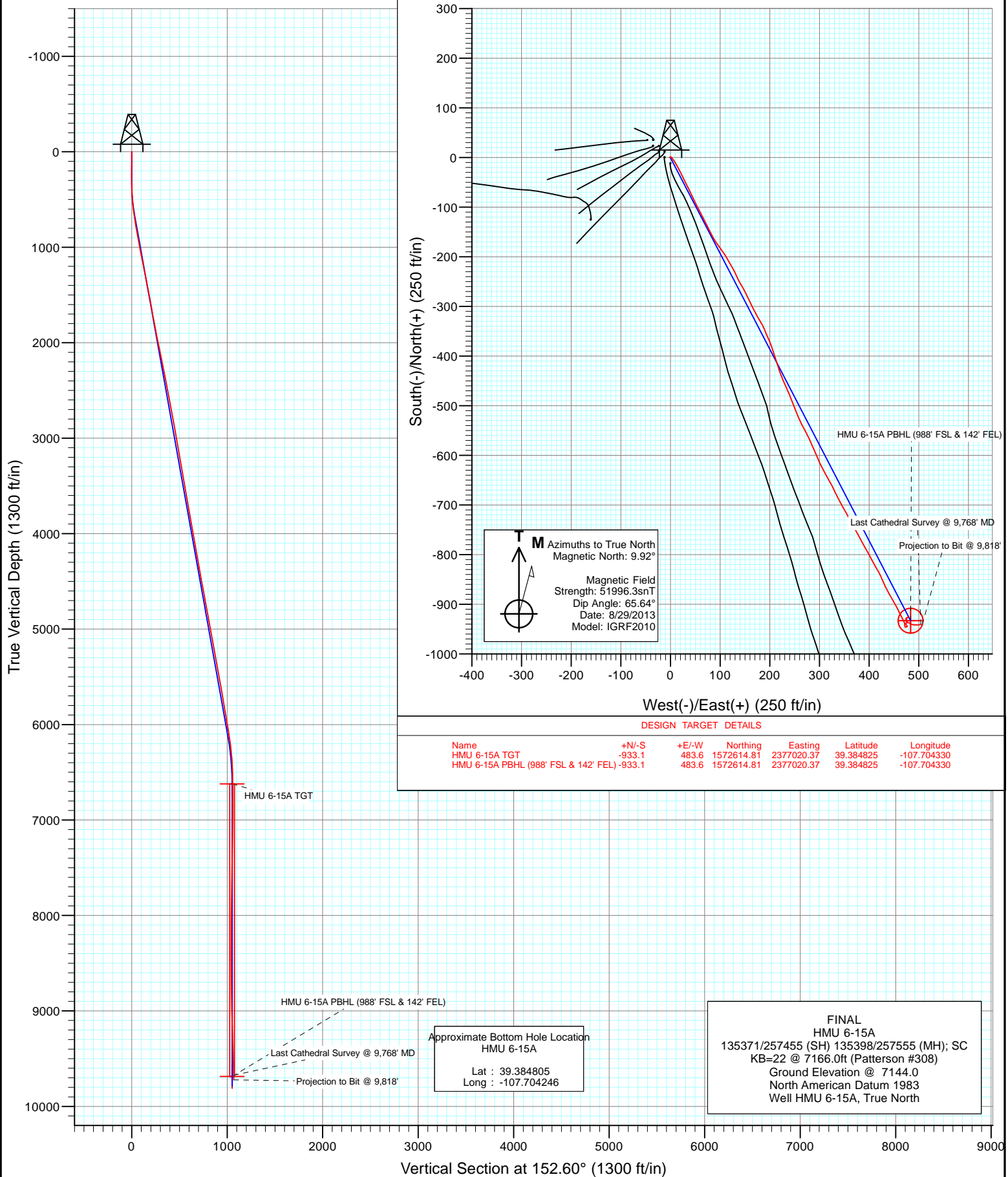


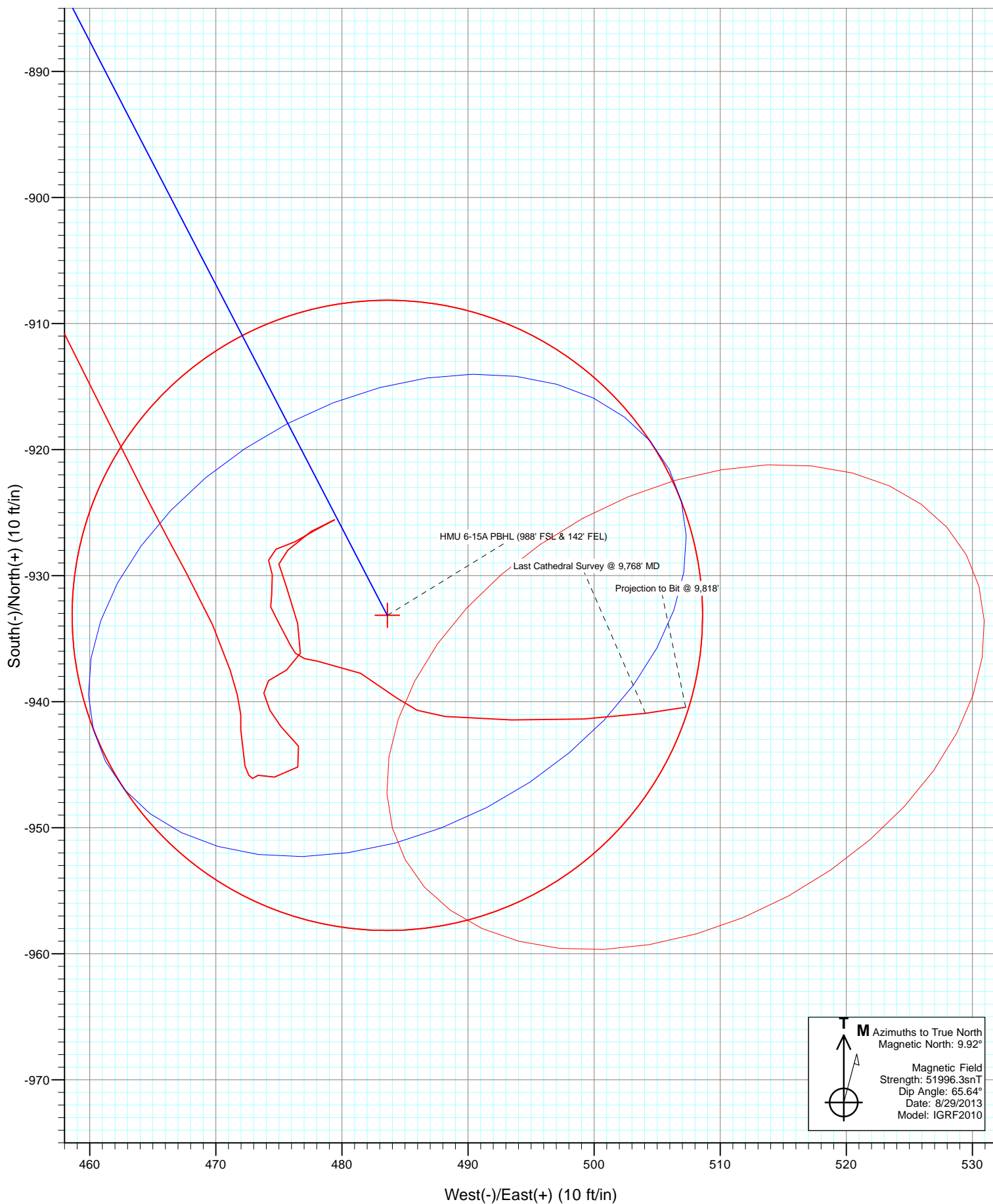


Project: Mamm Creek
Site: J6SEB Pad
Well: HMU 6-15A
Wellbore: OH
Design: FINAL



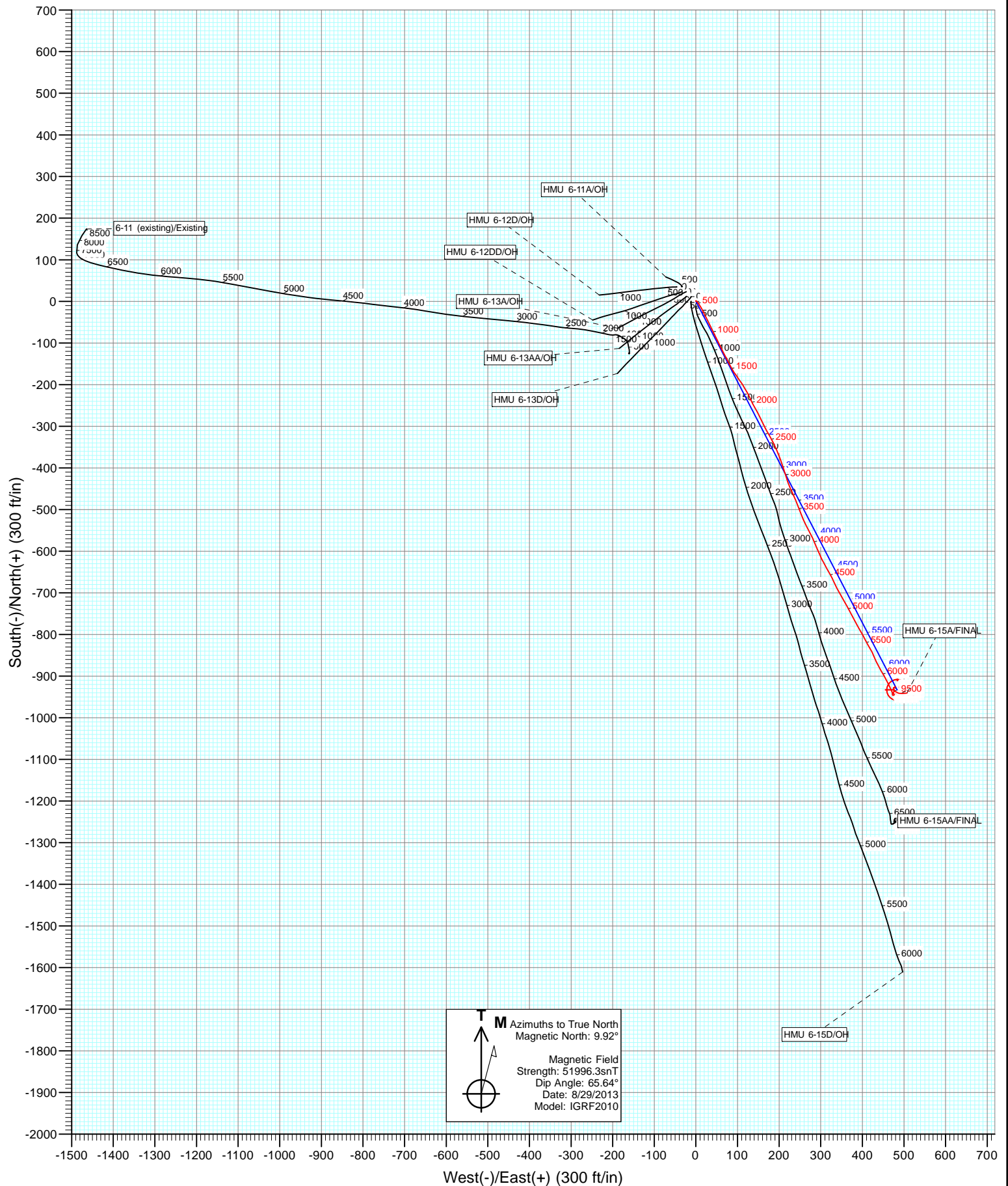


Project: Mamm Creek
Site: J6SEB Pad
Well: HMU 6-15A
Wellbore: OH
Design: FINAL





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



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-15A
Project:	Mamm Creek	TVD Reference:	KB=22 @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22 @ 7166.0ft (Patterson #308)
Well:	HMU 6-15A	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Project	Mamm Creek		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	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 6-15A					
Well Position	+N/-S	0.0 ft	Northing:	1,573,559.42 ft	Latitude:	39.387387
	+E/-W	0.0 ft	Easting:	2,376,559.56 ft	Longitude:	-107.706041
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,144.0 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/29/2013	9.92	65.64	51,996

Design	FINAL				
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	152.60	

Survey Program	Date	9/12/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
110.0	9,818.0	Survey #1 (OH)	Geolink 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		
110.0	0.40	353.60	110.0	0.4	0.0	-0.4	0.36	0.36		
140.0	0.50	344.90	140.0	0.6	-0.1	-0.6	0.40	0.33		
170.0	0.40	337.10	170.0	0.8	-0.2	-0.8	0.39	-0.33		
200.0	0.40	350.60	200.0	1.0	-0.2	-1.0	0.31	0.00		
231.0	0.40	359.00	231.0	1.2	-0.2	-1.2	0.19	0.00		
251.0	0.50	70.10	251.0	1.3	-0.2	-1.3	2.65	0.50		
282.0	0.40	83.70	282.0	1.4	0.1	-1.2	0.47	-0.32		
322.0	0.80	105.60	322.0	1.3	0.5	-1.0	1.14	1.00		
353.0	1.20	123.40	353.0	1.1	1.0	-0.5	1.62	1.29		
383.0	1.80	132.40	383.0	0.6	1.6	0.2	2.14	2.00		
414.0	2.50	136.10	414.0	-0.2	2.4	1.3	2.30	2.26		
445.0	3.30	140.40	444.9	-1.4	3.4	2.8	2.67	2.58		

Cathedral Energy Services

Survey Report

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Project:	Mamm Creek	TVD Reference:	KB=22 @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22 @ 7166.0ft (Patterson #308)
Well:	HMU 6-15A	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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
475.0	3.80	142.50	474.9	-2.8	4.6	4.6	1.72	1.67	
567.0	6.60	148.10	566.5	-9.7	9.2	12.9	3.09	3.04	
659.0	8.40	152.30	657.7	-20.2	15.2	24.9	2.04	1.96	
751.0	9.20	153.50	748.6	-32.7	21.6	39.0	0.89	0.87	
843.0	9.90	153.40	839.3	-46.4	28.4	54.2	0.76	0.76	
934.0	10.60	153.60	928.9	-60.8	35.6	70.4	0.77	0.77	
1,026.0	10.90	154.30	1,019.3	-76.3	43.1	87.6	0.36	0.33	
1,119.0	11.20	154.10	1,110.5	-92.3	50.9	105.4	0.33	0.32	
1,211.0	11.70	153.00	1,200.7	-108.7	59.0	123.6	0.59	0.54	
1,310.0	10.80	153.40	1,297.8	-125.9	67.8	143.0	0.91	-0.91	
1,436.0	11.60	152.80	1,421.4	-147.7	78.8	167.4	0.64	0.63	
1,532.0	9.70	150.40	1,515.7	-163.3	87.2	185.2	2.03	-1.98	
1,626.0	10.40	144.10	1,608.3	-177.1	96.1	201.5	1.39	0.74	
1,720.0	10.60	144.70	1,700.7	-191.0	106.1	218.4	0.24	0.21	
1,815.0	11.00	150.20	1,794.0	-206.0	115.7	236.1	1.16	0.42	
1,910.0	10.70	150.40	1,887.3	-221.6	124.5	254.0	0.32	-0.32	
2,005.0	11.80	156.10	1,980.5	-238.1	132.8	272.5	1.65	1.16	
2,100.0	11.70	149.10	2,073.5	-255.3	141.7	291.8	1.50	-0.11	
2,195.0	10.70	153.50	2,166.7	-271.4	150.6	310.3	1.38	-1.05	
2,290.0	11.60	154.20	2,259.9	-287.9	158.7	328.6	0.96	0.95	
2,384.0	11.80	153.90	2,352.0	-305.0	167.0	347.7	0.22	0.21	
2,478.0	11.30	149.20	2,444.1	-321.6	175.9	366.5	1.13	-0.53	
2,574.0	10.30	151.80	2,538.4	-337.2	184.8	384.5	1.16	-1.04	
2,669.0	10.10	158.80	2,631.9	-352.5	191.8	401.2	1.32	-0.21	
2,763.0	10.90	155.30	2,724.3	-368.2	198.5	418.3	1.09	0.85	
2,859.0	10.10	162.50	2,818.7	-384.5	204.9	435.7	1.60	-0.83	
2,954.0	10.80	161.20	2,912.1	-400.9	210.2	452.7	0.78	0.74	
3,049.0	9.70	163.00	3,005.6	-417.0	215.4	469.3	1.21	-1.16	
3,144.0	9.90	160.70	3,099.2	-432.3	220.5	485.3	0.46	0.21	
3,239.0	10.10	157.60	3,192.8	-447.7	226.4	501.7	0.60	0.21	
3,335.0	9.90	154.10	3,287.3	-462.9	233.2	518.3	0.67	-0.21	
3,429.0	9.80	157.90	3,379.9	-477.6	239.7	534.4	0.70	-0.11	
3,525.0	10.00	159.30	3,474.5	-493.0	245.7	550.8	0.33	0.21	
3,620.0	9.90	158.00	3,568.1	-508.3	251.7	567.1	0.26	-0.11	
3,715.0	10.10	157.50	3,661.6	-523.6	258.0	583.5	0.23	0.21	
3,809.0	9.70	153.30	3,754.2	-538.2	264.7	599.7	0.88	-0.43	
3,904.0	10.10	150.30	3,847.8	-552.6	272.4	616.0	0.69	0.42	
3,999.0	10.20	155.70	3,941.3	-567.5	280.0	632.7	1.01	0.11	
4,093.0	9.80	157.30	4,033.9	-582.5	286.5	649.0	0.52	-0.43	
4,188.0	9.60	156.40	4,127.6	-597.2	292.8	665.0	0.26	-0.21	
4,283.0	9.90	156.50	4,221.2	-612.0	299.2	681.0	0.32	0.32	
4,378.0	10.50	151.30	4,314.7	-627.0	306.6	697.8	1.16	0.63	
4,472.0	10.00	152.10	4,407.2	-641.8	314.6	714.5	0.55	-0.53	
4,567.0	10.70	150.10	4,500.6	-656.7	322.8	731.6	0.83	0.74	
4,662.0	11.00	155.60	4,593.9	-672.6	331.0	749.5	1.13	0.32	
4,757.0	10.30	152.90	4,687.3	-688.4	338.6	767.0	0.90	-0.74	
4,851.0	10.50	150.90	4,779.8	-703.4	346.6	784.0	0.44	0.21	
4,946.0	10.10	148.40	4,873.2	-718.0	355.1	800.9	0.63	-0.42	
5,041.0	9.90	153.50	4,966.8	-732.4	363.1	817.4	0.96	-0.21	
5,136.0	10.20	150.10	5,060.3	-747.0	371.0	834.0	0.70	0.32	
5,231.0	10.90	152.50	5,153.7	-762.3	379.3	851.4	0.87	0.74	
5,325.0	10.60	152.20	5,246.1	-777.8	387.5	868.9	0.32	-0.32	
5,420.0	11.10	149.00	5,339.4	-793.4	396.2	886.7	0.82	0.53	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-15A
Project:	Mamm Creek	TVD Reference:	KB=22 @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22 @ 7166.0ft (Patterson #308)
Well:	HMU 6-15A	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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
5,516.0	9.70	154.20	5,433.8	-808.6	404.5	904.1	1.75	-1.46	
5,611.0	9.80	148.80	5,527.4	-822.7	412.2	920.1	0.97	0.11	
5,706.0	8.90	150.90	5,621.2	-836.1	420.0	935.5	1.01	-0.95	
5,801.0	9.80	158.50	5,714.9	-850.0	426.5	950.9	1.61	0.95	
5,895.0	9.80	153.60	5,807.5	-864.6	433.0	966.9	0.89	0.00	
5,990.0	10.50	151.20	5,901.0	-879.4	440.7	983.6	0.86	0.74	
6,085.0	9.30	149.50	5,994.6	-893.6	448.8	999.9	1.30	-1.26	
6,179.0	9.10	153.30	6,087.4	-906.8	456.0	1,015.0	0.68	-0.21	
6,273.0	8.30	153.60	6,180.3	-919.5	462.4	1,029.2	0.85	-0.85	
6,368.0	5.80	151.20	6,274.6	-929.9	467.7	1,040.8	2.65	-2.63	
6,465.0	4.10	162.20	6,371.2	-937.5	471.1	1,049.1	2.00	-1.75	
6,560.0	1.80	187.60	6,466.1	-942.2	472.0	1,053.7	2.73	-2.42	
6,655.0	1.80	159.50	6,561.1	-945.1	472.3	1,056.4	0.92	0.00	
6,751.0	0.50	9.70	6,657.1	-946.1	472.9	1,057.6	2.34	-1.35	
6,846.0	0.50	112.60	6,752.1	-945.8	473.4	1,057.6	0.82	0.00	
6,941.0	1.10	88.90	6,847.1	-946.0	474.7	1,058.3	0.71	0.63	
7,035.0	1.50	50.20	6,941.0	-945.2	476.5	1,058.4	1.00	0.43	
7,131.0	1.50	313.00	7,037.0	-943.5	476.6	1,057.0	2.34	0.00	
7,226.0	1.00	326.00	7,132.0	-942.0	475.2	1,055.0	0.60	-0.53	
7,321.0	0.90	325.30	7,227.0	-940.7	474.3	1,053.4	0.11	-0.11	
7,416.0	0.90	356.20	7,322.0	-939.3	473.8	1,052.0	0.50	0.00	
7,510.0	0.60	58.00	7,416.0	-938.3	474.2	1,051.3	0.86	-0.32	
7,605.0	1.40	60.50	7,510.9	-937.5	475.6	1,051.2	0.84	0.84	
7,701.0	0.90	5.40	7,606.9	-936.2	476.7	1,050.5	1.20	-0.52	
7,796.0	2.00	350.00	7,701.9	-933.8	476.5	1,048.3	1.22	1.16	
7,892.0	1.70	334.60	7,797.8	-930.8	475.6	1,045.3	0.60	-0.31	
7,987.0	0.60	2.60	7,892.8	-929.1	475.0	1,043.4	1.27	-1.16	
8,082.0	1.10	48.20	7,987.8	-928.0	475.7	1,042.8	0.85	0.53	
8,177.0	1.80	53.20	8,082.8	-926.5	477.6	1,042.3	0.75	0.74	
8,271.0	0.80	88.30	8,176.8	-925.6	479.4	1,042.4	1.31	-1.06	
8,366.0	1.00	262.90	8,271.8	-925.6	479.3	1,042.4	1.89	0.21	
8,460.0	1.10	222.30	8,365.7	-926.4	477.8	1,042.4	0.78	0.11	
8,553.0	1.20	256.40	8,458.7	-927.3	476.3	1,042.5	0.73	0.11	
8,648.0	0.80	236.60	8,553.7	-927.9	474.8	1,042.3	0.55	-0.42	
8,744.0	0.60	182.40	8,649.7	-928.8	474.2	1,042.8	0.69	-0.21	
8,839.0	0.90	154.90	8,744.7	-929.9	474.5	1,044.0	0.48	0.32	
8,934.0	1.20	201.80	8,839.7	-931.5	474.4	1,045.4	0.93	0.32	
9,028.0	1.50	141.90	8,933.7	-933.4	474.8	1,047.2	1.46	0.32	
9,123.0	1.40	163.40	9,028.6	-935.5	475.9	1,049.6	0.58	-0.11	
9,218.0	2.20	94.90	9,123.6	-936.8	478.1	1,051.7	2.24	0.84	
9,312.0	2.20	116.50	9,217.5	-937.7	481.5	1,054.1	0.88	0.00	
9,406.0	2.10	132.40	9,311.5	-939.7	484.4	1,057.2	0.64	-0.11	
9,502.0	3.00	96.10	9,407.4	-941.2	488.2	1,060.2	1.88	0.94	
9,597.0	3.40	90.30	9,502.2	-941.4	493.5	1,062.9	0.54	0.42	
9,691.0	3.60	88.10	9,596.0	-941.4	499.2	1,065.5	0.26	0.21	
9,768.0	3.70	81.40	9,672.9	-940.9	504.1	1,067.3	0.57	0.13	Last Cathedral Survey @ 9,768' MD
9,818.0	3.70	81.40	9,722.8	-940.4	507.3	1,068.4	0.00	0.00	Projection to Bit @ 9,818'

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-15A
Project:	Mamm Creek	TVD Reference:	KB=22 @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22 @ 7166.0ft (Patterson #308)
Well:	HMU 6-15A	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	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 6-15A PBHL (988'	0.00	0.00	9,686.0	-933.1	483.6	1,572,614.81	2,377,020.37	39.384825	-107.704330
- actual wellpath misses target center by 25.5ft at 9768.0ft MD (9672.9 TVD, -940.9 N, 504.1 E)									
- Circle (radius 25.0)									
HMU 6-15A TGT	0.00	0.00	6,622.0	-933.1	483.6	1,572,614.81	2,377,020.37	39.384825	-107.704330
- actual wellpath misses target center by 16.9ft at 6715.9ft MD (6621.9 TVD, -946.1 N, 472.8 E)									
- Point									

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S	+E/-W		
		(ft)	(ft)	Comment	
9,768.0	9,672.9	-940.9	504.1	Last Cathedral Survey @ 9,768' MD	
9,818.0	9,722.8	-940.4	507.3	Projection to Bit @ 9,818'	

Checked By: _____ Approved By: _____ Date: _____