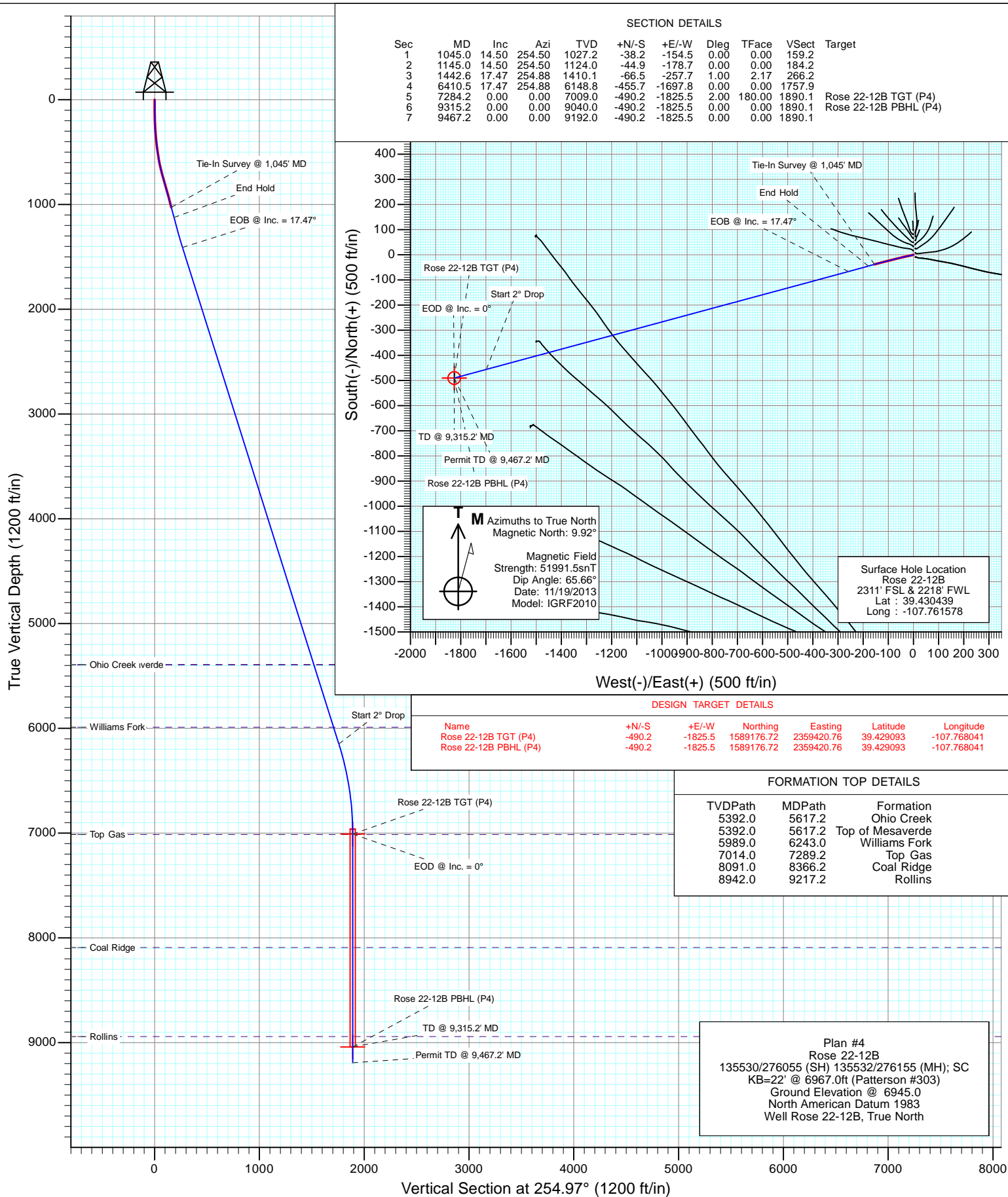
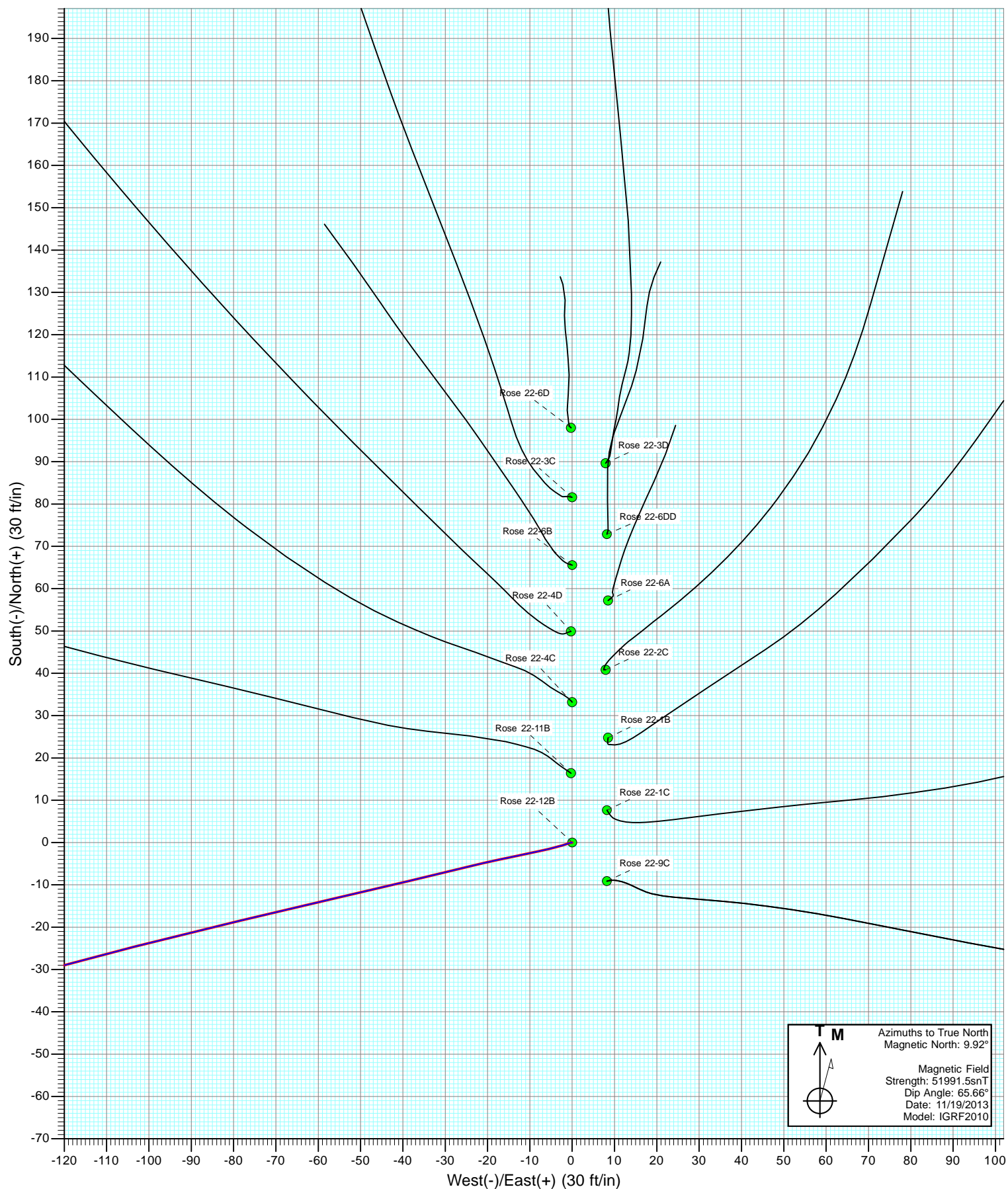
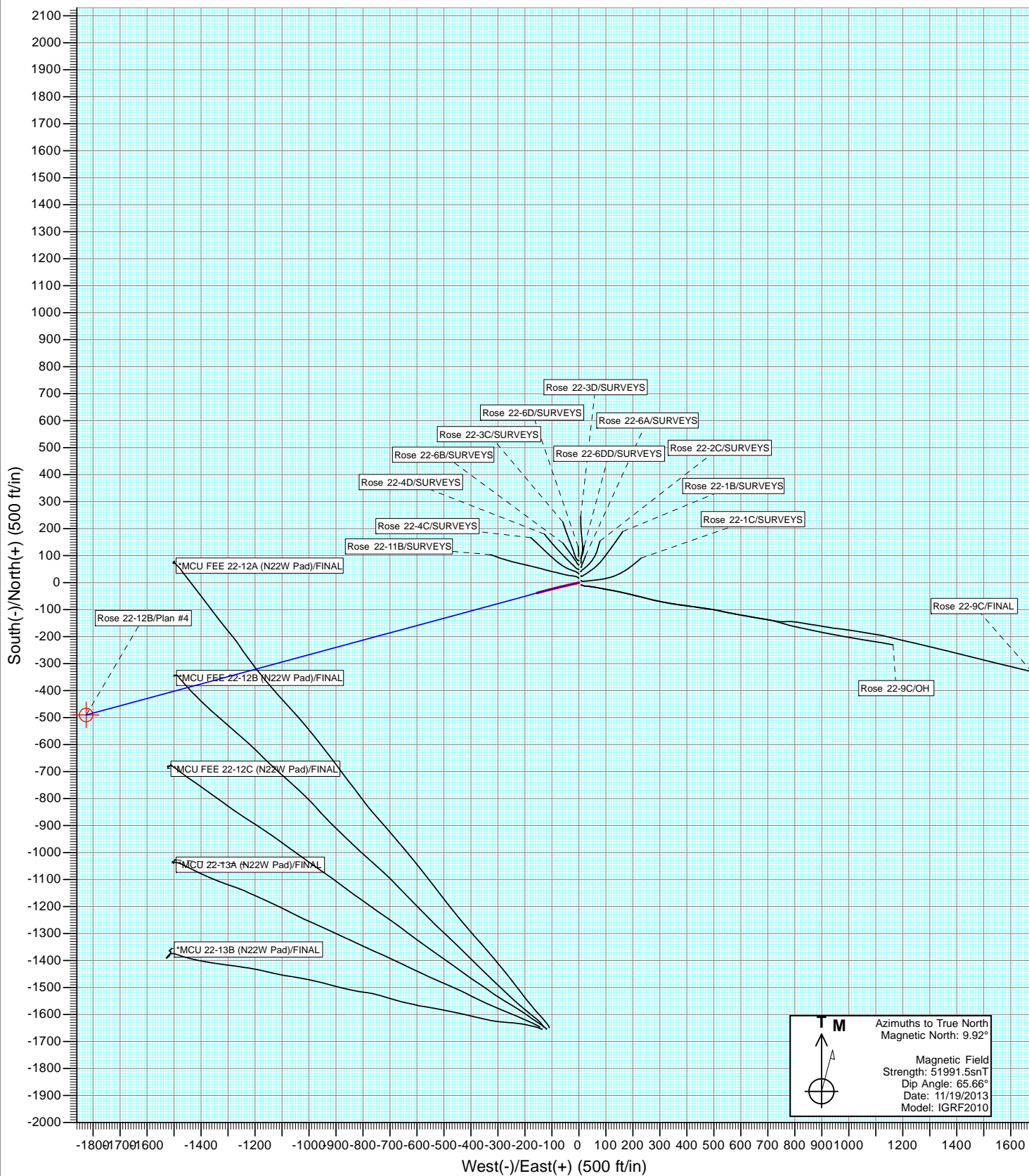


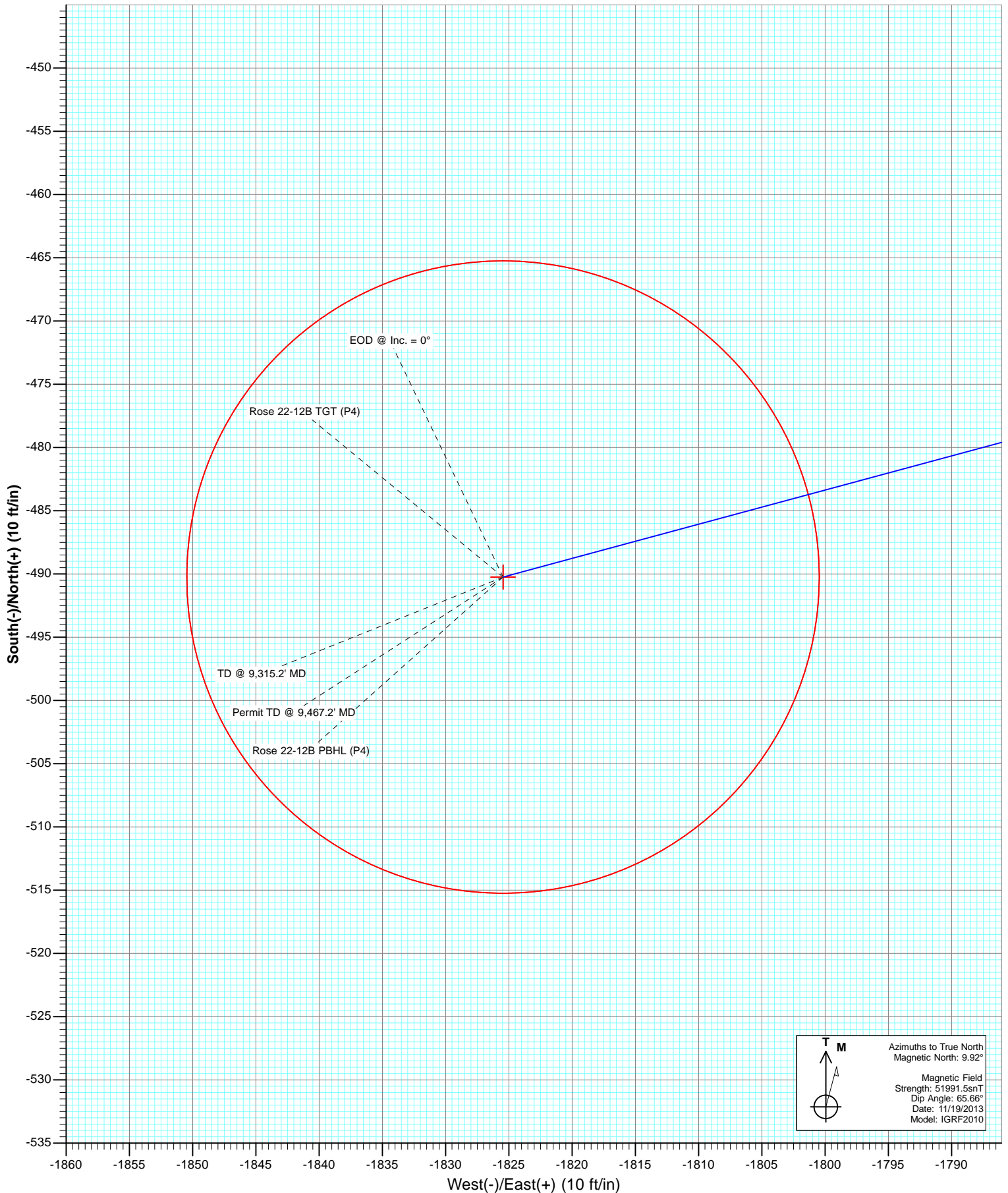


Project: Mamm Creek
Site: K22W Pad
Well: Rose 22-12B
Wellbore: OH
Design: Plan #4









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' @ 6967.0ft (Patterson #303)
Project:	Mamm Creek	MD Reference:	KB=22' @ 6967.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

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:	1,589,621.37 ft	Latitude:	39.430439
	+E/-W	0.0 ft	Easting:	2,361,257.85 ft	Longitude:	-107.761578
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	6,945.0 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	11/19/2013	9.92	65.66	51,991

Design	Plan #4			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	1,045.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.0	0.0	0.0	254.97

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
1,045.0	14.50	254.50	1,027.2	-38.2	-154.5	0.00	0.00	0.00	0.00	
1,145.0	14.50	254.50	1,124.0	-44.9	-178.7	0.00	0.00	0.00	0.00	
1,442.6	17.47	254.88	1,410.1	-66.5	-257.7	1.00	1.00	0.13	2.17	
6,410.5	17.47	254.88	6,148.8	-455.7	-1,697.8	0.00	0.00	0.00	0.00	
7,284.2	0.00	0.00	7,009.0	-490.2	-1,825.5	2.00	-2.00	0.00	180.00	Rose 22-12B TGT (P4)
9,315.2	0.00	0.00	9,040.0	-490.2	-1,825.5	0.00	0.00	0.00	0.00	Rose 22-12B PBHL (F4)
9,467.2	0.00	0.00	9,192.0	-490.2	-1,825.5	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 22-12B
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 6967.0ft (Patterson #303)
Project:	Mamm Creek	MD Reference:	KB=22' @ 6967.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

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	
114.0	0.40	260.40	114.0	-0.1	-0.4	0.4	0.35	0.35	
145.0	0.80	249.80	145.0	-0.2	-0.7	0.7	1.33	1.29	
175.0	1.30	251.50	175.0	-0.3	-1.2	1.3	1.67	1.67	
205.0	2.10	254.50	205.0	-0.6	-2.1	2.2	2.68	2.67	
235.0	2.60	254.30	235.0	-0.9	-3.3	3.4	1.67	1.67	
296.0	4.40	257.30	295.8	-1.8	-6.9	7.1	2.97	2.95	
387.0	5.40	258.40	386.5	-3.4	-14.5	14.9	1.10	1.10	
479.0	7.60	256.70	477.9	-5.7	-24.6	25.3	2.40	2.39	
570.0	10.10	256.30	567.8	-9.0	-38.2	39.3	2.75	2.75	
661.0	13.50	257.00	656.9	-13.3	-56.4	57.9	3.74	3.74	
752.0	15.50	256.60	745.0	-18.5	-78.5	80.6	2.20	2.20	
844.0	16.70	255.80	833.4	-24.6	-103.3	106.1	1.33	1.30	
934.0	15.30	254.80	919.9	-30.9	-127.3	130.9	1.59	-1.56	
1,024.0	14.30	255.00	1,006.9	-36.8	-149.5	153.9	1.11	-1.11	
1,045.0	14.50	254.50	1,027.2	-38.2	-154.5	159.2	1.12	0.95	Tie-In Survey @ 1,045' MD
1,068.5	14.50	254.50	1,050.0	-39.8	-160.2	165.0	0.00	0.00	Surface Casing
1,100.0	14.50	254.50	1,080.5	-41.9	-167.8	172.9	0.00	0.00	
1,145.0	14.50	254.50	1,124.0	-44.9	-178.7	184.2	0.00	0.00	End Hold
1,200.0	15.05	254.58	1,177.2	-48.6	-192.2	198.2	1.00	1.00	
1,300.0	16.05	254.71	1,273.6	-55.7	-218.0	225.0	1.00	1.00	
1,400.0	17.05	254.83	1,369.4	-63.2	-245.5	253.5	1.00	1.00	
1,442.6	17.47	254.88	1,410.1	-66.5	-257.7	266.2	1.00	1.00	EOB @ Inc. = 17.47°
1,500.0	17.47	254.88	1,464.9	-71.0	-274.4	283.4	0.00	0.00	
1,600.0	17.47	254.88	1,560.2	-78.9	-303.3	313.4	0.00	0.00	
1,700.0	17.47	254.88	1,655.6	-86.7	-332.3	343.4	0.00	0.00	
1,800.0	17.47	254.88	1,751.0	-94.5	-361.3	373.5	0.00	0.00	
1,900.0	17.47	254.88	1,846.4	-102.4	-390.3	403.5	0.00	0.00	
2,000.0	17.47	254.88	1,941.8	-110.2	-419.3	433.5	0.00	0.00	
2,100.0	17.47	254.88	2,037.2	-118.0	-448.3	463.6	0.00	0.00	
2,200.0	17.47	254.88	2,132.6	-125.9	-477.3	493.6	0.00	0.00	
2,300.0	17.47	254.88	2,227.9	-133.7	-506.3	523.6	0.00	0.00	
2,400.0	17.47	254.88	2,323.3	-141.5	-535.3	553.6	0.00	0.00	
2,500.0	17.47	254.88	2,418.7	-149.4	-564.2	583.7	0.00	0.00	
2,600.0	17.47	254.88	2,514.1	-157.2	-593.2	613.7	0.00	0.00	
2,700.0	17.47	254.88	2,609.5	-165.0	-622.2	643.7	0.00	0.00	
2,800.0	17.47	254.88	2,704.9	-172.9	-651.2	673.8	0.00	0.00	
2,900.0	17.47	254.88	2,800.2	-180.7	-680.2	703.8	0.00	0.00	
3,000.0	17.47	254.88	2,895.6	-188.5	-709.2	733.8	0.00	0.00	
3,100.0	17.47	254.88	2,991.0	-196.4	-738.2	763.8	0.00	0.00	
3,200.0	17.47	254.88	3,086.4	-204.2	-767.2	793.9	0.00	0.00	
3,300.0	17.47	254.88	3,181.8	-212.0	-796.1	823.9	0.00	0.00	
3,400.0	17.47	254.88	3,277.2	-219.9	-825.1	853.9	0.00	0.00	
3,500.0	17.47	254.88	3,372.6	-227.7	-854.1	884.0	0.00	0.00	
3,600.0	17.47	254.88	3,467.9	-235.6	-883.1	914.0	0.00	0.00	
3,700.0	17.47	254.88	3,563.3	-243.4	-912.1	944.0	0.00	0.00	
3,800.0	17.47	254.88	3,658.7	-251.2	-941.1	974.0	0.00	0.00	
3,900.0	17.47	254.88	3,754.1	-259.1	-970.1	1,004.1	0.00	0.00	
4,000.0	17.47	254.88	3,849.5	-266.9	-999.1	1,034.1	0.00	0.00	
4,100.0	17.47	254.88	3,944.9	-274.7	-1,028.1	1,064.1	0.00	0.00	
4,200.0	17.47	254.88	4,040.3	-282.6	-1,057.0	1,094.2	0.00	0.00	
4,300.0	17.47	254.88	4,135.6	-290.4	-1,086.0	1,124.2	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' @ 6967.0ft (Patterson #303)
Project:	Mamm Creek	MD Reference:	KB=22' @ 6967.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

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
4,400.0	17.47	254.88	4,231.0	-298.2	-1,115.0	1,154.2	0.00	0.00	
4,500.0	17.47	254.88	4,326.4	-306.1	-1,144.0	1,184.2	0.00	0.00	
4,600.0	17.47	254.88	4,421.8	-313.9	-1,173.0	1,214.3	0.00	0.00	
4,700.0	17.47	254.88	4,517.2	-321.7	-1,202.0	1,244.3	0.00	0.00	
4,800.0	17.47	254.88	4,612.6	-329.6	-1,231.0	1,274.3	0.00	0.00	
4,900.0	17.47	254.88	4,707.9	-337.4	-1,260.0	1,304.4	0.00	0.00	
5,000.0	17.47	254.88	4,803.3	-345.2	-1,288.9	1,334.4	0.00	0.00	
5,100.0	17.47	254.88	4,898.7	-353.1	-1,317.9	1,364.4	0.00	0.00	
5,200.0	17.47	254.88	4,994.1	-360.9	-1,346.9	1,394.4	0.00	0.00	
5,300.0	17.47	254.88	5,089.5	-368.7	-1,375.9	1,424.5	0.00	0.00	
5,400.0	17.47	254.88	5,184.9	-376.6	-1,404.9	1,454.5	0.00	0.00	
5,500.0	17.47	254.88	5,280.3	-384.4	-1,433.9	1,484.5	0.00	0.00	
5,600.0	17.47	254.88	5,375.6	-392.2	-1,462.9	1,514.5	0.00	0.00	
5,617.2	17.47	254.88	5,392.0	-393.6	-1,467.8	1,519.7	0.00	0.00	Top of Mesaverde - Ohio Creek
5,700.0	17.47	254.88	5,471.0	-400.1	-1,491.9	1,544.6	0.00	0.00	
5,800.0	17.47	254.88	5,566.4	-407.9	-1,520.8	1,574.6	0.00	0.00	
5,900.0	17.47	254.88	5,661.8	-415.8	-1,549.8	1,604.6	0.00	0.00	
6,000.0	17.47	254.88	5,757.2	-423.6	-1,578.8	1,634.7	0.00	0.00	
6,100.0	17.47	254.88	5,852.6	-431.4	-1,607.8	1,664.7	0.00	0.00	
6,200.0	17.47	254.88	5,948.0	-439.3	-1,636.8	1,694.7	0.00	0.00	
6,243.0	17.47	254.88	5,989.0	-442.6	-1,649.3	1,707.6	0.00	0.00	Williams Fork
6,300.0	17.47	254.88	6,043.3	-447.1	-1,665.8	1,724.7	0.00	0.00	
6,400.0	17.47	254.88	6,138.7	-454.9	-1,694.8	1,754.8	0.00	0.00	
6,410.5	17.47	254.88	6,148.8	-455.7	-1,697.8	1,757.9	0.00	0.00	Start 2° Drop
6,500.0	15.68	254.88	6,234.5	-462.4	-1,722.5	1,783.5	2.00	-2.00	
6,600.0	13.68	254.88	6,331.2	-469.0	-1,746.9	1,808.8	2.00	-2.00	
6,700.0	11.68	254.88	6,428.8	-474.8	-1,768.1	1,830.8	2.00	-2.00	
6,800.0	9.68	254.88	6,527.1	-479.6	-1,786.0	1,849.3	2.00	-2.00	
6,900.0	7.68	254.88	6,625.9	-483.5	-1,800.6	1,864.4	2.00	-2.00	
7,000.0	5.68	254.88	6,725.2	-486.6	-1,811.9	1,876.1	2.00	-2.00	
7,100.0	3.68	254.88	6,824.9	-488.7	-1,819.7	1,884.2	2.00	-2.00	
7,200.0	1.68	254.88	6,924.8	-489.9	-1,824.3	1,888.9	2.00	-2.00	
7,284.2	0.00	0.00	7,009.0	-490.2	-1,825.5	1,890.1	2.00	-2.00	EOD @ Inc. = 0°
7,289.2	0.00	0.00	7,014.0	-490.2	-1,825.5	1,890.1	0.00	0.00	Top Gas
7,300.0	0.00	0.00	7,024.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
7,400.0	0.00	0.00	7,124.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
7,500.0	0.00	0.00	7,224.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
7,600.0	0.00	0.00	7,324.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
7,700.0	0.00	0.00	7,424.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
7,800.0	0.00	0.00	7,524.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
7,900.0	0.00	0.00	7,624.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,000.0	0.00	0.00	7,724.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,100.0	0.00	0.00	7,824.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,200.0	0.00	0.00	7,924.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,300.0	0.00	0.00	8,024.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,366.2	0.00	0.00	8,091.0	-490.2	-1,825.5	1,890.1	0.00	0.00	Coal Ridge
8,400.0	0.00	0.00	8,124.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,500.0	0.00	0.00	8,224.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,600.0	0.00	0.00	8,324.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,700.0	0.00	0.00	8,424.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,800.0	0.00	0.00	8,524.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
8,900.0	0.00	0.00	8,624.8	-490.2	-1,825.5	1,890.1	0.00	0.00	

Cathedral Energy Services

Planning Report

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Project:	Mamm Creek	MD Reference:	KB=22' @ 6967.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

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
9,000.0	0.00	0.00	8,724.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
9,100.0	0.00	0.00	8,824.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
9,200.0	0.00	0.00	8,924.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
9,217.2	0.00	0.00	8,942.0	-490.2	-1,825.5	1,890.1	0.00	0.00	Rollins
9,300.0	0.00	0.00	9,024.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
9,315.2	0.00	0.00	9,040.0	-490.2	-1,825.5	1,890.1	0.00	0.00	TD @ 9,315.2' MD
9,400.0	0.00	0.00	9,124.8	-490.2	-1,825.5	1,890.1	0.00	0.00	
9,467.2	0.00	0.00	9,192.0	-490.2	-1,825.5	1,890.1	0.00	0.00	Permit TD @ 9,467.2' MD

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
Rose 22-12B PBHL (P4)	0.00	0.00	9,040.0	-490.2	-1,825.5	1,589,176.72	2,359,420.76	39.429093	-107.768041
- plan hits target center									
- Circle (radius 25.0)									
Rose 22-12B TGT (P4)	0.00	0.00	7,009.0	-490.2	-1,825.5	1,589,176.72	2,359,420.76	39.429093	-107.768041
- plan hits target center									
- Point									
Rose 22-12B TGT	0.00	0.00	7,009.0	-381.3	-1,573.9	1,589,279.39	2,359,674.94	39.429392	-107.767150
- plan misses target center by 274.2ft at 7280.3ft MD (7005.0 TVD, -490.2 N, -1825.5 E)									
- Point									
Rose 22-12B PBHL 193i	0.00	0.00	9,087.0	-381.3	-1,573.9	1,589,279.39	2,359,674.94	39.429392	-107.767150
- plan misses target center by 274.1ft at 9362.2ft MD (9087.0 TVD, -490.2 N, -1825.5 E)									
- Circle (radius 25.0)									

Casing Points				
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
1,068.5	1,050.0	Surface Casing		

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
5,617.2	5,392.0	Ohio Creek			
5,617.2	5,392.0	Top of Mesaverde			
6,243.0	5,989.0	Williams Fork			
7,289.2	7,014.0	Top Gas			
8,366.2	8,091.0	Coal Ridge			
9,217.2	8,942.0	Rollins			

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' @ 6967.0ft (Patterson #303)
Project:	Mamm Creek	MD Reference:	KB=22' @ 6967.0ft (Patterson #303)
Site:	K22W Pad	North Reference:	True
Well:	Rose 22-12B	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,045.0	1,027.2	-38.2	-154.5	Tie-In Survey @ 1,045' MD
1,145.0	1,124.0	-44.9	-178.7	End Hold
1,442.6	1,410.1	-66.5	-257.7	EOB @ Inc. = 17.47°
6,410.5	6,148.8	-455.7	-1,697.8	Start 2° Drop
7,284.2	7,009.0	-490.2	-1,825.5	EOD @ Inc. = 0°
9,315.2	9,040.0	-490.2	-1,825.5	TD @ 9,315.2' MD
9,467.2	9,192.0	-490.2	-1,825.5	Permit TD @ 9,467.2' MD