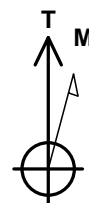
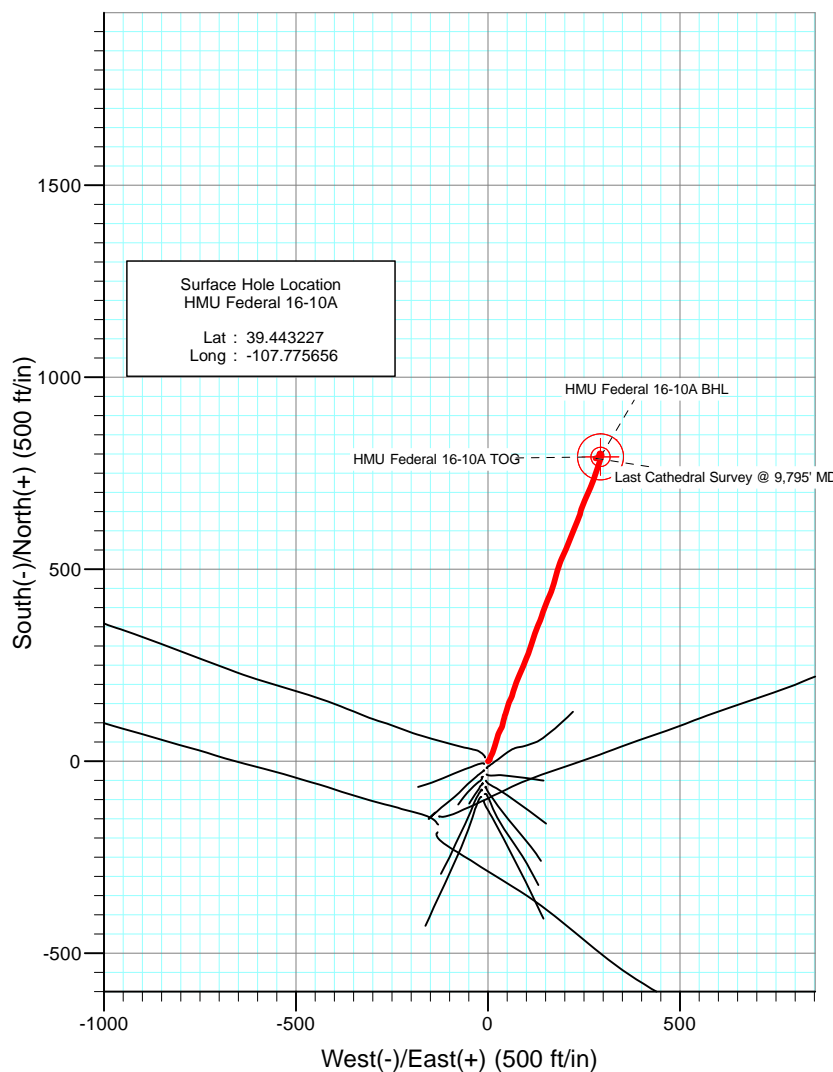
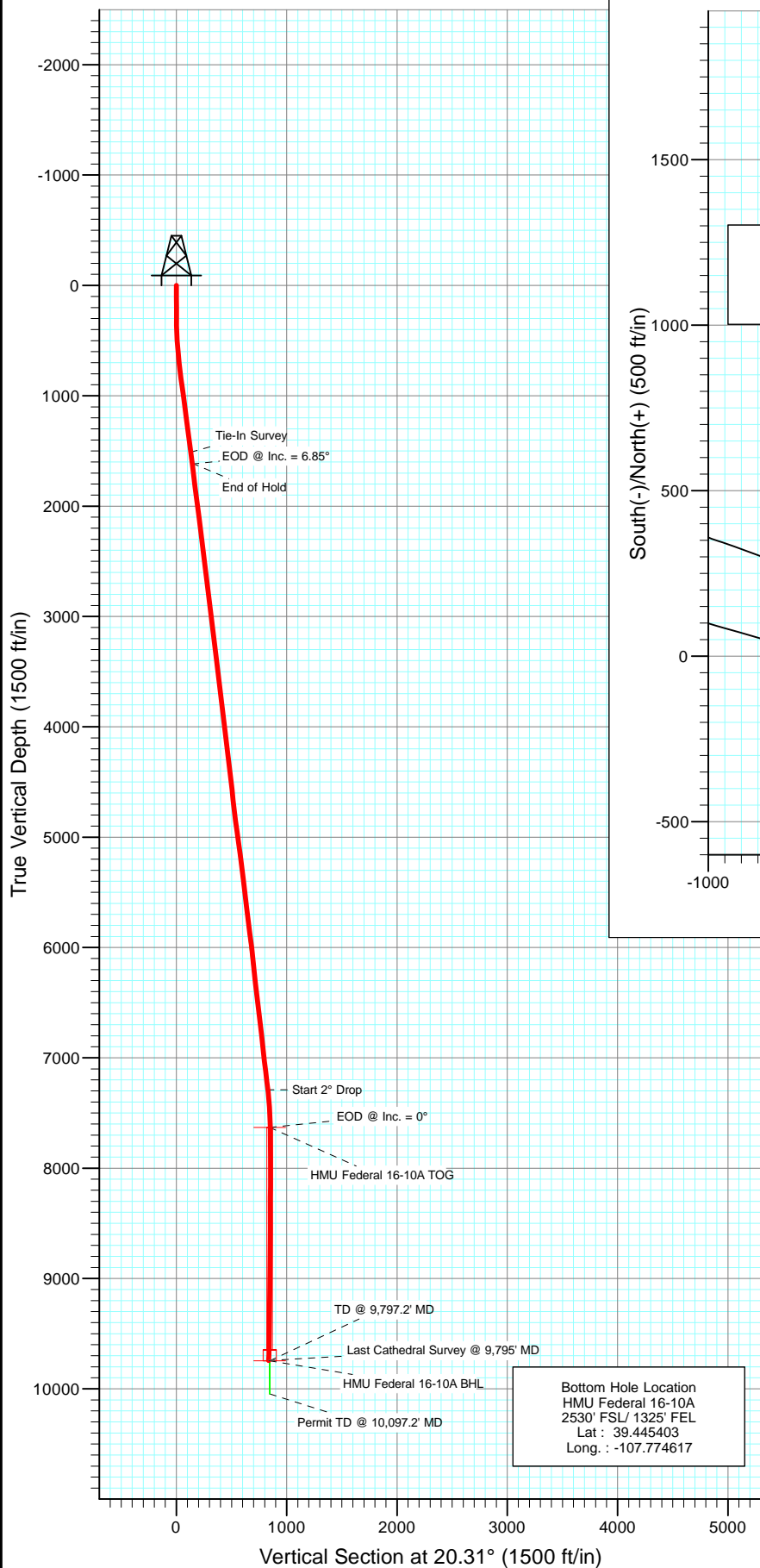




Project: Mamm Creek
 Site: J16W Pad
 Well: HMU Federal 16-10A
 Wellbore: DD
 Design: Final Survey



Azimuths to True North
 Magnetic North: 10.30°

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

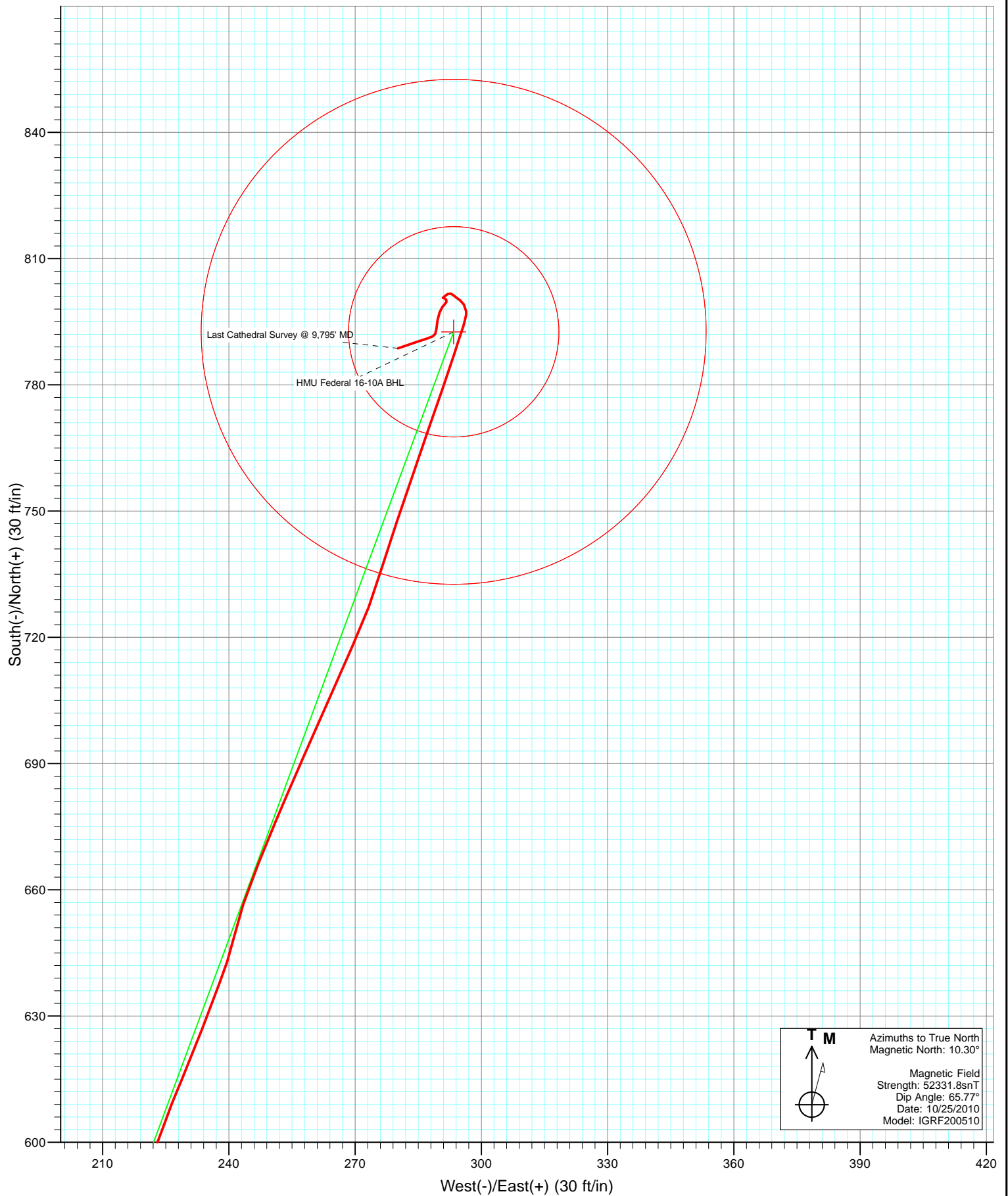
DESIGN DETAILS: DD

125015/128355 (SH) 125041/128155 (MH); SC
 WELL @ 7667.0ft (Original Well Elev)

Target	Azimuth	Origin	N/S	E/W	From TVD
HMU Federal 16-10A BHL	20.31	Slot	0.0	0.0	0.0



Project: Mamm Creek
Site: J16W Pad
Well: HMU Federal 16-10A
Wellbore: DD
Design: Final Survey



Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-10A
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 16-10A	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 16-10A			
Well Position	+N/-S	0.0 ft	Northing:	1,594,377.04 ft
	+E/-W	0.0 ft	Easting:	2,357,399.23 ft
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	20.31

Survey Program	Date	1/28/2012		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
79.0	2,026.0	Survey #1 (DD)	MWD	Geolink MWD
2,122.0	9,795.0	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	0.30	118.20	79.0	-0.1	0.2	0.0	0.38	0.38	
110.0	0.40	43.20	110.0	-0.1	0.3	0.1	1.40	0.32	
203.0	0.60	52.10	203.0	0.5	0.9	0.8	0.23	0.22	
294.0	0.70	64.20	294.0	1.0	1.8	1.6	0.19	0.11	
386.0	1.00	46.90	386.0	1.8	2.9	2.7	0.43	0.33	
417.0	1.30	41.70	417.0	2.3	3.3	3.3	1.02	0.97	
448.0	2.20	37.40	448.0	3.0	3.9	4.2	2.93	2.90	
479.0	3.20	19.00	478.9	4.3	4.6	5.6	4.23	3.23	
510.0	4.00	22.60	509.9	6.1	5.3	7.5	2.68	2.58	
571.0	4.90	19.20	570.7	10.5	6.9	12.3	1.54	1.48	
662.0	5.80	26.30	661.3	18.3	10.3	20.7	1.23	0.99	

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-10A
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 16-10A	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
754.0	7.00	17.70	752.7	27.8	14.0	31.0	1.67	1.30	
846.0	7.30	18.20	844.0	38.7	17.6	42.4	0.33	0.33	
938.0	7.90	17.30	935.2	50.3	21.3	54.6	0.66	0.65	
1,031.0	8.10	15.00	1,027.3	62.7	24.9	67.5	0.41	0.22	
1,122.0	6.90	23.40	1,117.5	73.9	28.7	79.3	1.78	-1.32	
1,214.0	7.20	31.10	1,208.8	84.0	33.9	90.5	1.08	0.33	
1,305.0	8.00	12.50	1,299.0	95.0	38.2	102.4	2.83	0.88	
1,398.0	8.00	13.30	1,391.1	107.6	41.1	115.2	0.12	0.00	
1,488.0	7.00	20.10	1,480.3	118.9	44.4	126.9	1.48	-1.11	
1,520.0	7.00	18.90	1,512.1	122.6	45.7	130.8	0.46	0.00	
1,648.0	7.20	16.30	1,639.1	137.6	50.5	146.6	0.30	0.16	
1,743.0	6.50	15.00	1,733.5	148.5	53.5	157.9	0.75	-0.74	
1,835.0	7.10	29.90	1,824.8	158.5	57.7	168.7	2.02	0.65	
1,931.0	7.70	17.90	1,920.0	169.8	62.7	181.0	1.72	0.62	
2,026.0	7.50	16.30	2,014.2	181.8	66.3	193.5	0.31	-0.21	
2,122.0	7.50	19.70	2,109.4	193.7	70.2	206.0	0.46	0.00	
2,217.0	7.20	20.80	2,203.6	205.1	74.4	218.2	0.35	-0.32	
2,312.0	7.20	22.60	2,297.8	216.2	78.8	230.1	0.24	0.00	
2,408.0	7.00	21.20	2,393.1	227.2	83.3	241.9	0.28	-0.21	
2,503.0	7.10	23.60	2,487.4	237.9	87.7	253.6	0.33	0.11	
2,598.0	6.60	24.50	2,581.7	248.3	92.3	264.9	0.54	-0.53	
2,694.0	7.00	21.90	2,677.0	258.7	96.8	276.2	0.53	0.42	
2,789.0	6.80	21.30	2,771.3	269.3	101.0	287.6	0.22	-0.21	
2,885.0	7.00	20.80	2,866.6	280.1	105.1	299.2	0.22	0.21	
2,980.0	6.50	22.20	2,961.0	290.5	109.2	310.3	0.55	-0.53	
3,075.0	7.10	14.30	3,055.3	301.2	112.7	321.6	1.17	0.63	
3,171.0	6.90	13.30	3,150.6	312.5	115.5	333.2	0.24	-0.21	
3,266.0	7.30	21.50	3,244.9	323.7	119.0	344.9	1.15	0.42	
3,362.0	7.00	21.20	3,340.1	334.8	123.4	356.8	0.31	-0.31	
3,457.0	7.00	24.10	3,434.4	345.5	127.8	368.4	0.37	0.00	
3,553.0	6.70	21.20	3,529.7	356.1	132.2	379.8	0.48	-0.31	
3,648.0	6.70	20.00	3,624.1	366.4	136.1	390.9	0.15	0.00	
3,743.0	6.70	18.30	3,718.4	376.9	139.8	402.0	0.21	0.00	
3,839.0	6.70	17.40	3,813.8	387.6	143.2	413.2	0.11	0.00	
3,934.0	7.40	22.00	3,908.1	398.5	147.1	424.8	0.95	0.74	
4,029.0	7.40	21.30	4,002.3	409.9	151.7	437.1	0.09	0.00	
4,125.0	7.00	23.70	4,097.5	421.0	156.3	449.1	0.52	-0.42	
4,220.0	6.80	23.30	4,191.8	431.5	160.8	460.5	0.22	-0.21	
4,315.0	6.30	22.00	4,286.2	441.5	165.0	471.3	0.55	-0.53	
4,411.0	7.20	16.20	4,381.5	452.1	168.6	482.6	1.17	0.94	
4,506.0	6.60	16.20	4,475.9	463.1	171.8	494.0	0.63	-0.63	
4,602.0	6.30	16.50	4,571.2	473.5	174.9	504.7	0.31	-0.31	
4,697.0	5.90	14.70	4,665.7	483.2	177.6	514.8	0.47	-0.42	
4,792.0	6.80	15.00	4,760.1	493.3	180.3	525.2	0.95	0.95	
4,888.0	7.70	19.80	4,855.4	504.9	183.9	537.3	1.13	0.94	
4,983.0	7.20	17.20	4,949.6	516.5	187.8	549.6	0.63	-0.53	
5,077.0	8.20	24.30	5,042.7	528.3	192.3	562.2	1.47	1.06	
5,172.0	7.60	25.20	5,136.8	540.1	197.8	575.2	0.64	-0.63	
5,268.0	7.20	24.00	5,232.0	551.4	203.0	587.5	0.45	-0.42	
5,364.0	7.00	22.10	5,327.3	562.3	207.6	599.4	0.32	-0.21	
5,459.0	7.10	22.20	5,421.6	573.1	212.0	611.1	0.11	0.11	
5,554.0	6.90	23.70	5,515.9	583.8	216.5	622.6	0.29	-0.21	
5,649.0	6.30	21.90	5,610.2	593.8	220.7	633.5	0.67	-0.63	

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-10A
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 16-10A	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
5,743.0	6.60	18.90	5,703.6	603.7	224.4	644.1	0.48	0.32	
5,839.0	8.10	23.60	5,798.8	615.1	228.9	656.3	1.68	1.56	
5,934.0	7.30	19.80	5,893.0	626.9	233.6	669.1	1.00	-0.84	
6,029.0	6.80	21.80	5,987.3	637.8	237.8	680.7	0.59	-0.53	
6,125.0	5.30	12.60	6,082.7	647.5	240.9	690.8	1.86	-1.56	
6,220.0	6.00	18.20	6,177.3	656.5	243.4	700.1	0.94	0.74	
6,315.0	6.70	22.50	6,271.7	666.3	247.0	710.6	0.89	0.74	
6,410.0	6.20	21.90	6,366.1	676.2	251.1	721.3	0.53	-0.53	
6,490.0	7.40	24.40	6,445.5	684.9	254.8	730.7	1.54	1.50	
6,601.0	7.20	23.10	6,555.6	697.8	260.5	744.8	0.23	-0.18	
6,696.0	6.60	24.10	6,649.9	708.2	265.1	756.2	0.64	-0.63	
6,792.0	6.10	24.00	6,745.3	717.9	269.4	766.8	0.52	-0.52	
6,887.0	6.10	21.00	6,839.8	727.3	273.2	776.9	0.34	0.00	
6,983.0	6.30	16.10	6,935.2	737.1	276.5	787.2	0.59	0.21	
7,078.0	6.90	19.70	7,029.6	747.5	279.9	798.1	0.77	0.63	
7,174.0	6.70	18.00	7,124.9	758.2	283.6	809.5	0.30	-0.21	
7,268.0	6.90	19.60	7,218.3	768.8	287.2	820.6	0.29	0.21	
7,364.0	6.20	18.70	7,313.7	779.1	290.8	831.6	0.74	-0.73	
7,459.0	4.70	18.50	7,408.2	787.6	293.6	840.6	1.58	-1.58	
7,557.0	3.20	17.50	7,506.0	794.1	295.7	847.3	1.53	-1.53	
7,649.0	1.20	352.40	7,597.9	797.5	296.4	850.8	2.36	-2.17	
7,682.0	1.07	345.06	7,630.9	798.1	296.3	851.3	0.58	-0.38	HMU Federal 16-10A TOG
7,745.0	0.90	326.10	7,693.9	799.1	295.8	852.1	0.58	-0.28	
7,840.0	0.80	309.10	7,788.9	800.1	294.9	852.7	0.28	-0.11	
7,936.0	0.60	301.50	7,884.9	800.8	293.9	853.1	0.23	-0.21	
8,031.0	0.40	321.50	7,979.9	801.3	293.3	853.3	0.28	-0.21	
8,126.0	0.50	280.50	8,074.9	801.7	292.7	853.4	0.35	0.11	
8,222.0	0.40	243.30	8,170.8	801.6	292.0	853.1	0.31	-0.10	
8,316.0	0.70	226.00	8,264.8	801.0	291.3	852.3	0.36	0.32	
8,411.0	0.00	281.20	8,359.8	800.6	290.9	851.8	0.74	-0.74	
8,506.0	0.20	100.20	8,454.8	800.6	291.0	851.9	0.21	0.21	
8,602.0	0.30	125.40	8,550.8	800.4	291.4	851.8	0.15	0.10	
8,697.0	0.20	152.50	8,645.8	800.1	291.7	851.6	0.16	-0.11	
8,792.0	0.40	196.10	8,740.8	799.7	291.7	851.2	0.31	0.21	
8,887.0	0.40	237.80	8,835.8	799.2	291.3	850.6	0.30	0.00	
8,982.0	0.70	209.50	8,930.8	798.5	290.7	849.8	0.42	0.32	
9,078.0	1.00	204.60	9,026.8	797.2	290.1	848.4	0.32	0.31	
9,173.0	1.40	189.40	9,121.8	795.3	289.6	846.4	0.53	0.42	
9,268.0	1.00	183.50	9,216.8	793.4	289.3	844.5	0.44	-0.42	
9,364.0	0.60	208.20	9,312.8	792.1	289.0	843.2	0.54	-0.42	
9,459.0	0.50	250.70	9,407.8	791.5	288.4	842.4	0.43	-0.11	
9,554.0	1.10	248.90	9,502.8	791.0	287.2	841.5	0.63	0.63	
9,649.0	1.60	253.10	9,597.8	790.3	285.0	840.1	0.54	0.53	
9,745.0	2.20	249.90	9,693.7	789.3	282.0	838.1	0.63	0.62	
9,795.0	2.20	252.60	9,743.6	788.7	280.2	836.9	0.21	0.00	Last Cathedral Survey @ 9,795' MD - HMU Fede

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-10A
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 16-10A	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 16-10A BF	0.00	0.00	9,747.0	792.6	293.4	1,595,162.03	2,357,712.41	39.445403	-107.774617
- actual wellpath misses target center by 14.2ft at 9795.0ft MD (9743.6 TVD, 788.7 N, 280.2 E)									
- Circle (radius 60.0)									
HMU Federal 16-10A TC	0.00	0.00	7,631.0	792.6	293.4	1,595,162.03	2,357,712.41	39.445403	-107.774617
- actual wellpath misses target center by 6.2ft at 7682.0ft MD (7630.9 TVD, 798.1 N, 296.3 E)									
- Circle (radius 25.0)									

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S	+E/-W		
(ft)	(ft)	(ft)	(ft)	Comment	
9,795.0	9,743.6	788.7	280.2	Last Cathedral Survey @ 9,795' MD	

Checked By: _____ Approved By: _____ Date: _____