



Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well lone 1E-8H
Project:	DJ Wattenberg	TVD Reference:	WELL @ 4917.0ft (Ensign 135)
Site:	S8-T2N-R66W (lone)	MD Reference:	WELL @ 4917.0ft (Ensign 135)
Well:	lone 1E-8H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Project	DJ Wattenberg		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		S8-T2N-R66W (lone)			
Site Position:		Northing:	1,297,444.41 ft	Latitude:	40.147740
From:	Lat/Long	Easting:	3,196,240.52 ft	Longitude:	-104.798020
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.45 °

Well	lone 1E-8H					
Well Position	+N/-S	0.0 ft	Northing:	1,301,630.23 ft	Latitude:	40.159220
	+E/-W	0.0 ft	Easting:	3,196,716.09 ft	Longitude:	-104.796200
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,904.0 ft

Wellbore	Hz				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/12/2012	8.69	66.81	52,870

Design	FINAL				
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	192.83	

Survey Program	Date	9/28/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
139.0	11,788.0	Survey #1 (Hz)	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		
139.0	0.20	194.60	139.0	-0.2	-0.1	0.2	0.14	0.14		
231.0	0.60	350.50	231.0	0.1	-0.2	0.0	0.86	0.43		
323.0	1.50	323.20	323.0	1.5	-1.0	-1.3	1.09	0.98		
415.0	2.50	324.10	414.9	4.1	-2.9	-3.4	1.09	1.09		
507.0	3.90	309.50	506.8	7.7	-6.5	-6.1	1.75	1.52		
599.0	5.40	301.40	598.5	12.0	-12.6	-8.9	1.78	1.63		
691.0	6.10	293.30	690.0	16.2	-20.8	-11.1	1.16	0.76		
783.0	6.40	284.10	781.5	19.3	-30.2	-12.2	1.14	0.33		
829.0	6.70	280.40	827.2	20.5	-35.4	-12.1	1.13	0.65		
906.0	7.30	279.60	903.6	22.1	-44.6	-11.6	0.79	0.78		
998.0	8.50	280.10	994.7	24.3	-57.1	-11.0	1.31	1.30		
1,090.0	8.70	280.10	1,085.7	26.7	-70.6	-10.3	0.22	0.22		

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Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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
1,182.0	10.30	280.10	1,176.4	29.3	-85.5	-9.6	1.74	1.74	
1,274.0	11.60	281.00	1,266.7	32.5	-102.7	-8.9	1.43	1.41	
1,366.0	13.40	278.30	1,356.6	35.8	-122.4	-7.8	2.06	1.96	
1,458.0	14.20	277.30	1,445.9	38.8	-144.1	-5.8	0.91	0.87	
1,553.0	15.60	276.50	1,537.7	41.7	-168.3	-3.3	1.49	1.47	
1,648.0	16.00	272.80	1,629.1	43.8	-194.1	0.4	1.14	0.42	
1,742.0	14.80	271.70	1,719.7	44.8	-219.1	5.0	1.31	-1.28	
1,837.0	13.80	278.20	1,811.8	46.8	-242.4	8.2	1.99	-1.05	
1,932.0	14.00	281.70	1,904.0	50.7	-264.9	9.4	0.91	0.21	
2,027.0	13.40	280.40	1,996.3	55.1	-286.9	10.1	0.71	-0.63	
2,121.0	12.90	277.90	2,087.9	58.5	-308.1	11.4	0.81	-0.53	
2,216.0	12.60	279.90	2,180.5	61.7	-328.8	12.9	0.56	-0.32	
2,311.0	12.50	284.80	2,273.3	66.1	-348.9	13.0	1.13	-0.11	
2,406.0	13.50	284.50	2,365.8	71.5	-369.6	12.4	1.06	1.05	
2,501.0	12.40	284.50	2,458.4	76.8	-390.2	11.7	1.16	-1.16	
2,595.0	12.70	281.90	2,550.2	81.5	-410.1	11.6	0.68	0.32	
2,690.0	12.20	281.90	2,642.9	85.7	-430.1	12.0	0.53	-0.53	
2,785.0	12.50	283.80	2,735.7	90.2	-449.9	11.9	0.53	0.32	
2,880.0	13.50	283.00	2,828.3	95.2	-470.7	11.7	1.07	1.05	
2,974.0	13.00	282.80	2,919.8	100.0	-491.7	11.7	0.53	-0.53	
3,069.0	13.10	281.60	3,012.3	104.5	-512.7	11.9	0.30	0.11	
3,164.0	12.40	281.70	3,105.0	108.8	-533.2	12.4	0.74	-0.74	
3,259.0	11.70	281.20	3,197.9	112.7	-552.7	12.9	0.74	-0.74	
3,354.0	12.00	280.40	3,290.9	116.4	-571.8	13.5	0.36	0.32	
3,448.0	11.50	278.20	3,382.9	119.5	-590.7	14.7	0.71	-0.53	
3,543.0	11.30	284.00	3,476.0	123.1	-609.1	15.3	1.22	-0.21	
3,638.0	11.80	285.60	3,569.1	127.9	-627.5	14.6	0.63	0.53	
3,733.0	12.50	285.20	3,662.0	133.2	-646.8	13.7	0.74	0.74	
3,827.0	12.10	281.30	3,753.8	137.8	-666.3	13.6	0.98	-0.43	
3,922.0	12.00	279.70	3,846.7	141.4	-685.8	14.4	0.37	-0.11	
4,017.0	11.30	277.80	3,939.8	144.4	-704.7	15.7	0.84	-0.74	
4,112.0	12.50	280.20	4,032.7	147.5	-724.1	17.0	1.37	1.26	
4,206.0	13.70	279.20	4,124.3	151.0	-745.1	18.2	1.30	1.28	
4,301.0	12.40	281.50	4,216.8	154.9	-766.2	19.2	1.47	-1.37	
4,396.0	12.00	284.00	4,309.7	159.3	-785.7	19.2	0.70	-0.42	
4,491.0	12.50	284.60	4,402.5	164.3	-805.3	18.7	0.54	0.53	
4,586.0	12.70	276.70	4,495.2	168.1	-825.6	19.5	1.82	0.21	
4,681.0	13.10	276.60	4,587.8	170.5	-846.7	21.8	0.42	0.42	
4,775.0	14.20	277.70	4,679.2	173.3	-868.7	23.9	1.20	1.17	
4,870.0	12.90	281.10	4,771.5	176.9	-890.6	25.3	1.60	-1.37	
4,965.0	10.90	284.10	4,864.5	181.1	-909.7	25.4	2.20	-2.11	
5,060.0	10.00	282.00	4,957.9	185.0	-926.5	25.4	1.03	-0.95	
5,154.0	9.80	277.20	5,050.5	187.7	-942.4	26.3	0.90	-0.21	
5,249.0	8.50	277.50	5,144.3	189.7	-957.4	27.7	1.37	-1.37	
5,344.0	8.00	280.40	5,238.3	191.8	-970.9	28.6	0.68	-0.53	
5,439.0	6.90	277.40	5,332.5	193.7	-983.0	29.5	1.23	-1.16	
5,534.0	7.00	283.80	5,426.8	195.8	-994.3	29.9	0.82	0.11	
5,628.0	6.30	285.60	5,520.2	198.6	-1,004.9	29.6	0.78	-0.74	
5,723.0	5.00	282.90	5,614.7	200.9	-1,013.9	29.3	1.40	-1.37	
5,818.0	4.10	281.90	5,709.4	202.5	-1,021.3	29.3	0.95	-0.95	
5,912.0	2.80	278.60	5,803.3	203.6	-1,026.8	29.6	1.40	-1.38	
6,007.0	2.20	268.80	5,898.2	203.9	-1,030.9	30.2	0.77	-0.63	
6,102.0	2.30	275.40	5,993.1	204.0	-1,034.7	30.9	0.29	0.11	

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Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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
6,197.0	1.90	248.10	6,088.0	203.6	-1,038.0	32.0	1.12	-0.42	
6,291.0	1.40	209.10	6,182.0	202.0	-1,040.0	34.0	1.27	-0.53	
6,386.0	1.40	184.60	6,277.0	199.9	-1,040.7	36.3	0.63	0.00	
6,481.0	1.10	169.70	6,371.9	197.8	-1,040.6	38.3	0.46	-0.32	
6,513.0	1.10	166.30	6,403.9	197.2	-1,040.5	38.8	0.20	0.00	
6,576.0	1.60	150.80	6,466.9	195.8	-1,039.9	40.0	0.98	0.79	
6,607.0	2.50	157.10	6,497.9	194.8	-1,039.4	40.9	2.99	2.90	
6,639.0	3.60	173.20	6,529.9	193.2	-1,039.0	42.4	4.32	3.44	
6,670.0	4.70	178.10	6,560.8	191.0	-1,038.9	44.5	3.73	3.55	
6,702.0	5.60	178.80	6,592.7	188.1	-1,038.8	47.3	2.82	2.81	
6,734.0	6.80	177.30	6,624.5	184.6	-1,038.7	50.7	3.78	3.75	
6,765.0	7.90	175.90	6,655.2	180.7	-1,038.5	54.5	3.59	3.55	
6,797.0	10.20	179.10	6,686.8	175.7	-1,038.3	59.3	7.35	7.19	
6,828.0	13.20	187.00	6,717.2	169.4	-1,038.6	65.5	10.95	9.68	
6,860.0	16.70	190.50	6,748.1	161.2	-1,039.9	73.7	11.29	10.94	
6,891.0	19.80	189.50	6,777.5	151.7	-1,041.6	83.4	10.05	10.00	
6,923.0	23.30	185.40	6,807.3	140.0	-1,043.1	95.1	11.90	10.94	
6,954.0	26.60	181.60	6,835.4	127.0	-1,043.9	108.0	11.83	10.65	
6,986.0	29.40	180.60	6,863.6	112.0	-1,044.1	122.7	8.87	8.75	
7,018.0	31.10	181.50	6,891.3	95.9	-1,044.4	138.5	5.50	5.31	
7,049.0	32.30	183.20	6,917.6	79.6	-1,045.1	154.5	4.83	3.87	
7,081.0	34.70	185.40	6,944.3	62.0	-1,046.5	172.0	8.40	7.50	
7,112.0	37.80	186.10	6,969.3	43.7	-1,048.3	190.2	10.09	10.00	
7,144.0	41.50	185.50	6,994.0	23.4	-1,050.4	210.4	11.62	11.56	
7,176.0	44.30	183.90	7,017.4	1.7	-1,052.1	232.0	9.39	8.75	
7,207.0	48.00	182.50	7,038.9	-20.6	-1,053.4	254.0	12.37	11.94	
7,239.0	51.50	181.80	7,059.5	-45.0	-1,054.3	278.0	11.06	10.94	
7,270.0	53.60	181.60	7,078.4	-69.6	-1,055.0	302.2	6.79	6.77	
7,302.0	56.30	182.80	7,096.8	-95.8	-1,056.0	327.9	8.98	8.44	
7,334.0	58.20	182.60	7,114.1	-122.7	-1,057.3	354.4	5.96	5.94	
7,365.0	61.50	181.10	7,129.7	-149.4	-1,058.1	380.7	11.44	10.65	
7,397.0	65.10	180.40	7,144.0	-178.0	-1,058.5	408.7	11.42	11.25	
7,428.0	69.50	179.30	7,156.0	-206.6	-1,058.4	436.5	14.57	14.19	
7,460.0	74.60	178.20	7,165.8	-237.0	-1,057.8	466.0	16.27	15.94	
7,482.0	78.00	178.00	7,171.1	-258.4	-1,057.1	486.7	15.48	15.45	
7,542.0	82.50	177.20	7,181.2	-317.5	-1,054.6	543.8	7.61	7.50	
7,574.0	84.20	176.50	7,184.9	-349.2	-1,052.8	574.3	5.74	5.31	
7,606.0	86.30	175.70	7,187.6	-381.0	-1,050.7	604.8	7.02	6.56	
7,637.0	87.70	174.70	7,189.2	-411.9	-1,048.1	634.3	5.55	4.52	
7,669.0	89.60	175.40	7,189.9	-443.7	-1,045.3	664.8	6.33	5.94	
7,700.0	92.10	176.30	7,189.5	-474.6	-1,043.1	694.5	8.57	8.06	
7,732.0	94.00	177.20	7,187.8	-506.5	-1,041.3	725.2	6.57	5.94	
7,764.0	94.40	178.10	7,185.4	-538.4	-1,040.0	756.0	3.07	1.25	
7,795.0	93.80	178.90	7,183.2	-569.3	-1,039.1	785.9	3.22	-1.94	
7,827.0	92.80	179.40	7,181.4	-601.3	-1,038.7	817.0	3.49	-3.12	
7,858.0	92.00	179.90	7,180.1	-632.3	-1,038.5	847.1	3.04	-2.58	
7,890.0	90.60	179.40	7,179.4	-664.2	-1,038.3	878.3	4.65	-4.37	
7,921.0	89.50	179.50	7,179.3	-695.2	-1,038.0	908.4	3.56	-3.55	
7,953.0	89.80	179.10	7,179.5	-727.2	-1,037.6	939.5	1.56	0.94	
7,984.0	90.40	178.80	7,179.5	-758.2	-1,037.0	969.6	2.16	1.94	
8,016.0	90.00	178.70	7,179.4	-790.2	-1,036.3	1,000.7	1.29	-1.25	
8,111.0	89.10	178.10	7,180.1	-885.2	-1,033.7	1,092.7	1.14	-0.95	
8,206.0	89.50	179.80	7,181.3	-980.2	-1,031.9	1,184.9	1.84	0.42	

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8,300.0	88.40	180.40	7,183.0	-1,074.1	-1,032.1	1,276.5	1.33	-1.17	
8,395.0	88.40	180.10	7,185.6	-1,169.1	-1,032.5	1,369.2	0.32	0.00	
8,490.0	89.90	180.30	7,187.1	-1,264.1	-1,032.8	1,461.9	1.59	1.58	
8,585.0	90.30	180.30	7,186.9	-1,359.1	-1,033.3	1,554.6	0.42	0.42	
8,680.0	90.10	181.30	7,186.6	-1,454.1	-1,034.7	1,647.6	1.07	-0.21	
8,774.0	89.00	181.40	7,187.3	-1,548.0	-1,036.9	1,739.7	1.18	-1.17	
8,869.0	89.10	180.90	7,188.9	-1,643.0	-1,038.8	1,832.7	0.54	0.11	
8,964.0	90.20	180.80	7,189.4	-1,738.0	-1,040.2	1,925.6	1.16	1.16	
9,059.0	90.10	180.30	7,189.2	-1,833.0	-1,041.1	2,018.4	0.54	-0.11	
9,154.0	90.50	180.90	7,188.7	-1,928.0	-1,042.1	2,111.3	0.76	0.42	
9,248.0	91.30	180.50	7,187.2	-2,022.0	-1,043.3	2,203.2	0.95	0.85	
9,343.0	91.10	181.10	7,185.2	-2,116.9	-1,044.6	2,296.1	0.67	-0.21	
9,438.0	91.30	181.00	7,183.2	-2,211.9	-1,046.3	2,389.0	0.24	0.21	
9,533.0	90.60	182.20	7,181.7	-2,306.8	-1,049.0	2,482.2	1.46	-0.74	
9,627.0	89.50	181.10	7,181.6	-2,400.8	-1,051.7	2,574.4	1.65	-1.17	
9,722.0	89.50	180.70	7,182.4	-2,495.8	-1,053.2	2,667.4	0.42	0.00	
9,817.0	89.10	181.00	7,183.6	-2,590.8	-1,054.6	2,760.3	0.53	-0.42	
9,912.0	90.00	181.50	7,184.3	-2,685.7	-1,056.7	2,853.4	1.08	0.95	
10,007.0	89.80	181.00	7,184.5	-2,780.7	-1,058.7	2,946.4	0.57	-0.21	
10,101.0	89.10	180.70	7,185.4	-2,874.7	-1,060.1	3,038.4	0.81	-0.74	
10,196.0	89.80	180.30	7,186.3	-2,969.7	-1,061.0	3,131.2	0.85	0.74	
10,291.0	89.30	179.50	7,187.1	-3,064.7	-1,060.8	3,223.8	0.99	-0.53	
10,385.0	90.00	179.40	7,187.6	-3,158.7	-1,059.9	3,315.2	0.75	0.74	
10,480.0	90.40	178.20	7,187.3	-3,253.7	-1,057.9	3,407.4	1.33	0.42	
10,575.0	90.10	177.80	7,186.9	-3,348.6	-1,054.6	3,499.2	0.53	-0.32	
10,670.0	89.90	177.60	7,186.9	-3,443.5	-1,050.8	3,590.9	0.30	-0.21	
10,765.0	90.10	178.80	7,186.9	-3,538.5	-1,047.8	3,682.8	1.28	0.21	
10,859.0	88.40	178.10	7,188.1	-3,632.4	-1,045.2	3,773.9	1.96	-1.81	
10,954.0	88.30	177.70	7,190.8	-3,727.3	-1,041.8	3,865.6	0.43	-0.11	
11,049.0	88.70	178.80	7,193.3	-3,822.3	-1,038.9	3,957.5	1.23	0.42	
11,097.0	89.60	176.90	7,194.0	-3,870.2	-1,037.1	4,003.9	4.38	1.87	
11,144.0	89.50	177.20	7,194.4	-3,917.2	-1,034.6	4,049.1	0.67	-0.21	
11,191.0	89.60	176.90	7,194.8	-3,964.1	-1,032.2	4,094.3	0.67	0.21	
11,238.0	89.70	176.10	7,195.1	-4,011.0	-1,029.4	4,139.4	1.72	0.21	
11,285.0	88.00	176.20	7,196.0	-4,057.9	-1,026.2	4,184.4	3.62	-3.62	
11,333.0	87.00	177.10	7,198.1	-4,105.8	-1,023.4	4,230.5	2.80	-2.08	
11,380.0	86.60	177.70	7,200.7	-4,152.6	-1,021.3	4,275.7	1.53	-0.85	
11,428.0	86.90	177.40	7,203.5	-4,200.5	-1,019.2	4,322.0	0.88	0.62	
11,475.0	86.80	178.80	7,206.0	-4,247.4	-1,017.7	4,367.4	2.98	-0.21	
11,523.0	87.30	181.60	7,208.5	-4,295.3	-1,017.8	4,414.1	5.92	1.04	
11,570.0	87.70	182.10	7,210.6	-4,342.3	-1,019.3	4,460.2	1.36	0.85	
11,617.0	87.50	181.40	7,212.5	-4,389.2	-1,020.8	4,506.3	1.55	-0.43	
11,664.0	87.70	181.10	7,214.5	-4,436.2	-1,021.8	4,552.3	0.77	0.43	
11,712.0	88.10	180.50	7,216.2	-4,484.1	-1,022.5	4,599.2	1.50	0.83	
11,738.0	88.60	180.70	7,217.0	-4,510.1	-1,022.7	4,624.6	2.07	1.92	Last Cathedral Survey @ 11,738' MD
11,788.0	88.60	180.70	7,218.2	-4,560.1	-1,023.4	4,673.5	0.00	0.00	Projection to Bit @ 11,788' MD

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well lone 1E-8H
Project:	DJ Wattenberg	TVD Reference:	WELL @ 4917.0ft (Ensign 135)
Site:	S8-T2N-R66W (lone)	MD Reference:	WELL @ 4917.0ft (Ensign 135)
Well:	lone 1E-8H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
lone 1E-8H TGT 1	0.00	0.00	7,192.0	-3,498.5	-1,045.5	1,298,123.56	3,195,698.36	40.149616	-104.799940
- actual wellpath misses target center by 6.0ft at 10725.1ft MD (7186.9 TVD, -3498.6 N, -1048.8 E)									
- Point									
lone 1E-8H PBHL	0.00	0.00	7,217.9	-4,589.9	-1,045.5	1,297,032.20	3,195,707.02	40.146620	-104.799940
- actual wellpath misses target center by 37.2ft at 11788.0ft MD (7218.2 TVD, -4560.1 N, -1023.4 E)									
- Point									
lone 1E-8H TGT 2	0.00	0.00	7,201.6	-4,098.5	-1,045.5	1,297,523.58	3,195,703.12	40.147969	-104.799940
- actual wellpath misses target center by 22.1ft at 11324.6ft MD (7197.7 TVD, -4097.4 N, -1023.8 E)									
- Point									

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
11,738.0	7,217.0	-4,510.1	-1,022.7	Last Cathedral Survey @ 11,738' MD
11,788.0	7,218.2	-4,560.1	-1,023.4	Projection to Bit @ 11,788' MD

Checked By: _____ Approved By: _____ Date: _____