

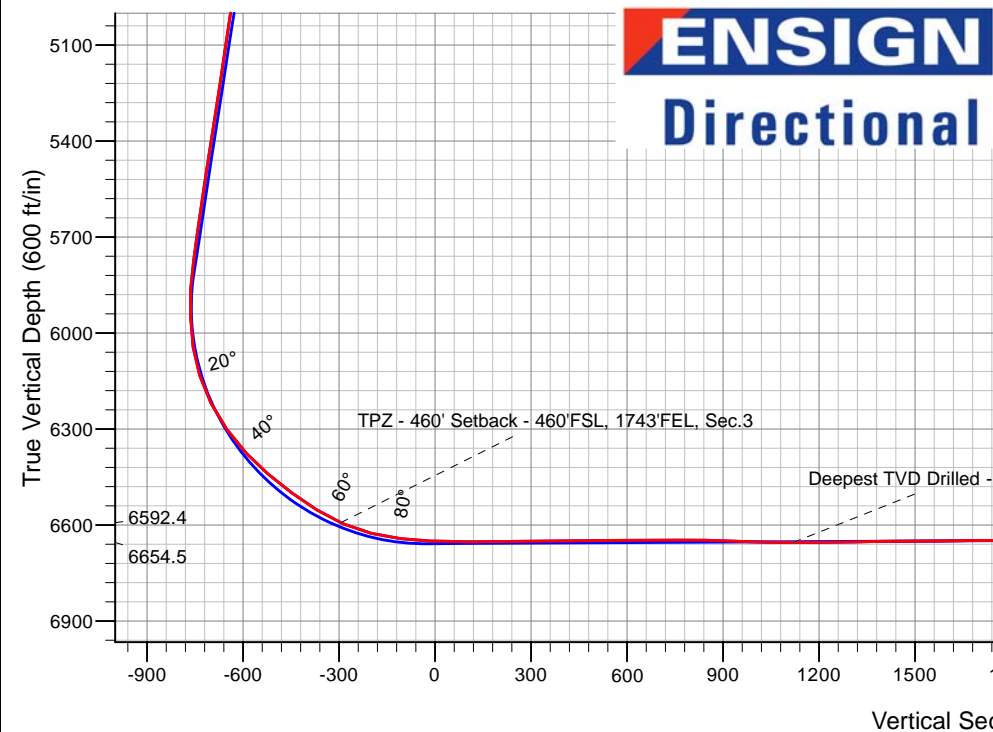
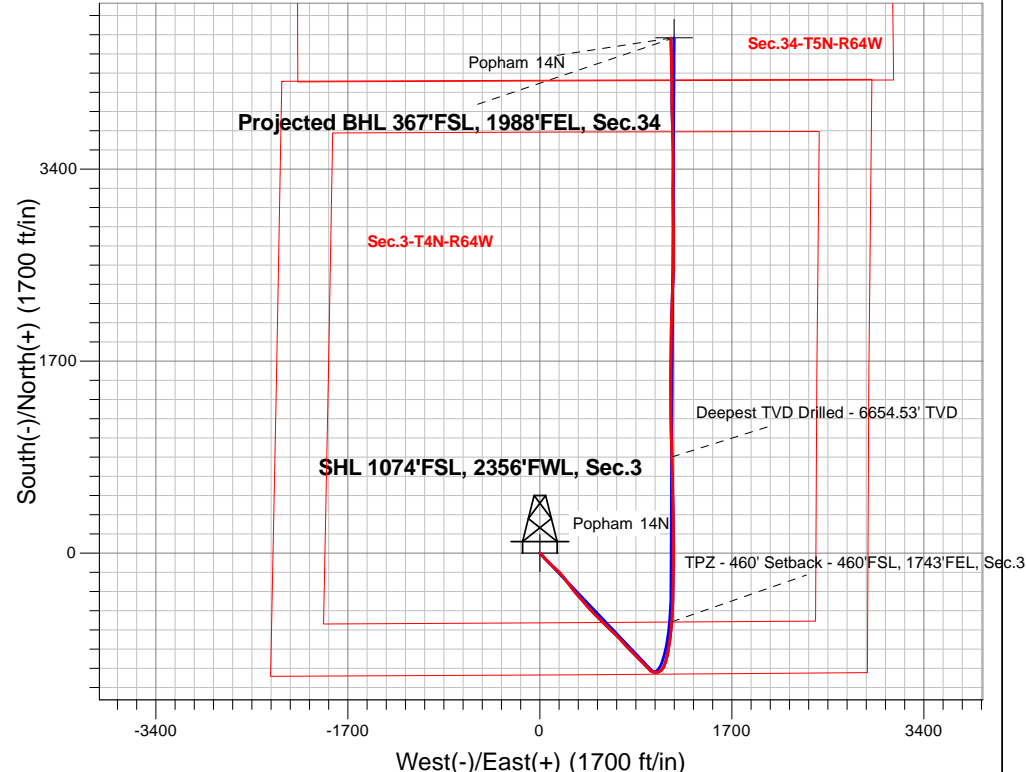
PDC Energy Inc. DJ Basin

Well Name: **Popham 14N**

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 1367095.13 268306.96 40.337080 -104.537510
 WELL @ 4685.0ft

FINAL SURVEY

Projected Bottom Hole Location
12,182'MD 6618'TVD 4559'N & 1161'E of SHL
92.88 degree Incl @ 358.31 degree AZM



Popham 4N64W03 Pad Sec.3-T4N-R64W
 Popham 14N
 Popham 14N Wellbore #1
 9:44, March 05 2019

ANNOTATIONS

TVD	MD	Annotation
6592.4	7004.4	TPZ - 460' Setback - 460'FSL, 1743'FEL, Sec.3
6654.5	8473.0	Deepest TVD Drilled - 6654.53' TVD

LEGEND

- ▲ Popham 14N, Popham 14N Wellbore #1, Plan #3 (2-28-19) V0
- Popham 14N Wellbore #1
- Survey #1



PDC Energy Inc. DJ Basin

SEC.3-T4N-R64W

Popham 4N64W03 Pad Sec.3-T4N-R64W

Popham 14N

Popham 14N Wellbore #1

Survey: Survey #1

Standard Survey Report

05 March, 2019

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 14N
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 14N	North Reference:	True
Wellbore:	Popham 14N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 14N 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 14N					
Well Position	+N/-S	0.0 ft	Northing:	1,367,095.11 usft	Latitude:	40.337080
	+E/-W	0.0 ft	Easting:	3,268,306.96 usft	Longitude:	-104.537510
Position Uncertainty		0.0 ft	Wellhead Elevation:	0.0 ft	Ground Level:	4,662.0 ft

Wellbore	Popham 14N Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/28/2019	8.15	66.85	52,176

Design	Popham 14N 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	14.61	

Survey Program	Date	3/5/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
157.0	12,182.0	Survey #1 (Popham 14N 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	72.70	1.0	0.0	0.0	0.0	0.29	0.29	0.00	
SHL 1074'FSL, 2356'FWL, Sec.3										
157.0	0.45	72.70	157.0	0.2	0.6	0.3	0.29	0.29	0.00	
252.0	0.10	52.75	252.0	0.3	1.0	0.6	0.38	-0.37	-21.00	
347.0	0.05	171.63	347.0	0.4	1.1	0.6	0.14	-0.05	125.14	
443.0	0.47	210.52	443.0	0.0	0.9	0.2	0.45	0.44	40.51	
538.0	1.25	137.55	538.0	-1.1	1.4	-0.7	1.26	0.82	-76.81	
633.0	3.28	130.85	632.9	-3.7	4.1	-2.5	2.15	2.14	-7.05	
728.0	5.25	131.68	727.6	-8.3	9.4	-5.7	2.07	2.07	0.87	
823.0	6.76	140.64	822.1	-15.6	16.2	-11.0	1.87	1.59	9.43	

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 14N
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 14N	North Reference:	True
Wellbore:	Popham 14N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 14N 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	8.54	137.07	916.3	-25.0	24.6	-18.0	1.94	1.87	-3.76
1,014.0	10.37	138.36	1,011.0	-36.7	35.2	-26.7	1.92	1.91	1.34
1,109.0	11.76	138.30	1,104.2	-50.3	47.3	-36.8	1.46	1.46	-0.06
1,204.0	13.18	135.02	1,197.0	-65.2	61.4	-47.6	1.67	1.49	-3.45
1,299.0	15.03	135.10	1,289.1	-81.6	77.8	-59.4	1.95	1.95	0.08
1,395.0	16.82	133.59	1,381.4	-100.0	96.6	-72.4	1.91	1.86	-1.57
1,490.0	15.88	131.37	1,472.6	-118.1	116.3	-84.9	1.19	-0.99	-2.34
1,593.0	14.89	132.31	1,571.9	-136.3	136.7	-97.4	0.99	-0.96	0.91
1,677.0	14.73	133.51	1,653.1	-150.9	152.4	-107.6	0.41	-0.19	1.43
1,773.0	16.05	137.26	1,745.6	-169.1	170.3	-120.7	1.72	1.38	3.91
1,868.0	16.09	139.84	1,836.9	-188.8	187.7	-135.3	0.75	0.04	2.72
1,963.0	15.39	139.82	1,928.4	-208.5	204.3	-150.2	0.74	-0.74	-0.02
2,058.0	16.10	143.04	2,019.8	-228.6	220.3	-165.7	1.18	0.75	3.39
2,153.0	17.03	141.41	2,110.8	-250.0	236.9	-182.2	1.09	0.98	-1.72
2,248.0	16.33	141.23	2,201.8	-271.3	254.0	-198.5	0.74	-0.74	-0.19
2,343.0	18.12	143.07	2,292.6	-293.5	271.2	-215.7	1.97	1.88	1.94
2,438.0	17.61	142.93	2,383.0	-316.8	288.8	-233.8	0.54	-0.54	-0.15
2,533.0	18.21	140.29	2,473.4	-339.7	306.9	-251.3	1.06	0.63	-2.78
2,629.0	17.38	140.02	2,564.8	-362.2	325.7	-268.4	0.87	-0.86	-0.28
2,724.0	17.38	139.62	2,655.5	-383.9	344.0	-284.7	0.13	0.00	-0.42
2,819.0	17.22	138.46	2,746.2	-405.2	362.5	-300.7	0.40	-0.17	-1.22
2,915.0	16.75	137.73	2,838.0	-426.1	381.3	-316.2	0.54	-0.49	-0.76
3,010.0	15.94	138.55	2,929.1	-446.0	399.1	-331.0	0.89	-0.85	0.86
3,105.0	17.91	138.69	3,020.0	-466.8	417.4	-346.4	2.07	2.07	0.15
3,200.0	16.98	137.36	3,110.7	-487.9	436.4	-362.1	1.07	-0.98	-1.40
3,295.0	15.91	137.36	3,201.8	-507.7	454.6	-376.7	1.13	-1.13	0.00
3,391.0	16.49	138.83	3,294.0	-527.7	472.5	-391.5	0.74	0.60	1.53
3,486.0	17.92	134.58	3,384.7	-548.1	491.8	-406.3	2.00	1.51	-4.47
3,582.0	17.07	134.58	3,476.3	-568.3	512.4	-420.8	0.89	-0.89	0.00
3,678.0	16.44	134.44	3,568.2	-587.7	532.1	-434.6	0.66	-0.66	-0.15
3,773.0	16.68	134.79	3,659.2	-606.7	551.4	-448.1	0.27	0.25	0.37
3,869.0	16.86	134.12	3,751.2	-626.1	571.1	-461.9	0.28	0.19	-0.70
3,965.0	16.75	134.18	3,843.1	-645.5	591.1	-475.6	0.12	-0.11	0.06
4,061.0	16.49	133.34	3,935.1	-664.5	610.9	-489.0	0.37	-0.27	-0.88
4,156.0	16.12	134.81	4,026.2	-683.0	630.1	-502.1	0.58	-0.39	1.55
4,251.0	15.60	135.25	4,117.6	-701.4	648.4	-515.2	0.56	-0.55	0.46
4,347.0	15.02	134.81	4,210.2	-719.3	666.3	-528.1	0.62	-0.60	-0.46
4,443.0	14.25	133.93	4,303.1	-736.3	683.7	-540.1	0.83	-0.80	-0.92
4,538.0	14.41	134.51	4,395.1	-752.7	700.5	-551.7	0.23	0.17	0.61
4,634.0	15.16	138.75	4,488.0	-770.5	717.3	-564.7	1.37	0.78	4.42
4,729.0	14.65	138.28	4,579.8	-788.8	733.5	-578.4	0.55	-0.54	-0.49
4,825.0	14.62	137.28	4,672.7	-806.8	749.8	-591.6	0.27	-0.03	-1.04
4,921.0	14.90	136.80	4,765.5	-824.7	766.4	-604.7	0.32	0.29	-0.50

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 14N
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 14N	North Reference:	True
Wellbore:	Popham 14N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 14N 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	16.67	134.93	4,855.9	-843.0	784.3	-618.0	1.96	1.88	-1.99
5,111.0	16.62	134.37	4,947.9	-862.3	803.8	-631.8	0.18	-0.05	-0.58
5,207.0	15.69	133.86	5,040.1	-880.9	823.0	-644.9	0.98	-0.97	-0.53
5,302.0	15.47	138.24	5,131.6	-899.3	840.7	-658.2	1.26	-0.23	4.61
5,397.0	16.41	137.45	5,223.0	-918.6	858.2	-672.5	1.02	0.99	-0.83
5,493.0	16.47	135.04	5,315.1	-938.2	877.0	-686.8	0.71	0.06	-2.51
5,587.0	16.71	136.02	5,405.1	-957.4	895.8	-700.5	0.39	0.26	1.04
5,683.0	17.30	135.57	5,496.9	-977.5	915.4	-715.1	0.63	0.61	-0.47
5,779.0	14.94	134.58	5,589.2	-996.4	934.2	-728.6	2.47	-2.46	-1.03
5,873.0	16.08	134.94	5,679.7	-1,014.1	952.0	-741.2	1.22	1.21	0.38
5,968.0	16.12	135.01	5,771.0	-1,032.7	970.7	-754.6	0.05	0.04	0.07
6,062.0	16.28	115.97	5,861.3	-1,047.7	991.8	-763.8	5.63	0.17	-20.26
6,157.0	17.27	94.59	5,952.4	-1,054.7	1,017.8	-763.9	6.54	1.04	-22.51
6,252.0	18.07	82.04	6,042.9	-1,053.8	1,046.5	-755.8	4.09	0.84	-13.21
6,347.0	21.23	49.19	6,132.7	-1,040.4	1,074.2	-736.0	11.92	3.33	-34.58
6,442.0	27.14	26.25	6,219.5	-1,009.7	1,096.8	-700.5	11.58	6.22	-24.15
6,537.0	35.95	15.67	6,300.4	-963.3	1,114.0	-651.2	10.92	9.27	-11.14
6,633.0	42.47	12.95	6,374.8	-904.5	1,128.9	-590.6	7.02	6.79	-2.83
6,728.0	50.34	8.38	6,440.2	-836.9	1,141.4	-522.0	8.98	8.28	-4.81
6,823.0	53.40	6.89	6,498.9	-762.9	1,151.3	-447.9	3.45	3.22	-1.57
6,917.0	58.35	6.63	6,551.6	-685.6	1,160.5	-370.8	5.27	5.27	-0.28
7,004.4	66.03	4.96	6,592.4	-608.8	1,168.3	-294.5	8.95	8.79	-1.92
TPZ - 460' Setback - 460'FSL, 1743'FEL, Sec.3									
7,012.0	66.70	4.82	6,595.4	-601.8	1,168.8	-287.6	8.95	8.80	-1.78
7,107.0	75.92	2.67	6,625.8	-512.1	1,174.7	-199.4	9.94	9.71	-2.26
7,202.0	83.62	0.88	6,642.7	-418.8	1,177.5	-108.3	8.31	8.11	-1.88
7,289.5	87.79	1.31	6,649.2	-331.5	1,179.2	-23.5	4.79	4.77	0.49
LPL 737'FSL, 1750'FEL, Sec.3									
7,297.0	88.15	1.35	6,649.5	-324.0	1,179.4	-16.2	4.79	4.77	0.49
7,421.0	89.67	0.72	6,651.9	-200.1	1,181.6	104.3	1.33	1.23	-0.51
7,517.0	90.59	359.81	6,651.6	-104.1	1,182.1	197.3	1.35	0.96	-0.95
7,612.0	90.59	0.12	6,650.7	-9.1	1,182.0	289.3	0.33	0.00	0.33
7,707.0	91.00	359.67	6,649.3	85.9	1,181.8	381.1	0.64	0.43	-0.47
7,803.0	89.71	359.88	6,648.8	181.9	1,181.5	473.9	1.36	-1.34	0.22
7,899.0	90.36	359.73	6,648.7	277.9	1,181.1	566.7	0.69	0.68	-0.16
7,995.0	90.63	359.42	6,647.9	373.9	1,180.4	659.5	0.43	0.28	-0.32
8,090.0	90.66	359.51	6,646.8	468.9	1,179.5	751.2	0.10	0.03	0.09
8,186.0	88.39	358.08	6,647.6	564.8	1,177.5	843.5	2.79	-2.36	-1.49
8,281.0	88.22	357.83	6,650.4	659.7	1,174.1	934.5	0.32	-0.18	-0.26
8,377.0	88.33	357.87	6,653.3	755.6	1,170.5	1,026.4	0.12	0.11	0.04
8,473.0	90.19	359.39	6,654.5	851.6	1,168.2	1,118.7	2.50	1.94	1.58
Deepest TVD Drilled - 6654.53' TVD									
8,568.0	90.57	358.65	6,653.9	946.6	1,166.6	1,210.2	0.88	0.40	-0.78
8,664.0	90.88	358.41	6,652.7	1,042.5	1,164.2	1,302.4	0.41	0.32	-0.25

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Wellbore:	Popham 14N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 14N 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	90.99	357.89	6,651.1	1,137.5	1,161.1	1,393.5	0.56	0.12	-0.55	
8,854.0	90.08	0.09	6,650.2	1,232.4	1,159.4	1,485.0	2.51	-0.96	2.32	
8,950.0	90.65	359.97	6,649.6	1,328.4	1,159.5	1,577.9	0.61	0.59	-0.13	
9,045.0	90.57	0.57	6,648.6	1,423.4	1,159.9	1,669.9	0.64	-0.08	0.63	
9,141.0	90.55	359.97	6,647.7	1,519.4	1,160.4	1,762.9	0.63	-0.02	-0.63	
9,236.0	90.32	359.86	6,647.0	1,614.4	1,160.2	1,854.8	0.27	-0.24	-0.12	
9,331.0	90.34	0.25	6,646.4	1,709.4	1,160.3	1,946.8	0.41	0.02	0.41	
9,428.0	90.20	358.91	6,646.0	1,806.4	1,159.6	2,040.4	1.39	-0.14	-1.38	
9,523.0	90.27	1.35	6,645.6	1,901.4	1,159.8	2,132.4	2.57	0.07	2.57	
9,619.0	90.24	2.35	6,645.1	1,997.3	1,162.9	2,226.0	1.04	-0.03	1.04	
9,714.0	90.39	2.20	6,644.6	2,092.3	1,166.7	2,318.9	0.22	0.16	-0.16	
9,810.0	90.29	2.29	6,644.1	2,188.2	1,170.4	2,412.6	0.14	-0.10	0.09	
9,905.0	90.32	2.72	6,643.5	2,283.1	1,174.6	2,505.5	0.45	0.03	0.45	
10,001.0	89.54	2.93	6,643.7	2,379.0	1,179.3	2,599.5	0.84	-0.81	0.22	
10,096.0	89.49	1.03	6,644.5	2,473.9	1,182.6	2,692.2	2.00	-0.05	-2.00	
10,192.0	89.35	0.54	6,645.4	2,569.9	1,183.9	2,785.4	0.53	-0.15	-0.51	
10,287.0	89.38	0.15	6,646.5	2,664.9	1,184.5	2,877.5	0.41	0.03	-0.41	
10,383.0	89.56	359.78	6,647.4	2,760.9	1,184.4	2,970.4	0.43	0.19	-0.39	
10,478.0	89.13	359.12	6,648.5	2,855.9	1,183.5	3,062.0	0.83	-0.45	-0.69	
10,574.0	88.82	358.62	6,650.2	2,951.9	1,181.6	3,154.4	0.61	-0.32	-0.52	
10,669.0	90.43	359.80	6,650.8	3,046.8	1,180.3	3,246.0	2.10	1.69	1.24	
10,765.0	90.18	359.59	6,650.3	3,142.8	1,179.8	3,338.8	0.34	-0.26	-0.22	
10,860.0	91.51	0.12	6,648.9	3,237.8	1,179.6	3,430.6	1.51	1.40	0.56	
10,956.0	91.89	0.30	6,646.0	3,333.8	1,179.9	3,523.6	0.44	0.40	0.19	
11,051.0	91.75	359.96	6,643.0	3,428.7	1,180.1	3,615.5	0.39	-0.15	-0.36	
11,146.0	91.87	359.43	6,640.0	3,523.7	1,179.6	3,707.3	0.57	0.13	-0.56	
11,241.0	91.95	358.59	6,636.9	3,618.6	1,178.0	3,798.7	0.89	0.08	-0.88	
11,337.0	90.47	358.97	6,634.8	3,714.6	1,176.0	3,891.1	1.59	-1.54	0.40	
11,433.0	90.34	358.52	6,634.2	3,810.5	1,173.8	3,983.4	0.49	-0.14	-0.47	
11,528.0	90.60	357.98	6,633.4	3,905.5	1,170.9	4,074.6	0.63	0.27	-0.57	
11,624.0	90.09	359.97	6,632.8	4,001.5	1,169.2	4,167.0	2.14	-0.53	2.07	
11,719.0	90.17	359.94	6,632.6	4,096.5	1,169.2	4,258.9	0.09	0.08	-0.03	
11,815.0	90.98	359.72	6,631.6	4,192.5	1,168.9	4,351.7	0.87	0.84	-0.23	
11,911.0	91.54	358.84	6,629.5	4,288.4	1,167.7	4,444.3	1.09	0.58	-0.92	
12,006.0	92.15	358.54	6,626.4	4,383.4	1,165.5	4,535.6	0.72	0.64	-0.32	
12,122.0	92.88	358.31	6,621.4	4,499.2	1,162.3	4,646.9	0.66	0.63	-0.20	
12,182.0	92.88	358.31	6,618.3	4,559.1	1,160.5	4,704.4	0.00	0.00	0.00	
Projected BHL 367°FSL, 1988°FEL, Sec.34										

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Popham 14N
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 14N	North Reference:	True
Wellbore:	Popham 14N Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Popham 14N 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 1074'FSL, 2356'FW - survey hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,367,095.12	3,268,306.96	40.337080	-104.537510
Projected BHL 367'FSL, - survey misses target center by 31.8ft at 12182.0ft MD (6618.3 TVD, 4559.1 N, 1160.5 E) - Point	0.00	0.00	6,633.0	4,561.6	1,188.7	1,371,669.16	3,269,446.03	40.349601	-104.533246

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
7,004.4	6,592.4	-608.8	1,168.3	TPZ - 460' Setback - 460'FSL, 1743'FEL, Sec.3	
8,473.0	6,654.5	851.6	1,168.2	Deepest TVD Drilled - 6654.53' TVD	

Checked By: _____	Approved By: _____	Date: _____
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