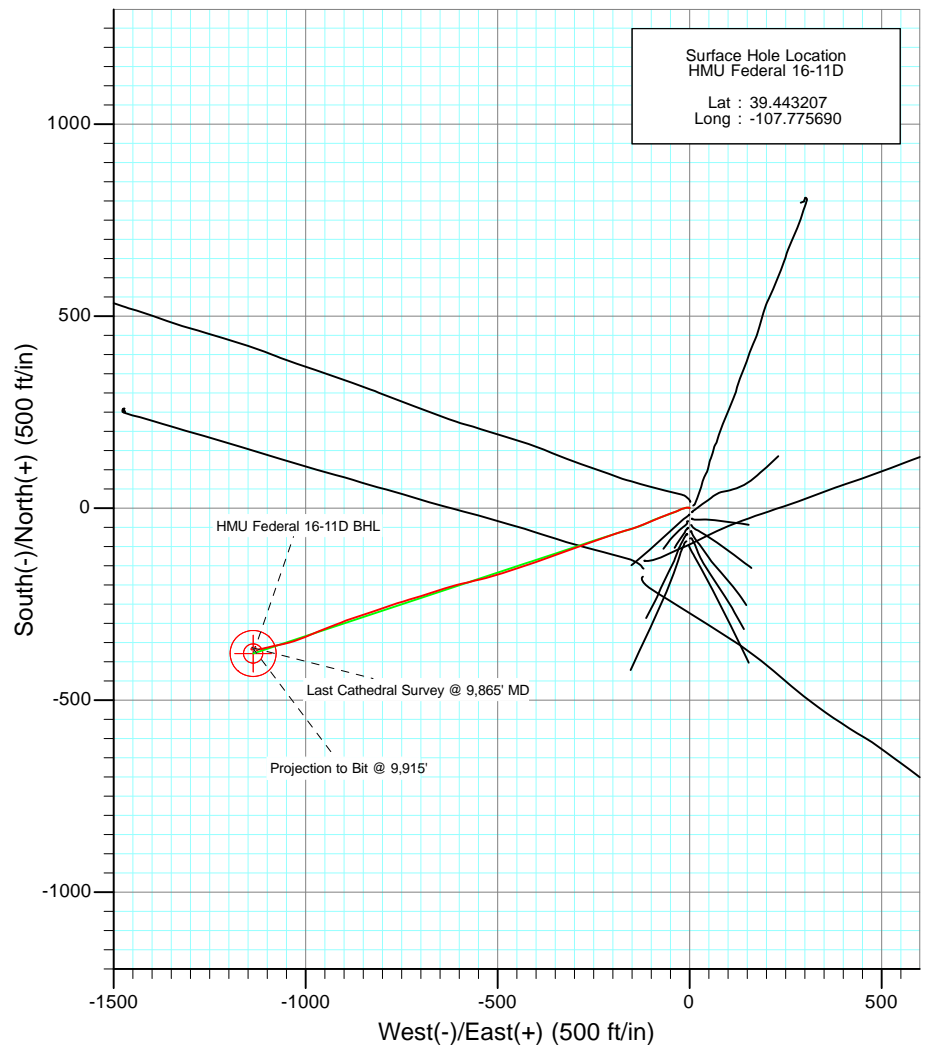
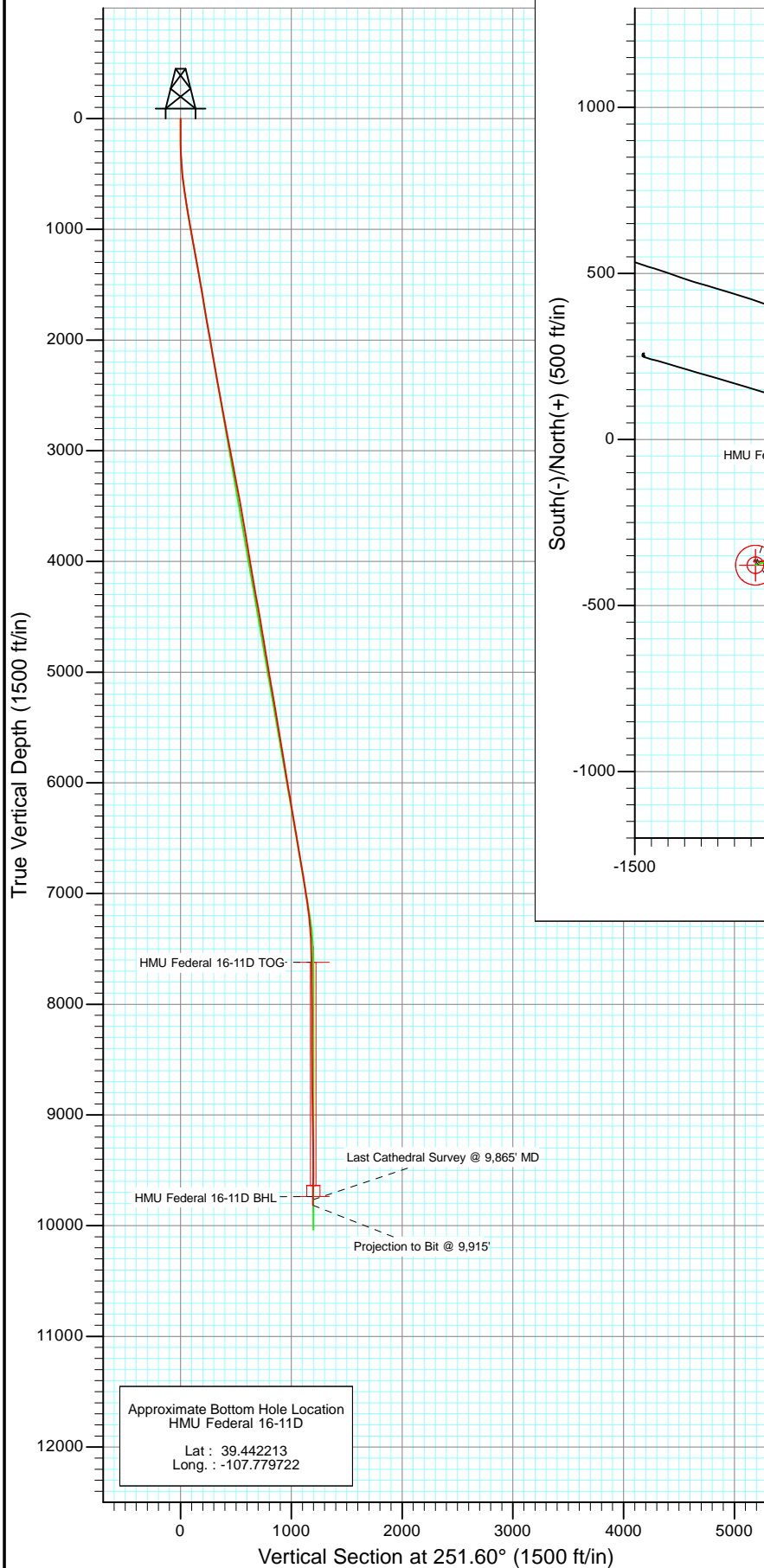




Project: Mamm Creek
 Site: J16W Pad
 Well: HMU Federal 16-11D
 Wellbore: DD
 Design: FINAL



Azimuths to True North
 Magnetic North: 10.30°

Magnetic Field
 Strength: 52331.8snT
 Dip Angle: 65.77°
 Date: 10/25/2010
 Model: IGRF200510

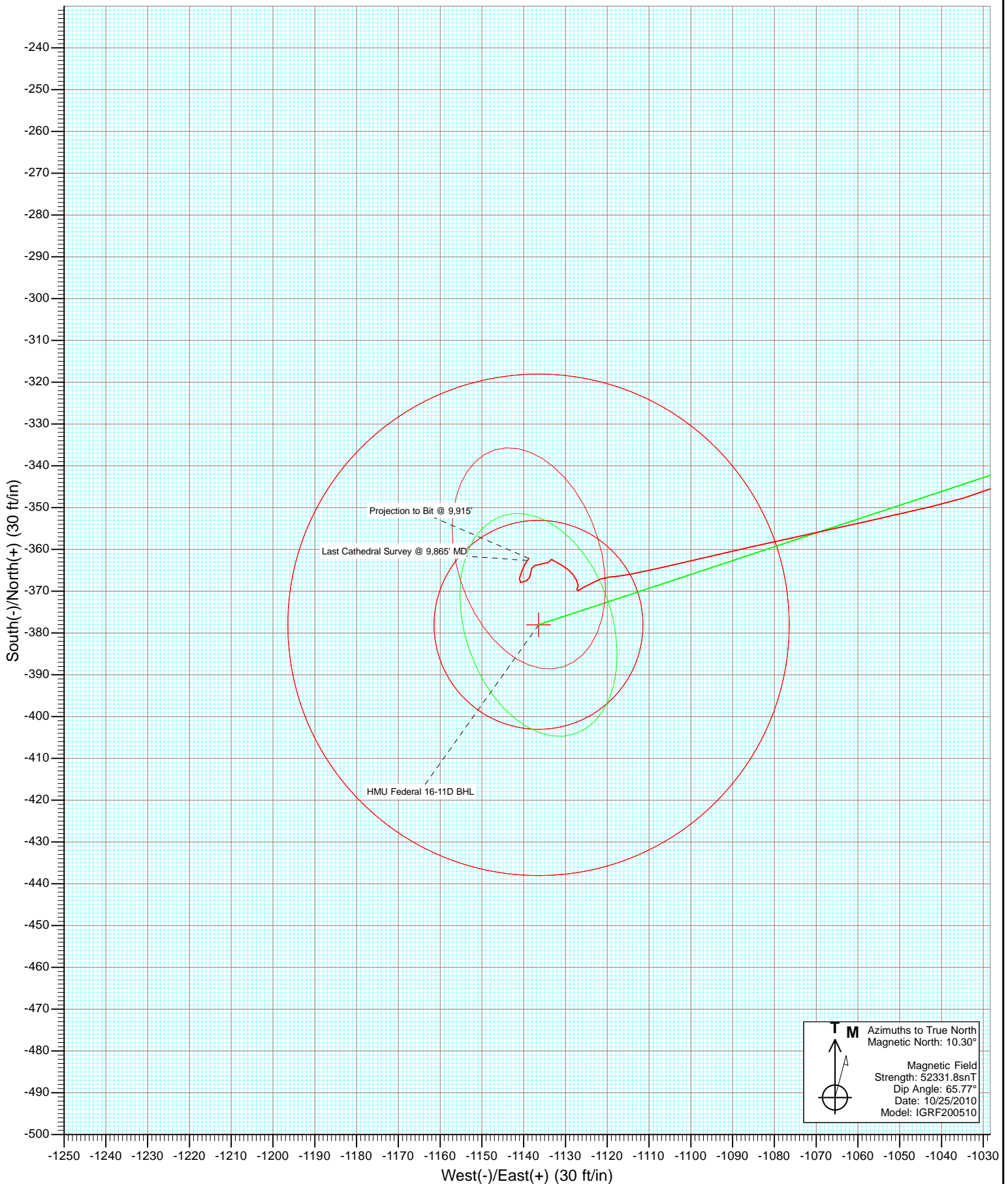
DESIGN DETAILS: DD

125004/128255 (SH) 125082/131955 (MH); SC
 WELL @ 7667.0ft (Original Well Elev)

Target	Azimuth	Origin	N/S	E/W	From TVD
HMU Federal 16-11D BHL	251.60	Slot	N 0.0	W 0.0	0.0

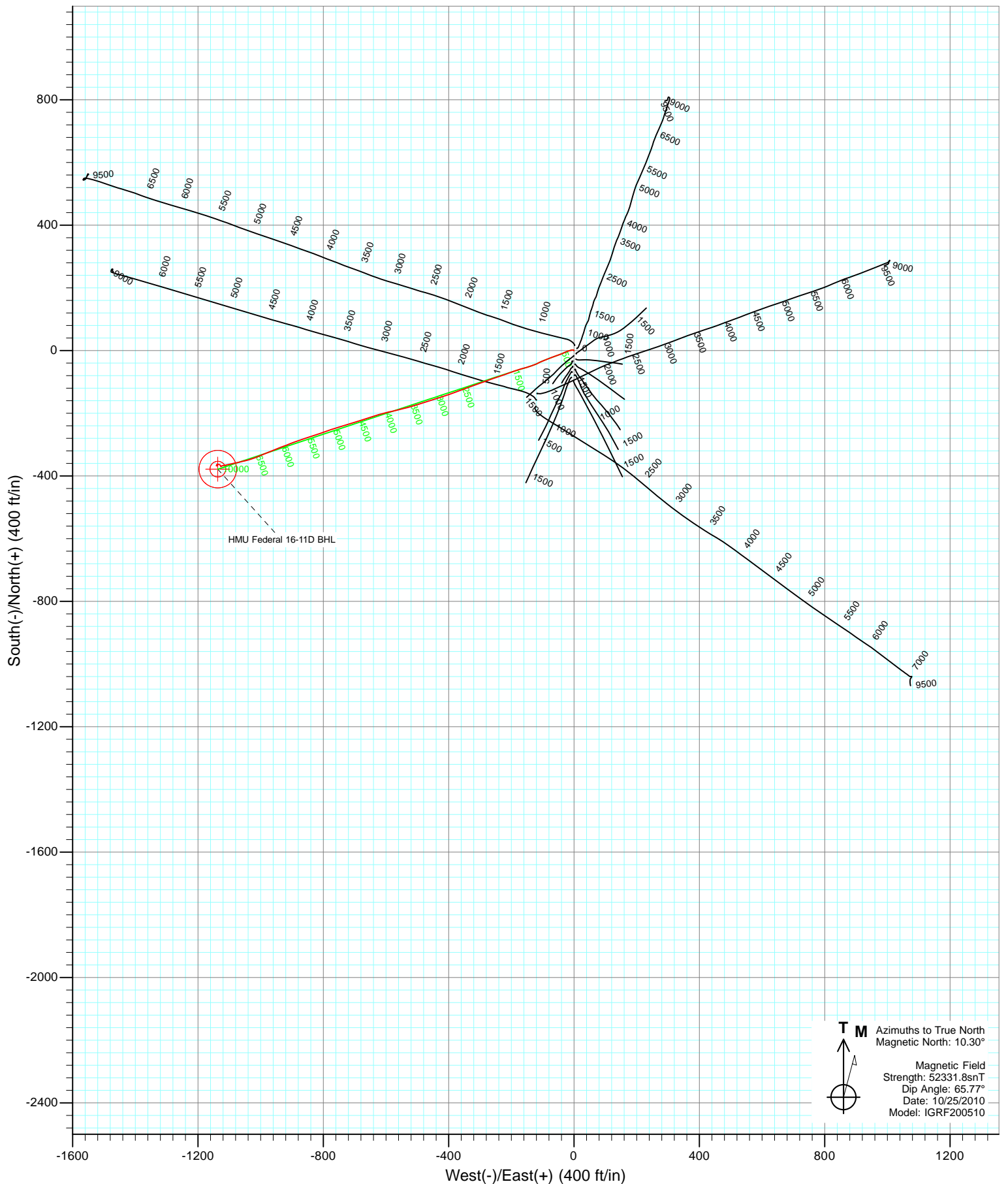


Project: Mamm Creek
Site: J16W Pad
Well: HMU Federal 16-11D
Wellbore: DD
Design: FINAL





Project: Mamm Creek
Site: J16W Pad
Well: HMU Federal 16-11D
Wellbore: DD
Design: FINAL



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-11D
Project:	Mamm Creek	TVD Reference:	WELL @ 7667.0ft (Original Well Elev)
Site:	J16W Pad	MD Reference:	WELL @ 7667.0ft (Original Well Elev)
Well:	HMU Federal 16-11D	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		J16W Pad			
Site Position:		Northing:	1,594,381.52 ft	Latitude:	39.443239
From:	Lat/Long	Easting:	2,357,395.39 ft	Longitude:	-107.775670
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.44 °

Well	HMU Federal 16-11D					
Well Position	+N/-S	0.0 ft	Northing:	1,594,370.00 ft	Latitude:	39.443207
	+E/-W	0.0 ft	Easting:	2,357,389.45 ft	Longitude:	-107.775690
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,645.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	10/25/2010	10.30	65.77	52,332

Design	DD				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.0	0.0	0.0	251.60	

Survey Program	Date	2/7/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
79.0	1,523.0	Survey #1 (DD)	MWD	Geolink MWD	
1,649.0	9,915.0	Survey #2 (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		
79.0	0.40	349.70	79.0	0.3	0.0	0.0	0.51	0.51		
110.0	0.30	343.60	110.0	0.5	-0.1	-0.1	0.34	-0.32		
203.0	0.70	335.00	203.0	1.2	-0.4	0.0	0.44	0.43		
234.0	0.90	313.10	234.0	1.5	-0.7	0.1	1.17	0.65		
264.0	1.50	287.90	264.0	1.8	-1.2	0.6	2.62	2.00		
294.0	2.60	272.50	294.0	2.0	-2.3	1.5	4.07	3.67		
325.0	3.00	268.30	324.9	2.0	-3.8	3.0	1.45	1.29		
356.0	3.40	264.10	355.9	1.9	-5.5	4.6	1.49	1.29		
386.0	4.10	262.20	385.8	1.6	-7.4	6.5	2.37	2.33		
417.0	4.40	256.50	416.7	1.2	-9.7	8.8	1.67	0.97		
448.0	4.60	256.80	447.6	0.6	-12.1	11.2	0.65	0.65		

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-11D
Project:	Mamm Creek	TVD Reference:	WELL @ 7667.0ft (Original Well Elev)
Site:	J16W Pad	MD Reference:	WELL @ 7667.0ft (Original Well Elev)
Well:	HMU Federal 16-11D	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
479.0	5.00	253.10	478.5	0.0	-14.6	13.8	1.63	1.29	
510.0	5.70	252.80	509.4	-0.9	-17.3	16.7	2.26	2.26	
540.0	6.20	249.30	539.2	-1.9	-20.3	19.8	2.06	1.67	
571.0	7.10	247.40	570.0	-3.2	-23.6	23.4	2.99	2.90	
662.0	8.00	245.00	660.2	-8.1	-34.5	35.3	1.05	0.99	
754.0	9.00	250.40	751.2	-13.2	-47.1	48.9	1.39	1.09	
846.0	9.90	251.00	842.0	-18.2	-61.4	64.0	0.98	0.98	
937.0	10.00	248.20	931.6	-23.7	-76.1	79.7	0.54	0.11	
1,030.0	10.40	248.50	1,023.1	-29.7	-91.4	96.1	0.43	0.43	
1,122.0	10.20	244.30	1,113.7	-36.3	-106.5	112.5	0.84	-0.22	
1,213.0	10.20	246.40	1,203.2	-43.0	-121.1	128.5	0.41	0.00	
1,304.0	10.20	251.90	1,292.8	-48.8	-136.2	144.6	1.07	0.00	
1,397.0	10.00	252.90	1,384.3	-53.7	-151.7	160.9	0.29	-0.22	
1,488.0	9.60	255.00	1,474.0	-58.0	-166.6	176.4	0.59	-0.44	
1,523.0	9.50	253.20	1,508.5	-59.6	-172.2	182.2	0.90	-0.29	
1,649.0	9.10	250.40	1,632.9	-65.9	-191.5	202.5	0.48	-0.32	
1,743.0	10.10	250.70	1,725.6	-71.1	-206.3	218.2	1.07	1.06	
1,836.0	10.00	250.40	1,817.1	-76.5	-221.6	234.4	0.12	-0.11	
1,932.0	10.00	251.00	1,911.7	-82.0	-237.3	251.1	0.11	0.00	
2,027.0	9.90	251.50	2,005.2	-87.3	-252.9	267.5	0.14	-0.11	
2,122.0	9.70	251.60	2,098.9	-92.4	-268.2	283.7	0.21	-0.21	
2,217.0	9.50	250.40	2,192.5	-97.6	-283.2	299.5	0.30	-0.21	
2,313.0	10.00	248.40	2,287.1	-103.3	-298.4	315.8	0.63	0.52	
2,408.0	10.60	250.60	2,380.6	-109.3	-314.3	332.7	0.76	0.63	
2,504.0	10.70	250.50	2,474.9	-115.2	-331.1	350.5	0.11	0.10	
2,599.0	10.60	250.20	2,568.3	-121.1	-347.6	368.0	0.12	-0.11	
2,694.0	10.10	249.80	2,661.8	-126.9	-363.6	385.1	0.53	-0.53	
2,790.0	10.70	250.10	2,756.2	-132.8	-379.9	402.4	0.63	0.62	
2,886.0	10.30	248.10	2,850.6	-139.1	-396.2	419.9	0.56	-0.42	
2,981.0	10.90	252.90	2,944.0	-144.9	-412.7	437.3	1.12	0.63	
3,076.0	10.80	252.50	3,037.3	-150.2	-429.8	455.2	0.13	-0.11	
3,171.0	10.90	252.80	3,130.6	-155.5	-446.9	473.1	0.12	0.11	
3,267.0	10.60	253.30	3,224.9	-160.8	-464.0	491.0	0.33	-0.31	
3,362.0	10.50	251.50	3,318.3	-166.0	-480.6	508.4	0.36	-0.11	
3,457.0	10.60	251.80	3,411.7	-171.5	-497.1	525.8	0.12	0.11	
3,553.0	10.60	252.00	3,506.0	-177.0	-513.9	543.5	0.04	0.00	
3,648.0	9.80	256.90	3,599.5	-181.5	-530.0	560.2	1.24	-0.84	
3,744.0	9.60	257.60	3,694.2	-185.1	-545.8	576.3	0.24	-0.21	
3,839.0	9.50	255.00	3,787.8	-188.8	-561.1	592.0	0.47	-0.11	
3,935.0	9.30	257.30	3,882.6	-192.6	-576.3	607.7	0.44	-0.21	
4,029.0	9.10	256.60	3,975.3	-196.0	-591.0	622.6	0.24	-0.21	
4,125.0	9.90	255.10	4,070.0	-199.8	-606.3	638.4	0.87	0.83	
4,220.0	9.50	255.60	4,163.7	-203.9	-621.8	654.4	0.43	-0.42	
4,316.0	10.40	250.80	4,258.2	-208.7	-637.7	671.0	1.27	0.94	
4,411.0	10.30	251.80	4,351.7	-214.2	-653.9	688.0	0.22	-0.11	
4,507.0	9.70	251.80	4,446.2	-219.4	-669.7	704.7	0.62	-0.62	
4,603.0	9.70	253.30	4,540.8	-224.2	-685.1	720.9	0.26	0.00	
4,697.0	9.50	253.20	4,633.5	-228.8	-700.1	736.5	0.21	-0.21	
4,793.0	9.60	254.40	4,728.2	-233.2	-715.4	752.5	0.23	0.10	
4,888.0	9.70	252.40	4,821.9	-237.8	-730.7	768.4	0.37	0.11	
4,983.0	9.50	251.60	4,915.5	-242.7	-745.8	784.2	0.25	-0.21	
5,078.0	9.40	254.20	5,009.2	-247.2	-760.7	799.8	0.46	-0.11	
5,173.0	9.70	249.90	5,102.9	-252.1	-775.6	815.6	0.81	0.32	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-11D
Project:	Mamm Creek	TVD Reference:	WELL @ 7667.0ft (Original Well Elev)
Site:	J16W Pad	MD Reference:	WELL @ 7667.0ft (Original Well Elev)
Well:	HMU Federal 16-11D	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
5,268.0	9.50	250.00	5,196.6	-257.5	-790.5	831.4	0.21	-0.21	
5,364.0	9.30	251.70	5,291.3	-262.7	-805.3	847.1	0.36	-0.21	
5,459.0	9.40	254.20	5,385.0	-267.2	-820.1	862.5	0.44	0.11	
5,554.0	9.80	249.00	5,478.7	-272.2	-835.1	878.3	1.00	0.42	
5,650.0	9.80	251.30	5,573.3	-277.8	-850.5	894.7	0.41	0.00	
5,744.0	9.70	252.30	5,666.0	-282.7	-865.6	910.6	0.21	-0.11	
5,839.0	8.80	252.60	5,759.7	-287.3	-880.1	925.8	0.95	-0.95	
5,934.0	9.60	248.60	5,853.5	-292.4	-894.5	941.0	1.08	0.84	
6,030.0	8.80	248.00	5,948.3	-298.1	-908.7	956.3	0.84	-0.83	
6,125.0	9.80	249.10	6,042.0	-303.7	-923.0	971.7	1.07	1.05	
6,221.0	9.80	249.00	6,136.6	-309.5	-938.3	988.0	0.02	0.00	
6,316.0	9.60	248.20	6,230.3	-315.4	-953.2	1,004.0	0.25	-0.21	
6,411.0	9.10	246.40	6,324.0	-321.3	-967.4	1,019.4	0.61	-0.53	
6,506.0	10.10	247.80	6,417.7	-327.5	-982.0	1,035.2	1.08	1.05	
6,601.0	10.10	249.00	6,511.2	-333.6	-997.5	1,051.8	0.22	0.00	
6,696.0	9.60	248.50	6,604.8	-339.5	-1,012.6	1,068.0	0.53	-0.53	
6,792.0	9.30	249.00	6,699.5	-345.2	-1,027.3	1,083.8	0.32	-0.31	
6,887.0	9.70	257.30	6,793.2	-349.7	-1,042.3	1,099.4	1.50	0.42	
6,982.0	9.10	256.80	6,886.9	-353.2	-1,057.4	1,114.8	0.64	-0.63	
7,078.0	8.70	258.20	6,981.8	-356.4	-1,071.9	1,129.6	0.47	-0.42	
7,173.0	7.90	257.00	7,075.8	-359.3	-1,085.3	1,143.3	0.86	-0.84	
7,268.0	6.60	257.00	7,170.0	-362.0	-1,097.0	1,155.2	1.37	-1.37	
7,363.0	5.50	257.10	7,264.5	-364.3	-1,106.8	1,165.2	1.16	-1.16	
7,459.0	4.00	259.30	7,360.1	-365.9	-1,114.5	1,173.1	1.57	-1.56	
7,554.0	1.80	268.50	7,455.0	-366.6	-1,119.3	1,177.8	2.36	-2.32	
7,649.0	1.20	242.90	7,550.0	-367.1	-1,121.7	1,180.2	0.93	-0.63	
7,744.0	1.10	244.30	7,645.0	-367.9	-1,123.4	1,182.1	0.11	-0.11	
7,840.0	1.30	243.40	7,740.9	-368.8	-1,125.2	1,184.1	0.21	0.21	
7,935.0	0.30	223.10	7,835.9	-369.5	-1,126.3	1,185.3	1.08	-1.05	
8,031.0	0.70	245.90	7,931.9	-369.9	-1,127.0	1,186.2	0.46	0.42	
8,126.0	0.70	30.50	8,026.9	-369.6	-1,127.2	1,186.3	1.40	0.00	
8,221.0	0.60	1.20	8,121.9	-368.6	-1,126.9	1,185.7	0.36	-0.11	
8,316.0	1.00	331.50	8,216.9	-367.4	-1,127.3	1,185.7	0.59	0.42	
8,411.0	0.80	325.30	8,311.9	-366.1	-1,128.1	1,186.0	0.23	-0.21	
8,506.0	1.10	312.50	8,406.9	-365.0	-1,129.1	1,186.6	0.38	0.32	
8,601.0	1.40	298.70	8,501.9	-363.8	-1,130.8	1,187.9	0.45	0.32	
8,696.0	1.00	300.70	8,596.8	-362.8	-1,132.6	1,189.2	0.42	-0.42	
8,791.0	0.00	100.20	8,691.8	-362.4	-1,133.3	1,189.7	1.05	-1.05	
8,887.0	0.30	237.40	8,787.8	-362.5	-1,133.5	1,190.0	0.31	0.31	
8,982.0	0.40	215.20	8,882.8	-362.9	-1,133.9	1,190.5	0.18	0.11	
9,077.0	1.50	262.70	8,977.8	-363.4	-1,135.3	1,192.0	1.33	1.16	
9,173.0	1.10	245.30	9,073.8	-363.9	-1,137.4	1,194.1	0.58	-0.42	
9,268.0	1.50	183.10	9,168.8	-365.5	-1,138.3	1,195.5	1.46	0.42	
9,363.0	1.40	232.30	9,263.7	-367.5	-1,139.3	1,197.0	1.27	-0.11	
9,459.0	0.70	297.80	9,359.7	-367.9	-1,140.7	1,198.6	1.33	-0.73	
9,554.0	0.90	17.70	9,454.7	-367.0	-1,141.0	1,198.5	1.09	0.21	
9,649.0	1.00	20.00	9,549.7	-365.5	-1,140.5	1,197.6	0.11	0.11	
9,745.0	0.80	24.80	9,645.7	-364.1	-1,139.9	1,196.6	0.22	-0.21	
9,840.0	0.80	34.40	9,740.7	-362.9	-1,139.3	1,195.6	0.14	0.00	
9,865.0	0.70	34.20	9,765.7	-362.6	-1,139.1	1,195.3	0.40	-0.40	Last Cathedral Survey @ 9,865' MD
9,915.0	0.70	34.20	9,815.7	-362.1	-1,138.8	1,194.9	0.00	0.00	Projection to Bit @ 9,915'

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-11D
Project:	Mamm Creek	TVD Reference:	WELL @ 7667.0ft (Original Well Elev)
Site:	J16W Pad	MD Reference:	WELL @ 7667.0ft (Original Well Elev)
Well:	HMU Federal 16-11D	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	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									
HMU Federal 16-11D TC	0.00	0.00	7,621.0	-378.0	-1,136.4	1,594,020.55	2,356,243.89	39.442169	-107.779714
- actual wellpath misses target center by 17.0ft at 7720.4ft MD (7621.3 TVD, -367.7 N, -1123.0 E)									
- Circle (radius 25.0)									
HMU Federal 16-11D B+	0.00	0.00	9,737.0	-378.0	-1,136.4	1,594,020.55	2,356,243.89	39.442169	-107.779714
- actual wellpath misses target center by 15.4ft at 9836.2ft MD (9736.8 TVD, -363.0 N, -1139.3 E)									
- Circle (radius 60.0)									

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S	+E/-W		
		(ft)	(ft)	Comment	
9,865.0	9,765.7	-362.6	-1,139.1	Last Cathedral Survey @ 9,865' MD	
9,915.0	9,815.7	-362.1	-1,138.8	Projection to Bit @ 9,915'	

Checked By: _____ Approved By: _____ Date: _____