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Azimuths to True North
Magnetic North: 10.22°

Magnetic Field
Strength: 52152.6snT
Dip Angle: 65.83°
Date: 2/5/2013
Model: IGRF2010

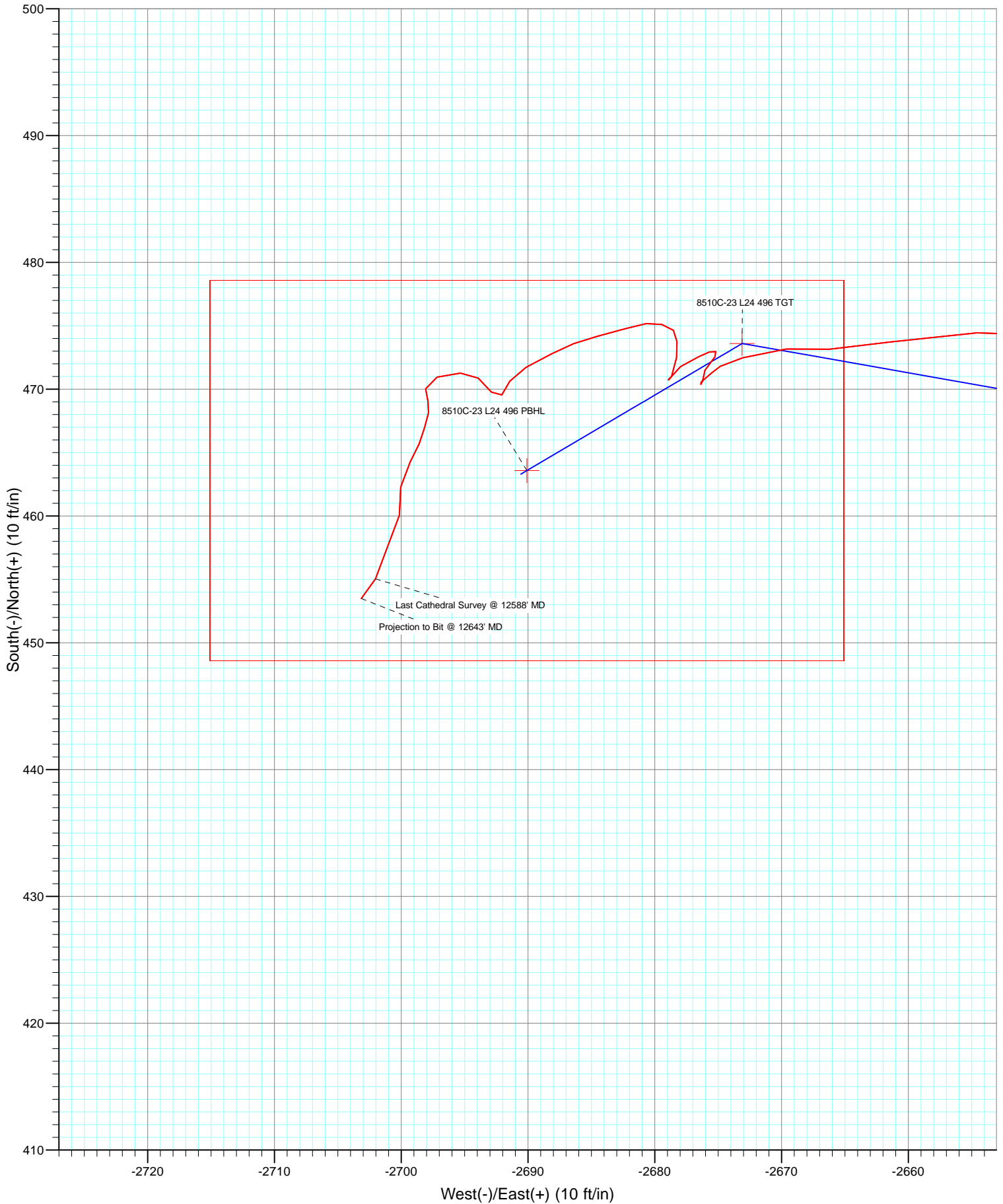
FORMATION TOP DETAILS

No formation data is available

DD
 8510C-23 L24 496 (was 8510A-23)
 125588/193255 (SH) 135071/203455 (MH); SC

KB @ 8208.0ft (Original Well Elev)
 North American Datum 1983
 Well 8510C-23 L24 496 (was 8510A-23), True North

User	Type Target	No Target (Freehand)	Azimuth	Origin Type	N/S	E/W	From TVD
			280.38	Slot	0.0	0.0	0.0
	Name	TVD	+N/-S	+E/-W	Latitude	Longitude	
	8510C-23 L24 496 TGT	8175.0	473.6	-2673.1	39° 41' 10.38 N	108° 7' 58.32 W	
	8510C-23 L24 496 PBHL	12887.0	463.6	-2690.1	39° 41' 10.28 N	108° 7' 58.54 W	





Cathedral Energy Services
Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well 8510C-23 L24 496 (was 8510A-23)
Project:	Story Gulch	TVD Reference:	KB @ 8208.0ft (Original Well Elev)
Site:	L24 496	MD Reference:	KB @ 8208.0ft (Original Well Elev)
Well:	8510C-23 L24 496 (was 8510A-23)	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	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	8510C-23 L24 496 (was 8510A-23)					
Well Position	+N/-S	0.0 ft	Northing:	1,685,022.80 ft	Latitude:	39° 41' 5.70 N
	+E/-W	0.0 ft	Easting:	2,261,778.15 ft	Longitude:	108° 7' 24.13 W
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	8,193.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/5/2013	10.22	65.83	52,153

Design	DD				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:		Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
		0.0	0.0	0.0	280.38

Survey Program	Date	2/18/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
180.0	2,975.0	Survey #1 (DD)	MWD	Geolink MWD	
3,070.0	12,643.0	Survey #2 (DD)	MWD	Geolink MWD	

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	
180.0	0.70	207.20	180.0	-1.0	-0.5	0.3	0.39	0.39	
211.0	1.40	256.20	211.0	-1.2	-1.0	0.7	3.48	2.26	
241.0	1.60	261.10	241.0	-1.4	-1.7	1.4	0.79	0.67	
272.0	2.30	274.70	272.0	-1.4	-2.8	2.5	2.69	2.26	
302.0	3.40	289.00	301.9	-1.1	-4.2	4.0	4.34	3.67	
333.0	4.10	304.40	332.9	-0.1	-6.0	5.9	3.94	2.26	
363.0	5.00	296.40	362.8	1.0	-8.1	8.1	3.66	3.00	
394.0	5.70	306.20	393.6	2.6	-10.5	10.8	3.71	2.26	
424.0	6.70	305.00	423.5	4.4	-13.1	13.7	3.36	3.33	
454.0	7.50	301.90	453.2	6.5	-16.2	17.1	2.96	2.67	
485.0	8.70	302.10	483.9	8.8	-19.9	21.2	3.87	3.87	



Cathedral Energy Services

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Site:	L24 496	MD Reference:	KB @ 8208.0ft (Original Well Elev)
Well:	8510C-23 L24 496 (was 8510A-23)	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
516.0	9.60	300.60	514.5	11.4	-24.2	25.8	3.00	2.90	
552.0	10.50	295.90	550.0	14.3	-29.7	31.8	3.38	2.50	
583.0	10.90	288.90	580.4	16.5	-35.0	37.4	4.38	1.29	
610.0	11.40	286.10	606.9	18.1	-40.0	42.6	2.73	1.85	
641.0	12.10	280.50	637.3	19.5	-46.1	48.9	4.31	2.26	
671.0	13.10	278.00	666.6	20.6	-52.6	55.4	3.80	3.33	
702.0	13.80	277.10	696.7	21.5	-59.7	62.6	2.36	2.26	
748.0	15.50	274.60	741.2	22.7	-71.3	74.2	3.94	3.70	
793.0	17.40	276.50	784.4	23.9	-84.0	86.9	4.39	4.22	
839.0	18.70	278.00	828.1	25.7	-98.1	101.1	3.00	2.83	
885.0	19.70	278.40	871.5	27.9	-113.1	116.3	2.19	2.17	
977.0	21.50	278.40	957.7	32.6	-145.1	148.6	1.96	1.96	
1,068.0	22.10	279.70	1,042.1	37.9	-178.5	182.4	0.85	0.66	
1,160.0	21.50	279.30	1,127.6	43.6	-212.2	216.6	0.67	-0.65	
1,251.0	21.20	278.70	1,212.3	48.8	-244.9	249.7	0.41	-0.33	
1,343.0	20.60	277.10	1,298.3	53.3	-277.4	282.5	0.90	-0.65	
1,435.0	20.70	277.40	1,384.4	57.4	-309.6	314.9	0.16	0.11	
1,526.0	20.20	281.10	1,469.6	62.5	-341.0	346.6	1.52	-0.55	
1,618.0	20.80	283.20	1,555.8	69.2	-372.4	378.8	1.03	0.65	
1,710.0	20.60	282.90	1,641.9	76.6	-404.1	411.3	0.25	-0.22	
1,801.0	20.90	285.10	1,727.0	84.4	-435.4	443.5	0.92	0.33	
1,893.0	20.30	285.20	1,813.1	92.9	-466.6	475.7	0.65	-0.65	
1,984.0	20.60	282.90	1,898.3	100.6	-497.5	507.5	0.94	0.33	
2,076.0	22.40	280.80	1,983.9	107.5	-530.5	541.2	2.13	1.96	
2,168.0	22.00	279.00	2,069.1	113.4	-564.7	575.9	0.86	-0.43	
2,259.0	21.20	277.20	2,153.7	118.2	-597.9	609.4	1.14	-0.88	
2,351.0	20.80	278.20	2,239.6	122.6	-630.6	642.3	0.58	-0.43	
2,442.0	20.70	278.20	2,324.7	127.2	-662.5	674.5	0.11	-0.11	
2,534.0	20.20	277.80	2,410.9	131.7	-694.3	706.7	0.56	-0.54	
2,625.0	21.60	278.70	2,495.9	136.3	-726.4	739.1	1.58	1.54	
2,717.0	21.90	280.10	2,581.4	141.9	-760.0	773.2	0.65	0.33	
2,809.0	20.70	278.40	2,667.1	147.3	-793.0	806.6	1.47	-1.30	
2,900.0	20.70	276.80	2,752.2	151.5	-824.9	838.7	0.62	0.00	
2,975.0	20.50	277.60	2,822.4	154.8	-851.1	865.1	0.46	-0.27	Last Cathedral Survey @ 2975' MD
3,070.0	18.40	275.00	2,912.0	158.4	-882.5	896.6	2.39	-2.21	
3,165.0	18.70	275.80	3,002.1	161.2	-912.6	926.7	0.41	0.32	
3,260.0	17.90	276.00	3,092.3	164.3	-942.3	956.5	0.84	-0.84	
3,355.0	20.60	279.30	3,181.9	168.5	-973.3	987.7	3.06	2.84	
3,451.0	22.00	279.90	3,271.4	174.3	-1,007.7	1,022.6	1.48	1.46	
3,546.0	22.90	281.80	3,359.2	181.1	-1,043.3	1,058.9	1.22	0.95	
3,640.0	21.40	281.20	3,446.2	188.2	-1,078.0	1,094.3	1.61	-1.60	
3,735.0	23.00	283.30	3,534.2	195.9	-1,113.1	1,130.2	1.88	1.68	
3,831.0	20.30	281.10	3,623.4	203.4	-1,147.7	1,165.6	2.94	-2.81	
3,926.0	20.70	281.90	3,712.4	210.0	-1,180.3	1,198.8	0.51	0.42	
4,021.0	21.60	281.20	3,801.0	216.9	-1,213.9	1,233.1	0.98	0.95	
4,116.0	19.90	277.80	3,889.8	222.5	-1,247.1	1,266.7	2.19	-1.79	
4,211.0	18.10	277.60	3,979.7	226.6	-1,277.7	1,297.6	1.90	-1.89	
4,305.0	20.70	277.50	4,068.3	230.7	-1,308.7	1,328.8	2.77	2.77	
4,400.0	22.20	279.90	4,156.7	236.0	-1,343.0	1,363.5	1.83	1.58	
4,495.0	22.90	281.20	4,244.5	242.7	-1,378.8	1,399.9	0.90	0.74	
4,590.0	22.70	282.80	4,332.0	250.3	-1,414.8	1,436.7	0.69	-0.21	
4,685.0	21.40	282.40	4,420.1	258.1	-1,449.6	1,472.4	1.38	-1.37	
4,780.0	20.10	278.70	4,508.9	264.3	-1,482.7	1,506.0	1.94	-1.37	



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well 8510C-23 L24 496 (was 8510A-23)
Project:	Story Gulch	TVD Reference:	KB @ 8208.0ft (Original Well Elev)
Site:	L24 496	MD Reference:	KB @ 8208.0ft (Original Well Elev)
Well:	8510C-23 L24 496 (was 8510A-23)	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
4,875.0	21.80	280.00	4,597.7	269.8	-1,516.2	1,540.0	1.86	1.79	
4,970.0	22.50	282.30	4,685.6	276.8	-1,551.3	1,575.8	1.17	0.74	
5,065.0	20.80	280.00	4,773.9	283.6	-1,585.7	1,610.8	2.00	-1.79	
5,160.0	21.00	279.60	4,862.7	289.3	-1,619.1	1,644.7	0.26	0.21	
5,256.0	22.10	280.10	4,952.0	295.4	-1,653.8	1,680.0	1.16	1.15	
5,351.0	20.00	278.20	5,040.6	300.8	-1,687.5	1,714.1	2.32	-2.21	
5,446.0	21.90	280.10	5,129.4	306.2	-1,721.0	1,748.0	2.12	2.00	
5,541.0	21.30	282.20	5,217.7	313.0	-1,755.3	1,783.0	1.03	-0.63	
5,636.0	21.20	280.10	5,306.2	319.7	-1,789.1	1,817.4	0.81	-0.11	
5,731.0	21.40	279.80	5,394.7	325.6	-1,823.1	1,851.9	0.24	0.21	
5,826.0	20.80	281.40	5,483.4	331.9	-1,856.7	1,886.1	0.88	-0.63	
5,920.0	20.60	279.20	5,571.3	337.8	-1,889.4	1,919.4	0.85	-0.21	
6,016.0	18.90	282.70	5,661.7	344.0	-1,921.2	1,951.8	2.16	-1.77	
6,111.0	19.80	280.10	5,751.3	350.2	-1,952.1	1,983.2	1.31	0.95	
6,206.0	19.40	279.30	5,840.8	355.5	-1,983.5	2,015.1	0.51	-0.42	
6,301.0	19.60	278.60	5,930.3	360.5	-2,014.8	2,046.8	0.32	0.21	
6,396.0	20.10	279.10	6,019.7	365.4	-2,046.7	2,079.1	0.56	0.53	
6,492.0	20.70	278.20	6,109.7	370.5	-2,079.8	2,112.5	0.71	0.62	
6,587.0	21.50	280.90	6,198.3	376.2	-2,113.5	2,146.7	1.32	0.84	
6,682.0	20.60	279.20	6,287.0	382.1	-2,147.1	2,180.8	1.14	-0.95	
6,777.0	19.80	280.30	6,376.1	387.7	-2,179.4	2,213.6	0.93	-0.84	
6,872.0	18.70	285.10	6,465.8	394.5	-2,210.0	2,244.9	2.03	-1.16	
6,967.0	18.50	283.60	6,555.8	402.0	-2,239.3	2,275.1	0.55	-0.21	
7,062.0	18.60	276.80	6,645.9	407.4	-2,269.0	2,305.3	2.28	0.11	
7,157.0	18.60	276.50	6,736.0	410.9	-2,299.1	2,335.5	0.10	0.00	
7,252.0	20.70	278.60	6,825.4	415.1	-2,330.8	2,367.4	2.33	2.21	
7,347.0	22.40	281.80	6,913.8	421.3	-2,365.1	2,402.3	2.17	1.79	
7,442.0	20.40	280.90	7,002.2	428.1	-2,399.1	2,436.9	2.13	-2.11	
7,537.0	21.10	279.90	7,091.1	434.2	-2,432.2	2,470.6	0.83	0.74	
7,633.0	19.90	281.00	7,181.0	440.3	-2,465.2	2,504.2	1.31	-1.25	
7,728.0	19.00	280.80	7,270.6	446.3	-2,496.3	2,535.9	0.95	-0.95	
7,823.0	18.20	282.70	7,360.6	452.4	-2,526.0	2,566.1	1.06	-0.84	
7,918.0	16.70	279.90	7,451.2	458.1	-2,553.9	2,594.6	1.81	-1.58	
8,013.0	14.10	279.80	7,542.8	462.4	-2,578.7	2,619.8	2.74	-2.74	
8,109.0	12.30	280.00	7,636.3	466.1	-2,600.3	2,641.8	1.88	-1.87	
8,204.0	10.10	276.20	7,729.5	468.8	-2,618.6	2,660.2	2.44	-2.32	
8,299.0	8.10	281.10	7,823.3	471.0	-2,633.4	2,675.2	2.26	-2.11	
8,394.0	6.00	282.10	7,917.5	473.3	-2,644.9	2,686.8	2.21	-2.21	
8,506.0	4.10	268.70	8,029.1	474.4	-2,654.6	2,696.6	1.99	-1.70	
8,601.0	4.10	259.30	8,123.9	473.7	-2,661.3	2,703.1	0.71	0.00	
8,696.0	1.90	271.60	8,218.7	473.2	-2,666.2	2,707.8	2.40	-2.32	
8,791.0	2.20	269.00	8,313.7	473.2	-2,669.6	2,711.2	0.33	0.32	
8,886.0	2.10	247.90	8,408.6	472.5	-2,673.1	2,714.4	0.83	-0.11	
8,981.0	0.20	265.10	8,503.6	471.8	-2,674.8	2,716.1	2.01	-2.00	
9,076.0	0.80	224.00	8,598.6	471.3	-2,675.5	2,716.6	0.70	0.63	
9,171.0	0.60	236.80	8,693.6	470.6	-2,676.3	2,717.3	0.27	-0.21	
9,266.0	0.50	77.90	8,788.6	470.4	-2,676.4	2,717.3	1.14	-0.11	
9,361.0	0.40	301.60	8,883.6	470.6	-2,676.2	2,717.2	0.88	-0.11	
9,456.0	1.00	35.30	8,978.5	471.5	-2,676.0	2,717.2	1.16	0.63	
9,551.0	0.60	37.60	9,073.5	472.6	-2,675.2	2,716.6	0.42	-0.42	
9,646.0	0.30	273.00	9,168.5	473.0	-2,675.2	2,716.6	0.85	-0.32	
9,741.0	0.30	258.60	9,263.5	472.9	-2,675.7	2,717.1	0.08	0.00	
9,836.0	0.80	241.50	9,358.5	472.6	-2,676.5	2,717.9	0.55	0.53	



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Site:	L24 496	MD Reference:	KB @ 8208.0ft (Original Well Elev)
Well:	8510C-23 L24 496 (was 8510A-23)	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
9,930.0	1.20	241.50	9,452.5	471.8	-2,678.0	2,719.1	0.43	0.43	
10,026.0	0.70	188.90	9,548.5	470.7	-2,678.9	2,719.9	0.99	-0.52	
10,120.0	1.10	22.10	9,642.5	471.0	-2,678.7	2,719.7	1.90	0.43	
10,215.0	0.80	4.90	9,737.5	472.5	-2,678.3	2,719.6	0.43	-0.32	
10,310.0	0.70	357.90	9,832.5	473.7	-2,678.2	2,719.8	0.14	-0.11	
10,405.0	0.50	321.20	9,927.5	474.6	-2,678.5	2,720.2	0.45	-0.21	
10,500.0	0.80	281.80	10,022.5	475.1	-2,679.4	2,721.2	0.55	0.32	
10,595.0	0.70	263.40	10,117.5	475.2	-2,680.7	2,722.4	0.27	-0.11	
10,690.0	1.30	252.90	10,212.4	474.8	-2,682.3	2,723.9	0.66	0.63	
10,785.0	1.50	256.40	10,307.4	474.2	-2,684.5	2,726.0	0.23	0.21	
10,880.0	0.90	246.80	10,402.4	473.6	-2,686.4	2,727.8	0.66	-0.63	
10,975.0	1.40	244.10	10,497.4	472.8	-2,688.1	2,729.3	0.53	0.53	
11,069.0	1.40	240.10	10,591.4	471.7	-2,690.2	2,731.1	0.10	0.00	
11,164.0	0.70	208.10	10,686.3	470.6	-2,691.4	2,732.2	0.93	-0.74	
11,259.0	0.80	211.60	10,781.3	469.6	-2,692.1	2,732.6	0.12	0.11	
11,354.0	1.10	328.70	10,876.3	469.8	-2,692.9	2,733.4	1.71	0.32	
11,449.0	0.80	300.10	10,971.3	470.9	-2,693.9	2,734.7	0.58	-0.32	
11,544.0	1.00	273.90	11,066.3	471.3	-2,695.3	2,736.1	0.48	0.21	
11,639.0	1.30	250.30	11,161.3	471.0	-2,697.2	2,737.9	0.58	0.32	
11,734.0	0.70	168.40	11,256.3	470.0	-2,698.1	2,738.6	1.46	-0.63	
11,829.0	0.50	171.20	11,351.3	469.0	-2,697.9	2,738.2	0.21	-0.21	
11,924.0	0.60	182.50	11,446.3	468.1	-2,697.8	2,738.0	0.15	0.11	
12,019.0	0.90	202.50	11,541.2	467.0	-2,698.2	2,738.1	0.41	0.32	
12,114.0	0.70	193.80	11,636.2	465.7	-2,698.6	2,738.3	0.25	-0.21	
12,208.0	1.30	213.20	11,730.2	464.3	-2,699.3	2,738.8	0.72	0.64	
12,303.0	1.30	187.90	11,825.2	462.3	-2,700.0	2,739.1	0.60	0.00	
12,398.0	1.40	178.40	11,920.2	460.1	-2,700.1	2,738.9	0.26	0.11	
12,588.0	2.00	215.80	12,110.1	455.0	-2,702.0	2,739.8	0.65	0.32	Last Cathedral Survey @ 12588' MD
12,643.0	2.00	215.80	12,165.1	453.5	-2,703.1	2,740.6	0.00	0.00	Projection to Bit @ 12643' MD



Cathedral Energy Services
Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well 8510C-23 L24 496 (was 8510A-23)
Project:	Story Gulch	TVD Reference:	KB @ 8208.0ft (Original Well Elev)
Site:	L24 496	MD Reference:	KB @ 8208.0ft (Original Well Elev)
Well:	8510C-23 L24 496 (was 8510A-23)	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	Database:	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									
8510C-23 L24 496 PBHI	0.00	0.00	12,887.0	463.6	-2,690.1	1,685,563.86	2,259,102.58	39° 41' 10.28 N	108° 7' 58.54 W
- actual wellpath misses target center by 722.1ft at 12643.0ft MD (12165.1 TVD, 453.5 N, -2703.1 E)									
- Rectangle (sides W30.0 H50.0 D0.0)									
8510C-23 L24 496 TGT	0.00	0.00	8,175.0	473.6	-2,673.1	1,685,573.38	2,259,119.84	39° 41' 10.38 N	108° 7' 58.32 W
- actual wellpath misses target center by 8.7ft at 8652.7ft MD (8175.4 TVD, 473.3 N, -2664.4 E)									
- Point									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
2,975.0	2,822.4	154.8	-851.1	Last Cathedral Survey @ 2975' MD	
12,588.0	12,110.1	455.0	-2,702.0	Last Cathedral Survey @ 12588' MD	
12,643.0	12,165.1	453.5	-2,703.1	Projection to Bit @ 12643' MD	

Checked By: _____ Approved By: _____ Date: _____