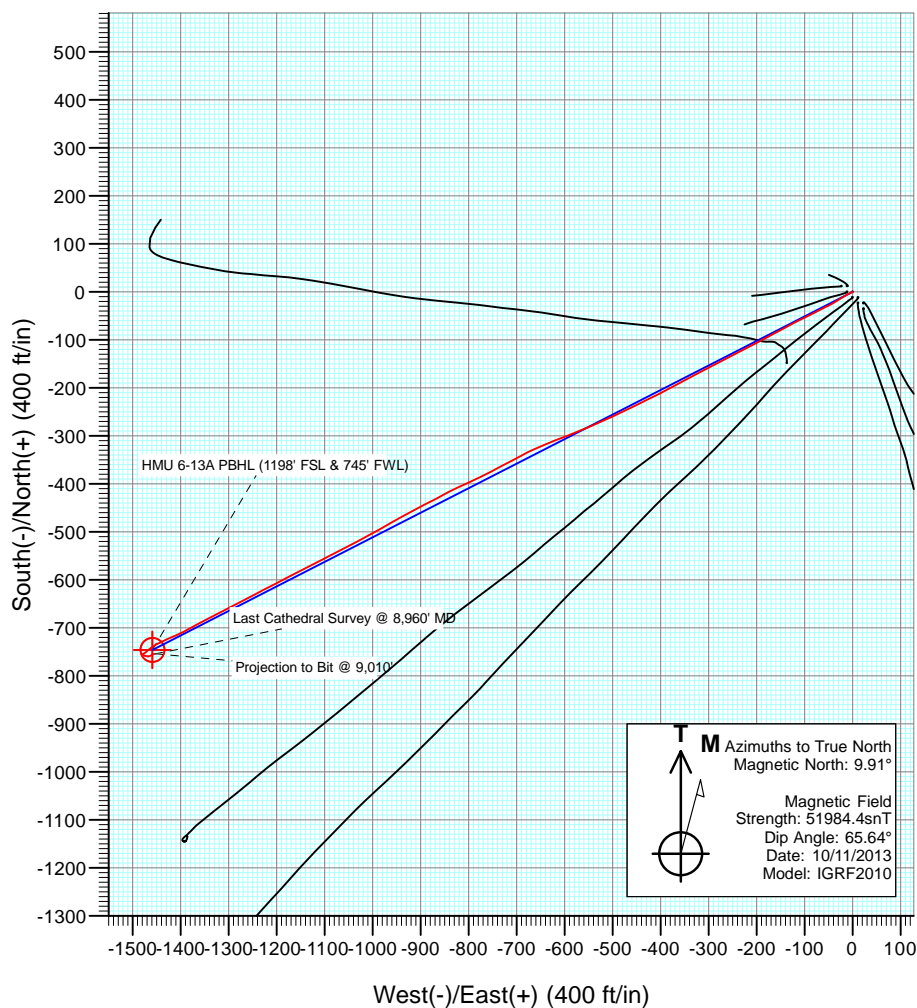
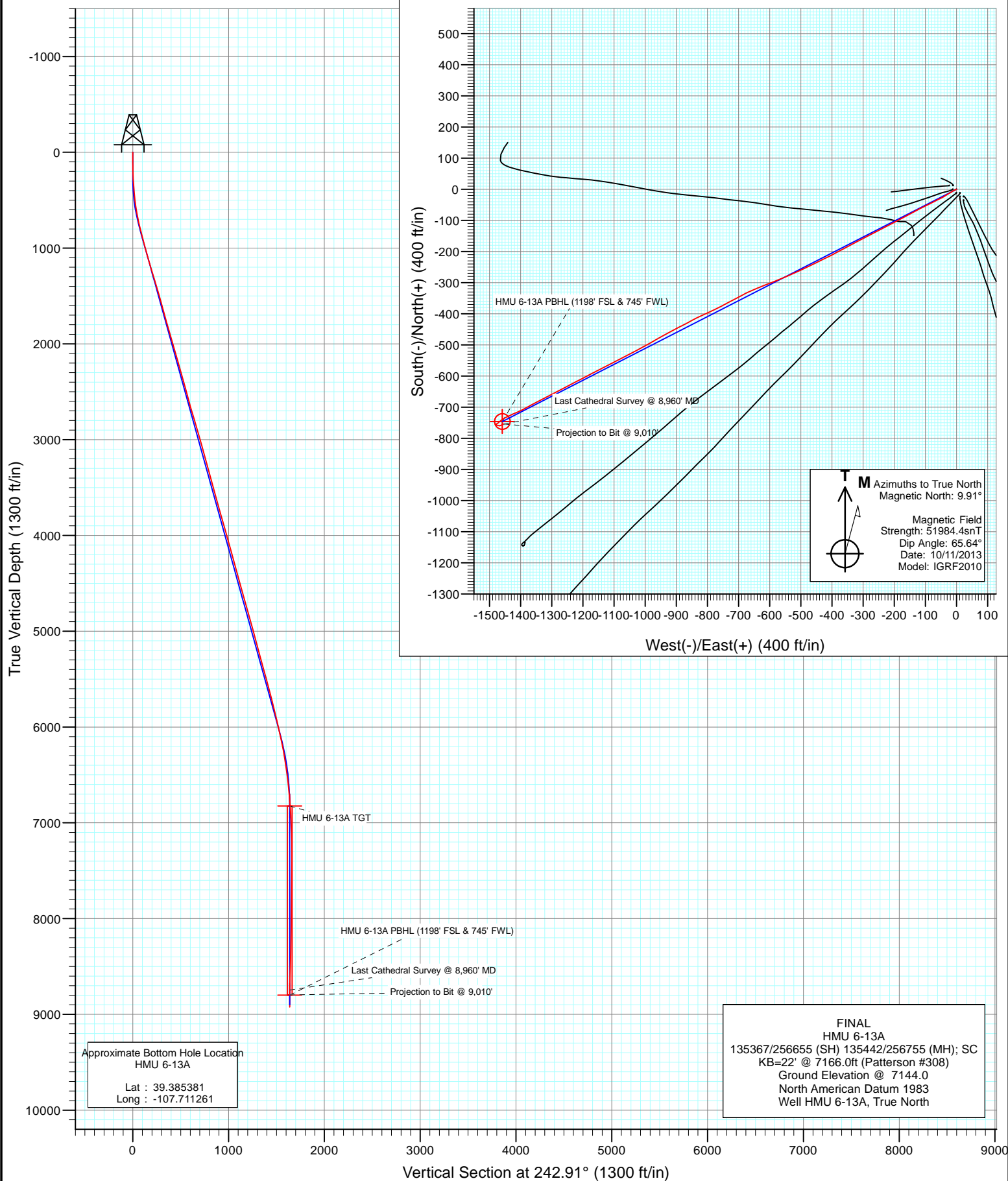




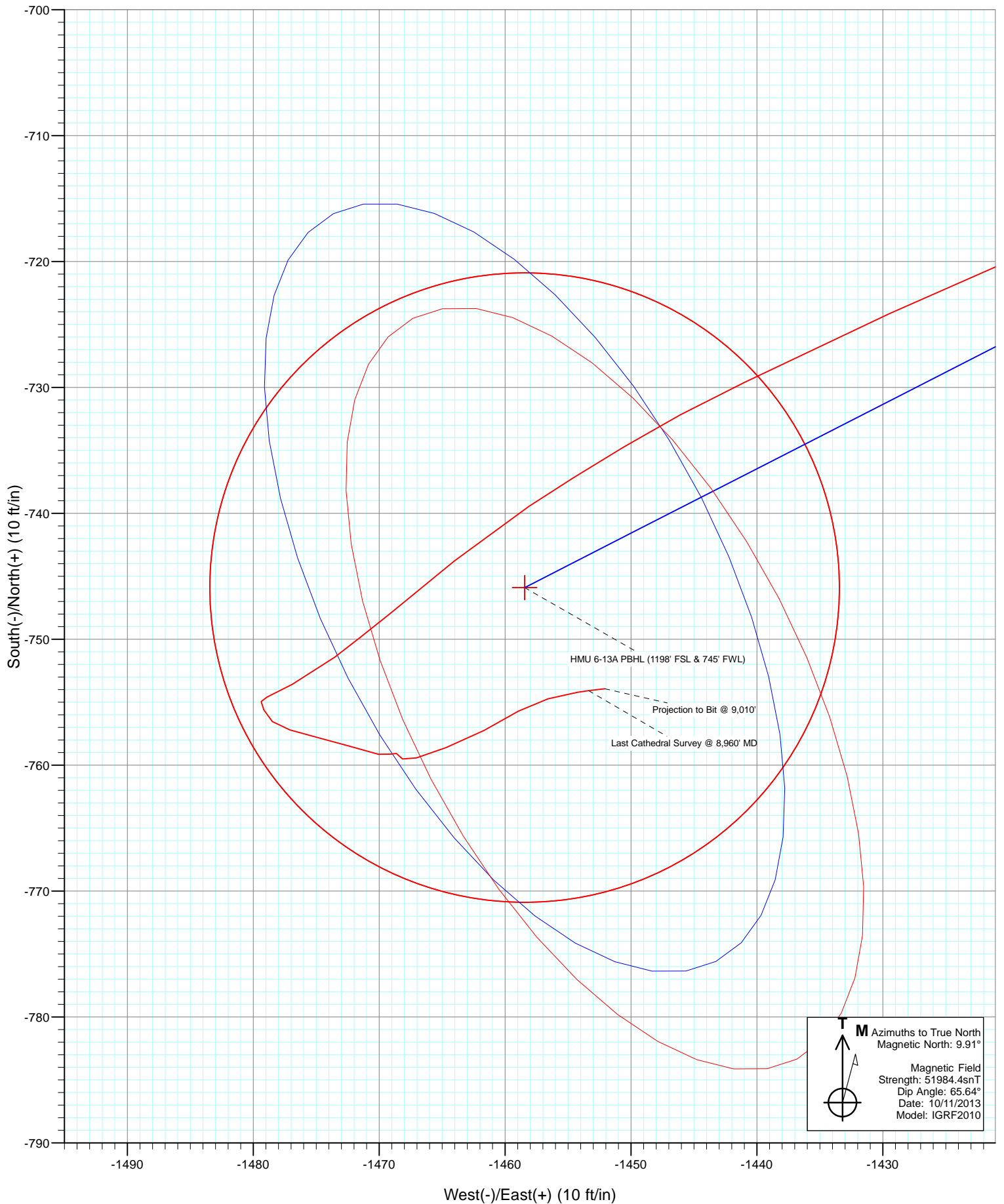
Project: Mamm Creek
Site: J6SEB Pad
Well: HMU 6-13A
Wellbore: OH
Design: FINAL



FINAL
HMU 6-13A
135367/256655 (SH) 135442/256755 (MH); SC
KB=22° @ 7166.0ft (Patterson #308)
Ground Elevation @ 7144.0
North American Datum 1983
Well HMU 6-13A, True North

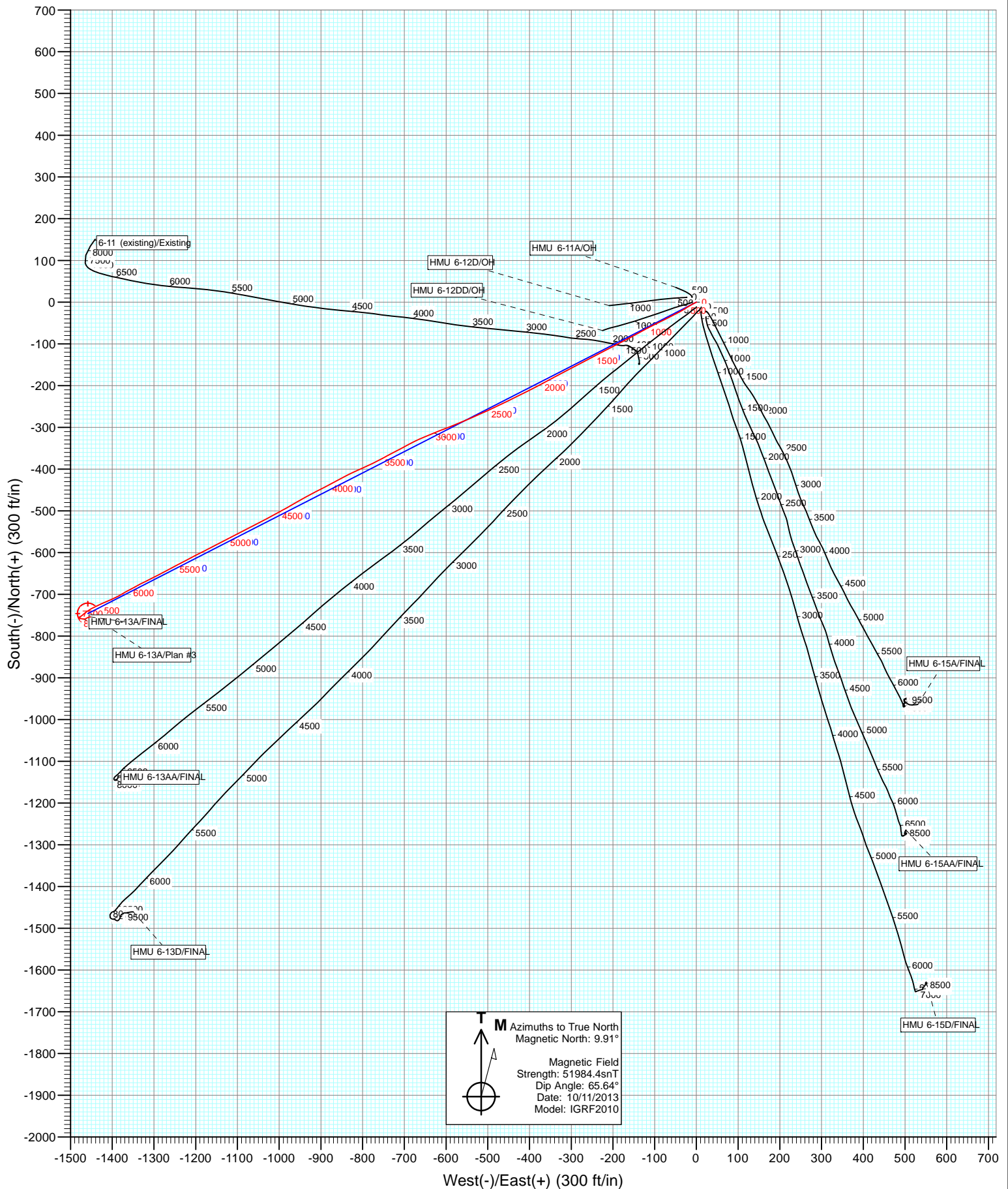


Project: Mamm Creek
Site: J6SEB Pad
Well: HMU 6-13A
Wellbore: OH
Design: FINAL





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



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-13A
Project:	Mamm Creek	TVD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Well:	HMU 6-13A	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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 6-13A					
Well Position	+N/-S	0.0 ft	Northing:	1,573,583.29 ft	Latitude:	39.387451
	+E/-W	0.0 ft	Easting:	2,376,536.96 ft	Longitude:	-107.706123
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	10/11/2013	9.91	65.64	51,984

Design	OH			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	242.91

Survey Program		Date	10/21/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
110.0	9,010.0	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	240.10	110.0	-0.2	-0.3	0.4	0.36	0.36	
140.0	1.00	242.30	140.0	-0.4	-0.7	0.7	2.00	2.00	
170.0	1.20	242.20	170.0	-0.6	-1.2	1.3	0.67	0.67	
201.0	0.90	259.80	201.0	-0.8	-1.7	1.9	1.41	-0.97	
231.0	1.30	246.90	231.0	-1.0	-2.2	2.4	1.56	1.33	
262.0	2.00	240.70	262.0	-1.4	-3.0	3.3	2.33	2.26	
292.0	2.90	249.20	291.9	-1.9	-4.2	4.6	3.23	3.00	
323.0	3.80	241.10	322.9	-2.7	-5.8	6.4	3.27	2.90	
353.0	4.80	242.70	352.8	-3.8	-7.8	8.7	3.36	3.33	
383.0	5.30	236.20	382.7	-5.1	-10.1	11.3	2.53	1.67	
414.0	5.50	241.20	413.5	-6.6	-12.6	14.2	1.65	0.65	
445.0	5.60	241.60	444.4	-8.1	-15.2	17.2	0.35	0.32	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-13A
Project:	Mamm Creek	TVD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Well:	HMU 6-13A	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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
476.0	5.80	242.70	475.3	-9.5	-17.9	20.3	0.74	0.65	
506.0	6.20	238.10	505.1	-11.0	-20.7	23.4	2.08	1.33	
536.0	7.40	236.20	534.9	-13.0	-23.6	26.9	4.07	4.00	
567.0	8.30	235.40	565.6	-15.4	-27.1	31.2	2.92	2.90	
659.0	10.80	241.40	656.3	-23.3	-40.2	46.4	2.92	2.72	
751.0	13.00	243.70	746.3	-32.0	-57.0	65.3	2.45	2.39	
843.0	14.20	243.30	835.7	-41.6	-76.4	87.0	1.31	1.30	
935.0	15.10	243.50	924.7	-52.0	-97.2	110.2	0.98	0.98	
1,027.0	15.20	242.20	1,013.6	-63.0	-118.6	134.3	0.38	0.11	
1,119.0	16.00	241.50	1,102.2	-74.7	-140.4	159.0	0.89	0.87	
1,216.0	16.70	241.20	1,195.2	-87.8	-164.3	186.3	0.73	0.72	
1,338.0	16.40	243.30	1,312.2	-104.0	-195.1	221.0	0.55	-0.25	
1,433.0	16.70	242.60	1,403.2	-116.3	-219.2	248.1	0.38	0.32	
1,528.0	16.30	243.20	1,494.3	-128.6	-243.2	275.1	0.46	-0.42	
1,623.0	15.50	242.80	1,585.7	-140.4	-266.4	301.1	0.85	-0.84	
1,719.0	15.20	242.30	1,678.3	-152.1	-289.0	326.5	0.34	-0.31	
1,814.0	15.90	241.80	1,769.8	-164.0	-311.4	352.0	0.75	0.74	
1,908.0	15.60	241.40	1,860.3	-176.2	-333.9	377.5	0.34	-0.32	
2,003.0	16.00	242.20	1,951.7	-188.4	-356.7	403.3	0.48	0.42	
2,098.0	16.30	242.00	2,042.9	-200.8	-380.0	429.8	0.32	0.32	
2,193.0	16.50	243.80	2,134.1	-213.0	-403.9	456.6	0.57	0.21	
2,288.0	15.80	243.90	2,225.3	-224.6	-427.6	483.0	0.74	-0.74	
2,382.0	15.60	243.60	2,315.8	-235.9	-450.5	508.4	0.23	-0.21	
2,477.0	15.40	244.80	2,407.4	-246.9	-473.3	533.8	0.40	-0.21	
2,573.0	15.30	245.50	2,499.9	-257.6	-496.4	559.2	0.22	-0.10	
2,668.0	14.90	243.80	2,591.7	-268.2	-518.7	583.9	0.63	-0.42	
2,763.0	16.90	247.80	2,683.0	-278.8	-542.5	609.9	2.40	2.11	
2,858.0	16.50	248.50	2,774.0	-289.0	-567.8	637.1	0.47	-0.42	
2,954.0	16.10	248.50	2,866.1	-298.8	-592.9	663.9	0.42	-0.42	
3,049.0	16.20	247.60	2,957.4	-308.7	-617.4	690.2	0.28	0.11	
3,144.0	15.80	247.70	3,048.7	-318.7	-641.6	716.3	0.42	-0.42	
3,238.0	15.30	246.10	3,139.3	-328.5	-664.8	741.5	0.70	-0.53	
3,333.0	15.60	242.00	3,230.8	-339.6	-687.5	766.8	1.19	0.32	
3,427.0	14.90	241.70	3,321.5	-351.3	-709.3	791.5	0.75	-0.74	
3,522.0	15.70	242.10	3,413.2	-363.1	-731.4	816.5	0.85	0.84	
3,617.0	15.10	241.90	3,504.8	-374.9	-753.7	841.8	0.63	-0.63	
3,712.0	15.80	244.40	3,596.3	-386.4	-776.3	867.1	1.02	0.74	
3,807.0	15.00	245.30	3,687.9	-397.1	-799.1	892.3	0.88	-0.84	
3,902.0	15.80	246.00	3,779.5	-407.5	-822.1	917.5	0.86	0.84	
3,996.0	16.20	241.60	3,869.9	-418.9	-845.3	943.4	1.36	0.43	
4,091.0	15.60	242.00	3,961.2	-431.2	-868.3	969.4	0.64	-0.63	
4,186.0	15.60	242.70	4,052.7	-443.1	-890.9	994.9	0.20	0.00	
4,280.0	15.20	242.80	4,143.4	-454.5	-913.1	1,019.9	0.43	-0.43	
4,375.0	15.80	240.50	4,234.9	-466.6	-935.4	1,045.3	0.90	0.63	
4,470.0	15.30	241.60	4,326.4	-478.9	-957.7	1,070.7	0.61	-0.53	
4,565.0	14.70	238.90	4,418.2	-491.1	-979.1	1,095.3	0.97	-0.63	
4,660.0	15.80	241.60	4,509.8	-503.5	-1,000.8	1,120.2	1.38	1.16	
4,754.0	15.90	242.50	4,600.3	-515.5	-1,023.4	1,145.9	0.28	0.11	
4,849.0	15.90	242.80	4,691.6	-527.4	-1,046.6	1,171.9	0.09	0.00	
4,944.0	15.80	242.50	4,783.0	-539.4	-1,069.6	1,197.9	0.14	-0.11	
5,038.0	15.40	241.50	4,873.6	-551.2	-1,091.9	1,223.2	0.51	-0.43	
5,133.0	15.10	244.40	4,965.2	-562.6	-1,114.2	1,248.1	0.86	-0.32	
5,228.0	14.80	241.20	5,057.0	-573.8	-1,136.0	1,272.6	0.92	-0.32	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-13A
Project:	Mamm Creek	TVD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Well:	HMU 6-13A	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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
5,322.0	15.50	243.40	5,147.7	-585.2	-1,157.7	1,297.2	0.96	0.74	
5,416.0	15.20	243.20	5,238.4	-596.4	-1,179.9	1,322.1	0.32	-0.32	
5,511.0	15.00	242.60	5,330.1	-607.7	-1,202.0	1,346.8	0.27	-0.21	
5,606.0	16.10	242.40	5,421.6	-619.4	-1,224.6	1,372.3	1.16	1.16	
5,701.0	15.30	242.00	5,513.1	-631.4	-1,247.3	1,398.0	0.85	-0.84	
5,796.0	14.70	242.20	5,604.8	-642.9	-1,269.0	1,422.6	0.63	-0.63	
5,891.0	14.00	242.60	5,696.9	-653.8	-1,289.9	1,446.1	0.74	-0.74	
5,986.0	14.20	244.10	5,789.0	-664.2	-1,310.6	1,469.3	0.44	0.21	
6,081.0	13.00	242.40	5,881.3	-674.2	-1,330.5	1,491.6	1.33	-1.26	
6,176.0	13.30	241.90	5,973.9	-684.3	-1,349.6	1,513.2	0.34	0.32	
6,271.0	12.70	240.10	6,066.4	-694.7	-1,368.3	1,534.6	0.76	-0.63	
6,366.0	11.50	242.20	6,159.3	-704.3	-1,385.8	1,554.5	1.35	-1.26	
6,461.0	10.50	246.20	6,252.6	-712.2	-1,402.1	1,572.6	1.32	-1.05	
6,555.0	8.80	247.40	6,345.2	-718.4	-1,416.5	1,588.3	1.82	-1.81	
6,650.0	8.30	245.00	6,439.2	-724.1	-1,429.5	1,602.4	0.65	-0.53	
6,745.0	7.20	244.20	6,533.3	-729.6	-1,441.0	1,615.2	1.16	-1.16	
6,840.0	5.90	239.00	6,627.7	-734.7	-1,450.6	1,626.0	1.50	-1.37	
6,935.0	4.80	236.60	6,722.3	-739.4	-1,458.1	1,634.8	1.18	-1.16	
7,030.0	4.10	230.50	6,817.0	-743.8	-1,464.0	1,642.1	0.89	-0.74	
7,124.0	3.90	231.00	6,910.8	-747.9	-1,469.1	1,648.5	0.22	-0.21	
7,219.0	2.90	232.70	7,005.6	-751.4	-1,473.5	1,654.1	1.06	-1.05	
7,310.0	2.20	243.40	7,096.5	-753.6	-1,476.9	1,658.1	0.93	-0.77	
7,405.0	0.50	243.30	7,191.5	-754.6	-1,478.9	1,660.3	1.79	-1.79	
7,500.0	0.22	206.50	7,286.5	-754.9	-1,479.4	1,660.9	0.37	-0.29	
7,595.0	0.70	150.10	7,381.5	-755.6	-1,479.2	1,661.0	0.64	0.51	
7,690.0	0.70	137.10	7,476.5	-756.5	-1,478.5	1,660.8	0.17	0.00	
7,786.0	1.20	103.30	7,572.4	-757.2	-1,477.1	1,659.9	0.76	0.52	
7,880.0	1.30	107.10	7,666.4	-757.7	-1,475.1	1,658.4	0.14	0.11	
7,975.0	2.00	103.90	7,761.4	-758.5	-1,472.5	1,656.3	0.74	0.74	
8,071.0	1.00	109.10	7,857.3	-759.1	-1,470.1	1,654.5	1.05	-1.04	
8,165.0	0.40	29.10	7,951.3	-759.1	-1,469.1	1,653.6	1.07	-0.64	
8,260.0	0.50	125.40	8,046.3	-759.1	-1,468.6	1,653.2	0.71	0.11	
8,355.0	0.30	144.10	8,141.3	-759.5	-1,468.1	1,652.9	0.25	-0.21	
8,450.0	1.20	72.80	8,236.3	-759.4	-1,467.0	1,651.9	1.20	0.95	
8,545.0	1.80	70.00	8,331.3	-758.6	-1,464.7	1,649.5	0.64	0.63	
8,640.0	2.20	62.10	8,426.2	-757.2	-1,461.7	1,646.2	0.51	0.42	
8,735.0	1.60	58.90	8,521.2	-755.7	-1,458.9	1,643.0	0.64	-0.63	
8,830.0	1.50	76.40	8,616.1	-754.7	-1,456.6	1,640.5	0.51	-0.11	
8,926.0	1.40	79.10	8,712.1	-754.2	-1,454.2	1,638.1	0.13	-0.10	
8,960.0	1.50	83.20	8,746.1	-754.1	-1,453.4	1,637.3	0.42	0.29	Last Cathedral Survey @ 8,960' MD
9,010.0	1.50	83.20	8,796.1	-753.9	-1,452.1	1,636.1	0.00	0.00	Projection to Bit @ 9,010'

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU 6-13A
Project:	Mamm Creek	TVD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Site:	J6SEB Pad	MD Reference:	KB=22' @ 7166.0ft (Patterson #308)
Well:	HMU 6-13A	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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 6-13A TGT	0.00	0.00	6,825.0	-745.9	-1,458.4	1,572,873.03	2,375,060.83	39.385403	-107.711283
- survey misses target center by 6.3ft at 7037.8ft MD (6824.8 TVD, -744.1 N, -1464.5 E)									
- Point									
HMU 6-13A PBHL (1198	0.00	0.00	8,799.0	-745.9	-1,458.4	1,572,873.03	2,375,060.83	39.385403	-107.711283
- survey misses target center by 10.7ft at 9010.0ft MD (8796.1 TVD, -753.9 N, -1452.1 E)									
- Circle (radius 25.0)									

Survey Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	Comment	
8,960.0	8,746.1	-754.1	-1,453.4	Last Cathedral Survey @ 8,960' MD	
9,010.0	8,796.1	-753.9	-1,452.1	Projection to Bit @ 9,010'	

Checked By: _____ Approved By: _____ Date: _____