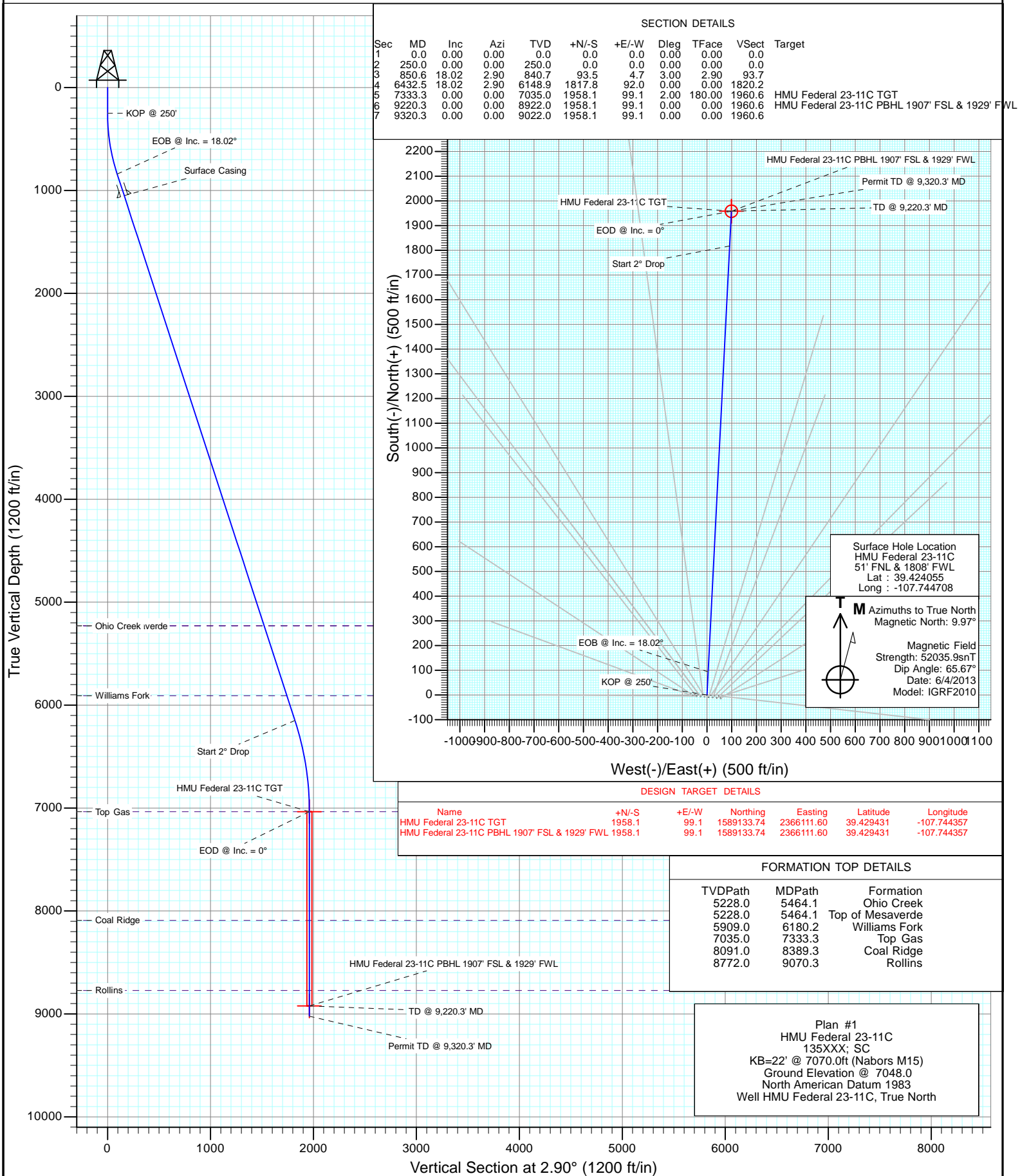
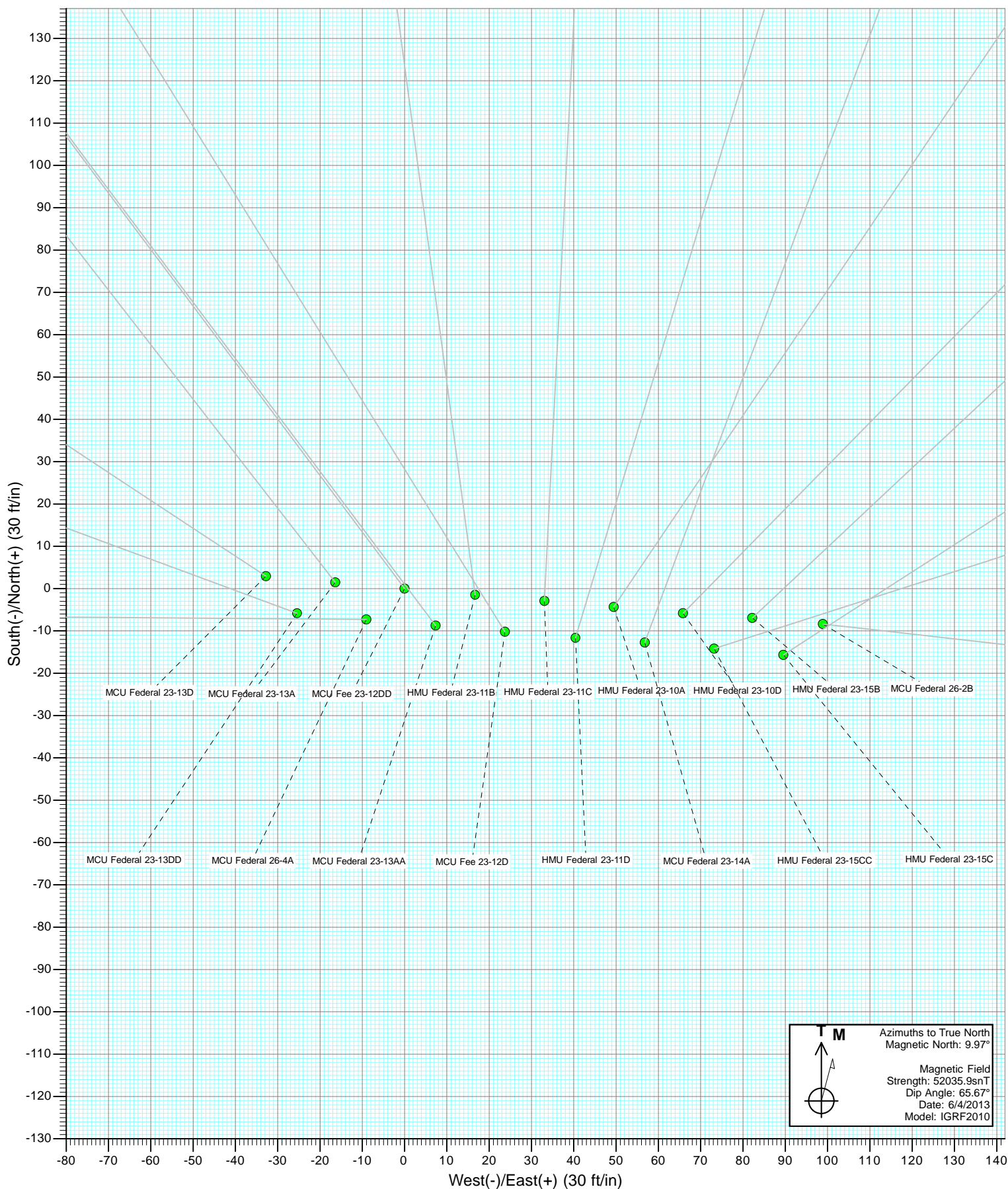
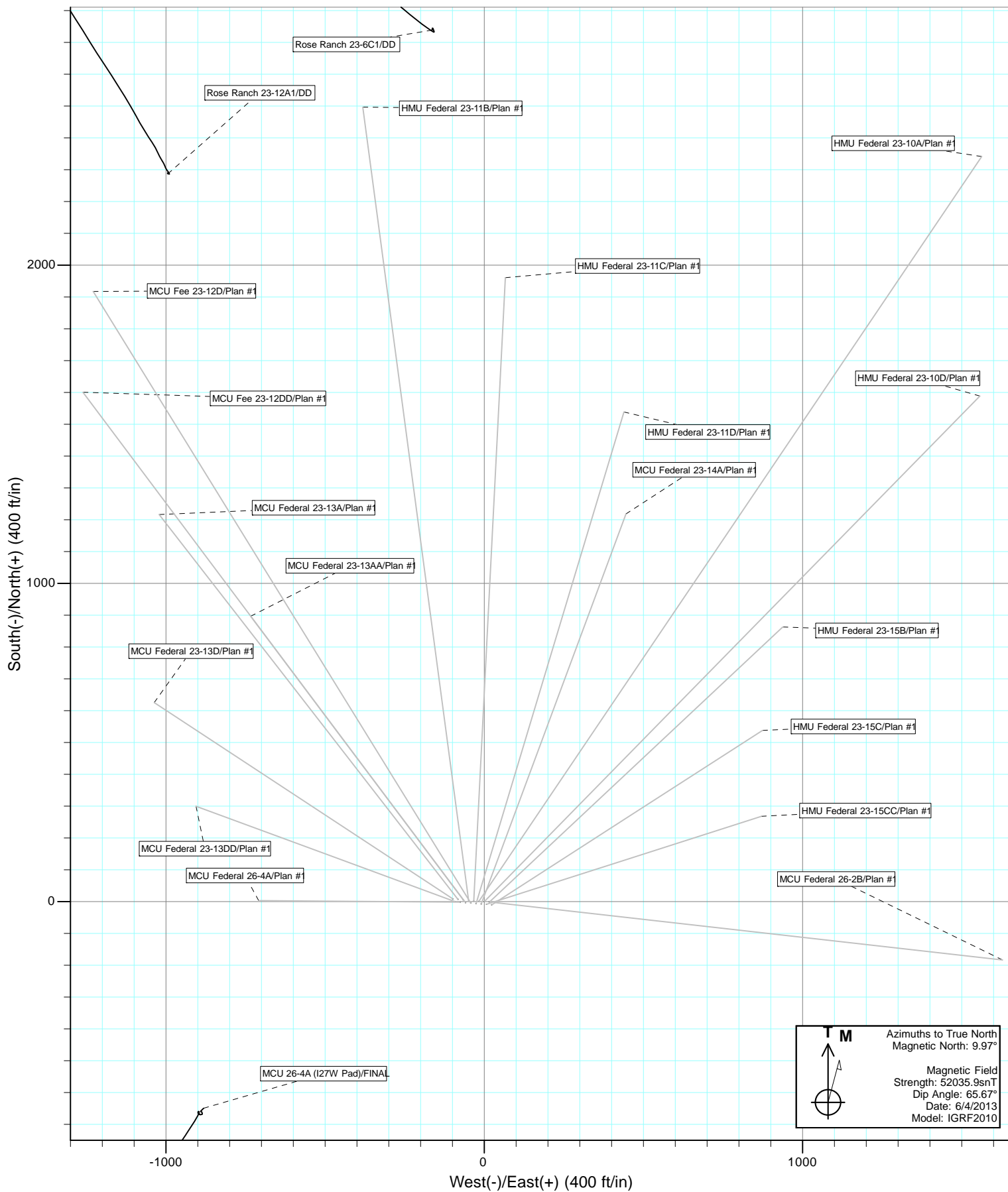




Project: Mamm Creek
Site: C26W Pad
Well: HMU Federal 23-11C
Wellbore: OH
Design: Plan #1

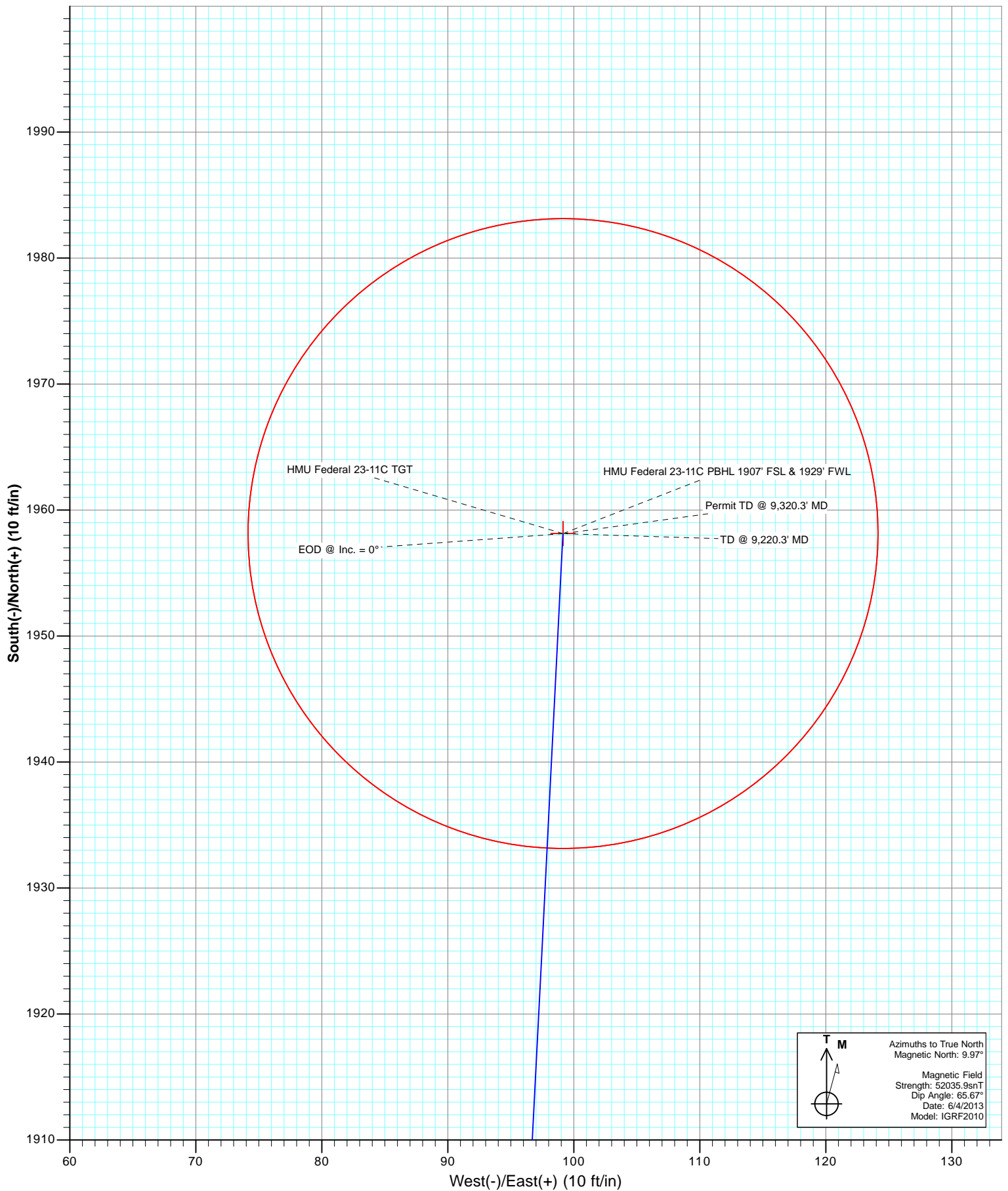








Project: Mamm Creek
Site: C26W Pad
Well: HMU Federal 23-11C
Wellbore: OH
Plan: Plan #1



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Azimuths to True North
Magnetic North: 9.97°

Magnetic Field
Strength: 52035.9snT
Dip Angle: 65.67°
Date: 6/4/2013
Model: IGRF2010

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well HMU Federal 23-11C
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 7070.0ft (Nabors M15)
Project:	Mamm Creek	MD Reference:	KB=22' @ 7070.0ft (Nabors M15)
Site:	C26W Pad	North Reference:	True
Well:	HMU Federal 23-11C	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

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		C26W Pad			
Site Position:		Northing:	1,587,164.53 ft	Latitude:	39.424020
From:	Lat/Long	Easting:	2,366,020.27 ft	Longitude:	-107.744508
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.42 °

Well	HMU Federal 23-11C					
Well Position	+N/-S	0.0 ft	Northing:	1,587,178.65 ft	Latitude:	39.424055
	+E/-W	0.0 ft	Easting:	2,365,964.10 ft	Longitude:	-107.744708
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,048.0 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/4/2013	9.98	65.67	52,036

Design	Plan #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.0	0.0	0.0	2.90

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
250.0	0.00	0.00	250.0	0.0	0.0	0.00	0.00	0.00	0.00	
850.6	18.02	2.90	840.7	93.5	4.7	3.00	3.00	0.00	2.90	
6,432.5	18.02	2.90	6,148.9	1,817.8	92.0	0.00	0.00	0.00	0.00	
7,333.3	0.00	0.00	7,035.0	1,958.1	99.1	2.00	-2.00	0.00	180.00	HMU Federal 23-11C
9,220.3	0.00	0.00	8,922.0	1,958.1	99.1	0.00	0.00	0.00	0.00	HMU Federal 23-11C
9,320.3	0.00	0.00	9,022.0	1,958.1	99.1	0.00	0.00	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well HMU Federal 23-11C
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 7070.0ft (Nabors M15)
Project:	Mamm Creek	MD Reference:	KB=22' @ 7070.0ft (Nabors M15)
Site:	C26W Pad	North Reference:	True
Well:	HMU Federal 23-11C	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	
250.0	0.00	0.00	250.0	0.0	0.0	0.0	0.00	0.00	KOP @ 250'
300.0	1.50	2.90	300.0	0.7	0.0	0.7	3.00	3.00	
400.0	4.50	2.90	399.8	5.9	0.3	5.9	3.00	3.00	
500.0	7.50	2.90	499.3	16.3	0.8	16.3	3.00	3.00	
600.0	10.50	2.90	598.0	31.9	1.6	32.0	3.00	3.00	
700.0	13.50	2.90	695.8	52.7	2.7	52.8	3.00	3.00	
800.0	16.50	2.90	792.4	78.5	4.0	78.6	3.00	3.00	
850.6	18.02	2.90	840.7	93.5	4.7	93.7	3.00	3.00	EOB @ Inc. = 18.02°
900.0	18.02	2.90	887.7	108.8	5.5	108.9	0.00	0.00	
1,000.0	18.02	2.90	982.8	139.7	7.1	139.9	0.00	0.00	
1,070.6	18.02	2.90	1,050.0	161.5	8.2	161.7	0.00	0.00	Surface Casing
1,100.0	18.02	2.90	1,077.9	170.6	8.6	170.8	0.00	0.00	
1,200.0	18.02	2.90	1,173.0	201.5	10.2	201.7	0.00	0.00	
1,300.0	18.02	2.90	1,268.1	232.4	11.8	232.7	0.00	0.00	
1,400.0	18.02	2.90	1,363.2	263.3	13.3	263.6	0.00	0.00	
1,500.0	18.02	2.90	1,458.3	294.1	14.9	294.5	0.00	0.00	
1,600.0	18.02	2.90	1,553.4	325.0	16.5	325.5	0.00	0.00	
1,700.0	18.02	2.90	1,648.5	355.9	18.0	356.4	0.00	0.00	
1,800.0	18.02	2.90	1,743.6	386.8	19.6	387.3	0.00	0.00	
1,900.0	18.02	2.90	1,838.7	417.7	21.1	418.2	0.00	0.00	
2,000.0	18.02	2.90	1,933.8	448.6	22.7	449.2	0.00	0.00	
2,100.0	18.02	2.90	2,028.9	479.5	24.3	480.1	0.00	0.00	
2,200.0	18.02	2.90	2,124.0	510.4	25.8	511.0	0.00	0.00	
2,300.0	18.02	2.90	2,219.1	541.3	27.4	542.0	0.00	0.00	
2,400.0	18.02	2.90	2,314.2	572.2	29.0	572.9	0.00	0.00	
2,500.0	18.02	2.90	2,409.3	603.1	30.5	603.8	0.00	0.00	
2,600.0	18.02	2.90	2,504.4	633.9	32.1	634.8	0.00	0.00	
2,700.0	18.02	2.90	2,599.5	664.8	33.7	665.7	0.00	0.00	
2,800.0	18.02	2.90	2,694.6	695.7	35.2	696.6	0.00	0.00	
2,900.0	18.02	2.90	2,789.7	726.6	36.8	727.6	0.00	0.00	
3,000.0	18.02	2.90	2,884.7	757.5	38.4	758.5	0.00	0.00	
3,100.0	18.02	2.90	2,979.8	788.4	39.9	789.4	0.00	0.00	
3,200.0	18.02	2.90	3,074.9	819.3	41.5	820.3	0.00	0.00	
3,300.0	18.02	2.90	3,170.0	850.2	43.0	851.3	0.00	0.00	
3,400.0	18.02	2.90	3,265.1	881.1	44.6	882.2	0.00	0.00	
3,500.0	18.02	2.90	3,360.2	912.0	46.2	913.1	0.00	0.00	
3,600.0	18.02	2.90	3,455.3	942.9	47.7	944.1	0.00	0.00	
3,700.0	18.02	2.90	3,550.4	973.7	49.3	975.0	0.00	0.00	
3,800.0	18.02	2.90	3,645.5	1,004.6	50.9	1,005.9	0.00	0.00	
3,900.0	18.02	2.90	3,740.6	1,035.5	52.4	1,036.9	0.00	0.00	
4,000.0	18.02	2.90	3,835.7	1,066.4	54.0	1,067.8	0.00	0.00	
4,100.0	18.02	2.90	3,930.8	1,097.3	55.6	1,098.7	0.00	0.00	
4,200.0	18.02	2.90	4,025.9	1,128.2	57.1	1,129.6	0.00	0.00	
4,300.0	18.02	2.90	4,121.0	1,159.1	58.7	1,160.6	0.00	0.00	
4,400.0	18.02	2.90	4,216.1	1,190.0	60.3	1,191.5	0.00	0.00	
4,500.0	18.02	2.90	4,311.2	1,220.9	61.8	1,222.4	0.00	0.00	
4,600.0	18.02	2.90	4,406.3	1,251.8	63.4	1,253.4	0.00	0.00	
4,700.0	18.02	2.90	4,501.4	1,282.7	64.9	1,284.3	0.00	0.00	
4,800.0	18.02	2.90	4,596.5	1,313.5	66.5	1,315.2	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well HMU Federal 23-11C
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 7070.0ft (Nabors M15)
Project:	Mamm Creek	MD Reference:	KB=22' @ 7070.0ft (Nabors M15)
Site:	C26W Pad	North Reference:	True
Well:	HMU Federal 23-11C	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
4,900.0	18.02	2.90	4,691.6	1,344.4	68.1	1,346.2	0.00	0.00	
5,000.0	18.02	2.90	4,786.7	1,375.3	69.6	1,377.1	0.00	0.00	
5,100.0	18.02	2.90	4,881.8	1,406.2	71.2	1,408.0	0.00	0.00	
5,200.0	18.02	2.90	4,976.9	1,437.1	72.8	1,439.0	0.00	0.00	
5,300.0	18.02	2.90	5,072.0	1,468.0	74.3	1,469.9	0.00	0.00	
5,400.0	18.02	2.90	5,167.1	1,498.9	75.9	1,500.8	0.00	0.00	
5,464.1	18.02	2.90	5,228.0	1,518.7	76.9	1,520.6	0.00	0.00	Top of Mesaverde - Ohio Creek
5,500.0	18.02	2.90	5,262.2	1,529.8	77.5	1,531.7	0.00	0.00	
5,600.0	18.02	2.90	5,357.3	1,560.7	79.0	1,562.7	0.00	0.00	
5,700.0	18.02	2.90	5,452.3	1,591.6	80.6	1,593.6	0.00	0.00	
5,800.0	18.02	2.90	5,547.4	1,622.5	82.1	1,624.5	0.00	0.00	
5,900.0	18.02	2.90	5,642.5	1,653.3	83.7	1,655.5	0.00	0.00	
6,000.0	18.02	2.90	5,737.6	1,684.2	85.3	1,686.4	0.00	0.00	
6,100.0	18.02	2.90	5,832.7	1,715.1	86.8	1,717.3	0.00	0.00	
6,180.2	18.02	2.90	5,909.0	1,739.9	88.1	1,742.1	0.00	0.00	Williams Fork
6,200.0	18.02	2.90	5,927.8	1,746.0	88.4	1,748.3	0.00	0.00	
6,300.0	18.02	2.90	6,022.9	1,776.9	90.0	1,779.2	0.00	0.00	
6,400.0	18.02	2.90	6,118.0	1,807.8	91.5	1,810.1	0.00	0.00	
6,432.5	18.02	2.90	6,148.9	1,817.8	92.0	1,820.2	0.00	0.00	Start 2° Drop
6,500.0	16.67	2.90	6,213.4	1,837.9	93.1	1,840.3	2.00	-2.00	
6,600.0	14.67	2.90	6,309.6	1,864.9	94.4	1,867.3	2.00	-2.00	
6,700.0	12.67	2.90	6,406.8	1,888.5	95.6	1,890.9	2.00	-2.00	
6,800.0	10.67	2.90	6,504.7	1,908.7	96.6	1,911.1	2.00	-2.00	
6,900.0	8.67	2.90	6,603.3	1,925.5	97.5	1,927.9	2.00	-2.00	
7,000.0	6.67	2.90	6,702.4	1,938.8	98.2	1,941.3	2.00	-2.00	
7,100.0	4.67	2.90	6,801.9	1,948.7	98.7	1,951.1	2.00	-2.00	
7,200.0	2.67	2.90	6,901.7	1,955.0	99.0	1,957.5	2.00	-2.00	
7,300.0	0.67	2.90	7,001.7	1,957.9	99.1	1,960.5	2.00	-2.00	
7,333.3	0.00	0.00	7,035.0	1,958.1	99.1	1,960.6	2.00	-2.00	EOD @ Inc. = 0° - Top Gas
7,400.0	0.00	0.00	7,101.7	1,958.1	99.1	1,960.6	0.00	0.00	
7,500.0	0.00	0.00	7,201.7	1,958.1	99.1	1,960.6	0.00	0.00	
7,600.0	0.00	0.00	7,301.7	1,958.1	99.1	1,960.6	0.00	0.00	
7,700.0	0.00	0.00	7,401.7	1,958.1	99.1	1,960.6	0.00	0.00	
7,800.0	0.00	0.00	7,501.7	1,958.1	99.1	1,960.6	0.00	0.00	
7,900.0	0.00	0.00	7,601.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,000.0	0.00	0.00	7,701.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,100.0	0.00	0.00	7,801.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,200.0	0.00	0.00	7,901.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,300.0	0.00	0.00	8,001.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,389.3	0.00	0.00	8,091.0	1,958.1	99.1	1,960.6	0.00	0.00	Coal Ridge
8,400.0	0.00	0.00	8,101.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,500.0	0.00	0.00	8,201.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,600.0	0.00	0.00	8,301.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,700.0	0.00	0.00	8,401.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,800.0	0.00	0.00	8,501.7	1,958.1	99.1	1,960.6	0.00	0.00	
8,900.0	0.00	0.00	8,601.7	1,958.1	99.1	1,960.6	0.00	0.00	
9,000.0	0.00	0.00	8,701.7	1,958.1	99.1	1,960.6	0.00	0.00	
9,070.3	0.00	0.00	8,772.0	1,958.1	99.1	1,960.6	0.00	0.00	Rollins
9,100.0	0.00	0.00	8,801.7	1,958.1	99.1	1,960.6	0.00	0.00	
9,200.0	0.00	0.00	8,901.7	1,958.1	99.1	1,960.6	0.00	0.00	
9,220.3	0.00	0.00	8,922.0	1,958.1	99.1	1,960.6	0.00	0.00	TD @ 9,220.3' MD
9,300.0	0.00	0.00	9,001.7	1,958.1	99.1	1,960.6	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well HMU Federal 23-11C
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 7070.0ft (Nabors M15)
Project:	Mamm Creek	MD Reference:	KB=22' @ 7070.0ft (Nabors M15)
Site:	C26W Pad	North Reference:	True
Well:	HMU Federal 23-11C	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
9,320.3	0.00	0.00	9,022.0	1,958.1	99.1	1,960.6	0.00	0.00	Permit TD @ 9,320.3' MD

Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
HMU Federal 23-11C TC - plan hits target center - Point	0.00	0.00	7,035.0	1,958.1	99.1	1,589,133.74	2,366,111.60	39.429431	-107.744357
HMU Federal 23-11C PE - plan hits target center - Circle (radius 25.0)	0.00	0.00	8,922.0	1,958.1	99.1	1,589,133.74	2,366,111.60	39.429431	-107.744357

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)	
1,070.6	1,050.0	Surface Casing			

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
5,464.1	5,228.0	Ohio Creek			
5,464.1	5,228.0	Top of Mesaverde			
6,180.2	5,909.0	Williams Fork			
7,333.3	7,035.0	Top Gas			
8,389.3	8,091.0	Coal Ridge			
9,070.3	8,772.0	Rollins			

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
250.0	250.0	0.0	0.0	KOP @ 250'	
850.6	840.7	93.5	4.7	EOB @ Inc. = 18.02°	
6,432.5	6,148.9	1,817.8	92.0	Start 2° Drop	
7,333.3	7,035.0	1,958.1	99.1	EOD @ Inc. = 0°	
9,220.3	8,922.0	1,958.1	99.1	TD @ 9,220.3' MD	
9,320.3	9,022.0	1,958.1	99.1	Permit TD @ 9,320.3' MD	