PETROLEUM DEVELOPMENT CORP DJ Basin

Well Name: **Hop 18F-212**

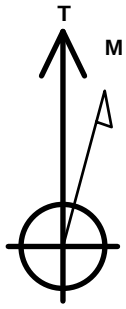
Surface Location: Hop 5N64W18A Pad Sec.18-T5N-R64W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
Ground Elevation: 4628.0

+N/-S	+E/-W	Northing	Easting	Latittude	Longitude	Slot
0.0	0.0	1391153.76	3251013.14	40.403617	-104.598666	

Original Well Elev WELL @ 4641.0ft (Original Well Elev)

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 1000'FNL, 878'FWL, SEC.18	1.0	0.0	0.0	Point
BHL 1030'FNL, 500'FEL, SEC.17	6662.0	37.4	9025.6	Point



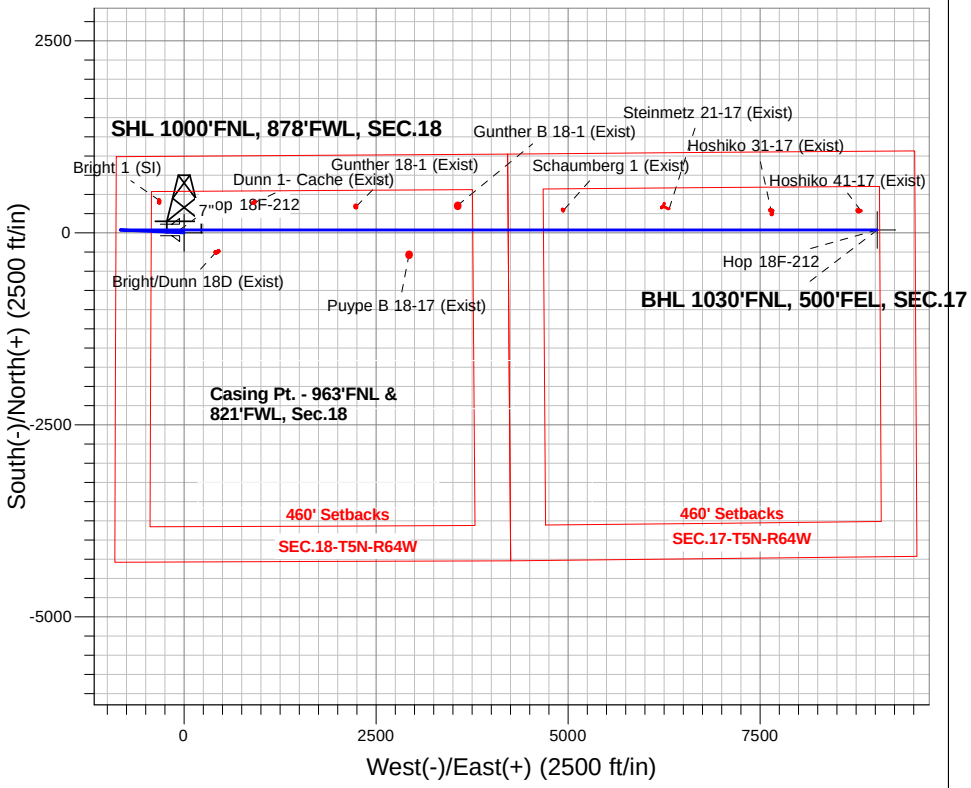
Azimuths to True North
Magnetic North: 8.16°

Magnetic Field
Strength: 52675.9snT
Dip Angle: 66.92°
Date: 12/21/2015
Model: IGRF2010

Hop 5N64W18A Pad Sec.18-T5N-R64W
Hop 18F-212
Plan #1 (12-16-15)
11:55, December 21 2015

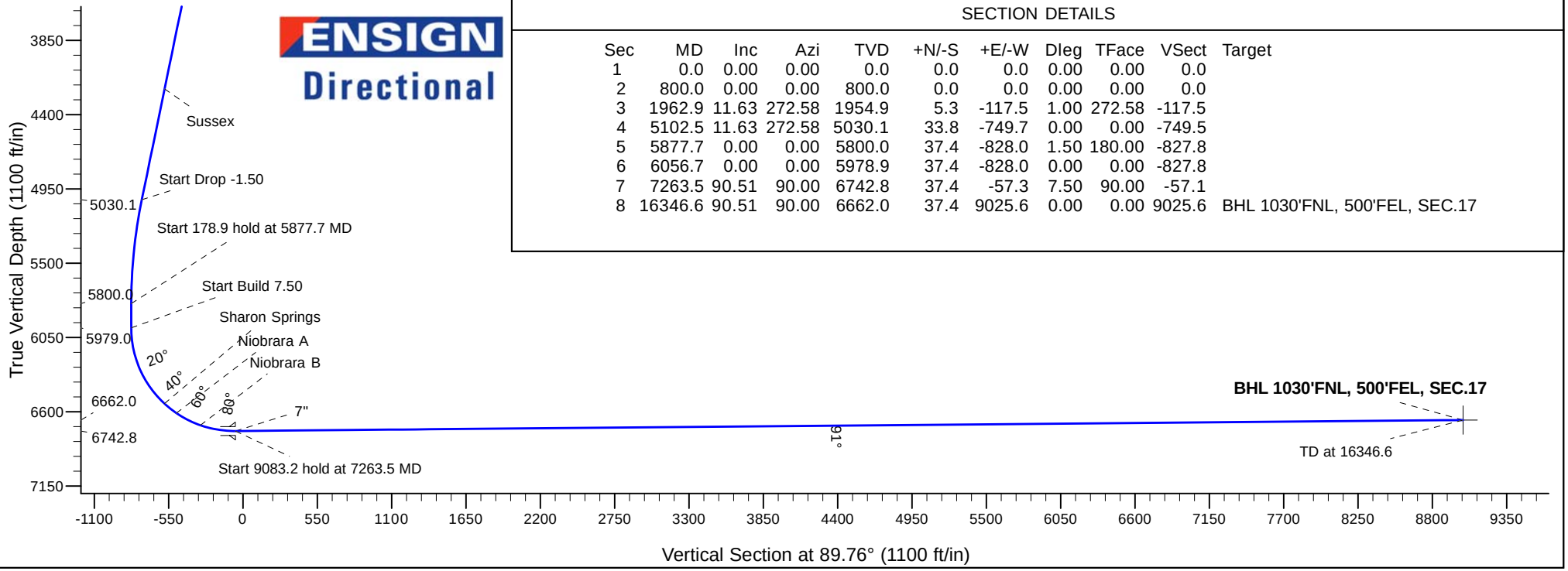
ANNOTATIONS

TVD	MD	Annotation
800.0	800.0	KOP - Start Build 1.00
5030.1	5102.5	Start Drop -1.50
5800.0	5877.7	Start 178.9 hold at 5877.7 MD
5978.9	6056.7	Start Build 7.50
6742.8	7263.5	Start 9083.2 hold at 7263.5 MD
6662.0	16346.6	TD at 16346.6



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	800.0	0.00	0.00	800.0	0.0	0.0	0.00	0.00	0.0	
3	1962.9	11.63	272.58	1954.9	5.3	-117.5	1.00	272.58	-117.5	
4	5102.5	11.63	272.58	5030.1	33.8	-749.7	0.00	0.00	-749.5	
5	5877.7	0.00	0.00	5800.0	37.4	-828.0	1.50	180.00	-827.8	
6	6056.7	0.00	0.00	5978.9	37.4	-828.0	0.00	0.00	-827.8	
7	7263.5	90.51	90.00	6742.8	37.4	-57.3	7.50	90.00	-57.1	
8	16346.6	90.51	90.00	6662.0	37.4	9025.6	0.00	0.00	9025.6	BHL 1030'FNL, 500'FEL, SEC.17



ENSIGN Directional

PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.18-T5N-R64W
Hop 5N64W18A Pad Sec.18-T5N-R64W
Hop 18F-212

Wellbore #1

Plan: Plan #1 (12-16-15)

Standard Planning Report

21 December, 2015

PDC ENERGY
Growing E&P Value

Database:	US_EDM	**Local Co-ordinate Reference:**	Well Hop 18F-212
Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Project:	SEC.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**North Reference:**	True
Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-16-15)		

Project SEC.18-T5N-R64W, Weld County, Colorado

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site Hop 5N64W18A Pad Sec.18-T5N-R64W

Site Position:		**Northing:**	1,391,153.68 usft	**Latitude:**	40.403618
From:	Lat/Long	**Easting:**	3,250,968.30 usft	**Longitude:**	-104.598827
Position Uncertainty:	0.0 ft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.58 °

Well Hop 18F-212

Well Position	**+N/-S**	-0.4 ft	**Northing:**	1,391,153.76 usft	**Latitude:**	40.403617
	+E/-W	44.8 ft	**Easting:**	3,251,013.14 usft	**Longitude:**	-104.598666
Position Uncertainty		0.0 ft	**Wellhead Elevation:**	0.0 ft	**Ground Level:**	4,628.0 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/21/2015	8.17	66.92	52,676

Design Plan #1 (12-16-15)

Audit Notes:

Version:		**Phase:**	PROTOTYPE	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	89.76

Plan Sections

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,962.9	11.63	272.58	1,954.9	5.3	-117.5	1.00	1.00	0.00	272.58	
5,102.5	11.63	272.58	5,030.1	33.8	-749.7	0.00	0.00	0.00	0.00	
5,877.7	0.00	0.00	5,800.0	37.4	-828.0	1.50	-1.50	0.00	180.00	
6,056.7	0.00	0.00	5,978.9	37.4	-828.0	0.00	0.00	0.00	0.00	
7,263.5	90.51	90.00	6,742.8	37.4	-57.3	7.50	7.50	0.00	90.00	
16,346.6	90.51	90.00	6,662.0	37.4	9,025.6	0.00	0.00	0.00	0.00	BHL 1030'FNL, 500'F

Database:	US_EDM	**Local Co-ordinate Reference:**	Well Hop 18F-212
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Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**North Reference:**	True
Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-16-15)		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
1.0	0.00	0.00	1.0	0.0	0.0	0.0	0.00	0.00	0.00
SHL 1000'FNL, 878'FWL, SEC.18									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP - Start Build 1.00									
900.0	1.00	272.58	900.0	0.0	-0.9	-0.9	1.00	1.00	0.00
1,000.0	2.00	272.58	1,000.0	0.2	-3.5	-3.5	1.00	1.00	0.00
1,100.0	3.00	272.58	1,099.9	0.4	-7.8	-7.8	1.00	1.00	0.00
1,200.0	4.00	272.58	1,199.7	0.6	-13.9	-13.9	1.00	1.00	0.00
1,300.0	5.00	272.58	1,299.4	1.0	-21.8	-21.8	1.00	1.00	0.00
1,400.0	6.00	272.58	1,398.9	1.4	-31.4	-31.3	1.00	1.00	0.00
1,500.0	7.00	272.58	1,498.3	1.9	-42.7	-42.7	1.00	1.00	0.00
1,600.0	8.00	272.58	1,597.4	2.5	-55.7	-55.7	1.00	1.00	0.00
1,700.0	9.00	272.58	1,696.3	3.2	-70.5	-70.5	1.00	1.00	0.00
1,800.0	10.00	272.58	1,794.9	3.9	-87.0	-86.9	1.00	1.00	0.00
1,900.0	11.00	272.58	1,893.3	4.7	-105.2	-105.1	1.00	1.00	0.00
1,962.9	11.63	272.58	1,954.9	5.3	-117.5	-117.5	1.00	1.00	0.00
2,000.0	11.63	272.58	1,991.3	5.6	-125.0	-124.9	0.00	0.00	0.00
2,100.0	11.63	272.58	2,089.2	6.5	-145.1	-145.1	0.00	0.00	0.00
2,200.0	11.63	272.58	2,187.2	7.5	-165.2	-165.2	0.00	0.00	0.00
2,300.0	11.63	272.58	2,285.1	8.4	-185.4	-185.3	0.00	0.00	0.00
2,400.0	11.63	272.58	2,383.1	9.3	-205.5	-205.5	0.00	0.00	0.00
2,500.0	11.63	272.58	2,481.0	10.2	-225.6	-225.6	0.00	0.00	0.00
2,600.0	11.63	272.58	2,579.0	11.1	-245.8	-245.7	0.00	0.00	0.00
2,700.0	11.63	272.58	2,676.9	12.0	-265.9	-265.9	0.00	0.00	0.00
2,800.0	11.63	272.58	2,774.9	12.9	-286.0	-286.0	0.00	0.00	0.00
2,900.0	11.63	272.58	2,872.8	13.8	-306.2	-306.1	0.00	0.00	0.00
3,000.0	11.63	272.58	2,970.7	14.7	-326.3	-326.3	0.00	0.00	0.00
3,100.0	11.63	272.58	3,068.7	15.6	-346.5	-346.4	0.00	0.00	0.00
3,200.0	11.63	272.58	3,166.6	16.5	-366.6	-366.5	0.00	0.00	0.00
3,300.0	11.63	272.58	3,264.6	17.5	-386.7	-386.7	0.00	0.00	0.00
3,400.0	11.63	272.58	3,362.5	18.4	-406.9	-406.8	0.00	0.00	0.00
3,500.0	11.63	272.58	3,460.5	19.3	-427.0	-426.9	0.00	0.00	0.00
3,530.1	11.63	272.58	3,490.0	19.5	-433.1	-433.0	0.00	0.00	0.00
Parkman									
3,600.0	11.63	272.58	3,558.4	20.2	-447.1	-447.1	0.00	0.00	0.00
3,700.0	11.63	272.58	3,656.4	21.1	-467.3	-467.2	0.00	0.00	0.00
3,800.0	11.63	272.58	3,754.3	22.0	-487.4	-487.3	0.00	0.00	0.00
3,900.0	11.63	272.58	3,852.3	22.9	-507.5	-507.4	0.00	0.00	0.00
4,000.0	11.63	272.58	3,950.2	23.8	-527.7	-527.6	0.00	0.00	0.00
4,100.0	11.63	272.58	4,048.2	24.7	-547.8	-547.7	0.00	0.00	0.00
4,200.0	11.63	272.58	4,146.1	25.6	-568.0	-567.8	0.00	0.00	0.00
4,265.2	11.63	272.58	4,210.0	26.2	-581.1	-581.0	0.00	0.00	0.00
Sussex									
4,300.0	11.63	272.58	4,244.1	26.5	-588.1	-588.0	0.00	0.00	0.00
4,400.0	11.63	272.58	4,342.0	27.4	-608.2	-608.1	0.00	0.00	0.00

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Project:	SEC.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**North Reference:**	True
Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-16-15)		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,500.0	11.63	272.58	4,440.0	28.4	-628.4	-628.2	0.00	0.00	0.00
4,600.0	11.63	272.58	4,537.9	29.3	-648.5	-648.4	0.00	0.00	0.00
4,700.0	11.63	272.58	4,635.9	30.2	-668.6	-668.5	0.00	0.00	0.00
4,800.0	11.63	272.58	4,733.8	31.1	-688.8	-688.6	0.00	0.00	0.00
4,900.0	11.63	272.58	4,831.7	32.0	-708.9	-708.8	0.00	0.00	0.00
5,000.0	11.63	272.58	4,929.7	32.9	-729.0	-728.9	0.00	0.00	0.00
5,100.0	11.63	272.58	5,027.6	33.8	-749.2	-749.0	0.00	0.00	0.00
5,102.5	11.63	272.58	5,030.1	33.8	-749.7	-749.5	0.00	0.00	0.00
Start Drop -1.50									
5,200.0	10.17	272.58	5,125.8	34.7	-768.1	-767.9	1.50	-1.50	0.00
5,300.0	8.67	272.58	5,224.5	35.4	-784.4	-784.3	1.50	-1.50	0.00
5,400.0	7.17	272.58	5,323.5	36.0	-798.2	-798.0	1.50	-1.50	0.00
5,500.0	5.67	272.58	5,422.9	36.5	-809.4	-809.2	1.50	-1.50	0.00
5,600.0	4.17	272.58	5,522.5	36.9	-817.9	-817.8	1.50	-1.50	0.00
5,700.0	2.67	272.58	5,622.3	37.2	-823.9	-823.7	1.50	-1.50	0.00
5,800.0	1.17	272.58	5,722.3	37.3	-827.2	-827.0	1.50	-1.50	0.00
5,877.7	0.00	272.58	5,800.0	37.4	-828.0	-827.8	1.50	-1.50	0.00
Start 178.9 hold at 5877.7 MD									
5,900.0	0.00	0.00	5,822.3	37.4	-828.0	-827.8	0.00	0.00	0.00
6,000.0	0.00	0.00	5,922.3	37.4	-828.0	-827.8	0.00	0.00	0.00
6,056.7	0.00	0.00	5,979.0	37.4	-828.0	-827.8	0.00	0.00	0.00
Start Build 7.50									
6,100.0	3.25	90.00	6,022.3	37.4	-826.8	-826.6	7.51	7.51	0.00
6,200.0	10.75	90.00	6,121.4	37.4	-814.6	-814.4	7.50	7.50	0.00
6,300.0	18.25	90.00	6,218.2	37.4	-789.6	-789.4	7.50	7.50	0.00
6,400.0	25.75	90.00	6,310.8	37.4	-752.1	-752.0	7.50	7.50	0.00
6,500.0	33.25	90.00	6,397.8	37.4	-702.9	-702.8	7.50	7.50	0.00
6,600.0	40.75	90.00	6,477.6	37.4	-642.8	-642.6	7.50	7.50	0.00
6,686.8	47.26	90.00	6,540.0	37.4	-582.5	-582.4	7.50	7.50	0.00
Sharon Springs									
6,700.0	48.25	90.00	6,548.9	37.4	-572.7	-572.6	7.50	7.50	0.00
6,799.3	55.70	90.00	6,610.0	37.4	-494.6	-494.4	7.50	7.50	0.00
Niobrara A									
6,800.0	55.75	90.00	6,610.4	37.4	-494.0	-493.8	7.50	7.50	0.00
6,900.0	63.25	90.00	6,661.1	37.4	-407.9	-407.7	7.50	7.50	0.00
6,999.5	70.71	90.00	6,700.0	37.4	-316.4	-316.2	7.50	7.50	0.00
Niobrara B									
7,000.0	70.75	90.00	6,700.2	37.4	-315.9	-315.8	7.50	7.50	0.00
7,100.0	78.25	90.00	6,726.9	37.4	-219.6	-219.5	7.50	7.50	0.00
7,200.0	85.75	90.00	6,740.8	37.4	-120.7	-120.5	7.50	7.50	0.00
7,263.5	90.51	90.00	6,742.8	37.4	-57.2	-57.1	7.49	7.49	0.00
Start 9083.2 hold at 7263.5 MD - 7"									
7,300.0	90.51	90.00	6,742.5	37.4	-20.7	-20.6	0.00	0.00	0.00
7,400.0	90.51	90.00	6,741.6	37.4	79.3	79.4	0.00	0.00	0.00
7,500.0	90.51	90.00	6,740.7	37.4	179.3	179.4	0.00	0.00	0.00
7,600.0	90.51	90.00	6,739.9	37.4	279.3	279.4	0.00	0.00	0.00
7,700.0	90.51	90.00	6,739.0	37.4	379.3	379.4	0.00	0.00	0.00
7,800.0	90.51	90.00	6,738.1	37.4	479.3	479.4	0.00	0.00	0.00
7,900.0	90.51	90.00	6,737.2	37.4	579.3	579.4	0.00	0.00	0.00
8,000.0	90.51	90.00	6,736.3	37.4	679.3	679.4	0.00	0.00	0.00
8,100.0	90.51	90.00	6,735.4	37.4	779.3	779.4	0.00	0.00	0.00
8,200.0	90.51	90.00	6,734.5	37.4	879.3	879.4	0.00	0.00	0.00

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Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-16-15)		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,300.0	90.51	90.00	6,733.6	37.4	979.2	979.4	0.00	0.00	0.00
8,400.0	90.51	90.00	6,732.7	37.4	1,079.2	1,079.4	0.00	0.00	0.00
8,500.0	90.51	90.00	6,731.8	37.4	1,179.2	1,179.4	0.00	0.00	0.00
8,600.0	90.51	90.00	6,731.0	37.4	1,279.2	1,279.4	0.00	0.00	0.00
8,700.0	90.51	90.00	6,730.1	37.4	1,379.2	1,379.4	0.00	0.00	0.00
8,800.0	90.51	90.00	6,729.2	37.4	1,479.2	1,479.4	0.00	0.00	0.00
8,900.0	90.51	90.00	6,728.3	37.4	1,579.2	1,579.4	0.00	0.00	0.00
9,000.0	90.51	90.00	6,727.4	37.4	1,679.2	1,679.4	0.00	0.00	0.00
9,100.0	90.51	90.00	6,726.5	37.4	1,779.2	1,779.4	0.00	0.00	0.00
9,200.0	90.51	90.00	6,725.6	37.4	1,879.2	1,879.4	0.00	0.00	0.00
9,300.0	90.51	90.00	6,724.7	37.4	1,979.2	1,979.3	0.00	0.00	0.00
9,400.0	90.51	90.00	6,723.8	37.4	2,079.2	2,079.3	0.00	0.00	0.00
9,500.0	90.51	90.00	6,722.9	37.4	2,179.2	2,179.3	0.00	0.00	0.00
9,600.0	90.51	90.00	6,722.1	37.4	2,279.2	2,279.3	0.00	0.00	0.00
9,700.0	90.51	90.00	6,721.2	37.4	2,379.2	2,379.3	0.00	0.00	0.00
9,800.0	90.51	90.00	6,720.3	37.4	2,479.2	2,479.3	0.00	0.00	0.00
9,900.0	90.51	90.00	6,719.4	37.4	2,579.2	2,579.3	0.00	0.00	0.00
10,000.0	90.51	90.00	6,718.5	37.4	2,679.2	2,679.3	0.00	0.00	0.00
10,100.0	90.51	90.00	6,717.6	37.4	2,779.2	2,779.3	0.00	0.00	0.00
10,200.0	90.51	90.00	6,716.7	37.4	2,879.2	2,879.3	0.00	0.00	0.00
10,300.0	90.51	90.00	6,715.8	37.4	2,979.2	2,979.3	0.00	0.00	0.00
10,400.0	90.51	90.00	6,714.9	37.4	3,079.2	3,079.3	0.00	0.00	0.00
10,500.0	90.51	90.00	6,714.0	37.4	3,179.2	3,179.3	0.00	0.00	0.00
10,600.0	90.51	90.00	6,713.2	37.4	3,279.2	3,279.3	0.00	0.00	0.00
10,700.0	90.51	90.00	6,712.3	37.4	3,379.2	3,379.3	0.00	0.00	0.00
10,800.0	90.51	90.00	6,711.4	37.4	3,479.1	3,479.3	0.00	0.00	0.00
10,900.0	90.51	90.00	6,710.5	37.4	3,579.1	3,579.3	0.00	0.00	0.00
11,000.0	90.51	90.00	6,709.6	37.4	3,679.1	3,679.3	0.00	0.00	0.00
11,100.0	90.51	90.00	6,708.7	37.4	3,779.1	3,779.3	0.00	0.00	0.00
11,200.0	90.51	90.00	6,707.8	37.4	3,879.1	3,879.3	0.00	0.00	0.00
11,300.0	90.51	90.00	6,706.9	37.4	3,979.1	3,979.2	0.00	0.00	0.00
11,400.0	90.51	90.00	6,706.0	37.4	4,079.1	4,079.2	0.00	0.00	0.00
11,500.0	90.51	90.00	6,705.1	37.4	4,179.1	4,179.2	0.00	0.00	0.00
11,600.0	90.51	90.00	6,704.3	37.4	4,279.1	4,279.2	0.00	0.00	0.00
11,700.0	90.51	90.00	6,703.4	37.4	4,379.1	4,379.2	0.00	0.00	0.00
11,800.0	90.51	90.00	6,702.5	37.4	4,479.1	4,479.2	0.00	0.00	0.00
11,900.0	90.51	90.00	6,701.6	37.4	4,579.1	4,579.2	0.00	0.00	0.00
12,000.0	90.51	90.00	6,700.7	37.4	4,679.1	4,679.2	0.00	0.00	0.00
12,100.0	90.51	90.00	6,699.8	37.4	4,779.1	4,779.2	0.00	0.00	0.00
12,200.0	90.51	90.00	6,698.9	37.4	4,879.1	4,879.2	0.00	0.00	0.00
12,300.0	90.51	90.00	6,698.0	37.4	4,979.1	4,979.2	0.00	0.00	0.00
12,400.0	90.51	90.00	6,697.1	37.4	5,079.1	5,079.2	0.00	0.00	0.00
12,500.0	90.51	90.00	6,696.2	37.4	5,179.1	5,179.2	0.00	0.00	0.00
12,600.0	90.51	90.00	6,695.3	37.4	5,279.1	5,279.2	0.00	0.00	0.00
12,700.0	90.51	90.00	6,694.5	37.4	5,379.1	5,379.2	0.00	0.00	0.00
12,800.0	90.51	90.00	6,693.6	37.4	5,479.1	5,479.2	0.00	0.00	0.00
12,900.0	90.51	90.00	6,692.7	37.4	5,579.1	5,579.2	0.00	0.00	0.00
13,000.0	90.51	90.00	6,691.8	37.4	5,679.1	5,679.2	0.00	0.00	0.00
13,100.0	90.51	90.00	6,690.9	37.4	5,779.1	5,779.2	0.00	0.00	0.00
13,200.0	90.51	90.00	6,690.0	37.4	5,879.1	5,879.2	0.00	0.00	0.00
13,300.0	90.51	90.00	6,689.1	37.4	5,979.0	5,979.2	0.00	0.00	0.00
13,400.0	90.51	90.00	6,688.2	37.4	6,079.0	6,079.1	0.00	0.00	0.00
13,500.0	90.51	90.00	6,687.3	37.4	6,179.0	6,179.1	0.00	0.00	0.00

Database:	US_EDM	**Local Co-ordinate Reference:**	Well Hop 18F-212
Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Project:	SEC.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**North Reference:**	True
Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-16-15)		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,600.0	90.51	90.00	6,686.4	37.4	6,279.0	6,279.1	0.00	0.00	0.00
13,700.0	90.51	90.00	6,685.6	37.4	6,379.0	6,379.1	0.00	0.00	0.00
13,800.0	90.51	90.00	6,684.7	37.4	6,479.0	6,479.1	0.00	0.00	0.00
13,900.0	90.51	90.00	6,683.8	37.4	6,579.0	6,579.1	0.00	0.00	0.00
14,000.0	90.51	90.00	6,682.9	37.4	6,679.0	6,679.1	0.00	0.00	0.00
14,100.0	90.51	90.00	6,682.0	37.4	6,779.0	6,779.1	0.00	0.00	0.00
14,200.0	90.51	90.00	6,681.1	37.4	6,879.0	6,879.1	0.00	0.00	0.00
14,300.0	90.51	90.00	6,680.2	37.4	6,979.0	6,979.1	0.00	0.00	0.00
14,400.0	90.51	90.00	6,679.3	37.4	7,079.0	7,079.1	0.00	0.00	0.00
14,500.0	90.51	90.00	6,678.4	37.4	7,179.0	7,179.1	0.00	0.00	0.00
14,600.0	90.51	90.00	6,677.5	37.4	7,279.0	7,279.1	0.00	0.00	0.00
14,700.0	90.51	90.00	6,676.7	37.4	7,379.0	7,379.1	0.00	0.00	0.00
14,800.0	90.51	90.00	6,675.8	37.4	7,479.0	7,479.1	0.00	0.00	0.00
14,900.0	90.51	90.00	6,674.9	37.4	7,579.0	7,579.1	0.00	0.00	0.00
15,000.0	90.51	90.00	6,674.0	37.4	7,679.0	7,679.1	0.00	0.00	0.00
15,100.0	90.51	90.00	6,673.1	37.4	7,779.0	7,779.1	0.00	0.00	0.00
15,200.0	90.51	90.00	6,672.2	37.4	7,879.0	7,879.1	0.00	0.00	0.00
15,300.0	90.51	90.00	6,671.3	37.4	7,979.0	7,979.1	0.00	0.00	0.00
15,400.0	90.51	90.00	6,670.4	37.4	8,079.0	8,079.1	0.00	0.00	0.00
15,500.0	90.51	90.00	6,669.5	37.4	8,179.0	8,179.0	0.00	0.00	0.00
15,600.0	90.51	90.00	6,668.6	37.4	8,279.0	8,279.0	0.00	0.00	0.00
15,700.0	90.51	90.00	6,667.8	37.4	8,379.0	8,379.0	0.00	0.00	0.00
15,800.0	90.51	90.00	6,666.9	37.4	8,479.0	8,479.0	0.00	0.00	0.00
15,900.0	90.51	90.00	6,666.0	37.4	8,578.9	8,579.0	0.00	0.00	0.00
16,000.0	90.51	90.00	6,665.1	37.4	8,678.9	8,679.0	0.00	0.00	0.00
16,100.0	90.51	90.00	6,664.2	37.4	8,778.9	8,779.0	0.00	0.00	0.00
16,200.0	90.51	90.00	6,663.3	37.4	8,878.9	8,879.0	0.00	0.00	0.00
16,300.0	90.51	90.00	6,662.4	37.4	8,978.9	8,979.0	0.00	0.00	0.00
16,346.6	90.51	90.00	6,662.0	37.4	9,025.5	9,025.6	0.00	0.00	0.00
TD at 16346.6 - BHL 1030'FNL, 500'FEL, SEC.17									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SHL 1000'FNL, 878'FWL - plan hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,391,153.78	3,251,013.14	40.403617	-104.598666
BHL 1030'FNL, 500'FEL - plan hits target center - Point	0.00	0.00	6,662.0	37.4	9,025.6	1,391,282.86	3,260,037.49	40.403715	-104.566259

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,263.5	6,742.8	7"	7	8-3/4

Database:	US_EDM	**Local Co-ordinate Reference:**	Well Hop 18F-212
Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Project:	SEC.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**North Reference:**	True
Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-16-15)		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,530.1	3,490.0	Parkman		0.00	
4,265.2	4,210.0	Sussex		0.00	
6,686.8	6,540.0	Sharon Springs		0.00	
6,799.3	6,610.0	Niobrara A		0.00	
6,999.5	6,700.0	Niobrara B		0.00	

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
800.0	800.0	0.0	0.0	KOP - Start Build 1.00
5,102.5	5,030.1	5.3	-117.5	Start Drop -1.50
5,877.7	5,800.0	33.8	-749.7	Start 178.9 hold at 5877.7 MD
6,056.7	5,978.9	37.4	-828.0	Start Build 7.50
7,263.5	6,742.8	37.4	-828.0	Start 9083.2 hold at 7263.5 MD
16,346.6	6,662.0	37.4	-57.3	TD at 16346.6

ENSIGN Directional

PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.18-T5N-R64W
Hop 5N64W18A Pad Sec.18-T5N-R64W
Hop 18F-212

Wellbore #1
Plan #1 (12-16-15)

Anticollision Report

21 December, 2015

PDC ENERGY
Growing E&P Value

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Reference Plan #1 (12-16-15)

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 500.0 ft	**Error Surface:**	Elliptical Conic
Warning Levels Evaluated at:	2.00 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 12/21/2015

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	16,346.6	Plan #1 (12-16-15) (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.17 & 18-T5N-R64W						
Bright 1 (SI) - Wellbore #1 - Wellbore #1	3,142.8	3,097.0	383.4	368.2	25.085	CC
Bright 1 (SI) - Wellbore #1 - Wellbore #1	6,991.5	6,682.6	387.1	354.7	11.963	ES
Bright 1 (SI) - Wellbore #1 - Wellbore #1	7,050.0	6,701.6	391.0	358.2	11.906	SF
Bright/Dunn 18D (Exist) - Wellbore #1 - Wellbore #1	7,738.5	6,724.3	285.1	240.6	6.397	CC, ES
Bright/Dunn 18D (Exist) - Wellbore #1 - Wellbore #1	7,800.0	6,723.5	291.7	245.8	6.350	SF
Dunn 1- Cache (Exist) - Wellbore #1 - Wellbore #1	8,234.6	6,720.4	356.0	299.1	6.257	CC, ES
Dunn 1- Cache (Exist) - Wellbore #1 - Wellbore #1	8,300.0	6,719.3	362.0	303.4	6.183	SF
Gunther 18-1 (Exist) - Wellbore #1 - Wellbore #1	9,565.8	6,705.6	307.4	215.7	3.350	CC, ES
Gunther 18-1 (Exist) - Wellbore #1 - Wellbore #1	9,600.0	6,705.4	309.3	216.6	3.337	SF
Gunther B 18-1 (Exist) - Wellbore #1 - Wellbore #1	10,884.6	6,691.6	320.3	70.5	1.282	Level 3, CC
Gunther B 18-1 (Exist) - Wellbore #1 - Wellbore #1	10,900.0	6,691.5	320.7	70.4	1.281	Level 3, ES, SF
Hoshiko 31-17 (Exist) - Wellbore #1 - Wellbore #1	14,972.6	6,660.9	206.8	-34.9	0.856	Level 1, CC, ES, SF
Hoshiko 41-17 (Exist) - Wellbore #1 - Wellbore #1	16,115.0	6,636.8	249.7	-24.0	0.912	Level 1, CC, ES, SF
Puype B 18-17 (Exist) - Wellbore #1 - Wellbore #1	10,250.8	6,697.3	318.1	85.6	1.369	Level 3, CC, ES, SF
Schaumberg 1 (Exist) - Wellbore #1 - Wellbore #1	12,265.5	6,678.1	266.0	99.9	1.602	CC, ES, SF
Steinmetz 21-17 (Exist) - Wellbore #1 - Wellbore #1	13,632.8	6,665.9	276.2	70.8	1.345	Level 3, CC, ES, SF
Hop 5N64W18A Pad Sec.18-T5N-R64W						
Hop 18E-232 - Wellbore #1 - Plan #1 (12-16-15)	400.0	400.0	30.1	28.5	19.119	CC, ES
Hop 18E-232 - Wellbore #1 - Plan #1 (12-16-15)	800.0	797.8	41.7	38.3	12.371	SF
Hop 18E-332 - Wellbore #1 - Plan #1 (12-16-15)	600.0	600.0	15.0	12.6	6.083	CC
Hop 18E-332 - Wellbore #1 - Plan #1 (12-16-15)	16,346.6	16,429.1	424.1	-105.6	0.801	Level 1, ES, SF
Hop 18E-402 - Wellbore #1 - Plan #1 (12-16-15)	200.0	200.0	44.8	44.2	66.501	CC, ES
Hop 18E-402 - Wellbore #1 - Plan #1 (12-16-15)	800.0	794.7	69.6	66.2	20.294	SF
Hop 18F-102 - Wellbore #1 - Plan #1 (12-16-15)	800.0	800.0	15.0	11.7	4.461	CC
Hop 18F-102 - Wellbore #1 - Plan #1 (12-16-15)	16,346.6	16,232.4	259.4	-230.3	0.530	Level 1, ES, SF

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Bright 1 (SI) - Wellbore #1 - Wellbore #1

Survey Program: 100-NS-GYRO-MS

Offset Site Error: 0.0 ft

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
1,500.0	1,498.3	1,478.9	1,478.7	3.3	3.8	53.14	413.3	-324.8	498.8	491.8	7.02	71.102	

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Bright 1 (SI) - 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)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
1,600.0	1,597.4	1,579.9	1,579.7	3.6	4.0	54.46	413.9	-324.9	491.6	484.1	7.54	65.167	
1,700.0	1,696.3	1,678.9	1,678.7	3.9	4.3	55.96	414.2	-324.9	483.4	475.3	8.08	59.841	
1,800.0	1,794.9	1,778.5	1,778.3	4.2	4.5	57.66	414.3	-325.2	474.5	466.0	8.58	55.336	
1,900.0	1,893.3	1,879.3	1,879.1	4.5	4.6	59.60	413.9	-325.7	464.8	455.8	9.00	51.633	
1,962.9	1,954.9	1,942.1	1,941.9	4.8	4.6	60.93	413.4	-326.0	458.3	449.0	9.26	49.509	
2,000.0	1,991.3	1,979.0	1,978.8	4.9	4.6	61.71	413.0	-326.2	454.4	445.0	9.41	48.293	
2,100.0	2,089.2	2,077.6	2,077.4	5.3	4.7	63.86	411.9	-326.6	444.1	434.3	9.83	45.169	
2,200.0	2,187.2	2,176.0	2,175.8	5.7	4.7	66.13	410.7	-326.8	434.4	424.2	10.27	42.297	
2,300.0	2,285.1	2,274.2	2,274.0	6.1	4.7	68.54	409.5	-326.8	425.4	414.7	10.72	39.675	
2,400.0	2,383.1	2,372.4	2,372.2	6.5	4.8	71.05	408.4	-326.5	417.1	405.9	11.19	37.266	
2,500.0	2,481.0	2,470.5	2,470.3	6.9	4.8	73.65	407.2	-326.4	409.6	397.9	11.69	35.044	
2,600.0	2,579.0	2,569.1	2,568.8	7.4	4.9	76.31	405.8	-326.4	402.9	390.7	12.21	32.999	
2,700.0	2,676.9	2,667.4	2,667.1	7.8	5.0	79.03	404.2	-326.5	397.0	384.2	12.75	31.134	
2,800.0	2,774.9	2,765.4	2,765.1	8.2	5.1	81.82	402.7	-326.7	391.9	378.6	13.30	29.461	
2,900.0	2,872.8	2,862.9	2,862.6	8.6	5.2	84.65	401.1	-326.8	387.9	374.0	13.87	27.975	
3,000.0	2,970.7	2,959.9	2,959.6	9.1	5.4	87.48	399.7	-327.3	385.1	370.6	14.44	26.659	
3,100.0	3,068.7	3,056.0	3,055.7	9.5	5.5	90.28	398.8	-327.9	383.6	368.6	15.03	25.516	
3,142.8	3,110.6	3,097.0	3,096.6	9.7	5.6	91.49	398.5	-328.0	383.4	368.2	15.29	25.085	CC
3,200.0	3,166.6	3,152.6	3,152.2	9.9	5.7	93.15	398.3	-328.2	383.6	368.0	15.62	24.566	
3,300.0	3,264.6	3,249.8	3,249.5	10.4	5.8	96.06	397.9	-328.2	385.0	368.8	16.17	23.806	
3,400.0	3,362.5	3,347.3	3,346.9	10.8	6.0	98.98	397.8	-328.0	387.5	370.8	16.69	23.220	
3,500.0	3,460.5	3,445.3	3,444.9	11.3	6.1	101.89	397.6	-327.8	391.1	373.9	17.19	22.759	
3,600.0	3,558.4	3,543.6	3,543.3	11.7	6.2	104.74	397.4	-327.5	395.7	378.0	17.68	22.384	
3,700.0	3,656.4	3,642.0	3,641.7	12.1	6.4	107.53	397.0	-327.3	401.1	382.9	18.17	22.078	
3,800.0	3,754.3	3,740.1	3,739.7	12.6	6.5	110.22	396.6	-327.2	407.4	388.8	18.65	21.843	
3,900.0	3,852.3	3,838.1	3,837.8	13.0	6.7	112.82	396.2	-327.1	414.6	395.4	19.13	21.668	
4,000.0	3,950.2	3,935.7	3,935.4	13.5	6.9	115.30	395.9	-327.3	422.6	403.0	19.61	21.550	
4,100.0	4,048.2	4,032.9	4,032.6	13.9	7.1	117.68	395.6	-327.2	431.6	411.5	20.07	21.508	
4,200.0	4,146.1	4,130.6	4,130.2	14.4	7.2	119.98	395.5	-327.0	441.4	420.9	20.49	21.539	
4,300.0	4,244.1	4,228.7	4,228.3	14.8	7.4	122.21	395.3	-326.8	451.9	431.0	20.91	21.613	
4,400.0	4,342.0	4,326.9	4,326.6	15.3	7.6	124.34	395.0	-326.6	463.1	441.7	21.32	21.715	
4,500.0	4,440.0	4,425.7	4,425.4	15.7	7.8	126.37	394.6	-326.5	474.6	452.9	21.75	21.827	
4,600.0	4,537.9	4,523.0	4,522.7	16.1	8.0	128.26	394.4	-326.6	486.8	464.6	22.16	21.962	
4,700.0	4,635.9	4,619.8	4,619.5	16.6	8.1	130.02	394.4	-326.6	499.7	477.1	22.55	22.156	
6,650.0	6,514.4	6,496.3	6,495.5	19.7	11.4	-62.00	423.1	-324.2	479.5	450.7	28.75	16.677	
6,700.0	6,548.9	6,530.4	6,529.7	19.6	11.4	-66.51	423.5	-324.3	459.1	429.8	29.35	15.642	
6,750.0	6,580.9	6,562.3	6,561.6	19.7	11.5	-71.15	423.8	-324.4	439.8	409.8	29.98	14.670	
6,800.0	6,610.4	6,591.7	6,591.0	19.7	11.6	-75.74	424.0	-324.4	422.2	391.7	30.58	13.808	
6,850.0	6,637.2	6,619.3	6,618.5	19.9	11.6	-80.18	424.3	-324.4	407.3	376.2	31.13	13.086	
6,900.0	6,661.1	6,644.3	6,643.6	20.1	11.6	-84.25	424.4	-324.3	395.9	364.3	31.60	12.529	
6,950.0	6,682.2	6,666.5	6,665.7	20.3	11.7	-87.73	424.4	-324.2	388.9	356.9	32.02	12.147	
6,991.5	6,697.3	6,682.6	6,681.9	20.6	11.7	-90.09	424.4	-324.2	387.1	354.7	32.35	11.963	ES
7,000.0	6,700.2	6,685.7	6,684.9	20.7	11.7	-90.50	424.4	-324.1	387.1	354.7	32.42	11.942	
7,050.0	6,715.1	6,701.6	6,700.9	21.1	11.7	-92.46	424.4	-324.0	391.0	358.2	32.84	11.906	SF
7,100.0	6,726.9	6,714.1	6,713.4	21.7	11.8	-93.50	424.3	-323.9	400.8	367.4	33.34	12.022	
7,150.0	6,735.4	6,723.4	6,722.6	22.2	11.8	-93.63	424.3	-323.9	416.3	382.3	33.92	12.270	
7,200.0	6,740.8	6,729.4	6,728.6	22.9	11.8	-92.80	424.2	-323.8	437.0	402.4	34.61	12.627	
7,250.0	6,742.9	6,732.0	6,731.3	23.6	11.8	-90.98	424.2	-323.8	462.3	427.0	35.36	13.076	
7,263.5	6,742.8	6,732.2	6,731.4	23.8	11.8	-90.32	424.2	-323.8	469.8	434.3	35.56	13.212	
7,300.0	6,742.5	6,732.2	6,731.4	24.3	11.8	-90.33	424.2	-323.8	491.5	455.4	36.11	13.609	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Bright/Dunn 18D (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)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
7,400.0	6,741.6	6,728.7	6,727.9	26.0	11.8	90.86	-247.8	417.8	442.6	404.8	37.77	11.718	
7,500.0	6,740.7	6,727.4	6,726.6	27.8	11.8	90.60	-247.8	417.8	371.7	332.1	39.61	9.384	
7,600.0	6,739.9	6,726.1	6,725.3	29.8	11.8	90.34	-247.8	417.8	317.0	275.4	41.61	7.619	
7,700.0	6,739.0	6,724.8	6,724.0	31.9	11.8	90.08	-247.8	417.8	287.7	244.0	43.72	6.581	
7,738.5	6,738.6	6,724.3	6,723.5	32.8	11.8	89.98	-247.8	417.8	285.1	240.6	44.58	6.397	CC, ES
7,800.0	6,738.1	6,723.5	6,722.7	34.2	11.8	89.81	-247.8	417.8	291.7	245.8	45.94	6.350	SF
7,900.0	6,737.2	6,722.1	6,721.4	36.5	11.8	89.54	-247.8	417.8	327.7	279.5	48.24	6.794	
8,000.0	6,736.3	6,720.7	6,720.0	38.8	11.8	89.27	-247.8	417.8	386.9	336.3	50.60	7.646	
8,100.0	6,735.4	6,719.4	6,718.6	41.3	11.8	88.99	-247.8	417.8	460.4	407.4	53.01	8.684	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Dunn 1- Cache (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)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
7,900.0	6,737.2	6,725.8	6,725.3	36.5	12.3	-90.82	393.4	913.8	488.6	439.8	48.78	10.016	
8,000.0	6,736.3	6,724.2	6,723.7	38.8	12.3	-90.57	393.4	913.8	426.4	375.2	51.14	8.336	
8,100.0	6,735.4	6,722.6	6,722.1	41.3	12.3	-90.31	393.4	913.8	380.6	327.0	53.57	7.105	
8,200.0	6,734.5	6,721.0	6,720.5	43.7	12.3	-90.04	393.4	913.9	357.7	301.7	56.04	6.383	
8,234.6	6,734.2	6,720.4	6,719.9	44.6	12.3	-89.95	393.4	913.9	356.0	299.1	56.90	6.257	CC, ES
8,300.0	6,733.6	6,719.3	6,718.8	46.2	12.3	-89.78	393.4	913.9	362.0	303.4	58.54	6.183	SF
8,400.0	6,732.7	6,717.7	6,717.1	48.8	12.3	-89.51	393.4	913.9	392.5	331.5	61.08	6.427	
8,500.0	6,731.8	6,715.9	6,715.4	51.3	12.3	-89.23	393.4	913.9	444.0	380.4	63.64	6.977	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Gunther 18-1 (Exist) - Wellbore #1 - Wellbore #1

Survey Program: 100-NS-GYRO-MS

Offset Site Error: 0.0 ft

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
9,200.0	6,725.6	6,707.8	6,707.2	69.9	12.0	-90.34	344.8	2,245.0	477.8	395.9	81.87	5.836	
9,300.0	6,724.7	6,707.2	6,706.6	72.5	12.0	-90.23	344.8	2,245.0	406.4	321.8	84.56	4.806	
9,400.0	6,723.8	6,706.6	6,706.0	75.2	12.0	-90.11	344.8	2,245.0	349.3	262.0	87.26	4.002	
9,500.0	6,722.9	6,706.0	6,705.4	78.0	12.0	-90.00	344.8	2,245.0	314.4	224.4	89.97	3.494	
9,565.8	6,722.4	6,705.6	6,705.0	79.7	12.0	-89.93	344.8	2,245.0	307.4	215.7	91.76	3.350	CC, ES
9,600.0	6,722.1	6,705.4	6,704.8	80.7	12.0	-89.89	344.8	2,245.0	309.3	216.6	92.69	3.337	SF
9,700.0	6,721.2	6,704.8	6,704.2	83.4	12.0	-89.78	344.8	2,244.9	335.5	240.0	95.41	3.516	
9,800.0	6,720.3	6,704.2	6,703.6	86.1	12.0	-89.67	344.8	2,244.9	386.5	288.4	98.14	3.938	
9,900.0	6,719.4	6,703.6	6,703.0	88.9	12.0	-89.56	344.8	2,244.9	454.1	353.2	100.87	4.502	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Gunther B 18-1 (Exist) - Wellbore #1 - Wellbore #1

Offset Site Error: 0.0 ft

Survey Program: 7035-UNKNOWN

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,600.0	6,713.2	6,694.2	6,694.2	108.1	133.9	-90.45	357.7	3,563.7	428.4	186.5	241.98	1.771	
10,700.0	6,712.3	6,693.3	6,693.3	110.9	133.9	-90.29	357.7	3,563.7	369.7	124.9	244.72	1.511	
10,800.0	6,711.4	6,692.4	6,692.4	113.6	133.8	-90.13	357.7	3,563.7	331.3	83.8	247.47	1.339	Level 3
10,884.6	6,710.6	6,691.6	6,691.6	116.0	133.8	-90.00	357.7	3,563.7	320.3	70.5	249.80	1.282	Level 3, CC
10,900.0	6,710.5	6,691.5	6,691.5	116.4	133.8	-89.98	357.7	3,563.7	320.7	70.4	250.22	1.281	Level 3, ES, SF
11,000.0	6,709.6	6,690.6	6,690.6	119.2	133.8	-89.82	357.7	3,563.7	340.4	87.5	252.97	1.346	Level 3
11,100.0	6,708.7	6,689.7	6,689.7	121.9	133.8	-89.66	357.7	3,563.7	386.0	130.3	255.72	1.509	
11,200.0	6,707.8	6,688.8	6,688.8	124.7	133.8	-89.50	357.7	3,563.7	449.5	191.0	258.47	1.739	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Hoshiko 31-17 (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)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
14,600.0	6,677.5	6,660.3	6,658.8	219.5	11.8	-89.88	244.2	7,651.6	426.1	194.9	231.28	1.843	
14,700.0	6,676.7	6,660.5	6,659.0	222.3	11.8	-89.93	244.2	7,651.6	342.2	108.1	234.08	1.462	Level 3
14,800.0	6,675.8	6,660.6	6,659.1	225.1	11.8	-89.98	244.2	7,651.6	269.4	32.5	236.87	1.137	Level 2
14,900.0	6,674.9	6,660.8	6,659.3	227.9	11.8	-90.02	244.2	7,651.6	219.2	-20.5	239.67	0.915	Level 1
14,972.6	6,674.2	6,660.9	6,659.4	230.0	11.8	-90.06	244.2	7,651.6	206.8	-34.9	241.70	0.856	Level 1, CC, ES, SF
15,000.0	6,674.0	6,661.0	6,659.5	230.7	11.8	-90.07	244.2	7,651.6	208.6	-33.8	242.47	0.860	Level 1
15,100.0	6,673.1	6,661.2	6,659.7	233.5	11.8	-90.12	244.2	7,651.6	242.9	-2.3	245.27	0.990	Level 1
15,200.0	6,672.2	6,661.3	6,659.8	236.3	11.8	-90.17	244.2	7,651.6	307.4	59.3	248.07	1.239	Level 2
15,300.0	6,671.3	6,661.5	6,660.0	239.1	11.8	-90.21	244.2	7,651.6	387.3	136.4	250.87	1.544	
15,400.0	6,670.4	6,661.7	6,660.2	241.9	11.8	-90.26	244.2	7,651.6	474.8	221.2	253.67	1.872	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Hoshiko 41-17 (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)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
15,700.0	6,667.8	6,625.7	6,624.9	250.3	11.7	-87.43	287.0	8,793.6	484.2	222.4	261.82	1.849	
15,800.0	6,666.9	6,628.3	6,627.5	253.1	11.7	-88.03	287.0	8,793.7	401.9	137.2	264.72	1.518	
15,900.0	6,666.0	6,631.0	6,630.1	255.9	11.7	-88.64	287.0	8,793.8	329.5	61.9	267.60	1.231	Level 2
16,000.0	6,665.1	6,633.7	6,632.8	258.7	11.7	-89.25	287.0	8,793.9	274.9	4.4	270.45	1.016	Level 2
16,100.0	6,664.2	6,636.4	6,635.6	261.5	11.7	-89.89	287.0	8,794.0	250.1	-23.1	273.27	0.915	Level 1
16,115.0	6,664.1	6,636.8	6,636.0	261.9	11.7	-89.98	287.0	8,794.0	249.7	-24.0	273.69	0.912	Level 1, CC, ES, SF
16,200.0	6,663.3	6,639.2	6,638.4	264.3	11.8	-90.53	287.0	8,794.1	263.7	-12.3	276.06	0.955	Level 1
16,300.0	6,662.4	6,642.1	6,641.2	267.1	11.8	-91.18	287.0	8,794.2	310.7	31.9	278.81	1.114	Level 2
16,346.6	6,662.0	6,643.4	6,642.6	268.4	11.8	-91.49	287.0	8,794.2	340.5	60.4	280.09	1.216	Level 2

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Puype B 18-17 (Exist) - Wellbore #1 - Wellbore #1

Offset Site Error: 0.0 ft

Survey Program: 7055-UNKNOWN

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
9,900.0	6,719.4	6,700.4	6,700.4	88.9	134.0	90.56	-280.7	2,929.9	473.5	250.6	222.86	2.125	
10,000.0	6,718.5	6,699.5	6,699.5	91.6	134.0	90.40	-280.7	2,929.9	405.0	179.4	225.58	1.795	
10,100.0	6,717.6	6,698.6	6,698.6	94.3	134.0	90.24	-280.7	2,929.9	352.0	123.7	228.31	1.542	
10,200.0	6,716.7	6,697.7	6,697.7	97.1	134.0	90.08	-280.7	2,929.9	322.1	91.1	231.04	1.394	Level 3
10,250.8	6,716.3	6,697.3	6,697.3	98.5	133.9	90.00	-280.7	2,929.9	318.1	85.6	232.43	1.369	Level 3, CC, ES, SF
10,300.0	6,715.8	6,696.8	6,696.8	99.8	133.9	89.92	-280.7	2,929.9	321.9	88.1	233.77	1.377	Level 3
10,400.0	6,714.9	6,695.9	6,695.9	102.6	133.9	89.76	-280.7	2,929.9	351.3	114.8	236.50	1.486	Level 3
10,500.0	6,714.0	6,695.0	6,695.0	105.3	133.9	89.60	-280.7	2,929.9	404.1	164.9	239.24	1.689	
10,600.0	6,713.2	6,694.2	6,694.2	108.1	133.9	89.44	-280.7	2,929.9	472.4	230.4	241.97	1.952	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Schaumberg 1 (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)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
11,900.0	6,701.6	6,678.1	6,677.7	144.1	11.7	-90.07	303.4	4,944.6	452.0	296.1	155.88	2.900	
12,000.0	6,700.7	6,678.1	6,677.7	146.9	11.7	-90.08	303.4	4,944.6	375.8	217.1	158.66	2.369	
12,100.0	6,699.8	6,678.1	6,677.7	149.7	11.7	-90.08	303.4	4,944.6	313.3	151.8	161.44	1.940	
12,200.0	6,698.9	6,678.1	6,677.7	152.5	11.7	-90.08	303.4	4,944.6	273.9	109.7	164.23	1.668	
12,265.5	6,698.3	6,678.1	6,677.7	154.3	11.7	-90.08	303.4	4,944.6	266.0	99.9	166.05	1.602	CC, ES, SF
12,300.0	6,698.0	6,678.1	6,677.7	155.3	11.7	-90.08	303.4	4,944.6	268.2	101.2	167.01	1.606	
12,400.0	6,697.1	6,678.2	6,677.7	158.1	11.7	-90.09	303.4	4,944.6	298.1	128.3	169.80	1.756	
12,500.0	6,696.2	6,678.2	6,677.7	160.9	11.7	-90.09	303.4	4,944.6	354.6	182.0	172.59	2.055	
12,600.0	6,695.3	6,678.2	6,677.8	163.6	11.7	-90.09	303.4	4,944.6	427.4	252.0	175.37	2.437	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells - Sec.17 & 18-T5N-R64W - Steinmetz 21-17 (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)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
13,300.0	6,689.1	6,662.2	6,658.8	183.2	12.9	-89.10	313.6	6,311.8	432.5	236.4	196.07	2.206	
13,400.0	6,688.2	6,663.3	6,659.9	186.0	12.9	-89.33	313.6	6,311.8	361.3	162.4	198.88	1.816	
13,500.0	6,687.3	6,664.4	6,661.1	188.8	12.9	-89.57	313.6	6,311.8	306.5	104.8	201.68	1.520	
13,600.0	6,686.4	6,665.5	6,662.2	191.6	12.9	-89.80	313.6	6,311.8	278.2	73.7	204.48	1.360	Level 3
13,632.8	6,686.2	6,665.9	6,662.6	192.5	12.9	-89.88	313.6	6,311.9	276.2	70.8	205.40	1.345	Level 3, CC, ES, SF
13,700.0	6,685.6	6,666.6	6,663.3	194.4	12.9	-90.03	313.6	6,311.9	284.3	77.0	207.27	1.372	Level 3
13,800.0	6,684.7	6,667.8	6,664.4	197.2	12.9	-90.26	313.6	6,311.9	322.9	112.8	210.07	1.537	
13,900.0	6,683.8	6,668.9	6,665.6	199.9	12.9	-90.50	313.6	6,311.9	384.3	171.4	212.86	1.805	
14,000.0	6,682.9	6,670.0	6,666.7	202.7	12.9	-90.73	313.6	6,311.9	459.5	243.8	215.65	2.131	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18E-232 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-89.30	0.4	-30.1	30.1				
100.0	100.0	100.0	100.0	0.1	0.1	-89.30	0.4	-30.1	30.1	29.9	0.22	133.833	
200.0	200.0	200.0	200.0	0.3	0.3	-89.30	0.4	-30.1	30.1	29.4	0.67	44.611	
300.0	300.0	300.0	300.0	0.6	0.6	-89.30	0.4	-30.1	30.1	29.0	1.12	26.767	
400.0	400.0	400.0	400.0	0.8	0.8	-89.30	0.4	-30.1	30.1	28.5	1.57	19.119	CC, ES
500.0	500.0	499.6	499.6	1.0	1.0	-88.26	0.9	-30.7	30.7	28.7	2.02	15.237	
600.0	600.0	599.1	599.1	1.2	1.2	-85.39	2.6	-32.7	32.8	30.3	2.46	13.325	
700.0	700.0	698.5	698.4	1.5	1.5	-81.36	5.5	-36.0	36.4	33.5	2.91	12.501	
800.0	800.0	797.8	797.4	1.7	1.7	-76.92	9.4	-40.5	41.7	38.3	3.37	12.371	SF
900.0	900.0	896.8	896.2	1.9	1.9	15.01	14.5	-46.3	47.9	44.1	3.79	12.625	
1,000.0	1,000.0	995.7	994.6	2.1	2.2	19.65	20.6	-53.5	54.3	50.0	4.22	12.861	
1,100.0	1,099.9	1,094.4	1,092.7	2.3	2.4	24.34	27.9	-61.8	61.0	56.4	4.65	13.112	
1,200.0	1,199.7	1,192.9	1,190.4	2.5	2.7	28.98	36.3	-71.5	68.3	63.2	5.10	13.398	
1,300.0	1,299.4	1,291.2	1,287.6	2.8	3.0	33.52	45.7	-82.3	76.2	70.6	5.55	13.725	
1,400.0	1,398.9	1,389.2	1,384.3	3.0	3.4	37.89	56.2	-94.4	84.8	78.8	6.02	14.087	
1,500.0	1,498.3	1,487.0	1,480.5	3.3	3.7	42.04	67.7	-107.8	94.2	87.7	6.51	14.475	
1,600.0	1,597.4	1,584.6	1,576.2	3.6	4.1	45.95	80.3	-122.3	104.6	97.5	7.03	14.875	
1,700.0	1,696.3	1,681.8	1,671.2	3.9	4.5	49.60	93.9	-138.0	115.8	108.3	7.59	15.269	
1,800.0	1,794.9	1,778.8	1,765.5	4.2	4.9	52.98	108.5	-154.8	128.1	119.9	8.19	15.647	
1,900.0	1,893.3	1,877.6	1,861.5	4.5	5.4	56.27	124.0	-172.6	140.7	131.8	8.85	15.903	
1,962.9	1,954.9	1,939.8	1,921.8	4.8	5.7	58.33	133.7	-183.9	148.3	139.0	9.29	15.967	
2,000.0	1,991.3	1,976.5	1,957.5	4.9	5.9	59.56	139.5	-190.5	152.8	143.3	9.56	15.982	
2,100.0	2,089.2	2,075.4	2,053.5	5.3	6.3	62.52	155.0	-208.4	165.2	154.9	10.32	16.016	
2,200.0	2,187.2	2,174.3	2,149.6	5.7	6.8	65.06	170.5	-226.2	178.0	166.9	11.10	16.040	
2,300.0	2,285.1	2,273.2	2,245.6	6.1	7.3	67.26	185.9	-244.1	191.2	179.2	11.90	16.058	
2,400.0	2,383.1	2,372.1	2,341.6	6.5	7.8	69.18	201.4	-261.9	204.5	191.8	12.72	16.072	
2,500.0	2,481.0	2,470.9	2,437.6	6.9	8.3	70.86	216.9	-279.8	218.0	204.5	13.56	16.083	
2,600.0	2,579.0	2,569.8	2,533.6	7.4	8.8	72.34	232.4	-297.6	231.8	217.4	14.40	16.093	
2,700.0	2,676.9	2,668.7	2,629.7	7.8	9.3	73.66	247.9	-315.5	245.6	230.3	15.25	16.101	
2,800.0	2,774.9	2,767.6	2,725.7	8.2	9.8	74.84	263.3	-333.3	259.6	243.4	16.11	16.109	
2,900.0	2,872.8	2,866.5	2,821.7	8.6	10.2	75.89	278.8	-351.2	273.6	256.6	16.98	16.117	
3,000.0	2,970.7	2,965.4	2,917.7	9.1	10.7	76.85	294.3	-369.0	287.7	269.9	17.85	16.124	
3,100.0	3,068.7	3,064.3	3,013.8	9.5	11.2	77.71	309.8	-386.9	302.0	283.2	18.72	16.131	
3,200.0	3,166.6	3,163.1	3,109.8	9.9	11.7	78.50	325.3	-404.7	316.2	296.6	19.60	16.137	
3,300.0	3,264.6	3,262.0	3,205.8	10.4	12.2	79.22	340.8	-422.6	330.5	310.1	20.48	16.144	
3,400.0	3,362.5	3,360.9	3,301.8	10.8	12.7	79.88	356.2	-440.4	344.9	323.6	21.36	16.150	
3,500.0	3,460.5	3,459.8	3,397.8	11.3	13.2	80.48	371.7	-458.3	359.3	337.1	22.24	16.157	
3,600.0	3,558.4	3,558.7	3,493.9	11.7	13.7	81.04	387.2	-476.1	373.8	350.7	23.13	16.163	
3,700.0	3,656.4	3,657.6	3,589.9	12.1	14.2	81.56	402.7	-494.0	388.3	364.2	24.01	16.169	
3,800.0	3,754.3	3,756.5	3,685.9	12.6	14.7	82.04	418.2	-511.8	402.8	377.9	24.90	16.175	
3,900.0	3,852.3	3,855.4	3,781.9	13.0	15.2	82.49	433.6	-529.7	417.3	391.5	25.79	16.181	
4,000.0	3,950.2	3,954.2	3,878.0	13.5	15.7	82.90	449.1	-547.5	431.9	405.2	26.68	16.187	
4,100.0	4,048.2	4,053.1	3,974.0	13.9	16.2	83.29	464.6	-565.4	446.4	418.9	27.57	16.193	
4,200.0	4,146.1	4,152.0	4,070.0	14.4	16.7	83.66	480.1	-583.2	461.0	432.6	28.46	16.198	
4,300.0	4,244.1	4,250.9	4,166.0	14.8	17.2	84.00	495.6	-601.1	475.7	446.3	29.35	16.204	
4,400.0	4,342.0	4,349.8	4,262.0	15.3	17.7	84.32	511.1	-618.9	490.3	460.0	30.25	16.209	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18E-332 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-89.97	0.0	-15.0	15.0	15.0	0.00	N/A	
100.0	100.0	100.0	100.0	0.1	0.1	-89.97	0.0	-15.0	15.0	14.8	0.22	66.911	
200.0	200.0	200.0	200.0	0.3	0.3	-89.97	0.0	-15.0	15.0	14.4	0.67	22.304	
300.0	300.0	300.0	300.0	0.6	0.6	-89.97	0.0	-15.0	15.0	13.9	1.12	13.382	
400.0	400.0	400.0	400.0	0.8	0.8	-89.97	0.0	-15.0	15.0	13.5	1.57	9.559	
500.0	500.0	500.0	500.0	1.0	1.0	-89.97	0.0	-15.0	15.0	13.0	2.02	7.435	
600.0	600.0	600.0	600.0	1.2	1.2	-89.97	0.0	-15.0	15.0	12.6	2.47	6.083	CC
700.0	700.0	699.8	699.8	1.5	1.5	-88.43	0.4	-15.8	15.8	12.9	2.92	5.422	
800.0	800.0	799.5	799.4	1.7	1.7	-84.61	1.7	-18.1	18.2	14.8	3.36	5.412	
900.0	900.0	899.1	898.9	1.9	1.9	7.64	3.8	-21.8	21.3	17.6	3.78	5.645	
1,000.0	1,000.0	998.6	998.3	2.1	2.1	13.05	6.8	-27.1	24.6	20.4	4.20	5.858	
1,100.0	1,099.9	1,098.1	1,097.4	2.3	2.4	18.78	10.6	-33.9	28.1	23.5	4.63	6.071	
1,200.0	1,199.7	1,197.4	1,196.4	2.5	2.6	24.62	15.2	-42.2	32.0	26.9	5.07	6.310	
1,300.0	1,299.4	1,296.7	1,295.0	2.8	2.9	30.36	20.7	-51.9	36.3	30.8	5.51	6.582	
1,400.0	1,398.9	1,395.8	1,393.3	3.0	3.2	35.86	27.0	-63.2	41.2	35.2	5.98	6.891	
1,500.0	1,498.3	1,494.9	1,491.2	3.3	3.5	41.02	34.1	-75.9	46.8	40.3	6.47	7.228	
1,600.0	1,597.4	1,593.7	1,588.8	3.6	3.8	45.77	42.0	-90.0	53.1	46.1	7.00	7.583	
1,700.0	1,696.3	1,692.5	1,685.9	3.9	4.1	50.09	50.8	-105.6	60.1	52.5	7.56	7.944	
1,800.0	1,794.9	1,791.1	1,782.5	4.2	4.5	53.99	60.3	-122.7	67.9	59.7	8.18	8.301	
1,900.0	1,893.3	1,890.2	1,879.4	4.5	4.9	57.62	70.6	-141.0	76.2	67.4	8.85	8.612	
1,962.9	1,954.9	1,952.8	1,940.5	4.8	5.2	60.04	77.1	-152.6	81.2	71.9	9.31	8.726	
2,000.0	1,991.3	1,989.8	1,976.7	4.9	5.3	61.47	81.0	-159.5	84.1	74.5	9.59	8.775	
2,100.0	2,089.2	2,089.3	2,073.9	5.3	5.7	64.87	91.3	-178.0	92.2	81.9	10.37	8.897	
2,200.0	2,187.2	2,188.8	2,171.2	5.7	6.2	67.72	101.7	-196.5	100.6	89.4	11.17	9.007	
2,300.0	2,285.1	2,288.4	2,268.4	6.1	6.6	70.12	112.1	-215.0	109.2	97.2	11.99	9.106	
2,400.0	2,383.1	2,387.9	2,365.6	6.5	7.1	72.17	122.5	-233.6	117.9	105.1	12.82	9.195	
2,500.0	2,481.0	2,487.4	2,462.9	6.9	7.5	73.94	132.8	-252.1	126.8	113.1	13.67	9.276	
2,600.0	2,579.0	2,587.0	2,560.1	7.4	7.9	75.48	143.2	-270.6	135.7	121.2	14.52	9.349	
2,700.0	2,676.9	2,686.5	2,657.4	7.8	8.4	76.82	153.6	-289.1	144.8	129.4	15.38	9.416	
2,800.0	2,774.9	2,786.0	2,754.6	8.2	8.8	78.01	164.0	-307.6	153.9	137.7	16.24	9.477	
2,900.0	2,872.8	2,885.6	2,851.9	8.6	9.3	79.06	174.3	-326.1	163.1	146.0	17.11	9.532	
3,000.0	2,970.7	2,985.1	2,949.1	9.1	9.7	80.00	184.7	-344.6	172.3	154.4	17.98	9.584	
3,100.0	3,068.7	3,084.6	3,046.4	9.5	10.2	80.85	195.1	-363.2	181.6	162.8	18.86	9.631	
3,200.0	3,166.6	3,184.2	3,143.6	9.9	10.6	81.61	205.5	-381.7	190.9	171.2	19.73	9.674	
3,300.0	3,264.6	3,283.7	3,240.9	10.4	11.1	82.30	215.8	-400.2	200.3	179.6	20.61	9.715	
3,400.0	3,362.5	3,383.3	3,338.1	10.8	11.6	82.93	226.2	-418.7	209.6	188.1	21.49	9.752	
3,500.0	3,460.5	3,482.8	3,435.4	11.3	12.0	83.51	236.6	-437.2	219.0	196.6	22.38	9.787	
3,600.0	3,558.4	3,582.3	3,532.6	11.7	12.5	84.03	247.0	-455.7	228.4	205.2	23.26	9.820	
3,700.0	3,656.4	3,681.9	3,629.8	12.1	12.9	84.52	257.3	-474.2	237.8	213.7	24.15	9.850	
3,800.0	3,754.3	3,781.4	3,727.1	12.6	13.4	84.97	267.7	-492.8	247.3	222.3	25.03	9.878	
3,900.0	3,852.3	3,880.9	3,824.3	13.0	13.8	85.39	278.1	-511.3	256.7	230.8	25.92	9.905	
4,000.0	3,950.2	3,980.5	3,921.6	13.5	14.3	85.77	288.5	-529.8	266.2	239.4	26.81	9.930	
4,100.0	4,048.2	4,080.0	4,018.8	13.9	14.8	86.13	298.8	-548.3	275.7	248.0	27.70	9.954	
4,200.0	4,146.1	4,179.5	4,116.1	14.4	15.2	86.47	309.2	-566.8	285.2	256.6	28.59	9.976	
4,300.0	4,244.1	4,279.1	4,213.3	14.8	15.7	86.79	319.6	-585.3	294.7	265.2	29.48	9.997	
4,400.0	4,342.0	4,378.6	4,310.6	15.3	16.1	87.08	330.0	-603.9	304.2	273.8	30.37	10.017	
4,500.0	4,440.0	4,478.1	4,407.8	15.7	16.6	87.36	340.4	-622.4	313.7	282.4	31.26	10.036	
4,600.0	4,537.9	4,577.7	4,505.1	16.1	17.1	87.62	350.7	-640.9	323.2	291.1	32.15	10.054	
4,700.0	4,635.9	4,677.2	4,602.3	16.6	17.5	87.86	361.1	-659.4	332.8	299.7	33.04	10.071	
4,800.0	4,733.8	4,776.7	4,699.5	17.0	18.0	88.10	371.5	-677.9	342.3	308.4	33.93	10.087	
4,900.0	4,831.7	4,876.3	4,796.8	17.5	18.5	88.32	381.9	-696.4	351.8	317.0	34.82	10.103	

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18E-332 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,000.0	4,929.7	4,975.8	4,894.0	17.9	18.9	88.52	392.2	-714.9	361.4	325.6	35.72	10.118	
5,102.5	5,030.1	5,077.8	4,993.7	18.4	19.4	88.73	402.9	-733.9	371.2	334.5	36.63	10.132	
5,200.0	5,125.8	5,175.0	5,088.7	18.8	19.8	88.86	413.0	-752.0	380.5	343.1	37.43	10.166	
5,300.0	5,224.5	5,279.5	5,191.0	19.1	20.2	88.79	423.2	-770.1	389.5	351.4	38.05	10.237	
5,400.0	5,323.5	5,384.2	5,294.2	19.3	20.5	88.68	432.0	-785.9	397.2	358.6	38.59	10.292	
5,500.0	5,422.9	5,489.1	5,398.0	19.5	20.8	88.53	439.4	-799.1	403.8	364.7	39.08	10.332	
5,600.0	5,522.5	5,594.2	5,502.3	19.8	21.1	88.33	445.5	-809.9	409.1	369.6	39.51	10.355	
5,700.0	5,622.3	5,699.5	5,607.2	19.9	21.3	88.10	450.1	-818.2	413.2	373.4	39.87	10.364	
5,800.0	5,722.3	5,804.9	5,712.4	20.1	21.5	87.83	453.4	-824.0	416.1	376.0	40.17	10.359	
5,877.7	5,800.0	5,887.0	5,794.4	20.2	21.6	0.17	454.9	-826.8	417.6	387.9	29.69	14.063	
5,900.0	5,822.3	5,910.5	5,817.9	20.2	21.6	0.10	455.2	-827.3	417.8	388.0	29.78	14.031	
6,000.0	5,922.3	6,014.9	5,922.3	20.3	21.8	-0.01	455.6	-828.0	418.2	388.1	30.14	13.876	
6,056.7	5,978.9	6,071.5	5,978.9	20.4	21.8	-0.01	455.6	-828.0	418.2	387.9	30.34	13.784	
6,064.6	5,986.9	6,079.5	5,986.9	20.4	21.9	-90.01	455.6	-828.0	418.2	377.4	40.85	10.238	
6,100.0	6,022.3	6,114.8	6,022.3	20.5	21.9	-90.17	455.6	-828.0	418.2	377.3	40.92	10.222	
6,150.0	6,072.0	6,164.8	6,072.2	20.5	22.0	-90.73	455.6	-827.7	418.3	377.3	40.93	10.219	
6,200.0	6,121.4	6,215.1	6,122.4	20.4	22.0	-91.36	455.6	-824.5	418.4	377.5	40.87	10.236	
6,250.0	6,170.2	6,265.7	6,172.6	20.4	22.0	-91.98	455.6	-818.0	418.5	377.7	40.75	10.269	
6,300.0	6,218.2	6,316.6	6,222.5	20.3	21.9	-92.59	455.6	-808.1	418.7	378.1	40.58	10.316	
6,350.0	6,265.1	6,367.8	6,272.0	20.2	21.9	-93.19	455.6	-794.8	418.9	378.5	40.37	10.377	
6,400.0	6,310.8	6,419.4	6,320.7	20.1	21.8	-93.78	455.6	-778.1	419.2	379.0	40.12	10.448	
6,450.0	6,355.1	6,471.2	6,368.5	20.0	21.7	-94.35	455.6	-758.0	419.5	379.6	39.84	10.528	
6,500.0	6,397.8	6,523.4	6,415.1	19.9	21.6	-94.91	455.6	-734.6	419.8	380.2	39.56	10.611	
6,550.0	6,438.7	6,575.8	6,460.2	19.8	21.5	-95.45	455.6	-707.9	420.1	380.9	39.28	10.695	
6,600.0	6,477.6	6,628.6	6,503.7	19.7	21.3	-95.96	455.6	-677.9	420.5	381.5	39.03	10.774	
6,650.0	6,514.4	6,681.6	6,545.1	19.7	21.2	-96.44	455.6	-644.9	420.9	382.1	38.82	10.842	
6,700.0	6,548.9	6,734.9	6,584.4	19.6	21.1	-96.90	455.6	-608.9	421.3	382.6	38.68	10.891	
6,750.0	6,580.9	6,788.5	6,621.3	19.7	21.0	-97.33	455.6	-570.1	421.7	383.1	38.63	10.916	
6,800.0	6,610.4	6,842.3	6,655.5	19.7	21.0	-97.72	455.6	-528.5	422.1	383.4	38.69	10.909	
6,850.0	6,637.2	6,896.4	6,686.8	19.9	21.0	-98.08	455.6	-484.5	422.4	383.6	38.88	10.864	
6,900.0	6,661.1	6,950.6	6,715.0	20.1	21.0	-98.40	455.6	-438.2	422.8	383.5	39.23	10.777	
6,950.0	6,682.2	7,005.0	6,740.0	20.3	21.1	-98.68	455.6	-389.8	423.1	383.3	39.74	10.645	
7,000.0	6,700.2	7,059.6	6,761.4	20.7	21.3	-98.92	455.6	-339.6	423.4	382.9	40.43	10.470	
7,050.0	6,715.1	7,114.4	6,779.3	21.1	21.6	-99.12	455.6	-287.9	423.6	382.3	41.30	10.257	
7,100.0	6,726.9	7,169.2	6,793.5	21.7	22.0	-99.28	455.6	-234.9	423.8	381.5	42.34	10.010	
7,150.0	6,735.4	7,224.2	6,803.9	22.2	22.5	-99.40	455.6	-181.0	423.9	380.4	43.53	9.738	
7,200.0	6,740.8	7,279.2	6,810.3	22.9	23.1	-99.47	455.6	-126.3	424.0	379.1	44.87	9.450	
7,250.0	6,742.9	7,334.2	6,812.8	23.6	23.8	-99.50	455.6	-71.4	424.0	377.7	46.34	9.152	
7,263.5	6,742.8	7,349.0	6,812.8	23.8	24.0	-99.50	455.6	-56.6	424.0	377.3	46.74	9.072	
7,300.0	6,742.5	7,385.5	6,812.5	24.3	24.5	-99.50	455.6	-20.1	424.0	376.2	47.84	8.863	
7,400.0	6,741.6	7,485.5	6,811.6	26.0	26.2	-99.50	455.6	79.9	424.0	372.9	51.13	8.293	
7,500.0	6,740.7	7,585.5	6,810.7	27.8	28.0	-99.50	455.6	179.9	424.0	369.3	54.78	7.741	
7,600.0	6,739.9	7,685.5	6,809.8	29.8	29.9	-99.50	455.6	279.9	424.0	365.3	58.72	7.221	
7,700.0	6,739.0	7,785.5	6,808.9	31.9	32.1	-99.50	455.6	379.9	424.0	361.1	62.91	6.741	
7,800.0	6,738.1	7,885.5	6,808.0	34.2	34.3	-99.50	455.6	479.9	424.0	356.8	67.29	6.302	
7,900.0	6,737.2	7,985.5	6,807.2	36.5	36.6	-99.50	455.6	579.9	424.0	352.2	71.84	5.903	
8,000.0	6,736.3	8,085.5	6,806.3	38.8	39.0	-99.50	455.6	679.9	424.0	347.5	76.51	5.542	
8,100.0	6,735.4	8,185.5	6,805.4	41.3	41.4	-99.50	455.6	779.9	424.0	342.7	81.30	5.216	
8,200.0	6,734.5	8,285.5	6,804.5	43.7	43.9	-99.50	455.6	879.9	424.0	337.9	86.18	4.921	
8,300.0	6,733.6	8,385.5	6,803.6	46.2	46.4	-99.50	455.6	979.9	424.0	332.9	91.13	4.653	
8,400.0	6,732.7	8,485.5	6,802.7	48.8	48.9	-99.50	455.6	1,079.9	424.0	327.9	96.15	4.410	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18E-332 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,500.0	6,731.8	8,585.5	6,801.8	51.3	51.5	-99.50	455.6	1,179.9	424.0	322.8	101.23	4.189	
8,600.0	6,731.0	8,685.5	6,800.9	53.9	54.1	-99.50	455.6	1,279.9	424.0	317.7	106.35	3.987	
8,700.0	6,730.1	8,785.5	6,800.0	56.6	56.7	-99.50	455.6	1,379.9	424.0	312.5	111.51	3.803	
8,800.0	6,729.2	8,885.5	6,799.1	59.2	59.3	-99.50	455.6	1,479.9	424.0	307.3	116.71	3.633	
8,900.0	6,728.3	8,985.5	6,798.3	61.8	62.0	-99.50	455.6	1,579.8	424.0	302.1	121.93	3.478	
9,000.0	6,727.4	9,085.5	6,797.4	64.5	64.6	-99.50	455.6	1,679.8	424.0	296.9	127.19	3.334	
9,100.0	6,726.5	9,185.5	6,796.5	67.2	67.3	-99.50	455.6	1,779.8	424.0	291.6	132.47	3.201	
9,200.0	6,725.6	9,285.5	6,795.6	69.9	70.0	-99.50	455.6	1,879.8	424.0	286.3	137.77	3.078	
9,300.0	6,724.7	9,385.5	6,794.7	72.5	72.7	-99.50	455.6	1,979.8	424.0	281.0	143.09	2.964	
9,400.0	6,723.8	9,485.5	6,793.8	75.2	75.4	-99.50	455.6	2,079.8	424.0	275.6	148.42	2.857	
9,500.0	6,722.9	9,585.5	6,792.9	78.0	78.1	-99.50	455.6	2,179.8	424.0	270.3	153.77	2.758	
9,600.0	6,722.1	9,685.5	6,792.0	80.7	80.8	-99.50	455.6	2,279.8	424.0	264.9	159.14	2.665	
9,700.0	6,721.2	9,785.5	6,791.1	83.4	83.5	-99.50	455.6	2,379.8	424.0	259.5	164.51	2.578	
9,800.0	6,720.3	9,885.5	6,790.2	86.1	86.3	-99.50	455.6	2,479.8	424.0	254.1	169.90	2.496	
9,900.0	6,719.4	9,985.5	6,789.4	88.9	89.0	-99.50	455.6	2,579.8	424.0	248.8	175.29	2.419	
10,000.0	6,718.5	10,085.5	6,788.5	91.6	91.7	-99.50	455.6	2,679.8	424.0	243.3	180.70	2.347	
10,100.0	6,717.6	10,185.5	6,787.6	94.3	94.5	-99.50	455.6	2,779.8	424.0	237.9	186.11	2.278	
10,200.0	6,716.7	10,285.5	6,786.7	97.1	97.2	-99.50	455.6	2,879.8	424.0	232.5	191.54	2.214	
10,300.0	6,715.8	10,385.5	6,785.8	99.8	100.0	-99.50	455.6	2,979.8	424.0	227.1	196.96	2.153	
10,400.0	6,714.9	10,485.5	6,784.9	102.6	102.7	-99.50	455.6	3,079.8	424.0	221.6	202.40	2.095	
10,500.0	6,714.0	10,585.5	6,784.0	105.3	105.5	-99.50	455.6	3,179.8	424.0	216.2	207.84	2.040	
10,600.0	6,713.2	10,685.5	6,783.1	108.1	108.2	-99.50	455.6	3,279.8	424.0	210.8	213.29	1.988	
10,700.0	6,712.3	10,785.5	6,782.2	110.9	111.0	-99.50	455.6	3,379.8	424.0	205.3	218.74	1.939	
10,800.0	6,711.4	10,885.5	6,781.3	113.6	113.8	-99.50	455.6	3,479.8	424.0	199.9	224.19	1.891	
10,900.0	6,710.5	10,985.5	6,780.5	116.4	116.5	-99.50	455.6	3,579.8	424.0	194.4	229.65	1.846	
11,000.0	6,709.6	11,085.5	6,779.6	119.2	119.3	-99.50	455.6	3,679.8	424.0	188.9	235.12	1.804	
11,100.0	6,708.7	11,185.5	6,778.7	121.9	122.1	-99.50	455.6	3,779.8	424.0	183.5	240.59	1.763	
11,200.0	6,707.8	11,285.5	6,777.8	124.7	124.8	-99.50	455.6	3,879.8	424.0	178.0	246.06	1.723	
11,300.0	6,706.9	11,385.5	6,776.9	127.5	127.6	-99.50	455.6	3,979.8	424.0	172.5	251.53	1.686	
11,400.0	6,706.0	11,485.5	6,776.0	130.3	130.4	-99.50	455.6	4,079.7	424.0	167.0	257.01	1.650	
11,500.0	6,705.1	11,585.5	6,775.1	133.0	133.2	-99.50	455.6	4,179.7	424.0	161.6	262.49	1.615	
11,600.0	6,704.3	11,685.5	6,774.2	135.8	135.9	-99.50	455.6	4,279.7	424.0	156.1	267.98	1.582	
11,700.0	6,703.4	11,785.5	6,773.3	138.6	138.7	-99.50	455.6	4,379.7	424.0	150.6	273.46	1.551	
11,800.0	6,702.5	11,885.5	6,772.4	141.4	141.5	-99.50	455.6	4,479.7	424.0	145.1	278.95	1.520	
11,900.0	6,701.6	11,985.5	6,771.6	144.1	144.3	-99.50	455.6	4,579.7	424.0	139.6	284.44	1.491	Level 3
12,000.0	6,700.7	12,085.5	6,770.7	146.9	147.0	-99.50	455.6	4,679.7	424.0	134.1	289.93	1.463	Level 3
12,100.0	6,699.8	12,185.5	6,769.8	149.7	149.8	-99.50	455.6	4,779.7	424.0	128.6	295.43	1.435	Level 3
12,200.0	6,698.9	12,285.5	6,768.9	152.5	152.6	-99.50	455.6	4,879.7	424.0	123.1	300.93	1.409	Level 3
12,300.0	6,698.0	12,385.5	6,768.0	155.3	155.4	-99.50	455.6	4,979.7	424.0	117.6	306.42	1.384	Level 3
12,400.0	6,697.1	12,485.5	6,767.1	158.1	158.2	-99.50	455.6	5,079.7	424.0	112.1	311.92	1.359	Level 3
12,500.0	6,696.2	12,585.5	6,766.2	160.9	161.0	-99.50	455.6	5,179.7	424.0	106.6	317.43	1.336	Level 3
12,600.0	6,695.3	12,685.5	6,765.3	163.6	163.8	-99.50	455.6	5,279.7	424.0	101.1	322.93	1.313	Level 3
12,700.0	6,694.5	12,785.5	6,764.4	166.4	166.6	-99.50	455.6	5,379.7	424.0	95.6	328.43	1.291	Level 3
12,800.0	6,693.6	12,885.5	6,763.5	169.2	169.3	-99.50	455.6	5,479.7	424.0	90.1	333.94	1.270	Level 3
12,900.0	6,692.7	12,985.5	6,762.7	172.0	172.1	-99.50	455.6	5,579.7	424.0	84.6	339.45	1.249	Level 2
13,000.0	6,691.8	13,085.5	6,761.8	174.8	174.9	-99.50	455.6	5,679.7	424.0	79.1	344.96	1.229	Level 2
13,100.0	6,690.9	13,185.5	6,760.9	177.6	177.7	-99.50	455.6	5,779.7	424.0	73.6	350.47	1.210	Level 2
13,200.0	6,690.0	13,285.5	6,760.0	180.4	180.5	-99.50	455.6	5,879.7	424.0	68.1	355.98	1.191	Level 2
13,300.0	6,689.1	13,385.5	6,759.1	183.2	183.3	-99.50	455.6	5,979.7	424.0	62.6	361.49	1.173	Level 2
13,400.0	6,688.2	13,485.5	6,758.2	186.0	186.1	-99.50	455.6	6,079.7	424.0	57.0	367.00	1.155	Level 2
13,500.0	6,687.3	13,585.5	6,757.3	188.8	188.9	-99.50	455.6	6,179.7	424.0	51.5	372.52	1.138	Level 2

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18E-332 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
13,600.0	6,686.4	13,685.5	6,756.4	191.6	191.7	-99.50	455.6	6,279.7	424.0	46.0	378.03	1.122	Level 2
13,700.0	6,685.6	13,785.5	6,755.5	194.4	194.5	-99.50	455.6	6,379.7	424.0	40.5	383.55	1.106	Level 2
13,800.0	6,684.7	13,885.5	6,754.6	197.2	197.3	-99.50	455.6	6,479.7	424.0	35.0	389.06	1.090	Level 2
13,900.0	6,683.8	13,985.5	6,753.8	199.9	200.1	-99.50	455.6	6,579.6	424.0	29.5	394.58	1.075	Level 2
14,000.0	6,682.9	14,085.5	6,752.9	202.7	202.9	-99.50	455.6	6,679.6	424.0	23.9	400.10	1.060	Level 2
14,100.0	6,682.0	14,185.5	6,752.0	205.5	205.6	-99.50	455.6	6,779.6	424.0	18.4	405.62	1.045	Level 2
14,200.0	6,681.1	14,285.5	6,751.1	208.3	208.4	-99.50	455.6	6,879.6	424.0	12.9	411.14	1.031	Level 2
14,300.0	6,680.2	14,385.5	6,750.2	211.1	211.2	-99.50	455.6	6,979.6	424.0	7.4	416.66	1.018	Level 2
14,400.0	6,679.3	14,485.5	6,749.3	213.9	214.0	-99.50	455.6	7,079.6	424.0	1.9	422.18	1.004	Level 2
14,500.0	6,678.4	14,585.5	6,748.4	216.7	216.8	-99.50	455.6	7,179.6	424.0	-3.7	427.70	0.991	Level 1
14,600.0	6,677.5	14,685.5	6,747.5	219.5	219.6	-99.50	455.6	7,279.6	424.0	-9.2	433.23	0.979	Level 1
14,700.0	6,676.7	14,785.5	6,746.6	222.3	222.4	-99.50	455.6	7,379.6	424.0	-14.7	438.75	0.966	Level 1
14,800.0	6,675.8	14,885.5	6,745.7	225.1	225.2	-99.50	455.6	7,479.6	424.0	-20.2	444.27	0.954	Level 1
14,900.0	6,674.9	14,985.5	6,744.8	227.9	228.0	-99.50	455.6	7,579.6	424.0	-25.8	449.80	0.943	Level 1
15,000.0	6,674.0	15,085.5	6,744.0	230.7	230.8	-99.50	455.6	7,679.6	424.0	-31.3	455.32	0.931	Level 1
15,100.0	6,673.1	15,185.5	6,743.1	233.5	233.6	-99.50	455.6	7,779.6	424.0	-36.8	460.85	0.920	Level 1
15,200.0	6,672.2	15,285.5	6,742.2	236.3	236.4	-99.50	455.6	7,879.6	424.0	-42.3	466.37	0.909	Level 1
15,300.0	6,671.3	15,385.5	6,741.3	239.1	239.2	-99.50	455.6	7,979.6	424.0	-47.9	471.90	0.899	Level 1
15,400.0	6,670.4	15,485.5	6,740.4	241.9	242.0	-99.50	455.6	8,079.6	424.0	-53.4	477.43	0.888	Level 1
15,500.0	6,669.5	15,585.5	6,739.5	244.7	244.8	-99.50	455.6	8,179.6	424.0	-58.9	482.95	0.878	Level 1
15,600.0	6,668.6	15,685.5	6,738.6	247.5	247.6	-99.50	455.6	8,279.6	424.0	-64.4	488.48	0.868	Level 1
15,700.0	6,667.8	15,785.5	6,737.7	250.3	250.4	-99.50	455.6	8,379.6	424.0	-70.0	494.01	0.858	Level 1
15,800.0	6,666.9	15,885.5	6,736.8	253.1	253.2	-99.50	455.6	8,479.6	424.0	-75.5	499.54	0.849	Level 1
15,900.0	6,666.0	15,985.5	6,735.9	255.9	256.0	-99.50	455.6	8,579.6	424.0	-81.0	505.07	0.840	Level 1
16,000.0	6,665.1	16,085.5	6,735.1	258.7	258.8	-99.50	455.6	8,679.6	424.0	-86.6	510.60	0.830	Level 1
16,100.0	6,664.2	16,185.5	6,734.2	261.5	261.6	-99.50	455.6	8,779.6	424.0	-92.1	516.13	0.822	Level 1
16,200.0	6,663.3	16,285.5	6,733.3	264.3	264.4	-99.50	455.6	8,879.6	424.0	-97.6	521.66	0.813	Level 1
16,300.0	6,662.4	16,385.5	6,732.4	267.1	267.2	-99.50	455.6	8,979.6	424.0	-103.1	527.19	0.804	Level 1
16,335.1	6,662.1	16,420.6	6,732.1	268.1	268.2	-99.50	455.6	9,014.6	424.0	-105.1	529.13	0.801	Level 1
16,346.6	6,662.0	16,429.1	6,732.0	268.4	268.5	-99.50	455.6	9,023.2	424.1	-105.6	529.68	0.801	Level 1, ES, SF

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18E-402 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-89.52	0.4	-44.8	44.8				
100.0	100.0	100.0	100.0	0.1	0.1	-89.52	0.4	-44.8	44.8	44.6	0.22	199.502	
200.0	200.0	200.0	200.0	0.3	0.3	-89.52	0.4	-44.8	44.8	44.2	0.67	66.501	CC, ES
300.0	300.0	299.5	299.5	0.6	0.6	-88.71	1.0	-45.4	45.4	44.3	1.12	40.540	
400.0	400.0	398.9	398.8	0.8	0.8	-86.39	3.0	-47.1	47.2	45.7	1.57	30.105	
500.0	500.0	498.2	498.0	1.0	1.0	-82.92	6.2	-50.0	50.4	48.4	2.02	24.925	
600.0	600.0	597.3	597.0	1.2	1.2	-78.75	10.7	-53.9	55.1	52.6	2.48	22.202	
700.0	700.0	696.2	695.5	1.5	1.5	-74.37	16.5	-59.0	61.4	58.5	2.95	20.836	
800.0	800.0	794.7	793.7	1.7	1.8	-70.13	23.6	-65.2	69.6	66.2	3.43	20.294	SF
900.0	900.0	893.0	891.4	1.9	2.0	21.33	31.8	-72.5	78.8	75.0	3.83	20.590	
1,000.0	1,000.0	991.1	988.6	2.1	2.3	25.37	41.4	-80.8	88.3	84.1	4.26	20.723	
1,100.0	1,099.9	1,088.8	1,085.3	2.3	2.6	29.36	52.1	-90.2	98.4	93.7	4.71	20.906	
1,200.0	1,199.7	1,186.3	1,181.4	2.5	3.0	33.26	64.0	-100.7	109.0	103.8	5.15	21.146	
1,300.0	1,299.4	1,283.4	1,277.0	2.8	3.3	37.05	77.1	-112.2	120.3	114.7	5.61	21.439	
1,400.0	1,398.9	1,380.2	1,371.9	3.0	3.7	40.70	91.4	-124.7	132.5	126.4	6.09	21.771	
1,500.0	1,498.3	1,476.6	1,466.1	3.3	4.1	44.18	106.8	-138.3	145.5	139.0	6.58	22.130	
1,600.0	1,597.4	1,572.7	1,559.6	3.6	4.6	47.48	123.4	-152.8	159.6	152.5	7.10	22.488	
1,700.0	1,696.3	1,668.8	1,652.7	3.9	5.0	50.60	141.1	-168.3	174.6	167.0	7.65	22.827	
1,800.0	1,794.9	1,767.1	1,748.0	4.2	5.5	53.67	159.6	-184.6	189.7	181.4	8.25	22.996	
1,900.0	1,893.3	1,865.5	1,843.2	4.5	6.0	56.67	178.1	-200.9	204.3	195.4	8.89	22.967	
1,962.9	1,954.9	1,927.3	1,903.0	4.8	6.3	58.53	189.8	-211.1	213.3	203.9	9.33	22.863	
2,000.0	1,991.3	1,963.8	1,938.4	4.9	6.5	59.65	196.7	-217.1	218.6	209.0	9.59	22.782	
2,100.0	2,089.2	2,062.1	2,033.5	5.3	7.0	62.41	215.2	-233.4	233.3	223.0	10.33	22.573	
2,200.0	2,187.2	2,160.4	2,128.7	5.7	7.5	64.84	233.7	-249.6	248.5	237.4	11.10	22.379	
2,300.0	2,285.1	2,258.8	2,223.9	6.1	8.0	66.99	252.2	-265.9	264.0	252.1	11.89	22.201	
2,400.0	2,383.1	2,357.1	2,319.1	6.5	8.5	68.90	270.8	-282.2	279.9	267.2	12.70	22.039	
2,500.0	2,481.0	2,455.4	2,414.3	6.9	9.0	70.61	289.3	-298.4	296.0	282.5	13.52	21.893	
2,600.0	2,579.0	2,553.7	2,509.4	7.4	9.6	72.14	307.8	-314.7	312.4	298.1	14.36	21.762	
2,700.0	2,676.9	2,652.0	2,604.6	7.8	10.1	73.51	326.3	-330.9	329.0	313.8	15.20	21.644	
2,800.0	2,774.9	2,750.4	2,699.8	8.2	10.6	74.76	344.8	-347.2	345.8	329.7	16.05	21.539	
2,900.0	2,872.8	2,848.7	2,795.0	8.6	11.1	75.88	363.4	-363.5	362.7	345.7	16.91	21.445	
3,000.0	2,970.7	2,947.0	2,890.2	9.1	11.6	76.91	381.9	-379.7	379.7	361.9	17.77	21.361	
3,100.0	3,068.7	3,045.3	2,985.3	9.5	12.1	77.85	400.4	-396.0	396.8	378.2	18.64	21.285	
3,200.0	3,166.6	3,143.7	3,080.5	9.9	12.6	78.72	418.9	-412.2	414.0	394.5	19.51	21.217	
3,300.0	3,264.6	3,242.0	3,175.7	10.4	13.2	79.51	437.5	-428.5	431.3	410.9	20.39	21.156	
3,400.0	3,362.5	3,340.3	3,270.9	10.8	13.7	80.24	456.0	-444.8	448.7	427.5	21.26	21.101	
3,500.0	3,460.5	3,438.6	3,366.1	11.3	14.2	80.92	474.5	-461.0	466.2	444.0	22.14	21.052	
3,600.0	3,558.4	3,536.9	3,461.3	11.7	14.7	81.55	493.0	-477.3	483.7	460.7	23.02	21.007	

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18F-102 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	90.03	0.0	15.0	15.0	15.0	0.00	N/A	
100.0	100.0	100.0	100.0	0.1	0.1	90.03	0.0	15.0	15.0	14.8	0.22	66.911	
200.0	200.0	200.0	200.0	0.3	0.3	90.03	0.0	15.0	15.0	14.4	0.67	22.304	
300.0	300.0	300.0	300.0	0.6	0.6	90.03	0.0	15.0	15.0	13.9	1.12	13.382	
400.0	400.0	400.0	400.0	0.8	0.8	90.03	0.0	15.0	15.0	13.5	1.57	9.559	
500.0	500.0	500.0	500.0	1.0	1.0	90.03	0.0	15.0	15.0	13.0	2.02	7.435	
600.0	600.0	600.0	600.0	1.2	1.2	90.03	0.0	15.0	15.0	12.6	2.47	6.083	
700.0	700.0	700.0	700.0	1.5	1.5	90.03	0.0	15.0	15.0	12.1	2.92	5.147	
800.0	800.0	800.0	800.0	1.7	1.7	90.03	0.0	15.0	15.0	11.7	3.37	4.461	CC
900.0	900.0	900.0	900.0	1.9	1.9	177.59	0.0	15.0	15.9	12.1	3.81	4.178	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	177.93	0.0	15.0	18.5	14.3	4.24	4.374	
1,100.0	1,099.9	1,100.2	1,100.2	2.3	2.3	178.88	-0.2	14.2	22.0	17.4	4.65	4.740	
1,200.0	1,199.7	1,200.6	1,200.5	2.5	2.5	-179.36	-0.8	11.6	25.6	20.6	5.05	5.069	
1,300.0	1,299.4	1,301.0	1,300.8	2.8	2.7	-177.10	-1.8	7.3	29.3	23.8	5.46	5.361	
1,400.0	1,398.9	1,401.4	1,401.1	3.0	3.0	-174.53	-3.2	1.4	33.1	27.2	5.88	5.627	
1,500.0	1,498.3	1,501.9	1,501.2	3.3	3.2	-171.77	-5.0	-6.3	37.1	30.8	6.31	5.877	
1,600.0	1,597.4	1,602.4	1,601.3	3.6	3.4	-168.92	-7.2	-15.8	41.3	34.5	6.75	6.115	
1,700.0	1,696.3	1,702.9	1,701.2	3.9	3.7	-166.02	-9.8	-26.9	45.7	38.5	7.21	6.344	
1,800.0	1,794.9	1,803.5	1,800.9	4.2	4.0	-163.14	-12.8	-39.7	50.5	42.8	7.69	6.563	
1,900.0	1,893.3	1,904.1	1,900.4	4.5	4.2	-160.30	-16.3	-54.3	55.5	47.3	8.20	6.771	
1,962.9	1,954.9	1,967.4	1,962.8	4.8	4.4	-158.56	-18.6	-64.3	58.9	50.3	8.54	6.893	
2,000.0	1,991.3	2,004.8	1,999.6	4.9	4.6	-157.51	-20.1	-70.5	60.8	52.0	8.75	6.948	
2,100.0	2,089.2	2,105.5	2,098.6	5.3	4.9	-154.30	-24.3	-88.5	65.2	55.8	9.36	6.961	
2,200.0	2,187.2	2,206.2	2,197.3	5.7	5.3	-150.47	-28.9	-108.1	68.4	58.4	10.04	6.819	
2,300.0	2,285.1	2,306.8	2,295.5	6.1	5.7	-145.94	-33.9	-129.4	70.9	60.1	10.80	6.560	
2,400.0	2,383.1	2,406.7	2,392.8	6.5	6.1	-141.10	-39.1	-151.6	73.1	61.4	11.65	6.272	
2,500.0	2,481.0	2,506.5	2,489.9	6.9	6.5	-136.56	-44.3	-173.8	75.7	63.2	12.54	6.038	
2,600.0	2,579.0	2,606.3	2,587.1	7.4	7.0	-132.36	-49.5	-195.9	78.9	65.4	13.48	5.851	
2,700.0	2,676.9	2,706.1	2,684.3	7.8	7.4	-128.49	-54.7	-218.1	82.4	67.9	14.44	5.706	
2,800.0	2,774.9	2,805.9	2,781.4	8.2	7.9	-124.96	-59.8	-240.2	86.2	70.8	15.41	5.596	
2,900.0	2,872.8	2,905.7	2,878.6	8.6	8.3	-121.74	-65.0	-262.4	90.4	74.0	16.39	5.515	
3,000.0	2,970.7	3,005.4	2,975.7	9.1	8.8	-118.81	-70.2	-284.5	94.8	77.4	17.37	5.457	
3,100.0	3,068.7	3,105.2	3,072.9	9.5	9.3	-116.14	-75.4	-306.7	99.5	81.1	18.36	5.418	
3,200.0	3,166.6	3,205.0	3,170.1	9.9	9.8	-113.72	-80.6	-328.9	104.3	85.0	19.33	5.395	
3,300.0	3,264.6	3,304.8	3,267.2	10.4	10.2	-111.52	-85.8	-351.0	109.3	89.0	20.31	5.383	
3,400.0	3,362.5	3,404.6	3,364.4	10.8	10.7	-109.51	-91.0	-373.2	114.5	93.2	21.27	5.381	
3,500.0	3,460.5	3,504.4	3,461.5	11.3	11.2	-107.67	-96.2	-395.3	119.7	97.5	22.23	5.386	
3,600.0	3,558.4	3,604.2	3,558.7	11.7	11.7	-106.00	-101.4	-417.5	125.1	102.0	23.19	5.397	
3,700.0	3,656.4	3,704.0	3,655.9	12.1	12.2	-104.46	-106.6	-439.6	130.6	106.5	24.14	5.412	
3,800.0	3,754.3	3,803.8	3,753.0	12.6	12.6	-103.05	-111.8	-461.8	136.2	111.1	25.08	5.431	
3,900.0	3,852.3	3,903.6	3,850.2	13.0	13.1	-101.75	-117.0	-484.0	141.9	115.9	26.02	5.453	
4,000.0	3,950.2	4,003.3	3,947.3	13.5	13.6	-100.54	-122.2	-506.1	147.6	120.6	26.95	5.476	
4,100.0	4,048.2	4,103.1	4,044.5	13.9	14.1	-99.43	-127.4	-528.3	153.4	125.5	27.88	5.501	
4,200.0	4,146.1	4,202.9	4,141.7	14.4	14.6	-98.40	-132.6	-550.4	159.2	130.4	28.81	5.527	
4,300.0	4,244.1	4,302.7	4,238.8	14.8	15.1	-97.45	-137.8	-572.6	165.1	135.4	29.73	5.553	
4,400.0	4,342.0	4,402.5	4,336.0	15.3	15.6	-96.56	-143.0	-594.7	171.0	140.4	30.65	5.580	
4,500.0	4,440.0	4,502.3	4,433.1	15.7	16.1	-95.73	-148.1	-616.9	177.0	145.4	31.57	5.607	
4,600.0	4,537.9	4,602.1	4,530.3	16.1	16.6	-94.95	-153.3	-639.1	183.0	150.5	32.48	5.634	
4,700.0	4,635.9	4,701.9	4,627.5	16.6	17.1	-94.22	-158.5	-661.2	189.0	155.6	33.39	5.661	
4,800.0	4,733.8	4,801.7	4,724.6	17.0	17.6	-93.54	-163.7	-683.4	195.1	160.8	34.30	5.687	
4,900.0	4,831.7	4,901.5	4,821.8	17.5	18.0	-92.90	-168.9	-705.5	201.2	166.0	35.21	5.714	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18F-102 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,000.0	4,929.7	5,001.2	4,918.9	17.9	18.5	-92.30	-174.1	-727.7	207.3	171.2	36.12	5.739	
5,102.5	5,030.1	5,104.7	5,019.9	18.4	19.0	-92.01	-179.2	-749.6	213.3	176.3	36.99	5.767	
5,200.0	5,125.8	5,203.4	5,116.8	18.8	19.3	-92.15	-183.6	-768.0	218.4	180.7	37.69	5.795	
5,300.0	5,224.5	5,304.7	5,216.6	19.1	19.6	-92.28	-187.4	-784.3	222.9	184.6	38.28	5.823	
5,400.0	5,323.5	5,406.0	5,316.9	19.3	19.9	-92.38	-190.6	-798.1	226.7	187.9	38.82	5.840	
5,500.0	5,422.9	5,507.3	5,417.6	19.5	20.1	-92.46	-193.2	-809.3	229.8	190.5	39.30	5.848	
5,600.0	5,522.5	5,608.7	5,518.6	19.8	20.3	-92.52	-195.3	-817.9	232.2	192.5	39.72	5.846	
5,700.0	5,622.3	5,710.1	5,619.8	19.9	20.5	-92.56	-196.6	-823.8	233.8	193.8	40.08	5.835	
5,800.0	5,722.3	5,811.5	5,721.2	20.1	20.6	-92.59	-197.4	-827.2	234.8	194.4	40.38	5.814	
5,877.7	5,800.0	5,890.3	5,800.0	20.2	20.7	179.99	-197.6	-828.0	235.0	207.1	27.85	8.438	
5,900.0	5,822.3	5,912.6	5,822.3	20.2	20.8	179.99	-197.6	-828.0	235.0	207.1	27.93	8.414	
5,943.1	5,865.4	5,955.7	5,865.4	20.3	20.8	179.97	-197.6	-827.9	235.0	206.9	28.08	8.368	
6,000.0	5,922.3	6,012.4	5,922.0	20.3	20.9	179.23	-197.6	-824.8	235.0	206.8	28.23	8.326	
6,056.7	5,978.9	6,068.1	5,977.3	20.4	20.8	177.52	-197.6	-817.8	235.2	206.9	28.32	8.305	
6,100.0	6,022.3	6,110.1	6,018.5	20.5	20.8	85.83	-197.6	-809.8	235.6	194.6	41.05	5.740	
6,150.0	6,072.0	6,158.1	6,065.0	20.5	20.8	83.93	-197.6	-798.0	236.3	195.3	41.02	5.762	
6,200.0	6,121.4	6,205.7	6,110.3	20.4	20.7	82.06	-197.6	-783.4	237.3	196.4	40.90	5.802	
6,250.0	6,170.2	6,252.8	6,154.1	20.4	20.6	80.26	-197.6	-766.1	238.5	197.8	40.71	5.858	
6,300.0	6,218.2	6,300.0	6,196.9	20.3	20.5	78.49	-197.6	-746.2	239.9	199.4	40.46	5.930	
6,350.0	6,265.1	6,345.9	6,237.2	20.2	20.4	76.84	-197.6	-724.4	241.5	201.3	40.15	6.015	
6,400.0	6,310.8	6,391.8	6,276.2	20.1	20.3	75.24	-197.6	-700.1	243.2	203.4	39.79	6.112	
6,450.0	6,355.1	6,437.4	6,313.4	20.0	20.2	73.72	-197.6	-673.7	245.0	205.6	39.39	6.219	
6,500.0	6,397.8	6,482.7	6,348.7	19.9	20.1	72.29	-197.6	-645.4	246.9	207.9	38.98	6.333	
6,550.0	6,438.7	6,527.7	6,382.1	19.8	20.0	70.94	-197.6	-615.2	248.8	210.2	38.56	6.453	
6,600.0	6,477.6	6,572.4	6,413.4	19.7	20.0	69.69	-197.6	-583.3	250.8	212.6	38.15	6.572	
6,650.0	6,514.4	6,616.9	6,442.7	19.7	20.0	68.53	-197.6	-549.8	252.7	214.9	37.78	6.689	
6,700.0	6,548.9	6,661.1	6,469.8	19.6	20.0	67.46	-197.6	-514.9	254.6	217.1	37.46	6.797	
6,750.0	6,580.9	6,705.1	6,494.7	19.7	20.0	66.48	-197.6	-478.7	256.4	219.2	37.21	6.891	
6,800.0	6,610.4	6,750.0	6,518.0	19.7	20.1	65.59	-197.6	-440.3	258.2	221.1	37.05	6.967	
6,850.0	6,637.2	6,792.5	6,537.9	19.9	20.3	64.82	-197.6	-402.7	259.8	222.8	37.02	7.017	
6,900.0	6,661.1	6,836.0	6,556.0	20.1	20.5	64.12	-197.6	-363.2	261.3	224.2	37.12	7.039	
6,950.0	6,682.2	6,879.4	6,571.9	20.3	20.8	63.52	-197.6	-322.8	262.6	225.3	37.36	7.030	
7,000.0	6,700.2	6,922.6	6,585.3	20.7	21.2	63.01	-197.6	-281.8	263.8	226.0	37.75	6.988	
7,050.0	6,715.1	6,965.7	6,596.5	21.1	21.5	62.60	-197.6	-240.1	264.7	226.4	38.30	6.913	
7,100.0	6,726.9	7,008.8	6,605.2	21.7	22.0	62.27	-197.6	-197.9	265.5	226.5	39.00	6.807	
7,150.0	6,735.4	7,050.0	6,611.3	22.2	22.5	62.04	-197.6	-157.2	266.1	226.2	39.85	6.678	
7,200.0	6,740.8	7,094.7	6,615.5	22.9	23.0	61.89	-197.6	-112.7	266.4	225.5	40.88	6.517	
7,250.0	6,742.9	7,137.6	6,617.0	23.6	23.6	61.83	-197.6	-69.8	266.6	224.5	42.03	6.342	
7,263.5	6,742.8	7,149.3	6,617.0	23.8	23.8	61.83	-197.6	-58.2	266.6	224.2	42.36	6.293	
7,300.0	6,742.5	7,185.8	6,616.7	24.3	24.3	61.84	-197.6	-21.6	266.5	223.2	43.36	6.146	
7,400.0	6,741.6	7,285.8	6,616.0	26.0	26.0	61.87	-197.6	78.4	266.4	220.1	46.37	5.746	
7,500.0	6,740.7	7,385.8	6,615.3	27.8	27.8	61.91	-197.6	178.4	266.4	216.7	49.70	5.359	
7,600.0	6,739.9	7,485.8	6,614.6	29.8	29.8	61.94	-197.6	278.4	266.3	213.0	53.30	4.996	
7,700.0	6,739.0	7,585.8	6,613.9	31.9	31.9	61.97	-197.6	378.4	266.2	209.1	57.11	4.662	
7,800.0	6,738.1	7,685.8	6,613.2	34.2	34.1	62.01	-197.6	478.4	266.1	205.0	61.09	4.356	
7,900.0	6,737.2	7,785.8	6,612.5	36.5	36.4	62.04	-197.6	578.4	266.0	200.8	65.22	4.079	
8,000.0	6,736.3	7,885.8	6,611.7	38.8	38.8	62.07	-197.6	678.4	266.0	196.5	69.47	3.828	
8,100.0	6,735.4	7,985.8	6,611.0	41.3	41.2	62.11	-197.6	778.4	265.9	192.1	73.82	3.601	
8,200.0	6,734.5	8,085.8	6,610.3	43.7	43.7	62.14	-197.6	878.4	265.8	187.5	78.26	3.396	
8,300.0	6,733.6	8,185.8	6,609.6	46.2	46.2	62.17	-197.6	978.4	265.7	182.9	82.76	3.211	
8,400.0	6,732.7	8,285.8	6,608.9	48.8	48.7	62.21	-197.6	1,078.4	265.6	178.3	87.33	3.042	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18F-102 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,500.0	6,731.8	8,385.8	6,608.2	51.3	51.3	62.24	-197.6	1,178.4	265.5	173.6	91.94	2.888	
8,600.0	6,731.0	8,485.8	6,607.4	53.9	53.9	62.27	-197.6	1,278.4	265.5	168.9	96.60	2.748	
8,700.0	6,730.1	8,585.8	6,606.7	56.6	56.5	62.31	-197.6	1,378.3	265.4	164.1	101.30	2.620	
8,800.0	6,729.2	8,685.8	6,606.0	59.2	59.2	62.34	-197.6	1,478.3	265.3	159.3	106.04	2.502	
8,900.0	6,728.3	8,785.8	6,605.3	61.8	61.8	62.37	-197.6	1,578.3	265.2	154.4	110.80	2.394	
9,000.0	6,727.4	8,885.8	6,604.6	64.5	64.5	62.41	-197.6	1,678.3	265.1	149.6	115.59	2.294	
9,100.0	6,726.5	8,985.8	6,603.9	67.2	67.1	62.44	-197.6	1,778.3	265.1	144.7	120.40	2.201	
9,200.0	6,725.6	9,085.8	6,603.2	69.9	69.8	62.47	-197.6	1,878.3	265.0	139.7	125.24	2.116	
9,300.0	6,724.7	9,185.8	6,602.4	72.5	72.5	62.51	-197.6	1,978.3	264.9	134.8	130.10	2.036	
9,400.0	6,723.8	9,285.8	6,601.7	75.2	75.2	62.54	-197.6	2,078.3	264.8	129.9	134.97	1.962	
9,500.0	6,722.9	9,385.8	6,601.0	78.0	77.9	62.57	-197.6	2,178.3	264.7	124.9	139.86	1.893	
9,600.0	6,722.1	9,485.8	6,600.3	80.7	80.7	62.61	-197.6	2,278.3	264.7	119.9	144.76	1.828	
9,700.0	6,721.2	9,585.8	6,599.6	83.4	83.4	62.64	-197.6	2,378.3	264.6	114.9	149.68	1.768	
9,800.0	6,720.3	9,685.8	6,598.9	86.1	86.1	62.68	-197.6	2,478.3	264.5	109.9	154.61	1.711	
9,900.0	6,719.4	9,785.8	6,598.1	88.9	88.8	62.71	-197.6	2,578.3	264.4	104.9	159.55	1.657	
10,000.0	6,718.5	9,885.8	6,597.4	91.6	91.6	62.74	-197.6	2,678.3	264.3	99.8	164.50	1.607	
10,100.0	6,717.6	9,985.8	6,596.7	94.3	94.3	62.78	-197.6	2,778.3	264.3	94.8	169.46	1.559	
10,200.0	6,716.7	10,085.8	6,596.0	97.1	97.1	62.81	-197.6	2,878.3	264.2	89.7	174.44	1.514	
10,300.0	6,715.8	10,185.8	6,595.3	99.8	99.8	62.84	-197.6	2,978.3	264.1	84.7	179.42	1.472	Level 3
10,400.0	6,714.9	10,285.8	6,594.6	102.6	102.6	62.88	-197.6	3,078.3	264.0	79.6	184.41	1.432	Level 3
10,500.0	6,714.0	10,385.8	6,593.9	105.3	105.3	62.91	-197.6	3,178.3	263.9	74.5	189.41	1.394	Level 3
10,600.0	6,713.2	10,485.8	6,593.1	108.1	108.1	62.94	-197.6	3,278.3	263.9	69.4	194.41	1.357	Level 3
10,700.0	6,712.3	10,585.8	6,592.4	110.9	110.8	62.98	-197.6	3,378.3	263.8	64.4	199.42	1.323	Level 3
10,800.0	6,711.4	10,685.8	6,591.7	113.6	113.6	63.01	-197.6	3,478.3	263.7	59.3	204.44	1.290	Level 3
10,900.0	6,710.5	10,785.8	6,591.0	116.4	116.4	63.05	-197.6	3,578.3	263.6	54.2	209.47	1.259	Level 3
11,000.0	6,709.6	10,885.8	6,590.3	119.2	119.1	63.08	-197.6	3,678.3	263.5	49.0	214.50	1.229	Level 2
11,100.0	6,708.7	10,985.8	6,589.6	121.9	121.9	63.11	-197.6	3,778.3	263.5	43.9	219.54	1.200	Level 2
11,200.0	6,707.8	11,085.8	6,588.8	124.7	124.7	63.15	-197.6	3,878.3	263.4	38.8	224.58	1.173	Level 2
11,300.0	6,706.9	11,185.8	6,588.1	127.5	127.5	63.18	-197.6	3,978.3	263.3	33.7	229.63	1.147	Level 2
11,400.0	6,706.0	11,285.8	6,587.4	130.3	130.2	63.21	-197.6	4,078.3	263.2	28.5	234.69	1.122	Level 2
11,500.0	6,705.1	11,385.8	6,586.7	133.0	133.0	63.25	-197.6	4,178.3	263.1	23.4	239.75	1.098	Level 2
11,600.0	6,704.3	11,485.8	6,586.0	135.8	135.8	63.28	-197.6	4,278.3	263.1	18.3	244.82	1.075	Level 2
11,700.0	6,703.4	11,585.8	6,585.3	138.6	138.6	63.32	-197.6	4,378.3	263.0	13.1	249.89	1.052	Level 2
11,800.0	6,702.5	11,685.8	6,584.5	141.4	141.3	63.35	-197.6	4,478.3	262.9	8.0	254.96	1.031	Level 2
11,900.0	6,701.6	11,785.8	6,583.8	144.1	144.1	63.38	-197.6	4,578.3	262.8	2.8	260.04	1.011	Level 2
12,000.0	6,700.7	11,885.8	6,583.1	146.9	146.9	63.42	-197.6	4,678.3	262.8	-2.4	265.13	0.991	Level 1
12,100.0	6,699.8	11,985.8	6,582.4	149.7	149.7	63.45	-197.6	4,778.3	262.7	-7.5	270.22	0.972	Level 1
12,200.0	6,698.9	12,085.8	6,581.7	152.5	152.5	63.49	-197.6	4,878.3	262.6	-12.7	275.31	0.954	Level 1
12,300.0	6,698.0	12,185.8	6,581.0	155.3	155.3	63.52	-197.6	4,978.3	262.5	-17.9	280.41	0.936	Level 1
12,400.0	6,697.1	12,285.8	6,580.3	158.1	158.1	63.56	-197.6	5,078.2	262.4	-23.1	285.51	0.919	Level 1
12,500.0	6,696.2	12,385.8	6,579.5	160.9	160.8	63.59	-197.6	5,178.2	262.4	-28.3	290.62	0.903	Level 1
12,600.0	6,695.3	12,485.8	6,578.8	163.6	163.6	63.62	-197.6	5,278.2	262.3	-33.4	295.73	0.887	Level 1
12,700.0	6,694.5	12,585.8	6,578.1	166.4	166.4	63.66	-197.6	5,378.2	262.2	-38.6	300.85	0.872	Level 1
12,800.0	6,693.6	12,685.8	6,577.4	169.2	169.2	63.69	-197.6	5,478.2	262.1	-43.8	305.97	0.857	Level 1
12,900.0	6,692.7	12,785.8	6,576.7	172.0	172.0	63.73	-197.6	5,578.2	262.1	-49.0	311.09	0.842	Level 1
13,000.0	6,691.8	12,885.8	6,576.0	174.8	174.8	63.76	-197.6	5,678.2	262.0	-54.2	316.22	0.828	Level 1
13,100.0	6,690.9	12,985.8	6,575.2	177.6	177.6	63.79	-197.6	5,778.2	261.9	-59.4	321.35	0.815	Level 1
13,200.0	6,690.0	13,085.8	6,574.5	180.4	180.4	63.83	-197.6	5,878.2	261.8	-64.7	326.48	0.802	Level 1
13,300.0	6,689.1	13,185.8	6,573.8	183.2	183.2	63.86	-197.6	5,978.2	261.7	-69.9	331.62	0.789	Level 1
13,400.0	6,688.2	13,285.8	6,573.1	186.0	186.0	63.90	-197.6	6,078.2	261.7	-75.1	336.76	0.777	Level 1
13,500.0	6,687.3	13,385.8	6,572.4	188.8	188.8	63.93	-197.6	6,178.2	261.6	-80.3	341.90	0.765	Level 1

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Offset Design Hop 5N64W18A Pad Sec.18-T5N-R64W - Hop 18F-102 - Wellbore #1 - Plan #1 (12-16-15)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

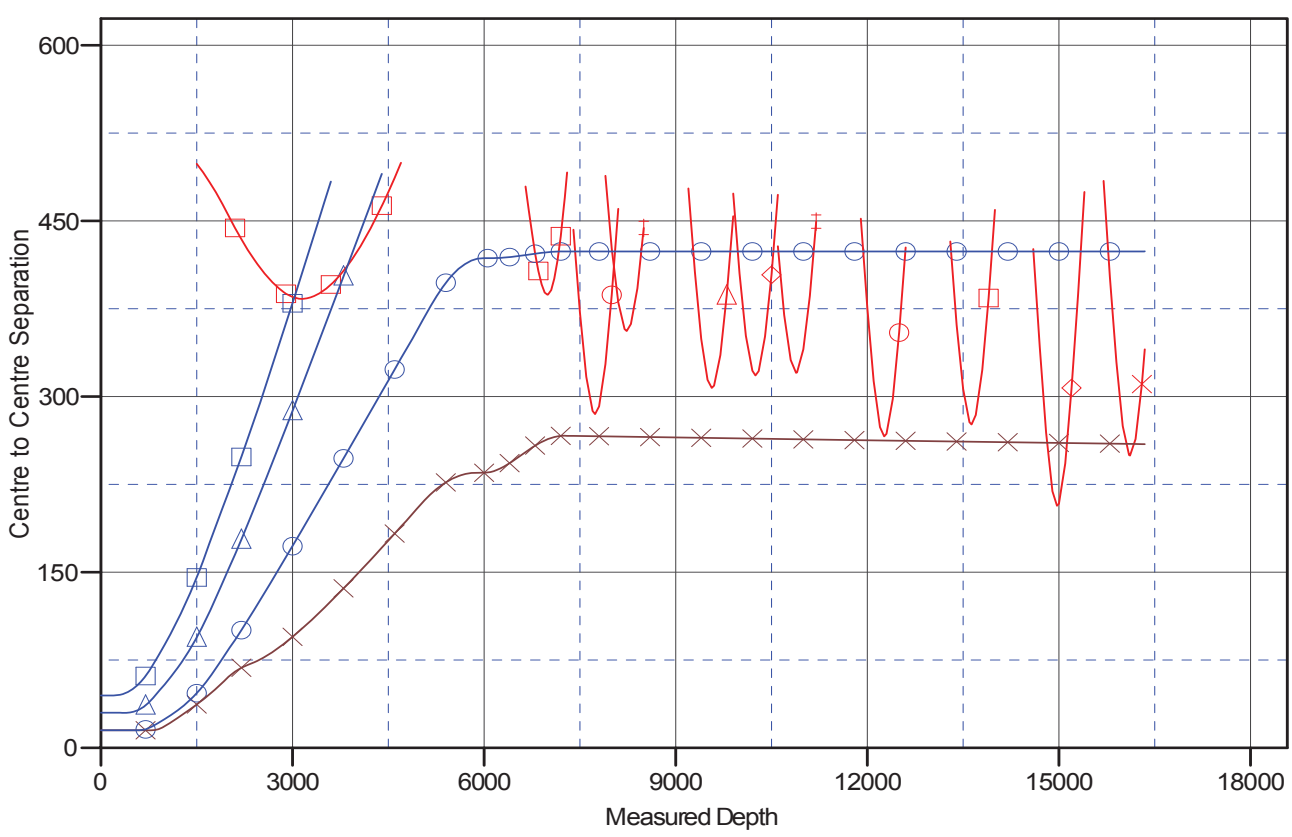
Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
13,600.0	6,686.4	13,485.8	6,571.7	191.6	191.5	63.97	-197.6	6,278.2	261.5	-85.5	347.05	0.754	Level 1
13,700.0	6,685.6	13,585.8	6,571.0	194.4	194.3	64.00	-197.6	6,378.2	261.4	-90.8	352.21	0.742	Level 1
13,800.0	6,684.7	13,685.8	6,570.2	197.2	197.1	64.03	-197.6	6,478.2	261.4	-96.0	357.36	0.731	Level 1
13,900.0	6,683.8	13,785.8	6,569.5	199.9	199.9	64.07	-197.6	6,578.2	261.3	-101.2	362.52	0.721	Level 1
14,000.0	6,682.9	13,885.8	6,568.8	202.7	202.7	64.10	-197.6	6,678.2	261.2	-106.5	367.68	0.710	Level 1
14,100.0	6,682.0	13,985.8	6,568.1	205.5	205.5	64.14	-197.6	6,778.2	261.1	-111.7	372.85	0.700	Level 1
14,200.0	6,681.1	14,085.8	6,567.4	208.3	208.3	64.17	-197.6	6,878.2	261.1	-117.0	378.02	0.691	Level 1
14,300.0	6,680.2	14,185.8	6,566.7	211.1	211.1	64.21	-197.6	6,978.2	261.0	-122.2	383.19	0.681	Level 1
14,400.0	6,679.3	14,285.8	6,565.9	213.9	213.9	64.24	-197.6	7,078.2	260.9	-127.5	388.37	0.672	Level 1
14,500.0	6,678.4	14,385.8	6,565.2	216.7	216.7	64.28	-197.6	7,178.2	260.8	-132.7	393.54	0.663	Level 1
14,600.0	6,677.5	14,485.8	6,564.5	219.5	219.5	64.31	-197.6	7,278.2	260.8	-138.0	398.73	0.654	Level 1
14,700.0	6,676.7	14,585.8	6,563.8	222.3	222.3	64.34	-197.6	7,378.2	260.7	-143.2	403.91	0.645	Level 1
14,800.0	6,675.8	14,685.8	6,563.1	225.1	225.1	64.38	-197.6	7,478.2	260.6	-148.5	409.10	0.637	Level 1
14,900.0	6,674.9	14,785.8	6,562.4	227.9	227.9	64.41	-197.6	7,578.2	260.5	-153.8	414.29	0.629	Level 1
15,000.0	6,674.0	14,885.8	6,561.7	230.7	230.7	64.45	-197.6	7,678.2	260.5	-159.0	419.49	0.621	Level 1
15,100.0	6,673.1	14,985.8	6,560.9	233.5	233.5	64.48	-197.6	7,778.2	260.4	-164.3	424.69	0.613	Level 1
15,200.0	6,672.2	15,085.8	6,560.2	236.3	236.3	64.52	-197.6	7,878.2	260.3	-169.6	429.89	0.606	Level 1
15,300.0	6,671.3	15,185.8	6,559.5	239.1	239.1	64.55	-197.6	7,978.2	260.2	-174.9	435.09	0.598	Level 1
15,400.0	6,670.4	15,285.8	6,558.8	241.9	241.9	64.59	-197.6	8,078.2	260.2	-180.1	440.30	0.591	Level 1
15,500.0	6,669.5	15,385.8	6,558.1	244.7	244.7	64.62	-197.6	8,178.2	260.1	-185.4	445.51	0.584	Level 1
15,600.0	6,668.6	15,485.8	6,557.4	247.5	247.5	64.66	-197.6	8,278.2	260.0	-190.7	450.72	0.577	Level 1
15,700.0	6,667.8	15,585.8	6,556.6	250.3	250.3	64.69	-197.6	8,378.2	259.9	-196.0	455.94	0.570	Level 1
15,800.0	6,666.9	15,685.8	6,555.9	253.1	253.1	64.73	-197.6	8,478.2	259.9	-201.3	461.16	0.563	Level 1
15,900.0	6,666.0	15,785.8	6,555.2	255.9	255.9	64.76	-197.6	8,578.2	259.8	-206.6	466.38	0.557	Level 1
16,000.0	6,665.1	15,885.8	6,554.5	258.7	258.7	64.80	-197.6	8,678.2	259.7	-211.9	471.60	0.551	Level 1
16,100.0	6,664.2	15,985.8	6,553.8	261.5	261.5	64.83	-197.6	8,778.1	259.6	-217.2	476.83	0.544	Level 1
16,200.0	6,663.3	16,085.8	6,553.1	264.3	264.3	64.87	-197.6	8,878.1	259.6	-222.5	482.06	0.538	Level 1
16,300.0	6,662.4	16,185.8	6,552.3	267.1	267.1	64.90	-197.6	8,978.1	259.5	-227.8	487.30	0.532	Level 1
16,346.6	6,662.0	16,232.4	6,552.0	268.4	268.4	64.92	-197.6	9,024.8	259.4	-230.3	489.74	0.530	Level 1, ES, SF

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to WELL @ 4641.0ft (Original Well Elev)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: Hop 18F-212
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.58°



LEGEND

Schaumberg 1 (Exist), Wellbore #1, Wellbore #1 V0
Dunn 1- Cache (Exist), Wellbore #1, Wellbore #1 V0
Bright 1 (SI), Wellbore #1, Wellbore #1 V0
Bright/Dunn 18D (Exist), Wellbore #1, Wellbore #1 V0
Puype B 18-17 (Exist), Wellbore #1, Wellbore #1 V0
Hoshiko 31-17 (Exist), Wellbore #1, Wellbore #1 V0
Hoshiko 41-17 (Exist), Wellbore #1, Wellbore #1 V0
Gunther B 18-1 (Exist), Wellbore #1, Wellbore #1 V0
Steinmetz 21-17 (Exist), Wellbore #1, Wellbore #1 V0
Gunther 18-1 (Exist), Wellbore #1, Wellbore #1 V0
Hop 18F-102, Wellbore #1, Plan #1 (12-16-15)
Hop 18E-332, Wellbore #1, Plan #1 (12-16-15)
Hop 18E-402, Wellbore #1, Plan #1 (12-16-15)
Hop 18E-232, Wellbore #1, Plan #1 (12-16-15)

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Hop 18F-212
Project:	SEC.18-T5N-R64W	**TVD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Reference Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	**MD Reference:**	WELL @ 4641.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Hop 18F-212	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #1 (12-16-15)	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to WELL @ 4641.0ft (Original Well Elev)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: Hop 18F-212
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.58°