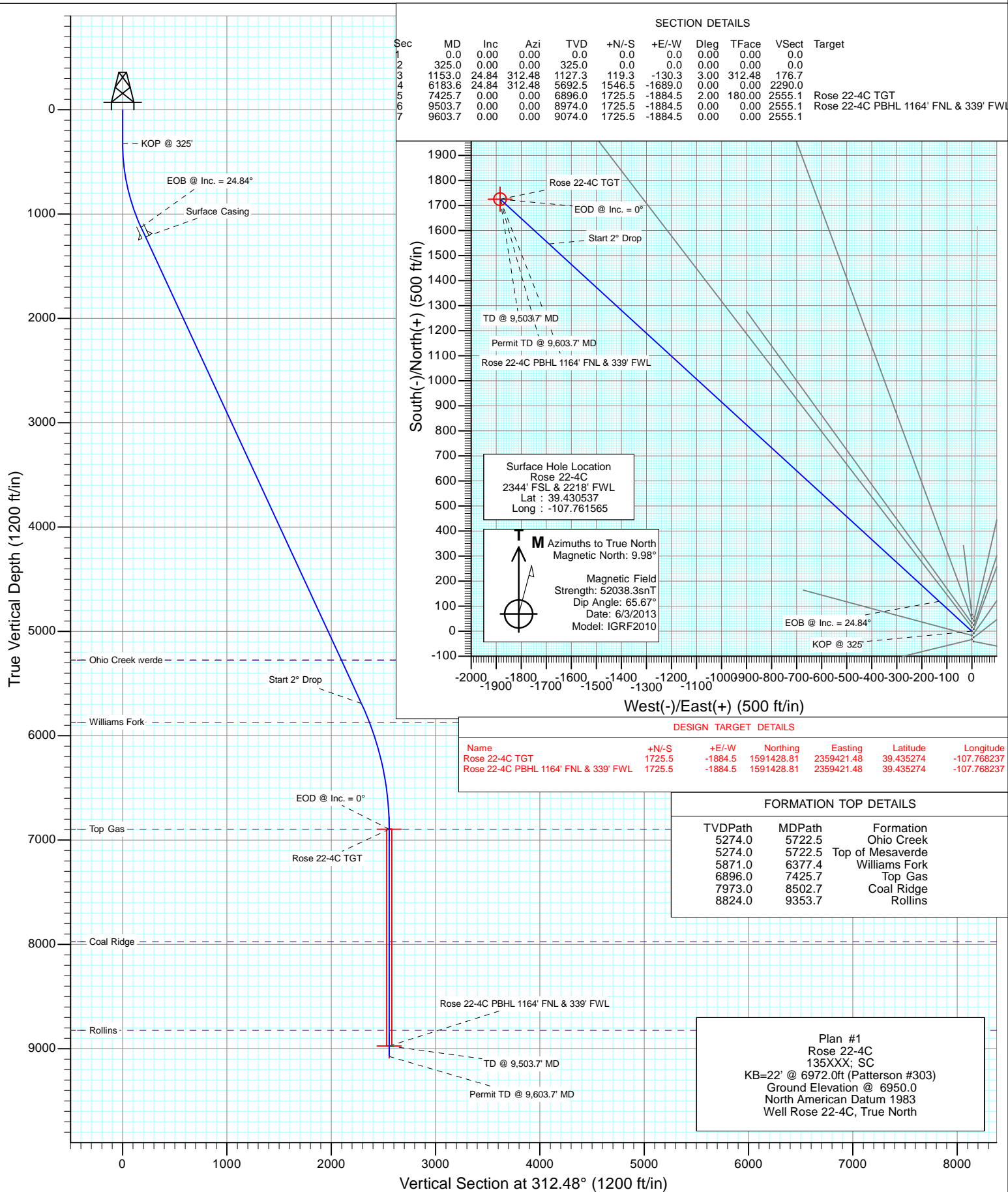
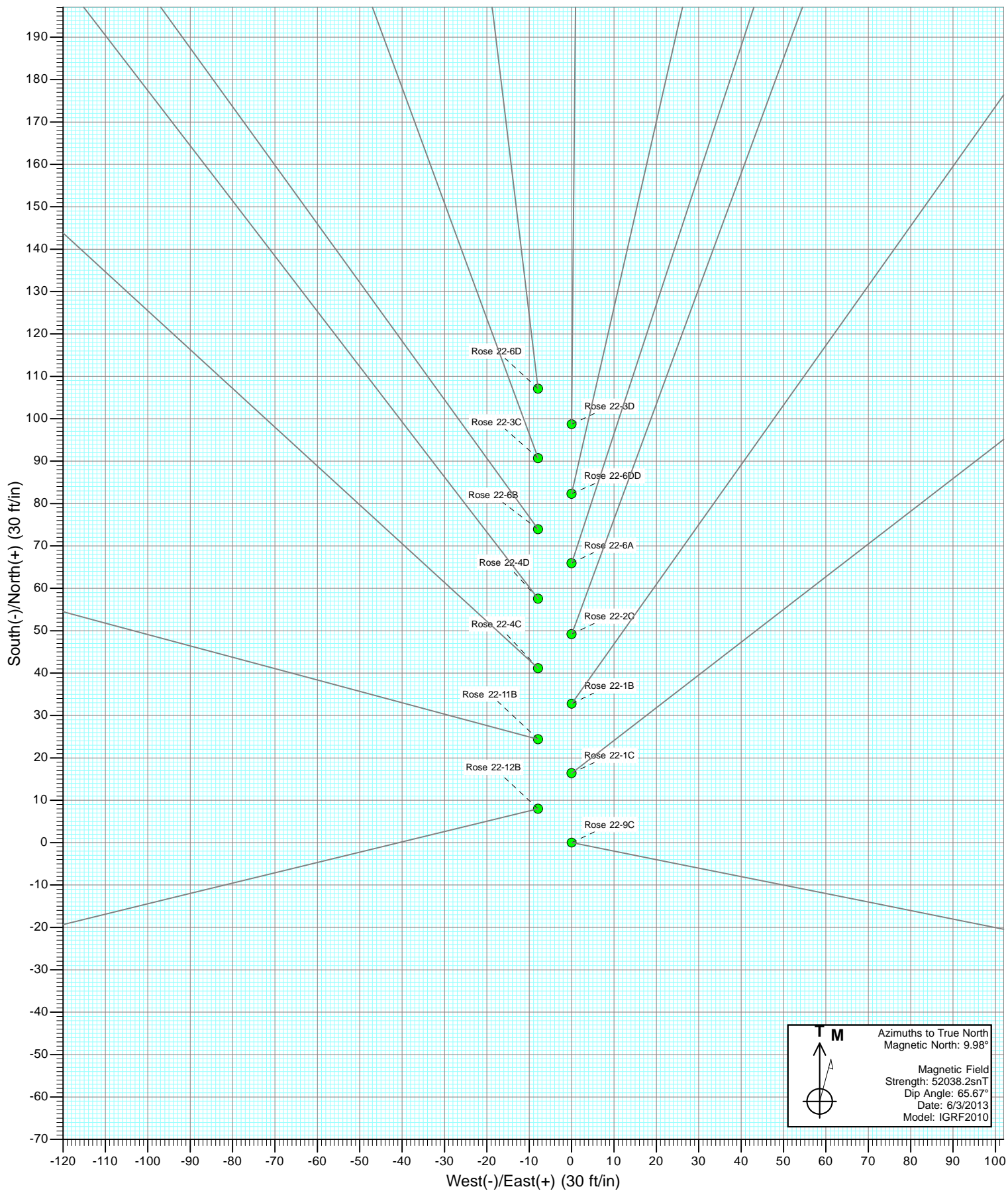
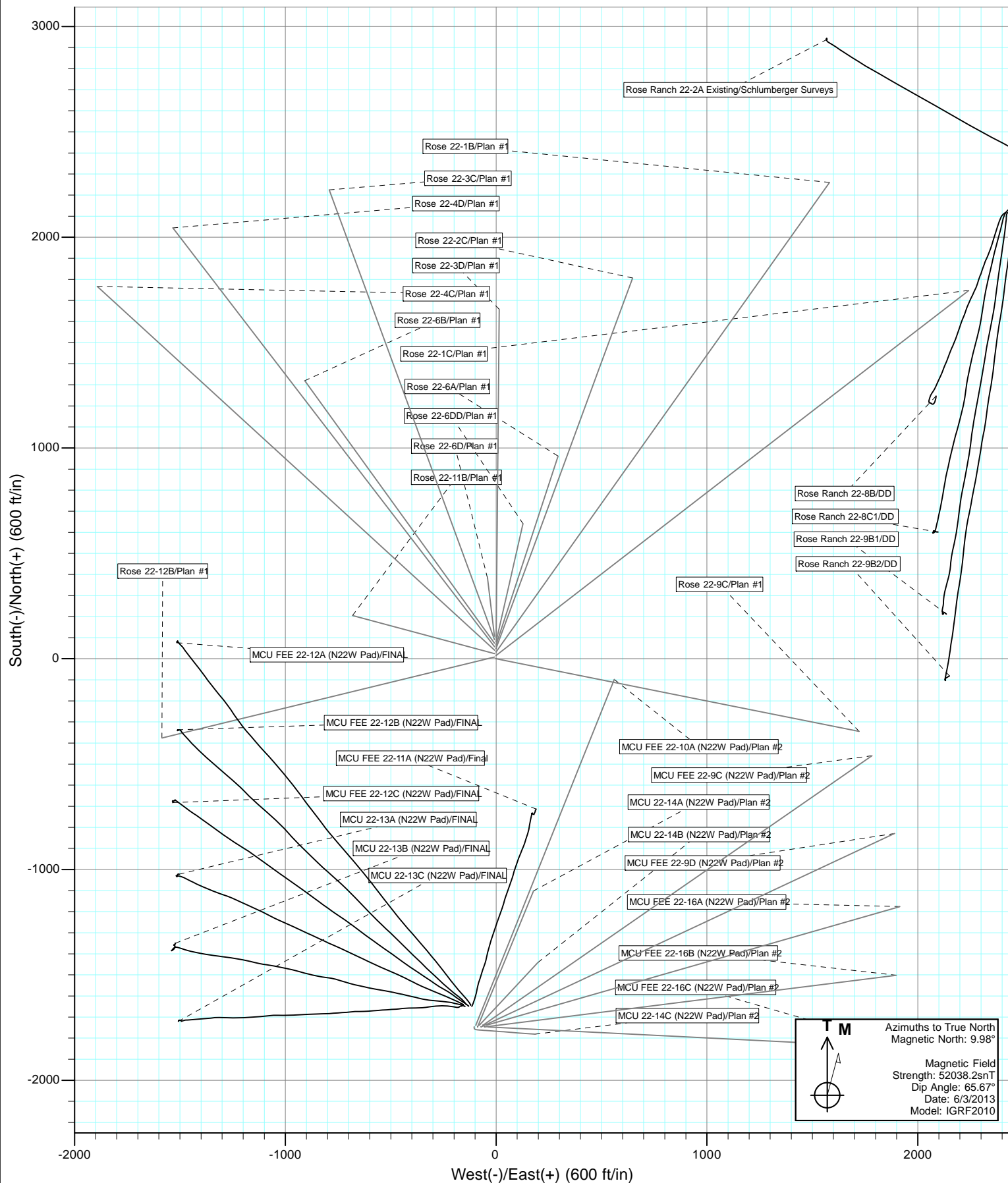




Project: Mamm Creek
Site: K22W Pad
Well: Rose 22-4C
Wellbore: OH
Design: Plan #1

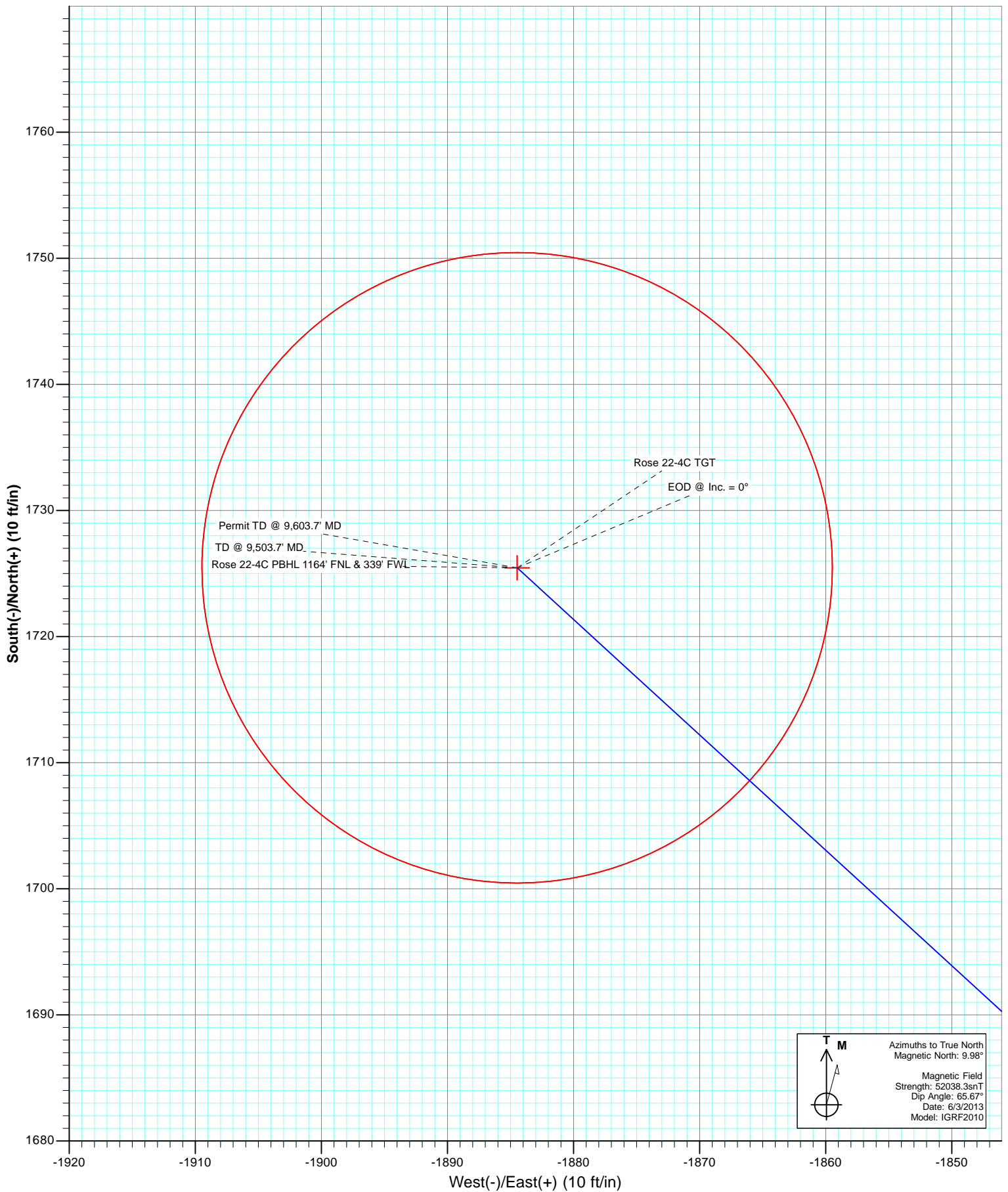








Project: Mamm Creek
Site: K22W Pad
Well: Rose 22-4C
Wellbore: OH
Plan: Plan #1



Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Rose 22-4C
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 22-4C	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	
From:		Easting:		2,361,269.29 ft	
Position Uncertainty:		Slot Radius:		Grid Convergence:	
Lat/Long		0.0 ft		39.430424	
				-107.761537	
		13.200 in		-1.43 °	

Well	Rose 22-4C					
Well Position	+N/-S	0.0 ft	Northing:	1,589,656.97 ft	Latitude:	39.430537
	+E/-W	0.0 ft	Easting:	2,361,262.41 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)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.0	0.0	0.0	312.48

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	
325.0	0.00	0.00	325.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,153.0	24.84	312.48	1,127.3	119.3	-130.3	3.00	3.00	0.00	312.48	
6,183.6	24.84	312.48	5,692.5	1,546.5	-1,689.0	0.00	0.00	0.00	0.00	
7,425.7	0.00	0.00	6,896.0	1,725.5	-1,884.5	2.00	-2.00	0.00	180.00	Rose 22-4C TGT
9,503.7	0.00	0.00	8,974.0	1,725.5	-1,884.5	0.00	0.00	0.00	0.00	Rose 22-4C PBHL 11'
9,603.7	0.00	0.00	9,074.0	1,725.5	-1,884.5	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 Rose 22-4C
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 22-4C	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	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	
325.0	0.00	0.00	325.0	0.0	0.0	0.0	0.00	0.00	KOP @ 325'
400.0	2.25	312.48	400.0	1.0	-1.1	1.5	3.00	3.00	
500.0	5.25	312.48	499.8	5.4	-5.9	8.0	3.00	3.00	
600.0	8.25	312.48	599.1	13.3	-14.6	19.8	3.00	3.00	
700.0	11.25	312.48	697.6	24.8	-27.1	36.7	3.00	3.00	
800.0	14.25	312.48	795.1	39.7	-43.3	58.8	3.00	3.00	
900.0	17.25	312.48	891.4	58.0	-63.4	85.9	3.00	3.00	
1,000.0	20.25	312.48	986.0	79.7	-87.1	118.0	3.00	3.00	
1,100.0	23.25	312.48	1,078.9	104.7	-114.4	155.1	3.00	3.00	
1,153.0	24.84	312.48	1,127.3	119.3	-130.3	176.7	3.00	3.00	EOB @ Inc. = 24.84°
1,200.0	24.84	312.48	1,170.0	132.7	-144.9	196.4	0.00	0.00	
1,253.0	24.84	312.48	1,218.1	147.7	-161.3	218.7	0.00	0.00	Surface Casing
1,300.0	24.84	312.48	1,260.7	161.0	-175.9	238.4	0.00	0.00	
1,400.0	24.84	312.48	1,351.5	189.4	-206.8	280.5	0.00	0.00	
1,500.0	24.84	312.48	1,442.2	217.8	-237.8	322.5	0.00	0.00	
1,600.0	24.84	312.48	1,532.9	246.1	-268.8	364.5	0.00	0.00	
1,700.0	24.84	312.48	1,623.7	274.5	-299.8	406.5	0.00	0.00	
1,800.0	24.84	312.48	1,714.4	302.9	-330.8	448.5	0.00	0.00	
1,900.0	24.84	312.48	1,805.2	331.2	-361.8	490.5	0.00	0.00	
2,000.0	24.84	312.48	1,895.9	359.6	-392.7	532.5	0.00	0.00	
2,100.0	24.84	312.48	1,986.7	388.0	-423.7	574.5	0.00	0.00	
2,200.0	24.84	312.48	2,077.4	416.3	-454.7	616.5	0.00	0.00	
2,300.0	24.84	312.48	2,168.2	444.7	-485.7	658.5	0.00	0.00	
2,400.0	24.84	312.48	2,258.9	473.1	-516.7	700.5	0.00	0.00	
2,500.0	24.84	312.48	2,349.7	501.5	-547.7	742.6	0.00	0.00	
2,600.0	24.84	312.48	2,440.4	529.8	-578.6	784.6	0.00	0.00	
2,700.0	24.84	312.48	2,531.2	558.2	-609.6	826.6	0.00	0.00	
2,800.0	24.84	312.48	2,621.9	586.6	-640.6	868.6	0.00	0.00	
2,900.0	24.84	312.48	2,712.7	614.9	-671.6	910.6	0.00	0.00	
3,000.0	24.84	312.48	2,803.4	643.3	-702.6	952.6	0.00	0.00	
3,100.0	24.84	312.48	2,894.2	671.7	-733.6	994.6	0.00	0.00	
3,200.0	24.84	312.48	2,984.9	700.0	-764.5	1,036.6	0.00	0.00	
3,300.0	24.84	312.48	3,075.7	728.4	-795.5	1,078.6	0.00	0.00	
3,400.0	24.84	312.48	3,166.4	756.8	-826.5	1,120.6	0.00	0.00	
3,500.0	24.84	312.48	3,257.2	785.1	-857.5	1,162.7	0.00	0.00	
3,600.0	24.84	312.48	3,347.9	813.5	-888.5	1,204.7	0.00	0.00	
3,700.0	24.84	312.48	3,438.7	841.9	-919.5	1,246.7	0.00	0.00	
3,800.0	24.84	312.48	3,529.4	870.3	-950.4	1,288.7	0.00	0.00	
3,900.0	24.84	312.48	3,620.2	898.6	-981.4	1,330.7	0.00	0.00	
4,000.0	24.84	312.48	3,710.9	927.0	-1,012.4	1,372.7	0.00	0.00	
4,100.0	24.84	312.48	3,801.7	955.4	-1,043.4	1,414.7	0.00	0.00	
4,200.0	24.84	312.48	3,892.4	983.7	-1,074.4	1,456.7	0.00	0.00	
4,300.0	24.84	312.48	3,983.1	1,012.1	-1,105.4	1,498.7	0.00	0.00	
4,400.0	24.84	312.48	4,073.9	1,040.5	-1,136.4	1,540.7	0.00	0.00	
4,500.0	24.84	312.48	4,164.6	1,068.8	-1,167.3	1,582.7	0.00	0.00	
4,600.0	24.84	312.48	4,255.4	1,097.2	-1,198.3	1,624.8	0.00	0.00	
4,700.0	24.84	312.48	4,346.1	1,125.6	-1,229.3	1,666.8	0.00	0.00	
4,800.0	24.84	312.48	4,436.9	1,153.9	-1,260.3	1,708.8	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Rose 22-4C
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 22-4C	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	24.84	312.48	4,527.6	1,182.3	-1,291.3	1,750.8	0.00	0.00	
5,000.0	24.84	312.48	4,618.4	1,210.7	-1,322.3	1,792.8	0.00	0.00	
5,100.0	24.84	312.48	4,709.1	1,239.0	-1,353.2	1,834.8	0.00	0.00	
5,200.0	24.84	312.48	4,799.9	1,267.4	-1,384.2	1,876.8	0.00	0.00	
5,300.0	24.84	312.48	4,890.6	1,295.8	-1,415.2	1,918.8	0.00	0.00	
5,400.0	24.84	312.48	4,981.4	1,324.2	-1,446.2	1,960.8	0.00	0.00	
5,500.0	24.84	312.48	5,072.1	1,352.5	-1,477.2	2,002.8	0.00	0.00	
5,600.0	24.84	312.48	5,162.9	1,380.9	-1,508.2	2,044.8	0.00	0.00	
5,700.0	24.84	312.48	5,253.6	1,409.3	-1,539.1	2,086.9	0.00	0.00	
5,722.5	24.84	312.48	5,274.0	1,415.6	-1,546.1	2,096.3	0.00	0.00	Top of Mesaverde - Ohio Creek
5,800.0	24.84	312.48	5,344.4	1,437.6	-1,570.1	2,128.9	0.00	0.00	
5,900.0	24.84	312.48	5,435.1	1,466.0	-1,601.1	2,170.9	0.00	0.00	
6,000.0	24.84	312.48	5,525.9	1,494.4	-1,632.1	2,212.9	0.00	0.00	
6,100.0	24.84	312.48	5,616.6	1,522.7	-1,663.1	2,254.9	0.00	0.00	
6,183.6	24.84	312.48	5,692.5	1,546.5	-1,689.0	2,290.0	0.00	0.00	Start 2° Drop
6,200.0	24.51	312.48	5,707.4	1,551.1	-1,694.0	2,296.9	2.00	-2.00	
6,300.0	22.51	312.48	5,799.1	1,578.0	-1,723.4	2,336.8	2.00	-2.00	
6,377.4	20.96	312.48	5,871.0	1,597.4	-1,744.6	2,365.4	2.00	-2.00	Williams Fork
6,400.0	20.51	312.48	5,892.1	1,602.8	-1,750.5	2,373.4	2.00	-2.00	
6,500.0	18.51	312.48	5,986.4	1,625.3	-1,775.1	2,406.8	2.00	-2.00	
6,600.0	16.51	312.48	6,081.7	1,645.7	-1,797.3	2,436.9	2.00	-2.00	
6,700.0	14.51	312.48	6,178.1	1,663.7	-1,817.0	2,463.7	2.00	-2.00	
6,800.0	12.51	312.48	6,275.3	1,679.5	-1,834.3	2,487.0	2.00	-2.00	
6,900.0	10.51	312.48	6,373.3	1,693.0	-1,849.0	2,507.0	2.00	-2.00	
7,000.0	8.51	312.48	6,471.9	1,704.1	-1,861.2	2,523.5	2.00	-2.00	
7,100.0	6.51	312.48	6,571.0	1,713.0	-1,870.8	2,536.6	2.00	-2.00	
7,200.0	4.51	312.48	6,670.6	1,719.5	-1,877.9	2,546.2	2.00	-2.00	
7,300.0	2.51	312.48	6,770.4	1,723.6	-1,882.4	2,552.3	2.00	-2.00	
7,400.0	0.51	312.48	6,870.3	1,725.4	-1,884.4	2,555.0	2.00	-2.00	
7,425.7	0.00	0.00	6,896.0	1,725.5	-1,884.5	2,555.1	2.00	-2.00	EOD @ Inc. = 0° - Top Gas
7,500.0	0.00	0.00	6,970.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
7,600.0	0.00	0.00	7,070.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
7,700.0	0.00	0.00	7,170.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
7,800.0	0.00	0.00	7,270.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
7,900.0	0.00	0.00	7,370.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,000.0	0.00	0.00	7,470.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,100.0	0.00	0.00	7,570.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,200.0	0.00	0.00	7,670.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,300.0	0.00	0.00	7,770.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,400.0	0.00	0.00	7,870.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,500.0	0.00	0.00	7,970.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,502.7	0.00	0.00	7,973.0	1,725.5	-1,884.5	2,555.1	0.00	0.00	Coal Ridge
8,600.0	0.00	0.00	8,070.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,700.0	0.00	0.00	8,170.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,800.0	0.00	0.00	8,270.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
8,900.0	0.00	0.00	8,370.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
9,000.0	0.00	0.00	8,470.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
9,100.0	0.00	0.00	8,570.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
9,200.0	0.00	0.00	8,670.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
9,300.0	0.00	0.00	8,770.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	
9,353.7	0.00	0.00	8,824.0	1,725.5	-1,884.5	2,555.1	0.00	0.00	Rollins
9,400.0	0.00	0.00	8,870.3	1,725.5	-1,884.5	2,555.1	0.00	0.00	

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 22-4C	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
9,503.7	0.00	0.00	8,974.0	1,725.5	-1,884.5	2,555.1	0.00	0.00	TD @ 9,503.7' MD
9,603.7	0.00	0.00	9,074.0	1,725.5	-1,884.5	2,555.1	0.00	0.00	Permit TD @ 9,603.7' 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
Rose 22-4C PBHL 1164' - plan hits target center - Circle (radius 25.0)	0.00	0.00	8,974.0	1,725.5	-1,884.5	1,591,428.81	2,359,421.48	39.435274	-107.768237
Rose 22-4C TGT - plan hits target center - Point	0.00	0.00	6,896.0	1,725.5	-1,884.5	1,591,428.81	2,359,421.48	39.435274	-107.768237

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
1,253.0	1,218.1	Surface Casing		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
5,722.5	5,274.0	Ohio Creek			
5,722.5	5,274.0	Top of Mesaverde			
6,377.4	5,871.0	Williams Fork			
7,425.7	6,896.0	Top Gas			
8,502.7	7,973.0	Coal Ridge			
9,353.7	8,824.0	Rollins			

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
325.0	325.0	0.0	0.0	KOP @ 325'
1,153.0	1,127.3	119.3	-130.3	EOB @ Inc. = 24.84°
6,183.6	5,692.5	1,546.5	-1,689.0	Start 2° Drop
7,425.7	6,896.0	1,725.5	-1,884.5	EOD @ Inc. = 0°
9,503.7	8,974.0	1,725.5	-1,884.5	TD @ 9,503.7' MD
9,603.7	9,074.0	1,725.5	-1,884.5	Permit TD @ 9,603.7' MD