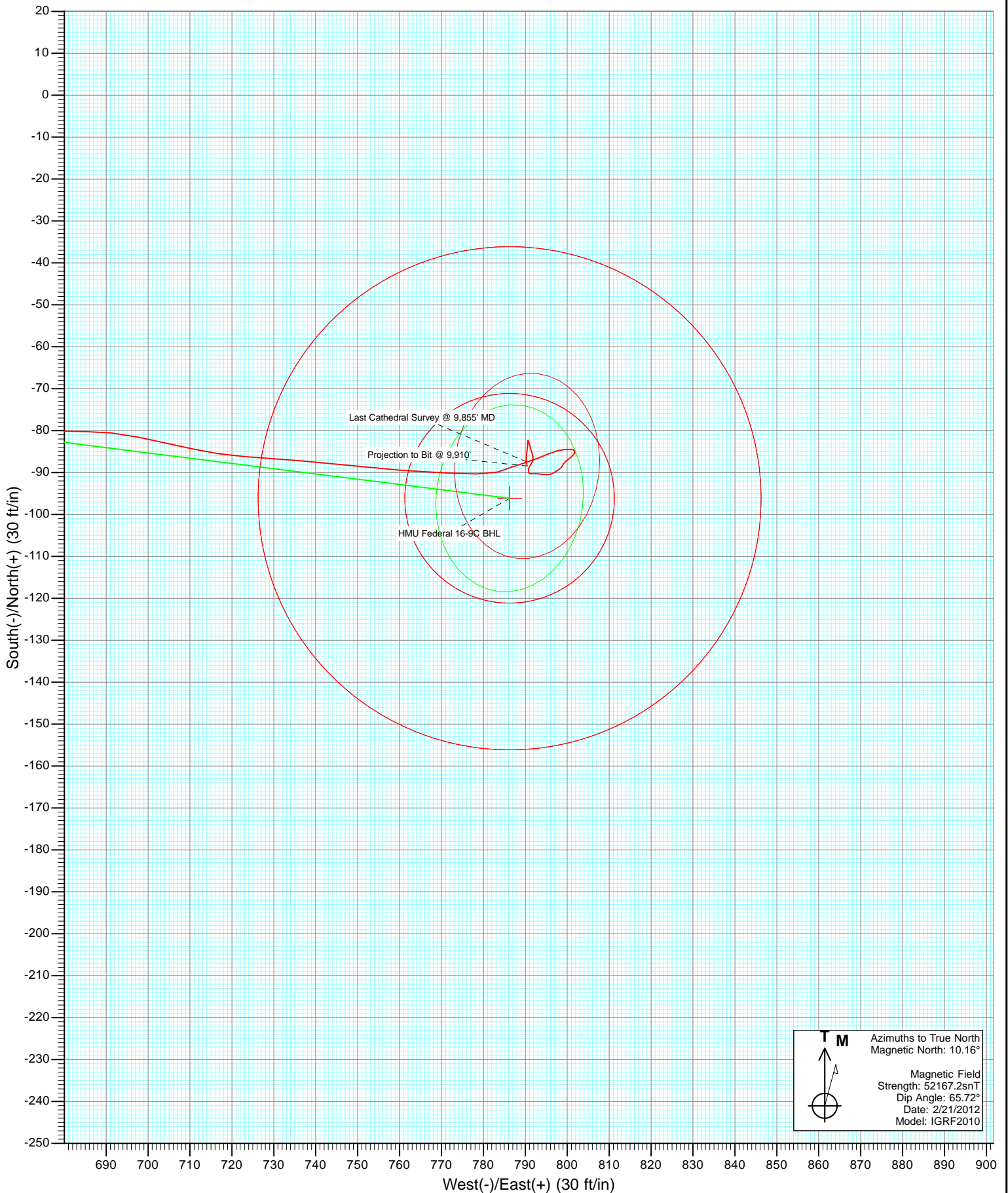


Azimuths to True North
 Magnetic North: 10.16°

Magnetic Field
 Strength: 52167.2snT
 Dip Angle: 65.72°
 Date: 2/21/2012
 Model: IGRF2010

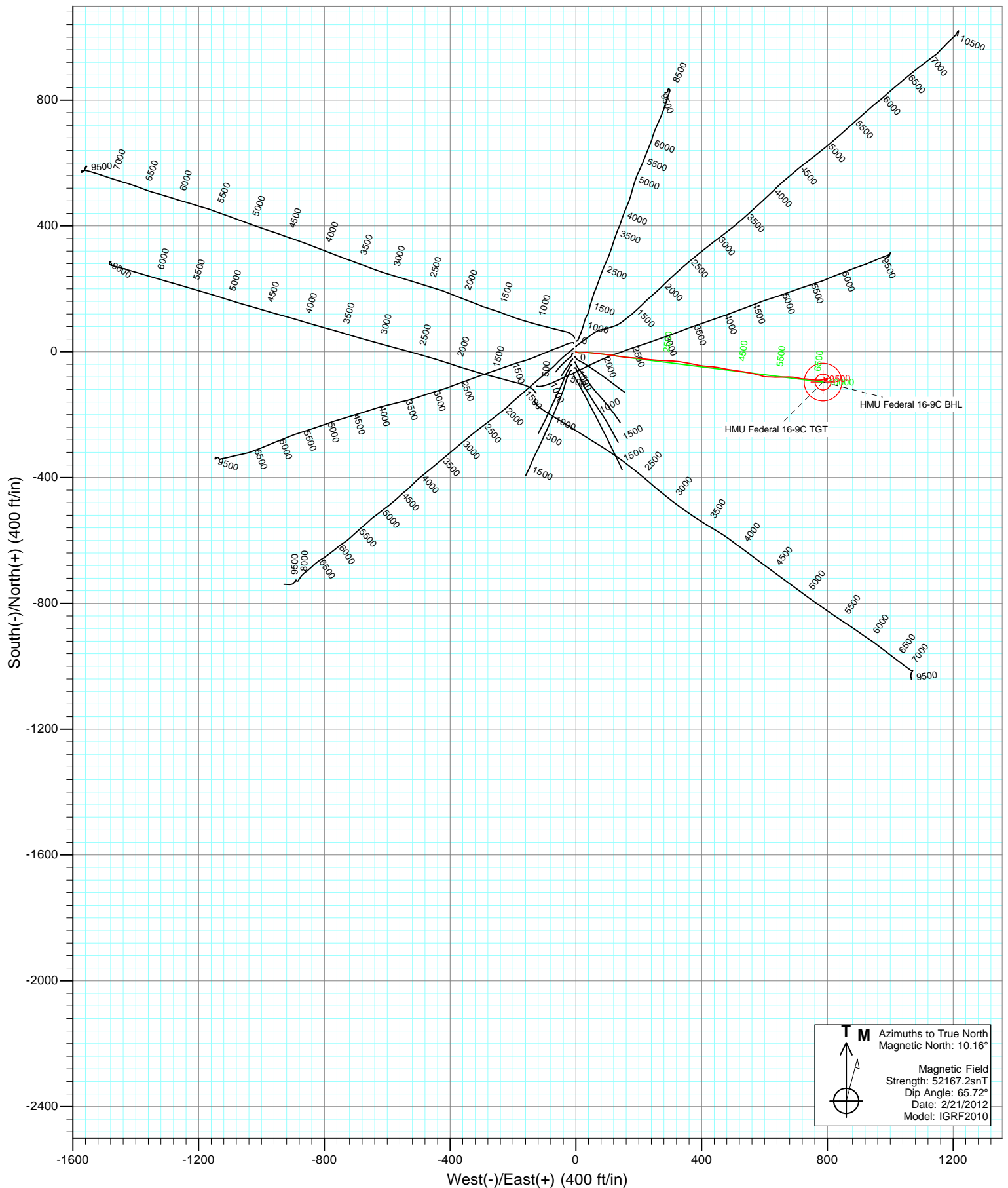


Project: Mamm Creek
Site: J16W Pad
Well: HMU Federal 16-9C
Wellbore: DD
Design: FINAL





Project: Mamm Creek
Site: J16W Pad
Well: HMU Federal 16-9C
Wellbore: DD
Design: FINAL



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-9C
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 16-9C	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 16-9C					
Well Position	+N/-S	0.0 ft	Northing:	1,594,342.90 ft	Latitude:	39.443133
	+E/-W	0.0 ft	Easting:	2,357,395.27 ft	Longitude:	-107.775667
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)
	IGRF2010	2/21/2012	10.16	65.72	52,167

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	96.97	

Survey Program	Date	3/5/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
110.0	9,910.0	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		
110.0	0.30	107.10	110.0	-0.1	0.3	0.3	0.27	0.27		
203.0	0.00	99.40	203.0	-0.2	0.5	0.5	0.32	-0.32		
234.0	0.50	186.00	234.0	-0.3	0.5	0.5	1.61	1.61		
264.0	0.80	155.60	264.0	-0.6	0.6	0.6	1.49	1.00		
294.0	0.80	117.10	294.0	-0.9	0.8	0.9	1.76	0.00		
325.0	1.70	115.90	325.0	-1.2	1.4	1.6	2.90	2.90		
356.0	1.80	112.30	356.0	-1.6	2.3	2.5	0.48	0.32		
386.0	3.20	105.10	385.9	-2.0	3.6	3.8	4.77	4.67		
417.0	4.00	100.30	416.9	-2.4	5.5	5.7	2.76	2.58		
448.0	5.10	95.50	447.8	-2.7	7.9	8.2	3.75	3.55		
479.0	5.70	90.30	478.6	-2.9	10.8	11.1	2.50	1.94		
571.0	6.70	87.30	570.1	-2.6	20.7	20.9	1.14	1.09		

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-9C
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 16-9C	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
662.0	6.50	87.70	660.5	-2.2	31.2	31.2	0.23	-0.22	
754.0	7.20	95.40	751.8	-2.5	42.1	42.1	1.25	0.76	
846.0	7.40	95.90	843.1	-3.7	53.8	53.8	0.23	0.22	
937.0	7.20	96.10	933.4	-4.9	65.3	65.4	0.22	-0.22	
1,030.0	7.70	97.10	1,025.6	-6.3	77.2	77.4	0.56	0.54	
1,122.0	8.10	97.60	1,116.7	-7.9	89.8	90.1	0.44	0.43	
1,213.0	7.80	97.90	1,206.8	-9.6	102.2	102.7	0.33	-0.33	
1,304.0	8.40	96.10	1,296.9	-11.1	115.0	115.5	0.72	0.66	
1,397.0	7.80	99.60	1,389.0	-12.9	127.9	128.6	0.83	-0.65	
1,488.0	8.00	98.60	1,479.1	-14.9	140.3	141.1	0.27	0.22	
1,540.0	8.40	97.30	1,530.6	-15.9	147.6	148.5	0.85	0.77	
1,647.0	7.20	96.00	1,636.6	-17.6	162.1	163.0	1.13	-1.12	
1,742.0	7.60	93.30	1,730.8	-18.6	174.3	175.2	0.56	0.42	
1,837.0	7.40	95.90	1,825.0	-19.6	186.6	187.6	0.41	-0.21	
1,933.0	7.40	94.80	1,920.2	-20.7	198.9	200.0	0.15	0.00	
2,028.0	7.10	96.30	2,014.4	-21.9	210.9	212.0	0.37	-0.32	
2,123.0	7.00	98.90	2,108.7	-23.4	222.4	223.6	0.35	-0.11	
2,219.0	7.70	94.50	2,203.9	-24.8	234.6	235.9	0.94	0.73	
2,315.0	7.50	94.00	2,299.1	-25.8	247.3	248.6	0.22	-0.21	
2,410.0	7.30	93.70	2,393.3	-26.6	259.5	260.8	0.21	-0.21	
2,504.0	7.50	93.30	2,486.5	-27.3	271.6	272.9	0.22	0.21	
2,600.0	8.10	93.10	2,581.6	-28.1	284.6	285.9	0.63	0.62	
2,695.0	7.80	93.40	2,675.7	-28.8	297.7	299.0	0.32	-0.32	
2,791.0	7.70	92.10	2,770.8	-29.4	310.6	311.9	0.21	-0.10	
2,887.0	8.00	98.80	2,865.9	-30.7	323.6	325.0	1.00	0.31	
2,950.0	7.90	97.50	2,928.3	-31.9	332.3	333.7	0.33	-0.16	
3,014.0	7.70	96.20	2,991.7	-33.0	340.9	342.4	0.42	-0.31	
3,078.0	7.80	101.70	3,055.2	-34.3	349.4	351.0	1.17	0.16	
3,142.0	7.70	103.10	3,118.6	-36.2	357.8	359.6	0.33	-0.16	
3,205.0	7.70	102.30	3,181.0	-38.0	366.1	368.0	0.17	0.00	
3,269.0	7.50	99.80	3,244.4	-39.6	374.4	376.4	0.60	-0.31	
3,333.0	7.30	100.80	3,307.9	-41.1	382.5	384.6	0.37	-0.31	
3,396.0	7.30	101.20	3,370.4	-42.6	390.3	392.6	0.08	0.00	
3,460.0	6.90	99.10	3,433.9	-44.0	398.1	400.5	0.74	-0.62	
3,523.0	6.90	97.20	3,496.5	-45.1	405.6	408.1	0.36	0.00	
3,587.0	6.30	94.30	3,560.0	-45.9	412.9	415.4	1.07	-0.94	
3,650.0	6.50	95.50	3,622.6	-46.5	419.9	422.5	0.38	0.32	
3,714.0	6.60	92.80	3,686.2	-47.0	427.2	429.8	0.51	0.16	
3,778.0	6.90	96.20	3,749.8	-47.6	434.7	437.3	0.78	0.47	
3,841.0	7.10	98.80	3,812.3	-48.6	442.3	444.9	0.59	0.32	
3,905.0	6.60	94.20	3,875.9	-49.5	449.9	452.6	1.16	-0.78	
3,969.0	7.00	101.80	3,939.4	-50.5	457.4	460.1	1.54	0.62	
4,032.0	7.10	103.00	4,001.9	-52.2	464.9	467.8	0.28	0.16	
4,128.0	6.80	101.80	4,097.2	-54.7	476.3	479.4	0.35	-0.31	
4,223.0	6.60	99.60	4,191.6	-56.7	487.2	490.4	0.34	-0.21	
4,318.0	6.20	98.20	4,286.0	-58.4	497.6	501.0	0.45	-0.42	
4,413.0	6.00	95.70	4,380.4	-59.6	507.6	511.1	0.35	-0.21	
4,507.0	6.70	101.10	4,473.9	-61.1	517.9	521.5	0.98	0.74	
4,603.0	6.20	100.70	4,569.3	-63.2	528.5	532.3	0.52	-0.52	
4,697.0	6.20	97.50	4,662.7	-64.8	538.5	542.4	0.37	0.00	
4,792.0	5.80	96.40	4,757.2	-66.0	548.4	552.3	0.44	-0.42	
4,888.0	5.70	101.30	4,852.7	-67.5	557.9	561.9	0.52	-0.10	
4,983.0	7.30	106.20	4,947.1	-70.1	568.3	572.6	1.78	1.68	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-9C
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 16-9C	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
5,078.0	6.80	106.10	5,041.4	-73.3	579.5	584.1	0.53	-0.53	
5,174.0	6.70	107.70	5,136.7	-76.6	590.3	595.2	0.22	-0.10	
5,267.0	7.00	96.30	5,229.1	-78.9	601.1	606.2	1.49	0.32	
5,362.0	6.40	92.70	5,323.4	-79.8	612.1	617.3	0.77	-0.63	
5,458.0	7.50	91.60	5,418.7	-80.2	623.7	628.9	1.15	1.15	
5,553.0	7.10	91.70	5,512.9	-80.5	635.8	640.9	0.42	-0.42	
5,648.0	6.90	90.10	5,607.2	-80.7	647.4	652.4	0.29	-0.21	
5,744.0	7.40	86.20	5,702.5	-80.3	659.3	664.2	0.73	0.52	
5,839.0	7.80	91.20	5,796.6	-80.0	671.9	676.6	0.81	0.42	
5,935.0	7.70	90.20	5,891.8	-80.2	684.8	689.5	0.17	-0.10	
6,030.0	7.90	101.50	5,985.9	-81.5	697.6	702.3	1.63	0.21	
6,126.0	7.70	102.90	6,081.0	-84.3	710.3	715.3	0.29	-0.21	
6,221.0	7.90	94.10	6,175.1	-86.2	723.0	728.1	1.27	0.21	
6,316.0	7.60	94.50	6,269.3	-87.1	735.8	740.9	0.32	-0.32	
6,412.0	7.40	96.40	6,364.4	-88.3	748.3	753.5	0.33	-0.21	
6,507.0	6.70	94.40	6,458.7	-89.4	759.9	765.1	0.78	-0.74	
6,602.0	5.80	92.40	6,553.2	-90.1	770.2	775.4	0.97	-0.95	
6,697.0	4.00	91.80	6,647.8	-90.4	778.3	783.5	1.90	-1.89	
6,793.0	2.20	71.10	6,743.7	-89.9	783.4	788.5	2.18	-1.87	
6,888.0	2.10	70.80	6,838.6	-88.7	786.8	791.7	0.11	-0.11	
6,983.0	2.20	72.50	6,933.5	-87.6	790.1	794.9	0.12	0.11	
7,078.0	1.40	68.40	7,028.5	-86.6	793.0	797.6	0.85	-0.84	
7,173.0	1.70	66.30	7,123.5	-85.6	795.3	799.8	0.32	0.32	
7,269.0	1.10	76.30	7,219.4	-84.8	797.5	801.9	0.67	-0.62	
7,364.0	1.30	83.00	7,314.4	-84.5	799.5	803.8	0.26	0.21	
7,462.0	1.10	102.30	7,412.4	-84.5	801.5	805.8	0.46	-0.20	
7,557.0	1.00	222.10	7,507.4	-85.3	801.8	806.3	1.91	-0.11	
7,652.0	1.00	229.30	7,602.3	-86.5	800.7	805.2	0.13	0.00	
7,745.0	0.60	234.90	7,695.3	-87.3	799.6	804.3	0.44	-0.43	
7,758.0	0.60	234.90	7,708.3	-87.4	799.5	804.2	0.00	0.00	
7,836.0	0.60	199.70	7,786.3	-88.0	799.1	803.8	0.47	0.00	
7,931.0	0.60	225.20	7,881.3	-88.8	798.5	803.4	0.28	0.00	
8,027.0	0.60	240.20	7,977.3	-89.4	797.8	802.7	0.16	0.00	
8,122.0	0.70	238.20	8,072.3	-90.0	796.8	801.9	0.11	0.11	
8,217.0	0.40	244.20	8,167.3	-90.4	796.0	801.1	0.32	-0.32	
8,310.0	0.70	275.90	8,260.3	-90.5	795.2	800.3	0.45	0.32	
8,406.0	0.70	273.40	8,356.3	-90.4	794.0	799.1	0.03	0.00	
8,501.0	0.60	279.90	8,451.3	-90.3	792.9	798.0	0.13	-0.11	
8,597.0	0.50	265.30	8,547.3	-90.3	792.0	797.1	0.18	-0.10	
8,692.0	0.30	267.30	8,642.3	-90.3	791.4	796.5	0.21	-0.21	
8,787.0	0.30	293.40	8,737.3	-90.2	790.9	796.0	0.14	0.00	
8,884.0	0.50	9.10	8,834.3	-89.7	790.7	795.8	0.53	0.21	
8,978.0	0.50	5.90	8,928.3	-88.9	790.8	795.8	0.03	0.00	
9,074.0	0.60	47.70	9,024.3	-88.1	791.2	796.1	0.42	0.10	
9,169.0	0.70	13.80	9,119.3	-87.2	791.8	796.5	0.41	0.11	
9,265.0	0.60	352.40	9,215.3	-86.2	791.8	796.4	0.27	-0.10	
9,360.0	1.30	338.00	9,310.3	-84.7	791.4	795.8	0.77	0.74	
9,455.0	1.40	350.60	9,405.2	-82.5	790.8	794.9	0.33	0.11	
9,551.0	1.10	177.60	9,501.2	-82.3	790.6	794.8	2.60	-0.31	
9,646.0	1.00	191.00	9,596.2	-84.0	790.5	794.8	0.28	-0.11	
9,741.0	0.90	183.20	9,691.2	-85.6	790.3	794.8	0.17	-0.11	
9,836.0	0.90	181.80	9,786.2	-87.1	790.2	794.9	0.02	0.00	
9,855.0	1.10	171.10	9,805.2	-87.4	790.2	795.0	1.44	1.05	Last Cathedral Survey @ 9,855' MD

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well HMU Federal 16-9C
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 16-9C	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
9,910.0	1.10	171.10	9,860.2	-88.4	790.4	795.3	0.00	0.00	Projection to Bit @ 9,910'

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									
HMU Federal 16-9C BHI	0.00	0.00	9,737.0	-96.1	786.2	1,594,227.10	2,358,178.85	39.442869	-107.772883
- actual wellpath misses target center by 10.6ft at 9787.0ft MD (9737.2 TVD, -86.3 N, 790.3 E)									
- Circle (radius 60.0)									
HMU Federal 16-9C TG	0.00	0.00	7,000.0	-96.1	786.2	1,594,227.10	2,358,178.85	39.442869	-107.772883
- actual wellpath misses target center by 11.0ft at 7049.2ft MD (6999.7 TVD, -86.9 N, 792.3 E)									
- Circle (radius 25.0)									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
9,855.0	9,805.2	-87.4	790.2	Last Cathedral Survey @ 9,855' MD
9,910.0	9,860.2	-88.4	790.4	Projection to Bit @ 9,910'

Checked By: _____ Approved By: _____ Date: _____