







# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Shideler Fee 31-9B
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 6921.0ft (Patterson 303)
<b>Site:</b>	K31E Pad	<b>MD Reference:</b>	KBE @ 6921.0ft (Patterson 303)
<b>Well:</b>	Shideler Fee 31-9B	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	Mamm Creek		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Central Zone		

Site		K31E Pad			
Site Position:		Northing:	1,578,791.89 ft	Latitude:	39.401699
From:	Lat/Long	Easting:	2,375,816.61 ft	Longitude:	-107.709119
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.39 °

Well	Shideler Fee 31-9B					
Well Position	+N/-S	0.0 ft	Northing:	1,578,806.13 ft	Latitude:	39.401740
	+E/-W	0.0 ft	Easting:	2,375,844.38 ft	Longitude:	-107.709022
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	6,899.0 ft

<b>Wellbore</b>	DD				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	10/8/2012	10.04	65.68	52,096

<b>Design</b>	DD				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	85.12	

<b>Survey Program</b>	<b>Date</b>	10/24/2012			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
79.0	8,540.0	Survey #1 (DD)	MWD	Geolink MWD	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Formations / Comments</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
79.0	0.30	185.60	79.0	-0.2	0.0	0.0	0.38	0.38		
110.0	0.40	179.90	110.0	-0.4	0.0	-0.1	0.34	0.32		
141.0	0.30	154.10	141.0	-0.6	0.0	0.0	0.59	-0.32		
171.0	0.30	145.10	171.0	-0.7	0.1	0.0	0.16	0.00		
202.0	0.40	170.60	202.0	-0.9	0.2	0.1	0.59	0.32		
232.0	0.40	152.00	232.0	-1.1	0.2	0.1	0.43	0.00		
263.0	0.60	159.80	263.0	-1.3	0.3	0.2	0.68	0.65		
294.0	0.70	132.10	294.0	-1.6	0.5	0.4	1.05	0.32		
325.0	1.50	110.70	325.0	-1.9	1.0	0.9	2.86	2.58		
356.0	2.30	105.30	356.0	-2.2	2.0	1.8	2.64	2.58		
386.0	2.60	97.10	385.9	-2.4	3.3	3.1	1.54	1.00		
417.0	3.30	94.20	416.9	-2.6	4.9	4.6	2.31	2.26		

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Shideler Fee 31-9B
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 6921.0ft (Patterson 303)
<b>Site:</b>	K31E Pad	<b>MD Reference:</b>	KBE @ 6921.0ft (Patterson 303)
<b>Well:</b>	Shideler Fee 31-9B	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	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
448.0	3.70	90.00	447.8	-2.6	6.8	6.5	1.53	1.29	
479.0	4.10	89.00	478.8	-2.6	8.9	8.6	1.31	1.29	
509.0	5.20	84.70	508.7	-2.5	11.3	11.0	3.84	3.67	
540.0	5.80	82.80	539.5	-2.2	14.2	14.0	2.02	1.94	
570.0	6.40	82.00	569.4	-1.7	17.4	17.2	2.02	2.00	
601.0	7.10	81.40	600.1	-1.2	21.0	20.8	2.27	2.26	
632.0	8.40	81.30	630.9	-0.6	25.1	25.0	4.19	4.19	
663.0	9.10	83.30	661.5	0.1	29.8	29.7	2.46	2.26	
755.0	12.30	84.20	751.9	1.9	46.8	46.8	3.48	3.48	
847.0	15.20	82.80	841.2	4.4	68.5	68.6	3.17	3.15	
939.0	18.00	83.10	929.4	7.6	94.6	94.9	3.04	3.04	
1,031.0	20.00	84.80	1,016.4	10.7	124.4	124.8	2.26	2.17	
1,124.0	23.10	85.70	1,102.9	13.6	158.4	159.0	3.35	3.33	
1,216.0	23.90	85.90	1,187.2	16.2	195.0	195.7	0.87	0.87	
1,308.0	24.20	85.40	1,271.3	19.1	232.4	233.2	0.39	0.33	
1,400.0	24.60	84.30	1,355.0	22.5	270.2	271.2	0.66	0.43	
1,500.0	24.60	84.30	1,446.0	26.6	311.7	312.8	0.00	0.00	
1,619.0	24.90	85.50	1,554.0	31.1	361.3	362.6	0.49	0.25	
1,711.0	25.10	85.50	1,637.4	34.1	400.0	401.5	0.22	0.22	
1,802.0	25.40	85.50	1,719.7	37.2	438.7	440.3	0.33	0.33	
1,894.0	25.80	85.50	1,802.7	40.3	478.4	480.1	0.43	0.43	
1,985.0	26.00	85.40	1,884.5	43.4	518.0	519.8	0.22	0.22	
2,077.0	26.20	84.90	1,967.2	46.9	558.3	560.3	0.32	0.22	
2,168.0	26.50	84.60	2,048.7	50.5	598.5	600.7	0.36	0.33	
2,259.0	26.70	83.00	2,130.1	55.0	639.0	641.4	0.82	0.22	
2,351.0	25.80	84.40	2,212.6	59.4	679.5	682.1	1.19	-0.98	
2,442.0	25.90	84.40	2,294.5	63.3	719.0	721.8	0.11	0.11	
2,534.0	26.10	83.30	2,377.2	67.6	759.1	762.1	0.57	0.22	
2,626.0	25.50	85.70	2,460.0	71.5	798.9	802.1	1.31	-0.65	
2,718.0	25.70	84.80	2,543.0	74.8	838.5	841.9	0.48	0.22	
2,810.0	25.40	84.40	2,626.0	78.5	878.0	881.5	0.38	-0.33	
2,901.0	24.00	87.30	2,708.7	81.3	915.9	919.5	2.03	-1.54	
2,993.0	23.80	87.10	2,792.8	83.1	953.2	956.8	0.23	-0.22	
3,085.0	24.60	87.50	2,876.7	84.9	990.8	994.5	0.89	0.87	
3,176.0	25.10	87.30	2,959.3	86.6	1,029.1	1,032.7	0.56	0.55	
3,268.0	25.20	87.50	3,042.5	88.4	1,068.1	1,071.8	0.14	0.11	
3,359.0	25.40	86.60	3,124.8	90.4	1,106.9	1,110.6	0.48	0.22	
3,451.0	26.20	86.30	3,207.6	92.9	1,146.9	1,150.7	0.88	0.87	
3,542.0	25.80	85.60	3,289.4	95.7	1,186.7	1,190.5	0.55	-0.44	
3,634.0	25.70	85.50	3,372.3	98.8	1,226.6	1,230.5	0.12	-0.11	
3,725.0	25.60	85.90	3,454.3	101.7	1,265.8	1,269.9	0.22	-0.11	
3,817.0	25.50	85.30	3,537.3	104.8	1,305.4	1,309.6	0.30	-0.11	
3,908.0	25.60	85.60	3,619.4	107.9	1,344.5	1,348.8	0.18	0.11	
4,000.0	25.60	85.10	3,702.4	111.1	1,384.1	1,388.6	0.23	0.00	
4,091.0	25.30	85.10	3,784.6	114.4	1,423.1	1,427.7	0.33	-0.33	
4,183.0	25.40	85.50	3,867.7	117.7	1,462.4	1,467.1	0.22	0.11	
4,275.0	25.10	85.80	3,950.9	120.6	1,501.5	1,506.3	0.35	-0.33	
4,366.0	25.30	84.80	4,033.3	123.8	1,540.1	1,545.1	0.52	0.22	
4,458.0	25.80	87.20	4,116.3	126.6	1,579.7	1,584.7	1.25	0.54	
4,549.0	24.10	82.60	4,198.8	129.9	1,617.9	1,623.1	2.83	-1.87	
4,641.0	23.90	85.20	4,282.8	133.9	1,655.1	1,660.5	1.17	-0.22	
4,732.0	24.90	84.70	4,365.7	137.2	1,692.5	1,698.1	1.12	1.10	
4,824.0	24.90	85.30	4,449.1	140.6	1,731.1	1,736.8	0.27	0.00	

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Shideler Fee 31-9B
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 6921.0ft (Patterson 303)
<b>Site:</b>	K31E Pad	<b>MD Reference:</b>	KBE @ 6921.0ft (Patterson 303)
<b>Well:</b>	Shideler Fee 31-9B	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	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
4,916.0	23.90	82.20	4,532.9	144.7	1,768.9	1,774.8	1.77	-1.09	
5,007.0	23.90	83.70	4,616.1	149.3	1,805.5	1,811.6	0.67	0.00	
5,098.0	23.10	85.50	4,699.6	152.7	1,841.6	1,847.9	1.18	-0.88	
5,190.0	22.40	83.90	4,784.4	156.0	1,877.0	1,883.5	1.02	-0.76	
5,281.0	22.20	83.70	4,868.6	159.7	1,911.3	1,918.0	0.24	-0.22	
5,373.0	21.30	85.20	4,954.1	163.0	1,945.3	1,952.1	1.15	-0.98	
5,465.0	20.60	86.80	5,040.0	165.3	1,978.1	1,985.0	0.98	-0.76	
5,556.0	18.60	85.90	5,125.7	167.2	2,008.5	2,015.5	2.22	-2.20	
5,648.0	18.00	84.80	5,213.0	169.6	2,037.3	2,044.4	0.75	-0.65	
5,739.0	16.80	84.80	5,299.9	172.0	2,064.4	2,071.6	1.32	-1.32	
5,831.0	16.10	84.80	5,388.1	174.4	2,090.4	2,097.6	0.76	-0.76	
5,922.0	15.10	85.70	5,475.8	176.4	2,114.8	2,122.1	1.13	-1.10	
6,014.0	14.70	85.20	5,564.7	178.3	2,138.4	2,145.8	0.46	-0.43	
6,106.0	12.70	86.20	5,654.0	179.9	2,160.1	2,167.6	2.19	-2.17	
6,198.0	11.00	86.20	5,744.1	181.2	2,178.9	2,186.4	1.85	-1.85	
6,290.0	8.60	80.40	5,834.7	182.9	2,194.5	2,202.1	2.82	-2.61	
6,381.0	8.20	77.90	5,924.8	185.4	2,207.5	2,215.3	0.60	-0.44	
6,473.0	7.10	76.50	6,015.9	188.1	2,219.5	2,227.4	1.21	-1.20	
6,565.0	6.70	85.10	6,107.3	189.9	2,230.3	2,238.4	1.20	-0.43	
6,656.0	5.70	84.30	6,197.7	190.8	2,240.1	2,248.2	1.10	-1.10	
6,748.0	4.20	95.50	6,289.4	190.9	2,248.0	2,256.1	1.93	-1.63	
6,840.0	1.90	108.40	6,381.3	190.1	2,252.8	2,260.8	2.59	-2.50	
6,930.0	1.80	197.10	6,471.2	188.3	2,253.8	2,261.7	2.87	-0.11	
7,022.0	1.30	197.00	6,563.2	185.9	2,253.1	2,260.8	0.54	-0.54	
7,114.0	1.10	184.20	6,655.2	184.1	2,252.7	2,260.2	0.36	-0.22	
7,205.0	0.80	171.10	6,746.2	182.6	2,252.8	2,260.1	0.40	-0.33	
7,297.0	0.80	151.40	6,838.2	181.4	2,253.2	2,260.4	0.30	0.00	
7,388.0	0.70	159.40	6,929.1	180.3	2,253.7	2,260.8	0.16	-0.11	
7,480.0	0.70	113.70	7,021.1	179.5	2,254.4	2,261.5	0.59	0.00	
7,572.0	0.70	100.00	7,113.1	179.2	2,255.5	2,262.5	0.18	0.00	
7,664.0	0.80	86.40	7,205.1	179.1	2,256.6	2,263.7	0.22	0.11	
7,755.0	0.50	261.10	7,296.1	179.1	2,256.9	2,263.9	1.43	-0.33	
7,846.0	0.40	293.10	7,387.1	179.2	2,256.2	2,263.3	0.29	-0.11	
7,938.0	0.80	343.10	7,479.1	179.9	2,255.7	2,262.9	0.68	0.43	
8,029.0	1.30	0.30	7,570.1	181.6	2,255.5	2,262.8	0.64	0.55	
8,121.0	1.60	1.30	7,662.1	183.9	2,255.6	2,263.0	0.33	0.33	
8,212.0	0.80	30.90	7,753.1	185.7	2,255.9	2,263.6	1.08	-0.88	
8,304.0	0.80	64.50	7,845.0	186.5	2,256.8	2,264.5	0.50	0.00	
8,395.0	0.60	77.20	7,936.0	186.9	2,257.9	2,265.6	0.28	-0.22	
8,485.0	0.70	163.50	8,026.0	186.5	2,258.5	2,266.2	0.99	0.11	Last Cathedral Survey @ 8,485' MD
8,540.0	0.70	163.50	8,081.0	185.9	2,258.7	2,266.3	0.00	0.00	Projection to Bit @ 8,540' MD

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Shideler Fee 31-9B
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 6921.0ft (Patterson 303)
<b>Site:</b>	K31E Pad	<b>MD Reference:</b>	KBE @ 6921.0ft (Patterson 303)
<b>Well:</b>	Shideler Fee 31-9B	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	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									
Shideler Fee 31-9B TGT	0.00	0.00	6,352.5	181.9	2,260.9	1,578,932.98	2,378,109.03	39.402239	-107.701021
- survey misses target center by 12.5ft at 6811.8ft MD (6353.1 TVD, 190.4 N, 2251.8 E)									
- Circle (radius 25.0)									
Shideler Fee 31-9B PBI-	0.00	0.00	8,018.0	181.9	2,260.9	1,578,932.98	2,378,109.03	39.402239	-107.701021
- survey misses target center by 5.3ft at 8477.0ft MD (8018.0 TVD, 186.6 N, 2258.5 E)									
- Circle (radius 50.0)									

Survey Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
8,485.0	8,026.0	186.5	2,258.5	Last Cathedral Survey @ 8,485' MD
8,540.0	8,081.0	185.9	2,258.7	Projection to Bit @ 8,540' MD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_