

PDC ENERGY

**WELD COUNTY, COLORADO
SE SE SEC. 18 T4N R67W 6th P.M.
RIEDER 18T-401
JOB #2015-042-135**

03 June, 2015

Survey: FINAL SURVEYS





Project: WELD COUNTY, COLORADO
Site: SE SE SEC. 18 T4N R67W 6th P.M.
Well: RIEDER 18T-401
Wellbore: JOB #2015-042-135
Design: FINAL SURVEYS

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSect	Dep	Annotation
913.9	914.0	1.56	245.69	-8.6	-4.3	-7.9	12.0	SURFACE CASING
6523.1	6600.0	1.09	306.60	-598.0	-666.4	-485.1	913.6	KOP
7153.6	7561.0	88.02	359.28	6.9	-664.0	111.9	1519.0	ICP
7146.4	11647.0	89.60	358.20	4091.4	-652.1	4143.0	5604.3	LAST SURVEY - JUNE 2, 2015
7146.8	11697.0	89.60	358.20	4141.3	-653.7	4192.6	5654.3	EXTRAPOLATION TO TD

AS DRILLED LOCAL COORDINATES:

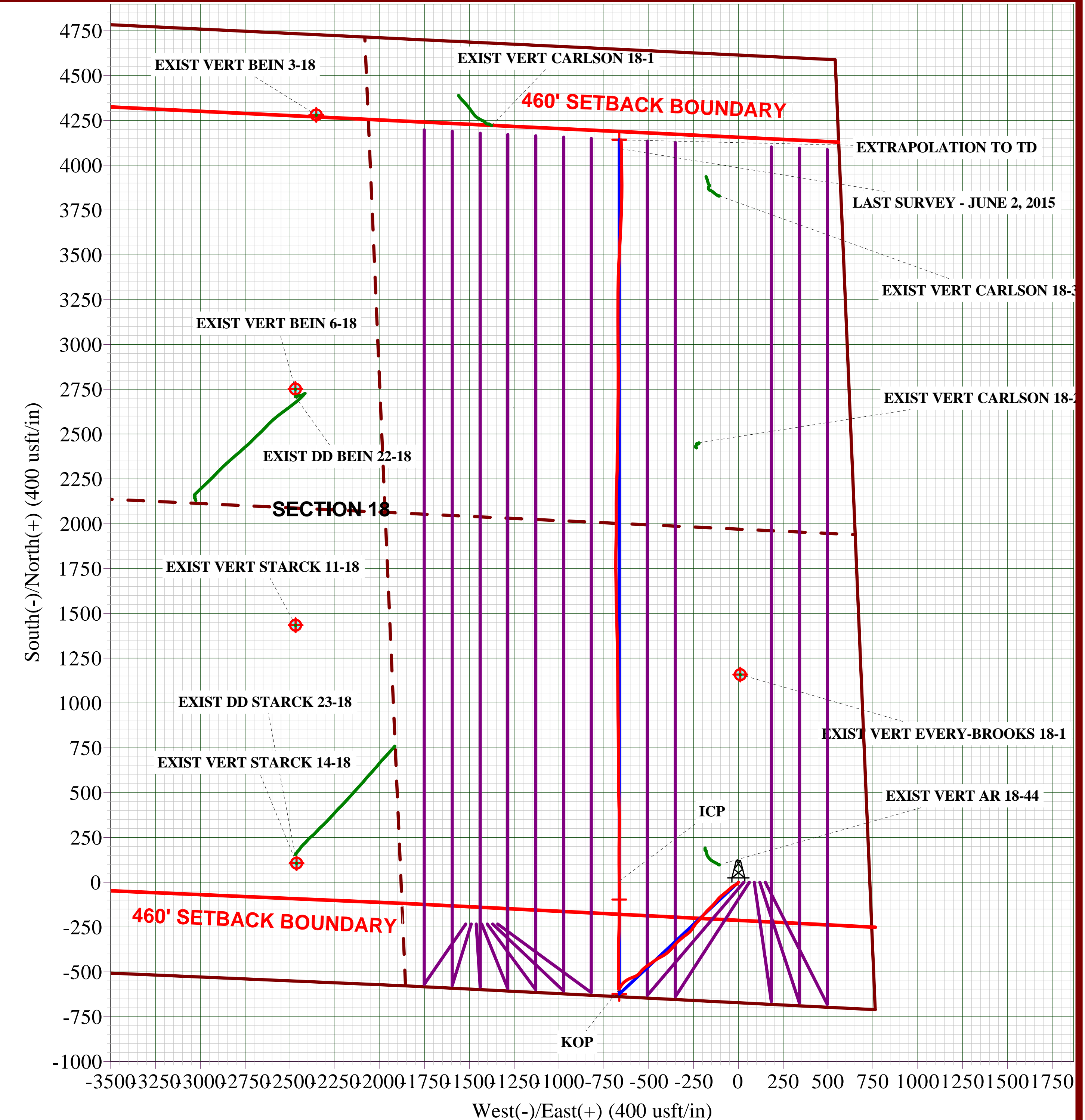
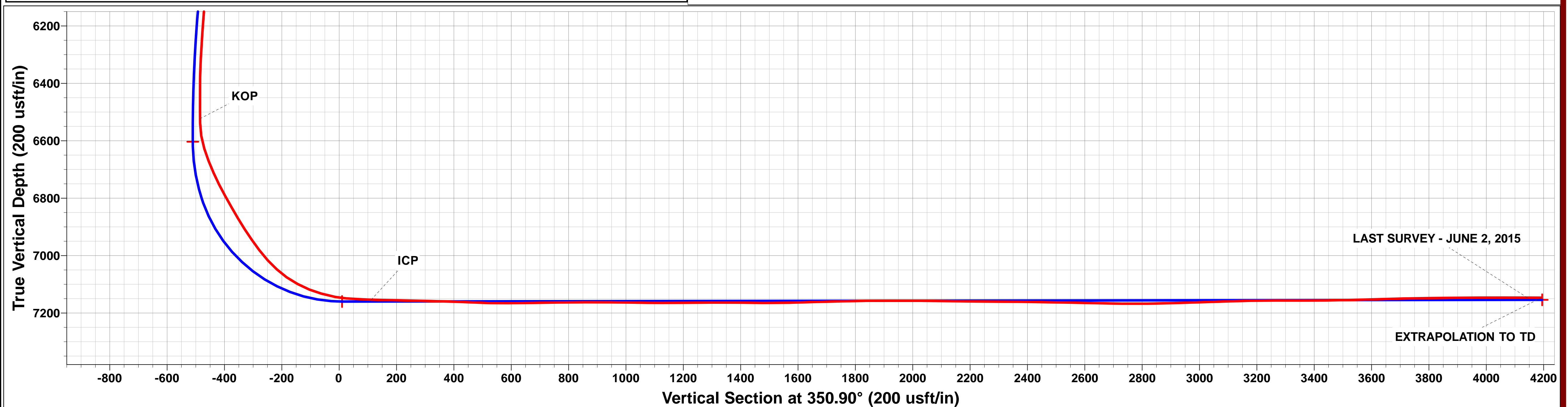
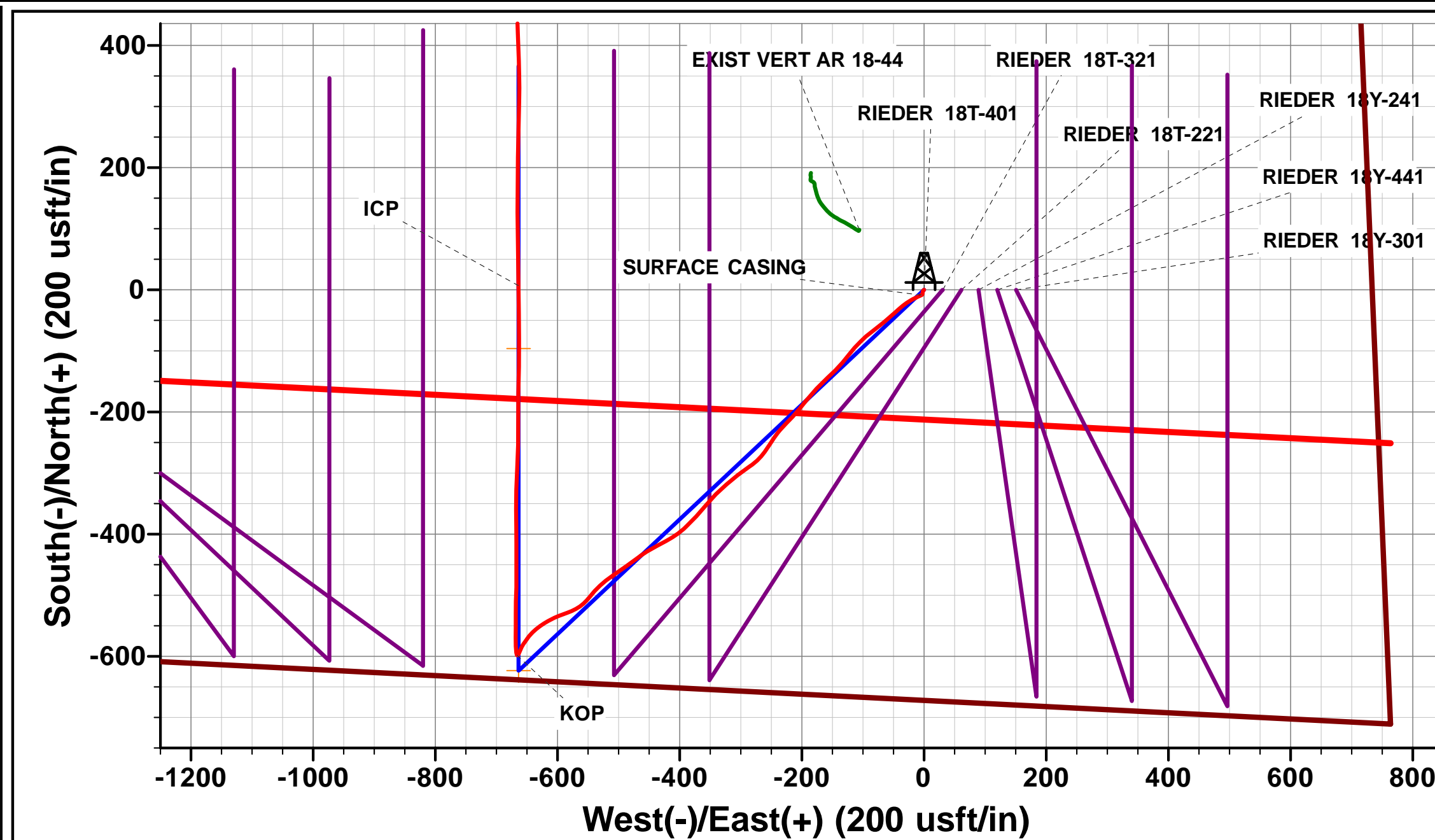
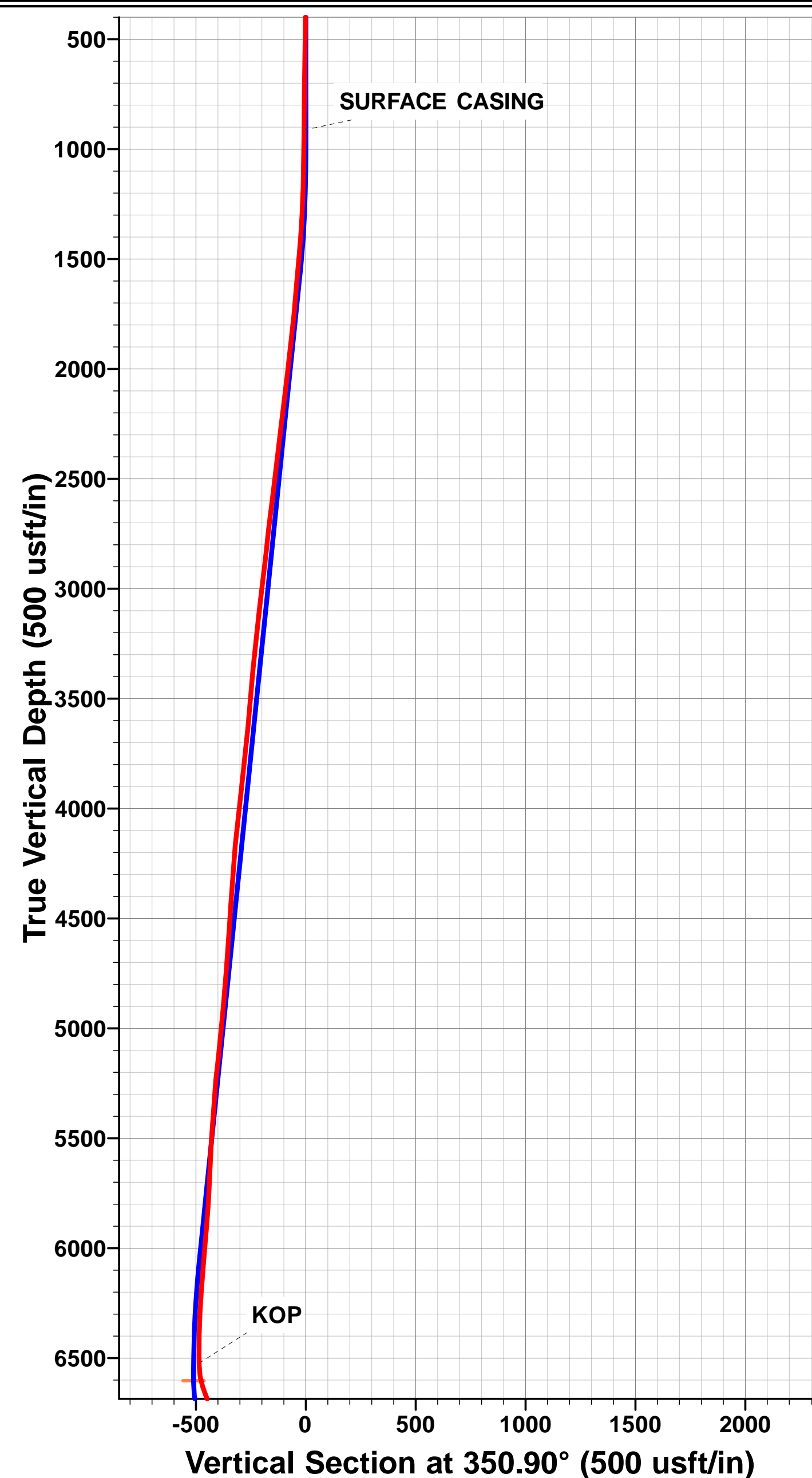
SHL: 674ft FSL & 742ft FEL Sec 18

7" ICP: 680.9ft FSL & 1406ft FEL Sec 18

BHL: 500.9ft FNL & 1220ft FEL Sec 18

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
7" ICP *NEW* - RIEDER 18T-401 (P2)	7160.0	-96.1	-663.7	40.307586	-104.928170
BHL - RIEDER 18T-401	7154.0	4142.2	-663.7	40.319220	-104.928170
KOP - RIEDER 18T-401 (P2)	6603.4	-623.4	-663.7	40.306139	-104.928170



Survey Report



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well RIEDER 18T-401
Project:	WELD COUNTY, COLORADO	TVD Reference:	KB @ 4820.0usft (ENS 135)
Site:	SE SE SEC. 18 T4N R67W 6th P.M.	MD Reference:	KB @ 4820.0usft (ENS 135)
Well:	RIEDER 18T-401	North Reference:	True
Wellbore:	JOB #2015-042-135	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
From:	Lat/Long	Easting:	3,160,139.69 usft
Position Uncertainty:	0.0 usft	Slot Radius:	1.10000ft
		Latitude:	40.307850
		Longitude:	-104.925790
		Grid Convergence:	0.37 °

Well	RIEDER 18T-401		
Well Position	+N-S	0.0 usft	Northing: 1,355,509.25 usft
	+E-W	0.0 usft	Easting: 3,160,139.69 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	40.307850
		Longitude:	-104.925790
		Ground Level:	4,805.0 usft

Wellbore	JOB #2015-042-135				
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	350.90	

Survey Program	Date	03/06/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
207.0	11,697.0	FINAL SURVEYS (JOB #2015-042-135)	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	4,820.0	0.0	0.0	0.0	0.00	0.00	0.00
207.0	0.50	236.30	207.0	4,613.0	-0.5	-0.8	-0.4	0.24	0.24	0.00
488.0	0.70	188.90	488.0	4,332.0	-2.9	-2.0	-2.5	0.18	0.07	-16.87
769.0	1.00	186.20	769.0	4,051.0	-7.0	-2.6	-6.5	0.11	0.11	-0.96
874.0	1.00	246.80	873.9	3,946.1	-8.3	-3.5	-7.6	0.96	0.00	57.71
SURFACE CASING										
914.0	1.56	245.69	913.9	3,906.1	-8.6	-4.3	-7.9	1.39	1.39	-2.78
1,169.0	5.10	244.30	1,168.5	3,651.5	-15.0	-17.7	-12.0	1.39	1.39	-0.54
1,482.0	9.10	227.00	1,479.0	3,341.0	-37.9	-48.3	-29.8	1.44	1.28	-5.53
1,762.0	10.50	233.20	1,754.9	3,065.1	-68.3	-85.0	-54.0	0.63	0.50	2.21
2,044.0	11.20	217.60	2,032.0	2,788.0	-105.4	-122.3	-84.7	1.07	0.25	-5.53
2,318.0	10.90	228.10	2,300.9	2,519.1	-143.8	-157.8	-117.0	0.74	-0.11	3.83
2,589.0	11.30	218.10	2,566.9	2,253.1	-181.8	-193.2	-148.9	0.72	0.15	-3.69

Survey Report



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well RIEDER 18T-401
Project:	WELD COUNTY, COLORADO	TVD Reference:	KB @ 4820.0usft (ENS 135)
Site:	SE SE SEC. 18 T4N R67W 6th P.M.	MD Reference:	KB @ 4820.0usft (ENS 135)
Well:	RIEDER 18T-401	North Reference:	True
Wellbore:	JOB #2015-042-135	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)
2,860.0	9.60	225.10	2,833.4	1,986.6	-218.6	-225.6	-180.2	0.78	-0.63	2.58
3,130.0	10.20	210.80	3,099.4	1,720.6	-255.1	-253.8	-211.7	0.93	0.22	-5.30
3,401.0	10.10	235.20	3,366.3	1,453.7	-289.3	-285.6	-240.4	1.58	-0.04	9.00
3,672.0	10.20	229.50	3,633.0	1,187.0	-318.4	-323.4	-263.2	0.37	0.04	-2.10
3,943.0	10.30	219.60	3,899.7	920.3	-352.7	-357.1	-291.7	0.65	0.04	-3.65
4,214.0	9.70	226.10	4,166.6	653.4	-387.2	-389.0	-320.7	0.47	-0.22	2.40
4,485.0	10.30	243.70	4,433.6	386.4	-413.7	-427.2	-340.9	1.14	0.22	6.49
4,756.0	10.00	233.90	4,700.3	119.7	-438.3	-467.9	-358.8	0.65	-0.11	-3.62
5,027.0	11.80	235.50	4,966.4	-146.4	-467.9	-509.8	-381.4	0.67	0.66	0.59
5,299.0	9.90	217.40	5,233.6	-413.6	-502.2	-546.9	-409.4	1.43	-0.70	-6.65
5,575.0	9.90	252.00	5,505.8	-685.8	-528.4	-583.9	-429.4	2.12	0.00	12.54
5,847.0	9.40	236.60	5,774.0	-954.0	-547.9	-624.7	-442.2	0.96	-0.18	-5.66
6,027.0	7.50	220.90	5,952.0	-1,132.0	-564.9	-644.7	-455.8	1.65	-1.06	-8.72
6,118.0	6.60	215.20	6,042.3	-1,222.3	-573.6	-651.6	-463.3	1.25	-0.99	-6.26
6,208.0	5.70	210.80	6,131.8	-1,311.8	-581.7	-656.8	-470.5	1.13	-1.00	-4.89
6,298.0	4.50	204.20	6,221.5	-1,401.5	-588.8	-660.6	-476.8	1.48	-1.33	-7.33
6,389.0	3.70	199.30	6,312.2	-1,492.2	-594.8	-663.0	-482.4	0.96	-0.88	-5.38
6,480.0	0.90	250.70	6,403.2	-1,583.2	-597.8	-664.6	-485.1	3.53	-3.08	56.48
6,570.0	0.80	258.40	6,493.1	-1,673.1	-598.2	-665.9	-485.3	0.17	-0.11	8.56
KOP										
6,600.0	1.09	306.60	6,523.1	-1,703.1	-598.0	-666.4	-485.1	2.72	0.97	160.67
6,615.0	1.40	318.90	6,538.1	-1,718.1	-597.8	-666.6	-484.8	2.72	2.07	81.99
6,660.0	8.90	350.80	6,582.9	-1,762.9	-593.9	-667.5	-480.9	17.21	16.67	70.89
6,706.0	17.60	357.60	6,627.7	-1,807.7	-583.5	-668.4	-470.4	19.18	18.91	14.78
6,751.0	21.50	1.00	6,670.1	-1,850.1	-568.4	-668.5	-455.5	9.02	8.67	7.56
6,796.0	24.50	359.90	6,711.5	-1,891.5	-550.8	-668.4	-438.2	6.73	6.67	-2.44
6,841.0	26.90	0.20	6,752.0	-1,932.0	-531.3	-668.4	-418.9	5.34	5.33	0.67
6,887.0	29.70	1.70	6,792.5	-1,972.5	-509.5	-668.0	-397.4	6.28	6.09	3.26
6,932.0	30.00	1.40	6,831.6	-2,011.6	-487.1	-667.4	-375.4	0.74	0.67	-0.67
6,977.0	30.80	359.60	6,870.4	-2,050.4	-464.4	-667.2	-353.0	2.69	1.78	-4.00
7,022.0	33.40	0.10	6,908.5	-2,088.5	-440.5	-667.3	-329.3	5.81	5.78	1.11
7,067.0	35.30	0.00	6,945.6	-2,125.6	-415.1	-667.2	-304.3	4.22	4.22	-0.22
7,111.0	37.50	359.10	6,981.1	-2,161.1	-389.0	-667.4	-278.5	5.15	5.00	-2.05
7,157.0	42.50	359.60	7,016.3	-2,196.3	-359.4	-667.8	-249.2	10.89	10.87	1.09
7,202.0	48.00	1.60	7,048.0	-2,228.0	-327.5	-667.4	-217.7	12.62	12.22	4.44
7,247.0	56.00	3.20	7,075.6	-2,255.6	-292.1	-665.9	-183.0	18.00	17.78	3.56
7,292.0	61.50	1.20	7,099.0	-2,279.0	-253.6	-664.4	-145.3	12.80	12.22	-4.44
7,338.0	68.80	359.40	7,118.3	-2,298.3	-211.9	-664.2	-104.2	16.26	15.87	-3.91
7,383.0	74.40	1.20	7,132.5	-2,312.5	-169.2	-664.0	-62.1	13.01	12.44	4.00
7,428.0	78.70	1.00	7,143.0	-2,323.0	-125.5	-663.2	-19.0	9.57	9.56	-0.44
7,473.0	85.70	359.70	7,149.1	-2,329.1	-80.9	-662.9	25.0	15.82	15.56	-2.89
7,518.0	87.20	359.10	7,151.8	-2,331.8	-36.0	-663.4	69.4	3.59	3.33	-1.33
ICP										
7,561.0	88.02	359.28	7,153.6	-2,333.6	6.9	-664.0	111.9	1.96	1.92	0.41
7,591.0	88.60	359.40	7,154.5	-2,334.5	36.9	-664.3	141.5	1.96	1.92	0.41
7,681.0	89.10	359.20	7,156.3	-2,336.3	126.9	-665.4	230.6	0.60	0.56	-0.22
7,771.0	88.50	1.70	7,158.2	-2,338.2	216.9	-664.7	319.3	2.86	-0.67	2.78
7,862.0	88.00	0.80	7,161.0	-2,341.0	307.8	-662.7	408.8	1.13	-0.55	-0.99
7,952.0	87.80	357.50	7,164.3	-2,344.3	397.7	-664.1	497.8	3.67	-0.22	-3.67
8,043.0	90.40	359.40	7,165.7	-2,345.7	488.6	-666.5	587.9	3.54	2.86	2.09
8,133.0	91.00	359.50	7,164.6	-2,344.6	578.6	-667.4	676.9	0.68	0.67	0.11
8,223.0	90.70	359.90	7,163.3	-2,343.3	668.6	-667.9	765.9	0.56	-0.33	0.44
8,313.0	90.30	359.40	7,162.5	-2,342.5	758.6	-668.4	854.8	0.71	-0.44	-0.56

Survey Report



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well RIEDER 18T-401
Project:	WELD COUNTY, COLORADO	TVD Reference:	KB @ 4820.0usft (ENS 135)
Site:	SE SE SEC. 18 T4N R67W 6th P.M.	MD Reference:	KB @ 4820.0usft (ENS 135)
Well:	RIEDER 18T-401	North Reference:	True
Wellbore:	JOB #2015-042-135	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)
8,404.0	89.40	359.30	7,162.7	-2,342.7	849.6	-669.5	944.8	1.00	-0.99	-0.11
8,494.0	89.00	359.30	7,164.0	-2,344.0	939.6	-670.6	1,033.9	0.44	-0.44	0.00
8,584.0	90.10	359.50	7,164.7	-2,344.7	1,029.6	-671.5	1,122.9	1.24	1.22	0.22
8,674.0	90.40	359.70	7,164.3	-2,344.3	1,119.6	-672.1	1,211.8	0.40	0.33	0.22
8,764.0	90.30	359.70	7,163.8	-2,343.8	1,209.6	-672.6	1,300.8	0.11	-0.11	0.00
8,855.0	89.50	358.80	7,163.9	-2,343.9	1,300.6	-673.8	1,390.8	1.32	-0.88	-0.99
8,945.0	89.20	358.30	7,164.9	-2,344.9	1,390.5	-676.1	1,480.0	0.65	-0.33	-0.56
9,036.0	91.80	358.80	7,164.1	-2,344.1	1,481.5	-678.4	1,570.2	2.91	2.86	0.55
9,126.0	91.60	358.60	7,161.5	-2,341.5	1,571.4	-680.4	1,659.3	0.31	-0.22	-0.22
9,217.0	91.20	359.50	7,159.3	-2,339.3	1,662.4	-681.9	1,749.3	1.08	-0.44	0.99
9,307.0	91.00	359.30	7,157.5	-2,337.5	1,752.4	-682.9	1,838.3	0.31	-0.22	-0.22
9,398.0	89.80	1.00	7,156.9	-2,336.9	1,843.4	-682.6	1,928.1	2.29	-1.32	1.87
9,488.0	89.70	0.90	7,157.3	-2,337.3	1,933.4	-681.1	2,016.8	0.16	-0.11	-0.11
9,579.0	89.00	359.90	7,158.3	-2,338.3	2,024.3	-680.5	2,106.5	1.34	-0.77	-1.10
9,669.0	89.30	359.40	7,159.6	-2,339.6	2,114.3	-681.0	2,195.4	0.65	0.33	-0.56
9,760.0	89.80	3.60	7,160.4	-2,340.4	2,205.3	-678.7	2,284.9	4.65	0.55	4.62
9,850.0	89.50	0.00	7,160.9	-2,340.9	2,295.2	-675.8	2,373.2	4.01	-0.33	-4.00
9,941.0	88.80	1.00	7,162.3	-2,342.3	2,386.2	-675.0	2,462.9	1.34	-0.77	1.10
10,031.0	89.10	1.20	7,163.9	-2,343.9	2,476.2	-673.3	2,551.5	0.40	0.33	0.22
10,121.0	88.60	0.90	7,165.7	-2,345.7	2,566.1	-671.7	2,640.1	0.65	-0.56	-0.33
10,212.0	89.10	0.50	7,167.5	-2,347.5	2,657.1	-670.6	2,729.7	0.70	0.55	-0.44
10,302.0	90.90	0.60	7,167.5	-2,347.5	2,747.1	-669.7	2,818.5	2.00	2.00	0.11
10,392.0	91.70	359.60	7,165.5	-2,345.5	2,837.1	-669.5	2,907.3	1.42	0.89	-1.11
10,483.0	91.80	359.60	7,162.7	-2,342.7	2,928.0	-670.2	2,997.2	0.11	0.11	0.00
10,574.0	91.70	359.80	7,159.9	-2,339.9	3,019.0	-670.6	3,087.1	0.25	-0.11	0.22
10,664.0	91.70	359.80	7,157.3	-2,337.3	3,108.9	-671.0	3,175.9	0.00	0.00	0.00
10,755.0	89.60	0.10	7,156.2	-2,336.2	3,199.9	-671.0	3,265.8	2.33	-2.31	0.33
10,845.0	90.00	0.40	7,156.6	-2,336.6	3,289.9	-670.6	3,354.6	0.56	0.44	0.33
10,936.0	90.70	1.60	7,156.0	-2,336.0	3,380.9	-669.1	3,444.2	1.53	0.77	1.32
11,026.0	91.30	3.20	7,154.4	-2,334.4	3,470.8	-665.3	3,532.4	1.90	0.67	1.78
11,116.0	91.60	3.00	7,152.2	-2,332.2	3,560.7	-660.4	3,620.3	0.40	0.33	-0.22
11,207.0	91.50	2.90	7,149.7	-2,329.7	3,651.5	-655.7	3,709.3	0.16	-0.11	-0.11
11,297.0	90.50	1.40	7,148.1	-2,328.1	3,741.4	-652.4	3,797.5	2.00	-1.11	-1.67
11,387.0	90.80	1.20	7,147.1	-2,327.1	3,831.4	-650.3	3,886.0	0.40	0.33	-0.22
11,478.0	90.00	359.50	7,146.5	-2,326.5	3,922.4	-649.8	3,975.8	2.06	-0.88	-1.87
11,568.0	90.20	359.50	7,146.3	-2,326.3	4,012.4	-650.6	4,064.8	0.22	0.22	0.00
LAST SURVEY - JUNE 2, 2015										
11,647.0	89.60	358.20	7,146.4	-2,326.4	4,091.4	-652.1	4,143.0	1.81	-0.76	-1.65
EXTRAPOLATION TO TD										
11,697.0	89.60	358.20	7,146.8	-2,326.8	4,141.3	-653.7	4,192.6	0.00	0.00	0.00

Survey Report



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well RIEDER 18T-401
Project:	WELD COUNTY, COLORADO	TVD Reference:	KB @ 4820.0usft (ENS 135)
Site:	SE SE SEC. 18 T4N R67W 6th P.M.	MD Reference:	KB @ 4820.0usft (ENS 135)
Well:	RIEDER 18T-401	North Reference:	True
Wellbore:	JOB #2015-042-135	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EDM 5000.1 Single User Db

Targets									
Target Name	- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	
- Shape		(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)	
									Latitude Longitude
BHL - RIEDER 18T-401	- survey misses target center by 12.3usft at 11697.0usft MD (7146.8 TVD, 4141.3 N, -653.7 E)	0.00	0.00	7,154.0	4,142.2	-663.7	1,359,646.85	3,159,449.24	40.319220 -104.928170
- Point									
7" ICP *NEW* - RIEDER 18T-401	- survey misses target center by 7.3usft at 7454.3usft MD (7147.2 TVD, -99.6 N, -662.9 E)	0.00	0.00	7,140.0	-98.6	-663.7	1,355,406.36	3,159,476.67	40.307579 -104.928170
- Point									
EXIST VERT EVERY- 30.0	- survey misses target center by 684.1usft at 8709.1usft MD (7164.1 TVD, 1154.7 N, -672.3 E)	0.00	0.00	7,193.0	1,158.5	11.2	1,356,667.73	3,160,143.35	40.311030 -104.925750
- Circle (radius 30.0)									
EXIST VERT STARCI 30.0	- survey misses target center by 1897.7usft at 9028.4usft MD (7164.4 TVD, 1473.9 N, -678.2 E)	0.00	0.00	7,792.0	1,434.0	-2,468.7	1,356,927.19	3,157,661.88	40.311786 -104.934642
- Circle (radius 30.0)									
EXIST VERT BEIN 6- 30.0	- survey misses target center by 1894.2usft at 10289.3usft MD (7167.7 TVD, 2734.4 N, -669.8 E)	0.00	0.00	7,757.0	2,751.7	-2,469.9	1,358,244.80	3,157,652.08	40.315403 -104.934647
- Circle (radius 30.0)									
7" ICP *NEW* - RIEDER 18T-401	- survey misses target center by 12.3usft at 7459.5usft MD (7147.8 TVD, -94.4 N, -662.9 E)	0.00	0.00	7,160.0	-96.1	-663.7	1,355,408.86	3,159,476.66	40.307586 -104.928170
- Point									
KOP - RIEDER 18T-401	- survey misses target center by 32.9usft at 6673.1usft MD (6595.9 TVD, -591.7 N, -667.8 E)	0.00	0.00	6,603.4	-623.4	-663.7	1,354,881.59	3,159,480.07	40.306139 -104.928170
- Point									
EXIST VERT BEIN 3- 30.0	- survey misses target center by 1709.6usft at 11697.0usft MD (7146.8 TVD, 4141.3 N, -653.7 E)	0.00	0.00	7,265.0	4,280.7	-2,353.5	1,359,774.44	3,157,758.61	40.319600 -104.934230
- Circle (radius 30.0)									
EXIST VERT STARCI 30.0	- survey misses target center by 1909.3usft at 7681.0usft MD (7156.3 TVD, 126.9 N, -665.4 E)	0.00	0.00	7,799.0	106.5	-2,463.2	1,355,599.78	3,157,675.92	40.308142 -104.934622
- Circle (radius 30.0)									
KOP - RIEDER 18T-401	- survey misses target center by 29.5usft at 6657.9usft MD (6580.8 TVD, -594.3 N, -667.5 E)	0.00	0.00	6,583.4	-623.4	-663.7	1,354,881.59	3,159,480.07	40.306139 -104.928170
- Point									

Survey Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S	+E/-W	
		(usft)	(usft)	
914.0	913.9	-8.6	-4.3	SURFACE CASING
6,600.0	6,523.1	-598.0	-666.4	KOP
7,561.0	7,153.6	6.9	-664.0	ICP
11,647.0	7,146.4	4,091.4	-652.1	LAST SURVEY - JUNE 2, 2015
11,697.0	7,146.8	4,141.3	-653.7	EXTRAPOLATION TO TD

Checked By: _____ Approved By: _____ Date: _____