

PDC ENERGY

WELD COUNTY, COLORADO

NE NW SEC. 19 T4N R63W 6th P.M.

SATER 19M-443

JOB #2016-009-135

07 March, 2016

Survey: FINAL SURVEYS





Project: WELD COUNTY, COLORADO
Site: NE NW SEC. 19 T4N R63W 6th P.M.
Well: SATER 19M-443
Wellbore: JOB #2016-009-135
Design: FINAL SURVEYS

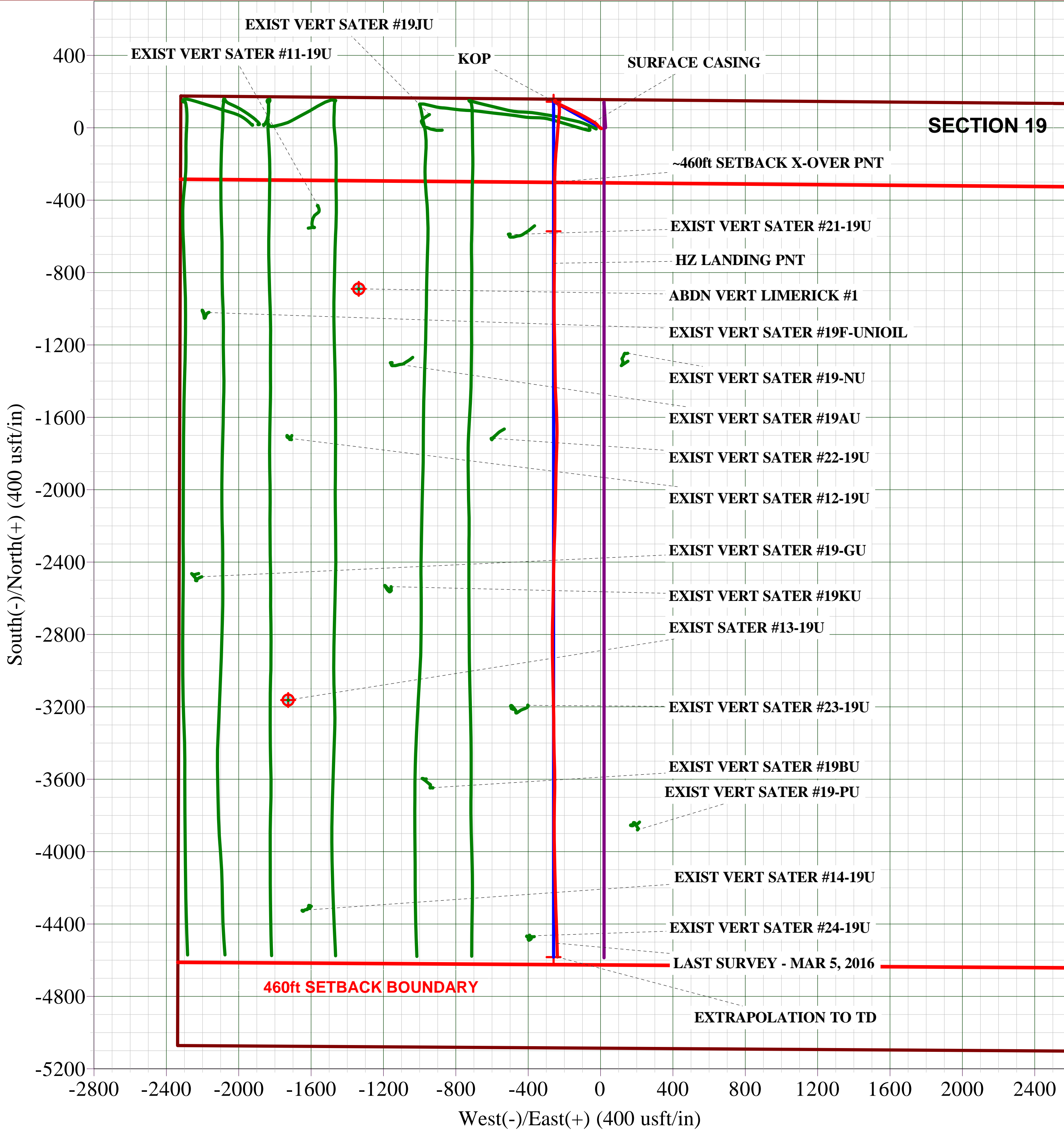
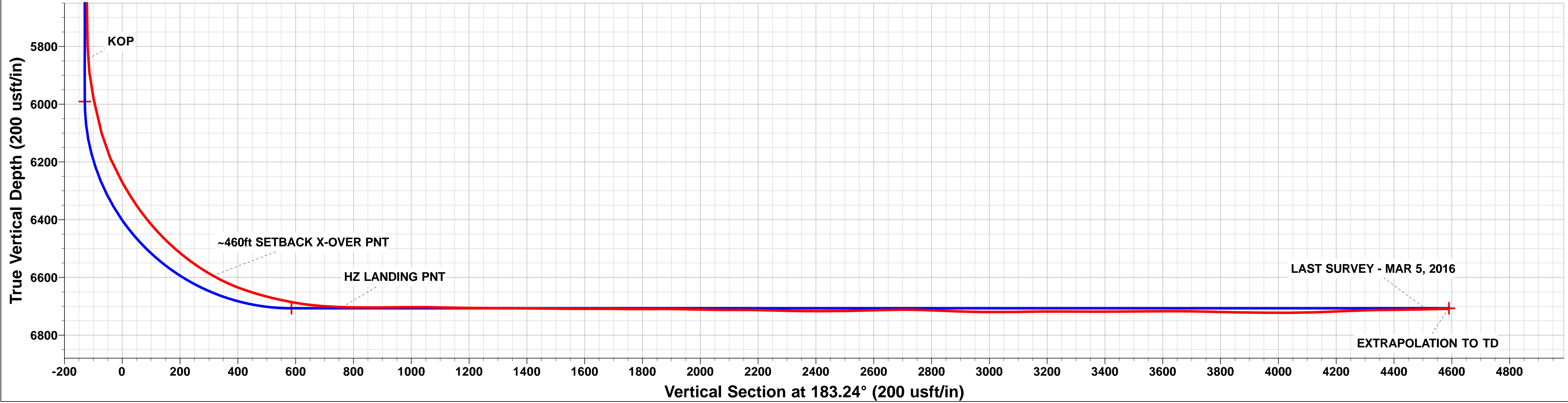
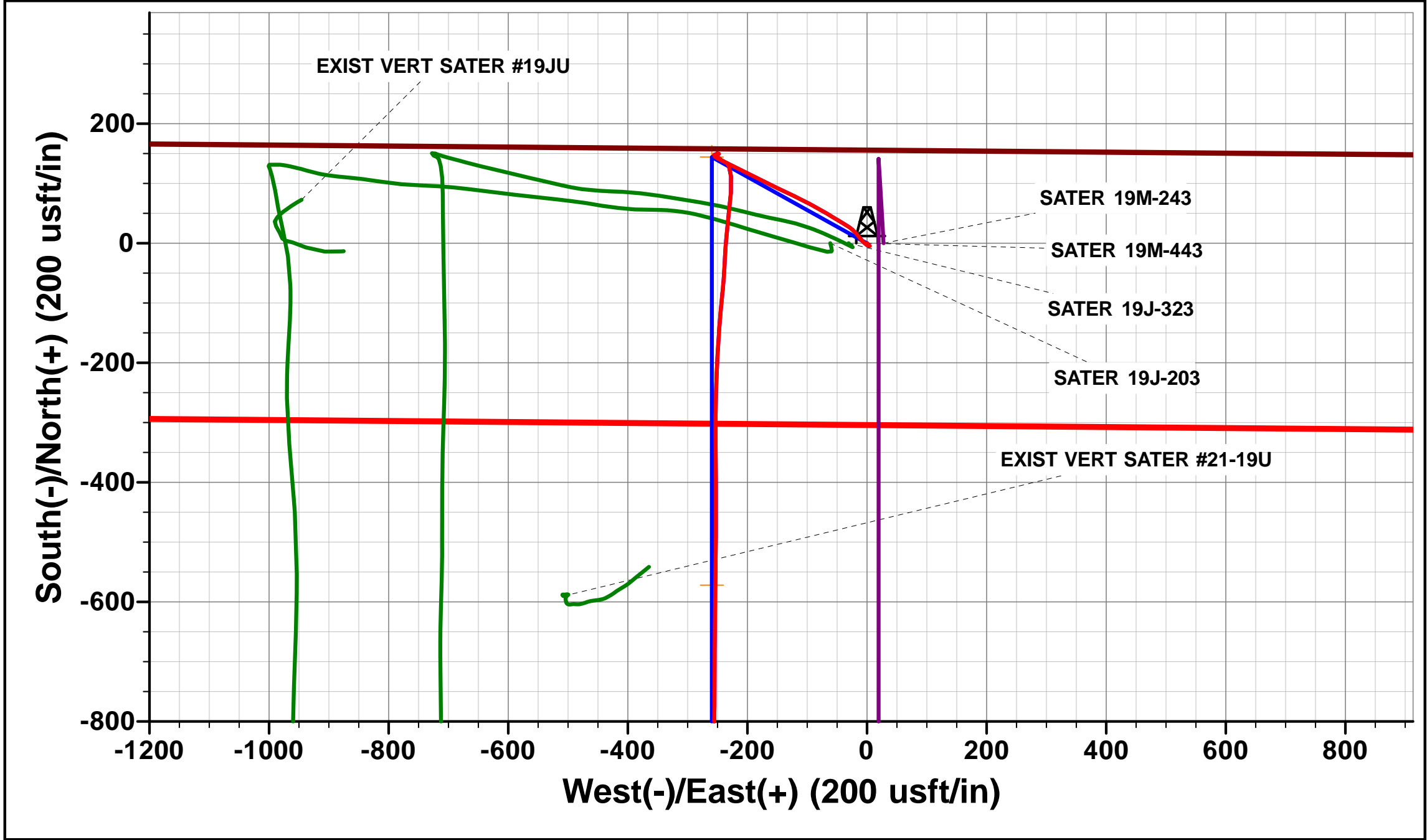
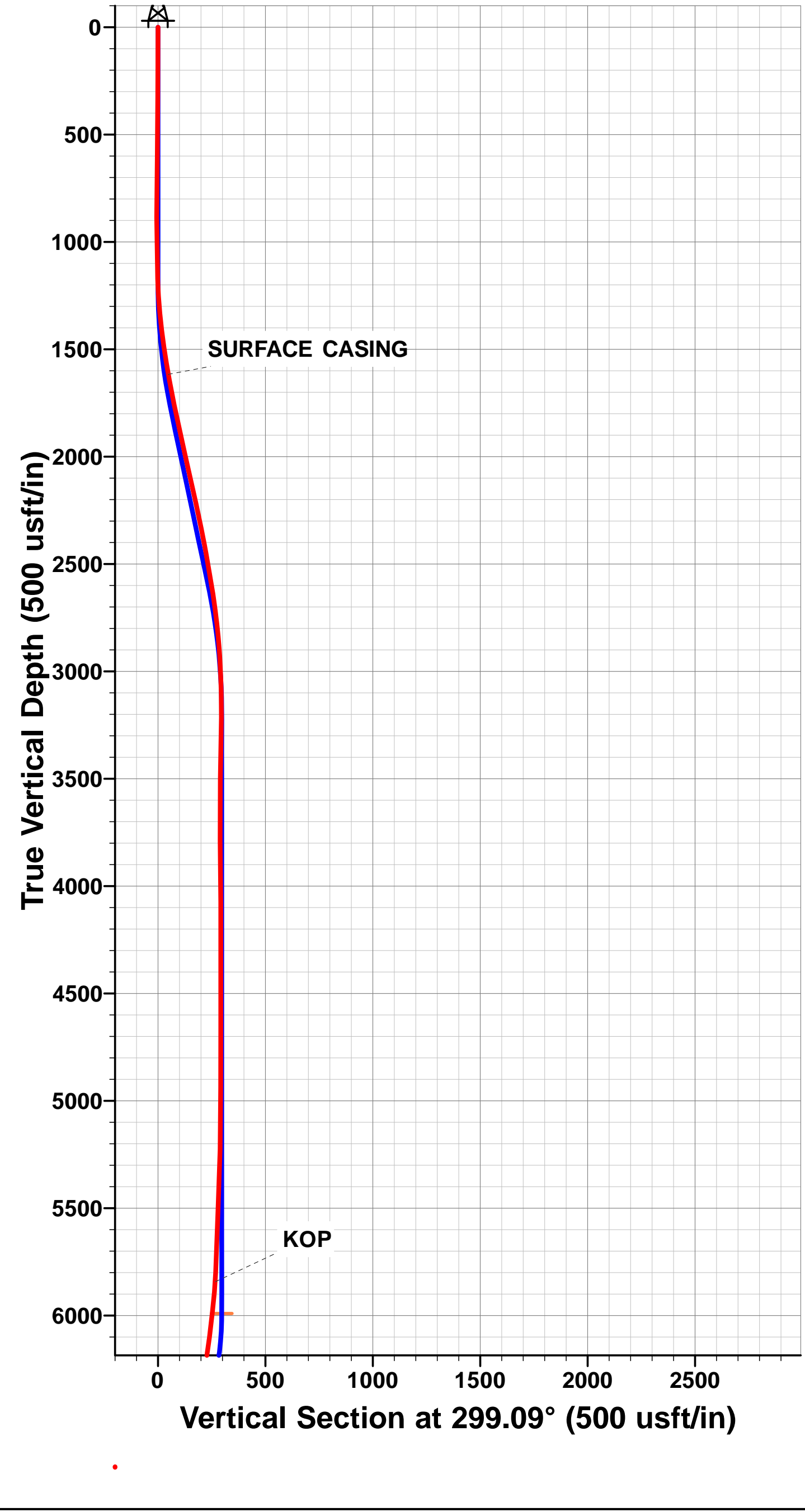
ANNOTATIONS										
TVD	MD	Inc	Azi	+N/-S	+E/-W	VSect	Dep	Annotation		
1616.6	1620.0	9.84	301.99	31.6	-37.2	-29.5	66.6	SURFACE CASING		
5842.8	5870.0	4.26	154.85	131.4	-232.0	-118.1	369.5	KOP		
6594.4	6774.7	60.69	180.28	-300.7	-253.3	314.5	802.6	~460ft SETBACK X-OVER PNT		
6703.0	7240.0	88.22	180.46	-748.7	-254.9	761.9	1250.3	HZ LANDING PNT		
6710.5	10999.0	91.60	178.60	-4506.1	-240.6	4512.5	5008.6	LAST SURVEY - MAR 5, 2016		
6708.4	11075.0	91.60	178.60	-4582.0	-238.8	4588.2	5084.6	EXTRAPOLATION TO TD		

AS DRILLED LOCAL COORDINATES:

SHL: 155ft FNL & 2319t FWL Sec 19
HZ LANDING PNT: 908ft FNL & 2058.3ft FWL Sec 19

BHL: 500.9ft FSL & 2055.4ft FWL Sec 19

WELLBORE TARGET DETAILS (LAT/LONG)					
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HZ LP *NEW* - SATER 19M-443	6707.0	-571.9	-259.4	40.302860	-104.482300
BHL - SATER 19M-443	6707.0	-4582.9	-259.4	40.291850	-104.482300
KOP - SATER 19M-443	5990.8	144.3	-259.4	40.304826	-104.482300



Survey Report



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well SATER 19M-443
Project:	WELD COUNTY, COLORADO	TVD Reference:	KB @ 4677.0usft (ENS 135)
Site:	NE NW SEC. 19 T4N R63W 6th P.M.	MD Reference:	KB @ 4677.0usft (ENS 135)
Well:	SATER 19M-443	North Reference:	True
Wellbore:	JOB #2016-009-135	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		NE NW SEC. 19 T4N R63W 6th P.M.				
Site Position:		Northing:	1,355,375.92 usft	Latitude:	40.304430	
From:	Lat/Long	Easting:	3,284,031.34 usft	Longitude:	-104.481590	
Position Uncertainty:		0.0 usft	Slot Radius:	1.10000ft	Grid Convergence:	0.66 °

Well	SATER 19M-443					
Well Position	+N-S	0.0 usft	Northing:	1,355,376.61 usft	Latitude:	40.304430
	+E-W	0.0 usft	Easting:	3,284,092.69 usft	Longitude:	-104.481370
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,664.0 usft

Wellbore	JOB #2016-009-135				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	29/12/2015	8.21	66.86	52,541

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	183.24	

Survey Program	Date	07/03/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
326.0	11,075.0	FINAL SURVEYS (JOB #2016-009-135)	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	4,677.0	0.0	0.0	0.0	0.00	0.00	0.00
326.0	0.40	134.10	326.0	4,351.0	-0.8	0.8	0.7	0.12	0.12	0.00
602.0	0.60	128.60	602.0	4,075.0	-2.4	2.6	2.2	0.07	0.07	-1.99
886.0	0.60	144.90	886.0	3,791.0	-4.5	4.7	4.2	0.06	0.00	5.74
1,172.0	2.30	297.60	1,171.9	3,505.1	-3.1	0.4	3.0	1.00	0.59	53.39
1,460.0	8.40	321.30	1,458.5	3,218.5	16.0	-17.9	-15.0	2.21	2.12	8.23
1,580.0	9.30	302.30	1,577.1	3,099.9	28.1	-31.5	-26.2	2.54	0.75	-15.83
SURFACE CASING										
1,620.0	9.84	301.99	1,616.6	3,060.4	31.6	-37.2	-29.5	1.35	1.34	-0.78
1,803.0	12.30	300.90	1,796.2	2,880.8	49.9	-67.2	-46.0	1.35	1.35	-0.59
2,091.0	13.00	295.20	2,077.2	2,599.8	79.4	-122.8	-72.4	0.50	0.24	-1.98
2,378.0	11.10	296.90	2,357.8	2,319.2	105.7	-176.6	-95.5	0.67	-0.66	0.59
2,665.0	8.90	296.20	2,640.5	2,036.5	128.0	-221.2	-115.3	0.77	-0.77	-0.24

Survey Report



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well SATER 19M-443
Project:	WELD COUNTY, COLORADO	TVD Reference:	KB @ 4677.0usft (ENS 135)
Site:	NE NW SEC. 19 T4N R63W 6th P.M.	MD Reference:	KB @ 4677.0usft (ENS 135)
Well:	SATER 19M-443	North Reference:	True
Wellbore:	JOB #2016-009-135	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)
2,953.0	3.70	296.30	2,926.6	1,750.4	142.0	-249.6	-127.6	1.81	-1.81	0.03
3,241.0	1.30	52.90	3,214.4	1,462.6	148.0	-255.3	-133.4	1.54	-0.83	40.49
3,528.0	1.50	97.40	3,501.4	1,175.6	149.5	-249.0	-135.2	0.37	0.07	15.51
3,816.0	1.00	285.80	3,789.3	887.7	149.7	-247.6	-135.5	0.87	-0.17	-59.58
4,104.0	0.20	315.50	4,077.3	599.7	150.8	-250.4	-136.4	0.29	-0.28	10.31
4,390.0	1.20	206.00	4,363.3	313.7	148.4	-252.1	-133.9	0.45	0.35	-38.29
4,678.0	0.10	34.90	4,651.3	25.7	145.9	-253.2	-131.4	0.45	-0.38	-59.41
4,965.0	0.30	69.80	4,938.3	-261.3	146.4	-252.4	-131.9	0.08	0.07	12.16
5,251.0	1.00	145.00	5,224.3	-547.3	144.6	-250.3	-130.2	0.34	0.24	26.29
5,539.0	3.00	122.80	5,512.1	-835.1	138.5	-242.5	-124.5	0.73	0.69	-7.71
5,826.0	1.30	113.40	5,798.9	-1,121.9	133.1	-233.2	-119.7	0.60	-0.59	-3.28
KOP										
5,870.0	4.26	154.85	5,842.8	-1,165.8	131.4	-232.0	-118.1	7.72	6.73	94.21
5,918.0	7.90	161.70	5,890.5	-1,213.5	126.7	-230.2	-113.5	7.72	7.58	14.26
6,010.0	10.80	174.10	5,981.3	-1,304.3	112.1	-227.4	-99.1	3.82	3.15	13.48
6,132.0	15.40	184.70	6,100.1	-1,423.1	84.6	-227.5	-71.6	4.24	3.77	8.69
6,224.0	23.10	186.70	6,186.9	-1,509.9	54.4	-230.6	-41.3	8.40	8.37	2.17
6,316.0	29.60	185.10	6,269.3	-1,592.3	13.8	-234.8	-0.5	7.11	7.07	-1.74
6,408.0	33.80	182.80	6,347.6	-1,670.6	-34.4	-238.0	47.8	4.75	4.57	-2.50
6,500.0	41.00	185.90	6,420.6	-1,743.6	-90.0	-242.4	103.6	8.09	7.83	3.37
6,596.0	47.30	183.80	6,489.5	-1,812.5	-156.6	-248.0	170.4	6.74	6.56	-2.19
6,692.0	54.40	182.20	6,550.0	-1,873.0	-230.9	-251.8	244.8	7.51	7.40	-1.67
-460ft SETBACK X-OVER PNT										
6,774.7	60.69	180.28	6,594.4	-1,917.4	-300.7	-253.3	314.5	7.85	7.60	-2.32
6,788.0	61.70	180.00	6,600.8	-1,923.8	-312.3	-253.3	326.1	7.85	7.62	-2.14
6,883.0	70.20	179.20	6,639.5	-1,962.5	-399.0	-252.7	412.6	8.98	8.95	-0.84
6,979.0	75.80	180.70	6,667.5	-1,990.5	-490.8	-252.6	504.2	6.02	5.83	1.56
7,075.0	80.00	180.80	6,687.7	-2,010.7	-584.6	-253.9	598.0	4.38	4.37	0.10
7,171.0	85.90	180.10	6,699.4	-2,022.4	-679.8	-254.6	693.1	6.19	6.15	-0.73
HZ LANDING PNT										
7,240.0	88.22	180.46	6,703.0	-2,026.0	-748.7	-254.9	761.9	3.41	3.37	0.53
7,266.0	89.10	180.60	6,703.6	-2,026.6	-774.7	-255.2	787.9	3.41	3.37	0.53
7,362.0	90.10	180.40	6,704.3	-2,027.3	-870.7	-256.0	883.8	1.06	1.04	-0.21
7,458.0	91.10	180.50	6,703.2	-2,026.2	-966.7	-256.8	979.7	1.05	1.04	0.10
7,554.0	88.60	178.80	6,703.5	-2,026.5	-1,062.7	-256.2	1,075.5	3.15	-2.60	-1.77
7,650.0	88.80	178.80	6,705.7	-2,028.7	-1,158.6	-254.2	1,171.2	0.21	0.21	0.00
7,746.0	90.20	178.80	6,706.5	-2,029.5	-1,254.6	-252.2	1,266.9	1.46	1.46	0.00
7,841.0	89.60	179.90	6,706.7	-2,029.7	-1,349.6	-251.1	1,361.6	1.32	-0.63	1.16
7,937.0	89.10	177.90	6,707.8	-2,030.8	-1,445.6	-249.2	1,457.4	2.15	-0.52	-2.08
8,033.0	89.70	176.40	6,708.8	-2,031.8	-1,541.4	-244.5	1,552.8	1.68	0.62	-1.56
8,129.0	90.20	179.40	6,708.9	-2,031.9	-1,637.4	-241.0	1,648.4	3.17	0.52	3.12
8,224.0	89.10	181.00	6,709.4	-2,032.4	-1,732.4	-241.3	1,743.2	2.04	-1.16	1.68
8,320.0	90.80	182.20	6,709.5	-2,032.5	-1,828.3	-244.0	1,839.2	2.17	1.77	1.25
8,415.0	88.60	181.10	6,710.0	-2,033.0	-1,923.3	-246.7	1,934.1	2.59	-2.32	-1.16
8,511.0	89.10	181.00	6,711.9	-2,034.9	-2,019.2	-248.5	2,030.1	0.53	0.52	-0.10
8,606.0	90.20	180.80	6,712.5	-2,035.5	-2,114.2	-250.0	2,125.0	1.18	1.16	-0.21
8,702.0	88.40	182.20	6,713.7	-2,036.7	-2,210.2	-252.5	2,220.9	2.38	-1.87	1.46
8,797.0	88.80	181.60	6,716.0	-2,039.0	-2,305.1	-255.6	2,315.9	0.76	0.42	-0.63
8,893.0	90.20	181.50	6,716.9	-2,039.9	-2,401.1	-258.2	2,411.8	1.46	1.46	-0.10
8,989.0	90.50	181.10	6,716.3	-2,039.3	-2,497.0	-260.4	2,507.8	0.52	0.31	-0.42
9,085.0	92.50	180.80	6,713.8	-2,036.8	-2,593.0	-262.0	2,603.6	2.11	2.08	-0.31
9,181.0	89.90	181.60	6,711.7	-2,034.7	-2,688.9	-264.0	2,699.6	2.83	-2.71	0.83
9,276.0	87.40	180.50	6,714.0	-2,037.0	-2,783.9	-265.7	2,794.4	2.87	-2.63	-1.16

Survey Report



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well SATER 19M-443
Project:	WELD COUNTY, COLORADO	TVD Reference:	KB @ 4677.0usft (ENS 135)
Site:	NE NW SEC. 19 T4N R63W 6th P.M.	MD Reference:	KB @ 4677.0usft (ENS 135)
Well:	SATER 19M-443	North Reference:	True
Wellbore:	JOB #2016-009-135	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)
9,372.0	88.10	179.80	6,717.8	-2,040.8	-2,879.8	-266.0	2,890.2	1.03	0.73	-0.73
9,468.0	89.50	179.00	6,719.8	-2,042.8	-2,975.8	-265.0	2,986.0	1.68	1.46	-0.83
9,564.0	90.80	178.30	6,719.5	-2,042.5	-3,071.7	-262.7	3,081.7	1.54	1.35	-0.73
9,660.0	90.60	178.30	6,718.3	-2,041.3	-3,167.7	-259.9	3,177.3	0.21	-0.21	0.00
9,756.0	89.40	180.20	6,718.3	-2,041.3	-3,263.7	-258.6	3,273.1	2.34	-1.25	1.98
9,851.0	90.20	179.40	6,718.7	-2,041.7	-3,358.7	-258.3	3,367.9	1.19	0.84	-0.84
9,947.0	90.20	178.60	6,718.3	-2,041.3	-3,454.7	-256.6	3,463.6	0.83	0.00	-0.83
10,043.0	90.70	178.00	6,717.6	-2,040.6	-3,550.6	-253.8	3,559.3	0.81	0.52	-0.62
10,138.0	89.90	181.30	6,717.1	-2,040.1	-3,645.6	-253.2	3,654.1	3.57	-0.84	3.47
10,234.0	88.40	181.10	6,718.5	-2,041.5	-3,741.6	-255.2	3,750.0	1.58	-1.56	-0.21
10,330.0	88.80	180.20	6,720.9	-2,043.9	-3,837.5	-256.3	3,845.9	1.03	0.42	-0.94
10,426.0	89.40	179.40	6,722.4	-2,045.4	-3,933.5	-255.9	3,941.7	1.04	0.62	-0.83
10,521.0	90.40	178.50	6,722.5	-2,045.5	-4,028.5	-254.2	4,036.4	1.42	1.05	-0.95
10,617.0	91.70	178.90	6,720.8	-2,043.8	-4,124.5	-252.0	4,132.1	1.42	1.35	0.42
10,712.0	93.10	178.60	6,716.8	-2,039.8	-4,219.3	-250.0	4,226.7	1.51	1.47	-0.32
10,808.0	91.10	177.90	6,713.3	-2,036.3	-4,315.2	-247.0	4,322.3	2.21	-2.08	-0.73
10,903.0	90.30	177.90	6,712.1	-2,035.1	-4,410.2	-243.5	4,416.9	0.84	-0.84	0.00
LAST SURVEY - MAR 5, 2016										
10,999.0	91.60	178.60	6,710.5	-2,033.5	-4,506.1	-240.6	4,512.5	1.54	1.35	0.73
EXTRAPOLATION TO TD										
11,075.0	91.60	178.60	6,708.4	-2,031.4	-4,582.0	-238.8	4,588.2	0.00	0.00	0.00

Survey Report



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well SATER 19M-443
Project:	WELD COUNTY, COLORADO	TVD Reference:	KB @ 4677.0usft (ENS 135)
Site:	NE NW SEC. 19 T4N R63W 6th P.M.	MD Reference:	KB @ 4677.0usft (ENS 135)
Well:	SATER 19M-443	North Reference:	True
Wellbore:	JOB #2016-009-135	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)	
EXIST VERT SATER		0.00	0.00	7,321.0	-3,162.1	-1,726.7	1,352,195.02	3,282,402.50	
- survey misses target center by 1584.8usft at 9603.5usft MD (6719.0 TVD, -3111.3 N, -261.5 E)									
- Circle (radius 30.0)									
BHL - SATER 19M-44		0.00	0.00	6,707.0	-4,582.9	-259.4	1,350,791.19	3,283,885.92	
- survey misses target center by 20.8usft at 11075.0usft MD (6708.4 TVD, -4582.0 N, -238.8 E)									
- Point									
7" ICP *NEW* - SATE		0.00	0.00	6,707.0	-571.9	-259.4	1,354,801.80	3,283,839.89	
- survey misses target center by 22.0usft at 7066.7usft MD (6686.2 TVD, -576.4 N, -253.7 E)									
- Point									
KOP - SATER 19M-44		0.00	0.00	5,990.8	144.3	-259.4	1,355,517.92	3,283,831.66	
- survey misses target center by 46.3usft at 6012.0usft MD (5983.3 TVD, 111.7 N, -227.3 E)									
- Point									
ABDN VERT LIMERIC		0.00	0.00	7,211.0	-890.0	-1,336.6	1,354,471.40	3,282,766.45	
- survey misses target center by 1193.4usft at 7384.4usft MD (6704.2 TVD, -893.1 N, -256.2 E)									
- Circle (radius 30.0)									

Survey Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
1,620.0	1,616.6	31.6	-37.2	SURFACE CASING
5,870.0	5,842.8	131.4	-232.0	KOP
6,774.7	6,594.4	-300.7	-253.3	~460ft SETBACK X-OVER PNT
7,240.0	6,703.0	-748.7	-254.9	HZ LANDING PNT
10,999.0	6,710.5	-4,506.1	-240.6	LAST SURVEY - MAR 5, 2016
11,075.0	6,708.4	-4,582.0	-238.8	EXTRAPOLATION TO TD

Checked By: _____ Approved By: _____ Date: _____