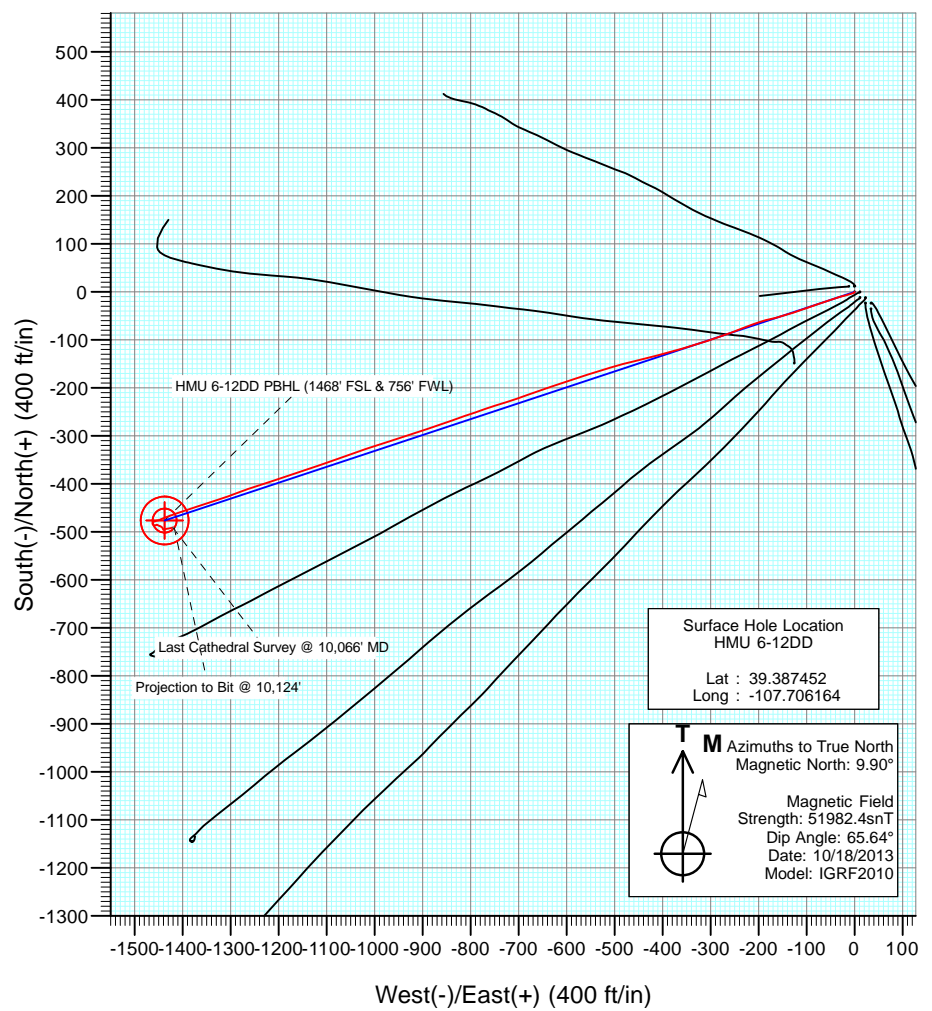
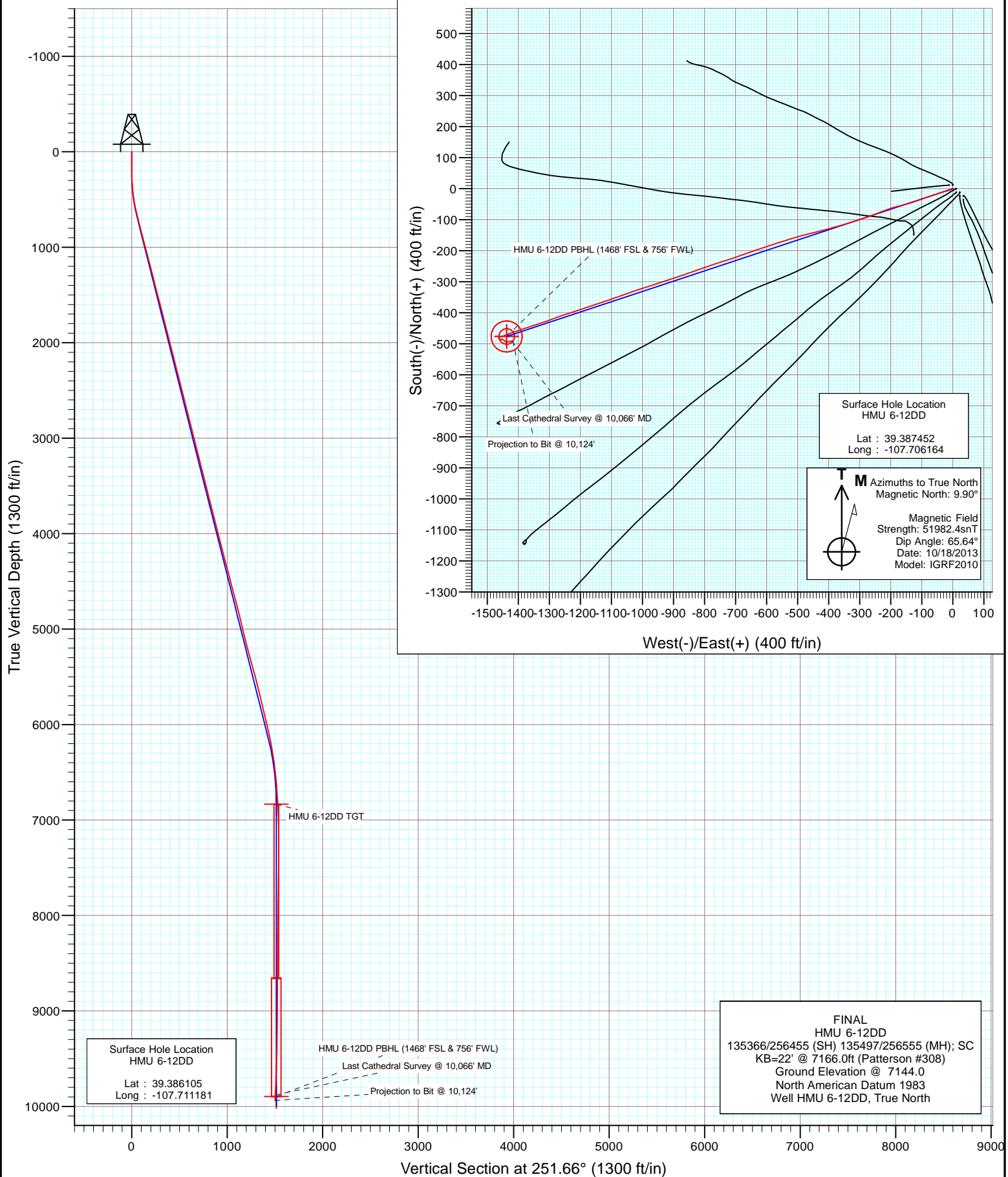




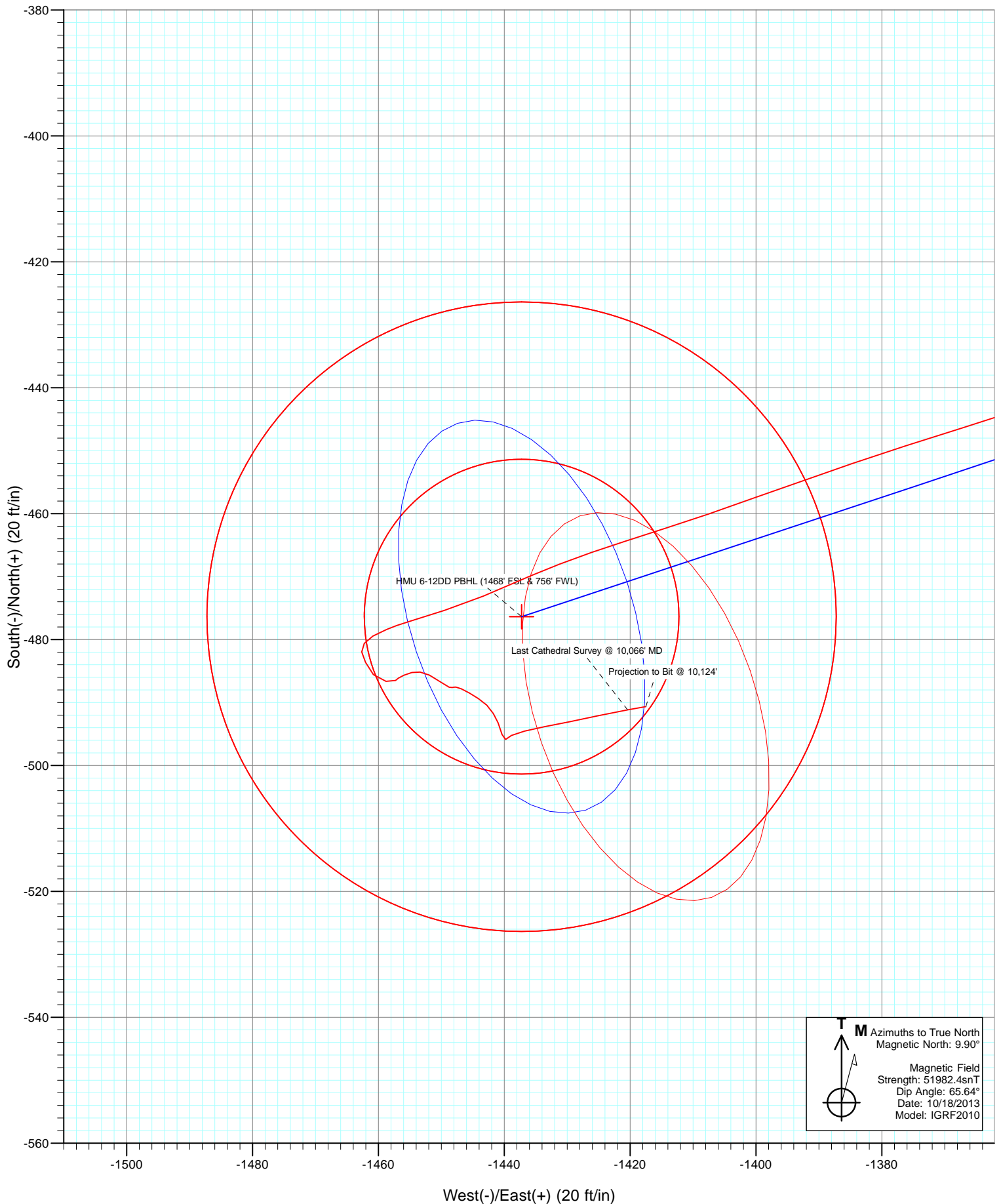
Project: Mamm Creek  
Site: J6SEB Pad  
Well: HMU 6-12DD  
Wellbore: OH  
Design: REVISED FINAL



FINAL  
HMU 6-12DD  
135366/256455 (SH) 135497/256555 (MH); SC  
KB=22' @ 7166.0ft (Patterson #308)  
Ground Elevation @ 7144.0  
North American Datum 1983  
Well HMU 6-12DD, True North

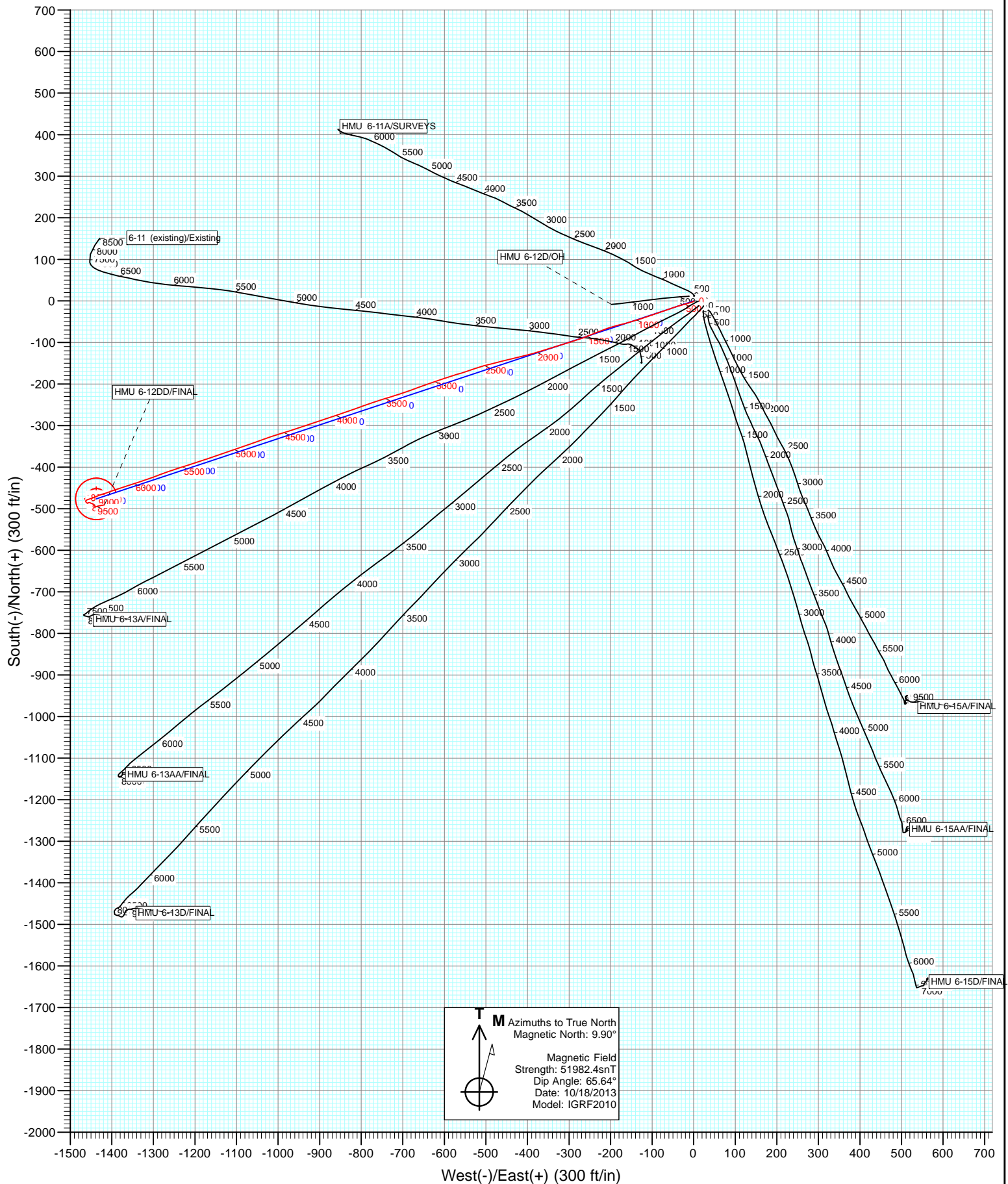


Project: Mamm Creek  
Site: J6SEB Pad  
Well: HMU 6-12DD  
Wellbore: OH  
Design: FINAL





Project: Mamm Creek  
Site: J6SEB Pad  
Well: HMU 6-12DD  
Wellbore: OH  
Design: FINAL



# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU 6-12DD
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KB=22' @ 7166.0ft (Patterson #308)
<b>Site:</b>	J6SEB Pad	<b>MD Reference:</b>	KB=22' @ 7166.0ft (Patterson #308)
<b>Well:</b>	HMU 6-12DD	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 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		

Site		J6SEB Pad			
Site Position:		Northing:	1,573,595.87 ft	Latitude:	39.387484
From:	Lat/Long	Easting:	2,376,514.08 ft	Longitude:	-107.706205
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.39 °

Well	HMU 6-12DD					
Well Position	+N/-S	0.0 ft	Northing:	1,573,583.93 ft	Latitude:	39.387452
	+E/-W	0.0 ft	Easting:	2,376,525.38 ft	Longitude:	-107.706164
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,144.0 ft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	10/18/2013	9.91	65.64	51,982

<b>Design</b>	FINAL				
<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	251.66	

<b>Survey Program</b>	<b>Date</b>	11/5/2013			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
121.0	10,124.0	Survey #1 (OH)	Geolink 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		
121.0	0.40	208.20	121.0	-0.4	-0.2	0.3	0.33	0.33		
151.0	0.40	200.70	151.0	-0.6	-0.3	0.4	0.17	0.00		
181.0	0.50	182.00	181.0	-0.8	-0.3	0.6	0.59	0.33		
212.0	0.60	199.20	212.0	-1.1	-0.4	0.7	0.62	0.32		
242.0	1.10	231.20	242.0	-1.4	-0.7	1.1	2.24	1.67		
273.0	1.80	243.90	273.0	-1.8	-1.3	1.8	2.47	2.26		
303.0	2.60	248.00	303.0	-2.3	-2.4	3.0	2.72	2.67		
334.0	3.40	252.00	333.9	-2.8	-3.9	4.6	2.67	2.58		
364.0	4.40	252.00	363.8	-3.4	-5.9	6.6	3.33	3.33		
395.0	5.40	252.20	394.7	-4.3	-8.4	9.3	3.23	3.23		
487.0	8.50	255.90	486.0	-7.2	-19.1	20.4	3.40	3.37		
578.0	11.30	253.00	575.7	-11.5	-34.1	36.0	3.12	3.08		

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU 6-12DD
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KB=22' @ 7166.0ft (Patterson #308)
<b>Site:</b>	J6SEB Pad	<b>MD Reference:</b>	KB=22' @ 7166.0ft (Patterson #308)
<b>Well:</b>	HMU 6-12DD	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	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
670.0	13.70	250.50	665.5	-17.8	-53.0	55.9	2.67	2.61	
762.0	14.30	251.50	754.8	-25.0	-74.1	78.2	0.70	0.65	
854.0	15.00	251.00	843.8	-32.5	-96.1	101.5	0.77	0.76	
946.0	15.80	250.80	932.5	-40.5	-119.2	125.9	0.87	0.87	
1,038.0	14.10	254.40	1,021.4	-47.6	-141.8	149.6	2.10	-1.85	
1,130.0	13.90	255.20	1,110.6	-53.5	-163.3	171.8	0.30	-0.22	
1,222.0	14.10	254.90	1,199.9	-59.2	-184.8	194.0	0.23	0.22	
1,314.0	14.40	250.80	1,289.1	-65.9	-206.4	216.7	1.14	0.33	
1,343.0	14.40	250.20	1,317.2	-68.3	-213.2	223.9	0.51	0.00	
1,430.0	14.60	248.90	1,401.4	-75.9	-233.6	245.6	0.44	0.23	
1,525.0	14.50	247.70	1,493.3	-84.7	-255.8	269.5	0.33	-0.11	
1,620.0	14.60	252.00	1,585.3	-92.9	-278.2	293.3	1.14	0.11	
1,715.0	14.40	252.80	1,677.3	-100.1	-300.9	317.1	0.30	-0.21	
1,810.0	14.10	252.30	1,769.3	-107.1	-323.2	340.5	0.34	-0.32	
1,905.0	14.30	253.90	1,861.4	-113.9	-345.5	363.8	0.46	0.21	
2,000.0	13.50	251.70	1,953.7	-120.6	-367.3	386.6	1.01	-0.84	
2,095.0	14.00	254.90	2,045.9	-127.1	-388.9	409.1	0.96	0.53	
2,190.0	14.60	256.40	2,138.0	-132.9	-411.6	432.5	0.74	0.63	
2,284.0	15.20	256.70	2,228.8	-138.5	-435.1	456.6	0.64	0.64	
2,380.0	14.70	255.70	2,321.6	-144.5	-459.2	481.3	0.59	-0.52	
2,475.0	14.30	255.90	2,413.6	-150.3	-482.2	505.0	0.42	-0.42	
2,570.0	14.10	254.90	2,505.6	-156.2	-504.8	528.3	0.33	-0.21	
2,664.0	14.20	251.20	2,596.8	-162.9	-526.8	551.3	0.97	0.11	
2,760.0	13.20	251.20	2,690.1	-170.2	-548.3	574.0	1.04	-1.04	
2,855.0	14.20	254.10	2,782.4	-176.9	-569.8	596.5	1.28	1.05	
2,950.0	14.70	251.30	2,874.4	-183.9	-592.4	620.2	0.90	0.53	
3,046.0	14.00	251.30	2,967.4	-191.6	-614.9	644.0	0.73	-0.73	
3,141.0	14.60	250.30	3,059.4	-199.3	-637.1	667.4	0.68	0.63	
3,237.0	13.80	250.80	3,152.5	-207.1	-659.3	691.0	0.84	-0.83	
3,332.0	14.10	250.10	3,244.7	-214.8	-680.9	713.9	0.36	0.32	
3,428.0	14.50	251.90	3,337.7	-222.5	-703.3	737.6	0.62	0.42	
3,523.0	14.30	252.20	3,429.7	-229.8	-725.8	761.2	0.22	-0.21	
3,618.0	13.20	252.70	3,522.0	-236.6	-747.3	783.8	1.16	-1.16	
3,713.0	14.30	251.80	3,614.3	-243.5	-768.8	806.4	1.18	1.16	
3,808.0	14.50	249.80	3,706.3	-251.3	-791.1	830.0	0.56	0.21	
3,904.0	14.10	251.30	3,799.3	-259.2	-813.5	853.7	0.57	-0.42	
3,999.0	14.60	250.20	3,891.4	-266.9	-835.7	877.2	0.60	0.53	
4,093.0	13.50	251.50	3,982.5	-274.4	-857.2	900.0	1.22	-1.17	
4,189.0	14.50	252.00	4,075.7	-281.7	-879.3	923.3	1.05	1.04	
4,283.0	14.90	251.00	4,166.6	-289.3	-901.9	947.1	0.50	0.43	
4,378.0	14.50	251.10	4,258.5	-297.1	-924.7	971.2	0.42	-0.42	
4,474.0	15.20	252.20	4,351.3	-304.8	-948.1	995.8	0.79	0.73	
4,569.0	14.90	252.10	4,443.0	-312.4	-971.5	1,020.5	0.32	-0.32	
4,664.0	14.30	253.50	4,535.0	-319.5	-994.4	1,044.4	0.73	-0.63	
4,759.0	14.80	250.50	4,626.9	-326.9	-1,017.1	1,068.3	0.95	0.53	
4,854.0	14.60	250.40	4,718.8	-334.9	-1,039.8	1,092.4	0.21	-0.21	
4,949.0	14.30	250.40	4,810.8	-342.9	-1,062.2	1,116.1	0.32	-0.32	
5,044.0	13.50	251.80	4,903.0	-350.3	-1,083.7	1,138.9	0.91	-0.84	
5,139.0	13.00	250.50	4,995.5	-357.3	-1,104.3	1,160.7	0.61	-0.53	
5,234.0	13.80	251.30	5,087.9	-364.5	-1,125.2	1,182.7	0.86	0.84	
5,328.0	14.80	250.50	5,179.0	-372.1	-1,147.1	1,205.9	1.08	1.06	
5,423.0	15.20	251.30	5,270.8	-380.1	-1,170.3	1,230.5	0.47	0.42	
5,518.0	15.10	252.70	5,362.5	-387.8	-1,193.9	1,255.3	0.40	-0.11	

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU 6-12DD
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KB=22' @ 7166.0ft (Patterson #308)
<b>Site:</b>	J6SEB Pad	<b>MD Reference:</b>	KB=22' @ 7166.0ft (Patterson #308)
<b>Well:</b>	HMU 6-12DD	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	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
5,613.0	15.20	251.80	5,454.2	-395.4	-1,217.6	1,280.1	0.27	0.11	
5,707.0	15.30	252.20	5,544.8	-403.0	-1,241.1	1,304.9	0.15	0.11	
5,802.0	13.50	250.60	5,636.9	-410.5	-1,263.5	1,328.5	1.94	-1.89	
5,897.0	13.30	249.40	5,729.3	-418.1	-1,284.2	1,350.5	0.36	-0.21	
5,992.0	13.40	249.80	5,821.7	-425.7	-1,304.7	1,372.4	0.14	0.11	
6,087.0	14.00	251.90	5,914.0	-433.1	-1,326.0	1,394.9	0.82	0.63	
6,181.0	13.20	252.00	6,005.4	-439.9	-1,347.0	1,417.0	0.85	-0.85	
6,276.0	12.30	252.70	6,098.0	-446.3	-1,367.0	1,438.0	0.96	-0.95	
6,371.0	10.40	251.30	6,191.2	-452.1	-1,384.8	1,456.7	2.02	-2.00	
6,466.0	9.60	250.00	6,284.7	-457.5	-1,400.3	1,473.2	0.87	-0.84	
6,561.0	8.30	252.50	6,378.6	-462.3	-1,414.3	1,487.9	1.43	-1.37	
6,655.0	6.90	251.00	6,471.7	-466.2	-1,426.1	1,500.4	1.50	-1.49	
6,750.0	5.60	246.50	6,566.2	-469.9	-1,435.8	1,510.7	1.46	-1.37	
6,845.0	4.30	247.30	6,660.8	-473.1	-1,443.3	1,518.9	1.37	-1.37	
6,940.0	3.60	252.70	6,755.6	-475.4	-1,449.4	1,525.4	0.83	-0.74	
7,033.0	3.30	252.60	6,848.4	-477.0	-1,454.8	1,531.0	0.32	-0.32	
7,128.0	1.70	246.90	6,943.3	-478.4	-1,458.7	1,535.1	1.70	-1.68	
7,221.0	1.30	240.50	7,036.3	-479.5	-1,460.9	1,537.5	0.47	-0.43	
7,316.0	0.90	213.80	7,131.3	-480.6	-1,462.2	1,539.2	0.67	-0.42	
7,411.0	0.90	178.70	7,226.3	-482.0	-1,462.6	1,540.0	0.57	0.00	
7,505.0	1.30	147.20	7,320.2	-483.6	-1,462.0	1,539.9	0.76	0.43	
7,600.0	1.50	147.70	7,415.2	-485.6	-1,460.8	1,539.4	0.21	0.21	
7,695.0	1.60	90.10	7,510.2	-486.6	-1,458.8	1,537.8	1.57	0.11	
7,790.0	0.30	56.00	7,605.2	-486.5	-1,457.3	1,536.3	1.43	-1.37	
7,885.0	0.40	50.00	7,700.2	-486.1	-1,456.8	1,535.8	0.11	0.11	
7,980.0	0.80	68.40	7,795.2	-485.7	-1,455.9	1,534.8	0.46	0.42	
8,076.0	0.80	73.50	7,891.2	-485.2	-1,454.7	1,533.5	0.07	0.00	
8,171.0	0.80	100.00	7,986.1	-485.2	-1,453.4	1,532.2	0.39	0.00	
8,266.0	1.10	114.30	8,081.1	-485.7	-1,451.9	1,531.0	0.40	0.32	
8,361.0	1.50	126.70	8,176.1	-486.8	-1,450.1	1,529.6	0.51	0.42	
8,456.0	0.40	99.90	8,271.1	-487.6	-1,448.7	1,528.6	1.22	-1.16	
8,550.0	0.20	80.70	8,365.1	-487.6	-1,448.3	1,528.1	0.24	-0.21	
8,645.0	0.10	80.40	8,460.1	-487.6	-1,448.0	1,527.9	0.11	-0.11	
8,740.0	0.30	89.30	8,555.1	-487.5	-1,447.7	1,527.6	0.21	0.21	
8,835.0	0.80	113.30	8,650.1	-487.8	-1,446.8	1,526.8	0.57	0.53	
8,930.0	1.00	120.70	8,745.1	-488.5	-1,445.5	1,525.8	0.24	0.21	
9,024.0	1.00	123.60	8,839.1	-489.4	-1,444.1	1,524.7	0.05	0.00	
9,117.0	1.10	131.80	8,932.0	-490.4	-1,442.8	1,523.8	0.19	0.11	
9,213.0	1.00	152.80	9,028.0	-491.8	-1,441.7	1,523.2	0.41	-0.10	
9,307.0	1.00	154.30	9,122.0	-493.2	-1,441.0	1,523.0	0.03	0.00	
9,401.0	1.40	165.20	9,216.0	-495.1	-1,440.3	1,522.9	0.49	0.43	
9,495.0	0.50	38.60	9,310.0	-495.9	-1,439.8	1,522.7	1.86	-0.96	
9,590.0	0.90	64.50	9,405.0	-495.2	-1,438.8	1,521.6	0.53	0.42	
9,686.0	1.70	75.80	9,501.0	-494.6	-1,436.8	1,519.4	0.87	0.83	
9,781.0	2.20	78.70	9,595.9	-493.9	-1,433.6	1,516.2	0.54	0.53	
9,876.0	2.70	78.80	9,690.8	-493.1	-1,429.6	1,512.2	0.53	0.53	
9,970.0	2.90	77.60	9,784.7	-492.1	-1,425.1	1,507.6	0.22	0.21	
10,066.0	2.90	79.80	9,880.6	-491.2	-1,420.4	1,502.8	0.12	0.00	Last Cathedral Survey @ 10,066' MD
10,124.0	2.90	79.80	9,938.5	-490.6	-1,417.5	1,499.9	0.00	0.00	Projection to Bit @ 10,124'

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU 6-12DD
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KB=22' @ 7166.0ft (Patterson #308)
<b>Site:</b>	J6SEB Pad	<b>MD Reference:</b>	KB=22' @ 7166.0ft (Patterson #308)
<b>Well:</b>	HMU 6-12DD	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	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									
HMU 6-12DD PBHL (14ft)	0.00	0.00	9,897.0	-476.4	-1,437.2	1,573,142.61	2,375,077.01	39.386144	-107.711249
- actual wellpath misses target center by 27.8ft at 10066.0ft MD (9880.6 TVD, -491.2 N, -1420.4 E)									
- Circle (radius 50.0)									
HMU 6-12DD TGT	0.00	0.00	6,833.0	-476.4	-1,437.2	1,573,142.61	2,375,077.01	39.386144	-107.711249
- actual wellpath misses target center by 16.7ft at 7016.6ft MD (6832.0 TVD, -476.7 N, -1453.9 E)									
- Circle (radius 25.0)									

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S	+E/-W		
		(ft)	(ft)	Comment	
10,066.0	9,880.6	-491.2	-1,420.4	Last Cathedral Survey @ 10,066' MD	
10,124.0	9,938.5	-490.6	-1,417.5	Projection to Bit @ 10,124'	

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