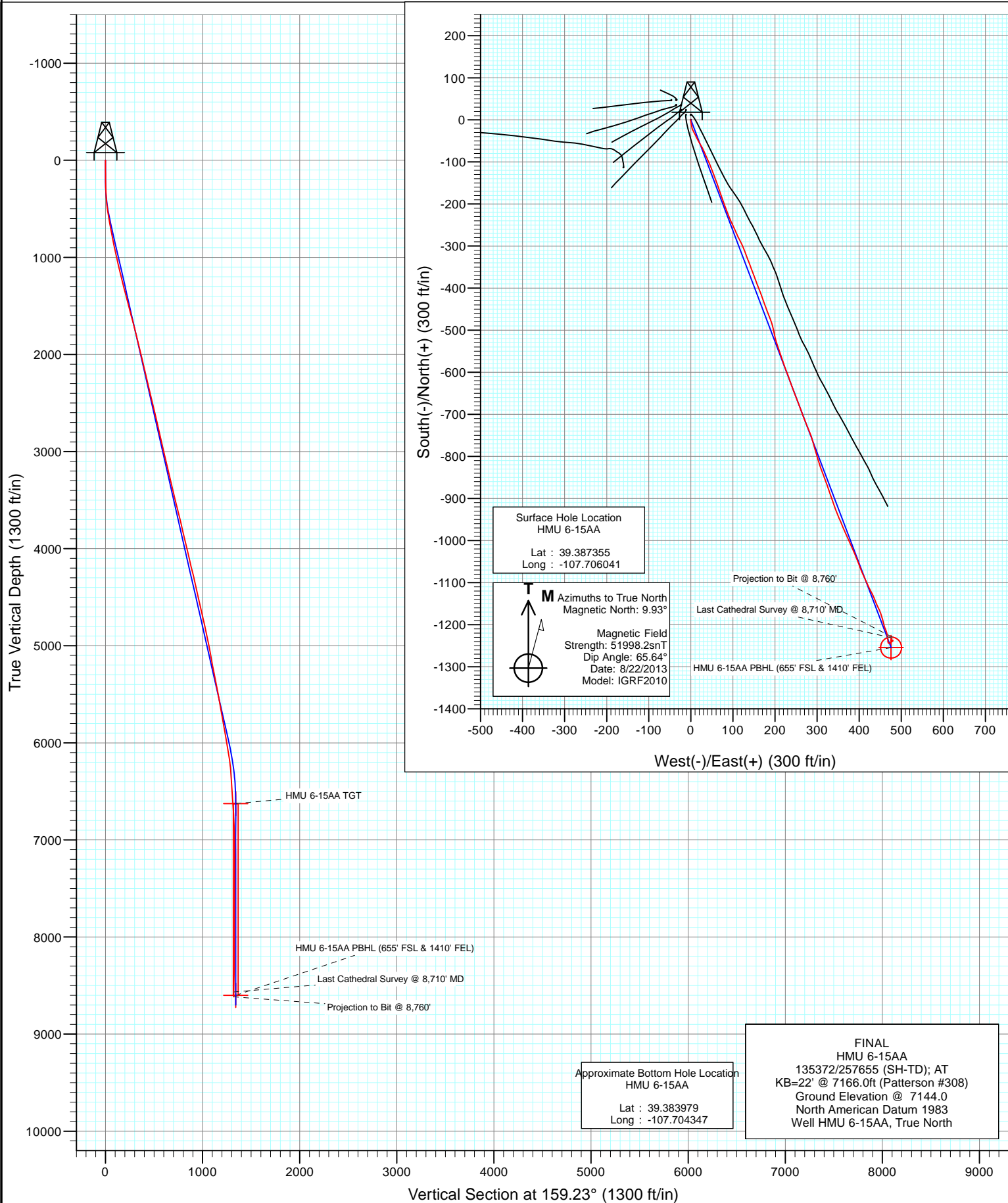


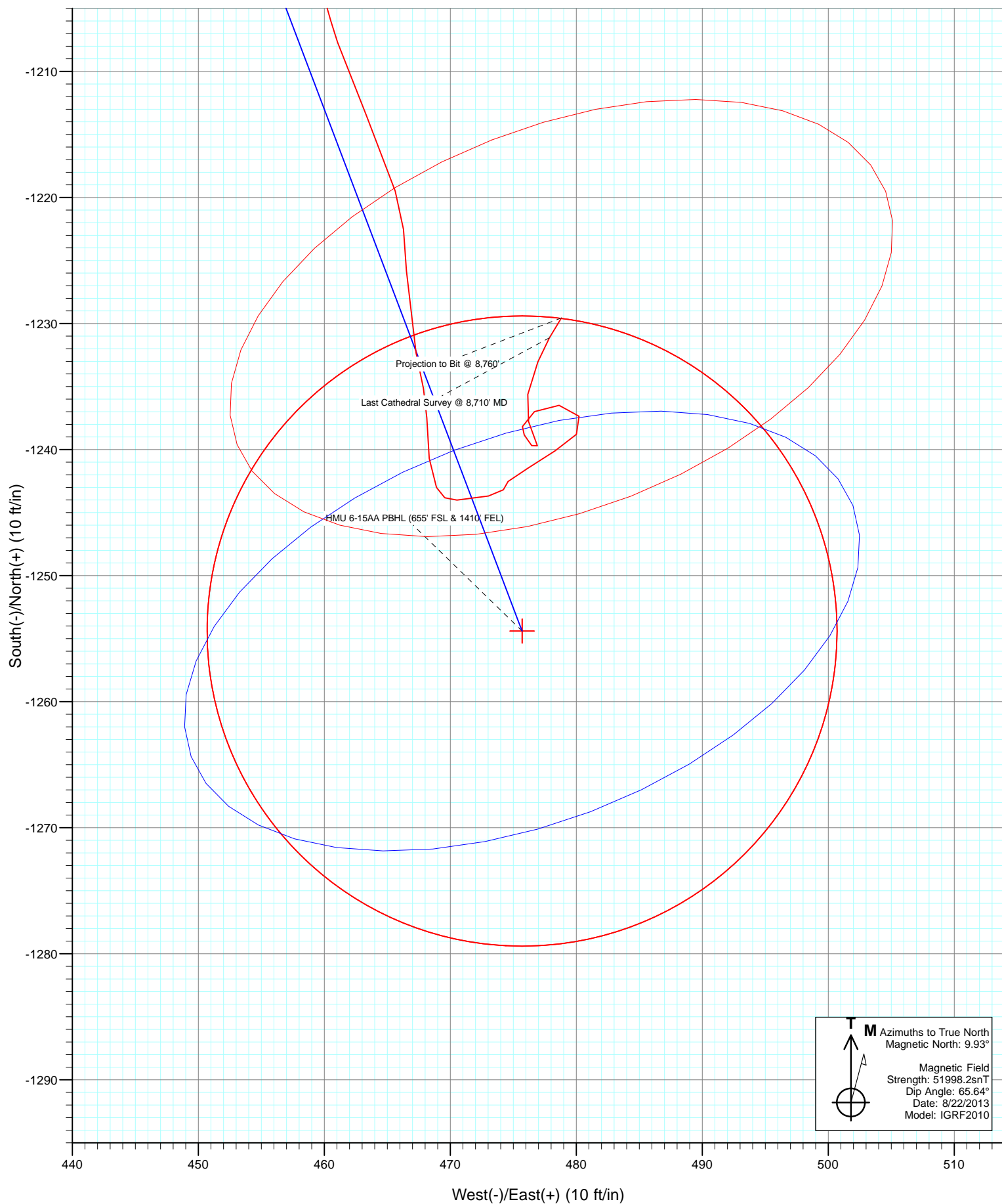


Project: Mamm Creek  
Site: J6SEB Pad  
Well: HMU 6-15AA  
Wellbore: OH  
Design: FINAL



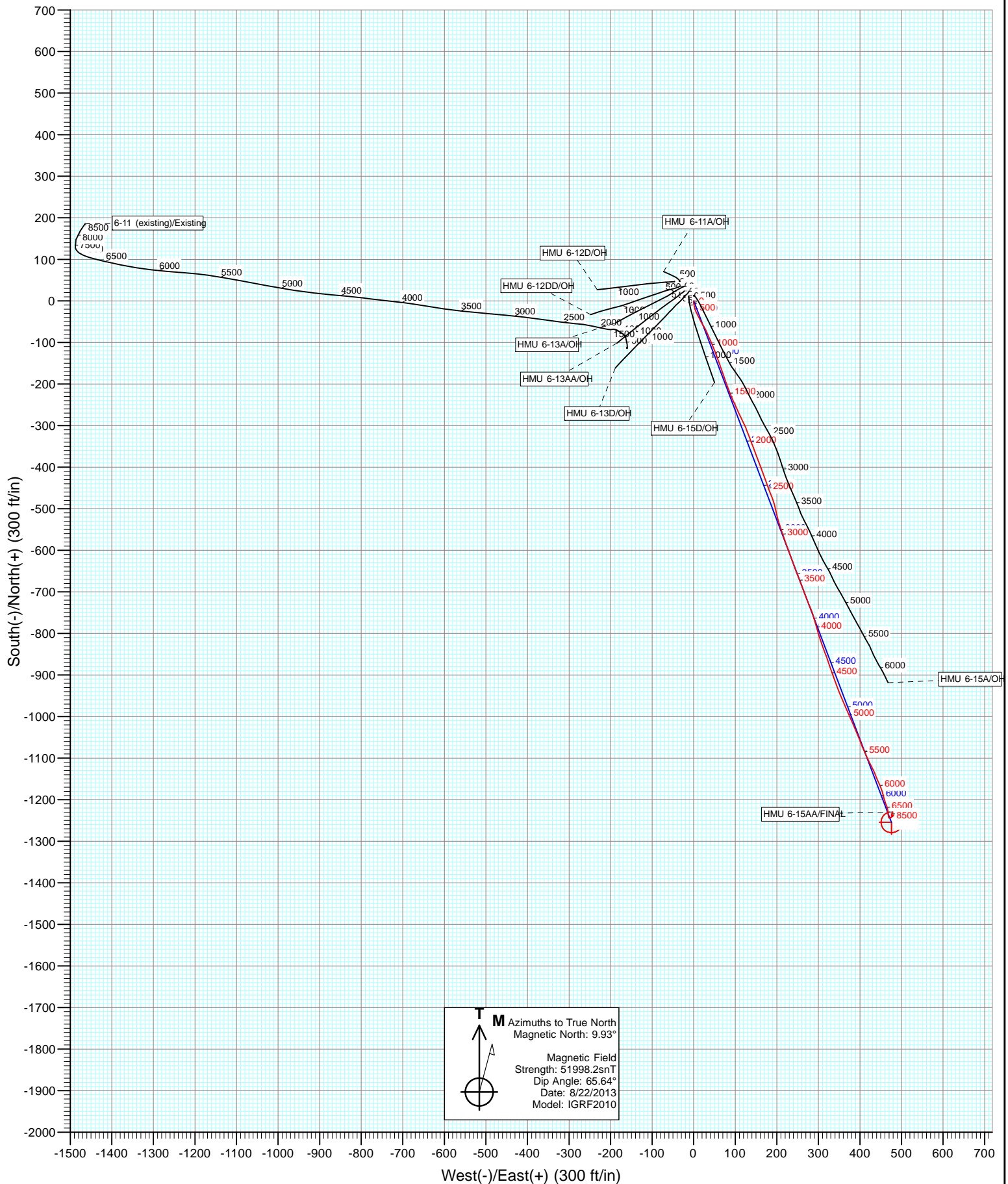


Project: Mamm Creek  
Site: J6SEB Pad  
Well: HMU 6-15AA  
Wellbore: OH  
Design: FINAL





Project: Mamm Creek  
Site: J6SEB Pad  
Well: HMU 6-15AA  
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 6-15AA
<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 6-15AA	<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 6-15AA					
Well Position	+N/-S	0.0 ft	Northing:	1,573,547.77 ft	Latitude:	39.387355
	+E/-W	0.0 ft	Easting:	2,376,559.28 ft	Longitude:	-107.706041
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	8/22/2013	9.93	65.64	51,998

<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</b>	<b>+E/-W</b>	<b>Direction</b>	
	(ft)	(ft)	(ft)	(°)	
	0.0	0.0	0.0	159.23	

<b>Survey Program</b>	<b>Date</b>	9/4/2013			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
110.0	8,760.0	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		
110.0	0.50	214.50	110.0	-0.4	-0.3	0.3	0.45	0.45		
140.0	0.60	204.50	140.0	-0.6	-0.4	0.5	0.46	0.33		
170.0	0.50	203.80	170.0	-0.9	-0.5	0.7	0.33	-0.33		
200.0	0.70	185.20	200.0	-1.2	-0.6	0.9	0.92	0.67		
231.0	1.20	176.70	231.0	-1.7	-0.6	1.4	1.67	1.61		
261.0	1.50	179.60	261.0	-2.4	-0.6	2.1	1.03	1.00		
292.0	2.00	174.10	292.0	-3.4	-0.5	3.0	1.70	1.61		
322.0	2.60	174.40	321.9	-4.6	-0.4	4.1	2.00	2.00		
353.0	3.10	166.90	352.9	-6.1	-0.1	5.6	2.01	1.61		
383.0	3.80	166.60	382.9	-7.8	0.3	7.4	2.33	2.33		
475.0	6.90	169.30	474.4	-16.2	2.0	15.9	3.38	3.37		
567.0	9.40	152.40	565.5	-28.3	6.5	28.8	3.74	2.72		

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU 6-15AA
<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 6-15AA	<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
659.0	10.50	154.40	656.1	-42.6	13.6	44.6	1.25	1.20	
751.0	11.10	147.60	746.5	-57.6	22.0	61.6	1.53	0.65	
843.0	11.50	156.20	836.7	-73.5	30.4	79.5	1.88	0.43	
934.0	12.00	155.40	925.8	-90.4	38.0	98.0	0.58	0.55	
1,026.0	12.60	157.30	1,015.7	-108.3	45.9	117.5	0.79	0.65	
1,119.0	13.30	160.30	1,106.3	-127.7	53.4	138.4	1.04	0.75	
1,230.0	13.90	159.60	1,214.2	-152.3	62.4	164.5	0.56	0.54	
1,343.0	14.60	162.10	1,323.8	-178.5	71.5	192.3	0.82	0.62	
1,437.0	14.80	159.10	1,414.7	-201.0	79.4	216.1	0.84	0.21	
1,533.0	14.90	159.30	1,507.5	-224.0	88.1	240.7	0.12	0.10	
1,628.0	15.20	154.60	1,599.2	-246.7	97.8	265.3	1.32	0.32	
1,723.0	14.00	156.40	1,691.1	-268.5	107.7	289.2	1.35	-1.26	
1,818.0	14.60	152.30	1,783.2	-289.6	117.9	312.6	1.24	0.63	
1,913.0	13.80	160.10	1,875.3	-310.9	127.3	335.8	2.18	-0.84	
2,008.0	13.70	158.00	1,967.6	-332.0	135.4	358.4	0.54	-0.11	
2,103.0	12.60	160.10	2,060.1	-352.1	143.1	380.0	1.26	-1.16	
2,198.0	13.10	159.00	2,152.7	-371.9	150.5	401.1	0.59	0.53	
2,293.0	13.20	159.40	2,245.2	-392.1	158.2	422.7	0.14	0.11	
2,388.0	13.80	159.10	2,337.6	-412.9	166.1	444.9	0.64	0.63	
2,483.0	13.80	161.20	2,429.9	-434.2	173.7	467.6	0.53	0.00	
2,578.0	13.30	158.80	2,522.2	-455.1	181.3	489.8	0.79	-0.53	
2,672.0	13.00	158.10	2,613.8	-475.0	189.2	511.2	0.36	-0.32	
2,768.0	13.10	168.20	2,707.3	-495.7	195.5	532.8	2.37	0.10	
2,863.0	13.10	166.50	2,799.8	-516.7	200.2	554.1	0.41	0.00	
2,957.0	13.10	161.90	2,891.4	-537.1	206.0	575.3	1.11	0.00	
3,052.0	13.10	160.20	2,983.9	-557.5	213.0	596.8	0.41	0.00	
3,147.0	13.00	162.20	3,076.4	-577.8	219.9	618.2	0.49	-0.11	
3,241.0	12.30	158.10	3,168.2	-597.2	226.8	638.8	1.21	-0.74	
3,337.0	13.40	161.20	3,261.8	-617.2	234.2	660.1	1.35	1.15	
3,431.0	13.90	159.70	3,353.1	-638.1	241.7	682.3	0.65	0.53	
3,526.0	13.90	158.80	3,445.3	-659.4	249.7	705.1	0.23	0.00	
3,621.0	14.20	158.40	3,537.5	-680.9	258.2	728.2	0.33	0.32	
3,715.0	13.40	160.80	3,628.8	-701.9	266.0	750.6	1.05	-0.85	
3,810.0	13.30	157.50	3,721.2	-722.4	273.8	772.5	0.81	-0.11	
3,905.0	13.10	157.00	3,813.7	-742.4	282.2	794.2	0.24	-0.21	
3,999.0	13.50	165.00	3,905.2	-762.8	289.2	815.8	2.00	0.43	
4,095.0	13.40	163.70	3,998.5	-784.3	295.2	838.0	0.33	-0.10	
4,190.0	13.10	162.80	4,091.0	-805.2	301.5	859.7	0.38	-0.32	
4,284.0	13.60	161.30	4,182.5	-825.8	308.2	881.4	0.65	0.53	
4,379.0	13.90	158.70	4,274.8	-847.0	315.9	904.0	0.72	0.32	
4,474.0	12.30	160.90	4,367.3	-867.2	323.4	925.5	1.76	-1.68	
4,569.0	12.40	161.90	4,460.1	-886.5	329.8	945.8	0.25	0.11	
4,665.0	13.00	158.80	4,553.7	-906.3	336.9	966.9	0.95	0.62	
4,760.0	13.00	161.50	4,646.3	-926.4	344.2	988.3	0.64	0.00	
4,854.0	13.40	156.00	4,737.8	-946.4	352.0	1,009.7	1.40	0.43	
4,949.0	11.50	157.80	4,830.6	-965.2	360.0	1,030.2	2.04	-2.00	
5,044.0	11.20	155.60	4,923.7	-982.4	367.4	1,048.9	0.55	-0.32	
5,137.0	10.80	156.00	5,015.0	-998.6	374.7	1,066.6	0.44	-0.43	
5,232.0	11.20	156.10	5,108.3	-1,015.2	382.1	1,084.7	0.42	0.42	
5,327.0	10.60	156.80	5,201.6	-1,031.6	389.2	1,102.6	0.65	-0.63	
5,422.0	11.70	158.90	5,294.8	-1,048.6	396.2	1,121.0	1.23	1.16	
5,517.0	10.90	158.80	5,387.9	-1,066.0	402.9	1,139.6	0.84	-0.84	
5,613.0	10.20	154.30	5,482.3	-1,082.1	409.8	1,157.1	1.13	-0.73	

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU 6-15AA
<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 6-15AA	<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
5,708.0	10.20	157.70	5,575.8	-1,097.5	416.7	1,173.9	0.63	0.00	
5,803.0	10.00	152.40	5,669.3	-1,112.6	423.7	1,190.5	1.00	-0.21	
5,898.0	10.60	153.40	5,762.8	-1,127.7	431.4	1,207.4	0.66	0.63	
5,993.0	10.00	159.80	5,856.3	-1,143.3	438.2	1,224.3	1.36	-0.63	
6,088.0	9.60	153.60	5,949.9	-1,158.1	444.6	1,240.5	1.19	-0.42	
6,183.0	9.60	160.60	6,043.6	-1,172.7	450.7	1,256.3	1.23	0.00	
6,278.0	8.70	164.40	6,137.4	-1,187.1	455.3	1,271.4	1.14	-0.95	
6,373.0	6.70	164.90	6,231.5	-1,199.3	458.6	1,284.0	2.11	-2.11	
6,469.0	3.70	162.20	6,327.1	-1,207.7	461.1	1,292.7	3.13	-3.13	
6,563.0	4.00	155.00	6,420.9	-1,213.5	463.4	1,299.0	0.60	0.32	
6,658.0	3.70	163.50	6,515.7	-1,219.5	465.6	1,305.4	0.68	-0.32	
6,753.0	4.10	179.70	6,610.4	-1,225.8	466.5	1,311.6	1.23	0.42	
6,849.0	3.80	166.40	6,706.2	-1,232.3	467.3	1,318.0	1.00	-0.31	
6,944.0	2.50	176.90	6,801.1	-1,237.5	468.1	1,323.1	1.49	-1.37	
7,039.0	1.40	176.20	6,896.0	-1,240.7	468.3	1,326.1	1.16	-1.16	
7,134.0	1.50	156.50	6,991.0	-1,243.0	468.9	1,328.5	0.53	0.11	
7,228.0	1.40	83.90	7,085.0	-1,244.0	470.5	1,330.0	1.83	-0.11	
7,328.0	1.50	81.30	7,184.9	-1,243.7	473.0	1,330.6	0.12	0.10	
7,418.0	0.40	0.30	7,274.9	-1,243.2	474.2	1,330.6	1.66	-1.22	
7,513.0	0.60	49.10	7,369.9	-1,242.5	474.6	1,330.1	0.48	0.21	
7,607.0	1.70	58.40	7,463.9	-1,241.5	476.2	1,329.6	1.18	1.17	
7,702.0	1.40	56.80	7,558.9	-1,240.1	478.3	1,329.1	0.32	-0.32	
7,797.0	1.20	46.80	7,653.8	-1,238.8	480.0	1,328.5	0.32	-0.21	
7,892.0	1.10	325.50	7,748.8	-1,237.4	480.2	1,327.2	1.58	-0.11	
7,987.0	1.30	276.20	7,843.8	-1,236.5	478.6	1,325.9	1.07	0.21	
8,082.0	1.30	234.90	7,938.8	-1,237.0	476.7	1,325.6	0.97	0.00	
8,176.0	0.70	188.20	8,032.8	-1,238.2	475.7	1,326.4	1.03	-0.64	
8,271.0	1.50	138.90	8,127.8	-1,239.7	476.5	1,328.1	1.23	0.84	
8,366.0	1.20	338.20	8,222.8	-1,239.7	476.9	1,328.2	2.80	-0.32	
8,460.0	1.30	341.80	8,316.7	-1,237.8	476.2	1,326.2	0.14	0.11	
8,555.0	1.40	13.50	8,411.7	-1,235.6	476.2	1,324.2	0.78	0.11	
8,649.0	1.90	20.00	8,505.7	-1,233.0	477.0	1,322.0	0.57	0.53	
8,710.0	2.10	31.10	8,566.6	-1,231.1	477.9	1,320.6	0.71	0.33	Last Cathedral Survey @ 8,710' MD
8,760.0	2.10	31.10	8,616.6	-1,229.6	478.8	1,319.4	0.00	0.00	Projection to Bit @ 8,760'

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU 6-15AA
<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 6-15AA	<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 6-15AA PBHL (65°)	0.00	0.00	8,600.0	-1,254.4	475.7	1,572,282.20	2,377,004.38	39.383911	-107.704358
- actual wellpath misses target center by 24.5ft at 8742.6ft MD (8599.2 TVD, -1230.1 N, 478.5 E)									
- Circle (radius 25.0)									
HMU 6-15AA TGT	0.00	0.00	6,626.0	-1,254.4	475.7	1,572,282.20	2,377,004.38	39.383911	-107.704358
- actual wellpath misses target center by 28.9ft at 6770.5ft MD (6627.9 TVD, -1227.1 N, 466.6 E)									
- Point									

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
8,710.0	8,566.6	-1,231.1	477.9	Last Cathedral Survey @ 8,710' MD
8,760.0	8,616.6	-1,229.6	478.8	Projection to Bit @ 8,760'

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