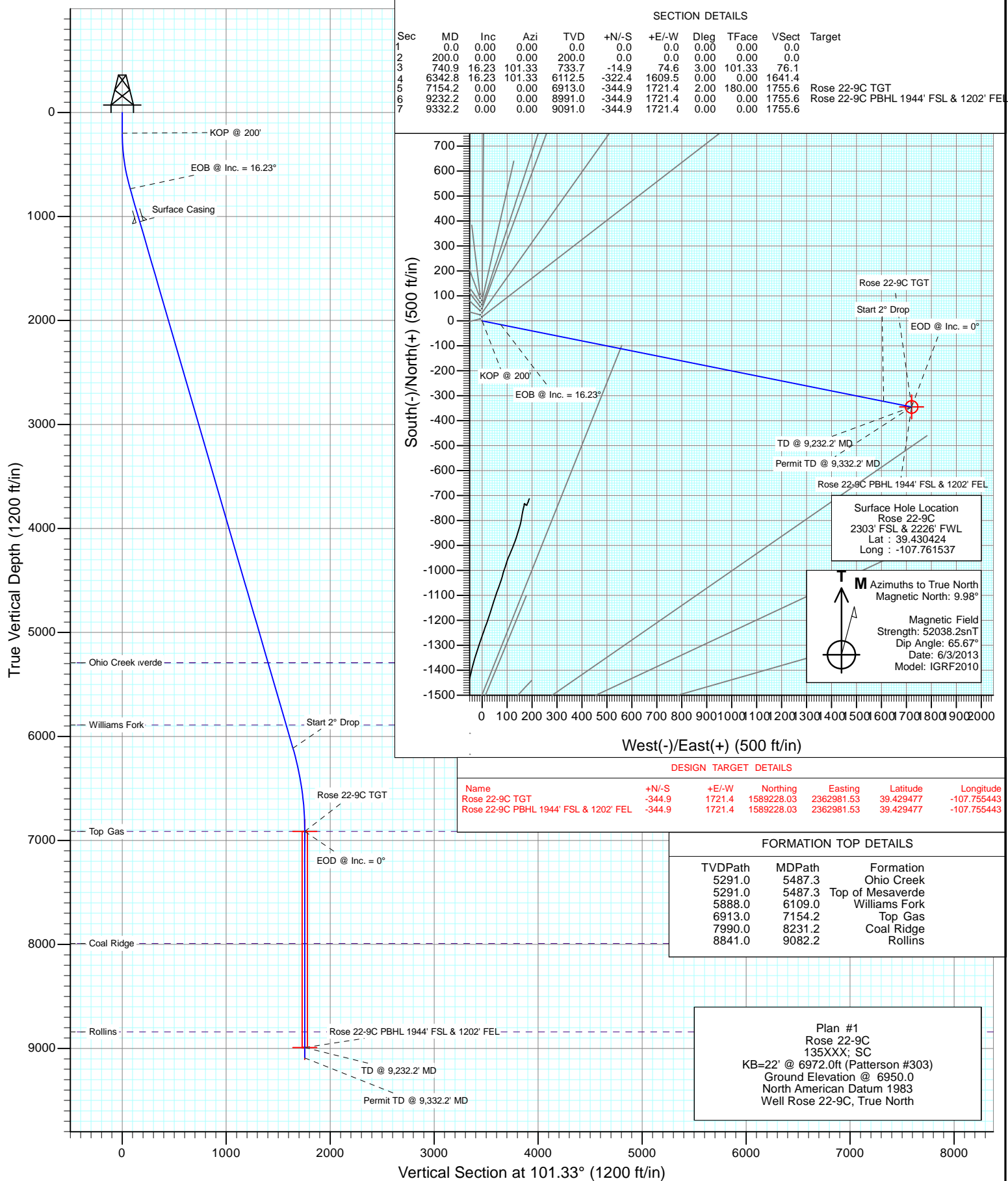
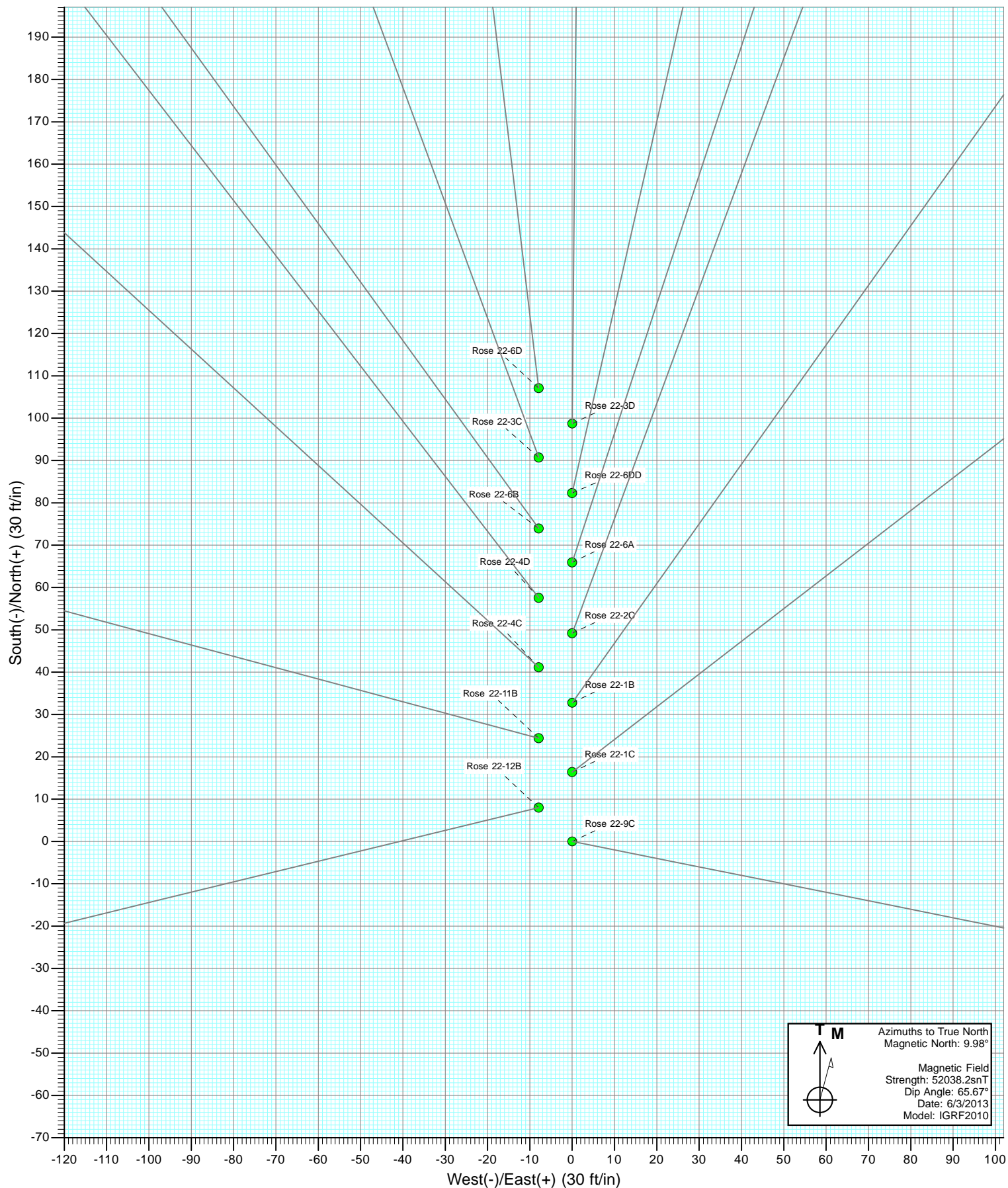
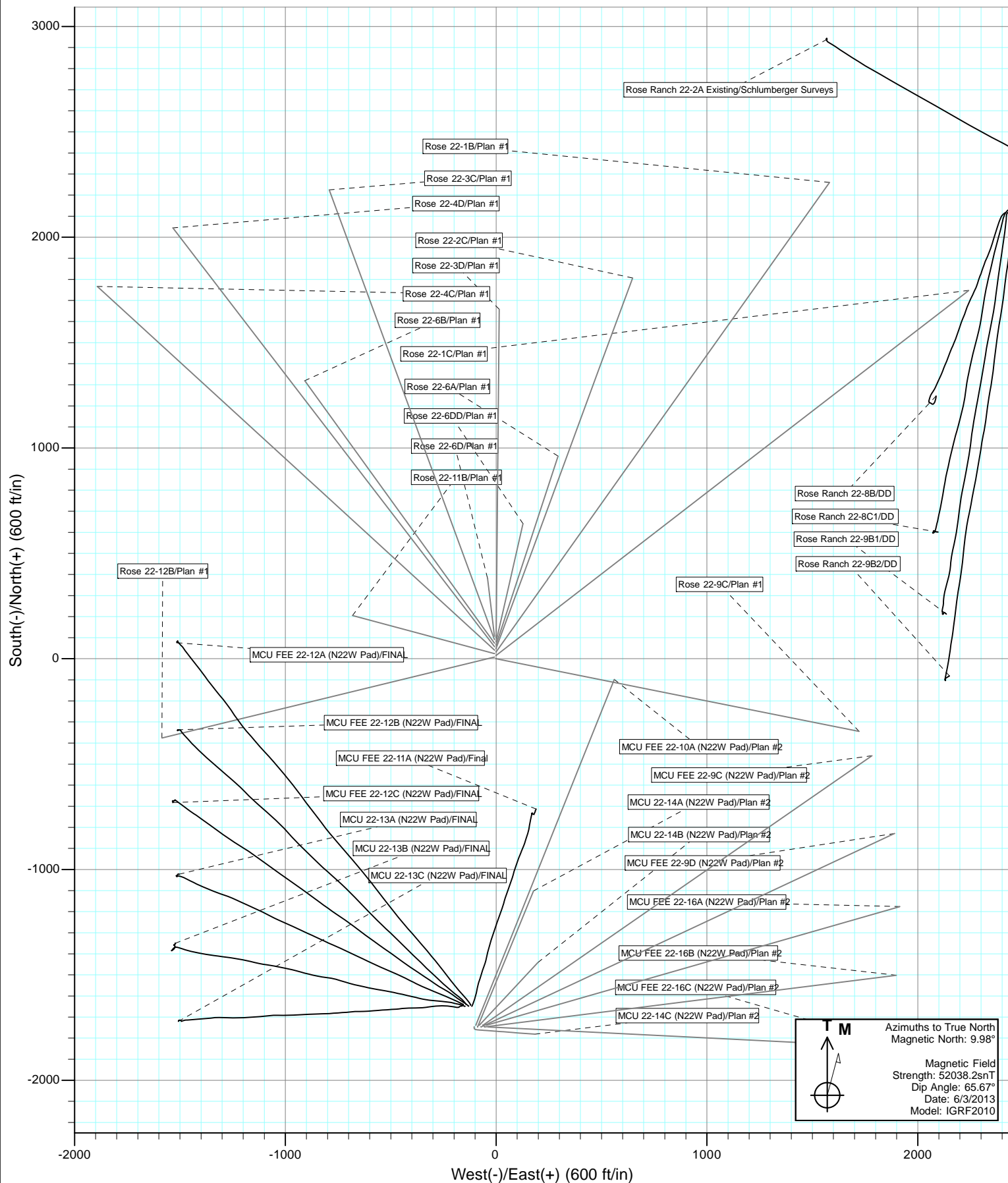




Project: Mamm Creek
Site: K22W Pad
Well: Rose 22-9C
Wellbore: OH
Design: Plan #1

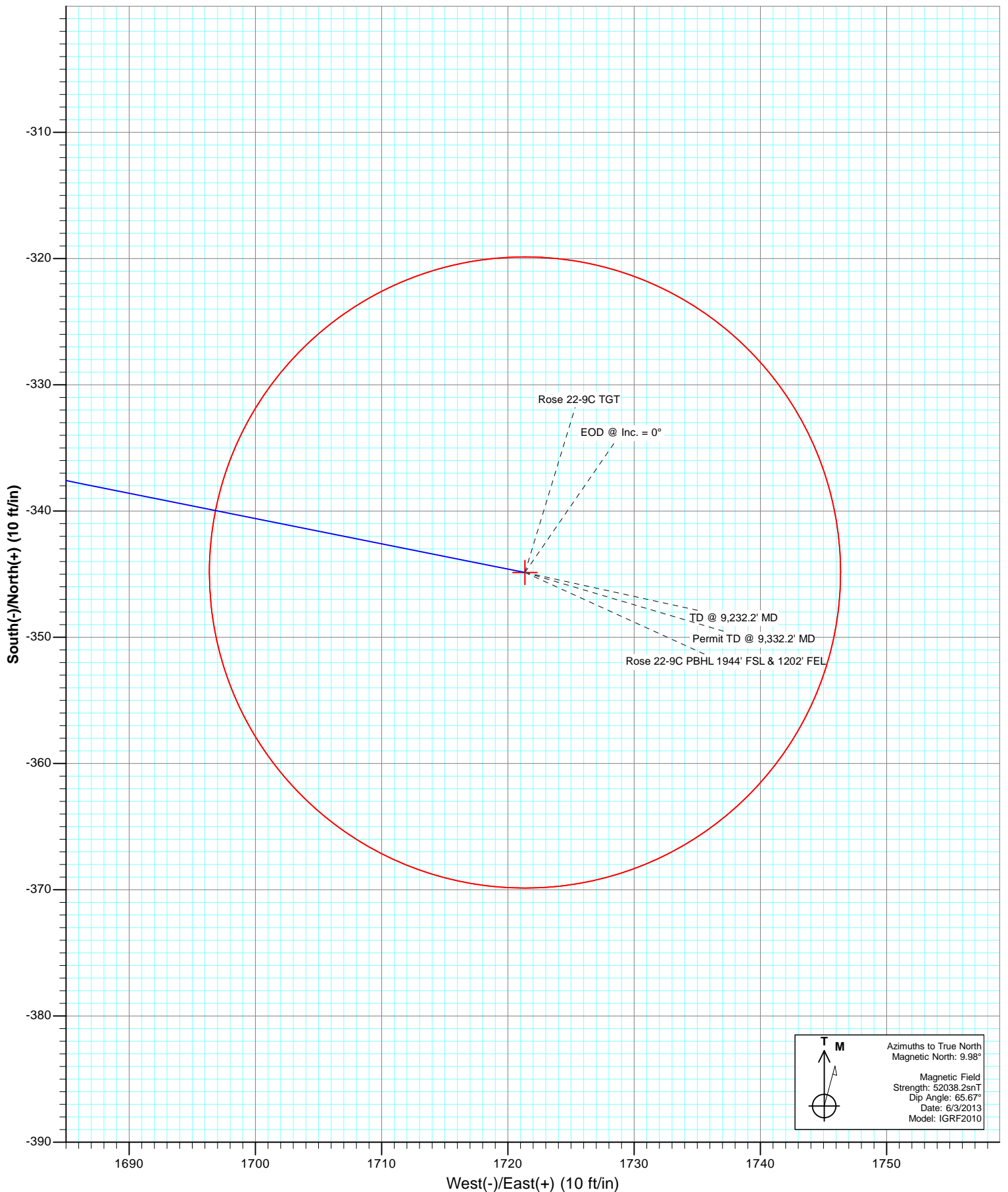









Project: Mamm Creek
Site: K22W Pad
Well: Rose 22-9C
Wellbore: OH
Plan: Plan #1





Azimuths to True North
Magnetic North: 9.98°

Magnetic Field
Strength: 52038.2snT
Dip Angle: 65.67°
Date: 6/3/2013
Model: IGRF2010

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Rose 22-9C
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 22-9C	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 22-9C					
Well Position	+N/-S	0.0 ft	Northing:	1,589,615.64 ft	Latitude:	39.430424
	+E/-W	0.0 ft	Easting:	2,361,269.29 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) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	101.33

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	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.00	0.00	
740.9	16.23	101.33	733.7	-14.9	74.6	3.00	3.00	0.00	101.33	
6,342.8	16.23	101.33	6,112.5	-322.4	1,609.5	0.00	0.00	0.00	0.00	
7,154.2	0.00	0.00	6,913.0	-344.9	1,721.4	2.00	-2.00	0.00	180.00	Rose 22-9C TGT
9,232.2	0.00	0.00	8,991.0	-344.9	1,721.4	0.00	0.00	0.00	0.00	Rose 22-9C PBHL 19
9,332.2	0.00	0.00	9,091.0	-344.9	1,721.4	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 22-9C
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 22-9C	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	KOP @ 200'
300.0	3.00	101.33	300.0	-0.5	2.6	2.6	3.00	3.00	
400.0	6.00	101.33	399.6	-2.1	10.3	10.5	3.00	3.00	
500.0	9.00	101.33	498.8	-4.6	23.1	23.5	3.00	3.00	
600.0	12.00	101.33	597.1	-8.2	40.9	41.7	3.00	3.00	
700.0	15.00	101.33	694.3	-12.8	63.8	65.1	3.00	3.00	
740.9	16.23	101.33	733.7	-14.9	74.6	76.1	3.00	3.00	EOB @ Inc. = 16.23°
800.0	16.23	101.33	790.4	-18.2	90.8	92.6	0.00	0.00	
900.0	16.23	101.33	886.5	-23.7	118.2	120.5	0.00	0.00	
1,000.0	16.23	101.33	982.5	-29.2	145.6	148.5	0.00	0.00	
1,070.3	16.23	101.33	1,050.0	-33.0	164.9	168.1	0.00	0.00	Surface Casing
1,100.0	16.23	101.33	1,078.5	-34.7	173.0	176.4	0.00	0.00	
1,200.0	16.23	101.33	1,174.5	-40.1	200.4	204.4	0.00	0.00	
1,300.0	16.23	101.33	1,270.5	-45.6	227.8	232.3	0.00	0.00	
1,400.0	16.23	101.33	1,366.5	-51.1	255.2	260.3	0.00	0.00	
1,500.0	16.23	101.33	1,462.6	-56.6	282.6	288.2	0.00	0.00	
1,600.0	16.23	101.33	1,558.6	-62.1	310.0	316.1	0.00	0.00	
1,700.0	16.23	101.33	1,654.6	-67.6	337.4	344.1	0.00	0.00	
1,800.0	16.23	101.33	1,750.6	-73.1	364.8	372.0	0.00	0.00	
1,900.0	16.23	101.33	1,846.6	-78.6	392.2	400.0	0.00	0.00	
2,000.0	16.23	101.33	1,942.6	-84.1	419.6	427.9	0.00	0.00	
2,100.0	16.23	101.33	2,038.7	-89.6	447.0	455.9	0.00	0.00	
2,200.0	16.23	101.33	2,134.7	-95.0	474.4	483.8	0.00	0.00	
2,300.0	16.23	101.33	2,230.7	-100.5	501.8	511.7	0.00	0.00	
2,400.0	16.23	101.33	2,326.7	-106.0	529.2	539.7	0.00	0.00	
2,500.0	16.23	101.33	2,422.7	-111.5	556.6	567.6	0.00	0.00	
2,600.0	16.23	101.33	2,518.7	-117.0	584.0	595.6	0.00	0.00	
2,700.0	16.23	101.33	2,614.8	-122.5	611.4	623.5	0.00	0.00	
2,800.0	16.23	101.33	2,710.8	-128.0	638.8	651.5	0.00	0.00	
2,900.0	16.23	101.33	2,806.8	-133.5	666.2	679.4	0.00	0.00	
3,000.0	16.23	101.33	2,902.8	-139.0	693.6	707.4	0.00	0.00	
3,100.0	16.23	101.33	2,998.8	-144.4	721.0	735.3	0.00	0.00	
3,200.0	16.23	101.33	3,094.8	-149.9	748.4	763.2	0.00	0.00	
3,300.0	16.23	101.33	3,190.9	-155.4	775.8	791.2	0.00	0.00	
3,400.0	16.23	101.33	3,286.9	-160.9	803.2	819.1	0.00	0.00	
3,500.0	16.23	101.33	3,382.9	-166.4	830.6	847.1	0.00	0.00	
3,600.0	16.23	101.33	3,478.9	-171.9	858.0	875.0	0.00	0.00	
3,700.0	16.23	101.33	3,574.9	-177.4	885.4	903.0	0.00	0.00	
3,800.0	16.23	101.33	3,670.9	-182.9	912.8	930.9	0.00	0.00	
3,900.0	16.23	101.33	3,767.0	-188.4	940.2	958.8	0.00	0.00	
4,000.0	16.23	101.33	3,863.0	-193.8	967.6	986.8	0.00	0.00	
4,100.0	16.23	101.33	3,959.0	-199.3	995.0	1,014.7	0.00	0.00	
4,200.0	16.23	101.33	4,055.0	-204.8	1,022.4	1,042.7	0.00	0.00	
4,300.0	16.23	101.33	4,151.0	-210.3	1,049.8	1,070.6	0.00	0.00	
4,400.0	16.23	101.33	4,247.0	-215.8	1,077.2	1,098.6	0.00	0.00	
4,500.0	16.23	101.33	4,343.1	-221.3	1,104.5	1,126.5	0.00	0.00	
4,600.0	16.23	101.33	4,439.1	-226.8	1,131.9	1,154.4	0.00	0.00	
4,700.0	16.23	101.33	4,535.1	-232.3	1,159.3	1,182.4	0.00	0.00	
4,800.0	16.23	101.33	4,631.1	-237.8	1,186.7	1,210.3	0.00	0.00	
4,900.0	16.23	101.33	4,727.1	-243.2	1,214.1	1,238.3	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Rose 22-9C
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 22-9C	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
5,000.0	16.23	101.33	4,823.1	-248.7	1,241.5	1,266.2	0.00	0.00	
5,100.0	16.23	101.33	4,919.2	-254.2	1,268.9	1,294.2	0.00	0.00	
5,200.0	16.23	101.33	5,015.2	-259.7	1,296.3	1,322.1	0.00	0.00	
5,300.0	16.23	101.33	5,111.2	-265.2	1,323.7	1,350.0	0.00	0.00	
5,400.0	16.23	101.33	5,207.2	-270.7	1,351.1	1,378.0	0.00	0.00	
5,487.3	16.23	101.33	5,291.0	-275.5	1,375.0	1,402.4	0.00	0.00	Top of Mesaverde - Ohio Creek
5,500.0	16.23	101.33	5,303.2	-276.2	1,378.5	1,405.9	0.00	0.00	
5,600.0	16.23	101.33	5,399.2	-281.7	1,405.9	1,433.9	0.00	0.00	
5,700.0	16.23	101.33	5,495.3	-287.2	1,433.3	1,461.8	0.00	0.00	
5,800.0	16.23	101.33	5,591.3	-292.7	1,460.7	1,489.8	0.00	0.00	
5,900.0	16.23	101.33	5,687.3	-298.1	1,488.1	1,517.7	0.00	0.00	
6,000.0	16.23	101.33	5,783.3	-303.6	1,515.5	1,545.6	0.00	0.00	
6,100.0	16.23	101.33	5,879.3	-309.1	1,542.9	1,573.6	0.00	0.00	
6,109.0	16.23	101.33	5,888.0	-309.6	1,545.4	1,576.1	0.00	0.00	Williams Fork
6,200.0	16.23	101.33	5,975.3	-314.6	1,570.3	1,601.5	0.00	0.00	
6,300.0	16.23	101.33	6,071.4	-320.1	1,597.7	1,629.5	0.00	0.00	
6,342.8	16.23	101.33	6,112.5	-322.4	1,609.5	1,641.4	0.00	0.00	Start 2° Drop
6,400.0	15.08	101.33	6,167.5	-325.5	1,624.6	1,656.9	2.00	-2.00	
6,500.0	13.08	101.33	6,264.5	-330.3	1,648.4	1,681.2	2.00	-2.00	
6,600.0	11.08	101.33	6,362.3	-334.4	1,669.0	1,702.1	2.00	-2.00	
6,700.0	9.08	101.33	6,460.7	-337.8	1,686.1	1,719.6	2.00	-2.00	
6,800.0	7.08	101.33	6,559.7	-340.6	1,699.9	1,733.7	2.00	-2.00	
6,900.0	5.08	101.33	6,659.2	-342.7	1,710.3	1,744.3	2.00	-2.00	
7,000.0	3.08	101.33	6,758.9	-344.1	1,717.3	1,751.4	2.00	-2.00	
7,100.0	1.08	101.33	6,858.8	-344.8	1,720.9	1,755.1	2.00	-2.00	
7,154.2	0.00	0.00	6,913.0	-344.9	1,721.4	1,755.6	2.00	-2.00	EOD @ Inc. = 0° - Top Gas
7,200.0	0.00	0.00	6,958.8	-344.9	1,721.4	1,755.6	0.00	0.00	
7,300.0	0.00	0.00	7,058.8	-344.9	1,721.4	1,755.6	0.00	0.00	
7,400.0	0.00	0.00	7,158.8	-344.9	1,721.4	1,755.6	0.00	0.00	
7,500.0	0.00	0.00	7,258.8	-344.9	1,721.4	1,755.6	0.00	0.00	
7,600.0	0.00	0.00	7,358.8	-344.9	1,721.4	1,755.6	0.00	0.00	
7,700.0	0.00	0.00	7,458.8	-344.9	1,721.4	1,755.6	0.00	0.00	
7,800.0	0.00	0.00	7,558.8	-344.9	1,721.4	1,755.6	0.00	0.00	
7,900.0	0.00	0.00	7,658.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,000.0	0.00	0.00	7,758.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,100.0	0.00	0.00	7,858.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,200.0	0.00	0.00	7,958.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,231.2	0.00	0.00	7,990.0	-344.9	1,721.4	1,755.6	0.00	0.00	Coal Ridge
8,300.0	0.00	0.00	8,058.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,400.0	0.00	0.00	8,158.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,500.0	0.00	0.00	8,258.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,600.0	0.00	0.00	8,358.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,700.0	0.00	0.00	8,458.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,800.0	0.00	0.00	8,558.8	-344.9	1,721.4	1,755.6	0.00	0.00	
8,900.0	0.00	0.00	8,658.8	-344.9	1,721.4	1,755.6	0.00	0.00	
9,000.0	0.00	0.00	8,758.8	-344.9	1,721.4	1,755.6	0.00	0.00	
9,082.2	0.00	0.00	8,841.0	-344.9	1,721.4	1,755.6	0.00	0.00	Rollins
9,100.0	0.00	0.00	8,858.8	-344.9	1,721.4	1,755.6	0.00	0.00	
9,200.0	0.00	0.00	8,958.8	-344.9	1,721.4	1,755.6	0.00	0.00	
9,232.2	0.00	0.00	8,991.0	-344.9	1,721.4	1,755.6	0.00	0.00	TD @ 9,232.2' MD
9,300.0	0.00	0.00	9,058.8	-344.9	1,721.4	1,755.6	0.00	0.00	
9,332.2	0.00	0.00	9,091.0	-344.9	1,721.4	1,755.6	0.00	0.00	Permit TD @ 9,332.2' MD

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Rose 22-9C
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 22-9C	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
Rose 22-9C PBHL 1944'	0.00	0.00	8,991.0	-344.9	1,721.4	1,589,228.03	2,362,981.53	39.429477	-107.755443
- plan hits target center									
- Circle (radius 25.0)									
Rose 22-9C TGT	0.00	0.00	6,913.0	-344.9	1,721.4	1,589,228.03	2,362,981.53	39.429477	-107.755443
- plan hits target center									
- Point									

Casing Points				
Measured Depth	Vertical Depth		Casing Diameter	Hole Diameter
(ft)	(ft)	Name	(in)	(in)
1,070.3	1,050.0	Surface Casing		

Formations					
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction
(ft)	(ft)			(°)	(°)
5,487.3	5,291.0	Top of Mesaverde			
5,487.3	5,291.0	Ohio Creek			
6,109.0	5,888.0	Williams Fork			
7,154.2	6,913.0	Top Gas			
8,231.2	7,990.0	Coal Ridge			
9,082.2	8,841.0	Rollins			

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
200.0	200.0	0.0	0.0	KOP @ 200'
740.9	733.7	-14.9	74.6	EOB @ Inc. = 16.23°
6,342.8	6,112.5	-322.4	1,609.5	Start 2° Drop
7,154.2	6,913.0	-344.9	1,721.4	EOD @ Inc. = 0°
9,232.2	8,991.0	-344.9	1,721.4	TD @ 9,232.2' MD
9,332.2	9,091.0	-344.9	1,721.4	Permit TD @ 9,332.2' MD