,797.0	28.70	267.70	1,674.7	-31.9	-564.9	565.8	1.11	0.66	
1,888.0	27.80	268.10	1,754.9	-33.5	-608.0	608.9	1.01	-0.99	
1,980.0	28.30	266.30	1,836.0	-35.6	-651.2	652.1	1.07	0.54	
2,045.0	27.70	265.30	1,893.4	-37.9	-681.6	682.6	1.17	-0.92	Last Cathedral Survey @ 2,045' MD
2,166.0	27.60	260.90	2,000.6	-44.6	-737.3	738.6	1.69	-0.08	
2,256.0	26.40	262.00	2,080.8	-50.7	-777.7	779.3	1.44	-1.33	
2,349.0	25.70	260.70	2,164.4	-56.8	-818.1	820.0	0.97	-0.75	
2,441.0	25.20	266.40	2,247.5	-61.3	-857.3	859.4	2.72	-0.54	
2,533.0	26.50	268.60	2,330.3	-63.0	-897.4	899.5	1.76	1.41	
2,624.0	28.10	267.60	2,411.1	-64.4	-939.1	941.2	1.83	1.76	
2,716.0	31.30	270.70	2,491.0	-65.0	-984.7	986.8	3.86	3.48	
2,807.0	31.50	269.60	2,568.7	-64.9	-1,032.1	1,034.1	0.67	0.22	
2,899.0	32.70	269.80	2,646.6	-65.1	-1,081.0	1,082.9	1.31	1.30	
2,990.0	32.10	269.80	2,723.5	-65.3	-1,129.7	1,131.6	0.66	-0.66	
3,082.0	32.40	266.80	2,801.3	-66.8	-1,178.8	1,180.7	1.77	0.33	
3,173.0	29.80	264.70	2,879.2	-70.2	-1,225.6	1,227.7	3.10	-2.86	
3,265.0	27.70	267.70	2,959.9	-73.2	-1,269.8	1,271.9	2.77	-2.28	
3,356.0	26.00	266.40	3,041.0	-75.3	-1,310.8	1,313.0	1.98	-1.87	
3,447.0	27.00	265.70	3,122.5	-78.1	-1,351.3	1,353.6	1.15	1.10	
3,539.0	23.90	262.90	3,205.5	-82.0	-1,390.7	1,393.1	3.61	-3.37	
3,631.0	23.30	264.70	3,289.8	-86.0	-1,427.3	1,429.8	1.02	-0.65	
3,722.0	26.60	269.10	3,372.4	-87.9	-1,465.6	1,468.2	4.16	3.63	
3,814.0	27.70	268.70	3,454.2	-88.8	-1,507.5	1,510.2	1.21	1.20	
3,906.0	28.60	268.20	3,535.3	-89.9	-1,550.9	1,553.5	1.01	0.98	
3,998.0	30.10	267.30	3,615.5	-91.7	-1,596.0	1,598.6	1.70	1.63	
4,089.0	28.00	265.50	3,695.1	-94.5	-1,640.1	1,642.8	2.50	-2.31	
4,181.0	28.30	265.50	3,776.2	-97.9	-1,683.4	1,686.2	0.33	0.33	
4,272.0	27.60	265.90	3,856.6	-101.1	-1,725.9	1,728.8	0.80	-0.77	
4,364.0	28.00	268.10	3,938.0	-103.3	-1,768.7	1,771.7	1.20	0.43	
4,456.0	29.70	267.00	4,018.5	-105.2	-1,813.1	1,816.1	1.94	1.85	
4,547.0	30.40	267.40	4,097.3	-107.4	-1,858.6	1,861.7	0.80	0.77	
4,638.0	30.20	268.70	4,175.9	-109.0	-1,904.5	1,907.6	0.75	-0.22	
4,730.0	30.10	270.20	4,255.4	-109.4	-1,950.7	1,953.7	0.83	-0.11	
4,822.0	29.10	267.20	4,335.4	-110.5	-1,996.1	1,999.1	1.94	-1.09	
4,914.0	29.60	267.30	4,415.6	-112.6	-2,041.1	2,044.2	0.55	0.54	
5,005.0	30.40	267.10	4,494.4	-114.8	-2,086.6	2,089.7	0.89	0.88	
5,097.0	30.00	263.60	4,573.9	-118.6	-2,132.7	2,136.0	1.96	-0.43	
5,189.0	29.80	266.50	4,653.7	-122.5	-2,178.4	2,181.8	1.59	-0.22	
5,280.0	28.10	265.10	4,733.3	-125.8	-2,222.3	2,225.8	2.01	-1.87	
5,372.0	28.40	264.90	4,814.4	-129.6	-2,265.7	2,269.4	0.34	0.33	
5,463.0	27.30	266.70	4,894.8	-132.7	-2,308.1	2,311.9	1.52	-1.21	
5,555.0	27.60	265.90	4,976.5	-135.4	-2,350.4	2,354.3	0.52	0.33	
5,646.0	27.20	269.70	5,057.3	-137.0	-2,392.2	2,396.1	1.97	-0.44	
5,738.0	27.80	271.00	5,138.9	-136.8	-2,434.7	2,438.5	0.92	0.65	

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Survey Report

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Site:	S22-T4S-R96W (N22 496) (Column Pattern)	MD Reference:	WELL @ 7602.0ft (Patterson #306)
Well:	8516B-21 N22 496	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
5,829.0	28.90	269.30	5,219.0	-136.7	-2,477.9	2,481.7	1.50	1.21	
5,921.0	30.20	269.10	5,299.0	-137.3	-2,523.3	2,527.0	1.42	1.41	
6,012.0	29.30	266.40	5,378.0	-139.1	-2,568.4	2,572.1	1.77	-0.99	
6,103.0	27.50	266.80	5,458.0	-141.6	-2,611.6	2,615.4	1.99	-1.98	
6,195.0	27.00	266.70	5,539.8	-144.0	-2,653.6	2,657.5	0.55	-0.54	
6,286.0	26.40	267.50	5,621.1	-146.1	-2,694.5	2,698.4	0.77	-0.66	
6,378.0	25.60	263.40	5,703.8	-149.3	-2,734.6	2,738.7	2.14	-0.87	
6,469.0	25.40	266.40	5,786.0	-152.8	-2,773.7	2,777.9	1.44	-0.22	
6,561.0	25.30	269.30	5,869.1	-154.2	-2,813.0	2,817.2	1.35	-0.11	
6,653.0	27.90	268.40	5,951.4	-155.1	-2,854.2	2,858.4	2.86	2.83	
6,744.0	27.00	268.30	6,032.1	-156.3	-2,896.1	2,900.3	0.99	-0.99	
6,836.0	25.80	266.60	6,114.5	-158.1	-2,937.0	2,941.2	1.54	-1.30	
6,928.0	22.50	269.40	6,198.5	-159.5	-2,974.6	2,978.8	3.80	-3.59	
7,019.0	21.50	269.50	6,282.8	-159.8	-3,008.7	3,012.9	1.10	-1.10	
7,111.0	19.90	267.50	6,368.9	-160.6	-3,041.2	3,045.4	1.90	-1.74	
7,203.0	18.40	266.00	6,455.8	-162.3	-3,071.3	3,075.6	1.72	-1.63	
7,294.0	16.90	267.30	6,542.5	-163.9	-3,098.8	3,103.2	1.70	-1.65	
7,386.0	14.40	266.40	6,631.1	-165.3	-3,123.6	3,128.0	2.73	-2.72	
7,477.0	12.00	260.80	6,719.7	-167.5	-3,144.3	3,148.7	2.99	-2.64	
7,569.0	10.20	262.90	6,810.0	-170.0	-3,161.8	3,166.3	2.00	-1.96	
7,660.0	7.90	251.40	6,899.8	-173.0	-3,175.7	3,180.4	3.20	-2.53	
7,752.0	6.10	249.60	6,991.1	-176.8	-3,186.3	3,191.2	1.97	-1.96	
7,844.0	4.50	256.50	7,082.8	-179.3	-3,194.4	3,199.4	1.87	-1.74	
7,935.0	2.00	270.60	7,173.6	-180.1	-3,199.4	3,204.5	2.86	-2.75	
8,027.0	0.90	45.70	7,265.6	-179.6	-3,200.5	3,205.6	2.95	-1.20	
8,118.0	1.50	60.20	7,356.6	-178.5	-3,199.0	3,204.0	0.73	0.66	
8,210.0	1.10	159.90	7,448.5	-178.7	-3,197.6	3,202.6	2.18	-0.43	
8,301.0	1.50	178.70	7,539.5	-180.7	-3,197.3	3,202.4	0.64	0.44	
8,393.0	0.40	312.10	7,631.5	-181.7	-3,197.5	3,202.7	1.95	-1.20	
8,485.0	0.90	300.90	7,723.5	-181.2	-3,198.4	3,203.5	0.56	0.54	
8,577.0	0.70	290.20	7,815.5	-180.6	-3,199.5	3,204.6	0.27	-0.22	
8,668.0	1.20	256.50	7,906.5	-180.6	-3,201.0	3,206.1	0.80	0.55	
8,760.0	0.90	289.00	7,998.5	-180.6	-3,202.6	3,207.7	0.71	-0.33	
8,851.0	1.50	22.50	8,089.5	-179.3	-3,202.8	3,207.8	1.97	0.66	
8,943.0	1.60	50.80	8,181.4	-177.3	-3,201.3	3,206.3	0.83	0.11	
9,034.0	1.00	50.10	8,272.4	-176.0	-3,199.8	3,204.6	0.66	-0.66	
9,126.0	0.30	29.60	8,364.4	-175.3	-3,199.0	3,203.8	0.79	-0.76	
9,218.0	0.30	203.50	8,456.4	-175.3	-3,199.0	3,203.8	0.65	0.00	
9,309.0	1.00	217.60	8,547.4	-176.2	-3,199.6	3,204.4	0.78	0.77	
9,401.0	1.10	219.10	8,639.4	-177.5	-3,200.6	3,205.5	0.11	0.11	
9,493.0	1.10	247.70	8,731.4	-178.5	-3,202.0	3,207.0	0.59	0.00	
9,585.0	1.30	237.50	8,823.3	-179.4	-3,203.7	3,208.7	0.32	0.22	
9,676.0	0.40	280.30	8,914.3	-179.9	-3,204.9	3,209.9	1.15	-0.99	
9,768.0	1.00	267.60	9,006.3	-179.9	-3,206.0	3,211.0	0.67	0.65	
9,859.0	1.40	239.10	9,097.3	-180.5	-3,207.7	3,212.8	0.78	0.44	
9,951.0	0.70	320.60	9,189.3	-180.6	-3,209.1	3,214.1	1.60	-0.76	
10,043.0	1.30	42.90	9,281.3	-179.4	-3,208.7	3,213.7	1.51	0.65	
10,134.0	1.50	28.60	9,372.3	-177.6	-3,207.4	3,212.4	0.44	0.22	
10,225.0	0.60	358.80	9,463.2	-176.1	-3,206.9	3,211.7	1.12	-0.99	
10,317.0	0.50	339.90	9,555.2	-175.2	-3,207.0	3,211.8	0.22	-0.11	
10,408.0	0.30	242.30	9,646.2	-175.0	-3,207.4	3,212.1	0.68	-0.22	
10,500.0	0.70	256.70	9,738.2	-175.2	-3,208.1	3,212.9	0.45	0.43	
10,591.0	1.30	231.00	9,829.2	-176.0	-3,209.5	3,214.3	0.81	0.66	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well 8516B-21 N22 496
Project:	Story Gulch	TVD Reference:	WELL @ 7602.0ft (Patterson #306)
Site:	S22-T4S-R96W (N22 496) (Column Pattern)	MD Reference:	WELL @ 7602.0ft (Patterson #306)
Well:	8516B-21 N22 496	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
10,683.0	1.20	228.60	9,921.2	-177.3	-3,211.0	3,215.9	0.12	-0.11	
10,773.0	1.30	219.50	10,011.2	-178.7	-3,212.4	3,217.3	0.25	0.11	
10,867.0	1.00	197.60	10,105.1	-180.3	-3,213.3	3,218.3	0.56	-0.32	
10,958.0	0.80	174.30	10,196.1	-181.7	-3,213.5	3,218.6	0.45	-0.22	
11,050.0	1.10	249.10	10,288.1	-182.7	-3,214.2	3,219.4	1.28	0.33	
11,232.0	1.40	258.60	10,470.1	-183.7	-3,218.0	3,223.3	0.20	0.16	
11,508.0	2.00	242.20	10,746.0	-186.6	-3,225.6	3,231.0	0.28	0.22	
11,739.0	3.10	237.70	10,976.7	-191.9	-3,234.5	3,240.1	0.48	0.48	Last Cathedral Survey @ 11,739' MD
11,809.0	3.10	237.70	11,046.6	-193.9	-3,237.7	3,243.4	0.00	0.00	Projection to Bit @ 11,809'

Targets

Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- Shape									
8516B-21 N22 496 TGT	0.00	0.00	7,162.0	-179.4	-3,202.4	1,684,788.08	2,249,021.34	39° 40' 59.71 N	108° 10' 7.15 W
- actual wellpath misses target center by 3.5ft at 7923.6ft MD (7162.2 TVD, -180.1 N, -3199.0 E)									
- Point									
8516B-21 N22 496 PBH	0.00	0.00	10,822.0	-189.3	-3,219.4	1,684,778.62	2,249,004.10	39° 40' 59.61 N	108° 10' 7.36 W
- actual wellpath misses target center by 8.9ft at 11583.8ft MD (10821.7 TVD, -188.0 N, -3228.1 E)									
- Rectangle (sides W30.0 H50.0 D0.0)									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,045.0	1,893.4	-37.9	-681.6	Last Cathedral Survey @ 2,045' MD
11,739.0	10,976.7	-191.9	-3,234.5	Last Cathedral Survey @ 11,739' MD
11,809.0	11,046.6	-193.9	-3,237.7	Projection to Bit @ 11,809'

Checked By: _____ Approved By: _____ Date: _____