

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Ledford 22Y-341**

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

0.0

+E/-W

0.0

Northing

1382195.78

Easting

3270959.85

Latitude

40.378450

Longitude

-104.527400

Slot

RKB - 13' WELL @ 4611.0ft (RKB - 13')

WELLBORE TARGET DETAILS				
	TVD	+N/-S	+E/-W	Shape
50'E/W Hardline (22Y-341)	1.0	2493.3	-181.1	Rectangle (Sides: L3939.1 W100.0)
SHL 299'FSL & 287'FEL	1.0	0.0	0.0	Point
BHL 500'FNL & 456'FEL	6623.0	4462.8	-181.1	Point

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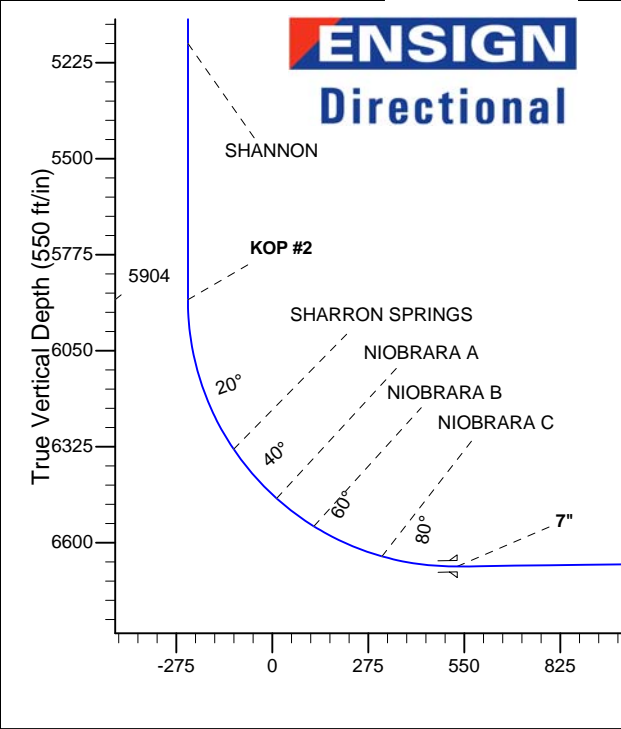
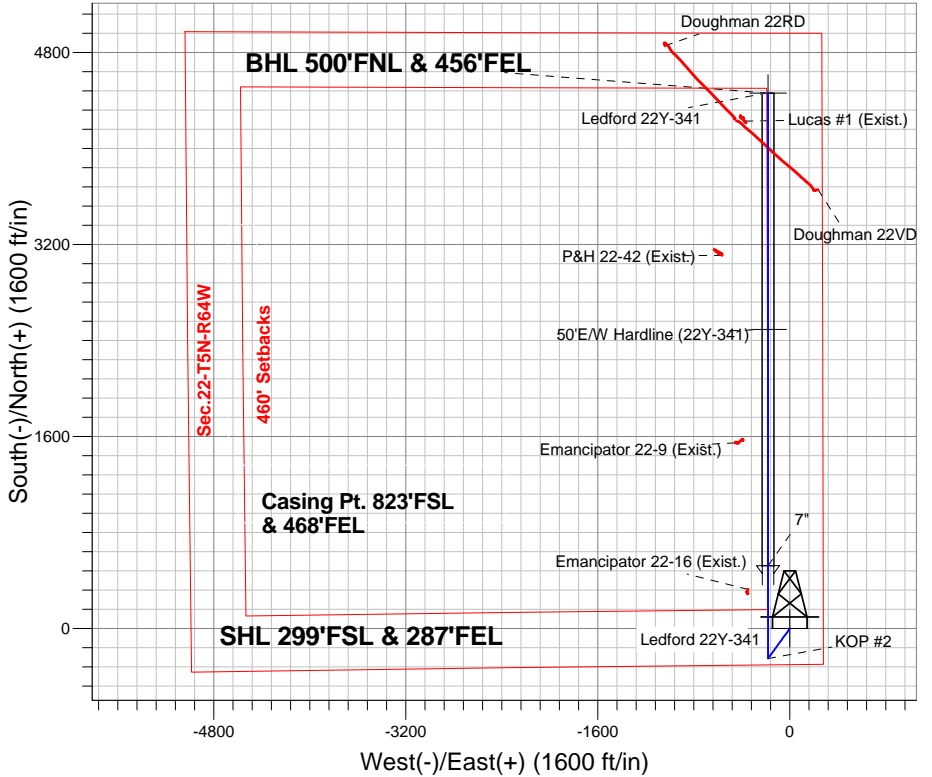
Azimuths to True North
Magnetic North: 8.23°

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

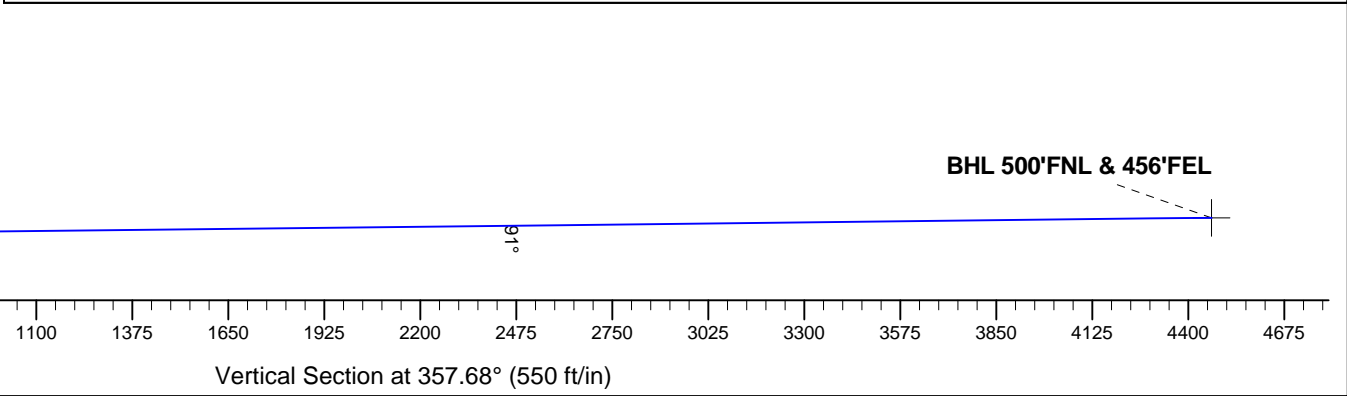
ANNOTATIONS

TVD	MD	Annotation
1800.0	1800.0	KOP #1
5903.8	5926.9	KOP #2

Ledford 22Y-HZ Pad Sec.22-T5N-R64W
Ledford 22Y-341
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	1800.0	0.00	0.00	1800.0	0.0	0.0	0.00	0.00	0.0	
3	2798.0	9.98	216.02	2793.0	-70.1	-51.0	1.00	216.02	-68.0	
4	3824.1	9.98	216.02	3803.5	-213.9	-155.6	0.00	0.00	-207.5	
5	4323.1	0.00	0.00	4300.0	-249.0	-181.1	2.00	180.00	-241.5	
6	5926.9	0.00	0.00	5903.8	-249.0	-181.1	0.00	0.00	-241.5	
7	7135.5	90.65	360.00	6667.7	523.6	-181.1	7.50	360.00	530.5	
8	11075.0	90.65	360.00	6623.0	4462.8	-181.1	0.00	0.00	4466.5	BHL 500'FNL & 456'FEL





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.22-T5N-R64W

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

Ledford 22Y-341

Wellbore #1

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

Standard Planning Report

09 March, 2015

Database:	Landmark	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 22Y-341					
Well Position	+N/-S	43.7 ft	Northing:	1,382,195.78 ft	Latitude:	40.378450
	+E/-W	41.8 ft	Easting:	3,270,959.85 ft	Longitude:	-104.527400
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	357.68

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	
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,798.0	9.98	216.02	2,793.0	-70.1	-51.0	1.00	1.00	0.00	216.02	
3,824.1	9.98	216.02	3,803.5	-213.9	-155.6	0.00	0.00	0.00	0.00	
4,323.1	0.00	0.00	4,300.0	-249.0	-181.1	2.00	-2.00	0.00	180.00	
5,926.9	0.00	0.00	5,903.8	-249.0	-181.1	0.00	0.00	0.00	0.00	
7,135.5	90.65	360.00	6,667.7	523.6	-181.1	7.50	7.50	0.00	360.00	
11,075.0	90.65	360.00	6,623.0	4,462.8	-181.1	0.00	0.00	0.00	0.00	BHL 500'FNL & 456

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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 22Y-341	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
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
1,900.0	1.00	216.02	1,900.0	-0.7	-0.5	-0.7	1.00	1.00	0.00
2,000.0	2.00	216.02	2,000.0	-2.8	-2.1	-2.7	1.00	1.00	0.00
2,100.0	3.00	216.02	2,099.9	-6.4	-4.6	-6.2	1.00	1.00	0.00
2,200.0	4.00	216.02	2,199.7	-11.3	-8.2	-10.9	1.00	1.00	0.00
2,300.0	5.00	216.02	2,299.4	-17.6	-12.8	-17.1	1.00	1.00	0.00
2,400.0	6.00	216.02	2,398.9	-25.4	-18.5	-24.6	1.00	1.00	0.00
2,500.0	7.00	216.02	2,498.3	-34.5	-25.1	-33.5	1.00	1.00	0.00
2,600.0	8.00	216.02	2,597.4	-45.1	-32.8	-43.7	1.00	1.00	0.00
2,700.0	9.00	216.02	2,696.3	-57.1	-41.5	-55.3	1.00	1.00	0.00
2,798.0	9.98	216.02	2,793.0	-70.1	-51.0	-68.0	1.00	1.00	0.00
2,800.0	9.98	216.02	2,794.9	-70.4	-51.2	-68.3	0.00	0.00	0.00
2,900.0	9.98	216.02	2,893.4	-84.4	-61.4	-81.9	0.00	0.00	0.00
3,000.0	9.98	216.02	2,991.9	-98.4	-71.6	-95.5	0.00	0.00	0.00
3,100.0	9.98	216.02	3,090.4	-112.4	-81.8	-109.0	0.00	0.00	0.00
3,200.0	9.98	216.02	3,188.9	-126.5	-92.0	-122.6	0.00	0.00	0.00
3,300.0	9.98	216.02	3,287.4	-140.5	-102.2	-136.2	0.00	0.00	0.00
3,400.0	9.98	216.02	3,385.9	-154.5	-112.3	-149.8	0.00	0.00	0.00
3,414.4	9.98	216.02	3,400.0	-156.5	-113.8	-151.8	0.00	0.00	0.00
PARKMAN									
3,500.0	9.98	216.02	3,484.3	-168.5	-122.5	-163.4	0.00	0.00	0.00
3,600.0	9.98	216.02	3,582.8	-182.5	-132.7	-177.0	0.00	0.00	0.00
3,700.0	9.98	216.02	3,681.3	-196.5	-142.9	-190.6	0.00	0.00	0.00
3,800.0	9.98	216.02	3,779.8	-210.6	-153.1	-204.2	0.00	0.00	0.00
3,824.1	9.98	216.02	3,803.5	-213.9	-155.6	-207.5	0.00	0.00	0.00
3,900.0	8.46	216.02	3,878.5	-223.8	-162.7	-217.0	2.00	-2.00	0.00
4,000.0	6.46	216.02	3,977.6	-234.3	-170.4	-227.2	2.00	-2.00	0.00
4,100.0	4.46	216.02	4,077.1	-242.0	-176.0	-234.6	2.00	-2.00	0.00
4,200.0	2.46	216.02	4,177.0	-246.9	-179.5	-239.4	2.00	-2.00	0.00
4,273.1	1.00	216.02	4,250.0	-248.6	-180.8	-241.1	2.00	-2.00	0.00
SUSSEX									
4,300.0	0.46	216.02	4,276.9	-248.9	-181.0	-241.4	2.00	-2.00	0.00
4,323.1	0.00	0.00	4,300.0	-249.0	-181.1	-241.5	2.00	-2.00	0.00
4,400.0	0.00	0.00	4,376.9	-249.0	-181.1	-241.5	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 22Y-341	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)
4,500.0	0.00	0.00	4,476.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
4,600.0	0.00	0.00	4,576.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
4,700.0	0.00	0.00	4,676.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
4,800.0	0.00	0.00	4,776.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
4,900.0	0.00	0.00	4,876.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,000.0	0.00	0.00	4,976.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,100.0	0.00	0.00	5,076.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,193.1	0.00	0.00	5,170.0	-249.0	-181.1	-241.5	0.00	0.00	0.00
SHANNON									
5,200.0	0.00	0.00	5,176.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,300.0	0.00	0.00	5,276.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,400.0	0.00	0.00	5,376.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,500.0	0.00	0.00	5,476.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,600.0	0.00	0.00	5,576.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,700.0	0.00	0.00	5,676.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,800.0	0.00	0.00	5,776.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,900.0	0.00	0.00	5,876.9	-249.0	-181.1	-241.5	0.00	0.00	0.00
5,926.9	0.00	0.00	5,903.8	-249.0	-181.1	-241.5	0.00	0.00	0.00
KOP #2									
6,000.0	5.48	360.00	5,976.8	-245.5	-181.1	-238.0	7.50	7.50	0.00
6,100.0	12.98	360.00	6,075.4	-229.5	-181.1	-221.9	7.50	7.50	0.00
6,200.0	20.48	360.00	6,171.1	-200.7	-181.1	-193.2	7.50	7.50	0.00
6,300.0	27.98	360.00	6,262.3	-159.7	-181.1	-152.2	7.50	7.50	0.00
6,381.4	34.09	360.00	6,332.0	-117.7	-181.1	-110.3	7.50	7.50	0.00
SHARRON SPRINGS									
6,400.0	35.48	360.00	6,347.2	-107.1	-181.1	-99.7	7.50	7.50	0.00
6,500.0	42.98	360.00	6,424.6	-43.9	-181.1	-36.5	7.50	7.50	0.00
6,569.1	48.17	360.00	6,473.0	5.4	-181.1	12.8	7.50	7.50	0.00
NIORBARA A									
6,600.0	50.48	360.00	6,493.1	28.9	-181.1	36.2	7.50	7.50	0.00
6,700.0	57.98	360.00	6,551.5	109.9	-181.1	117.2	7.50	7.50	0.00
6,702.8	58.19	360.00	6,553.0	112.3	-181.1	119.5	7.50	7.50	0.00
NIORBARA B									
6,800.0	65.48	360.00	6,598.9	197.9	-181.1	205.1	7.50	7.50	0.00
6,900.0	72.98	360.00	6,634.3	291.4	-181.1	298.5	7.50	7.50	0.00
6,916.7	74.23	360.00	6,639.0	307.4	-181.1	314.5	7.50	7.50	0.00
NIORBARA C									
7,000.0	80.48	360.00	6,657.2	388.6	-181.1	395.7	7.50	7.50	0.00
7,100.0	87.98	360.00	6,667.3	488.1	-181.1	495.0	7.50	7.50	0.00
7,135.5	90.65	360.00	6,667.7	523.6	-181.1	530.5	7.50	7.50	0.00
7"									
7,200.0	90.65	360.00	6,667.0	588.1	-181.1	594.9	0.01	0.01	0.00
7,300.0	90.65	360.00	6,665.8	688.1	-181.1	694.8	0.00	0.00	0.00
7,400.0	90.65	360.00	6,664.7	788.0	-181.1	794.7	0.00	0.00	0.00
7,500.0	90.65	360.00	6,663.6	888.0	-181.1	894.6	0.00	0.00	0.00
7,600.0	90.65	360.00	6,662.4	988.0	-181.1	994.6	0.00	0.00	0.00
7,700.0	90.65	360.00	6,661.3	1,088.0	-181.1	1,094.5	0.00	0.00	0.00
7,800.0	90.65	360.00	6,660.2	1,188.0	-181.1	1,194.4	0.00	0.00	0.00
7,900.0	90.65	360.00	6,659.0	1,288.0	-181.1	1,294.3	0.00	0.00	0.00
8,000.0	90.65	360.00	6,657.9	1,388.0	-181.1	1,394.2	0.00	0.00	0.00
8,100.0	90.65	360.00	6,656.7	1,488.0	-181.1	1,494.1	0.00	0.00	0.00
8,200.0	90.65	360.00	6,655.6	1,588.0	-181.1	1,594.0	0.00	0.00	0.00

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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)
8,300.0	90.65	360.00	6,654.5	1,688.0	-181.1	1,693.9	0.00	0.00	0.00
8,400.0	90.65	360.00	6,653.3	1,788.0	-181.1	1,793.9	0.00	0.00	0.00
8,500.0	90.65	360.00	6,652.2	1,888.0	-181.1	1,893.8	0.00	0.00	0.00
8,600.0	90.65	360.00	6,651.1	1,988.0	-181.1	1,993.7	0.00	0.00	0.00
8,700.0	90.65	360.00	6,649.9	2,088.0	-181.1	2,093.6	0.00	0.00	0.00
8,800.0	90.65	360.00	6,648.8	2,188.0	-181.1	2,193.5	0.00	0.00	0.00
8,900.0	90.65	360.00	6,647.7	2,287.9	-181.1	2,293.4	0.00	0.00	0.00
9,000.0	90.65	360.00	6,646.5	2,387.9	-181.1	2,393.3	0.00	0.00	0.00
9,100.0	90.65	360.00	6,645.4	2,487.9	-181.1	2,493.2	0.00	0.00	0.00
9,200.0	90.65	360.00	6,644.3	2,587.9	-181.1	2,593.1	0.00	0.00	0.00
9,300.0	90.65	360.00	6,643.1	2,687.9	-181.1	2,693.1	0.00	0.00	0.00
9,400.0	90.65	360.00	6,642.0	2,787.9	-181.1	2,793.0	0.00	0.00	0.00
9,500.0	90.65	360.00	6,640.9	2,887.9	-181.1	2,892.9	0.00	0.00	0.00
9,600.0	90.65	360.00	6,639.7	2,987.9	-181.1	2,992.8	0.00	0.00	0.00
9,700.0	90.65	360.00	6,638.6	3,087.9	-181.1	3,092.7	0.00	0.00	0.00
9,800.0	90.65	360.00	6,637.5	3,187.9	-181.1	3,192.6	0.00	0.00	0.00
9,900.0	90.65	360.00	6,636.3	3,287.9	-181.1	3,292.5	0.00	0.00	0.00
10,000.0	90.65	360.00	6,635.2	3,387.9	-181.1	3,392.4	0.00	0.00	0.00
10,100.0	90.65	360.00	6,634.1	3,487.9	-181.1	3,492.3	0.00	0.00	0.00
10,200.0	90.65	360.00	6,632.9	3,587.9	-181.1	3,592.3	0.00	0.00	0.00
10,300.0	90.65	360.00	6,631.8	3,687.9	-181.1	3,692.2	0.00	0.00	0.00
10,400.0	90.65	360.00	6,630.7	3,787.9	-181.1	3,792.1	0.00	0.00	0.00
10,500.0	90.65	360.00	6,629.5	3,887.8	-181.1	3,892.0	0.00	0.00	0.00
10,600.0	90.65	360.00	6,628.4	3,987.8	-181.1	3,991.9	0.00	0.00	0.00
10,700.0	90.65	360.00	6,627.3	4,087.8	-181.1	4,091.8	0.00	0.00	0.00
10,800.0	90.65	360.00	6,626.1	4,187.8	-181.1	4,191.7	0.00	0.00	0.00
10,900.0	90.65	360.00	6,625.0	4,287.8	-181.1	4,291.6	0.00	0.00	0.00
11,000.0	90.65	360.00	6,623.9	4,387.8	-181.1	4,391.5	0.00	0.00	0.00
11,075.0	90.65	360.00	6,623.0	4,462.8	-181.1	4,466.5	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 (22Y- - plan misses target center by 2499.8ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E) - Rectangle (sides W3,939.1 H100.0 D0.0)	0.00	0.00	1.0	2,493.3	-181.1	1,384,686.79	3,270,751.42	40.385294	-104.528050
BHL 500'FNL & 456'F - plan hits target center - Point	0.00	0.00	6,623.0	4,462.8	-181.1	1,386,656.16	3,270,729.85	40.390700	-104.528050
SHL 299'FSL & 287'F - plan hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,382,195.79	3,270,959.85	40.378450	-104.527400

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,135.5	6,667.7	7"	7	7-1/2	

Database:	Landmark	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 (°)	
3,414.4	3,400.0	PARKMAN		0.00		
4,273.1	4,250.0	SUSSEX		0.00		
5,193.1	5,170.0	SHANNON		0.00		
6,381.4	6,332.0	SHARRON SPRINGS		0.00		
6,569.1	6,473.0	NIOBRARA A		0.00		
6,702.8	6,553.0	NIOBRARA B		0.00		
6,916.7	6,639.0	NIOBRARA C		0.00		
	6,730.0	FT HAYS		0.00		

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
1,800.0	1,800.0	0.0	0.0	KOP #1	
5,926.9	5,903.8	-249.0	-181.1	KOP #2	



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.22-T5N-R64W

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

Ledford 22Y-341

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 22Y-341
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 22Y-341	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
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 1,000.0ft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic

Survey Tool Program		Date	3/11/2015		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.0	11,075.0	Plan #2 (3-5-15) (Wellbore #1)	MWD	MWD - Standard	

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Doughman 22VD Pad Sec.22-T5N-R64W						
Doughman 22RD - Wellbore #1 - Wellbore #1	11,075.7	6,705.0	948.0	842.6	9.001	CC, ES, SF
Doughman 22VD - Wellbore #1 - Wellbore #1	10,267.6	6,694.1	406.5	316.7	4.524	CC, ES
Doughman 22VD - Wellbore #1 - Wellbore #1	10,300.0	6,693.8	407.8	317.3	4.508	SF
Lucas #1 (Exist.) - Wellbore #1 - Wellbore #1	10,839.9	6,600.7	190.9	93.9	1.968	CC, ES, SF
Existing Wells Sec.22-T5N-R64W						
P&H 22-42 (Exist.) - Wellbore #1 - Wellbore #1	9,727.5	6,614.9	387.0	313.1	5.236	CC, ES
P&H 22-42 (Exist.) - Wellbore #1 - Wellbore #1	9,800.0	6,612.8	393.7	318.5	5.231	SF
Existing Wells Sec.22-T5N-R64W (Grid)						
Emancipator 22-16 (Exist.) - Wellbore #1 - Wellbore #1	6,937.2	6,635.4	168.0	139.8	5.955	CC, ES, SF
Emancipator 22-9 (Exist.) - Wellbore #1 - Wellbore #1	8,162.3	6,647.3	273.1	225.9	5.784	CC, ES
Emancipator 22-9 (Exist.) - Wellbore #1 - Wellbore #1	8,200.0	6,646.6	275.7	227.8	5.759	SF
Ledford 22Y-HZ Pad Sec.22-T5N-R64W						
Ledford 22T-221 - Wellbore #1 - Plan #2 (3-5-15)	1,000.0	1,000.0	29.3	25.0	6.860	CC, ES
Ledford 22T-221 - Wellbore #1 - Plan #2 (3-5-15)	11,075.7	11,040.1	489.7	315.0	2.804	SF
Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)	400.0	400.0	60.5	58.9	38.443	CC, ES
Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)	11,075.7	11,144.7	727.1	550.8	4.125	SF
Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)	1,800.0	1,802.0	32.1	24.2	4.079	CC, ES
Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)	11,075.7	11,155.6	329.9	163.3	1.980	SF

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								
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
11,000.0	6,623.9	6,708.0	6,611.0	86.3	20.2	-91.23	4,862.3	-1,041.0	982.2	878.3	103.88	9.455			
11,075.7	6,623.0	6,705.0	6,607.9	87.8	20.2	-91.03	4,862.4	-1,041.0	948.0	842.6	105.32	9.001	CC, ES, SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 22VD - Wellbore #1 - Wellbore #1												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	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)		
9,400.0	6,642.0	6,700.1	6,597.6	56.3	20.7	88.80	3,655.3	225.4	958.1	884.4	73.64	13.009	
9,500.0	6,640.9	6,699.4	6,596.9	58.1	20.7	88.70	3,655.3	225.4	868.5	793.0	75.50	11.504	
9,600.0	6,639.7	6,698.7	6,596.3	60.0	20.7	88.60	3,655.3	225.3	781.6	704.2	77.36	10.103	
9,700.0	6,638.6	6,698.0	6,595.6	61.9	20.7	88.51	3,655.3	225.3	698.1	618.9	79.22	8.812	
9,800.0	6,637.5	6,697.3	6,594.9	63.7	20.7	88.41	3,655.3	225.3	619.6	538.5	81.09	7.640	
9,900.0	6,636.3	6,696.6	6,594.2	65.6	20.7	88.31	3,655.3	225.3	548.0	465.1	82.96	6.606	
10,000.0	6,635.2	6,695.9	6,593.5	67.5	20.7	88.22	3,655.3	225.2	486.6	401.8	84.83	5.737	
10,100.0	6,634.1	6,695.2	6,592.8	69.3	20.7	88.12	3,655.3	225.2	439.7	353.0	86.70	5.071	
10,200.0	6,632.9	6,694.5	6,592.1	71.2	20.7	88.02	3,655.3	225.2	412.1	323.5	88.58	4.652	
10,267.6	6,632.2	6,694.1	6,591.7	72.5	20.7	87.95	3,655.3	225.2	406.5	316.7	89.85	4.524 CC, ES	
10,300.0	6,631.8	6,693.8	6,591.4	73.1	20.7	87.92	3,655.3	225.2	407.8	317.3	90.45	4.508 SF	
10,400.0	6,630.7	6,693.2	6,590.7	75.0	20.7	87.83	3,655.3	225.1	427.5	335.2	92.33	4.630	
10,500.0	6,629.5	6,692.5	6,590.0	76.9	20.7	87.73	3,655.2	225.1	468.3	374.0	94.21	4.970	
10,600.0	6,628.4	6,691.8	6,589.4	78.8	20.7	87.63	3,655.2	225.1	525.1	429.0	96.09	5.465	
10,700.0	6,627.3	6,691.1	6,588.7	80.7	20.7	87.53	3,655.2	225.1	593.5	495.5	97.98	6.058	
10,800.0	6,626.1	6,690.4	6,588.0	82.5	20.7	87.43	3,655.2	225.0	669.9	570.0	99.86	6.708	
10,900.0	6,625.0	6,689.7	6,587.3	84.4	20.7	87.34	3,655.2	225.0	751.8	650.1	101.74	7.389	
11,000.0	6,623.9	6,689.0	6,586.6	86.3	20.7	87.24	3,655.2	225.0	837.7	734.0	103.63	8.084	
11,075.7	6,623.0	6,688.5	6,586.1	87.8	20.7	87.16	3,655.2	225.0	904.6	799.6	105.05	8.611	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 - Lucas #1 (Exist.) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 100-MWD												Offset Well Error:	0.0 ft
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)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
9,900.0	6,636.3	6,582.1	6,580.5	65.6	13.7	-84.87	4,227.2	-372.0	959.0	879.9	79.04	12.133	
10,000.0	6,635.2	6,584.0	6,582.5	67.5	13.7	-85.45	4,227.3	-372.0	861.2	780.3	80.97	10.637	
10,100.0	6,634.1	6,586.0	6,584.4	69.3	13.7	-86.03	4,227.4	-372.0	764.1	681.2	82.89	9.218	
10,200.0	6,632.9	6,588.0	6,586.4	71.2	13.7	-86.62	4,227.4	-372.0	667.7	582.9	84.81	7.873	
10,300.0	6,631.8	6,589.9	6,588.4	73.1	13.7	-87.21	4,227.5	-372.0	572.6	485.9	86.73	6.602	
10,400.0	6,630.7	6,591.9	6,590.3	75.0	13.7	-87.80	4,227.5	-372.0	479.5	390.9	88.64	5.410	
10,500.0	6,629.5	6,593.9	6,592.3	76.9	13.8	-88.40	4,227.6	-372.0	389.8	299.3	90.55	4.305	
10,600.0	6,628.4	6,595.9	6,594.3	78.8	13.8	-89.00	4,227.7	-372.0	306.6	214.1	92.46	3.316	
10,700.0	6,627.3	6,597.9	6,596.3	80.7	13.8	-89.60	4,227.7	-372.0	236.7	142.3	94.36	2.508	
10,800.0	6,626.1	6,599.9	6,598.4	82.5	13.8	-90.21	4,227.8	-371.9	195.0	98.8	96.25	2.026	
10,839.9	6,625.7	6,600.7	6,599.2	83.3	13.8	-90.45	4,227.8	-371.9	190.9	93.9	97.00	1.968 CC, ES, SF	
10,900.0	6,625.0	6,601.9	6,600.3	84.4	13.8	-90.80	4,227.9	-371.9	200.1	102.0	98.13	2.039	
11,000.0	6,623.9	6,603.8	6,602.2	86.3	13.8	-91.37	4,227.9	-371.9	249.1	149.1	100.01	2.490	
11,075.7	6,623.0	6,605.2	6,603.6	87.8	13.8	-91.79	4,228.0	-371.9	303.3	201.9	101.42	2.990	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 - P&H 22-42 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 100-NS-GYRO-MS													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
8,900.0	6,647.7	6,638.7	6,636.5	47.1	11.6	-94.32	3,115.0	-567.7	913.2	854.8	58.44	15.627		
9,000.0	6,646.5	6,635.8	6,633.6	48.9	11.6	-93.90	3,115.1	-567.7	823.8	763.5	60.29	13.662		
9,100.0	6,645.4	6,632.9	6,630.7	50.7	11.6	-93.47	3,115.1	-567.8	737.0	674.9	62.16	11.857		
9,200.0	6,644.3	6,630.0	6,627.9	52.6	11.6	-93.05	3,115.2	-567.8	654.0	590.0	64.02	10.216		
9,300.0	6,643.1	6,627.2	6,625.0	54.4	11.6	-92.62	3,115.2	-567.8	576.5	510.6	65.89	8.749		
9,400.0	6,642.0	6,624.3	6,622.1	56.3	11.6	-92.19	3,115.3	-567.9	506.9	439.1	67.76	7.480		
9,500.0	6,640.9	6,621.4	6,619.2	58.1	11.6	-91.77	3,115.3	-567.9	448.9	379.2	69.64	6.446		
9,600.0	6,639.7	6,618.5	6,616.3	60.0	11.6	-91.34	3,115.4	-568.0	407.4	335.9	71.51	5.697		
9,700.0	6,638.6	6,615.6	6,613.5	61.9	11.6	-90.92	3,115.4	-568.0	388.0	314.6	73.39	5.286		
9,727.5	6,638.3	6,614.9	6,612.7	62.4	11.6	-90.80	3,115.4	-568.0	387.0	313.1	73.90	5.236 CC, ES		
9,800.0	6,637.5	6,612.8	6,610.6	63.7	11.6	-90.49	3,115.5	-568.0	393.7	318.5	75.26	5.231 SF		
9,900.0	6,636.3	6,609.9	6,607.7	65.6	11.6	-90.06	3,115.5	-568.1	423.7	346.5	77.14	5.492		
10,000.0	6,635.2	6,607.0	6,604.8	67.5	11.6	-89.64	3,115.6	-568.1	473.2	394.2	79.01	5.989		
10,100.0	6,634.1	6,604.1	6,601.9	69.3	11.6	-89.21	3,115.6	-568.2	537.0	456.2	80.89	6.639		
10,200.0	6,632.9	6,601.2	6,599.1	71.2	11.6	-88.78	3,115.7	-568.2	610.6	527.9	82.76	7.378		
10,300.0	6,631.8	6,598.4	6,596.2	73.1	11.6	-88.36	3,115.7	-568.2	690.8	606.2	84.63	8.163		
10,400.0	6,630.7	6,595.5	6,593.3	75.0	11.6	-87.93	3,115.8	-568.3	775.7	689.2	86.49	8.968		
10,500.0	6,629.5	6,592.6	6,590.5	76.9	11.6	-87.51	3,115.8	-568.3	863.7	775.4	88.36	9.776		
10,600.0	6,628.4	6,589.8	6,587.6	78.8	11.6	-87.09	3,115.9	-568.4	954.2	863.9	90.22	10.576		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
0.0	0.0	0.0	0.0	0.0	0.0	-50.05	298.7	-356.6	465.3					
100.0	100.0	91.7	91.7	0.1	0.1	-50.06	298.5	-356.5	465.0	464.7	0.23	1,986.137		
200.0	200.0	190.0	190.0	0.3	0.4	-50.09	298.0	-356.3	464.5	463.8	0.69	669.712		
300.0	300.0	291.7	291.7	0.6	0.6	-50.12	297.6	-356.2	464.2	463.0	1.17	397.886		
400.0	400.0	392.9	392.9	0.8	0.9	-50.15	297.0	-355.8	463.5	461.8	1.65	280.931		
500.0	500.0	492.8	492.8	1.0	1.1	-50.19	296.2	-355.4	462.6	460.5	2.14	216.309		
600.0	600.0	592.6	592.6	1.2	1.4	-50.24	295.4	-355.0	461.8	459.2	2.63	175.733		
700.0	700.0	693.6	693.6	1.5	1.6	-50.24	294.8	-354.3	460.9	457.8	3.10	148.789		
800.0	800.0	795.2	795.2	1.7	1.9	-50.20	294.3	-353.2	459.8	456.2	3.56	129.020		
900.0	900.0	894.7	894.7	1.9	2.1	-50.15	293.8	-351.9	458.5	454.4	4.03	113.834		
1,000.0	1,000.0	992.1	992.0	2.1	2.3	-50.14	293.2	-351.2	457.5	453.0	4.48	102.049		
1,100.0	1,100.0	1,091.7	1,091.7	2.4	2.6	-50.22	292.3	-351.1	456.9	452.0	4.95	92.337		
1,200.0	1,200.0	1,193.2	1,193.1	2.6	2.8	-50.26	291.6	-350.8	456.2	450.7	5.42	84.122		
1,300.0	1,300.0	1,293.5	1,293.5	2.8	3.1	-50.23	291.2	-349.9	455.2	449.3	5.89	77.240		
1,400.0	1,400.0	1,390.8	1,390.8	3.0	3.3	-50.20	290.9	-349.2	454.5	448.1	6.36	71.486		
1,500.0	1,500.0	1,491.9	1,491.8	3.3	3.6	-50.20	290.6	-348.8	454.0	447.2	6.84	66.346		
1,600.0	1,600.0	1,591.8	1,591.8	3.5	3.8	-50.22	290.1	-348.5	453.4	446.1	7.33	61.849		
1,671.9	1,671.9	1,661.0	1,660.9	3.6	3.9	-50.24	289.8	-348.4	453.2	445.6	7.59	59.717		
1,700.0	1,700.0	1,687.8	1,687.8	3.7	4.0	-50.24	289.9	-348.4	453.2	445.5	7.68	58.976		
1,800.0	1,800.0	1,786.6	1,786.6	3.9	4.0	-50.24	290.1	-348.7	453.6	445.7	7.93	57.239		
1,900.0	1,900.0	1,885.0	1,884.9	4.1	4.0	93.83	290.6	-349.3	454.4	446.3	8.14	55.825		
2,000.0	2,000.0	1,987.4	1,987.4	4.3	4.0	94.19	291.2	-349.7	455.3	446.9	8.36	54.479		
2,100.0	2,099.9	2,082.8	2,082.8	4.5	4.1	94.73	291.8	-350.1	456.4	447.8	8.59	53.108		
2,200.0	2,199.7	2,183.6	2,183.5	4.7	4.2	95.53	293.0	-350.8	458.3	449.4	8.85	51.785		
2,300.0	2,299.4	2,283.1	2,283.0	4.9	4.3	96.59	294.4	-351.1	460.2	451.1	9.13	50.401		
2,400.0	2,398.9	2,380.2	2,380.1	5.1	4.4	97.82	296.0	-351.4	462.8	453.4	9.43	49.060		
2,500.0	2,498.3	2,481.1	2,481.0	5.3	4.5	99.32	297.9	-351.8	466.1	456.4	9.77	47.731		
2,600.0	2,597.4	2,582.1	2,582.0	5.5	4.6	100.98	299.3	-351.9	469.6	459.4	10.13	46.349		
2,700.0	2,696.3	2,680.6	2,680.5	5.8	4.7	102.78	300.6	-351.9	473.6	463.1	10.52	45.023		
2,800.0	2,794.9	2,778.8	2,778.6	6.1	4.9	104.70	301.8	-352.1	478.7	467.7	10.93	43.793		
2,900.0	2,893.4	2,874.3	2,874.1	6.4	5.0	106.70	303.4	-352.2	484.8	473.4	11.36	42.674		
3,000.0	2,991.9	2,974.7	2,974.5	6.7	5.2	108.75	305.2	-352.5	491.8	480.0	11.82	41.620		
3,100.0	3,090.4	3,073.1	3,072.9	7.0	5.4	110.71	306.7	-352.5	499.0	486.7	12.28	40.634		
3,200.0	3,188.9	3,174.2	3,174.0	7.3	5.5	112.58	307.7	-353.0	506.6	493.8	12.75	39.743		
3,300.0	3,287.4	3,274.6	3,274.4	7.6	5.7	114.36	308.0	-353.4	514.1	500.9	13.21	38.927		
3,400.0	3,385.9	3,375.1	3,374.9	8.0	5.9	116.05	308.0	-353.9	521.8	508.1	13.66	38.207		
3,500.0	3,484.3	3,476.4	3,476.2	8.3	6.0	117.70	307.5	-354.3	529.4	515.3	14.11	37.530		
3,600.0	3,582.8	3,572.9	3,572.7	8.6	6.2	119.17	306.6	-355.1	537.3	522.8	14.56	36.906		
3,700.0	3,681.3	3,671.3	3,671.1	9.0	6.3	120.66	306.3	-355.7	546.0	531.0	15.02	36.356		
3,800.0	3,779.8	3,771.3	3,771.0	9.4	6.5	122.10	305.7	-356.6	554.9	539.4	15.49	35.832		
3,900.0	3,878.5	3,867.4	3,867.2	9.7	6.7	123.52	305.2	-357.0	563.5	547.6	15.93	35.366		
4,000.0	3,977.6	3,966.6	3,966.4	9.9	6.8	124.77	305.5	-356.6	571.0	554.7	16.34	34.936		
4,100.0	4,077.1	4,064.6	4,064.4	10.2	7.0	125.73	305.9	-355.6	576.6	559.9	16.74	34.442		
4,200.0	4,177.0	4,164.9	4,164.6	10.4	7.2	126.43	306.8	-354.2	580.6	563.4	17.13	33.894		
4,300.0	4,276.9	4,262.1	4,261.9	10.6	7.4	126.80	307.5	-353.0	582.4	564.9	17.50	33.283		
4,400.0	4,376.9	4,361.6	4,361.3	10.8	7.6	-17.03	308.8	-351.9	583.3	565.5	17.87	32.646		
4,500.0	4,476.9	4,464.3	4,464.0	11.0	7.8	-16.95	309.5	-351.2	583.9	565.6	18.26	31.979		
4,600.0	4,576.9	4,565.0	4,564.7	11.1	8.0	-16.92	309.8	-351.0	584.1	565.5	18.65	31.320		
4,700.0	4,676.9	4,662.9	4,662.6	11.3	8.2	-16.91	310.2	-351.0	584.4	565.4	19.04	30.703		
4,800.0	4,776.9	4,761.2	4,761.0	11.5	8.4	-16.89	310.9	-351.1	585.2	565.8	19.42	30.130		
4,900.0	4,876.9	4,862.8	4,862.6	11.7	8.6	-16.87	311.7	-351.2	586.0	566.2	19.82	29.563		

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 22Y-341
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 22Y-341	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						
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)		
5,000.0	4,976.9	4,963.4	4,963.2	11.9	8.8	-16.85	312.3	-351.0	586.4	566.2	20.23	28.993	
5,100.0	5,076.9	5,062.3	5,062.0	12.1	9.0	-16.82	312.9	-350.9	587.0	566.4	20.63	28.451	
5,200.0	5,176.9	5,159.5	5,159.3	12.2	9.2	-16.81	313.7	-351.0	587.8	566.8	21.03	27.952	
5,300.0	5,276.9	5,261.7	5,261.4	12.4	9.4	-16.83	314.7	-351.6	589.0	567.6	21.43	27.491	
5,400.0	5,376.9	5,364.7	5,364.4	12.6	9.6	-16.88	315.0	-352.3	589.4	567.6	21.80	27.037	
5,500.0	5,476.9	5,464.2	5,463.9	12.8	9.7	-16.94	315.1	-352.8	589.7	567.5	22.17	26.596	
5,600.0	5,576.9	5,564.1	5,563.8	13.0	9.9	-16.96	315.4	-353.2	590.0	567.5	22.56	26.150	
5,700.0	5,676.9	5,665.2	5,664.9	13.2	10.1	-16.96	315.6	-353.3	590.3	567.4	22.98	25.691	
5,800.0	5,776.9	5,761.9	5,761.6	13.4	10.4	-16.95	316.0	-353.2	590.6	567.2	23.39	25.249	
5,900.0	5,876.9	5,859.2	5,858.9	13.6	10.6	-16.89	317.1	-353.0	591.7	567.9	23.81	24.850	
6,000.0	5,976.8	5,957.8	5,957.5	13.8	10.8	-16.98	318.5	-352.8	589.6	565.5	24.12	24.442	
6,100.0	6,075.4	6,054.9	6,054.6	13.9	11.0	-17.66	320.2	-352.3	575.8	551.7	24.10	23.894	
6,200.0	6,171.1	6,151.7	6,151.4	14.0	11.2	-19.13	322.1	-352.0	550.1	526.3	23.76	23.149	
6,300.0	6,262.3	6,245.9	6,245.5	14.0	11.4	-21.67	323.5	-351.7	512.5	489.3	23.17	22.115	
6,400.0	6,347.2	6,332.5	6,332.2	14.0	11.6	-25.72	324.5	-351.5	464.1	441.6	22.48	20.648	
6,500.0	6,424.6	6,410.5	6,410.2	14.1	11.8	-31.99	325.4	-351.3	406.6	384.6	21.98	18.499	
6,600.0	6,493.1	6,480.5	6,480.1	14.1	12.0	-41.67	326.2	-350.8	342.4	320.1	22.29	15.361	
6,700.0	6,551.5	6,541.6	6,541.2	14.4	12.1	-55.93	326.7	-350.2	275.0	251.0	23.98	11.468	
6,800.0	6,598.9	6,590.7	6,590.3	14.9	12.2	-73.07	326.9	-349.6	212.2	185.9	26.36	8.051	
6,900.0	6,634.3	6,625.6	6,625.2	15.7	12.3	-87.10	326.8	-349.2	171.8	143.9	27.85	6.168	
6,937.2	6,644.3	6,635.4	6,635.0	16.0	12.3	-90.59	326.8	-349.1	168.0	139.8	28.21	5.955 CC, ES, SF	
7,000.0	6,657.2	6,648.0	6,647.6	16.6	12.3	-93.94	326.8	-348.9	178.9	150.2	28.72	6.230	
7,100.0	6,667.3	6,657.8	6,657.4	17.6	12.3	-92.33	326.8	-348.9	232.8	202.9	29.83	7.803	
7,200.0	6,667.0	6,657.4	6,657.0	18.8	12.3	-89.34	326.8	-348.9	310.5	279.5	31.06	9.999	
7,300.0	6,665.8	6,656.1	6,655.7	20.1	12.3	-88.90	326.8	-348.9	398.4	366.0	32.35	12.313	
7,400.0	6,664.7	6,654.8	6,654.4	21.5	12.3	-88.46	326.8	-348.9	490.9	457.1	33.74	14.547	
7,500.0	6,663.6	6,653.5	6,653.1	23.0	12.3	-88.03	326.8	-348.9	585.8	550.6	35.20	16.640	
7,600.0	6,662.4	6,652.3	6,651.9	24.5	12.3	-87.59	326.8	-348.9	682.2	645.5	36.73	18.575	
7,700.0	6,661.3	6,651.0	6,650.6	26.1	12.3	-87.16	326.8	-348.9	779.5	741.2	38.30	20.353	
7,800.0	6,660.2	6,650.0	6,649.6	27.7	12.3	-86.82	326.8	-348.9	877.5	837.5	39.92	21.983	
7,900.0	6,659.0	6,648.4	6,648.1	29.4	12.3	-86.29	326.8	-348.9	975.8	934.2	41.56	23.480	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)		
7,300.0	6,665.8	6,664.3	6,663.1	20.1	13.5	-93.15	1,550.1	-454.3	904.3	870.9	33.40	27.071	
7,400.0	6,664.7	6,662.3	6,661.1	21.5	13.5	-92.74	1,550.1	-454.2	809.6	774.7	34.81	23.259	
7,500.0	6,663.6	6,660.3	6,659.1	23.0	13.5	-92.33	1,550.1	-454.2	716.2	679.9	36.28	19.739	
7,600.0	6,662.4	6,658.4	6,657.2	24.5	13.5	-91.91	1,550.1	-454.2	625.0	587.1	37.82	16.523	
7,700.0	6,661.3	6,656.4	6,655.2	26.1	13.5	-91.50	1,550.1	-454.2	536.8	497.4	39.42	13.619	
7,800.0	6,660.2	6,654.5	6,653.2	27.7	13.5	-91.09	1,550.2	-454.2	453.6	412.5	41.05	11.050	
7,900.0	6,659.0	6,652.5	6,651.3	29.4	13.5	-90.68	1,550.2	-454.2	378.6	335.9	42.71	8.863	
8,000.0	6,657.9	6,650.5	6,649.3	31.1	13.5	-90.27	1,550.2	-454.2	317.6	273.2	44.41	7.152	
8,100.0	6,656.7	6,648.6	6,647.4	32.8	13.4	-89.86	1,550.2	-454.2	280.1	234.0	46.13	6.072	
8,162.3	6,656.0	6,647.3	6,646.1	33.9	13.4	-89.60	1,550.2	-454.1	273.1	225.9	47.21	5.784 CC, ES	
8,200.0	6,655.6	6,646.6	6,645.4	34.5	13.4	-89.44	1,550.2	-454.1	275.7	227.8	47.87	5.759 SF	
8,300.0	6,654.5	6,644.6	6,643.4	36.3	13.4	-89.03	1,550.2	-454.1	305.8	256.2	49.62	6.164	
8,400.0	6,653.3	6,642.7	6,641.5	38.0	13.4	-88.62	1,550.3	-454.1	362.0	310.7	51.39	7.046	
8,500.0	6,652.2	6,640.7	6,639.5	39.8	13.4	-88.21	1,550.3	-454.1	434.3	381.1	53.17	8.169	
8,600.0	6,651.1	6,638.8	6,637.5	41.6	13.4	-87.80	1,550.3	-454.1	515.9	460.9	54.95	9.388	
8,700.0	6,649.9	6,636.8	6,635.6	43.4	13.4	-87.39	1,550.3	-454.1	603.0	546.3	56.75	10.627	
8,800.0	6,648.8	8,800.0	6,633.6	45.2	17.9	-86.98	1,550.3	-454.1	693.6	630.7	62.98	11.013	
8,900.0	6,647.7	6,632.9	6,631.7	47.1	13.4	-86.57	1,550.3	-454.0	786.5	726.2	60.35	13.033	
9,000.0	6,646.5	6,630.9	6,629.7	48.9	13.4	-86.16	1,550.4	-454.0	881.0	818.8	62.16	14.173	
9,100.0	6,645.4	6,628.9	6,627.7	50.7	13.4	-85.74	1,550.4	-454.0	976.5	912.6	63.97	15.266	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-138.26	-138.26	-21.9	-19.5	29.3				
100.0	100.0	100.0	100.0	0.1	0.1	-138.26	-138.26	-21.9	-19.5	29.3	29.1	0.22	130.333	
200.0	200.0	200.0	200.0	0.3	0.3	-138.26	-138.26	-21.9	-19.5	29.3	28.6	0.67	43.444	
300.0	300.0	300.0	300.0	0.6	0.6	-138.26	-138.26	-21.9	-19.5	29.3	28.2	1.12	26.067	
400.0	400.0	400.0	400.0	0.8	0.8	-138.26	-138.26	-21.9	-19.5	29.3	27.7	1.57	18.619	
500.0	500.0	500.0	500.0	1.0	1.0	-138.26	-138.26	-21.9	-19.5	29.3	27.3	2.02	14.481	
600.0	600.0	600.0	600.0	1.2	1.2	-138.26	-138.26	-21.9	-19.5	29.3	26.8	2.47	11.848	
700.0	700.0	700.0	700.0	1.5	1.5	-138.26	-138.26	-21.9	-19.5	29.3	26.4	2.92	10.026	
800.0	800.0	800.0	800.0	1.7	1.7	-138.26	-138.26	-21.9	-19.5	29.3	25.9	3.37	8.689	
900.0	900.0	900.0	900.0	1.9	1.9	-138.26	-138.26	-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	-138.26	-138.26	-21.9	-19.5	29.3	25.0	4.27	6.860 CC, ES	
1,100.0	1,100.0	1,099.5	1,099.5	2.4	2.3	-137.48	-137.48	-22.2	-20.3	30.1	25.4	4.70	6.395	
1,200.0	1,200.0	1,199.0	1,199.0	2.6	2.5	-135.36	-135.36	-23.0	-22.8	32.4	27.3	5.12	6.330	
1,300.0	1,300.0	1,298.4	1,298.3	2.8	2.7	-132.45	-132.45	-24.5	-26.8	36.4	30.8	5.54	6.561	
1,400.0	1,400.0	1,397.6	1,397.2	3.0	2.9	-129.30	-129.30	-26.6	-32.5	42.0	36.1	5.97	7.037	
1,500.0	1,500.0	1,496.5	1,495.9	3.3	3.2	-126.34	-126.34	-29.2	-39.7	49.5	43.1	6.41	7.714	
1,600.0	1,600.0	1,595.2	1,594.1	3.5	3.4	-123.74	-123.74	-32.4	-48.5	58.7	51.8	6.86	8.553	
1,700.0	1,700.0	1,693.5	1,691.8	3.7	3.6	-121.57	-121.57	-36.2	-58.9	69.6	62.3	7.31	9.522	
1,800.0	1,800.0	1,791.3	1,788.8	3.9	3.9	-119.78	-119.78	-40.5	-70.8	82.3	74.5	7.77	10.592	
1,900.0	1,900.0	1,888.9	1,885.3	4.1	4.2	-25.81	-25.81	-45.4	-84.2	96.0	87.8	8.12	11.824	
2,000.0	2,000.0	1,986.1	1,981.3	4.3	4.5	27.52	27.52	-50.8	-99.1	109.8	101.3	8.51	12.908	
2,100.0	2,099.9	2,084.5	2,078.1	4.5	4.8	29.29	29.29	-56.7	-115.3	123.5	114.6	8.91	13.867	
2,200.0	2,199.7	2,183.7	2,175.7	4.7	5.2	31.08	31.08	-62.7	-131.7	135.9	126.6	9.31	14.593	
2,300.0	2,299.4	2,282.9	2,273.4	4.9	5.5	32.94	32.94	-68.7	-148.2	147.0	137.3	9.73	15.108	
2,400.0	2,398.9	2,382.3	2,371.2	5.1	5.9	34.89	34.89	-74.7	-164.7	156.8	146.6	10.15	15.439	
2,500.0	2,498.3	2,481.8	2,469.1	5.3	6.2	36.97	36.97	-80.7	-181.2	165.3	154.7	10.59	15.608	
2,600.0	2,597.4	2,581.3	2,567.1	5.5	6.6	39.20	39.20	-86.7	-197.7	172.7	161.7	11.05	15.635	
2,700.0	2,696.3	2,680.8	2,665.0	5.8	7.0	41.62	41.62	-92.7	-214.2	179.1	167.6	11.53	15.538	
2,800.0	2,794.9	2,780.3	2,763.0	6.1	7.4	44.24	44.24	-98.7	-230.7	184.5	172.5	12.03	15.331	
2,900.0	2,893.4	2,879.7	2,860.9	6.4	7.7	46.92	46.92	-104.7	-247.2	189.7	177.1	12.58	15.077	
3,000.0	2,991.9	2,979.2	2,958.8	6.7	8.1	49.46	49.46	-110.6	-263.7	195.3	182.2	13.16	14.844	
3,100.0	3,090.4	3,078.7	3,056.7	7.0	8.5	51.85	51.85	-116.6	-280.2	201.3	187.5	13.76	14.630	
3,200.0	3,188.9	3,178.2	3,154.6	7.3	8.9	54.10	54.10	-122.6	-296.7	207.6	193.2	14.38	14.433	
3,300.0	3,287.4	3,277.7	3,252.5	7.6	9.3	56.22	56.22	-128.6	-313.2	214.2	199.2	15.03	14.252	
3,400.0	3,385.9	3,377.1	3,350.5	8.0	9.7	58.20	58.20	-134.6	-329.7	221.1	205.4	15.70	14.085	
3,500.0	3,484.3	3,476.6	3,448.4	8.3	10.1	60.07	60.07	-140.6	-346.2	228.2	211.8	16.38	13.932	
3,600.0	3,582.8	3,576.1	3,546.3	8.6	10.5	61.82	61.82	-146.6	-362.7	235.6	218.5	17.08	13.793	
3,700.0	3,681.3	3,675.6	3,644.2	9.0	10.9	63.47	63.47	-152.6	-379.2	243.1	225.3	17.79	13.665	
3,800.0	3,779.8	3,775.0	3,742.1	9.4	11.3	65.01	65.01	-158.6	-395.7	250.9	232.4	18.52	13.548	
3,900.0	3,878.5	3,874.5	3,840.0	9.7	11.7	66.38	66.38	-164.6	-412.2	259.2	240.0	19.22	13.490	
4,000.0	3,977.6	3,974.0	3,938.0	9.9	12.1	67.06	67.06	-170.6	-428.7	269.0	249.1	19.82	13.573	
4,100.0	4,077.1	4,073.4	4,035.8	10.2	12.5	67.07	67.07	-176.6	-445.1	280.1	259.7	20.35	13.762	
4,200.0	4,177.0	4,172.5	4,133.4	10.4	12.9	66.49	66.49	-182.6	-461.6	292.6	271.7	20.82	14.055	
4,300.0	4,276.9	4,271.3	4,230.6	10.6	13.3	65.40	65.40	-188.6	-478.0	306.5	285.3	21.21	14.452	
4,400.0	4,376.9	4,369.7	4,327.5	10.8	13.7	-80.13	-80.13	-194.5	-494.3	321.7	300.2	21.56	14.924	
4,500.0	4,476.9	4,468.2	4,424.4	11.0	14.1	-81.62	-81.62	-200.4	-510.6	337.2	315.3	21.91	15.390	
4,600.0	4,576.9	4,566.6	4,521.3	11.1	14.5	-82.97	-82.97	-206.4	-526.9	352.9	330.6	22.27	15.845	
4,700.0	4,676.9	4,665.0	4,618.1	11.3	14.8	-84.22	-84.22	-212.3	-543.3	368.8	346.1	22.64	16.288	
4,800.0	4,776.9	4,763.5	4,715.0	11.5	15.2	-85.36	-85.36	-218.2	-559.6	384.8	361.8	23.01	16.720	
4,900.0	4,876.9	4,861.9	4,811.9	11.7	15.6	-86.40	-86.40	-224.2	-575.9	400.9	377.5	23.39	17.138	
5,000.0	4,976.9	4,960.3	4,908.8	11.9	16.0	-87.37	-87.37	-230.1	-592.2	417.2	393.4	23.78	17.545	

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 22Y-341
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 22Y-341	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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)						
5,100.0	5,076.9	5,058.7	5,005.7	12.1	16.4	-88.27	-236.1	-608.6	433.6	409.4	24.17	17.938		
5,200.0	5,176.9	5,158.6	5,104.0	12.2	16.8	-89.11	-242.1	-625.1	450.0	425.5	24.57	18.319		
5,300.0	5,276.9	5,274.8	5,218.8	12.4	17.2	-89.89	-248.2	-641.8	464.4	439.5	24.95	18.615		
5,400.0	5,376.9	5,392.3	5,335.6	12.6	17.5	-90.45	-252.7	-654.3	475.0	449.7	25.33	18.754		
5,500.0	5,476.9	5,510.8	5,453.7	12.8	17.7	-90.78	-255.6	-662.2	481.8	456.1	25.72	18.736		
5,600.0	5,576.9	5,629.7	5,572.5	13.0	17.9	-90.92	-256.8	-665.6	484.7	458.6	26.11	18.564		
5,700.0	5,676.9	5,734.1	5,676.9	13.2	18.0	-90.93	-256.9	-665.8	484.8	458.3	26.49	18.299		
5,800.0	5,776.9	5,834.1	5,776.9	13.4	18.2	-90.93	-256.9	-665.8	484.8	457.9	26.87	18.042		
5,900.0	5,876.9	5,934.5	5,877.3	13.6	18.3	-90.73	-255.2	-665.8	484.7	457.5	27.26	17.785		
5,976.1	5,953.0	6,010.7	5,953.0	13.7	18.4	-90.02	-246.4	-665.8	484.7	457.2	27.55	17.596		
6,000.0	5,976.8	6,034.2	5,976.1	13.8	18.4	-89.60	-242.2	-665.8	484.7	457.1	27.65	17.533		
6,100.0	6,075.4	6,132.7	6,071.2	13.9	18.4	-88.43	-216.8	-665.8	484.9	457.0	27.92	17.367		
6,200.0	6,171.1	6,229.9	6,161.1	14.0	18.5	-87.29	-180.0	-665.8	485.2	457.2	28.09	17.273		
6,300.0	6,262.3	6,326.0	6,244.6	14.0	18.5	-86.20	-132.6	-665.8	485.8	457.6	28.21	17.218		
6,400.0	6,347.2	6,421.0	6,320.8	14.0	18.5	-85.19	-75.9	-665.8	486.4	458.1	28.35	17.161		
6,500.0	6,424.6	6,515.2	6,388.7	14.1	18.5	-84.25	-10.8	-665.8	487.2	458.6	28.57	17.051		
6,600.0	6,493.1	6,608.5	6,447.6	14.1	18.5	-83.42	61.5	-665.8	487.9	458.9	28.98	16.836		
6,700.0	6,551.5	6,700.0	6,496.4	14.4	18.6	-82.70	138.9	-665.8	488.7	459.0	29.65	16.480		
6,800.0	6,598.9	6,793.1	6,536.2	14.9	18.8	-82.08	223.0	-665.8	489.4	458.7	30.68	15.954		
6,900.0	6,634.3	6,884.7	6,565.1	15.7	19.2	-81.60	309.9	-665.8	490.0	457.9	32.06	15.284		
7,000.0	6,657.2	6,975.9	6,583.3	16.6	19.7	-81.25	399.2	-665.8	490.4	456.6	33.80	14.509		
7,100.0	6,667.3	7,066.9	6,590.8	17.6	20.4	-81.03	489.8	-665.8	490.7	454.8	35.87	13.681		
7,200.0	6,667.0	7,164.4	6,590.2	18.8	21.4	-81.01	587.3	-665.8	490.7	452.5	38.22	12.838		
7,300.0	6,665.8	7,264.4	6,589.3	20.1	22.6	-81.03	687.3	-665.8	490.7	449.9	40.78	12.033		
7,400.0	6,664.7	7,364.4	6,588.3	21.5	23.8	-81.05	787.3	-665.8	490.7	447.2	43.52	11.275		
7,500.0	6,663.6	7,464.4	6,587.4	23.0	25.2	-81.07	887.3	-665.8	490.7	444.2	46.41	10.572		
7,600.0	6,662.4	7,564.4	6,586.4	24.5	26.6	-81.09	987.3	-665.8	490.6	441.2	49.42	9.927		
7,700.0	6,661.3	7,664.4	6,585.4	26.1	28.1	-81.11	1,087.3	-665.8	490.6	438.1	52.54	9.338		
7,800.0	6,660.2	7,764.4	6,584.5	27.7	29.6	-81.13	1,187.3	-665.8	490.6	434.8	55.74	8.801		
7,900.0	6,659.0	7,864.4	6,583.5	29.4	31.2	-81.15	1,287.3	-665.8	490.5	431.5	59.01	8.313		
8,000.0	6,657.9	7,964.4	6,582.6	31.1	32.8	-81.17	1,387.3	-665.8	490.5	428.2	62.35	7.868		
8,100.0	6,656.7	8,064.4	6,581.6	32.8	34.5	-81.19	1,487.3	-665.8	490.5	424.8	65.73	7.462		
8,200.0	6,655.6	8,164.4	6,580.6	34.5	36.1	-81.21	1,587.3	-665.8	490.5	421.3	69.16	7.092		
8,300.0	6,654.5	8,264.4	6,579.7	36.3	37.8	-81.23	1,687.3	-665.8	490.4	417.8	72.63	6.753		
8,400.0	6,653.3	8,364.4	6,578.7	38.0	39.5	-81.25	1,787.3	-665.8	490.4	414.3	76.13	6.442		
8,500.0	6,652.2	8,464.4	6,577.8	39.8	41.3	-81.27	1,887.3	-665.8	490.4	410.7	79.65	6.157		
8,600.0	6,651.1	8,564.4	6,576.8	41.6	43.0	-81.29	1,987.3	-665.8	490.4	407.2	83.20	5.893		
8,700.0	6,649.9	8,664.4	6,575.8	43.4	44.8	-81.31	2,087.3	-665.8	490.3	403.6	86.78	5.650		
8,800.0	6,648.8	8,764.4	6,574.9	45.2	46.6	-81.33	2,187.2	-665.8	490.3	399.9	90.37	5.425		
8,900.0	6,647.7	8,864.4	6,573.9	47.1	48.4	-81.35	2,287.2	-665.8	490.3	396.3	93.98	5.217		
9,000.0	6,646.5	8,964.4	6,573.0	48.9	50.2	-81.37	2,387.2	-665.8	490.3	392.6	97.61	5.023		
9,100.0	6,645.4	9,064.4	6,572.0	50.7	52.0	-81.39	2,487.2	-665.8	490.2	389.0	101.25	4.842		
9,200.0	6,644.3	9,164.4	6,571.0	52.6	53.8	-81.41	2,587.2	-665.8	490.2	385.3	104.90	4.673		
9,300.0	6,643.1	9,264.4	6,570.1	54.4	55.6	-81.43	2,687.2	-665.8	490.2	381.6	108.56	4.515		
9,400.0	6,642.0	9,364.4	6,569.1	56.3	57.4	-81.45	2,787.2	-665.8	490.1	377.9	112.23	4.367		
9,500.0	6,640.9	9,464.4	6,568.2	58.1	59.3	-81.47	2,887.2	-665.8	490.1	374.2	115.91	4.228		
9,600.0	6,639.7	9,564.4	6,567.2	60.0	61.1	-81.49	2,987.2	-665.8	490.1	370.5	119.60	4.098		
9,700.0	6,638.6	9,664.4	6,566.2	61.9	62.9	-81.51	3,087.2	-665.8	490.1	366.8	123.30	3.975		
9,800.0	6,637.5	9,764.4	6,565.3	63.7	64.8	-81.53	3,187.2	-665.8	490.0	363.0	127.00	3.858		
9,900.0	6,636.3	9,864.4	6,564.3	65.6	66.6	-81.55	3,287.2	-665.8	490.0	359.3	130.71	3.749		
10,000.0	6,635.2	9,964.4	6,563.4	67.5	68.5	-81.57	3,387.2	-665.8	490.0	355.6	134.43	3.645		

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22T-221 - Wellbore #1 - Plan #2 (3-5-15)												Offset Site Error:	0.0 ft
Survey Program: 0-MWD												Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,100.0	6,634.1	10,064.4	6,562.4	69.3	70.4	-81.59	3,487.2	-665.8	490.0	351.8	138.15	3.547	
10,200.0	6,632.9	10,164.4	6,561.4	71.2	72.2	-81.61	3,587.2	-665.8	489.9	348.1	141.88	3.453	
10,300.0	6,631.8	10,264.4	6,560.5	73.1	74.1	-81.63	3,687.2	-665.8	489.9	344.3	145.61	3.365	
10,400.0	6,630.7	10,364.4	6,559.5	75.0	75.9	-81.65	3,787.2	-665.8	489.9	340.5	149.35	3.280	
10,500.0	6,629.5	10,464.4	6,558.6	76.9	77.8	-81.67	3,887.2	-665.8	489.9	336.8	153.09	3.200	
10,600.0	6,628.4	10,564.4	6,557.6	78.8	79.7	-81.69	3,987.2	-665.8	489.8	333.0	156.83	3.123	
10,700.0	6,627.3	10,664.4	6,556.6	80.7	81.6	-81.71	4,087.2	-665.8	489.8	329.2	160.58	3.050	
10,800.0	6,626.1	10,764.4	6,555.7	82.5	83.4	-81.73	4,187.2	-665.8	489.8	325.5	164.33	2.981	
10,900.0	6,625.0	10,864.4	6,554.7	84.4	85.3	-81.75	4,287.1	-665.8	489.8	321.7	168.08	2.914	
11,000.0	6,623.9	10,964.4	6,553.8	86.3	87.2	-81.77	4,387.1	-665.8	489.7	317.9	171.84	2.850	
11,075.7	6,623.0	11,040.1	6,553.0	87.8	88.6	-81.79	4,462.8	-665.8	489.7	315.0	174.68	2.804 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-136.30	-136.30	-43.7	-41.8	60.5				
100.0	100.0	100.0	100.0	0.1	0.1	-136.30	-136.30	-43.7	-41.8	60.5	60.3	0.22	269.103	
200.0	200.0	200.0	200.0	0.3	0.3	-136.30	-136.30	-43.7	-41.8	60.5	59.8	0.67	89.701	
300.0	300.0	300.0	300.0	0.6	0.6	-136.30	-136.30	-43.7	-41.8	60.5	59.4	1.12	53.821	
400.0	400.0	400.0	400.0	0.8	0.8	-136.30	-136.30	-43.7	-41.8	60.5	58.9	1.57	38.443 CC, ES	
500.0	500.0	499.1	499.1	1.0	1.0	-135.86	-135.86	-43.9	-42.6	61.2	59.2	2.01	30.528	
600.0	600.0	598.2	598.1	1.2	1.2	-134.63	-134.63	-44.5	-45.1	63.4	61.0	2.43	26.087	
700.0	700.0	697.1	697.0	1.5	1.4	-132.76	-132.76	-45.6	-49.3	67.2	64.3	2.87	23.420	
800.0	800.0	795.8	795.5	1.7	1.6	-130.48	-130.48	-47.0	-55.1	72.5	69.2	3.32	21.878	
900.0	900.0	894.4	893.7	1.9	1.9	-128.00	-128.00	-48.8	-62.5	79.5	75.8	3.77	21.090	
1,000.0	1,000.0	992.6	991.5	2.1	2.1	-125.51	-125.51	-51.0	-71.5	88.3	84.0	4.24	20.830	
1,100.0	1,100.0	1,090.5	1,088.8	2.4	2.4	-123.15	-123.15	-53.7	-82.1	98.8	94.0	4.71	20.950	
1,200.0	1,200.0	1,187.9	1,185.5	2.6	2.7	-120.99	-120.99	-56.7	-94.3	111.0	105.8	5.20	21.347	
1,300.0	1,300.0	1,285.0	1,281.4	2.8	3.0	-119.06	-119.06	-60.0	-108.0	125.0	119.3	5.69	21.946	
1,400.0	1,400.0	1,381.5	1,376.7	3.0	3.3	-117.36	-117.36	-63.8	-123.2	140.7	134.5	6.20	22.694	
1,500.0	1,500.0	1,477.4	1,471.1	3.3	3.7	-115.88	-115.88	-67.9	-139.9	158.1	151.4	6.71	23.551	
1,600.0	1,600.0	1,573.9	1,565.7	3.5	4.1	-114.59	-114.59	-72.3	-158.0	177.1	169.9	7.24	24.463	
1,700.0	1,700.0	1,672.0	1,661.9	3.7	4.5	-113.52	-113.52	-76.9	-176.8	196.5	188.7	7.78	25.268	
1,800.0	1,800.0	1,770.0	1,758.0	3.9	4.9	-112.64	-112.64	-81.6	-195.5	215.9	207.6	8.31	25.971	
1,900.0	1,900.0	1,868.2	1,854.3	4.1	5.3	-111.06	-111.06	-86.2	-214.2	234.7	226.4	8.80	26.698	
2,000.0	2,000.0	1,966.6	1,950.7	4.3	5.7	-109.64	-109.64	-90.8	-233.0	252.0	243.3	8.72	28.909	
2,100.0	2,099.9	2,065.2	2,047.4	4.5	6.1	-108.37	-108.37	-95.4	-251.9	268.0	258.9	9.14	29.312	
2,200.0	2,199.7	2,164.0	2,144.3	4.7	6.5	-107.19	-107.19	-100.1	-270.8	282.6	273.1	9.57	29.522	
2,300.0	2,299.4	2,262.9	2,241.3	4.9	7.0	-106.06	-106.06	-104.7	-289.6	296.0	286.0	10.01	29.566	
2,400.0	2,398.9	2,361.9	2,338.4	5.1	7.4	-105.00	-105.00	-109.4	-308.6	308.0	297.6	10.46	29.463	
2,500.0	2,498.3	2,461.0	2,435.5	5.3	7.8	-104.00	-104.00	-114.0	-327.5	318.9	308.0	10.91	29.229	
2,600.0	2,597.4	2,560.2	2,532.8	5.5	8.3	-103.06	-103.06	-118.7	-346.4	328.6	317.2	11.38	28.877	
2,700.0	2,696.3	2,659.4	2,630.0	5.8	8.7	-102.19	-102.19	-123.4	-365.4	337.2	325.3	11.87	28.420	
2,800.0	2,794.9	2,758.6	2,727.3	6.1	9.1	-101.37	-101.37	-128.0	-384.3	344.8	332.4	12.37	27.864	
2,900.0	2,893.4	2,857.7	2,824.5	6.4	9.6	-100.60	-100.60	-132.7	-403.3	352.1	339.2	12.91	27.266	
3,000.0	2,991.9	2,956.9	2,921.7	6.7	10.0	-100.00	-100.00	-137.4	-422.2	359.7	346.2	13.47	26.698	
3,100.0	3,090.4	3,056.1	3,018.9	7.0	10.4	-99.46	-99.46	-142.0	-441.2	367.6	353.6	14.05	26.159	
3,200.0	3,188.9	3,155.2	3,116.2	7.3	10.9	-98.96	-98.96	-146.7	-460.1	375.8	361.2	14.65	25.648	
3,300.0	3,287.4	3,254.4	3,213.4	7.6	11.3	-98.50	-98.50	-151.3	-479.1	384.3	369.0	15.27	25.163	
3,400.0	3,385.9	3,353.6	3,310.6	8.0	11.7	-98.08	-98.08	-156.0	-498.0	392.9	377.0	15.91	24.705	
3,500.0	3,484.3	3,452.8	3,407.9	8.3	12.2	-97.69	-97.69	-160.7	-517.0	401.8	385.3	16.56	24.271	
3,600.0	3,582.8	3,551.9	3,505.1	8.6	12.6	-97.34	-97.34	-165.3	-535.9	411.0	393.7	17.22	23.863	
3,700.0	3,681.3	3,651.1	3,602.3	9.0	13.1	-97.02	-97.02	-170.0	-554.8	420.3	402.4	17.90	23.477	
3,800.0	3,779.8	3,750.3	3,699.6	9.4	13.5	-96.72	-96.72	-174.6	-573.8	429.8	411.2	18.59	23.114	
3,900.0	3,878.5	3,849.4	3,796.8	9.7	13.9	-96.44	-96.44	-179.3	-592.7	439.9	420.7	19.26	22.838	
4,000.0	3,977.6	3,948.6	3,894.0	9.9	14.4	-96.18	-96.18	-184.0	-611.7	452.0	432.1	19.86	22.760	
4,100.0	4,077.1	4,047.6	3,991.1	10.2	14.8	-95.94	-95.94	-188.6	-630.6	465.8	445.4	20.40	22.830	
4,200.0	4,177.0	4,146.4	4,088.0	10.4	15.2	-95.72	-95.72	-193.3	-649.5	481.3	460.4	20.89	23.039	
4,300.0	4,276.9	4,244.8	4,184.4	10.6	15.7	-95.52	-95.52	-197.9	-668.3	498.6	477.2	21.32	23.382	
4,400.0	4,376.9	4,342.9	4,280.6	10.8	16.1	-95.34	-95.34	-202.5	-687.0	517.1	495.4	21.72	23.811	
4,500.0	4,476.9	4,440.9	4,376.7	11.0	16.6	-95.18	-95.18	-207.1	-705.7	535.8	513.7	22.12	24.227	
4,600.0	4,576.9	4,538.9	4,472.8	11.1	17.0	-95.04	-95.04	-211.7	-724.5	554.5	532.0	22.52	24.627	
4,700.0	4,676.9	4,637.0	4,569.0	11.3	17.4	-94.92	-94.92	-216.3	-743.2	573.3	550.4	22.92	25.011	
4,800.0	4,776.9	4,735.0	4,665.1	11.5	17.9	-94.82	-94.82	-220.9	-761.9	592.2	568.9	23.33	25.379	
4,900.0	4,876.9	4,833.1	4,761.2	11.7	18.3	-94.73	-94.73	-225.6	-780.6	611.1	587.3	23.75	25.733	
5,000.0	4,976.9	4,931.1	4,857.3	11.9	18.7	-94.66	-94.66	-230.2	-799.4	630.1	605.9	24.16	26.074	

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 22Y-341
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 22Y-341	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													Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)		Offset Site Error:		0.0 ft
Survey Program: 0-MWD													Offset Well Error:		0.0 ft		
Reference		Offset		Semi Major Axis			Distance							Warning			
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor					
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)						
5,100.0	5,076.9	5,029.2	4,953.5	12.1	19.2	-88.72	-234.8	-818.1	649.0	624.5	24.58	26.401					
5,200.0	5,176.9	5,127.2	5,049.6	12.2	19.6	-89.16	-239.4	-836.8	668.1	643.1	25.01	26.716					
5,300.0	5,276.9	5,228.2	5,148.6	12.4	20.0	-89.59	-244.1	-856.1	687.1	661.7	25.44	27.015					
5,400.0	5,376.9	5,357.1	5,275.6	12.6	20.5	-90.03	-249.4	-877.4	703.7	677.8	25.87	27.196					
5,500.0	5,476.9	5,487.8	5,405.3	12.8	20.8	-90.35	-253.3	-893.4	715.9	689.6	26.29	27.228					
5,600.0	5,576.9	5,619.7	5,536.8	13.0	21.0	-90.54	-255.8	-903.6	723.7	697.0	26.71	27.099					
5,700.0	5,676.9	5,752.4	5,669.3	13.2	21.2	-90.62	-256.9	-908.0	727.0	699.9	27.12	26.808					
5,800.0	5,776.9	5,860.0	5,776.9	13.4	21.3	-90.62	-256.9	-908.1	727.1	699.6	27.50	26.442					
5,900.0	5,876.9	5,960.0	5,876.9	13.6	21.5	-90.62	-256.9	-908.1	727.1	699.2	27.87	26.091					
6,000.0	5,976.8	6,060.7	5,977.6	13.8	21.6	-90.63	-253.5	-908.1	727.1	698.9	28.20	25.781					
6,100.0	6,075.4	6,161.8	6,077.2	13.9	21.7	-90.63	-237.2	-908.1	727.1	698.7	28.43	25.577					
6,200.0	6,171.1	6,262.8	6,173.9	14.0	21.7	-90.61	-208.0	-908.1	727.1	698.5	28.56	25.454					
6,300.0	6,262.3	6,363.8	6,265.8	14.0	21.7	-90.59	-166.3	-908.1	727.1	698.4	28.66	25.366					
6,400.0	6,347.2	6,464.8	6,351.4	14.0	21.7	-90.56	-112.8	-908.1	727.1	698.3	28.80	25.250					
6,500.0	6,424.6	6,565.7	6,429.1	14.1	21.8	-90.51	-48.6	-908.1	727.1	698.0	29.04	25.035					
6,600.0	6,493.1	6,666.5	6,497.7	14.1	21.8	-90.46	25.2	-908.1	727.1	697.6	29.49	24.652					
6,700.0	6,551.5	6,767.2	6,555.9	14.4	21.9	-90.40	107.3	-908.1	727.1	696.8	30.22	24.056					
6,800.0	6,598.9	6,867.8	6,602.7	14.9	22.1	-90.33	196.2	-908.1	727.1	695.8	31.29	23.235					
6,900.0	6,634.3	6,968.3	6,637.5	15.7	22.4	-90.26	290.4	-908.1	727.1	694.3	32.72	22.220					
7,000.0	6,657.2	7,068.7	6,659.5	16.6	22.8	-90.18	388.3	-908.1	727.1	692.6	34.50	21.075					
7,100.0	6,667.3	7,168.9	6,668.6	17.6	23.4	-90.10	488.0	-908.1	727.1	690.5	36.58	19.874					
7,160.8	6,668.5	7,229.8	6,668.4	18.4	23.9	-89.99	548.9	-908.1	727.1	689.0	38.01	19.130					
7,200.0	6,667.0	7,269.0	6,668.0	18.8	24.2	-90.08	588.1	-908.1	727.1	688.1	38.93	18.677					
7,300.0	6,665.8	7,369.0	6,666.9	20.1	25.2	-90.08	688.1	-908.1	727.1	685.6	41.49	17.525					
7,400.0	6,664.7	7,469.0	6,665.8	21.5	26.3	-90.09	788.1	-908.1	727.1	682.8	44.23	16.438					
7,500.0	6,663.6	7,569.0	6,664.7	23.0	27.5	-90.09	888.1	-908.1	727.1	679.9	47.13	15.428					
7,600.0	6,662.4	7,669.0	6,663.6	24.5	28.8	-90.10	988.0	-908.1	727.1	676.9	50.15	14.497					
7,700.0	6,661.3	7,769.0	6,662.6	26.1	30.2	-90.10	1,088.0	-908.1	727.1	673.8	53.28	13.646					
7,800.0	6,660.2	7,869.0	6,661.5	27.7	31.6	-90.10	1,188.0	-908.1	727.1	670.6	56.50	12.869					
7,900.0	6,659.0	7,969.0	6,660.4	29.4	33.1	-90.11	1,288.0	-908.1	727.1	667.3	59.79	12.160					
8,000.0	6,657.9	8,069.0	6,659.3	31.1	34.6	-90.11	1,388.0	-908.1	727.1	663.9	63.14	11.515					
8,100.0	6,656.7	8,169.0	6,658.2	32.8	36.2	-90.12	1,488.0	-908.1	727.1	660.5	66.55	10.925					
8,200.0	6,655.6	8,269.0	6,657.1	34.5	37.8	-90.12	1,588.0	-908.1	727.1	657.1	70.00	10.387					
8,300.0	6,654.5	8,369.0	6,656.1	36.3	39.4	-90.13	1,688.0	-908.1	727.1	653.6	73.49	9.894					
8,400.0	6,653.3	8,469.0	6,655.0	38.0	41.1	-90.13	1,788.0	-908.1	727.1	650.0	77.01	9.441					
8,500.0	6,652.2	8,569.0	6,653.9	39.8	42.8	-90.13	1,888.0	-908.1	727.1	646.5	80.56	9.025					
8,600.0	6,651.1	8,669.0	6,652.8	41.6	44.5	-90.14	1,988.0	-908.1	727.1	642.9	84.14	8.641					
8,700.0	6,649.9	8,769.0	6,651.7	43.4	46.2	-90.14	2,088.0	-908.1	727.1	639.3	87.74	8.287					
8,800.0	6,648.8	8,869.0	6,650.7	45.2	48.0	-90.15	2,188.0	-908.1	727.1	635.7	91.36	7.958					
8,900.0	6,647.7	8,969.0	6,649.6	47.1	49.7	-90.15	2,288.0	-908.1	727.1	632.1	94.99	7.654					
9,000.0	6,646.5	9,069.0	6,648.5	48.9	51.5	-90.15	2,388.0	-908.1	727.1	628.4	98.65	7.370					
9,100.0	6,645.4	9,169.0	6,647.4	50.7	53.2	-90.16	2,488.0	-908.1	727.1	624.7	102.31	7.106					
9,200.0	6,644.3	9,269.0	6,646.3	52.6	55.0	-90.16	2,588.0	-908.1	727.1	621.1	105.99	6.860					
9,300.0	6,643.1	9,369.0	6,645.2	54.4	56.8	-90.17	2,687.9	-908.1	727.1	617.4	109.68	6.629					
9,400.0	6,642.0	9,469.0	6,644.2	56.3	58.6	-90.17	2,787.9	-908.1	727.1	613.7	113.38	6.413					
9,500.0	6,640.9	9,569.0	6,643.1	58.1	60.4	-90.17	2,887.9	-908.1	727.1	610.0	117.09	6.210					
9,600.0	6,639.7	9,669.0	6,642.0	60.0	62.2	-90.18	2,987.9	-908.1	727.1	606.3	120.80	6.018					
9,700.0	6,638.6	9,769.0	6,640.9	61.9	64.1	-90.18	3,087.9	-908.1	727.1	602.5	124.53	5.838					
9,800.0	6,637.5	9,869.0	6,639.8	63.7	65.9	-90.19	3,187.9	-908.1	727.1	598.8	128.26	5.669					
9,900.0	6,636.3	9,969.0	6,638.8	65.6	67.7	-90.19	3,287.9	-908.1	727.1	595.1	132.00	5.508					
10,000.0	6,635.2	10,069.0	6,637.7	67.5	69.6	-90.20	3,387.9	-908.1	727.1	591.3	135.74	5.356					

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 22Y-341
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 22Y-341	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 Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22T-321 - Wellbore #1 - Plan #2 (3-5-15)												Offset Site Error:	0.0 ft
Survey Program: 0-MWD												Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning
Reference	Offset	Reference	Offset	Reference	Offset		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)			
10,100.0	6,634.1	10,169.0	6,636.6	69.3	71.4	-90.20	3,487.9	-908.1	727.1	587.6	139.49	5.212	
10,200.0	6,632.9	10,269.0	6,635.5	71.2	73.2	-90.20	3,587.9	-908.1	727.1	583.8	143.24	5.076	
10,300.0	6,631.8	10,369.0	6,634.4	73.1	75.1	-90.21	3,687.9	-908.1	727.1	580.1	147.00	4.946	
10,400.0	6,630.7	10,469.0	6,633.3	75.0	76.9	-90.21	3,787.9	-908.1	727.1	576.3	150.76	4.823	
10,500.0	6,629.5	10,569.0	6,632.3	76.9	78.8	-90.22	3,887.9	-908.1	727.1	572.5	154.53	4.705	
10,600.0	6,628.4	10,669.0	6,631.2	78.8	80.6	-90.22	3,987.9	-908.1	727.1	568.8	158.29	4.593	
10,700.0	6,627.3	10,769.0	6,630.1	80.7	82.5	-90.22	4,087.9	-908.1	727.1	565.0	162.07	4.486	
10,800.0	6,626.1	10,869.0	6,629.0	82.5	84.4	-90.23	4,187.9	-908.1	727.1	561.2	165.84	4.384	
10,900.0	6,625.0	10,969.0	6,627.9	84.4	86.2	-90.23	4,287.9	-908.1	727.1	557.4	169.62	4.286	
11,000.0	6,623.9	11,069.0	6,626.9	86.3	88.1	-90.24	4,387.8	-908.1	727.1	553.7	173.40	4.193	
11,075.7	6,623.0	11,144.7	6,626.0	87.8	89.5	-90.24	4,463.5	-908.1	727.1	550.8	176.26	4.125 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Semi Major Axis Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.0	0.0	2.0	2.0	0.0	0.0	37.41	25.5	19.5	32.1	32.1	0.00	N/A		
100.0	100.0	102.0	102.0	0.1	0.1	37.41	25.5	19.5	32.1	31.9	0.23	140.034		
200.0	200.0	202.0	202.0	0.3	0.3	37.41	25.5	19.5	32.1	31.4	0.68	47.296		
300.0	300.0	302.0	302.0	0.6	0.6	37.41	25.5	19.5	32.1	31.0	1.13	28.453		
400.0	400.0	402.0	402.0	0.8	0.8	37.41	25.5	19.5	32.1	30.5	1.58	20.347		
500.0	500.0	502.0	502.0	1.0	1.0	37.41	25.5	19.5	32.1	30.1	2.03	15.835		
600.0	600.0	602.0	602.0	1.2	1.2	37.41	25.5	19.5	32.1	29.6	2.48	12.961		
700.0	700.0	702.0	702.0	1.5	1.5	37.41	25.5	19.5	32.1	29.2	2.93	10.970		
800.0	800.0	802.0	802.0	1.7	1.7	37.41	25.5	19.5	32.1	28.7	3.38	9.510		
900.0	900.0	902.0	902.0	1.9	1.9	37.41	25.5	19.5	32.1	28.3	3.83	8.392		
1,000.0	1,000.0	1,002.0	1,002.0	2.1	2.1	37.41	25.5	19.5	32.1	27.8	4.28	7.510		
1,100.0	1,100.0	1,102.0	1,102.0	2.4	2.4	37.41	25.5	19.5	32.1	27.4	4.72	6.795		
1,200.0	1,200.0	1,202.0	1,202.0	2.6	2.6	37.41	25.5	19.5	32.1	26.9	5.17	6.205		
1,300.0	1,300.0	1,302.0	1,302.0	2.8	2.8	37.41	25.5	19.5	32.1	26.5	5.62	5.709		
1,400.0	1,400.0	1,402.0	1,402.0	3.0	3.0	37.41	25.5	19.5	32.1	26.0	6.07	5.286		
1,500.0	1,500.0	1,502.0	1,502.0	3.3	3.3	37.41	25.5	19.5	32.1	25.6	6.52	4.922		
1,600.0	1,600.0	1,602.0	1,602.0	3.5	3.5	37.41	25.5	19.5	32.1	25.1	6.97	4.605		
1,700.0	1,700.0	1,702.0	1,702.0	3.7	3.7	37.41	25.5	19.5	32.1	24.7	7.42	4.326		
1,800.0	1,800.0	1,802.0	1,802.0	3.9	3.9	37.41	25.5	19.5	32.1	24.2	7.87	4.079 CC, ES		
1,900.0	1,900.0	1,902.0	1,902.0	4.1	4.2	-178.65	25.5	19.5	33.0	24.7	8.29	3.976		
2,000.0	2,000.0	2,002.0	2,002.0	4.3	4.4	-178.75	25.5	19.5	35.6	26.9	8.69	4.095		
2,100.0	2,099.9	2,102.2	2,102.2	4.5	4.6	-177.75	24.7	19.8	39.5	30.4	9.06	4.358		
2,200.0	2,199.7	2,202.4	2,202.4	4.7	4.8	-175.06	22.2	20.8	44.3	34.9	9.41	4.710		
2,300.0	2,299.4	2,302.6	2,302.4	4.9	4.9	-171.33	18.1	22.5	50.3	40.5	9.77	5.146		
2,400.0	2,398.9	2,402.6	2,402.2	5.1	5.1	-167.11	12.4	24.8	57.5	47.3	10.13	5.673		
2,500.0	2,498.3	2,502.4	2,501.7	5.3	5.3	-162.80	5.1	27.8	66.1	55.6	10.51	6.295		
2,600.0	2,597.4	2,602.0	2,600.9	5.5	5.5	-158.67	-3.8	31.4	76.4	65.5	10.90	7.008		
2,700.0	2,696.3	2,701.4	2,699.6	5.8	5.7	-154.85	-14.2	35.6	88.2	76.9	11.31	7.803		
2,800.0	2,794.9	2,800.4	2,797.8	6.1	5.9	-151.43	-26.2	40.5	101.8	90.1	11.74	8.668		
2,900.0	2,893.4	2,899.3	2,895.6	6.4	6.2	-148.23	-39.7	46.0	116.3	104.1	12.23	9.510		
3,000.0	2,991.9	2,997.9	2,992.8	6.7	6.4	-145.00	-54.8	52.1	131.2	118.4	12.75	10.287		
3,100.0	3,090.4	3,096.4	3,089.8	7.0	6.7	-142.01	-70.8	58.6	146.5	133.2	13.30	11.012		
3,200.0	3,188.9	3,195.0	3,186.9	7.3	7.0	-139.58	-86.9	65.2	162.1	148.2	13.87	11.684		
3,300.0	3,287.4	3,293.5	3,283.9	7.6	7.3	-137.58	-102.9	71.7	177.9	163.5	14.46	12.306		
3,400.0	3,385.9	3,392.1	3,380.9	8.0	7.6	-135.91	-118.9	78.2	193.9	178.9	15.06	12.878		
3,500.0	3,484.3	3,490.7	3,478.0	8.3	7.9	-134.49	-135.0	84.7	210.1	194.4	15.68	13.403		
3,600.0	3,582.8	3,589.2	3,575.0	8.6	8.3	-133.28	-151.0	91.2	226.4	210.1	16.30	13.886		
3,700.0	3,681.3	3,687.8	3,672.0	9.0	8.6	-132.23	-167.1	97.7	242.7	225.8	16.94	14.329		
3,800.0	3,779.8	3,786.3	3,769.1	9.4	8.9	-131.31	-183.1	104.3	259.1	241.6	17.58	14.737		
3,900.0	3,878.5	3,885.0	3,866.1	9.7	9.3	-130.52	-199.2	110.8	275.0	256.7	18.24	15.076		
4,000.0	3,977.6	3,986.0	3,965.8	9.9	9.6	-129.47	-214.8	117.1	288.5	269.6	18.84	15.309		
4,100.0	4,077.1	4,088.8	4,067.6	10.2	9.9	-128.57	-227.6	122.3	298.8	279.5	19.38	15.420		
4,200.0	4,177.0	4,192.1	4,170.4	10.4	10.2	-127.80	-237.0	126.1	305.9	286.1	19.87	15.399		
4,300.0	4,276.9	4,295.9	4,274.0	10.6	10.4	-127.13	-242.9	128.6	309.7	289.4	20.30	15.254		
4,400.0	4,376.9	4,400.0	4,378.0	10.8	10.6	89.34	-245.4	129.6	310.7	290.0	20.70	15.011		
4,500.0	4,476.9	4,500.9	4,478.9	11.0	10.8	89.35	-245.5	129.6	310.7	289.6	21.07	14.748		
4,600.0	4,576.9	4,600.9	4,578.9	11.1	11.0	89.35	-245.5	129.6	310.7	289.2	21.44	14.492		
4,700.0	4,676.9	4,700.9	4,678.9	11.3	11.1	89.35	-245.5	129.6	310.7	288.9	21.82	14.242		
4,800.0	4,776.9	4,800.9	4,778.9	11.5	11.3	89.35	-245.5	129.6	310.7	288.5	22.19	13.999		
4,900.0	4,876.9	4,900.9	4,878.9	11.7	11.5	89.35	-245.5	129.6	310.7	288.1	22.57	13.763		
5,000.0	4,976.9	5,000.9	4,978.9	11.9	11.7	89.35	-245.5	129.6	310.7	287.7	22.96	13.533		

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 22Y-341
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 22Y-341	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		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)						
5,100.0	5,076.9	5,100.9	5,078.9	12.1	11.9	89.35	-245.5	129.6	310.7	287.3	23.34	13.309		
5,200.0	5,176.9	5,200.9	5,178.9	12.2	12.1	89.35	-245.5	129.6	310.7	287.0	23.73	13.091		
5,300.0	5,276.9	5,300.9	5,278.9	12.4	12.3	89.35	-245.5	129.6	310.7	286.6	24.12	12.879		
5,400.0	5,376.9	5,400.9	5,378.9	12.6	12.5	89.35	-245.5	129.6	310.7	286.2	24.52	12.673		
5,500.0	5,476.9	5,500.9	5,478.9	12.8	12.7	89.35	-245.5	129.6	310.7	285.8	24.91	12.472		
5,600.0	5,576.9	5,600.9	5,578.9	13.0	12.9	89.35	-245.5	129.6	310.7	285.4	25.31	12.277		
5,700.0	5,676.9	5,700.9	5,678.9	13.2	13.1	89.35	-245.5	129.6	310.7	285.0	25.70	12.087		
5,800.0	5,776.9	5,800.9	5,778.9	13.4	13.3	89.35	-245.5	129.6	310.7	284.6	26.10	11.902		
5,900.0	5,876.9	5,900.9	5,878.9	13.6	13.5	89.35	-245.5	129.6	310.7	284.2	26.50	11.722		
6,000.0	5,976.8	6,000.7	5,978.8	13.8	13.7	90.00	-245.5	129.6	310.7	283.8	26.89	11.552		
6,000.1	5,976.9	6,000.8	5,978.9	13.8	13.7	90.00	-245.5	129.6	310.7	283.8	26.89	11.552		
6,100.0	6,075.4	6,100.9	6,078.7	13.9	13.8	91.99	-240.2	129.6	310.9	283.7	27.19	11.432		
6,200.0	6,171.1	6,202.4	6,178.5	14.0	13.9	93.97	-221.7	129.6	311.4	284.1	27.36	11.382		
6,300.0	6,262.3	6,305.5	6,276.4	14.0	14.0	95.88	-189.5	129.6	312.3	284.9	27.44	11.383		
6,400.0	6,347.2	6,410.1	6,370.3	14.0	14.0	97.70	-143.7	129.6	313.5	286.0	27.48	11.409		
6,500.0	6,424.6	6,516.2	6,458.3	14.1	14.1	99.38	-84.6	129.6	314.9	287.3	27.58	11.420		
6,600.0	6,493.1	6,623.7	6,538.2	14.1	14.1	100.89	-12.8	129.6	316.4	288.6	27.82	11.373		
6,700.0	6,551.5	6,732.5	6,608.1	14.4	14.3	102.20	70.5	129.6	317.9	289.6	28.32	11.223		
6,800.0	6,598.9	6,842.5	6,665.9	14.9	14.8	103.28	163.9	129.6	319.2	290.1	29.17	10.944		
6,900.0	6,634.3	6,953.4	6,710.1	15.7	15.5	104.12	265.5	129.6	320.4	289.9	30.43	10.527		
7,000.0	6,657.2	7,065.0	6,739.3	16.6	16.4	104.70	373.1	129.6	321.2	289.1	32.12	9.999		
7,100.0	6,667.3	7,177.1	6,752.4	17.6	17.6	105.00	484.4	129.6	321.6	287.4	34.20	9.403		
7,200.0	6,667.0	7,281.2	6,752.9	18.8	18.8	105.12	588.4	129.6	321.8	285.3	36.51	8.815		
7,300.0	6,665.8	7,381.2	6,752.5	20.1	20.0	105.24	688.4	129.6	322.0	283.0	38.98	8.261		
7,400.0	6,664.7	7,481.2	6,752.0	21.5	21.4	105.36	788.4	129.6	322.2	280.5	41.63	7.739		
7,500.0	6,663.6	7,581.2	6,751.6	23.0	22.9	105.48	888.4	129.6	322.4	277.9	44.43	7.255		
7,600.0	6,662.4	7,681.2	6,751.2	24.5	24.4	105.60	988.4	129.6	322.5	275.2	47.36	6.811		
7,700.0	6,661.3	7,781.2	6,750.7	26.1	25.9	105.72	1,088.4	129.6	322.7	272.4	50.38	6.406		
7,800.0	6,660.2	7,881.2	6,750.3	27.7	27.5	105.84	1,188.4	129.6	322.9	269.4	53.49	6.037		
7,900.0	6,659.0	7,981.2	6,749.9	29.4	29.2	105.96	1,288.4	129.6	323.1	266.5	56.66	5.703		
8,000.0	6,657.9	8,081.2	6,749.4	31.1	30.9	106.08	1,388.4	129.6	323.3	263.4	59.89	5.399		
8,100.0	6,656.7	8,181.2	6,749.0	32.8	32.6	106.19	1,488.4	129.6	323.5	260.3	63.16	5.122		
8,200.0	6,655.6	8,281.2	6,748.5	34.5	34.3	106.31	1,588.4	129.6	323.7	257.2	66.48	4.869		
8,300.0	6,654.5	8,381.2	6,748.1	36.3	36.0	106.43	1,688.4	129.6	323.9	254.1	69.83	4.638		
8,400.0	6,653.3	8,481.1	6,747.7	38.0	37.8	106.55	1,788.4	129.6	324.1	250.9	73.20	4.427		
8,500.0	6,652.2	8,581.1	6,747.2	39.8	39.6	106.67	1,888.4	129.6	324.3	247.7	76.60	4.233		
8,600.0	6,651.1	8,681.1	6,746.8	41.6	41.4	106.79	1,988.4	129.6	324.5	244.5	80.02	4.055		
8,700.0	6,649.9	8,781.1	6,746.4	43.4	43.2	106.90	2,088.4	129.6	324.7	241.2	83.46	3.891		
8,800.0	6,648.8	8,881.1	6,745.9	45.2	45.0	107.02	2,188.4	129.6	324.9	238.0	86.91	3.738		
8,900.0	6,647.7	8,981.1	6,745.5	47.1	46.8	107.14	2,288.4	129.6	325.1	234.7	90.37	3.597		
9,000.0	6,646.5	9,081.1	6,745.1	48.9	48.6	107.26	2,388.4	129.6	325.3	231.5	93.85	3.466		
9,100.0	6,645.4	9,181.1	6,744.6	50.7	50.5	107.38	2,488.4	129.6	325.5	228.2	97.33	3.345		
9,200.0	6,644.3	9,281.1	6,744.2	52.6	52.3	107.49	2,588.4	129.6	325.7	224.9	100.82	3.231		
9,300.0	6,643.1	9,381.1	6,743.7	54.4	54.2	107.61	2,688.4	129.6	325.9	221.6	104.31	3.125		
9,400.0	6,642.0	9,481.1	6,743.3	56.3	56.0	107.73	2,788.4	129.6	326.2	218.3	107.81	3.025		
9,500.0	6,640.9	9,581.1	6,742.9	58.1	57.9	107.84	2,888.3	129.6	326.4	215.0	111.32	2.932		
9,600.0	6,639.7	9,681.1	6,742.4	60.0	59.7	107.96	2,988.3	129.6	326.6	211.8	114.83	2.844		
9,700.0	6,638.6	9,781.1	6,742.0	61.9	61.6	108.08	3,088.3	129.6	326.8	208.5	118.34	2.762		
9,800.0	6,637.5	9,881.1	6,741.6	63.7	63.5	108.19	3,188.3	129.6	327.0	205.2	121.85	2.684		
9,900.0	6,636.3	9,981.1	6,741.1	65.6	65.3	108.31	3,288.3	129.6	327.2	201.9	125.36	2.610		
10,000.0	6,635.2	10,081.1	6,740.7	67.5	67.2	108.42	3,388.3	129.6	327.5	198.6	128.88	2.541		

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 22Y-341
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 22Y-341	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 Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)												Offset Site Error: 0.0 ft	
Survey Program: 0-MWD												Offset Well Error: 0.0 ft	
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)		
10,100.0	6,634.1	10,181.1	6,740.3	69.3	69.1	108.54	3,488.3	129.6	327.7	195.3	132.39	2.475	
10,200.0	6,632.9	10,281.1	6,739.8	71.2	71.0	108.66	3,588.3	129.6	327.9	192.0	135.91	2.413	
10,300.0	6,631.8	10,381.1	6,739.4	73.1	72.8	108.77	3,688.3	129.6	328.1	188.7	139.42	2.353	
10,400.0	6,630.7	10,481.1	6,738.9	75.0	74.7	108.89	3,788.3	129.6	328.3	185.4	142.94	2.297	
10,500.0	6,629.5	10,581.1	6,738.5	76.9	76.6	109.00	3,888.3	129.6	328.6	182.1	146.45	2.244	
10,600.0	6,628.4	10,681.1	6,738.1	78.8	78.5	109.12	3,988.3	129.6	328.8	178.8	149.96	2.193	
10,700.0	6,627.3	10,781.1	6,737.6	80.7	80.4	109.23	4,088.3	129.6	329.0	175.6	153.47	2.144	
10,800.0	6,626.1	10,881.1	6,737.2	82.5	82.3	109.35	4,188.3	129.6	329.3	172.3	156.98	2.097	
10,900.0	6,625.0	10,981.1	6,736.8	84.4	84.2	109.46	4,288.3	129.6	329.5	169.0	160.49	2.053	
11,000.0	6,623.9	11,081.1	6,736.3	86.3	86.1	109.58	4,388.3	129.6	329.7	165.7	163.99	2.011	
11,075.7	6,623.0	11,155.6	6,736.0	87.8	87.5	109.66	4,462.8	129.6	329.9	163.3	166.62	1.980 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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')

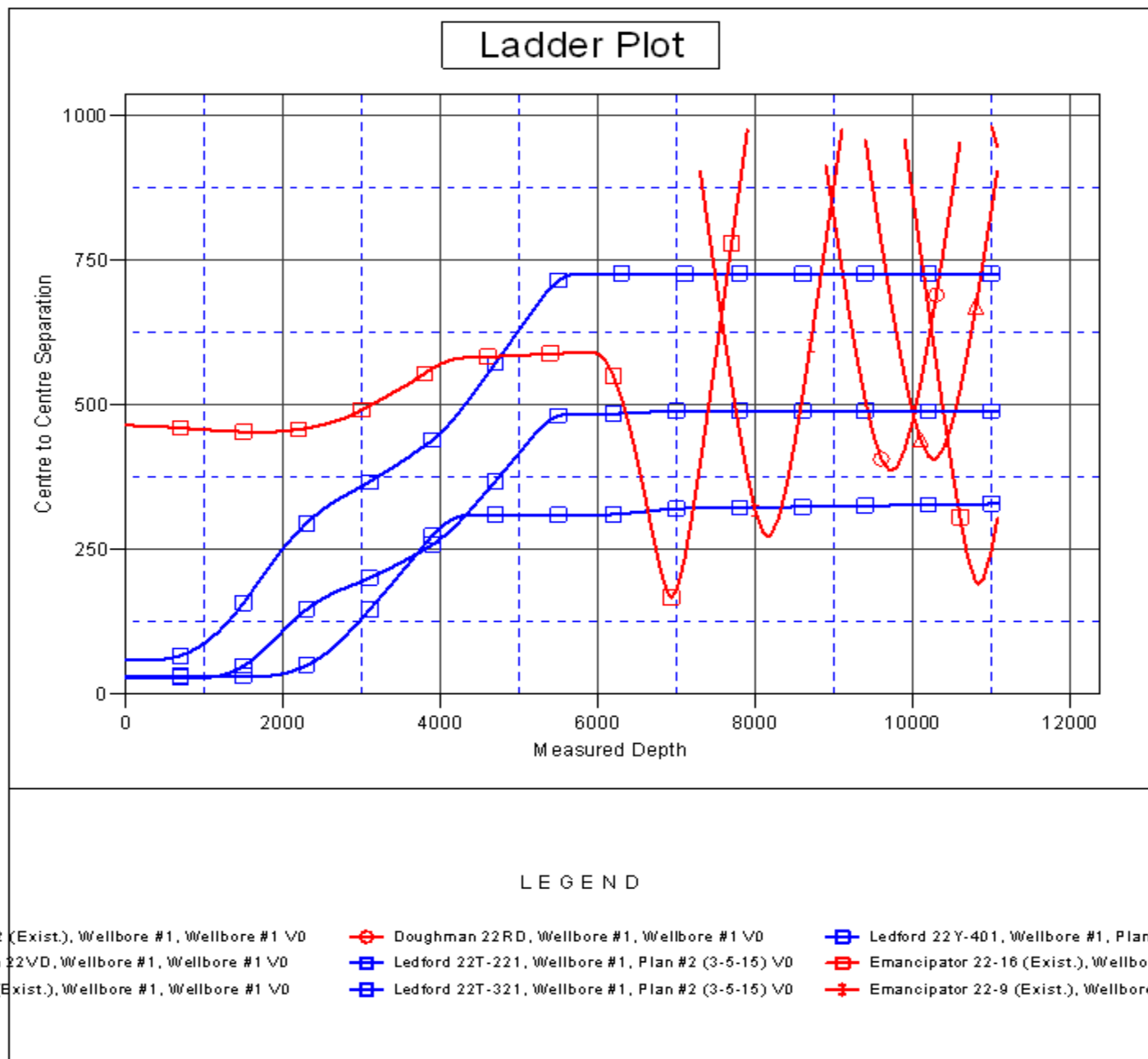
Offset Depths are relative to Offset Datum

Central Meridian is -105.500000 °

Coordinates are relative to: Ledford 22Y-341

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: 0.63°



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22Y-341
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 22Y-341	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 22Y-341

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: 0.63°

