



**Scientific  
Drilling**

## Survey Certification

7327 West Barton Road  
Casper, WY 82604  
(307)-472-6621 Fax (307) 472-5439

<b>Operator</b>	EnCana Oil & Gas (USA) Inc.
<b>Well Name &amp; No.</b>	Dale 4H-20H-0264
<b>County &amp; State</b>	Weld County, CO
<b>SDI Job No.</b>	410814HEFK186346
<b>Rig</b>	H&P 278
<b>Survey Date</b>	27-Sep-2014

I, Seth M. Burstad, having personal knowledge of all the facts, hereby  
certify that the attached directional survey run from a measured depth of 0 feet to a  
measured depth of 11669 feet is true and correct as determined from all available records.

Seth Burstad  
Signature

30-Sep-2014  
Date

**Seth M. Burstad**  
Rockies Region Well Planner  
Scientific Drilling - Rocky Mountain District



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

**DJ Wattenberg**

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

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

**HZ**

**Design: HZ**

## **Standard Survey Report**

**30 September, 2014**





<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Dale 4H-20H-O264
<b>Project:</b>	DJ Wattenberg	<b>TVD Reference:</b>	WELL @ 4988.00ft (Original Well Elev)
<b>Site:</b>	S20-T2N-R64W (Dale)	<b>MD Reference:</b>	WELL @ 4988.00ft (Original Well Elev)
<b>Well:</b>	Dale 4H-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>	Casper District

<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		

<b>Site</b>	S20-T2N-R64W (Dale)			
<b>Site Position:</b>		<b>Northing:</b>	1,287,026.80 usft	<b>Latitude:</b> 40.117609
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,257,591.72 usft	<b>Longitude:</b> -104.578929
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13.200 in	<b>Grid Convergence:</b> 0.60 °

<b>Well</b>	Dale 4H-20H-O264			
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	1,287,059.10 usft
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	3,259,576.03 usft
<b>Position Uncertainty</b>	0.00 ft		<b>Wellhead Elevation:</b>	ft
			<b>Ground Level:</b>	4,958.00 ft

<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	3/31/2014	8.36	66.76	52,708

<b>Design</b>	HZ			
<b>Audit Notes:</b>				
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b> 0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	112.63

<b>Survey Program</b>	<b>Date</b>	9/30/2014		
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
140.00	1,056.00	Survey #1 - Surface (HZ)	SDI MWD	SDI MWD - Standard ver 1.0.1
1,086.00	7,497.00	Survey #2 - Intermediate (HZ)	SDI MWD	SDI MWD - Standard ver 1.0.1
7,624.00	11,733.00	Survey #3 - Lateral (HZ)	SDI MWD	SDI MWD - Standard ver 1.0.1

<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>Turn Rate (°/100ft)</b>
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140.00	1.41	4.39	139.99	1.72	0.13	-0.54	1.01	1.01	0.00
<b>First SDI MWD Survey</b>									
201.00	0.35	146.87	200.98	2.31	0.29	-0.62	2.79	-1.74	233.57
263.00	0.26	196.00	262.98	2.02	0.36	-0.45	0.43	-0.15	79.24
323.00	0.88	141.06	322.98	1.53	0.61	-0.03	1.27	1.03	-91.57
384.00	1.14	106.17	383.97	0.99	1.49	0.99	1.07	0.43	-57.20
445.00	2.38	121.46	444.94	0.16	3.15	2.84	2.16	2.03	25.07
506.00	2.29	107.93	505.89	-0.87	5.39	5.31	0.91	-0.15	-22.18

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well Dale 4H-20H-O264
<b>Project:</b>	DJ Wattenberg	<b>TVD Reference:</b>	WELL @ 4988.00ft (Original Well Elev)
<b>Site:</b>	S20-T2N-R64W (Dale)	<b>MD Reference:</b>	WELL @ 4988.00ft (Original Well Elev)
<b>Well:</b>	Dale 4H-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>	Casper District

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
598.00	3.52	115.14	597.77	-2.64	9.69	9.96	1.39	1.34	7.84	
689.00	3.17	114.08	688.61	-4.85	14.52	15.27	0.39	-0.38	-1.16	
781.00	4.84	120.85	780.39	-7.88	20.17	21.65	1.88	1.82	7.36	
873.00	5.45	116.28	872.01	-11.81	27.42	29.86	0.80	0.66	-4.97	
964.00	6.25	111.53	962.54	-15.54	35.91	39.12	1.03	0.88	-5.22	
1,056.00	5.72	107.31	1,054.04	-18.74	44.94	48.69	0.75	-0.58	-4.59	
1,086.00	5.63	109.69	1,083.89	-19.68	47.76	51.65	0.84	-0.30	7.93	
1,178.00	7.13	108.72	1,175.32	-23.03	57.41	61.85	1.63	1.63	-1.05	
1,269.00	8.71	110.57	1,265.45	-27.27	69.21	74.38	1.76	1.74	2.03	
1,341.00	9.91	109.47	1,336.50	-31.25	80.16	86.01	1.68	1.67	-1.53	
1,525.00	10.16	108.78	1,517.68	-41.75	110.45	118.01	0.15	0.14	-0.38	
1,707.00	11.43	108.26	1,696.46	-52.57	142.78	152.01	0.70	0.70	-0.29	
1,890.00	10.27	112.71	1,876.19	-64.55	175.05	186.40	0.78	-0.63	2.43	
2,073.00	10.78	112.18	2,056.11	-77.31	205.94	219.83	0.28	0.28	-0.29	
2,255.00	9.48	113.02	2,235.27	-89.59	235.50	251.84	0.72	-0.71	0.46	
2,439.00	9.03	109.70	2,416.87	-100.39	263.04	281.41	0.38	-0.24	-1.80	
2,622.00	10.30	110.85	2,597.27	-111.05	291.85	312.11	0.70	0.69	0.63	
2,805.00	10.02	114.10	2,777.41	-123.37	321.67	344.38	0.35	-0.15	1.78	
2,995.00	11.13	109.86	2,964.18	-136.35	354.01	379.22	0.71	0.58	-2.23	
3,184.00	11.80	109.64	3,149.41	-149.05	389.37	416.74	0.36	0.35	-0.12	
3,374.00	10.86	108.43	3,335.70	-161.24	424.65	453.99	0.51	-0.49	-0.64	
3,563.00	9.39	118.59	3,521.77	-174.24	455.08	487.09	1.22	-0.78	5.38	
3,753.00	10.21	112.92	3,709.00	-188.22	484.20	519.34	0.67	0.43	-2.98	
3,943.00	10.60	110.68	3,895.87	-200.95	516.06	553.65	0.30	0.21	-1.18	
4,131.00	11.34	109.64	4,080.44	-213.27	549.65	589.39	0.41	0.39	-0.55	
4,320.00	9.39	109.99	4,266.34	-224.79	581.64	623.35	1.03	-1.03	0.19	
4,510.00	9.84	106.96	4,453.68	-234.82	611.73	654.99	0.36	0.24	-1.59	
4,701.00	8.89	111.47	4,642.13	-244.98	641.08	685.99	0.63	-0.50	2.36	
4,891.00	8.00	111.15	4,830.07	-255.13	667.07	713.88	0.47	-0.47	-0.17	
5,081.00	8.36	110.15	5,018.14	-264.66	692.37	740.90	0.20	0.19	-0.53	
5,271.00	10.65	110.53	5,205.51	-275.57	721.78	772.25	1.21	1.21	0.20	
5,462.00	9.05	107.48	5,393.69	-286.28	752.64	804.85	0.88	-0.84	-1.60	
5,652.00	7.22	114.08	5,581.78	-295.64	777.80	831.67	1.08	-0.96	3.47	
5,843.00	4.82	98.96	5,771.72	-301.78	796.69	851.47	1.50	-1.26	-7.92	
6,033.00	3.52	119.82	5,961.23	-305.93	809.63	865.01	1.04	-0.68	10.98	
6,224.00	1.87	134.09	6,152.01	-311.01	816.96	873.73	0.93	-0.86	7.47	
6,415.00	0.74	96.44	6,342.96	-313.32	820.42	877.82	0.71	-0.59	-19.71	
6,605.00	1.21	39.59	6,532.94	-311.91	822.92	879.58	0.53	0.25	-29.92	
6,652.00	2.25	2.48	6,579.92	-310.61	823.28	879.41	3.14	2.21	-78.96	
6,700.00	6.23	358.40	6,627.78	-307.06	823.25	878.01	8.31	8.29	-8.50	
6,747.00	13.15	359.64	6,674.08	-299.16	823.14	874.87	14.73	14.72	2.64	
6,796.00	17.21	3.94	6,721.36	-286.35	823.61	870.37	8.59	8.29	8.78	
6,843.00	20.34	2.94	6,765.85	-271.25	824.50	865.39	6.69	6.66	-2.13	

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<b>Well:</b>	Dale 4H-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>	Casper District

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,891.00	23.88	359.33	6,810.32	-253.19	824.82	858.73	7.90	7.38	-7.52
6,938.00	29.53	356.38	6,852.29	-232.10	823.97	849.84	12.34	12.02	-6.28
6,986.00	35.39	354.57	6,892.77	-206.44	821.91	838.06	12.37	12.21	-3.77
7,033.00	40.44	355.74	6,929.84	-177.67	819.49	824.75	10.85	10.74	2.49
7,081.00	46.15	356.92	6,964.76	-144.83	817.40	810.19	12.01	11.90	2.46
7,128.00	50.87	357.39	6,995.89	-109.68	815.66	795.05	10.07	10.04	1.00
7,176.00	55.37	357.03	7,024.69	-71.34	813.79	778.57	9.39	9.38	-0.75
7,223.00	60.30	357.27	7,049.70	-31.62	811.81	761.46	10.50	10.49	0.51
7,271.00	67.32	358.60	7,070.88	11.40	810.27	743.49	14.83	14.63	2.77
7,318.00	70.53	359.61	7,087.77	55.24	809.59	725.99	7.12	6.83	2.15
7,366.00	73.30	359.54	7,102.67	100.87	809.25	708.12	5.77	5.77	-0.15
7,413.00	76.52	358.50	7,114.91	146.23	808.48	689.94	7.18	6.85	-2.21
7,462.00	80.06	358.67	7,124.85	194.19	807.29	670.39	7.23	7.22	0.35
7,497.00	83.15	359.26	7,129.96	228.81	806.67	656.49	8.98	8.83	1.69
Last Survey in 8 3/4" Hole									
7,624.00	87.08	359.30	7,140.77	355.31	805.08	606.34	3.09	3.09	0.03
First Survey in 6" Hole									
7,719.00	86.70	358.47	7,145.93	450.15	803.23	568.14	0.96	-0.40	-0.87
7,814.00	87.62	0.52	7,150.64	545.02	802.40	530.86	2.36	0.97	2.16
7,909.00	89.63	0.90	7,152.91	639.98	803.57	495.40	2.15	2.12	0.40
8,003.00	90.07	0.68	7,153.16	733.97	804.87	460.43	0.52	0.47	-0.23
8,098.00	90.03	0.84	7,153.08	828.97	806.13	425.04	0.17	-0.04	0.17
8,193.00	90.97	0.88	7,152.25	923.95	807.55	389.80	0.99	0.99	0.04
8,288.00	91.04	1.19	7,150.58	1,018.92	809.27	354.84	0.33	0.07	0.33
8,383.00	91.11	0.38	7,148.80	1,113.89	810.57	319.49	0.86	0.07	-0.85
8,477.00	91.11	359.51	7,146.98	1,207.88	810.48	283.24	0.93	0.00	-0.93
8,573.00	90.67	358.47	7,145.49	1,303.85	808.79	244.75	1.18	-0.46	-1.08
8,667.00	90.60	359.12	7,144.45	1,397.82	806.81	206.76	0.70	-0.07	0.69
8,762.00	91.21	358.72	7,142.95	1,492.79	805.02	168.56	0.77	0.64	-0.42
8,857.00	90.30	359.61	7,141.69	1,587.77	803.64	130.73	1.34	-0.96	0.94
8,951.00	90.20	359.83	7,141.28	1,681.77	803.18	94.13	0.26	-0.11	0.23
9,045.00	89.80	1.28	7,141.28	1,775.76	804.09	58.80	1.60	-0.43	1.54
9,140.00	90.50	0.32	7,141.04	1,870.75	805.42	23.47	1.25	0.74	-1.01
9,234.00	90.77	0.05	7,139.99	1,964.74	805.72	-12.42	0.41	0.29	-0.29
9,330.00	91.65	0.17	7,137.97	2,060.72	805.90	-49.18	0.93	0.92	0.13
9,425.00	90.40	0.58	7,136.27	2,155.70	806.53	-85.16	1.38	-1.32	0.43
9,520.00	89.90	1.92	7,136.02	2,250.68	808.60	-119.80	1.51	-0.53	1.41
9,615.00	89.33	1.50	7,136.66	2,345.63	811.43	-153.72	0.75	-0.60	-0.44
9,710.00	88.32	0.88	7,138.60	2,440.59	813.41	-188.44	1.25	-1.06	-0.65
9,805.00	88.96	0.89	7,140.86	2,535.55	814.87	-223.63	0.67	0.67	0.01
9,901.00	89.93	0.47	7,141.79	2,631.54	816.01	-259.52	1.10	1.01	-0.44
9,996.00	89.66	0.93	7,142.13	2,726.53	817.17	-295.00	0.56	-0.28	0.48
10,091.00	89.16	1.12	7,143.11	2,821.51	818.87	-329.99	0.56	-0.53	0.20
10,186.00	90.71	0.78	7,143.22	2,916.49	820.45	-365.08	1.67	1.63	-0.36





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<b>Well:</b>	Dale 4H-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>	Casper District

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
10,281.00	89.97	0.91	7,142.65	3,011.48	821.85	-400.35	0.79	-0.78	0.14	
10,376.00	89.06	0.64	7,143.46	3,106.47	823.13	-435.71	1.00	-0.96	-0.28	
10,472.00	89.60	0.66	7,144.58	3,202.45	824.22	-471.65	0.56	0.56	0.02	
10,567.00	88.39	359.06	7,146.24	3,297.43	823.99	-508.41	2.11	-1.27	-1.68	
10,662.00	89.26	358.87	7,148.19	3,392.40	822.27	-546.54	0.94	0.92	-0.20	
10,757.00	89.09	358.89	7,149.56	3,487.37	820.42	-584.80	0.18	-0.18	0.02	
10,853.00	88.08	359.75	7,151.93	3,583.33	819.28	-622.78	1.38	-1.05	0.90	
10,948.00	88.89	359.43	7,154.44	3,678.30	818.60	-659.95	0.92	0.85	-0.34	
11,043.00	89.09	359.56	7,156.12	3,773.28	817.76	-697.28	0.25	0.21	0.14	
11,139.00	89.53	358.98	7,157.27	3,869.26	816.54	-735.34	0.76	0.46	-0.60	
11,234.00	89.83	358.25	7,157.80	3,964.23	814.24	-774.01	0.83	0.32	-0.77	
11,329.00	89.87	358.22	7,158.05	4,059.19	811.32	-813.25	0.05	0.04	-0.03	
11,425.00	88.69	359.47	7,159.26	4,155.16	809.38	-851.97	1.79	-1.23	1.30	
11,520.00	88.72	0.09	7,161.41	4,250.13	809.02	-888.85	0.65	0.03	0.65	
11,615.00	87.81	358.35	7,164.28	4,345.07	807.72	-926.58	2.07	-0.96	-1.83	
11,669.00	88.08	358.36	7,166.22	4,399.02	806.17	-948.77	0.50	0.50	0.02	
Last SDI MWD Survey										
11,733.00	88.08	358.36	7,168.36	4,462.95	804.34	-975.07	0.00	0.00	0.00	
Projection to TD										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
140.00	139.99	1.72	0.13	First SDI MWD Survey	
7,497.00	7,129.96	228.81	806.67	Last Survey in 8 3/4" Hole	
7,624.00	7,140.77	355.31	805.08	First Survey in 6" Hole	
11,669.00	7,166.22	4,399.02	806.17	Last SDI MWD Survey	
11,733.00	7,168.36	4,462.95	804.34	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
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