

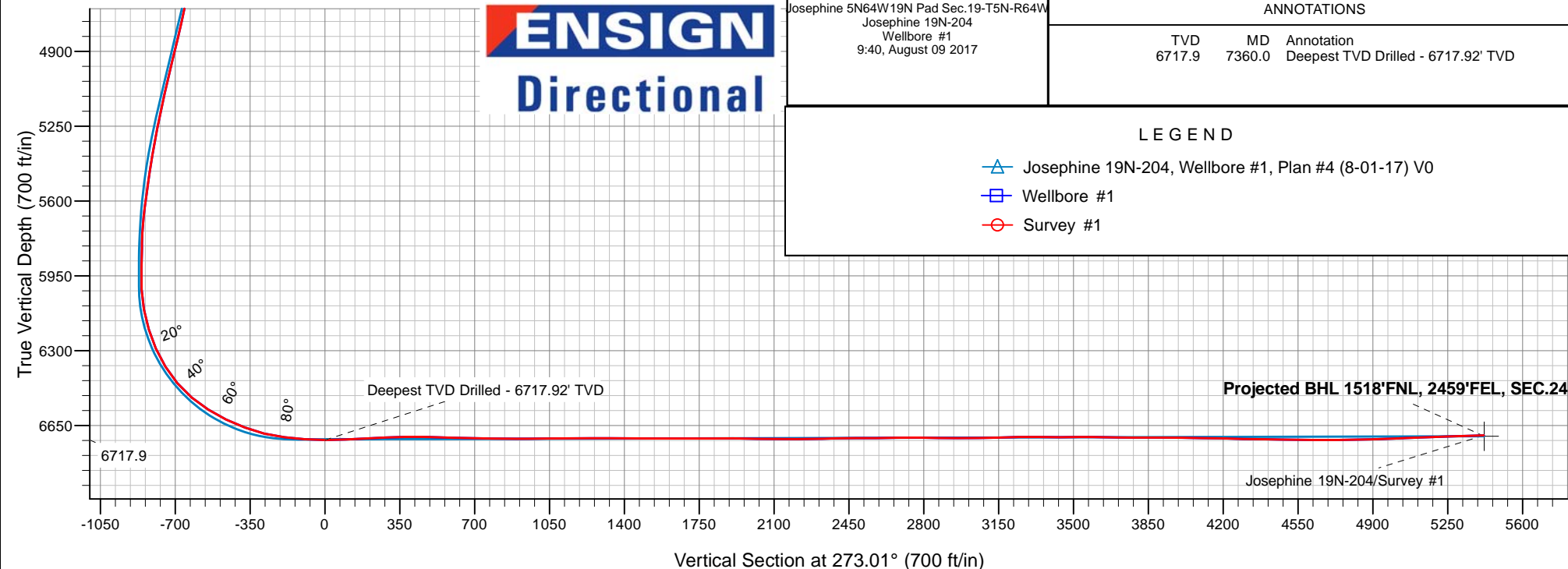
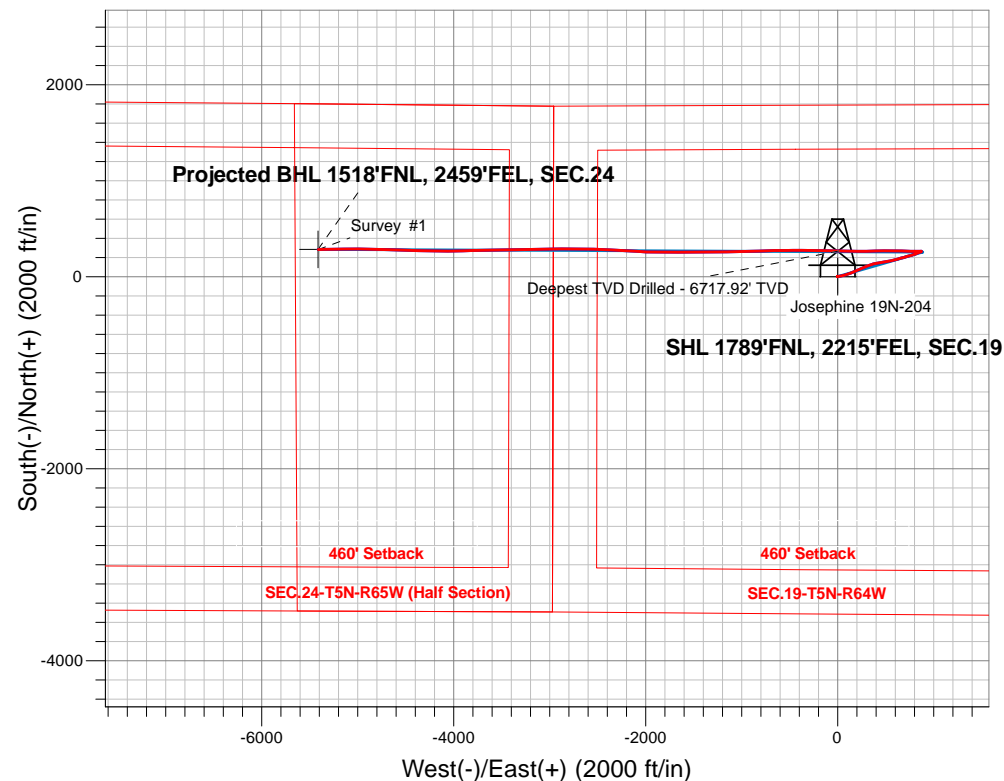
PDC Energy Inc. DJ Basin

Well Name: **Josephine 19N-204**

Surface Location: Josephine 5N64W19N Pad Sec.19-T5N-R64W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
Ground Elevation: 4626.0
+N/-S+E/-W Northing Easting Latitude Longitude Slot
0.0 0.0385110.60 3253129.36 40.386970 -104.591290
Original Well Elev WELL @ 4649.0ft (Original Well Elev)

FINAL SURVEY

Projected Bottom Hole Location
12,788'MD 6696'TVD 282'N & 5412'W of SHL
91.2 degree Incl @ 268.3 degree AZM





PDC Energy Inc. DJ Basin

SEC.19-T5N-R64W

Josephine 5N64W19N Pad Sec.19-T5N-R64W

Josephine 19N-204

Wellbore #1

Survey: Survey #1

Standard Survey Report

09 August, 2017

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Josephine 19N-204
Project:	SEC.19-T5N-R64W	TVD Reference:	WELL @ 4649.0ft (Original Well Elev)
Site:	Josephine 5N64W19N Pad Sec.19-T5N-R64W	MD Reference:	WELL @ 4649.0ft (Original Well Elev)
Well:	Josephine 19N-204	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	US_EDM

Project	SEC.19-T5N-R64W		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site	Josephine 5N64W19N Pad Sec.19-T5N-R64W				
Site Position:		Northing:	1,385,202.34 usft	Latitude:	40.387220
From:	Lat/Long	Easting:	3,253,192.49 usft	Longitude:	-104.591060
Position Uncertainty:	0.0 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.59 °

Well	Josephine 19N-204					
Well Position	+N/-S	0.0 ft	Northing:	1,385,110.60 usft	Latitude:	40.386970
	+E/-W	0.0 ft	Easting:	3,253,129.36 usft	Longitude:	-104.591290
Position Uncertainty		0.0 ft	Wellhead Elevation:	0.0 ft	Ground Level:	4,626.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/1/2017	7.94	66.85	52,498

Design	Wellbore #1				
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	273.01	

Survey Program	Date	8/9/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
156.0	12,788.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

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)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
156.0	0.70	30.10	156.0	0.8	0.5	-0.4	0.45	0.45	0.00	
251.0	0.90	24.50	251.0	2.0	1.1	-1.0	0.23	0.21	-5.89	
347.0	0.90	15.50	347.0	3.4	1.6	-1.4	0.15	0.00	-9.38	
443.0	0.40	313.80	443.0	4.4	1.6	-1.3	0.83	-0.52	-64.27	
539.0	0.20	273.00	539.0	4.6	1.1	-0.9	0.29	-0.21	-42.50	
635.0	0.40	286.20	635.0	4.7	0.7	-0.4	0.22	0.21	13.75	
729.0	0.20	249.50	729.0	4.8	0.2	0.1	0.28	-0.21	-39.04	
825.0	0.40	237.00	825.0	4.5	-0.3	0.5	0.22	0.21	-13.02	
921.0	0.40	202.70	921.0	4.0	-0.7	0.9	0.25	0.00	-35.73	

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Josephine 19N-204
Project:	SEC.19-T5N-R64W	TVD Reference:	WELL @ 4649.0ft (Original Well Elev)
Site:	Josephine 5N64W19N Pad Sec.19-T5N-R64W	MD Reference:	WELL @ 4649.0ft (Original Well Elev)
Well:	Josephine 19N-204	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	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)
1,016.0	0.40	210.80	1,016.0	3.4	-1.0	1.1	0.06	0.00	8.53
1,112.0	0.50	227.10	1,112.0	2.9	-1.4	1.6	0.17	0.10	16.98
1,207.0	0.50	255.40	1,207.0	2.5	-2.1	2.3	0.26	0.00	29.79
1,303.0	0.50	239.30	1,302.9	2.2	-2.9	3.0	0.15	0.00	-16.77
1,399.0	0.60	3.90	1,398.9	2.4	-3.2	3.4	1.02	0.10	129.79
1,495.0	1.60	102.20	1,494.9	2.7	-1.9	2.0	1.86	1.04	102.40
1,591.0	2.50	77.70	1,590.9	2.8	1.5	-1.3	1.29	0.94	-25.52
1,610.0	2.60	81.70	1,609.9	3.0	2.3	-2.1	1.07	0.53	21.05
1,687.0	2.70	78.60	1,686.8	3.6	5.8	-5.6	0.23	0.13	-4.03
1,783.0	4.90	84.10	1,782.6	4.4	12.1	-11.8	2.32	2.29	5.73
1,879.0	7.20	79.70	1,878.0	5.9	22.1	-21.8	2.44	2.40	-4.58
1,975.0	8.00	81.10	1,973.2	8.1	34.6	-34.1	0.86	0.83	1.46
2,071.0	9.90	80.50	2,068.0	10.5	49.4	-48.7	1.98	1.98	-0.63
2,166.0	12.70	72.10	2,161.2	15.0	67.4	-66.5	3.41	2.95	-8.84
2,262.0	14.90	72.60	2,254.4	21.9	89.2	-87.9	2.30	2.29	0.52
2,357.0	14.90	71.70	2,346.2	29.4	112.4	-110.7	0.24	0.00	-0.95
2,453.0	15.30	69.30	2,438.9	37.8	136.0	-133.8	0.77	0.42	-2.50
2,549.0	15.00	68.60	2,531.5	46.8	159.4	-156.7	0.37	-0.31	-0.73
2,644.0	15.70	67.40	2,623.1	56.2	182.7	-179.5	0.81	0.74	-1.26
2,740.0	14.70	67.70	2,715.8	65.8	206.0	-202.2	1.04	-1.04	0.31
2,835.0	15.00	64.70	2,807.6	75.7	228.2	-224.0	0.87	0.32	-3.16
2,931.0	14.30	61.60	2,900.5	86.6	249.9	-245.0	1.09	-0.73	-3.23
3,027.0	14.50	67.20	2,993.5	96.9	271.4	-266.0	1.47	0.21	5.83
3,123.0	12.20	69.30	3,086.9	105.2	292.0	-286.1	2.45	-2.40	2.19
3,219.0	14.10	65.10	3,180.4	113.7	312.1	-305.7	2.21	1.98	-4.38
3,314.0	14.20	72.10	3,272.5	122.1	333.7	-326.8	1.80	0.11	7.37
3,410.0	13.70	75.40	3,365.7	128.6	355.9	-348.6	0.98	-0.52	3.44
3,506.0	11.60	71.60	3,459.3	134.5	376.0	-368.5	2.35	-2.19	-3.96
3,601.0	12.40	79.80	3,552.3	139.3	395.1	-387.3	1.98	0.84	8.63
3,697.0	13.80	81.90	3,645.8	142.8	416.6	-408.6	1.54	1.46	2.19
3,793.0	15.90	81.90	3,738.5	146.2	441.0	-432.7	2.19	2.19	0.00
3,889.0	15.70	80.00	3,830.9	150.3	466.8	-458.3	0.58	-0.21	-1.98
3,984.0	14.90	80.20	3,922.5	154.7	491.5	-482.7	0.84	-0.84	0.21
4,080.0	13.90	79.50	4,015.5	158.9	515.0	-505.9	1.06	-1.04	-0.73
4,176.0	14.00	79.80	4,108.7	163.0	537.8	-528.4	0.13	0.10	0.31
4,272.0	13.30	79.10	4,202.0	167.2	560.0	-550.5	0.75	-0.73	-0.73
4,368.0	12.40	78.30	4,295.6	171.3	581.0	-571.2	0.96	-0.94	-0.83
4,464.0	12.50	74.60	4,389.3	176.2	601.1	-591.0	0.84	0.10	-3.85
4,559.0	12.90	74.70	4,482.0	181.7	621.2	-610.8	0.42	0.42	0.11
4,654.0	12.50	73.70	4,574.7	187.4	641.3	-630.6	0.48	-0.42	-1.05
4,749.0	12.50	73.30	4,667.4	193.2	661.0	-650.0	0.09	0.00	-0.42
4,845.0	13.30	74.70	4,761.0	199.1	681.6	-670.2	0.89	0.83	1.46
4,939.0	14.20	73.90	4,852.3	205.2	703.1	-691.4	0.98	0.96	-0.85
5,037.0	14.50	74.70	4,947.2	211.8	726.5	-714.4	0.37	0.31	0.82

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Josephine 19N-204
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Site:	Josephine 5N64W19N Pad Sec.19-T5N-R64W	MD Reference:	WELL @ 4649.0ft (Original Well Elev)
Well:	Josephine 19N-204	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	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)
5,132.0	14.00	75.30	5,039.3	217.8	749.1	-736.6	0.55	-0.53	0.63
5,228.0	13.10	74.00	5,132.7	223.8	770.8	-758.0	0.99	-0.94	-1.35
5,324.0	12.00	70.90	5,226.4	230.0	790.7	-777.5	1.34	-1.15	-3.23
5,419.0	11.30	68.60	5,319.4	236.7	808.7	-795.1	0.88	-0.74	-2.42
5,515.0	10.30	65.60	5,413.7	243.6	825.3	-811.3	1.19	-1.04	-3.13
5,610.0	9.20	68.90	5,507.3	249.9	840.1	-825.8	1.30	-1.16	3.47
5,734.0	7.70	71.90	5,630.0	256.0	857.2	-842.6	1.26	-1.21	2.42
5,830.0	4.70	73.00	5,725.4	259.2	867.1	-852.3	3.13	-3.13	1.15
5,926.0	2.20	10.60	5,821.2	262.1	871.2	-856.2	4.34	-2.60	-65.00
6,021.0	2.40	56.10	5,916.2	265.0	873.2	-858.1	1.88	0.21	47.89
6,118.0	3.20	255.10	6,013.1	265.5	872.3	-857.1	5.70	0.82	-165.98
6,213.0	10.00	267.40	6,107.5	264.4	861.4	-846.4	7.27	7.16	12.95
6,309.0	17.00	270.20	6,200.7	264.1	839.1	-824.0	7.32	7.29	2.92
6,404.0	24.00	270.60	6,289.7	264.3	805.8	-790.8	7.37	7.37	0.42
6,500.0	31.30	271.10	6,374.7	265.0	761.3	-746.3	7.61	7.60	0.52
6,595.0	40.40	272.00	6,451.6	266.6	705.7	-690.8	9.59	9.58	0.95
6,691.0	50.10	272.50	6,519.1	269.3	637.7	-622.7	10.11	10.10	0.52
6,786.0	57.60	270.40	6,575.1	271.1	561.1	-546.0	8.09	7.89	-2.21
6,882.0	64.40	268.40	6,621.6	270.2	477.2	-462.3	7.31	7.08	-2.08
6,978.0	69.60	267.90	6,659.1	267.4	388.9	-374.3	5.44	5.42	-0.52
7,073.0	75.70	268.30	6,687.4	264.4	298.3	-284.0	6.43	6.42	0.42
7,169.0	83.60	271.30	6,704.7	264.1	203.9	-189.8	8.78	8.23	3.13
7,265.0	84.80	271.60	6,714.4	266.5	108.5	-94.3	1.29	1.25	0.31
7,360.0	90.90	270.70	6,717.9	268.4	13.6	0.5	6.49	6.42	-0.95
Deepest TVD Drilled - 6717.92' TVD									
7,456.0	92.40	271.10	6,715.2	269.9	-82.4	96.4	1.62	1.56	0.42
7,552.0	93.00	270.90	6,710.6	271.6	-178.2	192.3	0.66	0.63	-0.21
7,647.0	92.70	270.60	6,705.9	272.8	-273.1	287.1	0.45	-0.32	-0.32
7,743.0	90.70	270.20	6,703.1	273.5	-369.1	382.9	2.12	-2.08	-0.42
7,839.0	88.20	269.90	6,704.0	273.6	-465.0	478.8	2.62	-2.60	-0.31
7,934.0	88.50	269.30	6,706.7	272.9	-560.0	573.6	0.71	0.32	-0.63
8,029.0	88.80	269.00	6,709.0	271.5	-655.0	668.3	0.45	0.32	-0.32
8,126.0	89.10	268.30	6,710.7	269.2	-751.9	765.0	0.79	0.31	-0.72
8,220.0	89.70	268.30	6,711.7	266.4	-845.9	858.7	0.64	0.64	0.00
8,316.0	90.30	268.40	6,711.7	263.6	-941.8	954.4	0.63	0.63	0.10
8,412.0	91.00	268.10	6,710.6	260.7	-1,037.8	1,050.0	0.79	0.73	-0.31
8,507.0	89.80	270.00	6,710.0	259.1	-1,132.8	1,144.8	2.37	-1.26	2.00
8,603.0	90.70	269.00	6,709.5	258.3	-1,228.8	1,240.6	1.40	0.94	-1.04
8,698.0	89.40	270.40	6,709.5	257.8	-1,323.8	1,335.5	2.01	-1.37	1.47
8,793.0	89.70	270.20	6,710.2	258.3	-1,418.7	1,430.4	0.38	0.32	-0.21
8,889.0	90.00	268.60	6,710.5	257.3	-1,514.7	1,526.2	1.70	0.31	-1.67
8,984.0	89.70	270.00	6,710.7	256.1	-1,609.7	1,621.0	1.51	-0.32	1.47
9,080.0	90.00	269.50	6,711.0	255.7	-1,705.7	1,716.8	0.61	0.31	-0.52

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Design:	Wellbore #1	Database:	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)
9,176.0	90.60	269.00	6,710.5	254.5	-1,801.7	1,812.6	0.81	0.63	-0.52
9,272.0	89.70	271.10	6,710.2	254.5	-1,897.7	1,908.5	2.38	-0.94	2.19
9,367.0	88.90	273.50	6,711.4	258.4	-1,992.6	2,003.4	2.66	-0.84	2.53
9,463.0	89.40	273.40	6,712.8	264.1	-2,088.4	2,099.4	0.53	0.52	-0.10
9,559.0	90.10	273.20	6,713.2	269.7	-2,184.3	2,195.4	0.76	0.73	-0.21
9,655.0	90.90	273.00	6,712.4	274.9	-2,280.1	2,291.4	0.86	0.83	-0.21
9,750.0	91.60	272.80	6,710.3	279.7	-2,375.0	2,386.4	0.77	0.74	-0.21
9,846.0	90.00	271.60	6,709.0	283.3	-2,470.9	2,482.4	2.08	-1.67	-1.25
9,942.0	90.50	271.30	6,708.5	285.8	-2,566.9	2,578.3	0.61	0.52	-0.31
10,037.0	91.10	270.90	6,707.2	287.6	-2,661.8	2,673.3	0.76	0.63	-0.42
10,133.0	89.30	270.70	6,706.9	288.9	-2,757.8	2,769.2	1.89	-1.88	-0.21
10,229.0	89.40	270.20	6,708.0	289.7	-2,853.8	2,865.1	0.53	0.10	-0.52
10,324.0	90.00	269.90	6,708.5	289.8	-2,948.8	2,960.0	0.71	0.63	-0.32
10,420.0	90.70	269.20	6,707.9	289.0	-3,044.8	3,055.8	1.03	0.73	-0.73
10,515.0	91.20	268.60	6,706.3	287.2	-3,139.8	3,150.5	0.82	0.53	-0.63
10,611.0	91.50	268.10	6,704.0	284.4	-3,235.7	3,246.2	0.61	0.31	-0.52
10,706.0	89.10	269.10	6,703.5	282.1	-3,330.7	3,340.9	2.74	-2.53	1.05
10,802.0	90.00	268.30	6,704.3	279.9	-3,426.6	3,436.6	1.25	0.94	-0.83
10,897.0	90.40	267.90	6,704.0	276.8	-3,521.6	3,531.3	0.60	0.42	-0.42
10,993.0	89.10	269.90	6,704.4	274.9	-3,617.6	3,627.0	2.48	-1.35	2.08
11,088.0	89.00	269.00	6,706.0	274.0	-3,712.5	3,721.8	0.95	-0.11	-0.95
11,184.0	90.00	268.40	6,706.8	271.9	-3,808.5	3,817.5	1.21	1.04	-0.63
11,279.0	90.00	268.60	6,706.8	269.4	-3,903.5	3,912.2	0.21	0.00	0.21
11,374.0	89.20	269.30	6,707.5	267.6	-3,998.5	4,007.0	1.12	-0.84	0.74
11,470.0	89.40	269.50	6,708.6	266.6	-4,094.4	4,102.8	0.29	0.21	0.21
11,566.0	88.50	272.10	6,710.4	268.0	-4,190.4	4,198.7	2.87	-0.94	2.71
11,660.0	88.90	271.60	6,712.5	271.0	-4,284.3	4,292.7	0.68	0.43	-0.53
11,756.0	89.10	271.30	6,714.2	273.4	-4,380.3	4,388.6	0.38	0.21	-0.31
11,851.0	89.30	271.10	6,715.5	275.4	-4,475.3	4,483.6	0.30	0.21	-0.21
11,947.0	89.00	271.60	6,717.0	277.7	-4,571.2	4,579.5	0.61	-0.31	0.52
12,043.0	90.10	272.50	6,717.7	281.1	-4,667.2	4,675.5	1.48	1.15	0.94
12,138.0	90.70	271.20	6,717.0	284.2	-4,762.1	4,770.5	1.51	0.63	-1.37
12,234.0	91.60	271.40	6,715.1	286.3	-4,858.1	4,866.4	0.96	0.94	0.21
12,330.0	92.20	270.70	6,711.9	288.1	-4,954.0	4,962.3	0.96	0.63	-0.73
12,426.0	92.30	269.70	6,708.2	288.4	-5,049.9	5,058.1	1.05	0.10	-1.04
12,522.0	92.20	269.70	6,704.4	287.9	-5,145.8	5,153.9	0.10	-0.10	0.00
12,617.0	92.20	268.80	6,700.8	286.7	-5,240.8	5,248.6	0.95	0.00	-0.95
12,733.0	91.20	268.30	6,697.3	283.8	-5,356.7	5,364.2	0.96	-0.86	-0.43
12,788.0	91.20	268.30	6,696.2	282.1	-5,411.6	5,419.0	0.00	0.00	0.00

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Josephine 19N-204
Project:	SEC.19-T5N-R64W	TVD Reference:	WELL @ 4649.0ft (Original Well Elev)
Site:	Josephine 5N64W19N Pad Sec.19-T5N-R64W	MD Reference:	WELL @ 4649.0ft (Original Well Elev)
Well:	Josephine 19N-204	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	US_EDM

Design Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SHL 1789'FNL, 2215'FE - survey hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,385,110.61	3,253,129.36	40.386970	-104.591290
BHL 1515'FNL, 2460'FE - survey misses target center by 4.8ft at 12788.0ft MD (6696.2 TVD, 282.1 N, -5411.6 E) - Point	0.00	0.00	6,700.0	284.8	-5,412.7	1,385,339.88	3,247,714.29	40.387750	-104.610720

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
7,360.0	6,717.9	268.4	13.6	Deepest TVD Drilled - 6717.92' TVD	

Checked By: _____	Approved By: _____	Date: _____
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