



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4A-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 4A-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 4A-30H					
Well Position	+N/-S	0.0 ft	Northing:	1,282,059.22 ft	Latitude:	40.104020
	+E/-W	0.0 ft	Easting:	3,255,696.98 ft	Longitude:	-104.585910
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,935.0 ft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/24/2012	8.65	66.82	52,921

Design	HZ				
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	355.15	

Survey Program	Date	3/10/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,088.0	Survey #1 (HZ)	Gyro	Gyro	
1,180.0	10,980.0	Survey #2 (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	Kaminsky (Existing)	
100.0	0.17	194.77	100.0	-0.1	0.0	-0.1	0.17	0.17		
200.0	0.10	261.11	200.0	-0.3	-0.2	-0.3	0.16	-0.07		
300.0	0.29	168.34	300.0	-0.6	-0.2	-0.5	0.31	0.20		
400.0	0.34	215.32	400.0	-1.1	-0.3	-1.0	0.26	0.05		
500.0	0.31	235.31	500.0	-1.5	-0.7	-1.4	0.12	-0.03		
600.0	0.25	249.74	600.0	-1.7	-1.1	-1.6	0.09	-0.06		
700.0	0.16	227.22	700.0	-1.9	-1.4	-1.7	0.12	-0.09		
800.0	0.21	346.11	800.0	-1.8	-1.6	-1.6	0.32	0.05		
900.0	0.11	210.09	900.0	-1.7	-1.7	-1.5	0.30	-0.09		
1,000.0	0.14	223.20	1,000.0	-1.9	-1.8	-1.7	0.04	0.02	Last Gyro Survey @ 1088' MD	
1,088.0	0.40	3.20	1,088.0	-1.6	-1.9	-1.5	0.58	0.30		

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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
1,180.0	0.50	327.10	1,180.0	-1.0	-2.1	-0.8	0.32	0.11	
1,272.0	0.60	293.40	1,272.0	-0.4	-2.7	-0.2	0.36	0.11	
1,364.0	0.60	309.70	1,364.0	0.1	-3.5	0.3	0.18	0.00	
1,456.0	0.60	294.40	1,456.0	0.6	-4.4	0.9	0.17	0.00	
1,551.0	0.80	295.70	1,551.0	1.0	-5.4	1.5	0.21	0.21	
1,646.0	0.90	310.30	1,646.0	1.8	-6.6	2.4	0.25	0.11	
1,741.0	1.10	301.20	1,740.9	2.8	-7.9	3.4	0.27	0.21	
1,836.0	1.10	315.10	1,835.9	3.9	-9.3	4.7	0.28	0.00	
1,932.0	1.10	307.80	1,931.9	5.1	-10.7	6.0	0.15	0.00	
2,027.0	1.00	305.60	2,026.9	6.2	-12.1	7.2	0.11	-0.11	
2,122.0	0.90	311.20	2,121.9	7.1	-13.4	8.2	0.14	-0.11	
2,408.0	1.70	306.20	2,407.8	11.1	-18.5	12.6	0.28	0.28	
2,693.0	2.20	336.30	2,692.6	18.6	-24.1	20.6	0.39	0.18	
2,979.0	1.00	309.90	2,978.5	25.2	-28.2	27.5	0.48	-0.42	
3,074.0	0.60	154.50	3,073.5	25.3	-28.6	27.7	1.65	-0.42	
3,169.0	0.40	344.20	3,168.5	25.2	-28.5	27.5	1.05	-0.21	
3,264.0	0.80	113.80	3,263.5	25.2	-28.0	27.5	1.16	0.42	
3,360.0	2.10	119.20	3,359.5	24.1	-25.8	26.2	1.36	1.35	
3,455.0	1.70	124.10	3,454.4	22.5	-23.1	24.4	0.45	-0.42	
3,550.0	1.80	82.30	3,549.4	21.9	-20.5	23.5	1.32	0.11	
3,645.0	1.60	79.00	3,644.4	22.3	-17.7	23.8	0.23	-0.21	
3,740.0	1.60	67.80	3,739.3	23.1	-15.2	24.3	0.33	0.00	
3,836.0	1.80	113.40	3,835.3	23.0	-12.6	24.0	1.39	0.21	
3,931.0	1.80	143.30	3,930.2	21.2	-10.3	22.0	0.98	0.00	
4,026.0	1.80	156.00	4,025.2	18.7	-8.8	19.3	0.42	0.00	
4,121.0	1.70	155.50	4,120.1	16.0	-7.6	16.6	0.11	-0.11	
4,217.0	2.10	156.70	4,216.1	13.1	-6.3	13.6	0.42	0.42	
4,312.0	2.30	159.10	4,311.0	9.7	-5.0	10.1	0.23	0.21	
4,407.0	2.70	153.50	4,405.9	5.9	-3.3	6.2	0.49	0.42	
4,502.0	2.20	154.80	4,500.8	2.3	-1.5	2.4	0.53	-0.53	
4,597.0	2.30	179.30	4,595.8	-1.3	-0.7	-1.2	1.01	0.11	
4,693.0	1.60	220.50	4,691.7	-4.2	-1.6	-4.1	1.58	-0.73	
4,788.0	0.80	277.50	4,786.7	-5.1	-3.1	-4.9	1.41	-0.84	
4,883.0	0.90	316.80	4,881.7	-4.5	-4.2	-4.1	0.61	0.11	
4,978.0	0.90	300.10	4,976.7	-3.6	-5.4	-3.1	0.28	0.00	
5,073.0	0.40	18.40	5,071.7	-2.9	-5.9	-2.4	0.96	-0.53	
5,169.0	0.30	54.70	5,167.7	-2.4	-5.6	-2.0	0.25	-0.10	
5,264.0	0.60	37.10	5,262.7	-1.9	-5.1	-1.5	0.34	0.32	
5,359.0	0.30	182.50	5,357.7	-1.7	-4.8	-1.3	0.91	-0.32	
5,454.0	0.40	123.00	5,452.7	-2.2	-4.6	-1.8	0.38	0.11	
5,550.0	0.40	141.50	5,548.7	-2.6	-4.1	-2.3	0.13	0.00	
5,645.0	0.40	20.30	5,643.7	-2.6	-3.8	-2.2	0.73	0.00	
5,740.0	0.30	160.60	5,738.7	-2.5	-3.6	-2.2	0.69	-0.11	
5,835.0	0.80	71.70	5,833.7	-2.5	-2.8	-2.3	0.89	0.53	
5,931.0	0.40	98.40	5,929.7	-2.4	-1.9	-2.2	0.50	-0.42	
6,026.0	0.20	48.60	6,024.7	-2.3	-1.4	-2.2	0.33	-0.21	
6,121.0	0.30	1.80	6,119.7	-1.9	-1.3	-1.8	0.23	0.11	
6,216.0	0.40	320.70	6,214.7	-1.4	-1.5	-1.3	0.28	0.11	
6,312.0	0.40	213.50	6,310.7	-1.5	-1.9	-1.3	0.67	0.00	
6,343.0	0.90	164.70	6,341.7	-1.8	-1.9	-1.6	2.27	1.61	
6,375.0	0.70	152.30	6,373.6	-2.2	-1.7	-2.0	0.82	-0.62	
6,407.0	0.80	351.70	6,405.6	-2.1	-1.7	-2.0	4.62	0.31	
6,439.0	4.00	341.40	6,437.6	-0.9	-2.1	-0.7	10.05	10.00	

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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
6,470.0	7.60	344.70	6,468.5	2.1	-2.9	2.4	11.66	11.61	
6,502.0	11.10	348.60	6,500.0	7.2	-4.1	7.5	11.11	10.94	
6,534.0	14.80	352.10	6,531.2	14.3	-5.3	14.7	11.81	11.56	
6,565.0	18.20	353.50	6,560.9	23.0	-6.4	23.5	11.04	10.97	
6,597.0	21.70	354.60	6,591.0	33.9	-7.5	34.4	11.00	10.94	
6,629.0	25.30	354.90	6,620.3	46.6	-8.7	47.1	11.26	11.25	
6,661.0	28.80	354.50	6,648.8	61.1	-10.0	61.7	10.95	10.94	
6,692.0	32.40	353.50	6,675.5	76.7	-11.7	77.5	11.73	11.61	
6,724.0	35.60	352.60	6,702.0	94.5	-13.8	95.3	10.12	10.00	
6,756.0	38.30	351.70	6,727.6	113.6	-16.5	114.5	8.61	8.44	
6,788.0	40.30	351.50	6,752.4	133.6	-19.4	134.8	6.26	6.25	
6,819.0	42.20	351.60	6,775.7	153.8	-22.4	155.2	6.13	6.13	
6,851.0	44.60	351.60	6,798.9	175.6	-25.6	177.1	7.50	7.50	
6,883.0	47.30	352.20	6,821.2	198.3	-28.9	200.1	8.54	8.44	
6,914.0	49.90	352.60	6,841.7	221.4	-32.0	223.3	8.44	8.39	
6,946.0	52.70	352.60	6,861.7	246.1	-35.2	248.2	8.75	8.75	
6,978.0	54.90	352.70	6,880.6	271.8	-38.5	274.0	6.88	6.87	
7,010.0	57.70	353.30	6,898.3	298.2	-41.7	300.6	8.89	8.75	
7,041.0	60.30	353.80	6,914.3	324.6	-44.7	327.2	8.50	8.39	
7,073.0	62.60	354.00	6,929.6	352.5	-47.7	355.3	7.21	7.19	
7,105.0	63.60	353.60	6,944.1	380.9	-50.8	383.8	3.32	3.12	
7,136.0	65.50	353.40	6,957.4	408.7	-53.9	411.8	6.16	6.13	
7,168.0	67.30	353.40	6,970.2	437.8	-57.3	441.1	5.62	5.62	
7,200.0	69.10	353.70	6,982.1	467.4	-60.6	470.8	5.69	5.62	
7,232.0	70.70	354.20	6,993.1	497.2	-63.8	500.9	5.21	5.00	
7,263.0	72.60	354.50	7,002.8	526.5	-66.7	530.3	6.20	6.13	
7,295.0	75.30	355.60	7,011.7	557.2	-69.4	561.0	9.06	8.44	
7,302.7	76.68	355.86	7,013.5	564.6	-69.9	568.5	18.29	18.00	Grattan 4A-30H - LP
7,325.0	80.70	356.60	7,017.9	586.4	-71.4	590.4	18.29	18.00	
7,338.3	82.30	356.82	7,019.9	599.6	-72.1	603.5	12.11	12.00	Grattan 4A-30H - TGT #1
7,385.0	87.90	357.60	7,023.9	646.0	-74.4	650.0	12.11	12.00	
7,449.0	89.90	357.00	7,025.1	709.9	-77.4	713.9	3.26	3.12	
7,512.0	90.80	355.60	7,024.7	772.8	-81.4	776.9	2.64	1.43	
7,538.3	91.18	356.18	7,024.3	799.0	-83.3	803.2	2.64	1.43	Grattan 4A-30H - TGT #2
7,575.0	91.70	357.00	7,023.3	835.6	-85.5	839.9	2.64	1.43	
7,639.0	91.60	356.20	7,021.5	899.5	-89.3	903.8	1.26	-0.16	
7,702.0	91.60	355.80	7,019.7	962.3	-93.7	966.8	0.63	0.00	
7,766.0	91.30	355.10	7,018.1	1,026.1	-98.8	1,030.8	1.19	-0.47	
7,829.0	90.80	355.20	7,017.0	1,088.9	-104.1	1,093.8	0.81	-0.79	
7,893.0	91.00	356.80	7,016.0	1,152.7	-108.6	1,157.8	2.52	0.31	
7,956.0	90.90	356.80	7,014.9	1,215.6	-112.1	1,220.7	0.16	-0.16	
8,020.0	90.80	356.40	7,014.0	1,279.5	-115.9	1,284.7	0.64	-0.16	
8,038.1	90.71	356.23	7,013.7	1,297.5	-117.0	1,302.7	1.06	-0.48	Grattan 4A-30H - TGT #3 BTM
8,038.1	90.71	356.23	7,013.7	1,297.5	-117.0	1,302.8	0.00	0.00	Grattan 4A-30H - TGT #3 TOP - Grattan 4A-30H
8,083.0	90.50	355.80	7,013.2	1,342.3	-120.2	1,347.7	1.07	-0.48	
8,147.0	90.00	355.60	7,013.0	1,406.2	-125.0	1,411.7	0.84	-0.78	
8,210.0	89.60	355.00	7,013.2	1,468.9	-130.1	1,474.7	1.14	-0.63	
8,274.0	90.90	355.40	7,012.9	1,532.7	-135.5	1,538.7	2.13	2.03	
8,337.0	91.60	355.40	7,011.5	1,595.5	-140.5	1,601.7	1.11	1.11	
8,369.0	91.90	355.70	7,010.6	1,627.4	-143.0	1,633.7	1.33	0.94	
8,401.0	92.70	356.00	7,009.3	1,659.3	-145.3	1,665.6	2.67	2.50	
8,432.0	90.10	356.40	7,008.5	1,690.2	-147.4	1,696.6	8.49	-8.39	
8,496.0	88.40	355.70	7,009.4	1,754.0	-151.8	1,760.6	2.87	-2.66	

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8,537.9	88.00	355.50	7,010.7	1,795.8	-155.0	1,802.4	1.06	-0.95	Grattan 4A-30H - TGT #4 TOP
8,538.0	88.00	355.50	7,010.7	1,795.9	-155.0	1,802.6	1.06	-0.95	Grattan 4A-30H - TGT #4
8,538.2	88.00	355.50	7,010.7	1,796.1	-155.0	1,802.7	1.06	-0.95	Grattan 4A-30H - TGT #4 BTM
8,559.0	87.80	355.40	7,011.4	1,816.8	-156.7	1,823.6	1.06	-0.95	
8,623.0	89.00	355.10	7,013.2	1,880.6	-162.0	1,887.5	1.93	1.87	
8,686.0	89.00	354.90	7,014.3	1,943.3	-167.5	1,950.5	0.32	0.00	
8,750.0	89.80	354.70	7,015.0	2,007.1	-173.3	2,014.5	1.29	1.25	
8,813.0	90.90	354.90	7,014.6	2,069.8	-179.0	2,077.5	1.77	1.75	
8,876.0	89.80	355.20	7,014.2	2,132.6	-184.4	2,140.5	1.81	-1.75	
8,940.0	89.50	354.40	7,014.6	2,196.3	-190.2	2,204.5	1.33	-0.47	
9,003.0	90.00	354.90	7,014.9	2,259.0	-196.1	2,267.5	1.12	0.79	
9,038.0	89.07	354.30	7,015.2	2,293.8	-199.4	2,302.5	3.16	-2.65	Grattan 4A-30H - TGT #5 - Grattan 4A-30H - TGT
9,067.0	88.30	353.80	7,015.8	2,322.7	-202.4	2,331.5	3.17	-2.66	
9,130.0	88.90	351.80	7,017.4	2,385.2	-210.3	2,394.4	3.31	0.95	
9,194.0	89.70	349.80	7,018.2	2,448.3	-220.5	2,458.2	3.37	1.25	
9,257.0	91.90	348.10	7,017.3	2,510.2	-232.6	2,520.8	4.41	3.49	
9,289.0	92.30	347.70	7,016.1	2,541.4	-239.3	2,552.6	1.77	1.25	
9,321.0	92.10	349.30	7,014.9	2,572.8	-245.7	2,584.3	5.04	-0.62	
9,384.0	92.00	349.40	7,012.6	2,634.6	-257.3	2,647.0	0.22	-0.16	
9,416.0	92.40	349.80	7,011.4	2,666.1	-263.1	2,678.8	1.77	1.25	
9,447.0	92.50	351.20	7,010.1	2,696.6	-268.2	2,709.7	4.52	0.32	
9,479.0	91.90	353.30	7,008.9	2,728.3	-272.5	2,741.6	6.82	-1.87	
9,511.0	90.70	354.30	7,008.1	2,760.1	-275.9	2,773.6	4.88	-3.75	
9,539.7	90.47	354.75	7,007.8	2,788.6	-278.7	2,802.2	1.77	-0.79	Grattan 4A-30H - TGT #6
9,539.8	90.47	354.76	7,007.8	2,788.8	-278.7	2,802.3	1.77	-0.79	Grattan 4A-30H - TGT #6 BTM
9,539.8	90.47	354.76	7,007.8	2,788.8	-278.7	2,802.4	0.00	0.00	Grattan 4A-30H - TGT #6 TOP
9,540.0	90.47	354.76	7,007.8	2,789.0	-278.7	2,802.6	0.00	0.00	Grattan 4A-30H - TGT #6 TOP of C Chalk
9,574.0	90.20	355.30	7,007.6	2,822.9	-281.6	2,836.6	1.79	-0.80	
9,638.0	92.10	355.60	7,006.3	2,886.6	-286.7	2,900.5	3.01	2.97	
9,669.0	92.70	355.50	7,005.0	2,917.5	-289.1	2,931.5	1.96	1.94	
9,733.0	91.00	355.10	7,003.0	2,981.3	-294.4	2,995.5	2.73	-2.66	
9,796.0	90.70	355.00	7,002.0	3,044.0	-299.8	3,058.5	0.50	-0.48	
9,860.0	91.80	355.60	7,000.7	3,107.8	-305.0	3,122.5	1.96	1.72	
9,923.0	92.40	356.90	6,998.3	3,170.6	-309.2	3,185.4	2.27	0.95	
9,987.0	92.90	356.70	6,995.4	3,234.4	-312.7	3,249.3	0.84	0.78	
10,041.0	93.16	356.36	6,992.5	3,288.3	-316.0	3,303.2	0.79	0.48	Grattan 4A-30H - TGT #7 BTM
10,041.3	93.16	356.36	6,992.5	3,288.5	-316.0	3,303.5	0.79	0.48	Grattan 4A-30H - TGT #7
10,041.5	93.16	356.36	6,992.5	3,288.7	-316.0	3,303.7	0.00	0.00	Grattan 4A-30H - TGT #7 TOP
10,044.2	93.17	356.34	6,992.4	3,291.5	-316.2	3,306.4	0.81	0.49	Grattan 4A-30H - TGT #7 TOP of B Chalk
10,050.0	93.20	356.30	6,992.0	3,297.2	-316.6	3,312.2	0.81	0.49	
10,114.0	93.70	356.20	6,988.2	3,361.0	-320.8	3,376.1	0.80	0.78	
10,177.0	93.60	357.20	6,984.2	3,423.8	-324.4	3,438.9	1.59	-0.16	
10,241.0	93.20	357.20	6,980.4	3,487.6	-327.5	3,502.8	0.62	-0.62	
10,304.0	92.40	357.70	6,977.3	3,550.4	-330.3	3,565.6	1.50	-1.27	
10,368.0	92.60	357.30	6,974.5	3,614.3	-333.1	3,629.5	0.70	0.31	
10,431.0	92.00	356.80	6,972.0	3,677.2	-336.3	3,692.4	1.24	-0.95	
10,495.0	91.60	355.70	6,970.0	3,741.0	-340.5	3,756.4	1.83	-0.62	
10,540.7	91.45	355.63	6,968.7	3,786.5	-344.0	3,802.1	0.35	-0.32	Grattan 4A-30H - TGT #8
10,558.0	91.40	355.60	6,968.3	3,803.8	-345.3	3,819.4	0.35	-0.32	
10,622.0	91.50	355.00	6,966.7	3,867.6	-350.5	3,883.4	0.95	0.16	
10,685.0	91.20	354.10	6,965.2	3,930.3	-356.5	3,946.3	1.51	-0.48	
10,748.0	92.60	354.90	6,963.1	3,992.9	-362.5	4,009.3	2.56	2.22	
10,811.0	92.60	354.20	6,960.3	4,055.6	-368.5	4,072.2	1.11	0.00	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4A-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 4A-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
10,875.0	92.80	353.90	6,957.3	4,119.2	-375.1	4,136.1	0.56	0.31	
10,909.9	93.05	353.71	6,955.5	4,153.8	-378.9	4,171.0	0.91	0.73	Grattan 4A-30H PBHL
10,930.0	93.20	353.60	6,954.4	4,173.7	-381.1	4,191.0	0.91	0.73	Last Cathedral Survey @ 10,930' MD
10,980.0	93.20	353.60	6,951.6	4,223.4	-386.7	4,240.9	0.00	0.00	PTB @ 10,980' MD - Grattan 4A-30H - TGT #9

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4A-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 4A-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)		
Grattan 4A-30H - TGT #	0.00	0.00	6,985.0	3,290.4	-279.1	1,285,346.56	3,255,383.93	40.113052	-104.586908
- actual wellpath misses target center by 37.7ft at 10041.2ft MD (6992.5 TVD, 3288.5 N, -316.0 E)									
- Point									
Grattan 4A-30H - LP	0.00	0.00	7,005.0	567.9	-48.1	1,282,626.59	3,255,642.98	40.105579	-104.586082
- actual wellpath misses target center by 23.6ft at 7302.2ft MD (7013.4 TVD, 564.2 N, -69.9 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	6,980.0	3,290.4	-279.1	1,285,346.56	3,255,383.93	40.113052	-104.586908
- actual wellpath misses target center by 39.0ft at 10041.5ft MD (6992.5 TVD, 3288.7 N, -316.0 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	6,975.0	3,788.4	-321.4	1,285,844.13	3,255,336.54	40.114420	-104.587059
- actual wellpath misses target center by 23.5ft at 10540.7ft MD (6968.7 TVD, 3786.5 N, -344.0 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,006.0	1,298.0	-110.1	1,283,355.98	3,255,573.52	40.107583	-104.586304
- actual wellpath misses target center by 10.4ft at 8038.1ft MD (7013.7 TVD, 1297.6 N, -117.0 E)									
- Point									
Grattan 4A-30H PBHL	0.00	0.00	6,950.0	4,156.5	-352.4	1,286,211.83	3,255,301.75	40.115430	-104.587170
- actual wellpath misses target center by 27.2ft at 10909.9ft MD (6955.5 TVD, 4153.8 N, -378.9 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	6,930.0	3,290.4	-279.1	1,285,346.56	3,255,383.93	40.113052	-104.586908
- actual wellpath misses target center by 72.5ft at 10044.2ft MD (6992.4 TVD, 3291.5 N, -316.2 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,010.0	2,792.6	-236.9	1,284,849.21	3,255,431.30	40.111686	-104.586757
- actual wellpath misses target center by 42.0ft at 9539.8ft MD (7007.8 TVD, 2788.7 N, -278.7 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,014.0	1,796.2	-152.4	1,283,853.73	3,255,526.12	40.108951	-104.586455
- actual wellpath misses target center by 4.3ft at 8538.2ft MD (7010.7 TVD, 1796.1 N, -155.0 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,009.0	1,796.2	-152.4	1,283,853.73	3,255,526.12	40.108951	-104.586455
- actual wellpath misses target center by 3.2ft at 8538.0ft MD (7010.7 TVD, 1795.9 N, -155.0 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	6,960.0	4,286.6	-363.7	1,286,341.87	3,255,289.14	40.115787	-104.587210
- actual wellpath misses target center by 67.8ft at 10980.0ft MD (6951.6 TVD, 4223.4 N, -386.7 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,002.0	2,792.6	-236.9	1,284,849.21	3,255,431.30	40.111686	-104.586757
- actual wellpath misses target center by 42.4ft at 9539.8ft MD (7007.8 TVD, 2788.8 N, -278.7 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,013.0	799.8	-67.8	1,282,858.24	3,255,620.98	40.106215	-104.586152
- actual wellpath misses target center by 19.2ft at 7538.1ft MD (7024.3 TVD, 798.8 N, -83.3 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,003.0	2,792.6	-236.9	1,284,849.21	3,255,431.30	40.111686	-104.586757
- actual wellpath misses target center by 42.2ft at 9539.8ft MD (7007.8 TVD, 2788.8 N, -278.7 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,016.0	1,298.0	-110.1	1,283,355.98	3,255,573.52	40.107583	-104.586304
- actual wellpath misses target center by 7.3ft at 8038.1ft MD (7013.7 TVD, 1297.5 N, -117.0 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	6,990.0	3,290.4	-279.1	1,285,346.56	3,255,383.93	40.113052	-104.586908
- actual wellpath misses target center by 37.0ft at 10041.0ft MD (6992.5 TVD, 3288.3 N, -316.0 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,007.0	2,294.4	-194.6	1,284,351.47	3,255,478.71	40.110318	-104.586606
- actual wellpath misses target center by 9.5ft at 9038.0ft MD (7015.2 TVD, 2293.8 N, -199.4 E)									
- Point									

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Grattan 4A-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 4A-30H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	USA EDM 5000 Multi Users DB

Grattan 4A-30H - TGT #	0.00	0.00	7,012.0	2,294.4	-194.6	1,284,351.47	3,255,478.71	40.110318	-104.586606
- actual wellpath misses target center by 5.7ft at 9038.0ft MD (7015.2 TVD, 2293.8 N, -199.4 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,022.0	600.5	-50.8	1,282,659.14	3,255,639.98	40.105668	-104.586092
- actual wellpath misses target center by 21.4ft at 7338.3ft MD (7019.9 TVD, 599.6 N, -72.1 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,002.0	2,294.4	-194.6	1,284,351.47	3,255,478.71	40.110318	-104.586606
- actual wellpath misses target center by 14.0ft at 9038.0ft MD (7015.2 TVD, 2293.8 N, -199.4 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,011.0	1,298.0	-110.1	1,283,355.98	3,255,573.52	40.107583	-104.586304
- actual wellpath misses target center by 7.5ft at 8038.1ft MD (7013.7 TVD, 1297.5 N, -117.0 E)									
- Point									
Kaminsky (Existing)	0.00	0.00	-6,950.0	3,956.4	-260.4	1,286,012.75	3,255,395.81	40.114881	-104.586841
- actual wellpath misses target center by 8001.5ft at 0.0ft MD (0.0 TVD, 0.0 N, 0.0 E)									
- Circle (radius 100.0)									
Grattan 4A-30H - TGT #	0.00	0.00	7,000.0	2,792.6	-236.9	1,284,849.21	3,255,431.30	40.111686	-104.586757
- actual wellpath misses target center by 42.7ft at 9539.8ft MD (7007.8 TVD, 2788.8 N, -278.7 E)									
- Point									
Grattan 4A-30H - TGT #	0.00	0.00	7,004.0	1,796.2	-152.4	1,283,853.73	3,255,526.12	40.108951	-104.586455
- actual wellpath misses target center by 7.2ft at 8537.9ft MD (7010.7 TVD, 1795.8 N, -155.0 E)									
- Point									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
1,000.0	1,000.0	-1.9	-1.8	Last Gyro Survey @ 1088' MD	
10,930.0	6,954.4	4,173.7	-381.1	Last Cathedral Survey @ 10,930' MD	
10,980.0	6,951.6	4,223.4	-386.7	PTB @ 10,980' MD	

Checked By: _____ Approved By: _____ Date: _____