

# PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Thornton 28K-223**

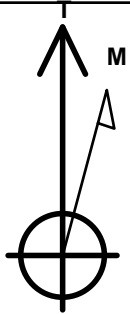
Surface Location: Thornton 28GK-HZ Pad Sec. 28-T7N-R66W  
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone  
Ground Elevation: 4895.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1442716.33	3197221.24	40.546490	-104.790330	

RKB-15' WELL @ 4910.0ft (RKB-15')

## WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
BHL 2140' FNL & 1877'FWL, SEC.33	7195.0	-5049.5	972.9	Point



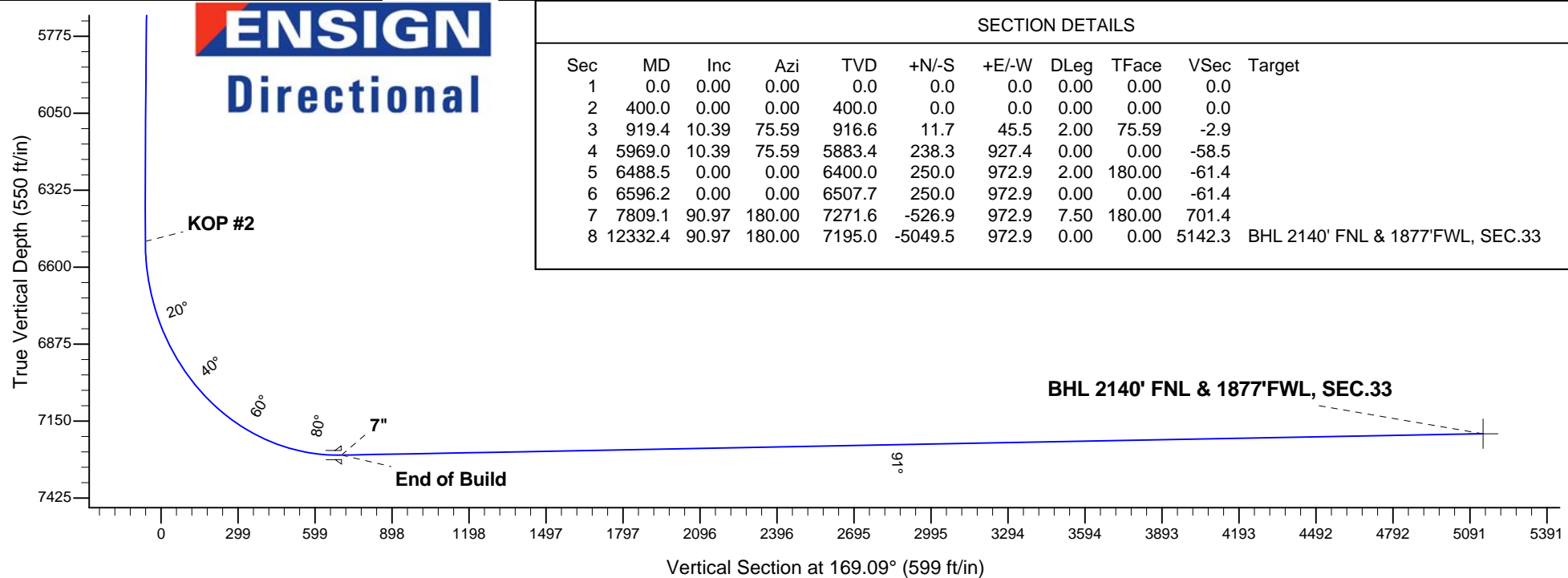
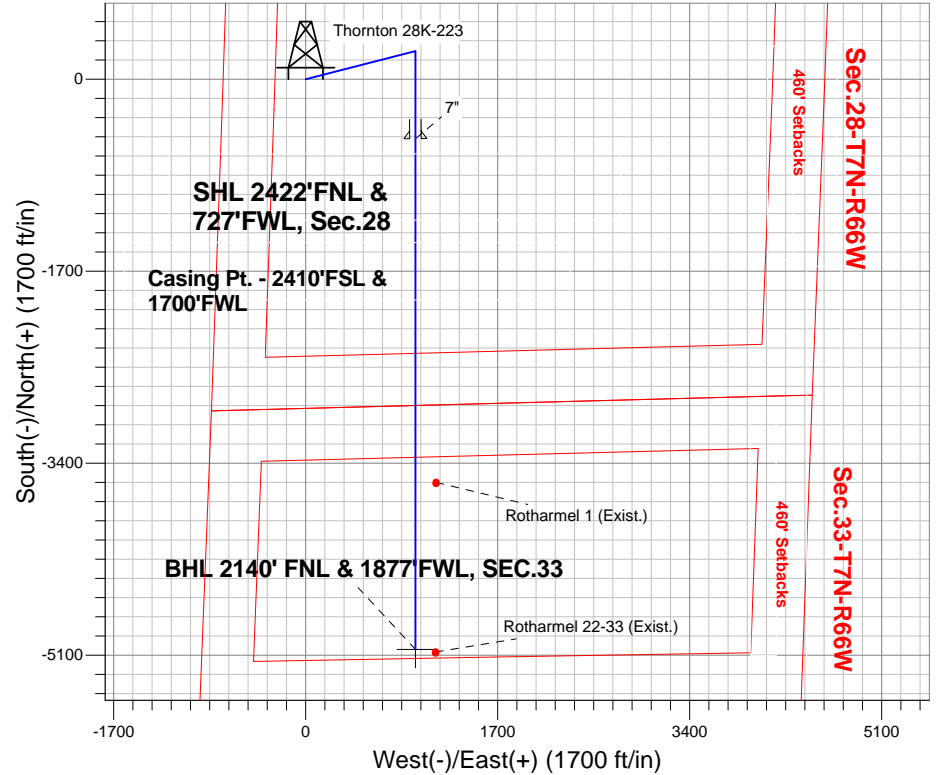
Azimuths to True North  
Magnetic North: 8.62°

Magnetic Field  
Strength: 52995.0snT  
Dip Angle: 67.10°  
Date: 6/11/2013  
Model: IGRF2010

## ANNOTATIONS

TVD	MD	Annotation
400.0	400.0	KOP #1
6507.7	6596.2	KOP #2
7271.6	7809.1	End of Build

Thornton 28GK-HZ Pad Sec. 28-T7N-R66W  
Thornton 28K-223  
Plan #1 (06-11-13)  
14:40, June 11 2013



## SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.0	
3	919.4	10.39	75.59	916.6	11.7	45.5	2.00	75.59	-2.9	
4	5969.0	10.39	75.59	5883.4	238.3	927.4	0.00	0.00	-58.5	
5	6488.5	0.00	0.00	6400.0	250.0	972.9	2.00	180.00	-61.4	
6	6596.2	0.00	0.00	6507.7	250.0	972.9	0.00	0.00	-61.4	
7	7809.1	90.97	180.00	7271.6	-526.9	972.9	7.50	180.00	701.4	
8	12332.4	90.97	180.00	7195.0	-5049.5	972.9	0.00	0.00	5142.3	BHL 2140' FNL & 1877'FWL, SEC.33



## **Directional**

# **PETROLEUM DEVELOPMENT CORP Weld County CO**

**SEC.28-T7N-R66W**

**Thornton 28GK-HZ Pad Sec. 28-T7N-R66W**

**Thornton 28K-223**

**Wellbore #1**

**Plan: Plan #1 (06-11-13)**

## **Standard Planning Report**

**11 June, 2013**

<b>Database:</b>	Landmark	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Project:</b>	SEC.28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>North Reference:</b>	True
<b>Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1 (06-11-13)		

<b>Project</b>	SEC.28-T7N-R66W, Weld Country		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		Using Well Reference Point
<b>Map Zone:</b>	Colorado Northern Zone		Using geodetic scale factor

Site		Thornton 28GK-HZ Pad Sec. 28-T7N-R66W				
Site Position:		Northing:	1,442,799.45 ft	Latitude:	40.546720	
From:	Lat/Long	Easting:	3,197,134.42 ft	Longitude:	-104.790640	
Position Uncertainty:		0.0 ft	Slot Radius:	"	Grid Convergence:	0.46 °

Well	Thornton 28K-223					
Well Position	+N-S	-83.8 ft	Northing:	1,442,716.33 ft	Latitude:	40.546490
	+E-W	86.2 ft	Easting:	3,197,221.24 ft	Longitude:	-104.790330
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,895.0 ft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	6/11/2013	8.62	67.10	52,995

<b>Design</b>	Plan #1 (06-11-13)			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>
	0.0	0.0	0.0	169.09

<b>Plan Sections</b>										
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	
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.00	0.00	
919.4	10.39	75.59	916.6	11.7	45.5	2.00	2.00	0.00	75.59	
5,969.0	10.39	75.59	5,883.4	238.3	927.4	0.00	0.00	0.00	0.00	
6,488.5	0.00	0.00	6,400.0	250.0	972.9	2.00	-2.00	0.00	180.00	
6,596.2	0.00	0.00	6,507.7	250.0	972.9	0.00	0.00	0.00	0.00	
7,809.1	90.97	180.00	7,271.6	-526.9	972.9	7.50	7.50	0.00	180.00	
12,332.4	90.97	180.00	7,195.0	-5,049.5	972.9	0.00	0.00	0.00	0.00	BHL 2140' FNL & 1

<b>Database:</b>	Landmark	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Project:</b>	SEC.28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>North Reference:</b>	True
<b>Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1 (06-11-13)		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
40.0	0.00	0.00	40.0	0.0	0.0	0.0	0.00	0.00	0.00
80.0	0.00	0.00	80.0	0.0	0.0	0.0	0.00	0.00	0.00
120.0	0.00	0.00	120.0	0.0	0.0	0.0	0.00	0.00	0.00
160.0	0.00	0.00	160.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
240.0	0.00	0.00	240.0	0.0	0.0	0.0	0.00	0.00	0.00
280.0	0.00	0.00	280.0	0.0	0.0	0.0	0.00	0.00	0.00
320.0	0.00	0.00	320.0	0.0	0.0	0.0	0.00	0.00	0.00
360.0	0.00	0.00	360.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>KOP #1</b>									
440.0	0.80	75.59	440.0	0.1	0.3	0.0	2.00	2.00	0.00
480.0	1.60	75.59	480.0	0.3	1.1	-0.1	2.00	2.00	0.00
520.0	2.40	75.59	520.0	0.6	2.4	-0.2	2.00	2.00	0.00
560.0	3.20	75.59	559.9	1.1	4.3	-0.3	2.00	2.00	0.00
600.0	4.00	75.59	599.8	1.7	6.8	-0.4	2.00	2.00	0.00
640.0	4.80	75.59	639.7	2.5	9.7	-0.6	2.00	2.00	0.00
680.0	5.60	75.59	679.6	3.4	13.2	-0.8	2.00	2.00	0.00
720.0	6.40	75.59	719.3	4.4	17.3	-1.1	2.00	2.00	0.00
760.0	7.20	75.59	759.1	5.6	21.9	-1.4	2.00	2.00	0.00
800.0	8.00	75.59	798.7	6.9	27.0	-1.7	2.00	2.00	0.00
840.0	8.80	75.59	838.3	8.4	32.7	-2.1	2.00	2.00	0.00
880.0	9.60	75.59	877.8	10.0	38.9	-2.5	2.00	2.00	0.00
919.4	10.39	75.59	916.6	11.7	45.5	-2.9	2.00	2.00	0.00
920.0	10.39	75.59	917.1	11.7	45.6	-2.9	0.00	0.00	0.00
960.0	10.39	75.59	956.5	13.5	52.6	-3.3	0.00	0.00	0.00
1,000.0	10.39	75.59	995.8	15.3	59.6	-3.8	0.00	0.00	0.00
1,040.0	10.39	75.59	1,035.2	17.1	66.5	-4.2	0.00	0.00	0.00
1,080.0	10.39	75.59	1,074.5	18.9	73.5	-4.6	0.00	0.00	0.00
1,120.0	10.39	75.59	1,113.9	20.7	80.5	-5.1	0.00	0.00	0.00
1,160.0	10.39	75.59	1,153.2	22.5	87.5	-5.5	0.00	0.00	0.00
1,200.0	10.39	75.59	1,192.6	24.3	94.5	-6.0	0.00	0.00	0.00
1,240.0	10.39	75.59	1,231.9	26.1	101.5	-6.4	0.00	0.00	0.00
1,280.0	10.39	75.59	1,271.2	27.9	108.5	-6.8	0.00	0.00	0.00
1,320.0	10.39	75.59	1,310.6	29.7	115.4	-7.3	0.00	0.00	0.00
1,360.0	10.39	75.59	1,349.9	31.5	122.4	-7.7	0.00	0.00	0.00
1,400.0	10.39	75.59	1,389.3	33.3	129.4	-8.2	0.00	0.00	0.00
1,440.0	10.39	75.59	1,428.6	35.1	136.4	-8.6	0.00	0.00	0.00
1,480.0	10.39	75.59	1,468.0	36.8	143.4	-9.1	0.00	0.00	0.00
1,520.0	10.39	75.59	1,507.3	38.6	150.4	-9.5	0.00	0.00	0.00
1,560.0	10.39	75.59	1,546.7	40.4	157.4	-9.9	0.00	0.00	0.00
1,600.0	10.39	75.59	1,586.0	42.2	164.3	-10.4	0.00	0.00	0.00
1,640.0	10.39	75.59	1,625.3	44.0	171.3	-10.8	0.00	0.00	0.00
1,680.0	10.39	75.59	1,664.7	45.8	178.3	-11.3	0.00	0.00	0.00
1,720.0	10.39	75.59	1,704.0	47.6	185.3	-11.7	0.00	0.00	0.00
1,760.0	10.39	75.59	1,743.4	49.4	192.3	-12.1	0.00	0.00	0.00
1,800.0	10.39	75.59	1,782.7	51.2	199.3	-12.6	0.00	0.00	0.00
1,840.0	10.39	75.59	1,822.1	53.0	206.3	-13.0	0.00	0.00	0.00
1,880.0	10.39	75.59	1,861.4	54.8	213.3	-13.5	0.00	0.00	0.00
1,920.0	10.39	75.59	1,900.8	56.6	220.2	-13.9	0.00	0.00	0.00
1,960.0	10.39	75.59	1,940.1	58.4	227.2	-14.3	0.00	0.00	0.00
2,000.0	10.39	75.59	1,979.4	60.2	234.2	-14.8	0.00	0.00	0.00

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<b>Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>North Reference:</b>	True
<b>Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1 (06-11-13)		

## Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,040.0	10.39	75.59	2,018.8	62.0	241.2	-15.2	0.00	0.00	0.00
2,080.0	10.39	75.59	2,058.1	63.8	248.2	-15.7	0.00	0.00	0.00
2,120.0	10.39	75.59	2,097.5	65.6	255.2	-16.1	0.00	0.00	0.00
2,160.0	10.39	75.59	2,136.8	67.4	262.2	-16.5	0.00	0.00	0.00
2,200.0	10.39	75.59	2,176.2	69.2	269.1	-17.0	0.00	0.00	0.00
2,240.0	10.39	75.59	2,215.5	71.0	276.1	-17.4	0.00	0.00	0.00
2,280.0	10.39	75.59	2,254.9	72.7	283.1	-17.9	0.00	0.00	0.00
2,320.0	10.39	75.59	2,294.2	74.5	290.1	-18.3	0.00	0.00	0.00
2,360.0	10.39	75.59	2,333.5	76.3	297.1	-18.8	0.00	0.00	0.00
2,400.0	10.39	75.59	2,372.9	78.1	304.1	-19.2	0.00	0.00	0.00
2,440.0	10.39	75.59	2,412.2	79.9	311.1	-19.6	0.00	0.00	0.00
2,480.0	10.39	75.59	2,451.6	81.7	318.0	-20.1	0.00	0.00	0.00
2,520.0	10.39	75.59	2,490.9	83.5	325.0	-20.5	0.00	0.00	0.00
2,560.0	10.39	75.59	2,530.3	85.3	332.0	-21.0	0.00	0.00	0.00
2,600.0	10.39	75.59	2,569.6	87.1	339.0	-21.4	0.00	0.00	0.00
2,640.0	10.39	75.59	2,609.0	88.9	346.0	-21.8	0.00	0.00	0.00
2,680.0	10.39	75.59	2,648.3	90.7	353.0	-22.3	0.00	0.00	0.00
2,720.0	10.39	75.59	2,687.6	92.5	360.0	-22.7	0.00	0.00	0.00
2,760.0	10.39	75.59	2,727.0	94.3	366.9	-23.2	0.00	0.00	0.00
2,800.0	10.39	75.59	2,766.3	96.1	373.9	-23.6	0.00	0.00	0.00
2,840.0	10.39	75.59	2,805.7	97.9	380.9	-24.0	0.00	0.00	0.00
2,880.0	10.39	75.59	2,845.0	99.7	387.9	-24.5	0.00	0.00	0.00
2,920.0	10.39	75.59	2,884.4	101.5	394.9	-24.9	0.00	0.00	0.00
2,960.0	10.39	75.59	2,923.7	103.3	401.9	-25.4	0.00	0.00	0.00
3,000.0	10.39	75.59	2,963.1	105.1	408.9	-25.8	0.00	0.00	0.00
3,040.0	10.39	75.59	3,002.4	106.9	415.9	-26.3	0.00	0.00	0.00
3,080.0	10.39	75.59	3,041.7	108.7	422.8	-26.7	0.00	0.00	0.00
3,120.0	10.39	75.59	3,081.1	110.4	429.8	-27.1	0.00	0.00	0.00
3,160.0	10.39	75.59	3,120.4	112.2	436.8	-27.6	0.00	0.00	0.00
3,200.0	10.39	75.59	3,159.8	114.0	443.8	-28.0	0.00	0.00	0.00
3,240.0	10.39	75.59	3,199.1	115.8	450.8	-28.5	0.00	0.00	0.00
3,280.0	10.39	75.59	3,238.5	117.6	457.8	-28.9	0.00	0.00	0.00
3,320.0	10.39	75.59	3,277.8	119.4	464.8	-29.3	0.00	0.00	0.00
3,360.0	10.39	75.59	3,317.1	121.2	471.7	-29.8	0.00	0.00	0.00
3,400.0	10.39	75.59	3,356.5	123.0	478.7	-30.2	0.00	0.00	0.00
3,440.0	10.39	75.59	3,395.8	124.8	485.7	-30.7	0.00	0.00	0.00
3,480.0	10.39	75.59	3,435.2	126.6	492.7	-31.1	0.00	0.00	0.00
3,520.0	10.39	75.59	3,474.5	128.4	499.7	-31.5	0.00	0.00	0.00
3,560.0	10.39	75.59	3,513.9	130.2	506.7	-32.0	0.00	0.00	0.00
3,600.0	10.39	75.59	3,553.2	132.0	513.7	-32.4	0.00	0.00	0.00
3,640.0	10.39	75.59	3,592.6	133.8	520.6	-32.9	0.00	0.00	0.00
3,680.0	10.39	75.59	3,631.9	135.6	527.6	-33.3	0.00	0.00	0.00
3,720.0	10.39	75.59	3,671.2	137.4	534.6	-33.7	0.00	0.00	0.00
3,760.0	10.39	75.59	3,710.6	139.2	541.6	-34.2	0.00	0.00	0.00
3,800.0	10.39	75.59	3,749.9	141.0	548.6	-34.6	0.00	0.00	0.00
3,840.0	10.39	75.59	3,789.3	142.8	555.6	-35.1	0.00	0.00	0.00
3,880.0	10.39	75.59	3,828.6	144.6	562.6	-35.5	0.00	0.00	0.00
3,920.0	10.39	75.59	3,868.0	146.4	569.6	-36.0	0.00	0.00	0.00
3,960.0	10.39	75.59	3,907.3	148.1	576.5	-36.4	0.00	0.00	0.00
4,000.0	10.39	75.59	3,946.7	149.9	583.5	-36.8	0.00	0.00	0.00
4,040.0	10.39	75.59	3,986.0	151.7	590.5	-37.3	0.00	0.00	0.00
4,080.0	10.39	75.59	4,025.3	153.5	597.5	-37.7	0.00	0.00	0.00
4,120.0	10.39	75.59	4,064.7	155.3	604.5	-38.2	0.00	0.00	0.00

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<b>Project:</b>	SEC.28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>North Reference:</b>	True
<b>Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1 (06-11-13)		

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)
4,160.0	10.39	75.59	4,104.0	157.1	611.5	-38.6	0.00	0.00	0.00
4,200.0	10.39	75.59	4,143.4	158.9	618.5	-39.0	0.00	0.00	0.00
4,240.0	10.39	75.59	4,182.7	160.7	625.4	-39.5	0.00	0.00	0.00
4,280.0	10.39	75.59	4,222.1	162.5	632.4	-39.9	0.00	0.00	0.00
4,320.0	10.39	75.59	4,261.4	164.3	639.4	-40.4	0.00	0.00	0.00
4,360.0	10.39	75.59	4,300.8	166.1	646.4	-40.8	0.00	0.00	0.00
4,400.0	10.39	75.59	4,340.1	167.9	653.4	-41.2	0.00	0.00	0.00
4,440.0	10.39	75.59	4,379.4	169.7	660.4	-41.7	0.00	0.00	0.00
4,480.0	10.39	75.59	4,418.8	171.5	667.4	-42.1	0.00	0.00	0.00
4,520.0	10.39	75.59	4,458.1	173.3	674.3	-42.6	0.00	0.00	0.00
4,560.0	10.39	75.59	4,497.5	175.1	681.3	-43.0	0.00	0.00	0.00
4,600.0	10.39	75.59	4,536.8	176.9	688.3	-43.4	0.00	0.00	0.00
4,640.0	10.39	75.59	4,576.2	178.7	695.3	-43.9	0.00	0.00	0.00
4,680.0	10.39	75.59	4,615.5	180.5	702.3	-44.3	0.00	0.00	0.00
4,720.0	10.39	75.59	4,654.9	182.3	709.3	-44.8	0.00	0.00	0.00
4,760.0	10.39	75.59	4,694.2	184.1	716.3	-45.2	0.00	0.00	0.00
4,800.0	10.39	75.59	4,733.5	185.8	723.2	-45.7	0.00	0.00	0.00
4,840.0	10.39	75.59	4,772.9	187.6	730.2	-46.1	0.00	0.00	0.00
4,880.0	10.39	75.59	4,812.2	189.4	737.2	-46.5	0.00	0.00	0.00
4,920.0	10.39	75.59	4,851.6	191.2	744.2	-47.0	0.00	0.00	0.00
4,960.0	10.39	75.59	4,890.9	193.0	751.2	-47.4	0.00	0.00	0.00
5,000.0	10.39	75.59	4,930.3	194.8	758.2	-47.9	0.00	0.00	0.00
5,040.0	10.39	75.59	4,969.6	196.6	765.2	-48.3	0.00	0.00	0.00
5,080.0	10.39	75.59	5,009.0	198.4	772.2	-48.7	0.00	0.00	0.00
5,120.0	10.39	75.59	5,048.3	200.2	779.1	-49.2	0.00	0.00	0.00
5,160.0	10.39	75.59	5,087.6	202.0	786.1	-49.6	0.00	0.00	0.00
5,200.0	10.39	75.59	5,127.0	203.8	793.1	-50.1	0.00	0.00	0.00
5,240.0	10.39	75.59	5,166.3	205.6	800.1	-50.5	0.00	0.00	0.00
5,280.0	10.39	75.59	5,205.7	207.4	807.1	-50.9	0.00	0.00	0.00
5,320.0	10.39	75.59	5,245.0	209.2	814.1	-51.4	0.00	0.00	0.00
5,360.0	10.39	75.59	5,284.4	211.0	821.1	-51.8	0.00	0.00	0.00
5,400.0	10.39	75.59	5,323.7	212.8	828.0	-52.3	0.00	0.00	0.00
5,440.0	10.39	75.59	5,363.0	214.6	835.0	-52.7	0.00	0.00	0.00
5,480.0	10.39	75.59	5,402.4	216.4	842.0	-53.2	0.00	0.00	0.00
5,520.0	10.39	75.59	5,441.7	218.2	849.0	-53.6	0.00	0.00	0.00
5,560.0	10.39	75.59	5,481.1	220.0	856.0	-54.0	0.00	0.00	0.00
5,600.0	10.39	75.59	5,520.4	221.8	863.0	-54.5	0.00	0.00	0.00
5,640.0	10.39	75.59	5,559.8	223.5	870.0	-54.9	0.00	0.00	0.00
5,680.0	10.39	75.59	5,599.1	225.3	876.9	-55.4	0.00	0.00	0.00
5,720.0	10.39	75.59	5,638.5	227.1	883.9	-55.8	0.00	0.00	0.00
5,760.0	10.39	75.59	5,677.8	228.9	890.9	-56.2	0.00	0.00	0.00
5,800.0	10.39	75.59	5,717.1	230.7	897.9	-56.7	0.00	0.00	0.00
5,840.0	10.39	75.59	5,756.5	232.5	904.9	-57.1	0.00	0.00	0.00
5,880.0	10.39	75.59	5,795.8	234.3	911.9	-57.6	0.00	0.00	0.00
5,920.0	10.39	75.59	5,835.2	236.1	918.9	-58.0	0.00	0.00	0.00
5,960.0	10.39	75.59	5,874.5	237.9	925.8	-58.4	0.00	0.00	0.00
5,969.0	10.39	75.59	5,883.4	238.3	927.4	-58.5	0.00	0.00	0.00
6,000.0	9.77	75.59	5,913.9	239.7	932.7	-58.9	2.00	-2.00	0.00
6,040.0	8.97	75.59	5,953.4	241.3	939.0	-59.3	2.00	-2.00	0.00
6,080.0	8.17	75.59	5,992.9	242.8	944.8	-59.6	2.00	-2.00	0.00
6,120.0	7.37	75.59	6,032.6	244.1	950.0	-60.0	2.00	-2.00	0.00
6,160.0	6.57	75.59	6,072.3	245.3	954.7	-60.3	2.00	-2.00	0.00
6,200.0	5.77	75.59	6,112.0	246.4	958.9	-60.5	2.00	-2.00	0.00

<b>Database:</b>	Landmark	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Project:</b>	SEC.28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>North Reference:</b>	True
<b>Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1 (06-11-13)		

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)	
6,240.0	4.97	75.59	6,151.8	247.3	962.5	-60.8	2.00	-2.00	0.00	
6,280.0	4.17	75.59	6,191.7	248.1	965.6	-61.0	2.00	-2.00	0.00	
6,320.0	3.37	75.59	6,231.6	248.8	968.1	-61.1	2.00	-2.00	0.00	
6,360.0	2.57	75.59	6,271.6	249.3	970.1	-61.2	2.00	-2.00	0.00	
6,400.0	1.77	75.59	6,311.5	249.7	971.6	-61.3	2.00	-2.00	0.00	
6,440.0	0.97	75.59	6,351.5	249.9	972.5	-61.4	2.00	-2.00	0.00	
6,480.0	0.17	75.59	6,391.5	250.0	972.9	-61.4	2.00	-2.00	0.00	
6,488.5	0.00	0.00	6,400.0	250.0	972.9	-61.4	2.00	-2.00	0.00	
6,520.0	0.00	0.00	6,431.5	250.0	972.9	-61.4	0.00	0.00	0.00	
6,560.0	0.00	0.00	6,471.5	250.0	972.9	-61.4	0.00	0.00	0.00	
6,596.2	0.00	0.00	6,507.7	250.0	972.9	-61.4	0.00	0.00	0.00	
<b>KOP #2</b>										
6,600.0	0.28	180.00	6,511.5	250.0	972.9	-61.4	7.50	7.50	0.00	
6,640.0	3.28	180.00	6,551.5	248.7	972.9	-60.2	7.50	7.50	0.00	
6,680.0	6.28	180.00	6,591.4	245.4	972.9	-56.9	7.50	7.50	0.00	
6,720.0	9.28	180.00	6,631.0	240.0	972.9	-51.6	7.50	7.50	0.00	
6,760.0	12.28	180.00	6,670.3	232.5	972.9	-44.2	7.50	7.50	0.00	
6,800.0	15.28	180.00	6,709.1	223.0	972.9	-34.9	7.50	7.50	0.00	
6,840.0	18.28	180.00	6,747.4	211.4	972.9	-23.5	7.50	7.50	0.00	
6,880.0	21.28	180.00	6,785.1	197.9	972.9	-10.2	7.50	7.50	0.00	
6,920.0	24.28	180.00	6,821.9	182.4	972.9	5.0	7.50	7.50	0.00	
6,960.0	27.28	180.00	6,857.9	165.0	972.9	22.0	7.50	7.50	0.00	
7,000.0	30.28	180.00	6,893.0	145.7	972.9	41.0	7.50	7.50	0.00	
7,040.0	33.28	180.00	6,927.0	124.7	972.9	61.6	7.50	7.50	0.00	
7,080.0	36.28	180.00	6,959.8	101.9	972.9	84.1	7.50	7.50	0.00	
7,120.0	39.28	180.00	6,991.4	77.4	972.9	108.1	7.50	7.50	0.00	
7,160.0	42.28	180.00	7,021.7	51.2	972.9	133.8	7.50	7.50	0.00	
7,200.0	45.28	180.00	7,050.6	23.6	972.9	160.9	7.50	7.50	0.00	
7,240.0	48.28	180.00	7,078.0	-5.6	972.9	189.6	7.50	7.50	0.00	
7,280.0	51.28	180.00	7,103.8	-36.1	972.9	219.6	7.50	7.50	0.00	
7,320.0	54.28	180.00	7,128.0	-68.0	972.9	250.8	7.50	7.50	0.00	
7,360.0	57.28	180.00	7,150.5	-101.1	972.9	283.3	7.50	7.50	0.00	
7,400.0	60.28	180.00	7,171.2	-135.3	972.9	316.9	7.50	7.50	0.00	
7,440.0	63.28	180.00	7,190.1	-170.5	972.9	351.5	7.50	7.50	0.00	
7,480.0	66.28	180.00	7,207.2	-206.7	972.9	387.0	7.50	7.50	0.00	
7,520.0	69.28	180.00	7,222.3	-243.7	972.9	423.4	7.50	7.50	0.00	
7,560.0	72.28	180.00	7,235.5	-281.5	972.9	460.5	7.50	7.50	0.00	
7,600.0	75.28	180.00	7,246.6	-319.9	972.9	498.2	7.50	7.50	0.00	
7,640.0	78.28	180.00	7,255.8	-358.8	972.9	536.4	7.50	7.50	0.00	
7,680.0	81.28	180.00	7,262.9	-398.2	972.9	575.1	7.50	7.50	0.00	
7,720.0	84.28	180.00	7,267.9	-437.9	972.9	614.0	7.50	7.50	0.00	
7,760.0	87.28	180.00	7,270.8	-477.8	972.9	653.2	7.50	7.50	0.00	
7,800.0	90.28	180.00	7,271.7	-517.7	972.9	692.5	7.50	7.50	0.00	
7,809.1	90.97	180.00	7,271.6	-526.8	972.9	701.4	7.50	7.50	0.00	
<b>End of Build - 7"</b>										
7,840.0	90.97	180.00	7,271.1	-557.7	972.9	731.7	0.01	0.01	0.00	
7,880.0	90.97	180.00	7,270.4	-597.7	972.9	771.0	0.00	0.00	0.00	
7,920.0	90.97	180.00	7,269.7	-637.7	972.9	810.3	0.00	0.00	0.00	
7,960.0	90.97	180.00	7,269.0	-677.7	972.9	849.5	0.00	0.00	0.00	
8,000.0	90.97	180.00	7,268.3	-717.7	972.9	888.8	0.00	0.00	0.00	
8,040.0	90.97	180.00	7,267.7	-757.7	972.9	928.1	0.00	0.00	0.00	
8,080.0	90.97	180.00	7,267.0	-797.7	972.9	967.4	0.00	0.00	0.00	
8,120.0	90.97	180.00	7,266.3	-837.7	972.9	1,006.6	0.00	0.00	0.00	



<b>Database:</b>	Landmark	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Project:</b>	SEC.28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>North Reference:</b>	True
<b>Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1 (06-11-13)		

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)
8,160.0	90.97	180.00	7,265.6	-877.7	972.9	1,045.9	0.00	0.00	0.00
8,200.0	90.97	180.00	7,265.0	-917.7	972.9	1,085.2	0.00	0.00	0.00
8,240.0	90.97	180.00	7,264.3	-957.7	972.9	1,124.5	0.00	0.00	0.00
8,280.0	90.97	180.00	7,263.6	-997.7	972.9	1,163.7	0.00	0.00	0.00
8,320.0	90.97	180.00	7,262.9	-1,037.7	972.9	1,203.0	0.00	0.00	0.00
8,360.0	90.97	180.00	7,262.2	-1,077.7	972.9	1,242.3	0.00	0.00	0.00
8,400.0	90.97	180.00	7,261.6	-1,117.7	972.9	1,281.5	0.00	0.00	0.00
8,440.0	90.97	180.00	7,260.9	-1,157.6	972.9	1,320.8	0.00	0.00	0.00
8,480.0	90.97	180.00	7,260.2	-1,197.6	972.9	1,360.1	0.00	0.00	0.00
8,520.0	90.97	180.00	7,259.5	-1,237.6	972.9	1,399.4	0.00	0.00	0.00
8,560.0	90.97	180.00	7,258.9	-1,277.6	972.9	1,438.6	0.00	0.00	0.00
8,600.0	90.97	180.00	7,258.2	-1,317.6	972.9	1,477.9	0.00	0.00	0.00
8,640.0	90.97	180.00	7,257.5	-1,357.6	972.9	1,517.2	0.00	0.00	0.00
8,680.0	90.97	180.00	7,256.8	-1,397.6	972.9	1,556.4	0.00	0.00	0.00
8,720.0	90.97	180.00	7,256.2	-1,437.6	972.9	1,595.7	0.00	0.00	0.00
8,760.0	90.97	180.00	7,255.5	-1,477.6	972.9	1,635.0	0.00	0.00	0.00
8,800.0	90.97	180.00	7,254.8	-1,517.6	972.9	1,674.3	0.00	0.00	0.00
8,840.0	90.97	180.00	7,254.1	-1,557.6	972.9	1,713.5	0.00	0.00	0.00
8,880.0	90.97	180.00	7,253.4	-1,597.6	972.9	1,752.8	0.00	0.00	0.00
8,920.0	90.97	180.00	7,252.8	-1,637.6	972.9	1,792.1	0.00	0.00	0.00
8,960.0	90.97	180.00	7,252.1	-1,677.6	972.9	1,831.3	0.00	0.00	0.00
9,000.0	90.97	180.00	7,251.4	-1,717.6	972.9	1,870.6	0.00	0.00	0.00
9,040.0	90.97	180.00	7,250.7	-1,757.6	972.9	1,909.9	0.00	0.00	0.00
9,080.0	90.97	180.00	7,250.1	-1,797.6	972.9	1,949.2	0.00	0.00	0.00
9,120.0	90.97	180.00	7,249.4	-1,837.6	972.9	1,988.4	0.00	0.00	0.00
9,160.0	90.97	180.00	7,248.7	-1,877.5	972.9	2,027.7	0.00	0.00	0.00
9,200.0	90.97	180.00	7,248.0	-1,917.5	972.9	2,067.0	0.00	0.00	0.00
9,240.0	90.97	180.00	7,247.4	-1,957.5	972.9	2,106.3	0.00	0.00	0.00
9,280.0	90.97	180.00	7,246.7	-1,997.5	972.9	2,145.5	0.00	0.00	0.00
9,320.0	90.97	180.00	7,246.0	-2,037.5	972.9	2,184.8	0.00	0.00	0.00
9,360.0	90.97	180.00	7,245.3	-2,077.5	972.9	2,224.1	0.00	0.00	0.00
9,400.0	90.97	180.00	7,244.6	-2,117.5	972.9	2,263.3	0.00	0.00	0.00
9,440.0	90.97	180.00	7,244.0	-2,157.5	972.9	2,302.6	0.00	0.00	0.00
9,480.0	90.97	180.00	7,243.3	-2,197.5	972.9	2,341.9	0.00	0.00	0.00
9,520.0	90.97	180.00	7,242.6	-2,237.5	972.9	2,381.2	0.00	0.00	0.00
9,560.0	90.97	180.00	7,241.9	-2,277.5	972.9	2,420.4	0.00	0.00	0.00
9,600.0	90.97	180.00	7,241.3	-2,317.5	972.9	2,459.7	0.00	0.00	0.00
9,640.0	90.97	180.00	7,240.6	-2,357.5	972.9	2,499.0	0.00	0.00	0.00
9,680.0	90.97	180.00	7,239.9	-2,397.5	972.9	2,538.2	0.00	0.00	0.00
9,720.0	90.97	180.00	7,239.2	-2,437.5	972.9	2,577.5	0.00	0.00	0.00
9,760.0	90.97	180.00	7,238.5	-2,477.5	972.9	2,616.8	0.00	0.00	0.00
9,800.0	90.97	180.00	7,237.9	-2,517.5	972.9	2,656.1	0.00	0.00	0.00
9,840.0	90.97	180.00	7,237.2	-2,557.4	972.9	2,695.3	0.00	0.00	0.00
9,880.0	90.97	180.00	7,236.5	-2,597.4	972.9	2,734.6	0.00	0.00	0.00
9,920.0	90.97	180.00	7,235.8	-2,637.4	972.9	2,773.9	0.00	0.00	0.00
9,960.0	90.97	180.00	7,235.2	-2,677.4	972.9	2,813.1	0.00	0.00	0.00
10,000.0	90.97	180.00	7,234.5	-2,717.4	972.9	2,852.4	0.00	0.00	0.00
10,040.0	90.97	180.00	7,233.8	-2,757.4	972.9	2,891.7	0.00	0.00	0.00
10,080.0	90.97	180.00	7,233.1	-2,797.4	972.9	2,931.0	0.00	0.00	0.00
10,120.0	90.97	180.00	7,232.5	-2,837.4	972.9	2,970.2	0.00	0.00	0.00
10,160.0	90.97	180.00	7,231.8	-2,877.4	972.9	3,009.5	0.00	0.00	0.00
10,200.0	90.97	180.00	7,231.1	-2,917.4	972.9	3,048.8	0.00	0.00	0.00
10,240.0	90.97	180.00	7,230.4	-2,957.4	972.9	3,088.1	0.00	0.00	0.00



<b>Database:</b>	Landmark	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Project:</b>	SEC.28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>North Reference:</b>	True
<b>Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1 (06-11-13)		

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)
10,280.0	90.97	180.00	7,229.7	-2,997.4	972.9	3,127.3	0.00	0.00	0.00
10,320.0	90.97	180.00	7,229.1	-3,037.4	972.9	3,166.6	0.00	0.00	0.00
10,360.0	90.97	180.00	7,228.4	-3,077.4	972.9	3,205.9	0.00	0.00	0.00
10,400.0	90.97	180.00	7,227.7	-3,117.4	972.9	3,245.1	0.00	0.00	0.00
10,440.0	90.97	180.00	7,227.0	-3,157.4	972.9	3,284.4	0.00	0.00	0.00
10,480.0	90.97	180.00	7,226.4	-3,197.4	972.9	3,323.7	0.00	0.00	0.00
10,520.0	90.97	180.00	7,225.7	-3,237.4	972.9	3,363.0	0.00	0.00	0.00
10,560.0	90.97	180.00	7,225.0	-3,277.3	972.9	3,402.2	0.00	0.00	0.00
10,600.0	90.97	180.00	7,224.3	-3,317.3	972.9	3,441.5	0.00	0.00	0.00
10,640.0	90.97	180.00	7,223.6	-3,357.3	972.9	3,480.8	0.00	0.00	0.00
10,680.0	90.97	180.00	7,223.0	-3,397.3	972.9	3,520.0	0.00	0.00	0.00
10,720.0	90.97	180.00	7,222.3	-3,437.3	972.9	3,559.3	0.00	0.00	0.00
10,760.0	90.97	180.00	7,221.6	-3,477.3	972.9	3,598.6	0.00	0.00	0.00
10,800.0	90.97	180.00	7,220.9	-3,517.3	972.9	3,637.9	0.00	0.00	0.00
10,840.0	90.97	180.00	7,220.3	-3,557.3	972.9	3,677.1	0.00	0.00	0.00
10,880.0	90.97	180.00	7,219.6	-3,597.3	972.9	3,716.4	0.00	0.00	0.00
10,920.0	90.97	180.00	7,218.9	-3,637.3	972.9	3,755.7	0.00	0.00	0.00
10,960.0	90.97	180.00	7,218.2	-3,677.3	972.9	3,794.9	0.00	0.00	0.00
11,000.0	90.97	180.00	7,217.6	-3,717.3	972.9	3,834.2	0.00	0.00	0.00
11,040.0	90.97	180.00	7,216.9	-3,757.3	972.9	3,873.5	0.00	0.00	0.00
11,080.0	90.97	180.00	7,216.2	-3,797.3	972.9	3,912.8	0.00	0.00	0.00
11,120.0	90.97	180.00	7,215.5	-3,837.3	972.9	3,952.0	0.00	0.00	0.00
11,160.0	90.97	180.00	7,214.8	-3,877.3	972.9	3,991.3	0.00	0.00	0.00
11,200.0	90.97	180.00	7,214.2	-3,917.3	972.9	4,030.6	0.00	0.00	0.00
11,240.0	90.97	180.00	7,213.5	-3,957.2	972.9	4,069.8	0.00	0.00	0.00
11,280.0	90.97	180.00	7,212.8	-3,997.2	972.9	4,109.1	0.00	0.00	0.00
11,320.0	90.97	180.00	7,212.1	-4,037.2	972.9	4,148.4	0.00	0.00	0.00
11,360.0	90.97	180.00	7,211.5	-4,077.2	972.9	4,187.7	0.00	0.00	0.00
11,400.0	90.97	180.00	7,210.8	-4,117.2	972.9	4,226.9	0.00	0.00	0.00
11,440.0	90.97	180.00	7,210.1	-4,157.2	972.9	4,266.2	0.00	0.00	0.00
11,480.0	90.97	180.00	7,209.4	-4,197.2	972.9	4,305.5	0.00	0.00	0.00
11,520.0	90.97	180.00	7,208.8	-4,237.2	972.9	4,344.8	0.00	0.00	0.00
11,560.0	90.97	180.00	7,208.1	-4,277.2	972.9	4,384.0	0.00	0.00	0.00
11,600.0	90.97	180.00	7,207.4	-4,317.2	972.9	4,423.3	0.00	0.00	0.00
11,640.0	90.97	180.00	7,206.7	-4,357.2	972.9	4,462.6	0.00	0.00	0.00
11,680.0	90.97	180.00	7,206.0	-4,397.2	972.9	4,501.8	0.00	0.00	0.00
11,720.0	90.97	180.00	7,205.4	-4,437.2	972.9	4,541.1	0.00	0.00	0.00
11,760.0	90.97	180.00	7,204.7	-4,477.2	972.9	4,580.4	0.00	0.00	0.00
11,800.0	90.97	180.00	7,204.0	-4,517.2	972.9	4,619.7	0.00	0.00	0.00
11,840.0	90.97	180.00	7,203.3	-4,557.2	972.9	4,658.9	0.00	0.00	0.00
11,880.0	90.97	180.00	7,202.7	-4,597.2	972.9	4,698.2	0.00	0.00	0.00
11,920.0	90.97	180.00	7,202.0	-4,637.2	972.9	4,737.5	0.00	0.00	0.00
11,960.0	90.97	180.00	7,201.3	-4,677.1	972.9	4,776.7	0.00	0.00	0.00
12,000.0	90.97	180.00	7,200.6	-4,717.1	972.9	4,816.0	0.00	0.00	0.00
12,040.0	90.97	180.00	7,199.9	-4,757.1	972.9	4,855.3	0.00	0.00	0.00
12,080.0	90.97	180.00	7,199.3	-4,797.1	972.9	4,894.6	0.00	0.00	0.00
12,120.0	90.97	180.00	7,198.6	-4,837.1	972.9	4,933.8	0.00	0.00	0.00
12,160.0	90.97	180.00	7,197.9	-4,877.1	972.9	4,973.1	0.00	0.00	0.00
12,200.0	90.97	180.00	7,197.2	-4,917.1	972.9	5,012.4	0.00	0.00	0.00
12,240.0	90.97	180.00	7,196.6	-4,957.1	972.9	5,051.6	0.00	0.00	0.00
12,280.0	90.97	180.00	7,195.9	-4,997.1	972.9	5,090.9	0.00	0.00	0.00
12,320.0	90.97	180.00	7,195.2	-5,037.1	972.9	5,130.2	0.00	0.00	0.00
12,332.4	90.97	180.00	7,195.0	-5,049.5	972.9	5,142.3	0.00	0.00	0.00

<b>Database:</b>	Landmark	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Project:</b>	SEC.28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>North Reference:</b>	True
<b>Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1 (06-11-13)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
BHL 2140' FNL & 1877'FWL, SEC.33									

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
BHL 2140' FNL & 187	0.00	0.00	7,195.0	-5,049.5	972.9	1,437,674.99	3,198,234.50	40.532630	-104.786830
- plan hits target center									
- Point									

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,809.1	7,271.6	7"	7	7-1/2	

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
400.0	400.0	0.0	0.0	KOP #1
6,596.2	6,507.7	250.0	972.9	KOP #2
7,809.1	7,271.6	-526.8	972.9	End of Build



## **Directional**

# **PETROLEUM DEVELOPMENT CORP Weld County CO**

**SEC.28-T7N-R66W**

**Thornton 28GK-HZ Pad Sec. 28-T7N-R66W**

**Thornton 28K-223**

**Wellbore #1**

**Plan #1 (06-11-13)**

## **Anticollision Report**

**11 June, 2013**



<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

<b>Reference</b>	Plan #1 (06-11-13)		
<b>Filter type:</b>	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
<b>Interpolation Method:</b>	Stations	<b>Error Model:</b>	ISCWSA
<b>Depth Range:</b>	Unlimited	<b>Scan Method:</b>	Closest Approach 3D
<b>Results Limited by:</b>	Maximum center-center distance of 10,000.0ft	<b>Error Surface:</b>	Elliptical Conic
<b>Warning Levels Evaluated at:</b>	2.00 Sigma		

<b>Survey Tool Program</b>	<b>Date</b> 6/11/2013			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
0.0	12,332.4	Plan #1 (06-11-13) (Wellbore #1)	MWD	MWD - Standard

<b>Summary</b>						
<b>Site Name</b>	<b>Reference Measured Depth (ft)</b>	<b>Offset Measured Depth (ft)</b>	<b>Distance Between Centres (ft)</b>	<b>Distance Between Ellipses (ft)</b>	<b>Separation Factor</b>	<b>Warning</b>
<b>Offset Well - Wellbore - Design</b>						
<b>Existing Wells</b>						
Rotharmel 1 (Exist.) - Wellbore #1 - Wellbore #1	10,853.0	7,168.0	180.6	-34.3	0.841	Level 1, CC, ES, SF
Rotharmel 22-33 (Exist.) - Wellbore #1 - Wellbore #1	12,332.4	7,155.0	179.2	-63.2	0.739	Level 1, CC, ES, SF
<b>Thornton 28GK-HZ Pad Sec. 28-T7N-R66W</b>						
Thornton 28K-303 - Wellbore #1 - Plan #1 (06-11-13)	400.0	400.0	62.4	60.8	39.634	CC, ES
Thornton 28K-303 - Wellbore #1 - Plan #1 (06-11-13)	12,332.4	12,405.2	660.9	462.1	3.325	SF
Thornton 28K-423 - Wellbore #1 - Plan #1 (06-11-13)	400.0	400.0	31.2	29.6	19.817	CC, ES
Thornton 28K-423 - Wellbore #1 - Plan #1 (06-11-13)	12,332.4	12,415.5	370.3	189.9	2.053	SF

Offset Design		Existing Wells - Rotharmel 1 (Exist.) - Wellbore #1 - Wellbore #1										Offset Site Error:		0.0 ft			
Survey Program: 7500-UNKNOWN														Offset Well Error:		0.0 ft	
Reference		Offset		Semi Major Axis			Distance							Warning			
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor					
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)						
0.0	0.0	0.0	0.0	0.0	0.0	162.09	-3,570.3	1,153.5	3,752.4								
100.0	100.0	48.0	48.0	0.1	1.0	162.09	-3,570.3	1,153.5	3,752.0	3,751.0	1.07	3,498.133					
200.0	200.0	148.0	148.0	0.3	3.0	162.09	-3,570.3	1,153.5	3,752.0	3,748.7	3.30	1,137.895					
300.0	300.0	248.0	248.0	0.6	5.0	162.09	-3,570.3	1,153.5	3,752.0	3,746.5	5.52	679.457					
400.0	400.0	348.0	348.0	0.8	7.0	162.09	-3,570.3	1,153.5	3,752.0	3,744.3	7.75	484.329					
500.0	500.0	448.0	448.0	1.0	9.0	86.53	-3,570.3	1,153.5	3,751.9	3,742.0	9.96	376.604					
600.0	599.8	547.8	547.8	1.2	11.0	86.62	-3,570.3	1,153.5	3,751.6	3,739.4	12.18	308.077					
700.0	699.5	647.5	647.5	1.5	12.9	86.76	-3,570.3	1,153.5	3,751.1	3,736.7	14.41	260.343					
800.0	798.7	746.7	746.7	1.7	14.9	86.96	-3,570.3	1,153.5	3,750.4	3,733.8	16.66	225.083					
900.0	897.5	845.5	845.5	2.0	16.9	87.21	-3,570.3	1,153.5	3,749.6	3,730.7	18.95	197.892					
919.4	916.6	864.6	864.6	2.1	17.3	87.27	-3,570.3	1,153.5	3,749.5	3,730.1	19.40	193.305					
1,000.0	995.8	943.8	943.8	2.4	18.9	87.49	-3,570.3	1,153.5	3,748.8	3,727.5	21.27	176.287					
1,100.0	1,094.2	1,042.2	1,042.2	2.8	20.8	87.76	-3,570.3	1,153.5	3,748.0	3,724.4	23.60	158.817					
1,200.0	1,192.6	1,140.6	1,140.6	3.1	22.8	88.03	-3,570.3	1,153.5	3,747.4	3,721.4	25.94	144.435					
1,300.0	1,290.9	1,238.9	1,238.9	3.5	24.8	88.30	-3,570.3	1,153.5	3,746.8	3,718.5	28.30	132.405					
1,400.0	1,389.3	1,337.3	1,337.3	3.9	26.7	88.57	-3,570.3	1,153.5	3,746.3	3,715.6	30.66	122.204					
1,500.0	1,487.6	1,435.6	1,435.6	4.3	28.7	88.84	-3,570.3	1,153.5	3,745.9	3,712.8	33.02	113.450					
1,600.0	1,586.0	1,534.0	1,534.0	4.7	30.7	89.11	-3,570.3	1,153.5	3,745.5	3,710.1	35.38	105.858					
1,700.0	1,684.4	1,632.4	1,632.4	5.1	32.6	89.38	-3,570.3	1,153.5	3,745.3	3,707.5	37.75	99.214					

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

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Existing Wells - Rotharmel 1 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7500-UNKNOWN													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
1,800.0	1,782.7	1,730.7	1,730.7	5.5	34.6	89.66		-3,570.3	1,153.5	3,745.1	3,705.0	40.12	93.352	
1,900.0	1,881.1	1,829.1	1,829.1	5.9	36.6	89.93		-3,570.3	1,153.5	3,745.1	3,702.6	42.49	88.144	
1,927.0	1,907.7	1,855.7	1,855.7	6.0	37.1	90.00		-3,570.3	1,153.5	3,745.1	3,701.9	43.13	86.833	
2,000.0	1,979.4	1,927.4	1,927.4	6.3	38.5	90.20		-3,570.3	1,153.5	3,745.1	3,700.2	44.86	83.485	
2,100.0	2,077.8	2,025.8	2,025.8	6.7	40.5	90.47		-3,570.3	1,153.5	3,745.2	3,698.0	47.23	79.295	
2,200.0	2,176.2	2,124.2	2,124.2	7.1	42.5	90.74		-3,570.3	1,153.5	3,745.4	3,695.8	49.60	75.506	
2,300.0	2,274.5	2,222.5	2,222.5	7.5	44.5	91.01		-3,570.3	1,153.5	3,745.7	3,693.7	51.98	72.064	
2,400.0	2,372.9	2,320.9	2,320.9	7.9	46.4	91.28		-3,570.3	1,153.5	3,746.0	3,691.7	54.35	68.923	
2,500.0	2,471.2	2,419.2	2,419.2	8.3	48.4	91.55		-3,570.3	1,153.5	3,746.5	3,689.8	56.72	66.047	
2,600.0	2,569.6	2,517.6	2,517.6	8.7	50.4	91.83		-3,570.3	1,153.5	3,747.0	3,687.9	59.10	63.403	
2,700.0	2,668.0	2,616.0	2,616.0	9.2	52.3	92.10		-3,570.3	1,153.5	3,747.7	3,686.2	61.47	60.964	
2,800.0	2,766.3	2,714.3	2,714.3	9.6	54.3	92.37		-3,570.3	1,153.5	3,748.4	3,684.5	63.85	58.708	
2,900.0	2,864.7	2,812.7	2,812.7	10.0	56.3	92.64		-3,570.3	1,153.5	3,749.2	3,682.9	66.22	56.615	
3,000.0	2,963.1	2,911.1	2,911.1	10.4	58.2	92.91		-3,570.3	1,153.5	3,750.1	3,681.5	68.60	54.668	
3,100.0	3,061.4	3,009.4	3,009.4	10.8	60.2	93.18		-3,570.3	1,153.5	3,751.0	3,680.1	70.97	52.853	
3,200.0	3,159.8	3,107.8	3,107.8	11.2	62.2	93.45		-3,570.3	1,153.5	3,752.1	3,678.7	73.35	51.156	
3,300.0	3,258.1	3,206.1	3,206.1	11.6	64.1	93.72		-3,570.3	1,153.5	3,753.2	3,677.5	75.72	49.568	
3,400.0	3,356.5	3,304.5	3,304.5	12.0	66.1	93.99		-3,570.3	1,153.5	3,754.5	3,676.4	78.09	48.076	
3,500.0	3,454.9	3,402.9	3,402.9	12.4	68.1	94.26		-3,570.3	1,153.5	3,755.8	3,675.3	80.47	46.675	
3,600.0	3,553.2	3,501.2	3,501.2	12.8	70.0	94.53		-3,570.3	1,153.5	3,757.2	3,674.3	82.84	45.354	
3,700.0	3,651.6	3,599.6	3,599.6	13.2	72.0	94.80		-3,570.3	1,153.5	3,758.7	3,673.5	85.21	44.108	
3,800.0	3,749.9	3,697.9	3,697.9	13.6	74.0	95.07		-3,570.3	1,153.5	3,760.3	3,672.7	87.59	42.931	
3,900.0	3,848.3	3,796.3	3,796.3	14.1	75.9	95.34		-3,570.3	1,153.5	3,761.9	3,672.0	89.96	41.818	
4,000.0	3,946.7	3,894.7	3,894.7	14.5	77.9	95.61		-3,570.3	1,153.5	3,763.7	3,671.3	92.33	40.762	
4,100.0	4,045.0	3,993.0	3,993.0	14.9	79.9	95.88		-3,570.3	1,153.5	3,765.5	3,670.8	94.70	39.760	
4,200.0	4,143.4	4,091.4	4,091.4	15.3	81.8	96.14		-3,570.3	1,153.5	3,767.4	3,670.3	97.08	38.809	
4,300.0	4,241.7	4,189.7	4,189.7	15.7	83.8	96.41		-3,570.3	1,153.5	3,769.4	3,670.0	99.45	37.904	
4,400.0	4,340.1	4,288.1	4,288.1	16.1	85.8	96.68		-3,570.3	1,153.5	3,771.5	3,669.7	101.82	37.042	
4,500.0	4,438.5	4,386.5	4,386.5	16.5	87.7	96.95		-3,570.3	1,153.5	3,773.7	3,669.5	104.19	36.220	
4,600.0	4,536.8	4,484.8	4,484.8	16.9	89.7	97.22		-3,570.3	1,153.5	3,776.0	3,669.4	106.56	35.435	
4,700.0	4,635.2	4,583.2	4,583.2	17.3	91.7	97.48		-3,570.3	1,153.5	3,778.3	3,669.4	108.93	34.686	
4,800.0	4,733.5	4,681.5	4,681.5	17.7	93.6	97.75		-3,570.3	1,153.5	3,780.7	3,669.4	111.30	33.970	
4,900.0	4,831.9	4,779.9	4,779.9	18.2	95.6	98.01		-3,570.3	1,153.5	3,783.2	3,669.6	113.67	33.284	
5,000.0	4,930.3	4,878.3	4,878.3	18.6	97.6	98.28		-3,570.3	1,153.5	3,785.8	3,669.8	116.03	32.627	
5,100.0	5,028.6	4,976.6	4,976.6	19.0	99.5	98.55		-3,570.3	1,153.5	3,788.5	3,670.1	118.40	31.998	
5,200.0	5,127.0	5,075.0	5,075.0	19.4	101.5	98.81		-3,570.3	1,153.5	3,791.3	3,670.5	120.77	31.394	
5,300.0	5,225.3	5,173.3	5,173.3	19.8	103.5	99.08		-3,570.3	1,153.5	3,794.1	3,671.0	123.13	30.813	
5,400.0	5,323.7	5,271.7	5,271.7	20.2	105.4	99.34		-3,570.3	1,153.5	3,797.1	3,671.6	125.50	30.256	
5,500.0	5,422.1	5,370.1	5,370.1	20.6	107.4	99.60		-3,570.3	1,153.5	3,800.1	3,672.2	127.86	29.720	
5,600.0	5,520.4	5,468.4	5,468.4	21.0	109.4	99.87		-3,570.3	1,153.5	3,803.2	3,673.0	130.23	29.205	
5,700.0	5,618.8	5,566.8	5,566.8	21.4	111.3	100.13		-3,570.3	1,153.5	3,806.4	3,673.8	132.59	28.708	
5,800.0	5,717.1	5,665.1	5,665.1	21.8	113.3	100.39		-3,570.3	1,153.5	3,809.6	3,674.7	134.95	28.230	
5,900.0	5,815.5	5,763.5	5,763.5	22.3	115.3	100.66		-3,570.3	1,153.5	3,813.0	3,675.7	137.31	27.768	
5,969.0	5,883.4	5,831.4	5,831.4	22.5	116.6	100.84		-3,570.3	1,153.5	3,815.3	3,676.4	138.94	27.460	
6,000.0	5,913.9	5,861.9	5,861.9	22.7	117.2	100.94		-3,570.3	1,153.5	3,816.4	3,676.7	139.66	27.325	
6,100.0	6,012.7	5,960.7	5,960.7	22.9	119.2	101.22		-3,570.3	1,153.5	3,819.3	3,677.4	141.93	26.911	
6,200.0	6,112.0	6,060.0	6,060.0	23.2	121.2	101.43		-3,570.3	1,153.5	3,821.7	3,677.5	144.16	26.511	
6,300.0	6,211.7	6,159.7	6,159.7	23.4	123.2	101.59		-3,570.3	1,153.5	3,823.3	3,677.0	146.35	26.124	
6,400.0	6,311.5	6,259.5	6,259.5	23.5	125.2	101.68		-3,570.3	1,153.5	3,824.3	3,675.8	148.51	25.751	
6,488.5	6,400.0	6,348.0	6,348.0	23.6	127.0	177.29		-3,570.3	1,153.5	3,824.6	3,674.2	150.39	25.431	
6,500.0	6,411.5	6,359.5	6,359.5	23.7	127.2	177.29		-3,570.3	1,153.5	3,824.6	3,673.9	150.63	25.390	

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

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Existing Wells - Rotharmel 1 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7500-UNKNOWN													Offset Well Error:	0.0 ft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
6,596.2	6,507.7	6,455.7	6,455.7	23.8	129.1	177.29	-3,570.3	1,153.5	3,824.6	3,671.9	152.68	25.050		
6,600.0	6,511.5	6,459.5	6,459.5	23.8	129.2	-2.71	-3,570.3	1,153.5	3,824.6	3,671.8	152.76	25.037		
6,650.0	6,561.5	6,509.5	6,509.5	23.8	130.2	-2.71	-3,570.3	1,153.5	3,822.7	3,669.3	153.41	24.917		
6,700.0	6,611.2	6,559.2	6,559.2	23.9	131.2	-2.74	-3,570.3	1,153.5	3,817.5	3,664.1	153.41	24.885		
6,750.0	6,660.5	6,608.5	6,608.5	23.9	132.2	-2.77	-3,570.3	1,153.5	3,809.2	3,656.4	152.73	24.940		
6,800.0	6,709.1	6,657.1	6,657.1	23.9	133.1	-2.83	-3,570.3	1,153.5	3,797.6	3,646.2	151.37	25.088		
6,850.0	6,756.9	6,704.9	6,704.9	23.9	134.1	-2.89	-3,570.3	1,153.5	3,782.9	3,633.5	149.33	25.333		
6,900.0	6,803.6	6,751.6	6,751.6	24.0	135.0	-2.98	-3,570.3	1,153.5	3,765.0	3,618.4	146.60	25.683		
6,950.0	6,849.0	6,797.0	6,797.0	24.0	135.9	-3.09	-3,570.3	1,153.5	3,744.2	3,601.0	143.18	26.149		
7,000.0	6,893.0	6,841.0	6,841.0	24.0	136.8	-3.22	-3,570.3	1,153.5	3,720.4	3,581.3	139.10	26.746		
7,050.0	6,935.3	6,883.3	6,883.3	24.0	137.7	-3.38	-3,570.3	1,153.5	3,693.9	3,559.5	134.37	27.490		
7,100.0	6,975.8	6,923.8	6,923.8	24.0	138.5	-3.57	-3,570.3	1,153.5	3,664.6	3,535.6	129.00	28.407		
7,150.0	7,014.3	6,962.3	6,962.3	24.0	139.2	-3.80	-3,570.3	1,153.5	3,632.7	3,509.7	123.03	29.526		
7,200.0	7,050.6	6,998.6	6,998.6	24.0	140.0	-4.09	-3,570.3	1,153.5	3,598.4	3,481.9	116.50	30.888		
7,250.0	7,084.6	7,032.6	7,032.6	24.0	140.7	-4.43	-3,570.3	1,153.5	3,561.8	3,452.4	109.44	32.545		
7,300.0	7,116.1	7,064.1	7,064.1	24.1	141.3	-4.85	-3,570.3	1,153.5	3,523.0	3,421.1	101.93	34.563		
7,350.0	7,145.0	7,093.0	7,093.0	24.1	141.9	-5.38	-3,570.3	1,153.5	3,482.3	3,388.3	94.05	37.027		
7,400.0	7,171.2	7,119.2	7,119.2	24.2	142.4	-6.05	-3,570.3	1,153.5	3,439.8	3,353.9	85.92	40.033		
7,450.0	7,194.6	7,142.6	7,142.6	24.3	142.9	-6.94	-3,570.3	1,153.5	3,395.7	3,317.9	77.76	43.669		
7,500.0	7,215.0	7,163.0	7,163.0	24.4	143.3	-8.13	-3,570.3	1,153.5	3,350.1	3,280.2	69.92	47.916		
7,550.0	7,232.4	7,180.4	7,180.4	24.5	143.6	-9.81	-3,570.3	1,153.5	3,303.3	3,240.2	63.12	52.335		
7,600.0	7,246.6	7,194.6	7,194.6	24.7	143.9	-12.34	-3,570.3	1,153.5	3,255.4	3,196.5	58.94	55.235		
7,650.0	7,257.7	7,205.7	7,205.7	24.9	144.1	-16.52	-3,570.3	1,153.5	3,206.8	3,146.0	60.79	52.754		
7,700.0	7,265.6	7,213.6	7,213.6	25.2	144.3	-24.52	-3,570.3	1,153.5	3,157.5	3,081.9	75.56	41.786		
7,750.0	7,270.3	7,218.3	7,218.3	25.5	144.4	-43.92	-3,570.3	1,153.5	3,107.8	2,990.3	117.48	26.453		
7,800.0	7,271.7	7,219.7	7,219.7	25.8	144.4	-94.80	-3,570.3	1,153.5	3,057.9	2,894.1	163.77	18.672		
7,809.1	7,271.6	7,219.6	7,219.6	25.9	144.4	-105.92	-3,570.3	1,153.5	3,048.8	2,891.2	157.62	19.343		
7,900.0	7,270.0	7,218.0	7,218.0	26.6	144.4	-105.47	-3,570.3	1,153.5	2,958.1	2,799.2	158.89	18.618		
8,000.0	7,268.3	7,216.3	7,216.3	27.4	144.3	-104.97	-3,570.3	1,153.5	2,858.3	2,697.9	160.39	17.821		
8,100.0	7,266.6	7,214.6	7,214.6	28.5	144.3	-104.47	-3,570.3	1,153.5	2,758.5	2,596.5	161.99	17.029		
8,200.0	7,265.0	7,213.0	7,213.0	29.6	144.3	-103.96	-3,570.3	1,153.5	2,658.8	2,495.1	163.67	16.244		
8,300.0	7,263.3	7,211.3	7,211.3	30.8	144.2	-103.46	-3,570.3	1,153.5	2,559.0	2,393.6	165.42	15.470		
8,400.0	7,261.6	7,209.6	7,209.6	32.1	144.2	-102.95	-3,570.3	1,153.5	2,459.3	2,292.1	167.21	14.708		
8,500.0	7,259.9	7,207.9	7,207.9	33.4	144.2	-102.44	-3,570.3	1,153.5	2,359.6	2,190.5	169.05	13.958		
8,600.0	7,258.2	7,206.2	7,206.2	34.8	144.1	-101.92	-3,570.3	1,153.5	2,259.9	2,089.0	170.93	13.221		
8,700.0	7,256.5	7,204.5	7,204.5	36.3	144.1	-101.41	-3,570.3	1,153.5	2,160.3	1,987.4	172.83	12.499		
8,800.0	7,254.8	7,202.8	7,202.8	37.8	144.1	-100.89	-3,570.3	1,153.5	2,060.6	1,885.9	174.76	11.791		
8,900.0	7,253.1	7,201.1	7,201.1	39.3	144.0	-100.37	-3,570.3	1,153.5	1,961.1	1,784.4	176.71	11.098		
9,000.0	7,251.4	7,199.4	7,199.4	40.9	144.0	-99.85	-3,570.3	1,153.5	1,861.5	1,682.9	178.67	10.419		
9,100.0	7,249.7	7,197.7	7,197.7	42.5	144.0	-99.33	-3,570.3	1,153.5	1,762.0	1,581.4	180.64	9.754		
9,200.0	7,248.0	7,196.0	7,196.0	44.1	143.9	-98.81	-3,570.3	1,153.5	1,662.6	1,480.0	182.62	9.104		
9,300.0	7,246.3	7,194.3	7,194.3	45.8	143.9	-98.28	-3,570.3	1,153.5	1,563.3	1,378.7	184.60	8.468		
9,400.0	7,244.6	7,192.6	7,192.6	47.4	143.9	-97.75	-3,570.3	1,153.5	1,464.0	1,277.4	186.59	7.846		
9,500.0	7,242.9	7,190.9	7,190.9	49.1	143.8	-97.23	-3,570.3	1,153.5	1,364.8	1,176.2	188.58	7.237		
9,600.0	7,241.3	7,189.3	7,189.3	50.8	143.8	-96.70	-3,570.3	1,153.5	1,265.8	1,075.2	190.57	6.642		
9,700.0	7,239.6	7,187.6	7,187.6	52.6	143.8	-96.17	-3,570.3	1,153.5	1,166.9	974.4	192.55	6.060		
9,800.0	7,237.9	7,185.9	7,185.9	54.3	143.7	-95.64	-3,570.3	1,153.5	1,068.2	873.7	194.54	5.491		
9,900.0	7,236.2	7,184.2	7,184.2	56.0	143.7	-95.10	-3,570.3	1,153.5	969.8	773.3	196.51	4.935		
10,000.0	7,234.5	7,182.5	7,182.5	57.8	143.6	-94.57	-3,570.3	1,153.5	871.8	673.3	198.48	4.392		
10,100.0	7,232.8	7,180.8	7,180.8	59.6	143.6	-94.04	-3,570.3	1,153.5	774.3	573.8	200.44	3.863		
10,200.0	7,231.1	7,179.1	7,179.1	61.4	143.6	-93.50	-3,570.3	1,153.5	677.4	475.0	202.40	3.347		

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

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Existing Wells - Rotharmel 1 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7500-UNKNOWN													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)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,300.0	7,229.4	7,177.4	7,177.4	63.1	143.5	-92.97	-3,570.3	1,153.5	581.7	377.3	204.34	2.847		
10,400.0	7,227.7	7,175.7	7,175.7	64.9	143.5	-92.43	-3,570.3	1,153.5	487.6	281.4	206.27	2.364		
10,500.0	7,226.0	7,174.0	7,174.0	66.7	143.5	-91.89	-3,570.3	1,153.5	396.5	188.3	208.19	1.904		
10,600.0	7,224.3	7,172.3	7,172.3	68.6	143.4	-91.36	-3,570.3	1,153.5	310.8	100.7	210.10	1.479 Level 3		
10,700.0	7,222.6	7,170.6	7,170.6	70.4	143.4	-90.82	-3,570.3	1,153.5	236.7	24.7	211.99	1.117 Level 2		
10,800.0	7,220.9	7,168.9	7,168.9	72.2	143.4	-90.28	-3,570.3	1,153.5	188.2	-25.6	213.87	0.880 Level 1		
10,853.0	7,220.0	7,168.0	7,168.0	73.2	143.4	-90.00	-3,570.3	1,153.5	180.6	-34.3	214.87	0.841 Level 1, CC, ES, SF		
10,900.0	7,219.2	7,167.2	7,167.2	74.0	143.3	-89.75	-3,570.3	1,153.5	186.6	-29.1	215.74	0.865 Level 1		
11,000.0	7,217.6	7,165.6	7,165.6	75.8	143.3	-89.21	-3,570.3	1,153.5	232.9	15.3	217.59	1.070 Level 2		
11,100.0	7,215.9	7,163.9	7,163.9	77.7	143.3	-88.67	-3,570.3	1,153.5	306.0	86.5	219.43	1.394 Level 3		
11,200.0	7,214.2	7,162.2	7,162.2	79.5	143.2	-88.14	-3,570.3	1,153.5	391.1	169.9	221.24	1.768		
11,300.0	7,212.5	7,160.5	7,160.5	81.4	143.2	-87.60	-3,570.3	1,153.5	482.0	259.0	223.05	2.161		
11,400.0	7,210.8	7,158.8	7,158.8	83.2	143.2	-87.07	-3,570.3	1,153.5	576.0	351.1	224.83	2.562		
11,500.0	7,209.1	7,157.1	7,157.1	85.1	143.1	-86.53	-3,570.3	1,153.5	671.6	445.0	226.60	2.964		
11,600.0	7,207.4	7,155.4	7,155.4	86.9	143.1	-86.00	-3,570.3	1,153.5	768.4	540.1	228.34	3.365		
11,700.0	7,205.7	7,153.7	7,153.7	88.8	143.1	-85.46	-3,570.3	1,153.5	865.9	635.8	230.07	3.764		
11,800.0	7,204.0	7,152.0	7,152.0	90.6	143.0	-84.93	-3,570.3	1,153.5	963.9	732.1	231.78	4.159		
11,900.0	7,202.3	7,150.3	7,150.3	92.5	143.0	-84.40	-3,570.3	1,153.5	1,062.3	828.8	233.47	4.550		
12,000.0	7,200.6	7,148.6	7,148.6	94.4	143.0	-83.86	-3,570.3	1,153.5	1,161.0	925.8	235.14	4.937		
12,100.0	7,198.9	7,146.9	7,146.9	96.2	142.9	-83.33	-3,570.3	1,153.5	1,259.8	1,023.0	236.79	5.320		
12,200.0	7,197.2	7,145.2	7,145.2	98.1	142.9	-82.81	-3,570.3	1,153.5	1,358.9	1,120.4	238.42	5.699		
12,300.0	7,195.5	7,143.5	7,143.5	100.0	142.9	-82.28	-3,570.3	1,153.5	1,458.0	1,218.0	240.02	6.074		
12,332.4	7,195.0	7,143.0	7,143.0	100.6	142.9	-82.11	-3,570.3	1,153.5	1,490.1	1,249.6	240.54	6.195		



<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Existing Wells - Rotharmel 22-33 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7500-UNKNOWN													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	167.21	167.21	-5,071.3	1,150.8	5,200.4				
100.0	100.0	60.0	60.0	0.1	1.2	167.21	167.21	-5,071.3	1,150.8	5,200.2	5,198.9	1.31	3,961.849	
200.0	200.0	160.0	160.0	0.3	3.2	167.21	167.21	-5,071.3	1,150.8	5,200.2	5,196.7	3.54	1,470.100	
300.0	300.0	260.0	260.0	0.6	5.2	167.21	167.21	-5,071.3	1,150.8	5,200.2	5,194.5	5.76	902.491	
400.0	400.0	360.0	360.0	0.8	7.2	167.21	167.21	-5,071.3	1,150.8	5,200.2	5,192.3	7.99	651.100	
500.0	500.0	460.0	460.0	1.0	9.2	91.64	91.64	-5,071.3	1,150.8	5,200.3	5,190.1	10.20	509.702	
600.0	599.8	559.8	559.8	1.2	11.2	91.70	91.70	-5,071.3	1,150.8	5,200.5	5,188.0	12.42	418.786	
700.0	699.5	659.5	659.5	1.5	13.2	91.79	91.79	-5,071.3	1,150.8	5,200.7	5,186.1	14.65	355.015	
800.0	798.7	758.7	758.7	1.7	15.2	91.91	91.91	-5,071.3	1,150.8	5,201.1	5,184.2	16.90	307.683	
900.0	897.5	857.5	857.5	2.0	17.1	92.07	92.07	-5,071.3	1,150.8	5,201.7	5,182.5	19.19	271.058	
919.4	916.6	876.6	876.6	2.1	17.5	92.11	92.11	-5,071.3	1,150.8	5,201.8	5,182.2	19.64	264.869	
1,000.0	995.8	955.8	955.8	2.4	19.1	92.26	92.26	-5,071.3	1,150.8	5,202.4	5,180.8	21.51	241.879	
1,100.0	1,094.2	1,054.2	1,054.2	2.8	21.1	92.46	92.46	-5,071.3	1,150.8	5,203.1	5,179.3	23.84	218.227	
1,200.0	1,192.6	1,152.6	1,152.6	3.1	23.1	92.66	92.66	-5,071.3	1,150.8	5,203.9	5,177.7	26.19	198.714	
1,300.0	1,290.9	1,250.9	1,250.9	3.5	25.0	92.85	92.85	-5,071.3	1,150.8	5,204.8	5,176.3	28.54	182.365	
1,400.0	1,389.3	1,349.3	1,349.3	3.9	27.0	93.05	93.05	-5,071.3	1,150.8	5,205.8	5,174.9	30.90	168.481	
1,500.0	1,487.6	1,447.6	1,447.6	4.3	29.0	93.24	93.24	-5,071.3	1,150.8	5,206.8	5,173.5	33.26	156.549	
1,600.0	1,586.0	1,546.0	1,546.0	4.7	30.9	93.43	93.43	-5,071.3	1,150.8	5,207.8	5,172.2	35.62	146.191	
1,700.0	1,684.4	1,644.4	1,644.4	5.1	32.9	93.63	93.63	-5,071.3	1,150.8	5,209.0	5,171.0	37.99	137.116	
1,800.0	1,782.7	1,742.7	1,742.7	5.5	34.9	93.82	93.82	-5,071.3	1,150.8	5,210.1	5,169.8	40.36	129.101	
1,900.0	1,881.1	1,841.1	1,841.1	5.9	36.8	94.02	94.02	-5,071.3	1,150.8	5,211.4	5,168.7	42.73	121.973	
2,000.0	1,979.4	1,939.4	1,939.4	6.3	38.8	94.21	94.21	-5,071.3	1,150.8	5,212.7	5,167.6	45.10	115.593	
2,100.0	2,077.8	2,037.8	2,037.8	6.7	40.8	94.41	94.41	-5,071.3	1,150.8	5,214.1	5,166.6	47.47	109.849	
2,200.0	2,176.2	2,136.2	2,136.2	7.1	42.7	94.60	94.60	-5,071.3	1,150.8	5,215.5	5,165.7	49.84	104.652	
2,300.0	2,274.5	2,234.5	2,234.5	7.5	44.7	94.80	94.80	-5,071.3	1,150.8	5,217.0	5,164.8	52.21	99.927	
2,400.0	2,372.9	2,332.9	2,332.9	7.9	46.7	94.99	94.99	-5,071.3	1,150.8	5,218.6	5,164.0	54.58	95.613	
2,500.0	2,471.2	2,431.2	2,431.2	8.3	48.6	95.18	95.18	-5,071.3	1,150.8	5,220.2	5,163.3	56.95	91.660	
2,600.0	2,569.6	2,529.6	2,529.6	8.7	50.6	95.38	95.38	-5,071.3	1,150.8	5,221.9	5,162.6	59.32	88.023	
2,700.0	2,668.0	2,628.0	2,628.0	9.2	52.6	95.57	95.57	-5,071.3	1,150.8	5,223.7	5,162.0	61.70	84.667	
2,800.0	2,766.3	2,726.3	2,726.3	9.6	54.5	95.77	95.77	-5,071.3	1,150.8	5,225.5	5,161.4	64.07	81.560	
2,900.0	2,864.7	2,824.7	2,824.7	10.0	56.5	95.96	95.96	-5,071.3	1,150.8	5,227.3	5,160.9	66.44	78.676	
3,000.0	2,963.1	2,923.1	2,923.1	10.4	58.5	96.15	96.15	-5,071.3	1,150.8	5,229.3	5,160.5	68.81	75.992	
3,100.0	3,061.4	3,021.4	3,021.4	10.8	60.4	96.35	96.35	-5,071.3	1,150.8	5,231.3	5,160.1	71.19	73.487	
3,200.0	3,159.8	3,119.8	3,119.8	11.2	62.4	96.54	96.54	-5,071.3	1,150.8	5,233.3	5,159.8	73.56	71.145	
3,300.0	3,258.1	3,218.1	3,218.1	11.6	64.4	96.73	96.73	-5,071.3	1,150.8	5,235.4	5,159.5	75.93	68.950	
3,400.0	3,356.5	3,316.5	3,316.5	12.0	66.3	96.92	96.92	-5,071.3	1,150.8	5,237.6	5,159.3	78.30	66.890	
3,500.0	3,454.9	3,414.9	3,414.9	12.4	68.3	97.12	97.12	-5,071.3	1,150.8	5,239.9	5,159.2	80.67	64.951	
3,600.0	3,553.2	3,513.2	3,513.2	12.8	70.3	97.31	97.31	-5,071.3	1,150.8	5,242.2	5,159.1	83.05	63.124	
3,700.0	3,651.6	3,611.6	3,611.6	13.2	72.2	97.50	97.50	-5,071.3	1,150.8	5,244.5	5,159.1	85.42	61.399	
3,800.0	3,749.9	3,709.9	3,709.9	13.6	74.2	97.69	97.69	-5,071.3	1,150.8	5,247.0	5,159.2	87.79	59.768	
3,900.0	3,848.3	3,808.3	3,808.3	14.1	76.2	97.89	97.89	-5,071.3	1,150.8	5,249.4	5,159.3	90.16	58.224	
4,000.0	3,946.7	3,906.7	3,906.7	14.5	78.1	98.08	98.08	-5,071.3	1,150.8	5,252.0	5,159.5	92.53	56.760	
4,100.0	4,045.0	4,005.0	4,005.0	14.9	80.1	98.27	98.27	-5,071.3	1,150.8	5,254.6	5,159.7	94.90	55.370	
4,200.0	4,143.4	4,103.4	4,103.4	15.3	82.1	98.46	98.46	-5,071.3	1,150.8	5,257.3	5,160.0	97.27	54.048	
4,300.0	4,241.7	4,201.7	4,201.7	15.7	84.0	98.65	98.65	-5,071.3	1,150.8	5,260.0	5,160.3	99.64	52.790	
4,400.0	4,340.1	4,300.1	4,300.1	16.1	86.0	98.84	98.84	-5,071.3	1,150.8	5,262.8	5,160.8	102.01	51.591	
4,500.0	4,438.5	4,398.5	4,398.5	16.5	88.0	99.03	99.03	-5,071.3	1,150.8	5,265.6	5,161.2	104.38	50.447	
4,600.0	4,536.8	4,496.8	4,496.8	16.9	89.9	99.22	99.22	-5,071.3	1,150.8	5,268.5	5,161.8	106.75	49.355	
4,700.0	4,635.2	4,595.2	4,595.2	17.3	91.9	99.41	99.41	-5,071.3	1,150.8	5,271.5	5,162.4	109.12	48.311	
4,800.0	4,733.5	4,693.5	4,693.5	17.7	93.9	99.60	99.60	-5,071.3	1,150.8	5,274.5	5,163.0	111.48	47.312	
4,900.0	4,831.9	4,791.9	4,791.9	18.2	95.8	99.79	99.79	-5,071.3	1,150.8	5,277.6	5,163.8	113.85	46.355	

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

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Existing Wells - Rotharmel 22-33 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7500-UNKNOWN													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis		Distance								Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
5,000.0	4,930.3	4,890.3	4,890.3	18.6	97.8	99.98	-5,071.3	1,150.8	5,280.8	5,164.5	116.22	45.438		
5,100.0	5,028.6	4,988.6	4,988.6	19.0	99.8	100.17	-5,071.3	1,150.8	5,284.0	5,165.4	118.59	44.558		
5,200.0	5,127.0	5,087.0	5,087.0	19.4	101.7	100.36	-5,071.3	1,150.8	5,287.2	5,166.3	120.95	43.714		
5,300.0	5,225.3	5,185.3	5,185.3	19.8	103.7	100.55	-5,071.3	1,150.8	5,290.6	5,167.2	123.32	42.902		
5,400.0	5,323.7	5,283.7	5,283.7	20.2	105.7	100.74	-5,071.3	1,150.8	5,293.9	5,168.3	125.68	42.121		
5,500.0	5,422.1	5,382.1	5,382.1	20.6	107.6	100.93	-5,071.3	1,150.8	5,297.4	5,169.3	128.05	41.370		
5,600.0	5,520.4	5,480.4	5,480.4	21.0	109.6	101.12	-5,071.3	1,150.8	5,300.9	5,170.5	130.41	40.647		
5,700.0	5,618.8	5,578.8	5,578.8	21.4	111.6	101.31	-5,071.3	1,150.8	5,304.4	5,171.7	132.78	39.950		
5,800.0	5,717.1	5,677.1	5,677.1	21.8	113.5	101.49	-5,071.3	1,150.8	5,308.1	5,172.9	135.14	39.278		
5,900.0	5,815.5	5,775.5	5,775.5	22.3	115.5	101.68	-5,071.3	1,150.8	5,311.7	5,174.2	137.50	38.630		
5,969.0	5,883.4	5,843.4	5,843.4	22.5	116.9	101.81	-5,071.3	1,150.8	5,314.3	5,175.2	139.13	38.196		
6,000.0	5,913.9	5,873.9	5,873.9	22.7	117.5	101.89	-5,071.3	1,150.8	5,315.5	5,175.6	139.86	38.006		
6,100.0	6,012.7	5,972.7	5,972.7	22.9	119.5	102.11	-5,071.3	1,150.8	5,318.7	5,176.5	142.12	37.423		
6,200.0	6,112.0	6,072.0	6,072.0	23.2	121.4	102.28	-5,071.3	1,150.8	5,321.2	5,176.8	144.36	36.861		
6,300.0	6,211.7	6,171.7	6,171.7	23.4	123.4	102.40	-5,071.3	1,150.8	5,322.9	5,176.4	146.56	36.320		
6,400.0	6,311.5	6,271.5	6,271.5	23.5	125.4	102.48	-5,071.3	1,150.8	5,324.0	5,175.3	148.72	35.800		
6,488.5	6,400.0	6,360.0	6,360.0	23.6	127.2	178.09	-5,071.3	1,150.8	5,324.3	5,173.7	150.59	35.355		
6,500.0	6,411.5	6,371.5	6,371.5	23.7	127.4	178.09	-5,071.3	1,150.8	5,324.3	5,173.4	150.84	35.298		
6,596.2	6,507.7	6,467.7	6,467.7	23.8	129.4	178.09	-5,071.3	1,150.8	5,324.3	5,171.4	152.89	34.825		
6,600.0	6,511.5	6,471.5	6,471.5	23.8	129.4	-1.91	-5,071.3	1,150.8	5,324.3	5,171.3	152.96	34.807		
6,650.0	6,561.5	6,521.5	6,521.5	23.8	130.4	-1.92	-5,071.3	1,150.8	5,322.4	5,168.8	153.62	34.647		
6,700.0	6,611.2	6,571.2	6,571.2	23.9	131.4	-1.94	-5,071.3	1,150.8	5,317.2	5,163.6	153.61	34.615		
6,750.0	6,660.5	6,620.5	6,620.5	23.9	132.4	-1.96	-5,071.3	1,150.8	5,308.9	5,155.9	152.93	34.715		
6,800.0	6,709.1	6,669.1	6,669.1	23.9	133.4	-2.00	-5,071.3	1,150.8	5,297.3	5,145.7	151.56	34.952		
6,850.0	6,756.9	6,716.9	6,716.9	23.9	134.3	-2.04	-5,071.3	1,150.8	5,282.5	5,133.0	149.51	35.333		
6,900.0	6,803.6	6,763.6	6,763.6	24.0	135.3	-2.10	-5,071.3	1,150.8	5,264.7	5,117.9	146.76	35.872		
6,950.0	6,849.0	6,809.0	6,809.0	24.0	136.2	-2.17	-5,071.3	1,150.8	5,243.9	5,100.5	143.34	36.583		
7,000.0	6,893.0	6,853.0	6,853.0	24.0	137.1	-2.26	-5,071.3	1,150.8	5,220.1	5,080.8	139.24	37.489		
7,050.0	6,935.3	6,895.3	6,895.3	24.0	137.9	-2.37	-5,071.3	1,150.8	5,193.5	5,059.0	134.49	38.617		
7,100.0	6,975.8	6,935.8	6,935.8	24.0	138.7	-2.50	-5,071.3	1,150.8	5,164.2	5,035.1	129.09	40.005		
7,150.0	7,014.3	6,974.3	6,974.3	24.0	139.5	-2.65	-5,071.3	1,150.8	5,132.3	5,009.2	123.08	41.698		
7,200.0	7,050.6	7,010.6	7,010.6	24.0	140.2	-2.84	-5,071.3	1,150.8	5,098.0	4,981.5	116.49	43.762		
7,250.0	7,084.6	7,044.6	7,044.6	24.0	140.9	-3.07	-5,071.3	1,150.8	5,061.3	4,952.0	109.37	46.279		
7,300.0	7,116.1	7,076.1	7,076.1	24.1	141.5	-3.35	-5,071.3	1,150.8	5,022.6	4,920.8	101.75	49.362		
7,350.0	7,145.0	7,105.0	7,105.0	24.1	142.1	-3.71	-5,071.3	1,150.8	4,981.8	4,888.1	93.71	53.162		
7,400.0	7,171.2	7,131.2	7,131.2	24.2	142.6	-4.16	-5,071.3	1,150.8	4,939.3	4,853.9	85.34	57.880		
7,450.0	7,194.6	7,154.6	7,154.6	24.3	143.1	-4.75	-5,071.3	1,150.8	4,895.1	4,818.3	76.76	63.773		
7,500.0	7,215.0	7,175.0	7,175.0	24.4	143.5	-5.55	-5,071.3	1,150.8	4,849.5	4,781.3	68.19	71.119		
7,550.0	7,232.4	7,192.4	7,192.4	24.5	143.8	-6.68	-5,071.3	1,150.8	4,802.6	4,742.6	60.04	79.988		
7,600.0	7,246.6	7,206.6	7,206.6	24.7	144.1	-8.39	-5,071.3	1,150.8	4,754.8	4,701.5	53.27	89.256		
7,650.0	7,257.7	7,217.7	7,217.7	24.9	144.4	-11.25	-5,071.3	1,150.8	4,706.0	4,655.7	50.34	93.480		
7,700.0	7,265.6	7,225.6	7,225.6	25.2	144.5	-16.93	-5,071.3	1,150.8	4,656.7	4,599.0	57.69	80.724		
7,750.0	7,270.3	7,230.3	7,230.3	25.5	144.6	-32.59	-5,071.3	1,150.8	4,607.0	4,513.5	93.50	49.274		
7,800.0	7,271.7	7,231.7	7,231.7	25.8	144.6	-97.25	-5,071.3	1,150.8	4,557.0	4,393.9	163.14	27.933		
7,809.1	7,271.6	7,231.6	7,231.6	25.9	144.6	-113.39	-5,071.3	1,150.8	4,547.9	4,397.5	150.42	30.234		
7,900.0	7,270.0	7,230.0	7,230.0	26.6	144.6	-112.97	-5,071.3	1,150.8	4,457.1	4,305.4	151.77	29.368		
8,000.0	7,268.3	7,228.3	7,228.3	27.4	144.6	-112.50	-5,071.3	1,150.8	4,357.2	4,203.9	153.35	28.413		
8,100.0	7,266.6	7,226.6	7,226.6	28.5	144.5	-112.04	-5,071.3	1,150.8	4,257.3	4,102.3	155.04	27.459		
8,200.0	7,265.0	7,225.0	7,225.0	29.6	144.5	-111.57	-5,071.3	1,150.8	4,157.4	4,000.6	156.81	26.512		
8,300.0	7,263.3	7,223.3	7,223.3	30.8	144.5	-111.09	-5,071.3	1,150.8	4,057.5	3,898.9	158.65	25.575		
8,400.0	7,261.6	7,221.6	7,221.6	32.1	144.4	-110.62	-5,071.3	1,150.8	3,957.7	3,797.1	160.55	24.651		

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

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Existing Wells - Rotharmel 22-33 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error: 0.0 ft	
Survey Program: 7500-UNKNOWN													Offset Well Error: 0.0 ft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
8,500.0	7,259.9	7,219.9	7,219.9	33.4	144.4	-110.14	-5,071.3	1,150.8	3,857.8	3,695.3	162.49	23.741		
8,600.0	7,258.2	7,218.2	7,218.2	34.8	144.4	-109.66	-5,071.3	1,150.8	3,757.9	3,593.4	164.48	22.847		
8,700.0	7,256.5	7,216.5	7,216.5	36.3	144.3	-109.17	-5,071.3	1,150.8	3,658.0	3,491.5	166.50	21.970		
8,800.0	7,254.8	7,214.8	7,214.8	37.8	144.3	-108.68	-5,071.3	1,150.8	3,558.2	3,389.6	168.56	21.110		
8,900.0	7,253.1	7,213.1	7,213.1	39.3	144.3	-108.19	-5,071.3	1,150.8	3,458.3	3,287.7	170.63	20.268		
9,000.0	7,251.4	7,211.4	7,211.4	40.9	144.2	-107.70	-5,071.3	1,150.8	3,358.5	3,185.7	172.73	19.444		
9,100.0	7,249.7	7,209.7	7,209.7	42.5	144.2	-107.20	-5,071.3	1,150.8	3,258.6	3,083.8	174.84	18.638		
9,200.0	7,248.0	7,208.0	7,208.0	44.1	144.2	-106.70	-5,071.3	1,150.8	3,158.8	2,981.8	176.97	17.849		
9,300.0	7,246.3	7,206.3	7,206.3	45.8	144.1	-106.20	-5,071.3	1,150.8	3,059.0	2,879.9	179.11	17.079		
9,400.0	7,244.6	7,204.6	7,204.6	47.4	144.1	-105.70	-5,071.3	1,150.8	2,959.2	2,777.9	181.26	16.326		
9,500.0	7,242.9	7,202.9	7,202.9	49.1	144.1	-105.19	-5,071.3	1,150.8	2,859.4	2,675.9	183.41	15.590		
9,600.0	7,241.3	7,201.3	7,201.3	50.8	144.0	-104.68	-5,071.3	1,150.8	2,759.6	2,574.0	185.58	14.870		
9,700.0	7,239.6	7,199.6	7,199.6	52.6	144.0	-104.17	-5,071.3	1,150.8	2,659.8	2,472.1	187.74	14.167		
9,800.0	7,237.9	7,197.9	7,197.9	54.3	144.0	-103.66	-5,071.3	1,150.8	2,560.0	2,370.1	189.91	13.480		
9,900.0	7,236.2	7,196.2	7,196.2	56.0	143.9	-103.14	-5,071.3	1,150.8	2,460.3	2,268.2	192.08	12.809		
10,000.0	7,234.5	7,194.5	7,194.5	57.8	143.9	-102.63	-5,071.3	1,150.8	2,360.6	2,166.4	194.25	12.153		
10,100.0	7,232.8	7,192.8	7,192.8	59.6	143.9	-102.11	-5,071.3	1,150.8	2,260.9	2,064.5	196.41	11.511		
10,200.0	7,231.1	7,191.1	7,191.1	61.4	143.8	-101.58	-5,071.3	1,150.8	2,161.3	1,962.7	198.58	10.884		
10,300.0	7,229.4	7,189.4	7,189.4	63.1	143.8	-101.06	-5,071.3	1,150.8	2,061.6	1,860.9	200.74	10.270		
10,400.0	7,227.7	7,187.7	7,187.7	64.9	143.8	-100.53	-5,071.3	1,150.8	1,962.0	1,759.1	202.90	9.670		
10,500.0	7,226.0	7,186.0	7,186.0	66.7	143.7	-100.01	-5,071.3	1,150.8	1,862.5	1,657.4	205.05	9.083		
10,600.0	7,224.3	7,184.3	7,184.3	68.6	143.7	-99.48	-5,071.3	1,150.8	1,763.0	1,555.8	207.19	8.509		
10,700.0	7,222.6	7,182.6	7,182.6	70.4	143.7	-98.94	-5,071.3	1,150.8	1,663.5	1,454.2	209.33	7.947		
10,800.0	7,220.9	7,180.9	7,180.9	72.2	143.6	-98.41	-5,071.3	1,150.8	1,564.2	1,352.7	211.46	7.397		
10,900.0	7,219.2	7,179.2	7,179.2	74.0	143.6	-97.88	-5,071.3	1,150.8	1,464.9	1,251.3	213.57	6.859		
11,000.0	7,217.6	7,177.6	7,177.6	75.8	143.6	-97.34	-5,071.3	1,150.8	1,365.7	1,150.0	215.68	6.332		
11,100.0	7,215.9	7,175.9	7,175.9	77.7	143.5	-96.80	-5,071.3	1,150.8	1,266.6	1,048.8	217.78	5.816		
11,200.0	7,214.2	7,174.2	7,174.2	79.5	143.5	-96.27	-5,071.3	1,150.8	1,167.7	947.8	219.87	5.311		
11,300.0	7,212.5	7,172.5	7,172.5	81.4	143.4	-95.73	-5,071.3	1,150.8	1,069.0	847.0	221.94	4.817		
11,400.0	7,210.8	7,170.8	7,170.8	83.2	143.4	-95.19	-5,071.3	1,150.8	970.5	746.5	224.00	4.333		
11,500.0	7,209.1	7,169.1	7,169.1	85.1	143.4	-94.65	-5,071.3	1,150.8	872.4	646.4	226.05	3.860		
11,600.0	7,207.4	7,167.4	7,167.4	86.9	143.3	-94.10	-5,071.3	1,150.8	774.8	546.7	228.08	3.397		
11,700.0	7,205.7	7,165.7	7,165.7	88.8	143.3	-93.56	-5,071.3	1,150.8	677.9	447.8	230.10	2.946		
11,800.0	7,204.0	7,164.0	7,164.0	90.6	143.3	-93.02	-5,071.3	1,150.8	582.0	349.9	232.10	2.508		
11,900.0	7,202.3	7,162.3	7,162.3	92.5	143.2	-92.47	-5,071.3	1,150.8	487.8	253.7	234.08	2.084		
12,000.0	7,200.6	7,160.6	7,160.6	94.4	143.2	-91.93	-5,071.3	1,150.8	396.3	160.3	236.05	1.679		
12,100.0	7,198.9	7,158.9	7,158.9	96.2	143.2	-91.39	-5,071.3	1,150.8	310.3	72.3	238.00	1.304 Level 3		
12,200.0	7,197.2	7,157.2	7,157.2	98.1	143.1	-90.84	-5,071.3	1,150.8	235.4	-4.5	239.93	0.981 Level 1		
12,300.0	7,195.5	7,155.5	7,155.5	100.0	143.1	-90.30	-5,071.3	1,150.8	186.0	-55.9	241.84	0.769 Level 1		
12,332.4	7,195.0	7,155.0	7,155.0	100.6	143.1	-90.12	-5,071.3	1,150.8	179.2	-63.2	242.46	0.739 Level 1, CC, ES, SF		

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Thornton 28GK-HZ Pad Sec. 28-T7N-R66W - Thornton 28K-303 - Wellbore #1 - Plan #1 (06-11-13)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-45.49		43.7	-44.5	62.4				
100.0	100.0	100.0	100.0	0.1	0.1	-45.49		43.7	-44.5	62.4	62.1	0.22	277.438	
200.0	200.0	200.0	200.0	0.3	0.3	-45.49		43.7	-44.5	62.4	61.7	0.67	92.479	
300.0	300.0	300.0	300.0	0.6	0.6	-45.49		43.7	-44.5	62.4	61.2	1.12	55.488	
400.0	400.0	400.0	400.0	0.8	0.8	-45.49		43.7	-44.5	62.4	60.8	1.57	39.634 CC, ES	
500.0	500.0	500.0	500.0	1.0	1.0	-122.41		43.7	-44.5	63.3	61.3	2.01	31.410	
600.0	599.8	599.8	599.8	1.2	1.2	-126.19		43.7	-44.5	66.2	63.8	2.46	26.974	
700.0	699.5	699.5	699.5	1.5	1.5	-131.72		43.7	-44.5	71.7	68.8	2.91	24.667	
800.0	798.7	798.7	798.7	1.7	1.7	-138.08		43.7	-44.5	80.4	77.0	3.37	23.851	
900.0	897.5	897.5	897.5	2.0	1.9	-144.38		43.7	-44.5	92.7	88.8	3.84	24.149	
919.4	916.6	916.6	916.6	2.1	1.9	-145.55		43.7	-44.5	95.5	91.6	3.93	24.312	
1,000.0	995.8	995.8	995.8	2.4	2.1	-149.90		43.7	-44.5	107.8	103.5	4.30	25.061	
1,100.0	1,094.2	1,094.2	1,094.2	2.8	2.3	-154.08		43.7	-44.5	123.8	119.1	4.77	25.974	
1,200.0	1,192.6	1,192.6	1,192.6	3.1	2.6	-157.29		43.7	-44.5	140.3	135.1	5.23	26.825	
1,300.0	1,290.9	1,290.9	1,290.9	3.5	2.8	-159.82		43.7	-44.5	157.1	151.4	5.69	27.597	
1,400.0	1,389.3	1,389.3	1,389.3	3.9	3.0	-161.87		43.7	-44.5	174.2	168.0	6.16	28.290	
1,500.0	1,487.6	1,487.6	1,487.6	4.3	3.2	-163.54		43.7	-44.5	191.4	184.8	6.62	28.909	
1,600.0	1,586.0	1,591.4	1,591.4	4.7	3.5	-164.78		44.5	-43.3	207.7	200.6	7.09	29.284	
1,700.0	1,684.4	1,697.0	1,696.8	5.1	3.7	-165.29		47.6	-38.9	221.1	213.5	7.57	29.220	
1,800.0	1,782.7	1,803.3	1,802.8	5.5	3.9	-165.18		52.8	-31.3	231.4	223.4	8.05	28.742	
1,900.0	1,881.1	1,905.6	1,904.4	5.9	4.2	-164.67		59.6	-21.5	239.4	230.8	8.54	28.014	
2,000.0	1,979.4	2,005.3	2,003.3	6.3	4.4	-164.17		66.4	-11.7	247.1	238.1	9.04	27.332	
2,100.0	2,077.8	2,105.0	2,102.3	6.7	4.7	-163.70		73.2	-1.9	254.9	245.4	9.55	26.704	
2,200.0	2,176.2	2,204.6	2,201.2	7.1	4.9	-163.25		79.9	7.9	262.7	252.6	10.05	26.126	
2,300.0	2,274.5	2,304.3	2,300.2	7.5	5.2	-162.84		86.7	17.7	270.5	259.9	10.57	25.593	
2,400.0	2,372.9	2,404.0	2,399.2	7.9	5.5	-162.44		93.5	27.4	278.3	267.2	11.09	25.099	
2,500.0	2,471.2	2,503.7	2,498.1	8.3	5.7	-162.07		100.2	37.2	286.1	274.5	11.61	24.642	
2,600.0	2,569.6	2,603.4	2,597.1	8.7	6.0	-161.72		107.0	47.0	294.0	281.8	12.14	24.217	
2,700.0	2,668.0	2,703.0	2,696.1	9.2	6.3	-161.38		113.8	56.8	301.8	289.2	12.67	23.822	
2,800.0	2,766.3	2,802.7	2,795.0	9.6	6.6	-161.07		120.5	66.6	309.7	296.5	13.20	23.454	
2,900.0	2,864.7	2,902.4	2,894.0	10.0	6.9	-160.77		127.3	76.3	317.6	303.8	13.74	23.110	
3,000.0	2,963.1	3,002.1	2,993.0	10.4	7.2	-160.48		134.1	86.1	325.4	311.1	14.28	22.788	
3,100.0	3,061.4	3,101.7	3,091.9	10.8	7.5	-160.21		140.8	95.9	333.3	318.5	14.82	22.486	
3,200.0	3,159.8	3,201.4	3,190.9	11.2	7.8	-159.94		147.6	105.7	341.2	325.8	15.37	22.203	
3,300.0	3,258.1	3,301.1	3,289.9	11.6	8.1	-159.70		154.4	115.5	349.1	333.2	15.91	21.937	
3,400.0	3,356.5	3,400.8	3,388.8	12.0	8.4	-159.46		161.1	125.2	357.0	340.6	16.46	21.686	
3,500.0	3,454.9	3,500.4	3,487.8	12.4	8.7	-159.23		167.9	135.0	364.9	347.9	17.01	21.449	
3,600.0	3,553.2	3,600.1	3,586.7	12.8	9.0	-159.01		174.6	144.8	372.8	355.3	17.57	21.225	
3,700.0	3,651.6	3,699.8	3,685.7	13.2	9.3	-158.80		181.4	154.6	380.8	362.6	18.12	21.014	
3,800.0	3,749.9	3,799.5	3,784.7	13.6	9.6	-158.60		188.2	164.3	388.7	370.0	18.67	20.814	
3,900.0	3,848.3	3,899.1	3,883.6	14.1	9.9	-158.41		194.9	174.1	396.6	377.4	19.23	20.624	
4,000.0	3,946.7	3,998.8	3,982.6	14.5	10.2	-158.23		201.7	183.9	404.6	384.8	19.79	20.443	
4,100.0	4,045.0	4,098.5	4,081.6	14.9	10.5	-158.05		208.5	193.7	412.5	392.1	20.35	20.272	
4,200.0	4,143.4	4,198.2	4,180.5	15.3	10.8	-157.88		215.2	203.5	420.4	399.5	20.91	20.108	
4,300.0	4,241.7	4,297.8	4,279.5	15.7	11.1	-157.71		222.0	213.2	428.4	406.9	21.47	19.953	
4,400.0	4,340.1	4,397.5	4,378.5	16.1	11.4	-157.55		228.8	223.0	436.3	414.3	22.03	19.805	
4,500.0	4,438.5	4,497.2	4,477.4	16.5	11.7	-157.40		235.5	232.8	444.3	421.7	22.60	19.663	
4,600.0	4,536.8	4,596.9	4,576.4	16.9	12.0	-157.25		242.3	242.6	452.2	429.1	23.16	19.527	
4,700.0	4,635.2	4,696.6	4,675.4	17.3	12.3	-157.11		249.1	252.4	460.2	436.5	23.72	19.398	
4,800.0	4,733.5	4,796.2	4,774.3	17.7	12.6	-156.97		255.8	262.1	468.2	443.9	24.29	19.274	
4,900.0	4,831.9	4,895.9	4,873.3	18.2	12.9	-156.84		262.6	271.9	476.1	451.3	24.86	19.155	

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

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Thornton 28GK-HZ Pad Sec. 28-T7N-R66W - Thornton 28K-303 - Wellbore #1 - Plan #1 (06-11-13)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,000.0	4,930.3	4,995.6	4,972.3	18.6	13.2	-156.71		269.4	281.7	484.1	458.7	25.42	19.041	
5,100.0	5,028.6	5,095.3	5,071.2	19.0	13.5	-156.59		276.1	291.5	492.1	466.1	25.99	18.932	
5,200.0	5,127.0	5,193.6	5,168.8	19.4	13.8	-156.47		282.8	301.1	500.1	473.5	26.55	18.832	
5,300.0	5,225.3	5,281.9	5,256.7	19.8	14.0	-156.50		287.8	308.4	509.4	482.4	27.02	18.852	
5,400.0	5,323.7	5,369.7	5,344.3	20.2	14.2	-156.73		291.3	313.4	521.0	493.5	27.45	18.980	
5,500.0	5,422.1	5,456.9	5,431.4	20.6	14.4	-157.15		293.3	316.2	534.8	507.0	27.83	19.213	
5,600.0	5,520.4	5,545.9	5,520.4	21.0	14.5	-157.75		293.7	316.9	550.8	522.6	28.19	19.537	
5,700.0	5,618.8	5,644.3	5,618.8	21.4	14.7	-158.44		293.7	316.9	567.6	539.0	28.57	19.869	
5,800.0	5,717.1	5,742.6	5,717.1	21.8	14.9	-159.09		293.7	316.9	584.4	555.5	28.95	20.186	
5,900.0	5,815.5	5,841.0	5,815.5	22.3	15.0	-159.70		293.7	316.9	601.3	572.0	29.34	20.493	
5,969.0	5,883.4	5,908.9	5,883.4	22.5	15.2	-160.10		293.7	316.9	613.0	583.4	29.62	20.700	
6,000.0	5,913.9	5,939.4	5,913.9	22.7	15.2	-160.31		293.7	316.9	618.1	588.4	29.74	20.785	
6,100.0	6,012.7	6,038.2	6,012.7	22.9	15.4	-160.87		293.7	316.9	632.5	602.4	30.11	21.007	
6,200.0	6,112.0	6,137.5	6,112.0	23.2	15.6	-161.28		293.7	316.9	643.7	613.2	30.46	21.131	
6,300.0	6,211.7	6,237.2	6,211.7	23.4	15.8	-161.57		293.7	316.9	651.6	620.8	30.79	21.160	
6,400.0	6,311.5	6,337.0	6,311.5	23.5	16.0	-161.73		293.7	316.9	656.2	625.1	31.10	21.100	
6,488.5	6,400.0	6,425.5	6,400.0	23.6	16.1	-86.19		293.7	316.9	657.5	626.1	31.35	20.969	
6,500.0	6,411.5	6,437.0	6,411.5	23.7	16.2	-86.19		293.7	316.9	657.5	626.1	31.40	20.941	
6,596.2	6,507.7	6,533.2	6,507.7	23.8	16.3	-86.19		293.7	316.9	657.5	625.7	31.76	20.701	
6,600.0	6,511.5	6,537.0	6,511.5	23.8	16.4	93.81		293.7	316.9	657.5	625.7	31.77	20.692	
6,650.0	6,561.5	6,587.0	6,561.5	23.8	16.5	93.97		293.7	316.9	657.6	625.6	31.98	20.565	
6,700.0	6,611.2	6,637.6	6,611.2	23.9	16.5	94.38		293.6	316.9	658.0	625.8	32.19	20.441	
6,750.0	6,660.5	6,691.0	6,665.5	23.9	16.6	94.88		290.7	316.9	658.4	626.1	32.37	20.342	
6,800.0	6,709.1	6,744.9	6,718.9	23.9	16.7	95.36		284.1	316.9	658.9	626.4	32.51	20.271	
6,850.0	6,756.9	6,792.2	6,772.2	23.9	16.7	95.82		273.6	316.9	659.4	626.8	32.60	20.227	
6,900.0	6,803.6	6,854.0	6,825.0	24.0	16.8	96.25		259.3	316.9	660.0	627.3	32.66	20.206	
6,950.0	6,849.0	6,909.1	6,877.0	24.0	16.8	96.65		241.0	316.9	660.5	627.8	32.69	20.205	
7,000.0	6,893.0	6,964.7	6,928.0	24.0	16.8	97.02		218.9	316.9	661.0	628.3	32.70	20.217	
7,050.0	6,935.3	7,020.6	6,977.5	24.0	16.8	97.36		192.9	316.9	661.5	628.8	32.69	20.235	
7,100.0	6,975.8	7,076.9	7,025.3	24.0	16.8	97.67		163.2	316.9	662.0	629.3	32.69	20.251	
7,150.0	7,014.3	7,133.5	7,071.0	24.0	16.8	97.93		129.8	316.9	662.4	629.7	32.70	20.255	
7,200.0	7,050.6	7,190.3	7,114.3	24.0	16.8	98.17		93.0	316.9	662.7	630.0	32.75	20.238	
7,250.0	7,084.6	7,247.4	7,154.9	24.0	16.8	98.36		52.9	316.9	663.1	630.2	32.84	20.188	
7,300.0	7,116.1	7,304.6	7,192.5	24.1	16.9	98.51		9.8	316.9	663.3	630.3	33.01	20.094	
7,350.0	7,145.0	7,362.1	7,226.9	24.1	16.9	98.62		-36.2	316.9	663.5	630.2	33.26	19.948	
7,400.0	7,171.2	7,419.6	7,257.7	24.2	17.1	98.68		-84.7	316.9	663.6	630.0	33.61	19.745	
7,450.0	7,194.6	7,477.1	7,284.9	24.3	17.2	98.71		-135.4	316.9	663.7	629.6	34.06	19.482	
7,500.0	7,215.0	7,534.7	7,308.1	24.4	17.5	98.69		-188.1	316.9	663.6	629.0	34.64	19.160	
7,550.0	7,232.4	7,592.2	7,327.3	24.5	17.8	98.62		-242.3	316.9	663.5	628.2	35.32	18.783	
7,600.0	7,246.6	7,649.6	7,342.4	24.7	18.2	98.52		-297.7	316.9	663.3	627.2	36.13	18.360	
7,650.0	7,257.7	7,706.9	7,353.2	24.9	18.7	98.37		-353.9	316.9	663.1	626.0	37.05	17.896	
7,700.0	7,265.6	7,764.0	7,359.8	25.2	19.2	98.18		-410.6	316.9	662.8	624.7	38.08	17.407	
7,750.0	7,270.3	7,820.9	7,362.1	25.5	19.8	97.96		-467.4	316.9	662.4	623.2	39.19	16.904	
7,800.0	7,271.7	7,872.9	7,361.3	25.8	20.4	97.78		-519.4	316.9	662.1	621.8	40.33	16.416	
7,809.1	7,271.6	7,882.0	7,361.2	25.9	20.5	97.78		-528.6	316.9	662.1	621.6	40.54	16.331	
7,900.0	7,270.0	7,972.9	7,359.4	26.6	21.5	97.76		-619.4	316.9	662.1	619.5	42.61	15.536	
8,000.0	7,268.3	8,072.9	7,357.5	27.4	22.8	97.74		-719.4	316.9	662.0	617.0	45.09	14.684	
8,100.0	7,266.6	8,172.9	7,355.6	28.5	24.2	97.73		-819.4	316.9	662.0	614.3	47.73	13.869	
8,200.0	7,265.0	8,272.9	7,353.7	29.6	25.6	97.71		-919.4	316.9	662.0	611.5	50.53	13.100	
8,300.0	7,263.3	8,372.9	7,351.8	30.8	27.1	97.69		-1,019.4	316.9	662.0	608.5	53.46	12.383	
8,400.0	7,261.6	8,472.9	7,349.9	32.1	28.6	97.67		-1,119.3	316.9	661.9	605.4	56.49	11.718	

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

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Thornton 28GK-HZ Pad Sec. 28-T7N-R66W - Thornton 28K-303 - Wellbore #1 - Plan #1 (06-11-13)											Offset Site Error:		0.0 ft
Survey Program: 0-MWD											Offset Well Error:		0.0 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (ft)	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)				Between Centres (ft)	Between Ellipses (ft)
8,500.0	7,259.9	8,572.9	7,348.0	33.4	30.2	97.65	-1,219.3	316.9	661.9	602.3	59.61	11.103	
8,600.0	7,258.2	8,672.9	7,346.1	34.8	31.8	97.64	-1,319.3	316.9	661.9	599.1	62.81	10.537	
8,700.0	7,256.5	8,772.9	7,344.2	36.3	33.5	97.62	-1,419.3	316.9	661.9	595.8	66.08	10.016	
8,800.0	7,254.8	8,872.9	7,342.3	37.8	35.1	97.60	-1,519.3	316.9	661.8	592.4	69.40	9.536	
8,900.0	7,253.1	8,972.9	7,340.4	39.3	36.8	97.58	-1,619.2	316.9	661.8	589.0	72.77	9.094	
9,000.0	7,251.4	9,072.9	7,338.5	40.9	38.6	97.56	-1,719.2	316.9	661.8	585.6	76.19	8.686	
9,100.0	7,249.7	9,172.9	7,336.6	42.5	40.3	97.55	-1,819.2	316.9	661.7	582.1	79.64	8.309	
9,200.0	7,248.0	9,272.9	7,334.7	44.1	42.1	97.53	-1,919.2	316.9	661.7	578.6	83.12	7.961	
9,300.0	7,246.3	9,372.9	7,332.8	45.8	43.8	97.51	-2,019.2	316.9	661.7	575.1	86.63	7.638	
9,400.0	7,244.6	9,472.9	7,330.9	47.4	45.6	97.49	-2,119.2	316.9	661.7	571.5	90.17	7.338	
9,500.0	7,242.9	9,572.9	7,329.0	49.1	47.4	97.47	-2,219.1	316.9	661.6	567.9	93.73	7.059	
9,600.0	7,241.3	9,672.9	7,327.1	50.8	49.2	97.46	-2,319.1	316.9	661.6	564.3	97.31	6.799	
9,700.0	7,239.6	9,772.9	7,325.2	52.6	51.0	97.44	-2,419.1	316.9	661.6	560.7	100.91	6.556	
9,800.0	7,237.9	9,872.9	7,323.3	54.3	52.8	97.42	-2,519.1	316.9	661.5	557.0	104.52	6.329	
9,900.0	7,236.2	9,972.9	7,321.4	56.0	54.7	97.40	-2,619.1	316.9	661.5	553.4	108.15	6.117	
10,000.0	7,234.5	10,072.9	7,319.5	57.8	56.5	97.38	-2,719.0	316.9	661.5	549.7	111.79	5.917	
10,100.0	7,232.8	10,172.9	7,317.6	59.6	58.3	97.37	-2,819.0	316.9	661.5	546.0	115.45	5.730	
10,200.0	7,231.1	10,272.9	7,315.7	61.4	60.2	97.35	-2,919.0	316.9	661.4	542.3	119.11	5.553	
10,300.0	7,229.4	10,372.9	7,313.8	63.1	62.0	97.33	-3,019.0	316.9	661.4	538.6	122.79	5.387	
10,400.0	7,227.7	10,472.9	7,311.9	64.9	63.9	97.31	-3,119.0	316.9	661.4	534.9	126.47	5.230	
10,500.0	7,226.0	10,572.9	7,310.0	66.7	65.7	97.29	-3,219.0	316.9	661.4	531.2	130.16	5.081	
10,600.0	7,224.3	10,672.9	7,308.1	68.6	67.6	97.28	-3,318.9	316.9	661.3	527.5	133.86	4.940	
10,700.0	7,222.6	10,772.9	7,306.2	70.4	69.5	97.26	-3,418.9	316.9	661.3	523.7	137.57	4.807	
10,800.0	7,220.9	10,872.9	7,304.3	72.2	71.3	97.24	-3,518.9	316.9	661.3	520.0	141.28	4.681	
10,900.0	7,219.2	10,972.9	7,302.4	74.0	73.2	97.22	-3,618.9	316.9	661.3	516.3	145.00	4.560	
11,000.0	7,217.6	11,072.9	7,300.5	75.8	75.1	97.20	-3,718.9	316.9	661.2	512.5	148.73	4.446	
11,100.0	7,215.9	11,172.9	7,298.6	77.7	76.9	97.19	-3,818.8	316.9	661.2	508.7	152.46	4.337	
11,200.0	7,214.2	11,272.9	7,296.7	79.5	78.8	97.17	-3,918.8	316.9	661.2	505.0	156.19	4.233	
11,300.0	7,212.5	11,372.9	7,294.7	81.4	80.7	97.15	-4,018.8	316.9	661.2	501.2	159.93	4.134	
11,400.0	7,210.8	11,472.9	7,292.8	83.2	82.6	97.13	-4,118.8	316.9	661.1	497.5	163.67	4.039	
11,500.0	7,209.1	11,572.9	7,290.9	85.1	84.5	97.11	-4,218.8	316.9	661.1	493.7	167.42	3.949	
11,600.0	7,207.4	11,672.9	7,289.0	86.9	86.4	97.10	-4,318.8	316.9	661.1	489.9	171.17	3.862	
11,700.0	7,205.7	11,772.9	7,287.1	88.8	88.2	97.08	-4,418.7	316.9	661.0	486.1	174.93	3.779	
11,800.0	7,204.0	11,872.9	7,285.2	90.6	90.1	97.06	-4,518.7	316.9	661.0	482.3	178.69	3.699	
11,900.0	7,202.3	11,972.9	7,283.3	92.5	92.0	97.04	-4,618.7	316.9	661.0	478.5	182.45	3.623	
12,000.0	7,200.6	12,072.9	7,281.4	94.4	93.9	97.02	-4,718.7	316.9	661.0	474.8	186.21	3.550	
12,100.0	7,198.9	12,172.9	7,279.5	96.2	95.8	97.01	-4,818.7	316.9	660.9	471.0	189.98	3.479	
12,200.0	7,197.2	12,272.9	7,277.6	98.1	97.7	96.99	-4,918.6	316.9	660.9	467.2	193.75	3.411	
12,300.0	7,195.5	12,372.9	7,275.7	100.0	99.6	96.97	-5,018.6	316.9	660.9	463.4	197.52	3.346	
12,332.4	7,195.0	12,405.2	7,275.1	100.6	100.2	96.96	-5,051.0	316.9	660.9	462.1	198.74	3.325 SF	



<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Thornton 28GK-HZ Pad Sec. 28-T7N-R66W - Thornton 28K-423 - Wellbore #1 - Plan #1 (06-11-13)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	-45.49	21.9	-22.2	31.2					
100.0	100.0	100.0	100.0	0.1	0.1	-45.49	21.9	-22.2	31.2	31.0	0.22	138.719		
200.0	200.0	200.0	200.0	0.3	0.3	-45.49	21.9	-22.2	31.2	30.5	0.67	46.240		
300.0	300.0	300.0	300.0	0.6	0.6	-45.49	21.9	-22.2	31.2	30.1	1.12	27.744		
400.0	400.0	400.0	400.0	0.8	0.8	-45.49	21.9	-22.2	31.2	29.6	1.57	19.817 CC, ES		
500.0	500.0	500.0	500.0	1.0	1.0	-123.73	21.9	-22.2	32.1	30.1	2.01	15.941		
600.0	599.8	599.8	599.8	1.2	1.2	-130.76	21.9	-22.2	35.3	32.8	2.46	14.373		
700.0	699.5	699.5	699.5	1.5	1.5	-139.81	21.9	-22.2	41.5	38.6	2.91	14.289		
800.0	798.7	798.7	798.7	1.7	1.7	-148.48	21.9	-22.2	51.4	48.1	3.36	15.314		
900.0	897.5	897.5	897.5	2.0	1.9	-155.54	21.9	-22.2	65.3	61.5	3.81	17.130		
919.4	916.6	916.6	916.6	2.1	1.9	-156.71	21.9	-22.2	68.5	64.6	3.90	17.553		
1,000.0	995.8	995.8	995.8	2.4	2.1	-160.71	21.9	-22.2	82.1	77.8	4.27	19.229		
1,100.0	1,094.2	1,097.3	1,097.3	2.8	2.3	-163.88	22.4	-20.7	97.8	93.1	4.72	20.731		
1,200.0	1,192.6	1,199.9	1,199.8	3.1	2.6	-165.53	24.3	-15.7	110.4	105.3	5.17	21.376		
1,300.0	1,290.9	1,303.4	1,302.8	3.5	2.8	-166.25	27.5	-7.2	119.7	114.1	5.63	21.275		
1,400.0	1,389.3	1,407.4	1,406.1	3.9	3.1	-166.31	31.9	4.9	125.7	119.6	6.11	20.581		
1,500.0	1,487.6	1,509.1	1,506.5	4.3	3.3	-165.92	37.4	19.5	128.8	122.2	6.59	19.536		
1,600.0	1,586.0	1,609.0	1,605.2	4.7	3.6	-165.50	42.8	34.0	131.7	124.6	7.09	18.582		
1,700.0	1,684.4	1,709.0	1,704.0	5.1	3.9	-165.11	48.2	48.6	134.6	127.0	7.59	17.735		
1,800.0	1,782.7	1,808.9	1,802.7	5.5	4.2	-164.73	53.6	63.2	137.5	129.4	8.10	16.981		
1,900.0	1,881.1	1,908.9	1,901.4	5.9	4.6	-164.37	59.0	77.8	140.4	131.8	8.61	16.308		
2,000.0	1,979.4	2,008.8	2,000.2	6.3	4.9	-164.02	64.5	92.4	143.4	134.2	9.13	15.701		
2,100.0	2,077.8	2,108.8	2,098.9	6.7	5.2	-163.69	69.9	107.0	146.3	136.6	9.65	15.153		
2,200.0	2,176.2	2,208.7	2,197.6	7.1	5.6	-163.37	75.3	121.6	149.2	139.0	10.18	14.656		
2,300.0	2,274.5	2,308.7	2,296.4	7.5	5.9	-163.06	80.7	136.2	152.1	141.4	10.71	14.203		
2,400.0	2,372.9	2,408.7	2,395.1	7.9	6.3	-162.77	86.2	150.8	155.1	143.8	11.25	13.790		
2,500.0	2,471.2	2,508.6	2,493.8	8.3	6.6	-162.48	91.6	165.4	158.0	146.2	11.78	13.411		
2,600.0	2,569.6	2,608.6	2,592.6	8.7	7.0	-162.21	97.0	180.0	161.0	148.6	12.32	13.062		
2,700.0	2,668.0	2,708.5	2,691.3	9.2	7.3	-161.94	102.4	194.6	163.9	151.1	12.87	12.740		
2,800.0	2,766.3	2,808.5	2,790.0	9.6	7.7	-161.69	107.9	209.2	166.9	153.5	13.41	12.442		
2,900.0	2,864.7	2,908.4	2,888.8	10.0	8.0	-161.44	113.3	223.8	169.8	155.9	13.96	12.166		
3,000.0	2,963.1	3,008.4	2,987.5	10.4	8.4	-161.20	118.7	238.4	172.8	158.3	14.51	11.909		
3,100.0	3,061.4	3,108.3	3,086.2	10.8	8.7	-160.97	124.1	253.0	175.8	160.7	15.06	11.670		
3,200.0	3,159.8	3,208.3	3,185.0	11.2	9.1	-160.75	129.6	267.6	178.7	163.1	15.61	11.446		
3,300.0	3,258.1	3,308.2	3,283.7	11.6	9.5	-160.54	135.0	282.1	181.7	165.5	16.17	11.236		
3,400.0	3,356.5	3,408.2	3,382.4	12.0	9.8	-160.33	140.4	296.7	184.7	167.9	16.73	11.040		
3,500.0	3,454.9	3,508.1	3,481.2	12.4	10.2	-160.13	145.8	311.3	187.6	170.3	17.28	10.855		
3,600.0	3,553.2	3,608.1	3,579.9	12.8	10.5	-159.93	151.2	325.9	190.6	172.8	17.84	10.681		
3,700.0	3,651.6	3,708.0	3,678.6	13.2	10.9	-159.74	156.7	340.5	193.6	175.2	18.41	10.517		
3,800.0	3,749.9	3,808.0	3,777.4	13.6	11.3	-159.56	162.1	355.1	196.6	177.6	18.97	10.362		
3,900.0	3,848.3	3,908.0	3,876.1	14.1	11.6	-159.38	167.5	369.7	199.5	180.0	19.53	10.215		
4,000.0	3,946.7	4,007.9	3,974.8	14.5	12.0	-159.21	172.9	384.3	202.5	182.4	20.10	10.076		
4,100.0	4,045.0	4,107.9	4,073.6	14.9	12.4	-159.04	178.4	398.9	205.5	184.8	20.66	9.944		
4,200.0	4,143.4	4,207.8	4,172.3	15.3	12.7	-158.88	183.8	413.5	208.5	187.3	21.23	9.819		
4,300.0	4,241.7	4,307.8	4,271.0	15.7	13.1	-158.72	189.2	428.1	211.5	189.7	21.80	9.700		
4,400.0	4,340.1	4,407.7	4,369.8	16.1	13.5	-158.56	194.6	442.7	214.5	192.1	22.37	9.587		
4,500.0	4,438.5	4,507.7	4,468.5	16.5	13.8	-158.41	200.1	457.3	217.5	194.5	22.94	9.479		
4,600.0	4,536.8	4,607.6	4,567.2	16.9	14.2	-158.27	205.5	471.9	220.4	196.9	23.51	9.375		
4,700.0	4,635.2	4,707.6	4,666.0	17.3	14.6	-158.13	210.9	486.5	223.4	199.3	24.09	9.277		
4,800.0	4,733.5	4,807.5	4,764.7	17.7	14.9	-157.99	216.3	501.1	226.4	201.8	24.66	9.183		
4,900.0	4,831.9	4,907.5	4,863.4	18.2	15.3	-157.85	221.8	515.6	229.4	204.2	25.23	9.092		

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



<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Thornton 28GK-HZ Pad Sec. 28-T7N-R66W - Thornton 28K-423 - Wellbore #1 - Plan #1 (06-11-13)												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
5,000.0	4,930.3	5,007.4	4,962.2	18.6	15.7	-157.72	227.2	530.2	232.4	206.6	25.81	9.006	
5,100.0	5,028.6	5,107.4	5,060.9	19.0	16.0	-157.60	232.6	544.8	235.4	209.0	26.38	8.923	
5,200.0	5,127.0	5,207.4	5,159.6	19.4	16.4	-157.47	238.0	559.4	238.4	211.5	26.96	8.844	
5,300.0	5,225.3	5,307.3	5,258.4	19.8	16.8	-157.35	243.5	574.0	241.4	213.9	27.54	8.767	
5,400.0	5,323.7	5,407.3	5,357.1	20.2	17.1	-157.23	248.9	588.6	244.4	216.3	28.11	8.694	
5,500.0	5,422.1	5,507.2	5,455.8	20.6	17.5	-157.12	254.3	603.2	247.4	218.7	28.69	8.623	
5,600.0	5,520.4	5,606.3	5,553.8	21.0	17.9	-157.00	259.7	617.7	250.4	221.2	29.27	8.556	
5,700.0	5,618.8	5,700.0	5,646.5	21.4	18.1	-157.07	264.2	629.9	254.9	225.1	29.77	8.561	
5,800.0	5,717.1	5,792.3	5,738.2	21.8	18.4	-157.44	267.7	639.2	262.1	232.0	30.18	8.686	
5,900.0	5,815.5	5,884.1	5,829.8	22.3	18.5	-158.10	270.1	645.7	272.3	241.7	30.52	8.920	
5,969.0	5,883.4	5,947.1	5,892.8	22.5	18.7	-158.68	271.2	648.6	280.9	250.2	30.73	9.142	
6,000.0	5,913.9	5,975.3	5,920.9	22.7	18.7	-158.99	271.5	649.4	285.1	254.3	30.81	9.253	
6,100.0	6,012.7	6,067.1	6,012.7	22.9	18.8	-159.96	271.9	650.5	298.3	267.3	31.03	9.613	
6,200.0	6,112.0	6,166.4	6,112.0	23.2	19.0	-160.78	271.9	650.5	309.4	278.2	31.26	9.897	
6,300.0	6,211.7	6,266.1	6,211.7	23.4	19.1	-161.32	271.9	650.5	317.3	285.8	31.51	10.071	
6,400.0	6,311.5	6,366.0	6,311.5	23.5	19.3	-161.63	271.9	650.5	321.9	290.1	31.75	10.138	
6,488.5	6,400.0	6,454.4	6,400.0	23.6	19.4	-86.12	271.9	650.5	323.2	291.2	31.97	10.110	
6,500.0	6,411.5	6,465.9	6,411.5	23.7	19.4	-86.12	271.9	650.5	323.2	291.2	32.01	10.097	
6,596.2	6,507.7	6,562.1	6,507.7	23.8	19.6	-86.12	271.9	650.5	323.2	290.8	32.36	9.988	
6,600.0	6,511.5	6,565.9	6,511.5	23.8	19.6	93.88	271.9	650.5	323.2	290.8	32.37	9.983	
6,650.0	6,561.5	6,615.9	6,561.5	23.8	19.7	94.20	271.9	650.5	323.3	290.7	32.60	9.917	
6,700.0	6,611.2	6,665.9	6,611.5	23.9	19.8	95.07	271.8	650.5	323.7	290.8	32.90	9.841	
6,750.0	6,660.5	6,717.7	6,663.3	23.9	19.8	96.15	269.5	650.5	324.3	291.2	33.19	9.772	
6,800.0	6,709.1	6,770.0	6,715.1	23.9	19.9	97.21	263.6	650.5	325.1	291.6	33.43	9.723	
6,850.0	6,756.9	6,822.6	6,767.0	23.9	19.9	98.23	254.1	650.5	325.8	292.2	33.62	9.691	
6,900.0	6,803.6	6,875.8	6,818.4	24.0	19.9	99.22	240.9	650.5	326.7	293.0	33.76	9.678	
6,950.0	6,849.0	6,929.4	6,869.3	24.0	20.0	100.16	224.0	650.5	327.6	293.8	33.84	9.682	
7,000.0	6,893.0	6,983.4	6,919.2	24.0	20.0	101.06	203.4	650.5	328.6	294.7	33.87	9.701	
7,050.0	6,935.3	7,037.8	6,967.9	24.0	20.0	101.91	179.2	650.5	329.6	295.7	33.86	9.734	
7,100.0	6,975.8	7,092.7	7,015.2	24.0	20.0	102.70	151.3	650.5	330.6	296.8	33.82	9.775	
7,150.0	7,014.3	7,148.0	7,060.6	24.0	20.0	103.44	119.8	650.5	331.6	297.8	33.77	9.820	
7,200.0	7,050.6	7,203.6	7,103.9	24.0	20.0	104.11	84.9	650.5	332.5	298.8	33.72	9.863	
7,250.0	7,084.6	7,259.5	7,144.8	24.0	20.0	104.71	46.8	650.5	333.4	299.7	33.69	9.897	
7,300.0	7,116.1	7,315.8	7,182.9	24.1	20.0	105.25	5.4	650.5	334.3	300.5	33.71	9.916	
7,350.0	7,145.0	7,372.3	7,218.1	24.1	20.1	105.71	-38.8	650.5	335.0	301.2	33.82	9.906	
7,400.0	7,171.2	7,429.1	7,250.1	24.2	20.2	106.10	-85.7	650.5	335.6	301.6	34.01	9.870	
7,450.0	7,194.6	7,486.1	7,278.6	24.3	20.3	106.42	-135.0	650.5	336.2	301.9	34.31	9.797	
7,500.0	7,215.0	7,543.3	7,303.4	24.4	20.4	106.65	-186.5	650.5	336.6	301.8	34.75	9.685	
7,550.0	7,232.4	7,600.5	7,324.3	24.5	20.6	106.81	-239.8	650.5	336.8	301.5	35.34	9.532	
7,600.0	7,246.6	7,657.9	7,341.2	24.7	20.9	106.89	-294.6	650.5	337.0	300.9	36.08	9.339	
7,650.0	7,257.7	7,715.2	7,353.9	24.9	21.2	106.89	-350.5	650.5	337.0	300.0	36.98	9.113	
7,700.0	7,265.6	7,772.5	7,362.4	25.2	21.6	106.81	-407.2	650.5	336.8	298.8	38.01	8.862	
7,716.1	7,267.5	7,789.3	7,364.2	25.3	21.7	106.78	-423.9	650.5	336.8	298.4	38.36	8.780	
7,750.0	7,270.3	7,823.2	7,367.7	25.5	21.9	106.89	-457.5	650.5	337.0	297.9	39.10	8.619	
7,800.0	7,271.7	7,875.1	7,372.9	25.8	22.4	107.43	-509.2	650.5	338.1	297.8	40.28	8.394	
7,809.1	7,271.6	7,885.1	7,373.7	25.9	22.5	107.56	-519.1	650.5	338.3	297.8	40.51	8.352	
7,900.0	7,270.0	7,983.8	7,377.0	26.6	23.4	108.35	-617.7	650.5	339.7	297.2	42.51	7.993	
8,000.0	7,268.3	8,083.7	7,377.0	27.4	24.5	108.62	-717.7	650.5	340.3	295.4	44.84	7.588	
8,100.0	7,266.6	8,183.7	7,377.0	28.5	25.7	108.89	-817.7	650.5	340.8	293.5	47.34	7.199	
8,200.0	7,265.0	8,283.7	7,377.0	29.6	27.0	109.16	-917.7	650.5	341.4	291.4	49.97	6.831	
8,300.0	7,263.3	8,383.7	7,377.0	30.8	28.4	109.43	-1,017.7	650.5	341.9	289.2	52.71	6.487	

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

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design Thornton 28GK-HZ Pad Sec. 28-T7N-R66W - Thornton 28K-423 - Wellbore #1 - Plan #1 (06-11-13)													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	7,261.6	8,483.7	7,377.0	32.1	29.8	109.69		-1,117.7	650.5	342.5	286.9	55.55	6.165	
8,500.0	7,259.9	8,583.7	7,377.0	33.4	31.3	109.96		-1,217.6	650.5	343.1	284.6	58.46	5.868	
8,600.0	7,258.2	8,683.7	7,377.0	34.8	32.8	110.23		-1,317.6	650.5	343.6	282.2	61.44	5.593	
8,700.0	7,256.5	8,783.6	7,377.0	36.3	34.4	110.49		-1,417.6	650.5	344.2	279.7	64.48	5.339	
8,800.0	7,254.8	8,883.6	7,377.0	37.8	36.0	110.75		-1,517.6	650.5	344.8	277.3	67.56	5.104	
8,900.0	7,253.1	8,983.6	7,377.0	39.3	37.7	111.02		-1,617.6	650.5	345.4	274.8	70.68	4.887	
9,000.0	7,251.4	9,083.6	7,377.0	40.9	39.3	111.28		-1,717.6	650.5	346.0	272.2	73.82	4.687	
9,100.0	7,249.7	9,183.6	7,377.0	42.5	41.0	111.54		-1,817.6	650.5	346.7	269.7	77.00	4.502	
9,200.0	7,248.0	9,283.6	7,377.0	44.1	42.7	111.80		-1,917.5	650.5	347.3	267.1	80.19	4.331	
9,300.0	7,246.3	9,383.6	7,377.0	45.8	44.4	112.06		-2,017.5	650.5	347.9	264.5	83.40	4.172	
9,400.0	7,244.6	9,483.5	7,377.0	47.4	46.2	112.31		-2,117.5	650.5	348.6	261.9	86.62	4.024	
9,500.0	7,242.9	9,583.5	7,377.0	49.1	47.9	112.57		-2,217.5	650.5	349.2	259.3	89.86	3.886	
9,600.0	7,241.3	9,683.5	7,377.0	50.8	49.7	112.83		-2,317.5	650.5	349.9	256.8	93.10	3.758	
9,700.0	7,239.6	9,783.5	7,377.0	52.6	51.5	113.08		-2,417.5	650.5	350.5	254.2	96.35	3.638	
9,800.0	7,237.9	9,883.5	7,377.0	54.3	53.2	113.34		-2,517.5	650.5	351.2	251.6	99.60	3.526	
9,900.0	7,236.2	9,983.5	7,377.0	56.0	55.0	113.59		-2,617.4	650.5	351.9	249.0	102.85	3.421	
10,000.0	7,234.5	10,083.5	7,377.0	57.8	56.8	113.84		-2,717.4	650.5	352.5	246.4	106.11	3.322	
10,100.0	7,232.8	10,183.4	7,377.0	59.6	58.7	114.09		-2,817.4	650.5	353.2	243.9	109.36	3.230	
10,200.0	7,231.1	10,283.4	7,377.0	61.4	60.5	114.34		-2,917.4	650.5	353.9	241.3	112.61	3.143	
10,300.0	7,229.4	10,383.4	7,377.0	63.1	62.3	114.59		-3,017.4	650.5	354.6	238.8	115.86	3.061	
10,400.0	7,227.7	10,483.4	7,377.0	64.9	64.1	114.84		-3,117.4	650.5	355.3	236.2	119.11	2.983	
10,500.0	7,226.0	10,583.4	7,377.0	66.7	66.0	115.09		-3,217.4	650.5	356.0	233.7	122.35	2.910	
10,600.0	7,224.3	10,683.4	7,377.0	68.6	67.8	115.33		-3,317.3	650.5	356.8	231.2	125.58	2.841	
10,700.0	7,222.6	10,783.4	7,377.0	70.4	69.7	115.58		-3,417.3	650.5	357.5	228.7	128.81	2.775	
10,800.0	7,220.9	10,883.3	7,377.0	72.2	71.5	115.82		-3,517.3	650.5	358.2	226.2	132.04	2.713	
10,900.0	7,219.2	10,983.3	7,377.0	74.0	73.4	116.07		-3,617.3	650.5	359.0	223.7	135.25	2.654	
11,000.0	7,217.6	11,083.3	7,377.0	75.8	75.2	116.31		-3,717.3	650.5	359.7	221.3	138.46	2.598	
11,100.0	7,215.9	11,183.3	7,377.0	77.7	77.1	116.55		-3,817.3	650.5	360.5	218.8	141.66	2.545	
11,200.0	7,214.2	11,283.3	7,377.0	79.5	78.9	116.79		-3,917.3	650.5	361.2	216.4	144.85	2.494	
11,300.0	7,212.5	11,383.3	7,377.0	81.4	80.8	117.03		-4,017.2	650.5	362.0	214.0	148.04	2.445	
11,400.0	7,210.8	11,483.3	7,377.0	83.2	82.7	117.27		-4,117.2	650.5	362.8	211.6	151.21	2.399	
11,500.0	7,209.1	11,583.2	7,377.0	85.1	84.5	117.50		-4,217.2	650.5	363.5	209.2	154.37	2.355	
11,600.0	7,207.4	11,683.2	7,377.0	86.9	86.4	117.74		-4,317.2	650.5	364.3	206.8	157.53	2.313	
11,700.0	7,205.7	11,783.2	7,377.0	88.8	88.3	117.98		-4,417.2	650.5	365.1	204.4	160.67	2.272	
11,800.0	7,204.0	11,883.2	7,377.0	90.6	90.2	118.21		-4,517.2	650.5	365.9	202.1	163.81	2.234	
11,900.0	7,202.3	11,983.2	7,377.0	92.5	92.0	118.44		-4,617.2	650.5	366.7	199.8	166.93	2.197	
12,000.0	7,200.6	12,083.2	7,377.0	94.4	93.9	118.67		-4,717.1	650.5	367.5	197.5	170.05	2.161	
12,100.0	7,198.9	12,183.2	7,377.0	96.2	95.8	118.91		-4,817.1	650.5	368.3	195.2	173.15	2.127	
12,200.0	7,197.2	12,283.1	7,377.0	98.1	97.7	119.14		-4,917.1	650.5	369.2	192.9	176.24	2.095	
12,300.0	7,195.5	12,383.1	7,377.0	100.0	99.6	119.36		-5,017.1	650.5	370.0	190.7	179.32	2.063	
12,332.4	7,195.0	12,415.5	7,377.0	100.6	100.2	119.44		-5,049.5	650.5	370.3	189.9	180.32	2.053 SF	

Reference Depths are relative to WELL @ 4910.0ft (RKB-15')	Coordinates are relative to: Thornton 28K-223
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, Colorado Northern Zone
Central Meridian is -105.500000 °	Grid Convergence at Surface is: 0.46°



<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 28K-223
<b>Project:</b>	SEC.28-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Reference Site:</b>	Thornton 28GK-HZ Pad Sec. 28-T7N-R66W	<b>MD Reference:</b>	WELL @ 4910.0ft (RKB-15')
<b>Site Error:</b>	0.0ft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Thornton 28K-223	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.0ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #1	<b>Database:</b>	Landmark
<b>Reference Design:</b>	Plan #1 (06-11-13)	<b>Offset TVD Reference:</b>	Offset Datum

Reference Depths are relative to WELL @ 4910.0ft (RKB-15')  
Offset Depths are relative to Offset Datum  
Central Meridian is -105.500000 °

Coordinates are relative to: Thornton 28K-223  
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