

Azimuths to True North
Magnetic North: 10.02°

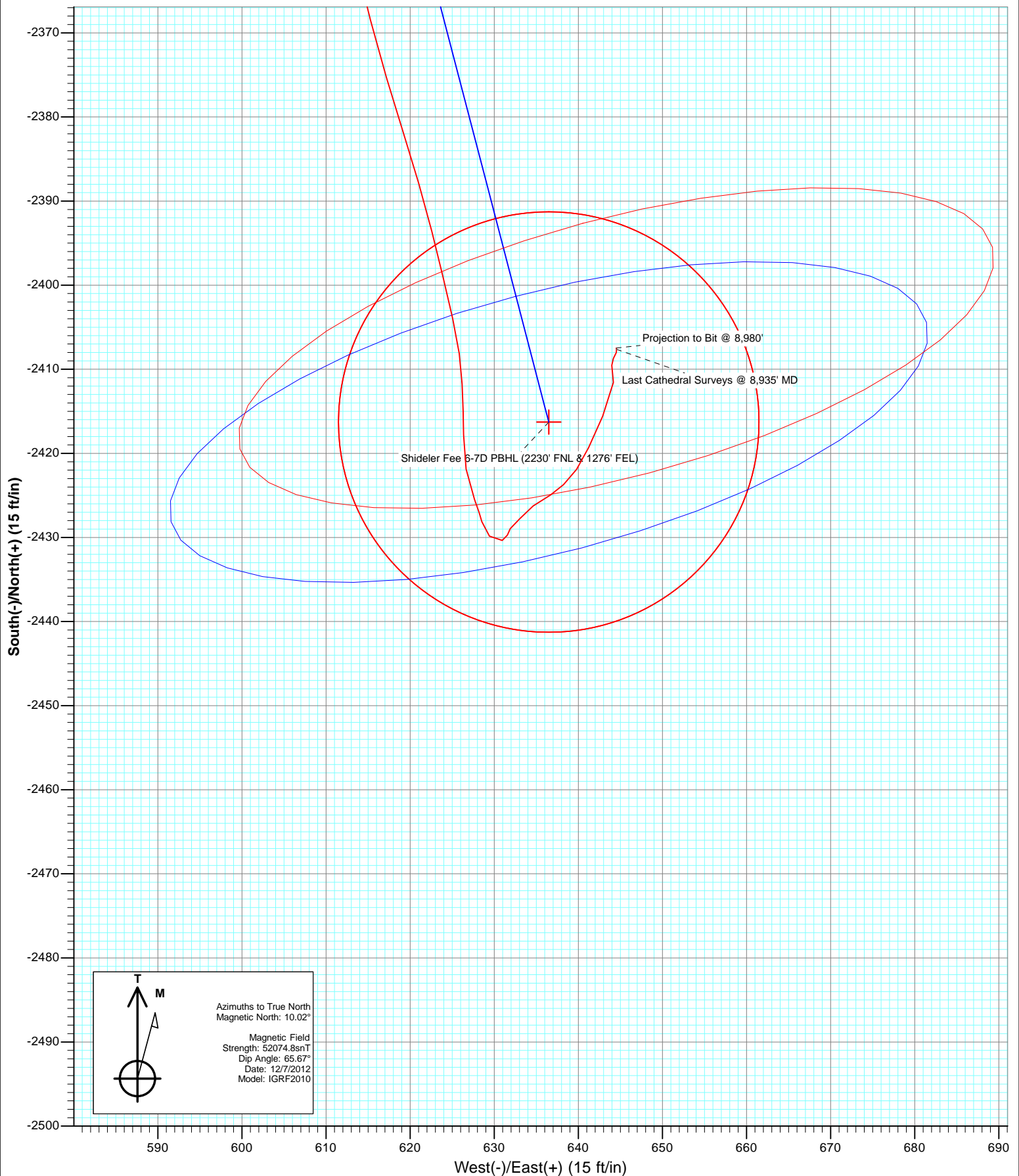
Magnetic Field
Strength: 52074.8snT
Dip Angle: 65.67°
Date: 12/7/2012
Model: IGRF2010

DESIGN DETAILS: DD

125635/207455 (SH); 125647/207655 DN
KB = 22° @ 7126.0ft (Patterson #303)

No Target (Freehand) Azimuth 162.42 Origin Type N/S E/W

Slot 0.0 0.0



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Shideler Fee 6-7D
Project:	Mamm Creek	TVD Reference:	KB = 22' @ 7126.0ft (Patterson #303)
Site:	O31E Pad	MD Reference:	KB = 22' @ 7126.0ft (Patterson #303)
Well:	Shideler Fee 6-7D	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	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		O31E Pad			
Site Position:		Northing:	1,577,012.73 ft	Latitude:	39.396873
From:	Lat/Long	Easting:	2,376,675.10 ft	Longitude:	-107.705929
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.39 °

Well	Shideler Fee 6-7D					
Well Position	+N/-S	0.0 ft	Northing:	1,576,812.06 ft	Latitude:	39.396318
	+E/-W	0.0 ft	Easting:	2,376,610.58 ft	Longitude:	-107.706140
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,107.0 ft

Wellbore		DD			
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/7/2012	10.02	65.67	52,075

Design	DD			
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	162.42

Survey Program		Date	12/20/2012		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
111.0	8,980.0	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	0.0	0.0	0.0	0.00	0.00	
111.0	0.30	19.20	111.0	0.3	0.1	-0.2	0.27	0.27	
141.0	0.10	119.00	141.0	0.3	0.1	-0.3	1.11	-0.67	
171.0	1.20	144.60	171.0	0.1	0.3	0.0	3.70	3.67	
203.0	2.00	167.40	203.0	-0.8	0.7	0.9	3.15	2.50	
233.0	2.70	156.40	233.0	-1.9	1.1	2.1	2.77	2.33	
264.0	3.90	156.50	263.9	-3.5	1.8	3.9	3.87	3.87	
295.0	4.60	151.90	294.8	-5.6	2.8	6.2	2.51	2.26	
325.0	5.30	165.90	324.7	-8.0	3.7	8.8	4.64	2.33	
356.0	6.20	161.90	355.6	-11.0	4.6	11.9	3.18	2.90	
387.0	6.80	163.10	386.4	-14.3	5.6	15.4	1.98	1.94	
417.0	7.50	165.00	416.1	-17.9	6.6	19.1	2.46	2.33	
448.0	8.80	168.90	446.8	-22.2	7.6	23.5	4.55	4.19	

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Site:	O31E Pad	MD Reference:	KB = 22' @ 7126.0ft (Patterson #303)
Well:	Shideler Fee 6-7D	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	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
478.0	9.50	167.10	476.4	-26.9	8.6	28.2	2.52	2.33	
508.0	10.50	164.80	506.0	-31.9	9.9	33.4	3.59	3.33	
539.0	11.30	164.10	536.4	-37.6	11.4	39.3	2.62	2.58	
570.0	11.70	174.40	566.8	-43.6	12.6	45.4	6.74	1.29	
661.0	14.60	160.70	655.4	-63.6	17.3	65.9	4.66	3.19	
753.0	17.50	159.90	743.8	-87.6	25.9	91.3	3.16	3.15	
845.0	20.20	160.20	830.9	-115.5	36.0	121.0	2.94	2.93	
937.0	22.50	160.70	916.6	-147.1	47.2	154.5	2.51	2.50	
1,029.0	24.10	163.00	1,001.1	-181.7	58.5	190.9	2.00	1.74	
1,120.0	25.50	164.50	1,083.7	-218.3	69.2	229.0	1.69	1.54	
1,243.0	26.50	165.60	1,194.2	-270.4	83.1	282.9	0.90	0.81	
1,334.0	25.90	164.40	1,275.9	-309.2	93.5	323.0	0.88	-0.66	
1,426.0	25.90	162.50	1,358.6	-347.7	104.9	363.2	0.90	0.00	
1,518.0	25.70	161.00	1,441.5	-385.8	117.5	403.2	0.74	-0.22	
1,609.0	24.30	162.30	1,523.9	-422.2	129.6	441.7	1.65	-1.54	
1,700.0	25.30	163.60	1,606.5	-458.7	140.8	479.8	1.25	1.10	
1,792.0	25.80	167.30	1,689.5	-497.1	150.7	519.4	1.82	0.54	
1,883.0	25.40	166.80	1,771.6	-535.5	159.5	558.6	0.50	-0.44	
1,975.0	24.80	165.70	1,854.9	-573.4	168.8	597.6	0.83	-0.65	
2,066.0	25.80	168.70	1,937.2	-611.3	177.4	636.3	1.79	1.10	
2,158.0	25.40	168.60	2,020.2	-650.2	185.2	675.8	0.44	-0.43	
2,249.0	25.00	168.40	2,102.5	-688.2	192.9	714.3	0.45	-0.44	
2,341.0	25.70	167.30	2,185.6	-726.7	201.2	753.6	0.92	0.76	
2,433.0	25.30	167.10	2,268.7	-765.3	210.0	793.0	0.44	-0.43	
2,524.0	24.70	166.70	2,351.2	-802.8	218.7	831.4	0.69	-0.66	
2,616.0	26.00	166.50	2,434.3	-841.1	227.8	870.7	1.42	1.41	
2,708.0	25.20	166.10	2,517.3	-879.7	237.3	910.3	0.89	-0.87	
2,799.0	24.60	165.10	2,599.8	-916.8	246.8	948.6	0.81	-0.66	
2,891.0	25.70	165.70	2,683.1	-954.7	256.6	987.6	1.23	1.20	
2,982.0	25.40	165.90	2,765.2	-992.7	266.3	1,026.8	0.34	-0.33	
3,073.0	24.90	164.90	2,847.6	-1,030.2	276.0	1,065.4	0.72	-0.55	
3,165.0	25.80	166.00	2,930.7	-1,068.3	285.9	1,104.7	1.10	0.98	
3,257.0	25.90	165.90	3,013.5	-1,107.2	295.6	1,144.8	0.12	0.11	
3,348.0	25.40	165.60	3,095.5	-1,145.4	305.3	1,184.1	0.57	-0.55	
3,440.0	25.40	164.50	3,178.6	-1,183.5	315.5	1,223.5	0.51	0.00	
3,531.0	25.00	164.50	3,261.0	-1,220.8	325.9	1,262.2	0.44	-0.44	
3,623.0	25.40	164.60	3,344.2	-1,258.6	336.3	1,301.4	0.44	0.43	
3,714.0	25.20	164.80	3,426.5	-1,296.1	346.6	1,340.2	0.24	-0.22	
3,806.0	24.30	163.70	3,510.0	-1,333.2	357.0	1,378.7	1.10	-0.98	
3,898.0	25.50	164.70	3,593.5	-1,370.4	367.6	1,417.5	1.38	1.30	
3,989.0	25.20	164.40	3,675.7	-1,408.0	377.9	1,456.4	0.36	-0.33	
4,081.0	25.20	166.70	3,759.0	-1,445.9	387.7	1,495.5	1.06	0.00	
4,172.0	25.00	165.50	3,841.4	-1,483.4	397.0	1,534.0	0.60	-0.22	
4,264.0	25.00	164.80	3,924.8	-1,521.0	406.9	1,572.9	0.32	0.00	
4,356.0	24.60	168.30	4,008.3	-1,558.5	415.9	1,611.3	1.65	-0.43	
4,447.0	24.00	167.30	4,091.2	-1,595.1	423.8	1,648.6	0.80	-0.66	
4,539.0	23.70	166.70	4,175.4	-1,631.3	432.2	1,685.7	0.42	-0.33	
4,630.0	24.30	165.70	4,258.5	-1,667.3	441.0	1,722.6	0.80	0.66	
4,722.0	24.40	165.20	4,342.3	-1,704.0	450.6	1,760.5	0.25	0.11	
4,813.0	24.50	165.40	4,425.1	-1,740.4	460.1	1,798.1	0.14	0.11	
4,905.0	24.00	164.10	4,509.0	-1,776.9	470.1	1,835.9	0.80	-0.54	
4,997.0	25.00	165.20	4,592.7	-1,813.7	480.1	1,874.0	1.19	1.09	
5,088.0	24.10	165.40	4,675.5	-1,850.2	489.7	1,911.7	0.99	-0.99	

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Site:	O31E Pad	MD Reference:	KB = 22' @ 7126.0ft (Patterson #303)
Well:	Shideler Fee 6-7D	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	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
5,180.0	24.90	165.50	4,759.2	-1,887.2	499.3	1,949.8	0.87	0.87	
5,271.0	26.10	168.70	4,841.4	-1,925.4	508.0	1,988.9	2.01	1.32	
5,363.0	25.60	168.30	4,924.2	-1,964.7	516.0	2,028.8	0.58	-0.54	
5,454.0	25.20	167.00	5,006.4	-2,002.8	524.4	2,067.6	0.75	-0.44	
5,546.0	24.10	166.80	5,090.0	-2,040.2	533.1	2,105.9	1.20	-1.20	
5,638.0	22.30	165.90	5,174.5	-2,075.4	541.6	2,142.0	1.99	-1.96	
5,730.0	22.20	167.20	5,259.7	-2,109.3	549.7	2,176.8	0.55	-0.11	
5,822.0	21.20	167.50	5,345.2	-2,142.4	557.2	2,210.7	1.09	-1.09	
5,913.0	19.40	167.60	5,430.5	-2,173.3	564.0	2,242.1	1.98	-1.98	
6,004.0	17.40	166.00	5,516.9	-2,201.2	570.5	2,270.7	2.27	-2.20	
6,096.0	17.20	166.00	5,604.7	-2,227.8	577.1	2,298.1	0.22	-0.22	
6,188.0	16.10	164.20	5,692.8	-2,253.3	583.9	2,324.4	1.32	-1.20	
6,280.0	14.80	162.60	5,781.5	-2,276.8	590.9	2,348.9	1.49	-1.41	
6,371.0	14.20	167.30	5,869.6	-2,298.7	596.8	2,371.6	1.45	-0.66	
6,463.0	12.40	163.80	5,959.1	-2,319.2	602.1	2,392.7	2.14	-1.96	
6,555.0	10.90	161.40	6,049.2	-2,337.0	607.6	2,411.3	1.71	-1.63	
6,646.0	10.40	169.30	6,138.7	-2,353.2	611.9	2,428.1	1.69	-0.55	
6,738.0	9.20	165.20	6,229.3	-2,368.5	615.3	2,443.7	1.51	-1.30	
6,829.0	8.30	162.20	6,319.3	-2,381.7	619.1	2,457.5	1.11	-0.99	
6,920.0	7.30	165.80	6,409.4	-2,393.6	622.6	2,469.8	1.22	-1.10	
7,012.0	5.90	167.40	6,500.8	-2,403.9	625.0	2,480.4	1.53	-1.52	
7,103.0	4.20	177.80	6,591.5	-2,411.8	626.2	2,488.3	2.11	-1.87	
7,149.0	3.90	178.20	6,637.4	-2,415.0	626.3	2,491.4	0.66	-0.65	
7,195.0	2.90	180.30	6,683.3	-2,417.8	626.3	2,494.0	2.19	-2.17	
7,286.0	2.30	170.10	6,774.2	-2,421.9	626.6	2,498.0	0.83	-0.66	
7,378.0	2.40	159.10	6,866.1	-2,425.5	627.6	2,501.8	0.50	0.11	
7,470.0	1.10	167.90	6,958.1	-2,428.1	628.5	2,504.6	1.44	-1.41	
7,561.0	1.40	140.10	7,049.0	-2,429.8	629.4	2,506.5	0.73	0.33	
7,653.0	1.10	66.00	7,141.0	-2,430.3	630.9	2,507.4	1.66	-0.33	
7,745.0	0.40	324.60	7,233.0	-2,429.7	631.6	2,507.0	1.35	-0.76	
7,837.0	0.90	44.70	7,325.0	-2,428.9	631.9	2,506.4	1.00	0.54	
7,928.0	1.20	44.00	7,416.0	-2,427.8	633.1	2,505.6	0.33	0.33	
8,020.0	1.50	48.30	7,508.0	-2,426.3	634.6	2,504.6	0.34	0.33	
8,112.0	1.60	65.70	7,600.0	-2,424.9	636.7	2,504.0	0.52	0.11	
8,203.0	1.00	29.00	7,690.9	-2,423.7	638.2	2,503.3	1.10	-0.66	
8,295.0	2.00	46.50	7,782.9	-2,421.9	639.8	2,502.0	1.18	1.09	
8,386.0	1.90	10.50	7,873.8	-2,419.3	641.2	2,500.0	1.33	-0.11	
8,478.0	3.30	31.90	7,965.8	-2,415.6	642.9	2,496.9	1.83	1.52	
8,570.0	2.20	356.10	8,057.7	-2,411.6	644.2	2,493.5	2.16	-1.20	
8,661.0	0.40	344.90	8,148.6	-2,409.5	644.0	2,491.5	1.99	-1.98	
8,753.0	0.70	29.20	8,240.6	-2,408.7	644.2	2,490.8	0.54	0.33	
8,845.0	0.30	18.60	8,332.6	-2,408.0	644.5	2,490.2	0.44	-0.43	
8,935.0	0.20	343.81	8,422.6	-2,407.6	644.5	2,489.9	0.20	-0.11	Last Cathedral Surveys @ 8,935' MD Projection to Bit @ 8,980'
8,980.0	0.20	343.80	8,467.6	-2,407.5	644.5	2,489.7	0.00	0.00	

Cathedral Energy Services

Survey Report

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Site:	O31E Pad	MD Reference:	KB = 22' @ 7126.0ft (Patterson #303)
Well:	Shideler Fee 6-7D	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
Shideler Fee 6-7D PBHL	0.00	0.00	8,423.0	-2,416.3	636.5	1,574,381.05	2,377,188.19	39.389684	-107.703888
- actual wellpath misses target center by 11.8ft at 8935.0ft MD (8422.6 TVD, -2407.6 N, 644.5 E)									
- Circle (radius 25.0)									
Shideler Fee 6-7D TGT	0.00	0.00	6,582.0	-2,416.3	636.5	1,574,381.05	2,377,188.19	39.389684	-107.703888
- actual wellpath misses target center by 11.6ft at 7094.1ft MD (6582.6 TVD, -2411.1 N, 626.2 E)									
- Point									

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S	+E/-W		
		(ft)	(ft)	Comment	
8,935.0	8,422.6	-2,407.6	644.5	Last Cathedral Surveys @ 8,935' MD	
8,980.0	8,467.6	-2,407.5	644.5	Projection to Bit @ 8,980'	

Checked By: _____ Approved By: _____ Date: _____