

PETROLEUM DEVELOPMENT CORP DJ Basin

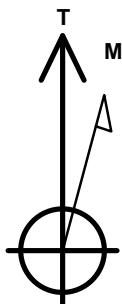
Well Name: **Niles Miller 20Q-221**

Surface Location: Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
Ground Elevation: 4954.0

+N/-S +E/-W Northing Easting Latitude Longitude Slot
0.0 0.0 1317895.71 3197037.36 40.203869 -104.794565
Original Well Elev WELL @ 4967.0ft (Original Well Elev)

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 274'FSL, 828'FEL	1.0	0.0	0.0	Point
BHL 500'FNL, 2356'FEL	7186.0	4481.2	-1568.2	Point



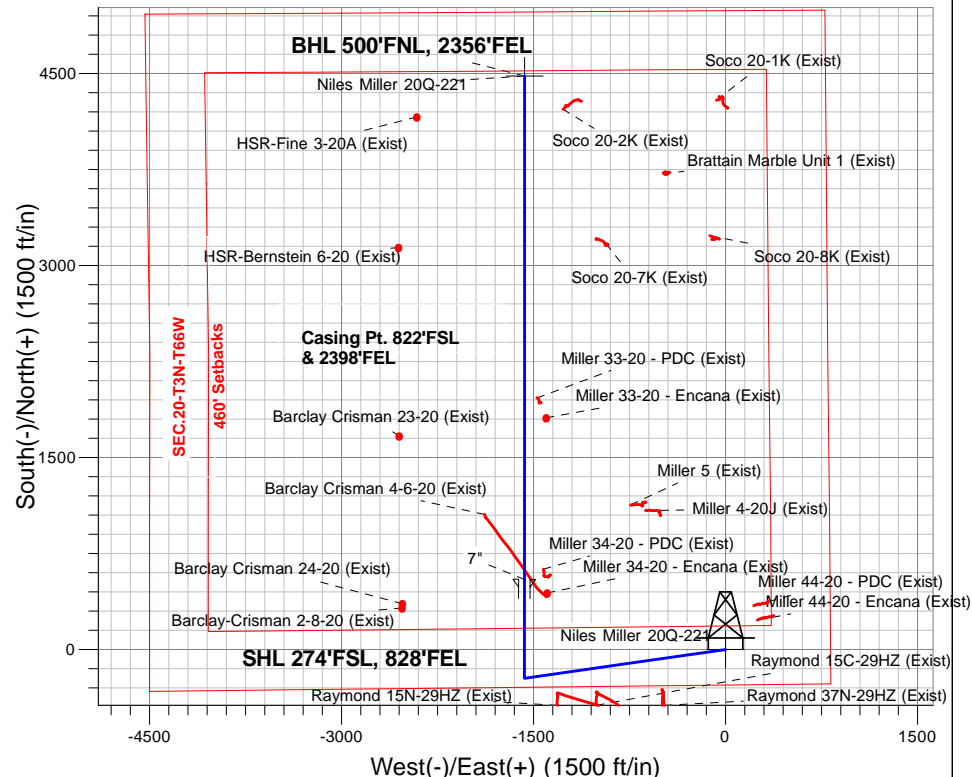
Azimuths to True North
Magnetic North: 8.26°

Magnetic Field
Strength: 52553.8snT
Dip Angle: 66.73°
Date: 12/3/2015
Model: IGRF2010

ANNOTATIONS

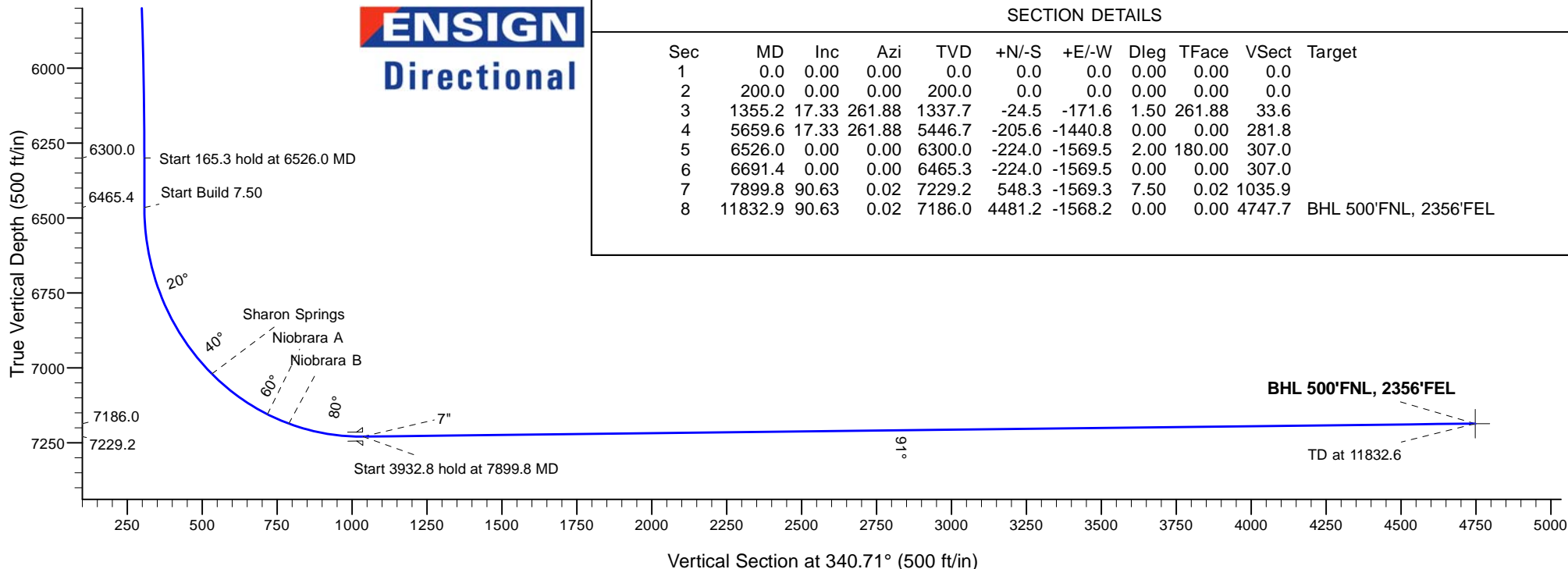
TVD	MD	Annotation
200.0	200.0	KOP - Start Build 1.50
5446.7	5659.6	Start Drop -2.00
6300.0	6526.0	Start 165.3 hold at 6526.0 MD
6465.4	6691.4	Start Build 7.50
7229.2	7899.8	Start 3932.8 hold at 7899.8 MD
7186.0	11832.6	TD at 11832.6

Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W
Niles Miller 20Q-221
Plan #1 (12-01-15)
7:08, December 08 2015



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	
3	1355.2	17.33	261.88	1337.7	-24.5	-171.6	1.50	261.88	33.6	
4	5659.6	17.33	261.88	5446.7	-205.6	-1440.8	0.00	0.00	281.8	
5	6526.0	0.00	0.00	6300.0	-224.0	-1569.5	2.00	180.00	307.0	
6	6691.4	0.00	0.00	6465.3	-224.0	-1569.5	0.00	0.00	307.0	
7	7899.8	90.63	0.02	7229.2	548.3	-1569.3	7.50	0.02	1035.9	
8	11832.9	90.63	0.02	7186.0	4481.2	-1568.2	0.00	0.00	4747.7	BHL 500'FNL, 2356'FEL





PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.20-T3N-R66W

Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W

Niles Miller 20Q-221

Wellbore #1

Plan: Plan #1 (12-01-15)

Standard Planning Report

08 December, 2015

Database:	US_EDM	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Project:	SEC.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	North Reference:	True
Well:	Niles Miller 20Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-01-15)		

Project	SEC.20-T3N-R66W, 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	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W				
Site Position:		Northing:	1,317,895.72 usft	Latitude:	40.203869
From:	Lat/Long	Easting:	3,197,037.36 usft	Longitude:	-104.794565
Position Uncertainty:	0.0 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.46

Well	Niles Miller 20Q-221					
Well Position	+N/-S	0.0 ft	Northing:	1,317,895.71 usft	Latitude:	40.203869
	+E/-W	0.0 ft	Easting:	3,197,037.36 usft	Longitude:	-104.794565
Position Uncertainty		0.0 ft	Wellhead Elevation:	0.0 ft	Ground Level:	4,954.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/3/2015	8.26	66.73	52,554

Design	Plan #1 (12-01-15)			
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	340.71

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	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,355.2	17.33	261.88	1,337.7	-24.5	-171.6	1.50	1.50	0.00	261.88	
5,659.6	17.33	261.88	5,446.7	-205.6	-1,440.8	0.00	0.00	0.00	0.00	
6,526.0	0.00	0.00	6,300.0	-224.0	-1,569.5	2.00	-2.00	0.00	180.00	
6,691.4	0.00	0.00	6,465.3	-224.0	-1,569.5	0.00	0.00	0.00	0.00	
7,899.8	90.63	0.02	7,229.2	548.3	-1,569.3	7.50	7.50	0.00	0.02	
11,832.9	90.63	0.02	7,186.0	4,481.2	-1,568.2	0.00	0.00	0.00	0.00	BHL 500'FNL, 2356'F

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Project:	SEC.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	North Reference:	True
Well:	Niles Miller 20Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-01-15)		

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 274°FSL, 828°FEL									
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
KOP - Start Build 1.50									
300.0	1.50	261.88	300.0	-0.2	-1.3	0.3	1.50	1.50	0.00
400.0	3.00	261.88	399.9	-0.7	-5.2	1.0	1.50	1.50	0.00
500.0	4.50	261.88	499.7	-1.7	-11.7	2.3	1.50	1.50	0.00
600.0	6.00	261.88	599.3	-3.0	-20.7	4.1	1.50	1.50	0.00
700.0	7.50	261.88	698.6	-4.6	-32.4	6.3	1.50	1.50	0.00
800.0	9.00	261.88	797.5	-6.6	-46.6	9.1	1.50	1.50	0.00
900.0	10.50	261.88	896.1	-9.0	-63.3	12.4	1.50	1.50	0.00
1,000.0	12.00	261.88	994.2	-11.8	-82.6	16.2	1.50	1.50	0.00
1,100.0	13.50	261.88	1,091.7	-14.9	-104.5	20.4	1.50	1.50	0.00
1,200.0	15.00	261.88	1,188.6	-18.4	-128.8	25.2	1.50	1.50	0.00
1,300.0	16.50	261.88	1,284.9	-22.2	-155.7	30.5	1.50	1.50	0.00
1,355.2	17.33	261.88	1,337.7	-24.5	-171.6	33.6	1.50	1.50	0.00
1,400.0	17.33	261.88	1,380.4	-26.4	-184.8	36.2	0.00	0.00	0.00
1,500.0	17.33	261.88	1,475.9	-30.6	-214.3	41.9	0.00	0.00	0.00
1,600.0	17.33	261.88	1,571.4	-34.8	-243.8	47.7	0.00	0.00	0.00
1,700.0	17.33	261.88	1,666.8	-39.0	-273.3	53.5	0.00	0.00	0.00
1,800.0	17.33	261.88	1,762.3	-43.2	-302.8	59.2	0.00	0.00	0.00
1,900.0	17.33	261.88	1,857.7	-47.4	-332.3	65.0	0.00	0.00	0.00
2,000.0	17.33	261.88	1,953.2	-51.6	-361.7	70.8	0.00	0.00	0.00
2,100.0	17.33	261.88	2,048.7	-55.8	-391.2	76.5	0.00	0.00	0.00
2,200.0	17.33	261.88	2,144.1	-60.0	-420.7	82.3	0.00	0.00	0.00
2,300.0	17.33	261.88	2,239.6	-64.3	-450.2	88.1	0.00	0.00	0.00
2,400.0	17.33	261.88	2,335.1	-68.5	-479.7	93.8	0.00	0.00	0.00
2,500.0	17.33	261.88	2,430.5	-72.7	-509.2	99.6	0.00	0.00	0.00
2,600.0	17.33	261.88	2,526.0	-76.9	-538.7	105.4	0.00	0.00	0.00
2,700.0	17.33	261.88	2,621.4	-81.1	-568.1	111.1	0.00	0.00	0.00
2,800.0	17.33	261.88	2,716.9	-85.3	-597.6	116.9	0.00	0.00	0.00
2,900.0	17.33	261.88	2,812.4	-89.5	-627.1	122.7	0.00	0.00	0.00
3,000.0	17.33	261.88	2,907.8	-93.7	-656.6	128.4	0.00	0.00	0.00
3,100.0	17.33	261.88	3,003.3	-97.9	-686.1	134.2	0.00	0.00	0.00
3,200.0	17.33	261.88	3,098.7	-102.1	-715.6	140.0	0.00	0.00	0.00
3,300.0	17.33	261.88	3,194.2	-106.3	-745.1	145.7	0.00	0.00	0.00
3,400.0	17.33	261.88	3,289.7	-110.5	-774.5	151.5	0.00	0.00	0.00
3,500.0	17.33	261.88	3,385.1	-114.7	-804.0	157.3	0.00	0.00	0.00
3,600.0	17.33	261.88	3,480.6	-119.0	-833.5	163.0	0.00	0.00	0.00
3,700.0	17.33	261.88	3,576.0	-123.2	-863.0	168.8	0.00	0.00	0.00
3,800.0	17.33	261.88	3,671.5	-127.4	-892.5	174.6	0.00	0.00	0.00
3,900.0	17.33	261.88	3,767.0	-131.6	-922.0	180.3	0.00	0.00	0.00
4,000.0	17.33	261.88	3,862.4	-135.8	-951.5	186.1	0.00	0.00	0.00
4,069.7	17.33	261.88	3,929.0	-138.7	-972.0	190.1	0.00	0.00	0.00
Parkman									
4,100.0	17.33	261.88	3,957.9	-140.0	-981.0	191.9	0.00	0.00	0.00
4,200.0	17.33	261.88	4,053.4	-144.2	-1,010.4	197.7	0.00	0.00	0.00
4,300.0	17.33	261.88	4,148.8	-148.4	-1,039.9	203.4	0.00	0.00	0.00
4,400.0	17.33	261.88	4,244.3	-152.6	-1,069.4	209.2	0.00	0.00	0.00
4,500.0	17.33	261.88	4,339.7	-156.8	-1,098.9	215.0	0.00	0.00	0.00

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Project:	SEC.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	North Reference:	True
Well:	Niles Miller 20Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-01-15)		

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)
4,546.4	17.33	261.88	4,384.0	-158.8	-1,112.6	217.6	0.00	0.00	0.00
Sussex									
4,600.0	17.33	261.88	4,435.2	-161.0	-1,128.4	220.7	0.00	0.00	0.00
4,700.0	17.33	261.88	4,530.7	-165.2	-1,157.9	226.5	0.00	0.00	0.00
4,800.0	17.33	261.88	4,626.1	-169.5	-1,187.4	232.3	0.00	0.00	0.00
4,900.0	17.33	261.88	4,721.6	-173.7	-1,216.8	238.0	0.00	0.00	0.00
5,000.0	17.33	261.88	4,817.0	-177.9	-1,246.3	243.8	0.00	0.00	0.00
5,100.0	17.33	261.88	4,912.5	-182.1	-1,275.8	249.6	0.00	0.00	0.00
5,148.7	17.33	261.88	4,959.0	-184.1	-1,290.2	252.4	0.00	0.00	0.00
Shannon									
5,200.0	17.33	261.88	5,008.0	-186.3	-1,305.3	255.3	0.00	0.00	0.00
5,300.0	17.33	261.88	5,103.4	-190.5	-1,334.8	261.1	0.00	0.00	0.00
5,400.0	17.33	261.88	5,198.9	-194.7	-1,364.3	266.9	0.00	0.00	0.00
5,500.0	17.33	261.88	5,294.4	-198.9	-1,393.8	272.6	0.00	0.00	0.00
5,600.0	17.33	261.88	5,389.8	-203.1	-1,423.2	278.4	0.00	0.00	0.00
5,659.6	17.33	261.88	5,446.7	-205.6	-1,440.8	281.8	0.00	0.00	0.00
Start Drop -2.00									
5,700.0	16.52	261.88	5,485.4	-207.3	-1,452.5	284.1	2.00	-2.00	0.00
5,800.0	14.52	261.88	5,581.7	-211.1	-1,478.9	289.3	2.00	-2.00	0.00
5,900.0	12.52	261.88	5,678.9	-214.4	-1,502.1	293.8	2.00	-2.00	0.00
6,000.0	10.52	261.88	5,776.9	-217.2	-1,521.9	297.7	2.00	-2.00	0.00
6,100.0	8.52	261.88	5,875.5	-219.5	-1,538.2	300.9	2.00	-2.00	0.00
6,200.0	6.52	261.88	5,974.7	-221.4	-1,551.2	303.4	2.00	-2.00	0.00
6,300.0	4.52	261.88	6,074.2	-222.7	-1,560.7	305.3	2.00	-2.00	0.00
6,400.0	2.52	261.88	6,174.0	-223.6	-1,566.8	306.5	2.00	-2.00	0.00
6,500.0	0.52	261.88	6,274.0	-224.0	-1,569.4	307.0	2.00	-2.00	0.00
6,526.0	0.00	261.88	6,300.0	-224.0	-1,569.5	307.0	2.00	-2.00	0.00
Start 165.3 hold at 6526.0 MD									
6,600.0	0.00	0.00	6,374.0	-224.0	-1,569.5	307.0	0.00	0.00	0.00
6,691.4	0.00	0.00	6,465.4	-224.0	-1,569.5	307.0	0.00	0.00	0.00
Start Build 7.50									
6,700.0	0.65	0.02	6,474.0	-224.0	-1,569.5	307.1	7.51	7.51	0.00
6,800.0	8.15	0.02	6,573.6	-216.3	-1,569.5	314.3	7.50	7.50	0.00
6,900.0	15.65	0.02	6,671.4	-195.7	-1,569.5	333.7	7.50	7.50	0.00
7,000.0	23.15	0.02	6,765.6	-162.5	-1,569.5	365.1	7.50	7.50	0.00
7,100.0	30.65	0.02	6,854.8	-117.3	-1,569.5	407.7	7.50	7.50	0.00
7,200.0	38.15	0.02	6,937.2	-60.9	-1,569.5	461.0	7.50	7.50	0.00
7,300.0	45.65	0.02	7,011.6	5.9	-1,569.5	524.0	7.50	7.50	0.00
7,312.1	46.56	0.02	7,020.0	14.6	-1,569.5	532.2	7.50	7.50	0.00
Sharon Springs									
7,400.0	53.15	0.02	7,076.6	81.7	-1,569.5	595.6	7.50	7.50	0.00
7,500.0	60.65	0.02	7,131.2	165.5	-1,569.4	674.6	7.50	7.50	0.00
7,551.7	64.52	0.02	7,155.0	211.3	-1,569.4	717.9	7.50	7.50	0.00
Niobrara A									
7,600.0	68.15	0.02	7,174.4	255.6	-1,569.4	759.6	7.50	7.50	0.00
7,633.0	70.62	0.02	7,186.0	286.4	-1,569.4	788.7	7.50	7.50	0.00
Niobrara B									
7,700.0	75.65	0.02	7,205.4	350.5	-1,569.4	849.3	7.50	7.50	0.00
7,800.0	83.15	0.02	7,223.8	448.8	-1,569.4	942.0	7.50	7.50	0.00
7,899.8	90.63	0.02	7,229.2	548.4	-1,569.3	1,035.9	7.50	7.50	0.00
Start 3932.8 hold at 7899.8 MD - 7"									

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Project:	SEC.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	North Reference:	True
Well:	Niles Miller 20Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-01-15)		

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)
7,900.0	90.63	0.02	7,229.2	548.6	-1,569.3	1,036.1	0.00	0.00	0.00
8,000.0	90.63	0.02	7,228.1	648.5	-1,569.3	1,130.5	0.00	0.00	0.00
8,100.0	90.63	0.02	7,227.0	748.5	-1,569.3	1,224.9	0.00	0.00	0.00
8,200.0	90.63	0.02	7,225.9	848.5	-1,569.2	1,319.3	0.00	0.00	0.00
8,300.0	90.63	0.02	7,224.8	948.5	-1,569.2	1,413.6	0.00	0.00	0.00
8,400.0	90.63	0.02	7,223.7	1,048.5	-1,569.2	1,508.0	0.00	0.00	0.00
8,500.0	90.63	0.02	7,222.6	1,148.5	-1,569.2	1,602.4	0.00	0.00	0.00
8,600.0	90.63	0.02	7,221.5	1,248.5	-1,569.1	1,696.7	0.00	0.00	0.00
8,700.0	90.63	0.02	7,220.4	1,348.5	-1,569.1	1,791.1	0.00	0.00	0.00
8,800.0	90.63	0.02	7,219.3	1,448.5	-1,569.1	1,885.5	0.00	0.00	0.00
8,900.0	90.63	0.02	7,218.2	1,548.5	-1,569.1	1,979.9	0.00	0.00	0.00
9,000.0	90.63	0.02	7,217.1	1,648.5	-1,569.0	2,074.2	0.00	0.00	0.00
9,100.0	90.63	0.02	7,216.0	1,748.5	-1,569.0	2,168.6	0.00	0.00	0.00
9,200.0	90.63	0.02	7,214.9	1,848.5	-1,569.0	2,263.0	0.00	0.00	0.00
9,300.0	90.63	0.02	7,213.9	1,948.5	-1,568.9	2,357.3	0.00	0.00	0.00
9,400.0	90.63	0.02	7,212.8	2,048.5	-1,568.9	2,451.7	0.00	0.00	0.00
9,500.0	90.63	0.02	7,211.7	2,148.5	-1,568.9	2,546.1	0.00	0.00	0.00
9,600.0	90.63	0.02	7,210.6	2,248.5	-1,568.9	2,640.5	0.00	0.00	0.00
9,700.0	90.63	0.02	7,209.5	2,348.4	-1,568.8	2,734.8	0.00	0.00	0.00
9,800.0	90.63	0.02	7,208.4	2,448.4	-1,568.8	2,829.2	0.00	0.00	0.00
9,900.0	90.63	0.02	7,207.3	2,548.4	-1,568.8	2,923.6	0.00	0.00	0.00
10,000.0	90.63	0.02	7,206.2	2,648.4	-1,568.7	3,018.0	0.00	0.00	0.00
10,100.0	90.63	0.02	7,205.1	2,748.4	-1,568.7	3,112.3	0.00	0.00	0.00
10,200.0	90.63	0.02	7,204.0	2,848.4	-1,568.7	3,206.7	0.00	0.00	0.00
10,300.0	90.63	0.02	7,202.9	2,948.4	-1,568.7	3,301.1	0.00	0.00	0.00
10,400.0	90.63	0.02	7,201.8	3,048.4	-1,568.6	3,395.4	0.00	0.00	0.00
10,500.0	90.63	0.02	7,200.7	3,148.4	-1,568.6	3,489.8	0.00	0.00	0.00
10,600.0	90.63	0.02	7,199.6	3,248.4	-1,568.6	3,584.2	0.00	0.00	0.00
10,700.0	90.63	0.02	7,198.5	3,348.4	-1,568.6	3,678.6	0.00	0.00	0.00
10,800.0	90.63	0.02	7,197.4	3,448.4	-1,568.5	3,772.9	0.00	0.00	0.00
10,900.0	90.63	0.02	7,196.3	3,548.4	-1,568.5	3,867.3	0.00	0.00	0.00
11,000.0	90.63	0.02	7,195.2	3,648.4	-1,568.5	3,961.7	0.00	0.00	0.00
11,100.0	90.63	0.02	7,194.1	3,748.4	-1,568.4	4,056.0	0.00	0.00	0.00
11,200.0	90.63	0.02	7,193.0	3,848.4	-1,568.4	4,150.4	0.00	0.00	0.00
11,300.0	90.63	0.02	7,191.9	3,948.3	-1,568.4	4,244.8	0.00	0.00	0.00
11,400.0	90.63	0.02	7,190.8	4,048.3	-1,568.4	4,339.2	0.00	0.00	0.00
11,500.0	90.63	0.02	7,189.7	4,148.3	-1,568.3	4,433.5	0.00	0.00	0.00
11,600.0	90.63	0.02	7,188.6	4,248.3	-1,568.3	4,527.9	0.00	0.00	0.00
11,700.0	90.63	0.02	7,187.5	4,348.3	-1,568.3	4,622.3	0.00	0.00	0.00
11,800.0	90.63	0.02	7,186.4	4,448.3	-1,568.2	4,716.7	0.00	0.00	0.00
11,832.6	90.63	0.02	7,186.0	4,480.9	-1,568.2	4,747.4	0.00	0.00	0.00
TD at 11832.6									
11,832.9	90.63	0.02	7,186.0	4,481.2	-1,568.2	4,747.7	0.00	0.00	0.00
BHL 500'FNL, 2356'FEL									

Database:	US_EDM	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Project:	SEC.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	North Reference:	True
Well:	Niles Miller 20Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (12-01-15)		

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 274'FSL, 828'FEL - plan hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,317,895.72	3,197,037.36	40.203869	-104.794565
BHL 500'FNL, 2356'FEL - plan hits target center - Point	0.00	0.00	7,186.0	4,481.2	-1,568.2	1,322,364.11	3,195,433.60	40.216170	-104.800180

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,899.8	7,229.2	7"	7	8-3/4	

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,069.7	3,929.0	Parkman		0.00	
4,546.4	4,384.0	Sussex		0.00	
5,148.7	4,959.0	Shannon		0.00	
7,312.1	7,020.0	Sharon Springs		0.00	
7,551.7	7,155.0	Niobrara A		0.00	
7,633.0	7,186.0	Niobrara B		0.00	

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
200.0	200.0	0.0	0.0	KOP - Start Build 1.50	
5,659.6	5,446.7	-205.6	-1,440.8	Start Drop -2.00	
6,526.0	6,300.0	-224.0	-1,569.5	Start 165.3 hold at 6526.0 MD	
6,691.4	6,465.4	-224.0	-1,569.5	Start Build 7.50	
7,899.8	7,229.2	548.4	-1,569.3	Start 3932.8 hold at 7899.8 MD	
11,832.6	7,186.0	4,480.9	-1,568.2	TD at 11832.6	

PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.20-T3N-R66W

Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W

Niles Miller 20Q-221

Wellbore #1

Plan #1 (12-01-15)

Anticollision Report

08 December, 2015

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (12-01-15)		
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 800.0 ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date	12/8/2015		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,832.6	Plan #1 (12-01-15) (Wellbore #1)	MWD	MWD - Standard

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Existing Wells Sec.20-T3N-R66W						
Barclay Crisman 23-20 (Exist) - Wellbore #1 - Wellbore #						Out of range
Barclay Crisman 24-20 (Exist) - Wellbore #1 - Wellbore #						Out of range
Barclay Crisman 4-6-20 (Exist) - Wellbore #1 - Wellbore	8,399.0	7,263.4	309.5	262.8	6.630	CC
Barclay Crisman 4-6-20 (Exist) - Wellbore #1 - Wellbore	8,400.0	7,263.4	309.5	262.8	6.628	ES, SF
Barclay-Crisman 2-8-20 (Exist) - Wellbore #1 - Wellbore						Out of range
Brattain Marble Unit 1 (Exist) - Wellbore #1 - Wellbore #1						Out of range
HSR-Bernstein 6-20 (Exist) - Wellbore #1 - Wellbore #1						Out of range
HSR-Fine 3-20A (Exist) - Wellbore #1 - Wellbore #1						Out of range
Miller 33-20 - Encana (Exist) - Wellbore #1 - Wellbore #1	9,162.4	7,196.4	168.2	-15.7	0.914	Level 1, CC, ES, SF
Miller 33-20 - PDC (Exist) - Wellbore #1 - Wellbore #1	9,318.6	7,196.5	97.6	39.2	1.671	CC, ES, SF
Miller 34-20 - Encana (Exist) - Wellbore #1 - Wellbore #1	7,792.3	7,184.9	176.8	12.2	1.074	Level 2, CC, ES, SF
Miller 34-20 - PDC (Exist) - Wellbore #1 - Wellbore #1	7,957.4	7,196.3	152.3	115.9	4.186	CC, ES, SF
Miller 4-20J (Exist) - Wellbore #1 - Wellbore #1						Out of range
Miller 44-20 - Encana (Exist) - Wellbore #1 - Wellbore #1	110.4	118.4	460.3	460.0	1,532.960	CC
Miller 44-20 - Encana (Exist) - Wellbore #1 - Wellbore #1	200.0	206.0	460.5	459.9	703.458	ES
Miller 44-20 - Encana (Exist) - Wellbore #1 - Wellbore #1	2,000.0	1,965.2	799.3	790.6	91.082	SF
Miller 44-20 - PDC (Exist) - Wellbore #1 - Wellbore #1	100.0	109.9	497.8	497.5	1,898.480	CC
Miller 44-20 - PDC (Exist) - Wellbore #1 - Wellbore #1	200.0	208.1	498.0	497.3	755.666	ES
Miller 44-20 - PDC (Exist) - Wellbore #1 - Wellbore #1	1,900.0	1,871.0	781.7	773.1	90.472	SF
Miller 5 (Exist) - Wellbore #1 - Wellbore #1						Out of range
Raymond 15C-29HZ (Exist) - Wellbore #1 - Wellbore #1	4,360.9	4,205.4	200.2	166.5	5.953	CC, ES
Raymond 15C-29HZ (Exist) - Wellbore #1 - Wellbore #1	4,400.0	4,242.3	200.5	166.8	5.945	SF
Raymond 15N-29HZ (Exist) - Wellbore #1 - Wellbore #1	5,352.2	5,175.7	164.5	121.0	3.784	CC, ES, SF
Raymond 37N-29HZ (Exist) - Wellbore #1 - Wellbore #1	2,624.4	2,529.9	242.8	224.9	13.575	CC, ES
Raymond 37N-29HZ (Exist) - Wellbore #1 - Wellbore #1	2,800.0	2,695.3	250.5	231.3	13.063	SF
Soco 20-1K (Exist) - Wellbore #1 - Wellbore #1						Out of range
Soco 20-2K (Exist) - Wellbore #1 - Wellbore #1	11,575.9	7,145.0	308.4	208.1	3.074	CC, ES
Soco 20-2K (Exist) - Wellbore #1 - Wellbore #1	11,600.0	7,144.4	309.3	208.6	3.070	SF
Soco 20-7K (Exist) - Wellbore #1 - Wellbore #1	10,520.5	7,169.0	642.2	564.1	8.220	CC, ES
Soco 20-7K (Exist) - Wellbore #1 - Wellbore #1	10,600.0	7,168.3	647.1	567.5	8.131	SF
Soco 20-8K (Exist) - Wellbore #1 - Wellbore #1						Out of range

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W						
Niles Miller 20Q-321 - Wellbore #1 - Plan #1 (12-01-15)	200.0	200.0	15.0	14.3	22.200	CC
Niles Miller 20Q-321 - Wellbore #1 - Plan #1 (12-01-15)	300.0	300.0	15.2	14.1	13.662	ES
Niles Miller 20Q-321 - Wellbore #1 - Plan #1 (12-01-15)	11,832.9	11,855.8	361.8	187.1	2.071	SF
Niles Miller 20T-221 - Wellbore #1 - Plan #1 (12-01-15)	200.0	201.0	60.0	59.4	88.758	CC
Niles Miller 20T-221 - Wellbore #1 - Plan #1 (12-01-15)	300.0	301.0	60.2	59.1	54.075	ES
Niles Miller 20T-221 - Wellbore #1 - Plan #1 (12-01-15)	800.0	798.5	80.9	77.4	23.169	SF
Niles Miller 20T-241 - Wellbore #1 - Plan #1 (12-01-15)	200.0	201.0	30.0	29.3	44.283	CC
Niles Miller 20T-241 - Wellbore #1 - Plan #1 (12-01-15)	300.0	301.0	30.2	29.0	27.074	ES
Niles Miller 20T-241 - Wellbore #1 - Plan #1 (12-01-15)	11,832.9	11,699.0	684.2	508.2	3.886	SF
Niles Miller 20T-301 - Wellbore #1 - Plan #1 (12-01-15)	200.0	201.0	45.0	44.3	66.458	CC
Niles Miller 20T-301 - Wellbore #1 - Plan #1 (12-01-15)	300.0	301.0	45.1	44.0	40.532	ES
Niles Miller 20T-301 - Wellbore #1 - Plan #1 (12-01-15)	700.0	699.6	58.9	55.9	19.713	SF
Niles Miller 20T-321 - Wellbore #1 - Plan #1 (12-01-15)	200.0	203.0	105.0	104.3	154.196	CC
Niles Miller 20T-321 - Wellbore #1 - Plan #1 (12-01-15)	300.0	303.0	105.2	104.1	94.062	ES
Niles Miller 20T-321 - Wellbore #1 - Plan #1 (12-01-15)	1,100.0	1,094.7	158.2	153.1	31.032	SF
Niles Miller 20Y-241 - Wellbore #1 - Plan #1 (12-01-15)	200.0	202.0	89.9	89.3	132.487	CC
Niles Miller 20Y-241 - Wellbore #1 - Plan #1 (12-01-15)	300.0	302.0	90.1	89.0	80.739	ES
Niles Miller 20Y-241 - Wellbore #1 - Plan #1 (12-01-15)	1,000.0	996.2	130.4	125.9	28.673	SF
Niles Miller 20Y-401 - Wellbore #1 - Plan #1 (12-01-15)	200.0	202.0	74.9	74.3	110.389	CC
Niles Miller 20Y-401 - Wellbore #1 - Plan #1 (12-01-15)	300.0	302.0	75.1	74.0	67.299	ES
Niles Miller 20Y-401 - Wellbore #1 - Plan #1 (12-01-15)	900.0	898.1	104.6	100.6	26.062	SF

Offset Design Existing Wells Sec.20-T3N-R66W - Barclay Crisman 4-6-20 (Exist) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 730-NS-GYRO-MS												Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	
7,700.0	7,205.4	7,237.0	7,158.2	34.9	19.1	-59.58	1,047.3	-1,878.6	762.4	725.1	37.22	20.485	
7,750.0	7,216.2	7,248.4	7,169.6	35.0	19.1	-67.56	1,047.5	-1,878.7	718.2	679.3	38.86	18.483	
7,800.0	7,223.8	7,256.5	7,177.7	35.1	19.1	-75.59	1,047.5	-1,878.7	674.0	633.9	40.09	16.812	
7,850.0	7,228.2	7,261.4	7,182.6	35.3	19.1	-83.14	1,047.6	-1,878.7	630.2	589.6	40.67	15.494	
7,899.8	7,229.2	7,263.1	7,184.3	35.5	19.1	-89.73	1,047.6	-1,878.7	587.4	546.8	40.63	14.457	
8,000.0	7,228.1	7,263.2	7,184.3	35.9	19.1	-89.74	1,047.6	-1,878.7	505.0	463.4	41.65	12.124	
8,100.0	7,227.0	7,263.2	7,184.4	36.5	19.1	-89.75	1,047.6	-1,878.7	430.4	387.6	42.79	10.059	
8,200.0	7,225.9	7,263.3	7,184.5	37.1	19.1	-89.76	1,047.6	-1,878.7	368.0	324.0	44.01	8.361	
8,300.0	7,224.8	7,263.4	7,184.5	37.8	19.1	-89.77	1,047.6	-1,878.7	325.0	279.7	45.32	7.171	
8,399.0	7,223.8	7,263.4	7,184.6	38.7	19.1	-89.79	1,047.6	-1,878.7	309.5	262.8	46.68	6.630	CC
8,400.0	7,223.7	7,263.4	7,184.6	38.7	19.1	-89.79	1,047.6	-1,878.7	309.5	262.8	46.70	6.628	ES, SF
8,500.0	7,222.6	7,263.5	7,184.7	39.6	19.1	-89.80	1,047.6	-1,878.7	325.6	277.4	48.13	6.764	
8,600.0	7,221.5	7,263.5	7,184.7	40.6	19.1	-89.81	1,047.6	-1,878.7	369.0	319.4	49.63	7.437	
8,700.0	7,220.4	7,263.6	7,184.8	41.7	19.1	-89.82	1,047.6	-1,878.7	431.7	380.6	51.16	8.439	
8,800.0	7,219.3	7,263.7	7,184.9	42.8	19.1	-89.83	1,047.6	-1,878.7	506.5	453.8	52.73	9.606	
8,900.0	7,218.2	7,263.7	7,184.9	44.1	19.1	-89.84	1,047.6	-1,878.7	588.9	534.5	54.34	10.837	
9,000.0	7,217.1	7,263.8	7,185.0	45.3	19.1	-89.86	1,047.6	-1,878.7	676.0	620.0	55.98	12.076	
9,100.0	7,216.0	7,263.9	7,185.0	46.7	19.1	-89.87	1,047.6	-1,878.7	766.3	708.6	57.64	13.294	

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Miller 33-20 - Encana (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 8050-UNKNOWN													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
8,400.0	7,223.7	7,204.7	7,204.7	38.7	144.1	92.85	1,810.9	-1,400.8	780.7	608.5	172.17	4.535		
8,500.0	7,222.6	7,203.6	7,203.6	39.6	144.1	92.48	1,810.9	-1,400.8	683.4	509.8	173.59	3.937		
8,600.0	7,221.5	7,202.5	7,202.5	40.6	144.1	92.11	1,810.9	-1,400.8	587.0	411.9	175.06	3.353		
8,700.0	7,220.4	7,201.4	7,201.4	41.7	144.0	91.73	1,810.9	-1,400.8	492.0	315.5	176.57	2.787		
8,800.0	7,219.3	7,200.3	7,200.3	42.8	144.0	91.36	1,810.9	-1,400.8	399.5	221.4	178.11	2.243		
8,900.0	7,218.2	7,199.2	7,199.2	44.1	144.0	90.98	1,810.9	-1,400.8	311.7	132.0	179.68	1.735		
9,000.0	7,217.1	7,198.1	7,198.1	45.3	144.0	90.61	1,810.9	-1,400.8	233.8	52.5	181.27	1.290	Level 3	
9,100.0	7,216.0	7,197.0	7,197.0	46.7	143.9	90.23	1,810.9	-1,400.8	179.4	-3.5	182.88	0.981	Level 1	
9,162.4	7,215.4	7,196.4	7,196.4	47.5	143.9	90.00	1,810.9	-1,400.8	168.2	-15.7	183.89	0.914	Level 1, CC, ES, SF	
9,200.0	7,214.9	7,195.9	7,195.9	48.0	143.9	89.86	1,810.9	-1,400.8	172.3	-12.2	184.50	0.934	Level 1	
9,300.0	7,213.8	7,194.8	7,194.8	49.4	143.9	89.48	1,810.9	-1,400.8	217.3	31.1	186.14	1.167	Level 2	
9,400.0	7,212.8	7,193.8	7,193.8	50.9	143.9	89.11	1,810.9	-1,400.8	291.0	103.3	187.79	1.550		
9,500.0	7,211.7	7,192.7	7,192.7	52.4	143.9	88.74	1,810.9	-1,400.8	377.1	187.7	189.44	1.991		
9,600.0	7,210.6	7,191.6	7,191.6	53.9	143.8	88.36	1,810.9	-1,400.8	468.7	277.6	191.10	2.453		
9,700.0	7,209.5	7,190.5	7,190.5	55.4	143.8	87.99	1,810.9	-1,400.8	563.2	370.5	192.77	2.922		
9,800.0	7,208.4	7,189.4	7,189.4	57.0	143.8	87.61	1,810.9	-1,400.8	659.3	464.9	194.44	3.391		
9,900.0	7,207.3	7,188.3	7,188.3	58.6	143.8	87.24	1,810.9	-1,400.8	756.4	560.3	196.11	3.857		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Miller 33-20 - PDC (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
8,600.0	7,221.5	7,209.0	7,208.6	40.6	15.8	97.54	1,967.0	-1,471.4	725.1	678.0	47.15	15.378		
8,700.0	7,220.4	7,207.3	7,206.8	41.7	15.8	96.54	1,967.0	-1,471.4	626.2	577.5	48.65	12.871		
8,800.0	7,219.3	7,205.5	7,205.1	42.8	15.8	95.53	1,967.0	-1,471.4	527.6	477.5	50.18	10.515		
8,900.0	7,218.2	7,203.8	7,203.3	44.1	15.8	94.51	1,967.0	-1,471.4	429.8	378.1	51.73	8.308		
9,000.0	7,217.1	7,202.0	7,201.6	45.3	15.8	93.49	1,967.0	-1,471.4	333.2	279.9	53.30	6.251		
9,100.0	7,216.0	7,200.3	7,199.9	46.7	15.8	92.47	1,967.0	-1,471.4	239.4	184.5	54.89	4.361		
9,200.0	7,214.9	7,198.6	7,198.1	48.0	15.8	91.45	1,967.1	-1,471.4	153.6	97.1	56.49	2.719		
9,300.0	7,213.8	7,196.8	7,196.4	49.4	15.7	90.43	1,967.1	-1,471.3	99.4	41.3	58.10	1.710		
9,318.6	7,213.6	7,196.5	7,196.1	49.7	15.7	90.24	1,967.1	-1,471.3	97.6	39.2	58.40	1.671	CC, ES, SF	
9,400.0	7,212.8	7,195.1	7,194.6	50.9	15.7	89.41	1,967.1	-1,471.3	127.1	67.4	59.70	2.128		
9,500.0	7,211.7	7,193.3	7,192.9	52.4	15.7	88.39	1,967.1	-1,471.3	205.9	144.6	61.31	3.359		
9,600.0	7,210.6	7,191.6	7,191.2	53.9	15.7	87.37	1,967.1	-1,471.3	297.8	234.9	62.92	4.733		
9,700.0	7,209.5	7,189.8	7,189.4	55.4	15.7	86.35	1,967.1	-1,471.3	393.6	329.1	64.52	6.101		
9,800.0	7,208.4	7,188.1	7,187.7	57.0	15.7	85.34	1,967.1	-1,471.3	491.1	425.0	66.11	7.429		
9,900.0	7,207.3	7,186.4	7,185.9	58.6	15.7	84.32	1,967.1	-1,471.3	589.4	521.7	67.69	8.708		
10,000.0	7,206.2	7,184.6	7,184.2	60.2	15.7	83.32	1,967.1	-1,471.3	688.2	619.0	69.26	9.937		
10,100.0	7,205.1	7,182.9	7,182.5	61.8	15.7	82.31	1,967.2	-1,471.3	787.3	716.5	70.82	11.118		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Miller 34-20 - Encana (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 8015-UNKNOWN													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
3,600.0	3,480.6	3,442.6	3,442.6	18.6	68.9	54.44	441.1	-1,392.5	791.3	707.2	84.13	9.405		
3,700.0	3,576.0	3,538.0	3,538.0	19.2	70.8	56.18	441.1	-1,392.5	773.8	686.9	86.88	8.907		
3,800.0	3,671.5	3,633.5	3,633.5	19.9	72.7	58.00	441.1	-1,392.5	757.1	667.4	89.64	8.446		
3,900.0	3,767.0	3,729.0	3,729.0	20.5	74.6	59.88	441.1	-1,392.5	741.2	648.8	92.43	8.019		
4,000.0	3,862.4	3,824.4	3,824.4	21.2	76.5	61.84	441.1	-1,392.5	726.2	630.9	95.23	7.625		
4,100.0	3,957.9	3,919.9	3,919.9	21.8	78.4	63.88	441.1	-1,392.5	712.1	614.0	98.05	7.263		
4,200.0	4,053.4	4,015.4	4,015.4	22.4	80.3	65.99	441.1	-1,392.5	699.0	598.1	100.87	6.929		
4,300.0	4,148.8	4,110.8	4,110.8	23.1	82.2	68.17	441.1	-1,392.5	686.9	583.2	103.70	6.624		
4,400.0	4,244.3	4,206.3	4,206.3	23.7	84.1	70.42	441.1	-1,392.5	675.9	569.4	106.52	6.345		
4,500.0	4,339.7	4,301.7	4,301.7	24.3	86.0	72.74	441.1	-1,392.5	666.1	556.8	109.34	6.092		
4,600.0	4,435.2	4,397.2	4,397.2	25.0	87.9	75.11	441.1	-1,392.5	657.5	545.4	112.14	5.863		
4,700.0	4,530.7	4,492.7	4,492.7	25.6	89.9	77.54	441.1	-1,392.5	650.2	535.2	114.92	5.657		
4,800.0	4,626.1	4,588.1	4,588.1	26.3	91.8	80.01	441.1	-1,392.5	644.1	526.4	117.67	5.474		
4,900.0	4,721.6	4,683.6	4,683.6	26.9	93.7	82.53	441.1	-1,392.5	639.4	519.0	120.38	5.311		
5,000.0	4,817.0	4,779.0	4,779.0	27.5	95.6	85.07	441.1	-1,392.5	636.0	513.0	123.04	5.169		
5,100.0	4,912.5	4,874.5	4,874.5	28.2	97.5	87.63	441.1	-1,392.5	634.0	508.4	125.66	5.046		
5,192.3	5,000.6	4,962.6	4,962.6	28.8	99.3	90.00	441.1	-1,392.5	633.4	505.4	128.02	4.948		
5,200.0	5,008.0	4,970.0	4,970.0	28.8	99.4	90.20	441.1	-1,392.5	633.4	505.2	128.21	4.940		
5,300.0	5,103.4	5,065.4	5,065.4	29.5	101.3	92.77	441.1	-1,392.5	634.2	503.5	130.71	4.852		
5,400.0	5,198.9	5,160.9	5,160.9	30.1	103.2	95.33	441.1	-1,392.5	636.4	503.3	133.14	4.780		
5,500.0	5,294.4	5,256.4	5,256.4	30.7	105.1	97.86	441.1	-1,392.5	640.0	504.5	135.50	4.723		
5,600.0	5,389.8	5,351.8	5,351.8	31.4	107.0	100.37	441.1	-1,392.5	645.0	507.2	137.80	4.680		
5,659.6	5,446.7	5,408.7	5,408.7	31.8	108.2	101.85	441.1	-1,392.5	648.5	509.4	139.14	4.661		
5,700.0	5,485.4	5,447.4	5,447.4	32.0	108.9	102.87	441.1	-1,392.5	651.2	511.1	140.02	4.651		
5,800.0	5,581.7	5,543.7	5,543.7	32.4	110.9	105.19	441.1	-1,392.5	657.9	515.8	142.11	4.629		
5,900.0	5,678.9	5,640.9	5,640.9	32.8	112.8	107.22	441.1	-1,392.5	664.6	520.4	144.20	4.609		
6,000.0	5,776.9	5,738.9	5,738.9	33.2	114.8	108.94	441.1	-1,392.5	670.9	524.6	146.28	4.586		
6,100.0	5,875.5	5,837.5	5,837.5	33.4	116.8	110.35	441.1	-1,392.5	676.5	528.1	148.38	4.559		
6,200.0	5,974.7	5,936.7	5,936.7	33.7	118.7	111.46	441.1	-1,392.5	681.2	530.7	150.47	4.527		
6,300.0	6,074.2	6,036.2	6,036.2	33.9	120.7	112.28	441.1	-1,392.5	684.8	532.3	152.56	4.489		
6,400.0	6,174.0	6,136.0	6,136.0	34.0	122.7	112.79	441.1	-1,392.5	687.2	532.5	154.65	4.443		
6,500.0	6,274.0	6,236.0	6,236.0	34.1	124.7	113.02	441.1	-1,392.5	688.2	531.5	156.72	4.391		
6,526.0	6,300.0	6,262.0	6,262.0	34.2	125.2	14.90	441.1	-1,392.5	688.3	531.0	157.26	4.376		
6,600.0	6,374.0	6,336.0	6,336.0	34.2	126.7	14.90	441.1	-1,392.5	688.3	529.4	158.81	4.334		
6,691.4	6,465.3	6,427.3	6,427.3	34.3	128.5	14.90	441.1	-1,392.5	688.3	527.5	160.72	4.282		
6,700.0	6,474.0	6,436.0	6,436.0	34.3	128.7	14.89	441.1	-1,392.5	688.2	527.3	160.88	4.278		
6,750.0	6,523.9	6,485.9	6,485.9	34.3	129.7	14.98	441.1	-1,392.5	686.1	524.7	161.42	4.250		
6,800.0	6,573.6	6,535.6	6,535.6	34.4	130.7	15.20	441.1	-1,392.5	680.8	519.5	161.28	4.221		
6,850.0	6,622.8	6,584.8	6,584.8	34.4	131.7	15.57	441.1	-1,392.5	672.4	512.0	160.45	4.191		
6,900.0	6,671.4	6,633.4	6,633.4	34.4	132.7	16.09	441.1	-1,392.5	660.9	502.0	158.95	4.158		
6,950.0	6,719.0	6,681.0	6,681.0	34.4	133.6	16.78	441.1	-1,392.5	646.5	489.7	156.79	4.123		
7,000.0	6,765.6	6,727.6	6,727.6	34.4	134.6	17.67	441.1	-1,392.5	629.0	475.0	154.00	4.085		
7,050.0	6,810.9	6,772.9	6,772.9	34.5	135.5	18.80	441.1	-1,392.5	608.8	458.1	150.64	4.041		
7,100.0	6,854.8	6,816.8	6,816.8	34.5	136.3	20.21	441.1	-1,392.5	585.8	439.0	146.81	3.990		
7,150.0	6,896.9	6,858.9	6,858.9	34.5	137.2	21.96	441.1	-1,392.5	560.2	417.6	142.65	3.927		
7,200.0	6,937.2	6,899.2	6,899.2	34.5	138.0	24.13	441.1	-1,392.5	532.2	393.9	138.37	3.847		
7,250.0	6,975.5	6,937.5	6,937.5	34.5	138.7	26.82	441.1	-1,392.5	502.0	367.7	134.31	3.738		
7,300.0	7,011.6	6,973.6	6,973.6	34.5	139.5	30.16	441.1	-1,392.5	469.8	338.9	130.94	3.588		
7,350.0	7,045.4	7,007.4	7,007.4	34.5	140.1	34.29	441.1	-1,392.5	435.9	307.0	128.90	3.382		
7,400.0	7,076.6	7,038.6	7,038.6	34.5	140.8	39.36	441.1	-1,392.5	400.6	271.6	128.92	3.107		
7,450.0	7,105.3	7,067.3	7,067.3	34.5	141.3	45.48	441.1	-1,392.5	364.2	232.6	131.62	2.768		

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Miller 34-20 - Encana (Exist) - Wellbore #1 - Wellbore #1														Offset Site Error:	0.0 ft
Survey Program: 8015-UNKNOWN														Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance								
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
7,500.0	7,131.2	7,093.2	7,093.2	34.6	141.9	52.61	441.1	-1,392.5	327.5	190.5	137.07	2.390			
7,550.0	7,154.3	7,116.3	7,116.3	34.6	142.3	60.52	441.1	-1,392.5	291.2	146.8	144.41	2.016			
7,600.0	7,174.4	7,136.4	7,136.4	34.7	142.7	68.66	441.1	-1,392.5	256.3	104.4	151.96	1.687			
7,650.0	7,191.5	7,153.5	7,153.5	34.8	143.1	76.31	441.1	-1,392.5	224.7	66.7	158.01	1.422	Level 3		
7,700.0	7,205.4	7,167.4	7,167.4	34.9	143.3	82.76	441.1	-1,392.5	198.7	36.8	161.85	1.228	Level 2		
7,750.0	7,216.2	7,178.2	7,178.2	35.0	143.6	87.51	441.1	-1,392.5	181.7	17.9	163.80	1.109	Level 2		
7,792.3	7,222.9	7,184.9	7,184.9	35.1	143.7	90.00	441.1	-1,392.5	176.8	12.2	164.63	1.074	Level 2, CC, ES, SF		
7,800.0	7,223.8	7,185.8	7,185.8	35.1	143.7	90.29	441.1	-1,392.5	177.0	12.3	164.73	1.075	Level 2		
7,850.0	7,228.2	7,190.2	7,190.2	35.3	143.8	91.01	441.1	-1,392.5	185.9	20.6	165.30	1.125	Level 2		
7,899.8	7,229.2	7,191.2	7,191.2	35.5	143.8	89.62	441.1	-1,392.5	206.8	41.1	165.67	1.248	Level 2		
8,000.0	7,228.1	7,190.1	7,190.1	35.9	143.8	89.26	441.1	-1,392.5	272.6	105.9	166.62	1.636			
8,100.0	7,227.0	7,189.0	7,189.0	36.5	143.8	88.91	441.1	-1,392.5	354.6	187.0	167.67	2.115			
8,200.0	7,225.9	7,187.9	7,187.9	37.1	143.8	88.55	441.1	-1,392.5	444.1	275.3	168.81	2.631			
8,300.0	7,224.8	7,186.8	7,186.8	37.8	143.7	88.19	441.1	-1,392.5	537.3	367.3	170.03	3.160			
8,400.0	7,223.7	7,185.7	7,185.7	38.7	143.7	87.84	441.1	-1,392.5	632.6	461.3	171.31	3.693			
8,500.0	7,222.6	7,184.6	7,184.6	39.6	143.7	87.48	441.1	-1,392.5	729.1	556.5	172.64	4.223			

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design		Existing Wells Sec.20-T3N-R66W - Miller 34-20 - PDC (Exist) - Wellbore #1 - Wellbore #1											Offset Site Error:	0.0 ft
Survey Program:		100-NS-GYRO-MS											Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
4,300.0	4,148.8	4,118.7	4,118.4	23.1	8.0	73.41	569.4	-1,383.1	795.6	765.1	30.47	26.110		
4,400.0	4,244.3	4,211.3	4,211.0	23.7	8.2	75.35	569.0	-1,382.8	786.8	755.4	31.38	25.070		
4,500.0	4,339.7	4,300.0	4,299.7	24.3	8.3	77.21	569.1	-1,383.2	779.7	747.4	32.30	24.138		
4,600.0	4,435.2	4,396.9	4,396.7	25.0	8.6	79.19	569.2	-1,384.8	773.9	740.7	33.26	23.268		
4,700.0	4,530.7	4,494.6	4,494.3	25.6	8.8	81.17	568.8	-1,387.0	768.9	734.7	34.23	22.466		
4,800.0	4,626.1	4,586.3	4,586.0	26.3	9.0	83.03	568.5	-1,389.3	765.1	729.9	35.15	21.764		
4,900.0	4,721.6	4,678.8	4,678.5	26.9	9.2	84.90	568.6	-1,392.0	762.7	726.7	36.06	21.151		
5,000.0	4,817.0	4,775.9	4,775.5	27.5	9.4	86.84	569.0	-1,395.2	761.6	724.6	36.96	20.605		
5,090.7	4,903.6	4,863.5	4,863.0	28.1	9.6	88.59	569.1	-1,398.2	761.2	723.4	37.76	20.160		
5,100.0	4,912.5	4,872.5	4,872.0	28.2	9.7	88.77	569.1	-1,398.5	761.2	723.3	37.84	20.117		
5,200.0	5,008.0	4,969.3	4,968.7	28.8	9.9	90.74	569.3	-1,401.4	761.7	723.0	38.69	19.687		
5,300.0	5,103.4	5,066.5	5,066.0	29.5	10.1	92.74	569.5	-1,403.9	763.1	723.6	39.52	19.309		
5,400.0	5,198.9	5,161.0	5,160.4	30.1	10.3	94.69	569.6	-1,406.1	765.5	725.2	40.32	18.987		
5,500.0	5,294.4	5,254.5	5,253.9	30.7	10.5	96.63	570.1	-1,407.9	769.2	728.1	41.07	18.729		
5,600.0	5,389.8	5,350.0	5,349.3	31.4	10.8	98.61	570.9	-1,409.6	774.1	732.3	41.79	18.524		
5,659.6	5,446.7	5,407.8	5,407.2	31.8	10.9	99.79	571.3	-1,410.6	777.5	735.3	42.20	18.422		
5,700.0	5,485.4	5,447.6	5,447.0	32.0	11.0	100.63	571.5	-1,411.3	779.9	737.4	42.45	18.373		
5,800.0	5,581.7	5,548.6	5,547.9	32.4	11.2	102.57	571.8	-1,412.8	785.7	742.7	42.95	18.294		
5,900.0	5,678.9	5,647.8	5,647.1	32.8	11.5	104.23	571.5	-1,414.1	790.8	747.4	43.41	18.218		
6,000.0	5,776.9	5,742.0	5,741.3	33.2	11.7	105.59	571.4	-1,414.8	795.8	752.0	43.81	18.167		
6,900.0	6,671.4	6,616.2	6,615.4	34.4	12.9	11.44	583.9	-1,416.3	794.8	750.8	44.06	18.038		
6,950.0	6,719.0	6,662.2	6,661.4	34.4	13.0	11.86	585.2	-1,416.1	781.4	738.2	43.21	18.083		
7,000.0	6,765.6	6,707.8	6,707.0	34.4	13.1	12.37	586.6	-1,416.2	765.0	722.9	42.18	18.139		
7,050.0	6,810.9	6,754.3	6,753.4	34.5	13.1	13.03	588.1	-1,416.4	745.7	704.8	40.97	18.203		
7,100.0	6,854.8	6,799.3	6,798.4	34.5	13.2	13.87	589.5	-1,416.4	723.5	683.9	39.58	18.281		
7,150.0	6,896.9	6,840.8	6,839.9	34.5	13.3	14.90	590.8	-1,416.4	698.6	660.5	38.02	18.374		
7,200.0	6,937.2	6,880.7	6,879.8	34.5	13.3	16.17	592.1	-1,416.4	671.0	634.7	36.32	18.479		
7,250.0	6,975.5	6,918.3	6,917.3	34.5	13.4	17.73	593.4	-1,416.3	641.1	606.6	34.49	18.590		
7,300.0	7,011.6	6,953.6	6,952.6	34.5	13.4	19.64	594.8	-1,416.3	609.0	576.4	32.57	18.695		
7,350.0	7,045.4	6,987.1	6,986.0	34.5	13.5	22.01	596.2	-1,416.3	574.8	544.2	30.63	18.767		
7,400.0	7,076.6	7,019.1	7,018.0	34.5	13.5	24.99	597.6	-1,416.3	538.7	509.9	28.74	18.745		
7,450.0	7,105.3	7,049.2	7,048.1	34.5	13.6	28.76	599.0	-1,416.3	500.8	473.8	27.05	18.517		
7,500.0	7,131.2	7,076.7	7,075.6	34.6	13.6	33.50	600.4	-1,416.3	461.5	435.7	25.77	17.907		
7,550.0	7,154.3	7,101.7	7,100.6	34.6	13.7	39.39	601.6	-1,416.4	421.0	395.8	25.21	16.701		
7,600.0	7,174.4	7,124.8	7,123.6	34.7	13.7	46.73	602.7	-1,416.5	379.6	353.9	25.69	14.780		
7,650.0	7,191.5	7,144.7	7,143.5	34.8	13.8	55.25	603.6	-1,416.6	337.9	310.6	27.25	12.397		
7,700.0	7,205.4	7,161.3	7,160.1	34.9	13.8	64.44	604.4	-1,416.8	296.4	266.9	29.51	10.042		
7,750.0	7,216.2	7,174.6	7,173.4	35.0	13.8	73.35	605.0	-1,416.9	256.1	224.3	31.79	8.057		
7,800.0	7,223.8	7,184.5	7,183.3	35.1	13.8	80.98	605.4	-1,416.9	218.6	185.0	33.59	6.508		
7,850.0	7,228.2	7,191.1	7,189.9	35.3	13.8	86.60	605.7	-1,417.0	186.3	151.4	34.85	5.345		
7,899.8	7,229.2	7,194.4	7,193.2	35.5	13.8	89.83	605.8	-1,417.0	162.8	127.1	35.71	4.559		
7,957.4	7,228.6	7,196.3	7,195.0	35.7	13.8	90.53	605.9	-1,417.0	152.3	115.9	36.38	4.186 CC, ES, SF		
8,000.0	7,228.1	7,197.6	7,196.4	35.9	13.8	91.05	606.0	-1,417.1	158.1	121.2	36.87	4.288		
8,100.0	7,227.0	7,200.9	7,199.6	36.5	13.9	92.26	606.1	-1,417.1	208.6	170.4	38.13	5.470		
8,200.0	7,225.9	7,204.4	7,203.2	37.1	13.9	93.60	606.3	-1,417.1	286.3	246.9	39.48	7.253		
8,300.0	7,224.8	7,208.3	7,207.0	37.8	13.9	95.04	606.4	-1,417.2	374.8	333.9	40.89	9.165		
8,400.0	7,223.7	7,212.4	7,211.2	38.7	13.9	96.60	606.6	-1,417.2	467.8	425.5	42.35	11.048		
8,500.0	7,222.6	7,217.0	7,215.7	39.6	13.9	98.27	606.8	-1,417.3	563.3	519.4	43.83	12.851		
8,600.0	7,221.5	7,221.9	7,220.6	40.6	13.9	100.09	607.1	-1,417.3	660.0	614.7	45.32	14.564		
8,700.0	7,220.4	7,227.3	7,226.0	41.7	13.9	102.05	607.4	-1,417.4	757.6	710.8	46.79	16.192		

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Miller 44-20 - Encana (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.0	0.0	8.0	8.0	0.0	0.0	54.67	266.2	375.6	460.4	460.4	0.01	N/A		
100.0	100.0	108.3	108.3	0.1	0.1	54.65	266.3	375.4	460.3	460.1	0.26	1,774.767		
110.4	110.4	118.4	118.4	0.1	0.2	54.64	266.4	375.4	460.3	460.0	0.30	1,532.960 CC		
200.0	200.0	206.0	206.0	0.3	0.3	54.64	266.5	375.6	460.5	459.9	0.65	703.458 ES		
300.0	300.0	306.7	306.7	0.5	0.5	152.82	266.8	375.9	462.1	461.0	1.08	428.719		
400.0	399.9	409.7	409.7	0.8	0.7	153.07	266.4	376.0	465.4	464.0	1.46	318.977		
500.0	499.7	506.6	506.6	1.0	0.8	153.45	265.9	376.3	471.3	469.4	1.84	256.382		
600.0	599.3	610.1	610.1	1.3	1.0	153.90	265.8	376.0	479.2	477.0	2.24	213.908		
700.0	698.6	707.3	707.3	1.6	1.1	154.41	265.7	375.7	489.5	486.8	2.63	186.176		
800.0	797.5	805.5	805.5	1.9	1.3	155.02	265.7	375.6	502.4	499.3	3.06	164.068		
900.0	896.1	902.7	902.7	2.2	1.5	155.68	266.0	375.6	518.0	514.4	3.51	147.379		
1,000.0	994.2	1,003.8	1,003.8	2.6	1.7	156.40	266.4	375.3	535.8	531.8	3.99	134.240		
1,100.0	1,091.7	1,102.8	1,102.7	3.1	1.9	157.16	266.5	374.8	555.8	551.3	4.46	124.589		
1,200.0	1,188.6	1,198.1	1,198.0	3.6	2.1	157.98	266.1	374.6	578.2	573.3	4.89	118.199		
1,300.0	1,284.9	1,292.0	1,292.0	4.1	2.2	158.81	265.8	374.6	603.5	598.2	5.32	113.465		
1,355.2	1,337.7	1,346.5	1,346.5	4.4	2.3	159.28	265.8	374.7	618.7	613.1	5.57	111.126		
1,400.0	1,380.4	1,391.2	1,391.2	4.7	2.4	159.73	265.7	374.6	631.1	625.3	5.77	109.302		
1,500.0	1,475.9	1,484.7	1,484.7	5.3	2.6	160.62	265.4	374.4	658.9	652.7	6.25	105.479		
1,600.0	1,571.4	1,583.3	1,583.3	5.9	2.8	161.44	265.5	374.0	687.0	680.2	6.75	101.818		
1,700.0	1,666.8	1,680.0	1,680.0	6.6	3.0	162.19	265.5	373.3	714.7	707.5	7.25	98.540		
1,800.0	1,762.3	1,772.1	1,772.0	7.2	3.2	162.82	265.7	372.7	742.7	735.0	7.76	95.763		
1,900.0	1,857.7	1,869.1	1,869.1	7.8	3.4	163.44	266.1	372.3	771.2	762.9	8.27	93.304		
2,000.0	1,953.2	1,965.2	1,965.1	8.4	3.6	164.04	266.0	371.8	799.3	790.6	8.78	91.082 SF		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Miller 44-20 - PDC (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:		0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:		0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning		
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
0.0	0.0	10.0	10.0	0.0	0.0	41.67	371.8	330.9	497.8	497.8	0.01	N/A			
100.0	100.0	109.9	109.9	0.1	0.1	41.64	372.0	330.7	497.8	497.5	0.26	1,898.480 CC			
200.0	200.0	208.1	208.1	0.3	0.3	41.64	372.1	330.9	498.0	497.3	0.66	755.666 ES			
300.0	300.0	308.5	308.5	0.5	0.5	139.85	372.4	331.2	499.4	498.3	1.08	462.553			
400.0	399.9	412.5	412.5	0.8	0.7	140.17	372.0	331.3	502.1	500.7	1.46	343.525			
500.0	499.7	508.9	508.9	1.0	0.8	140.63	371.6	331.6	507.1	505.2	1.84	275.327			
600.0	599.3	611.9	611.9	1.3	1.0	141.23	371.5	331.3	513.9	511.7	2.25	228.586			
700.0	698.6	709.3	709.3	1.6	1.2	141.91	371.4	331.0	522.9	520.2	2.65	197.449			
800.0	797.5	807.4	807.4	1.9	1.3	142.74	371.4	330.9	534.2	531.1	3.10	172.505			
900.0	896.1	904.3	904.3	2.2	1.5	143.64	371.6	330.9	548.0	544.4	3.57	153.506			
1,000.0	994.2	1,005.1	1,005.1	2.6	1.7	144.65	372.1	330.6	564.0	559.9	4.07	138.463			
1,100.0	1,091.7	1,104.8	1,104.8	3.1	1.9	145.73	372.1	330.1	581.9	577.3	4.58	127.192			
1,200.0	1,188.6	1,200.0	1,200.0	3.6	2.1	146.86	371.7	329.9	602.2	597.1	5.04	119.419			
1,300.0	1,284.9	1,293.9	1,293.9	4.1	2.2	148.01	371.5	329.9	625.2	619.7	5.51	113.472			
1,355.2	1,337.7	1,348.8	1,348.8	4.4	2.3	148.68	371.5	330.0	639.1	633.3	5.78	110.528			
1,400.0	1,380.4	1,393.8	1,393.8	4.7	2.4	149.32	371.3	329.9	650.5	644.5	6.01	108.305			
1,500.0	1,475.9	1,486.3	1,486.3	5.3	2.6	150.56	371.1	329.7	676.2	669.7	6.51	103.797			
1,600.0	1,571.4	1,585.3	1,585.3	5.9	2.8	151.76	371.2	329.3	702.4	695.3	7.05	99.662			
1,700.0	1,666.8	1,681.5	1,681.5	6.6	3.0	152.84	371.1	328.6	728.4	720.8	7.58	96.075			
1,800.0	1,762.3	1,773.3	1,773.3	7.2	3.2	153.78	371.4	328.0	754.8	746.7	8.11	93.077			
1,900.0	1,857.7	1,871.0	1,871.0	7.8	3.4	154.72	371.7	327.6	781.7	773.1	8.64	90.472 SF			

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Raymond 15C-29HZ (Exist) - Wellbore #1 - Wellbore #1														Offset Site Error:	0.0 ft
Survey Program: 17-MWD														Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance								Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
800.0	797.5	751.1	751.1	1.9	1.6	-33.23	-530.4	-648.1	797.6	794.3	3.35	238.236			
900.0	896.1	852.4	852.4	2.2	1.8	-34.04	-530.4	-648.3	783.6	779.8	3.84	204.086			
1,000.0	994.2	952.2	952.2	2.6	2.0	-34.97	-529.9	-648.5	767.3	762.9	4.35	176.328			
1,100.0	1,091.7	1,051.2	1,051.2	3.1	2.2	-36.06	-529.3	-648.6	748.8	743.9	4.89	153.191			
1,200.0	1,188.6	1,149.2	1,149.1	3.6	2.4	-37.35	-528.5	-648.6	728.3	722.8	5.46	133.489			
1,300.0	1,284.9	1,244.3	1,244.3	4.1	2.6	-38.81	-527.7	-648.7	706.1	700.0	6.06	116.544			
1,355.2	1,337.7	1,297.2	1,297.2	4.4	2.7	-39.72	-527.2	-648.8	693.1	686.7	6.41	108.087			
1,400.0	1,380.4	1,340.0	1,339.9	4.7	2.8	-40.39	-526.7	-649.0	682.5	675.8	6.71	101.764			
1,500.0	1,475.9	1,435.0	1,435.0	5.3	3.0	-41.93	-525.6	-649.5	659.1	651.8	7.39	89.247			
1,600.0	1,571.4	1,530.4	1,530.3	5.9	3.2	-43.54	-524.3	-650.4	636.4	628.3	8.09	78.617			
1,700.0	1,666.8	1,620.5	1,620.4	6.6	3.4	-44.98	-521.8	-653.0	614.3	605.5	8.81	69.718			
1,800.0	1,762.3	1,713.1	1,712.8	7.2	3.6	-46.30	-518.9	-658.5	594.0	584.5	9.55	62.215			
1,900.0	1,857.7	1,809.8	1,809.2	7.8	3.8	-47.69	-515.1	-664.8	573.8	563.5	10.32	55.602			
2,000.0	1,953.2	1,905.3	1,904.2	8.4	4.1	-48.92	-510.4	-673.1	554.4	543.3	11.11	49.902			
2,100.0	2,048.7	1,996.1	1,994.4	9.1	4.3	-50.03	-505.6	-682.3	535.9	524.0	11.91	45.010			
2,200.0	2,144.1	2,091.6	2,089.1	9.7	4.5	-51.08	-500.6	-694.0	518.6	505.8	12.73	40.720			
2,300.0	2,239.6	2,179.0	2,175.4	10.3	4.8	-51.93	-495.9	-706.4	502.4	488.8	13.55	37.066			
2,400.0	2,335.1	2,271.6	2,266.6	11.0	5.1	-52.64	-491.4	-722.2	488.1	473.7	14.40	33.887			
2,500.0	2,430.5	2,377.3	2,370.4	11.6	5.4	-53.37	-485.4	-740.9	473.6	458.3	15.31	30.935			
2,600.0	2,526.0	2,477.5	2,468.9	12.2	5.7	-54.10	-479.5	-758.6	459.0	442.8	16.22	28.300			
2,700.0	2,621.4	2,583.0	2,572.5	12.9	6.1	-54.81	-471.6	-777.3	443.0	425.9	17.17	25.804			
2,800.0	2,716.9	2,686.4	2,673.8	13.5	6.4	-55.50	-462.6	-795.4	426.0	407.8	18.13	23.499			
2,900.0	2,812.4	2,792.0	2,777.3	14.1	6.8	-56.22	-451.8	-813.5	407.5	388.4	19.11	21.320			
3,000.0	2,907.8	2,895.0	2,878.1	14.8	7.2	-56.93	-439.4	-830.6	387.3	367.2	20.11	19.258			
3,100.0	3,003.3	2,992.4	2,973.2	15.4	7.5	-57.54	-427.1	-847.5	366.9	345.8	21.09	17.400			
3,200.0	3,098.7	3,087.8	3,066.6	16.0	7.9	-58.32	-415.5	-863.5	346.8	324.7	22.07	15.714			
3,300.0	3,194.2	3,183.0	3,159.7	16.7	8.2	-59.24	-404.9	-879.6	327.6	304.6	23.06	14.208			
3,400.0	3,289.7	3,276.8	3,251.9	17.3	8.6	-60.46	-395.7	-894.9	309.6	285.5	24.08	12.857			
3,500.0	3,385.1	3,372.0	3,345.4	18.0	8.9	-61.92	-387.4	-910.4	292.7	267.6	25.13	11.648			
3,600.0	3,480.6	3,470.8	3,442.7	18.6	9.2	-63.82	-379.5	-925.7	276.5	250.2	26.21	10.548			
3,700.0	3,576.0	3,567.9	3,538.6	19.2	9.5	-66.25	-372.6	-939.4	260.9	233.6	27.33	9.547			
3,800.0	3,671.5	3,664.8	3,634.5	19.9	9.8	-69.31	-366.5	-951.8	246.5	218.0	28.49	8.649			
3,900.0	3,767.0	3,761.3	3,730.2	20.5	10.1	-73.06	-361.2	-962.9	233.3	203.7	29.67	7.863			
4,000.0	3,862.4	3,858.8	3,827.1	21.2	10.4	-77.60	-356.5	-972.8	221.9	191.1	30.81	7.201			
4,100.0	3,957.9	3,955.5	3,923.3	21.8	10.7	-82.80	-351.9	-981.7	212.1	180.3	31.84	6.662			
4,200.0	4,053.4	4,051.4	4,018.8	22.4	10.9	-88.66	-347.9	-989.4	205.0	172.3	32.72	6.267			
4,300.0	4,148.8	4,147.9	4,114.9	23.1	11.2	-95.02	-344.4	-996.5	200.9	167.6	33.36	6.023			
4,360.9	4,206.9	4,205.4	4,172.3	23.5	11.3	-99.03	-342.4	-1,000.3	200.2	166.5	33.62	5.953 CC, ES			
4,400.0	4,244.3	4,242.3	4,209.1	23.7	11.4	-101.70	-341.3	-1,002.3	200.5	166.8	33.72	5.945 SF			
4,500.0	4,339.7	4,336.4	4,303.1	24.3	11.6	-108.60	-339.0	-1,006.3	204.4	170.6	33.78	6.052			
4,600.0	4,435.2	4,429.8	4,396.5	25.0	11.8	-115.34	-337.2	-1,009.1	212.9	179.3	33.59	6.336			
4,700.0	4,530.7	4,522.6	4,489.2	25.6	12.0	-121.63	-336.1	-1,010.4	225.7	192.5	33.26	6.787			
4,800.0	4,626.1	4,615.8	4,582.4	26.3	12.1	-127.38	-335.6	-1,010.6	242.6	209.8	32.84	7.386			
4,900.0	4,721.6	4,709.4	4,676.0	26.9	12.3	-132.52	-335.1	-1,009.9	262.5	230.1	32.42	8.095			
5,000.0	4,817.0	4,802.5	4,769.1	27.5	12.4	-137.02	-334.6	-1,008.4	284.9	252.9	32.06	8.888			
5,100.0	4,912.5	4,900.8	4,867.4	28.2	12.6	-141.13	-333.8	-1,006.7	308.9	277.2	31.74	9.735			
5,200.0	5,008.0	5,000.5	4,967.0	28.8	12.7	-144.59	-332.9	-1,006.6	332.8	301.2	31.53	10.554			
5,300.0	5,103.4	5,095.3	5,061.9	29.5	12.9	-147.37	-332.1	-1,007.2	356.9	325.4	31.46	11.344			
5,400.0	5,198.9	5,186.4	5,153.0	30.1	13.1	-149.69	-331.8	-1,007.1	382.6	351.1	31.48	12.153			
5,500.0	5,294.4	5,280.1	5,246.7	30.7	13.2	-151.74	-332.0	-1,006.4	409.6	378.0	31.56	12.976			
5,600.0	5,389.8	5,375.0	5,341.6	31.4	13.4	-153.54	-332.5	-1,005.6	437.2	405.5	31.70	13.792			

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Raymond 15C-29HZ (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 17-MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
5,659.6	5,446.7	5,431.4	5,398.0	31.8	13.5	-154.51	-332.8	-1,005.1	453.9	422.1	31.80	14.272		
5,700.0	5,485.4	5,469.5	5,436.1	32.0	13.5	-155.21	-333.0	-1,004.8	465.0	433.2	31.87	14.591		
5,800.0	5,581.7	5,564.7	5,531.3	32.4	13.7	-156.73	-333.2	-1,003.6	490.8	458.8	32.03	15.325		
5,900.0	5,678.9	5,661.3	5,627.8	32.8	13.9	-157.96	-333.2	-1,002.3	513.8	481.6	32.22	15.949		
6,000.0	5,776.9	5,758.1	5,724.6	33.2	14.0	-158.91	-333.5	-1,000.9	533.9	501.4	32.43	16.461		
6,100.0	5,875.5	5,857.0	5,823.5	33.4	14.2	-159.60	-334.3	-999.5	550.9	518.2	32.67	16.863		
6,200.0	5,974.7	5,956.6	5,923.1	33.7	14.4	-160.07	-335.5	-998.4	564.5	531.6	32.90	17.157		
6,300.0	6,074.2	6,057.4	6,023.9	33.9	14.5	-160.33	-337.1	-997.4	574.8	541.7	33.14	17.344		
6,400.0	6,174.0	6,157.6	6,124.1	34.0	14.7	-160.39	-339.2	-996.8	581.6	548.2	33.37	17.427		
6,500.0	6,274.0	6,261.8	6,228.2	34.1	14.9	-160.29	-341.5	-996.5	584.9	551.3	33.60	17.407		
6,526.0	6,300.0	6,287.8	6,254.3	34.2	14.9	101.63	-341.9	-996.5	585.1	551.4	33.65	17.386		
6,600.0	6,374.0	6,359.5	6,325.9	34.2	15.1	101.77	-343.4	-996.4	585.5	551.5	33.92	17.259		
6,691.4	6,465.3	6,457.8	6,424.2	34.3	15.2	101.95	-345.2	-996.8	585.5	551.2	34.28	17.080		
6,700.0	6,474.0	6,466.5	6,432.9	34.3	15.2	101.95	-345.3	-996.8	585.4	551.1	34.33	17.056		
6,711.2	6,485.2	6,477.9	6,444.3	34.3	15.3	101.99	-345.5	-996.9	585.4	551.0	34.38	17.027		
6,750.0	6,523.9	6,517.2	6,483.6	34.3	15.3	102.24	-346.1	-997.3	585.6	551.0	34.59	16.928		
6,800.0	6,573.6	6,567.3	6,533.6	34.4	15.4	102.78	-346.9	-997.8	586.5	551.6	34.89	16.811		
6,850.0	6,622.8	6,616.9	6,583.3	34.4	15.5	103.58	-347.8	-998.4	588.1	552.9	35.19	16.711		
6,900.0	6,671.4	6,669.1	6,635.5	34.4	15.6	104.67	-348.6	-999.2	590.6	555.0	35.53	16.620		
6,950.0	6,719.0	6,718.6	6,684.9	34.4	15.7	105.91	-349.3	-1,000.2	593.9	558.0	35.85	16.568		
7,000.0	6,765.6	6,763.8	6,730.1	34.4	15.8	107.18	-350.1	-1,001.2	598.6	562.5	36.10	16.583		
7,050.0	6,810.9	6,804.1	6,770.4	34.5	15.9	108.41	-351.6	-1,002.2	605.0	568.8	36.26	16.688		
7,100.0	6,854.8	6,837.2	6,803.3	34.5	15.9	109.46	-354.5	-1,003.2	614.0	577.7	36.29	16.918		
7,150.0	6,896.9	6,868.0	6,833.8	34.5	16.0	110.44	-358.9	-1,004.5	625.9	589.6	36.24	17.269		
7,200.0	6,937.2	6,893.1	6,858.4	34.5	16.0	111.00	-363.7	-1,005.7	641.0	604.9	36.06	17.774		
7,250.0	6,975.5	6,911.0	6,875.9	34.5	16.1	110.90	-367.5	-1,006.6	659.4	623.6	35.75	18.442		
7,300.0	7,011.6	6,929.6	6,893.9	34.5	16.1	110.60	-371.9	-1,007.4	681.2	645.8	35.45	19.219		
7,350.0	7,045.4	6,942.2	6,906.1	34.5	16.1	109.55	-375.1	-1,007.8	706.5	671.4	35.12	20.116		
7,400.0	7,076.6	6,954.0	6,917.5	34.5	16.1	108.11	-378.2	-1,008.1	734.8	699.9	34.87	21.072		
7,450.0	7,105.3	6,962.7	6,925.8	34.5	16.1	106.03	-380.5	-1,008.2	765.9	731.2	34.72	22.057		
7,500.0	7,131.2	6,970.1	6,932.9	34.6	16.2	103.44	-382.6	-1,008.4	799.4	764.7	34.70	23.037		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Raymond 15N-29HZ (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 17-MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
1,000.0	994.2	948.6	948.6	2.6	2.0	-33.25	-526.6	-678.8	787.7	783.4	4.34	181.644		
1,100.0	1,091.7	1,045.4	1,045.3	3.1	2.2	-34.26	-526.6	-679.3	769.6	764.7	4.86	158.242		
1,200.0	1,188.6	1,142.9	1,142.8	3.6	2.4	-35.47	-526.6	-679.8	749.6	744.2	5.42	138.301		
1,300.0	1,284.9	1,230.0	1,230.0	4.1	2.6	-36.74	-526.6	-680.3	727.8	721.8	6.00	121.407		
1,355.2	1,337.7	1,280.8	1,280.8	4.4	2.7	-37.51	-526.4	-681.4	715.5	709.2	6.34	112.911		
1,400.0	1,380.4	1,321.0	1,320.9	4.7	2.8	-37.98	-526.0	-683.2	705.9	699.3	6.61	106.730		
1,500.0	1,475.9	1,397.9	1,397.5	5.3	3.0	-38.74	-524.6	-689.2	686.1	678.9	7.23	94.940		
1,600.0	1,571.4	1,480.5	1,479.5	5.9	3.2	-39.30	-522.0	-699.3	668.8	660.9	7.86	85.065		
1,700.0	1,666.8	1,575.1	1,572.8	6.6	3.4	-39.64	-517.8	-714.6	653.1	644.6	8.55	76.385		
1,800.0	1,762.3	1,670.0	1,666.1	7.2	3.7	-39.87	-512.8	-731.2	637.9	628.6	9.27	68.837		
1,900.0	1,857.7	1,769.0	1,763.3	7.8	4.0	-40.13	-507.8	-748.7	622.9	612.9	10.02	62.185		
2,000.0	1,953.2	1,870.2	1,862.9	8.4	4.3	-40.45	-503.0	-766.2	607.9	597.1	10.78	56.394		
2,100.0	2,048.7	1,972.9	1,964.3	9.1	4.6	-41.00	-499.0	-781.9	592.2	580.6	11.55	51.250		
2,200.0	2,144.1	2,071.8	2,062.1	9.7	4.9	-41.61	-495.3	-796.3	576.2	563.9	12.35	46.669		
2,300.0	2,239.6	2,169.9	2,159.1	10.3	5.2	-42.22	-491.3	-811.0	560.3	547.2	13.15	42.606		
2,400.0	2,335.1	2,264.3	2,252.2	11.0	5.5	-42.74	-487.3	-826.0	544.9	530.9	13.97	39.011		
2,500.0	2,430.5	2,371.9	2,358.3	11.6	5.9	-43.36	-482.1	-842.9	529.1	514.2	14.84	35.657		
2,600.0	2,526.0	2,470.7	2,456.0	12.2	6.2	-44.14	-477.6	-856.6	512.2	496.5	15.69	32.642		
2,700.0	2,621.4	2,565.4	2,549.6	12.9	6.5	-44.88	-473.5	-870.4	496.2	479.6	16.55	29.972		
2,800.0	2,716.9	2,662.5	2,645.4	13.5	6.8	-45.60	-469.1	-885.5	480.6	463.2	17.44	27.551		
2,900.0	2,812.4	2,758.8	2,740.3	14.1	7.2	-46.28	-464.7	-901.1	465.5	447.2	18.35	25.371		
3,000.0	2,907.8	2,855.6	2,835.5	14.8	7.5	-46.83	-459.9	-918.2	451.0	431.7	19.26	23.417		
3,100.0	3,003.3	2,957.6	2,935.8	15.4	7.9	-47.45	-454.6	-936.1	436.3	416.1	20.20	21.604		
3,200.0	3,098.7	3,057.8	3,034.4	16.0	8.2	-48.17	-449.4	-953.1	421.2	400.1	21.14	19.928		
3,300.0	3,194.2	3,159.6	3,134.9	16.7	8.6	-49.15	-444.3	-968.9	405.7	383.5	22.12	18.338		
3,400.0	3,289.7	3,258.6	3,232.5	17.3	8.9	-50.18	-438.8	-983.8	389.6	366.5	23.12	16.850		
3,500.0	3,385.1	3,355.0	3,327.6	18.0	9.3	-51.22	-433.6	-998.9	374.0	349.8	24.12	15.502		
3,600.0	3,480.6	3,451.3	3,422.6	18.6	9.6	-52.44	-429.2	-1,013.8	359.1	333.9	25.16	14.272		
3,700.0	3,576.0	3,547.8	3,518.0	19.2	9.9	-53.86	-425.6	-1,028.4	345.1	318.8	26.24	13.150		
3,800.0	3,671.5	3,647.8	3,616.8	19.9	10.3	-55.49	-422.1	-1,043.5	331.3	304.0	27.36	12.109		
3,900.0	3,767.0	3,748.4	3,716.2	20.5	10.6	-57.24	-418.0	-1,058.6	317.4	288.9	28.51	11.132		
4,000.0	3,862.4	3,850.1	3,816.5	21.2	11.0	-59.05	-412.8	-1,074.0	302.9	273.2	29.69	10.203		
4,100.0	3,957.9	3,942.6	3,907.9	21.8	11.3	-60.94	-408.2	-1,087.7	288.8	257.9	30.85	9.361		
4,200.0	4,053.4	4,039.0	4,002.8	22.4	11.6	-62.74	-404.9	-1,104.4	277.2	245.2	32.03	8.655		
4,300.0	4,148.8	4,143.1	4,104.8	23.1	12.1	-64.27	-399.7	-1,124.5	265.1	231.9	33.24	7.977		
4,400.0	4,244.3	4,242.2	4,202.0	23.7	12.4	-65.92	-393.8	-1,143.2	252.2	217.8	34.43	7.325		
4,500.0	4,339.7	4,341.8	4,299.9	24.3	12.8	-68.08	-387.9	-1,160.6	239.1	203.5	35.66	6.705		
4,600.0	4,435.2	4,438.2	4,394.8	25.0	13.2	-70.81	-382.9	-1,176.0	226.9	190.0	36.92	6.145		
4,700.0	4,530.7	4,535.4	4,490.5	25.6	13.5	-73.64	-378.7	-1,192.4	216.3	178.1	38.16	5.667		
4,800.0	4,626.1	4,636.9	4,590.4	26.3	13.9	-76.79	-374.1	-1,210.0	206.0	166.6	39.40	5.229		
4,900.0	4,721.6	4,736.8	4,688.8	26.9	14.3	-80.35	-368.3	-1,226.7	195.2	154.6	40.59	4.809		
5,000.0	4,817.0	4,835.6	4,786.1	27.5	14.6	-84.38	-362.3	-1,242.9	184.9	143.2	41.67	4.436		
5,100.0	4,912.5	4,932.9	4,882.0	28.2	15.0	-89.04	-356.7	-1,257.9	175.9	133.3	42.59	4.131		
5,200.0	5,008.0	5,029.9	4,977.9	28.8	15.3	-94.54	-351.5	-1,271.6	169.1	125.9	43.25	3.911		
5,300.0	5,103.4	5,126.2	5,073.3	29.5	15.6	-100.89	-346.9	-1,283.5	165.1	121.6	43.54	3.793		
5,352.2	5,153.2	5,175.7	5,122.5	29.8	15.7	-104.55	-344.8	-1,288.6	164.5	121.0	43.48	3.784 CC, ES, SF		
5,400.0	5,198.9	5,220.7	5,167.3	30.1	15.9	-107.97	-343.1	-1,292.8	165.1	121.8	43.32	3.811		
5,500.0	5,294.4	5,313.6	5,259.8	30.7	16.1	-114.99	-340.9	-1,300.3	170.2	127.4	42.71	3.984		
5,600.0	5,389.8	5,409.2	5,355.3	31.4	16.3	-121.91	-339.8	-1,306.3	180.1	138.3	41.78	4.311		
5,659.6	5,446.7	5,464.5	5,410.5	31.8	16.4	-125.69	-339.3	-1,309.2	187.7	146.5	41.17	4.560		
5,700.0	5,485.4	5,501.5	5,447.4	32.0	16.5	-128.19	-339.0	-1,310.5	193.7	153.0	40.71	4.758		

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Raymond 15N-29HZ (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 17-MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
5,800.0	5,581.7	5,593.4	5,539.4	32.4	16.7	-133.51	-338.9	-1,312.2	210.1	170.5	39.62	5.304		
5,900.0	5,678.9	5,689.6	5,635.6	32.8	16.8	-137.77	-339.4	-1,312.6	227.0	188.3	38.77	5.856		
6,000.0	5,776.9	5,786.9	5,732.8	33.2	16.9	-140.95	-340.0	-1,312.7	242.6	204.4	38.19	6.352		
6,100.0	5,875.5	5,885.2	5,831.1	33.4	17.1	-143.24	-341.0	-1,312.6	256.3	218.4	37.86	6.770		
6,200.0	5,974.7	5,984.4	5,930.3	33.7	17.2	-144.78	-342.4	-1,312.7	267.4	229.7	37.71	7.090		
6,300.0	6,074.2	6,083.0	6,028.9	33.9	17.4	-145.68	-344.1	-1,312.9	276.0	238.2	37.72	7.315		
6,400.0	6,174.0	6,185.8	6,131.7	34.0	17.5	-146.17	-345.6	-1,313.1	281.5	243.6	37.82	7.442		
6,500.0	6,274.0	6,284.6	6,230.5	34.1	17.7	-146.33	-346.3	-1,313.5	283.6	245.6	37.97	7.469		
6,526.0	6,300.0	6,310.0	6,255.9	34.2	17.7	115.59	-346.6	-1,313.6	283.8	245.8	38.03	7.463		
6,600.0	6,374.0	6,382.4	6,328.3	34.2	17.8	115.78	-347.6	-1,313.6	284.3	246.0	38.31	7.420		
6,691.4	6,465.3	6,472.2	6,418.1	34.3	18.0	116.06	-349.4	-1,313.2	285.4	246.7	38.68	7.378		
6,700.0	6,474.0	6,480.7	6,426.6	34.3	18.0	116.07	-349.5	-1,313.1	285.5	246.8	38.74	7.371		
6,750.0	6,523.9	6,529.9	6,475.8	34.3	18.0	116.48	-350.6	-1,312.7	287.4	248.3	39.09	7.351		
6,800.0	6,573.6	6,579.4	6,525.2	34.4	18.1	117.34	-351.6	-1,312.2	290.8	251.3	39.49	7.363		
6,850.0	6,622.8	6,625.4	6,571.2	34.4	18.2	118.54	-352.8	-1,311.7	296.0	256.2	39.88	7.422		
6,900.0	6,671.4	6,666.5	6,612.2	34.4	18.2	119.96	-355.0	-1,311.2	303.9	263.7	40.23	7.555		
6,950.0	6,719.0	6,702.1	6,647.6	34.4	18.3	121.57	-359.2	-1,311.0	315.6	275.1	40.49	7.794		
7,000.0	6,765.6	6,736.3	6,681.1	34.4	18.3	123.38	-365.5	-1,311.1	331.2	290.6	40.66	8.147		
7,050.0	6,810.9	6,767.1	6,711.1	34.5	18.4	125.00	-372.8	-1,311.6	351.2	310.6	40.63	8.645		
7,100.0	6,854.8	6,794.1	6,737.0	34.5	18.4	126.17	-380.4	-1,312.2	375.5	335.1	40.33	9.311		
7,150.0	6,896.9	6,826.0	6,767.2	34.5	18.4	127.77	-390.6	-1,313.2	404.1	364.1	39.98	10.108		
7,200.0	6,937.2	6,836.8	6,777.3	34.5	18.4	126.59	-394.4	-1,313.7	436.3	397.3	39.00	11.186		
7,250.0	6,975.5	6,853.2	6,792.6	34.5	18.4	125.66	-400.4	-1,314.3	472.1	434.0	38.11	12.387		
7,300.0	7,011.6	6,869.0	6,807.1	34.5	18.5	124.16	-406.5	-1,314.9	510.8	473.6	37.21	13.728		
7,350.0	7,045.4	6,869.0	6,807.1	34.5	18.5	119.51	-406.5	-1,314.9	552.0	515.8	36.20	15.250		
7,400.0	7,076.6	6,869.0	6,807.1	34.5	18.5	113.66	-406.5	-1,314.9	595.3	559.9	35.46	16.788		
7,450.0	7,105.3	6,884.4	6,821.3	34.5	18.5	109.59	-412.7	-1,315.4	639.8	604.7	35.14	18.206		
7,500.0	7,131.2	6,886.9	6,823.4	34.6	18.5	101.80	-413.7	-1,315.4	685.6	650.7	34.93	19.630		
7,550.0	7,154.3	6,887.8	6,824.3	34.6	18.5	92.44	-414.1	-1,315.4	732.2	697.6	34.65	21.131		
7,600.0	7,174.4	6,887.4	6,823.9	34.7	18.5	81.91	-414.0	-1,315.4	779.3	745.5	33.85	23.023		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design		Existing Wells Sec.20-T3N-R66W - Raymond 37N-29HZ (Exist) - Wellbore #1 - Wellbore #1											Offset Site Error:		0.0 ft
Survey Program: 17-MWD													Offset Well Error:		0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
0.0	0.0	0.0	0.0	0.0	0.0	-137.01	-532.0	-495.9	728.5						
100.0	100.0	59.1	59.1	0.1	0.1	-137.01	-531.9	-495.9	727.2	727.0	0.23	3,223.496			
200.0	200.0	160.8	160.8	0.3	0.3	-137.00	-531.4	-495.6	726.7	726.0	0.67	1,086.404			
300.0	300.0	259.8	259.8	0.5	0.5	-38.95	-531.1	-495.4	725.3	724.2	1.09	665.891			
400.0	399.9	359.8	359.8	0.8	0.7	-39.18	-530.8	-495.0	721.8	720.3	1.52	475.637			
500.0	499.7	459.4	459.4	1.0	0.9	-39.56	-530.5	-494.9	716.4	714.4	1.96	365.277			
600.0	599.3	559.3	559.3	1.3	1.2	-40.10	-530.2	-494.6	708.9	706.5	2.42	293.305			
700.0	698.6	657.6	657.6	1.6	1.4	-40.80	-529.9	-494.4	699.6	696.7	2.88	242.719			
800.0	797.5	756.7	756.7	1.9	1.6	-41.73	-530.0	-493.9	688.5	685.1	3.37	204.456			
900.0	896.1	854.5	854.5	2.2	1.8	-42.79	-529.6	-493.8	675.5	671.6	3.87	174.412			
1,000.0	994.2	949.0	949.0	2.6	2.0	-43.99	-529.4	-494.2	661.3	656.9	4.40	150.273			
1,100.0	1,091.7	1,078.6	1,078.5	3.1	2.2	-45.91	-527.6	-493.9	644.5	639.4	5.05	127.543			
1,200.0	1,188.6	1,200.7	1,200.3	3.6	2.5	-47.92	-519.1	-491.8	620.9	615.1	5.74	108.112			
1,300.0	1,284.9	1,313.1	1,311.8	4.1	2.8	-49.73	-505.1	-491.9	592.5	586.0	6.46	91.721			
1,355.2	1,337.7	1,374.8	1,372.7	4.4	3.0	-50.74	-495.0	-492.7	575.0	568.1	6.88	83.542			
1,400.0	1,380.4	1,424.0	1,421.1	4.7	3.1	-51.43	-486.3	-493.1	560.0	552.8	7.23	77.459			
1,500.0	1,475.9	1,532.2	1,527.2	5.3	3.5	-53.06	-465.2	-493.0	524.9	516.8	8.02	65.428			
1,600.0	1,571.4	1,625.6	1,618.4	5.9	3.7	-54.64	-445.1	-492.3	488.0	479.2	8.80	55.441			
1,700.0	1,666.8	1,712.3	1,703.3	6.6	4.0	-56.28	-427.2	-492.5	452.9	443.3	9.58	47.278			
1,800.0	1,762.3	1,805.7	1,794.7	7.2	4.4	-58.37	-408.4	-492.6	418.4	408.0	10.41	40.214			
1,900.0	1,857.7	1,893.0	1,880.4	7.8	4.7	-60.80	-391.4	-491.9	384.9	373.6	11.24	34.241			
2,000.0	1,953.2	1,981.1	1,967.1	8.4	5.0	-63.69	-375.8	-491.7	353.9	341.8	12.11	29.227			
2,100.0	2,048.7	2,069.3	2,054.2	9.1	5.2	-67.28	-361.5	-490.7	325.1	312.1	13.01	24.980			
2,200.0	2,144.1	2,159.9	2,143.7	9.7	5.5	-71.49	-348.0	-490.5	299.3	285.4	13.96	21.440			
2,300.0	2,239.6	2,248.1	2,231.0	10.3	5.8	-76.12	-335.7	-491.1	276.7	261.8	14.92	18.546			
2,400.0	2,335.1	2,334.1	2,316.5	11.0	6.0	-81.26	-326.1	-491.8	259.1	243.2	15.87	16.325			
2,500.0	2,430.5	2,420.5	2,402.6	11.6	6.3	-86.96	-319.4	-492.6	247.8	231.0	16.80	14.744			
2,600.0	2,526.0	2,508.3	2,490.3	12.2	6.4	-93.01	-315.5	-493.4	243.0	225.3	17.68	13.742			
2,624.4	2,549.3	2,529.9	2,511.9	12.4	6.5	-94.50	-315.0	-493.7	242.8	224.9	17.89	13.575 CC, ES			
2,700.0	2,621.4	2,597.3	2,579.3	12.9	6.6	-99.11	-314.2	-494.2	244.6	226.1	18.48	13.232			
2,800.0	2,716.9	2,695.3	2,677.4	13.5	6.8	-105.67	-313.7	-494.7	250.5	231.3	19.18	13.063 SF			
2,900.0	2,812.4	2,790.9	2,772.9	14.1	7.0	-111.80	-312.3	-495.2	259.0	239.2	19.75	13.113			
3,000.0	2,907.8	2,883.2	2,865.2	14.8	7.1	-117.26	-311.8	-495.5	271.2	251.0	20.22	13.410			
3,100.0	3,003.3	2,978.4	2,960.4	15.4	7.3	-122.30	-312.0	-495.8	286.4	265.8	20.61	13.896			
3,200.0	3,098.7	3,072.0	3,054.0	16.0	7.5	-126.74	-312.4	-496.1	304.0	283.0	20.95	14.511			
3,300.0	3,194.2	3,163.4	3,145.4	16.7	7.6	-130.63	-313.5	-495.5	324.4	303.1	21.25	15.266			
3,400.0	3,289.7	3,257.5	3,239.4	17.3	7.8	-134.18	-315.0	-494.2	347.0	325.5	21.52	16.126			
3,500.0	3,385.1	3,355.6	3,337.5	18.0	7.9	-137.37	-316.8	-493.4	370.6	348.9	21.78	17.015			
3,600.0	3,480.6	3,455.6	3,437.6	18.6	8.1	-140.02	-319.3	-494.1	394.1	372.0	22.06	17.861			
3,700.0	3,576.0	3,549.0	3,530.9	19.2	8.3	-142.24	-321.3	-495.1	417.9	395.5	22.37	18.685			
3,800.0	3,671.5	3,641.6	3,623.5	19.9	8.4	-144.35	-322.7	-494.9	443.0	420.4	22.65	19.557			
3,900.0	3,767.0	3,737.8	3,719.7	20.5	8.6	-146.40	-323.6	-494.2	468.9	446.0	22.94	20.441			
4,000.0	3,862.4	3,834.0	3,815.9	21.2	8.8	-148.29	-324.0	-493.6	495.1	471.9	23.23	21.315			
4,100.0	3,957.9	3,931.7	3,913.5	21.8	9.0	-150.05	-324.0	-493.0	521.5	498.0	23.52	22.172			
4,200.0	4,053.4	4,028.3	4,010.2	22.4	9.1	-151.59	-324.3	-493.0	547.8	524.0	23.84	22.980			
4,300.0	4,148.8	4,122.6	4,104.5	23.1	9.3	-152.94	-324.5	-493.0	574.6	550.4	24.17	23.772			
4,400.0	4,244.3	4,219.0	4,200.9	23.7	9.5	-154.21	-324.9	-492.9	601.7	577.2	24.51	24.546			
4,500.0	4,339.7	4,310.8	4,292.6	24.3	9.7	-155.29	-325.4	-492.8	629.1	604.3	24.87	25.298			
4,600.0	4,435.2	4,409.7	4,391.6	25.0	9.9	-156.35	-326.1	-492.6	656.9	631.6	25.23	26.031			
4,700.0	4,530.7	4,504.4	4,486.2	25.6	10.1	-157.26	-327.0	-492.7	684.6	659.0	25.61	26.729			
4,800.0	4,626.1	4,594.9	4,576.8	26.3	10.2	-158.04	-328.2	-492.6	712.7	686.7	26.00	27.408			

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Raymond 37N-29HZ (Exist) - Wellbore #1 - Wellbore #1													
Survey Program: 17-MWD												Offset Site Error:	0.0 ft
Reference												Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
4,900.0	4,721.6	4,680.4	4,662.2	26.9	10.4	-158.69	-330.0	-491.4	742.2	715.8	26.40	28.116	
5,000.0	4,817.0	4,779.4	4,761.2	27.5	10.6	-159.39	-332.1	-489.9	772.1	745.3	26.81	28.802	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Soco 20-2K (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
10,900.0	7,196.3	7,162.0	7,158.9	75.4	16.7	93.73	4,223.9	-1,260.1	742.7	654.7	87.95	8.444		
11,000.0	7,195.2	7,159.7	7,156.6	77.2	16.7	93.29	4,223.9	-1,260.1	653.1	563.3	89.78	7.274		
11,100.0	7,194.1	7,157.3	7,154.2	78.9	16.7	92.85	4,224.0	-1,260.1	566.9	475.3	91.61	6.188		
11,200.0	7,193.0	7,154.8	7,151.7	80.7	16.7	92.39	4,224.0	-1,260.0	486.1	392.6	93.44	5.202		
11,300.0	7,191.9	7,152.3	7,149.2	82.4	16.7	91.92	4,224.0	-1,260.0	413.7	318.4	95.27	4.342		
11,400.0	7,190.8	7,149.7	7,146.6	84.2	16.7	91.44	4,224.1	-1,260.0	355.0	257.9	97.10	3.656		
11,500.0	7,189.7	7,147.1	7,144.0	86.0	16.7	90.96	4,224.1	-1,260.0	317.6	218.7	98.92	3.210		
11,575.9	7,188.8	7,145.0	7,141.9	87.4	16.6	90.58	4,224.2	-1,259.9	308.4	208.1	100.30	3.074 CC, ES		
11,600.0	7,188.6	7,144.4	7,141.3	87.8	16.6	90.46	4,224.2	-1,259.9	309.3	208.6	100.74	3.070 SF		
11,700.0	7,187.5	7,141.6	7,138.5	89.6	16.6	89.95	4,224.2	-1,259.9	332.4	229.8	102.56	3.241		
11,800.0	7,186.4	7,138.8	7,135.7	91.4	16.6	89.42	4,224.3	-1,259.9	381.2	276.8	104.36	3.652		
11,832.9	7,186.0	7,137.9	7,134.8	92.0	16.6	89.25	4,224.3	-1,259.9	401.4	296.4	104.96	3.824		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.20-T3N-R66W - Soco 20-7K (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
10,100.0	7,205.1	7,172.5	7,170.4	61.8	14.0	90.71	3,168.8	-926.4	767.6	697.1	70.51	10.887		
10,200.0	7,204.0	7,171.7	7,169.6	63.5	14.0	90.64	3,168.8	-926.4	717.7	645.4	72.31	9.926		
10,300.0	7,202.9	7,170.8	7,168.7	65.2	14.0	90.56	3,168.8	-926.4	679.0	604.9	74.12	9.161		
10,400.0	7,201.8	7,170.0	7,167.9	66.8	14.0	90.49	3,168.8	-926.4	653.4	577.5	75.93	8.605		
10,500.0	7,200.7	7,169.2	7,167.1	68.5	14.0	90.42	3,168.8	-926.4	642.5	564.8	77.75	8.264		
10,520.5	7,200.4	7,169.0	7,166.9	68.9	14.0	90.40	3,168.8	-926.4	642.2	564.1	78.13	8.220 CC, ES		
10,600.0	7,199.6	7,168.3	7,166.3	70.2	14.0	90.34	3,168.8	-926.4	647.1	567.5	79.58	8.131 SF		
10,700.0	7,198.5	7,167.5	7,165.4	72.0	14.0	90.27	3,168.8	-926.4	666.8	585.4	81.41	8.191		
10,800.0	7,197.4	7,166.7	7,164.6	73.7	14.0	90.19	3,168.8	-926.4	700.4	617.1	83.25	8.413		
10,900.0	7,196.3	7,165.9	7,163.8	75.4	14.0	90.12	3,168.8	-926.4	745.9	660.8	85.09	8.767		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design													Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W - Niles Miller 20Q-321 - Wellbore #1 - Plan #1 (12-01-15)		Offset Site Error:		0.0 ft
Survey Program: 0-MWD														Offset Well Error:		0.0 ft	
Reference		Offset		Semi Major Axis			Distance							Warning			
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor					
Depth (ft)	Depth (ft)	Depth (ft)	Depth (ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)						
0.0	0.0	0.0	0.0	0.0	0.0	-0.87	15.0	-0.2	15.0	15.0	0.00	N/A					
100.0	100.0	100.0	100.0	0.1	0.1	-0.87	15.0	-0.2	15.0	14.7	0.22	66.600					
200.0	200.0	200.0	200.0	0.3	0.3	-0.87	15.0	-0.2	15.0	14.3	0.67	22.200 CC					
300.0	300.0	300.0	300.0	0.5	0.6	102.15	15.0	-0.2	15.2	14.1	1.11	13.662 ES					
400.0	399.9	399.9	399.9	0.8	0.8	115.60	15.0	-0.2	16.5	14.9	1.56	10.586					
500.0	499.7	500.0	500.0	1.0	1.0	129.87	14.7	-1.5	19.3	17.3	2.00	9.616					
600.0	599.3	600.3	600.2	1.3	1.2	140.33	14.0	-5.4	22.8	20.4	2.45	9.314					
700.0	698.6	700.7	700.4	1.6	1.4	148.03	12.7	-11.8	26.9	24.0	2.91	9.230					
800.0	797.5	801.3	800.5	1.9	1.7	153.87	10.9	-20.9	31.2	27.9	3.38	9.232					
900.0	896.1	902.0	900.5	2.2	2.0	158.44	8.6	-32.5	35.8	31.9	3.86	9.265					
1,000.0	994.2	1,002.8	1,000.3	2.6	2.3	162.16	5.8	-46.8	40.4	36.0	4.34	9.304					
1,100.0	1,091.7	1,103.8	1,099.8	3.1	2.6	165.27	2.5	-63.7	45.1	40.3	4.83	9.338					
1,200.0	1,188.6	1,204.9	1,198.9	3.6	3.0	167.93	-1.3	-83.1	49.9	44.5	5.33	9.361					
1,300.0	1,284.9	1,306.1	1,297.6	4.1	3.4	170.26	-5.7	-105.2	54.7	48.8	5.84	9.369					
1,355.2	1,337.7	1,362.1	1,351.9	4.4	3.7	171.44	-8.3	-118.5	57.4	51.2	6.12	9.368					
1,400.0	1,380.4	1,407.0	1,395.4	4.7	3.9	172.32	-10.5	-129.6	59.4	53.0	6.36	9.337					
1,500.0	1,475.9	1,506.9	1,492.0	5.3	4.4	174.06	-15.4	-154.4	63.9	57.0	6.89	9.274					
1,600.0	1,571.4	1,606.7	1,588.7	5.9	4.9	175.57	-20.2	-179.1	68.5	61.1	7.44	9.211					
1,700.0	1,666.8	1,706.6	1,685.3	6.6	5.5	176.89	-25.1	-203.9	73.2	65.2	8.00	9.151					
1,800.0	1,762.3	1,806.5	1,781.9	7.2	6.0	178.06	-30.0	-228.6	77.8	69.3	8.56	9.094					
1,900.0	1,857.7	1,906.4	1,878.6	7.8	6.5	179.09	-34.8	-253.4	82.5	73.4	9.13	9.038					
2,000.0	1,953.2	2,006.3	1,975.2	8.4	7.0	-179.99	-39.7	-278.1	87.3	77.6	9.71	8.984					
2,100.0	2,048.7	2,106.1	2,071.9	9.1	7.6	-179.17	-44.6	-302.9	92.0	81.7	10.30	8.932					
2,200.0	2,144.1	2,206.0	2,168.5	9.7	8.1	-178.42	-49.5	-327.7	96.8	85.9	10.89	8.882					
2,300.0	2,239.6	2,305.9	2,265.1	10.3	8.6	-177.75	-54.3	-352.4	101.5	90.0	11.50	8.834					
2,400.0	2,335.1	2,405.8	2,361.8	11.0	9.2	-177.14	-59.2	-377.2	106.3	94.2	12.10	8.787					
2,500.0	2,430.5	2,505.7	2,458.4	11.6	9.7	-176.58	-64.1	-401.9	111.1	98.4	12.71	8.742					
2,600.0	2,526.0	2,605.5	2,555.1	12.2	10.3	-176.06	-68.9	-426.7	115.9	102.6	13.33	8.700					
2,700.0	2,621.4	2,705.4	2,651.7	12.9	10.8	-175.59	-73.8	-451.5	120.8	106.8	13.95	8.659					
2,800.0	2,716.9	2,805.3	2,748.3	13.5	11.3	-175.15	-78.7	-476.2	125.6	111.0	14.57	8.620					
2,900.0	2,812.4	2,905.2	2,845.0	14.1	11.9	-174.75	-83.5	-501.0	130.4	115.2	15.20	8.582					
3,000.0	2,907.8	3,005.0	2,941.6	14.8	12.4	-174.37	-88.4	-525.7	135.3	119.4	15.83	8.546					
3,100.0	3,003.3	3,104.9	3,038.3	15.4	13.0	-174.02	-93.3	-550.5	140.1	123.6	16.46	8.512					
3,200.0	3,098.7	3,204.8	3,134.9	16.0	13.5	-173.70	-98.2	-575.3	144.9	127.9	17.09	8.480					
3,300.0	3,194.2	3,304.7	3,231.5	16.7	14.1	-173.39	-103.0	-600.0	149.8	132.1	17.73	8.448					
3,400.0	3,289.7	3,404.6	3,328.2	17.3	14.6	-173.10	-107.9	-624.8	154.7	136.3	18.37	8.419					
3,500.0	3,385.1	3,504.4	3,424.8	18.0	15.1	-172.84	-112.8	-649.5	159.5	140.5	19.01	8.390					
3,600.0	3,480.6	3,604.3	3,521.4	18.6	15.7	-172.58	-117.6	-674.3	164.4	144.7	19.66	8.363					
3,700.0	3,576.0	3,704.2	3,618.1	19.2	16.2	-172.34	-122.5	-699.1	169.2	148.9	20.30	8.337					
3,800.0	3,671.5	3,804.1	3,714.7	19.9	16.8	-172.12	-127.4	-723.8	174.1	153.2	20.95	8.312					
3,900.0	3,767.0	3,904.0	3,811.4	20.5	17.3	-171.91	-132.3	-748.6	179.0	157.4	21.60	8.288					
4,000.0	3,862.4	4,003.8	3,908.0	21.2	17.9	-171.71	-137.1	-773.3	183.9	161.6	22.25	8.265					
4,100.0	3,957.9	4,103.7	4,004.6	21.8	18.4	-171.52	-142.0	-798.1	188.7	165.8	22.90	8.243					
4,200.0	4,053.4	4,203.6	4,101.3	22.4	19.0	-171.33	-146.9	-822.9	193.6	170.1	23.55	8.222					
4,300.0	4,148.8	4,303.5	4,197.9	23.1	19.5	-171.16	-151.7	-847.6	198.5	174.3	24.20	8.201					
4,400.0	4,244.3	4,403.4	4,294.6	23.7	20.1	-171.00	-156.6	-872.4	203.4	178.5	24.86	8.182					
4,500.0	4,339.7	4,503.2	4,391.2	24.3	20.6	-170.84	-161.5	-897.1	208.3	182.8	25.51	8.163					
4,600.0	4,435.2	4,603.1	4,487.8	25.0	21.2	-170.69	-166.4	-921.9	213.1	187.0	26.17	8.145					
4,700.0	4,530.7	4,703.0	4,584.5	25.6	21.7	-170.55	-171.2	-946.7	218.0	191.2	26.82	8.128					
4,800.0	4,626.1	4,802.9	4,681.1	26.3	22.2	-170.41	-176.1	-971.4	222.9	195.4	27.48	8.111					
4,900.0	4,721.6	4,902.8	4,777.7	26.9	22.8	-170.28	-181.0	-996.2	227.8	199.7	28.14	8.095					

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W - Niles Miller 20Q-321 - Wellbore #1 - Plan #1 (12-01-15)													Offset Site Error:	0.0 ft	
Survey Program: 0-MWD														Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
5,000.0	4,817.0	5,002.6	4,874.4	27.5	23.3	-170.16	-185.8	-1,020.9	232.7	203.9	28.80	8.080			
5,100.0	4,912.5	5,102.5	4,971.0	28.2	23.9	-170.04	-190.7	-1,045.7	237.6	208.1	29.46	8.065			
5,200.0	5,008.0	5,202.4	5,067.7	28.8	24.4	-169.92	-195.6	-1,070.5	242.5	212.4	30.12	8.051			
5,300.0	5,103.4	5,302.3	5,164.3	29.5	25.0	-169.81	-200.5	-1,095.2	247.4	216.6	30.78	8.037			
5,400.0	5,198.9	5,402.1	5,260.9	30.1	25.5	-169.71	-205.3	-1,120.0	252.3	220.8	31.44	8.023			
5,500.0	5,294.4	5,495.2	5,351.3	30.7	26.0	-169.66	-209.7	-1,142.1	258.3	226.2	32.04	8.061			
5,600.0	5,389.8	5,586.7	5,440.6	31.4	26.3	-169.77	-213.4	-1,161.0	267.3	234.8	32.55	8.213			
5,659.6	5,446.7	5,640.9	5,493.9	31.8	26.5	-169.89	-215.3	-1,170.9	274.2	241.4	32.83	8.353			
5,700.0	5,485.4	5,677.5	5,530.0	32.0	26.6	-170.01	-216.5	-1,177.0	279.2	246.2	33.01	8.457			
5,800.0	5,581.7	5,768.0	5,619.5	32.4	26.8	-170.29	-219.1	-1,190.2	291.3	257.9	33.40	8.722			
5,900.0	5,678.9	5,858.1	5,709.0	32.8	27.0	-170.57	-221.2	-1,200.5	303.1	269.4	33.73	8.987			
6,000.0	5,776.9	5,948.0	5,798.5	33.2	27.2	-170.84	-222.7	-1,208.1	314.5	280.5	33.99	9.253			
6,100.0	5,875.5	6,037.6	5,888.0	33.4	27.3	-171.11	-223.6	-1,212.9	325.6	291.4	34.19	9.522			
6,200.0	5,974.7	6,126.9	5,977.3	33.7	27.4	-171.38	-224.0	-1,215.0	336.2	301.9	34.33	9.794			
6,300.0	6,074.2	6,223.8	6,074.2	33.9	27.5	-171.64	-224.0	-1,215.1	345.6	311.2	34.43	10.038			
6,400.0	6,174.0	6,323.6	6,174.0	34.0	27.6	-171.80	-224.0	-1,215.1	351.7	317.2	34.51	10.192			
6,500.0	6,274.0	6,423.6	6,274.0	34.1	27.7	-171.87	-224.0	-1,215.1	354.3	319.8	34.56	10.253			
6,526.0	6,300.0	6,449.6	6,300.0	34.2	27.8	90.01	-224.0	-1,215.1	354.5	319.9	34.57	10.255			
6,600.0	6,374.0	6,523.6	6,374.0	34.2	27.8	90.01	-224.0	-1,215.1	354.5	319.7	34.79	10.187			
6,691.4	6,465.3	6,615.0	6,465.3	34.3	27.9	90.01	-224.0	-1,215.1	354.5	319.4	35.08	10.106			
6,700.0	6,474.0	6,623.6	6,474.0	34.3	27.9	90.00	-224.0	-1,215.1	354.5	319.3	35.11	10.096			
6,705.8	6,479.8	6,629.4	6,479.8	34.3	27.9	90.01	-224.0	-1,215.1	354.5	319.3	35.13	10.090			
6,750.0	6,523.9	6,673.5	6,523.9	34.3	28.0	90.35	-224.0	-1,215.1	354.5	319.1	35.34	10.030			
6,800.0	6,573.6	6,723.3	6,573.7	34.4	28.0	91.21	-224.0	-1,215.1	354.5	318.8	35.70	9.930			
6,850.0	6,622.8	6,773.7	6,623.9	34.4	28.1	92.24	-221.6	-1,215.1	354.7	318.6	36.11	9.825			
6,900.0	6,671.4	6,824.4	6,674.4	34.4	28.1	93.26	-215.9	-1,215.1	355.0	318.5	36.49	9.729			
6,950.0	6,719.0	6,875.6	6,724.7	34.4	28.2	94.26	-206.7	-1,215.1	355.4	318.6	36.85	9.646			
7,000.0	6,765.6	6,927.2	6,774.8	34.4	28.2	95.25	-194.1	-1,215.1	356.0	318.8	37.16	9.578			
7,050.0	6,810.9	6,979.3	6,824.3	34.5	28.2	96.22	-178.0	-1,215.1	356.6	319.1	37.43	9.525			
7,100.0	6,854.8	7,031.9	6,873.0	34.5	28.2	97.16	-158.4	-1,215.1	357.2	319.6	37.65	9.488			
7,150.0	6,896.9	7,084.8	6,920.7	34.5	28.2	98.08	-135.2	-1,215.1	358.0	320.2	37.82	9.466			
7,200.0	6,937.2	7,138.3	6,967.0	34.5	28.2	98.95	-108.6	-1,215.1	358.8	320.9	37.94	9.458			
7,250.0	6,975.5	7,192.2	7,011.7	34.5	28.2	99.79	-78.5	-1,215.1	359.7	321.7	38.01	9.461			
7,300.0	7,011.6	7,246.5	7,054.5	34.5	28.2	100.58	-45.1	-1,215.1	360.5	322.5	38.07	9.472			
7,350.0	7,045.4	7,301.2	7,095.1	34.5	28.2	101.33	-8.4	-1,215.1	361.4	323.3	38.11	9.484			
7,400.0	7,076.6	7,356.3	7,133.2	34.5	28.2	102.02	31.4	-1,215.2	362.3	324.1	38.16	9.494			
7,450.0	7,105.3	7,411.8	7,168.6	34.5	28.3	102.65	74.1	-1,215.2	363.2	324.9	38.24	9.498			
7,500.0	7,131.2	7,467.6	7,201.0	34.6	28.3	103.23	119.5	-1,215.2	364.0	325.5	38.43	9.472			
7,550.0	7,154.3	7,523.8	7,230.2	34.6	28.3	103.75	167.5	-1,215.2	364.7	326.1	38.66	9.434			
7,600.0	7,174.4	7,580.2	7,255.8	34.7	28.4	104.20	217.8	-1,215.2	365.4	326.4	39.02	9.364			
7,650.0	7,191.5	7,636.9	7,277.8	34.8	28.5	104.58	270.0	-1,215.2	366.0	326.5	39.51	9.262			
7,700.0	7,205.4	7,693.9	7,295.9	34.9	28.6	104.90	324.0	-1,215.2	366.5	326.3	40.16	9.126			
7,750.0	7,216.2	7,750.9	7,310.0	35.0	28.8	105.14	379.3	-1,215.2	366.9	325.9	40.96	8.956			
7,800.0	7,223.8	7,808.2	7,319.9	35.1	28.9	105.31	435.6	-1,215.3	367.1	325.2	41.93	8.755			
7,850.0	7,228.2	7,865.5	7,325.6	35.3	29.2	105.41	492.6	-1,215.3	367.3	324.2	43.06	8.530			
7,899.8	7,229.2	7,922.6	7,327.0	35.5	29.4	105.44	549.7	-1,215.3	367.3	323.0	44.31	8.288			
8,000.0	7,228.1	8,022.9	7,325.6	35.9	30.0	105.39	650.1	-1,215.3	367.1	320.7	46.40	7.912			
8,100.0	7,227.0	8,122.9	7,324.1	36.5	30.7	105.34	750.0	-1,215.3	367.0	318.3	48.67	7.541			
8,200.0	7,225.9	8,222.9	7,322.7	37.1	31.5	105.29	850.0	-1,215.4	366.9	315.7	51.11	7.178			
8,300.0	7,224.8	8,322.9	7,321.2	37.8	32.4	105.24	950.0	-1,215.4	366.7	313.0	53.69	6.830			

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design		Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W - Niles Miller 20Q-321 - Wellbore #1 - Plan #1 (12-01-15)											Offset Site Error:		0.0 ft
Survey Program:		0-MWD											Offset Well Error:		0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
8,400.0	7,223.7	8,422.9	7,319.8	38.7	33.4	105.19	1,050.0	-1,215.4	366.6	310.2	56.41	6.499			
8,500.0	7,222.6	8,522.9	7,318.3	39.6	34.6	105.14	1,150.0	-1,215.5	366.4	307.2	59.23	6.186			
8,600.0	7,221.5	8,622.9	7,316.9	40.6	35.8	105.09	1,250.0	-1,215.5	366.3	304.1	62.15	5.893			
8,700.0	7,220.4	8,722.9	7,315.4	41.7	37.1	105.04	1,350.0	-1,215.5	366.1	301.0	65.16	5.619			
8,800.0	7,219.3	8,822.9	7,314.0	42.8	38.4	104.98	1,450.0	-1,215.5	366.0	297.8	68.23	5.364			
8,900.0	7,218.2	8,922.9	7,312.5	44.1	39.8	104.93	1,550.0	-1,215.6	365.8	294.5	71.37	5.126			
9,000.0	7,217.1	9,022.9	7,311.1	45.3	41.2	104.88	1,649.9	-1,215.6	365.7	291.1	74.56	4.905			
9,100.0	7,216.0	9,122.9	7,309.6	46.7	42.7	104.83	1,749.9	-1,215.6	365.6	287.8	77.81	4.698			
9,200.0	7,214.9	9,222.9	7,308.2	48.0	44.2	104.78	1,849.9	-1,215.6	365.4	284.3	81.09	4.506			
9,300.0	7,213.8	9,322.9	7,306.7	49.4	45.8	104.73	1,949.9	-1,215.7	365.3	280.9	84.42	4.327			
9,400.0	7,212.8	9,422.9	7,305.3	50.9	47.4	104.68	2,049.9	-1,215.7	365.1	277.4	87.78	4.160			
9,500.0	7,211.7	9,522.9	7,303.8	52.4	49.0	104.63	2,149.9	-1,215.7	365.0	273.8	91.17	4.004			
9,600.0	7,210.6	9,622.9	7,302.4	53.9	50.6	104.58	2,249.9	-1,215.7	364.9	270.3	94.58	3.858			
9,700.0	7,209.5	9,722.9	7,300.9	55.4	52.3	104.53	2,349.9	-1,215.8	364.7	266.7	98.02	3.721			
9,800.0	7,208.4	9,822.9	7,299.5	57.0	53.9	104.48	2,449.9	-1,215.8	364.6	263.1	101.49	3.592			
9,900.0	7,207.3	9,922.9	7,298.0	58.6	55.6	104.43	2,549.8	-1,215.8	364.4	259.5	104.97	3.472			
10,000.0	7,206.2	10,022.9	7,296.6	60.2	57.3	104.37	2,649.8	-1,215.9	364.3	255.8	108.47	3.358			
10,100.0	7,205.1	10,122.9	7,295.1	61.8	59.1	104.32	2,749.8	-1,215.9	364.2	252.2	111.99	3.252			
10,200.0	7,204.0	10,222.9	7,293.7	63.5	60.8	104.27	2,849.8	-1,215.9	364.0	248.5	115.53	3.151			
10,300.0	7,202.9	10,322.9	7,292.2	65.2	62.5	104.22	2,949.8	-1,215.9	363.9	244.8	119.07	3.056			
10,400.0	7,201.8	10,422.9	7,290.8	66.8	64.3	104.17	3,049.8	-1,216.0	363.7	241.1	122.64	2.966			
10,500.0	7,200.7	10,522.9	7,289.3	68.5	66.0	104.12	3,149.8	-1,216.0	363.6	237.4	126.21	2.881			
10,600.0	7,199.6	10,622.9	7,287.9	70.2	67.8	104.07	3,249.8	-1,216.0	363.5	233.7	129.80	2.800			
10,700.0	7,198.5	10,722.9	7,286.4	72.0	69.6	104.02	3,349.8	-1,216.0	363.3	229.9	133.39	2.724			
10,800.0	7,197.4	10,822.9	7,285.0	73.7	71.4	103.97	3,449.7	-1,216.1	363.2	226.2	137.00	2.651			
10,900.0	7,196.3	10,922.9	7,283.5	75.4	73.1	103.91	3,549.7	-1,216.1	363.1	222.4	140.61	2.582			
11,000.0	7,195.2	11,022.9	7,282.1	77.2	74.9	103.86	3,649.7	-1,216.1	362.9	218.7	144.23	2.516			
11,100.0	7,194.1	11,122.9	7,280.6	78.9	76.7	103.81	3,749.7	-1,216.2	362.8	214.9	147.86	2.453			
11,200.0	7,193.0	11,222.9	7,279.2	80.7	78.6	103.76	3,849.7	-1,216.2	362.6	211.1	151.50	2.394			
11,300.0	7,191.9	11,322.9	7,277.8	82.4	80.4	103.71	3,949.7	-1,216.2	362.5	207.4	155.15	2.337			
11,400.0	7,190.8	11,422.9	7,276.3	84.2	82.2	103.66	4,049.7	-1,216.2	362.4	203.6	158.80	2.282			
11,500.0	7,189.7	11,522.9	7,274.9	86.0	84.0	103.60	4,149.7	-1,216.3	362.2	199.8	162.46	2.230			
11,600.0	7,188.6	11,622.9	7,273.4	87.8	85.8	103.55	4,249.7	-1,216.3	362.1	196.0	166.12	2.180			
11,700.0	7,187.5	11,722.9	7,272.0	89.6	87.7	103.50	4,349.6	-1,216.3	362.0	192.2	169.79	2.132			
11,800.0	7,186.4	11,822.9	7,270.5	91.4	89.5	103.45	4,449.6	-1,216.3	361.8	188.4	173.47	2.086			
11,832.9	7,186.0	11,855.8	7,270.0	92.0	90.1	103.43	4,482.5	-1,216.3	361.8	187.1	174.68	2.071 SF			

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W - Niles Miller 20T-221 - Wellbore #1 - Plan #1 (12-01-15)													Offset Well Error:	0.0 ft
Survey Program: 0-MWD														
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
0.0	0.0	1.0	1.0	0.0	0.0	-0.71	60.0	-0.7	60.0	60.0	0.00	N/A		
100.0	100.0	101.0	101.0	0.1	0.1	-0.71	60.0	-0.7	60.0	59.8	0.23	264.516		
200.0	200.0	201.0	201.0	0.3	0.3	-0.71	60.0	-0.7	60.0	59.4	0.68	88.758 CC		
300.0	300.0	301.0	301.0	0.5	0.6	98.64	60.0	-0.7	60.2	59.1	1.11	54.075 ES		
400.0	399.9	400.9	400.9	0.8	0.8	102.28	60.0	-0.7	60.9	59.4	1.56	39.185		
500.0	499.7	500.7	500.7	1.0	1.0	108.10	60.0	-0.7	62.7	60.6	2.02	31.076		
600.0	599.3	600.3	600.3	1.3	1.2	115.59	60.0	-0.7	66.1	63.6	2.50	26.469		
700.0	698.6	699.6	699.6	1.6	1.5	123.94	60.0	-0.7	72.0	69.0	2.99	24.057		
800.0	797.5	798.5	798.5	1.9	1.7	132.26	60.0	-0.7	80.9	77.4	3.49	23.169 SF		
900.0	896.1	897.1	897.1	2.2	1.9	139.82	60.0	-0.7	93.2	89.2	3.99	23.367		
1,000.0	894.2	895.2	895.2	2.6	2.1	146.28	60.0	-0.7	108.9	104.5	4.48	24.324		
1,100.0	1,091.7	1,095.7	1,095.7	3.1	2.3	151.92	59.1	-1.5	126.9	121.9	4.94	25.699		
1,200.0	1,188.6	1,196.7	1,196.6	3.6	2.5	156.93	56.0	-3.8	145.7	140.3	5.36	27.161		
1,300.0	1,284.9	1,297.7	1,297.4	4.1	2.7	161.48	50.8	-7.8	165.4	159.6	5.79	28.572		
1,355.2	1,337.7	1,353.6	1,353.1	4.4	2.8	163.84	47.1	-10.7	176.7	170.7	6.03	29.323		
1,400.0	1,380.4	1,398.9	1,398.2	4.7	2.9	165.69	43.5	-13.4	185.9	179.7	6.22	29.889		
1,500.0	1,475.9	1,500.2	1,498.8	5.3	3.2	169.52	34.1	-20.6	205.4	198.7	6.66	30.819		
1,600.0	1,571.4	1,597.6	1,595.4	5.9	3.4	172.71	24.2	-28.2	224.7	217.5	7.13	31.493		
1,700.0	1,666.8	1,695.0	1,692.0	6.6	3.7	175.40	14.3	-35.8	244.6	236.9	7.63	32.062		
1,800.0	1,762.3	1,792.4	1,788.6	7.2	3.9	177.68	4.4	-43.4	264.9	256.7	8.14	32.528		
1,900.0	1,857.7	1,889.8	1,885.2	7.8	4.2	179.64	-5.5	-51.0	285.6	276.9	8.68	32.908		
2,000.0	1,953.2	1,987.2	1,981.8	8.4	4.5	-178.67	-15.4	-58.6	306.5	297.3	9.23	33.201		
2,100.0	2,048.7	2,084.6	2,078.4	9.1	4.8	-177.19	-25.3	-66.2	327.7	317.9	9.80	33.432		
2,200.0	2,144.1	2,182.0	2,175.0	9.7	5.1	-175.89	-35.2	-73.8	349.1	338.7	10.39	33.610		
2,300.0	2,239.6	2,279.4	2,271.6	10.3	5.4	-174.74	-45.1	-81.4	370.6	359.6	10.98	33.747		
2,400.0	2,335.1	2,376.8	2,368.2	11.0	5.7	-173.72	-55.0	-89.0	392.2	380.6	11.59	33.849		
2,500.0	2,430.5	2,474.2	2,464.7	11.6	6.0	-172.80	-64.9	-96.6	414.0	401.8	12.20	33.926		
2,600.0	2,526.0	2,571.6	2,561.3	12.2	6.3	-171.97	-74.8	-104.2	435.8	423.0	12.83	33.981		
2,700.0	2,621.4	2,669.0	2,657.9	12.9	6.6	-171.23	-84.7	-111.8	457.7	444.3	13.46	34.020		
2,800.0	2,716.9	2,766.4	2,754.5	13.5	6.9	-170.55	-94.7	-119.4	479.7	465.6	14.09	34.045		
2,900.0	2,812.4	2,863.8	2,851.1	14.1	7.2	-169.93	-104.6	-127.0	501.8	487.0	14.73	34.061		
3,000.0	2,907.8	2,961.2	2,947.7	14.8	7.5	-169.36	-114.5	-134.6	523.9	508.5	15.38	34.068		
3,100.0	3,003.3	3,058.6	3,044.3	15.4	7.8	-168.84	-124.4	-142.2	546.0	530.0	16.03	34.069		
3,200.0	3,098.7	3,156.0	3,140.9	16.0	8.1	-168.36	-134.3	-149.8	568.2	551.5	16.68	34.065		
3,300.0	3,194.2	3,253.4	3,237.5	16.7	8.5	-167.92	-144.2	-157.4	590.4	573.1	17.34	34.056		
3,400.0	3,289.7	3,350.8	3,334.1	17.3	8.8	-167.51	-154.1	-165.0	612.7	594.7	18.00	34.045		
3,500.0	3,385.1	3,448.2	3,430.7	18.0	9.1	-167.12	-164.0	-172.6	634.9	616.3	18.66	34.032		
3,600.0	3,480.6	3,545.6	3,527.3	18.6	9.4	-166.76	-173.9	-180.2	657.2	637.9	19.32	34.016		
3,700.0	3,576.0	3,643.0	3,623.9	19.2	9.7	-166.43	-183.8	-187.8	679.6	659.6	19.99	34.000		
3,800.0	3,671.5	3,740.4	3,720.5	19.9	10.0	-166.12	-193.7	-195.4	701.9	681.3	20.66	33.982		
3,900.0	3,767.0	3,837.8	3,817.1	20.5	10.4	-165.82	-203.6	-203.0	724.3	703.0	21.33	33.964		
4,000.0	3,862.4	3,925.4	3,904.1	21.2	10.6	-165.64	-211.8	-209.3	747.2	725.3	21.91	34.099		
4,100.0	3,957.9	4,010.5	3,988.8	21.8	10.8	-165.63	-217.8	-213.8	771.6	749.2	22.43	34.401		
4,200.0	4,053.4	4,100.0	4,078.2	22.4	11.0	-165.79	-221.9	-217.0	797.6	774.7	22.91	34.808		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Reference														
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.0	0.0	1.0	1.0	0.0	0.0	-0.60	30.0	-0.3	30.0	30.0	0.00	N/A		
100.0	100.0	101.0	101.0	0.1	0.1	-0.60	30.0	-0.3	30.0	29.7	0.23	131.972		
200.0	200.0	201.0	201.0	0.3	0.3	-0.60	30.0	-0.3	30.0	29.3	0.68	44.283 CC		
300.0	300.0	301.0	301.0	0.5	0.6	99.99	30.0	-0.3	30.2	29.0	1.11	27.074 ES		
400.0	399.9	400.9	400.9	0.8	0.8	107.12	30.0	-0.3	31.1	29.5	1.56	19.973		
500.0	499.7	500.7	500.7	1.0	1.0	117.79	30.0	-0.3	33.6	31.6	2.02	16.644		
600.0	599.3	600.3	600.3	1.3	1.2	129.76	30.0	-0.3	38.7	36.2	2.50	15.517		
700.0	698.6	700.6	700.6	1.6	1.4	139.96	29.6	-1.6	46.0	43.1	2.96	15.548		
800.0	797.5	801.2	801.1	1.9	1.6	147.54	28.5	-5.4	54.2	50.8	3.41	15.881		
900.0	896.1	902.1	901.8	2.2	1.9	153.38	26.7	-11.8	62.9	59.0	3.87	16.249		
1,000.0	994.2	1,003.3	1,002.5	2.6	2.1	158.05	24.1	-20.7	71.9	67.6	4.33	16.599		
1,100.0	1,091.7	1,104.7	1,103.2	3.1	2.4	161.91	20.7	-32.3	81.2	76.4	4.80	16.912		
1,200.0	1,188.6	1,206.4	1,203.8	3.6	2.7	165.19	16.7	-46.5	90.7	85.4	5.28	17.183		
1,300.0	1,284.9	1,308.4	1,304.3	4.1	3.0	168.05	11.8	-63.2	100.3	94.5	5.76	17.407		
1,355.2	1,337.7	1,364.8	1,359.7	4.4	3.2	169.49	8.9	-73.6	105.6	99.6	6.03	17.507		
1,400.0	1,380.4	1,410.4	1,404.4	4.7	3.4	170.59	6.3	-82.6	109.7	103.5	6.26	17.537		
1,500.0	1,475.9	1,510.0	1,501.7	5.3	3.8	172.70	0.5	-102.6	118.6	111.8	6.77	17.517		
1,600.0	1,571.4	1,609.5	1,599.0	5.9	4.2	174.52	-5.2	-122.6	127.5	120.2	7.29	17.503		
1,700.0	1,666.8	1,709.0	1,696.3	6.6	4.6	176.10	-11.0	-142.6	136.6	128.8	7.82	17.471		
1,800.0	1,762.3	1,808.5	1,793.7	7.2	5.0	177.48	-16.8	-162.6	145.8	137.4	8.36	17.433		
1,900.0	1,857.7	1,908.0	1,891.0	7.8	5.5	178.70	-22.5	-182.7	155.1	146.1	8.92	17.388		
2,000.0	1,953.2	2,007.6	1,988.3	8.4	5.9	179.78	-28.3	-202.7	164.4	154.9	9.48	17.337		
2,100.0	2,048.7	2,107.1	2,085.6	9.1	6.4	-179.26	-34.0	-222.7	173.7	163.7	10.05	17.283		
2,200.0	2,144.1	2,206.6	2,182.9	9.7	6.8	-178.39	-39.8	-242.7	183.1	172.5	10.63	17.225		
2,300.0	2,239.6	2,306.1	2,280.2	10.3	7.3	-177.61	-45.6	-262.7	192.6	181.4	11.22	17.166		
2,400.0	2,335.1	2,405.6	2,377.6	11.0	7.7	-176.91	-51.3	-282.7	202.1	190.3	11.81	17.107		
2,500.0	2,430.5	2,505.2	2,474.9	11.6	8.2	-176.26	-57.1	-302.7	211.6	199.2	12.41	17.047		
2,600.0	2,526.0	2,604.7	2,572.2	12.2	8.6	-175.67	-62.8	-322.7	221.1	208.1	13.02	16.988		
2,700.0	2,621.4	2,704.2	2,669.5	12.9	9.1	-175.13	-68.6	-342.7	230.7	217.0	13.62	16.929		
2,800.0	2,716.9	2,803.7	2,766.8	13.5	9.5	-174.64	-74.3	-362.7	240.2	226.0	14.24	16.872		
2,900.0	2,812.4	2,903.2	2,864.2	14.1	10.0	-174.18	-80.1	-382.7	249.8	235.0	14.86	16.816		
3,000.0	2,907.8	3,002.8	2,961.5	14.8	10.4	-173.75	-85.9	-402.7	259.4	243.9	15.48	16.762		
3,100.0	3,003.3	3,102.3	3,058.8	15.4	10.9	-173.36	-91.6	-422.7	269.0	252.9	16.10	16.709		
3,200.0	3,098.7	3,201.8	3,156.1	16.0	11.4	-172.99	-97.4	-442.7	278.7	261.9	16.73	16.658		
3,300.0	3,194.2	3,301.3	3,253.4	16.7	11.8	-172.65	-103.1	-462.7	288.3	270.9	17.36	16.609		
3,400.0	3,289.7	3,400.8	3,350.7	17.3	12.3	-172.33	-108.9	-482.7	297.9	279.9	17.99	16.562		
3,500.0	3,385.1	3,500.4	3,448.1	18.0	12.7	-172.03	-114.6	-502.7	307.6	289.0	18.62	16.516		
3,600.0	3,480.6	3,599.9	3,545.4	18.6	13.2	-171.74	-120.4	-522.7	317.3	298.0	19.26	16.472		
3,700.0	3,576.0	3,699.4	3,642.7	19.2	13.7	-171.48	-126.2	-542.8	326.9	307.0	19.90	16.430		
3,800.0	3,671.5	3,798.9	3,740.0	19.9	14.1	-171.23	-131.9	-562.8	336.6	316.1	20.54	16.389		
3,900.0	3,767.0	3,898.5	3,837.3	20.5	14.6	-170.99	-137.7	-582.8	346.3	325.1	21.18	16.349		
4,000.0	3,862.4	3,998.0	3,934.7	21.2	15.1	-170.77	-143.4	-602.8	356.0	334.2	21.82	16.312		
4,100.0	3,957.9	4,097.5	4,032.0	21.8	15.5	-170.56	-149.2	-622.8	365.7	343.2	22.47	16.275		
4,200.0	4,053.4	4,197.0	4,129.3	22.4	16.0	-170.36	-155.0	-642.8	375.4	352.3	23.11	16.240		
4,300.0	4,148.8	4,296.5	4,226.6	23.1	16.4	-170.17	-160.7	-662.8	385.1	361.3	23.76	16.206		
4,400.0	4,244.3	4,396.1	4,323.9	23.7	16.9	-169.98	-166.5	-682.8	394.8	370.4	24.41	16.173		
4,500.0	4,339.7	4,495.6	4,421.3	24.3	17.4	-169.81	-172.2	-702.8	404.5	379.4	25.06	16.142		
4,600.0	4,435.2	4,595.1	4,518.6	25.0	17.8	-169.65	-178.0	-722.8	414.2	388.5	25.71	16.112		
4,700.0	4,530.7	4,694.6	4,615.9	25.6	18.3	-169.49	-183.7	-742.8	423.9	397.6	26.36	16.082		
4,800.0	4,626.1	4,794.1	4,713.2	26.3	18.8	-169.34	-189.5	-762.8	433.6	406.6	27.01	16.054		
4,900.0	4,721.6	4,893.7	4,810.5	26.9	19.2	-169.20	-195.3	-782.8	443.4	415.7	27.66	16.027		

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design														Offset Site Error:	0.0 ft
Survey Program: 0-MWD														Offset Well Error:	0.0 ft
Reference															
Offset															
Semi Major Axis															
Distance															
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
5,000.0	4,817.0	4,993.2	4,907.8	27.5	19.7	-169.06	-201.0	-802.8	453.1	424.8	28.32	16.001			
5,100.0	4,912.5	5,092.1	5,004.6	28.2	20.1	-168.93	-206.7	-822.7	462.8	433.9	28.97	15.977			
5,200.0	5,008.0	5,178.1	5,089.0	28.8	20.4	-168.88	-211.3	-838.7	474.1	444.6	29.50	16.068			
5,300.0	5,103.4	5,263.6	5,173.3	29.5	20.7	-168.92	-215.2	-852.1	488.2	458.2	30.00	16.270			
5,400.0	5,198.9	5,348.2	5,257.2	30.1	20.9	-169.06	-218.3	-863.0	505.0	474.6	30.47	16.576			
5,500.0	5,294.4	5,432.0	5,340.5	30.7	21.1	-169.28	-220.8	-871.5	524.6	493.7	30.90	16.978			
5,600.0	5,389.8	5,514.7	5,422.9	31.4	21.2	-169.56	-222.5	-877.6	547.0	515.7	31.30	17.472			
5,659.6	5,446.7	5,563.5	5,471.7	31.8	21.3	-169.75	-223.2	-880.1	561.5	530.0	31.53	17.809			
5,700.0	5,485.4	5,600.0	5,508.1	32.0	21.4	-169.94	-223.6	-881.4	571.7	540.0	31.69	18.039			
5,800.0	5,581.7	5,677.5	5,585.6	32.4	21.5	-170.34	-224.0	-882.8	596.3	564.3	32.02	18.620			
5,900.0	5,678.9	5,771.8	5,679.9	32.8	21.6	-170.77	-224.0	-882.8	619.3	587.0	32.33	19.158			
6,000.0	5,776.9	5,869.8	5,777.9	33.2	21.7	-171.12	-224.0	-882.8	639.1	606.5	32.61	19.598			
6,100.0	5,875.5	5,968.4	5,876.5	33.4	21.8	-171.39	-224.0	-882.8	655.4	622.6	32.86	19.946			
6,200.0	5,974.7	6,067.5	5,975.7	33.7	21.9	-171.60	-224.0	-882.8	668.4	635.3	33.08	20.205			
6,300.0	6,074.2	6,167.1	6,075.2	33.9	22.0	-171.74	-224.0	-882.8	677.9	644.6	33.26	20.380			
6,400.0	6,174.0	6,266.9	6,175.0	34.0	22.2	-171.83	-224.0	-882.8	684.0	650.6	33.41	20.473			
6,500.0	6,274.0	6,366.8	6,275.0	34.1	22.3	-171.87	-224.0	-882.8	686.6	653.1	33.51	20.487			
6,526.0	6,300.0	6,392.9	6,301.0	34.2	22.3	90.00	-224.0	-882.8	686.7	653.2	33.53	20.478			
6,600.0	6,374.0	6,466.8	6,375.0	34.2	22.4	90.00	-224.0	-882.8	686.7	652.9	33.77	20.334			
6,691.4	6,465.3	6,558.2	6,466.3	34.3	22.5	90.00	-224.0	-882.8	686.7	652.6	34.07	20.158			
6,700.0	6,474.0	6,566.8	6,475.0	34.3	22.5	89.99	-224.0	-882.8	686.7	652.6	34.10	20.141			
6,750.0	6,523.9	6,616.9	6,524.9	34.3	22.6	89.98	-221.7	-882.8	686.7	652.5	34.24	20.058			
6,800.0	6,573.6	6,666.9	6,574.6	34.4	22.7	89.98	-216.2	-882.8	686.7	652.4	34.35	19.991			
6,850.0	6,622.8	6,716.9	6,623.8	34.4	22.7	89.97	-207.4	-882.8	686.7	652.3	34.44	19.938			
6,900.0	6,671.4	6,766.9	6,672.4	34.4	22.7	89.97	-195.5	-882.8	686.7	652.2	34.51	19.899			
6,950.0	6,719.0	6,816.9	6,720.0	34.4	22.7	89.96	-180.4	-882.8	686.7	652.1	34.56	19.871			
7,000.0	6,765.6	6,866.9	6,766.6	34.4	22.8	89.96	-162.2	-882.8	686.7	652.1	34.60	19.849			
7,050.0	6,810.9	6,916.8	6,811.8	34.5	22.8	89.95	-141.0	-882.9	686.7	652.0	34.63	19.831			
7,100.0	6,854.8	6,966.8	6,855.6	34.5	22.8	89.95	-116.9	-882.9	686.7	652.0	34.66	19.812			
7,150.0	6,896.9	7,016.8	6,897.7	34.5	22.8	89.95	-90.0	-882.9	686.6	651.9	34.70	19.788			
7,200.0	6,937.2	7,066.8	6,938.0	34.5	22.8	89.94	-60.4	-882.9	686.6	651.9	34.76	19.753			
7,250.0	6,975.5	7,116.8	6,976.2	34.5	22.7	89.94	-28.2	-882.9	686.6	651.8	34.85	19.702			
7,300.0	7,011.6	7,166.7	7,012.2	34.5	22.7	89.94	6.4	-882.9	686.6	651.6	34.98	19.631			
7,350.0	7,045.4	7,216.7	7,045.9	34.5	22.8	89.93	43.3	-882.9	686.6	651.4	35.15	19.534			
7,400.0	7,076.6	7,266.6	7,077.1	34.5	22.8	89.93	82.3	-882.9	686.6	651.2	35.37	19.408			
7,450.0	7,105.3	7,316.6	7,105.7	34.5	22.8	89.93	123.2	-882.9	686.5	650.9	35.67	19.249			
7,500.0	7,131.2	7,366.6	7,131.6	34.6	22.8	89.93	166.0	-882.9	686.5	650.5	36.03	19.056			
7,550.0	7,154.3	7,416.5	7,154.6	34.6	22.9	89.93	210.3	-882.9	686.5	650.0	36.46	18.828			
7,600.0	7,174.4	7,466.5	7,174.7	34.7	23.0	89.92	256.0	-882.9	686.5	649.5	36.97	18.566			
7,650.0	7,191.5	7,516.4	7,191.7	34.8	23.1	89.92	303.0	-883.0	686.4	648.9	37.57	18.272			
7,700.0	7,205.4	7,566.4	7,205.6	34.9	23.2	89.92	350.9	-883.0	686.4	648.2	38.24	17.949			
7,750.0	7,216.2	7,616.3	7,216.4	35.0	23.4	89.92	399.7	-883.0	686.4	647.4	39.00	17.601			
7,800.0	7,223.8	7,666.2	7,224.0	35.1	23.6	89.92	449.0	-883.0	686.4	646.5	39.82	17.235			
7,850.0	7,228.2	7,716.2	7,228.3	35.3	23.9	89.92	498.8	-883.0	686.3	645.6	40.72	16.854			
7,899.8	7,229.2	7,765.9	7,229.3	35.5	24.2	89.92	548.5	-883.0	686.3	644.6	41.68	16.468			
8,000.0	7,228.1	7,866.1	7,228.2	35.9	25.0	89.92	648.7	-883.0	686.3	642.4	43.80	15.666			
8,100.0	7,227.0	7,966.1	7,227.1	36.5	25.9	89.92	748.7	-883.1	686.2	640.1	46.14	14.873			
8,200.0	7,225.9	8,066.1	7,226.0	37.1	26.9	89.92	848.7	-883.1	686.1	637.5	48.66	14.100			
8,300.0	7,224.8	8,166.1	7,224.9	37.8	28.1	89.92	948.7	-883.1	686.1	634.7	51.35	13.361			
8,400.0	7,223.7	8,266.1	7,223.8	38.7	29.3	89.92	1,048.7	-883.1	686.0	631.9	54.17	12.664			

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Reference														
Offset														
Semi Major Axis														
Distance														
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
8,500.0	7,222.6	8,366.1	7,222.7	39.6	30.7	89.92	1,148.7	-883.2	686.0	628.9	57.12	12.010		
8,600.0	7,221.5	8,466.1	7,221.6	40.6	32.1	89.92	1,248.7	-883.2	685.9	625.8	60.16	11.402		
8,700.0	7,220.4	8,566.1	7,220.5	41.7	33.5	89.92	1,348.7	-883.2	685.9	622.6	63.29	10.837		
8,800.0	7,219.3	8,666.1	7,219.4	42.8	35.0	89.92	1,448.7	-883.2	685.8	619.3	66.49	10.314		
8,900.0	7,218.2	8,766.1	7,218.3	44.1	36.6	89.92	1,548.7	-883.3	685.8	616.0	69.76	9.831		
9,000.0	7,217.1	8,866.1	7,217.2	45.3	38.2	89.92	1,648.6	-883.3	685.7	612.6	73.08	9.383		
9,100.0	7,216.0	8,966.1	7,216.1	46.7	39.8	89.92	1,748.6	-883.3	685.7	609.2	76.45	8.969		
9,200.0	7,214.9	9,066.1	7,215.0	48.0	41.4	89.92	1,848.6	-883.3	685.6	605.8	79.86	8.585		
9,300.0	7,213.8	9,166.1	7,213.9	49.4	43.1	89.92	1,948.6	-883.4	685.6	602.3	83.31	8.229		
9,400.0	7,212.8	9,266.1	7,212.8	50.9	44.8	89.92	2,048.6	-883.4	685.5	598.7	86.79	7.898		
9,500.0	7,211.7	9,366.1	7,211.7	52.4	46.5	89.92	2,148.6	-883.4	685.5	595.2	90.30	7.591		
9,600.0	7,210.6	9,466.1	7,210.6	53.9	48.2	89.92	2,248.6	-883.4	685.4	591.6	93.84	7.304		
9,700.0	7,209.5	9,566.1	7,209.5	55.4	49.9	89.92	2,348.6	-883.5	685.4	588.0	97.40	7.037		
9,800.0	7,208.4	9,666.1	7,208.4	57.0	51.6	89.92	2,448.6	-883.5	685.3	584.3	100.97	6.787		
9,900.0	7,207.3	9,766.1	7,207.3	58.6	53.4	89.92	2,548.6	-883.5	685.3	580.7	104.57	6.553		
10,000.0	7,206.2	9,866.1	7,206.2	60.2	55.2	89.92	2,648.6	-883.5	685.2	577.0	108.18	6.334		
10,100.0	7,205.1	9,966.1	7,205.1	61.8	56.9	89.92	2,748.6	-883.6	685.1	573.3	111.81	6.128		
10,200.0	7,204.0	10,066.1	7,204.0	63.5	58.7	89.92	2,848.6	-883.6	685.1	569.6	115.45	5.934		
10,300.0	7,202.9	10,166.1	7,202.9	65.2	60.5	89.92	2,948.6	-883.6	685.0	565.9	119.10	5.752		
10,400.0	7,201.8	10,266.1	7,201.8	66.8	62.3	89.92	3,048.6	-883.6	685.0	562.2	122.77	5.580		
10,500.0	7,200.7	10,366.1	7,200.7	68.5	64.1	89.92	3,148.6	-883.7	684.9	558.5	126.44	5.417		
10,600.0	7,199.6	10,466.1	7,199.6	70.2	65.9	89.92	3,248.6	-883.7	684.9	554.8	130.13	5.263		
10,700.0	7,198.5	10,566.1	7,198.5	72.0	67.8	89.92	3,348.5	-883.7	684.8	551.0	133.82	5.118		
10,800.0	7,197.4	10,666.1	7,197.4	73.7	69.6	89.92	3,448.5	-883.7	684.8	547.3	137.52	4.980		
10,900.0	7,196.3	10,766.1	7,196.3	75.4	71.4	89.92	3,548.5	-883.8	684.7	543.5	141.22	4.848		
11,000.0	7,195.2	10,866.1	7,195.2	77.2	73.3	89.92	3,648.5	-883.8	684.7	539.7	144.94	4.724		
11,100.0	7,194.1	10,966.1	7,194.1	78.9	75.1	89.92	3,748.5	-883.8	684.6	536.0	148.66	4.605		
11,200.0	7,193.0	11,066.1	7,193.0	80.7	76.9	89.92	3,848.5	-883.8	684.6	532.2	152.38	4.492		
11,300.0	7,191.9	11,166.1	7,191.9	82.4	78.8	89.92	3,948.5	-883.9	684.5	528.4	156.11	4.385		
11,400.0	7,190.8	11,266.1	7,190.8	84.2	80.6	89.92	4,048.5	-883.9	684.5	524.6	159.85	4.282		
11,500.0	7,189.7	11,366.1	7,189.7	86.0	82.5	89.92	4,148.5	-883.9	684.4	520.8	163.59	4.184		
11,600.0	7,188.6	11,466.1	7,188.6	87.8	84.3	89.92	4,248.5	-883.9	684.4	517.0	167.33	4.090		
11,700.0	7,187.5	11,566.1	7,187.5	89.6	86.2	89.92	4,348.5	-884.0	684.3	513.2	171.08	4.000		
11,800.0	7,186.4	11,666.1	7,186.4	91.4	88.0	89.92	4,448.5	-884.0	684.3	509.4	174.84	3.914		
11,832.9	7,186.0	11,699.0	7,186.1	92.0	88.7	89.92	4,481.4	-884.0	684.2	508.2	176.07	3.886 SF		

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design														Offset Site Error:	0.0 ft
Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W - Niles Miller 20T-301 - Wellbore #1 - Plan #1 (12-01-15)														Offset Well Error:	0.0 ft
Survey Program: 0-MWD															
Reference		Offset		Semi Major Axis			Distance								Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
0.0	0.0	1.0	1.0	0.0	0.0	-0.78	45.0	-0.6	45.0	45.0	0.00	N/A			
100.0	100.0	101.0	101.0	0.1	0.1	-0.78	45.0	-0.6	45.0	44.7	0.23	198.059			
200.0	200.0	201.0	201.0	0.3	0.3	-0.78	45.0	-0.6	45.0	44.3	0.68	66.458 CC			
300.0	300.0	301.0	301.0	0.5	0.6	98.99	45.0	-0.6	45.1	44.0	1.11	40.532 ES			
400.0	399.9	400.9	400.9	0.8	0.8	103.82	45.0	-0.6	45.9	44.4	1.56	29.523			
500.0	499.7	500.7	500.7	1.0	1.0	111.39	45.0	-0.6	47.9	45.9	2.02	23.753			
600.0	599.3	600.3	600.3	1.3	1.2	120.74	45.0	-0.6	52.0	49.5	2.50	20.814			
700.0	698.6	699.6	699.6	1.6	1.5	130.51	45.0	-0.6	58.9	55.9	2.99	19.713 SF			
800.0	797.5	798.5	798.5	1.9	1.7	139.45	45.0	-0.6	69.1	65.6	3.48	19.878			
900.0	896.1	899.1	899.1	2.2	1.9	146.87	44.4	-1.8	81.5	77.6	3.94	20.686			
1,000.0	994.2	1,000.2	1,000.1	2.6	2.1	152.74	42.7	-5.3	94.7	90.3	4.39	21.591			
1,100.0	1,091.7	1,101.5	1,101.2	3.1	2.3	157.58	39.7	-11.3	108.4	103.5	4.83	22.419			
1,200.0	1,188.6	1,203.3	1,202.5	3.6	2.5	161.70	35.6	-19.7	122.4	117.2	5.29	23.167			
1,300.0	1,284.9	1,305.4	1,303.9	4.1	2.8	165.32	30.3	-30.6	136.9	131.1	5.74	23.837			
1,355.2	1,337.7	1,361.9	1,359.9	4.4	2.9	167.15	26.8	-37.7	145.0	139.0	6.00	24.168			
1,400.0	1,380.4	1,407.8	1,405.3	4.7	3.1	168.56	23.8	-44.0	151.4	145.2	6.21	24.380			
1,500.0	1,475.9	1,507.8	1,503.9	5.3	3.4	171.31	16.5	-58.8	164.7	158.1	6.69	24.616			
1,600.0	1,571.4	1,606.6	1,601.3	5.9	3.7	173.62	9.3	-73.5	178.3	171.1	7.19	24.792			
1,700.0	1,666.8	1,705.5	1,698.8	6.6	4.0	175.61	2.1	-88.2	192.1	184.4	7.70	24.938			
1,800.0	1,762.3	1,804.3	1,796.3	7.2	4.4	177.33	-5.1	-102.9	206.1	197.9	8.23	25.041			
1,900.0	1,857.7	1,903.2	1,893.8	7.8	4.7	178.82	-12.3	-117.7	220.3	211.5	8.77	25.111			
2,000.0	1,953.2	2,002.0	1,991.2	8.4	5.1	-179.86	-19.5	-132.4	234.5	225.2	9.32	25.155			
2,100.0	2,048.7	2,100.8	2,088.7	9.1	5.4	-178.69	-26.7	-147.1	248.9	239.0	9.89	25.176			
2,200.0	2,144.1	2,199.7	2,186.2	9.7	5.8	-177.65	-33.9	-161.8	263.4	253.0	10.46	25.179			
2,300.0	2,239.6	2,298.5	2,283.6	10.3	6.2	-176.72	-41.1	-176.6	278.0	266.9	11.04	25.168			
2,400.0	2,335.1	2,397.4	2,381.1	11.0	6.5	-175.89	-48.3	-191.3	292.6	281.0	11.64	25.146			
2,500.0	2,430.5	2,496.2	2,478.6	11.6	6.9	-175.13	-55.5	-206.0	307.3	295.0	12.23	25.116			
2,600.0	2,526.0	2,595.0	2,576.1	12.2	7.3	-174.44	-62.7	-220.7	322.0	309.2	12.84	25.080			
2,700.0	2,621.4	2,693.9	2,673.5	12.9	7.7	-173.81	-69.9	-235.5	336.8	323.3	13.45	25.040			
2,800.0	2,716.9	2,792.7	2,771.0	13.5	8.0	-173.24	-77.1	-250.2	351.6	337.5	14.07	24.996			
2,900.0	2,812.4	2,891.5	2,868.5	14.1	8.4	-172.71	-84.3	-264.9	366.4	351.7	14.69	24.951			
3,000.0	2,907.8	2,990.4	2,965.9	14.8	8.8	-172.22	-91.5	-279.6	381.3	366.0	15.31	24.904			
3,100.0	3,003.3	3,089.2	3,063.4	15.4	9.2	-171.77	-98.7	-294.4	396.2	380.2	15.94	24.857			
3,200.0	3,098.7	3,188.1	3,160.9	16.0	9.6	-171.35	-105.9	-309.1	411.1	394.5	16.57	24.810			
3,300.0	3,194.2	3,286.9	3,258.3	16.7	9.9	-170.96	-113.1	-323.8	426.0	408.8	17.20	24.764			
3,400.0	3,289.7	3,385.7	3,355.8	17.3	10.3	-170.60	-120.3	-338.5	441.0	423.1	17.84	24.717			
3,500.0	3,385.1	3,484.6	3,453.3	18.0	10.7	-170.26	-127.5	-353.3	455.9	437.4	18.48	24.672			
3,600.0	3,480.6	3,583.4	3,550.8	18.6	11.1	-169.94	-134.7	-368.0	470.9	451.8	19.12	24.627			
3,700.0	3,576.0	3,682.3	3,648.2	19.2	11.5	-169.64	-141.9	-382.7	485.9	466.1	19.77	24.584			
3,800.0	3,671.5	3,781.1	3,745.7	19.9	11.9	-169.36	-149.1	-397.4	500.9	480.5	20.41	24.541			
3,900.0	3,767.0	3,879.9	3,843.2	20.5	12.2	-169.10	-156.3	-412.2	515.9	494.9	21.06	24.500			
4,000.0	3,862.4	3,978.8	3,940.6	21.2	12.6	-168.85	-163.5	-426.9	531.0	509.2	21.71	24.459			
4,100.0	3,957.9	4,077.6	4,038.1	21.8	13.0	-168.61	-170.7	-441.6	546.0	523.6	22.36	24.420			
4,200.0	4,053.4	4,176.5	4,135.6	22.4	13.4	-168.39	-177.9	-456.3	561.0	538.0	23.01	24.383			
4,300.0	4,148.8	4,275.3	4,233.0	23.1	13.8	-168.18	-185.1	-471.1	576.1	552.4	23.66	24.346			
4,400.0	4,244.3	4,374.1	4,330.5	23.7	14.2	-167.98	-192.3	-485.8	591.1	566.8	24.32	24.310			
4,500.0	4,339.7	4,473.0	4,428.0	24.3	14.5	-167.79	-199.5	-500.5	606.2	581.2	24.97	24.276			
4,600.0	4,435.2	4,571.3	4,524.9	25.0	14.9	-167.61	-206.6	-515.2	621.3	595.7	25.63	24.244			
4,700.0	4,530.7	4,654.6	4,607.3	25.6	15.2	-167.52	-212.2	-526.5	637.6	611.4	26.17	24.367			
4,800.0	4,626.1	4,736.8	4,688.8	26.3	15.4	-167.54	-216.6	-535.6	656.4	629.7	26.66	24.617			
4,900.0	4,721.6	4,818.1	4,769.8	26.9	15.5	-167.66	-220.0	-542.5	677.6	650.5	27.13	24.978			

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

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:		0.0 ft	
Survey Program: 0-MWD												Offset Well Error:		0.0 ft	
Reference		Offset		Semi Major Axis			Distance					Warning			
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation			Separation Factor	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
5,000.0	4,817.0	4,900.0	4,851.5	27.5	15.7	-167.87	-222.4	-547.3	701.2	673.6	27.56			25.441	
5,100.0	4,912.5	4,977.7	4,929.2	28.2	15.8	-168.15	-223.7	-550.0	727.2	699.2	27.96			26.006	
5,200.0	5,008.0	5,057.5	5,009.0	28.8	15.9	-168.50	-224.0	-550.8	755.5	727.1	28.35			26.650	
5,300.0	5,103.4	5,153.0	5,104.4	29.5	16.1	-168.94	-224.0	-550.8	784.7	756.0	28.74	27.306			

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design														Offset Site Error:	0.0 ft
Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W - Niles Miller 20T-321 - Wellbore #1 - Plan #1 (12-01-15)														Offset Well Error:	0.0 ft
Survey Program: 0-MWD															
Reference		Offset		Semi Major Axis			Distance								
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
0.0	0.0	3.0	3.0	0.0	0.0	-0.68	105.0	-1.2	105.0	105.0	0.00	N/A			
100.0	100.0	103.0	103.0	0.1	0.1	-0.68	105.0	-1.2	105.0	104.8	0.23	453.607			
200.0	200.0	203.0	203.0	0.3	0.3	-0.68	105.0	-1.2	105.0	104.3	0.68	154.196 CC			
300.0	300.0	303.0	303.0	0.5	0.6	98.15	105.0	-1.2	105.2	104.1	1.12	94.062 ES			
400.0	399.9	402.9	402.9	0.8	0.8	100.24	105.0	-1.2	105.8	104.3	1.56	67.852			
500.0	499.7	502.7	502.7	1.0	1.0	103.66	105.0	-1.2	107.2	105.2	2.02	53.047			
600.0	599.3	602.3	602.3	1.3	1.2	108.25	105.0	-1.2	109.7	107.2	2.50	43.845			
700.0	698.6	701.6	701.6	1.6	1.5	113.78	105.0	-1.2	114.0	110.9	3.00	37.926			
800.0	797.5	800.5	800.5	1.9	1.7	119.90	105.0	-1.2	120.5	117.0	3.52	34.197			
900.0	896.1	899.1	899.1	2.2	1.9	126.22	105.0	-1.2	129.8	125.8	4.05	32.051			
1,000.0	994.2	997.2	997.2	2.6	2.1	132.36	105.0	-1.2	142.4	137.8	4.58	31.093			
1,100.0	1,091.7	1,094.7	1,094.7	3.1	2.3	138.05	105.0	-1.2	158.2	153.1	5.10	31.032 SF			
1,200.0	1,188.6	1,191.6	1,191.6	3.6	2.6	143.13	105.0	-1.2	177.5	171.9	5.61	31.644			
1,300.0	1,284.9	1,287.9	1,287.9	4.1	2.8	147.57	105.0	-1.2	200.1	194.0	6.11	32.754			
1,355.2	1,337.7	1,340.7	1,340.7	4.4	2.9	149.74	105.0	-1.2	214.0	207.6	6.38	33.531			
1,400.0	1,380.4	1,383.4	1,383.4	4.7	3.0	151.43	105.0	-1.2	225.8	219.2	6.60	34.203			
1,500.0	1,475.9	1,478.9	1,478.9	5.3	3.2	154.64	105.0	-1.2	252.6	245.5	7.08	35.659			
1,600.0	1,571.4	1,574.4	1,574.4	5.9	3.4	157.23	105.0	-1.2	280.0	272.4	7.56	37.022			
1,700.0	1,666.8	1,670.7	1,670.7	6.6	3.6	159.51	104.4	-1.0	307.7	299.7	8.02	38.372			
1,800.0	1,762.3	1,767.1	1,767.0	7.2	3.8	161.82	101.5	-0.1	335.5	327.1	8.44	39.752			
1,900.0	1,857.7	1,862.9	1,862.7	7.8	4.0	164.16	96.4	1.7	363.6	354.7	8.85	41.084			
2,000.0	1,953.2	1,958.2	1,957.7	8.4	4.1	166.51	89.1	4.2	392.0	382.8	9.26	42.328			
2,100.0	2,048.7	2,052.7	2,051.7	9.1	4.3	168.82	79.9	7.3	421.0	411.3	9.68	43.483			
2,200.0	2,144.1	2,147.1	2,145.5	9.7	4.5	170.88	70.4	10.5	450.5	440.4	10.12	44.512			
2,300.0	2,239.6	2,241.4	2,239.3	10.3	4.7	172.69	60.8	13.7	480.5	470.0	10.58	45.424			
2,400.0	2,335.1	2,335.7	2,333.1	11.0	5.0	174.29	51.3	17.0	510.9	499.9	11.05	46.222			
2,500.0	2,430.5	2,430.1	2,426.9	11.6	5.2	175.71	41.8	20.2	541.7	530.1	11.54	46.924			
2,600.0	2,526.0	2,524.4	2,520.7	12.2	5.4	176.98	32.3	23.4	572.7	560.6	12.05	47.540			
2,700.0	2,621.4	2,618.7	2,614.5	12.9	5.6	178.12	22.8	26.7	603.9	591.3	12.56	48.081			
2,800.0	2,716.9	2,713.1	2,708.3	13.5	5.9	179.15	13.3	29.9	635.3	622.3	13.08	48.556			
2,900.0	2,812.4	2,807.4	2,802.1	14.1	6.1	-179.91	3.8	33.1	666.9	653.3	13.62	48.974			
3,000.0	2,907.8	2,901.7	2,895.9	14.8	6.4	-179.06	-5.8	36.4	698.7	684.5	14.16	49.344			
3,100.0	3,003.3	2,996.1	2,989.7	15.4	6.6	-178.29	-15.3	39.6	730.6	715.9	14.71	49.670			
3,200.0	3,098.7	3,090.4	3,083.5	16.0	6.9	-177.57	-24.8	42.8	762.6	747.3	15.26	49.960			
3,300.0	3,194.2	3,184.7	3,177.3	16.7	7.1	-176.92	-34.3	46.1	794.6	778.8	15.82	50.217			

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design														Offset Site Error:	0.0 ft
Survey Program: 0-MWD														Offset Well Error:	0.0 ft
Reference															
Offset															
Semi Major Axis															
Distance															
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
0.0	0.0	2.0	2.0	0.0	0.0	-0.63	89.9	-1.0	89.9	89.9	0.00	N/A			
100.0	100.0	102.0	102.0	0.1	0.1	-0.63	89.9	-1.0	89.9	89.7	0.23	392.266			
200.0	200.0	202.0	202.0	0.3	0.3	-0.63	89.9	-1.0	89.9	89.3	0.68	132.487 CC			
300.0	300.0	302.0	302.0	0.5	0.6	98.32	89.9	-1.0	90.1	89.0	1.12	80.739 ES			
400.0	399.9	401.9	401.9	0.8	0.8	100.76	89.9	-1.0	90.8	89.2	1.56	58.279			
500.0	499.7	501.7	501.7	1.0	1.0	104.73	89.9	-1.0	92.2	90.2	2.02	45.687			
600.0	599.3	601.3	601.3	1.3	1.2	110.02	89.9	-1.0	95.0	92.5	2.50	37.987			
700.0	698.6	700.6	700.6	1.6	1.5	116.28	89.9	-1.0	99.6	96.6	3.00	33.199			
800.0	797.5	799.5	799.5	1.9	1.7	123.06	89.9	-1.0	106.8	103.3	3.51	30.382			
900.0	896.1	898.1	898.1	2.2	1.9	129.85	89.9	-1.0	117.0	112.9	4.03	28.996			
1,000.0	994.2	996.2	996.2	2.6	2.1	136.24	89.9	-1.0	130.4	125.9	4.55	28.673 SF			
1,100.0	1,091.7	1,093.7	1,093.7	3.1	2.3	141.98	89.9	-1.0	147.3	142.3	5.06	29.137			
1,200.0	1,188.6	1,190.6	1,190.6	3.6	2.6	146.95	89.9	-1.0	167.6	162.0	5.55	30.175			
1,300.0	1,284.9	1,286.9	1,286.9	4.1	2.8	151.18	89.9	-1.0	191.1	185.1	6.04	31.627			
1,355.2	1,337.7	1,339.7	1,339.7	4.4	2.9	153.22	89.9	-1.0	205.5	199.1	6.31	32.562			
1,400.0	1,380.4	1,382.4	1,382.4	4.7	3.0	154.79	89.9	-1.0	217.5	211.0	6.52	33.345			
1,500.0	1,475.9	1,476.0	1,476.0	5.3	3.2	157.86	89.5	-0.4	245.3	238.3	6.98	35.150			
1,600.0	1,571.4	1,568.1	1,568.0	5.9	3.4	160.71	87.7	2.0	274.6	267.2	7.41	37.071			
1,700.0	1,666.8	1,659.1	1,658.9	6.6	3.5	163.38	84.6	6.0	305.6	297.7	7.83	39.032			
1,800.0	1,762.3	1,748.8	1,748.3	7.2	3.7	165.87	80.3	11.7	338.2	329.9	8.25	40.994			
1,900.0	1,857.7	1,837.2	1,836.2	7.8	3.9	168.20	74.7	18.9	372.5	363.8	8.68	42.938			
2,000.0	1,953.2	1,924.2	1,922.5	8.4	4.1	170.37	68.1	27.5	408.6	399.5	9.11	44.847			
2,100.0	2,048.7	2,014.7	2,012.2	9.1	4.3	172.43	60.4	37.7	446.0	436.5	9.56	46.635			
2,200.0	2,144.1	2,106.3	2,102.8	9.7	4.6	174.20	52.5	47.9	483.9	473.9	10.03	48.237			
2,300.0	2,239.6	2,197.8	2,193.5	10.3	4.8	175.72	44.7	58.2	522.1	511.6	10.52	49.657			
2,400.0	2,335.1	2,289.4	2,284.1	11.0	5.1	177.03	36.8	68.4	560.7	549.7	11.01	50.924			
2,500.0	2,430.5	2,381.0	2,374.8	11.6	5.3	178.18	29.0	78.7	599.4	587.9	11.51	52.057			
2,600.0	2,526.0	2,472.5	2,465.4	12.2	5.6	179.19	21.1	89.0	638.3	626.3	12.03	53.073			
2,700.0	2,621.4	2,564.1	2,556.0	12.9	5.9	-179.92	13.3	99.2	677.4	664.8	12.55	53.987			
2,800.0	2,716.9	2,655.6	2,646.7	13.5	6.2	-179.12	5.4	109.5	716.6	703.5	13.07	54.812			
2,900.0	2,812.4	2,747.2	2,737.3	14.1	6.5	-178.41	-2.4	119.8	755.9	742.3	13.60	55.560			
3,000.0	2,907.8	2,838.8	2,828.0	14.8	6.8	-177.76	-10.3	130.0	795.3	781.1	14.14	56.239			

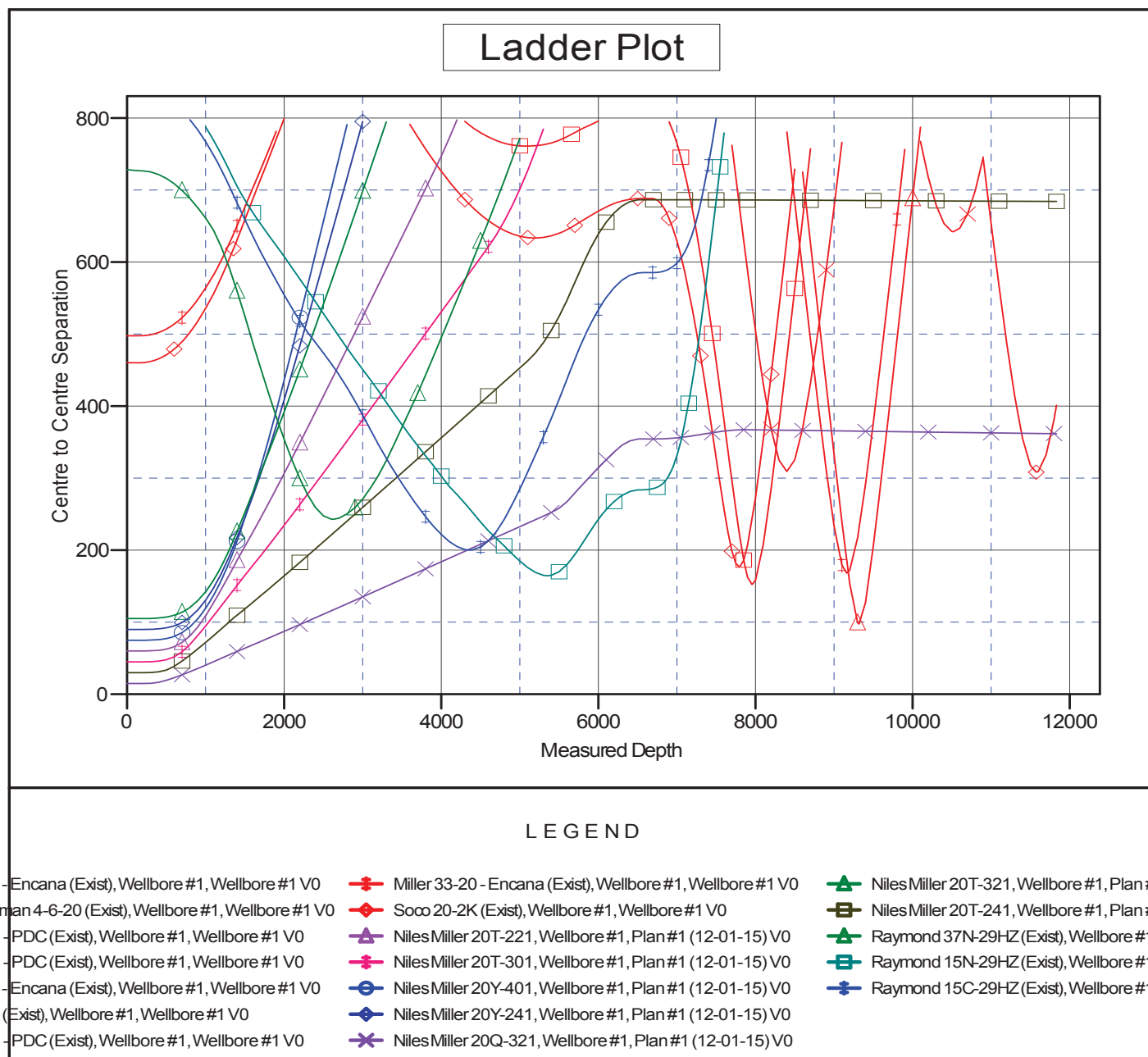
Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Offset Design														Offset Site Error:	0.0 ft
Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W - Niles Miller 20Y-401 - Wellbore #1 - Plan #1 (12-01-15)														Offset Well Error:	0.0 ft
Survey Program: 0-MWD															
Reference		Offset		Semi Major Axis			Distance								
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
0.0	0.0	2.0	2.0	0.0	0.0	-0.68	74.9	-0.9	74.9	74.9	0.00	N/A			
100.0	100.0	102.0	102.0	0.1	0.1	-0.68	74.9	-0.9	74.9	74.7	0.23	326.837			
200.0	200.0	202.0	202.0	0.3	0.3	-0.68	74.9	-0.9	74.9	74.3	0.68	110.389 CC			
300.0	300.0	302.0	302.0	0.5	0.6	98.43	74.9	-0.9	75.1	74.0	1.12	67.299 ES			
400.0	399.9	401.9	401.9	0.8	0.8	101.36	74.9	-0.9	75.8	74.2	1.56	48.661			
500.0	499.7	501.7	501.7	1.0	1.0	106.08	74.9	-0.9	77.3	75.3	2.02	38.318			
600.0	599.3	601.3	601.3	1.3	1.2	112.30	74.9	-0.9	80.4	77.9	2.50	32.154			
700.0	698.6	700.6	700.6	1.6	1.5	119.49	74.9	-0.9	85.5	82.5	3.00	28.534			
800.0	797.5	799.5	799.5	1.9	1.7	127.03	74.9	-0.9	93.5	90.0	3.51	26.664			
900.0	896.1	898.1	898.1	2.2	1.9	134.27	74.9	-0.9	104.6	100.6	4.01	26.062 SF			
1,000.0	994.2	996.2	996.2	2.6	2.1	140.81	74.9	-0.9	119.2	114.7	4.52	26.382			
1,100.0	1,091.7	1,093.7	1,093.7	3.1	2.3	146.46	74.9	-0.9	137.1	132.1	5.01	27.364			
1,200.0	1,188.6	1,190.6	1,190.6	3.6	2.6	151.19	74.9	-0.9	158.4	152.9	5.50	28.812			
1,300.0	1,284.9	1,284.6	1,284.5	4.1	2.8	155.27	74.6	0.0	183.3	177.4	5.96	30.782			
1,355.2	1,337.7	1,335.5	1,335.5	4.4	2.9	157.40	74.0	1.3	199.1	192.9	6.20	32.110			
1,400.0	1,380.4	1,376.4	1,376.3	4.7	2.9	159.10	73.3	2.9	212.6	206.2	6.39	33.262			
1,500.0	1,475.9	1,466.7	1,466.5	5.3	3.1	162.49	71.2	7.7	244.5	237.7	6.82	35.845			
1,600.0	1,571.4	1,555.6	1,555.1	5.9	3.3	165.42	68.3	14.3	278.5	271.3	7.25	38.421			
1,700.0	1,666.8	1,643.0	1,642.0	6.6	3.5	167.97	64.7	22.7	314.7	307.1	7.68	40.963			
1,800.0	1,762.3	1,728.8	1,727.1	7.2	3.7	170.21	60.4	32.7	353.0	344.9	8.12	43.454			
1,900.0	1,857.7	1,813.1	1,810.4	7.8	3.9	172.20	55.4	44.2	393.3	384.7	8.57	45.883			
2,000.0	1,953.2	1,895.7	1,891.9	8.4	4.2	173.97	49.8	57.1	435.6	426.5	9.03	48.240			
2,100.0	2,048.7	1,983.1	1,977.7	9.1	4.4	175.64	43.4	71.9	479.3	469.8	9.51	50.416			
2,200.0	2,144.1	2,072.1	2,065.2	9.7	4.7	177.06	36.8	87.1	523.3	513.3	9.99	52.358			
2,300.0	2,239.6	2,161.2	2,152.8	10.3	5.0	178.26	30.2	102.3	567.5	557.1	10.49	54.107			
2,400.0	2,335.1	2,250.3	2,240.3	11.0	5.4	179.29	23.6	117.5	612.0	601.0	10.99	55.672			
2,500.0	2,430.5	2,339.4	2,327.8	11.6	5.7	-179.81	17.0	132.7	656.5	645.0	11.50	57.078			
2,600.0	2,526.0	2,428.5	2,415.3	12.2	6.0	-179.03	10.4	147.9	701.2	689.2	12.02	58.346			
2,700.0	2,621.4	2,517.5	2,502.9	12.9	6.3	-178.35	3.8	163.1	746.0	733.5	12.54	59.494			
2,800.0	2,716.9	2,606.6	2,590.4	13.5	6.7	-177.74	-2.8	178.3	790.8	777.8	13.06	60.537			

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4967.0ft (Original Well Elev)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

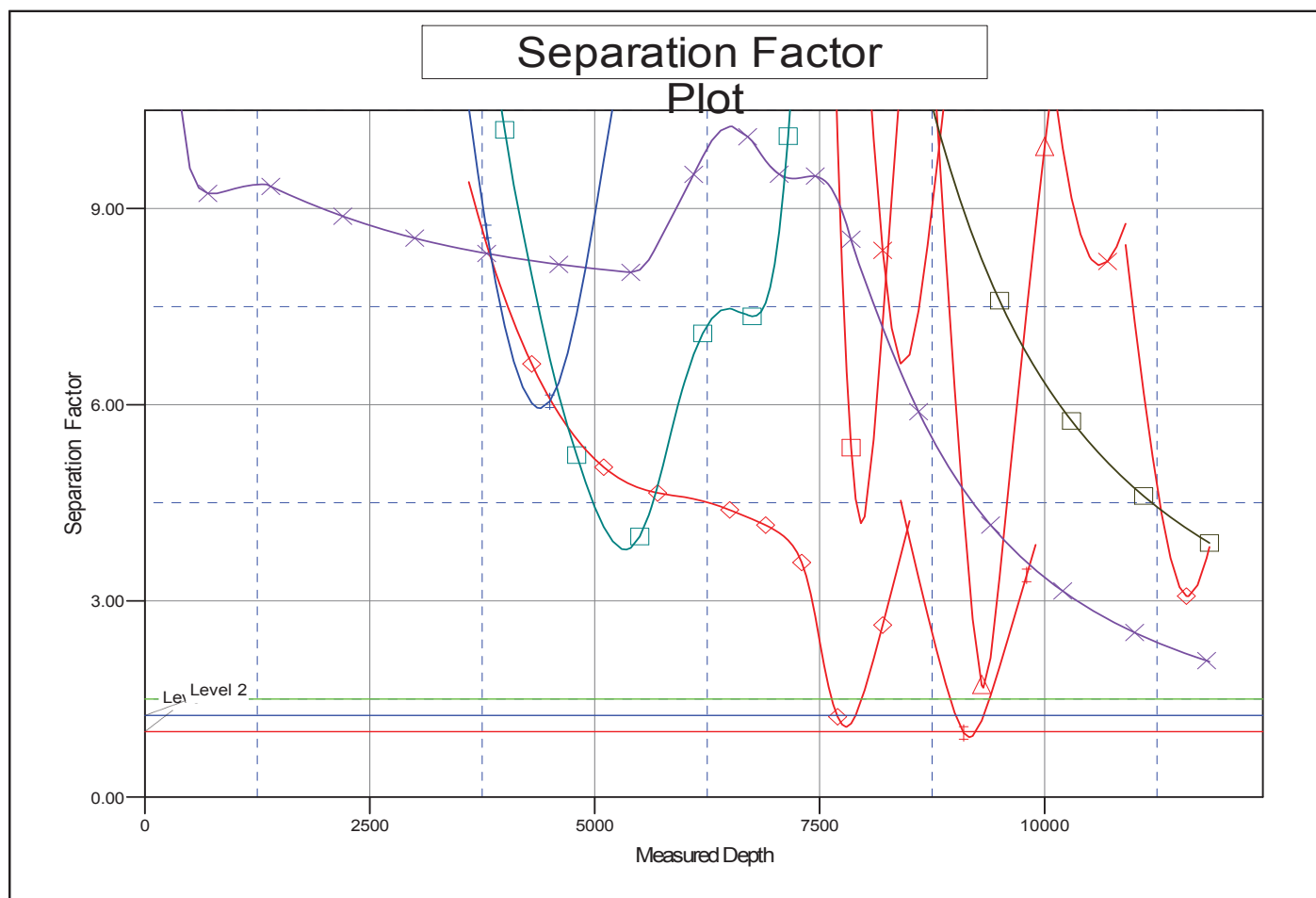
Coordinates are relative to: Niles Miller 20Q-221
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.46°



Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Niles Miller 20Q-221
Project:	SEC.20-T3N-R66W	TVD Reference:	WELL @ 4967.0ft (Original Well Elev)
Reference Site:	Niles Miller 3N66W20Y Pad Sec.20-T3N-R66W	MD Reference:	WELL @ 4967.0ft (Original Well Elev)
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Niles Miller 20Q-221	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 (12-01-15)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4967.0ft (Original Well Elev)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: Niles Miller 20Q-221
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.46°



LEGEND

0 - Encana (Exist), Wellbore #1, Wellbore #1 V0	Miller 33-20 - Encana (Exist), Wellbore #1, Wellbore #1 V0	NilesMiller 20T-321, Wellbore #1, Plan #1 (12-01-15) V0
0 - Soco 20-2K (Exist), Wellbore #1, Wellbore #1 V0	Soco 20-2K (Exist), Wellbore #1, Wellbore #1 V0	NilesMiller 20T-241, Wellbore #1, Plan #1 (12-01-15) V0
0 - PDC (Exist), Wellbore #1, Wellbore #1 V0	NilesMiller 20T-221, Wellbore #1, Plan #1 (12-01-15) V0	Raymond 37N-29HZ (Exist), Wellbore #1, V0
0 - PDC (Exist), Wellbore #1, Wellbore #1 V0	NilesMiller 20T-301, Wellbore #1, Plan #1 (12-01-15) V0	Raymond 15N-29HZ (Exist), Wellbore #1, V0
0 - Encana (Exist), Wellbore #1, Wellbore #1 V0	NilesMiller 20Y-401, Wellbore #1, Plan #1 (12-01-15) V0	Raymond 15C-29HZ (Exist), Wellbore #1, V0
0 - (Exist), Wellbore #1, Wellbore #1 V0	NilesMiller 20Y-241, Wellbore #1, Plan #1 (12-01-15) V0	
0 - PDC (Exist), Wellbore #1, Wellbore #1 V0	NilesMiller 20Q-321, Wellbore #1, Plan #1 (12-01-15) V0	