



HP

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3E-4H
Project:	DJ Wattenberg	TVD Reference:	30' KB @ 5107.0ft (H&P 522)
Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3E-4H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM R5000 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		S4-T3N-R68W (Minch)			
Site Position:		Northing:	1,334,165.55 ft	Latitude:	40.249600
From:	Lat/Long	Easting:	3,139,290.53 ft	Longitude:	-105.001000
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.32 °

Well	Minch 3E-4H					
Well Position	+N/-S	0.0 ft	Northing:	1,335,096.62 ft	Latitude:	40.252220
	+E/-W	0.0 ft	Easting:	3,135,076.12 ft	Longitude:	-105.016080
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,077.0 ft

Wellbore	Hz				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/25/2014	8.51	66.77	52,654

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	90.00	

Survey Program	Date	1/2/2015			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
182.0	11,752.0	Surveys (Hz)	Geolink 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		
182.0	0.31	353.14	182.0	0.5	-0.1	-0.1	0.17	0.17		
228.0	0.44	338.99	228.0	0.8	-0.1	-0.1	0.34	0.28		
320.0	0.40	239.67	320.0	0.9	-0.5	-0.5	0.70	-0.04		
412.0	0.48	245.56	412.0	0.6	-1.2	-1.2	0.10	0.09		
504.0	0.57	233.17	504.0	0.2	-1.9	-1.9	0.16	0.10		
596.0	0.88	256.46	596.0	-0.3	-2.9	-2.9	0.46	0.34		
688.0	0.75	230.44	688.0	-0.8	-4.1	-4.1	0.42	-0.14		
780.0	0.75	210.23	780.0	-1.7	-4.9	-4.9	0.29	0.00		
823.0	0.88	236.42	823.0	-2.1	-5.3	-5.3	0.91	0.30		
925.0	0.70	232.20	925.0	-2.9	-6.4	-6.4	0.19	-0.18		
1,020.0	2.90	233.30	1,019.9	-4.7	-8.8	-8.8	2.32	2.32		
1,112.0	5.30	229.70	1,111.7	-8.9	-13.9	-13.9	2.62	2.61		

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Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3E-4H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM R5000 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
1,204.0	6.80	219.50	1,203.1	-15.8	-20.6	-20.6	2.00	1.63	
1,295.0	6.50	214.20	1,293.5	-24.2	-26.9	-26.9	0.75	-0.33	
1,387.0	6.60	211.90	1,384.9	-33.0	-32.7	-32.7	0.31	0.11	
1,479.0	6.20	233.30	1,476.4	-40.5	-39.4	-39.4	2.61	-0.43	
1,571.0	6.10	232.60	1,567.8	-46.4	-47.3	-47.3	0.14	-0.11	
1,663.0	6.20	229.40	1,659.3	-52.6	-55.0	-55.0	0.39	0.11	
1,755.0	6.10	226.80	1,750.8	-59.2	-62.3	-62.3	0.32	-0.11	
1,847.0	6.00	225.00	1,842.3	-66.0	-69.3	-69.3	0.23	-0.11	
1,939.0	6.00	224.00	1,933.8	-72.8	-76.0	-76.0	0.11	0.00	
2,031.0	6.10	219.80	2,025.3	-80.0	-82.5	-82.5	0.49	0.11	
2,123.0	5.90	223.00	2,116.8	-87.3	-88.8	-88.8	0.42	-0.22	
2,215.0	5.90	219.10	2,208.3	-94.4	-95.0	-95.0	0.44	0.00	
2,306.0	5.80	221.20	2,298.8	-101.5	-101.0	-101.0	0.26	-0.11	
2,398.0	5.80	222.10	2,390.3	-108.4	-107.2	-107.2	0.10	0.00	
2,490.0	5.90	222.30	2,481.8	-115.4	-113.5	-113.5	0.11	0.11	
2,582.0	6.10	223.70	2,573.3	-122.4	-120.0	-120.0	0.27	0.22	
2,674.0	6.10	223.90	2,664.8	-129.4	-126.8	-126.8	0.02	0.00	
2,766.0	5.80	226.00	2,756.3	-136.2	-133.5	-133.5	0.40	-0.33	
2,858.0	6.70	217.40	2,847.8	-143.7	-140.1	-140.1	1.41	0.98	
2,950.0	6.80	220.00	2,939.1	-152.1	-146.9	-146.9	0.35	0.11	
3,042.0	6.60	220.20	3,030.5	-160.3	-153.8	-153.8	0.22	-0.22	
3,133.0	6.60	221.50	3,120.9	-168.3	-160.7	-160.7	0.16	0.00	
3,228.0	6.50	222.60	3,215.3	-176.3	-167.9	-167.9	0.17	-0.11	
3,322.0	6.40	219.60	3,308.7	-184.3	-174.9	-174.9	0.37	-0.11	
3,417.0	7.10	223.40	3,403.0	-192.6	-182.3	-182.3	0.87	0.74	
3,512.0	6.30	213.60	3,497.4	-201.2	-189.2	-189.2	1.47	-0.84	
3,606.0	6.80	218.30	3,590.8	-209.9	-195.5	-195.5	0.78	0.53	
3,701.0	5.80	209.40	3,685.2	-218.5	-201.3	-201.3	1.47	-1.05	
3,795.0	6.20	207.70	3,778.7	-227.1	-206.0	-206.0	0.47	0.43	
3,890.0	4.40	217.10	3,873.3	-234.5	-210.6	-210.6	2.10	-1.89	
3,984.0	4.10	216.80	3,967.0	-240.1	-214.8	-214.8	0.32	-0.32	
4,079.0	4.80	239.30	4,061.7	-244.9	-220.3	-220.3	1.96	0.74	
4,268.0	5.80	233.90	4,249.9	-254.5	-234.8	-234.8	0.59	0.53	
4,363.0	7.20	223.10	4,344.3	-261.7	-242.7	-242.7	1.95	1.47	
4,457.0	6.90	222.40	4,437.6	-270.2	-250.5	-250.5	0.33	-0.32	
4,552.0	6.50	223.30	4,532.0	-278.3	-258.1	-258.1	0.44	-0.42	
4,646.0	6.10	218.50	4,625.4	-286.1	-264.8	-264.8	0.70	-0.43	
4,741.0	6.10	221.80	4,719.9	-293.8	-271.3	-271.3	0.37	0.00	
4,835.0	5.70	221.70	4,813.4	-301.0	-277.8	-277.8	0.43	-0.43	
4,930.0	5.30	223.50	4,907.9	-307.7	-283.9	-283.9	0.46	-0.42	
5,024.0	6.20	215.90	5,001.5	-315.0	-289.9	-289.9	1.25	0.96	
5,119.0	5.60	216.90	5,096.0	-322.8	-295.7	-295.7	0.64	-0.63	
5,213.0	7.30	220.80	5,189.4	-331.0	-302.4	-302.4	1.87	1.81	
5,308.0	6.70	218.90	5,283.6	-339.9	-309.8	-309.8	0.68	-0.63	
5,403.0	6.00	222.00	5,378.1	-347.9	-316.6	-316.6	0.82	-0.74	
5,497.0	5.10	219.70	5,471.6	-354.8	-322.5	-322.5	0.99	-0.96	
5,592.0	6.90	218.10	5,566.1	-362.5	-328.8	-328.8	1.90	1.89	
5,686.0	6.10	216.50	5,659.5	-371.0	-335.2	-335.2	0.87	-0.85	
5,781.0	8.10	228.40	5,753.8	-379.5	-343.2	-343.2	2.60	2.11	
5,876.0	7.40	227.70	5,847.9	-388.0	-352.7	-352.7	0.74	-0.74	
5,970.0	6.80	225.90	5,941.2	-396.0	-361.2	-361.2	0.68	-0.64	
6,065.0	6.20	219.40	6,035.6	-403.9	-368.5	-368.5	1.00	-0.63	
6,159.0	6.40	216.70	6,129.0	-412.0	-374.9	-374.9	0.38	0.21	

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Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3E-4H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM R5000 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
6,254.0	5.80	217.80	6,223.5	-420.0	-381.0	-381.0	0.64	-0.63	
6,348.0	4.60	219.30	6,317.1	-426.7	-386.3	-386.3	1.28	-1.28	
6,443.0	4.60	207.90	6,411.8	-433.0	-390.5	-390.5	0.96	0.00	
6,537.0	6.20	211.50	6,505.4	-440.7	-394.9	-394.9	1.74	1.70	
6,584.0	5.50	210.90	6,552.1	-444.8	-397.4	-397.4	1.50	-1.49	
6,632.0	5.00	201.20	6,599.9	-448.7	-399.3	-399.3	2.12	-1.04	
6,679.0	8.40	152.70	6,646.6	-453.6	-398.5	-398.5	13.42	7.23	
6,726.0	12.60	143.30	6,692.8	-460.8	-393.8	-393.8	9.62	8.94	
6,773.0	13.10	133.90	6,738.6	-468.6	-386.9	-386.9	4.57	1.06	
6,820.0	16.40	120.10	6,784.1	-475.6	-377.3	-377.3	10.21	7.02	
6,867.0	23.30	109.90	6,828.3	-482.1	-362.8	-362.8	16.37	14.68	
6,915.0	30.20	101.90	6,871.1	-487.9	-342.1	-342.1	16.19	14.37	
6,962.0	34.60	98.30	6,910.8	-492.2	-317.3	-317.3	10.22	9.36	
7,009.0	36.40	95.80	6,949.1	-495.6	-290.2	-290.2	4.92	3.83	
7,056.0	39.40	95.60	6,986.2	-498.4	-261.5	-261.5	6.39	6.38	
7,104.0	44.00	94.60	7,022.0	-501.3	-229.7	-229.7	9.68	9.58	
7,151.0	47.20	92.90	7,054.9	-503.4	-196.2	-196.2	7.28	6.81	
7,199.0	50.70	90.80	7,086.4	-504.6	-160.0	-160.0	8.00	7.29	
7,246.0	55.30	89.50	7,114.7	-504.7	-122.5	-122.5	10.03	9.79	
7,293.0	59.10	89.10	7,140.1	-504.2	-83.0	-83.0	8.12	8.09	
7,340.0	64.90	88.00	7,162.2	-503.1	-41.5	-41.5	12.51	12.34	
7,387.0	70.30	85.70	7,180.1	-500.7	1.8	1.8	12.35	11.49	
7,432.0	75.00	84.50	7,193.5	-497.1	44.6	44.6	10.75	10.44	
7,479.0	79.90	85.00	7,203.7	-492.9	90.3	90.3	10.48	10.43	
7,574.0	91.90	89.50	7,210.5	-488.4	184.8	184.8	13.48	12.63	
7,668.0	92.30	91.30	7,207.1	-489.0	278.7	278.7	1.96	0.43	
7,763.0	91.60	92.10	7,203.8	-491.8	373.6	373.6	1.12	-0.74	
7,857.0	90.10	91.80	7,202.4	-495.0	467.5	467.5	1.63	-1.60	
7,952.0	90.90	91.80	7,201.6	-498.0	562.5	562.5	0.84	0.84	
8,046.0	91.60	91.70	7,199.6	-500.9	656.4	656.4	0.75	0.74	
8,140.0	88.40	89.50	7,199.6	-501.9	750.4	750.4	4.13	-3.40	
8,235.0	88.80	89.10	7,201.9	-500.7	845.3	845.3	0.60	0.42	
8,329.0	89.70	89.20	7,203.1	-499.3	939.3	939.3	0.96	0.96	
8,424.0	92.20	89.50	7,201.5	-498.2	1,034.3	1,034.3	2.65	2.63	
8,518.0	91.90	91.70	7,198.2	-499.2	1,128.2	1,128.2	2.36	-0.32	
8,613.0	89.10	90.20	7,197.3	-500.8	1,223.2	1,223.2	3.34	-2.95	
8,707.0	88.50	90.20	7,199.3	-501.1	1,317.2	1,317.2	0.64	-0.64	
8,802.0	87.30	88.90	7,202.8	-500.4	1,412.1	1,412.1	1.86	-1.26	
8,896.0	87.40	89.70	7,207.1	-499.2	1,506.0	1,506.0	0.86	0.11	
8,991.0	94.30	87.60	7,205.7	-497.0	1,600.9	1,600.9	7.59	7.26	
9,085.0	93.20	89.70	7,199.6	-494.8	1,694.6	1,694.6	2.52	-1.17	
9,180.0	90.50	90.80	7,196.5	-495.2	1,789.6	1,789.6	3.07	-2.84	
9,274.0	90.50	90.20	7,195.7	-496.0	1,883.6	1,883.6	0.64	0.00	
9,369.0	90.90	90.70	7,194.5	-496.8	1,978.6	1,978.6	0.67	0.42	
9,463.0	90.50	91.10	7,193.4	-498.2	2,072.5	2,072.5	0.60	-0.43	
9,557.0	89.70	88.80	7,193.2	-498.2	2,166.5	2,166.5	2.59	-0.85	
9,652.0	91.30	89.50	7,192.4	-496.8	2,261.5	2,261.5	1.84	1.68	
9,746.0	90.50	90.70	7,190.9	-496.9	2,355.5	2,355.5	1.53	-0.85	
9,840.0	87.50	91.00	7,192.6	-498.3	2,449.5	2,449.5	3.21	-3.19	
9,935.0	87.50	90.40	7,196.7	-499.5	2,544.4	2,544.4	0.63	0.00	
10,029.0	87.00	89.70	7,201.2	-499.6	2,638.3	2,638.3	0.91	-0.53	
10,124.0	88.60	89.20	7,204.9	-498.6	2,733.2	2,733.2	1.76	1.68	
10,218.0	90.00	88.60	7,206.0	-496.8	2,827.2	2,827.2	1.62	1.49	

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Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3E-4H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM R5000 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
10,312.0	90.20	89.60	7,205.8	-495.4	2,921.1	2,921.1	1.08	0.21	
10,407.0	90.40	88.70	7,205.3	-493.9	3,016.1	3,016.1	0.97	0.21	
10,502.0	89.30	90.80	7,205.6	-493.5	3,111.1	3,111.1	2.50	-1.16	
10,596.0	88.40	90.50	7,207.5	-494.6	3,205.1	3,205.1	1.01	-0.96	
10,690.0	89.00	90.10	7,209.6	-495.1	3,299.1	3,299.1	0.77	0.64	
10,785.0	88.00	91.00	7,212.1	-496.0	3,394.0	3,394.0	1.42	-1.05	
10,879.0	86.90	91.00	7,216.3	-497.6	3,487.9	3,487.9	1.17	-1.17	
10,974.0	85.70	89.90	7,222.4	-498.4	3,582.7	3,582.7	1.71	-1.26	
11,068.0	85.50	88.10	7,229.6	-496.8	3,676.4	3,676.4	1.92	-0.21	
11,163.0	86.90	87.70	7,235.9	-493.3	3,771.2	3,771.2	1.53	1.47	
11,257.0	88.60	89.80	7,239.6	-491.2	3,865.0	3,865.0	2.87	1.81	
11,351.0	89.60	89.30	7,241.1	-490.5	3,959.0	3,959.0	1.19	1.06	
11,446.0	88.90	89.90	7,242.3	-489.8	4,054.0	4,054.0	0.97	-0.74	
11,540.0	87.30	89.70	7,245.4	-489.5	4,148.0	4,148.0	1.72	-1.70	
11,635.0	87.80	88.90	7,249.5	-488.3	4,242.9	4,242.9	0.99	0.53	
11,704.0	87.30	88.20	7,252.5	-486.6	4,311.8	4,311.8	1.25	-0.72	Last CES Survey @ 11,704' MD
11,752.0	87.30	88.20	7,254.7	-485.1	4,359.7	4,359.7	0.00	0.00	PTB @ 11,752' MD

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Minch 3E-4H PBHL	0.00	0.00	7,184.0	-498.7	4,399.0	1,334,621.97	3,139,477.77	40.250850	-105.000320
- hit/miss target									
- Shape									
- survey misses target center by 82.0ft at 11752.0ft MD (7254.7 TVD, -485.1 N, 4359.7 E)									
- Point									
Minch 3E-4H PBHL P2	0.00	0.00	7,214.0	-498.7	4,399.0	1,334,621.97	3,139,477.77	40.250850	-105.000320
- survey misses target center by 58.2ft at 11752.0ft MD (7254.7 TVD, -485.1 N, 4359.7 E)									
- Point									
Minch 3E-4H TGT 1 10,312.0	0.00	0.00	7,200.0	-498.7	2,951.1	1,334,614.06	3,138,029.90	40.250851	-105.005507
- survey misses target center by 6.8ft at 10341.9ft MD (7205.7 TVD, -495.1 N, 2951.1 E)									
- Point									

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
11,704.0	7,252.5	-486.6	4,311.8	Last CES Survey @ 11,704' MD
11,752.0	7,254.7	-485.1	4,359.7	PTB @ 11,752' MD

Checked By: _____	Approved By: _____	Date: _____
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EnCana Oil & Gas (USA) Inc

DJ Wattenberg

S4-T3N-R68W (Minch)

Minch 3E-4H

Hz

Design: FINAL

Survey Report - Geographic

02 January, 2015

HP

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3E-4H
Project:	DJ Wattenberg	TVD Reference:	30' KB @ 5107.0ft (H&P 522)
Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3E-4H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM R5000 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		S4-T3N-R68W (Minch)			
Site Position:		Northing:	1,334,165.54 ft	Latitude:	40.249600
From:	Lat/Long	Easting:	3,139,290.53 ft	Longitude:	-105.001000
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.32 °

Well	Minch 3E-4H					
Well Position	+N/-S	0.0 ft	Northing:	1,335,096.62 ft	Latitude:	40.252220
	+E/-W	0.0 ft	Easting:	3,135,076.12 ft	Longitude:	-105.016080
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,077.0 ft

Wellbore	Hz				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/25/2014	8.51	66.77	52,654

Design	FINAL				
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	90.00	

Survey Program	Date	1/2/2015			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
182.0	11,752.0	Surveys (Hz)	Geolink MWD	Geolink MWD	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude	
0.0	0.00	0.00	0.0	0.0	0.0	1,335,096.62	3,135,076.12	40.252220	-105.016080	
182.0	0.31	353.14	182.0	0.5	-0.1	1,335,097.11	3,135,076.06	40.252221	-105.016080	
228.0	0.44	338.99	228.0	0.8	-0.1	1,335,097.39	3,135,075.98	40.252222	-105.016081	
320.0	0.40	239.67	320.0	0.9	-0.5	1,335,097.56	3,135,075.58	40.252223	-105.016082	
412.0	0.48	245.56	412.0	0.6	-1.2	1,335,097.23	3,135,074.95	40.252222	-105.016084	
504.0	0.57	233.17	504.0	0.2	-1.9	1,335,096.80	3,135,074.24	40.252221	-105.016087	
596.0	0.88	256.46	596.0	-0.3	-2.9	1,335,096.35	3,135,073.18	40.252219	-105.016091	
688.0	0.75	230.44	688.0	-0.8	-4.1	1,335,095.80	3,135,072.04	40.252218	-105.016095	
780.0	0.75	210.23	780.0	-1.7	-4.9	1,335,094.89	3,135,071.27	40.252215	-105.016098	
823.0	0.88	236.42	823.0	-2.1	-5.3	1,335,094.46	3,135,070.86	40.252214	-105.016099	
925.0	0.70	232.20	925.0	-2.9	-6.4	1,335,093.64	3,135,069.72	40.252212	-105.016103	
1,020.0	2.90	233.30	1,019.9	-4.7	-8.8	1,335,091.83	3,135,067.34	40.252207	-105.016112	

HP

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3E-4H
Project:	DJ Wattenberg	TVD Reference:	30' KB @ 5107.0ft (H&P 522)
Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3E-4H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM R5000 Multi Users DB

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude	
1,112.0	5.30	229.70	1,111.7	-8.9	-13.9	1,335,087.67	3,135,062.26	40.252196	-105.016130	
1,204.0	6.80	219.50	1,203.1	-15.8	-20.6	1,335,080.68	3,135,055.59	40.252177	-105.016154	
1,295.0	6.50	214.20	1,293.5	-24.2	-26.9	1,335,072.23	3,135,049.32	40.252153	-105.016177	
1,387.0	6.60	211.90	1,384.9	-33.0	-32.7	1,335,063.40	3,135,043.64	40.252129	-105.016197	
1,479.0	6.20	233.30	1,476.4	-40.5	-39.4	1,335,055.90	3,135,036.91	40.252109	-105.016222	
1,571.0	6.10	232.60	1,567.8	-46.4	-47.3	1,335,049.92	3,135,029.07	40.252093	-105.016250	
1,663.0	6.20	229.40	1,659.3	-52.6	-55.0	1,335,043.68	3,135,021.45	40.252076	-105.016277	
1,755.0	6.10	226.80	1,750.8	-59.2	-62.3	1,335,037.06	3,135,014.15	40.252057	-105.016303	
1,847.0	6.00	225.00	1,842.3	-66.0	-69.3	1,335,030.28	3,135,007.22	40.252039	-105.016328	
1,939.0	6.00	224.00	1,933.8	-72.8	-76.0	1,335,023.38	3,135,000.52	40.252020	-105.016353	
2,031.0	6.10	219.80	2,025.3	-80.0	-82.5	1,335,016.13	3,134,994.09	40.252000	-105.016376	
2,123.0	5.90	223.00	2,116.8	-87.3	-88.8	1,335,008.88	3,134,987.78	40.251981	-105.016398	
2,215.0	5.90	219.10	2,208.3	-94.4	-95.0	1,335,001.72	3,134,981.61	40.251961	-105.016421	
2,306.0	5.80	221.20	2,298.8	-101.5	-101.0	1,334,994.60	3,134,975.67	40.251942	-105.016442	
2,398.0	5.80	222.10	2,390.3	-108.4	-107.2	1,334,987.62	3,134,969.53	40.251922	-105.016464	
2,490.0	5.90	222.30	2,481.8	-115.4	-113.5	1,334,980.64	3,134,963.27	40.251903	-105.016487	
2,582.0	6.10	223.70	2,573.3	-122.4	-120.0	1,334,973.57	3,134,956.75	40.251884	-105.016510	
2,674.0	6.10	223.90	2,664.8	-129.4	-126.8	1,334,966.48	3,134,950.02	40.251865	-105.016535	
2,766.0	5.80	226.00	2,756.3	-136.2	-133.5	1,334,959.69	3,134,943.32	40.251846	-105.016559	
2,858.0	6.70	217.40	2,847.8	-143.7	-140.1	1,334,952.16	3,134,936.76	40.251826	-105.016582	
2,950.0	6.80	220.00	2,939.1	-152.1	-146.9	1,334,943.69	3,134,930.05	40.251802	-105.016607	
3,042.0	6.60	220.20	3,030.5	-160.3	-153.8	1,334,935.44	3,134,923.18	40.251780	-105.016631	
3,133.0	6.60	221.50	3,120.9	-168.3	-160.7	1,334,927.49	3,134,916.38	40.251758	-105.016656	
3,228.0	6.50	222.60	3,215.3	-176.3	-167.9	1,334,919.41	3,134,909.17	40.251736	-105.016682	
3,322.0	6.40	219.60	3,308.7	-184.3	-174.9	1,334,911.41	3,134,902.27	40.251714	-105.016707	
3,417.0	7.10	223.40	3,403.0	-192.6	-182.3	1,334,903.03	3,134,894.91	40.251691	-105.016733	
3,512.0	6.30	213.60	3,497.4	-201.2	-189.2	1,334,894.38	3,134,888.03	40.251668	-105.016758	
3,606.0	6.80	218.30	3,590.8	-209.9	-195.5	1,334,885.69	3,134,881.78	40.251644	-105.016781	
3,701.0	5.80	209.40	3,685.2	-218.5	-201.3	1,334,877.06	3,134,875.98	40.251620	-105.016802	
3,795.0	6.20	207.70	3,778.7	-227.1	-206.0	1,334,868.40	3,134,871.34	40.251597	-105.016818	
3,890.0	4.40	217.10	3,873.3	-234.5	-210.6	1,334,860.93	3,134,866.80	40.251576	-105.016835	
3,984.0	4.10	216.80	3,967.0	-240.1	-214.8	1,334,855.34	3,134,862.64	40.251561	-105.016850	
4,079.0	4.80	239.30	4,061.7	-244.9	-220.3	1,334,850.56	3,134,857.21	40.251548	-105.016869	
4,268.0	5.80	233.90	4,249.9	-254.5	-234.8	1,334,840.81	3,134,842.75	40.251521	-105.016921	
4,363.0	7.20	223.10	4,344.3	-261.7	-242.7	1,334,833.60	3,134,834.84	40.251502	-105.016950	
4,457.0	6.90	222.40	4,437.6	-270.2	-250.5	1,334,825.08	3,134,827.05	40.251478	-105.016978	
4,552.0	6.50	223.30	4,532.0	-278.3	-258.1	1,334,816.91	3,134,819.56	40.251456	-105.017005	
4,646.0	6.10	218.50	4,625.4	-286.1	-264.8	1,334,809.10	3,134,812.85	40.251435	-105.017029	
4,741.0	6.10	221.80	4,719.9	-293.8	-271.3	1,334,801.35	3,134,806.38	40.251414	-105.017052	
4,835.0	5.70	221.70	4,813.4	-301.0	-277.8	1,334,794.10	3,134,799.99	40.251394	-105.017075	
4,930.0	5.30	223.50	4,907.9	-307.7	-283.9	1,334,787.37	3,134,793.87	40.251375	-105.017098	
5,024.0	6.20	215.90	5,001.5	-315.0	-289.9	1,334,780.07	3,134,787.94	40.251355	-105.017119	
5,119.0	5.60	216.90	5,096.0	-322.8	-295.7	1,334,772.18	3,134,782.19	40.251334	-105.017140	
5,213.0	7.30	220.80	5,189.4	-331.0	-302.4	1,334,763.95	3,134,775.58	40.251311	-105.017163	
5,308.0	6.70	218.90	5,283.6	-339.9	-309.8	1,334,755.03	3,134,768.21	40.251287	-105.017190	
5,403.0	6.00	222.00	5,378.1	-347.9	-316.6	1,334,746.99	3,134,761.45	40.251265	-105.017214	
5,497.0	5.10	219.70	5,471.6	-354.8	-322.5	1,334,740.09	3,134,755.53	40.251246	-105.017236	
5,592.0	6.90	218.10	5,566.1	-362.5	-328.8	1,334,732.32	3,134,749.35	40.251225	-105.017258	
5,686.0	6.10	216.50	5,659.5	-371.0	-335.2	1,334,723.83	3,134,742.94	40.251202	-105.017281	
5,781.0	8.10	228.40	5,753.8	-379.5	-343.2	1,334,715.28	3,134,734.98	40.251178	-105.017310	
5,876.0	7.40	227.70	5,847.9	-388.0	-352.7	1,334,706.67	3,134,725.50	40.251155	-105.017344	
5,970.0	6.80	225.90	5,941.2	-396.0	-361.2	1,334,698.67	3,134,717.07	40.251133	-105.017374	
6,065.0	6.20	219.40	6,035.6	-403.9	-368.5	1,334,690.76	3,134,709.82	40.251111	-105.017401	
6,159.0	6.40	216.70	6,129.0	-412.0	-374.9	1,334,682.60	3,134,703.51	40.251089	-105.017423	
6,254.0	5.80	217.80	6,223.5	-420.0	-381.0	1,334,674.53	3,134,697.45	40.251067	-105.017445	

HP

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3E-4H
Project:	DJ Wattenberg	TVD Reference:	30' KB @ 5107.0ft (H&P 522)
Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3E-4H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM R5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
6,348.0	4.60	219.30	6,317.1	-426.7	-386.3	1,334,667.83	3,134,692.18	40.251049	-105.017464
6,443.0	4.60	207.90	6,411.8	-433.0	-390.5	1,334,661.49	3,134,688.02	40.251031	-105.017479
6,537.0	6.20	211.50	6,505.4	-440.7	-394.9	1,334,653.81	3,134,683.65	40.251010	-105.017495
6,584.0	5.50	210.90	6,552.1	-444.8	-397.4	1,334,649.70	3,134,681.19	40.250999	-105.017504
6,632.0	5.00	201.20	6,599.9	-448.7	-399.3	1,334,645.76	3,134,679.27	40.250988	-105.017511
6,679.0	8.40	152.70	6,646.6	-453.6	-398.5	1,334,640.80	3,134,680.13	40.250975	-105.017508
6,726.0	12.60	143.30	6,692.8	-460.8	-393.8	1,334,633.66	3,134,684.81	40.250955	-105.017491
6,773.0	13.10	133.90	6,738.6	-468.6	-386.9	1,334,625.90	3,134,691.76	40.250934	-105.017466
6,820.0	16.40	120.10	6,784.1	-475.6	-377.3	1,334,618.92	3,134,701.38	40.250914	-105.017432
6,867.0	23.30	109.90	6,828.3	-482.1	-362.8	1,334,612.50	3,134,715.92	40.250897	-105.017380
6,915.0	30.20	101.90	6,871.1	-487.9	-342.1	1,334,606.88	3,134,736.72	40.250881	-105.017306
6,962.0	34.60	98.30	6,910.8	-492.2	-317.3	1,334,602.65	3,134,761.53	40.250869	-105.017217
7,009.0	36.40	95.80	6,949.1	-495.6	-290.2	1,334,599.47	3,134,788.63	40.250860	-105.017120
7,056.0	39.40	95.60	6,986.2	-498.4	-261.5	1,334,596.76	3,134,817.37	40.250852	-105.017017
7,104.0	44.00	94.60	7,022.0	-501.3	-229.7	1,334,594.11	3,134,849.18	40.250844	-105.016903
7,151.0	47.20	92.90	7,054.9	-503.4	-196.2	1,334,592.11	3,134,882.69	40.250838	-105.016783
7,199.0	50.70	90.80	7,086.4	-504.6	-160.0	1,334,591.15	3,134,918.87	40.250835	-105.016654
7,246.0	55.30	89.50	7,114.7	-504.7	-122.5	1,334,591.27	3,134,956.40	40.250835	-105.016519
7,293.0	59.10	89.10	7,140.1	-504.2	-83.0	1,334,591.97	3,134,995.89	40.250836	-105.016378
7,340.0	64.90	88.00	7,162.2	-503.1	-41.5	1,334,593.26	3,135,037.35	40.250839	-105.016229
7,387.0	70.30	85.70	7,180.1	-500.7	1.8	1,334,595.90	3,135,080.70	40.250845	-105.016074
7,432.0	75.00	84.50	7,193.5	-497.1	44.6	1,334,599.81	3,135,123.46	40.250856	-105.015920
7,479.0	79.90	85.00	7,203.7	-492.9	90.3	1,334,604.25	3,135,169.11	40.250867	-105.015757
7,574.0	91.90	89.50	7,210.5	-488.4	184.8	1,334,609.27	3,135,263.54	40.250879	-105.015418
7,668.0	92.30	91.30	7,207.1	-489.0	278.7	1,334,609.13	3,135,357.47	40.250878	-105.015082
7,763.0	91.60	92.10	7,203.8	-491.8	373.6	1,334,606.83	3,135,452.39	40.250870	-105.014742
7,857.0	90.10	91.80	7,202.4	-495.0	467.5	1,334,604.15	3,135,546.33	40.250861	-105.014405
7,952.0	90.90	91.80	7,201.6	-498.0	562.5	1,334,601.68	3,135,641.30	40.250853	-105.014065
8,046.0	91.60	91.70	7,199.6	-500.9	656.4	1,334,599.32	3,135,735.25	40.250845	-105.013729
8,140.0	88.40	89.50	7,199.6	-501.9	750.4	1,334,598.85	3,135,829.23	40.250842	-105.013392
8,235.0	88.80	89.10	7,201.9	-500.7	845.3	1,334,600.53	3,135,924.18	40.250846	-105.013052
8,329.0	89.70	89.20	7,203.1	-499.3	939.3	1,334,602.44	3,136,018.16	40.250849	-105.012715
8,424.0	92.20	89.50	7,201.5	-498.2	1,034.3	1,334,604.03	3,136,113.12	40.250852	-105.012375
8,518.0	91.90	91.70	7,198.2	-499.2	1,128.2	1,334,603.56	3,136,207.05	40.250850	-105.012038
8,613.0	89.10	90.20	7,197.3	-500.8	1,223.2	1,334,602.51	3,136,302.02	40.250845	-105.011698
8,707.0	88.50	90.20	7,199.3	-501.1	1,317.2	1,334,602.69	3,136,395.99	40.250844	-105.011361
8,802.0	87.30	88.90	7,202.8	-500.4	1,412.1	1,334,603.96	3,136,490.92	40.250846	-105.011021
8,896.0	87.40	89.70	7,207.1	-499.2	1,506.0	1,334,605.62	3,136,584.80	40.250849	-105.010685
8,991.0	94.30	87.60	7,205.7	-497.0	1,600.9	1,334,608.37	3,136,679.69	40.250856	-105.010345
9,085.0	93.20	89.70	7,199.6	-494.8	1,694.6	1,334,611.09	3,136,773.44	40.250862	-105.010009
9,180.0	90.50	90.80	7,196.5	-495.2	1,789.6	1,334,611.19	3,136,868.38	40.250861	-105.009669
9,274.0	90.50	90.20	7,195.7	-496.0	1,883.6	1,334,610.88	3,136,962.38	40.250858	-105.009332
9,369.0	90.90	90.70	7,194.5	-496.8	1,978.6	1,334,610.66	3,137,057.37	40.250856	-105.008992
9,463.0	90.50	91.10	7,193.4	-498.2	2,072.5	1,334,609.69	3,137,151.36	40.250852	-105.008655
9,557.0	89.70	88.80	7,193.2	-498.2	2,166.5	1,334,610.29	3,137,245.35	40.250852	-105.008318
9,652.0	91.30	89.50	7,192.4	-496.8	2,261.5	1,334,612.22	3,137,340.32	40.250856	-105.007978
9,746.0	90.50	90.70	7,190.9	-496.9	2,355.5	1,334,612.56	3,137,434.31	40.250856	-105.007641
9,840.0	87.50	91.00	7,192.6	-498.3	2,449.5	1,334,611.68	3,137,528.28	40.250852	-105.007305
9,935.0	87.50	90.40	7,196.7	-499.5	2,544.4	1,334,611.04	3,137,623.18	40.250849	-105.006965
10,029.0	87.00	89.70	7,201.2	-499.6	2,638.3	1,334,611.47	3,137,717.07	40.250848	-105.006628
10,124.0	88.60	89.20	7,204.9	-498.6	2,733.2	1,334,612.90	3,137,811.99	40.250851	-105.006288
10,218.0	90.00	88.60	7,206.0	-496.8	2,827.2	1,334,615.22	3,137,905.95	40.250856	-105.005952
10,312.0	90.20	89.60	7,205.8	-495.4	2,921.1	1,334,617.21	3,137,999.93	40.250860	-105.005615
10,407.0	90.40	88.70	7,205.3	-493.9	3,016.1	1,334,619.14	3,138,094.91	40.250864	-105.005275
10,502.0	89.30	90.80	7,205.6	-493.5	3,111.1	1,334,620.07	3,138,189.90	40.250865	-105.004934

HP

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3E-4H
Project:	DJ Wattenberg	TVD Reference:	30' KB @ 5107.0ft (H&P 522)
Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3E-4H	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM R5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
10,596.0	88.40	90.50	7,207.5	-494.6	3,205.1	1,334,619.52	3,138,283.87	40.250862	-105.004598
10,690.0	89.00	90.10	7,209.6	-495.1	3,299.1	1,334,619.54	3,138,377.85	40.250860	-105.004261
10,785.0	88.00	91.00	7,212.1	-496.0	3,394.0	1,334,619.14	3,138,472.81	40.250858	-105.003921
10,879.0	86.90	91.00	7,216.3	-497.6	3,487.9	1,334,618.02	3,138,566.71	40.250853	-105.003584
10,974.0	85.70	89.90	7,222.4	-498.4	3,582.7	1,334,617.79	3,138,661.51	40.250851	-105.003245
11,068.0	85.50	88.10	7,229.6	-496.8	3,676.4	1,334,619.94	3,138,755.21	40.250856	-105.002909
11,163.0	86.90	87.70	7,235.9	-493.3	3,771.2	1,334,623.93	3,138,849.91	40.250865	-105.002570
11,257.0	88.60	89.80	7,239.6	-491.2	3,865.0	1,334,626.49	3,138,943.79	40.250871	-105.002233
11,351.0	89.60	89.30	7,241.1	-490.5	3,959.0	1,334,627.74	3,139,037.77	40.250873	-105.001896
11,446.0	88.90	89.90	7,242.3	-489.8	4,054.0	1,334,628.92	3,139,132.76	40.250875	-105.001556
11,540.0	87.30	89.70	7,245.4	-489.5	4,148.0	1,334,629.76	3,139,226.70	40.250875	-105.001220
11,635.0	87.80	88.90	7,249.5	-488.3	4,242.9	1,334,631.44	3,139,321.59	40.250879	-105.000880
11,704.0	87.30	88.20	7,252.5	-486.6	4,311.8	1,334,633.56	3,139,390.50	40.250883	-105.000633
Last CES Survey @ 11,704' MD									
11,752.0	87.30	88.20	7,254.7	-485.1	4,359.7	1,334,635.32	3,139,438.41	40.250887	-105.000461
PTB @ 11,752' MD									

Design 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									
Minch 3E-4H TGT 1 10,1	0.00	0.00	7,200.0	-498.7	2,951.1	1,334,614.06	3,138,029.90	40.250851	-105.005508
- actual wellpath misses target center by 6.8ft at 10341.9ft MD (7205.7 TVD, -495.1 N, 2951.1 E)									
- Point									
Minch 3E-4H PBHL P2	0.00	0.00	7,214.0	-498.7	4,399.0	1,334,621.97	3,139,477.77	40.250850	-105.000320
- actual wellpath misses target center by 58.2ft at 11752.0ft MD (7254.7 TVD, -485.1 N, 4359.7 E)									
- Point									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
11,704.0	7,252.5	-486.6	4,311.8	Last CES Survey @ 11,704' MD	
11,752.0	7,254.7	-485.1	4,359.7	PTB @ 11,752' MD	

Checked By: _____ Approved By: _____ Date: _____