



# **EnCana Oil & Gas (USA) Inc**

**DJ Wattenberg**

**S20-T2N-R64W (Dale)**

**Dale 4B-20H-O264**

**HZ**

**Survey: Dale 4B-20H-O264 As-Drilled**

## **Standard Survey Report**

**19 November, 2014**





<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Dale 4B-20H-O264
<b>Project:</b>	DJ Wattenberg	<b>TVD Reference:</b>	WELL @ 4989.0usft (Original Well Elev)
<b>Site:</b>	S20-T2N-R64W (Dale)	<b>MD Reference:</b>	WELL @ 4989.0usft (Original Well Elev)
<b>Well:</b>	Dale 4B-20H-O264	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	HZ	<b>Database:</b>	EDM 5000.1 Single User Db

<b>Project</b>	DJ Wattenberg, Weld County, CO		
<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 Northern Zone		

Site						S20-T2N-R64W (Dale)											
Site Position:			Northing:			1,287,026.80 usft			Latitude:			40° 7' 3.392 N					
From:			Lat/Long			Easting:			3,257,591.72 usft			Longitude:			104° 34' 44.144 W		
Position Uncertainty:			0.0 usft			Slot Radius:			13-3/16 "			Grid Convergence:			0.60 °		

Well	Dale 4B-20H-O264					
Well Position	+N/-S	0.0 usft	Northing:	1,287,059.02 usft	Latitude:	40° 7' 3.511 N
	+E/-W	0.0 usft	Easting:	3,259,531.00 usft	Longitude:	104° 34' 19.178 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,959.0 usft

<b>Wellbore</b>	HZ				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	2014/03/31	8.36	66.76	52,708
	BGGM2014	2014/11/07	8.38	66.73	52,533

<b>Design</b>	HZ				
<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) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	236.74	

<b>Survey Program</b>	<b>Date</b>	2014/11/19			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
140.0	11,624.0	Dale 4B-20H-O264 As-Drilled (HZ)	SDI MWD	SDI MWD - Standard ver 1.0.1	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
140.0	0.35	288.63	140.0	0.1	-0.4	0.3	0.25	0.25	0.00	
232.0	0.26	188.61	232.0	0.0	-0.7	0.6	0.51	-0.10	-108.72	
323.0	1.58	224.30	323.0	-1.1	-1.6	1.9	1.51	1.45	39.22	
415.0	2.64	224.91	414.9	-3.5	-4.0	5.3	1.15	1.15	0.66	
507.0	5.01	227.46	506.7	-7.7	-8.4	11.3	2.58	2.58	2.77	
598.0	6.51	241.70	597.3	-12.8	-15.9	20.4	2.26	1.65	15.65	
690.0	7.30	239.06	688.6	-18.3	-25.5	31.4	0.93	0.86	-2.87	
781.0	8.01	241.96	778.8	-24.3	-36.1	43.5	0.89	0.78	3.19	
873.0	8.27	238.80	869.8	-30.7	-47.4	56.5	0.56	0.28	-3.43	



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<b>Well:</b>	Dale 4B-20H-O264	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	HZ	<b>Database:</b>	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
964.0	8.01	236.43	959.9	-37.6	-58.3	69.4	0.47	-0.29	-2.60
1,045.0	8.09	231.94	1,040.1	-44.2	-67.5	80.7	0.78	0.10	-5.54
1,154.0	8.02	231.44	1,148.1	-53.7	-79.5	95.9	0.09	-0.06	-0.46
1,338.0	10.52	242.95	1,329.7	-69.4	-104.5	125.4	1.69	1.36	6.26
1,521.0	10.78	240.54	1,509.5	-85.4	-134.2	159.1	0.28	0.14	-1.32
1,704.0	11.34	239.66	1,689.1	-102.9	-164.7	194.1	0.32	0.31	-0.48
1,887.0	11.75	238.47	1,868.4	-121.7	-196.1	230.7	0.26	0.22	-0.65
2,070.0	11.23	243.44	2,047.7	-139.4	-227.9	267.0	0.61	-0.28	2.72
2,252.0	9.58	243.25	2,226.7	-154.2	-257.3	299.7	0.91	-0.91	-0.10
2,435.0	9.31	250.31	2,407.3	-166.0	-284.8	329.2	0.65	-0.15	3.86
2,618.0	10.80	247.60	2,587.4	-177.5	-314.6	360.4	0.85	0.81	-1.48
2,802.0	8.55	242.88	2,768.8	-190.3	-342.7	391.0	1.30	-1.22	-2.57
2,992.0	10.34	239.95	2,956.2	-205.3	-370.0	422.0	0.98	0.94	-1.54
3,181.0	9.96	244.77	3,142.3	-220.8	-399.5	455.2	0.49	-0.20	2.55
3,371.0	8.97	242.56	3,329.7	-234.6	-427.5	486.2	0.55	-0.52	-1.16
3,560.0	9.34	235.85	3,516.3	-250.0	-453.3	516.2	0.60	0.20	-3.55
3,750.0	8.90	237.98	3,703.9	-266.4	-478.5	546.3	0.29	-0.23	1.12
3,939.0	10.05	245.15	3,890.3	-281.1	-505.9	577.2	0.87	0.61	3.79
4,128.0	11.26	237.47	4,076.1	-298.0	-536.4	612.0	0.99	0.64	-4.06
4,317.0	7.00	227.23	4,262.6	-315.7	-560.4	641.8	2.40	-2.25	-5.42
4,507.0	6.10	230.64	4,451.4	-330.0	-576.7	663.2	0.52	-0.47	1.79
4,698.0	2.38	250.78	4,641.9	-337.7	-588.3	677.2	2.07	-1.95	10.54
4,888.0	1.38	331.40	4,831.8	-337.0	-593.1	680.8	1.34	-0.53	42.43
5,078.0	1.85	0.48	5,021.7	-332.0	-594.2	678.9	0.49	0.25	15.31
5,269.0	0.59	262.75	5,212.7	-329.0	-595.2	678.1	1.06	-0.66	-51.17
5,459.0	0.92	348.53	5,402.7	-327.6	-596.4	678.4	0.56	0.17	45.15
5,649.0	2.12	1.94	5,592.6	-322.6	-596.6	675.8	0.65	0.63	7.06
5,840.0	0.48	21.72	5,783.5	-318.3	-596.2	673.1	0.88	-0.86	10.36
6,030.0	0.23	351.11	5,973.5	-317.2	-596.0	672.3	0.16	-0.13	-16.11
6,221.0	0.61	269.86	6,164.5	-316.9	-597.1	673.0	0.32	0.20	-42.54
6,412.0	0.67	311.31	6,355.5	-316.1	-598.9	674.2	0.24	0.03	21.70
6,602.0	0.67	12.42	6,545.5	-314.3	-599.5	673.7	0.36	0.00	32.16
6,697.0	5.18	1.11	6,640.4	-309.5	-599.3	670.9	4.76	4.75	-11.91
6,793.0	11.75	353.56	6,735.3	-295.4	-600.3	664.0	6.93	6.84	-7.86
6,888.0	21.16	351.97	6,826.3	-268.8	-603.8	652.3	9.92	9.91	-1.67
6,983.0	29.16	352.81	6,912.2	-228.8	-609.1	634.8	8.43	8.42	0.88
7,078.0	35.92	353.47	6,992.2	-178.0	-615.2	612.1	7.13	7.12	0.69
7,173.0	45.61	353.81	7,064.1	-116.5	-622.0	584.0	10.20	10.20	0.36
7,268.0	58.31	354.74	7,122.5	-42.2	-629.4	549.5	13.39	13.37	0.98
7,363.0	72.50	355.84	7,161.9	43.7	-636.4	508.3	14.97	14.94	1.16
7,428.0	81.34	355.42	7,176.6	106.8	-641.3	477.7	13.61	13.60	-0.65
7,546.0	89.97	358.00	7,185.6	224.1	-648.0	419.0	7.63	7.31	2.19
7,638.0	91.48	359.43	7,184.4	316.1	-650.1	370.3	2.26	1.64	1.55



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Survey										
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7,729.0	91.92	1.58	7,181.7	407.0	-649.3	319.7	2.41	0.48	2.36	
7,824.0	92.18	1.58	7,178.3	501.9	-646.6	265.5	0.27	0.27	0.00	
7,918.0	90.20	1.92	7,176.4	595.9	-643.8	211.6	2.14	-2.11	0.36	
8,013.0	89.93	1.01	7,176.3	690.8	-641.3	157.5	1.00	-0.28	-0.96	
8,108.0	89.56	1.01	7,176.7	785.8	-639.7	104.0	0.39	-0.39	0.00	
8,203.0	90.20	2.36	7,176.9	880.8	-636.9	49.6	1.57	0.67	1.42	
8,297.0	89.26	1.05	7,177.3	974.7	-634.1	-4.3	1.72	-1.00	-1.39	
8,392.0	89.56	1.85	7,178.3	1,069.7	-631.7	-58.4	0.90	0.32	0.84	
8,487.0	91.18	2.51	7,177.7	1,164.6	-628.1	-113.4	1.84	1.71	0.69	
8,582.0	91.24	2.17	7,175.7	1,259.5	-624.2	-168.7	0.36	0.06	-0.36	
8,677.0	89.73	0.90	7,174.9	1,354.5	-621.6	-222.9	2.08	-1.59	-1.34	
8,771.0	90.50	0.69	7,174.7	1,448.5	-620.3	-275.6	0.85	0.82	-0.22	
8,866.0	91.34	359.98	7,173.2	1,543.4	-619.8	-328.1	1.16	0.88	-0.75	
8,961.0	91.68	0.25	7,170.7	1,638.4	-619.6	-380.3	0.46	0.36	0.28	
9,055.0	90.34	359.18	7,169.0	1,732.4	-620.1	-431.5	1.82	-1.43	-1.14	
9,150.0	90.60	359.34	7,168.2	1,827.4	-621.3	-482.6	0.32	0.27	0.17	
9,244.0	90.50	359.54	7,167.3	1,921.4	-622.2	-533.3	0.24	-0.11	0.21	
9,339.0	89.87	0.69	7,167.0	2,016.4	-622.0	-585.6	1.38	-0.66	1.21	
9,434.0	90.07	0.62	7,167.1	2,111.4	-620.9	-638.6	0.22	0.21	-0.07	
9,529.0	88.76	0.24	7,168.0	2,206.4	-620.2	-691.3	1.44	-1.38	-0.40	
9,624.0	88.42	359.35	7,170.4	2,301.3	-620.6	-743.1	1.00	-0.36	-0.94	
9,719.0	90.57	1.10	7,171.2	2,396.3	-620.2	-795.5	2.92	2.26	1.84	
9,815.0	90.81	0.54	7,170.0	2,492.3	-618.8	-849.2	0.63	0.25	-0.58	
9,910.0	90.37	359.51	7,169.1	2,587.3	-618.8	-901.4	1.18	-0.46	-1.08	
10,005.0	90.57	1.37	7,168.3	2,682.3	-618.0	-954.1	1.97	0.21	1.96	
10,100.0	89.90	0.18	7,167.9	2,777.3	-616.7	-1,007.2	1.44	-0.71	-1.25	
10,195.0	90.44	0.02	7,167.6	2,872.3	-616.6	-1,059.5	0.59	0.57	-0.17	
10,290.0	89.50	1.20	7,167.7	2,967.3	-615.6	-1,112.4	1.59	-0.99	1.24	
10,385.0	89.56	2.61	7,168.4	3,062.2	-612.4	-1,167.1	1.49	0.06	1.48	
10,481.0	90.47	2.01	7,168.4	3,158.1	-608.5	-1,222.9	1.14	0.95	-0.63	
10,576.0	89.46	2.66	7,168.5	3,253.0	-604.7	-1,278.2	1.26	-1.06	0.68	
10,671.0	88.72	1.63	7,170.0	3,348.0	-601.1	-1,333.3	1.33	-0.78	-1.08	
10,766.0	88.46	1.07	7,172.3	3,442.9	-598.9	-1,387.2	0.65	-0.27	-0.59	
10,862.0	89.03	2.66	7,174.4	3,538.8	-595.8	-1,442.4	1.76	0.59	1.66	
10,957.0	90.64	2.73	7,174.7	3,633.7	-591.3	-1,498.2	1.70	1.69	0.07	
11,052.0	90.30	1.94	7,173.9	3,728.6	-587.4	-1,553.5	0.91	-0.36	-0.83	
11,148.0	90.27	1.61	7,173.4	3,824.6	-584.4	-1,608.6	0.35	-0.03	-0.34	
11,243.0	90.37	1.23	7,172.9	3,919.6	-582.1	-1,662.6	0.41	0.11	-0.40	
11,338.0	89.03	1.17	7,173.4	4,014.5	-580.1	-1,716.4	1.41	-1.41	-0.06	
11,434.0	89.06	0.51	7,175.0	4,110.5	-578.7	-1,770.2	0.69	0.03	-0.69	
11,529.0	88.82	0.36	7,176.8	4,205.5	-578.0	-1,822.9	0.30	-0.25	-0.16	
11,624.0	89.56	0.45	7,178.1	4,300.5	-577.3	-1,875.5	0.78	0.78	0.09	
11,717.0	89.70	359.94	7,178.7	4,393.5	-577.0	-1,926.8	0.57	0.15	-0.55	



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Survey									
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11,780.0	89.70	359.94	7,179.0	4,456.5	-577.1	-1,961.3	0.00	0.00	0.00

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
140.0	140.0	0.1	-0.4	First SDI MWD Survey

Checked By: _____	Approved By: _____	Date: _____
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