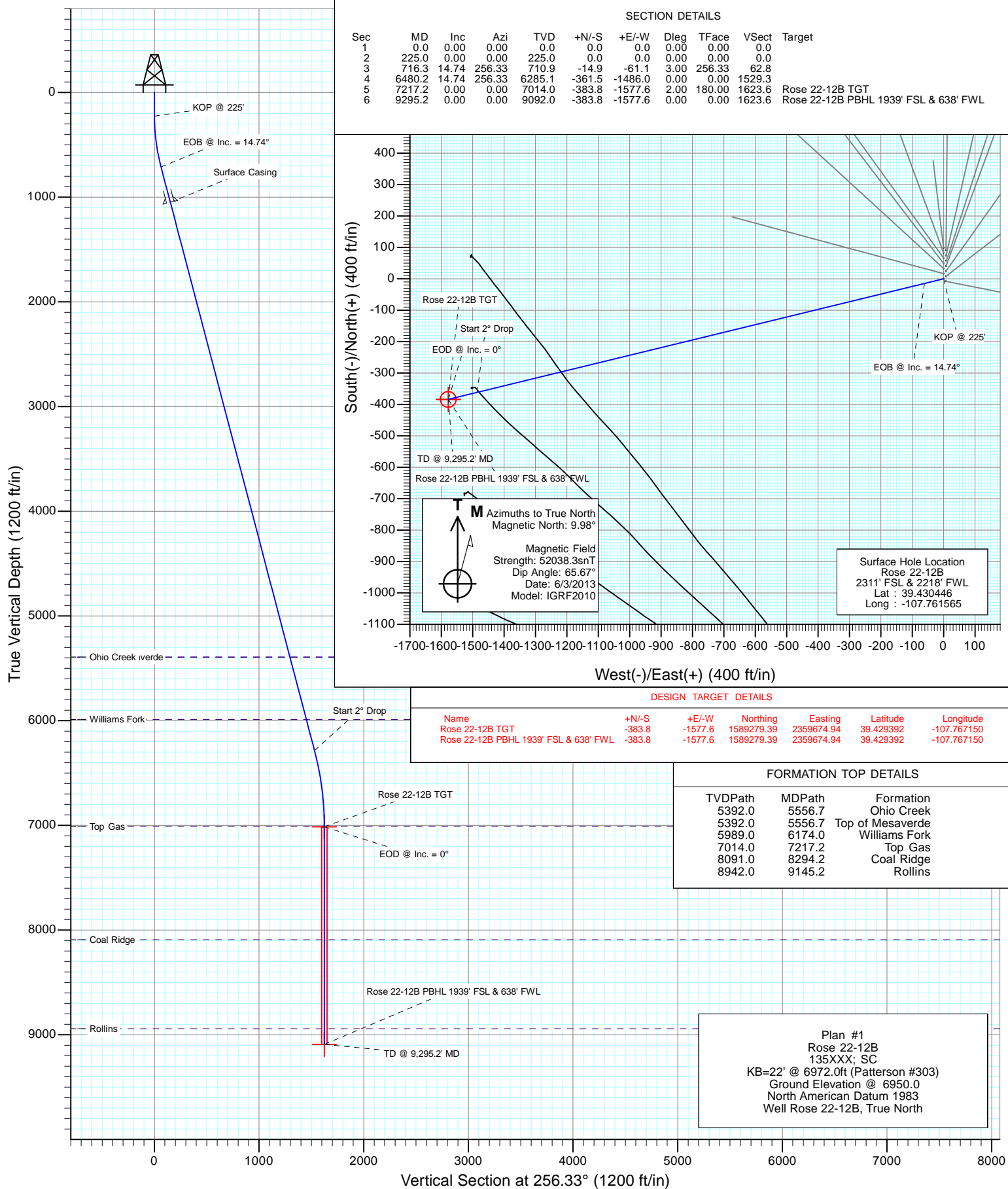
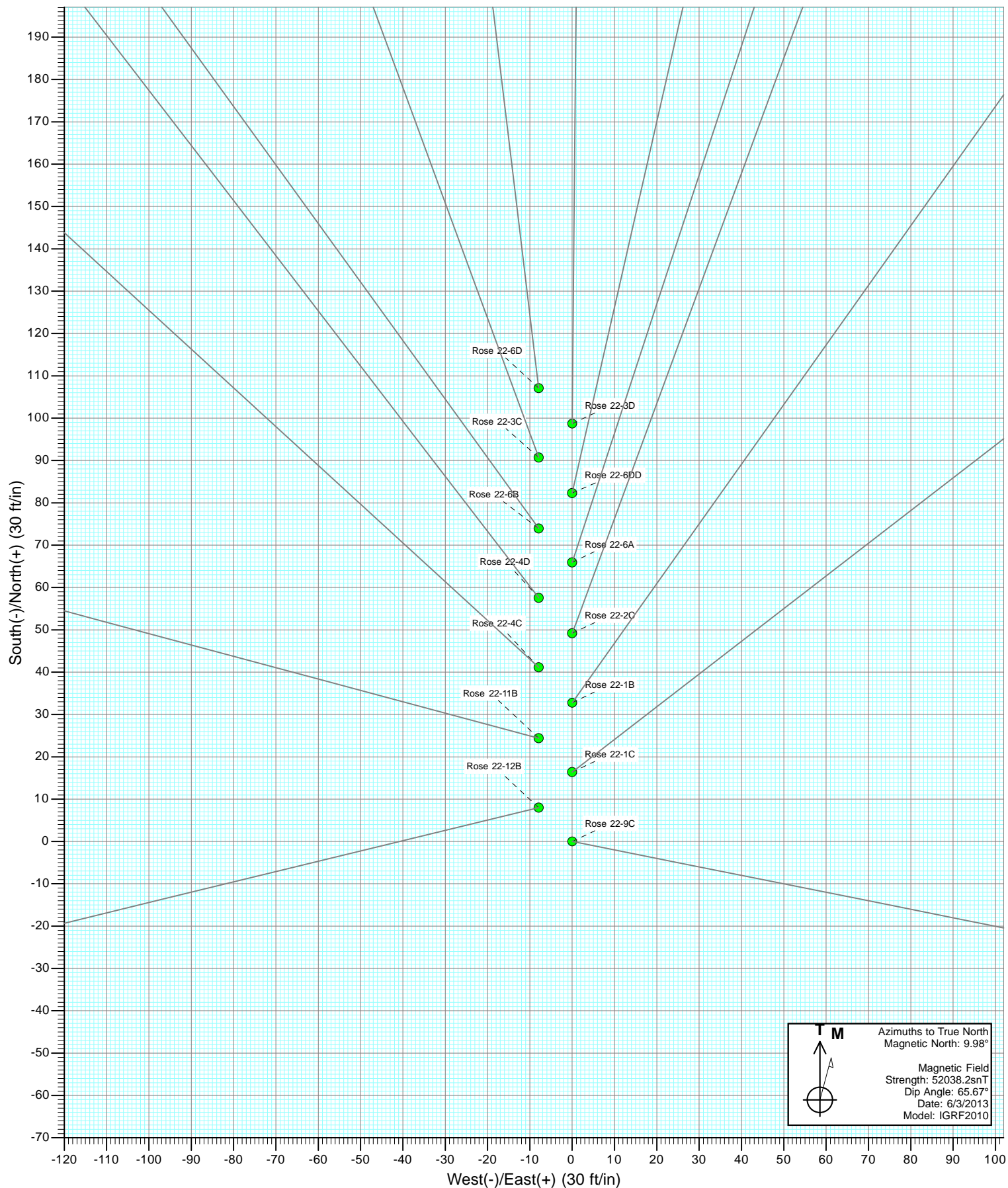
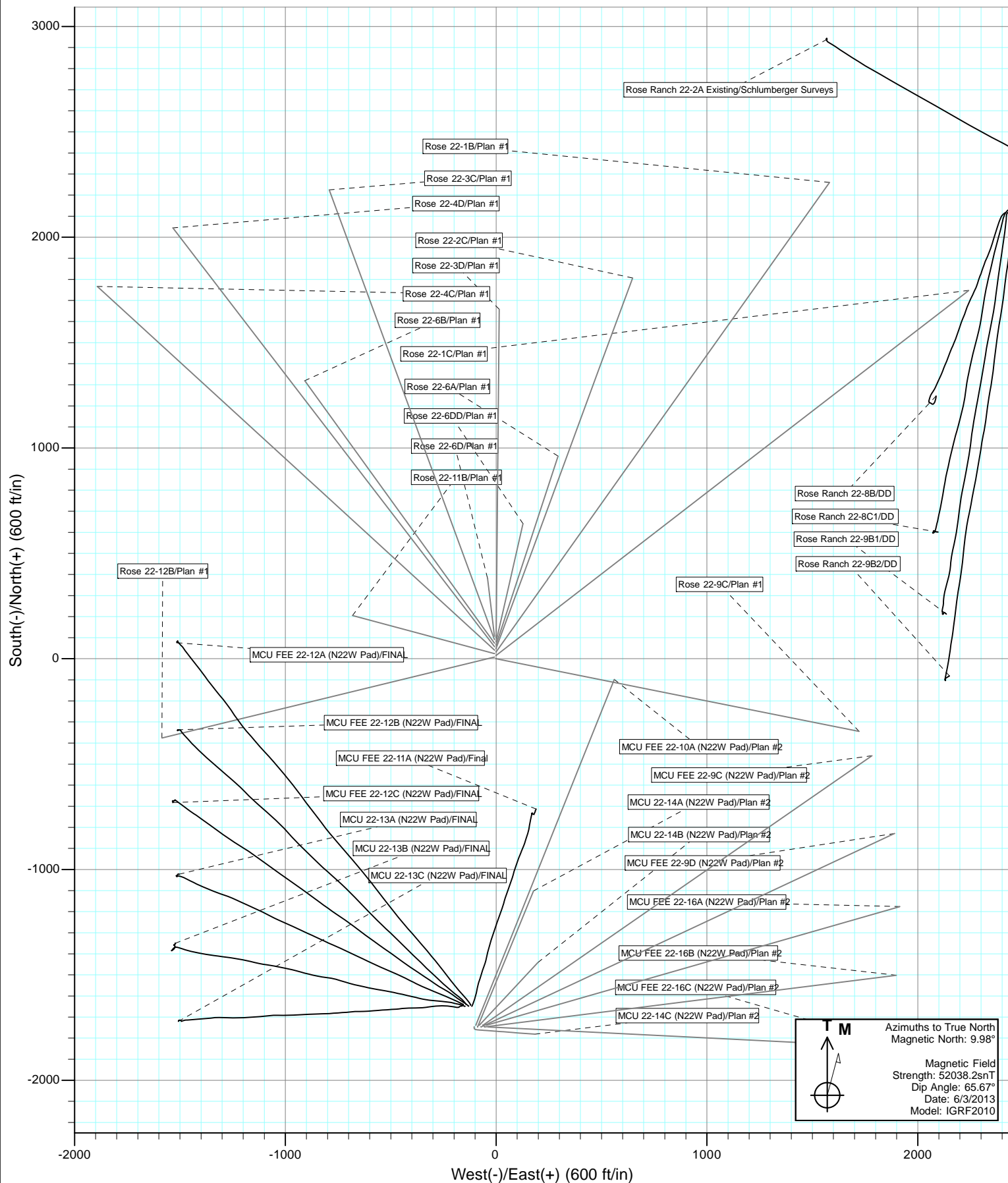


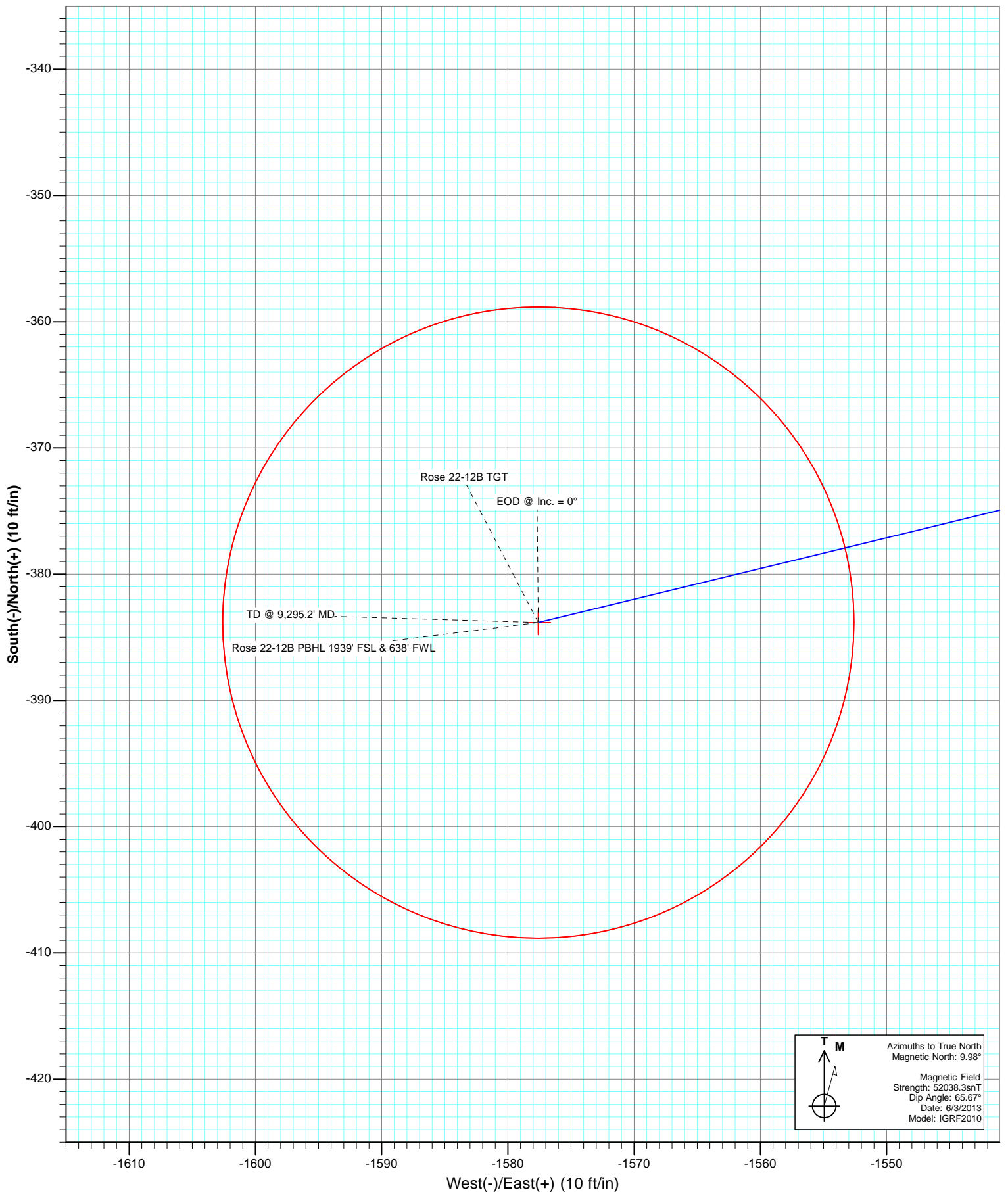


Project: Mamm Creek
Site: K22W Pad
Well: Rose 22-12B
Wellbore: OH
Design: Plan #1









Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Rose 22-12B
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 6972.0ft (Patterson #303)
Project:	Mamm Creek	MD Reference:	KB=22' @ 6972.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	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		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 22-12B					
Well Position	+N/-S	0.0 ft	Northing:	1,589,623.83 ft	Latitude:	39.430446
	+E/-W	0.0 ft	Easting:	2,361,261.59 ft	Longitude:	-107.761565
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) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	256.33

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	
225.0	0.00	0.00	225.0	0.0	0.0	0.00	0.00	0.00	0.00	
716.3	14.74	256.33	710.9	-14.9	-61.1	3.00	3.00	0.00	256.33	
6,480.2	14.74	256.33	6,285.1	-361.5	-1,486.0	0.00	0.00	0.00	0.00	
7,217.2	0.00	0.00	7,014.0	-383.8	-1,577.6	2.00	-2.00	0.00	180.00	Rose 22-12B TGT
9,295.2	0.00	0.00	9,092.0	-383.8	-1,577.6	0.00	0.00	0.00	0.00	Rose 22-12B PBHL 1'

Cathedral Energy Services

Planning Report

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Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 6972.0ft (Patterson #303)
Project:	Mamm Creek	MD Reference:	KB=22' @ 6972.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	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	
225.0	0.00	0.00	225.0	0.0	0.0	0.0	0.00	0.00	KOP @ 225'
300.0	2.25	256.33	300.0	-0.3	-1.4	1.5	3.00	3.00	
400.0	5.25	256.33	399.8	-1.9	-7.8	8.0	3.00	3.00	
500.0	8.25	256.33	499.1	-4.7	-19.2	19.8	3.00	3.00	
600.0	11.25	256.33	597.6	-8.7	-35.7	36.7	3.00	3.00	
700.0	14.25	256.33	695.1	-13.9	-57.1	58.8	3.00	3.00	
716.3	14.74	256.33	710.9	-14.9	-61.1	62.8	3.00	3.00	EOB @ Inc. = 14.74°
800.0	14.74	256.33	791.8	-19.9	-81.8	84.1	0.00	0.00	
900.0	14.74	256.33	888.6	-25.9	-106.5	109.6	0.00	0.00	
1,000.0	14.74	256.33	985.3	-31.9	-131.2	135.0	0.00	0.00	
1,066.9	14.74	256.33	1,050.0	-35.9	-147.7	152.1	0.00	0.00	Surface Casing
1,100.0	14.74	256.33	1,082.0	-37.9	-155.9	160.5	0.00	0.00	
1,200.0	14.74	256.33	1,178.7	-44.0	-180.6	185.9	0.00	0.00	
1,300.0	14.74	256.33	1,275.4	-50.0	-205.4	211.4	0.00	0.00	
1,400.0	14.74	256.33	1,372.1	-56.0	-230.1	236.8	0.00	0.00	
1,500.0	14.74	256.33	1,468.8	-62.0	-254.8	262.2	0.00	0.00	
1,600.0	14.74	256.33	1,565.5	-68.0	-279.5	287.7	0.00	0.00	
1,700.0	14.74	256.33	1,662.2	-74.0	-304.2	313.1	0.00	0.00	
1,800.0	14.74	256.33	1,758.9	-80.0	-329.0	338.6	0.00	0.00	
1,900.0	14.74	256.33	1,855.6	-86.1	-353.7	364.0	0.00	0.00	
2,000.0	14.74	256.33	1,952.4	-92.1	-378.4	389.5	0.00	0.00	
2,100.0	14.74	256.33	2,049.1	-98.1	-403.1	414.9	0.00	0.00	
2,200.0	14.74	256.33	2,145.8	-104.1	-427.9	440.3	0.00	0.00	
2,300.0	14.74	256.33	2,242.5	-110.1	-452.6	465.8	0.00	0.00	
2,400.0	14.74	256.33	2,339.2	-116.1	-477.3	491.2	0.00	0.00	
2,500.0	14.74	256.33	2,435.9	-122.1	-502.0	516.7	0.00	0.00	
2,600.0	14.74	256.33	2,532.6	-128.2	-526.7	542.1	0.00	0.00	
2,700.0	14.74	256.33	2,629.3	-134.2	-551.5	567.5	0.00	0.00	
2,800.0	14.74	256.33	2,726.0	-140.2	-576.2	593.0	0.00	0.00	
2,900.0	14.74	256.33	2,822.7	-146.2	-600.9	618.4	0.00	0.00	
3,000.0	14.74	256.33	2,919.4	-152.2	-625.6	643.9	0.00	0.00	
3,100.0	14.74	256.33	3,016.2	-158.2	-650.3	669.3	0.00	0.00	
3,200.0	14.74	256.33	3,112.9	-164.2	-675.1	694.8	0.00	0.00	
3,300.0	14.74	256.33	3,209.6	-170.3	-699.8	720.2	0.00	0.00	
3,400.0	14.74	256.33	3,306.3	-176.3	-724.5	745.6	0.00	0.00	
3,500.0	14.74	256.33	3,403.0	-182.3	-749.2	771.1	0.00	0.00	
3,600.0	14.74	256.33	3,499.7	-188.3	-774.0	796.5	0.00	0.00	
3,700.0	14.74	256.33	3,596.4	-194.3	-798.7	822.0	0.00	0.00	
3,800.0	14.74	256.33	3,693.1	-200.3	-823.4	847.4	0.00	0.00	
3,900.0	14.74	256.33	3,789.8	-206.4	-848.1	872.9	0.00	0.00	
4,000.0	14.74	256.33	3,886.5	-212.4	-872.8	898.3	0.00	0.00	
4,100.0	14.74	256.33	3,983.2	-218.4	-897.6	923.7	0.00	0.00	
4,200.0	14.74	256.33	4,080.0	-224.4	-922.3	949.2	0.00	0.00	
4,300.0	14.74	256.33	4,176.7	-230.4	-947.0	974.6	0.00	0.00	
4,400.0	14.74	256.33	4,273.4	-236.4	-971.7	1,000.1	0.00	0.00	
4,500.0	14.74	256.33	4,370.1	-242.4	-996.4	1,025.5	0.00	0.00	
4,600.0	14.74	256.33	4,466.8	-248.5	-1,021.2	1,051.0	0.00	0.00	
4,700.0	14.74	256.33	4,563.5	-254.5	-1,045.9	1,076.4	0.00	0.00	
4,800.0	14.74	256.33	4,660.2	-260.5	-1,070.6	1,101.8	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Rose 22-12B
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 6972.0ft (Patterson #303)
Project:	Mamm Creek	MD Reference:	KB=22' @ 6972.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	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	14.74	256.33	4,756.9	-266.5	-1,095.3	1,127.3	0.00	0.00	
5,000.0	14.74	256.33	4,853.6	-272.5	-1,120.1	1,152.7	0.00	0.00	
5,100.0	14.74	256.33	4,950.3	-278.5	-1,144.8	1,178.2	0.00	0.00	
5,200.0	14.74	256.33	5,047.1	-284.5	-1,169.5	1,203.6	0.00	0.00	
5,300.0	14.74	256.33	5,143.8	-290.6	-1,194.2	1,229.1	0.00	0.00	
5,400.0	14.74	256.33	5,240.5	-296.6	-1,218.9	1,254.5	0.00	0.00	
5,500.0	14.74	256.33	5,337.2	-302.6	-1,243.7	1,279.9	0.00	0.00	
5,556.7	14.74	256.33	5,392.0	-306.0	-1,257.7	1,294.4	0.00	0.00	Top of Mesaverde - Ohio Creek
5,600.0	14.74	256.33	5,433.9	-308.6	-1,268.4	1,305.4	0.00	0.00	
5,700.0	14.74	256.33	5,530.6	-314.6	-1,293.1	1,330.8	0.00	0.00	
5,800.0	14.74	256.33	5,627.3	-320.6	-1,317.8	1,356.3	0.00	0.00	
5,900.0	14.74	256.33	5,724.0	-326.6	-1,342.5	1,381.7	0.00	0.00	
6,000.0	14.74	256.33	5,820.7	-332.7	-1,367.3	1,407.2	0.00	0.00	
6,100.0	14.74	256.33	5,917.4	-338.7	-1,392.0	1,432.6	0.00	0.00	
6,174.0	14.74	256.33	5,989.0	-343.1	-1,410.3	1,451.4	0.00	0.00	Williams Fork
6,200.0	14.74	256.33	6,014.1	-344.7	-1,416.7	1,458.0	0.00	0.00	
6,300.0	14.74	256.33	6,110.9	-350.7	-1,441.4	1,483.5	0.00	0.00	
6,400.0	14.74	256.33	6,207.6	-356.7	-1,466.2	1,508.9	0.00	0.00	
6,480.2	14.74	256.33	6,285.1	-361.5	-1,486.0	1,529.3	0.00	0.00	Start 2° Drop
6,500.0	14.34	256.33	6,304.3	-362.7	-1,490.8	1,534.3	2.00	-2.00	
6,600.0	12.34	256.33	6,401.6	-368.2	-1,513.2	1,557.4	2.00	-2.00	
6,700.0	10.34	256.33	6,499.6	-372.8	-1,532.3	1,577.1	2.00	-2.00	
6,800.0	8.34	256.33	6,598.3	-376.7	-1,548.1	1,593.3	2.00	-2.00	
6,900.0	6.34	256.33	6,697.5	-379.7	-1,560.5	1,606.1	2.00	-2.00	
7,000.0	4.34	256.33	6,797.0	-381.9	-1,569.6	1,615.4	2.00	-2.00	
7,100.0	2.34	256.33	6,896.9	-383.3	-1,575.3	1,621.2	2.00	-2.00	
7,200.0	0.34	256.33	6,996.8	-383.8	-1,577.5	1,623.6	2.00	-2.00	
7,217.2	0.00	0.00	7,014.0	-383.8	-1,577.6	1,623.6	2.00	-2.00	EOD @ Inc. = 0° - Top Gas
7,300.0	0.00	0.00	7,096.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
7,400.0	0.00	0.00	7,196.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
7,500.0	0.00	0.00	7,296.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
7,600.0	0.00	0.00	7,396.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
7,700.0	0.00	0.00	7,496.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
7,800.0	0.00	0.00	7,596.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
7,900.0	0.00	0.00	7,696.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,000.0	0.00	0.00	7,796.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,100.0	0.00	0.00	7,896.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,200.0	0.00	0.00	7,996.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,294.2	0.00	0.00	8,091.0	-383.8	-1,577.6	1,623.6	0.00	0.00	Coal Ridge
8,300.0	0.00	0.00	8,096.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,400.0	0.00	0.00	8,196.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,500.0	0.00	0.00	8,296.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,600.0	0.00	0.00	8,396.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,700.0	0.00	0.00	8,496.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,800.0	0.00	0.00	8,596.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
8,900.0	0.00	0.00	8,696.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
9,000.0	0.00	0.00	8,796.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
9,100.0	0.00	0.00	8,896.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
9,145.2	0.00	0.00	8,942.0	-383.8	-1,577.6	1,623.6	0.00	0.00	Rollins
9,200.0	0.00	0.00	8,996.8	-383.8	-1,577.6	1,623.6	0.00	0.00	
9,295.2	0.00	0.00	9,092.0	-383.8	-1,577.6	1,623.6	0.00	0.00	TD @ 9,295.2' MD

Cathedral Energy Services

Planning Report

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Project:	Mamm Creek	MD Reference:	KB=22' @ 6972.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

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									
Rose 22-12B TGT	0.00	0.00	7,014.0	-383.8	-1,577.6	1,589,279.39	2,359,674.94	39.429392	-107.767150
- plan hits target center									
- Point									
Rose 22-12B PBHL 193'	0.00	0.00	9,092.0	-383.8	-1,577.6	1,589,279.39	2,359,674.94	39.429392	-107.767150
- plan hits target center									
- Circle (radius 25.0)									

Casing Points				
Measured Depth	Vertical Depth	Name		
(ft)	(ft)			
		Casing Diameter	Hole Diameter	
		(in)	(in)	
1,066.9	1,050.0	Surface Casing		

Formations					
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction
(ft)	(ft)			(°)	(°)
5,556.7	5,392.0	Top of Mesaverde			
5,556.7	5,392.0	Ohio Creek			
6,174.0	5,989.0	Williams Fork			
7,217.2	7,014.0	Top Gas			
8,294.2	8,091.0	Coal Ridge			
9,145.2	8,942.0	Rollins			

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		
(ft)	(ft)	+N/-S	+E/-W	Comment
		(ft)	(ft)	
225.0	225.0	0.0	0.0	KOP @ 225'
716.3	710.9	-14.9	-61.1	EOB @ Inc. = 14.74°
6,480.2	6,285.1	-361.5	-1,486.0	Start 2° Drop
7,217.2	7,014.0	-383.8	-1,577.6	EOD @ Inc. = 0°
9,295.2	9,092.0	-383.8	-1,577.6	TD @ 9,295.2' MD