

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Thornton 15F-212**

Surface Location: Thornton Pad Sec.15-T7N-R66W

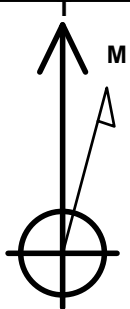
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

Ground Elevation: 4970.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1455539.74	3202071.31	40.581580	-104.772500	
RKB Ensign 32 - 15' WELL @ 4985.0ft (RKB Ensign 32 - 15')						

WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
HARDLINE BHL 460'FEL (3)	1.0	-900.0	4603.9	Polygon
HARDLINE SHL 460'FWL (3)	1.0	-900.0	175.0	Polygon
SECTION LINE 285'W OF SHL (3)	1.0	-900.0	-285.0	Polygon
BHL 1080'FNL, 500'FEL	7305.0	-739.1	4563.9	Point



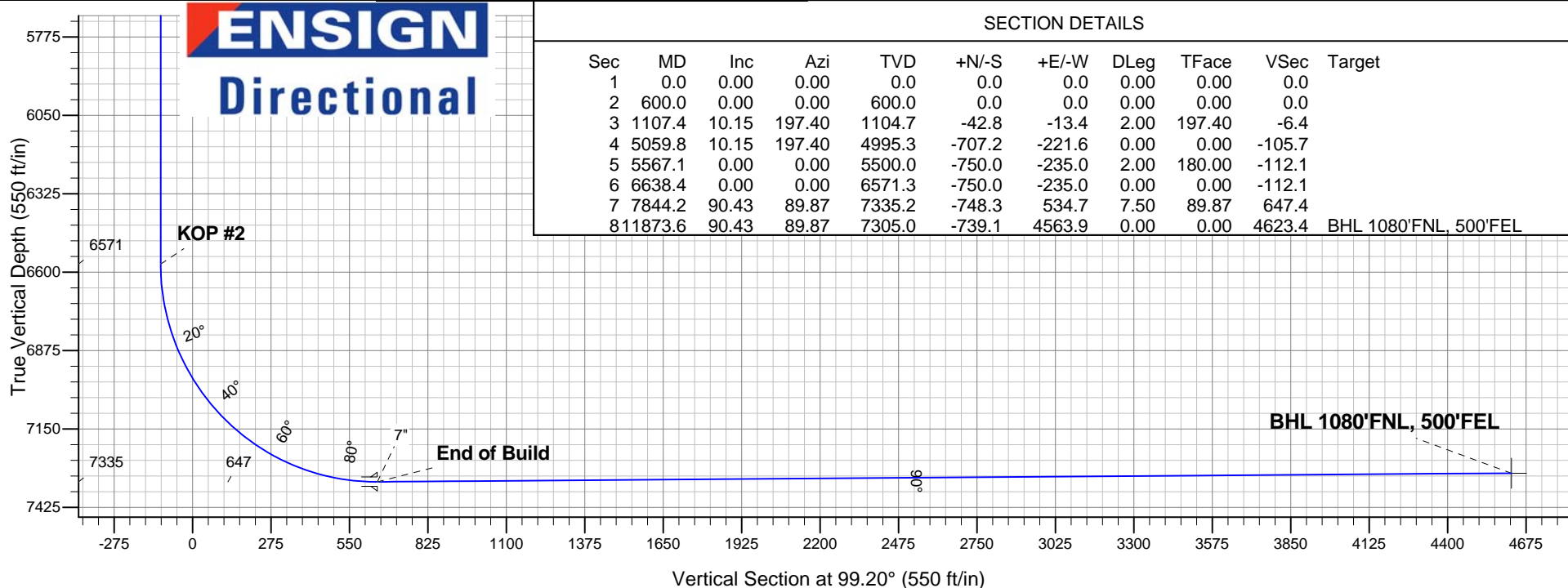
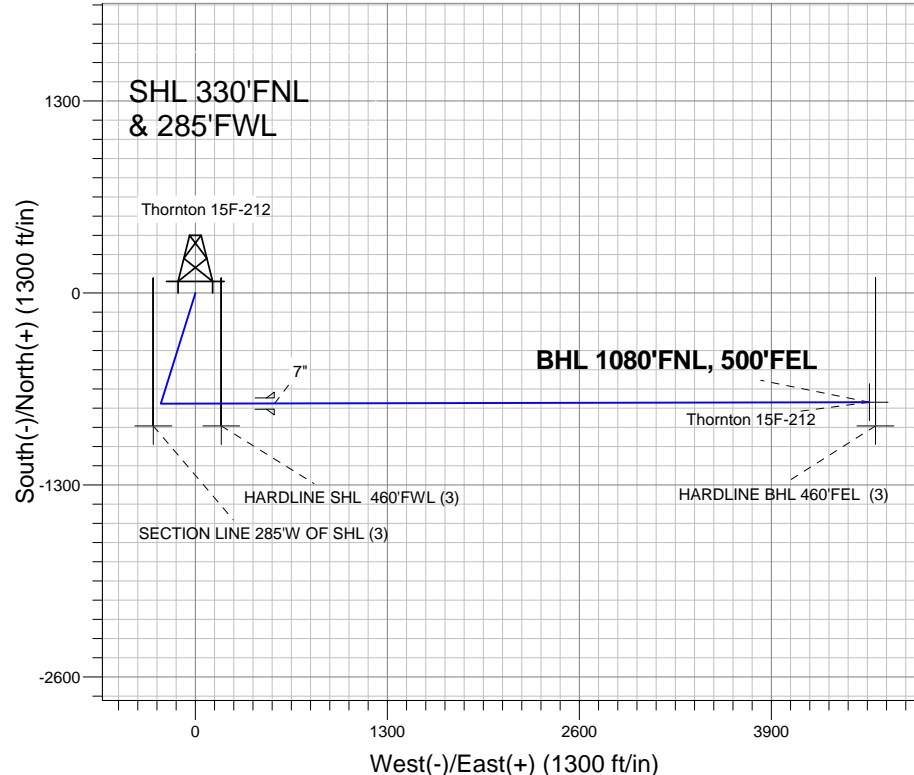
Azimuths to True North
Magnetic North: 8.75°

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

Thornton Pad Sec.15-T7N-R66W
Thornton 15F-212
Plan #1 (6-13-12)
11:14, June 27 2012

ANNOTATIONS

TVD	MD	Annotation
600.0	600.0	KOP #1
6571.3	6638.4	KOP #2
7335.2	7844.2	End of Build





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15F-212

Wellbore #1

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

Standard Planning Report

27 June, 2012

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-212
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-212	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:	1,455,601.69 ft	Latitude:	40.581750
From:	Lat/Long	Easting:	3,202,070.80 ft	Longitude:	-104.772500
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.47 °

Well	Thornton 15F-212					
Well Position	+N/-S	-62.0 ft	Northing:	1,455,539.74 ft	Latitude:	40.581580
	+E/-W	0.0 ft	Easting:	3,202,071.31 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	99.20

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	
600.0	0.00	0.00	600.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,107.4	10.15	197.40	1,104.7	-42.8	-13.4	2.00	2.00	0.00	197.40	
5,059.8	10.15	197.40	4,995.3	-707.2	-221.6	0.00	0.00	0.00	0.00	
5,567.1	0.00	0.00	5,500.0	-750.0	-235.0	2.00	-2.00	0.00	180.00	
6,638.4	0.00	0.00	6,571.3	-750.0	-235.0	0.00	0.00	0.00	0.00	
7,844.2	90.43	89.87	7,335.2	-748.3	534.7	7.50	7.50	0.00	89.87	
11,873.6	90.43	89.87	7,305.0	-739.1	4,563.9	0.00	0.00	0.00	0.00	BHL 1080°FNL, 500

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Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-212	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
SECTION LINE 285°W OF SHL (3) - HARDLINE BHL 460°FEL(3) - HARDLINE SHL 460°FWL (3)									
40.0	0.00	0.00	40.0	0.0	0.0	0.0	0.00	0.00	0.00
80.0	0.00	0.00	80.0	0.0	0.0	0.0	0.00	0.00	0.00
120.0	0.00	0.00	120.0	0.0	0.0	0.0	0.00	0.00	0.00
160.0	0.00	0.00	160.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
240.0	0.00	0.00	240.0	0.0	0.0	0.0	0.00	0.00	0.00
280.0	0.00	0.00	280.0	0.0	0.0	0.0	0.00	0.00	0.00
320.0	0.00	0.00	320.0	0.0	0.0	0.0	0.00	0.00	0.00
360.0	0.00	0.00	360.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
440.0	0.00	0.00	440.0	0.0	0.0	0.0	0.00	0.00	0.00
480.0	0.00	0.00	480.0	0.0	0.0	0.0	0.00	0.00	0.00
520.0	0.00	0.00	520.0	0.0	0.0	0.0	0.00	0.00	0.00
560.0	0.00	0.00	560.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
640.0	0.80	197.40	640.0	-0.3	-0.1	0.0	2.00	2.00	0.00
680.0	1.60	197.40	680.0	-1.1	-0.3	-0.2	2.00	2.00	0.00
720.0	2.40	197.40	720.0	-2.4	-0.8	-0.4	2.00	2.00	0.00
760.0	3.20	197.40	759.9	-4.3	-1.3	-0.6	2.00	2.00	0.00
800.0	4.00	197.40	799.8	-6.7	-2.1	-1.0	2.00	2.00	0.00
840.0	4.80	197.40	839.7	-9.6	-3.0	-1.4	2.00	2.00	0.00
880.0	5.60	197.40	879.6	-13.0	-4.1	-1.9	2.00	2.00	0.00
920.0	6.40	197.40	919.3	-17.0	-5.3	-2.5	2.00	2.00	0.00
960.0	7.20	197.40	959.1	-21.6	-6.8	-3.2	2.00	2.00	0.00
1,000.0	8.00	197.40	998.7	-26.6	-8.3	-4.0	2.00	2.00	0.00
1,040.0	8.80	197.40	1,038.3	-32.2	-10.1	-4.8	2.00	2.00	0.00
1,080.0	9.60	197.40	1,077.8	-38.3	-12.0	-5.7	2.00	2.00	0.00
1,107.4	10.15	197.40	1,104.7	-42.8	-13.4	-6.4	2.00	2.00	0.00
1,120.0	10.15	197.40	1,117.2	-44.9	-14.1	-6.7	0.00	0.00	0.00
1,160.0	10.15	197.40	1,156.5	-51.6	-16.2	-7.7	0.00	0.00	0.00
1,200.0	10.15	197.40	1,195.9	-58.3	-18.3	-8.7	0.00	0.00	0.00
1,240.0	10.15	197.40	1,235.3	-65.1	-20.4	-9.7	0.00	0.00	0.00
1,280.0	10.15	197.40	1,274.7	-71.8	-22.5	-10.7	0.00	0.00	0.00
1,320.0	10.15	197.40	1,314.0	-78.5	-24.6	-11.7	0.00	0.00	0.00
1,360.0	10.15	197.40	1,353.4	-85.2	-26.7	-12.7	0.00	0.00	0.00
1,400.0	10.15	197.40	1,392.8	-92.0	-28.8	-13.7	0.00	0.00	0.00
1,440.0	10.15	197.40	1,432.1	-98.7	-30.9	-14.7	0.00	0.00	0.00
1,480.0	10.15	197.40	1,471.5	-105.4	-33.0	-15.8	0.00	0.00	0.00
1,520.0	10.15	197.40	1,510.9	-112.1	-35.1	-16.8	0.00	0.00	0.00
1,560.0	10.15	197.40	1,550.3	-118.9	-37.2	-17.8	0.00	0.00	0.00
1,600.0	10.15	197.40	1,589.6	-125.6	-39.3	-18.8	0.00	0.00	0.00
1,640.0	10.15	197.40	1,629.0	-132.3	-41.5	-19.8	0.00	0.00	0.00
1,680.0	10.15	197.40	1,668.4	-139.0	-43.6	-20.8	0.00	0.00	0.00
1,720.0	10.15	197.40	1,707.8	-145.8	-45.7	-21.8	0.00	0.00	0.00
1,760.0	10.15	197.40	1,747.1	-152.5	-47.8	-22.8	0.00	0.00	0.00
1,800.0	10.15	197.40	1,786.5	-159.2	-49.9	-23.8	0.00	0.00	0.00
1,840.0	10.15	197.40	1,825.9	-165.9	-52.0	-24.8	0.00	0.00	0.00
1,880.0	10.15	197.40	1,865.3	-172.7	-54.1	-25.8	0.00	0.00	0.00
1,920.0	10.15	197.40	1,904.6	-179.4	-56.2	-26.8	0.00	0.00	0.00

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Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-212	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	10.15	197.40	1,944.0	-186.1	-58.3	-27.8	0.00	0.00	0.00
2,000.0	10.15	197.40	1,983.4	-192.8	-60.4	-28.8	0.00	0.00	0.00
2,040.0	10.15	197.40	2,022.8	-199.6	-62.5	-29.8	0.00	0.00	0.00
2,080.0	10.15	197.40	2,062.1	-206.3	-64.6	-30.8	0.00	0.00	0.00
2,120.0	10.15	197.40	2,101.5	-213.0	-66.7	-31.8	0.00	0.00	0.00
2,160.0	10.15	197.40	2,140.9	-219.7	-68.8	-32.8	0.00	0.00	0.00
2,200.0	10.15	197.40	2,180.3	-226.5	-71.0	-33.8	0.00	0.00	0.00
2,240.0	10.15	197.40	2,219.6	-233.2	-73.1	-34.8	0.00	0.00	0.00
2,280.0	10.15	197.40	2,259.0	-239.9	-75.2	-35.9	0.00	0.00	0.00
2,320.0	10.15	197.40	2,298.4	-246.6	-77.3	-36.9	0.00	0.00	0.00
2,360.0	10.15	197.40	2,337.8	-253.4	-79.4	-37.9	0.00	0.00	0.00
2,400.0	10.15	197.40	2,377.1	-260.1	-81.5	-38.9	0.00	0.00	0.00
2,440.0	10.15	197.40	2,416.5	-266.8	-83.6	-39.9	0.00	0.00	0.00
2,480.0	10.15	197.40	2,455.9	-273.5	-85.7	-40.9	0.00	0.00	0.00
2,520.0	10.15	197.40	2,495.3	-280.3	-87.8	-41.9	0.00	0.00	0.00
2,560.0	10.15	197.40	2,534.6	-287.0	-89.9	-42.9	0.00	0.00	0.00
2,600.0	10.15	197.40	2,574.0	-293.7	-92.0	-43.9	0.00	0.00	0.00
2,640.0	10.15	197.40	2,613.4	-300.4	-94.1	-44.9	0.00	0.00	0.00
2,680.0	10.15	197.40	2,652.8	-307.2	-96.2	-45.9	0.00	0.00	0.00
2,720.0	10.15	197.40	2,692.1	-313.9	-98.3	-46.9	0.00	0.00	0.00
2,760.0	10.15	197.40	2,731.5	-320.6	-100.5	-47.9	0.00	0.00	0.00
2,800.0	10.15	197.40	2,770.9	-327.3	-102.6	-48.9	0.00	0.00	0.00
2,840.0	10.15	197.40	2,810.2	-334.1	-104.7	-49.9	0.00	0.00	0.00
2,880.0	10.15	197.40	2,849.6	-340.8	-106.8	-50.9	0.00	0.00	0.00
2,920.0	10.15	197.40	2,889.0	-347.5	-108.9	-51.9	0.00	0.00	0.00
2,960.0	10.15	197.40	2,928.4	-354.2	-111.0	-52.9	0.00	0.00	0.00
3,000.0	10.15	197.40	2,967.7	-361.0	-113.1	-53.9	0.00	0.00	0.00
3,040.0	10.15	197.40	3,007.1	-367.7	-115.2	-54.9	0.00	0.00	0.00
3,080.0	10.15	197.40	3,046.5	-374.4	-117.3	-55.9	0.00	0.00	0.00
3,120.0	10.15	197.40	3,085.9	-381.1	-119.4	-57.0	0.00	0.00	0.00
3,160.0	10.15	197.40	3,125.2	-387.9	-121.5	-58.0	0.00	0.00	0.00
3,200.0	10.15	197.40	3,164.6	-394.6	-123.6	-59.0	0.00	0.00	0.00
3,240.0	10.15	197.40	3,204.0	-401.3	-125.7	-60.0	0.00	0.00	0.00
3,280.0	10.15	197.40	3,243.4	-408.0	-127.8	-61.0	0.00	0.00	0.00
3,320.0	10.15	197.40	3,282.7	-414.8	-130.0	-62.0	0.00	0.00	0.00
3,360.0	10.15	197.40	3,322.1	-421.5	-132.1	-63.0	0.00	0.00	0.00
3,400.0	10.15	197.40	3,361.5	-428.2	-134.2	-64.0	0.00	0.00	0.00
3,440.0	10.15	197.40	3,400.9	-434.9	-136.3	-65.0	0.00	0.00	0.00
3,480.0	10.15	197.40	3,440.2	-441.6	-138.4	-66.0	0.00	0.00	0.00
3,520.0	10.15	197.40	3,479.6	-448.4	-140.5	-67.0	0.00	0.00	0.00
3,560.0	10.15	197.40	3,519.0	-455.1	-142.6	-68.0	0.00	0.00	0.00
3,600.0	10.15	197.40	3,558.4	-461.8	-144.7	-69.0	0.00	0.00	0.00
3,640.0	10.15	197.40	3,597.7	-468.5	-146.8	-70.0	0.00	0.00	0.00
3,680.0	10.15	197.40	3,637.1	-475.3	-148.9	-71.0	0.00	0.00	0.00
3,720.0	10.15	197.40	3,676.5	-482.0	-151.0	-72.0	0.00	0.00	0.00
3,760.0	10.15	197.40	3,715.9	-488.7	-153.1	-73.0	0.00	0.00	0.00
3,800.0	10.15	197.40	3,755.2	-495.4	-155.2	-74.0	0.00	0.00	0.00
3,840.0	10.15	197.40	3,794.6	-502.2	-157.3	-75.0	0.00	0.00	0.00
3,880.0	10.15	197.40	3,834.0	-508.9	-159.5	-76.0	0.00	0.00	0.00
3,920.0	10.15	197.40	3,873.4	-515.6	-161.6	-77.1	0.00	0.00	0.00
3,960.0	10.15	197.40	3,912.7	-522.3	-163.7	-78.1	0.00	0.00	0.00
4,000.0	10.15	197.40	3,952.1	-529.1	-165.8	-79.1	0.00	0.00	0.00
4,040.0	10.15	197.40	3,991.5	-535.8	-167.9	-80.1	0.00	0.00	0.00

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Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-212	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	10.15	197.40	4,030.9	-542.5	-170.0	-81.1	0.00	0.00	0.00
4,120.0	10.15	197.40	4,070.2	-549.2	-172.1	-82.1	0.00	0.00	0.00
4,160.0	10.15	197.40	4,109.6	-556.0	-174.2	-83.1	0.00	0.00	0.00
4,200.0	10.15	197.40	4,149.0	-562.7	-176.3	-84.1	0.00	0.00	0.00
4,240.0	10.15	197.40	4,188.4	-569.4	-178.4	-85.1	0.00	0.00	0.00
4,280.0	10.15	197.40	4,227.7	-576.1	-180.5	-86.1	0.00	0.00	0.00
4,320.0	10.15	197.40	4,267.1	-582.9	-182.6	-87.1	0.00	0.00	0.00
4,360.0	10.15	197.40	4,306.5	-589.6	-184.7	-88.1	0.00	0.00	0.00
4,400.0	10.15	197.40	4,345.8	-596.3	-186.8	-89.1	0.00	0.00	0.00
4,440.0	10.15	197.40	4,385.2	-603.0	-189.0	-90.1	0.00	0.00	0.00
4,480.0	10.15	197.40	4,424.6	-609.8	-191.1	-91.1	0.00	0.00	0.00
4,520.0	10.15	197.40	4,464.0	-616.5	-193.2	-92.1	0.00	0.00	0.00
4,560.0	10.15	197.40	4,503.3	-623.2	-195.3	-93.1	0.00	0.00	0.00
4,600.0	10.15	197.40	4,542.7	-629.9	-197.4	-94.1	0.00	0.00	0.00
4,640.0	10.15	197.40	4,582.1	-636.7	-199.5	-95.1	0.00	0.00	0.00
4,680.0	10.15	197.40	4,621.5	-643.4	-201.6	-96.1	0.00	0.00	0.00
4,720.0	10.15	197.40	4,660.8	-650.1	-203.7	-97.2	0.00	0.00	0.00
4,760.0	10.15	197.40	4,700.2	-656.8	-205.8	-98.2	0.00	0.00	0.00
4,800.0	10.15	197.40	4,739.6	-663.6	-207.9	-99.2	0.00	0.00	0.00
4,840.0	10.15	197.40	4,779.0	-670.3	-210.0	-100.2	0.00	0.00	0.00
4,880.0	10.15	197.40	4,818.3	-677.0	-212.1	-101.2	0.00	0.00	0.00
4,920.0	10.15	197.40	4,857.7	-683.7	-214.2	-102.2	0.00	0.00	0.00
4,960.0	10.15	197.40	4,897.1	-690.5	-216.3	-103.2	0.00	0.00	0.00
5,000.0	10.15	197.40	4,936.5	-697.2	-218.5	-104.2	0.00	0.00	0.00
5,040.0	10.15	197.40	4,975.8	-703.9	-220.6	-105.2	0.00	0.00	0.00
5,059.8	10.15	197.40	4,995.3	-707.2	-221.6	-105.7	0.00	0.00	0.00
5,080.0	9.74	197.40	5,015.2	-710.6	-222.6	-106.2	2.00	-2.00	0.00
5,120.0	8.94	197.40	5,054.7	-716.8	-224.6	-107.1	2.00	-2.00	0.00
5,160.0	8.14	197.40	5,094.2	-722.4	-226.4	-108.0	2.00	-2.00	0.00
5,200.0	7.34	197.40	5,133.9	-727.6	-228.0	-108.7	2.00	-2.00	0.00
5,240.0	6.54	197.40	5,173.6	-732.2	-229.4	-109.4	2.00	-2.00	0.00
5,280.0	5.74	197.40	5,213.4	-736.3	-230.7	-110.0	2.00	-2.00	0.00
5,320.0	4.94	197.40	5,253.2	-739.8	-231.8	-110.6	2.00	-2.00	0.00
5,360.0	4.14	197.40	5,293.1	-742.9	-232.8	-111.0	2.00	-2.00	0.00
5,400.0	3.34	197.40	5,333.0	-745.3	-233.5	-111.4	2.00	-2.00	0.00
5,440.0	2.54	197.40	5,372.9	-747.3	-234.2	-111.7	2.00	-2.00	0.00
5,480.0	1.74	197.40	5,412.9	-748.7	-234.6	-111.9	2.00	-2.00	0.00
5,520.0	0.94	197.40	5,452.9	-749.6	-234.9	-112.0	2.00	-2.00	0.00
5,560.0	0.14	197.40	5,492.9	-750.0	-235.0	-112.1	2.00	-2.00	0.00
5,567.1	0.00	0.00	5,500.0	-750.0	-235.0	-112.1	2.00	-2.00	0.00
5,600.0	0.00	0.00	5,532.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,640.0	0.00	0.00	5,572.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,680.0	0.00	0.00	5,612.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,720.0	0.00	0.00	5,652.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,760.0	0.00	0.00	5,692.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,800.0	0.00	0.00	5,732.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,840.0	0.00	0.00	5,772.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,880.0	0.00	0.00	5,812.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,920.0	0.00	0.00	5,852.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
5,960.0	0.00	0.00	5,892.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,000.0	0.00	0.00	5,932.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,040.0	0.00	0.00	5,972.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,080.0	0.00	0.00	6,012.9	-750.0	-235.0	-112.1	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-212
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-212	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)
6,120.0	0.00	0.00	6,052.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,160.0	0.00	0.00	6,092.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,200.0	0.00	0.00	6,132.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,240.0	0.00	0.00	6,172.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,280.0	0.00	0.00	6,212.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,320.0	0.00	0.00	6,252.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,360.0	0.00	0.00	6,292.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,400.0	0.00	0.00	6,332.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,440.0	0.00	0.00	6,372.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,480.0	0.00	0.00	6,412.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,520.0	0.00	0.00	6,452.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,560.0	0.00	0.00	6,492.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,600.0	0.00	0.00	6,532.9	-750.0	-235.0	-112.1	0.00	0.00	0.00
6,638.4	0.00	0.00	6,571.3	-750.0	-235.0	-112.1	0.00	0.00	0.00
KOP #2									
6,640.0	0.12	89.87	6,572.9	-750.0	-235.0	-112.1	7.33	7.33	0.00
6,680.0	3.12	89.87	6,612.9	-750.0	-233.9	-111.0	7.50	7.50	0.00
6,720.0	6.12	89.87	6,652.7	-750.0	-230.6	-107.8	7.50	7.50	0.00
6,760.0	9.12	89.87	6,692.4	-750.0	-225.3	-102.6	7.50	7.50	0.00
6,800.0	12.12	89.87	6,731.7	-750.0	-218.0	-95.3	7.50	7.50	0.00
6,840.0	15.12	89.87	6,770.5	-749.9	-208.6	-86.0	7.50	7.50	0.00
6,880.0	18.12	89.87	6,808.9	-749.9	-197.1	-74.7	7.50	7.50	0.00
6,920.0	21.12	89.87	6,846.5	-749.9	-183.7	-61.5	7.50	7.50	0.00
6,960.0	24.12	89.87	6,883.5	-749.8	-168.3	-46.3	7.50	7.50	0.00
7,000.0	27.12	89.87	6,919.5	-749.8	-151.0	-29.2	7.50	7.50	0.00
7,040.0	30.12	89.87	6,954.6	-749.8	-131.9	-10.3	7.50	7.50	0.00
7,080.0	33.12	89.87	6,988.7	-749.7	-110.9	10.4	7.50	7.50	0.00
7,120.0	36.12	89.87	7,021.6	-749.7	-88.2	32.8	7.50	7.50	0.00
7,160.0	39.12	89.87	7,053.3	-749.6	-63.8	56.9	7.50	7.50	0.00
7,200.0	42.12	89.87	7,083.7	-749.6	-37.7	82.6	7.50	7.50	0.00
7,240.0	45.12	89.87	7,112.6	-749.5	-10.1	109.8	7.50	7.50	0.00
7,280.0	48.12	89.87	7,140.1	-749.4	18.9	138.5	7.50	7.50	0.00
7,320.0	51.12	89.87	7,166.0	-749.4	49.4	168.6	7.50	7.50	0.00
7,360.0	54.12	89.87	7,190.3	-749.3	81.2	199.9	7.50	7.50	0.00
7,400.0	57.12	89.87	7,212.9	-749.2	114.2	232.5	7.50	7.50	0.00
7,440.0	60.12	89.87	7,233.7	-749.1	148.3	266.2	7.50	7.50	0.00
7,480.0	63.12	89.87	7,252.7	-749.1	183.5	300.9	7.50	7.50	0.00
7,520.0	66.12	89.87	7,269.8	-749.0	219.6	336.6	7.50	7.50	0.00
7,560.0	69.12	89.87	7,285.1	-748.9	256.6	373.1	7.50	7.50	0.00
7,600.0	72.12	89.87	7,298.4	-748.8	294.4	410.3	7.50	7.50	0.00
7,640.0	75.12	89.87	7,309.6	-748.7	332.7	448.1	7.50	7.50	0.00
7,680.0	78.12	89.87	7,318.9	-748.6	371.6	486.5	7.50	7.50	0.00
7,720.0	81.12	89.87	7,326.1	-748.5	411.0	525.4	7.50	7.50	0.00
7,760.0	84.12	89.87	7,331.2	-748.4	450.6	564.5	7.50	7.50	0.00
7,800.0	87.12	89.87	7,334.3	-748.4	490.5	603.9	7.50	7.50	0.00
7,840.0	90.12	89.87	7,335.3	-748.3	530.5	643.3	7.50	7.50	0.00
7,844.2	90.43	89.87	7,335.2	-748.3	534.7	647.5	7.45	7.45	0.00
End of Build - 7"									
7,880.0	90.43	89.87	7,335.0	-748.2	570.5	682.8	0.00	0.00	0.00
7,920.0	90.43	89.87	7,334.7	-748.1	610.5	722.2	0.00	0.00	0.00
7,960.0	90.43	89.87	7,334.4	-748.0	650.5	761.7	0.00	0.00	0.00
8,000.0	90.43	89.87	7,334.1	-747.9	690.5	801.2	0.00	0.00	0.00
8,040.0	90.43	89.87	7,333.8	-747.8	730.5	840.7	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-212
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-212	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)
8,080.0	90.43	89.87	7,333.5	-747.7	770.5	880.1	0.00	0.00	0.00
8,120.0	90.43	89.87	7,333.2	-747.6	810.5	919.6	0.00	0.00	0.00
8,160.0	90.43	89.87	7,332.9	-747.5	850.5	959.1	0.00	0.00	0.00
8,200.0	90.43	89.87	7,332.6	-747.5	890.5	998.5	0.00	0.00	0.00
8,240.0	90.43	89.87	7,332.3	-747.4	930.5	1,038.0	0.00	0.00	0.00
8,280.0	90.43	89.87	7,332.0	-747.3	970.5	1,077.5	0.00	0.00	0.00
8,320.0	90.43	89.87	7,331.7	-747.2	1,010.5	1,116.9	0.00	0.00	0.00
8,360.0	90.43	89.87	7,331.4	-747.1	1,050.5	1,156.4	0.00	0.00	0.00
8,400.0	90.43	89.87	7,331.1	-747.0	1,090.5	1,195.9	0.00	0.00	0.00
8,440.0	90.43	89.87	7,330.8	-746.9	1,130.5	1,235.4	0.00	0.00	0.00
8,480.0	90.43	89.87	7,330.5	-746.8	1,170.5	1,274.8	0.00	0.00	0.00
8,520.0	90.43	89.87	7,330.2	-746.7	1,210.5	1,314.3	0.00	0.00	0.00
8,560.0	90.43	89.87	7,329.9	-746.6	1,250.5	1,353.8	0.00	0.00	0.00
8,600.0	90.43	89.87	7,329.6	-746.5	1,290.5	1,393.2	0.00	0.00	0.00
8,640.0	90.43	89.87	7,329.3	-746.5	1,330.5	1,432.7	0.00	0.00	0.00
8,680.0	90.43	89.87	7,329.0	-746.4	1,370.5	1,472.2	0.00	0.00	0.00
8,720.0	90.43	89.87	7,328.7	-746.3	1,410.5	1,511.6	0.00	0.00	0.00
8,760.0	90.43	89.87	7,328.4	-746.2	1,450.5	1,551.1	0.00	0.00	0.00
8,800.0	90.43	89.87	7,328.1	-746.1	1,490.5	1,590.6	0.00	0.00	0.00
8,840.0	90.43	89.87	7,327.8	-746.0	1,530.5	1,630.1	0.00	0.00	0.00
8,880.0	90.43	89.87	7,327.5	-745.9	1,570.5	1,669.5	0.00	0.00	0.00
8,920.0	90.43	89.87	7,327.2	-745.8	1,610.5	1,709.0	0.00	0.00	0.00
8,960.0	90.43	89.87	7,326.9	-745.7	1,650.5	1,748.5	0.00	0.00	0.00
9,000.0	90.43	89.87	7,326.6	-745.6	1,690.5	1,787.9	0.00	0.00	0.00
9,040.0	90.43	89.87	7,326.3	-745.6	1,730.5	1,827.4	0.00	0.00	0.00
9,080.0	90.43	89.87	7,326.0	-745.5	1,770.5	1,866.9	0.00	0.00	0.00
9,120.0	90.43	89.87	7,325.7	-745.4	1,810.5	1,906.3	0.00	0.00	0.00
9,160.0	90.43	89.87	7,325.4	-745.3	1,850.5	1,945.8	0.00	0.00	0.00
9,200.0	90.43	89.87	7,325.1	-745.2	1,890.5	1,985.3	0.00	0.00	0.00
9,240.0	90.43	89.87	7,324.8	-745.1	1,930.5	2,024.8	0.00	0.00	0.00
9,280.0	90.43	89.87	7,324.5	-745.0	1,970.5	2,064.2	0.00	0.00	0.00
9,320.0	90.43	89.87	7,324.2	-744.9	2,010.5	2,103.7	0.00	0.00	0.00
9,360.0	90.43	89.87	7,323.9	-744.8	2,050.5	2,143.2	0.00	0.00	0.00
9,400.0	90.43	89.87	7,323.6	-744.7	2,090.5	2,182.6	0.00	0.00	0.00
9,440.0	90.43	89.87	7,323.3	-744.6	2,130.5	2,222.1	0.00	0.00	0.00
9,480.0	90.43	89.87	7,323.0	-744.6	2,170.5	2,261.6	0.00	0.00	0.00
9,520.0	90.43	89.87	7,322.7	-744.5	2,210.5	2,301.0	0.00	0.00	0.00
9,560.0	90.43	89.87	7,322.4	-744.4	2,250.5	2,340.5	0.00	0.00	0.00
9,600.0	90.43	89.87	7,322.1	-744.3	2,290.5	2,380.0	0.00	0.00	0.00
9,640.0	90.43	89.87	7,321.8	-744.2	2,330.4	2,419.4	0.00	0.00	0.00
9,680.0	90.43	89.87	7,321.5	-744.1	2,370.4	2,458.9	0.00	0.00	0.00
9,720.0	90.43	89.87	7,321.2	-744.0	2,410.4	2,498.4	0.00	0.00	0.00
9,760.0	90.43	89.87	7,320.9	-743.9	2,450.4	2,537.9	0.00	0.00	0.00
9,800.0	90.43	89.87	7,320.6	-743.8	2,490.4	2,577.3	0.00	0.00	0.00
9,840.0	90.43	89.87	7,320.3	-743.7	2,530.4	2,616.8	0.00	0.00	0.00
9,880.0	90.43	89.87	7,320.0	-743.6	2,570.4	2,656.3	0.00	0.00	0.00
9,920.0	90.43	89.87	7,319.7	-743.6	2,610.4	2,695.7	0.00	0.00	0.00
9,960.0	90.43	89.87	7,319.4	-743.5	2,650.4	2,735.2	0.00	0.00	0.00
10,000.0	90.43	89.87	7,319.1	-743.4	2,690.4	2,774.7	0.00	0.00	0.00
10,040.0	90.43	89.87	7,318.8	-743.3	2,730.4	2,814.1	0.00	0.00	0.00
10,080.0	90.43	89.87	7,318.5	-743.2	2,770.4	2,853.6	0.00	0.00	0.00
10,120.0	90.43	89.87	7,318.2	-743.1	2,810.4	2,893.1	0.00	0.00	0.00
10,160.0	90.43	89.87	7,317.9	-743.0	2,850.4	2,932.6	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-212
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-212	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)
10,200.0	90.43	89.87	7,317.6	-742.9	2,890.4	2,972.0	0.00	0.00	0.00
10,240.0	90.43	89.87	7,317.3	-742.8	2,930.4	3,011.5	0.00	0.00	0.00
10,280.0	90.43	89.87	7,317.0	-742.7	2,970.4	3,051.0	0.00	0.00	0.00
10,320.0	90.43	89.87	7,316.7	-742.7	3,010.4	3,090.4	0.00	0.00	0.00
10,360.0	90.43	89.87	7,316.4	-742.6	3,050.4	3,129.9	0.00	0.00	0.00
10,400.0	90.43	89.87	7,316.1	-742.5	3,090.4	3,169.4	0.00	0.00	0.00
10,440.0	90.43	89.87	7,315.8	-742.4	3,130.4	3,208.8	0.00	0.00	0.00
10,480.0	90.43	89.87	7,315.5	-742.3	3,170.4	3,248.3	0.00	0.00	0.00
10,520.0	90.43	89.87	7,315.2	-742.2	3,210.4	3,287.8	0.00	0.00	0.00
10,560.0	90.43	89.87	7,314.9	-742.1	3,250.4	3,327.3	0.00	0.00	0.00
10,600.0	90.43	89.87	7,314.6	-742.0	3,290.4	3,366.7	0.00	0.00	0.00
10,640.0	90.43	89.87	7,314.3	-741.9	3,330.4	3,406.2	0.00	0.00	0.00
10,680.0	90.43	89.87	7,314.0	-741.8	3,370.4	3,445.7	0.00	0.00	0.00
10,720.0	90.43	89.87	7,313.7	-741.7	3,410.4	3,485.1	0.00	0.00	0.00
10,760.0	90.43	89.87	7,313.4	-741.7	3,450.4	3,524.6	0.00	0.00	0.00
10,800.0	90.43	89.87	7,313.1	-741.6	3,490.4	3,564.1	0.00	0.00	0.00
10,840.0	90.43	89.87	7,312.8	-741.5	3,530.4	3,603.5	0.00	0.00	0.00
10,880.0	90.43	89.87	7,312.5	-741.4	3,570.4	3,643.0	0.00	0.00	0.00
10,920.0	90.43	89.87	7,312.2	-741.3	3,610.4	3,682.5	0.00	0.00	0.00
10,960.0	90.43	89.87	7,311.9	-741.2	3,650.4	3,722.0	0.00	0.00	0.00
11,000.0	90.43	89.87	7,311.6	-741.1	3,690.4	3,761.4	0.00	0.00	0.00
11,040.0	90.43	89.87	7,311.3	-741.0	3,730.4	3,800.9	0.00	0.00	0.00
11,080.0	90.43	89.87	7,311.0	-740.9	3,770.4	3,840.4	0.00	0.00	0.00
11,120.0	90.43	89.87	7,310.7	-740.8	3,810.4	3,879.8	0.00	0.00	0.00
11,160.0	90.43	89.87	7,310.4	-740.8	3,850.4	3,919.3	0.00	0.00	0.00
11,200.0	90.43	89.87	7,310.1	-740.7	3,890.4	3,958.8	0.00	0.00	0.00
11,240.0	90.43	89.87	7,309.8	-740.6	3,930.4	3,998.2	0.00	0.00	0.00
11,280.0	90.43	89.87	7,309.5	-740.5	3,970.4	4,037.7	0.00	0.00	0.00
11,320.0	90.43	89.87	7,309.2	-740.4	4,010.4	4,077.2	0.00	0.00	0.00
11,360.0	90.43	89.87	7,308.9	-740.3	4,050.4	4,116.7	0.00	0.00	0.00
11,400.0	90.43	89.87	7,308.6	-740.2	4,090.4	4,156.1	0.00	0.00	0.00
11,440.0	90.43	89.87	7,308.3	-740.1	4,130.4	4,195.6	0.00	0.00	0.00
11,480.0	90.43	89.87	7,308.0	-740.0	4,170.4	4,235.1	0.00	0.00	0.00
11,520.0	90.43	89.87	7,307.7	-739.9	4,210.4	4,274.5	0.00	0.00	0.00
11,560.0	90.43	89.87	7,307.4	-739.8	4,250.4	4,314.0	0.00	0.00	0.00
11,600.0	90.43	89.87	7,307.1	-739.8	4,290.4	4,353.5	0.00	0.00	0.00
11,640.0	90.43	89.87	7,306.8	-739.7	4,330.4	4,392.9	0.00	0.00	0.00
11,680.0	90.43	89.87	7,306.5	-739.6	4,370.4	4,432.4	0.00	0.00	0.00
11,720.0	90.43	89.87	7,306.2	-739.5	4,410.4	4,471.9	0.00	0.00	0.00
11,760.0	90.43	89.87	7,305.9	-739.4	4,450.4	4,511.4	0.00	0.00	0.00
11,800.0	90.43	89.87	7,305.6	-739.3	4,490.4	4,550.8	0.00	0.00	0.00
11,840.0	90.43	89.87	7,305.3	-739.2	4,530.4	4,590.3	0.00	0.00	0.00
11,873.6	90.43	89.87	7,305.0	-739.1	4,563.9	4,623.4	0.00	0.00	0.00
BHL 1080'FNL, 500'FEL									

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15F-212
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15F-212	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-13-12)		

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
SECTION LINE 285'W	0.00	0.00	1.0	-900.0	-285.0	1,454,637.46	3,201,793.71	40.579110	-104.773526
- plan misses target center by 944.0ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,454,637.46	3,201,793.71		
Point 2			1.0	1,000.0	0.0	1,455,637.40	3,201,785.51		
HARDLINE BHL 460'F	0.00	0.00	1.0	-2,205.8	4,603.9	1,453,371.87	3,206,693.02	40.575524	-104.755927
- plan misses target center by 5105.0ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,453,371.87	3,206,693.02		
Point 2			1.0	700.0	0.0	1,454,071.83	3,206,687.28		
BHL 1080'FNL, 500'FI	0.00	0.00	7,305.0	-739.1	4,563.9	1,454,838.09	3,206,641.03	40.579550	-104.756070
- plan hits target center									
- Point									
HARDLINE SHL 460'	0.00	0.00	1.0	-900.0	175.0	1,454,641.24	3,202,253.68	40.579110	-104.771870
- plan misses target center by 916.9ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,454,641.24	3,202,253.68		
Point 2			1.0	1,000.0	0.0	1,455,641.17	3,202,245.48		

Casing Points					
Measured Depth	Vertical Depth	Name		Casing Diameter	Hole Diameter
(ft)	(ft)			(")	(")
7,844.2	7,335.2	7"		7	7-1/2

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S	+E/-W	
(ft)	(ft)	(ft)	(ft)	
600.0	600.0	0.0	0.0	KOP #1
6,638.4	6,571.3	-750.0	-235.0	KOP #2
7,844.2	7,335.2	-748.3	534.7	End of Build



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15F-212

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-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	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	11,873.6	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)	Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Thornton Pad Sec.15-T7N-R66W						
Thornton 15E-432 - Wellbore #1 - Plan #1 (6-12-12)	600.0	600.0	29.1	26.7	11.788	CC, ES
Thornton 15E-432 - Wellbore #1 - Plan #1 (6-12-12)	11,873.6	11,990.5	480.1	238.0	1.983	SF
Thornton 15F-432 - Wellbore #1 - Plan #1 (6-13-12)	200.0	200.0	29.1	28.5	43.212	CC, ES
Thornton 15F-432 - Wellbore #1 - Plan #1 (6-13-12)	11,873.6	12,092.1	476.7	236.7	1.987	SF

Offset Design Thornton Pad Sec.15-T7N-R66W - Thornton 15E-432 - Wellbore #1 - Plan #1 (6-12-12)												
Survey Program: 0-MWD												
Reference	Offset	Semi Major Axis			Distance							
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor
0.0	0.0	0.0	0.0	0.0	0.0	0.00	29.1	0.0	29.1			
100.0	100.0	100.0	100.0	0.1	0.1	0.00	29.1	0.0	29.1	28.9	0.22	129.672
200.0	200.0	200.0	200.0	0.3	0.3	0.00	29.1	0.0	29.1	28.5	0.67	43.224
300.0	300.0	300.0	300.0	0.6	0.6	0.00	29.1	0.0	29.1	28.0	1.12	25.934
400.0	400.0	400.0	400.0	0.8	0.8	0.00	29.1	0.0	29.1	27.6	1.57	18.525
500.0	500.0	500.0	500.0	1.0	1.0	0.00	29.1	0.0	29.1	27.1	2.02	14.408
600.0	600.0	600.0	600.0	1.2	1.2	0.00	29.1	0.0	29.1	26.7	2.47	11.788 CC, ES
700.0	700.0	700.0	700.0	1.4	1.5	163.56	29.1	0.0	30.8	27.9	2.90	10.639
800.0	799.8	799.8	799.8	1.6	1.7	165.90	29.1	0.0	35.9	32.6	3.30	10.854
900.0	899.5	899.5	899.5	1.8	1.9	168.61	29.1	0.0	44.4	40.6	3.72	11.925
1,000.0	998.7	998.7	998.7	2.1	2.1	171.02	29.1	0.0	56.4	52.2	4.14	13.608
1,107.4	1,104.7	1,104.7	1,104.7	2.4	2.4	173.05	29.1	0.0	73.1	68.5	4.60	15.907
1,200.0	1,195.9	1,195.9	1,195.9	2.7	2.6	174.32	29.1	0.0	89.4	84.4	5.00	17.860
1,300.0	1,294.3	1,294.3	1,294.3	3.0	2.8	175.25	29.1	0.0	106.9	101.5	5.45	19.626
1,400.0	1,392.8	1,392.8	1,392.8	3.4	3.0	175.92	29.1	0.0	124.5	118.6	5.90	21.110
1,500.0	1,491.2	1,491.2	1,491.2	3.7	3.2	176.43	29.1	0.0	142.1	135.7	6.35	22.372
1,600.0	1,589.6	1,594.6	1,594.5	4.1	3.4	176.64	27.9	-0.9	158.3	151.5	6.79	23.307
1,700.0	1,688.1	1,699.4	1,699.2	4.5	3.6	176.37	23.4	-3.9	171.1	163.9	7.21	23.724
1,800.0	1,786.5	1,804.9	1,804.4	4.9	3.8	175.69	15.8	-9.2	180.6	172.9	7.65	23.605
1,900.0	1,885.0	1,909.0	1,907.6	5.3	4.1	174.68	5.3	-16.5	186.8	178.7	8.10	23.068
2,000.0	1,983.4	2,008.8	2,006.5	5.7	4.3	173.66	-5.5	-23.9	192.3	183.7	8.55	22.484
2,100.0	2,081.8	2,108.6	2,105.5	6.1	4.5	172.71	-16.2	-31.4	197.9	188.8	9.02	21.941

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-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	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
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)					
2,200.0	2,180.3	2,208.4	2,204.4	6.4	4.8	171.80	-27.0	-38.8	203.5	194.0	9.49	21.434			
2,300.0	2,278.7	2,308.1	2,303.3	6.8	5.0	170.95	-37.8	-46.3	209.1	199.2	9.98	20.965			
2,400.0	2,377.1	2,407.9	2,402.3	7.2	5.3	170.14	-48.5	-53.7	214.8	204.4	10.47	20.525			
2,500.0	2,475.6	2,507.7	2,501.2	7.6	5.6	169.37	-59.3	-61.1	220.6	209.6	10.97	20.115			
2,600.0	2,574.0	2,607.5	2,600.1	8.0	5.9	168.64	-70.1	-68.6	226.4	214.9	11.47	19.732			
2,700.0	2,672.4	2,707.3	2,699.0	8.4	6.2	167.95	-80.9	-76.0	232.2	220.2	11.98	19.373			
2,800.0	2,770.9	2,807.1	2,798.0	8.8	6.5	167.29	-91.6	-83.5	238.0	225.5	12.50	19.037			
2,900.0	2,869.3	2,906.9	2,896.9	9.2	6.8	166.67	-102.4	-90.9	243.9	230.9	13.03	18.721			
3,000.0	2,967.7	3,006.7	2,995.8	9.7	7.1	166.07	-113.2	-98.4	249.8	236.2	13.56	18.425			
3,100.0	3,066.2	3,106.5	3,094.8	10.1	7.4	165.50	-124.0	-105.8	255.7	241.6	14.09	18.147			
3,200.0	3,164.6	3,206.3	3,193.7	10.5	7.7	164.96	-134.7	-113.3	261.7	247.0	14.63	17.884			
3,300.0	3,263.1	3,306.1	3,292.6	10.9	8.0	164.44	-145.5	-120.7	267.7	252.5	15.18	17.637			
3,400.0	3,361.5	3,405.9	3,391.6	11.3	8.3	163.94	-156.3	-128.2	273.7	257.9	15.72	17.404			
3,500.0	3,459.9	3,505.7	3,490.5	11.7	8.6	163.46	-167.0	-135.6	279.7	263.4	16.28	17.184			
3,600.0	3,558.4	3,605.4	3,589.4	12.1	8.9	163.01	-177.8	-143.0	285.7	268.9	16.83	16.975			
3,700.0	3,656.8	3,705.2	3,688.3	12.5	9.3	162.57	-188.6	-150.5	291.8	274.4	17.39	16.778			
3,800.0	3,755.2	3,805.0	3,787.3	12.9	9.6	162.15	-199.4	-157.9	297.8	279.9	17.95	16.590			
3,900.0	3,853.7	3,904.8	3,886.2	13.3	9.9	161.75	-210.1	-165.4	303.9	285.4	18.52	16.413			
4,000.0	3,952.1	4,004.6	3,985.1	13.7	10.2	161.37	-220.9	-172.8	310.0	290.9	19.08	16.244			
4,100.0	4,050.5	4,104.4	4,084.1	14.1	10.6	160.99	-231.7	-180.3	316.1	296.5	19.66	16.084			
4,200.0	4,149.0	4,204.2	4,183.0	14.5	10.9	160.64	-242.4	-187.7	322.3	302.0	20.23	15.931			
4,300.0	4,247.4	4,304.0	4,281.9	14.9	11.2	160.29	-253.2	-195.2	328.4	307.6	20.80	15.785			
4,400.0	4,345.8	4,403.8	4,380.8	15.3	11.5	159.96	-264.0	-202.6	334.5	313.2	21.38	15.647			
4,500.0	4,444.3	4,503.6	4,479.8	15.7	11.9	159.64	-274.8	-210.1	340.7	318.7	21.96	15.514			
4,600.0	4,542.7	4,603.4	4,578.7	16.1	12.2	159.34	-285.5	-217.5	346.9	324.3	22.54	15.388			
4,700.0	4,641.2	4,700.0	4,674.6	16.5	12.5	159.09	-295.6	-224.5	353.4	330.3	23.10	15.301			
4,800.0	4,739.6	4,789.1	4,763.2	16.9	12.7	159.13	-302.8	-229.4	362.2	338.6	23.56	15.370			
4,900.0	4,838.0	4,879.3	4,853.2	17.3	12.9	159.43	-307.8	-232.9	373.5	349.5	23.99	15.565			
5,000.0	4,936.5	4,968.8	4,942.6	17.8	13.0	159.97	-310.4	-234.7	387.2	362.8	24.38	15.883			
5,059.8	4,995.3	5,021.9	4,995.8	18.0	13.1	160.39	-310.9	-235.0	396.6	372.0	24.60	16.125			
5,100.0	5,034.9	5,061.1	5,034.9	18.1	13.2	160.75	-310.9	-235.0	403.0	378.3	24.74	16.291			
5,200.0	5,133.9	5,160.0	5,133.9	18.4	13.3	161.50	-310.9	-235.0	416.8	391.7	25.07	16.625			
5,300.0	5,233.3	5,259.4	5,233.3	18.6	13.5	162.03	-310.9	-235.0	427.3	401.9	25.39	16.829			
5,400.0	5,333.0	5,359.1	5,333.0	18.8	13.7	162.38	-310.9	-235.0	434.5	408.8	25.70	16.906			
5,500.0	5,432.9	5,459.0	5,432.9	18.9	13.8	162.57	-310.9	-235.0	438.4	412.4	26.00	16.864			
5,567.1	5,500.0	5,526.1	5,500.0	19.0	14.0	0.00	-310.9	-235.0	439.1	407.3	31.89	13.772			
5,600.0	5,532.9	5,559.0	5,532.9	19.1	14.0	0.00	-310.9	-235.0	439.1	407.2	31.99	13.729			
5,700.0	5,632.9	5,659.0	5,632.9	19.2	14.2	0.00	-310.9	-235.0	439.1	406.9	32.28	13.606			
5,800.0	5,732.9	5,759.0	5,732.9	19.3	14.3	0.00	-310.9	-235.0	439.1	406.6	32.57	13.484			
5,900.0	5,832.9	5,859.0	5,832.9	19.4	14.5	0.00	-310.9	-235.0	439.1	406.3	32.86	13.363			
6,000.0	5,932.9	5,959.0	5,932.9	19.5	14.7	0.00	-310.9	-235.0	439.1	406.0	33.16	13.242			
6,100.0	6,032.9	6,059.0	6,032.9	19.6	14.9	0.00	-310.9	-235.0	439.1	405.7	33.46	13.123			
6,200.0	6,132.9	6,159.0	6,132.9	19.8	15.0	0.00	-310.9	-235.0	439.1	405.4	33.77	13.005			
6,300.0	6,232.9	6,259.0	6,232.9	19.9	15.2	0.00	-310.9	-235.0	439.1	405.1	34.08	12.887			
6,400.0	6,332.9	6,359.0	6,332.9	20.0	15.4	0.00	-310.9	-235.0	439.1	404.8	34.39	12.771			
6,500.0	6,432.9	6,459.0	6,432.9	20.1	15.6	0.00	-310.9	-235.0	439.1	404.4	34.70	12.655			
6,600.0	6,532.9	6,559.0	6,532.9	20.3	15.8	0.00	-310.9	-235.0	439.1	404.1	35.02	12.541			
6,638.4	6,571.3	6,597.5	6,571.3	20.3	15.8	0.00	-310.9	-235.0	439.1	404.0	35.14	12.497			
6,650.0	6,582.9	6,609.0	6,582.9	20.3	15.8	-89.88	-310.9	-235.0	439.1	409.0	30.12	14.581			
6,677.4	6,610.3	6,636.4	6,610.3	20.4	15.9	-90.00	-310.9	-235.0	439.1	408.9	30.23	14.529			
6,700.0	6,632.8	6,659.0	6,632.8	20.4	15.9	-90.19	-310.9	-235.0	439.1	408.8	30.32	14.482			

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-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	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	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
6,750.0	6,682.5	6,708.6	6,682.5	20.4	16.0	-90.92	-310.9	-235.0	439.2	408.6	30.56	14.374		
6,800.0	6,731.7	6,757.8	6,731.7	20.5	16.1	-92.04	-310.9	-235.0	439.4	408.6	30.81	14.262		
6,850.0	6,780.2	6,807.9	6,781.7	20.5	16.2	-93.42	-310.9	-233.7	440.0	408.9	31.07	14.162		
6,900.0	6,827.8	6,858.9	6,832.5	20.5	16.3	-94.79	-310.8	-229.0	440.8	409.5	31.29	14.087		
6,950.0	6,874.3	6,910.6	6,883.6	20.6	16.3	-96.15	-310.8	-220.9	441.8	410.3	31.48	14.036		
7,000.0	6,919.5	6,963.2	6,934.7	20.6	16.4	-97.48	-310.8	-209.0	443.1	411.5	31.63	14.008		
7,050.0	6,963.3	7,016.5	6,985.8	20.6	16.4	-98.79	-310.7	-193.4	444.6	412.9	31.75	14.002		
7,100.0	7,005.3	7,070.8	7,036.4	20.6	16.4	-100.06	-310.7	-174.0	446.3	414.5	31.86	14.011		
7,150.0	7,045.5	7,125.9	7,086.3	20.6	16.5	-101.29	-310.6	-150.6	448.2	416.2	31.95	14.029		
7,200.0	7,083.7	7,181.9	7,135.1	20.6	16.5	-102.48	-310.6	-123.2	450.2	418.1	32.05	14.048		
7,250.0	7,119.6	7,238.7	7,182.5	20.6	16.5	-103.60	-310.5	-91.8	452.3	420.1	32.18	14.057		
7,300.0	7,153.2	7,296.5	7,228.1	20.6	16.5	-104.67	-310.4	-56.4	454.4	422.1	32.36	14.042		
7,350.0	7,184.4	7,355.1	7,271.5	20.7	16.5	-105.66	-310.3	-17.1	456.6	423.9	32.64	13.988		
7,400.0	7,212.9	7,414.5	7,312.3	20.7	16.6	-106.59	-310.2	26.1	458.7	425.7	33.05	13.881		
7,450.0	7,238.6	7,474.7	7,350.1	20.8	16.6	-107.43	-310.0	72.9	460.8	427.1	33.61	13.711		
7,500.0	7,261.5	7,535.6	7,384.5	20.9	16.9	-108.18	-309.9	123.2	462.7	428.3	34.36	13.466		
7,550.0	7,281.5	7,597.3	7,415.1	21.1	17.5	-108.84	-309.8	176.7	464.4	429.1	35.30	13.156		
7,600.0	7,298.4	7,659.5	7,441.6	21.3	18.3	-109.41	-309.6	233.0	466.0	429.5	36.48	12.772		
7,650.0	7,312.1	7,722.3	7,463.5	21.7	19.2	-109.88	-309.5	291.9	467.3	429.4	37.89	12.332		
7,700.0	7,322.8	7,785.5	7,480.6	22.3	20.1	-110.24	-309.3	352.7	468.4	428.8	39.52	11.850		
7,750.0	7,330.1	7,849.1	7,492.7	23.0	21.2	-110.50	-309.2	415.1	469.1	427.8	41.36	11.343		
7,800.0	7,334.3	7,906.4	7,499.4	23.8	22.3	-110.67	-309.0	472.0	469.7	426.5	43.26	10.857		
7,844.2	7,335.2	7,950.5	7,504.0	24.5	23.2	-111.00	-308.9	515.8	471.0	426.2	44.90	10.492		
7,900.0	7,334.8	8,014.7	7,509.3	25.6	24.5	-111.65	-308.7	579.8	472.9	425.9	47.02	10.058		
8,000.0	7,334.1	8,125.0	7,510.8	27.6	26.8	-111.91	-308.4	690.1	473.7	422.6	51.11	9.268		
8,100.0	7,333.3	8,225.0	7,510.4	29.7	29.1	-111.95	-308.2	790.1	473.8	418.6	55.26	8.575		
8,200.0	7,332.6	8,325.0	7,510.0	32.0	31.4	-111.98	-307.9	890.1	474.0	414.4	59.57	7.957		
8,300.0	7,331.8	8,425.0	7,509.6	34.4	33.8	-112.02	-307.6	990.1	474.2	410.1	64.02	7.406		
8,400.0	7,331.1	8,525.0	7,509.2	36.8	36.3	-112.06	-307.4	1,090.1	474.3	405.8	68.58	6.917		
8,500.0	7,330.3	8,625.0	7,508.8	39.2	38.8	-112.09	-307.1	1,190.1	474.5	401.3	73.22	6.480		
8,600.0	7,329.6	8,725.0	7,508.4	41.8	41.3	-112.13	-306.9	1,290.1	474.7	396.7	77.93	6.090		
8,700.0	7,328.8	8,825.0	7,508.0	44.3	43.9	-112.17	-306.6	1,390.1	474.8	392.1	82.70	5.741		
8,800.0	7,328.1	8,925.0	7,507.6	46.9	46.5	-112.20	-306.3	1,490.1	475.0	387.5	87.52	5.427		
8,900.0	7,327.3	9,025.0	7,507.1	49.5	49.1	-112.24	-306.1	1,590.1	475.1	382.8	92.38	5.143		
9,000.0	7,326.6	9,125.0	7,506.7	52.1	51.8	-112.28	-305.8	1,690.1	475.3	378.0	97.27	4.886		
9,100.0	7,325.8	9,225.0	7,506.3	54.8	54.5	-112.31	-305.6	1,790.1	475.5	373.3	102.19	4.653		
9,200.0	7,325.1	9,325.0	7,505.9	57.4	57.1	-112.35	-305.3	1,890.1	475.6	368.5	107.14	4.439		
9,300.0	7,324.3	9,425.0	7,505.5	60.1	59.8	-112.38	-305.0	1,990.0	475.8	363.7	112.10	4.244		
9,400.0	7,323.6	9,525.0	7,505.1	62.8	62.5	-112.42	-304.8	2,090.0	476.0	358.9	117.09	4.065		
9,500.0	7,322.8	9,625.0	7,504.7	65.5	65.2	-112.46	-304.5	2,190.0	476.1	354.0	122.08	3.900		
9,600.0	7,322.1	9,725.0	7,504.3	68.2	67.9	-112.49	-304.2	2,290.0	476.3	349.2	127.09	3.747		
9,700.0	7,321.3	9,825.0	7,503.9	70.9	70.7	-112.53	-304.0	2,390.0	476.4	344.3	132.12	3.606		
9,800.0	7,320.6	9,925.0	7,503.5	73.6	73.4	-112.57	-303.7	2,490.0	476.6	339.5	137.15	3.475		
9,900.0	7,319.8	10,025.0	7,503.0	76.3	76.1	-112.60	-303.5	2,590.0	476.8	334.6	142.19	3.353		
10,000.0	7,319.1	10,125.0	7,502.6	79.0	78.9	-112.64	-303.2	2,690.0	476.9	329.7	147.23	3.239		
10,100.0	7,318.3	10,225.0	7,502.2	81.8	81.6	-112.67	-302.9	2,790.0	477.1	324.8	152.29	3.133		
10,200.0	7,317.6	10,325.0	7,501.8	84.5	84.4	-112.71	-302.7	2,890.0	477.3	319.9	157.35	3.033		
10,300.0	7,316.8	10,425.0	7,501.4	87.3	87.1	-112.75	-302.4	2,990.0	477.4	315.0	162.41	2.940		
10,400.0	7,316.1	10,525.0	7,501.0	90.0	89.9	-112.78	-302.1	3,090.0	477.6	310.1	167.48	2.852		
10,500.0	7,315.3	10,625.0	7,500.6	92.8	92.6	-112.82	-301.9	3,190.0	477.8	305.2	172.55	2.769		
10,600.0	7,314.6	10,725.0	7,500.2	95.5	95.4	-112.86	-301.6	3,290.0	477.9	300.3	177.62	2.691		

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-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	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	
10,700.0	7,313.8	10,825.0	7,499.8	98.3	98.2	-112.89	-301.4	3,390.0	478.1	295.4	182.70	2.617		
10,800.0	7,313.1	10,925.0	7,499.4	101.0	100.9	-112.93	-301.1	3,490.0	478.3	290.5	187.78	2.547		
10,900.0	7,312.3	11,025.0	7,499.0	103.8	103.7	-112.96	-300.8	3,590.0	478.4	285.6	192.86	2.481		
11,000.0	7,311.6	11,125.0	7,498.5	106.6	106.5	-113.00	-300.6	3,690.0	478.6	280.6	197.94	2.418		
11,100.0	7,310.8	11,225.0	7,498.1	109.3	109.2	-113.03	-300.3	3,790.0	478.7	275.7	203.02	2.358		
11,200.0	7,310.1	11,325.0	7,497.7	112.1	112.0	-113.07	-300.1	3,890.0	478.9	270.8	208.10	2.301		
11,300.0	7,309.3	11,425.0	7,497.3	114.9	114.8	-113.11	-299.8	3,990.0	479.1	265.9	213.19	2.247		
11,400.0	7,308.6	11,525.0	7,496.9	117.7	117.6	-113.14	-299.5	4,090.0	479.2	261.0	218.27	2.196		
11,500.0	7,307.8	11,625.0	7,496.5	120.4	120.4	-113.18	-299.3	4,190.0	479.4	256.1	223.35	2.146		
11,600.0	7,307.1	11,725.0	7,496.1	123.2	123.1	-113.21	-299.0	4,290.0	479.6	251.1	228.44	2.099		
11,700.0	7,306.3	11,825.0	7,495.7	126.0	125.9	-113.25	-298.7	4,390.0	479.7	246.2	233.52	2.054		
11,800.0	7,305.6	11,925.0	7,495.3	128.8	128.7	-113.29	-298.5	4,490.0	479.9	241.3	238.60	2.011		
11,835.5	7,305.3	11,960.5	7,495.1	129.7	129.7	-113.30	-298.4	4,525.6	480.0	239.6	240.41	1.996		
11,873.6	7,305.0	11,990.5	7,495.0	130.8	130.5	-113.31	-298.3	4,555.5	480.1	238.0	242.14	1.983 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15F-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	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-432 - 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)	+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	-180.00	-180.00	-29.1	0.0	29.1				
100.0	100.0	100.0	100.0	0.1	0.1	-180.00	-180.00	-29.1	0.0	29.1	28.9	0.22	129.636	
200.0	200.0	200.0	200.0	0.3	0.3	-180.00	-180.00	-29.1	0.0	29.1	28.5	0.67	43.212 CC, ES	
300.0	300.0	299.0	299.0	0.6	0.5	-179.35	-179.35	-30.8	-0.3	30.8	29.7	1.10	28.021	
400.0	400.0	397.7	397.6	0.8	0.7	-177.79	-177.79	-35.8	-1.4	35.9	34.4	1.53	23.450	
500.0	500.0	496.0	495.5	1.0	1.0	-175.98	-175.98	-44.1	-3.1	44.4	42.5	1.98	22.420	
600.0	600.0	593.6	592.3	1.2	1.3	-174.37	-174.37	-55.6	-5.5	56.4	53.9	2.44	23.055	
700.0	700.0	690.5	688.1	1.4	1.6	-10.70	-10.70	-70.2	-8.5	70.0	67.1	2.86	24.496	
800.0	799.8	787.0	782.9	1.6	2.0	-10.20	-10.20	-87.8	-12.2	83.5	80.2	3.27	25.546	
900.0	899.5	885.7	879.4	1.8	2.4	-10.09	-10.09	-108.0	-16.4	95.9	92.2	3.70	25.912	
1,000.0	998.7	985.2	976.7	2.1	2.8	-10.33	-10.33	-128.5	-20.6	105.0	100.8	4.15	25.305	
1,107.4	1,104.7	1,092.4	1,081.5	2.4	3.3	-10.93	-10.93	-150.6	-25.2	110.9	106.2	4.65	23.864	
1,200.0	1,195.9	1,185.0	1,172.0	2.7	3.7	-11.58	-11.58	-169.6	-29.1	114.3	109.2	5.10	22.393	
1,300.0	1,294.3	1,284.9	1,269.7	3.0	4.1	-12.24	-12.24	-190.1	-33.4	118.0	112.4	5.61	21.047	
1,400.0	1,392.8	1,384.8	1,367.4	3.4	4.6	-12.87	-12.87	-210.7	-37.6	121.7	115.6	6.12	19.886	
1,500.0	1,491.2	1,484.8	1,465.1	3.7	5.0	-13.46	-13.46	-231.2	-41.9	125.5	118.8	6.64	18.887	
1,600.0	1,589.6	1,584.7	1,562.8	4.1	5.5	-14.01	-14.01	-251.8	-46.1	129.2	122.0	7.17	18.018	
1,700.0	1,688.1	1,684.6	1,660.5	4.5	6.0	-14.53	-14.53	-272.3	-50.4	132.9	125.2	7.70	17.257	
1,800.0	1,786.5	1,784.5	1,758.2	4.9	6.4	-15.02	-15.02	-292.9	-54.7	136.7	128.5	8.24	16.585	
1,900.0	1,885.0	1,884.4	1,855.9	5.3	6.9	-15.49	-15.49	-313.4	-58.9	140.5	131.7	8.79	15.988	
2,000.0	1,983.4	1,984.4	1,953.6	5.7	7.3	-15.93	-15.93	-334.0	-63.2	144.3	134.9	9.34	15.454	
2,100.0	2,081.8	2,084.3	2,051.3	6.1	7.8	-16.35	-16.35	-354.5	-67.4	148.1	138.2	9.89	14.975	
2,200.0	2,180.3	2,184.2	2,149.0	6.4	8.3	-16.75	-16.75	-375.1	-71.7	151.9	141.4	10.44	14.542	
2,300.0	2,278.7	2,284.1	2,246.7	6.8	8.7	-17.13	-17.13	-395.6	-75.9	155.7	144.7	11.00	14.149	
2,400.0	2,377.1	2,384.1	2,344.4	7.2	9.2	-17.49	-17.49	-416.1	-80.2	159.5	147.9	11.56	13.791	
2,500.0	2,475.6	2,484.0	2,442.1	7.6	9.6	-17.83	-17.83	-436.7	-84.5	163.3	151.2	12.13	13.464	
2,600.0	2,574.0	2,583.9	2,539.8	8.0	10.1	-18.16	-18.16	-457.2	-88.7	167.1	154.4	12.70	13.163	
2,700.0	2,672.4	2,683.8	2,637.5	8.4	10.6	-18.47	-18.47	-477.8	-93.0	170.9	157.7	13.26	12.886	
2,800.0	2,770.9	2,783.8	2,735.1	8.8	11.0	-18.77	-18.77	-498.3	-97.2	174.8	160.9	13.84	12.631	
2,900.0	2,869.3	2,883.7	2,832.8	9.2	11.5	-19.06	-19.06	-518.9	-101.5	178.6	164.2	14.41	12.394	
3,000.0	2,967.7	2,983.6	2,930.5	9.7	11.9	-19.34	-19.34	-539.4	-105.8	182.5	167.5	14.99	12.174	
3,100.0	3,066.2	3,083.5	3,028.2	10.1	12.4	-19.60	-19.60	-560.0	-110.0	186.3	170.7	15.57	11.969	
3,200.0	3,164.6	3,183.4	3,125.9	10.5	12.9	-19.85	-19.85	-580.5	-114.3	190.1	174.0	16.15	11.777	
3,300.0	3,263.1	3,283.4	3,223.6	10.9	13.3	-20.10	-20.10	-601.1	-118.5	194.0	177.3	16.73	11.598	
3,400.0	3,361.5	3,383.3	3,321.3	11.3	13.8	-20.33	-20.33	-621.6	-122.8	197.9	180.5	17.31	11.430	
3,500.0	3,459.9	3,483.2	3,419.0	11.7	14.2	-20.55	-20.55	-642.1	-127.0	201.7	183.8	17.89	11.273	
3,600.0	3,558.4	3,583.1	3,516.7	12.1	14.7	-20.77	-20.77	-662.7	-131.3	205.6	187.1	18.48	11.124	
3,700.0	3,656.8	3,683.1	3,614.4	12.5	15.2	-20.98	-20.98	-683.2	-135.6	209.4	190.4	19.07	10.984	
3,800.0	3,755.2	3,783.0	3,712.1	12.9	15.6	-21.18	-21.18	-703.8	-139.8	213.3	193.7	19.66	10.852	
3,900.0	3,853.7	3,882.9	3,809.8	13.3	16.1	-21.37	-21.37	-724.3	-144.1	217.2	196.9	20.25	10.727	
4,000.0	3,952.1	3,982.8	3,907.5	13.7	16.5	-21.56	-21.56	-744.9	-148.3	221.1	200.2	20.84	10.609	
4,100.0	4,050.5	4,082.7	4,005.2	14.1	17.0	-21.74	-21.74	-765.4	-152.6	224.9	203.5	21.43	10.497	
4,200.0	4,149.0	4,182.7	4,102.9	14.5	17.5	-21.91	-21.91	-786.0	-156.9	228.8	206.8	22.02	10.390	
4,300.0	4,247.4	4,282.6	4,200.6	14.9	17.9	-22.08	-22.08	-806.5	-161.1	232.7	210.1	22.62	10.289	
4,400.0	4,345.8	4,382.5	4,298.3	15.3	18.4	-22.24	-22.24	-827.1	-165.4	236.6	213.4	23.21	10.192	
4,500.0	4,444.3	4,482.4	4,396.0	15.7	18.8	-22.40	-22.40	-847.6	-169.6	240.5	216.6	23.81	10.100	
4,600.0	4,542.7	4,582.4	4,493.6	16.1	19.3	-22.55	-22.55	-868.2	-173.9	244.3	219.9	24.40	10.012	
4,700.0	4,641.2	4,682.3	4,591.3	16.5	19.8	-22.70	-22.70	-888.7	-178.1	248.2	223.2	25.00	9.929	
4,800.0	4,739.6	4,782.2	4,689.0	16.9	20.2	-22.84	-22.84	-909.2	-182.4	252.1	226.5	25.60	9.848	
4,900.0	4,838.0	4,882.1	4,786.7	17.3	20.7	-22.98	-22.98	-929.8	-186.7	256.0	229.8	26.20	9.772	
5,000.0	4,936.5	4,982.0	4,884.4	17.8	21.2	-23.12	-23.12	-950.3	-190.9	259.9	233.1	26.80	9.698	

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-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	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-432 - 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	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
5,059.8	4,995.3	5,041.7	4,942.8	18.0	21.4	-23.20	-962.6	-193.5	262.2	235.1	27.16	9.656		
5,100.0	5,034.9	5,082.0	4,982.1	18.1	21.6	-23.24	-970.9	-195.2	264.0	236.7	27.38	9.644		
5,200.0	5,133.9	5,181.7	5,079.6	18.4	22.1	-23.16	-991.4	-199.4	270.8	243.0	27.85	9.726		
5,300.0	5,233.3	5,281.2	5,176.9	18.6	22.5	-22.82	-1,011.8	-203.7	280.8	252.6	28.23	9.949		
5,400.0	5,333.0	5,380.3	5,273.8	18.8	23.0	-22.28	-1,032.2	-207.9	294.0	265.5	28.52	10.308		
5,500.0	5,432.9	5,478.8	5,370.1	18.9	23.4	-21.58	-1,052.5	-212.1	310.5	281.7	28.75	10.799		
5,567.1	5,500.0	5,544.6	5,434.4	19.0	23.8	176.36	-1,066.0	-214.9	323.4	281.8	41.60	7.773		
5,600.0	5,532.9	5,576.7	5,465.8	19.1	23.9	176.68	-1,072.6	-216.3	330.0	288.2	41.83	7.890		
5,700.0	5,632.9	5,674.5	5,561.4	19.2	24.4	177.56	-1,092.7	-220.4	350.4	307.9	42.50	8.245		
5,800.0	5,732.9	5,780.9	5,665.6	19.3	24.8	178.39	-1,113.8	-224.8	370.1	327.0	43.14	8.580		
5,900.0	5,832.9	5,894.1	5,777.2	19.4	25.1	179.05	-1,132.3	-228.6	386.4	342.8	43.64	8.854		
6,000.0	5,932.9	6,008.6	5,890.8	19.5	25.4	179.51	-1,146.6	-231.6	398.9	354.8	44.07	9.051		
6,100.0	6,032.9	6,124.1	6,005.9	19.6	25.6	179.81	-1,156.6	-233.7	407.5	363.1	44.43	9.171		
6,200.0	6,132.9	6,240.3	6,121.9	19.8	25.7	179.97	-1,162.0	-234.8	412.1	367.4	44.73	9.213		
6,300.0	6,232.9	6,351.3	6,232.9	19.9	25.9	180.00	-1,163.0	-235.0	413.0	368.1	44.99	9.182		
6,400.0	6,332.9	6,451.3	6,332.9	20.0	25.9	180.00	-1,163.0	-235.0	413.0	367.8	45.21	9.136		
6,500.0	6,432.9	6,551.3	6,432.9	20.1	26.0	180.00	-1,163.0	-235.0	413.0	367.6	45.43	9.092		
6,600.0	6,532.9	6,651.3	6,532.9	20.3	26.1	180.00	-1,163.0	-235.0	413.0	367.4	45.65	9.048		
6,638.4	6,571.3	6,689.7	6,571.3	20.3	26.2	180.00	-1,163.0	-235.0	413.0	367.3	45.74	9.031		
6,650.0	6,582.9	6,701.3	6,582.9	20.3	26.2	90.14	-1,163.0	-235.0	413.0	380.8	32.25	12.806		
6,700.0	6,632.8	6,751.2	6,632.8	20.4	26.2	90.47	-1,163.0	-235.0	413.1	380.7	32.36	12.766		
6,750.0	6,682.5	6,800.9	6,682.5	20.4	26.3	91.24	-1,163.0	-235.0	413.1	380.8	32.38	12.759		
6,800.0	6,731.7	6,850.1	6,731.7	20.5	26.3	92.43	-1,163.0	-235.0	413.4	381.1	32.34	12.785		
6,850.0	6,780.2	6,899.8	6,781.4	20.5	26.4	93.88	-1,163.1	-233.7	414.1	381.8	32.26	12.834		
6,900.0	6,827.8	6,950.4	6,831.8	20.5	26.4	95.32	-1,163.1	-229.1	415.0	382.8	32.19	12.892		
6,950.0	6,874.3	7,001.7	6,882.4	20.6	26.4	96.74	-1,163.3	-221.1	416.3	384.2	32.13	12.956		
7,000.0	6,919.5	7,053.9	6,933.3	20.6	26.5	98.13	-1,163.5	-209.4	418.0	385.9	32.09	13.025		
7,050.0	6,963.3	7,106.8	6,983.9	20.6	26.5	99.49	-1,163.7	-194.1	419.9	387.8	32.06	13.095		
7,100.0	7,005.3	7,160.6	7,034.2	20.6	26.5	100.81	-1,164.0	-175.0	422.1	390.0	32.07	13.163		
7,150.0	7,045.5	7,215.3	7,083.7	20.6	26.5	102.08	-1,164.4	-151.9	424.5	392.4	32.10	13.224		
7,200.0	7,083.7	7,270.8	7,132.3	20.6	26.5	103.29	-1,164.8	-125.0	427.1	394.9	32.18	13.273		
7,250.0	7,119.6	7,327.2	7,179.4	20.6	26.6	104.44	-1,165.3	-94.1	429.9	397.6	32.31	13.304		
7,300.0	7,153.2	7,384.5	7,224.9	20.6	26.6	105.51	-1,165.9	-59.2	432.8	400.3	32.51	13.312		
7,350.0	7,184.4	7,442.7	7,268.2	20.7	26.6	106.51	-1,166.5	-20.4	435.7	402.9	32.79	13.288		
7,400.0	7,212.9	7,501.7	7,309.0	20.7	26.6	107.43	-1,167.2	22.2	438.7	405.5	33.17	13.224		
7,450.0	7,238.6	7,561.5	7,346.9	20.8	26.7	108.26	-1,168.0	68.4	441.6	407.9	33.66	13.118		
7,500.0	7,261.5	7,622.1	7,381.4	20.9	26.7	109.00	-1,168.8	118.2	444.4	410.1	34.31	12.954		
7,550.0	7,281.5	7,683.4	7,412.3	21.1	26.8	109.64	-1,169.6	171.1	447.1	412.0	35.10	12.740		
7,600.0	7,298.4	7,745.3	7,439.0	21.3	27.0	110.17	-1,170.5	227.0	449.7	413.6	36.05	12.474		
7,650.0	7,312.1	7,807.8	7,461.4	21.7	27.1	110.60	-1,171.5	285.3	452.0	414.8	37.17	12.159		
7,700.0	7,322.8	7,870.9	7,479.0	22.3	27.4	110.92	-1,172.5	345.8	454.0	415.6	38.47	11.803		
7,750.0	7,330.1	7,934.2	7,491.6	23.0	27.7	111.14	-1,173.5	407.9	455.8	415.9	39.92	11.418		
7,800.0	7,334.3	7,993.1	7,498.9	23.8	28.2	111.25	-1,174.4	466.3	457.4	415.9	41.44	11.037		
7,844.2	7,335.2	8,037.1	7,503.5	24.5	28.6	111.49	-1,175.1	510.1	459.5	416.8	42.68	10.765		
7,900.0	7,334.8	8,104.0	7,509.1	25.6	29.3	112.15	-1,176.0	576.7	462.2	417.6	44.68	10.345		
8,000.0	7,334.1	8,218.6	7,510.8	27.6	30.9	112.42	-1,176.3	691.2	463.5	414.7	48.74	9.509		
8,100.0	7,333.3	8,318.6	7,510.4	29.7	32.6	112.45	-1,176.3	791.2	463.8	411.0	52.83	8.779		
8,200.0	7,332.6	8,418.6	7,510.0	32.0	34.5	112.48	-1,176.3	891.2	464.1	407.0	57.11	8.128		
8,300.0	7,331.8	8,518.6	7,509.6	34.4	36.6	112.50	-1,176.3	991.2	464.5	403.0	61.52	7.550		
8,400.0	7,331.1	8,618.6	7,509.2	36.8	38.8	112.53	-1,176.3	1,091.2	464.8	398.8	66.06	7.037		
8,500.0	7,330.3	8,718.6	7,508.8	39.2	41.1	112.56	-1,176.3	1,191.2	465.2	394.5	70.68	6.581		

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-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	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-432 - 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	Offset		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)			
8,600.0	7,329.6	8,818.6	7,508.4	41.8	43.5	112.59	-1,176.3	1,291.2	465.5	390.1	75.38	6.175	
8,700.0	7,328.8	8,918.6	7,508.0	44.3	45.9	112.62	-1,176.3	1,391.2	465.8	385.7	80.14	5.813	
8,800.0	7,328.1	9,018.6	7,507.6	46.9	48.4	112.65	-1,176.3	1,491.2	466.2	381.2	84.95	5.488	
8,900.0	7,327.3	9,118.6	7,507.2	49.5	50.9	112.67	-1,176.3	1,591.2	466.5	376.7	89.80	5.195	
9,000.0	7,326.6	9,218.6	7,506.8	52.1	53.5	112.70	-1,176.3	1,691.2	466.9	372.2	94.69	4.930	
9,100.0	7,325.8	9,318.6	7,506.3	54.8	56.0	112.73	-1,176.3	1,791.2	467.2	367.6	99.61	4.690	
9,200.0	7,325.1	9,418.6	7,505.9	57.4	58.6	112.76	-1,176.3	1,891.2	467.5	363.0	104.55	4.472	
9,300.0	7,324.3	9,518.6	7,505.5	60.1	61.2	112.79	-1,176.3	1,991.2	467.9	358.4	109.52	4.272	
9,400.0	7,323.6	9,618.5	7,505.1	62.8	63.9	112.81	-1,176.3	2,091.2	468.2	353.7	114.50	4.089	
9,500.0	7,322.8	9,718.5	7,504.7	65.5	66.5	112.84	-1,176.3	2,191.2	468.6	349.1	119.50	3.921	
9,600.0	7,322.1	9,818.5	7,504.3	68.2	69.2	112.87	-1,176.3	2,291.2	468.9	344.4	124.51	3.766	
9,700.0	7,321.3	9,918.5	7,503.9	70.9	71.8	112.90	-1,176.3	2,391.2	469.3	339.7	129.53	3.623	
9,800.0	7,320.6	10,018.5	7,503.5	73.6	74.5	112.93	-1,176.3	2,491.2	469.6	335.0	134.57	3.490	
9,900.0	7,319.8	10,118.5	7,503.1	76.3	77.2	112.95	-1,176.3	2,591.2	469.9	330.3	139.61	3.366	
10,000.0	7,319.1	10,218.5	7,502.7	79.0	79.9	112.98	-1,176.3	2,691.2	470.3	325.6	144.66	3.251	
10,100.0	7,318.3	10,318.5	7,502.3	81.8	82.6	113.01	-1,176.3	2,791.2	470.6	320.9	149.72	3.143	
10,200.0	7,317.6	10,418.5	7,501.9	84.5	85.3	113.04	-1,176.3	2,891.2	471.0	316.2	154.79	3.043	
10,300.0	7,316.8	10,518.5	7,501.4	87.3	88.1	113.06	-1,176.3	2,991.2	471.3	311.4	159.86	2.948	
10,400.0	7,316.1	10,618.5	7,501.0	90.0	90.8	113.09	-1,176.3	3,091.2	471.6	306.7	164.93	2.860	
10,500.0	7,315.3	10,718.5	7,500.6	92.8	93.5	113.12	-1,176.3	3,191.2	472.0	302.0	170.01	2.776	
10,600.0	7,314.6	10,818.5	7,500.2	95.5	96.2	113.15	-1,176.3	3,291.2	472.3	297.2	175.09	2.698	
10,700.0	7,313.8	10,918.5	7,499.8	98.3	99.0	113.17	-1,176.3	3,391.2	472.7	292.5	180.18	2.623	
10,800.0	7,313.1	11,018.5	7,499.4	101.0	101.7	113.20	-1,176.3	3,491.2	473.0	287.8	185.26	2.553	
10,900.0	7,312.3	11,118.5	7,499.0	103.8	104.5	113.23	-1,176.3	3,591.2	473.4	283.0	190.35	2.487	
11,000.0	7,311.6	11,218.5	7,498.6	106.6	107.2	113.25	-1,176.3	3,691.2	473.7	278.3	195.45	2.424	
11,100.0	7,310.8	11,318.5	7,498.2	109.3	110.0	113.28	-1,176.3	3,791.2	474.0	273.5	200.54	2.364	
11,200.0	7,310.1	11,418.5	7,497.8	112.1	112.7	113.31	-1,176.3	3,891.2	474.4	268.8	205.63	2.307	
11,300.0	7,309.3	11,518.5	7,497.4	114.9	115.5	113.34	-1,176.3	3,991.2	474.7	264.0	210.73	2.253	
11,400.0	7,308.6	11,618.5	7,497.0	117.7	118.2	113.36	-1,176.3	4,091.2	475.1	259.2	215.83	2.201	
11,500.0	7,307.8	11,718.5	7,496.5	120.4	121.0	113.39	-1,176.3	4,191.2	475.4	254.5	220.92	2.152	
11,600.0	7,307.1	11,818.5	7,496.1	123.2	123.8	113.42	-1,176.3	4,291.2	475.8	249.7	226.02	2.105	
11,700.0	7,306.3	11,918.5	7,495.7	126.0	126.5	113.44	-1,176.3	4,391.2	476.1	245.0	231.12	2.060	
11,800.0	7,305.6	12,018.5	7,495.3	128.8	129.3	113.47	-1,176.3	4,491.2	476.4	240.2	236.22	2.017	
11,873.6	7,305.0	12,092.1	7,495.0	130.8	131.3	113.49	-1,176.3	4,564.7	476.7	236.7	239.97	1.987 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15F-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	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 (RKB Ensign 32 - 1 Coordinates are relative to: Thornton 15F-212
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-212
Project:	SEC.15-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Reference Site:	Thornton Pad Sec.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB Ensign 32 - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Thornton 15F-212	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
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