



# **PDC Energy Inc. DJ Basin**

**SEC.6-T3N-R65W**

**Elkhead 03N65W06 1-16 Pad**

**Elkhead 8N**

**Elkhead 8N Wellbore #1**

**Survey: Survey #1**

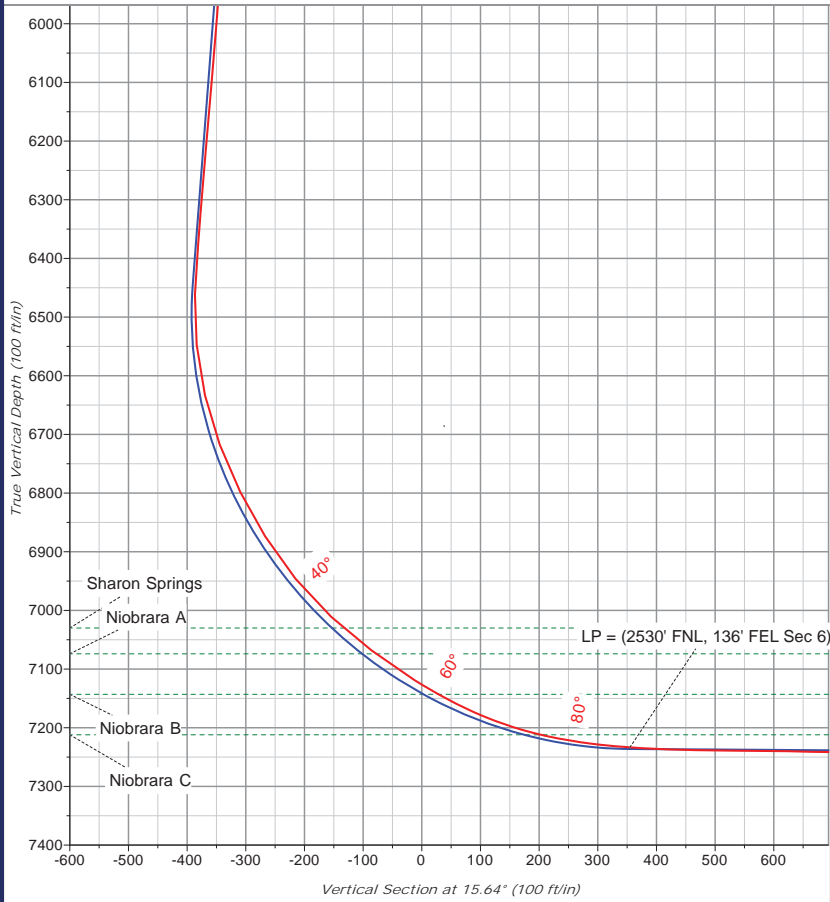
## **Standard Survey Report**

**12 April, 2021**



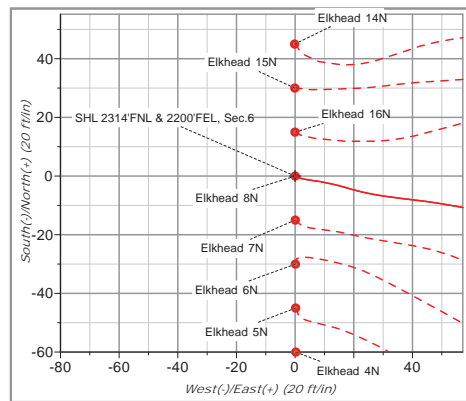


Company: PDC Energy Inc. DJ Basin  
 Project: SEC.6-T3N-R65W  
 Site: Elkhead 03N65W06 1-16 Pad  
 Well: Elkhead 8N  
 Design: Elkhead 8N Final Surveys

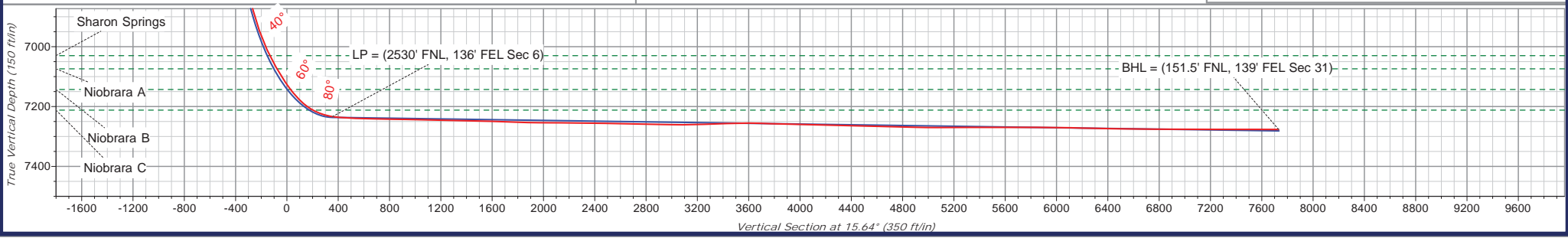
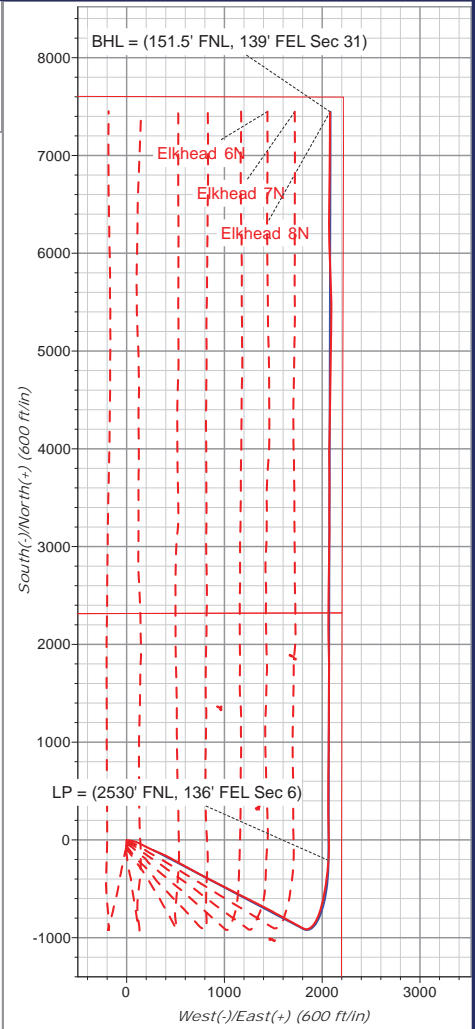
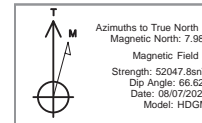


ANNOTATIONS							
TVD	MD	Inc	Azi	+N/-S	+E/-W	V Sect	Annotation
7233.6	8002.9	86.01	4.44	-209.3	2063.6	354.7	LP = (2530' FNL, 136' FEL Sec 6)
7276.6	15660.0	89.93	0.71	7446.3	2080.8	7731.6	BHL = (151.5' FNL, 139' FEL Sec 31)

**FINAL SURVEY**  
**Projected Bottom Hole Location**  
**15660' MD / 7276.6' TVD**  
**151.5' FNL / 139' FEL Sec 31**  
**89.93° INC / 0.71° AZM**



FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
1137.0	1147.4	Fox Hills Aq Base
3199.0	3334.8	Parkman
3964.0	4151.8	Sussex
5049.0	5306.9	Shannon
7030.0	7459.6	Sharon Springs
7074.0	7530.1	Niobrara A
7143.0	7657.3	Niobrara B
7212.0	7847.4	Niobrara C



<b>Company:</b>	PDC Energy Inc. DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Elkhead 8N
<b>Project:</b>	SEC.6-T3N-R65W	<b>TVD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Site:</b>	Elkhead 03N65W06 1-16 Pad	<b>MD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Well:</b>	Elkhead 8N	<b>North Reference:</b>	True
<b>Wellbore:</b>	Elkhead 8N Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Elkhead 8N Final Surveys	<b>Database:</b>	US_EDM

<b>Project</b>	SEC.6-T3N-R65W		
<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		Using geodetic scale factor

<b>Site</b>	Elkhead 03N65W06 1-16 Pad				
<b>Site Position:</b>		<b>Northing:</b>	1,336,763.37 usft	<b>Latitude:</b>	40.255081
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,222,007.75 usft	<b>Longitude:</b>	-104.704564
<b>Position Uncertainty:</b>	0.0 ft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.51 °

<b>Well</b>	Elkhead 8N					
<b>Well Position</b>	<b>+N/-S</b>	0.0 ft	<b>Northing:</b>	1,336,853.33 usft	<b>Latitude:</b>	40.255328
	<b>+E/-W</b>	0.0 ft	<b>Easting:</b>	3,222,006.61 usft	<b>Longitude:</b>	-104.704565
<b>Position Uncertainty</b>		0.0 ft	<b>Wellhead Elevation:</b>	0.0 ft	<b>Ground Level:</b>	4,968.0 ft

<b>Wellbore</b>	Elkhead 8N Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	08/07/2020	7.98	66.62	52,048

<b>Design</b>	Elkhead 8N Final Surveys				
<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) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	15.64	

<b>Survey Program</b>	<b>Date</b>	04/12/2021			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
155.0	15,660.0	Survey #1 (Elkhead 8N Wellbore #1)	MWD	MWD - Standard	

<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 (°/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	
155.0	0.18	110.28	155.0	-0.1	0.2	0.0	0.12	0.12	0.00	
247.0	1.41	113.98	247.0	-0.6	1.4	-0.2	1.34	1.34	4.02	
338.0	3.25	96.57	337.9	-1.3	5.0	0.0	2.14	2.02	-19.13	
458.0	4.57	103.08	457.6	-2.8	13.0	0.8	1.16	1.10	5.43	
547.0	6.42	106.07	546.2	-5.0	21.3	0.9	2.10	2.08	3.36	
636.0	6.77	96.57	634.6	-7.0	31.2	1.7	1.29	0.39	-10.67	
725.0	8.09	97.45	722.9	-8.4	42.7	3.4	1.49	1.48	0.99	
814.0	9.67	100.27	810.8	-10.5	56.2	5.0	1.84	1.78	3.17	
904.0	11.17	103.25	899.3	-13.9	72.2	6.1	1.77	1.67	3.31	

<b>Company:</b>	PDC Energy Inc. DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Elkhead 8N
<b>Project:</b>	SEC.6-T3N-R65W	<b>TVD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Site:</b>	Elkhead 03N65W06 1-16 Pad	<b>MD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Well:</b>	Elkhead 8N	<b>North Reference:</b>	True
<b>Wellbore:</b>	Elkhead 8N Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Elkhead 8N Final Surveys	<b>Database:</b>	US_EDM

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
993.0	12.22	107.65	986.5	-18.7	89.5	6.1	1.55	1.18	4.94
1,078.0	12.93	111.52	1,069.4	-24.9	106.9	4.8	1.30	0.84	4.55
1,147.4	13.52	115.73	1,137.0	-31.3	121.5	2.6	1.63	0.85	6.06
<b>Fox Hills Aq Base</b>									
1,169.0	13.72	116.96	1,158.0	-33.6	126.0	1.7	1.63	0.92	5.71
1,258.0	15.30	117.84	1,244.2	-43.8	145.8	-2.9	1.79	1.78	0.99
1,347.0	16.09	115.91	1,329.8	-54.7	167.3	-7.6	1.06	0.89	-2.17
1,437.0	17.32	117.14	1,416.0	-66.3	190.4	-12.5	1.42	1.37	1.37
1,527.0	18.20	116.61	1,501.7	-78.7	214.9	-17.8	0.99	0.98	-0.59
1,617.0	19.35	115.56	1,587.0	-91.4	241.0	-23.1	1.33	1.28	-1.17
1,658.0	19.61	115.21	1,625.6	-97.3	253.3	-25.4	0.70	0.63	-0.85
1,789.0	18.34	113.78	1,749.5	-114.9	292.1	-31.9	1.03	-0.97	-1.09
1,879.0	18.06	111.76	1,835.0	-125.8	318.0	-35.4	0.77	-0.31	-2.24
1,968.0	19.89	111.49	1,919.1	-136.5	344.9	-38.4	2.06	2.06	-0.30
2,058.0	20.43	114.86	2,003.6	-148.7	373.4	-42.5	1.42	0.60	3.74
2,147.0	20.96	115.45	2,086.9	-162.1	401.8	-47.7	0.64	0.60	0.66
2,236.0	20.81	118.57	2,170.0	-176.5	430.1	-54.0	1.26	-0.17	3.51
2,325.0	20.31	119.81	2,253.4	-191.7	457.4	-61.3	0.74	-0.56	1.39
2,415.0	20.09	120.15	2,337.8	-207.2	484.3	-69.0	0.28	-0.24	0.38
2,505.0	20.87	117.49	2,422.2	-222.4	511.9	-76.2	1.35	0.87	-2.96
2,594.0	20.64	118.38	2,505.4	-237.2	539.8	-82.9	0.44	-0.26	1.00
2,684.0	20.75	117.64	2,589.6	-252.1	567.8	-89.7	0.32	0.12	-0.82
2,773.0	19.88	119.34	2,673.0	-266.8	595.0	-96.5	1.18	-0.98	1.91
2,863.0	20.30	119.50	2,757.6	-282.0	621.9	-103.9	0.47	0.47	0.18
2,952.0	20.70	119.26	2,840.9	-297.3	649.1	-111.3	0.46	0.45	-0.27
3,042.0	20.65	119.15	2,925.1	-312.8	676.8	-118.8	0.07	-0.06	-0.12
3,132.0	20.74	118.94	3,009.3	-328.2	704.6	-126.1	0.13	0.10	-0.23
3,221.0	21.14	116.78	3,092.4	-343.1	732.7	-132.9	0.98	0.45	-2.43
3,311.0	20.25	118.69	3,176.6	-357.9	760.9	-139.5	1.24	-0.99	2.12
3,334.8	20.37	118.49	3,199.0	-361.9	768.2	-141.4	0.60	0.52	-0.84
<b>Parkman</b>									
3,401.0	20.72	117.95	3,260.9	-372.8	788.6	-146.4	0.60	0.52	-0.82
3,491.0	20.88	117.62	3,345.1	-387.7	816.9	-153.2	0.22	0.18	-0.37
3,581.0	19.35	116.16	3,429.6	-401.7	844.5	-159.2	1.79	-1.70	-1.62
3,670.0	20.98	116.63	3,513.1	-415.4	872.0	-164.9	1.84	1.83	0.53
3,760.0	20.45	117.72	3,597.3	-429.9	900.3	-171.3	0.73	-0.59	1.21
3,849.0	20.69	117.41	3,680.6	-444.4	928.0	-177.8	0.30	0.27	-0.35
3,939.0	19.90	118.45	3,765.0	-459.0	955.6	-184.4	0.96	-0.88	1.16
4,029.0	20.97	116.12	3,849.4	-473.4	983.5	-190.7	1.49	1.19	-2.59
4,118.0	21.05	116.03	3,932.5	-487.4	1,012.2	-196.5	0.10	0.09	-0.10
4,151.8	21.03	116.06	3,964.0	-492.7	1,023.1	-198.7	0.08	-0.07	0.10
<b>Sussex</b>									
4,208.0	20.99	116.12	4,016.5	-501.6	1,041.2	-202.4	0.08	-0.07	0.10
4,297.0	20.23	118.27	4,099.8	-515.9	1,069.1	-208.6	1.20	-0.85	2.42

<b>Company:</b>	PDC Energy Inc. DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Elkhead 8N
<b>Project:</b>	SEC.6-T3N-R65W	<b>TVD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Site:</b>	Elkhead 03N65W06 1-16 Pad	<b>MD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Well:</b>	Elkhead 8N	<b>North Reference:</b>	True
<b>Wellbore:</b>	Elkhead 8N Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Elkhead 8N Final Surveys	<b>Database:</b>	US_EDM

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,387.0	19.74	119.01	4,184.4	-530.7	1,096.0	-215.5	0.61	-0.54	0.82
4,476.0	20.30	116.54	4,268.0	-544.8	1,123.0	-221.9	1.14	0.63	-2.78
4,566.0	20.12	116.94	4,352.4	-558.8	1,150.8	-227.9	0.25	-0.20	0.44
4,655.0	19.69	117.43	4,436.1	-572.7	1,177.7	-234.0	0.52	-0.48	0.55
4,745.0	19.70	117.17	4,520.9	-586.6	1,204.7	-240.1	0.10	0.01	-0.29
4,835.0	20.32	116.32	4,605.4	-600.4	1,232.2	-246.0	0.76	0.69	-0.94
4,924.0	20.17	116.07	4,688.9	-614.0	1,259.8	-251.7	0.19	-0.17	-0.28
5,013.0	20.00	116.99	4,772.5	-627.7	1,287.2	-257.5	0.40	-0.19	1.03
5,103.0	19.72	117.18	4,857.2	-641.6	1,314.4	-263.5	0.32	-0.31	0.21
5,193.0	19.81	114.84	4,941.9	-655.0	1,341.7	-269.0	0.88	0.10	-2.60
5,283.0	19.87	116.92	5,026.5	-668.3	1,369.2	-274.4	0.79	0.07	2.31
5,306.9	19.80	117.05	5,049.0	-672.0	1,376.4	-276.0	0.34	-0.28	0.55
<b>Shannon</b>									
5,373.0	19.62	117.42	5,111.2	-682.2	1,396.3	-280.5	0.34	-0.28	0.56
5,462.0	19.87	118.40	5,195.0	-696.2	1,422.8	-286.9	0.47	0.28	1.10
5,552.0	19.73	117.96	5,279.7	-710.6	1,449.7	-293.5	0.23	-0.16	-0.49
5,642.0	19.71	117.99	5,364.4	-724.9	1,476.5	-300.0	0.02	-0.02	0.03
5,731.0	18.74	120.29	5,448.4	-739.1	1,502.1	-306.8	1.38	-1.09	2.58
5,820.0	18.84	119.38	5,532.7	-753.4	1,527.0	-313.9	0.35	0.11	-1.02
5,910.0	18.94	116.11	5,617.9	-767.0	1,552.8	-320.0	1.18	0.11	-3.63
6,000.0	18.79	120.77	5,703.0	-780.8	1,578.3	-326.4	1.68	-0.17	5.18
6,090.0	18.90	117.13	5,788.2	-794.9	1,603.8	-333.1	1.31	0.12	-4.04
6,180.0	18.99	120.56	5,873.3	-809.0	1,629.3	-339.8	1.24	0.10	3.81
6,270.0	20.88	117.71	5,957.9	-823.9	1,656.2	-346.9	2.36	2.10	-3.17
6,359.0	20.09	117.47	6,041.3	-838.3	1,683.8	-353.3	0.89	-0.89	-0.27
6,449.0	19.92	119.77	6,125.9	-853.0	1,710.8	-360.3	0.89	-0.19	2.56
6,539.0	20.04	119.93	6,210.5	-868.3	1,737.5	-367.8	0.15	0.13	0.18
6,628.0	20.29	117.03	6,294.0	-883.0	1,764.4	-374.6	1.16	0.28	-3.26
6,717.0	20.02	119.37	6,377.6	-897.4	1,791.4	-381.3	0.96	-0.30	2.63
6,807.0	19.44	111.69	6,462.3	-910.5	1,818.8	-386.5	2.95	-0.64	-8.53
6,896.0	16.19	84.89	6,547.1	-914.9	1,845.0	-383.7	9.81	-3.65	-30.11
6,986.0	18.87	64.24	6,633.0	-907.5	1,870.6	-369.6	7.48	2.98	-22.94
7,076.0	22.63	42.35	6,717.3	-888.3	1,895.4	-344.5	9.50	4.18	-24.32
7,165.0	27.18	29.78	6,798.1	-858.0	1,917.1	-309.4	7.82	5.11	-14.12
7,252.0	32.70	27.72	6,873.4	-819.9	1,937.9	-267.1	6.45	6.34	-2.37
7,342.0	39.17	22.67	6,946.3	-772.1	1,960.2	-215.1	7.90	7.19	-5.61
7,431.0	47.50	18.87	7,011.0	-715.0	1,981.7	-154.3	9.80	9.36	-4.27
7,459.6	49.22	17.52	7,030.0	-694.7	1,988.3	-132.9	6.97	6.01	-4.73
<b>Sharon Springs</b>									
7,520.0	52.90	14.88	7,067.9	-649.6	2,001.4	-86.0	6.97	6.09	-4.37
7,530.1	53.46	14.44	7,074.0	-641.7	2,003.5	-77.9	6.57	5.56	-4.35
<b>Niobrara A</b>									
7,610.0	57.96	11.17	7,119.0	-577.4	2,018.0	-12.0	6.57	5.63	-4.09
7,657.3	61.05	9.50	7,143.0	-537.3	2,025.3	28.6	7.20	6.53	-3.53

<b>Company:</b>	PDC Energy Inc. DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Elkhead 8N
<b>Project:</b>	SEC.6-T3N-R65W	<b>TVD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Site:</b>	Elkhead 03N65W06 1-16 Pad	<b>MD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Well:</b>	Elkhead 8N	<b>North Reference:</b>	True
<b>Wellbore:</b>	Elkhead 8N Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Elkhead 8N Final Surveys	<b>Database:</b>	US_EDM

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
<b>Niobrara B</b>									
7,700.0	63.85	8.08	7,162.8	-499.9	2,031.1	66.1	7.20	6.57	-3.33
7,789.0	71.88	6.70	7,196.3	-418.2	2,041.7	147.7	9.14	9.02	-1.55
7,847.4	76.82	6.48	7,212.0	-362.4	2,048.1	203.2	8.47	8.47	-0.37
<b>Niobrara C</b>									
7,879.0	79.50	6.37	7,218.5	-331.6	2,051.6	233.7	8.47	8.47	-0.36
7,969.0	84.67	5.35	7,230.9	-243.0	2,060.7	321.5	5.85	5.74	-1.13
8,002.9	86.01	4.44	7,233.6	-209.3	2,063.6	354.7	4.78	3.96	-2.68
<b>LP = (2530' FNL, 136' FEL Sec 6)</b>									
8,059.0	88.24	2.94	7,236.4	-153.4	2,067.2	409.5	4.78	3.97	-2.67
8,149.0	89.17	359.45	7,238.5	-63.5	2,069.0	496.6	4.01	1.03	-3.88
8,239.0	89.15	358.08	7,239.8	26.5	2,067.1	582.8	1.52	-0.02	-1.52
8,328.0	89.06	359.11	7,241.2	115.5	2,064.9	667.8	1.16	-0.10	1.16
8,418.0	89.78	358.67	7,242.1	205.4	2,063.2	754.0	0.94	0.80	-0.49
8,508.0	89.71	359.27	7,242.5	295.4	2,061.6	840.2	0.67	-0.08	0.67
8,597.0	89.68	0.39	7,243.0	384.4	2,061.3	925.9	1.26	-0.03	1.26
8,686.0	89.38	0.56	7,243.7	473.4	2,062.0	1,011.8	0.39	-0.34	0.19
8,776.0	89.39	0.16	7,244.7	563.4	2,062.6	1,098.6	0.44	0.01	-0.44
8,865.0	89.50	0.02	7,245.5	652.4	2,062.7	1,184.3	0.20	0.12	-0.16
8,955.0	89.64	1.32	7,246.2	742.4	2,063.8	1,271.2	1.45	0.16	1.44
9,044.0	89.47	0.97	7,246.9	831.4	2,065.6	1,357.4	0.44	-0.19	-0.39
9,134.0	89.48	0.23	7,247.7	921.4	2,066.5	1,444.3	0.82	0.01	-0.82
9,224.0	89.28	359.96	7,248.7	1,011.3	2,066.7	1,531.0	0.37	-0.22	-0.30
9,314.0	89.30	0.40	7,249.8	1,101.3	2,066.9	1,617.8	0.49	0.02	0.49
9,404.0	89.20	0.60	7,251.0	1,191.3	2,067.7	1,704.6	0.25	-0.11	0.22
9,493.0	89.13	0.43	7,252.3	1,280.3	2,068.5	1,790.5	0.21	-0.08	-0.19
9,583.0	89.33	359.72	7,253.5	1,370.3	2,068.6	1,877.2	0.82	0.22	-0.79
9,672.0	89.92	0.35	7,254.1	1,459.3	2,068.7	1,963.0	0.97	0.66	0.71
9,762.0	89.94	0.26	7,254.2	1,549.3	2,069.2	2,049.7	0.10	0.02	-0.10
9,852.0	89.80	0.01	7,254.4	1,639.3	2,069.4	2,136.5	0.32	-0.16	-0.28
9,942.0	89.81	0.68	7,254.7	1,729.3	2,069.9	2,223.3	0.74	0.01	0.74
10,031.0	89.64	359.15	7,255.1	1,818.3	2,069.8	2,309.0	1.73	-0.19	-1.72
10,121.0	89.68	358.83	7,255.7	1,908.3	2,068.2	2,395.2	0.36	0.04	-0.36
10,210.0	89.46	358.55	7,256.3	1,997.3	2,066.2	2,480.3	0.40	-0.25	-0.31
10,300.0	89.66	358.86	7,257.0	2,087.2	2,064.1	2,566.4	0.41	0.22	0.34
10,390.0	89.43	359.72	7,257.7	2,177.2	2,063.0	2,652.8	0.99	-0.26	0.96
10,480.0	89.72	0.68	7,258.4	2,267.2	2,063.3	2,739.5	1.11	0.32	1.07
10,569.0	89.32	0.31	7,259.2	2,356.2	2,064.1	2,825.4	0.61	-0.45	-0.42
10,659.0	89.77	0.58	7,259.9	2,446.2	2,064.8	2,912.3	0.58	0.50	0.30
10,749.0	89.48	0.53	7,260.5	2,536.2	2,065.7	2,999.2	0.33	-0.32	-0.06
10,838.0	90.20	1.31	7,260.7	2,625.2	2,067.1	3,085.2	1.19	0.81	0.88
10,928.0	90.38	0.53	7,260.2	2,715.2	2,068.6	3,172.3	0.89	0.20	-0.87
11,017.0	90.87	0.75	7,259.3	2,804.2	2,069.6	3,258.2	0.60	0.55	0.25
11,107.0	90.63	0.47	7,258.1	2,894.1	2,070.5	3,345.2	0.41	-0.27	-0.31

<b>Company:</b>	PDC Energy Inc. DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Elkhead 8N
<b>Project:</b>	SEC.6-T3N-R65W	<b>TVD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Site:</b>	Elkhead 03N65W06 1-16 Pad	<b>MD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Well:</b>	Elkhead 8N	<b>North Reference:</b>	True
<b>Wellbore:</b>	Elkhead 8N Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Elkhead 8N Final Surveys	<b>Database:</b>	US_EDM

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,196.0	90.93	0.87	7,256.9	2,983.1	2,071.6	3,431.1	0.56	0.34	0.45
11,284.0	90.49	0.76	7,255.8	3,071.1	2,072.8	3,516.2	0.52	-0.50	-0.13
11,374.0	90.07	0.48	7,255.4	3,161.1	2,073.8	3,603.1	0.56	-0.47	-0.31
11,464.0	89.02	359.02	7,256.1	3,251.1	2,073.4	3,689.7	2.00	-1.17	-1.62
11,553.0	89.33	359.82	7,257.4	3,340.1	2,072.5	3,775.1	0.96	0.35	0.90
11,643.0	89.49	0.79	7,258.3	3,430.1	2,073.0	3,861.9	1.09	0.18	1.08
11,733.0	89.31	0.37	7,259.2	3,520.1	2,073.9	3,948.8	0.51	-0.20	-0.47
11,823.0	89.54	359.60	7,260.1	3,610.1	2,073.9	4,035.5	0.89	0.26	-0.86
11,913.0	89.29	359.47	7,261.0	3,700.1	2,073.1	4,121.9	0.31	-0.28	-0.14
12,002.0	89.33	359.62	7,262.1	3,789.0	2,072.4	4,207.4	0.17	0.04	0.17
12,092.0	89.48	359.53	7,263.1	3,879.0	2,071.7	4,293.9	0.19	0.17	-0.10
12,182.0	89.45	0.71	7,263.9	3,969.0	2,071.9	4,380.6	1.31	-0.03	1.31
12,271.0	89.48	1.30	7,264.7	4,058.0	2,073.5	4,466.7	0.66	0.03	0.66
12,360.0	89.49	1.23	7,265.5	4,147.0	2,075.5	4,553.0	0.08	0.01	-0.08
12,450.0	89.36	0.66	7,266.4	4,237.0	2,076.9	4,640.0	0.65	-0.14	-0.63
12,540.0	89.50	1.12	7,267.3	4,327.0	2,078.3	4,727.0	0.53	0.16	0.51
12,629.0	89.34	0.15	7,268.2	4,415.9	2,079.3	4,813.0	1.10	-0.18	-1.09
12,719.0	89.45	0.74	7,269.2	4,505.9	2,080.0	4,899.8	0.67	0.12	0.66
12,808.0	89.60	1.40	7,269.9	4,594.9	2,081.7	4,986.0	0.76	0.17	0.74
12,897.0	90.19	1.09	7,270.1	4,683.9	2,083.6	5,072.2	0.75	0.66	-0.35
12,987.0	90.18	1.22	7,269.8	4,773.9	2,085.4	5,159.3	0.14	-0.01	0.14
13,077.0	89.83	0.57	7,269.8	4,863.9	2,086.8	5,246.4	0.82	-0.39	-0.72
13,167.0	90.02	0.88	7,269.9	4,953.9	2,088.0	5,333.3	0.40	0.21	0.34
13,257.0	90.25	0.90	7,269.7	5,043.8	2,089.4	5,420.4	0.26	0.26	0.02
13,347.0	90.07	0.69	7,269.4	5,133.8	2,090.6	5,507.4	0.31	-0.20	-0.23
13,437.0	89.84	0.53	7,269.5	5,223.8	2,091.6	5,594.3	0.31	-0.26	-0.18
13,526.0	89.90	0.26	7,269.7	5,312.8	2,092.2	5,680.2	0.31	0.07	-0.30
13,616.0	90.12	1.02	7,269.7	5,402.8	2,093.2	5,767.1	0.88	0.24	0.84
13,705.0	89.79	359.38	7,269.8	5,491.8	2,093.5	5,852.9	1.88	-0.37	-1.84
13,795.0	89.78	357.37	7,270.1	5,581.8	2,091.0	5,938.8	2.23	-0.01	-2.23
13,885.0	89.98	358.79	7,270.3	5,671.7	2,088.0	6,024.6	1.59	0.22	1.58
13,975.0	89.23	357.41	7,270.9	5,761.7	2,085.0	6,110.4	1.75	-0.83	-1.53
14,064.0	89.34	357.88	7,272.0	5,850.6	2,081.3	6,195.1	0.54	0.12	0.53
14,155.0	89.75	357.93	7,272.7	5,941.5	2,078.0	6,281.7	0.45	0.45	0.05
14,244.0	89.90	358.27	7,273.0	6,030.5	2,075.0	6,366.6	0.42	0.17	0.38
14,334.0	89.43	358.47	7,273.5	6,120.4	2,072.5	6,452.5	0.57	-0.52	0.22
14,423.0	89.45	359.14	7,274.4	6,209.4	2,070.6	6,537.7	0.75	0.02	0.75
14,513.0	89.38	0.43	7,275.3	6,299.4	2,070.3	6,624.3	1.44	-0.08	1.43
14,603.0	89.90	0.31	7,275.9	6,389.4	2,070.9	6,711.1	0.59	0.58	-0.13
14,692.0	90.03	0.35	7,275.9	6,478.4	2,071.4	6,797.0	0.15	0.15	0.04
14,782.0	89.84	0.53	7,276.0	6,568.4	2,072.1	6,883.8	0.29	-0.21	0.20
14,871.0	90.24	1.57	7,276.0	6,657.4	2,073.7	6,969.9	1.25	0.45	1.17
14,960.0	89.86	0.30	7,275.9	6,746.4	2,075.1	7,056.0	1.49	-0.43	-1.43

<b>Company:</b>	PDC Energy Inc. DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Elkhead 8N
<b>Project:</b>	SEC.6-T3N-R65W	<b>TVD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Site:</b>	Elkhead 03N65W06 1-16 Pad	<b>MD Reference:</b>	RKB @ 4996.0ft (Ensign 142)
<b>Well:</b>	Elkhead 8N	<b>North Reference:</b>	True
<b>Wellbore:</b>	Elkhead 8N Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Elkhead 8N Final Surveys	<b>Database:</b>	US_EDM

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,049.0	89.84	0.52	7,276.1	6,835.4	2,075.8	7,141.9	0.25	-0.02	0.25
15,139.0	90.05	0.77	7,276.2	6,925.4	2,076.8	7,228.8	0.36	0.23	0.28
15,229.0	89.98	0.43	7,276.2	7,015.4	2,077.7	7,315.7	0.39	-0.08	-0.38
15,318.0	89.90	0.25	7,276.3	7,104.4	2,078.3	7,401.6	0.22	-0.09	-0.20
15,407.0	90.04	0.50	7,276.3	7,193.3	2,078.9	7,487.5	0.32	0.16	0.28
15,497.0	89.89	0.08	7,276.4	7,283.3	2,079.3	7,574.2	0.50	-0.17	-0.47
15,587.0	89.93	0.71	7,276.5	7,373.3	2,079.9	7,661.1	0.70	0.04	0.70
15,660.0	89.93	0.71	7,276.6	7,446.3	2,080.8	7,731.6	0.00	0.00	0.00

**BHL = (151.5' FNL, 139' FEL Sec 31)**

**Formations**

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,147.4	1,137.0	Fox Hills Aq Base			
3,334.8	3,199.0	Parkman			
4,151.8	3,964.0	Sussex			
5,306.9	5,049.0	Shannon			
7,459.6	7,030.0	Sharon Springs			
7,530.1	7,074.0	Niobrara A			
7,657.3	7,143.0	Niobrara B			
7,847.4	7,212.0	Niobrara C			

**Survey Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
8,002.9	7,233.6	-209.3	2,063.6	LP = (2530' FNL, 136' FEL Sec 6)
15,660.0	7,276.6	7,446.3	2,080.8	BHL = (151.5' FNL, 139' FEL Sec 31)

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_