

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Sorin Natural Resources 2U-443**

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

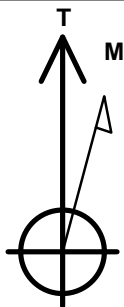
Ground Elevation: 4671.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1370685.96	3211929.38	40.348440	-104.739630	

Ensign Rig #136 - RKB 12.5' WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')

WELBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 20'FNL, 1364'FEL		0.0	0.0	Point
BHL 500'FSL, 379' FEL	7146.0	-4874.4	905.0	Point



Azimuths to True North
Magnetic North: 8.42°

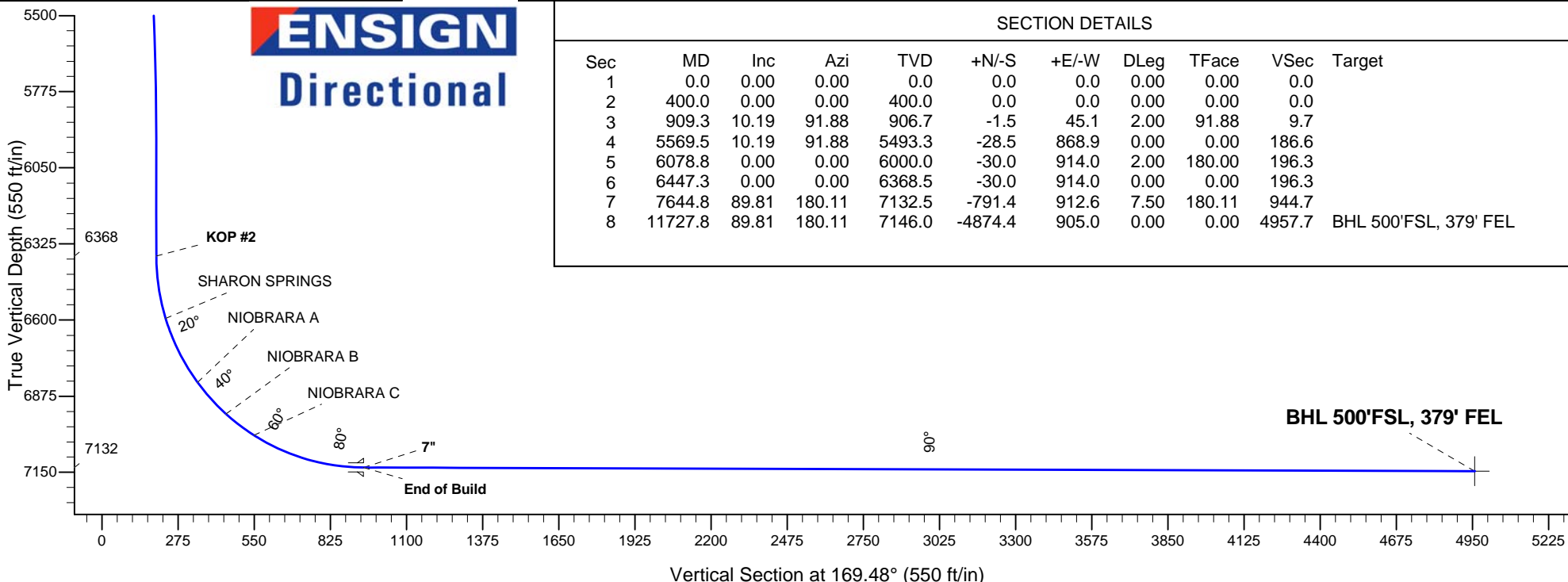
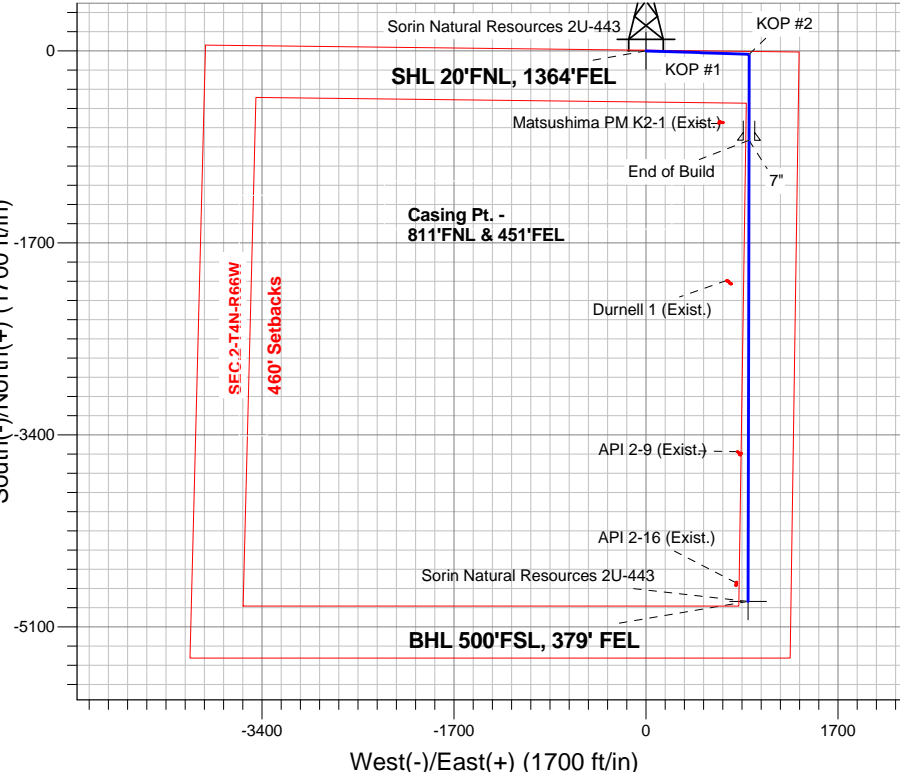
Magnetic Field
Strength: 52777.7snT
Dip Angle: 66.90°
Date: 8/4/2014
Model: IGRF2010

ANNOTATIONS

TVD	MD	Annotation
400.0	400.0	KOP #1
6368.5	6447.3	KOP #2
7132.5	7644.8	End of Build

Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W
Sorin Natural Resources 2U-443
Plan #2 (08-04-14)
6:39, August 06 2014

South(-)/North(+) (1700 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	400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.0	
3	909.3	10.19	91.88	906.7	-1.5	45.1	2.00	91.88	9.7	
4	5569.5	10.19	91.88	5493.3	-28.5	868.9	0.00	0.00	186.6	
5	6078.8	0.00	0.00	6000.0	-30.0	914.0	2.00	180.00	196.3	
6	6447.3	0.00	0.00	6368.5	-30.0	914.0	0.00	0.00	196.3	
7	7644.8	89.81	180.11	7132.5	-791.4	912.6	7.50	180.11	944.7	
8	11727.8	89.81	180.11	7146.0	-4874.4	905.0	0.00	0.00	4957.7	BHL 500'FSL, 379' FEL



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.2-T4N-R66W

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

Sorin Natural Resources 2U-443

Wellbore #1

Plan: Plan #2 (08-04-14)

Standard Planning Report

06 August, 2014

Database:	Landmark	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (08-04-14)		

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 2U-443					
Well Position	+N-S	0.0 ft	Northing:	1,370,685.96 ft	Latitude:	40.348440
	+E-W	0.0 ft	Easting:	3,211,929.38 ft	Longitude:	-104.739630
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	8/4/2014	8.42	66.90	52,778

Design	Plan #2 (08-04-14)			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	169.48

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	
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.00	0.00	
909.3	10.19	91.88	906.7	-1.5	45.1	2.00	2.00	0.00	91.88	
5,569.5	10.19	91.88	5,493.3	-28.5	868.9	0.00	0.00	0.00	0.00	
6,078.8	0.00	0.00	6,000.0	-30.0	914.0	2.00	-2.00	0.00	180.00	
6,447.3	0.00	0.00	6,368.5	-30.0	914.0	0.00	0.00	0.00	0.00	
7,644.8	89.81	180.11	7,132.5	-791.4	912.6	7.50	7.50	0.00	180.11	
11,727.8	89.81	180.11	7,146.0	-4,874.4	905.0	0.00	0.00	0.00	0.00	BHL 500'FSL, 379'

Database:	Landmark	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (08-04-14)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
1.0	0.00	0.00	1.0	0.0	0.0	0.0	0.00	0.00	0.00
SHL 20'FNL, 1364'FEL									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
500.0	2.00	91.88	500.0	-0.1	1.7	0.4	2.00	2.00	0.00
600.0	4.00	91.88	599.8	-0.2	7.0	1.5	2.00	2.00	0.00
700.0	6.00	91.88	699.5	-0.5	15.7	3.4	2.00	2.00	0.00
800.0	8.00	91.88	798.7	-0.9	27.9	6.0	2.00	2.00	0.00
900.0	10.00	91.88	897.5	-1.4	43.5	9.3	2.00	2.00	0.00
909.3	10.19	91.88	906.7	-1.5	45.1	9.7	2.00	2.00	0.00
1,000.0	10.19	91.88	995.9	-2.0	61.2	13.1	0.00	0.00	0.00
1,100.0	10.19	91.88	1,094.3	-2.6	78.8	16.9	0.00	0.00	0.00
1,200.0	10.19	91.88	1,192.7	-3.2	96.5	20.7	0.00	0.00	0.00
1,300.0	10.19	91.88	1,291.2	-3.7	114.2	24.5	0.00	0.00	0.00
1,400.0	10.19	91.88	1,389.6	-4.3	131.9	28.3	0.00	0.00	0.00
1,500.0	10.19	91.88	1,488.0	-4.9	149.5	32.1	0.00	0.00	0.00
1,600.0	10.19	91.88	1,586.4	-5.5	167.2	35.9	0.00	0.00	0.00
1,700.0	10.19	91.88	1,684.9	-6.1	184.9	39.7	0.00	0.00	0.00
1,800.0	10.19	91.88	1,783.3	-6.6	202.6	43.5	0.00	0.00	0.00
1,900.0	10.19	91.88	1,881.7	-7.2	220.2	47.3	0.00	0.00	0.00
2,000.0	10.19	91.88	1,980.1	-7.8	237.9	51.1	0.00	0.00	0.00
2,100.0	10.19	91.88	2,078.6	-8.4	255.6	54.9	0.00	0.00	0.00
2,200.0	10.19	91.88	2,177.0	-9.0	273.3	58.7	0.00	0.00	0.00
2,300.0	10.19	91.88	2,275.4	-9.5	290.9	62.5	0.00	0.00	0.00
2,400.0	10.19	91.88	2,373.8	-10.1	308.6	66.3	0.00	0.00	0.00
2,500.0	10.19	91.88	2,472.2	-10.7	326.3	70.1	0.00	0.00	0.00
2,600.0	10.19	91.88	2,570.7	-11.3	344.0	73.9	0.00	0.00	0.00
2,700.0	10.19	91.88	2,669.1	-11.9	361.7	77.7	0.00	0.00	0.00
2,800.0	10.19	91.88	2,767.5	-12.5	379.3	81.5	0.00	0.00	0.00
2,900.0	10.19	91.88	2,865.9	-13.0	397.0	85.3	0.00	0.00	0.00
3,000.0	10.19	91.88	2,964.4	-13.6	414.7	89.1	0.00	0.00	0.00
3,100.0	10.19	91.88	3,062.8	-14.2	432.4	92.9	0.00	0.00	0.00
3,200.0	10.19	91.88	3,161.2	-14.8	450.0	96.7	0.00	0.00	0.00
3,300.0	10.19	91.88	3,259.6	-15.4	467.7	100.5	0.00	0.00	0.00
3,400.0	10.19	91.88	3,358.1	-15.9	485.4	104.3	0.00	0.00	0.00
3,500.0	10.19	91.88	3,456.5	-16.5	503.1	108.1	0.00	0.00	0.00
3,600.0	10.19	91.88	3,554.9	-17.1	520.7	111.9	0.00	0.00	0.00
3,645.8	10.19	91.88	3,600.0	-17.4	528.8	113.6	0.00	0.00	0.00
PARKMAN									
3,700.0	10.19	91.88	3,653.3	-17.7	538.4	115.6	0.00	0.00	0.00
3,800.0	10.19	91.88	3,751.8	-18.3	556.1	119.4	0.00	0.00	0.00
3,900.0	10.19	91.88	3,850.2	-18.8	573.8	123.2	0.00	0.00	0.00
4,000.0	10.19	91.88	3,948.6	-19.4	591.4	127.0	0.00	0.00	0.00
4,100.0	10.19	91.88	4,047.0	-20.0	609.1	130.8	0.00	0.00	0.00
4,153.8	10.19	91.88	4,100.0	-20.3	618.6	132.9	0.00	0.00	0.00
SUSSEX									
4,200.0	10.19	91.88	4,145.4	-20.6	626.8	134.6	0.00	0.00	0.00

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Well:	Sorin Natural Resources 2U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (08-04-14)		

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)
4,300.0	10.19	91.88	4,243.9	-21.2	644.5	138.4	0.00	0.00	0.00
4,400.0	10.19	91.88	4,342.3	-21.7	662.1	142.2	0.00	0.00	0.00
4,500.0	10.19	91.88	4,440.7	-22.3	679.8	146.0	0.00	0.00	0.00
4,600.0	10.19	91.88	4,539.1	-22.9	697.5	149.8	0.00	0.00	0.00
4,700.0	10.19	91.88	4,637.6	-23.5	715.2	153.6	0.00	0.00	0.00
4,800.0	10.19	91.88	4,736.0	-24.1	732.9	157.4	0.00	0.00	0.00
4,814.2	10.19	91.88	4,750.0	-24.1	735.4	158.0	0.00	0.00	0.00
SHANNON									
4,900.0	10.19	91.88	4,834.4	-24.6	750.5	161.2	0.00	0.00	0.00
5,000.0	10.19	91.88	4,932.8	-25.2	768.2	165.0	0.00	0.00	0.00
5,100.0	10.19	91.88	5,031.3	-25.8	785.9	168.8	0.00	0.00	0.00
5,200.0	10.19	91.88	5,129.7	-26.4	803.6	172.6	0.00	0.00	0.00
5,300.0	10.19	91.88	5,228.1	-27.0	821.2	176.4	0.00	0.00	0.00
5,400.0	10.19	91.88	5,326.5	-27.5	838.9	180.2	0.00	0.00	0.00
5,500.0	10.19	91.88	5,425.0	-28.1	856.6	184.0	0.00	0.00	0.00
5,569.5	10.19	91.88	5,493.3	-28.5	868.9	186.6	0.00	0.00	0.00
5,600.0	9.58	91.88	5,523.4	-28.7	874.1	187.7	2.00	-2.00	0.00
5,700.0	7.58	91.88	5,622.3	-29.2	889.0	191.0	2.00	-2.00	0.00
5,800.0	5.58	91.88	5,721.6	-29.6	900.4	193.4	2.00	-2.00	0.00
5,900.0	3.58	91.88	5,821.3	-29.8	908.4	195.1	2.00	-2.00	0.00
6,000.0	1.58	91.88	5,921.2	-30.0	912.9	196.1	2.00	-2.00	0.00
6,078.8	0.00	0.00	6,000.0	-30.0	914.0	196.3	2.00	-2.00	0.00
6,100.0	0.00	0.00	6,021.2	-30.0	914.0	196.3	0.00	0.00	0.00
6,200.0	0.00	0.00	6,121.2	-30.0	914.0	196.3	0.00	0.00	0.00
6,300.0	0.00	0.00	6,221.2	-30.0	914.0	196.3	0.00	0.00	0.00
6,400.0	0.00	0.00	6,321.2	-30.0	914.0	196.3	0.00	0.00	0.00
6,447.3	0.00	0.00	6,368.5	-30.0	914.0	196.3	0.00	0.00	0.00
KOP #2									
6,500.0	3.95	180.11	6,421.1	-31.8	914.0	198.1	7.49	7.49	0.00
6,600.0	11.45	180.11	6,520.2	-45.2	914.0	211.3	7.50	7.50	0.00
6,676.2	17.17	180.11	6,594.0	-64.0	913.9	229.8	7.50	7.50	0.00
SHARON SPRINGS									
6,700.0	18.95	180.11	6,616.6	-71.4	913.9	237.0	7.50	7.50	0.00
6,800.0	26.45	180.11	6,708.8	-110.0	913.9	274.9	7.50	7.50	0.00
6,900.0	33.95	180.11	6,795.2	-160.2	913.8	324.3	7.50	7.50	0.00
6,936.6	36.69	180.11	6,825.0	-181.4	913.7	345.1	7.50	7.50	0.00
NIOBRARA A									
7,000.0	41.45	180.11	6,874.2	-221.3	913.6	384.4	7.50	7.50	0.00
7,091.5	48.31	180.11	6,939.0	-285.8	913.5	447.8	7.50	7.50	0.00
NIOBRARA B									
7,100.0	48.95	180.11	6,944.6	-292.2	913.5	454.1	7.50	7.50	0.00
7,200.0	56.45	180.11	7,005.2	-371.7	913.4	532.2	7.50	7.50	0.00
7,220.0	57.95	180.11	7,016.0	-388.5	913.3	548.7	7.50	7.50	0.00
NIOBRARA C									
7,300.0	63.95	180.11	7,054.9	-458.4	913.2	617.4	7.50	7.50	0.00
7,400.0	71.45	180.11	7,092.8	-550.9	913.0	708.3	7.50	7.50	0.00
7,500.0	78.95	180.11	7,118.3	-647.5	912.9	803.3	7.50	7.50	0.00
7,600.0	86.45	180.11	7,131.0	-746.6	912.7	900.7	7.50	7.50	0.00
7,644.8	89.81	180.11	7,132.5	-791.4	912.6	944.7	7.50	7.50	0.00
End of Build - 7"									

Database:	Landmark	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
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Well:	Sorin Natural Resources 2U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (08-04-14)		

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)
7,700.0	89.81	180.11	7,132.6	-846.6	912.5	998.9	0.00	0.00	0.00
7,800.0	89.81	180.11	7,133.0	-946.6	912.3	1,097.2	0.00	0.00	0.00
7,900.0	89.81	180.11	7,133.3	-1,046.6	912.1	1,195.5	0.00	0.00	0.00
8,000.0	89.81	180.11	7,133.6	-1,146.6	911.9	1,293.8	0.00	0.00	0.00
8,100.0	89.81	180.11	7,134.0	-1,246.6	911.7	1,392.1	0.00	0.00	0.00
8,200.0	89.81	180.11	7,134.3	-1,346.6	911.6	1,490.4	0.00	0.00	0.00
8,300.0	89.81	180.11	7,134.6	-1,446.6	911.4	1,588.6	0.00	0.00	0.00
8,400.0	89.81	180.11	7,135.0	-1,546.6	911.2	1,686.9	0.00	0.00	0.00
8,500.0	89.81	180.11	7,135.3	-1,646.6	911.0	1,785.2	0.00	0.00	0.00
8,600.0	89.81	180.11	7,135.6	-1,746.6	910.8	1,883.5	0.00	0.00	0.00
8,700.0	89.81	180.11	7,136.0	-1,846.6	910.6	1,981.8	0.00	0.00	0.00
8,800.0	89.81	180.11	7,136.3	-1,946.6	910.4	2,080.1	0.00	0.00	0.00
8,900.0	89.81	180.11	7,136.6	-2,046.6	910.3	2,178.4	0.00	0.00	0.00
9,000.0	89.81	180.11	7,137.0	-2,146.6	910.1	2,276.6	0.00	0.00	0.00
9,100.0	89.81	180.11	7,137.3	-2,246.6	909.9	2,374.9	0.00	0.00	0.00
9,200.0	89.81	180.11	7,137.6	-2,346.6	909.7	2,473.2	0.00	0.00	0.00
9,300.0	89.81	180.11	7,137.9	-2,446.6	909.5	2,571.5	0.00	0.00	0.00
9,400.0	89.81	180.11	7,138.3	-2,546.6	909.3	2,669.8	0.00	0.00	0.00
9,500.0	89.81	180.11	7,138.6	-2,646.6	909.1	2,768.1	0.00	0.00	0.00
9,600.0	89.81	180.11	7,138.9	-2,746.6	909.0	2,866.4	0.00	0.00	0.00
9,700.0	89.81	180.11	7,139.3	-2,846.6	908.8	2,964.6	0.00	0.00	0.00
9,800.0	89.81	180.11	7,139.6	-2,946.6	908.6	3,062.9	0.00	0.00	0.00
9,900.0	89.81	180.11	7,139.9	-3,046.6	908.4	3,161.2	0.00	0.00	0.00
10,000.0	89.81	180.11	7,140.3	-3,146.6	908.2	3,259.5	0.00	0.00	0.00
10,100.0	89.81	180.11	7,140.6	-3,246.6	908.0	3,357.8	0.00	0.00	0.00
10,200.0	89.81	180.11	7,140.9	-3,346.6	907.8	3,456.1	0.00	0.00	0.00
10,300.0	89.81	180.11	7,141.3	-3,446.6	907.7	3,554.4	0.00	0.00	0.00
10,400.0	89.81	180.11	7,141.6	-3,546.6	907.5	3,652.6	0.00	0.00	0.00
10,500.0	89.81	180.11	7,141.9	-3,646.6	907.3	3,750.9	0.00	0.00	0.00
10,600.0	89.81	180.11	7,142.3	-3,746.6	907.1	3,849.2	0.00	0.00	0.00
10,700.0	89.81	180.11	7,142.6	-3,846.6	906.9	3,947.5	0.00	0.00	0.00
10,800.0	89.81	180.11	7,142.9	-3,946.6	906.7	4,045.8	0.00	0.00	0.00
10,900.0	89.81	180.11	7,143.3	-4,046.6	906.5	4,144.1	0.00	0.00	0.00
11,000.0	89.81	180.11	7,143.6	-4,146.6	906.4	4,242.4	0.00	0.00	0.00
11,100.0	89.81	180.11	7,143.9	-4,246.6	906.2	4,340.6	0.00	0.00	0.00
11,200.0	89.81	180.11	7,144.2	-4,346.6	906.0	4,438.9	0.00	0.00	0.00
11,300.0	89.81	180.11	7,144.6	-4,446.6	905.8	4,537.2	0.00	0.00	0.00
11,400.0	89.81	180.11	7,144.9	-4,546.6	905.6	4,635.5	0.00	0.00	0.00
11,500.0	89.81	180.11	7,145.2	-4,646.6	905.4	4,733.8	0.00	0.00	0.00
11,600.0	89.81	180.11	7,145.6	-4,746.6	905.2	4,832.1	0.00	0.00	0.00
11,700.0	89.81	180.11	7,145.9	-4,846.6	905.1	4,930.4	0.00	0.00	0.00
11,727.8	89.81	180.11	7,146.0	-4,874.4	905.0	4,957.7	0.00	0.00	0.00

BHL 500'FSL, 379' FEL

Database:	Landmark	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Project:	SEC.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	North Reference:	True
Well:	Sorin Natural Resources 2U-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (08-04-14)		

Targets									
Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude Longitude
BHL 500'FSL, 379' FE	- plan hits target center	0.00	0.00	7,146.0	-4,874.4	905.0	1,365,819.70	3,212,876.11	40.335060 -104.736384
	- Point								
SHL 20'FNL, 1364'FE	- plan hits target center	0.00	0.00	1.0	0.0	0.0	1,370,685.98	3,211,929.38	40.348440 -104.739630
	- Point								

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,644.8	7,132.5	7"	7	8-3/4	

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
3,645.8	3,600.0	PARKMAN				
4,153.8	4,100.0	SUSSEX				
4,814.2	4,750.0	SHANNON				
6,676.2	6,594.0	SHARON SPRINGS				
6,936.6	6,825.0	NIOBRARA A				
7,091.5	6,939.0	NIOBRARA B				
7,220.0	7,016.0	NIOBRARA C				

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
400.0	400.0	0.0	0.0	KOP #1
6,447.3	6,368.5	-30.0	914.0	KOP #2
7,644.8	7,132.5	-791.4	912.6	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 2U-443

Wellbore #1

Plan #2 (08-04-14)

Anticollision Report

06 August, 2014



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

Reference	Plan #2 (08-04-14)		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.0ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date 8/6/2014			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,727.8	Plan #2 (08-04-14) (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	11,561.7	7,100.0	136.1	51.3	1.604	CC, ES, SF
API 2-9 (Exist.) - Wellbore #1 - Wellbore #1	10,401.8	7,178.6	100.5	17.6	1.212	Level 2, CC, ES, SF
Durnell 1 (Exist.) - Wellbore #1 - Wellbore #1	8,886.3	7,100.0	198.9	143.1	3.561	CC, ES
Durnell 1 (Exist.) - Wellbore #1 - Wellbore #1	8,900.0	7,100.0	199.4	143.3	3.555	SF
Matsushima PM K2-1 (Exist.) - Wellbore #1 - Wellbore #	7,492.1	7,100.0	268.0	233.7	7.810	CC, ES
Matsushima PM K2-1 (Exist.) - Wellbore #1 - Wellbore #	7,500.0	7,100.0	268.2	233.8	7.795	SF
Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W						
Sorin Natural Resources 2R-323 - Wellbore #1 - Plan #3	400.0	400.0	30.7	29.1	19.487	CC, ES
Sorin Natural Resources 2R-323 - Wellbore #1 - Plan #3	11,728.5	11,589.8	472.9	290.9	2.599	SF
Sorin Natural Resources 2R-403 - Wellbore #1 - Plan #2	400.0	400.0	61.3	59.7	38.975	CC, ES
Sorin Natural Resources 2R-403 - Wellbore #1 - Plan #2	11,728.5	11,653.0	782.2	593.6	4.146	SF
Sorin Natural Resources 2U-203 - Wellbore #1 - Plan #2	200.0	200.0	27.9	27.2	41.337	CC, ES
Sorin Natural Resources 2U-203 - Wellbore #1 - Plan #2	11,728.5	11,601.8	265.0	121.7	1.849	SF

Offset Design												
Sorin Natural Existing wells Sec.2-T4N-R66W - API 2-16 (Exist.) - Wellbore #1 - Wellbore #1												
Survey Program: 100-NS-GYRO-MS												
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
10,600.0	7,142.3	7,100.0	7,099.4	75.2	12.8	52.68	-4,708.3	797.1	971.3	901.4	69.87	13.901
10,700.0	7,142.6	7,100.0	7,099.4	77.1	12.8	52.68	-4,708.3	797.1	872.4	801.0	71.42	12.214
10,800.0	7,142.9	7,100.0	7,099.4	78.9	12.8	52.68	-4,708.3	797.1	773.8	700.8	72.98	10.603
10,900.0	7,143.3	7,100.0	7,099.4	80.7	12.8	52.68	-4,708.3	797.1	675.5	601.0	74.53	9.064
11,000.0	7,143.6	7,100.0	7,099.4	82.6	12.8	52.68	-4,708.3	797.1	577.9	501.9	76.09	7.596
11,100.0	7,143.9	7,100.0	7,099.4	84.4	12.8	52.68	-4,708.3	797.1	481.3	403.7	77.64	6.199
11,200.0	7,144.2	7,100.0	7,099.4	86.3	12.8	52.68	-4,708.3	797.1	386.5	307.2	79.20	4.879
11,300.0	7,144.6	7,100.0	7,099.4	88.1	12.8	52.68	-4,708.3	797.1	295.0	214.2	80.76	3.652
11,400.0	7,144.9	7,100.0	7,099.4	90.0	12.8	52.68	-4,708.3	797.1	211.4	129.0	82.33	2.567
11,500.0	7,145.2	7,100.0	7,099.4	91.8	12.8	52.68	-4,708.3	797.1	149.4	65.6	83.89	1.781
11,561.7	7,145.4	7,100.0	7,099.4	93.0	12.8	52.68	-4,708.3	797.1	136.1	51.3	84.86	1.604 CC, ES, SF

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 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

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: 100-NS-GYRO-MS												Offset Well Error:	0.0 ft		
Reference		Offset		Semi Major Axis			Distance						Warning		
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
11,600.0	7,145.6	7,100.0	7,099.4	93.7	12.8	52.68	-4,708.3	797.1	141.4	55.9	85.45	1.655			
11,700.0	7,145.9	7,100.0	7,099.4	95.6	12.8	52.68	-4,708.3	797.1	194.1	107.0	87.02	2.230			
11,727.8	7,146.0	7,100.0	7,099.4	96.1	12.8	52.68	-4,708.3	797.1	214.8	127.3	87.46	2.456			
11,728.5	7,146.0	7,100.0	7,099.4	96.1	12.8	52.68	-4,708.3	797.1	215.3	127.8	87.46	2.461			

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

Offset Design Sorin Natural Existing wells Sec.2-T4N-R66W - API 2-9 (Exist.) - Wellbore #1 - Wellbore #1														Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS														Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning		
Reference	Offset	Reference	Offset				+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)					
9,500.0	7,138.6	7,172.1	7,171.5	55.4	13.0	86.27	-3,548.1	806.9	907.3	841.3	65.99	13.750			
9,600.0	7,138.9	7,172.8	7,172.3	57.2	13.0	86.69	-3,548.1	806.9	808.0	740.2	67.86	11.907			
9,700.0	7,139.3	7,173.5	7,173.0	59.0	13.0	87.10	-3,548.1	806.9	708.9	639.2	69.73	10.166			
9,800.0	7,139.6	7,174.3	7,173.8	60.7	13.0	87.52	-3,548.1	806.9	610.1	538.5	71.61	8.519			
9,900.0	7,139.9	7,175.0	7,174.5	62.5	13.0	87.94	-3,548.1	806.9	511.7	438.2	73.50	6.963			
10,000.0	7,140.3	7,175.7	7,175.2	64.3	13.0	88.35	-3,548.2	806.9	414.1	338.8	75.38	5.494			
10,100.0	7,140.6	7,176.5	7,175.9	66.1	13.0	88.76	-3,548.2	806.9	318.1	240.8	77.26	4.117			
10,200.0	7,140.9	7,177.2	7,176.7	67.9	13.0	89.18	-3,548.2	806.9	225.4	146.3	79.15	2.848			
10,300.0	7,141.3	7,177.9	7,177.4	69.7	13.0	89.59	-3,548.2	806.9	143.0	62.0	81.03	1.765			
10,400.0	7,141.6	7,178.6	7,178.1	71.6	13.0	90.00	-3,548.2	806.9	100.5	17.6	82.92	1.212 Level 2			
10,401.8	7,141.6	7,178.6	7,178.1	71.6	13.0	90.00	-3,548.2	806.9	100.5	17.6	82.95	1.212 Level 2, CC, ES, SF			
10,500.0	7,141.9	7,179.3	7,178.8	73.4	13.0	90.40	-3,548.2	806.9	140.6	55.7	84.80	1.657			
10,600.0	7,142.3	7,180.1	7,179.5	75.2	13.0	90.81	-3,548.2	806.9	222.3	135.6	86.69	2.564			
10,700.0	7,142.6	7,180.8	7,180.2	77.1	13.0	91.22	-3,548.2	806.9	314.7	226.1	88.57	3.553			
10,800.0	7,142.9	7,181.5	7,180.9	78.9	13.0	91.62	-3,548.2	806.9	410.7	320.3	90.45	4.541			
10,900.0	7,143.3	7,182.2	7,181.7	80.7	13.0	92.02	-3,548.2	806.9	508.3	415.9	92.33	5.505			
11,000.0	7,143.6	7,182.9	7,182.4	82.6	13.0	92.42	-3,548.2	806.9	606.6	512.4	94.20	6.440			
11,100.0	7,143.9	7,183.6	7,183.1	84.4	13.0	92.82	-3,548.2	806.9	705.4	609.3	96.07	7.343			
11,200.0	7,144.2	7,184.3	7,183.8	86.3	13.0	93.22	-3,548.2	806.9	804.5	706.6	97.94	8.214			
11,300.0	7,144.6	7,185.0	7,184.5	88.1	13.0	93.61	-3,548.2	806.9	903.8	804.0	99.80	9.056			

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

Offset Design Sorin Natural Existing wells Sec.2-T4N-R66W - Durnell 1 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error: 0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error: 0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,000.0	7,133.6	7,100.0	7,099.5	31.5	14.9	79.71	-2,032.7	714.5	908.4	867.1	41.26	22.018	
8,100.0	7,134.0	7,100.0	7,099.5	32.8	14.9	79.71	-2,032.7	714.5	811.1	768.3	42.78	18.959	
8,200.0	7,134.3	7,100.0	7,099.5	34.2	14.9	79.71	-2,032.7	714.5	714.6	670.2	44.35	16.112	
8,300.0	7,134.6	7,100.0	7,099.5	35.7	14.9	79.71	-2,032.7	714.5	619.1	573.2	45.95	13.473	
8,400.0	7,135.0	7,100.0	7,099.5	37.2	14.9	79.71	-2,032.7	714.5	525.4	477.8	47.59	11.041	
8,500.0	7,135.3	7,100.0	7,099.5	38.7	14.9	79.71	-2,032.7	714.5	434.5	385.3	49.25	8.823	
8,600.0	7,135.6	7,100.0	7,099.5	40.3	14.9	79.71	-2,032.7	714.5	348.6	297.7	50.93	6.845	
8,700.0	7,136.0	7,100.0	7,099.5	41.9	14.9	79.71	-2,032.7	714.5	272.6	219.9	52.64	5.178	
8,800.0	7,136.3	7,100.0	7,099.5	43.5	14.9	79.71	-2,032.7	714.5	216.9	162.5	54.36	3.989	
8,886.3	7,136.6	7,100.0	7,099.5	44.9	14.9	79.71	-2,032.7	714.5	198.9	143.1	55.86	3.561 CC, ES	
8,900.0	7,136.6	7,100.0	7,099.5	45.2	14.9	79.71	-2,032.7	714.5	199.4	143.3	56.09	3.555 SF	
9,000.0	7,137.0	7,100.0	7,099.5	46.8	14.9	79.71	-2,032.7	714.5	229.1	171.3	57.84	3.961	
9,100.0	7,137.3	7,100.0	7,099.5	48.5	14.9	79.71	-2,032.7	714.5	292.0	232.3	59.60	4.898	
9,200.0	7,137.6	7,100.0	7,099.5	50.2	14.9	79.71	-2,032.7	714.5	371.4	310.1	61.38	6.052	
9,300.0	7,137.9	7,100.0	7,099.5	52.0	14.9	79.71	-2,032.7	714.5	459.0	395.9	63.16	7.268	
9,400.0	7,138.3	7,100.0	7,099.5	53.7	14.9	79.71	-2,032.7	714.5	550.9	485.9	64.94	8.482	
9,500.0	7,138.6	7,100.0	7,099.5	55.4	14.9	79.71	-2,032.7	714.5	645.1	578.4	66.74	9.666	
9,600.0	7,138.9	7,100.0	7,099.5	57.2	14.9	79.71	-2,032.7	714.5	740.9	672.4	68.54	10.809	
9,700.0	7,139.3	7,100.0	7,099.5	59.0	14.9	79.71	-2,032.7	714.5	837.7	767.3	70.35	11.907	
9,800.0	7,139.6	7,100.0	7,099.5	60.7	14.9	79.71	-2,032.7	714.5	935.1	862.9	72.17	12.958	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	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: 100-NS-GYRO-MS												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)		
0.0	0.0	0.5	0.5	0.0	0.0	132.75	-633.9	685.7	933.8				
100.0	100.0	103.2	103.2	0.1	0.1	132.74	-633.7	685.7	933.7	933.4	0.25	3,695.880	
200.0	200.0	203.1	203.1	0.3	0.4	132.74	-633.4	685.5	933.4	932.7	0.71	1,313.807	
300.0	300.0	300.5	300.5	0.6	0.6	132.75	-633.4	685.3	933.2	932.1	1.11	837.279	
386.8	386.8	388.0	388.0	0.8	0.7	132.74	-633.3	685.4	933.2	931.7	1.45	643.646	
400.0	400.0	400.0	400.0	0.8	0.7	132.74	-633.3	685.4	933.2	931.7	1.50	622.673	
500.0	500.0	498.5	498.5	1.0	0.8	40.94	-633.3	685.5	931.9	930.1	1.84	505.352	
600.0	599.8	598.2	598.2	1.2	1.0	41.21	-633.5	685.6	928.2	926.0	2.18	425.871	
700.0	699.5	701.9	701.9	1.4	1.1	41.67	-633.7	685.5	921.7	919.1	2.58	357.266	
800.0	798.7	800.0	800.0	1.7	1.3	42.31	-633.6	685.2	912.4	909.4	3.01	303.603	
909.3	906.7	906.7	906.7	2.1	1.5	43.21	-633.5	685.2	899.6	896.1	3.47	259.582	
1,000.0	995.9	992.9	992.9	2.4	1.7	43.90	-633.8	685.3	888.1	884.2	3.87	229.549	
1,100.0	1,094.3	1,096.2	1,096.1	2.7	1.8	44.75	-634.1	685.1	875.5	871.1	4.37	200.494	
1,200.0	1,192.7	1,193.9	1,193.9	3.1	2.0	45.59	-634.2	684.8	862.8	857.9	4.88	176.686	
1,300.0	1,291.2	1,288.8	1,288.8	3.5	2.2	46.42	-634.5	684.7	850.5	845.1	5.41	157.312	
1,400.0	1,389.6	1,387.4	1,387.4	3.9	2.5	47.32	-635.0	684.6	838.7	832.7	5.95	140.908	
1,500.0	1,488.0	1,486.4	1,486.4	4.3	2.7	48.25	-635.6	684.4	827.0	820.4	6.52	126.852	
1,600.0	1,586.4	1,586.5	1,586.5	4.7	2.9	49.22	-636.1	684.1	815.4	808.3	7.10	114.772	
1,700.0	1,684.9	1,690.3	1,690.2	5.1	3.2	50.27	-636.3	683.4	803.6	795.9	7.70	104.413	
1,800.0	1,783.3	1,792.7	1,792.7	5.5	3.4	51.35	-636.1	682.2	791.4	783.1	8.27	95.690	
1,900.0	1,881.7	1,893.9	1,893.8	5.9	3.6	52.43	-635.4	680.9	779.1	770.2	8.84	88.156	
2,000.0	1,980.1	1,994.9	1,994.9	6.3	3.8	53.55	-634.5	679.3	766.6	757.2	9.41	81.455	
2,100.0	2,078.6	2,093.5	2,093.4	6.7	4.0	54.69	-633.5	677.5	754.3	744.3	10.00	75.440	
2,200.0	2,177.0	2,190.6	2,190.5	7.1	4.2	55.87	-632.6	675.5	742.3	731.7	10.60	70.012	
2,300.0	2,275.4	2,284.3	2,284.1	7.5	4.4	57.07	-632.3	673.5	730.9	719.7	11.22	65.153	
2,400.0	2,373.8	2,382.6	2,382.5	7.9	4.6	58.39	-632.4	671.3	720.3	708.4	11.86	60.712	
2,500.0	2,472.2	2,483.4	2,483.2	8.3	4.9	59.75	-632.1	669.2	709.8	697.3	12.52	56.696	
2,600.0	2,570.7	2,582.2	2,582.0	8.7	5.1	61.12	-631.5	667.1	699.4	686.2	13.17	53.089	
2,700.0	2,669.1	2,678.9	2,678.7	9.1	5.3	62.52	-631.0	664.9	689.5	675.6	13.83	49.841	
2,800.0	2,767.5	2,778.6	2,778.4	9.5	5.6	63.99	-630.5	662.8	680.0	665.5	14.51	46.871	
2,900.0	2,865.9	2,874.4	2,874.2	9.9	5.8	65.44	-630.0	660.6	671.0	655.8	15.18	44.204	
3,000.0	2,964.4	2,970.8	2,970.5	10.3	6.1	66.90	-629.6	659.0	662.7	646.9	15.86	41.797	
3,100.0	3,062.8	3,069.9	3,069.6	10.7	6.3	68.40	-629.2	657.7	655.0	638.5	16.54	39.614	
3,200.0	3,161.2	3,166.6	3,166.3	11.1	6.5	69.86	-628.6	656.9	647.7	630.5	17.20	37.650	
3,300.0	3,259.6	3,264.9	3,264.6	11.5	6.8	71.37	-628.2	656.1	641.1	623.3	17.88	35.851	
3,400.0	3,358.1	3,363.5	3,363.2	11.9	7.0	72.93	-627.7	655.2	634.9	616.3	18.57	34.188	
3,500.0	3,456.5	3,461.5	3,461.2	12.3	7.2	74.51	-627.2	654.4	629.2	609.9	19.26	32.674	
3,600.0	3,554.9	3,559.2	3,558.9	12.7	7.5	76.08	-626.7	653.8	624.0	604.0	19.94	31.299	
3,700.0	3,653.3	3,657.3	3,657.0	13.1	7.7	77.67	-626.3	653.3	619.4	598.8	20.61	30.051	
3,800.0	3,751.8	3,755.4	3,755.1	13.5	7.9	79.28	-625.9	652.9	615.3	594.0	21.29	28.905	
3,900.0	3,850.2	3,853.1	3,852.7	14.0	8.1	80.90	-625.5	652.5	611.8	589.8	21.96	27.862	
4,000.0	3,948.6	3,950.4	3,950.1	14.4	8.3	82.51	-625.3	652.3	608.9	586.3	22.57	26.978	
4,100.0	4,047.0	4,045.6	4,045.2	14.8	8.4	84.07	-625.3	652.6	606.8	583.8	23.10	26.276	
4,200.0	4,145.4	4,141.1	4,140.7	15.2	8.5	85.60	-625.9	653.2	606.0	582.4	23.58	25.694	
4,300.0	4,243.9	4,239.9	4,239.6	15.6	8.5	87.20	-626.7	653.8	605.7	581.6	24.09	25.147	
4,315.9	4,259.6	4,255.6	4,255.3	15.6	8.5	87.46	-626.9	653.9	605.7	581.5	24.17	25.063	
4,400.0	4,342.3	4,338.4	4,338.1	16.0	8.6	88.81	-627.5	654.3	605.8	581.2	24.60	24.628	
4,500.0	4,440.7	4,437.9	4,437.6	16.4	8.7	90.45	-628.3	654.4	606.5	581.4	25.13	24.135	
4,600.0	4,539.1	4,539.2	4,538.9	16.8	8.9	92.13	-628.6	654.5	607.2	581.6	25.68	23.645	

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 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	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: 100-NS-GYRO-MS														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			
4,700.0	4,637.6	4,640.4	4,640.1	17.2	9.1	93.86	-628.5	654.1	608.1	581.9	26.28	23.139			
4,800.0	4,736.0	4,741.6	4,741.2	17.6	9.3	95.61	-627.8	653.3	609.0	582.1	26.90	22.637			
4,900.0	4,834.4	4,839.4	4,839.1	18.0	9.5	97.32	-626.9	652.5	610.2	582.7	27.50	22.192			
5,000.0	4,932.8	4,936.2	4,935.9	18.4	9.7	98.97	-626.3	652.0	612.2	584.1	28.08	21.798			
5,100.0	5,031.3	5,032.5	5,032.2	18.8	10.0	100.57	-626.0	651.6	615.0	586.3	28.67	21.451			
5,200.0	5,129.7	5,129.6	5,129.3	19.2	10.2	102.19	-625.9	651.0	618.6	589.4	29.26	21.142			
5,300.0	5,228.1	5,227.9	5,227.6	19.6	10.5	103.81	-625.9	650.4	622.8	592.9	29.85	20.867			
5,400.0	5,326.5	5,324.8	5,324.4	20.0	10.7	105.38	-626.0	649.8	627.6	597.2	30.41	20.636			
5,500.0	5,425.0	5,420.6	5,420.2	20.5	10.9	106.91	-626.3	649.2	633.2	602.2	30.96	20.452			
5,569.5	5,493.3	5,484.4	5,484.0	20.7	11.0	107.90	-627.0	648.7	637.7	606.4	31.32	20.364			
5,600.0	5,523.4	5,512.9	5,512.6	20.8	11.1	108.37	-627.4	648.4	639.9	608.5	31.45	20.345			
5,700.0	5,622.3	5,608.9	5,608.5	21.1	11.3	109.74	-629.1	647.4	646.9	615.0	31.83	20.325			
5,800.0	5,721.6	5,708.8	5,708.4	21.4	11.5	110.82	-631.0	646.5	653.0	620.8	32.18	20.294			
5,900.0	5,821.3	5,807.6	5,807.2	21.5	11.7	111.55	-633.0	645.7	658.1	625.6	32.50	20.247			
6,000.0	5,921.2	5,910.1	5,909.7	21.7	11.9	111.97	-635.0	645.0	661.8	629.0	32.81	20.168			
6,078.8	6,000.0	5,992.1	5,991.6	21.8	12.0	-156.04	-636.2	644.6	663.4	630.4	33.06	20.066			
6,100.0	6,021.2	6,014.1	6,013.7	21.8	12.1	-156.04	-636.5	644.5	663.7	630.6	33.13	20.033			
6,200.0	6,121.2	6,117.1	6,116.6	22.0	12.3	-156.06	-637.4	644.3	664.6	631.2	33.45	19.869			
6,300.0	6,221.2	6,216.8	6,216.3	22.1	12.4	-156.07	-638.3	644.1	665.5	631.7	33.76	19.709			
6,400.0	6,321.2	6,319.8	6,319.3	22.2	12.6	-156.10	-638.9	644.2	666.0	631.9	34.07	19.548			
6,447.3	6,368.5	6,367.0	6,366.5	22.3	12.7	-156.11	-639.1	644.2	666.2	632.0	34.22	19.467			
6,450.0	6,371.2	6,369.6	6,369.1	22.3	12.7	23.79	-639.1	644.2	666.2	632.0	34.22	19.468			
6,500.0	6,421.1	6,419.7	6,419.2	22.3	12.8	23.90	-639.2	644.0	664.7	630.4	34.28	19.388			
6,550.0	6,470.9	6,470.0	6,469.5	22.4	12.9	24.22	-639.4	643.9	660.2	626.0	34.24	19.281			
6,600.0	6,520.2	6,519.6	6,519.1	22.5	13.0	24.76	-639.5	643.9	652.8	618.7	34.07	19.157			
6,650.0	6,568.8	6,568.0	6,567.5	22.5	13.1	25.52	-639.6	643.9	642.4	608.7	33.78	19.020			
6,700.0	6,616.6	6,615.6	6,615.1	22.6	13.2	26.52	-639.8	644.0	629.3	595.9	33.37	18.856			
6,750.0	6,663.3	6,662.1	6,661.6	22.7	13.2	27.81	-640.1	644.1	613.4	580.5	32.87	18.660			
6,800.0	6,708.8	6,707.3	6,706.8	22.8	13.3	29.43	-640.3	644.1	595.0	562.7	32.30	18.418			
6,850.0	6,752.8	6,751.1	6,750.6	22.9	13.4	31.42	-640.5	644.1	574.1	542.4	31.69	18.115			
6,900.0	6,795.2	6,793.3	6,792.9	23.0	13.5	33.84	-640.8	644.3	551.0	519.9	31.07	17.732			
6,950.0	6,835.7	6,833.5	6,833.0	23.1	13.5	36.74	-641.1	644.4	525.9	495.4	30.50	17.243			
7,000.0	6,874.2	6,871.7	6,871.2	23.2	13.6	40.20	-641.5	644.5	499.0	469.0	30.02	16.622			
7,050.0	6,910.6	6,908.2	6,907.7	23.4	13.6	44.31	-641.8	644.5	470.7	441.0	29.72	15.839			
7,100.0	6,944.6	6,943.4	6,942.9	23.6	13.7	49.18	-642.1	644.5	441.3	411.7	29.66	14.880			
7,150.0	6,976.2	6,976.1	6,975.6	23.8	13.7	54.71	-642.4	644.6	411.3	381.5	29.89	13.763			
7,200.0	7,005.2	7,006.0	7,005.5	24.0	13.8	60.76	-642.6	644.8	381.4	351.0	30.39	12.551			
7,250.0	7,031.4	7,033.0	7,032.5	24.2	13.8	67.08	-642.7	645.0	352.4	321.3	31.08	11.338			
7,300.0	7,054.9	7,057.0	7,056.5	24.5	13.8	73.33	-642.8	645.1	325.4	293.5	31.86	10.212			
7,350.0	7,075.3	7,077.9	7,077.4	24.8	13.9	79.11	-642.9	645.3	301.7	269.1	32.63	9.247			
7,400.0	7,092.8	7,095.6	7,095.1	25.2	13.9	84.08	-642.9	645.4	283.0	249.7	33.32	8.495			
7,450.0	7,107.1	7,100.0	7,099.5	25.5	13.9	85.88	-642.9	645.4	271.3	237.4	33.87	8.008			
7,492.1	7,116.7	7,100.0	7,099.5	25.9	13.9	86.12	-642.9	645.4	268.0	233.7	34.32	7.810 CC, ES			
7,500.0	7,118.3	7,100.0	7,099.5	25.9	13.9	86.12	-642.9	645.4	268.2	233.8	34.40	7.795 SF			
7,550.0	7,126.3	7,100.0	7,099.5	26.4	13.9	85.67	-642.9	645.4	274.1	239.2	34.92	7.848			
7,600.0	7,131.0	7,100.0	7,099.5	26.9	13.9	84.54	-642.9	645.4	288.4	253.0	35.39	8.149			
7,644.8	7,132.5	7,100.0	7,099.5	27.3	13.9	82.97	-642.9	645.4	307.5	271.7	35.74	8.603			
7,700.0	7,132.6	7,100.0	7,099.5	27.9	13.9	82.97	-642.9	645.4	337.5	301.1	36.45	9.260			
7,800.0	7,133.0	7,100.0	7,099.5	29.0	13.9	82.97	-642.9	645.4	405.7	367.9	37.81	10.730			

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 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	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: 100-NS-GYRO-MS											Offset Well Error:	0.0 ft			
Reference		Offset		Semi Major Axis			Distance								
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
7,900.0	7,133.3	7,100.0	7,099.5	30.2	13.9	82.97	-642.9	645.4	485.0	445.8	39.24	12.361			
8,000.0	7,133.6	7,100.0	7,099.5	31.5	13.9	82.97	-642.9	645.4	570.9	530.1	40.73	14.017			
8,100.0	7,134.0	7,100.0	7,099.5	32.8	13.9	82.97	-642.9	645.4	660.7	618.4	42.26	15.633			
8,200.0	7,134.3	7,100.0	7,099.5	34.2	13.9	82.97	-642.9	645.4	753.1	709.3	43.84	17.177			
8,300.0	7,134.6	7,100.0	7,099.5	35.7	13.9	82.97	-642.9	645.4	847.3	801.8	45.46	18.637			
8,400.0	7,135.0	7,100.0	7,099.5	37.2	13.9	82.97	-642.9	645.4	942.6	895.5	47.11	20.009			

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

Offset Design Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2R-323 - 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	-30.7	30.7						
100.0	100.0	100.0	100.0	0.1	0.1	-90.01	0.0	-30.7	30.7	30.4	0.22	136.412			
200.0	200.0	200.0	200.0	0.3	0.3	-90.01	0.0	-30.7	30.7	30.0	0.67	45.471			
300.0	300.0	300.0	300.0	0.6	0.6	-90.01	0.0	-30.7	30.7	29.5	1.12	27.282			
400.0	400.0	400.0	400.0	0.8	0.8	-90.01	0.0	-30.7	30.7	29.1	1.57	19.487 CC, ES			
500.0	500.0	500.0	500.0	1.0	1.0	178.21	0.0	-30.7	32.4	30.4	2.01	16.099			
600.0	599.8	599.8	599.8	1.2	1.2	178.46	0.0	-30.7	37.6	35.2	2.45	15.372			
700.0	699.5	699.5	699.5	1.4	1.5	178.74	0.0	-30.7	46.3	43.5	2.89	16.042			
800.0	798.7	798.7	798.7	1.7	1.7	179.00	0.0	-30.7	58.5	55.2	3.33	17.561			
909.3	906.7	906.7	906.7	2.1	1.9	179.22	0.0	-30.7	75.8	72.0	3.82	19.843			
1,000.0	995.9	995.9	995.9	2.4	2.1	179.36	0.0	-30.7	91.8	87.6	4.23	21.721			
1,100.0	1,094.3	1,098.0	1,098.0	2.7	2.3	179.44	-0.1	-29.0	107.9	103.2	4.67	23.099			
1,200.0	1,192.7	1,201.4	1,201.2	3.1	2.6	179.45	-0.4	-23.6	120.4	115.3	5.11	23.576			
1,300.0	1,291.2	1,305.5	1,304.9	3.5	2.8	179.40	-0.9	-14.4	129.4	123.8	5.56	23.270			
1,400.0	1,389.6	1,407.8	1,406.5	3.9	3.0	179.32	-1.5	-2.1	135.1	129.1	6.02	22.448			
1,500.0	1,488.0	1,507.7	1,505.6	4.3	3.3	179.24	-2.2	10.4	140.3	133.8	6.48	21.647			
1,600.0	1,586.4	1,607.6	1,604.7	4.7	3.6	179.16	-2.9	22.9	145.5	138.6	6.95	20.939			
1,700.0	1,684.9	1,707.4	1,703.7	5.1	3.8	179.09	-3.5	35.4	150.7	143.3	7.42	20.309			
1,800.0	1,783.3	1,807.3	1,802.8	5.5	4.1	179.03	-4.2	47.9	155.9	148.0	7.90	19.746			
1,900.0	1,881.7	1,907.1	1,901.9	5.9	4.4	178.97	-4.9	60.4	161.2	152.8	8.38	19.241			
2,000.0	1,980.1	2,007.0	2,001.0	6.3	4.7	178.91	-5.6	72.9	166.4	157.5	8.86	18.785			
2,100.0	2,078.6	2,106.9	2,100.0	6.7	5.0	178.86	-6.2	85.4	171.6	162.3	9.34	18.372			
2,200.0	2,177.0	2,206.7	2,199.1	7.1	5.3	178.81	-6.9	97.9	176.8	167.0	9.82	17.997			
2,300.0	2,275.4	2,306.6	2,298.2	7.5	5.6	178.76	-7.6	110.4	182.0	171.7	10.31	17.654			
2,400.0	2,373.8	2,406.5	2,397.3	7.9	5.9	178.72	-8.2	122.9	187.3	176.5	10.80	17.340			
2,500.0	2,472.2	2,506.3	2,496.3	8.3	6.2	178.67	-8.9	135.4	192.5	181.2	11.29	17.052			
2,600.0	2,570.7	2,606.2	2,595.4	8.7	6.5	178.63	-9.6	147.9	197.7	185.9	11.78	16.786			
2,700.0	2,669.1	2,706.1	2,694.5	9.1	6.9	178.59	-10.2	160.3	202.9	190.6	12.27	16.540			
2,800.0	2,767.5	2,805.9	2,793.6	9.5	7.2	178.56	-10.9	172.8	208.1	195.4	12.76	16.312			
2,900.0	2,865.9	2,905.8	2,892.7	9.9	7.5	178.52	-11.6	185.3	213.3	200.1	13.25	16.100			
3,000.0	2,964.4	3,005.6	2,991.7	10.3	7.8	178.49	-12.2	197.8	218.6	204.8	13.74	15.903			
3,100.0	3,062.8	3,105.5	3,090.8	10.7	8.1	178.46	-12.9	210.3	223.8	209.5	14.24	15.719			
3,200.0	3,161.2	3,205.4	3,189.9	11.1	8.4	178.43	-13.6	222.8	229.0	214.3	14.73	15.546			
3,300.0	3,259.6	3,305.2	3,289.0	11.5	8.8	178.40	-14.3	235.3	234.2	219.0	15.22	15.384			
3,400.0	3,358.1	3,405.1	3,388.0	11.9	9.1	178.37	-14.9	247.8	239.4	223.7	15.72	15.232			
3,500.0	3,456.5	3,505.0	3,487.1	12.3	9.4	178.35	-15.6	260.3	244.7	228.4	16.21	15.089			
3,600.0	3,554.9	3,604.8	3,586.2	12.7	9.7	178.32	-16.3	272.8	249.9	233.2	16.71	14.954			
3,700.0	3,653.3	3,704.7	3,685.3	13.1	10.0	178.30	-16.9	285.3	255.1	237.9	17.21	14.827			
3,800.0	3,751.8	3,804.6	3,784.3	13.5	10.4	178.28	-17.6	297.8	260.3	242.6	17.70	14.706			
3,900.0	3,850.2	3,904.4	3,883.4	14.0	10.7	178.25	-18.3	310.3	265.5	247.3	18.20	14.592			
4,000.0	3,948.6	4,004.3	3,982.5	14.4	11.0	178.23	-18.9	322.8	270.8	252.1	18.69	14.484			
4,100.0	4,047.0	4,104.1	4,081.6	14.8	11.3	178.21	-19.6	335.3	276.0	256.8	19.19	14.381			
4,200.0	4,145.4	4,204.0	4,180.6	15.2	11.6	178.19	-20.3	347.8	281.2	261.5	19.69	14.283			
4,300.0	4,243.9	4,303.9	4,279.7	15.6	12.0	178.17	-20.9	360.3	286.4	266.2	20.18	14.190			
4,400.0	4,342.3	4,403.7	4,378.8	16.0	12.3	178.15	-21.6	372.8	291.6	271.0	20.68	14.101			
4,500.0	4,440.7	4,503.6	4,477.9	16.4	12.6	178.14	-22.3	385.3	296.9	275.7	21.18	14.016			
4,600.0	4,539.1	4,603.5	4,576.9	16.8	12.9	178.12	-23.0	397.8	302.1	280.4	21.68	13.935			
4,700.0	4,637.6	4,703.3	4,676.0	17.2	13.3	178.10	-23.6	410.3	307.3	285.1	22.17	13.858			
4,800.0	4,736.0	4,803.2	4,775.1	17.6	13.6	178.09	-24.3	422.8	312.5	289.8	22.67	13.784			

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 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

Offset Design Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2R-323 - 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		
4,900.0	4,834.4	4,903.1	4,874.2	18.0	13.9	178.07	-25.0	435.3	317.7	294.6	23.17	13.713		
5,000.0	4,932.8	5,002.9	4,973.3	18.4	14.2	178.06	-25.6	447.8	323.0	299.3	23.67	13.645		
5,100.0	5,031.3	5,102.8	5,072.3	18.8	14.5	178.04	-26.3	460.3	328.2	304.0	24.17	13.579		
5,200.0	5,129.7	5,202.6	5,171.4	19.2	14.9	178.03	-27.0	472.8	333.4	308.7	24.67	13.517		
5,300.0	5,228.1	5,302.5	5,270.5	19.6	15.2	178.02	-27.6	485.3	338.6	313.5	25.16	13.456		
5,400.0	5,326.5	5,402.4	5,369.6	20.0	15.5	178.00	-28.3	497.8	343.8	318.2	25.66	13.398		
5,500.0	5,425.0	5,500.0	5,466.4	20.5	15.8	177.99	-29.0	509.9	349.2	323.0	26.15	13.353		
5,569.5	5,493.3	5,561.0	5,527.0	20.7	16.0	177.99	-29.3	516.3	354.1	327.7	26.44	13.392		
5,600.0	5,523.4	5,588.0	5,554.0	20.8	16.0	178.00	-29.4	518.8	356.6	330.1	26.57	13.420		
5,700.0	5,622.3	5,676.6	5,642.3	21.1	16.2	178.02	-29.8	525.0	364.6	337.6	26.95	13.527		
5,800.0	5,721.6	5,764.9	5,730.6	21.4	16.3	178.05	-30.0	528.5	372.1	344.8	27.28	13.638		
5,900.0	5,821.3	5,855.6	5,821.3	21.5	16.5	178.09	-30.0	529.3	379.1	351.5	27.58	13.744		
6,000.0	5,921.2	5,955.5	5,921.2	21.7	16.6	178.11	-30.0	529.3	383.6	355.7	27.87	13.761		
6,078.8	6,000.0	6,034.3	6,000.0	21.8	16.8	-90.00	-30.0	529.3	384.7	356.6	28.09	13.694		
6,100.0	6,021.2	6,055.5	6,021.2	21.8	16.8	-90.00	-30.0	529.3	384.7	356.5	28.17	13.656		
6,200.0	6,121.2	6,155.5	6,121.2	22.0	17.0	-90.00	-30.0	529.3	384.7	356.1	28.54	13.476		
6,300.0	6,221.2	6,255.5	6,221.2	22.1	17.1	-90.00	-30.0	529.3	384.7	355.7	28.92	13.300		
6,347.4	6,268.6	6,302.9	6,268.6	22.1	17.2	-90.00	-30.0	529.3	384.7	355.6	29.10	13.218		
6,400.0	6,321.2	6,355.2	6,320.8	22.2	17.3	-90.15	-31.0	529.3	384.7	355.4	29.30	13.127		
6,447.3	6,368.5	6,401.8	6,367.3	22.3	17.4	-90.71	-34.8	529.3	384.8	355.3	29.50	13.044		
6,450.0	6,371.2	6,404.4	6,369.9	22.3	17.4	89.14	-35.1	529.3	384.8	355.3	29.51	13.041		
6,500.0	6,421.1	6,453.2	6,418.1	22.3	17.5	88.32	-42.2	529.1	385.0	355.3	29.72	12.955		
6,550.0	6,470.9	6,501.6	6,465.5	22.4	17.5	87.51	-52.4	529.0	385.4	355.4	29.94	12.871		
6,600.0	6,520.2	6,550.0	6,512.0	22.5	17.6	86.71	-65.5	528.8	385.8	355.7	30.18	12.786		
6,650.0	6,568.8	6,597.6	6,556.9	22.5	17.7	85.93	-81.2	528.5	386.4	356.0	30.43	12.699		
6,700.0	6,616.6	6,645.1	6,600.7	22.6	17.8	85.17	-99.7	528.2	387.1	356.4	30.70	12.608		
6,750.0	6,663.3	6,692.3	6,643.0	22.7	17.9	84.44	-120.7	527.8	387.9	356.9	31.00	12.513		
6,800.0	6,708.8	6,739.3	6,683.7	22.8	18.0	83.73	-144.1	527.4	388.7	357.4	31.32	12.411		
6,850.0	6,752.8	6,786.1	6,722.7	22.9	18.2	83.06	-169.9	527.0	389.7	358.0	31.67	12.302		
6,900.0	6,795.2	6,832.6	6,759.8	23.0	18.3	82.41	-197.9	526.6	390.6	358.6	32.06	12.186		
6,950.0	6,835.7	6,878.8	6,795.0	23.1	18.5	81.80	-227.9	526.1	391.7	359.2	32.47	12.061		
7,000.0	6,874.2	6,924.9	6,828.2	23.2	18.6	81.23	-259.9	525.5	392.7	359.8	32.92	11.928		
7,050.0	6,910.6	6,970.8	6,859.3	23.4	18.8	80.70	-293.6	525.0	393.8	360.4	33.41	11.788		
7,100.0	6,944.6	7,016.6	6,888.2	23.6	19.1	80.20	-329.1	524.4	394.9	361.0	33.93	11.639		
7,150.0	6,976.2	7,062.1	6,914.8	23.8	19.3	79.75	-366.0	523.8	396.0	361.5	34.49	11.482		
7,200.0	7,005.2	7,107.6	6,939.2	24.0	19.6	79.33	-404.4	523.1	397.1	362.0	35.09	11.318		
7,250.0	7,031.4	7,152.9	6,961.1	24.2	19.9	78.97	-444.0	522.5	398.2	362.5	35.72	11.147		
7,300.0	7,054.9	7,200.0	6,981.4	24.5	20.3	78.63	-486.5	521.8	399.3	362.9	36.42	10.964		
7,350.0	7,075.3	7,243.2	6,997.6	24.8	20.6	78.37	-526.6	521.1	400.3	363.2	37.12	10.784		
7,400.0	7,092.8	7,288.3	7,012.1	25.2	21.0	78.13	-569.2	520.4	401.3	363.4	37.88	10.594		
7,450.0	7,107.1	7,333.2	7,024.1	25.5	21.5	77.95	-612.5	519.7	402.2	363.5	38.67	10.400		
7,500.0	7,118.3	7,378.2	7,033.5	25.9	21.9	77.81	-656.5	518.9	403.1	363.5	39.51	10.201		
7,550.0	7,126.3	7,423.1	7,040.2	26.4	22.4	77.71	-700.9	518.2	403.9	363.5	40.39	9.999		
7,600.0	7,131.0	7,468.0	7,044.4	26.9	22.9	77.67	-745.6	517.5	404.6	363.3	41.31	9.795		
7,644.8	7,132.5	7,508.2	7,045.9	27.3	23.4	77.66	-785.8	516.8	405.2	363.0	42.16	9.611		
7,700.0	7,132.6	7,562.0	7,045.7	27.9	24.0	77.63	-839.5	515.9	406.1	362.5	43.56	9.322		
7,800.0	7,133.0	7,661.9	7,045.0	29.0	25.3	77.55	-939.5	514.2	407.7	361.5	46.25	8.816		
7,900.0	7,133.3	7,761.9	7,044.4	30.2	26.7	77.46	-1,039.4	512.6	409.4	360.3	49.07	8.342		
8,000.0	7,133.6	7,861.9	7,043.8	31.5	28.1	77.38	-1,139.4	510.9	411.0	359.0	52.01	7.903		

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 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

Offset Design Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2R-323 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
8,100.0	7,134.0	7,961.9	7,043.2	32.8	29.6	77.30	-1,239.4	509.2	412.7	357.6	55.04	7.498		
8,200.0	7,134.3	8,061.9	7,042.6	34.2	31.1	77.21	-1,339.3	507.6	414.3	356.2	58.15	7.125		
8,300.0	7,134.6	8,161.9	7,042.0	35.7	32.7	77.13	-1,439.3	505.9	416.0	354.6	61.33	6.783		
8,400.0	7,135.0	8,261.8	7,041.4	37.2	34.3	77.05	-1,539.3	504.3	417.6	353.0	64.56	6.468		
8,500.0	7,135.3	8,361.8	7,040.8	38.7	36.0	76.97	-1,639.2	502.6	419.3	351.4	67.85	6.179		
8,600.0	7,135.6	8,461.8	7,040.2	40.3	37.6	76.89	-1,739.2	500.9	420.9	349.7	71.18	5.913		
8,700.0	7,136.0	8,561.8	7,039.5	41.9	39.3	76.81	-1,839.2	499.3	422.6	348.0	74.54	5.669		
8,800.0	7,136.3	8,661.8	7,038.9	43.5	41.0	76.73	-1,939.1	497.6	424.2	346.3	77.94	5.443		
8,900.0	7,136.6	8,761.8	7,038.3	45.2	42.8	76.66	-2,039.1	496.0	425.9	344.5	81.36	5.234		
9,000.0	7,137.0	8,861.8	7,037.7	46.8	44.5	76.58	-2,139.1	494.3	427.5	342.7	84.80	5.041		
9,100.0	7,137.3	8,961.7	7,037.1	48.5	46.3	76.50	-2,239.1	492.6	429.2	340.9	88.27	4.862		
9,200.0	7,137.6	9,061.7	7,036.5	50.2	48.0	76.43	-2,339.0	491.0	430.8	339.1	91.75	4.696		
9,300.0	7,137.9	9,161.7	7,035.9	52.0	49.8	76.35	-2,439.0	489.3	432.5	337.2	95.25	4.541		
9,400.0	7,138.3	9,261.7	7,035.3	53.7	51.6	76.28	-2,539.0	487.7	434.1	335.4	98.76	4.396		
9,500.0	7,138.6	9,361.7	7,034.7	55.4	53.4	76.20	-2,638.9	486.0	435.8	333.5	102.29	4.261		
9,600.0	7,138.9	9,461.7	7,034.0	57.2	55.2	76.13	-2,738.9	484.3	437.5	331.6	105.82	4.134		
9,700.0	7,139.3	9,561.6	7,033.4	59.0	57.0	76.05	-2,838.9	482.7	439.1	329.7	109.37	4.015		
9,800.0	7,139.6	9,661.6	7,032.8	60.7	58.8	75.98	-2,938.8	481.0	440.8	327.8	112.92	3.903		
9,900.0	7,139.9	9,761.6	7,032.2	62.5	60.6	75.91	-3,038.8	479.4	442.4	325.9	116.48	3.798		
10,000.0	7,140.3	9,861.6	7,031.6	64.3	62.5	75.84	-3,138.8	477.7	444.1	324.0	120.05	3.699		
10,100.0	7,140.6	9,961.6	7,031.0	66.1	64.3	75.77	-3,238.7	476.0	445.8	322.1	123.62	3.606		
10,200.0	7,140.9	10,061.6	7,030.4	67.9	66.1	75.70	-3,338.7	474.4	447.4	320.2	127.20	3.517		
10,300.0	7,141.3	10,161.6	7,029.8	69.7	68.0	75.63	-3,438.7	472.7	449.1	318.3	130.78	3.434		
10,400.0	7,141.6	10,261.5	7,029.2	71.6	69.8	75.56	-3,538.6	471.0	450.7	316.4	134.37	3.354		
10,500.0	7,141.9	10,361.5	7,028.6	73.4	71.7	75.49	-3,638.6	469.4	452.4	314.4	137.96	3.279		
10,600.0	7,142.3	10,461.5	7,027.9	75.2	73.5	75.42	-3,738.6	467.7	454.1	312.5	141.56	3.208		
10,700.0	7,142.6	10,561.5	7,027.3	77.1	75.4	75.35	-3,838.6	466.1	455.7	310.6	145.15	3.140		
10,800.0	7,142.9	10,661.5	7,026.7	78.9	77.3	75.28	-3,938.5	464.4	457.4	308.6	148.75	3.075		
10,900.0	7,143.3	10,761.5	7,026.1	80.7	79.1	75.22	-4,038.5	462.7	459.1	306.7	152.36	3.013		
11,000.0	7,143.6	10,861.4	7,025.5	82.6	81.0	75.15	-4,138.5	461.1	460.7	304.8	155.96	2.954		
11,100.0	7,143.9	10,961.4	7,024.9	84.4	82.8	75.08	-4,238.4	459.4	462.4	302.8	159.57	2.898		
11,200.0	7,144.2	11,061.4	7,024.3	86.3	84.7	75.02	-4,338.4	457.8	464.1	300.9	163.17	2.844		
11,300.0	7,144.6	11,161.4	7,023.7	88.1	86.6	74.95	-4,438.4	456.1	465.7	299.0	166.78	2.792		
11,400.0	7,144.9	11,261.4	7,023.1	90.0	88.5	74.89	-4,538.3	454.4	467.4	297.0	170.39	2.743		
11,500.0	7,145.2	11,361.4	7,022.4	91.8	90.3	74.82	-4,638.3	452.8	469.1	295.1	174.00	2.696		
11,600.0	7,145.6	11,461.4	7,021.8	93.7	92.2	74.76	-4,738.3	451.1	470.7	293.1	177.62	2.650		
11,700.0	7,145.9	11,561.3	7,021.2	95.6	93.9	74.70	-4,838.2	449.5	472.4	291.4	181.02	2.610		
11,727.8	7,146.0	11,589.2	7,021.1	96.1	94.3	74.68	-4,866.1	449.0	472.9	291.0	181.93	2.599		
11,728.5	7,146.0	11,589.8	7,021.0	96.1	94.3	74.68	-4,866.7	449.0	472.9	290.9	181.95	2.599 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	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	-61.3	61.3						
100.0	100.0	100.0	100.0	0.1	0.1	-90.00	0.0	-61.3	61.3	61.1	0.22	272.824			
200.0	200.0	200.0	200.0	0.3	0.3	-90.00	0.0	-61.3	61.3	60.6	0.67	90.941			
300.0	300.0	300.0	300.0	0.6	0.6	-90.00	0.0	-61.3	61.3	60.2	1.12	54.565			
400.0	400.0	400.0	400.0	0.8	0.8	-90.00	0.0	-61.3	61.3	59.7	1.57	38.975 CC, ES			
500.0	500.0	500.0	500.0	1.0	1.0	178.17	0.0	-61.3	63.1	61.1	2.01	31.331			
600.0	599.8	599.8	599.8	1.2	1.2	178.31	0.0	-61.3	68.3	65.8	2.45	27.895			
700.0	699.5	699.5	699.5	1.4	1.5	178.49	0.0	-61.3	77.0	74.1	2.89	26.653			
800.0	798.7	798.7	798.7	1.7	1.7	178.69	0.0	-61.3	89.2	85.9	3.33	26.759			
909.3	906.7	906.7	906.7	2.1	1.9	178.90	0.0	-61.3	106.5	102.6	3.82	27.866			
1,000.0	995.9	995.9	995.9	2.4	2.1	179.04	0.0	-61.3	122.5	118.3	4.23	28.969			
1,100.0	1,094.3	1,094.3	1,094.3	2.7	2.3	179.16	0.0	-61.3	140.2	135.5	4.68	29.930			
1,200.0	1,192.7	1,192.7	1,192.7	3.1	2.6	179.26	0.0	-61.3	157.9	152.7	5.14	30.698			
1,300.0	1,291.2	1,291.2	1,291.2	3.5	2.8	179.33	0.0	-61.3	175.6	169.9	5.60	31.324			
1,400.0	1,389.6	1,389.6	1,389.6	3.9	3.0	179.39	0.0	-61.3	193.2	187.2	6.07	31.843			
1,500.0	1,488.0	1,488.0	1,488.0	4.3	3.2	179.44	0.0	-61.3	210.9	204.4	6.53	32.279			
1,600.0	1,586.4	1,593.9	1,593.8	4.7	3.5	179.46	-0.2	-59.8	227.2	220.2	7.00	32.457			
1,700.0	1,684.9	1,701.8	1,701.7	5.1	3.7	179.38	-0.8	-54.3	239.8	232.3	7.45	32.169			
1,800.0	1,783.3	1,810.7	1,810.1	5.5	3.9	179.22	-1.9	-44.6	248.7	240.7	7.92	31.402			
1,900.0	1,881.7	1,913.9	1,912.5	5.9	4.1	179.01	-3.3	-32.4	254.5	246.1	8.38	30.371			
2,000.0	1,980.1	2,013.7	2,011.6	6.3	4.4	178.82	-4.7	-20.3	260.2	251.3	8.84	29.420			
2,100.0	2,078.6	2,113.6	2,110.7	6.7	4.6	178.63	-6.1	-8.2	265.8	256.5	9.31	28.551			
2,200.0	2,177.0	2,213.4	2,209.8	7.1	4.9	178.45	-7.5	3.9	271.4	261.6	9.78	27.755			
2,300.0	2,275.4	2,313.2	2,308.9	7.5	5.2	178.28	-8.8	15.9	277.1	266.8	10.25	27.025			
2,400.0	2,373.8	2,413.1	2,408.0	7.9	5.4	178.11	-10.2	28.0	282.7	272.0	10.73	26.352			
2,500.0	2,472.2	2,512.9	2,507.1	8.3	5.7	177.95	-11.6	40.1	288.3	277.1	11.21	25.730			
2,600.0	2,570.7	2,612.8	2,606.2	8.7	6.0	177.80	-13.0	52.2	294.0	282.3	11.69	25.155			
2,700.0	2,669.1	2,712.6	2,705.3	9.1	6.3	177.65	-14.4	64.2	299.6	287.5	12.17	24.622			
2,800.0	2,767.5	2,812.4	2,804.4	9.5	6.6	177.51	-15.8	76.3	305.3	292.6	12.65	24.126			
2,900.0	2,865.9	2,912.3	2,903.5	9.9	6.9	177.37	-17.1	88.4	310.9	297.8	13.14	23.664			
3,000.0	2,964.4	3,012.1	3,002.6	10.3	7.2	177.24	-18.5	100.5	316.6	302.9	13.63	23.232			
3,100.0	3,062.8	3,111.9	3,101.7	10.7	7.5	177.11	-19.9	112.5	322.2	308.1	14.12	22.828			
3,200.0	3,161.2	3,211.8	3,200.8	11.1	7.8	176.99	-21.3	124.6	327.9	313.3	14.61	22.449			
3,300.0	3,259.6	3,311.6	3,299.9	11.5	8.1	176.87	-22.7	136.7	333.5	318.4	15.10	22.094			
3,400.0	3,358.1	3,411.5	3,399.0	11.9	8.4	176.76	-24.1	148.8	339.2	323.6	15.59	21.759			
3,500.0	3,456.5	3,511.3	3,498.1	12.3	8.7	176.65	-25.4	160.8	344.9	328.8	16.08	21.444			
3,600.0	3,554.9	3,611.1	3,597.2	12.7	9.0	176.54	-26.8	172.9	350.5	333.9	16.58	21.146			
3,700.0	3,653.3	3,706.0	3,691.3	13.1	9.2	176.45	-28.1	184.1	356.5	339.4	17.05	20.908			
3,800.0	3,751.8	3,800.0	3,785.0	13.5	9.5	176.42	-29.1	192.6	365.1	347.6	17.49	20.871			
3,900.0	3,850.2	3,882.6	3,867.4	14.0	9.6	176.45	-29.6	197.6	376.7	358.8	17.91	21.030			
4,000.0	3,948.6	3,970.0	3,954.7	14.4	9.8	176.53	-30.0	200.3	391.3	373.0	18.33	21.343			
4,100.0	4,047.0	4,062.3	4,047.0	14.8	9.9	176.66	-30.0	200.7	408.6	389.8	18.77	21.769			
4,200.0	4,145.4	4,160.7	4,145.4	15.2	10.1	176.80	-30.0	200.7	426.2	407.0	19.22	22.174			
4,300.0	4,243.9	4,259.1	4,243.9	15.6	10.3	176.93	-30.0	200.7	443.9	424.2	19.68	22.555			
4,400.0	4,342.3	4,357.5	4,342.3	16.0	10.5	177.05	-30.0	200.7	461.5	441.4	20.14	22.918			
4,500.0	4,440.7	4,456.0	4,440.7	16.4	10.7	177.16	-30.0	200.7	479.2	458.6	20.60	23.264			
4,600.0	4,539.1	4,554.4	4,539.1	16.8	10.9	177.26	-30.0	200.7	496.9	475.8	21.06	23.594			
4,700.0	4,637.6	4,652.8	4,637.6	17.2	11.1	177.35	-30.0	200.7	514.5	493.0	21.52	23.909			
4,800.0	4,736.0	4,751.2	4,736.0	17.6	11.3	177.44	-30.0	200.7	532.2	510.2	21.98	24.210			

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 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	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		Minimum Separation		Separation Factor		Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
4,900.0	4,834.4	4,849.7	4,834.4	18.0	11.5	177.52	-30.0	200.7	549.9	527.4	22.45	24.498		
5,000.0	4,932.8	4,948.1	4,932.8	18.4	11.7	177.60	-30.0	200.7	567.5	544.6	22.91	24.774		
5,100.0	5,031.3	5,046.5	5,031.3	18.8	11.9	177.67	-30.0	200.7	585.2	561.8	23.37	25.038		
5,200.0	5,129.7	5,144.9	5,129.7	19.2	12.1	177.74	-30.0	200.7	602.9	579.1	23.84	25.292		
5,300.0	5,228.1	5,243.4	5,228.1	19.6	12.2	177.80	-30.0	200.7	620.6	596.3	24.30	25.535		
5,400.0	5,326.5	5,341.8	5,326.5	20.0	12.4	177.87	-30.0	200.7	638.2	613.5	24.77	25.768		
5,500.0	5,425.0	5,440.2	5,425.0	20.5	12.6	177.92	-30.0	200.7	655.9	630.7	25.23	25.993		
5,569.5	5,493.3	5,508.6	5,493.3	20.7	12.8	177.96	-30.0	200.7	668.2	642.6	25.56	26.144		
5,600.0	5,523.4	5,538.7	5,523.4	20.8	12.8	177.98	-30.0	200.7	673.4	647.7	25.71	26.197		
5,700.0	5,622.3	5,637.5	5,622.3	21.1	13.0	178.03	-30.0	200.7	688.3	662.2	26.14	26.327		
5,800.0	5,721.6	5,736.9	5,721.6	21.4	13.3	178.07	-30.0	200.7	699.8	673.2	26.55	26.356		
5,900.0	5,821.3	5,836.5	5,821.3	21.5	13.5	178.10	-30.0	200.7	707.7	680.8	26.92	26.289		
6,000.0	5,921.2	5,936.4	5,921.2	21.7	13.7	178.12	-30.0	200.7	712.2	685.0	27.26	26.130		
6,078.8	6,000.0	6,015.2	6,000.0	21.8	13.8	-90.00	-30.0	200.7	713.3	685.8	27.51	25.933		
6,100.0	6,021.2	6,036.4	6,021.2	21.8	13.9	-90.00	-30.0	200.7	713.3	685.7	27.59	25.854		
6,200.0	6,121.2	6,136.4	6,121.2	22.0	14.1	-90.00	-30.0	200.7	713.3	685.3	27.99	25.488		
6,300.0	6,221.2	6,236.4	6,221.2	22.1	14.3	-90.00	-30.0	200.7	713.3	684.9	28.38	25.131		
6,400.0	6,321.2	6,336.4	6,321.2	22.2	14.5	-90.00	-30.0	200.7	713.3	684.5	28.78	24.782		
6,447.3	6,368.5	6,383.8	6,368.5	22.3	14.6	-90.00	-30.0	200.7	713.3	684.3	28.97	24.620		
6,450.0	6,371.2	6,386.4	6,371.1	22.3	14.6	89.89	-30.0	200.7	713.3	684.3	28.98	24.614		
6,500.0	6,421.1	6,435.6	6,420.4	22.3	14.7	89.89	-31.8	200.7	713.3	684.2	29.16	24.460		
6,550.0	6,470.9	6,484.9	6,469.4	22.4	14.8	89.89	-36.7	200.6	713.4	684.1	29.35	24.309		
6,600.0	6,520.2	6,534.2	6,518.0	22.5	14.9	89.90	-44.8	200.4	713.5	684.0	29.54	24.156		
6,650.0	6,568.8	6,583.5	6,565.9	22.5	15.0	89.90	-55.9	200.3	713.7	684.0	29.74	24.000		
6,700.0	6,616.6	6,632.8	6,613.1	22.6	15.1	89.90	-70.2	200.0	713.9	684.0	29.95	23.838		
6,750.0	6,663.3	6,682.1	6,659.3	22.7	15.2	89.90	-87.5	199.8	714.2	684.0	30.18	23.666		
6,800.0	6,708.8	6,731.4	6,704.3	22.8	15.3	89.90	-107.7	199.4	714.4	684.0	30.43	23.479		
6,850.0	6,752.8	6,780.7	6,747.9	22.9	15.4	89.91	-130.8	199.1	714.8	684.1	30.71	23.273		
6,900.0	6,795.2	6,830.1	6,789.9	23.0	15.6	89.91	-156.7	198.6	715.1	684.1	31.04	23.043		
6,950.0	6,835.7	6,879.5	6,830.2	23.1	15.7	89.92	-185.2	198.2	715.6	684.2	31.40	22.787		
7,000.0	6,874.2	6,928.9	6,868.6	23.2	15.9	89.92	-216.4	197.7	716.0	684.2	31.82	22.500		
7,050.0	6,910.6	6,978.4	6,904.9	23.4	16.1	89.92	-249.9	197.1	716.5	684.2	32.30	22.181		
7,100.0	6,944.6	7,027.8	6,939.0	23.6	16.4	89.93	-285.8	196.6	717.0	684.2	32.85	21.829		
7,150.0	6,976.2	7,077.4	6,970.7	23.8	16.6	89.93	-323.8	195.9	717.6	684.1	33.46	21.444		
7,200.0	7,005.2	7,126.9	6,999.9	24.0	16.9	89.94	-363.8	195.3	718.1	684.0	34.15	21.027		
7,250.0	7,031.4	7,176.5	7,026.5	24.2	17.3	89.94	-405.6	194.6	718.7	683.8	34.92	20.583		
7,300.0	7,054.9	7,226.1	7,050.3	24.5	17.7	89.95	-449.2	193.9	719.3	683.6	35.76	20.115		
7,350.0	7,075.3	7,275.8	7,071.2	24.8	18.1	89.96	-494.2	193.2	720.0	683.3	36.68	19.628		
7,400.0	7,092.8	7,325.6	7,089.2	25.2	18.6	89.96	-540.5	192.5	720.7	683.0	37.68	19.127		
7,450.0	7,107.1	7,375.3	7,104.2	25.5	19.1	89.97	-588.0	191.7	721.3	682.6	38.74	18.618		
7,500.0	7,118.3	7,425.1	7,116.1	25.9	19.7	89.97	-636.4	190.9	722.0	682.2	39.87	18.107		
7,550.0	7,126.3	7,475.0	7,124.7	26.4	20.3	89.98	-685.5	190.1	722.7	681.7	41.07	17.599		
7,600.0	7,131.0	7,524.9	7,130.2	26.9	20.9	89.99	-735.1	189.3	723.4	681.1	42.31	17.098		
7,644.8	7,132.5	7,569.7	7,132.3	27.3	21.5	89.99	-779.8	188.6	724.1	680.6	43.46	16.660		
7,700.0	7,132.6	7,624.9	7,132.7	27.9	22.2	90.00	-834.9	187.7	724.9	679.9	44.94	16.131		
7,800.0	7,133.0	7,724.9	7,133.1	29.0	23.6	90.01	-934.9	186.1	726.3	678.6	47.72	15.221		
7,900.0	7,133.3	7,824.9	7,133.6	30.2	25.0	90.02	-1,034.9	184.5	727.7	677.1	50.64	14.372		
8,000.0	7,133.6	7,924.8	7,134.0	31.5	26.5	90.03	-1,134.9	182.9	729.1	675.5	53.67	13.586		
8,100.0	7,134.0	8,024.8	7,134.5	32.8	28.1	90.04	-1,234.8	181.3	730.6	673.8	56.80	12.862		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	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
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
8,200.0	7,134.3	8,124.8	7,134.9	34.2	29.7	90.05		-1,334.8	179.7	732.0	672.0	60.01	12.197		
8,300.0	7,134.6	8,224.8	7,135.4	35.7	31.3	90.06		-1,434.8	178.1	733.4	670.1	63.30	11.587		
8,400.0	7,135.0	8,324.8	7,135.8	37.2	33.0	90.07		-1,534.8	176.5	734.8	668.2	66.64	11.027		
8,500.0	7,135.3	8,424.8	7,136.3	38.7	34.7	90.08		-1,634.7	174.8	736.3	666.2	70.03	10.514		
8,600.0	7,135.6	8,524.8	7,136.8	40.3	36.4	90.09		-1,734.7	173.2	737.7	664.2	73.46	10.041		
8,700.0	7,136.0	8,624.8	7,137.2	41.9	38.1	90.10		-1,834.7	171.6	739.1	662.2	76.94	9.607		
8,800.0	7,136.3	8,724.8	7,137.7	43.5	39.9	90.11		-1,934.7	170.0	740.5	660.1	80.44	9.206		
8,900.0	7,136.6	8,824.7	7,138.1	45.2	41.6	90.12		-2,034.6	168.4	741.9	658.0	83.98	8.835		
9,000.0	7,137.0	8,924.7	7,138.6	46.8	43.4	90.13		-2,134.6	166.8	743.4	655.8	87.54	8.492		
9,100.0	7,137.3	9,024.7	7,139.0	48.5	45.2	90.14		-2,234.6	165.2	744.8	653.7	91.12	8.174		
9,200.0	7,137.6	9,124.7	7,139.5	50.2	47.0	90.15		-2,334.6	163.6	746.2	651.5	94.72	7.878		
9,300.0	7,137.9	9,224.7	7,139.9	52.0	48.8	90.15		-2,434.5	162.0	747.6	649.3	98.34	7.603		
9,400.0	7,138.3	9,324.7	7,140.4	53.7	50.6	90.16		-2,534.5	160.4	749.1	647.1	101.98	7.345		
9,500.0	7,138.6	9,424.7	7,140.8	55.4	52.5	90.17		-2,634.5	158.7	750.5	644.9	105.63	7.105		
9,600.0	7,138.9	9,524.7	7,141.3	57.2	54.3	90.18		-2,734.5	157.1	751.9	642.6	109.29	6.880		
9,700.0	7,139.3	9,624.7	7,141.7	59.0	56.1	90.19		-2,834.5	155.5	753.3	640.4	112.96	6.669		
9,800.0	7,139.6	9,724.7	7,142.2	60.7	58.0	90.20		-2,934.4	153.9	754.8	638.1	116.65	6.471		
9,900.0	7,139.9	9,824.6	7,142.6	62.5	59.8	90.21		-3,034.4	152.3	756.2	635.9	120.34	6.284		
10,000.0	7,140.3	9,924.6	7,143.1	64.3	61.6	90.22		-3,134.4	150.7	757.6	633.6	124.04	6.108		
10,100.0	7,140.6	10,024.6	7,143.6	66.1	63.5	90.23		-3,234.4	149.1	759.0	631.3	127.75	5.942		
10,200.0	7,140.9	10,124.6	7,144.0	67.9	65.4	90.23		-3,334.3	147.5	760.5	629.0	131.47	5.784		
10,300.0	7,141.3	10,224.6	7,144.5	69.7	67.2	90.24		-3,434.3	145.9	761.9	626.7	135.19	5.636		
10,400.0	7,141.6	10,324.6	7,144.9	71.6	69.1	90.25		-3,534.3	144.3	763.3	624.4	138.92	5.495		
10,500.0	7,141.9	10,424.6	7,145.4	73.4	70.9	90.26		-3,634.3	142.6	764.7	622.1	142.66	5.361		
10,600.0	7,142.3	10,524.6	7,145.8	75.2	72.8	90.27		-3,734.2	141.0	766.2	619.8	146.40	5.233		
10,700.0	7,142.6	10,624.6	7,146.3	77.1	74.7	90.28		-3,834.2	139.4	767.6	617.4	150.14	5.112		
10,800.0	7,142.9	10,724.6	7,146.7	78.9	76.6	90.29		-3,934.2	137.8	769.0	615.1	153.89	4.997		
10,900.0	7,143.3	10,824.5	7,147.2	80.7	78.4	90.30		-4,034.2	136.2	770.4	612.8	157.64	4.887		
11,000.0	7,143.6	10,924.5	7,147.6	82.6	80.3	90.30		-4,134.1	134.6	771.9	610.5	161.40	4.782		
11,100.0	7,143.9	11,024.5	7,148.1	84.4	82.2	90.31		-4,234.1	133.0	773.3	608.1	165.16	4.682		
11,200.0	7,144.2	11,124.5	7,148.5	86.3	84.1	90.32		-4,334.1	131.4	774.7	605.8	168.93	4.586		
11,300.0	7,144.6	11,224.5	7,149.0	88.1	85.9	90.33		-4,434.1	129.8	776.1	603.4	172.69	4.494		
11,400.0	7,144.9	11,324.5	7,149.5	90.0	87.8	90.34		-4,534.0	128.2	777.6	601.1	176.46	4.406		
11,500.0	7,145.2	11,424.5	7,149.9	91.8	89.7	90.35		-4,634.0	126.6	779.0	598.8	180.24	4.322		
11,600.0	7,145.6	11,524.5	7,150.4	93.7	91.6	90.35		-4,734.0	124.9	780.4	596.4	184.01	4.241		
11,700.0	7,145.9	11,624.5	7,150.8	95.6	93.4	90.36		-4,834.0	123.3	781.8	594.1	187.70	4.165		
11,727.8	7,146.0	11,652.3	7,150.9	96.1	93.8	90.36		-4,861.8	122.9	782.2	593.6	188.66	4.146		
11,728.5	7,146.0	11,653.0	7,150.9	96.1	93.8	90.36		-4,862.5	122.9	782.2	593.6	188.68	4.146 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	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 +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	90.03	0.0	27.9	27.9						
100.0	100.0	100.0	100.0	0.1	0.1	90.03	0.0	27.9	27.9	27.6	0.22	124.011			
200.0	200.0	200.0	200.0	0.3	0.3	90.03	0.0	27.9	27.9	27.2	0.67	41.337 CC, ES			
300.0	300.0	299.0	299.0	0.6	0.6	90.12	-0.1	29.6	29.6	28.5	1.11	26.637			
400.0	400.0	397.8	397.6	0.8	0.8	90.33	-0.2	34.7	34.8	33.2	1.56	22.359			
500.0	500.0	496.2	495.7	1.0	1.0	-1.37	-0.4	43.2	41.6	39.7	1.99	20.959			
600.0	599.8	594.4	593.2	1.2	1.3	-1.27	-0.7	55.0	48.5	46.0	2.42	20.050			
700.0	699.5	692.4	690.0	1.4	1.6	-1.21	-1.1	70.1	55.2	52.3	2.86	19.305			
800.0	798.7	790.2	786.0	1.7	2.0	-1.19	-1.6	88.4	61.9	58.6	3.32	18.663			
909.3	906.7	898.8	892.1	2.1	2.5	-1.21	-2.2	111.5	68.0	64.1	3.83	17.741			
1,000.0	995.9	989.4	980.6	2.4	2.9	-1.25	-2.7	130.9	71.4	67.1	4.28	16.682			
1,100.0	1,094.3	1,089.3	1,078.2	2.7	3.3	-1.29	-3.3	152.3	75.2	70.4	4.78	15.723			
1,200.0	1,192.7	1,189.2	1,175.9	3.1	3.8	-1.33	-3.9	173.6	79.0	73.7	5.29	14.930			
1,300.0	1,291.2	1,289.2	1,273.5	3.5	4.2	-1.36	-4.4	195.0	82.7	76.9	5.80	14.271			
1,400.0	1,389.6	1,389.1	1,371.1	3.9	4.7	-1.39	-5.0	216.4	86.5	80.2	6.31	13.705			
1,500.0	1,488.0	1,489.0	1,468.7	4.3	5.2	-1.42	-5.6	237.7	90.3	83.5	6.83	13.222			
1,600.0	1,586.4	1,588.9	1,566.3	4.7	5.6	-1.44	-6.1	259.1	94.1	86.7	7.35	12.803			
1,700.0	1,684.9	1,688.9	1,663.9	5.1	6.1	-1.47	-6.7	280.5	97.9	90.0	7.87	12.438			
1,800.0	1,783.3	1,788.8	1,761.5	5.5	6.6	-1.49	-7.3	301.9	101.6	93.3	8.39	12.116			
1,900.0	1,881.7	1,888.7	1,859.2	5.9	7.0	-1.51	-7.8	323.2	105.4	96.5	8.91	11.830			
2,000.0	1,980.1	1,988.7	1,956.8	6.3	7.5	-1.53	-8.4	344.6	109.2	99.8	9.43	11.575			
2,100.0	2,078.6	2,088.6	2,054.4	6.7	8.0	-1.55	-9.0	366.0	113.0	103.0	9.96	11.346			
2,200.0	2,177.0	2,188.5	2,152.0	7.1	8.4	-1.56	-9.5	387.3	116.8	106.3	10.48	11.139			
2,300.0	2,275.4	2,288.4	2,249.6	7.5	8.9	-1.58	-10.1	408.7	120.5	109.5	11.01	10.951			
2,400.0	2,373.8	2,388.4	2,347.2	7.9	9.4	-1.59	-10.7	430.1	124.3	112.8	11.53	10.780			
2,500.0	2,472.2	2,488.3	2,444.8	8.3	9.8	-1.61	-11.2	451.4	128.1	116.1	12.06	10.624			
2,600.0	2,570.7	2,588.2	2,542.5	8.7	10.3	-1.62	-11.8	472.8	131.9	119.3	12.59	10.480			
2,700.0	2,669.1	2,688.2	2,640.1	9.1	10.8	-1.63	-12.4	494.2	135.7	122.6	13.11	10.348			
2,800.0	2,767.5	2,788.1	2,737.7	9.5	11.2	-1.65	-12.9	515.6	139.5	125.8	13.64	10.225			
2,900.0	2,865.9	2,888.0	2,835.3	9.9	11.7	-1.66	-13.5	536.9	143.2	129.1	14.17	10.112			
3,000.0	2,964.4	2,987.9	2,932.9	10.3	12.2	-1.67	-14.0	558.3	147.0	132.3	14.69	10.006			
3,100.0	3,062.8	3,087.9	3,030.5	10.7	12.7	-1.68	-14.6	579.7	150.8	135.6	15.22	9.908			
3,200.0	3,161.2	3,187.8	3,128.2	11.1	13.1	-1.69	-15.2	601.0	154.6	138.8	15.75	9.816			
3,300.0	3,259.6	3,287.7	3,225.8	11.5	13.6	-1.70	-15.7	622.4	158.4	142.1	16.28	9.730			
3,400.0	3,358.1	3,387.7	3,323.4	11.9	14.1	-1.70	-16.3	643.8	162.1	145.3	16.80	9.650			
3,500.0	3,456.5	3,487.6	3,421.0	12.3	14.5	-1.71	-16.9	665.1	165.9	148.6	17.33	9.574			
3,600.0	3,554.9	3,587.5	3,518.6	12.7	15.0	-1.72	-17.4	686.5	169.7	151.8	17.86	9.502			
3,700.0	3,653.3	3,687.4	3,616.2	13.1	15.5	-1.73	-18.0	707.9	173.5	155.1	18.39	9.435			
3,800.0	3,751.8	3,787.4	3,713.8	13.5	15.9	-1.73	-18.6	729.3	177.3	158.4	18.92	9.371			
3,900.0	3,850.2	3,887.3	3,811.5	14.0	16.4	-1.74	-19.1	750.6	181.0	161.6	19.44	9.311			
4,000.0	3,948.6	3,987.2	3,909.1	14.4	16.9	-1.75	-19.7	772.0	184.8	164.9	19.97	9.254			
4,100.0	4,047.0	4,087.2	4,006.7	14.8	17.4	-1.75	-20.3	793.4	188.6	168.1	20.50	9.200			
4,200.0	4,145.4	4,187.1	4,104.3	15.2	17.8	-1.76	-20.8	814.7	192.4	171.4	21.03	9.149			
4,300.0	4,243.9	4,287.0	4,201.9	15.6	18.3	-1.77	-21.4	836.1	196.2	174.6	21.56	9.100			
4,400.0	4,342.3	4,386.9	4,299.5	16.0	18.8	-1.77	-22.0	857.5	200.0	177.9	22.09	9.053			
4,500.0	4,440.7	4,486.9	4,397.1	16.4	19.2	-1.78	-22.5	878.8	203.7	181.1	22.62	9.008			
4,600.0	4,539.1	4,586.8	4,494.8	16.8	19.7	-1.78	-23.1	900.2	207.5	184.4	23.15	8.966			
4,700.0	4,637.6	4,686.7	4,592.4	17.2	20.2	-1.79	-23.7	921.6	211.3	187.6	23.67	8.925			
4,800.0	4,736.0	4,786.7	4,690.0	17.6	20.7	-1.79	-24.2	943.0	215.1	190.9	24.20	8.886			

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 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

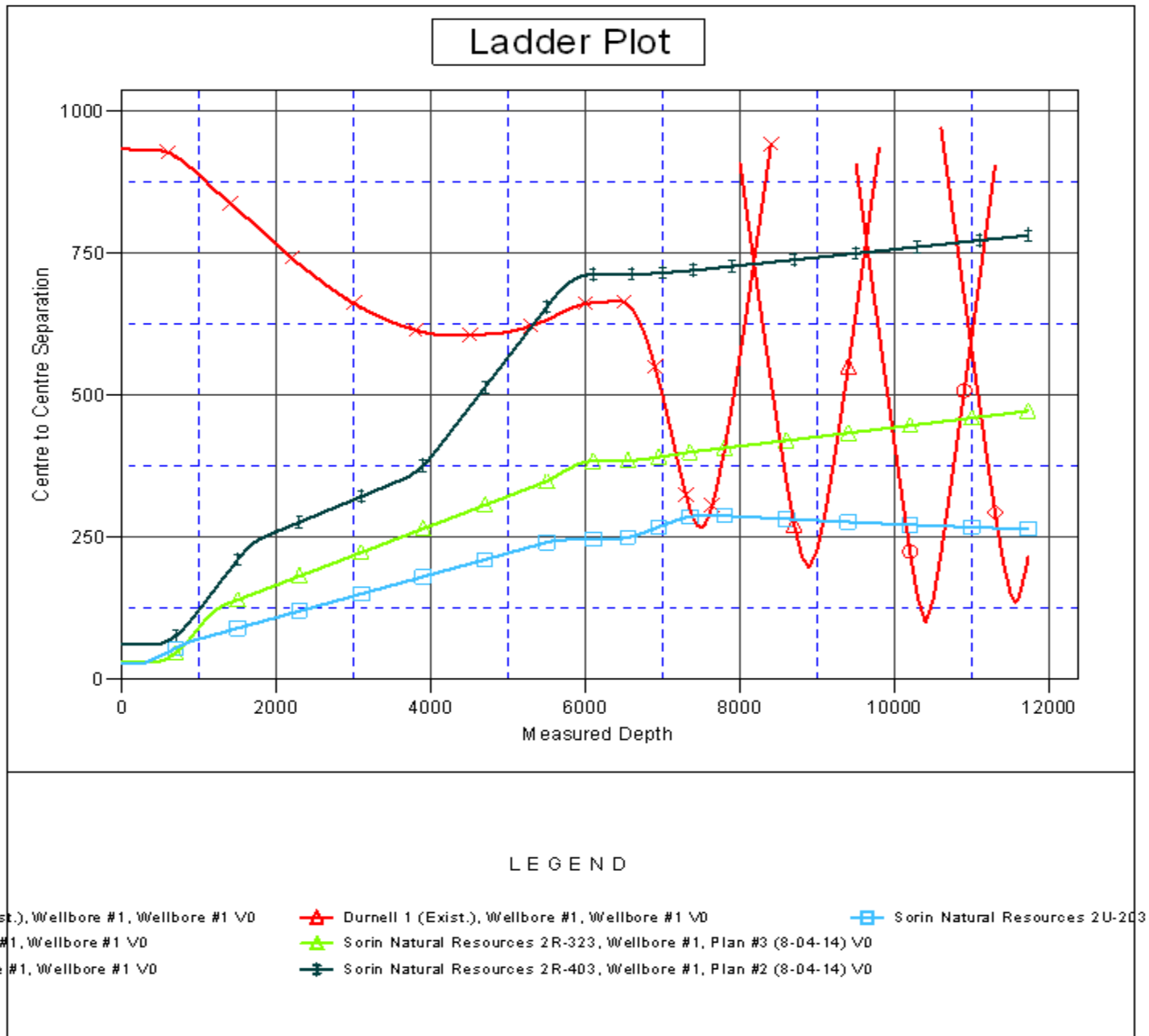
Offset Design Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W - Sorin Natural Resources 2U-203 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
4,900.0	4,834.4	4,886.6	4,787.6	18.0	21.1	-1.80	-24.8	964.3	218.9	194.1	24.73	8.849		
5,000.0	4,932.8	4,986.5	4,885.2	18.4	21.6	-1.80	-25.4	985.7	222.6	197.4	25.26	8.814		
5,100.0	5,031.3	5,086.4	4,982.8	18.8	22.1	-1.81	-25.9	1,007.1	226.4	200.6	25.79	8.779		
5,200.0	5,129.7	5,186.4	5,080.5	19.2	22.5	-1.81	-26.5	1,028.4	230.2	203.9	26.32	8.747		
5,300.0	5,228.1	5,286.3	5,178.1	19.6	23.0	-1.81	-27.1	1,049.8	234.0	207.1	26.85	8.715		
5,400.0	5,326.5	5,386.2	5,275.7	20.0	23.5	-1.82	-27.6	1,071.2	237.8	210.4	27.38	8.685		
5,500.0	5,425.0	5,486.2	5,373.3	20.5	24.0	-1.82	-28.2	1,092.5	241.5	213.6	27.91	8.655		
5,569.5	5,493.3	5,560.7	5,446.3	20.7	24.3	-1.83	-28.6	1,107.9	243.6	215.3	28.27	8.616		
5,600.0	5,523.4	5,594.1	5,479.0	20.8	24.4	-1.83	-28.8	1,114.1	244.1	215.7	28.42	8.589		
5,700.0	5,622.3	5,703.4	5,586.9	21.1	24.7	-1.85	-29.2	1,131.9	245.5	216.7	28.82	8.519		
5,800.0	5,721.6	5,812.8	5,695.4	21.4	25.0	-1.86	-29.6	1,145.6	246.6	217.4	29.16	8.456		
5,900.0	5,821.3	5,922.2	5,804.4	21.5	25.2	-1.87	-29.8	1,155.2	247.3	217.9	29.45	8.399		
6,000.0	5,921.2	6,031.7	5,913.7	21.7	25.4	-1.88	-30.0	1,160.6	247.8	218.1	29.68	8.348		
6,078.8	6,000.0	6,118.0	6,000.0	21.8	25.5	90.00	-30.0	1,161.9	247.9	218.0	29.84	8.308		
6,100.0	6,021.2	6,139.1	6,021.2	21.8	25.5	90.00	-30.0	1,161.9	247.9	218.0	29.91	8.287		
6,200.0	6,121.2	6,239.1	6,121.2	22.0	25.6	90.00	-30.0	1,161.9	247.9	217.6	30.26	8.192		
6,300.0	6,221.2	6,339.2	6,221.3	22.1	25.7	90.06	-30.3	1,161.9	247.9	217.3	30.60	8.099		
6,358.3	6,279.5	6,397.6	6,279.5	22.2	25.8	90.91	-34.0	1,161.8	247.8	217.1	30.78	8.052		
6,400.0	6,321.2	6,438.8	6,320.4	22.2	25.8	92.14	-39.2	1,161.7	247.9	217.0	30.90	8.023		
6,447.3	6,368.5	6,484.7	6,365.5	22.3	25.8	94.09	-47.7	1,161.6	248.2	217.2	31.06	7.994		
6,450.0	6,371.2	6,487.3	6,368.0	22.3	25.8	-85.89	-48.3	1,161.6	248.3	217.2	31.07	7.991		
6,500.0	6,421.1	6,534.9	6,414.1	22.3	25.9	-83.50	-60.1	1,161.4	249.1	217.8	31.32	7.954		
6,550.0	6,470.9	6,581.9	6,458.9	22.4	26.0	-81.17	-74.5	1,161.2	250.3	218.7	31.62	7.915		
6,600.0	6,520.2	6,628.4	6,502.1	22.5	26.0	-78.91	-91.4	1,160.9	251.9	219.9	31.96	7.880		
6,650.0	6,568.8	6,674.3	6,543.8	22.5	26.1	-76.72	-110.7	1,160.6	253.7	221.4	32.30	7.854		
6,700.0	6,616.6	6,719.7	6,583.8	22.6	26.2	-74.63	-132.2	1,160.2	255.8	223.2	32.62	7.842		
6,750.0	6,663.3	6,764.7	6,622.0	22.7	26.2	-72.62	-155.8	1,159.9	258.2	225.3	32.90	7.846		
6,800.0	6,708.8	6,809.2	6,658.5	22.8	26.3	-70.73	-181.4	1,159.5	260.7	227.5	33.14	7.867		
6,850.0	6,752.8	6,853.3	6,693.1	22.9	26.4	-68.93	-208.8	1,159.0	263.3	230.0	33.31	7.905		
6,900.0	6,795.2	6,900.0	6,727.9	23.0	26.5	-67.15	-239.8	1,158.5	266.0	232.6	33.44	7.956		
6,950.0	6,835.7	6,940.5	6,756.5	23.1	26.6	-65.67	-268.4	1,158.1	268.7	235.2	33.50	8.021		
7,000.0	6,874.2	6,983.6	6,785.2	23.2	26.7	-64.21	-300.5	1,157.6	271.4	237.9	33.54	8.092		
7,050.0	6,910.6	7,026.3	6,811.9	23.4	26.9	-62.86	-333.9	1,157.0	274.1	240.5	33.57	8.164		
7,100.0	6,944.6	7,068.8	6,836.6	23.6	27.0	-61.62	-368.6	1,156.5	276.6	243.0	33.61	8.230		
7,150.0	6,976.2	7,111.1	6,859.1	23.8	27.2	-60.49	-404.3	1,155.9	279.0	245.4	33.69	8.282		
7,200.0	7,005.2	7,150.0	6,878.1	24.0	27.4	-59.53	-438.2	1,155.4	281.3	247.5	33.84	8.314		
7,250.0	7,031.4	7,195.0	6,897.9	24.2	27.6	-58.56	-478.7	1,154.7	283.3	249.2	34.10	8.309		
7,300.0	7,054.9	7,236.7	6,914.0	24.5	27.8	-57.75	-517.1	1,154.1	285.1	250.6	34.48	8.268		
7,350.0	7,075.3	7,278.2	6,928.0	24.8	28.1	-57.04	-556.1	1,153.5	286.7	251.7	35.02	8.185		
7,400.0	7,092.8	7,319.6	6,939.8	25.2	28.3	-56.44	-595.8	1,152.8	287.9	252.2	35.73	8.058		
7,450.0	7,107.1	7,360.9	6,949.4	25.5	28.6	-55.94	-635.9	1,152.2	288.9	252.3	36.63	7.888		
7,500.0	7,118.3	7,400.0	6,956.6	25.9	28.9	-55.55	-674.4	1,151.6	289.6	251.9	37.70	7.683		
7,550.0	7,126.3	7,443.2	6,962.1	26.4	29.2	-55.23	-717.2	1,150.9	290.0	251.0	38.99	7.437		
7,600.0	7,131.0	7,484.3	6,965.1	26.9	29.6	-55.02	-758.2	1,150.2	290.0	249.5	40.44	7.171		
7,644.8	7,132.5	7,522.8	6,965.9	27.3	29.9	-54.91	-796.7	1,149.6	289.7	247.8	41.89	6.916		
7,700.0	7,132.6	7,575.9	6,965.8	27.9	30.4	-54.77	-849.8	1,148.8	289.3	246.2	43.07	6.717		
7,800.0	7,133.0	7,675.9	6,965.4	29.0	31.4	-54.49	-949.7	1,147.2	288.6	243.2	45.33	6.365		
7,900.0	7,133.3	7,775.8	6,965.0	30.2	32.5	-54.22	-1,049.7	1,145.6	287.8	240.1	47.68	6.037		
8,000.0	7,133.6	7,875.8	6,964.7	31.5	33.6	-53.94	-1,149.7	1,144.0	287.1	237.0	50.10	5.730		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	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 +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor				
8,100.0	7,134.0	7,975.8	6,964.3	32.8	34.9	-53.66	-1,249.7	1,142.4	286.4	233.8	52.58	5.446				
8,200.0	7,134.3	8,075.8	6,963.9	34.2	36.2	-53.38	-1,349.6	1,140.8	285.6	230.5	55.11	5.183				
8,300.0	7,134.6	8,175.8	6,963.6	35.7	37.5	-53.10	-1,449.6	1,139.2	284.9	227.2	57.69	4.939				
8,400.0	7,135.0	8,275.8	6,963.2	37.2	38.9	-52.81	-1,549.6	1,137.6	284.2	223.9	60.29	4.715				
8,500.0	7,135.3	8,375.8	6,962.8	38.7	40.4	-52.53	-1,649.6	1,136.0	283.5	220.6	62.91	4.507				
8,600.0	7,135.6	8,475.8	6,962.5	40.3	41.8	-52.24	-1,749.5	1,134.4	282.8	217.3	65.55	4.315				
8,700.0	7,136.0	8,575.8	6,962.1	41.9	43.4	-51.95	-1,849.5	1,132.8	282.1	213.9	68.21	4.137				
8,800.0	7,136.3	8,675.7	6,961.7	43.5	44.9	-51.67	-1,949.5	1,131.2	281.5	210.6	70.87	3.972				
8,900.0	7,136.6	8,775.7	6,961.4	45.2	46.5	-51.37	-2,049.5	1,129.6	280.8	207.3	73.54	3.818				
9,000.0	7,137.0	8,875.7	6,961.0	46.8	48.1	-51.08	-2,149.4	1,128.0	280.1	203.9	76.21	3.676				
9,100.0	7,137.3	8,975.7	6,960.6	48.5	49.7	-50.79	-2,249.4	1,126.4	279.5	200.6	78.87	3.543				
9,200.0	7,137.6	9,075.7	6,960.3	50.2	51.4	-50.50	-2,349.4	1,124.8	278.8	197.3	81.54	3.420				
9,300.0	7,137.9	9,175.7	6,959.9	52.0	53.0	-50.20	-2,449.4	1,123.2	278.2	194.0	84.19	3.304				
9,400.0	7,138.3	9,275.7	6,959.5	53.7	54.7	-49.90	-2,549.3	1,121.6	277.6	190.7	86.84	3.196				
9,500.0	7,138.6	9,375.7	6,959.2	55.4	56.4	-49.60	-2,649.3	1,120.0	276.9	187.4	89.48	3.095				
9,600.0	7,138.9	9,475.6	6,958.8	57.2	58.1	-49.30	-2,749.3	1,118.4	276.3	184.2	92.10	3.000				
9,700.0	7,139.3	9,575.6	6,958.4	59.0	59.9	-49.00	-2,849.3	1,116.8	275.7	181.0	94.72	2.911				
9,800.0	7,139.6	9,675.6	6,958.1	60.7	61.6	-48.70	-2,949.2	1,115.2	275.1	177.8	97.31	2.827				
9,900.0	7,139.9	9,775.6	6,957.7	62.5	63.4	-48.40	-3,049.2	1,113.6	274.5	174.6	99.90	2.748				
10,000.0	7,140.3	9,875.6	6,957.3	64.3	65.1	-48.09	-3,149.2	1,112.0	273.9	171.4	102.46	2.673				
10,100.0	7,140.6	9,975.6	6,957.0	66.1	66.9	-47.78	-3,249.1	1,110.4	273.3	168.3	105.01	2.603				
10,200.0	7,140.9	10,075.6	6,956.6	67.9	68.6	-47.48	-3,349.1	1,108.9	272.8	165.2	107.54	2.536				
10,300.0	7,141.3	10,175.6	6,956.2	69.7	70.4	-47.17	-3,449.1	1,107.3	272.2	162.1	110.05	2.473				
10,400.0	7,141.6	10,275.5	6,955.9	71.6	72.2	-46.86	-3,549.1	1,105.7	271.6	159.1	112.54	2.414				
10,500.0	7,141.9	10,375.5	6,955.5	73.4	74.0	-46.55	-3,649.0	1,104.1	271.1	156.1	115.01	2.357				
10,600.0	7,142.3	10,475.5	6,955.1	75.2	75.8	-46.23	-3,749.0	1,102.5	270.5	153.1	117.45	2.303				
10,700.0	7,142.6	10,575.5	6,954.8	77.1	77.6	-45.92	-3,849.0	1,100.9	270.0	150.1	119.88	2.252				
10,800.0	7,142.9	10,675.5	6,954.4	78.9	79.4	-45.60	-3,949.0	1,099.3	269.5	147.2	122.28	2.204				
10,900.0	7,143.3	10,775.5	6,954.0	80.7	81.2	-45.29	-4,048.9	1,097.7	269.0	144.3	124.66	2.158				
11,000.0	7,143.6	10,875.5	6,953.7	82.6	83.1	-44.97	-4,148.9	1,096.1	268.5	141.4	127.01	2.114				
11,100.0	7,143.9	10,975.5	6,953.3	84.4	84.9	-44.65	-4,248.9	1,094.5	268.0	138.6	129.34	2.072				
11,200.0	7,144.2	11,075.4	6,952.9	86.3	86.7	-44.33	-4,348.9	1,092.9	267.5	135.8	131.65	2.032				
11,300.0	7,144.6	11,175.4	6,952.6	88.1	88.5	-44.01	-4,448.8	1,091.3	267.0	133.1	133.93	1.994				
11,400.0	7,144.9	11,275.4	6,952.2	90.0	90.4	-43.69	-4,548.8	1,089.7	266.5	130.3	136.18	1.957				
11,500.0	7,145.2	11,375.4	6,951.8	91.8	92.2	-43.36	-4,648.8	1,088.1	266.0	127.6	138.41	1.922				
11,600.0	7,145.6	11,475.4	6,951.5	93.7	94.1	-43.04	-4,748.8	1,086.5	265.6	125.0	140.60	1.889				
11,700.0	7,145.9	11,575.4	6,951.1	95.6	95.9	-42.71	-4,848.7	1,084.9	265.1	122.4	142.78	1.857				
11,727.6	7,146.0	11,601.8	6,951.0	96.1	96.5	-42.63	-4,875.1	1,084.5	265.0	121.7	143.36	1.849				
11,727.8	7,146.0	11,601.8	6,951.0	96.1	96.5	-42.63	-4,875.1	1,084.5	265.0	121.7	143.36	1.849				
11,728.5	7,146.0	11,601.8	6,951.0	96.1	96.5	-42.63	-4,875.1	1,084.5	265.0	121.7	143.37	1.849 SF				

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sorin Natural Resources 2U-443
Project:	SEC.2-T4N-R66W	TVD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Reference Site:	Sorin Natural Resources 2R-HZ Pad Sec.2-T4N-R66W	MD Reference:	WELL @ 4683.5ft (Ensign Rig #136 - RKB 12.5')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sorin Natural Resources 2U-443	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 #2 (08-04-14)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4683.5ft (Ensign Rig #136 - Coordinates are relative to: Sorin Natural Resources 2U-443
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000 °
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.49°



Reference Depths are relative to WELL @ 4683.5ft (Ensign Rig #136 - Coordinates are relative to: Sorin Natural Resources 2U-443
Offset Depths are relative to Offset Datum Coordinate System is US State Plane 1983, Colorado Northern Zone
Central Meridian is -105.500000 ° Grid Convergence at Surface is: 0.49°

