

PETROLEUM DEVELOPMENT CORP Weld County CO

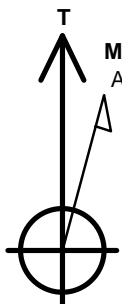
Well Name: **Ledford 22T-221**

Surface Location: Ledford 22Y-HZ Pad Sec.22-T5N-R64W
 North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
 Ground Elevation: 4598.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1382173.71	3270940.59	40.378390	-104.527470	
RKB - 13' WELL @ 4611.0ft (RKB - 13')						

WELLBORE TARGET DETAILS

	TVD	+N/-S	+E/-W	Shape
50'E/W Hardline (22T-221)	1.0	2512.3	-646.3	Rectangle (Sides: L3952.0 W100.0)
SHL 276'FSL & 307'FEL	1.0	0.0	0.0	Point
BHL 500'FNL & 941'FEL	6553.0	4488.3	-646.3	Point



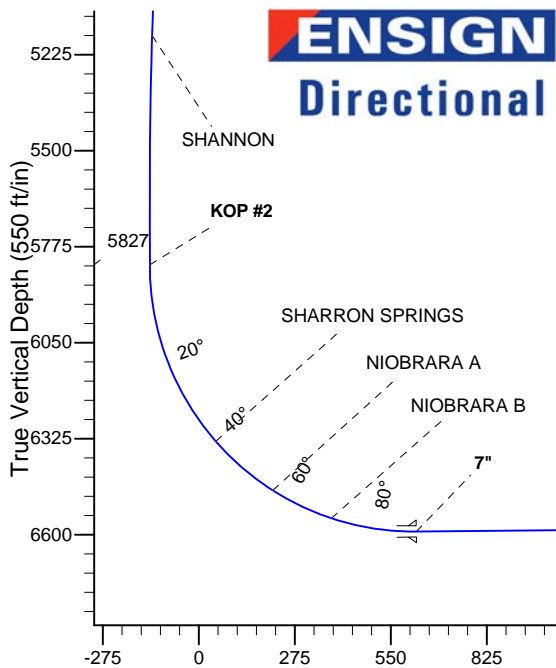
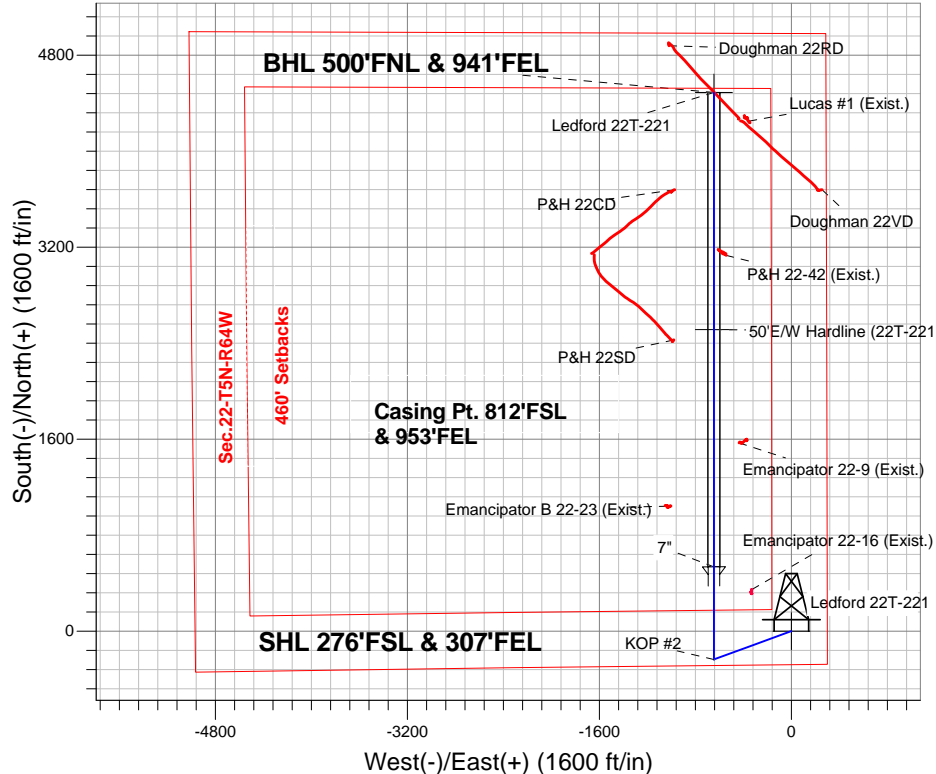
Azimuths to True North
 Magnetic North: 8.23°

Magnetic Field
 Strength: 52754.4snT
 Dip Angle: 66.94°
 Date: 3/5/2015
 Model: IGRF2010

ANNOTATIONS

TVD	MD	Annotation
1000.0	1000.0	KOP #1
5827.1	5884.2	KOP #2

Ledford 22Y-HZ Pad Sec.22-T5N-R64W
 Ledford 22T-221
 Plan #2 (3-5-15)



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	1000.0	0.00	0.00	1000.0	0.0	0.0	0.00	0.00	0.0	
3	2016.4	10.16	250.02	2011.1	-30.7	-84.5	1.00	250.02	-18.4	
4	5148.9	10.16	250.02	5094.5	-219.6	-604.0	0.00	0.00	-131.3	
5	5657.1	0.00	0.00	5600.0	-235.0	-646.3	2.00	180.00	-140.5	
6	5884.2	0.00	0.00	5827.0	-235.0	-646.3	0.00	0.00	-140.5	
7	7091.5	90.55	360.00	6590.9	536.3	-646.3	7.50	360.00	622.9	
8	11043.7	90.55	360.00	6553.0	4488.3	-646.3	0.00	0.00	4534.6	BHL 500'FNL & 941'FEL

BHL 500'FNL & 941'FEL

Vertical Section at 351.81° (550 ft/in)



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.22-T5N-R64W

Ledford 22Y-HZ Pad Sec.22-T5N-R64W

Ledford 22T-221

Wellbore #1

Plan: Plan #2 (3-5-15)

Standard Planning Report

06 March, 2015



Database:	Landmark	Local Co-ordinate Reference:	Well Ledford 22T-221
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Project:	SEC.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (3-5-15)		

Project	SEC.22-T5N-R64W, 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	Ledford 22Y-HZ Pad Sec.22-T5N-R64W				
Site Position:		Northing:	1,382,151.62 ft	Latitude:	40.378330
From:	Lat/Long	Easting:	3,270,918.54 ft	Longitude:	-104.527550
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.63 °

Well	Ledford 22T-221					
Well Position	+N/-S	21.9 ft	Northing:	1,382,173.71 ft	Latitude:	40.378390
	+E/-W	22.3 ft	Easting:	3,270,940.59 ft	Longitude:	-104.527470
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,598.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/5/2015	8.23	66.94	52,754

Design	Plan #2 (3-5-15)			
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	351.81

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,016.4	10.16	250.02	2,011.1	-30.7	-84.5	1.00	1.00	0.00	250.02	
5,148.9	10.16	250.02	5,094.5	-219.6	-604.0	0.00	0.00	0.00	0.00	
5,657.1	0.00	0.00	5,600.0	-235.0	-646.3	2.00	-2.00	0.00	180.00	
5,884.2	0.00	0.00	5,827.0	-235.0	-646.3	0.00	0.00	0.00	0.00	
7,091.5	90.55	360.00	6,590.9	536.3	-646.3	7.50	7.50	0.00	360.00	
11,043.7	90.55	360.00	6,553.0	4,488.3	-646.3	0.00	0.00	0.00	0.00	BHL 500'FNL & 941

Database:	Landmark	Local Co-ordinate Reference:	Well Ledford 22T-221
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Project:	SEC.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (3-5-15)		

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	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	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	0.00
300.0	0.00	0.00	300.0	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	0.0	0.00	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	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	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	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	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	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
KOP #1										
1,100.0	1.00	250.02	1,100.0	-0.3	-0.8	-0.2	1.00	1.00	0.00	0.00
1,200.0	2.00	250.02	1,200.0	-1.2	-3.3	-0.7	1.00	1.00	0.00	0.00
1,300.0	3.00	250.02	1,299.9	-2.7	-7.4	-1.6	1.00	1.00	0.00	0.00
1,400.0	4.00	250.02	1,399.7	-4.8	-13.1	-2.9	1.00	1.00	0.00	0.00
1,500.0	5.00	250.02	1,499.4	-7.5	-20.5	-4.5	1.00	1.00	0.00	0.00
1,600.0	6.00	250.02	1,598.9	-10.7	-29.5	-6.4	1.00	1.00	0.00	0.00
1,700.0	7.00	250.02	1,698.3	-14.6	-40.1	-8.7	1.00	1.00	0.00	0.00
1,800.0	8.00	250.02	1,797.4	-19.1	-52.4	-11.4	1.00	1.00	0.00	0.00
1,900.0	9.00	250.02	1,896.3	-24.1	-66.3	-14.4	1.00	1.00	0.00	0.00
2,000.0	10.00	250.02	1,994.9	-29.7	-81.8	-17.8	1.00	1.00	0.00	0.00
2,016.4	10.16	250.02	2,011.1	-30.7	-84.5	-18.4	1.00	1.00	0.00	0.00
2,100.0	10.16	250.02	2,093.4	-35.8	-98.4	-21.4	0.00	0.00	0.00	0.00
2,200.0	10.16	250.02	2,191.8	-41.8	-115.0	-25.0	0.00	0.00	0.00	0.00
2,300.0	10.16	250.02	2,290.2	-47.8	-131.5	-28.6	0.00	0.00	0.00	0.00
2,400.0	10.16	250.02	2,388.7	-53.9	-148.1	-32.2	0.00	0.00	0.00	0.00
2,500.0	10.16	250.02	2,487.1	-59.9	-164.7	-35.8	0.00	0.00	0.00	0.00
2,600.0	10.16	250.02	2,585.5	-65.9	-181.3	-39.4	0.00	0.00	0.00	0.00
2,700.0	10.16	250.02	2,683.9	-72.0	-197.9	-43.0	0.00	0.00	0.00	0.00
2,800.0	10.16	250.02	2,782.4	-78.0	-214.5	-46.6	0.00	0.00	0.00	0.00
2,900.0	10.16	250.02	2,880.8	-84.0	-231.0	-50.2	0.00	0.00	0.00	0.00
3,000.0	10.16	250.02	2,979.2	-90.0	-247.6	-53.8	0.00	0.00	0.00	0.00
3,100.0	10.16	250.02	3,077.7	-96.1	-264.2	-57.4	0.00	0.00	0.00	0.00
3,200.0	10.16	250.02	3,176.1	-102.1	-280.8	-61.0	0.00	0.00	0.00	0.00
3,300.0	10.16	250.02	3,274.5	-108.1	-297.4	-64.7	0.00	0.00	0.00	0.00
3,400.0	10.16	250.02	3,373.0	-114.2	-314.0	-68.3	0.00	0.00	0.00	0.00
3,427.5	10.16	250.02	3,400.0	-115.8	-318.5	-69.2	0.00	0.00	0.00	0.00
PARKMAN										
3,500.0	10.16	250.02	3,471.4	-120.2	-330.5	-71.9	0.00	0.00	0.00	0.00
3,600.0	10.16	250.02	3,569.8	-126.2	-347.1	-75.5	0.00	0.00	0.00	0.00
3,700.0	10.16	250.02	3,668.3	-132.3	-363.7	-79.1	0.00	0.00	0.00	0.00
3,800.0	10.16	250.02	3,766.7	-138.3	-380.3	-82.7	0.00	0.00	0.00	0.00
3,900.0	10.16	250.02	3,865.1	-144.3	-396.9	-86.3	0.00	0.00	0.00	0.00
4,000.0	10.16	250.02	3,963.5	-150.3	-413.5	-89.9	0.00	0.00	0.00	0.00
4,100.0	10.16	250.02	4,062.0	-156.4	-430.1	-93.5	0.00	0.00	0.00	0.00
4,200.0	10.16	250.02	4,160.4	-162.4	-446.6	-97.1	0.00	0.00	0.00	0.00
4,291.0	10.16	250.02	4,250.0	-167.9	-461.7	-100.4	0.00	0.00	0.00	0.00
SUSSEX										
4,300.0	10.16	250.02	4,258.8	-168.4	-463.2	-100.7	0.00	0.00	0.00	0.00
4,400.0	10.16	250.02	4,357.3	-174.5	-479.8	-104.3	0.00	0.00	0.00	0.00
4,500.0	10.16	250.02	4,455.7	-180.5	-496.4	-107.9	0.00	0.00	0.00	0.00
4,600.0	10.16	250.02	4,554.1	-186.5	-513.0	-111.5	0.00	0.00	0.00	0.00

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Project:	SEC.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (3-5-15)		

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)
4,700.0	10.16	250.02	4,652.6	-192.6	-529.6	-115.1	0.00	0.00	0.00
4,800.0	10.16	250.02	4,751.0	-198.6	-546.1	-118.7	0.00	0.00	0.00
4,900.0	10.16	250.02	4,849.4	-204.6	-562.7	-122.3	0.00	0.00	0.00
5,000.0	10.16	250.02	4,947.9	-210.7	-579.3	-125.9	0.00	0.00	0.00
5,100.0	10.16	250.02	5,046.3	-216.7	-595.9	-129.5	0.00	0.00	0.00
5,148.9	10.16	250.02	5,094.5	-219.6	-604.0	-131.3	0.00	0.00	0.00
5,200.0	9.14	250.02	5,144.8	-222.6	-612.1	-133.1	2.00	-2.00	0.00
5,225.5	8.63	250.02	5,170.0	-223.9	-615.8	-133.9	2.00	-2.00	0.00
SHANNON									
5,300.0	7.14	250.02	5,243.8	-227.4	-625.4	-136.0	2.00	-2.00	0.00
5,400.0	5.14	250.02	5,343.2	-231.1	-635.4	-138.1	2.00	-2.00	0.00
5,500.0	3.14	250.02	5,442.9	-233.5	-642.2	-139.6	2.00	-2.00	0.00
5,600.0	1.14	250.02	5,542.9	-234.8	-645.7	-140.4	2.00	-2.00	0.00
5,657.1	0.00	0.00	5,600.0	-235.0	-646.3	-140.5	2.00	-2.00	0.00
5,700.0	0.00	0.00	5,642.9	-235.0	-646.3	-140.5	0.00	0.00	0.00
5,800.0	0.00	0.00	5,742.9	-235.0	-646.3	-140.5	0.00	0.00	0.00
5,884.2	0.00	0.00	5,827.1	-235.0	-646.3	-140.5	0.00	0.00	0.00
KOP #2									
5,900.0	1.19	360.00	5,842.9	-234.8	-646.3	-140.3	7.51	7.51	0.00
6,000.0	8.69	360.00	5,942.4	-226.2	-646.3	-131.8	7.50	7.50	0.00
6,100.0	16.19	360.00	6,040.0	-204.7	-646.3	-110.5	7.50	7.50	0.00
6,200.0	23.69	360.00	6,133.9	-170.6	-646.3	-76.8	7.50	7.50	0.00
6,300.0	31.19	360.00	6,222.6	-124.6	-646.3	-31.2	7.50	7.50	0.00
6,400.0	38.69	360.00	6,304.5	-67.4	-646.3	25.4	7.50	7.50	0.00
6,435.9	41.38	360.00	6,332.0	-44.3	-646.3	48.3	7.50	7.50	0.00
SHARRON SPRINGS									
6,500.0	46.19	360.00	6,378.3	0.1	-646.3	92.2	7.50	7.50	0.00
6,600.0	53.69	360.00	6,442.6	76.5	-646.3	167.9	7.50	7.50	0.00
6,654.0	57.73	360.00	6,473.0	121.1	-646.3	212.0	7.50	7.50	0.00
NIOBRARA A									
6,700.0	61.19	360.00	6,496.4	160.8	-646.3	251.2	7.50	7.50	0.00
6,800.0	68.69	360.00	6,538.7	251.3	-646.3	340.8	7.50	7.50	0.00
6,842.3	71.86	360.00	6,553.0	291.1	-646.3	380.2	7.50	7.50	0.00
NIOBRARA B									
6,900.0	76.19	360.00	6,568.9	346.6	-646.3	435.1	7.50	7.50	0.00
7,000.0	83.69	360.00	6,586.3	444.9	-646.3	532.5	7.50	7.50	0.00
7,091.5	90.55	360.00	6,590.9	536.3	-646.3	622.9	7.50	7.50	0.00
7"									
7,100.0	90.55	360.00	6,590.9	544.8	-646.3	631.3	0.01	0.01	0.00
7,200.0	90.55	360.00	6,589.9	644.8	-646.3	730.3	0.00	0.00	0.00
7,300.0	90.55	360.00	6,588.9	744.8	-646.3	829.3	0.00	0.00	0.00
7,400.0	90.55	360.00	6,588.0	844.8	-646.3	928.2	0.00	0.00	0.00
7,500.0	90.55	360.00	6,587.0	944.8	-646.3	1,027.2	0.00	0.00	0.00
7,600.0	90.55	360.00	6,586.1	1,044.7	-646.3	1,126.2	0.00	0.00	0.00
7,700.0	90.55	360.00	6,585.1	1,144.7	-646.3	1,225.2	0.00	0.00	0.00
7,800.0	90.55	360.00	6,584.1	1,244.7	-646.3	1,324.1	0.00	0.00	0.00
7,900.0	90.55	360.00	6,583.2	1,344.7	-646.3	1,423.1	0.00	0.00	0.00
8,000.0	90.55	360.00	6,582.2	1,444.7	-646.3	1,522.1	0.00	0.00	0.00
8,100.0	90.55	360.00	6,581.3	1,544.7	-646.3	1,621.1	0.00	0.00	0.00
8,200.0	90.55	360.00	6,580.3	1,644.7	-646.3	1,720.0	0.00	0.00	0.00
8,300.0	90.55	360.00	6,579.3	1,744.7	-646.3	1,819.0	0.00	0.00	0.00
8,400.0	90.55	360.00	6,578.4	1,844.7	-646.3	1,918.0	0.00	0.00	0.00

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Well:	Ledford 22T-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (3-5-15)		

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)	
8,500.0	90.55	360.00	6,577.4	1,944.7	-646.3	2,017.0	0.00	0.00	0.00	
8,600.0	90.55	360.00	6,576.5	2,044.7	-646.3	2,115.9	0.00	0.00	0.00	
8,700.0	90.55	360.00	6,575.5	2,144.7	-646.3	2,214.9	0.00	0.00	0.00	
8,800.0	90.55	360.00	6,574.5	2,244.7	-646.3	2,313.9	0.00	0.00	0.00	
8,900.0	90.55	360.00	6,573.6	2,344.7	-646.3	2,412.9	0.00	0.00	0.00	
9,000.0	90.55	360.00	6,572.6	2,444.7	-646.3	2,511.8	0.00	0.00	0.00	
9,100.0	90.55	360.00	6,571.7	2,544.7	-646.3	2,610.8	0.00	0.00	0.00	
9,200.0	90.55	360.00	6,570.7	2,644.7	-646.3	2,709.8	0.00	0.00	0.00	
9,300.0	90.55	360.00	6,569.7	2,744.7	-646.3	2,808.8	0.00	0.00	0.00	
9,400.0	90.55	360.00	6,568.8	2,844.7	-646.3	2,907.7	0.00	0.00	0.00	
9,500.0	90.55	360.00	6,567.8	2,944.7	-646.3	3,006.7	0.00	0.00	0.00	
9,600.0	90.55	360.00	6,566.9	3,044.7	-646.3	3,105.7	0.00	0.00	0.00	
9,700.0	90.55	360.00	6,565.9	3,144.7	-646.3	3,204.7	0.00	0.00	0.00	
9,800.0	90.55	360.00	6,564.9	3,244.6	-646.3	3,303.6	0.00	0.00	0.00	
9,900.0	90.55	360.00	6,564.0	3,344.6	-646.3	3,402.6	0.00	0.00	0.00	
10,000.0	90.55	360.00	6,563.0	3,444.6	-646.3	3,501.6	0.00	0.00	0.00	
10,100.0	90.55	360.00	6,562.1	3,544.6	-646.3	3,600.6	0.00	0.00	0.00	
10,200.0	90.55	360.00	6,561.1	3,644.6	-646.3	3,699.5	0.00	0.00	0.00	
10,300.0	90.55	360.00	6,560.1	3,744.6	-646.3	3,798.5	0.00	0.00	0.00	
10,400.0	90.55	360.00	6,559.2	3,844.6	-646.3	3,897.5	0.00	0.00	0.00	
10,500.0	90.55	360.00	6,558.2	3,944.6	-646.3	3,996.5	0.00	0.00	0.00	
10,600.0	90.55	360.00	6,557.3	4,044.6	-646.3	4,095.4	0.00	0.00	0.00	
10,700.0	90.55	360.00	6,556.3	4,144.6	-646.3	4,194.4	0.00	0.00	0.00	
10,800.0	90.55	360.00	6,555.3	4,244.6	-646.3	4,293.4	0.00	0.00	0.00	
10,900.0	90.55	360.00	6,554.4	4,344.6	-646.3	4,392.4	0.00	0.00	0.00	
11,000.0	90.55	360.00	6,553.4	4,444.6	-646.3	4,491.3	0.00	0.00	0.00	
11,043.7	90.55	360.00	6,553.0	4,488.3	-646.3	4,534.6	0.00	0.00	0.00	

Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude	
50'E/W Hardline (22T- - plan misses target center by 2594.1ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E) - Rectangle (sides W3,952.0 H100.0 D0.0)	0.00	0.00	1.0	2,512.3	-646.3	1,384,678.67	3,270,266.80	40.385286	-104.529790	
BHL 500'FNL & 941'F - plan hits target center - Point	0.00	0.00	6,553.0	4,488.3	-646.3	1,386,654.50	3,270,245.17	40.390710	-104.529790	
SHL 276'FSL & 307'F - plan hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,382,173.72	3,270,940.59	40.378390	-104.527470	

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,091.5	6,590.9	7"	7	7-1/2	

Database:	Landmark	Local Co-ordinate Reference:	Well Ledford 22T-221
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Project:	SEC.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-221	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (3-5-15)		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,427.5	3,400.0	PARKMAN		0.00	
4,291.0	4,250.0	SUSSEX		0.00	
5,225.5	5,170.0	SHANNON		0.00	
6,435.9	6,332.0	SHARRON SPRINGS		0.00	
6,654.0	6,473.0	NIOBRARA A		0.00	
6,842.3	6,553.0	NIOBRARA B		0.00	
	6,639.0	NIOBRARA C		0.00	
	6,730.0	FT HAYS		0.00	

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,000.0	1,000.0	0.0	0.0	KOP #1
5,884.2	5,827.0	-30.7	-84.5	KOP #2



Directional

PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.22-T5N-R64W

Ledford 22Y-HZ Pad Sec.22-T5N-R64W

Ledford 22T-221

Wellbore #1

Plan #2 (3-5-15)

Anticollision Report

11 March, 2015



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Reference	Plan #2 (3-5-15)		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0ft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.0ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date	3/11/2015		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,043.7	Plan #2 (3-5-15) (Wellbore #1)	MWD	MWD - Standard

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Doughman 22VD Pad Sec.22-T5N-R64W						
Doughman 22RD - Wellbore #1 - Wellbore #1	11,043.7	6,634.0	546.9	441.3	5.181	CC, ES, SF
Doughman 22VD - Wellbore #1 - Wellbore #1	10,232.4	6,607.4	888.4	798.3	9.863	CC, ES
Doughman 22VD - Wellbore #1 - Wellbore #1	10,400.0	6,606.6	904.1	810.9	9.698	SF
Lucas #1 (Exist.) - Wellbore #1 - Wellbore #1	10,802.9	6,529.7	293.7	196.4	3.020	CC, ES, SF
Existing Wells Sec.22-T5N-R64W						
P&H 22-42 (Exist.) - Wellbore #1 - Wellbore #1	9,694.0	6,536.0	96.7	22.5	1.303	Level 3, CC, ES, SF
Existing Wells Sec.22-T5N-R64W (Grid)						
Emancipator 22-16 (Exist.) - Wellbore #1 - Wellbore #1	6,901.2	6,554.8	315.7	287.0	10.987	CC, ES, SF
Emancipator 22-9 (Exist.) - Wellbore #1 - Wellbore #1	8,127.9	6,575.7	212.1	164.5	4.453	CC, ES, SF
Emancipator B 22-23 (Exist.) - Wellbore #1 - Wellbore #1	7,600.3	6,584.1	397.4	360.3	10.729	CC, ES
Emancipator B 22-23 (Exist.) - Wellbore #1 - Wellbore #1	7,700.0	6,582.0	409.7	371.1	10.606	SF
Ledford 22Y-HZ Pad Sec.22-T5N-R64W						
Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)	400.0	400.0	31.2	29.7	19.846	CC, ES
Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)	11,043.7	11,148.3	253.1	84.0	1.497	Level 3, SF
Ledford 22Y-341 - Wellbore #1 - Plan #2 (3-5-15)	1,000.0	1,000.0	29.3	25.0	6.860	CC, ES
Ledford 22Y-341 - Wellbore #1 - Plan #2 (3-5-15)	11,043.7	11,075.7	489.7	315.0	2.803	SF
Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)	1,000.0	1,002.0	61.4	57.1	14.352	CC, ES
Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)	11,043.7	11,155.6	815.7	643.4	4.734	SF
P&H 22CD Pad Sec.22-T5N-R64W						
P&H 22CD - Wellbore #1 - Wellbore #1	10,229.1	6,675.3	339.9	250.1	3.785	CC, ES, SF
P&H 22SD - Wellbore #1 - Wellbore #1	8,983.6	6,691.1	334.3	265.4	4.851	CC, ES
P&H 22SD - Wellbore #1 - Wellbore #1	9,000.0	6,690.9	334.7	265.5	4.836	SF

Offset Design													Offset Site Error:	0.0 ft
Doughman 22VD Pad Sec.22-T5N-R64W - Doughman 22RD - Wellbore #1 - Wellbore #1													Offset Well Error:	0.0 ft
Survey Program: 765-MWD														
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 +N/-S (ft)	Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
10,600.0	6,557.3	6,649.6	6,552.5	80.4	20.1	-94.47	4,885.7	-1,021.5	921.2	824.4	96.88	9.509		
10,700.0	6,556.3	6,646.0	6,549.0	82.2	20.1	-93.93	4,885.8	-1,021.5	831.0	732.1	98.85	8.407		
10,800.0	6,555.3	6,642.5	6,545.4	84.1	20.1	-93.39	4,885.9	-1,021.5	743.2	642.4	100.81	7.372		

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design Doughman 22VD Pad Sec.22-T5N-R64W - Doughman 22RD - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 765-MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
10,900.0	6,554.4	6,638.9	6,541.9	86.0	20.1	-92.85	4,886.0	-1,021.5	658.8	556.1	102.76	6.411		
11,000.0	6,553.4	6,635.5	6,538.4	87.9	20.1	-92.33	4,886.1	-1,021.5	579.5	474.8	104.71	5.534		
11,043.7	6,553.0	6,634.0	6,536.9	88.7	20.1	-92.10	4,886.1	-1,021.5	546.9	441.3	105.57	5.181 CC, ES, SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 671-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		
9,800.0	6,564.9	6,609.6	6,507.2	65.4	20.6	88.22	3,676.8	241.7	988.1	906.1	81.99	12.052		
9,900.0	6,564.0	6,609.1	6,506.7	67.3	20.6	88.19	3,676.8	241.7	948.6	864.7	83.85	11.312		
10,000.0	6,563.0	6,608.6	6,506.2	69.2	20.6	88.16	3,676.7	241.7	918.3	832.6	85.72	10.713		
10,100.0	6,562.1	6,608.1	6,505.7	71.0	20.6	88.12	3,676.7	241.7	898.2	810.6	87.60	10.254		
10,200.0	6,561.1	6,607.6	6,505.2	72.9	20.6	88.09	3,676.7	241.7	889.0	799.5	89.47	9.936		
10,232.4	6,560.8	6,607.4	6,505.1	73.5	20.6	88.08	3,676.7	241.7	888.4	798.3	90.08	9.863	CC, ES	
10,300.0	6,560.1	6,607.1	6,504.7	74.7	20.6	88.06	3,676.7	241.7	891.0	799.6	91.35	9.754		
10,400.0	6,559.2	6,606.6	6,504.2	76.6	20.6	88.03	3,676.7	241.6	904.1	810.9	93.22	9.698	SF	
10,500.0	6,558.2	6,606.1	6,503.7	78.5	20.6	88.00	3,676.7	241.6	927.8	832.7	95.11	9.756		
10,600.0	6,557.3	6,605.6	6,503.2	80.4	20.6	87.96	3,676.7	241.6	961.5	864.5	96.99	9.913		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 100-MWD													Offset Well Error:	0.0 ft
Doughman 22VD Pad Sec.22-T5N-R64W - Lucas #1 (Exist.) - Wellbore #1 - Wellbore #1														
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		
9,900.0	6,564.0	6,512.9	6,511.4	67.3	13.6	86.90	4,247.0	-352.5	949.3	869.3	80.00	11.867		
10,000.0	6,563.0	6,514.7	6,513.2	69.2	13.6	87.25	4,247.1	-352.5	854.8	772.9	81.90	10.436		
10,100.0	6,562.1	6,516.6	6,515.1	71.0	13.6	87.61	4,247.1	-352.5	761.7	677.9	83.81	9.088		
10,200.0	6,561.1	6,518.4	6,516.9	72.9	13.6	87.97	4,247.2	-352.6	670.5	584.8	85.73	7.822		
10,300.0	6,560.1	6,520.3	6,518.8	74.7	13.6	88.33	4,247.3	-352.6	582.3	494.7	87.64	6.645		
10,400.0	6,559.2	6,522.2	6,520.6	76.6	13.6	88.69	4,247.3	-352.6	498.5	409.0	89.55	5.567		
10,500.0	6,558.2	6,524.0	6,522.5	78.5	13.6	89.06	4,247.4	-352.6	421.9	330.4	91.46	4.613		
10,600.0	6,557.3	6,525.9	6,524.4	80.4	13.6	89.43	4,247.4	-352.6	356.9	263.6	93.36	3.823		
10,700.0	6,556.3	6,527.8	6,526.3	82.2	13.6	89.79	4,247.5	-352.6	311.2	215.9	95.27	3.266		
10,800.0	6,555.3	6,529.7	6,528.1	84.1	13.6	90.16	4,247.5	-352.6	293.7	196.5	97.18	3.022		
10,802.9	6,555.3	6,529.7	6,528.2	84.2	13.6	90.17	4,247.5	-352.6	293.7	196.4	97.23	3.020	CC, ES, SF	
10,900.0	6,554.4	6,531.6	6,530.0	86.0	13.6	90.53	4,247.6	-352.6	309.3	210.2	99.08	3.122		
11,000.0	6,553.4	6,533.5	6,532.0	87.9	13.6	90.91	4,247.6	-352.6	353.6	252.7	100.98	3.502		
11,043.7	6,553.0	6,534.3	6,532.8	88.7	13.6	91.07	4,247.7	-352.6	379.7	277.9	101.81	3.730		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft					
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft					
Reference													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							
8,700.0	6,575.5	6,561.8	6,559.7	45.4	11.5	104.30	3,138.2	-549.2	998.4	943.3	55.09	18.121							
8,800.0	6,574.5	6,559.2	6,557.0	47.2	11.5	102.82	3,138.3	-549.3	898.9	841.8	57.09	15.745							
8,900.0	6,573.6	6,556.5	6,554.4	49.0	11.5	101.33	3,138.3	-549.3	799.6	740.5	59.09	13.533							
9,000.0	6,572.6	6,553.9	6,551.8	50.8	11.5	99.83	3,138.3	-549.3	700.5	639.4	61.07	11.470							
9,100.0	6,571.7	6,551.3	6,549.1	52.6	11.5	98.32	3,138.4	-549.4	601.6	538.6	63.04	9.543							
9,200.0	6,570.7	6,548.7	6,546.5	54.4	11.5	96.81	3,138.4	-549.4	503.2	438.2	65.00	7.742							
9,300.0	6,569.7	6,546.1	6,543.9	56.2	11.5	95.30	3,138.5	-549.4	405.6	338.6	66.93	6.060							
9,400.0	6,568.8	6,543.5	6,541.4	58.1	11.5	93.79	3,138.5	-549.4	309.4	240.6	68.83	4.495							
9,500.0	6,567.8	6,541.0	6,538.8	59.9	11.5	92.28	3,138.6	-549.5	216.7	146.0	70.71	3.065							
9,600.0	6,566.9	6,538.4	6,536.3	61.8	11.5	90.77	3,138.6	-549.5	134.9	62.3	72.55	1.859							
9,694.0	6,566.0	6,536.0	6,533.9	63.5	11.5	89.35	3,138.6	-549.5	96.7	22.5	74.24	1.303	Level 3, CC, ES, SF						
9,700.0	6,565.9	6,535.9	6,533.7	63.6	11.5	89.27	3,138.6	-549.5	96.9	22.6	74.35	1.304	Level 3						
9,800.0	6,564.9	6,533.3	6,531.2	65.4	11.5	87.77	3,138.7	-549.6	143.5	67.4	76.11	1.885							
9,900.0	6,564.0	6,530.8	6,528.7	67.3	11.5	86.29	3,138.7	-549.6	227.5	149.7	77.83	2.923							
10,000.0	6,563.0	6,528.3	6,526.2	69.2	11.5	84.81	3,138.8	-549.6	320.8	241.3	79.51	4.035							
10,100.0	6,562.1	6,525.8	6,523.7	71.0	11.5	83.35	3,138.8	-549.6	417.2	336.1	81.13	5.143							
10,200.0	6,561.1	6,523.4	6,521.2	72.9	11.5	81.91	3,138.8	-549.7	515.0	432.3	82.72	6.226							
10,300.0	6,560.1	6,520.9	6,518.8	74.7	11.5	80.48	3,138.9	-549.7	613.5	529.2	84.25	7.282							
10,400.0	6,559.2	6,518.5	6,516.3	76.6	11.5	79.07	3,138.9	-549.7	712.4	626.7	85.73	8.310							
10,500.0	6,558.2	6,516.0	6,513.9	78.5	11.5	77.68	3,138.9	-549.7	811.5	724.4	87.16	9.311							
10,600.0	6,557.3	6,513.6	6,511.5	80.4	11.5	76.31	3,139.0	-549.8	910.9	822.3	88.54	10.288							

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Existing Wells Sec.22-T5N-R64W (Grid) - Emancipator 22-16 (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 (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	-46.44	320.6	-337.1	465.3						
100.0	100.0	91.7	91.7	0.1	0.1	-46.45	320.4	-337.0	465.0	464.7	0.23	1,985.669			
200.0	200.0	190.1	190.1	0.3	0.4	-46.48	319.9	-336.8	464.5	463.8	0.69	669.435			
300.0	300.0	291.7	291.7	0.6	0.6	-46.51	319.5	-336.7	464.1	463.0	1.17	397.847			
400.0	400.0	393.0	393.0	0.8	0.9	-46.52	318.8	-336.3	463.4	461.8	1.65	280.863			
500.0	500.0	492.9	492.9	1.0	1.1	-46.56	318.0	-335.9	462.5	460.4	2.14	216.250			
600.0	600.0	592.7	592.7	1.2	1.4	-46.60	317.2	-335.5	461.7	459.1	2.63	175.681			
700.0	700.0	693.5	693.4	1.5	1.6	-46.59	316.7	-334.8	460.9	457.8	3.10	148.772			
800.0	800.0	795.1	795.1	1.7	1.9	-46.54	316.2	-333.7	459.7	456.2	3.56	129.004			
900.0	900.0	894.5	894.5	1.9	2.1	-46.48	315.6	-332.4	458.4	454.4	4.03	113.831			
1,000.0	1,000.0	992.2	992.2	2.1	2.3	-46.47	315.1	-331.7	457.5	453.0	4.48	102.028			
1,100.0	1,100.0	1,091.9	1,091.9	2.3	2.6	63.55	314.2	-331.6	456.4	451.5	4.93	92.601			
1,200.0	1,200.0	1,193.1	1,193.1	2.5	2.8	63.82	313.5	-331.3	454.5	449.2	5.37	84.638			
1,300.0	1,299.9	1,293.2	1,293.2	2.7	3.1	64.39	313.0	-330.4	451.7	445.9	5.82	77.675			
1,400.0	1,399.7	1,390.4	1,390.4	2.9	3.3	65.14	312.8	-329.7	448.4	442.1	6.26	71.602			
1,500.0	1,499.4	1,491.2	1,491.1	3.2	3.6	66.10	312.5	-329.3	444.7	437.9	6.74	65.973			
1,600.0	1,598.9	1,590.8	1,590.7	3.4	3.8	67.27	312.0	-329.0	440.2	433.0	7.23	60.867			
1,700.0	1,698.3	1,686.2	1,686.2	3.7	4.0	68.61	311.7	-328.9	435.7	428.1	7.61	57.265			
1,800.0	1,797.4	1,784.3	1,784.2	3.9	4.0	70.22	312.0	-329.2	431.5	423.6	7.89	54.677			
1,900.0	1,896.3	1,881.6	1,881.6	4.2	4.0	72.06	312.4	-329.8	427.4	419.2	8.20	52.145			
2,000.0	1,994.9	1,982.1	1,982.0	4.5	4.0	74.24	313.0	-330.2	423.3	414.7	8.55	49.511			
2,100.0	2,093.4	2,077.1	2,077.1	4.9	4.1	76.46	313.6	-330.5	419.5	410.6	8.94	46.922			
2,200.0	2,191.8	2,175.3	2,175.2	5.2	4.2	78.78	314.8	-331.3	417.1	407.7	9.36	44.575			
2,300.0	2,290.2	2,273.7	2,273.6	5.6	4.2	81.20	316.1	-331.5	415.3	405.5	9.80	42.377			
2,400.0	2,388.7	2,369.9	2,369.8	5.9	4.3	83.57	317.6	-331.9	414.5	404.3	10.26	40.391			
2,404.8	2,393.4	2,374.4	2,374.3	5.9	4.3	83.68	317.7	-331.9	414.5	404.2	10.29	40.303			
2,500.0	2,487.1	2,469.4	2,469.3	6.3	4.5	86.06	319.6	-332.2	414.9	404.1	10.75	38.604			
2,600.0	2,585.5	2,569.2	2,569.1	6.7	4.6	88.54	321.0	-332.4	415.5	404.2	11.25	36.923			
2,700.0	2,683.9	2,668.3	2,668.1	7.1	4.7	91.02	322.4	-332.4	416.6	404.9	11.77	35.405			
2,800.0	2,782.4	2,766.0	2,765.9	7.4	4.9	93.39	323.5	-332.6	418.5	406.2	12.29	34.060			
2,900.0	2,880.8	2,862.4	2,862.2	7.8	5.0	95.75	325.0	-332.7	421.5	408.7	12.81	32.902			
3,000.0	2,979.2	2,961.2	2,961.1	8.2	5.2	98.11	326.8	-333.0	425.6	412.2	13.35	31.890			
3,100.0	3,077.7	3,061.0	3,060.8	8.6	5.4	100.49	328.4	-332.9	430.0	416.1	13.88	30.980			
3,200.0	3,176.1	3,161.9	3,161.7	9.0	5.5	102.75	329.4	-333.5	434.8	420.3	14.41	30.176			
3,300.0	3,274.5	3,262.8	3,262.6	9.4	5.7	104.98	329.9	-333.8	439.5	424.6	14.92	29.460			
3,400.0	3,373.0	3,362.7	3,362.5	9.8	5.8	107.11	329.9	-334.4	444.5	429.1	15.41	28.841			
3,500.0	3,471.4	3,464.4	3,464.2	10.2	6.0	109.25	329.5	-334.7	449.7	433.8	15.90	28.290			
3,600.0	3,569.8	3,561.8	3,561.6	10.6	6.1	111.20	328.6	-335.5	454.9	438.6	16.38	27.782			
3,700.0	3,668.3	3,659.8	3,659.5	11.0	6.3	113.13	328.2	-336.1	461.3	444.4	16.85	27.371			
3,800.0	3,766.7	3,759.5	3,759.3	11.4	6.5	115.02	327.6	-337.0	467.9	450.6	17.33	26.997			
3,900.0	3,865.1	3,854.9	3,854.7	11.8	6.6	116.81	327.1	-337.5	475.1	457.3	17.80	26.690			
4,000.0	3,963.5	3,950.7	3,950.5	12.2	6.8	118.63	327.3	-337.2	483.7	465.5	18.26	26.490			
4,100.0	4,062.0	4,047.2	4,047.0	12.6	7.0	120.48	327.7	-336.3	493.1	474.3	18.71	26.347			
4,200.0	4,160.4	4,144.4	4,144.1	13.0	7.2	122.29	328.5	-335.0	503.5	484.3	19.16	26.271			
4,300.0	4,258.8	4,241.9	4,241.7	13.4	7.3	124.05	329.1	-333.7	514.2	494.6	19.61	26.219			
4,400.0	4,357.3	4,338.8	4,338.5	13.8	7.5	125.69	330.4	-332.6	525.9	505.9	20.06	26.221			
4,500.0	4,455.7	4,441.2	4,440.9	14.2	7.7	127.31	331.3	-331.8	537.6	517.1	20.51	26.214			
4,600.0	4,554.1	4,541.9	4,541.6	14.6	7.9	128.81	331.6	-331.6	549.0	528.0	20.96	26.194			
4,700.0	4,652.6	4,639.5	4,639.2	15.0	8.1	130.19	331.9	-331.5	560.6	539.2	21.40	26.195			
4,800.0	4,751.0	4,736.2	4,735.9	15.4	8.3	131.47	332.6	-331.6	572.9	551.0	21.84	26.229			
4,900.0	4,849.4	4,834.7	4,834.4	15.8	8.5	132.72	333.4	-331.7	585.6	563.3	22.28	26.280			

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Reference													Existing Wells Sec.22-T5N-R64W (Grid) - Emancipator 22-16 (Exist.) - Wellbore #1 - Wellbore #1	
Reference				Offset		Semi Major Axis			Distance				Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
5,000.0	4,947.9	4,934.1	4,933.8	16.2	8.7	133.95	334.0	-331.6	598.3	575.6	22.73	26.328		
5,100.0	5,046.3	5,031.8	5,031.5	16.6	8.9	135.12	334.5	-331.4	611.4	588.2	23.17	26.386		
5,200.0	5,144.8	5,129.5	5,129.2	17.0	9.1	136.27	335.2	-331.5	624.4	600.8	23.60	26.457		
5,300.0	5,243.8	5,229.5	5,229.2	17.2	9.3	137.23	336.4	-331.9	635.6	611.6	23.98	26.502		
5,400.0	5,343.2	5,333.6	5,333.3	17.5	9.5	137.95	336.8	-332.6	643.6	619.3	24.33	26.449		
5,500.0	5,442.9	5,433.2	5,432.9	17.7	9.7	138.39	336.9	-333.2	648.7	624.1	24.66	26.311		
5,600.0	5,542.9	5,531.2	5,530.9	17.8	9.9	138.60	337.1	-333.6	651.6	626.6	24.98	26.082		
5,700.0	5,642.9	5,631.2	5,630.9	18.0	10.1	28.63	337.4	-333.8	652.2	626.8	25.33	25.742		
5,800.0	5,742.9	5,729.3	5,729.0	18.1	10.3	28.62	337.6	-333.8	652.3	626.6	25.71	25.371		
5,900.0	5,842.9	5,823.9	5,823.6	18.2	10.5	28.60	338.5	-333.6	653.2	627.1	26.07	25.054		
6,000.0	5,942.4	5,923.0	5,922.7	18.4	10.7	29.15	339.8	-333.4	646.9	620.7	26.11	24.770		
6,100.0	6,040.0	6,017.8	6,017.5	18.4	10.9	30.70	341.4	-333.0	629.7	603.9	25.78	24.422		
6,200.0	6,133.9	6,112.4	6,112.0	18.5	11.1	33.44	343.2	-332.6	602.1	576.9	25.16	23.931		
6,300.0	6,222.6	6,203.8	6,203.4	18.5	11.4	37.72	344.8	-332.4	564.7	540.3	24.41	23.139		
6,400.0	6,304.5	6,288.8	6,288.4	18.5	11.5	43.96	345.9	-332.1	519.1	495.3	23.84	21.780		
6,500.0	6,378.3	6,362.9	6,362.5	18.5	11.7	52.25	346.7	-331.9	467.9	444.1	23.87	19.606		
6,600.0	6,442.6	6,427.2	6,426.9	18.5	11.9	62.43	347.4	-331.7	415.1	390.4	24.76	16.765		
6,700.0	6,496.4	6,481.0	6,480.6	18.6	12.0	73.31	348.0	-331.3	366.4	340.2	26.22	13.976		
6,800.0	6,538.7	6,524.0	6,523.6	18.8	12.1	82.92	348.5	-330.9	330.0	302.4	27.61	11.951		
6,900.0	6,568.9	6,554.5	6,554.1	19.3	12.1	89.24	348.7	-330.6	315.7	287.0	28.72	10.992		
6,901.2	6,569.2	6,554.8	6,554.4	19.3	12.1	89.29	348.7	-330.6	315.7	287.0	28.74	10.987	CC, ES, SF	
7,000.0	6,586.3	6,571.9	6,571.5	19.9	12.2	91.22	348.7	-330.4	330.3	300.5	29.75	11.100		
7,100.0	6,590.9	6,576.4	6,576.0	20.8	12.2	88.96	348.7	-330.3	371.9	341.1	30.77	12.084		
7,200.0	6,589.9	6,575.6	6,575.2	21.8	12.2	88.81	348.7	-330.3	433.0	401.0	31.97	13.542		
7,300.0	6,588.9	6,574.8	6,574.4	23.0	12.2	88.67	348.7	-330.3	506.6	473.4	33.28	15.223		
7,400.0	6,588.0	6,574.1	6,573.7	24.3	12.2	88.54	348.7	-330.3	588.1	553.4	34.68	16.960		
7,500.0	6,587.0	6,573.3	6,572.9	25.7	12.2	88.40	348.7	-330.3	674.6	638.4	36.14	18.665		
7,600.0	6,586.1	6,572.6	6,572.2	27.1	12.2	88.27	348.7	-330.3	764.4	726.7	37.67	20.293		
7,700.0	6,585.1	6,571.9	6,571.5	28.6	12.2	88.15	348.7	-330.4	856.4	817.2	39.24	21.825		
7,800.0	6,584.1	6,571.2	6,570.8	30.2	12.2	88.02	348.7	-330.4	950.1	909.2	40.86	23.255		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.22-T5N-R64W (Grid) - Emancipator 22-9 (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 (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		
7,200.0	6,589.9	6,592.3	6,591.1	21.8	13.3	94.87	1,572.5	-434.3	951.7	918.5	33.28	28.599		
7,300.0	6,588.9	6,590.5	6,589.3	23.0	13.3	94.39	1,572.6	-434.2	854.6	820.0	34.59	24.707		
7,400.0	6,588.0	6,588.7	6,587.5	24.3	13.3	93.91	1,572.6	-434.2	758.1	722.1	35.98	21.069		
7,500.0	6,587.0	6,586.9	6,585.7	25.7	13.3	93.43	1,572.6	-434.2	662.7	625.3	37.45	17.697		
7,600.0	6,586.1	6,585.1	6,583.9	27.1	13.3	92.95	1,572.6	-434.2	568.9	529.9	38.97	14.598		
7,700.0	6,585.1	6,583.3	6,582.1	28.6	13.3	92.47	1,572.6	-434.2	477.6	437.0	40.54	11.780		
7,800.0	6,584.1	6,581.5	6,580.3	30.2	13.3	91.98	1,572.6	-434.2	390.5	348.4	42.15	9.265		
7,900.0	6,583.2	6,579.7	6,578.5	31.8	13.3	91.50	1,572.6	-434.2	311.3	267.6	43.79	7.110		
8,000.0	6,582.2	6,578.0	6,576.8	33.4	13.3	91.02	1,572.7	-434.2	247.7	202.2	45.46	5.449		
8,100.0	6,581.3	6,576.2	6,575.0	35.0	13.3	90.53	1,572.7	-434.1	214.0	166.8	47.15	4.537		
8,127.9	6,581.0	6,575.7	6,574.5	35.5	13.3	90.40	1,572.7	-434.1	212.1	164.5	47.63	4.453	CC, ES, SF	
8,200.0	6,580.3	6,574.4	6,573.2	36.7	13.3	90.05	1,572.7	-434.1	224.0	175.2	48.86	4.585		
8,300.0	6,579.3	6,572.6	6,571.4	38.4	13.3	89.57	1,572.7	-434.1	273.1	222.5	50.59	5.399		
8,400.0	6,578.4	6,570.8	6,569.6	40.2	13.3	89.09	1,572.7	-434.1	345.0	292.6	52.33	6.592		
8,500.0	6,577.4	6,569.0	6,567.8	41.9	13.3	88.60	1,572.7	-434.1	428.2	374.2	54.08	7.919		
8,600.0	6,576.5	6,567.2	6,566.0	43.7	13.3	88.12	1,572.7	-434.1	517.5	461.6	55.84	9.267		
8,700.0	6,575.5	6,565.4	6,564.2	45.4	13.3	87.64	1,572.8	-434.1	610.0	552.4	57.60	10.590		
8,800.0	6,574.5	6,563.7	6,562.4	47.2	13.3	87.16	1,572.8	-434.1	704.6	645.3	59.37	11.868		
8,900.0	6,573.6	6,561.9	6,560.7	49.0	13.3	86.68	1,572.8	-434.0	800.6	739.4	61.15	13.093		
9,000.0	6,572.6	6,560.1	6,558.9	50.8	13.3	86.20	1,572.8	-434.0	897.4	834.4	62.92	14.262		
9,100.0	6,571.7	6,558.3	6,557.1	52.6	13.3	85.71	1,572.8	-434.0	994.8	930.1	64.70	15.376		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Existing Wells Sec.22-T5N-R64W (Grid) - Emancipator B 22-23 (Exist.) - Wellbore #1 - Wellbore #1														
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		
6,700.0	6,496.4	6,506.1	6,505.2	18.6	11.4	-44.21	1,046.0	-1,045.3	971.2	948.1	23.05	42.136		
6,800.0	6,538.7	6,547.4	6,546.5	18.8	11.4	-55.64	1,045.5	-1,044.3	888.6	863.9	24.72	35.949		
6,900.0	6,568.9	6,576.2	6,575.3	19.3	11.5	-69.22	1,045.2	-1,043.7	803.9	776.8	27.18	29.583		
7,000.0	6,586.3	6,592.2	6,591.3	19.9	11.5	-82.67	1,045.0	-1,043.4	719.7	690.6	29.10	24.735		
7,100.0	6,590.9	6,595.4	6,594.4	20.8	11.5	-92.65	1,044.9	-1,043.4	638.8	608.7	30.03	21.274		
7,200.0	6,589.9	6,593.1	6,592.2	21.8	11.5	-92.32	1,044.9	-1,043.4	563.9	532.7	31.25	18.046		
7,300.0	6,588.9	6,590.8	6,589.9	23.0	11.5	-92.00	1,045.0	-1,043.5	498.0	465.4	32.58	15.286		
7,400.0	6,588.0	6,588.6	6,587.7	24.3	11.5	-91.67	1,045.0	-1,043.5	445.0	411.0	34.00	13.088		
7,500.0	6,587.0	6,586.4	6,585.4	25.7	11.5	-91.35	1,045.0	-1,043.5	409.8	374.3	35.49	11.549		
7,600.0	6,586.1	6,584.2	6,583.2	27.1	11.5	-91.04	1,045.1	-1,043.6	397.4	360.3	37.03	10.730		
7,600.3	6,586.1	6,584.1	6,583.2	27.1	11.5	-91.03	1,045.1	-1,043.6	397.4	360.3	37.04	10.729	CC, ES	
7,700.0	6,585.1	6,582.0	6,581.0	28.6	11.5	-90.72	1,045.1	-1,043.6	409.7	371.1	38.63	10.606	SF	
7,800.0	6,584.1	6,579.8	6,578.9	30.2	11.5	-90.41	1,045.1	-1,043.7	444.7	404.5	40.26	11.045		
7,900.0	6,583.2	6,577.6	6,576.7	31.8	11.5	-90.10	1,045.2	-1,043.7	497.7	455.8	41.93	11.869		
8,000.0	6,582.2	6,575.5	6,574.6	33.4	11.5	-89.79	1,045.2	-1,043.7	563.6	520.0	43.63	12.917		
8,100.0	6,581.3	6,573.4	6,572.5	35.0	11.5	-89.48	1,045.2	-1,043.8	638.4	593.0	45.35	14.076		
8,200.0	6,580.3	6,571.3	6,570.4	36.7	11.5	-89.18	1,045.2	-1,043.8	719.3	672.2	47.09	15.275		
8,300.0	6,579.3	6,569.2	6,568.3	38.4	11.5	-88.88	1,045.3	-1,043.9	804.6	755.7	48.85	16.471		
8,400.0	6,578.4	6,567.1	6,566.2	40.2	11.5	-88.58	1,045.3	-1,043.9	892.9	842.2	50.62	17.639		
8,500.0	6,577.4	6,565.1	6,564.2	41.9	11.5	-88.29	1,045.3	-1,043.9	983.4	931.0	52.40	18.766		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)														
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	-134.45	-21.9	-22.3	31.2					
100.0	100.0	100.0	100.0	0.1	0.1	-134.45	-21.9	-22.3	31.2	31.0	0.22	138.919		
200.0	200.0	200.0	200.0	0.3	0.3	-134.45	-21.9	-22.3	31.2	30.5	0.67	46.306		
300.0	300.0	300.0	300.0	0.6	0.6	-134.45	-21.9	-22.3	31.2	30.1	1.12	27.784		
400.0	400.0	400.0	400.0	0.8	0.8	-134.45	-21.9	-22.3	31.2	29.7	1.57	19.846	CC, ES	
500.0	500.0	499.5	499.5	1.0	1.0	-133.66	-22.1	-23.1	32.0	30.0	2.01	15.939		
600.0	600.0	599.0	598.9	1.2	1.2	-131.51	-22.7	-25.6	34.3	31.8	2.43	14.080		
700.0	700.0	698.3	698.2	1.5	1.4	-128.49	-23.7	-29.8	38.2	35.3	2.87	13.285		
800.0	800.0	797.5	797.2	1.7	1.6	-125.20	-25.2	-35.7	43.7	40.4	3.32	13.164		
900.0	900.0	896.4	895.8	1.9	1.9	-122.03	-27.0	-43.2	51.1	47.3	3.79	13.488		
1,000.0	1,000.0	995.1	994.0	2.1	2.1	-119.23	-29.2	-52.3	60.2	55.9	4.27	14.110		
1,100.0	1,100.0	1,093.4	1,091.7	2.3	2.4	-6.94	-31.9	-63.0	70.2	65.6	4.63	15.178		
1,200.0	1,200.0	1,191.6	1,189.1	2.5	2.7	-5.08	-34.9	-75.3	80.3	75.2	5.04	15.920		
1,300.0	1,299.9	1,289.7	1,286.1	2.7	3.0	-3.53	-38.3	-89.2	90.3	84.9	5.47	16.528		
1,400.0	1,399.7	1,387.5	1,382.6	2.9	3.3	-2.20	-42.2	-104.7	100.4	94.5	5.90	17.029		
1,500.0	1,499.4	1,485.2	1,478.7	3.2	3.7	-1.01	-46.4	-121.8	110.5	104.1	6.33	17.442		
1,600.0	1,598.9	1,583.7	1,575.4	3.4	4.1	0.05	-50.9	-140.4	120.3	113.5	6.78	17.746		
1,700.0	1,698.3	1,683.4	1,673.0	3.7	4.5	0.99	-55.6	-159.4	128.7	121.4	7.23	17.797		
1,800.0	1,797.4	1,783.1	1,770.9	3.9	4.9	1.83	-60.3	-178.5	135.3	127.6	7.69	17.600		
1,900.0	1,896.3	1,883.0	1,868.8	4.2	5.3	2.63	-65.0	-197.6	140.2	132.1	8.15	17.206		
2,000.0	1,994.9	1,982.9	1,966.7	4.5	5.8	3.41	-69.7	-216.7	143.4	134.8	8.62	16.646		
2,100.0	2,093.4	2,082.9	2,064.7	4.9	6.2	4.20	-74.4	-235.8	145.6	136.5	9.10	15.991		
2,200.0	2,191.8	2,182.8	2,162.7	5.2	6.6	4.96	-79.1	-254.9	147.7	138.1	9.59	15.391		
2,300.0	2,290.2	2,282.8	2,260.8	5.6	7.0	5.70	-83.8	-273.9	149.8	139.7	10.09	14.845		
2,400.0	2,388.7	2,382.7	2,358.8	5.9	7.5	6.41	-88.5	-293.0	152.0	141.4	10.59	14.346		
2,500.0	2,487.1	2,482.7	2,456.8	6.3	7.9	7.11	-93.2	-312.1	154.2	143.1	11.10	13.888		
2,600.0	2,585.5	2,582.7	2,554.8	6.7	8.4	7.79	-97.9	-331.2	156.4	144.8	11.61	13.467		
2,700.0	2,683.9	2,682.6	2,652.8	7.1	8.8	8.45	-102.6	-350.3	158.6	146.5	12.13	13.078		
2,800.0	2,782.4	2,782.6	2,750.8	7.4	9.2	9.09	-107.3	-369.4	160.9	148.2	12.65	12.718		
2,900.0	2,880.8	2,882.5	2,848.8	7.8	9.7	9.72	-112.0	-388.5	163.1	149.9	13.17	12.384		
3,000.0	2,979.2	2,982.5	2,946.8	8.2	10.1	10.32	-116.7	-407.6	165.4	151.7	13.70	12.073		
3,100.0	3,077.7	3,082.4	3,044.8	8.6	10.5	10.91	-121.4	-426.7	167.7	153.5	14.23	11.782		
3,200.0	3,176.1	3,182.4	3,142.8	9.0	11.0	11.48	-126.1	-445.8	170.0	155.3	14.77	11.511		
3,300.0	3,274.5	3,282.4	3,240.8	9.4	11.4	12.04	-130.8	-464.9	172.4	157.1	15.31	11.256		
3,400.0	3,373.0	3,382.3	3,338.8	9.8	11.9	12.59	-135.5	-484.0	174.7	158.9	15.86	11.017		
3,500.0	3,471.4	3,482.3	3,436.8	10.2	12.3	13.11	-140.2	-503.1	177.1	160.7	16.41	10.793		
3,600.0	3,569.8	3,582.2	3,534.8	10.6	12.7	13.63	-144.9	-522.2	179.5	162.5	16.96	10.581		
3,700.0	3,668.3	3,682.2	3,632.8	11.0	13.2	14.13	-149.6	-541.3	181.9	164.4	17.52	10.381		
3,800.0	3,766.7	3,782.2	3,730.8	11.4	13.6	14.62	-154.3	-560.4	184.3	166.2	18.08	10.192		
3,900.0	3,865.1	3,882.1	3,828.8	11.8	14.1	15.09	-159.0	-579.5	186.7	168.1	18.65	10.013		
4,000.0	3,963.5	3,982.1	3,926.8	12.2	14.5	15.56	-163.7	-598.6	189.2	170.0	19.22	9.843		
4,100.0	4,062.0	4,082.0	4,024.8	12.6	15.0	16.01	-168.4	-617.7	191.6	171.8	19.79	9.682		
4,200.0	4,160.4	4,182.0	4,122.9	13.0	15.4	16.45	-173.1	-636.8	194.1	173.7	20.37	9.529		
4,300.0	4,258.8	4,282.0	4,220.9	13.4	15.8	16.88	-177.8	-655.9	196.6	175.6	20.95	9.383		
4,400.0	4,357.3	4,381.9	4,318.9	13.8	16.3	17.29	-182.5	-675.0	199.1	177.5	21.53	9.244		
4,500.0	4,455.7	4,481.9	4,416.9	14.2	16.7	17.70	-187.2	-694.1	201.6	179.4	22.12	9.112		
4,600.0	4,554.1	4,581.8	4,514.9	14.6	17.2	18.10	-191.9	-713.1	204.1	181.3	22.71	8.985		
4,700.0	4,652.6	4,681.8	4,612.9	15.0	17.6	18.49	-196.6	-732.2	206.6	183.3	23.30	8.864		
4,800.0	4,751.0	4,781.7	4,710.9	15.4	18.1	18.87	-201.3	-751.3	209.1	185.2	23.90	8.749		
4,900.0	4,849.4	4,881.7	4,808.9	15.8	18.5	19.24	-206.0	-770.4	211.6	187.1	24.50	8.638		
5,000.0	4,947.9	4,981.7	4,906.9	16.2	19.0	19.60	-210.7	-789.5	214.2	189.1	25.10	8.532		

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)														
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
5,100.0	5,046.3	5,081.6	5,004.9	16.6	19.4	19.95	-215.4	-808.6	216.7	191.0	25.71	8.431		
5,200.0	5,144.8	5,181.6	5,102.9	17.0	19.8	20.27	-220.1	-827.7	219.7	193.4	26.30	8.355		
5,300.0	5,243.8	5,286.8	5,206.2	17.2	20.3	20.37	-224.8	-847.0	224.8	198.0	26.78	8.394		
5,400.0	5,343.2	5,395.0	5,313.1	17.5	20.6	20.39	-228.8	-863.1	229.7	202.5	27.17	8.454		
5,500.0	5,442.9	5,503.4	5,420.8	17.7	20.8	20.33	-231.8	-875.4	234.2	206.7	27.50	8.518		
5,600.0	5,542.9	5,612.0	5,529.1	17.8	21.0	20.19	-233.8	-883.7	238.3	210.6	27.76	8.585		
5,700.0	5,642.9	5,720.8	5,637.8	18.0	21.2	-89.98	-234.9	-888.0	241.7	213.7	28.03	8.624		
5,800.0	5,742.9	5,825.9	5,742.9	18.1	21.3	-90.02	-235.1	-888.6	242.4	214.0	28.38	8.540		
5,862.9	5,805.7	5,888.8	5,805.7	18.2	21.4	-90.11	-235.1	-888.6	242.4	213.8	28.58	8.480		
5,900.0	5,842.9	5,925.9	5,842.9	18.2	21.4	-90.05	-235.1	-888.6	242.4	213.6	28.72	8.439		
6,000.0	5,942.4	6,025.9	5,942.8	18.4	21.5	-91.86	-234.1	-888.6	242.5	213.7	28.76	8.430		
6,100.0	6,040.0	6,127.1	6,043.3	18.4	21.6	-94.23	-222.4	-888.6	243.0	214.3	28.68	8.473		
6,200.0	6,133.9	6,229.7	6,142.6	18.5	21.7	-96.53	-197.1	-888.6	243.9	215.4	28.60	8.531		
6,300.0	6,222.6	6,333.7	6,238.9	18.5	21.7	-98.71	-158.1	-888.6	245.2	216.6	28.56	8.585		
6,400.0	6,304.5	6,439.0	6,330.2	18.5	21.7	-100.74	-105.7	-888.6	246.7	218.1	28.63	8.618		
6,500.0	6,378.3	6,545.7	6,414.4	18.5	21.8	-102.56	-40.3	-888.6	248.3	219.5	28.83	8.613		
6,600.0	6,442.6	6,653.6	6,489.5	18.5	21.8	-104.15	37.1	-888.6	250.0	220.7	29.23	8.552		
6,700.0	6,496.4	6,762.6	6,553.5	18.6	21.9	-105.48	125.2	-888.6	251.5	221.7	29.83	8.431		
6,800.0	6,538.7	6,872.6	6,604.6	18.8	22.1	-106.52	222.4	-888.6	252.8	222.1	30.70	8.236		
6,900.0	6,568.9	6,983.2	6,641.5	19.3	22.4	-107.26	326.6	-888.6	253.8	222.0	31.83	7.972		
7,000.0	6,586.3	7,094.3	6,663.1	19.9	22.9	-107.69	435.5	-888.6	254.4	221.1	33.26	7.648		
7,100.0	6,590.9	7,204.6	6,668.7	20.8	23.7	-107.80	545.6	-888.6	254.5	219.5	35.00	7.273		
7,200.0	6,589.9	7,304.6	6,667.6	21.8	24.5	-107.77	645.6	-888.6	254.5	217.2	37.29	6.826		
7,300.0	6,588.9	7,404.6	6,666.5	23.0	25.6	-107.75	745.6	-888.6	254.5	214.7	39.78	6.396		
7,400.0	6,588.0	7,504.6	6,665.4	24.3	26.7	-107.72	845.6	-888.6	254.4	212.0	42.46	5.992		
7,500.0	6,587.0	7,604.6	6,664.3	25.7	27.9	-107.70	945.6	-888.6	254.4	209.1	45.28	5.619		
7,600.0	6,586.1	7,704.6	6,663.3	27.1	29.3	-107.67	1,045.6	-888.6	254.4	206.1	48.21	5.276		
7,700.0	6,585.1	7,804.6	6,662.2	28.6	30.7	-107.64	1,145.6	-888.6	254.3	203.1	51.25	4.963		
7,800.0	6,584.1	7,904.6	6,661.1	30.2	32.1	-107.62	1,245.6	-888.6	254.3	199.9	54.36	4.677		
7,900.0	6,583.2	8,004.6	6,660.0	31.8	33.6	-107.59	1,345.6	-888.6	254.2	196.7	57.55	4.418		
8,000.0	6,582.2	8,104.6	6,658.9	33.4	35.2	-107.56	1,445.6	-888.6	254.2	193.4	60.80	4.181		
8,100.0	6,581.3	8,204.6	6,657.8	35.0	36.8	-107.54	1,545.6	-888.6	254.2	190.1	64.09	3.966		
8,200.0	6,580.3	8,304.6	6,656.8	36.7	38.4	-107.51	1,645.5	-888.6	254.1	186.7	67.43	3.769		
8,300.0	6,579.3	8,404.6	6,655.7	38.4	40.0	-107.49	1,745.5	-888.6	254.1	183.3	70.80	3.589		
8,400.0	6,578.4	8,504.6	6,654.6	40.2	41.7	-107.46	1,845.5	-888.6	254.1	179.8	74.21	3.424		
8,500.0	6,577.4	8,604.6	6,653.5	41.9	43.4	-107.43	1,945.5	-888.6	254.0	176.4	77.64	3.272		
8,600.0	6,576.5	8,704.6	6,652.4	43.7	45.1	-107.41	2,045.5	-888.6	254.0	172.9	81.10	3.132		
8,700.0	6,575.5	8,804.6	6,651.4	45.4	46.8	-107.38	2,145.5	-888.6	253.9	169.4	84.58	3.002		
8,800.0	6,574.5	8,904.6	6,650.3	47.2	48.6	-107.35	2,245.5	-888.6	253.9	165.8	88.08	2.883		
8,900.0	6,573.6	9,004.6	6,649.2	49.0	50.3	-107.33	2,345.5	-888.6	253.9	162.3	91.59	2.772		
9,000.0	6,572.6	9,104.6	6,648.1	50.8	52.1	-107.30	2,445.5	-888.6	253.8	158.7	95.13	2.668		
9,100.0	6,571.7	9,204.6	6,647.0	52.6	53.9	-107.28	2,545.5	-888.6	253.8	155.1	98.67	2.572		
9,200.0	6,570.7	9,304.6	6,645.9	54.4	55.7	-107.25	2,645.5	-888.6	253.8	151.5	102.23	2.482		
9,300.0	6,569.7	9,404.6	6,644.9	56.2	57.5	-107.22	2,745.5	-888.6	253.7	147.9	105.79	2.398		
9,400.0	6,568.8	9,504.6	6,643.8	58.1	59.3	-107.20	2,845.5	-888.6	253.7	144.3	109.37	2.320		
9,500.0	6,567.8	9,604.6	6,642.7	59.9	61.1	-107.17	2,945.5	-888.6	253.7	140.7	112.96	2.246		
9,600.0	6,566.9	9,704.6	6,641.6	61.8	62.9	-107.14	3,045.5	-888.6	253.6	137.1	116.56	2.176		
9,700.0	6,565.9	9,804.6	6,640.5	63.6	64.7	-107.12	3,145.5	-888.6	253.6	133.4	120.16	2.110		
9,800.0	6,564.9	9,904.6	6,639.4	65.4	66.5	-107.09	3,245.5	-888.6	253.5	129.8	123.77	2.049		
9,900.0	6,564.0	10,004.6	6,638.4	67.3	68.4	-107.06	3,345.4	-888.6	253.5	126.1	127.39	1.990		
10,000.0	6,563.0	10,104.6	6,637.3	69.2	70.2	-107.04	3,445.4	-888.6	253.5	122.5	131.01	1.935		

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)													Offset Well Error:	0.0 ft
Survey Program: 0-MWD														
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
10,100.0	6,562.1	10,204.6	6,636.2	71.0	72.1	-107.01	3,545.4	-888.6	253.4	118.8	134.64	1.882		
10,200.0	6,561.1	10,304.6	6,635.1	72.9	73.9	-106.99	3,645.4	-888.6	253.4	115.1	138.28	1.833		
10,300.0	6,560.1	10,404.6	6,634.0	74.7	75.7	-106.96	3,745.4	-888.6	253.4	111.5	141.92	1.785		
10,400.0	6,559.2	10,504.6	6,633.0	76.6	77.6	-106.93	3,845.4	-888.6	253.3	107.8	145.56	1.740		
10,500.0	6,558.2	10,604.6	6,631.9	78.5	79.5	-106.91	3,945.4	-888.6	253.3	104.1	149.21	1.698		
10,600.0	6,557.3	10,704.6	6,630.8	80.4	81.3	-106.88	4,045.4	-888.6	253.3	100.4	152.87	1.657		
10,700.0	6,556.3	10,804.6	6,629.7	82.2	83.2	-106.85	4,145.4	-888.6	253.2	96.7	156.52	1.618		
10,800.0	6,555.3	10,904.6	6,628.6	84.1	85.0	-106.83	4,245.4	-888.6	253.2	93.0	160.18	1.581		
10,900.0	6,554.4	11,004.6	6,627.5	86.0	86.9	-106.80	4,345.4	-888.6	253.2	89.3	163.85	1.545		
11,000.0	6,553.4	11,104.6	6,626.5	87.9	88.8	-106.77	4,445.4	-888.6	253.1	85.6	167.52	1.511		
11,043.6	6,553.0	11,148.3	6,626.0	88.7	89.6	-106.76	4,489.0	-888.6	253.1	84.0	169.12	1.497	Level 3	
11,043.7	6,553.0	11,148.3	6,626.0	88.7	89.6	-106.76	4,489.0	-888.6	253.1	84.0	169.12	1.497	Level 3, SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-341 - Wellbore #1 - Plan #2 (3-5-15)														
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	41.74	21.9	19.5	29.3					
100.0	100.0	100.0	100.0	0.1	0.1	41.74	21.9	19.5	29.3	29.1	0.22	130.333		
200.0	200.0	200.0	200.0	0.3	0.3	41.74	21.9	19.5	29.3	28.6	0.67	43.444		
300.0	300.0	300.0	300.0	0.6	0.6	41.74	21.9	19.5	29.3	28.2	1.12	26.067		
400.0	400.0	400.0	400.0	0.8	0.8	41.74	21.9	19.5	29.3	27.7	1.57	18.619		
500.0	500.0	500.0	500.0	1.0	1.0	41.74	21.9	19.5	29.3	27.3	2.02	14.481		
600.0	600.0	600.0	600.0	1.2	1.2	41.74	21.9	19.5	29.3	26.8	2.47	11.848		
700.0	700.0	700.0	700.0	1.5	1.5	41.74	21.9	19.5	29.3	26.4	2.92	10.026		
800.0	800.0	800.0	800.0	1.7	1.7	41.74	21.9	19.5	29.3	25.9	3.37	8.689		
900.0	900.0	900.0	900.0	1.9	1.9	41.74	21.9	19.5	29.3	25.5	3.82	7.667		
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	41.74	21.9	19.5	29.3	25.0	4.27	6.860 CC, ES		
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.4	152.51	21.9	19.5	30.1	25.4	4.70	6.395		
1,200.0	1,200.0	1,200.0	1,200.0	2.5	2.6	154.63	21.9	19.5	32.4	27.3	5.12	6.334		
1,300.0	1,299.9	1,299.9	1,299.9	2.7	2.8	157.56	21.9	19.5	36.4	30.9	5.54	6.573		
1,400.0	1,399.7	1,399.7	1,399.7	2.9	3.0	160.71	21.9	19.5	42.1	36.1	5.96	7.064		
1,500.0	1,499.4	1,499.4	1,499.4	3.2	3.3	163.69	21.9	19.5	49.6	43.2	6.39	7.765		
1,600.0	1,598.9	1,598.9	1,598.9	3.4	3.5	166.29	21.9	19.5	58.8	52.0	6.81	8.640		
1,700.0	1,698.3	1,698.3	1,698.3	3.7	3.7	168.46	21.9	19.5	69.9	62.7	7.24	9.657		
1,800.0	1,797.4	1,797.4	1,797.4	3.9	3.9	170.25	21.9	19.5	82.7	75.1	7.66	10.794		
1,900.0	1,896.3	1,897.8	1,897.8	4.2	4.1	171.94	21.2	19.0	96.6	88.5	8.07	11.972		
2,000.0	1,994.9	1,998.4	1,998.3	4.5	4.3	173.73	19.1	17.5	110.7	102.2	8.45	13.101		
2,100.0	2,093.4	2,099.2	2,099.0	4.9	4.5	175.58	15.5	14.9	124.5	115.6	8.85	14.064		
2,200.0	2,191.8	2,200.3	2,200.0	5.2	4.7	177.44	10.6	11.3	136.9	127.6	9.27	14.776		
2,300.0	2,290.2	2,301.7	2,301.0	5.6	4.9	179.37	4.1	6.6	148.0	138.3	9.69	15.271		
2,400.0	2,388.7	2,403.3	2,402.2	5.9	5.1	-178.59	-3.8	0.8	157.7	147.6	10.13	15.577		
2,500.0	2,487.1	2,505.1	2,503.3	6.3	5.3	-176.42	-13.2	-6.0	166.2	155.7	10.58	15.718		
2,600.0	2,585.5	2,606.9	2,604.3	6.7	5.6	-174.09	-24.0	-13.9	173.6	162.6	11.05	15.716		
2,700.0	2,683.9	2,708.8	2,705.0	7.1	5.8	-171.57	-36.3	-22.8	179.9	168.4	11.54	15.588		
2,800.0	2,782.4	2,810.4	2,805.2	7.4	6.1	-168.84	-50.0	-32.7	185.3	173.2	12.07	15.354		
2,900.0	2,880.8	2,909.9	2,903.1	7.8	6.4	-166.18	-63.9	-42.9	190.5	177.9	12.62	15.101		
3,000.0	2,979.2	3,009.3	3,001.1	8.2	6.7	-163.67	-77.9	-53.0	196.2	183.0	13.20	14.869		
3,100.0	3,077.7	3,108.8	3,099.1	8.6	7.0	-161.30	-91.8	-63.2	202.2	188.4	13.80	14.654		
3,200.0	3,176.1	3,208.3	3,197.1	9.0	7.3	-159.07	-105.8	-73.3	208.6	194.1	14.43	14.456		
3,300.0	3,274.5	3,307.8	3,295.0	9.4	7.6	-156.97	-119.7	-83.4	215.2	200.1	15.08	14.274		
3,400.0	3,373.0	3,407.3	3,393.0	9.8	8.0	-155.01	-133.7	-93.6	222.1	206.4	15.75	14.106		
3,500.0	3,471.4	3,506.7	3,491.0	10.2	8.3	-153.16	-147.6	-103.7	229.3	212.9	16.44	13.952		
3,600.0	3,569.8	3,606.2	3,588.9	10.6	8.7	-151.42	-161.5	-113.9	236.7	219.6	17.14	13.811		
3,700.0	3,668.3	3,705.7	3,686.9	11.0	9.0	-149.79	-175.5	-124.0	244.3	226.4	17.86	13.682		
3,800.0	3,766.7	3,805.2	3,784.9	11.4	9.4	-148.26	-189.4	-134.1	252.1	233.5	18.58	13.564		
3,900.0	3,865.1	3,901.8	3,880.3	11.8	9.7	-147.08	-202.1	-143.4	260.5	241.2	19.26	13.520		
4,000.0	3,963.5	3,997.8	3,975.5	12.2	9.9	-146.60	-212.2	-150.7	270.2	250.3	19.85	13.611		
4,100.0	4,062.0	4,093.6	4,070.8	12.6	10.2	-146.76	-219.7	-156.2	281.3	260.9	20.38	13.803		
4,200.0	4,160.4	4,189.0	4,166.0	13.0	10.4	-147.48	-224.6	-159.7	293.6	272.8	20.84	14.093		
4,300.0	4,258.8	4,283.7	4,260.6	13.4	10.6	-148.68	-226.9	-161.4	307.4	286.2	21.23	14.480		
4,400.0	4,357.3	4,380.4	4,357.3	13.8	10.7	-150.23	-227.1	-161.6	322.6	301.0	21.59	14.944		
4,500.0	4,455.7	4,478.8	4,455.7	14.2	10.9	-151.71	-227.1	-161.6	338.1	316.1	21.94	15.408		
4,600.0	4,554.1	4,577.2	4,554.1	14.6	11.1	-153.06	-227.1	-161.6	353.7	331.4	22.30	15.861		
4,700.0	4,652.6	4,675.6	4,652.6	15.0	11.3	-154.30	-227.1	-161.6	369.6	346.9	22.67	16.302		
4,800.0	4,751.0	4,774.1	4,751.0	15.4	11.5	-155.43	-227.1	-161.6	385.6	362.6	23.05	16.731		
4,900.0	4,849.4	4,872.5	4,849.4	15.8	11.6	-156.47	-227.1	-161.6	401.8	378.4	23.43	17.147		
5,000.0	4,947.9	4,970.9	4,947.9	16.2	11.8	-157.44	-227.1	-161.6	418.1	394.3	23.82	17.551		

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-341 - Wellbore #1 - Plan #2 (3-5-15)														
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
5,100.0	5,046.3	5,069.4	5,046.3	16.6	12.0	-158.33	-227.1	-161.6	434.5	410.2	24.21	17.943		
5,200.0	5,144.8	5,167.9	5,144.8	17.0	12.2	-159.19	-227.1	-161.6	450.5	425.9	24.62	18.302		
5,300.0	5,243.8	5,266.9	5,243.8	17.2	12.4	-159.91	-227.1	-161.6	463.8	438.8	24.99	18.562		
5,400.0	5,343.2	5,366.3	5,343.2	17.5	12.6	-160.42	-227.1	-161.6	473.9	448.5	25.35	18.696		
5,500.0	5,442.9	5,466.0	5,442.9	17.7	12.8	-160.75	-227.1	-161.6	480.7	455.0	25.69	18.711		
5,600.0	5,542.9	5,565.9	5,542.9	17.8	12.9	-160.92	-227.1	-161.6	484.2	458.2	26.02	18.612		
5,700.0	5,642.9	5,665.9	5,642.9	18.0	13.1	89.07	-227.1	-161.6	484.8	458.4	26.36	18.388		
5,800.0	5,742.9	5,765.9	5,742.9	18.1	13.3	89.07	-227.1	-161.6	484.8	458.0	26.74	18.129		
5,900.0	5,842.9	5,865.9	5,842.9	18.2	13.5	89.09	-227.1	-161.6	484.8	457.6	27.12	17.875		
6,000.0	5,942.4	5,965.5	5,942.4	18.4	13.7	89.99	-226.2	-161.6	484.7	457.2	27.52	17.611		
6,000.7	5,943.1	5,966.2	5,943.1	18.4	13.7	90.00	-226.1	-161.6	484.7	457.2	27.53	17.609		
6,100.0	6,040.0	6,065.7	6,041.8	18.4	13.9	91.18	-214.6	-161.6	484.8	457.0	27.84	17.414		
6,200.0	6,133.9	6,167.2	6,140.1	18.5	14.0	92.35	-189.7	-161.6	485.1	457.1	28.04	17.298		
6,300.0	6,222.6	6,270.0	6,235.5	18.5	14.0	93.49	-151.4	-161.6	485.6	457.4	28.18	17.235		
6,400.0	6,304.5	6,374.3	6,326.1	18.5	14.0	94.58	-99.8	-161.6	486.3	458.0	28.30	17.182		
6,500.0	6,378.3	6,479.9	6,409.8	18.5	14.1	95.58	-35.6	-161.6	487.0	458.5	28.51	17.081		
6,600.0	6,442.6	6,586.8	6,484.7	18.5	14.1	96.49	40.6	-161.6	487.8	458.9	28.92	16.868		
6,700.0	6,496.4	6,694.9	6,548.8	18.6	14.3	97.29	127.5	-161.6	488.7	459.0	29.64	16.488		
6,800.0	6,538.7	6,804.0	6,600.5	18.8	15.0	97.95	223.5	-161.6	489.4	458.7	30.75	15.914		
6,900.0	6,568.9	6,914.0	6,638.3	19.3	15.8	98.46	326.7	-161.6	490.0	457.7	32.32	15.164		
7,000.0	6,586.3	7,024.7	6,660.9	19.9	16.8	98.82	434.9	-161.6	490.5	456.2	34.32	14.294		
7,100.0	6,590.9	7,135.7	6,667.7	20.8	18.1	99.01	545.6	-161.6	490.8	454.1	36.68	13.380		
7,200.0	6,589.9	7,235.7	6,666.6	21.8	19.3	98.99	645.6	-161.6	490.7	451.6	39.11	12.547		
7,300.0	6,588.9	7,335.7	6,665.4	23.0	20.6	98.97	745.6	-161.6	490.7	449.0	41.74	11.757		
7,400.0	6,588.0	7,435.7	6,664.3	24.3	22.0	98.95	845.6	-161.6	490.7	446.1	44.53	11.019		
7,500.0	6,587.0	7,535.7	6,663.2	25.7	23.5	98.93	945.6	-161.6	490.6	443.2	47.47	10.336		
7,600.0	6,586.1	7,635.7	6,662.0	27.1	25.1	98.91	1,045.6	-161.6	490.6	440.1	50.52	9.711		
7,700.0	6,585.1	7,735.7	6,660.9	28.6	26.7	98.89	1,145.6	-161.6	490.6	436.9	53.67	9.141		
7,800.0	6,584.1	7,835.7	6,659.7	30.2	28.3	98.87	1,245.6	-161.6	490.6	433.7	56.90	8.622		
7,900.0	6,583.2	7,935.7	6,658.6	31.8	30.0	98.85	1,345.6	-161.6	490.5	430.3	60.19	8.150		
8,000.0	6,582.2	8,035.7	6,657.5	33.4	31.7	98.83	1,445.6	-161.6	490.5	427.0	63.54	7.719		
8,100.0	6,581.3	8,135.7	6,656.3	35.0	33.4	98.81	1,545.6	-161.6	490.5	423.5	66.95	7.327		
8,200.0	6,580.3	8,235.7	6,655.2	36.7	35.1	98.79	1,645.6	-161.6	490.5	420.1	70.39	6.968		
8,300.0	6,579.3	8,335.7	6,654.1	38.4	36.9	98.77	1,745.6	-161.6	490.4	416.6	73.87	6.639		
8,400.0	6,578.4	8,435.7	6,652.9	40.2	38.7	98.75	1,845.6	-161.6	490.4	413.0	77.38	6.338		
8,500.0	6,577.4	8,535.7	6,651.8	41.9	40.5	98.73	1,945.6	-161.6	490.4	409.5	80.91	6.060		
8,600.0	6,576.5	8,635.7	6,650.7	43.7	42.3	98.71	2,045.5	-161.6	490.3	405.9	84.47	5.805		
8,700.0	6,575.5	8,735.7	6,649.5	45.4	44.1	98.69	2,145.5	-161.6	490.3	402.3	88.05	5.568		
8,800.0	6,574.5	8,835.7	6,648.4	47.2	45.9	98.67	2,245.5	-161.6	490.3	398.6	91.65	5.349		
8,900.0	6,573.6	8,935.7	6,647.3	49.0	47.7	98.65	2,345.5	-161.6	490.3	395.0	95.27	5.146		
9,000.0	6,572.6	9,035.7	6,646.1	50.8	49.5	98.63	2,445.5	-161.6	490.2	391.3	98.90	4.957		
9,100.0	6,571.7	9,135.7	6,645.0	52.6	51.4	98.60	2,545.5	-161.6	490.2	387.7	102.54	4.781		
9,200.0	6,570.7	9,235.7	6,643.9	54.4	53.2	98.58	2,645.5	-161.6	490.2	384.0	106.20	4.616		
9,300.0	6,569.7	9,335.7	6,642.7	56.2	55.1	98.56	2,745.5	-161.6	490.2	380.3	109.87	4.461		
9,400.0	6,568.8	9,435.7	6,641.6	58.1	56.9	98.54	2,845.5	-161.6	490.1	376.6	113.54	4.317		
9,500.0	6,567.8	9,535.7	6,640.5	59.9	58.8	98.52	2,945.5	-161.6	490.1	372.9	117.23	4.181		
9,600.0	6,566.9	9,635.7	6,639.3	61.8	60.7	98.50	3,045.5	-161.6	490.1	369.2	120.92	4.053		
9,700.0	6,565.9	9,735.7	6,638.2	63.6	62.5	98.48	3,145.5	-161.6	490.1	365.4	124.62	3.933		
9,800.0	6,564.9	9,835.7	6,637.1	65.4	64.4	98.46	3,245.5	-161.6	490.0	361.7	128.32	3.819		
9,900.0	6,564.0	9,935.7	6,635.9	67.3	66.3	98.44	3,345.5	-161.6	490.0	358.0	132.04	3.711		
10,000.0	6,563.0	10,035.7	6,634.8	69.2	68.1	98.42	3,445.5	-161.6	490.0	354.2	135.75	3.609		

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft													
Survey Program: 0-MWD													Offset Well Error:	0.0 ft													
Reference																											
Measured Depth (ft)		Vertical Depth (ft)		Measured Depth (ft)		Vertical Depth (ft)		Semi Major Axis Reference (ft)		Offset (ft)		Highside Toolface (°)		Offset Wellbore Centre +N/-S (ft)		+E/-W (ft)		Distance Between Centres (ft)		Between Ellipses (ft)		Minimum Separation (ft)		Separation Factor		Warning	
10,100.0	6,562.1	10,135.7	6,633.7	71.0	70.0	98.40	3,545.4	-161.6	490.0	350.5	139.48	3.513															
10,200.0	6,561.1	10,235.7	6,632.5	72.9	71.9	98.38	3,645.4	-161.6	489.9	346.7	143.21	3.421															
10,300.0	6,560.1	10,335.7	6,631.4	74.7	73.8	98.36	3,745.4	-161.6	489.9	343.0	146.94	3.334															
10,400.0	6,559.2	10,435.7	6,630.3	76.6	75.7	98.34	3,845.4	-161.6	489.9	339.2	150.68	3.251															
10,500.0	6,558.2	10,535.7	6,629.1	78.5	77.5	98.32	3,945.4	-161.6	489.9	335.4	154.42	3.172															
10,600.0	6,557.3	10,635.7	6,628.0	80.4	79.4	98.30	4,045.4	-161.6	489.8	331.7	158.16	3.097															
10,700.0	6,556.3	10,735.7	6,626.8	82.2	81.3	98.28	4,145.4	-161.6	489.8	327.9	161.91	3.025															
10,800.0	6,555.3	10,835.7	6,625.7	84.1	83.2	98.26	4,245.4	-161.6	489.8	324.1	165.66	2.957															
10,900.0	6,554.4	10,935.7	6,624.6	86.0	85.1	98.24	4,345.4	-161.6	489.8	320.3	169.42	2.891															
11,000.0	6,553.4	11,035.7	6,623.4	87.9	87.0	98.22	4,445.4	-161.6	489.7	316.6	173.17	2.828															
11,033.6	6,553.1	11,069.3	6,623.1	88.5	87.6	98.21	4,479.0	-161.6	489.7	315.3	174.44	2.807															
11,043.7	6,553.0	11,075.7	6,623.0	88.7	87.8	98.21	4,485.4	-161.6	489.7	315.0	174.74	2.803 SF															

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWDD													Offset Well Error:	0.0 ft
Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)														
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	2.0	2.0	0.0	0.0	39.47	47.4	39.0	61.4	61.4	0.00	N/A		
100.0	100.0	102.0	102.0	0.1	0.1	39.47	47.4	39.0	61.4	61.1	0.23	267.620		
200.0	200.0	202.0	202.0	0.3	0.3	39.47	47.4	39.0	61.4	60.7	0.68	90.388		
300.0	300.0	302.0	302.0	0.6	0.6	39.47	47.4	39.0	61.4	60.2	1.13	54.377		
400.0	400.0	402.0	402.0	0.8	0.8	39.47	47.4	39.0	61.4	59.8	1.58	38.885		
500.0	500.0	502.0	502.0	1.0	1.0	39.47	47.4	39.0	61.4	59.3	2.03	30.263		
600.0	600.0	602.0	602.0	1.2	1.2	39.47	47.4	39.0	61.4	58.9	2.48	24.771		
700.0	700.0	702.0	702.0	1.5	1.5	39.47	47.4	39.0	61.4	58.4	2.93	20.966		
800.0	800.0	802.0	802.0	1.7	1.7	39.47	47.4	39.0	61.4	58.0	3.38	18.174		
900.0	900.0	902.0	902.0	1.9	1.9	39.47	47.4	39.0	61.4	57.5	3.83	16.038		
1,000.0	1,000.0	1,002.0	1,002.0	2.1	2.1	39.47	47.4	39.0	61.4	57.1	4.28	14.352 CC, ES		
1,100.0	1,100.0	1,102.0	1,102.0	2.3	2.4	149.86	47.4	39.0	62.1	57.4	4.71	13.198		
1,200.0	1,200.0	1,202.0	1,202.0	2.5	2.6	151.02	47.4	39.0	64.4	59.3	5.12	12.570		
1,300.0	1,299.9	1,301.9	1,301.9	2.7	2.8	152.78	47.4	39.0	68.2	62.7	5.54	12.310		
1,400.0	1,399.7	1,401.7	1,401.7	2.9	3.0	154.92	47.4	39.0	73.7	67.8	5.97	12.354		
1,500.0	1,499.4	1,501.4	1,501.4	3.2	3.3	157.25	47.4	39.0	80.9	74.5	6.39	12.653		
1,600.0	1,598.9	1,600.9	1,600.9	3.4	3.5	159.58	47.4	39.0	89.8	83.0	6.82	13.167		
1,700.0	1,698.3	1,700.3	1,700.3	3.7	3.7	161.80	47.4	39.0	100.5	93.3	7.25	13.863		
1,800.0	1,797.4	1,799.4	1,799.4	3.9	3.9	163.83	47.4	39.0	113.0	105.3	7.68	14.714		
1,900.0	1,896.3	1,898.3	1,898.3	4.2	4.2	165.65	47.4	39.0	127.3	119.2	8.11	15.696		
2,000.0	1,994.9	1,996.9	1,996.9	4.5	4.4	167.25	47.4	39.0	143.3	134.8	8.54	16.788		
2,100.0	2,093.4	2,095.8	2,095.8	4.9	4.6	168.92	46.6	39.3	160.4	151.5	8.95	17.917		
2,200.0	2,191.8	2,194.6	2,194.5	5.2	4.7	170.83	44.3	40.2	177.5	168.1	9.35	18.978		
2,300.0	2,290.2	2,293.2	2,293.1	5.6	4.9	172.90	40.4	41.8	194.5	184.8	9.75	19.943		
2,400.0	2,388.7	2,391.6	2,391.3	5.9	5.1	175.10	35.0	44.0	211.7	201.5	10.16	20.829		
2,500.0	2,487.1	2,489.8	2,489.2	6.3	5.3	177.39	28.0	46.9	229.1	218.5	10.58	21.648		
2,600.0	2,585.5	2,587.7	2,586.7	6.7	5.5	179.74	19.5	50.3	246.9	235.8	11.02	22.411		
2,700.0	2,683.9	2,685.2	2,683.6	7.1	5.7	-177.86	9.4	54.4	265.1	253.6	11.46	23.125		
2,800.0	2,782.4	2,782.3	2,779.9	7.4	5.9	-175.45	-2.0	59.1	283.9	272.0	11.93	23.796		
2,900.0	2,880.8	2,879.0	2,875.5	7.8	6.1	-173.03	-15.0	64.3	303.4	291.0	12.42	24.428		
3,000.0	2,979.2	2,975.1	2,970.4	8.2	6.4	-170.64	-29.3	70.2	323.7	310.8	12.93	25.028		
3,100.0	3,077.7	3,071.4	3,065.2	8.6	6.7	-168.30	-44.9	76.5	344.8	331.3	13.47	25.593		
3,200.0	3,176.1	3,168.2	3,160.5	9.0	6.9	-166.20	-60.6	82.9	366.5	352.4	14.03	26.117		
3,300.0	3,274.5	3,265.0	3,255.8	9.4	7.2	-164.33	-76.4	89.3	388.5	373.9	14.60	26.606		
3,400.0	3,373.0	3,361.8	3,351.1	9.8	7.5	-162.66	-92.2	95.7	410.9	395.7	15.19	27.060		
3,500.0	3,471.4	3,458.6	3,446.4	10.2	7.8	-161.16	-107.9	102.1	433.6	417.9	15.78	27.483		
3,600.0	3,569.8	3,555.4	3,541.6	10.6	8.2	-159.82	-123.7	108.5	456.6	440.2	16.38	27.877		
3,700.0	3,668.3	3,652.1	3,636.9	11.0	8.5	-158.60	-139.4	114.9	479.8	462.8	16.99	28.244		
3,800.0	3,766.7	3,748.9	3,732.2	11.4	8.8	-157.49	-155.2	121.3	503.2	485.6	17.60	28.586		
3,900.0	3,865.1	3,845.7	3,827.5	11.8	9.1	-156.48	-170.9	127.7	526.7	508.5	18.22	28.906		
4,000.0	3,963.5	3,944.9	3,925.2	12.2	9.5	-155.55	-186.9	134.2	550.4	531.5	18.84	29.205		
4,100.0	4,062.0	4,051.6	4,030.6	12.6	9.8	-154.90	-201.5	140.1	572.9	553.5	19.44	29.464		
4,200.0	4,160.4	4,159.3	4,137.7	13.0	10.1	-154.65	-212.5	144.6	593.8	573.8	20.00	29.686		
4,300.0	4,258.8	4,267.8	4,245.9	13.4	10.3	-154.76	-219.8	147.5	613.1	592.6	20.53	29.862		
4,400.0	4,357.3	4,376.8	4,354.8	13.8	10.5	-155.20	-223.3	149.0	630.7	609.7	21.02	30.000		
4,500.0	4,455.7	4,479.6	4,457.7	14.2	10.7	-155.86	-223.6	149.1	646.9	625.5	21.47	30.127		
4,600.0	4,554.1	4,578.1	4,556.1	14.6	10.9	-156.48	-223.6	149.1	663.1	641.2	21.91	30.259		
4,700.0	4,652.6	4,676.5	4,654.6	15.0	11.1	-157.07	-223.6	149.1	679.4	657.0	22.36	30.388		
4,800.0	4,751.0	4,774.9	4,753.0	15.4	11.3	-157.64	-223.6	149.1	695.7	672.9	22.80	30.515		
4,900.0	4,849.4	4,873.4	4,851.4	15.8	11.5	-158.18	-223.6	149.1	712.1	688.8	23.24	30.639		
5,000.0	4,947.9	4,971.8	4,949.9	16.2	11.7	-158.69	-223.6	149.1	728.5	704.8	23.68	30.761		

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)														
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
5,100.0	5,046.3	5,070.2	5,048.3	16.6	11.8	-159.18	-223.6	149.1	745.0	720.9	24.13	30.880		
5,200.0	5,144.8	5,168.7	5,146.8	17.0	12.0	-159.70	-223.6	149.1	761.2	736.6	24.59	30.958		
5,300.0	5,243.8	5,267.7	5,245.8	17.2	12.2	-160.15	-223.6	149.1	774.5	749.5	25.02	30.961		
5,400.0	5,343.2	5,367.1	5,345.2	17.5	12.4	-160.49	-223.6	149.1	784.6	759.1	25.42	30.865		
5,500.0	5,442.9	5,466.9	5,444.9	17.7	12.6	-160.71	-223.6	149.1	791.4	765.6	25.80	30.677		
5,600.0	5,542.9	5,566.8	5,544.9	17.8	12.8	-160.82	-223.6	149.1	794.9	768.8	26.15	30.400		
5,700.0	5,642.9	5,666.8	5,644.9	18.0	13.0	89.18	-223.6	149.1	795.4	768.9	26.50	30.013		
5,800.0	5,742.9	5,766.8	5,744.9	18.1	13.2	89.18	-223.6	149.1	795.4	768.6	26.88	29.594		
5,900.0	5,842.9	5,866.8	5,844.9	18.2	13.4	89.19	-223.6	149.1	795.4	768.2	27.25	29.185		
6,000.0	5,942.4	5,966.4	5,944.4	18.4	13.6	89.82	-223.6	149.1	795.4	767.7	27.62	28.794		
6,016.1	5,958.3	5,982.2	5,960.3	18.4	13.6	90.00	-223.6	149.1	795.4	767.7	27.68	28.737		
6,100.0	6,040.0	6,065.2	6,043.2	18.4	13.8	91.20	-221.7	149.1	795.5	767.6	27.96	28.455		
6,200.0	6,133.9	6,166.6	6,143.6	18.5	13.9	92.68	-207.9	149.1	796.3	768.1	28.19	28.248		
6,300.0	6,222.6	6,271.1	6,244.2	18.5	14.0	94.13	-179.9	149.1	797.5	769.2	28.33	28.154		
6,400.0	6,304.5	6,378.8	6,342.8	18.5	14.0	95.53	-136.9	149.1	799.2	770.8	28.43	28.116		
6,500.0	6,378.3	6,489.8	6,437.2	18.5	14.0	96.84	-78.5	149.1	801.3	772.7	28.57	28.043		
6,600.0	6,442.6	6,604.2	6,524.5	18.5	14.1	98.05	-4.8	149.1	803.5	774.6	28.88	27.823		
6,700.0	6,496.4	6,721.8	6,601.7	18.6	14.3	99.12	83.7	149.1	805.7	776.3	29.48	27.331		
6,800.0	6,538.7	6,842.4	6,665.9	18.8	14.8	100.02	185.7	149.1	807.8	777.3	30.49	26.499		
6,900.0	6,568.9	6,965.5	6,714.0	19.3	15.6	100.71	298.9	149.1	809.6	777.6	31.98	25.310		
7,000.0	6,586.3	7,090.6	6,743.7	19.9	16.7	101.18	420.2	149.1	810.8	776.8	33.98	23.858		
7,100.0	6,590.9	7,216.4	6,753.2	20.8	18.0	101.40	545.5	149.1	811.4	775.0	36.41	22.283		
7,200.0	6,589.9	7,316.4	6,752.8	21.8	19.2	101.43	645.5	149.1	811.5	772.7	38.79	20.921		
7,300.0	6,588.9	7,416.4	6,752.3	23.0	20.5	101.47	745.5	149.1	811.6	770.2	41.36	19.620		
7,400.0	6,588.0	7,516.4	6,751.9	24.3	21.9	101.51	845.5	149.1	811.7	767.6	44.11	18.400		
7,500.0	6,587.0	7,616.4	6,751.4	25.7	23.4	101.54	945.5	149.1	811.8	764.8	47.00	17.270		
7,600.0	6,586.1	7,716.4	6,751.0	27.1	24.9	101.58	1,045.5	149.1	811.9	761.9	50.01	16.234		
7,700.0	6,585.1	7,816.4	6,750.6	28.6	26.5	101.61	1,145.5	149.1	812.0	758.9	53.12	15.287		
7,800.0	6,584.1	7,916.4	6,750.1	30.2	28.1	101.65	1,245.5	149.1	812.1	755.8	56.30	14.424		
7,900.0	6,583.2	8,016.4	6,749.7	31.8	29.8	101.69	1,345.5	149.1	812.2	752.6	59.55	13.638		
8,000.0	6,582.2	8,116.4	6,749.3	33.4	31.5	101.72	1,445.4	149.1	812.3	749.4	62.86	12.922		
8,100.0	6,581.3	8,216.4	6,748.8	35.0	33.2	101.76	1,545.4	149.1	812.4	746.2	66.22	12.268		
8,200.0	6,580.3	8,316.3	6,748.4	36.7	34.9	101.80	1,645.4	149.1	812.5	742.9	69.62	11.671		
8,300.0	6,579.3	8,416.3	6,748.0	38.4	36.7	101.83	1,745.4	149.1	812.6	739.6	73.05	11.124		
8,400.0	6,578.4	8,516.3	6,747.5	40.2	38.4	101.87	1,845.4	149.1	812.7	736.2	76.52	10.621		
8,500.0	6,577.4	8,616.3	6,747.1	41.9	40.2	101.90	1,945.4	149.1	812.8	732.8	80.01	10.159		
8,600.0	6,576.5	8,716.3	6,746.6	43.7	42.0	101.94	2,045.4	149.1	813.0	729.4	83.52	9.733		
8,700.0	6,575.5	8,816.3	6,746.2	45.4	43.8	101.98	2,145.4	149.1	813.1	726.0	87.06	9.339		
8,800.0	6,574.5	8,916.3	6,745.8	47.2	45.6	102.01	2,245.4	149.1	813.2	722.6	90.61	8.975		
8,900.0	6,573.6	9,016.3	6,745.3	49.0	47.5	102.05	2,345.4	149.1	813.3	719.1	94.17	8.636		
9,000.0	6,572.6	9,116.3	6,744.9	50.8	49.3	102.08	2,445.4	149.1	813.4	715.6	97.75	8.321		
9,100.0	6,571.7	9,216.3	6,744.5	52.6	51.1	102.12	2,545.4	149.1	813.5	712.2	101.35	8.027		
9,200.0	6,570.7	9,316.3	6,744.0	54.4	53.0	102.16	2,645.4	149.1	813.6	708.7	104.95	7.752		
9,300.0	6,569.7	9,416.3	6,743.6	56.2	54.8	102.19	2,745.4	149.1	813.7	705.2	108.56	7.495		
9,400.0	6,568.8	9,516.3	6,743.2	58.1	56.7	102.23	2,845.4	149.1	813.8	701.6	112.18	7.255		
9,500.0	6,567.8	9,616.3	6,742.7	59.9	58.5	102.26	2,945.4	149.1	813.9	698.1	115.81	7.028		
9,600.0	6,566.9	9,716.3	6,742.3	61.8	60.4	102.30	3,045.4	149.1	814.1	694.6	119.45	6.815		
9,700.0	6,565.9	9,816.3	6,741.8	63.6	62.3	102.34	3,145.4	149.1	814.2	691.1	123.09	6.614		
9,800.0	6,564.9	9,916.3	6,741.4	65.4	64.1	102.37	3,245.4	149.1	814.3	687.5	126.74	6.425		
9,900.0	6,564.0	10,016.3	6,741.0	67.3	66.0	102.41	3,345.4	149.1	814.4	684.0	130.39	6.246		
10,000.0	6,563.0	10,116.3	6,740.5	69.2	67.9	102.44	3,445.4	149.1	814.5	680.5	134.04	6.076		

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)													Offset Well Error:	0.0 ft
Survey Program: 0-MWD														
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
10,100.0	6,562.1	10,216.3	6,740.1	71.0	69.8	102.48	3,545.4	149.1	814.6	676.9	137.71	5.916		
10,200.0	6,561.1	10,316.3	6,739.7	72.9	71.6	102.52	3,645.4	149.1	814.7	673.4	141.37	5.763		
10,300.0	6,560.1	10,416.3	6,739.2	74.7	73.5	102.55	3,745.4	149.1	814.8	669.8	145.04	5.618		
10,400.0	6,559.2	10,516.3	6,738.8	76.6	75.4	102.59	3,845.4	149.1	815.0	666.2	148.71	5.480		
10,500.0	6,558.2	10,616.3	6,738.4	78.5	77.3	102.62	3,945.4	149.1	815.1	662.7	152.38	5.349		
10,600.0	6,557.3	10,716.3	6,737.9	80.4	79.2	102.66	4,045.4	149.1	815.2	659.1	156.06	5.224		
10,700.0	6,556.3	10,816.3	6,737.5	82.2	81.1	102.70	4,145.4	149.1	815.3	655.6	159.74	5.104		
10,800.0	6,555.3	10,916.3	6,737.0	84.1	82.9	102.73	4,245.4	149.1	815.4	652.0	163.42	4.990		
10,900.0	6,554.4	11,016.3	6,736.6	86.0	84.8	102.77	4,345.4	149.1	815.5	648.4	167.10	4.881		
11,000.0	6,553.4	11,116.3	6,736.2	87.9	86.7	102.80	4,445.4	149.1	815.6	644.9	170.78	4.776		
11,043.7	6,553.0	11,155.6	6,736.0	88.7	87.5	102.82	4,484.7	149.1	815.7	643.4	172.31	4.734 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 175-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)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
9,300.0	6,569.7	6,635.6	6,545.2	56.2	20.5	-87.05	3,671.8	-987.9	988.5	915.9	72.56	13.622		
9,400.0	6,568.8	6,639.2	6,548.9	58.1	20.5	-87.66	3,672.0	-987.7	895.3	820.9	74.44	12.027		
9,500.0	6,567.8	6,643.0	6,552.6	59.9	20.5	-88.29	3,672.2	-987.5	803.8	727.5	76.32	10.531		
9,600.0	6,566.9	6,647.0	6,556.6	61.8	20.5	-88.96	3,672.4	-987.3	714.5	636.3	78.20	9.137		
9,700.0	6,565.9	6,651.2	6,560.8	63.6	20.5	-89.65	3,672.6	-987.0	628.4	548.4	80.07	7.848		
9,800.0	6,564.9	6,655.5	6,565.1	65.4	20.6	-90.39	3,672.8	-986.8	547.1	465.1	81.94	6.677		
9,900.0	6,564.0	6,660.1	6,569.7	67.3	20.6	-91.16	3,673.1	-986.5	472.9	389.1	83.79	5.644		
10,000.0	6,563.0	6,665.0	6,574.5	69.2	20.6	-91.97	3,673.4	-986.2	409.8	324.2	85.64	4.785		
10,100.0	6,562.1	6,669.0	6,578.5	71.0	20.6	-92.65	3,673.6	-985.9	363.6	276.1	87.48	4.156		
10,200.0	6,561.1	6,674.2	6,583.7	72.9	20.6	-93.52	3,673.9	-985.6	341.2	251.9	89.29	3.821		
10,229.1	6,560.8	6,675.3	6,584.8	73.4	20.6	-93.71	3,673.9	-985.5	339.9	250.1	89.82	3.785	CC, ES, SF	
10,300.0	6,560.1	6,678.0	6,587.5	74.7	20.6	-94.16	3,674.1	-985.3	347.2	256.1	91.11	3.811		
10,400.0	6,559.2	6,681.5	6,591.0	76.6	20.6	-94.76	3,674.2	-985.1	380.4	287.5	92.92	4.094		
10,500.0	6,558.2	6,684.8	6,594.2	78.5	20.6	-95.30	3,674.4	-984.9	434.6	339.8	94.73	4.587		
10,600.0	6,557.3	6,687.7	6,597.2	80.4	20.6	-95.80	3,674.5	-984.7	502.9	406.4	96.54	5.209		
10,700.0	6,556.3	6,690.5	6,600.0	82.2	20.6	-96.27	3,674.7	-984.5	580.5	482.2	98.35	5.902		
10,800.0	6,555.3	6,693.1	6,602.5	84.1	20.6	-96.70	3,674.8	-984.4	664.1	564.0	100.16	6.631		
10,900.0	6,554.4	6,695.4	6,604.9	86.0	20.6	-97.10	3,674.9	-984.2	751.7	649.8	101.97	7.372		
11,000.0	6,553.4	6,697.7	6,607.1	87.9	20.7	-97.47	3,675.0	-984.1	842.1	738.3	103.77	8.115		
11,043.7	6,553.0	6,698.6	6,608.0	88.7	20.7	-97.63	3,675.0	-984.1	882.3	777.7	104.57	8.437		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

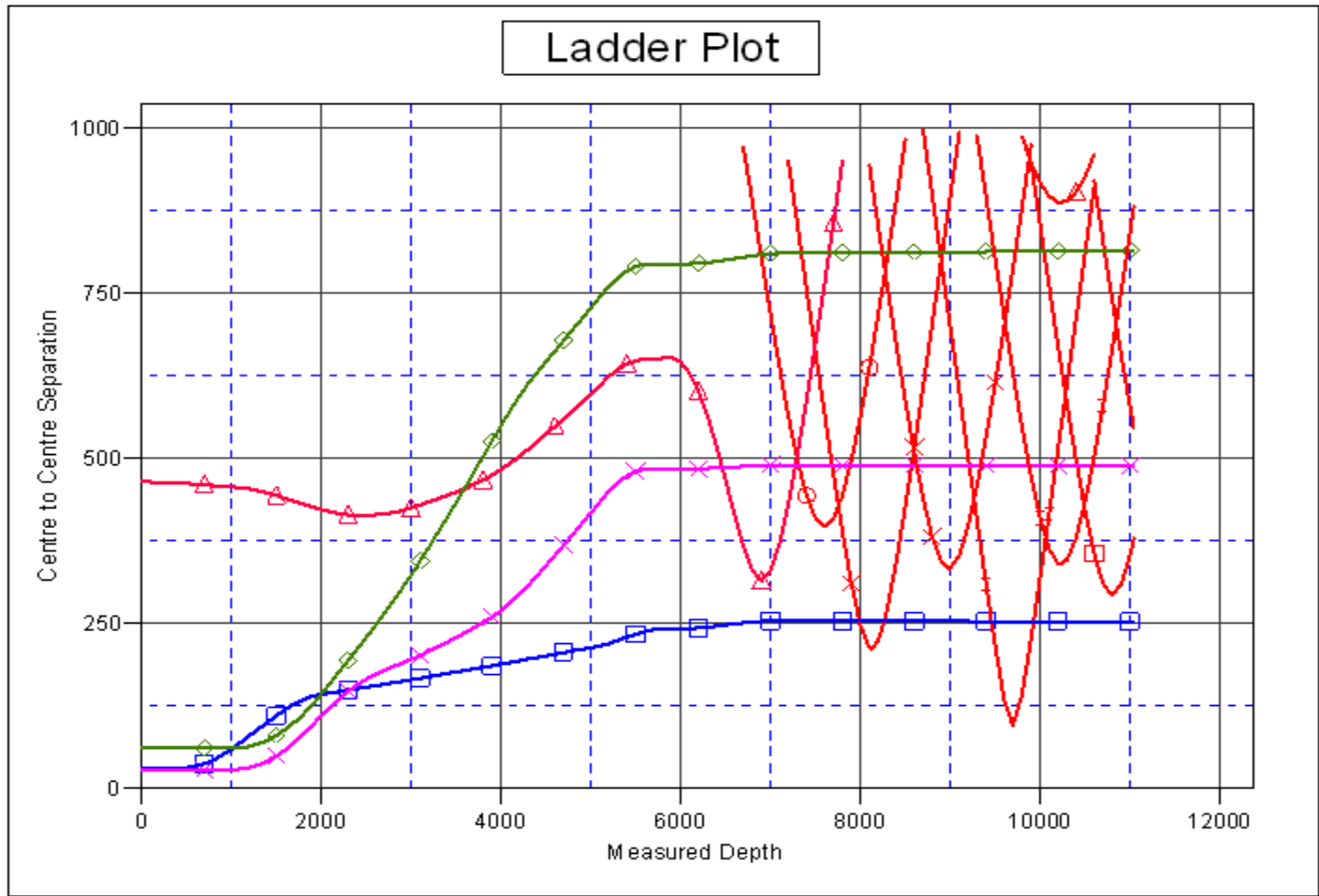
Offset Design													Offset Site Error:	0.0 ft
Survey Program: 140-MWD													Offset Well Error:	0.0 ft
Reference				Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
8,100.0	6,581.3	6,700.7	6,582.4	35.0	22.3	-91.31	2,428.3	-980.6	944.7	891.6	53.09	17.796		
8,200.0	6,580.3	6,699.6	6,581.3	36.7	22.3	-91.11	2,428.3	-980.6	851.9	797.1	54.83	15.539		
8,300.0	6,579.3	6,698.4	6,580.1	38.4	22.3	-90.92	2,428.3	-980.6	761.0	704.4	56.58	13.449		
8,400.0	6,578.4	6,697.3	6,579.0	40.2	22.3	-90.73	2,428.3	-980.6	672.6	614.2	58.36	11.526		
8,500.0	6,577.4	6,696.2	6,577.9	41.9	22.3	-90.54	2,428.3	-980.6	587.9	527.8	60.14	9.776		
8,600.0	6,576.5	6,695.1	6,576.8	43.7	22.3	-90.35	2,428.3	-980.6	508.9	446.9	61.94	8.215		
8,700.0	6,575.5	6,694.1	6,575.8	45.4	22.3	-90.17	2,428.3	-980.6	438.4	374.7	63.75	6.878		
8,800.0	6,574.5	6,693.0	6,574.7	47.2	22.3	-89.99	2,428.3	-980.6	381.4	315.9	65.56	5.818		
8,900.0	6,573.6	6,691.9	6,573.6	49.0	22.3	-89.80	2,428.3	-980.6	344.6	277.2	67.39	5.114		
8,983.6	6,572.8	6,691.1	6,572.8	50.5	22.3	-89.65	2,428.3	-980.6	334.3	265.4	68.92	4.851 CC, ES		
9,000.0	6,572.6	6,690.9	6,572.6	50.8	22.3	-89.63	2,428.3	-980.6	334.7	265.5	69.22	4.836 SF		
9,100.0	6,571.7	6,689.9	6,571.6	52.6	22.3	-89.45	2,428.3	-980.6	354.0	282.9	71.05	4.982		
9,200.0	6,570.7	6,688.8	6,570.5	54.4	22.3	-89.27	2,428.3	-980.6	398.2	325.3	72.89	5.463		
9,300.0	6,569.7	6,687.8	6,569.5	56.2	22.3	-89.10	2,428.3	-980.6	460.3	385.5	74.74	6.158		
9,400.0	6,568.8	6,686.8	6,568.5	58.1	22.3	-88.93	2,428.3	-980.5	534.0	457.4	76.59	6.972		
9,500.0	6,567.8	6,685.8	6,567.5	59.9	22.3	-88.76	2,428.3	-980.5	615.1	536.7	78.44	7.842		
9,600.0	6,566.9	6,684.8	6,566.5	61.8	22.2	-88.59	2,428.3	-980.5	701.2	620.9	80.30	8.732		
9,700.0	6,565.9	6,683.9	6,565.6	63.6	22.2	-88.42	2,428.3	-980.5	790.5	708.3	82.16	9.622		
9,800.0	6,564.9	6,682.9	6,564.6	65.4	22.2	-88.26	2,428.3	-980.5	882.1	798.1	84.02	10.499		
9,900.0	6,564.0	6,681.9	6,563.6	67.3	22.2	-88.09	2,428.3	-980.5	975.4	889.5	85.89	11.357		

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 Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4611.0ft (RKB - 13')
 Offset Depths are relative to Offset Datum
 Central Meridian is -105.500000 °

Coordinates are relative to: Ledford 22T-221
 Coordinate System is US State Plane 1983, Colorado Northern Zone
 Grid Convergence at Surface is: 0.63°



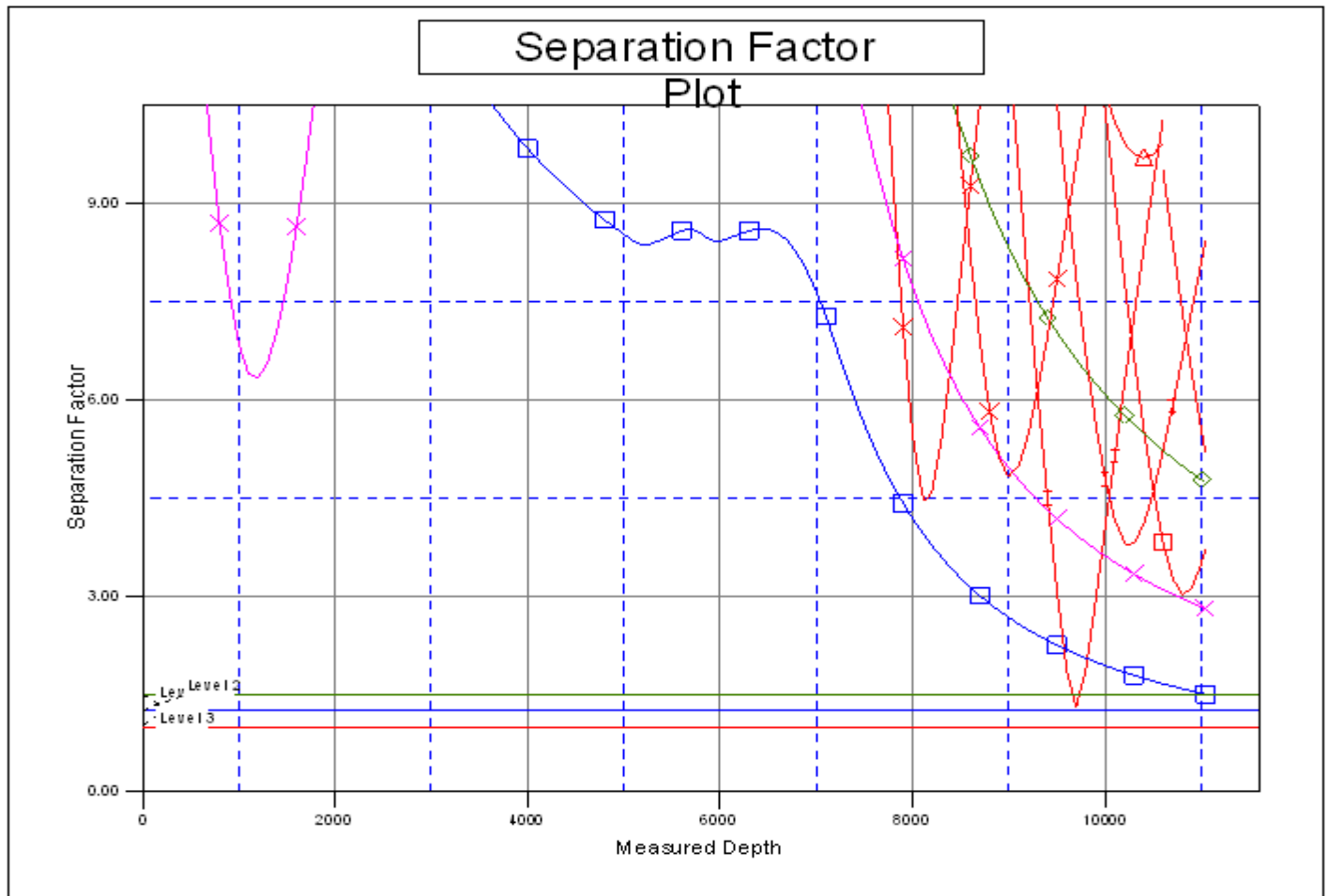
LEGEND

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|-------------------------------------------------|-----------------------------------------------------|----------------------------------------|
| (Exist.), Wellbore #1, Wellbore #1 VD | ▲ Doughman 22VD, Wellbore #1, Wellbore #1 VD | ✱ Ledford 22Y-341, Wellbore #1, Plan # |
| - B 22-23 (Exist.), Wellbore #1, Wellbore #1 VD | ■ Lucas #1 (Exist.), Wellbore #1, Wellbore #1 VD | ◆ Ledford 22Y-401, Wellbore #1, Plan # |
| - 22-9 (Exist.), Wellbore #1, Wellbore #1 VD | □ Doughman 22RD, Wellbore #1, Wellbore #1 VD | ✱ P&H 22SD, Wellbore #1, Wellbore #1 |
| - 22-16 (Exist.), Wellbore #1, Wellbore #1 VD | ■ Ledford 22T-321, Wellbore #1, Plan #2 (3-5-15) VD | ✱ P&H 22CD, Wellbore #1, Wellbore #1 |

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-221
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4611.0ft (RKB - 13')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4611.0ft (RKB - 13')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-221	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 (3-5-15)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4611.0ft (RKB - 13')
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000 °

Coordinates are relative to: Ledford 22T-221
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.63°



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|-------------------------------------------------|-----------------------------------------------------|----------------------------------------|
| (Exist.), Wellbore #1, Wellbore #1 VD | ▲ Doughman 22VD, Wellbore #1, Wellbore #1 VD | ✱ Ledford 22Y-341, Wellbore #1, Plan # |
| - B 22-23 (Exist.), Wellbore #1, Wellbore #1 VD | ■ Lucas #1 (Exist.), Wellbore #1, Wellbore #1 VD | ◆ Ledford 22Y-401, Wellbore #1, Plan # |
| - 22-9 (Exist.), Wellbore #1, Wellbore #1 VD | □ Doughman 22RD, Wellbore #1, Wellbore #1 VD | ✱ P&H 22SD, Wellbore #1, Wellbore #1 |
| - 22-16 (Exist.), Wellbore #1, Wellbore #1 VD | ■ Ledford 22T-321, Wellbore #1, Plan #2 (3-5-15) VD | ✱ P&H 22CD, Wellbore #1, Wellbore #1 |