

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Collins 18Q-221**

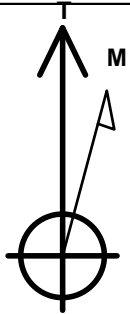
Surface Location: Collins 4N64W18T Pad Sec.18-T4N-R64W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
Ground Elevation: 4783.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1355531.37	3254475.62	40.305740	-104.587550	

Original Well Elev WELL @ 4798.0ft (Original Well Elev)

WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 234'FSL & 970'FEL	1.0	0.0	0.0	Point
BHL 500'FNL & 2218'FEL	6842.0	4524.7	-1221.4	Point



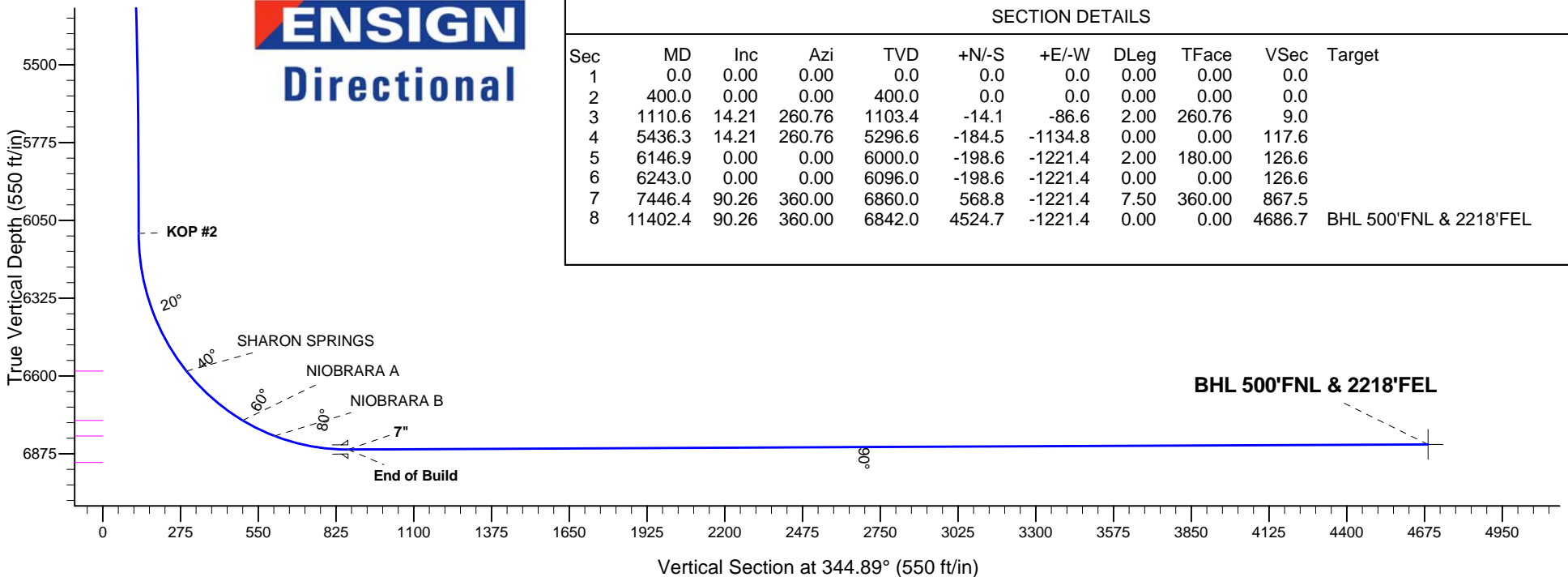
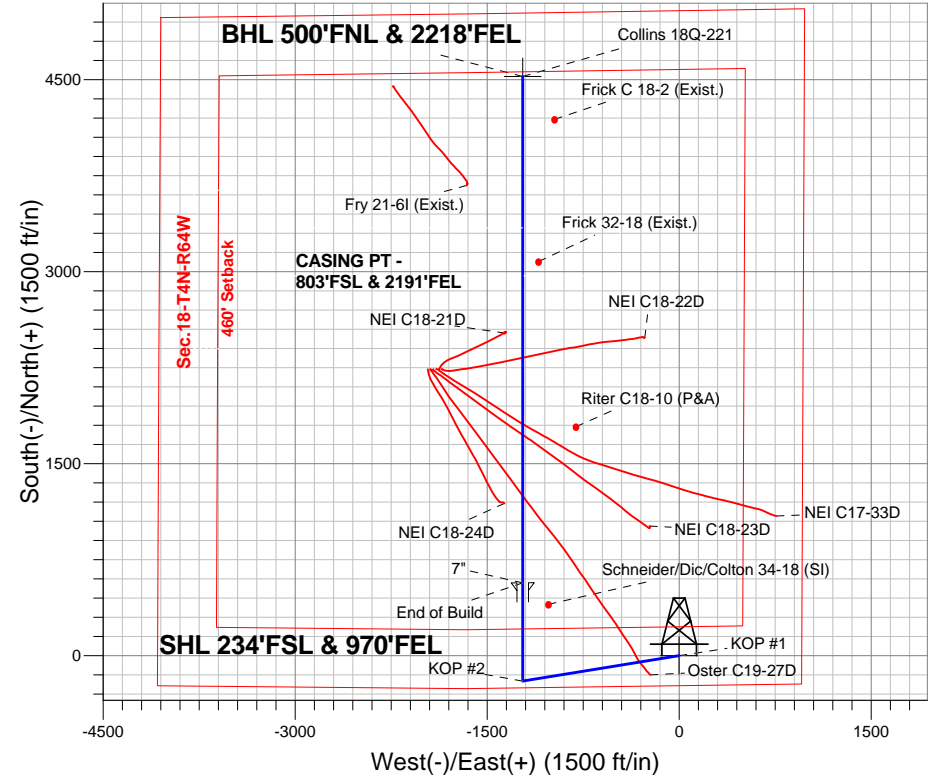
Azimuths to True North
Magnetic North: 8.30°

Magnetic Field
Strength: 52744.0nT
Dip Angle: 66.89°
Date: 11/3/2014
Model: IGRF2010

Collins 4N64W18T Pad Sec.18-T4N-R64W
Collins 18Q-221
Plan #1 (11-3-14)

ANNOTATIONS

TVD	MD	Annotation
400.0	400.0	KOP #1
6096.1	6243.0	KOP #2
6860.0	7446.4	End of Build





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.18-T4N-R64W

Collins 4N64W18T Pad Sec.18-T4N-R64W

Collins 18Q-221

Wellbore #1

Plan: Plan #1 (11-3-14)

Standard Planning Report

06 November, 2014

Database:	landmark	Local Co-ordinate Reference:	Well Collins 18Q-221
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Project:	SEC.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	North Reference:	True
Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-3-14)		

Project	SEC.18-T4N-R64W		
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

Collins 4N64W18T Pad Sec.18-T4N-R64W					
Site Position:		Northing:	1,355,535.33ft	Latitude:	40.305750
From:	Lat/Long	Easting:	3,254,506.26ft	Longitude:	-104.587440
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.59 °

Well	Collins 18Q-221					
Well Position	+N/-S	-3.7 ft	Northing:	1,355,531.37 ft	Latitude:	40.305740
	+E/-W	-30.7 ft	Easting:	3,254,475.62 ft	Longitude:	-104.587550
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,783.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/3/2014	8.30	66.89	52,744

Design	Plan #1 (11-3-14)			
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	344.89

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,110.6	14.21	260.76	1,103.4	-14.1	-86.6	2.00	2.00	0.00	260.76	
5,436.3	14.21	260.76	5,296.6	-184.5	-1,134.8	0.00	0.00	0.00	0.00	
6,146.9	0.00	0.00	6,000.0	-198.6	-1,221.4	2.00	-2.00	0.00	180.00	
6,243.0	0.00	0.00	6,096.0	-198.6	-1,221.4	0.00	0.00	0.00	0.00	
7,446.4	90.26	360.00	6,860.0	568.8	-1,221.4	7.50	7.50	0.00	360.00	
11,402.4	90.26	360.00	6,842.0	4,524.7	-1,221.4	0.00	0.00	0.00	0.00	BHL 500'FNL & 221

Database:	landmark	Local Co-ordinate Reference:	Well Collins 18Q-221
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Project:	SEC.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	North Reference:	True
Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-3-14)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
500.0	2.00	260.76	500.0	-0.3	-1.7	0.2	2.00	2.00	0.00
600.0	4.00	260.76	599.8	-1.1	-6.9	0.7	2.00	2.00	0.00
700.0	6.00	260.76	699.5	-2.5	-15.5	1.6	2.00	2.00	0.00
800.0	8.00	260.76	798.7	-4.5	-27.5	2.9	2.00	2.00	0.00
900.0	10.00	260.76	897.5	-7.0	-43.0	4.5	2.00	2.00	0.00
1,000.0	12.00	260.76	995.6	-10.0	-61.8	6.4	2.00	2.00	0.00
1,100.0	14.00	260.76	1,093.1	-13.7	-84.0	8.7	2.00	2.00	0.00
1,110.6	14.21	260.76	1,103.4	-14.1	-86.6	9.0	2.00	2.00	0.00
1,200.0	14.21	260.76	1,190.0	-17.6	-108.2	11.2	0.00	0.00	0.00
1,300.0	14.21	260.76	1,286.9	-21.5	-132.4	13.7	0.00	0.00	0.00
1,400.0	14.21	260.76	1,383.9	-25.5	-156.7	16.2	0.00	0.00	0.00
1,500.0	14.21	260.76	1,480.8	-29.4	-180.9	18.7	0.00	0.00	0.00
1,600.0	14.21	260.76	1,577.8	-33.4	-205.1	21.3	0.00	0.00	0.00
1,700.0	14.21	260.76	1,674.7	-37.3	-229.4	23.8	0.00	0.00	0.00
1,800.0	14.21	260.76	1,771.6	-41.2	-253.6	26.3	0.00	0.00	0.00
1,900.0	14.21	260.76	1,868.6	-45.2	-277.8	28.8	0.00	0.00	0.00
2,000.0	14.21	260.76	1,965.5	-49.1	-302.1	31.3	0.00	0.00	0.00
2,100.0	14.21	260.76	2,062.4	-53.1	-326.3	33.8	0.00	0.00	0.00
2,200.0	14.21	260.76	2,159.4	-57.0	-350.6	36.3	0.00	0.00	0.00
2,300.0	14.21	260.76	2,256.3	-60.9	-374.8	38.8	0.00	0.00	0.00
2,400.0	14.21	260.76	2,353.3	-64.9	-399.0	41.4	0.00	0.00	0.00
2,500.0	14.21	260.76	2,450.2	-68.8	-423.3	43.9	0.00	0.00	0.00
2,600.0	14.21	260.76	2,547.1	-72.8	-447.5	46.4	0.00	0.00	0.00
2,700.0	14.21	260.76	2,644.1	-76.7	-471.7	48.9	0.00	0.00	0.00
2,800.0	14.21	260.76	2,741.0	-80.6	-496.0	51.4	0.00	0.00	0.00
2,900.0	14.21	260.76	2,838.0	-84.6	-520.2	53.9	0.00	0.00	0.00
3,000.0	14.21	260.76	2,934.9	-88.5	-544.4	56.4	0.00	0.00	0.00
3,100.0	14.21	260.76	3,031.8	-92.5	-568.7	58.9	0.00	0.00	0.00
3,200.0	14.21	260.76	3,128.8	-96.4	-592.9	61.4	0.00	0.00	0.00
3,300.0	14.21	260.76	3,225.7	-100.3	-617.1	64.0	0.00	0.00	0.00
3,400.0	14.21	260.76	3,322.7	-104.3	-641.4	66.5	0.00	0.00	0.00
3,500.0	14.21	260.76	3,419.6	-108.2	-665.6	69.0	0.00	0.00	0.00
3,600.0	14.21	260.76	3,516.5	-112.2	-689.8	71.5	0.00	0.00	0.00
3,700.0	14.21	260.76	3,613.5	-116.1	-714.1	74.0	0.00	0.00	0.00
3,800.0	14.21	260.76	3,710.4	-120.0	-738.3	76.5	0.00	0.00	0.00
3,900.0	14.21	260.76	3,807.4	-124.0	-762.5	79.0	0.00	0.00	0.00
3,919.2	14.21	260.76	3,826.0	-124.7	-767.2	79.5	0.00	0.00	0.00
PARKMAN									
4,000.0	14.21	260.76	3,904.3	-127.9	-786.8	81.5	0.00	0.00	0.00
4,100.0	14.21	260.76	4,001.2	-131.9	-811.0	84.0	0.00	0.00	0.00
4,200.0	14.21	260.76	4,098.2	-135.8	-835.2	86.6	0.00	0.00	0.00
4,300.0	14.21	260.76	4,195.1	-139.8	-859.5	89.1	0.00	0.00	0.00
4,400.0	14.21	260.76	4,292.0	-143.7	-883.7	91.6	0.00	0.00	0.00
4,408.2	14.21	260.76	4,300.0	-144.0	-885.7	91.8	0.00	0.00	0.00
SUSSEX									
4,500.0	14.21	260.76	4,389.0	-147.6	-907.9	94.1	0.00	0.00	0.00
4,600.0	14.21	260.76	4,485.9	-151.6	-932.2	96.6	0.00	0.00	0.00

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Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	North Reference:	True
Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-3-14)		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,700.0	14.21	260.76	4,582.9	-155.5	-956.4	99.1	0.00	0.00	0.00
4,800.0	14.21	260.76	4,679.8	-159.5	-980.6	101.6	0.00	0.00	0.00
4,900.0	14.21	260.76	4,776.7	-163.4	-1,004.9	104.1	0.00	0.00	0.00
5,000.0	14.21	260.76	4,873.7	-167.3	-1,029.1	106.6	0.00	0.00	0.00
5,027.2	14.21	260.76	4,900.0	-168.4	-1,035.7	107.3	0.00	0.00	0.00
SHANNON									
5,100.0	14.21	260.76	4,970.6	-171.3	-1,053.3	109.2	0.00	0.00	0.00
5,200.0	14.21	260.76	5,067.6	-175.2	-1,077.6	111.7	0.00	0.00	0.00
5,300.0	14.21	260.76	5,164.5	-179.2	-1,101.8	114.2	0.00	0.00	0.00
5,400.0	14.21	260.76	5,261.4	-183.1	-1,126.1	116.7	0.00	0.00	0.00
5,436.3	14.21	260.76	5,296.6	-184.5	-1,134.8	117.6	0.00	0.00	0.00
5,500.0	12.94	260.76	5,358.5	-186.9	-1,149.6	119.1	2.00	-2.00	0.00
5,600.0	10.94	260.76	5,456.4	-190.2	-1,170.0	121.3	2.00	-2.00	0.00
5,700.0	8.94	260.76	5,554.9	-193.0	-1,187.1	123.0	2.00	-2.00	0.00
5,800.0	6.94	260.76	5,653.9	-195.2	-1,200.7	124.4	2.00	-2.00	0.00
5,900.0	4.94	260.76	5,753.4	-196.9	-1,210.9	125.5	2.00	-2.00	0.00
6,000.0	2.94	260.76	5,853.1	-198.0	-1,217.7	126.2	2.00	-2.00	0.00
6,100.0	0.94	260.76	5,953.1	-198.5	-1,221.0	126.5	2.00	-2.00	0.00
6,146.9	0.00	0.00	6,000.0	-198.6	-1,221.4	126.6	2.00	-2.00	0.00
6,200.0	0.00	0.00	6,053.1	-198.6	-1,221.4	126.6	0.00	0.00	0.00
6,243.0	0.00	0.00	6,096.1	-198.6	-1,221.4	126.6	0.00	0.00	0.00
KOP #2									
6,300.0	4.28	360.00	6,153.0	-196.5	-1,221.4	128.6	7.51	7.51	0.00
6,400.0	11.78	360.00	6,252.0	-182.5	-1,221.4	142.1	7.50	7.50	0.00
6,500.0	19.28	360.00	6,348.2	-155.8	-1,221.4	167.9	7.50	7.50	0.00
6,600.0	26.78	360.00	6,440.2	-116.7	-1,221.4	205.7	7.50	7.50	0.00
6,700.0	34.28	360.00	6,526.3	-65.9	-1,221.4	254.7	7.50	7.50	0.00
6,771.0	39.60	360.00	6,583.0	-23.3	-1,221.4	295.9	7.50	7.50	0.00
SHARON SPRINGS									
6,800.0	41.78	360.00	6,605.0	-4.4	-1,221.4	314.1	7.50	7.50	0.00
6,900.0	49.28	360.00	6,675.0	67.0	-1,221.4	383.0	7.50	7.50	0.00
7,000.0	56.78	360.00	6,735.1	146.8	-1,221.4	460.0	7.50	7.50	0.00
7,041.7	59.91	360.00	6,757.0	182.3	-1,221.4	494.3	7.50	7.50	0.00
NIORARA A									
7,100.0	64.28	360.00	6,784.3	233.8	-1,221.4	544.0	7.50	7.50	0.00
7,170.8	69.59	360.00	6,812.0	298.9	-1,221.4	606.9	7.50	7.50	0.00
NIORARA B									
7,200.0	71.78	360.00	6,821.7	326.5	-1,221.4	633.5	7.50	7.50	0.00
7,300.0	79.28	360.00	6,846.6	423.2	-1,221.4	726.9	7.50	7.50	0.00
7,400.0	86.78	360.00	6,858.8	522.4	-1,221.4	822.7	7.50	7.50	0.00
7,446.4	90.26	360.00	6,860.0	568.8	-1,221.4	867.4	7.50	7.50	0.00
End of Build - 7"									
7,500.0	90.26	360.00	6,859.7	622.4	-1,221.4	919.2	0.00	0.00	0.00
7,600.0	90.26	360.00	6,859.3	722.4	-1,221.4	1,015.7	0.00	0.00	0.00
7,700.0	90.26	360.00	6,858.8	822.4	-1,221.4	1,112.3	0.00	0.00	0.00
7,800.0	90.26	360.00	6,858.3	922.4	-1,221.4	1,208.8	0.00	0.00	0.00
7,900.0	90.26	360.00	6,857.9	1,022.4	-1,221.4	1,305.4	0.00	0.00	0.00
8,000.0	90.26	360.00	6,857.4	1,122.4	-1,221.4	1,401.9	0.00	0.00	0.00
8,100.0	90.26	360.00	6,857.0	1,222.4	-1,221.4	1,498.5	0.00	0.00	0.00
8,200.0	90.26	360.00	6,856.5	1,322.4	-1,221.4	1,595.0	0.00	0.00	0.00
8,300.0	90.26	360.00	6,856.1	1,422.4	-1,221.4	1,691.5	0.00	0.00	0.00
8,400.0	90.26	360.00	6,855.6	1,522.4	-1,221.4	1,788.1	0.00	0.00	0.00

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Project:	SEC.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	North Reference:	True
Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-3-14)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
8,500.0	90.26	360.00	6,855.2	1,622.4	-1,221.4	1,884.6	0.00	0.00	0.00
8,600.0	90.26	360.00	6,854.7	1,722.4	-1,221.4	1,981.2	0.00	0.00	0.00
8,700.0	90.26	360.00	6,854.3	1,822.4	-1,221.4	2,077.7	0.00	0.00	0.00
8,800.0	90.26	360.00	6,853.8	1,922.4	-1,221.4	2,174.3	0.00	0.00	0.00
8,900.0	90.26	360.00	6,853.4	2,022.4	-1,221.4	2,270.8	0.00	0.00	0.00
9,000.0	90.26	360.00	6,852.9	2,122.4	-1,221.4	2,367.3	0.00	0.00	0.00
9,100.0	90.26	360.00	6,852.4	2,222.4	-1,221.4	2,463.9	0.00	0.00	0.00
9,200.0	90.26	360.00	6,852.0	2,322.4	-1,221.4	2,560.4	0.00	0.00	0.00
9,300.0	90.26	360.00	6,851.5	2,422.4	-1,221.4	2,657.0	0.00	0.00	0.00
9,400.0	90.26	360.00	6,851.1	2,522.4	-1,221.4	2,753.5	0.00	0.00	0.00
9,500.0	90.26	360.00	6,850.6	2,622.4	-1,221.4	2,850.1	0.00	0.00	0.00
9,600.0	90.26	360.00	6,850.2	2,722.4	-1,221.4	2,946.6	0.00	0.00	0.00
9,700.0	90.26	360.00	6,849.7	2,822.4	-1,221.4	3,043.1	0.00	0.00	0.00
9,800.0	90.26	360.00	6,849.3	2,922.4	-1,221.4	3,139.7	0.00	0.00	0.00
9,900.0	90.26	360.00	6,848.8	3,022.4	-1,221.4	3,236.2	0.00	0.00	0.00
10,000.0	90.26	360.00	6,848.4	3,122.4	-1,221.4	3,332.8	0.00	0.00	0.00
10,100.0	90.26	360.00	6,847.9	3,222.4	-1,221.4	3,429.3	0.00	0.00	0.00
10,200.0	90.26	360.00	6,847.5	3,322.4	-1,221.4	3,525.9	0.00	0.00	0.00
10,300.0	90.26	360.00	6,847.0	3,422.4	-1,221.4	3,622.4	0.00	0.00	0.00
10,400.0	90.26	360.00	6,846.5	3,522.4	-1,221.4	3,719.0	0.00	0.00	0.00
10,500.0	90.26	360.00	6,846.1	3,622.4	-1,221.4	3,815.5	0.00	0.00	0.00
10,600.0	90.26	360.00	6,845.6	3,722.4	-1,221.4	3,912.0	0.00	0.00	0.00
10,700.0	90.26	360.00	6,845.2	3,822.4	-1,221.4	4,008.6	0.00	0.00	0.00
10,800.0	90.26	360.00	6,844.7	3,922.4	-1,221.4	4,105.1	0.00	0.00	0.00
10,900.0	90.26	360.00	6,844.3	4,022.4	-1,221.4	4,201.7	0.00	0.00	0.00
11,000.0	90.26	360.00	6,843.8	4,122.4	-1,221.4	4,298.2	0.00	0.00	0.00
11,100.0	90.26	360.00	6,843.4	4,222.4	-1,221.4	4,394.8	0.00	0.00	0.00
11,200.0	90.26	360.00	6,842.9	4,322.3	-1,221.4	4,491.3	0.00	0.00	0.00
11,300.0	90.26	360.00	6,842.5	4,422.3	-1,221.4	4,587.8	0.00	0.00	0.00
11,400.0	90.26	360.00	6,842.0	4,522.3	-1,221.4	4,684.4	0.00	0.00	0.00
11,402.4	90.26	360.00	6,842.0	4,524.7	-1,221.4	4,686.7	0.00	0.00	0.00

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
SHL 234'FSL & 970'F	0.00	0.00	1.0	0.0	0.0	1,355,531.37	3,254,475.62	40.305740	-104.587550
- plan hits target									
- Point									
BHL 500'FNL & 2218'	0.00	0.00	6,842.0	4,524.7	-1,221.4	1,360,043.08	3,253,207.78	40.318160	-104.591930
- plan hits target									
- Point									

Casing Points				
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,446.4	6,860.0	7"	7	7-1/2

Database:	landmark	Local Co-ordinate Reference:	Well Collins 18Q-221
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Project:	SEC.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	North Reference:	True
Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-3-14)		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,919.2	3,826.0	PARKMAN		0.00	
4,408.2	4,300.0	SUSSEX		0.00	
5,027.2	4,900.0	SHANNON		0.00	
6,771.0	6,583.0	SHARON SPRINGS		0.00	
7,041.7	6,757.0	NIOBRARA A		0.00	
7,170.8	6,812.0	NIOBRARA B		0.00	
	6,906.0	NIOBRARA C		0.00	

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
400.0	400.0	0.0	0.0	KOP #1
6,243.0	6,096.1	-198.6	-1,221.4	KOP #2
7,446.4	6,860.0	568.8	-1,221.4	End of Build



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.18-T4N-R64W

Collins 4N64W18T Pad Sec.18-T4N-R64W

Collins 18Q-221

Wellbore #1

Plan #1 (11-3-14)

Anticollision Report

06 November, 2014



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (11-3-14)		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0ft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.0ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date	11/6/2014		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,402.4	Plan #1 (11-3-14) (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						
Collins 4N64W18T Pad Sec.18-T4N-R64W						
Collins 18Q-301 - Wellbore #1 - Plan #1 (11-3-14)	166.3	167.3	30.7	30.2	58.417	CC
Collins 18Q-301 - Wellbore #1 - Plan #1 (11-3-14)	200.0	201.0	30.7	30.0	45.358	ES
Collins 18Q-301 - Wellbore #1 - Plan #1 (11-3-14)	11,402.4	11,532.1	256.8	86.0	1.503	SF
Collins 18T-201 - Wellbore #1 - Plan #1 (11-3-14)	400.0	399.0	58.7	57.1	37.352	CC, ES
Collins 18T-201 - Wellbore #1 - Plan #1 (11-3-14)	11,402.4	11,269.4	828.2	650.7	4.664	SF
Collins 18T-221 - Wellbore #1 - Plan #1 (11-3-14)	400.0	398.0	120.0	118.4	76.480	CC, ES
Collins 18T-221 - Wellbore #1 - Plan #1 (11-3-14)	1,000.0	993.6	182.2	178.0	43.218	SF
Collins 18T-321 - Wellbore #1 - Plan #1 (11-3-14)	400.0	399.0	89.3	87.8	56.855	CC, ES
Collins 18T-321 - Wellbore #1 - Plan #1 (11-3-14)	900.0	896.5	132.6	128.9	35.180	SF
Collins 18T-341 - Wellbore #1 - Plan #1 (10-27-14)	400.0	400.0	30.9	29.3	19.636	CC, ES
Collins 18T-341 - Wellbore #1 - Plan #1 (10-27-14)	11,402.4	11,379.4	588.3	410.8	3.314	SF
Existing Wells Sec. 7-T4N-R64W						
Frick 32-18 (Exist.) - Wellbore #1 - Wellbore #1	9,956.0	6,852.6	122.6	-76.3	0.616	Level 1, CC, ES, SF
Frick C 18-2 (Exist.) - Wellbore #1 - Wellbore #1	11,067.2	6,846.5	248.2	28.6	1.130	Level 2, CC, ES, SF
Fry 21-6I (Exist.) - Wellbore #1 - Wellbore #1	10,557.2	6,975.7	436.6	139.8	1.471	Level 3, CC, ES, SF
NEI C18-32D Pad Sec.18-T4N-R64W						
NEI C17-33D - Wellbore #1 - Wellbore #1						Out of range
NEI C18-21D - Wellbore #1 - Wellbore #1	9,399.7	6,970.6	139.6	72.3	2.074	CC
NEI C18-21D - Wellbore #1 - Wellbore #1	9,400.0	6,970.6	139.6	72.3	2.074	ES, SF
NEI C18-22D - Wellbore #1 - Wellbore #1	9,361.0	7,164.6	948.8	879.4	13.681	CC, ES
NEI C18-22D - Wellbore #1 - Wellbore #1	9,600.0	7,164.1	978.4	904.7	13.277	SF
NEI C18-23D - Wellbore #1 - Wellbore #1	7,878.0	7,367.1	993.6	937.5	17.714	CC
NEI C18-23D - Wellbore #1 - Wellbore #1	7,900.0	7,367.6	993.8	937.4	17.619	ES, SF
NEI C18-24D - Wellbore #1 - Wellbore #1	8,070.8	7,071.1	147.7	95.2	2.810	CC, ES, SF
Oster C19-27D - Wellbore #1 - Wellbore #1	5,156.4	5,751.3	761.8	700.7	12.461	CC, ES
Oster C19-27D - Wellbore #1 - Wellbore #1	5,300.0	5,862.0	767.0	704.6	12.279	SF
Riter C18-10 (P&A) - Wellbore #1 - Design #1	8,666.4	6,872.4	415.4	361.3	7.682	CC, ES
Riter C18-10 (P&A) - Wellbore #1 - Design #1	8,700.0	6,872.3	416.8	362.1	7.626	SF
Schneider/Dic/Colton 34-18 (SI) - Wellbore #1 - Design #	7,277.1	6,859.0	200.6	166.4	5.865	CC, ES
Schneider/Dic/Colton 34-18 (SI) - Wellbore #1 - Design #	7,300.0	6,863.6	201.9	167.4	5.859	SF

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18Q-301 - Wellbore #1 - Plan #1 (11-3-14)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Semi Major Axis 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	-90.00	0.0	-30.7	30.7	30.7	0.00	N/A		
100.0	100.0	101.0	101.0	0.1	0.1	-90.00	0.0	-30.7	30.7	30.5	0.23	135.147		
166.3	166.3	167.3	167.3	0.3	0.3	-90.00	0.0	-30.7	30.7	30.2	0.53	58.417 CC		
200.0	200.0	201.0	201.0	0.3	0.3	-90.00	0.0	-30.7	30.7	30.0	0.68	45.358 ES		
300.0	300.0	300.0	300.0	0.6	0.6	-90.43	-0.2	-32.4	32.4	31.3	1.11	29.154		
400.0	400.0	398.6	398.4	0.8	0.8	-91.46	-1.0	-37.5	37.6	36.0	1.55	24.177		
500.0	500.0	496.9	496.4	1.0	1.0	6.81	-2.1	-45.9	44.5	42.5	1.98	22.410		
600.0	599.8	595.1	593.8	1.2	1.3	6.18	-3.8	-57.6	51.3	48.9	2.41	21.265		
700.0	699.5	693.0	690.5	1.4	1.6	5.78	-5.9	-72.6	58.0	55.2	2.85	20.342		
800.0	798.7	790.7	786.5	1.7	2.0	5.54	-8.4	-90.8	64.7	61.4	3.31	19.560		
900.0	897.5	888.1	881.5	2.0	2.4	5.40	-11.4	-112.1	71.4	67.6	3.78	18.869		
1,000.0	995.6	985.4	975.6	2.4	2.9	5.34	-14.9	-136.6	77.9	73.6	4.27	18.235		
1,100.0	1,093.1	1,083.9	1,070.1	2.8	3.5	5.37	-18.8	-164.2	83.9	79.1	4.78	17.537		
1,200.0	1,190.0	1,183.8	1,165.8	3.3	4.1	5.51	-22.7	-192.5	88.2	82.8	5.33	16.541		
1,300.0	1,286.9	1,283.7	1,261.6	3.8	4.7	5.64	-26.7	-220.9	92.4	86.5	5.89	15.701		
1,400.0	1,383.9	1,383.7	1,357.3	4.3	5.3	5.75	-30.7	-249.2	96.7	90.2	6.45	14.986		
1,500.0	1,480.8	1,483.6	1,453.0	4.8	5.9	5.86	-34.7	-277.5	101.0	93.9	7.02	14.371		
1,600.0	1,577.8	1,583.5	1,548.7	5.3	6.5	5.96	-38.7	-305.9	105.2	97.6	7.60	13.842		
1,700.0	1,674.7	1,683.4	1,644.5	5.8	7.1	6.05	-42.6	-334.2	109.5	101.3	8.18	13.382		
1,800.0	1,771.6	1,783.3	1,740.2	6.3	7.7	6.14	-46.6	-362.5	113.8	105.0	8.77	12.978		
1,900.0	1,868.6	1,883.2	1,835.9	6.9	8.3	6.22	-50.6	-390.8	118.0	108.7	9.35	12.622		
2,000.0	1,965.5	1,983.1	1,931.6	7.4	8.9	6.29	-54.6	-419.2	122.3	112.4	9.94	12.304		
2,100.0	2,062.4	2,083.0	2,027.4	7.9	9.5	6.36	-58.6	-447.5	126.6	116.0	10.53	12.021		
2,200.0	2,159.4	2,182.9	2,123.1	8.5	10.1	6.42	-62.6	-475.8	130.8	119.7	11.12	11.765		
2,300.0	2,256.3	2,282.8	2,218.8	9.0	10.7	6.48	-66.5	-504.2	135.1	123.4	11.71	11.535		
2,400.0	2,353.3	2,382.7	2,314.5	9.5	11.3	6.54	-70.5	-532.5	139.4	127.1	12.31	11.325		
2,500.0	2,450.2	2,482.6	2,410.3	10.0	12.0	6.59	-74.5	-560.8	143.6	130.7	12.90	11.134		
2,600.0	2,547.1	2,582.6	2,506.0	10.6	12.6	6.64	-78.5	-589.1	147.9	134.4	13.50	10.959		
2,700.0	2,644.1	2,682.5	2,601.7	11.1	13.2	6.69	-82.5	-617.5	152.2	138.1	14.09	10.798		
2,800.0	2,741.0	2,782.4	2,697.4	11.6	13.8	6.73	-86.4	-645.8	156.4	141.8	14.69	10.650		
2,900.0	2,838.0	2,882.3	2,793.2	12.2	14.4	6.78	-90.4	-674.1	160.7	145.4	15.29	10.513		
3,000.0	2,934.9	2,982.2	2,888.9	12.7	15.0	6.82	-94.4	-702.5	165.0	149.1	15.88	10.386		
3,100.0	3,031.8	3,082.1	2,984.6	13.2	15.6	6.85	-98.4	-730.8	169.2	152.8	16.48	10.268		
3,200.0	3,128.8	3,182.0	3,080.3	13.8	16.3	6.89	-102.4	-759.1	173.5	156.4	17.08	10.158		
3,300.0	3,225.7	3,281.9	3,176.1	14.3	16.9	6.92	-106.3	-787.4	177.8	160.1	17.68	10.055		
3,400.0	3,322.7	3,381.8	3,271.8	14.8	17.5	6.96	-110.3	-815.8	182.1	163.8	18.28	9.958		
3,500.0	3,419.6	3,481.7	3,367.5	15.4	18.1	6.99	-114.3	-844.1	186.3	167.4	18.88	9.868		
3,600.0	3,516.5	3,581.6	3,463.2	15.9	18.7	7.02	-118.3	-872.4	190.6	171.1	19.48	9.783		
3,700.0	3,613.5	3,681.6	3,559.0	16.4	19.3	7.05	-122.3	-900.8	194.9	174.8	20.08	9.703		
3,800.0	3,710.4	3,781.5	3,654.7	17.0	20.0	7.07	-126.2	-929.1	199.1	178.5	20.68	9.627		
3,900.0	3,807.4	3,881.4	3,750.4	17.5	20.6	7.10	-130.2	-957.4	203.4	182.1	21.29	9.556		
4,000.0	3,904.3	3,981.3	3,846.1	18.0	21.2	7.13	-134.2	-985.7	207.7	185.8	21.89	9.488		
4,100.0	4,001.2	4,081.2	3,941.9	18.6	21.8	7.15	-138.2	-1,014.1	211.9	189.5	22.49	9.424		
4,200.0	4,098.2	4,181.1	4,037.6	19.1	22.4	7.17	-142.2	-1,042.4	216.2	193.1	23.09	9.363		
4,300.0	4,195.1	4,281.0	4,133.3	19.6	23.0	7.19	-146.2	-1,070.7	220.5	196.8	23.69	9.306		
4,400.0	4,292.0	4,380.9	4,229.0	20.2	23.6	7.22	-150.1	-1,099.1	224.8	200.5	24.30	9.251		
4,500.0	4,389.0	4,480.8	4,324.8	20.7	24.3	7.24	-154.1	-1,127.4	229.0	204.1	24.90	9.198		
4,600.0	4,485.9	4,580.7	4,420.5	21.2	24.9	7.26	-158.1	-1,155.7	233.3	207.8	25.50	9.148		
4,700.0	4,582.9	4,680.6	4,516.2	21.8	25.5	7.28	-162.1	-1,184.1	237.6	211.5	26.10	9.101		
4,800.0	4,679.8	4,780.5	4,611.9	22.3	26.1	7.29	-166.1	-1,212.4	241.8	215.1	26.71	9.055		
4,900.0	4,776.7	4,880.5	4,707.7	22.8	26.7	7.31	-170.0	-1,240.7	246.1	218.8	27.31	9.011		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18Q-301 - Wellbore #1 - Plan #1 (11-3-14)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	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
5,000.0	4,873.7	4,980.4	4,803.4	23.4	27.3	7.33	7.33	-174.0	-1,269.0	250.4	222.5	27.91	8.970	
5,100.0	4,970.6	5,080.3	4,899.1	23.9	28.0	7.35	7.35	-178.0	-1,297.4	254.6	226.1	28.52	8.929	
5,200.0	5,067.6	5,180.2	4,994.9	24.4	28.6	7.36	7.36	-182.0	-1,325.7	258.9	229.8	29.12	8.891	
5,300.0	5,164.5	5,281.2	5,091.7	25.0	29.2	7.38	7.38	-186.0	-1,354.3	263.2	233.4	29.73	8.853	
5,400.0	5,261.4	5,391.3	5,197.9	25.5	29.7	7.45	7.45	-190.0	-1,383.1	265.1	234.8	30.31	8.746	
5,500.0	5,358.5	5,501.4	5,305.1	26.0	30.1	7.61	7.61	-193.5	-1,407.7	263.9	233.0	30.86	8.551	
5,600.0	5,456.4	5,611.4	5,413.1	26.3	30.4	7.76	7.76	-196.4	-1,428.3	262.1	230.8	31.32	8.370	
5,700.0	5,554.9	5,721.4	5,521.8	26.6	30.7	7.90	7.90	-198.7	-1,444.8	260.0	228.3	31.71	8.200	
5,800.0	5,653.9	5,831.2	5,630.9	26.9	31.0	8.04	8.04	-200.4	-1,457.0	257.5	225.5	32.03	8.039	
5,900.0	5,753.4	5,940.9	5,740.3	27.1	31.2	8.17	8.17	-201.6	-1,465.2	254.7	222.4	32.29	7.887	
6,000.0	5,853.1	6,050.4	5,849.7	27.3	31.3	8.29	8.29	-202.1	-1,469.2	251.5	219.1	32.49	7.742	
6,100.0	5,953.1	6,154.7	5,954.1	27.4	31.4	8.39	8.39	-202.2	-1,469.6	248.6	216.0	32.63	7.619	
6,167.8	6,020.9	6,222.6	6,021.9	27.5	31.4	8.42	8.42	-202.2	-1,469.6	247.9	215.1	32.77	7.564	
6,200.0	6,053.1	6,254.7	6,054.1	27.5	31.5	-90.83	-90.83	-202.2	-1,469.6	248.2	215.4	32.83	7.560	
6,232.2	6,085.2	6,286.9	6,086.2	27.5	31.5	-90.92	-90.92	-202.2	-1,469.6	248.2	215.3	32.91	7.542	
6,300.0	6,153.0	6,354.7	6,154.0	27.6	31.6	-91.32	-91.32	-202.2	-1,469.6	248.3	215.2	33.04	7.515	
6,400.0	6,252.0	6,455.5	6,254.6	27.7	31.6	-93.51	-93.51	-197.7	-1,469.6	248.7	215.8	32.90	7.558	
6,500.0	6,348.2	6,557.7	6,355.2	27.7	31.7	-95.70	-95.70	-179.9	-1,469.6	249.4	216.6	32.80	7.604	
6,600.0	6,440.2	6,661.3	6,453.8	27.7	31.7	-97.78	-97.78	-148.3	-1,469.6	250.5	217.7	32.79	7.640	
6,700.0	6,526.3	6,766.2	6,548.3	27.8	31.8	-99.73	-99.73	-103.1	-1,469.6	251.8	219.0	32.88	7.660	
6,800.0	6,605.0	6,872.4	6,636.8	27.8	31.8	-101.50	-101.50	-44.5	-1,469.6	253.3	220.2	33.07	7.660	
6,900.0	6,675.0	6,979.7	6,717.1	27.8	31.8	-103.05	-103.05	26.6	-1,469.6	254.8	221.4	33.36	7.639	
7,000.0	6,735.1	7,088.2	6,787.4	27.9	31.9	-104.36	-104.36	109.1	-1,469.6	256.2	222.5	33.72	7.600	
7,100.0	6,784.3	7,197.5	6,845.7	28.0	32.0	-105.41	-105.41	201.5	-1,469.6	257.5	223.2	34.26	7.515	
7,200.0	6,821.7	7,307.6	6,890.4	28.3	32.1	-106.18	-106.18	302.0	-1,469.6	258.4	223.5	34.94	7.397	
7,300.0	6,846.6	7,418.2	6,920.4	28.6	32.4	-106.65	-106.65	408.3	-1,469.6	259.1	223.3	35.81	7.234	
7,400.0	6,858.8	7,529.0	6,934.7	29.0	32.8	-106.83	-106.83	518.1	-1,469.6	259.3	222.4	36.92	7.023	
7,500.0	6,859.7	7,633.8	6,935.5	29.5	33.3	-106.78	-106.78	622.9	-1,469.6	259.2	220.6	38.63	6.711	
7,600.0	6,859.3	7,733.8	6,934.9	30.2	33.9	-106.73	-106.73	722.9	-1,469.6	259.2	218.3	40.86	6.343	
7,700.0	6,858.8	7,833.8	6,934.2	31.0	34.5	-106.68	-106.68	822.9	-1,469.6	259.1	215.8	43.29	5.985	
7,800.0	6,858.3	7,933.8	6,933.5	31.9	35.3	-106.63	-106.63	922.9	-1,469.6	259.0	213.1	45.90	5.644	
7,900.0	6,857.9	8,033.8	6,932.8	33.0	36.2	-106.59	-106.59	1,022.9	-1,469.6	259.0	210.3	48.65	5.323	
8,000.0	6,857.4	8,133.8	6,932.1	34.1	37.2	-106.54	-106.54	1,122.9	-1,469.6	258.9	207.4	51.52	5.025	
8,100.0	6,857.0	8,233.8	6,931.5	35.3	38.3	-106.49	-106.49	1,222.9	-1,469.6	258.8	204.3	54.50	4.749	
8,200.0	6,856.5	8,333.8	6,930.8	36.6	39.4	-106.44	-106.44	1,322.9	-1,469.6	258.8	201.2	57.56	4.495	
8,300.0	6,856.1	8,433.8	6,930.1	37.9	40.6	-106.39	-106.39	1,422.9	-1,469.6	258.7	198.0	60.70	4.262	
8,400.0	6,855.6	8,533.8	6,929.4	39.3	41.9	-106.34	-106.34	1,522.9	-1,469.6	258.6	194.7	63.91	4.047	
8,500.0	6,855.2	8,633.8	6,928.7	40.7	43.2	-106.30	-106.30	1,622.9	-1,469.6	258.6	191.4	67.17	3.850	
8,600.0	6,854.7	8,733.8	6,928.0	42.2	44.6	-106.25	-106.25	1,722.9	-1,469.6	258.5	188.0	70.47	3.668	
8,700.0	6,854.3	8,833.8	6,927.4	43.8	46.0	-106.20	-106.20	1,822.9	-1,469.6	258.5	184.6	73.82	3.501	
8,800.0	6,853.8	8,933.8	6,926.7	45.3	47.5	-106.15	-106.15	1,922.9	-1,469.6	258.4	181.2	77.21	3.347	
8,900.0	6,853.4	9,033.8	6,926.0	46.9	49.0	-106.10	-106.10	2,022.9	-1,469.6	258.3	177.7	80.62	3.204	
9,000.0	6,852.9	9,133.8	6,925.3	48.5	50.5	-106.05	-106.05	2,122.9	-1,469.6	258.3	174.2	84.07	3.072	
9,100.0	6,852.4	9,233.8	6,924.6	50.1	52.1	-106.01	-106.01	2,222.9	-1,469.6	258.2	170.7	87.53	2.950	
9,200.0	6,852.0	9,333.8	6,924.0	51.8	53.7	-105.96	-105.96	2,322.9	-1,469.6	258.1	167.1	91.03	2.836	
9,300.0	6,851.5	9,433.8	6,923.3	53.5	55.3	-105.91	-105.91	2,422.9	-1,469.6	258.1	163.5	94.54	2.730	
9,400.0	6,851.1	9,533.8	6,922.6	55.2	56.9	-105.86	-105.86	2,522.9	-1,469.6	258.0	159.9	98.07	2.631	
9,500.0	6,850.6	9,633.8	6,921.9	56.9	58.6	-105.81	-105.81	2,622.9	-1,469.6	258.0	156.3	101.61	2.539	
9,600.0	6,850.2	9,733.8	6,921.2	58.6	60.2	-105.76	-105.76	2,722.9	-1,469.6	257.9	152.7	105.17	2.452	
9,700.0	6,849.7	9,833.8	6,920.6	60.3	61.9	-105.72	-105.72	2,822.9	-1,469.6	257.8	149.1	108.75	2.371	
9,800.0	6,849.3	9,933.8	6,919.9	62.1	63.6	-105.67	-105.67	2,922.9	-1,469.6	257.8	145.4	112.34	2.295	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18Q-301 - Wellbore #1 - Plan #1 (11-3-14)												Offset Site Error:	0.0 ft
Survey Program: 0-MWD												Offset Well Error:	0.0 ft
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
9,900.0	6,848.8	10,033.8	6,919.2	63.8	65.3	-105.62	3,022.8	-1,469.6	257.7	141.8	115.93	2.223	
10,000.0	6,848.4	10,133.8	6,918.5	65.6	67.0	-105.57	3,122.8	-1,469.6	257.6	138.1	119.54	2.155	
10,100.0	6,847.9	10,233.8	6,917.8	67.4	68.8	-105.52	3,222.8	-1,469.6	257.6	134.4	123.16	2.091	
10,200.0	6,847.5	10,333.8	6,917.2	69.1	70.5	-105.47	3,322.8	-1,469.6	257.5	130.7	126.79	2.031	
10,300.0	6,847.0	10,433.8	6,916.5	70.9	72.3	-105.42	3,422.8	-1,469.6	257.5	127.0	130.42	1.974	
10,400.0	6,846.5	10,533.8	6,915.8	72.7	74.0	-105.38	3,522.8	-1,469.6	257.4	123.3	134.07	1.920	
10,500.0	6,846.1	10,633.8	6,915.1	74.5	75.8	-105.33	3,622.8	-1,469.6	257.3	119.6	137.72	1.869	
10,600.0	6,845.6	10,733.8	6,914.4	76.3	77.6	-105.28	3,722.8	-1,469.6	257.3	115.9	141.37	1.820	
10,700.0	6,845.2	10,833.8	6,913.8	78.1	79.3	-105.23	3,822.8	-1,469.6	257.2	112.2	145.04	1.773	
10,800.0	6,844.7	10,933.8	6,913.1	80.0	81.1	-105.18	3,922.8	-1,469.6	257.2	108.5	148.71	1.729	
10,900.0	6,844.3	11,033.8	6,912.4	81.8	82.9	-105.13	4,022.8	-1,469.6	257.1	104.7	152.38	1.687	
11,000.0	6,843.8	11,133.8	6,911.7	83.6	84.7	-105.08	4,122.8	-1,469.6	257.0	101.0	156.06	1.647	
11,100.0	6,843.4	11,233.8	6,911.0	85.4	86.5	-105.03	4,222.8	-1,469.6	257.0	97.2	159.75	1.609	
11,200.0	6,842.9	11,333.8	6,910.3	87.3	88.3	-104.98	4,322.8	-1,469.6	256.9	93.5	163.44	1.572	
11,300.0	6,842.5	11,433.8	6,909.7	89.1	90.2	-104.94	4,422.8	-1,469.6	256.9	89.7	167.13	1.537	
11,370.3	6,842.1	11,504.2	6,909.2	90.4	91.4	-104.90	4,493.1	-1,469.6	256.8	87.1	169.74	1.513	
11,400.0	6,842.0	11,532.1	6,909.0	90.9	91.9	-104.89	4,521.1	-1,469.6	256.8	86.0	170.80	1.504	
11,402.4	6,842.0	11,532.1	6,909.0	91.0	91.9	-104.89	4,521.1	-1,469.6	256.8	86.0	170.85	1.503 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-201 - Wellbore #1 - Plan #1 (11-3-14)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Semi Major Axis 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	0.0	0.0	0.0	0.0	86.44	3.6	58.6	58.7					
100.0	100.0	99.0	99.0	0.1	0.1	86.44	3.6	58.6	58.7	58.5	0.22	262.400		
200.0	200.0	199.0	199.0	0.3	0.3	86.44	3.6	58.6	58.7	58.0	0.67	87.321		
300.0	300.0	299.0	299.0	0.6	0.6	86.44	3.6	58.6	58.7	57.6	1.12	52.323		
400.0	400.0	399.0	399.0	0.8	0.8	86.44	3.6	58.6	58.7	57.1	1.57	37.352 CC, ES		
500.0	500.0	499.0	499.0	1.0	1.0	-174.48	3.6	58.6	60.4	58.4	2.01	30.077		
600.0	599.8	598.8	598.8	1.2	1.2	-174.91	3.6	58.6	65.6	63.2	2.44	26.878		
700.0	699.5	698.5	698.5	1.4	1.5	-175.50	3.6	58.6	74.3	71.4	2.88	25.794		
800.0	798.7	797.7	797.7	1.7	1.7	-176.11	3.6	58.6	86.5	83.1	3.32	26.013		
900.0	897.5	896.5	896.5	2.0	1.9	-176.69	3.6	58.6	102.1	98.3	3.77	27.083		
1,000.0	995.6	994.6	994.6	2.4	2.1	-177.19	3.6	58.6	121.1	116.9	4.22	28.730		
1,100.0	1,093.1	1,096.7	1,096.7	2.8	2.3	-177.45	3.0	57.1	142.1	137.5	4.65	30.564		
1,200.0	1,190.0	1,200.0	1,199.8	3.3	2.5	-177.31	0.9	52.1	161.8	156.7	5.08	31.835		
1,300.0	1,286.9	1,304.6	1,304.0	3.8	2.8	-176.86	-2.7	43.7	178.0	172.5	5.54	32.155		
1,400.0	1,383.9	1,408.0	1,406.7	4.3	3.0	-176.18	-7.6	32.0	191.0	185.0	6.01	31.797		
1,500.0	1,480.8	1,507.3	1,505.1	4.8	3.3	-175.53	-12.6	20.1	203.3	196.8	6.49	31.305		
1,600.0	1,577.8	1,606.5	1,603.4	5.3	3.5	-174.96	-17.7	8.2	215.5	208.6	6.99	30.840		
1,700.0	1,674.7	1,705.7	1,701.8	5.8	3.8	-174.45	-22.8	-3.8	227.8	220.3	7.49	30.403		
1,800.0	1,771.6	1,804.9	1,800.2	6.3	4.1	-174.00	-27.8	-15.7	240.1	232.1	8.00	29.997		
1,900.0	1,868.6	1,904.2	1,898.6	6.9	4.4	-173.58	-32.9	-27.6	252.4	243.9	8.52	29.619		
2,000.0	1,965.5	2,003.4	1,996.9	7.4	4.7	-173.21	-37.9	-39.6	264.7	255.7	9.05	29.267		
2,100.0	2,062.4	2,102.6	2,095.3	7.9	5.0	-172.87	-43.0	-51.5	277.1	267.5	9.57	28.941		
2,200.0	2,159.4	2,201.8	2,193.7	8.5	5.3	-172.55	-48.0	-63.4	289.4	279.3	10.11	28.638		
2,300.0	2,256.3	2,301.1	2,292.1	9.0	5.6	-172.27	-53.1	-75.4	301.8	291.1	10.64	28.356		
2,400.0	2,353.3	2,400.3	2,390.4	9.5	5.9	-172.00	-58.1	-87.3	314.1	302.9	11.18	28.094		
2,500.0	2,450.2	2,499.5	2,488.8	10.0	6.2	-171.76	-63.2	-99.2	326.5	314.8	11.72	27.849		
2,600.0	2,547.1	2,598.7	2,587.2	10.6	6.6	-171.53	-68.2	-111.2	338.8	326.6	12.27	27.621		
2,700.0	2,644.1	2,697.9	2,685.5	11.1	6.9	-171.32	-73.3	-123.1	351.2	338.4	12.81	27.408		
2,800.0	2,741.0	2,797.2	2,783.9	11.6	7.2	-171.13	-78.3	-135.0	363.6	350.2	13.36	27.209		
2,900.0	2,838.0	2,896.4	2,882.3	12.2	7.5	-170.94	-83.4	-147.0	376.0	362.1	13.91	27.022		
3,000.0	2,934.9	2,995.6	2,980.7	12.7	7.9	-170.77	-88.4	-158.9	388.4	373.9	14.47	26.846		
3,100.0	3,031.8	3,094.8	3,079.0	13.2	8.2	-170.61	-93.5	-170.8	400.7	385.7	15.02	26.681		
3,200.0	3,128.8	3,194.1	3,177.4	13.8	8.5	-170.46	-98.6	-182.8	413.1	397.6	15.58	26.525		
3,300.0	3,225.7	3,293.3	3,275.8	14.3	8.8	-170.32	-103.6	-194.7	425.5	409.4	16.13	26.379		
3,400.0	3,322.7	3,392.5	3,374.2	14.8	9.2	-170.18	-108.7	-206.6	437.9	421.2	16.69	26.240		
3,500.0	3,419.6	3,491.7	3,472.5	15.4	9.5	-170.06	-113.7	-218.6	450.3	433.1	17.25	26.109		
3,600.0	3,516.5	3,591.0	3,570.9	15.9	9.8	-169.94	-118.8	-230.5	462.7	444.9	17.81	25.985		
3,700.0	3,613.5	3,690.2	3,669.3	16.4	10.2	-169.82	-123.8	-242.4	475.1	456.7	18.37	25.867		
3,800.0	3,710.4	3,789.4	3,767.7	17.0	10.5	-169.71	-128.9	-254.4	487.5	468.6	18.93	25.755		
3,900.0	3,807.4	3,888.6	3,866.0	17.5	10.8	-169.61	-133.9	-266.3	499.9	480.4	19.49	25.649		
4,000.0	3,904.3	3,987.9	3,964.4	18.0	11.1	-169.51	-139.0	-278.2	512.3	492.3	20.05	25.548		
4,100.0	4,001.2	4,087.1	4,062.8	18.6	11.5	-169.42	-144.0	-290.2	524.7	504.1	20.62	25.452		
4,200.0	4,098.2	4,186.3	4,161.2	19.1	11.8	-169.33	-149.1	-302.1	537.1	516.0	21.18	25.360		
4,300.0	4,195.1	4,285.5	4,259.5	19.6	12.1	-169.25	-154.1	-314.0	549.6	527.8	21.75	25.272		
4,400.0	4,292.0	4,384.8	4,357.9	20.2	12.5	-169.17	-159.2	-326.0	562.0	539.7	22.31	25.188		
4,500.0	4,389.0	4,484.0	4,456.3	20.7	12.8	-169.09	-164.2	-337.9	574.4	551.5	22.88	25.108		
4,600.0	4,485.9	4,583.2	4,554.7	21.2	13.1	-169.01	-169.3	-349.8	586.8	563.3	23.44	25.031		
4,700.0	4,582.9	4,682.4	4,653.0	21.8	13.5	-168.94	-174.3	-361.8	599.2	575.2	24.01	24.958		
4,800.0	4,679.8	4,777.5	4,747.3	22.3	13.8	-168.88	-179.2	-373.1	611.7	587.1	24.56	24.909		
4,900.0	4,776.7	4,860.2	4,829.5	22.8	14.0	-168.90	-182.7	-381.4	626.1	601.1	25.02	25.020		
5,000.0	4,873.7	4,942.2	4,911.2	23.4	14.1	-169.00	-185.2	-387.4	643.1	617.6	25.46	25.255		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-201 - Wellbore #1 - Plan #1 (11-3-14)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	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
5,100.0	4,970.6	5,023.4	4,992.3	23.9	14.3	-169.18	-186.9	-393.1	662.6	636.7	25.88	25.600		
5,200.0	5,067.6	5,103.6	5,072.6	24.4	14.4	-169.43	-187.6	-393.1	684.7	658.4	26.29	26.047		
5,300.0	5,164.5	5,194.6	5,163.5	25.0	14.6	-169.77	-187.7	-393.2	708.7	682.0	26.70	26.543		
5,400.0	5,261.4	5,291.5	5,260.4	25.5	14.7	-170.11	-187.7	-393.2	732.9	705.8	27.12	27.023		
5,500.0	5,358.5	5,388.6	5,357.5	26.0	14.9	-170.47	-187.7	-393.2	756.4	728.9	27.56	27.450		
5,600.0	5,456.4	5,486.5	5,455.4	26.3	15.0	-170.79	-187.7	-393.2	776.8	748.9	27.95	27.794		
5,700.0	5,554.9	5,585.0	5,553.9	26.6	15.2	-171.04	-187.7	-393.2	793.9	765.6	28.32	28.036		
5,800.0	5,653.9	5,684.0	5,652.9	26.9	15.3	-171.24	-187.7	-393.2	807.5	778.9	28.65	28.183		
5,900.0	5,753.4	5,783.5	5,752.4	27.1	15.5	-171.38	-187.7	-393.2	817.8	788.8	28.96	28.239		
6,000.0	5,853.1	5,883.2	5,852.1	27.3	15.7	-171.47	-187.7	-393.2	824.6	795.3	29.23	28.209		
6,100.0	5,953.1	5,983.2	5,952.1	27.4	15.8	-171.52	-187.7	-393.2	827.9	798.4	29.47	28.094		
6,200.0	6,053.1	6,083.2	6,052.1	27.5	16.0	89.24	-187.7	-393.2	828.3	798.5	29.76	27.832		
6,300.0	6,153.0	6,183.3	6,151.1	27.6	16.2	89.22	-185.2	-393.2	828.3	798.2	30.09	27.531		
6,400.0	6,252.0	6,280.8	6,248.5	27.7	16.3	89.18	-171.0	-393.2	828.3	798.0	30.33	27.314		
6,500.0	6,348.2	6,379.2	6,343.2	27.7	16.4	89.17	-144.4	-393.2	828.3	797.8	30.50	27.159		
6,600.0	6,440.2	6,477.7	6,433.7	27.7	16.4	89.16	-105.9	-393.2	828.3	797.7	30.65	27.027		
6,700.0	6,526.3	6,576.1	6,518.6	27.8	16.5	89.17	-56.0	-393.2	828.3	797.5	30.83	26.868		
6,800.0	6,605.0	6,674.6	6,596.3	27.8	16.5	89.19	4.4	-393.2	828.3	797.2	31.11	26.622		
6,900.0	6,675.0	6,773.1	6,665.6	27.8	16.6	89.23	74.3	-393.2	828.3	796.7	31.58	26.231		
7,000.0	6,735.1	6,871.7	6,725.5	27.9	16.7	89.28	152.6	-393.2	828.3	796.0	32.29	25.654		
7,100.0	6,784.3	6,970.4	6,774.8	28.0	17.0	89.34	238.0	-393.2	828.3	795.0	33.30	24.874		
7,200.0	6,821.7	7,069.3	6,812.7	28.3	17.5	89.42	329.2	-393.2	828.3	793.6	34.64	23.909		
7,300.0	6,846.6	7,168.3	6,838.5	28.6	18.2	89.50	424.7	-393.2	828.3	791.9	36.31	22.808		
7,400.0	6,858.8	7,267.4	6,851.9	29.0	19.2	89.59	522.8	-393.2	828.2	790.0	38.29	21.633		
7,500.0	6,859.7	7,367.0	6,853.6	29.5	20.3	89.65	622.4	-393.2	828.2	787.7	40.52	20.439		
7,600.0	6,859.3	7,467.0	6,853.3	30.2	21.6	89.66	722.4	-393.2	828.2	785.3	42.99	19.268		
7,700.0	6,858.8	7,567.0	6,853.0	31.0	22.9	89.67	822.4	-393.2	828.2	782.6	45.63	18.149		
7,800.0	6,858.3	7,667.0	6,852.7	31.9	24.3	89.68	922.4	-393.2	828.2	779.8	48.44	17.097		
7,900.0	6,857.9	7,767.0	6,852.4	33.0	25.8	89.69	1,022.4	-393.2	828.2	776.8	51.39	16.118		
8,000.0	6,857.4	7,867.0	6,852.1	34.1	27.3	89.70	1,122.4	-393.2	828.2	773.8	54.44	15.214		
8,100.0	6,857.0	7,967.0	6,851.8	35.3	28.9	89.71	1,222.4	-393.2	828.2	770.6	57.59	14.382		
8,200.0	6,856.5	8,067.0	6,851.5	36.6	30.5	89.72	1,322.4	-393.2	828.2	767.4	60.81	13.619		
8,300.0	6,856.1	8,167.0	6,851.2	37.9	32.2	89.73	1,422.4	-393.2	828.2	764.1	64.11	12.919		
8,400.0	6,855.6	8,267.0	6,850.9	39.3	33.8	89.75	1,522.4	-393.2	828.2	760.8	67.46	12.277		
8,500.0	6,855.2	8,367.0	6,850.6	40.7	35.5	89.76	1,622.4	-393.2	828.2	757.4	70.86	11.688		
8,600.0	6,854.7	8,467.0	6,850.3	42.2	37.3	89.77	1,722.4	-393.2	828.2	753.9	74.31	11.146		
8,700.0	6,854.3	8,567.0	6,850.1	43.8	39.0	89.78	1,822.4	-393.2	828.2	750.4	77.79	10.647		
8,800.0	6,853.8	8,667.0	6,849.8	45.3	40.7	89.79	1,922.4	-393.2	828.2	746.9	81.30	10.187		
8,900.0	6,853.4	8,767.0	6,849.5	46.9	42.5	89.80	2,022.4	-393.2	828.2	743.4	84.85	9.761		
9,000.0	6,852.9	8,867.0	6,849.2	48.5	44.3	89.81	2,122.4	-393.2	828.2	739.8	88.41	9.368		
9,100.0	6,852.4	8,967.0	6,848.9	50.1	46.1	89.82	2,222.4	-393.2	828.2	736.2	92.00	9.002		
9,200.0	6,852.0	9,067.0	6,848.6	51.8	47.9	89.83	2,322.4	-393.2	828.2	732.6	95.61	8.662		
9,300.0	6,851.5	9,167.0	6,848.3	53.5	49.7	89.84	2,422.4	-393.2	828.2	729.0	99.24	8.346		
9,400.0	6,851.1	9,267.0	6,848.0	55.2	51.5	89.85	2,522.4	-393.2	828.2	725.3	102.88	8.051		
9,500.0	6,850.6	9,367.0	6,847.7	56.9	53.4	89.86	2,622.4	-393.2	828.2	721.7	106.53	7.774		
9,600.0	6,850.2	9,467.0	6,847.4	58.6	55.2	89.88	2,722.4	-393.2	828.2	718.0	110.20	7.516		
9,700.0	6,849.7	9,567.0	6,847.1	60.3	57.0	89.89	2,822.4	-393.2	828.2	714.3	113.88	7.273		
9,800.0	6,849.3	9,667.0	6,846.8	62.1	58.9	89.90	2,922.4	-393.2	828.2	710.7	117.57	7.045		
9,900.0	6,848.8	9,767.0	6,846.5	63.8	60.7	89.91	3,022.4	-393.2	828.2	707.0	121.27	6.830		
10,000.0	6,848.4	9,867.0	6,846.2	65.6	62.6	89.92	3,122.4	-393.2	828.2	703.2	124.98	6.627		
10,100.0	6,847.9	9,967.0	6,845.9	67.4	64.4	89.93	3,222.4	-393.2	828.2	699.5	128.69	6.436		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-201 - Wellbore #1 - Plan #1 (11-3-14)												Offset Site Error:	0.0 ft
Survey Program: 0-MWD												Offset Well Error:	0.0 ft
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
10,200.0	6,847.5	10,067.0	6,845.6	69.1	66.3	89.94	3,322.4	-393.2	828.2	695.8	132.41	6.255	
10,300.0	6,847.0	10,167.0	6,845.3	70.9	68.1	89.95	3,422.4	-393.2	828.2	692.1	136.14	6.084	
10,400.0	6,846.5	10,267.0	6,845.0	72.7	70.0	89.96	3,522.4	-393.2	828.2	688.3	139.88	5.921	
10,500.0	6,846.1	10,367.0	6,844.7	74.5	71.9	89.97	3,622.4	-393.2	828.2	684.6	143.62	5.767	
10,600.0	6,845.6	10,467.0	6,844.4	76.3	73.8	89.98	3,722.4	-393.2	828.2	680.9	147.36	5.620	
10,700.0	6,845.2	10,567.0	6,844.1	78.1	75.6	90.00	3,822.4	-393.2	828.2	677.1	151.11	5.481	
10,745.4	6,845.0	10,612.4	6,844.0	79.0	76.5	90.00	3,867.7	-393.2	828.2	675.4	152.81	5.420	
10,800.0	6,844.7	10,667.0	6,843.8	80.0	77.5	90.01	3,922.4	-393.2	828.2	673.4	154.87	5.348	
10,900.0	6,844.3	10,767.0	6,843.5	81.8	79.4	90.02	4,022.4	-393.2	828.2	669.6	158.62	5.221	
11,000.0	6,843.8	10,867.0	6,843.2	83.6	81.3	90.03	4,122.4	-393.2	828.2	665.8	162.39	5.100	
11,100.0	6,843.4	10,967.0	6,842.9	85.4	83.1	90.04	4,222.4	-393.2	828.2	662.1	166.15	4.985	
11,200.0	6,842.9	11,067.0	6,842.6	87.3	85.0	90.05	4,322.4	-393.2	828.2	658.3	169.92	4.874	
11,300.0	6,842.5	11,167.0	6,842.3	89.1	86.9	90.06	4,422.4	-393.2	828.2	654.5	173.69	4.768	
11,400.0	6,842.0	11,267.0	6,842.0	90.9	88.8	90.07	4,522.4	-393.2	828.2	650.8	177.47	4.667	
11,402.4	6,842.0	11,269.4	6,842.0	91.0	88.8	90.07	4,524.7	-393.2	828.2	650.7	177.56	4.664 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-221 - Wellbore #1 - Plan #1 (11-3-14)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Semi Major Axis 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	0.0	0.0	0.0	0.0	88.26	3.6	119.9	120.0					
100.0	100.0	98.0	98.0	0.1	0.1	88.26	3.6	119.9	120.0	119.8	0.22	539.212		
200.0	200.0	198.0	198.0	0.3	0.3	88.26	3.6	119.9	120.0	119.3	0.67	179.137		
300.0	300.0	298.0	298.0	0.6	0.6	88.26	3.6	119.9	120.0	118.9	1.12	107.195		
400.0	400.0	398.0	398.0	0.8	0.8	88.26	3.6	119.9	120.0	118.4	1.57	76.480 CC, ES		
500.0	500.0	498.0	498.0	1.0	1.0	-172.61	3.6	119.9	121.7	119.7	2.01	60.658		
600.0	599.8	597.8	597.8	1.2	1.2	-172.90	3.6	119.9	126.9	124.5	2.44	52.019		
700.0	699.5	697.5	697.5	1.4	1.5	-173.33	3.6	119.9	135.6	132.7	2.88	47.083		
800.0	798.7	796.7	796.7	1.7	1.7	-173.86	3.6	119.9	147.7	144.4	3.32	44.444		
900.0	897.5	895.5	895.5	2.0	1.9	-174.41	3.6	119.9	163.2	159.5	3.77	43.314		
1,000.0	995.6	993.6	993.6	2.4	2.1	-174.96	3.6	119.9	182.2	178.0	4.22	43.218 SF		
1,100.0	1,093.1	1,091.1	1,091.1	2.8	2.3	-175.48	3.6	119.9	204.7	200.0	4.67	43.857		
1,200.0	1,190.0	1,188.0	1,188.0	3.3	2.6	-175.96	3.6	119.9	229.1	224.0	5.13	44.668		
1,300.0	1,286.9	1,284.9	1,284.9	3.8	2.8	-176.35	3.6	119.9	253.6	248.0	5.60	45.293		
1,400.0	1,383.9	1,381.9	1,381.9	4.3	3.0	-176.67	3.6	119.9	278.1	272.1	6.07	45.790		
1,500.0	1,480.8	1,478.8	1,478.8	4.8	3.2	-176.94	3.6	119.9	302.7	296.1	6.55	46.191		
1,600.0	1,577.8	1,575.8	1,575.8	5.3	3.4	-177.17	3.6	119.9	327.2	320.1	7.03	46.521		
1,700.0	1,674.7	1,672.7	1,672.7	5.8	3.6	-177.37	3.6	119.9	351.7	344.2	7.52	46.796		
1,800.0	1,771.6	1,769.6	1,769.6	6.3	3.9	-177.54	3.6	119.9	376.2	368.2	8.00	47.028		
1,900.0	1,868.6	1,866.6	1,866.6	6.9	4.1	-177.69	3.6	119.9	400.8	392.3	8.49	47.226		
2,000.0	1,965.5	1,963.5	1,963.5	7.4	4.3	-177.82	3.6	119.9	425.3	416.3	8.97	47.396		
2,100.0	2,062.4	2,060.4	2,060.4	7.9	4.5	-177.94	3.6	119.9	449.8	440.4	9.46	47.544		
2,200.0	2,159.4	2,157.4	2,157.4	8.5	4.7	-178.05	3.6	119.9	474.4	464.4	9.95	47.674		
2,300.0	2,256.3	2,254.3	2,254.3	9.0	5.0	-178.15	3.6	119.9	498.9	488.5	10.44	47.788		
2,400.0	2,353.3	2,351.3	2,351.3	9.5	5.2	-178.23	3.6	119.9	523.5	512.5	10.93	47.889		
2,500.0	2,450.2	2,448.2	2,448.2	10.0	5.4	-178.31	3.6	119.9	548.0	536.6	11.42	47.979		
2,600.0	2,547.1	2,543.1	2,543.1	10.6	5.6	-178.35	3.3	120.1	572.6	560.7	11.90	48.131		
2,700.0	2,644.1	2,635.3	2,635.2	11.1	5.8	-178.14	0.7	121.1	597.9	585.5	12.35	48.419		
2,800.0	2,741.0	2,726.9	2,726.6	11.6	5.9	-177.67	-4.7	123.2	623.9	611.2	12.79	48.783		
2,900.0	2,838.0	2,817.7	2,817.0	12.2	6.1	-176.99	-12.7	126.4	650.8	637.6	13.24	49.152		
3,000.0	2,934.9	2,910.1	2,908.8	12.7	6.3	-176.13	-23.3	130.6	678.6	664.8	13.71	49.490		
3,100.0	3,031.8	3,005.6	3,003.5	13.2	6.5	-175.27	-34.7	135.0	706.6	692.4	14.20	49.762		
3,200.0	3,128.8	3,101.1	3,098.2	13.8	6.7	-174.47	-46.1	139.5	734.7	720.0	14.70	49.984		
3,300.0	3,225.7	3,196.6	3,192.8	14.3	6.9	-173.74	-57.5	144.0	763.0	747.8	15.21	50.162		
3,400.0	3,322.7	3,292.0	3,287.5	14.8	7.1	-173.05	-68.8	148.5	791.3	775.6	15.73	50.304		
3,500.0	3,419.6	3,387.5	3,382.2	15.4	7.3	-172.41	-80.2	153.0	819.8	803.6	16.26	50.415		
3,600.0	3,516.5	3,483.0	3,476.9	15.9	7.5	-171.82	-91.6	157.5	848.4	831.6	16.80	50.500		
3,700.0	3,613.5	3,578.4	3,571.6	16.4	7.8	-171.26	-103.0	161.9	877.0	859.7	17.34	50.564		
3,800.0	3,710.4	3,673.9	3,666.3	17.0	8.0	-170.74	-114.3	166.4	905.7	887.8	17.90	50.610		
3,900.0	3,807.4	3,769.4	3,761.0	17.5	8.3	-170.25	-125.7	170.9	934.5	916.0	18.45	50.640		
4,000.0	3,904.3	3,864.9	3,855.6	18.0	8.5	-169.79	-137.1	175.4	963.3	944.3	19.02	50.657		
4,100.0	4,001.2	3,960.3	3,950.3	18.6	8.8	-169.36	-148.5	179.9	992.2	972.6	19.58	50.664		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-321 - Wellbore #1 - Plan #1 (11-3-14)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Semi Major Axis 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	0.0	0.0	0.0	0.0	87.66	3.6	89.3	89.3					
100.0	100.0	99.0	99.0	0.1	0.1	87.66	3.6	89.3	89.3	89.1	0.22	399.409		
200.0	200.0	199.0	199.0	0.3	0.3	87.66	3.6	89.3	89.3	88.7	0.67	132.915		
300.0	300.0	299.0	299.0	0.6	0.6	87.66	3.6	89.3	89.3	88.2	1.12	79.642		
400.0	400.0	399.0	399.0	0.8	0.8	87.66	3.6	89.3	89.3	87.8	1.57	56.855 CC, ES		
500.0	500.0	499.0	499.0	1.0	1.0	-173.23	3.6	89.3	91.1	89.0	2.01	45.328		
600.0	599.8	598.8	598.8	1.2	1.2	-173.59	3.6	89.3	96.3	93.8	2.44	39.419		
700.0	699.5	698.5	698.5	1.4	1.5	-174.10	3.6	89.3	104.9	102.0	2.88	36.414		
800.0	798.7	797.7	797.7	1.7	1.7	-174.69	3.6	89.3	117.1	113.7	3.32	35.208		
900.0	897.5	896.5	896.5	2.0	1.9	-175.29	3.6	89.3	132.6	128.9	3.77	35.180 SF		
1,000.0	995.6	994.6	994.6	2.4	2.1	-175.85	3.6	89.3	151.7	147.4	4.22	35.958		
1,100.0	1,093.1	1,092.1	1,092.1	2.8	2.3	-176.36	3.6	89.3	174.1	169.4	4.67	37.307		
1,200.0	1,190.0	1,189.0	1,189.0	3.3	2.6	-176.81	3.6	89.3	198.6	193.5	5.13	38.717		
1,300.0	1,286.9	1,285.9	1,285.9	3.8	2.8	-177.16	3.6	89.3	223.1	217.5	5.60	39.848		
1,400.0	1,383.9	1,382.9	1,382.9	4.3	3.0	-177.44	3.6	89.3	247.6	241.6	6.07	40.775		
1,500.0	1,480.8	1,479.8	1,479.8	4.8	3.2	-177.67	3.6	89.3	272.2	265.6	6.55	41.546		
1,600.0	1,577.8	1,576.8	1,576.8	5.3	3.4	-177.86	3.6	89.3	296.7	289.7	7.03	42.197		
1,700.0	1,674.7	1,680.0	1,680.0	5.8	3.6	-177.89	2.8	88.6	320.5	313.0	7.51	42.702		
1,800.0	1,771.6	1,786.3	1,786.2	6.3	3.8	-177.46	-1.2	85.5	341.9	333.9	7.96	42.932		
1,900.0	1,868.6	1,893.6	1,893.1	6.9	4.0	-176.61	-8.3	80.1	360.7	352.3	8.43	42.776		
2,000.0	1,965.5	1,994.8	1,993.6	7.4	4.2	-175.57	-17.2	73.1	377.7	368.8	8.91	42.383		
2,100.0	2,062.4	2,093.1	2,091.4	7.9	4.5	-174.64	-26.1	66.3	394.7	385.3	9.40	41.969		
2,200.0	2,159.4	2,191.5	2,189.1	8.5	4.7	-173.77	-34.9	59.5	411.8	401.9	9.91	41.552		
2,300.0	2,256.3	2,289.8	2,286.8	9.0	4.9	-172.98	-43.7	52.6	428.9	418.5	10.43	41.137		
2,400.0	2,353.3	2,388.2	2,384.5	9.5	5.2	-172.25	-52.6	45.8	446.2	435.2	10.95	40.732		
2,500.0	2,450.2	2,486.5	2,482.2	10.0	5.4	-171.57	-61.4	39.0	463.5	452.0	11.49	40.333		
2,600.0	2,547.1	2,584.9	2,579.9	10.6	5.7	-170.94	-70.3	32.1	480.8	468.8	12.04	39.947		
2,700.0	2,644.1	2,683.2	2,677.6	11.1	5.9	-170.36	-79.1	25.3	498.2	485.6	12.59	39.575		
2,800.0	2,741.0	2,781.6	2,775.3	11.6	6.2	-169.81	-88.0	18.5	515.7	502.5	13.15	39.217		
2,900.0	2,838.0	2,879.9	2,873.0	12.2	6.5	-169.30	-96.8	11.6	533.2	519.5	13.72	38.873		
3,000.0	2,934.9	2,978.3	2,970.8	12.7	6.7	-168.83	-105.7	4.8	550.7	536.4	14.29	38.544		
3,100.0	3,031.8	3,076.6	3,068.5	13.2	7.0	-168.38	-114.5	-2.0	568.3	553.4	14.87	38.229		
3,200.0	3,128.8	3,175.0	3,166.2	13.8	7.3	-167.96	-123.4	-8.9	585.9	570.5	15.45	37.928		
3,300.0	3,225.7	3,273.3	3,263.9	14.3	7.6	-167.56	-132.2	-15.7	603.6	587.5	16.03	37.640		
3,400.0	3,322.7	3,371.7	3,361.6	14.8	7.8	-167.19	-141.0	-22.5	621.2	604.6	16.63	37.366		
3,500.0	3,419.6	3,470.0	3,459.3	15.4	8.1	-166.83	-149.9	-29.4	638.9	621.7	17.22	37.104		
3,600.0	3,516.5	3,568.4	3,557.0	15.9	8.4	-166.50	-158.7	-36.2	656.6	638.8	17.82	36.854		
3,700.0	3,613.5	3,666.7	3,654.7	16.4	8.7	-166.18	-167.6	-43.0	674.3	655.9	18.42	36.616		
3,800.0	3,710.4	3,755.9	3,743.4	17.0	8.9	-165.97	-174.9	-48.7	692.6	673.6	18.96	36.539		
3,900.0	3,807.4	3,842.3	3,829.6	17.5	9.1	-165.95	-180.0	-52.7	712.5	693.0	19.45	36.630		
4,000.0	3,904.3	3,928.0	3,915.2	18.0	9.3	-166.10	-183.1	-55.0	734.0	714.0	19.92	36.854		
4,100.0	4,001.2	4,013.0	4,000.2	18.6	9.5	-166.41	-184.1	-55.8	757.1	736.7	20.35	37.197		
4,200.0	4,098.2	4,110.0	4,097.2	19.1	9.6	-166.83	-184.1	-55.8	781.0	760.2	20.79	37.559		
4,300.0	4,195.1	4,206.9	4,194.1	19.6	9.8	-167.23	-184.1	-55.8	804.9	783.7	21.24	37.905		
4,400.0	4,292.0	4,303.9	4,291.0	20.2	10.0	-167.61	-184.1	-55.8	828.9	807.3	21.68	38.234		
4,500.0	4,389.0	4,400.8	4,388.0	20.7	10.2	-167.96	-184.1	-55.8	853.0	830.8	22.13	38.546		
4,600.0	4,485.9	4,497.7	4,484.9	21.2	10.4	-168.29	-184.1	-55.8	877.0	854.4	22.58	38.843		
4,700.0	4,582.9	4,594.7	4,581.9	21.8	10.6	-168.61	-184.1	-55.8	901.1	878.1	23.03	39.126		
4,800.0	4,679.8	4,691.6	4,678.8	22.3	10.7	-168.91	-184.1	-55.8	925.2	901.7	23.49	39.396		
4,900.0	4,776.7	4,788.6	4,775.7	22.8	10.9	-169.19	-184.1	-55.8	949.4	925.4	23.94	39.653		
5,000.0	4,873.7	4,885.5	4,872.7	23.4	11.1	-169.46	-184.1	-55.8	973.5	949.1	24.40	39.898		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-321 - Wellbore #1 - Plan #1 (11-3-14)													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 (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		
5,100.0	4,970.6	4,982.4	4,969.6	23.9	11.3	-169.72	-184.1	-55.8	997.7	972.8	24.86	40.132		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-341 - Wellbore #1 - Plan #1 (10-27-14)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Semi Major Axis 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	0.0	0.0	0.0	0.0	83.24	3.6	30.7	30.9					
100.0	100.0	100.0	100.0	0.1	0.1	83.24	3.6	30.7	30.9	30.7	0.22	137.455		
200.0	200.0	200.0	200.0	0.3	0.3	83.24	3.6	30.7	30.9	30.2	0.67	45.818		
300.0	300.0	300.0	300.0	0.6	0.6	83.24	3.6	30.7	30.9	29.8	1.12	27.491		
400.0	400.0	400.0	400.0	0.8	0.8	83.24	3.6	30.7	30.9	29.3	1.57	19.636 CC, ES		
500.0	500.0	500.0	500.0	1.0	1.0	-177.66	3.6	30.7	32.6	30.6	2.01	16.229		
600.0	599.8	599.8	599.8	1.2	1.2	-177.98	3.6	30.7	37.9	35.4	2.44	15.494		
700.0	699.5	699.5	699.5	1.4	1.5	-178.35	3.6	30.7	46.6	43.7	2.88	16.155		
800.0	798.7	798.7	798.7	1.7	1.7	-178.69	3.6	30.7	58.8	55.4	3.33	17.668		
900.0	897.5	900.0	900.0	2.0	1.9	-178.77	3.1	29.0	72.7	69.0	3.75	19.381		
1,000.0	995.6	1,001.8	1,001.7	2.4	2.1	-178.53	1.6	23.9	86.7	82.5	4.17	20.805		
1,100.0	1,093.1	1,104.2	1,103.6	2.8	2.3	-178.09	-0.9	15.2	100.6	96.0	4.59	21.898		
1,200.0	1,190.0	1,207.2	1,205.8	3.3	2.6	-177.51	-4.5	3.0	113.0	108.0	5.05	22.377		
1,300.0	1,286.9	1,309.1	1,306.4	3.8	2.9	-176.78	-8.9	-12.3	122.4	116.8	5.53	22.121		
1,400.0	1,383.9	1,408.7	1,404.7	4.3	3.2	-176.12	-13.5	-27.8	131.1	125.1	6.03	21.759		
1,500.0	1,480.8	1,508.3	1,503.0	4.8	3.5	-175.55	-18.0	-43.3	139.9	133.4	6.53	21.420		
1,600.0	1,577.8	1,607.9	1,601.3	5.3	3.8	-175.04	-22.5	-58.7	148.7	141.6	7.05	21.103		
1,700.0	1,674.7	1,707.5	1,699.6	5.8	4.2	-174.59	-27.0	-74.2	157.5	149.9	7.57	20.819		
1,800.0	1,771.6	1,807.1	1,797.9	6.3	4.5	-174.19	-31.6	-89.7	166.3	158.2	8.09	20.551		
1,900.0	1,868.6	1,906.7	1,896.2	6.9	4.9	-173.83	-36.1	-105.2	175.1	166.5	8.62	20.306		
2,000.0	1,965.5	2,006.3	1,994.5	7.4	5.2	-173.50	-40.6	-120.6	183.9	174.8	9.16	20.080		
2,100.0	2,062.4	2,105.9	2,092.8	7.9	5.6	-173.20	-45.2	-136.1	192.8	183.1	9.70	19.872		
2,200.0	2,159.4	2,205.5	2,191.1	8.5	6.0	-172.93	-49.7	-151.6	201.6	191.4	10.24	19.680		
2,300.0	2,256.3	2,305.1	2,289.3	9.0	6.3	-172.68	-54.2	-167.1	210.4	199.7	10.79	19.502		
2,400.0	2,353.3	2,404.7	2,387.6	9.5	6.7	-172.45	-58.7	-182.5	219.3	207.9	11.34	19.338		
2,500.0	2,450.2	2,504.3	2,485.9	10.0	7.1	-172.24	-63.3	-198.0	228.1	216.2	11.89	19.185		
2,600.0	2,547.1	2,603.9	2,584.2	10.6	7.4	-172.05	-67.8	-213.5	237.0	224.5	12.44	19.043		
2,700.0	2,644.1	2,703.5	2,682.5	11.1	7.8	-171.87	-72.3	-229.0	245.8	232.8	13.00	18.911		
2,800.0	2,741.0	2,803.1	2,780.8	11.6	8.2	-171.70	-76.9	-244.4	254.7	241.1	13.56	18.787		
2,900.0	2,838.0	2,902.7	2,879.1	12.2	8.6	-171.54	-81.4	-259.9	263.5	249.4	14.11	18.672		
3,000.0	2,934.9	3,002.3	2,977.4	12.7	8.9	-171.39	-85.9	-275.4	272.4	257.7	14.67	18.563		
3,100.0	3,031.8	3,101.9	3,075.7	13.2	9.3	-171.26	-90.4	-290.9	281.3	266.0	15.23	18.462		
3,200.0	3,128.8	3,201.5	3,174.0	13.8	9.7	-171.13	-95.0	-306.3	290.1	274.3	15.80	18.366		
3,300.0	3,225.7	3,301.1	3,272.3	14.3	10.1	-171.01	-99.5	-321.8	299.0	282.6	16.36	18.276		
3,400.0	3,322.7	3,400.8	3,370.5	14.8	10.5	-170.89	-104.0	-337.3	307.8	290.9	16.92	18.191		
3,500.0	3,419.6	3,500.4	3,468.8	15.4	10.8	-170.78	-108.5	-352.8	316.7	299.2	17.49	18.111		
3,600.0	3,516.5	3,600.0	3,567.1	15.9	11.2	-170.68	-113.1	-368.2	325.6	307.5	18.05	18.035		
3,700.0	3,613.5	3,699.6	3,665.4	16.4	11.6	-170.58	-117.6	-383.7	334.4	315.8	18.62	17.963		
3,800.0	3,710.4	3,799.2	3,763.7	17.0	12.0	-170.49	-122.1	-399.2	343.3	324.1	19.18	17.895		
3,900.0	3,807.4	3,898.8	3,862.0	17.5	12.4	-170.40	-126.7	-414.7	352.2	332.4	19.75	17.830		
4,000.0	3,904.3	3,998.4	3,960.3	18.0	12.7	-170.32	-131.2	-430.1	361.0	340.7	20.32	17.768		
4,100.0	4,001.2	4,098.0	4,058.6	18.6	13.1	-170.24	-135.7	-445.6	369.9	349.0	20.89	17.710		
4,200.0	4,098.2	4,197.6	4,156.9	19.1	13.5	-170.17	-140.2	-461.1	378.8	357.3	21.46	17.654		
4,300.0	4,195.1	4,297.2	4,255.2	19.6	13.9	-170.10	-144.8	-476.6	387.6	365.6	22.02	17.600		
4,400.0	4,292.0	4,396.8	4,353.5	20.2	14.3	-170.03	-149.3	-492.0	396.5	373.9	22.59	17.550		
4,500.0	4,389.0	4,496.4	4,451.7	20.7	14.7	-169.96	-153.8	-507.5	405.4	382.2	23.16	17.501		
4,600.0	4,485.9	4,596.0	4,550.0	21.2	15.0	-169.90	-158.4	-523.0	414.2	390.5	23.73	17.454		
4,700.0	4,582.9	4,695.6	4,648.3	21.8	15.4	-169.84	-162.9	-538.5	423.1	398.8	24.30	17.409		
4,800.0	4,679.8	4,795.2	4,746.6	22.3	15.8	-169.78	-167.4	-553.9	432.0	407.1	24.87	17.367		
4,900.0	4,776.7	4,894.8	4,844.9	22.8	16.2	-169.73	-171.9	-569.4	440.9	415.4	25.45	17.326		
5,000.0	4,873.7	4,994.4	4,943.2	23.4	16.6	-169.67	-176.5	-584.9	449.7	423.7	26.02	17.286		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design		Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-341 - Wellbore #1 - Plan #1 (10-27-14)											Offset Site Error:		0.0 ft
Survey Program: 0-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)				
5,100.0	4,970.6	5,093.3	5,040.8	23.9	17.0	-169.62	-181.0	-600.2	458.6	432.0	26.59	17.250			
5,200.0	5,067.6	5,179.5	5,126.0	24.4	17.2	-169.63	-184.5	-612.3	469.1	442.0	27.06	17.335			
5,300.0	5,164.5	5,265.0	5,211.0	25.0	17.4	-169.73	-187.3	-621.8	482.4	454.9	27.51	17.535			
5,400.0	5,261.4	5,349.8	5,295.5	25.5	17.6	-169.91	-189.3	-628.8	498.5	470.5	27.93	17.845			
5,500.0	5,358.5	5,433.9	5,379.4	26.0	17.7	-170.20	-190.6	-633.4	516.7	488.3	28.34	18.230			
5,600.0	5,456.4	5,517.5	5,463.0	26.3	17.8	-170.50	-191.3	-635.6	534.5	505.8	28.68	18.634			
5,700.0	5,554.9	5,609.4	5,554.9	26.6	17.9	-170.83	-191.4	-635.8	551.3	522.3	29.00	19.008			
5,800.0	5,653.9	5,708.4	5,653.9	26.9	18.1	-171.09	-191.4	-635.8	564.9	535.6	29.30	19.280			
5,900.0	5,753.4	5,807.9	5,753.4	27.1	18.2	-171.28	-191.4	-635.8	575.1	545.6	29.57	19.449			
6,000.0	5,853.1	5,907.6	5,853.1	27.3	18.4	-171.41	-191.4	-635.8	581.9	552.1	29.81	19.520			
6,100.0	5,953.1	6,007.6	5,953.1	27.4	18.5	-171.47	-191.4	-635.8	585.3	555.3	30.02	19.495			
6,200.0	6,053.1	6,107.6	6,053.1	27.5	18.7	89.29	-191.4	-635.8	585.7	555.4	30.30	19.331			
6,300.0	6,153.0	6,207.5	6,153.0	27.6	18.8	89.50	-191.4	-635.8	585.6	555.0	30.66	19.102			
6,353.7	6,206.4	6,260.9	6,206.4	27.6	18.9	90.00	-190.6	-635.8	585.6	554.7	30.89	18.960			
6,400.0	6,252.0	6,307.1	6,252.4	27.7	18.9	90.45	-187.1	-635.8	585.6	554.5	31.08	18.843			
6,500.0	6,348.2	6,407.9	6,351.7	27.7	19.0	91.42	-169.9	-635.8	585.8	554.4	31.42	18.644			
6,600.0	6,440.2	6,510.0	6,449.0	27.7	19.1	92.37	-139.4	-635.8	586.1	554.4	31.68	18.502			
6,700.0	6,526.3	6,613.5	6,542.7	27.8	19.2	93.29	-95.4	-635.8	586.6	554.7	31.89	18.392			
6,800.0	6,605.0	6,718.4	6,630.6	27.8	19.2	94.15	-38.4	-635.8	587.2	555.0	32.13	18.275			
6,900.0	6,675.0	6,824.5	6,710.8	27.8	19.2	94.94	31.0	-635.8	587.8	555.3	32.48	18.100			
7,000.0	6,735.1	6,931.9	6,781.4	27.9	19.3	95.64	111.8	-635.8	588.5	555.4	33.05	17.805			
7,100.0	6,784.3	7,040.4	6,840.5	28.0	19.5	96.25	202.7	-635.8	589.1	555.2	33.95	17.352			
7,200.0	6,821.7	7,149.9	6,886.4	28.3	19.8	96.74	301.9	-635.8	589.7	554.4	35.27	16.721			
7,300.0	6,846.6	7,260.1	6,917.9	28.6	20.4	97.10	407.4	-635.8	590.1	553.1	37.04	15.934			
7,400.0	6,858.8	7,370.8	6,933.9	29.0	21.2	97.33	516.9	-635.8	590.4	551.2	39.23	15.050			
7,500.0	6,859.7	7,477.1	6,935.5	29.5	22.2	97.38	623.1	-635.8	590.5	548.9	41.60	14.194			
7,600.0	6,859.3	7,577.1	6,934.6	30.2	23.2	97.33	723.1	-635.8	590.4	546.4	44.03	13.410			
7,700.0	6,858.8	7,677.1	6,933.6	31.0	24.5	97.28	823.1	-635.8	590.4	543.7	46.64	12.659			
7,800.0	6,858.3	7,777.1	6,932.6	31.9	25.8	97.23	923.1	-635.8	590.3	540.9	49.40	11.949			
7,900.0	6,857.9	7,877.1	6,931.7	33.0	27.1	97.18	1,023.1	-635.8	590.2	537.9	52.30	11.286			
8,000.0	6,857.4	7,977.1	6,930.7	34.1	28.6	97.13	1,123.1	-635.8	590.2	534.9	55.31	10.671			
8,100.0	6,857.0	8,077.1	6,929.8	35.3	30.1	97.08	1,223.1	-635.8	590.1	531.7	58.41	10.103			
8,200.0	6,856.5	8,177.1	6,928.8	36.6	31.7	97.04	1,323.1	-635.8	590.1	528.5	61.60	9.580			
8,300.0	6,856.1	8,277.1	6,927.8	37.9	33.2	96.99	1,423.1	-635.8	590.0	525.1	64.85	9.098			
8,400.0	6,855.6	8,377.1	6,926.9	39.3	34.9	96.94	1,523.1	-635.8	589.9	521.8	68.16	8.655			
8,500.0	6,855.2	8,477.1	6,925.9	40.7	36.5	96.89	1,623.1	-635.8	589.9	518.3	71.52	8.248			
8,600.0	6,854.7	8,577.1	6,925.0	42.2	38.2	96.84	1,723.1	-635.8	589.8	514.9	74.93	7.872			
8,700.0	6,854.3	8,677.1	6,924.0	43.8	39.9	96.79	1,823.0	-635.8	589.7	511.4	78.37	7.525			
8,800.0	6,853.8	8,777.1	6,923.0	45.3	41.6	96.74	1,923.0	-635.8	589.7	507.8	81.85	7.205			
8,900.0	6,853.4	8,877.1	6,922.1	46.9	43.3	96.69	2,023.0	-635.8	589.6	504.3	85.35	6.908			
9,000.0	6,852.9	8,977.1	6,921.1	48.5	45.1	96.65	2,123.0	-635.8	589.6	500.7	88.89	6.633			
9,100.0	6,852.4	9,077.1	6,920.2	50.1	46.9	96.60	2,223.0	-635.8	589.5	497.1	92.44	6.377			
9,200.0	6,852.0	9,177.1	6,919.2	51.8	48.6	96.55	2,323.0	-635.8	589.5	493.4	96.02	6.139			
9,300.0	6,851.5	9,277.1	6,918.2	53.5	50.4	96.50	2,423.0	-635.8	589.4	489.8	99.62	5.917			
9,400.0	6,851.1	9,377.1	6,917.3	55.2	52.2	96.45	2,523.0	-635.8	589.3	486.1	103.23	5.709			
9,500.0	6,850.6	9,477.1	6,916.3	56.9	54.0	96.40	2,623.0	-635.8	589.3	482.4	106.86	5.515			
9,600.0	6,850.2	9,577.1	6,915.4	58.6	55.8	96.35	2,723.0	-635.8	589.2	478.7	110.50	5.332			
9,700.0	6,849.7	9,677.1	6,914.4	60.3	57.6	96.30	2,823.0	-635.8	589.2	475.0	114.15	5.161			
9,800.0	6,849.3	9,777.1	6,913.4	62.1	59.5	96.25	2,923.0	-635.8	589.1	471.3	117.82	5.000			
9,900.0	6,848.8	9,877.1	6,912.5	63.8	61.3	96.21	3,023.0	-635.8	589.1	467.6	121.49	4.849			
10,000.0	6,848.4	9,977.1	6,911.5	65.6	63.1	96.16	3,123.0	-635.8	589.0	463.8	125.18	4.705			

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Collins 4N64W18T Pad Sec.18-T4N-R64W - Collins 18T-341 - Wellbore #1 - Plan #1 (10-27-14)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Semi Major Axis (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
10,100.0	6,847.9	10,077.1	6,910.6	67.4	65.0	96.11	3,223.0	-635.8	589.0	460.1	128.87	4.570		
10,200.0	6,847.5	10,177.0	6,909.6	69.1	66.8	96.06	3,323.0	-635.8	588.9	456.3	132.57	4.442		
10,300.0	6,847.0	10,277.0	6,908.6	70.9	68.7	96.01	3,423.0	-635.8	588.8	452.6	136.28	4.321		
10,400.0	6,846.5	10,377.0	6,907.7	72.7	70.5	95.96	3,522.9	-635.8	588.8	448.8	139.99	4.206		
10,500.0	6,846.1	10,477.0	6,906.7	74.5	72.4	95.91	3,622.9	-635.8	588.7	445.0	143.72	4.097		
10,600.0	6,845.6	10,577.0	6,905.8	76.3	74.2	95.86	3,722.9	-635.8	588.7	441.2	147.44	3.993		
10,700.0	6,845.2	10,677.0	6,904.8	78.1	76.1	95.81	3,822.9	-635.8	588.6	437.5	151.18	3.894		
10,800.0	6,844.7	10,777.0	6,903.8	80.0	78.0	95.76	3,922.9	-635.8	588.6	433.7	154.91	3.799		
10,900.0	6,844.3	10,877.0	6,902.9	81.8	79.8	95.72	4,022.9	-635.8	588.5	429.9	158.66	3.709		
11,000.0	6,843.8	10,977.0	6,901.9	83.6	81.7	95.67	4,122.9	-635.8	588.5	426.1	162.40	3.624		
11,100.0	6,843.4	11,077.0	6,901.0	85.4	83.6	95.62	4,222.9	-635.8	588.4	422.3	166.16	3.541		
11,200.0	6,842.9	11,177.0	6,900.0	87.3	85.4	95.57	4,322.9	-635.8	588.4	418.5	169.91	3.463		
11,300.0	6,842.5	11,277.0	6,899.0	89.1	87.3	95.52	4,422.9	-635.8	588.3	414.7	173.67	3.388		
11,400.0	6,842.0	11,377.0	6,898.1	90.9	89.2	95.47	4,522.9	-635.8	588.3	410.9	177.43	3.316		
11,402.4	6,842.0	11,379.4	6,898.1	91.0	89.2	95.47	4,525.3	-635.8	588.3	410.8	177.52	3.314 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec. 7-T4N-R64W - Frick 32-18 (Exist.) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 7160-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
9,000.0	6,852.9	6,856.9	6,856.9	48.5	137.1	92.03	3,078.4	-1,098.8	963.9	782.1	181.76	5.303	
9,100.0	6,852.4	6,856.4	6,856.4	50.1	137.1	91.81	3,078.4	-1,098.8	864.8	681.2	183.53	4.712	
9,200.0	6,852.0	6,856.0	6,856.0	51.8	137.1	91.60	3,078.4	-1,098.8	765.9	580.6	185.32	4.133	
9,300.0	6,851.5	6,855.5	6,855.5	53.5	137.1	91.39	3,078.4	-1,098.8	667.4	480.3	187.11	3.567	
9,400.0	6,851.1	6,855.1	6,855.1	55.2	137.1	91.18	3,078.4	-1,098.8	569.4	380.5	188.91	3.014	
9,500.0	6,850.6	6,854.6	6,854.6	56.9	137.1	90.97	3,078.4	-1,098.8	472.2	281.5	190.71	2.476	
9,600.0	6,850.2	6,854.2	6,854.2	58.6	137.1	90.75	3,078.4	-1,098.8	376.6	184.1	192.52	1.956	
9,700.0	6,849.7	6,853.7	6,853.7	60.3	137.1	90.54	3,078.4	-1,098.8	283.9	89.6	194.33	1.461 Level 3	
9,800.0	6,849.3	6,853.3	6,853.3	62.1	137.1	90.33	3,078.4	-1,098.8	198.5	2.3	196.14	1.012 Level 2	
9,900.0	6,848.8	6,852.8	6,852.8	63.8	137.1	90.12	3,078.4	-1,098.8	134.8	-63.1	197.96	0.681 Level 1	
9,956.0	6,848.6	6,852.6	6,852.6	64.8	137.1	90.00	3,078.4	-1,098.8	122.6	-76.3	198.98	0.616 Level 1, CC, ES, SF	
10,000.0	6,848.4	6,852.4	6,852.4	65.6	137.0	89.91	3,078.4	-1,098.8	130.3	-69.5	199.78	0.652 Level 1	
10,100.0	6,847.9	6,851.9	6,851.9	67.4	137.0	89.69	3,078.4	-1,098.8	189.1	-12.5	201.61	0.938 Level 1	
10,200.0	6,847.5	6,851.5	6,851.5	69.1	137.0	89.48	3,078.4	-1,098.8	273.0	69.6	203.43	1.342 Level 3	
10,300.0	6,847.0	6,851.0	6,851.0	70.9	137.0	89.27	3,078.4	-1,098.8	365.2	159.9	205.26	1.779	
10,400.0	6,846.5	6,850.5	6,850.5	72.7	137.0	89.06	3,078.4	-1,098.8	460.6	253.5	207.08	2.224	
10,500.0	6,846.1	6,850.1	6,850.1	74.5	137.0	88.85	3,078.4	-1,098.8	557.6	348.7	208.91	2.669	
10,600.0	6,845.6	6,849.6	6,849.6	76.3	137.0	88.64	3,078.4	-1,098.8	655.5	444.8	210.73	3.111	
10,700.0	6,845.2	6,849.2	6,849.2	78.1	137.0	88.42	3,078.4	-1,098.8	754.0	541.4	212.56	3.547	
10,800.0	6,844.7	6,848.7	6,848.7	80.0	137.0	88.21	3,078.4	-1,098.8	852.8	638.4	214.39	3.978	
10,900.0	6,844.3	6,848.3	6,848.3	81.8	137.0	88.00	3,078.4	-1,098.8	951.9	735.7	216.21	4.403	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec. 7-T4N-R64W - Frick C 18-2 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7186-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)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
10,100.0	6,847.9	6,850.9	6,850.9	67.4	137.0	91.01	4,189.5	-973.2	998.5	796.9	201.65	4.952		
10,200.0	6,847.5	6,850.5	6,850.5	69.1	137.0	90.91	4,189.5	-973.2	902.0	698.5	203.49	4.433		
10,300.0	6,847.0	6,850.0	6,850.0	70.9	137.0	90.80	4,189.5	-973.2	806.3	601.0	205.34	3.927		
10,400.0	6,846.5	6,849.5	6,849.5	72.7	137.0	90.70	4,189.5	-973.2	711.8	504.7	207.19	3.436		
10,500.0	6,846.1	6,849.1	6,849.1	74.5	137.0	90.59	4,189.5	-973.2	619.1	410.1	209.04	2.962		
10,600.0	6,845.6	6,848.6	6,848.6	76.3	137.0	90.49	4,189.5	-973.2	529.0	318.1	210.89	2.508		
10,700.0	6,845.2	6,848.2	6,848.2	78.1	137.0	90.38	4,189.5	-973.2	443.2	230.4	212.75	2.083		
10,800.0	6,844.7	6,847.7	6,847.7	80.0	137.0	90.28	4,189.5	-973.2	364.7	150.1	214.60	1.699		
10,900.0	6,844.3	6,847.3	6,847.3	81.8	136.9	90.18	4,189.5	-973.2	299.2	82.8	216.46	1.382	Level 3	
11,000.0	6,843.8	6,846.8	6,846.8	83.6	136.9	90.07	4,189.5	-973.2	257.1	38.8	218.32	1.178	Level 2	
11,067.2	6,843.5	6,846.5	6,846.5	84.8	136.9	90.00	4,189.5	-973.2	248.2	28.6	219.57	1.130	Level 2, CC, ES, SF	
11,100.0	6,843.4	6,846.4	6,846.4	85.4	136.9	89.97	4,189.5	-973.2	250.3	30.1	220.18	1.137	Level 2	
11,200.0	6,842.9	6,845.9	6,845.9	87.3	136.9	89.86	4,189.5	-973.2	281.5	59.4	222.05	1.268	Level 3	
11,300.0	6,842.5	6,845.5	6,845.5	89.1	136.9	89.76	4,189.5	-973.2	340.3	116.4	223.91	1.520		
11,400.0	6,842.0	6,845.0	6,845.0	90.9	136.9	89.65	4,189.5	-973.2	415.2	189.4	225.78	1.839		
11,402.4	6,842.0	6,845.0	6,845.0	91.0	136.9	89.65	4,189.5	-973.2	417.1	191.2	225.82	1.847		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec. 7-T4N-R64W - Fry 21-6I (Exist.) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 644-UNKNOWN												Offset Well Error:	0.0 ft
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
9,700.0	6,849.7	7,000.3	6,905.7	60.3	233.6	-92.47	3,679.0	-1,658.2	961.7	679.5	282.13	3.409	
9,800.0	6,849.3	6,997.5	6,902.9	62.1	233.5	-92.11	3,679.0	-1,658.2	873.8	589.9	283.87	3.078	
9,900.0	6,848.8	6,994.7	6,900.1	63.8	233.5	-91.74	3,679.1	-1,658.2	788.8	503.2	285.60	2.762	
10,000.0	6,848.4	6,991.9	6,897.3	65.6	233.4	-91.37	3,679.2	-1,658.1	707.7	420.4	287.33	2.463	
10,100.0	6,847.9	6,989.0	6,894.4	67.4	233.4	-90.99	3,679.2	-1,658.1	632.0	343.0	289.04	2.187	
10,200.0	6,847.5	6,986.2	6,891.5	69.1	233.3	-90.62	3,679.3	-1,658.1	564.0	273.2	290.75	1.940	
10,300.0	6,847.0	6,983.3	6,888.6	70.9	233.2	-90.24	3,679.4	-1,658.0	506.6	214.2	292.45	1.732	
10,400.0	6,846.5	6,980.3	6,885.7	72.7	233.2	-89.85	3,679.4	-1,658.0	464.0	169.9	294.14	1.577	
10,500.0	6,846.1	6,977.4	6,882.8	74.5	233.1	-89.47	3,679.5	-1,658.0	440.3	144.5	295.81	1.488	Level 3
10,557.2	6,845.8	6,975.7	6,881.1	75.6	233.1	-89.24	3,679.5	-1,657.9	436.6	139.8	296.77	1.471	Level 3, CC, ES, SF
10,600.0	6,845.6	6,974.4	6,879.8	76.3	233.0	-89.08	3,679.6	-1,657.9	438.7	141.2	297.48	1.475	Level 3
10,700.0	6,845.2	6,971.4	6,876.8	78.1	233.0	-88.68	3,679.6	-1,657.9	459.3	160.2	299.13	1.535	
10,800.0	6,844.7	6,968.4	6,873.8	80.0	232.9	-88.29	3,679.7	-1,657.8	499.5	198.7	300.77	1.661	
10,900.0	6,844.3	6,967.0	6,872.4	81.8	232.9	-88.10	3,679.8	-1,657.8	555.0	252.4	302.53	1.834	
11,000.0	6,843.8	6,962.9	6,868.2	83.6	232.8	-87.56	3,679.9	-1,657.8	621.7	317.6	304.07	2.045	
11,100.0	6,843.4	6,960.2	6,865.6	85.4	232.8	-87.21	3,679.9	-1,657.7	696.4	390.7	305.72	2.278	
11,200.0	6,842.9	6,957.6	6,863.0	87.3	232.7	-86.87	3,680.0	-1,657.7	776.8	469.4	307.36	2.527	
11,300.0	6,842.5	6,955.0	6,860.4	89.1	232.7	-86.53	3,680.0	-1,657.6	861.3	552.3	308.99	2.788	
11,400.0	6,842.0	6,952.4	6,857.8	90.9	232.6	-86.20	3,680.1	-1,657.6	948.8	638.2	310.62	3.055	
11,402.4	6,842.0	6,952.4	6,857.8	91.0	232.6	-86.19	3,680.1	-1,657.6	951.0	640.3	310.66	3.061	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 128-Reference NEI C18-32D Pad Sec.18-T4N-R64W - NEI C18-21D - Wellbore #1 - Wellbore #1													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis 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	6,855.2	6,979.0	6,910.4	40.7	17.9	-93.81	2,522.0	-1,360.9	910.4	859.2	51.17	17.790		
8,600.0	6,854.7	6,978.1	6,909.4	42.2	17.9	-93.43	2,522.0	-1,360.9	811.7	758.8	52.91	15.341		
8,700.0	6,854.3	6,977.2	6,908.5	43.8	17.9	-93.05	2,522.0	-1,360.9	713.4	658.8	54.67	13.051		
8,800.0	6,853.8	6,976.2	6,907.6	45.3	17.9	-92.66	2,522.0	-1,360.9	615.7	559.2	56.44	10.909		
8,900.0	6,853.4	6,975.3	6,906.6	46.9	17.9	-92.28	2,522.0	-1,361.0	518.8	460.5	58.22	8.910		
9,000.0	6,852.9	6,974.3	6,905.7	48.5	17.9	-91.90	2,522.0	-1,361.0	423.3	363.3	60.02	7.053		
9,100.0	6,852.4	6,973.4	6,904.8	50.1	17.9	-91.51	2,522.0	-1,361.0	330.6	268.7	61.83	5.346		
9,200.0	6,852.0	6,972.5	6,903.8	51.8	17.9	-91.12	2,522.0	-1,361.0	243.6	180.0	63.65	3.827		
9,300.0	6,851.5	6,971.5	6,902.9	53.5	17.9	-90.73	2,522.0	-1,361.0	171.5	106.0	65.47	2.619		
9,399.7	6,851.1	6,970.6	6,901.9	55.2	17.8	-90.34	2,522.0	-1,361.0	139.6	72.3	67.30	2.074 CC		
9,400.0	6,851.1	6,970.6	6,901.9	55.2	17.8	-90.34	2,522.0	-1,361.0	139.6	72.3	67.31	2.074 ES, SF		
9,500.0	6,850.6	6,969.6	6,901.0	56.9	17.8	-89.95	2,522.0	-1,361.0	171.9	102.8	69.14	2.486		
9,600.0	6,850.2	6,968.6	6,900.0	58.6	17.8	-89.56	2,522.0	-1,361.0	244.2	173.2	70.98	3.440		
9,700.0	6,849.7	6,967.7	6,899.0	60.3	17.8	-89.16	2,522.0	-1,361.0	331.2	258.4	72.83	4.548		
9,800.0	6,849.3	6,966.7	6,898.1	62.1	17.8	-88.77	2,522.1	-1,361.0	424.0	349.3	74.67	5.678		
9,900.0	6,848.8	6,965.8	6,897.1	63.8	17.8	-88.37	2,522.1	-1,361.0	519.4	442.9	76.52	6.788		
10,000.0	6,848.4	6,964.8	6,896.1	65.6	17.8	-87.97	2,522.1	-1,361.0	616.3	538.0	78.37	7.865		
10,100.0	6,847.9	6,963.8	6,895.2	67.4	17.8	-87.57	2,522.1	-1,361.0	714.1	633.9	80.22	8.902		
10,200.0	6,847.5	6,962.8	6,894.2	69.1	17.8	-87.17	2,522.1	-1,361.0	812.4	730.3	82.07	9.899		
10,300.0	6,847.0	6,961.9	6,893.2	70.9	17.8	-86.77	2,522.1	-1,361.0	911.1	827.1	83.91	10.857		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design NEI C18-32D Pad Sec.18-T4N-R64W - NEI C18-22D - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 134-Reference													Offset Well Error:	0.0 ft
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	
9,100.0	6,852.4	7,165.1	6,888.5	50.1	33.8	89.29	2,483.3	-272.7	984.0	919.3	64.66	15.219		
9,200.0	6,852.0	7,164.9	6,888.3	51.8	33.8	89.28	2,483.3	-272.7	962.3	895.9	66.44	14.483		
9,300.0	6,851.5	7,164.7	6,888.1	53.5	33.8	89.27	2,483.3	-272.7	950.7	882.5	68.24	13.931		
9,361.0	6,851.3	7,164.6	6,888.0	54.5	33.8	89.26	2,483.3	-272.7	948.8	879.4	69.35	13.681 CC, ES		
9,400.0	6,851.1	7,164.5	6,888.0	55.2	33.8	89.26	2,483.3	-272.7	949.6	879.5	70.05	13.555		
9,500.0	6,850.6	7,164.3	6,887.8	56.9	33.8	89.24	2,483.3	-272.7	958.9	887.0	71.87	13.342		
9,600.0	6,850.2	7,164.1	6,887.6	58.6	33.8	89.23	2,483.3	-272.7	978.4	904.7	73.69	13.277 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design NEI C18-32D Pad Sec.18-T4N-R64W - NEI C18-23D - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 726-Reference												Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Semi Major Axis Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Distance Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
7,800.0	6,858.3	7,365.2	6,901.0	31.9	43.5	89.60	1,000.3	-227.8	996.7	941.7	54.97	18.130	
7,878.0	6,858.0	7,367.1	6,902.8	32.7	43.5	89.70	1,000.3	-227.8	993.6	937.5	56.09	17.714 CC	
7,900.0	6,857.9	7,367.6	6,903.3	33.0	43.5	89.73	1,000.4	-227.8	993.8	937.4	56.41	17.619 ES, SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 731-Reference													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	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	
7,100.0	6,784.3	7,004.2	6,841.2	28.0	25.6	-19.95	1,193.6	-1,370.0	971.3	946.4	24.89	39.023		
7,200.0	6,821.7	7,041.3	6,878.3	28.3	25.6	-29.31	1,193.4	-1,369.5	879.5	853.0	26.49	33.197		
7,300.0	6,846.6	7,066.9	6,903.8	28.6	25.6	-47.54	1,193.2	-1,369.2	784.1	749.8	34.27	22.878		
7,400.0	6,858.8	7,078.7	6,915.6	29.0	25.7	-78.58	1,193.1	-1,369.0	686.8	643.3	43.49	15.792		
7,500.0	6,859.7	7,078.7	6,915.7	29.5	25.7	-93.72	1,193.1	-1,369.0	589.5	545.1	44.48	13.253		
7,600.0	6,859.3	7,077.4	6,914.3	30.2	25.7	-93.19	1,193.1	-1,369.0	493.4	447.7	45.71	10.793		
7,700.0	6,858.8	7,076.0	6,913.0	31.0	25.7	-92.66	1,193.1	-1,369.0	399.1	352.1	47.04	8.484		
7,800.0	6,858.3	7,074.7	6,911.6	31.9	25.7	-92.14	1,193.1	-1,369.1	308.4	260.0	48.44	6.367		
7,900.0	6,857.9	7,073.3	6,910.3	33.0	25.7	-91.63	1,193.2	-1,369.1	225.8	175.9	49.92	4.523		
8,000.0	6,857.4	7,072.0	6,909.0	34.1	25.7	-91.12	1,193.2	-1,369.1	163.8	112.3	51.45	3.184		
8,070.8	6,857.1	7,071.1	6,908.1	34.9	25.7	-90.76	1,193.2	-1,369.1	147.7	95.2	52.56	2.810 CC, ES, SF		
8,100.0	6,857.0	7,070.7	6,907.7	35.3	25.7	-90.62	1,193.2	-1,369.1	150.6	97.6	53.02	2.840		
8,200.0	6,856.5	7,069.5	6,906.4	36.6	25.6	-90.12	1,193.2	-1,369.1	196.2	141.6	54.64	3.592		
8,300.0	6,856.1	7,068.2	6,905.2	37.9	25.6	-89.63	1,193.2	-1,369.1	272.7	216.4	56.28	4.845		
8,400.0	6,855.6	7,066.9	6,903.9	39.3	25.6	-89.14	1,193.2	-1,369.2	360.8	302.9	57.96	6.226		
8,500.0	6,855.2	7,065.7	6,902.7	40.7	25.6	-88.67	1,193.2	-1,369.2	453.9	394.2	59.65	7.609		
8,600.0	6,854.7	7,064.5	6,901.5	42.2	25.6	-88.19	1,193.2	-1,369.2	549.4	488.0	61.37	8.953		
8,700.0	6,854.3	7,063.3	6,900.2	43.8	25.6	-87.73	1,193.2	-1,369.2	646.3	583.2	63.09	10.243		
8,800.0	6,853.8	7,062.1	6,899.1	45.3	25.6	-87.26	1,193.2	-1,369.2	744.0	679.1	64.84	11.474		
8,900.0	6,853.4	7,060.9	6,897.9	46.9	25.6	-86.81	1,193.3	-1,369.2	842.2	775.6	66.59	12.648		
9,000.0	6,852.9	7,059.7	6,896.7	48.5	25.6	-86.36	1,193.3	-1,369.3	940.8	872.5	68.35	13.764		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 260-Reference													Offset Well Error:	0.0 ft
NEI C18-32D Pad Sec.18-T4N-R64W - Oster C19-27D - Wellbore #1 - Wellbore #1														
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
4,100.0	4,001.2	4,932.1	4,493.3	18.6	36.5	103.24		762.1	-851.5	998.5	954.2	44.33	22.526	
4,200.0	4,098.2	5,007.4	4,558.5	19.1	37.3	105.72		730.8	-830.3	959.4	913.3	46.09	20.814	
4,300.0	4,195.1	5,083.2	4,624.1	19.6	38.0	108.38		699.7	-808.6	922.9	875.0	47.88	19.274	
4,400.0	4,292.0	5,159.1	4,689.9	20.2	38.7	111.19		668.7	-786.7	889.5	839.8	49.68	17.904	
4,500.0	4,389.0	5,234.1	4,755.1	20.7	39.4	114.07		638.3	-765.6	859.4	808.0	51.43	16.710	
4,600.0	4,485.9	5,303.2	4,815.6	21.2	40.0	116.80		611.0	-746.5	833.5	780.5	53.03	15.718	
4,700.0	4,582.9	5,381.4	4,884.7	21.8	40.7	119.95		580.9	-725.6	812.1	757.4	54.69	14.849	
4,800.0	4,679.8	5,473.8	4,966.4	22.3	41.6	123.75		544.7	-702.0	793.7	737.2	56.44	14.063	
4,900.0	4,776.7	5,555.0	5,037.8	22.8	42.3	127.22		512.2	-681.1	778.7	720.7	57.96	13.435	
5,000.0	4,873.7	5,632.3	5,105.1	23.4	43.1	130.69		480.9	-659.6	768.1	708.8	59.31	12.950	
5,100.0	4,970.6	5,708.2	5,171.3	23.9	43.8	134.15		450.4	-638.5	762.7	702.1	60.53	12.600	
5,156.4	5,025.3	5,751.3	5,209.1	24.2	44.2	136.09		433.4	-626.6	761.8	700.7	61.14	12.461 CC, ES	
5,200.0	5,067.6	5,784.6	5,238.3	24.4	44.5	137.59		420.3	-617.5	762.3	700.8	61.57	12.381	
5,300.0	5,164.5	5,862.0	5,306.7	25.0	45.2	141.03		390.5	-596.7	767.0	704.6	62.47	12.279 SF	
5,400.0	5,261.4	5,934.9	5,371.5	25.5	45.8	144.17		363.3	-577.3	776.8	713.6	63.18	12.295	
5,500.0	5,358.5	6,012.0	5,440.6	26.0	46.5	147.45		335.7	-557.1	790.8	726.9	63.91	12.373	
5,600.0	5,456.4	6,097.7	5,517.6	26.3	47.2	150.90		305.5	-534.8	805.9	741.3	64.57	12.480	
5,700.0	5,554.9	6,191.5	5,602.0	26.6	48.0	154.43		272.2	-510.9	820.7	755.6	65.12	12.603	
5,800.0	5,653.9	6,290.1	5,690.7	26.9	48.8	157.88		236.5	-487.0	834.2	768.7	65.55	12.726	
5,900.0	5,753.4	6,388.4	5,779.3	27.1	49.7	161.10		200.4	-464.5	845.9	780.0	65.88	12.838	
6,000.0	5,853.1	6,469.3	5,852.5	27.3	50.3	163.60		171.1	-446.2	856.7	790.5	66.11	12.958	
6,100.0	5,953.1	6,546.8	5,922.7	27.4	50.9	165.86		143.8	-428.1	867.3	801.0	66.27	13.087	
6,200.0	6,053.1	6,632.0	5,999.6	27.5	51.6	169.01		114.0	-406.6	878.7	812.3	66.40	13.234	
6,300.0	6,153.0	6,761.8	6,117.1	27.6	52.7	172.27		68.1	-376.3	889.6	823.1	66.55	13.367	
6,400.0	6,252.0	6,857.9	6,205.1	27.7	53.4	174.99		34.2	-357.4	895.9	829.5	66.41	13.491	
6,500.0	6,348.2	6,954.9	6,295.0	27.7	54.1	178.27		2.3	-340.2	901.1	835.1	65.98	13.657	
6,600.0	6,440.2	7,041.3	6,376.9	27.7	54.6	181.40		-21.9	-327.1	906.3	840.8	65.48	13.841	
6,700.0	6,526.3	7,102.1	6,435.1	27.8	54.9	183.50		-36.8	-317.9	914.8	849.7	65.12	14.049	
6,800.0	6,605.0	7,160.6	6,491.3	27.8	55.3	185.33		-49.7	-308.5	928.4	863.5	64.89	14.308	
6,900.0	6,675.0	7,221.5	6,550.2	27.8	55.6	187.06		-62.3	-298.9	947.6	882.8	64.79	14.625	
7,000.0	6,735.1	7,271.2	6,598.3	27.9	55.8	187.82		-72.2	-291.4	973.3	908.3	65.05	14.962	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design NEI C18-32D Pad Sec.18-T4N-R64W - Riter C18-10 (P&A) - Wellbore #1 - Design #1												Offset Site Error:	0.0 ft
Survey Program: 0-Reference												Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
7,800.0	6,858.3	6,876.3	6,876.3	31.9	15.3	90.54	1,788.8	-806.0	960.8	920.5	40.30	23.841	
7,900.0	6,857.9	6,875.9	6,875.9	33.0	15.3	90.48	1,788.8	-806.0	871.7	830.0	41.73	20.892	
8,000.0	6,857.4	6,875.4	6,875.4	34.1	15.3	90.42	1,788.8	-806.0	785.2	742.0	43.21	18.173	
8,100.0	6,857.0	6,875.0	6,875.0	35.3	15.3	90.35	1,788.8	-806.0	702.4	657.6	44.74	15.698	
8,200.0	6,856.5	6,874.5	6,874.5	36.6	15.3	90.29	1,788.8	-806.0	624.6	578.2	46.32	13.484	
8,300.0	6,856.1	6,874.1	6,874.1	37.9	15.3	90.23	1,788.8	-806.0	553.9	506.0	47.93	11.556	
8,400.0	6,855.6	6,873.6	6,873.6	39.3	15.3	90.17	1,788.8	-806.0	493.5	443.9	49.58	9.954	
8,500.0	6,855.2	6,873.2	6,873.2	40.7	15.3	90.10	1,788.8	-806.0	447.5	396.2	51.25	8.732	
8,600.0	6,854.7	6,872.7	6,872.7	42.2	15.3	90.04	1,788.8	-806.0	420.7	367.7	52.94	7.946	
8,666.4	6,854.4	6,872.4	6,872.4	43.2	15.3	90.00	1,788.8	-806.0	415.4	361.3	54.08	7.682 CC, ES	
8,700.0	6,854.3	6,872.3	6,872.3	43.8	15.3	89.98	1,788.8	-806.0	416.8	362.1	54.65	7.626 SF	
8,800.0	6,853.8	6,871.8	6,871.8	45.3	15.3	89.92	1,788.8	-806.0	436.4	380.0	56.39	7.739	
8,900.0	6,853.4	6,871.4	6,871.4	46.9	15.3	89.85	1,788.8	-806.0	476.6	418.5	58.13	8.198	
9,000.0	6,852.9	6,870.9	6,870.9	48.5	15.3	89.79	1,788.8	-806.0	532.8	472.9	59.89	8.895	
9,100.0	6,852.4	6,870.4	6,870.4	50.1	15.3	89.73	1,788.8	-806.0	600.5	538.8	61.67	9.738	
9,200.0	6,852.0	6,870.0	6,870.0	51.8	15.3	89.67	1,788.8	-806.0	676.2	612.8	63.45	10.658	
9,300.0	6,851.5	6,869.5	6,869.5	53.5	15.3	89.60	1,788.8	-806.0	757.7	692.4	65.25	11.612	
9,400.0	6,851.1	6,869.1	6,869.1	55.2	15.3	89.54	1,788.8	-806.0	843.1	776.0	67.05	12.574	
9,500.0	6,850.6	6,868.6	6,868.6	56.9	15.3	89.48	1,788.8	-806.0	931.4	862.5	68.86	13.526	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design NEI C18-32D Pad Sec.18-T4N-R64W - Schneider/Dic/Colton 34-18 (SI) - Wellbore #1 - Design #1													Offset Site Error:	0.0 ft
Survey Program: 0-Reference													Offset Well Error:	0.0 ft
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	
1,300.0	1,286.9	1,303.9	1,303.9	3.8	2.8	35.50	400.8	-1,020.8	983.6	977.6	6.01	163.553		
1,400.0	1,383.9	1,400.9	1,400.9	4.3	3.0	36.34	400.8	-1,020.8	963.5	956.9	6.61	145.854		
1,500.0	1,480.8	1,497.8	1,497.8	4.8	3.3	37.21	400.8	-1,020.8	943.6	936.4	7.21	130.834		
1,600.0	1,577.8	1,594.8	1,594.8	5.3	3.5	38.12	400.8	-1,020.8	924.0	916.1	7.83	117.971		
1,700.0	1,674.7	1,691.7	1,691.7	5.8	3.7	39.07	400.8	-1,020.8	904.6	896.1	8.46	106.859		
1,800.0	1,771.6	1,788.6	1,788.6	6.3	3.9	40.06	400.8	-1,020.8	885.4	876.3	9.11	97.185		
1,900.0	1,868.6	1,885.6	1,885.6	6.9	4.1	41.09	400.8	-1,020.8	866.5	856.7	9.77	88.703		
2,000.0	1,965.5	1,982.5	1,982.5	7.4	4.3	42.16	400.8	-1,020.8	847.9	837.5	10.44	81.220		
2,100.0	2,062.4	2,079.4	2,079.4	7.9	4.6	43.29	400.8	-1,020.8	829.6	818.5	11.12	74.582		
2,200.0	2,159.4	2,176.4	2,176.4	8.5	4.8	44.46	400.8	-1,020.8	811.6	799.8	11.82	68.664		
2,300.0	2,256.3	2,273.3	2,273.3	9.0	5.0	45.68	400.8	-1,020.8	794.0	781.5	12.53	63.365		
2,400.0	2,353.3	2,370.3	2,370.3	9.5	5.2	46.95	400.8	-1,020.8	776.8	763.5	13.26	58.603		
2,500.0	2,450.2	2,467.2	2,467.2	10.0	5.4	48.28	400.8	-1,020.8	760.0	746.0	13.99	54.309		
2,600.0	2,547.1	2,564.1	2,564.1	10.6	5.7	49.67	400.8	-1,020.8	743.6	728.8	14.75	50.427		
2,700.0	2,644.1	2,661.1	2,661.1	11.1	5.9	51.12	400.8	-1,020.8	727.6	712.1	15.51	46.909		
2,800.0	2,741.0	2,758.0	2,758.0	11.6	6.1	52.63	400.8	-1,020.8	712.2	695.9	16.29	43.714		
2,900.0	2,838.0	2,855.0	2,855.0	12.2	6.3	54.20	400.8	-1,020.8	697.2	680.2	17.09	40.810		
3,000.0	2,934.9	2,951.9	2,951.9	12.7	6.5	55.83	400.8	-1,020.8	682.9	665.0	17.89	38.166		
3,100.0	3,031.8	3,048.8	3,048.8	13.2	6.7	57.54	400.8	-1,020.8	669.1	650.4	18.71	35.758		
3,200.0	3,128.8	3,145.8	3,145.8	13.8	7.0	59.30	400.8	-1,020.8	655.9	636.4	19.54	33.564		
3,300.0	3,225.7	3,242.7	3,242.7	14.3	7.2	61.14	400.8	-1,020.8	643.5	623.1	20.39	31.566		
3,400.0	3,322.7	3,339.7	3,339.7	14.8	7.4	63.04	400.8	-1,020.8	631.7	610.5	21.24	29.746		
3,500.0	3,419.6	3,436.6	3,436.6	15.4	7.6	65.01	400.8	-1,020.8	620.7	598.6	22.09	28.092		
3,600.0	3,516.5	3,533.5	3,533.5	15.9	7.8	67.05	400.8	-1,020.8	610.4	587.5	22.96	26.589		
3,700.0	3,613.5	3,630.5	3,630.5	16.4	8.0	69.15	400.8	-1,020.8	601.0	577.2	23.82	25.227		
3,800.0	3,710.4	3,727.4	3,727.4	17.0	8.3	71.31	400.8	-1,020.8	592.5	567.8	24.69	23.996		
3,900.0	3,807.4	3,824.4	3,824.4	17.5	8.5	73.52	400.8	-1,020.8	584.9	559.3	25.55	22.886		
4,000.0	3,904.3	3,921.3	3,921.3	18.0	8.7	75.79	400.8	-1,020.8	578.2	551.8	26.41	21.890		
4,100.0	4,001.2	4,018.2	4,018.2	18.6	8.9	78.10	400.8	-1,020.8	572.4	545.2	27.26	20.999		
4,200.0	4,098.2	4,115.2	4,115.2	19.1	9.1	80.45	400.8	-1,020.8	567.7	539.6	28.10	20.208		
4,300.0	4,195.1	4,212.1	4,212.1	19.6	9.4	82.84	400.8	-1,020.8	564.1	535.2	28.91	19.508		
4,400.0	4,292.0	4,309.0	4,309.0	20.2	9.6	85.25	400.8	-1,020.8	561.4	531.7	29.71	18.895		
4,500.0	4,389.0	4,406.0	4,406.0	20.7	9.8	87.68	400.8	-1,020.8	559.9	529.4	30.49	18.362		
4,595.2	4,481.3	4,498.3	4,498.3	21.2	10.0	90.00	400.8	-1,020.8	559.4	528.2	31.21	17.925		
4,600.0	4,485.9	4,502.9	4,502.9	21.2	10.0	90.12	400.8	-1,020.8	559.4	528.1	31.24	17.905		
4,700.0	4,582.9	4,599.9	4,599.9	21.8	10.2	92.55	400.8	-1,020.8	560.0	528.0	31.97	17.518		
4,800.0	4,679.8	4,696.8	4,696.8	22.3	10.4	94.98	400.8	-1,020.8	561.6	529.0	32.66	17.196		
4,900.0	4,776.7	4,793.7	4,793.7	22.8	10.7	97.39	400.8	-1,020.8	564.4	531.0	33.33	16.935		
5,000.0	4,873.7	4,890.7	4,890.7	23.4	10.9	99.77	400.8	-1,020.8	568.1	534.2	33.96	16.731		
5,100.0	4,970.6	4,987.6	4,987.6	23.9	11.1	102.12	400.8	-1,020.8	573.0	538.4	34.56	16.579		
5,200.0	5,067.6	5,084.6	5,084.6	24.4	11.3	104.43	400.8	-1,020.8	578.8	543.6	35.13	16.475		
5,300.0	5,164.5	5,181.5	5,181.5	25.0	11.5	106.69	400.8	-1,020.8	585.5	549.9	35.67	16.415		
5,400.0	5,261.4	5,278.4	5,278.4	25.5	11.8	108.90	400.8	-1,020.8	593.3	557.1	36.18	16.396		
5,500.0	5,358.5	5,375.5	5,375.5	26.0	12.0	111.10	400.8	-1,020.8	601.6	565.0	36.62	16.427		
5,600.0	5,456.4	5,473.4	5,473.4	26.3	12.2	113.03	400.8	-1,020.8	609.5	572.6	36.95	16.495		
5,700.0	5,554.9	5,571.9	5,571.9	26.6	12.4	114.61	400.8	-1,020.8	616.6	579.3	37.27	16.545		
5,800.0	5,653.9	5,670.9	5,670.9	26.9	12.6	115.87	400.8	-1,020.8	622.5	585.0	37.57	16.569		
5,900.0	5,753.4	5,770.4	5,770.4	27.1	12.9	116.80	400.8	-1,020.8	627.2	589.3	37.87	16.559		
6,000.0	5,853.1	5,870.1	5,870.1	27.3	13.1	117.41	400.8	-1,020.8	630.3	592.1	38.17	16.511		
6,100.0	5,953.1	5,970.1	5,970.1	27.4	13.3	117.71	400.8	-1,020.8	631.9	593.4	38.48	16.422		
6,200.0	6,053.1	6,070.1	6,070.1	27.5	13.5	118.51	400.8	-1,020.8	632.0	593.2	38.79	16.292		

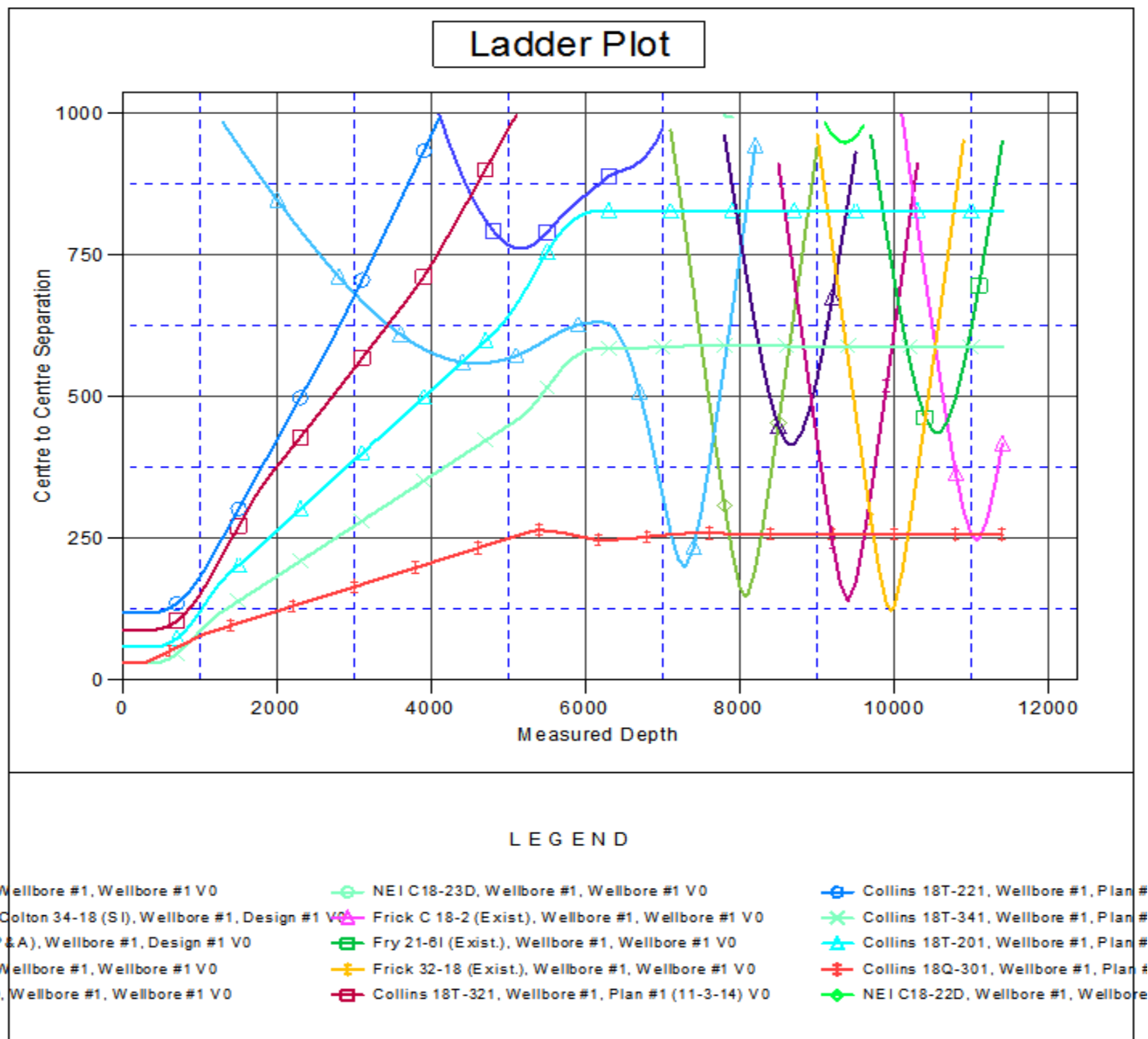
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-Reference													Offset Well Error:	0.0 ft
NEI C18-32D Pad Sec.18-T4N-R64W - Schneider/Dic/Colton 34-18 (SI) - Wellbore #1 - Design #1														
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	
6,300.0	6,153.0	6,170.0	6,170.0	27.6	13.8	18.62	400.8	-1,020.8	630.0	591.0	38.97	16.166		
6,400.0	6,252.0	6,269.0	6,269.0	27.7	14.0	19.36	400.8	-1,020.8	616.8	578.3	38.53	16.008		
6,500.0	6,348.2	6,365.2	6,365.2	27.7	14.2	20.90	400.8	-1,020.8	591.6	554.1	37.47	15.789		
6,600.0	6,440.2	6,457.2	6,457.2	27.7	14.4	23.47	400.8	-1,020.8	555.0	519.1	35.83	15.487		
6,700.0	6,526.3	6,543.3	6,543.3	27.8	14.6	27.49	400.8	-1,020.8	508.0	474.2	33.76	15.044		
6,800.0	6,605.0	6,622.0	6,622.0	27.8	14.8	33.59	400.8	-1,020.8	452.1	420.5	31.55	14.327		
6,900.0	6,675.0	6,692.0	6,692.0	27.8	14.9	42.65	400.8	-1,020.8	389.4	359.6	29.85	13.048		
7,000.0	6,735.1	6,752.1	6,752.1	27.9	15.1	55.26	400.8	-1,020.8	323.6	294.0	29.65	10.915		
7,100.0	6,784.3	6,801.3	6,801.3	28.0	15.2	70.14	400.8	-1,020.8	261.0	229.8	31.24	8.355		
7,200.0	6,821.7	6,838.7	6,838.7	28.3	15.3	83.39	400.8	-1,020.8	213.9	180.8	33.14	6.454		
7,277.1	6,842.0	6,859.0	6,859.0	28.5	15.3	90.00	400.8	-1,020.8	200.6	166.4	34.21	5.865 CC, ES		
7,300.0	6,846.6	6,863.6	6,863.6	28.6	15.3	91.19	400.8	-1,020.8	201.9	167.4	34.45	5.859 SF		
7,400.0	6,858.8	6,875.8	6,875.8	29.0	15.3	91.95	400.8	-1,020.8	234.6	199.1	35.48	6.612		
7,500.0	6,859.7	6,876.7	6,876.7	29.5	15.3	89.71	400.8	-1,020.8	298.9	262.5	36.42	8.209		
7,600.0	6,859.3	6,876.3	6,876.3	30.2	15.3	89.58	400.8	-1,020.8	379.1	341.5	37.59	10.086		
7,700.0	6,858.8	6,875.8	6,875.8	31.0	15.3	89.45	400.8	-1,020.8	466.9	428.1	38.85	12.018		
7,800.0	6,858.3	6,875.3	6,875.3	31.9	15.3	89.32	400.8	-1,020.8	558.9	518.7	40.20	13.902		
7,900.0	6,857.9	6,874.9	6,874.9	33.0	15.3	89.19	400.8	-1,020.8	653.2	611.6	41.62	15.694		
8,000.0	6,857.4	6,874.4	6,874.4	34.1	15.3	89.06	400.8	-1,020.8	749.0	705.9	43.10	17.379		
8,100.0	6,857.0	6,874.0	6,874.0	35.3	15.3	88.94	400.8	-1,020.8	845.8	801.1	44.62	18.953		
8,200.0	6,856.5	6,873.5	6,873.5	36.6	15.3	88.81	400.8	-1,020.8	943.2	897.0	46.19	20.418		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Collins 18Q-221
Project:	SEC.18-T4N-R64W	TVD Reference:	WELL @ 4798.0ft (Original Well Elev)
Reference Site:	Collins 4N64W18T Pad Sec.18-T4N-R64W	MD Reference:	WELL @ 4798.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Collins 18Q-221	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (11-3-14)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4798.0ft (Original Well Elev) Coordinates are relative to: Collins 18Q-221
 Offset Depths are relative to Offset Datum
 Central Meridian is -105.500000 °
 Coordinate System is US State Plane 1983, Colorado Northern Zone
 Grid Convergence at Surface is: 0.59°



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