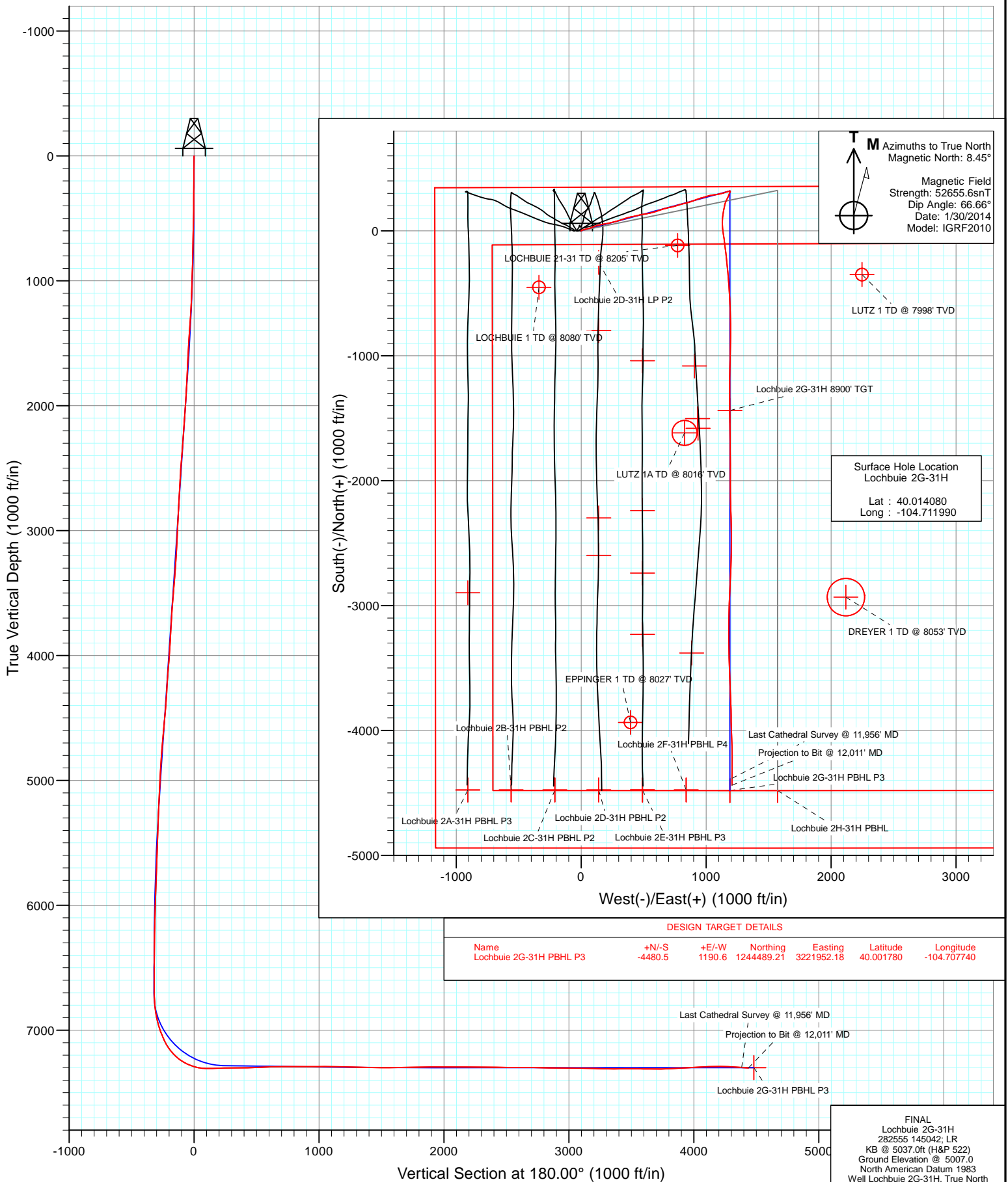




Project: DJ Wattenberg
Site: S31-T1N-R65W (Lochbuie)
Well: Lochbuie 2G-31H
Wellbore: Hz
Design: FINAL





Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Lochbuie 2G-31H
Project:	DJ Wattenberg	TVD Reference:	KB @ 5037.0ft (H&P 522)
Site:	S31-T1N-R65W (Lochbuie)	MD Reference:	KB @ 5037.0ft (H&P 522)
Well:	Lochbuie 2G-31H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Project	DJ Wattenberg		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		S31-T1N-R65W (Lochbuie)			
Site Position:		Northing:	1,248,958.49 ft	Latitude:	40.014080
From:	Lat/Long	Easting:	3,220,662.97 ft	Longitude:	-104.712200
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.51 °

Well	Lochbuie 2G-31H					
Well Position	+N/-S	0.0 ft	Northing:	1,248,958.95 ft	Latitude:	40.014080
	+E/-W	0.0 ft	Easting:	3,220,721.79 ft	Longitude:	-104.711990
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,007.0 ft

Wellbore	Hz				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/30/2014	8.45	66.66	52,656

Design	FINAL				
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	180.00	

Survey Program	Date	2/13/2014			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
167.0	12,011.0	Survey #1 (Hz)	Geolink 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	
167.0	0.40	12.70	167.0	0.6	0.1	-0.6	0.24	0.24	
259.0	0.50	6.10	259.0	1.3	0.2	-1.3	0.12	0.11	
351.0	0.70	54.80	351.0	2.0	0.7	-2.0	0.57	0.22	
444.0	1.60	61.80	444.0	2.9	2.4	-2.9	0.98	0.97	
536.0	2.80	67.80	535.9	4.4	5.6	-4.4	1.33	1.30	
628.0	3.90	63.00	627.7	6.7	10.4	-6.7	1.23	1.20	
719.0	4.40	78.20	718.5	8.8	16.6	-8.8	1.32	0.55	
811.0	4.50	74.40	810.2	10.5	23.5	-10.5	0.34	0.11	
903.0	5.30	72.90	901.9	12.7	31.1	-12.7	0.88	0.87	
995.0	7.00	76.70	993.4	15.2	40.6	-15.2	1.90	1.85	
1,087.0	8.50	76.50	1,084.5	18.1	52.7	-18.1	1.63	1.63	
1,179.0	10.40	74.50	1,175.3	21.9	67.3	-21.9	2.10	2.07	



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Lochbuie 2G-31H
Project:	DJ Wattenberg	TVD Reference:	KB @ 5037.0ft (H&P 522)
Site:	S31-T1N-R65W (Lochbuie)	MD Reference:	KB @ 5037.0ft (H&P 522)
Well:	Lochbuie 2G-31H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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
1,271.0	10.50	70.60	1,265.7	26.9	83.2	-26.9	0.78	0.11	
1,363.0	10.40	69.50	1,356.2	32.6	98.9	-32.6	0.24	-0.11	
1,455.0	11.10	70.10	1,446.6	38.5	115.0	-38.5	0.77	0.76	
1,548.0	12.10	73.50	1,537.7	44.4	132.7	-44.4	1.30	1.08	
1,643.0	14.50	81.00	1,630.2	49.0	154.0	-49.0	3.11	2.53	
1,737.0	14.70	79.70	1,721.1	53.0	177.4	-53.0	0.41	0.21	
1,832.0	15.00	78.00	1,812.9	57.7	201.3	-57.7	0.56	0.32	
1,926.0	15.30	78.00	1,903.7	62.8	225.3	-62.8	0.32	0.32	
2,021.0	15.30	76.60	1,995.3	68.4	249.8	-68.4	0.39	0.00	
2,115.0	14.50	74.00	2,086.2	74.5	273.1	-74.5	1.11	-0.85	
2,210.0	14.40	73.70	2,178.1	81.1	295.9	-81.1	0.13	-0.11	
2,304.0	13.90	72.40	2,269.3	87.8	317.9	-87.8	0.63	-0.53	
2,399.0	13.30	70.20	2,361.6	94.9	339.0	-94.9	0.83	-0.63	
2,494.0	13.40	72.10	2,454.1	102.0	359.8	-102.0	0.47	0.11	
2,588.0	15.70	78.20	2,545.1	107.9	382.6	-107.9	2.94	2.45	
2,683.0	14.60	78.20	2,636.7	113.0	406.9	-113.0	1.16	-1.16	
2,778.0	13.30	75.10	2,728.9	118.3	429.2	-118.3	1.58	-1.37	
2,872.0	14.80	78.70	2,820.1	123.4	451.4	-123.4	1.85	1.60	
2,967.0	14.00	77.90	2,912.1	128.2	474.6	-128.2	0.87	-0.84	
3,062.0	15.80	82.10	3,004.0	132.4	498.6	-132.4	2.21	1.89	
3,156.0	14.90	79.30	3,094.6	136.4	523.2	-136.4	1.24	-0.96	
3,251.0	15.70	77.70	3,186.2	141.4	547.7	-141.4	0.95	0.84	
3,345.0	15.10	74.90	3,276.9	147.3	572.0	-147.3	1.02	-0.64	
3,440.0	14.80	72.10	3,368.6	154.2	595.5	-154.2	0.82	-0.32	
3,534.0	14.40	70.70	3,459.6	161.8	617.9	-161.8	0.57	-0.43	
3,629.0	13.70	71.20	3,551.8	169.3	639.7	-169.3	0.75	-0.74	
3,724.0	14.00	73.50	3,644.0	176.2	661.4	-176.2	0.66	0.32	
3,818.0	13.70	77.40	3,735.3	181.9	683.2	-181.9	1.04	-0.32	
3,913.0	13.80	76.00	3,827.6	187.1	705.1	-187.1	0.37	0.11	
4,007.0	15.60	78.40	3,918.5	192.3	728.4	-192.3	2.02	1.91	
4,102.0	15.00	74.60	4,010.1	198.2	752.8	-198.2	1.23	-0.63	
4,197.0	13.50	70.00	4,102.2	205.2	775.0	-205.2	1.98	-1.58	
4,291.0	13.80	73.60	4,193.5	212.1	796.1	-212.1	0.96	0.32	
4,386.0	14.90	78.10	4,285.6	217.9	818.9	-217.9	1.65	1.16	
4,480.0	16.30	74.00	4,376.1	224.0	843.4	-224.0	1.89	1.49	
4,575.0	16.30	73.80	4,467.3	231.4	869.0	-231.4	0.06	0.00	
4,670.0	14.90	70.30	4,558.8	239.2	893.4	-239.2	1.78	-1.47	
4,764.0	14.40	70.60	4,649.7	247.2	915.8	-247.2	0.54	-0.53	
4,859.0	13.70	67.50	4,741.9	255.4	937.3	-255.4	1.08	-0.74	
4,953.0	12.50	75.40	4,833.4	262.2	957.4	-262.2	2.29	-1.28	
5,048.0	11.60	73.20	4,926.4	267.6	976.5	-267.6	1.06	-0.95	
5,142.0	11.20	74.70	5,018.5	272.7	994.4	-272.7	0.53	-0.43	
5,237.0	10.50	73.70	5,111.8	277.6	1,011.6	-277.6	0.76	-0.74	
5,331.0	9.90	73.10	5,204.3	282.3	1,027.5	-282.3	0.65	-0.64	
5,426.0	13.60	82.50	5,297.3	286.2	1,046.4	-286.2	4.37	3.89	
5,521.0	12.30	82.30	5,389.9	289.0	1,067.5	-289.0	1.37	-1.37	
5,615.0	11.50	80.40	5,481.9	291.9	1,086.7	-291.9	0.95	-0.85	
5,710.0	10.60	80.30	5,575.1	294.9	1,104.6	-294.9	0.95	-0.95	
5,804.0	9.10	76.00	5,667.7	298.2	1,120.4	-298.2	1.78	-1.60	
5,899.0	7.60	72.80	5,761.7	301.9	1,133.7	-301.9	1.65	-1.58	
5,993.0	6.40	72.20	5,855.0	305.3	1,144.6	-305.3	1.28	-1.28	
6,088.0	5.30	72.60	5,949.5	308.2	1,153.8	-308.2	1.16	-1.16	
6,183.0	4.60	68.60	6,044.2	310.9	1,161.6	-310.9	0.82	-0.74	



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Lochbuie 2G-31H
Project:	DJ Wattenberg	TVD Reference:	KB @ 5037.0ft (H&P 522)
Site:	S31-T1N-R65W (Lochbuie)	MD Reference:	KB @ 5037.0ft (H&P 522)
Well:	Lochbuie 2G-31H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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
6,277.0	4.00	70.10	6,137.9	313.4	1,168.1	-313.4	0.65	-0.64	
6,372.0	3.90	76.20	6,232.7	315.3	1,174.4	-315.3	0.45	-0.11	
6,466.0	3.40	77.90	6,326.5	316.7	1,180.2	-316.7	0.54	-0.53	
6,561.0	2.90	79.70	6,421.3	317.7	1,185.3	-317.7	0.54	-0.53	
6,656.0	2.10	81.40	6,516.2	318.4	1,189.4	-318.4	0.85	-0.84	
6,750.0	1.10	74.20	6,610.2	318.9	1,192.0	-318.9	1.08	-1.06	
6,845.0	1.00	149.20	6,705.2	318.4	1,193.3	-318.4	1.35	-0.11	
6,876.0	1.90	177.10	6,736.2	317.7	1,193.5	-317.7	3.61	2.90	
6,940.0	5.10	202.80	6,800.1	314.0	1,192.4	-314.0	5.45	5.00	
6,987.0	9.40	202.80	6,846.7	308.5	1,190.1	-308.5	9.15	9.15	
7,035.0	12.40	200.00	6,893.8	300.1	1,186.8	-300.1	6.34	6.25	
7,082.0	15.90	201.30	6,939.4	289.3	1,182.8	-289.3	7.48	7.45	
7,129.0	19.00	203.30	6,984.2	276.3	1,177.4	-276.3	6.72	6.60	
7,161.0	22.00	204.10	7,014.2	266.0	1,172.9	-266.0	9.42	9.37	
7,192.0	24.40	205.90	7,042.7	255.0	1,167.7	-255.0	8.07	7.74	
7,225.0	26.60	205.90	7,072.5	242.2	1,161.5	-242.2	6.67	6.67	
7,256.0	28.60	201.00	7,099.9	229.0	1,155.8	-229.0	9.75	6.45	
7,288.0	32.80	195.40	7,127.5	213.5	1,150.8	-213.5	15.87	13.12	
7,319.0	37.80	191.00	7,152.7	196.1	1,146.7	-196.1	18.09	16.13	
7,351.0	41.70	191.00	7,177.3	176.0	1,142.8	-176.0	12.19	12.19	
7,382.0	44.50	190.60	7,200.0	155.2	1,138.9	-155.2	9.08	9.03	
7,414.0	49.50	188.20	7,221.8	132.1	1,135.1	-132.1	16.56	15.62	
7,446.0	55.40	186.00	7,241.3	107.0	1,132.0	-107.0	19.22	18.44	
7,477.0	60.80	183.30	7,257.7	80.7	1,129.8	-80.7	18.92	17.42	
7,509.0	64.80	178.60	7,272.3	52.3	1,129.4	-52.3	18.08	12.50	
7,540.0	69.20	174.10	7,284.4	23.8	1,131.2	-23.8	19.49	14.19	
7,572.0	74.70	171.50	7,294.3	-6.3	1,135.0	6.3	18.84	17.19	
7,603.0	80.00	171.30	7,301.1	-36.2	1,139.6	36.2	17.11	17.10	
7,635.0	85.80	172.20	7,305.1	-67.6	1,144.1	67.6	18.34	18.12	
7,716.0	92.20	174.20	7,306.5	-148.0	1,153.7	148.0	8.28	7.90	
7,811.0	91.30	173.60	7,303.6	-242.4	1,163.8	242.4	1.14	-0.95	
7,905.0	89.70	174.00	7,302.8	-335.9	1,173.9	335.9	1.75	-1.70	
8,000.0	91.90	175.80	7,301.4	-430.5	1,182.4	430.5	2.99	2.32	
8,094.0	92.00	177.20	7,298.2	-524.3	1,188.1	524.3	1.49	0.11	
8,189.0	91.90	178.70	7,295.0	-619.1	1,191.5	619.1	1.58	-0.11	
8,283.0	90.60	178.90	7,292.9	-713.1	1,193.5	713.1	1.40	-1.38	
8,378.0	90.50	179.10	7,292.0	-808.1	1,195.1	808.1	0.24	-0.11	
8,472.0	89.50	181.30	7,292.0	-902.1	1,194.8	902.1	2.57	-1.06	
8,567.0	90.50	181.10	7,292.0	-997.0	1,192.8	997.0	1.07	1.05	
8,662.0	89.30	181.90	7,292.2	-1,092.0	1,190.3	1,092.0	1.52	-1.26	
8,756.0	88.10	180.10	7,294.3	-1,186.0	1,188.7	1,186.0	2.30	-1.28	
8,851.0	89.00	180.20	7,296.7	-1,280.9	1,188.4	1,280.9	0.95	0.95	
8,945.0	88.40	179.30	7,298.9	-1,374.9	1,188.9	1,374.9	1.15	-0.64	
9,008.2	89.00	179.43	7,300.3	-1,438.1	1,189.6	1,438.1	0.97	0.95	Lochbuie 2G-31H 8900' TGT
9,040.0	89.30	179.50	7,300.8	-1,469.9	1,189.9	1,469.9	0.97	0.95	
9,134.0	90.70	179.30	7,300.8	-1,563.9	1,190.8	1,563.9	1.50	1.49	
9,229.0	91.20	179.30	7,299.2	-1,658.8	1,192.0	1,658.8	0.53	0.53	
9,323.0	91.20	179.30	7,297.2	-1,752.8	1,193.1	1,752.8	0.00	0.00	
9,418.0	90.20	180.50	7,296.1	-1,847.8	1,193.3	1,847.8	1.64	-1.05	
9,513.0	90.60	180.10	7,295.4	-1,942.8	1,192.8	1,942.8	0.60	0.42	
9,607.0	90.40	179.40	7,294.6	-2,036.8	1,193.2	2,036.8	0.77	-0.21	
9,702.0	88.70	179.00	7,295.3	-2,131.8	1,194.6	2,131.8	1.84	-1.79	
9,796.0	89.70	178.40	7,296.6	-2,225.7	1,196.7	2,225.7	1.24	1.06	



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Lochbuie 2G-31H
Project:	DJ Wattenberg	TVD Reference:	KB @ 5037.0ft (H&P 522)
Site:	S31-T1N-R65W (Lochbuie)	MD Reference:	KB @ 5037.0ft (H&P 522)
Well:	Lochbuie 2G-31H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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
9,891.0	89.90	177.60	7,297.0	-2,320.7	1,200.0	2,320.7	0.87	0.21	
9,986.0	89.00	179.00	7,297.9	-2,415.6	1,202.8	2,415.6	1.75	-0.95	
10,080.0	89.50	181.60	7,299.1	-2,509.6	1,202.3	2,509.6	2.82	0.53	
10,175.0	90.20	180.70	7,299.4	-2,604.6	1,200.4	2,604.6	1.20	0.74	
10,269.0	89.30	182.00	7,299.8	-2,698.6	1,198.2	2,698.6	1.68	-0.96	
10,364.0	88.60	183.10	7,301.5	-2,793.5	1,194.0	2,793.5	1.37	-0.74	
10,459.0	89.50	182.60	7,303.1	-2,888.3	1,189.3	2,888.3	1.08	0.95	
10,553.0	90.00	182.20	7,303.5	-2,982.2	1,185.3	2,982.2	0.68	0.53	
10,648.0	88.20	181.30	7,305.0	-3,077.2	1,182.4	3,077.2	2.12	-1.89	
10,742.0	88.50	179.70	7,307.7	-3,171.1	1,181.6	3,171.1	1.73	0.32	
10,837.0	88.90	180.00	7,309.9	-3,266.1	1,181.8	3,266.1	0.53	0.42	
10,931.0	90.40	179.10	7,310.4	-3,360.1	1,182.6	3,360.1	1.86	1.60	
11,026.0	90.20	178.10	7,309.9	-3,455.1	1,184.9	3,455.1	1.07	-0.21	
11,121.0	89.90	177.80	7,309.9	-3,550.0	1,188.3	3,550.0	0.45	-0.32	
11,215.0	88.70	177.80	7,311.0	-3,643.9	1,191.9	3,643.9	1.28	-1.28	
11,310.0	90.90	177.60	7,311.3	-3,738.9	1,195.7	3,738.9	2.33	2.32	
11,404.0	93.20	178.40	7,308.0	-3,832.7	1,199.0	3,832.7	2.59	2.45	
11,499.0	93.30	179.60	7,302.6	-3,927.6	1,200.7	3,927.6	1.27	0.11	
11,593.0	93.10	177.60	7,297.3	-4,021.4	1,203.0	4,021.4	2.13	-0.21	
11,688.0	93.10	178.30	7,292.2	-4,116.2	1,206.3	4,116.2	0.74	0.00	
11,783.0	89.00	179.60	7,290.5	-4,211.1	1,208.1	4,211.1	4.53	-4.32	
11,877.0	86.50	180.80	7,294.1	-4,305.0	1,207.8	4,305.0	2.95	-2.66	
11,956.0	86.30	180.70	7,299.1	-4,383.9	1,206.7	4,383.9	0.28	-0.25	Last Cathedral Survey @ 11,956' MD
12,011.0	86.30	180.70	7,302.7	-4,438.8	1,206.1	4,438.8	0.00	0.00	Projection to Bit @ 12,011' MD - Lochbuie 2G-31

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Lochbuie 2G-31H PBHL	0.00	0.00	7,300.0	-4,480.5	1,190.6	1,244,489.21	3,221,952.18	40.001780	-104.707740
- survey misses target center by 44.6ft at 12011.0ft MD (7302.7 TVD, -4438.8 N, 1206.1 E)									
- Point									
Lochbuie 2G-31H PBHL	0.00	0.00	7,267.0	-4,480.5	1,190.6	1,244,489.21	3,221,952.18	40.001780	-104.707740
- survey misses target center by 57.0ft at 12011.0ft MD (7302.7 TVD, -4438.8 N, 1206.1 E)									
- Point									
Lochbuie 2G-31H 8900'	0.00	0.00	7,300.0	-1,438.1	1,190.6	1,247,531.51	3,221,925.15	40.010132	-104.707739
- survey misses target center by 1.1ft at 9008.2ft MD (7300.3 TVD, -1438.1 N, 1189.6 E)									
- Point									

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
11,956.0	7,299.1	-4,383.9	1,206.7	Last Cathedral Survey @ 11,956' MD
12,011.0	7,302.7	-4,438.8	1,206.1	Projection to Bit @ 12,011' MD

Checked By: _____ Approved By: _____ Date: _____



EnCana Oil & Gas (USA) Inc

**DJ Wattenberg
S31-T1N-R65W (Lochbuie)
Lochbuie 2G-31H**

Hz

Survey: Survey #1

Survey Report - Geographic

13 February, 2014



Cathedral Energy Services

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Lochbuie 2G-31H
Project:	DJ Wattenberg	TVD Reference:	KB @ 5037.0ft (H&P 522)
Site:	S31-T1N-R65W (Lochbuie)	MD Reference:	KB @ 5037.0ft (H&P 522)
Well:	Lochbuie 2G-31H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Project	DJ Wattenberg		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site	S31-T1N-R65W (Lochbuie)				
Site Position:		Northing:	1,248,958.49 ft	Latitude:	40.014080
From:	Lat/Long	Easting:	3,220,662.97 ft	Longitude:	-104.712200
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.51 °

Well	Lochbuie 2G-31H					
Well Position	+N/-S	0.0 ft	Northing:	1,248,958.94 ft	Latitude:	40.014080
	+E/-W	0.0 ft	Easting:	3,220,721.79 ft	Longitude:	-104.711990
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,007.0 ft

Wellbore	Hz				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/30/2014	8.45	66.66	52,656

Design	FINAL				
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	180.00	

Survey Program	Date	2/13/2014			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
167.0	12,011.0	Survey #1 (Hz)	Geolink MWD	Geolink MWD	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude	
0.0	0.00	0.00	0.0	0.0	0.0	1,248,958.94	3,220,721.79	40.014080	-104.711990	
167.0	0.40	12.70	167.0	0.6	0.1	1,248,959.51	3,220,721.91	40.014081	-104.711990	
259.0	0.50	6.10	259.0	1.3	0.2	1,248,960.23	3,220,722.02	40.014083	-104.711989	
351.0	0.70	54.80	351.0	2.0	0.7	1,248,960.96	3,220,722.52	40.014085	-104.711988	
444.0	1.60	61.80	444.0	2.9	2.4	1,248,961.91	3,220,724.12	40.014088	-104.711982	
536.0	2.80	67.80	535.9	4.4	5.6	1,248,963.39	3,220,727.32	40.014092	-104.711970	
628.0	3.90	63.00	627.7	6.7	10.4	1,248,965.71	3,220,732.16	40.014098	-104.711953	
719.0	4.40	78.20	718.5	8.8	16.6	1,248,967.88	3,220,738.32	40.014104	-104.711931	
811.0	4.50	74.40	810.2	10.5	23.5	1,248,969.64	3,220,745.24	40.014109	-104.711906	
903.0	5.30	72.90	901.9	12.7	31.1	1,248,971.92	3,220,752.75	40.014115	-104.711879	
995.0	7.00	76.70	993.4	15.2	40.6	1,248,974.55	3,220,762.25	40.014122	-104.711845	
1,087.0	8.50	76.50	1,084.5	18.1	52.7	1,248,977.53	3,220,774.29	40.014130	-104.711802	



Cathedral Energy Services

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Lochbuie 2G-31H
Project:	DJ Wattenberg	TVD Reference:	KB @ 5037.0ft (H&P 522)
Site:	S31-T1N-R65W (Lochbuie)	MD Reference:	KB @ 5037.0ft (H&P 522)
Well:	Lochbuie 2G-31H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
1,179.0	10.40	74.50	1,175.3	21.9	67.3	1,248,981.47	3,220,788.87	40.014140	-104.711750
1,271.0	10.50	70.60	1,265.7	26.9	83.2	1,248,986.61	3,220,804.73	40.014154	-104.711693
1,363.0	10.40	69.50	1,356.2	32.6	98.9	1,248,992.44	3,220,820.37	40.014169	-104.711637
1,455.0	11.10	70.10	1,446.6	38.5	115.0	1,248,998.51	3,220,836.42	40.014186	-104.711580
1,548.0	12.10	73.50	1,537.7	44.4	132.7	1,249,004.48	3,220,854.13	40.014202	-104.711516
1,643.0	14.50	81.00	1,630.2	49.0	154.0	1,249,009.36	3,220,875.39	40.014215	-104.711440
1,737.0	14.70	79.70	1,721.1	53.0	177.4	1,249,013.54	3,220,898.71	40.014225	-104.711357
1,832.0	15.00	78.00	1,812.9	57.7	201.3	1,249,018.46	3,220,922.55	40.014238	-104.711272
1,926.0	15.30	78.00	1,903.7	62.8	225.3	1,249,023.79	3,220,946.53	40.014252	-104.711186
2,021.0	15.30	76.60	1,995.3	68.4	249.8	1,249,029.51	3,220,970.94	40.014268	-104.711099
2,115.0	14.50	74.00	2,086.2	74.5	273.1	1,249,035.84	3,220,994.26	40.014284	-104.711015
2,210.0	14.40	73.70	2,178.1	81.1	295.9	1,249,042.63	3,221,016.97	40.014302	-104.710934
2,304.0	13.90	72.40	2,269.3	87.8	317.9	1,249,049.52	3,221,038.89	40.014321	-104.710855
2,399.0	13.30	70.20	2,361.6	94.9	339.0	1,249,056.86	3,221,059.98	40.014340	-104.710780
2,494.0	13.40	72.10	2,454.1	102.0	359.8	1,249,064.13	3,221,080.68	40.014360	-104.710706
2,588.0	15.70	78.20	2,545.1	107.9	382.6	1,249,070.29	3,221,103.44	40.014376	-104.710624
2,683.0	14.60	78.20	2,636.7	113.0	406.9	1,249,075.58	3,221,127.70	40.014390	-104.710537
2,778.0	13.30	75.10	2,728.9	118.3	429.2	1,249,081.03	3,221,149.93	40.014405	-104.710458
2,872.0	14.80	78.70	2,820.1	123.4	451.4	1,249,086.36	3,221,172.11	40.014419	-104.710379
2,967.0	14.00	77.90	2,912.1	128.2	474.6	1,249,091.36	3,221,195.20	40.014432	-104.710296
3,062.0	15.80	82.10	3,004.0	132.4	498.6	1,249,095.76	3,221,219.21	40.014443	-104.710210
3,156.0	14.90	79.30	3,094.6	136.4	523.2	1,249,099.98	3,221,243.73	40.014454	-104.710122
3,251.0	15.70	77.70	3,186.2	141.4	547.7	1,249,105.20	3,221,268.24	40.014468	-104.710035
3,345.0	15.10	74.90	3,276.9	147.3	572.0	1,249,111.32	3,221,292.44	40.014484	-104.709948
3,440.0	14.80	72.10	3,368.6	154.2	595.5	1,249,118.48	3,221,315.87	40.014503	-104.709864
3,534.0	14.40	70.70	3,459.6	161.8	617.9	1,249,126.23	3,221,338.26	40.014524	-104.709784
3,629.0	13.70	71.20	3,551.8	169.3	639.7	1,249,133.95	3,221,359.99	40.014545	-104.709706
3,724.0	14.00	73.50	3,644.0	176.2	661.4	1,249,141.04	3,221,381.59	40.014564	-104.709629
3,818.0	13.70	77.40	3,735.3	181.9	683.2	1,249,146.89	3,221,403.31	40.014579	-104.709551
3,913.0	13.80	76.00	3,827.6	187.1	705.1	1,249,152.28	3,221,425.23	40.014593	-104.709473
4,007.0	15.60	78.40	3,918.5	192.3	728.4	1,249,157.74	3,221,448.45	40.014608	-104.709390
4,102.0	15.00	74.60	4,010.1	198.2	752.8	1,249,163.79	3,221,472.76	40.014624	-104.709303
4,197.0	13.50	70.00	4,102.2	205.2	775.0	1,249,171.04	3,221,494.97	40.014643	-104.709223
4,291.0	13.80	73.60	4,193.5	212.1	796.1	1,249,178.15	3,221,515.98	40.014662	-104.709148
4,386.0	14.90	78.10	4,285.6	217.9	818.9	1,249,184.07	3,221,538.75	40.014678	-104.709067
4,480.0	16.30	74.00	4,376.1	224.0	843.4	1,249,190.41	3,221,563.20	40.014695	-104.708979
4,575.0	16.30	73.80	4,467.3	231.4	869.0	1,249,198.04	3,221,588.75	40.014715	-104.708888
4,670.0	14.90	70.30	4,558.8	239.2	893.4	1,249,206.09	3,221,612.98	40.014737	-104.708801
4,764.0	14.40	70.60	4,649.7	247.2	915.8	1,249,214.24	3,221,635.31	40.014758	-104.708721
4,859.0	13.70	67.50	4,741.9	255.4	937.3	1,249,222.66	3,221,656.77	40.014781	-104.708644
4,953.0	12.50	75.40	4,833.4	262.2	957.4	1,249,229.67	3,221,676.84	40.014800	-104.708572
5,048.0	11.60	73.20	4,926.4	267.6	976.5	1,249,235.19	3,221,695.89	40.014814	-104.708504
5,142.0	11.20	74.70	5,018.5	272.7	994.4	1,249,240.49	3,221,713.69	40.014829	-104.708440
5,237.0	10.50	73.70	5,111.8	277.6	1,011.6	1,249,245.50	3,221,730.86	40.014842	-104.708379
5,331.0	9.90	73.10	5,204.3	282.3	1,027.5	1,249,250.40	3,221,746.77	40.014855	-104.708322
5,426.0	13.60	82.50	5,297.3	286.2	1,046.4	1,249,254.40	3,221,765.63	40.014865	-104.708254
5,521.0	12.30	82.30	5,389.9	289.0	1,067.5	1,249,257.40	3,221,786.70	40.014873	-104.708179
5,615.0	11.50	80.40	5,481.9	291.9	1,086.7	1,249,260.48	3,221,805.84	40.014881	-104.708111
5,710.0	10.60	80.30	5,575.1	294.9	1,104.6	1,249,263.69	3,221,823.76	40.014890	-104.708046
5,804.0	9.10	76.00	5,667.7	298.2	1,120.4	1,249,267.08	3,221,839.47	40.014898	-104.707990
5,899.0	7.60	72.80	5,761.7	301.9	1,133.7	1,249,270.87	3,221,852.73	40.014909	-104.707943
5,993.0	6.40	72.20	5,855.0	305.3	1,144.6	1,249,274.41	3,221,863.62	40.014918	-104.707904
6,088.0	5.30	72.60	5,949.5	308.2	1,153.8	1,249,277.42	3,221,872.82	40.014926	-104.707871
6,183.0	4.60	68.60	6,044.2	310.9	1,161.6	1,249,280.19	3,221,880.53	40.014933	-104.707843
6,277.0	4.00	70.10	6,137.9	313.4	1,168.1	1,249,282.74	3,221,887.10	40.014940	-104.707820



Cathedral Energy Services

Survey Report - Geographic

Company: EnCana Oil & Gas (USA) Inc
Project: DJ Wattenberg
Site: S31-T1N-R65W (Lochbuie)
Well: Lochbuie 2G-31H
Wellbore: Hz
Design: FINAL

Local Co-ordinate Reference: Well Lochbuie 2G-31H
TVD Reference: KB @ 5037.0ft (H&P 522)
MD Reference: KB @ 5037.0ft (H&P 522)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: USA EDM 5000 Multi Users DB

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
6,372.0	3.90	76.20	6,232.7	315.3	1,174.4	1,249,284.70	3,221,893.34	40.014945	-104.707797
6,466.0	3.40	77.90	6,326.5	316.7	1,180.2	1,249,286.10	3,221,899.16	40.014949	-104.707777
6,561.0	2.90	79.70	6,421.3	317.7	1,185.3	1,249,287.16	3,221,904.27	40.014952	-104.707758
6,656.0	2.10	81.40	6,516.2	318.4	1,189.4	1,249,287.89	3,221,908.35	40.014954	-104.707744
6,750.0	1.10	74.20	6,610.2	318.9	1,192.0	1,249,288.42	3,221,910.91	40.014955	-104.707735
6,845.0	1.00	149.20	6,705.2	318.4	1,193.3	1,249,287.96	3,221,912.22	40.014954	-104.707730
6,876.0	1.90	177.10	6,736.2	317.7	1,193.5	1,249,287.22	3,221,912.39	40.014952	-104.707729
6,940.0	5.10	202.80	6,800.1	314.0	1,192.4	1,249,283.53	3,221,911.37	40.014942	-104.707733
6,987.0	9.40	202.80	6,846.7	308.5	1,190.1	1,249,278.04	3,221,909.12	40.014927	-104.707741
7,035.0	12.40	200.00	6,893.8	300.1	1,186.8	1,249,269.55	3,221,905.92	40.014904	-104.707753
7,082.0	15.90	201.30	6,939.4	289.3	1,182.8	1,249,258.77	3,221,901.95	40.014874	-104.707767
7,129.0	19.00	203.30	6,984.2	276.3	1,177.4	1,249,245.70	3,221,896.70	40.014838	-104.707787
7,161.0	22.00	204.10	7,014.2	266.0	1,172.9	1,249,235.40	3,221,892.28	40.014810	-104.707803
7,192.0	24.40	205.90	7,042.7	255.0	1,167.7	1,249,224.29	3,221,887.21	40.014780	-104.707821
7,225.0	26.60	205.90	7,072.5	242.2	1,161.5	1,249,211.46	3,221,881.12	40.014745	-104.707843
7,256.0	28.60	201.00	7,099.9	229.0	1,155.8	1,249,198.23	3,221,875.54	40.014709	-104.707864
7,288.0	32.80	195.40	7,127.5	213.5	1,150.8	1,249,182.67	3,221,870.63	40.014666	-104.707882
7,319.0	37.80	191.00	7,152.7	196.1	1,146.7	1,249,165.20	3,221,866.74	40.014618	-104.707896
7,351.0	41.70	191.00	7,177.3	176.0	1,142.8	1,249,145.10	3,221,863.02	40.014563	-104.707910
7,382.0	44.50	190.60	7,200.0	155.2	1,138.9	1,249,124.26	3,221,859.24	40.014506	-104.707924
7,414.0	49.50	188.20	7,221.8	132.1	1,135.1	1,249,101.14	3,221,855.64	40.014443	-104.707938
7,446.0	55.40	186.00	7,241.3	107.0	1,132.0	1,249,075.95	3,221,852.75	40.014373	-104.707949
7,477.0	60.80	183.30	7,257.7	80.7	1,129.8	1,249,049.72	3,221,850.87	40.014301	-104.707957
7,509.0	64.80	178.60	7,272.3	52.3	1,129.4	1,249,021.27	3,221,850.67	40.014223	-104.707958
7,540.0	69.20	174.10	7,284.4	23.8	1,131.2	1,248,992.83	3,221,852.76	40.014145	-104.707952
7,572.0	74.70	171.50	7,294.3	-6.3	1,135.0	1,248,962.69	3,221,856.85	40.014062	-104.707938
7,603.0	80.00	171.30	7,301.1	-36.2	1,139.6	1,248,932.84	3,221,861.63	40.013980	-104.707922
7,635.0	85.80	172.20	7,305.1	-67.6	1,144.1	1,248,901.47	3,221,866.47	40.013894	-104.707906
7,716.0	92.20	174.20	7,306.5	-148.0	1,153.7	1,248,821.18	3,221,876.76	40.013674	-104.707871
7,811.0	91.30	173.60	7,303.6	-242.4	1,163.8	1,248,726.86	3,221,887.69	40.013414	-104.707835
7,905.0	89.70	174.00	7,302.8	-335.9	1,173.9	1,248,633.51	3,221,898.67	40.013158	-104.707799
8,000.0	91.90	175.80	7,301.4	-430.5	1,182.4	1,248,538.99	3,221,907.96	40.012898	-104.707769
8,094.0	92.00	177.20	7,298.2	-524.3	1,188.1	1,248,445.27	3,221,914.52	40.012641	-104.707749
8,189.0	91.90	178.70	7,295.0	-619.1	1,191.5	1,248,350.43	3,221,918.76	40.012380	-104.707736
8,283.0	90.60	178.90	7,292.9	-713.1	1,193.5	1,248,256.49	3,221,921.57	40.012122	-104.707729
8,378.0	90.50	179.10	7,292.0	-808.1	1,195.1	1,248,161.53	3,221,924.07	40.011862	-104.707724
8,472.0	89.50	181.30	7,292.0	-902.1	1,194.8	1,248,067.54	3,221,924.58	40.011604	-104.707725
8,567.0	90.50	181.10	7,292.0	-997.0	1,192.8	1,247,972.55	3,221,923.43	40.011343	-104.707732
8,662.0	89.30	181.90	7,292.2	-1,092.0	1,190.3	1,247,877.56	3,221,921.79	40.011082	-104.707741
8,756.0	88.10	180.10	7,294.3	-1,186.0	1,188.7	1,247,783.60	3,221,920.98	40.010824	-104.707747
8,851.0	89.00	180.20	7,296.7	-1,280.9	1,188.4	1,247,688.63	3,221,921.58	40.010563	-104.707747
8,945.0	88.40	179.30	7,298.9	-1,374.9	1,188.9	1,247,594.66	3,221,922.82	40.010305	-104.707746
9,008.2	89.00	179.43	7,300.3	-1,438.1	1,189.6	1,247,531.50	3,221,924.08	40.010132	-104.707744
Lochbuie 2G-31H 8900' TGT									
9,040.0	89.30	179.50	7,300.8	-1,469.9	1,189.9	1,247,499.70	3,221,924.66	40.010045	-104.707742
9,134.0	90.70	179.30	7,300.8	-1,563.9	1,190.8	1,247,405.72	3,221,926.48	40.009787	-104.707739
9,229.0	91.20	179.30	7,299.2	-1,658.8	1,192.0	1,247,310.75	3,221,928.49	40.009526	-104.707735
9,323.0	91.20	179.30	7,297.2	-1,752.8	1,193.1	1,247,216.80	3,221,930.47	40.009268	-104.707731
9,418.0	90.20	180.50	7,296.1	-1,847.8	1,193.3	1,247,121.81	3,221,931.48	40.009007	-104.707730
9,513.0	90.60	180.10	7,295.4	-1,942.8	1,192.8	1,247,026.82	3,221,931.82	40.008746	-104.707732
9,607.0	90.40	179.40	7,294.6	-2,036.8	1,193.2	1,246,932.83	3,221,933.07	40.008488	-104.707731
9,702.0	88.70	179.00	7,295.3	-2,131.8	1,194.6	1,246,837.86	3,221,935.24	40.008228	-104.707726
9,796.0	89.70	178.40	7,296.6	-2,225.7	1,196.7	1,246,743.92	3,221,938.21	40.007970	-104.707718
9,891.0	89.90	177.60	7,297.0	-2,320.7	1,200.0	1,246,649.01	3,221,942.37	40.007709	-104.707706
9,986.0	89.00	179.00	7,297.9	-2,415.6	1,202.8	1,246,554.09	3,221,946.03	40.007448	-104.707696



Cathedral Energy Services

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Lochbuie 2G-31H
Project:	DJ Wattenberg	TVD Reference:	KB @ 5037.0ft (H&P 522)
Site:	S31-T1N-R65W (Lochbuie)	MD Reference:	KB @ 5037.0ft (H&P 522)
Well:	Lochbuie 2G-31H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
10,080.0	89.50	181.60	7,299.1	-2,509.6	1,202.3	1,246,460.10	3,221,946.37	40.007190	-104.707698
10,175.0	90.20	180.70	7,299.4	-2,604.6	1,200.4	1,246,365.11	3,221,945.31	40.006930	-104.707705
10,269.0	89.30	182.00	7,299.8	-2,698.6	1,198.2	1,246,271.13	3,221,943.93	40.006672	-104.707713
10,364.0	88.60	183.10	7,301.5	-2,793.5	1,194.0	1,246,176.20	3,221,940.55	40.006411	-104.707728
10,459.0	89.50	182.60	7,303.1	-2,888.3	1,189.3	1,246,081.30	3,221,936.67	40.006151	-104.707745
10,553.0	90.00	182.20	7,303.5	-2,982.2	1,185.3	1,245,987.35	3,221,933.57	40.005893	-104.707759
10,648.0	88.20	181.30	7,305.0	-3,077.2	1,182.4	1,245,892.39	3,221,931.51	40.005632	-104.707769
10,742.0	88.50	179.70	7,307.7	-3,171.1	1,181.6	1,245,798.43	3,221,931.52	40.005374	-104.707772
10,837.0	88.90	180.00	7,309.9	-3,266.1	1,181.8	1,245,703.46	3,221,932.62	40.005114	-104.707771
10,931.0	90.40	179.10	7,310.4	-3,360.1	1,182.6	1,245,609.48	3,221,934.19	40.004856	-104.707769
11,026.0	90.20	178.10	7,309.9	-3,455.1	1,184.9	1,245,514.54	3,221,937.36	40.004595	-104.707760
11,121.0	89.90	177.80	7,309.9	-3,550.0	1,188.3	1,245,419.63	3,221,941.60	40.004334	-104.707748
11,215.0	88.70	177.80	7,311.0	-3,643.9	1,191.9	1,245,325.75	3,221,946.04	40.004077	-104.707736
11,310.0	90.90	177.60	7,311.3	-3,738.9	1,195.7	1,245,230.87	3,221,950.70	40.003816	-104.707722
11,404.0	93.20	178.40	7,308.0	-3,832.7	1,199.0	1,245,137.02	3,221,954.81	40.003558	-104.707710
11,499.0	93.30	179.60	7,302.6	-3,927.6	1,200.7	1,245,042.21	3,221,957.31	40.003298	-104.707704
11,593.0	93.10	177.60	7,297.3	-4,021.4	1,203.0	1,244,948.41	3,221,960.43	40.003040	-104.707696
11,688.0	93.10	178.30	7,292.2	-4,116.2	1,206.3	1,244,853.65	3,221,964.67	40.002780	-104.707684
11,783.0	89.00	179.60	7,290.5	-4,211.1	1,208.1	1,244,758.72	3,221,967.25	40.002520	-104.707678
11,877.0	86.50	180.80	7,294.1	-4,305.0	1,207.8	1,244,664.80	3,221,967.76	40.002262	-104.707679
11,956.0	86.30	180.70	7,299.1	-4,383.9	1,206.7	1,244,585.96	3,221,967.43	40.002045	-104.707683
Last Cathedral Survey @ 11,956' MD									
12,011.0	86.30	180.70	7,302.7	-4,438.8	1,206.1	1,244,531.08	3,221,967.24	40.001895	-104.707685
Projection to Bit @ 12,011' MD - Lochbuie 2G-31H PBHL P3									

Design 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									
Lochbuie 2G-31H PBHL	0.00	0.00	7,300.0	-4,480.5	1,190.6	1,244,489.21	3,221,952.18	40.001780	-104.707740
- survey misses target center by 44.6ft at 12011.0ft MD (7302.7 TVD, -4438.8 N, 1206.1 E)									
- Point									

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
11,956.0	7,299.1	-4,383.9	1,206.7	Last Cathedral Survey @ 11,956' MD	
12,011.0	7,302.7	-4,438.8	1,206.1	Projection to Bit @ 12,011' MD	

Checked By: _____ Approved By: _____ Date: _____