

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Thornton 15E-332**

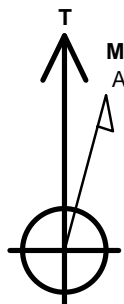
Surface Location: Thornton Pad Sec.15-T7N-R66W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
Ground Elevation: 4970.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1455601.67	3202070.80	40.581750	-104.772500	

RKB - 13' WELL @ 4983.0ft (RKB - 13')

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 270'FNL & 285'FWL	1.0	0.0	0.0	Point
BHL 200'FNL, 500'FEL	7370.0	80.6	4549.9	Point



Azimuths to True North
Magnetic North: 8.32°

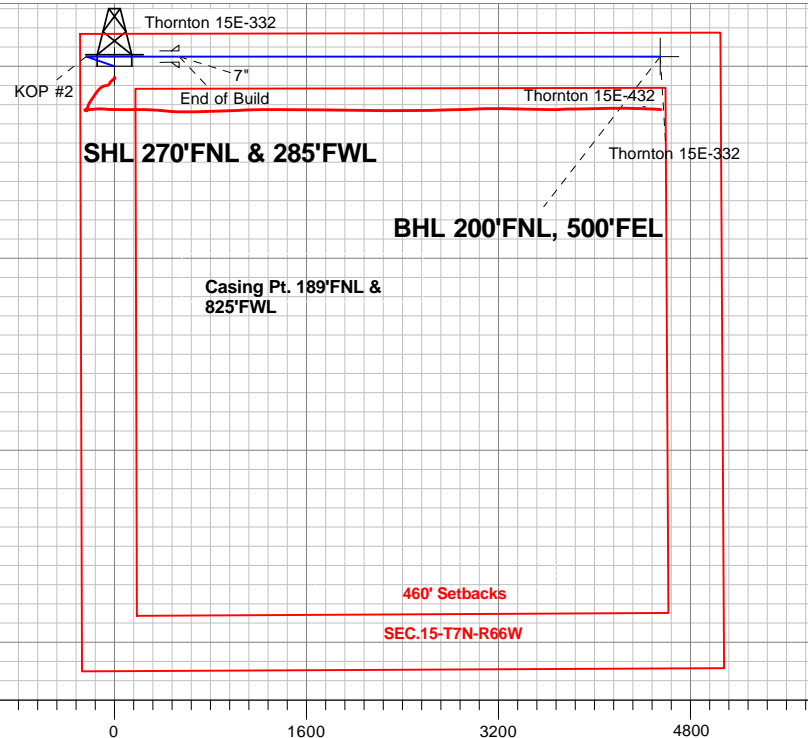
Magnetic Field
Strength: 52784.5snT
Dip Angle: 67.05°
Date: 8/17/2015
Model: IGRF2010

ANNOTATIONS

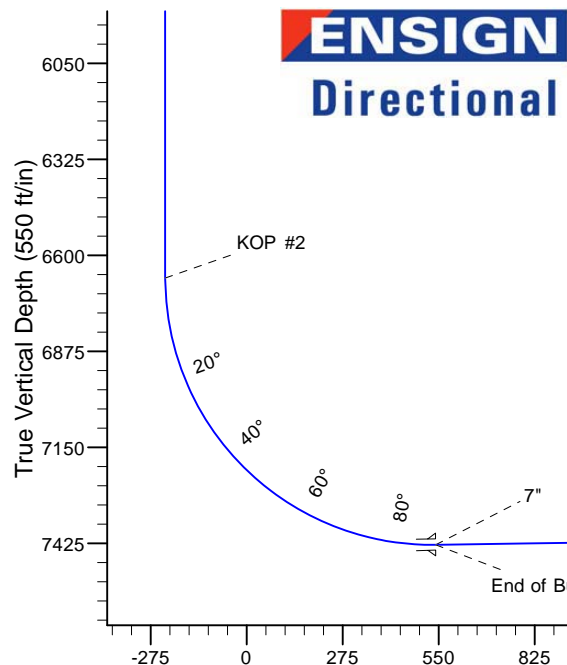
TVD	MD	Annotation
3000.0	3000.0	KOP #1
6664.9	6682.2	KOP #2
7428.8	7893.5	End of Build

Thornton Pad Sec.15-T7N-R66W
Thornton 15E-332
Plan #2 (8-17-15)

South(-)/North(+) (1600 ft/in)



West(-)/East(+) (1600 ft/in)



Vertical Section at 88.99° (550 ft/in)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	3000.0	0.00	0.00	3000.0	0.0	0.0	0.00	0.00	0.0	
3	3597.0	8.96	288.93	3594.6	15.1	-44.0	1.50	288.93	-43.8	
4	4669.6	8.96	288.93	4654.1	69.3	-202.0	0.00	0.00	-200.7	
5	5117.3	0.00	0.00	5100.0	80.6	-235.0	2.00	180.00	-233.5	
6	6682.2	0.00	0.00	6664.9	80.6	-235.0	0.00	0.00	-233.5	
7	7893.5	90.84	90.00	7428.8	80.6	540.1	7.50	90.00	541.5	
8	11903.6	90.84	90.00	7370.0	80.6	4549.9	0.00	0.00	4550.6	BHL 200'FNL, 500'FEL



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15E-332

Wellbore #1

Plan: Plan #2 (8-17-15)

Standard Planning Report

18 August, 2015

Database:	US_EDM	Local Co-ordinate Reference:	Well Thornton 15E-332
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-17-15)		

Project	SEC.15-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 Pad Sec.15-T7N-R66W			
Site Position:		Northing:	1,455,601.69 usft	Latitude:	40.581750
From:	Lat/Long	Easting:	3,202,070.80 usft	Longitude:	-104.772500
Position Uncertainty:	0.0 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.47 °

Well	Thornton 15E-332					
Well Position	+N/-S	0.0 ft	Northing:	1,455,601.67 usft	Latitude:	40.581750
	+E/-W	0.0 ft	Easting:	3,202,070.80 usft	Longitude:	-104.772500
Position Uncertainty		0.0 ft	Wellhead Elevation:		Ground Level:	4,970.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/17/2015	8.32	67.05	52,784

Design	Plan #2 (8-17-15)			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	88.99

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
3,597.0	8.96	288.93	3,594.6	15.1	-44.0	1.50	1.50	0.00	288.93	
4,669.6	8.96	288.93	4,654.1	69.3	-202.0	0.00	0.00	0.00	0.00	
5,117.3	0.00	0.00	5,100.0	80.6	-235.0	2.00	-2.00	0.00	180.00	
6,682.2	0.00	0.00	6,664.9	80.6	-235.0	0.00	0.00	0.00	0.00	
7,893.5	90.84	90.00	7,428.8	80.6	540.1	7.50	7.50	0.00	90.00	
11,903.6	90.84	90.00	7,370.0	80.6	4,549.9	0.00	0.00	0.00	0.00	BHL 200'FNL, 500'FE

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Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-17-15)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
3,100.0	1.50	288.93	3,100.0	0.4	-1.2	-1.2	1.50	1.50	0.00
3,200.0	3.00	288.93	3,199.9	1.7	-5.0	-4.9	1.50	1.50	0.00
3,300.0	4.50	288.93	3,299.7	3.8	-11.1	-11.1	1.50	1.50	0.00
3,400.0	6.00	288.93	3,399.3	6.8	-19.8	-19.7	1.50	1.50	0.00
3,500.0	7.50	288.93	3,498.6	10.6	-30.9	-30.7	1.50	1.50	0.00
3,597.0	8.96	288.93	3,594.6	15.1	-44.0	-43.8	1.50	1.50	0.00
3,600.0	8.96	288.93	3,597.5	15.3	-44.5	-44.2	0.00	0.00	0.00
3,700.0	8.96	288.93	3,696.3	20.3	-59.2	-58.8	0.00	0.00	0.00
3,800.0	8.96	288.93	3,795.1	25.4	-73.9	-73.5	0.00	0.00	0.00
3,900.0	8.96	288.93	3,893.9	30.4	-88.7	-88.1	0.00	0.00	0.00
4,000.0	8.96	288.93	3,992.7	35.5	-103.4	-102.7	0.00	0.00	0.00
4,100.0	8.96	288.93	4,091.4	40.5	-118.1	-117.4	0.00	0.00	0.00
4,200.0	8.96	288.93	4,190.2	45.6	-132.8	-132.0	0.00	0.00	0.00
4,300.0	8.96	288.93	4,289.0	50.6	-147.6	-146.6	0.00	0.00	0.00
4,400.0	8.96	288.93	4,387.8	55.7	-162.3	-161.3	0.00	0.00	0.00
4,500.0	8.96	288.93	4,486.6	60.7	-177.0	-175.9	0.00	0.00	0.00
4,600.0	8.96	288.93	4,585.3	65.8	-191.7	-190.5	0.00	0.00	0.00
4,669.6	8.96	288.93	4,654.1	69.3	-202.0	-200.7	0.00	0.00	0.00
4,700.0	8.35	288.93	4,684.2	70.7	-206.3	-205.0	2.00	-2.00	0.00
4,800.0	6.35	288.93	4,783.3	74.9	-218.4	-217.0	2.00	-2.00	0.00
4,900.0	4.35	288.93	4,882.9	77.9	-227.2	-225.8	2.00	-2.00	0.00

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Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-17-15)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,000.0	2.35	288.93	4,982.7	79.8	-232.7	-231.3	2.00	-2.00	0.00
5,100.0	0.35	288.93	5,082.7	80.6	-235.0	-233.5	2.00	-2.00	0.00
5,117.3	0.00	0.00	5,100.0	80.6	-235.0	-233.5	2.00	-2.00	0.00
5,200.0	0.00	0.00	5,182.7	80.6	-235.0	-233.5	0.00	0.00	0.00
5,300.0	0.00	0.00	5,282.7	80.6	-235.0	-233.5	0.00	0.00	0.00
5,400.0	0.00	0.00	5,382.7	80.6	-235.0	-233.5	0.00	0.00	0.00
5,500.0	0.00	0.00	5,482.7	80.6	-235.0	-233.5	0.00	0.00	0.00
5,600.0	0.00	0.00	5,582.7	80.6	-235.0	-233.5	0.00	0.00	0.00
5,700.0	0.00	0.00	5,682.7	80.6	-235.0	-233.5	0.00	0.00	0.00
5,800.0	0.00	0.00	5,782.7	80.6	-235.0	-233.5	0.00	0.00	0.00
5,900.0	0.00	0.00	5,882.7	80.6	-235.0	-233.5	0.00	0.00	0.00
6,000.0	0.00	0.00	5,982.7	80.6	-235.0	-233.5	0.00	0.00	0.00
6,100.0	0.00	0.00	6,082.7	80.6	-235.0	-233.5	0.00	0.00	0.00
6,200.0	0.00	0.00	6,182.7	80.6	-235.0	-233.5	0.00	0.00	0.00
6,300.0	0.00	0.00	6,282.7	80.6	-235.0	-233.5	0.00	0.00	0.00
6,400.0	0.00	0.00	6,382.7	80.6	-235.0	-233.5	0.00	0.00	0.00
6,500.0	0.00	0.00	6,482.7	80.6	-235.0	-233.5	0.00	0.00	0.00
6,600.0	0.00	0.00	6,582.7	80.6	-235.0	-233.5	0.00	0.00	0.00
6,682.2	0.00	0.00	6,664.9	80.6	-235.0	-233.5	0.00	0.00	0.00
KOP #2									
6,700.0	1.33	90.00	6,682.7	80.6	-234.8	-233.3	7.48	7.48	0.00
6,800.0	8.83	90.00	6,782.2	80.6	-225.9	-224.5	7.50	7.50	0.00
6,900.0	16.33	90.00	6,879.7	80.6	-204.2	-202.7	7.50	7.50	0.00
7,000.0	23.83	90.00	6,973.6	80.6	-169.9	-168.4	7.50	7.50	0.00
7,100.0	31.33	90.00	7,062.2	80.6	-123.6	-122.2	7.50	7.50	0.00
7,200.0	38.83	90.00	7,143.9	80.6	-66.2	-64.7	7.50	7.50	0.00
7,300.0	46.33	90.00	7,217.5	80.6	1.4	2.9	7.50	7.50	0.00
7,400.0	53.83	90.00	7,281.6	80.6	78.1	79.5	7.50	7.50	0.00
7,500.0	61.33	90.00	7,335.2	80.6	162.4	163.8	7.50	7.50	0.00
7,600.0	68.83	90.00	7,377.3	80.6	253.1	254.5	7.50	7.50	0.00
7,700.0	76.33	90.00	7,407.2	80.6	348.4	349.8	7.50	7.50	0.00
7,800.0	83.83	90.00	7,424.4	80.6	446.9	448.2	7.50	7.50	0.00
7,893.5	90.84	90.00	7,428.8	80.6	540.2	541.5	7.50	7.50	0.00
End of Build - 7"									
7,900.0	90.84	90.00	7,428.7	80.6	546.7	548.0	0.00	0.00	0.00
8,000.0	90.84	90.00	7,427.2	80.6	646.7	648.0	0.00	0.00	0.00
8,100.0	90.84	90.00	7,425.8	80.6	746.7	748.0	0.00	0.00	0.00
8,200.0	90.84	90.00	7,424.3	80.6	846.7	848.0	0.00	0.00	0.00
8,300.0	90.84	90.00	7,422.8	80.6	946.6	947.9	0.00	0.00	0.00
8,400.0	90.84	90.00	7,421.4	80.6	1,046.6	1,047.9	0.00	0.00	0.00
8,500.0	90.84	90.00	7,419.9	80.6	1,146.6	1,147.9	0.00	0.00	0.00
8,600.0	90.84	90.00	7,418.4	80.6	1,246.6	1,247.8	0.00	0.00	0.00
8,700.0	90.84	90.00	7,417.0	80.6	1,346.6	1,347.8	0.00	0.00	0.00
8,800.0	90.84	90.00	7,415.5	80.6	1,446.6	1,447.8	0.00	0.00	0.00
8,900.0	90.84	90.00	7,414.0	80.6	1,546.6	1,547.8	0.00	0.00	0.00
9,000.0	90.84	90.00	7,412.6	80.6	1,646.6	1,647.7	0.00	0.00	0.00
9,100.0	90.84	90.00	7,411.1	80.6	1,746.6	1,747.7	0.00	0.00	0.00
9,200.0	90.84	90.00	7,409.6	80.6	1,846.6	1,847.7	0.00	0.00	0.00
9,300.0	90.84	90.00	7,408.2	80.6	1,946.5	1,947.7	0.00	0.00	0.00
9,400.0	90.84	90.00	7,406.7	80.6	2,046.5	2,047.6	0.00	0.00	0.00
9,500.0	90.84	90.00	7,405.2	80.6	2,146.5	2,147.6	0.00	0.00	0.00
9,600.0	90.84	90.00	7,403.8	80.6	2,246.5	2,247.6	0.00	0.00	0.00
9,700.0	90.84	90.00	7,402.3	80.6	2,346.5	2,347.6	0.00	0.00	0.00

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Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-17-15)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,800.0	90.84	90.00	7,400.8	80.6	2,446.5	2,447.5	0.00	0.00	0.00
9,900.0	90.84	90.00	7,399.4	80.6	2,546.5	2,547.5	0.00	0.00	0.00
10,000.0	90.84	90.00	7,397.9	80.6	2,646.5	2,647.5	0.00	0.00	0.00
10,100.0	90.84	90.00	7,396.4	80.6	2,746.5	2,747.5	0.00	0.00	0.00
10,200.0	90.84	90.00	7,395.0	80.6	2,846.4	2,847.4	0.00	0.00	0.00
10,300.0	90.84	90.00	7,393.5	80.6	2,946.4	2,947.4	0.00	0.00	0.00
10,400.0	90.84	90.00	7,392.0	80.6	3,046.4	3,047.4	0.00	0.00	0.00
10,500.0	90.84	90.00	7,390.6	80.6	3,146.4	3,147.3	0.00	0.00	0.00
10,600.0	90.84	90.00	7,389.1	80.6	3,246.4	3,247.3	0.00	0.00	0.00
10,700.0	90.84	90.00	7,387.6	80.6	3,346.4	3,347.3	0.00	0.00	0.00
10,800.0	90.84	90.00	7,386.2	80.6	3,446.4	3,447.3	0.00	0.00	0.00
10,900.0	90.84	90.00	7,384.7	80.6	3,546.4	3,547.2	0.00	0.00	0.00
11,000.0	90.84	90.00	7,383.2	80.6	3,646.4	3,647.2	0.00	0.00	0.00
11,100.0	90.84	90.00	7,381.8	80.6	3,746.3	3,747.2	0.00	0.00	0.00
11,200.0	90.84	90.00	7,380.3	80.6	3,846.3	3,847.2	0.00	0.00	0.00
11,300.0	90.84	90.00	7,378.8	80.6	3,946.3	3,947.1	0.00	0.00	0.00
11,400.0	90.84	90.00	7,377.4	80.6	4,046.3	4,047.1	0.00	0.00	0.00
11,500.0	90.84	90.00	7,375.9	80.6	4,146.3	4,147.1	0.00	0.00	0.00
11,600.0	90.84	90.00	7,374.5	80.6	4,246.3	4,247.1	0.00	0.00	0.00
11,700.0	90.84	90.00	7,373.0	80.6	4,346.3	4,347.0	0.00	0.00	0.00
11,800.0	90.84	90.00	7,371.5	80.6	4,446.3	4,447.0	0.00	0.00	0.00
11,900.0	90.84	90.00	7,370.1	80.6	4,546.3	4,547.0	0.00	0.00	0.00
11,903.6	90.84	90.00	7,370.0	80.6	4,549.9	4,550.6	0.00	0.00	0.00

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
SHL 270'FNL & 285'FWI	0.00	0.00	1.0	0.0	0.0	1,455,601.69	3,202,070.80	40.581750	-104.772500
- plan hits target center									
- Point									
BHL 200'FNL, 500'FEL	0.00	0.00	7,370.0	80.6	4,549.9	1,455,719.59	3,206,619.74	40.581970	-104.756120
- plan hits target center									
- Point									

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,893.5	7,428.8	7"	7	8-3/4	

Database:	US_EDM	Local Co-ordinate Reference:	Well Thornton 15E-332
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-17-15)		

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3,000.0	3,000.0	0.0	0.0	KOP #1
6,682.2	6,664.9	15.1	-44.0	KOP #2
7,893.5	7,428.8	69.3	-202.0	End of Build



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15E-332

Wellbore #1

Plan #2 (8-17-15)

Anticollision Report

18 August, 2015



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Reference	Plan #2 (8-17-15)		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.0 ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 8/18/2015			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,903.6	Plan #2 (8-17-15) (Wellbore #1)	MWD	MWD - Standard

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Thornton Pad Sec.15-T7N-R66W						
Thornton 15E-432 - Wellbore #1 - Wellbore #1	0.0	2.0	91.1	91.1	10,000.000	CC, ES
Thornton 15E-432 - Wellbore #1 - Wellbore #1	11,903.6	11,975.1	455.3	202.3	1.799	SF
Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)	566.0	568.0	61.9	59.6	26.646	CC
Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)	600.0	602.0	61.9	59.5	25.008	ES
Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)	11,903.6	11,861.0	884.2	623.8	3.395	SF

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-432 - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 121-MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
0.0	0.0	2.0	2.0	0.0	0.0	180.00	-91.1	0.0	91.1	91.1	0.00	N/A CC, ES		
100.0	100.0	101.5	101.5	0.1	0.1	179.86	-91.4	0.2	91.4	91.1	0.23	402.411		
200.0	200.0	201.4	201.4	0.3	0.3	179.59	-92.0	0.7	92.0	91.4	0.64	143.751		
300.0	300.0	300.9	300.9	0.6	0.5	179.37	-92.9	1.0	92.9	91.8	1.08	86.378		
400.0	400.0	400.5	400.4	0.8	0.7	178.95	-94.3	1.7	94.4	92.8	1.52	62.232		
500.0	500.0	500.5	500.4	1.0	0.9	178.20	-96.1	3.0	96.2	94.2	1.96	49.128		
600.0	600.0	601.5	601.4	1.2	1.2	178.01	-97.2	3.4	97.2	94.9	2.39	40.680		
700.0	700.0	701.6	701.5	1.5	1.4	178.05	-97.7	3.3	97.8	95.0	2.82	34.692		
800.0	800.0	800.9	800.9	1.7	1.6	177.80	-98.5	3.8	98.5	95.3	3.26	30.263		
900.0	900.0	900.0	899.9	1.9	1.8	177.24	-100.0	4.8	100.1	96.4	3.70	27.081		
1,000.0	1,000.0	1,000.2	1,000.0	2.1	2.0	176.77	-102.4	5.8	102.6	98.4	4.14	24.779		
1,100.0	1,100.0	1,103.7	1,103.6	2.4	2.2	176.87	-102.5	5.6	102.6	98.1	4.58	22.424		
1,200.0	1,200.0	1,203.8	1,203.7	2.6	2.4	177.02	-100.9	5.2	101.0	96.0	5.00	20.183		
1,300.0	1,300.0	1,302.6	1,302.5	2.8	2.6	177.15	-99.7	5.0	99.8	94.4	5.43	18.362		
1,331.2	1,331.2	1,333.4	1,333.2	2.9	2.7	177.39	-99.6	4.5	99.7	94.1	5.57	17.905		
1,400.0	1,400.0	1,400.8	1,400.6	3.0	2.8	178.29	-100.1	3.0	100.2	94.3	5.87	17.075		
1,500.0	1,500.0	1,498.6	1,498.4	3.3	3.0	-179.37	-102.5	-1.1	102.6	96.3	6.30	16.291		
1,600.0	1,600.0	1,596.4	1,595.8	3.5	3.3	-176.41	-106.9	-6.7	107.3	100.5	6.74	15.920		
1,700.0	1,700.0	1,693.7	1,692.8	3.7	3.5	-173.24	-113.0	-13.4	114.2	107.0	7.18	15.893		
1,800.0	1,800.0	1,792.9	1,791.4	3.9	3.7	-170.13	-120.8	-21.0	123.0	115.4	7.63	16.119		
1,900.0	1,900.0	1,894.9	1,892.8	4.2	4.0	-167.71	-127.6	-27.8	130.9	122.8	8.09	16.186		

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 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-432 - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 121-MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
2,000.0	2,000.0	1,994.9	1,992.6	4.4	4.2	-166.04	-133.2	-33.1	137.5	129.0	8.53	16.116		
2,100.0	2,100.0	2,094.0	2,091.4	4.6	4.4	-165.09	-139.4	-37.1	144.6	135.6	8.98	16.103		
2,200.0	2,200.0	2,193.6	2,190.7	4.8	4.7	-164.36	-146.0	-40.9	152.0	142.6	9.43	16.115		
2,300.0	2,300.0	2,293.1	2,289.9	5.1	4.9	-163.17	-152.3	-46.1	159.5	149.7	9.89	16.134		
2,400.0	2,400.0	2,396.1	2,392.6	5.3	5.1	-161.53	-157.4	-52.5	166.2	155.8	10.34	16.071		
2,500.0	2,500.0	2,498.4	2,494.6	5.5	5.4	-159.53	-160.1	-59.8	171.0	160.2	10.79	15.846		
2,600.0	2,600.0	2,598.2	2,594.1	5.7	5.6	-157.28	-161.7	-67.7	175.4	164.2	11.23	15.615		
2,700.0	2,700.0	2,696.5	2,692.0	6.0	5.8	-154.87	-162.9	-76.4	180.2	168.5	11.68	15.427		
2,800.0	2,800.0	2,792.2	2,787.1	6.2	6.1	-152.53	-165.4	-86.0	187.0	174.9	12.14	15.407		
2,900.0	2,900.0	2,887.8	2,882.0	6.4	6.3	-150.34	-169.5	-96.6	196.1	183.5	12.60	15.564		
3,000.0	3,000.0	2,983.8	2,977.3	6.6	6.6	-148.53	-175.5	-107.4	207.2	194.1	13.08	15.837		
3,100.0	3,100.0	3,080.7	3,073.2	6.8	6.9	-76.24	-183.2	-118.2	219.6	206.3	13.32	16.485		
3,200.0	3,199.9	3,179.0	3,170.6	7.1	7.2	-76.22	-192.5	-127.9	232.0	218.2	13.75	16.867		
3,300.0	3,299.7	3,277.5	3,268.2	7.3	7.5	-77.25	-203.2	-136.1	244.1	230.0	14.19	17.201		
3,400.0	3,399.3	3,376.4	3,366.1	7.5	7.7	-78.77	-214.2	-144.3	256.1	241.4	14.64	17.486		
3,500.0	3,498.6	3,476.8	3,465.6	7.7	8.0	-80.71	-225.1	-152.6	267.6	252.5	15.11	17.712		
3,597.0	3,594.6	3,575.5	3,563.5	7.9	8.3	-83.11	-235.3	-159.9	277.9	262.3	15.58	17.836		
3,600.0	3,597.5	3,578.6	3,566.5	8.0	8.3	-83.20	-235.6	-160.1	278.2	262.6	15.60	17.838		
3,700.0	3,696.3	3,679.3	3,666.5	8.2	8.6	-85.97	-245.3	-166.6	288.3	272.2	16.10	17.909		
3,800.0	3,795.1	3,779.7	3,766.3	8.5	8.9	-88.52	-254.4	-172.9	298.3	281.7	16.61	17.965		
3,900.0	3,893.9	3,875.6	3,861.7	8.7	9.1	-90.78	-263.0	-179.1	308.9	291.8	17.12	18.043		
4,000.0	3,992.7	3,970.3	3,955.6	9.0	9.4	-92.79	-272.4	-185.9	321.2	303.5	17.64	18.204		
4,100.0	4,091.4	4,062.7	4,047.2	9.3	9.7	-94.56	-282.9	-193.1	335.2	317.1	18.17	18.447		
4,200.0	4,190.2	4,154.0	4,137.3	9.6	10.0	-96.18	-295.0	-200.6	351.6	332.9	18.71	18.791		
4,300.0	4,289.0	4,248.7	4,230.7	9.9	10.3	-97.74	-309.1	-208.5	369.8	350.5	19.26	19.196		
4,400.0	4,387.8	4,350.8	4,331.3	10.2	10.6	-99.36	-324.5	-216.4	388.4	368.6	19.83	19.582		
4,500.0	4,486.6	4,460.7	4,440.1	10.5	10.9	-101.31	-338.6	-221.9	404.8	384.3	20.42	19.820		
4,600.0	4,585.3	4,568.1	4,546.9	10.8	11.2	-103.26	-349.9	-225.6	419.0	398.0	20.99	19.960		
4,669.6	4,654.1	4,643.1	4,621.6	11.0	11.4	-104.58	-356.5	-227.8	427.9	406.5	21.39	20.003		
4,700.0	4,684.2	4,676.1	4,654.4	11.1	11.5	-105.19	-358.9	-228.7	431.4	409.9	21.56	20.013		
4,800.0	4,783.3	4,787.0	4,765.1	11.3	11.7	-106.86	-365.5	-231.4	441.1	419.0	22.06	19.999		
4,900.0	4,882.9	4,897.0	4,875.0	11.5	12.0	-108.16	-369.0	-232.1	447.1	424.5	22.52	19.850		
5,000.0	4,982.7	4,997.8	4,975.8	11.8	12.1	-108.98	-371.1	-231.8	451.0	428.1	22.94	19.663		
5,100.0	5,082.7	5,101.1	5,079.1	11.9	12.3	-109.38	-372.9	-231.4	453.6	430.2	23.33	19.439		
5,117.3	5,100.0	5,119.7	5,097.7	12.0	12.4	179.54	-373.1	-231.4	453.8	430.8	22.94	19.781		
5,200.0	5,182.7	5,208.7	5,186.7	12.1	12.5	179.66	-373.4	-232.3	454.0	430.7	23.27	19.505		
5,300.0	5,282.7	5,311.9	5,289.8	12.3	12.7	179.96	-372.4	-234.7	453.0	429.3	23.69	19.122		
5,400.0	5,382.7	5,411.9	5,389.9	12.5	12.9	-179.79	-371.2	-236.7	451.8	427.7	24.09	18.753		
5,500.0	5,482.7	5,511.4	5,489.3	12.7	13.1	-179.58	-370.1	-238.3	450.7	426.2	24.50	18.397		
5,600.0	5,582.7	5,610.6	5,588.5	12.9	13.3	-179.34	-369.1	-240.2	449.8	424.9	24.91	18.059		
5,700.0	5,682.7	5,709.2	5,687.0	13.2	13.5	-179.14	-368.4	-241.7	449.1	423.8	25.31	17.740		
5,800.0	5,782.7	5,807.6	5,785.4	13.4	13.6	-179.14	-368.1	-241.8	448.7	423.0	25.72	17.447		
5,900.0	5,882.7	5,908.8	5,886.7	13.6	13.8	-179.24	-367.8	-240.9	448.5	422.3	26.13	17.164		
6,000.0	5,982.7	6,010.7	5,988.5	13.8	14.0	-179.29	-367.2	-240.6	447.8	421.3	26.54	16.874		
6,100.0	6,082.7	6,108.9	6,086.8	14.0	14.2	-179.25	-366.5	-240.8	447.1	420.2	26.95	16.594		
6,200.0	6,182.7	6,207.2	6,185.1	14.2	14.4	-179.12	-366.2	-241.9	446.9	419.5	27.35	16.337		
6,300.0	6,282.7	6,309.0	6,286.9	14.4	14.6	-178.97	-365.9	-243.1	446.6	418.8	27.77	16.080		
6,400.0	6,382.7	6,410.3	6,388.2	14.6	14.8	-178.87	-365.2	-243.8	445.9	417.7	28.19	15.818		
6,500.0	6,482.7	6,508.9	6,486.7	14.8	14.9	-178.76	-364.6	-244.6	445.3	416.7	28.60	15.569		
6,600.0	6,582.7	6,608.5	6,586.3	15.1	15.1	-178.62	-364.2	-245.7	445.0	415.9	29.02	15.335		
6,682.2	6,664.9	6,693.0	6,670.8	15.2	15.3	-178.47	-363.7	-246.9	444.4	415.1	29.36	15.136		

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 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-432 - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 121-MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
6,700.0	6,682.7	6,710.6	6,688.5	15.3	15.3	91.60	-363.5	-247.1	444.3	414.4	29.87	14.876		
6,720.4	6,703.0	6,727.9	6,705.7	15.3	15.4	91.72	-363.4	-247.4	444.2	414.3	29.93	14.839		
6,750.0	6,732.6	6,755.6	6,733.5	15.4	15.4	92.00	-363.5	-247.7	444.3	414.3	30.03	14.794		
6,800.0	6,782.2	6,803.9	6,781.7	15.4	15.5	92.57	-363.7	-246.5	444.7	414.5	30.19	14.733		
6,850.0	6,831.3	6,852.0	6,829.5	15.5	15.6	93.01	-364.2	-241.5	445.5	415.2	30.31	14.696		
6,900.0	6,879.7	6,896.2	6,873.0	15.5	15.6	93.32	-365.3	-233.7	446.9	416.5	30.42	14.694		
6,950.0	6,927.2	6,992.8	6,966.2	15.6	15.7	94.06	-363.5	-208.6	446.0	415.5	30.54	14.604		
7,000.0	6,973.6	7,040.7	7,011.0	15.6	15.7	94.49	-360.6	-192.1	443.2	412.5	30.62	14.473		
7,050.0	7,018.6	7,088.0	7,054.5	15.7	15.7	94.97	-358.2	-173.5	440.8	410.1	30.70	14.358		
7,100.0	7,062.2	7,132.1	7,094.2	15.8	15.7	95.48	-356.5	-154.4	439.2	408.4	30.80	14.262		
7,140.9	7,096.6	7,165.9	7,123.9	15.8	15.7	95.86	-355.9	-138.3	438.7	407.8	30.90	14.201		
7,150.0	7,104.0	7,173.1	7,130.1	15.9	15.8	95.94	-355.8	-134.8	438.8	407.9	30.92	14.192		
7,200.0	7,143.9	7,214.0	7,164.9	16.0	15.8	96.35	-356.3	-113.3	439.8	408.8	31.08	14.154		
7,250.0	7,181.8	7,260.5	7,203.4	16.1	15.8	96.86	-357.8	-87.2	442.1	410.8	31.30	14.125		
7,300.0	7,217.5	7,319.3	7,249.6	16.3	15.8	97.50	-359.7	-50.9	444.5	412.8	31.62	14.057		
7,350.0	7,250.8	7,385.0	7,296.6	16.6	15.9	97.95	-360.7	-5.0	445.6	413.5	32.09	13.886		
7,400.0	7,281.6	7,439.4	7,332.3	16.9	16.0	98.26	-360.8	36.0	446.1	413.4	32.66	13.660		
7,450.0	7,309.8	7,498.1	7,366.8	17.3	16.4	98.46	-361.0	83.4	446.4	413.0	33.42	13.360		
7,500.0	7,335.2	7,556.5	7,396.0	17.8	16.9	98.41	-360.7	134.0	446.1	411.7	34.38	12.977		
7,525.4	7,347.0	7,580.8	7,406.8	18.1	17.1	98.34	-360.7	155.8	446.0	411.1	34.90	12.782		
7,550.0	7,357.8	7,605.8	7,417.3	18.4	17.4	98.28	-360.8	178.4	446.1	410.7	35.43	12.590		
7,600.0	7,377.3	7,656.0	7,436.3	19.0	18.0	98.16	-361.2	224.9	446.4	409.7	36.65	12.179		
7,650.0	7,393.8	7,699.4	7,451.0	19.7	18.6	98.09	-362.3	265.7	447.7	409.7	37.93	11.801		
7,700.0	7,407.2	7,746.9	7,465.2	20.5	19.3	98.09	-364.2	311.0	449.9	410.5	39.39	11.421		
7,750.0	7,417.5	7,791.1	7,476.6	21.4	20.1	98.13	-366.6	353.6	452.9	412.0	40.92	11.069		
7,800.0	7,424.4	7,832.6	7,485.4	22.3	20.8	98.12	-369.9	394.1	457.4	414.9	42.50	10.761		
7,850.0	7,428.2	7,888.0	7,492.8	23.2	21.8	98.07	-375.1	448.7	462.4	418.0	44.43	10.407		
7,893.5	7,428.8	7,949.4	7,497.7	24.0	23.0	98.22	-379.6	509.7	466.0	419.6	46.42	10.039		
7,900.0	7,428.7	7,960.2	7,498.4	24.2	23.2	98.31	-380.1	520.5	466.4	419.7	46.75	9.976		
8,000.0	7,427.2	8,102.8	7,502.7	26.2	26.2	99.09	-380.3	663.0	467.0	415.3	51.66	9.040		
8,100.0	7,425.8	8,197.4	7,505.0	28.4	28.3	99.60	-376.7	757.5	463.9	408.1	55.85	8.306		
8,200.0	7,424.3	8,302.7	7,502.4	30.7	30.8	99.52	-374.8	862.7	462.0	401.4	60.56	7.629		
8,300.0	7,422.8	8,405.6	7,502.4	33.1	33.2	99.78	-370.9	965.5	458.5	393.2	65.29	7.022		
8,400.0	7,421.4	8,504.8	7,504.3	35.6	35.6	100.30	-366.1	1,064.6	454.4	384.4	70.00	6.491		
8,500.0	7,419.9	8,599.4	7,506.5	38.0	38.0	100.82	-362.9	1,159.1	451.6	377.0	74.68	6.048		
8,600.0	7,418.4	8,689.6	7,509.2	40.6	40.3	101.38	-360.7	1,249.3	450.2	370.9	79.30	5.677		
8,612.3	7,418.3	8,700.6	7,509.3	40.9	40.6	101.42	-360.6	1,260.2	450.1	370.3	79.87	5.636		
8,700.0	7,417.0	8,782.5	7,508.5	43.1	42.7	101.44	-361.3	1,342.1	450.9	366.7	84.16	5.357		
8,800.0	7,415.5	8,888.6	7,508.4	45.7	45.5	101.63	-361.2	1,448.2	451.1	361.7	89.37	5.047		
8,802.7	7,415.5	8,891.1	7,508.5	45.8	45.5	101.64	-361.2	1,450.6	451.1	361.5	89.50	5.040		
8,900.0	7,414.0	8,979.5	7,508.2	48.4	47.9	101.75	-361.9	1,539.1	452.1	357.8	94.26	4.797		
9,000.0	7,412.6	9,083.8	7,509.3	51.0	50.6	102.06	-362.6	1,643.3	453.2	353.7	99.46	4.557		
9,100.0	7,411.1	9,179.5	7,509.9	53.7	53.2	102.27	-363.7	1,739.1	454.8	350.3	104.49	4.353		
9,200.0	7,409.6	9,277.5	7,509.8	56.3	55.8	102.38	-365.9	1,837.1	457.2	347.6	109.64	4.170		
9,300.0	7,408.2	9,375.5	7,508.8	59.0	58.5	102.37	-368.3	1,935.0	459.8	344.9	114.86	4.003		
9,400.0	7,406.7	9,482.8	7,507.4	61.7	61.4	102.34	-370.3	2,042.3	461.6	341.2	120.35	3.835		
9,500.0	7,405.2	9,592.1	7,507.0	64.4	64.3	102.50	-369.8	2,151.5	461.3	335.5	125.82	3.667		
9,551.6	7,404.5	9,640.1	7,507.0	65.8	65.6	102.60	-369.4	2,199.6	461.1	332.7	128.43	3.590		
9,600.0	7,403.8	9,684.2	7,506.8	67.1	66.8	102.64	-369.6	2,243.7	461.4	330.5	130.87	3.525		
9,700.0	7,402.3	9,787.9	7,506.6	69.9	69.7	102.81	-369.6	2,347.4	461.7	325.5	136.21	3.389		
9,800.0	7,400.8	9,888.7	7,507.2	72.6	72.4	103.06	-369.2	2,448.2	461.7	320.3	141.44	3.264		

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 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-432 - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 121-MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
9,900.0	7,399.4	9,993.3	7,508.3	75.3	75.3	103.41	-368.3	2,552.8	461.5	314.8	146.71	3.146		
10,000.0	7,397.9	10,094.4	7,507.5	78.1	78.0	103.54	-366.9	2,653.8	460.3	308.3	152.00	3.028		
10,100.0	7,396.4	10,199.7	7,506.8	80.8	80.9	103.70	-364.8	2,759.1	458.6	301.2	157.39	2.914		
10,200.0	7,395.0	10,302.8	7,505.0	83.6	83.7	103.74	-362.0	2,862.1	455.8	293.0	162.79	2.800		
10,300.0	7,393.5	10,402.3	7,501.9	86.3	86.5	103.64	-358.9	2,961.6	452.5	284.3	168.20	2.690		
10,400.0	7,392.0	10,503.0	7,499.7	89.1	89.2	103.63	-356.1	3,062.2	449.6	276.0	173.58	2.590		
10,500.0	7,390.6	10,591.8	7,500.3	91.8	91.7	103.94	-353.7	3,150.9	447.5	269.0	178.44	2.508		
10,533.3	7,390.1	10,622.2	7,500.2	92.7	92.5	103.99	-353.5	3,181.3	447.4	267.2	180.12	2.484		
10,600.0	7,389.1	10,685.7	7,499.4	94.6	94.3	104.00	-353.7	3,244.8	447.6	264.0	183.61	2.438		
10,700.0	7,387.6	10,782.1	7,497.1	97.4	96.9	103.85	-355.0	3,341.2	448.7	259.7	189.02	2.374		
10,800.0	7,386.2	10,876.7	7,495.2	100.1	99.6	103.72	-357.2	3,435.7	450.8	256.4	194.36	2.319		
10,900.0	7,384.7	10,976.4	7,493.7	102.9	102.3	103.62	-360.1	3,535.4	453.6	253.8	199.84	2.270		
11,000.0	7,383.2	11,093.2	7,492.5	105.7	105.6	103.64	-361.6	3,652.1	455.1	249.4	205.67	2.213		
11,100.0	7,381.8	11,199.2	7,493.5	108.4	108.5	104.05	-358.7	3,758.1	452.9	242.0	210.89	2.148		
11,200.0	7,380.3	11,297.2	7,493.7	111.2	111.2	104.32	-356.0	3,856.1	450.7	234.7	215.99	2.087		
11,300.0	7,378.8	11,394.3	7,493.2	114.0	113.9	104.49	-354.5	3,953.2	449.4	228.2	221.16	2.032		
11,400.0	7,377.4	11,497.9	7,491.1	116.8	116.8	104.47	-352.8	4,056.7	447.7	221.0	226.67	1.975		
11,500.0	7,375.9	11,599.2	7,488.3	119.6	119.6	104.38	-350.6	4,158.0	445.3	213.1	232.18	1.918		
11,564.7	7,375.0	11,653.9	7,488.3	121.4	121.1	104.51	-349.7	4,212.6	444.4	209.2	235.28	1.889		
11,600.0	7,374.5	11,680.8	7,488.6	122.3	121.9	104.59	-349.8	4,239.5	444.8	207.9	236.88	1.878		
11,700.0	7,373.0	11,773.6	7,489.5	125.1	124.4	104.79	-352.3	4,332.3	448.0	206.2	241.88	1.852		
11,800.0	7,371.5	11,873.8	7,489.0	127.9	127.2	104.80	-355.7	4,432.5	451.5	204.2	247.29	1.826		
11,903.6	7,370.0	11,975.1	7,486.7	130.8	130.1	104.57	-359.7	4,533.7	455.3	202.3	253.07	1.799 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)													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 (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.0	0.0	2.0	2.0	0.0	0.0	-180.00	-61.9	0.0	61.9	61.9	0.00	N/A		
100.0	100.0	102.0	102.0	0.1	0.1	-180.00	-61.9	0.0	61.9	61.7	0.23	270.115		
200.0	200.0	202.0	202.0	0.3	0.3	-180.00	-61.9	0.0	61.9	61.2	0.68	91.231		
300.0	300.0	302.0	302.0	0.6	0.6	-180.00	-61.9	0.0	61.9	60.8	1.13	54.884		
400.0	400.0	402.0	402.0	0.8	0.8	-180.00	-61.9	0.0	61.9	60.3	1.58	39.247		
500.0	500.0	502.0	502.0	1.0	1.0	-180.00	-61.9	0.0	61.9	59.9	2.03	30.545		
566.0	566.0	568.0	568.0	1.2	1.2	-180.00	-61.9	0.0	61.9	59.6	2.32	26.646 CC		
600.0	600.0	602.0	602.0	1.2	1.2	-180.00	-61.9	0.0	61.9	59.5	2.48	25.008 ES		
700.0	700.0	700.0	700.0	1.5	1.4	-179.53	-63.6	-0.5	63.6	60.7	2.89	21.980		
800.0	800.0	797.6	797.4	1.7	1.6	-178.29	-68.4	-2.0	68.6	65.3	3.30	20.795		
900.0	900.0	894.9	894.3	1.9	1.8	-176.60	-76.4	-4.5	76.9	73.2	3.72	20.660		
1,000.0	1,000.0	991.4	990.2	2.1	2.0	-174.78	-87.4	-8.0	88.6	84.4	4.17	21.235		
1,100.0	1,100.0	1,087.1	1,084.8	2.4	2.3	-173.05	-101.3	-12.4	103.5	98.9	4.65	22.266		
1,200.0	1,200.0	1,184.8	1,181.0	2.6	2.6	-171.55	-117.7	-17.5	120.8	115.7	5.17	23.395		
1,300.0	1,300.0	1,283.3	1,277.9	2.8	3.0	-170.42	-134.3	-22.7	138.3	132.6	5.71	24.237		
1,400.0	1,400.0	1,381.7	1,374.8	3.0	3.3	-169.54	-150.8	-27.8	155.8	149.5	6.26	24.878		
1,500.0	1,500.0	1,480.1	1,471.6	3.3	3.7	-168.83	-167.4	-33.0	173.3	166.4	6.83	25.376		
1,600.0	1,600.0	1,578.6	1,568.5	3.5	4.0	-168.26	-183.9	-38.2	190.8	183.4	7.40	25.770		
1,700.0	1,700.0	1,677.0	1,665.4	3.7	4.4	-167.78	-200.5	-43.4	208.3	200.3	7.99	26.088		
1,800.0	1,800.0	1,775.4	1,762.3	3.9	4.8	-167.38	-217.0	-48.6	225.9	217.3	8.57	26.349		
1,900.0	1,900.0	1,873.9	1,859.2	4.2	5.2	-167.03	-233.6	-53.8	243.5	234.3	9.16	26.566		
2,000.0	2,000.0	1,972.3	1,956.1	4.4	5.6	-166.73	-250.1	-59.0	261.0	251.3	9.76	26.748		
2,100.0	2,100.0	2,070.7	2,053.0	4.6	5.9	-166.47	-266.7	-64.1	278.6	268.2	10.36	26.904		
2,200.0	2,200.0	2,169.2	2,149.9	4.8	6.3	-166.24	-283.2	-69.3	296.2	285.2	10.95	27.038		
2,300.0	2,300.0	2,267.6	2,246.8	5.1	6.7	-166.04	-299.7	-74.5	313.8	302.2	11.55	27.155		
2,400.0	2,400.0	2,366.0	2,343.7	5.3	7.1	-165.86	-316.3	-79.7	331.4	319.2	12.16	27.257		
2,500.0	2,500.0	2,464.5	2,440.6	5.5	7.5	-165.69	-332.8	-84.9	348.9	336.2	12.76	27.347		
2,600.0	2,600.0	2,562.9	2,537.5	5.7	7.9	-165.54	-349.4	-90.1	366.5	353.2	13.36	27.427		
2,700.0	2,700.0	2,661.4	2,634.4	6.0	8.3	-165.41	-365.9	-95.3	384.1	370.2	13.97	27.499		
2,800.0	2,800.0	2,759.8	2,731.3	6.2	8.7	-165.29	-382.5	-100.4	401.7	387.2	14.58	27.563		
2,900.0	2,900.0	2,858.2	2,828.2	6.4	9.1	-165.17	-399.0	-105.6	419.3	404.2	15.18	27.621		
3,000.0	3,000.0	2,956.7	2,925.1	6.6	9.5	-165.07	-415.6	-110.8	436.9	421.1	15.79	27.673		
3,100.0	3,100.0	3,055.1	3,022.0	6.8	9.9	-93.80	-432.1	-116.0	454.6	440.8	13.81	32.926		
3,200.0	3,199.9	3,153.4	3,118.8	7.1	10.3	-93.92	-448.7	-121.2	472.5	458.2	14.26	33.132		
3,300.0	3,299.7	3,251.6	3,215.4	7.3	10.7	-94.31	-465.2	-126.4	490.6	475.9	14.72	33.328		
3,400.0	3,399.3	3,349.6	3,311.9	7.5	11.1	-94.95	-481.7	-131.5	509.0	493.8	15.19	33.515		
3,500.0	3,498.6	3,447.3	3,408.0	7.7	11.5	-95.80	-498.1	-136.7	527.7	512.1	15.66	33.693		
3,597.0	3,594.6	3,541.7	3,501.0	7.9	11.8	-96.80	-514.0	-141.6	546.4	530.3	16.14	33.856		
3,600.0	3,597.5	3,544.6	3,503.9	8.0	11.8	-96.84	-514.4	-141.8	547.0	530.8	16.15	33.861		
3,700.0	3,696.3	3,641.8	3,599.5	8.2	12.2	-98.20	-530.8	-146.9	566.7	550.0	16.67	33.999		
3,800.0	3,795.1	3,739.0	3,695.1	8.5	12.6	-99.48	-547.1	-152.0	586.7	569.5	17.20	34.119		
3,900.0	3,893.9	3,836.1	3,790.8	8.7	13.0	-100.66	-563.4	-157.1	607.0	589.2	17.74	34.223		
4,000.0	3,992.7	3,933.3	3,886.4	9.0	13.4	-101.77	-579.8	-162.3	627.5	609.2	18.29	34.315		
4,100.0	4,091.4	4,030.4	3,982.1	9.3	13.8	-102.82	-596.1	-167.4	648.2	629.3	18.84	34.395		
4,200.0	4,190.2	4,127.6	4,077.7	9.6	14.2	-103.79	-612.5	-172.5	669.1	649.7	19.41	34.466		
4,300.0	4,289.0	4,224.8	4,173.4	9.9	14.6	-104.71	-628.8	-177.6	690.2	670.2	19.99	34.529		
4,400.0	4,387.8	4,321.9	4,269.0	10.2	15.0	-105.58	-645.1	-182.7	711.4	690.8	20.57	34.585		
4,500.0	4,486.6	4,419.1	4,364.6	10.5	15.4	-106.39	-661.5	-187.9	732.8	711.6	21.16	34.635		
4,600.0	4,485.3	4,516.3	4,460.3	10.8	15.8	-107.16	-677.8	-193.0	754.3	732.6	21.75	34.680		
4,669.6	4,654.1	4,583.9	4,526.8	11.0	16.1	-107.67	-689.2	-196.5	769.4	747.2	22.17	34.709		
4,700.0	4,684.2	4,613.4	4,556.0	11.1	16.2	-108.00	-694.1	-198.1	775.9	753.6	22.35	34.716		

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 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Offset Design		Thornton Pad Sec.15-T7N-R66W - Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)											Offset Site Error:		0.0 ft
Survey Program: 0-MWD													Offset Well Error:		0.0 ft
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
4,800.0	4,783.3	4,711.0	4,652.0	11.3	16.6	-108.90	-710.5	-203.2	796.8	773.9	22.91	34.781			
4,900.0	4,882.9	4,809.0	4,748.4	11.5	17.0	-109.52	-727.0	-208.4	816.6	793.2	23.44	34.833			
5,000.0	4,982.7	4,907.2	4,845.1	11.8	17.4	-109.87	-743.5	-213.6	835.3	811.4	23.95	34.876			
5,100.0	5,082.7	5,005.6	4,942.0	11.9	17.8	-109.98	-760.1	-218.7	852.8	828.4	24.43	34.915			
5,117.3	5,100.0	5,022.6	4,958.8	12.0	17.8	178.96	-762.9	-219.6	855.7	827.2	28.52	30.001			
5,200.0	5,182.7	5,122.0	5,056.7	12.1	18.2	179.31	-779.0	-224.7	869.1	840.1	29.04	29.933			
5,300.0	5,282.7	5,261.9	5,195.3	12.3	18.5	179.68	-796.4	-230.1	881.6	852.0	29.60	29.786			
5,400.0	5,382.7	5,403.2	5,336.2	12.5	18.8	179.91	-807.5	-233.6	889.4	859.3	30.10	29.550			
5,500.0	5,482.7	5,545.3	5,478.2	12.7	19.0	180.00	-811.8	-235.0	892.5	861.9	30.53	29.234			
5,600.0	5,582.7	5,651.8	5,584.7	12.9	19.1	-180.00	-811.9	-235.0	892.5	861.6	30.88	28.904			
5,700.0	5,682.7	5,751.8	5,684.7	13.2	19.2	-180.00	-811.9	-235.0	892.5	861.3	31.21	28.596			
5,800.0	5,782.7	5,851.8	5,784.7	13.4	19.4	-180.00	-811.9	-235.0	892.5	861.0	31.55	28.292			
5,900.0	5,882.7	5,951.8	5,884.7	13.6	19.5	-180.00	-811.9	-235.0	892.5	860.6	31.88	27.993			
6,000.0	5,982.7	6,051.8	5,984.7	13.8	19.6	-180.00	-811.9	-235.0	892.5	860.3	32.22	27.698			
6,100.0	6,082.7	6,151.8	6,084.7	14.0	19.7	-180.00	-811.9	-235.0	892.5	860.0	32.57	27.407			
6,200.0	6,182.7	6,251.8	6,184.7	14.2	19.8	-180.00	-811.9	-235.0	892.5	859.6	32.91	27.121			
6,300.0	6,282.7	6,351.8	6,284.7	14.4	20.0	-180.00	-811.9	-235.0	892.5	859.3	33.25	26.839			
6,400.0	6,382.7	6,451.8	6,384.7	14.6	20.1	-180.00	-811.9	-235.0	892.5	858.9	33.60	26.562			
6,500.0	6,482.7	6,551.8	6,484.7	14.8	20.2	-180.00	-811.9	-235.0	892.5	858.6	33.95	26.289			
6,600.0	6,582.7	6,651.8	6,584.7	15.1	20.3	179.99	-811.9	-234.9	892.5	858.2	34.30	26.019			
6,642.2	6,624.8	6,694.0	6,626.8	15.2	20.4	179.87	-811.9	-233.0	892.5	858.1	34.45	25.909			
6,682.2	6,664.9	6,733.8	6,666.4	15.2	20.4	179.62	-811.9	-229.1	892.5	857.9	34.58	25.811			
6,700.0	6,682.7	6,751.3	6,683.8	15.3	20.4	89.48	-811.9	-226.7	892.5	861.7	30.82	28.956			
6,750.0	6,732.6	6,800.0	6,731.7	15.4	20.5	89.09	-811.9	-218.0	892.6	861.6	30.98	28.816			
6,800.0	6,782.2	6,849.0	6,779.2	15.4	20.5	88.70	-811.9	-206.2	892.7	861.6	31.11	28.699			
6,850.0	6,831.3	6,897.2	6,825.2	15.5	20.5	88.32	-811.8	-191.6	892.8	861.6	31.21	28.602			
6,900.0	6,879.7	6,945.2	6,869.9	15.5	20.5	87.94	-811.8	-174.2	893.0	861.7	31.31	28.520			
6,950.0	6,927.2	6,992.8	6,913.1	15.6	20.6	87.58	-811.7	-154.3	893.1	861.7	31.40	28.445			
7,000.0	6,973.6	7,040.1	6,954.7	15.6	20.6	87.23	-811.7	-131.8	893.3	861.8	31.49	28.368			
7,050.0	7,018.6	7,087.1	6,994.6	15.7	20.6	86.89	-811.6	-107.0	893.6	862.0	31.60	28.280			
7,100.0	7,062.2	7,133.7	7,032.6	15.8	20.6	86.56	-811.6	-80.0	893.8	862.1	31.73	28.168			
7,150.0	7,104.0	7,180.2	7,068.8	15.9	20.6	86.25	-811.5	-50.8	894.0	862.1	31.91	28.020			
7,200.0	7,143.9	7,226.4	7,102.9	16.0	20.6	85.95	-811.4	-19.7	894.3	862.1	32.14	27.822			
7,250.0	7,181.8	7,272.3	7,134.9	16.1	20.6	85.67	-811.4	13.2	894.5	862.1	32.45	27.563			
7,300.0	7,217.5	7,318.0	7,164.8	16.3	20.6	85.41	-811.3	47.9	894.8	861.9	32.85	27.235			
7,350.0	7,250.8	7,363.6	7,192.4	16.6	20.7	85.16	-811.2	84.1	895.0	861.6	33.38	26.815			
7,400.0	7,281.6	7,408.9	7,217.7	16.9	20.7	84.94	-811.1	121.7	895.2	861.2	34.01	26.320			
7,450.0	7,309.8	7,454.1	7,240.6	17.3	20.8	84.73	-811.0	160.6	895.4	860.6	34.78	25.743			
7,500.0	7,335.2	7,500.0	7,261.5	17.8	20.9	84.54	-810.9	201.5	895.6	859.9	35.71	25.082			
7,550.0	7,357.8	7,544.0	7,279.2	18.4	21.0	84.38	-810.8	241.8	895.7	859.0	36.76	24.364			
7,600.0	7,377.3	7,588.8	7,294.8	19.0	21.3	84.24	-810.8	283.7	895.9	857.9	37.98	23.590			
7,650.0	7,393.8	7,633.5	7,307.9	19.7	21.6	84.12	-810.7	326.4	896.0	856.6	39.33	22.783			
7,700.0	7,407.2	7,678.1	7,318.5	20.5	22.0	84.03	-810.6	369.8	896.0	855.2	40.81	21.958			
7,750.0	7,417.5	7,722.6	7,326.5	21.4	22.6	83.96	-810.5	413.6	896.0	853.6	42.40	21.132			
7,800.0	7,424.4	7,767.1	7,331.9	22.3	23.2	83.91	-810.4	457.7	896.0	851.9	44.10	20.317			
7,850.0	7,428.2	7,811.6	7,334.8	23.2	24.0	83.88	-810.3	502.1	896.0	850.1	45.89	19.524			
7,893.5	7,428.8	7,850.9	7,335.2	24.0	24.6	83.88	-810.2	541.4	895.9	848.4	47.52	18.853			
7,900.0	7,428.7	7,857.5	7,335.1	24.2	24.8	83.88	-810.2	548.0	895.9	848.1	47.78	18.750			
8,000.0	7,427.2	7,957.5	7,334.4	26.2	26.7	83.92	-809.9	648.0	895.6	843.7	51.90	17.254			
8,100.0	7,425.8	8,057.5	7,333.6	28.4	28.8	83.97	-809.7	748.0	895.3	839.0	56.27	15.910			
8,200.0	7,424.3	8,157.5	7,332.9	30.7	31.0	84.01	-809.5	848.0	895.0	834.1	60.84	14.710			

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 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)													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 (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	
8,300.0	7,422.8	8,257.5	7,332.1	33.1	33.4	84.06	-809.2	948.0	894.7	829.1	65.57	13.645		
8,400.0	7,421.4	8,357.5	7,331.4	35.6	35.7	84.10	-809.0	1,048.0	894.4	823.9	70.42	12.700		
8,500.0	7,419.9	8,457.5	7,330.6	38.0	38.2	84.14	-808.8	1,148.0	894.1	818.7	75.38	11.861		
8,600.0	7,418.4	8,557.5	7,329.9	40.6	40.7	84.19	-808.6	1,248.0	893.8	813.3	80.42	11.113		
8,700.0	7,417.0	8,657.5	7,329.1	43.1	43.2	84.23	-808.3	1,347.9	893.5	807.9	85.54	10.446		
8,800.0	7,415.5	8,757.5	7,328.4	45.7	45.8	84.28	-808.1	1,447.9	893.2	802.5	90.71	9.847		
8,900.0	7,414.0	8,857.5	7,327.6	48.4	48.4	84.32	-807.9	1,547.9	892.9	796.9	95.92	9.308		
9,000.0	7,412.6	8,957.5	7,326.9	51.0	51.0	84.36	-807.7	1,647.9	892.6	791.4	101.18	8.821		
9,100.0	7,411.1	9,057.5	7,326.1	53.7	53.6	84.41	-807.4	1,747.9	892.3	785.8	106.48	8.380		
9,200.0	7,409.6	9,157.5	7,325.4	56.3	56.3	84.45	-807.2	1,847.9	892.0	780.2	111.80	7.978		
9,300.0	7,408.2	9,257.4	7,324.6	59.0	58.9	84.50	-807.0	1,947.9	891.7	774.5	117.16	7.611		
9,400.0	7,406.7	9,357.4	7,323.9	61.7	61.6	84.54	-806.8	2,047.9	891.4	768.9	122.53	7.275		
9,500.0	7,405.2	9,457.4	7,323.1	64.4	64.3	84.59	-806.5	2,147.9	891.1	763.2	127.92	6.966		
9,600.0	7,403.8	9,557.4	7,322.4	67.1	67.0	84.63	-806.3	2,247.9	890.8	757.5	133.34	6.681		
9,700.0	7,402.3	9,657.4	7,321.6	69.9	69.7	84.67	-806.1	2,347.9	890.5	751.8	138.76	6.417		
9,800.0	7,400.8	9,757.4	7,320.9	72.6	72.4	84.72	-805.9	2,447.9	890.2	746.0	144.21	6.173		
9,900.0	7,399.4	9,857.4	7,320.1	75.3	75.2	84.76	-805.6	2,547.9	889.9	740.3	149.66	5.946		
10,000.0	7,397.9	9,957.4	7,319.4	78.1	77.9	84.81	-805.4	2,647.9	889.6	734.5	155.13	5.735		
10,100.0	7,396.4	10,057.4	7,318.6	80.8	80.6	84.85	-805.2	2,747.9	889.4	728.8	160.60	5.538		
10,200.0	7,395.0	10,157.4	7,317.9	83.6	83.4	84.90	-804.9	2,847.9	889.1	723.0	166.09	5.353		
10,300.0	7,393.5	10,257.4	7,317.1	86.3	86.1	84.94	-804.7	2,947.9	888.8	717.2	171.58	5.180		
10,400.0	7,392.0	10,357.4	7,316.4	89.1	88.8	84.99	-804.5	3,047.8	888.5	711.4	177.08	5.017		
10,500.0	7,390.6	10,457.4	7,315.6	91.8	91.6	85.03	-804.3	3,147.8	888.2	705.6	182.59	4.864		
10,600.0	7,389.1	10,557.4	7,314.9	94.6	94.3	85.08	-804.0	3,247.8	887.9	699.8	188.11	4.720		
10,700.0	7,387.6	10,657.4	7,314.1	97.4	97.1	85.12	-803.8	3,347.8	887.6	694.0	193.63	4.584		
10,800.0	7,386.2	10,757.4	7,313.4	100.1	99.9	85.17	-803.6	3,447.8	887.3	688.2	199.16	4.456		
10,900.0	7,384.7	10,857.4	7,312.6	102.9	102.6	85.21	-803.4	3,547.8	887.1	682.4	204.69	4.334		
11,000.0	7,383.2	10,957.4	7,311.9	105.7	105.4	85.26	-803.1	3,647.8	886.8	676.5	210.23	4.218		
11,100.0	7,381.8	11,057.4	7,311.1	108.4	108.2	85.30	-802.9	3,747.8	886.5	670.7	215.77	4.109		
11,200.0	7,380.3	11,157.4	7,310.4	111.2	110.9	85.35	-802.7	3,847.8	886.2	664.9	221.31	4.004		
11,300.0	7,378.8	11,257.4	7,309.6	114.0	113.7	85.39	-802.5	3,947.8	885.9	659.1	226.86	3.905		
11,400.0	7,377.4	11,357.4	7,308.9	116.8	116.5	85.44	-802.2	4,047.8	885.6	653.2	232.41	3.811		
11,500.0	7,375.9	11,457.4	7,308.1	119.6	119.2	85.48	-802.0	4,147.8	885.4	647.4	237.97	3.720		
11,600.0	7,374.5	11,557.4	7,307.4	122.3	122.0	85.53	-801.8	4,247.8	885.1	641.5	243.53	3.634		
11,700.0	7,373.0	11,657.4	7,306.6	125.1	124.8	85.57	-801.6	4,347.8	884.8	635.7	249.09	3.552		
11,800.0	7,371.5	11,757.4	7,305.9	127.9	127.6	85.62	-801.3	4,447.8	884.5	629.9	254.66	3.473		
11,903.6	7,370.0	11,861.0	7,305.1	130.8	130.5	85.66	-801.1	4,551.4	884.2	623.8	260.42	3.395 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4983.0ft (RKB - 13')

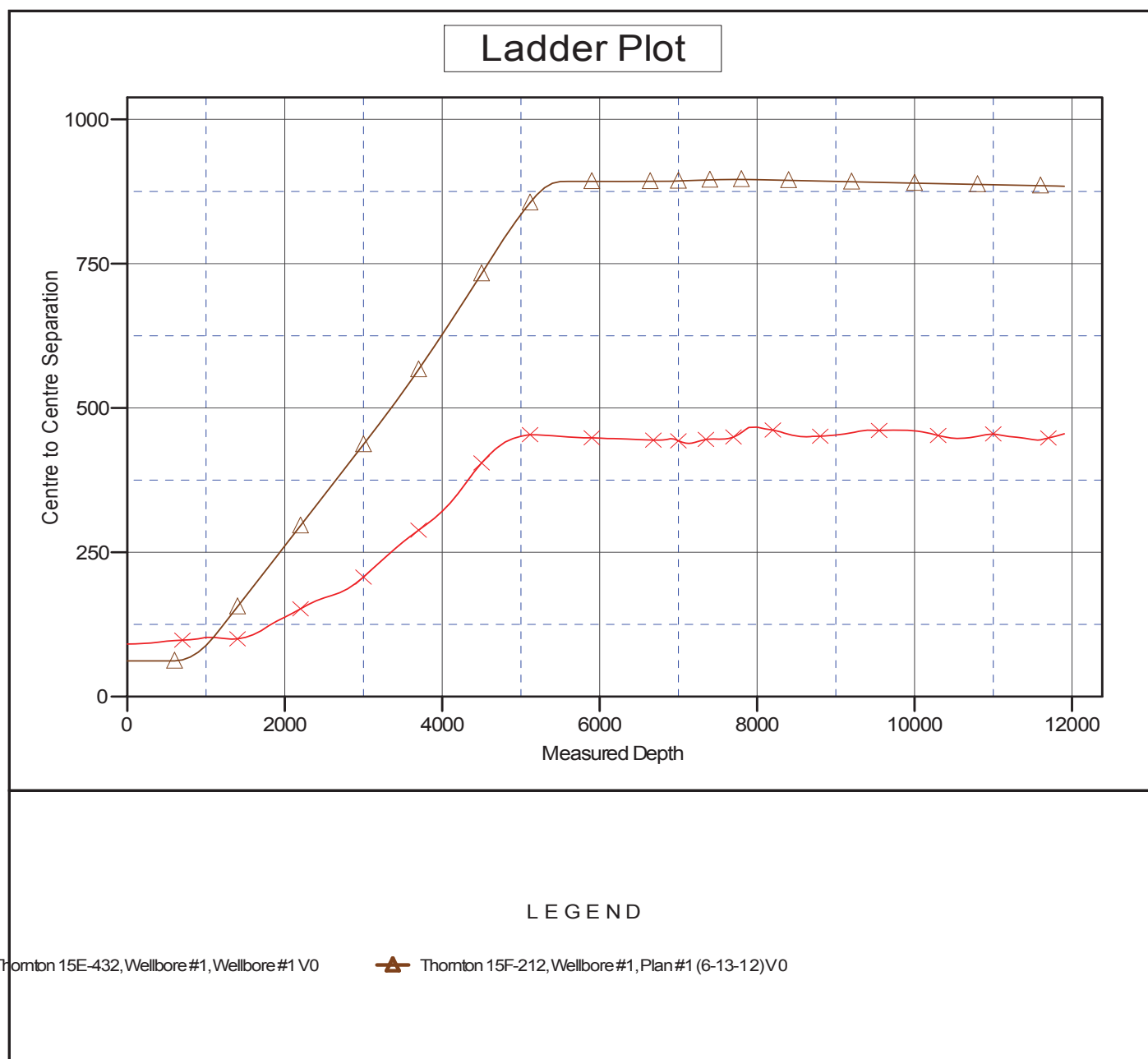
Offset Depths are relative to Offset Datum

Central Meridian is -105.500000

Coordinates are relative to: Thornton 15E-332

Coordinate System is US State Plane 1983, Colorado Northern Zone

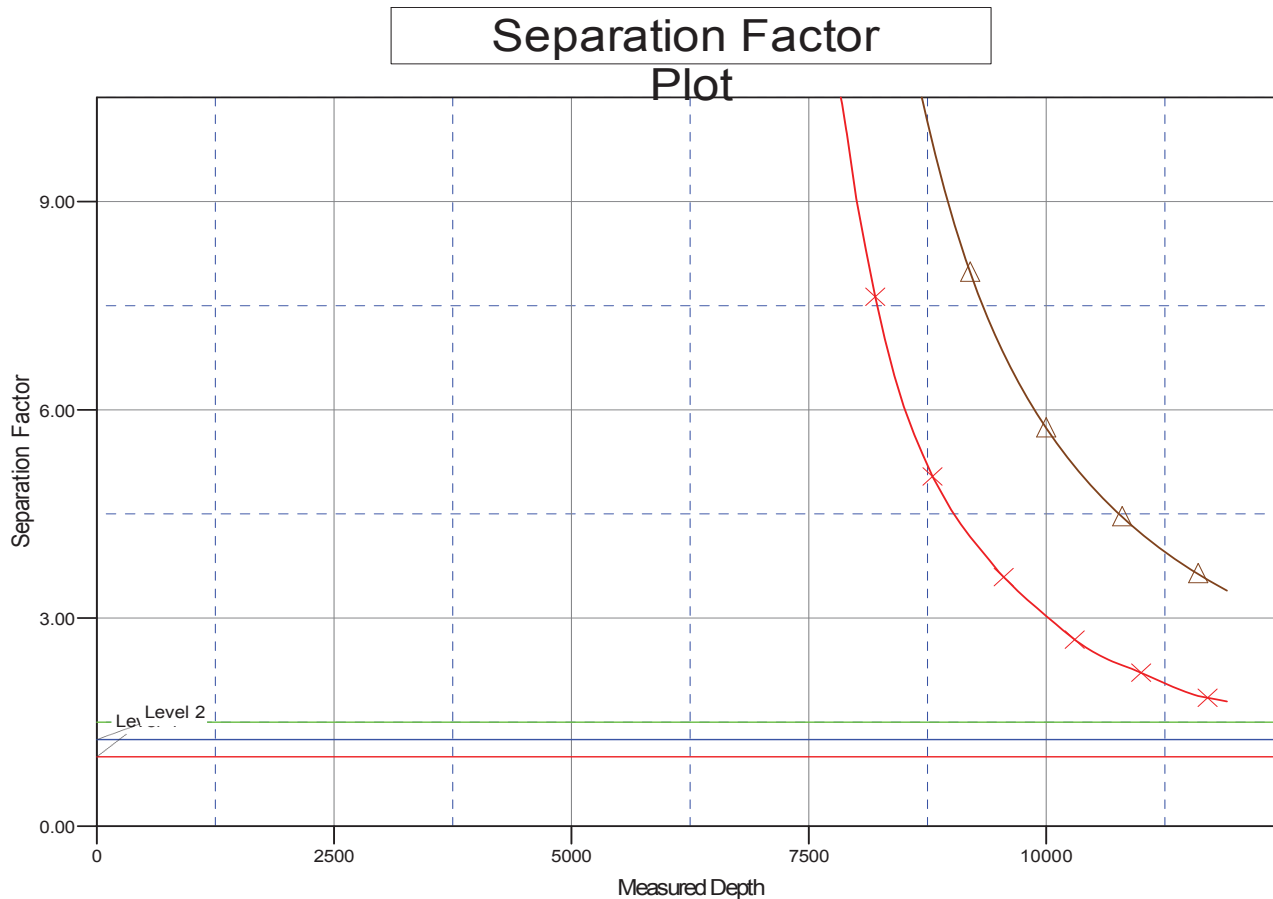
Grid Convergence at Surface is: 0.47°



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-332
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4983.0ft (RKB - 13')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4983.0ft (RKB - 13')
Site Error:	0.0 ft	North Reference:	True
Reference Well:	Thornton 15E-332	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	US_EDM
Reference Design:	Plan #2 (8-17-15)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4983.0ft (RKB - 13')
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: Thornton 15E-332
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.47°



LEGEND

Thornton 15E-432, Wellbore #1, Wellbore #1 V0

Thomton 15F-212, Wellbore #1, Plan #1 (6-13-12)V0