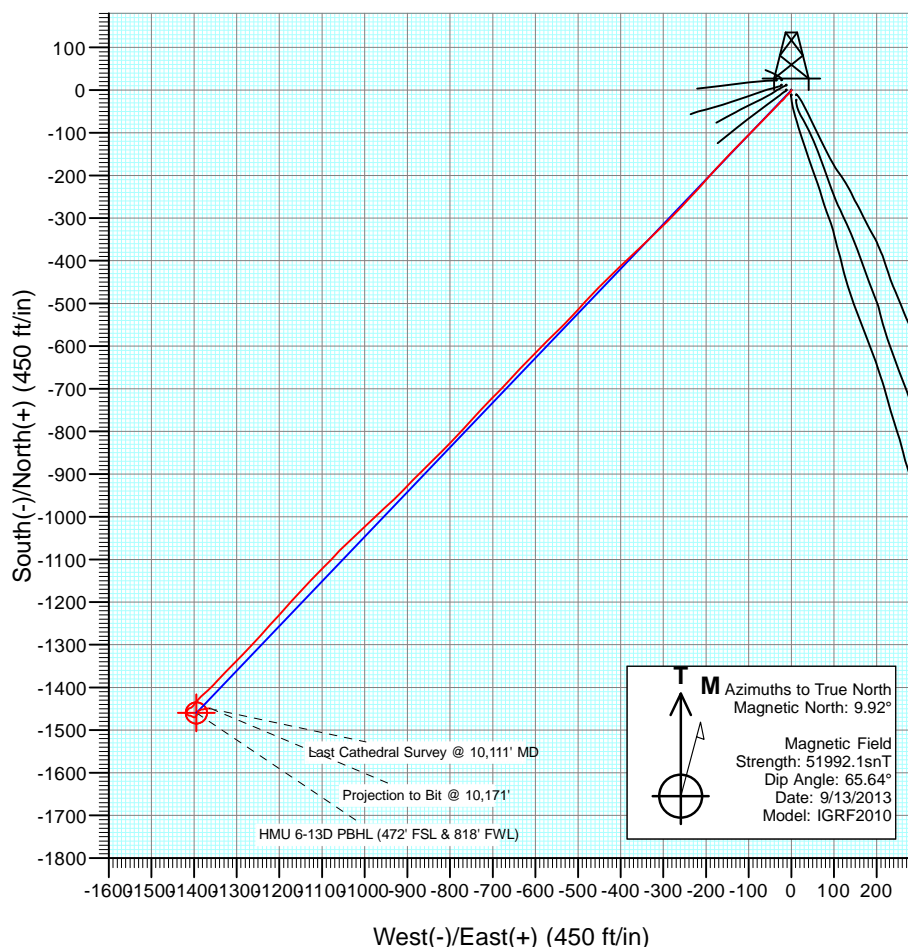
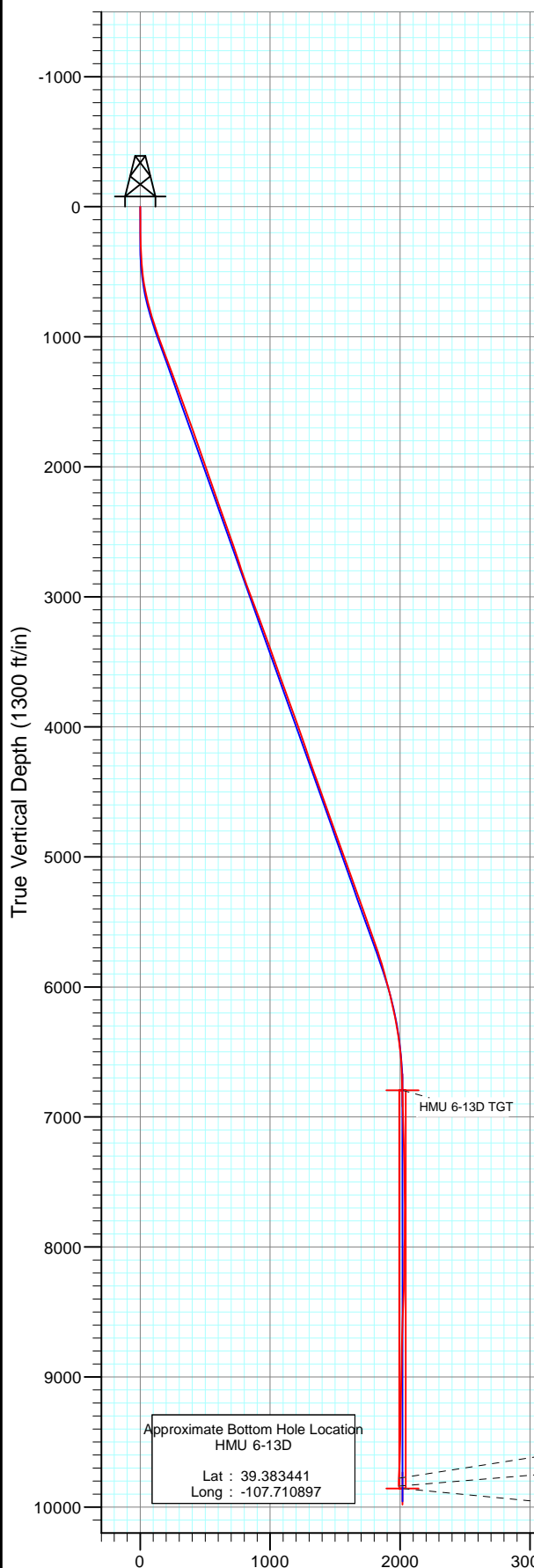




Project: Mamm Creek
Site: J6SEB Pad
Well: HMU 6-13D
Wellbore: OH
Design: FINAL



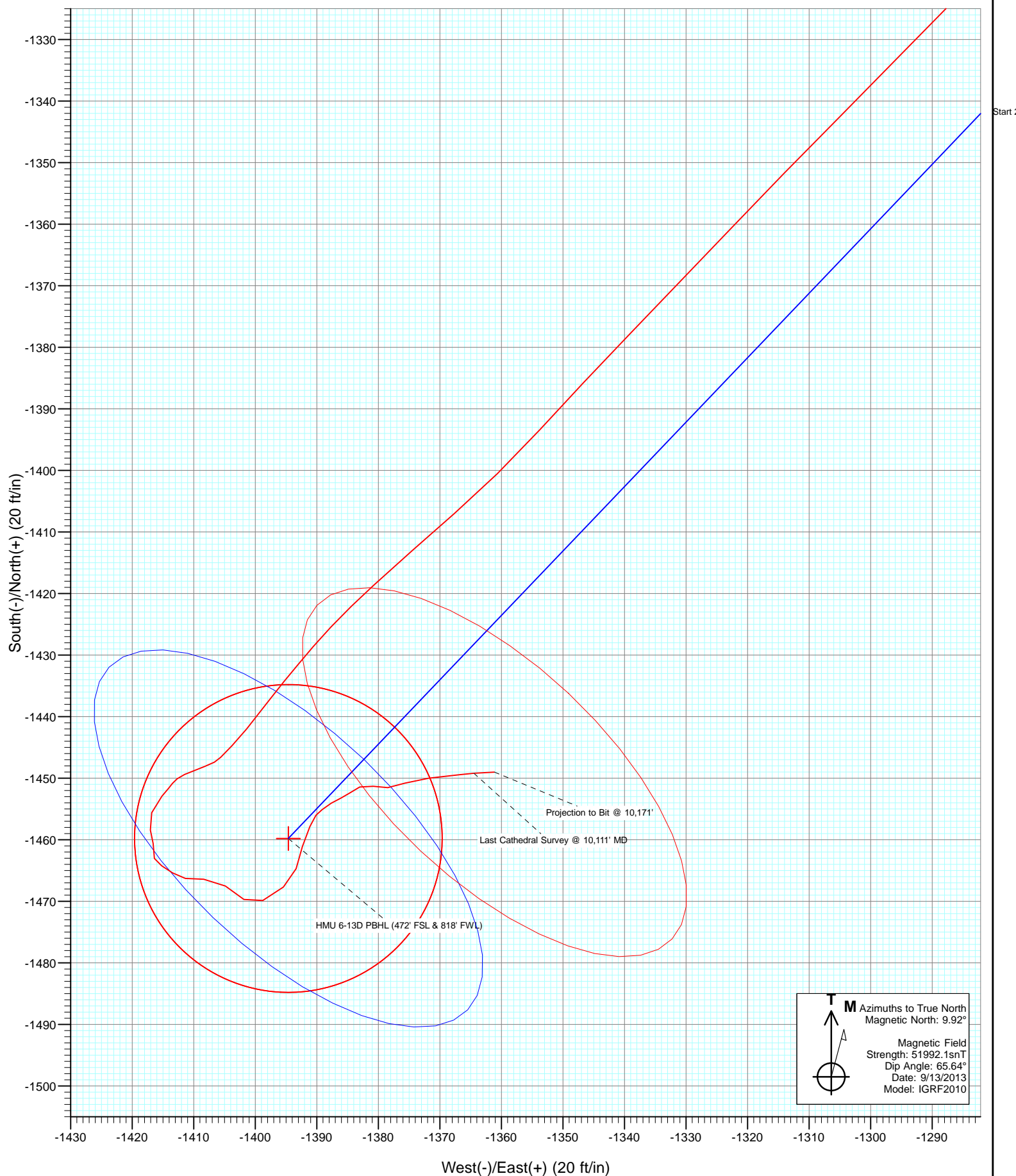
DESIGN TARGET DETAILS

Name	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
HMU 6-13D TGT	-1459.8	-1394.6	1572145.86	2375118.62	39.383411	-107.711016
HMU 6-13D PBHL (472' FSL & 818' FWL)	-1459.8	-1394.6	1572145.86	2375118.62	39.383411	-107.711016

FINAL
HMU 6-13D
135369/257055 (SH) 135423/257155 (MH); SC
KB=22' @ 7166.0ft (Patterson #308)
Ground Elevation @ 7144.0
North American Datum 1983
Well HMU 6-13D, True North

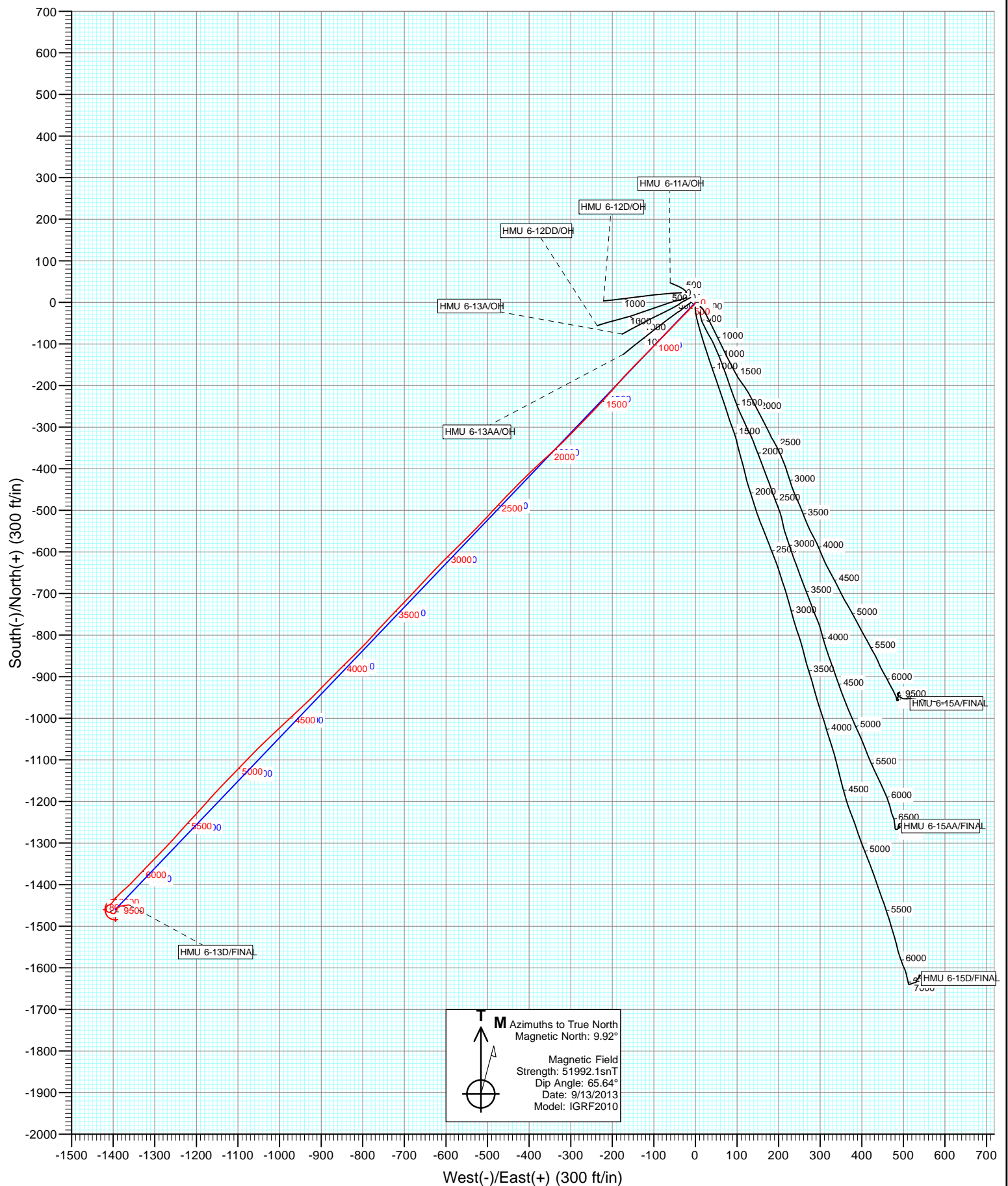


Project: Mamm Creek
Site: J6SEB Pad
Well: HMU 6-13D
Wellbore: OH
Design: FINAL





Project: Mamm Creek
Site: J6SEB Pad
Well: HMU 6-13D
Wellbore: OH
Design: FINAL



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-13D
Project:	Mamm Creek	TVD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Well:	HMU 6-13D	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 6-13D					
Well Position	+N/-S	0.0 ft	Northing:	1,573,571.35 ft	Latitude:	39.387419
	+E/-W	0.0 ft	Easting:	2,376,548.26 ft	Longitude:	-107.706082
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	9/13/2013	9.92	65.64	51,992

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	223.11	

Survey Program	Date	9/28/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
110.0	10,171.0	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	0.70	184.90	110.0	-0.7	-0.1	0.5	0.64	0.64		
140.0	0.60	192.20	140.0	-1.0	-0.1	0.8	0.43	-0.33		
170.0	0.70	191.80	170.0	-1.3	-0.2	1.1	0.33	0.33		
200.0	0.40	217.50	200.0	-1.6	-0.3	1.4	1.27	-1.00		
231.0	1.20	222.40	231.0	-1.9	-0.6	1.8	2.59	2.58		
261.0	1.80	223.90	261.0	-2.5	-1.1	2.6	2.00	2.00		
292.0	1.90	219.50	292.0	-3.2	-1.8	3.6	0.56	0.32		
322.0	2.30	200.90	321.9	-4.2	-2.3	4.6	2.62	1.33		
353.0	2.90	217.40	352.9	-5.4	-3.0	6.0	3.08	1.94		
383.0	3.30	223.20	382.9	-6.6	-4.0	7.6	1.69	1.33		
414.0	4.00	237.00	413.8	-7.9	-5.6	9.5	3.61	2.26		
445.0	4.50	226.60	444.7	-9.3	-7.4	11.8	2.96	1.61		

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-13D
Project:	Mamm Creek	TVD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Well:	HMU 6-13D	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	5.20	224.60	474.6	-11.1	-9.2	14.3	2.40	2.33	
505.0	6.30	226.60	504.5	-13.2	-11.3	17.3	3.73	3.67	
536.0	7.30	217.30	535.2	-15.9	-13.7	21.0	4.79	3.23	
567.0	8.30	221.90	566.0	-19.1	-16.4	25.2	3.80	3.23	
597.0	9.40	223.20	595.6	-22.5	-19.6	29.8	3.73	3.67	
628.0	10.50	227.90	626.1	-26.3	-23.4	35.2	4.41	3.55	
659.0	11.60	225.30	656.6	-30.4	-27.7	41.1	3.89	3.55	
751.0	14.10	223.90	746.2	-44.9	-42.0	61.5	2.74	2.72	
843.0	16.60	222.50	835.0	-62.7	-58.7	85.9	2.75	2.72	
934.0	18.90	225.90	921.6	-82.6	-78.1	113.6	2.77	2.53	
1,026.0	19.60	223.90	1,008.5	-104.0	-99.5	143.9	1.05	0.76	
1,119.0	20.30	224.50	1,095.9	-126.8	-121.6	175.7	0.78	0.75	
1,211.0	21.00	224.40	1,182.0	-149.9	-144.3	208.1	0.76	0.76	
1,303.0	19.90	223.00	1,268.2	-173.2	-166.5	240.2	1.31	-1.20	
1,348.0	20.20	221.90	1,310.5	-184.6	-176.9	255.7	1.07	0.67	
1,438.0	21.00	220.80	1,394.7	-208.3	-197.8	287.3	0.99	0.89	
1,533.0	19.70	222.70	1,483.8	-233.0	-219.8	320.3	1.53	-1.37	
1,629.0	20.00	223.00	1,574.1	-256.9	-242.0	352.9	0.33	0.31	
1,724.0	19.80	224.20	1,663.4	-280.3	-264.3	385.3	0.48	-0.21	
1,819.0	18.90	224.70	1,753.0	-302.8	-286.3	416.7	0.96	-0.95	
1,915.0	19.40	223.90	1,843.7	-325.3	-308.3	448.2	0.59	0.52	
2,009.0	18.90	227.70	1,932.5	-346.8	-330.4	479.0	1.43	-0.53	
2,104.0	19.50	227.00	2,022.2	-368.0	-353.4	510.2	0.68	0.63	
2,199.0	19.90	227.30	2,111.7	-389.8	-376.9	542.1	0.43	0.42	
2,294.0	18.90	225.70	2,201.3	-411.5	-399.8	573.6	1.19	-1.05	
2,390.0	19.30	225.10	2,292.0	-433.5	-422.1	605.0	0.46	0.42	
2,485.0	19.80	224.00	2,381.5	-456.2	-444.4	636.8	0.65	0.53	
2,579.0	20.00	224.20	2,469.9	-479.2	-466.7	668.7	0.22	0.21	
2,674.0	19.20	222.20	2,559.4	-502.4	-488.5	700.6	1.10	-0.84	
2,770.0	18.20	223.90	2,650.3	-524.9	-509.5	731.4	1.19	-1.04	
2,865.0	18.20	223.40	2,740.6	-546.3	-530.0	761.1	0.16	0.00	
2,959.0	19.80	226.30	2,829.5	-568.0	-551.6	791.6	1.98	1.70	
3,055.0	20.00	225.30	2,919.7	-590.8	-575.0	824.3	0.41	0.21	
3,150.0	20.20	224.80	3,008.9	-613.9	-598.1	856.9	0.28	0.21	
3,245.0	20.20	224.10	3,098.1	-637.3	-621.1	889.7	0.25	0.00	
3,340.0	20.40	223.10	3,187.2	-661.1	-643.8	922.7	0.42	0.21	
3,434.0	20.60	222.20	3,275.3	-685.4	-666.1	955.6	0.40	0.21	
3,529.0	19.50	224.90	3,364.5	-709.0	-688.5	988.1	1.51	-1.16	
3,624.0	19.60	223.90	3,454.0	-731.7	-710.8	1,019.9	0.37	0.11	
3,719.0	19.70	222.60	3,543.5	-755.0	-732.7	1,051.9	0.47	0.11	
3,814.0	19.90	223.10	3,632.9	-778.5	-754.6	1,084.0	0.28	0.21	
3,909.0	20.20	221.90	3,722.1	-802.6	-776.6	1,116.6	0.54	0.32	
4,004.0	19.50	224.70	3,811.5	-826.0	-798.7	1,148.9	1.24	-0.74	
4,098.0	19.80	225.20	3,900.0	-848.4	-821.0	1,180.4	0.37	0.32	
4,193.0	19.30	225.50	3,989.5	-870.8	-843.6	1,212.2	0.54	-0.53	
4,288.0	19.30	224.80	4,079.2	-892.9	-865.9	1,243.6	0.24	0.00	
4,383.0	19.10	225.30	4,168.9	-915.0	-888.0	1,274.8	0.27	-0.21	
4,477.0	18.80	222.70	4,257.8	-936.9	-909.2	1,305.3	0.95	-0.32	
4,572.0	19.50	227.00	4,347.6	-959.0	-931.2	1,336.5	1.66	0.74	
4,667.0	19.60	227.60	4,437.1	-980.5	-954.5	1,368.2	0.24	0.11	
4,762.0	19.80	226.60	4,526.5	-1,002.3	-978.0	1,400.1	0.41	0.21	
4,857.0	19.60	226.30	4,616.0	-1,024.4	-1,001.2	1,432.1	0.24	-0.21	
4,952.0	19.60	227.10	4,705.5	-1,046.3	-1,024.4	1,463.9	0.28	0.00	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-13D
Project:	Mamm Creek	TVD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Well:	HMU 6-13D	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
5,047.0	19.60	225.70	4,794.9	-1,068.2	-1,047.5	1,495.7	0.49	0.00	
5,142.0	19.30	222.80	4,884.5	-1,090.9	-1,069.5	1,527.3	1.06	-0.32	
5,237.0	20.20	225.30	4,973.9	-1,113.9	-1,091.9	1,559.4	1.30	0.95	
5,332.0	19.60	223.90	5,063.3	-1,137.0	-1,114.6	1,591.7	0.81	-0.63	
5,427.0	19.70	223.70	5,152.7	-1,160.0	-1,136.7	1,623.7	0.13	0.11	
5,522.0	19.60	222.00	5,242.2	-1,183.4	-1,158.4	1,655.6	0.61	-0.11	
5,617.0	20.00	221.00	5,331.6	-1,207.5	-1,179.7	1,687.8	0.55	0.42	
5,710.0	19.80	223.40	5,419.0	-1,231.0	-1,201.0	1,719.4	0.90	-0.22	
5,805.0	19.70	222.60	5,508.4	-1,254.5	-1,222.9	1,751.5	0.30	-0.11	
5,900.0	20.00	221.20	5,597.8	-1,278.5	-1,244.4	1,783.8	0.59	0.32	
5,995.0	18.50	223.30	5,687.5	-1,301.7	-1,265.5	1,815.1	1.74	-1.58	
6,090.0	17.40	224.10	5,777.9	-1,322.8	-1,285.7	1,844.4	1.19	-1.16	
6,185.0	16.30	224.80	5,868.8	-1,342.5	-1,305.0	1,871.9	1.18	-1.16	
6,280.0	14.90	223.70	5,960.3	-1,360.8	-1,322.8	1,897.4	1.51	-1.47	
6,376.0	13.70	223.90	6,053.3	-1,377.9	-1,339.2	1,921.1	1.25	-1.25	
6,470.0	12.40	222.50	6,144.9	-1,393.4	-1,353.7	1,942.4	1.42	-1.38	
6,565.0	11.30	228.90	6,237.8	-1,407.0	-1,367.6	1,961.8	1.80	-1.16	
6,661.0	9.70	227.70	6,332.2	-1,418.6	-1,380.7	1,979.2	1.68	-1.67	
6,755.0	7.50	220.60	6,425.2	-1,428.6	-1,390.6	1,993.3	2.59	-2.34	
6,849.0	5.50	218.10	6,518.6	-1,436.8	-1,397.3	2,003.9	2.15	-2.13	
6,944.0	2.50	217.90	6,613.3	-1,442.0	-1,401.4	2,010.5	3.16	-3.16	
7,039.0	1.80	226.10	6,708.3	-1,444.7	-1,403.8	2,014.0	0.80	-0.74	
7,134.0	1.40	221.90	6,803.2	-1,446.6	-1,405.6	2,016.7	0.44	-0.42	
7,226.0	2.40	251.20	6,895.2	-1,448.1	-1,408.2	2,019.5	1.48	1.09	
7,321.0	1.90	244.10	6,990.1	-1,449.4	-1,411.5	2,022.7	0.60	-0.53	
7,416.0	1.10	215.10	7,085.1	-1,450.8	-1,413.4	2,025.1	1.14	-0.84	
7,510.0	2.20	221.70	7,179.0	-1,452.9	-1,415.2	2,027.8	1.19	1.17	
7,605.0	1.70	198.50	7,274.0	-1,455.6	-1,416.8	2,030.9	0.97	-0.53	
7,700.0	1.80	171.60	7,368.9	-1,458.4	-1,417.0	2,033.1	0.86	0.11	
7,795.0	0.90	161.10	7,463.9	-1,460.6	-1,416.6	2,034.4	0.98	-0.95	
7,889.0	0.60	197.30	7,557.9	-1,461.8	-1,416.5	2,035.2	0.58	-0.32	
7,984.0	1.00	162.20	7,652.9	-1,463.0	-1,416.4	2,036.0	0.65	0.42	
8,079.0	1.20	112.40	7,747.9	-1,464.2	-1,415.2	2,036.1	0.99	0.21	
8,174.0	1.40	131.90	7,842.9	-1,465.4	-1,413.4	2,035.7	0.51	0.21	
8,268.0	1.50	97.10	7,936.8	-1,466.3	-1,411.3	2,035.0	0.93	0.11	
8,363.0	2.10	89.20	8,031.8	-1,466.4	-1,408.4	2,033.0	0.68	0.63	
8,459.0	2.50	122.50	8,127.7	-1,467.5	-1,404.9	2,031.4	1.43	0.42	
8,554.0	2.00	130.00	8,222.6	-1,469.7	-1,401.8	2,030.9	0.61	-0.53	
8,650.0	2.40	62.70	8,318.6	-1,469.8	-1,398.8	2,029.0	2.56	0.42	
8,744.0	2.50	51.50	8,412.5	-1,467.7	-1,395.4	2,025.1	0.52	0.11	
8,839.0	2.10	14.80	8,507.4	-1,464.7	-1,393.3	2,021.5	1.58	-0.42	
8,934.0	2.40	16.60	8,602.3	-1,461.1	-1,392.3	2,018.2	0.32	0.32	
9,029.0	1.80	26.10	8,697.3	-1,457.9	-1,391.1	2,015.0	0.73	-0.63	
9,124.0	0.70	32.90	8,792.3	-1,456.0	-1,390.1	2,013.0	1.17	-1.16	
9,218.0	1.00	58.00	8,886.2	-1,455.1	-1,389.1	2,011.6	0.50	0.32	
9,313.0	1.20	51.30	8,981.2	-1,454.1	-1,387.6	2,009.8	0.25	0.21	
9,408.0	1.00	76.60	9,076.2	-1,453.2	-1,386.1	2,008.2	0.55	-0.21	
9,503.0	1.00	42.50	9,171.2	-1,452.4	-1,384.7	2,006.6	0.62	0.00	
9,596.0	1.50	70.20	9,264.2	-1,451.4	-1,383.0	2,004.7	0.83	0.54	
9,691.0	1.30	106.80	9,359.1	-1,451.3	-1,380.8	2,003.2	0.95	-0.21	
9,786.0	1.60	86.00	9,454.1	-1,451.5	-1,378.4	2,001.7	0.63	0.32	
9,880.0	2.00	67.00	9,548.1	-1,450.8	-1,375.6	1,999.3	0.76	0.43	
9,975.0	2.80	86.20	9,643.0	-1,450.0	-1,371.8	1,996.0	1.18	0.84	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-13D
Project:	Mamm Creek	TVD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Well:	HMU 6-13D	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
10,070.0	3.30	81.30	9,737.9	-1,449.4	-1,366.8	1,992.2	0.59	0.53	
10,111.0	3.20	86.90	9,778.8	-1,449.2	-1,364.5	1,990.4	0.81	-0.24	Last Cathedral Survey @ 10,111' MD Projection to Bit @ 10,171'
10,171.0	3.20	86.90	9,838.7	-1,449.0	-1,361.1	1,988.0	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									
HMU 6-13D TGT	0.00	0.00	6,794.0	-1,459.8	-1,394.6	1,572,145.86	2,375,118.62	39.383411	-107.711016
- actual wellpath misses target center by 17.2ft at 7124.8ft MD (6794.1 TVD, -1446.4 N, -1405.5 E)									
- Point									
HMU 6-13D PBHL (472')	0.00	0.00	9,858.0	-1,459.8	-1,394.6	1,572,145.86	2,375,118.62	39.383411	-107.711016
- actual wellpath misses target center by 40.1ft at 10171.0ft MD (9838.7 TVD, -1449.0 N, -1361.1 E)									
- Circle (radius 25.0)									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
10,111.0	9,778.8	-1,449.2	-1,364.5	Last Cathedral Survey @ 10,111' MD
10,171.0	9,838.7	-1,449.0	-1,361.1	Projection to Bit @ 10,171'

Checked By: _____ Approved By: _____ Date: _____