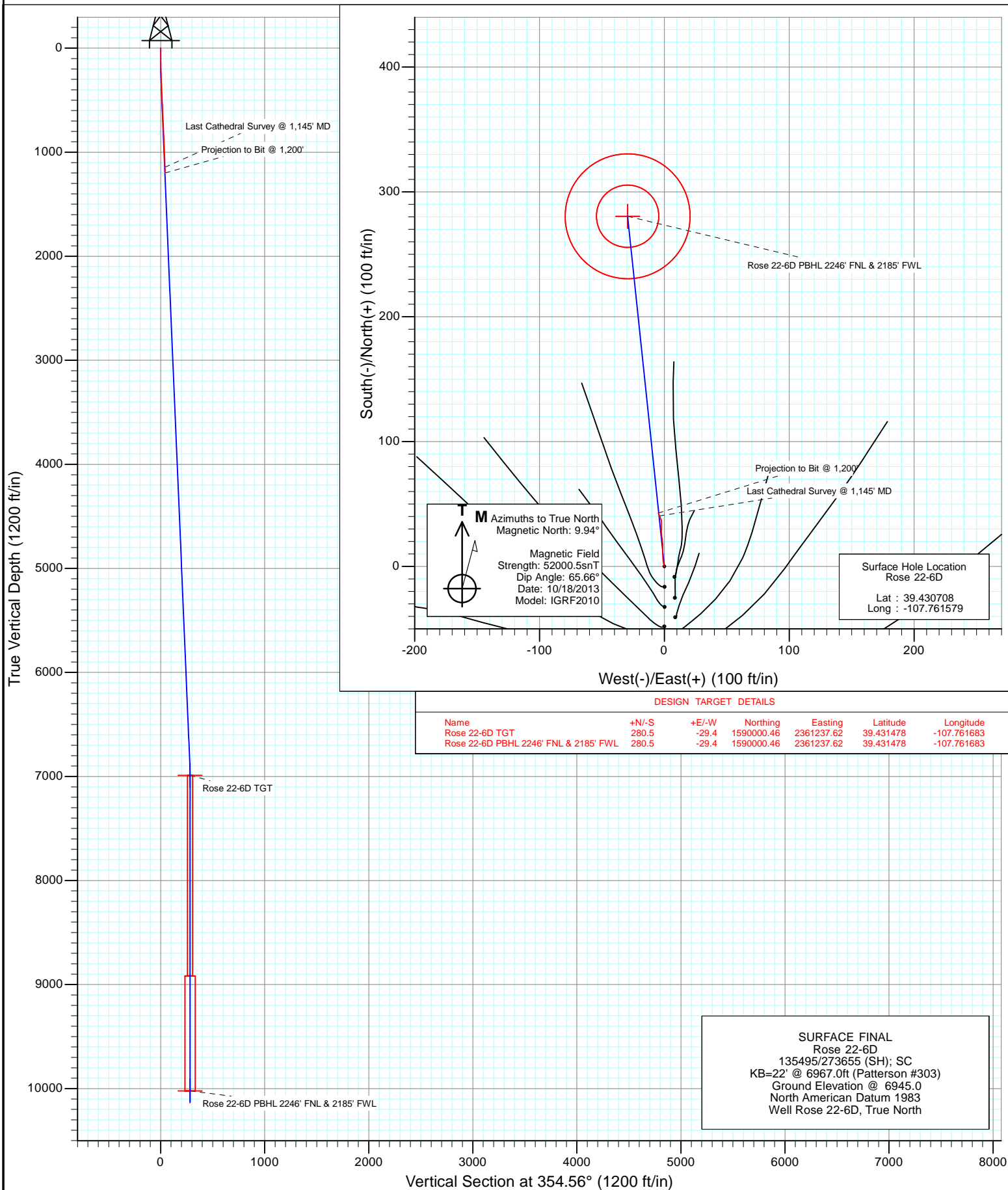




Project: Mamm Creek  
Site: K22W Pad  
Well: Rose 22-6D  
Wellbore: OH  
Design: SURFACE FINAL



# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Rose 22-6D
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KB=22' @ 6967.0ft (Patterson #303)
<b>Site:</b>	K22W Pad	<b>MD Reference:</b>	KB=22' @ 6967.0ft (Patterson #303)
<b>Well:</b>	Rose 22-6D	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	SURFACE FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

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 22-6D					
Well Position	+N/-S	0.0 ft	Northing:	1,589,719.33 ft	Latitude:	39.430708
	+E/-W	0.0 ft	Easting:	2,361,260.01 ft	Longitude:	-107.761579
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	10/18/2013	9.94	65.66	52,000

Design	SURFACE FINAL			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	354.56

Survey Program		Date	12/16/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
173.0	1,200.0	Survey #1 (OH)	Geolink MWD	Geolink MWD	

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
173.0	0.60	343.00	173.0	0.9	-0.3	0.9	0.35	0.35	
233.0	2.10	349.70	233.0	2.2	-0.6	2.3	2.51	2.50	
325.0	2.40	353.60	324.9	5.8	-1.1	5.9	0.37	0.33	
416.0	2.70	0.00	415.8	9.9	-1.3	9.9	0.45	0.33	
508.0	2.90	0.90	507.7	14.4	-1.2	14.4	0.22	0.22	
598.0	2.30	354.40	597.6	18.4	-1.4	18.5	0.74	-0.67	
690.0	2.20	352.60	689.5	22.0	-1.8	22.1	0.13	-0.11	
781.0	2.50	355.70	780.5	25.7	-2.2	25.8	0.36	0.33	
872.0	2.30	0.10	871.4	29.5	-2.3	29.6	0.30	-0.22	
962.0	2.60	5.10	961.3	33.4	-2.1	33.4	0.41	0.33	
1,053.0	2.20	342.60	1,052.2	37.1	-2.5	37.2	1.12	-0.44	
1,145.0	2.50	334.40	1,144.1	40.6	-3.9	40.8	0.49	0.33	Last Cathedral Survey @ 1,145' MD

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Rose 22-6D
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KB=22' @ 6967.0ft (Patterson #303)
<b>Site:</b>	K22W Pad	<b>MD Reference:</b>	KB=22' @ 6967.0ft (Patterson #303)
<b>Well:</b>	Rose 22-6D	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	SURFACE FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
1,200.0	2.50	334.40	1,199.1	42.8	-4.9	43.0	0.00	0.00	Projection to Bit @ 1,200'

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 22-6D TGT	0.00	0.00	6,989.0	280.5	-29.4	1,590,000.46	2,361,237.62	39.431478	-107.761683
- actual wellpath misses target center by 5794.8ft at 1200.0ft MD (1199.1 TVD, 42.8 N, -4.9 E)									
- Circle (radius 25.0)									
Rose 22-6D PBHL 2246'	0.00	0.00	10,022.0	280.5	-29.4	1,590,000.46	2,361,237.62	39.431478	-107.761683
- actual wellpath misses target center by 8826.1ft at 1200.0ft MD (1199.1 TVD, 42.8 N, -4.9 E)									
- Circle (radius 50.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
1,145.0	1,144.1	40.6	-3.9	Last Cathedral Survey @ 1,145' MD	
1,200.0	1,199.1	42.8	-4.9	Projection to Bit @ 1,200'	

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_