

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Sater 19M-443**

Surface Location: Sater 4N63W19M Pad Sec.19-T4N-R63W

North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

Ground Elevation: 4664.0

+N/-S

+E/-W

Northing

Easting

Latitude

Longitude

Slot

0.0

0.0

1355376.62

3284092.69

40.304430

-104.481370

RKB - 13' WELL @ 4677.0ft (RKB - 13')

WELLBORE TARGET DETAILS				
Name	TVD	+N/-S	+E/-W	Shape
50' E/W Hardline (19M-443)	1.0	-2620.9	-259.4	Rectangle (Sides: L3924.1 W100.0)
SHL 155'FNL & 2319'FWL	1.0	0.0	0.0	Point
BHL 500'FSL & 2076'FWL	6709.0	-4583.0	-259.4	Point

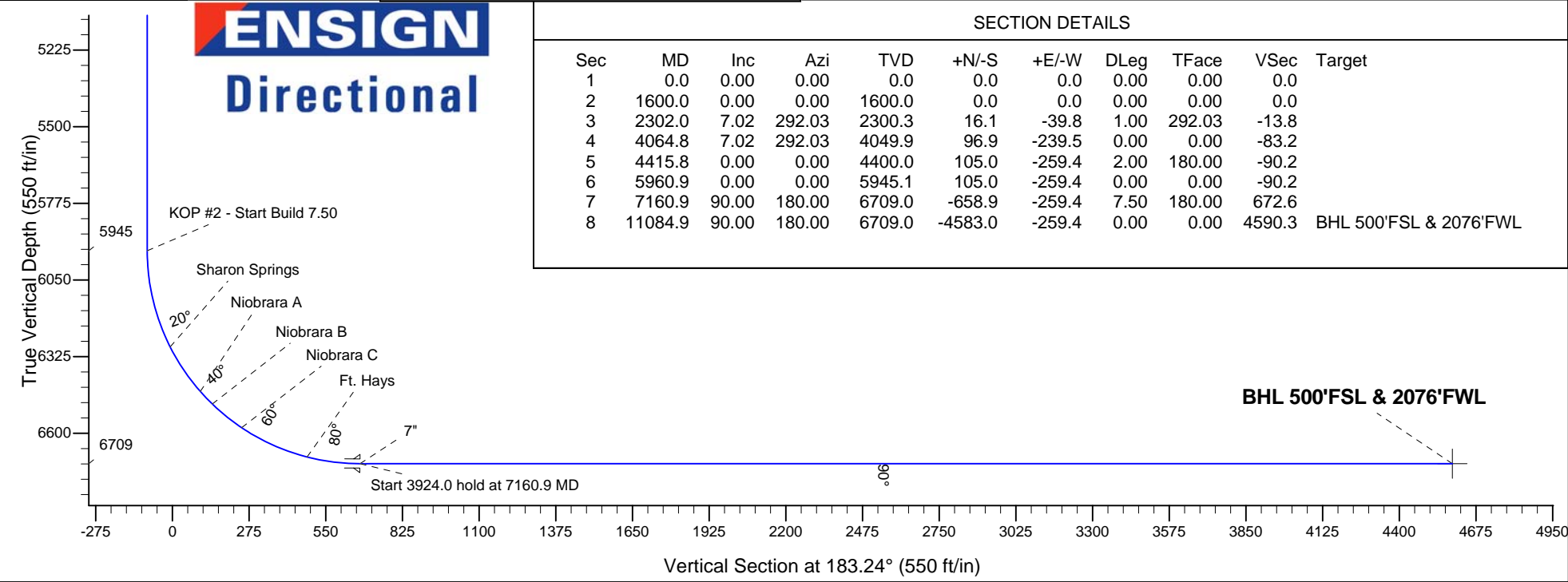
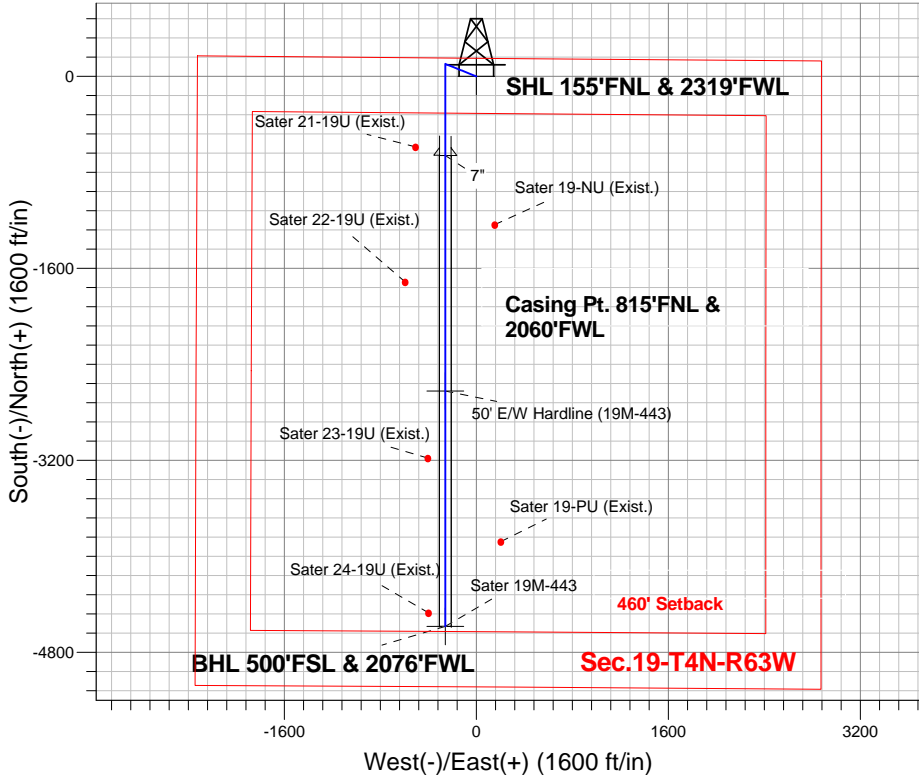
Azimuths to True North
Magnetic North: 8.21°

Magnetic Field
Strength: 52726.5nT
Dip Angle: 66.89°
Date: 2/10/2015
Model: IGRF2010

Sater 4N63W19M Pad Sec.19-T4N-R63W
Sater 19M-443
Plan #1 (2-10-15)
11:57, February 12 2015

ANNOTATIONS

TVD	MD	Annotation
1600.0	1600.0	KOP - Start Build 1.00
4049.8	4064.8	Start Drop -2.00
5945.1	5960.9	KOP #2 - Start Build 7.50
6709.0	7160.9	Start 3924.0 hold at 7160.9 MD
6709.0	11084.9	TD at 11084.9





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.19-T4N-R63W

Sater 4N63W19M Pad Sec.19-T4N-R63W

Sater 19M-443

Wellbore #1

Plan: Plan #1 (2-10-15)

Standard Planning Report

12 February, 2015

Database:	Landmark	Local Co-ordinate Reference:	Well Sater 19M-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Project:	SEC.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	North Reference:	True
Well:	Sater 19M-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-10-15)		

Project	SEC.19-T4N-R63W, Weld County, CO		
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	Sater 4N63W19M Pad Sec.19-T4N-R63W		
Site Position:		Northing:	1,355,375.92 ft
From:	Lat/Long	Easting:	3,284,031.34 ft
Position Uncertainty:	0.0 ft	Slot Radius:	"
		Latitude:	40.304430
		Longitude:	-104.481590
		Grid Convergence:	0.66 °

Well	Sater 19M-443		
Well Position	+N/-S	0.0 ft	Northing: 1,355,376.62 ft
	+E/-W	61.4 ft	Easting: 3,284,092.69 ft
Position Uncertainty		0.0 ft	Wellhead Elevation: ft
			Latitude: 40.304430
			Longitude: -104.481370
			Ground Level: 4,664.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/10/2015	8.21	66.89	52,727

Design	Plan #1 (2-10-15)			
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	183.24

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	
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,302.0	7.02	292.03	2,300.3	16.1	-39.8	1.00	1.00	0.00	292.03	
4,064.8	7.02	292.03	4,049.9	96.9	-239.5	0.00	0.00	0.00	0.00	
4,415.8	0.00	0.00	4,400.0	105.0	-259.4	2.00	-2.00	0.00	180.00	
5,960.9	0.00	0.00	5,945.1	105.0	-259.4	0.00	0.00	0.00	0.00	
7,160.9	90.00	180.00	6,709.0	-658.9	-259.4	7.50	7.50	0.00	180.00	
11,084.9	90.00	180.00	6,709.0	-4,583.0	-259.4	0.00	0.00	0.00	0.00	BHL 500'FSL & 207

Database:	Landmark	Local Co-ordinate Reference:	Well Sater 19M-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Project:	SEC.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	North Reference:	True
Well:	Sater 19M-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-10-15)		

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 155'FNL & 2319'FWL - 50' E/W Hardline (19M-443)									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP - Start Build 1.00									
1,700.0	1.00	292.03	1,700.0	0.3	-0.8	-0.3	1.00	1.00	0.00
1,800.0	2.00	292.03	1,800.0	1.3	-3.2	-1.1	1.00	1.00	0.00
1,900.0	3.00	292.03	1,899.9	2.9	-7.3	-2.5	1.00	1.00	0.00
2,000.0	4.00	292.03	1,999.7	5.2	-12.9	-4.5	1.00	1.00	0.00
2,100.0	5.00	292.03	2,099.4	8.2	-20.2	-7.0	1.00	1.00	0.00
2,200.0	6.00	292.03	2,198.9	11.8	-29.1	-10.1	1.00	1.00	0.00
2,300.0	7.00	292.03	2,298.3	16.0	-39.6	-13.8	1.00	1.00	0.00
2,302.0	7.02	292.03	2,300.3	16.1	-39.8	-13.8	1.00	1.00	0.00
2,400.0	7.02	292.03	2,397.5	20.6	-50.9	-17.7	0.00	0.00	0.00
2,500.0	7.02	292.03	2,496.8	25.2	-62.2	-21.6	0.00	0.00	0.00
2,600.0	7.02	292.03	2,596.0	29.8	-73.6	-25.6	0.00	0.00	0.00
2,700.0	7.02	292.03	2,695.3	34.4	-84.9	-29.5	0.00	0.00	0.00
2,800.0	7.02	292.03	2,794.5	38.9	-96.2	-33.4	0.00	0.00	0.00
2,900.0	7.02	292.03	2,893.8	43.5	-107.6	-37.4	0.00	0.00	0.00
3,000.0	7.02	292.03	2,993.0	48.1	-118.9	-41.3	0.00	0.00	0.00
3,100.0	7.02	292.03	3,092.3	52.7	-130.2	-45.3	0.00	0.00	0.00
3,200.0	7.02	292.03	3,191.5	57.3	-141.6	-49.2	0.00	0.00	0.00
3,300.0	7.02	292.03	3,290.8	61.9	-152.9	-53.1	0.00	0.00	0.00
3,400.0	7.02	292.03	3,390.0	66.5	-164.2	-57.1	0.00	0.00	0.00
3,460.4	7.02	292.03	3,450.0	69.2	-171.1	-59.5	0.00	0.00	0.00
Parkman									
3,500.0	7.02	292.03	3,489.3	71.0	-175.5	-61.0	0.00	0.00	0.00
3,600.0	7.02	292.03	3,588.5	75.6	-186.9	-64.9	0.00	0.00	0.00
3,700.0	7.02	292.03	3,687.8	80.2	-198.2	-68.9	0.00	0.00	0.00
3,800.0	7.02	292.03	3,787.0	84.8	-209.5	-72.8	0.00	0.00	0.00
3,900.0	7.02	292.03	3,886.3	89.4	-220.9	-76.8	0.00	0.00	0.00
4,000.0	7.02	292.03	3,985.5	94.0	-232.2	-80.7	0.00	0.00	0.00
4,064.8	7.02	292.03	4,049.8	96.9	-239.5	-83.2	0.00	0.00	0.00
Start Drop -2.00									
4,100.0	6.32	292.03	4,084.8	98.5	-243.3	-84.6	2.00	-2.00	0.00
4,115.3	6.01	292.03	4,100.0	99.1	-244.8	-85.1	2.00	-2.00	0.00
Sussex									
4,200.0	4.32	292.03	4,184.4	102.0	-251.9	-87.6	2.00	-2.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Sater 19M-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Project:	SEC.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	North Reference:	True
Well:	Sater 19M-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-10-15)		

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	2.32	292.03	4,284.2	104.1	-257.3	-89.4	2.00	-2.00	0.00
4,400.0	0.32	292.03	4,384.2	105.0	-259.4	-90.2	2.00	-2.00	0.00
4,415.8	0.00	0.00	4,400.0	105.0	-259.4	-90.2	2.00	-2.00	0.00
4,500.0	0.00	0.00	4,484.2	105.0	-259.4	-90.2	0.00	0.00	0.00
4,600.0	0.00	0.00	4,584.2	105.0	-259.4	-90.2	0.00	0.00	0.00
4,700.0	0.00	0.00	4,684.2	105.0	-259.4	-90.2	0.00	0.00	0.00
4,800.0	0.00	0.00	4,784.2	105.0	-259.4	-90.2	0.00	0.00	0.00
4,880.8	0.00	0.00	4,865.0	105.0	-259.4	-90.2	0.00	0.00	0.00
Shannon									
4,900.0	0.00	0.00	4,884.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,000.0	0.00	0.00	4,984.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,100.0	0.00	0.00	5,084.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,200.0	0.00	0.00	5,184.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,300.0	0.00	0.00	5,284.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,400.0	0.00	0.00	5,384.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,500.0	0.00	0.00	5,484.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,600.0	0.00	0.00	5,584.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,700.0	0.00	0.00	5,684.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,800.0	0.00	0.00	5,784.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,900.0	0.00	0.00	5,884.2	105.0	-259.4	-90.2	0.00	0.00	0.00
5,960.9	0.00	0.00	5,945.1	105.0	-259.4	-90.2	0.00	0.00	0.00
KOP #2 - Start Build 7.50									
6,000.0	2.93	180.00	5,984.1	104.0	-259.4	-89.2	7.50	7.50	0.00
6,100.0	10.43	180.00	6,083.4	92.4	-259.4	-77.6	7.50	7.50	0.00
6,200.0	17.93	180.00	6,180.3	67.9	-259.4	-53.1	7.50	7.50	0.00
6,300.0	25.43	180.00	6,273.1	31.0	-259.4	-16.3	7.50	7.50	0.00
6,318.8	26.84	180.00	6,290.0	22.7	-259.4	-8.0	7.50	7.50	0.00
Sharon Springs									
6,400.0	32.93	180.00	6,360.4	-17.8	-259.4	32.4	7.50	7.50	0.00
6,500.0	40.43	180.00	6,440.5	-77.4	-259.4	92.0	7.50	7.50	0.00
6,512.6	41.37	180.00	6,450.0	-85.7	-259.4	100.2	7.50	7.50	0.00
Niobrara A									
6,574.8	46.04	180.00	6,495.0	-128.7	-259.4	143.1	7.50	7.50	0.00
Niobrara B									
6,600.0	47.93	180.00	6,512.2	-147.1	-259.4	161.5	7.50	7.50	0.00
6,700.0	55.43	180.00	6,574.1	-225.5	-259.4	239.8	7.50	7.50	0.00
6,710.5	56.22	180.00	6,580.0	-234.1	-259.4	248.4	7.50	7.50	0.00
Niobrara C									
6,800.0	62.93	180.00	6,625.3	-311.3	-259.4	325.5	7.50	7.50	0.00
6,900.0	70.43	180.00	6,664.9	-403.1	-259.4	417.1	7.50	7.50	0.00
6,968.9	75.60	180.00	6,685.0	-469.0	-259.4	482.9	7.50	7.50	0.00
Ft. Hays									
7,000.0	77.93	180.00	6,692.1	-499.2	-259.4	513.1	7.50	7.50	0.00
7,100.0	85.43	180.00	6,706.6	-598.1	-259.4	611.8	7.50	7.50	0.00
7,160.9	90.00	180.00	6,709.0	-658.9	-259.4	672.5	7.50	7.50	0.00
Start 3924.0 hold at 7160.9 MD - 7"									
7,200.0	90.00	180.00	6,709.0	-698.0	-259.4	711.6	0.00	0.00	0.00
7,300.0	90.00	180.00	6,709.0	-798.0	-259.4	811.4	0.00	0.00	0.00
7,400.0	90.00	180.00	6,709.0	-898.0	-259.4	911.3	0.00	0.00	0.00
7,500.0	90.00	180.00	6,709.0	-998.0	-259.4	1,011.1	0.00	0.00	0.00
7,600.0	90.00	180.00	6,709.0	-1,098.0	-259.4	1,110.9	0.00	0.00	0.00
7,700.0	90.00	180.00	6,709.0	-1,198.0	-259.4	1,210.8	0.00	0.00	0.00

Database:	Landmark	Local Co-ordinate Reference:	Well Sater 19M-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Project:	SEC.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	North Reference:	True
Well:	Sater 19M-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-10-15)		

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)
7,800.0	90.00	180.00	6,709.0	-1,298.0	-259.4	1,310.6	0.00	0.00	0.00
7,900.0	90.00	180.00	6,709.0	-1,398.0	-259.4	1,410.5	0.00	0.00	0.00
8,000.0	90.00	180.00	6,709.0	-1,498.0	-259.4	1,510.3	0.00	0.00	0.00
8,100.0	90.00	180.00	6,709.0	-1,598.0	-259.4	1,610.1	0.00	0.00	0.00
8,200.0	90.00	180.00	6,709.0	-1,698.0	-259.4	1,710.0	0.00	0.00	0.00
8,300.0	90.00	180.00	6,709.0	-1,798.0	-259.4	1,809.8	0.00	0.00	0.00
8,400.0	90.00	180.00	6,709.0	-1,898.0	-259.4	1,909.7	0.00	0.00	0.00
8,500.0	90.00	180.00	6,709.0	-1,998.0	-259.4	2,009.5	0.00	0.00	0.00
8,600.0	90.00	180.00	6,709.0	-2,098.0	-259.4	2,109.3	0.00	0.00	0.00
8,700.0	90.00	180.00	6,709.0	-2,198.0	-259.4	2,209.2	0.00	0.00	0.00
8,800.0	90.00	180.00	6,709.0	-2,298.0	-259.4	2,309.0	0.00	0.00	0.00
8,900.0	90.00	180.00	6,709.0	-2,398.0	-259.4	2,408.9	0.00	0.00	0.00
9,000.0	90.00	180.00	6,709.0	-2,498.0	-259.4	2,508.7	0.00	0.00	0.00
9,100.0	90.00	180.00	6,709.0	-2,598.0	-259.4	2,608.5	0.00	0.00	0.00
9,200.0	90.00	180.00	6,709.0	-2,698.0	-259.4	2,708.4	0.00	0.00	0.00
9,300.0	90.00	180.00	6,709.0	-2,798.0	-259.4	2,808.2	0.00	0.00	0.00
9,400.0	90.00	180.00	6,709.0	-2,898.0	-259.4	2,908.1	0.00	0.00	0.00
9,500.0	90.00	180.00	6,709.0	-2,998.0	-259.4	3,007.9	0.00	0.00	0.00
9,600.0	90.00	180.00	6,709.0	-3,098.0	-259.4	3,107.8	0.00	0.00	0.00
9,700.0	90.00	180.00	6,709.0	-3,198.0	-259.4	3,207.6	0.00	0.00	0.00
9,800.0	90.00	180.00	6,709.0	-3,298.0	-259.4	3,307.4	0.00	0.00	0.00
9,900.0	90.00	180.00	6,709.0	-3,398.0	-259.4	3,407.3	0.00	0.00	0.00
10,000.0	90.00	180.00	6,709.0	-3,498.0	-259.4	3,507.1	0.00	0.00	0.00
10,100.0	90.00	180.00	6,709.0	-3,598.0	-259.4	3,607.0	0.00	0.00	0.00
10,200.0	90.00	180.00	6,709.0	-3,698.0	-259.4	3,706.8	0.00	0.00	0.00
10,300.0	90.00	180.00	6,709.0	-3,798.0	-259.4	3,806.6	0.00	0.00	0.00
10,400.0	90.00	180.00	6,709.0	-3,898.0	-259.4	3,906.5	0.00	0.00	0.00
10,500.0	90.00	180.00	6,709.0	-3,998.0	-259.4	4,006.3	0.00	0.00	0.00
10,600.0	90.00	180.00	6,709.0	-4,098.0	-259.4	4,106.2	0.00	0.00	0.00
10,700.0	90.00	180.00	6,709.0	-4,198.0	-259.4	4,206.0	0.00	0.00	0.00
10,800.0	90.00	180.00	6,709.0	-4,298.0	-259.4	4,305.8	0.00	0.00	0.00
10,900.0	90.00	180.00	6,709.0	-4,398.0	-259.4	4,405.7	0.00	0.00	0.00
11,000.0	90.00	180.00	6,709.0	-4,498.0	-259.4	4,505.5	0.00	0.00	0.00
11,084.9	90.00	180.00	6,709.0	-4,582.9	-259.4	4,590.3	0.00	0.00	0.00
TD at 11084.9 - BHL 500'FSL & 2076'FWL									

Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
SHL 155'FNL & 2319'	0.00	0.00	1.0	0.0	0.0	1,355,376.63	3,284,092.69	40.304430	-104.481370
- plan hits target center									
- Point									
50' E/W Hardline (19M	0.00	0.00	1.0	-2,620.9	-259.4	1,352,752.98	3,283,863.43	40.297236	-104.482300
- plan misses target center by 2633.8ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Rectangle (sides W3,924.1 H100.0 D0.0)									
BHL 500'FSL & 2076'	0.00	0.00	6,709.0	-4,583.0	-259.4	1,350,791.19	3,283,885.92	40.291850	-104.482300
- plan hits target center									
- Point									

Database:	Landmark	Local Co-ordinate Reference:	Well Sater 19M-443
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Project:	SEC.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	North Reference:	True
Well:	Sater 19M-443	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-10-15)		

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,160.9	6,709.0	7"	7	7-1/2

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,460.4	3,450.0	Parkman		0.00	
4,115.3	4,100.0	Sussex		0.00	
4,880.8	4,865.0	Shannon		0.00	
6,318.8	6,290.0	Sharon Springs		0.00	
6,512.6	6,450.0	Niobrara A		0.00	
6,574.8	6,495.0	Niobrara B		0.00	
6,710.5	6,580.0	Niobrara C		0.00	
6,968.9	6,685.0	Ft. Hays		0.00	
	6,710.0	Codell		0.00	

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,600.0	1,600.0	0.0	0.0	KOP - Start Build 1.00
4,064.8	4,049.8	96.9	-239.5	Start Drop -2.00
5,960.9	5,945.1	105.0	-259.4	KOP #2 - Start Build 7.50
7,160.9	6,709.0	-658.9	-259.4	Start 3924.0 hold at 7160.9 MD
11,084.9	6,709.0	-4,582.9	-259.4	TD at 11084.9



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.19-T4N-R63W

Sater 4N63W19M Pad Sec.19-T4N-R63W

Sater 19M-443

Wellbore #1

Plan #1 (2-10-15)

Anticollision Report

12 February, 2015



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (2-10-15)
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	MD Interval 100.0ft
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 1,000.0ft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic

Survey Tool Program		Date	2/12/2015		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.0	11,084.2	Plan #1 (2-10-15) (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						
Existing Wells Sec.19-T4N-R63W						
Sater 19-NU (Exist.) - Wellbore #1 - Wellbore #1	7,737.0	6,706.0	412.9	251.0	2.550	CC, ES, SF
Sater 19-PU (Exist.) - Wellbore #1 - Wellbore #1	10,378.2	6,740.0	463.1	252.4	2.199	CC, ES
Sater 19-PU (Exist.) - Wellbore #1 - Wellbore #1	10,400.0	6,740.0	463.6	252.6	2.197	SF
Sater 21-19U (Exist.) - Wellbore #1 - Wellbore #1	7,088.4	6,714.6	248.2	95.6	1.627	CC, ES, SF
Sater 22-19U (Exist.) - Wellbore #1 - Wellbore #1	8,214.2	6,716.0	334.7	164.4	1.966	CC, ES, SF
Sater 23-19U (Exist.) - Wellbore #1 - Wellbore #1	9,682.3	6,733.0	145.0	-52.4	0.735	Level 1, CC, ES, SF
Sater 24-19U (Exist.) - Wellbore #1 - Wellbore #1	10,972.0	6,767.0	139.5	-82.9	0.627	Level 1, CC, ES, SF
Sater 4N63W19M Pad Sec.19-T4N-R63W						
Sater 19J-203 - Wellbore #1 - Plan #1 (2-10-15)	200.0	200.0	61.4	60.7	91.000	CC, ES
Sater 19J-203 - Wellbore #1 - Plan #1 (2-10-15)	11,084.9	10,986.9	794.1	619.9	4.558	SF
Sater 19J-323 - Wellbore #1 - Plan #1 (2-10-15)	800.0	800.0	30.7	27.3	9.100	CC, ES
Sater 19J-323 - Wellbore #1 - Plan #1 (2-10-15)	11,084.9	11,019.2	474.1	301.2	2.743	SF
Sater 19M-243 - Wellbore #1 - Plan #1 (2-10-15)	1,600.0	1,600.0	27.9	20.9	4.003	CC, ES
Sater 19M-243 - Wellbore #1 - Plan #1 (2-10-15)	11,084.9	10,892.6	346.2	197.6	2.330	SF

Offset Design												Offset Site Error:	0.0 ft
Survey Program: 6885-UNKNOWN												Offset Well Error:	0.0 ft
Reference													
Offset													
Semi Major Axis													
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)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
6,900.0	6,664.9	6,661.9	6,661.9	16.7	133.2	-55.99	-1,235.0	153.4	928.7	801.2	127.50	7.284	
7,000.0	6,692.1	6,689.1	6,689.1	17.7	133.8	-69.56	-1,235.0	153.4	843.7	701.6	142.07	5.938	
7,100.0	6,706.6	6,703.6	6,703.6	18.8	134.1	-83.00	-1,235.0	153.4	759.0	607.7	151.32	5.016	
7,200.0	6,709.0	6,706.0	6,706.0	20.0	134.1	-90.00	-1,235.0	153.4	677.3	523.5	153.81	4.404	
7,300.0	6,709.0	6,706.0	6,706.0	21.4	134.1	-90.00	-1,235.0	153.4	601.1	446.0	155.16	3.874	
7,400.0	6,709.0	6,706.0	6,706.0	22.8	134.1	-90.00	-1,235.0	153.4	532.9	376.3	156.61	3.403	
7,500.0	6,709.0	6,706.0	6,706.0	24.3	134.1	-90.00	-1,235.0	153.4	476.0	317.9	158.11	3.011	
7,600.0	6,709.0	6,706.0	6,706.0	25.8	134.1	-90.00	-1,235.0	153.4	435.0	275.3	159.68	2.724	
7,700.0	6,709.0	6,706.0	6,706.0	27.4	134.1	-90.00	-1,235.0	153.4	414.5	253.2	161.29	2.570	
7,737.0	6,709.0	6,706.0	6,706.0	28.0	134.1	-90.00	-1,235.0	153.4	412.9	251.0	161.89	2.550	CC, ES, SF
7,800.0	6,709.0	6,706.0	6,706.0	29.1	134.1	-90.00	-1,235.0	153.4	417.6	254.7	162.93	2.563	
7,900.0	6,709.0	6,706.0	6,706.0	30.7	134.1	-90.00	-1,235.0	153.4	443.9	279.3	164.61	2.697	

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 Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.19-T4N-R63W - Sater 19-NU (Exist.) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 6885-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	
8,000.0	6,709.0	6,706.0	6,706.0	32.4	134.1	-90.00	-1,235.0	153.4	489.5	323.2	166.32	2.943	
8,100.0	6,709.0	6,706.0	6,706.0	34.2	134.1	-90.00	-1,235.0	153.4	549.8	381.7	168.04	3.272	
8,200.0	6,709.0	6,706.0	6,706.0	35.9	134.1	-90.00	-1,235.0	153.4	620.4	450.6	169.79	3.654	
8,300.0	6,709.0	6,706.0	6,706.0	37.6	134.1	-90.00	-1,235.0	153.4	698.2	526.6	171.56	4.070	
8,400.0	6,709.0	6,706.0	6,706.0	39.4	134.1	-90.00	-1,235.0	153.4	781.1	607.7	173.34	4.506	
8,500.0	6,709.0	6,706.0	6,706.0	41.2	134.1	-90.00	-1,235.0	153.4	867.6	692.4	175.13	4.954	
8,600.0	6,709.0	6,706.0	6,706.0	43.0	134.1	-90.00	-1,235.0	153.4	956.7	779.8	176.93	5.407	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.19-T4N-R63W - Sater 19-PU (Exist.) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 6920-UNKNOWN												Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre	Between Centres	Between Ellipses	Minimum Separation	Separation Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)		
9,500.0	6,709.0	6,740.0	6,740.0	59.5	134.8	-90.00	-3,876.2	203.6	992.8	798.6	194.17	5.113	
9,600.0	6,709.0	6,740.0	6,740.0	61.4	134.8	-90.00	-3,876.2	203.6	905.5	709.5	196.03	4.619	
9,700.0	6,709.0	6,740.0	6,740.0	63.2	134.8	-90.00	-3,876.2	203.6	821.2	623.3	197.90	4.150	
9,800.0	6,709.0	6,740.0	6,740.0	65.1	134.8	-90.00	-3,876.2	203.6	740.8	541.0	199.77	3.708	
9,900.0	6,709.0	6,740.0	6,740.0	67.0	134.8	-90.00	-3,876.2	203.6	665.7	464.0	201.64	3.301	
10,000.0	6,709.0	6,740.0	6,740.0	68.8	134.8	-90.00	-3,876.2	203.6	597.9	394.4	203.52	2.938	
10,100.0	6,709.0	6,740.0	6,740.0	70.7	134.8	-90.00	-3,876.2	203.6	540.2	334.8	205.40	2.630	
10,200.0	6,709.0	6,740.0	6,740.0	72.6	134.8	-90.00	-3,876.2	203.6	496.2	288.9	207.28	2.394	
10,300.0	6,709.0	6,740.0	6,740.0	74.5	134.8	-90.00	-3,876.2	203.6	469.6	260.5	209.16	2.245	
10,378.2	6,709.0	6,740.0	6,740.0	75.9	134.8	-90.00	-3,876.2	203.6	463.1	252.4	210.63	2.199 CC, ES	
10,400.0	6,709.0	6,740.0	6,740.0	76.3	134.8	-90.00	-3,876.2	203.6	463.6	252.6	211.04	2.197 SF	
10,500.0	6,709.0	6,740.0	6,740.0	78.2	134.8	-90.00	-3,876.2	203.6	478.8	265.9	212.93	2.249	
10,600.0	6,709.0	6,740.0	6,740.0	80.1	134.8	-90.00	-3,876.2	203.6	513.5	298.7	214.82	2.390	
10,700.0	6,709.0	6,740.0	6,740.0	82.0	134.8	-90.00	-3,876.2	203.6	563.9	347.2	216.70	2.602	
10,800.0	6,709.0	6,740.0	6,740.0	83.9	134.8	-90.00	-3,876.2	203.6	626.4	407.8	218.59	2.866	
10,900.0	6,709.0	6,740.0	6,740.0	85.8	134.8	-90.00	-3,876.2	203.6	697.7	477.2	220.49	3.164	
11,000.0	6,709.0	6,740.0	6,740.0	87.7	134.8	-90.00	-3,876.2	203.6	775.3	552.9	222.38	3.486	
11,084.9	6,709.0	6,740.0	6,740.0	89.0	134.8	-90.00	-3,876.2	203.6	844.9	621.3	223.68	3.777	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.19-T4N-R63W - Sater 21-19U (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7333-UNKNOWN													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	9.0	9.0	0.0	0.2	-139.12	-139.12	-586.5	-507.6	775.7	775.5	0.18	4,304.669	
100.0	100.0	109.0	109.0	0.1	2.2	-139.12	-139.12	-586.5	-507.6	775.7	773.4	2.29	338.353	
200.0	200.0	209.0	209.0	0.3	4.2	-139.12	-139.12	-586.5	-507.6	775.7	771.2	4.52	171.716	
300.0	300.0	309.0	309.0	0.6	6.2	-139.12	-139.12	-586.5	-507.6	775.7	769.0	6.74	115.053	
400.0	400.0	409.0	409.0	0.8	8.2	-139.12	-139.12	-586.5	-507.6	775.7	766.7	8.97	86.507	
500.0	500.0	509.0	509.0	1.0	10.2	-139.12	-139.12	-586.5	-507.6	775.7	764.5	11.19	69.311	
600.0	600.0	609.0	609.0	1.2	12.2	-139.12	-139.12	-586.5	-507.6	775.7	762.3	13.42	57.817	
700.0	700.0	709.0	709.0	1.5	14.2	-139.12	-139.12	-586.5	-507.6	775.7	760.1	15.64	49.594	
800.0	800.0	809.0	809.0	1.7	16.2	-139.12	-139.12	-586.5	-507.6	775.7	757.8	17.87	43.418	
900.0	900.0	909.0	909.0	1.9	18.2	-139.12	-139.12	-586.5	-507.6	775.7	755.6	20.09	38.610	
1,000.0	1,000.0	1,009.0	1,009.0	2.1	20.2	-139.12	-139.12	-586.5	-507.6	775.7	753.4	22.32	34.761	
1,100.0	1,100.0	1,109.0	1,109.0	2.4	22.2	-139.12	-139.12	-586.5	-507.6	775.7	751.2	24.54	31.609	
1,200.0	1,200.0	1,209.0	1,209.0	2.6	24.2	-139.12	-139.12	-586.5	-507.6	775.7	748.9	26.76	28.982	
1,300.0	1,300.0	1,309.0	1,309.0	2.8	26.2	-139.12	-139.12	-586.5	-507.6	775.7	746.7	28.99	26.758	
1,400.0	1,400.0	1,409.0	1,409.0	3.0	28.2	-139.12	-139.12	-586.5	-507.6	775.7	744.5	31.21	24.851	
1,500.0	1,500.0	1,509.0	1,509.0	3.3	30.2	-139.12	-139.12	-586.5	-507.6	775.7	742.3	33.44	23.197	
1,600.0	1,600.0	1,609.0	1,609.0	3.5	32.2	-139.12	-139.12	-586.5	-507.6	775.7	740.0	35.66	21.750	
1,700.0	1,700.0	1,709.0	1,709.0	3.7	34.2	-71.22	-71.22	-586.5	-507.6	775.4	737.5	37.88	20.471	
1,800.0	1,800.0	1,809.0	1,809.0	3.9	36.2	-71.41	-71.41	-586.5	-507.6	774.6	734.5	40.09	19.323	
1,900.0	1,899.9	1,908.9	1,908.9	4.1	38.2	-71.73	-71.73	-586.5	-507.6	773.2	730.9	42.29	18.281	
2,000.0	1,999.7	2,008.7	2,008.7	4.3	40.2	-72.18	-72.18	-586.5	-507.6	771.3	726.8	44.50	17.331	
2,100.0	2,099.4	2,108.4	2,108.4	4.6	42.2	-72.76	-72.76	-586.5	-507.6	768.9	722.2	46.72	16.460	
2,200.0	2,198.9	2,207.9	2,207.9	4.8	44.2	-73.47	-73.47	-586.5	-507.6	766.1	717.2	48.93	15.657	
2,300.0	2,298.3	2,307.3	2,307.3	5.1	46.1	-74.31	-74.31	-586.5	-507.6	763.0	711.8	51.16	14.915	
2,400.0	2,397.5	2,406.5	2,406.5	5.3	48.1	-75.19	-75.19	-586.5	-507.6	759.7	706.3	53.40	14.229	
2,500.0	2,496.8	2,505.8	2,505.8	5.6	50.1	-76.08	-76.08	-586.5	-507.6	756.7	701.0	55.64	13.599	
2,600.0	2,596.0	2,605.0	2,605.0	5.8	52.1	-76.97	-76.97	-586.5	-507.6	753.8	695.9	57.90	13.020	
2,700.0	2,695.3	2,704.3	2,704.3	6.1	54.1	-77.87	-77.87	-586.5	-507.6	751.1	691.0	60.15	12.487	
2,800.0	2,794.5	2,803.5	2,803.5	6.4	56.1	-78.78	-78.78	-586.5	-507.6	748.6	686.2	62.42	11.994	
2,900.0	2,893.8	2,902.8	2,902.8	6.7	58.1	-79.70	-79.70	-586.5	-507.6	746.3	681.7	64.69	11.538	
3,000.0	2,893.0	3,002.0	3,002.0	7.0	60.0	-80.61	-80.61	-586.5	-507.6	744.2	677.3	66.96	11.115	
3,100.0	3,092.3	3,101.3	3,101.3	7.2	62.0	-81.54	-81.54	-586.5	-507.6	742.3	673.1	69.24	10.722	
3,200.0	3,191.5	3,200.5	3,200.5	7.5	64.0	-82.47	-82.47	-586.5	-507.6	740.6	669.1	71.52	10.356	
3,300.0	3,290.8	3,299.8	3,299.8	7.8	66.0	-83.40	-83.40	-586.5	-507.6	739.1	665.3	73.80	10.015	
3,400.0	3,390.0	3,399.0	3,399.0	8.1	68.0	-84.34	-84.34	-586.5	-507.6	737.8	661.7	76.08	9.697	
3,500.0	3,489.3	3,498.3	3,498.3	8.4	70.0	-85.27	-85.27	-586.5	-507.6	736.7	658.3	78.37	9.400	
3,600.0	3,588.5	3,597.5	3,597.5	8.7	72.0	-86.22	-86.22	-586.5	-507.6	735.8	655.1	80.66	9.122	
3,700.0	3,687.8	3,696.8	3,696.8	9.0	73.9	-87.16	-87.16	-586.5	-507.6	735.0	652.1	82.95	8.862	
3,800.0	3,787.0	3,796.0	3,796.0	9.3	75.9	-88.10	-88.10	-586.5	-507.6	734.5	649.3	85.24	8.617	
3,900.0	3,886.3	3,895.3	3,895.3	9.6	77.9	-89.05	-89.05	-586.5	-507.6	734.2	646.7	87.53	8.388	
4,000.0	3,985.5	3,994.5	3,994.5	9.9	79.9	-90.00	-90.00	-586.5	-507.6	734.1	644.3	89.82	8.173	
4,000.3	3,985.8	3,994.8	3,994.8	9.9	79.9	-90.00	-90.00	-586.5	-507.6	734.1	644.3	89.83	8.172	
4,100.0	4,084.8	4,093.8	4,093.8	10.2	81.9	-90.93	-90.93	-586.5	-507.6	734.2	642.1	92.10	7.972	
4,200.0	4,184.4	4,193.4	4,193.4	10.4	83.9	-91.65	-91.65	-586.5	-507.6	734.4	640.1	94.31	7.787	
4,300.0	4,284.2	4,293.2	4,293.2	10.6	85.9	-92.11	-92.11	-586.5	-507.6	734.6	638.1	96.51	7.612	
4,400.0	4,384.2	4,393.2	4,393.2	10.8	87.9	-92.29	-92.29	-586.5	-507.6	734.7	636.0	98.68	7.445	
4,500.0	4,484.2	4,493.2	4,493.2	11.0	89.9	-160.26	-160.26	-586.5	-507.6	734.7	633.9	100.85	7.285	
4,600.0	4,584.2	4,593.2	4,593.2	11.2	91.9	-160.26	-160.26	-586.5	-507.6	734.7	631.7	103.05	7.130	
4,700.0	4,684.2	4,693.2	4,693.2	11.4	93.9	-160.26	-160.26	-586.5	-507.6	734.7	629.5	105.24	6.981	
4,800.0	4,784.2	4,793.2	4,793.2	11.6	95.9	-160.26	-160.26	-586.5	-507.6	734.7	627.3	107.44	6.838	
4,900.0	4,884.2	4,893.2	4,893.2	11.8	97.9	-160.26	-160.26	-586.5	-507.6	734.7	625.1	109.64	6.701	

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 Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.19-T4N-R63W - Sater 21-19U (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7333-UNKNOWN													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,000.0	4,984.2	4,993.2	4,993.2	12.0	99.9	-160.26	-160.26	-586.5	-507.6	734.7	622.9	111.84	6.569	
5,100.0	5,084.2	5,093.2	5,093.2	12.2	101.9	-160.26	-160.26	-586.5	-507.6	734.7	620.7	114.04	6.443	
5,200.0	5,184.2	5,193.2	5,193.2	12.4	103.9	-160.26	-160.26	-586.5	-507.6	734.7	618.5	116.24	6.321	
5,300.0	5,284.2	5,293.2	5,293.2	12.6	105.9	-160.26	-160.26	-586.5	-507.6	734.7	616.3	118.44	6.203	
5,400.0	5,384.2	5,393.2	5,393.2	12.8	107.9	-160.26	-160.26	-586.5	-507.6	734.7	614.1	120.64	6.090	
5,500.0	5,484.2	5,493.2	5,493.2	13.0	109.9	-160.26	-160.26	-586.5	-507.6	734.7	611.9	122.85	5.981	
5,600.0	5,584.2	5,593.2	5,593.2	13.2	111.9	-160.26	-160.26	-586.5	-507.6	734.7	609.7	125.05	5.875	
5,700.0	5,684.2	5,693.2	5,693.2	13.4	113.9	-160.26	-160.26	-586.5	-507.6	734.7	607.5	127.25	5.774	
5,800.0	5,784.2	5,793.2	5,793.2	13.6	115.9	-160.26	-160.26	-586.5	-507.6	734.7	605.3	129.46	5.675	
5,900.0	5,884.2	5,893.2	5,893.2	13.8	117.9	-160.26	-160.26	-586.5	-507.6	734.7	603.1	131.66	5.580	
6,000.0	5,984.1	5,993.1	5,993.1	14.0	119.9	19.79	19.79	-586.5	-507.6	733.8	600.1	133.70	5.488	
6,100.0	6,083.4	6,092.4	6,092.4	14.1	121.8	20.39	20.39	-586.5	-507.6	722.8	588.8	134.04	5.393	
6,200.0	6,180.3	6,189.3	6,189.3	14.3	123.8	21.73	21.73	-586.5	-507.6	699.9	567.5	132.37	5.288	
6,300.0	6,273.1	6,282.1	6,282.1	14.4	125.6	23.99	23.99	-586.5	-507.6	665.5	536.6	128.96	5.161	
6,400.0	6,360.4	6,369.4	6,369.4	14.5	127.4	27.47	27.47	-586.5	-507.6	620.6	496.0	124.54	4.983	
6,500.0	6,440.5	6,449.5	6,449.5	14.7	129.0	32.64	32.64	-586.5	-507.6	566.4	445.7	120.62	4.695	
6,600.0	6,512.2	6,521.2	6,521.2	14.9	130.4	40.13	40.13	-586.5	-507.6	504.7	384.8	119.89	4.210	
6,700.0	6,574.1	6,583.1	6,583.1	15.3	131.7	50.47	50.47	-586.5	-507.6	438.1	312.9	125.23	3.499	
6,800.0	6,625.3	6,634.3	6,634.3	15.9	132.7	63.23	63.23	-586.5	-507.6	370.6	234.6	135.96	2.726	
6,900.0	6,664.9	6,673.9	6,673.9	16.7	133.5	76.10	76.10	-586.5	-507.6	308.6	162.7	145.97	2.114	
7,000.0	6,692.1	6,701.1	6,701.1	17.7	134.0	85.79	85.79	-586.5	-507.6	263.1	112.2	150.94	1.743	
7,088.4	6,705.6	6,714.6	6,714.6	18.7	134.3	90.00	90.00	-586.5	-507.6	248.2	95.6	152.58	1.627	CC, ES, SF
7,100.0	6,706.6	6,715.6	6,715.6	18.8	134.3	90.21	90.21	-586.5	-507.6	248.5	95.7	152.73	1.627	
7,200.0	6,709.0	6,718.0	6,718.0	20.0	134.4	90.00	90.00	-586.5	-507.6	272.1	118.1	154.05	1.766	
7,300.0	6,709.0	6,718.0	6,718.0	21.4	134.4	90.00	90.00	-586.5	-507.6	326.1	170.7	155.40	2.098	
7,400.0	6,709.0	6,718.0	6,718.0	22.8	134.4	90.00	90.00	-586.5	-507.6	398.3	241.5	156.85	2.539	
7,500.0	6,709.0	6,718.0	6,718.0	24.3	134.4	90.00	90.00	-586.5	-507.6	480.6	322.2	158.35	3.035	
7,600.0	6,709.0	6,718.0	6,718.0	25.8	134.4	90.00	90.00	-586.5	-507.6	568.5	408.6	159.92	3.555	
7,700.0	6,709.0	6,718.0	6,718.0	27.4	134.4	90.00	90.00	-586.5	-507.6	660.0	498.4	161.53	4.086	
7,800.0	6,709.0	6,718.0	6,718.0	29.1	134.4	90.00	90.00	-586.5	-507.6	753.6	590.4	163.17	4.618	
7,900.0	6,709.0	6,718.0	6,718.0	30.7	134.4	90.00	90.00	-586.5	-507.6	848.6	683.8	164.85	5.148	
8,000.0	6,709.0	6,718.0	6,718.0	32.4	134.4	90.00	90.00	-586.5	-507.6	944.7	778.1	166.56	5.672	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.19-T4N-R63W - Sater 22-19U (Exist.) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 7343-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
7,300.0	6,709.0	6,716.0	6,716.0	21.4	134.3	90.00	-1,712.2	-594.1	973.5	818.2	155.36	6.266	
7,400.0	6,709.0	6,716.0	6,716.0	22.8	134.3	90.00	-1,712.2	-594.1	880.3	723.5	156.81	5.614	
7,500.0	6,709.0	6,716.0	6,716.0	24.3	134.3	90.00	-1,712.2	-594.1	788.7	630.4	158.31	4.982	
7,600.0	6,709.0	6,716.0	6,716.0	25.8	134.3	90.00	-1,712.2	-594.1	699.5	539.6	159.88	4.375	
7,700.0	6,709.0	6,716.0	6,716.0	27.4	134.3	90.00	-1,712.2	-594.1	613.5	452.0	161.49	3.799	
7,800.0	6,709.0	6,716.0	6,716.0	29.1	134.3	90.00	-1,712.2	-594.1	532.5	369.4	163.13	3.264	
7,900.0	6,709.0	6,716.0	6,716.0	30.7	134.3	90.00	-1,712.2	-594.1	459.1	294.2	164.81	2.785	
8,000.0	6,709.0	6,716.0	6,716.0	32.4	134.3	90.00	-1,712.2	-594.1	397.4	230.8	166.52	2.386	
8,100.0	6,709.0	6,716.0	6,716.0	34.2	134.3	90.00	-1,712.2	-594.1	353.6	185.4	168.24	2.102	
8,200.0	6,709.0	6,716.0	6,716.0	35.9	134.3	90.00	-1,712.2	-594.1	335.0	165.0	169.99	1.971	
8,214.2	6,709.0	6,716.0	6,716.0	36.1	134.3	90.00	-1,712.2	-594.1	334.7	164.4	170.24	1.966	CC, ES, SF
8,300.0	6,709.0	6,716.0	6,716.0	37.6	134.3	90.00	-1,712.2	-594.1	345.5	173.8	171.76	2.012	
8,400.0	6,709.0	6,716.0	6,716.0	39.4	134.3	90.00	-1,712.2	-594.1	382.8	209.3	173.54	2.206	
8,500.0	6,709.0	6,716.0	6,716.0	41.2	134.3	90.00	-1,712.2	-594.1	440.1	264.8	175.33	2.510	
8,600.0	6,709.0	6,716.0	6,716.0	43.0	134.3	90.00	-1,712.2	-594.1	510.8	333.6	177.13	2.883	
8,700.0	6,709.0	6,716.0	6,716.0	44.8	134.3	90.00	-1,712.2	-594.1	589.9	411.0	178.94	3.297	
8,800.0	6,709.0	6,716.0	6,716.0	46.6	134.3	90.00	-1,712.2	-594.1	674.7	493.9	180.77	3.732	
8,900.0	6,709.0	6,716.0	6,716.0	48.4	134.3	90.00	-1,712.2	-594.1	763.1	580.5	182.59	4.179	
9,000.0	6,709.0	6,716.0	6,716.0	50.3	134.3	90.00	-1,712.2	-594.1	854.1	669.7	184.43	4.631	
9,100.0	6,709.0	6,716.0	6,716.0	52.1	134.3	90.00	-1,712.2	-594.1	946.9	760.7	186.27	5.084	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design		Existing Wells Sec.19-T4N-R63W - Sater 23-19U (Exist.) - Wellbore #1 - Wellbore #1											Offset Site Error:	0.0 ft
Survey Program: 7363-UNKNOWN													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis		Distance								Warning
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)			
8,700.0	6,709.0	6,733.0	6,733.0	44.8	134.7	90.00	-3,180.4	-404.5	993.0	813.7	179.28	5.539		
8,800.0	6,709.0	6,733.0	6,733.0	46.6	134.7	90.00	-3,180.4	-404.5	894.2	713.1	181.11	4.937		
8,900.0	6,709.0	6,733.0	6,733.0	48.4	134.7	90.00	-3,180.4	-404.5	795.7	612.7	182.93	4.350		
9,000.0	6,709.0	6,733.0	6,733.0	50.3	134.7	90.00	-3,180.4	-404.5	697.6	512.8	184.77	3.775		
9,100.0	6,709.0	6,733.0	6,733.0	52.1	134.7	90.00	-3,180.4	-404.5	600.1	413.5	186.61	3.216		
9,200.0	6,709.0	6,733.0	6,733.0	53.9	134.7	90.00	-3,180.4	-404.5	503.7	315.2	188.46	2.673		
9,300.0	6,709.0	6,733.0	6,733.0	55.8	134.7	90.00	-3,180.4	-404.5	408.9	218.6	190.31	2.149		
9,400.0	6,709.0	6,733.0	6,733.0	57.6	134.7	90.00	-3,180.4	-404.5	317.4	125.3	192.17	1.652		
9,500.0	6,709.0	6,733.0	6,733.0	59.5	134.7	90.00	-3,180.4	-404.5	233.0	39.0	194.03	1.201	Level 2	
9,600.0	6,709.0	6,733.0	6,733.0	61.4	134.7	90.00	-3,180.4	-404.5	166.8	-29.1	195.89	0.851	Level 1	
9,682.3	6,709.0	6,733.0	6,733.0	62.9	134.7	90.00	-3,180.4	-404.5	145.0	-52.4	197.43	0.735	Level 1, CC, ES, SF	
9,700.0	6,709.0	6,733.0	6,733.0	63.2	134.7	90.00	-3,180.4	-404.5	146.1	-51.6	197.76	0.739	Level 1	
9,800.0	6,709.0	6,733.0	6,733.0	65.1	134.7	90.00	-3,180.4	-404.5	186.8	-12.9	199.63	0.936	Level 1	
9,900.0	6,709.0	6,733.0	6,733.0	67.0	134.7	90.00	-3,180.4	-404.5	261.6	60.0	201.50	1.298	Level 3	
10,000.0	6,709.0	6,733.0	6,733.0	68.8	134.7	90.00	-3,180.4	-404.5	349.2	145.8	203.38	1.717		
10,100.0	6,709.0	6,733.0	6,733.0	70.7	134.7	90.00	-3,180.4	-404.5	442.1	236.9	205.26	2.154		
10,200.0	6,709.0	6,733.0	6,733.0	72.6	134.7	90.00	-3,180.4	-404.5	537.6	330.5	207.14	2.595		
10,300.0	6,709.0	6,733.0	6,733.0	74.5	134.7	90.00	-3,180.4	-404.5	634.5	425.4	209.02	3.035		
10,400.0	6,709.0	6,733.0	6,733.0	76.3	134.7	90.00	-3,180.4	-404.5	732.2	521.3	210.90	3.472		
10,500.0	6,709.0	6,733.0	6,733.0	78.2	134.7	90.00	-3,180.4	-404.5	830.4	617.6	212.79	3.903		
10,600.0	6,709.0	6,733.0	6,733.0	80.1	134.7	90.00	-3,180.4	-404.5	929.0	714.4	214.68	4.328		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.19-T4N-R63W - Sater 24-19U (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7395-UNKNOWN													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Distance Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
10,000.0	6,709.0	6,767.0	6,767.0	68.8	135.3	90.00	-4,470.0	-398.9	981.9	777.9	204.06	4.812		
10,100.0	6,709.0	6,767.0	6,767.0	70.7	135.3	90.00	-4,470.0	-398.9	883.1	677.1	205.94	4.288		
10,200.0	6,709.0	6,767.0	6,767.0	72.6	135.3	90.00	-4,470.0	-398.9	784.5	576.7	207.82	3.775		
10,300.0	6,709.0	6,767.0	6,767.0	74.5	135.3	90.00	-4,470.0	-398.9	686.3	476.6	209.70	3.273		
10,400.0	6,709.0	6,767.0	6,767.0	76.3	135.3	90.00	-4,470.0	-398.9	588.7	377.2	211.58	2.783		
10,500.0	6,709.0	6,767.0	6,767.0	78.2	135.3	90.00	-4,470.0	-398.9	492.2	278.7	213.47	2.306		
10,600.0	6,709.0	6,767.0	6,767.0	80.1	135.3	90.00	-4,470.0	-398.9	397.3	181.9	215.36	1.845		
10,700.0	6,709.0	6,767.0	6,767.0	82.0	135.3	90.00	-4,470.0	-398.9	305.7	88.4	217.24	1.407	Level 3	
10,800.0	6,709.0	6,767.0	6,767.0	83.9	135.3	90.00	-4,470.0	-398.9	221.4	2.3	219.13	1.011	Level 2	
10,900.0	6,709.0	6,767.0	6,767.0	85.8	135.3	90.00	-4,470.0	-398.9	157.0	-64.1	221.03	0.710	Level 1	
10,972.0	6,709.0	6,767.0	6,767.0	87.1	135.3	90.00	-4,470.0	-398.9	139.5	-82.9	222.39	0.627	Level 1, CC, ES, SF	
11,000.0	6,709.0	6,767.0	6,767.0	87.7	135.3	90.00	-4,470.0	-398.9	142.3	-80.7	222.92	0.638	Level 1	
11,084.9	6,709.0	6,767.0	6,767.0	89.0	135.3	90.00	-4,470.0	-398.9	179.5	-44.8	224.22	0.800	Level 1	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design		Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19J-203 - Wellbore #1 - Plan #1 (2-10-15)											Offset Site Error:		0.0 ft
Survey Program: 0-MWD													Offset Well Error:		0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning		
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
0.0	0.0	0.0	0.0	0.0	0.0	-90.00	0.0	-61.4	61.4						
100.0	100.0	100.0	100.0	0.1	0.1	-90.00	0.0	-61.4	61.4	61.1	0.22	273.001	91,000 CC, ES		
200.0	200.0	200.0	200.0	0.3	0.3	-90.00	0.0	-61.4	61.4	60.7	0.67	91.000			
300.0	300.0	298.4	298.4	0.6	0.5	-89.87	0.1	-62.6	62.6	61.5	1.11	56.374			
400.0	400.0	396.7	396.6	0.8	0.8	-89.53	0.5	-66.4	66.5	64.9	1.55	42.830			
500.0	500.0	494.7	494.4	1.0	1.0	-89.03	1.2	-72.7	72.9	70.9	2.01	36.285			
600.0	600.0	592.3	591.6	1.2	1.3	-88.47	2.2	-81.4	81.8	79.3	2.48	32.959			
700.0	700.0	689.4	688.1	1.5	1.5	-87.90	3.4	-92.5	93.3	90.3	2.98	31.325			
800.0	800.0	785.9	783.6	1.7	1.8	-87.38	4.9	-105.9	107.3	103.8	3.50	30.661			
900.0	900.0	881.7	878.1	1.9	2.2	-86.91	6.6	-121.7	123.8	119.8	4.05	30.572			
1,000.0	1,000.0	976.5	971.2	2.1	2.5	-86.51	8.5	-139.6	142.8	138.1	4.63	30.840			
1,100.0	1,100.0	1,073.7	1,066.3	2.4	3.0	-86.17	10.7	-159.5	163.3	158.1	5.24	31.155			
1,200.0	1,200.0	1,171.6	1,162.1	2.6	3.4	-85.90	12.9	-179.5	184.0	178.1	5.87	31.344			
1,300.0	1,300.0	1,269.4	1,257.8	2.8	3.8	-85.69	15.0	-199.6	204.6	198.1	6.50	31.465			
1,400.0	1,400.0	1,367.3	1,353.5	3.0	4.2	-85.52	17.2	-219.7	225.2	218.1	7.14	31.544			
1,500.0	1,500.0	1,465.1	1,449.3	3.3	4.7	-85.37	19.4	-239.8	245.9	238.1	7.78	31.596			
1,600.0	1,600.0	1,563.0	1,545.0	3.5	5.1	-85.25	21.6	-259.9	266.5	258.1	8.42	31.632			
1,700.0	1,700.0	1,661.0	1,640.9	3.7	5.6	-17.17	23.8	-280.0	286.3	278.7	7.58	37.792			
1,800.0	1,800.0	1,759.3	1,737.1	3.9	6.0	-17.17	26.0	-300.1	304.5	296.4	8.04	37.869			
1,900.0	1,899.9	1,857.9	1,833.6	4.1	6.5	-17.26	28.2	-320.4	321.0	312.5	8.51	37.731			
2,000.0	1,999.7	1,956.8	1,930.4	4.3	6.9	-17.43	30.4	-340.7	335.9	326.9	8.98	37.413			
2,100.0	2,099.4	2,055.9	2,027.3	4.6	7.4	-17.68	32.6	-361.0	349.2	339.7	9.45	36.942			
2,200.0	2,198.9	2,155.2	2,124.5	4.8	7.8	-17.99	34.8	-381.4	360.8	350.9	9.93	36.342			
2,300.0	2,298.3	2,254.7	2,221.8	5.1	8.3	-18.38	37.0	-401.8	370.8	360.4	10.41	35.629			
2,400.0	2,397.5	2,354.2	2,319.2	5.3	8.7	-18.81	39.3	-422.2	379.9	369.0	10.89	34.876			
2,500.0	2,496.8	2,453.8	2,416.6	5.6	9.2	-19.23	41.5	-442.6	389.1	377.7	11.38	34.180			
2,600.0	2,596.0	2,553.3	2,514.0	5.8	9.6	-19.63	43.7	-463.1	398.3	386.4	11.88	33.533			
2,700.0	2,695.3	2,652.8	2,611.4	6.1	10.1	-20.01	45.9	-483.5	407.5	395.1	12.37	32.932			
2,800.0	2,794.5	2,752.4	2,708.8	6.4	10.5	-20.37	48.1	-503.9	416.7	403.8	12.87	32.372			
2,900.0	2,893.8	2,851.9	2,806.2	6.7	11.0	-20.72	50.4	-524.3	425.9	412.6	13.37	31.849			
3,000.0	2,993.0	2,951.5	2,903.6	7.0	11.4	-21.05	52.6	-544.8	435.2	421.3	13.88	31.359			
3,100.0	3,092.3	3,051.0	3,001.0	7.2	11.9	-21.37	54.8	-565.2	444.4	430.1	14.38	30.900			
3,200.0	3,191.5	3,150.5	3,098.4	7.5	12.4	-21.67	57.0	-585.6	453.7	438.8	14.89	30.468			
3,300.0	3,290.8	3,250.1	3,195.8	7.8	12.8	-21.97	59.3	-606.0	463.0	447.6	15.40	30.062			
3,400.0	3,390.0	3,349.6	3,293.2	8.1	13.3	-22.25	61.5	-626.5	472.3	456.4	15.91	29.679			
3,500.0	3,489.3	3,449.2	3,390.6	8.4	13.7	-22.52	63.7	-646.9	481.6	465.2	16.43	29.318			
3,600.0	3,588.5	3,548.7	3,488.0	8.7	14.2	-22.78	65.9	-667.3	491.0	474.0	16.94	28.976			
3,700.0	3,687.8	3,648.2	3,585.4	9.0	14.6	-23.03	68.1	-687.7	500.3	482.8	17.46	28.652			
3,800.0	3,787.0	3,747.8	3,682.8	9.3	15.1	-23.27	70.4	-708.2	509.6	491.6	17.98	28.345			
3,900.0	3,886.3	3,847.3	3,780.2	9.6	15.6	-23.50	72.6	-728.6	519.0	500.5	18.50	28.054			
4,000.0	3,985.5	3,946.9	3,877.6	9.9	16.0	-23.73	74.8	-749.0	528.3	509.3	19.02	27.777			
4,100.0	4,084.8	4,046.4	3,974.9	10.2	16.5	-23.96	77.0	-769.4	537.9	518.4	19.53	27.538			
4,200.0	4,184.4	4,145.6	4,072.1	10.4	16.9	-24.14	79.2	-789.8	550.0	530.0	19.98	27.520			
4,300.0	4,284.2	4,244.5	4,168.8	10.6	17.4	-24.20	81.4	-810.1	565.2	544.8	20.40	27.701			
4,400.0	4,384.2	4,342.7	4,264.9	10.8	17.8	-24.15	83.6	-830.3	583.6	562.8	20.79	28.072			
4,500.0	4,484.2	4,440.6	4,360.7	11.0	18.3	-91.86	85.8	-850.3	604.0	582.7	21.22	28.467			
4,600.0	4,584.2	4,538.4	4,456.4	11.2	18.7	-91.59	88.0	-870.4	624.4	602.7	21.67	28.810			
4,700.0	4,684.2	4,636.3	4,552.2	11.4	19.2	-91.34	90.2	-890.5	644.9	622.7	22.13	29.137			
4,800.0	4,784.2	4,734.1	4,647.9	11.6	19.6	-91.11	92.4	-910.6	665.4	642.8	22.59	29.450			
4,900.0	4,884.2	4,832.0	4,743.6	11.8	20.1	-90.89	94.6	-930.6	685.8	662.8	23.05	29.749			
5,000.0	4,984.2	4,929.8	4,839.4	12.0	20.5	-90.68	96.7	-950.7	706.3	682.8	23.52	30.035			

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 Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19J-203 - Wellbore #1 - Plan #1 (2-10-15)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,084.2	5,036.8	4,944.1	12.2	21.0	-90.47	-90.47	99.1	-972.4	726.7	702.7	23.99	30.285	
5,200.0	5,184.2	5,169.0	5,074.3	12.4	21.4	-90.27	-90.27	101.6	-995.0	743.7	719.2	24.49	30.369	
5,300.0	5,284.2	5,303.1	5,207.4	12.6	21.8	-90.12	-90.12	103.4	-1,011.7	756.2	731.2	24.96	30.298	
5,400.0	5,384.2	5,438.5	5,342.4	12.8	22.0	-90.04	-90.04	104.5	-1,022.3	764.0	738.6	25.41	30.068	
5,500.0	5,484.2	5,574.7	5,478.4	13.0	22.2	-90.00	-90.00	105.0	-1,026.5	767.1	741.2	25.85	29.676	
5,600.0	5,584.2	5,680.4	5,584.2	13.2	22.3	-90.00	-90.00	105.0	-1,026.6	767.1	740.9	26.25	29.229	
5,700.0	5,684.2	5,780.4	5,684.2	13.4	22.4	-90.00	-90.00	105.0	-1,026.6	767.1	740.5	26.64	28.800	
5,764.2	5,748.3	5,844.6	5,748.3	13.5	22.5	-90.00	-90.00	105.0	-1,026.6	767.1	740.3	26.89	28.530	
5,800.0	5,784.2	5,880.4	5,784.1	13.6	22.5	-90.01	-90.01	104.9	-1,026.6	767.1	740.1	27.03	28.383	
5,816.2	5,800.3	5,896.6	5,800.3	13.6	22.6	-90.04	-90.04	104.4	-1,026.6	767.1	740.1	27.09	28.316	
5,900.0	5,884.2	5,979.6	5,882.9	13.8	22.6	-90.62	-90.62	96.6	-1,026.6	767.2	739.8	27.42	27.979	
6,000.0	5,984.1	6,075.3	5,976.5	14.0	22.7	87.93	87.93	76.6	-1,026.6	767.7	739.9	27.81	27.602	
6,100.0	6,083.4	6,168.2	6,064.1	14.1	22.8	86.35	86.35	46.2	-1,026.6	768.8	740.6	28.14	27.318	
6,200.0	6,180.3	6,258.9	6,145.6	14.3	22.9	84.85	84.85	6.4	-1,026.6	770.4	742.0	28.43	27.097	
6,300.0	6,273.1	6,350.0	6,222.1	14.4	23.0	83.40	83.40	-43.0	-1,026.6	772.4	743.7	28.72	26.893	
6,400.0	6,360.4	6,434.8	6,287.5	14.5	23.1	82.13	82.13	-96.9	-1,026.6	774.6	745.6	29.04	26.671	
6,500.0	6,440.5	6,520.6	6,347.2	14.7	23.2	80.96	80.96	-158.4	-1,026.6	777.0	747.5	29.48	26.359	
6,600.0	6,512.2	6,605.1	6,399.0	14.9	23.4	79.92	79.92	-225.2	-1,026.6	779.4	749.3	30.09	25.897	
6,700.0	6,574.1	6,688.7	6,442.6	15.3	23.6	79.04	79.04	-296.4	-1,026.6	781.6	750.6	30.98	25.228	
6,800.0	6,625.3	6,771.5	6,477.8	15.9	23.9	78.32	78.32	-371.3	-1,026.6	783.5	751.3	32.19	24.339	
6,900.0	6,664.9	6,850.0	6,503.6	16.7	24.3	77.78	77.78	-445.4	-1,026.6	785.1	751.3	33.72	23.279	
7,000.0	6,692.1	6,935.4	6,522.9	17.7	24.8	77.39	77.39	-528.5	-1,026.6	786.1	750.5	35.69	22.029	
7,100.0	6,706.6	7,016.8	6,532.5	18.8	25.4	77.19	77.19	-609.4	-1,026.6	786.7	748.8	37.94	20.736	
7,200.0	6,709.0	7,104.2	6,533.8	20.0	26.1	77.14	77.14	-696.7	-1,026.6	786.9	746.5	40.40	19.476	
7,300.0	6,709.0	7,204.2	6,533.0	21.4	27.1	77.08	77.08	-796.7	-1,026.6	787.1	744.0	43.03	18.293	
7,400.0	6,709.0	7,304.2	6,532.3	22.8	28.1	77.03	77.03	-896.7	-1,026.6	787.2	741.4	45.81	17.186	
7,500.0	6,709.0	7,404.1	6,531.5	24.3	29.3	76.97	76.97	-996.7	-1,026.6	787.4	738.7	48.71	16.164	
7,600.0	6,709.0	7,504.1	6,530.7	25.8	30.6	76.92	76.92	-1,096.7	-1,026.6	787.6	735.9	51.73	15.225	
7,700.0	6,709.0	7,604.1	6,530.0	27.4	31.9	76.86	76.86	-1,196.7	-1,026.6	787.8	732.9	54.84	14.366	
7,800.0	6,709.0	7,704.1	6,529.2	29.1	33.3	76.81	76.81	-1,296.7	-1,026.6	787.9	729.9	58.02	13.582	
7,900.0	6,709.0	7,804.1	6,528.4	30.7	34.8	76.76	76.76	-1,396.7	-1,026.6	788.1	726.9	61.26	12.865	
8,000.0	6,709.0	7,904.1	6,527.7	32.4	36.3	76.70	76.70	-1,496.6	-1,026.6	788.3	723.7	64.55	12.211	
8,100.0	6,709.0	8,004.1	6,526.9	34.2	37.8	76.65	76.65	-1,596.6	-1,026.6	788.5	720.6	67.89	11.613	
8,200.0	6,709.0	8,104.1	6,526.1	35.9	39.4	76.59	76.59	-1,696.6	-1,026.6	788.6	717.4	71.27	11.065	
8,300.0	6,709.0	8,204.1	6,525.4	37.6	41.0	76.54	76.54	-1,796.6	-1,026.6	788.8	714.1	74.69	10.562	
8,400.0	6,709.0	8,304.1	6,524.6	39.4	42.6	76.48	76.48	-1,896.6	-1,026.6	789.0	710.9	78.13	10.099	
8,500.0	6,709.0	8,404.1	6,523.8	41.2	44.3	76.43	76.43	-1,996.6	-1,026.6	789.2	707.6	81.59	9.672	
8,600.0	6,709.0	8,504.1	6,523.1	43.0	46.0	76.38	76.38	-2,096.6	-1,026.6	789.4	704.3	85.08	9.278	
8,700.0	6,709.0	8,604.1	6,522.3	44.8	47.6	76.32	76.32	-2,196.6	-1,026.6	789.5	701.0	88.58	8.913	
8,800.0	6,709.0	8,704.1	6,521.5	46.6	49.4	76.27	76.27	-2,296.6	-1,026.6	789.7	697.6	92.11	8.574	
8,900.0	6,709.0	8,804.1	6,520.8	48.4	51.1	76.21	76.21	-2,396.6	-1,026.6	789.9	694.3	95.64	8.259	
9,000.0	6,709.0	8,904.1	6,520.0	50.3	52.8	76.16	76.16	-2,496.6	-1,026.6	790.1	690.9	99.19	7.965	
9,100.0	6,709.0	9,004.1	6,519.2	52.1	54.6	76.11	76.11	-2,596.6	-1,026.6	790.3	687.5	102.75	7.691	
9,200.0	6,709.0	9,104.1	6,518.5	53.9	56.4	76.05	76.05	-2,696.6	-1,026.6	790.5	684.1	106.32	7.435	
9,300.0	6,709.0	9,204.1	6,517.7	55.8	58.1	76.00	76.00	-2,796.6	-1,026.6	790.6	680.7	109.90	7.194	
9,400.0	6,709.0	9,304.1	6,516.9	57.6	59.9	75.94	75.94	-2,896.6	-1,026.6	790.8	677.3	113.49	6.968	
9,500.0	6,709.0	9,404.1	6,516.2	59.5	61.7	75.89	75.89	-2,996.6	-1,026.6	791.0	673.9	117.08	6.756	
9,600.0	6,709.0	9,504.1	6,515.4	61.4	63.5	75.84	75.84	-3,096.6	-1,026.6	791.2	670.5	120.68	6.556	
9,700.0	6,709.0	9,604.1	6,514.6	63.2	65.3	75.78	75.78	-3,196.5	-1,026.6	791.4	667.1	124.29	6.367	
9,800.0	6,709.0	9,704.1	6,513.9	65.1	67.1	75.73	75.73	-3,296.5	-1,026.6	791.6	663.7	127.90	6.189	
9,900.0	6,709.0	9,804.1	6,513.1	67.0	69.0	75.67	75.67	-3,396.5	-1,026.6	791.8	660.3	131.51	6.021	

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 Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19J-203 - Wellbore #1 - Plan #1 (2-10-15)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
10,000.0	6,709.0	9,904.1	6,512.3	68.8	70.8	75.62	-3,496.5	-1,026.6	792.0	656.8	135.13	5.861		
10,100.0	6,709.0	10,004.1	6,511.5	70.7	72.6	75.57	-3,596.5	-1,026.6	792.2	653.4	138.75	5.709		
10,200.0	6,709.0	10,104.1	6,510.8	72.6	74.4	75.51	-3,696.5	-1,026.6	792.3	650.0	142.38	5.565		
10,300.0	6,709.0	10,204.1	6,510.0	74.5	76.3	75.46	-3,796.5	-1,026.6	792.5	646.5	146.00	5.428		
10,400.0	6,709.0	10,304.1	6,509.2	76.3	78.1	75.40	-3,896.5	-1,026.6	792.7	643.1	149.63	5.298		
10,500.0	6,709.0	10,404.1	6,508.5	78.2	80.0	75.35	-3,996.5	-1,026.6	792.9	639.7	153.27	5.174		
10,600.0	6,709.0	10,504.1	6,507.7	80.1	81.8	75.30	-4,096.5	-1,026.6	793.1	636.2	156.90	5.055		
10,700.0	6,709.0	10,604.1	6,506.9	82.0	83.7	75.24	-4,196.5	-1,026.6	793.3	632.8	160.53	4.942		
10,800.0	6,709.0	10,704.1	6,506.2	83.9	85.5	75.19	-4,296.5	-1,026.6	793.5	629.3	164.17	4.833		
10,900.0	6,709.0	10,804.0	6,505.4	85.8	87.4	75.14	-4,396.5	-1,026.6	793.7	625.9	167.81	4.730		
11,000.0	6,709.0	10,904.0	6,504.6	87.7	89.2	75.08	-4,496.5	-1,026.6	793.9	622.5	171.45	4.631		
11,084.9	6,709.0	10,986.9	6,504.0	89.0	90.8	75.04	-4,579.3	-1,026.6	794.1	619.9	174.20	4.558 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19J-323 - Wellbore #1 - Plan #1 (2-10-15)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-90.00	-90.00	0.0	-30.7	30.7				
100.0	100.0	100.0	100.0	0.1	0.1	-90.00	-90.00	0.0	-30.7	30.7	30.5	0.22	136.501	
200.0	200.0	200.0	200.0	0.3	0.3	-90.00	-90.00	0.0	-30.7	30.7	30.0	0.67	45.500	
300.0	300.0	300.0	300.0	0.6	0.6	-90.00	-90.00	0.0	-30.7	30.7	29.6	1.12	27.300	
400.0	400.0	400.0	400.0	0.8	0.8	-90.00	-90.00	0.0	-30.7	30.7	29.1	1.57	19.500	
500.0	500.0	500.0	500.0	1.0	1.0	-90.00	-90.00	0.0	-30.7	30.7	28.7	2.02	15.167	
600.0	600.0	600.0	600.0	1.2	1.2	-90.00	-90.00	0.0	-30.7	30.7	28.2	2.47	12.409	
700.0	700.0	700.0	700.0	1.5	1.5	-90.00	-90.00	0.0	-30.7	30.7	27.8	2.92	10.500	
800.0	800.0	800.0	800.0	1.7	1.7	-90.00	-90.00	0.0	-30.7	30.7	27.3	3.37	9.100 CC, ES	
900.0	900.0	899.2	899.2	1.9	1.9	-89.65	-89.65	0.2	-32.0	32.0	28.2	3.81	8.393	
1,000.0	1,000.0	998.2	998.2	2.1	2.1	-88.75	-88.75	0.8	-35.8	35.8	31.6	4.24	8.448	
1,100.0	1,100.0	1,097.0	1,096.7	2.4	2.3	-87.62	-87.62	1.8	-42.1	42.3	37.6	4.68	9.027	
1,200.0	1,200.0	1,195.4	1,194.7	2.6	2.6	-86.51	-86.51	3.1	-50.9	51.3	46.1	5.13	9.985	
1,300.0	1,300.0	1,293.3	1,291.9	2.8	2.8	-85.55	-85.55	4.8	-62.1	62.8	57.2	5.60	11.214	
1,400.0	1,400.0	1,390.5	1,388.2	3.0	3.1	-84.78	-84.78	6.9	-75.7	76.9	70.8	6.09	12.629	
1,500.0	1,500.0	1,488.8	1,485.1	3.3	3.4	-84.18	-84.18	9.3	-91.2	92.9	86.2	6.61	14.057	
1,600.0	1,600.0	1,587.5	1,582.6	3.5	3.7	-83.75	-83.75	11.7	-106.8	108.9	101.7	7.13	15.260	
1,700.0	1,700.0	1,686.3	1,680.1	3.7	4.0	-15.53	-15.53	14.1	-122.5	124.0	116.7	7.33	16.916	
1,800.0	1,800.0	1,785.4	1,777.9	3.9	4.3	-15.53	-15.53	16.5	-138.2	137.5	129.8	7.77	17.706	
1,900.0	1,899.9	1,884.7	1,876.0	4.1	4.7	-15.70	-15.70	18.9	-153.9	149.4	141.2	8.21	18.199	
2,000.0	1,999.7	1,984.1	1,974.1	4.3	5.0	-16.02	-16.02	21.3	-169.6	159.6	150.9	8.65	18.443	
2,100.0	2,099.4	2,083.8	2,072.5	4.6	5.4	-16.47	-16.47	23.8	-185.4	168.1	159.0	9.10	18.475	
2,200.0	2,198.9	2,183.5	2,170.9	4.8	5.7	-17.05	-17.05	26.2	-201.2	174.9	165.4	9.55	18.324	
2,300.0	2,298.3	2,283.4	2,269.5	5.1	6.1	-17.75	-17.75	28.6	-217.0	180.2	170.2	10.00	18.017	
2,400.0	2,397.5	2,383.2	2,368.1	5.3	6.5	-18.52	-18.52	31.1	-232.8	184.6	174.1	10.47	17.633	
2,500.0	2,496.8	2,483.1	2,466.7	5.6	6.8	-19.25	-19.25	33.5	-248.6	189.0	178.0	10.94	17.277	
2,600.0	2,596.0	2,583.0	2,565.2	5.8	7.2	-19.95	-19.95	35.9	-264.4	193.4	182.0	11.41	16.947	
2,700.0	2,695.3	2,682.9	2,663.8	6.1	7.6	-20.61	-20.61	38.3	-280.2	197.9	186.0	11.89	16.640	
2,800.0	2,794.5	2,782.7	2,762.4	6.4	7.9	-21.25	-21.25	40.8	-296.1	202.4	190.0	12.38	16.354	
2,900.0	2,893.8	2,882.6	2,861.0	6.7	8.3	-21.86	-21.86	43.2	-311.9	206.9	194.1	12.86	16.087	
3,000.0	2,993.0	2,982.5	2,959.6	7.0	8.7	-22.44	-22.44	45.6	-327.7	211.5	198.1	13.35	15.837	
3,100.0	3,092.3	3,082.4	3,058.2	7.2	9.0	-23.00	-23.00	48.1	-343.5	216.0	202.2	13.85	15.603	
3,200.0	3,191.5	3,182.2	3,156.8	7.5	9.4	-23.53	-23.53	50.5	-359.3	220.6	206.3	14.34	15.383	
3,300.0	3,290.8	3,282.1	3,255.3	7.8	9.8	-24.05	-24.05	52.9	-375.1	225.2	210.4	14.84	15.176	
3,400.0	3,390.0	3,382.0	3,353.9	8.1	10.2	-24.54	-24.54	55.3	-390.9	229.8	214.5	15.34	14.980	
3,500.0	3,489.3	3,481.8	3,452.5	8.4	10.5	-25.01	-25.01	57.8	-406.7	234.5	218.6	15.85	14.795	
3,600.0	3,588.5	3,581.7	3,551.1	8.7	10.9	-25.47	-25.47	60.2	-422.6	239.1	222.8	16.36	14.621	
3,700.0	3,687.8	3,681.6	3,649.7	9.0	11.3	-25.91	-25.91	62.6	-438.4	243.8	226.9	16.87	14.456	
3,800.0	3,787.0	3,781.5	3,748.3	9.3	11.7	-26.33	-26.33	65.1	-454.2	248.5	231.1	17.38	14.299	
3,900.0	3,886.3	3,881.3	3,846.8	9.6	12.0	-26.73	-26.73	67.5	-470.0	253.2	235.3	17.89	14.150	
4,000.0	3,985.5	3,981.2	3,945.4	9.9	12.4	-27.12	-27.12	69.9	-485.8	257.9	239.5	18.41	14.008	
4,100.0	4,084.8	4,081.1	4,044.0	10.2	12.8	-27.49	-27.49	72.3	-501.6	262.8	243.9	18.92	13.888	
4,200.0	4,184.4	4,180.8	4,142.4	10.4	13.2	-27.63	-27.63	74.8	-517.4	270.2	250.8	19.38	13.940	
4,300.0	4,284.2	4,280.2	4,240.6	10.6	13.5	-27.46	-27.46	77.2	-533.1	280.6	260.8	19.80	14.172	
4,400.0	4,384.2	4,379.3	4,338.4	10.8	13.9	-27.02	-27.02	79.6	-548.8	294.1	273.9	20.18	14.576	
4,500.0	4,484.2	4,478.0	4,435.8	11.0	14.3	-94.31	-94.31	82.0	-564.5	309.7	289.1	20.58	15.047	
4,600.0	4,584.2	4,576.7	4,533.2	11.2	14.7	-93.68	-93.68	84.4	-580.1	325.3	304.3	21.01	15.482	
4,700.0	4,684.2	4,675.4	4,630.7	11.4	15.0	-93.10	-93.10	86.8	-595.7	341.0	319.5	21.45	15.900	
4,800.0	4,784.2	4,774.1	4,728.1	11.6	15.4	-92.57	-92.57	89.2	-611.3	356.7	334.8	21.88	16.299	
4,900.0	4,884.2	4,872.8	4,825.5	11.8	15.8	-92.09	-92.09	91.6	-627.0	372.4	350.1	22.32	16.682	
5,000.0	4,984.2	4,971.5	4,923.0	12.0	16.1	-91.64	-91.64	94.0	-642.6	388.2	365.4	22.77	17.050	

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 Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19J-323 - Wellbore #1 - Plan #1 (2-10-15)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,084.2	5,070.3	5,020.4	12.2	16.5	-91.23	-91.23	96.4	-658.2	403.9	380.7	23.21	17.403	
5,200.0	5,184.2	5,169.0	5,117.8	12.4	16.9	-90.86	-90.86	98.8	-673.9	419.7	396.1	23.66	17.742	
5,300.0	5,284.2	5,280.9	5,228.5	12.6	17.2	-90.49	-90.49	101.3	-690.2	434.4	410.3	24.10	18.027	
5,400.0	5,384.2	5,398.1	5,345.0	12.8	17.5	-90.22	-90.22	103.3	-702.9	445.2	420.7	24.53	18.150	
5,500.0	5,484.2	5,516.1	5,462.8	13.0	17.7	-90.06	-90.06	104.5	-710.9	452.0	427.0	24.95	18.112	
5,600.0	5,584.2	5,634.6	5,581.2	13.2	17.9	-90.00	-90.00	105.0	-714.1	454.7	429.3	25.37	17.918	
5,700.0	5,684.2	5,737.6	5,684.2	13.4	18.0	-90.00	-90.00	105.0	-714.2	454.7	428.9	25.78	17.638	
5,800.0	5,784.2	5,837.6	5,784.2	13.6	18.2	-90.00	-90.00	105.0	-714.2	454.7	428.5	26.19	17.363	
5,853.6	5,837.8	5,891.2	5,837.8	13.7	18.3	-90.00	-90.00	105.0	-714.2	454.7	428.3	26.41	17.219	
5,900.0	5,884.2	5,937.5	5,884.1	13.8	18.3	-90.12	-90.12	104.0	-714.2	454.7	428.1	26.59	17.099	
6,000.0	5,984.1	6,036.2	5,982.1	14.0	18.4	88.56	88.56	92.6	-714.2	454.9	427.9	26.99	16.850	
6,100.0	6,083.4	6,133.2	6,076.1	14.1	18.5	86.98	86.98	69.3	-714.2	455.4	428.0	27.32	16.665	
6,200.0	6,180.3	6,228.6	6,165.0	14.3	18.6	85.46	85.46	34.8	-714.2	456.2	428.6	27.61	16.523	
6,300.0	6,273.1	6,322.8	6,247.9	14.4	18.7	84.03	84.03	-9.7	-714.2	457.2	429.3	27.89	16.397	
6,400.0	6,360.4	6,415.7	6,323.7	14.5	18.9	82.70	82.70	-63.4	-714.2	458.5	430.3	28.19	16.264	
6,500.0	6,440.5	6,507.6	6,391.7	14.7	19.0	81.50	81.50	-125.1	-714.2	459.8	431.2	28.61	16.071	
6,600.0	6,512.2	6,600.0	6,452.1	14.9	19.2	80.43	80.43	-195.0	-714.2	461.1	431.9	29.23	15.775	
6,700.0	6,574.1	6,688.8	6,501.9	15.3	19.5	79.55	79.55	-268.5	-714.2	462.4	432.3	30.13	15.349	
6,800.0	6,625.3	6,778.4	6,543.0	15.9	19.9	78.81	78.81	-348.0	-714.2	463.5	432.2	31.36	14.782	
6,900.0	6,664.9	6,867.5	6,574.5	16.7	20.5	78.24	78.24	-431.3	-714.2	464.5	431.5	32.96	14.092	
7,000.0	6,692.1	6,956.3	6,595.9	17.7	21.1	77.86	77.86	-517.4	-714.2	465.1	430.2	34.92	13.319	
7,100.0	6,706.6	7,044.8	6,607.3	18.8	21.9	77.65	77.65	-605.1	-714.2	465.5	428.3	37.21	12.509	
7,200.0	6,709.0	7,136.9	6,608.9	20.0	22.9	77.58	77.58	-697.2	-714.2	465.6	425.9	39.72	11.721	
7,300.0	6,709.0	7,236.9	6,608.0	21.4	24.1	77.48	77.48	-797.2	-714.2	465.8	423.4	42.37	10.994	
7,400.0	6,709.0	7,336.9	6,607.1	22.8	25.3	77.37	77.37	-897.2	-714.2	466.0	420.8	45.17	10.316	
7,500.0	6,709.0	7,436.9	6,606.3	24.3	26.7	77.27	77.27	-997.1	-714.2	466.2	418.1	48.10	9.692	
7,600.0	6,709.0	7,536.9	6,605.4	25.8	28.1	77.16	77.16	-1,097.1	-714.2	466.4	415.2	51.13	9.121	
7,700.0	6,709.0	7,636.9	6,604.5	27.4	29.6	77.06	77.06	-1,197.1	-714.2	466.6	412.3	54.25	8.600	
7,800.0	6,709.0	7,736.9	6,603.6	29.1	31.1	76.95	76.95	-1,297.1	-714.2	466.8	409.3	57.44	8.126	
7,900.0	6,709.0	7,836.9	6,602.8	30.7	32.7	76.85	76.85	-1,397.1	-714.2	467.0	406.3	60.69	7.693	
8,000.0	6,709.0	7,936.8	6,601.9	32.4	34.3	76.75	76.75	-1,497.1	-714.2	467.2	403.2	64.00	7.299	
8,100.0	6,709.0	8,036.8	6,601.0	34.2	35.9	76.64	76.64	-1,597.1	-714.2	467.4	400.0	67.34	6.940	
8,200.0	6,709.0	8,136.8	6,600.2	35.9	37.6	76.54	76.54	-1,697.1	-714.2	467.6	396.8	70.73	6.611	
8,300.0	6,709.0	8,236.8	6,599.3	37.6	39.2	76.43	76.43	-1,797.1	-714.2	467.8	393.6	74.14	6.309	
8,400.0	6,709.0	8,336.8	6,598.4	39.4	41.0	76.33	76.33	-1,897.1	-714.2	468.0	390.4	77.58	6.032	
8,500.0	6,709.0	8,436.8	6,597.5	41.2	42.7	76.23	76.23	-1,997.1	-714.2	468.2	387.1	81.04	5.777	
8,600.0	6,709.0	8,536.8	6,596.7	43.0	44.4	76.12	76.12	-2,097.1	-714.2	468.4	383.9	84.52	5.542	
8,700.0	6,709.0	8,636.8	6,595.8	44.8	46.2	76.02	76.02	-2,197.1	-714.2	468.6	380.6	88.02	5.324	
8,800.0	6,709.0	8,736.8	6,594.9	46.6	48.0	75.92	75.92	-2,297.0	-714.2	468.8	377.3	91.53	5.122	
8,900.0	6,709.0	8,836.8	6,594.0	48.4	49.7	75.81	75.81	-2,397.0	-714.2	469.0	374.0	95.05	4.934	
9,000.0	6,709.0	8,936.8	6,593.2	50.3	51.5	75.71	75.71	-2,497.0	-714.2	469.2	370.6	98.59	4.760	
9,100.0	6,709.0	9,036.8	6,592.3	52.1	53.3	75.61	75.61	-2,597.0	-714.2	469.4	367.3	102.13	4.596	
9,200.0	6,709.0	9,136.8	6,591.4	53.9	55.1	75.50	75.50	-2,697.0	-714.2	469.7	364.0	105.68	4.444	
9,300.0	6,709.0	9,236.8	6,590.6	55.8	56.9	75.40	75.40	-2,797.0	-714.2	469.9	360.6	109.24	4.301	
9,400.0	6,709.0	9,336.8	6,589.7	57.6	58.8	75.30	75.30	-2,897.0	-714.2	470.1	357.3	112.81	4.167	
9,500.0	6,709.0	9,436.8	6,588.8	59.5	60.6	75.19	75.19	-2,997.0	-714.2	470.3	354.0	116.37	4.041	
9,600.0	6,709.0	9,536.8	6,587.9	61.4	62.4	75.09	75.09	-3,097.0	-714.2	470.6	350.6	119.95	3.923	
9,700.0	6,709.0	9,636.8	6,587.1	63.2	64.3	74.99	74.99	-3,197.0	-714.2	470.8	347.3	123.52	3.811	
9,800.0	6,709.0	9,736.8	6,586.2	65.1	66.1	74.89	74.89	-3,297.0	-714.2	471.0	343.9	127.10	3.706	
9,900.0	6,709.0	9,836.8	6,585.3	67.0	67.9	74.78	74.78	-3,397.0	-714.2	471.2	340.5	130.69	3.606	
10,000.0	6,709.0	9,936.8	6,584.4	68.8	69.8	74.68	74.68	-3,497.0	-714.2	471.5	337.2	134.27	3.511	

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 Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19J-323 - Wellbore #1 - Plan #1 (2-10-15)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,100.0	6,709.0	10,036.8	6,583.6	70.7	71.6	74.58	74.58	-3,596.9	-714.2	471.7	333.8	137.86	3.422	
10,200.0	6,709.0	10,136.8	6,582.7	72.6	73.5	74.48	74.48	-3,696.9	-714.2	471.9	330.5	141.44	3.337	
10,300.0	6,709.0	10,236.8	6,581.8	74.5	75.4	74.37	74.37	-3,796.9	-714.2	472.2	327.1	145.03	3.256	
10,400.0	6,709.0	10,336.8	6,581.0	76.3	77.2	74.27	74.27	-3,896.9	-714.2	472.4	323.8	148.62	3.179	
10,500.0	6,709.0	10,436.8	6,580.1	78.2	79.1	74.17	74.17	-3,996.9	-714.2	472.6	320.4	152.20	3.105	
10,600.0	6,709.0	10,536.7	6,579.2	80.1	81.0	74.07	74.07	-4,096.9	-714.2	472.9	317.1	155.79	3.035	
10,700.0	6,709.0	10,636.7	6,578.3	82.0	82.8	73.97	73.97	-4,196.9	-714.2	473.1	313.7	159.38	2.969	
10,800.0	6,709.0	10,736.7	6,577.5	83.9	84.7	73.87	73.87	-4,296.9	-714.2	473.4	310.4	162.96	2.905	
10,900.0	6,709.0	10,836.7	6,576.6	85.8	86.6	73.76	73.76	-4,396.9	-714.2	473.6	307.1	166.55	2.844	
11,000.0	6,709.0	10,936.7	6,575.7	87.7	88.5	73.66	73.66	-4,496.9	-714.2	473.8	303.7	170.13	2.785	
11,084.9	6,709.0	11,019.2	6,575.0	89.0	90.0	73.58	73.58	-4,579.3	-714.2	474.1	301.2	172.83	2.743 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19M-243 - Wellbore #1 - Plan #1 (2-10-15)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	90.00	90.00	0.0	27.9	27.9				
100.0	100.0	100.0	100.0	0.1	0.1	90.00	90.00	0.0	27.9	27.9	27.7	0.22	124.091	
200.0	200.0	200.0	200.0	0.3	0.3	90.00	90.00	0.0	27.9	27.9	27.2	0.67	41.364	
300.0	300.0	300.0	300.0	0.6	0.6	90.00	90.00	0.0	27.9	27.9	26.8	1.12	24.818	
400.0	400.0	400.0	400.0	0.8	0.8	90.00	90.00	0.0	27.9	27.9	26.3	1.57	17.727	
500.0	500.0	500.0	500.0	1.0	1.0	90.00	90.00	0.0	27.9	27.9	25.9	2.02	13.788	
600.0	600.0	600.0	600.0	1.2	1.2	90.00	90.00	0.0	27.9	27.9	25.4	2.47	11.281	
700.0	700.0	700.0	700.0	1.5	1.5	90.00	90.00	0.0	27.9	27.9	25.0	2.92	9.545	
800.0	800.0	800.0	800.0	1.7	1.7	90.00	90.00	0.0	27.9	27.9	24.5	3.37	8.273	
900.0	900.0	900.0	900.0	1.9	1.9	90.00	90.00	0.0	27.9	27.9	24.1	3.82	7.299	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	90.00	90.00	0.0	27.9	27.9	23.6	4.27	6.531	
1,100.0	1,100.0	1,100.0	1,100.0	2.4	2.4	90.00	90.00	0.0	27.9	27.9	23.2	4.72	5.909	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	90.00	90.00	0.0	27.9	27.9	22.7	5.17	5.395	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	90.00	90.00	0.0	27.9	27.9	22.3	5.62	4.964	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	90.00	90.00	0.0	27.9	27.9	21.8	6.07	4.596	
1,500.0	1,500.0	1,500.0	1,500.0	3.3	3.3	90.00	90.00	0.0	27.9	27.9	21.4	6.52	4.279	
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	90.00	90.00	0.0	27.9	27.9	20.9	6.97	4.003 CC, ES	
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	158.62	158.62	0.0	27.9	28.7	21.3	7.41	3.875	
1,800.0	1,800.0	1,800.0	1,800.0	3.9	3.9	160.36	160.36	0.0	27.9	31.2	23.3	7.84	3.975	
1,900.0	1,899.9	1,899.9	1,899.9	4.1	4.2	162.73	162.73	0.0	27.9	35.3	27.0	8.27	4.269	
2,000.0	1,999.7	1,999.7	1,999.7	4.3	4.4	165.24	165.24	0.0	27.9	41.2	32.5	8.70	4.733	
2,100.0	2,099.4	2,099.4	2,099.4	4.6	4.6	167.57	167.57	0.0	27.9	48.8	39.7	9.13	5.347	
2,200.0	2,198.9	2,198.9	2,198.9	4.8	4.8	169.58	169.58	0.0	27.9	58.2	48.6	9.55	6.092	
2,300.0	2,298.3	2,298.3	2,298.3	5.1	5.1	171.26	171.26	0.0	27.9	69.4	59.4	9.98	6.952	
2,400.0	2,397.5	2,397.5	2,397.5	5.3	5.3	172.56	172.56	0.0	27.9	81.5	71.0	10.42	7.820	
2,500.0	2,496.8	2,496.8	2,496.8	5.6	5.5	173.53	173.53	0.0	27.9	93.6	82.7	10.86	8.619	
2,600.0	2,596.0	2,596.0	2,596.0	5.8	5.7	174.28	174.28	0.0	27.9	105.7	94.4	11.30	9.355	
2,700.0	2,695.3	2,695.3	2,695.3	6.1	5.9	174.87	174.87	0.0	27.9	117.9	106.2	11.75	10.036	
2,800.0	2,794.5	2,794.5	2,794.5	6.4	6.2	175.35	175.35	0.0	27.9	130.1	117.9	12.20	10.666	
2,900.0	2,893.8	2,893.8	2,893.8	6.7	6.4	175.75	175.75	0.0	27.9	142.3	129.6	12.64	11.252	
3,000.0	2,993.0	2,993.0	2,993.0	7.0	6.6	176.09	176.09	0.0	27.9	154.5	141.4	13.09	11.797	
3,100.0	3,092.3	3,093.3	3,093.3	7.2	6.8	176.13	176.13	0.8	27.8	166.4	152.8	13.55	12.282	
3,200.0	3,191.5	3,193.8	3,193.8	7.5	7.1	175.65	175.65	3.3	27.6	177.6	163.6	14.00	12.688	
3,300.0	3,290.8	3,294.4	3,294.3	7.8	7.3	174.72	174.72	7.5	27.3	188.2	173.8	14.45	13.024	
3,400.0	3,390.0	3,395.0	3,394.7	8.1	7.5	173.41	173.41	13.6	26.8	198.3	183.4	14.91	13.300	
3,500.0	3,489.3	3,495.6	3,494.9	8.4	7.7	171.77	171.77	21.4	26.2	207.8	192.5	15.37	13.526	
3,600.0	3,588.5	3,595.6	3,594.5	8.7	8.0	169.88	169.88	30.7	25.4	217.1	201.3	15.83	13.714	
3,700.0	3,687.8	3,694.9	3,693.4	9.0	8.2	168.07	168.07	40.3	24.7	226.5	210.2	16.30	13.895	
3,800.0	3,787.0	3,794.2	3,792.2	9.3	8.4	166.42	166.42	49.9	23.9	236.1	219.3	16.78	14.072	
3,900.0	3,886.3	3,893.5	3,891.1	9.6	8.7	164.89	164.89	59.4	23.2	245.9	228.6	17.26	14.246	
4,000.0	3,985.5	3,992.8	3,989.9	9.9	8.9	163.48	163.48	69.0	22.4	255.8	238.1	17.75	14.415	
4,100.0	4,084.8	4,092.2	4,088.8	10.2	9.1	162.18	162.18	78.6	21.6	265.7	247.5	18.25	14.563	
4,200.0	4,184.4	4,191.7	4,187.8	10.4	9.4	160.82	160.82	88.2	20.9	273.1	254.4	18.73	14.583	
4,300.0	4,284.2	4,290.6	4,286.4	10.6	9.6	159.42	159.42	97.0	20.2	277.5	258.3	19.17	14.474	
4,400.0	4,384.2	4,389.6	4,385.1	10.8	9.8	158.43	158.43	102.7	19.7	279.1	259.6	19.55	14.277	
4,500.0	4,484.2	4,488.7	4,484.3	11.0	10.0	90.01	90.01	105.0	19.5	279.0	259.0	19.92	14.003	
4,539.6	4,523.8	4,528.2	4,523.8	11.1	10.1	90.00	90.00	105.0	19.5	279.0	258.9	20.08	13.893	
4,600.0	4,584.2	4,588.6	4,584.2	11.2	10.2	90.00	90.00	105.0	19.5	279.0	258.6	20.32	13.725	
4,700.0	4,684.2	4,688.6	4,684.2	11.4	10.4	90.00	90.00	105.0	19.5	279.0	258.2	20.75	13.442	
4,800.0	4,784.2	4,788.6	4,784.2	11.6	10.6	90.00	90.00	105.0	19.5	279.0	257.8	21.19	13.167	
4,900.0	4,884.2	4,888.6	4,884.2	11.8	10.8	90.00	90.00	105.0	19.5	279.0	257.3	21.62	12.903	

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 Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19M-243 - Wellbore #1 - Plan #1 (2-10-15)													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
5,000.0	4,984.2	4,988.6	4,984.2	12.0	11.1	90.00	90.00	105.0	19.5	279.0	256.9	22.05	12.650	
5,100.0	5,084.2	5,088.6	5,084.2	12.2	11.3	90.00	90.00	105.0	19.5	279.0	256.5	22.49	12.405	
5,200.0	5,184.2	5,188.6	5,184.2	12.4	11.5	90.00	90.00	105.0	19.5	279.0	256.0	22.92	12.170	
5,300.0	5,284.2	5,288.6	5,284.2	12.6	11.7	90.00	90.00	105.0	19.5	279.0	255.6	23.36	11.943	
5,400.0	5,384.2	5,388.6	5,384.2	12.8	11.9	90.00	90.00	105.0	19.5	279.0	255.2	23.79	11.724	
5,500.0	5,484.2	5,488.6	5,484.2	13.0	12.2	90.00	90.00	105.0	19.5	279.0	254.7	24.23	11.513	
5,600.0	5,584.2	5,588.6	5,584.2	13.2	12.4	90.00	90.00	105.0	19.5	279.0	254.3	24.67	11.309	
5,700.0	5,684.2	5,688.6	5,684.2	13.4	12.6	90.00	90.00	105.0	19.5	279.0	253.9	25.11	11.112	
5,763.2	5,747.4	5,751.8	5,747.4	13.5	12.7	90.00	90.00	105.0	19.5	279.0	253.6	25.38	10.990	
5,800.0	5,784.2	5,788.6	5,784.1	13.6	12.8	90.05	90.05	104.8	19.5	279.0	253.4	25.54	10.924	
5,810.9	5,795.0	5,799.5	5,795.0	13.6	12.8	90.12	90.12	104.4	19.5	279.0	253.4	25.58	10.905	
5,900.0	5,884.2	5,887.7	5,882.7	13.8	13.0	91.86	91.86	95.9	19.5	279.1	253.2	25.88	10.784	
6,000.0	5,984.1	5,983.2	5,975.9	14.0	13.1	-84.07	-84.07	75.4	19.5	280.5	254.4	26.17	10.722	
6,100.0	6,083.4	6,075.7	6,063.2	14.1	13.2	-79.71	-79.71	44.6	19.5	283.7	257.4	26.38	10.756	
6,200.0	6,180.3	6,166.1	6,144.1	14.3	13.4	-75.64	-75.64	4.5	19.5	288.3	261.8	26.57	10.851	
6,300.0	6,273.1	6,254.5	6,218.2	14.4	13.5	-71.94	-71.94	-43.7	19.5	293.9	267.2	26.75	10.987	
6,400.0	6,360.4	6,341.3	6,285.0	14.5	13.7	-68.64	-68.64	-98.9	19.5	300.1	273.2	26.94	11.141	
6,500.0	6,440.5	6,426.7	6,344.2	14.7	14.0	-65.77	-65.77	-160.4	19.5	306.5	279.4	27.16	11.288	
6,600.0	6,512.2	6,510.8	6,395.5	14.9	14.5	-63.33	-63.33	-227.0	19.5	312.8	285.3	27.43	11.400	
6,700.0	6,574.1	6,594.0	6,438.7	15.3	15.0	-61.31	-61.31	-298.1	19.5	318.5	290.6	27.84	11.441	
6,800.0	6,625.3	6,676.4	6,473.7	15.9	15.7	-59.71	-59.71	-372.6	19.5	323.4	295.0	28.42	11.377	
6,900.0	6,664.9	6,758.1	6,500.2	16.7	16.5	-58.51	-58.51	-449.9	19.5	327.3	298.1	29.25	11.191	
7,000.0	6,692.1	6,839.5	6,518.2	17.7	17.4	-57.71	-57.71	-529.2	19.5	330.1	299.7	30.36	10.873	
7,100.0	6,706.6	6,920.5	6,527.8	18.8	18.3	-57.29	-57.29	-609.7	19.5	331.6	299.8	31.78	10.434	
7,200.0	6,709.0	7,007.8	6,529.1	20.0	19.4	-57.19	-57.19	-696.9	19.5	331.9	298.3	33.64	9.868	
7,300.0	6,709.0	7,107.8	6,528.5	21.4	20.8	-57.09	-57.09	-796.9	19.5	332.3	296.3	35.95	9.244	
7,400.0	6,709.0	7,207.8	6,527.8	22.8	22.3	-57.00	-57.00	-896.9	19.5	332.6	294.2	38.39	8.663	
7,500.0	6,709.0	7,307.8	6,527.2	24.3	23.8	-56.91	-56.91	-996.9	19.5	333.0	292.0	40.96	8.130	
7,600.0	6,709.0	7,407.8	6,526.5	25.8	25.4	-56.81	-56.81	-1,096.9	19.5	333.3	289.7	43.61	7.643	
7,700.0	6,709.0	7,507.8	6,525.9	27.4	27.0	-56.72	-56.72	-1,196.9	19.5	333.7	287.3	46.35	7.200	
7,800.0	6,709.0	7,607.8	6,525.2	29.1	28.6	-56.63	-56.63	-1,296.9	19.5	334.0	284.9	49.14	6.798	
7,900.0	6,709.0	7,707.8	6,524.6	30.7	30.3	-56.53	-56.53	-1,396.8	19.5	334.4	282.4	51.99	6.433	
8,000.0	6,709.0	7,807.8	6,524.0	32.4	32.1	-56.44	-56.44	-1,496.8	19.5	334.8	279.9	54.87	6.101	
8,100.0	6,709.0	7,907.8	6,523.3	34.2	33.8	-56.35	-56.35	-1,596.8	19.5	335.1	277.3	57.79	5.799	
8,200.0	6,709.0	8,007.8	6,522.7	35.9	35.5	-56.26	-56.26	-1,696.8	19.5	335.5	274.7	60.74	5.523	
8,300.0	6,709.0	8,107.8	6,522.0	37.6	37.3	-56.17	-56.17	-1,796.8	19.5	335.8	272.1	63.72	5.271	
8,400.0	6,709.0	8,207.8	6,521.4	39.4	39.1	-56.08	-56.08	-1,896.8	19.5	336.2	269.5	66.71	5.040	
8,500.0	6,709.0	8,307.8	6,520.7	41.2	40.9	-55.98	-55.98	-1,996.8	19.5	336.6	266.8	69.72	4.827	
8,600.0	6,709.0	8,407.8	6,520.1	43.0	42.7	-55.89	-55.89	-2,096.8	19.5	336.9	264.2	72.75	4.631	
8,700.0	6,709.0	8,507.8	6,519.4	44.8	44.5	-55.80	-55.80	-2,196.8	19.5	337.3	261.5	75.78	4.451	
8,800.0	6,709.0	8,607.8	6,518.8	46.6	46.3	-55.71	-55.71	-2,296.8	19.5	337.6	258.8	78.83	4.283	
8,900.0	6,709.0	8,707.8	6,518.1	48.4	48.2	-55.62	-55.62	-2,396.8	19.5	338.0	256.1	81.88	4.128	
9,000.0	6,709.0	8,807.8	6,517.5	50.3	50.0	-55.53	-55.53	-2,496.8	19.5	338.4	253.4	84.94	3.984	
9,100.0	6,709.0	8,907.8	6,516.8	52.1	51.9	-55.44	-55.44	-2,596.8	19.5	338.7	250.7	88.00	3.849	
9,200.0	6,709.0	9,007.8	6,516.2	53.9	53.7	-55.35	-55.35	-2,696.8	19.5	339.1	248.0	91.07	3.724	
9,300.0	6,709.0	9,107.8	6,515.6	55.8	55.6	-55.26	-55.26	-2,796.8	19.5	339.5	245.3	94.14	3.606	
9,400.0	6,709.0	9,207.7	6,514.9	57.6	57.4	-55.17	-55.17	-2,896.8	19.5	339.8	242.6	97.21	3.496	
9,500.0	6,709.0	9,307.7	6,514.3	59.5	59.3	-55.08	-55.08	-2,996.8	19.5	340.2	239.9	100.28	3.392	
9,600.0	6,709.0	9,407.7	6,513.6	61.4	61.2	-54.99	-54.99	-3,096.8	19.5	340.6	237.2	103.36	3.295	
9,700.0	6,709.0	9,507.7	6,513.0	63.2	63.0	-54.90	-54.90	-3,196.8	19.5	341.0	234.5	106.43	3.203	
9,800.0	6,709.0	9,607.7	6,512.3	65.1	64.9	-54.82	-54.82	-3,296.8	19.5	341.3	231.8	109.51	3.117	

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 Sater 19M-443
Project:	SEC.19-T4N-R63W	TVD Reference:	WELL @ 4677.0ft (RKB - 13')
Reference Site:	Sater 4N63W19M Pad Sec.19-T4N-R63W	MD Reference:	WELL @ 4677.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Sater 19M-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 #1 (2-10-15)	Offset TVD Reference:	Offset Datum

Offset Design Sater 4N63W19M Pad Sec.19-T4N-R63W - Sater 19M-243 - Wellbore #1 - Plan #1 (2-10-15)												Offset Site Error:	0.0 ft
Survey Program: 0-MWD												Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
9,900.0	6,709.0	9,707.7	6,511.7	67.0	66.8	-54.73	-3,396.8	19.5	341.7	229.1	112.58	3.035	
10,000.0	6,709.0	9,807.7	6,511.0	68.8	68.7	-54.64	-3,496.8	19.5	342.1	226.4	115.65	2.958	
10,100.0	6,709.0	9,907.7	6,510.4	70.7	70.5	-54.55	-3,596.8	19.5	342.4	223.7	118.72	2.884	
10,200.0	6,709.0	10,007.7	6,509.7	72.6	72.4	-54.46	-3,696.8	19.5	342.8	221.0	121.79	2.815	
10,300.0	6,709.0	10,107.7	6,509.1	74.5	74.3	-54.38	-3,796.7	19.5	343.2	218.3	124.86	2.749	
10,400.0	6,709.0	10,207.7	6,508.5	76.3	76.2	-54.29	-3,896.7	19.5	343.6	215.6	127.92	2.686	
10,500.0	6,709.0	10,307.7	6,507.8	78.2	78.1	-54.20	-3,996.7	19.5	343.9	213.0	130.98	2.626	
10,600.0	6,709.0	10,407.7	6,507.2	80.1	80.0	-54.11	-4,096.7	19.5	344.3	210.3	134.04	2.569	
10,700.0	6,709.0	10,507.7	6,506.5	82.0	81.9	-54.03	-4,196.7	19.5	344.7	207.6	137.10	2.514	
10,800.0	6,709.0	10,607.7	6,505.9	83.9	83.7	-53.94	-4,296.7	19.5	345.1	204.9	140.15	2.462	
10,900.0	6,709.0	10,707.7	6,505.2	85.8	85.6	-53.85	-4,396.7	19.5	345.5	202.3	143.20	2.412	
11,000.0	6,709.0	10,807.7	6,504.6	87.7	87.5	-53.77	-4,496.7	19.5	345.8	199.6	146.25	2.365	
11,084.9	6,709.0	10,892.6	6,504.0	89.0	89.1	-53.69	-4,581.6	19.5	346.2	197.6	148.55	2.330 SF	

Reference Depths are relative to WELL @ 4677.0ft (RKB - 13')	Coordinates are relative to: Sater 19M-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: 0.66°



Coordinates are relative to: Sater 19M-443
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.66°

