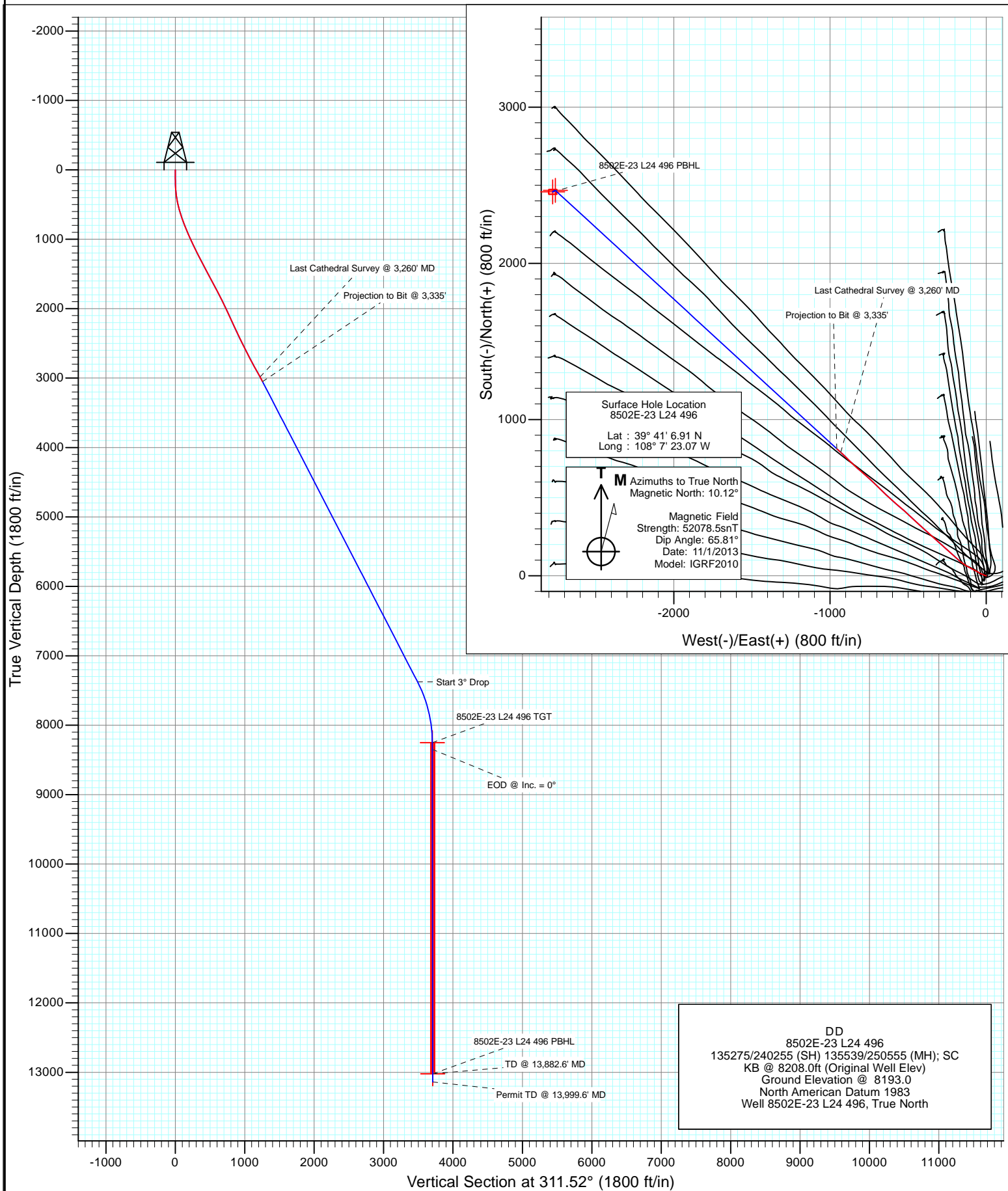




Project: Story Gulch  
Site: L24 496  
Well: 8502E-23 L24 496  
Wellbore: DD  
Design: DD



# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well 8502E-23 L24 496
<b>Project:</b>	Story Gulch	<b>TVD Reference:</b>	KB @ 8208.0ft (Original Well Elev)
<b>Site:</b>	L24 496	<b>MD Reference:</b>	KB @ 8208.0ft (Original Well Elev)
<b>Well:</b>	8502E-23 L24 496	<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>	Story Gulch		
<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		L24 496			
Site Position:		Northing:	1,685,024.52 ft	Latitude:	39° 41' 5.72 N
From:	Lat/Long	Easting:	2,261,789.15 ft	Longitude:	108° 7' 23.99 W
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.65 °

Well	8502E-23 L24 496					
Well Position	+N/-S	0.0 ft	Northing:	1,685,142.77 ft	Latitude:	39° 41' 6.91 N
	+E/-W	0.0 ft	Easting:	2,261,864.52 ft	Longitude:	108° 7' 23.07 W
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	8,193.0 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	11/1/2013	10.12	65.81	52,079

<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 (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	311.52	

<b>Survey Program</b>	<b>Date</b>	2/21/2014			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
126.0	3,335.0	Survey #1 (DD)	Geolink 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		
126.0	0.20	263.30	126.0	0.0	-0.2	0.1	0.16	0.16		
157.0	1.00	285.00	157.0	0.0	-0.5	0.4	2.64	2.58		
187.0	1.60	291.90	187.0	0.3	-1.2	1.1	2.06	2.00		
217.0	2.20	293.50	217.0	0.6	-2.1	2.0	2.01	2.00		
248.0	3.10	290.20	247.9	1.2	-3.4	3.3	2.94	2.90		
279.0	4.10	290.90	278.9	1.9	-5.2	5.2	3.23	3.23		
309.0	5.20	287.10	308.8	2.6	-7.5	7.4	3.81	3.67		
339.0	6.30	289.60	338.6	3.6	-10.4	10.2	3.76	3.67		
370.0	7.60	295.30	369.4	5.0	-13.9	13.7	4.74	4.19		
401.0	9.00	291.60	400.1	6.8	-18.0	18.0	4.83	4.52		
431.0	10.40	289.50	429.6	8.6	-22.7	22.7	4.81	4.67		
461.0	12.00	293.20	459.1	10.7	-28.1	28.1	5.84	5.33		

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<b>Site:</b>	L24 496	<b>MD Reference:</b>	KB @ 8208.0ft (Original Well Elev)
<b>Well:</b>	8502E-23 L24 496	<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
491.0	13.40	298.10	488.3	13.6	-34.0	34.5	5.88	4.67	
563.0	16.30	300.50	557.9	22.6	-50.1	52.5	4.12	4.03	
609.0	16.90	293.50	602.0	28.6	-61.8	65.2	4.54	1.30	
654.0	18.00	297.80	644.9	34.4	-74.0	78.2	3.76	2.44	
700.0	18.90	299.10	688.6	41.4	-86.8	92.4	2.15	1.96	
746.0	20.10	299.50	731.9	48.9	-100.1	107.4	2.62	2.61	
792.0	21.50	299.60	774.9	56.9	-114.4	123.4	3.04	3.04	
838.0	22.60	301.10	817.6	65.7	-129.3	140.3	2.69	2.39	
884.0	22.90	304.30	860.0	75.3	-144.2	157.9	2.77	0.65	
976.0	23.40	310.90	944.6	97.3	-172.8	193.9	2.87	0.54	
1,068.0	25.20	312.43	1,028.5	122.5	-201.1	231.8	2.07	1.96	
1,160.0	26.20	311.90	1,111.4	149.3	-230.7	271.7	1.12	1.09	
1,252.0	26.20	311.50	1,193.9	176.3	-261.0	312.3	0.19	0.00	
1,344.0	27.20	312.00	1,276.1	203.8	-291.8	353.6	1.11	1.09	
1,436.0	27.60	312.10	1,357.8	232.2	-323.3	395.9	0.44	0.43	
1,527.0	28.30	311.60	1,438.2	260.6	-355.0	438.6	0.81	0.77	
1,619.0	28.30	312.10	1,519.2	289.7	-387.5	482.2	0.26	0.00	
1,711.0	28.20	312.60	1,600.2	319.1	-419.7	525.8	0.28	-0.11	
1,803.0	27.90	312.80	1,681.4	348.4	-451.5	569.0	0.34	-0.33	
1,895.0	27.30	313.00	1,762.9	377.4	-482.7	611.6	0.66	-0.65	
1,987.0	27.10	312.50	1,844.8	406.0	-513.6	653.7	0.33	-0.22	
2,079.0	26.00	310.50	1,927.1	433.2	-544.4	694.8	1.54	-1.20	
2,170.0	25.20	310.30	2,009.1	458.7	-574.3	734.1	0.88	-0.88	
2,262.0	24.70	311.90	2,092.5	484.2	-603.6	772.9	0.91	-0.54	
2,354.0	24.60	312.90	2,176.1	510.1	-631.9	811.3	0.47	-0.11	
2,446.0	24.70	313.70	2,259.8	536.4	-659.8	849.6	0.38	0.11	
2,538.0	25.10	315.00	2,343.2	563.5	-687.5	888.3	0.74	0.43	
2,630.0	25.50	314.70	2,426.4	591.2	-715.4	927.5	0.46	0.43	
2,722.0	26.50	312.30	2,509.1	619.0	-744.7	967.8	1.58	1.09	
2,814.0	27.60	310.30	2,591.0	646.6	-776.1	1,009.7	1.55	1.20	
2,906.0	27.90	310.40	2,672.4	674.3	-808.7	1,052.5	0.33	0.33	
2,996.0	27.90	313.40	2,752.0	702.4	-840.1	1,094.6	1.56	0.00	
3,088.0	28.40	315.10	2,833.1	732.7	-871.2	1,138.0	1.03	0.54	
3,180.0	29.10	313.80	2,913.8	763.7	-902.8	1,182.1	1.02	0.76	
3,260.0	28.10	312.00	2,984.0	789.8	-930.8	1,220.4	1.65	-1.25	Last Cathedral Survey @ 3,260' MD Projection to Bit @ 3,335'
3,335.0	28.10	312.00	3,050.2	813.4	-957.1	1,255.7	0.00	0.00	

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<b>Site:</b>	L24 496	<b>MD Reference:</b>	KB @ 8208.0ft (Original Well Elev)
<b>Well:</b>	8502E-23 L24 496	<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

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
8502E-23 L24 496 PBHI	0.00	0.00	13,021.0	2,458.0	-2,775.8	1,687,679.83	2,259,160.79	39° 41' 31.20 N	108° 7' 58.58 W
- actual wellpath misses target center by 10267.9ft at 3335.0ft MD (3050.2 TVD, 813.4 N, -957.1 E)									
- Rectangle (sides W30.0 H50.0 D0.0)									
8502E-23 L24 496 TGT	0.00	0.00	8,251.0	2,467.9	-2,758.8	1,687,689.31	2,259,178.12	39° 41' 31.30 N	108° 7' 58.36 W
- actual wellpath misses target center by 5747.4ft at 3335.0ft MD (3050.2 TVD, 813.4 N, -957.1 E)									
- Point									

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S	+E/-W		
		(ft)	(ft)	Comment	
3,260.0	2,984.0	789.8	-930.8	Last Cathedral Survey @ 3,260' MD	
3,335.0	3,050.2	813.4	-957.1	Projection to Bit @ 3,335'	

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_