

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: Thornton 21U-443

Surface Location: Thornton 21R-HZ Pad Sec.21-T7N-R66W

North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

Ground Elevation: 4970.0

+N/-S

+E/-W

Northing

Easting

Latitude

Longitude

Slot

0.0

0.0

1450162.13

3200265.05

40.566860

-104.779160

Original Well Elev WELL @ 4985.0ft (Original Well Elev)

WELLBORE TARGET DETAILS				
Name	TVD	+N/-S	+E/-W	Shape
BHL 500'FSL, 640'FEL	7505.0	-4481.1	950.4	Point

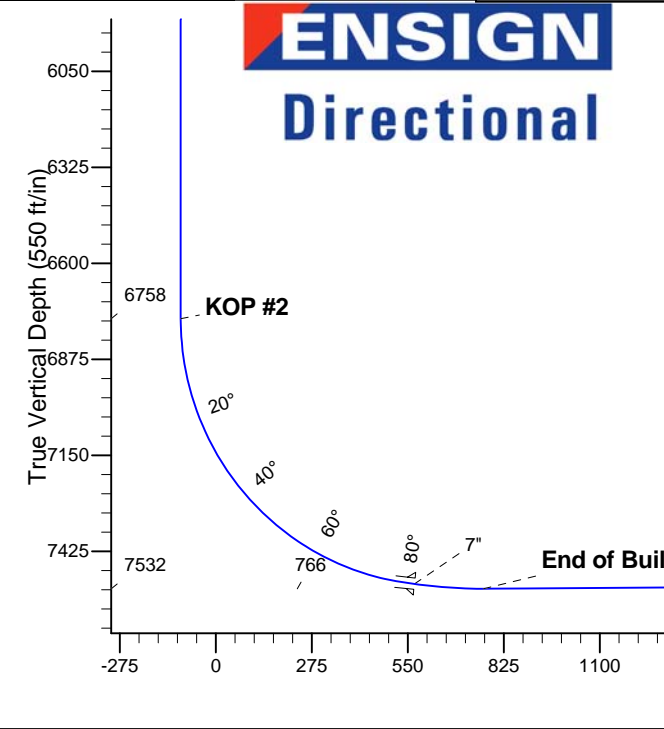
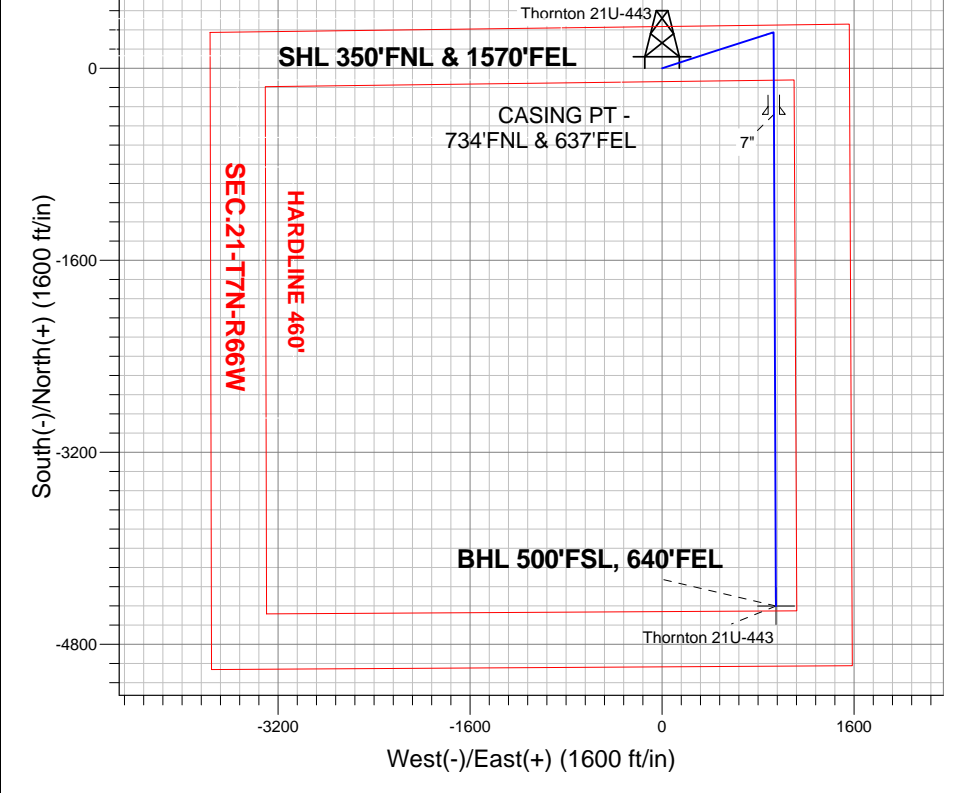
Azimuths to True North
Magnetic North: 8.69°

Magnetic Field
Strength: 53062.2srT
Dip Angle: 67.13°
Date: 11/29/2012
Model: IGRF2010

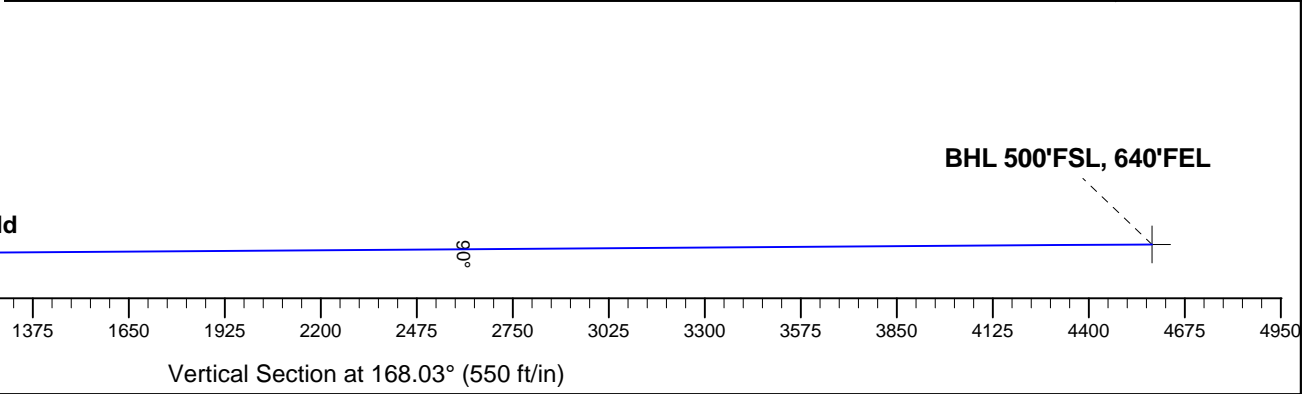
Thornton 21R-HZ Pad Sec.21-T7N-R66W
Thornton 21U-443
Plan #1 (11-29-12)
15:27, November 30 2012

ANNOTATIONS

TVD	MD	Annotation
800.0	800.0	KOP #1
6758.2	6856.5	KOP #2
7532.0	8178.4	End of Build



SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	800.0	0.00	0.00	800.0	0.0	0.0	0.00	0.00	0.0	
3	1399.9	12.00	72.12	1395.6	19.2	59.6	2.00	72.12	-6.4	
4	5498.4	12.00	72.12	5404.4	280.8	870.4	0.00	0.00	-94.1	
5	6098.3	0.00	0.00	6000.0	300.0	930.0	2.00	180.00	-100.5	
6	6856.5	0.00	0.00	6758.2	300.0	930.0	0.00	0.00	-100.5	
7	7976.5	84.00	179.76	7518.0	-384.1	932.9	7.50	179.76	569.3	
8	8050.5	84.00	179.76	7525.7	-457.7	933.2	0.00	0.00	641.3	
9	8178.4	90.40	179.76	7532.0	-585.4	933.7	5.00	-0.04	766.4	
10	12074.3	90.40	179.76	7505.0	-4481.1	950.4	0.00	0.00	4580.8	BHL 500'FSL, 640'FEL





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.21-T7N-R66W

Thornton 21R-HZ Pad Sec.21-T7N-R66W

Thornton 21U-443

Wellbore #1

Plan: Plan #1 (11-29-12)

Standard Planning Report

30 November, 2012

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 21U-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	North Reference:	True
Well:	Thornton 21U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-29-12)		

Project	SEC.21-T7N-R66W, Weld County, Colorado		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site		Thornton 21R-HZ Pad Sec.21-T7N-R66W			
Site Position:		Northing:	1,450,103.21 ft	Latitude:	40.566700
From:	Lat/Long	Easting:	3,200,184.96 ft	Longitude:	-104.779450
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.47 °

Well	Thornton 21U-443					
Well Position	+N-S	58.3 ft	Northing:	1,450,162.13 ft	Latitude:	40.566860
	+E-W	80.6 ft	Easting:	3,200,265.05 ft	Longitude:	-104.779160
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,970.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/29/2012	8.69	67.13	53,062

Design	Plan #1 (11-29-12)			
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	168.03

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	
800.0	0.00	0.00	800.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,399.9	12.00	72.12	1,395.6	19.2	59.6	2.00	2.00	0.00	72.12	
5,498.4	12.00	72.12	5,404.4	280.8	870.4	0.00	0.00	0.00	0.00	
6,098.3	0.00	0.00	6,000.0	300.0	930.0	2.00	-2.00	0.00	180.00	
6,856.5	0.00	0.00	6,758.2	300.0	930.0	0.00	0.00	0.00	0.00	
7,976.5	84.00	179.76	7,518.0	-384.1	932.9	7.50	7.50	0.00	179.76	
8,050.5	84.00	179.76	7,525.7	-457.7	933.2	0.00	0.00	0.00	0.00	
8,178.4	90.40	179.76	7,532.0	-585.4	933.7	5.00	5.00	0.00	-0.04	
12,074.3	90.40	179.76	7,505.0	-4,481.1	950.4	0.00	0.00	0.00	0.00	BHL 500'FSL, 640°F

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Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	North Reference:	True
Well:	Thornton 21U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-29-12)		

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
40.0	0.00	0.00	40.0	0.0	0.0	0.0	0.00	0.00	0.00
80.0	0.00	0.00	80.0	0.0	0.0	0.0	0.00	0.00	0.00
120.0	0.00	0.00	120.0	0.0	0.0	0.0	0.00	0.00	0.00
160.0	0.00	0.00	160.0	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
240.0	0.00	0.00	240.0	0.0	0.0	0.0	0.00	0.00	0.00
280.0	0.00	0.00	280.0	0.0	0.0	0.0	0.00	0.00	0.00
320.0	0.00	0.00	320.0	0.0	0.0	0.0	0.00	0.00	0.00
360.0	0.00	0.00	360.0	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
440.0	0.00	0.00	440.0	0.0	0.0	0.0	0.00	0.00	0.00
480.0	0.00	0.00	480.0	0.0	0.0	0.0	0.00	0.00	0.00
520.0	0.00	0.00	520.0	0.0	0.0	0.0	0.00	0.00	0.00
560.0	0.00	0.00	560.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
640.0	0.00	0.00	640.0	0.0	0.0	0.0	0.00	0.00	0.00
680.0	0.00	0.00	680.0	0.0	0.0	0.0	0.00	0.00	0.00
720.0	0.00	0.00	720.0	0.0	0.0	0.0	0.00	0.00	0.00
760.0	0.00	0.00	760.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
840.0	0.80	72.12	840.0	0.1	0.3	0.0	2.00	2.00	0.00
880.0	1.60	72.12	880.0	0.3	1.1	-0.1	2.00	2.00	0.00
920.0	2.40	72.12	920.0	0.8	2.4	-0.3	2.00	2.00	0.00
960.0	3.20	72.12	959.9	1.4	4.3	-0.5	2.00	2.00	0.00
1,000.0	4.00	72.12	999.8	2.1	6.6	-0.7	2.00	2.00	0.00
1,040.0	4.80	72.12	1,039.7	3.1	9.6	-1.0	2.00	2.00	0.00
1,080.0	5.60	72.12	1,079.6	4.2	13.0	-1.4	2.00	2.00	0.00
1,120.0	6.40	72.12	1,119.3	5.5	17.0	-1.8	2.00	2.00	0.00
1,160.0	7.20	72.12	1,159.1	6.9	21.5	-2.3	2.00	2.00	0.00
1,200.0	8.00	72.12	1,198.7	8.6	26.5	-2.9	2.00	2.00	0.00
1,240.0	8.80	72.12	1,238.3	10.4	32.1	-3.5	2.00	2.00	0.00
1,280.0	9.60	72.12	1,277.8	12.3	38.2	-4.1	2.00	2.00	0.00
1,320.0	10.40	72.12	1,317.1	14.4	44.8	-4.8	2.00	2.00	0.00
1,360.0	11.20	72.12	1,356.4	16.7	51.9	-5.6	2.00	2.00	0.00
1,399.9	12.00	72.12	1,395.6	19.2	59.6	-6.4	2.00	2.00	0.00
1,400.0	12.00	72.12	1,395.6	19.2	59.6	-6.4	0.00	0.00	0.00
1,440.0	12.00	72.12	1,434.7	21.8	67.5	-7.3	0.00	0.00	0.00
1,480.0	12.00	72.12	1,473.9	24.3	75.4	-8.2	0.00	0.00	0.00
1,520.0	12.00	72.12	1,513.0	26.9	83.3	-9.0	0.00	0.00	0.00
1,560.0	12.00	72.12	1,552.1	29.4	91.2	-9.9	0.00	0.00	0.00
1,600.0	12.00	72.12	1,591.3	32.0	99.1	-10.7	0.00	0.00	0.00
1,640.0	12.00	72.12	1,630.4	34.5	107.1	-11.6	0.00	0.00	0.00
1,680.0	12.00	72.12	1,669.5	37.1	115.0	-12.4	0.00	0.00	0.00
1,720.0	12.00	72.12	1,708.6	39.6	122.9	-13.3	0.00	0.00	0.00
1,760.0	12.00	72.12	1,747.8	42.2	130.8	-14.1	0.00	0.00	0.00
1,800.0	12.00	72.12	1,786.9	44.7	138.7	-15.0	0.00	0.00	0.00
1,840.0	12.00	72.12	1,826.0	47.3	146.6	-15.9	0.00	0.00	0.00
1,880.0	12.00	72.12	1,865.1	49.9	154.5	-16.7	0.00	0.00	0.00
1,920.0	12.00	72.12	1,904.3	52.4	162.5	-17.6	0.00	0.00	0.00
1,960.0	12.00	72.12	1,943.4	55.0	170.4	-18.4	0.00	0.00	0.00
2,000.0	12.00	72.12	1,982.5	57.5	178.3	-19.3	0.00	0.00	0.00

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Well:	Thornton 21U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-29-12)		

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)
2,040.0	12.00	72.12	2,021.6	60.1	186.2	-20.1	0.00	0.00	0.00
2,080.0	12.00	72.12	2,060.8	62.6	194.1	-21.0	0.00	0.00	0.00
2,120.0	12.00	72.12	2,099.9	65.2	202.0	-21.8	0.00	0.00	0.00
2,160.0	12.00	72.12	2,139.0	67.7	209.9	-22.7	0.00	0.00	0.00
2,200.0	12.00	72.12	2,178.1	70.3	217.9	-23.5	0.00	0.00	0.00
2,240.0	12.00	72.12	2,217.3	72.8	225.8	-24.4	0.00	0.00	0.00
2,280.0	12.00	72.12	2,256.4	75.4	233.7	-25.3	0.00	0.00	0.00
2,320.0	12.00	72.12	2,295.5	77.9	241.6	-26.1	0.00	0.00	0.00
2,360.0	12.00	72.12	2,334.6	80.5	249.5	-27.0	0.00	0.00	0.00
2,400.0	12.00	72.12	2,373.8	83.0	257.4	-27.8	0.00	0.00	0.00
2,440.0	12.00	72.12	2,412.9	85.6	265.3	-28.7	0.00	0.00	0.00
2,480.0	12.00	72.12	2,452.0	88.1	273.3	-29.5	0.00	0.00	0.00
2,520.0	12.00	72.12	2,491.2	90.7	281.2	-30.4	0.00	0.00	0.00
2,560.0	12.00	72.12	2,530.3	93.3	289.1	-31.2	0.00	0.00	0.00
2,600.0	12.00	72.12	2,569.4	95.8	297.0	-32.1	0.00	0.00	0.00
2,640.0	12.00	72.12	2,608.5	98.4	304.9	-33.0	0.00	0.00	0.00
2,680.0	12.00	72.12	2,647.7	100.9	312.8	-33.8	0.00	0.00	0.00
2,720.0	12.00	72.12	2,686.8	103.5	320.7	-34.7	0.00	0.00	0.00
2,760.0	12.00	72.12	2,725.9	106.0	328.7	-35.5	0.00	0.00	0.00
2,800.0	12.00	72.12	2,765.0	108.6	336.6	-36.4	0.00	0.00	0.00
2,840.0	12.00	72.12	2,804.2	111.1	344.5	-37.2	0.00	0.00	0.00
2,880.0	12.00	72.12	2,843.3	113.7	352.4	-38.1	0.00	0.00	0.00
2,920.0	12.00	72.12	2,882.4	116.2	360.3	-38.9	0.00	0.00	0.00
2,960.0	12.00	72.12	2,921.5	118.8	368.2	-39.8	0.00	0.00	0.00
3,000.0	12.00	72.12	2,960.7	121.3	376.1	-40.7	0.00	0.00	0.00
3,040.0	12.00	72.12	2,999.8	123.9	384.1	-41.5	0.00	0.00	0.00
3,080.0	12.00	72.12	3,038.9	126.4	392.0	-42.4	0.00	0.00	0.00
3,120.0	12.00	72.12	3,078.0	129.0	399.9	-43.2	0.00	0.00	0.00
3,160.0	12.00	72.12	3,117.2	131.5	407.8	-44.1	0.00	0.00	0.00
3,200.0	12.00	72.12	3,156.3	134.1	415.7	-44.9	0.00	0.00	0.00
3,240.0	12.00	72.12	3,195.4	136.7	423.6	-45.8	0.00	0.00	0.00
3,280.0	12.00	72.12	3,234.6	139.2	431.5	-46.6	0.00	0.00	0.00
3,320.0	12.00	72.12	3,273.7	141.8	439.4	-47.5	0.00	0.00	0.00
3,360.0	12.00	72.12	3,312.8	144.3	447.4	-48.4	0.00	0.00	0.00
3,400.0	12.00	72.12	3,351.9	146.9	455.3	-49.2	0.00	0.00	0.00
3,440.0	12.00	72.12	3,391.1	149.4	463.2	-50.1	0.00	0.00	0.00
3,480.0	12.00	72.12	3,430.2	152.0	471.1	-50.9	0.00	0.00	0.00
3,520.0	12.00	72.12	3,469.3	154.5	479.0	-51.8	0.00	0.00	0.00
3,560.0	12.00	72.12	3,508.4	157.1	486.9	-52.6	0.00	0.00	0.00
3,600.0	12.00	72.12	3,547.6	159.6	494.8	-53.5	0.00	0.00	0.00
3,640.0	12.00	72.12	3,586.7	162.2	502.8	-54.3	0.00	0.00	0.00
3,680.0	12.00	72.12	3,625.8	164.7	510.7	-55.2	0.00	0.00	0.00
3,720.0	12.00	72.12	3,664.9	167.3	518.6	-56.1	0.00	0.00	0.00
3,760.0	12.00	72.12	3,704.1	169.8	526.5	-56.9	0.00	0.00	0.00
3,800.0	12.00	72.12	3,743.2	172.4	534.4	-57.8	0.00	0.00	0.00
3,840.0	12.00	72.12	3,782.3	174.9	542.3	-58.6	0.00	0.00	0.00
3,880.0	12.00	72.12	3,821.4	177.5	550.2	-59.5	0.00	0.00	0.00
3,920.0	12.00	72.12	3,860.6	180.1	558.2	-60.3	0.00	0.00	0.00
3,960.0	12.00	72.12	3,899.7	182.6	566.1	-61.2	0.00	0.00	0.00
4,000.0	12.00	72.12	3,938.8	185.2	574.0	-62.0	0.00	0.00	0.00
4,040.0	12.00	72.12	3,977.9	187.7	581.9	-62.9	0.00	0.00	0.00
4,080.0	12.00	72.12	4,017.1	190.3	589.8	-63.8	0.00	0.00	0.00
4,120.0	12.00	72.12	4,056.2	192.8	597.7	-64.6	0.00	0.00	0.00

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Planned Survey									
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4,160.0	12.00	72.12	4,095.3	195.4	605.6	-65.5	0.00	0.00	0.00
4,200.0	12.00	72.12	4,134.5	197.9	613.6	-66.3	0.00	0.00	0.00
4,240.0	12.00	72.12	4,173.6	200.5	621.5	-67.2	0.00	0.00	0.00
4,280.0	12.00	72.12	4,212.7	203.0	629.4	-68.0	0.00	0.00	0.00
4,320.0	12.00	72.12	4,251.8	205.6	637.3	-68.9	0.00	0.00	0.00
4,360.0	12.00	72.12	4,291.0	208.1	645.2	-69.7	0.00	0.00	0.00
4,400.0	12.00	72.12	4,330.1	210.7	653.1	-70.6	0.00	0.00	0.00
4,440.0	12.00	72.12	4,369.2	213.2	661.0	-71.5	0.00	0.00	0.00
4,480.0	12.00	72.12	4,408.3	215.8	669.0	-72.3	0.00	0.00	0.00
4,520.0	12.00	72.12	4,447.5	218.3	676.9	-73.2	0.00	0.00	0.00
4,560.0	12.00	72.12	4,486.6	220.9	684.8	-74.0	0.00	0.00	0.00
4,600.0	12.00	72.12	4,525.7	223.5	692.7	-74.9	0.00	0.00	0.00
4,640.0	12.00	72.12	4,564.8	226.0	700.6	-75.7	0.00	0.00	0.00
4,680.0	12.00	72.12	4,604.0	228.6	708.5	-76.6	0.00	0.00	0.00
4,720.0	12.00	72.12	4,643.1	231.1	716.4	-77.4	0.00	0.00	0.00
4,760.0	12.00	72.12	4,682.2	233.7	724.4	-78.3	0.00	0.00	0.00
4,800.0	12.00	72.12	4,721.3	236.2	732.3	-79.2	0.00	0.00	0.00
4,840.0	12.00	72.12	4,760.5	238.8	740.2	-80.0	0.00	0.00	0.00
4,880.0	12.00	72.12	4,799.6	241.3	748.1	-80.9	0.00	0.00	0.00
4,920.0	12.00	72.12	4,838.7	243.9	756.0	-81.7	0.00	0.00	0.00
4,960.0	12.00	72.12	4,877.8	246.4	763.9	-82.6	0.00	0.00	0.00
5,000.0	12.00	72.12	4,917.0	249.0	771.8	-83.4	0.00	0.00	0.00
5,040.0	12.00	72.12	4,956.1	251.5	779.7	-84.3	0.00	0.00	0.00
5,080.0	12.00	72.12	4,995.2	254.1	787.7	-85.1	0.00	0.00	0.00
5,120.0	12.00	72.12	5,034.4	256.6	795.6	-86.0	0.00	0.00	0.00
5,160.0	12.00	72.12	5,073.5	259.2	803.5	-86.9	0.00	0.00	0.00
5,200.0	12.00	72.12	5,112.6	261.7	811.4	-87.7	0.00	0.00	0.00
5,240.0	12.00	72.12	5,151.7	264.3	819.3	-88.6	0.00	0.00	0.00
5,280.0	12.00	72.12	5,190.9	266.8	827.2	-89.4	0.00	0.00	0.00
5,320.0	12.00	72.12	5,230.0	269.4	835.1	-90.3	0.00	0.00	0.00
5,360.0	12.00	72.12	5,269.1	272.0	843.1	-91.1	0.00	0.00	0.00
5,400.0	12.00	72.12	5,308.2	274.5	851.0	-92.0	0.00	0.00	0.00
5,440.0	12.00	72.12	5,347.4	277.1	858.9	-92.8	0.00	0.00	0.00
5,480.0	12.00	72.12	5,386.5	279.6	866.8	-93.7	0.00	0.00	0.00
5,498.4	12.00	72.12	5,404.4	280.8	870.4	-94.1	0.00	0.00	0.00
5,520.0	11.57	72.12	5,425.6	282.1	874.6	-94.5	2.00	-2.00	0.00
5,560.0	10.77	72.12	5,464.9	284.5	882.0	-95.3	2.00	-2.00	0.00
5,600.0	9.97	72.12	5,504.2	286.7	888.9	-96.1	2.00	-2.00	0.00
5,640.0	9.17	72.12	5,543.7	288.8	895.2	-96.8	2.00	-2.00	0.00
5,680.0	8.37	72.12	5,583.2	290.6	901.0	-97.4	2.00	-2.00	0.00
5,720.0	7.57	72.12	5,622.8	292.3	906.3	-98.0	2.00	-2.00	0.00
5,760.0	6.77	72.12	5,662.5	293.9	911.0	-98.5	2.00	-2.00	0.00
5,800.0	5.97	72.12	5,702.2	295.2	915.2	-98.9	2.00	-2.00	0.00
5,840.0	5.17	72.12	5,742.1	296.4	918.9	-99.3	2.00	-2.00	0.00
5,880.0	4.37	72.12	5,781.9	297.4	922.1	-99.7	2.00	-2.00	0.00
5,920.0	3.57	72.12	5,821.8	298.3	924.7	-100.0	2.00	-2.00	0.00
5,960.0	2.77	72.12	5,861.8	299.0	926.8	-100.2	2.00	-2.00	0.00
6,000.0	1.97	72.12	5,901.7	299.5	928.4	-100.4	2.00	-2.00	0.00
6,040.0	1.17	72.12	5,941.7	299.8	929.4	-100.5	2.00	-2.00	0.00
6,080.0	0.37	72.12	5,981.7	300.0	929.9	-100.5	2.00	-2.00	0.00
6,098.3	0.00	0.00	6,000.0	300.0	930.0	-100.5	2.00	-2.00	0.00
6,120.0	0.00	0.00	6,021.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,160.0	0.00	0.00	6,061.7	300.0	930.0	-100.5	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 21U-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	North Reference:	True
Well:	Thornton 21U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-29-12)		

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)
6,200.0	0.00	0.00	6,101.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,240.0	0.00	0.00	6,141.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,280.0	0.00	0.00	6,181.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,320.0	0.00	0.00	6,221.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,360.0	0.00	0.00	6,261.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,400.0	0.00	0.00	6,301.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,440.0	0.00	0.00	6,341.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,480.0	0.00	0.00	6,381.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,520.0	0.00	0.00	6,421.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,560.0	0.00	0.00	6,461.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,600.0	0.00	0.00	6,501.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,640.0	0.00	0.00	6,541.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,680.0	0.00	0.00	6,581.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,720.0	0.00	0.00	6,621.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,760.0	0.00	0.00	6,661.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,800.0	0.00	0.00	6,701.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,840.0	0.00	0.00	6,741.7	300.0	930.0	-100.5	0.00	0.00	0.00
6,856.5	0.00	0.00	6,758.2	300.0	930.0	-100.5	0.00	0.00	0.00
KOP #2									
6,880.0	1.76	179.76	6,781.7	299.6	930.0	-100.2	7.50	7.50	0.00
6,920.0	4.76	179.76	6,821.6	297.4	930.0	-97.9	7.50	7.50	0.00
6,960.0	7.76	179.76	6,861.4	293.0	930.0	-93.7	7.50	7.50	0.00
7,000.0	10.76	179.76	6,900.9	286.6	930.1	-87.4	7.50	7.50	0.00
7,040.0	13.76	179.76	6,940.0	278.1	930.1	-79.1	7.50	7.50	0.00
7,080.0	16.76	179.76	6,978.5	267.5	930.1	-68.7	7.50	7.50	0.00
7,120.0	19.76	179.76	7,016.5	255.0	930.2	-56.5	7.50	7.50	0.00
7,160.0	22.76	179.76	7,053.8	240.5	930.2	-42.3	7.50	7.50	0.00
7,200.0	25.76	179.76	7,090.3	224.1	930.3	-26.2	7.50	7.50	0.00
7,240.0	28.76	179.76	7,125.8	205.8	930.4	-8.2	7.50	7.50	0.00
7,280.0	31.76	179.76	7,160.4	185.6	930.5	11.5	7.50	7.50	0.00
7,320.0	34.76	179.76	7,193.8	163.7	930.6	33.0	7.50	7.50	0.00
7,360.0	37.76	179.76	7,226.0	140.0	930.7	56.1	7.50	7.50	0.00
7,400.0	40.76	179.76	7,257.0	114.7	930.8	80.9	7.50	7.50	0.00
7,440.0	43.76	179.76	7,286.6	87.8	930.9	107.2	7.50	7.50	0.00
7,480.0	46.76	179.76	7,314.8	59.4	931.0	135.1	7.50	7.50	0.00
7,520.0	49.76	179.76	7,341.4	29.5	931.1	164.3	7.50	7.50	0.00
7,560.0	52.76	179.76	7,366.4	-1.7	931.3	194.8	7.50	7.50	0.00
7,600.0	55.76	179.76	7,389.8	-34.1	931.4	226.6	7.50	7.50	0.00
7,640.0	58.76	179.76	7,411.4	-67.8	931.5	259.6	7.50	7.50	0.00
7,680.0	61.76	179.76	7,431.2	-102.5	931.7	293.6	7.50	7.50	0.00
7,720.0	64.76	179.76	7,449.2	-138.2	931.8	328.5	7.50	7.50	0.00
7,760.0	67.76	179.76	7,465.3	-174.8	932.0	364.4	7.50	7.50	0.00
7,800.0	70.76	179.76	7,479.5	-212.2	932.1	401.0	7.50	7.50	0.00
7,840.0	73.76	179.76	7,491.7	-250.3	932.3	438.3	7.50	7.50	0.00
7,880.0	76.76	179.76	7,501.9	-289.0	932.5	476.2	7.50	7.50	0.00
7,920.0	79.76	179.76	7,510.0	-328.2	932.6	514.5	7.50	7.50	0.00
7,960.0	82.76	179.76	7,516.1	-367.7	932.8	553.2	7.50	7.50	0.00
7,976.5	84.00	179.76	7,518.0	-384.1	932.9	569.3	7.50	7.50	0.00
7"									
8,000.0	84.00	179.76	7,520.4	-407.4	933.0	592.1	0.00	0.00	0.00
8,040.0	84.00	179.76	7,524.6	-447.2	933.1	631.1	0.00	0.00	0.00
8,050.5	84.00	179.76	7,525.7	-457.7	933.2	641.3	0.00	0.00	0.00
8,080.0	85.47	179.76	7,528.4	-487.0	933.3	670.1	5.00	5.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 21U-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	North Reference:	True
Well:	Thornton 21U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-29-12)		

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)
8,120.0	87.47	179.76	7,530.9	-527.0	933.5	709.2	5.00	5.00	0.00
8,160.0	89.47	179.76	7,531.9	-566.9	933.6	748.3	5.00	5.00	0.00
8,178.4	90.39	179.76	7,532.0	-585.3	933.7	766.3	5.00	5.00	0.00
End of Build									
8,200.0	90.40	179.76	7,531.8	-606.9	933.8	787.5	0.01	0.01	0.00
8,240.0	90.40	179.76	7,531.5	-646.9	934.0	826.6	0.00	0.00	0.00
8,280.0	90.40	179.76	7,531.3	-686.9	934.1	865.8	0.00	0.00	0.00
8,320.0	90.40	179.76	7,531.0	-726.9	934.3	905.0	0.00	0.00	0.00
8,360.0	90.40	179.76	7,530.7	-766.9	934.5	944.1	0.00	0.00	0.00
8,400.0	90.40	179.76	7,530.4	-806.9	934.7	983.3	0.00	0.00	0.00
8,440.0	90.40	179.76	7,530.2	-846.9	934.8	1,022.5	0.00	0.00	0.00
8,480.0	90.40	179.76	7,529.9	-886.9	935.0	1,061.6	0.00	0.00	0.00
8,520.0	90.40	179.76	7,529.6	-926.9	935.2	1,100.8	0.00	0.00	0.00
8,560.0	90.40	179.76	7,529.3	-966.9	935.3	1,140.0	0.00	0.00	0.00
8,600.0	90.40	179.76	7,529.0	-1,006.9	935.5	1,179.1	0.00	0.00	0.00
8,640.0	90.40	179.76	7,528.8	-1,046.9	935.7	1,218.3	0.00	0.00	0.00
8,680.0	90.40	179.76	7,528.5	-1,086.9	935.9	1,257.4	0.00	0.00	0.00
8,720.0	90.40	179.76	7,528.2	-1,126.9	936.0	1,296.6	0.00	0.00	0.00
8,760.0	90.40	179.76	7,527.9	-1,166.9	936.2	1,335.8	0.00	0.00	0.00
8,800.0	90.40	179.76	7,527.7	-1,206.9	936.4	1,374.9	0.00	0.00	0.00
8,840.0	90.40	179.76	7,527.4	-1,246.9	936.5	1,414.1	0.00	0.00	0.00
8,880.0	90.40	179.76	7,527.1	-1,286.9	936.7	1,453.3	0.00	0.00	0.00
8,920.0	90.40	179.76	7,526.8	-1,326.9	936.9	1,492.4	0.00	0.00	0.00
8,960.0	90.40	179.76	7,526.6	-1,366.9	937.1	1,531.6	0.00	0.00	0.00
9,000.0	90.40	179.76	7,526.3	-1,406.9	937.2	1,570.8	0.00	0.00	0.00
9,040.0	90.40	179.76	7,526.0	-1,446.9	937.4	1,609.9	0.00	0.00	0.00
9,080.0	90.40	179.76	7,525.7	-1,486.9	937.6	1,649.1	0.00	0.00	0.00
9,120.0	90.40	179.76	7,525.4	-1,526.9	937.7	1,688.2	0.00	0.00	0.00
9,160.0	90.40	179.76	7,525.2	-1,566.9	937.9	1,727.4	0.00	0.00	0.00
9,200.0	90.40	179.76	7,524.9	-1,606.9	938.1	1,766.6	0.00	0.00	0.00
9,240.0	90.40	179.76	7,524.6	-1,646.9	938.3	1,805.7	0.00	0.00	0.00
9,280.0	90.40	179.76	7,524.3	-1,686.9	938.4	1,844.9	0.00	0.00	0.00
9,320.0	90.40	179.76	7,524.1	-1,726.9	938.6	1,884.1	0.00	0.00	0.00
9,360.0	90.40	179.76	7,523.8	-1,766.9	938.8	1,923.2	0.00	0.00	0.00
9,400.0	90.40	179.76	7,523.5	-1,806.9	938.9	1,962.4	0.00	0.00	0.00
9,440.0	90.40	179.76	7,523.2	-1,846.9	939.1	2,001.6	0.00	0.00	0.00
9,480.0	90.40	179.76	7,523.0	-1,886.9	939.3	2,040.7	0.00	0.00	0.00
9,520.0	90.40	179.76	7,522.7	-1,926.9	939.4	2,079.9	0.00	0.00	0.00
9,560.0	90.40	179.76	7,522.4	-1,966.9	939.6	2,119.0	0.00	0.00	0.00
9,600.0	90.40	179.76	7,522.1	-2,006.9	939.8	2,158.2	0.00	0.00	0.00
9,640.0	90.40	179.76	7,521.8	-2,046.9	940.0	2,197.4	0.00	0.00	0.00
9,680.0	90.40	179.76	7,521.6	-2,086.9	940.1	2,236.5	0.00	0.00	0.00
9,720.0	90.40	179.76	7,521.3	-2,126.9	940.3	2,275.7	0.00	0.00	0.00
9,760.0	90.40	179.76	7,521.0	-2,166.9	940.5	2,314.9	0.00	0.00	0.00
9,800.0	90.40	179.76	7,520.7	-2,206.9	940.6	2,354.0	0.00	0.00	0.00
9,840.0	90.40	179.76	7,520.5	-2,246.9	940.8	2,393.2	0.00	0.00	0.00
9,880.0	90.40	179.76	7,520.2	-2,286.9	941.0	2,432.4	0.00	0.00	0.00
9,920.0	90.40	179.76	7,519.9	-2,326.9	941.2	2,471.5	0.00	0.00	0.00
9,960.0	90.40	179.76	7,519.6	-2,366.9	941.3	2,510.7	0.00	0.00	0.00
10,000.0	90.40	179.76	7,519.4	-2,406.9	941.5	2,549.8	0.00	0.00	0.00
10,040.0	90.40	179.76	7,519.1	-2,446.9	941.7	2,589.0	0.00	0.00	0.00
10,080.0	90.40	179.76	7,518.8	-2,486.9	941.8	2,628.2	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 21U-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	North Reference:	True
Well:	Thornton 21U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-29-12)		

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)
10,120.0	90.40	179.76	7,518.5	-2,526.9	942.0	2,667.3	0.00	0.00	0.00
10,160.0	90.40	179.76	7,518.2	-2,566.9	942.2	2,706.5	0.00	0.00	0.00
10,200.0	90.40	179.76	7,518.0	-2,606.9	942.4	2,745.7	0.00	0.00	0.00
10,240.0	90.40	179.76	7,517.7	-2,646.9	942.5	2,784.8	0.00	0.00	0.00
10,280.0	90.40	179.76	7,517.4	-2,686.9	942.7	2,824.0	0.00	0.00	0.00
10,320.0	90.40	179.76	7,517.1	-2,726.9	942.9	2,863.2	0.00	0.00	0.00
10,360.0	90.40	179.76	7,516.9	-2,766.9	943.0	2,902.3	0.00	0.00	0.00
10,400.0	90.40	179.76	7,516.6	-2,806.9	943.2	2,941.5	0.00	0.00	0.00
10,440.0	90.40	179.76	7,516.3	-2,846.9	943.4	2,980.7	0.00	0.00	0.00
10,480.0	90.40	179.76	7,516.0	-2,886.9	943.5	3,019.8	0.00	0.00	0.00
10,520.0	90.40	179.76	7,515.8	-2,926.9	943.7	3,059.0	0.00	0.00	0.00
10,560.0	90.40	179.76	7,515.5	-2,966.9	943.9	3,098.1	0.00	0.00	0.00
10,600.0	90.40	179.76	7,515.2	-3,006.9	944.1	3,137.3	0.00	0.00	0.00
10,640.0	90.40	179.76	7,514.9	-3,046.9	944.2	3,176.5	0.00	0.00	0.00
10,680.0	90.40	179.76	7,514.6	-3,086.9	944.4	3,215.6	0.00	0.00	0.00
10,720.0	90.40	179.76	7,514.4	-3,126.9	944.6	3,254.8	0.00	0.00	0.00
10,760.0	90.40	179.76	7,514.1	-3,166.9	944.7	3,294.0	0.00	0.00	0.00
10,800.0	90.40	179.76	7,513.8	-3,206.9	944.9	3,333.1	0.00	0.00	0.00
10,840.0	90.40	179.76	7,513.5	-3,246.9	945.1	3,372.3	0.00	0.00	0.00
10,880.0	90.40	179.76	7,513.3	-3,286.9	945.3	3,411.5	0.00	0.00	0.00
10,920.0	90.40	179.76	7,513.0	-3,326.9	945.4	3,450.6	0.00	0.00	0.00
10,960.0	90.40	179.76	7,512.7	-3,366.9	945.6	3,489.8	0.00	0.00	0.00
11,000.0	90.40	179.76	7,512.4	-3,406.9	945.8	3,528.9	0.00	0.00	0.00
11,040.0	90.40	179.76	7,512.2	-3,446.9	945.9	3,568.1	0.00	0.00	0.00
11,080.0	90.40	179.76	7,511.9	-3,486.9	946.1	3,607.3	0.00	0.00	0.00
11,120.0	90.40	179.76	7,511.6	-3,526.9	946.3	3,646.4	0.00	0.00	0.00
11,160.0	90.40	179.76	7,511.3	-3,566.9	946.5	3,685.6	0.00	0.00	0.00
11,200.0	90.40	179.76	7,511.1	-3,606.8	946.6	3,724.8	0.00	0.00	0.00
11,240.0	90.40	179.76	7,510.8	-3,646.8	946.8	3,763.9	0.00	0.00	0.00
11,280.0	90.40	179.76	7,510.5	-3,686.8	947.0	3,803.1	0.00	0.00	0.00
11,320.0	90.40	179.76	7,510.2	-3,726.8	947.1	3,842.3	0.00	0.00	0.00
11,360.0	90.40	179.76	7,509.9	-3,766.8	947.3	3,881.4	0.00	0.00	0.00
11,400.0	90.40	179.76	7,509.7	-3,806.8	947.5	3,920.6	0.00	0.00	0.00
11,440.0	90.40	179.76	7,509.4	-3,846.8	947.7	3,959.7	0.00	0.00	0.00
11,480.0	90.40	179.76	7,509.1	-3,886.8	947.8	3,998.9	0.00	0.00	0.00
11,520.0	90.40	179.76	7,508.8	-3,926.8	948.0	4,038.1	0.00	0.00	0.00
11,560.0	90.40	179.76	7,508.6	-3,966.8	948.2	4,077.2	0.00	0.00	0.00
11,600.0	90.40	179.76	7,508.3	-4,006.8	948.3	4,116.4	0.00	0.00	0.00
11,640.0	90.40	179.76	7,508.0	-4,046.8	948.5	4,155.6	0.00	0.00	0.00
11,680.0	90.40	179.76	7,507.7	-4,086.8	948.7	4,194.7	0.00	0.00	0.00
11,720.0	90.40	179.76	7,507.5	-4,126.8	948.8	4,233.9	0.00	0.00	0.00
11,760.0	90.40	179.76	7,507.2	-4,166.8	949.0	4,273.1	0.00	0.00	0.00
11,800.0	90.40	179.76	7,506.9	-4,206.8	949.2	4,312.2	0.00	0.00	0.00
11,840.0	90.40	179.76	7,506.6	-4,246.8	949.4	4,351.4	0.00	0.00	0.00
11,880.0	90.40	179.76	7,506.3	-4,286.8	949.5	4,390.6	0.00	0.00	0.00
11,920.0	90.40	179.76	7,506.1	-4,326.8	949.7	4,429.7	0.00	0.00	0.00
11,960.0	90.40	179.76	7,505.8	-4,366.8	949.9	4,468.9	0.00	0.00	0.00
12,000.0	90.40	179.76	7,505.5	-4,406.8	950.0	4,508.0	0.00	0.00	0.00
12,040.0	90.40	179.76	7,505.2	-4,446.8	950.2	4,547.2	0.00	0.00	0.00
12,074.3	90.40	179.76	7,505.0	-4,481.1	950.4	4,580.8	0.00	0.00	0.00
BHL 500°FSL, 640°FEL									

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 21U-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	North Reference:	True
Well:	Thornton 21U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-29-12)		

Targets

Target Name

- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
BHL 500'FSL, 640'FE	0.00	0.00	7,505.0	-4,481.1	950.4	1,445,689.01	3,201,251.78	40.554560	-104.775740
- plan hits target center									
- Point									

Casing Points

Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter
(ft)	(ft)		(")	(")
7,976.5	7,518.0	7"	7	7-1/2

Plan Annotations

Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
800.0	800.0	0.0	0.0	KOP #1
6,856.5	6,758.2	300.0	930.0	KOP #2
8,178.4	7,532.0	-585.3	933.7	End of Build



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.21-T7N-R66W

Thornton 21R-HZ Pad Sec.21-T7N-R66W

Thornton 21U-443

Wellbore #1

Plan #1 (11-29-12)

Anticollision Report

30 November, 2012



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (11-29-12)
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	Stations
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 1,000.0ft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic

Survey Tool Program		Date	11/30/2012		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.0	12,074.3	Plan #1 (11-29-12) (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						
Thornton 21R-HZ Pad Sec.21-T7N-R66W						
Thornton 21R-223 - Wellbore #1 - Plan #1 (11-29-12)	800.0	800.0	30.6	27.2	9.065	CC, ES
Thornton 21R-223 - Wellbore #1 - Plan #1 (11-29-12)	12,074.3	11,864.5	473.4	307.5	2.854	SF
Thornton 21R-403 - Wellbore #1 - Plan #1 (11-29-12)	800.0	800.0	99.4	96.1	29.494	CC, ES
Thornton 21R-403 - Wellbore #1 - Plan #1 (11-29-12)	12,074.3	12,006.2	880.9	703.8	4.973	SF
Thornton 21U-203 - Wellbore #1 - Plan #1 (11-29-12)	200.0	200.0	27.8	27.1	41.203	CC, ES
Thornton 21U-203 - Wellbore #1 - Plan #1 (11-29-12)	12,074.3	11,993.9	470.8	300.1	2.758	SF

Offset Design	Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21R-223 - Wellbore #1 - Plan #1 (11-29-12)												Offset Site Error:	0.0ft
Survey Program:	0-MWD												Offset Well Error:	0.0ft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
0.0	0.0	0.0	0.0	0.0	0.0	-90.00	0.0	-30.6	30.6					
100.0	100.0	100.0	100.0	0.1	0.1	-90.00	0.0	-30.6	30.6	30.3	0.22	135.971		
200.0	200.0	200.0	200.0	0.3	0.3	-90.00	0.0	-30.6	30.6	29.9	0.67	45.324		
300.0	300.0	300.0	300.0	0.6	0.6	-90.00	0.0	-30.6	30.6	29.4	1.12	27.194		
400.0	400.0	400.0	400.0	0.8	0.8	-90.00	0.0	-30.6	30.6	29.0	1.57	19.424		
500.0	500.0	500.0	500.0	1.0	1.0	-90.00	0.0	-30.6	30.6	28.5	2.02	15.108		
600.0	600.0	600.0	600.0	1.2	1.2	-90.00	0.0	-30.6	30.6	28.1	2.47	12.361		
700.0	700.0	700.0	700.0	1.5	1.5	-90.00	0.0	-30.6	30.6	27.6	2.92	10.459		
800.0	800.0	800.0	800.0	1.7	1.7	-90.00	0.0	-30.6	30.6	27.2	3.37	9.065	CC, ES	
900.0	900.0	900.0	900.0	1.9	1.9	-163.06	0.0	-30.6	32.2	28.4	3.81	8.455		
1,000.0	999.8	999.8	999.8	2.1	2.1	-165.38	0.0	-30.6	37.3	33.0	4.24	8.783		
1,100.0	1,099.5	1,100.9	1,100.9	2.3	2.4	-167.21	0.9	-29.0	44.2	39.5	4.67	9.461		
1,200.0	1,198.7	1,202.2	1,202.0	2.6	2.6	-167.72	3.6	-24.4	51.3	46.2	5.08	10.085		
1,300.0	1,297.5	1,303.7	1,303.1	2.9	2.8	-167.39	8.0	-16.6	58.6	53.1	5.50	10.640		
1,399.9	1,395.6	1,405.3	1,404.0	3.2	3.1	-166.49	14.3	-5.8	66.1	60.1	5.93	11.130		
1,500.0	1,493.4	1,505.1	1,502.8	3.6	3.3	-165.52	21.4	6.5	73.6	67.2	6.40	11.491		
1,600.0	1,591.3	1,604.8	1,601.5	3.9	3.6	-164.73	28.4	18.7	81.1	74.3	6.89	11.777		
1,700.0	1,689.1	1,704.6	1,700.2	4.3	3.9	-164.07	35.5	31.0	88.7	81.3	7.39	12.009		
1,800.0	1,786.9	1,804.3	1,798.9	4.8	4.2	-163.51	42.6	43.2	96.3	88.4	7.89	12.196		
1,900.0	1,884.7	1,904.0	1,897.6	5.2	4.5	-163.04	49.6	55.5	103.9	95.4	8.41	12.350		
2,000.0	1,982.5	2,003.7	1,996.3	5.6	4.8	-162.63	56.7	67.7	111.4	102.5	8.93	12.477		

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 Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21R-223 - Wellbore #1 - Plan #1 (11-29-12)													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
2,100.0	2,080.3	2,103.4	2,095.0	6.0	5.1	-162.27		63.8	80.0	119.0	109.6	9.46	12.582	
2,200.0	2,178.1	2,203.1	2,193.7	6.5	5.5	-161.96		70.8	92.2	126.6	116.6	9.99	12.670	
2,300.0	2,276.0	2,302.8	2,292.4	6.9	5.8	-161.68		77.9	104.4	134.2	123.7	10.53	12.743	
2,400.0	2,373.8	2,402.5	2,391.1	7.3	6.1	-161.43		85.0	116.7	141.8	130.7	11.07	12.805	
2,500.0	2,471.6	2,502.2	2,489.8	7.8	6.4	-161.21		92.0	128.9	149.4	137.8	11.62	12.858	
2,600.0	2,569.4	2,601.9	2,588.5	8.2	6.8	-161.01		99.1	141.2	157.0	144.9	12.17	12.903	
2,700.0	2,667.2	2,701.6	2,687.2	8.6	7.1	-160.82		106.1	153.4	164.6	151.9	12.72	12.942	
2,800.0	2,765.0	2,801.4	2,785.9	9.1	7.4	-160.66		113.2	165.7	172.2	159.0	13.27	12.975	
2,900.0	2,862.9	2,901.1	2,884.6	9.5	7.8	-160.50		120.3	177.9	179.8	166.0	13.83	13.004	
3,000.0	2,960.7	3,000.8	2,983.3	10.0	8.1	-160.36		127.3	190.2	187.5	173.1	14.39	13.029	
3,100.0	3,058.5	3,100.5	3,082.0	10.4	8.4	-160.24		134.4	202.4	195.1	180.1	14.95	13.050	
3,200.0	3,156.3	3,200.2	3,180.7	10.9	8.8	-160.12		141.5	214.6	202.7	187.2	15.51	13.069	
3,300.0	3,254.1	3,299.9	3,279.4	11.3	9.1	-160.00		148.5	226.9	210.3	194.2	16.07	13.086	
3,400.0	3,351.9	3,399.6	3,378.1	11.8	9.4	-159.90		155.6	239.1	217.9	201.3	16.63	13.100	
3,500.0	3,449.7	3,499.3	3,476.8	12.2	9.8	-159.80		162.7	251.4	225.5	208.3	17.20	13.113	
3,600.0	3,547.6	3,599.0	3,575.5	12.7	10.1	-159.71		169.7	263.6	233.1	215.4	17.76	13.125	
3,700.0	3,645.4	3,698.7	3,674.2	13.1	10.5	-159.63		176.8	275.9	240.7	222.4	18.33	13.135	
3,800.0	3,743.2	3,798.4	3,772.9	13.6	10.8	-159.55		183.8	288.1	248.4	229.5	18.90	13.143	
3,900.0	3,841.0	3,898.2	3,871.6	14.0	11.1	-159.48		190.9	300.3	256.0	236.5	19.46	13.151	
4,000.0	3,938.8	3,997.9	3,970.3	14.5	11.5	-159.41		198.0	312.6	263.6	243.6	20.03	13.158	
4,100.0	4,036.6	4,097.6	4,069.0	14.9	11.8	-159.34		205.0	324.8	271.2	250.6	20.60	13.164	
4,200.0	4,134.5	4,197.3	4,167.7	15.4	12.2	-159.28		212.1	337.1	278.8	257.7	21.17	13.170	
4,300.0	4,232.3	4,297.0	4,266.4	15.9	12.5	-159.22		219.2	349.3	286.4	264.7	21.74	13.175	
4,400.0	4,330.1	4,396.7	4,365.1	16.3	12.8	-159.16		226.2	361.6	294.1	271.8	22.31	13.179	
4,500.0	4,427.9	4,496.4	4,463.8	16.8	13.2	-159.11		233.3	373.8	301.7	278.8	22.88	13.183	
4,600.0	4,525.7	4,596.1	4,562.5	17.2	13.5	-159.06		240.4	386.1	309.3	285.8	23.46	13.186	
4,700.0	4,623.5	4,695.8	4,661.2	17.7	13.9	-159.01		247.4	398.3	316.9	292.9	24.03	13.189	
4,800.0	4,721.3	4,795.5	4,759.9	18.1	14.2	-158.96		254.5	410.5	324.5	299.9	24.60	13.192	
4,900.0	4,819.2	4,895.2	4,858.6	18.6	14.6	-158.92		261.5	422.8	332.2	307.0	25.17	13.195	
5,000.0	4,917.0	4,995.0	4,957.3	19.0	14.9	-158.88		268.6	435.0	339.8	314.0	25.75	13.197	
5,100.0	5,014.8	5,094.7	5,056.0	19.5	15.3	-158.84		275.7	447.3	347.4	321.1	26.32	13.199	
5,200.0	5,112.6	5,194.4	5,154.8	19.9	15.6	-158.80		282.7	459.5	355.0	328.1	26.89	13.200	
5,300.0	5,210.4	5,288.3	5,247.8	20.4	15.9	-158.81		289.1	470.6	363.1	335.7	27.43	13.238	
5,400.0	5,308.2	5,378.1	5,337.0	20.9	16.1	-159.04		294.0	479.0	373.6	345.8	27.88	13.402	
5,498.4	5,404.4	5,465.7	5,424.4	21.3	16.3	-159.47		297.3	484.8	386.5	358.3	28.27	13.673	
5,500.0	5,406.0	5,467.2	5,425.9	21.3	16.3	-159.48		297.4	484.9	386.8	358.5	28.28	13.678	
5,600.0	5,504.2	5,555.8	5,514.4	21.6	16.4	-160.12		299.4	488.3	400.9	372.2	28.61	14.010	
5,700.0	5,603.0	5,644.4	5,603.0	21.9	16.6	-160.78		300.0	489.4	414.3	385.4	28.90	14.338	
5,800.0	5,702.2	5,743.6	5,702.2	22.2	16.7	-161.39		300.0	489.4	425.8	396.6	29.18	14.593	
5,900.0	5,801.9	5,843.3	5,801.9	22.4	16.9	-161.80		300.0	489.4	434.0	404.6	29.46	14.732	
6,000.0	5,901.7	5,943.1	5,901.7	22.5	17.1	-162.04		300.0	489.4	439.0	409.2	29.73	14.764	
6,098.3	6,000.0	6,041.4	6,000.0	22.7	17.2	-90.00		300.0	489.4	440.6	410.5	30.02	14.675	
6,100.0	6,001.7	6,043.1	6,001.7	22.7	17.2	-90.00		300.0	489.4	440.6	410.5	30.03	14.672	
6,200.0	6,101.7	6,143.1	6,101.7	22.8	17.4	-90.00		300.0	489.4	440.6	410.2	30.39	14.495	
6,300.0	6,201.7	6,243.1	6,201.7	22.9	17.6	-90.00		300.0	489.4	440.6	409.8	30.76	14.322	
6,400.0	6,301.7	6,343.1	6,301.7	23.1	17.7	-90.00		300.0	489.4	440.6	409.4	31.13	14.151	
6,500.0	6,401.7	6,443.1	6,401.7	23.2	17.9	-90.00		300.0	489.4	440.6	409.1	31.50	13.984	
6,600.0	6,501.7	6,543.1	6,501.7	23.3	18.1	-90.00		300.0	489.4	440.6	408.7	31.88	13.820	
6,700.0	6,601.7	6,643.1	6,601.7	23.4	18.2	-90.00		300.0	489.4	440.6	408.3	32.26	13.659	
6,755.5	6,657.2	6,698.7	6,657.2	23.5	18.3	-90.23		298.2	489.4	440.6	408.1	32.41	13.594	
6,800.0	6,701.7	6,742.8	6,701.2	23.6	18.4	-90.78		294.0	489.5	440.6	408.1	32.46	13.571	

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 Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21R-223 - Wellbore #1 - Plan #1 (11-29-12)													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	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	
6,856.5	6,758.2	6,798.0	6,755.6	23.7	18.4	-91.94	285.1	489.5	440.8	408.3	32.47	13.576		
6,900.0	6,801.7	6,839.6	6,796.2	23.7	18.4	87.22	275.8	489.5	441.1	408.7	32.39	13.617		
6,950.0	6,851.5	6,887.1	6,841.7	23.8	18.4	85.99	262.5	489.6	441.7	409.4	32.33	13.664		
7,000.0	6,900.9	6,933.9	6,885.8	23.8	18.4	84.79	246.7	489.7	442.5	410.2	32.25	13.720		
7,050.0	6,949.6	6,980.3	6,928.4	23.8	18.4	83.62	228.4	489.7	443.4	411.2	32.17	13.782		
7,100.0	6,997.6	7,026.2	6,969.4	23.8	18.4	82.48	207.7	489.8	444.5	412.4	32.10	13.848		
7,150.0	7,044.5	7,071.7	7,008.7	23.8	18.4	81.38	184.9	489.9	445.8	413.7	32.04	13.914		
7,200.0	7,090.3	7,116.7	7,046.2	23.8	18.4	80.32	160.0	490.0	447.1	415.1	31.99	13.977		
7,250.0	7,134.5	7,161.3	7,081.9	23.8	18.4	79.30	133.2	490.1	448.6	416.6	31.96	14.037		
7,300.0	7,177.2	7,205.6	7,115.7	23.8	18.4	78.34	104.6	490.2	450.1	418.2	31.94	14.090		
7,350.0	7,218.1	7,250.0	7,147.9	23.8	18.4	77.41	74.0	490.3	451.7	419.7	31.95	14.135		
7,400.0	7,257.0	7,293.2	7,177.4	23.8	18.4	76.56	42.5	490.5	453.2	421.3	31.99	14.169		
7,450.0	7,293.8	7,336.6	7,205.2	23.8	18.4	75.75	9.2	490.6	454.8	422.8	32.05	14.190		
7,500.0	7,328.3	7,379.7	7,230.9	23.8	18.4	75.01	-25.4	490.7	456.4	424.2	32.16	14.191		
7,550.0	7,360.3	7,422.5	7,254.5	23.8	18.4	74.32	-61.1	490.9	457.9	425.6	32.25	14.196		
7,600.0	7,389.8	7,465.2	7,276.0	23.8	18.5	73.69	-98.0	491.0	459.3	426.9	32.42	14.169		
7,650.0	7,416.5	7,507.6	7,295.3	23.8	18.5	73.12	-135.8	491.2	460.6	428.0	32.61	14.127		
7,700.0	7,440.5	7,550.0	7,312.4	23.9	18.6	72.62	-174.5	491.3	461.9	429.0	32.84	14.065		
7,750.0	7,461.5	7,592.0	7,327.3	23.9	18.8	72.17	-213.9	491.5	463.0	429.9	33.11	13.981		
7,800.0	7,479.5	7,634.0	7,339.9	24.1	18.9	71.80	-253.9	491.6	464.0	430.5	33.44	13.875		
7,850.0	7,494.4	7,675.9	7,350.3	24.2	19.2	71.48	-294.5	491.8	464.8	431.0	33.81	13.748		
7,900.0	7,506.2	7,717.7	7,358.5	24.4	19.4	71.23	-335.5	492.0	465.5	431.2	34.23	13.598		
7,950.0	7,514.7	7,759.5	7,364.4	24.6	19.7	71.05	-376.8	492.1	466.0	431.3	34.70	13.427		
7,976.5	7,518.0	7,781.6	7,366.6	24.7	19.9	70.98	-398.8	492.2	466.2	431.2	34.98	13.327		
8,000.0	7,520.4	7,800.0	7,367.9	24.8	20.0	70.91	-417.2	492.3	466.4	431.1	35.31	13.207		
8,050.5	7,525.7	7,843.1	7,369.4	25.1	20.4	70.56	-460.2	492.5	467.6	431.5	36.08	12.962		
8,100.0	7,529.8	7,890.3	7,369.0	25.4	20.9	70.00	-507.4	492.7	469.1	432.4	36.70	12.782		
8,178.4	7,532.0	7,968.6	7,368.3	26.0	21.7	69.63	-585.7	493.0	470.1	432.2	37.94	12.391		
8,200.0	7,531.8	7,990.2	7,368.2	26.2	21.9	69.63	-607.3	493.1	470.1	431.8	38.39	12.247		
8,300.0	7,531.1	8,090.2	7,367.3	27.1	23.1	69.61	-707.3	493.5	470.2	429.6	40.64	11.571		
8,400.0	7,530.4	8,190.2	7,366.5	28.1	24.4	69.59	-807.3	493.9	470.3	427.2	43.08	10.918		
8,500.0	7,529.7	8,290.2	7,365.6	29.2	25.7	69.58	-907.3	494.3	470.4	424.7	45.68	10.298		
8,600.0	7,529.0	8,390.2	7,364.7	30.5	27.2	69.56	-1,007.3	494.7	470.5	422.1	48.41	9.719		
8,700.0	7,528.4	8,490.2	7,363.9	31.8	28.6	69.54	-1,107.3	495.1	470.6	419.3	51.26	9.181		
8,800.0	7,527.7	8,590.2	7,363.0	33.1	30.2	69.52	-1,207.3	495.5	470.6	416.5	54.20	8.684		
8,900.0	7,527.0	8,690.2	7,362.2	34.5	31.7	69.51	-1,307.3	495.9	470.7	413.5	57.22	8.227		
9,000.0	7,526.3	8,790.2	7,361.3	36.0	33.4	69.49	-1,407.3	496.3	470.8	410.5	60.30	7.807		
9,100.0	7,525.6	8,890.2	7,360.5	37.5	35.0	69.47	-1,507.3	496.7	470.9	407.5	63.45	7.422		
9,200.0	7,524.9	8,990.2	7,359.6	39.1	36.7	69.45	-1,607.3	497.0	471.0	404.3	66.64	7.067		
9,300.0	7,524.2	9,090.2	7,358.8	40.7	38.4	69.44	-1,707.3	497.4	471.1	401.2	69.88	6.741		
9,400.0	7,523.5	9,190.2	7,357.9	42.3	40.1	69.42	-1,807.3	497.8	471.2	398.0	73.16	6.440		
9,500.0	7,522.8	9,290.2	7,357.0	43.9	41.8	69.40	-1,907.2	498.2	471.2	394.8	76.46	6.163		
9,600.0	7,522.1	9,390.2	7,356.2	45.6	43.6	69.39	-2,007.2	498.6	471.3	391.5	79.80	5.907		
9,700.0	7,521.4	9,490.2	7,355.3	47.3	45.3	69.37	-2,107.2	499.0	471.4	388.2	83.16	5.669		
9,800.0	7,520.7	9,590.2	7,354.5	49.0	47.1	69.35	-2,207.2	499.4	471.5	385.0	86.54	5.448		
9,900.0	7,520.0	9,690.2	7,353.6	50.7	48.9	69.33	-2,307.2	499.8	471.6	381.6	89.93	5.243		
10,000.0	7,519.4	9,790.2	7,352.8	52.4	50.7	69.32	-2,407.2	500.2	471.7	378.3	93.35	5.053		
10,100.0	7,518.7	9,890.2	7,351.9	54.1	52.5	69.30	-2,507.2	500.6	471.7	375.0	96.78	4.874		
10,200.0	7,518.0	9,990.2	7,351.1	55.9	54.3	69.28	-2,607.2	501.0	471.8	371.6	100.23	4.708		
10,300.0	7,517.3	10,090.2	7,350.2	57.7	56.1	69.26	-2,707.2	501.4	471.9	368.2	103.68	4.551		
10,400.0	7,516.6	10,190.2	7,349.3	59.4	57.9	69.25	-2,807.2	501.8	472.0	364.8	107.15	4.405		

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 Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21R-223 - Wellbore #1 - Plan #1 (11-29-12)													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	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
10,500.0	7,515.9	10,290.2	7,348.5	61.2	59.8	69.23	-2,907.2	502.2	472.1	361.5	110.63	4.267		
10,600.0	7,515.2	10,390.2	7,347.6	63.0	61.6	69.21	-3,007.2	502.6	472.2	358.0	114.11	4.138		
10,700.0	7,514.5	10,490.2	7,346.8	64.8	63.5	69.19	-3,107.2	503.0	472.2	354.6	117.60	4.016		
10,800.0	7,513.8	10,590.2	7,345.9	66.6	65.3	69.18	-3,207.2	503.4	472.3	351.2	121.10	3.900		
10,900.0	7,513.1	10,690.2	7,345.1	68.5	67.2	69.16	-3,307.2	503.8	472.4	347.8	124.61	3.791		
11,000.0	7,512.4	10,790.2	7,344.2	70.3	69.0	69.14	-3,407.2	504.2	472.5	344.4	128.12	3.688		
11,100.0	7,511.7	10,890.2	7,343.4	72.1	70.9	69.13	-3,507.2	504.6	472.6	340.9	131.64	3.590		
11,200.0	7,511.1	10,990.2	7,342.5	73.9	72.7	69.11	-3,607.2	505.0	472.7	337.5	135.17	3.497		
11,300.0	7,510.4	11,090.2	7,341.7	75.8	74.6	69.09	-3,707.2	505.4	472.8	334.1	138.69	3.409		
11,400.0	7,509.7	11,190.2	7,340.8	77.6	76.5	69.07	-3,807.2	505.8	472.8	330.6	142.22	3.325		
11,500.0	7,509.0	11,290.2	7,339.9	79.5	78.4	69.06	-3,907.2	506.2	472.9	327.2	145.76	3.245		
11,600.0	7,508.3	11,390.2	7,339.1	81.3	80.2	69.04	-4,007.2	506.6	473.0	323.7	149.30	3.168		
11,700.0	7,507.6	11,490.2	7,338.2	83.2	82.1	69.02	-4,107.1	507.0	473.1	320.3	152.84	3.095		
11,800.0	7,506.9	11,590.2	7,337.4	85.0	84.0	69.01	-4,207.1	507.4	473.2	316.8	156.38	3.026		
11,900.0	7,506.2	11,690.2	7,336.5	86.9	85.9	68.99	-4,307.1	507.8	473.3	313.3	159.93	2.959		
12,000.0	7,505.5	11,790.2	7,335.7	88.7	87.7	68.97	-4,407.1	508.2	473.3	309.9	163.48	2.895		
12,074.3	7,505.0	11,864.5	7,335.0	90.1	88.9	68.96	-4,481.4	508.5	473.4	307.5	165.89	2.854 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21R-403 - Wellbore #1 - Plan #1 (11-29-12)													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	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	-125.88	-58.3	-80.6	99.4					
100.0	100.0	100.0	100.0	0.1	0.1	-125.88	-58.3	-80.6	99.4	99.2	0.22	442.415		
200.0	200.0	200.0	200.0	0.3	0.3	-125.88	-58.3	-80.6	99.4	98.8	0.67	147.472		
300.0	300.0	300.0	300.0	0.6	0.6	-125.88	-58.3	-80.6	99.4	98.3	1.12	88.483		
400.0	400.0	400.0	400.0	0.8	0.8	-125.88	-58.3	-80.6	99.4	97.9	1.57	63.202		
500.0	500.0	500.0	500.0	1.0	1.0	-125.88	-58.3	-80.6	99.4	97.4	2.02	49.157		
600.0	600.0	600.0	600.0	1.2	1.2	-125.88	-58.3	-80.6	99.4	97.0	2.47	40.220		
700.0	700.0	700.0	700.0	1.5	1.5	-125.88	-58.3	-80.6	99.4	96.5	2.92	34.032		
800.0	800.0	800.0	800.0	1.7	1.7	-125.88	-58.3	-80.6	99.4	96.1	3.37	29.494 CC, ES		
900.0	900.0	900.0	900.0	1.9	1.9	162.30	-58.3	-80.6	101.1	97.3	3.81	26.522		
1,000.0	999.8	999.8	999.8	2.1	2.1	163.13	-58.3	-80.6	106.1	101.9	4.25	24.993		
1,100.0	1,099.5	1,099.5	1,099.5	2.3	2.4	164.35	-58.3	-80.6	114.5	109.8	4.68	24.464		
1,200.0	1,198.7	1,198.7	1,198.7	2.6	2.6	165.78	-58.3	-80.6	126.2	121.1	5.11	24.695		
1,300.0	1,297.5	1,297.5	1,297.5	2.9	2.8	167.27	-58.3	-80.6	141.5	135.9	5.54	25.516		
1,399.9	1,395.6	1,395.6	1,395.6	3.2	3.0	168.70	-58.3	-80.6	160.1	154.2	5.97	26.805		
1,500.0	1,493.4	1,493.4	1,493.4	3.6	3.2	169.99	-58.3	-80.6	180.6	174.2	6.43	28.098		
1,600.0	1,591.3	1,591.3	1,591.3	3.9	3.5	171.02	-58.3	-80.6	201.1	194.2	6.88	29.212		
1,700.0	1,689.1	1,689.1	1,689.1	4.3	3.7	171.86	-58.3	-80.6	221.7	214.3	7.35	30.179		
1,800.0	1,786.9	1,786.9	1,786.9	4.8	3.9	172.55	-58.3	-80.6	242.3	234.5	7.81	31.027		
1,900.0	1,884.7	1,884.7	1,884.7	5.2	4.1	173.14	-58.3	-80.6	262.9	254.6	8.27	31.773		
2,000.0	1,982.5	1,982.5	1,982.5	5.6	4.3	173.64	-58.3	-80.6	283.6	274.8	8.74	32.435		
2,100.0	2,080.3	2,086.6	2,086.6	6.0	4.6	174.28	-57.0	-80.1	303.4	294.2	9.22	32.902		
2,200.0	2,178.1	2,192.8	2,192.7	6.5	4.8	175.36	-52.2	-78.4	320.9	311.2	9.70	33.083		
2,300.0	2,276.0	2,299.5	2,299.0	6.9	5.1	176.84	-43.6	-75.3	336.0	325.8	10.18	33.012		
2,400.0	2,373.8	2,405.0	2,403.6	7.3	5.3	178.65	-31.5	-70.9	349.0	338.3	10.66	32.736		
2,500.0	2,471.6	2,503.6	2,501.3	7.8	5.5	-179.62	-18.9	-66.4	361.5	350.3	11.14	32.439		
2,600.0	2,569.4	2,602.2	2,599.1	8.2	5.8	-178.01	-6.4	-61.8	374.3	362.7	11.64	32.160		
2,700.0	2,667.2	2,700.9	2,696.8	8.6	6.0	-176.51	6.1	-57.3	387.4	375.2	12.15	31.896		
2,800.0	2,765.0	2,799.5	2,794.6	9.1	6.3	-175.10	18.6	-52.8	400.7	388.1	12.66	31.644		
2,900.0	2,862.9	2,898.1	2,892.3	9.5	6.6	-173.78	31.1	-48.3	414.3	401.1	13.19	31.402		
3,000.0	2,960.7	2,996.8	2,990.0	10.0	6.8	-172.55	43.6	-43.8	428.0	414.3	13.73	31.171		
3,100.0	3,058.5	3,095.4	3,087.8	10.4	7.1	-171.39	56.1	-39.3	442.0	427.7	14.28	30.949		
3,200.0	3,156.3	3,194.1	3,185.5	10.9	7.4	-170.31	68.7	-34.7	456.1	441.3	14.84	30.736		
3,300.0	3,254.1	3,292.7	3,283.2	11.3	7.7	-169.29	81.2	-30.2	470.4	455.0	15.41	30.531		
3,400.0	3,351.9	3,391.3	3,381.0	11.8	8.0	-168.33	93.7	-25.7	484.8	468.8	15.98	30.335		
3,500.0	3,449.7	3,490.0	3,478.7	12.2	8.3	-167.42	106.2	-21.2	499.3	482.7	16.56	30.147		
3,600.0	3,547.6	3,588.6	3,576.4	12.7	8.6	-166.57	118.7	-16.7	514.0	496.8	17.15	29.966		
3,700.0	3,645.4	3,687.2	3,674.2	13.1	8.9	-165.76	131.2	-12.1	528.7	511.0	17.75	29.793		
3,800.0	3,743.2	3,785.9	3,771.9	13.6	9.2	-165.00	143.7	-7.6	543.6	525.2	18.35	29.627		
3,900.0	3,841.0	3,884.5	3,869.7	14.0	9.5	-164.28	156.2	-3.1	558.5	539.5	18.95	29.468		
4,000.0	3,938.8	3,983.2	3,967.4	14.5	9.8	-163.59	168.8	1.4	573.5	554.0	19.56	29.316		
4,100.0	4,036.6	4,081.8	4,065.1	14.9	10.1	-162.94	181.3	5.9	588.6	568.4	20.18	29.170		
4,200.0	4,134.5	4,180.4	4,162.9	15.4	10.4	-162.32	193.8	10.5	603.8	583.0	20.80	29.031		
4,300.0	4,232.3	4,279.1	4,260.6	15.9	10.7	-161.73	206.3	15.0	619.0	597.6	21.42	28.897		
4,400.0	4,330.1	4,377.7	4,358.3	16.3	11.0	-161.18	218.8	19.5	634.3	612.3	22.05	28.769		
4,500.0	4,427.9	4,476.3	4,456.1	16.8	11.3	-160.64	231.3	24.0	649.7	627.0	22.68	28.647		
4,600.0	4,525.7	4,575.0	4,553.8	17.2	11.6	-160.13	243.8	28.5	665.1	641.8	23.31	28.530		
4,700.0	4,623.5	4,673.6	4,651.5	17.7	11.9	-159.65	256.4	33.0	680.5	656.6	23.95	28.418		
4,800.0	4,721.3	4,772.3	4,749.3	18.1	12.2	-159.18	268.9	37.6	696.0	671.4	24.59	28.310		
4,900.0	4,819.2	4,868.6	4,844.8	18.6	12.5	-158.76	280.9	41.9	711.6	686.4	25.21	28.233		
5,000.0	4,917.0	4,960.6	4,936.2	19.0	12.8	-158.56	290.3	45.3	728.0	702.2	25.74	28.281		

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 Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21R-403 - Wellbore #1 - Plan #1 (11-29-12)													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	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
5,100.0	5,014.8	5,052.3	5,027.7	19.5	13.0	-158.58	296.8	47.7	745.2	719.0	26.22	28.418		
5,200.0	5,112.6	5,143.6	5,118.9	19.9	13.1	-158.81	300.6	49.0	763.4	736.7	26.66	28.631		
5,300.0	5,210.4	5,235.2	5,210.4	20.4	13.3	-159.24	301.7	49.4	782.5	755.4	27.06	28.913		
5,400.0	5,308.2	5,333.0	5,308.2	20.9	13.5	-159.77	301.7	49.4	802.0	774.5	27.47	29.194		
5,498.4	5,404.4	5,429.2	5,404.4	21.3	13.6	-160.26	301.7	49.4	821.3	793.4	27.89	29.450		
5,500.0	5,406.0	5,430.8	5,406.0	21.3	13.6	-160.27	301.7	49.4	821.6	793.7	27.89	29.454		
5,600.0	5,504.2	5,529.0	5,504.2	21.6	13.8	-160.83	301.7	49.4	839.6	811.2	28.32	29.641		
5,700.0	5,603.0	5,627.7	5,603.0	21.9	14.0	-161.27	301.7	49.4	854.3	825.6	28.73	29.736		
5,800.0	5,702.2	5,727.0	5,702.2	22.2	14.2	-161.60	301.7	49.4	865.8	836.7	29.11	29.743		
5,900.0	5,801.9	5,826.6	5,801.9	22.4	14.4	-161.83	301.7	49.4	874.1	844.6	29.46	29.667		
6,000.0	5,901.7	5,926.5	5,901.7	22.5	14.6	-161.97	301.7	49.4	879.0	849.2	29.79	29.510		
6,098.3	6,000.0	6,024.7	6,000.0	22.7	14.8	-89.89	301.7	49.4	880.6	850.5	30.10	29.251		
6,100.0	6,001.7	6,026.5	6,001.7	22.7	14.8	-89.89	301.7	49.4	880.6	850.5	30.11	29.245		
6,200.0	6,101.7	6,126.5	6,101.7	22.8	15.0	-89.89	301.7	49.4	880.6	850.1	30.48	28.887		
6,300.0	6,201.7	6,226.5	6,201.7	22.9	15.2	-89.89	301.7	49.4	880.6	849.7	30.86	28.537		
6,400.0	6,301.7	6,326.5	6,301.7	23.1	15.4	-89.89	301.7	49.4	880.6	849.3	31.23	28.193		
6,500.0	6,401.7	6,426.5	6,401.7	23.2	15.6	-89.89	301.7	49.4	880.6	849.0	31.61	27.856		
6,600.0	6,501.7	6,526.5	6,501.7	23.3	15.8	-89.89	301.7	49.4	880.6	848.6	31.99	27.525		
6,700.0	6,601.7	6,626.5	6,601.7	23.4	16.0	-89.89	301.7	49.4	880.6	848.2	32.37	27.200		
6,800.0	6,701.7	6,726.5	6,701.7	23.6	16.2	-89.89	301.7	49.4	880.6	847.8	32.76	26.882		
6,856.5	6,758.2	6,783.0	6,758.2	23.7	16.3	-89.89	301.7	49.4	880.6	847.6	32.97	26.705		
6,900.0	6,801.7	6,826.8	6,802.0	23.7	16.4	90.35	300.5	49.4	880.6	847.5	33.08	26.617		
6,950.0	6,851.5	6,877.1	6,852.1	23.8	16.4	90.35	295.9	49.5	880.6	847.4	33.19	26.528		
7,000.0	6,900.9	6,927.5	6,901.9	23.8	16.4	90.35	288.1	49.5	880.6	847.3	33.27	26.470		
7,050.0	6,949.6	6,977.8	6,951.0	23.8	16.5	90.34	277.0	49.5	880.6	847.3	33.31	26.438		
7,100.0	6,997.6	7,028.2	6,999.2	23.8	16.5	90.33	262.7	49.6	880.6	847.3	33.32	26.429		
7,150.0	7,044.5	7,078.5	7,046.4	23.8	16.4	90.33	245.3	49.7	880.6	847.3	33.31	26.439		
7,200.0	7,090.3	7,128.8	7,092.4	23.8	16.4	90.32	224.8	49.8	880.6	847.3	33.28	26.461		
7,250.0	7,134.5	7,179.1	7,136.9	23.8	16.4	90.31	201.3	49.8	880.6	847.3	33.24	26.490		
7,300.0	7,177.2	7,229.4	7,179.7	23.8	16.4	90.30	174.9	50.0	880.6	847.4	33.21	26.519		
7,350.0	7,218.1	7,279.7	7,220.7	23.8	16.3	90.28	145.8	50.1	880.6	847.4	33.18	26.539		
7,400.0	7,257.0	7,330.0	7,259.7	23.8	16.3	90.27	114.1	50.2	880.6	847.4	33.18	26.541		
7,450.0	7,293.8	7,380.3	7,296.5	23.8	16.3	90.25	79.9	50.4	880.6	847.4	33.21	26.519		
7,500.0	7,328.3	7,430.5	7,331.0	23.8	16.3	90.24	43.3	50.5	880.6	847.3	33.28	26.462		
7,550.0	7,360.3	7,480.8	7,363.0	23.8	16.3	90.22	4.6	50.7	880.6	847.2	33.40	26.364		
7,600.0	7,389.8	7,531.0	7,392.3	23.8	16.4	90.20	-36.1	50.8	880.6	847.0	33.59	26.218		
7,650.0	7,416.5	7,581.2	7,418.9	23.8	16.4	90.18	-78.6	51.0	880.6	846.7	33.84	26.020		
7,700.0	7,440.5	7,631.3	7,442.7	23.9	16.6	90.16	-122.8	51.2	880.6	846.4	34.18	25.766		
7,750.0	7,461.5	7,681.5	7,463.5	23.9	16.8	90.14	-168.5	51.4	880.6	846.0	34.59	25.456		
7,800.0	7,479.5	7,731.6	7,481.2	24.1	17.1	90.12	-215.3	51.6	880.6	845.5	35.09	25.093		
7,850.0	7,494.4	7,781.7	7,495.8	24.2	17.4	90.10	-263.2	51.8	880.6	844.9	35.68	24.680		
7,900.0	7,506.2	7,831.8	7,507.3	24.4	17.7	90.07	-312.0	52.0	880.6	844.2	36.35	24.224		
7,950.0	7,514.7	7,881.8	7,515.5	24.6	18.1	90.05	-361.4	52.2	880.6	843.5	37.11	23.731		
7,976.5	7,518.0	7,908.4	7,518.6	24.7	18.3	90.04	-387.7	52.3	880.6	843.0	37.53	23.460		
8,000.0	7,520.4	7,931.9	7,521.0	24.8	18.5	90.04	-411.1	52.4	880.6	842.6	37.94	23.208		
8,050.5	7,525.7	7,982.4	7,526.3	25.1	19.0	90.04	-461.3	52.6	880.6	841.7	38.85	22.665		
8,054.9	7,526.2	7,986.7	7,526.7	25.1	19.0	90.04	-465.6	52.6	880.6	841.6	38.93	22.617		
8,100.0	7,529.8	8,031.9	7,530.2	25.4	19.5	90.02	-510.7	52.8	880.6	840.7	39.83	22.106		
8,178.4	7,532.0	8,110.3	7,532.0	26.0	20.3	90.00	-589.1	53.2	880.6	839.1	41.48	21.229		
8,200.0	7,531.8	8,131.9	7,531.8	26.2	20.5	90.00	-610.6	53.2	880.6	838.6	41.97	20.981		
8,300.0	7,531.1	8,231.9	7,531.1	27.1	21.7	90.00	-710.6	53.7	880.6	836.2	44.34	19.860		

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 Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21R-403 - Wellbore #1 - Plan #1 (11-29-12)													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	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
8,400.0	7,530.4	8,331.9	7,530.4	28.1	23.0	90.00	-810.6	54.1	880.6	833.7	46.90	18.775		
8,500.0	7,529.7	8,431.9	7,529.7	29.2	24.4	90.00	-910.6	54.5	880.6	831.0	49.63	17.742		
8,600.0	7,529.0	8,531.9	7,529.0	30.5	25.8	90.00	-1,010.6	54.9	880.6	828.1	52.51	16.771		
8,700.0	7,528.4	8,631.9	7,528.4	31.8	27.3	90.00	-1,110.6	55.3	880.6	825.1	55.50	15.868		
8,800.0	7,527.7	8,731.9	7,527.7	33.1	28.9	90.00	-1,210.6	55.8	880.6	822.0	58.59	15.030		
8,900.0	7,527.0	8,831.9	7,527.0	34.5	30.5	90.00	-1,310.6	56.2	880.6	818.9	61.77	14.257		
9,000.0	7,526.3	8,931.9	7,526.3	36.0	32.1	90.00	-1,410.6	56.6	880.6	815.6	65.02	13.545		
9,100.0	7,525.6	9,031.9	7,525.6	37.5	33.8	90.00	-1,510.6	57.0	880.6	812.3	68.33	12.888		
9,200.0	7,524.9	9,131.9	7,524.9	39.1	35.5	90.00	-1,610.6	57.4	880.7	809.0	71.70	12.283		
9,300.0	7,524.2	9,231.9	7,524.2	40.7	37.2	90.00	-1,710.6	57.9	880.7	805.5	75.11	11.725		
9,400.0	7,523.5	9,331.9	7,523.5	42.3	38.9	90.00	-1,810.6	58.3	880.7	802.1	78.56	11.209		
9,500.0	7,522.8	9,431.9	7,522.8	43.9	40.6	90.00	-1,910.6	58.7	880.7	798.6	82.05	10.733		
9,600.0	7,522.1	9,531.9	7,522.1	45.6	42.4	90.00	-2,010.6	59.1	880.7	795.1	85.58	10.291		
9,700.0	7,521.4	9,631.9	7,521.4	47.3	44.2	90.00	-2,110.6	59.5	880.7	791.6	89.12	9.882		
9,800.0	7,520.7	9,731.9	7,520.7	49.0	46.0	90.00	-2,210.6	59.9	880.7	788.0	92.70	9.501		
9,900.0	7,520.0	9,831.9	7,520.1	50.7	47.8	90.00	-2,310.6	60.4	880.7	784.4	96.29	9.146		
10,000.0	7,519.4	9,931.9	7,519.4	52.4	49.6	90.00	-2,410.6	60.8	880.7	780.8	99.90	8.816		
10,100.0	7,518.7	10,031.9	7,518.7	54.1	51.4	90.00	-2,510.6	61.2	880.7	777.2	103.53	8.507		
10,200.0	7,518.0	10,131.9	7,518.0	55.9	53.2	90.00	-2,610.6	61.6	880.7	773.6	107.18	8.217		
10,300.0	7,517.3	10,231.9	7,517.3	57.7	55.1	90.00	-2,710.6	62.0	880.7	769.9	110.84	7.946		
10,400.0	7,516.6	10,331.9	7,516.6	59.4	56.9	90.00	-2,810.6	62.5	880.8	766.2	114.51	7.691		
10,500.0	7,515.9	10,431.9	7,515.9	61.2	58.8	90.00	-2,910.6	62.9	880.8	762.6	118.20	7.452		
10,600.0	7,515.2	10,531.9	7,515.2	63.0	60.6	90.00	-3,010.6	63.3	880.8	758.9	121.89	7.226		
10,700.0	7,514.5	10,631.9	7,514.5	64.8	62.5	90.00	-3,110.6	63.7	880.8	755.2	125.59	7.013		
10,800.0	7,513.8	10,731.9	7,513.8	66.6	64.3	90.00	-3,210.5	64.1	880.8	751.5	129.31	6.812		
10,900.0	7,513.1	10,831.9	7,513.1	68.5	66.2	90.00	-3,310.5	64.6	880.8	747.8	133.03	6.621		
11,000.0	7,512.4	10,931.9	7,512.5	70.3	68.0	90.00	-3,410.5	65.0	880.8	744.1	136.75	6.441		
11,100.0	7,511.7	11,031.9	7,511.8	72.1	69.9	90.00	-3,510.5	65.4	880.8	740.3	140.49	6.270		
11,200.0	7,511.1	11,131.9	7,511.1	73.9	71.8	90.00	-3,610.5	65.8	880.8	736.6	144.23	6.107		
11,300.0	7,510.4	11,231.9	7,510.4	75.8	73.7	90.00	-3,710.5	66.2	880.8	732.9	147.98	5.953		
11,400.0	7,509.7	11,331.9	7,509.7	77.6	75.5	90.00	-3,810.5	66.6	880.8	729.1	151.73	5.805		
11,500.0	7,509.0	11,431.9	7,509.0	79.5	77.4	90.00	-3,910.5	67.1	880.8	725.4	155.48	5.665		
11,600.0	7,508.3	11,531.9	7,508.3	81.3	79.3	90.00	-4,010.5	67.5	880.9	721.6	159.25	5.531		
11,700.0	7,507.6	11,631.9	7,507.6	83.2	81.2	90.00	-4,110.5	67.9	880.9	717.9	163.01	5.404		
11,800.0	7,506.9	11,731.9	7,506.9	85.0	83.1	90.00	-4,210.5	68.3	880.9	714.1	166.78	5.282		
11,900.0	7,506.2	11,831.9	7,506.2	86.9	85.0	90.00	-4,310.5	68.7	880.9	710.3	170.55	5.165		
12,000.0	7,505.5	11,931.9	7,505.5	88.7	86.8	90.00	-4,410.5	69.2	880.9	706.6	174.33	5.053		
12,074.3	7,505.0	12,006.2	7,505.0	90.1	88.3	90.00	-4,484.8	69.5	880.9	703.8	177.14	4.973 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21U-203 - Wellbore #1 - Plan #1 (11-29-12)													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)	+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	90.03	90.03	0.0	27.8	27.8				
100.0	100.0	100.0	100.0	0.1	0.1	90.03	90.03	0.0	27.8	27.8	27.6	0.22	123.610	
200.0	200.0	200.0	200.0	0.3	0.3	90.03	90.03	0.0	27.8	27.8	27.1	0.67	41.203 CC, ES	
300.0	300.0	299.0	299.0	0.6	0.6	89.30	89.30	0.4	29.5	29.5	28.4	1.11	26.440	
400.0	400.0	397.8	397.7	0.8	0.8	87.55	87.55	1.5	34.4	34.6	33.0	1.56	22.109	
500.0	500.0	496.1	495.6	1.0	1.0	85.55	85.55	3.3	42.7	43.1	41.0	2.03	21.182	
600.0	600.0	593.8	592.5	1.2	1.3	83.80	83.80	5.9	54.1	55.0	52.4	2.53	21.715	
700.0	700.0	690.5	688.1	1.5	1.6	82.42	82.42	9.1	68.7	70.3	67.2	3.07	22.916	
800.0	800.0	786.1	782.0	1.7	2.0	81.39	81.39	13.0	86.1	88.9	85.3	3.64	24.403	
900.0	900.0	880.7	874.3	1.9	2.4	8.57	8.57	17.6	106.3	109.1	105.2	3.86	28.262	
1,000.0	999.8	975.3	965.9	2.1	2.9	8.22	8.22	22.8	129.5	129.1	124.8	4.31	29.931	
1,100.0	1,099.5	1,073.7	1,060.8	2.3	3.4	8.11	8.11	28.4	154.8	147.0	142.2	4.78	30.775	
1,200.0	1,198.7	1,172.6	1,156.3	2.6	3.9	8.21	8.21	34.1	180.2	161.5	156.2	5.25	30.764	
1,300.0	1,297.5	1,272.0	1,252.1	2.9	4.4	8.46	8.46	39.8	205.7	172.5	166.8	5.73	30.105	
1,399.9	1,395.6	1,371.7	1,348.2	3.2	5.0	8.85	8.85	45.6	231.3	180.1	173.9	6.22	28.948	
1,500.0	1,493.4	1,471.5	1,444.6	3.6	5.5	9.32	9.32	51.3	257.0	186.0	179.3	6.75	27.572	
1,600.0	1,591.3	1,571.3	1,540.9	3.9	6.1	9.76	9.76	57.0	282.6	191.9	184.6	7.28	26.369	
1,700.0	1,689.1	1,671.2	1,637.2	4.3	6.6	10.18	10.18	62.8	308.3	197.8	190.0	7.82	25.310	
1,800.0	1,786.9	1,771.0	1,733.5	4.8	7.2	10.57	10.57	68.5	333.9	203.8	195.4	8.36	24.372	
1,900.0	1,884.7	1,870.8	1,829.8	5.2	7.7	10.94	10.94	74.3	359.6	209.7	200.8	8.91	23.535	
2,000.0	1,982.5	1,970.6	1,926.1	5.6	8.3	11.28	11.28	80.0	385.2	215.6	206.2	9.46	22.786	
2,100.0	2,080.3	2,070.4	2,022.4	6.0	8.9	11.61	11.61	85.7	410.8	221.6	211.6	10.02	22.111	
2,200.0	2,178.1	2,170.2	2,118.7	6.5	9.4	11.92	11.92	91.5	436.5	227.6	217.0	10.58	21.500	
2,300.0	2,276.0	2,270.1	2,215.0	6.9	10.0	12.22	12.22	97.2	462.1	233.5	222.4	11.15	20.945	
2,400.0	2,373.8	2,369.9	2,311.3	7.3	10.5	12.50	12.50	103.0	487.8	239.5	227.8	11.72	20.439	
2,500.0	2,471.6	2,469.7	2,407.6	7.8	11.1	12.77	12.77	108.7	513.4	245.5	233.2	12.29	19.976	
2,600.0	2,569.4	2,569.5	2,503.8	8.2	11.6	13.02	13.02	114.4	539.0	251.5	238.6	12.86	19.550	
2,700.0	2,667.2	2,669.3	2,600.1	8.6	12.2	13.27	13.27	120.2	564.7	257.4	244.0	13.44	19.157	
2,800.0	2,765.0	2,769.1	2,696.4	9.1	12.8	13.50	13.50	125.9	590.3	263.4	249.4	14.02	18.795	
2,900.0	2,862.9	2,868.9	2,792.7	9.5	13.3	13.72	13.72	131.7	616.0	269.4	254.8	14.60	18.458	
3,000.0	2,960.7	2,968.8	2,889.0	10.0	13.9	13.93	13.93	137.4	641.6	275.4	260.3	15.18	18.145	
3,100.0	3,058.5	3,068.6	2,985.3	10.4	14.4	14.14	14.14	143.1	667.2	281.4	265.7	15.76	17.854	
3,200.0	3,156.3	3,168.4	3,081.6	10.9	15.0	14.33	14.33	148.9	692.9	287.4	271.1	16.35	17.581	
3,300.0	3,254.1	3,268.2	3,177.9	11.3	15.6	14.52	14.52	154.6	718.5	293.5	276.5	16.94	17.327	
3,400.0	3,351.9	3,368.0	3,274.2	11.8	16.1	14.70	14.70	160.4	744.2	299.5	281.9	17.53	17.087	
3,500.0	3,449.7	3,467.8	3,370.5	12.2	16.7	14.87	14.87	166.1	769.8	305.5	287.4	18.12	16.863	
3,600.0	3,547.6	3,567.6	3,466.8	12.7	17.2	15.03	15.03	171.8	795.5	311.5	292.8	18.71	16.651	
3,700.0	3,645.4	3,667.5	3,563.1	13.1	17.8	15.19	15.19	177.6	821.1	317.5	298.2	19.30	16.452	
3,800.0	3,743.2	3,767.3	3,659.4	13.6	18.4	15.35	15.35	183.3	846.7	323.6	303.7	19.89	16.263	
3,900.0	3,841.0	3,867.1	3,755.7	14.0	18.9	15.49	15.49	189.1	872.4	329.6	309.1	20.49	16.085	
4,000.0	3,938.8	3,966.9	3,852.0	14.5	19.5	15.64	15.64	194.8	898.0	335.6	314.5	21.09	15.916	
4,100.0	4,036.6	4,066.7	3,948.3	14.9	20.0	15.77	15.77	200.6	923.7	341.6	320.0	21.68	15.756	
4,200.0	4,134.5	4,166.5	4,044.6	15.4	20.6	15.91	15.91	206.3	949.3	347.7	325.4	22.28	15.603	
4,300.0	4,232.3	4,266.3	4,140.8	15.9	21.2	16.03	16.03	212.0	974.9	353.7	330.8	22.88	15.458	
4,400.0	4,330.1	4,366.2	4,237.1	16.3	21.7	16.16	16.16	217.8	1,000.6	359.7	336.3	23.48	15.320	
4,500.0	4,427.9	4,466.0	4,333.4	16.8	22.3	16.28	16.28	223.5	1,026.2	365.8	341.7	24.08	15.189	
4,600.0	4,525.7	4,565.8	4,429.7	17.2	22.8	16.39	16.39	229.3	1,051.9	371.8	347.1	24.68	15.063	
4,700.0	4,623.5	4,665.6	4,526.0	17.7	23.4	16.50	16.50	235.0	1,077.5	377.9	352.6	25.29	14.943	
4,800.0	4,721.3	4,765.4	4,622.3	18.1	24.0	16.61	16.61	240.7	1,103.1	383.9	358.0	25.89	14.828	
4,900.0	4,819.2	4,865.2	4,718.6	18.6	24.5	16.72	16.72	246.5	1,128.8	389.9	363.4	26.49	14.719	
5,000.0	4,917.0	4,965.0	4,814.9	19.0	25.1	16.82	16.82	252.2	1,154.4	396.0	368.9	27.10	14.613	

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 Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21U-203 - Wellbore #1 - Plan #1 (11-29-12)													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	5,014.8	5,064.9	4,911.2	19.5	25.6	16.92	16.92	258.0	1,180.1	402.0	374.3	27.70	14.512	
5,200.0	5,112.6	5,164.7	5,007.5	19.9	26.2	17.01	17.01	263.7	1,205.7	408.1	379.8	28.31	14.415	
5,300.0	5,210.4	5,264.5	5,103.8	20.4	26.8	17.11	17.11	269.4	1,231.3	414.1	385.2	28.91	14.322	
5,400.0	5,308.2	5,364.3	5,200.1	20.9	27.3	17.20	17.20	275.2	1,257.0	420.2	390.7	29.52	14.233	
5,498.4	5,404.4	5,471.1	5,303.3	21.3	27.9	17.31	17.31	281.2	1,283.8	425.6	395.5	30.13	14.124	
5,500.0	5,406.0	5,473.0	5,305.1	21.3	27.9	17.31	17.31	281.3	1,284.3	425.7	395.5	30.14	14.121	
5,600.0	5,504.2	5,590.0	5,419.2	21.6	28.3	17.49	17.49	287.0	1,309.7	429.4	398.7	30.68	13.993	
5,700.0	5,603.0	5,707.2	5,534.4	21.9	28.7	17.63	17.63	291.7	1,330.6	432.4	401.2	31.15	13.881	
5,800.0	5,702.2	5,824.5	5,650.5	22.2	29.0	17.74	17.74	295.3	1,346.9	434.8	403.2	31.54	13.783	
5,900.0	5,801.9	5,941.9	5,767.3	22.4	29.3	17.82	17.82	297.9	1,358.5	436.4	404.6	31.86	13.697	
6,000.0	5,901.7	6,059.4	5,884.5	22.5	29.4	17.87	17.87	299.5	1,365.5	437.5	405.3	32.11	13.622	
6,098.3	6,000.0	6,174.9	6,000.0	22.7	29.6	90.00	90.00	300.0	1,367.8	437.8	405.4	32.35	13.531	
6,100.0	6,001.7	6,176.6	6,001.7	22.7	29.6	90.00	90.00	300.0	1,367.8	437.8	405.4	32.36	13.529	
6,200.0	6,101.7	6,276.6	6,101.7	22.8	29.7	90.00	90.00	300.0	1,367.8	437.8	405.1	32.69	13.393	
6,300.0	6,201.7	6,376.6	6,201.7	22.9	29.8	90.00	90.00	300.0	1,367.8	437.8	404.8	33.02	13.259	
6,400.0	6,301.7	6,476.6	6,301.7	23.1	29.9	90.00	90.00	300.0	1,367.8	437.8	404.4	33.35	13.126	
6,500.0	6,401.7	6,576.6	6,401.7	23.2	30.0	90.00	90.00	300.0	1,367.8	437.8	404.1	33.69	12.994	
6,600.0	6,501.7	6,676.6	6,501.7	23.3	30.1	90.00	90.00	300.0	1,367.8	437.8	403.8	34.03	12.865	
6,700.0	6,601.7	6,776.6	6,601.7	23.4	30.2	90.00	90.00	300.0	1,367.8	437.8	403.4	34.37	12.737	
6,710.3	6,612.0	6,786.9	6,612.0	23.5	30.2	90.01	90.01	300.0	1,367.8	437.8	403.4	34.41	12.724	
6,800.0	6,701.7	6,875.9	6,700.7	23.6	30.2	90.78	90.78	294.0	1,367.8	437.9	403.0	34.84	12.568	
6,856.5	6,758.2	6,930.7	6,754.9	23.7	30.3	91.93	91.93	285.2	1,367.9	438.1	402.9	35.23	12.435	
6,900.0	6,801.7	6,972.2	6,795.3	23.7	30.3	-86.74	-86.74	276.0	1,367.9	438.5	403.0	35.52	12.347	
6,950.0	6,851.5	7,019.4	6,840.7	23.8	30.3	-85.51	-85.51	262.8	1,368.0	439.2	403.3	35.88	12.240	
7,000.0	6,900.9	7,066.1	6,884.6	23.8	30.3	-84.31	-84.31	247.1	1,368.0	440.0	403.8	36.21	12.154	
7,050.0	6,949.6	7,112.3	6,927.1	23.8	30.3	-83.15	-83.15	228.9	1,368.1	441.1	404.6	36.49	12.088	
7,100.0	6,997.6	7,158.0	6,967.9	23.8	30.3	-82.01	-82.01	208.5	1,368.2	442.2	405.5	36.72	12.045	
7,150.0	7,044.5	7,203.3	7,007.1	23.8	30.3	-80.92	-80.92	185.8	1,368.3	443.5	406.6	36.89	12.024	
7,200.0	7,090.3	7,250.0	7,046.1	23.8	30.3	-79.83	-79.83	160.1	1,368.4	445.0	407.9	37.01	12.023	
7,250.0	7,134.5	7,292.7	7,080.2	23.8	30.2	-78.87	-78.87	134.4	1,368.5	446.4	409.4	37.06	12.046	
7,300.0	7,177.2	7,336.9	7,114.0	23.8	30.2	-77.91	-77.91	106.0	1,368.7	448.0	410.9	37.07	12.085	
7,350.0	7,218.1	7,380.7	7,145.9	23.8	30.2	-77.01	-77.01	75.9	1,368.8	449.6	412.5	37.04	12.139	
7,400.0	7,257.0	7,424.2	7,175.7	23.8	30.2	-76.17	-76.17	44.3	1,368.9	451.2	414.2	36.97	12.203	
7,450.0	7,293.8	7,467.5	7,203.6	23.8	30.2	-75.38	-75.38	11.2	1,369.1	452.8	415.9	36.89	12.273	
7,500.0	7,328.3	7,510.5	7,229.4	23.8	30.2	-74.65	-74.65	-23.2	1,369.2	454.3	417.5	36.81	12.343	
7,550.0	7,360.3	7,550.0	7,251.3	23.8	30.3	-74.02	-74.02	-56.1	1,369.4	455.8	419.0	36.77	12.397	
7,600.0	7,389.8	7,595.8	7,274.6	23.8	30.3	-73.37	-73.37	-95.5	1,369.6	457.2	420.4	36.77	12.434	
7,650.0	7,416.5	7,638.2	7,294.0	23.8	30.3	-72.82	-72.82	-133.2	1,369.7	458.5	421.7	36.83	12.449	
7,700.0	7,440.5	7,680.4	7,311.2	23.9	30.4	-72.34	-72.34	-171.8	1,369.9	459.7	422.7	36.98	12.432	
7,750.0	7,461.5	7,722.5	7,326.2	23.9	30.5	-71.92	-71.92	-211.1	1,370.1	460.8	423.6	37.23	12.376	
7,800.0	7,479.5	7,764.4	7,339.0	24.1	30.5	-71.56	-71.56	-251.0	1,370.3	461.7	424.1	37.61	12.277	
7,850.0	7,494.4	7,806.3	7,349.6	24.2	30.6	-71.27	-71.27	-291.5	1,370.5	462.5	424.4	38.12	12.133	
7,900.0	7,506.2	7,850.0	7,358.2	24.4	30.8	-71.04	-71.04	-334.3	1,370.7	463.1	424.4	38.78	11.942	
7,950.0	7,514.7	7,889.8	7,364.0	24.6	30.9	-70.88	-70.88	-373.7	1,370.8	463.6	424.0	39.57	11.717	
7,976.5	7,518.0	7,911.9	7,366.2	24.7	31.0	-70.83	-70.83	-395.7	1,370.9	463.7	423.7	40.04	11.581	
8,000.0	7,520.4	7,931.5	7,367.7	24.8	31.1	-70.76	-70.76	-415.2	1,371.0	464.0	423.6	40.39	11.489	
8,050.5	7,525.7	7,973.4	7,369.3	25.1	31.2	-70.43	-70.43	-457.1	1,371.2	465.1	424.0	41.14	11.305	
8,100.0	7,529.8	8,019.9	7,369.0	25.4	31.5	-69.88	-69.88	-503.6	1,371.4	466.6	424.5	42.17	11.066	
8,178.4	7,532.0	8,098.3	7,368.3	26.0	31.9	-69.52	-69.52	-582.0	1,371.8	467.6	423.6	44.06	10.614	
8,200.0	7,531.8	8,119.9	7,368.1	26.2	32.0	-69.51	-69.51	-603.6	1,371.9	467.7	423.1	44.52	10.503	
8,300.0	7,531.1	8,219.9	7,367.3	27.1	32.7	-69.49	-69.49	-703.6	1,372.3	467.7	421.0	46.76	10.003	

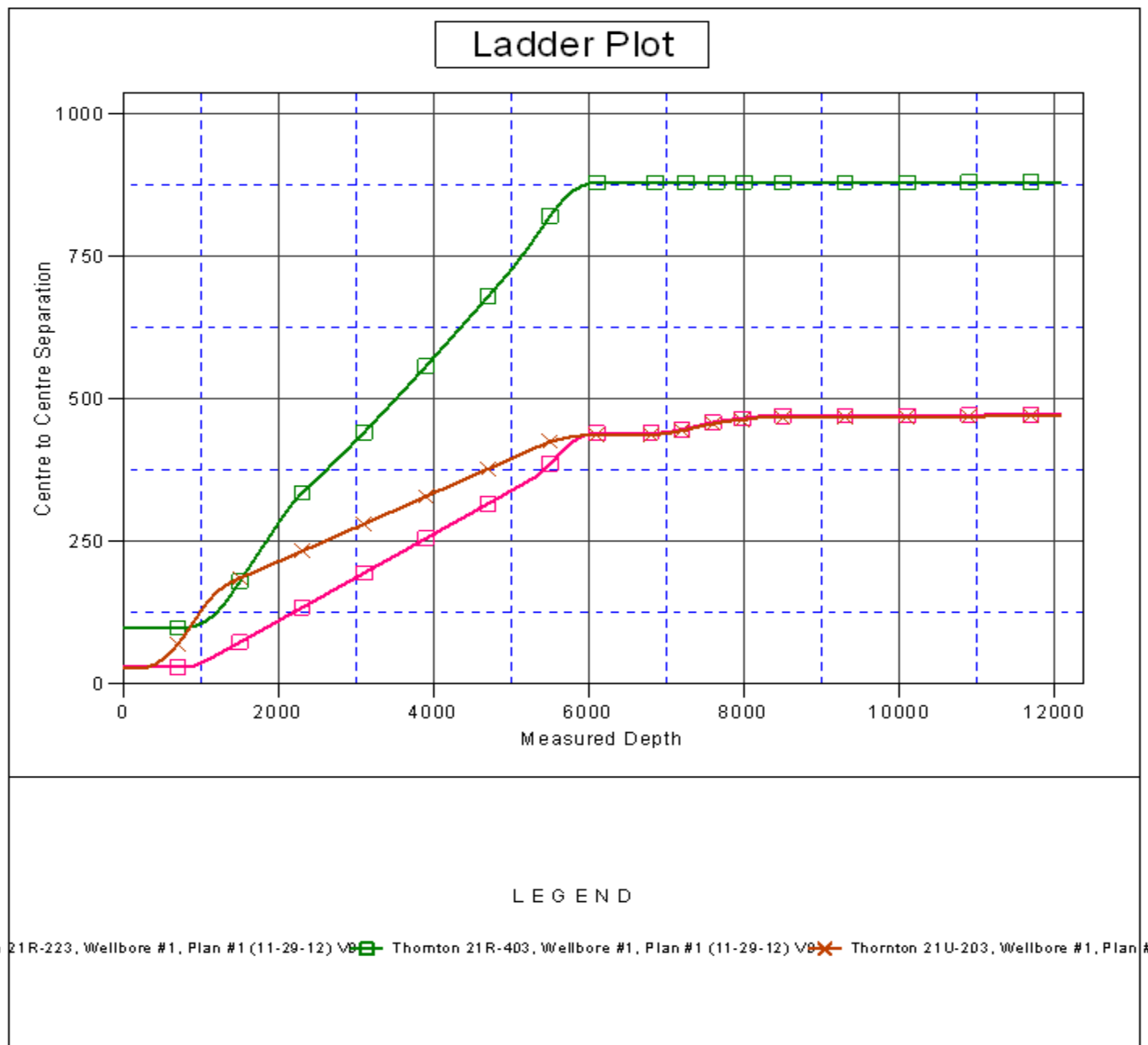
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton 21R-HZ Pad Sec.21-T7N-R66W - Thornton 21U-203 - Wellbore #1 - Plan #1 (11-29-12)													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)			
8,400.0	7,530.4	8,319.9	7,366.4	28.1	33.5	-69.48	-803.6	1,372.8	467.8	418.7	49.17	9.515		
8,500.0	7,529.7	8,419.9	7,365.6	29.2	34.3	-69.46	-903.6	1,373.2	467.9	416.2	51.72	9.048		
8,600.0	7,529.0	8,519.9	7,364.7	30.5	35.3	-69.44	-1,003.5	1,373.7	468.0	413.6	54.39	8.604		
8,700.0	7,528.4	8,619.9	7,363.9	31.8	36.4	-69.42	-1,103.5	1,374.1	468.1	410.9	57.17	8.187		
8,800.0	7,527.7	8,719.9	7,363.0	33.1	37.5	-69.41	-1,203.5	1,374.6	468.1	408.1	60.04	7.797		
8,900.0	7,527.0	8,819.9	7,362.1	34.5	38.7	-69.39	-1,303.5	1,375.0	468.2	405.2	62.99	7.433		
9,000.0	7,526.3	8,919.9	7,361.3	36.0	40.0	-69.37	-1,403.5	1,375.5	468.3	402.3	66.01	7.094		
9,100.0	7,525.6	9,019.9	7,360.4	37.5	41.3	-69.35	-1,503.5	1,375.9	468.4	399.3	69.09	6.779		
9,200.0	7,524.9	9,119.9	7,359.6	39.1	42.7	-69.34	-1,603.5	1,376.4	468.5	396.2	72.22	6.486		
9,300.0	7,524.2	9,219.9	7,358.7	40.7	44.2	-69.32	-1,703.5	1,376.9	468.6	393.2	75.40	6.214		
9,400.0	7,523.5	9,319.9	7,357.9	42.3	45.6	-69.30	-1,803.5	1,377.3	468.6	390.0	78.61	5.961		
9,500.0	7,522.8	9,419.9	7,357.0	43.9	47.1	-69.28	-1,903.5	1,377.8	468.7	386.9	81.86	5.726		
9,600.0	7,522.1	9,519.9	7,356.2	45.6	48.7	-69.27	-2,003.5	1,378.2	468.8	383.7	85.14	5.506		
9,700.0	7,521.4	9,619.9	7,355.3	47.3	50.2	-69.25	-2,103.5	1,378.7	468.9	380.4	88.45	5.301		
9,800.0	7,520.7	9,719.9	7,354.4	49.0	51.8	-69.23	-2,203.5	1,379.1	469.0	377.2	91.78	5.109		
9,900.0	7,520.0	9,819.9	7,353.6	50.7	53.4	-69.21	-2,303.5	1,379.6	469.0	373.9	95.14	4.930		
10,000.0	7,519.4	9,919.9	7,352.7	52.4	55.1	-69.20	-2,403.5	1,380.0	469.1	370.6	98.51	4.762		
10,100.0	7,518.7	10,019.9	7,351.9	54.1	56.7	-69.18	-2,503.5	1,380.5	469.2	367.3	101.90	4.605		
10,200.0	7,518.0	10,119.9	7,351.0	55.9	58.4	-69.16	-2,603.5	1,380.9	469.3	364.0	105.30	4.457		
10,300.0	7,517.3	10,219.9	7,350.2	57.7	60.1	-69.14	-2,703.5	1,381.4	469.4	360.6	108.72	4.317		
10,400.0	7,516.6	10,319.9	7,349.3	59.4	61.8	-69.13	-2,803.5	1,381.8	469.5	357.3	112.16	4.186		
10,500.0	7,515.9	10,419.9	7,348.5	61.2	63.5	-69.11	-2,903.5	1,382.3	469.5	353.9	115.60	4.062		
10,600.0	7,515.2	10,519.9	7,347.6	63.0	65.2	-69.09	-3,003.4	1,382.7	469.6	350.6	119.05	3.945		
10,700.0	7,514.5	10,619.9	7,346.8	64.8	67.0	-69.07	-3,103.4	1,383.2	469.7	347.2	122.52	3.834		
10,800.0	7,513.8	10,719.9	7,345.9	66.6	68.7	-69.06	-3,203.4	1,383.6	469.8	343.8	125.99	3.729		
10,900.0	7,513.1	10,819.9	7,345.0	68.5	70.5	-69.04	-3,303.4	1,384.1	469.9	340.4	129.47	3.629		
11,000.0	7,512.4	10,919.9	7,344.2	70.3	72.3	-69.02	-3,403.4	1,384.6	469.9	337.0	132.95	3.535		
11,100.0	7,511.7	11,019.9	7,343.3	72.1	74.0	-69.00	-3,503.4	1,385.0	470.0	333.6	136.45	3.445		
11,200.0	7,511.1	11,119.9	7,342.5	73.9	75.8	-68.99	-3,603.4	1,385.5	470.1	330.2	139.95	3.359		
11,300.0	7,510.4	11,219.9	7,341.6	75.8	77.6	-68.97	-3,703.4	1,385.9	470.2	326.7	143.45	3.278		
11,400.0	7,509.7	11,319.9	7,340.8	77.6	79.4	-68.95	-3,803.4	1,386.4	470.3	323.3	146.96	3.200		
11,500.0	7,509.0	11,419.9	7,339.9	79.5	81.2	-68.93	-3,903.4	1,386.8	470.4	319.9	150.48	3.126		
11,600.0	7,508.3	11,519.9	7,339.1	81.3	83.0	-68.92	-4,003.4	1,387.3	470.4	316.4	154.00	3.055		
11,700.0	7,507.6	11,619.9	7,338.2	83.2	84.8	-68.90	-4,103.4	1,387.7	470.5	313.0	157.52	2.987		
11,800.0	7,506.9	11,719.9	7,337.3	85.0	86.6	-68.88	-4,203.4	1,388.2	470.6	309.6	161.05	2.922		
11,900.0	7,506.2	11,819.9	7,336.5	86.9	88.5	-68.86	-4,303.4	1,388.6	470.7	306.1	164.58	2.860		
12,000.0	7,505.5	11,919.9	7,335.6	88.7	90.3	-68.85	-4,403.4	1,389.1	470.8	302.7	168.11	2.800		
12,074.3	7,505.0	11,993.9	7,335.0	90.1	91.6	-68.83	-4,477.5	1,389.4	470.8	300.1	170.73	2.758 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21U-443
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Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 21U-443	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 (11-29-12)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4985.0ft (Original Well Elev) Coordinates are relative to: Thornton 21U-443
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: 0.47°



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21U-443
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
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