

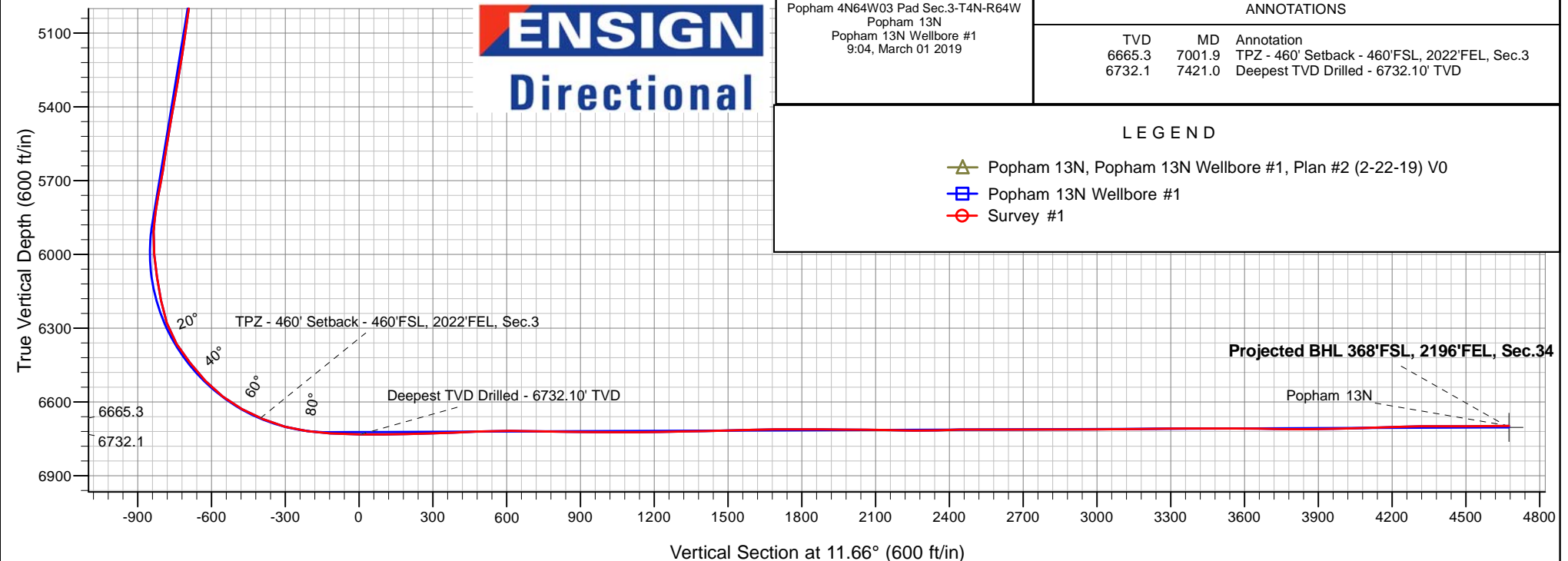
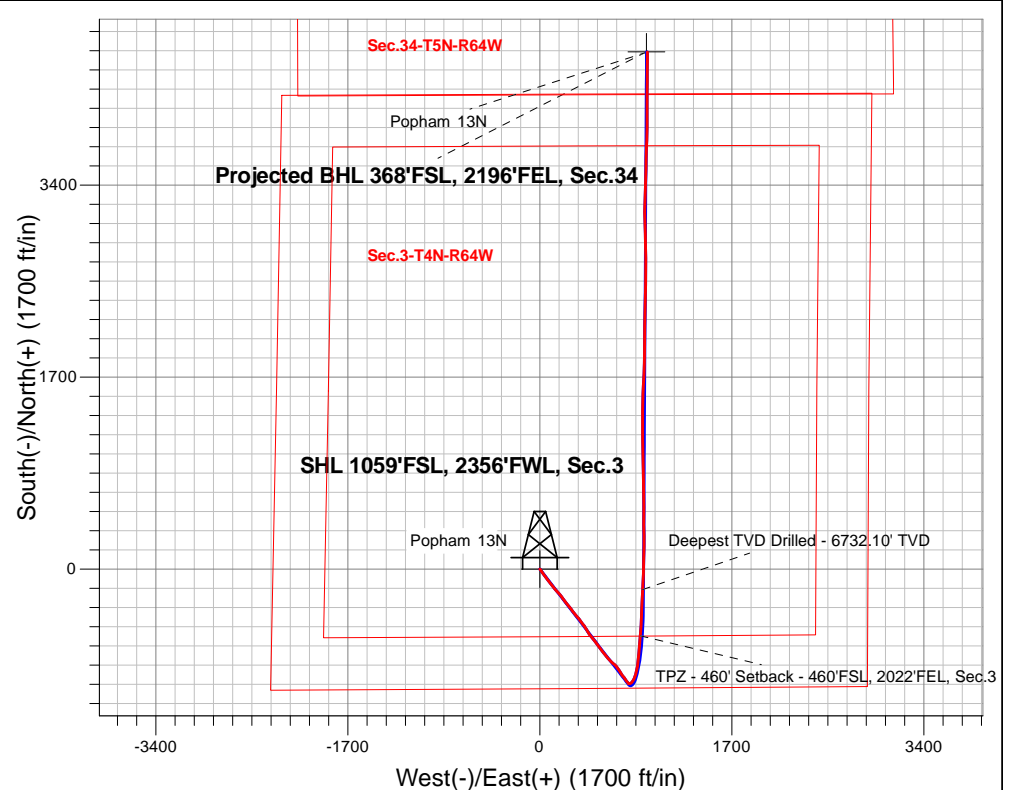
PDC Energy Inc. DJ Basin

Well Name: **Popham 13N**

Surface Location: Popham 4N64W03 Pad Sec.3-T4N-R64W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
Ground Elevation: 4662.0
+N/-S +E/-W Northing Easting Latitude Longitude Slot
0.0 0.0 1367076.908268307.15 40.337030 -104.537510
WELL @ 4685.0ft

FINAL SURVEY

Projected Bottom Hole Location
12,182'MD 6697'TVD 4577'N & 952'E of SHL
90.66 degree Incl @ 0.40 degree AZM



Popham 4N64W03 Pad Sec.3-T4N-R64W
Popham 13N
Popham 13N Wellbore #1
9:04, March 01 2019

ANNOTATIONS

TVD	MD	Annotation
6665.3	7001.9	TPZ - 460' Setback - 460'FSL, 2022'FEL, Sec.3
6732.1	7421.0	Deepest TVD Drilled - 6732.10' TVD

LEGEND

- Popham 13N, Popham 13N Wellbore #1, Plan #2 (2-22-19) V0
- Popham 13N Wellbore #1
- Survey #1



PDC Energy Inc. DJ Basin

SEC.3-T4N-R64W

Popham 4N64W03 Pad Sec.3-T4N-R64W

Popham 13N

Popham 13N Wellbore #1

Survey: Survey #1

Standard Survey Report

01 March, 2019

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 13N
Project:	SEC.3-T4N-R64W	TVD Reference:	WELL @ 4685.0ft
Site:	Popham 4N64W03 Pad Sec.3-T4N-R64W	MD Reference:	WELL @ 4685.0ft
Well:	Popham 13N	North Reference:	True
Wellbore:	Popham 13N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 13N Wellbore #1	Database:	US_EDM

Project	SEC.3-T4N-R64W, Weld County, CO		
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	Popham 4N64W03 Pad Sec.3-T4N-R64W				
Site Position:		Northing:	1,367,183.37 usft	Latitude:	40.337327
From:	Lat/Long	Easting:	3,268,156.99 usft	Longitude:	-104.538045
Position Uncertainty:	0.0 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.62 °

Well	Popham 13N					
Well Position	+N/-S	0.0 ft	Northing:	1,367,076.90 usft	Latitude:	40.337030
	+E/-W	0.0 ft	Easting:	3,268,307.16 usft	Longitude:	-104.537510
Position Uncertainty		0.0 ft	Wellhead Elevation:	0.0 ft	Ground Level:	4,662.0 ft

Wellbore	Popham 13N Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/22/2019	8.15	66.85	52,178

Design	Popham 13N 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	11.66	

Survey Program	Date	3/1/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
157.0	12,182.0	Survey #1 (Popham 13N 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	
1.0	0.00	269.11	1.0	0.0	0.0	0.0	0.17	0.17	0.00	
SHL 1059'FSL, 2356'FWL, Sec.3										
157.0	0.27	269.11	157.0	0.0	-0.4	-0.1	0.17	0.17	0.00	
252.0	0.18	274.26	252.0	0.0	-0.7	-0.1	0.10	-0.09	5.42	
347.0	0.40	332.00	347.0	0.3	-1.0	0.1	0.36	0.23	60.78	
443.0	1.08	134.77	443.0	0.0	-0.6	-0.1	1.53	0.71	169.55	
538.0	2.13	141.35	538.0	-2.0	1.2	-1.8	1.12	1.11	6.93	
633.0	3.62	141.32	632.8	-5.8	4.2	-4.8	1.57	1.57	-0.03	
728.0	6.03	142.22	727.5	-12.1	9.1	-10.0	2.54	2.54	0.95	
823.0	8.63	145.01	821.7	-21.8	16.2	-18.1	2.76	2.74	2.94	

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 13N
Project:	SEC.3-T4N-R64W	TVD Reference:	WELL @ 4685.0ft
Site:	Popham 4N64W03 Pad Sec.3-T4N-R64W	MD Reference:	WELL @ 4685.0ft
Well:	Popham 13N	North Reference:	True
Wellbore:	Popham 13N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 13N 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)
918.0	10.45	144.85	915.4	-34.7	25.3	-28.9	1.92	1.92	-0.17
1,014.0	12.11	144.21	1,009.5	-50.0	36.2	-41.7	1.73	1.73	-0.67
1,109.0	13.56	142.09	1,102.2	-66.9	48.9	-55.6	1.60	1.53	-2.23
1,204.0	15.12	143.59	1,194.2	-85.6	63.1	-71.1	1.69	1.64	1.58
1,299.0	14.59	144.24	1,286.0	-105.3	77.4	-87.5	0.58	-0.56	0.68
1,395.0	14.00	145.55	1,379.0	-124.7	91.0	-103.7	0.70	-0.61	1.36
1,490.0	12.08	142.94	1,471.6	-142.1	103.5	-118.3	2.11	-2.02	-2.75
1,595.0	11.60	137.05	1,574.4	-158.6	117.3	-131.6	1.24	-0.46	-5.61
1,677.0	13.40	138.79	1,654.4	-171.8	129.2	-142.1	2.24	2.20	2.12
1,773.0	15.21	135.60	1,747.4	-189.2	145.4	-155.9	2.06	1.89	-3.32
1,868.0	15.17	139.07	1,839.1	-207.5	162.2	-170.4	0.96	-0.04	3.65
1,963.0	14.89	143.86	1,930.9	-226.7	177.6	-186.2	1.34	-0.29	5.04
2,058.0	14.58	142.00	2,022.7	-246.0	192.1	-202.1	0.60	-0.33	-1.96
2,153.0	13.34	142.62	2,114.9	-264.1	206.1	-217.0	1.31	-1.31	0.65
2,248.0	11.94	142.63	2,207.6	-280.6	218.8	-230.6	1.47	-1.47	0.01
2,343.0	13.07	142.45	2,300.4	-297.0	231.3	-244.1	1.19	1.19	-0.19
2,438.0	15.73	142.64	2,392.4	-315.7	245.6	-259.6	2.80	2.80	0.20
2,533.0	14.99	141.67	2,484.0	-335.6	261.1	-275.9	0.82	-0.78	-1.02
2,629.0	14.19	140.82	2,576.9	-354.5	276.2	-291.3	0.86	-0.83	-0.89
2,724.0	16.64	142.98	2,668.5	-374.3	291.8	-307.7	2.65	2.58	2.27
2,819.0	16.64	141.87	2,759.5	-395.9	308.3	-325.4	0.33	0.00	-1.17
2,915.0	15.86	140.12	2,851.7	-416.8	325.2	-342.5	0.96	-0.81	-1.82
3,010.0	15.14	138.44	2,943.2	-436.0	341.8	-358.0	0.89	-0.76	-1.77
3,105.0	15.36	144.11	3,034.9	-455.5	357.4	-373.9	1.59	0.23	5.97
3,200.0	14.31	143.98	3,126.7	-475.2	371.7	-390.3	1.11	-1.11	-0.14
3,295.0	13.49	142.63	3,218.9	-493.5	385.3	-405.5	0.93	-0.86	-1.42
3,391.0	15.35	149.17	3,311.9	-513.3	398.6	-422.2	2.57	1.94	6.81
3,486.0	14.80	147.97	3,403.6	-534.4	411.5	-440.2	0.67	-0.58	-1.26
3,582.0	13.37	147.80	3,496.7	-554.2	423.9	-457.1	1.49	-1.49	-0.18
3,678.0	12.67	147.70	3,590.3	-572.5	435.5	-472.7	0.73	-0.73	-0.10
3,773.0	14.14	143.32	3,682.7	-590.6	448.0	-487.9	1.88	1.55	-4.61
3,869.0	13.88	142.12	3,775.8	-609.1	462.0	-503.2	0.41	-0.27	-1.25
3,965.0	14.21	142.05	3,868.9	-627.5	476.3	-518.3	0.34	0.34	-0.07
4,060.0	13.33	140.13	3,961.2	-645.1	490.5	-532.6	1.04	-0.93	-2.02
4,156.0	15.34	142.48	4,054.2	-663.6	505.4	-547.8	2.18	2.09	2.45
4,251.0	15.30	142.21	4,145.9	-683.5	520.7	-564.2	0.09	-0.04	-0.28
4,347.0	14.75	142.32	4,238.6	-703.2	535.9	-580.4	0.57	-0.57	0.11
4,443.0	13.81	142.41	4,331.6	-721.9	550.4	-595.8	0.98	-0.98	0.09
4,538.0	13.26	143.23	4,424.0	-739.6	563.8	-610.5	0.61	-0.58	0.86
4,634.0	11.67	143.83	4,517.7	-756.3	576.2	-624.3	1.66	-1.66	0.63
4,729.0	13.57	143.72	4,610.4	-773.0	588.4	-638.2	2.00	2.00	-0.12
4,825.0	13.59	139.43	4,703.7	-790.7	602.4	-652.7	1.05	0.02	-4.47
4,920.0	13.92	134.04	4,796.0	-807.1	617.9	-665.6	1.39	0.35	-5.67

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 13N
Project:	SEC.3-T4N-R64W	TVD Reference:	WELL @ 4685.0ft
Site:	Popham 4N64W03 Pad Sec.3-T4N-R64W	MD Reference:	WELL @ 4685.0ft
Well:	Popham 13N	North Reference:	True
Wellbore:	Popham 13N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 13N 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)
5,015.0	14.83	132.12	4,888.0	-823.2	635.1	-677.9	1.08	0.96	-2.02
5,111.0	14.69	131.19	4,980.9	-839.5	653.4	-690.1	0.29	-0.15	-0.97
5,207.0	13.82	136.69	5,073.9	-855.8	670.4	-702.7	1.68	-0.91	5.73
5,302.0	12.33	141.49	5,166.4	-872.0	684.5	-715.7	1.94	-1.57	5.05
5,397.0	13.71	147.50	5,259.0	-889.5	696.9	-730.3	2.03	1.45	6.33
5,493.0	14.60	147.49	5,352.1	-909.3	709.5	-747.1	0.93	0.93	-0.01
5,587.0	12.87	146.05	5,443.4	-927.9	721.7	-763.0	1.88	-1.84	-1.53
5,683.0	12.79	144.90	5,537.0	-945.5	733.8	-777.7	0.28	-0.08	-1.20
5,779.0	13.65	143.64	5,630.4	-963.3	746.6	-792.6	0.94	0.90	-1.31
5,873.0	16.08	144.07	5,721.3	-982.8	760.8	-808.8	2.59	2.59	0.46
5,968.0	14.27	140.56	5,813.0	-1,002.5	776.0	-825.0	2.14	-1.91	-3.69
6,062.0	7.25	126.62	5,905.3	-1,015.0	788.1	-834.8	7.91	-7.47	-14.83
6,157.0	7.90	58.37	5,999.6	-1,015.1	798.5	-832.9	8.95	0.68	-71.84
6,252.0	11.07	50.82	6,093.3	-1,006.0	811.2	-821.3	3.58	3.34	-7.95
6,347.0	12.18	35.31	6,186.4	-992.0	824.0	-805.0	3.48	1.17	-16.33
6,442.0	17.93	24.43	6,278.1	-970.5	835.9	-781.6	6.72	6.05	-11.45
6,537.0	32.26	14.73	6,364.0	-932.4	848.4	-741.8	15.65	15.08	-10.21
6,632.0	37.97	11.08	6,441.6	-879.2	860.5	-687.2	6.40	6.01	-3.84
6,728.0	43.90	7.04	6,514.1	-817.1	870.3	-624.4	6.76	6.18	-4.21
6,823.0	51.92	3.97	6,577.8	-747.0	876.9	-554.4	8.77	8.44	-3.23
6,917.0	62.24	5.32	6,628.8	-668.5	883.4	-476.2	11.04	10.98	1.44
7,001.9	66.75	4.16	6,665.3	-592.1	889.7	-400.1	5.46	5.32	-1.36
TPZ - 460' Setback - 460'FSL, 2022'FEL, Sec.3									
7,012.0	67.29	4.03	6,669.3	-582.9	890.3	-390.9	5.46	5.32	-1.31
7,107.0	75.00	2.97	6,700.0	-493.2	895.8	-302.0	8.18	8.12	-1.12
7,201.0	82.44	2.72	6,718.3	-401.2	900.4	-211.0	7.92	7.91	-0.27
7,287.8	86.24	2.87	6,726.9	-314.9	904.6	-125.6	4.38	4.38	0.18
LPL 737'FSL, 1994'FEL, Sec.3									
7,297.0	86.64	2.89	6,727.5	-305.7	905.1	-116.6	4.38	4.38	0.18
7,421.0	89.08	2.42	6,732.1	-182.0	910.8	5.8	2.00	1.97	-0.38
Deepest TVD Drilled - 6732.10' TVD									
7,517.0	91.10	2.98	6,732.0	-86.1	915.3	100.6	2.18	2.10	0.58
7,612.0	91.24	1.45	6,730.0	8.8	919.0	194.3	1.62	0.15	-1.61
7,707.0	91.57	0.87	6,727.7	103.8	920.9	287.7	0.70	0.35	-0.61
7,803.0	92.13	0.28	6,724.6	199.7	921.9	381.9	0.85	0.58	-0.61
7,898.0	92.74	359.60	6,720.5	294.6	921.8	474.8	0.96	0.64	-0.72
7,995.0	90.49	359.54	6,717.8	391.6	921.0	569.6	2.32	-2.32	-0.06
8,090.0	88.96	359.59	6,718.3	486.6	920.3	662.5	1.61	-1.61	0.05
8,186.0	89.11	359.94	6,719.9	582.6	919.9	756.4	0.40	0.16	0.36
8,281.0	89.08	359.32	6,721.4	677.5	919.3	849.3	0.65	-0.03	-0.65
8,377.0	89.52	359.16	6,722.6	773.5	918.0	943.1	0.49	0.46	-0.17
8,472.0	89.89	359.00	6,723.0	868.5	916.5	1,035.8	0.42	0.39	-0.17
8,568.0	90.43	358.84	6,722.8	964.5	914.7	1,129.4	0.59	0.56	-0.17
8,663.0	90.94	358.51	6,721.6	1,059.5	912.5	1,222.0	0.64	0.54	-0.35

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Wellbore:	Popham 13N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 13N 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)	
8,759.0	91.15	358.31	6,719.9	1,155.4	909.8	1,315.4	0.30	0.22	-0.21	
8,854.0	91.31	0.96	6,717.9	1,250.4	909.2	1,408.3	2.79	0.17	2.79	
8,950.0	91.45	0.56	6,715.5	1,346.3	910.5	1,502.5	0.44	0.15	-0.42	
9,045.0	91.59	0.50	6,713.0	1,441.3	911.4	1,595.7	0.16	0.15	-0.06	
9,141.0	90.07	2.03	6,711.6	1,537.3	913.5	1,690.1	2.25	-1.58	1.59	
9,236.0	89.94	2.30	6,711.6	1,632.2	917.1	1,783.8	0.32	-0.14	0.28	
9,332.0	90.04	2.74	6,711.6	1,728.1	921.3	1,878.6	0.47	0.10	0.46	
9,428.0	89.76	1.64	6,711.8	1,824.0	925.0	1,973.3	1.18	-0.29	-1.15	
9,523.0	89.34	1.10	6,712.6	1,919.0	927.3	2,066.8	0.72	-0.44	-0.57	
9,619.0	88.64	0.34	6,714.2	2,015.0	928.5	2,161.0	1.08	-0.73	-0.79	
9,714.0	88.80	359.54	6,716.4	2,110.0	928.4	2,254.0	0.86	0.17	-0.84	
9,810.0	92.84	2.16	6,715.0	2,205.9	929.8	2,348.3	5.02	4.21	2.73	
9,905.0	90.42	1.69	6,712.3	2,300.8	933.0	2,441.9	2.59	-2.55	-0.49	
10,000.0	90.03	1.35	6,711.9	2,395.8	935.5	2,535.4	0.54	-0.41	-0.36	
10,096.0	90.00	0.82	6,711.9	2,491.8	937.3	2,629.7	0.55	-0.03	-0.55	
10,191.0	90.01	359.81	6,711.9	2,586.7	937.8	2,722.9	1.06	0.01	-1.06	
10,287.0	90.01	0.03	6,711.9	2,682.7	937.7	2,816.9	0.23	0.00	0.23	
10,383.0	90.41	359.65	6,711.5	2,778.7	937.4	2,910.8	0.57	0.42	-0.40	
10,478.0	90.10	358.90	6,711.1	2,873.7	936.2	3,003.6	0.85	-0.33	-0.79	
10,573.0	90.15	358.15	6,710.9	2,968.7	933.8	3,096.2	0.79	0.05	-0.79	
10,669.0	90.70	357.53	6,710.2	3,064.6	930.2	3,189.4	0.86	0.57	-0.65	
10,765.0	91.04	0.48	6,708.7	3,160.6	928.5	3,283.0	3.09	0.35	3.07	
10,860.0	90.06	2.45	6,707.8	3,255.6	930.9	3,376.5	2.32	-1.03	2.07	
10,955.0	90.08	1.81	6,707.7	3,350.5	934.5	3,470.2	0.67	0.02	-0.67	
11,051.0	89.72	1.54	6,707.9	3,446.4	937.3	3,564.7	0.47	-0.38	-0.28	
11,146.0	89.27	1.14	6,708.7	3,541.4	939.5	3,658.2	0.63	-0.47	-0.42	
11,241.0	88.74	1.15	6,710.3	3,636.4	941.4	3,751.6	0.56	-0.56	0.01	
11,337.0	90.95	1.91	6,710.6	3,732.3	944.0	3,846.1	2.43	2.30	0.79	
11,433.0	91.00	1.70	6,709.0	3,828.3	947.0	3,940.7	0.22	0.05	-0.22	
11,528.0	91.28	0.82	6,707.1	3,923.2	949.1	4,034.1	0.97	0.29	-0.93	
11,624.0	91.76	0.06	6,704.5	4,019.2	949.8	4,128.2	0.94	0.50	-0.79	
11,719.0	92.38	359.50	6,701.1	4,114.1	949.4	4,221.1	0.88	0.65	-0.59	
11,815.0	90.01	0.67	6,699.1	4,210.1	949.6	4,315.1	2.75	-2.47	1.22	
11,911.0	90.11	0.53	6,699.0	4,306.1	950.6	4,409.4	0.18	0.10	-0.15	
12,006.0	90.25	0.32	6,698.7	4,401.1	951.3	4,502.5	0.27	0.15	-0.22	
12,122.0	90.66	0.40	6,697.8	4,517.1	952.0	4,616.3	0.36	0.35	0.07	
12,182.0	90.66	0.40	6,697.1	4,577.1	952.4	4,675.1	0.00	0.00	0.00	
Projected BHL 368°FSL, 2196°FEL, Sec.34										

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 13N
Project:	SEC.3-T4N-R64W	TVD Reference:	WELL @ 4685.0ft
Site:	Popham 4N64W03 Pad Sec.3-T4N-R64W	MD Reference:	WELL @ 4685.0ft
Well:	Popham 13N	North Reference:	True
Wellbore:	Popham 13N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 13N 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 1059'FSL, 2356'FW - survey hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,367,076.91	3,268,307.16	40.337030	-104.537510
Projected BHL 368'FSL, - survey misses target center by 9.9ft at 12182.0ft MD (6697.1 TVD, 4577.1 N, 952.4 E) - Point	0.00	0.00	6,703.0	4,579.1	944.7	1,371,665.78	3,269,202.09	40.349599	-104.534121

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
7,001.9	6,665.3	-592.1	889.7	TPZ - 460' Setback - 460'FSL, 2022'FEL, Sec.3	
7,421.0	6,732.1	-182.0	910.8	Deepest TVD Drilled - 6732.10' TVD	

Checked By: _____	Approved By: _____	Date: _____
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