

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: Sorin Natural Resources 2R-223

Surface Location: Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

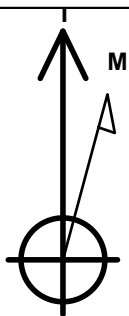
Ground Elevation: 4671.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1370685.71	3211898.73	40.348440	-104.739740	

RKB -15' WELL @ 4686.0ft (RKB -15')

WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape Point
BHL 500' FSL & 834' FEL	6951.0	-4874.4	479.5	Point



Azimuths to True North
Magnetic North: 8.63°

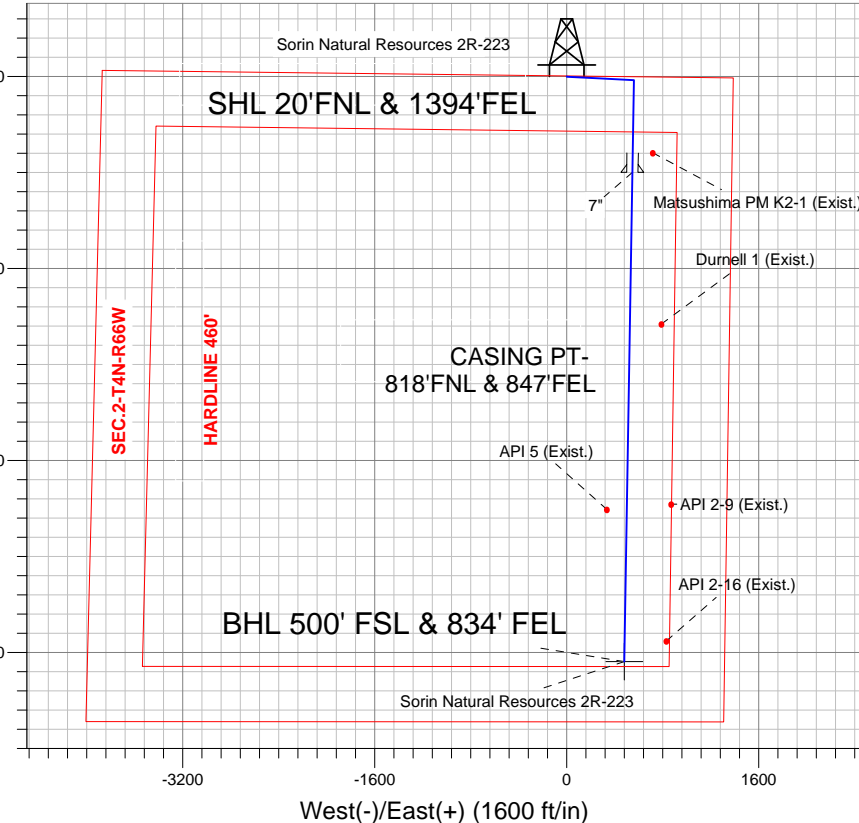
Magnetic Field
Strength: 52937.3nT
Dip Angle: 66.96°
Date: 1/28/2013
Model: IGRF2010

ANNOTATIONS

TVD	MD	Annotation
1000.0	1000.0	KOP #1
6207.7	6242.0	KOP #2
6971.6	7445.9	End of Build

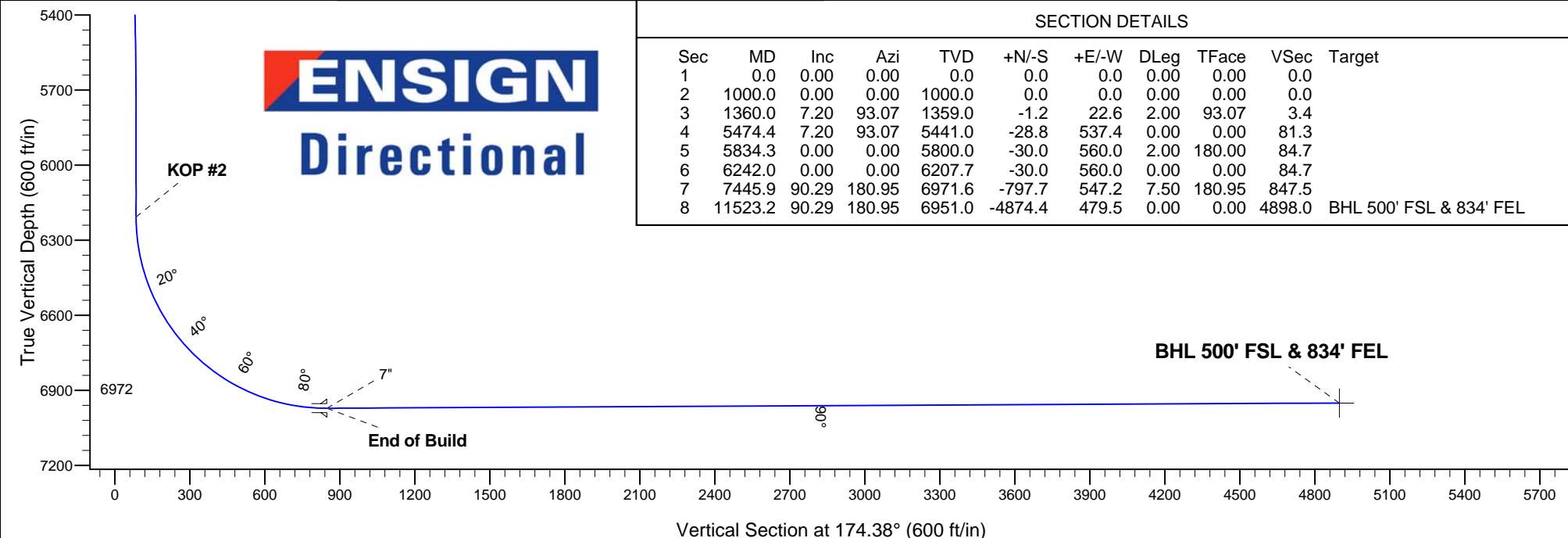
Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W
Sorin Natural Resources 2R-223
Plan #1 (01-28-13)
11:13, January 29 2013

South(-)/North(+) (1600 ft/in)



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	1000.0	0.00	0.00	1000.0	0.0	0.0	0.00	0.00	0.0	
3	1360.0	7.20	93.07	1359.0	-1.2	22.6	2.00	93.07	3.4	
4	5474.4	7.20	93.07	5441.0	-28.8	537.4	0.00	0.00	81.3	
5	5834.3	0.00	0.00	5800.0	-30.0	560.0	2.00	180.00	84.7	
6	6242.0	0.00	0.00	6207.7	-30.0	560.0	0.00	0.00	84.7	
7	7445.9	90.29	180.95	6971.6	-797.7	547.2	7.50	180.95	847.5	
8	11523.2	90.29	180.95	6951.0	-4874.4	479.5	0.00	0.00	4898.0	BHL 500' FSL & 834' FEL





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.2-T4N-R66W

Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W

Sorin Natural Resources 2R-223

Wellbore #1

Plan: Plan #1 (01-28-13)

Standard Planning Report

29 January, 2013

Database:	Landmark	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2R-223	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (01-28-13)		

Project	SEC.2-T4N-R66W, Weld County, Colorado		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site						Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W											
Site Position:						Northing:			1,370,685.98 ft			Latitude:			40.348440		
From:			Lat/Long			Easting:			3,211,929.38 ft			Longitude:			-104.739630		
Position Uncertainty:			0.0 ft			Slot Radius:			"			Grid Convergence:			0.49 °		

Well	Sorin Natural Resources 2R-223					
Well Position	+N/-S	0.0 ft	Northing:	1,370,685.71 ft	Latitude:	40.348440
	+E/-W	-30.7 ft	Easting:	3,211,898.73 ft	Longitude:	-104.739740
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,671.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/28/2013	8.63	66.96	52,937

Design	Plan #1 (01-28-13)			
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	174.38

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	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,360.0	7.20	93.07	1,359.0	-1.2	22.6	2.00	2.00	0.00	93.07	
5,474.4	7.20	93.07	5,441.0	-28.8	537.4	0.00	0.00	0.00	0.00	
5,834.3	0.00	0.00	5,800.0	-30.0	560.0	2.00	-2.00	0.00	180.00	
6,242.0	0.00	0.00	6,207.7	-30.0	560.0	0.00	0.00	0.00	0.00	
7,445.9	90.29	180.95	6,971.6	-797.7	547.2	7.50	7.50	0.00	180.95	
11,523.2	90.29	180.95	6,951.0	-4,874.4	479.5	0.00	0.00	0.00	0.00	BHL 500' FSL & 83-

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Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2R-223	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (01-28-13)		

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
440.0	0.00	0.00	440.0	0.0	0.0	0.0	0.00	0.00	0.00
480.0	0.00	0.00	480.0	0.0	0.0	0.0	0.00	0.00	0.00
520.0	0.00	0.00	520.0	0.0	0.0	0.0	0.00	0.00	0.00
560.0	0.00	0.00	560.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
640.0	0.00	0.00	640.0	0.0	0.0	0.0	0.00	0.00	0.00
680.0	0.00	0.00	680.0	0.0	0.0	0.0	0.00	0.00	0.00
720.0	0.00	0.00	720.0	0.0	0.0	0.0	0.00	0.00	0.00
760.0	0.00	0.00	760.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
840.0	0.00	0.00	840.0	0.0	0.0	0.0	0.00	0.00	0.00
880.0	0.00	0.00	880.0	0.0	0.0	0.0	0.00	0.00	0.00
920.0	0.00	0.00	920.0	0.0	0.0	0.0	0.00	0.00	0.00
960.0	0.00	0.00	960.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,040.0	0.80	93.07	1,040.0	0.0	0.3	0.0	2.00	2.00	0.00
1,080.0	1.60	93.07	1,080.0	-0.1	1.1	0.2	2.00	2.00	0.00
1,120.0	2.40	93.07	1,120.0	-0.1	2.5	0.4	2.00	2.00	0.00
1,160.0	3.20	93.07	1,159.9	-0.2	4.5	0.7	2.00	2.00	0.00
1,200.0	4.00	93.07	1,199.8	-0.4	7.0	1.1	2.00	2.00	0.00
1,240.0	4.80	93.07	1,239.7	-0.5	10.0	1.5	2.00	2.00	0.00
1,280.0	5.60	93.07	1,279.6	-0.7	13.7	2.1	2.00	2.00	0.00
1,320.0	6.40	93.07	1,319.3	-1.0	17.8	2.7	2.00	2.00	0.00
1,360.0	7.20	93.07	1,359.0	-1.2	22.6	3.4	2.00	2.00	0.00
1,400.0	7.20	93.07	1,398.7	-1.5	27.6	4.2	0.00	0.00	0.00
1,440.0	7.20	93.07	1,438.4	-1.7	32.6	4.9	0.00	0.00	0.00
1,480.0	7.20	93.07	1,478.1	-2.0	37.6	5.7	0.00	0.00	0.00
1,520.0	7.20	93.07	1,517.8	-2.3	42.6	6.4	0.00	0.00	0.00
1,560.0	7.20	93.07	1,557.5	-2.5	47.6	7.2	0.00	0.00	0.00
1,600.0	7.20	93.07	1,597.2	-2.8	52.6	8.0	0.00	0.00	0.00
1,640.0	7.20	93.07	1,636.8	-3.1	57.6	8.7	0.00	0.00	0.00
1,680.0	7.20	93.07	1,676.5	-3.4	62.6	9.5	0.00	0.00	0.00
1,720.0	7.20	93.07	1,716.2	-3.6	67.6	10.2	0.00	0.00	0.00
1,760.0	7.20	93.07	1,755.9	-3.9	72.6	11.0	0.00	0.00	0.00
1,800.0	7.20	93.07	1,795.6	-4.2	77.6	11.7	0.00	0.00	0.00
1,840.0	7.20	93.07	1,835.3	-4.4	82.6	12.5	0.00	0.00	0.00
1,880.0	7.20	93.07	1,875.0	-4.7	87.6	13.3	0.00	0.00	0.00
1,920.0	7.20	93.07	1,914.6	-5.0	92.6	14.0	0.00	0.00	0.00
1,960.0	7.20	93.07	1,954.3	-5.2	97.6	14.8	0.00	0.00	0.00
2,000.0	7.20	93.07	1,994.0	-5.5	102.6	15.5	0.00	0.00	0.00
2,040.0	7.20	93.07	2,033.7	-5.8	107.7	16.3	0.00	0.00	0.00

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Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2R-223	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (01-28-13)		

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)
2,080.0	7.20	93.07	2,073.4	-6.0	112.7	17.0	0.00	0.00	0.00
2,120.0	7.20	93.07	2,113.1	-6.3	117.7	17.8	0.00	0.00	0.00
2,160.0	7.20	93.07	2,152.7	-6.6	122.7	18.6	0.00	0.00	0.00
2,200.0	7.20	93.07	2,192.4	-6.8	127.7	19.3	0.00	0.00	0.00
2,240.0	7.20	93.07	2,232.1	-7.1	132.7	20.1	0.00	0.00	0.00
2,280.0	7.20	93.07	2,271.8	-7.4	137.7	20.8	0.00	0.00	0.00
2,320.0	7.20	93.07	2,311.5	-7.6	142.7	21.6	0.00	0.00	0.00
2,360.0	7.20	93.07	2,351.2	-7.9	147.7	22.3	0.00	0.00	0.00
2,400.0	7.20	93.07	2,390.9	-8.2	152.7	23.1	0.00	0.00	0.00
2,440.0	7.20	93.07	2,430.5	-8.4	157.7	23.8	0.00	0.00	0.00
2,480.0	7.20	93.07	2,470.2	-8.7	162.7	24.6	0.00	0.00	0.00
2,520.0	7.20	93.07	2,509.9	-9.0	167.7	25.4	0.00	0.00	0.00
2,560.0	7.20	93.07	2,549.6	-9.3	172.7	26.1	0.00	0.00	0.00
2,600.0	7.20	93.07	2,589.3	-9.5	177.7	26.9	0.00	0.00	0.00
2,640.0	7.20	93.07	2,629.0	-9.8	182.7	27.6	0.00	0.00	0.00
2,680.0	7.20	93.07	2,668.6	-10.1	187.7	28.4	0.00	0.00	0.00
2,720.0	7.20	93.07	2,708.3	-10.3	192.8	29.1	0.00	0.00	0.00
2,760.0	7.20	93.07	2,748.0	-10.6	197.8	29.9	0.00	0.00	0.00
2,800.0	7.20	93.07	2,787.7	-10.9	202.8	30.7	0.00	0.00	0.00
2,840.0	7.20	93.07	2,827.4	-11.1	207.8	31.4	0.00	0.00	0.00
2,880.0	7.20	93.07	2,867.1	-11.4	212.8	32.2	0.00	0.00	0.00
2,920.0	7.20	93.07	2,906.8	-11.7	217.8	32.9	0.00	0.00	0.00
2,960.0	7.20	93.07	2,946.4	-11.9	222.8	33.7	0.00	0.00	0.00
3,000.0	7.20	93.07	2,986.1	-12.2	227.8	34.4	0.00	0.00	0.00
3,040.0	7.20	93.07	3,025.8	-12.5	232.8	35.2	0.00	0.00	0.00
3,080.0	7.20	93.07	3,065.5	-12.7	237.8	36.0	0.00	0.00	0.00
3,120.0	7.20	93.07	3,105.2	-13.0	242.8	36.7	0.00	0.00	0.00
3,160.0	7.20	93.07	3,144.9	-13.3	247.8	37.5	0.00	0.00	0.00
3,200.0	7.20	93.07	3,184.5	-13.5	252.8	38.2	0.00	0.00	0.00
3,240.0	7.20	93.07	3,224.2	-13.8	257.8	39.0	0.00	0.00	0.00
3,280.0	7.20	93.07	3,263.9	-14.1	262.8	39.7	0.00	0.00	0.00
3,320.0	7.20	93.07	3,303.6	-14.3	267.8	40.5	0.00	0.00	0.00
3,360.0	7.20	93.07	3,343.3	-14.6	272.8	41.3	0.00	0.00	0.00
3,400.0	7.20	93.07	3,383.0	-14.9	277.9	42.0	0.00	0.00	0.00
3,440.0	7.20	93.07	3,422.7	-15.2	282.9	42.8	0.00	0.00	0.00
3,480.0	7.20	93.07	3,462.3	-15.4	287.9	43.5	0.00	0.00	0.00
3,520.0	7.20	93.07	3,502.0	-15.7	292.9	44.3	0.00	0.00	0.00
3,560.0	7.20	93.07	3,541.7	-16.0	297.9	45.0	0.00	0.00	0.00
3,600.0	7.20	93.07	3,581.4	-16.2	302.9	45.8	0.00	0.00	0.00
3,640.0	7.20	93.07	3,621.1	-16.5	307.9	46.6	0.00	0.00	0.00
3,680.0	7.20	93.07	3,660.8	-16.8	312.9	47.3	0.00	0.00	0.00
3,720.0	7.20	93.07	3,700.4	-17.0	317.9	48.1	0.00	0.00	0.00
3,760.0	7.20	93.07	3,740.1	-17.3	322.9	48.8	0.00	0.00	0.00
3,800.0	7.20	93.07	3,779.8	-17.6	327.9	49.6	0.00	0.00	0.00
3,840.0	7.20	93.07	3,819.5	-17.8	332.9	50.3	0.00	0.00	0.00
3,880.0	7.20	93.07	3,859.2	-18.1	337.9	51.1	0.00	0.00	0.00
3,920.0	7.20	93.07	3,898.9	-18.4	342.9	51.9	0.00	0.00	0.00
3,960.0	7.20	93.07	3,938.6	-18.6	347.9	52.6	0.00	0.00	0.00
4,000.0	7.20	93.07	3,978.2	-18.9	352.9	53.4	0.00	0.00	0.00
4,040.0	7.20	93.07	4,017.9	-19.2	357.9	54.1	0.00	0.00	0.00
4,080.0	7.20	93.07	4,057.6	-19.4	362.9	54.9	0.00	0.00	0.00
4,120.0	7.20	93.07	4,097.3	-19.7	368.0	55.6	0.00	0.00	0.00

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Well:	Sorin Natural Resources 2R-223	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (01-28-13)		

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	7.20	93.07	4,137.0	-20.0	373.0	56.4	0.00	0.00	0.00
4,200.0	7.20	93.07	4,176.7	-20.2	378.0	57.2	0.00	0.00	0.00
4,240.0	7.20	93.07	4,216.3	-20.5	383.0	57.9	0.00	0.00	0.00
4,280.0	7.20	93.07	4,256.0	-20.8	388.0	58.7	0.00	0.00	0.00
4,320.0	7.20	93.07	4,295.7	-21.1	393.0	59.4	0.00	0.00	0.00
4,360.0	7.20	93.07	4,335.4	-21.3	398.0	60.2	0.00	0.00	0.00
4,400.0	7.20	93.07	4,375.1	-21.6	403.0	60.9	0.00	0.00	0.00
4,440.0	7.20	93.07	4,414.8	-21.9	408.0	61.7	0.00	0.00	0.00
4,480.0	7.20	93.07	4,454.5	-22.1	413.0	62.5	0.00	0.00	0.00
4,520.0	7.20	93.07	4,494.1	-22.4	418.0	63.2	0.00	0.00	0.00
4,560.0	7.20	93.07	4,533.8	-22.7	423.0	64.0	0.00	0.00	0.00
4,600.0	7.20	93.07	4,573.5	-22.9	428.0	64.7	0.00	0.00	0.00
4,640.0	7.20	93.07	4,613.2	-23.2	433.0	65.5	0.00	0.00	0.00
4,680.0	7.20	93.07	4,652.9	-23.5	438.0	66.2	0.00	0.00	0.00
4,720.0	7.20	93.07	4,692.6	-23.7	443.0	67.0	0.00	0.00	0.00
4,760.0	7.20	93.07	4,732.2	-24.0	448.0	67.8	0.00	0.00	0.00
4,800.0	7.20	93.07	4,771.9	-24.3	453.1	68.5	0.00	0.00	0.00
4,840.0	7.20	93.07	4,811.6	-24.5	458.1	69.3	0.00	0.00	0.00
4,880.0	7.20	93.07	4,851.3	-24.8	463.1	70.0	0.00	0.00	0.00
4,920.0	7.20	93.07	4,891.0	-25.1	468.1	70.8	0.00	0.00	0.00
4,960.0	7.20	93.07	4,930.7	-25.3	473.1	71.5	0.00	0.00	0.00
5,000.0	7.20	93.07	4,970.4	-25.6	478.1	72.3	0.00	0.00	0.00
5,040.0	7.20	93.07	5,010.0	-25.9	483.1	73.1	0.00	0.00	0.00
5,080.0	7.20	93.07	5,049.7	-26.1	488.1	73.8	0.00	0.00	0.00
5,120.0	7.20	93.07	5,089.4	-26.4	493.1	74.6	0.00	0.00	0.00
5,160.0	7.20	93.07	5,129.1	-26.7	498.1	75.3	0.00	0.00	0.00
5,200.0	7.20	93.07	5,168.8	-27.0	503.1	76.1	0.00	0.00	0.00
5,240.0	7.20	93.07	5,208.5	-27.2	508.1	76.8	0.00	0.00	0.00
5,280.0	7.20	93.07	5,248.1	-27.5	513.1	77.6	0.00	0.00	0.00
5,320.0	7.20	93.07	5,287.8	-27.8	518.1	78.3	0.00	0.00	0.00
5,360.0	7.20	93.07	5,327.5	-28.0	523.1	79.1	0.00	0.00	0.00
5,400.0	7.20	93.07	5,367.2	-28.3	528.1	79.9	0.00	0.00	0.00
5,440.0	7.20	93.07	5,406.9	-28.6	533.1	80.6	0.00	0.00	0.00
5,474.4	7.20	93.07	5,441.0	-28.8	537.4	81.3	0.00	0.00	0.00
5,480.0	7.09	93.07	5,446.6	-28.8	538.1	81.4	2.00	-2.00	0.00
5,520.0	6.29	93.07	5,486.3	-29.1	542.8	82.1	2.00	-2.00	0.00
5,560.0	5.49	93.07	5,526.1	-29.3	546.9	82.7	2.00	-2.00	0.00
5,600.0	4.69	93.07	5,565.9	-29.5	550.4	83.2	2.00	-2.00	0.00
5,640.0	3.89	93.07	5,605.8	-29.6	553.4	83.7	2.00	-2.00	0.00
5,680.0	3.09	93.07	5,645.7	-29.8	555.8	84.1	2.00	-2.00	0.00
5,720.0	2.29	93.07	5,685.7	-29.9	557.7	84.3	2.00	-2.00	0.00
5,760.0	1.49	93.07	5,725.7	-29.9	559.0	84.5	2.00	-2.00	0.00
5,800.0	0.69	93.07	5,765.7	-30.0	559.8	84.6	2.00	-2.00	0.00
5,834.3	0.00	0.00	5,800.0	-30.0	560.0	84.7	2.00	-2.00	0.00
5,840.0	0.00	0.00	5,805.7	-30.0	560.0	84.7	0.00	0.00	0.00
5,880.0	0.00	0.00	5,845.7	-30.0	560.0	84.7	0.00	0.00	0.00
5,920.0	0.00	0.00	5,885.7	-30.0	560.0	84.7	0.00	0.00	0.00
5,960.0	0.00	0.00	5,925.7	-30.0	560.0	84.7	0.00	0.00	0.00
6,000.0	0.00	0.00	5,965.7	-30.0	560.0	84.7	0.00	0.00	0.00
6,040.0	0.00	0.00	6,005.7	-30.0	560.0	84.7	0.00	0.00	0.00
6,080.0	0.00	0.00	6,045.7	-30.0	560.0	84.7	0.00	0.00	0.00
6,120.0	0.00	0.00	6,085.7	-30.0	560.0	84.7	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2R-223	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (01-28-13)		

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)
6,160.0	0.00	0.00	6,125.7	-30.0	560.0	84.7	0.00	0.00	0.00
6,200.0	0.00	0.00	6,165.7	-30.0	560.0	84.7	0.00	0.00	0.00
6,240.0	0.00	0.00	6,205.7	-30.0	560.0	84.7	0.00	0.00	0.00
6,242.0	0.00	0.00	6,207.7	-30.0	560.0	84.7	0.00	0.00	0.00
6,280.0	2.85	180.95	6,245.7	-30.9	560.0	85.6	7.50	7.50	0.00
6,320.0	5.85	180.95	6,285.5	-34.0	559.9	88.6	7.50	7.50	0.00
6,360.0	8.85	180.95	6,325.2	-39.1	559.8	93.7	7.50	7.50	0.00
6,400.0	11.85	180.95	6,364.5	-46.3	559.7	100.8	7.50	7.50	0.00
6,440.0	14.85	180.95	6,403.5	-55.5	559.6	110.0	7.50	7.50	0.00
6,480.0	17.85	180.95	6,441.8	-66.8	559.4	121.2	7.50	7.50	0.00
6,520.0	20.85	180.95	6,479.6	-80.0	559.2	134.4	7.50	7.50	0.00
6,560.0	23.85	180.95	6,516.6	-95.2	558.9	149.5	7.50	7.50	0.00
6,600.0	26.85	180.95	6,552.7	-112.3	558.6	166.5	7.50	7.50	0.00
6,640.0	29.85	180.95	6,587.9	-131.3	558.3	185.3	7.50	7.50	0.00
6,680.0	32.85	180.95	6,622.1	-152.1	558.0	206.0	7.50	7.50	0.00
6,720.0	35.85	180.95	6,655.1	-174.7	557.6	228.4	7.50	7.50	0.00
6,760.0	38.85	180.95	6,686.9	-198.9	557.2	252.5	7.50	7.50	0.00
6,800.0	41.85	180.95	6,717.4	-224.8	556.8	278.3	7.50	7.50	0.00
6,840.0	44.85	180.95	6,746.5	-252.3	556.3	305.5	7.50	7.50	0.00
6,880.0	47.85	180.95	6,774.1	-281.2	555.8	334.3	7.50	7.50	0.00
6,920.0	50.85	180.95	6,800.1	-311.6	555.3	364.4	7.50	7.50	0.00
6,960.0	53.85	180.95	6,824.5	-343.2	554.8	395.9	7.50	7.50	0.00
7,000.0	56.85	180.95	6,847.3	-376.1	554.2	428.6	7.50	7.50	0.00
7,040.0	59.85	180.95	6,868.3	-410.2	553.7	462.4	7.50	7.50	0.00
7,080.0	62.85	180.95	6,887.5	-445.3	553.1	497.3	7.50	7.50	0.00
7,120.0	65.85	180.95	6,904.8	-481.3	552.5	533.1	7.50	7.50	0.00
7,160.0	68.85	180.95	6,920.2	-518.2	551.9	569.7	7.50	7.50	0.00
7,200.0	71.85	180.95	6,933.6	-555.9	551.3	607.2	7.50	7.50	0.00
7,240.0	74.85	180.95	6,945.1	-594.2	550.6	645.2	7.50	7.50	0.00
7,280.0	77.85	180.95	6,954.5	-633.0	550.0	683.8	7.50	7.50	0.00
7,320.0	80.85	180.95	6,961.9	-672.3	549.3	722.9	7.50	7.50	0.00
7,360.0	83.85	180.95	6,967.2	-712.0	548.7	762.3	7.50	7.50	0.00
7,400.0	86.85	180.95	6,970.5	-751.8	548.0	801.9	7.50	7.50	0.00
7,440.0	89.85	180.95	6,971.6	-791.8	547.3	841.6	7.50	7.50	0.00
7,445.9	90.29	180.95	6,971.6	-797.7	547.2	847.5	7.50	7.50	0.00
7,480.0	90.29	180.95	6,971.5	-831.8	546.7	881.3	0.00	0.00	0.00
7,520.0	90.29	180.95	6,971.3	-871.8	546.0	921.1	0.00	0.00	0.00
7,560.0	90.29	180.95	6,971.1	-911.8	545.4	960.8	0.00	0.00	0.00
7,600.0	90.29	180.95	6,970.9	-951.8	544.7	1,000.5	0.00	0.00	0.00
7,640.0	90.29	180.95	6,970.7	-991.8	544.0	1,040.3	0.00	0.00	0.00
7,680.0	90.29	180.95	6,970.5	-1,031.8	543.4	1,080.0	0.00	0.00	0.00
7,720.0	90.29	180.95	6,970.2	-1,071.8	542.7	1,119.7	0.00	0.00	0.00
7,760.0	90.29	180.95	6,970.0	-1,111.8	542.0	1,159.5	0.00	0.00	0.00
7,800.0	90.29	180.95	6,969.8	-1,151.8	541.4	1,199.2	0.00	0.00	0.00
7,840.0	90.29	180.95	6,969.6	-1,191.7	540.7	1,239.0	0.00	0.00	0.00
7,880.0	90.29	180.95	6,969.4	-1,231.7	540.0	1,278.7	0.00	0.00	0.00
7,920.0	90.29	180.95	6,969.2	-1,271.7	539.4	1,318.4	0.00	0.00	0.00
7,960.0	90.29	180.95	6,969.0	-1,311.7	538.7	1,358.2	0.00	0.00	0.00
8,000.0	90.29	180.95	6,968.8	-1,351.7	538.0	1,397.9	0.00	0.00	0.00
8,040.0	90.29	180.95	6,968.6	-1,391.7	537.4	1,437.6	0.00	0.00	0.00
8,080.0	90.29	180.95	6,968.4	-1,431.7	536.7	1,477.4	0.00	0.00	0.00
8,120.0	90.29	180.95	6,968.2	-1,471.7	536.0	1,517.1	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2R-223	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (01-28-13)		

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	90.29	180.95	6,968.0	-1,511.7	535.4	1,556.8	0.00	0.00	0.00
8,200.0	90.29	180.95	6,967.8	-1,551.7	534.7	1,596.6	0.00	0.00	0.00
8,240.0	90.29	180.95	6,967.6	-1,591.7	534.1	1,636.3	0.00	0.00	0.00
8,280.0	90.29	180.95	6,967.4	-1,631.7	533.4	1,676.1	0.00	0.00	0.00
8,320.0	90.29	180.95	6,967.2	-1,671.7	532.7	1,715.8	0.00	0.00	0.00
8,360.0	90.29	180.95	6,967.0	-1,711.7	532.1	1,755.5	0.00	0.00	0.00
8,400.0	90.29	180.95	6,966.8	-1,751.7	531.4	1,795.3	0.00	0.00	0.00
8,440.0	90.29	180.95	6,966.6	-1,791.7	530.7	1,835.0	0.00	0.00	0.00
8,480.0	90.29	180.95	6,966.4	-1,831.6	530.1	1,874.7	0.00	0.00	0.00
8,520.0	90.29	180.95	6,966.2	-1,871.6	529.4	1,914.5	0.00	0.00	0.00
8,560.0	90.29	180.95	6,966.0	-1,911.6	528.7	1,954.2	0.00	0.00	0.00
8,600.0	90.29	180.95	6,965.8	-1,951.6	528.1	1,994.0	0.00	0.00	0.00
8,640.0	90.29	180.95	6,965.6	-1,991.6	527.4	2,033.7	0.00	0.00	0.00
8,680.0	90.29	180.95	6,965.4	-2,031.6	526.7	2,073.4	0.00	0.00	0.00
8,720.0	90.29	180.95	6,965.2	-2,071.6	526.1	2,113.2	0.00	0.00	0.00
8,760.0	90.29	180.95	6,965.0	-2,111.6	525.4	2,152.9	0.00	0.00	0.00
8,800.0	90.29	180.95	6,964.8	-2,151.6	524.8	2,192.6	0.00	0.00	0.00
8,840.0	90.29	180.95	6,964.6	-2,191.6	524.1	2,232.4	0.00	0.00	0.00
8,880.0	90.29	180.95	6,964.4	-2,231.6	523.4	2,272.1	0.00	0.00	0.00
8,920.0	90.29	180.95	6,964.2	-2,271.6	522.8	2,311.8	0.00	0.00	0.00
8,960.0	90.29	180.95	6,964.0	-2,311.6	522.1	2,351.6	0.00	0.00	0.00
9,000.0	90.29	180.95	6,963.8	-2,351.6	521.4	2,391.3	0.00	0.00	0.00
9,040.0	90.29	180.95	6,963.6	-2,391.6	520.8	2,431.1	0.00	0.00	0.00
9,080.0	90.29	180.95	6,963.4	-2,431.6	520.1	2,470.8	0.00	0.00	0.00
9,120.0	90.29	180.95	6,963.2	-2,471.6	519.4	2,510.5	0.00	0.00	0.00
9,160.0	90.29	180.95	6,963.0	-2,511.5	518.8	2,550.3	0.00	0.00	0.00
9,200.0	90.29	180.95	6,962.8	-2,551.5	518.1	2,590.0	0.00	0.00	0.00
9,240.0	90.29	180.95	6,962.6	-2,591.5	517.4	2,629.7	0.00	0.00	0.00
9,280.0	90.29	180.95	6,962.4	-2,631.5	516.8	2,669.5	0.00	0.00	0.00
9,320.0	90.29	180.95	6,962.2	-2,671.5	516.1	2,709.2	0.00	0.00	0.00
9,360.0	90.29	180.95	6,961.9	-2,711.5	515.5	2,749.0	0.00	0.00	0.00
9,400.0	90.29	180.95	6,961.7	-2,751.5	514.8	2,788.7	0.00	0.00	0.00
9,440.0	90.29	180.95	6,961.5	-2,791.5	514.1	2,828.4	0.00	0.00	0.00
9,480.0	90.29	180.95	6,961.3	-2,831.5	513.5	2,868.2	0.00	0.00	0.00
9,520.0	90.29	180.95	6,961.1	-2,871.5	512.8	2,907.9	0.00	0.00	0.00
9,560.0	90.29	180.95	6,960.9	-2,911.5	512.1	2,947.6	0.00	0.00	0.00
9,600.0	90.29	180.95	6,960.7	-2,951.5	511.5	2,987.4	0.00	0.00	0.00
9,640.0	90.29	180.95	6,960.5	-2,991.5	510.8	3,027.1	0.00	0.00	0.00
9,680.0	90.29	180.95	6,960.3	-3,031.5	510.1	3,066.8	0.00	0.00	0.00
9,720.0	90.29	180.95	6,960.1	-3,071.5	509.5	3,106.6	0.00	0.00	0.00
9,760.0	90.29	180.95	6,959.9	-3,111.5	508.8	3,146.3	0.00	0.00	0.00
9,800.0	90.29	180.95	6,959.7	-3,151.4	508.1	3,186.1	0.00	0.00	0.00
9,840.0	90.29	180.95	6,959.5	-3,191.4	507.5	3,225.8	0.00	0.00	0.00
9,880.0	90.29	180.95	6,959.3	-3,231.4	506.8	3,265.5	0.00	0.00	0.00
9,920.0	90.29	180.95	6,959.1	-3,271.4	506.1	3,305.3	0.00	0.00	0.00
9,960.0	90.29	180.95	6,958.9	-3,311.4	505.5	3,345.0	0.00	0.00	0.00
10,000.0	90.29	180.95	6,958.7	-3,351.4	504.8	3,384.7	0.00	0.00	0.00
10,040.0	90.29	180.95	6,958.5	-3,391.4	504.2	3,424.5	0.00	0.00	0.00
10,080.0	90.29	180.95	6,958.3	-3,431.4	503.5	3,464.2	0.00	0.00	0.00
10,120.0	90.29	180.95	6,958.1	-3,471.4	502.8	3,504.0	0.00	0.00	0.00
10,160.0	90.29	180.95	6,957.9	-3,511.4	502.2	3,543.7	0.00	0.00	0.00
10,200.0	90.29	180.95	6,957.7	-3,551.4	501.5	3,583.4	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2R-223	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (01-28-13)		

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)
10,240.0	90.29	180.95	6,957.5	-3,591.4	500.8	3,623.2	0.00	0.00	0.00
10,280.0	90.29	180.95	6,957.3	-3,631.4	500.2	3,662.9	0.00	0.00	0.00
10,320.0	90.29	180.95	6,957.1	-3,671.4	499.5	3,702.6	0.00	0.00	0.00
10,360.0	90.29	180.95	6,956.9	-3,711.4	498.8	3,742.4	0.00	0.00	0.00
10,400.0	90.29	180.95	6,956.7	-3,751.4	498.2	3,782.1	0.00	0.00	0.00
10,440.0	90.29	180.95	6,956.5	-3,791.4	497.5	3,821.8	0.00	0.00	0.00
10,480.0	90.29	180.95	6,956.3	-3,831.3	496.8	3,861.6	0.00	0.00	0.00
10,520.0	90.29	180.95	6,956.1	-3,871.3	496.2	3,901.3	0.00	0.00	0.00
10,560.0	90.29	180.95	6,955.9	-3,911.3	495.5	3,941.1	0.00	0.00	0.00
10,600.0	90.29	180.95	6,955.7	-3,951.3	494.9	3,980.8	0.00	0.00	0.00
10,640.0	90.29	180.95	6,955.5	-3,991.3	494.2	4,020.5	0.00	0.00	0.00
10,680.0	90.29	180.95	6,955.3	-4,031.3	493.5	4,060.3	0.00	0.00	0.00
10,720.0	90.29	180.95	6,955.1	-4,071.3	492.9	4,100.0	0.00	0.00	0.00
10,760.0	90.29	180.95	6,954.9	-4,111.3	492.2	4,139.7	0.00	0.00	0.00
10,800.0	90.29	180.95	6,954.7	-4,151.3	491.5	4,179.5	0.00	0.00	0.00
10,840.0	90.29	180.95	6,954.5	-4,191.3	490.9	4,219.2	0.00	0.00	0.00
10,880.0	90.29	180.95	6,954.3	-4,231.3	490.2	4,259.0	0.00	0.00	0.00
10,920.0	90.29	180.95	6,954.1	-4,271.3	489.5	4,298.7	0.00	0.00	0.00
10,960.0	90.29	180.95	6,953.9	-4,311.3	488.9	4,338.4	0.00	0.00	0.00
11,000.0	90.29	180.95	6,953.6	-4,351.3	488.2	4,378.2	0.00	0.00	0.00
11,040.0	90.29	180.95	6,953.4	-4,391.3	487.5	4,417.9	0.00	0.00	0.00
11,080.0	90.29	180.95	6,953.2	-4,431.3	486.9	4,457.6	0.00	0.00	0.00
11,120.0	90.29	180.95	6,953.0	-4,471.2	486.2	4,497.4	0.00	0.00	0.00
11,160.0	90.29	180.95	6,952.8	-4,511.2	485.6	4,537.1	0.00	0.00	0.00
11,200.0	90.29	180.95	6,952.6	-4,551.2	484.9	4,576.8	0.00	0.00	0.00
11,240.0	90.29	180.95	6,952.4	-4,591.2	484.2	4,616.6	0.00	0.00	0.00
11,280.0	90.29	180.95	6,952.2	-4,631.2	483.6	4,656.3	0.00	0.00	0.00
11,320.0	90.29	180.95	6,952.0	-4,671.2	482.9	4,696.1	0.00	0.00	0.00
11,360.0	90.29	180.95	6,951.8	-4,711.2	482.2	4,735.8	0.00	0.00	0.00
11,400.0	90.29	180.95	6,951.6	-4,751.2	481.6	4,775.5	0.00	0.00	0.00
11,440.0	90.29	180.95	6,951.4	-4,791.2	480.9	4,815.3	0.00	0.00	0.00
11,480.0	90.29	180.95	6,951.2	-4,831.2	480.2	4,855.0	0.00	0.00	0.00
11,520.0	90.29	180.95	6,951.0	-4,871.2	479.6	4,894.7	0.00	0.00	0.00
11,523.2	90.29	180.95	6,951.0	-4,874.4	479.5	4,898.0	0.00	0.00	0.00

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,445.9	6,971.6	7"	7	8-3/4

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,000.0	1,000.0	0.0	0.0	KOP #1
6,242.0	6,207.7	-30.0	560.0	KOP #2
7,445.9	6,971.6	-797.7	547.2	End of Build



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.2-T4N-R66W

Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W

Sorin Natural Resources 2R-223

Wellbore #1

Plan #1 (01-28-13)

Anticollision Report

29 January, 2013

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (01-28-13)		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0ft	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 1/29/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,523.2	Plan #1 (01-28-13) (Wellbore #1)	MWD	MWD - Standard

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Sorin Natural Existing wells Sec.2-T4N-R66W						
API 2-16 (Exist.) - Wellbore #1 - Wellbore #1	11,346.2	6,985.9	348.4	117.7	1.510	CC, ES, SF
API 2-9 (Exist.) - Wellbore #1 - Wellbore #1	10,205.4	6,991.7	368.4	159.1	1.760	CC, ES, SF
API 5 (Exist.) - Wellbore #1 - Wellbore #1	10,258.0	6,992.4	166.0	-44.3	0.789	Level 1, CC, ES, SF
Durnell 1 (Exist.) - Wellbore #1 - Wellbore #1	8,706.0	6,961.3	262.6	81.4	1.449	Level 3, CC, ES, SF
Matsushima PM K2-1 (Exist.) - Wellbore #1 - Wellbore #	7,278.0	6,952.1	166.4	8.0	1.050	Level 2, CC, ES, SF
Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W						
Sorin Natural Resources 2R-403 - Wellbore #1 - Plan #1	1,000.0	1,000.0	30.7	26.4	7.180	CC, ES
Sorin Natural Resources 2R-403 - Wellbore #1 - Plan #1	11,523.2	11,663.6	382.6	216.4	2.303	SF
Sorin Natural Resources 2U-203 - Wellbore #1 - Plan #1	200.0	200.0	58.5	57.9	86.808	CC, ES
Sorin Natural Resources 2U-203 - Wellbore #1 - Plan #1	11,523.2	11,601.8	635.6	446.8	3.366	SF
Sorin Natural Resources 2U-443 - Wellbore #1 - Plan #1	400.0	400.0	30.7	29.1	19.487	CC, ES
Sorin Natural Resources 2U-443 - Wellbore #1 - Plan #1	11,523.2	11,732.7	431.3	261.9	2.546	SF

Offset Design		Sorin Natural Existing wells Sec.2-T4N-R66W - API 2-16 (Exist.) - Wellbore #1 - Wellbore #1										Offset Site Error:		0.0 ft			
Survey Program: 7300-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					
10,500.0	6,956.2	6,990.2	6,990.2	75.6	139.8	-90.70	-4,703.2	830.8	915.1	700.3	214.81	4.260					
10,600.0	6,955.7	6,989.7	6,989.7	77.5	139.8	-90.62	-4,703.2	830.8	823.5	606.8	216.68	3.801					
10,700.0	6,955.2	6,989.2	6,989.2	79.4	139.8	-90.54	-4,703.2	830.8	734.1	515.6	218.55	3.359					
10,800.0	6,954.7	6,988.7	6,988.7	81.2	139.8	-90.45	-4,703.2	830.8	647.8	427.4	220.43	2.939					
10,900.0	6,954.2	6,988.2	6,988.2	83.1	139.8	-90.37	-4,703.2	830.8	566.1	343.8	222.30	2.547					
11,000.0	6,953.6	6,987.6	6,987.6	85.0	139.8	-90.29	-4,703.2	830.8	491.1	267.0	224.18	2.191					
11,100.0	6,953.1	6,987.1	6,987.1	86.8	139.7	-90.20	-4,703.2	830.8	426.6	200.5	226.06	1.887					
11,200.0	6,952.6	6,986.6	6,986.6	88.7	139.7	-90.12	-4,703.2	830.8	377.8	149.9	227.93	1.658					
11,300.0	6,952.1	6,986.1	6,986.1	90.6	139.7	-90.04	-4,703.2	830.8	351.4	121.6	229.81	1.529					
11,346.2	6,951.9	6,985.9	6,985.9	91.4	139.7	-90.00	-4,703.2	830.8	348.4	117.7	230.68	1.510	CC, ES, SF				
11,400.0	6,951.6	6,985.6	6,985.6	92.5	139.7	-89.96	-4,703.2	830.8	352.5	120.8	231.69	1.521					
11,500.0	6,951.1	6,985.1	6,985.1	94.3	139.7	-89.87	-4,703.2	830.8	380.8	147.2	233.57	1.630					
11,523.2	6,951.0	6,985.0	6,985.0	94.8	139.7	-89.85	-4,703.2	830.8	390.8	156.8	234.01	1.670					

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 Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 7300-UNKNOWN													Offset Well Error:	0.0 ft
Reference														
Semi Major Axis														
Distance														
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
9,300.0	6,962.3	6,996.3	6,996.3	53.6	139.9	-90.71	-3,562.9	869.8	977.5	784.8	192.65	5.074		
9,400.0	6,961.7	6,995.7	6,995.7	55.4	139.9	-90.63	-3,562.9	869.8	885.7	691.2	194.48	4.554		
9,500.0	6,961.2	6,995.2	6,995.2	57.2	139.9	-90.56	-3,562.9	869.8	795.8	599.5	196.31	4.054		
9,600.0	6,960.7	6,994.7	6,994.7	59.0	139.9	-90.48	-3,562.9	869.8	708.7	510.5	198.15	3.577		
9,700.0	6,960.2	6,994.2	6,994.2	60.9	139.9	-90.40	-3,562.9	869.8	625.4	425.4	200.00	3.127		
9,800.0	6,959.7	6,993.7	6,993.7	62.7	139.9	-90.32	-3,562.9	869.8	547.8	346.0	201.84	2.714		
9,900.0	6,959.2	6,993.2	6,993.2	64.5	139.9	-90.24	-3,562.9	869.8	478.5	274.9	203.69	2.349		
10,000.0	6,958.7	6,992.7	6,992.7	66.4	139.9	-90.16	-3,562.9	869.8	421.8	216.3	205.55	2.052		
10,100.0	6,958.2	6,992.2	6,992.2	68.2	139.8	-90.08	-3,562.9	869.8	383.2	175.8	207.40	1.848		
10,200.0	6,957.7	6,991.7	6,991.7	70.1	139.8	-90.00	-3,562.9	869.8	368.5	159.2	209.26	1.761		
10,205.4	6,957.7	6,991.7	6,991.7	70.2	139.8	-90.00	-3,562.9	869.8	368.4	159.1	209.36	1.760 CC, ES, SF		
10,300.0	6,957.2	6,991.2	6,991.2	71.9	139.8	-89.93	-3,562.9	869.8	380.4	169.2	211.12	1.802		
10,400.0	6,956.7	6,990.7	6,990.7	73.8	139.8	-89.85	-3,562.9	869.8	416.6	203.7	212.99	1.956		
10,500.0	6,956.2	6,990.2	6,990.2	75.6	139.8	-89.77	-3,562.9	869.8	471.7	256.9	214.85	2.196		
10,600.0	6,955.7	6,989.7	6,989.7	77.5	139.8	-89.69	-3,562.9	869.8	539.8	323.1	216.72	2.491		
10,700.0	6,955.2	6,989.2	6,989.2	79.4	139.8	-89.61	-3,562.9	869.8	616.7	398.1	218.58	2.821		
10,800.0	6,954.7	6,988.7	6,988.7	81.2	139.8	-89.53	-3,562.9	869.8	699.5	479.0	220.45	3.173		
10,900.0	6,954.2	6,988.2	6,988.2	83.1	139.8	-89.45	-3,562.9	869.8	786.2	563.9	222.32	3.536		
11,000.0	6,953.6	6,987.6	6,987.6	85.0	139.8	-89.37	-3,562.9	869.8	875.8	651.6	224.20	3.907		
11,100.0	6,953.1	6,987.1	6,987.1	86.8	139.7	-89.30	-3,562.9	869.8	967.5	741.4	226.07	4.280		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design														Offset Site Error:	0.0 ft
Survey Program: 7300-UNKNOWN														Offset Well Error:	0.0 ft
Sorin Natural Existing wells Sec.2-T4N-R66W - API 5 (Exist.) - Wellbore #1 - Wellbore #1															
Reference		Offset		Semi Major Axis			Distance								
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
9,300.0	6,962.3	6,997.3	6,997.3	53.6	139.9	91.67	-3,606.7	334.5	972.3	779.6	192.68	5.046			
9,400.0	6,961.7	6,996.7	6,996.7	55.4	139.9	91.50	-3,606.7	334.5	873.9	679.4	194.51	4.493			
9,500.0	6,961.2	6,996.2	6,996.2	57.2	139.9	91.32	-3,606.7	334.5	776.0	579.6	196.35	3.952			
9,600.0	6,960.7	6,995.7	6,995.7	59.0	139.9	91.15	-3,606.7	334.5	678.6	480.5	198.19	3.424			
9,700.0	6,960.2	6,995.2	6,995.2	60.9	139.9	90.97	-3,606.7	334.5	582.2	382.2	200.04	2.910			
9,800.0	6,959.7	6,994.7	6,994.7	62.7	139.9	90.80	-3,606.7	334.5	487.2	285.3	201.88	2.413			
9,900.0	6,959.2	6,994.2	6,994.2	64.5	139.9	90.63	-3,606.7	334.5	394.6	190.9	203.73	1.937			
10,000.0	6,958.7	6,993.7	6,993.7	66.4	139.9	90.45	-3,606.7	334.5	306.8	101.2	205.58	1.492	Level 3		
10,100.0	6,958.2	6,993.2	6,993.2	68.2	139.9	90.28	-3,606.7	334.5	229.2	21.8	207.43	1.105	Level 2		
10,200.0	6,957.7	6,992.7	6,992.7	70.1	139.9	90.10	-3,606.7	334.5	175.9	-33.4	209.28	0.840	Level 1		
10,258.0	6,957.4	6,992.4	6,992.4	71.1	139.8	90.00	-3,606.7	334.5	166.0	-44.3	210.36	0.789	Level 1, CC, ES, SF		
10,300.0	6,957.2	6,992.2	6,992.2	71.9	139.8	89.93	-3,606.7	334.5	171.2	-39.9	211.14	0.811	Level 1		
10,400.0	6,956.7	6,991.7	6,991.7	73.8	139.8	89.75	-3,606.7	334.5	218.4	5.5	212.99	1.026	Level 2		
10,500.0	6,956.2	6,991.2	6,991.2	75.6	139.8	89.58	-3,606.7	334.5	293.5	78.6	214.85	1.366	Level 3		
10,600.0	6,955.7	6,990.7	6,990.7	77.5	139.8	89.40	-3,606.7	334.5	380.1	163.4	216.70	1.754			
10,700.0	6,955.2	6,990.2	6,990.2	79.4	139.8	89.23	-3,606.7	334.5	472.1	253.6	218.55	2.160			
10,800.0	6,954.7	6,989.7	6,989.7	81.2	139.8	89.05	-3,606.7	334.5	566.8	346.4	220.41	2.572			
10,900.0	6,954.2	6,989.2	6,989.2	83.1	139.8	88.88	-3,606.7	334.5	663.1	440.8	222.26	2.983			
11,000.0	6,953.6	6,988.6	6,988.6	85.0	139.8	88.70	-3,606.7	334.5	760.3	536.2	224.12	3.392			
11,100.0	6,953.1	6,988.1	6,988.1	86.8	139.8	88.53	-3,606.7	334.5	858.2	632.2	225.97	3.798			
11,200.0	6,952.6	6,987.6	6,987.6	88.7	139.8	88.36	-3,606.7	334.5	956.5	728.7	227.82	4.198			

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design														Offset Site Error:	0.0 ft
Survey Program: 7300-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 +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
7,800.0	6,969.8	6,965.8	6,965.8	28.2	139.3	-91.00	-2,062.0	788.9	943.3	777.4	165.91	5.686			
7,900.0	6,969.3	6,965.3	6,965.3	29.7	139.3	-90.89	-2,062.0	788.9	847.7	680.2	167.49	5.061			
8,000.0	6,968.8	6,964.8	6,964.8	31.3	139.3	-90.78	-2,062.0	788.9	753.2	584.1	169.11	4.454			
8,100.0	6,968.3	6,964.3	6,964.3	32.9	139.3	-90.67	-2,062.0	788.9	660.4	489.7	170.76	3.868			
8,200.0	6,967.8	6,963.8	6,963.8	34.5	139.3	-90.56	-2,062.0	788.9	570.1	397.6	172.44	3.306			
8,300.0	6,967.3	6,963.3	6,963.3	36.1	139.3	-90.45	-2,062.0	788.9	483.5	309.4	174.14	2.777			
8,400.0	6,966.8	6,962.8	6,962.8	37.8	139.3	-90.34	-2,062.0	788.9	403.2	227.4	175.87	2.293			
8,500.0	6,966.3	6,962.3	6,962.3	39.5	139.2	-90.23	-2,062.0	788.9	333.8	156.2	177.61	1.879			
8,600.0	6,965.8	6,961.8	6,961.8	41.2	139.2	-90.12	-2,062.0	788.9	283.2	103.8	179.36	1.579			
8,700.0	6,965.3	6,961.3	6,961.3	42.9	139.2	-90.01	-2,062.0	788.9	262.7	81.5	181.13	1.450	Level 3		
8,706.0	6,965.3	6,961.3	6,961.3	43.0	139.2	-90.00	-2,062.0	788.9	262.6	81.4	181.24	1.449	Level 3, CC, ES, SF		
8,800.0	6,964.8	6,960.8	6,960.8	44.7	139.2	-89.90	-2,062.0	788.9	278.9	96.0	182.91	1.525			
8,900.0	6,964.3	6,960.3	6,960.3	46.4	139.2	-89.79	-2,062.0	788.9	326.5	141.8	184.70	1.768			
9,000.0	6,963.8	6,959.8	6,959.8	48.2	139.2	-89.68	-2,062.0	788.9	394.2	207.7	186.50	2.114			
9,100.0	6,963.3	6,959.3	6,959.3	50.0	139.2	-89.56	-2,062.0	788.9	473.5	285.2	188.30	2.515			
9,200.0	6,962.8	6,958.8	6,958.8	51.8	139.2	-89.45	-2,062.0	788.9	559.5	369.3	190.11	2.943			
9,300.0	6,962.3	6,958.3	6,958.3	53.6	139.2	-89.34	-2,062.0	788.9	649.5	457.5	191.93	3.384			
9,400.0	6,961.7	6,957.7	6,957.7	55.4	139.2	-89.23	-2,062.0	788.9	742.0	548.3	193.76	3.830			
9,500.0	6,961.2	6,957.2	6,957.2	57.2	139.1	-89.12	-2,062.0	788.9	836.3	640.7	195.58	4.276			
9,600.0	6,960.7	6,956.7	6,956.7	59.0	139.1	-89.01	-2,062.0	788.9	931.8	734.3	197.42	4.720			

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design				Sorin Natural Existing wells Sec.2-T4N-R66W - Matsushima PM K2-1 (Exist.) - Wellbore #1 - Wellbore #										Offset Site Error:		0.0 ft
Survey Program: 7300-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				
0.0	0.0	0.0	0.0	0.0	0.0	131.50	-633.9	716.4	956.6							
100.0	100.0	98.0	98.0	0.1	2.0	131.50	-633.9	716.4	956.5	954.5	2.07	461.526				
200.0	200.0	198.0	198.0	0.3	4.0	131.50	-633.9	716.4	956.5	952.3	4.30	222.591				
300.0	300.0	298.0	298.0	0.6	6.0	131.50	-633.9	716.4	956.5	950.0	6.52	146.663				
400.0	400.0	398.0	398.0	0.8	8.0	131.50	-633.9	716.4	956.5	947.8	8.75	109.359				
500.0	500.0	498.0	498.0	1.0	10.0	131.50	-633.9	716.4	956.5	945.6	10.97	87.184				
600.0	600.0	598.0	598.0	1.2	12.0	131.50	-633.9	716.4	956.5	943.4	13.20	72.486				
700.0	700.0	698.0	698.0	1.5	14.0	131.50	-633.9	716.4	956.5	941.1	15.42	62.028				
800.0	800.0	798.0	798.0	1.7	16.0	131.50	-633.9	716.4	956.5	938.9	17.65	54.208				
900.0	900.0	898.0	898.0	1.9	18.0	131.50	-633.9	716.4	956.5	936.7	19.87	48.139				
1,000.0	1,000.0	998.0	998.0	2.1	20.0	131.50	-633.9	716.4	956.5	934.5	22.10	43.292				
1,100.0	1,100.0	1,098.0	1,098.0	2.3	22.0	38.52	-633.9	716.4	955.2	930.9	24.30	39.313				
1,200.0	1,199.8	1,197.8	1,197.8	2.6	24.0	38.77	-633.9	716.4	951.1	924.6	26.47	35.937				
1,300.0	1,299.5	1,297.5	1,297.5	2.8	25.9	39.18	-633.9	716.4	944.3	915.7	28.61	33.002				
1,400.0	1,398.7	1,396.7	1,396.7	3.0	27.9	39.71	-633.9	716.4	935.1	904.3	30.77	30.388				
1,500.0	1,497.9	1,495.9	1,495.9	3.3	29.9	40.21	-633.9	716.4	925.4	892.5	32.98	28.062				
1,600.0	1,597.2	1,595.2	1,595.2	3.5	31.9	40.71	-633.9	716.4	915.9	880.7	35.19	26.024				
1,700.0	1,696.4	1,694.4	1,694.4	3.8	33.9	41.23	-633.9	716.4	906.4	869.0	37.42	24.224				
1,800.0	1,795.6	1,793.6	1,793.6	4.1	35.9	41.75	-633.9	716.4	897.0	857.3	39.65	22.625				
1,900.0	1,894.8	1,892.8	1,892.8	4.4	37.9	42.29	-633.9	716.4	887.6	845.7	41.88	21.195				
2,000.0	1,994.0	1,992.0	1,992.0	4.7	39.8	42.84	-633.9	716.4	878.4	834.2	44.12	19.909				
2,100.0	2,093.2	2,091.2	2,091.2	5.0	41.8	43.40	-633.9	716.4	869.2	822.8	46.36	18.748				
2,200.0	2,192.4	2,190.4	2,190.4	5.3	43.8	43.97	-633.9	716.4	860.1	811.5	48.61	17.694				
2,300.0	2,291.6	2,289.6	2,289.6	5.6	45.8	44.55	-633.9	716.4	851.1	800.2	50.86	16.733				
2,400.0	2,390.9	2,388.9	2,388.9	5.9	47.8	45.15	-633.9	716.4	842.1	789.0	53.12	15.855				
2,500.0	2,490.1	2,488.1	2,488.1	6.2	49.8	45.75	-633.9	716.4	833.3	777.9	55.37	15.049				
2,600.0	2,589.3	2,587.3	2,587.3	6.5	51.7	46.38	-633.9	716.4	824.6	767.0	57.64	14.306				
2,700.0	2,688.5	2,686.5	2,686.5	6.8	53.7	47.01	-633.9	716.4	816.0	756.1	59.90	13.621				
2,800.0	2,787.7	2,785.7	2,785.7	7.1	55.7	47.66	-633.9	716.4	807.4	745.3	62.17	12.987				
2,900.0	2,886.9	2,884.9	2,884.9	7.5	57.7	48.32	-633.9	716.4	799.0	734.6	64.45	12.398				
3,000.0	2,986.1	2,984.1	2,984.1	7.8	59.7	48.99	-633.9	716.4	790.7	724.0	66.72	11.850				
3,100.0	3,085.3	3,083.3	3,083.3	8.1	61.7	49.68	-633.9	716.4	782.5	713.5	69.00	11.340				
3,200.0	3,184.5	3,182.5	3,182.5	8.4	63.7	50.39	-633.9	716.4	774.4	703.1	71.29	10.863				
3,300.0	3,283.8	3,281.8	3,281.8	8.7	65.6	51.11	-633.9	716.4	766.4	692.9	73.57	10.418				
3,400.0	3,383.0	3,381.0	3,381.0	9.1	67.6	51.84	-633.9	716.4	758.6	682.7	75.86	10.000				
3,500.0	3,482.2	3,480.2	3,480.2	9.4	69.6	52.59	-633.9	716.4	750.9	672.7	78.15	9.608				
3,600.0	3,581.4	3,579.4	3,579.4	9.7	71.6	53.35	-633.9	716.4	743.3	662.8	80.45	9.239				
3,700.0	3,680.6	3,678.6	3,678.6	10.0	73.6	54.13	-633.9	716.4	735.8	653.1	82.75	8.892				
3,800.0	3,779.8	3,777.8	3,777.8	10.3	75.6	54.92	-633.9	716.4	728.5	643.5	85.05	8.566				
3,900.0	3,879.0	3,877.0	3,877.0	10.7	77.5	55.73	-633.9	716.4	721.4	634.0	87.36	8.258				
4,000.0	3,978.2	3,976.2	3,976.2	11.0	79.5	56.56	-633.9	716.4	714.3	624.7	89.67	7.967				
4,100.0	4,077.5	4,075.5	4,075.5	11.3	81.5	57.40	-633.9	716.4	707.5	615.5	91.98	7.692				
4,200.0	4,176.7	4,174.7	4,174.7	11.6	83.5	58.26	-633.9	716.4	700.8	606.5	94.29	7.432				
4,300.0	4,275.9	4,273.9	4,273.9	11.9	85.5	59.14	-633.9	716.4	694.2	597.6	96.61	7.186				
4,400.0	4,375.1	4,373.1	4,373.1	12.3	87.5	60.03	-633.9	716.4	687.8	588.9	98.93	6.952				
4,500.0	4,474.3	4,472.3	4,472.3	12.6	89.4	60.93	-633.9	716.4	681.6	580.4	101.26	6.732				
4,600.0	4,573.5	4,571.5	4,571.5	12.9	91.4	61.86	-633.9	716.4	675.6	572.0	103.58	6.522				
4,700.0	4,672.7	4,670.7	4,670.7	13.2	93.4	62.80	-633.9	716.4	669.7	563.8	105.91	6.323				
4,800.0	4,771.9	4,769.9	4,769.9	13.6	95.4	63.75	-633.9	716.4	664.0	555.8	108.25	6.135				
4,900.0	4,871.1	4,869.1	4,869.1	13.9	97.4	64.72	-633.9	716.4	658.6	548.0	110.58	5.956				
5,000.0	4,970.4	4,968.4	4,968.4	14.2	99.4	65.71	-633.9	716.4	653.3	540.4	112.92	5.785				

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

Offset Design Sorin Natural Existing wells Sec.2-T4N-R66W - Matsushima PM K2-1 (Exist.) - Wellbore #1 - Wellbore #											Offset Site Error: 0.0 ft		
Survey Program: 7300-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
5,100.0	5,069.6	5,067.6	5,067.6	14.5	101.4	66.71	-633.9	716.4	648.2	532.9	115.26	5.624	
5,200.0	5,168.8	5,166.8	5,166.8	14.9	103.3	67.73	-633.9	716.4	643.3	525.7	117.60	5.470	
5,300.0	5,268.0	5,266.0	5,266.0	15.2	105.3	68.77	-633.9	716.4	638.6	518.7	119.94	5.325	
5,400.0	5,367.2	5,365.2	5,365.2	15.5	107.3	69.81	-633.9	716.4	634.2	511.9	122.28	5.186	
5,500.0	5,466.4	5,464.4	5,464.4	15.8	109.3	70.85	-633.9	716.4	630.0	505.3	124.63	5.055	
5,600.0	5,565.9	5,563.9	5,563.9	16.0	111.3	71.64	-633.9	716.4	626.8	499.8	126.91	4.938	
5,700.0	5,665.7	5,663.7	5,663.7	16.2	113.3	72.16	-633.9	716.4	624.8	495.6	129.15	4.838	
5,800.0	5,765.7	5,763.7	5,763.7	16.4	115.3	72.40	-633.9	716.4	623.9	492.5	131.33	4.750	
5,855.7	5,821.4	5,819.4	5,819.4	16.5	116.4	72.44	-633.9	716.4	623.7	491.2	132.53	4.706	
5,900.0	5,865.7	5,863.7	5,863.7	16.6	117.3	165.48	-633.9	716.4	623.8	490.3	133.45	4.674	
6,000.0	5,965.7	5,963.7	5,963.7	16.7	119.3	165.48	-633.9	716.4	623.8	488.2	135.62	4.600	
6,100.0	6,065.7	6,063.7	6,063.7	16.9	121.3	165.48	-633.9	716.4	623.8	486.0	137.79	4.527	
6,200.0	6,165.7	6,163.7	6,163.7	17.0	123.3	165.48	-633.9	716.4	623.8	483.8	139.95	4.457	
6,300.0	6,265.6	6,263.6	6,263.6	17.2	125.3	-15.57	-633.9	716.4	621.7	479.9	141.78	4.385	
6,400.0	6,364.5	6,362.5	6,362.5	17.4	127.3	-16.21	-633.9	716.4	608.1	466.7	141.47	4.299	
6,500.0	6,460.8	6,458.8	6,458.8	17.5	129.2	-17.54	-633.9	716.4	582.3	443.4	138.89	4.193	
6,600.0	6,552.7	6,550.7	6,550.7	17.8	131.0	-19.77	-633.9	716.4	544.9	410.6	134.29	4.058	
6,700.0	6,638.7	6,636.7	6,636.7	18.0	132.7	-23.30	-633.9	716.4	496.7	368.3	128.42	3.868	
6,800.0	6,717.4	6,715.4	6,715.4	18.3	134.3	-28.80	-633.9	716.4	439.1	316.0	123.06	3.568	
6,900.0	6,787.3	6,785.3	6,785.3	18.7	135.7	-37.32	-633.9	716.4	374.0	252.1	121.93	3.067	
7,000.0	6,847.3	6,845.3	6,845.3	19.3	136.9	-50.03	-633.9	716.4	304.5	174.7	129.84	2.345	
7,100.0	6,896.3	6,894.3	6,894.3	20.0	137.9	-66.39	-633.9	716.4	236.4	91.5	144.98	1.631	
7,200.0	6,933.6	6,931.6	6,931.6	20.8	138.6	-81.98	-633.9	716.4	182.6	26.8	155.76	1.172 Level 2	
7,278.0	6,954.1	6,952.1	6,952.1	21.5	139.0	-90.00	-633.9	716.4	166.4	8.0	158.42	1.050 Level 2, CC, ES, SF	
7,300.0	6,958.5	6,956.5	6,956.5	21.8	139.1	-91.37	-633.9	716.4	167.8	9.1	158.70	1.057 Level 2	
7,400.0	6,970.5	6,968.5	6,968.5	22.9	139.4	-92.29	-633.9	716.4	205.6	45.5	160.07	1.284 Level 3	
7,500.0	6,971.4	6,969.4	6,969.4	24.1	139.4	-89.62	-633.9	716.4	276.4	114.8	161.61	1.710	
7,600.0	6,970.9	6,968.9	6,968.9	25.4	139.4	-89.44	-633.9	716.4	361.3	198.3	163.01	2.216	
7,700.0	6,970.4	6,968.4	6,968.4	26.8	139.4	-89.27	-633.9	716.4	452.4	287.9	164.48	2.750	
7,800.0	6,969.8	6,967.8	6,967.8	28.2	139.4	-89.09	-633.9	716.4	546.6	380.6	166.01	3.293	
7,900.0	6,969.3	6,967.3	6,967.3	29.7	139.3	-88.92	-633.9	716.4	642.6	475.0	167.58	3.835	
8,000.0	6,968.8	6,966.8	6,966.8	31.3	139.3	-88.74	-633.9	716.4	739.7	570.5	169.19	4.372	
8,100.0	6,968.3	6,966.3	6,966.3	32.9	139.3	-88.57	-633.9	716.4	837.4	666.6	170.82	4.902	
8,200.0	6,967.8	6,965.8	6,965.8	34.5	139.3	-88.40	-633.9	716.4	935.6	763.1	172.49	5.424	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design		Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2R-403 - Wellbore #1										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		
0.0	0.0	0.0	0.0	0.0	0.0	-90.00	0.0	-30.7	30.7					
100.0	100.0	100.0	100.0	0.1	0.1	-90.00	0.0	-30.7	30.7	30.4	0.22	136.412		
200.0	200.0	200.0	200.0	0.3	0.3	-90.00	0.0	-30.7	30.7	30.0	0.67	45.471		
300.0	300.0	300.0	300.0	0.6	0.6	-90.00	0.0	-30.7	30.7	29.5	1.12	27.282		
400.0	400.0	400.0	400.0	0.8	0.8	-90.00	0.0	-30.7	30.7	29.1	1.57	19.487		
500.0	500.0	500.0	500.0	1.0	1.0	-90.00	0.0	-30.7	30.7	28.6	2.02	15.157		
600.0	600.0	600.0	600.0	1.2	1.2	-90.00	0.0	-30.7	30.7	28.2	2.47	12.401		
700.0	700.0	700.0	700.0	1.5	1.5	-90.00	0.0	-30.7	30.7	27.7	2.92	10.493		
800.0	800.0	800.0	800.0	1.7	1.7	-90.00	0.0	-30.7	30.7	27.3	3.37	9.094		
900.0	900.0	900.0	900.0	1.9	1.9	-90.00	0.0	-30.7	30.7	26.8	3.82	8.024		
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	-90.00	0.0	-30.7	30.7	26.4	4.27	7.180 CC, ES		
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.4	177.10	0.0	-30.7	32.4	27.7	4.70	6.888		
1,200.0	1,199.8	1,199.8	1,199.8	2.6	2.6	177.50	0.0	-30.7	37.6	32.5	5.12	7.344		
1,300.0	1,299.5	1,299.5	1,299.5	2.8	2.8	177.96	0.0	-30.7	46.3	40.8	5.54	8.360		
1,400.0	1,398.7	1,398.7	1,398.7	3.0	3.0	178.37	0.0	-30.7	58.2	52.3	5.97	9.764		
1,500.0	1,497.9	1,497.9	1,497.9	3.3	3.3	178.66	0.0	-30.7	70.8	64.4	6.40	11.059		
1,600.0	1,597.2	1,600.0	1,600.0	3.5	3.5	178.77	-0.2	-28.9	81.6	74.8	6.83	11.957		
1,700.0	1,696.4	1,702.8	1,702.6	3.8	3.7	178.66	-0.8	-23.5	88.9	81.7	7.24	12.275		
1,800.0	1,795.6	1,806.0	1,805.4	4.1	3.9	178.37	-1.9	-14.4	92.6	84.9	7.67	12.075		
1,900.0	1,894.8	1,907.4	1,906.1	4.4	4.1	177.94	-3.2	-2.5	93.3	85.2	8.10	11.520		
2,000.0	1,994.0	2,007.4	2,005.4	4.7	4.4	177.50	-4.6	9.6	93.8	85.2	8.54	10.980		
2,100.0	2,093.2	2,107.4	2,104.6	5.0	4.6	177.06	-6.0	21.7	94.2	85.2	8.98	10.486		
2,200.0	2,192.4	2,207.4	2,203.9	5.3	4.9	176.63	-7.4	33.8	94.6	85.2	9.43	10.034		
2,300.0	2,291.6	2,307.4	2,303.1	5.6	5.1	176.20	-8.8	45.9	95.0	85.1	9.88	9.620		
2,400.0	2,390.9	2,407.4	2,402.4	5.9	5.4	175.77	-10.1	58.0	95.5	85.1	10.33	9.238		
2,500.0	2,490.1	2,507.4	2,501.6	6.2	5.7	175.35	-11.5	70.1	95.9	85.1	10.79	8.886		
2,600.0	2,589.3	2,607.4	2,600.9	6.5	6.0	174.93	-12.9	82.2	96.3	85.1	11.25	8.561		
2,700.0	2,688.5	2,707.4	2,700.1	6.8	6.3	174.52	-14.3	94.3	96.8	85.1	11.72	8.260		
2,800.0	2,787.7	2,807.4	2,799.4	7.1	6.6	174.11	-15.7	106.4	97.2	85.0	12.18	7.980		
2,900.0	2,886.9	2,907.4	2,898.6	7.5	6.9	173.70	-17.1	118.5	97.7	85.0	12.66	7.719		
3,000.0	2,986.1	3,007.4	2,997.9	7.8	7.1	173.30	-18.5	130.5	98.2	85.0	13.13	7.477		
3,100.0	3,085.3	3,107.4	3,097.1	8.1	7.4	172.90	-19.8	142.6	98.6	85.0	13.60	7.250		
3,200.0	3,184.5	3,207.4	3,196.4	8.4	7.7	172.51	-21.2	154.7	99.1	85.0	14.08	7.037		
3,300.0	3,283.8	3,307.4	3,295.6	8.7	8.0	172.12	-22.6	166.8	99.6	85.0	14.56	6.838		
3,400.0	3,383.0	3,407.4	3,394.9	9.1	8.3	171.73	-24.0	178.9	100.1	85.0	15.04	6.651		
3,500.0	3,482.2	3,507.3	3,494.2	9.4	8.7	171.35	-25.4	191.0	100.5	85.0	15.53	6.475		
3,600.0	3,581.4	3,607.3	3,593.4	9.7	9.0	170.97	-26.8	203.1	101.0	85.0	16.01	6.309		
3,700.0	3,680.6	3,705.9	3,691.3	10.0	9.2	170.63	-28.1	214.8	101.8	85.3	16.49	6.175		
3,800.0	3,779.8	3,802.5	3,787.4	10.3	9.5	170.64	-29.1	223.5	105.3	88.4	16.92	6.225		
3,900.0	3,879.0	3,900.0	3,884.8	10.7	9.7	171.03	-29.7	229.0	112.1	94.8	17.34	6.466		
4,000.0	3,978.2	3,994.4	3,979.1	11.0	9.8	171.67	-30.0	231.3	122.2	104.4	17.75	6.885		
4,100.0	4,077.5	4,092.7	4,077.5	11.3	10.0	172.43	-30.0	231.3	134.5	116.4	18.16	7.406		
4,200.0	4,176.7	4,191.9	4,176.7	11.6	10.2	173.07	-30.0	231.3	147.0	128.4	18.59	7.903		
4,300.0	4,275.9	4,291.1	4,275.9	11.9	10.4	173.62	-30.0	231.3	159.4	140.4	19.03	8.376		
4,400.0	4,375.1	4,390.3	4,375.1	12.3	10.6	174.08	-30.0	231.3	171.9	152.4	19.47	8.828		
4,500.0	4,474.3	4,489.5	4,474.3	12.6	10.8	174.48	-30.0	231.3	184.3	164.4	19.91	9.259		
4,600.0	4,573.5	4,588.8	4,573.5	12.9	10.9	174.83	-30.0	231.3	196.8	176.5	20.35	9.671		
4,700.0	4,672.7	4,688.0	4,672.7	13.2	11.1	175.14	-30.0	231.3	209.3	188.5	20.79	10.065		
4,800.0	4,771.9	4,787.2	4,771.9	13.6	11.3	175.42	-30.0	231.3	221.8	200.5	21.24	10.442		
4,900.0	4,871.1	4,886.4	4,871.1	13.9	11.5	175.66	-30.0	231.3	234.3	212.6	21.69	10.803		
5,000.0	4,970.4	4,985.6	4,970.4	14.2	11.7	175.88	-30.0	231.3	246.8	224.6	22.13	11.150		

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 Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design		Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2R-403 - Wellbore #1										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		Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
							+N/-S (ft)	+E/-W (ft)						
5,100.0	5,069.6	5,084.8	5,069.6	14.5	11.9	176.08	-30.0	231.3	259.3	236.7	22.58	11.482		
5,200.0	5,168.8	5,184.0	5,168.8	14.9	12.1	176.26	-30.0	231.3	271.8	248.8	23.03	11.801		
5,300.0	5,268.0	5,283.2	5,268.0	15.2	12.3	176.43	-30.0	231.3	284.3	260.8	23.48	12.107		
5,400.0	5,367.2	5,382.4	5,367.2	15.5	12.5	176.58	-30.0	231.3	296.8	272.9	23.93	12.402		
5,500.0	5,466.4	5,481.7	5,466.4	15.8	12.7	176.72	-30.0	231.3	309.2	284.8	24.38	12.680		
5,600.0	5,565.9	5,581.2	5,565.9	16.0	12.9	176.83	-30.0	231.3	319.1	294.3	24.80	12.867		
5,700.0	5,665.7	5,681.0	5,665.7	16.2	13.1	176.90	-30.0	231.3	325.5	300.3	25.19	12.923		
5,800.0	5,765.7	5,780.9	5,765.7	16.4	13.3	176.93	-30.0	231.3	328.5	302.9	25.55	12.857		
5,900.0	5,865.7	5,880.9	5,865.7	16.6	13.5	-90.00	-30.0	231.3	328.7	302.7	25.95	12.666		
6,000.0	5,965.7	5,980.9	5,965.7	16.7	13.8	-90.00	-30.0	231.3	328.7	302.3	26.36	12.467		
6,100.0	6,065.7	6,080.9	6,065.7	16.9	14.0	-90.00	-30.0	231.3	328.7	301.9	26.78	12.275		
6,200.0	6,165.7	6,180.9	6,165.7	17.0	14.2	-90.00	-30.0	231.3	328.7	301.5	27.19	12.088		
6,300.0	6,265.6	6,280.9	6,265.6	17.2	14.4	89.43	-30.0	231.3	328.6	301.1	27.58	11.916		
6,333.4	6,298.9	6,314.1	6,298.9	17.3	14.4	90.00	-30.0	231.3	328.6	300.9	27.71	11.859		
6,400.0	6,364.5	6,379.8	6,364.5	17.4	14.6	91.84	-30.0	231.3	328.8	300.8	27.97	11.756		
6,500.0	6,460.8	6,480.2	6,464.7	17.5	14.8	95.49	-35.6	231.2	330.2	301.8	28.35	11.646		
6,600.0	6,552.7	6,583.8	6,566.4	17.8	15.0	99.06	-55.1	230.9	332.9	304.2	28.74	11.583		
6,700.0	6,638.7	6,690.6	6,667.5	18.0	15.2	102.47	-89.3	230.4	336.9	307.7	29.13	11.563		
6,800.0	6,717.4	6,800.8	6,765.7	18.3	15.5	105.65	-139.1	229.6	341.7	312.1	29.55	11.561		
6,900.0	6,787.3	6,914.5	6,858.5	18.7	15.8	108.53	-204.7	228.5	347.0	316.9	30.09	11.532		
7,000.0	6,847.3	7,031.7	6,942.8	19.3	16.4	111.04	-285.8	227.2	352.4	321.6	30.86	11.421		
7,100.0	6,896.3	7,152.0	7,015.4	20.0	17.1	113.13	-381.6	225.7	357.5	325.5	32.00	11.173		
7,200.0	6,933.6	7,275.1	7,073.2	20.8	18.1	114.76	-490.1	224.0	361.9	328.2	33.64	10.755		
7,300.0	6,958.5	7,400.4	7,113.4	21.8	19.4	115.90	-608.7	222.0	365.1	329.2	35.84	10.185		
7,400.0	6,970.5	7,523.0	7,133.6	22.9	20.8	116.53	-729.4	220.1	366.9	328.4	38.55	9.519		
7,500.0	6,971.4	7,629.8	7,143.8	24.1	22.2	117.71	-835.7	218.4	370.9	329.9	40.97	9.051		
7,600.0	6,970.9	7,740.4	7,146.1	25.4	23.7	118.10	-946.3	216.6	372.0	328.4	43.55	8.540		
7,700.0	6,970.4	7,840.4	7,146.2	26.8	25.2	118.19	-1,046.3	215.0	372.2	326.0	46.19	8.058		
7,800.0	6,969.8	7,940.4	7,146.3	28.2	26.7	118.28	-1,146.2	213.4	372.5	323.6	48.92	7.614		
7,900.0	6,969.3	8,040.4	7,146.5	29.7	28.3	118.37	-1,246.2	211.8	372.7	321.0	51.73	7.205		
8,000.0	6,968.8	8,140.4	7,146.6	31.3	29.9	118.46	-1,346.2	210.2	373.0	318.4	54.61	6.831		
8,100.0	6,968.3	8,240.4	7,146.7	32.9	31.5	118.55	-1,446.2	208.6	373.2	315.7	57.53	6.487		
8,200.0	6,967.8	8,340.4	7,146.8	34.5	33.2	118.64	-1,546.2	207.0	373.5	313.0	60.51	6.173		
8,300.0	6,967.3	8,440.4	7,147.0	36.1	34.9	118.73	-1,646.2	205.3	373.8	310.2	63.52	5.884		
8,400.0	6,966.8	8,540.4	7,147.1	37.8	36.6	118.81	-1,746.2	203.7	374.0	307.4	66.57	5.618		
8,500.0	6,966.3	8,640.4	7,147.2	39.5	38.3	118.90	-1,846.1	202.1	374.3	304.6	69.65	5.374		
8,600.0	6,965.8	8,740.4	7,147.3	41.2	40.1	118.99	-1,946.1	200.5	374.5	301.8	72.75	5.149		
8,700.0	6,965.3	8,840.4	7,147.5	42.9	41.9	119.08	-2,046.1	198.9	374.8	298.9	75.86	4.940		
8,800.0	6,964.8	8,940.4	7,147.6	44.7	43.6	119.17	-2,146.1	197.3	375.1	296.1	79.00	4.748		
8,900.0	6,964.3	9,040.4	7,147.7	46.4	45.4	119.26	-2,246.1	195.7	375.3	293.2	82.15	4.569		
9,000.0	6,963.8	9,140.4	7,147.8	48.2	47.2	119.34	-2,346.1	194.1	375.6	290.3	85.31	4.403		
9,100.0	6,963.3	9,240.4	7,148.0	50.0	49.0	119.43	-2,446.1	192.5	375.9	287.4	88.48	4.248		
9,200.0	6,962.8	9,340.4	7,148.1	51.8	50.9	119.52	-2,546.0	190.8	376.1	284.5	91.67	4.103		
9,300.0	6,962.3	9,440.4	7,148.2	53.6	52.7	119.61	-2,646.0	189.2	376.4	281.5	94.85	3.968		
9,400.0	6,961.7	9,540.4	7,148.3	55.4	54.5	119.69	-2,746.0	187.6	376.7	278.6	98.05	3.842		
9,500.0	6,961.2	9,640.4	7,148.5	57.2	56.3	119.78	-2,846.0	186.0	376.9	275.7	101.25	3.723		
9,600.0	6,960.7	9,740.4	7,148.6	59.0	58.2	119.87	-2,946.0	184.4	377.2	272.8	104.45	3.611		
9,700.0	6,960.2	9,840.4	7,148.7	60.9	60.0	119.95	-3,046.0	182.8	377.5	269.8	107.66	3.506		
9,800.0	6,959.7	9,940.4	7,148.8	62.7	61.9	120.04	-3,145.9	181.2	377.7	266.9	110.87	3.407		
9,900.0	6,959.2	10,040.4	7,149.0	64.5	63.7	120.13	-3,245.9	179.6	378.0	263.9	114.08	3.314		

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 Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design		Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2R-403 - Wellbore #1										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					
10,000.0	6,958.7	10,140.4	7,149.1	66.4	65.6	120.21	-3,345.9	178.0	378.3	261.0	117.30	3.225					
10,100.0	6,958.2	10,240.4	7,149.2	68.2	67.5	120.30	-3,445.9	176.4	378.6	258.1	120.51	3.141					
10,200.0	6,957.7	10,340.4	7,149.3	70.1	69.3	120.39	-3,545.9	174.7	378.8	255.1	123.72	3.062					
10,300.0	6,957.2	10,440.4	7,149.5	71.9	71.2	120.47	-3,645.9	173.1	379.1	252.2	126.94	2.987					
10,400.0	6,956.7	10,540.4	7,149.6	73.8	73.0	120.56	-3,745.9	171.5	379.4	249.2	130.15	2.915					
10,500.0	6,956.2	10,640.4	7,149.7	75.6	74.9	120.65	-3,845.8	169.9	379.7	246.3	133.36	2.847					
10,600.0	6,955.7	10,740.4	7,149.8	77.5	76.8	120.73	-3,945.8	168.3	380.0	243.4	136.58	2.782					
10,700.0	6,955.2	10,840.4	7,150.0	79.4	78.7	120.82	-4,045.8	166.7	380.2	240.4	139.79	2.720					
10,800.0	6,954.7	10,940.4	7,150.1	81.2	80.5	120.90	-4,145.8	165.1	380.5	237.5	143.00	2.661					
10,900.0	6,954.2	11,040.4	7,150.2	83.1	82.4	120.99	-4,245.8	163.5	380.8	234.6	146.20	2.605					
11,000.0	6,953.6	11,140.4	7,150.3	85.0	84.3	121.07	-4,345.8	161.9	381.1	231.7	149.41	2.551					
11,100.0	6,953.1	11,240.4	7,150.5	86.8	86.2	121.16	-4,445.7	160.2	381.4	228.8	152.61	2.499					
11,200.0	6,952.6	11,340.4	7,150.6	88.7	88.1	121.24	-4,545.7	158.6	381.6	225.8	155.81	2.449					
11,300.0	6,952.1	11,440.4	7,150.7	90.6	90.0	121.33	-4,645.7	157.0	381.9	222.9	159.01	2.402					
11,400.0	6,951.6	11,540.4	7,150.8	92.5	91.8	121.41	-4,745.7	155.4	382.2	220.0	162.20	2.356					
11,500.0	6,951.1	11,640.4	7,151.0	94.3	93.7	121.50	-4,845.7	153.8	382.5	217.1	165.40	2.313					
11,523.2	6,951.0	11,663.6	7,151.0	94.8	94.2	121.52	-4,868.9	153.4	382.6	216.4	166.14	2.303 SF					

Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2U-203 - Wellbore #1													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		
0.0	0.0	0.0	0.0	0.0	0.0	90.01	0.0	58.5	58.5					
100.0	100.0	100.0	100.0	0.1	0.1	90.01	0.0	58.5	58.5	58.3	0.22	260.423		
200.0	200.0	200.0	200.0	0.3	0.3	90.01	0.0	58.5	58.5	57.9	0.67	86.808	CC, ES	
300.0	300.0	298.0	297.9	0.6	0.5	90.05	-0.1	60.2	60.2	59.1	1.11	54.321		
400.0	400.0	395.7	395.5	0.8	0.8	90.16	-0.2	65.2	65.4	63.8	1.55	42.151		
500.0	500.0	493.0	492.5	1.0	1.0	90.31	-0.4	73.5	73.9	71.9	2.02	36.617		
600.0	600.0	589.6	588.4	1.2	1.3	90.48	-0.7	85.0	85.8	83.2	2.52	34.073		
700.0	700.0	685.3	683.0	1.5	1.6	90.63	-1.1	99.5	101.0	97.9	3.06	33.047		
800.0	800.0	779.9	776.0	1.7	2.0	90.76	-1.6	117.0	119.5	115.8	3.64	32.840		
900.0	900.0	876.1	869.9	1.9	2.4	90.87	-2.1	137.3	140.6	136.3	4.27	32.955		
1,000.0	1,000.0	973.7	965.3	2.1	2.8	90.96	-2.6	158.2	162.0	157.1	4.92	32.916		
1,100.0	1,100.0	1,071.8	1,061.1	2.3	3.2	-2.05	-3.2	179.2	181.7	176.9	4.77	38.091		
1,200.0	1,199.8	1,170.4	1,157.5	2.6	3.7	-2.04	-3.8	200.3	197.9	192.7	5.21	37.962		
1,300.0	1,299.5	1,269.6	1,254.4	2.8	4.1	-2.06	-4.3	221.5	210.7	205.1	5.67	37.195		
1,400.0	1,398.7	1,369.1	1,351.6	3.0	4.6	-2.12	-4.9	242.8	220.3	214.2	6.13	35.940		
1,500.0	1,497.9	1,468.7	1,448.9	3.3	5.1	-2.18	-5.4	264.1	229.3	222.7	6.61	34.700		
1,600.0	1,597.2	1,568.3	1,546.2	3.5	5.5	-2.24	-6.0	285.4	238.3	231.2	7.09	33.606		
1,700.0	1,696.4	1,667.9	1,643.5	3.8	6.0	-2.29	-6.6	306.7	247.3	239.7	7.58	32.635		
1,800.0	1,795.6	1,767.5	1,740.8	4.1	6.5	-2.34	-7.1	328.0	256.3	248.2	8.07	31.769		
1,900.0	1,894.8	1,867.1	1,838.0	4.4	6.9	-2.39	-7.7	349.3	265.3	256.7	8.56	30.992		
2,000.0	1,994.0	1,966.7	1,935.3	4.7	7.4	-2.43	-8.3	370.6	274.3	265.2	9.05	30.293		
2,100.0	2,093.2	2,066.3	2,032.6	5.0	7.8	-2.47	-8.8	391.9	283.3	273.7	9.55	29.659		
2,200.0	2,192.4	2,165.9	2,129.9	5.3	8.3	-2.51	-9.4	413.2	292.3	282.2	10.05	29.084		
2,300.0	2,291.6	2,265.5	2,227.2	5.6	8.8	-2.54	-10.0	434.5	301.3	290.7	10.55	28.560		
2,400.0	2,390.9	2,365.1	2,324.5	5.9	9.3	-2.57	-10.5	455.8	310.2	299.2	11.05	28.079		
2,500.0	2,490.1	2,464.7	2,421.8	6.2	9.7	-2.61	-11.1	477.1	319.2	307.7	11.55	27.638		
2,600.0	2,589.3	2,564.3	2,519.1	6.5	10.2	-2.64	-11.6	498.4	328.2	316.2	12.05	27.231		
2,700.0	2,688.5	2,663.9	2,616.4	6.8	10.7	-2.66	-12.2	519.7	337.2	324.7	12.56	26.856		
2,800.0	2,787.7	2,763.5	2,713.7	7.1	11.1	-2.69	-12.8	541.0	346.2	333.1	13.06	26.507		
2,900.0	2,886.9	2,863.1	2,810.9	7.5	11.6	-2.72	-13.3	562.3	355.2	341.6	13.57	26.184		
3,000.0	2,986.1	2,962.7	2,908.2	7.8	12.1	-2.74	-13.9	583.6	364.2	350.1	14.07	25.882		
3,100.0	3,085.3	3,062.3	3,005.5	8.1	12.5	-2.76	-14.5	604.9	373.2	358.6	14.58	25.601		
3,200.0	3,184.5	3,161.9	3,102.8	8.4	13.0	-2.78	-15.0	626.1	382.2	367.1	15.08	25.337		
3,300.0	3,283.8	3,261.4	3,200.1	8.7	13.5	-2.81	-15.6	647.4	391.2	375.6	15.59	25.090		
3,400.0	3,383.0	3,361.0	3,297.4	9.1	13.9	-2.83	-16.2	668.7	400.2	384.1	16.10	24.858		
3,500.0	3,482.2	3,460.6	3,394.7	9.4	14.4	-2.84	-16.7	690.0	409.1	392.5	16.61	24.640		
3,600.0	3,581.4	3,560.2	3,492.0	9.7	14.9	-2.86	-17.3	711.3	418.1	401.0	17.11	24.434		
3,700.0	3,680.6	3,659.8	3,589.3	10.0	15.3	-2.88	-17.8	732.6	427.1	409.5	17.62	24.240		
3,800.0	3,779.8	3,759.4	3,686.5	10.3	15.8	-2.90	-18.4	753.9	436.1	418.0	18.13	24.056		
3,900.0	3,879.0	3,859.0	3,783.8	10.7	16.3	-2.91	-19.0	775.2	445.1	426.5	18.64	23.881		
4,000.0	3,978.2	3,958.6	3,881.1	11.0	16.8	-2.93	-19.5	796.5	454.1	435.0	19.15	23.716		
4,100.0	4,077.5	4,058.2	3,978.4	11.3	17.2	-2.94	-20.1	817.8	463.1	443.4	19.66	23.559		
4,200.0	4,176.7	4,157.8	4,075.7	11.6	17.7	-2.96	-20.7	839.1	472.1	451.9	20.17	23.410		
4,300.0	4,275.9	4,257.4	4,173.0	11.9	18.2	-2.97	-21.2	860.4	481.1	460.4	20.68	23.268		
4,400.0	4,375.1	4,357.0	4,270.3	12.3	18.6	-2.98	-21.8	881.7	490.1	468.9	21.19	23.133		
4,500.0	4,474.3	4,456.6	4,367.6	12.6	19.1	-3.00	-22.3	903.0	499.1	477.4	21.70	23.003		
4,600.0	4,573.5	4,556.2	4,464.9	12.9	19.6	-3.01	-22.9	924.3	508.1	485.9	22.21	22.880		
4,700.0	4,672.7	4,655.8	4,562.1	13.2	20.0	-3.02	-23.5	945.6	517.1	494.3	22.72	22.762		
4,800.0	4,771.9	4,755.4	4,659.4	13.6	20.5	-3.03	-24.0	966.9	526.0	502.8	23.23	22.649		
4,900.0	4,871.1	4,855.0	4,756.7	13.9	21.0	-3.04	-24.6	988.2	535.0	511.3	23.74	22.541		
5,000.0	4,970.4	4,954.6	4,854.0	14.2	21.4	-3.05	-25.2	1,009.5	544.0	519.8	24.25	22.437		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design		Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2U-203 - Wellbore #1										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 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				
5,100.0	5,069.6	5,054.2	4,951.3	14.5	21.9	-3.07	-25.7	1,030.8	553.0	528.3	24.76	22.337				
5,200.0	5,168.8	5,153.7	5,048.6	14.9	22.4	-3.08	-26.3	1,052.1	562.0	536.7	25.27	22.242				
5,300.0	5,268.0	5,253.3	5,145.9	15.2	22.9	-3.08	-26.9	1,073.4	571.0	545.2	25.78	22.150				
5,400.0	5,367.2	5,352.9	5,243.2	15.5	23.3	-3.09	-27.4	1,094.7	580.0	553.7	26.29	22.061				
5,500.0	5,466.4	5,452.5	5,340.4	15.8	23.8	-3.11	-28.0	1,116.0	589.1	562.3	26.79	21.991				
5,600.0	5,565.9	5,565.5	5,451.0	16.0	24.3	-3.11	-28.6	1,139.4	600.1	572.9	27.22	22.049				
5,700.0	5,665.7	5,691.6	5,575.2	16.2	24.7	-3.11	-29.2	1,160.9	610.8	583.2	27.60	22.133				
5,800.0	5,765.7	5,818.3	5,700.9	16.4	25.0	-3.10	-29.6	1,176.9	620.5	592.6	27.91	22.231				
5,900.0	5,865.7	5,945.8	5,827.9	16.6	25.2	89.99	-29.9	1,187.4	628.5	600.2	28.32	22.196				
6,000.0	5,965.7	6,073.9	5,956.0	16.7	25.4	90.00	-30.0	1,192.2	632.3	603.6	28.72	22.018				
6,100.0	6,065.7	6,183.6	6,065.7	16.9	25.5	90.00	-30.0	1,192.5	632.5	603.4	29.09	21.743				
6,200.0	6,165.7	6,283.6	6,165.7	17.0	25.6	90.00	-30.0	1,192.5	632.5	603.1	29.46	21.473				
6,300.0	6,265.6	6,384.4	6,266.4	17.2	25.7	-90.91	-32.7	1,192.5	632.5	602.7	29.78	21.239				
6,396.4	6,361.0	6,482.0	6,362.9	17.4	25.8	-90.84	-47.0	1,192.3	632.5	602.4	30.14	20.988				
6,400.0	6,364.5	6,485.7	6,366.4	17.4	25.8	-90.84	-47.8	1,192.3	632.5	602.4	30.15	20.979				
6,500.0	6,460.8	6,586.8	6,463.5	17.5	26.0	-90.74	-75.9	1,191.8	632.5	602.0	30.56	20.699				
6,600.0	6,552.7	6,687.7	6,555.8	17.8	26.1	-90.64	-116.5	1,191.2	632.5	601.5	31.04	20.376				
6,700.0	6,638.7	6,788.5	6,641.9	18.0	26.3	-90.52	-168.8	1,190.3	632.6	600.9	31.65	19.983				
6,800.0	6,717.4	6,889.1	6,720.2	18.3	26.5	-90.40	-231.9	1,189.3	632.6	600.1	32.45	19.493				
6,900.0	6,787.3	6,989.6	6,789.4	18.7	26.8	-90.27	-304.6	1,188.1	632.6	599.1	33.49	18.891				
7,000.0	6,847.3	7,089.8	6,848.4	19.3	27.1	-90.13	-385.5	1,186.9	632.7	597.9	34.81	18.176				
7,100.0	6,896.3	7,189.9	6,896.2	20.0	27.6	-90.00	-473.4	1,185.5	632.7	596.3	36.43	17.367				
7,200.0	6,933.6	7,289.8	6,932.0	20.8	28.1	-89.86	-566.5	1,184.0	632.8	594.4	38.36	16.495				
7,300.0	6,958.5	7,389.4	6,955.4	21.8	28.8	-89.73	-663.3	1,182.4	632.9	592.3	40.58	15.597				
7,400.0	6,970.5	7,488.9	6,966.0	22.9	29.6	-89.60	-762.1	1,180.8	632.9	589.9	43.02	14.712				
7,500.0	6,971.4	7,588.7	6,966.4	24.1	30.5	-89.55	-861.9	1,179.2	633.0	587.4	45.64	13.868				
7,600.0	6,970.9	7,688.7	6,966.0	25.4	31.5	-89.56	-961.9	1,177.6	633.1	584.6	48.42	13.075				
7,700.0	6,970.4	7,788.7	6,965.6	26.8	32.6	-89.57	-1,061.9	1,176.1	633.1	581.8	51.32	12.336				
7,800.0	6,969.8	7,888.7	6,965.3	28.2	33.8	-89.58	-1,161.8	1,174.5	633.2	578.8	54.35	11.651				
7,900.0	6,969.3	7,988.7	6,964.9	29.7	35.0	-89.60	-1,261.8	1,172.9	633.2	575.8	57.46	11.020				
8,000.0	6,968.8	8,088.7	6,964.5	31.3	36.3	-89.61	-1,361.8	1,171.3	633.3	572.6	60.66	10.440				
8,100.0	6,968.3	8,188.7	6,964.1	32.9	37.7	-89.62	-1,461.8	1,169.7	633.4	569.4	63.93	9.907				
8,200.0	6,967.8	8,288.7	6,963.7	34.5	39.1	-89.63	-1,561.8	1,168.1	633.4	566.2	67.26	9.418				
8,300.0	6,967.3	8,388.7	6,963.3	36.1	40.5	-89.64	-1,661.8	1,166.5	633.5	562.9	70.64	8.968				
8,400.0	6,966.8	8,488.7	6,963.0	37.8	42.0	-89.65	-1,761.8	1,164.9	633.6	559.5	74.06	8.555				
8,500.0	6,966.3	8,588.7	6,962.6	39.5	43.6	-89.66	-1,861.8	1,163.3	633.6	556.1	77.52	8.173				
8,600.0	6,965.8	8,688.7	6,962.2	41.2	45.1	-89.67	-1,961.7	1,161.7	633.7	552.7	81.02	7.822				
8,700.0	6,965.3	8,788.7	6,961.8	42.9	46.7	-89.68	-2,061.7	1,160.1	633.8	549.2	84.54	7.496				
8,800.0	6,964.8	8,888.7	6,961.4	44.7	48.3	-89.70	-2,161.7	1,158.5	633.8	545.7	88.09	7.195				
8,900.0	6,964.3	8,988.7	6,961.0	46.4	49.9	-89.71	-2,261.7	1,156.9	633.9	542.2	91.66	6.915				
9,000.0	6,963.8	9,088.7	6,960.6	48.2	51.6	-89.72	-2,361.7	1,155.3	633.9	538.7	95.25	6.655				
9,100.0	6,963.3	9,188.7	6,960.3	50.0	53.3	-89.73	-2,461.7	1,153.7	634.0	535.1	98.86	6.413				
9,200.0	6,962.8	9,288.7	6,959.9	51.8	55.0	-89.74	-2,561.7	1,152.1	634.1	531.6	102.49	6.187				
9,300.0	6,962.3	9,388.7	6,959.5	53.6	56.7	-89.75	-2,661.6	1,150.5	634.1	528.0	106.13	5.975				
9,400.0	6,961.7	9,488.7	6,959.1	55.4	58.4	-89.76	-2,761.6	1,148.9	634.2	524.4	109.78	5.777				
9,500.0	6,961.2	9,588.7	6,958.7	57.2	60.1	-89.77	-2,861.6	1,147.3	634.3	520.8	113.45	5.591				
9,600.0	6,960.7	9,688.7	6,958.3	59.0	61.8	-89.78	-2,961.6	1,145.7	634.3	517.2	117.12	5.416				
9,700.0	6,960.2	9,788.7	6,958.0	60.9	63.6	-89.80	-3,061.6	1,144.1	634.4	513.6	120.81	5.251				
9,800.0	6,959.7	9,888.7	6,957.6	62.7	65.3	-89.81	-3,161.6	1,142.5	634.5	510.0	124.50	5.096				
9,900.0	6,959.2	9,988.7	6,957.2	64.5	67.1	-89.82	-3,261.6	1,140.9	634.5	506.3	128.20	4.949				

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 Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design		Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2U-203 - Wellbore #1										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		Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor					
							+N/-S (ft)	+E/-W (ft)									
10,000.0	6,958.7	10,088.7	6,956.8	66.4	68.9	-89.83	-3,361.5	1,139.3	634.6	502.7	131.91	4.811					
10,100.0	6,958.2	10,188.7	6,956.4	68.2	70.7	-89.84	-3,461.5	1,137.7	634.6	499.0	135.63	4.679					
10,200.0	6,957.7	10,288.7	6,956.0	70.1	72.5	-89.85	-3,561.5	1,136.1	634.7	495.4	139.35	4.555					
10,300.0	6,957.2	10,388.7	6,955.7	71.9	74.3	-89.86	-3,661.5	1,134.5	634.8	491.7	143.08	4.437					
10,400.0	6,956.7	10,488.7	6,955.3	73.8	76.1	-89.87	-3,761.5	1,132.9	634.8	488.0	146.81	4.324					
10,500.0	6,956.2	10,588.7	6,954.9	75.6	77.9	-89.88	-3,861.5	1,131.3	634.9	484.3	150.55	4.217					
10,600.0	6,955.7	10,688.7	6,954.5	77.5	79.7	-89.89	-3,961.5	1,129.7	635.0	480.7	154.29	4.115					
10,700.0	6,955.2	10,788.7	6,954.1	79.4	81.5	-89.91	-4,061.5	1,128.1	635.0	477.0	158.03	4.018					
10,800.0	6,954.7	10,888.7	6,953.7	81.2	83.3	-89.92	-4,161.4	1,126.5	635.1	473.3	161.79	3.925					
10,900.0	6,954.2	10,988.7	6,953.4	83.1	85.1	-89.93	-4,261.4	1,124.9	635.1	469.6	165.54	3.837					
11,000.0	6,953.6	11,088.7	6,953.0	85.0	87.0	-89.94	-4,361.4	1,123.3	635.2	465.9	169.30	3.752					
11,100.0	6,953.1	11,188.7	6,952.6	86.8	88.8	-89.95	-4,461.4	1,121.7	635.3	462.2	173.06	3.671					
11,200.0	6,952.6	11,288.7	6,952.2	88.7	90.6	-89.96	-4,561.4	1,120.1	635.3	458.5	176.82	3.593					
11,300.0	6,952.1	11,388.7	6,951.8	90.6	92.5	-89.97	-4,661.4	1,118.5	635.4	454.8	180.59	3.519					
11,400.0	6,951.6	11,488.7	6,951.4	92.5	94.3	-89.98	-4,761.4	1,117.0	635.5	451.1	184.36	3.447					
11,500.0	6,951.1	11,588.7	6,951.1	94.3	96.2	-89.99	-4,861.3	1,115.4	635.5	447.4	188.13	3.378					
11,502.3	6,951.1	11,591.0	6,951.0	94.4	96.2	-89.99	-4,863.6	1,115.3	635.5	447.3	188.21	3.377					
11,523.2	6,951.0	11,601.8	6,951.0	94.8	96.4	-90.00	-4,874.4	1,115.1	635.6	446.8	188.81	3.366 SF					

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design		Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2U-443 - Wellbore #1										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		
0.0	0.0	0.0	0.0	0.0	0.0	90.00	0.0	30.7	30.7					
100.0	100.0	100.0	100.0	0.1	0.1	90.00	0.0	30.7	30.7	30.4	0.22	136.412		
200.0	200.0	200.0	200.0	0.3	0.3	90.00	0.0	30.7	30.7	30.0	0.67	45.471		
300.0	300.0	300.0	300.0	0.6	0.6	90.00	0.0	30.7	30.7	29.5	1.12	27.282		
400.0	400.0	400.0	400.0	0.8	0.8	90.00	0.0	30.7	30.7	29.1	1.57	19.487 CC, ES		
500.0	500.0	498.9	498.9	1.0	1.0	90.10	-0.1	32.4	32.4	30.4	2.01	16.125		
600.0	600.0	597.6	597.4	1.2	1.2	90.34	-0.2	37.5	37.6	35.1	2.44	15.369		
700.0	700.0	695.8	695.2	1.5	1.4	90.62	-0.5	45.9	46.2	43.3	2.90	15.916		
800.0	800.0	793.3	792.0	1.7	1.7	90.88	-0.9	57.6	58.2	54.8	3.39	17.178		
900.0	900.0	889.9	887.5	1.9	2.0	91.08	-1.4	72.4	73.5	69.6	3.91	18.801		
1,000.0	1,000.0	987.8	983.9	2.1	2.3	91.24	-1.9	89.7	91.1	86.7	4.47	20.387		
1,100.0	1,100.0	1,086.5	1,081.0	2.3	2.7	-1.74	-2.5	107.1	107.1	102.4	4.68	22.885		
1,200.0	1,199.8	1,185.7	1,178.7	2.6	3.1	-1.73	-3.1	124.6	119.6	114.5	5.11	23.421		
1,300.0	1,299.5	1,285.3	1,276.7	2.8	3.4	-1.77	-3.7	142.3	128.6	123.1	5.54	23.211		
1,400.0	1,398.7	1,385.1	1,375.0	3.0	3.8	-1.84	-4.2	159.9	134.5	128.5	5.99	22.450		
1,500.0	1,497.9	1,485.0	1,473.2	3.3	4.2	-1.92	-4.8	177.5	139.7	133.2	6.45	21.653		
1,600.0	1,597.2	1,584.9	1,571.5	3.5	4.6	-2.00	-5.4	195.2	144.9	138.0	6.92	20.942		
1,700.0	1,696.4	1,684.7	1,669.8	3.8	5.0	-2.07	-6.0	212.9	150.1	142.7	7.39	20.311		
1,800.0	1,795.6	1,784.6	1,768.1	4.1	5.4	-2.14	-6.6	230.5	155.4	147.5	7.87	19.747		
1,900.0	1,894.8	1,884.5	1,866.4	4.4	5.8	-2.20	-7.1	248.2	160.6	152.2	8.35	19.240		
2,000.0	1,994.0	1,984.3	1,964.7	4.7	6.2	-2.25	-7.7	265.8	165.8	157.0	8.83	18.784		
2,100.0	2,093.2	2,084.2	2,063.0	5.0	6.6	-2.31	-8.3	283.5	171.0	161.7	9.31	18.370		
2,200.0	2,192.4	2,184.0	2,161.3	5.3	7.0	-2.36	-8.9	301.1	176.2	166.4	9.79	17.994		
2,300.0	2,291.6	2,283.9	2,259.6	5.6	7.4	-2.41	-9.5	318.8	181.4	171.2	10.28	17.651		
2,400.0	2,390.9	2,383.8	2,357.9	5.9	7.8	-2.45	-10.0	336.4	186.7	175.9	10.77	17.337		
2,500.0	2,490.1	2,483.6	2,456.1	6.2	8.2	-2.49	-10.6	354.1	191.9	180.6	11.25	17.048		
2,600.0	2,589.3	2,583.5	2,554.4	6.5	8.6	-2.54	-11.2	371.7	197.1	185.4	11.74	16.782		
2,700.0	2,688.5	2,683.4	2,652.7	6.8	9.0	-2.57	-11.8	389.4	202.3	190.1	12.23	16.536		
2,800.0	2,787.7	2,783.2	2,751.0	7.1	9.4	-2.61	-12.4	407.0	207.5	194.8	12.73	16.308		
2,900.0	2,886.9	2,883.1	2,849.3	7.5	9.8	-2.64	-12.9	424.7	212.8	199.5	13.22	16.096		
3,000.0	2,986.1	2,983.0	2,947.6	7.8	10.2	-2.68	-13.5	442.3	218.0	204.3	13.71	15.899		
3,100.0	3,085.3	3,082.8	3,045.9	8.1	10.6	-2.71	-14.1	460.0	223.2	209.0	14.20	15.714		
3,200.0	3,184.5	3,182.7	3,144.2	8.4	11.0	-2.74	-14.7	477.6	228.4	213.7	14.70	15.542		
3,300.0	3,283.8	3,282.5	3,242.5	8.7	11.4	-2.77	-15.3	495.3	233.6	218.4	15.19	15.380		
3,400.0	3,383.0	3,382.4	3,340.7	9.1	11.9	-2.80	-15.8	512.9	238.8	223.2	15.69	15.228		
3,500.0	3,482.2	3,482.3	3,439.0	9.4	12.3	-2.82	-16.4	530.6	244.1	227.9	16.18	15.084		
3,600.0	3,581.4	3,582.1	3,537.3	9.7	12.7	-2.85	-17.0	548.2	249.3	232.6	16.68	14.950		
3,700.0	3,680.6	3,682.0	3,635.6	10.0	13.1	-2.87	-17.6	565.9	254.5	237.3	17.17	14.822		
3,800.0	3,779.8	3,781.9	3,733.9	10.3	13.5	-2.89	-18.1	583.5	259.7	242.1	17.67	14.702		
3,900.0	3,879.0	3,881.7	3,832.2	10.7	13.9	-2.92	-18.7	601.2	264.9	246.8	18.16	14.587		
4,000.0	3,978.2	3,981.6	3,930.5	11.0	14.3	-2.94	-19.3	618.8	270.2	251.5	18.66	14.479		
4,100.0	4,077.5	4,081.5	4,028.8	11.3	14.7	-2.96	-19.9	636.5	275.4	256.2	19.16	14.376		
4,200.0	4,176.7	4,181.3	4,127.1	11.6	15.1	-2.98	-20.5	654.2	280.6	261.0	19.65	14.278		
4,300.0	4,275.9	4,281.2	4,225.3	11.9	15.5	-3.00	-21.0	671.8	285.8	265.7	20.15	14.185		
4,400.0	4,375.1	4,381.0	4,323.6	12.3	15.9	-3.02	-21.6	689.5	291.0	270.4	20.65	14.097		
4,500.0	4,474.3	4,480.9	4,421.9	12.6	16.3	-3.03	-22.2	707.1	296.3	275.1	21.14	14.012		
4,600.0	4,573.5	4,580.8	4,520.2	12.9	16.7	-3.05	-22.8	724.8	301.5	279.8	21.64	13.931		
4,700.0	4,672.7	4,680.6	4,618.5	13.2	17.1	-3.07	-23.4	742.4	306.7	284.6	22.14	13.854		
4,800.0	4,771.9	4,780.5	4,716.8	13.6	17.5	-3.08	-23.9	760.1	311.9	289.3	22.64	13.779		
4,900.0	4,871.1	4,880.4	4,815.1	13.9	17.9	-3.10	-24.5	777.7	317.1	294.0	23.13	13.708		
5,000.0	4,970.4	4,980.2	4,913.4	14.2	18.3	-3.11	-25.1	795.4	322.4	298.7	23.63	13.640		

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 Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design		Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2U-443 - Wellbore #1										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				
5,100.0	5,069.6	5,080.1	5,011.7	14.5	18.7	-3.13	-25.7	813.0	327.6	303.5	24.13	13.575				
5,200.0	5,168.8	5,180.0	5,110.0	14.9	19.1	-3.14	-26.3	830.7	332.8	308.2	24.63	13.512				
5,300.0	5,268.0	5,279.8	5,208.2	15.2	19.6	-3.16	-26.8	848.3	338.0	312.9	25.13	13.452				
5,400.0	5,367.2	5,379.7	5,306.5	15.5	20.0	-3.17	-27.4	866.0	343.2	317.6	25.63	13.394				
5,500.0	5,466.4	5,479.5	5,404.8	15.8	20.4	-3.18	-28.0	883.6	348.6	322.5	26.12	13.347				
5,600.0	5,565.9	5,580.6	5,504.3	16.0	20.8	-3.18	-28.6	901.5	356.4	329.9	26.54	13.431				
5,700.0	5,665.7	5,694.6	5,616.9	16.2	21.1	-3.16	-29.2	918.9	365.4	338.5	26.90	13.584				
5,800.0	5,765.7	5,808.9	5,730.5	16.4	21.4	-3.13	-29.6	932.0	373.8	346.6	27.21	13.740				
5,900.0	5,865.7	5,923.8	5,845.1	16.6	21.6	89.98	-29.9	940.5	381.0	353.4	27.59	13.808				
6,000.0	5,965.7	6,039.2	5,960.4	16.7	21.7	90.00	-30.0	944.4	384.4	356.4	27.98	13.737				
6,100.0	6,065.7	6,144.5	6,065.7	16.9	21.9	90.00	-30.0	944.7	384.7	356.3	28.36	13.562				
6,200.0	6,165.7	6,244.5	6,165.7	17.0	22.0	90.00	-30.0	944.7	384.7	355.9	28.74	13.384				
6,227.0	6,192.7	6,271.5	6,192.7	17.1	22.0	-90.99	-30.0	944.7	384.7	355.9	28.81	13.352				
6,300.0	6,265.6	6,344.4	6,265.6	17.2	22.1	-91.28	-30.0	944.7	384.7	355.6	29.09	13.226				
6,400.0	6,364.5	6,443.4	6,364.5	17.4	22.3	-93.30	-30.0	944.7	385.3	355.8	29.51	13.054				
6,500.0	6,460.8	6,545.3	6,466.2	17.5	22.4	-96.39	-35.8	944.6	387.1	357.1	30.02	12.897				
6,600.0	6,552.7	6,650.6	6,569.5	17.8	22.5	-99.40	-55.9	944.2	390.1	359.5	30.59	12.751				
6,700.0	6,638.7	6,759.2	6,672.1	18.0	22.7	-102.25	-91.3	943.6	393.9	362.7	31.23	12.613				
6,800.0	6,717.4	6,871.4	6,771.7	18.3	22.9	-104.88	-142.7	942.8	398.4	366.5	31.93	12.477				
6,900.0	6,787.3	6,986.9	6,865.2	18.7	23.2	-107.23	-210.3	941.7	403.1	370.5	32.68	12.335				
7,000.0	6,847.3	7,105.8	6,949.8	19.3	23.5	-109.25	-293.8	940.3	407.8	374.3	33.51	12.171				
7,100.0	6,896.3	7,227.7	7,021.9	20.0	24.0	-110.89	-391.9	938.7	412.0	377.5	34.44	11.962				
7,200.0	6,933.6	7,352.1	7,078.5	20.8	24.7	-112.11	-502.5	936.8	415.3	379.8	35.53	11.690				
7,300.0	6,958.5	7,478.4	7,116.8	21.8	25.6	-112.88	-622.6	934.8	417.5	380.7	36.84	11.334				
7,400.0	6,970.5	7,598.2	7,134.9	22.9	26.7	-113.23	-740.9	932.9	418.6	380.3	38.31	10.927				
7,500.0	6,971.4	7,707.3	7,144.5	24.1	27.8	-114.23	-849.6	931.1	421.9	381.8	40.07	10.528				
7,600.0	6,970.9	7,815.9	7,146.0	25.4	29.0	-114.48	-958.2	929.3	422.6	380.0	42.63	9.914				
7,700.0	6,970.4	7,915.9	7,146.0	26.8	30.2	-114.54	-1,058.1	927.6	422.8	377.6	45.27	9.341				
7,800.0	6,969.8	8,015.9	7,146.0	28.2	31.5	-114.60	-1,158.1	925.9	423.0	375.0	48.02	8.810				
7,900.0	6,969.3	8,115.9	7,146.0	29.7	32.8	-114.66	-1,258.1	924.3	423.2	372.4	50.86	8.322				
8,000.0	6,968.8	8,215.9	7,146.0	31.3	34.2	-114.73	-1,358.1	922.6	423.5	369.7	53.78	7.874				
8,100.0	6,968.3	8,315.9	7,146.0	32.9	35.6	-114.79	-1,458.1	921.0	423.7	366.9	56.76	7.464				
8,200.0	6,967.8	8,415.9	7,146.0	34.5	37.1	-114.85	-1,558.1	919.3	423.9	364.1	59.80	7.088				
8,300.0	6,967.3	8,515.9	7,146.0	36.1	38.7	-114.91	-1,658.1	917.6	424.1	361.2	62.88	6.744				
8,400.0	6,966.8	8,615.9	7,146.0	37.8	40.2	-114.97	-1,758.0	916.0	424.3	358.3	66.01	6.428				
8,500.0	6,966.3	8,715.9	7,146.0	39.5	41.8	-115.04	-1,858.0	914.3	424.5	355.4	69.16	6.138				
8,600.0	6,965.8	8,815.9	7,146.0	41.2	43.5	-115.10	-1,958.0	912.7	424.7	352.4	72.35	5.871				
8,700.0	6,965.3	8,915.9	7,146.0	42.9	45.1	-115.16	-2,058.0	911.0	425.0	349.4	75.56	5.624				
8,800.0	6,964.8	9,015.9	7,146.0	44.7	46.8	-115.22	-2,158.0	909.3	425.2	346.4	78.79	5.397				
8,900.0	6,964.3	9,115.9	7,146.0	46.4	48.5	-115.28	-2,258.0	907.7	425.4	343.4	82.03	5.186				
9,000.0	6,963.8	9,215.9	7,146.0	48.2	50.2	-115.35	-2,358.0	906.0	425.6	340.3	85.30	4.990				
9,100.0	6,963.3	9,315.9	7,146.0	50.0	51.9	-115.41	-2,457.9	904.4	425.8	337.3	88.58	4.808				
9,200.0	6,962.8	9,415.9	7,146.0	51.8	53.6	-115.47	-2,557.9	902.7	426.1	334.2	91.86	4.638				
9,300.0	6,962.3	9,515.9	7,146.0	53.6	55.3	-115.53	-2,657.9	901.0	426.3	331.1	95.16	4.479				
9,400.0	6,961.7	9,615.9	7,146.0	55.4	57.1	-115.59	-2,757.9	899.4	426.5	328.0	98.47	4.331				
9,500.0	6,961.2	9,715.9	7,146.0	57.2	58.9	-115.65	-2,857.9	897.7	426.7	324.9	101.79	4.192				
9,600.0	6,960.7	9,815.9	7,146.0	59.0	60.6	-115.71	-2,957.9	896.1	426.9	321.8	105.11	4.062				
9,700.0	6,960.2	9,915.9	7,146.0	60.9	62.4	-115.78	-3,057.8	894.4	427.2	318.7	108.44	3.939				
9,800.0	6,959.7	10,015.9	7,146.0	62.7	64.2	-115.84	-3,157.8	892.7	427.4	315.6	111.78	3.824				
9,900.0	6,959.2	10,115.9	7,146.0	64.5	66.0	-115.90	-3,257.8	891.1	427.6	312.5	115.11	3.715				

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 Sorin Natural Resources 2R-223
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4686.0ft (RKB -15')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Offset Design		Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2U-443 - Wellbore #1										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					
10,000.0	6,958.7	10,215.9	7,146.0	66.4	67.8	-115.96	-3,357.8	889.4	427.8	309.4	118.45	3.612					
10,100.0	6,958.2	10,315.9	7,146.0	68.2	69.6	-116.02	-3,457.8	887.8	428.0	306.2	121.80	3.514					
10,200.0	6,957.7	10,415.9	7,146.0	70.1	71.4	-116.08	-3,557.8	886.1	428.3	303.1	125.15	3.422					
10,300.0	6,957.2	10,515.9	7,146.0	71.9	73.2	-116.14	-3,657.8	884.4	428.5	300.0	128.50	3.335					
10,400.0	6,956.7	10,615.9	7,146.0	73.8	75.1	-116.20	-3,757.7	882.8	428.7	296.9	131.85	3.252					
10,500.0	6,956.2	10,715.9	7,146.0	75.6	76.9	-116.26	-3,857.7	881.1	428.9	293.7	135.20	3.173					
10,600.0	6,955.7	10,815.9	7,146.0	77.5	78.7	-116.32	-3,957.7	879.5	429.2	290.6	138.55	3.097					
10,700.0	6,955.2	10,915.9	7,146.0	79.4	80.6	-116.38	-4,057.7	877.8	429.4	287.5	141.91	3.026					
10,800.0	6,954.7	11,015.9	7,146.0	81.2	82.4	-116.45	-4,157.7	876.1	429.6	284.4	145.26	2.958					
10,900.0	6,954.2	11,115.9	7,146.0	83.1	84.3	-116.51	-4,257.7	874.5	429.8	281.2	148.62	2.892					
11,000.0	6,953.6	11,215.9	7,146.0	85.0	86.1	-116.57	-4,357.7	872.8	430.1	278.1	151.97	2.830					
11,100.0	6,953.1	11,315.9	7,146.0	86.8	88.0	-116.63	-4,457.6	871.2	430.3	275.0	155.33	2.770					
11,200.0	6,952.6	11,415.9	7,146.0	88.7	89.8	-116.69	-4,557.6	869.5	430.5	271.8	158.68	2.713					
11,300.0	6,952.1	11,515.9	7,146.0	90.6	91.7	-116.75	-4,657.6	867.8	430.8	268.7	162.04	2.658					
11,400.0	6,951.6	11,615.9	7,146.0	92.5	93.5	-116.81	-4,757.6	866.2	431.0	265.6	165.39	2.606					
11,500.0	6,951.1	11,715.9	7,146.0	94.3	95.4	-116.87	-4,857.6	864.5	431.2	262.5	168.74	2.556					
11,523.2	6,951.0	11,732.7	7,146.0	94.8	95.7	-116.88	-4,874.4	864.2	431.3	261.9	169.42	2.546 SF					

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Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4686.0ft (RKB -15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2R-223	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 (01-28-13)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4686.0ft (RKB -15')
 Offset Depths are relative to Offset Datum
 Central Meridian is -105.500000 °

Coordinates are relative to: Sorin Natural Resources 2R-223
 Coordinate System is US State Plane 1983, Colorado Northern Zone
 Grid Convergence at Surface is: 0.49°



Coordinates are relative to: Sorin Natural Resources 2R-223
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.49°

