

FORMATION TOP DETAILS

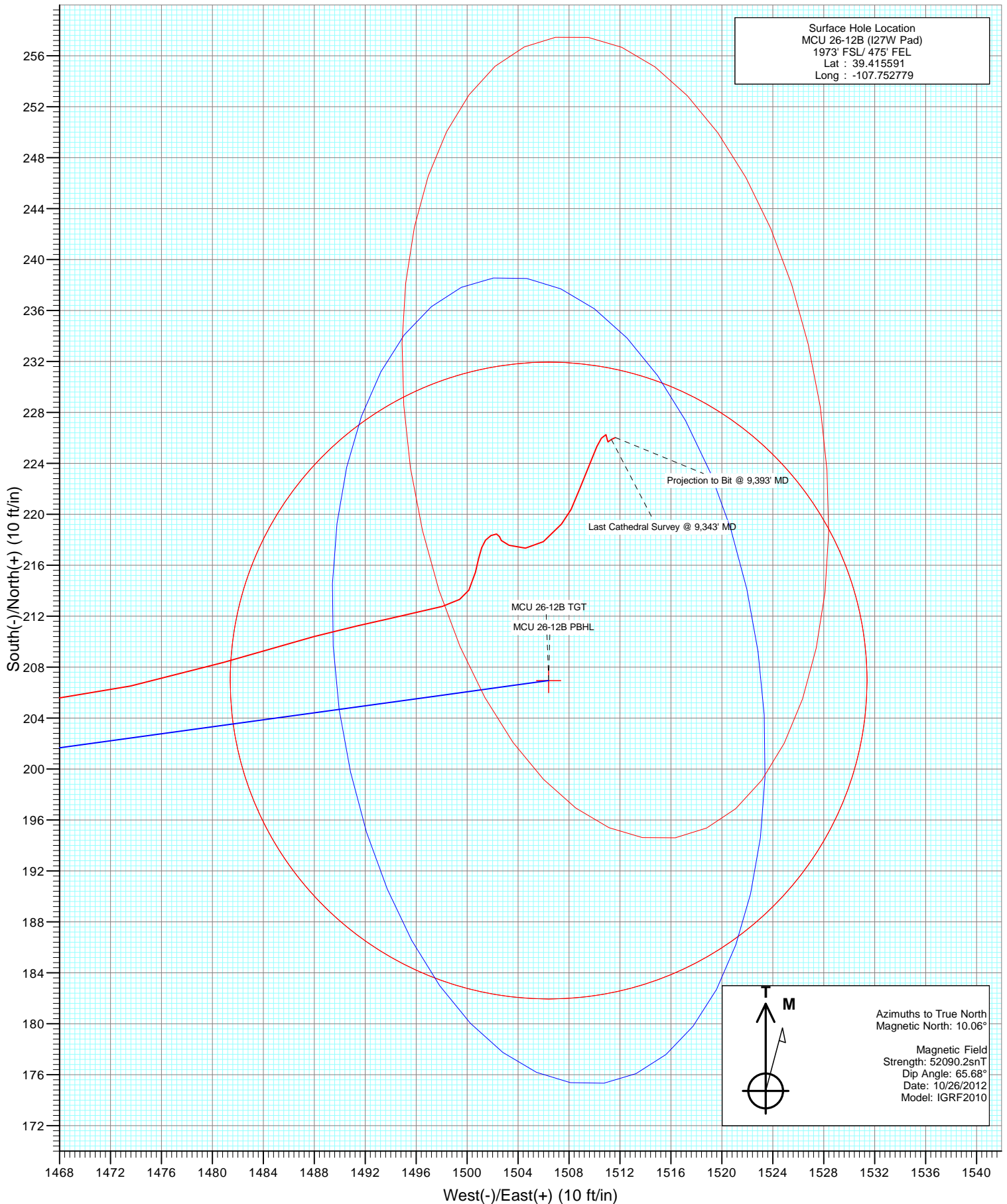
No formation data is available



Azimuths to True North
Magnetic North: 10.06°

Magnetic Field
Strength: 52090.2snT
Dip Angle: 65.68°
Date: 10/26/2012
Model: IGRF2010

FINAL MCU 26-12B (I27W Pad) 125583; 196855; DN					
KBE @ 7223.0ft (Nabors M15) North American Datum 1983 Well MCU 26-12B (I27W Pad), True North					
Target		Azimuth	Origin Type	N/S	E/W
No Target (Freehand)		82.77	Slot	0.0	0.0
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
MCU 26-12B TGT	7150.0	206.9	1506.4	39.416159	-107.747447
MCU 26-12B PBHL	9210.0	206.9	1506.4	39.416159	-107.747447



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Site I27W
Project:	Mamm Creek	TVD Reference:	KBE @ 7223.0ft (Nabors M15)
Site:	I27W	MD Reference:	KBE @ 7223.0ft (Nabors M15)
Well:	MCU 26-12B (I27W Pad)	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	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		I27W			
Site Position:		Northing:	1,584,160.49 ft	Latitude:	39.415612
From:	Lat/Long	Easting:	2,363,622.14 ft	Longitude:	-107.752731
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.42 °

Well	MCU 26-12B (I27W Pad)					
Well Position	+N/-S	-7.7 ft	Northing:	1,584,153.16 ft	Latitude:	39.415591
	+E/-W	-13.6 ft	Easting:	2,363,608.39 ft	Longitude:	-107.752779
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,201.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/26/2012	10.06	65.68	52,090

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	-7.7	-13.6	82.77	

Survey Program	Date	11/9/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
154.0	9,393.0	Survey #1 (DD)	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	-7.7	-13.6	0.0	0.00	0.00		
154.0	0.30	225.30	154.0	-8.0	-13.8	-0.3	0.19	0.19		
184.0	0.20	203.40	184.0	-8.1	-13.9	-0.4	0.46	-0.33		
215.0	0.10	278.50	215.0	-8.1	-14.0	-0.5	0.64	-0.32		
245.0	0.70	111.10	245.0	-8.2	-13.8	-0.3	2.66	2.00		
276.0	2.00	93.90	276.0	-8.3	-13.1	0.4	4.35	4.19		
306.0	3.20	100.10	306.0	-8.4	-11.8	1.7	4.10	4.00		
336.0	4.00	97.40	335.9	-8.7	-9.9	3.5	2.73	2.67		
367.0	5.60	95.90	366.8	-9.0	-7.3	6.0	5.18	5.16		
397.0	6.60	89.00	396.6	-9.1	-4.1	9.2	4.13	3.33		
489.0	9.20	85.60	487.7	-8.5	8.5	21.8	2.87	2.83		
581.0	12.40	78.80	578.1	-6.0	25.5	39.0	3.74	3.48		
672.0	13.50	80.00	666.8	-2.3	45.5	59.3	1.24	1.21		

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Site:	I27W	MD Reference:	KBE @ 7223.0ft (Nabors M15)
Well:	MCU 26-12B (I27W Pad)	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	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
763.0	14.20	78.30	755.1	1.8	66.9	81.1	0.89	0.77	
854.0	13.30	83.10	843.5	5.4	88.3	102.7	1.60	-0.99	
946.0	13.70	83.10	933.0	7.9	109.6	124.1	0.43	0.43	
1,039.0	13.90	83.50	1,023.3	10.5	131.6	146.3	0.24	0.22	
1,135.0	13.90	81.80	1,116.5	13.5	154.5	169.4	0.43	0.00	
1,230.0	14.10	79.40	1,208.7	17.2	177.2	192.3	0.65	0.21	
1,326.0	14.00	78.60	1,301.8	21.7	200.0	215.6	0.23	-0.10	
1,420.0	12.70	82.70	1,393.3	25.2	221.4	237.3	1.71	-1.38	
1,430.0	12.60	83.60	1,403.0	25.5	223.6	239.5	2.21	-1.00	
1,548.0	12.70	81.70	1,518.2	28.8	249.2	265.3	0.36	0.08	
1,643.0	14.10	81.60	1,610.6	32.0	271.0	287.3	1.47	1.47	
1,739.0	14.50	81.00	1,703.6	35.6	294.4	311.0	0.44	0.42	
1,834.0	15.10	81.20	1,795.4	39.4	318.4	335.3	0.63	0.63	
1,929.0	14.00	83.20	1,887.4	42.6	342.1	359.1	1.27	-1.16	
2,024.0	14.30	82.90	1,979.5	45.4	365.1	382.3	0.33	0.32	
2,120.0	14.40	83.40	2,072.5	48.3	388.7	406.1	0.17	0.10	
2,215.0	14.30	83.60	2,164.6	50.9	412.1	429.7	0.12	-0.11	
2,310.0	14.40	78.60	2,256.6	54.6	435.4	453.2	1.31	0.11	
2,405.0	14.40	79.80	2,348.6	59.0	458.6	476.8	0.31	0.00	
2,501.0	13.20	82.70	2,441.8	62.5	481.2	499.7	1.44	-1.25	
2,596.0	13.10	83.10	2,534.3	65.2	502.6	521.3	0.14	-0.11	
2,692.0	13.00	82.10	2,627.9	68.0	524.1	542.9	0.26	-0.10	
2,788.0	13.20	82.70	2,721.4	70.8	545.7	564.7	0.25	0.21	
2,882.0	13.00	82.80	2,812.9	73.5	566.8	586.0	0.21	-0.21	
2,978.0	12.80	83.20	2,906.5	76.1	588.1	607.4	0.23	-0.21	
3,073.0	13.70	84.70	2,999.0	78.4	609.8	629.2	1.01	0.95	
3,169.0	13.90	82.20	3,092.2	81.0	632.5	652.1	0.66	0.21	
3,264.0	13.80	80.60	3,184.4	84.4	655.0	674.8	0.42	-0.11	
3,359.0	13.70	80.40	3,276.7	88.2	677.3	697.4	0.12	-0.11	
3,454.0	13.20	80.90	3,369.1	91.8	699.1	719.5	0.54	-0.53	
3,549.0	13.80	82.40	3,461.5	95.0	721.0	741.6	0.73	0.63	
3,645.0	13.20	82.40	3,554.8	97.9	743.2	764.1	0.62	-0.62	
3,740.0	14.10	84.20	3,647.2	100.5	765.5	786.5	1.05	0.95	
3,834.0	14.20	83.10	3,738.3	103.1	788.3	809.4	0.31	0.11	
3,929.0	14.10	83.40	3,830.4	105.8	811.4	832.7	0.13	-0.11	
4,024.0	14.00	83.90	3,922.6	108.4	834.3	855.7	0.17	-0.11	
4,120.0	14.20	84.50	4,015.7	110.7	857.6	879.1	0.26	0.21	
4,215.0	13.50	81.70	4,107.9	113.4	880.1	901.8	1.02	-0.74	
4,310.0	13.20	81.40	4,200.4	116.7	901.8	923.8	0.32	-0.32	
4,406.0	13.20	81.30	4,293.8	120.0	923.5	945.7	0.02	0.00	
4,502.0	12.80	81.80	4,387.4	123.1	944.9	967.3	0.43	-0.42	
4,597.0	14.10	83.50	4,479.8	125.9	966.8	989.4	1.43	1.37	
4,692.0	14.10	82.60	4,571.9	128.7	989.8	1,012.5	0.23	0.00	
4,788.0	13.80	82.40	4,665.1	131.8	1,012.7	1,035.7	0.32	-0.31	
4,883.0	13.70	81.90	4,757.3	134.9	1,035.1	1,058.2	0.16	-0.11	
4,978.0	13.50	81.00	4,849.7	138.2	1,057.2	1,080.6	0.31	-0.21	
5,072.0	13.10	81.00	4,941.2	141.6	1,078.5	1,102.2	0.43	-0.43	
5,168.0	13.40	82.20	5,034.6	144.8	1,100.3	1,124.2	0.42	0.31	
5,262.0	13.00	81.10	5,126.1	147.9	1,121.5	1,145.6	0.50	-0.43	
5,357.0	12.60	81.30	5,218.7	151.1	1,142.3	1,166.7	0.42	-0.42	
5,452.0	14.40	83.00	5,311.1	154.1	1,164.3	1,188.9	1.94	1.89	
5,548.0	14.40	83.70	5,404.1	156.9	1,188.0	1,212.7	0.18	0.00	
5,643.0	14.10	84.60	5,496.2	159.3	1,211.3	1,236.1	0.39	-0.32	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Site I27W
Project:	Mamm Creek	TVD Reference:	KBE @ 7223.0ft (Nabors M15)
Site:	I27W	MD Reference:	KBE @ 7223.0ft (Nabors M15)
Well:	MCU 26-12B (I27W Pad)	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	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
5,738.0	14.10	83.70	5,588.3	161.6	1,234.3	1,259.2	0.23	0.00	
5,833.0	13.50	79.90	5,680.6	164.8	1,256.7	1,281.9	1.14	-0.63	
5,928.0	13.30	80.70	5,773.0	168.5	1,278.4	1,303.9	0.29	-0.21	
6,023.0	13.00	79.60	5,865.5	172.2	1,299.7	1,325.5	0.41	-0.32	
6,119.0	12.60	78.90	5,959.1	176.2	1,320.6	1,346.7	0.45	-0.42	
6,213.0	11.30	77.50	6,051.1	180.2	1,339.7	1,366.1	1.42	-1.38	
6,309.0	10.50	80.50	6,145.3	183.6	1,357.5	1,384.2	1.02	-0.83	
6,404.0	9.90	81.90	6,238.8	186.2	1,374.1	1,401.0	0.68	-0.63	
6,500.0	9.50	80.50	6,333.5	188.7	1,390.1	1,417.2	0.48	-0.42	
6,595.0	8.10	81.30	6,427.3	191.0	1,404.4	1,431.7	1.48	-1.47	
6,691.0	7.30	83.10	6,522.5	192.8	1,417.2	1,444.6	0.87	-0.83	
6,786.0	5.90	83.40	6,616.8	194.0	1,428.0	1,455.5	1.47	-1.47	
6,881.0	4.70	81.20	6,711.4	195.2	1,436.7	1,464.3	1.28	-1.26	
6,976.0	4.90	81.00	6,806.1	196.4	1,444.6	1,472.2	0.21	0.21	
7,071.0	4.70	82.30	6,900.8	197.6	1,452.4	1,480.2	0.24	-0.21	
7,166.0	4.60	78.80	6,995.5	198.9	1,460.0	1,487.8	0.32	-0.11	
7,262.0	4.40	72.60	7,091.2	200.7	1,467.3	1,495.3	0.55	-0.21	
7,322.5	4.46	74.46	7,151.5	202.0	1,471.8	1,499.9	0.26	0.10	MCU 26-12B TGT
7,357.0	4.50	75.50	7,185.9	202.7	1,474.4	1,502.6	0.26	0.11	
7,453.0	2.90	78.40	7,281.7	204.2	1,480.4	1,508.8	1.68	-1.67	
7,549.0	2.10	74.90	7,377.6	205.1	1,484.5	1,512.9	0.85	-0.83	
7,644.0	1.10	25.80	7,472.5	206.4	1,486.6	1,515.1	1.70	-1.05	
7,740.0	0.70	12.00	7,568.5	207.8	1,487.1	1,515.8	0.47	-0.42	
7,835.0	0.60	13.40	7,663.5	208.8	1,487.3	1,516.2	0.11	-0.11	
7,930.0	0.50	20.30	7,758.5	209.7	1,487.6	1,516.6	0.13	-0.11	
8,026.0	0.30	35.60	7,854.5	210.3	1,487.9	1,516.9	0.23	-0.21	
8,121.0	0.40	59.50	7,949.5	210.7	1,488.3	1,517.4	0.18	0.11	
8,217.0	0.20	109.10	8,045.5	210.8	1,488.8	1,517.9	0.32	-0.21	
8,312.0	0.20	154.30	8,140.5	210.6	1,489.0	1,518.1	0.16	0.00	
8,407.0	0.20	155.80	8,235.5	210.3	1,489.1	1,518.2	0.01	0.00	
8,503.0	0.70	113.00	8,331.5	209.9	1,489.7	1,518.7	0.59	0.52	
8,598.0	0.90	90.00	8,426.5	209.7	1,491.0	1,520.0	0.39	0.21	
8,694.0	1.00	51.80	8,522.5	210.2	1,492.4	1,521.4	0.66	0.10	
8,789.0	1.40	41.90	8,617.5	211.6	1,493.9	1,523.0	0.47	0.42	
8,884.0	2.50	19.10	8,712.4	214.4	1,495.3	1,524.8	1.40	1.16	
8,980.0	1.70	26.30	8,808.4	217.6	1,496.6	1,526.5	0.88	-0.83	
9,075.0	0.40	163.00	8,903.4	218.6	1,497.3	1,527.4	2.12	-1.37	
9,171.0	0.20	172.80	8,999.4	218.1	1,497.5	1,527.4	0.21	-0.21	
9,266.0	0.10	17.30	9,094.4	218.0	1,497.5	1,527.5	0.31	-0.11	
9,343.0	0.40	63.10	9,171.3	218.2	1,497.8	1,527.7	0.44	0.39	Last Cathedral Survey @ 9,343' MD
9,381.6	0.40	63.10	9,209.9	218.3	1,498.0	1,528.0	0.00	0.00	MCU 26-12B PBHL
9,393.0	0.40	63.10	9,221.3	218.4	1,498.1	1,528.1	0.00	0.00	Projection to Bit @ 9,393' MD

Cathedral Energy Services

Survey Report

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Project:	Mamm Creek	TVD Reference:	KBE @ 7223.0ft (Nabors M15)
Site:	I27W	MD Reference:	KBE @ 7223.0ft (Nabors M15)
Well:	MCU 26-12B (I27W Pad)	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
MCU 26-12B TGT	0.00	358.58	7,150.0	199.3	1,492.8	1,584,322.69	2,365,119.46	39.416159	-107.747447
- actual wellpath misses target center by 21.3ft at 7322.6ft MD (7151.5 TVD, 202.0 N, 1471.8 E)									
- Point									
MCU 26-12B PBHL	0.00	358.58	9,210.0	199.3	1,492.8	1,584,322.69	2,365,119.46	39.416159	-107.747447
- actual wellpath misses target center by 19.7ft at 9381.6ft MD (9209.9 TVD, 218.3 N, 1498.0 E)									
- Circle (radius 25.0)									

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S	+E/-W		
		(ft)	(ft)	Comment	
9,343.0	9,171.3	218.2	1,497.8	Last Cathedral Survey @ 9,343' MD	
9,393.0	9,221.3	218.4	1,498.1	Projection to Bit @ 9,393' MD	

Checked By: _____ Approved By: _____ Date: _____