

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: Thornton 15E-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	1455568.89	3202071.07	40.581660	-104.772500	
RKB Ensign 32 - 15' WELL @ 4985.0ft (RKB Ensign 32 - 15')						

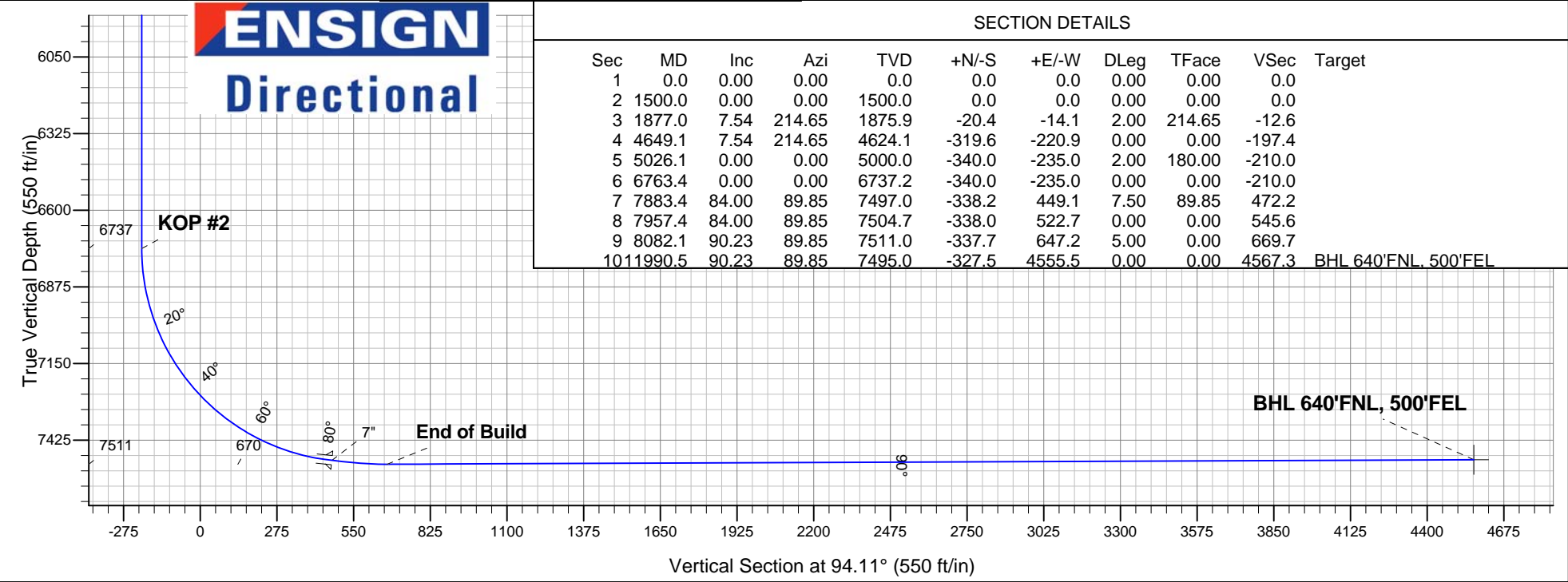
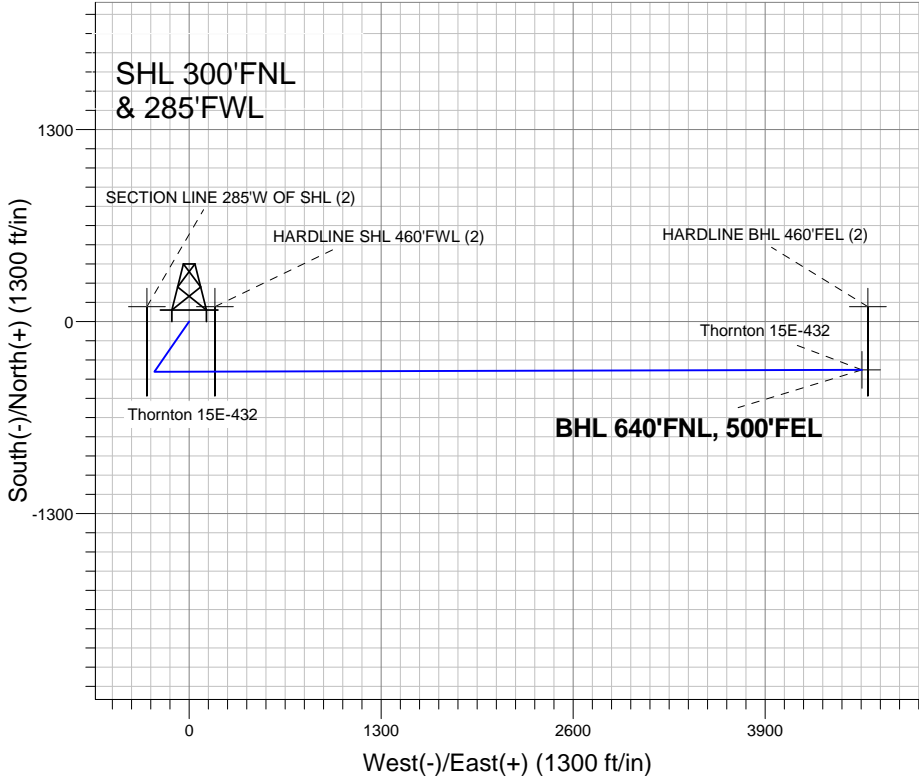
WELLBORE TARGET DETAILS				
Name	TVD	+N/-S	+E/-W	Shape
HARDLINE BHL 460'FEL (2)	1.0	100.0	4595.5	Polygon
HARDLINE SHL 460'FWL (2)	1.0	100.0	175.0	Polygon
SECTION LINE 285'W OF SHL (2)	1.0	100.0	-285.0	Polygon
BHL 640'FNL, 500'FEL	7495.0	-327.5	4555.5	Point

Azimuths to True North
Magnetic North: 8.75°

Magnetic Field
Strength: 53118.7µT
Dip Angle: 67.16°
Date: 6/15/2012
Model: IGRF2010

Thornton Pad Sec.15-T7N-R66W
Thornton 15E-432
Plan #1 (6-12-12)
10:53, June 27 2012

ANNOTATIONS		
TVD	MD	Annotation
1500.0	1500.0	KOP #1
6737.3	6763.4	KOP #2
7511.0	8082.1	End of Build





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15E-432

Wellbore #1

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

Standard Planning Report

27 June, 2012

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-12-12)		

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 15E-432					
Well Position	+N/-S	-32.8 ft	Northing:	1,455,568.89 ft	Latitude:	40.581660
	+E/-W	0.0 ft	Easting:	3,202,071.07 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	6/15/2012	8.75	67.16	53,119

Design	Plan #1 (6-12-12)			
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	94.11

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	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,877.0	7.54	214.65	1,875.9	-20.4	-14.1	2.00	2.00	0.00	214.65	
4,649.1	7.54	214.65	4,624.1	-319.6	-220.9	0.00	0.00	0.00	0.00	
5,026.1	0.00	0.00	5,000.0	-340.0	-235.0	2.00	-2.00	0.00	180.00	
6,763.4	0.00	0.00	6,737.2	-340.0	-235.0	0.00	0.00	0.00	0.00	
7,883.4	84.00	89.85	7,497.0	-338.2	449.1	7.50	7.50	0.00	89.85	
7,957.4	84.00	89.85	7,504.7	-338.0	522.7	0.00	0.00	0.00	0.00	
8,082.1	90.23	89.85	7,511.0	-337.7	647.2	5.00	5.00	0.00	0.00	
11,990.5	90.23	89.85	7,495.0	-327.5	4,555.5	0.00	0.00	0.00	0.00	BHL 640'FNL, 500'

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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 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-12-12)		

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 (2) - HARDLINE SHL 460'FWL (2) - HARDLINE BHL 460'FEL (2)									
40.0	0.00	0.00	40.0	0.0	0.0	0.0	0.00	0.00	0.00
80.0	0.00	0.00	80.0	0.0	0.0	0.0	0.00	0.00	0.00
120.0	0.00	0.00	120.0	0.0	0.0	0.0	0.00	0.00	0.00
160.0	0.00	0.00	160.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
240.0	0.00	0.00	240.0	0.0	0.0	0.0	0.00	0.00	0.00
280.0	0.00	0.00	280.0	0.0	0.0	0.0	0.00	0.00	0.00
320.0	0.00	0.00	320.0	0.0	0.0	0.0	0.00	0.00	0.00
360.0	0.00	0.00	360.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
440.0	0.00	0.00	440.0	0.0	0.0	0.0	0.00	0.00	0.00
480.0	0.00	0.00	480.0	0.0	0.0	0.0	0.00	0.00	0.00
520.0	0.00	0.00	520.0	0.0	0.0	0.0	0.00	0.00	0.00
560.0	0.00	0.00	560.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
640.0	0.00	0.00	640.0	0.0	0.0	0.0	0.00	0.00	0.00
680.0	0.00	0.00	680.0	0.0	0.0	0.0	0.00	0.00	0.00
720.0	0.00	0.00	720.0	0.0	0.0	0.0	0.00	0.00	0.00
760.0	0.00	0.00	760.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
840.0	0.00	0.00	840.0	0.0	0.0	0.0	0.00	0.00	0.00
880.0	0.00	0.00	880.0	0.0	0.0	0.0	0.00	0.00	0.00
920.0	0.00	0.00	920.0	0.0	0.0	0.0	0.00	0.00	0.00
960.0	0.00	0.00	960.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,040.0	0.00	0.00	1,040.0	0.0	0.0	0.0	0.00	0.00	0.00
1,080.0	0.00	0.00	1,080.0	0.0	0.0	0.0	0.00	0.00	0.00
1,120.0	0.00	0.00	1,120.0	0.0	0.0	0.0	0.00	0.00	0.00
1,160.0	0.00	0.00	1,160.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,240.0	0.00	0.00	1,240.0	0.0	0.0	0.0	0.00	0.00	0.00
1,280.0	0.00	0.00	1,280.0	0.0	0.0	0.0	0.00	0.00	0.00
1,320.0	0.00	0.00	1,320.0	0.0	0.0	0.0	0.00	0.00	0.00
1,360.0	0.00	0.00	1,360.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,440.0	0.00	0.00	1,440.0	0.0	0.0	0.0	0.00	0.00	0.00
1,480.0	0.00	0.00	1,480.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
1,520.0	0.40	214.65	1,520.0	-0.1	0.0	0.0	2.00	2.00	0.00
1,560.0	1.20	214.65	1,560.0	-0.5	-0.4	-0.3	2.00	2.00	0.00
1,600.0	2.00	214.65	1,600.0	-1.4	-1.0	-0.9	2.00	2.00	0.00
1,640.0	2.80	214.65	1,639.9	-2.8	-1.9	-1.7	2.00	2.00	0.00
1,680.0	3.60	214.65	1,679.9	-4.7	-3.2	-2.9	2.00	2.00	0.00
1,720.0	4.40	214.65	1,719.8	-6.9	-4.8	-4.3	2.00	2.00	0.00
1,760.0	5.20	214.65	1,759.6	-9.7	-6.7	-6.0	2.00	2.00	0.00
1,800.0	6.00	214.65	1,799.5	-12.9	-8.9	-8.0	2.00	2.00	0.00
1,840.0	6.80	214.65	1,839.2	-16.6	-11.5	-10.2	2.00	2.00	0.00
1,877.0	7.54	214.65	1,875.9	-20.4	-14.1	-12.6	2.00	2.00	0.00
1,880.0	7.54	214.65	1,878.9	-20.7	-14.3	-12.8	0.00	0.00	0.00

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Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-12-12)		

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)
1,920.0	7.54	214.65	1,918.5	-25.0	-17.3	-15.5	0.00	0.00	0.00
1,960.0	7.54	214.65	1,958.2	-29.3	-20.3	-18.1	0.00	0.00	0.00
2,000.0	7.54	214.65	1,997.8	-33.7	-23.3	-20.8	0.00	0.00	0.00
2,040.0	7.54	214.65	2,037.5	-38.0	-26.2	-23.5	0.00	0.00	0.00
2,080.0	7.54	214.65	2,077.2	-42.3	-29.2	-26.1	0.00	0.00	0.00
2,120.0	7.54	214.65	2,116.8	-46.6	-32.2	-28.8	0.00	0.00	0.00
2,160.0	7.54	214.65	2,156.5	-50.9	-35.2	-31.5	0.00	0.00	0.00
2,200.0	7.54	214.65	2,196.1	-55.2	-38.2	-34.1	0.00	0.00	0.00
2,240.0	7.54	214.65	2,235.8	-59.6	-41.2	-36.8	0.00	0.00	0.00
2,280.0	7.54	214.65	2,275.4	-63.9	-44.2	-39.5	0.00	0.00	0.00
2,320.0	7.54	214.65	2,315.1	-68.2	-47.1	-42.1	0.00	0.00	0.00
2,360.0	7.54	214.65	2,354.7	-72.5	-50.1	-44.8	0.00	0.00	0.00
2,400.0	7.54	214.65	2,394.4	-76.8	-53.1	-47.5	0.00	0.00	0.00
2,440.0	7.54	214.65	2,434.0	-81.2	-56.1	-50.1	0.00	0.00	0.00
2,480.0	7.54	214.65	2,473.7	-85.5	-59.1	-52.8	0.00	0.00	0.00
2,520.0	7.54	214.65	2,513.4	-89.8	-62.1	-55.5	0.00	0.00	0.00
2,560.0	7.54	214.65	2,553.0	-94.1	-65.0	-58.1	0.00	0.00	0.00
2,600.0	7.54	214.65	2,592.7	-98.4	-68.0	-60.8	0.00	0.00	0.00
2,640.0	7.54	214.65	2,632.3	-102.7	-71.0	-63.5	0.00	0.00	0.00
2,680.0	7.54	214.65	2,672.0	-107.1	-74.0	-66.1	0.00	0.00	0.00
2,720.0	7.54	214.65	2,711.6	-111.4	-77.0	-68.8	0.00	0.00	0.00
2,760.0	7.54	214.65	2,751.3	-115.7	-80.0	-71.5	0.00	0.00	0.00
2,800.0	7.54	214.65	2,790.9	-120.0	-82.9	-74.1	0.00	0.00	0.00
2,840.0	7.54	214.65	2,830.6	-124.3	-85.9	-76.8	0.00	0.00	0.00
2,880.0	7.54	214.65	2,870.2	-128.6	-88.9	-79.5	0.00	0.00	0.00
2,920.0	7.54	214.65	2,909.9	-133.0	-91.9	-82.1	0.00	0.00	0.00
2,960.0	7.54	214.65	2,949.5	-137.3	-94.9	-84.8	0.00	0.00	0.00
3,000.0	7.54	214.65	2,989.2	-141.6	-97.9	-87.5	0.00	0.00	0.00
3,040.0	7.54	214.65	3,028.9	-145.9	-100.9	-90.1	0.00	0.00	0.00
3,080.0	7.54	214.65	3,068.5	-150.2	-103.8	-92.8	0.00	0.00	0.00
3,120.0	7.54	214.65	3,108.2	-154.6	-106.8	-95.5	0.00	0.00	0.00
3,160.0	7.54	214.65	3,147.8	-158.9	-109.8	-98.1	0.00	0.00	0.00
3,200.0	7.54	214.65	3,187.5	-163.2	-112.8	-100.8	0.00	0.00	0.00
3,240.0	7.54	214.65	3,227.1	-167.5	-115.8	-103.5	0.00	0.00	0.00
3,280.0	7.54	214.65	3,266.8	-171.8	-118.8	-106.1	0.00	0.00	0.00
3,320.0	7.54	214.65	3,306.4	-176.1	-121.7	-108.8	0.00	0.00	0.00
3,360.0	7.54	214.65	3,346.1	-180.5	-124.7	-111.5	0.00	0.00	0.00
3,400.0	7.54	214.65	3,385.7	-184.8	-127.7	-114.1	0.00	0.00	0.00
3,440.0	7.54	214.65	3,425.4	-189.1	-130.7	-116.8	0.00	0.00	0.00
3,480.0	7.54	214.65	3,465.1	-193.4	-133.7	-119.5	0.00	0.00	0.00
3,520.0	7.54	214.65	3,504.7	-197.7	-136.7	-122.1	0.00	0.00	0.00
3,560.0	7.54	214.65	3,544.4	-202.1	-139.7	-124.8	0.00	0.00	0.00
3,600.0	7.54	214.65	3,584.0	-206.4	-142.6	-127.5	0.00	0.00	0.00
3,640.0	7.54	214.65	3,623.7	-210.7	-145.6	-130.1	0.00	0.00	0.00
3,680.0	7.54	214.65	3,663.3	-215.0	-148.6	-132.8	0.00	0.00	0.00
3,720.0	7.54	214.65	3,703.0	-219.3	-151.6	-135.5	0.00	0.00	0.00
3,760.0	7.54	214.65	3,742.6	-223.6	-154.6	-138.1	0.00	0.00	0.00
3,800.0	7.54	214.65	3,782.3	-228.0	-157.6	-140.8	0.00	0.00	0.00
3,840.0	7.54	214.65	3,821.9	-232.3	-160.5	-143.5	0.00	0.00	0.00
3,880.0	7.54	214.65	3,861.6	-236.6	-163.5	-146.1	0.00	0.00	0.00
3,920.0	7.54	214.65	3,901.2	-240.9	-166.5	-148.8	0.00	0.00	0.00
3,960.0	7.54	214.65	3,940.9	-245.2	-169.5	-151.5	0.00	0.00	0.00
4,000.0	7.54	214.65	3,980.6	-249.5	-172.5	-154.1	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 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-12-12)		

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)
4,040.0	7.54	214.65	4,020.2	-253.9	-175.5	-156.8	0.00	0.00	0.00
4,080.0	7.54	214.65	4,059.9	-258.2	-178.5	-159.5	0.00	0.00	0.00
4,120.0	7.54	214.65	4,099.5	-262.5	-181.4	-162.1	0.00	0.00	0.00
4,160.0	7.54	214.65	4,139.2	-266.8	-184.4	-164.8	0.00	0.00	0.00
4,200.0	7.54	214.65	4,178.8	-271.1	-187.4	-167.5	0.00	0.00	0.00
4,240.0	7.54	214.65	4,218.5	-275.5	-190.4	-170.2	0.00	0.00	0.00
4,280.0	7.54	214.65	4,258.1	-279.8	-193.4	-172.8	0.00	0.00	0.00
4,320.0	7.54	214.65	4,297.8	-284.1	-196.4	-175.5	0.00	0.00	0.00
4,360.0	7.54	214.65	4,337.4	-288.4	-199.3	-178.2	0.00	0.00	0.00
4,400.0	7.54	214.65	4,377.1	-292.7	-202.3	-180.8	0.00	0.00	0.00
4,440.0	7.54	214.65	4,416.8	-297.0	-205.3	-183.5	0.00	0.00	0.00
4,480.0	7.54	214.65	4,456.4	-301.4	-208.3	-186.2	0.00	0.00	0.00
4,520.0	7.54	214.65	4,496.1	-305.7	-211.3	-188.8	0.00	0.00	0.00
4,560.0	7.54	214.65	4,535.7	-310.0	-214.3	-191.5	0.00	0.00	0.00
4,600.0	7.54	214.65	4,575.4	-314.3	-217.2	-194.2	0.00	0.00	0.00
4,640.0	7.54	214.65	4,615.0	-318.6	-220.2	-196.8	0.00	0.00	0.00
4,649.1	7.54	214.65	4,624.1	-319.6	-220.9	-197.4	0.00	0.00	0.00
4,680.0	6.92	214.65	4,654.7	-322.8	-223.1	-199.4	2.00	-2.00	0.00
4,720.0	6.12	214.65	4,694.4	-326.6	-225.7	-201.7	2.00	-2.00	0.00
4,760.0	5.32	214.65	4,734.2	-329.8	-228.0	-203.7	2.00	-2.00	0.00
4,800.0	4.52	214.65	4,774.1	-332.7	-229.9	-205.5	2.00	-2.00	0.00
4,840.0	3.72	214.65	4,814.0	-335.0	-231.6	-206.9	2.00	-2.00	0.00
4,880.0	2.92	214.65	4,853.9	-336.9	-232.9	-208.1	2.00	-2.00	0.00
4,920.0	2.12	214.65	4,893.9	-338.4	-233.9	-209.0	2.00	-2.00	0.00
4,960.0	1.32	214.65	4,933.9	-339.4	-234.6	-209.6	2.00	-2.00	0.00
5,000.0	0.52	214.65	4,973.9	-339.9	-234.9	-210.0	2.00	-2.00	0.00
5,026.1	0.00	0.00	5,000.0	-340.0	-235.0	-210.0	2.00	-2.00	0.00
5,040.0	0.00	0.00	5,013.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,080.0	0.00	0.00	5,053.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,120.0	0.00	0.00	5,093.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,160.0	0.00	0.00	5,133.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,173.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,240.0	0.00	0.00	5,213.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,280.0	0.00	0.00	5,253.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,320.0	0.00	0.00	5,293.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,360.0	0.00	0.00	5,333.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,400.0	0.00	0.00	5,373.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,440.0	0.00	0.00	5,413.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,480.0	0.00	0.00	5,453.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,520.0	0.00	0.00	5,493.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,560.0	0.00	0.00	5,533.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,573.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,640.0	0.00	0.00	5,613.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,680.0	0.00	0.00	5,653.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,720.0	0.00	0.00	5,693.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,760.0	0.00	0.00	5,733.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,773.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,840.0	0.00	0.00	5,813.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,880.0	0.00	0.00	5,853.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,920.0	0.00	0.00	5,893.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
5,960.0	0.00	0.00	5,933.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,000.0	0.00	0.00	5,973.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,040.0	0.00	0.00	6,013.9	-340.0	-235.0	-210.0	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-12-12)		

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)
6,080.0	0.00	0.00	6,053.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,120.0	0.00	0.00	6,093.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,160.0	0.00	0.00	6,133.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,173.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,240.0	0.00	0.00	6,213.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,280.0	0.00	0.00	6,253.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,320.0	0.00	0.00	6,293.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,360.0	0.00	0.00	6,333.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,400.0	0.00	0.00	6,373.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,440.0	0.00	0.00	6,413.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,480.0	0.00	0.00	6,453.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,520.0	0.00	0.00	6,493.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,560.0	0.00	0.00	6,533.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,573.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,640.0	0.00	0.00	6,613.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,680.0	0.00	0.00	6,653.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,720.0	0.00	0.00	6,693.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,760.0	0.00	0.00	6,733.9	-340.0	-235.0	-210.0	0.00	0.00	0.00
6,763.4	0.00	0.00	6,737.3	-340.0	-235.0	-210.0	0.00	0.00	0.00
KOP #2									
6,800.0	2.75	89.85	6,773.8	-340.0	-234.1	-209.1	7.50	7.50	0.00
6,840.0	5.75	89.85	6,813.7	-340.0	-231.2	-206.2	7.50	7.50	0.00
6,880.0	8.75	89.85	6,853.4	-340.0	-226.1	-201.2	7.50	7.50	0.00
6,920.0	11.75	89.85	6,892.8	-340.0	-219.0	-194.1	7.50	7.50	0.00
6,960.0	14.75	89.85	6,931.7	-339.9	-209.8	-184.9	7.50	7.50	0.00
7,000.0	17.75	89.85	6,970.1	-339.9	-198.7	-173.8	7.50	7.50	0.00
7,040.0	20.75	89.85	7,007.8	-339.9	-185.5	-160.6	7.50	7.50	0.00
7,080.0	23.75	89.85	7,044.9	-339.8	-170.3	-145.5	7.50	7.50	0.00
7,120.0	26.75	89.85	7,081.0	-339.8	-153.3	-128.5	7.50	7.50	0.00
7,160.0	29.75	89.85	7,116.3	-339.7	-134.3	-109.6	7.50	7.50	0.00
7,200.0	32.75	89.85	7,150.5	-339.7	-113.6	-88.9	7.50	7.50	0.00
7,240.0	35.75	89.85	7,183.5	-339.6	-91.1	-66.5	7.50	7.50	0.00
7,280.0	38.75	89.85	7,215.4	-339.6	-66.9	-42.4	7.50	7.50	0.00
7,320.0	41.75	89.85	7,245.9	-339.5	-41.0	-16.6	7.50	7.50	0.00
7,360.0	44.75	89.85	7,275.0	-339.4	-13.6	10.7	7.50	7.50	0.00
7,400.0	47.75	89.85	7,302.7	-339.3	15.3	39.5	7.50	7.50	0.00
7,440.0	50.75	89.85	7,328.8	-339.3	45.5	69.8	7.50	7.50	0.00
7,480.0	53.75	89.85	7,353.3	-339.2	77.2	101.3	7.50	7.50	0.00
7,520.0	56.75	89.85	7,376.1	-339.1	110.0	134.1	7.50	7.50	0.00
7,560.0	59.75	89.85	7,397.1	-339.0	144.0	168.0	7.50	7.50	0.00
7,600.0	62.75	89.85	7,416.4	-338.9	179.1	202.9	7.50	7.50	0.00
7,640.0	65.75	89.85	7,433.8	-338.8	215.1	238.9	7.50	7.50	0.00
7,680.0	68.75	89.85	7,449.2	-338.7	252.0	275.6	7.50	7.50	0.00
7,720.0	71.75	89.85	7,462.7	-338.6	289.6	313.2	7.50	7.50	0.00
7,760.0	74.75	89.85	7,474.3	-338.5	327.9	351.4	7.50	7.50	0.00
7,800.0	77.75	89.85	7,483.8	-338.4	366.8	390.1	7.50	7.50	0.00
7,840.0	80.75	89.85	7,491.2	-338.3	406.1	429.3	7.50	7.50	0.00
7,880.0	83.75	89.85	7,496.6	-338.2	445.7	468.8	7.50	7.50	0.00
7,883.4	84.00	89.85	7,497.0	-338.2	449.1	472.2	7.48	7.48	0.00
7"									
7,920.0	84.00	89.85	7,500.8	-338.1	485.5	508.5	0.00	0.00	0.00
7,957.4	84.00	89.85	7,504.7	-338.0	522.7	545.6	0.00	0.00	0.00
7,960.0	84.13	89.85	7,505.0	-338.0	525.3	548.2	5.00	5.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-12-12)		

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)
8,000.0	86.13	89.85	7,508.4	-337.9	565.1	587.9	5.00	5.00	0.00
8,040.0	88.13	89.85	7,510.4	-337.8	605.1	627.7	5.00	5.00	0.00
8,080.0	90.13	89.85	7,511.0	-337.7	645.1	667.6	5.00	5.00	0.00
8,082.1	90.23	89.85	7,511.0	-337.7	647.2	669.7	4.96	4.96	0.00
End of Build									
8,120.0	90.23	89.85	7,510.9	-337.6	685.1	707.5	0.00	0.00	0.00
8,160.0	90.23	89.85	7,510.7	-337.5	725.1	747.4	0.00	0.00	0.00
8,200.0	90.23	89.85	7,510.5	-337.4	765.1	787.3	0.00	0.00	0.00
8,240.0	90.23	89.85	7,510.4	-337.3	805.1	827.2	0.00	0.00	0.00
8,280.0	90.23	89.85	7,510.2	-337.2	845.1	867.1	0.00	0.00	0.00
8,320.0	90.23	89.85	7,510.0	-337.1	885.1	907.0	0.00	0.00	0.00
8,360.0	90.23	89.85	7,509.9	-337.0	925.1	946.8	0.00	0.00	0.00
8,400.0	90.23	89.85	7,509.7	-336.9	965.1	986.7	0.00	0.00	0.00
8,440.0	90.23	89.85	7,509.5	-336.8	1,005.1	1,026.6	0.00	0.00	0.00
8,480.0	90.23	89.85	7,509.4	-336.6	1,045.1	1,066.5	0.00	0.00	0.00
8,520.0	90.23	89.85	7,509.2	-336.5	1,085.1	1,106.4	0.00	0.00	0.00
8,560.0	90.23	89.85	7,509.0	-336.4	1,125.1	1,146.3	0.00	0.00	0.00
8,600.0	90.23	89.85	7,508.9	-336.3	1,165.1	1,186.2	0.00	0.00	0.00
8,640.0	90.23	89.85	7,508.7	-336.2	1,205.1	1,226.1	0.00	0.00	0.00
8,680.0	90.23	89.85	7,508.6	-336.1	1,245.1	1,266.0	0.00	0.00	0.00
8,720.0	90.23	89.85	7,508.4	-336.0	1,285.1	1,305.8	0.00	0.00	0.00
8,760.0	90.23	89.85	7,508.2	-335.9	1,325.1	1,345.7	0.00	0.00	0.00
8,800.0	90.23	89.85	7,508.1	-335.8	1,365.1	1,385.6	0.00	0.00	0.00
8,840.0	90.23	89.85	7,507.9	-335.7	1,405.1	1,425.5	0.00	0.00	0.00
8,880.0	90.23	89.85	7,507.7	-335.6	1,445.1	1,465.4	0.00	0.00	0.00
8,920.0	90.23	89.85	7,507.6	-335.5	1,485.1	1,505.3	0.00	0.00	0.00
8,960.0	90.23	89.85	7,507.4	-335.4	1,525.1	1,545.2	0.00	0.00	0.00
9,000.0	90.23	89.85	7,507.2	-335.3	1,565.1	1,585.1	0.00	0.00	0.00
9,040.0	90.23	89.85	7,507.1	-335.2	1,605.1	1,625.0	0.00	0.00	0.00
9,080.0	90.23	89.85	7,506.9	-335.1	1,645.1	1,664.9	0.00	0.00	0.00
9,120.0	90.23	89.85	7,506.8	-335.0	1,685.1	1,704.7	0.00	0.00	0.00
9,160.0	90.23	89.85	7,506.6	-334.9	1,725.1	1,744.6	0.00	0.00	0.00
9,200.0	90.23	89.85	7,506.4	-334.8	1,765.1	1,784.5	0.00	0.00	0.00
9,240.0	90.23	89.85	7,506.3	-334.7	1,805.1	1,824.4	0.00	0.00	0.00
9,280.0	90.23	89.85	7,506.1	-334.6	1,845.1	1,864.3	0.00	0.00	0.00
9,320.0	90.23	89.85	7,505.9	-334.4	1,885.1	1,904.2	0.00	0.00	0.00
9,360.0	90.23	89.85	7,505.8	-334.3	1,925.1	1,944.1	0.00	0.00	0.00
9,400.0	90.23	89.85	7,505.6	-334.2	1,965.1	1,984.0	0.00	0.00	0.00
9,440.0	90.23	89.85	7,505.4	-334.1	2,005.1	2,023.9	0.00	0.00	0.00
9,480.0	90.23	89.85	7,505.3	-334.0	2,045.1	2,063.7	0.00	0.00	0.00
9,520.0	90.23	89.85	7,505.1	-333.9	2,085.1	2,103.6	0.00	0.00	0.00
9,560.0	90.23	89.85	7,505.0	-333.8	2,125.1	2,143.5	0.00	0.00	0.00
9,600.0	90.23	89.85	7,504.8	-333.7	2,165.1	2,183.4	0.00	0.00	0.00
9,640.0	90.23	89.85	7,504.6	-333.6	2,205.1	2,223.3	0.00	0.00	0.00
9,680.0	90.23	89.85	7,504.5	-333.5	2,245.1	2,263.2	0.00	0.00	0.00
9,720.0	90.23	89.85	7,504.3	-333.4	2,285.1	2,303.1	0.00	0.00	0.00
9,760.0	90.23	89.85	7,504.1	-333.3	2,325.1	2,343.0	0.00	0.00	0.00
9,800.0	90.23	89.85	7,504.0	-333.2	2,365.1	2,382.9	0.00	0.00	0.00
9,840.0	90.23	89.85	7,503.8	-333.1	2,405.1	2,422.7	0.00	0.00	0.00
9,880.0	90.23	89.85	7,503.6	-333.0	2,445.1	2,462.6	0.00	0.00	0.00
9,920.0	90.23	89.85	7,503.5	-332.9	2,485.1	2,502.5	0.00	0.00	0.00
9,960.0	90.23	89.85	7,503.3	-332.8	2,525.1	2,542.4	0.00	0.00	0.00
10,000.0	90.23	89.85	7,503.2	-332.7	2,565.0	2,582.3	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-12-12)		

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)
10,040.0	90.23	89.85	7,503.0	-332.6	2,605.0	2,622.2	0.00	0.00	0.00
10,080.0	90.23	89.85	7,502.8	-332.5	2,645.0	2,662.1	0.00	0.00	0.00
10,120.0	90.23	89.85	7,502.7	-332.4	2,685.0	2,702.0	0.00	0.00	0.00
10,160.0	90.23	89.85	7,502.5	-332.2	2,725.0	2,741.9	0.00	0.00	0.00
10,200.0	90.23	89.85	7,502.3	-332.1	2,765.0	2,781.7	0.00	0.00	0.00
10,240.0	90.23	89.85	7,502.2	-332.0	2,805.0	2,821.6	0.00	0.00	0.00
10,280.0	90.23	89.85	7,502.0	-331.9	2,845.0	2,861.5	0.00	0.00	0.00
10,320.0	90.23	89.85	7,501.8	-331.8	2,885.0	2,901.4	0.00	0.00	0.00
10,360.0	90.23	89.85	7,501.7	-331.7	2,925.0	2,941.3	0.00	0.00	0.00
10,400.0	90.23	89.85	7,501.5	-331.6	2,965.0	2,981.2	0.00	0.00	0.00
10,440.0	90.23	89.85	7,501.3	-331.5	3,005.0	3,021.1	0.00	0.00	0.00
10,480.0	90.23	89.85	7,501.2	-331.4	3,045.0	3,061.0	0.00	0.00	0.00
10,520.0	90.23	89.85	7,501.0	-331.3	3,085.0	3,100.9	0.00	0.00	0.00
10,560.0	90.23	89.85	7,500.9	-331.2	3,125.0	3,140.7	0.00	0.00	0.00
10,600.0	90.23	89.85	7,500.7	-331.1	3,165.0	3,180.6	0.00	0.00	0.00
10,640.0	90.23	89.85	7,500.5	-331.0	3,205.0	3,220.5	0.00	0.00	0.00
10,680.0	90.23	89.85	7,500.4	-330.9	3,245.0	3,260.4	0.00	0.00	0.00
10,720.0	90.23	89.85	7,500.2	-330.8	3,285.0	3,300.3	0.00	0.00	0.00
10,760.0	90.23	89.85	7,500.0	-330.7	3,325.0	3,340.2	0.00	0.00	0.00
10,800.0	90.23	89.85	7,499.9	-330.6	3,365.0	3,380.1	0.00	0.00	0.00
10,840.0	90.23	89.85	7,499.7	-330.5	3,405.0	3,420.0	0.00	0.00	0.00
10,880.0	90.23	89.85	7,499.5	-330.4	3,445.0	3,459.9	0.00	0.00	0.00
10,920.0	90.23	89.85	7,499.4	-330.3	3,485.0	3,499.7	0.00	0.00	0.00
10,960.0	90.23	89.85	7,499.2	-330.2	3,525.0	3,539.6	0.00	0.00	0.00
11,000.0	90.23	89.85	7,499.1	-330.0	3,565.0	3,579.5	0.00	0.00	0.00
11,040.0	90.23	89.85	7,498.9	-329.9	3,605.0	3,619.4	0.00	0.00	0.00
11,080.0	90.23	89.85	7,498.7	-329.8	3,645.0	3,659.3	0.00	0.00	0.00
11,120.0	90.23	89.85	7,498.6	-329.7	3,685.0	3,699.2	0.00	0.00	0.00
11,160.0	90.23	89.85	7,498.4	-329.6	3,725.0	3,739.1	0.00	0.00	0.00
11,200.0	90.23	89.85	7,498.2	-329.5	3,765.0	3,779.0	0.00	0.00	0.00
11,240.0	90.23	89.85	7,498.1	-329.4	3,805.0	3,818.9	0.00	0.00	0.00
11,280.0	90.23	89.85	7,497.9	-329.3	3,845.0	3,858.8	0.00	0.00	0.00
11,320.0	90.23	89.85	7,497.7	-329.2	3,885.0	3,898.6	0.00	0.00	0.00
11,360.0	90.23	89.85	7,497.6	-329.1	3,925.0	3,938.5	0.00	0.00	0.00
11,400.0	90.23	89.85	7,497.4	-329.0	3,965.0	3,978.4	0.00	0.00	0.00
11,440.0	90.23	89.85	7,497.3	-328.9	4,005.0	4,018.3	0.00	0.00	0.00
11,480.0	90.23	89.85	7,497.1	-328.8	4,045.0	4,058.2	0.00	0.00	0.00
11,520.0	90.23	89.85	7,496.9	-328.7	4,085.0	4,098.1	0.00	0.00	0.00
11,560.0	90.23	89.85	7,496.8	-328.6	4,125.0	4,138.0	0.00	0.00	0.00
11,600.0	90.23	89.85	7,496.6	-328.5	4,165.0	4,177.9	0.00	0.00	0.00
11,640.0	90.23	89.85	7,496.4	-328.4	4,205.0	4,217.8	0.00	0.00	0.00
11,680.0	90.23	89.85	7,496.3	-328.3	4,245.0	4,257.6	0.00	0.00	0.00
11,720.0	90.23	89.85	7,496.1	-328.2	4,285.0	4,297.5	0.00	0.00	0.00
11,760.0	90.23	89.85	7,495.9	-328.1	4,325.0	4,337.4	0.00	0.00	0.00
11,800.0	90.23	89.85	7,495.8	-328.0	4,365.0	4,377.3	0.00	0.00	0.00
11,840.0	90.23	89.85	7,495.6	-327.8	4,405.0	4,417.2	0.00	0.00	0.00
11,880.0	90.23	89.85	7,495.5	-327.7	4,445.0	4,457.1	0.00	0.00	0.00
11,920.0	90.23	89.85	7,495.3	-327.6	4,485.0	4,497.0	0.00	0.00	0.00
11,960.0	90.23	89.85	7,495.1	-327.5	4,525.0	4,536.9	0.00	0.00	0.00
11,990.5	90.23	89.85	7,495.0	-327.5	4,555.5	4,567.3	0.00	0.00	0.00
BHL 640°FNL, 500°FEL									

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (6-12-12)		

Targets

Target Name

- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
SECTION LINE 285'W	0.00	0.00	1.0	100.0	-285.0	1,455,666.54	3,201,785.27	40.581934	-104.773526
- plan misses target center by 302.0ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,455,666.54	3,201,785.27		
Point 2			1.0	-600.0	0.0	1,455,066.58	3,201,790.19		
BHL 640'FNL, 500'FE	0.00	0.00	7,495.0	-327.5	4,555.5	1,455,278.83	3,206,629.00	40.580760	-104.756100
- plan hits target center									
- Point									
HARDLINE SHL 460'f	0.00	0.00	1.0	100.0	175.0	1,455,670.32	3,202,245.24	40.581934	-104.771870
- plan misses target center by 201.6ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,455,670.32	3,202,245.24		
Point 2			1.0	-600.0	0.0	1,455,070.35	3,202,250.16		
HARDLINE BHL 460'f	0.00	0.00	1.0	100.0	4,595.5	1,455,706.58	3,206,665.47	40.581933	-104.755956
- plan misses target center by 4596.6ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,455,706.58	3,206,665.47		
Point 2			1.0	-600.0	0.0	1,455,106.62	3,206,670.39		

Casing Points

Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter
(ft)	(ft)		(")	(")
7,883.4	7,497.0	7"	7	7-1/2

Plan Annotations

Measured Depth	Vertical Depth	Local Coordinates		
(ft)	(ft)	+N/-S	+E/-W	Comment
(ft)	(ft)	(ft)	(ft)	
1,500.0	1,500.0	0.0	0.0	KOP #1
6,763.4	6,737.3	-340.0	-235.0	KOP #2
8,082.1	7,511.0	-337.7	647.2	End of Build



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15E-432

Wellbore #1

Plan #1 (6-12-12)

Anticollision Report

27 June, 2012



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (6-12-12)		
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	11,990.5	Plan #1 (6-12-12) (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)	1,500.0	1,500.0	32.8	26.3	5.031	CC, ES
Thornton 15E-232 - Wellbore #1 - Plan #1 (6-12-12)	11,990.5	11,808.6	480.1	239.7	1.997	SF
Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)	600.0	600.0	29.1	26.7	11.788	CC, ES
Thornton 15F-212 - Wellbore #1 - Plan #1 (6-13-12)	11,990.5	11,864.7	480.0	238.1	1.984	SF
Thornton 15F-432 - Wellbore #1 - Plan #1 (6-13-12)	200.0	200.0	58.3	57.6	86.436	CC, ES
Thornton 15F-432 - Wellbore #1 - Plan #1 (6-13-12)	11,990.5	12,082.9	878.0	617.0	3.364	SF

Offset Design												
Thornton Pad Sec.15-T7N-R66W - Thornton 15E-232 - 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	32.8	0.0	32.8			
100.0	100.0	100.0	100.0	0.1	0.1	0.00	32.8	0.0	32.8	32.6	0.22	145.899
200.0	200.0	200.0	200.0	0.3	0.3	0.00	32.8	0.0	32.8	32.1	0.67	48.633
300.0	300.0	300.0	300.0	0.6	0.6	0.00	32.8	0.0	32.8	31.7	1.12	29.180
400.0	400.0	400.0	400.0	0.8	0.8	0.00	32.8	0.0	32.8	31.2	1.57	20.843
500.0	500.0	500.0	500.0	1.0	1.0	0.00	32.8	0.0	32.8	30.8	2.02	16.211
600.0	600.0	600.0	600.0	1.2	1.2	0.00	32.8	0.0	32.8	30.3	2.47	13.264
700.0	700.0	700.0	700.0	1.5	1.5	0.00	32.8	0.0	32.8	29.9	2.92	11.223
800.0	800.0	800.0	800.0	1.7	1.7	0.00	32.8	0.0	32.8	29.4	3.37	9.727
900.0	900.0	900.0	900.0	1.9	1.9	0.00	32.8	0.0	32.8	29.0	3.82	8.582
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	0.00	32.8	0.0	32.8	28.5	4.27	7.679
1,100.0	1,100.0	1,100.0	1,100.0	2.4	2.4	0.00	32.8	0.0	32.8	28.1	4.72	6.948
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	0.00	32.8	0.0	32.8	27.6	5.17	6.343
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	0.00	32.8	0.0	32.8	27.2	5.62	5.836
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	0.00	32.8	0.0	32.8	26.7	6.07	5.404
1,500.0	1,500.0	1,500.0	1,500.0	3.3	3.3	0.00	32.8	0.0	32.8	26.3	6.52	5.031 CC, ES
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	146.99	32.8	0.0	34.2	27.3	6.94	4.934
1,700.0	1,699.8	1,699.8	1,699.8	3.6	3.7	151.17	32.8	0.0	38.7	31.4	7.34	5.281
1,800.0	1,799.5	1,799.5	1,799.5	3.8	3.9	156.28	32.8	0.0	46.6	38.8	7.73	6.025
1,877.0	1,875.9	1,875.9	1,875.9	4.0	4.1	160.03	32.8	0.0	55.0	47.0	8.03	6.851
1,900.0	1,898.7	1,898.7	1,898.7	4.0	4.2	161.05	32.8	0.0	57.9	49.7	8.12	7.122

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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
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)				
2,000.0	1,997.8	1,997.8	1,997.8	4.3	4.4	164.51	32.8	0.0	70.4	61.9	8.54	8.246			
2,100.0	2,097.0	2,097.0	2,097.0	4.5	4.6	166.93	32.8	0.0	83.1	74.2	8.96	9.280			
2,200.0	2,196.1	2,196.1	2,196.1	4.7	4.8	168.70	32.8	0.0	96.0	86.6	9.38	10.229			
2,300.0	2,295.3	2,295.3	2,295.3	5.0	5.0	170.05	32.8	0.0	108.9	99.1	9.81	11.098			
2,400.0	2,394.4	2,394.4	2,394.4	5.3	5.3	171.12	32.8	0.0	121.8	111.6	10.24	11.896			
2,500.0	2,493.5	2,493.5	2,493.5	5.6	5.5	171.98	32.8	0.0	134.8	124.1	10.67	12.629			
2,600.0	2,592.7	2,592.7	2,592.7	5.8	5.7	172.69	32.8	0.0	147.8	136.7	11.11	13.305			
2,700.0	2,691.8	2,691.8	2,691.8	6.1	5.9	173.28	32.8	0.0	160.8	149.3	11.55	13.927			
2,800.0	2,790.9	2,790.9	2,790.9	6.4	6.2	173.79	32.8	0.0	173.9	161.9	11.99	14.504			
2,900.0	2,890.1	2,890.1	2,890.1	6.7	6.4	174.23	32.8	0.0	186.9	174.5	12.43	15.038			
3,000.0	2,989.2	2,989.2	2,989.2	7.0	6.6	174.60	32.8	0.0	200.0	187.1	12.87	15.534			
3,100.0	3,088.3	3,089.8	3,089.8	7.3	6.8	174.57	33.2	-1.3	212.7	199.4	13.32	15.977			
3,200.0	3,187.5	3,190.7	3,190.5	7.7	7.0	173.65	34.6	-6.1	224.8	211.0	13.75	16.342			
3,300.0	3,286.6	3,291.3	3,290.8	8.0	7.3	171.99	37.0	-14.2	236.2	222.0	14.20	16.629			
3,400.0	3,385.7	3,391.6	3,390.4	8.3	7.5	169.68	40.4	-25.6	247.3	232.6	14.67	16.856			
3,500.0	3,484.9	3,490.5	3,488.3	8.6	7.7	167.06	44.5	-39.2	258.5	243.4	15.16	17.055			
3,600.0	3,584.0	3,589.2	3,586.0	8.9	8.0	164.65	48.5	-52.8	270.3	254.6	15.66	17.255			
3,700.0	3,683.1	3,687.9	3,683.6	9.2	8.2	162.45	52.6	-66.4	282.4	266.2	16.18	17.455			
3,800.0	3,782.3	3,786.6	3,781.3	9.6	8.5	160.42	56.6	-80.0	295.0	278.3	16.71	17.653			
3,900.0	3,881.4	3,885.3	3,878.9	9.9	8.7	158.56	60.7	-93.6	307.8	290.6	17.25	17.847			
4,000.0	3,980.6	3,984.0	3,976.6	10.2	9.0	156.86	64.7	-107.3	321.0	303.2	17.80	18.036			
4,100.0	4,079.7	4,082.7	4,074.3	10.5	9.3	155.28	68.8	-120.9	334.4	316.1	18.36	18.220			
4,200.0	4,178.8	4,181.3	4,171.9	10.9	9.5	153.83	72.9	-134.5	348.1	329.2	18.92	18.398			
4,300.0	4,278.0	4,280.0	4,269.6	11.2	9.8	152.49	76.9	-148.1	362.0	342.5	19.49	18.570			
4,400.0	4,377.1	4,378.7	4,367.2	11.5	10.1	151.24	81.0	-161.7	376.0	356.0	20.07	18.737			
4,500.0	4,476.2	4,477.4	4,464.9	11.8	10.4	150.09	85.0	-175.4	390.2	369.6	20.65	18.898			
4,600.0	4,575.4	4,576.1	4,562.6	12.2	10.7	149.02	89.1	-189.0	404.6	383.4	21.24	19.053			
4,649.1	4,624.1	4,624.6	4,610.5	12.3	10.8	148.52	91.1	-195.7	411.7	390.2	21.52	19.127			
4,700.0	4,674.6	4,674.8	4,660.3	12.5	11.0	148.06	93.1	-202.6	418.7	396.9	21.83	19.178			
4,800.0	4,774.1	4,776.6	4,761.1	12.7	11.3	147.09	97.1	-215.7	430.1	407.8	22.38	19.220			
4,900.0	4,873.9	4,880.2	4,864.2	12.9	11.5	146.30	100.0	-225.7	437.9	415.1	22.85	19.164			
5,000.0	4,973.9	4,984.4	4,968.2	13.1	11.7	145.71	101.9	-232.1	441.9	418.6	23.26	18.993			
5,026.1	5,000.0	5,011.7	4,995.5	13.1	11.8	0.24	102.2	-233.2	442.3	418.9	23.41	18.895			
5,100.0	5,073.9	5,088.9	5,072.6	13.3	11.9	0.02	102.8	-234.9	442.8	419.1	23.68	18.701			
5,200.0	5,173.9	5,190.2	5,173.9	13.4	12.1	0.00	102.8	-235.0	442.8	418.8	24.04	18.419			
5,300.0	5,273.9	5,290.2	5,273.9	13.6	12.3	0.00	102.8	-235.0	442.8	418.4	24.43	18.127			
5,400.0	5,373.9	5,390.2	5,373.9	13.7	12.5	0.00	102.8	-235.0	442.8	418.0	24.82	17.843			
5,500.0	5,473.9	5,490.2	5,473.9	13.9	12.7	0.00	102.8	-235.0	442.8	417.6	25.21	17.565			
5,600.0	5,573.9	5,590.2	5,573.9	14.1	12.9	0.00	102.8	-235.0	442.8	417.2	25.60	17.295			
5,700.0	5,673.9	5,690.2	5,673.9	14.2	13.1	0.00	102.8	-235.0	442.8	416.8	26.00	17.032			
5,800.0	5,773.9	5,790.2	5,773.9	14.4	13.4	0.00	102.8	-235.0	442.8	416.4	26.39	16.776			
5,900.0	5,873.9	5,890.2	5,873.9	14.6	13.6	0.00	102.8	-235.0	442.8	416.0	26.79	16.526			
6,000.0	5,973.9	5,990.2	5,973.9	14.8	13.8	0.00	102.8	-235.0	442.8	415.6	27.19	16.283			
6,100.0	6,073.9	6,090.2	6,073.9	14.9	14.0	0.00	102.8	-235.0	442.8	415.2	27.59	16.046			
6,200.0	6,173.9	6,190.2	6,173.9	15.1	14.2	0.00	102.8	-235.0	442.8	414.8	28.00	15.816			
6,300.0	6,273.9	6,290.2	6,273.9	15.3	14.4	0.00	102.8	-235.0	442.8	414.4	28.40	15.591			
6,400.0	6,373.9	6,390.2	6,373.9	15.5	14.6	0.00	102.8	-235.0	442.8	414.0	28.81	15.371			
6,500.0	6,473.9	6,490.2	6,473.9	15.7	14.8	0.00	102.8	-235.0	442.8	413.6	29.21	15.157			
6,565.8	6,539.6	6,555.9	6,539.6	15.8	15.0	0.00	102.8	-235.0	442.8	413.3	29.48	15.019			
6,600.0	6,573.9	6,590.2	6,573.9	15.8	15.0	0.00	102.8	-235.0	442.8	413.2	29.62	14.949			
6,614.7	6,588.6	6,604.8	6,588.5	15.9	15.1	0.03	102.8	-234.8	442.8	413.1	29.68	14.920			

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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
6,700.0	6,673.9	6,689.4	6,672.8	16.0	15.2	0.88		102.8	-228.2	442.9	412.8	30.02	14.753	
6,763.4	6,737.2	6,750.8	6,733.3	16.1	15.3	2.25		102.8	-217.6	443.2	412.9	30.28	14.636	
6,800.0	6,773.8	6,785.6	6,767.0	16.2	15.3	-86.63		102.8	-209.5	443.6	413.3	30.26	14.658	
6,850.0	6,823.7	6,832.5	6,812.0	16.3	15.4	-85.31		102.9	-196.0	444.3	414.0	30.36	14.637	
6,900.0	6,873.1	6,878.9	6,855.6	16.3	15.4	-84.03		102.9	-180.1	445.3	414.8	30.44	14.630	
6,950.0	6,922.0	6,924.8	6,897.6	16.4	15.5	-82.78		103.0	-161.7	446.4	415.9	30.51	14.633	
7,000.0	6,970.1	6,970.2	6,938.1	16.4	15.5	-81.57		103.0	-141.1	447.8	417.2	30.58	14.643	
7,050.0	7,017.2	7,015.1	6,976.8	16.4	15.6	-80.40		103.1	-118.4	449.2	418.6	30.65	14.655	
7,100.0	7,063.1	7,059.6	7,013.8	16.5	15.7	-79.28		103.1	-93.7	450.8	420.1	30.74	14.665	
7,150.0	7,107.6	7,103.7	7,049.0	16.5	15.8	-78.20		103.2	-67.2	452.5	421.7	30.85	14.668	
7,200.0	7,150.5	7,150.0	7,084.2	16.5	15.9	-77.13		103.2	-37.1	454.3	423.3	31.00	14.654	
7,250.0	7,191.6	7,190.8	7,113.7	16.5	16.1	-76.22		103.3	-8.9	456.1	424.9	31.19	14.624	
7,300.0	7,230.8	7,233.8	7,143.1	16.5	16.3	-75.31		103.4	22.5	457.9	426.5	31.44	14.566	
7,350.0	7,267.9	7,276.6	7,170.6	16.5	16.6	-74.47		103.4	55.3	459.7	428.0	31.76	14.477	
7,400.0	7,302.7	7,319.1	7,196.0	16.6	16.9	-73.68		103.5	89.3	461.5	429.4	32.16	14.351	
7,450.0	7,335.1	7,361.4	7,219.3	16.6	17.2	-72.96		103.6	124.6	463.2	430.6	32.65	14.186	
7,500.0	7,364.9	7,400.0	7,239.0	16.6	17.6	-72.35		103.7	157.8	464.8	431.6	33.22	13.994	
7,550.0	7,392.0	7,445.3	7,259.8	17.1	18.1	-71.72		103.8	198.0	466.3	432.4	33.97	13.730	
7,600.0	7,416.4	7,486.9	7,276.8	17.6	18.6	-71.20		103.8	236.1	467.7	432.9	34.80	13.439	
7,650.0	7,437.8	7,528.5	7,291.7	18.2	19.2	-70.74		103.9	274.8	469.0	433.2	35.76	13.113	
7,700.0	7,456.2	7,569.9	7,304.4	18.8	19.8	-70.35		104.0	314.2	470.0	433.2	36.84	12.759	
7,750.0	7,471.6	7,611.2	7,314.9	19.6	20.5	-70.03		104.1	354.2	470.9	432.9	38.03	12.382	
7,800.0	7,483.8	7,650.0	7,322.8	20.4	21.1	-69.79		104.2	392.2	471.7	432.4	39.30	12.001	
7,850.0	7,492.8	7,693.5	7,329.4	21.3	21.9	-69.59		104.3	435.2	472.2	431.4	40.75	11.586	
7,883.4	7,497.0	7,721.0	7,332.3	21.9	22.4	-69.51		104.3	462.5	472.4	430.7	41.75	11.314	
7,900.0	7,498.7	7,734.6	7,333.3	22.2	22.7	-69.47		104.4	476.1	472.6	430.3	42.28	11.178	
7,957.4	7,504.7	7,781.6	7,335.1	23.3	23.6	-69.12		104.5	523.0	473.9	429.8	44.08	10.750	
8,000.0	7,508.4	7,821.4	7,334.9	24.1	24.4	-68.64		104.6	562.9	475.3	429.8	45.49	10.448	
8,082.1	7,511.0	7,903.4	7,334.3	25.9	26.1	-68.23		104.7	644.9	476.4	427.9	48.51	9.821	
8,100.0	7,510.9	7,921.3	7,334.2	26.3	26.5	-68.22		104.8	662.8	476.4	427.2	49.23	9.677	
8,200.0	7,510.5	8,021.3	7,333.4	28.5	28.7	-68.18		105.0	762.8	476.5	423.2	53.35	8.932	
8,300.0	7,510.1	8,121.3	7,332.7	30.8	31.0	-68.14		105.2	862.8	476.6	419.0	57.64	8.268	
8,400.0	7,509.7	8,221.3	7,331.9	33.2	33.4	-68.10		105.4	962.8	476.7	414.6	62.08	7.679	
8,500.0	7,509.3	8,321.3	7,331.2	35.6	35.8	-68.06		105.7	1,062.8	476.8	410.2	66.63	7.156	
8,600.0	7,508.9	8,421.3	7,330.4	38.1	38.3	-68.02		105.9	1,162.7	476.9	405.6	71.27	6.691	
8,700.0	7,508.5	8,521.3	7,329.7	40.7	40.9	-67.98		106.1	1,262.7	477.0	401.0	75.99	6.277	
8,800.0	7,508.1	8,621.3	7,328.9	43.3	43.5	-67.94		106.3	1,362.7	477.1	396.3	80.76	5.907	
8,900.0	7,507.7	8,721.3	7,328.2	45.9	46.1	-67.90		106.5	1,462.7	477.1	391.6	85.58	5.575	
9,000.0	7,507.2	8,821.3	7,327.4	48.5	48.7	-67.86		106.8	1,562.7	477.2	386.8	90.45	5.276	
9,100.0	7,506.8	8,921.3	7,326.7	51.1	51.3	-67.82		107.0	1,662.7	477.3	382.0	95.35	5.006	
9,200.0	7,506.4	9,021.3	7,325.9	53.8	54.0	-67.78		107.2	1,762.7	477.4	377.1	100.28	4.761	
9,300.0	7,506.0	9,121.3	7,325.2	56.5	56.7	-67.74		107.4	1,862.7	477.5	372.3	105.23	4.538	
9,400.0	7,505.6	9,221.3	7,324.4	59.1	59.3	-67.70		107.7	1,962.7	477.6	367.4	110.21	4.334	
9,500.0	7,505.2	9,321.3	7,323.7	61.8	62.0	-67.66		107.9	2,062.7	477.7	362.5	115.20	4.147	
9,600.0	7,504.8	9,421.3	7,322.9	64.5	64.7	-67.63		108.1	2,162.7	477.8	357.6	120.20	3.975	
9,700.0	7,504.4	9,521.3	7,322.2	67.3	67.5	-67.59		108.3	2,262.7	477.9	352.7	125.22	3.816	
9,800.0	7,504.0	9,621.3	7,321.4	70.0	70.2	-67.55		108.5	2,362.7	478.0	347.7	130.25	3.670	
9,900.0	7,503.6	9,721.3	7,320.7	72.7	72.9	-67.51		108.8	2,462.7	478.1	342.8	135.29	3.534	
10,000.0	7,503.2	9,821.3	7,319.9	75.4	75.6	-67.47		109.0	2,562.7	478.2	337.8	140.34	3.407	
10,100.0	7,502.7	9,921.3	7,319.2	78.2	78.4	-67.43		109.2	2,662.7	478.3	332.9	145.40	3.289	
10,200.0	7,502.3	10,021.3	7,318.4	80.9	81.1	-67.39		109.4	2,762.7	478.3	327.9	150.46	3.179	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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	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	
10,300.0	7,501.9	10,121.3	7,317.7	83.7	83.9	-67.35	109.6	2,862.7	478.4	322.9	155.53	3.076		
10,400.0	7,501.5	10,221.3	7,316.9	86.4	86.6	-67.31	109.9	2,962.7	478.5	317.9	160.60	2.980		
10,500.0	7,501.1	10,321.3	7,316.2	89.2	89.4	-67.27	110.1	3,062.7	478.6	313.0	165.67	2.889		
10,600.0	7,500.7	10,421.3	7,315.4	91.9	92.2	-67.23	110.3	3,162.7	478.7	308.0	170.75	2.804		
10,700.0	7,500.3	10,521.3	7,314.7	94.7	94.9	-67.19	110.5	3,262.7	478.8	303.0	175.83	2.723		
10,800.0	7,499.9	10,621.3	7,313.9	97.5	97.7	-67.15	110.8	3,362.7	478.9	298.0	180.91	2.647		
10,900.0	7,499.5	10,721.3	7,313.2	100.2	100.4	-67.11	111.0	3,462.7	479.0	293.0	186.00	2.575		
11,000.0	7,499.1	10,821.3	7,312.4	103.0	103.2	-67.07	111.2	3,562.7	479.1	288.0	191.08	2.507		
11,100.0	7,498.6	10,921.3	7,311.7	105.8	106.0	-67.03	111.4	3,662.7	479.2	283.0	196.17	2.443		
11,200.0	7,498.2	11,021.3	7,310.9	108.5	108.8	-66.99	111.6	3,762.7	479.3	278.0	201.26	2.381		
11,300.0	7,497.8	11,121.3	7,310.2	111.3	111.5	-66.95	111.9	3,862.7	479.4	273.0	206.35	2.323		
11,400.0	7,497.4	11,221.3	7,309.4	114.1	114.3	-66.91	112.1	3,962.6	479.5	268.0	211.44	2.268		
11,500.0	7,497.0	11,321.3	7,308.7	116.9	117.1	-66.87	112.3	4,062.6	479.6	263.1	216.52	2.215		
11,600.0	7,496.6	11,421.3	7,307.9	119.7	119.9	-66.83	112.5	4,162.6	479.7	258.1	221.61	2.164		
11,700.0	7,496.2	11,521.3	7,307.2	122.4	122.6	-66.80	112.7	4,262.6	479.8	253.1	226.70	2.116		
11,800.0	7,495.8	11,621.3	7,306.4	125.2	125.4	-66.76	113.0	4,362.6	479.9	248.1	231.79	2.070		
11,900.0	7,495.4	11,721.3	7,305.7	128.0	128.0	-66.72	113.2	4,462.6	480.0	243.3	236.68	2.028		
11,945.7	7,495.2	11,767.0	7,305.3	129.3	128.8	-66.70	113.3	4,508.3	480.0	241.4	238.58	2.012		
11,990.5	7,495.0	11,808.6	7,305.0	130.5	129.6	-66.68	113.4	4,549.9	480.1	239.7	240.40	1.997 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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	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	-29.1	0.0	29.1					
100.0	100.0	100.0	100.0	0.1	0.1	-180.00	-29.1	0.0	29.1	28.9	0.22	129.672		
200.0	200.0	200.0	200.0	0.3	0.3	-180.00	-29.1	0.0	29.1	28.5	0.67	43.224		
300.0	300.0	300.0	300.0	0.6	0.6	-180.00	-29.1	0.0	29.1	28.0	1.12	25.934		
400.0	400.0	400.0	400.0	0.8	0.8	-180.00	-29.1	0.0	29.1	27.6	1.57	18.525		
500.0	500.0	500.0	500.0	1.0	1.0	-180.00	-29.1	0.0	29.1	27.1	2.02	14.408		
600.0	600.0	600.0	600.0	1.2	1.2	-180.00	-29.1	0.0	29.1	26.7	2.47	11.788 CC, ES		
700.0	700.0	699.0	699.0	1.5	1.4	-179.05	-30.8	-0.5	30.8	27.9	2.89	10.645		
800.0	800.0	797.8	797.6	1.7	1.6	-176.73	-35.7	-2.0	35.8	32.5	3.30	10.842		
900.0	900.0	896.1	895.5	1.9	1.8	-174.03	-43.7	-4.6	44.2	40.5	3.73	11.857		
1,000.0	1,000.0	993.7	992.4	2.1	2.1	-171.64	-54.9	-8.1	56.0	51.8	4.17	13.429		
1,100.0	1,100.0	1,090.3	1,088.0	2.4	2.3	-169.73	-69.1	-12.5	71.2	66.6	4.64	15.369		
1,200.0	1,200.0	1,188.4	1,184.4	2.6	2.6	-168.33	-85.5	-17.7	88.7	83.6	5.12	17.335		
1,300.0	1,300.0	1,286.8	1,281.3	2.8	3.0	-167.38	-102.1	-22.9	106.3	100.6	5.61	18.950		
1,400.0	1,400.0	1,385.2	1,378.2	3.0	3.3	-166.70	-118.6	-28.0	123.8	117.7	6.10	20.284		
1,500.0	1,500.0	1,483.7	1,475.1	3.3	3.7	-166.19	-135.2	-33.2	141.4	134.8	6.61	21.400		
1,600.0	1,600.0	1,582.4	1,572.3	3.5	4.0	-20.56	-151.8	-38.4	157.4	150.6	6.81	23.110		
1,700.0	1,699.8	1,681.6	1,669.9	3.6	4.4	-20.74	-168.4	-43.6	170.1	162.9	7.22	23.564		
1,800.0	1,799.5	1,781.1	1,767.9	3.8	4.8	-21.31	-185.2	-48.9	179.6	172.0	7.64	23.520		
1,877.0	1,875.9	1,857.9	1,843.5	4.0	5.1	-21.99	-198.1	-52.9	184.8	176.8	7.96	23.198		
1,900.0	1,898.7	1,880.8	1,866.1	4.0	5.2	-22.23	-201.9	-54.1	186.0	178.0	8.07	23.058		
2,000.0	1,997.8	1,980.6	1,964.3	4.3	5.6	-23.25	-218.7	-59.4	191.5	183.0	8.52	22.476		
2,100.0	2,097.0	2,080.4	2,062.5	4.5	6.0	-24.22	-235.5	-64.7	197.1	188.1	8.98	21.934		
2,200.0	2,196.1	2,180.2	2,160.8	4.7	6.4	-25.13	-252.3	-69.9	202.7	193.2	9.46	21.429		
2,300.0	2,295.3	2,280.0	2,259.0	5.0	6.8	-25.99	-269.0	-75.2	208.3	198.4	9.94	20.959		
2,400.0	2,394.4	2,379.8	2,357.2	5.3	7.2	-26.80	-285.8	-80.4	214.0	203.6	10.43	20.520		
2,500.0	2,493.5	2,479.6	2,455.5	5.6	7.6	-27.58	-302.6	-85.7	219.8	208.8	10.93	20.110		
2,600.0	2,592.7	2,579.4	2,553.7	5.8	8.0	-28.31	-319.4	-90.9	225.5	214.1	11.43	19.728		
2,700.0	2,691.8	2,679.2	2,651.9	6.1	8.4	-29.01	-336.2	-96.2	231.3	219.4	11.94	19.369		
2,800.0	2,790.9	2,779.0	2,750.2	6.4	8.8	-29.67	-352.9	-101.5	237.2	224.7	12.46	19.034		
2,900.0	2,890.1	2,878.7	2,848.4	6.7	9.2	-30.30	-369.7	-106.7	243.1	230.1	12.99	18.718		
3,000.0	2,989.2	2,978.5	2,946.6	7.0	9.6	-30.90	-386.5	-112.0	249.0	235.4	13.51	18.423		
3,100.0	3,088.3	3,078.3	3,044.9	7.3	10.0	-31.48	-403.3	-117.2	254.9	240.8	14.05	18.144		
3,200.0	3,187.5	3,178.1	3,143.1	7.7	10.4	-32.02	-420.0	-122.5	260.8	246.3	14.59	17.882		
3,300.0	3,286.6	3,277.9	3,241.3	8.0	10.8	-32.55	-436.8	-127.7	266.8	251.7	15.13	17.635		
3,400.0	3,385.7	3,377.7	3,339.5	8.3	11.2	-33.05	-453.6	-133.0	272.8	257.1	15.68	17.402		
3,500.0	3,484.9	3,477.5	3,437.8	8.6	11.6	-33.53	-470.4	-138.3	278.8	262.6	16.23	17.182		
3,600.0	3,584.0	3,577.3	3,536.0	8.9	12.0	-33.98	-487.2	-143.5	284.9	268.1	16.78	16.973		
3,700.0	3,683.1	3,677.1	3,634.2	9.2	12.4	-34.42	-503.9	-148.8	290.9	273.6	17.34	16.776		
3,800.0	3,782.3	3,776.9	3,732.5	9.6	12.8	-34.84	-520.7	-154.0	297.0	279.1	17.90	16.589		
3,900.0	3,881.4	3,876.7	3,830.7	9.9	13.2	-35.25	-537.5	-159.3	303.1	284.6	18.47	16.411		
4,000.0	3,980.6	3,976.5	3,928.9	10.2	13.6	-35.64	-554.3	-164.5	309.2	290.1	19.03	16.243		
4,100.0	4,079.7	4,076.3	4,027.2	10.5	14.0	-36.01	-571.0	-169.8	315.3	295.7	19.60	16.082		
4,200.0	4,178.8	4,176.0	4,125.4	10.9	14.4	-36.37	-587.8	-175.0	321.4	301.2	20.18	15.929		
4,300.0	4,278.0	4,275.8	4,223.6	11.2	14.8	-36.71	-604.6	-180.3	327.5	306.8	20.75	15.784		
4,400.0	4,377.1	4,375.6	4,321.9	11.5	15.2	-37.05	-621.4	-185.6	333.7	312.3	21.33	15.645		
4,500.0	4,476.2	4,475.4	4,420.1	11.8	15.6	-37.37	-638.1	-190.8	339.8	317.9	21.91	15.513		
4,600.0	4,575.4	4,575.2	4,518.3	12.2	16.0	-37.68	-654.9	-196.1	346.0	323.5	22.49	15.386		
4,649.1	4,624.1	4,624.2	4,566.6	12.3	16.2	-37.83	-663.2	-198.7	349.0	326.3	22.77	15.326		
4,700.0	4,674.6	4,675.0	4,616.5	12.5	16.4	-37.97	-671.7	-201.3	352.5	329.5	23.05	15.293		
4,800.0	4,774.1	4,774.6	4,714.6	12.7	16.8	-38.03	-688.4	-206.6	361.5	337.9	23.53	15.361		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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
4,900.0	4,873.9	4,873.9	4,812.3	12.9	17.2	-37.79	-705.1	-211.8	373.2	349.2	23.95	15.581		
5,000.0	4,973.9	4,972.7	4,909.6	13.1	17.6	-37.29	-721.8	-217.0	387.6	363.3	24.31	15.946		
5,026.1	5,000.0	4,998.5	4,935.0	13.1	17.7	177.53	-726.1	-218.4	391.9	362.3	29.54	13.264		
5,100.0	5,073.9	5,072.9	5,008.2	13.3	18.0	178.17	-738.6	-222.3	404.1	374.1	30.02	13.464		
5,200.0	5,173.9	5,187.3	5,121.3	13.4	18.4	178.96	-755.2	-227.5	418.5	388.0	30.56	13.695		
5,300.0	5,273.9	5,303.0	5,236.2	13.6	18.6	179.51	-767.5	-231.4	429.2	398.2	31.03	13.830		
5,400.0	5,373.9	5,419.5	5,352.4	13.7	18.8	179.85	-775.5	-233.9	436.0	404.6	31.44	13.868		
5,500.0	5,473.9	5,536.5	5,469.4	13.9	19.0	179.99	-779.0	-235.0	439.0	407.2	31.80	13.805		
5,600.0	5,573.9	5,641.0	5,573.9	14.1	19.1	-180.00	-779.1	-235.0	439.1	407.0	32.11	13.678		
5,700.0	5,673.9	5,741.0	5,673.9	14.2	19.2	-180.00	-779.1	-235.0	439.1	406.7	32.40	13.555		
5,800.0	5,773.9	5,841.0	5,773.9	14.4	19.3	-180.00	-779.1	-235.0	439.1	406.5	32.69	13.434		
5,900.0	5,873.9	5,941.0	5,873.9	14.6	19.5	-180.00	-779.1	-235.0	439.1	406.2	32.99	13.313		
6,000.0	5,973.9	6,041.0	5,973.9	14.8	19.6	-180.00	-779.1	-235.0	439.1	405.9	33.29	13.193		
6,100.0	6,073.9	6,141.0	6,073.9	14.9	19.7	-180.00	-779.1	-235.0	439.1	405.6	33.59	13.074		
6,200.0	6,173.9	6,241.0	6,173.9	15.1	19.8	-180.00	-779.1	-235.0	439.1	405.2	33.90	12.956		
6,300.0	6,273.9	6,341.0	6,273.9	15.3	19.9	-180.00	-779.1	-235.0	439.1	404.9	34.21	12.839		
6,400.0	6,373.9	6,441.0	6,373.9	15.5	20.1	-180.00	-779.1	-235.0	439.1	404.6	34.52	12.722		
6,500.0	6,473.9	6,541.0	6,473.9	15.7	20.2	-180.00	-779.1	-235.0	439.1	404.3	34.83	12.607		
6,600.0	6,573.9	6,641.0	6,573.9	15.8	20.3	180.00	-779.1	-235.0	439.1	404.0	35.15	12.494		
6,636.4	6,610.3	6,677.4	6,610.3	15.9	20.4	179.87	-779.1	-234.0	439.1	403.9	35.26	12.455		
6,700.0	6,673.9	6,740.5	6,673.1	16.0	20.4	179.11	-779.1	-228.2	439.2	403.8	35.40	12.405		
6,763.4	6,737.2	6,802.0	6,733.7	16.1	20.5	177.72	-779.1	-217.6	439.5	404.0	35.50	12.379		
6,800.0	6,773.8	6,836.9	6,767.5	16.2	20.5	86.89	-779.1	-209.4	439.8	408.8	31.01	14.184		
6,850.0	6,823.7	6,883.9	6,812.6	16.3	20.5	85.56	-779.1	-195.9	440.5	409.3	31.24	14.103		
6,900.0	6,873.1	6,930.4	6,856.3	16.3	20.5	84.26	-779.0	-179.9	441.5	410.0	31.44	14.043		
6,950.0	6,922.0	6,976.4	6,898.4	16.4	20.6	83.00	-779.0	-161.4	442.6	411.0	31.61	14.002		
7,000.0	6,970.1	7,021.9	6,938.9	16.4	20.6	81.77	-778.9	-140.8	443.9	412.2	31.76	13.980		
7,050.0	7,017.2	7,066.9	6,977.7	16.4	20.6	80.58	-778.9	-118.0	445.4	413.5	31.88	13.972		
7,100.0	7,063.1	7,111.5	7,014.7	16.5	20.6	79.44	-778.8	-93.2	447.0	415.0	31.98	13.976		
7,150.0	7,107.6	7,155.6	7,049.9	16.5	20.6	78.35	-778.8	-66.5	448.7	416.6	32.08	13.986		
7,200.0	7,150.5	7,200.0	7,083.7	16.5	20.6	77.30	-778.7	-37.7	450.5	418.3	32.19	13.996		
7,250.0	7,191.6	7,242.9	7,114.6	16.5	20.6	76.33	-778.6	-8.1	452.3	420.0	32.31	13.999		
7,300.0	7,230.8	7,286.0	7,144.1	16.5	20.6	75.41	-778.6	23.4	454.2	421.7	32.47	13.987		
7,350.0	7,267.9	7,328.8	7,171.5	16.5	20.6	74.54	-778.5	56.3	456.0	423.4	32.68	13.955		
7,400.0	7,302.7	7,371.4	7,196.9	16.6	20.7	73.74	-778.4	90.4	457.9	424.9	32.99	13.877		
7,450.0	7,335.1	7,413.7	7,220.2	16.6	20.7	73.00	-778.3	125.7	459.6	426.2	33.37	13.773		
7,500.0	7,364.9	7,455.8	7,241.4	16.6	20.8	72.33	-778.2	162.1	461.3	427.4	33.86	13.624		
7,550.0	7,392.0	7,500.0	7,261.5	17.1	20.9	71.70	-778.2	201.5	462.9	428.4	34.49	13.418		
7,600.0	7,416.4	7,539.4	7,277.5	17.6	21.0	71.18	-778.1	237.4	464.3	429.0	35.24	13.173		
7,650.0	7,437.8	7,580.9	7,292.3	18.2	21.2	70.71	-778.0	276.3	465.6	429.4	36.16	12.877		
7,700.0	7,456.2	7,622.3	7,304.9	18.8	21.5	70.31	-777.9	315.7	466.7	429.5	37.22	12.541		
7,750.0	7,471.6	7,663.7	7,315.4	19.6	21.9	69.97	-777.8	355.7	467.7	429.3	38.42	12.172		
7,800.0	7,483.8	7,704.9	7,323.6	20.4	22.3	69.70	-777.7	396.1	468.5	428.7	39.78	11.779		
7,850.0	7,492.8	7,750.0	7,330.1	21.3	23.0	69.49	-777.6	440.7	469.1	427.8	41.33	11.351		
7,883.4	7,497.0	7,773.5	7,332.5	21.9	23.3	69.41	-777.6	464.1	469.4	427.0	42.34	11.087		
7,900.0	7,498.7	7,787.2	7,333.5	22.2	23.5	69.37	-777.5	477.7	469.6	426.7	42.85	10.959		
7,957.4	7,504.7	7,834.1	7,335.2	23.3	24.3	69.00	-777.4	524.6	471.0	426.3	44.64	10.551		
8,000.0	7,508.4	7,874.3	7,335.0	24.1	25.1	68.52	-777.3	564.8	472.4	426.3	46.14	10.239		
8,082.1	7,511.0	7,956.3	7,334.4	25.9	26.7	68.11	-777.1	646.8	473.6	424.2	49.37	9.593		
8,100.0	7,510.9	7,974.2	7,334.3	26.3	27.1	68.10	-777.1	664.7	473.6	423.6	50.08	9.458		
8,200.0	7,510.5	8,074.2	7,333.5	28.5	29.2	68.06	-776.9	764.7	473.8	419.6	54.18	8.745		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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	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
8,300.0	7,510.1	8,174.2	7,332.8	30.8	31.4	68.03	-776.7	864.7	474.0	415.5	58.45	8.108	
8,400.0	7,509.7	8,274.2	7,332.0	33.2	33.8	67.99	-776.4	964.7	474.1	411.3	62.87	7.541	
8,500.0	7,509.3	8,374.2	7,331.3	35.6	36.2	67.95	-776.2	1,064.7	474.3	406.9	67.40	7.037	
8,600.0	7,508.9	8,474.2	7,330.5	38.1	38.6	67.92	-776.0	1,164.7	474.5	402.4	72.02	6.588	
8,700.0	7,508.5	8,574.2	7,329.8	40.7	41.1	67.88	-775.8	1,264.7	474.6	397.9	76.72	6.186	
8,800.0	7,508.1	8,674.2	7,329.0	43.3	43.6	67.84	-775.5	1,364.7	474.8	393.3	81.47	5.827	
8,900.0	7,507.7	8,774.2	7,328.3	45.9	46.2	67.81	-775.3	1,464.7	474.9	388.7	86.28	5.504	
9,000.0	7,507.2	8,874.2	7,327.5	48.5	48.8	67.77	-775.1	1,564.7	475.1	384.0	91.13	5.213	
9,100.0	7,506.8	8,974.2	7,326.8	51.1	51.4	67.73	-774.8	1,664.7	475.3	379.2	96.01	4.950	
9,200.0	7,506.4	9,074.2	7,326.0	53.8	54.1	67.70	-774.6	1,764.7	475.4	374.5	100.93	4.711	
9,300.0	7,506.0	9,174.2	7,325.3	56.5	56.7	67.66	-774.4	1,864.7	475.6	369.7	105.87	4.492	
9,400.0	7,505.6	9,274.2	7,324.5	59.1	59.4	67.62	-774.2	1,964.7	475.7	364.9	110.83	4.293	
9,500.0	7,505.2	9,374.2	7,323.8	61.8	62.1	67.59	-773.9	2,064.7	475.9	360.1	115.80	4.110	
9,600.0	7,504.8	9,474.2	7,323.0	64.5	64.8	67.55	-773.7	2,164.7	476.1	355.3	120.80	3.941	
9,700.0	7,504.4	9,574.2	7,322.3	67.3	67.5	67.52	-773.5	2,264.7	476.2	350.4	125.80	3.786	
9,800.0	7,504.0	9,674.2	7,321.5	70.0	70.2	67.48	-773.3	2,364.7	476.4	345.6	130.82	3.642	
9,900.0	7,503.6	9,774.2	7,320.8	72.7	72.9	67.44	-773.0	2,464.7	476.6	340.7	135.85	3.508	
10,000.0	7,503.2	9,874.2	7,320.0	75.4	75.6	67.41	-772.8	2,564.7	476.7	335.8	140.89	3.384	
10,100.0	7,502.7	9,974.2	7,319.3	78.2	78.3	67.37	-772.6	2,664.7	476.9	331.0	145.94	3.268	
10,200.0	7,502.3	10,074.2	7,318.5	80.9	81.1	67.33	-772.4	2,764.7	477.1	326.1	150.99	3.160	
10,300.0	7,501.9	10,174.2	7,317.8	83.7	83.8	67.30	-772.1	2,864.7	477.2	321.2	156.05	3.058	
10,400.0	7,501.5	10,274.2	7,317.0	86.4	86.6	67.26	-771.9	2,964.7	477.4	316.3	161.11	2.963	
10,500.0	7,501.1	10,374.2	7,316.3	89.2	89.3	67.23	-771.7	3,064.7	477.5	311.4	166.17	2.874	
10,600.0	7,500.7	10,474.2	7,315.5	91.9	92.1	67.19	-771.5	3,164.6	477.7	306.5	171.24	2.790	
10,700.0	7,500.3	10,574.2	7,314.8	94.7	94.8	67.15	-771.2	3,264.6	477.9	301.6	176.32	2.710	
10,800.0	7,499.9	10,674.2	7,314.0	97.5	97.6	67.12	-771.0	3,364.6	478.0	296.7	181.39	2.635	
10,900.0	7,499.5	10,774.2	7,313.3	100.2	100.3	67.08	-770.8	3,464.6	478.2	291.7	186.47	2.565	
11,000.0	7,499.1	10,874.2	7,312.5	103.0	103.1	67.05	-770.5	3,564.6	478.4	286.8	191.55	2.497	
11,100.0	7,498.6	10,974.2	7,311.7	105.8	105.9	67.01	-770.3	3,664.6	478.5	281.9	196.63	2.434	
11,200.0	7,498.2	11,074.2	7,311.0	108.5	108.6	66.97	-770.1	3,764.6	478.7	277.0	201.71	2.373	
11,300.0	7,497.8	11,174.2	7,310.2	111.3	111.4	66.94	-769.9	3,864.6	478.9	272.1	206.79	2.316	
11,400.0	7,497.4	11,274.2	7,309.5	114.1	114.2	66.90	-769.6	3,964.6	479.0	267.2	211.88	2.261	
11,500.0	7,497.0	11,374.2	7,308.7	116.9	116.9	66.87	-769.4	4,064.6	479.2	262.2	216.96	2.209	
11,600.0	7,496.6	11,474.2	7,308.0	119.7	119.7	66.83	-769.2	4,164.6	479.4	257.3	222.05	2.159	
11,700.0	7,496.2	11,574.2	7,307.2	122.4	122.5	66.80	-769.0	4,264.6	479.5	252.4	227.13	2.111	
11,800.0	7,495.8	11,674.2	7,306.5	125.2	125.3	66.76	-768.7	4,364.6	479.7	247.5	232.21	2.066	
11,900.0	7,495.4	11,774.2	7,305.7	128.0	128.0	66.72	-768.5	4,464.6	479.9	242.6	237.30	2.022	
11,990.5	7,495.0	11,864.7	7,305.1	130.5	130.6	66.69	-768.3	4,555.1	480.0	238.1	241.89	1.984 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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	-58.3	0.0	58.3				
100.0	100.0	100.0	100.0	0.1	0.1	-180.00	-180.00	-58.3	0.0	58.3	58.1	0.22	259.308	
200.0	200.0	200.0	200.0	0.3	0.3	-180.00	-180.00	-58.3	0.0	58.3	57.6	0.67	86.436 CC, ES	
300.0	300.0	298.0	298.0	0.6	0.5	-179.67	-179.67	-59.9	-0.3	60.0	58.9	1.10	54.631	
400.0	400.0	395.8	395.6	0.8	0.7	-178.80	-178.80	-64.8	-1.4	65.0	63.5	1.53	42.578	
500.0	500.0	493.1	492.6	1.0	1.0	-177.61	-177.61	-73.0	-3.0	73.4	71.4	1.98	37.086	
600.0	600.0	589.8	588.6	1.2	1.2	-176.35	-176.35	-84.2	-5.4	85.1	82.7	2.45	34.711	
700.0	700.0	685.5	683.2	1.5	1.6	-175.17	-175.17	-98.5	-8.3	100.2	97.3	2.95	34.007	
800.0	800.0	780.2	776.3	1.7	1.9	-174.13	-174.13	-115.6	-11.9	118.6	115.2	3.46	34.254	
900.0	900.0	876.9	870.8	1.9	2.3	-173.27	-173.27	-135.4	-16.0	139.4	135.4	4.00	34.872	
1,000.0	1,000.0	974.7	966.4	2.1	2.8	-172.62	-172.62	-155.5	-20.1	160.4	155.8	4.54	35.324	
1,100.0	1,100.0	1,072.5	1,062.0	2.4	3.2	-172.12	-172.12	-175.6	-24.3	181.3	176.2	5.08	35.661	
1,200.0	1,200.0	1,170.2	1,157.6	2.6	3.6	-171.72	-171.72	-195.7	-28.5	202.3	196.6	5.63	35.915	
1,300.0	1,300.0	1,268.0	1,253.2	2.8	4.1	-171.40	-171.40	-215.8	-32.6	223.2	217.0	6.18	36.113	
1,400.0	1,400.0	1,365.8	1,348.8	3.0	4.5	-171.13	-171.13	-235.9	-36.8	244.2	237.5	6.73	36.271	
1,500.0	1,500.0	1,463.5	1,444.4	3.3	5.0	-170.91	-170.91	-256.0	-41.0	265.2	257.9	7.28	36.400	
1,600.0	1,600.0	1,561.6	1,540.3	3.5	5.4	-25.35	-25.35	-276.2	-45.2	284.6	277.5	7.10	40.102	
1,700.0	1,699.8	1,660.3	1,636.7	3.6	5.8	-25.46	-25.46	-296.5	-49.4	300.9	293.4	7.54	39.938	
1,800.0	1,799.5	1,759.4	1,733.6	3.8	6.3	-25.85	-25.85	-316.8	-53.6	314.2	306.2	7.98	39.363	
1,877.0	1,875.9	1,835.9	1,808.4	4.0	6.7	-26.33	-26.33	-332.6	-56.8	322.3	313.9	8.33	38.681	
1,900.0	1,898.7	1,858.7	1,830.8	4.0	6.8	-26.52	-26.52	-337.3	-57.8	324.4	316.0	8.44	38.442	
2,000.0	1,997.8	1,958.2	1,928.0	4.3	7.2	-27.29	-27.29	-357.7	-62.1	333.8	324.9	8.91	37.447	
2,100.0	2,097.0	2,057.7	2,025.2	4.5	7.7	-28.02	-28.02	-378.2	-66.3	343.2	333.8	9.40	36.522	
2,200.0	2,196.1	2,157.1	2,122.5	4.7	8.1	-28.71	-28.71	-398.6	-70.5	352.7	342.8	9.89	35.661	
2,300.0	2,295.3	2,256.6	2,219.7	5.0	8.6	-29.36	-29.36	-419.1	-74.8	362.2	351.8	10.39	34.859	
2,400.0	2,394.4	2,356.1	2,317.0	5.3	9.0	-29.98	-29.98	-439.5	-79.0	371.8	360.9	10.90	34.112	
2,500.0	2,493.5	2,455.5	2,414.2	5.6	9.5	-30.57	-30.57	-460.0	-83.3	381.4	370.0	11.41	33.414	
2,600.0	2,592.7	2,555.0	2,511.5	5.8	10.0	-31.13	-31.13	-480.4	-87.5	391.0	379.1	11.94	32.763	
2,700.0	2,691.8	2,654.4	2,608.7	6.1	10.4	-31.66	-31.66	-500.9	-91.7	400.7	388.2	12.46	32.153	
2,800.0	2,790.9	2,753.9	2,706.0	6.4	10.9	-32.17	-32.17	-521.3	-96.0	410.4	397.4	13.00	31.583	
2,900.0	2,890.1	2,853.4	2,803.2	6.7	11.3	-32.65	-32.65	-541.8	-100.2	420.2	406.6	13.53	31.048	
3,000.0	2,989.2	2,952.8	2,900.5	7.0	11.8	-33.11	-33.11	-562.2	-104.4	429.9	415.9	14.08	30.545	
3,100.0	3,088.3	3,052.3	2,997.7	7.3	12.2	-33.56	-33.56	-582.7	-108.7	439.7	425.1	14.62	30.073	
3,200.0	3,187.5	3,151.8	3,094.9	7.7	12.7	-33.98	-33.98	-603.1	-112.9	449.6	434.4	15.17	29.628	
3,300.0	3,286.6	3,251.2	3,192.2	8.0	13.2	-34.38	-34.38	-623.6	-117.2	459.4	443.7	15.73	29.209	
3,400.0	3,385.7	3,350.7	3,289.4	8.3	13.6	-34.77	-34.77	-644.0	-121.4	469.3	453.0	16.29	28.814	
3,500.0	3,484.9	3,450.1	3,386.7	8.6	14.1	-35.14	-35.14	-664.5	-125.6	479.2	462.3	16.85	28.440	
3,600.0	3,584.0	3,549.6	3,483.9	8.9	14.5	-35.50	-35.50	-684.9	-129.9	489.1	471.7	17.41	28.087	
3,700.0	3,683.1	3,649.1	3,581.2	9.2	15.0	-35.84	-35.84	-705.4	-134.1	499.0	481.0	17.98	27.752	
3,800.0	3,782.3	3,748.5	3,678.4	9.6	15.5	-36.17	-36.17	-725.8	-138.4	509.0	490.4	18.55	27.435	
3,900.0	3,881.4	3,848.0	3,775.7	9.9	15.9	-36.49	-36.49	-746.3	-142.6	518.9	499.8	19.13	27.133	
4,000.0	3,980.6	3,947.5	3,872.9	10.2	16.4	-36.79	-36.79	-766.7	-146.8	528.9	509.2	19.70	26.847	
4,100.0	4,079.7	4,046.9	3,970.1	10.5	16.8	-37.08	-37.08	-787.2	-151.1	538.9	518.6	20.28	26.575	
4,200.0	4,178.8	4,146.4	4,067.4	10.9	17.3	-37.37	-37.37	-807.7	-155.3	548.9	528.0	20.86	26.316	
4,300.0	4,278.0	4,245.8	4,164.6	11.2	17.8	-37.64	-37.64	-828.1	-159.5	558.9	537.5	21.44	26.069	
4,400.0	4,377.1	4,345.3	4,261.9	11.5	18.2	-37.90	-37.90	-848.6	-163.8	568.9	546.9	22.02	25.833	
4,500.0	4,476.2	4,444.8	4,359.1	11.8	18.7	-38.15	-38.15	-869.0	-168.0	579.0	556.4	22.61	25.608	
4,600.0	4,575.4	4,544.2	4,456.4	12.2	19.1	-38.40	-38.40	-889.5	-172.3	589.0	565.8	23.20	25.393	
4,649.1	4,624.1	4,593.1	4,504.1	12.3	19.4	-38.52	-38.52	-899.5	-174.3	594.0	570.5	23.49	25.291	
4,700.0	4,674.6	4,643.7	4,553.6	12.5	19.6	-38.68	-38.68	-909.9	-176.5	599.5	575.7	23.77	25.224	
4,800.0	4,774.1	4,742.8	4,650.5	12.7	20.1	-38.86	-38.86	-930.3	-180.7	612.2	588.0	24.25	25.243	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
4,900.0	4,873.9	4,841.6	4,747.1	12.9	20.5	-38.88	-950.6	-184.9	627.7	603.0	24.69	25.421	
5,000.0	4,973.9	4,939.8	4,843.2	13.1	21.0	-38.74	-970.8	-189.1	645.9	620.8	25.08	25.752	
5,026.1	5,000.0	4,965.4	4,868.2	13.1	21.1	175.97	-976.1	-190.2	651.1	618.2	32.88	19.800	
5,100.0	5,073.9	5,037.6	4,938.8	13.3	21.4	176.33	-990.9	-193.3	666.1	632.7	33.38	19.957	
5,200.0	5,173.9	5,135.4	5,034.4	13.4	21.9	176.80	-1,011.0	-197.5	686.4	652.4	34.03	20.168	
5,300.0	5,273.9	5,233.2	5,130.0	13.6	22.3	177.23	-1,031.1	-201.6	706.7	672.0	34.69	20.373	
5,400.0	5,373.9	5,331.0	5,225.6	13.7	22.8	177.65	-1,051.2	-205.8	727.1	691.8	35.34	20.572	
5,500.0	5,473.9	5,428.7	5,321.1	13.9	23.2	178.04	-1,071.3	-210.0	747.5	711.5	36.00	20.765	
5,600.0	5,573.9	5,526.5	5,416.7	14.1	23.7	178.41	-1,091.4	-214.1	768.0	731.3	36.65	20.952	
5,700.0	5,673.9	5,624.3	5,512.3	14.2	24.1	178.76	-1,111.5	-218.3	788.4	751.1	37.31	21.134	
5,800.0	5,773.9	5,725.7	5,611.5	14.4	24.6	179.10	-1,132.4	-222.6	808.9	770.9	37.97	21.307	
5,900.0	5,873.9	5,862.1	5,745.6	14.6	25.0	179.48	-1,156.7	-227.6	826.7	788.1	38.61	21.410	
6,000.0	5,973.9	6,000.6	5,882.9	14.8	25.3	179.75	-1,174.9	-231.4	839.9	800.7	39.14	21.456	
6,100.0	6,073.9	6,140.6	6,022.4	14.9	25.6	179.92	-1,186.8	-233.9	848.4	808.8	39.59	21.428	
6,200.0	6,173.9	6,281.5	6,163.1	15.1	25.8	180.00	-1,192.0	-235.0	852.0	812.1	39.96	21.321	
6,300.0	6,273.9	6,392.3	6,273.9	15.3	25.9	-180.00	-1,192.2	-235.0	852.2	811.9	40.27	21.164	
6,400.0	6,373.9	6,492.3	6,373.9	15.5	26.0	-180.00	-1,192.2	-235.0	852.2	811.6	40.54	21.020	
6,500.0	6,473.9	6,592.3	6,473.9	15.7	26.1	-180.00	-1,192.2	-235.0	852.2	811.4	40.82	20.878	
6,600.0	6,573.9	6,692.3	6,573.9	15.8	26.2	-180.00	-1,192.2	-235.0	852.2	811.1	41.10	20.735	
6,700.0	6,673.9	6,792.3	6,673.9	16.0	26.3	-180.00	-1,192.2	-235.0	852.2	810.8	41.38	20.594	
6,763.4	6,737.2	6,855.7	6,737.2	16.1	26.3	-180.00	-1,192.2	-235.0	852.2	810.6	41.56	20.505	
6,800.0	6,773.8	6,891.6	6,773.2	16.2	26.4	90.15	-1,192.2	-234.2	852.2	820.0	32.16	26.502	
6,850.0	6,823.7	6,940.7	6,822.1	16.3	26.4	90.15	-1,192.3	-230.3	852.3	820.0	32.30	26.390	
6,900.0	6,873.1	6,989.8	6,870.8	16.3	26.4	90.15	-1,192.4	-223.3	852.4	820.0	32.41	26.302	
6,950.0	6,922.0	7,039.0	6,918.8	16.4	26.5	90.15	-1,192.5	-213.1	852.6	820.1	32.50	26.234	
7,000.0	6,970.1	7,088.1	6,966.1	16.4	26.5	90.14	-1,192.8	-199.9	852.9	820.3	32.57	26.183	
7,050.0	7,017.2	7,137.3	7,012.5	16.4	26.5	90.14	-1,193.0	-183.7	853.2	820.5	32.64	26.142	
7,100.0	7,063.1	7,186.5	7,057.8	16.5	26.5	90.14	-1,193.3	-164.5	853.5	820.8	32.70	26.106	
7,150.0	7,107.6	7,235.7	7,101.8	16.5	26.5	90.13	-1,193.7	-142.5	854.0	821.2	32.76	26.064	
7,200.0	7,150.5	7,284.9	7,144.3	16.5	26.6	90.13	-1,194.1	-117.6	854.4	821.6	32.86	26.006	
7,250.0	7,191.6	7,334.2	7,185.1	16.5	26.6	90.12	-1,194.5	-90.0	855.0	822.0	32.98	25.921	
7,300.0	7,230.8	7,383.4	7,224.0	16.5	26.6	90.11	-1,195.0	-59.9	855.5	822.4	33.17	25.794	
7,350.0	7,267.9	7,432.8	7,261.0	16.5	26.6	90.11	-1,195.6	-27.2	856.2	822.7	33.43	25.614	
7,400.0	7,302.7	7,482.1	7,295.8	16.6	26.6	90.10	-1,196.1	7.7	856.8	823.1	33.78	25.367	
7,450.0	7,335.1	7,531.5	7,328.4	16.6	26.6	90.09	-1,196.7	44.9	857.6	823.3	34.24	25.045	
7,500.0	7,364.9	7,581.0	7,358.4	16.6	26.7	90.08	-1,197.4	84.2	858.3	823.5	34.83	24.640	
7,550.0	7,392.0	7,630.5	7,385.9	17.1	26.7	90.08	-1,198.0	125.3	859.1	823.5	35.57	24.153	
7,600.0	7,416.4	7,680.0	7,410.7	17.6	26.8	90.07	-1,198.7	168.2	859.9	823.4	36.46	23.586	
7,650.0	7,437.8	7,729.6	7,432.7	18.2	26.9	90.06	-1,199.4	212.6	860.7	823.2	37.50	22.950	
7,700.0	7,456.2	7,779.3	7,451.8	18.8	27.0	90.05	-1,200.2	258.4	861.6	822.9	38.71	22.258	
7,750.0	7,471.6	7,829.0	7,467.8	19.6	27.2	90.04	-1,201.0	305.5	862.5	822.4	40.07	21.525	
7,800.0	7,483.8	7,878.7	7,480.8	20.4	27.4	90.03	-1,201.7	353.5	863.4	821.8	41.57	20.768	
7,850.0	7,492.8	7,928.5	7,490.7	21.3	27.7	90.02	-1,202.5	402.3	864.3	821.1	43.21	20.003	
7,883.4	7,497.0	7,961.8	7,495.5	21.9	27.9	90.01	-1,203.1	435.2	865.0	820.6	44.36	19.497	
7,900.0	7,498.7	7,978.4	7,497.3	22.2	28.1	90.02	-1,203.3	451.7	865.3	820.3	44.96	19.247	
7,957.4	7,504.7	8,035.8	7,503.3	23.3	28.6	90.02	-1,204.3	508.8	866.4	819.3	47.10	18.396	
8,000.0	7,508.4	8,082.1	7,507.7	24.1	29.1	90.01	-1,204.9	554.9	867.1	818.3	48.83	17.758	
8,082.1	7,511.0	8,174.5	7,511.0	25.9	30.3	90.00	-1,205.5	647.1	867.8	815.4	52.38	16.567	
8,100.0	7,510.9	8,192.4	7,510.9	26.3	30.5	90.00	-1,205.5	665.1	867.8	814.7	53.14	16.332	
8,200.0	7,510.5	8,292.4	7,510.5	28.5	32.2	90.00	-1,205.5	765.1	868.1	810.6	57.50	15.097	
8,300.0	7,510.1	8,392.4	7,510.1	30.8	34.0	90.00	-1,205.5	865.1	868.4	806.3	62.06	13.992	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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 15E-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 (6-12-12)	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)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,400.0	7,509.7	8,492.4	7,509.7	33.2	36.1	90.00	90.00	-1,205.5	965.1	868.6	801.8	66.78	13.006	
8,500.0	7,509.3	8,592.4	7,509.3	35.6	38.3	90.00	90.00	-1,205.5	1,065.1	868.9	797.3	71.64	12.129	
8,600.0	7,508.9	8,692.4	7,508.9	38.1	40.5	90.00	90.00	-1,205.5	1,165.1	869.1	792.6	76.59	11.348	
8,700.0	7,508.5	8,792.4	7,508.5	40.7	42.9	90.00	90.00	-1,205.5	1,265.1	869.4	787.8	81.63	10.650	
8,800.0	7,508.1	8,892.4	7,508.1	43.3	45.3	90.00	90.00	-1,205.5	1,365.1	869.7	782.9	86.75	10.026	
8,900.0	7,507.7	8,992.4	7,507.7	45.9	47.8	90.00	90.00	-1,205.5	1,465.1	869.9	778.0	91.92	9.464	
9,000.0	7,507.2	9,092.4	7,507.3	48.5	50.3	90.00	90.00	-1,205.5	1,565.1	870.2	773.1	97.14	8.958	
9,100.0	7,506.8	9,192.4	7,506.9	51.1	52.8	90.00	90.00	-1,205.5	1,665.1	870.5	768.1	102.40	8.501	
9,200.0	7,506.4	9,292.4	7,506.5	53.8	55.4	90.00	90.00	-1,205.5	1,765.1	870.7	763.0	107.70	8.085	
9,300.0	7,506.0	9,392.4	7,506.0	56.5	57.9	90.00	90.00	-1,205.5	1,865.1	871.0	758.0	113.03	7.706	
9,400.0	7,505.6	9,492.4	7,505.6	59.1	60.6	90.00	90.00	-1,205.5	1,965.1	871.2	752.9	118.38	7.360	
9,500.0	7,505.2	9,592.4	7,505.2	61.8	63.2	90.00	90.00	-1,205.5	2,065.1	871.5	747.7	123.76	7.042	
9,600.0	7,504.8	9,692.4	7,504.8	64.5	65.8	90.00	90.00	-1,205.5	2,165.1	871.8	742.6	129.16	6.749	
9,700.0	7,504.4	9,792.4	7,504.4	67.3	68.5	90.00	90.00	-1,205.5	2,265.1	872.0	737.4	134.58	6.480	
9,800.0	7,504.0	9,892.4	7,504.0	70.0	71.2	90.00	90.00	-1,205.5	2,365.1	872.3	732.3	140.01	6.230	
9,900.0	7,503.6	9,992.4	7,503.6	72.7	73.8	90.00	90.00	-1,205.5	2,465.1	872.5	727.1	145.46	5.999	
10,000.0	7,503.2	10,092.4	7,503.2	75.4	76.5	90.00	90.00	-1,205.5	2,565.1	872.8	721.9	150.92	5.783	
10,100.0	7,502.7	10,192.4	7,502.8	78.2	79.2	90.00	90.00	-1,205.5	2,665.1	873.1	716.7	156.39	5.583	
10,200.0	7,502.3	10,292.4	7,502.4	80.9	81.9	90.00	90.00	-1,205.5	2,765.1	873.3	711.5	161.87	5.395	
10,300.0	7,501.9	10,392.4	7,502.0	83.7	84.6	90.00	90.00	-1,205.5	2,865.0	873.6	706.2	167.36	5.220	
10,400.0	7,501.5	10,492.4	7,501.6	86.4	87.3	90.00	90.00	-1,205.5	2,965.0	873.9	701.0	172.85	5.055	
10,500.0	7,501.1	10,592.4	7,501.1	89.2	90.1	90.00	90.00	-1,205.5	3,065.0	874.1	695.8	178.36	4.901	
10,600.0	7,500.7	10,692.4	7,500.7	91.9	92.8	90.00	90.00	-1,205.5	3,165.0	874.4	690.5	183.87	4.755	
10,700.0	7,500.3	10,792.4	7,500.3	94.7	95.5	90.00	90.00	-1,205.5	3,265.0	874.6	685.3	189.39	4.618	
10,800.0	7,499.9	10,892.4	7,499.9	97.5	98.3	90.00	90.00	-1,205.5	3,365.0	874.9	680.0	194.91	4.489	
10,900.0	7,499.5	10,992.4	7,499.5	100.2	101.0	90.00	90.00	-1,205.5	3,465.0	875.2	674.7	200.44	4.366	
11,000.0	7,499.1	11,092.4	7,499.1	103.0	103.8	90.00	90.00	-1,205.5	3,565.0	875.4	669.5	205.98	4.250	
11,100.0	7,498.6	11,192.4	7,498.7	105.8	106.5	90.00	90.00	-1,205.5	3,665.0	875.7	664.2	211.51	4.140	
11,200.0	7,498.2	11,292.4	7,498.3	108.5	109.3	90.00	90.00	-1,205.5	3,765.0	875.9	658.9	217.06	4.036	
11,300.0	7,497.8	11,392.4	7,497.9	111.3	112.0	90.00	90.00	-1,205.5	3,865.0	876.2	653.6	222.60	3.936	
11,400.0	7,497.4	11,492.4	7,497.5	114.1	114.8	90.00	90.00	-1,205.5	3,965.0	876.5	648.3	228.15	3.842	
11,500.0	7,497.0	11,592.4	7,497.1	116.9	117.5	90.00	90.00	-1,205.5	4,065.0	876.7	643.0	233.70	3.751	
11,600.0	7,496.6	11,692.4	7,496.7	119.7	120.3	90.00	90.00	-1,205.5	4,165.0	877.0	637.7	239.26	3.665	
11,700.0	7,496.2	11,792.4	7,496.2	122.4	123.0	90.00	90.00	-1,205.5	4,265.0	877.3	632.4	244.82	3.583	
11,800.0	7,495.8	11,892.4	7,495.8	125.2	125.8	90.00	90.00	-1,205.5	4,365.0	877.5	627.1	250.38	3.505	
11,900.0	7,495.4	11,992.4	7,495.4	128.0	128.6	90.00	90.00	-1,205.5	4,465.0	877.8	621.8	255.94	3.430	
11,990.5	7,495.0	12,082.9	7,495.1	130.5	131.1	90.00	90.00	-1,205.5	4,555.5	878.0	617.0	260.98	3.364 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 15E-432
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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 15E-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 (6-12-12)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4985.0ft (RKB Ensign 32 - 1 Coordinates are relative to: Thornton 15E-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 15E-432
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 15E-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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