PDC ENERGY

WELD COUNTY, COLORADO
SE SE SEC. 18 T4N R67W 6th P.M.
RIEDER 18T-221
JOB # 2015-044-135

20 June, 2015

Survey: FINAL SURVEYS

Project: WELD COUNTY, COLORADO
Site: SE SE SEC. 18 T4N R67W 6th P.M.
Well: RIEDER 18T-221
Wellbore: JOB # 2015-044-135
Design: FINAL SURVEYS

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSect	Dep	Annotation
899.9	900.0	1.20	283.49	0.7	-6.4	1.3	7.4	SURFACE CASING
6371.6	6435.0	5.12	356.96	-628.6	-408.2	-584.8	786.1	KOP
6980.9	7339.0	87.47	357.83	-74.9	-424.1	-32.4	1338.4	ICP
6936.8	11491.0	91.30	2.10	4074.8	-411.6	4095.6	5488.8	LAST SURVEY - JUNE 19, 2014
6935.6	11543.0	91.30	2.10	4126.8	-409.7	4147.1	5540.8	EXTRAPOLATION TO TD

AS DRILLED LOCAL COORDINATES:

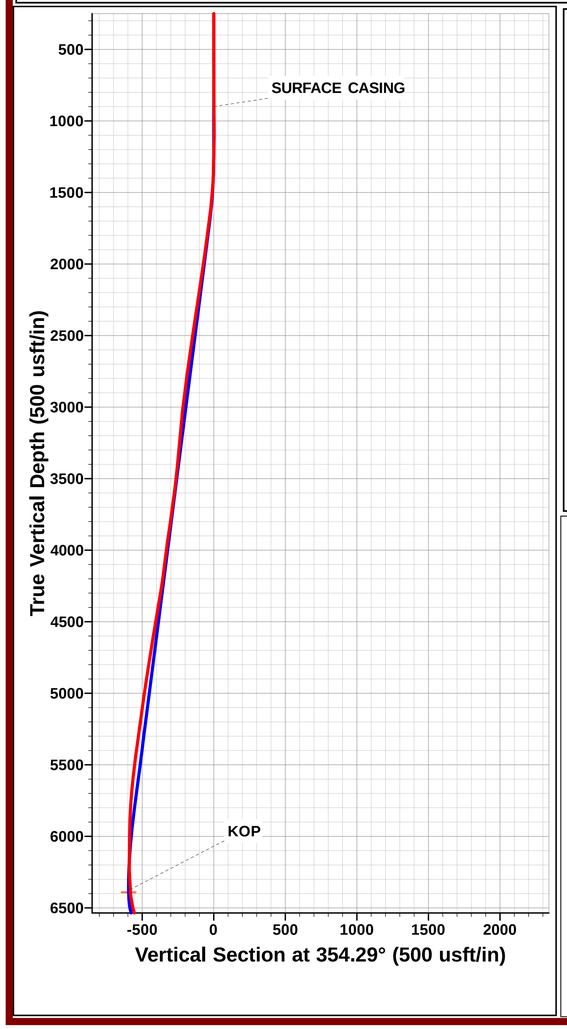
SHL: 677ft FSL & 682ft FEL Sec 18

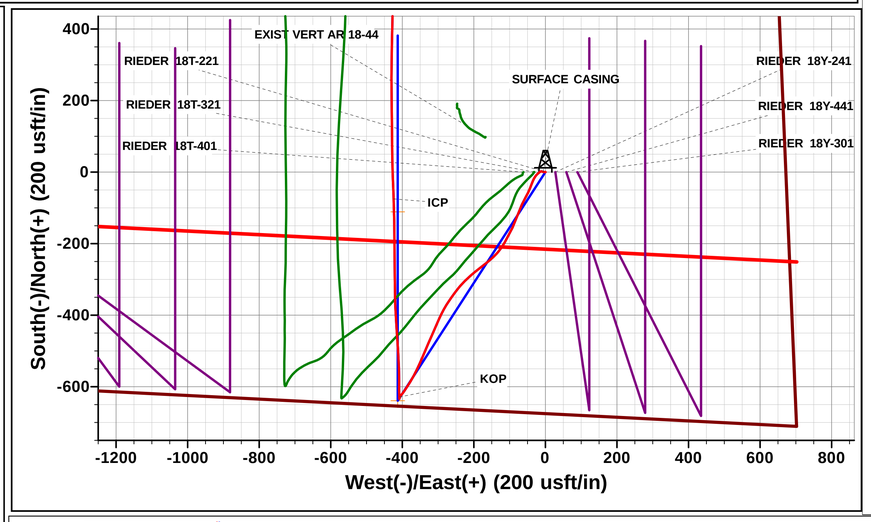
7" ICP: 529.7ft FSL & 1106.1ft FEL Sec 18

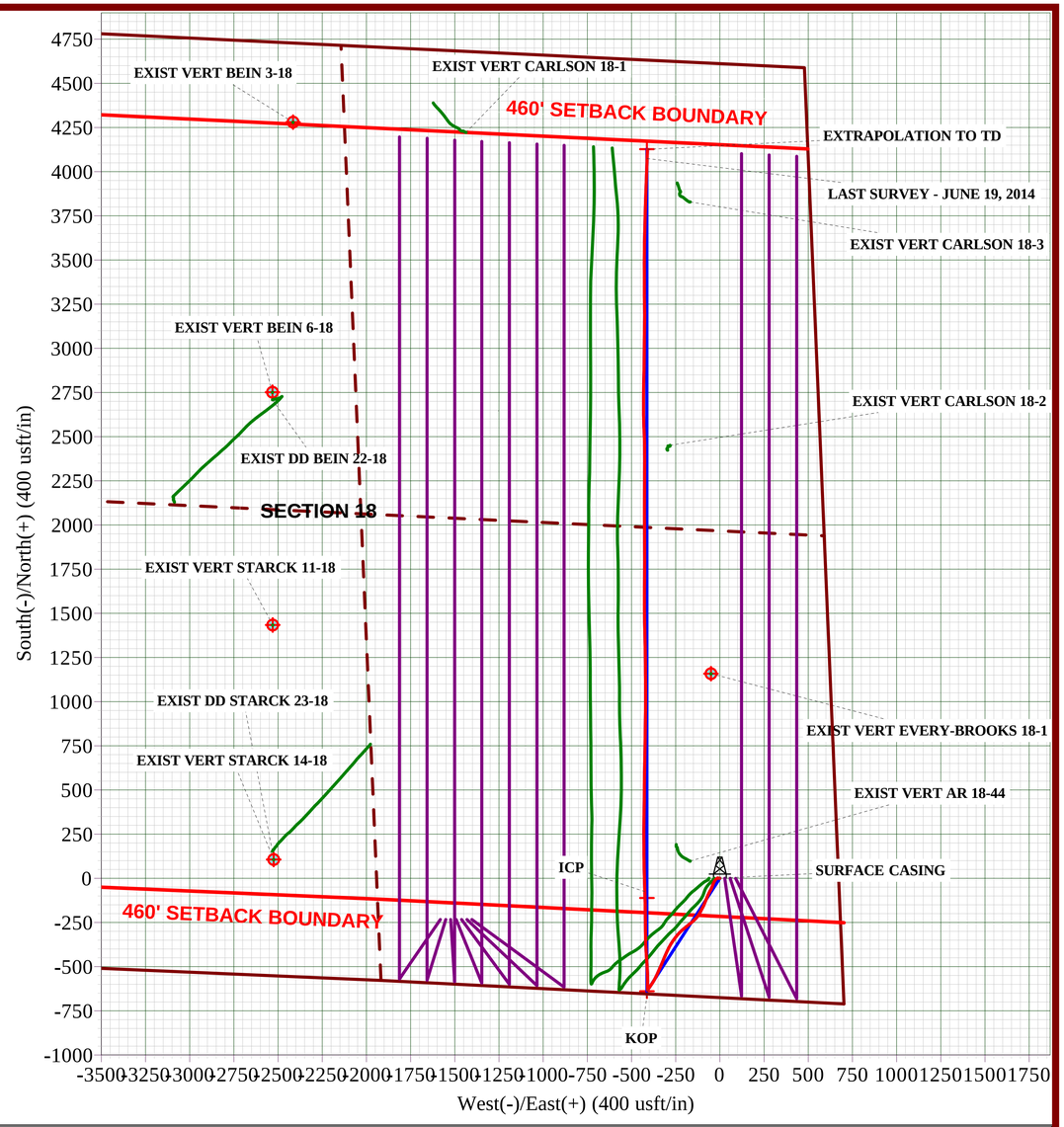
BHL: 500.8ft FNL & 917ft FEL Sec 18

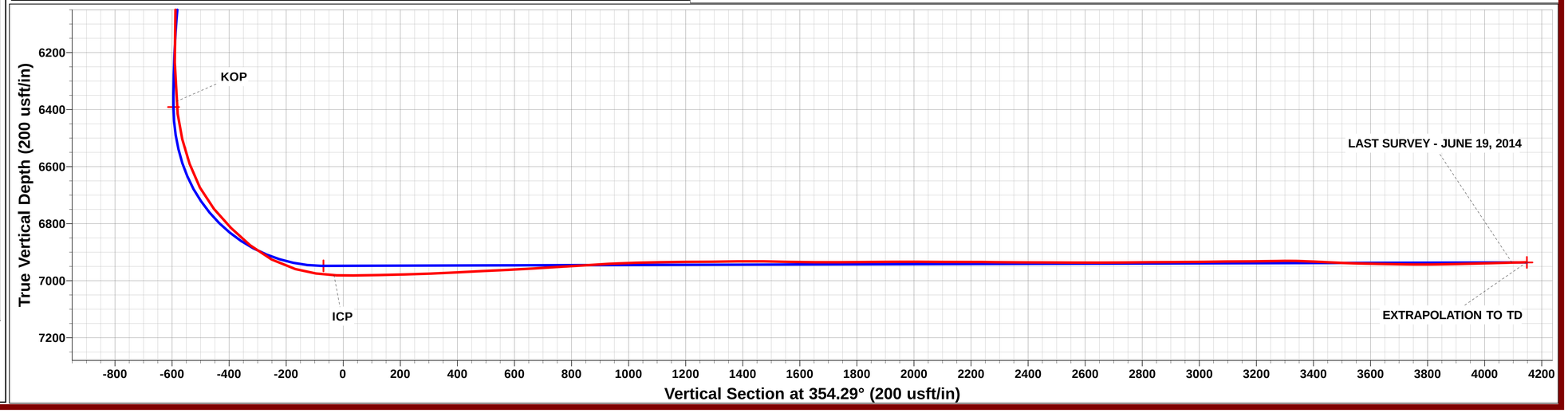
WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
7" ICP *NEW* - RIEDER 18-221 (P2)	6948.0	-111.1	-412.7	40.307545	-104.927050	Point
BHL - RIEDER 18T-221 (P2)	6936.0	4127.6	-412.7	40.319180	-104.927050	Point
KOP - RIEDER 18T-221 (P2)	6391.4	-639.1	-412.7	40.306096	-104.927050	Point









Company:	PDC ENERGY	**Local Co-ordinate Reference:**	Well RIEDER 18T-221
Project:	WELD COUNTY, COLORADO	**TVD Reference:**	KB @ 4819.0usft (ENS 135)
Site:	SE SE SEC. 18 T4N R67W 6th P.M.	**MD Reference:**	KB @ 4819.0usft (ENS 135)
Well:	RIEDER 18T-221	**North Reference:**	True
Wellbore:	JOB # 2015-044-135	**Survey Calculation Method:**	Minimum Curvature
Design:	FINAL SURVEYS	**Database:**	EDM 5000.1 Single User Db

Project WELD COUNTY, COLORADO

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site SE SE SEC. 18 T4N R67W 6th P.M.

Site Position:		**Northing:**	1,355,509.25 usft	**Latitude:**	40.307850
From:	Lat/Long	**Easting:**	3,160,139.69 usft	**Longitude:**	-104.925790
Position Uncertainty:	0.0 usft	**Slot Radius:**	1.10000 ft	**Grid Convergence:**	0.37 °

Well RIEDER 18T-221

Well Position	**+N/-S**	0.0 usft	**Northing:**	1,355,509.63 usft	**Latitude:**	40.307850
	+E/-W	0.0 usft	**Easting:**	3,160,201.05 usft	**Longitude:**	-104.925570
Position Uncertainty		0.0 usft	**Wellhead Elevation:**	usft	**Ground Level:**	4,806.0 usft

Wellbore JOB # 2015-044-135

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	28/04/2015	8.51	66.81	52,571

Design FINAL SURVEYS

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	354.29

Survey Program **Date** 20/06/2015

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	11,543.0	FINAL SURVEYS (JOB # 2015-044-135)	MWD	MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	4,819.0	0.0	0.0	0.0	0.00	0.00	0.00
265.0	0.10	68.50	265.0	4,554.0	0.1	0.2	0.1	0.04	0.04	0.00
546.0	0.50	262.20	546.0	4,273.0	0.0	-0.8	0.1	0.21	0.14	-59.18
827.0	1.20	280.70	827.0	3,992.0	0.4	-4.9	0.9	0.26	0.25	6.58
SURFACE CASING										
900.0	***1.20***	***283.49***	***899.9***	***3,919.1***	***0.7***	***-6.4***	***1.3***	***0.08***	***-0.01***	***3.83***
1,106.0	1.20	291.40	1,105.9	3,713.1	2.0	-10.5	3.0	0.08	0.00	3.84
1,390.0	5.00	227.40	1,389.5	3,429.5	-5.3	-22.4	-3.0	1.62	1.34	-22.54
1,671.0	8.00	199.30	1,668.7	3,150.3	-32.1	-37.8	-28.1	1.53	1.07	-10.00
1,952.0	9.50	209.10	1,946.5	2,872.5	-70.8	-55.6	-64.9	0.75	0.53	3.49
2,230.0	9.80	199.60	2,220.5	2,598.5	-113.1	-74.7	-105.1	0.58	0.11	-3.42
2,501.0	9.70	205.20	2,487.6	2,331.4	-155.5	-92.1	-145.6	0.35	-0.04	2.07
2,772.0	10.10	209.80	2,754.6	2,064.4	-196.8	-113.7	-184.5	0.33	0.15	1.70

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Site:	SE SE SEC. 18 T4N R67W 6th P.M.	**MD Reference:**	KB @ 4819.0usft (ENS 135)
Well:	RIEDER 18T-221	**North Reference:**	True
Wellbore:	JOB # 2015-044-135	**Survey Calculation Method:**	Minimum Curvature
Design:	FINAL SURVEYS	**Database:**	EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,044.0	9.20	225.30	3,022.8	1,796.2	-232.8	-141.0	-217.6	1.01	-0.33	5.70
3,315.0	9.60	233.30	3,290.2	1,528.8	-261.5	-174.5	-242.9	0.50	0.15	2.95
3,586.0	11.30	228.60	3,556.7	1,262.3	-292.6	-212.5	-270.0	0.70	0.63	-1.73
3,857.0	11.80	217.30	3,822.2	996.8	-332.2	-249.2	-305.7	0.85	0.18	-4.17
4,128.0	8.70	211.90	4,088.9	730.1	-371.6	-276.9	-342.3	1.20	-1.14	-1.99
4,399.0	11.30	203.90	4,355.7	463.3	-413.3	-298.5	-381.6	1.09	0.96	-2.95
4,671.0	10.40	203.10	4,622.9	196.1	-460.3	-318.9	-426.3	0.34	-0.33	-0.29
4,942.0	10.10	204.10	4,889.5	-70.5	-504.5	-338.2	-468.3	0.13	-0.11	0.37
5,213.0	8.60	203.40	5,156.9	-337.9	-544.8	-355.9	-506.6	0.56	-0.55	-0.26
5,485.0	10.00	211.10	5,425.4	-606.4	-583.6	-376.2	-543.3	0.69	0.51	2.83
5,756.0	6.50	216.70	5,693.5	-874.5	-616.1	-397.6	-573.5	1.32	-1.29	2.07
6,027.0	1.10	203.80	5,963.8	-1,144.8	-630.8	-407.8	-587.1	2.00	-1.99	-4.76
6,298.0	0.50	147.30	6,234.8	-1,415.8	-634.2	-408.2	-590.4	0.34	-0.22	-20.85
KOP										
6,435.0	***5.12***	***356.96***	***6,371.6***	***-1,552.6***	***-628.6***	***-408.2***	***-584.8***	***4.06***	***3.37***	***-109.74***
6,479.0	6.90	356.30	6,415.4	-1,596.4	-624.0	-408.5	-580.2	4.06	4.05	-1.51
6,569.0	13.70	359.90	6,503.9	-1,684.9	-607.9	-408.8	-564.2	7.59	7.56	4.00
6,659.0	19.30	0.80	6,590.1	-1,771.1	-582.3	-408.6	-538.8	6.23	6.22	1.00
6,750.0	27.90	357.00	6,673.5	-1,854.5	-546.0	-409.5	-502.5	9.59	9.45	-4.18
6,840.0	38.90	357.60	6,748.5	-1,929.5	-496.6	-411.8	-453.1	12.23	12.22	0.67
6,930.0	44.80	354.70	6,815.5	-1,996.5	-436.7	-416.0	-393.1	6.90	6.56	-3.22
7,020.0	51.00	358.60	6,875.8	-2,056.8	-370.1	-419.7	-326.5	7.60	6.89	4.33
7,111.0	62.10	359.60	6,925.9	-2,106.9	-294.3	-420.9	-250.9	12.23	12.20	1.10
7,201.0	74.20	359.20	6,959.3	-2,140.3	-210.9	-421.8	-167.9	13.45	13.44	-0.44
7,275.0	81.60	359.50	6,974.8	-2,155.8	-138.6	-422.6	-95.9	10.01	10.00	0.41
ICP										
7,339.0	***87.47***	***357.83***	***6,980.9***	***-2,161.9***	***-74.9***	***-424.1***	***-32.4***	***9.54***	***9.18***	***-2.61***
7,348.0	88.30	357.60	6,981.3	-2,162.3	-66.0	-424.4	-23.4	9.54	9.18	-2.58
7,407.0	90.40	358.10	6,981.9	-2,162.9	-7.0	-426.7	35.5	3.66	3.56	0.85
7,497.0	91.60	359.50	6,980.4	-2,161.4	83.0	-428.5	125.2	2.05	1.33	1.56
7,588.0	91.20	359.20	6,978.1	-2,159.1	173.9	-429.6	215.8	0.55	-0.44	-0.33
7,678.0	92.30	359.90	6,975.4	-2,156.4	263.9	-430.3	305.4	1.45	1.22	0.78
7,769.0	93.10	1.60	6,971.1	-2,152.1	354.8	-429.1	395.7	2.06	0.88	1.87
7,859.0	92.80	0.60	6,966.5	-2,147.5	444.6	-427.4	484.9	1.16	-0.33	-1.11
7,949.0	92.50	0.10	6,962.3	-2,143.3	534.5	-426.8	574.3	0.65	-0.33	-0.56
8,039.0	93.70	1.30	6,957.4	-2,138.4	624.4	-425.7	663.6	1.88	1.33	1.33
8,130.0	93.20	1.00	6,952.0	-2,133.0	715.2	-423.9	753.8	0.64	-0.55	-0.33
8,220.0	93.80	0.90	6,946.5	-2,127.5	805.0	-422.4	843.1	0.68	0.67	-0.11
8,310.0	93.40	0.80	6,940.8	-2,121.8	894.8	-421.1	932.3	0.46	-0.44	-0.11
8,401.0	91.00	0.30	6,937.3	-2,118.3	985.8	-420.2	1,022.7	2.69	-2.64	-0.55
8,491.0	91.60	359.70	6,935.3	-2,116.3	1,075.7	-420.2	1,112.2	0.94	0.67	-0.67
8,581.0	89.90	359.50	6,934.1	-2,115.1	1,165.7	-420.8	1,201.8	1.90	-1.89	-0.22
8,671.0	90.60	359.30	6,933.7	-2,114.7	1,255.7	-421.8	1,291.4	0.81	0.78	-0.22
8,762.0	91.30	358.70	6,932.2	-2,113.2	1,346.7	-423.4	1,382.1	1.01	0.77	-0.66
8,853.0	88.70	358.70	6,932.2	-2,113.2	1,437.7	-425.4	1,472.8	2.86	-2.86	0.00
8,943.0	89.00	359.80	6,934.0	-2,115.0	1,527.6	-426.6	1,562.5	1.27	0.33	1.22
9,033.0	89.40	0.20	6,935.3	-2,116.3	1,617.6	-426.6	1,652.0	0.63	0.44	0.44
9,124.0	90.50	0.70	6,935.3	-2,116.3	1,708.6	-425.9	1,742.5	1.33	1.21	0.55
9,214.0	90.40	359.90	6,934.6	-2,115.6	1,798.6	-425.4	1,832.0	0.90	-0.11	-0.89
9,305.0	90.50	359.60	6,933.9	-2,114.9	1,889.6	-425.8	1,922.6	0.35	0.11	-0.33
9,395.0	89.80	359.70	6,933.7	-2,114.7	1,979.6	-426.4	2,012.2	0.79	-0.78	0.11
9,486.0	89.40	0.10	6,934.3	-2,115.3	2,070.6	-426.5	2,102.8	0.62	-0.44	0.44
9,577.0	90.30	0.10	6,934.6	-2,115.6	2,161.6	-426.4	2,193.3	0.99	0.99	0.00

Company:	PDC ENERGY	**Local Co-ordinate Reference:**	Well RIEDER 18T-221
Project:	WELD COUNTY, COLORADO	**TVD Reference:**	KB @ 4819.0usft (ENS 135)
Site:	SE SE SEC. 18 T4N R67W 6th P.M.	**MD Reference:**	KB @ 4819.0usft (ENS 135)
Well:	RIEDER 18T-221	**North Reference:**	True
Wellbore:	JOB # 2015-044-135	**Survey Calculation Method:**	Minimum Curvature
Design:	FINAL SURVEYS	**Database:**	EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,667.0	89.00	0.30	6,935.1	-2,116.1	2,251.6	-426.0	2,282.8	1.46	-1.44	0.22
9,757.0	90.00	0.30	6,935.9	-2,116.9	2,341.6	-425.6	2,372.3	1.11	1.11	0.00
9,848.0	89.80	359.50	6,936.1	-2,117.1	2,432.6	-425.7	2,462.9	0.91	-0.22	-0.88
9,938.0	89.40	357.20	6,936.7	-2,117.7	2,522.5	-428.3	2,552.6	2.59	-0.44	-2.56
10,028.0	90.20	359.30	6,937.0	-2,118.0	2,612.5	-431.1	2,642.4	2.50	0.89	2.33
10,119.0	90.80	359.70	6,936.2	-2,117.2	2,703.5	-431.9	2,733.0	0.79	0.66	0.44
10,210.0	90.40	1.50	6,935.3	-2,116.3	2,794.5	-430.9	2,823.5	2.03	-0.44	1.98
10,300.0	90.00	1.20	6,934.9	-2,115.9	2,884.4	-428.8	2,912.8	0.56	-0.44	-0.33
10,390.0	91.00	0.10	6,934.2	-2,115.2	2,974.4	-427.8	3,002.2	1.65	1.11	-1.22
10,481.0	90.60	1.10	6,932.9	-2,113.9	3,065.4	-426.8	3,092.7	1.18	-0.44	1.10
10,571.0	90.10	0.40	6,932.3	-2,113.3	3,155.4	-425.6	3,182.1	0.96	-0.56	-0.78
10,662.0	91.40	358.80	6,931.1	-2,112.1	3,246.4	-426.3	3,272.7	2.27	1.43	-1.76
10,752.0	88.00	0.30	6,931.6	-2,112.6	3,336.4	-427.0	3,362.3	4.13	-3.78	1.67
10,842.0	87.00	359.70	6,935.5	-2,116.5	3,426.3	-427.0	3,451.8	1.30	-1.11	-0.67
10,933.0	88.30	359.80	6,939.3	-2,120.3	3,517.2	-427.4	3,542.3	1.43	1.43	0.11
11,023.0	89.20	1.60	6,941.2	-2,122.2	3,607.2	-426.3	3,631.7	2.24	1.00	2.00
11,113.0	88.80	1.00	6,942.8	-2,123.8	3,697.1	-424.2	3,721.0	0.80	-0.44	-0.67
11,204.0	90.60	2.00	6,943.3	-2,124.3	3,788.1	-421.9	3,811.3	2.26	1.98	1.10
11,294.0	91.20	2.00	6,941.9	-2,122.9	3,878.0	-418.7	3,900.4	0.67	0.67	0.00
11,385.0	91.70	2.20	6,939.6	-2,120.6	3,968.9	-415.4	3,990.6	0.59	0.55	0.22
11,475.0	91.40	1.90	6,937.1	-2,118.1	4,058.8	-412.2	4,079.7	0.47	-0.33	-0.33
LAST SURVEY - JUNE 19, 2014										
11,491.0	***91.30***	***2.10***	***6,936.8***	***-2,117.8***	***4,074.8***	***-411.6***	***4,095.6***	***1.40***	***-0.62***	***1.25***
EXTRAPOLATION TO TD										
11,543.0	***91.30***	***2.10***	***6,935.6***	***-2,116.6***	***4,126.8***	***-409.7***	***4,147.1***	***0.00***	***0.00***	***0.00***

Company:	PDC ENERGY	**Local Co-ordinate Reference:**	Well RIEDER 18T-221
Project:	WELD COUNTY, COLORADO	**TVD Reference:**	KB @ 4819.0usft (ENS 135)
Site:	SE SE SEC. 18 T4N R67W 6th P.M.	**MD Reference:**	KB @ 4819.0usft (ENS 135)
Well:	RIEDER 18T-221	**North Reference:**	True
Wellbore:	JOB # 2015-044-135	**Survey Calculation Method:**	Minimum Curvature
Design:	FINAL SURVEYS	**Database:**	EDM 5000.1 Single User Db

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
KOP - RIEDER 18T-2	0.00	0.00	6,391.4	-639.1	-412.7	1,354,867.90	3,159,792.51	40.306096	-104.927050
- survey misses target center by 13.1usft at 6453.6usft MD (6390.1 TVD, -626.8 N, -408.3 E)									
- Point									
7" ICP *NEW* - RIEDI	0.00	0.00	6,940.0	-112.8	-412.7	1,355,394.17	3,159,789.10	40.307540	-104.927050
- survey misses target center by 39.2usft at 7297.2usft MD (6977.7 TVD, -116.6 N, -422.9 E)									
- Point									
EXIST VERT EVERY-	0.00	0.00	7,192.0	1,158.5	-50.2	1,356,667.73	3,160,143.35	40.311030	-104.925750
- survey misses target center by 451.5usft at 8567.8usft MD (6934.1 TVD, 1152.5 N, -420.7 E)									
- Circle (radius 30.0)									
EXIST VERT STARCI	0.00	0.00	7,791.0	1,434.0	-2,530.0	1,356,927.19	3,157,661.88	40.311786	-104.934642
- survey misses target center by 2272.5usft at 8894.2usft MD (6933.1 TVD, 1478.8 N, -426.2 E)									
- Circle (radius 30.0)									
EXIST VERT BEIN 6-	0.00	0.00	7,756.0	2,751.7	-2,531.3	1,358,244.80	3,157,652.08	40.315403	-104.934647
- survey misses target center by 2254.1usft at 10136.7usft MD (6936.0 TVD, 2721.2 N, -431.9 E)									
- Circle (radius 30.0)									
BHL - RIEDER 18T-2	0.00	0.00	6,942.0	4,127.6	-412.7	1,359,634.30	3,159,761.63	40.319180	-104.927050
- survey misses target center by 7.1usft at 11543.0usft MD (6935.6 TVD, 4126.8 N, -409.7 E)									
- Point									
BHL - RIEDER 18T-2	0.00	0.00	6,936.0	4,127.6	-412.7	1,359,634.30	3,159,761.63	40.319180	-104.927050
- survey misses target center by 3.1usft at 11543.0usft MD (6935.6 TVD, 4126.8 N, -409.7 E)									
- Point									
7" ICP *NEW* - RIEDI	0.00	0.00	6,948.0	-111.1	-412.7	1,355,395.87	3,159,789.09	40.307545	-104.927050
- survey misses target center by 31.8usft at 7299.6usft MD (6978.0 TVD, -114.2 N, -422.9 E)									
- Point									
EXIST VERT BEIN 3-	0.00	0.00	7,264.0	4,280.7	-2,414.9	1,359,774.44	3,157,758.61	40.319600	-104.934230
- survey misses target center by 2037.7usft at 11543.0usft MD (6935.6 TVD, 4126.8 N, -409.7 E)									
- Circle (radius 30.0)									
KOP - RIEDER 18T-2	0.00	0.00	6,383.4	-639.1	-412.7	1,354,867.90	3,159,792.51	40.306096	-104.927050
- survey misses target center by 12.4usft at 6445.6usft MD (6382.2 TVD, -627.6 N, -408.2 E)									
- Point									
EXIST VERT STARCI	0.00	0.00	7,798.0	106.5	-2,524.6	1,355,599.78	3,157,675.92	40.308142	-104.934622
- survey misses target center by 2249.9usft at 7524.3usft MD (6979.6 TVD, 110.3 N, -428.8 E)									
- Circle (radius 30.0)									

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
900.0	899.9	0.7	-6.4	SURFACE CASING
6,435.0	6,371.6	-628.6	-408.2	KOP
7,339.0	6,980.9	-74.9	-424.1	ICP
11,491.0	6,936.8	4,074.8	-411.6	LAST SURVEY - JUNE 19, 2014
11,543.0	6,935.6	4,126.8	-409.7	EXTRAPOLATION TO TD

Checked By: _____ Approved By: _____ Date: _____