

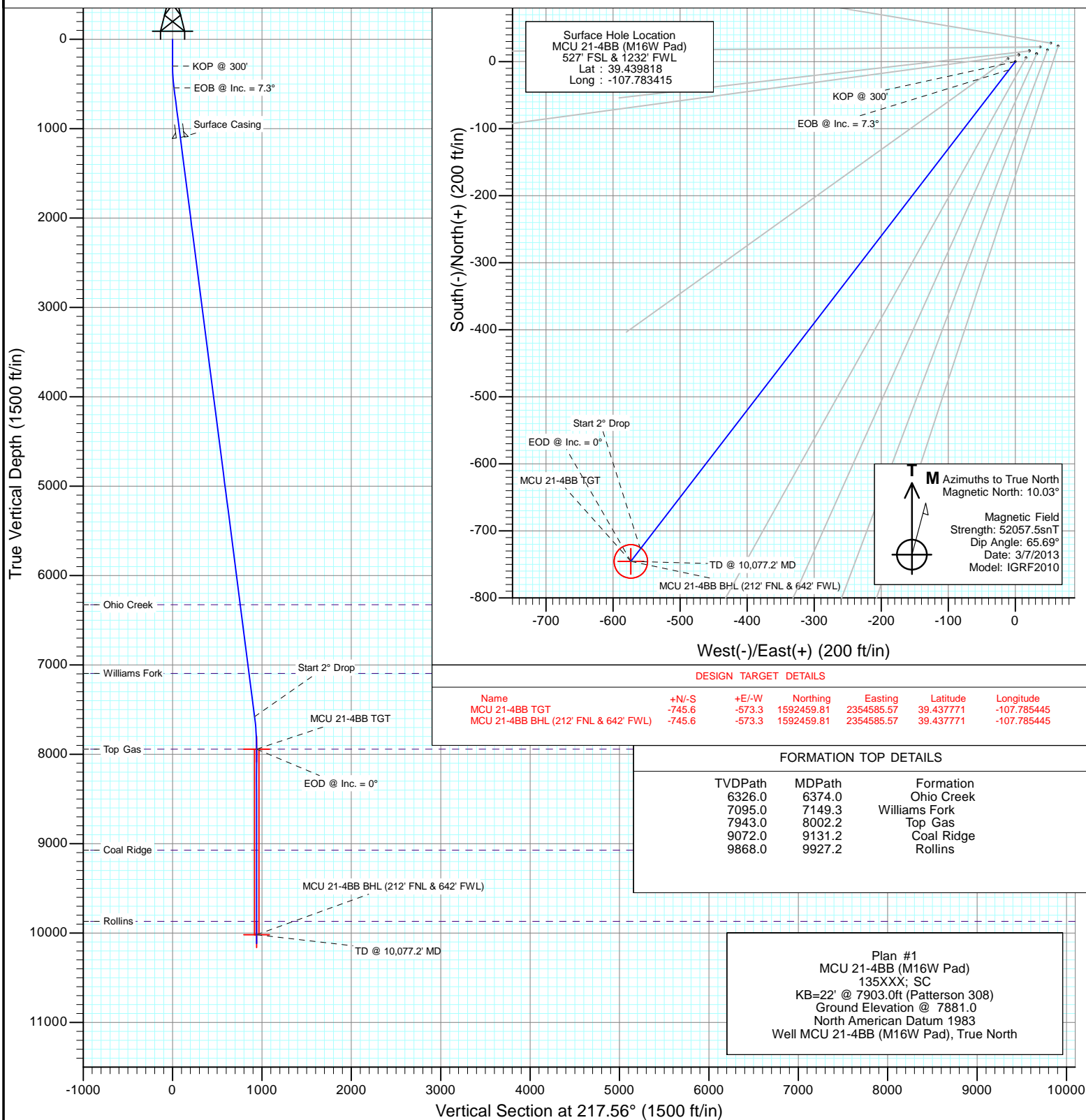


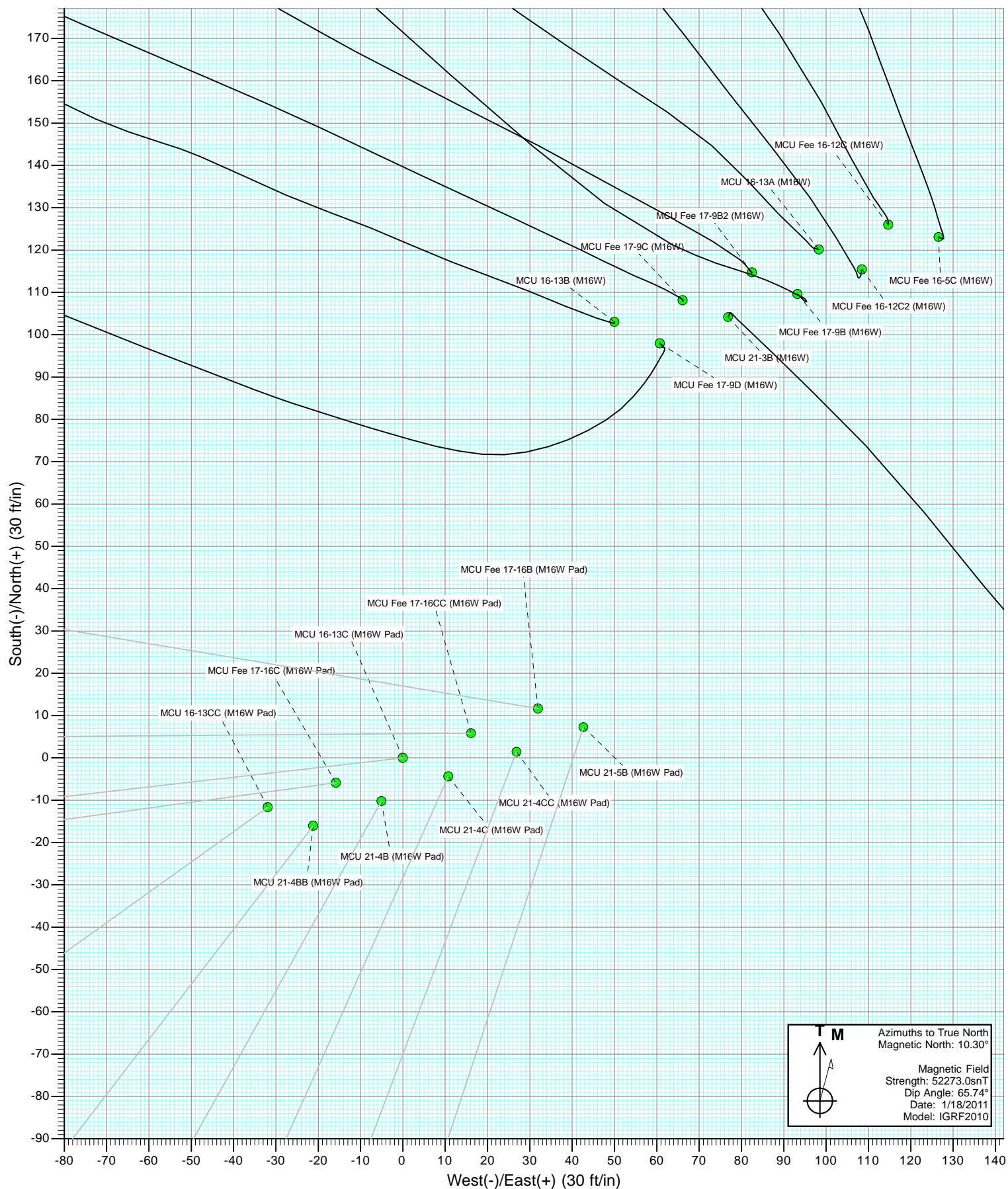
Project: Mamm Creek
Site: M16W Pad (SWSW S16-T7S-R93W)
Well: MCU 21-4BB (M16W Pad)
Wellbore: DD
Design: Plan #1

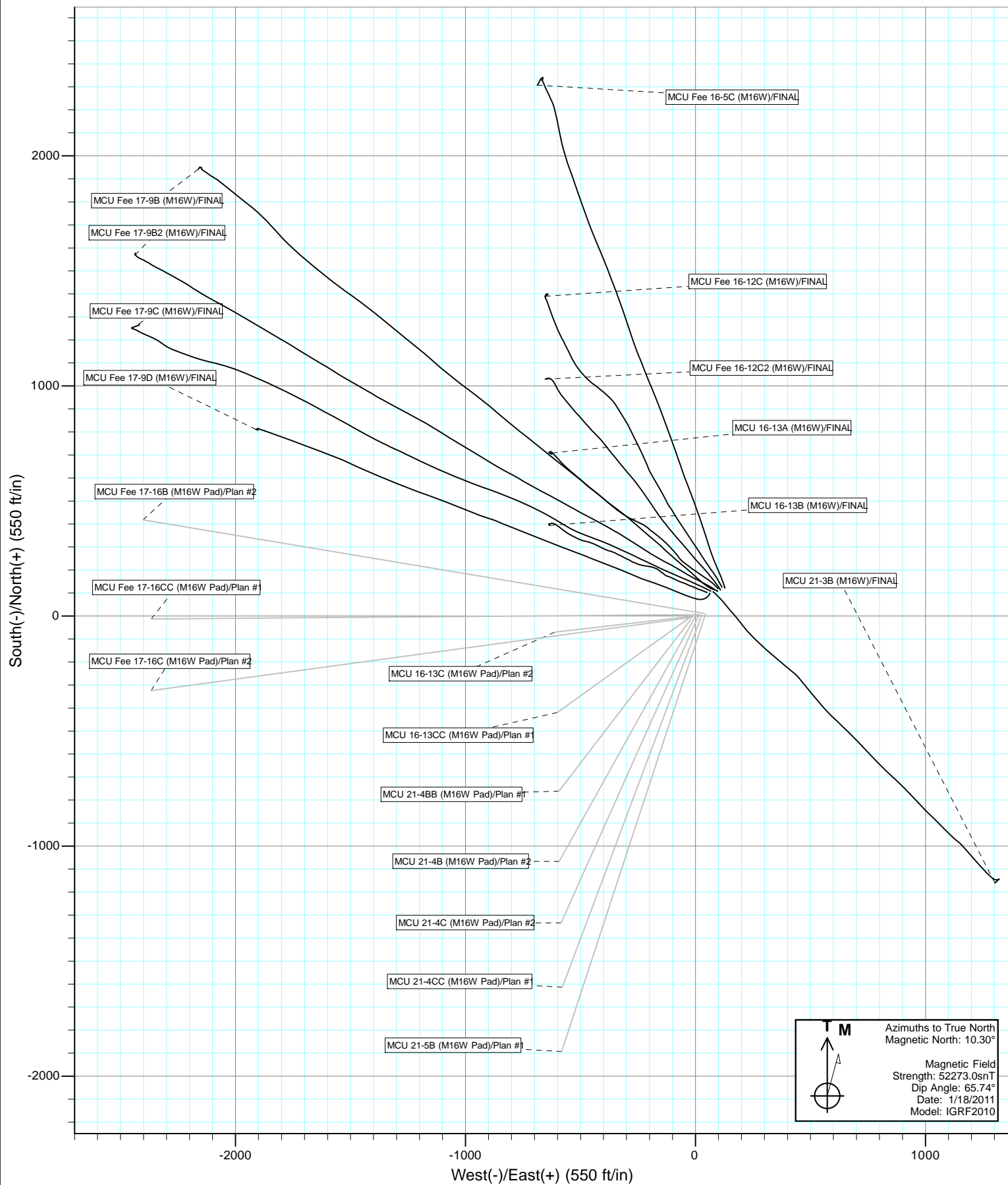


SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	300.0	0.00	0.00	300.0	0.0	0.0	0.00	0.00	0.0	
3	543.5	7.30	217.56	542.8	-12.3	-9.4	3.00	217.56	15.5	
4	7637.0	7.30	217.56	7578.8	-727.1	-559.2	0.00	0.00	917.3	
5	8002.2	0.00	0.00	7943.0	-745.6	-573.3	2.00	180.00	940.5	MCU 21-4BB TGT
6	10077.2	0.00	0.00	10018.0	-745.6	-573.3	0.00	0.00	940.5	MCU 21-4BB BHL (212' FNL & 642' FWL)
7	10177.2	0.00	0.00	10118.0	-745.6	-573.3	0.00	0.00	940.5	

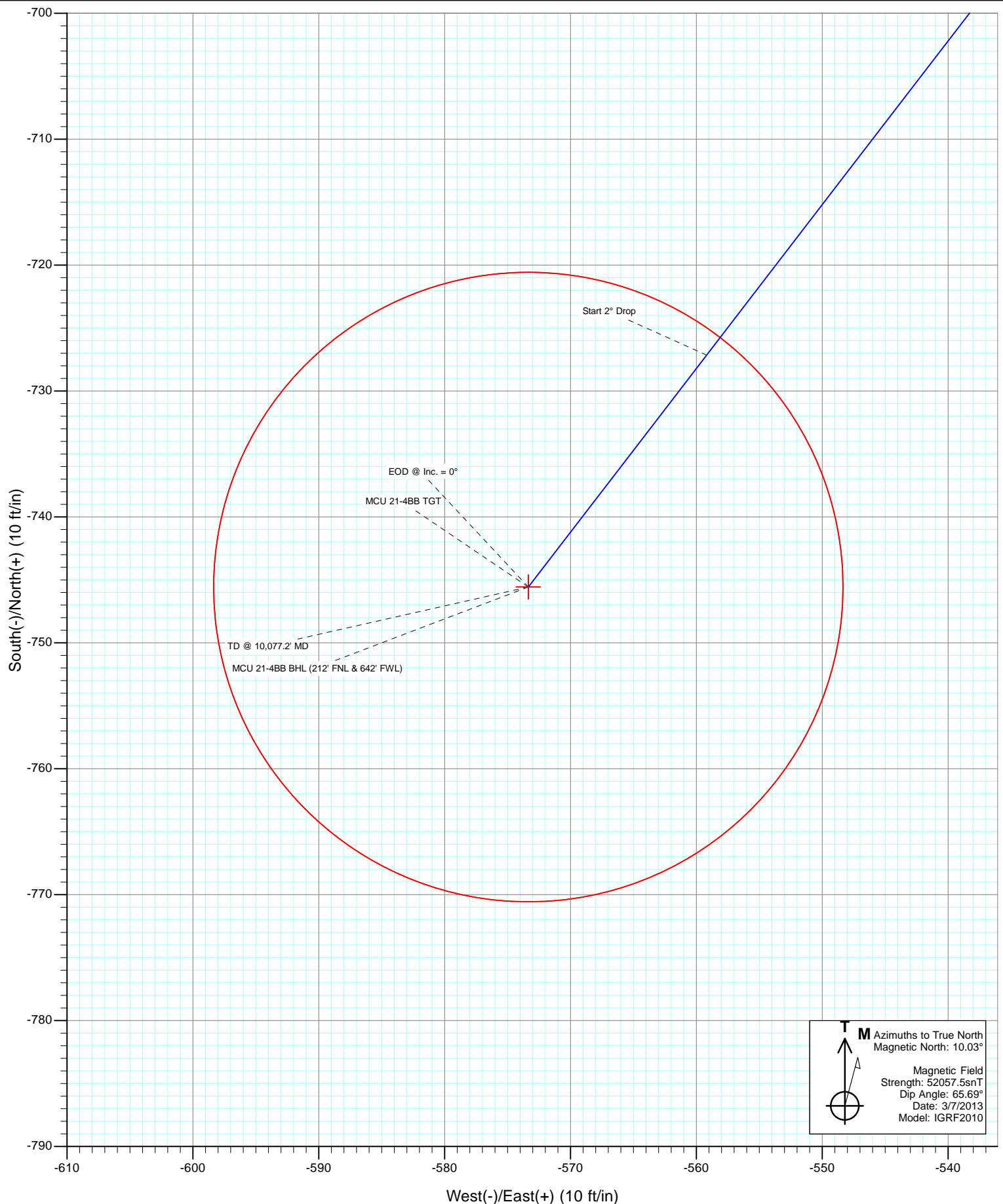








Project: Mamm Creek
Site: M16W Pad (SWSW S16-T7S-R93W)
Well: MCU 21-4BB (M16W Pad)
Wellbore: DD
Design: Plan #1



Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well MCU 21-4BB (M16W Pad)
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	KB=22' @ 7903.0ft (Patterson 308)
Project:	Mamm Creek	MD Reference:	KB=22' @ 7903.0ft (Patterson 308)
Site:	M16W Pad (SWSW S16-T7S-R93W)	North Reference:	True
Well:	MCU 21-4BB (M16W Pad)	Survey Calculation Method:	Minimum Curvature
Wellbore:	DD		
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		M16W Pad (SWSW S16-T7S-R93W)			
Site Position:		Northing:	1,593,196.15 ft	Latitude:	39.439834
From:	Lat/Long	Easting:	2,355,193.71 ft	Longitude:	-107.783358
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.44 °

Well	MCU 21-4BB (M16W Pad)					
Well Position	+N/-S	0.0 ft	Northing:	1,593,190.73 ft	Latitude:	39.439818
	+E/-W	0.0 ft	Easting:	2,355,177.47 ft	Longitude:	-107.783415
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,881.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/7/2013	10.03	65.69	52,057

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	217.56

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	
300.0	0.00	0.00	300.0	0.0	0.0	0.00	0.00	0.00	0.00	
543.5	7.30	217.56	542.8	-12.3	-9.4	3.00	3.00	0.00	217.56	
7,637.0	7.30	217.56	7,578.8	-727.1	-559.2	0.00	0.00	0.00	0.00	
8,002.2	0.00	0.00	7,943.0	-745.6	-573.3	2.00	-2.00	0.00	180.00	MCU 21-4BB TGT
10,077.2	0.00	0.00	10,018.0	-745.6	-573.3	0.00	0.00	0.00	0.00	MCU 21-4BB BHL (21
10,177.2	0.00	0.00	10,118.0	-745.6	-573.3	0.00	0.00	0.00	0.00	

Cathedral Energy Services

Planning Report

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Project:	Mamm Creek	MD Reference:	KB=22' @ 7903.0ft (Patterson 308)
Site:	M16W Pad (SWSW S16-T7S-R93W)	North Reference:	True
Well:	MCU 21-4BB (M16W Pad)	Survey Calculation Method:	Minimum Curvature
Wellbore:	DD		
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	KOP @ 300'
400.0	3.00	217.56	400.0	-2.1	-1.6	2.6	3.00	3.00	
500.0	6.00	217.56	499.6	-8.3	-6.4	10.5	3.00	3.00	
543.5	7.30	217.56	542.8	-12.3	-9.4	15.5	3.00	3.00	EOB @ Inc. = 7.3°
600.0	7.30	217.56	598.9	-18.0	-13.8	22.7	0.00	0.00	
700.0	7.30	217.56	698.1	-28.1	-21.6	35.4	0.00	0.00	
800.0	7.30	217.56	797.3	-38.1	-29.3	48.1	0.00	0.00	
900.0	7.30	217.56	896.4	-48.2	-37.1	60.8	0.00	0.00	
1,000.0	7.30	217.56	995.6	-58.3	-44.8	73.5	0.00	0.00	
1,100.0	7.30	217.56	1,094.8	-68.4	-52.6	86.2	0.00	0.00	
1,105.2	7.30	217.56	1,100.0	-68.9	-53.0	86.9	0.00	0.00	Surface Casing
1,200.0	7.30	217.56	1,194.0	-78.4	-60.3	99.0	0.00	0.00	
1,300.0	7.30	217.56	1,293.2	-88.5	-68.1	111.7	0.00	0.00	
1,400.0	7.30	217.56	1,392.4	-98.6	-75.8	124.4	0.00	0.00	
1,500.0	7.30	217.56	1,491.6	-108.7	-83.6	137.1	0.00	0.00	
1,600.0	7.30	217.56	1,590.8	-118.8	-91.3	149.8	0.00	0.00	
1,700.0	7.30	217.56	1,690.0	-128.8	-99.1	162.5	0.00	0.00	
1,800.0	7.30	217.56	1,789.1	-138.9	-106.8	175.2	0.00	0.00	
1,900.0	7.30	217.56	1,888.3	-149.0	-114.6	188.0	0.00	0.00	
2,000.0	7.30	217.56	1,987.5	-159.1	-122.3	200.7	0.00	0.00	
2,100.0	7.30	217.56	2,086.7	-169.1	-130.1	213.4	0.00	0.00	
2,200.0	7.30	217.56	2,185.9	-179.2	-137.8	226.1	0.00	0.00	
2,300.0	7.30	217.56	2,285.1	-189.3	-145.6	238.8	0.00	0.00	
2,400.0	7.30	217.56	2,384.3	-199.4	-153.3	251.5	0.00	0.00	
2,500.0	7.30	217.56	2,483.5	-209.5	-161.1	264.2	0.00	0.00	
2,600.0	7.30	217.56	2,582.7	-219.5	-168.8	276.9	0.00	0.00	
2,700.0	7.30	217.56	2,681.8	-229.6	-176.6	289.7	0.00	0.00	
2,800.0	7.30	217.56	2,781.0	-239.7	-184.3	302.4	0.00	0.00	
2,900.0	7.30	217.56	2,880.2	-249.8	-192.1	315.1	0.00	0.00	
3,000.0	7.30	217.56	2,979.4	-259.8	-199.8	327.8	0.00	0.00	
3,100.0	7.30	217.56	3,078.6	-269.9	-207.6	340.5	0.00	0.00	
3,200.0	7.30	217.56	3,177.8	-280.0	-215.3	353.2	0.00	0.00	
3,300.0	7.30	217.56	3,277.0	-290.1	-223.1	365.9	0.00	0.00	
3,400.0	7.30	217.56	3,376.2	-300.2	-230.8	378.6	0.00	0.00	
3,500.0	7.30	217.56	3,475.4	-310.2	-238.6	391.4	0.00	0.00	
3,600.0	7.30	217.56	3,574.5	-320.3	-246.3	404.1	0.00	0.00	
3,700.0	7.30	217.56	3,673.7	-330.4	-254.1	416.8	0.00	0.00	
3,800.0	7.30	217.56	3,772.9	-340.5	-261.8	429.5	0.00	0.00	
3,900.0	7.30	217.56	3,872.1	-350.5	-269.6	442.2	0.00	0.00	
4,000.0	7.30	217.56	3,971.3	-360.6	-277.3	454.9	0.00	0.00	
4,100.0	7.30	217.56	4,070.5	-370.7	-285.1	467.6	0.00	0.00	
4,200.0	7.30	217.56	4,169.7	-380.8	-292.8	480.3	0.00	0.00	
4,300.0	7.30	217.56	4,268.9	-390.9	-300.6	493.1	0.00	0.00	
4,400.0	7.30	217.56	4,368.1	-400.9	-308.3	505.8	0.00	0.00	
4,500.0	7.30	217.56	4,467.2	-411.0	-316.1	518.5	0.00	0.00	
4,600.0	7.30	217.56	4,566.4	-421.1	-323.8	531.2	0.00	0.00	
4,700.0	7.30	217.56	4,665.6	-431.2	-331.6	543.9	0.00	0.00	
4,800.0	7.30	217.56	4,764.8	-441.2	-339.3	556.6	0.00	0.00	
4,900.0	7.30	217.56	4,864.0	-451.3	-347.1	569.3	0.00	0.00	

Cathedral Energy Services

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Project:	Mamm Creek	MD Reference:	KB=22' @ 7903.0ft (Patterson 308)
Site:	M16W Pad (SWSW S16-T7S-R93W)	North Reference:	True
Well:	MCU 21-4BB (M16W Pad)	Survey Calculation Method:	Minimum Curvature
Wellbore:	DD		
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	7.30	217.56	4,963.2	-461.4	-354.8	582.0	0.00	0.00	
5,100.0	7.30	217.56	5,062.4	-471.5	-362.6	594.8	0.00	0.00	
5,200.0	7.30	217.56	5,161.6	-481.6	-370.3	607.5	0.00	0.00	
5,300.0	7.30	217.56	5,260.7	-491.6	-378.1	620.2	0.00	0.00	
5,400.0	7.30	217.56	5,359.9	-501.7	-385.8	632.9	0.00	0.00	
5,500.0	7.30	217.56	5,459.1	-511.8	-393.6	645.6	0.00	0.00	
5,600.0	7.30	217.56	5,558.3	-521.9	-401.3	658.3	0.00	0.00	
5,700.0	7.30	217.56	5,657.5	-531.9	-409.1	671.0	0.00	0.00	
5,800.0	7.30	217.56	5,756.7	-542.0	-416.8	683.7	0.00	0.00	
5,900.0	7.30	217.56	5,855.9	-552.1	-424.6	696.5	0.00	0.00	
6,000.0	7.30	217.56	5,955.1	-562.2	-432.3	709.2	0.00	0.00	
6,100.0	7.30	217.56	6,054.3	-572.2	-440.1	721.9	0.00	0.00	
6,200.0	7.30	217.56	6,153.4	-582.3	-447.8	734.6	0.00	0.00	
6,300.0	7.30	217.56	6,252.6	-592.4	-455.6	747.3	0.00	0.00	
6,374.0	7.30	217.56	6,326.0	-599.9	-461.3	756.7	0.00	0.00	Ohio Creek
6,400.0	7.30	217.56	6,351.8	-602.5	-463.3	760.0	0.00	0.00	
6,500.0	7.30	217.56	6,451.0	-612.6	-471.1	772.7	0.00	0.00	
6,600.0	7.30	217.56	6,550.2	-622.6	-478.8	785.5	0.00	0.00	
6,700.0	7.30	217.56	6,649.4	-632.7	-486.6	798.2	0.00	0.00	
6,800.0	7.30	217.56	6,748.6	-642.8	-494.3	810.9	0.00	0.00	
6,900.0	7.30	217.56	6,847.8	-652.9	-502.1	823.6	0.00	0.00	
7,000.0	7.30	217.56	6,947.0	-662.9	-509.8	836.3	0.00	0.00	
7,100.0	7.30	217.56	7,046.1	-673.0	-517.6	849.0	0.00	0.00	
7,149.3	7.30	217.56	7,095.0	-678.0	-521.4	855.3	0.00	0.00	Williams Fork
7,200.0	7.30	217.56	7,145.3	-683.1	-525.3	861.7	0.00	0.00	
7,300.0	7.30	217.56	7,244.5	-693.2	-533.1	874.4	0.00	0.00	
7,400.0	7.30	217.56	7,343.7	-703.3	-540.8	887.2	0.00	0.00	
7,500.0	7.30	217.56	7,442.9	-713.3	-548.6	899.9	0.00	0.00	
7,600.0	7.30	217.56	7,542.1	-723.4	-556.3	912.6	0.00	0.00	
7,637.0	7.30	217.56	7,578.8	-727.1	-559.2	917.3	0.00	0.00	Start 2° Drop
7,700.0	6.04	217.56	7,641.4	-732.9	-563.6	924.6	2.00	-2.00	
7,800.0	4.04	217.56	7,741.0	-739.9	-569.0	933.4	2.00	-2.00	
7,900.0	2.04	217.56	7,840.8	-744.1	-572.2	938.7	2.00	-2.00	
8,002.2	0.00	0.00	7,943.0	-745.6	-573.3	940.5	2.00	-2.00	EOD @ Inc. = 0° - Top Gas
8,100.0	0.00	0.00	8,040.8	-745.6	-573.3	940.5	0.00	0.00	
8,200.0	0.00	0.00	8,140.8	-745.6	-573.3	940.5	0.00	0.00	
8,300.0	0.00	0.00	8,240.8	-745.6	-573.3	940.5	0.00	0.00	
8,400.0	0.00	0.00	8,340.8	-745.6	-573.3	940.5	0.00	0.00	
8,500.0	0.00	0.00	8,440.8	-745.6	-573.3	940.5	0.00	0.00	
8,600.0	0.00	0.00	8,540.8	-745.6	-573.3	940.5	0.00	0.00	
8,700.0	0.00	0.00	8,640.8	-745.6	-573.3	940.5	0.00	0.00	
8,800.0	0.00	0.00	8,740.8	-745.6	-573.3	940.5	0.00	0.00	
8,900.0	0.00	0.00	8,840.8	-745.6	-573.3	940.5	0.00	0.00	
9,000.0	0.00	0.00	8,940.8	-745.6	-573.3	940.5	0.00	0.00	
9,100.0	0.00	0.00	9,040.8	-745.6	-573.3	940.5	0.00	0.00	
9,131.2	0.00	0.00	9,072.0	-745.6	-573.3	940.5	0.00	0.00	Coal Ridge
9,200.0	0.00	0.00	9,140.8	-745.6	-573.3	940.5	0.00	0.00	
9,300.0	0.00	0.00	9,240.8	-745.6	-573.3	940.5	0.00	0.00	
9,400.0	0.00	0.00	9,340.8	-745.6	-573.3	940.5	0.00	0.00	
9,500.0	0.00	0.00	9,440.8	-745.6	-573.3	940.5	0.00	0.00	
9,600.0	0.00	0.00	9,540.8	-745.6	-573.3	940.5	0.00	0.00	
9,700.0	0.00	0.00	9,640.8	-745.6	-573.3	940.5	0.00	0.00	

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Well:	MCU 21-4BB (M16W Pad)	Survey Calculation Method:	Minimum Curvature
Wellbore:	DD		
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
9,800.0	0.00	0.00	9,740.8	-745.6	-573.3	940.5	0.00	0.00	
9,900.0	0.00	0.00	9,840.8	-745.6	-573.3	940.5	0.00	0.00	
9,927.2	0.00	0.00	9,868.0	-745.6	-573.3	940.5	0.00	0.00	Rollins
10,000.0	0.00	0.00	9,940.8	-745.6	-573.3	940.5	0.00	0.00	
10,077.2	0.00	0.00	10,018.0	-745.6	-573.3	940.5	0.00	0.00	TD @ 10,077.2' MD
10,100.0	0.00	0.00	10,040.8	-745.6	-573.3	940.5	0.00	0.00	
10,177.2	0.00	0.00	10,118.0	-745.6	-573.3	940.5	0.00	0.00	Permit TD @ 10,177.2' 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									
MCU 21-4BB BHL (212' - plan hits target center - Circle (radius 25.0))	0.00	0.00	10,018.0	-745.6	-573.3	1,592,459.81	2,354,585.57	39.437771	-107.785445
MCU 21-4BB TGT - plan hits target center - Point	0.00	0.00	7,943.0	-745.6	-573.3	1,592,459.81	2,354,585.57	39.437771	-107.785445

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)	
1,105.2	1,100.0	Surface Casing			

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
6,374.0	6,326.0	Ohio Creek			
7,149.3	7,095.0	Williams Fork			
8,002.2	7,943.0	Top Gas			
9,131.2	9,072.0	Coal Ridge			
9,927.2	9,868.0	Rollins			

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment	
300.0	300.0	0.0	0.0	KOP @ 300'	
543.5	542.8	-12.3	-9.4	EOB @ Inc. = 7.3°	
7,637.0	7,578.8	-727.1	-559.2	Start 2° Drop	
8,002.2	7,943.0	-745.6	-573.3	EOD @ Inc. = 0°	
10,077.2	10,018.0	-745.6	-573.3	TD @ 10,077.2' MD	
10,177.2	10,118.0	-745.6	-573.3	Permit TD @ 10,177.2' MD	