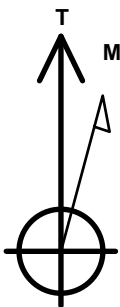


PDC Energy Inc. DJ Basin

Well Name: **Thistle Down 311-302**
 Surface Location: Thistle Down 5N64W31H Pad Sec.31-T5N-R64W
 North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
 Ground Elevation: 4803.0
 +N/-S +E/-W Northing Easting Longitude Slot
 0.0 1372438.94251620.34 40.352230 -104.597170
 Original Well Elev WELL @ 4826.0ft (Original Well Elev)

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 1384'FSL, 1357'FWL, SEC.31	1.0	0.0	0.0	Point
BHL 160'FSL, 800'FWL, SEC.32	6936.0	-1201.8	4727.3	Point
LPL 160'FSL, 735'FWL, SEC.31	6976.0	-1227.7	-620.4	Point



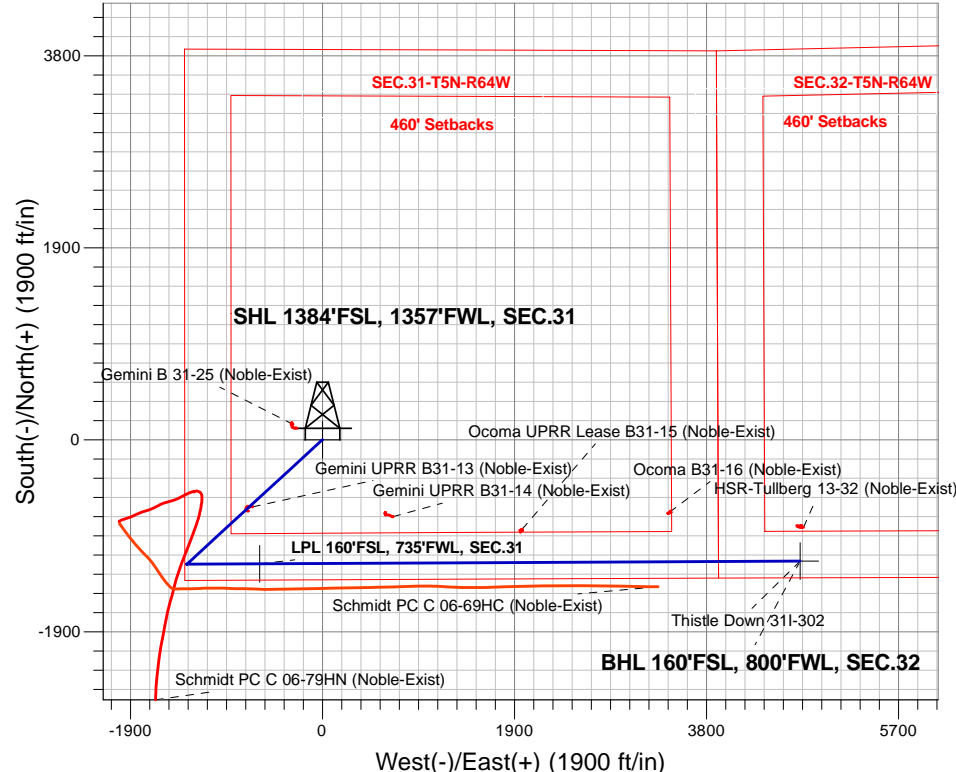
Azimuths to True North
 Magnetic North: 8.00°

Magnetic Field
 Strength: 52520.2snT
 Dip Angle: 66.84°
 Date: 3/8/2017
 Model: IGRF2010

Thistle Down 5N64W31H Pad Sec.31-T5N-R64W
 Thistle Down 311-302
 Plan #1 (2-28-17)
 10:03, March 08 2017

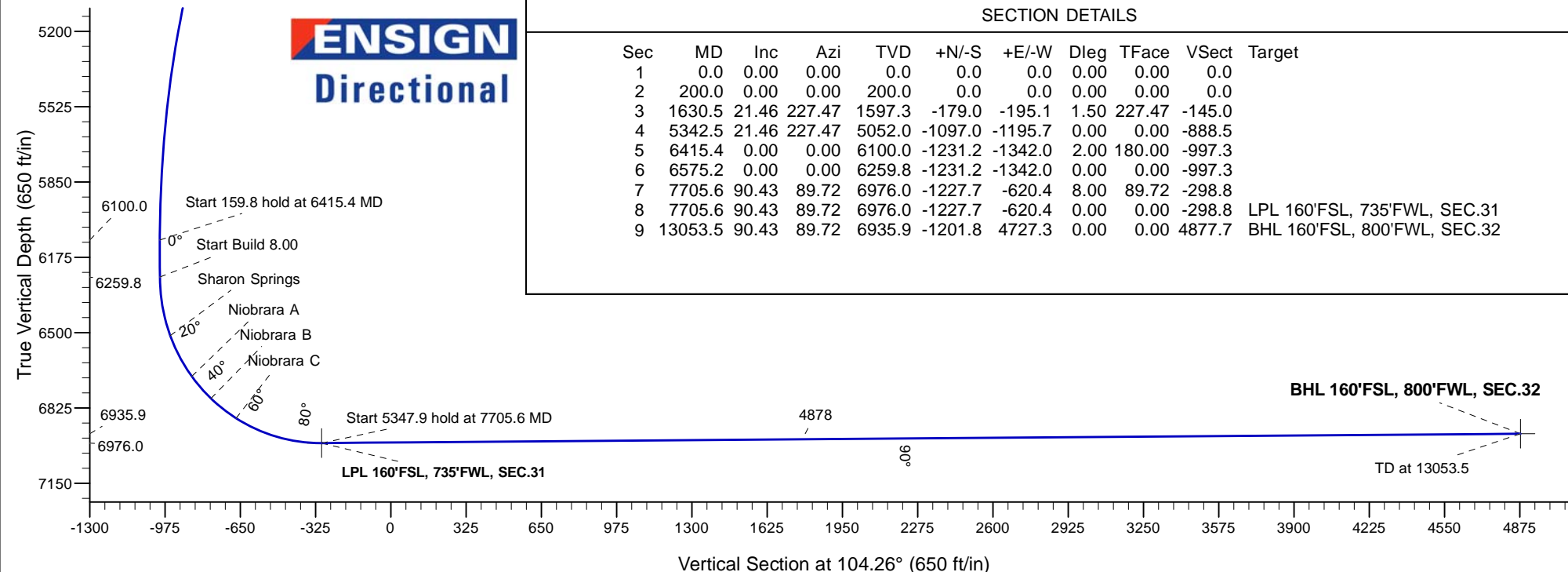
ANNOTATIONS

TVD	MD	Annotation
200.0	200.0	KOP - Start Build 1.50
5052.0	5342.5	Start Drop -2.00
6100.0	6415.4	Start 159.8 hold at 6415.4 MD
6259.8	6575.2	Start Build 8.00
6976.0	7705.6	Start 5347.9 hold at 7705.6 MD
6935.9	13053.5	TD at 13053.5



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	
3	1630.5	21.46	227.47	1597.3	-179.0	-195.1	1.50	227.47	-145.0	
4	5342.5	21.46	227.47	5052.0	-1097.0	-1195.7	0.00	0.00	-888.5	
5	6415.4	0.00	0.00	6100.0	-1231.2	-1342.0	2.00	180.00	-997.3	
6	6575.2	0.00	0.00	6259.8	-1231.2	-1342.0	0.00	0.00	-997.3	
7	7705.6	90.43	89.72	6976.0	-1227.7	-620.4	8.00	89.72	-298.8	
8	7705.6	90.43	89.72	6976.0	-1227.7	-620.4	0.00	0.00	-298.8	LPL 160'FSL, 735'FWL, SEC.31
9	13053.5	90.43	89.72	6935.9	-1201.8	4727.3	0.00	0.00	4877.7	BHL 160'FSL, 800'FWL, SEC.32





PDC Energy Inc. DJ Basin

SEC.31-T5N-R64W

Thistle Down 5N64W31H Pad Sec.31-T5N-R64W

Thistle Down 31I-302

Wellbore #1

Plan #1 (2-28-17)

Anticollision Report

08 March, 2017



Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Thistle Down 311-302
Project:	SEC.31-T5N-R64W	TVD Reference:	WELL @ 4826.0ft (Original Well Elev)
Reference Site:	Thistle Down 5N64W31H Pad Sec.31-T5N-R64W	MD Reference:	WELL @ 4826.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thistle Down 311-302	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.45 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #1 (2-28-17)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (2-28-17)		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 800.0 ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.45 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 3/8/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	13,053.5	Plan #1 (2-28-17) (Wellbore #1)	MWD	MWD - Standard

Summary						
Site Name Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Existing Wells Sec.31-T5N-R64W (GRID)						
Gemini B 31-25 (Noble-Exist) - Wellbore #1 - Wellbore #	1,062.0	1,021.0	261.8	255.1	39.377	CC
Gemini B 31-25 (Noble-Exist) - Wellbore #1 - Wellbore #	1,100.0	1,058.2	261.9	254.9	37.528	ES
Gemini B 31-25 (Noble-Exist) - Wellbore #1 - Wellbore #	1,700.0	1,632.0	317.4	304.8	25.375	SF
Gemini UPRR B31-13 (Noble-Exist) - Wellbore #1 - Well	3,604.2	3,399.7	7.5	-25.9	0.224	Level 1, CC, ES, SF
Gemini UPRR B31-14 (Noble-Exist) - Wellbore #1 - Well	9,025.8	6,947.4	459.6	376.8	5.555	CC, ES
Gemini UPRR B31-14 (Noble-Exist) - Wellbore #1 - Well	9,100.0	6,946.9	465.5	380.6	5.484	SF
Ocoma B31-16 (Noble-Exist) - Wellbore #1 - Wellbore #1	11,760.8	6,901.1	489.1	320.7	2.904	CC, ES
Ocoma B31-16 (Noble-Exist) - Wellbore #1 - Wellbore #1	11,800.0	6,901.3	490.7	321.0	2.891	SF
Ocoma UPRR Lease B31-15 (Noble-Exist) - Wellbore #1	10,303.0	6,923.7	330.7	210.4	2.749	CC, ES, SF
Existing Wells Sec.32-T5N-R64W (GRID)						
HSR-Tullberg 13-32 (Noble-Exist) - Wellbore #1 - Wellbo	13,053.5	6,869.5	337.7	126.0	1.595	CC, ES, SF
Existing Wells Sec.36-T5N-R65W						
Schmidt PC C 06-69HC (Noble-Exist) - Wellbore #1 - We	9,322.6	9,128.9	229.4	62.4	1.374	Level 3, CC
Schmidt PC C 06-69HC (Noble-Exist) - Wellbore #1 - We	11,600.0	11,401.4	245.5	-71.7	0.774	Level 1, ES, SF
Schmidt PC C 06-79HN (Noble-Exist) - Wellbore #1 - We	7,100.0	7,555.4	418.4	373.0	9.208	SF
Schmidt PC C 06-79HN (Noble-Exist) - Wellbore #1 - We	7,183.6	7,529.3	406.0	362.9	9.413	CC, ES

Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Thistle Down 311-302
Project:	SEC.31-T5N-R64W	TVD Reference:	WELL @ 4826.0ft (Original Well Elev)
Reference Site:	Thistle Down 5N64W31H Pad Sec.31-T5N-R64W	MD Reference:	WELL @ 4826.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thistle Down 311-302	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.45 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #1 (2-28-17)	Offset TVD Reference:	Offset Datum

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Thistle Down 5N64W31H Pad Sec.31-T5N-R64W						
Thistle Down 31G-232 - Wellbore #1 - Plan #1 (2-28-17)	200.0	202.0	105.6	104.8	127.056	CC, ES
Thistle Down 31G-232 - Wellbore #1 - Plan #1 (2-28-17)	2,800.0	2,672.1	781.2	753.3	27.931	SF
Thistle Down 31G-332 - Wellbore #1 - Plan #1 (2-28-17)	166.0	168.0	120.2	119.6	186.598	CC
Thistle Down 31G-332 - Wellbore #1 - Plan #1 (2-28-17)	200.0	202.0	120.2	119.4	144.600	ES
Thistle Down 31G-332 - Wellbore #1 - Plan #1 (2-28-17)	2,500.0	2,347.3	778.9	754.6	32.073	SF
Thistle Down 31H-202 - Wellbore #1 - Plan #1 (2-28-17)	200.0	201.0	76.5	75.7	92.312	CC, ES
Thistle Down 31H-202 - Wellbore #1 - Plan #1 (2-28-17)	3,700.0	3,634.8	794.3	754.5	19.990	SF
Thistle Down 31H-232 - Wellbore #1 - Plan #1 (2-28-17)	200.0	201.0	43.7	42.9	52.749	CC, ES
Thistle Down 31H-232 - Wellbore #1 - Plan #1 (2-28-17)	5,342.5	5,323.2	760.0	693.1	11.357	SF
Thistle Down 31H-302 - Wellbore #1 - Plan #1 (2-28-17)	200.0	201.0	61.9	61.1	74.728	CC, ES
Thistle Down 31H-302 - Wellbore #1 - Plan #1 (2-28-17)	4,300.0	4,274.8	781.1	733.6	16.426	SF
Thistle Down 31H-312 - Wellbore #1 - Plan #1 (2-28-17)	200.0	201.0	91.1	90.2	109.895	CC, ES
Thistle Down 31H-312 - Wellbore #1 - Plan #1 (2-28-17)	3,200.0	3,100.8	789.5	756.8	24.148	SF
Thistle Down 31H-332 - Wellbore #1 - Plan #1 (2-28-17)	200.0	200.0	29.1	28.3	35.284	CC, ES
Thistle Down 31H-332 - Wellbore #1 - Plan #1 (2-28-17)	13,053.5	12,955.5	582.9	188.3	1.477	Level 3, SF
Thistle Down 31I-212 - Wellbore #1 - Plan #1 (2-28-17)	200.0	200.0	14.6	13.7	17.637	CC
Thistle Down 31I-212 - Wellbore #1 - Plan #1 (2-28-17)	13,053.5	12,929.7	298.7	-81.2	0.786	Level 1, ES, SF

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Existing Wells Sec.31-T5N-R64W (GRID) - Gemini B 31-25 (Noble-Exist) - Wellbore #1 - Wellbore #1														
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
0.0	0.0	0.0	0.0	0.0	0.0	-65.76	112.9	-250.8	276.7					
100.0	100.0	69.0	69.0	0.1	0.1	-65.77	112.9	-251.0	275.2	275.0	0.25	1,100.819		
200.0	200.0	169.0	169.0	0.4	0.4	-65.81	113.0	-251.4	275.7	274.9	0.80	345.209		
300.0	300.0	268.8	268.8	0.7	0.7	66.94	112.9	-251.8	275.5	274.1	1.37	200.667		
400.0	399.9	368.5	368.5	0.9	1.0	67.69	113.1	-252.3	274.5	272.5	1.94	141.230		
500.0	499.7	467.6	467.6	1.2	1.3	69.00	113.4	-252.8	272.7	270.1	2.53	107.778		
600.0	599.3	566.4	566.4	1.5	1.6	70.87	114.1	-253.5	270.4	267.3	3.15	85.964		
700.0	698.6	664.9	664.9	1.9	1.9	73.26	114.7	-254.5	268.0	264.2	3.81	70.376		
800.0	797.5	763.9	763.8	2.3	2.3	76.17	115.2	-255.9	265.7	261.1	4.52	58.721		
900.0	896.1	862.4	862.4	2.7	2.6	79.62	115.5	-257.3	263.5	258.2	5.29	49.800		
1,000.0	994.2	960.4	960.3	3.2	2.9	83.60	115.8	-258.9	262.0	255.9	6.11	42.899		
1,062.0	1,054.7	1,021.0	1,021.0	3.6	3.1	86.33	116.0	-260.0	261.8	255.1	6.65	39.377	CC	
1,100.0	1,091.7	1,058.2	1,058.1	3.8	3.2	88.10	116.1	-260.6	261.9	254.9	6.98	37.528	ES	
1,200.0	1,188.6	1,155.5	1,155.4	4.4	3.5	93.04	116.2	-262.4	263.5	255.6	7.89	33.388		
1,300.0	1,284.9	1,251.9	1,251.8	5.0	3.8	98.32	116.2	-264.2	267.5	258.7	8.83	30.277		
1,400.0	1,380.4	1,348.1	1,347.9	5.8	4.1	103.86	116.4	-265.9	274.6	264.8	9.79	28.041		
1,500.0	1,475.0	1,443.8	1,443.7	6.5	4.5	109.52	116.4	-267.4	285.0	274.2	10.74	26.544		
1,600.0	1,568.9	1,538.3	1,538.2	7.4	4.8	115.09	116.3	-268.7	299.2	287.6	11.65	25.690		
1,630.5	1,597.3	1,566.9	1,566.7	7.7	4.8	116.75	116.3	-269.0	304.4	292.5	11.92	25.544		
1,700.0	1,662.0	1,632.0	1,631.9	8.3	5.0	120.53	116.2	-269.8	317.4	304.8	12.51	25.375	SF	
1,800.0	1,755.0	1,726.0	1,725.9	9.2	5.3	125.50	116.0	-270.9	338.2	324.9	13.29	25.438		
1,900.0	1,848.1	1,819.7	1,819.6	10.1	5.6	129.89	115.6	-272.0	361.2	347.2	14.02	25.757		
2,000.0	1,941.2	1,912.6	1,912.4	11.0	5.9	133.76	115.2	-272.9	386.2	371.5	14.71	26.253		
2,100.0	2,034.3	2,005.5	2,005.4	11.9	6.2	137.16	115.1	-273.9	412.9	397.6	15.38	26.854		
2,200.0	2,127.3	2,100.0	2,099.8	12.8	6.5	140.20	114.8	-275.1	440.8	424.8	16.02	27.512		
2,300.0	2,220.4	2,191.4	2,191.3	13.7	6.8	142.77	114.7	-276.5	469.8	453.1	16.66	28.205		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation