

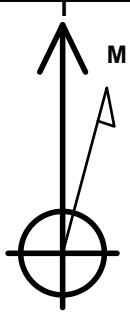
PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Thornton 15F-432**

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 1455510.61 3202071.55 40.581500 -104.772500
 Original Well Elev WELL @ 4985.0ft (Original Well Elev)

WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
HARDLINE BHL 460'FEL (4)	1.0	-1300.0	4609.6	Polygon
HARDLINE SHL 460'FWL (4)	1.0	-1300.0	175.0	Polygon
SECTION LINE 285'W OF SHL (4)	1.0	-1300.0	-285.0	Polygon
BHL 1520'FNL, 500'FEL	7495.0	-1147.2	4569.6	Point



Azimuths to True North
 Magnetic North: 8.75°

Magnetic Field
 Strength: 53115.2nT
 Dip Angle: 67.16°
 Date: 6/27/2012
 Model: IGRF2010

Thornton Pad Sec.15-T7N-R66W
 Thornton 15F-432
 Plan #1 (6-13-12)
 14:05, June 27 2012

ANNOTATIONS

TVD	MD	Annotation
200.0	200.0	KOP #1
6737.3	6855.7	KOP #2
7511.0	8174.8	End of Build

South(-)/North(+) (1300 ft/in)

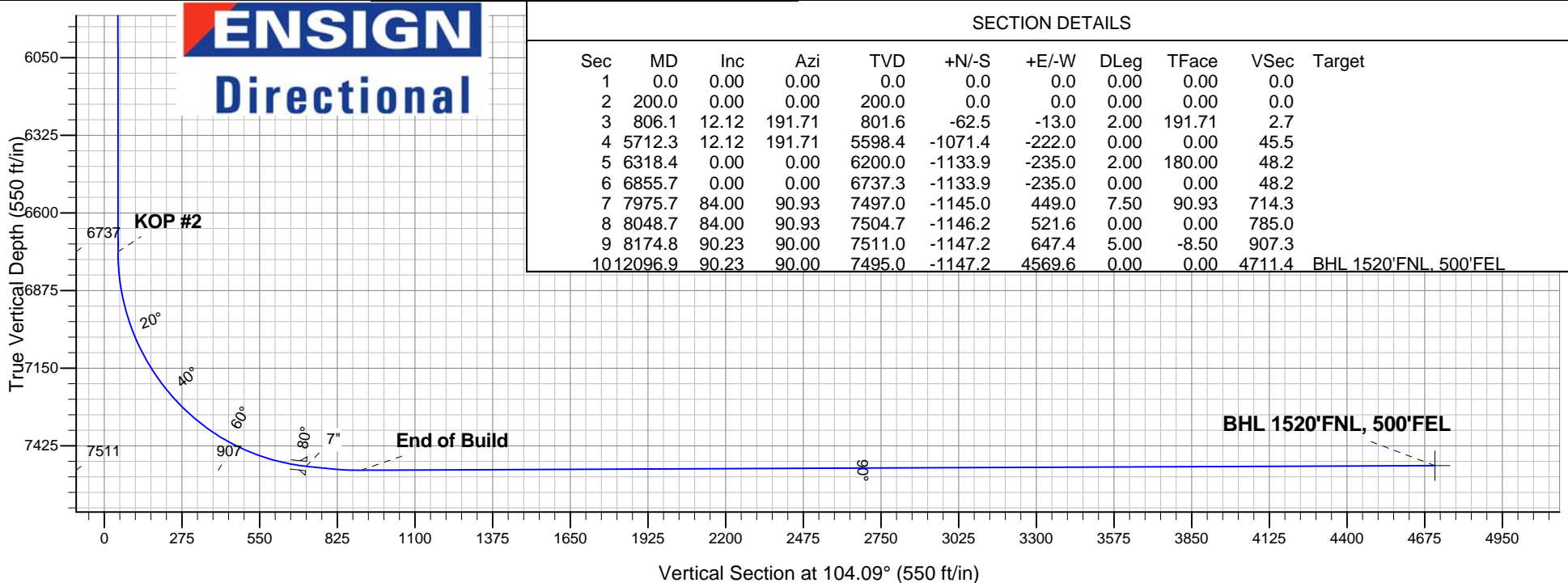
SHL 360'FNL
 & 285'FWL

Thornton 15F-432

BHL 1520'FNL, 500'FEL

HARDLINE SHL 460'FWL (4)
 SECTION LINE 285'W OF SHL (4)
 HARDLINE BHL 460'FEL (4)

West(-)/East(+) (1300 ft/in)





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15F-432

Wellbore #1

Plan: Plan #1 (6-13-12)

Standard Planning Report

27 June, 2012

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

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:	1,455,601.69ft	Latitude:	40.581750
From:	Lat/Long	Easting:	3,202,070.80ft	Longitude:	-104.772500
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.47 °

Well	Thornton 15F-432					
Well Position	+N/-S	-91.1 ft	Northing:	1,455,510.61 ft	Latitude:	40.581500
	+E/-W	0.0 ft	Easting:	3,202,071.55 ft	Longitude:	-104.772500
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	6/13/2012	8.75	67.16	53,119

Design	Plan #1 (6-13-12)			
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	104.09

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	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.00	0.00	
806.1	12.12	191.71	801.6	-62.5	-13.0	2.00	2.00	0.00	191.71	
5,712.3	12.12	191.71	5,598.4	-1,071.4	-222.0	0.00	0.00	0.00	0.00	
6,318.4	0.00	0.00	6,200.0	-1,133.9	-235.0	2.00	-2.00	0.00	180.00	
6,855.7	0.00	0.00	6,737.3	-1,133.9	-235.0	0.00	0.00	0.00	0.00	
7,975.7	84.00	90.93	7,497.0	-1,145.0	449.0	7.50	7.50	0.00	90.93	
8,048.7	84.00	90.93	7,504.7	-1,146.2	521.6	0.00	0.00	0.00	0.00	
8,174.8	90.23	90.00	7,511.0	-1,147.2	647.4	5.00	4.95	-0.74	-8.50	
12,096.9	90.23	90.00	7,495.0	-1,147.2	4,569.6	0.00	0.00	0.00	0.00	BHL 1520'FNL, 500

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

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
1.0	0.00	0.00	1.0	0.0	0.0	0.0	0.00	0.00	0.00
HARDLINE BHL 460'FEL (4) - HARDLINE SHL 460'FWL (4) - SECTION LINE 285'W OF SHL (4)									
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
KOP #1									
240.0	0.80	191.71	240.0	-0.3	-0.1	0.0	2.00	2.00	0.00
280.0	1.60	191.71	280.0	-1.1	-0.2	0.0	2.00	2.00	0.00
320.0	2.40	191.71	320.0	-2.5	-0.5	0.1	2.00	2.00	0.00
360.0	3.20	191.71	359.9	-4.4	-0.9	0.2	2.00	2.00	0.00
400.0	4.00	191.71	399.8	-6.8	-1.4	0.3	2.00	2.00	0.00
440.0	4.80	191.71	439.7	-9.8	-2.0	0.4	2.00	2.00	0.00
480.0	5.60	191.71	479.6	-13.4	-2.8	0.6	2.00	2.00	0.00
520.0	6.40	191.71	519.3	-17.5	-3.6	0.7	2.00	2.00	0.00
560.0	7.20	191.71	559.1	-22.1	-4.6	0.9	2.00	2.00	0.00
600.0	8.00	191.71	598.7	-27.3	-5.7	1.2	2.00	2.00	0.00
640.0	8.80	191.71	638.3	-33.0	-6.8	1.4	2.00	2.00	0.00
680.0	9.60	191.71	677.8	-39.3	-8.1	1.7	2.00	2.00	0.00
720.0	10.40	191.71	717.1	-46.1	-9.6	2.0	2.00	2.00	0.00
760.0	11.20	191.71	756.4	-53.4	-11.1	2.3	2.00	2.00	0.00
800.0	12.00	191.71	795.6	-61.3	-12.7	2.6	2.00	2.00	0.00
806.1	12.12	191.71	801.6	-62.5	-13.0	2.7	2.00	2.00	0.00
840.0	12.12	191.71	834.7	-69.5	-14.4	3.0	0.00	0.00	0.00
880.0	12.12	191.71	873.8	-77.7	-16.1	3.3	0.00	0.00	0.00
920.0	12.12	191.71	912.9	-86.0	-17.8	3.7	0.00	0.00	0.00
960.0	12.12	191.71	952.1	-94.2	-19.5	4.0	0.00	0.00	0.00
1,000.0	12.12	191.71	991.2	-102.4	-21.2	4.4	0.00	0.00	0.00
1,040.0	12.12	191.71	1,030.3	-110.6	-22.9	4.7	0.00	0.00	0.00
1,080.0	12.12	191.71	1,069.4	-118.9	-24.6	5.0	0.00	0.00	0.00
1,120.0	12.12	191.71	1,108.5	-127.1	-26.3	5.4	0.00	0.00	0.00
1,160.0	12.12	191.71	1,147.6	-135.3	-28.0	5.7	0.00	0.00	0.00
1,200.0	12.12	191.71	1,186.7	-143.5	-29.7	6.1	0.00	0.00	0.00
1,240.0	12.12	191.71	1,225.8	-151.8	-31.5	6.4	0.00	0.00	0.00
1,280.0	12.12	191.71	1,264.9	-160.0	-33.2	6.8	0.00	0.00	0.00
1,320.0	12.12	191.71	1,304.0	-168.2	-34.9	7.1	0.00	0.00	0.00
1,360.0	12.12	191.71	1,343.1	-176.4	-36.6	7.5	0.00	0.00	0.00
1,400.0	12.12	191.71	1,382.2	-184.7	-38.3	7.8	0.00	0.00	0.00
1,440.0	12.12	191.71	1,421.4	-192.9	-40.0	8.2	0.00	0.00	0.00
1,480.0	12.12	191.71	1,460.5	-201.1	-41.7	8.5	0.00	0.00	0.00
1,520.0	12.12	191.71	1,499.6	-209.3	-43.4	8.9	0.00	0.00	0.00
1,560.0	12.12	191.71	1,538.7	-217.6	-45.1	9.2	0.00	0.00	0.00
1,600.0	12.12	191.71	1,577.8	-225.8	-46.8	9.6	0.00	0.00	0.00
1,640.0	12.12	191.71	1,616.9	-234.0	-48.5	9.9	0.00	0.00	0.00
1,680.0	12.12	191.71	1,656.0	-242.2	-50.2	10.3	0.00	0.00	0.00
1,720.0	12.12	191.71	1,695.1	-250.5	-51.9	10.6	0.00	0.00	0.00
1,760.0	12.12	191.71	1,734.2	-258.7	-53.6	11.0	0.00	0.00	0.00
1,800.0	12.12	191.71	1,773.3	-266.9	-55.3	11.3	0.00	0.00	0.00
1,840.0	12.12	191.71	1,812.4	-275.1	-57.0	11.7	0.00	0.00	0.00
1,880.0	12.12	191.71	1,851.5	-283.4	-58.7	12.0	0.00	0.00	0.00
1,920.0	12.12	191.71	1,890.7	-291.6	-60.4	12.4	0.00	0.00	0.00

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Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

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)
1,960.0	12.12	191.71	1,929.8	-299.8	-62.1	12.7	0.00	0.00	0.00
2,000.0	12.12	191.71	1,968.9	-308.0	-63.8	13.1	0.00	0.00	0.00
2,040.0	12.12	191.71	2,008.0	-316.3	-65.5	13.4	0.00	0.00	0.00
2,080.0	12.12	191.71	2,047.1	-324.5	-67.2	13.8	0.00	0.00	0.00
2,120.0	12.12	191.71	2,086.2	-332.7	-69.0	14.1	0.00	0.00	0.00
2,160.0	12.12	191.71	2,125.3	-340.9	-70.7	14.5	0.00	0.00	0.00
2,200.0	12.12	191.71	2,164.4	-349.2	-72.4	14.8	0.00	0.00	0.00
2,240.0	12.12	191.71	2,203.5	-357.4	-74.1	15.2	0.00	0.00	0.00
2,280.0	12.12	191.71	2,242.6	-365.6	-75.8	15.5	0.00	0.00	0.00
2,320.0	12.12	191.71	2,281.7	-373.8	-77.5	15.9	0.00	0.00	0.00
2,360.0	12.12	191.71	2,320.8	-382.1	-79.2	16.2	0.00	0.00	0.00
2,400.0	12.12	191.71	2,360.0	-390.3	-80.9	16.6	0.00	0.00	0.00
2,440.0	12.12	191.71	2,399.1	-398.5	-82.6	16.9	0.00	0.00	0.00
2,480.0	12.12	191.71	2,438.2	-406.7	-84.3	17.3	0.00	0.00	0.00
2,520.0	12.12	191.71	2,477.3	-415.0	-86.0	17.6	0.00	0.00	0.00
2,560.0	12.12	191.71	2,516.4	-423.2	-87.7	18.0	0.00	0.00	0.00
2,600.0	12.12	191.71	2,555.5	-431.4	-89.4	18.3	0.00	0.00	0.00
2,640.0	12.12	191.71	2,594.6	-439.6	-91.1	18.7	0.00	0.00	0.00
2,680.0	12.12	191.71	2,633.7	-447.9	-92.8	19.0	0.00	0.00	0.00
2,720.0	12.12	191.71	2,672.8	-456.1	-94.5	19.4	0.00	0.00	0.00
2,760.0	12.12	191.71	2,711.9	-464.3	-96.2	19.7	0.00	0.00	0.00
2,800.0	12.12	191.71	2,751.0	-472.5	-97.9	20.1	0.00	0.00	0.00
2,840.0	12.12	191.71	2,790.1	-480.8	-99.6	20.4	0.00	0.00	0.00
2,880.0	12.12	191.71	2,829.2	-489.0	-101.3	20.8	0.00	0.00	0.00
2,920.0	12.12	191.71	2,868.4	-497.2	-103.0	21.1	0.00	0.00	0.00
2,960.0	12.12	191.71	2,907.5	-505.4	-104.7	21.5	0.00	0.00	0.00
3,000.0	12.12	191.71	2,946.6	-513.7	-106.5	21.8	0.00	0.00	0.00
3,040.0	12.12	191.71	2,985.7	-521.9	-108.2	22.2	0.00	0.00	0.00
3,080.0	12.12	191.71	3,024.8	-530.1	-109.9	22.5	0.00	0.00	0.00
3,120.0	12.12	191.71	3,063.9	-538.3	-111.6	22.9	0.00	0.00	0.00
3,160.0	12.12	191.71	3,103.0	-546.6	-113.3	23.2	0.00	0.00	0.00
3,200.0	12.12	191.71	3,142.1	-554.8	-115.0	23.6	0.00	0.00	0.00
3,240.0	12.12	191.71	3,181.2	-563.0	-116.7	23.9	0.00	0.00	0.00
3,280.0	12.12	191.71	3,220.3	-571.2	-118.4	24.3	0.00	0.00	0.00
3,320.0	12.12	191.71	3,259.4	-579.5	-120.1	24.6	0.00	0.00	0.00
3,360.0	12.12	191.71	3,298.5	-587.7	-121.8	25.0	0.00	0.00	0.00
3,400.0	12.12	191.71	3,337.7	-595.9	-123.5	25.3	0.00	0.00	0.00
3,440.0	12.12	191.71	3,376.8	-604.1	-125.2	25.7	0.00	0.00	0.00
3,480.0	12.12	191.71	3,415.9	-612.3	-126.9	26.0	0.00	0.00	0.00
3,520.0	12.12	191.71	3,455.0	-620.6	-128.6	26.4	0.00	0.00	0.00
3,560.0	12.12	191.71	3,494.1	-628.8	-130.3	26.7	0.00	0.00	0.00
3,600.0	12.12	191.71	3,533.2	-637.0	-132.0	27.1	0.00	0.00	0.00
3,640.0	12.12	191.71	3,572.3	-645.2	-133.7	27.4	0.00	0.00	0.00
3,680.0	12.12	191.71	3,611.4	-653.5	-135.4	27.8	0.00	0.00	0.00
3,720.0	12.12	191.71	3,650.5	-661.7	-137.1	28.1	0.00	0.00	0.00
3,760.0	12.12	191.71	3,689.6	-669.9	-138.8	28.5	0.00	0.00	0.00
3,800.0	12.12	191.71	3,728.7	-678.1	-140.5	28.8	0.00	0.00	0.00
3,840.0	12.12	191.71	3,767.8	-686.4	-142.3	29.2	0.00	0.00	0.00
3,880.0	12.12	191.71	3,807.0	-694.6	-144.0	29.5	0.00	0.00	0.00
3,920.0	12.12	191.71	3,846.1	-702.8	-145.7	29.9	0.00	0.00	0.00
3,960.0	12.12	191.71	3,885.2	-711.0	-147.4	30.2	0.00	0.00	0.00
4,000.0	12.12	191.71	3,924.3	-719.3	-149.1	30.6	0.00	0.00	0.00
4,040.0	12.12	191.71	3,963.4	-727.5	-150.8	30.9	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

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)
4,080.0	12.12	191.71	4,002.5	-735.7	-152.5	31.3	0.00	0.00	0.00
4,120.0	12.12	191.71	4,041.6	-743.9	-154.2	31.6	0.00	0.00	0.00
4,160.0	12.12	191.71	4,080.7	-752.2	-155.9	32.0	0.00	0.00	0.00
4,200.0	12.12	191.71	4,119.8	-760.4	-157.6	32.3	0.00	0.00	0.00
4,240.0	12.12	191.71	4,158.9	-768.6	-159.3	32.7	0.00	0.00	0.00
4,280.0	12.12	191.71	4,198.0	-776.8	-161.0	33.0	0.00	0.00	0.00
4,320.0	12.12	191.71	4,237.1	-785.1	-162.7	33.4	0.00	0.00	0.00
4,360.0	12.12	191.71	4,276.3	-793.3	-164.4	33.7	0.00	0.00	0.00
4,400.0	12.12	191.71	4,315.4	-801.5	-166.1	34.0	0.00	0.00	0.00
4,440.0	12.12	191.71	4,354.5	-809.7	-167.8	34.4	0.00	0.00	0.00
4,480.0	12.12	191.71	4,393.6	-818.0	-169.5	34.7	0.00	0.00	0.00
4,520.0	12.12	191.71	4,432.7	-826.2	-171.2	35.1	0.00	0.00	0.00
4,560.0	12.12	191.71	4,471.8	-834.4	-172.9	35.4	0.00	0.00	0.00
4,600.0	12.12	191.71	4,510.9	-842.6	-174.6	35.8	0.00	0.00	0.00
4,640.0	12.12	191.71	4,550.0	-850.9	-176.3	36.1	0.00	0.00	0.00
4,680.0	12.12	191.71	4,589.1	-859.1	-178.0	36.5	0.00	0.00	0.00
4,720.0	12.12	191.71	4,628.2	-867.3	-179.8	36.8	0.00	0.00	0.00
4,760.0	12.12	191.71	4,667.3	-875.5	-181.5	37.2	0.00	0.00	0.00
4,800.0	12.12	191.71	4,706.4	-883.8	-183.2	37.5	0.00	0.00	0.00
4,840.0	12.12	191.71	4,745.5	-892.0	-184.9	37.9	0.00	0.00	0.00
4,880.0	12.12	191.71	4,784.7	-900.2	-186.6	38.2	0.00	0.00	0.00
4,920.0	12.12	191.71	4,823.8	-908.4	-188.3	38.6	0.00	0.00	0.00
4,960.0	12.12	191.71	4,862.9	-916.7	-190.0	38.9	0.00	0.00	0.00
5,000.0	12.12	191.71	4,902.0	-924.9	-191.7	39.3	0.00	0.00	0.00
5,040.0	12.12	191.71	4,941.1	-933.1	-193.4	39.6	0.00	0.00	0.00
5,080.0	12.12	191.71	4,980.2	-941.3	-195.1	40.0	0.00	0.00	0.00
5,120.0	12.12	191.71	5,019.3	-949.6	-196.8	40.3	0.00	0.00	0.00
5,160.0	12.12	191.71	5,058.4	-957.8	-198.5	40.7	0.00	0.00	0.00
5,200.0	12.12	191.71	5,097.5	-966.0	-200.2	41.0	0.00	0.00	0.00
5,240.0	12.12	191.71	5,136.6	-974.2	-201.9	41.4	0.00	0.00	0.00
5,280.0	12.12	191.71	5,175.7	-982.5	-203.6	41.7	0.00	0.00	0.00
5,320.0	12.12	191.71	5,214.8	-990.7	-205.3	42.1	0.00	0.00	0.00
5,360.0	12.12	191.71	5,254.0	-998.9	-207.0	42.4	0.00	0.00	0.00
5,400.0	12.12	191.71	5,293.1	-1,007.1	-208.7	42.8	0.00	0.00	0.00
5,440.0	12.12	191.71	5,332.2	-1,015.4	-210.4	43.1	0.00	0.00	0.00
5,480.0	12.12	191.71	5,371.3	-1,023.6	-212.1	43.5	0.00	0.00	0.00
5,520.0	12.12	191.71	5,410.4	-1,031.8	-213.8	43.8	0.00	0.00	0.00
5,560.0	12.12	191.71	5,449.5	-1,040.0	-215.5	44.2	0.00	0.00	0.00
5,600.0	12.12	191.71	5,488.6	-1,048.3	-217.3	44.5	0.00	0.00	0.00
5,640.0	12.12	191.71	5,527.7	-1,056.5	-219.0	44.9	0.00	0.00	0.00
5,680.0	12.12	191.71	5,566.8	-1,064.7	-220.7	45.2	0.00	0.00	0.00
5,712.3	12.12	191.71	5,598.4	-1,071.4	-222.0	45.5	0.00	0.00	0.00
5,720.0	11.97	191.71	5,605.9	-1,072.9	-222.4	45.6	2.00	-2.00	0.00
5,760.0	11.17	191.71	5,645.1	-1,080.8	-224.0	45.9	2.00	-2.00	0.00
5,800.0	10.37	191.71	5,684.4	-1,088.1	-225.5	46.2	2.00	-2.00	0.00
5,840.0	9.57	191.71	5,723.8	-1,094.9	-226.9	46.5	2.00	-2.00	0.00
5,880.0	8.77	191.71	5,763.3	-1,101.1	-228.2	46.8	2.00	-2.00	0.00
5,920.0	7.97	191.71	5,802.9	-1,106.8	-229.4	47.0	2.00	-2.00	0.00
5,960.0	7.17	191.71	5,842.5	-1,112.0	-230.5	47.2	2.00	-2.00	0.00
6,000.0	6.37	191.71	5,882.2	-1,116.6	-231.4	47.4	2.00	-2.00	0.00
6,040.0	5.57	191.71	5,922.0	-1,120.7	-232.3	47.6	2.00	-2.00	0.00
6,080.0	4.77	191.71	5,961.9	-1,124.2	-233.0	47.8	2.00	-2.00	0.00
6,120.0	3.97	191.71	6,001.7	-1,127.2	-233.6	47.9	2.00	-2.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

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)
6,160.0	3.17	191.71	6,041.7	-1,129.6	-234.1	48.0	2.00	-2.00	0.00
6,200.0	2.37	191.71	6,081.6	-1,131.5	-234.5	48.1	2.00	-2.00	0.00
6,240.0	1.57	191.71	6,121.6	-1,132.8	-234.8	48.1	2.00	-2.00	0.00
6,280.0	0.77	191.71	6,161.6	-1,133.6	-234.9	48.2	2.00	-2.00	0.00
6,318.4	0.00	0.00	6,200.0	-1,133.9	-235.0	48.2	2.00	-2.00	0.00
6,320.0	0.00	0.00	6,201.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,360.0	0.00	0.00	6,241.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,400.0	0.00	0.00	6,281.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,440.0	0.00	0.00	6,321.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,480.0	0.00	0.00	6,361.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,520.0	0.00	0.00	6,401.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,560.0	0.00	0.00	6,441.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,600.0	0.00	0.00	6,481.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,640.0	0.00	0.00	6,521.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,680.0	0.00	0.00	6,561.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,720.0	0.00	0.00	6,601.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,760.0	0.00	0.00	6,641.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,800.0	0.00	0.00	6,681.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,840.0	0.00	0.00	6,721.6	-1,133.9	-235.0	48.2	0.00	0.00	0.00
6,855.7	0.00	0.00	6,737.3	-1,133.9	-235.0	48.2	0.00	0.00	0.00
KOP #2									
6,880.0	1.82	90.93	6,761.6	-1,133.9	-234.6	48.5	7.50	7.50	0.00
6,920.0	4.82	90.93	6,801.5	-1,133.9	-232.3	50.8	7.50	7.50	0.00
6,960.0	7.82	90.93	6,841.3	-1,134.0	-227.9	55.1	7.50	7.50	0.00
7,000.0	10.82	90.93	6,880.7	-1,134.1	-221.4	61.4	7.50	7.50	0.00
7,040.0	13.82	90.93	6,919.8	-1,134.3	-212.9	69.7	7.50	7.50	0.00
7,080.0	16.82	90.93	6,958.4	-1,134.4	-202.3	80.0	7.50	7.50	0.00
7,120.0	19.82	90.93	6,996.3	-1,134.6	-189.7	92.2	7.50	7.50	0.00
7,160.0	22.82	90.93	7,033.6	-1,134.9	-175.2	106.4	7.50	7.50	0.00
7,200.0	25.82	90.93	7,070.1	-1,135.1	-158.7	122.4	7.50	7.50	0.00
7,240.0	28.82	90.93	7,105.6	-1,135.4	-140.4	140.3	7.50	7.50	0.00
7,280.0	31.82	90.93	7,140.1	-1,135.8	-120.2	160.0	7.50	7.50	0.00
7,320.0	34.82	90.93	7,173.5	-1,136.1	-98.2	181.4	7.50	7.50	0.00
7,360.0	37.82	90.93	7,205.8	-1,136.5	-74.5	204.4	7.50	7.50	0.00
7,400.0	40.82	90.93	7,236.7	-1,136.9	-49.2	229.1	7.50	7.50	0.00
7,440.0	43.82	90.93	7,266.3	-1,137.4	-22.3	255.3	7.50	7.50	0.00
7,480.0	46.82	90.93	7,294.4	-1,137.8	6.2	283.0	7.50	7.50	0.00
7,520.0	49.82	90.93	7,321.0	-1,138.3	36.0	312.1	7.50	7.50	0.00
7,560.0	52.82	90.93	7,346.0	-1,138.8	67.3	342.5	7.50	7.50	0.00
7,600.0	55.82	90.93	7,369.3	-1,139.3	99.7	374.2	7.50	7.50	0.00
7,640.0	58.82	90.93	7,390.9	-1,139.9	133.4	406.9	7.50	7.50	0.00
7,680.0	61.82	90.93	7,410.7	-1,140.4	168.2	440.8	7.50	7.50	0.00
7,720.0	64.82	90.93	7,428.7	-1,141.0	203.9	475.6	7.50	7.50	0.00
7,760.0	67.82	90.93	7,444.7	-1,141.6	240.5	511.2	7.50	7.50	0.00
7,800.0	70.82	90.93	7,458.8	-1,142.2	277.9	547.7	7.50	7.50	0.00
7,840.0	73.82	90.93	7,471.0	-1,142.8	316.0	584.8	7.50	7.50	0.00
7,880.0	76.82	90.93	7,481.1	-1,143.5	354.7	622.5	7.50	7.50	0.00
7,920.0	79.82	90.93	7,489.2	-1,144.1	393.9	660.6	7.50	7.50	0.00
7,960.0	82.82	90.93	7,495.2	-1,144.8	433.4	699.1	7.50	7.50	0.00
7,975.7	84.00	90.93	7,497.0	-1,145.0	449.0	714.3	7.50	7.50	0.00
7"									
8,000.0	84.00	90.93	7,499.6	-1,145.4	473.2	737.8	0.00	0.00	0.00
8,040.0	84.00	90.93	7,503.8	-1,146.0	512.9	776.6	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

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)
8,048.7	84.00	90.93	7,504.7	-1,146.2	521.6	785.0	0.00	0.00	0.00
8,080.0	85.55	90.70	7,507.5	-1,146.6	552.8	815.3	5.00	4.95	-0.74
8,120.0	87.53	90.40	7,509.9	-1,147.0	592.7	854.1	5.00	4.95	-0.74
8,160.0	89.50	90.11	7,511.0	-1,147.2	632.7	893.0	5.00	4.95	-0.74
8,174.8	90.23	90.00	7,511.0	-1,147.2	647.5	907.3	4.99	4.93	-0.73
End of Build									
8,200.0	90.23	90.00	7,510.9	-1,147.2	672.7	931.8	0.00	0.00	0.00
8,240.0	90.23	90.00	7,510.8	-1,147.2	712.7	970.5	0.00	0.00	0.00
8,280.0	90.23	90.00	7,510.6	-1,147.2	752.7	1,009.3	0.00	0.00	0.00
8,320.0	90.23	90.00	7,510.4	-1,147.2	792.7	1,048.1	0.00	0.00	0.00
8,360.0	90.23	90.00	7,510.3	-1,147.2	832.7	1,086.9	0.00	0.00	0.00
8,400.0	90.23	90.00	7,510.1	-1,147.2	872.7	1,125.7	0.00	0.00	0.00
8,440.0	90.23	90.00	7,509.9	-1,147.2	912.7	1,164.5	0.00	0.00	0.00
8,480.0	90.23	90.00	7,509.8	-1,147.2	952.7	1,203.3	0.00	0.00	0.00
8,520.0	90.23	90.00	7,509.6	-1,147.2	992.7	1,242.1	0.00	0.00	0.00
8,560.0	90.23	90.00	7,509.4	-1,147.2	1,032.7	1,280.9	0.00	0.00	0.00
8,600.0	90.23	90.00	7,509.3	-1,147.2	1,072.7	1,319.7	0.00	0.00	0.00
8,640.0	90.23	90.00	7,509.1	-1,147.2	1,112.7	1,358.5	0.00	0.00	0.00
8,680.0	90.23	90.00	7,509.0	-1,147.2	1,152.7	1,397.3	0.00	0.00	0.00
8,720.0	90.23	90.00	7,508.8	-1,147.2	1,192.7	1,436.1	0.00	0.00	0.00
8,760.0	90.23	90.00	7,508.6	-1,147.2	1,232.7	1,474.9	0.00	0.00	0.00
8,800.0	90.23	90.00	7,508.5	-1,147.2	1,272.7	1,513.7	0.00	0.00	0.00
8,840.0	90.23	90.00	7,508.3	-1,147.2	1,312.7	1,552.5	0.00	0.00	0.00
8,880.0	90.23	90.00	7,508.1	-1,147.2	1,352.7	1,591.3	0.00	0.00	0.00
8,920.0	90.23	90.00	7,508.0	-1,147.2	1,392.7	1,630.1	0.00	0.00	0.00
8,960.0	90.23	90.00	7,507.8	-1,147.2	1,432.7	1,668.9	0.00	0.00	0.00
9,000.0	90.23	90.00	7,507.6	-1,147.2	1,472.7	1,707.7	0.00	0.00	0.00
9,040.0	90.23	90.00	7,507.5	-1,147.2	1,512.7	1,746.5	0.00	0.00	0.00
9,080.0	90.23	90.00	7,507.3	-1,147.2	1,552.7	1,785.3	0.00	0.00	0.00
9,120.0	90.23	90.00	7,507.2	-1,147.2	1,592.7	1,824.1	0.00	0.00	0.00
9,160.0	90.23	90.00	7,507.0	-1,147.2	1,632.7	1,862.8	0.00	0.00	0.00
9,200.0	90.23	90.00	7,506.8	-1,147.2	1,672.7	1,901.6	0.00	0.00	0.00
9,240.0	90.23	90.00	7,506.7	-1,147.2	1,712.7	1,940.4	0.00	0.00	0.00
9,280.0	90.23	90.00	7,506.5	-1,147.2	1,752.7	1,979.2	0.00	0.00	0.00
9,320.0	90.23	90.00	7,506.3	-1,147.2	1,792.7	2,018.0	0.00	0.00	0.00
9,360.0	90.23	90.00	7,506.2	-1,147.2	1,832.7	2,056.8	0.00	0.00	0.00
9,400.0	90.23	90.00	7,506.0	-1,147.2	1,872.7	2,095.6	0.00	0.00	0.00
9,440.0	90.23	90.00	7,505.8	-1,147.2	1,912.7	2,134.4	0.00	0.00	0.00
9,480.0	90.23	90.00	7,505.7	-1,147.2	1,952.7	2,173.2	0.00	0.00	0.00
9,520.0	90.23	90.00	7,505.5	-1,147.2	1,992.7	2,212.0	0.00	0.00	0.00
9,560.0	90.23	90.00	7,505.4	-1,147.2	2,032.7	2,250.8	0.00	0.00	0.00
9,600.0	90.23	90.00	7,505.2	-1,147.2	2,072.7	2,289.6	0.00	0.00	0.00
9,640.0	90.23	90.00	7,505.0	-1,147.2	2,112.7	2,328.4	0.00	0.00	0.00
9,680.0	90.23	90.00	7,504.9	-1,147.2	2,152.6	2,367.2	0.00	0.00	0.00
9,720.0	90.23	90.00	7,504.7	-1,147.2	2,192.6	2,406.0	0.00	0.00	0.00
9,760.0	90.23	90.00	7,504.5	-1,147.2	2,232.6	2,444.8	0.00	0.00	0.00
9,800.0	90.23	90.00	7,504.4	-1,147.2	2,272.6	2,483.6	0.00	0.00	0.00
9,840.0	90.23	90.00	7,504.2	-1,147.2	2,312.6	2,522.4	0.00	0.00	0.00
9,880.0	90.23	90.00	7,504.1	-1,147.2	2,352.6	2,561.2	0.00	0.00	0.00
9,920.0	90.23	90.00	7,503.9	-1,147.2	2,392.6	2,600.0	0.00	0.00	0.00
9,960.0	90.23	90.00	7,503.7	-1,147.2	2,432.6	2,638.8	0.00	0.00	0.00
10,000.0	90.23	90.00	7,503.6	-1,147.2	2,472.6	2,677.6	0.00	0.00	0.00
10,040.0	90.23	90.00	7,503.4	-1,147.2	2,512.6	2,716.4	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

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)
10,080.0	90.23	90.00	7,503.2	-1,147.2	2,552.6	2,755.2	0.00	0.00	0.00
10,120.0	90.23	90.00	7,503.1	-1,147.2	2,592.6	2,793.9	0.00	0.00	0.00
10,160.0	90.23	90.00	7,502.9	-1,147.2	2,632.6	2,832.7	0.00	0.00	0.00
10,200.0	90.23	90.00	7,502.7	-1,147.2	2,672.6	2,871.5	0.00	0.00	0.00
10,240.0	90.23	90.00	7,502.6	-1,147.2	2,712.6	2,910.3	0.00	0.00	0.00
10,280.0	90.23	90.00	7,502.4	-1,147.2	2,752.6	2,949.1	0.00	0.00	0.00
10,320.0	90.23	90.00	7,502.3	-1,147.2	2,792.6	2,987.9	0.00	0.00	0.00
10,360.0	90.23	90.00	7,502.1	-1,147.2	2,832.6	3,026.7	0.00	0.00	0.00
10,400.0	90.23	90.00	7,501.9	-1,147.2	2,872.6	3,065.5	0.00	0.00	0.00
10,440.0	90.23	90.00	7,501.8	-1,147.2	2,912.6	3,104.3	0.00	0.00	0.00
10,480.0	90.23	90.00	7,501.6	-1,147.2	2,952.6	3,143.1	0.00	0.00	0.00
10,520.0	90.23	90.00	7,501.4	-1,147.2	2,992.6	3,181.9	0.00	0.00	0.00
10,560.0	90.23	90.00	7,501.3	-1,147.2	3,032.6	3,220.7	0.00	0.00	0.00
10,600.0	90.23	90.00	7,501.1	-1,147.2	3,072.6	3,259.5	0.00	0.00	0.00
10,640.0	90.23	90.00	7,500.9	-1,147.2	3,112.6	3,298.3	0.00	0.00	0.00
10,680.0	90.23	90.00	7,500.8	-1,147.2	3,152.6	3,337.1	0.00	0.00	0.00
10,720.0	90.23	90.00	7,500.6	-1,147.2	3,192.6	3,375.9	0.00	0.00	0.00
10,760.0	90.23	90.00	7,500.5	-1,147.2	3,232.6	3,414.7	0.00	0.00	0.00
10,800.0	90.23	90.00	7,500.3	-1,147.2	3,272.6	3,453.5	0.00	0.00	0.00
10,840.0	90.23	90.00	7,500.1	-1,147.2	3,312.6	3,492.3	0.00	0.00	0.00
10,880.0	90.23	90.00	7,500.0	-1,147.2	3,352.6	3,531.1	0.00	0.00	0.00
10,920.0	90.23	90.00	7,499.8	-1,147.2	3,392.6	3,569.9	0.00	0.00	0.00
10,960.0	90.23	90.00	7,499.6	-1,147.2	3,432.6	3,608.7	0.00	0.00	0.00
11,000.0	90.23	90.00	7,499.5	-1,147.2	3,472.6	3,647.5	0.00	0.00	0.00
11,040.0	90.23	90.00	7,499.3	-1,147.2	3,512.6	3,686.3	0.00	0.00	0.00
11,080.0	90.23	90.00	7,499.2	-1,147.2	3,552.6	3,725.0	0.00	0.00	0.00
11,120.0	90.23	90.00	7,499.0	-1,147.2	3,592.6	3,763.8	0.00	0.00	0.00
11,160.0	90.23	90.00	7,498.8	-1,147.2	3,632.6	3,802.6	0.00	0.00	0.00
11,200.0	90.23	90.00	7,498.7	-1,147.2	3,672.6	3,841.4	0.00	0.00	0.00
11,240.0	90.23	90.00	7,498.5	-1,147.2	3,712.6	3,880.2	0.00	0.00	0.00
11,280.0	90.23	90.00	7,498.3	-1,147.2	3,752.6	3,919.0	0.00	0.00	0.00
11,320.0	90.23	90.00	7,498.2	-1,147.2	3,792.6	3,957.8	0.00	0.00	0.00
11,360.0	90.23	90.00	7,498.0	-1,147.2	3,832.6	3,996.6	0.00	0.00	0.00
11,400.0	90.23	90.00	7,497.8	-1,147.2	3,872.6	4,035.4	0.00	0.00	0.00
11,440.0	90.23	90.00	7,497.7	-1,147.2	3,912.6	4,074.2	0.00	0.00	0.00
11,480.0	90.23	90.00	7,497.5	-1,147.2	3,952.6	4,113.0	0.00	0.00	0.00
11,520.0	90.23	90.00	7,497.4	-1,147.2	3,992.6	4,151.8	0.00	0.00	0.00
11,560.0	90.23	90.00	7,497.2	-1,147.2	4,032.6	4,190.6	0.00	0.00	0.00
11,600.0	90.23	90.00	7,497.0	-1,147.2	4,072.6	4,229.4	0.00	0.00	0.00
11,640.0	90.23	90.00	7,496.9	-1,147.2	4,112.6	4,268.2	0.00	0.00	0.00
11,680.0	90.23	90.00	7,496.7	-1,147.2	4,152.6	4,307.0	0.00	0.00	0.00
11,720.0	90.23	90.00	7,496.5	-1,147.2	4,192.6	4,345.8	0.00	0.00	0.00
11,760.0	90.23	90.00	7,496.4	-1,147.2	4,232.6	4,384.6	0.00	0.00	0.00
11,800.0	90.23	90.00	7,496.2	-1,147.2	4,272.6	4,423.4	0.00	0.00	0.00
11,840.0	90.23	90.00	7,496.0	-1,147.2	4,312.6	4,462.2	0.00	0.00	0.00
11,880.0	90.23	90.00	7,495.9	-1,147.2	4,352.6	4,501.0	0.00	0.00	0.00
11,920.0	90.23	90.00	7,495.7	-1,147.2	4,392.6	4,539.8	0.00	0.00	0.00
11,960.0	90.23	90.00	7,495.6	-1,147.2	4,432.6	4,578.6	0.00	0.00	0.00
12,000.0	90.23	90.00	7,495.4	-1,147.2	4,472.6	4,617.3	0.00	0.00	0.00
12,040.0	90.23	90.00	7,495.2	-1,147.2	4,512.6	4,656.1	0.00	0.00	0.00
12,080.0	90.23	90.00	7,495.1	-1,147.2	4,552.6	4,694.9	0.00	0.00	0.00
12,096.9	90.23	90.00	7,495.0	-1,147.2	4,569.6	4,711.4	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

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)
BHL 1520'FNL, 500'FEL									

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
HARDLINE BHL 460'F	0.00	0.00	1.0	-1,300.0	4,609.6	1,454,248.50	3,206,691.53	40.577931	-104.755906
- plan misses target center by 4789.4ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,454,248.50	3,206,691.53		
Point 2			1.0	1,400.0	0.0	1,455,648.42	3,206,680.04		
HARDLINE SHL 460'F	0.00	0.00	1.0	-1,300.0	175.0	1,454,212.12	3,202,257.20	40.577932	-104.771870
- plan misses target center by 1311.7ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,454,212.12	3,202,257.20		
Point 2			1.0	1,400.0	0.0	1,455,612.04	3,202,245.72		
BHL 1520'FNL, 500'FI	0.00	0.00	7,495.0	-1,147.2	4,569.6	1,454,400.98	3,206,650.25	40.578350	-104.756050
- plan hits target center									
- Point									
SECTION LINE 285'W	0.00	0.00	1.0	-1,300.0	-285.0	1,454,208.35	3,201,797.23	40.577932	-104.773526
- plan misses target center by 1330.9ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,454,208.35	3,201,797.23		
Point 2			1.0	1,400.0	0.0	1,455,608.26	3,201,785.75		

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name		Casing Diameter (")	Hole Diameter (")
7,975.7	7,497.0	7"		7	7-1/2

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
200.0	200.0	0.0	0.0	KOP #1
6,855.7	6,737.3	-1,133.9	-235.0	KOP #2
8,174.8	7,511.0	-1,147.2	647.5	End of Build



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15F-432

Wellbore #1

Plan #1 (6-13-12)

Anticollision Report

27 June, 2012



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (6-13-12)		
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 1,000.0ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date 6/27/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	12,096.9	Plan #1 (6-13-12) (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 Pad Sec.15-T7N-R66W						
Thornton 15E-232 - Wellbore #1 - Plan #1 (6-12-12)	200.0	200.0	91.1	90.4	135.069	CC, ES
Thornton 15E-232 - Wellbore #1 - Plan #1 (6-12-12)	4,600.0	4,482.3	987.0	964.6	44.040	SF
Thornton 15E-432 - Wellbore #1 - Plan #1 (6-12-12)	200.0	200.0	58.3	57.6	86.436	CC, ES
Thornton 15E-432 - Wellbore #1 - Plan #1 (6-12-12)	12,096.9	11,990.5	878.1	616.7	3.359	SF
Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)	200.0	200.0	29.1	28.5	43.212	CC, ES
Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)	12,096.9	11,873.6	476.7	236.6	1.985	SF

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-232 - Wellbore #1 - Plan #1 (6-12-12)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Reference	Offset	Semi Major Axis			Distance									
Measured Depth (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	0.0	0.0	0.0	0.0	0.00	91.1	0.0	91.1					
100.0	100.0	100.0	100.0	0.1	0.1	0.00	91.1	0.0	91.1	90.9	0.22	405.207		
200.0	200.0	200.0	200.0	0.3	0.3	0.00	91.1	0.0	91.1	90.4	0.67	135.069	CC, ES	
300.0	300.0	300.0	300.0	0.5	0.6	168.50	91.1	0.0	92.8	91.7	1.11	83.760		
400.0	399.8	399.8	399.8	0.8	0.8	169.09	91.1	0.0	97.9	96.4	1.54	63.499		
500.0	499.5	499.5	499.5	1.0	1.0	169.95	91.1	0.0	106.5	104.5	1.99	53.524		
600.0	598.7	598.7	598.7	1.3	1.2	170.94	91.1	0.0	118.5	116.1	2.44	48.489		
700.0	697.5	697.5	697.5	1.6	1.5	171.95	91.1	0.0	134.0	131.1	2.90	46.152		
806.1	801.6	801.6	801.6	2.0	1.7	172.96	91.1	0.0	154.2	150.8	3.39	45.423		
900.0	893.4	893.4	893.4	2.4	1.9	173.76	91.1	0.0	173.8	169.9	3.83	45.401		
1,000.0	991.2	991.2	991.2	2.9	2.1	174.43	91.1	0.0	194.7	190.4	4.29	45.335		
1,100.0	1,088.9	1,088.9	1,088.9	3.3	2.3	174.97	91.1	0.0	215.6	210.8	4.76	45.252		
1,200.0	1,186.7	1,186.7	1,186.7	3.8	2.6	175.42	91.1	0.0	236.5	231.3	5.24	45.164		
1,300.0	1,284.5	1,284.5	1,284.5	4.2	2.8	175.79	91.1	0.0	257.4	251.7	5.71	45.076		
1,400.0	1,382.2	1,382.2	1,382.2	4.7	3.0	176.11	91.1	0.0	278.4	272.2	6.19	44.992		
1,500.0	1,480.0	1,480.0	1,480.0	5.1	3.2	176.38	91.1	0.0	299.3	292.7	6.66	44.913		
1,600.0	1,577.8	1,577.8	1,577.8	5.6	3.4	176.62	91.1	0.0	320.3	313.2	7.14	44.839		
1,700.0	1,675.6	1,675.6	1,675.6	6.0	3.7	176.82	91.1	0.0	341.3	333.6	7.62	44.770		
1,800.0	1,773.3	1,773.3	1,773.3	6.5	3.9	177.01	91.1	0.0	362.2	354.1	8.10	44.706		
1,900.0	1,871.1	1,871.1	1,871.1	6.9	4.1	177.17	91.1	0.0	383.2	374.6	8.58	44.646		
2,000.0	1,968.9	1,968.9	1,968.9	7.4	4.3	177.32	91.1	0.0	404.2	395.1	9.06	44.590		

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 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-232 - Wellbore #1 - Plan #1 (6-12-12)													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	2,066.6	2,066.6	2,066.6	7.9	4.5	177.45		91.1	0.0	425.2	415.6	9.55	44.539	
2,200.0	2,164.4	2,164.4	2,164.4	8.3	4.8	177.57		91.1	0.0	446.1	436.1	10.03	44.491	
2,300.0	2,262.2	2,262.2	2,262.2	8.8	5.0	177.68		91.1	0.0	467.1	456.6	10.51	44.446	
2,400.0	2,360.0	2,360.0	2,360.0	9.2	5.2	177.78		91.1	0.0	488.1	477.1	10.99	44.404	
2,500.0	2,457.7	2,457.7	2,457.7	9.7	5.4	177.87		91.1	0.0	509.1	497.6	11.48	44.365	
2,600.0	2,555.5	2,555.5	2,555.5	10.2	5.6	177.96		91.1	0.0	530.1	518.1	11.96	44.328	
2,700.0	2,653.3	2,653.3	2,653.3	10.6	5.9	178.03		91.1	0.0	551.1	538.6	12.44	44.293	
2,800.0	2,751.0	2,751.0	2,751.0	11.1	6.1	178.11		91.1	0.0	572.1	559.1	12.92	44.261	
2,900.0	2,848.8	2,848.8	2,848.8	11.5	6.3	178.17		91.1	0.0	593.0	579.6	13.41	44.230	
3,000.0	2,946.6	2,946.6	2,946.6	12.0	6.5	178.24		91.1	0.0	614.0	600.1	13.89	44.201	
3,100.0	3,044.3	3,043.2	3,043.2	12.5	6.7	178.26		91.2	-0.3	635.1	620.7	14.37	44.195	
3,200.0	3,142.1	3,138.4	3,138.4	12.9	6.9	178.05		92.0	-3.2	656.4	641.6	14.84	44.236	
3,300.0	3,239.9	3,233.2	3,232.9	13.4	7.1	177.58		93.8	-9.1	678.2	662.9	15.31	44.300	
3,400.0	3,337.7	3,327.3	3,326.6	13.9	7.3	176.88		96.4	-17.9	700.4	684.6	15.79	44.367	
3,500.0	3,435.4	3,420.9	3,419.4	14.3	7.5	175.99		99.9	-29.6	723.2	706.9	16.28	44.429	
3,600.0	3,533.2	3,517.4	3,514.9	14.8	7.8	175.02		103.9	-42.9	746.4	729.6	16.79	44.449	
3,700.0	3,631.0	3,613.9	3,610.3	15.2	8.0	174.10		107.8	-56.2	769.9	752.5	17.32	44.453	
3,800.0	3,728.7	3,710.4	3,705.8	15.7	8.3	173.24		111.8	-69.5	793.4	775.6	17.85	44.441	
3,900.0	3,826.5	3,806.9	3,801.3	16.2	8.5	172.43		115.7	-82.8	817.2	798.8	18.40	44.415	
4,000.0	3,924.3	3,903.3	3,896.8	16.6	8.8	171.66		119.7	-96.1	841.1	822.1	18.95	44.378	
4,100.0	4,022.0	3,999.8	3,992.3	17.1	9.0	170.94		123.7	-109.5	865.1	845.6	19.51	44.334	
4,200.0	4,119.8	4,096.3	4,087.8	17.5	9.3	170.25		127.6	-122.8	889.3	869.2	20.08	44.282	
4,300.0	4,217.6	4,192.8	4,183.3	18.0	9.6	169.60		131.6	-136.1	913.6	892.9	20.66	44.226	
4,400.0	4,315.4	4,289.3	4,278.8	18.5	9.9	168.98		135.6	-149.4	938.0	916.7	21.24	44.166	
4,500.0	4,413.1	4,385.8	4,374.3	18.9	10.1	168.40		139.5	-162.7	962.4	940.6	21.82	44.104	
4,600.0	4,510.9	4,482.3	4,469.7	19.4	10.4	167.84		143.5	-176.0	987.0	964.6	22.41	44.040 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-432 - Wellbore #1 - Plan #1 (6-12-12)													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	0.0	0.0	0.0	0.0	0.00	58.3	0.0	58.3					
100.0	100.0	100.0	100.0	0.1	0.1	0.00	58.3	0.0	58.3	58.1	0.22	259.308		
200.0	200.0	200.0	200.0	0.3	0.3	0.00	58.3	0.0	58.3	57.6	0.67	86.436 CC, ES		
300.0	300.0	300.0	300.0	0.5	0.6	168.62	58.3	0.0	60.0	58.9	1.11	54.157		
400.0	399.8	399.8	399.8	0.8	0.8	169.51	58.3	0.0	65.1	63.6	1.54	42.236		
500.0	499.5	499.5	499.5	1.0	1.0	170.72	58.3	0.0	73.7	71.7	1.99	37.054		
600.0	598.7	598.7	598.7	1.3	1.2	172.00	58.3	0.0	85.8	83.3	2.44	35.099		
700.0	697.5	697.5	697.5	1.6	1.5	173.19	58.3	0.0	101.3	98.4	2.90	34.901		
806.1	801.6	801.6	801.6	2.0	1.7	174.29	58.3	0.0	121.5	118.1	3.39	35.825		
900.0	893.4	893.4	893.4	2.4	1.9	175.08	58.3	0.0	141.2	137.3	3.82	36.908		
1,000.0	991.2	991.2	991.2	2.9	2.1	175.72	58.3	0.0	162.1	157.8	4.29	37.780		
1,100.0	1,088.9	1,088.9	1,088.9	3.3	2.3	176.21	58.3	0.0	183.0	178.3	4.76	38.453		
1,200.0	1,186.7	1,186.7	1,186.7	3.8	2.6	176.60	58.3	0.0	204.0	198.8	5.23	38.987		
1,300.0	1,284.5	1,284.5	1,284.5	4.2	2.8	176.92	58.3	0.0	225.0	219.3	5.71	39.419		
1,400.0	1,382.2	1,382.2	1,382.2	4.7	3.0	177.18	58.3	0.0	245.9	239.8	6.18	39.775		
1,500.0	1,480.0	1,480.0	1,480.0	5.1	3.2	177.40	58.3	0.0	266.9	260.3	6.66	40.073		
1,600.0	1,577.8	1,585.5	1,585.5	5.6	3.4	177.49	57.2	-0.7	286.9	279.7	7.13	40.219		
1,700.0	1,675.6	1,694.2	1,694.1	6.0	3.6	177.25	52.9	-3.7	303.5	295.9	7.58	40.018		
1,800.0	1,773.3	1,804.0	1,803.5	6.5	3.8	176.70	45.0	-9.2	316.8	308.7	8.05	39.358		
1,900.0	1,871.1	1,910.7	1,909.4	6.9	4.1	175.91	34.3	-16.6	326.8	318.3	8.52	38.348		
2,000.0	1,968.9	2,010.2	2,008.0	7.4	4.3	175.15	23.5	-24.0	336.2	327.2	9.00	37.358		
2,100.0	2,066.6	2,109.7	2,106.6	7.9	4.5	174.43	12.8	-31.4	345.7	336.2	9.49	36.438		
2,200.0	2,164.4	2,209.1	2,205.2	8.3	4.8	173.75	2.1	-38.9	355.2	345.2	9.98	35.580		
2,300.0	2,262.2	2,308.6	2,303.8	8.8	5.0	173.11	-8.7	-46.3	364.7	354.2	10.48	34.786		
2,400.0	2,360.0	2,408.1	2,402.4	9.2	5.3	172.50	-19.4	-53.7	374.3	363.3	10.99	34.042		
2,500.0	2,457.7	2,507.5	2,501.0	9.7	5.6	171.92	-30.2	-61.1	383.9	372.4	11.51	33.349		
2,600.0	2,555.5	2,607.0	2,599.6	10.2	5.9	171.36	-40.9	-68.5	393.5	381.5	12.03	32.701		
2,700.0	2,653.3	2,706.4	2,698.2	10.6	6.2	170.84	-51.6	-76.0	403.2	390.7	12.56	32.095		
2,800.0	2,751.0	2,805.9	2,796.8	11.1	6.5	170.34	-62.4	-83.4	413.0	399.9	13.10	31.527		
2,900.0	2,848.8	2,905.4	2,895.4	11.5	6.8	169.86	-73.1	-90.8	422.7	409.1	13.64	30.995		
3,000.0	2,946.6	3,004.8	2,994.0	12.0	7.1	169.40	-83.8	-98.2	432.5	418.3	14.18	30.495		
3,100.0	3,044.3	3,104.3	3,092.6	12.5	7.4	168.96	-94.6	-105.7	442.3	427.6	14.73	30.026		
3,200.0	3,142.1	3,203.8	3,191.2	12.9	7.7	168.55	-105.3	-113.1	452.1	436.9	15.28	29.583		
3,300.0	3,239.9	3,303.2	3,289.8	13.4	8.0	168.15	-116.1	-120.5	462.0	446.2	15.84	29.167		
3,400.0	3,337.7	3,402.7	3,388.4	13.9	8.3	167.76	-126.8	-127.9	471.9	455.5	16.40	28.773		
3,500.0	3,435.4	3,502.1	3,487.0	14.3	8.6	167.40	-137.5	-135.3	481.8	464.8	16.96	28.401		
3,600.0	3,533.2	3,601.6	3,585.6	14.8	8.9	167.04	-148.3	-142.8	491.7	474.2	17.53	28.050		
3,700.0	3,631.0	3,701.1	3,684.2	15.2	9.2	166.70	-159.0	-150.2	501.6	483.5	18.10	27.717		
3,800.0	3,728.7	3,800.5	3,782.8	15.7	9.6	166.38	-169.7	-157.6	511.6	492.9	18.67	27.401		
3,900.0	3,826.5	3,900.0	3,881.4	16.2	9.9	166.07	-180.5	-165.0	521.5	502.3	19.24	27.101		
4,000.0	3,924.3	3,999.5	3,980.0	16.6	10.2	165.76	-191.2	-172.4	531.5	511.7	19.82	26.816		
4,100.0	4,022.0	4,098.9	4,078.6	17.1	10.5	165.47	-201.9	-179.9	541.5	521.1	20.40	26.545		
4,200.0	4,119.8	4,198.4	4,177.2	17.5	10.9	165.19	-212.7	-187.3	551.5	530.5	20.98	26.287		
4,300.0	4,217.6	4,297.8	4,275.8	18.0	11.2	164.92	-223.4	-194.7	561.5	540.0	21.56	26.041		
4,400.0	4,315.4	4,397.3	4,374.4	18.5	11.5	164.66	-234.2	-202.1	571.6	549.4	22.15	25.807		
4,500.0	4,413.1	4,496.8	4,473.0	18.9	11.8	164.41	-244.9	-209.5	581.6	558.9	22.73	25.583		
4,600.0	4,510.9	4,596.2	4,571.6	19.4	12.2	164.17	-255.6	-217.0	591.7	568.3	23.32	25.368		
4,700.0	4,608.7	4,689.1	4,663.8	19.9	12.5	163.97	-266.4	-223.7	602.0	578.1	23.88	25.208		
4,800.0	4,706.4	4,774.3	4,748.5	20.3	12.7	163.92	-272.6	-228.7	614.3	589.9	24.36	25.214		
4,900.0	4,804.2	4,858.9	4,832.9	20.8	12.8	164.01	-277.7	-232.2	628.9	604.1	24.81	25.346		
5,000.0	4,902.0	4,942.8	4,916.7	21.2	13.0	164.25	-280.7	-234.3	645.7	620.5	25.23	25.593		

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 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-432 - Wellbore #1 - Plan #1 (6-12-12)													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	4,999.8	5,026.1	5,000.0	21.7	13.1	164.60	-281.7	-235.0	664.9	639.3	25.63	25.945		
5,200.0	5,097.5	5,123.7	5,097.5	22.2	13.3	165.06	-281.7	-235.0	685.2	659.2	26.03	26.325		
5,300.0	5,195.3	5,221.4	5,195.3	22.6	13.4	165.50	-281.7	-235.0	705.5	679.1	26.43	26.693		
5,400.0	5,293.1	5,319.2	5,293.1	23.1	13.6	165.92	-281.7	-235.0	725.9	699.1	26.84	27.047		
5,500.0	5,390.8	5,417.0	5,390.8	23.5	13.8	166.31	-281.7	-235.0	746.3	719.1	27.25	27.387		
5,600.0	5,488.6	5,514.7	5,488.6	24.0	13.9	166.68	-281.7	-235.0	766.7	739.1	27.67	27.715		
5,700.0	5,586.4	5,612.5	5,586.4	24.5	14.1	167.03	-281.7	-235.0	787.2	759.1	28.08	28.031		
5,712.3	5,598.4	5,624.6	5,598.4	24.5	14.1	167.07	-281.7	-235.0	789.7	761.6	28.14	28.069		
5,800.0	5,684.4	5,710.6	5,684.4	24.9	14.3	167.42	-281.7	-235.0	806.4	777.9	28.51	28.286		
5,900.0	5,783.1	5,809.2	5,783.1	25.1	14.4	167.73	-281.7	-235.0	822.3	793.5	28.89	28.466		
6,000.0	5,882.2	5,908.4	5,882.2	25.3	14.6	167.97	-281.7	-235.0	834.9	805.6	29.24	28.554		
6,100.0	5,981.8	6,007.9	5,981.8	25.5	14.8	168.14	-281.7	-235.0	844.0	814.5	29.56	28.553		
6,200.0	6,081.6	6,107.8	6,081.6	25.7	15.0	168.25	-281.7	-235.0	849.8	819.9	29.85	28.468		
6,300.0	6,181.6	6,207.7	6,181.6	25.8	15.1	168.29	-281.7	-235.0	852.1	822.0	30.11	28.302		
6,318.4	6,200.0	6,226.1	6,200.0	25.8	15.2	0.00	-281.7	-235.0	852.2	812.2	39.95	21.329		
6,400.0	6,281.6	6,307.7	6,281.6	25.9	15.3	0.00	-281.7	-235.0	852.2	812.0	40.19	21.203		
6,500.0	6,381.6	6,407.7	6,381.6	26.0	15.5	0.00	-281.7	-235.0	852.2	811.7	40.47	21.059		
6,600.0	6,481.6	6,507.7	6,481.6	26.1	15.7	0.00	-281.7	-235.0	852.2	811.4	40.74	20.915		
6,700.0	6,581.6	6,607.7	6,581.6	26.2	15.8	0.00	-281.7	-235.0	852.2	811.2	41.03	20.772		
6,800.0	6,681.6	6,707.7	6,681.6	26.3	16.0	0.00	-281.7	-235.0	852.2	810.9	41.31	20.630		
6,837.1	6,718.7	6,744.9	6,718.7	26.3	16.1	0.00	-281.7	-235.0	852.2	810.8	41.41	20.577		
6,855.7	6,737.3	6,763.4	6,737.2	26.3	16.1	0.00	-281.7	-235.0	852.2	810.7	41.47	20.551		
6,900.0	6,781.6	6,807.6	6,781.4	26.4	16.2	-90.93	-281.7	-233.7	852.2	820.0	32.18	26.480		
6,950.0	6,831.3	6,857.5	6,831.1	26.4	16.3	-90.92	-281.7	-229.2	852.3	820.0	32.32	26.370		
7,000.0	6,880.7	6,907.3	6,880.3	26.4	16.3	-90.91	-281.7	-221.5	852.4	820.0	32.43	26.284		
7,050.0	6,929.5	6,957.2	6,929.0	26.5	16.4	-90.90	-281.7	-210.6	852.6	820.1	32.52	26.219		
7,100.0	6,977.4	7,007.0	6,976.8	26.5	16.4	-90.88	-281.6	-196.5	852.9	820.3	32.59	26.170		
7,150.0	7,024.4	7,056.9	7,023.6	26.5	16.4	-90.86	-281.6	-179.3	853.2	820.6	32.65	26.131		
7,200.0	7,070.1	7,106.8	7,069.2	26.5	16.5	-90.84	-281.5	-159.1	853.6	820.9	32.71	26.095		
7,250.0	7,114.3	7,156.6	7,113.3	26.5	16.5	-90.81	-281.5	-136.0	854.1	821.3	32.78	26.051		
7,300.0	7,157.0	7,206.5	7,155.9	26.6	16.5	-90.77	-281.4	-110.1	854.6	821.7	32.88	25.988		
7,350.0	7,197.8	7,256.4	7,196.7	26.6	16.5	-90.74	-281.3	-81.4	855.1	822.1	33.02	25.894		
7,400.0	7,236.7	7,306.2	7,235.6	26.6	16.5	-90.70	-281.2	-50.1	855.7	822.5	33.22	25.754		
7,450.0	7,273.4	7,356.1	7,272.3	26.6	16.5	-90.66	-281.1	-16.4	856.3	822.8	33.51	25.556		
7,500.0	7,307.9	7,406.0	7,306.7	26.6	16.6	-90.61	-281.0	19.7	857.0	823.1	33.89	25.287		
7,550.0	7,339.9	7,455.9	7,338.7	26.7	16.6	-90.57	-280.9	58.0	857.7	823.3	34.39	24.939		
7,600.0	7,369.3	7,505.8	7,368.2	26.7	16.7	-90.52	-280.8	98.2	858.5	823.5	35.03	24.506		
7,650.0	7,396.0	7,555.7	7,395.0	26.8	17.1	-90.47	-280.7	140.4	859.3	823.5	35.82	23.990		
7,700.0	7,419.9	7,605.7	7,418.9	26.9	17.6	-90.41	-280.6	184.1	860.1	823.4	36.76	23.397		
7,750.0	7,440.9	7,655.6	7,440.0	27.0	18.2	-90.36	-280.5	229.4	861.0	823.1	37.87	22.737		
7,800.0	7,458.8	7,705.5	7,458.1	27.1	18.9	-90.30	-280.4	275.9	861.9	822.7	39.13	22.025		
7,850.0	7,473.7	7,755.5	7,473.1	27.3	19.7	-90.24	-280.3	323.6	862.7	822.2	40.55	21.278		
7,900.0	7,485.4	7,805.4	7,484.9	27.5	20.5	-90.18	-280.1	372.1	863.7	821.6	42.10	20.513		
7,950.0	7,493.9	7,855.4	7,493.6	27.8	21.3	-90.12	-280.0	421.3	864.6	820.8	43.78	19.746		
7,975.7	7,497.0	7,881.1	7,496.8	28.0	21.8	-90.09	-279.9	446.8	865.1	820.4	44.69	19.356		
8,000.0	7,499.6	7,905.3	7,499.3	28.2	22.3	-90.09	-279.9	470.9	865.5	820.0	45.58	18.989		
8,048.7	7,504.7	7,954.0	7,504.4	28.7	23.2	-90.09	-279.7	519.4	866.4	819.0	47.42	18.272		
8,100.0	7,508.9	8,005.3	7,508.8	29.3	24.3	-90.03	-279.6	570.4	867.2	817.9	49.39	17.560		
8,174.8	7,511.0	8,080.1	7,511.0	30.3	25.8	-90.00	-279.4	645.1	867.8	815.4	52.37	16.571		
8,200.0	7,510.9	8,105.3	7,510.9	30.6	26.4	-90.00	-279.3	670.4	867.9	814.4	53.44	16.240		
8,300.0	7,510.5	8,205.3	7,510.5	32.3	28.6	-90.00	-279.1	770.4	868.1	810.3	57.81	15.016		

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 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	Offset TVD Reference:	Offset Datum

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-432 - Wellbore #1 - Plan #1 (6-12-12)												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
8,400.0	7,510.1	8,305.3	7,510.1	34.2	30.9	-90.00	-278.8	870.4	868.4	806.0	62.39	13.919	
8,500.0	7,509.7	8,405.3	7,509.7	36.2	33.3	-90.00	-278.6	970.4	868.6	801.5	67.12	12.941	
8,600.0	7,509.3	8,505.3	7,509.3	38.4	35.8	-90.00	-278.3	1,070.4	868.9	796.9	71.98	12.071	
8,700.0	7,508.9	8,605.3	7,508.9	40.7	38.3	-90.00	-278.0	1,170.4	869.2	792.2	76.95	11.296	
8,800.0	7,508.5	8,705.3	7,508.5	43.1	40.8	-90.00	-277.8	1,270.4	869.4	787.4	81.99	10.604	
8,900.0	7,508.1	8,805.3	7,508.0	45.5	43.4	-90.00	-277.5	1,370.4	869.7	782.6	87.11	9.984	
9,000.0	7,507.6	8,905.3	7,507.6	47.9	46.0	-90.00	-277.3	1,470.4	869.9	777.7	92.29	9.427	
9,100.0	7,507.2	9,005.3	7,507.2	50.5	48.6	-90.00	-277.0	1,570.4	870.2	772.7	97.51	8.924	
9,200.0	7,506.8	9,105.3	7,506.8	53.0	51.3	-90.00	-276.7	1,670.4	870.5	767.7	102.78	8.470	
9,300.0	7,506.4	9,205.3	7,506.4	55.6	53.9	-90.00	-276.5	1,770.4	870.7	762.7	108.08	8.057	
9,400.0	7,506.0	9,305.3	7,506.0	58.1	56.6	-90.00	-276.2	1,870.4	871.0	757.6	113.41	7.680	
9,500.0	7,505.6	9,405.3	7,505.6	60.8	59.3	-90.00	-275.9	1,970.4	871.3	752.5	118.77	7.336	
9,600.0	7,505.2	9,505.3	7,505.2	63.4	62.0	-90.00	-275.7	2,070.4	871.5	747.4	124.15	7.020	
9,700.0	7,504.8	9,605.3	7,504.8	66.0	64.7	-90.00	-275.4	2,170.4	871.8	742.2	129.55	6.729	
9,800.0	7,504.4	9,705.3	7,504.4	68.7	67.4	-90.00	-275.2	2,270.4	872.0	737.1	134.96	6.461	
9,900.0	7,504.0	9,805.3	7,503.9	71.4	70.1	-90.00	-274.9	2,370.4	872.3	731.9	140.40	6.213	
10,000.0	7,503.6	9,905.3	7,503.5	74.0	72.9	-90.00	-274.6	2,470.4	872.6	726.7	145.85	5.983	
10,100.0	7,503.2	10,005.3	7,503.1	76.7	75.6	-90.00	-274.4	2,570.4	872.8	721.5	151.31	5.769	
10,200.0	7,502.7	10,105.3	7,502.7	79.4	78.3	-90.00	-274.1	2,670.4	873.1	716.3	156.78	5.569	
10,300.0	7,502.3	10,205.3	7,502.3	82.1	81.1	-90.00	-273.8	2,770.4	873.4	711.1	162.26	5.382	
10,400.0	7,501.9	10,305.3	7,501.9	84.8	83.8	-90.00	-273.6	2,870.4	873.6	705.9	167.75	5.208	
10,500.0	7,501.5	10,405.3	7,501.5	87.6	86.6	-90.00	-273.3	2,970.4	873.9	700.6	173.25	5.044	
10,600.0	7,501.1	10,505.3	7,501.1	90.3	89.3	-90.00	-273.1	3,070.4	874.1	695.4	178.75	4.890	
10,700.0	7,500.7	10,605.3	7,500.7	93.0	92.1	-90.00	-272.8	3,170.4	874.4	690.1	184.27	4.745	
10,800.0	7,500.3	10,705.3	7,500.3	95.7	94.9	-90.00	-272.5	3,270.3	874.7	684.9	189.78	4.609	
10,900.0	7,499.9	10,805.3	7,499.9	98.5	97.6	-90.00	-272.3	3,370.3	874.9	679.6	195.31	4.480	
11,000.0	7,499.5	10,905.3	7,499.4	101.2	100.4	-90.00	-272.0	3,470.3	875.2	674.3	200.84	4.358	
11,100.0	7,499.1	11,005.3	7,499.0	104.0	103.2	-90.00	-271.8	3,570.3	875.4	669.1	206.37	4.242	
11,200.0	7,498.7	11,105.3	7,498.6	106.7	105.9	-90.00	-271.5	3,670.3	875.7	663.8	211.91	4.132	
11,300.0	7,498.3	11,205.3	7,498.2	109.5	108.7	-90.00	-271.2	3,770.3	876.0	658.5	217.45	4.028	
11,400.0	7,497.8	11,305.3	7,497.8	112.2	111.5	-90.00	-271.0	3,870.3	876.2	653.2	223.00	3.929	
11,500.0	7,497.4	11,405.3	7,497.4	115.0	114.2	-90.00	-270.7	3,970.3	876.5	647.9	228.55	3.835	
11,600.0	7,497.0	11,505.3	7,497.0	117.7	117.0	-90.00	-270.4	4,070.3	876.8	642.7	234.10	3.745	
11,700.0	7,496.6	11,605.3	7,496.6	120.5	119.8	-90.00	-270.2	4,170.3	877.0	637.4	239.66	3.659	
11,800.0	7,496.2	11,705.3	7,496.2	123.3	122.6	-90.00	-269.9	4,270.3	877.3	632.1	245.21	3.578	
11,900.0	7,495.8	11,805.3	7,495.8	126.0	125.4	-90.00	-269.7	4,370.3	877.5	626.8	250.78	3.499	
12,000.0	7,495.4	11,905.3	7,495.3	128.8	128.1	-90.00	-269.4	4,470.3	877.8	621.5	256.34	3.424	
12,096.9	7,495.0	11,990.5	7,495.0	131.5	130.5	-90.00	-269.2	4,555.5	878.1	616.7	261.41	3.359 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	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	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
0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	29.1	0.0	29.1				
100.0	100.0	100.0	100.0	0.1	0.1	0.00	0.00	29.1	0.0	29.1	28.9	0.22	129.636	
200.0	200.0	200.0	200.0	0.3	0.3	0.00	0.00	29.1	0.0	29.1	28.5	0.67	43.212 CC, ES	
300.0	300.0	300.0	300.0	0.5	0.6	168.94	168.94	29.1	0.0	30.8	29.7	1.11	27.847	
400.0	399.8	399.8	399.8	0.8	0.8	170.52	170.52	29.1	0.0	36.0	34.5	1.54	23.343	
500.0	499.5	499.5	499.5	1.0	1.0	172.34	172.34	29.1	0.0	44.6	42.6	1.99	22.428	
600.0	598.7	598.7	598.7	1.3	1.2	173.96	173.96	29.1	0.0	56.7	54.3	2.44	23.217	
700.0	697.5	699.9	699.9	1.6	1.4	175.01	175.01	27.5	-0.5	70.6	67.8	2.87	24.595	
806.1	801.6	807.8	807.7	2.0	1.6	175.48	175.48	21.9	-2.3	85.4	82.1	3.31	25.796	
900.0	893.4	904.1	903.5	2.4	1.8	175.53	175.53	13.8	-4.8	96.9	93.2	3.72	26.065	
1,000.0	991.2	1,007.3	1,005.9	2.9	2.1	175.23	175.23	1.6	-8.6	105.8	101.6	4.18	25.319	
1,100.0	1,088.9	1,110.9	1,108.1	3.3	2.4	174.62	174.62	-14.2	-13.6	111.1	106.4	4.66	23.842	
1,200.0	1,186.7	1,210.8	1,206.5	3.8	2.7	173.91	173.91	-31.0	-18.8	114.8	109.6	5.15	22.274	
1,300.0	1,284.5	1,310.7	1,304.9	4.2	3.1	173.26	173.26	-47.8	-24.1	118.5	112.8	5.66	20.939	
1,400.0	1,382.2	1,410.6	1,403.2	4.7	3.4	172.64	172.64	-64.6	-29.4	122.2	116.0	6.17	19.795	
1,500.0	1,480.0	1,510.5	1,501.6	5.1	3.8	172.05	172.05	-81.4	-34.6	125.9	119.2	6.70	18.806	
1,600.0	1,577.8	1,610.5	1,599.9	5.6	4.2	171.51	171.51	-98.2	-39.9	129.7	122.5	7.22	17.952	
1,700.0	1,675.6	1,710.4	1,698.3	6.0	4.5	170.99	170.99	-115.0	-45.2	133.4	125.7	7.76	17.199	
1,800.0	1,773.3	1,810.3	1,796.7	6.5	4.9	170.50	170.50	-131.8	-50.4	137.2	128.9	8.30	16.533	
1,900.0	1,871.1	1,910.2	1,895.0	6.9	5.3	170.04	170.04	-148.6	-55.7	141.0	132.1	8.84	15.942	
2,000.0	1,968.9	2,010.2	1,993.4	7.4	5.7	169.60	169.60	-165.4	-61.0	144.8	135.4	9.39	15.414	
2,100.0	2,066.6	2,110.1	2,091.7	7.9	6.1	169.18	169.18	-182.2	-66.2	148.5	138.6	9.94	14.938	
2,200.0	2,164.4	2,210.0	2,190.1	8.3	6.5	168.78	168.78	-199.0	-71.5	152.3	141.8	10.50	14.509	
2,300.0	2,262.2	2,309.9	2,288.5	8.8	6.9	168.41	168.41	-215.8	-76.7	156.2	145.1	11.06	14.119	
2,400.0	2,360.0	2,409.8	2,386.8	9.2	7.3	168.05	168.05	-232.6	-82.0	160.0	148.3	11.62	13.764	
2,500.0	2,457.7	2,509.8	2,485.2	9.7	7.7	167.71	167.71	-249.4	-87.3	163.8	151.6	12.19	13.439	
2,600.0	2,555.5	2,609.7	2,583.5	10.2	8.1	167.38	167.38	-266.2	-92.5	167.6	154.8	12.75	13.141	
2,700.0	2,653.3	2,709.6	2,681.9	10.6	8.5	167.07	167.07	-283.0	-97.8	171.4	158.1	13.32	12.866	
2,800.0	2,751.0	2,809.5	2,780.3	11.1	8.9	166.77	166.77	-299.8	-103.1	175.3	161.4	13.90	12.612	
2,900.0	2,848.8	2,909.5	2,878.6	11.5	9.3	166.48	166.48	-316.6	-108.3	179.1	164.6	14.47	12.376	
3,000.0	2,946.6	3,009.4	2,977.0	12.0	9.7	166.21	166.21	-333.4	-113.6	182.9	167.9	15.05	12.157	
3,100.0	3,044.3	3,109.3	3,075.3	12.5	10.1	165.95	165.95	-350.2	-118.9	186.8	171.2	15.63	11.954	
3,200.0	3,142.1	3,209.2	3,173.7	12.9	10.5	165.70	165.70	-367.0	-124.1	190.6	174.4	16.21	11.763	
3,300.0	3,239.9	3,309.1	3,272.1	13.4	10.9	165.46	165.46	-383.8	-129.4	194.5	177.7	16.79	11.585	
3,400.0	3,337.7	3,409.1	3,370.4	13.9	11.3	165.22	165.22	-400.6	-134.6	198.4	181.0	17.37	11.418	
3,500.0	3,435.4	3,509.0	3,468.8	14.3	11.7	165.00	165.00	-417.4	-139.9	202.2	184.3	17.96	11.261	
3,600.0	3,533.2	3,608.9	3,567.1	14.8	12.1	164.79	164.79	-434.2	-145.2	206.1	187.5	18.54	11.113	
3,700.0	3,631.0	3,708.8	3,665.5	15.2	12.5	164.58	164.58	-451.0	-150.4	209.9	190.8	19.13	10.974	
3,800.0	3,728.7	3,808.8	3,763.9	15.7	12.9	164.38	164.38	-467.8	-155.7	213.8	194.1	19.72	10.843	
3,900.0	3,826.5	3,908.7	3,862.2	16.2	13.3	164.19	164.19	-484.6	-161.0	217.7	197.4	20.31	10.718	
4,000.0	3,924.3	4,008.6	3,960.6	16.6	13.7	164.00	164.00	-501.4	-166.2	221.6	200.7	20.90	10.600	
4,100.0	4,022.0	4,108.5	4,058.9	17.1	14.1	163.82	163.82	-518.2	-171.5	225.4	203.9	21.49	10.489	
4,200.0	4,119.8	4,208.4	4,157.3	17.5	14.5	163.65	163.65	-535.0	-176.8	229.3	207.2	22.09	10.383	
4,300.0	4,217.6	4,308.4	4,255.7	18.0	14.9	163.48	163.48	-551.8	-182.0	233.2	210.5	22.68	10.282	
4,400.0	4,315.4	4,408.3	4,354.0	18.5	15.3	163.32	163.32	-568.6	-187.3	237.1	213.8	23.28	10.186	
4,500.0	4,413.1	4,508.2	4,452.4	18.9	15.8	163.16	163.16	-585.4	-192.5	241.0	217.1	23.87	10.094	
4,600.0	4,510.9	4,608.1	4,550.7	19.4	16.2	163.01	163.01	-602.2	-197.8	244.8	220.4	24.47	10.006	
4,700.0	4,608.7	4,708.1	4,649.1	19.9	16.6	162.86	162.86	-619.0	-203.1	248.7	223.7	25.07	9.923	
4,800.0	4,706.4	4,808.0	4,747.4	20.3	17.0	162.72	162.72	-635.8	-208.3	252.6	227.0	25.66	9.843	
4,900.0	4,804.2	4,907.9	4,845.8	20.8	17.4	162.58	162.58	-652.6	-213.6	256.5	230.2	26.26	9.767	
5,000.0	4,902.0	5,007.8	4,944.2	21.2	17.8	162.45	162.45	-669.4	-218.9	260.4	233.5	26.86	9.693	

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 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	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)		
5,100.0	4,999.8	5,104.0	5,038.9	21.7	18.1	162.35	-685.2	-223.8	264.6	237.2	27.43	9.647	
5,200.0	5,097.5	5,195.9	5,129.8	22.2	18.4	162.48	-697.9	-227.8	271.4	243.5	27.90	9.729	
5,300.0	5,195.3	5,287.3	5,220.6	22.6	18.6	162.83	-707.8	-230.9	281.1	252.8	28.30	9.933	
5,400.0	5,293.1	5,378.0	5,311.0	23.1	18.7	163.38	-714.9	-233.1	293.8	265.1	28.66	10.251	
5,500.0	5,390.8	5,467.9	5,400.8	23.5	18.9	164.07	-719.2	-234.5	309.4	280.4	28.97	10.678	
5,600.0	5,488.6	5,556.8	5,489.7	24.0	19.0	164.88	-720.8	-235.0	327.9	298.6	29.27	11.204	
5,700.0	5,586.4	5,653.5	5,586.4	24.5	19.1	165.77	-720.9	-235.0	348.2	318.7	29.55	11.785	
5,712.3	5,598.4	5,665.5	5,598.4	24.5	19.1	165.87	-720.9	-235.0	350.7	321.1	29.58	11.855	
5,800.0	5,684.4	5,751.5	5,684.4	24.9	19.2	166.60	-720.9	-235.0	367.4	337.5	29.83	12.315	
5,900.0	5,783.1	5,850.2	5,783.1	25.1	19.4	167.23	-720.9	-235.0	383.2	353.1	30.08	12.738	
6,000.0	5,882.2	5,949.4	5,882.2	25.3	19.5	167.70	-720.9	-235.0	395.7	365.4	30.33	13.047	
6,100.0	5,981.8	6,048.9	5,981.8	25.5	19.6	168.02	-720.9	-235.0	404.9	374.3	30.57	13.246	
6,200.0	6,081.6	6,148.7	6,081.6	25.7	19.7	168.21	-720.9	-235.0	410.6	379.9	30.78	13.340	
6,300.0	6,181.6	6,248.7	6,181.6	25.8	19.8	168.29	-720.9	-235.0	413.0	382.0	30.98	13.332	
6,318.4	6,200.0	6,267.1	6,200.0	25.8	19.8	0.00	-720.9	-235.0	413.0	368.2	44.79	9.221	
6,400.0	6,281.6	6,348.7	6,281.6	25.9	19.9	0.00	-720.9	-235.0	413.0	368.1	44.98	9.182	
6,500.0	6,381.6	6,448.7	6,381.6	26.0	20.1	0.00	-720.9	-235.0	413.0	367.8	45.20	9.138	
6,600.0	6,481.6	6,548.7	6,481.6	26.1	20.2	0.00	-720.9	-235.0	413.0	367.6	45.42	9.094	
6,663.0	6,544.6	6,611.7	6,544.6	26.1	20.3	0.00	-720.9	-235.0	413.0	367.5	45.56	9.065	
6,700.0	6,581.6	6,648.7	6,581.6	26.2	20.3	0.01	-720.9	-234.9	413.0	367.4	45.65	9.049	
6,800.0	6,681.6	6,747.8	6,680.3	26.3	20.4	1.08	-720.8	-227.2	413.1	367.1	45.99	8.983	
6,855.7	6,737.3	6,801.7	6,733.3	26.3	20.5	2.41	-720.8	-217.6	413.5	367.2	46.24	8.942	
6,900.0	6,781.6	6,843.7	6,774.1	26.4	20.5	-87.26	-720.8	-207.6	414.0	381.7	32.32	12.811	
6,950.0	6,831.3	6,890.6	6,818.9	26.4	20.5	-85.85	-720.8	-193.8	414.9	382.7	32.27	12.857	
7,000.0	6,880.7	6,936.9	6,862.2	26.4	20.5	-84.47	-720.7	-177.4	416.1	383.9	32.24	12.907	
7,050.0	6,929.5	6,982.7	6,904.0	26.5	20.6	-83.13	-720.7	-158.7	417.6	385.4	32.23	12.958	
7,100.0	6,977.4	7,028.0	6,944.2	26.5	20.6	-81.83	-720.6	-137.8	419.3	387.1	32.24	13.006	
7,150.0	7,024.4	7,072.9	6,982.7	26.5	20.6	-80.57	-720.6	-114.8	421.2	389.0	32.28	13.049	
7,200.0	7,070.1	7,117.3	7,019.4	26.5	20.6	-79.36	-720.5	-89.8	423.3	391.0	32.35	13.086	
7,250.0	7,114.3	7,161.3	7,054.3	26.5	20.6	-78.21	-720.5	-62.9	425.6	393.1	32.46	13.113	
7,300.0	7,157.0	7,205.0	7,087.3	26.6	20.6	-77.12	-720.4	-34.4	428.0	395.4	32.60	13.128	
7,350.0	7,197.8	7,250.0	7,119.6	26.6	20.6	-76.05	-720.3	-3.0	430.4	397.6	32.79	13.128	
7,400.0	7,236.7	7,291.3	7,147.6	26.6	20.6	-75.11	-720.3	27.4	432.9	399.9	33.02	13.112	
7,450.0	7,273.4	7,334.1	7,174.7	26.6	20.6	-74.20	-720.2	60.4	435.4	402.1	33.31	13.072	
7,500.0	7,307.9	7,376.5	7,199.8	26.6	20.7	-73.36	-720.1	94.7	437.9	404.3	33.63	13.020	
7,550.0	7,339.9	7,418.7	7,222.8	26.7	20.7	-72.59	-720.0	130.0	440.4	406.4	34.05	12.934	
7,600.0	7,369.3	7,460.8	7,243.8	26.7	20.8	-71.89	-720.0	166.5	442.8	408.3	34.53	12.823	
7,650.0	7,396.0	7,500.0	7,261.5	26.8	20.9	-71.29	-719.9	201.5	445.1	410.1	35.06	12.695	
7,700.0	7,419.9	7,544.2	7,279.3	26.9	21.0	-70.70	-719.8	241.9	447.3	411.6	35.75	12.514	
7,750.0	7,440.9	7,585.7	7,293.8	27.0	21.3	-70.21	-719.7	280.8	449.4	412.9	36.50	12.313	
7,800.0	7,458.8	7,627.1	7,306.2	27.1	21.5	-69.79	-719.6	320.3	451.3	414.0	37.34	12.085	
7,850.0	7,473.7	7,668.4	7,316.4	27.3	21.9	-69.44	-719.5	360.3	453.1	414.8	38.29	11.833	
7,900.0	7,485.4	7,709.6	7,324.4	27.5	22.4	-69.17	-719.4	400.7	454.7	415.3	39.33	11.560	
7,950.0	7,493.9	7,750.0	7,330.1	27.8	23.0	-68.96	-719.3	440.7	456.0	415.6	40.46	11.272	
7,975.7	7,497.0	7,771.8	7,332.4	28.0	23.3	-68.88	-719.3	462.4	456.7	415.6	41.10	11.112	
8,000.0	7,499.6	7,791.8	7,333.8	28.2	23.6	-68.83	-719.2	482.3	457.3	415.5	41.84	10.930	
8,048.7	7,504.7	7,831.6	7,335.2	28.7	24.3	-68.54	-719.1	522.1	459.4	416.1	43.33	10.602	
8,100.0	7,508.9	7,879.9	7,335.0	29.3	25.2	-67.95	-719.0	570.4	461.8	417.1	44.71	10.330	
8,174.8	7,511.0	7,954.6	7,334.4	30.3	26.7	-67.59	-718.9	645.1	463.3	416.3	47.03	9.851	
8,200.0	7,510.9	7,979.9	7,334.2	30.6	27.2	-67.58	-718.8	670.4	463.4	415.4	48.01	9.651	
8,300.0	7,510.5	8,079.9	7,333.5	32.3	29.3	-67.56	-718.6	770.4	463.7	411.7	52.07	8.906	

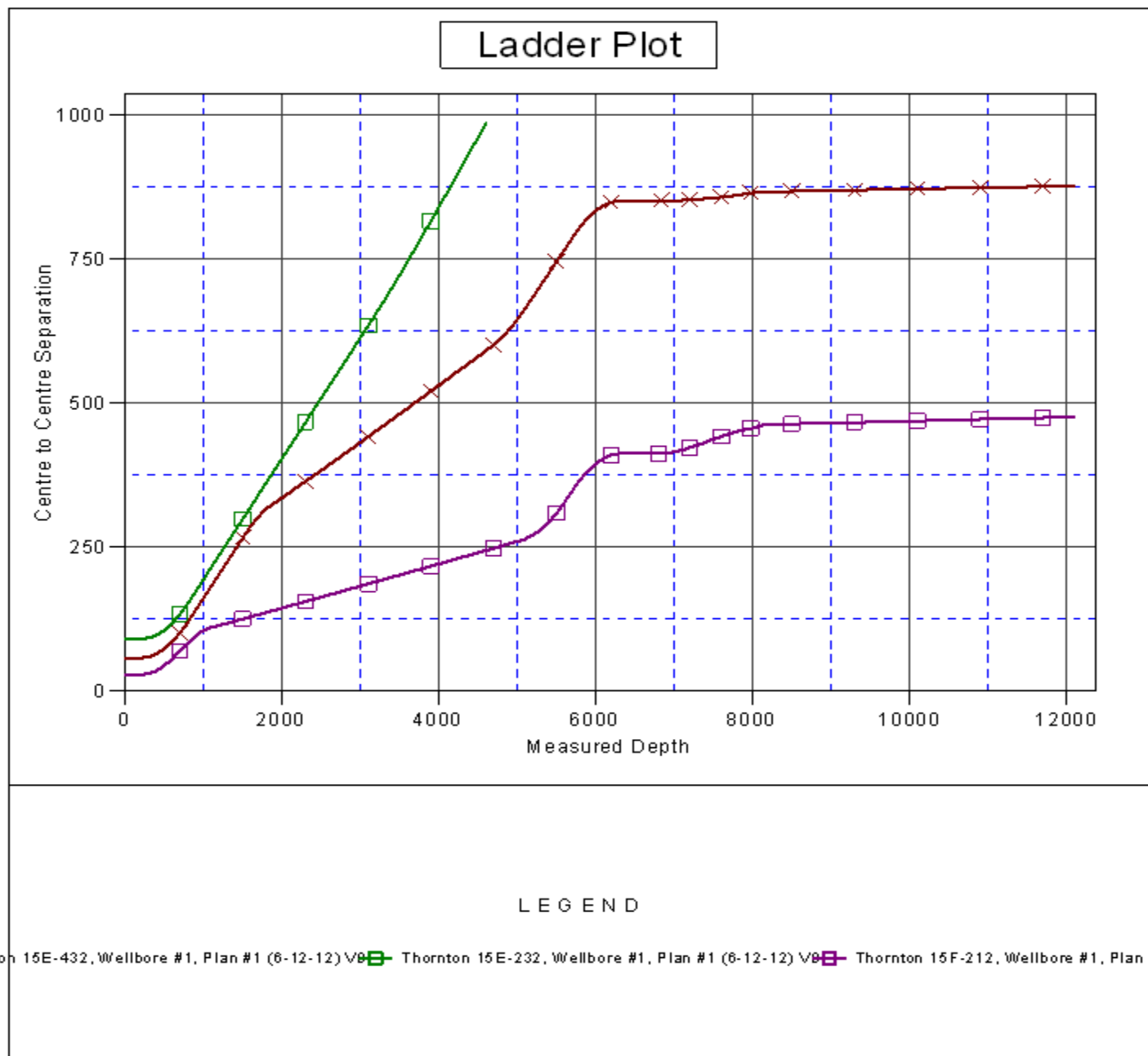
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	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		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)			
8,400.0	7,510.1	8,179.9	7,332.7	34.2	31.5	-67.53	-718.4	870.4	464.1	407.8	56.32	8.241	
8,500.0	7,509.7	8,279.9	7,332.0	36.2	33.9	-67.50	-718.1	970.4	464.4	403.7	60.71	7.650	
8,600.0	7,509.3	8,379.9	7,331.2	38.4	36.3	-67.47	-717.9	1,070.4	464.8	399.5	65.23	7.125	
8,700.0	7,508.9	8,479.9	7,330.5	40.7	38.7	-67.44	-717.7	1,170.3	465.1	395.3	69.83	6.660	
8,800.0	7,508.5	8,579.9	7,329.7	43.1	41.3	-67.41	-717.5	1,270.3	465.4	390.9	74.52	6.246	
8,900.0	7,508.1	8,679.9	7,329.0	45.5	43.8	-67.39	-717.2	1,370.3	465.8	386.5	79.27	5.876	
9,000.0	7,507.6	8,779.9	7,328.2	47.9	46.4	-67.36	-717.0	1,470.3	466.1	382.0	84.07	5.544	
9,100.0	7,507.2	8,879.9	7,327.5	50.5	49.0	-67.33	-716.8	1,570.3	466.5	377.5	88.92	5.246	
9,200.0	7,506.8	8,979.9	7,326.7	53.0	51.6	-67.30	-716.5	1,670.3	466.8	373.0	93.80	4.976	
9,300.0	7,506.4	9,079.9	7,326.0	55.6	54.2	-67.27	-716.3	1,770.3	467.1	368.4	98.72	4.732	
9,400.0	7,506.0	9,179.9	7,325.2	58.1	56.9	-67.25	-716.1	1,870.3	467.5	363.8	103.65	4.510	
9,500.0	7,505.6	9,279.9	7,324.5	60.8	59.5	-67.22	-715.9	1,970.3	467.8	359.2	108.62	4.307	
9,600.0	7,505.2	9,379.9	7,323.7	63.4	62.2	-67.19	-715.6	2,070.3	468.2	354.6	113.60	4.121	
9,700.0	7,504.8	9,479.9	7,323.0	66.0	64.9	-67.16	-715.4	2,170.3	468.5	349.9	118.59	3.951	
9,800.0	7,504.4	9,579.9	7,322.2	68.7	67.6	-67.14	-715.2	2,270.3	468.8	345.2	123.60	3.793	
9,900.0	7,504.0	9,679.9	7,321.5	71.4	70.3	-67.11	-715.0	2,370.3	469.2	340.6	128.62	3.648	
10,000.0	7,503.6	9,779.9	7,320.7	74.0	73.0	-67.08	-714.7	2,470.3	469.5	335.9	133.66	3.513	
10,100.0	7,503.2	9,879.9	7,320.0	76.7	75.8	-67.05	-714.5	2,570.3	469.9	331.2	138.70	3.388	
10,200.0	7,502.7	9,979.9	7,319.2	79.4	78.5	-67.02	-714.3	2,670.3	470.2	326.5	143.75	3.271	
10,300.0	7,502.3	10,079.8	7,318.5	82.1	81.2	-67.00	-714.1	2,770.3	470.6	321.7	148.81	3.162	
10,400.0	7,501.9	10,179.8	7,317.7	84.8	84.0	-66.97	-713.8	2,870.3	470.9	317.0	153.87	3.060	
10,500.0	7,501.5	10,279.8	7,317.0	87.6	86.7	-66.94	-713.6	2,970.3	471.2	312.3	158.94	2.965	
10,600.0	7,501.1	10,379.8	7,316.2	90.3	89.5	-66.91	-713.4	3,070.3	471.6	307.6	164.01	2.875	
10,700.0	7,500.7	10,479.8	7,315.5	93.0	92.2	-66.89	-713.2	3,170.3	471.9	302.8	169.09	2.791	
10,800.0	7,500.3	10,579.8	7,314.7	95.7	95.0	-66.86	-712.9	3,270.3	472.3	298.1	174.17	2.711	
10,900.0	7,499.9	10,679.8	7,314.0	98.5	97.7	-66.83	-712.7	3,370.3	472.6	293.3	179.26	2.636	
11,000.0	7,499.5	10,779.8	7,313.2	101.2	100.5	-66.80	-712.5	3,470.3	472.9	288.6	184.34	2.566	
11,100.0	7,499.1	10,879.8	7,312.5	104.0	103.2	-66.78	-712.2	3,570.3	473.3	283.9	189.43	2.498	
11,200.0	7,498.7	10,979.8	7,311.7	106.7	106.0	-66.75	-712.0	3,670.2	473.6	279.1	194.53	2.435	
11,300.0	7,498.3	11,079.8	7,311.0	109.5	108.8	-66.72	-711.8	3,770.2	474.0	274.4	199.62	2.374	
11,400.0	7,497.8	11,179.8	7,310.2	112.2	111.5	-66.70	-711.6	3,870.2	474.3	269.6	204.71	2.317	
11,500.0	7,497.4	11,279.8	7,309.5	115.0	114.3	-66.67	-711.3	3,970.2	474.7	264.9	209.81	2.262	
11,600.0	7,497.0	11,379.8	7,308.7	117.7	117.1	-66.64	-711.1	4,070.2	475.0	260.1	214.91	2.210	
11,700.0	7,496.6	11,479.8	7,308.0	120.5	119.9	-66.61	-710.9	4,170.2	475.3	255.3	220.00	2.161	
11,800.0	7,496.2	11,579.8	7,307.2	123.3	122.6	-66.59	-710.7	4,270.2	475.7	250.6	225.10	2.113	
11,900.0	7,495.8	11,679.8	7,306.5	126.0	125.4	-66.56	-710.4	4,370.2	476.0	245.8	230.20	2.068	
12,000.0	7,495.4	11,779.8	7,305.7	128.8	128.2	-66.53	-710.2	4,470.2	476.4	241.1	235.30	2.025	
12,096.9	7,495.0	11,873.6	7,305.0	131.5	130.8	-66.51	-710.0	4,563.9	476.7	236.6	240.16	1.985 SF	

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Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	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 (6-13-12)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4985.0ft (Original Well Elev) Coordinates are relative to: Thornton 15F-432
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 15F-432
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (Original Well Elev)
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-432	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
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Central Meridian is -105.500000 ° Grid Convergence at Surface is: 0.47°

