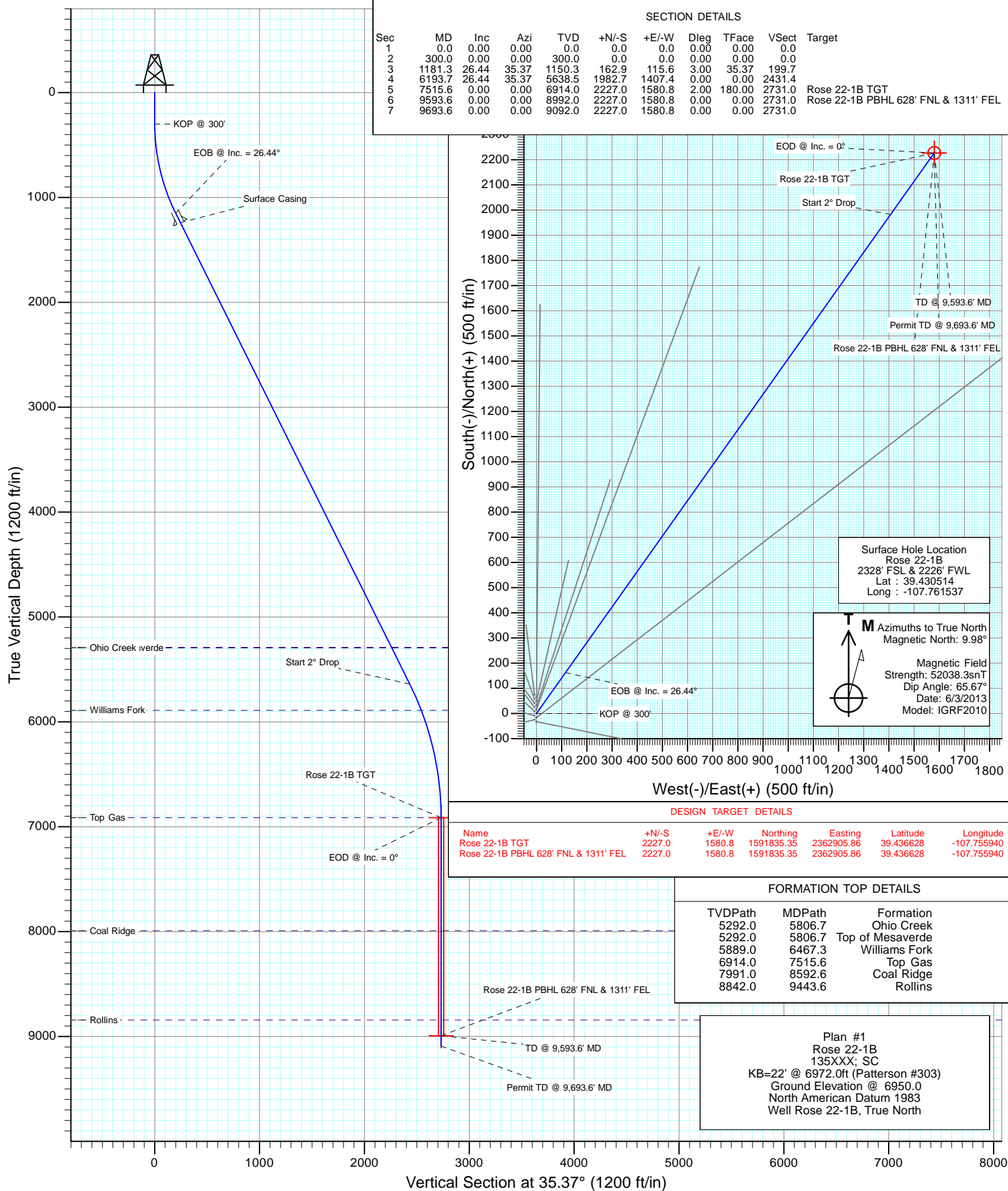
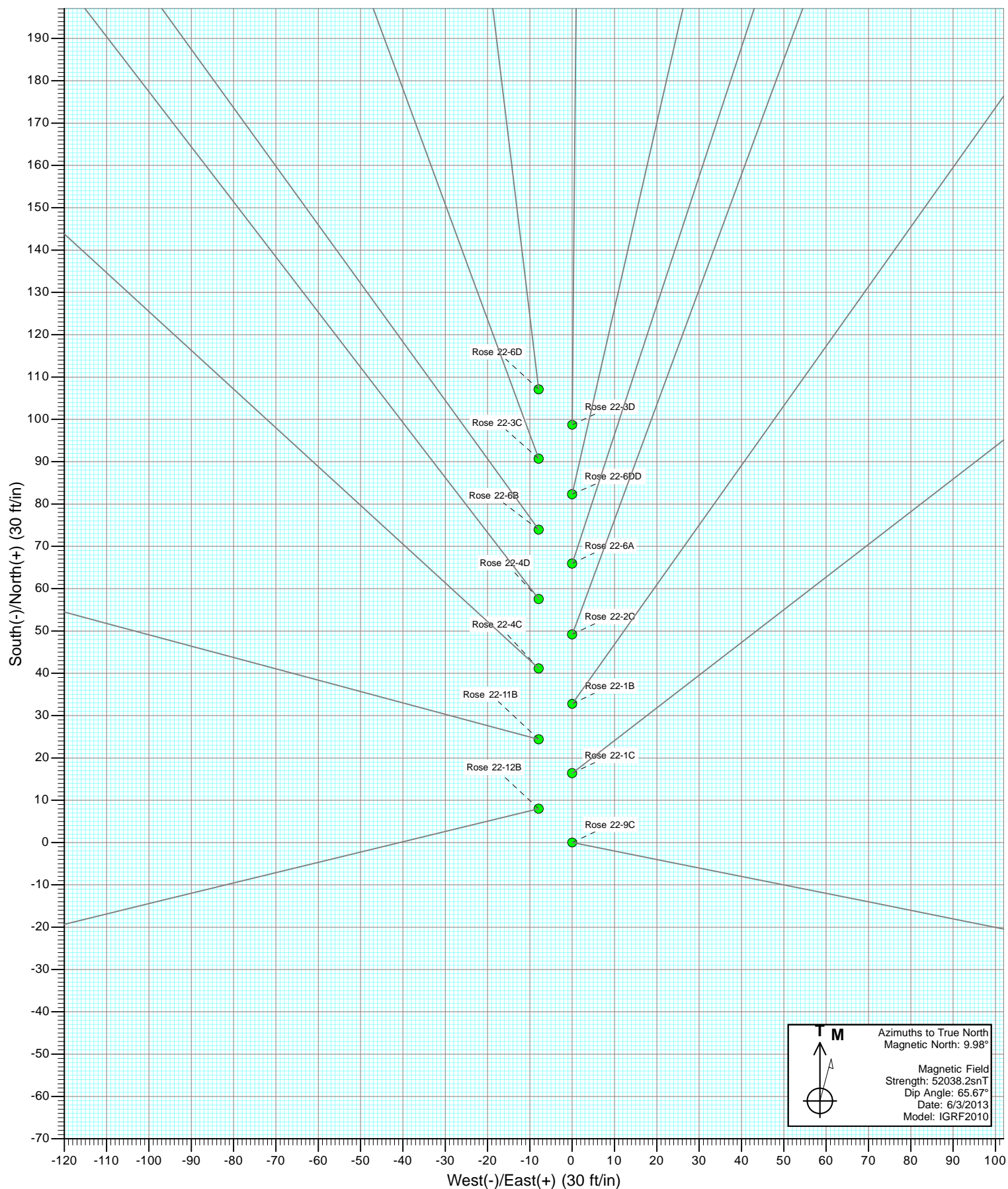
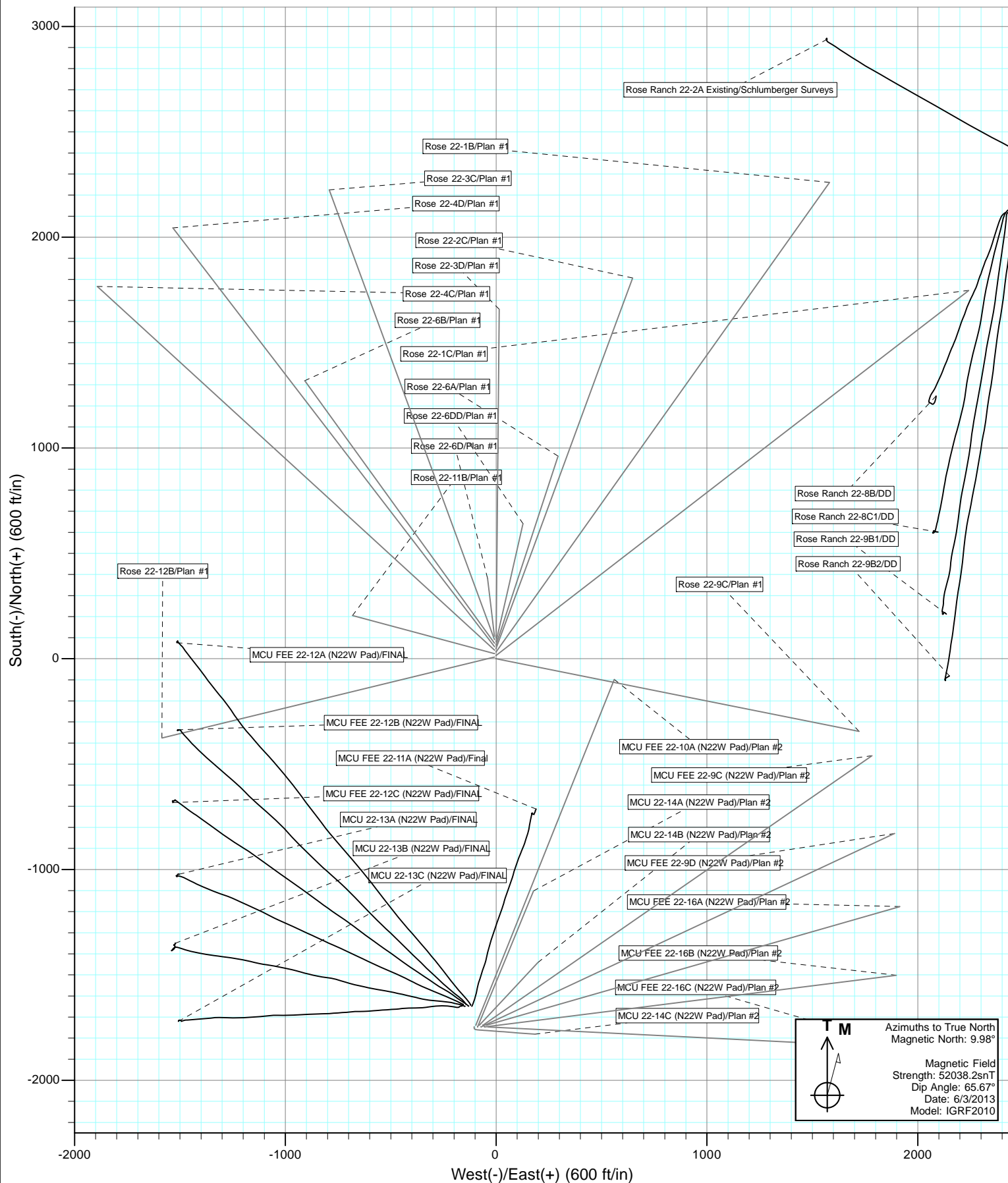




Project: Mamm Creek  
Site: K22W Pad  
Well: Rose 22-1B  
Wellbore: OH  
Design: Plan #1

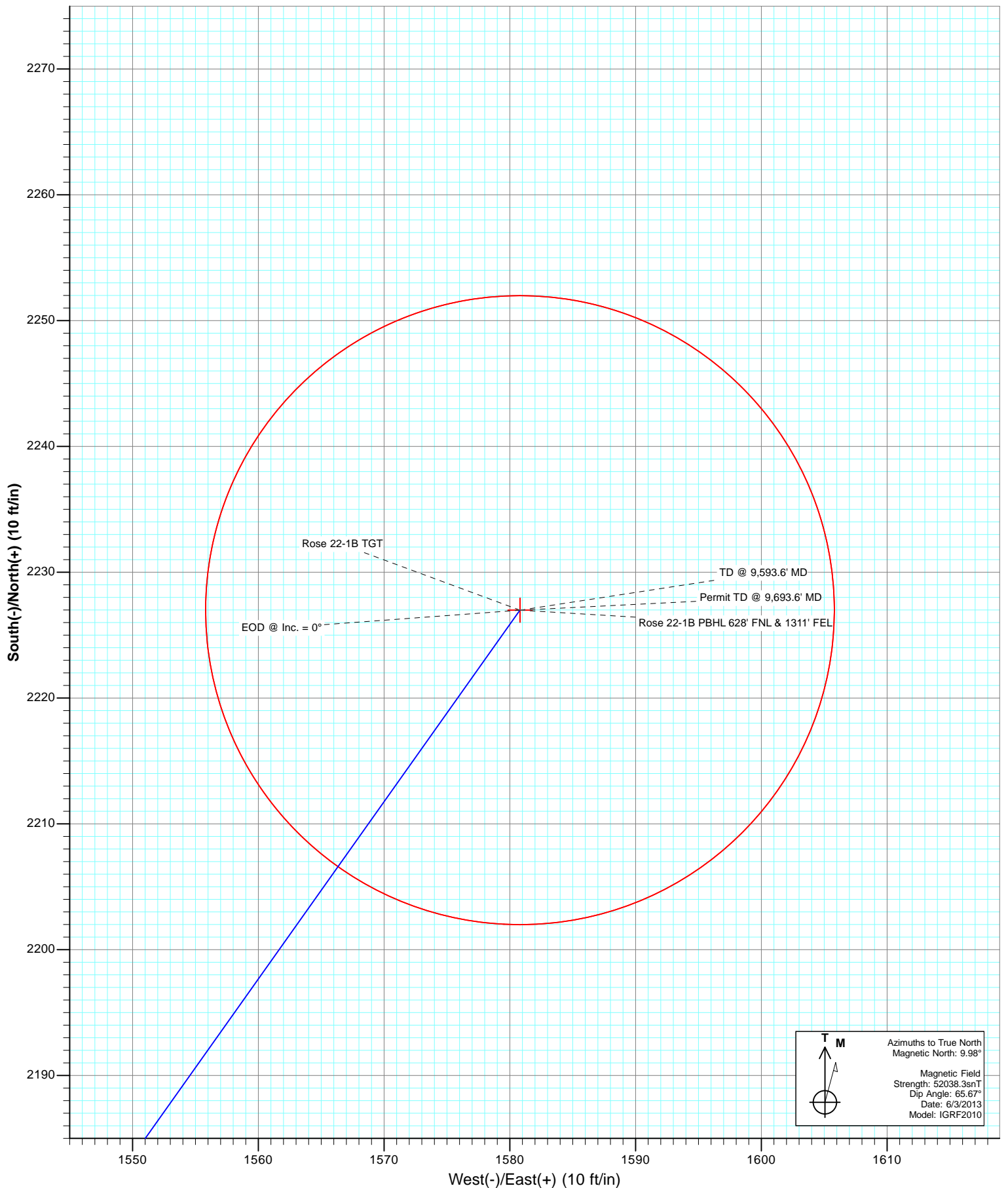








Project: Mamm Creek  
Site: K22W Pad  
Well: Rose 22-1B  
Wellbore: OH  
Plan: Plan #1



# Cathedral Energy Services

## Planning Report

<b>Database:</b>	USA EDM 5000 Multi Users DB	<b>Local Co-ordinate Reference:</b>	Well Rose 22-1B
<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>TVD Reference:</b>	KB=22' @ 6972.0ft (Patterson #303)
<b>Project:</b>	Mamm Creek	<b>MD Reference:</b>	KB=22' @ 6972.0ft (Patterson #303)
<b>Site:</b>	K22W Pad	<b>North Reference:</b>	True
<b>Well:</b>	Rose 22-1B	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OH		
<b>Design:</b>	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		K22W Pad			
Site Position:		Northing:	1,589,615.65 ft	Latitude:	39.430424
From:	Lat/Long	Easting:	2,361,269.29 ft	Longitude:	-107.761537
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.43 °

Well	Rose 22-1B					
Well Position	+N/-S	0.0 ft	Northing:	1,589,648.40 ft	Latitude:	39.430514
	+E/-W	0.0 ft	Easting:	2,361,270.11 ft	Longitude:	-107.761537
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	6,950.0 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/3/2013	9.98	65.67	52,038

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	35.37

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	
300.0	0.00	0.00	300.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,181.3	26.44	35.37	1,150.3	162.9	115.6	3.00	3.00	0.00	35.37	
6,193.7	26.44	35.37	5,638.5	1,982.7	1,407.4	0.00	0.00	0.00	0.00	
7,515.6	0.00	0.00	6,914.0	2,227.0	1,580.8	2.00	-2.00	0.00	180.00	Rose 22-1B TGT
9,593.6	0.00	0.00	8,992.0	2,227.0	1,580.8	0.00	0.00	0.00	0.00	Rose 22-1B PBHL 62
9,693.6	0.00	0.00	9,092.0	2,227.0	1,580.8	0.00	0.00	0.00	0.00	

# Cathedral Energy Services

## Planning Report

<b>Database:</b>	USA EDM 5000 Multi Users DB	<b>Local Co-ordinate Reference:</b>	Well Rose 22-1B
<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>TVD Reference:</b>	KB=22' @ 6972.0ft (Patterson #303)
<b>Project:</b>	Mamm Creek	<b>MD Reference:</b>	KB=22' @ 6972.0ft (Patterson #303)
<b>Site:</b>	K22W Pad	<b>North Reference:</b>	True
<b>Well:</b>	Rose 22-1B	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OH		
<b>Design:</b>	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	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	KOP @ 300'
400.0	3.00	35.37	400.0	2.1	1.5	2.6	3.00	3.00	
500.0	6.00	35.37	499.6	8.5	6.1	10.5	3.00	3.00	
600.0	9.00	35.37	598.8	19.2	13.6	23.5	3.00	3.00	
700.0	12.00	35.37	697.1	34.0	24.2	41.7	3.00	3.00	
800.0	15.00	35.37	794.3	53.1	37.7	65.1	3.00	3.00	
900.0	18.00	35.37	890.2	76.2	54.1	93.5	3.00	3.00	
1,000.0	21.00	35.37	984.4	103.4	73.4	126.9	3.00	3.00	
1,100.0	24.00	35.37	1,076.8	134.6	95.6	165.1	3.00	3.00	
1,181.3	26.44	35.37	1,150.3	162.9	115.6	199.7	3.00	3.00	EOB @ Inc. = 26.44°
1,200.0	26.44	35.37	1,167.1	169.7	120.4	208.1	0.00	0.00	
1,281.3	26.44	35.37	1,239.9	199.2	141.4	244.3	0.00	0.00	Surface Casing
1,300.0	26.44	35.37	1,256.6	206.0	146.2	252.6	0.00	0.00	
1,400.0	26.44	35.37	1,346.2	242.3	172.0	297.1	0.00	0.00	
1,500.0	26.44	35.37	1,435.7	278.6	197.8	341.6	0.00	0.00	
1,600.0	26.44	35.37	1,525.3	314.9	223.5	386.2	0.00	0.00	
1,700.0	26.44	35.37	1,614.8	351.2	249.3	430.7	0.00	0.00	
1,800.0	26.44	35.37	1,704.3	387.5	275.1	475.2	0.00	0.00	
1,900.0	26.44	35.37	1,793.9	423.8	300.8	519.7	0.00	0.00	
2,000.0	26.44	35.37	1,883.4	460.1	326.6	564.3	0.00	0.00	
2,100.0	26.44	35.37	1,973.0	496.4	352.4	608.8	0.00	0.00	
2,200.0	26.44	35.37	2,062.5	532.7	378.2	653.3	0.00	0.00	
2,300.0	26.44	35.37	2,152.1	569.0	403.9	697.8	0.00	0.00	
2,400.0	26.44	35.37	2,241.6	605.3	429.7	742.4	0.00	0.00	
2,500.0	26.44	35.37	2,331.1	641.7	455.5	786.9	0.00	0.00	
2,600.0	26.44	35.37	2,420.7	678.0	481.2	831.4	0.00	0.00	
2,700.0	26.44	35.37	2,510.2	714.3	507.0	875.9	0.00	0.00	
2,800.0	26.44	35.37	2,599.8	750.6	532.8	920.4	0.00	0.00	
2,900.0	26.44	35.37	2,689.3	786.9	558.6	965.0	0.00	0.00	
3,000.0	26.44	35.37	2,778.8	823.2	584.3	1,009.5	0.00	0.00	
3,100.0	26.44	35.37	2,868.4	859.5	610.1	1,054.0	0.00	0.00	
3,200.0	26.44	35.37	2,957.9	895.8	635.9	1,098.5	0.00	0.00	
3,300.0	26.44	35.37	3,047.5	932.1	661.6	1,143.1	0.00	0.00	
3,400.0	26.44	35.37	3,137.0	968.4	687.4	1,187.6	0.00	0.00	
3,500.0	26.44	35.37	3,226.6	1,004.7	713.2	1,232.1	0.00	0.00	
3,600.0	26.44	35.37	3,316.1	1,041.0	739.0	1,276.6	0.00	0.00	
3,700.0	26.44	35.37	3,405.6	1,077.3	764.7	1,321.2	0.00	0.00	
3,800.0	26.44	35.37	3,495.2	1,113.6	790.5	1,365.7	0.00	0.00	
3,900.0	26.44	35.37	3,584.7	1,149.9	816.3	1,410.2	0.00	0.00	
4,000.0	26.44	35.37	3,674.3	1,186.2	842.0	1,454.7	0.00	0.00	
4,100.0	26.44	35.37	3,763.8	1,222.5	867.8	1,499.2	0.00	0.00	
4,200.0	26.44	35.37	3,853.3	1,258.9	893.6	1,543.8	0.00	0.00	
4,300.0	26.44	35.37	3,942.9	1,295.2	919.4	1,588.3	0.00	0.00	
4,400.0	26.44	35.37	4,032.4	1,331.5	945.1	1,632.8	0.00	0.00	
4,500.0	26.44	35.37	4,122.0	1,367.8	970.9	1,677.3	0.00	0.00	
4,600.0	26.44	35.37	4,211.5	1,404.1	996.7	1,721.9	0.00	0.00	
4,700.0	26.44	35.37	4,301.1	1,440.4	1,022.4	1,766.4	0.00	0.00	
4,800.0	26.44	35.37	4,390.6	1,476.7	1,048.2	1,810.9	0.00	0.00	
4,900.0	26.44	35.37	4,480.1	1,513.0	1,074.0	1,855.4	0.00	0.00	

# Cathedral Energy Services

## Planning Report

<b>Database:</b>	USA EDM 5000 Multi Users DB	<b>Local Co-ordinate Reference:</b>	Well Rose 22-1B
<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>TVD Reference:</b>	KB=22' @ 6972.0ft (Patterson #303)
<b>Project:</b>	Mamm Creek	<b>MD Reference:</b>	KB=22' @ 6972.0ft (Patterson #303)
<b>Site:</b>	K22W Pad	<b>North Reference:</b>	True
<b>Well:</b>	Rose 22-1B	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OH		
<b>Design:</b>	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
5,000.0	26.44	35.37	4,569.7	1,549.3	1,099.8	1,900.0	0.00	0.00	
5,100.0	26.44	35.37	4,659.2	1,585.6	1,125.5	1,944.5	0.00	0.00	
5,200.0	26.44	35.37	4,748.8	1,621.9	1,151.3	1,989.0	0.00	0.00	
5,300.0	26.44	35.37	4,838.3	1,658.2	1,177.1	2,033.5	0.00	0.00	
5,400.0	26.44	35.37	4,927.8	1,694.5	1,202.8	2,078.0	0.00	0.00	
5,500.0	26.44	35.37	5,017.4	1,730.8	1,228.6	2,122.6	0.00	0.00	
5,600.0	26.44	35.37	5,106.9	1,767.1	1,254.4	2,167.1	0.00	0.00	
5,700.0	26.44	35.37	5,196.5	1,803.4	1,280.2	2,211.6	0.00	0.00	
5,800.0	26.44	35.37	5,286.0	1,839.7	1,305.9	2,256.1	0.00	0.00	
5,806.7	26.44	35.37	5,292.0	1,842.2	1,307.7	2,259.1	0.00	0.00	Top of Mesaverde - Ohio Creek
5,900.0	26.44	35.37	5,375.6	1,876.1	1,331.7	2,300.7	0.00	0.00	
6,000.0	26.44	35.37	5,465.1	1,912.4	1,357.5	2,345.2	0.00	0.00	
6,100.0	26.44	35.37	5,554.6	1,948.7	1,383.2	2,389.7	0.00	0.00	
6,193.7	26.44	35.37	5,638.5	1,982.7	1,407.4	2,431.4	0.00	0.00	Start 2° Drop
6,200.0	26.31	35.37	5,644.2	1,985.0	1,409.0	2,434.2	2.00	-2.00	
6,300.0	24.31	35.37	5,734.6	2,019.8	1,433.8	2,477.0	2.00	-2.00	
6,400.0	22.31	35.37	5,826.4	2,052.1	1,456.7	2,516.5	2.00	-2.00	
6,467.3	20.96	35.37	5,889.0	2,072.3	1,471.0	2,541.4	2.00	-2.00	Williams Fork
6,500.0	20.31	35.37	5,919.6	2,081.7	1,477.7	2,552.9	2.00	-2.00	
6,600.0	18.31	35.37	6,013.9	2,108.7	1,496.8	2,586.0	2.00	-2.00	
6,700.0	16.31	35.37	6,109.4	2,133.0	1,514.1	2,615.7	2.00	-2.00	
6,800.0	14.31	35.37	6,205.9	2,154.5	1,529.4	2,642.1	2.00	-2.00	
6,900.0	12.31	35.37	6,303.2	2,173.3	1,542.7	2,665.1	2.00	-2.00	
7,000.0	10.31	35.37	6,401.2	2,189.3	1,554.0	2,684.7	2.00	-2.00	
7,100.0	8.31	35.37	6,499.9	2,202.5	1,563.4	2,700.9	2.00	-2.00	
7,200.0	6.31	35.37	6,599.1	2,212.8	1,570.8	2,713.7	2.00	-2.00	
7,300.0	4.31	35.37	6,698.6	2,220.4	1,576.1	2,722.9	2.00	-2.00	
7,400.0	2.31	35.37	6,798.5	2,225.1	1,579.5	2,728.7	2.00	-2.00	
7,500.0	0.31	35.37	6,898.4	2,227.0	1,580.8	2,731.0	2.00	-2.00	
7,515.6	0.00	0.00	6,914.0	2,227.0	1,580.8	2,731.0	2.00	-2.00	EOD @ Inc. = 0° - Top Gas
7,600.0	0.00	0.00	6,998.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
7,700.0	0.00	0.00	7,098.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
7,800.0	0.00	0.00	7,198.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
7,900.0	0.00	0.00	7,298.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,000.0	0.00	0.00	7,398.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,100.0	0.00	0.00	7,498.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,200.0	0.00	0.00	7,598.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,300.0	0.00	0.00	7,698.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,400.0	0.00	0.00	7,798.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,500.0	0.00	0.00	7,898.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,592.6	0.00	0.00	7,991.0	2,227.0	1,580.8	2,731.0	0.00	0.00	Coal Ridge
8,600.0	0.00	0.00	7,998.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,700.0	0.00	0.00	8,098.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,800.0	0.00	0.00	8,198.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
8,900.0	0.00	0.00	8,298.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
9,000.0	0.00	0.00	8,398.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
9,100.0	0.00	0.00	8,498.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
9,200.0	0.00	0.00	8,598.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
9,300.0	0.00	0.00	8,698.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
9,400.0	0.00	0.00	8,798.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
9,443.6	0.00	0.00	8,842.0	2,227.0	1,580.8	2,731.0	0.00	0.00	Rollins
9,500.0	0.00	0.00	8,898.4	2,227.0	1,580.8	2,731.0	0.00	0.00	

# Cathedral Energy Services

## Planning Report

<b>Database:</b>	USA EDM 5000 Multi Users DB	<b>Local Co-ordinate Reference:</b>	Well Rose 22-1B
<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>TVD Reference:</b>	KB=22' @ 6972.0ft (Patterson #303)
<b>Project:</b>	Mamm Creek	<b>MD Reference:</b>	KB=22' @ 6972.0ft (Patterson #303)
<b>Site:</b>	K22W Pad	<b>North Reference:</b>	True
<b>Well:</b>	Rose 22-1B	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OH		
<b>Design:</b>	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
9,593.6	0.00	0.00	8,992.0	2,227.0	1,580.8	2,731.0	0.00	0.00	TD @ 9,593.6' MD
9,600.0	0.00	0.00	8,998.4	2,227.0	1,580.8	2,731.0	0.00	0.00	
9,693.6	0.00	0.00	9,092.0	2,227.0	1,580.8	2,731.0	0.00	0.00	Permit TD @ 9,693.6' MD

Targets									
Target Name									
- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Rose 22-1B TGT - plan hits target center - Point	0.00	0.00	6,914.0	2,227.0	1,580.8	1,591,835.35	2,362,905.86	39.436628	-107.755940
Rose 22-1B PBHL 628' I - plan hits target center - Circle (radius 25.0)	0.00	0.00	8,992.0	2,227.0	1,580.8	1,591,835.35	2,362,905.86	39.436628	-107.755940

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)	
1,281.3	1,239.9	Surface Casing			

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
5,806.7	5,292.0	Top of Mesaverde			
5,806.7	5,292.0	Ohio Creek			
6,467.3	5,889.0	Williams Fork			
7,515.6	6,914.0	Top Gas			
8,592.6	7,991.0	Coal Ridge			
9,443.6	8,842.0	Rollins			

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
300.0	300.0	0.0	0.0	KOP @ 300'
1,181.3	1,150.3	162.9	115.6	EOB @ Inc. = 26.44°
6,193.7	5,638.5	1,982.7	1,407.4	Start 2° Drop
7,515.6	6,914.0	2,227.0	1,580.8	EOD @ Inc. = 0°
9,593.6	8,992.0	2,227.0	1,580.8	TD @ 9,593.6' MD
9,693.6	9,092.0	2,227.0	1,580.8	Permit TD @ 9,693.6' MD