

PDC Energy Inc. DJ Basin

Well Name: **Thistle Down 31G-232**

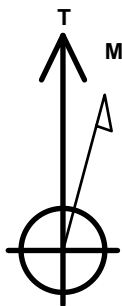
Surface Location: Thistle Down 5N64W31H Pad Sec.31-T5N-R64W
 North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
 Ground Elevation: 4805.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1372544.58	3251619.26	40.352520	-104.597170	

Original Well Elev WELL @ 4828.0ft (Original Well Elev)

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 1489'FSL, 1357'FWL, SEC.31	1.0	0.0	0.0	Point
BHL 2068'FSL, 800'FWL, SEC.32	6856.0	597.9	4718.6	Point
LPL 2068'FSL, 738'FWL, SEC.31	6896.0	575.6	-620.4	Point



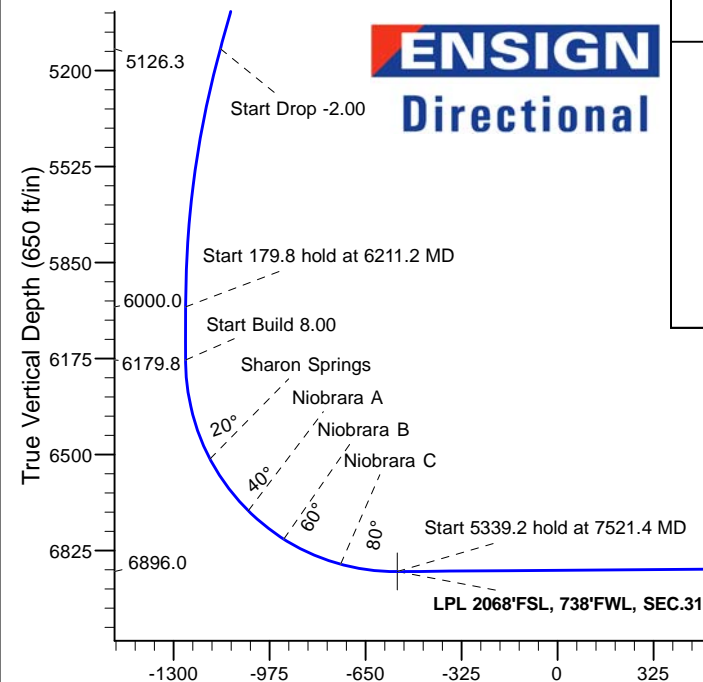
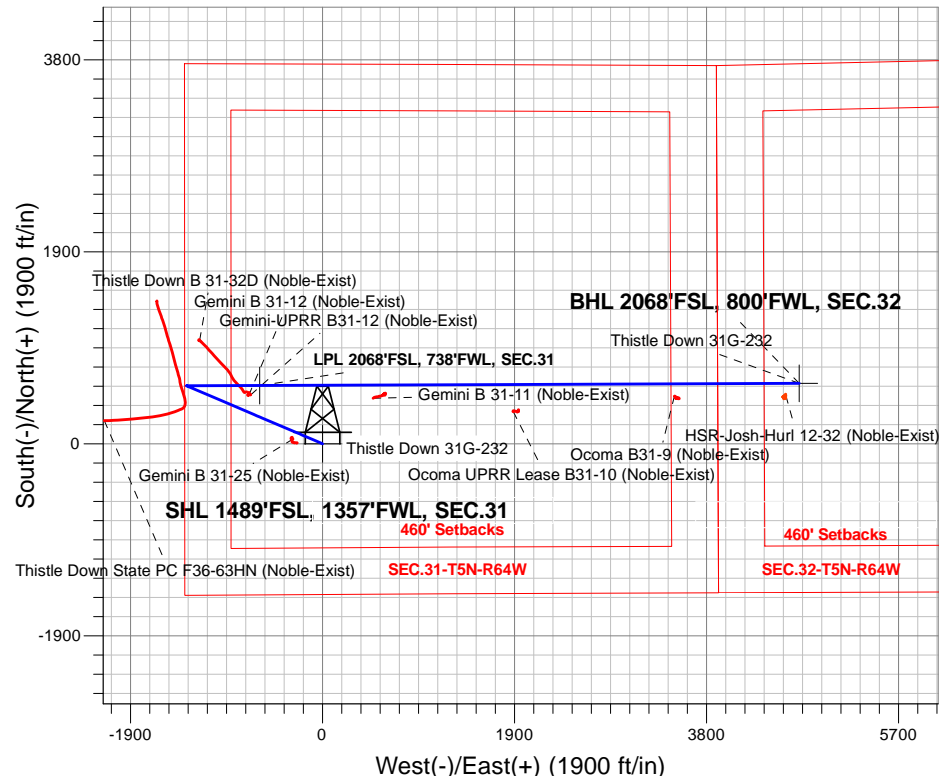
Azimuths to True North
Magnetic North: 8.00°

Magnetic Field
Strength: 52520.6snT
Dip Angle: 66.84°
Date: 3/7/2017
Model: IGRF2010

Thistle Down 5N64W31H Pad Sec.31-T5N-R64W
Thistle Down 31G-232
Plan #1 (2-28-17)
12:05, March 07 2017

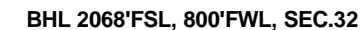
ANNOTATIONS

TVD	MD	Annotation
400.0	400.0	KOP - Start Build 1.50
5126.3	5323.3	Start Drop -2.00
6000.0	6211.2	Start 179.8 hold at 6211.2 MD
6179.8	6391.0	Start Build 8.00
6896.0	7521.4	Start 5339.2 hold at 7521.4 MD
6855.9	12860.6	TD at 12860.6



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	400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.0	
3	1583.9	17.76	293.11	1565.0	71.4	-167.4	1.50	293.11	-157.1	
4	5323.3	17.76	293.11	5126.2	519.0	-1216.4	0.00	0.00	-1141.5	
5	6211.2	0.00	0.00	6000.0	572.6	-1342.0	2.00	180.00	-1259.4	
6	6391.0	0.00	0.00	6179.8	572.6	-1342.0	0.00	0.00	-1259.4	
7	7521.4	90.43	89.76	6896.0	575.6	-620.4	8.00	89.76	-543.1	
8	7521.4	90.43	89.76	6896.0	575.6	-620.4	0.00	0.00	-543.1	LPL 2068'FSL, 738'FWL, SEC.31
9	12860.6	90.43	89.76	6855.9	598.0	4718.6	0.00	0.00	4756.3	BHL 2068'FSL, 800'FWL, SEC.32





PDC Energy Inc. DJ Basin

SEC.31-T5N-R64W

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

Thistle Down 31G-232

Wellbore #1

Plan #1 (2-28-17)

Anticollision Report

07 March, 2017



Company:	PDC Energy Inc. DJ Basin	Local Co-ordinate Reference:	Well Thistle Down 31G-232
Project:	SEC.31-T5N-R64W	TVD Reference:	WELL @ 4828.0ft (Original Well Elev)
Reference Site:	Thistle Down 5N64W31H Pad Sec.31-T5N-R64W	MD Reference:	WELL @ 4828.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thistle Down 31G-232	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 3/7/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	12,860.3	Plan #1 (2-28-17) (Wellbore #1)	MWD	MWD - Standard

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						
Existing Wells Sec.31-T5N-R64W (GRID)						
Gemini B 31-11 (Noble-Exist) - Wellbore #1 - Wellbore #1	8,652.5	6,874.4	125.3	48.1	1.623	CC, ES, SF
Gemini B 31-25 (Noble-Exist) - Wellbore #1 - Wellbore #	1,809.8	1,747.5	97.0	84.0	7.438	CC, ES
Gemini B 31-25 (Noble-Exist) - Wellbore #1 - Wellbore #	1,900.0	1,833.7	100.7	86.8	7.249	SF
Ocoma B31-9 (Noble-Exist) - Wellbore #1 - Wellbore #1	11,626.7	6,827.7	122.7	-48.6	0.716	Level 1, CC, ES, SF
Ocoma UPRR Lease B31-10 (Noble-Exist) - Wellbore #1	10,027.2	6,861.9	267.2	148.4	2.248	CC, ES, SF
Existing Wells Sec.32-T5N-R64W (GRID)						
HSR-Josh-Hurl 12-32 (Noble-Exist) - Wellbore #1 - Wellb	12,719.4	6,807.6	119.6	-88.7	0.574	Level 1, CC, ES, SF
Thistle Down 5N64W31H Pad Sec.31-T5N-R64W						
Thistle Down 31G-332 - Wellbore #1 - Plan #1 (2-28-17)	200.0	200.0	14.6	13.7	17.627	CC
Thistle Down 31G-332 - Wellbore #1 - Plan #1 (2-28-17)	12,860.6	12,955.2	274.9	-108.2	0.718	Level 1, ES, SF
Thistle Down 31H-202 - Wellbore #1 - Plan #1 (2-28-17)	400.0	399.0	29.1	27.2	15.143	CC
Thistle Down 31H-202 - Wellbore #1 - Plan #1 (2-28-17)	500.0	499.0	29.7	27.2	12.028	ES
Thistle Down 31H-202 - Wellbore #1 - Plan #1 (2-28-17)	12,860.6	12,846.9	550.2	153.4	1.387	Level 3, SF
Thistle Down 31H-232 - Wellbore #1 - Plan #1 (2-28-17)	400.0	399.0	61.9	60.0	32.179	CC
Thistle Down 31H-232 - Wellbore #1 - Plan #1 (2-28-17)	500.0	499.0	62.5	60.0	25.311	ES
Thistle Down 31H-232 - Wellbore #1 - Plan #1 (2-28-17)	4,500.0	4,429.5	782.8	730.0	14.847	SF
Thistle Down 31H-302 - Wellbore #1 - Plan #1 (2-28-17)	400.0	399.0	43.7	41.8	22.715	CC
Thistle Down 31H-302 - Wellbore #1 - Plan #1 (2-28-17)	500.0	499.0	44.2	41.8	17.931	ES
Thistle Down 31H-302 - Wellbore #1 - Plan #1 (2-28-17)	5,400.0	5,364.2	750.5	684.4	11.356	SF
Thistle Down 31H-312 - Wellbore #1 - Plan #1 (2-28-17)	400.0	399.0	14.6	12.6	7.572	CC
Thistle Down 31H-312 - Wellbore #1 - Plan #1 (2-28-17)	12,860.6	12,912.4	285.8	-100.1	0.741	Level 1, ES, SF
Thistle Down 31H-332 - Wellbore #1 - Plan #1 (2-28-17)	400.0	398.0	76.5	74.6	39.808	CC
Thistle Down 31H-332 - Wellbore #1 - Plan #1 (2-28-17)	500.0	498.0	77.0	74.6	31.250	SF
Thistle Down 31H-332 - Wellbore #1 - Plan #1 (2-28-17)	3,800.0	3,698.3	784.1	742.3	18.729	SF
Thistle Down 31I-212 - Wellbore #1 - Plan #1 (2-28-17)	400.0	398.0	91.1	89.2	47.392	CC, ES
Thistle Down 31I-212 - Wellbore #1 - Plan #1 (2-28-17)	3,200.0	3,063.7	778.2	744.7	23.254	SF
Thistle Down 31I-302 - Wellbore #1 - Plan #1 (2-28-17)	200.0	198.0	105.6	104.8	128.761	CC, ES
Thistle Down 31I-302 - Wellbore #1 - Plan #1 (2-28-17)	2,800.0	2,636.9	774.7	746.9	27.923	SF
Thistle Down PC F36-63HN Pad Sec.36-T5N-R65W						
Thistle Down State PC F36-63HN (Noble-Exist) - Wellbo	5,789.4	5,631.7	85.6	28.8	1.507	CC
Thistle Down State PC F36-63HN (Noble-Exist) - Wellbo	5,800.0	5,641.7	85.7	28.4	1.497	Level 3, ES, SF

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Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thistle Down 31G-232	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
Thistle Down Wells (Noble) Sec.31-T5N-R64W						
Gemini B 31-12 (Noble-Exist) - Wellbore #1 - Wellbore #	7,407.6	6,845.3	94.6	-83.0	0.533	Level 1, CC, ES, SF
Thistle Down B 31-32D (Noble-Exist) - Thistle Down B 31	6,550.0	6,378.6	459.1	400.9	7.883	SF
Thistle Down B 31-32D (Noble-Exist) - Thistle Down B 31	6,800.0	6,608.9	447.4	392.0	8.075	ES
Thistle Down B 31-32D (Noble-Exist) - Thistle Down B 31	6,817.0	6,623.1	447.3	392.1	8.115	CC

Offset Design Existing Wells Sec.31-T5N-R64W (GRID) - Gemini B 31-11 (Noble-Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Reference Measured Depth (ft)	Vertical Depth (ft)	Offset Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
				Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
0.0	0.0	0.0	0.0	0.0	0.0	51.39	491.8	616.0	788.3					
100.0	100.0	86.6	86.6	0.1	0.1	51.36	492.1	615.7	788.2	787.9	0.28	2,827.406		
200.0	200.0	186.7	186.7	0.4	0.4	51.30	492.8	615.0	788.1	787.2	0.86	918.739		
300.0	300.0	287.1	287.1	0.7	0.8	51.26	493.1	614.6	788.0	786.5	1.45	544.079		
340.2	340.2	326.2	326.2	0.8	0.8	51.26	493.1	614.6	787.9	786.3	1.64	479.354		
400.0	400.0	383.5	383.5	1.0	0.9	51.26	493.1	614.7	788.0	786.1	1.91	413.497		
500.0	500.0	486.9	486.9	1.2	1.1	118.23	493.3	614.8	788.8	786.5	2.37	332.773		
600.0	599.9	583.8	583.8	1.5	1.4	118.41	493.7	614.5	790.7	787.8	2.91	271.631		
700.0	699.7	685.1	685.0	1.8	1.7	118.75	494.2	614.4	794.1	790.6	3.50	227.082		
800.0	799.3	782.1	782.1	2.1	1.9	119.23	494.5	614.4	798.7	794.7	4.01	199.337		
7,900.0	6,893.2	6,900.0	6,896.8	43.3	16.0	100.47	454.6	510.5	762.4	704.2	58.28	13.083		
8,000.0	6,892.4	6,895.5	6,892.2	45.2	16.0	98.47	454.7	510.6	664.0	603.5	60.53	10.970		
8,100.0	6,891.7	6,892.4	6,889.1	47.3	15.9	97.08	454.8	510.6	566.2	503.4	62.85	9.009		
8,200.0	6,890.9	6,889.2	6,886.0	49.6	15.9	95.66	454.8	510.7	469.3	404.0	65.28	7.188		
8,300.0	6,890.2	6,886.0	6,882.8	52.0	15.9	94.22	454.9	510.8	373.9	306.1	67.81	5.513		
8,400.0	6,889.4	6,882.8	6,879.5	54.6	15.9	92.74	454.9	510.9	281.7	211.3	70.42	4.001		
8,500.0	6,888.7	6,879.5	6,876.2	57.2	15.9	91.25	455.0	511.0	197.3	124.2	73.08	2.700		
8,600.0	6,887.9	6,876.1	6,872.9	59.9	15.9	89.73	455.1	511.1	135.8	60.1	75.77	1.793		
8,652.5	6,887.5	6,874.4	6,871.2	61.4	15.9	88.92	455.1	511.1	125.3	48.1	77.20	1.623	CC, ES, SF	
8,700.0	6,887.2	6,872.8	6,869.5	62.7	15.9	88.19	455.1	511.1	134.0	55.5	78.49	1.707		
8,800.0	6,886.4	6,869.4	6,866.1	65.6	15.9	86.63	455.2	511.2	193.5	112.3	81.20	2.383		
8,900.0	6,885.7	6,865.9	6,862.7	68.5	15.9	85.05	455.2	511.3	277.3	193.4	83.90	3.305		
9,000.0	6,884.9	6,862.4	6,859.2	71.5	15.9	83.46	455.3	511.4	369.2	282.7	86.58	4.265		
9,100.0	6,884.2	6,858.8	6,855.6	74.5	15.8	81.85	455.4	511.5	464.5	375.3	89.21	5.207		
9,200.0	6,883.4	6,855.2	6,852.0	77.5	15.8	80.24	455.5	511.6	561.4	469.6	91.79	6.116		
9,300.0	6,882.7	6,851.6	6,848.4	80.6	15.8	78.61	455.5	511.7	659.2	564.9	94.30	6.990		
9,400.0	6,881.9	6,847.9	6,844.7	83.7	15.8	76.98	455.6	511.8	757.5	660.8	96.75	7.830		