

PDC Energy Inc. DJ Basin

Well Name: **Popham 16N**

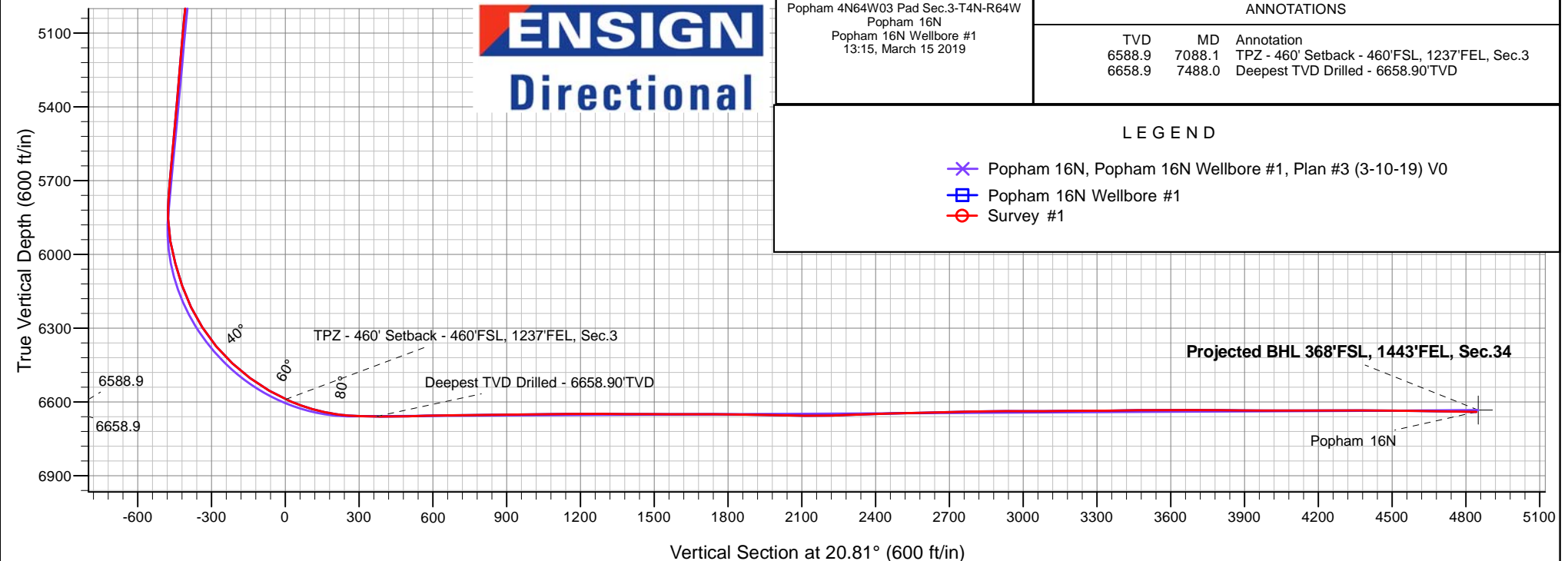
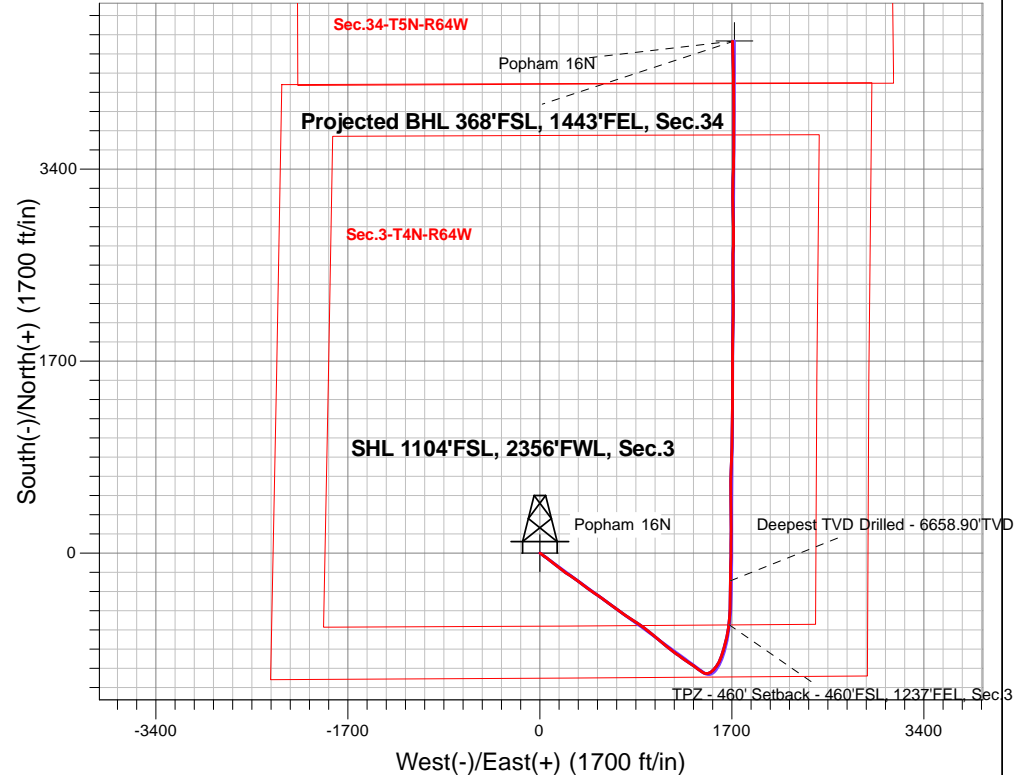
Surface Location: Popham 4N64W03 Pad Sec.3-T4N-R64W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone

Ground Elevation: 4662.0

+N/-S +E/-W Northing Easting Latitude Longitude Slot
0.0 0.0 367124.2 268306.67 40.337160 -104.537510
WELL @ 4685.0ft

FINAL SURVEY

Projected Bottom Hole Location
12,266'MD 6640'TVD 4532'N & 1706'E of SHL
89.01 degree Incl @ 358.39 degree AZM



Popham 4N64W03 Pad Sec.3-T4N-R64W
Popham 16N
Popham 16N Wellbore #1
13:15, March 15 2019

ANNOTATIONS

TVD	MD	Annotation
6588.9	7088.1	TPZ - 460' Setback - 460'FSL, 1237'FEL, Sec.3
6658.9	7488.0	Deepest TVD Drilled - 6658.90'TVD

LEGEND

- ✕ Popham 16N, Popham 16N Wellbore #1, Plan #3 (3-10-19) V0
- Popham 16N Wellbore #1
- Survey #1



PDC Energy Inc. DJ Basin

SEC.3-T4N-R64W

Popham 4N64W03 Pad Sec.3-T4N-R64W

Popham 16N

Popham 16N Wellbore #1

Survey: Survey #1

Standard Survey Report

15 March, 2019

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 16N
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 16N	North Reference:	True
Wellbore:	Popham 16N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 16N 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 16N					
Well Position	+N/-S	0.0 ft	Northing:	1,367,124.26 usft	Latitude:	40.337160
	+E/-W	0.0 ft	Easting:	3,268,306.67 usft	Longitude:	-104.537510
Position Uncertainty		0.0 ft	Wellhead Elevation:	0.0 ft	Ground Level:	4,662.0 ft

Wellbore	Popham 16N Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	3/10/2019	8.15	66.85	52,173

Design	Popham 16N 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	20.81	

Survey Program	Date	3/15/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
252.0	12,266.0	Survey #1 (Popham 16N 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	115.07	1.0	0.0	0.0	0.0	0.46	0.46	0.00	
SHL 1104'FSL, 2356'FWL, Sec.3										
252.0	1.16	115.07	252.0	-1.1	2.3	-0.2	0.46	0.46	0.00	
347.0	2.27	126.32	346.9	-2.6	4.7	-0.8	1.22	1.17	11.84	
443.0	3.78	124.16	442.8	-5.5	8.8	-2.0	1.58	1.57	-2.25	
538.0	4.75	127.75	537.5	-9.7	14.5	-3.9	1.06	1.02	3.78	
633.0	6.91	127.87	632.0	-15.6	22.2	-6.7	2.27	2.27	0.13	
728.0	9.55	128.59	726.1	-24.0	32.8	-10.8	2.78	2.78	0.76	
823.0	12.51	125.18	819.3	-34.9	47.4	-15.7	3.19	3.12	-3.59	
918.0	15.36	125.84	911.5	-48.2	66.0	-21.6	3.00	3.00	0.69	

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Well:	Popham 16N	North Reference:	True
Wellbore:	Popham 16N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 16N 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)
1,014.0	17.20	127.68	1,003.6	-64.3	87.6	-29.0	1.99	1.92	1.92
1,109.0	18.88	128.40	1,094.0	-82.4	110.7	-37.7	1.78	1.77	0.76
1,204.0	20.04	127.89	1,183.5	-102.0	135.6	-47.1	1.23	1.22	-0.54
1,299.0	20.36	127.86	1,272.7	-122.1	161.5	-56.7	0.34	0.34	-0.03
1,395.0	19.41	128.75	1,363.0	-142.3	187.1	-66.5	1.04	-0.99	0.93
1,490.0	17.80	126.99	1,453.0	-161.0	211.1	-75.5	1.79	-1.69	-1.85
1,593.0	16.12	125.38	1,551.5	-178.7	235.3	-83.4	1.69	-1.63	-1.56
1,677.0	16.29	121.68	1,632.2	-191.6	254.8	-88.6	1.25	0.20	-4.40
1,773.0	19.14	123.43	1,723.6	-207.4	279.4	-94.6	3.02	2.97	1.82
1,868.0	20.08	125.92	1,813.1	-225.5	305.6	-102.2	1.32	0.99	2.62
1,963.0	21.27	126.62	1,902.0	-245.4	332.7	-111.2	1.28	1.25	0.74
2,058.0	20.48	124.29	1,990.8	-265.0	360.2	-119.7	1.21	-0.83	-2.45
2,153.0	21.16	128.79	2,079.6	-285.1	387.3	-128.9	1.83	0.72	4.74
2,248.0	19.76	127.01	2,168.6	-305.5	413.5	-138.7	1.61	-1.47	-1.87
2,343.0	18.75	125.25	2,258.2	-324.0	438.8	-147.0	1.23	-1.06	-1.85
2,438.0	20.14	124.72	2,347.8	-342.1	464.7	-154.7	1.47	1.46	-0.56
2,533.0	19.33	124.74	2,437.2	-360.4	491.1	-162.4	0.85	-0.85	0.02
2,629.0	18.51	124.13	2,528.1	-378.0	516.8	-169.7	0.88	-0.85	-0.64
2,724.0	21.02	128.12	2,617.5	-397.0	542.7	-178.3	3.00	2.64	4.20
2,819.0	20.74	126.33	2,706.2	-417.5	569.6	-187.9	0.73	-0.29	-1.88
2,915.0	20.66	126.06	2,796.0	-437.5	597.0	-196.9	0.13	-0.08	-0.28
3,010.0	19.78	124.92	2,885.2	-456.6	623.7	-205.2	1.01	-0.93	-1.20
3,105.0	19.18	123.85	2,974.7	-474.5	649.9	-212.6	0.73	-0.63	-1.13
3,200.0	20.50	128.92	3,064.1	-493.6	675.8	-221.3	2.28	1.39	5.34
3,295.0	19.46	127.05	3,153.4	-513.6	701.3	-230.9	1.28	-1.09	-1.97
3,391.0	18.39	124.99	3,244.2	-531.9	726.5	-239.1	1.31	-1.11	-2.15
3,486.0	19.33	122.50	3,334.1	-549.0	752.0	-245.9	1.30	0.99	-2.62
3,582.0	18.28	122.01	3,425.0	-565.5	778.2	-252.1	1.11	-1.09	-0.51
3,678.0	19.55	123.32	3,515.8	-582.3	804.4	-258.5	1.39	1.32	1.36
3,773.0	19.28	124.23	3,605.4	-599.9	830.7	-265.6	0.43	-0.28	0.96
3,869.0	19.21	123.68	3,696.0	-617.5	856.9	-272.8	0.20	-0.07	-0.57
3,965.0	19.00	122.60	3,786.7	-634.7	883.2	-279.5	0.43	-0.22	-1.13
4,060.0	19.33	128.36	3,876.5	-652.8	908.6	-287.4	2.02	0.35	6.06
4,156.0	18.71	126.93	3,967.2	-671.9	933.3	-296.4	0.81	-0.65	-1.49
4,251.0	18.27	127.34	4,057.3	-690.1	957.4	-304.9	0.48	-0.46	0.43
4,347.0	17.46	125.15	4,148.7	-707.5	981.1	-312.7	1.10	-0.84	-2.28
4,443.0	18.54	132.93	4,240.0	-726.2	1,004.0	-322.1	2.74	1.13	8.10
4,538.0	18.77	131.47	4,330.0	-746.6	1,026.6	-333.1	0.55	0.24	-1.54
4,634.0	20.36	130.09	4,420.5	-767.6	1,050.9	-344.1	1.72	1.66	-1.44
4,729.0	19.00	129.44	4,509.9	-788.1	1,075.5	-354.5	1.45	-1.43	-0.68
4,825.0	19.00	129.01	4,600.7	-807.8	1,099.7	-364.4	0.15	0.00	-0.45
4,920.0	19.43	128.61	4,690.4	-827.4	1,124.1	-374.0	0.47	0.45	-0.42
5,015.0	18.22	128.07	4,780.3	-846.5	1,148.1	-383.3	1.29	-1.27	-0.57

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Survey									
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5,111.0	20.82	128.00	4,870.8	-866.2	1,173.4	-392.8	2.71	2.71	-0.07
5,207.0	21.28	127.17	4,960.4	-887.2	1,200.7	-402.7	0.57	0.48	-0.86
5,302.0	20.20	125.70	5,049.2	-907.2	1,227.8	-411.8	1.26	-1.14	-1.55
5,397.0	18.89	125.88	5,138.7	-925.8	1,253.5	-420.0	1.38	-1.38	0.19
5,493.0	18.96	124.04	5,229.6	-943.7	1,279.1	-427.6	0.63	0.07	-1.92
5,587.0	20.45	124.60	5,318.1	-961.5	1,305.2	-435.0	1.60	1.59	0.60
5,683.0	19.74	124.27	5,408.2	-980.2	1,332.4	-442.8	0.75	-0.74	-0.34
5,779.0	21.24	124.25	5,498.1	-999.1	1,360.2	-450.6	1.56	1.56	-0.02
5,873.0	19.75	126.02	5,586.2	-1,018.0	1,387.1	-458.7	1.72	-1.59	1.88
5,968.0	18.06	126.36	5,676.1	-1,036.2	1,412.0	-466.9	1.78	-1.78	0.36
6,062.0	19.56	122.85	5,765.0	-1,053.4	1,436.9	-474.0	2.00	1.60	-3.73
6,157.0	16.60	107.52	5,855.4	-1,066.1	1,463.2	-476.6	5.87	-3.12	-16.14
6,252.0	17.48	75.25	5,946.4	-1,066.5	1,490.0	-467.5	9.87	0.93	-33.97
6,347.0	17.38	52.52	6,037.2	-1,054.3	1,515.1	-447.1	7.12	-0.11	-23.93
6,442.0	20.97	44.10	6,126.9	-1,033.4	1,538.2	-419.4	4.76	3.78	-8.86
6,537.0	26.51	36.55	6,213.8	-1,004.1	1,562.7	-383.3	6.64	5.83	-7.95
6,632.0	32.97	26.95	6,296.3	-964.0	1,587.1	-337.2	8.43	6.80	-10.11
6,728.0	39.76	18.63	6,373.6	-911.5	1,608.8	-280.4	8.73	7.07	-8.67
6,823.0	47.36	14.82	6,442.4	-848.9	1,627.5	-215.2	8.46	8.00	-4.01
6,917.0	53.21	15.76	6,502.5	-779.1	1,646.5	-143.2	6.27	6.22	1.00
7,012.0	60.24	10.82	6,554.6	-701.9	1,664.6	-64.6	8.58	7.40	-5.20
7,088.1	66.23	5.83	6,588.9	-634.7	1,674.4	1.7	9.80	7.87	-6.55
TPZ - 460' Setback - 460'FSL, 1237'FEL, Sec.3									
7,107.0	67.74	4.67	6,596.2	-617.4	1,676.0	18.4	9.80	8.00	-6.16
7,201.0	74.33	2.75	6,626.8	-528.7	1,681.7	103.3	7.27	7.01	-2.04
7,297.0	81.06	1.48	6,647.2	-435.1	1,685.1	192.1	7.13	7.01	-1.32
7,375.3	86.61	0.79	6,655.6	-357.2	1,686.7	265.4	7.14	7.08	-0.88
LPL 737'FSL, 1215'FEL, Sec.3									
7,393.0	87.86	0.64	6,656.5	-339.6	1,686.9	282.0	7.14	7.08	-0.87
7,488.0	89.24	0.34	6,658.9	-244.6	1,687.7	371.0	1.49	1.45	-0.32
Deepest TVD Drilled - 6658.90'TVD									
7,612.0	91.40	1.32	6,658.2	-120.7	1,689.5	487.6	1.91	1.74	0.79
7,707.0	91.29	0.87	6,656.0	-25.7	1,691.3	577.0	0.49	-0.12	-0.47
7,803.0	90.69	0.52	6,654.3	70.3	1,692.5	667.1	0.72	-0.63	-0.36
7,898.0	90.73	0.23	6,653.1	165.3	1,693.1	756.1	0.31	0.04	-0.31
7,995.0	90.65	359.90	6,652.0	262.3	1,693.2	846.8	0.35	-0.08	-0.34
8,090.0	90.57	359.48	6,651.0	357.3	1,692.7	935.4	0.45	-0.08	-0.44
8,186.0	90.55	359.22	6,650.0	453.2	1,691.6	1,024.8	0.27	-0.02	-0.27
8,281.0	90.48	358.83	6,649.2	548.2	1,690.0	1,113.0	0.42	-0.07	-0.41
8,377.0	90.19	2.26	6,648.6	644.2	1,690.9	1,203.0	3.59	-0.30	3.57
8,472.0	89.83	1.94	6,648.6	739.1	1,694.4	1,293.0	0.51	-0.38	-0.34
8,568.0	89.78	1.76	6,648.9	835.1	1,697.5	1,383.8	0.19	-0.05	-0.19
8,663.0	89.83	1.39	6,649.2	930.1	1,700.1	1,473.5	0.39	0.05	-0.39
8,759.0	89.84	0.97	6,649.5	1,026.0	1,702.1	1,563.9	0.44	0.01	-0.44

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Survey									
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8,854.0	90.04	0.52	6,649.6	1,121.0	1,703.3	1,653.1	0.52	0.21	-0.47
8,950.0	89.63	0.50	6,649.9	1,217.0	1,704.2	1,743.1	0.43	-0.43	-0.02
9,045.0	89.22	0.27	6,650.8	1,312.0	1,704.8	1,832.2	0.49	-0.43	-0.24
9,141.0	89.20	359.99	6,652.2	1,408.0	1,705.0	1,922.0	0.29	-0.02	-0.29
9,236.0	88.78	0.06	6,653.8	1,503.0	1,705.1	2,010.8	0.45	-0.44	0.07
9,332.0	89.05	359.98	6,655.7	1,599.0	1,705.1	2,100.5	0.29	0.28	-0.08
9,428.0	91.54	1.05	6,655.2	1,695.0	1,706.0	2,190.5	2.82	2.59	1.11
9,523.0	91.67	0.88	6,652.5	1,789.9	1,707.6	2,279.9	0.23	0.14	-0.18
9,619.0	92.03	0.31	6,649.4	1,885.9	1,708.6	2,369.9	0.70	0.38	-0.59
9,714.0	91.07	0.77	6,646.8	1,980.8	1,709.5	2,459.0	1.12	-1.01	0.48
9,810.0	91.27	0.84	6,644.9	2,076.8	1,710.8	2,549.2	0.22	0.21	0.07
9,905.0	91.37	0.27	6,642.7	2,171.8	1,711.7	2,638.3	0.61	0.11	-0.60
10,001.0	91.29	359.71	6,640.5	2,267.7	1,711.7	2,728.0	0.59	-0.08	-0.58
10,096.0	91.34	359.52	6,638.3	2,362.7	1,711.1	2,816.5	0.21	0.05	-0.20
10,191.0	90.12	0.11	6,637.1	2,457.7	1,710.8	2,905.2	1.43	-1.28	0.62
10,287.0	89.87	359.98	6,637.1	2,553.7	1,710.8	2,995.0	0.29	-0.26	-0.14
10,383.0	90.39	1.00	6,636.9	2,649.7	1,711.7	3,085.0	1.19	0.54	1.06
10,478.0	90.31	0.91	6,636.3	2,744.7	1,713.3	3,174.3	0.13	-0.08	-0.09
10,574.0	90.36	0.90	6,635.7	2,840.7	1,714.8	3,264.6	0.05	0.05	-0.01
10,669.0	90.40	358.37	6,635.1	2,935.6	1,714.2	3,353.2	2.66	0.04	-2.66
10,765.0	90.65	356.70	6,634.2	3,031.6	1,710.0	3,441.3	1.76	0.26	-1.74
10,860.0	90.62	0.08	6,633.2	3,126.5	1,707.4	3,529.1	3.56	-0.03	3.56
10,955.0	89.82	1.63	6,632.8	3,221.5	1,708.8	3,618.4	1.84	-0.84	1.63
11,051.0	89.66	1.50	6,633.2	3,317.4	1,711.4	3,709.1	0.21	-0.17	-0.14
11,146.0	89.74	1.22	6,633.7	3,412.4	1,713.7	3,798.6	0.31	0.08	-0.29
11,241.0	89.68	0.89	6,634.2	3,507.4	1,715.4	3,888.0	0.35	-0.06	-0.35
11,337.0	89.89	0.71	6,634.6	3,603.4	1,716.7	3,978.2	0.29	0.22	-0.19
11,433.0	90.08	0.55	6,634.6	3,699.4	1,717.8	4,068.3	0.26	0.20	-0.17
11,528.0	90.00	359.94	6,634.5	3,794.4	1,718.2	4,157.3	0.65	-0.08	-0.64
11,624.0	90.16	359.42	6,634.4	3,890.4	1,717.7	4,246.8	0.57	0.17	-0.54
11,719.0	90.03	359.30	6,634.2	3,985.4	1,716.6	4,335.3	0.19	-0.14	-0.13
11,815.0	89.55	359.20	6,634.6	4,081.4	1,715.4	4,424.5	0.51	-0.50	-0.10
11,911.0	89.31	358.85	6,635.5	4,177.3	1,713.7	4,513.7	0.44	-0.25	-0.36
12,006.0	89.37	358.91	6,636.6	4,272.3	1,711.9	4,601.8	0.09	0.06	0.06
12,102.0	89.32	358.87	6,637.7	4,368.3	1,710.0	4,690.8	0.07	-0.05	-0.04
12,206.0	89.01	358.39	6,639.2	4,472.3	1,707.5	4,787.1	0.55	-0.30	-0.46
12,266.0	89.01	358.39	6,640.3	4,532.2	1,705.8	4,842.6	0.00	0.00	0.00
Projected BHL 368°FSL, 1443°FEL, Sec.34									

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 16N
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 16N	North Reference:	True
Wellbore:	Popham 16N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 16N 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 1104'FSL, 2356'FW - survey hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,367,124.26	3,268,306.64	40.337160	-104.537510
Projected BHL 368'FSL, - survey misses target center by 19.2ft at 12266.0ft MD (6640.3 TVD, 4532.2 N, 1705.8 E) - Point	0.00	0.00	6,633.0	4,534.1	1,723.6	1,371,676.57	3,269,980.84	40.349606	-104.531327

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
7,088.1	6,588.9	-634.7	1,674.4	TPZ - 460' Setback - 460'FSL, 1237'FEL, Sec.3
7,488.0	6,658.9	-244.6	1,687.7	Deepest TVD Drilled - 6658.90'TVD

Checked By: _____	Approved By: _____	Date: _____
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