



HP

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3B-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 3B-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 3B-4H					
Well Position	+N/-S	0.0 ft	Northing:	1,335,125.78 ft	Latitude:	40.252300
	+E/-W	0.0 ft	Easting:	3,135,078.75 ft	Longitude:	-105.016070
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	1/23/2015	8.50	66.77	52,645

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	2/3/2015			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
167.0	11,956.0	Survey #1 (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		
167.0	0.79	278.52	167.0	0.2	-1.1	-1.1	0.47	0.47		
259.0	1.45	262.96	259.0	0.1	-2.9	-2.9	0.78	0.72		
351.0	1.67	319.74	350.9	1.0	-4.9	-4.9	1.63	0.24		
443.0	1.85	316.66	442.9	3.1	-6.8	-6.8	0.22	0.20		
535.0	2.37	326.51	534.8	5.8	-8.9	-8.9	0.69	0.57		
626.0	2.37	327.21	625.8	8.9	-11.0	-11.0	0.03	0.00		
718.0	2.37	326.42	717.7	12.1	-13.0	-13.0	0.04	0.00		
810.0	3.60	326.77	809.6	16.1	-15.7	-15.7	1.34	1.34		
833.0	4.00	327.21	832.5	17.4	-16.5	-16.5	1.74	1.74		
926.0	4.90	325.40	925.2	23.4	-20.5	-20.5	0.98	0.97		
1,021.0	4.60	327.00	1,019.9	29.9	-24.9	-24.9	0.35	-0.32		
1,112.0	5.60	327.30	1,110.5	36.7	-29.3	-29.3	1.10	1.10		

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Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3B-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	5.70	323.90	1,202.1	44.2	-34.4	-34.4	0.38	0.11	
1,296.0	5.60	316.50	1,293.6	51.1	-40.2	-40.2	0.80	-0.11	
1,388.0	5.50	310.70	1,385.2	57.3	-46.6	-46.6	0.62	-0.11	
1,480.0	6.00	325.40	1,476.8	64.1	-52.7	-52.7	1.69	0.54	
1,572.0	6.90	322.50	1,568.2	72.4	-58.8	-58.8	1.04	0.98	
1,664.0	6.70	319.90	1,659.5	80.9	-65.6	-65.6	0.40	-0.22	
1,756.0	6.90	315.40	1,750.9	89.0	-72.9	-72.9	0.62	0.22	
1,847.0	5.10	310.10	1,841.4	95.5	-79.9	-79.9	2.07	-1.98	
1,939.0	5.50	322.80	1,933.0	101.6	-85.7	-85.7	1.34	0.43	
2,031.0	5.80	319.80	2,024.5	108.7	-91.3	-91.3	0.46	0.33	
2,123.0	6.00	314.30	2,116.1	115.6	-97.8	-97.8	0.65	0.22	
2,215.0	6.10	313.90	2,207.5	122.3	-104.7	-104.7	0.12	0.11	
2,307.0	4.70	321.70	2,299.1	128.7	-110.6	-110.6	1.71	-1.52	
2,399.0	5.10	319.50	2,390.8	134.7	-115.6	-115.6	0.48	0.43	
2,491.0	4.70	318.00	2,482.5	140.7	-120.8	-120.8	0.46	-0.43	
2,581.0	4.90	317.30	2,572.1	146.2	-125.8	-125.8	0.23	0.22	
2,703.0	5.20	329.60	2,693.7	154.8	-132.2	-132.2	0.92	0.25	
2,795.0	6.20	333.30	2,785.2	162.9	-136.5	-136.5	1.16	1.09	
2,887.0	5.90	328.70	2,876.7	171.3	-141.2	-141.2	0.62	-0.33	
2,979.0	6.60	321.80	2,968.2	179.5	-146.9	-146.9	1.11	0.76	
3,071.0	6.60	316.40	3,059.6	187.5	-153.8	-153.8	0.67	0.00	
3,163.0	6.20	312.40	3,151.0	194.7	-161.2	-161.2	0.65	-0.43	
3,257.0	5.70	307.80	3,244.5	201.0	-168.6	-168.6	0.73	-0.53	
3,352.0	5.80	307.60	3,339.0	206.8	-176.1	-176.1	0.11	0.11	
3,446.0	6.00	323.10	3,432.5	213.6	-182.8	-182.8	1.70	0.21	
3,541.0	5.70	313.70	3,527.0	220.9	-189.2	-189.2	1.06	-0.32	
3,635.0	5.10	308.30	3,620.6	226.7	-195.9	-195.9	0.84	-0.64	
3,730.0	6.70	326.80	3,715.1	233.9	-202.2	-202.2	2.60	1.68	
3,824.0	6.50	322.50	3,808.5	242.7	-208.5	-208.5	0.57	-0.21	
3,919.0	6.50	321.70	3,902.9	251.2	-215.1	-215.1	0.10	0.00	
4,013.0	5.90	318.30	3,996.3	259.0	-221.6	-221.6	0.75	-0.64	
4,107.0	5.40	312.70	4,089.9	265.6	-228.1	-228.1	0.79	-0.53	
4,202.0	5.20	324.20	4,184.5	272.1	-233.9	-233.9	1.14	-0.21	
4,296.0	5.50	317.60	4,278.0	278.9	-239.4	-239.4	0.73	0.32	
4,391.0	6.70	321.00	4,372.5	286.6	-245.9	-245.9	1.32	1.26	
4,486.0	6.00	317.90	4,466.9	294.6	-252.8	-252.8	0.82	-0.74	
4,580.0	5.50	315.00	4,560.4	301.4	-259.2	-259.2	0.62	-0.53	
4,674.0	5.20	315.50	4,654.0	307.6	-265.4	-265.4	0.32	-0.32	
4,769.0	5.10	316.80	4,748.7	313.8	-271.3	-271.3	0.16	-0.11	
4,863.0	5.20	315.90	4,842.3	319.9	-277.1	-277.1	0.14	0.11	
4,958.0	4.30	315.20	4,936.9	325.5	-282.7	-282.7	0.95	-0.95	
5,052.0	5.60	325.30	5,030.6	331.8	-287.7	-287.7	1.66	1.38	
5,146.0	5.80	316.60	5,124.1	339.0	-293.6	-293.6	0.94	0.21	
5,241.0	5.20	320.30	5,218.7	345.8	-299.7	-299.7	0.73	-0.63	
5,335.0	5.90	318.10	5,312.3	352.7	-305.6	-305.6	0.78	0.74	
5,430.0	5.50	323.60	5,406.8	360.0	-311.6	-311.6	0.71	-0.42	
5,524.0	4.50	323.90	5,500.4	366.6	-316.4	-316.4	1.06	-1.06	
5,618.0	7.30	316.90	5,593.9	373.9	-322.7	-322.7	3.07	2.98	
5,713.0	6.50	312.70	5,688.2	382.0	-330.8	-330.8	1.00	-0.84	
5,808.0	7.30	320.30	5,782.5	390.3	-338.6	-338.6	1.28	0.84	
5,902.0	6.40	315.30	5,875.9	398.6	-346.1	-346.1	1.15	-0.96	
5,996.0	6.60	316.10	5,969.3	406.2	-353.5	-353.5	0.23	0.21	
6,091.0	6.30	326.00	6,063.7	414.4	-360.2	-360.2	1.21	-0.32	

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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
6,185.0	5.50	322.10	6,157.2	422.3	-365.8	-365.8	0.95	-0.85	
6,280.0	6.10	330.50	6,251.7	430.3	-371.1	-371.1	1.09	0.63	
6,374.0	5.20	323.90	6,345.2	438.1	-376.1	-376.1	1.18	-0.96	
6,469.0	6.20	322.30	6,439.8	445.6	-381.8	-381.8	1.07	1.05	
6,563.0	5.20	314.10	6,533.3	452.6	-387.9	-387.9	1.37	-1.06	
6,657.0	5.50	317.20	6,626.9	458.8	-394.1	-394.1	0.44	0.32	
6,752.0	5.10	308.40	6,721.5	464.8	-400.5	-400.5	0.95	-0.42	
6,799.0	4.90	328.40	6,768.3	467.8	-403.1	-403.1	3.71	-0.43	
6,846.0	7.20	358.20	6,815.1	472.5	-404.3	-404.3	8.13	4.89	
6,894.0	8.70	25.70	6,862.6	478.7	-402.8	-402.8	8.42	3.12	
6,941.0	10.60	53.70	6,909.0	484.5	-397.8	-397.8	10.64	4.04	
6,988.0	14.60	61.70	6,954.8	489.9	-389.1	-389.1	9.27	8.51	
7,035.0	19.30	65.70	6,999.8	495.9	-376.8	-376.8	10.30	10.00	
7,083.0	23.60	73.00	7,044.5	502.0	-360.3	-360.3	10.53	8.96	
7,130.0	26.50	79.30	7,087.0	506.7	-341.0	-341.0	8.38	6.17	
7,177.0	29.00	83.60	7,128.6	509.9	-319.4	-319.4	6.81	5.32	
7,224.0	34.00	82.20	7,168.7	512.9	-295.0	-295.0	10.75	10.64	
7,272.0	39.20	85.00	7,207.2	516.1	-266.6	-266.6	11.38	10.83	
7,319.0	44.30	87.20	7,242.3	518.2	-235.4	-235.4	11.29	10.85	
7,366.0	49.70	90.80	7,274.3	518.7	-201.1	-201.1	12.78	11.49	
7,413.0	55.40	90.90	7,302.9	518.2	-163.8	-163.8	12.13	12.13	
7,461.0	61.10	90.90	7,328.1	517.5	-123.0	-123.0	11.87	11.87	
7,508.0	67.20	90.60	7,348.6	517.0	-80.7	-80.7	12.99	12.98	
7,555.0	71.70	91.00	7,365.1	516.4	-36.7	-36.7	9.61	9.57	
7,602.0	74.30	89.60	7,378.9	516.1	8.2	8.2	6.22	5.53	
7,650.0	76.20	88.80	7,391.1	516.8	54.6	54.6	4.27	3.96	
7,697.0	78.00	88.50	7,401.6	517.9	100.4	100.4	3.88	3.83	
7,752.0	82.70	89.20	7,410.8	519.0	154.6	154.6	8.64	8.55	
7,858.0	86.80	89.50	7,420.5	520.2	260.2	260.2	3.88	3.87	
7,953.0	88.70	89.50	7,424.2	521.0	355.1	355.1	2.00	2.00	
8,047.0	90.50	89.90	7,424.9	521.5	449.1	449.1	1.96	1.91	
8,142.0	92.30	90.00	7,422.5	521.6	544.0	544.0	1.90	1.89	
8,236.0	91.60	90.20	7,419.3	521.4	638.0	638.0	0.77	-0.74	
8,331.0	91.20	89.70	7,417.0	521.5	733.0	733.0	0.67	-0.42	
8,426.0	90.20	89.40	7,415.9	522.2	827.9	827.9	1.10	-1.05	
8,520.0	91.10	90.00	7,414.8	522.7	921.9	921.9	1.15	0.96	
8,615.0	90.90	91.50	7,413.1	521.5	1,016.9	1,016.9	1.59	-0.21	
8,709.0	89.80	90.40	7,412.6	519.9	1,110.9	1,110.9	1.65	-1.17	
8,804.0	89.90	90.70	7,412.8	519.0	1,205.9	1,205.9	0.33	0.11	
8,898.0	89.30	90.40	7,413.5	518.1	1,299.9	1,299.9	0.71	-0.64	
8,993.0	88.90	89.20	7,415.0	518.4	1,394.9	1,394.9	1.33	-0.42	
9,088.0	88.90	88.60	7,416.8	520.3	1,489.8	1,489.8	0.63	0.00	
9,182.0	90.70	88.20	7,417.1	522.9	1,583.8	1,583.8	1.96	1.91	
9,276.0	90.80	88.50	7,415.9	525.6	1,677.7	1,677.7	0.34	0.11	
9,371.0	91.10	88.50	7,414.3	528.1	1,772.7	1,772.7	0.32	0.32	
9,466.0	90.90	89.20	7,412.6	530.0	1,867.7	1,867.7	0.77	-0.21	
9,560.0	91.20	89.90	7,410.9	530.7	1,961.6	1,961.6	0.81	0.32	
9,655.0	91.50	90.50	7,408.7	530.4	2,056.6	2,056.6	0.71	0.32	
9,750.0	90.30	90.50	7,407.2	529.6	2,151.6	2,151.6	1.26	-1.26	
9,844.0	89.90	90.90	7,407.0	528.4	2,245.6	2,245.6	0.60	-0.43	
9,939.0	88.20	91.00	7,408.6	526.8	2,340.6	2,340.6	1.79	-1.79	
10,034.0	86.90	91.20	7,412.7	525.0	2,435.5	2,435.5	1.38	-1.37	
10,128.0	87.90	90.60	7,416.9	523.5	2,529.3	2,529.3	1.24	1.06	

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Site:	S4-T3N-R68W (Minch)	MD Reference:	30' KB @ 5107.0ft (H&P 522)
Well:	Minch 3B-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
10,223.0	87.00	90.00	7,421.2	523.0	2,624.3	2,624.3	1.14	-0.95	
10,317.0	87.90	90.00	7,425.3	523.0	2,718.2	2,718.2	0.96	0.96	
10,412.0	89.90	89.20	7,427.2	523.7	2,813.1	2,813.1	2.27	2.11	
10,506.0	89.50	90.10	7,427.7	524.3	2,907.1	2,907.1	1.05	-0.43	
10,601.0	88.80	89.70	7,429.1	524.4	3,002.1	3,002.1	0.85	-0.74	
10,695.0	87.10	88.80	7,432.4	525.7	3,096.0	3,096.0	2.05	-1.81	
10,790.0	88.80	89.60	7,435.8	527.0	3,191.0	3,191.0	1.98	1.79	
10,884.0	89.70	88.70	7,437.1	528.4	3,284.9	3,284.9	1.35	0.96	
10,979.0	90.50	88.90	7,436.9	530.4	3,379.9	3,379.9	0.87	0.84	
11,073.0	89.90	89.70	7,436.6	531.5	3,473.9	3,473.9	1.06	-0.64	
11,168.0	90.00	89.30	7,436.6	532.4	3,568.9	3,568.9	0.43	0.11	
11,262.0	90.80	90.90	7,436.0	532.2	3,662.9	3,662.9	1.90	0.85	
11,357.0	89.70	91.90	7,435.6	529.9	3,757.9	3,757.9	1.56	-1.16	
11,451.0	89.10	89.80	7,436.6	528.5	3,851.9	3,851.9	2.32	-0.64	
11,545.0	89.70	89.00	7,437.5	529.5	3,945.8	3,945.8	1.06	0.64	
11,640.0	89.80	88.70	7,438.0	531.4	4,040.8	4,040.8	0.33	0.11	
11,734.0	90.50	89.10	7,437.7	533.2	4,134.8	4,134.8	0.86	0.74	
11,829.0	91.50	89.50	7,436.1	534.3	4,229.8	4,229.8	1.13	1.05	
11,906.0	92.00	88.70	7,433.7	535.5	4,306.7	4,306.7	1.22	0.65	Last CES Survey @ 11,906' MD
11,956.0	92.00	88.70	7,432.0	536.7	4,356.7	4,356.7	0.00	0.00	PTB @ 11,956' MD

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Minch 3B-4H 9900' MD - hit/miss target - Shape	0.00	0.00	7,405.0	521.4	2,328.1	1,335,659.89	3,137,403.93	40.253731	-105.007729
- survey misses target center by 6.5ft at 9926.5ft MD (7408.2 TVD, 527.0 N, 2328.1 E)									
- Point									
Minch 3B-4H PBHL - survey misses target center by 55.4ft at 11956.0ft MD (7432.0 TVD, 536.7 N, 4356.7 E)	0.00	0.00	7,396.0	521.3	4,396.0	1,335,671.10	3,139,471.85	40.253730	-105.000320
- Point									
Minch 3B-4H 10700' MD - survey misses target center by 6.9ft at 10726.8ft MD (7433.9 TVD, 526.3 N, 3127.8 E)	0.00	0.00	7,429.0	521.4	3,128.1	1,335,664.22	3,138,203.91	40.253731	-105.004863
- Point									
Minch 3B-4H PBHL P3 - survey misses target center by 42.3ft at 11956.0ft MD (7432.0 TVD, 536.7 N, 4356.7 E)	0.00	0.00	7,429.0	521.3	4,396.0	1,335,671.10	3,139,471.85	40.253730	-105.000320
- Point									

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
11,906.0	7,433.7	535.5	4,306.7	Last CES Survey @ 11,906' MD	
11,956.0	7,432.0	536.7	4,356.7	PTB @ 11,956' MD	

Checked By: _____ Approved By: _____ Date: _____

EnCana Oil & Gas (USA) Inc

DJ Wattenberg

S4-T3N-R68W (Minch)

Minch 3B-4H

Hz

Survey: Survey #1

Survey Report - Geographic

03 February, 2015

HP

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3B-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 3B-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 3B-4H				
Well Position	+N/-S	0.0 ft	Northing:	1,335,125.78 ft	Latitude:	40.252300
	+E/-W	0.0 ft	Easting:	3,135,078.75 ft	Longitude:	-105.016070
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	1/23/2015	8.50	66.77	52,645

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	2/3/2015			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
167.0	11,956.0	Survey #1 (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	1,335,125.78	3,135,078.75	40.252300	-105.016070	
167.0	0.79	278.52	167.0	0.2	-1.1	1,335,125.94	3,135,077.62	40.252301	-105.016074	
259.0	1.45	262.96	259.0	0.1	-2.9	1,335,125.88	3,135,075.83	40.252300	-105.016081	
351.0	1.67	319.74	350.9	1.0	-4.9	1,335,126.75	3,135,073.81	40.252303	-105.016088	
443.0	1.85	316.66	442.9	3.1	-6.8	1,335,128.84	3,135,071.91	40.252309	-105.016095	
535.0	2.37	326.51	534.8	5.8	-8.9	1,335,131.50	3,135,069.83	40.252316	-105.016102	
626.0	2.37	327.21	625.8	8.9	-11.0	1,335,134.64	3,135,067.75	40.252325	-105.016110	
718.0	2.37	326.42	717.7	12.1	-13.0	1,335,137.81	3,135,065.65	40.252333	-105.016117	
810.0	3.60	326.77	809.6	16.1	-15.7	1,335,141.80	3,135,063.00	40.252344	-105.016126	
833.0	4.00	327.21	832.5	17.4	-16.5	1,335,143.07	3,135,062.16	40.252348	-105.016129	
926.0	4.90	325.40	925.2	23.4	-20.5	1,335,149.05	3,135,058.11	40.252364	-105.016144	
1,021.0	4.60	327.00	1,019.9	29.9	-24.9	1,335,155.56	3,135,053.70	40.252382	-105.016159	

HP

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3B-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 3B-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	5.60	327.30	1,110.5	36.7	-29.3	1,335,162.33	3,135,049.28	40.252401	-105.016175
1,204.0	5.70	323.90	1,202.1	44.2	-34.4	1,335,169.77	3,135,044.12	40.252421	-105.016193
1,296.0	5.60	316.50	1,293.6	51.1	-40.2	1,335,176.69	3,135,038.30	40.252440	-105.016214
1,388.0	5.50	310.70	1,385.2	57.3	-46.6	1,335,182.78	3,135,031.83	40.252457	-105.016237
1,480.0	6.00	325.40	1,476.8	64.1	-52.7	1,335,189.58	3,135,025.72	40.252476	-105.016259
1,572.0	6.90	322.50	1,568.2	72.4	-58.8	1,335,197.89	3,135,019.58	40.252499	-105.016281
1,664.0	6.70	319.90	1,659.5	80.9	-65.6	1,335,206.34	3,135,012.71	40.252522	-105.016305
1,756.0	6.90	315.40	1,750.9	89.0	-72.9	1,335,214.34	3,135,005.33	40.252544	-105.016332
1,847.0	5.10	310.10	1,841.4	95.5	-79.9	1,335,220.80	3,134,998.37	40.252562	-105.016356
1,939.0	5.50	322.80	1,933.0	101.6	-85.7	1,335,226.92	3,134,992.54	40.252579	-105.016377
2,031.0	5.80	319.80	2,024.5	108.7	-91.3	1,335,233.95	3,134,986.83	40.252598	-105.016397
2,123.0	6.00	314.30	2,116.1	115.6	-97.8	1,335,240.82	3,134,980.35	40.252617	-105.016421
2,215.0	6.10	313.90	2,207.5	122.3	-104.7	1,335,247.53	3,134,973.35	40.252636	-105.016446
2,307.0	4.70	321.70	2,299.1	128.7	-110.6	1,335,253.85	3,134,967.46	40.252653	-105.016466
2,399.0	5.10	319.50	2,390.8	134.7	-115.6	1,335,259.89	3,134,962.44	40.252670	-105.016484
2,491.0	4.70	318.00	2,482.5	140.7	-120.8	1,335,265.77	3,134,957.23	40.252686	-105.016503
2,581.0	4.90	317.30	2,572.1	146.2	-125.8	1,335,271.31	3,134,952.12	40.252701	-105.016521
2,703.0	5.20	329.60	2,693.7	154.8	-132.2	1,335,279.87	3,134,945.74	40.252725	-105.016544
2,795.0	6.20	333.30	2,785.2	162.9	-136.5	1,335,287.88	3,134,941.36	40.252747	-105.016559
2,887.0	5.90	328.70	2,876.7	171.3	-141.2	1,335,296.33	3,134,936.62	40.252770	-105.016576
2,979.0	6.60	321.80	2,968.2	179.5	-146.9	1,335,304.50	3,134,930.85	40.252793	-105.016597
3,071.0	6.60	316.40	3,059.6	187.5	-153.8	1,335,312.44	3,134,923.89	40.252815	-105.016621
3,163.0	6.20	312.40	3,151.0	194.7	-161.2	1,335,319.58	3,134,916.54	40.252834	-105.016648
3,257.0	5.70	307.80	3,244.5	201.0	-168.6	1,335,325.83	3,134,909.07	40.252852	-105.016674
3,352.0	5.80	307.60	3,339.0	206.8	-176.1	1,335,331.60	3,134,901.51	40.252868	-105.016701
3,446.0	6.00	323.10	3,432.5	213.6	-182.8	1,335,338.39	3,134,894.76	40.252886	-105.016725
3,541.0	5.70	313.70	3,527.0	220.9	-189.2	1,335,345.59	3,134,888.32	40.252906	-105.016748
3,635.0	5.10	308.30	3,620.6	226.7	-195.9	1,335,351.37	3,134,881.64	40.252922	-105.016772
3,730.0	6.70	326.80	3,715.1	233.9	-202.2	1,335,358.59	3,134,875.25	40.252942	-105.016795
3,824.0	6.50	322.50	3,808.5	242.7	-208.5	1,335,367.36	3,134,868.96	40.252966	-105.016817
3,919.0	6.50	321.70	3,902.9	251.2	-215.1	1,335,375.81	3,134,862.31	40.252990	-105.016841
4,013.0	5.90	318.30	3,996.3	259.0	-221.6	1,335,383.56	3,134,855.75	40.253011	-105.016864
4,107.0	5.40	312.70	4,089.9	265.6	-228.1	1,335,390.13	3,134,849.25	40.253029	-105.016887
4,202.0	5.20	324.20	4,184.5	272.1	-233.9	1,335,396.62	3,134,843.41	40.253047	-105.016908
4,296.0	5.50	317.60	4,278.0	278.9	-239.4	1,335,403.37	3,134,837.85	40.253066	-105.016928
4,391.0	6.70	321.00	4,372.5	286.6	-245.9	1,335,411.01	3,134,831.25	40.253087	-105.016951
4,486.0	6.00	317.90	4,466.9	294.6	-252.8	1,335,418.96	3,134,824.39	40.253109	-105.016976
4,580.0	5.50	315.00	4,560.4	301.4	-259.2	1,335,425.76	3,134,817.87	40.253127	-105.016999
4,674.0	5.20	315.50	4,654.0	307.6	-265.4	1,335,431.95	3,134,811.67	40.253144	-105.017021
4,769.0	5.10	316.80	4,748.7	313.8	-271.3	1,335,438.06	3,134,805.73	40.253161	-105.017042
4,863.0	5.20	315.90	4,842.3	319.9	-277.1	1,335,444.14	3,134,799.87	40.253178	-105.017063
4,958.0	4.30	315.20	4,936.9	325.5	-282.7	1,335,449.72	3,134,794.33	40.253194	-105.017083
5,052.0	5.60	325.30	5,030.6	331.8	-287.7	1,335,455.97	3,134,789.20	40.253211	-105.017101
5,146.0	5.80	316.60	5,124.1	339.0	-293.6	1,335,463.16	3,134,783.29	40.253231	-105.017122
5,241.0	5.20	320.30	5,218.7	345.8	-299.7	1,335,469.92	3,134,777.20	40.253249	-105.017144
5,335.0	5.90	318.10	5,312.3	352.7	-305.6	1,335,476.77	3,134,771.22	40.253268	-105.017165
5,430.0	5.50	323.60	5,406.8	360.0	-311.6	1,335,484.03	3,134,765.22	40.253288	-105.017187
5,524.0	4.50	323.90	5,500.4	366.6	-316.4	1,335,490.61	3,134,760.34	40.253306	-105.017204
5,618.0	7.30	316.90	5,593.9	373.9	-322.7	1,335,497.92	3,134,754.04	40.253326	-105.017226
5,713.0	6.50	312.70	5,688.2	382.0	-330.8	1,335,505.93	3,134,745.92	40.253349	-105.017255
5,808.0	7.30	320.30	5,782.5	390.3	-338.6	1,335,514.18	3,134,738.07	40.253371	-105.017283
5,902.0	6.40	315.30	5,875.9	398.6	-346.1	1,335,522.45	3,134,730.52	40.253394	-105.017310
5,996.0	6.60	316.10	5,969.3	406.2	-353.5	1,335,530.03	3,134,723.05	40.253415	-105.017337
6,091.0	6.30	326.00	6,063.7	414.4	-360.2	1,335,538.25	3,134,716.31	40.253438	-105.017361
6,185.0	5.50	322.10	6,157.2	422.3	-365.8	1,335,546.05	3,134,710.61	40.253459	-105.017381

HP

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3B-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 3B-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
6,280.0	6.10	330.50	6,251.7	430.3	-371.1	1,335,554.00	3,134,705.29	40.253481	-105.017400
6,374.0	5.20	323.90	6,345.2	438.1	-376.1	1,335,561.77	3,134,700.27	40.253503	-105.017418
6,469.0	6.20	322.30	6,439.8	445.6	-381.8	1,335,569.27	3,134,694.56	40.253523	-105.017438
6,563.0	5.20	314.10	6,533.3	452.6	-387.9	1,335,576.22	3,134,688.36	40.253542	-105.017460
6,657.0	5.50	317.20	6,626.9	458.8	-394.1	1,335,582.46	3,134,682.20	40.253560	-105.017482
6,752.0	5.10	308.40	6,721.5	464.8	-400.5	1,335,588.38	3,134,675.77	40.253576	-105.017505
6,799.0	4.90	328.40	6,768.3	467.8	-403.1	1,335,591.38	3,134,673.06	40.253584	-105.017515
6,846.0	7.20	358.20	6,815.1	472.5	-404.3	1,335,596.03	3,134,671.89	40.253597	-105.017519
6,894.0	8.70	25.70	6,862.6	478.7	-402.8	1,335,602.31	3,134,673.34	40.253614	-105.017513
6,941.0	10.60	53.70	6,909.0	484.5	-397.8	1,335,608.11	3,134,678.34	40.253630	-105.017495
6,988.0	14.60	61.70	6,954.8	489.9	-389.1	1,335,613.53	3,134,687.01	40.253645	-105.017464
7,035.0	19.30	65.70	6,999.8	495.9	-376.8	1,335,619.60	3,134,699.28	40.253661	-105.017420
7,083.0	23.60	73.00	7,044.5	502.0	-360.3	1,335,625.77	3,134,715.67	40.253678	-105.017361
7,130.0	26.50	79.30	7,087.0	506.7	-341.0	1,335,630.57	3,134,734.96	40.253691	-105.017292
7,177.0	29.00	83.60	7,128.6	509.9	-319.4	1,335,633.91	3,134,756.57	40.253700	-105.017215
7,224.0	34.00	82.20	7,168.7	512.9	-295.0	1,335,637.10	3,134,780.91	40.253708	-105.017127
7,272.0	39.20	85.00	7,207.2	516.1	-266.6	1,335,640.40	3,134,809.32	40.253717	-105.017026
7,319.0	44.30	87.20	7,242.3	518.2	-235.4	1,335,642.66	3,134,840.52	40.253722	-105.016914
7,366.0	49.70	90.80	7,274.3	518.7	-201.1	1,335,643.40	3,134,874.86	40.253724	-105.016791
7,413.0	55.40	90.90	7,302.9	518.2	-163.8	1,335,643.05	3,134,912.16	40.253722	-105.016657
7,461.0	61.10	90.90	7,328.1	517.5	-123.0	1,335,642.64	3,134,952.96	40.253721	-105.016511
7,508.0	67.20	90.60	7,348.6	517.0	-80.7	1,335,642.32	3,134,995.23	40.253719	-105.016359
7,555.0	71.70	91.00	7,365.1	516.4	-36.7	1,335,641.94	3,135,039.23	40.253718	-105.016202
7,602.0	74.30	89.60	7,378.9	516.1	8.2	1,335,641.95	3,135,084.17	40.253717	-105.016041
7,650.0	76.20	88.80	7,391.1	516.8	54.6	1,335,642.86	3,135,130.58	40.253719	-105.015874
7,697.0	78.00	88.50	7,401.6	517.9	100.4	1,335,644.18	3,135,176.37	40.253722	-105.015710
7,752.0	82.70	89.20	7,410.8	519.0	154.6	1,335,645.57	3,135,230.56	40.253725	-105.015516
7,858.0	86.80	89.50	7,420.5	520.2	260.2	1,335,647.34	3,135,336.08	40.253728	-105.015138
7,953.0	88.70	89.50	7,424.2	521.0	355.1	1,335,648.68	3,135,430.99	40.253730	-105.014798
8,047.0	90.50	89.90	7,424.9	521.5	449.1	1,335,649.69	3,135,524.98	40.253732	-105.014461
8,142.0	92.30	90.00	7,422.5	521.6	544.0	1,335,650.29	3,135,619.94	40.253732	-105.014121
8,236.0	91.60	90.20	7,419.3	521.4	638.0	1,335,650.64	3,135,713.89	40.253731	-105.013784
8,331.0	91.20	89.70	7,417.0	521.5	733.0	1,335,651.24	3,135,808.86	40.253732	-105.013444
8,426.0	90.20	89.40	7,415.9	522.2	827.9	1,335,652.51	3,135,903.84	40.253734	-105.013104
8,520.0	91.10	90.00	7,414.8	522.7	921.9	1,335,653.51	3,135,997.83	40.253735	-105.012767
8,615.0	90.90	91.50	7,413.1	521.5	1,016.9	1,335,652.79	3,136,092.81	40.253731	-105.012427
8,709.0	89.80	90.40	7,412.6	519.9	1,110.9	1,335,651.74	3,136,186.80	40.253727	-105.012090
8,804.0	89.90	90.70	7,412.8	519.0	1,205.9	1,335,651.35	3,136,281.79	40.253725	-105.011750
8,898.0	89.30	90.40	7,413.5	518.1	1,299.9	1,335,650.96	3,136,375.79	40.253722	-105.011413
8,993.0	88.90	89.20	7,415.0	518.4	1,394.9	1,335,651.81	3,136,470.77	40.253723	-105.011073
9,088.0	88.90	88.60	7,416.8	520.3	1,489.8	1,335,654.15	3,136,565.73	40.253728	-105.010732
9,182.0	90.70	88.20	7,417.1	522.9	1,583.8	1,335,657.29	3,136,659.67	40.253735	-105.010396
9,276.0	90.80	88.50	7,415.9	525.6	1,677.7	1,335,660.51	3,136,753.61	40.253743	-105.010059
9,371.0	91.10	88.50	7,414.3	528.1	1,772.7	1,335,663.51	3,136,848.55	40.253749	-105.009719
9,466.0	90.90	89.20	7,412.6	530.0	1,867.7	1,335,665.93	3,136,943.50	40.253755	-105.009379
9,560.0	91.20	89.90	7,410.9	530.7	1,961.6	1,335,667.19	3,137,037.48	40.253757	-105.009042
9,655.0	91.50	90.50	7,408.7	530.4	2,056.6	1,335,667.37	3,137,132.45	40.253756	-105.008702
9,750.0	90.30	90.50	7,407.2	529.6	2,151.6	1,335,667.06	3,137,227.43	40.253753	-105.008362
9,844.0	89.90	90.90	7,407.0	528.4	2,245.6	1,335,666.43	3,137,321.43	40.253750	-105.008025
9,939.0	88.20	91.00	7,408.6	526.8	2,340.6	1,335,665.37	3,137,416.41	40.253746	-105.007685
10,034.0	86.90	91.20	7,412.7	525.0	2,435.5	1,335,664.07	3,137,511.31	40.253741	-105.007345
10,128.0	87.90	90.60	7,416.9	523.5	2,529.3	1,335,663.10	3,137,605.21	40.253737	-105.007008
10,223.0	87.00	90.00	7,421.2	523.0	2,624.3	1,335,663.12	3,137,700.11	40.253735	-105.006668
10,317.0	87.90	90.00	7,425.3	523.0	2,718.2	1,335,663.64	3,137,794.02	40.253735	-105.006332
10,412.0	89.90	89.20	7,427.2	523.7	2,813.1	1,335,664.82	3,137,888.99	40.253737	-105.005991

HP

Survey Report - Geographic

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Minch 3B-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 3B-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
10,506.0	89.50	90.10	7,427.7	524.3	2,907.1	1,335,665.91	3,137,982.98	40.253739	-105.005655
10,601.0	88.80	89.70	7,429.1	524.4	3,002.1	1,335,666.59	3,138,077.96	40.253739	-105.005314
10,695.0	87.10	88.80	7,432.4	525.7	3,096.0	1,335,668.33	3,138,171.88	40.253743	-105.004978
10,790.0	88.80	89.60	7,435.8	527.0	3,191.0	1,335,670.17	3,138,266.80	40.253746	-105.004638
10,884.0	89.70	88.70	7,437.1	528.4	3,284.9	1,335,672.08	3,138,360.77	40.253750	-105.004301
10,979.0	90.50	88.90	7,436.9	530.4	3,379.9	1,335,674.59	3,138,455.74	40.253755	-105.003961
11,073.0	89.90	89.70	7,436.6	531.5	3,473.9	1,335,676.25	3,138,549.72	40.253758	-105.003624
11,168.0	90.00	89.30	7,436.6	532.4	3,568.9	1,335,677.60	3,138,644.71	40.253761	-105.003284
11,262.0	90.80	90.90	7,436.0	532.2	3,662.9	1,335,677.95	3,138,738.70	40.253760	-105.002947
11,357.0	89.70	91.90	7,435.6	529.9	3,757.9	1,335,676.14	3,138,833.68	40.253754	-105.002607
11,451.0	89.10	89.80	7,436.6	528.5	3,851.9	1,335,675.26	3,138,927.67	40.253750	-105.002270
11,545.0	89.70	89.00	7,437.5	529.5	3,945.8	1,335,676.76	3,139,021.65	40.253753	-105.001933
11,640.0	89.80	88.70	7,438.0	531.4	4,040.8	1,335,679.19	3,139,116.62	40.253758	-105.001593
11,734.0	90.50	89.10	7,437.7	533.2	4,134.8	1,335,681.50	3,139,210.59	40.253763	-105.001256
11,829.0	91.50	89.50	7,436.1	534.3	4,229.8	1,335,683.18	3,139,305.56	40.253766	-105.000916
11,906.0	92.00	88.70	7,433.7	535.5	4,306.7	1,335,684.81	3,139,382.50	40.253769	-105.000640
Last CES Survey @ 11,906' MD									
11,956.0	92.00	88.70	7,432.0	536.7	4,356.7	1,335,686.22	3,139,432.45	40.253772	-105.000461
PTB @ 11,956' MD									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Minch 3B-4H 9900' MD	0.00	0.00	7,405.0	521.4	2,328.1	1,335,659.88	3,137,403.93	40.253731	-105.007729
- hit/miss target									
- Shape									
- survey misses target center by 6.5ft at 9926.5ft MD (7408.2 TVD, 527.0 N, 2328.1 E)									
- Point									
Minch 3B-4H 10700' MD	0.00	0.00	7,429.0	521.4	3,128.1	1,335,664.22	3,138,203.91	40.253731	-105.004863
- hit/miss target									
- Shape									
- survey misses target center by 6.9ft at 10726.8ft MD (7433.9 TVD, 526.3 N, 3127.8 E)									
- Point									
Minch 3B-4H PBHL P3	0.00	0.00	7,429.0	521.3	4,396.0	1,335,671.10	3,139,471.86	40.253730	-105.000320
- hit/miss target									
- Shape									
- survey misses target center by 42.3ft at 11956.0ft MD (7432.0 TVD, 536.7 N, 4356.7 E)									
- Point									

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
11,906.0	7,433.7	535.5	4,306.7	Last CES Survey @ 11,906' MD	
11,956.0	7,432.0	536.7	4,356.7	PTB @ 11,956' MD	

Checked By: _____ Approved By: _____ Date: _____