

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Sunmarke 28U-434**

Surface Location: Sunmarke 28U-HZ Pad Sec.28-T4N-R67W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

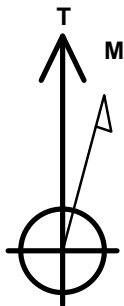
Ground Elevation: 4894.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1349090.16	3170999.64	40.290030	-104.887010	

RKB - 15' WELL @ 4909.0ft (RKB - 15')

WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 338'FNL, 210'FEL		0.0	0.0	Point
BHL 585'FNL,500'FWL	7254.0	-167.1	-4619.9	Point



Azimuths to True North
Magnetic North: 8.59°

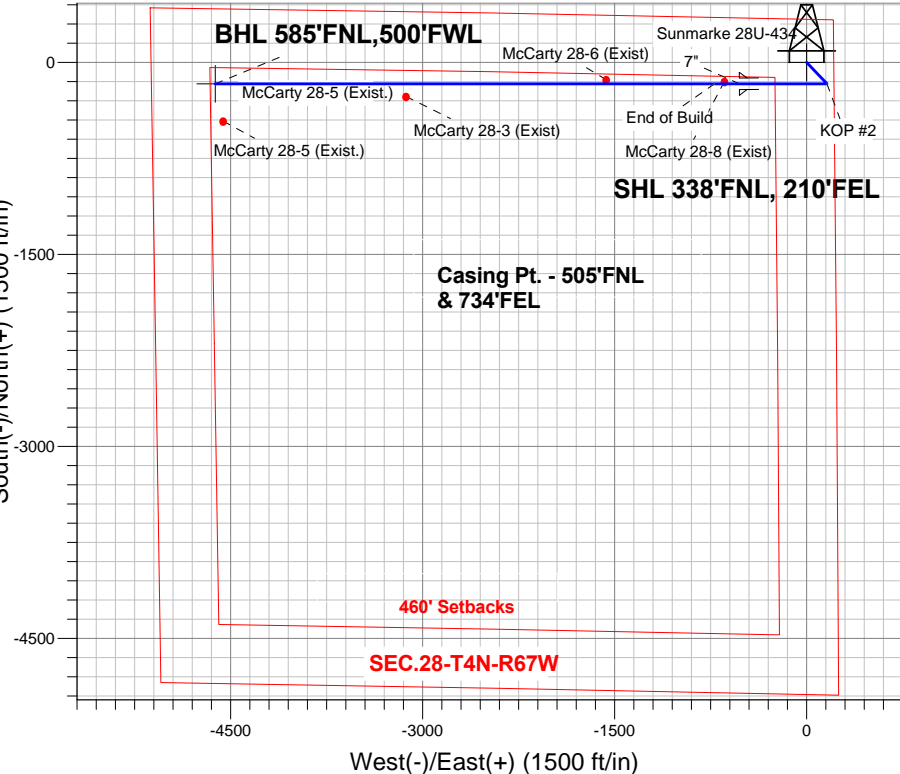
Magnetic Field
Strength: 52803.8snT
Dip Angle: 66.86°
Date: 11/20/2013
Model: IGRF2010

ANNOTATIONS

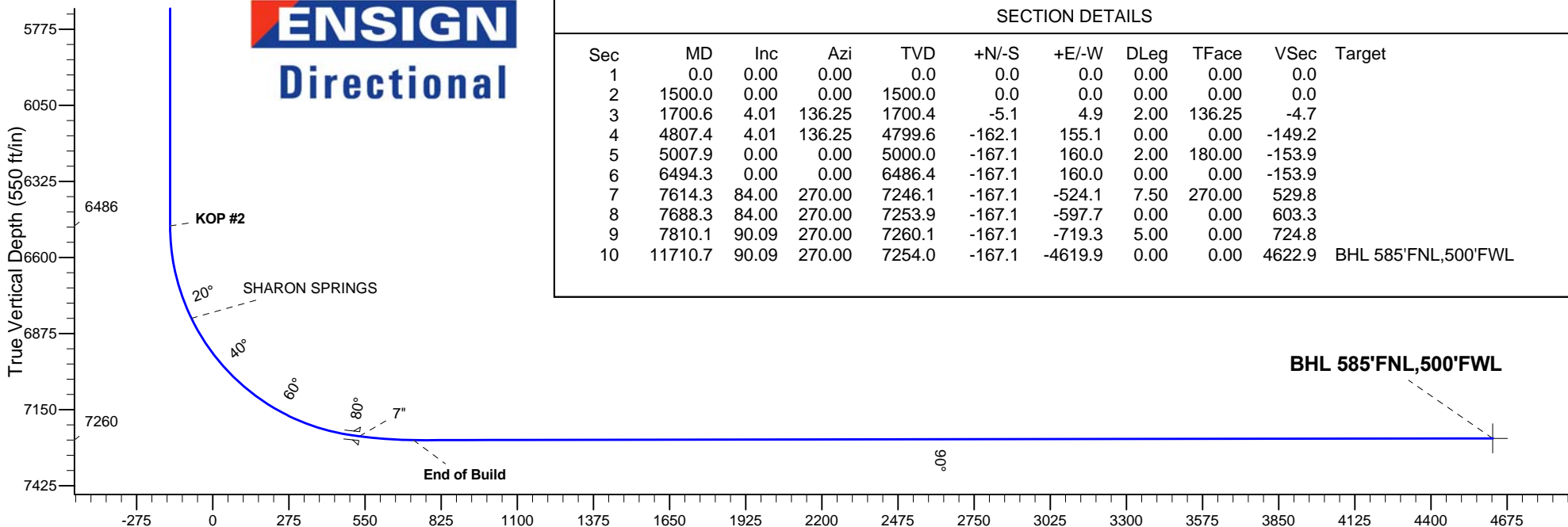
TVD	MD	Annotation
1500.0	1500.0	KOP #1
6486.4	6494.3	KOP #2
7260.1	7810.1	End of Build

Sunmarke 28U-HZ Pad Sec.28-T4N-R67W
Sunmarke 28U-434
Plan #1 (11-18-13)
14:42, November 20 2013

South(-)/North(+) (1500 ft/in)



ENSIGN
Directional



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	1500.0	0.00	0.00	1500.0	0.0	0.0	0.00	0.00	0.0	
3	1700.6	4.01	136.25	1700.4	-5.1	4.9	2.00	136.25	-4.7	
4	4807.4	4.01	136.25	4799.6	-162.1	155.1	0.00	0.00	-149.2	
5	5007.9	0.00	0.00	5000.0	-167.1	160.0	2.00	180.00	-153.9	
6	6494.3	0.00	0.00	6486.4	-167.1	160.0	0.00	0.00	-153.9	
7	7614.3	84.00	270.00	7246.1	-167.1	-524.1	7.50	270.00	529.8	
8	7688.3	84.00	270.00	7253.9	-167.1	-597.7	0.00	0.00	603.3	
9	7810.1	90.09	270.00	7260.1	-167.1	-719.3	5.00	0.00	724.8	
10	11710.7	90.09	270.00	7254.0	-167.1	-4619.9	0.00	0.00	4622.9	BHL 585'FNL,500'FWL



Directional

PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.28-T4N-R67W

Sunmarke 28U-HZ Pad Sec.28-T4N-R67W

Sunmarke 28U-434

Wellbore #1

Plan: Plan #1 (11-18-13)

Standard Planning Report

20 November, 2013

Database:	Landmark	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Project:	SEC.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	North Reference:	True
Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-18-13)		

Project	SEC.28-T4N-R67W, Weld County, Colorado		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site						Sunmarke 28U-HZ Pad Sec.28-T4N-R67W											
Site Position:						Northing:			1,349,119.31 ft			Latitude:			40.290110		
From:			Lat/Long			Easting:			3,170,999.44 ft			Longitude:			-104.887010		
Position Uncertainty:			0.0 ft			Slot Radius:			"			Grid Convergence:			0.40 °		

Well	Sunmarke 28U-434					
Well Position	+N/-S	-29.1 ft	Northing:	1,349,090.16 ft	Latitude:	40.290030
	+E/-W	0.0 ft	Easting:	3,170,999.64 ft	Longitude:	-104.887010
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,894.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/20/2013	8.59	66.86	52,804

Design	Plan #1 (11-18-13)			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	267.93

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,700.6	4.01	136.25	1,700.4	-5.1	4.9	2.00	2.00	0.00	136.25	
4,807.4	4.01	136.25	4,799.6	-162.1	155.1	0.00	0.00	0.00	0.00	
5,007.9	0.00	0.00	5,000.0	-167.1	160.0	2.00	-2.00	0.00	180.00	
6,494.3	0.00	0.00	6,486.4	-167.1	160.0	0.00	0.00	0.00	0.00	
7,614.3	84.00	270.00	7,246.1	-167.1	-524.1	7.50	7.50	0.00	270.00	
7,688.3	84.00	270.00	7,253.9	-167.1	-597.7	0.00	0.00	0.00	0.00	
7,810.1	90.09	270.00	7,260.1	-167.1	-719.3	5.00	5.00	0.00	0.00	
11,710.7	90.09	270.00	7,254.0	-167.1	-4,619.9	0.00	0.00	0.00	0.00	BHL 585'FNL,500'F

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Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	North Reference:	True
Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-18-13)		

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
1.0	0.00	0.00	1.0	0.0	0.0	0.0	0.00	0.00	0.00
SHL 338°FNL, 210°FEL									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
1,600.0	2.00	136.25	1,600.0	-1.3	1.2	-1.2	2.00	2.00	0.00
1,700.0	4.00	136.25	1,699.8	-5.0	4.8	-4.6	2.00	2.00	0.00
1,700.6	4.01	136.25	1,700.4	-5.1	4.9	-4.7	2.00	2.00	0.00
1,800.0	4.01	136.25	1,799.6	-10.1	9.7	-9.3	0.00	0.00	0.00
1,900.0	4.01	136.25	1,899.3	-15.1	14.5	-13.9	0.00	0.00	0.00
2,000.0	4.01	136.25	1,999.1	-20.2	19.3	-18.6	0.00	0.00	0.00
2,100.0	4.01	136.25	2,098.9	-25.3	24.2	-23.2	0.00	0.00	0.00
2,200.0	4.01	136.25	2,198.6	-30.3	29.0	-27.9	0.00	0.00	0.00
2,300.0	4.01	136.25	2,298.4	-35.4	33.9	-32.6	0.00	0.00	0.00
2,400.0	4.01	136.25	2,398.1	-40.4	38.7	-37.2	0.00	0.00	0.00
2,500.0	4.01	136.25	2,497.9	-45.5	43.5	-41.9	0.00	0.00	0.00
2,600.0	4.01	136.25	2,597.6	-50.5	48.4	-46.5	0.00	0.00	0.00
2,700.0	4.01	136.25	2,697.4	-55.6	53.2	-51.2	0.00	0.00	0.00
2,800.0	4.01	136.25	2,797.1	-60.6	58.0	-55.8	0.00	0.00	0.00
2,900.0	4.01	136.25	2,896.9	-65.7	62.9	-60.5	0.00	0.00	0.00
3,000.0	4.01	136.25	2,996.7	-70.7	67.7	-65.1	0.00	0.00	0.00
3,100.0	4.01	136.25	3,096.4	-75.8	72.6	-69.8	0.00	0.00	0.00
3,200.0	4.01	136.25	3,196.2	-80.8	77.4	-74.4	0.00	0.00	0.00
3,300.0	4.01	136.25	3,295.9	-85.9	82.2	-79.1	0.00	0.00	0.00
3,400.0	4.01	136.25	3,395.7	-91.0	87.1	-83.7	0.00	0.00	0.00
3,500.0	4.01	136.25	3,495.4	-96.0	91.9	-88.4	0.00	0.00	0.00
3,600.0	4.01	136.25	3,595.2	-101.1	96.7	-93.0	0.00	0.00	0.00
3,644.9	4.01	136.25	3,640.0	-103.3	98.9	-95.1	0.00	0.00	0.00
PARKMAN									
3,700.0	4.01	136.25	3,694.9	-106.1	101.6	-97.7	0.00	0.00	0.00
3,800.0	4.01	136.25	3,794.7	-111.2	106.4	-102.3	0.00	0.00	0.00
3,900.0	4.01	136.25	3,894.4	-116.2	111.3	-107.0	0.00	0.00	0.00
4,000.0	4.01	136.25	3,994.2	-121.3	116.1	-111.6	0.00	0.00	0.00
4,100.0	4.01	136.25	4,094.0	-126.3	120.9	-116.3	0.00	0.00	0.00
4,156.2	4.01	136.25	4,150.0	-129.2	123.6	-118.9	0.00	0.00	0.00
SUSSEX									
4,200.0	4.01	136.25	4,193.7	-131.4	125.8	-120.9	0.00	0.00	0.00
4,300.0	4.01	136.25	4,293.5	-136.4	130.6	-125.6	0.00	0.00	0.00
4,400.0	4.01	136.25	4,393.2	-141.5	135.4	-130.2	0.00	0.00	0.00

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Project:	SEC.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	North Reference:	True
Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-18-13)		

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)
4,500.0	4.01	136.25	4,493.0	-146.5	140.3	-134.9	0.00	0.00	0.00
4,600.0	4.01	136.25	4,592.7	-151.6	145.1	-139.5	0.00	0.00	0.00
4,670.4	4.01	136.25	4,663.0	-155.2	148.5	-142.8	0.00	0.00	0.00
SHANNON									
4,700.0	4.01	136.25	4,692.5	-156.6	150.0	-144.2	0.00	0.00	0.00
4,800.0	4.01	136.25	4,792.2	-161.7	154.8	-148.8	0.00	0.00	0.00
4,807.4	4.01	136.25	4,799.6	-162.1	155.1	-149.2	0.00	0.00	0.00
4,900.0	2.16	136.25	4,892.1	-165.7	158.6	-152.5	2.00	-2.00	0.00
5,000.0	0.16	136.25	4,992.1	-167.1	160.0	-153.8	2.00	-2.00	0.00
5,007.9	0.00	0.00	5,000.0	-167.1	160.0	-153.9	2.00	-2.00	0.00
5,100.0	0.00	0.00	5,092.1	-167.1	160.0	-153.9	0.00	0.00	0.00
5,200.0	0.00	0.00	5,192.1	-167.1	160.0	-153.9	0.00	0.00	0.00
5,300.0	0.00	0.00	5,292.1	-167.1	160.0	-153.9	0.00	0.00	0.00
5,400.0	0.00	0.00	5,392.1	-167.1	160.0	-153.9	0.00	0.00	0.00
5,500.0	0.00	0.00	5,492.1	-167.1	160.0	-153.9	0.00	0.00	0.00
5,600.0	0.00	0.00	5,592.1	-167.1	160.0	-153.9	0.00	0.00	0.00
5,700.0	0.00	0.00	5,692.1	-167.1	160.0	-153.9	0.00	0.00	0.00
5,800.0	0.00	0.00	5,792.1	-167.1	160.0	-153.9	0.00	0.00	0.00
5,900.0	0.00	0.00	5,892.1	-167.1	160.0	-153.9	0.00	0.00	0.00
6,000.0	0.00	0.00	5,992.1	-167.1	160.0	-153.9	0.00	0.00	0.00
6,100.0	0.00	0.00	6,092.1	-167.1	160.0	-153.9	0.00	0.00	0.00
6,200.0	0.00	0.00	6,192.1	-167.1	160.0	-153.9	0.00	0.00	0.00
6,300.0	0.00	0.00	6,292.1	-167.1	160.0	-153.9	0.00	0.00	0.00
6,400.0	0.00	0.00	6,392.1	-167.1	160.0	-153.9	0.00	0.00	0.00
6,494.3	0.00	0.00	6,486.4	-167.1	160.0	-153.9	0.00	0.00	0.00
KOP #2									
6,500.0	0.43	270.00	6,492.1	-167.1	160.0	-153.8	7.51	7.51	0.00
6,600.0	7.93	270.00	6,591.7	-167.1	152.7	-146.6	7.50	7.50	0.00
6,700.0	15.43	270.00	6,689.6	-167.1	132.5	-126.3	7.50	7.50	0.00
6,800.0	22.93	270.00	6,784.0	-167.1	99.6	-93.5	7.50	7.50	0.00
6,839.6	25.90	270.00	6,820.0	-167.1	83.3	-77.2	7.50	7.50	0.00
SHARON SPRINGS									
6,900.0	30.43	270.00	6,873.3	-167.1	54.8	-48.7	7.50	7.50	0.00
7,000.0	37.93	270.00	6,955.9	-167.1	-1.4	7.4	7.50	7.50	0.00
7,100.0	45.43	270.00	7,030.6	-167.1	-67.8	73.8	7.50	7.50	0.00
7,200.0	52.93	270.00	7,095.9	-167.1	-143.4	149.4	7.50	7.50	0.00
7,300.0	60.43	270.00	7,150.8	-167.1	-226.9	232.8	7.50	7.50	0.00
7,400.0	67.93	270.00	7,194.3	-167.1	-316.9	322.7	7.50	7.50	0.00
7,500.0	75.43	270.00	7,225.7	-167.1	-411.7	417.5	7.50	7.50	0.00
7,600.0	82.93	270.00	7,244.5	-167.1	-509.9	515.6	7.50	7.50	0.00
7,614.3	84.00	270.00	7,246.1	-167.1	-524.1	529.8	7.50	7.50	0.00
7"									
7,688.3	84.00	270.00	7,253.9	-167.1	-597.7	603.3	0.00	0.00	0.00
7,700.0	84.59	270.00	7,255.0	-167.1	-609.3	615.0	5.00	5.00	0.00
7,800.0	89.59	270.00	7,260.1	-167.1	-709.2	714.7	5.00	5.00	0.00
7,810.1	90.09	270.00	7,260.1	-167.1	-719.3	724.8	5.00	5.00	0.00
End of Build									
7,900.0	90.09	270.00	7,260.0	-167.1	-809.2	814.7	0.00	0.00	0.00
8,000.0	90.09	270.00	7,259.8	-167.1	-909.2	914.6	0.00	0.00	0.00
8,100.0	90.09	270.00	7,259.7	-167.1	-1,009.2	1,014.6	0.00	0.00	0.00
8,200.0	90.09	270.00	7,259.5	-167.1	-1,109.2	1,114.5	0.00	0.00	0.00
8,300.0	90.09	270.00	7,259.4	-167.1	-1,209.2	1,214.4	0.00	0.00	0.00

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Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-18-13)		

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)
8,400.0	90.09	270.00	7,259.2	-167.1	-1,309.2	1,314.4	0.00	0.00	0.00
8,500.0	90.09	270.00	7,259.0	-167.1	-1,409.2	1,414.3	0.00	0.00	0.00
8,600.0	90.09	270.00	7,258.9	-167.1	-1,509.2	1,514.2	0.00	0.00	0.00
8,700.0	90.09	270.00	7,258.7	-167.1	-1,609.2	1,614.2	0.00	0.00	0.00
8,800.0	90.09	270.00	7,258.6	-167.1	-1,709.2	1,714.1	0.00	0.00	0.00
8,900.0	90.09	270.00	7,258.4	-167.1	-1,809.2	1,814.0	0.00	0.00	0.00
9,000.0	90.09	270.00	7,258.3	-167.1	-1,909.2	1,914.0	0.00	0.00	0.00
9,100.0	90.09	270.00	7,258.1	-167.1	-2,009.2	2,013.9	0.00	0.00	0.00
9,200.0	90.09	270.00	7,257.9	-167.1	-2,109.2	2,113.8	0.00	0.00	0.00
9,300.0	90.09	270.00	7,257.8	-167.1	-2,209.2	2,213.8	0.00	0.00	0.00
9,400.0	90.09	270.00	7,257.6	-167.1	-2,309.2	2,313.7	0.00	0.00	0.00
9,500.0	90.09	270.00	7,257.5	-167.1	-2,409.2	2,413.6	0.00	0.00	0.00
9,600.0	90.09	270.00	7,257.3	-167.1	-2,509.2	2,513.6	0.00	0.00	0.00
9,700.0	90.09	270.00	7,257.2	-167.1	-2,609.2	2,613.5	0.00	0.00	0.00
9,800.0	90.09	270.00	7,257.0	-167.1	-2,709.2	2,713.4	0.00	0.00	0.00
9,900.0	90.09	270.00	7,256.8	-167.1	-2,809.2	2,813.4	0.00	0.00	0.00
10,000.0	90.09	270.00	7,256.7	-167.1	-2,909.2	2,913.3	0.00	0.00	0.00
10,100.0	90.09	270.00	7,256.5	-167.1	-3,009.2	3,013.2	0.00	0.00	0.00
10,200.0	90.09	270.00	7,256.4	-167.1	-3,109.2	3,113.2	0.00	0.00	0.00
10,300.0	90.09	270.00	7,256.2	-167.1	-3,209.2	3,213.1	0.00	0.00	0.00
10,400.0	90.09	270.00	7,256.1	-167.1	-3,309.2	3,313.0	0.00	0.00	0.00
10,500.0	90.09	270.00	7,255.9	-167.1	-3,409.2	3,413.0	0.00	0.00	0.00
10,600.0	90.09	270.00	7,255.7	-167.1	-3,509.2	3,512.9	0.00	0.00	0.00
10,700.0	90.09	270.00	7,255.6	-167.1	-3,609.2	3,612.8	0.00	0.00	0.00
10,800.0	90.09	270.00	7,255.4	-167.1	-3,709.2	3,712.8	0.00	0.00	0.00
10,900.0	90.09	270.00	7,255.3	-167.1	-3,809.2	3,812.7	0.00	0.00	0.00
11,000.0	90.09	270.00	7,255.1	-167.1	-3,909.2	3,912.7	0.00	0.00	0.00
11,100.0	90.09	270.00	7,255.0	-167.1	-4,009.2	4,012.6	0.00	0.00	0.00
11,200.0	90.09	270.00	7,254.8	-167.1	-4,109.2	4,112.5	0.00	0.00	0.00
11,300.0	90.09	270.00	7,254.6	-167.1	-4,209.2	4,212.5	0.00	0.00	0.00
11,400.0	90.09	270.00	7,254.5	-167.1	-4,309.2	4,312.4	0.00	0.00	0.00
11,500.0	90.09	270.00	7,254.3	-167.1	-4,409.2	4,412.3	0.00	0.00	0.00
11,600.0	90.09	270.00	7,254.2	-167.1	-4,509.2	4,512.3	0.00	0.00	0.00
11,700.0	90.09	270.00	7,254.0	-167.1	-4,609.2	4,612.2	0.00	0.00	0.00
11,710.7	90.09	270.00	7,254.0	-167.1	-4,619.9	4,622.9	0.00	0.00	0.00
BHL 585'FNL,500'FWL									

Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
BHL 585'FNL,500'FW - hit/miss target - Shape - Point	0.00	0.00	7,254.0	-167.1	-4,619.9	1,348,891.09	3,166,381.26	40.289570	-104.903570
SHL 338'FNL, 210'FE - plan hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,349,090.16	3,170,999.64	40.290030	-104.887010

Database:	Landmark	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Project:	SEC.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	North Reference:	True
Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (11-18-13)		

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,614.3	7,246.1	7"	7	7-1/2

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,644.9	3,640.0	PARKMAN			
4,156.2	4,150.0	SUSSEX			
4,670.4	4,663.0	SHANNON			
6,839.6	6,820.0	SHARON SPRINGS			

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,500.0	1,500.0	0.0	0.0	KOP #1
6,494.3	6,486.4	-167.1	160.0	KOP #2
7,810.1	7,260.1	-167.1	-719.3	End of Build



Directional

PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.28-T4N-R67W

Sunmarke 28U-HZ Pad Sec.28-T4N-R67W

Sunmarke 28U-434

Wellbore #1

Plan #1 (11-18-13)

Anticollision Report

20 November, 2013



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (11-18-13)		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.0ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date	11/20/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,697.1	Plan #1 (11-18-13) (Wellbore #1)	MWD	MWD - Standard

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Existing wells - Sec.28-T4N-R67W						
McCarty 28-3 (Exist) - Wellbore #1 - Wellbore #1	10,207.3	7,303.1	98.6	-136.7	0.419	Level 1, CC, ES, SF
McCarty 28-5 (Exist.) - Wellbore #1 - Wellbore #1	11,635.7	7,317.9	291.5	16.2	1.059	Level 2, CC, ES, SF
McCarty 28-6 (Exist) - Wellbore #1 - Wellbore #1	8,642.3	7,263.1	32.4	-159.6	0.169	Level 1, CC, ES, SF
McCarty 28-8 (Exist) - Wellbore #1 - Wellbore #1	7,718.8	7,241.0	17.8	-151.1	0.105	Level 1, CC, ES, SF
Sunmarke 28U-HZ Pad Sec.28-T4N-R67W						
Sunmarke 28U-334 - Wellbore #1 - Plan #1 (11-18-13)	1,500.0	1,500.0	29.1	22.6	4.470	CC, ES
Sunmarke 28U-334 - Wellbore #1 - Plan #1 (11-18-13)	11,697.1	11,605.7	307.8	79.2	1.346	Level 3, SF
Sunmarke 28V-214 - Wellbore #1 - Plan #1 (11-18-13)	1,000.0	1,000.0	32.8	28.5	7.679	CC, ES
Sunmarke 28V-214 - Wellbore #1 - Plan #1 (11-18-13)	11,697.1	11,512.0	345.6	142.0	1.697	SF
Sunmarke 28V-404 - Wellbore #1 - Plan #1 (11-18-13)	600.0	600.0	61.9	59.5	25.051	CC, ES
Sunmarke 28V-404 - Wellbore #1 - Plan #1 (11-18-13)	11,697.1	11,741.4	528.3	267.2	2.024	SF

Offset Design		Existing wells - Sec.28-T4N-R67W - McCarty 28-3 (Exist) - Wellbore #1 - Wellbore #1											Offset Site Error:		0.0 ft	
Survey Program: 7600-UNKNOWN														Offset Well Error:		0.0 ft
Reference		Offset		Semi Major Axis			Distance									
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre		Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning			
							+N/-S (ft)	+E/-W (ft)								
9,300.0	7,249.4	7,301.4	7,301.4	64.4	146.0	-88.99	-265.7	-3,130.1	912.7	702.3	210.40	4.338				
9,400.0	7,249.6	7,301.6	7,301.6	67.1	146.0	-89.10	-265.7	-3,130.1	813.3	600.2	213.13	3.816				
9,500.0	7,249.8	7,301.8	7,301.8	69.9	146.0	-89.21	-265.7	-3,130.1	714.2	498.3	215.87	3.308				
9,600.0	7,250.0	7,302.0	7,302.0	72.6	146.0	-89.32	-265.7	-3,130.1	615.3	396.7	218.61	2.815				
9,700.0	7,250.2	7,302.2	7,302.2	75.3	146.0	-89.43	-265.7	-3,130.1	516.8	295.5	221.36	2.335				
9,800.0	7,250.4	7,302.4	7,302.4	78.1	146.0	-89.55	-265.7	-3,130.1	419.1	195.0	224.11	1.870				
9,900.0	7,250.5	7,302.5	7,302.5	80.8	146.1	-89.66	-265.7	-3,130.1	322.8	95.9	226.87	1.423	Level 3			
10,000.0	7,250.7	7,302.7	7,302.7	83.6	146.1	-89.77	-265.7	-3,130.1	229.6	0.0	229.63	1.000	Level 1			
10,100.0	7,250.9	7,302.9	7,302.9	86.3	146.1	-89.88	-265.7	-3,130.1	145.8	-86.6	232.39	0.627	Level 1			
10,200.0	7,251.1	7,303.1	7,303.1	89.1	146.1	-89.99	-265.7	-3,130.1	98.9	-136.3	235.15	0.420	Level 1			
10,207.3	7,251.1	7,303.1	7,303.1	89.3	146.1	-90.00	-265.7	-3,130.1	98.6	-136.7	235.35	0.419	Level 1, CC, ES, SF			
10,300.0	7,251.3	7,303.3	7,303.3	91.9	146.1	-90.10	-265.7	-3,130.1	135.3	-102.6	237.92	0.569	Level 1			
10,400.0	7,251.5	7,303.5	7,303.5	94.6	146.1	-90.21	-265.7	-3,130.1	216.4	-24.3	240.68	0.899	Level 1			
10,500.0	7,251.7	7,303.7	7,303.7	97.4	146.1	-90.33	-265.7	-3,130.1	308.8	65.4	243.45	1.269	Level 3			
10,600.0	7,251.9	7,303.9	7,303.9	100.2	146.1	-90.44	-265.7	-3,130.1	404.8	158.6	246.22	1.644				

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Existing wells - Sec.28-T4N-R67W - McCarty 28-3 (Exist) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 7600-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)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	
10,700.0	7,252.1	7,304.1	7,304.1	102.9	146.1	-90.55	-265.7	-3,130.1	502.4	253.4	248.99	2.018	
10,800.0	7,252.3	7,304.3	7,304.3	105.7	146.1	-90.66	-265.7	-3,130.1	600.8	349.0	251.77	2.386	
10,900.0	7,252.5	7,304.5	7,304.5	108.5	146.1	-90.77	-265.7	-3,130.1	699.6	445.1	254.54	2.749	
11,000.0	7,252.7	7,304.7	7,304.7	111.3	146.1	-90.88	-265.7	-3,130.1	798.8	541.5	257.31	3.104	
11,100.0	7,252.9	7,304.9	7,304.9	114.0	146.1	-91.00	-265.7	-3,130.1	898.1	638.0	260.08	3.453	
11,200.0	7,253.0	7,305.0	7,305.0	116.8	146.1	-91.11	-265.7	-3,130.1	997.5	734.7	262.86	3.795	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Existing wells - Sec.28-T4N-R67W - McCarty 28-5 (Exist.) - Wellbore #1 - Wellbore #1											Offset Site Error:		0.0 ft
Survey Program: 7600-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	
10,700.0	7,252.1	7,316.1	7,316.1	102.9	146.3	-89.65	-458.6	-4,558.5	980.1	730.8	249.24	3.932	
10,800.0	7,252.3	7,316.3	7,316.3	105.7	146.3	-89.68	-458.6	-4,558.5	885.1	633.1	252.02	3.512	
10,900.0	7,252.5	7,316.5	7,316.5	108.5	146.3	-89.72	-458.6	-4,558.5	791.4	536.6	254.80	3.106	
11,000.0	7,252.7	7,316.7	7,316.7	111.3	146.3	-89.76	-458.6	-4,558.5	699.4	441.8	257.58	2.715	
11,100.0	7,252.9	7,316.9	7,316.9	114.0	146.3	-89.80	-458.6	-4,558.5	609.9	349.5	260.36	2.342	
11,200.0	7,253.0	7,317.0	7,317.0	116.8	146.3	-89.84	-458.6	-4,558.5	524.2	261.1	263.15	1.992	
11,300.0	7,253.2	7,317.2	7,317.2	119.6	146.3	-89.87	-458.6	-4,558.5	444.6	178.7	265.93	1.672	
11,400.0	7,253.4	7,317.4	7,317.4	122.4	146.3	-89.91	-458.6	-4,558.5	374.9	106.1	268.72	1.395 Level 3	
11,500.0	7,253.6	7,317.6	7,317.6	125.2	146.4	-89.95	-458.6	-4,558.5	321.5	50.0	271.51	1.184 Level 2	
11,600.0	7,253.8	7,317.8	7,317.8	127.9	146.4	-89.99	-458.6	-4,558.5	293.6	19.3	274.29	1.071 Level 2	
11,635.7	7,253.9	7,317.9	7,317.9	128.9	146.4	-90.00	-458.6	-4,558.5	291.5	16.2	275.29	1.059 Level 2, CC, ES, SF	
11,697.1	7,254.0	7,318.0	7,318.0	130.7	146.4	-90.02	-458.6	-4,558.5	297.8	20.8	277.00	1.075 Level 2	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design		Existing wells - Sec.28-T4N-R67W - McCarty 28-6 (Exist) - Wellbore #1 - Wellbore #1										Offset Site Error:		0.0 ft			
Survey Program: 7600-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)						
7,674.7	7,240.2	7,255.2	7,255.2	23.2	145.1	17.77	-134.7	-1,565.1	967.9	910.3	57.61	16.800					
7,700.0	7,242.6	7,257.6	7,257.6	23.7	145.2	22.62	-134.7	-1,565.1	942.7	873.6	69.16	13.631					
7,792.5	7,246.5	7,261.5	7,261.5	25.7	145.2	87.12	-134.7	-1,565.1	850.4	679.8	170.65	4.983					
7,800.0	7,246.5	7,261.5	7,261.5	25.8	145.2	87.14	-134.7	-1,565.1	842.9	672.1	170.82	4.934					
7,900.0	7,246.7	7,261.7	7,261.7	28.1	145.2	87.48	-134.7	-1,565.1	743.0	569.8	173.13	4.291					
8,000.0	7,246.9	7,261.9	7,261.9	30.5	145.2	87.82	-134.7	-1,565.1	643.1	467.6	175.52	3.664					
8,100.0	7,247.1	7,262.1	7,262.1	32.9	145.2	88.16	-134.7	-1,565.1	543.2	365.2	177.99	3.052					
8,200.0	7,247.3	7,262.3	7,262.3	35.4	145.2	88.50	-134.7	-1,565.1	443.5	262.9	180.50	2.457					
8,300.0	7,247.5	7,262.5	7,262.5	37.9	145.2	88.84	-134.7	-1,565.1	343.8	160.7	183.06	1.878					
8,400.0	7,247.7	7,262.7	7,262.7	40.4	145.3	89.18	-134.7	-1,565.1	244.4	58.8	185.64	1.317 Level 3					
8,500.0	7,247.9	7,262.9	7,262.9	43.0	145.3	89.52	-134.7	-1,565.1	145.9	-42.3	188.25	0.775 Level 1					
8,600.0	7,248.1	7,263.1	7,263.1	45.6	145.3	89.86	-134.7	-1,565.1	53.3	-137.6	190.88	0.279 Level 1					
8,642.3	7,248.1	7,263.1	7,263.1	46.8	145.3	90.00	-134.7	-1,565.1	32.4	-159.6	192.00	0.169 Level 1, CC, ES, SF					
8,700.0	7,248.2	7,263.2	7,263.2	48.3	145.3	90.20	-134.7	-1,565.1	66.2	-127.3	193.53	0.342 Level 1					
8,800.0	7,248.4	7,263.4	7,263.4	50.9	145.3	90.54	-134.7	-1,565.1	161.0	-35.2	196.18	0.821 Level 1					
8,900.0	7,248.6	7,263.6	7,263.6	53.6	145.3	90.88	-134.7	-1,565.1	259.8	60.9	198.85	1.306 Level 3					
9,000.0	7,248.8	7,263.8	7,263.8	56.3	145.3	91.21	-134.7	-1,565.1	359.2	157.7	201.52	1.782					
9,100.0	7,249.0	7,264.0	7,264.0	59.0	145.3	91.55	-134.7	-1,565.1	458.9	254.7	204.19	2.247					
9,200.0	7,249.2	7,264.2	7,264.2	61.7	145.3	91.89	-134.7	-1,565.1	558.7	351.8	206.86	2.701					
9,300.0	7,249.4	7,264.4	7,264.4	64.4	145.3	92.23	-134.7	-1,565.1	658.5	449.0	209.54	3.143					
9,400.0	7,249.6	7,264.6	7,264.6	67.1	145.3	92.57	-134.7	-1,565.1	758.4	546.2	212.21	3.574					
9,500.0	7,249.8	7,264.8	7,264.8	69.9	145.3	92.91	-134.7	-1,565.1	858.3	643.5	214.89	3.994					
9,600.0	7,250.0	7,265.0	7,265.0	72.6	145.3	93.25	-134.7	-1,565.1	958.3	740.7	217.55	4.405					

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 ft
Survey Program: 7600-UNKNOWN												Offset Well Error:	0.0 ft
Existing wells - Sec.28-T4N-R67W - McCarty 28-8 (Exist) - Wellbore #1 - Wellbore #1													
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (ft)	Between Ellipses (ft)	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)					
0.0	0.0	0.0	0.0	0.0	0.0	-103.10	-149.4	-641.6	658.8				
100.0	100.0	97.0	97.0	0.1	1.9	-103.10	-149.4	-641.6	658.8	656.7	2.05	320.962	
200.0	200.0	197.0	197.0	0.3	3.9	-103.10	-149.4	-641.6	658.8	654.5	4.28	154.021	
300.0	300.0	297.0	297.0	0.6	5.9	-103.10	-149.4	-641.6	658.8	652.3	6.50	101.321	
400.0	400.0	397.0	397.0	0.8	7.9	-103.10	-149.4	-641.6	658.8	650.1	8.73	75.491	
500.0	500.0	497.0	497.0	1.0	9.9	-103.10	-149.4	-641.6	658.8	647.8	10.95	60.155	
600.0	600.0	597.0	597.0	1.2	11.9	-103.10	-149.4	-641.6	658.8	645.6	13.18	49.999	
700.0	700.0	697.0	697.0	1.5	13.9	-103.10	-149.4	-641.6	658.8	643.4	15.40	42.776	
800.0	800.0	797.0	797.0	1.7	15.9	-103.10	-149.4	-641.6	658.8	641.2	17.63	37.377	
900.0	900.0	897.0	897.0	1.9	17.9	-103.10	-149.4	-641.6	658.8	638.9	19.85	33.188	
1,000.0	1,000.0	997.0	997.0	2.1	19.9	-103.10	-149.4	-641.6	658.8	636.7	22.08	29.843	
1,100.0	1,100.0	1,097.0	1,097.0	2.4	21.9	-103.10	-149.4	-641.6	658.8	634.5	24.30	27.111	
1,200.0	1,200.0	1,197.0	1,197.0	2.6	23.9	-103.10	-149.4	-641.6	658.8	632.3	26.52	24.837	
1,300.0	1,300.0	1,297.0	1,297.0	2.8	25.9	-103.10	-149.4	-641.6	658.8	630.1	28.75	22.915	
1,400.0	1,400.0	1,397.0	1,397.0	3.0	27.9	-103.10	-149.4	-641.6	658.8	627.8	30.97	21.269	
1,500.0	1,500.0	1,497.0	1,497.0	3.3	29.9	-103.10	-149.4	-641.6	658.8	625.6	33.20	19.844	
1,600.0	1,600.0	1,597.0	1,597.0	3.5	31.9	120.76	-149.4	-641.6	659.7	624.3	35.39	18.639	
1,700.6	1,700.4	1,697.4	1,697.4	3.6	33.9	121.11	-149.4	-641.6	662.4	624.8	37.56	17.634	
1,800.0	1,799.6	1,796.6	1,796.6	3.8	35.9	121.62	-149.4	-641.6	666.0	626.3	39.73	16.763	
1,900.0	1,899.3	1,896.3	1,896.3	4.0	37.9	122.13	-149.4	-641.6	669.7	627.8	41.92	15.976	
2,000.0	1,999.1	1,996.1	1,996.1	4.2	39.9	122.63	-149.4	-641.6	673.5	629.4	44.12	15.266	
2,100.0	2,098.9	2,095.9	2,095.9	4.5	41.9	123.13	-149.4	-641.6	677.3	631.0	46.32	14.623	
2,200.0	2,198.6	2,195.6	2,195.6	4.7	43.9	123.62	-149.4	-641.6	681.1	632.6	48.52	14.038	
2,300.0	2,298.4	2,295.4	2,295.4	4.9	45.9	124.10	-149.4	-641.6	685.0	634.3	50.73	13.504	
2,400.0	2,398.1	2,395.1	2,395.1	5.1	47.9	124.59	-149.4	-641.6	689.0	636.1	52.94	13.015	
2,500.0	2,497.9	2,494.9	2,494.9	5.3	49.9	125.06	-149.4	-641.6	693.0	637.8	55.15	12.565	
2,600.0	2,597.6	2,594.6	2,594.6	5.6	51.9	125.53	-149.4	-641.6	697.1	639.7	57.37	12.150	
2,700.0	2,697.4	2,694.4	2,694.4	5.8	53.9	126.00	-149.4	-641.6	701.1	641.6	59.59	11.766	
2,800.0	2,797.1	2,794.1	2,794.1	6.1	55.9	126.45	-149.4	-641.6	705.3	643.5	61.81	11.410	
2,900.0	2,896.9	2,893.9	2,893.9	6.3	57.9	126.91	-149.4	-641.6	709.5	645.4	64.03	11.080	
3,000.0	2,996.7	2,993.7	2,993.7	6.5	59.9	127.36	-149.4	-641.6	713.7	647.4	66.26	10.772	
3,100.0	3,096.4	3,093.4	3,093.4	6.8	61.9	127.80	-149.4	-641.6	718.0	649.5	68.48	10.484	
3,200.0	3,196.2	3,193.2	3,193.2	7.0	63.9	128.24	-149.4	-641.6	722.3	651.6	70.71	10.216	
3,300.0	3,295.9	3,292.9	3,292.9	7.3	65.9	128.67	-149.4	-641.6	726.6	653.7	72.93	9.964	
3,400.0	3,395.7	3,392.7	3,392.7	7.5	67.9	129.10	-149.4	-641.6	731.0	655.9	75.16	9.727	
3,500.0	3,495.4	3,492.4	3,492.4	7.8	69.8	129.52	-149.4	-641.6	735.5	658.1	77.38	9.504	
3,600.0	3,595.2	3,592.2	3,592.2	8.0	71.8	129.94	-149.4	-641.6	740.0	660.4	79.61	9.295	
3,700.0	3,694.9	3,691.9	3,691.9	8.3	73.8	130.35	-149.4	-641.6	744.5	662.6	81.84	9.097	
3,800.0	3,794.7	3,791.7	3,791.7	8.5	75.8	130.76	-149.4	-641.6	749.0	665.0	84.07	8.910	
3,900.0	3,894.4	3,891.4	3,891.4	8.8	77.8	131.16	-149.4	-641.6	753.6	667.3	86.30	8.733	
4,000.0	3,994.2	3,991.2	3,991.2	9.0	79.8	131.56	-149.4	-641.6	758.3	669.7	88.53	8.565	
4,100.0	4,094.0	4,091.0	4,091.0	9.3	81.8	131.95	-149.4	-641.6	762.9	672.2	90.75	8.406	
4,200.0	4,193.7	4,190.7	4,190.7	9.5	83.8	132.34	-149.4	-641.6	767.6	674.6	92.98	8.255	
4,300.0	4,293.5	4,290.5	4,290.5	9.8	85.8	132.72	-149.4	-641.6	772.4	677.1	95.21	8.112	
4,400.0	4,393.2	4,390.2	4,390.2	10.0	87.8	133.10	-149.4	-641.6	777.1	679.7	97.44	7.975	
4,500.0	4,493.0	4,490.0	4,490.0	10.3	89.8	133.47	-149.4	-641.6	781.9	682.3	99.67	7.845	
4,600.0	4,592.7	4,589.7	4,589.7	10.5	91.8	133.84	-149.4	-641.6	786.8	684.9	101.90	7.721	
4,700.0	4,692.5	4,689.5	4,689.5	10.8	93.8	134.21	-149.4	-641.6	791.6	687.5	104.13	7.602	
4,807.4	4,799.6	4,796.6	4,796.6	11.1	95.9	134.59	-149.4	-641.6	796.9	690.4	106.52	7.481	
4,900.0	4,892.1	4,889.1	4,889.1	11.3	97.8	134.90	-149.4	-641.6	800.4	691.8	108.65	7.367	
5,007.9	5,000.0	4,997.0	4,997.0	11.5	99.9	-88.73	-149.4	-641.6	801.8	690.8	111.01	7.223	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Existing wells - Sec.28-T4N-R67W - McCarty 28-8 (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7600-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
5,100.0	5,092.1	5,089.1	5,089.1	11.7	101.8	-88.73	-88.73	-149.4	-641.6	801.8	688.8	113.04	7.094	
5,200.0	5,192.1	5,189.1	5,189.1	11.9	103.8	-88.73	-88.73	-149.4	-641.6	801.8	686.6	115.23	6.959	
5,300.0	5,292.1	5,289.1	5,289.1	12.0	105.8	-88.73	-88.73	-149.4	-641.6	801.8	684.4	117.42	6.829	
5,400.0	5,392.1	5,389.1	5,389.1	12.2	107.8	-88.73	-88.73	-149.4	-641.6	801.8	682.2	119.62	6.703	
5,500.0	5,492.1	5,489.1	5,489.1	12.4	109.8	-88.73	-88.73	-149.4	-641.6	801.8	680.0	121.82	6.582	
5,600.0	5,592.1	5,589.1	5,589.1	12.6	111.8	-88.73	-88.73	-149.4	-641.6	801.8	677.8	124.01	6.466	
5,700.0	5,692.1	5,689.1	5,689.1	12.8	113.8	-88.73	-88.73	-149.4	-641.6	801.8	675.6	126.21	6.353	
5,800.0	5,792.1	5,789.1	5,789.1	13.0	115.8	-88.73	-88.73	-149.4	-641.6	801.8	673.4	128.41	6.244	
5,900.0	5,892.1	5,889.1	5,889.1	13.2	117.8	-88.73	-88.73	-149.4	-641.6	801.8	671.2	130.61	6.139	
6,000.0	5,992.1	5,989.1	5,989.1	13.4	119.8	-88.73	-88.73	-149.4	-641.6	801.8	669.0	132.81	6.037	
6,100.0	6,092.1	6,089.1	6,089.1	13.6	121.8	-88.73	-88.73	-149.4	-641.6	801.8	666.8	135.02	5.939	
6,200.0	6,192.1	6,189.1	6,189.1	13.8	123.8	-88.73	-88.73	-149.4	-641.6	801.8	664.6	137.22	5.844	
6,300.0	6,292.1	6,289.1	6,289.1	14.0	125.8	-88.73	-88.73	-149.4	-641.6	801.8	662.4	139.42	5.751	
6,400.0	6,392.1	6,389.1	6,389.1	14.2	127.8	-88.73	-88.73	-149.4	-641.6	801.8	660.2	141.63	5.662	
6,480.7	6,472.7	6,469.7	6,469.7	14.3	129.4	-88.73	-88.73	-149.4	-641.6	801.8	658.4	143.40	5.591	
6,500.0	6,492.1	6,489.1	6,489.1	14.4	129.8	1.27	1.27	-149.4	-641.6	801.6	657.8	143.77	5.576	
6,550.0	6,542.0	6,539.0	6,539.0	14.5	130.8	1.28	1.28	-149.4	-641.6	798.7	654.4	144.30	5.535	
6,600.0	6,591.6	6,588.6	6,588.6	14.5	131.8	1.30	1.30	-149.4	-641.6	792.5	648.3	144.21	5.496	
6,650.0	6,640.7	6,637.7	6,637.7	14.6	132.8	1.33	1.33	-149.4	-641.6	783.2	639.7	143.49	5.458	
6,700.0	6,689.1	6,686.1	6,686.1	14.7	133.7	1.38	1.38	-149.4	-641.6	770.6	628.5	142.12	5.422	
6,750.0	6,736.5	6,733.5	6,733.5	14.7	134.7	1.44	1.44	-149.4	-641.6	754.9	614.8	140.10	5.388	
6,800.0	6,782.8	6,779.8	6,779.8	14.8	135.6	1.51	1.51	-149.4	-641.6	736.1	598.6	137.44	5.356	
6,850.0	6,827.8	6,824.8	6,824.8	14.8	136.5	1.61	1.61	-149.4	-641.6	714.3	580.2	134.13	5.325	
6,900.0	6,871.3	6,868.3	6,868.3	14.9	137.4	1.73	1.73	-149.4	-641.6	689.7	559.5	130.19	5.297	
6,950.0	6,913.1	6,910.1	6,910.1	14.9	138.2	1.88	1.88	-149.4	-641.6	662.2	536.6	125.64	5.271	
7,000.0	6,953.0	6,950.0	6,950.0	15.0	139.0	2.07	2.07	-149.4	-641.6	632.1	511.6	120.48	5.246	
7,050.0	6,990.8	6,987.8	6,987.8	15.1	139.8	2.31	2.31	-149.4	-641.6	599.4	484.7	114.75	5.224	
7,100.0	7,026.4	7,023.4	7,023.4	15.3	140.5	2.62	2.62	-149.4	-641.6	564.3	455.9	108.48	5.202	
7,150.0	7,059.7	7,056.7	7,056.7	15.6	141.1	3.02	3.02	-149.4	-641.6	527.0	425.3	101.72	5.181	
7,200.0	7,090.4	7,087.4	7,087.4	16.0	141.7	3.55	3.55	-149.4	-641.6	487.6	393.1	94.54	5.158	
7,250.0	7,118.5	7,115.5	7,115.5	16.4	142.3	4.27	4.27	-149.4	-641.6	446.3	359.3	87.02	5.129	
7,300.0	7,143.8	7,140.8	7,140.8	17.0	142.8	5.28	5.28	-149.4	-641.6	403.2	323.9	79.34	5.082	
7,350.0	7,166.2	7,163.2	7,163.2	17.6	143.3	6.75	6.75	-149.4	-641.6	358.6	286.7	71.85	4.991	
7,400.0	7,185.7	7,182.7	7,182.7	18.2	143.7	9.01	9.01	-149.4	-641.6	312.6	247.2	65.40	4.780	
7,450.0	7,202.1	7,199.1	7,199.1	19.0	144.0	12.72	12.72	-149.4	-641.6	265.5	203.2	62.26	4.264	
7,500.0	7,215.4	7,212.4	7,212.4	19.8	144.2	19.30	19.30	-149.4	-641.6	217.4	149.4	67.99	3.198	
7,550.0	7,225.5	7,222.5	7,222.5	20.7	144.5	31.92	31.92	-149.4	-641.6	168.7	76.4	92.31	1.827	
7,600.7	7,232.5	7,229.5	7,229.5	21.7	144.6	55.36	55.36	-149.4	-641.6	118.9	-18.7	137.64	0.864 Level 1	
7,674.7	7,240.2	7,237.2	7,237.2	23.2	144.7	75.51	75.51	-149.4	-641.6	47.4	-115.2	162.65	0.292 Level 1	
7,700.0	7,242.6	7,239.6	7,239.6	23.7	144.8	85.03	85.03	-149.4	-641.6	25.8	-142.0	167.81	0.154 Level 1	
7,718.8	7,244.0	7,241.0	7,241.0	24.1	144.8	90.00	90.00	-149.4	-641.6	17.8	-151.1	168.88	0.105 Level 1, CC, ES, SF	
7,792.5	7,246.5	7,243.5	7,243.5	25.7	144.9	90.46	90.46	-149.4	-641.6	75.7	-94.8	170.51	0.444 Level 1	
7,800.0	7,246.5	7,243.5	7,243.5	25.8	144.9	90.50	90.50	-149.4	-641.6	83.1	-87.6	170.68	0.487 Level 1	
7,900.0	7,246.7	7,243.7	7,243.7	28.1	144.9	91.12	91.12	-149.4	-641.6	182.0	9.1	172.92	1.053 Level 2	
8,000.0	7,246.9	7,243.9	7,243.9	30.5	144.9	91.74	91.74	-149.4	-641.6	281.7	106.5	175.23	1.608	
8,100.0	7,247.1	7,244.1	7,244.1	32.9	144.9	92.36	92.36	-149.4	-641.6	381.6	204.0	177.59	2.149	
8,200.0	7,247.3	7,244.3	7,244.3	35.4	144.9	92.97	92.97	-149.4	-641.6	481.5	301.5	179.99	2.675	
8,300.0	7,247.5	7,244.5	7,244.5	37.9	144.9	93.59	93.59	-149.4	-641.6	581.4	399.0	182.41	3.187	
8,400.0	7,247.7	7,244.7	7,244.7	40.4	144.9	94.21	94.21	-149.4	-641.6	681.4	496.5	184.84	3.686	
8,500.0	7,247.9	7,244.9	7,244.9	43.0	144.9	94.82	94.82	-149.4	-641.6	781.3	594.1	187.28	4.172	
8,600.0	7,248.1	7,245.1	7,245.1	45.6	144.9	95.43	95.43	-149.4	-641.6	881.3	691.6	189.71	4.646	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Existing wells - Sec.28-T4N-R67W - McCarty 28-8 (Exist) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7600-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		
8,700.0	7,248.2	7,245.2	7,245.2	48.3	144.9	96.05	-149.4	-641.6	981.3	789.2	192.15	5.107		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28U-334 - Wellbore #1 - Plan #1 (11-18-13)													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)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	0.00	29.1	0.0	29.1					
100.0	100.0	100.0	100.0	0.1	0.1	0.00	29.1	0.0	29.1	28.9	0.22	129.629		
200.0	200.0	200.0	200.0	0.3	0.3	0.00	29.1	0.0	29.1	28.5	0.67	43.210		
300.0	300.0	300.0	300.0	0.6	0.6	0.00	29.1	0.0	29.1	28.0	1.12	25.926		
400.0	400.0	400.0	400.0	0.8	0.8	0.00	29.1	0.0	29.1	27.6	1.57	18.518		
500.0	500.0	500.0	500.0	1.0	1.0	0.00	29.1	0.0	29.1	27.1	2.02	14.403		
600.0	600.0	600.0	600.0	1.2	1.2	0.00	29.1	0.0	29.1	26.7	2.47	11.784		
700.0	700.0	700.0	700.0	1.5	1.5	0.00	29.1	0.0	29.1	26.2	2.92	9.971		
800.0	800.0	800.0	800.0	1.7	1.7	0.00	29.1	0.0	29.1	25.8	3.37	8.642		
900.0	900.0	900.0	900.0	1.9	1.9	0.00	29.1	0.0	29.1	25.3	3.82	7.625		
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	0.00	29.1	0.0	29.1	24.9	4.27	6.823		
1,100.0	1,100.0	1,100.0	1,100.0	2.4	2.4	0.00	29.1	0.0	29.1	24.4	4.72	6.173		
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	0.00	29.1	0.0	29.1	24.0	5.17	5.636		
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	0.00	29.1	0.0	29.1	23.5	5.62	5.185		
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	0.00	29.1	0.0	29.1	23.1	6.07	4.801		
1,500.0	1,500.0	1,500.0	1,500.0	3.3	3.3	0.00	29.1	0.0	29.1	22.6	6.52	4.470 CC, ES		
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	-138.51	29.1	0.0	30.4	23.5	6.94	4.382		
1,700.6	1,700.4	1,700.4	1,700.4	3.6	3.7	-144.26	29.1	0.0	34.5	27.2	7.34	4.704		
1,800.0	1,799.6	1,799.6	1,799.6	3.8	3.9	-150.03	29.1	0.0	40.4	32.7	7.75	5.212		
1,900.0	1,899.3	1,899.3	1,899.3	4.0	4.2	-154.33	29.1	0.0	46.6	38.4	8.17	5.706		
2,000.0	1,999.1	1,999.1	1,999.1	4.2	4.4	-157.60	29.1	0.0	53.0	44.4	8.58	6.173		
2,100.0	2,098.9	2,098.8	2,098.8	4.5	4.6	-158.53	29.8	1.6	59.5	50.5	9.00	6.616		
2,200.0	2,198.6	2,198.5	2,198.4	4.7	4.8	-156.32	31.8	6.2	66.2	56.8	9.41	7.032		
2,300.0	2,298.4	2,298.2	2,297.9	4.9	5.0	-153.70	34.3	11.9	73.1	63.2	9.84	7.424		
2,400.0	2,398.1	2,398.0	2,397.4	5.1	5.2	-151.52	36.8	17.5	80.0	69.8	10.27	7.792		
2,500.0	2,497.9	2,497.7	2,496.9	5.3	5.5	-149.70	39.2	23.2	87.1	76.4	10.71	8.134		
2,600.0	2,597.6	2,597.4	2,596.5	5.6	5.7	-148.15	41.7	28.8	94.3	83.1	11.15	8.453		
2,700.0	2,697.4	2,697.1	2,696.0	5.8	5.9	-146.82	44.1	34.4	101.5	89.9	11.60	8.748		
2,800.0	2,797.1	2,796.8	2,795.5	6.1	6.1	-145.66	46.6	40.1	108.7	96.7	12.05	9.023		
2,900.0	2,896.9	2,896.5	2,895.0	6.3	6.4	-144.66	49.0	45.7	116.0	103.5	12.50	9.279		
3,000.0	2,996.7	2,996.2	2,994.6	6.5	6.6	-143.77	51.5	51.4	123.3	110.4	12.96	9.517		
3,100.0	3,096.4	3,096.0	3,094.1	6.8	6.8	-142.98	53.9	57.0	130.7	117.3	13.42	9.739		
3,200.0	3,196.2	3,195.7	3,193.6	7.0	7.1	-142.27	56.4	62.6	138.1	124.2	13.88	9.946		
3,300.0	3,295.9	3,295.4	3,293.1	7.3	7.3	-141.64	58.9	68.3	145.5	131.1	14.35	10.139		
3,400.0	3,395.7	3,395.1	3,392.7	7.5	7.5	-141.07	61.3	73.9	152.9	138.1	14.81	10.320		
3,500.0	3,495.4	3,494.8	3,492.2	7.8	7.8	-140.55	63.8	79.6	160.3	145.0	15.28	10.489		
3,600.0	3,595.2	3,594.5	3,591.7	8.0	8.0	-140.08	66.2	85.2	167.7	152.0	15.75	10.648		
3,700.0	3,694.9	3,694.2	3,691.2	8.3	8.3	-139.64	68.7	90.8	175.2	158.9	16.22	10.797		
3,800.0	3,794.7	3,794.0	3,790.8	8.5	8.5	-139.24	71.1	96.5	182.6	165.9	16.70	10.938		
3,900.0	3,894.4	3,893.7	3,890.3	8.8	8.7	-138.88	73.6	102.1	190.1	172.9	17.17	11.070		
4,000.0	3,994.2	3,993.4	3,989.8	9.0	9.0	-138.54	76.0	107.8	197.5	179.9	17.65	11.195		
4,100.0	4,094.0	4,093.1	4,089.3	9.3	9.2	-138.23	78.5	113.4	205.0	186.9	18.12	11.314		
4,200.0	4,193.7	4,192.8	4,188.9	9.5	9.5	-137.93	81.0	119.0	212.5	193.9	18.60	11.425		
4,300.0	4,293.5	4,292.5	4,288.4	9.8	9.7	-137.66	83.4	124.7	220.0	200.9	19.08	11.531		
4,400.0	4,393.2	4,392.2	4,387.9	10.0	9.9	-137.41	85.9	130.3	227.5	207.9	19.56	11.632		
4,500.0	4,493.0	4,491.9	4,487.4	10.3	10.2	-137.17	88.3	136.0	235.0	214.9	20.04	11.727		
4,600.0	4,592.7	4,591.7	4,587.0	10.5	10.4	-136.95	90.8	141.6	242.5	222.0	20.52	11.818		
4,700.0	4,692.5	4,691.4	4,686.5	10.8	10.7	-136.74	93.2	147.2	250.0	229.0	21.00	11.905		
4,807.4	4,799.6	4,798.4	4,793.3	11.1	10.9	-136.52	95.9	153.3	258.0	236.5	21.52	11.993		
4,900.0	4,892.1	4,893.2	4,888.0	11.3	11.1	-136.34	97.9	158.0	263.6	241.7	21.94	12.015		
5,007.9	5,000.0	5,005.3	5,000.0	11.5	11.3	0.00	98.8	160.0	265.9	243.9	22.08	12.045		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28U-334 - Wellbore #1 - Plan #1 (11-18-13)													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
5,100.0	5,092.1	5,097.3	5,092.1	11.7	11.5	0.00	0.00	98.8	160.0	265.9	243.5	22.44	11.850	
5,200.0	5,192.1	5,197.3	5,192.1	11.9	11.7	0.00	0.00	98.8	160.0	265.9	243.1	22.85	11.640	
5,300.0	5,292.1	5,297.3	5,292.1	12.0	11.9	0.00	0.00	98.8	160.0	265.9	242.7	23.25	11.436	
5,400.0	5,392.1	5,397.3	5,392.1	12.2	12.2	0.00	0.00	98.8	160.0	265.9	242.3	23.66	11.238	
5,500.0	5,492.1	5,497.3	5,492.1	12.4	12.4	0.00	0.00	98.8	160.0	265.9	241.9	24.07	11.047	
5,600.0	5,592.1	5,597.3	5,592.1	12.6	12.6	0.00	0.00	98.8	160.0	265.9	241.4	24.49	10.861	
5,700.0	5,692.1	5,697.3	5,692.1	12.8	12.8	0.00	0.00	98.8	160.0	265.9	241.0	24.90	10.681	
5,800.0	5,792.1	5,797.3	5,792.1	13.0	13.0	0.00	0.00	98.8	160.0	265.9	240.6	25.31	10.506	
5,900.0	5,892.1	5,897.3	5,892.1	13.2	13.2	0.00	0.00	98.8	160.0	265.9	240.2	25.73	10.336	
6,000.0	5,992.1	5,997.3	5,992.1	13.4	13.4	0.00	0.00	98.8	160.0	265.9	239.8	26.14	10.172	
6,100.0	6,092.1	6,097.3	6,092.1	13.6	13.6	0.00	0.00	98.8	160.0	265.9	239.4	26.56	10.012	
6,200.0	6,192.1	6,197.3	6,192.1	13.8	13.9	0.00	0.00	98.8	160.0	265.9	239.0	26.98	9.857	
6,300.0	6,292.1	6,297.3	6,292.1	14.0	14.1	0.00	0.00	98.8	160.0	265.9	238.5	27.40	9.706	
6,365.6	6,357.7	6,363.0	6,357.7	14.1	14.2	0.00	0.00	98.8	160.0	265.9	238.3	27.68	9.609	
6,400.0	6,392.1	6,397.3	6,392.1	14.2	14.3	0.00	0.00	98.8	160.0	265.9	238.1	27.82	9.559	
6,416.9	6,409.0	6,414.2	6,408.9	14.2	14.3	-0.07	0.00	98.8	159.7	265.9	238.0	27.89	9.536	
6,480.7	6,472.7	6,477.6	6,472.2	14.3	14.4	-1.05	0.00	98.8	155.1	266.0	237.8	28.14	9.452	
6,500.0	6,492.1	6,496.7	6,491.1	14.4	14.5	88.49	0.00	98.8	152.8	266.0	237.6	28.45	9.350	
6,550.0	6,542.0	6,545.8	6,539.4	14.5	14.5	87.30	0.00	98.8	144.5	266.2	237.6	28.60	9.309	
6,600.0	6,591.6	6,594.5	6,586.8	14.5	14.6	86.12	0.00	98.8	133.2	266.6	237.8	28.73	9.277	
6,650.0	6,640.7	6,642.9	6,633.1	14.6	14.7	84.97	0.00	98.8	119.0	267.0	238.1	28.85	9.253	
6,700.0	6,689.1	6,690.9	6,678.0	14.7	14.7	83.84	0.00	98.8	102.1	267.5	238.5	28.97	9.234	
6,750.0	6,736.5	6,738.7	6,721.6	14.7	14.8	82.75	0.00	98.8	82.4	268.1	239.0	29.08	9.218	
6,800.0	6,782.8	6,786.2	6,763.6	14.8	14.9	81.69	0.00	98.8	60.3	268.8	239.6	29.21	9.202	
6,850.0	6,827.8	6,833.4	6,803.9	14.8	15.0	80.67	0.00	98.8	35.7	269.5	240.2	29.36	9.182	
6,900.0	6,871.3	6,880.3	6,842.4	14.9	15.1	79.70	0.00	98.8	8.9	270.3	240.8	29.53	9.153	
6,950.0	6,913.1	6,927.0	6,878.9	14.9	15.2	78.78	0.00	98.8	-20.1	271.2	241.4	29.75	9.113	
7,000.0	6,953.0	6,973.5	6,913.5	15.0	15.4	77.91	0.00	98.8	-51.2	272.0	242.0	30.03	9.057	
7,050.0	6,990.8	7,019.7	6,946.0	15.1	15.7	77.09	0.00	98.8	-84.1	272.9	242.5	30.39	8.980	
7,100.0	7,026.4	7,065.8	6,976.3	15.3	16.0	76.33	0.00	98.8	-118.8	273.7	242.9	30.83	8.880	
7,150.0	7,059.7	7,111.7	7,004.4	15.6	16.3	75.62	0.00	98.8	-155.1	274.6	243.2	31.37	8.753	
7,200.0	7,090.4	7,157.4	7,030.1	16.0	16.7	74.97	0.00	98.8	-192.8	275.4	243.4	32.03	8.598	
7,250.0	7,118.5	7,203.0	7,053.5	16.4	17.2	74.39	0.00	98.8	-232.0	276.2	243.3	32.81	8.416	
7,300.0	7,143.8	7,250.0	7,075.1	17.0	17.7	73.85	0.00	98.8	-273.7	276.9	243.1	33.74	8.205	
7,350.0	7,166.2	7,293.7	7,092.8	17.6	18.3	73.40	0.00	98.8	-313.6	277.5	242.7	34.78	7.979	
7,400.0	7,185.7	7,338.9	7,108.8	18.2	19.0	73.01	0.00	98.8	-355.9	278.1	242.1	35.97	7.731	
7,450.0	7,202.1	7,384.0	7,122.1	19.0	19.7	72.67	0.00	98.8	-399.0	278.6	241.3	37.29	7.471	
7,500.0	7,215.4	7,429.1	7,132.9	19.8	20.4	72.40	0.00	98.8	-442.8	279.0	240.3	38.73	7.204	
7,550.0	7,225.5	7,474.0	7,141.1	20.7	21.2	72.20	0.00	98.8	-487.0	279.3	239.0	40.28	6.934	
7,600.7	7,232.5	7,519.6	7,146.8	21.7	22.1	72.06	0.00	98.8	-532.2	279.5	237.6	41.96	6.662	
7,674.7	7,240.2	7,585.9	7,150.1	23.2	23.4	71.36	0.00	98.8	-598.3	280.8	236.3	44.47	6.315	
7,700.0	7,242.6	7,609.2	7,150.0	23.7	23.9	70.88	0.00	98.8	-621.7	281.6	236.3	45.30	6.217	
7,792.5	7,246.5	7,701.6	7,148.8	25.7	25.8	69.83	0.00	98.8	-714.0	283.3	234.6	48.73	5.814	
7,800.0	7,246.5	7,709.1	7,148.7	25.8	26.0	69.81	0.00	98.8	-721.5	283.4	234.3	49.04	5.779	
7,900.0	7,246.7	7,809.1	7,147.4	28.1	28.3	69.53	0.00	98.8	-821.5	283.9	230.7	53.18	5.337	
8,000.0	7,246.9	7,909.1	7,146.2	30.5	30.6	69.25	0.00	98.8	-921.5	284.4	226.9	57.49	4.946	
8,100.0	7,247.1	8,009.1	7,144.9	32.9	33.0	68.98	0.00	98.8	-1,021.5	284.9	223.0	61.92	4.601	
8,200.0	7,247.3	8,109.0	7,143.6	35.4	35.5	68.70	0.00	98.8	-1,121.5	285.4	219.0	66.45	4.296	
8,300.0	7,247.5	8,209.0	7,142.3	37.9	38.0	68.43	0.00	98.8	-1,221.5	286.0	214.9	71.04	4.025	
8,400.0	7,247.7	8,309.0	7,141.1	40.4	40.5	68.16	0.00	98.8	-1,321.4	286.5	210.8	75.69	3.785	
8,500.0	7,247.9	8,409.0	7,139.8	43.0	43.1	67.88	0.00	98.8	-1,421.4	287.1	206.7	80.38	3.571	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28U-334 - Wellbore #1 - Plan #1 (11-18-13)													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
8,600.0	7,248.1	8,509.0	7,138.5	45.6	45.7	67.61	67.61	98.8	-1,521.4	287.6	202.5	85.10	3.380	
8,700.0	7,248.2	8,609.0	7,137.2	48.3	48.4	67.34	67.34	98.8	-1,621.4	288.2	198.3	89.84	3.208	
8,800.0	7,248.4	8,709.0	7,136.0	50.9	51.0	67.08	67.08	98.8	-1,721.4	288.7	194.2	94.59	3.052	
8,900.0	7,248.6	8,809.0	7,134.7	53.6	53.7	66.81	66.81	98.8	-1,821.3	289.3	190.0	99.36	2.912	
9,000.0	7,248.8	8,909.0	7,133.4	56.3	56.4	66.54	66.54	98.8	-1,921.3	289.9	185.8	104.13	2.784	
9,100.0	7,249.0	9,008.9	7,132.1	59.0	59.1	66.28	66.28	98.8	-2,021.3	290.5	181.6	108.91	2.667	
9,200.0	7,249.2	9,108.9	7,130.9	61.7	61.8	66.01	66.01	98.8	-2,121.3	291.1	177.4	113.68	2.561	
9,300.0	7,249.4	9,208.9	7,129.6	64.4	64.5	65.75	65.75	98.8	-2,221.3	291.7	173.2	118.45	2.462	
9,400.0	7,249.6	9,308.9	7,128.3	67.1	67.2	65.49	65.49	98.8	-2,321.2	292.3	169.1	123.21	2.372	
9,500.0	7,249.8	9,408.9	7,127.0	69.9	69.9	65.23	65.23	98.8	-2,421.2	292.9	164.9	127.97	2.289	
9,600.0	7,250.0	9,508.9	7,125.8	72.6	72.6	64.97	64.97	98.8	-2,521.2	293.5	160.8	132.72	2.212	
9,700.0	7,250.2	9,608.9	7,124.5	75.3	75.4	64.71	64.71	98.8	-2,621.2	294.1	156.7	137.45	2.140	
9,800.0	7,250.4	9,708.9	7,123.2	78.1	78.1	64.45	64.45	98.8	-2,721.2	294.8	152.6	142.18	2.073	
9,900.0	7,250.5	9,808.9	7,122.0	80.8	80.9	64.19	64.19	98.8	-2,821.1	295.4	148.5	146.89	2.011	
10,000.0	7,250.7	9,908.8	7,120.7	83.6	83.6	63.94	63.94	98.8	-2,921.1	296.0	144.5	151.58	1.953	
10,100.0	7,250.9	10,008.8	7,119.4	86.3	86.4	63.68	63.68	98.8	-3,021.1	296.7	140.4	156.27	1.899	
10,200.0	7,251.1	10,108.8	7,118.1	89.1	89.1	63.43	63.43	98.8	-3,121.1	297.3	136.4	160.93	1.848	
10,300.0	7,251.3	10,208.8	7,116.9	91.9	91.9	63.18	63.18	98.8	-3,221.1	298.0	132.4	165.58	1.800	
10,400.0	7,251.5	10,308.8	7,115.6	94.6	94.7	62.93	62.93	98.8	-3,321.1	298.7	128.5	170.22	1.755	
10,500.0	7,251.7	10,408.8	7,114.3	97.4	97.4	62.68	62.68	98.8	-3,421.0	299.3	124.5	174.83	1.712	
10,600.0	7,251.9	10,508.8	7,113.0	100.2	100.2	62.43	62.43	98.8	-3,521.0	300.0	120.6	179.43	1.672	
10,700.0	7,252.1	10,608.8	7,111.8	102.9	103.0	62.18	62.18	98.8	-3,621.0	300.7	116.7	184.01	1.634	
10,800.0	7,252.3	10,708.8	7,110.5	105.7	105.7	61.94	61.94	98.8	-3,721.0	301.4	112.8	188.58	1.598	
10,900.0	7,252.5	10,808.8	7,109.2	108.5	108.5	61.69	61.69	98.8	-3,821.0	302.1	109.0	193.12	1.564	
11,000.0	7,252.7	10,908.7	7,107.9	111.3	111.3	61.45	61.45	98.8	-3,920.9	302.8	105.1	197.65	1.532	
11,100.0	7,252.9	11,008.7	7,106.7	114.0	114.1	61.20	61.20	98.8	-4,020.9	303.5	101.3	202.15	1.501	
11,200.0	7,253.0	11,108.7	7,105.4	116.8	116.8	60.96	60.96	98.8	-4,120.9	304.2	97.6	206.64	1.472 Level 3	
11,300.0	7,253.2	11,208.7	7,104.1	119.6	119.6	60.72	60.72	98.8	-4,220.9	304.9	93.8	211.10	1.444 Level 3	
11,400.0	7,253.4	11,308.7	7,102.8	122.4	122.4	60.48	60.48	98.8	-4,320.9	305.6	90.1	215.55	1.418 Level 3	
11,500.0	7,253.6	11,408.7	7,101.6	125.2	125.2	60.24	60.24	98.8	-4,420.8	306.3	86.4	219.98	1.393 Level 3	
11,600.0	7,253.8	11,508.7	7,100.3	127.9	128.0	60.00	60.00	98.8	-4,520.8	307.1	82.7	224.38	1.369 Level 3	
11,697.1	7,254.0	11,605.7	7,099.1	130.7	130.6	59.78	59.78	98.8	-4,617.9	307.8	79.2	228.59	1.346 Level 3, SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28V-214 - Wellbore #1 - Plan #1 (11-18-13)													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)	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	180.00	180.00	-32.8	0.0	32.8				
100.0	100.0	100.0	100.0	0.1	0.1	180.00	180.00	-32.8	0.0	32.8	32.6	0.22	145.892	
200.0	200.0	200.0	200.0	0.3	0.3	180.00	180.00	-32.8	0.0	32.8	32.1	0.67	48.631	
300.0	300.0	300.0	300.0	0.6	0.6	180.00	180.00	-32.8	0.0	32.8	31.7	1.12	29.178	
400.0	400.0	400.0	400.0	0.8	0.8	180.00	180.00	-32.8	0.0	32.8	31.2	1.57	20.842	
500.0	500.0	500.0	500.0	1.0	1.0	180.00	180.00	-32.8	0.0	32.8	30.8	2.02	16.210	
600.0	600.0	600.0	600.0	1.2	1.2	180.00	180.00	-32.8	0.0	32.8	30.3	2.47	13.263	
700.0	700.0	700.0	700.0	1.5	1.5	180.00	180.00	-32.8	0.0	32.8	29.9	2.92	11.222	
800.0	800.0	800.0	800.0	1.7	1.7	180.00	180.00	-32.8	0.0	32.8	29.4	3.37	9.726	
900.0	900.0	900.0	900.0	1.9	1.9	180.00	180.00	-32.8	0.0	32.8	29.0	3.82	8.582	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	180.00	180.00	-32.8	0.0	32.8	28.5	4.27	7.679 CC, ES	
1,100.0	1,100.0	1,098.9	1,098.9	2.4	2.3	178.94	178.94	-34.4	0.6	34.4	29.7	4.69	7.333	
1,200.0	1,200.0	1,197.6	1,197.4	2.6	2.5	176.27	176.27	-39.1	2.5	39.3	34.2	5.09	7.712	
1,300.0	1,300.0	1,295.9	1,295.4	2.8	2.7	173.07	173.07	-46.9	5.7	47.5	42.0	5.51	8.625	
1,400.0	1,400.0	1,395.4	1,394.3	3.0	2.9	170.45	170.45	-56.3	9.5	57.3	51.4	5.94	9.654	
1,500.0	1,500.0	1,494.9	1,493.3	3.3	3.1	168.59	168.59	-65.6	13.2	67.3	60.9	6.38	10.540	
1,600.0	1,600.0	1,594.5	1,592.4	3.5	3.4	31.56	31.56	-74.9	17.0	75.7	69.0	6.74	11.228	
1,700.6	1,700.4	1,694.9	1,692.3	3.6	3.6	32.23	32.23	-84.3	20.8	81.3	74.1	7.13	11.400	
1,800.0	1,799.6	1,794.2	1,791.2	3.8	3.9	33.49	33.49	-93.7	24.6	85.3	77.8	7.53	11.330	
1,900.0	1,899.3	1,894.1	1,890.5	4.0	4.1	34.65	34.65	-103.0	28.3	89.4	81.5	7.94	11.259	
2,000.0	1,999.1	1,994.0	1,989.9	4.2	4.4	35.70	35.70	-112.4	32.1	93.5	85.2	8.36	11.187	
2,100.0	2,098.9	2,093.9	2,089.3	4.5	4.7	36.66	36.66	-121.8	35.9	97.7	88.9	8.79	11.116	
2,200.0	2,198.6	2,193.8	2,188.7	4.7	4.9	37.55	37.55	-131.1	39.7	101.9	92.6	9.22	11.046	
2,300.0	2,298.4	2,293.7	2,288.1	4.9	5.2	38.36	38.36	-140.5	43.4	106.1	96.4	9.66	10.978	
2,400.0	2,398.1	2,393.6	2,387.5	5.1	5.5	39.12	39.12	-149.8	47.2	110.3	100.2	10.11	10.912	
2,500.0	2,497.9	2,493.5	2,486.9	5.3	5.8	39.81	39.81	-159.2	51.0	114.5	104.0	10.56	10.848	
2,600.0	2,597.6	2,593.4	2,586.3	5.6	6.1	40.46	40.46	-168.6	54.8	118.8	107.8	11.01	10.787	
2,700.0	2,697.4	2,693.3	2,685.7	5.8	6.3	41.06	41.06	-177.9	58.6	123.0	111.6	11.47	10.728	
2,800.0	2,797.1	2,793.2	2,785.0	6.1	6.6	41.62	41.62	-187.3	62.3	127.3	115.4	11.93	10.671	
2,900.0	2,896.9	2,893.1	2,884.4	6.3	6.9	42.15	42.15	-196.7	66.1	131.6	119.2	12.40	10.617	
3,000.0	2,996.7	2,993.0	2,983.8	6.5	7.2	42.64	42.64	-206.0	69.9	135.9	123.1	12.86	10.566	
3,100.0	3,096.4	3,092.9	3,083.2	6.8	7.5	43.10	43.10	-215.4	73.7	140.2	126.9	13.34	10.516	
3,200.0	3,196.2	3,192.8	3,182.6	7.0	7.8	43.54	43.54	-224.8	77.4	144.6	130.8	13.81	10.469	
3,300.0	3,295.9	3,292.7	3,282.0	7.3	8.1	43.95	43.95	-234.1	81.2	148.9	134.6	14.28	10.423	
3,400.0	3,395.7	3,392.6	3,381.4	7.5	8.4	44.33	44.33	-243.5	85.0	153.2	138.5	14.76	10.380	
3,500.0	3,495.4	3,492.5	3,480.8	7.8	8.7	44.70	44.70	-252.9	88.8	157.6	142.3	15.24	10.339	
3,600.0	3,595.2	3,592.4	3,580.2	8.0	8.9	45.04	45.04	-262.2	92.5	161.9	146.2	15.72	10.299	
3,700.0	3,694.9	3,692.3	3,679.5	8.3	9.2	45.37	45.37	-271.6	96.3	166.3	150.1	16.20	10.261	
3,800.0	3,794.7	3,792.2	3,778.9	8.5	9.5	45.68	45.68	-281.0	100.1	170.6	153.9	16.69	10.225	
3,900.0	3,894.4	3,892.1	3,878.3	8.8	9.8	45.98	45.98	-290.3	103.9	175.0	157.8	17.17	10.190	
4,000.0	3,994.2	3,992.0	3,977.7	9.0	10.1	46.26	46.26	-299.7	107.7	179.4	161.7	17.66	10.156	
4,100.0	4,094.0	4,091.9	4,077.1	9.3	10.4	46.52	46.52	-309.1	111.4	183.7	165.6	18.15	10.124	
4,200.0	4,193.7	4,191.8	4,176.5	9.5	10.7	46.78	46.78	-318.4	115.2	188.1	169.5	18.64	10.094	
4,300.0	4,293.5	4,291.7	4,275.9	9.8	11.0	47.02	47.02	-327.8	119.0	192.5	173.4	19.13	10.064	
4,400.0	4,393.2	4,391.6	4,375.3	10.0	11.3	47.25	47.25	-337.1	122.8	196.9	177.3	19.62	10.036	
4,500.0	4,493.0	4,491.6	4,474.7	10.3	11.6	47.48	47.48	-346.5	126.5	201.3	181.2	20.11	10.009	
4,600.0	4,592.7	4,591.5	4,574.0	10.5	11.9	47.69	47.69	-355.9	130.3	205.7	185.1	20.60	9.982	
4,700.0	4,692.5	4,691.4	4,673.4	10.8	12.2	47.89	47.89	-365.2	134.1	210.1	189.0	21.10	9.957	
4,807.4	4,799.6	4,798.6	4,780.1	11.1	12.5	48.10	48.10	-375.3	138.2	214.8	193.2	21.63	9.931	
4,900.0	4,892.1	4,891.1	4,872.2	11.3	12.8	48.06	48.06	-384.0	141.7	219.9	197.8	22.05	9.972	
5,007.9	5,000.0	4,998.7	4,979.2	11.5	13.1	-176.40	-176.40	-394.0	145.7	228.3	204.5	23.82	9.584	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28V-214 - Wellbore #1 - Plan #1 (11-18-13)												Offset Site Error: 0.0 ft		
Survey Program: 0-MWD												Offset Well Error: 0.0 ft		
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
5,100.0	5,092.1	5,090.2	5,070.3	11.7	13.4	-177.37	-402.6	149.2	236.7	212.4	24.30	9.741		
5,200.0	5,192.1	5,189.7	5,169.3	11.9	13.7	-178.35	-412.0	152.9	246.0	221.2	24.82	9.910		
5,300.0	5,292.1	5,294.4	5,273.5	12.0	13.9	-179.24	-421.1	156.6	254.7	229.4	25.32	10.058		
5,400.0	5,392.1	5,403.3	5,382.1	12.2	14.2	-179.80	-427.2	159.1	260.2	234.5	25.74	10.109		
5,500.0	5,492.1	5,512.5	5,491.3	12.4	14.3	-180.00	-429.4	160.0	262.3	236.2	26.13	10.039		
5,600.0	5,592.1	5,613.2	5,592.1	12.6	14.5	180.00	-429.4	160.0	262.3	235.8	26.49	9.901		
5,700.0	5,692.1	5,713.2	5,692.1	12.8	14.7	180.00	-429.4	160.0	262.3	235.5	26.84	9.772		
5,800.0	5,792.1	5,813.2	5,792.1	13.0	14.8	180.00	-429.4	160.0	262.3	235.1	27.20	9.645		
5,900.0	5,892.1	5,913.2	5,892.1	13.2	15.0	180.00	-429.4	160.0	262.3	234.7	27.55	9.520		
6,000.0	5,992.1	6,013.2	5,992.1	13.4	15.1	180.00	-429.4	160.0	262.3	234.4	27.91	9.397		
6,100.0	6,092.1	6,113.2	6,092.1	13.6	15.3	180.00	-429.4	160.0	262.3	234.0	28.27	9.277		
6,200.0	6,192.1	6,213.2	6,192.1	13.8	15.4	180.00	-429.4	160.0	262.3	233.7	28.64	9.159		
6,264.6	6,256.7	6,277.8	6,256.7	13.9	15.6	180.00	-429.4	160.0	262.3	233.4	28.87	9.084		
6,300.0	6,292.1	6,313.2	6,292.1	14.0	15.6	-179.98	-429.4	159.9	262.3	233.3	29.00	9.044		
6,318.4	6,310.5	6,331.7	6,310.5	14.0	15.6	-179.87	-429.4	159.4	262.3	233.2	29.07	9.024		
6,400.0	6,392.1	6,412.5	6,390.9	14.2	15.8	-178.25	-429.4	152.0	262.4	233.1	29.31	8.953		
6,480.7	6,472.7	6,490.0	6,466.9	14.3	15.8	-174.97	-429.4	136.9	263.4	233.9	29.49	8.931		
6,500.0	6,492.1	6,508.1	6,484.4	14.4	15.9	-83.98	-429.4	132.3	263.8	235.5	28.39	9.294		
6,550.0	6,542.0	6,554.6	6,528.8	14.5	15.9	-81.46	-429.4	118.5	265.4	236.8	28.62	9.275		
6,600.0	6,591.6	6,600.0	6,571.3	14.5	16.0	-79.04	-429.4	102.5	267.5	238.7	28.82	9.281		
6,650.0	6,640.7	6,645.6	6,612.9	14.6	16.0	-76.67	-429.4	83.9	269.9	241.0	28.99	9.311		
6,700.0	6,689.1	6,690.3	6,652.5	14.7	16.0	-74.42	-429.4	63.3	272.8	243.7	29.14	9.362		
6,750.0	6,736.5	6,734.4	6,690.5	14.7	16.1	-72.28	-429.4	40.6	276.0	246.7	29.25	9.433		
6,800.0	6,782.8	6,778.1	6,726.7	14.8	16.1	-70.25	-429.4	16.1	279.4	250.0	29.34	9.521		
6,850.0	6,827.8	6,821.4	6,761.0	14.8	16.1	-68.34	-429.4	-10.1	283.0	253.6	29.41	9.623		
6,900.0	6,871.3	6,864.2	6,793.6	14.9	16.2	-66.56	-429.4	-38.0	286.7	257.3	29.46	9.734		
6,950.0	6,913.1	6,906.7	6,824.2	14.9	16.2	-64.90	-429.4	-67.4	290.5	261.0	29.52	9.841		
7,000.0	6,953.0	6,950.0	6,853.7	15.0	16.3	-63.33	-429.4	-99.0	294.3	264.7	29.58	9.950		
7,050.0	6,990.8	6,990.7	6,879.8	15.1	16.4	-61.95	-429.4	-130.2	298.0	268.4	29.67	10.044		
7,100.0	7,026.4	7,032.2	6,904.7	15.3	16.5	-60.66	-429.4	-163.5	301.7	271.9	29.81	10.120		
7,150.0	7,059.7	7,073.5	6,927.5	15.6	16.7	-59.49	-429.4	-197.9	305.2	275.2	30.01	10.168		
7,200.0	7,090.4	7,114.5	6,948.4	16.0	17.0	-58.43	-429.4	-233.2	308.5	278.2	30.30	10.182		
7,250.0	7,118.5	7,155.3	6,967.2	16.4	17.4	-57.49	-429.4	-269.4	311.6	280.9	30.68	10.157		
7,300.0	7,143.8	7,200.0	6,985.6	17.0	18.0	-56.59	-429.4	-310.1	314.5	283.3	31.21	10.077		
7,350.0	7,166.2	7,236.4	6,998.8	17.6	18.5	-55.94	-429.4	-344.1	317.0	285.2	31.81	9.964		
7,400.0	7,185.7	7,276.8	7,011.5	18.2	19.1	-55.32	-429.4	-382.3	319.2	286.7	32.58	9.797		
7,450.0	7,202.1	7,317.0	7,022.2	19.0	19.8	-54.81	-429.4	-421.1	321.2	287.7	33.50	9.588		
7,500.0	7,215.4	7,357.1	7,030.8	19.8	20.5	-54.40	-429.4	-460.3	322.7	288.2	34.55	9.341		
7,550.0	7,225.5	7,400.0	7,037.6	20.7	21.2	-54.08	-429.4	-502.6	323.9	288.1	35.78	9.052		
7,600.7	7,232.5	7,437.7	7,041.7	21.7	22.0	-53.88	-429.4	-540.1	324.7	287.6	37.10	8.752		
7,674.7	7,240.2	7,496.6	7,044.4	23.2	23.2	-53.38	-429.4	-599.0	327.4	288.3	39.05	8.383		
7,700.0	7,242.6	7,519.8	7,044.3	23.7	23.6	-53.02	-429.4	-622.1	328.8	289.1	39.74	8.274		
7,792.5	7,246.5	7,612.2	7,044.0	25.7	25.6	-52.33	-429.4	-714.5	331.4	288.7	42.73	7.755		
7,800.0	7,246.5	7,619.7	7,043.9	25.8	25.8	-52.32	-429.4	-722.0	331.4	288.4	43.00	7.708		
7,900.0	7,246.7	7,719.7	7,043.6	28.1	28.1	-52.24	-429.4	-822.0	331.8	285.2	46.56	7.126		
8,000.0	7,246.9	7,819.7	7,043.2	30.5	30.4	-52.16	-429.4	-922.0	332.1	281.9	50.26	6.608		
8,100.0	7,247.1	7,919.7	7,042.8	32.9	32.8	-52.09	-429.4	-1,022.0	332.5	278.4	54.07	6.149		
8,200.0	7,247.3	8,019.7	7,042.4	35.4	35.3	-52.01	-429.4	-1,122.0	332.8	274.9	57.97	5.741		
8,300.0	7,247.5	8,119.7	7,042.0	37.9	37.8	-51.93	-429.4	-1,222.0	333.2	271.2	61.94	5.379		
8,400.0	7,247.7	8,219.7	7,041.6	40.4	40.4	-51.85	-429.4	-1,322.0	333.5	267.6	65.96	5.056		
8,500.0	7,247.9	8,319.7	7,041.3	43.0	43.0	-51.77	-429.4	-1,422.0	333.9	263.9	70.03	4.768		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28V-214 - Wellbore #1 - Plan #1 (11-18-13)											Offset Site Error: 0.0 ft		
Survey Program: 0-MWD											Offset Well Error: 0.0 ft		
Reference		Offset		Semi Major Axis			Distance				Warning		
Measured Depth (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
8,600.0	7,248.1	8,419.7	7,040.9	45.6	45.6	-51.70	-429.4	-1,522.0	334.3	260.1	74.13	4.509	
8,700.0	7,248.2	8,519.7	7,040.5	48.3	48.2	-51.62	-429.4	-1,622.0	334.6	256.4	78.26	4.276	
8,800.0	7,248.4	8,619.7	7,040.1	50.9	50.9	-51.54	-429.4	-1,722.0	335.0	252.6	82.41	4.065	
8,900.0	7,248.6	8,719.7	7,039.7	53.6	53.6	-51.46	-429.4	-1,822.0	335.3	248.7	86.58	3.873	
9,000.0	7,248.8	8,819.7	7,039.3	56.3	56.3	-51.39	-429.4	-1,922.0	335.7	244.9	90.77	3.698	
9,100.0	7,249.0	8,919.7	7,039.0	59.0	59.0	-51.31	-429.4	-2,022.0	336.0	241.1	94.96	3.539	
9,200.0	7,249.2	9,019.7	7,038.6	61.7	61.7	-51.23	-429.4	-2,122.0	336.4	237.2	99.16	3.392	
9,300.0	7,249.4	9,119.7	7,038.2	64.4	64.4	-51.16	-429.4	-2,222.0	336.8	233.4	103.37	3.258	
9,400.0	7,249.6	9,219.7	7,037.8	67.1	67.1	-51.08	-429.4	-2,322.0	337.1	229.5	107.59	3.134	
9,500.0	7,249.8	9,319.7	7,037.4	69.9	69.8	-51.01	-429.4	-2,422.0	337.5	225.7	111.81	3.019	
9,600.0	7,250.0	9,419.7	7,037.0	72.6	72.6	-50.93	-429.4	-2,522.0	337.9	221.8	116.02	2.912	
9,700.0	7,250.2	9,519.7	7,036.7	75.3	75.3	-50.85	-429.4	-2,622.0	338.2	218.0	120.24	2.813	
9,800.0	7,250.4	9,619.7	7,036.3	78.1	78.0	-50.78	-429.4	-2,722.0	338.6	214.1	124.46	2.720	
9,900.0	7,250.5	9,719.7	7,035.9	80.8	80.8	-50.70	-429.4	-2,822.0	338.9	210.3	128.68	2.634	
10,000.0	7,250.7	9,819.7	7,035.5	83.6	83.5	-50.63	-429.4	-2,922.0	339.3	206.4	132.90	2.553	
10,100.0	7,250.9	9,919.7	7,035.1	86.3	86.3	-50.55	-429.4	-3,022.0	339.7	202.6	137.11	2.477	
10,200.0	7,251.1	10,019.7	7,034.7	89.1	89.1	-50.48	-429.4	-3,122.0	340.0	198.7	141.33	2.406	
10,300.0	7,251.3	10,119.7	7,034.3	91.9	91.8	-50.40	-429.4	-3,222.0	340.4	194.9	145.53	2.339	
10,400.0	7,251.5	10,219.7	7,034.0	94.6	94.6	-50.33	-429.4	-3,322.0	340.8	191.0	149.74	2.276	
10,500.0	7,251.7	10,319.7	7,033.6	97.4	97.4	-50.25	-429.4	-3,421.9	341.1	187.2	153.94	2.216	
10,600.0	7,251.9	10,419.6	7,033.2	100.2	100.1	-50.18	-429.4	-3,521.9	341.5	183.4	158.13	2.160	
10,700.0	7,252.1	10,519.6	7,032.8	102.9	102.9	-50.11	-429.4	-3,621.9	341.9	179.6	162.33	2.106	
10,800.0	7,252.3	10,619.6	7,032.4	105.7	105.7	-50.03	-429.4	-3,721.9	342.3	175.7	166.51	2.055	
10,900.0	7,252.5	10,719.6	7,032.0	108.5	108.4	-49.96	-429.4	-3,821.9	342.6	171.9	170.69	2.007	
11,000.0	7,252.7	10,819.6	7,031.7	111.3	111.2	-49.88	-429.4	-3,921.9	343.0	168.1	174.87	1.961	
11,100.0	7,252.9	10,919.6	7,031.3	114.0	114.0	-49.81	-429.4	-4,021.9	343.4	164.3	179.03	1.918	
11,200.0	7,253.0	11,019.6	7,030.9	116.8	116.8	-49.74	-429.4	-4,121.9	343.7	160.5	183.20	1.876	
11,300.0	7,253.2	11,119.6	7,030.5	119.6	119.6	-49.66	-429.4	-4,221.9	344.1	156.8	187.35	1.837	
11,400.0	7,253.4	11,219.6	7,030.1	122.4	122.3	-49.59	-429.4	-4,321.9	344.5	153.0	191.51	1.799	
11,500.0	7,253.6	11,319.6	7,029.7	125.2	125.1	-49.52	-429.4	-4,421.9	344.9	149.2	195.65	1.763	
11,600.0	7,253.8	11,419.6	7,029.4	127.9	127.9	-49.45	-429.4	-4,521.9	345.2	145.4	199.79	1.728	
11,697.1	7,254.0	11,512.0	7,029.0	130.7	130.4	-49.38	-429.4	-4,614.3	345.6	142.0	203.61	1.697 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28V-404 - Wellbore #1 - Plan #1 (11-18-13)													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)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	180.00	-61.9	0.0	61.9					
100.0	100.0	100.0	100.0	0.1	0.1	180.00	-61.9	0.0	61.9	61.7	0.22	275.558		
200.0	200.0	200.0	200.0	0.3	0.3	180.00	-61.9	0.0	61.9	61.3	0.67	91.853		
300.0	300.0	300.0	300.0	0.6	0.6	180.00	-61.9	0.0	61.9	60.8	1.12	55.112		
400.0	400.0	400.0	400.0	0.8	0.8	180.00	-61.9	0.0	61.9	60.4	1.57	39.365		
500.0	500.0	500.0	500.0	1.0	1.0	180.00	-61.9	0.0	61.9	59.9	2.02	30.618		
600.0	600.0	600.0	600.0	1.2	1.2	180.00	-61.9	0.0	61.9	59.5	2.47	25.051 CC, ES		
700.0	700.0	697.9	697.9	1.5	1.4	179.63	-63.6	0.4	63.6	60.7	2.89	21.998		
800.0	800.0	795.6	795.4	1.7	1.6	178.62	-68.4	1.6	68.6	65.3	3.30	20.800		
900.0	900.0	892.8	892.3	1.9	1.8	177.24	-76.4	3.7	76.9	73.2	3.72	20.668		
1,000.0	1,000.0	989.4	988.2	2.1	2.0	175.75	-87.5	6.5	88.6	84.4	4.17	21.258		
1,100.0	1,100.0	1,087.6	1,085.4	2.4	2.3	174.37	-101.2	10.0	102.7	98.1	4.64	22.146		
1,200.0	1,200.0	1,186.5	1,183.3	2.6	2.6	173.31	-115.0	13.5	117.0	111.9	5.12	22.844		
1,300.0	1,300.0	1,285.5	1,281.2	2.8	2.9	172.48	-128.8	17.0	131.3	125.7	5.61	23.389		
1,400.0	1,400.0	1,384.4	1,379.1	3.0	3.2	171.82	-142.7	20.5	145.6	139.5	6.11	23.824		
1,500.0	1,500.0	1,483.4	1,477.0	3.3	3.5	171.27	-156.5	24.0	160.0	153.4	6.62	24.178		
1,600.0	1,600.0	1,582.5	1,575.2	3.5	3.9	34.74	-170.3	27.6	172.9	166.1	6.78	25.494		
1,700.6	1,700.4	1,682.6	1,674.2	3.6	4.2	35.15	-184.3	31.1	183.1	175.9	7.20	25.442		
1,800.0	1,799.6	1,781.6	1,772.1	3.8	4.5	35.91	-198.2	34.6	191.7	184.1	7.62	25.162		
1,900.0	1,899.3	1,881.2	1,870.7	4.0	4.9	36.62	-212.1	38.2	200.4	192.4	8.05	24.890		
2,000.0	1,999.1	1,980.8	1,969.2	4.2	5.2	37.26	-226.0	41.7	209.2	200.7	8.49	24.629		
2,100.0	2,098.9	2,080.4	2,067.8	4.5	5.6	37.86	-239.9	45.2	217.9	209.0	8.94	24.380		
2,200.0	2,198.6	2,180.0	2,166.3	4.7	5.9	38.41	-253.8	48.8	226.7	217.3	9.39	24.143		
2,300.0	2,298.4	2,279.5	2,264.9	4.9	6.3	38.91	-267.8	52.3	235.5	225.7	9.85	23.918		
2,400.0	2,398.1	2,379.1	2,363.4	5.1	6.6	39.38	-281.7	55.9	244.4	234.0	10.31	23.705		
2,500.0	2,497.9	2,478.7	2,462.0	5.3	7.0	39.82	-295.6	59.4	253.2	242.4	10.77	23.503		
2,600.0	2,597.6	2,578.3	2,560.5	5.6	7.3	40.23	-309.5	62.9	262.1	250.8	11.24	23.312		
2,700.0	2,697.4	2,677.9	2,659.1	5.8	7.7	40.61	-323.4	66.5	270.9	259.2	11.71	23.131		
2,800.0	2,797.1	2,777.5	2,757.6	6.1	8.0	40.97	-337.4	70.0	279.8	267.6	12.19	22.959		
2,900.0	2,896.9	2,877.1	2,856.2	6.3	8.4	41.30	-351.3	73.5	288.7	276.0	12.66	22.797		
3,000.0	2,996.7	2,976.7	2,954.7	6.5	8.7	41.62	-365.2	77.1	297.6	284.4	13.14	22.643		
3,100.0	3,096.4	3,076.3	3,053.3	6.8	9.1	41.91	-379.1	80.6	306.5	292.9	13.62	22.498		
3,200.0	3,196.2	3,175.9	3,151.8	7.0	9.4	42.19	-393.0	84.2	315.4	301.3	14.11	22.359		
3,300.0	3,295.9	3,275.5	3,250.4	7.3	9.8	42.46	-407.0	87.7	324.3	309.7	14.59	22.228		
3,400.0	3,395.7	3,375.0	3,348.9	7.5	10.1	42.71	-420.9	91.2	333.3	318.2	15.08	22.103		
3,500.0	3,495.4	3,474.6	3,447.5	7.8	10.5	42.95	-434.8	94.8	342.2	326.6	15.57	21.984		
3,600.0	3,595.2	3,574.2	3,546.0	8.0	10.9	43.17	-448.7	98.3	351.1	335.1	16.05	21.871		
3,700.0	3,694.9	3,673.8	3,644.6	8.3	11.2	43.39	-462.6	101.8	360.1	343.5	16.54	21.764		
3,800.0	3,794.7	3,773.4	3,743.1	8.5	11.6	43.59	-476.6	105.4	369.0	352.0	17.04	21.661		
3,900.0	3,894.4	3,873.0	3,841.7	8.8	11.9	43.78	-490.5	108.9	378.0	360.4	17.53	21.563		
4,000.0	3,994.2	3,972.6	3,940.2	9.0	12.3	43.97	-504.4	112.5	386.9	368.9	18.02	21.470		
4,100.0	4,094.0	4,072.2	4,038.8	9.3	12.6	44.15	-518.3	116.0	395.9	377.4	18.52	21.380		
4,200.0	4,193.7	4,171.8	4,137.3	9.5	13.0	44.32	-532.2	119.5	404.9	385.8	19.01	21.295		
4,300.0	4,293.5	4,271.4	4,235.9	9.8	13.3	44.48	-546.2	123.1	413.8	394.3	19.51	21.213		
4,400.0	4,393.2	4,370.9	4,334.4	10.0	13.7	44.63	-560.1	126.6	422.8	402.8	20.01	21.134		
4,500.0	4,493.0	4,470.5	4,433.0	10.3	14.1	44.78	-574.0	130.1	431.8	411.3	20.50	21.059		
4,600.0	4,592.7	4,570.1	4,531.5	10.5	14.4	44.92	-587.9	133.7	440.7	419.7	21.00	20.987		
4,700.0	4,692.5	4,669.7	4,630.1	10.8	14.8	45.06	-601.8	137.2	449.7	428.2	21.50	20.917		
4,807.4	4,799.6	4,776.6	4,735.9	11.1	15.1	45.20	-616.8	141.0	459.4	437.3	22.04	20.846		
4,900.0	4,892.1	4,868.8	4,827.1	11.3	15.5	45.32	-629.7	144.3	468.7	446.3	22.46	20.869		
5,007.9	5,000.0	4,975.8	4,933.0	11.5	15.9	-178.57	-644.6	148.1	482.3	455.6	26.71	18.056		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28V-404 - Wellbore #1 - Plan #1 (11-18-13)													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
5,100.0	5,092.1	5,066.9	5,023.1	11.7	16.2	-178.99		-657.4	151.3	495.1	467.9	27.23	18.182	
5,200.0	5,192.1	5,173.1	5,128.2	11.9	16.5	-179.44		-671.9	155.0	508.8	481.0	27.79	18.309	
5,300.0	5,292.1	5,293.4	5,247.8	12.0	16.8	-179.81		-684.6	158.3	519.4	491.1	28.28	18.368	
5,400.0	5,392.1	5,414.6	5,368.7	12.2	17.0	-179.97		-692.5	160.3	525.8	497.1	28.70	18.325	
5,500.0	5,492.1	5,536.3	5,490.3	12.4	17.2	-179.89		-695.4	161.0	528.2	499.2	29.08	18.167	
5,600.0	5,592.1	5,638.0	5,592.1	12.6	17.4	-179.89		-695.4	161.0	528.2	498.8	29.41	17.963	
5,700.0	5,692.1	5,738.0	5,692.1	12.8	17.5	-179.89		-695.4	161.0	528.2	498.5	29.73	17.769	
5,800.0	5,792.1	5,838.0	5,792.1	13.0	17.6	-179.89		-695.4	161.0	528.2	498.2	30.05	17.578	
5,900.0	5,892.1	5,938.0	5,892.1	13.2	17.7	-179.89		-695.4	161.0	528.2	497.9	30.38	17.390	
6,000.0	5,992.1	6,038.0	5,992.1	13.4	17.9	-179.89		-695.4	161.0	528.2	497.5	30.71	17.204	
6,100.0	6,092.1	6,138.0	6,092.1	13.6	18.0	-179.89		-695.4	161.0	528.2	497.2	31.04	17.020	
6,200.0	6,192.1	6,238.0	6,192.1	13.8	18.1	-179.89		-695.4	161.0	528.2	496.9	31.37	16.839	
6,300.0	6,292.1	6,338.0	6,292.1	14.0	18.3	-179.89		-695.4	161.0	528.2	496.5	31.71	16.660	
6,400.0	6,392.1	6,438.0	6,392.1	14.2	18.4	-179.89		-695.4	161.0	528.2	496.2	32.05	16.483	
6,480.7	6,472.7	6,518.7	6,472.7	14.3	18.5	-179.89		-695.4	161.0	528.2	495.9	32.32	16.343	
6,500.0	6,492.1	6,538.0	6,492.1	14.4	18.5	-90.13		-695.4	161.0	528.2	499.5	28.71	18.397	
6,550.0	6,542.0	6,588.1	6,542.1	14.5	18.6	-90.23		-695.4	159.0	528.2	499.4	28.88	18.292	
6,600.0	6,591.6	6,638.3	6,592.0	14.5	18.7	-90.32		-695.4	153.7	528.3	499.2	29.03	18.199	
6,650.0	6,640.7	6,688.5	6,641.5	14.6	18.7	-90.42		-695.4	145.1	528.3	499.1	29.16	18.117	
6,700.0	6,689.1	6,738.7	6,690.3	14.7	18.8	-90.51		-695.4	133.3	528.3	499.0	29.28	18.044	
6,750.0	6,736.5	6,789.1	6,738.3	14.7	18.8	-90.60		-695.4	118.2	528.3	498.9	29.39	17.975	
6,800.0	6,782.8	6,839.5	6,785.3	14.8	18.9	-90.69		-695.4	100.1	528.3	498.8	29.51	17.903	
6,850.0	6,827.8	6,889.9	6,831.1	14.8	18.9	-90.77		-695.4	78.8	528.3	498.7	29.64	17.824	
6,900.0	6,871.3	6,940.4	6,875.3	14.9	18.9	-90.85		-695.4	54.6	528.3	498.5	29.80	17.728	
6,950.0	6,913.1	6,990.9	6,917.9	14.9	19.0	-90.93		-695.4	27.4	528.3	498.3	30.01	17.606	
7,000.0	6,953.0	7,041.5	6,958.7	15.0	19.0	-91.01		-695.4	-2.5	528.3	498.0	30.28	17.450	
7,050.0	6,990.8	7,092.2	6,997.4	15.1	19.1	-91.07		-695.4	-35.1	528.3	497.7	30.63	17.251	
7,100.0	7,026.4	7,142.8	7,033.9	15.3	19.1	-91.14		-695.4	-70.3	528.3	497.3	31.08	17.001	
7,150.0	7,059.7	7,193.5	7,068.1	15.6	19.2	-91.20		-695.4	-107.8	528.4	496.7	31.65	16.694	
7,200.0	7,090.4	7,244.3	7,099.7	16.0	19.3	-91.25		-695.4	-147.5	528.4	496.0	32.36	16.330	
7,250.0	7,118.5	7,295.1	7,128.6	16.4	19.4	-91.30		-695.4	-189.2	528.4	495.2	33.21	15.909	
7,300.0	7,143.8	7,345.9	7,154.6	17.0	19.5	-91.35		-695.4	-232.8	528.4	494.2	34.23	15.438	
7,350.0	7,166.2	7,396.7	7,177.8	17.6	19.8	-91.38		-695.4	-278.1	528.4	493.0	35.40	14.925	
7,400.0	7,185.7	7,447.6	7,197.9	18.2	20.1	-91.42		-695.4	-324.8	528.4	491.7	36.74	14.382	
7,450.0	7,202.1	7,498.5	7,214.8	19.0	20.6	-91.44		-695.4	-372.8	528.4	490.2	38.23	13.821	
7,500.0	7,215.4	7,549.3	7,228.5	19.8	21.2	-91.46		-695.4	-421.8	528.4	488.5	39.87	13.255	
7,550.0	7,225.5	7,600.2	7,238.9	20.7	22.0	-91.47		-695.4	-471.6	528.4	486.8	41.63	12.694	
7,600.7	7,232.5	7,651.8	7,246.1	21.7	22.8	-91.48		-695.4	-522.7	528.4	484.9	43.53	12.139	
7,674.7	7,240.2	7,725.8	7,253.8	23.2	24.2	-91.48		-695.4	-596.3	528.4	482.0	46.46	11.373	
7,674.7	7,240.2	7,725.8	7,253.8	23.2	24.2	-91.48		-695.4	-596.3	528.4	482.0	46.46	11.373	
7,700.0	7,242.6	7,751.5	7,256.2	23.7	24.7	-91.48		-695.4	-621.8	528.4	480.9	47.52	11.121	
7,792.5	7,246.5	7,845.1	7,260.1	25.7	26.6	-91.48		-695.4	-715.3	528.4	476.9	51.47	10.267	
7,800.0	7,246.5	7,852.6	7,260.1	25.8	26.8	-91.47		-695.4	-722.8	528.4	476.6	51.80	10.201	
7,900.0	7,246.7	7,952.6	7,260.0	28.1	29.0	-91.44		-695.4	-822.8	528.4	472.1	56.31	9.384	
8,000.0	7,246.9	8,052.6	7,259.8	30.5	31.2	-91.40		-695.4	-922.8	528.4	467.4	61.00	8.663	
8,100.0	7,247.1	8,152.6	7,259.6	32.9	33.6	-91.36		-695.4	-1,022.8	528.4	462.6	65.82	8.027	
8,200.0	7,247.3	8,252.6	7,259.5	35.4	36.0	-91.32		-695.4	-1,122.8	528.4	457.6	70.77	7.466	
8,300.0	7,247.5	8,352.6	7,259.3	37.9	38.5	-91.28		-695.4	-1,222.8	528.4	452.6	75.81	6.970	
8,400.0	7,247.7	8,452.6	7,259.2	40.4	41.0	-91.25		-695.4	-1,322.8	528.4	447.4	80.92	6.529	
8,500.0	7,247.9	8,552.6	7,259.0	43.0	43.6	-91.21		-695.4	-1,422.8	528.4	442.3	86.10	6.137	
8,600.0	7,248.1	8,652.6	7,258.9	45.6	46.2	-91.17		-695.4	-1,522.8	528.4	437.0	91.33	5.785	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Offset Design Sunmarke 28U-HZ Pad Sec.28-T4N-R67W - Sunmarke 28V-404 - Wellbore #1 - Plan #1 (11-18-13)													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	
8,700.0	7,248.2	8,752.6	7,258.7	48.3	48.8	-91.13	-695.4	-1,622.8	528.3	431.7	96.60	5.469		
8,800.0	7,248.4	8,852.6	7,258.5	50.9	51.4	-91.10	-695.4	-1,722.8	528.3	426.4	101.91	5.184		
8,900.0	7,248.6	8,952.6	7,258.4	53.6	54.1	-91.06	-695.4	-1,822.8	528.3	421.1	107.25	4.926		
9,000.0	7,248.8	9,052.6	7,258.2	56.3	56.7	-91.02	-695.4	-1,922.8	528.3	415.7	112.62	4.691		
9,100.0	7,249.0	9,152.6	7,258.1	59.0	59.4	-90.98	-695.4	-2,022.8	528.3	410.3	118.01	4.477		
9,200.0	7,249.2	9,252.6	7,257.9	61.7	62.1	-90.94	-695.4	-2,122.8	528.3	404.9	123.42	4.281		
9,300.0	7,249.4	9,352.6	7,257.8	64.4	64.8	-90.91	-695.4	-2,222.8	528.3	399.5	128.84	4.100		
9,400.0	7,249.6	9,452.6	7,257.6	67.1	67.5	-90.87	-695.4	-2,322.8	528.3	394.0	134.29	3.934		
9,500.0	7,249.8	9,552.6	7,257.4	69.9	70.2	-90.83	-695.4	-2,422.8	528.3	388.6	139.74	3.781		
9,600.0	7,250.0	9,652.6	7,257.3	72.6	72.9	-90.79	-695.4	-2,522.8	528.3	383.1	145.21	3.638		
9,700.0	7,250.2	9,752.6	7,257.1	75.3	75.7	-90.75	-695.4	-2,622.8	528.3	377.6	150.69	3.506		
9,800.0	7,250.4	9,852.6	7,257.0	78.1	78.4	-90.72	-695.4	-2,722.8	528.3	372.1	156.18	3.383		
9,900.0	7,250.5	9,952.6	7,256.8	80.8	81.1	-90.68	-695.4	-2,822.8	528.3	366.6	161.68	3.268		
10,000.0	7,250.7	10,052.6	7,256.7	83.6	83.9	-90.64	-695.4	-2,922.8	528.3	361.1	167.18	3.160		
10,100.0	7,250.9	10,152.6	7,256.5	86.3	86.6	-90.60	-695.4	-3,022.8	528.3	355.6	172.69	3.059		
10,200.0	7,251.1	10,252.6	7,256.3	89.1	89.4	-90.57	-695.4	-3,122.8	528.3	350.1	178.21	2.964		
10,300.0	7,251.3	10,352.6	7,256.2	91.9	92.1	-90.53	-695.4	-3,222.8	528.3	344.5	183.74	2.875		
10,400.0	7,251.5	10,452.6	7,256.0	94.6	94.9	-90.49	-695.4	-3,322.8	528.3	339.0	189.27	2.791		
10,500.0	7,251.7	10,552.6	7,255.9	97.4	97.6	-90.45	-695.4	-3,422.8	528.3	333.5	194.80	2.712		
10,600.0	7,251.9	10,652.6	7,255.7	100.2	100.4	-90.41	-695.4	-3,522.8	528.3	327.9	200.34	2.637		
10,700.0	7,252.1	10,752.6	7,255.6	102.9	103.2	-90.38	-695.4	-3,622.8	528.3	322.4	205.89	2.566		
10,800.0	7,252.3	10,852.6	7,255.4	105.7	105.9	-90.34	-695.4	-3,722.8	528.3	316.8	211.43	2.498		
10,900.0	7,252.5	10,952.6	7,255.2	108.5	108.7	-90.30	-695.4	-3,822.8	528.3	311.3	216.98	2.435		
11,000.0	7,252.7	11,052.6	7,255.1	111.3	111.5	-90.26	-695.4	-3,922.8	528.2	305.7	222.54	2.374		
11,100.0	7,252.9	11,152.6	7,254.9	114.0	114.2	-90.22	-695.4	-4,022.8	528.2	300.2	228.09	2.316		
11,200.0	7,253.0	11,252.6	7,254.8	116.8	117.0	-90.19	-695.4	-4,122.8	528.2	294.6	233.65	2.261		
11,300.0	7,253.2	11,352.6	7,254.6	119.6	119.8	-90.15	-695.4	-4,222.8	528.2	289.0	239.21	2.208		
11,400.0	7,253.4	11,452.6	7,254.5	122.4	122.6	-90.11	-695.4	-4,322.8	528.2	283.5	244.78	2.158		
11,500.0	7,253.6	11,552.6	7,254.3	125.2	125.4	-90.07	-695.4	-4,422.8	528.2	277.9	250.34	2.110		
11,600.0	7,253.8	11,652.6	7,254.1	127.9	128.1	-90.04	-695.4	-4,522.8	528.2	272.3	255.91	2.064		
11,666.7	7,253.9	11,719.3	7,254.0	129.8	130.0	-90.01	-695.4	-4,589.5	528.2	268.6	259.63	2.035		
11,697.1	7,254.0	11,741.4	7,254.0	130.7	130.6	-90.00	-695.4	-4,611.6	528.3	267.2	261.09	2.024 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4909.0ft (RKB - 15')

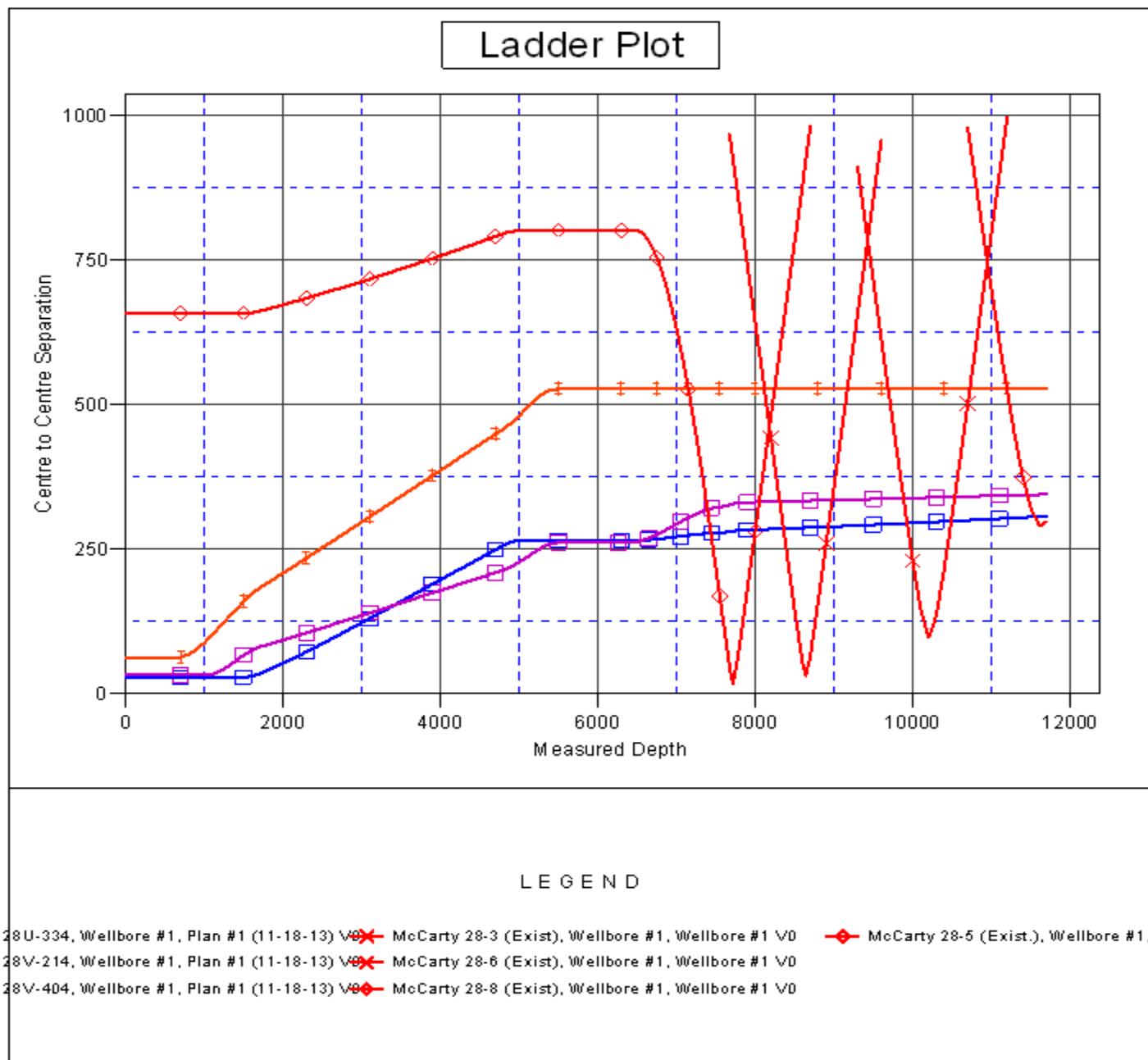
Offset Depths are relative to Offset Datum

Central Meridian is -105.500000 °

Coordinates are relative to: Sunmarke 28U-434

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: 0.40°



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sunmarke 28U-434
Project:	SEC.28-T4N-R67W	TVD Reference:	WELL @ 4909.0ft (RKB - 15')
Reference Site:	Sunmarke 28U-HZ Pad Sec.28-T4N-R67W	MD Reference:	WELL @ 4909.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sunmarke 28U-434	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Landmark
Reference Design:	Plan #1 (11-18-13)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4909.0ft (RKB - 15')

Offset Depths are relative to Offset Datum

Central Meridian is -105.500000 °

Coordinates are relative to: Sunmarke 28U-434

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: 0.40°

