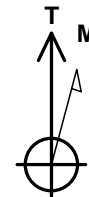
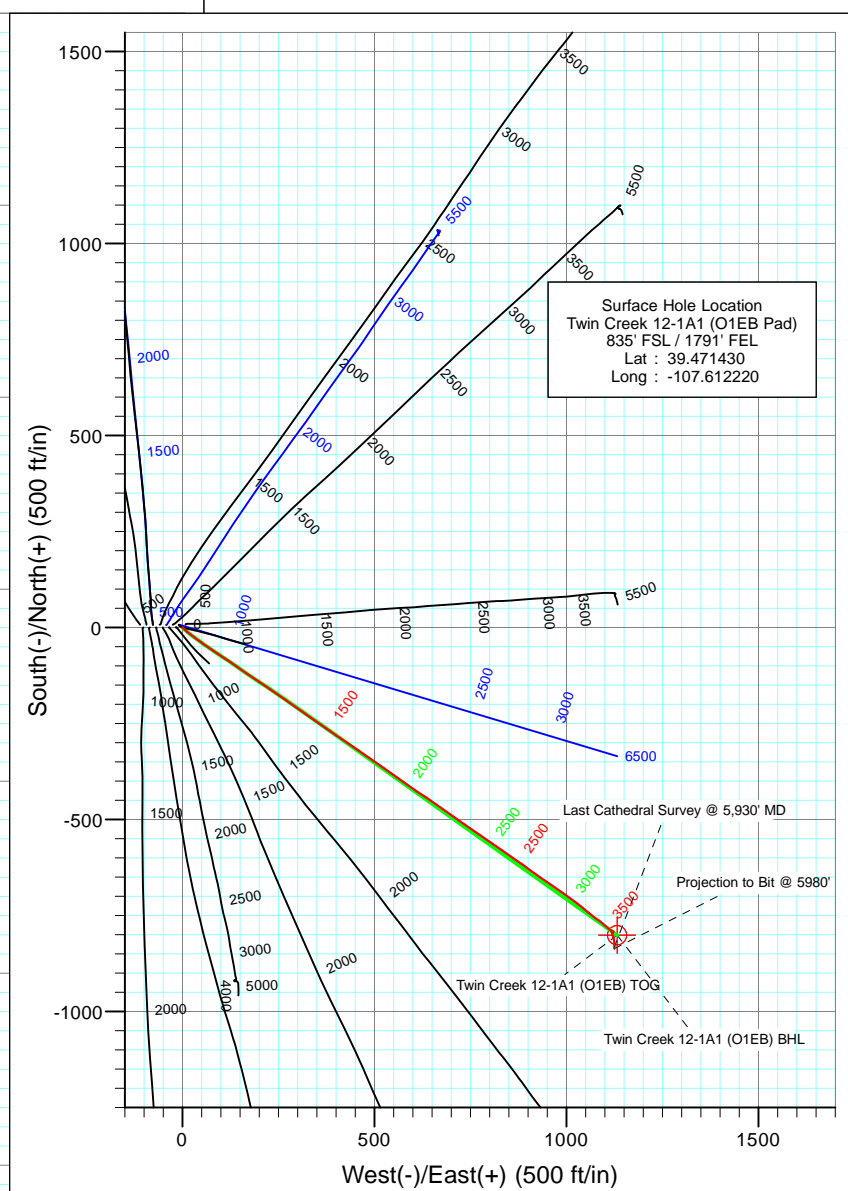
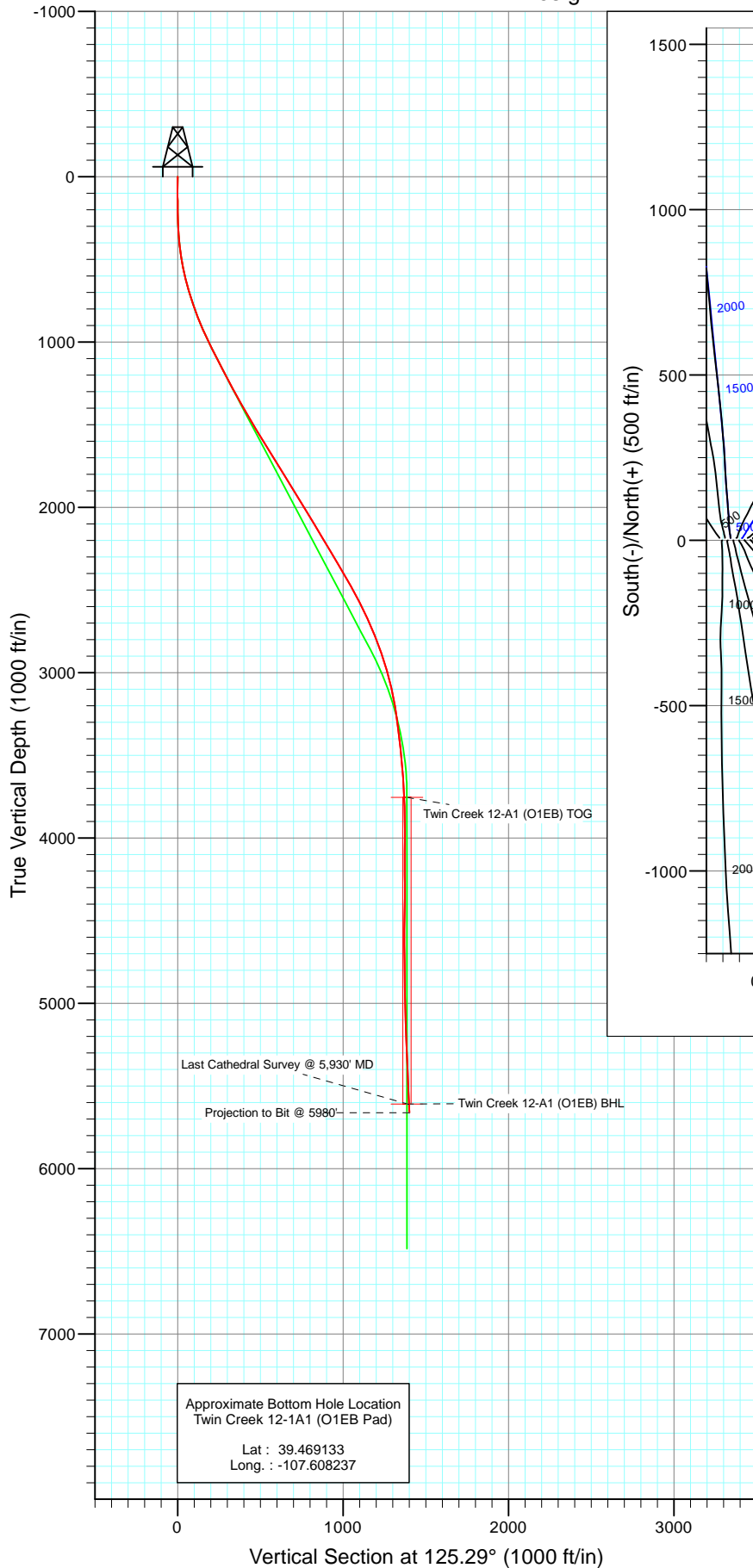




Project: Mamm Creek  
 Site: SWSE S1-T7S-R92W (O1EB Pad)  
 Well: Twin Creek 12-1A1 (O1EB Pad)  
 Wellbore: DD  
 Design: FINAL



Azimuths to True North  
 Magnetic North: 10.24°

Magnetic Field  
 Strength: 52338.8nT  
 Dip Angle: 65.80°  
 Date: 12/7/2010  
 Model: IGRF2010

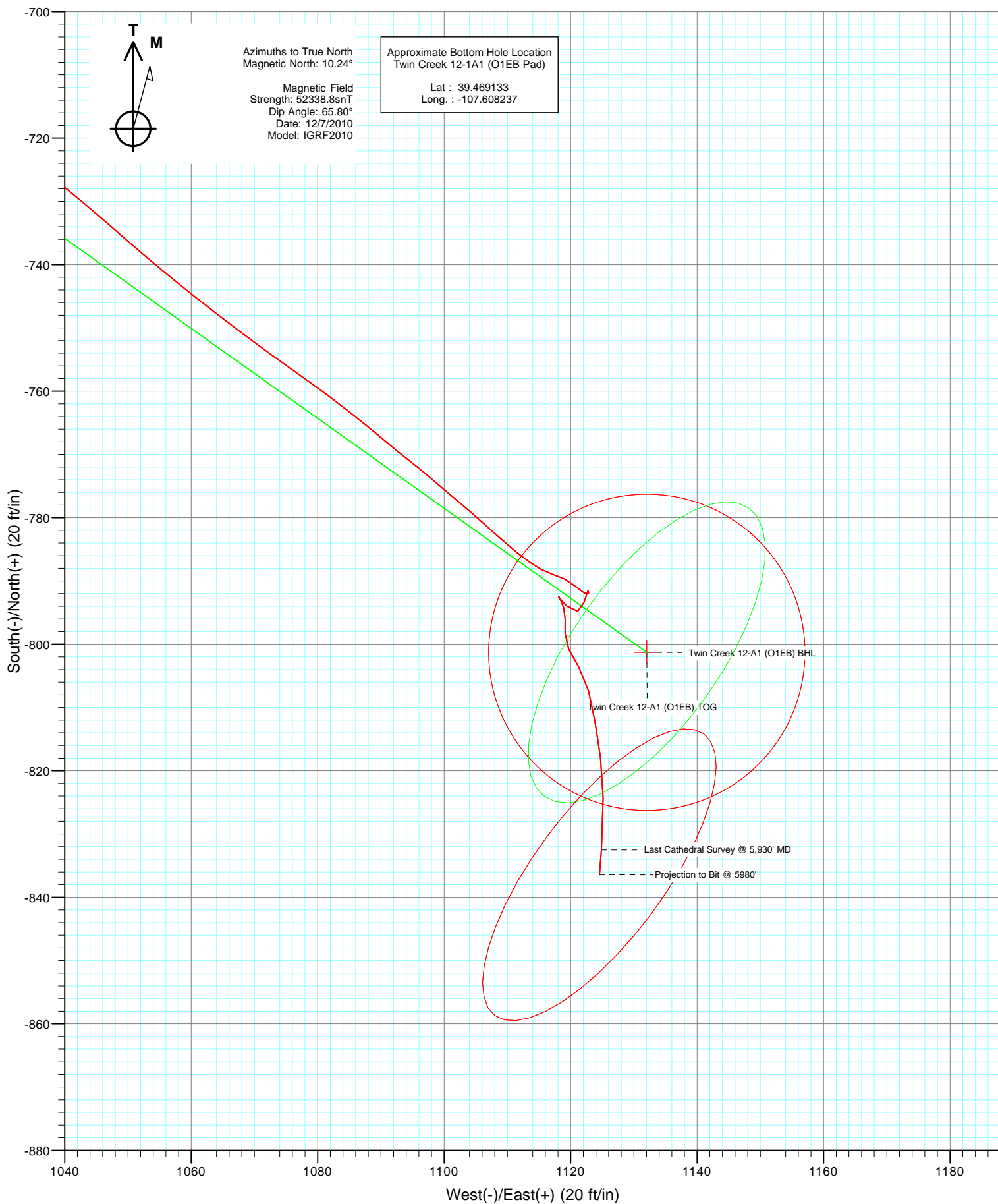
#### DESIGN DETAILS: DD

105353(SH), 105547 (MH): KR  
 KBE @ 6084.0ft (Nabors M15)

Target	Azimuth	Origin	N/S	E/W	From TVD
Twin Creek 12-A1 (O1EB) BHL	125.29	Slot	0.0	0.0	0.0



Project: Mamm Creek  
Site: SWSE S1-T7S-R92W (O1EB Pad)  
Well: Twin Creek 12-1A1 (O1EB Pad)  
Wellbore: DD  
Design: FINAL



# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Twin Creek 12-1A1 (O1EB Pad)
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 6084.0ft (Nabors M15)
<b>Site:</b>	SWSE S1-T7S-R92W (O1EB Pad)	<b>MD Reference:</b>	KBE @ 6084.0ft (Nabors M15)
<b>Well:</b>	Twin Creek 12-1A1 (O1EB Pad)	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	EDM 5000.1 US Multi Users DB

<b>Project</b>	Mamm Creek		
<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		

<b>Site</b>	SWSE S1-T7S-R92W (O1EB Pad)			
<b>Site Position:</b>		<b>Northing:</b>	1,603,540.14 ft	<b>Latitude:</b> 39.471450
<b>From:</b>	Lat/Long	<b>Easting:</b>	2,403,755.74 ft	<b>Longitude:</b> -107.612310
<b>Position Uncertainty:</b>	0.0 ft	<b>Slot Radius:</b>	13.200 in	<b>Grid Convergence:</b> -1.33 °

<b>Well</b>	Twin Creek 12-1A1 (O1EB Pad)			
<b>Well Position</b>	<b>+N/-S</b>	0.0 ft	<b>Northing:</b>	1,603,532.24 ft
	<b>+E/-W</b>	0.0 ft	<b>Easting:</b>	2,403,780.97 ft
<b>Position Uncertainty</b>	0.0 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b> 6,062.0 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	12/7/2010	10.24	65.80	52,339

<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	125.29

<b>Survey Program</b>	<b>Date</b>	12/14/2010		
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
115.0	5,980.0	Survey #1 (DD)	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	
115.0	0.20	23.60	115.0	0.2	0.1	0.0	0.17	0.17	
145.0	0.40	72.30	145.0	0.3	0.2	0.0	1.02	0.67	
176.0	0.70	109.50	176.0	0.2	0.5	0.3	1.46	0.97	
207.0	0.90	119.10	207.0	0.1	0.9	0.7	0.77	0.65	
238.0	1.40	141.20	238.0	-0.4	1.3	1.3	2.13	1.61	
268.0	2.10	140.70	268.0	-1.1	1.9	2.2	2.33	2.33	
299.0	2.70	138.30	298.9	-2.1	2.7	3.4	1.96	1.94	
330.0	3.60	130.30	329.9	-3.2	4.0	5.1	3.22	2.90	
361.0	4.20	133.00	360.8	-4.6	5.5	7.2	2.02	1.94	
392.0	5.10	132.90	391.7	-6.3	7.4	9.7	2.90	2.90	
422.0	6.30	134.30	421.6	-8.4	9.5	12.6	4.03	4.00	
453.0	7.80	132.40	452.3	-11.0	12.3	16.4	4.90	4.84	

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Twin Creek 12-1A1 (O1EB Pad)
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 6084.0ft (Nabors M15)
<b>Site:</b>	SWSE S1-T7S-R92W (O1EB Pad)	<b>MD Reference:</b>	KBE @ 6084.0ft (Nabors M15)
<b>Well:</b>	Twin Creek 12-1A1 (O1EB Pad)	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	EDM 5000.1 US 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
483.0	9.20	129.90	482.0	-13.9	15.7	20.8	4.83	4.67	
514.0	10.30	128.80	512.6	-17.2	19.7	26.1	3.60	3.55	
545.0	10.80	127.40	543.0	-20.8	24.2	31.7	1.81	1.61	
576.0	12.30	126.60	573.4	-24.5	29.1	37.9	4.87	4.84	
606.0	13.30	125.90	602.7	-28.4	34.5	44.6	3.37	3.33	
637.0	14.50	124.50	632.8	-32.7	40.6	52.0	4.02	3.87	
668.0	15.20	125.10	662.7	-37.2	47.1	60.0	2.31	2.26	
699.0	16.30	125.70	692.6	-42.1	54.0	68.4	3.59	3.55	
729.0	17.50	123.90	721.3	-47.1	61.1	77.1	4.36	4.00	
759.0	18.30	123.80	749.8	-52.2	68.8	86.3	2.67	2.67	
790.0	18.90	124.40	779.2	-57.8	77.0	96.2	2.03	1.94	
821.0	19.70	124.50	808.4	-63.6	85.4	106.5	2.58	2.58	
852.0	20.80	125.20	837.5	-69.7	94.2	117.2	3.63	3.55	
883.0	21.80	124.50	866.4	-76.1	103.5	128.4	3.33	3.23	
913.0	22.80	123.60	894.2	-82.5	112.9	139.8	3.52	3.33	
944.0	23.80	123.50	922.6	-89.3	123.1	152.1	3.23	3.23	
975.0	24.50	125.20	950.9	-96.4	133.6	164.8	3.18	2.26	
1,067.0	26.80	124.20	1,033.9	-119.1	166.3	204.6	2.54	2.50	
1,160.0	27.20	123.30	1,116.7	-142.5	201.4	246.8	0.61	0.43	
1,215.0	27.20	123.90	1,165.6	-156.5	222.4	271.9	0.50	0.00	
1,355.0	28.40	125.80	1,289.5	-193.8	276.0	337.2	1.07	0.86	
1,450.0	29.30	124.80	1,372.7	-220.3	313.4	383.0	1.07	0.95	
1,545.0	30.20	124.80	1,455.2	-247.2	352.1	430.2	0.95	0.95	
1,640.0	31.10	124.70	1,536.9	-274.8	391.9	478.6	0.95	0.95	
1,735.0	32.20	124.00	1,617.8	-302.9	433.0	528.4	1.22	1.16	
1,828.0	31.60	125.10	1,696.7	-330.8	473.5	577.6	0.90	-0.65	
1,922.0	31.70	124.50	1,776.7	-358.9	514.0	626.9	0.35	0.11	
2,018.0	31.60	125.70	1,858.5	-387.9	555.2	677.3	0.66	-0.10	
2,113.0	30.80	124.80	1,939.7	-416.3	595.4	726.5	0.97	-0.84	
2,208.0	32.10	123.10	2,020.8	-443.9	636.5	776.0	1.66	1.37	
2,303.0	31.30	126.30	2,101.6	-472.3	677.6	825.9	1.96	-0.84	
2,398.0	30.40	124.50	2,183.2	-500.6	717.3	874.6	1.36	-0.95	
2,493.0	30.90	125.00	2,264.9	-528.2	757.0	923.1	0.59	0.53	
2,588.0	30.10	124.30	2,346.7	-555.6	796.7	971.3	0.92	-0.84	
2,683.0	30.80	125.00	2,428.6	-583.0	836.3	1,019.4	0.83	0.74	
2,779.0	28.70	125.10	2,512.0	-610.3	875.3	1,067.0	2.19	-2.19	
2,874.0	25.80	126.30	2,596.4	-635.7	910.6	1,110.5	3.11	-3.05	
2,969.0	24.50	124.10	2,682.4	-659.0	943.6	1,150.9	1.69	-1.37	
3,064.0	22.50	124.30	2,769.5	-680.3	974.9	1,188.8	2.11	-2.11	
3,159.0	20.10	126.50	2,858.0	-700.2	1,003.1	1,223.3	2.66	-2.53	
3,255.0	17.30	126.30	2,949.0	-718.5	1,027.9	1,254.0	2.92	-2.92	
3,350.0	13.80	131.30	3,040.5	-734.3	1,047.8	1,279.4	3.94	-3.68	
3,446.0	11.20	127.40	3,134.2	-747.5	1,063.8	1,300.2	2.85	-2.71	
3,541.0	9.40	125.30	3,227.7	-757.6	1,077.4	1,317.1	1.94	-1.89	
3,636.0	7.00	129.90	3,321.7	-765.8	1,088.2	1,330.7	2.62	-2.53	
3,731.0	6.00	128.30	3,416.1	-772.6	1,096.5	1,341.4	1.07	-1.05	
3,826.0	6.50	132.00	3,510.5	-779.3	1,104.4	1,351.7	0.68	0.53	
3,921.0	4.90	130.10	3,605.0	-785.5	1,111.5	1,361.1	1.70	-1.68	
4,016.0	3.00	107.40	3,699.8	-788.9	1,117.0	1,367.5	2.55	-2.00	
4,110.0	1.80	133.10	3,793.7	-790.6	1,120.4	1,371.3	1.68	-1.28	
4,206.0	0.90	113.60	3,889.7	-791.9	1,122.2	1,373.5	1.04	-0.94	
4,301.0	0.40	350.00	3,984.7	-791.9	1,122.9	1,374.0	1.23	-0.53	
4,396.0	0.10	349.70	4,079.7	-791.5	1,122.8	1,373.7	0.32	-0.32	

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Twin Creek 12-1A1 (O1EB Pad)
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 6084.0ft (Nabors M15)
<b>Site:</b>	SWSE S1-T7S-R92W (O1EB Pad)	<b>MD Reference:</b>	KBE @ 6084.0ft (Nabors M15)
<b>Well:</b>	Twin Creek 12-1A1 (O1EB Pad)	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	EDM 5000.1 US 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
4,491.0	0.50	195.50	4,174.7	-791.8	1,122.7	1,373.8	0.62	0.42	
4,586.0	1.50	200.90	4,269.7	-793.4	1,122.1	1,374.3	1.06	1.05	
4,681.0	0.70	247.40	4,364.7	-794.8	1,121.1	1,374.3	1.20	-0.84	
4,776.0	1.90	311.50	4,459.6	-793.9	1,119.4	1,372.4	1.80	1.26	
4,871.0	0.40	342.90	4,554.6	-792.6	1,118.1	1,370.6	1.66	-1.58	
4,965.0	0.70	150.00	4,648.6	-792.8	1,118.3	1,370.8	1.16	0.32	
5,060.0	1.20	163.30	4,743.6	-794.2	1,118.9	1,372.1	0.57	0.53	
5,156.0	1.00	183.10	4,839.6	-796.0	1,119.1	1,373.4	0.44	-0.21	
5,250.0	1.70	178.50	4,933.6	-798.2	1,119.1	1,374.6	0.75	0.74	
5,346.0	1.50	154.60	5,029.5	-800.8	1,119.7	1,376.6	0.72	-0.21	
5,441.0	2.30	147.70	5,124.5	-803.5	1,121.3	1,379.4	0.87	0.84	
5,536.0	2.80	166.10	5,219.4	-807.4	1,122.8	1,382.9	1.00	0.53	
5,631.0	3.30	169.60	5,314.2	-812.3	1,123.9	1,386.7	0.56	0.53	
5,725.0	3.60	173.30	5,408.1	-817.9	1,124.7	1,390.6	0.40	0.32	
5,820.0	4.10	178.60	5,502.9	-824.3	1,125.2	1,394.6	0.65	0.53	
5,930.0	4.50	184.80	5,612.5	-832.5	1,124.9	1,399.1	0.56	0.36	Last Cathedral Survey @ 5,930' MD Projection to Bit @ 5980'
5,980.0	4.50	184.80	5,662.4	-836.4	1,124.6	1,401.1	0.00	0.00	

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									
Twin Creek 12-A1 (O1EI	0.00	0.00	5,609.0	-801.3	1,132.1	1,602,704.87	2,404,894.10	39.469230	-107.608210
- actual wellpath misses target center by 31.7ft at 5924.1ft MD (5606.7 TVD, -832.1 N, 1124.9 E)									
- Circle (radius 25.0)									
Twin Creek 12-A1 (O1EI	0.00	0.00	3,754.0	-801.3	1,132.1	1,602,704.87	2,404,894.10	39.469230	-107.608210
- actual wellpath misses target center by 17.1ft at 4070.9ft MD (3754.7 TVD, -789.8 N, 1119.3 E)									
- Point									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
5,930.0	5,612.5	-832.5	1,124.9	Last Cathedral Survey @ 5,930' MD	
5,980.0	5,662.4	-836.4	1,124.6	Projection to Bit @ 5980'	

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