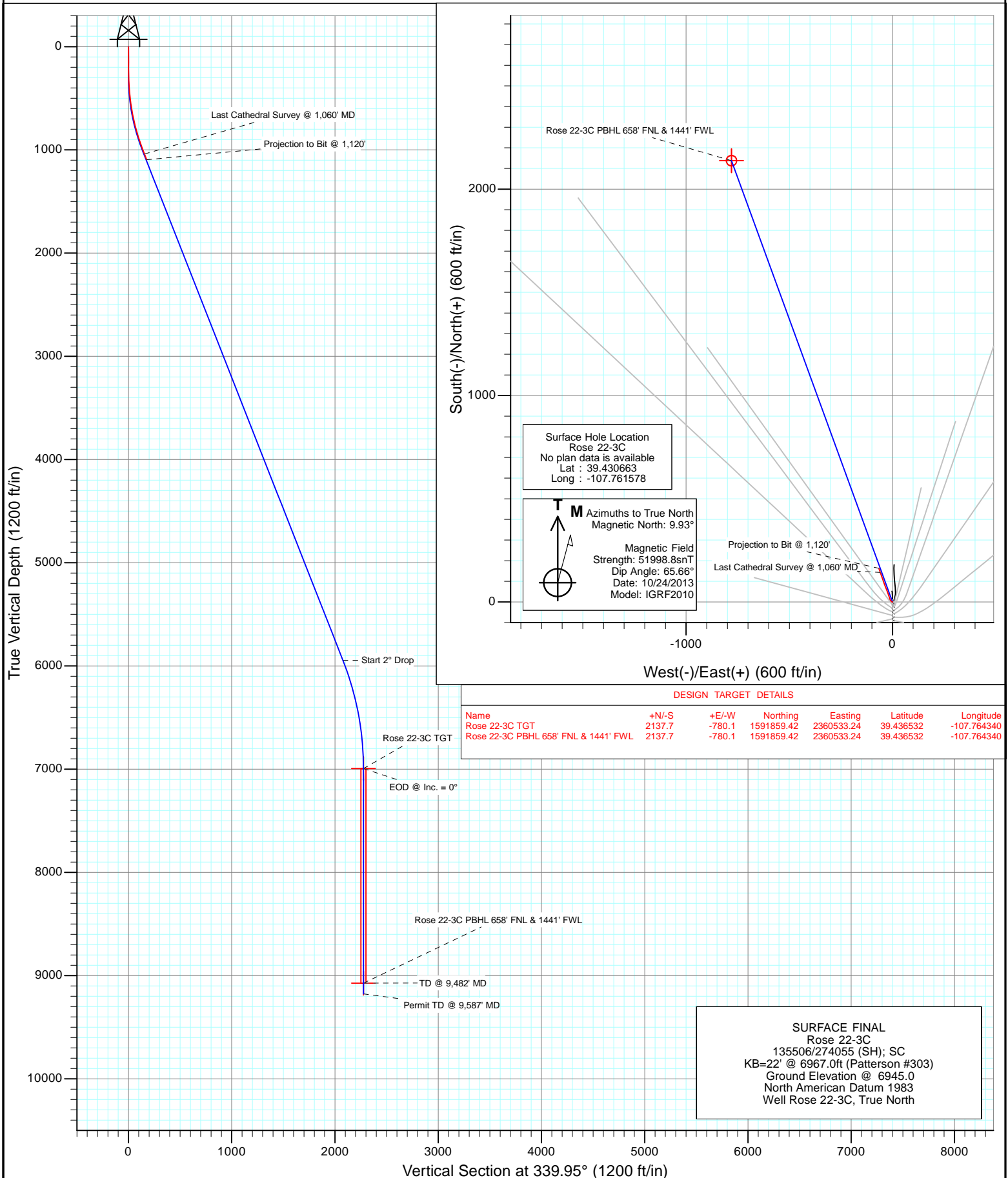




Project: Mamm Creek
Site: K22W Pad
Well: Rose 22-3C
Wellbore: OH
Design: SURFACE FINAL



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Rose 22-3C
Project:	Mamm Creek	TVD Reference:	KB=22' @ 6967.0ft (Patterson #303)
Site:	K22W Pad	MD Reference:	KB=22' @ 6967.0ft (Patterson #303)
Well:	Rose 22-3C	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	SURFACE FINAL	Database:	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 22-3C					
Well Position	+N/-S	0.0 ft	Northing:	1,589,702.94 ft	Latitude:	39.430663
	+E/-W	0.0 ft	Easting:	2,361,259.88 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	10/24/2013	9.93	65.66	51,999

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	339.95

Survey Program		Date	12/16/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
152.0	1,120.0	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	
152.0	0.80	279.90	152.0	0.2	-1.0	0.5	0.53	0.53	
212.0	1.10	257.80	212.0	0.1	-2.0	0.8	0.78	0.50	
242.0	1.40	304.90	242.0	0.3	-2.6	1.2	3.45	1.00	
303.0	2.20	303.00	302.9	1.3	-4.2	2.7	1.31	1.31	
334.0	2.80	310.80	333.9	2.2	-5.3	3.8	2.22	1.94	
364.0	3.70	318.30	363.9	3.4	-6.5	5.4	3.31	3.00	
425.0	4.30	322.30	424.7	6.6	-9.2	9.4	1.08	0.98	
455.0	5.10	329.60	454.6	8.7	-10.5	11.8	3.32	2.67	
486.0	5.80	334.00	485.5	11.3	-11.9	14.7	2.63	2.26	
547.0	7.30	343.40	546.1	17.8	-14.4	21.6	3.01	2.46	
638.0	10.40	342.00	636.0	31.1	-18.6	35.6	3.41	3.41	
668.0	11.60	340.30	665.4	36.5	-20.4	41.3	4.14	4.00	

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Well:	Rose 22-3C	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	SURFACE FINAL	Database:	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
759.0	14.00	339.10	754.2	55.4	-27.4	61.5	2.65	2.64	
851.0	17.10	338.40	842.8	78.4	-36.4	86.1	3.38	3.37	
941.0	19.30	340.90	928.3	104.8	-46.1	114.2	2.59	2.44	
1,060.0	20.70	340.90	1,040.1	143.2	-59.4	154.9	1.18	1.18	Last Cathedral Survey @ 1,060' MD Projection to Bit @ 1,120'
1,120.0	20.70	340.90	1,096.2	163.3	-66.4	176.1	0.00	0.00	

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Rose 22-3C PBHL 658' I	0.00	0.00	9,072.0	2,137.7	-780.1	1,591,859.42	2,360,533.24	39.436532	-107.764340
- hit/miss target									
- actual wellpath misses target center by 8247.5ft at 1120.0ft MD (1096.2 TVD, 163.3 N, -66.4 E)									
- Circle (radius 25.0)									
Rose 22-3C TGT	0.00	0.00	6,994.0	2,137.7	-780.1	1,591,859.42	2,360,533.24	39.436532	-107.764340
- actual wellpath misses target center by 6260.3ft at 1120.0ft MD (1096.2 TVD, 163.3 N, -66.4 E)									
- Point									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
1,060.0	1,040.1	143.2	-59.4	Last Cathedral Survey @ 1,060' MD	
1,120.0	1,096.2	163.3	-66.4	Projection to Bit @ 1,120'	

Checked By: _____ Approved By: _____ Date: _____