

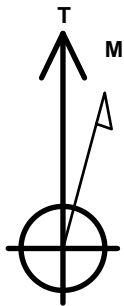
PETROLEUM DEVELOPMENT CORP DJ Basin

Well Name: **Fern 11V-234**

Surface Location: Fern 5N65W11EJ Pad Sec.11-T5N-R65W
 North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
 Ground Elevation: 4619.0
 +N/-S +E/-W Northing Easting Latitude Longitude Slot
 0.0 0.0 1397124.25 3240103.82 40.420303 -104.637628
 Original Well Elev WELL @ 4642.0ft (Original Well Elev)

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 366'FNL, 688'FWL, SEC.11	1.0	0.0	0.0	Point
BHL 1817'FNL, 2380'FEL, SEC.9	6732.0	-1635.1	-8318.3	Point
LPL 2001'FNL, 507'FWL, SEC.11	6787.0	-1635.1	-181.0	Point



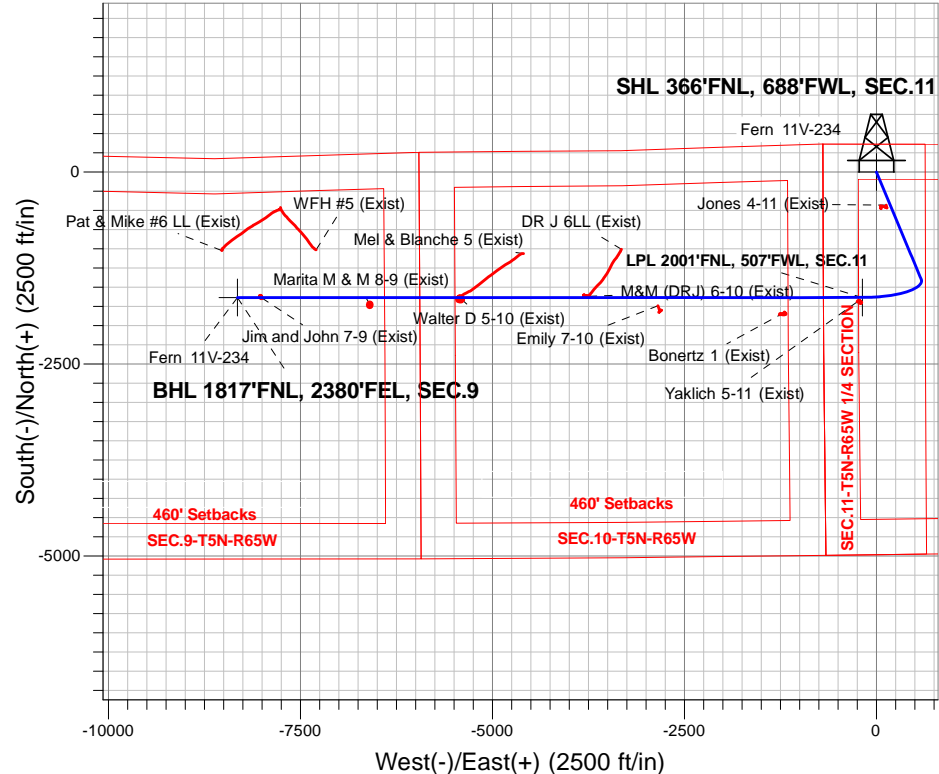
Azimuths to True North
 Magnetic North: 8.10°

Magnetic Field
 Strength: 52613.6snT
 Dip Angle: 66.91°
 Date: 8/10/2016
 Model: IGRF2010

Fern 5N65W11EJ Pad Sec.11-T5N-R65W
 Fern 11V-234
 Plan #1 (8-05-16)
 11:31, August 10 2016

ANNOTATIONS

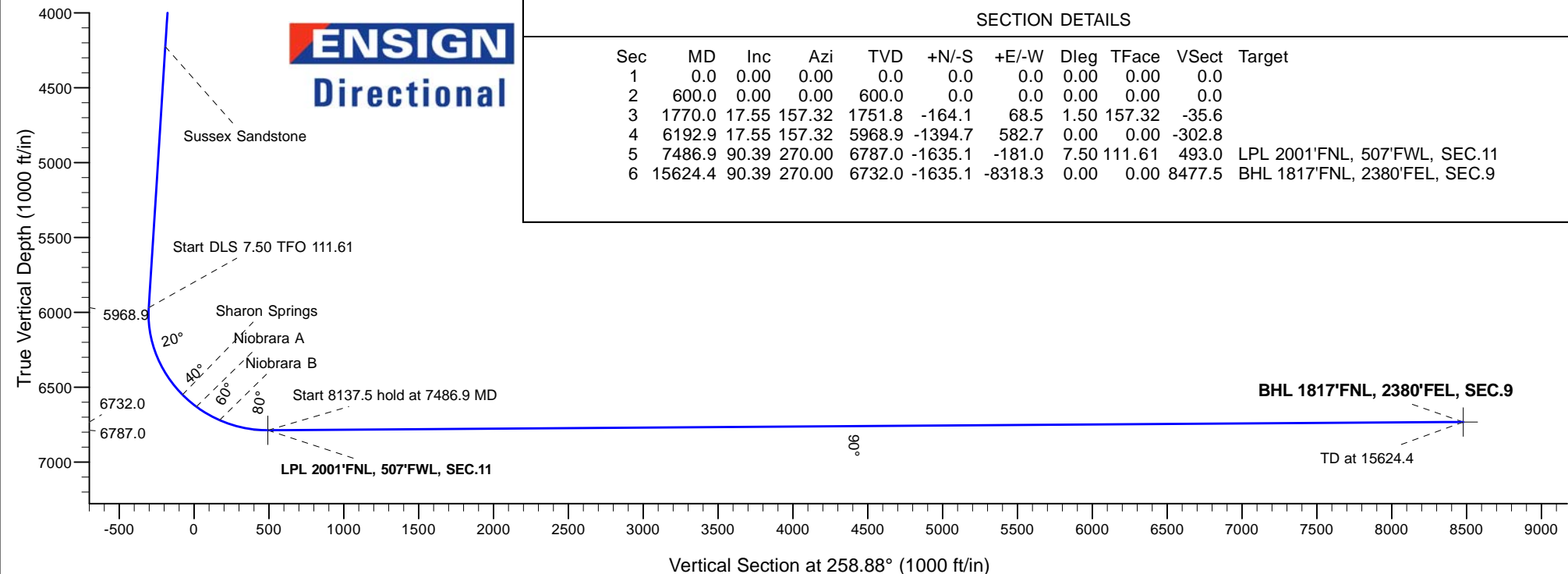
TVD	MD	Annotation
600.0	600.0	KOP - Start Build 1.50
1751.8	1770.0	Start 4422.9 hold at 1770.0 MD
5968.9	6192.9	Start DLS 7.50 TFO 111.61
6787.0	7486.9	Start 8137.5 hold at 7486.9 MD
6732.0	15624.4	TD at 15624.4



ENSIGN
 Directional

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	600.0	0.00	0.00	600.0	0.0	0.0	0.00	0.00	0.0	
3	1770.0	17.55	157.32	1751.8	-164.1	68.5	1.50	157.32	-35.6	
4	6192.9	17.55	157.32	5968.9	-1394.7	582.7	0.00	0.00	-302.8	
5	7486.9	90.39	270.00	6787.0	-1635.1	-181.0	7.50	111.61	493.0	LPL 2001'FNL, 507'FWL, SEC.11
6	15624.4	90.39	270.00	6732.0	-1635.1	-8318.3	0.00	0.00	8477.5	BHL 1817'FNL, 2380'FEL, SEC.9





PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.11-T5N-R65W

Fern 5N65W11EJ Pad Sec.11-T5N-R65W

Fern 11V-234

Wellbore #1

Plan #1 (8-05-16)

Anticollision Report

10 August, 2016



Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Fern 11V-234
Project:	SEC.11-T5N-R65W	TVD Reference:	WELL @ 4642.0ft (Original Well Elev)
Reference Site:	Fern 5N65W11EJ Pad Sec.11-T5N-R65W	MD Reference:	WELL @ 4642.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Fern 11V-234	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 (8-05-16)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (8-05-16)		
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 1,000.0 ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.45 Sigma	Casing Method:	Not applied

Survey Tool Program	Date	8/10/2016		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	15,624.4	Plan #1 (8-05-16) (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.4-T5N-R65W						
Jim and John 7-9 (Exist) - Wellbore #1 - Wellbore #1	15,314.0	6,737.4	9.0	-292.6	0.030	Level 1, CC, ES, SF
Marita M & M 8-9 (Exist) - Wellbore #1 - Wellbore #1	13,902.7	6,728.6	89.1	-314.3	0.221	Level 1, CC, ES, SF
Pat & Mike #6 LL (Exist) - Wellbore #1 - Wellbore #1	15,624.4	6,818.6	649.4	328.2	2.022	CC, ES, SF
WFH #5 (Exist) - Wellbore #1 - Wellbore #1	14,604.2	6,781.7	621.6	339.1	2.200	CC, ES, SF
Existing Wells Sec.9, 10, & 11						
Bonertz 1 (Exist) - Wellbore #1 - Wellbore #1	8,503.1	6,759.2	198.6	124.0	2.662	CC, ES, SF
DR J 6LL (Exist) - Wellbore #1 - Wellbore #1	10,629.3	6,791.2	620.0	472.0	4.187	CC, ES
DR J 6LL (Exist) - Wellbore #1 - Wellbore #1	10,700.0	6,790.3	624.1	473.6	4.148	SF
Emily 7-10 (Exist) - Wellbore #1 - Wellbore #1	10,143.2	6,756.4	127.4	2.1	1.017	Level 2, CC, ES, SF
Jones 4-11 (Exist) - Wellbore #1 - Wellbore #1	2,640.8	2,555.8	126.4	106.9	6.499	CC, ES
Jones 4-11 (Exist) - Wellbore #1 - Wellbore #1	2,700.0	2,612.0	127.8	107.8	6.396	SF
M&M (DRJ) 6-10 (Exist) - Wellbore #1 - Wellbore #1	11,048.2	6,743.6	14.1	-143.8	0.090	Level 1, CC, ES, SF
Mel & Blanche 5 (Exist) - Wellbore #1 - Wellbore #1	11,914.7	6,842.9	571.5	375.4	2.914	CC, ES
Mel & Blanche 5 (Exist) - Wellbore #1 - Wellbore #1	12,000.0	6,839.3	577.9	378.8	2.904	SF
Walter D 5-10 (Exist) - Wellbore #1 - Wellbore #1	12,714.8	6,734.2	20.2	-194.1	0.094	Level 1, CC, ES, SF
Yaklich 5-11 (Exist) - Wellbore #1 - Wellbore #1	7,545.7	6,758.6	52.4	5.6	1.119	Level 2, CC, ES, SF

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Fern 11V-234
Project:	SEC.11-T5N-R65W	TVD Reference:	WELL @ 4642.0ft (Original Well Elev)
Reference Site:	Fern 5N65W11EJ Pad Sec.11-T5N-R65W	MD Reference:	WELL @ 4642.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Fern 11V-234	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 (8-05-16)	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
Fern 5N65W11EJ Pad Sec.11-T5N-R65W						
Fern 11U-204 - Wellbore #1 - Plan #1 (8-05-16)	600.0	600.0	104.9	101.9	34.644	CC, ES
Fern 11U-204 - Wellbore #1 - Plan #1 (8-05-16)	1,100.0	1,098.7	135.5	129.9	24.125	SF
Fern 11U-334 - Wellbore #1 - Plan #1 (8-05-16)	600.0	600.0	75.1	72.0	24.780	CC, ES
Fern 11U-334 - Wellbore #1 - Plan #1 (8-05-16)	1,000.0	999.3	94.7	89.6	18.566	SF
Fern 11U-434 - Wellbore #1 - Plan #1 (8-05-16)	600.0	600.0	90.0	87.0	29.712	CC, ES
Fern 11U-434 - Wellbore #1 - Plan #1 (8-05-16)	1,100.0	1,098.6	120.7	115.1	21.434	SF
Fern 11V-204 - Wellbore #1 - Plan #1 (8-05-16)	600.0	600.0	29.9	26.8	9.864	CC
Fern 11V-204 - Wellbore #1 - Plan #1 (8-05-16)	15,624.4	15,537.3	407.3	-187.9	0.684	Level 1, ES, SF
Fern 11V-214 - Wellbore #1 - Plan #1 (8-05-16)	600.0	600.0	59.7	56.7	19.728	CC, ES
Fern 11V-214 - Wellbore #1 - Plan #1 (8-05-16)	900.0	899.7	70.7	66.2	15.470	SF
Fern 11V-304 - Wellbore #1 - Plan #1 (8-05-16)	600.0	600.0	44.8	41.8	14.795	CC, ES
Fern 11V-304 - Wellbore #1 - Plan #1 (8-05-16)	15,624.4	15,559.3	703.0	110.0	1.185	Level 2, SF
Fern 11V-334 - Wellbore #1 - Plan #1 (8-05-16)	600.0	600.0	14.9	11.9	4.933	CC
Fern 11V-334 - Wellbore #1 - Plan #1 (8-05-16)	15,624.4	15,651.9	221.2	-339.3	0.395	Level 1, ES, SF
Fern 11W-214 - Wellbore #1 - Plan #1 (8-05-16)	200.0	200.0	30.2	29.4	36.609	CC
Fern 11W-214 - Wellbore #1 - Plan #1 (8-05-16)	15,624.4	15,777.0	600.0	5.0	1.008	Level 2, ES, SF
Fern 11W-314 - Wellbore #1 - Plan #1 (8-05-16)	400.0	400.0	14.9	13.0	7.749	CC
Fern 11W-314 - Wellbore #1 - Plan #1 (8-05-16)	15,624.4	15,778.3	359.8	-219.8	0.621	Level 1, ES, SF

Offset Design												
Existing Wells Sec.4-T5N-R65W - Jim and John 7-9 (Exist) - Wellbore #1 - Wellbore #1												
Survey Program: 100-												
Reference												
Offset												
Semi Major Axis												
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
14,400.0	6,740.3	6,750.1	6,748.9	256.3	14.8	-146.56	-1,643.5	-8,004.8	911.0	752.4	158.54	5.746
14,500.0	6,739.6	6,748.7	6,747.5	259.7	14.8	-143.42	-1,643.5	-8,004.8	811.0	639.8	171.21	4.737
14,600.0	6,738.9	6,747.3	6,746.1	263.1	14.8	-139.74	-1,643.5	-8,004.9	711.0	525.4	185.64	3.830
14,700.0	6,738.2	6,745.9	6,744.7	266.5	14.8	-135.42	-1,643.5	-8,004.9	611.0	409.1	201.94	3.026
14,800.0	6,737.6	6,744.5	6,743.3	270.0	14.8	-130.33	-1,643.5	-8,004.9	511.0	291.0	220.02	2.323
14,900.0	6,736.9	6,743.1	6,741.9	273.4	14.8	-124.34	-1,643.5	-8,004.9	411.1	171.6	239.45	1.717
15,000.0	6,736.2	6,741.7	6,740.5	276.8	14.8	-117.37	-1,643.6	-8,004.9	311.1	51.9	259.22	1.200 Level 2
15,100.0	6,735.5	6,740.4	6,739.1	280.2	14.7	-109.43	-1,643.6	-8,004.9	211.2	-66.5	277.62	0.761 Level 1
15,200.0	6,734.9	6,739.0	6,737.7	283.6	14.7	-100.64	-1,643.6	-8,004.9	111.3	-181.0	292.32	0.381 Level 1
15,300.0	6,734.2	6,737.6	6,736.3	287.1	14.7	-91.34	-1,643.6	-8,004.9	13.9	-287.1	301.00	0.046 Level 1
15,314.0	6,734.1	6,737.4	6,736.1	287.5	14.7	-90.02	-1,643.6	-8,004.9	9.0	-292.6	301.64	0.030 Level 1, CC, ES, SF
15,400.0	6,733.5	6,736.2	6,734.9	290.5	14.7	-81.98	-1,643.6	-8,004.9	89.4	-213.0	302.34	0.296 Level 1
15,500.0	6,732.8	6,734.8	6,733.5	293.9	14.7	-73.05	-1,643.6	-8,004.9	189.1	-107.6	296.72	0.637 Level 1
15,600.0	6,732.2	6,733.4	6,732.1	297.3	14.7	-64.90	-1,643.6	-8,005.0	289.1	3.2	285.87	1.011 Level 2
15,624.4	6,732.0	6,733.0	6,731.8	298.2	14.7	-63.05	-1,643.6	-8,005.0	313.5	30.8	282.69	1.109 Level 2