

PETROLEUM DEVELOPMENT CORP DJ Basin

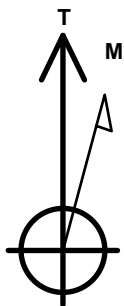
Well Name: **Josephine 19N-314**

Surface Location: Josephine 5N64W19N Pad Sec.19-T5N-R64W
 North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
 Ground Elevation: 4626.0
 +N/-S +E/-W Northing Easting Latitude Longitude Slot
 0.0 0.0 1385140.43 3253195.91 40.387050 -104.591050
 Original Well Elev WELL @ 4649.0ft (Original Well Elev)

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 1759'FNL, 2150'FEL, SEC.19	1.0	0.0	0.0	Point
BHL 982'FNL, 2464'FEL, SEC.24	6798.0	787.5	-5482.2	Point
LPL 982'FNL, 2299'FWL, SEC.19	6813.0	776.0	-721.5	Point

Josephine 5N64W19N Pad Sec.19-T5N-R64W
 Josephine 19N-314
 Plan #1 (12-20-16)
 12:08, December 27 2016

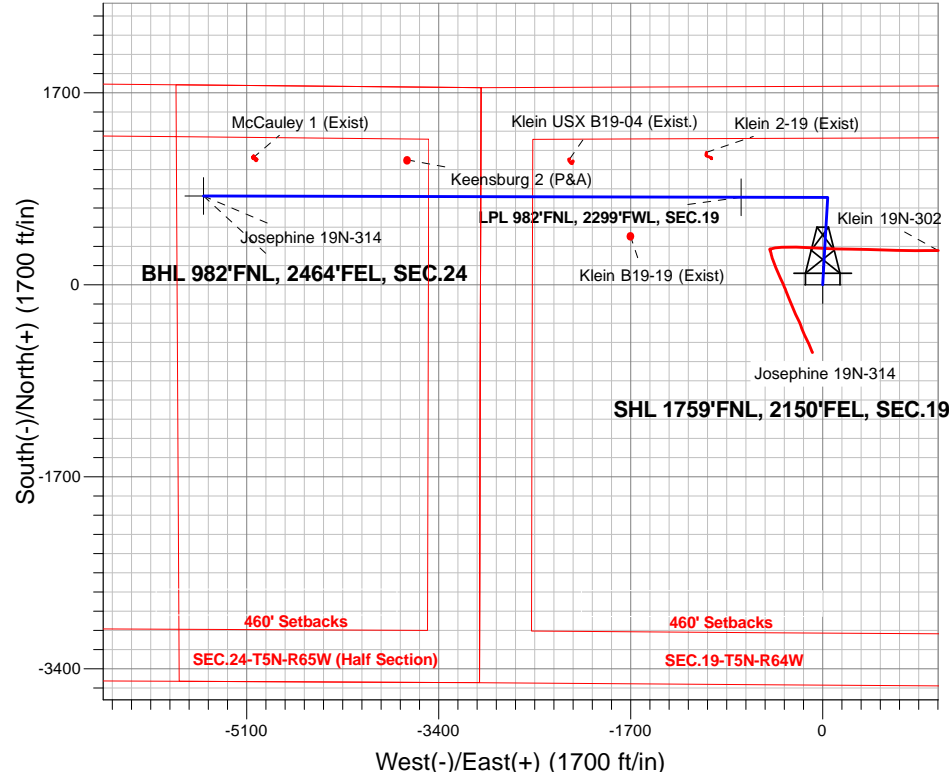


Azimuths to True North
 Magnetic North: 8.02°

Magnetic Field
 Strength: 52560.9snT
 Dip Angle: 66.87°
 Date: 12/27/2016
 Model: IGRF2010

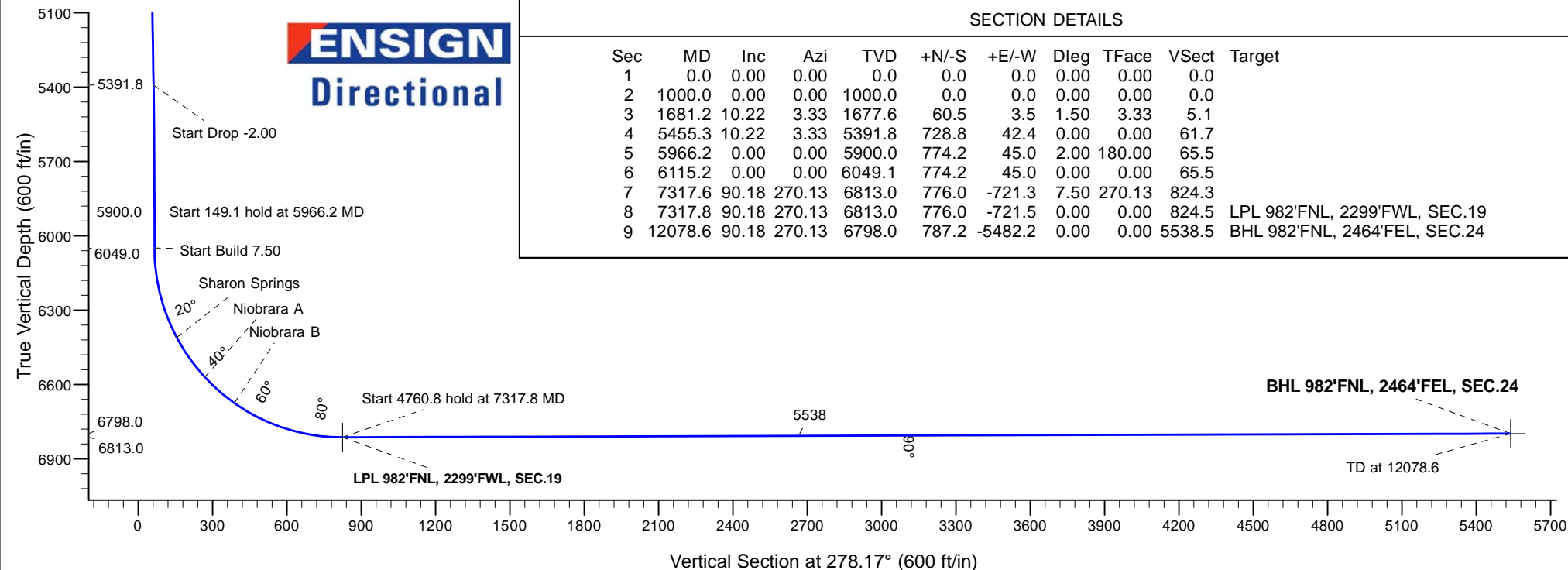
ANNOTATIONS

TVD	MD	Annotation
1000.0	1000.0	KOP - Start Build 1.50
5391.8	5455.3	Start Drop -2.00
5900.0	5966.2	Start 149.1 hold at 5966.2 MD
6049.0	6115.2	Start Build 7.50
6813.0	7317.8	Start 4760.8 hold at 7317.8 MD
6798.0	12078.6	TD at 12078.6



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	1000.0	0.00	0.00	1000.0	0.0	0.0	0.00	0.00	0.0	
3	1681.2	10.22	3.33	1677.6	60.5	3.5	1.50	3.33	5.1	
4	5455.3	10.22	3.33	5391.8	728.8	42.4	0.00	0.00	61.7	
5	5966.2	0.00	0.00	5900.0	774.2	45.0	2.00	180.00	65.5	
6	6115.2	0.00	0.00	6049.1	774.2	45.0	0.00	0.00	65.5	
7	7317.6	90.18	270.13	6813.0	776.0	-721.3	7.50	270.13	824.3	
8	7317.8	90.18	270.13	6813.0	776.0	-721.5	0.00	0.00	824.5	LPL 982'FNL, 2299'FWL, SEC.19
9	12078.6	90.18	270.13	6798.0	787.2	-5482.2	0.00	0.00	5538.5	BHL 982'FNL, 2464'FEL, SEC.24





PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.19-T5N-R64W

Josephine 5N64W19N Pad Sec.19-T5N-R64W

Josephine 19N-314

Wellbore #1

Plan #1 (12-20-16)

Anticollision Report

27 December, 2016



Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Josephine 19N-314
Project:	SEC.19-T5N-R64W	TVD Reference:	WELL @ 4649.0ft (Original Well Elev)
Reference Site:	Josephine 5N64W19N Pad Sec.19-T5N-R64W	MD Reference:	WELL @ 4649.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Josephine 19N-314	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 (12-20-16)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (12-20-16)		
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 800.0 ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.45 Sigma	Casing Method:	Not applied

Survey Tool Program	Date	12/27/2016		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	12,078.6	Plan #1 (12-20-16) (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.24-T5N-R65W						
Klein 2-19 (Exist) - Wellbore #1 - Wellbore #1	7,625.6	6,787.2	394.2	340.2	7.305	CC, ES
Klein 2-19 (Exist) - Wellbore #1 - Wellbore #1	7,700.0	6,786.7	401.1	345.0	7.142	SF
McCaughey 1 (Exist) - Wellbore #1 - Wellbore #1	11,639.2	6,788.7	340.6	153.1	1.817	CC, ES, SF
Josephine 5N64W19N Pad Sec.19-T5N-R64W						
Josephine 19M-234 - Wellbore #1 - Plan #1 (12-20-16)	366.3	367.3	47.4	45.7	27.192	CC
Josephine 19M-234 - Wellbore #1 - Plan #1 (12-20-16)	400.0	401.0	47.4	45.5	24.580	ES
Josephine 19M-234 - Wellbore #1 - Plan #1 (12-20-16)	12,078.6	12,132.0	712.9	340.0	1.912	SF
Josephine 19M-234 - Wellbore #1 - Spider Plot	366.3	367.3	47.4	45.7	27.192	CC
Josephine 19M-234 - Wellbore #1 - Spider Plot	400.0	401.0	47.4	45.5	24.580	ES
Josephine 19M-234 - Wellbore #1 - Spider Plot	12,078.6	12,132.0	712.9	340.0	1.912	SF
Josephine 19M-334 - Wellbore #1 - Plan #1 (12-20-16)	600.0	600.0	32.9	29.9	10.866	CC, ES
Josephine 19M-334 - Wellbore #1 - Plan #1 (12-20-16)	12,078.6	12,163.9	495.7	120.8	1.322	Level 3, SF
Josephine 19M-404 - Wellbore #1 - Plan #1 (12-20-16)	200.0	200.0	62.0	61.2	75.059	CC, ES
Josephine 19M-404 - Wellbore #1 - Plan #1 (12-20-16)	4,900.0	4,794.2	793.8	762.3	25.140	SF
Josephine 19N-204 - Wellbore #1 - Plan #1 (12-20-16)	1,000.0	1,000.0	29.1	23.9	5.570	CC, ES
Josephine 19N-204 - Wellbore #1 - Plan #1 (12-20-16)	12,078.6	11,945.7	539.2	169.9	1.460	Level 3, SF
Josephine 19N-214 - Wellbore #1 - Plan #1 (12-20-16)	800.0	800.0	18.4	14.3	4.462	CC
Josephine 19N-214 - Wellbore #1 - Plan #1 (12-20-16)	12,078.6	12,030.0	246.9	-106.0	0.700	Level 1, ES, SF
Josephine 19N-334 - Wellbore #1 - Plan #1 (12-20-16)	1,000.0	1,000.0	43.7	38.5	8.356	CC, ES
Josephine 19N-334 - Wellbore #1 - Plan #1 (12-20-16)	12,078.6	12,018.4	742.8	368.4	1.984	SF
Josephine 19N-404 - Wellbore #1 - Plan #1 (12-20-16)	1,000.0	1,000.0	14.6	9.3	2.785	CC
Josephine 19N-404 - Wellbore #1 - Plan #1 (12-20-16)	12,078.6	12,131.3	277.0	-75.9	0.785	Level 1, ES, SF
Josephine 19O-204 - Wellbore #1 - Plan #1 (12-20-16)	500.0	500.0	87.4	85.0	35.282	CC, ES
Josephine 19O-204 - Wellbore #1 - Plan #1 (12-20-16)	1,000.0	986.2	119.2	114.1	23.577	SF
Josephine 19O-214 - Wellbore #1 - Plan #1 (12-20-16)	1,000.0	1,000.0	58.3	53.1	11.142	CC, ES
Josephine 19O-214 - Wellbore #1 - Plan #1 (12-20-16)	1,200.0	1,199.9	63.5	57.2	10.029	SF
Josephine 19O-314 - Wellbore #1 - Plan #1 (12-20-16)	1,000.0	1,000.0	72.9	67.6	13.927	CC, ES
Josephine 19O-314 - Wellbore #1 - Plan #1 (12-20-16)	1,100.0	1,098.1	75.4	69.7	13.132	SF
Klein (Existing) Sec.19-T5N-R64W						
Keensburg 2 (P&A) - Wellbore #1 - Wellbore #1	10,276.9	6,783.7	324.8	32.7	1.112	Level 2, CC, ES
Keensburg 2 (P&A) - Wellbore #1 - Wellbore #1	10,300.0	6,783.6	325.6	32.7	1.112	Level 2, SF
Klein B19-19 (Exist) - Wellbore #1 - Wellbore #1	8,297.5	6,791.9	344.7	118.6	1.525	CC
Klein B19-19 (Exist) - Wellbore #1 - Wellbore #1	8,300.0	6,791.9	344.7	118.6	1.524	ES, SF

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

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Project:	SEC.19-T5N-R64W	TVD Reference:	WELL @ 4649.0ft (Original Well Elev)
Reference Site:	Josephine 5N64W19N Pad Sec.19-T5N-R64W	MD Reference:	WELL @ 4649.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Josephine 19N-314	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 (12-20-16)	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
Offset Well - Wellbore - Design						
Klein 190-HZ Pad Sec.19-T5N-R64W						
Klein 19N-302 - Wellbore #1 - Wellbore #1	6,840.3	6,811.9	442.1	401.8	10.950	CC
Klein 19N-302 - Wellbore #1 - Wellbore #1	6,850.0	6,809.1	442.2	401.8	10.925	ES
Klein 19N-302 - Wellbore #1 - Wellbore #1	6,900.0	6,794.6	445.8	404.7	10.855	SF
McCauley B19-31D Pad Sec.24-T5N-R65W						
Klein USX B19-04 (Exist.) - Wellbore #1 - Wellbore #1	8,837.7	6,792.0	336.3	243.4	3.622	CC, ES
Klein USX B19-04 (Exist.) - Wellbore #1 - Wellbore #1	8,900.0	6,791.2	342.0	247.1	3.603	SF

Offset Design														Offset Site Error:	0.0 ft
Survey Program: 100- Existing Wells - Sec.24-T5N-R65W - Klein 2-19 (Exist) - Wellbore #1 - Wellbore #1														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				Warning		
				Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
6,950.0	6,727.4	6,707.3	6,706.1	26.3	15.0	52.11	1,169.7	-1,028.8	770.1	738.0	32.08	24.007			
7,000.0	6,748.9	6,728.0	6,726.8	26.8	15.1	57.62	1,170.0	-1,028.7	731.7	697.8	33.94	21.559			
7,050.0	6,767.4	6,745.8	6,744.6	27.4	15.1	63.43	1,170.2	-1,028.6	693.1	657.0	36.11	19.196			
7,100.0	6,782.9	6,760.7	6,759.5	28.1	15.2	69.31	1,170.5	-1,028.5	654.6	616.2	38.33	17.076			
7,150.0	6,795.2	6,772.5	6,771.3	28.9	15.2	74.99	1,170.6	-1,028.5	616.6	576.2	40.41	15.258			
7,200.0	6,804.3	6,781.3	6,780.0	29.8	15.2	80.19	1,170.8	-1,028.4	579.7	537.5	42.22	13.732			
7,250.0	6,810.2	6,786.9	6,785.6	30.8	15.2	84.69	1,170.9	-1,028.4	544.4	500.7	43.73	12.450			
7,300.0	6,812.9	6,789.3	6,788.0	31.9	15.2	88.35	1,170.9	-1,028.4	511.3	466.3	45.00	11.361			
7,317.6	6,813.0	6,789.4	6,788.1	32.3	15.2	89.43	1,170.9	-1,028.4	500.3	454.8	45.42	11.015			
7,317.8	6,813.0	6,789.3	6,788.1	32.3	15.2	89.43	1,170.9	-1,028.4	500.2	454.7	45.42	11.012			
7,400.0	6,812.7	6,788.8	6,787.5	34.3	15.2	89.34	1,170.9	-1,028.4	454.2	406.6	47.58	9.546			
7,500.0	6,812.4	6,788.1	6,786.8	36.8	15.2	89.24	1,170.9	-1,028.4	413.7	363.4	50.34	8.219			
7,600.0	6,812.1	6,787.4	6,786.1	39.5	15.2	89.14	1,170.9	-1,028.4	395.0	341.8	53.21	7.424			
7,625.6	6,812.0	6,787.2	6,786.0	40.3	15.2	89.12	1,170.9	-1,028.4	394.2	340.2	53.96	7.305	CC, ES		
7,700.0	6,811.8	6,786.7	6,785.4	42.4	15.2	89.04	1,170.9	-1,028.4	401.1	345.0	56.16	7.142	SF		
7,800.0	6,811.5	6,786.0	6,784.7	45.3	15.2	88.94	1,170.9	-1,028.4	431.0	371.8	59.19	7.282			
7,900.0	6,811.2	6,785.3	6,784.0	48.3	15.2	88.84	1,170.8	-1,028.4	480.3	418.0	62.28	7.712			
8,000.0	6,810.9	6,784.6	6,783.3	51.3	15.2	88.73	1,170.8	-1,028.4	543.6	478.2	65.41	8.311			
8,100.0	6,810.5	6,783.8	6,782.6	54.4	15.2	88.63	1,170.8	-1,028.4	616.8	548.2	68.58	8.994			
8,200.0	6,810.2	6,783.1	6,781.9	57.5	15.2	88.52	1,170.8	-1,028.4	696.6	624.8	71.78	9.705			
8,300.0	6,809.9	6,782.4	6,781.1	60.7	15.2	88.42	1,170.8	-1,028.4	781.1	706.1	75.01	10.414			