





Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4B-30H
Project:	DJ Wattenberg	TVD Reference:	KBE @ 4945.0ft (Ensign #135)
Site:	SESE S30-T2N-R64W (Grattan)	MD Reference:	KBE @ 4945.0ft (Ensign #135)
Well:	Grattan 4B-30H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	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		SESE S30-T2N-R64W (Grattan)			
Site Position:		Northing:	1,281,949.98 ft	Latitude:	40.103720
From:	Lat/Long	Easting:	3,255,698.10 ft	Longitude:	-104.585910
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.59 °

Well	Grattan 4B-30H					
Well Position	+N/-S	0.0 ft	Northing:	1,282,058.96 ft	Latitude:	40.104020
	+E/-W	0.0 ft	Easting:	3,255,669.00 ft	Longitude:	-104.586010
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,933.0 ft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/9/2012	8.65	66.82	52,925

Design	HZ				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	344.25	

Survey Program	Date	2/27/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
72.0	11,408.0	Survey #1 (HZ)	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		
72.0	0.60	33.90	72.0	0.3	0.2	0.2	0.83	0.83		
163.0	0.40	31.00	163.0	1.0	0.6	0.8	0.22	-0.22		
255.0	0.50	7.20	255.0	1.7	0.9	1.4	0.23	0.11		
347.0	0.10	11.20	347.0	2.1	0.9	1.8	0.44	-0.43		
438.0	0.40	356.60	438.0	2.5	0.9	2.2	0.33	0.33		
530.0	0.30	341.70	530.0	3.1	0.8	2.7	0.15	-0.11		
622.0	0.30	85.10	622.0	3.3	1.0	2.9	0.51	0.00		
714.0	0.30	328.90	714.0	3.6	1.1	3.1	0.55	0.00		
806.0	0.10	261.70	806.0	3.7	0.9	3.4	0.30	-0.22		
897.0	0.10	110.20	897.0	3.7	0.9	3.3	0.21	0.00		
967.0	0.40	167.90	967.0	3.4	1.0	3.0	0.51	0.43		
1,084.0	0.30	161.10	1,084.0	2.8	1.2	2.3	0.09	-0.09		

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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
1,176.0	2.40	236.70	1,176.0	1.5	-0.3	1.5	2.55	2.28	
1,268.0	4.80	241.50	1,267.8	-1.4	-5.3	0.1	2.63	2.61	
1,360.0	6.40	243.70	1,359.3	-5.5	-13.3	-1.7	1.75	1.74	
1,452.0	8.20	253.80	1,450.6	-9.6	-24.2	-2.7	2.40	1.96	
1,547.0	10.20	253.70	1,544.4	-13.9	-38.8	-2.8	2.11	2.11	
1,642.0	12.80	254.00	1,637.4	-19.1	-57.0	-3.0	2.74	2.74	
1,738.0	14.30	253.20	1,730.8	-25.5	-78.6	-3.2	1.57	1.56	
1,833.0	14.40	251.50	1,822.8	-32.6	-101.0	-4.0	0.46	0.11	
1,928.0	14.10	253.80	1,914.9	-39.6	-123.3	-4.7	0.67	-0.32	
2,023.0	13.10	258.80	2,007.2	-44.9	-145.0	-3.9	1.62	-1.05	
2,119.0	12.70	258.60	2,100.8	-49.1	-166.0	-2.3	0.42	-0.42	
2,214.0	12.90	260.50	2,193.4	-53.0	-186.7	-0.3	0.49	0.21	
2,309.0	12.50	258.70	2,286.1	-56.7	-207.2	1.6	0.59	-0.42	
2,404.0	12.40	256.30	2,378.9	-61.2	-227.2	2.8	0.55	-0.11	
2,499.0	13.10	255.30	2,471.5	-66.3	-247.6	3.4	0.77	0.74	
2,595.0	12.30	254.70	2,565.2	-71.8	-267.9	3.6	0.84	-0.83	
2,690.0	11.90	252.00	2,658.1	-77.5	-287.0	3.3	0.73	-0.42	
2,785.0	12.20	254.90	2,751.0	-83.1	-306.0	3.1	0.71	0.32	
2,880.0	11.50	254.80	2,844.0	-88.2	-324.9	3.3	0.74	-0.74	
2,976.0	11.80	251.10	2,938.0	-93.9	-343.4	2.8	0.84	0.31	
3,039.0	12.40	249.50	2,999.6	-98.3	-355.8	1.9	1.09	0.95	
3,103.0	12.40	249.60	3,062.1	-103.1	-368.7	0.8	0.03	0.00	
3,166.0	12.50	252.60	3,123.6	-107.5	-381.5	0.0	1.04	0.16	
3,230.0	12.40	252.10	3,186.1	-111.7	-394.7	-0.4	0.23	-0.16	
3,293.0	11.50	252.60	3,247.7	-115.7	-407.1	-0.9	1.44	-1.43	
3,357.0	11.20	252.20	3,310.5	-119.5	-419.1	-1.3	0.48	-0.47	
3,420.0	10.80	253.90	3,372.3	-123.0	-430.6	-1.5	0.82	-0.63	
3,452.0	10.70	253.00	3,403.8	-124.7	-436.3	-1.6	0.61	-0.31	
3,484.0	10.90	254.30	3,435.2	-126.4	-442.1	-1.7	0.98	0.62	
3,515.0	10.90	254.30	3,465.6	-128.0	-447.7	-1.7	0.00	0.00	
3,547.0	11.60	251.80	3,497.0	-129.8	-453.7	-1.8	2.67	2.19	
3,579.0	12.00	254.00	3,528.3	-131.7	-459.9	-2.0	1.88	1.25	
3,611.0	12.30	255.80	3,559.6	-133.5	-466.5	-1.9	1.51	0.94	
3,642.0	12.20	258.30	3,589.9	-134.9	-472.9	-1.6	1.74	-0.32	
3,674.0	12.60	258.60	3,621.2	-136.3	-479.6	-1.1	1.27	1.25	
3,706.0	12.70	259.00	3,652.4	-137.7	-486.5	-0.5	0.42	0.31	
3,737.0	12.40	259.10	3,682.7	-139.0	-493.1	0.1	0.97	-0.97	
3,769.0	12.40	260.10	3,713.9	-140.2	-499.8	0.7	0.67	0.00	
3,801.0	12.70	258.50	3,745.1	-141.5	-506.7	1.3	1.43	0.94	
3,833.0	12.70	258.00	3,776.4	-142.9	-513.6	1.8	0.34	0.00	
3,865.0	12.70	257.50	3,807.6	-144.4	-520.4	2.2	0.34	0.00	
3,896.0	12.80	256.90	3,837.8	-145.9	-527.1	2.6	0.54	0.32	
3,960.0	12.80	256.40	3,900.2	-149.2	-540.9	3.2	0.17	0.00	
4,023.0	12.40	257.10	3,961.7	-152.4	-554.3	3.8	0.68	-0.63	
4,087.0	12.40	256.80	4,024.2	-155.5	-567.7	4.4	0.10	0.00	
4,150.0	12.80	256.20	4,085.7	-158.7	-581.0	5.0	0.67	0.63	
4,214.0	14.10	255.40	4,147.9	-162.3	-595.5	5.4	2.05	2.03	
4,277.0	13.40	256.10	4,209.1	-166.0	-610.0	5.7	1.14	-1.11	
4,341.0	12.40	256.80	4,271.5	-169.4	-623.9	6.3	1.58	-1.56	
4,404.0	11.80	252.50	4,333.1	-172.8	-636.6	6.4	1.72	-0.95	
4,468.0	12.70	252.70	4,395.7	-176.9	-649.5	6.0	1.41	1.41	
4,531.0	13.60	252.10	4,457.0	-181.2	-663.2	5.5	1.44	1.43	
4,595.0	13.10	249.80	4,519.3	-186.1	-677.2	4.7	1.14	-0.78	

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Survey									
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4,658.0	12.80	245.10	4,580.7	-191.5	-690.2	3.0	1.74	-0.48	
4,721.0	13.70	248.20	4,642.0	-197.2	-703.5	1.1	1.82	1.43	
4,785.0	13.80	252.60	4,704.2	-202.3	-717.8	0.1	1.64	0.16	
4,848.0	12.30	254.00	4,765.5	-206.4	-731.4	-0.1	2.43	-2.38	
4,912.0	11.20	255.40	4,828.2	-209.8	-744.0	-0.1	1.78	-1.72	
4,975.0	11.20	257.60	4,890.0	-212.7	-755.9	0.4	0.68	0.00	
5,039.0	10.10	258.50	4,952.9	-215.1	-767.4	1.2	1.74	-1.72	
5,102.0	10.00	259.00	5,014.9	-217.3	-778.2	2.1	0.21	-0.16	
5,134.0	9.50	258.30	5,046.5	-218.3	-783.5	2.5	1.61	-1.56	
5,166.0	9.50	259.40	5,078.0	-219.3	-788.7	2.9	0.57	0.00	
5,197.0	10.40	257.80	5,108.6	-220.4	-794.0	3.3	3.04	2.90	
5,229.0	11.00	257.90	5,140.0	-221.7	-799.8	3.7	1.88	1.87	
5,261.0	11.40	256.50	5,171.4	-223.0	-805.8	4.0	1.51	1.25	
5,324.0	12.40	254.60	5,233.0	-226.3	-818.4	4.3	1.70	1.59	
5,388.0	11.90	253.70	5,295.6	-230.0	-831.4	4.3	0.84	-0.78	
5,451.0	11.60	252.30	5,357.3	-233.7	-843.6	4.0	0.66	-0.48	
5,483.0	11.40	253.30	5,388.6	-235.6	-849.7	3.8	0.88	-0.62	
5,515.0	11.70	253.80	5,420.0	-237.4	-855.9	3.7	0.99	0.94	
5,578.0	12.30	254.00	5,481.6	-241.0	-868.5	3.7	0.95	0.95	
5,642.0	11.40	248.70	5,544.3	-245.2	-880.9	3.0	2.21	-1.41	
5,673.0	11.00	246.70	5,574.7	-247.5	-886.5	2.3	1.80	-1.29	
5,705.0	11.20	247.40	5,606.1	-249.9	-892.2	1.6	0.75	0.62	
5,737.0	11.30	245.90	5,637.5	-252.4	-897.9	0.7	0.97	0.31	
5,769.0	11.70	244.30	5,668.8	-255.1	-903.7	-0.3	1.60	1.25	
5,800.0	11.60	247.30	5,699.2	-257.6	-909.4	-1.2	1.98	-0.32	
5,832.0	11.60	245.90	5,730.5	-260.2	-915.3	-2.1	0.88	0.00	
5,864.0	11.60	248.50	5,761.9	-262.7	-921.2	-2.9	1.63	0.00	
5,896.0	11.60	251.60	5,793.2	-264.9	-927.3	-3.3	1.95	0.00	
5,927.0	12.10	253.80	5,823.6	-266.8	-933.3	-3.5	2.17	1.61	
5,959.0	12.40	253.90	5,854.8	-268.7	-939.9	-3.5	0.94	0.94	
5,991.0	12.60	252.80	5,886.1	-270.6	-946.5	-3.7	0.97	0.62	
6,022.0	12.70	253.70	5,916.3	-272.6	-953.0	-3.8	0.71	0.32	
6,054.0	12.40	254.20	5,947.6	-274.5	-959.7	-3.8	1.00	-0.94	
6,086.0	12.50	253.50	5,978.8	-276.4	-966.3	-3.9	0.57	0.31	
6,118.0	12.30	253.20	6,010.1	-278.4	-972.9	-4.0	0.66	-0.62	
6,149.0	12.40	253.30	6,040.3	-280.3	-979.2	-4.1	0.33	0.32	
6,181.0	12.70	253.50	6,071.6	-282.3	-985.9	-4.2	0.95	0.94	
6,213.0	13.00	254.00	6,102.8	-284.3	-992.7	-4.2	1.00	0.94	
6,245.0	13.20	255.00	6,133.9	-286.2	-999.7	-4.2	0.94	0.62	
6,276.0	13.10	255.40	6,164.1	-288.0	-1,006.5	-4.1	0.44	-0.32	
6,308.0	13.20	254.70	6,195.3	-289.9	-1,013.6	-4.0	0.59	0.31	
6,340.0	13.00	255.60	6,226.5	-291.8	-1,020.6	-3.9	0.89	-0.62	
6,372.0	12.80	256.00	6,257.6	-293.5	-1,027.5	-3.7	0.68	-0.62	
6,403.0	12.90	256.40	6,287.9	-295.2	-1,034.2	-3.5	0.43	0.32	
6,435.0	13.30	256.20	6,319.0	-296.9	-1,041.2	-3.2	1.26	1.25	
6,467.0	13.50	257.10	6,350.2	-298.6	-1,048.5	-2.9	0.90	0.62	
6,492.0	13.10	256.00	6,374.5	-299.9	-1,054.1	-2.7	1.89	-1.60	
6,523.0	13.50	260.20	6,404.7	-301.4	-1,061.0	-2.2	3.37	1.29	
6,555.0	14.80	274.30	6,435.7	-301.7	-1,068.8	-0.4	11.48	4.06	
6,587.0	16.10	285.00	6,466.5	-300.3	-1,077.2	3.3	9.77	4.06	
6,618.0	17.20	296.10	6,496.3	-297.1	-1,085.4	8.5	10.84	3.55	
6,650.0	19.10	305.10	6,526.7	-292.1	-1,094.0	15.8	10.57	5.94	
6,682.0	21.10	313.10	6,556.7	-285.1	-1,102.4	24.7	10.61	6.25	

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6,714.0	23.60	319.50	6,586.3	-276.3	-1,110.8	35.5	10.89	7.81	
6,745.0	25.90	324.30	6,614.5	-266.1	-1,118.8	47.5	9.85	7.42	
6,777.0	28.60	329.10	6,642.9	-253.8	-1,126.8	61.5	10.87	8.44	
6,808.0	31.20	334.50	6,669.8	-240.2	-1,134.1	76.5	12.07	8.39	
6,840.0	33.80	338.90	6,696.8	-224.4	-1,140.9	93.6	10.98	8.12	
6,872.0	36.00	342.00	6,723.0	-207.2	-1,147.0	111.8	8.83	6.87	
6,904.0	38.30	344.50	6,748.5	-188.7	-1,152.5	131.2	8.60	7.19	
6,935.0	40.80	347.00	6,772.4	-169.5	-1,157.4	150.9	9.56	8.06	
6,967.0	43.20	350.50	6,796.2	-148.5	-1,161.5	172.2	10.48	7.50	
6,999.0	45.80	352.90	6,819.1	-126.3	-1,164.8	194.5	9.68	8.12	
7,031.0	48.50	354.00	6,840.8	-103.0	-1,167.4	217.6	8.81	8.44	
7,062.0	50.70	354.90	6,860.9	-79.5	-1,169.7	240.8	7.43	7.10	
7,094.0	53.70	355.60	6,880.5	-54.4	-1,171.8	265.7	9.53	9.37	
7,126.0	56.70	356.60	6,898.8	-28.1	-1,173.6	291.4	9.72	9.37	
7,158.0	60.10	357.30	6,915.5	-0.9	-1,175.0	318.0	10.79	10.62	
7,189.0	62.80	358.10	6,930.4	26.3	-1,176.1	344.4	9.00	8.71	
7,221.0	65.70	357.90	6,944.3	55.1	-1,177.1	372.4	9.08	9.06	
7,253.0	68.10	358.70	6,956.8	84.5	-1,178.0	401.0	7.84	7.50	
7,284.0	70.60	359.30	6,967.7	113.5	-1,178.5	429.0	8.27	8.06	
7,316.0	73.70	359.90	6,977.5	144.0	-1,178.7	458.4	9.85	9.69	
7,348.0	76.40	0.10	6,985.8	174.9	-1,178.7	488.2	8.46	8.44	
7,380.0	78.70	0.60	6,992.7	206.1	-1,178.5	518.2	7.35	7.19	
7,403.8	80.70	0.37	6,997.0	229.5	-1,178.3	540.7	8.44	8.39	7435' MD (7005'-7015')
7,404.5	80.75	0.36	6,997.1	230.2	-1,178.3	541.3	8.44	8.39	7435' MD (7005'-7015') Target
7,405.2	80.81	0.36	6,997.2	230.9	-1,178.3	542.0	8.44	8.39	7435' MD (7005'-7015').
7,411.0	81.30	0.30	6,998.1	236.6	-1,178.3	547.5	8.44	8.39	
7,443.0	83.20	0.40	7,002.4	268.3	-1,178.1	578.0	5.95	5.94	
7,457.0	84.20	0.10	7,003.9	282.3	-1,178.0	591.3	7.45	7.14	
7,504.0	88.00	359.90	7,007.1	329.1	-1,178.0	636.5	8.10	8.09	
7,536.0	88.70	359.80	7,008.1	361.1	-1,178.1	667.3	2.21	2.19	
7,567.0	88.40	359.30	7,008.8	392.1	-1,178.4	697.2	1.88	-0.97	
7,631.0	89.30	359.60	7,010.1	456.1	-1,179.0	758.9	1.48	1.41	
7,694.0	89.30	359.10	7,010.9	519.1	-1,179.7	819.7	0.79	0.00	
7,726.0	89.00	358.50	7,011.4	551.1	-1,180.4	850.7	2.10	-0.94	
7,789.0	89.80	358.40	7,012.0	614.1	-1,182.1	911.8	1.28	1.27	
7,821.0	89.60	358.10	7,012.2	646.0	-1,183.0	942.8	1.13	-0.62	
7,885.0	90.50	359.00	7,012.1	710.0	-1,184.7	1,004.8	1.99	1.41	
7,948.0	90.00	0.30	7,011.9	773.0	-1,185.0	1,065.6	2.21	-0.79	
8,011.0	90.20	359.90	7,011.8	836.0	-1,184.9	1,126.2	0.71	0.32	
8,075.0	90.10	359.60	7,011.6	900.0	-1,185.2	1,187.9	0.49	-0.16	
8,138.0	90.50	359.90	7,011.3	963.0	-1,185.5	1,248.6	0.79	0.63	
8,202.0	89.80	0.20	7,011.1	1,027.0	-1,185.4	1,310.2	1.19	-1.09	
8,265.0	90.00	0.70	7,011.2	1,090.0	-1,184.9	1,370.7	0.85	0.32	
8,329.0	89.50	1.40	7,011.5	1,154.0	-1,183.8	1,431.9	1.34	-0.78	
8,392.0	90.50	1.80	7,011.5	1,217.0	-1,182.0	1,492.1	1.71	1.59	
8,455.0	89.60	1.30	7,011.4	1,279.9	-1,180.3	1,552.2	1.63	-1.43	
8,519.0	90.50	1.50	7,011.4	1,343.9	-1,178.7	1,613.4	1.44	1.41	
8,582.0	89.20	1.30	7,011.5	1,406.9	-1,177.2	1,673.6	2.09	-2.06	
8,646.0	89.80	1.50	7,012.1	1,470.9	-1,175.6	1,734.7	0.99	0.94	
8,709.0	88.40	1.40	7,013.1	1,533.9	-1,174.0	1,794.9	2.23	-2.22	
8,773.0	88.50	0.90	7,014.8	1,597.8	-1,172.8	1,856.1	0.80	0.16	
8,836.0	90.10	1.60	7,015.6	1,660.8	-1,171.4	1,916.3	2.77	2.54	
8,900.0	90.90	1.40	7,015.0	1,724.8	-1,169.7	1,977.5	1.29	1.25	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4B-30H
Project:	DJ Wattenberg	TVD Reference:	KBE @ 4945.0ft (Ensign #135)
Site:	SESE S30-T2N-R64W (Grattan)	MD Reference:	KBE @ 4945.0ft (Ensign #135)
Well:	Grattan 4B-30H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	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
8,963.0	89.90	1.10	7,014.6	1,787.8	-1,168.3	2,037.7	1.66	-1.59	
9,026.0	88.60	0.50	7,015.4	1,850.7	-1,167.5	2,098.1	2.27	-2.06	
9,090.0	88.70	0.70	7,016.9	1,914.7	-1,166.8	2,159.5	0.35	0.16	
9,153.0	88.80	0.70	7,018.3	1,977.7	-1,166.0	2,219.9	0.16	0.16	
9,216.0	88.30	0.10	7,019.9	2,040.7	-1,165.6	2,280.4	1.24	-0.79	
9,280.0	90.30	1.10	7,020.7	2,104.7	-1,164.9	2,341.8	3.49	3.12	
9,343.0	91.00	0.90	7,020.0	2,167.7	-1,163.8	2,402.1	1.16	1.11	
9,407.0	91.30	0.80	7,018.7	2,231.6	-1,162.9	2,463.4	0.49	0.47	
9,470.0	90.50	0.30	7,017.7	2,294.6	-1,162.3	2,523.9	1.50	-1.27	
9,488.4	90.41	0.21	7,017.5	2,313.0	-1,162.2	2,541.6	0.67	-0.48	9520' MD (7005'-7015').
9,488.5	90.41	0.21	7,017.5	2,313.1	-1,162.2	2,541.7	0.67	-0.48	9520' MD (7005'-7015') Target - 9520' MD (7005'-
9,533.0	90.20	0.00	7,017.3	2,357.6	-1,162.1	2,584.5	0.67	-0.48	
9,597.0	91.30	359.50	7,016.5	2,421.6	-1,162.4	2,646.2	1.89	1.72	
9,629.0	91.10	359.20	7,015.8	2,453.6	-1,162.7	2,677.1	1.13	-0.62	
9,692.0	92.80	358.80	7,013.6	2,516.6	-1,163.8	2,737.9	2.77	2.70	
9,724.0	93.00	358.80	7,012.0	2,548.5	-1,164.5	2,768.9	0.62	0.62	
9,755.0	92.90	358.20	7,010.4	2,579.5	-1,165.3	2,798.9	1.96	-0.32	
9,789.3	93.17	358.41	7,008.6	2,613.7	-1,166.3	2,832.1	1.00	0.78	9820' MD (6990'-7000').
9,789.9	93.17	358.42	7,008.6	2,614.2	-1,166.3	2,832.6	1.00	0.78	9820' MD (6990'-7000')
9,819.0	93.40	358.60	7,006.9	2,643.3	-1,167.1	2,860.8	1.00	0.78	
9,882.0	93.50	358.00	7,003.1	2,706.2	-1,169.0	2,921.9	0.96	0.16	
9,946.0	94.50	357.40	6,998.7	2,770.0	-1,171.5	2,983.9	1.82	1.56	
9,989.4	94.36	358.16	6,995.3	2,813.2	-1,173.2	3,026.0	1.77	-0.32	10020' MD (6983'-6993').
9,990.1	94.36	358.17	6,995.2	2,814.0	-1,173.2	3,026.7	1.77	-0.32	10020' MD (6983'-6993')
10,009.0	94.30	358.50	6,993.8	2,832.8	-1,173.8	3,045.0	1.77	-0.32	
10,073.0	93.30	358.60	6,989.6	2,896.6	-1,175.4	3,106.9	1.57	-1.56	
10,136.0	92.30	358.50	6,986.5	2,959.5	-1,177.0	3,167.8	1.60	-1.59	
10,200.0	91.40	359.60	6,984.4	3,023.5	-1,178.0	3,229.7	2.22	-1.41	
10,263.0	91.00	0.10	6,983.1	3,086.4	-1,178.2	3,290.3	1.02	-0.63	
10,326.0	91.10	359.80	6,982.0	3,149.4	-1,178.3	3,351.0	0.50	0.16	
10,389.6	88.91	359.20	6,982.0	3,213.0	-1,178.8	3,412.3	3.56	-3.44	10420' MD (6974'-6984') - 10420' MD (6974'-6984
10,390.0	88.90	359.20	6,982.0	3,213.4	-1,178.8	3,412.7	3.59	-3.46	
10,453.0	89.10	359.60	6,983.1	3,276.4	-1,179.5	3,473.5	0.71	0.32	
10,517.0	89.80	359.10	6,983.7	3,340.4	-1,180.2	3,535.3	1.34	1.09	
10,580.0	90.30	359.30	6,983.6	3,403.4	-1,181.1	3,596.2	0.85	0.79	
10,589.6	90.24	359.26	6,983.6	3,413.0	-1,181.2	3,605.4	0.78	-0.62	10620' MD (6970'-6980') - 10620' MD (6970'-6980
10,644.0	89.90	359.00	6,983.5	3,467.4	-1,182.0	3,658.0	0.78	-0.63	
10,707.0	91.60	0.40	6,982.7	3,530.4	-1,182.4	3,718.8	3.50	2.70	
10,771.0	89.90	359.90	6,981.8	3,594.4	-1,182.2	3,780.3	2.77	-2.66	
10,819.6	89.82	359.67	6,982.0	3,643.0	-1,182.4	3,827.1	0.50	-0.16	10850' MD (6964'-6974') - 10850' MD (6964'-6974
10,834.0	89.80	359.60	6,982.0	3,657.4	-1,182.5	3,841.0	0.50	-0.16	
10,898.0	89.10	0.30	6,982.6	3,721.4	-1,182.5	3,902.6	1.55	-1.09	
10,961.0	90.20	1.40	6,983.0	3,784.4	-1,181.6	3,963.0	2.47	1.75	
11,019.9	89.56	1.58	6,983.1	3,843.2	-1,180.1	4,019.2	1.14	-1.09	11050' MD (6960'-6970') - 11050' MD (6960'-6970'
11,025.0	89.50	1.60	6,983.2	3,848.3	-1,179.9	4,024.1	1.14	-1.09	
11,088.0	89.60	1.60	6,983.7	3,911.3	-1,178.2	4,084.2	0.16	0.16	
11,152.0	89.70	1.40	6,984.1	3,975.3	-1,176.5	4,145.4	0.35	0.16	
11,215.0	89.80	1.00	6,984.3	4,038.3	-1,175.2	4,205.6	0.65	0.16	
11,219.8	89.82	1.01	6,984.4	4,043.0	-1,175.1	4,210.2	0.49	0.47	11250' MD (6956'-6966')
11,219.8	89.82	1.01	6,984.4	4,043.1	-1,175.1	4,210.3	0.49	0.47	11250' MD (6956'-6966').
11,279.0	90.10	1.10	6,984.4	4,102.3	-1,174.0	4,266.9	0.49	0.47	
11,333.3	89.89	0.41	6,984.4	4,156.5	-1,173.3	4,318.9	1.32	-0.38	Grattan 4B-30 PBHL (2)
11,358.0	89.80	0.10	6,984.5	4,181.3	-1,173.2	4,342.7	1.32	-0.38	Last Cathedral Survey @ 11,358' MD

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4B-30H
Project:	DJ Wattenberg	TVD Reference:	KBE @ 4945.0ft (Ensign #135)
Site:	SESE S30-T2N-R64W (Grattan)	MD Reference:	KBE @ 4945.0ft (Ensign #135)
Well:	Grattan 4B-30H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	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
11,408.0	89.80	0.10	6,984.6	4,231.3	-1,173.1	4,390.8	0.00	0.00	PTB @ 11,408' MD

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4B-30H
Project:	DJ Wattenberg	TVD Reference:	KBE @ 4945.0ft (Ensign #135)
Site:	SESE S30-T2N-R64W (Grattan)	MD Reference:	KBE @ 4945.0ft (Ensign #135)
Well:	Grattan 4B-30H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
10420' MD (6974'-6984') - actual wellpath misses target center by 10.6ft at 10389.6ft MD (6982.0 TVD, 3213.0 N, -1178.8 E) - Point	0.00	0.00	6,974.0	3,213.1	-1,171.9	1,285,259.77	3,254,464.09	40.112840	-104.590200
11250' MD (6956'-6966') - actual wellpath misses target center by 18.6ft at 11219.8ft MD (6984.4 TVD, 4043.1 N, -1175.1 E) - Point	0.00	0.00	6,966.0	4,043.1	-1,171.9	1,286,089.73	3,254,455.54	40.115119	-104.590200
10020' MD (6983'-6993') - actual wellpath misses target center by 12.4ft at 9990.1ft MD (6995.2 TVD, 2814.0 N, -1173.2 E) - Point	0.00	0.00	6,983.0	2,813.1	-1,171.9	1,284,859.80	3,254,468.21	40.111742	-104.590200
11050' MD (6960'-6970') - actual wellpath misses target center by 24.5ft at 11019.9ft MD (6983.1 TVD, 3843.2 N, -1180.1 E) - Point	0.00	0.00	6,960.0	3,843.1	-1,171.9	1,285,889.74	3,254,457.60	40.114570	-104.590200
7435' MD (7005'-7015') - actual wellpath misses target center by 10.4ft at 7403.8ft MD (6997.0 TVD, 229.5 N, -1178.3 E) - Point	0.00	0.00	7,005.0	228.1	-1,171.9	1,282,274.93	3,254,494.86	40.104646	-104.590199
7435' MD (7005'-7015'). - actual wellpath misses target center by 19.2ft at 7405.2ft MD (6997.2 TVD, 230.9 N, -1178.3 E) - Point	0.00	0.00	7,015.0	228.1	-1,171.9	1,282,274.93	3,254,494.86	40.104646	-104.590199
10850' MD (6964'-6974') - actual wellpath misses target center by 20.8ft at 10819.6ft MD (6982.0 TVD, 3643.0 N, -1182.4 E) - Point	0.00	0.00	6,964.0	3,643.1	-1,171.9	1,285,689.75	3,254,459.66	40.114021	-104.590200
7435' MD (7005'-7015') - actual wellpath misses target center by 14.6ft at 7404.5ft MD (6997.1 TVD, 230.2 N, -1178.3 E) - Point	0.00	0.00	7,010.0	228.1	-1,171.9	1,282,274.93	3,254,494.86	40.104646	-104.590199
9820' MD (6990'-7000') - actual wellpath misses target center by 19.4ft at 9789.9ft MD (7008.6 TVD, 2614.3 N, -1166.3 E) - Point	0.00	0.00	6,990.0	2,613.1	-1,171.9	1,284,659.81	3,254,470.28	40.111193	-104.590200
9520' MD (7005'-7015') - actual wellpath misses target center by 12.3ft at 9488.5ft MD (7017.5 TVD, 2313.1 N, -1162.2 E) - Point	0.00	0.00	7,010.0	2,313.1	-1,171.9	1,284,359.82	3,254,473.37	40.110370	-104.590200
Grattan 4B-30 PBHL - actual wellpath misses target center by 34.4ft at 11333.2ft MD (6984.4 TVD, 4156.5 N, -1173.3 E) - Point	0.00	0.00	6,950.0	4,156.5	-1,171.9	1,286,203.12	3,254,454.37	40.115430	-104.590200
11250' MD (6956'-6966') - actual wellpath misses target center by 28.5ft at 11219.8ft MD (6984.4 TVD, 4043.0 N, -1175.1 E) - Point	0.00	0.00	6,956.0	4,043.1	-1,171.9	1,286,089.73	3,254,455.54	40.115119	-104.590200
9520' MD (7005'-7015') - actual wellpath misses target center by 15.8ft at 9488.5ft MD (7017.5 TVD, 2313.1 N, -1162.2 E) - Point	0.00	0.00	7,005.0	2,313.1	-1,171.9	1,284,359.82	3,254,473.37	40.110370	-104.590200
11050' MD (6960'-6970') - actual wellpath misses target center by 15.5ft at 11019.9ft MD (6983.1 TVD, 3843.2 N, -1180.1 E) - Point	0.00	0.00	6,970.0	3,843.1	-1,171.9	1,285,889.74	3,254,457.60	40.114570	-104.590200
9520' MD (7005'-7015'). - actual wellpath misses target center by 10.0ft at 9488.4ft MD (7017.5 TVD, 2313.1 N, -1162.2 E) - Point	0.00	0.00	7,015.0	2,313.1	-1,171.9	1,284,359.82	3,254,473.37	40.110370	-104.590200
10020' MD (6983'-6993') - actual wellpath misses target center by 2.7ft at 9989.4ft MD (6995.3 TVD, 2813.2 N, -1173.2 E) - Point	0.00	0.00	6,993.0	2,813.1	-1,171.9	1,284,859.80	3,254,468.21	40.111742	-104.590200
10620' MD (6970'-6980') - actual wellpath misses target center by 16.5ft at 10589.6ft MD (6983.6 TVD, 3413.0 N, -1181.2 E) - Point	0.00	0.00	6,970.0	3,413.1	-1,171.9	1,285,459.76	3,254,462.03	40.113389	-104.590200

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4B-30H
Project:	DJ Wattenberg	TVD Reference:	KBE @ 4945.0ft (Ensign #135)
Site:	SESE S30-T2N-R64W (Grattan)	MD Reference:	KBE @ 4945.0ft (Ensign #135)
Well:	Grattan 4B-30H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	USA EDM 5000 Multi Users DB

9820' MD (6990'-7000').	0.00	0.00	7,000.0	2,613.1	-1,171.9	1,284,659.81	3,254,470.28	40.111193	-104.590200
- actual wellpath misses target center by 10.3ft at 9789.3ft MD (7008.6 TVD, 2613.7 N, -1166.3 E)									
- Point									
10420' MD (6974'-6984').	0.00	0.00	6,984.0	3,213.1	-1,171.9	1,285,259.77	3,254,464.09	40.112840	-104.590200
- actual wellpath misses target center by 7.2ft at 10389.6ft MD (6982.0 TVD, 3213.0 N, -1178.8 E)									
- Point									
Grattan 4B-30 PBHL (2)	0.00	0.00	7,010.0	4,156.5	-1,171.9	1,286,203.12	3,254,454.37	40.115430	-104.590200
- actual wellpath misses target center by 25.6ft at 11333.3ft MD (6984.4 TVD, 4156.5 N, -1173.3 E)									
- Point									
10620' MD (6970'-6980').	0.00	0.00	6,980.0	3,413.1	-1,171.9	1,285,459.76	3,254,462.03	40.113389	-104.590200
- actual wellpath misses target center by 10.0ft at 10589.6ft MD (6983.6 TVD, 3413.0 N, -1181.2 E)									
- Point									
10850' MD (6964'-6974').	0.00	0.00	6,974.0	3,643.1	-1,171.9	1,285,689.75	3,254,459.66	40.114021	-104.590200
- actual wellpath misses target center by 13.2ft at 10819.6ft MD (6982.0 TVD, 3643.0 N, -1182.4 E)									
- Point									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
11,358.0	6,984.5	4,181.3	-1,173.2	Last Cathedral Survey @ 11,358' MD	
11,408.0	6,984.6	4,231.3	-1,173.1	PTB @ 11,408' MD	

Checked By: _____ Approved By: _____ Date: _____