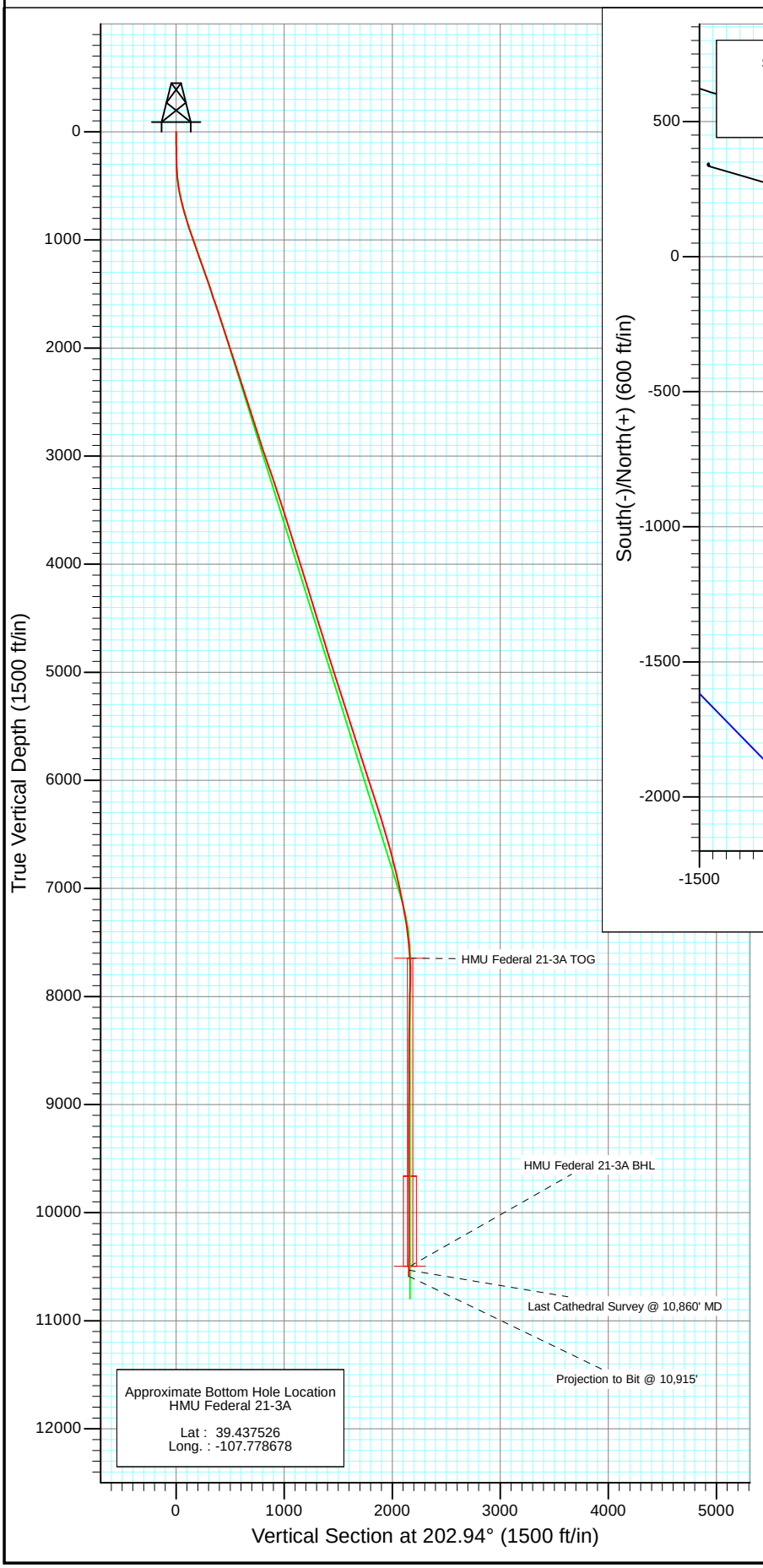
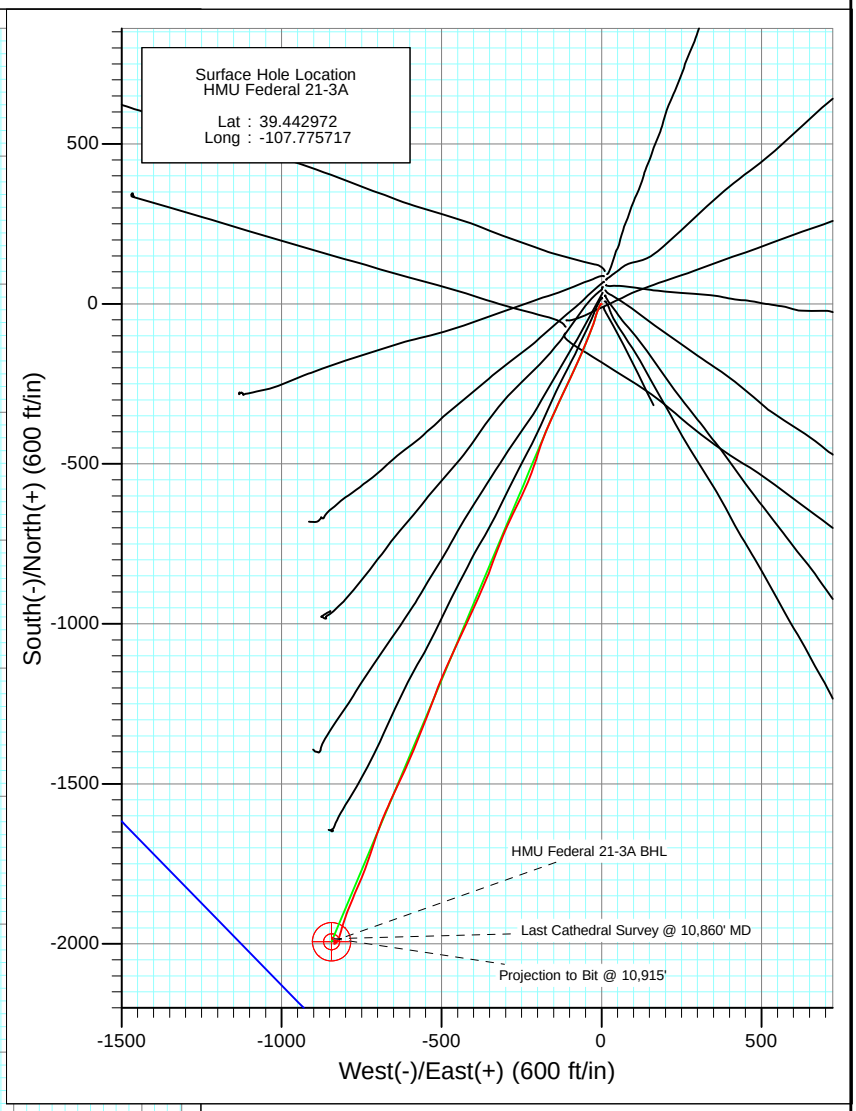
Project: Mamm Creek
Site: J16W Pad
Well: HMU Federal 21-3A
Wellbore: DD
Design: FINAL





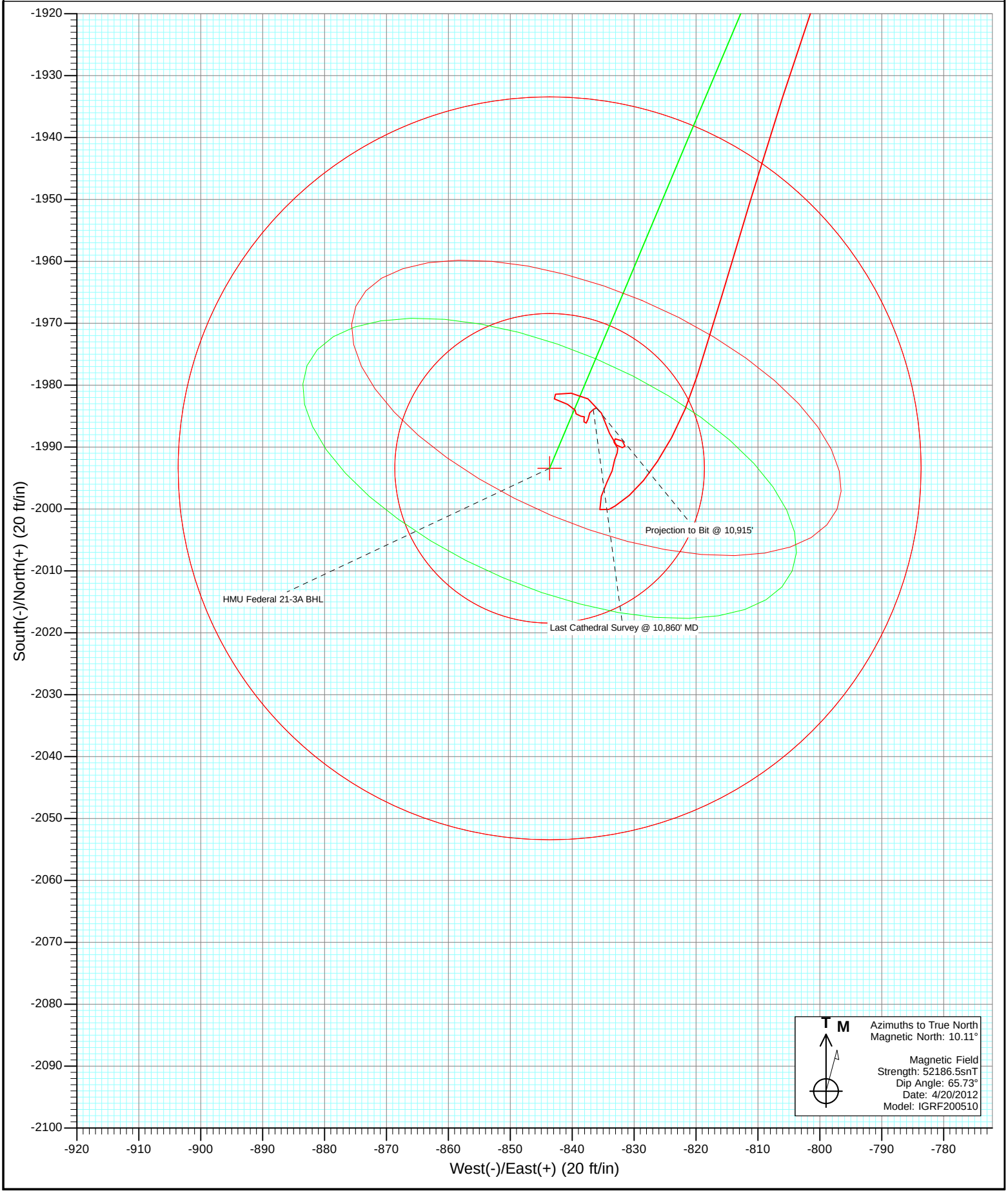
Azimuths to True North
Magnetic North: 10.11°

Magnetic Field
Strength: 52186.5snT
Dip Angle: 65.73°
Date: 4/20/2012
Model: IGRF200510

encana natural gas

Project: Mamm Creek
Site: J16W Pad
Well: HMU Federal 21-3A
Wellbore: DD
Design: FINAL

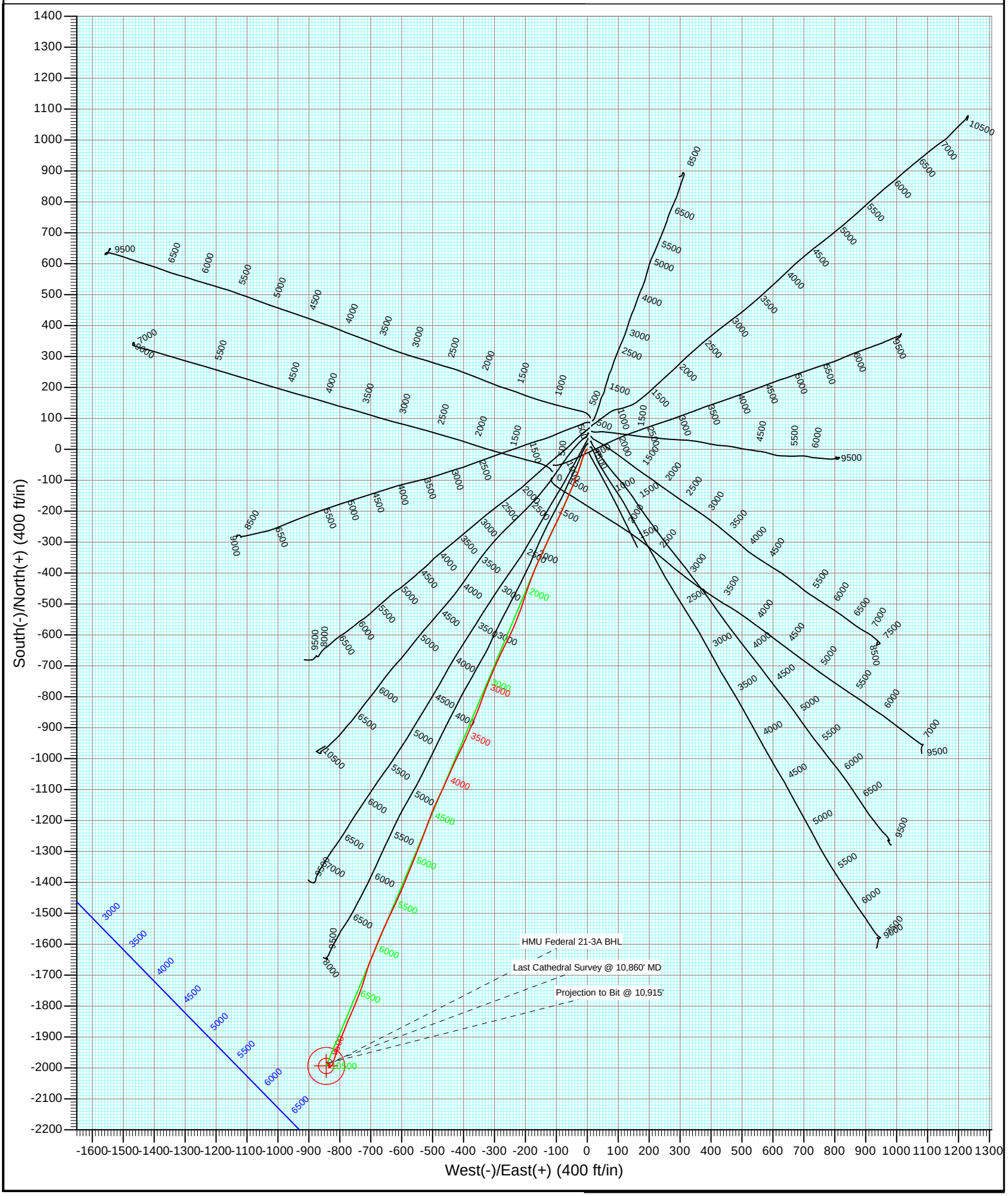
CATHEDRAL



encana natural gas

Project: Mamm Creek
Site: J16W Pad
Well: HMU Federal 21-3A
Wellbore: DD
Design: FINAL

CATHEDRAL



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	**Local Co-ordinate Reference:**	Well HMU Federal 21-3A
Project:	Mamm Creek	**TVD Reference:**	KBE @ 7667.0ft (Nabors M11)
Site:	J16W Pad	**MD Reference:**	KBE @ 7667.0ft (Nabors M11)
Well:	HMU Federal 21-3A	**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 21-3A

Well Position	**+N/-S**	0.0 ft	**Northing:**	1,594,284.62 ft	**Latitude:**	39.442972
	+E/-W	0.0 ft	**Easting:**	2,357,379.68 ft	**Longitude:**	-107.775717
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	4/20/2012	10.11	65.73	52,186

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	202.94

Survey Program **Date** 5/2/2012

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
81.0	10,915.0	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	
81.0	0.30	204.00	81.0	-0.2	-0.1	0.2	0.37	0.37	
112.0	0.50	232.20	112.0	-0.4	-0.2	0.4	0.89	0.65	
143.0	0.30	245.90	143.0	-0.5	-0.4	0.6	0.71	-0.65	
173.0	1.00	254.50	173.0	-0.6	-0.7	0.8	2.35	2.33	
204.0	1.30	244.10	204.0	-0.8	-1.3	1.2	1.18	0.97	
235.0	1.20	232.00	235.0	-1.1	-1.9	1.8	0.91	-0.32	
265.0	1.40	236.80	265.0	-1.5	-2.4	2.4	0.76	0.67	
295.0	2.00	226.00	295.0	-2.1	-3.1	3.2	2.26	2.00	
326.0	2.70	218.60	325.9	-3.1	-4.0	4.4	2.46	2.26	
357.0	3.60	212.90	356.9	-4.4	-4.9	6.0	3.07	2.90	
388.0	4.20	205.30	387.8	-6.3	-6.0	8.1	2.55	1.94	
419.0	5.70	195.50	418.7	-8.8	-6.9	10.8	5.54	4.84	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	**Local Co-ordinate Reference:**	Well HMU Federal 21-3A
Project:	Mamm Creek	**TVD Reference:**	KBE @ 7667.0ft (Nabors M11)
Site:	J16W Pad	**MD Reference:**	KBE @ 7667.0ft (Nabors M11)
Well:	HMU Federal 21-3A	**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
450.0	6.70	203.60	449.5	-11.9	-8.0	14.1	4.28	3.23	
480.0	7.60	202.80	479.3	-15.4	-9.5	17.8	3.02	3.00	
511.0	8.30	204.10	510.0	-19.3	-11.2	22.1	2.33	2.26	
542.0	9.70	202.70	540.6	-23.8	-13.1	27.0	4.57	4.52	
572.0	10.70	199.40	570.1	-28.7	-15.0	32.3	3.86	3.33	
603.0	12.10	198.20	600.5	-34.5	-17.0	38.4	4.58	4.52	
634.0	13.20	196.60	630.8	-41.0	-19.0	45.1	3.72	3.55	
664.0	13.90	196.60	659.9	-47.7	-21.0	52.1	2.33	2.33	
695.0	15.30	196.80	689.9	-55.2	-23.2	59.9	4.52	4.52	
725.0	16.00	199.20	718.8	-62.9	-25.7	68.0	3.18	2.33	
755.0	16.70	199.10	747.6	-70.9	-28.5	76.4	2.34	2.33	
848.0	17.80	203.20	836.4	-96.6	-38.5	103.9	1.76	1.18	
939.0	18.40	201.10	922.9	-122.8	-49.1	132.2	0.97	0.66	
1,031.0	18.60	203.60	1,010.2	-149.8	-60.2	161.4	0.89	0.22	
1,123.0	19.30	204.30	1,097.2	-177.1	-72.4	191.3	0.80	0.76	
1,214.0	19.60	203.70	1,183.0	-204.7	-84.7	221.6	0.40	0.33	
1,306.0	19.20	205.60	1,269.8	-232.5	-97.4	252.1	0.81	-0.43	
1,398.0	19.60	206.60	1,356.5	-259.9	-110.9	282.6	0.57	0.43	
1,490.0	18.60	203.80	1,443.5	-287.2	-123.7	312.7	1.47	-1.09	
1,582.0	18.90	204.30	1,530.6	-314.2	-135.8	342.2	0.37	0.33	
1,655.0	18.90	205.10	1,599.7	-335.7	-145.6	365.9	0.35	0.00	
1,739.0	18.60	205.50	1,679.2	-360.1	-157.2	392.9	0.39	-0.36	
1,835.0	18.50	201.80	1,770.2	-388.0	-169.4	423.4	1.23	-0.10	
1,930.0	18.40	201.10	1,860.3	-416.0	-180.4	453.4	0.26	-0.11	
2,025.0	17.80	199.50	1,950.6	-443.7	-190.7	482.9	0.82	-0.63	
2,120.0	17.20	196.60	2,041.2	-470.8	-199.5	511.4	1.11	-0.63	
2,216.0	18.20	198.20	2,132.7	-498.7	-208.3	540.4	1.16	1.04	
2,311.0	18.30	202.60	2,222.9	-526.5	-218.6	570.1	1.45	0.11	
2,407.0	18.10	200.10	2,314.1	-554.5	-229.6	600.1	0.84	-0.21	
2,502.0	18.30	203.90	2,404.4	-582.0	-240.7	629.7	1.27	0.21	
2,597.0	17.80	206.70	2,494.7	-608.6	-253.2	659.1	1.05	-0.53	
2,693.0	18.00	207.10	2,586.0	-634.9	-266.6	688.6	0.24	0.21	
2,788.0	17.40	204.70	2,676.5	-660.9	-279.2	717.4	0.99	-0.63	
2,884.0	18.10	204.50	2,768.0	-687.5	-291.4	746.7	0.73	0.73	
2,979.0	17.90	203.30	2,858.3	-714.3	-303.3	776.0	0.44	-0.21	
3,074.0	18.85	201.90	2,948.5	-742.0	-314.8	806.0	1.10	1.00	
3,169.0	18.70	201.30	3,038.4	-770.4	-326.0	836.5	0.26	-0.16	
3,265.0	19.20	200.30	3,129.2	-799.5	-337.1	867.7	0.62	0.52	
3,360.0	18.30	199.10	3,219.2	-828.3	-347.4	898.2	1.03	-0.95	
3,455.0	18.60	203.80	3,309.3	-856.2	-358.4	928.2	1.60	0.32	
3,551.0	18.40	202.20	3,400.3	-884.3	-370.3	958.7	0.57	-0.21	
3,646.0	18.10	204.20	3,490.6	-911.6	-382.0	988.4	0.73	-0.32	
3,742.0	17.50	203.30	3,582.0	-938.5	-393.8	1,017.8	0.69	-0.62	
3,837.0	17.80	206.10	3,672.5	-964.6	-405.9	1,046.5	0.95	0.32	
3,932.0	17.60	204.90	3,763.0	-990.7	-418.3	1,075.4	0.44	-0.21	
4,028.0	16.90	204.90	3,854.7	-1,016.5	-430.3	1,103.8	0.73	-0.73	
4,123.0	17.70	204.20	3,945.4	-1,042.2	-442.0	1,132.1	0.87	0.84	
4,219.0	16.90	204.40	4,037.0	-1,068.2	-453.8	1,160.6	0.84	-0.83	
4,314.0	17.90	204.40	4,127.7	-1,094.1	-465.5	1,189.0	1.05	1.05	
4,409.0	17.40	205.30	4,218.2	-1,120.2	-477.6	1,217.8	0.60	-0.53	
4,505.0	16.30	204.50	4,310.1	-1,145.5	-489.3	1,245.6	1.17	-1.15	
4,600.0	17.40	202.60	4,401.0	-1,170.7	-500.3	1,273.1	1.29	1.16	
4,696.0	17.00	200.20	4,492.7	-1,197.1	-510.7	1,301.5	0.85	-0.42	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	**Local Co-ordinate Reference:**	Well HMU Federal 21-3A
Project:	Mamm Creek	**TVD Reference:**	KBE @ 7667.0ft (Nabors M11)
Site:	J16W Pad	**MD Reference:**	KBE @ 7667.0ft (Nabors M11)
Well:	HMU Federal 21-3A	**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
4,791.0	17.70	200.20	4,583.4	-1,223.7	-520.5	1,329.8	0.74	0.74	
4,886.0	17.10	199.50	4,674.1	-1,250.5	-530.1	1,358.2	0.67	-0.63	
4,981.0	17.50	202.40	4,764.8	-1,276.8	-540.2	1,386.4	1.00	0.42	
5,076.0	16.70	201.70	4,855.6	-1,302.7	-550.7	1,414.3	0.87	-0.84	
5,171.0	17.30	201.90	4,946.4	-1,328.5	-561.0	1,442.1	0.63	0.63	
5,266.0	18.40	201.20	5,036.8	-1,355.6	-571.7	1,471.2	1.18	1.16	
5,361.0	17.70	202.90	5,127.2	-1,382.9	-582.8	1,500.6	0.92	-0.74	
5,457.0	18.50	203.30	5,218.4	-1,410.3	-594.5	1,530.5	0.84	0.83	
5,552.0	17.60	201.40	5,308.7	-1,437.5	-605.7	1,559.9	1.13	-0.95	
5,647.0	18.30	206.50	5,399.1	-1,464.2	-617.6	1,589.1	1.81	0.74	
5,742.0	17.30	205.60	5,489.6	-1,490.3	-630.3	1,618.1	1.09	-1.05	
5,837.0	17.70	204.50	5,580.2	-1,516.2	-642.4	1,646.7	0.55	0.42	
5,932.0	18.90	205.00	5,670.4	-1,543.3	-654.9	1,676.5	1.27	1.26	
6,027.0	17.90	203.20	5,760.5	-1,570.7	-667.2	1,706.5	1.21	-1.05	
6,122.0	18.00	201.70	5,850.9	-1,597.7	-678.3	1,735.8	0.50	0.11	
6,217.0	17.10	202.60	5,941.5	-1,624.2	-689.1	1,764.4	0.99	-0.95	
6,312.0	17.50	201.60	6,032.2	-1,650.4	-699.8	1,792.6	0.52	0.42	
6,407.0	18.20	198.40	6,122.6	-1,677.8	-709.7	1,821.7	1.27	0.74	
6,502.0	18.20	196.20	6,212.8	-1,706.1	-718.5	1,851.2	0.72	0.00	
6,597.0	17.30	198.70	6,303.3	-1,733.7	-727.2	1,880.1	1.24	-0.95	
6,693.0	17.20	200.60	6,395.0	-1,760.5	-736.8	1,908.5	0.60	-0.10	
6,788.0	16.30	202.40	6,486.0	-1,786.0	-746.8	1,935.8	1.09	-0.95	
6,883.0	16.10	203.60	6,577.2	-1,810.4	-757.1	1,962.3	0.41	-0.21	
6,978.0	15.50	203.90	6,668.6	-1,834.1	-767.6	1,988.2	0.64	-0.63	
7,072.0	14.60	201.50	6,759.4	-1,856.6	-777.0	2,012.6	1.16	-0.96	
7,167.0	13.40	202.30	6,851.5	-1,877.9	-785.6	2,035.6	1.28	-1.26	
7,262.0	12.40	201.40	6,944.2	-1,897.6	-793.5	2,056.8	1.07	-1.05	
7,357.0	11.30	198.80	7,037.1	-1,915.9	-800.2	2,076.3	1.29	-1.16	
7,453.0	11.00	197.90	7,131.3	-1,933.5	-806.0	2,094.8	0.36	-0.31	
7,548.0	10.20	196.60	7,224.7	-1,950.2	-811.2	2,112.2	0.88	-0.84	
7,644.0	8.90	196.90	7,319.4	-1,965.5	-815.8	2,128.0	1.35	-1.35	
7,740.0	7.30	197.40	7,414.4	-1,978.4	-819.8	2,141.5	1.67	-1.67	
7,835.0	5.90	208.50	7,508.8	-1,988.4	-823.9	2,152.3	1.99	-1.47	
7,930.0	4.22	220.00	7,603.4	-1,995.4	-828.5	2,160.5	2.06	-1.77	
8,026.0	3.20	238.70	7,699.2	-1,999.5	-833.0	2,166.1	1.64	-1.06	
8,121.0	1.00	346.60	7,794.2	-2,000.1	-835.5	2,167.6	3.83	-2.32	
8,215.0	1.70	16.80	7,888.1	-1,997.9	-835.3	2,165.5	1.04	0.74	
8,310.0	1.30	28.90	7,983.1	-1,995.7	-834.4	2,163.0	0.53	-0.42	
8,406.0	1.10	19.70	8,079.1	-1,993.8	-833.5	2,161.0	0.29	-0.21	
8,501.0	1.10	5.80	8,174.1	-1,992.1	-833.1	2,159.3	0.28	0.00	
8,596.0	0.50	51.10	8,269.1	-1,990.9	-832.7	2,158.0	0.87	-0.63	
8,692.0	0.60	332.00	8,365.1	-1,990.2	-832.6	2,157.3	0.73	0.10	
8,787.0	0.80	325.80	8,460.0	-1,989.2	-833.2	2,156.7	0.22	0.21	
8,882.0	0.70	91.40	8,555.0	-1,988.7	-833.0	2,156.1	1.41	-0.11	
8,978.0	0.80	121.00	8,651.0	-1,989.0	-831.9	2,156.0	0.41	0.10	
9,074.0	0.60	200.70	8,747.0	-1,989.8	-831.5	2,156.6	0.95	-0.21	
9,170.0	0.40	313.10	8,843.0	-1,990.1	-831.9	2,156.9	0.87	-0.21	
9,265.0	0.90	285.20	8,938.0	-1,989.7	-832.9	2,156.9	0.61	0.53	
9,360.0	2.10	346.80	9,033.0	-1,987.8	-834.0	2,155.6	1.95	1.26	
9,455.0	2.20	330.20	9,127.9	-1,984.5	-835.3	2,153.1	0.66	0.11	
9,551.0	1.70	298.60	9,223.9	-1,982.2	-837.4	2,151.9	1.21	-0.52	
9,646.0	1.80	280.10	9,318.8	-1,981.3	-840.1	2,152.1	0.60	0.11	
9,741.0	1.40	246.80	9,413.8	-1,981.5	-842.7	2,153.2	1.05	-0.42	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	**Local Co-ordinate Reference:**	Well HMU Federal 21-3A
Project:	Mamm Creek	**TVD Reference:**	KBE @ 7667.0ft (Nabors M11)
Site:	J16W Pad	**MD Reference:**	KBE @ 7667.0ft (Nabors M11)
Well:	HMU Federal 21-3A	**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
9,837.0	1.10	107.00	9,509.8	-1,982.2	-842.9	2,154.0	2.45	-0.31	
9,932.0	1.70	115.90	9,604.8	-1,983.1	-840.7	2,153.9	0.67	0.63	
10,027.0	0.40	188.40	9,699.7	-1,984.0	-839.5	2,154.3	1.71	-1.37	
10,123.0	0.40	143.10	9,795.7	-1,984.6	-839.4	2,154.8	0.32	0.00	
10,218.0	0.70	100.10	9,890.7	-1,985.0	-838.6	2,154.9	0.52	0.32	
10,314.0	0.00	348.30	9,986.7	-1,985.1	-838.0	2,154.7	0.73	-0.73	
10,409.0	0.31	193.30	10,081.7	-1,985.4	-838.1	2,155.0	0.33	0.33	
10,505.0	0.40	170.60	10,177.7	-1,985.9	-838.1	2,155.5	0.17	0.09	
10,600.0	0.44	63.40	10,272.7	-1,986.1	-837.7	2,155.5	0.71	0.04	
10,695.0	0.60	355.00	10,367.7	-1,985.4	-837.4	2,154.8	0.63	0.17	
10,790.0	0.70	33.30	10,462.7	-1,984.5	-837.1	2,153.8	0.46	0.11	
10,860.0	0.60	62.00	10,532.7	-1,983.9	-836.6	2,153.1	0.48	-0.14	**Last Cathedral Survey @ 10,860' MD**
10,915.0	0.60	62.00	10,587.7	-1,983.7	-836.1	2,152.7	0.00	0.00	**Projection to Bit @ 10,915'**

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
HMU Federal 21-3A TO(	0.00	0.00	7,646.0	-1,993.4	-843.6	1,592,312.95	2,356,486.38	39.437499	-107.778704
- actual wellpath misses target center by 13.8ft at 7973.1ft MD (7646.4 TVD, -1997.6 N, -830.5 E)									
- Circle (radius 25.0)									
HMU Federal 21-3A BHl	0.00	0.00	10,497.0	-1,993.4	-843.6	1,592,312.95	2,356,486.38	39.437499	-107.778704
- actual wellpath misses target center by 11.5ft at 10824.2ft MD (10496.9 TVD, -1984.2 N, -836.9 E)									
- Circle (radius 60.0)									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
10,860.0	10,532.7	-1,983.9	-836.6	Last Cathedral Survey @ 10,860' MD
10,915.0	10,587.7	-1,983.7	-836.1	Projection to Bit @ 10,915'

Checked By: _____ Approved By: _____ Date: _____