

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Ledford 22T-321**
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 1382151.61 3270918.54 40.378330 -104.527550
RKB - 13' WELL @ 4611.0ft (RKB - 13')

WELLBORE TARGET DETAILS				
	TVD	+N/-S	+E/-W	Shape
50'E/W Hardline (22T-321)	1.0	2534.6	-866.3	Rectangle (Sides: L3951.2 W100.0)
SHL 254'FSL & 327'FEL	1.0	0.0	0.0	Point
BHL 500'FNL & 1183'FEL	6626.0	4510.2	-866.3	Point

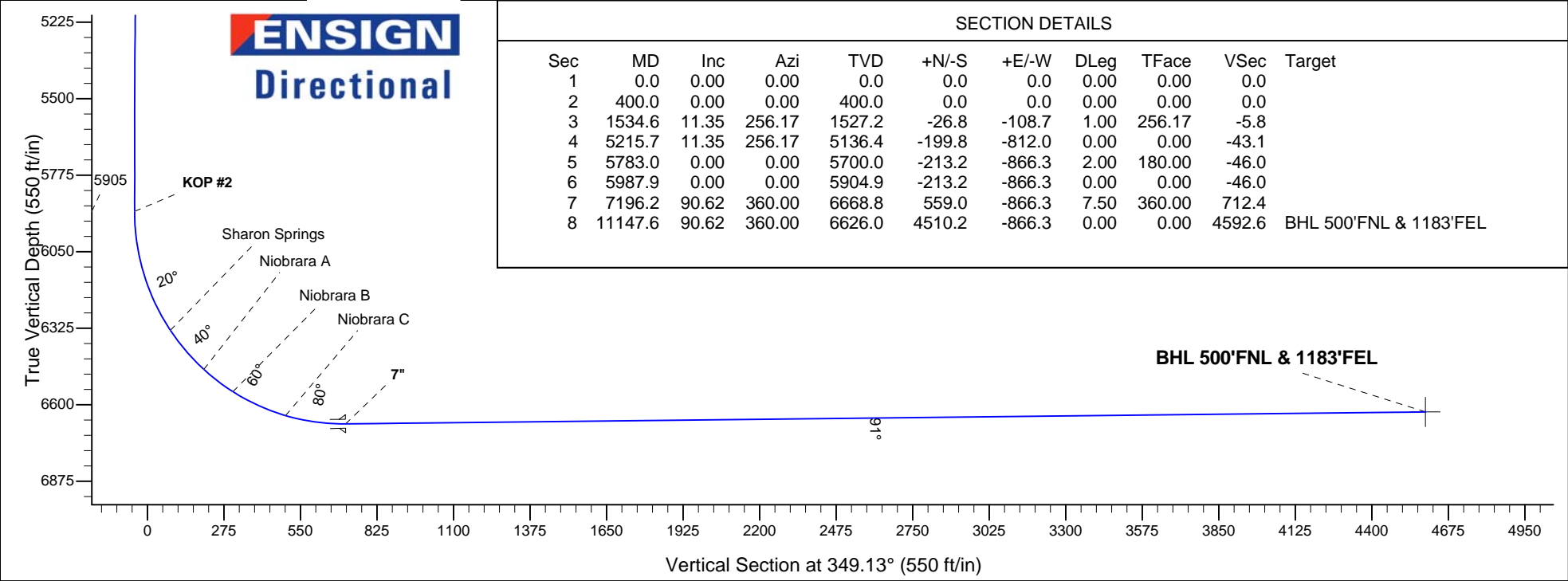
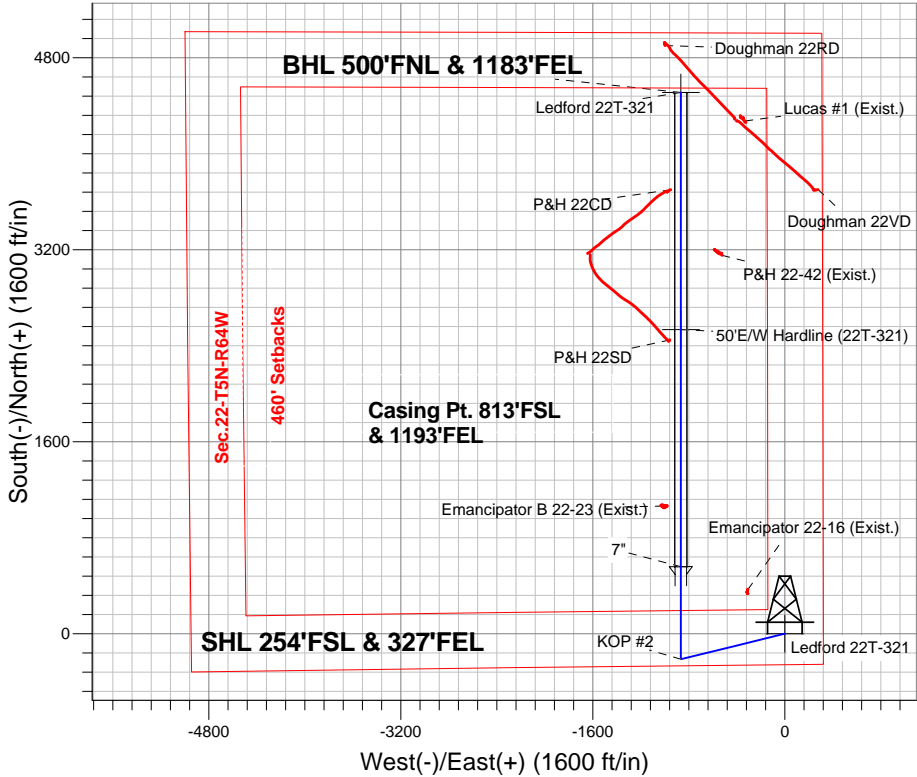
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M
Azimuths to True North
Magnetic North: 8.23°

Magnetic Field
Strength: 52754.3snT
Dip Angle: 66.94°
Date: 3/5/2015
Model: IGRF2010

ANNOTATIONS

TVD	MD	Annotation
400.0	400.0	KOP #1
5904.9	5987.9	KOP #2

Ledford 22Y-HZ Pad Sec.22-T5N-R64W
Ledford 22T-321
Plan #2 (3-5-15)





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.22-T5N-R64W

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

Ledford 22T-321

Wellbore #1

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

Standard Planning Report

06 March, 2015

Database:	Landmark	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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-321					
Well Position	+N/-S	0.0 ft	Northing:	1,382,151.61 ft	Latitude:	40.378330
	+E/-W	0.0 ft	Easting:	3,270,918.54 ft	Longitude:	-104.527550
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	349.13

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,534.6	11.35	256.17	1,527.2	-26.8	-108.7	1.00	1.00	0.00	256.17	
5,215.7	11.35	256.17	5,136.4	-199.8	-812.0	0.00	0.00	0.00	0.00	
5,783.0	0.00	0.00	5,700.0	-213.2	-866.3	2.00	-2.00	0.00	180.00	
5,987.9	0.00	0.00	5,904.9	-213.2	-866.3	0.00	0.00	0.00	0.00	
7,196.2	90.62	360.00	6,668.8	559.0	-866.3	7.50	7.50	0.00	360.00	
11,147.6	90.62	360.00	6,626.0	4,510.2	-866.3	0.00	0.00	0.00	0.00	BHL 500'FNL & 11E

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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-321	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
KOP #1									
500.0	1.00	256.17	500.0	-0.2	-0.8	0.0	1.00	1.00	0.00
600.0	2.00	256.17	600.0	-0.8	-3.4	-0.2	1.00	1.00	0.00
700.0	3.00	256.17	699.9	-1.9	-7.6	-0.4	1.00	1.00	0.00
800.0	4.00	256.17	799.7	-3.3	-13.6	-0.7	1.00	1.00	0.00
900.0	5.00	256.17	899.4	-5.2	-21.2	-1.1	1.00	1.00	0.00
1,000.0	6.00	256.17	998.9	-7.5	-30.5	-1.6	1.00	1.00	0.00
1,100.0	7.00	256.17	1,098.3	-10.2	-41.5	-2.2	1.00	1.00	0.00
1,200.0	8.00	256.17	1,197.4	-13.3	-54.1	-2.9	1.00	1.00	0.00
1,300.0	9.00	256.17	1,296.3	-16.9	-68.5	-3.6	1.00	1.00	0.00
1,400.0	10.00	256.17	1,394.9	-20.8	-84.5	-4.5	1.00	1.00	0.00
1,500.0	11.00	256.17	1,493.3	-25.2	-102.2	-5.4	1.00	1.00	0.00
1,534.6	11.35	256.17	1,527.2	-26.8	-108.7	-5.8	1.00	1.00	0.00
1,600.0	11.35	256.17	1,591.3	-29.8	-121.2	-6.4	0.00	0.00	0.00
1,700.0	11.35	256.17	1,689.4	-34.5	-140.3	-7.4	0.00	0.00	0.00
1,800.0	11.35	256.17	1,787.4	-39.2	-159.4	-8.5	0.00	0.00	0.00
1,900.0	11.35	256.17	1,885.5	-43.9	-178.5	-9.5	0.00	0.00	0.00
2,000.0	11.35	256.17	1,983.5	-48.6	-197.6	-10.5	0.00	0.00	0.00
2,100.0	11.35	256.17	2,081.5	-53.3	-216.7	-11.5	0.00	0.00	0.00
2,200.0	11.35	256.17	2,179.6	-58.0	-235.8	-12.5	0.00	0.00	0.00
2,300.0	11.35	256.17	2,277.6	-62.7	-254.9	-13.5	0.00	0.00	0.00
2,400.0	11.35	256.17	2,375.7	-67.4	-274.1	-14.5	0.00	0.00	0.00
2,500.0	11.35	256.17	2,473.7	-72.1	-293.2	-15.6	0.00	0.00	0.00
2,600.0	11.35	256.17	2,571.8	-76.8	-312.3	-16.6	0.00	0.00	0.00
2,700.0	11.35	256.17	2,669.8	-81.5	-331.4	-17.6	0.00	0.00	0.00
2,800.0	11.35	256.17	2,767.9	-86.2	-350.5	-18.6	0.00	0.00	0.00
2,900.0	11.35	256.17	2,865.9	-91.0	-369.6	-19.6	0.00	0.00	0.00
3,000.0	11.35	256.17	2,964.0	-95.7	-388.7	-20.6	0.00	0.00	0.00
3,100.0	11.35	256.17	3,062.0	-100.4	-407.8	-21.6	0.00	0.00	0.00
3,200.0	11.35	256.17	3,160.1	-105.1	-426.9	-22.7	0.00	0.00	0.00
3,300.0	11.35	256.17	3,258.1	-109.8	-446.0	-23.7	0.00	0.00	0.00
3,400.0	11.35	256.17	3,356.1	-114.5	-465.1	-24.7	0.00	0.00	0.00
3,444.7	11.35	256.17	3,400.0	-116.6	-473.6	-25.1	0.00	0.00	0.00
Parkman									
3,500.0	11.35	256.17	3,454.2	-119.2	-484.2	-25.7	0.00	0.00	0.00
3,600.0	11.35	256.17	3,552.2	-123.9	-503.3	-26.7	0.00	0.00	0.00
3,700.0	11.35	256.17	3,650.3	-128.6	-522.4	-27.7	0.00	0.00	0.00
3,800.0	11.35	256.17	3,748.3	-133.3	-541.5	-28.7	0.00	0.00	0.00
3,900.0	11.35	256.17	3,846.4	-138.0	-560.6	-29.8	0.00	0.00	0.00
4,000.0	11.35	256.17	3,944.4	-142.7	-579.7	-30.8	0.00	0.00	0.00
4,100.0	11.35	256.17	4,042.5	-147.4	-598.8	-31.8	0.00	0.00	0.00
4,200.0	11.35	256.17	4,140.5	-152.1	-617.9	-32.8	0.00	0.00	0.00
4,300.0	11.35	256.17	4,238.6	-156.8	-637.0	-33.8	0.00	0.00	0.00
4,311.7	11.35	256.17	4,250.0	-157.3	-639.2	-33.9	0.00	0.00	0.00
Sussex									
4,400.0	11.35	256.17	4,336.6	-161.5	-656.1	-34.8	0.00	0.00	0.00
4,500.0	11.35	256.17	4,434.6	-166.2	-675.2	-35.8	0.00	0.00	0.00
4,600.0	11.35	256.17	4,532.7	-170.9	-694.3	-36.9	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)
4,700.0	11.35	256.17	4,630.7	-175.6	-713.4	-37.9	0.00	0.00	0.00
4,800.0	11.35	256.17	4,728.8	-180.3	-732.5	-38.9	0.00	0.00	0.00
4,900.0	11.35	256.17	4,826.8	-185.0	-751.6	-39.9	0.00	0.00	0.00
5,000.0	11.35	256.17	4,924.9	-189.7	-770.7	-40.9	0.00	0.00	0.00
5,100.0	11.35	256.17	5,022.9	-194.4	-789.8	-41.9	0.00	0.00	0.00
5,200.0	11.35	256.17	5,121.0	-199.1	-809.0	-42.9	0.00	0.00	0.00
5,215.7	11.35	256.17	5,136.4	-199.8	-812.0	-43.1	0.00	0.00	0.00
5,250.0	10.66	256.17	5,170.0	-201.4	-818.3	-43.4	2.00	-2.00	0.00
Shannon									
5,300.0	9.66	256.17	5,219.2	-203.5	-826.9	-43.9	2.00	-2.00	0.00
5,400.0	7.66	256.17	5,318.1	-207.1	-841.5	-44.7	2.00	-2.00	0.00
5,500.0	5.66	256.17	5,417.4	-209.9	-852.8	-45.3	2.00	-2.00	0.00
5,600.0	3.66	256.17	5,517.1	-211.8	-860.6	-45.7	2.00	-2.00	0.00
5,700.0	1.66	256.17	5,617.0	-212.9	-865.2	-45.9	2.00	-2.00	0.00
5,783.0	0.00	0.00	5,700.0	-213.2	-866.3	-46.0	2.00	-2.00	0.00
5,800.0	0.00	0.00	5,717.0	-213.2	-866.3	-46.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,817.0	-213.2	-866.3	-46.0	0.00	0.00	0.00
5,987.9	0.00	0.00	5,904.9	-213.2	-866.3	-46.0	0.00	0.00	0.00
KOP #2									
6,000.0	0.91	360.00	5,917.0	-213.1	-866.3	-45.9	7.50	7.50	0.00
6,100.0	8.41	360.00	6,016.6	-205.0	-866.3	-37.9	7.50	7.50	0.00
6,200.0	15.91	360.00	6,114.2	-183.9	-866.3	-17.3	7.50	7.50	0.00
6,300.0	23.41	360.00	6,208.3	-150.3	-866.3	15.8	7.50	7.50	0.00
6,400.0	30.91	360.00	6,297.3	-104.7	-866.3	60.6	7.50	7.50	0.00
6,441.2	34.00	360.00	6,332.0	-82.6	-866.3	82.2	7.50	7.50	0.00
Sharon Springs									
6,500.0	38.41	360.00	6,379.5	-47.9	-866.3	116.4	7.50	7.50	0.00
6,600.0	45.91	360.00	6,453.5	19.2	-866.3	182.2	7.50	7.50	0.00
6,628.5	48.05	360.00	6,473.0	40.0	-866.3	202.7	7.50	7.50	0.00
Niobrara A									
6,700.0	53.41	360.00	6,518.2	95.3	-866.3	257.0	7.50	7.50	0.00
6,761.8	58.04	360.00	6,553.0	146.4	-866.3	307.1	7.50	7.50	0.00
Niobrara B									
6,800.0	60.91	360.00	6,572.4	179.3	-866.3	339.5	7.50	7.50	0.00
6,900.0	68.41	360.00	6,615.2	269.6	-866.3	428.2	7.50	7.50	0.00
6,973.8	73.94	360.00	6,639.0	339.4	-866.3	496.7	7.50	7.50	0.00
Niobrara C									
7,000.0	75.91	360.00	6,645.8	364.7	-866.3	521.6	7.50	7.50	0.00
7,100.0	83.41	360.00	6,663.8	463.0	-866.3	618.1	7.50	7.50	0.00
7,196.2	90.62	360.00	6,668.8	559.0	-866.3	712.4	7.50	7.50	0.00
7"									
7,200.0	90.62	360.00	6,668.7	562.8	-866.3	716.1	0.00	0.00	0.00
7,300.0	90.62	360.00	6,667.6	662.8	-866.3	814.3	0.00	0.00	0.00
7,400.0	90.62	360.00	6,666.6	762.8	-866.3	912.5	0.00	0.00	0.00
7,500.0	90.62	360.00	6,665.5	862.8	-866.3	1,010.7	0.00	0.00	0.00
7,600.0	90.62	360.00	6,664.4	962.8	-866.3	1,108.9	0.00	0.00	0.00
7,700.0	90.62	360.00	6,663.3	1,062.8	-866.3	1,207.1	0.00	0.00	0.00
7,800.0	90.62	360.00	6,662.2	1,162.8	-866.3	1,305.3	0.00	0.00	0.00
7,900.0	90.62	360.00	6,661.1	1,262.8	-866.3	1,403.5	0.00	0.00	0.00
8,000.0	90.62	360.00	6,660.1	1,362.8	-866.3	1,501.7	0.00	0.00	0.00
8,100.0	90.62	360.00	6,659.0	1,462.8	-866.3	1,599.9	0.00	0.00	0.00
8,200.0	90.62	360.00	6,657.9	1,562.8	-866.3	1,698.1	0.00	0.00	0.00

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Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-321	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)
8,300.0	90.62	360.00	6,656.8	1,662.8	-866.3	1,796.3	0.00	0.00	0.00
8,400.0	90.62	360.00	6,655.7	1,762.8	-866.3	1,894.5	0.00	0.00	0.00
8,500.0	90.62	360.00	6,654.6	1,862.8	-866.3	1,992.7	0.00	0.00	0.00
8,600.0	90.62	360.00	6,653.6	1,962.8	-866.3	2,090.9	0.00	0.00	0.00
8,700.0	90.62	360.00	6,652.5	2,062.8	-866.3	2,189.1	0.00	0.00	0.00
8,800.0	90.62	360.00	6,651.4	2,162.7	-866.3	2,287.3	0.00	0.00	0.00
8,900.0	90.62	360.00	6,650.3	2,262.7	-866.3	2,385.5	0.00	0.00	0.00
9,000.0	90.62	360.00	6,649.2	2,362.7	-866.3	2,483.7	0.00	0.00	0.00
9,100.0	90.62	360.00	6,648.2	2,462.7	-866.3	2,581.9	0.00	0.00	0.00
9,200.0	90.62	360.00	6,647.1	2,562.7	-866.3	2,680.1	0.00	0.00	0.00
9,300.0	90.62	360.00	6,646.0	2,662.7	-866.3	2,778.3	0.00	0.00	0.00
9,400.0	90.62	360.00	6,644.9	2,762.7	-866.3	2,876.5	0.00	0.00	0.00
9,500.0	90.62	360.00	6,643.8	2,862.7	-866.3	2,974.7	0.00	0.00	0.00
9,600.0	90.62	360.00	6,642.7	2,962.7	-866.3	3,072.9	0.00	0.00	0.00
9,700.0	90.62	360.00	6,641.7	3,062.7	-866.3	3,171.1	0.00	0.00	0.00
9,800.0	90.62	360.00	6,640.6	3,162.7	-866.3	3,269.3	0.00	0.00	0.00
9,900.0	90.62	360.00	6,639.5	3,262.7	-866.3	3,367.5	0.00	0.00	0.00
10,000.0	90.62	360.00	6,638.4	3,362.7	-866.3	3,465.7	0.00	0.00	0.00
10,100.0	90.62	360.00	6,637.3	3,462.7	-866.3	3,563.9	0.00	0.00	0.00
10,200.0	90.62	360.00	6,636.3	3,562.7	-866.3	3,662.1	0.00	0.00	0.00
10,300.0	90.62	360.00	6,635.2	3,662.7	-866.3	3,760.3	0.00	0.00	0.00
10,400.0	90.62	360.00	6,634.1	3,762.7	-866.3	3,858.5	0.00	0.00	0.00
10,500.0	90.62	360.00	6,633.0	3,862.6	-866.3	3,956.7	0.00	0.00	0.00
10,600.0	90.62	360.00	6,631.9	3,962.6	-866.3	4,054.9	0.00	0.00	0.00
10,700.0	90.62	360.00	6,630.8	4,062.6	-866.3	4,153.1	0.00	0.00	0.00
10,800.0	90.62	360.00	6,629.8	4,162.6	-866.3	4,251.3	0.00	0.00	0.00
10,900.0	90.62	360.00	6,628.7	4,262.6	-866.3	4,349.5	0.00	0.00	0.00
11,000.0	90.62	360.00	6,627.6	4,362.6	-866.3	4,447.7	0.00	0.00	0.00
11,100.0	90.62	360.00	6,626.5	4,462.6	-866.3	4,545.9	0.00	0.00	0.00
11,147.6	90.62	360.00	6,626.0	4,510.2	-866.3	4,592.6	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- - hit/miss target - Shape - plan misses target center by 2678.6ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E) - Rectangle (sides W3,951.2 H100.0 D0.0)	0.00	0.00	1.0	2,534.6	-866.3	1,384,676.44	3,270,024.53	40.385287	-104.530660
SHL 254'FSL & 327'F - plan hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,382,151.62	3,270,918.54	40.378330	-104.527550
BHL 500'FNL & 1183' - plan hits target center - Point	0.00	0.00	6,626.0	4,510.2	-866.3	1,386,651.84	3,270,002.85	40.390710	-104.530660

Database:	Landmark	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (3-5-15)		

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,196.2	6,668.8	7"	7	7-1/2

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,444.7	3,400.0	Parkman		0.00	
4,311.7	4,250.0	Sussex		0.00	
5,250.0	5,170.0	Shannon		0.00	
6,441.2	6,332.0	Sharon Springs		0.00	
6,628.5	6,473.0	Niobrara A		0.00	
6,761.8	6,553.0	Niobrara B		0.00	
6,973.8	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)	
400.0	400.0	0.0	0.0	KOP #1
5,987.9	5,904.9	-213.2	-866.3	KOP #2



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.22-T5N-R64W

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

Ledford 22T-321

Wellbore #1

Plan #2 (3-5-15)

Anticollision Report

10 March, 2015



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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	3/6/2015		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.0	11,147.6	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	11,148.3	6,708.2	417.0	311.8	3.962	CC, ES, SF
Doughman 22VD - Wellbore #1 - Wellbore #1						Out of range
Lucas #1 (Exist.) - Wellbore #1 - Wellbore #1	10,908.9	6,600.0	536.2	438.3	5.480	CC, ES
Lucas #1 (Exist.) - Wellbore #1 - Wellbore #1	11,000.0	6,600.0	543.9	444.3	5.463	SF
Existing Wells Sec.22-T5N-R64W						
Emancipator 22-16 (Exist.) - Wellbore #1 - Wellbore #1	2,029.9	2,000.0	399.0	389.0	39.828	CC, ES
Emancipator 22-16 (Exist.) - Wellbore #1 - Wellbore #1	7,100.0	6,648.3	566.5	535.8	18.481	SF
P&H 22-42 (Exist.) - Wellbore #1 - Wellbore #1	9,796.7	6,607.1	340.0	265.2	4.546	CC
P&H 22-42 (Exist.) - Wellbore #1 - Wellbore #1	9,800.0	6,607.0	340.0	265.2	4.543	ES, SF
Existing Wells Sec.22-T5N-R64W (Grid)						
Emancipator B 22-23 (Exist.) - Wellbore #1 - Wellbore #1	7,703.2	6,656.3	153.9	116.0	4.066	CC, ES, SF
Ledford 22Y-HZ Pad Sec.22-T5N-R64W						
Ledford 22T-221 - Wellbore #1 - Plan #2 (3-5-15)	400.0	400.0	31.2	29.7	19.846	CC, ES
Ledford 22T-221 - Wellbore #1 - Plan #2 (3-5-15)	11,148.3	11,043.7	253.1	84.0	1.497	Level 3, SF
Ledford 22Y-341 - Wellbore #1 - Plan #2 (3-5-15)	400.0	400.0	60.5	58.9	38.443	CC, ES
Ledford 22Y-341 - Wellbore #1 - Plan #2 (3-5-15)	11,148.3	11,075.7	727.1	550.7	4.123	SF
Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)	400.0	402.0	92.5	90.9	58.600	CC, ES
Ledford 22Y-401 - Wellbore #1 - Plan #2 (3-5-15)	1,200.0	1,199.4	141.9	136.8	27.763	SF
P&H 22CD Pad Sec.22-T5N-R64W						
P&H 22CD - Wellbore #1 - Wellbore #1	10,335.3	6,731.8	93.8	3.3	1.037	Level 2, CC, ES, SF
P&H 22SD - Wellbore #1 - Wellbore #1	9,087.2	6,768.3	92.3	22.8	1.327	Level 3, CC, ES, 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		Minimum Separation		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	Warning
10,600.0	6,631.9	6,730.9	6,633.8	79.4	20.2	-105.98	4,905.3	-999.2	952.4	860.6	91.80	10.375	
10,700.0	6,630.8	6,726.6	6,629.5	81.2	20.2	-104.28	4,905.5	-999.2	853.6	759.2	94.36	9.046	
10,800.0	6,629.8	6,722.5	6,625.4	83.1	20.2	-102.57	4,905.6	-999.2	755.1	658.2	96.88	7.794	
10,900.0	6,628.7	6,718.3	6,621.2	85.0	20.2	-100.86	4,905.7	-999.2	656.9	557.6	99.35	6.612	

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-321
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-321	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: 765-MWD												Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis		Distance							
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
11,000.0	6,627.6	6,714.2	6,617.1	86.8	20.2	-99.15	4,905.8	-999.2	559.4	457.7	101.77	5.497	
11,100.0	6,626.5	6,710.2	6,613.1	88.7	20.2	-97.45	4,905.9	-999.2	463.0	358.9	104.12	4.447	
11,148.3	6,626.0	6,708.2	6,611.2	89.6	20.2	-96.63	4,906.0	-999.2	417.0	311.8	105.24	3.962 CC, ES, SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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							
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,100.0	6,637.3	6,583.4	6,581.8	70.1	13.7	87.99	4,271.0	-330.3	970.3	887.8	82.48	11.765	
10,200.0	6,636.3	6,585.2	6,583.6	72.0	13.7	88.18	4,271.1	-330.2	888.7	804.3	84.37	10.534	
10,300.0	6,635.2	6,587.0	6,585.4	73.8	13.7	88.38	4,271.1	-330.2	811.2	725.0	86.26	9.404	
10,400.0	6,634.1	6,588.8	6,587.2	75.7	13.7	88.57	4,271.2	-330.2	739.2	651.0	88.16	8.384	
10,500.0	6,633.0	6,590.6	6,589.1	77.5	13.7	88.77	4,271.2	-330.2	674.2	584.2	90.06	7.487	
10,600.0	6,631.9	6,600.0	6,598.4	79.4	13.8	89.77	4,271.5	-330.2	618.8	526.8	92.02	6.725	
10,700.0	6,630.8	6,600.0	6,598.4	81.2	13.8	89.77	4,271.5	-330.2	575.4	481.5	93.90	6.128	
10,800.0	6,629.8	6,600.0	6,598.4	83.1	13.8	89.77	4,271.5	-330.2	547.1	451.3	95.79	5.712	
10,900.0	6,628.7	6,600.0	6,598.4	85.0	13.8	89.77	4,271.5	-330.2	536.3	438.6	97.67	5.490	
10,908.9	6,628.6	6,600.0	6,598.4	85.1	13.8	89.77	4,271.5	-330.2	536.2	438.3	97.84	5.480 CC, ES	
11,000.0	6,627.6	6,600.0	6,598.4	86.8	13.8	89.77	4,271.5	-330.2	543.9	444.3	99.56	5.463 SF	
11,100.0	6,626.5	6,600.0	6,598.4	88.7	13.8	89.77	4,271.5	-330.2	569.2	467.8	101.45	5.611	
11,148.3	6,626.0	6,602.6	6,601.0	89.6	13.8	90.05	4,271.6	-330.1	587.2	484.8	102.38	5.735	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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 - 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
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	-42.59		342.5	-314.8	465.3				
100.0	100.0	91.8	91.8	0.1	0.1	-42.60		342.2	-314.7	464.9	464.7	0.23	1,984.951	
200.0	200.0	190.2	190.2	0.3	0.4	-42.63		341.7	-314.5	464.5	463.8	0.69	669.061	
300.0	300.0	291.7	291.7	0.6	0.6	-42.65		341.3	-314.4	464.1	462.9	1.17	397.785	
400.0	400.0	393.1	393.1	0.8	0.9	-42.66		340.7	-314.0	463.3	461.7	1.65	280.773	
500.0	500.0	493.0	493.0	1.0	1.1	61.24		339.9	-313.5	462.0	459.9	2.12	217.620	
600.0	600.0	592.7	592.7	1.2	1.4	61.52		339.1	-313.1	459.9	457.3	2.59	177.574	
700.0	699.9	693.1	693.1	1.4	1.6	62.04		338.6	-312.5	457.0	454.0	3.05	149.950	
800.0	799.7	794.5	794.5	1.6	1.9	62.83		338.1	-311.3	453.1	449.6	3.51	128.952	
900.0	899.4	893.4	893.3	1.9	2.1	63.83		337.6	-310.1	448.3	444.3	3.99	112.383	
1,000.0	998.9	991.3	991.3	2.1	2.3	65.00		337.0	-309.3	443.2	438.8	4.47	99.049	
1,100.0	1,098.3	1,090.5	1,090.5	2.4	2.6	66.32		336.1	-309.3	437.8	432.8	4.99	87.820	
1,200.0	1,197.4	1,190.1	1,190.1	2.7	2.8	67.93		335.4	-308.9	431.9	426.4	5.52	78.197	
1,300.0	1,296.3	1,288.9	1,288.9	3.0	3.1	69.88		335.0	-308.1	425.7	419.6	6.08	69.974	
1,400.0	1,394.9	1,385.5	1,385.5	3.4	3.3	72.04		334.7	-307.3	419.6	412.9	6.67	62.939	
1,500.0	1,493.3	1,484.7	1,484.7	3.8	3.6	74.51		334.5	-307.0	413.8	406.5	7.30	56.703	
1,600.0	1,591.3	1,583.1	1,583.0	4.2	3.8	77.15		334.0	-306.6	408.3	400.3	7.96	51.284	
1,700.0	1,689.4	1,677.8	1,677.8	4.6	4.0	79.72		333.7	-306.5	403.9	395.4	8.52	47.422	
1,800.0	1,787.4	1,774.8	1,774.7	5.0	4.0	82.38		333.9	-306.8	401.2	392.2	8.97	44.724	
1,900.0	1,885.5	1,871.6	1,871.5	5.4	4.0	85.04		334.3	-307.3	399.6	390.1	9.41	42.450	
2,000.0	1,983.5	1,970.4	1,970.4	5.8	4.0	87.78		334.9	-307.8	399.0	389.2	9.88	40.401	
2,029.9	2,012.8	2,000.0	1,999.9	6.0	4.1	88.62		335.0	-307.8	399.0	389.0	10.02	39.828 CC, ES	
2,100.0	2,081.5	2,066.6	2,066.5	6.3	4.1	90.48		335.5	-308.1	399.4	389.0	10.35	38.571	
2,200.0	2,179.6	2,163.2	2,163.1	6.7	4.2	93.12		336.5	-308.9	401.3	390.5	10.84	37.023	
2,300.0	2,277.6	2,261.1	2,261.0	7.1	4.2	95.85		337.9	-309.1	404.3	393.0	11.33	35.677	
2,400.0	2,375.7	2,357.2	2,357.1	7.6	4.3	98.47		339.3	-309.5	408.4	396.5	11.83	34.520	
2,500.0	2,473.7	2,455.6	2,455.5	8.0	4.4	101.09		341.3	-309.9	413.8	401.5	12.33	33.557	
2,600.0	2,571.8	2,554.9	2,554.8	8.4	4.6	103.69		342.7	-310.2	419.6	406.8	12.84	32.683	
2,700.0	2,669.8	2,653.8	2,653.7	8.9	4.7	106.25		344.1	-310.1	426.2	412.9	13.35	31.932	
2,800.0	2,767.9	2,751.6	2,751.4	9.3	4.8	108.66		345.2	-310.3	433.4	419.5	13.85	31.289	
2,900.0	2,865.9	2,847.7	2,847.6	9.7	5.0	110.97		346.7	-310.4	441.7	427.3	14.35	30.784	
3,000.0	2,964.0	2,945.4	2,945.2	10.2	5.2	113.18		348.5	-310.8	450.9	436.1	14.85	30.376	
3,100.0	3,062.0	3,045.0	3,044.8	10.6	5.3	115.41		350.0	-310.7	460.8	445.5	15.34	30.042	
3,200.0	3,160.1	3,146.0	3,145.8	11.1	5.5	117.52		351.2	-311.2	470.7	454.9	15.82	29.750	
3,300.0	3,258.1	3,246.7	3,246.5	11.5	5.7	119.57		351.7	-311.6	480.7	464.4	16.29	29.513	
3,400.0	3,356.1	3,346.5	3,346.3	11.9	5.8	121.51		351.8	-312.1	490.7	474.0	16.73	29.329	
3,500.0	3,454.2	3,447.5	3,447.3	12.4	6.0	123.43		351.5	-312.4	501.0	483.9	17.16	29.200	
3,600.0	3,552.2	3,546.4	3,546.2	12.8	6.1	125.22		350.5	-313.2	511.1	493.5	17.58	29.065	
3,700.0	3,650.3	3,642.8	3,642.6	13.3	6.3	126.88		350.2	-313.8	522.2	504.2	18.01	28.995	
3,800.0	3,748.3	3,742.7	3,742.4	13.7	6.4	128.52		349.6	-314.6	533.5	515.1	18.44	28.939	
3,900.0	3,846.4	3,837.8	3,837.6	14.2	6.6	130.05		349.0	-315.2	545.3	526.4	18.86	28.917	
4,000.0	3,944.4	3,930.4	3,930.2	14.6	6.8	131.50		349.1	-315.1	558.5	539.2	19.27	28.983	
4,100.0	4,042.5	4,026.4	4,026.1	15.0	6.9	132.98		349.4	-314.3	572.5	552.8	19.68	29.096	
4,200.0	4,140.5	4,121.1	4,120.8	15.5	7.1	134.39		350.2	-313.1	587.6	567.5	20.08	29.257	
4,300.0	4,238.6	4,220.1	4,219.8	15.9	7.3	135.80		350.9	-311.8	602.9	582.4	20.49	29.422	
4,400.0	4,336.6	4,314.8	4,314.5	16.4	7.5	137.06		352.0	-310.7	618.9	598.0	20.90	29.611	
4,500.0	4,434.6	4,418.0	4,417.7	16.8	7.7	138.33		353.1	-309.8	635.0	613.6	21.32	29.779	
4,600.0	4,532.7	4,520.0	4,519.8	17.3	7.9	139.52		353.5	-309.4	650.5	628.7	21.75	29.913	
4,700.0	4,630.7	4,618.1	4,617.8	17.7	8.1	140.61		353.8	-309.3	666.0	643.8	22.17	30.045	
4,800.0	4,728.8	4,714.4	4,714.1	18.1	8.3	141.60		354.3	-309.4	681.8	659.2	22.58	30.191	
4,900.0	4,826.8	4,811.8	4,811.5	18.6	8.5	142.54		355.2	-309.5	698.0	675.0	23.00	30.344	

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-321
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-321	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 - 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)			
5,000.0	4,924.9	4,910.9	4,910.7	19.0	8.7	143.48	355.8	-309.4	714.4	690.9	23.43	30.489	
5,100.0	5,022.9	5,008.4	5,008.1	19.5	8.9	144.37	356.3	-309.3	730.9	707.0	23.86	30.632	
5,200.0	5,121.0	5,106.1	5,105.9	19.9	9.1	145.20	357.0	-309.3	747.6	723.3	24.29	30.777	
5,300.0	5,219.2	5,204.9	5,204.6	20.3	9.3	146.07	358.0	-309.6	763.4	738.7	24.71	30.896	
5,400.0	5,318.1	5,309.7	5,309.4	20.6	9.5	146.80	358.7	-310.3	776.1	751.0	25.07	30.957	
5,500.0	5,417.4	5,409.8	5,409.6	20.8	9.6	147.33	358.8	-310.9	785.5	760.1	25.39	30.934	
5,600.0	5,517.1	5,506.4	5,506.1	21.0	9.8	147.67	359.0	-311.4	792.1	766.4	25.71	30.815	
5,700.0	5,617.0	5,605.5	5,605.2	21.1	10.0	147.86	359.3	-311.6	796.1	770.1	26.03	30.582	
5,800.0	5,717.0	5,705.2	5,704.9	21.3	10.2	44.08	359.5	-311.7	797.2	770.8	26.37	30.236	
5,900.0	5,817.0	5,800.0	5,799.7	21.4	10.4	44.06	360.1	-311.5	797.8	771.1	26.73	29.844	
6,000.0	5,917.0	5,898.1	5,897.8	21.5	10.7	44.01	361.4	-311.3	798.8	771.7	27.10	29.479	
6,100.0	6,016.6	5,993.2	5,992.9	21.6	10.9	44.57	362.9	-311.0	794.3	767.2	27.14	29.266	
6,200.0	6,114.2	6,091.2	6,090.8	21.7	11.1	46.30	364.7	-310.7	781.0	754.1	26.88	29.059	
6,300.0	6,208.3	6,187.6	6,187.3	21.7	11.3	49.29	366.5	-310.4	759.1	732.7	26.41	28.748	
6,400.0	6,297.3	6,280.1	6,279.8	21.7	11.5	53.69	367.7	-310.1	729.8	703.9	25.94	28.138	
6,500.0	6,379.5	6,362.6	6,362.2	21.7	11.7	59.31	368.6	-309.9	695.0	669.3	25.73	27.009	
6,600.0	6,453.5	6,435.8	6,435.4	21.8	11.9	65.91	369.4	-309.6	657.7	631.7	26.00	25.300	
6,700.0	6,518.2	6,500.0	6,499.6	21.8	12.0	73.04	370.2	-309.2	621.3	594.6	26.73	23.247	
6,800.0	6,572.4	6,554.3	6,553.9	21.9	12.1	79.88	370.6	-308.6	589.7	562.0	27.69	21.299	
6,900.0	6,615.2	6,596.9	6,596.5	22.1	12.2	85.46	370.7	-308.0	567.4	538.7	28.67	19.789	
7,000.0	6,645.8	6,629.2	6,628.8	22.5	12.3	89.26	370.6	-307.6	558.8	529.1	29.65	18.848	
7,004.6	6,646.9	6,630.4	6,630.0	22.5	12.3	89.37	370.6	-307.6	558.7	529.0	29.69	18.816	
7,100.0	6,663.8	6,648.3	6,647.9	23.0	12.3	90.59	370.6	-307.4	566.5	535.8	30.65	18.481 SF	
7,200.0	6,668.7	6,653.2	6,652.8	23.7	12.3	89.28	370.6	-307.4	591.1	559.4	31.67	18.666	
7,300.0	6,667.6	6,652.0	6,651.6	24.5	12.3	89.16	370.6	-307.4	630.7	597.9	32.84	19.203	
7,400.0	6,666.6	6,650.8	6,650.4	25.5	12.3	89.03	370.6	-307.4	682.8	648.7	34.13	20.008	
7,500.0	6,665.5	6,649.5	6,649.1	26.6	12.3	88.91	370.6	-307.4	744.8	709.3	35.50	20.982	
7,600.0	6,664.4	6,648.2	6,647.8	27.9	12.3	88.77	370.6	-307.5	814.3	777.4	36.94	22.046	
7,700.0	6,663.3	6,646.9	6,646.5	29.2	12.3	88.64	370.6	-307.5	889.7	851.2	38.44	23.146	
7,800.0	6,662.2	6,645.6	6,645.2	30.6	12.3	88.50	370.6	-307.5	969.5	929.5	39.99	24.245	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance						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)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	
8,900.0	6,650.3	6,632.4	6,630.2	48.5	11.6	93.47	3,158.9	-526.0	958.6	900.2	58.48	16.391	
9,000.0	6,649.2	6,629.6	6,627.4	50.3	11.6	92.99	3,158.9	-526.0	865.9	805.6	60.29	14.363	
9,100.0	6,648.2	6,626.8	6,624.6	52.0	11.6	92.52	3,159.0	-526.1	775.0	712.9	62.10	12.480	
9,200.0	6,647.1	6,623.9	6,621.8	53.8	11.6	92.04	3,159.0	-526.1	686.5	622.6	63.91	10.742	
9,300.0	6,646.0	6,621.1	6,618.9	55.6	11.6	91.57	3,159.1	-526.1	601.7	536.0	65.73	9.155	
9,400.0	6,644.9	6,618.3	6,616.1	57.4	11.6	91.09	3,159.1	-526.2	522.3	454.8	67.55	7.732	
9,500.0	6,643.8	6,615.4	6,613.3	59.2	11.6	90.62	3,159.2	-526.2	451.2	381.8	69.38	6.503	
9,600.0	6,642.7	6,612.6	6,610.4	61.0	11.6	90.14	3,159.2	-526.3	392.8	321.6	71.20	5.516	
9,700.0	6,641.7	6,609.8	6,607.6	62.8	11.6	89.66	3,159.3	-526.3	353.5	280.5	73.02	4.841	
9,796.7	6,640.6	6,607.1	6,604.9	64.6	11.6	89.20	3,159.3	-526.3	340.0	265.2	74.79	4.546 CC	
9,800.0	6,640.6	6,607.0	6,604.8	64.6	11.6	89.19	3,159.3	-526.3	340.0	265.2	74.85	4.543 ES, SF	
9,900.0	6,639.5	6,604.1	6,602.0	66.5	11.6	88.71	3,159.4	-526.4	355.4	278.7	76.67	4.635	
10,000.0	6,638.4	6,601.3	6,599.1	68.3	11.6	88.23	3,159.4	-526.4	396.1	317.6	78.49	5.047	
10,100.0	6,637.3	6,598.5	6,596.3	70.1	11.6	87.76	3,159.5	-526.5	455.6	375.3	80.31	5.672	
10,200.0	6,636.3	6,595.8	6,593.6	72.0	11.6	87.30	3,159.5	-526.5	527.4	445.3	82.13	6.421	
10,300.0	6,635.2	6,593.0	6,590.8	73.8	11.6	86.84	3,159.6	-526.5	607.2	523.3	83.95	7.234	
10,400.0	6,634.1	6,590.3	6,588.1	75.7	11.6	86.38	3,159.6	-526.6	692.3	606.6	85.76	8.073	
10,500.0	6,633.0	6,587.6	6,585.4	77.5	11.6	85.92	3,159.6	-526.6	781.0	693.4	87.57	8.918	
10,600.0	6,631.9	6,584.9	6,582.7	79.4	11.6	85.47	3,159.7	-526.6	872.0	782.7	89.37	9.757	
10,700.0	6,630.8	6,582.2	6,580.0	81.2	11.6	85.02	3,159.7	-526.7	964.9	873.7	91.18	10.583	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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 B 22-23 (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)			
6,700.0	6,518.2	6,523.2	6,522.3	21.8	11.4	-15.37	1,067.7	-1,022.6	984.9	962.3	22.59	43.598		
6,800.0	6,572.4	6,577.7	6,576.8	21.9	11.5	-20.31	1,067.0	-1,021.4	901.3	880.4	20.86	43.202		
6,900.0	6,615.2	6,618.3	6,617.4	22.1	11.6	-28.71	1,066.5	-1,020.7	811.8	791.1	20.66	39.292		
7,000.0	6,645.8	6,645.9	6,645.0	22.5	11.6	-43.57	1,066.2	-1,020.3	718.2	694.6	23.62	30.402		
7,100.0	6,663.8	6,662.6	6,661.7	23.0	11.6	-68.26	1,066.0	-1,020.1	622.3	593.3	29.07	21.409		
7,200.0	6,668.7	6,666.6	6,665.7	23.7	11.6	-94.62	1,066.0	-1,020.0	526.1	495.4	30.69	17.143		
7,300.0	6,667.6	6,664.6	6,663.6	24.5	11.6	-93.86	1,066.0	-1,020.1	431.5	399.6	31.94	13.512		
7,400.0	6,666.6	6,662.5	6,661.6	25.5	11.6	-93.10	1,066.0	-1,020.1	340.0	306.7	33.29	10.214		
7,500.0	6,665.5	6,660.5	6,659.5	26.6	11.6	-92.33	1,066.0	-1,020.1	254.9	220.2	34.72	7.341		
7,600.0	6,664.4	6,658.4	6,657.5	27.9	11.6	-91.57	1,066.0	-1,020.1	185.3	149.0	36.23	5.115		
7,700.0	6,663.3	6,656.4	6,655.4	29.2	11.6	-90.80	1,066.1	-1,020.2	153.9	116.1	37.79	4.073		
7,703.2	6,663.3	6,656.3	6,655.4	29.2	11.6	-90.78	1,066.1	-1,020.2	153.9	116.0	37.84	4.066 CC, ES, SF		
7,800.0	6,662.2	6,654.3	6,653.4	30.6	11.6	-90.04	1,066.1	-1,020.2	181.8	142.4	39.39	4.614		
7,900.0	6,661.1	6,652.2	6,651.3	32.1	11.6	-89.27	1,066.1	-1,020.2	249.7	208.7	41.03	6.087		
8,000.0	6,660.1	6,650.2	6,649.3	33.6	11.6	-88.51	1,066.1	-1,020.3	334.2	291.5	42.70	7.827		
8,100.0	6,659.0	6,648.1	6,647.2	35.1	11.6	-87.73	1,066.1	-1,020.3	425.5	381.1	44.40	9.583		
8,200.0	6,657.9	6,646.0	6,645.0	36.7	11.6	-86.94	1,066.2	-1,020.3	519.9	473.8	46.11	11.277		
8,300.0	6,656.8	6,643.8	6,642.8	38.3	11.6	-86.13	1,066.2	-1,020.3	616.2	568.3	47.83	12.882		
8,400.0	6,655.7	6,641.6	6,640.6	40.0	11.6	-85.31	1,066.2	-1,020.4	713.4	663.8	49.56	14.394		
8,500.0	6,654.6	6,639.3	6,638.4	41.6	11.6	-84.48	1,066.2	-1,020.4	811.3	760.0	51.30	15.816		
8,600.0	6,653.6	6,637.0	6,636.1	43.3	11.6	-83.64	1,066.3	-1,020.4	909.7	856.6	53.03	17.153		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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		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	45.55	21.9	22.3	31.2					
100.0	100.0	100.0	100.0	0.1	0.1	45.55	21.9	22.3	31.2	31.0	0.22	138.919		
200.0	200.0	200.0	200.0	0.3	0.3	45.55	21.9	22.3	31.2	30.5	0.67	46.306		
300.0	300.0	300.0	300.0	0.6	0.6	45.55	21.9	22.3	31.2	30.1	1.12	27.784		
400.0	400.0	400.0	400.0	0.8	0.8	45.55	21.9	22.3	31.2	29.7	1.57	19.846 CC, ES		
500.0	500.0	500.0	500.0	1.0	1.0	150.17	21.9	22.3	32.0	30.0	2.01	15.930		
600.0	600.0	600.0	600.0	1.2	1.2	152.33	21.9	22.3	34.3	31.8	2.43	14.078		
700.0	699.9	699.9	699.9	1.4	1.5	155.36	21.9	22.3	38.2	35.3	2.87	13.310		
800.0	799.7	799.7	799.7	1.6	1.7	158.67	21.9	22.3	43.8	40.5	3.31	13.241		
900.0	899.4	899.4	899.4	1.9	1.9	161.84	21.9	22.3	51.2	47.5	3.75	13.650		
1,000.0	998.9	998.9	998.9	2.1	2.1	164.65	21.9	22.3	60.4	56.2	4.20	14.395		
1,100.0	1,098.3	1,099.5	1,099.5	2.4	2.3	166.97	21.6	21.5	70.5	65.9	4.62	15.256		
1,200.0	1,197.4	1,200.3	1,200.2	2.7	2.5	168.85	20.7	19.0	80.7	75.7	5.04	16.025		
1,300.0	1,296.3	1,301.2	1,301.1	3.0	2.7	170.42	19.2	14.8	90.9	85.5	5.46	16.659		
1,400.0	1,394.9	1,402.4	1,402.0	3.4	3.0	171.78	17.0	9.0	101.2	95.3	5.89	17.184		
1,500.0	1,493.3	1,503.7	1,503.0	3.8	3.2	172.98	14.3	1.5	111.4	105.1	6.32	17.620		
1,600.0	1,591.3	1,605.2	1,604.1	4.2	3.4	174.07	11.0	-7.7	121.3	114.5	6.77	17.905		
1,700.0	1,689.4	1,707.1	1,705.3	4.6	3.7	175.01	7.0	-18.7	129.5	122.3	7.24	17.898		
1,800.0	1,787.4	1,809.2	1,806.6	5.0	4.0	175.87	2.4	-31.3	136.0	128.3	7.71	17.648		
1,900.0	1,885.5	1,911.6	1,907.7	5.4	4.3	176.68	-2.9	-45.7	140.8	132.6	8.19	17.196		
2,000.0	1,983.5	2,014.1	2,008.8	5.8	4.6	177.49	-8.7	-61.8	143.8	135.1	8.67	16.579		
2,100.0	2,081.5	2,114.1	2,107.2	6.3	4.9	178.27	-14.8	-78.4	145.9	136.7	9.16	15.925		
2,200.0	2,179.6	2,214.0	2,205.6	6.7	5.3	179.02	-20.8	-95.0	148.0	138.3	9.65	15.331		
2,300.0	2,277.6	2,314.0	2,304.0	7.1	5.6	179.76	-26.8	-111.6	150.1	140.0	10.15	14.790		
2,400.0	2,375.7	2,414.0	2,402.4	7.6	6.0	-179.53	-32.8	-128.1	152.3	141.7	10.65	14.296		
2,500.0	2,473.7	2,513.9	2,500.8	8.0	6.4	-178.83	-38.9	-144.7	154.5	143.3	11.16	13.843		
2,600.0	2,571.8	2,613.9	2,599.2	8.4	6.7	-178.15	-44.9	-161.3	156.7	145.0	11.67	13.425		
2,700.0	2,669.8	2,713.8	2,697.6	8.9	7.1	-177.50	-50.9	-177.9	159.0	146.8	12.19	13.040		
2,800.0	2,767.9	2,813.8	2,795.9	9.3	7.5	-176.86	-56.9	-194.5	161.2	148.5	12.71	12.682		
2,900.0	2,865.9	2,913.7	2,894.3	9.7	7.9	-176.24	-63.0	-211.0	163.5	150.2	13.24	12.351		
3,000.0	2,964.0	3,013.7	2,992.7	10.2	8.3	-175.64	-69.0	-227.6	165.8	152.0	13.77	12.042		
3,100.0	3,062.0	3,113.7	3,091.1	10.6	8.6	-175.05	-75.0	-244.2	168.1	153.8	14.30	11.754		
3,200.0	3,160.1	3,213.6	3,189.5	11.1	9.0	-174.48	-81.1	-260.8	170.4	155.6	14.84	11.484		
3,300.0	3,258.1	3,313.6	3,287.9	11.5	9.4	-173.92	-87.1	-277.3	172.7	157.4	15.38	11.231		
3,400.0	3,356.1	3,413.5	3,386.3	11.9	9.8	-173.38	-93.1	-293.9	175.1	159.2	15.93	10.994		
3,500.0	3,454.2	3,513.5	3,484.7	12.4	10.2	-172.85	-99.1	-310.5	177.5	161.0	16.48	10.771		
3,600.0	3,552.2	3,613.5	3,583.1	12.8	10.6	-172.34	-105.2	-327.1	179.9	162.8	17.03	10.560		
3,700.0	3,650.3	3,713.4	3,681.5	13.3	11.0	-171.84	-111.2	-343.6	182.3	164.7	17.59	10.361		
3,800.0	3,748.3	3,813.4	3,779.9	13.7	11.4	-171.36	-117.2	-360.2	184.7	166.5	18.15	10.173		
3,900.0	3,846.4	3,913.3	3,878.2	14.2	11.8	-170.88	-123.3	-376.8	187.1	168.4	18.72	9.995		
4,000.0	3,944.4	4,013.3	3,976.6	14.6	12.2	-170.42	-129.3	-393.4	189.6	170.3	19.29	9.826		
4,100.0	4,042.5	4,113.2	4,075.0	15.0	12.6	-169.97	-135.3	-410.0	192.0	172.2	19.86	9.666		
4,200.0	4,140.5	4,213.2	4,173.4	15.5	13.0	-169.53	-141.3	-426.5	194.5	174.0	20.44	9.514		
4,300.0	4,238.6	4,313.2	4,271.8	15.9	13.4	-169.11	-147.4	-443.1	197.0	175.9	21.02	9.369		
4,400.0	4,336.6	4,413.1	4,370.2	16.4	13.8	-168.69	-153.4	-459.7	199.4	177.8	21.61	9.231		
4,500.0	4,434.6	4,513.1	4,468.6	16.8	14.2	-168.28	-159.4	-476.3	201.9	179.7	22.19	9.099		
4,600.0	4,532.7	4,613.0	4,567.0	17.3	14.6	-167.89	-165.5	-492.8	204.5	181.7	22.79	8.973		
4,700.0	4,630.7	4,713.0	4,665.4	17.7	15.0	-167.50	-171.5	-509.4	207.0	183.6	23.38	8.853		
4,800.0	4,728.8	4,813.0	4,763.8	18.1	15.4	-167.12	-177.5	-526.0	209.5	185.5	23.98	8.738		
4,900.0	4,826.8	4,912.9	4,862.1	18.6	15.9	-166.76	-183.5	-542.6	212.0	187.5	24.58	8.628		
5,000.0	4,924.9	5,012.9	4,960.5	19.0	16.3	-166.40	-189.6	-559.2	214.6	189.4	25.18	8.522		

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-321
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-321	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
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)						
5,100.0	5,022.9	5,112.8	5,058.9	19.5	16.7	-166.05	-195.6	-575.7	217.1	191.3	25.78	8.421				
5,200.0	5,121.0	5,208.5	5,153.2	19.9	17.0	-165.77	-201.2	-591.0	220.3	194.0	26.35	8.362				
5,300.0	5,219.2	5,300.0	5,243.8	20.3	17.2	-165.72	-205.5	-603.1	225.1	198.3	26.82	8.396				
5,400.0	5,318.1	5,394.6	5,337.8	20.6	17.5	-165.73	-209.0	-612.7	229.7	202.5	27.21	8.442				
5,500.0	5,417.4	5,487.4	5,430.4	20.8	17.6	-165.80	-211.4	-619.2	233.9	206.3	27.54	8.494				
5,600.0	5,517.1	5,580.2	5,523.1	21.0	17.8	-165.93	-212.8	-623.0	237.7	209.9	27.81	8.549				
5,700.0	5,617.0	5,674.1	5,617.0	21.1	17.9	-166.12	-213.1	-624.0	241.2	213.1	28.04	8.602				
5,800.0	5,717.0	5,774.1	5,717.0	21.3	18.1	89.98	-213.1	-624.0	242.4	214.1	28.29	8.567				
5,900.0	5,817.0	5,874.1	5,817.0	21.4	18.2	89.98	-213.1	-624.0	242.4	213.7	28.63	8.464				
5,925.2	5,842.2	5,899.3	5,842.2	21.4	18.2	89.96	-213.0	-624.0	242.4	213.6	28.72	8.439				
6,000.0	5,917.0	5,973.7	5,916.3	21.5	18.3	88.77	-207.9	-624.0	242.4	213.6	28.78	8.421				
6,100.0	6,016.6	6,071.9	6,012.8	21.6	18.4	86.42	-190.2	-624.0	242.8	214.1	28.72	8.455				
6,200.0	6,114.2	6,168.8	6,105.2	21.7	18.5	84.15	-160.7	-624.0	243.6	215.0	28.64	8.506				
6,300.0	6,208.3	6,264.7	6,192.0	21.7	18.5	82.00	-120.3	-624.0	244.8	216.1	28.60	8.557				
6,400.0	6,297.3	6,359.5	6,272.3	21.7	18.5	80.02	-69.9	-624.0	246.1	217.5	28.65	8.590				
6,500.0	6,379.5	6,453.5	6,345.1	21.7	18.5	78.22	-10.6	-624.0	247.6	218.8	28.81	8.594				
6,600.0	6,453.5	6,546.6	6,409.5	21.8	18.5	76.63	56.5	-624.0	249.1	220.0	29.11	8.558				
6,700.0	6,518.2	6,639.1	6,464.9	21.8	18.5	75.27	130.5	-624.0	250.6	221.1	29.56	8.479				
6,800.0	6,572.4	6,730.9	6,510.8	21.9	18.7	74.15	210.0	-624.0	252.0	221.7	30.21	8.340				
6,900.0	6,615.2	6,822.4	6,546.5	22.1	18.9	73.27	294.1	-624.0	253.1	222.0	31.05	8.151				
7,000.0	6,645.8	6,913.5	6,572.0	22.5	19.3	72.65	381.5	-624.0	253.9	221.8	32.10	7.910				
7,100.0	6,663.8	7,004.3	6,586.8	23.0	19.9	72.30	471.1	-624.0	254.4	221.0	33.37	7.623				
7,200.0	6,668.7	7,095.5	6,590.9	23.7	20.7	72.20	562.1	-624.0	254.5	219.6	34.89	7.295				
7,300.0	6,667.6	7,195.5	6,589.9	24.5	21.8	72.22	662.1	-624.0	254.5	217.3	37.17	6.847				
7,400.0	6,666.6	7,295.5	6,589.0	25.5	22.9	72.25	762.1	-624.0	254.5	214.8	39.66	6.416				
7,500.0	6,665.5	7,395.5	6,588.0	26.6	24.2	72.28	862.1	-624.0	254.4	212.1	42.33	6.011				
7,600.0	6,664.4	7,495.5	6,587.1	27.9	25.6	72.30	962.1	-624.0	254.4	209.3	45.14	5.636				
7,700.0	6,663.3	7,595.5	6,586.1	29.2	27.0	72.33	1,062.1	-624.0	254.4	206.3	48.07	5.292				
7,800.0	6,662.2	7,695.5	6,585.1	30.6	28.5	72.36	1,162.1	-624.0	254.3	203.2	51.10	4.977				
7,900.0	6,661.1	7,795.5	6,584.2	32.1	30.1	72.38	1,262.1	-624.0	254.3	200.1	54.21	4.690				
8,000.0	6,660.1	7,895.5	6,583.2	33.6	31.7	72.41	1,362.1	-624.0	254.2	196.8	57.40	4.430				
8,100.0	6,659.0	7,995.5	6,582.3	35.1	33.3	72.43	1,462.1	-624.0	254.2	193.6	60.64	4.192				
8,200.0	6,657.9	8,095.5	6,581.3	36.7	35.0	72.46	1,562.0	-624.0	254.2	190.2	63.93	3.976				
8,300.0	6,656.8	8,195.5	6,580.3	38.3	36.7	72.49	1,662.0	-624.0	254.1	186.9	67.27	3.778				
8,400.0	6,655.7	8,295.5	6,579.4	40.0	38.4	72.51	1,762.0	-624.0	254.1	183.5	70.64	3.597				
8,500.0	6,654.6	8,395.5	6,578.4	41.6	40.1	72.54	1,862.0	-624.0	254.1	180.0	74.04	3.431				
8,600.0	6,653.6	8,495.5	6,577.5	43.3	41.8	72.57	1,962.0	-624.0	254.0	176.5	77.48	3.279				
8,700.0	6,652.5	8,595.5	6,576.5	45.0	43.6	72.59	2,062.0	-624.0	254.0	173.1	80.93	3.138				
8,800.0	6,651.4	8,695.5	6,575.5	46.8	45.3	72.62	2,162.0	-624.0	253.9	169.5	84.41	3.008				
8,900.0	6,650.3	8,795.5	6,574.6	48.5	47.1	72.64	2,262.0	-624.0	253.9	166.0	87.91	2.888				
9,000.0	6,649.2	8,895.5	6,573.6	50.3	48.9	72.67	2,362.0	-624.0	253.9	162.5	91.42	2.777				
9,100.0	6,648.2	8,995.5	6,572.7	52.0	50.7	72.70	2,462.0	-624.0	253.8	158.9	94.96	2.673				
9,200.0	6,647.1	9,095.5	6,571.7	53.8	52.5	72.72	2,562.0	-624.0	253.8	155.3	98.50	2.577				
9,300.0	6,646.0	9,195.5	6,570.7	55.6	54.3	72.75	2,662.0	-624.0	253.8	151.7	102.06	2.487				
9,400.0	6,644.9	9,295.5	6,569.8	57.4	56.2	72.78	2,762.0	-624.0	253.7	148.1	105.62	2.402				
9,500.0	6,643.8	9,395.5	6,568.8	59.2	58.0	72.80	2,862.0	-624.0	253.7	144.5	109.20	2.323				
9,600.0	6,642.7	9,495.5	6,567.9	61.0	59.8	72.83	2,962.0	-624.0	253.7	140.9	112.79	2.249				
9,700.0	6,641.7	9,595.5	6,566.9	62.8	61.7	72.86	3,062.0	-624.0	253.6	137.2	116.38	2.179				
9,800.0	6,640.6	9,695.5	6,565.9	64.6	63.5	72.88	3,162.0	-624.0	253.6	133.6	119.99	2.113				
9,900.0	6,639.5	9,795.5	6,565.0	66.5	65.4	72.91	3,262.0	-624.0	253.6	130.0	123.60	2.051				
10,000.0	6,638.4	9,895.5	6,564.0	68.3	67.2	72.93	3,362.0	-624.0	253.5	126.3	127.22	1.993				

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-321
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-321	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	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	6,637.3	9,995.5	6,563.1	70.1	69.1	72.96	3,462.0	-624.0	253.5	122.6	130.84	1.937	
10,200.0	6,636.3	10,095.5	6,562.1	72.0	70.9	72.99	3,562.0	-624.0	253.4	119.0	134.47	1.885	
10,300.0	6,635.2	10,195.5	6,561.1	73.8	72.8	73.01	3,661.9	-624.0	253.4	115.3	138.10	1.835	
10,400.0	6,634.1	10,295.5	6,560.2	75.7	74.7	73.04	3,761.9	-624.0	253.4	111.6	141.74	1.788	
10,500.0	6,633.0	10,395.5	6,559.2	77.5	76.5	73.07	3,861.9	-624.0	253.3	107.9	145.39	1.742	
10,600.0	6,631.9	10,495.5	6,558.3	79.4	78.4	73.09	3,961.9	-624.0	253.3	104.3	149.04	1.700	
10,700.0	6,630.8	10,595.5	6,557.3	81.2	80.3	73.12	4,061.9	-624.0	253.3	100.6	152.69	1.659	
10,800.0	6,629.8	10,695.5	6,556.3	83.1	82.1	73.15	4,161.9	-624.0	253.2	96.9	156.35	1.620	
10,900.0	6,628.7	10,795.5	6,555.4	85.0	84.0	73.17	4,261.9	-624.0	253.2	93.2	160.01	1.582	
11,000.0	6,627.6	10,895.5	6,554.4	86.8	85.9	73.20	4,361.9	-624.0	253.2	89.5	163.67	1.547	
11,100.0	6,626.5	10,995.5	6,553.5	88.7	87.8	73.23	4,461.9	-624.0	253.1	85.8	167.34	1.513	
11,148.3	6,626.0	11,043.7	6,553.0	89.6	88.7	73.24	4,510.2	-624.0	253.1	84.0	169.11	1.497	Level 3, SF

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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		Highside Toolface (°)	Distance		Minimum Separation (ft)	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		Between Centres (ft)	Between Ellipses (ft)					
0.0	0.0	0.0	0.0	0.0	0.0	43.70	43.7	41.8	60.5				
100.0	100.0	100.0	100.0	0.1	0.1	43.70	43.7	41.8	60.5	60.3	0.22	269.103	
200.0	200.0	200.0	200.0	0.3	0.3	43.70	43.7	41.8	60.5	59.8	0.67	89.701	
300.0	300.0	300.0	300.0	0.6	0.6	43.70	43.7	41.8	60.5	59.4	1.12	53.821	
400.0	400.0	400.0	400.0	0.8	0.8	43.70	43.7	41.8	60.5	58.9	1.57	38.443 CC, ES	
500.0	500.0	500.0	500.0	1.0	1.0	147.96	43.7	41.8	61.2	59.2	2.01	30.499	
600.0	600.0	600.0	600.0	1.2	1.2	149.21	43.7	41.8	63.5	61.0	2.43	26.065	
700.0	699.9	699.9	699.9	1.4	1.5	151.09	43.7	41.8	67.2	64.4	2.87	23.430	
800.0	799.7	799.7	799.7	1.6	1.7	153.39	43.7	41.8	72.6	69.3	3.31	21.946	
900.0	899.4	899.4	899.4	1.9	1.9	155.89	43.7	41.8	79.7	76.0	3.75	21.241	
1,000.0	998.9	998.9	998.9	2.1	2.1	158.39	43.7	41.8	88.6	84.4	4.20	21.089	
1,100.0	1,098.3	1,098.3	1,098.3	2.4	2.4	160.76	43.7	41.8	99.2	94.6	4.65	21.343	
1,200.0	1,197.4	1,197.4	1,197.4	2.7	2.6	162.93	43.7	41.8	111.6	106.5	5.10	21.901	
1,300.0	1,296.3	1,296.3	1,296.3	3.0	2.8	164.87	43.7	41.8	125.8	120.3	5.55	22.691	
1,400.0	1,394.9	1,394.9	1,394.9	3.4	3.0	166.57	43.7	41.8	141.8	135.8	6.00	23.659	
1,500.0	1,493.3	1,493.3	1,493.3	3.8	3.2	168.05	43.7	41.8	159.6	153.2	6.45	24.766	
1,600.0	1,591.3	1,591.3	1,591.3	4.2	3.5	169.34	43.7	41.8	178.8	171.9	6.90	25.903	
1,700.0	1,689.4	1,689.4	1,689.4	4.6	3.7	170.39	43.7	41.8	198.2	190.9	7.37	26.901	
1,800.0	1,787.4	1,787.4	1,787.4	5.0	3.9	171.25	43.7	41.8	217.7	209.8	7.83	27.780	
1,900.0	1,885.5	1,885.5	1,885.5	5.4	4.1	172.09	43.2	41.4	236.6	228.3	8.28	28.554	
2,000.0	1,983.5	1,990.6	1,990.6	5.8	4.3	173.02	41.2	39.9	254.1	245.4	8.71	29.163	
2,100.0	2,081.5	2,093.1	2,093.0	6.3	4.5	174.06	37.7	37.4	270.2	261.0	9.14	29.550	
2,200.0	2,179.6	2,196.0	2,195.6	6.7	4.7	175.19	32.7	33.7	284.9	275.3	9.58	29.737	
2,300.0	2,277.6	2,299.1	2,298.5	7.1	4.9	176.42	26.2	29.0	298.3	288.3	10.03	29.750	
2,400.0	2,375.7	2,402.6	2,401.4	7.6	5.1	177.76	18.1	23.2	310.4	299.9	10.48	29.608	
2,500.0	2,473.7	2,506.1	2,504.4	8.0	5.3	179.20	8.6	16.2	321.2	310.3	10.95	29.330	
2,600.0	2,571.8	2,609.8	2,607.2	8.4	5.6	-179.24	-2.5	8.2	330.9	319.4	11.44	28.929	
2,700.0	2,669.8	2,713.6	2,709.7	8.9	5.8	-177.56	-15.1	-1.0	339.4	327.4	11.94	28.418	
2,800.0	2,767.9	2,816.5	2,811.1	9.3	6.1	-175.77	-29.0	-11.1	346.9	334.4	12.47	27.815	
2,900.0	2,865.9	2,915.6	2,908.8	9.7	6.4	-174.06	-42.9	-21.2	354.3	341.3	13.02	27.220	
3,000.0	2,964.0	3,014.8	3,006.5	10.2	6.7	-172.41	-56.8	-31.3	362.0	348.4	13.58	26.654	
3,100.0	3,062.0	3,114.0	3,104.1	10.6	7.0	-170.83	-70.7	-41.4	370.0	355.8	14.17	26.116	
3,200.0	3,160.1	3,213.1	3,201.8	11.1	7.3	-169.32	-84.6	-51.5	378.2	363.5	14.77	25.606	
3,300.0	3,258.1	3,312.3	3,299.5	11.5	7.7	-167.88	-98.5	-61.6	386.8	371.4	15.39	25.123	
3,400.0	3,356.1	3,411.5	3,397.1	11.9	8.0	-166.50	-112.4	-71.7	395.5	379.5	16.03	24.665	
3,500.0	3,454.2	3,510.6	3,494.8	12.4	8.3	-165.17	-126.3	-81.8	404.5	387.8	16.69	24.233	
3,600.0	3,552.2	3,609.8	3,592.5	12.8	8.7	-163.91	-140.2	-91.9	413.6	396.3	17.36	23.826	
3,700.0	3,650.3	3,709.0	3,690.1	13.3	9.0	-162.70	-154.1	-102.0	423.0	405.0	18.05	23.442	
3,800.0	3,748.3	3,808.1	3,787.8	13.7	9.4	-161.54	-168.0	-112.2	432.6	413.8	18.74	23.080	
3,900.0	3,846.4	3,900.0	3,878.5	14.2	9.7	-160.63	-180.1	-120.9	442.8	423.5	19.38	22.848	
4,000.0	3,944.4	3,993.1	3,970.7	14.6	9.9	-160.06	-189.9	-128.1	454.8	434.9	19.96	22.788	
4,100.0	4,042.5	4,084.7	4,061.9	15.0	10.2	-159.85	-197.3	-133.4	468.4	448.0	20.49	22.864	
4,200.0	4,140.5	4,176.0	4,153.0	15.5	10.4	-159.96	-202.2	-137.1	483.6	462.7	20.97	23.063	
4,300.0	4,238.6	4,266.6	4,243.6	15.9	10.5	-160.35	-204.8	-138.9	500.4	479.0	21.41	23.378	
4,400.0	4,336.6	4,359.7	4,336.6	16.4	10.7	-160.98	-205.3	-139.3	518.7	496.9	21.81	23.785	
4,500.0	4,434.6	4,457.7	4,434.6	16.8	10.9	-161.67	-205.3	-139.3	537.4	515.2	22.21	24.197	
4,600.0	4,532.7	4,555.8	4,532.7	17.3	11.1	-162.30	-205.3	-139.3	556.1	533.5	22.61	24.592	
4,700.0	4,630.7	4,653.8	4,630.7	17.7	11.2	-162.90	-205.3	-139.3	574.9	551.9	23.02	24.972	
4,800.0	4,728.8	4,751.9	4,728.8	18.1	11.4	-163.46	-205.3	-139.3	593.8	570.4	23.44	25.337	
4,900.0	4,826.8	4,849.9	4,826.8	18.6	11.6	-163.98	-205.3	-139.3	612.7	588.9	23.85	25.687	
5,000.0	4,924.9	4,948.0	4,924.9	19.0	11.8	-164.47	-205.3	-139.3	631.7	607.4	24.27	26.024	

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-321
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-321	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-341 - 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	5,022.9	5,046.0	5,022.9	19.5	12.0	-164.93	-205.3	-139.3	650.7	626.0	24.70	26.348					
5,200.0	5,121.0	5,144.0	5,121.0	19.9	12.1	-165.37	-205.3	-139.3	669.7	644.6	25.12	26.659					
5,300.0	5,219.2	5,242.3	5,219.2	20.3	12.3	-165.83	-205.3	-139.3	687.6	662.0	25.56	26.904					
5,400.0	5,318.1	5,341.2	5,318.1	20.6	12.5	-166.20	-205.3	-139.3	702.2	676.3	25.95	27.064					
5,500.0	5,417.4	5,440.5	5,417.4	20.8	12.7	-166.48	-205.3	-139.3	713.5	687.2	26.31	27.117					
5,600.0	5,517.1	5,540.2	5,517.1	21.0	12.9	-166.67	-205.3	-139.3	721.4	694.8	26.65	27.067					
5,700.0	5,617.0	5,640.1	5,617.0	21.1	13.1	-166.77	-205.3	-139.3	725.9	699.0	26.97	26.920					
5,800.0	5,717.0	5,740.0	5,717.0	21.3	13.3	89.38	-205.3	-139.3	727.1	699.8	27.28	26.656					
5,900.0	5,817.0	5,840.0	5,817.0	21.4	13.5	89.38	-205.3	-139.3	727.1	699.4	27.65	26.301					
5,959.3	5,876.3	5,899.4	5,876.3	21.5	13.6	89.40	-205.3	-139.3	727.1	699.2	27.87	26.092					
6,000.0	5,917.0	5,939.9	5,916.8	21.5	13.7	89.37	-205.2	-139.3	727.1	699.1	28.01	25.955					
6,100.0	6,016.6	6,038.9	6,015.4	21.6	13.8	89.37	-197.1	-139.3	727.1	698.8	28.30	25.690					
6,200.0	6,114.2	6,137.8	6,112.1	21.7	13.9	89.38	-176.3	-139.3	727.1	698.6	28.49	25.523					
6,300.0	6,208.3	6,236.8	6,205.3	21.7	14.0	89.39	-143.3	-139.3	727.1	698.5	28.60	25.421					
6,400.0	6,297.3	6,335.8	6,293.5	21.7	14.0	89.42	-98.4	-139.3	727.1	698.4	28.70	25.332					
6,500.0	6,379.5	6,434.9	6,375.2	21.7	14.1	89.46	-42.5	-139.3	727.1	698.2	28.86	25.190					
6,600.0	6,453.5	6,534.1	6,449.0	21.8	14.1	89.50	23.6	-139.3	727.1	697.9	29.17	24.926					
6,700.0	6,518.2	6,633.3	6,513.8	21.8	14.1	89.56	98.7	-139.3	727.1	697.4	29.70	24.479					
6,800.0	6,572.4	6,732.6	6,568.2	21.9	14.5	89.62	181.7	-139.3	727.1	696.5	30.53	23.812					
6,900.0	6,615.2	6,832.0	6,611.5	22.1	15.1	89.69	271.1	-139.3	727.1	695.4	31.71	22.928					
7,000.0	6,645.8	6,931.6	6,642.9	22.5	15.9	89.76	365.5	-139.3	727.1	693.8	33.25	21.869					
7,100.0	6,663.8	7,031.2	6,661.8	23.0	16.9	89.84	463.3	-139.3	727.1	691.9	35.12	20.702					
7,200.0	6,668.7	7,131.0	6,667.7	23.7	18.0	89.92	562.8	-139.3	727.1	689.8	37.28	19.502					
7,224.9	6,668.4	7,155.9	6,667.5	23.9	18.3	89.92	587.7	-139.3	727.1	689.2	37.87	19.197					
7,300.0	6,667.6	7,231.0	6,666.6	24.5	19.2	89.92	662.8	-139.3	727.1	687.4	39.70	18.314					
7,400.0	6,666.6	7,331.0	6,665.5	25.5	20.6	89.91	762.8	-139.3	727.1	684.7	42.32	17.180					
7,500.0	6,665.5	7,431.0	6,664.3	26.6	22.0	89.91	862.8	-139.3	727.1	681.9	45.11	16.116					
7,600.0	6,664.4	7,531.0	6,663.2	27.9	23.5	89.91	962.8	-139.3	727.1	679.0	48.05	15.130					
7,700.0	6,663.3	7,631.0	6,662.1	29.2	25.0	89.90	1,062.8	-139.3	727.1	675.9	51.11	14.225					
7,800.0	6,662.2	7,731.0	6,660.9	30.6	26.6	89.90	1,162.8	-139.3	727.1	672.8	54.27	13.397					
7,900.0	6,661.1	7,831.0	6,659.8	32.1	28.2	89.89	1,262.8	-139.3	727.1	669.5	57.51	12.642					
8,000.0	6,660.1	7,931.0	6,658.7	33.6	29.9	89.89	1,362.8	-139.3	727.1	666.2	60.82	11.954					
8,100.0	6,659.0	8,031.0	6,657.5	35.1	31.6	89.89	1,462.8	-139.3	727.1	662.9	64.19	11.326					
8,200.0	6,657.9	8,131.0	6,656.4	36.7	33.3	89.88	1,562.8	-139.3	727.1	659.4	67.61	10.753					
8,300.0	6,656.8	8,231.0	6,655.3	38.3	35.1	89.88	1,662.8	-139.3	727.1	656.0	71.08	10.229					
8,400.0	6,655.7	8,331.0	6,654.1	40.0	36.8	89.87	1,762.8	-139.3	727.1	652.5	74.58	9.749					
8,500.0	6,654.6	8,431.0	6,653.0	41.6	38.6	89.87	1,862.7	-139.3	727.1	648.9	78.11	9.308					
8,600.0	6,653.6	8,531.0	6,651.9	43.3	40.4	89.87	1,962.7	-139.3	727.1	645.4	81.67	8.902					
8,700.0	6,652.5	8,631.0	6,650.7	45.0	42.2	89.86	2,062.7	-139.3	727.1	641.8	85.25	8.528					
8,800.0	6,651.4	8,731.0	6,649.6	46.8	44.0	89.86	2,162.7	-139.3	727.1	638.2	88.86	8.182					
8,900.0	6,650.3	8,831.0	6,648.5	48.5	45.8	89.85	2,262.7	-139.3	727.1	634.6	92.49	7.861					
9,000.0	6,649.2	8,931.0	6,647.3	50.3	47.6	89.85	2,362.7	-139.3	727.1	630.9	96.13	7.563					
9,100.0	6,648.2	9,031.0	6,646.2	52.0	49.5	89.84	2,462.7	-139.3	727.1	627.3	99.78	7.286					
9,200.0	6,647.1	9,131.0	6,645.1	53.8	51.3	89.84	2,562.7	-139.3	727.1	623.6	103.45	7.028					
9,300.0	6,646.0	9,231.0	6,643.9	55.6	53.1	89.84	2,662.7	-139.3	727.1	619.9	107.13	6.786					
9,400.0	6,644.9	9,331.0	6,642.8	57.4	55.0	89.83	2,762.7	-139.3	727.1	616.2	110.83	6.560					
9,500.0	6,643.8	9,431.0	6,641.6	59.2	56.8	89.83	2,862.7	-139.3	727.1	612.5	114.53	6.348					
9,600.0	6,642.7	9,531.0	6,640.5	61.0	58.7	89.82	2,962.7	-139.3	727.1	608.8	118.24	6.149					
9,700.0	6,641.7	9,631.0	6,639.4	62.8	60.6	89.82	3,062.7	-139.3	727.1	605.1	121.96	5.961					
9,800.0	6,640.6	9,731.0	6,638.2	64.6	62.4	89.82	3,162.7	-139.3	727.1	601.4	125.69	5.785					
9,900.0	6,639.5	9,831.0	6,637.1	66.5	64.3	89.81	3,262.7	-139.3	727.1	597.6	129.42	5.618					

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-321
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-321	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-341 - 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)	Distance Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
10,000.0	6,638.4	9,931.0	6,636.0	68.3	66.2	89.81	3,362.7	-139.3	727.1	593.9	133.16	5.460		
10,100.0	6,637.3	10,031.0	6,634.8	70.1	68.1	89.80	3,462.6	-139.3	727.1	590.2	136.90	5.311		
10,200.0	6,636.3	10,131.0	6,633.7	72.0	69.9	89.80	3,562.6	-139.3	727.1	586.4	140.65	5.169		
10,300.0	6,635.2	10,231.0	6,632.6	73.8	71.8	89.80	3,662.6	-139.3	727.1	582.6	144.41	5.035		
10,400.0	6,634.1	10,331.0	6,631.4	75.7	73.7	89.79	3,762.6	-139.3	727.1	578.9	148.17	4.907		
10,500.0	6,633.0	10,431.0	6,630.3	77.5	75.6	89.79	3,862.6	-139.3	727.1	575.1	151.93	4.786		
10,600.0	6,631.9	10,531.0	6,629.2	79.4	77.5	89.78	3,962.6	-139.3	727.1	571.4	155.70	4.670		
10,700.0	6,630.8	10,631.0	6,628.0	81.2	79.3	89.78	4,062.6	-139.3	727.1	567.6	159.47	4.559		
10,800.0	6,629.8	10,731.0	6,626.9	83.1	81.2	89.77	4,162.6	-139.3	727.1	563.8	163.24	4.454		
10,900.0	6,628.7	10,831.0	6,625.8	85.0	83.1	89.77	4,262.6	-139.3	727.1	560.0	167.02	4.353		
11,000.0	6,627.6	10,931.0	6,624.6	86.8	85.0	89.77	4,362.6	-139.3	727.1	556.3	170.80	4.257		
11,100.0	6,626.5	11,031.0	6,623.5	88.7	86.9	89.76	4,462.6	-139.3	727.1	552.5	174.58	4.165		
11,125.3	6,626.2	11,056.4	6,623.2	89.2	87.4	89.76	4,487.9	-139.3	727.1	551.5	175.53	4.142		
11,148.3	6,626.0	11,075.7	6,623.0	89.6	87.8	89.76	4,507.2	-139.3	727.1	550.7	176.33	4.123 SF		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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	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	2.0	2.0	0.0	0.0	41.52		69.2	61.3	92.5	92.5	0.00	N/A	
100.0	100.0	102.0	102.0	0.1	0.1	41.52		69.2	61.3	92.5	92.2	0.23	403.308	
200.0	200.0	202.0	202.0	0.3	0.3	41.52		69.2	61.3	92.5	91.8	0.68	136.217	
300.0	300.0	302.0	302.0	0.6	0.6	41.52		69.2	61.3	92.5	91.3	1.13	81.947	
400.0	400.0	402.0	402.0	0.8	0.8	41.52		69.2	61.3	92.5	90.9	1.58	58.600 CC, ES	
500.0	500.0	502.0	502.0	1.0	1.0	145.65		69.2	61.3	93.2	91.2	2.01	46.316	
600.0	600.0	602.0	602.0	1.2	1.2	146.52		69.2	61.3	95.4	92.9	2.44	39.093	
700.0	699.9	701.9	701.9	1.4	1.5	147.90		69.2	61.3	99.0	96.1	2.87	34.447	
800.0	799.7	801.7	801.7	1.6	1.7	149.65		69.2	61.3	104.2	100.9	3.32	31.438	
900.0	899.4	901.4	901.4	1.9	1.9	151.66		69.2	61.3	111.1	107.3	3.76	29.536	
1,000.0	998.9	1,000.9	1,000.9	2.1	2.1	153.80		69.2	61.3	119.6	115.4	4.21	28.416	
1,100.0	1,098.3	1,100.3	1,100.3	2.4	2.4	155.96		69.2	61.3	129.9	125.2	4.66	27.872	
1,200.0	1,197.4	1,199.4	1,199.4	2.7	2.6	158.06		69.2	61.3	141.9	136.8	5.11	27.763 SF	
1,300.0	1,296.3	1,298.3	1,298.3	3.0	2.8	160.04		69.2	61.3	155.7	150.2	5.56	27.990	
1,400.0	1,394.9	1,396.9	1,396.9	3.4	3.0	161.88		69.2	61.3	171.4	165.4	6.02	28.479	
1,500.0	1,493.3	1,495.3	1,495.3	3.8	3.2	163.54		69.2	61.3	188.8	182.3	6.47	29.177	
1,600.0	1,591.3	1,593.3	1,593.3	4.2	3.5	165.06		69.2	61.3	207.7	200.7	6.93	29.960	
1,700.0	1,689.4	1,691.4	1,691.4	4.6	3.7	166.34		69.2	61.3	226.8	219.4	7.40	30.655	
1,800.0	1,787.4	1,789.4	1,789.4	5.0	3.9	167.42		69.2	61.3	245.9	238.1	7.86	31.273	
1,900.0	1,885.5	1,887.5	1,887.5	5.4	4.1	168.34		69.2	61.3	265.2	256.9	8.33	31.827	
2,000.0	1,983.5	1,985.5	1,985.5	5.8	4.4	169.14		69.2	61.3	284.5	275.7	8.80	32.324	
2,100.0	2,081.5	2,083.7	2,083.7	6.3	4.5	169.96		68.7	61.5	303.8	294.6	9.25	32.855	
2,200.0	2,179.6	2,181.7	2,181.7	6.7	4.7	170.98		66.6	62.4	323.2	313.5	9.67	33.429	
2,300.0	2,277.6	2,279.6	2,279.5	7.1	4.9	172.16		62.9	63.9	342.7	332.6	10.09	33.971	
2,400.0	2,375.7	2,377.2	2,376.9	7.6	5.1	173.49		57.7	66.0	362.3	351.8	10.51	34.472	
2,500.0	2,473.7	2,474.4	2,473.9	8.0	5.3	174.92		51.0	68.7	382.2	371.3	10.94	34.934	
2,600.0	2,571.8	2,571.3	2,570.4	8.4	5.4	176.45		42.9	72.0	402.5	391.1	11.38	35.362	
2,700.0	2,669.8	2,667.8	2,666.3	8.9	5.6	178.05		33.2	75.9	423.2	411.3	11.84	35.756	
2,800.0	2,767.9	2,763.8	2,761.6	9.3	5.9	179.70		22.1	80.4	444.4	432.1	12.30	36.116	
2,900.0	2,865.9	2,859.3	2,856.1	9.7	6.1	-178.60		9.6	85.5	466.2	453.4	12.79	36.442	
3,000.0	2,964.0	2,954.2	2,949.8	10.2	6.3	-176.88		-4.2	91.1	488.7	475.4	13.30	36.739	
3,100.0	3,062.0	3,049.3	3,043.5	10.6	6.6	-175.14		-19.4	97.3	511.9	498.1	13.84	37.003	
3,200.0	3,160.1	3,145.3	3,138.0	11.1	6.9	-173.51		-35.1	103.7	535.7	521.3	14.39	37.224	
3,300.0	3,258.1	3,241.3	3,232.5	11.5	7.2	-172.01		-50.7	110.0	559.8	544.8	14.96	37.418	
3,400.0	3,356.1	3,337.4	3,327.0	11.9	7.5	-170.63		-66.3	116.4	584.3	568.7	15.54	37.589	
3,500.0	3,454.2	3,433.4	3,421.6	12.4	7.8	-169.36		-81.9	122.7	609.0	592.9	16.14	37.740	
3,600.0	3,552.2	3,529.4	3,516.1	12.8	8.1	-168.19		-97.6	129.1	634.0	617.3	16.74	37.875	
3,700.0	3,650.3	3,625.4	3,610.6	13.3	8.4	-167.11		-113.2	135.4	659.3	642.0	17.35	37.997	
3,800.0	3,748.3	3,721.5	3,705.2	13.7	8.7	-166.11		-128.8	141.8	684.8	666.8	17.97	38.107	
3,900.0	3,846.4	3,817.5	3,799.7	14.2	9.0	-165.17		-144.5	148.1	710.4	691.8	18.59	38.208	
4,000.0	3,944.4	3,913.5	3,894.2	14.6	9.4	-164.31		-160.1	154.5	736.2	717.0	19.22	38.301	
4,100.0	4,042.5	4,021.1	4,000.5	15.0	9.7	-163.54		-175.8	160.9	761.5	741.6	19.85	38.363	
4,200.0	4,140.5	4,130.4	4,109.0	15.5	10.0	-163.09		-188.0	165.8	785.3	764.8	20.43	38.440	
4,300.0	4,238.6	4,240.8	4,219.0	15.9	10.3	-162.95		-196.5	169.2	807.5	786.5	20.97	38.501	
4,400.0	4,336.6	4,352.0	4,330.1	16.4	10.5	-163.09		-201.0	171.1	828.2	806.7	21.48	38.553	
4,500.0	4,434.6	4,458.6	4,436.6	16.8	10.7	-163.46		-201.8	171.4	847.4	825.4	21.95	38.612	
4,600.0	4,532.7	4,556.6	4,534.7	17.3	10.9	-163.83		-201.8	171.4	866.3	843.9	22.39	38.692	
4,700.0	4,630.7	4,654.7	4,632.7	17.7	11.1	-164.18		-201.8	171.4	885.2	862.4	22.83	38.768	
4,800.0	4,728.8	4,752.7	4,730.8	18.1	11.2	-164.52		-201.8	171.4	904.2	880.9	23.28	38.840	
4,900.0	4,826.8	4,850.8	4,828.8	18.6	11.4	-164.85		-201.8	171.4	923.2	899.5	23.73	38.910	
5,000.0	4,924.9	4,948.8	4,926.9	19.0	11.6	-165.16		-201.8	171.4	942.2	918.0	24.17	38.977	

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-321
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-321	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									
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,022.9	5,046.9	5,024.9	19.5	11.8	-165.46	-201.8	171.4	961.3	936.6	24.62	39.041	
5,200.0	5,121.0	5,144.9	5,123.0	19.9	12.0	-165.75	-201.8	171.4	980.3	955.3	25.07	39.102	
5,300.0	5,219.2	5,243.2	5,221.2	20.3	12.2	-166.08	-201.8	171.4	998.3	972.7	25.55	39.073	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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 P&H 22CD Pad Sec.22-T5N-R64W - P&H 22CD - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 175-MWD												Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	
9,400.0	6,644.9	6,708.8	6,618.3	57.4	20.7	-78.94	3,697.3	-961.2	939.8	867.4	72.38	12.985	
9,500.0	6,643.8	6,713.0	6,622.4	59.2	20.7	-81.36	3,697.4	-961.0	840.4	765.8	74.58	11.268	
9,600.0	6,642.7	6,716.5	6,625.9	61.0	20.7	-83.43	3,697.5	-960.8	741.1	664.5	76.67	9.667	
9,700.0	6,641.7	6,719.5	6,628.9	62.8	20.7	-85.23	3,697.6	-960.6	642.1	563.4	78.67	8.162	
9,800.0	6,640.6	6,722.1	6,631.5	64.6	20.7	-86.81	3,697.7	-960.5	543.4	462.8	80.61	6.741	
9,900.0	6,639.5	6,724.4	6,633.8	66.5	20.7	-88.20	3,697.8	-960.4	445.2	362.7	82.51	5.396	
10,000.0	6,638.4	6,726.5	6,635.9	68.3	20.7	-89.43	3,697.8	-960.3	348.1	263.7	84.38	4.126	
10,100.0	6,637.3	6,728.3	6,637.6	70.1	20.7	-90.52	3,697.9	-960.2	253.3	167.0	86.22	2.938	
10,200.0	6,636.3	6,729.9	6,639.3	72.0	20.7	-91.51	3,697.9	-960.1	164.6	76.6	88.04	1.870	
10,300.0	6,635.2	6,731.3	6,640.7	73.8	20.7	-92.39	3,698.0	-960.1	100.2	10.4	89.86	1.115 Level 2	
10,335.3	6,634.8	6,731.8	6,641.2	74.5	20.7	-92.68	3,698.0	-960.0	93.8	3.3	90.49	1.037 Level 2, CC, ES, SF	
10,400.0	6,634.1	6,732.6	6,642.0	75.7	20.7	-93.19	3,698.0	-960.0	114.0	22.3	91.66	1.243 Level 2	
10,500.0	6,633.0	6,733.8	6,643.2	77.5	20.7	-93.92	3,698.0	-959.9	189.6	96.1	93.46	2.028	
10,600.0	6,631.9	6,734.9	6,644.3	79.4	20.7	-94.59	3,698.1	-959.9	280.8	185.6	95.25	2.948	
10,700.0	6,630.8	6,735.9	6,645.3	81.2	20.7	-95.20	3,698.1	-959.8	376.6	279.5	97.04	3.881	
10,800.0	6,629.8	6,736.8	6,646.2	83.1	20.7	-95.76	3,698.1	-959.8	474.1	375.2	98.83	4.797	
10,900.0	6,628.7	6,737.7	6,647.1	85.0	20.7	-96.27	3,698.1	-959.8	572.4	471.8	100.62	5.689	
11,000.0	6,627.6	6,738.5	6,647.8	86.8	20.7	-96.75	3,698.1	-959.7	671.3	568.9	102.40	6.555	
11,100.0	6,626.5	6,739.2	6,648.6	88.7	20.7	-97.20	3,698.1	-959.7	770.4	666.2	104.19	7.395	
11,148.3	6,626.0	6,739.5	6,648.9	89.6	20.7	-97.40	3,698.2	-959.7	818.4	713.3	105.05	7.790	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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 P&H 22CD Pad Sec.22-T5N-R64W - P&H 22SD - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 140-MWD												Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,100.0	6,659.0	6,784.0	6,665.7	35.1	22.4	-99.46	2,449.9	-958.7	991.4	940.2	51.18	19.372	
8,200.0	6,657.9	6,782.3	6,664.0	36.7	22.4	-98.47	2,449.9	-958.7	891.9	838.9	53.01	16.825	
8,300.0	6,656.8	6,780.7	6,662.4	38.3	22.4	-97.48	2,449.9	-958.7	792.5	737.7	54.86	14.446	
8,400.0	6,655.7	6,779.1	6,660.8	40.0	22.4	-96.49	2,449.9	-958.7	693.3	636.6	56.72	12.224	
8,500.0	6,654.6	6,777.5	6,659.2	41.6	22.4	-95.50	2,449.9	-958.7	594.4	535.8	58.59	10.145	
8,600.0	6,653.6	6,775.9	6,657.6	43.3	22.4	-94.52	2,449.9	-958.7	495.9	435.4	60.46	8.201	
8,700.0	6,652.5	6,774.3	6,656.0	45.0	22.4	-93.55	2,449.9	-958.6	398.0	335.7	62.33	6.386	
8,800.0	6,651.4	6,772.8	6,654.5	46.8	22.4	-92.58	2,449.9	-958.6	301.7	237.5	64.21	4.699	
8,900.0	6,650.3	6,771.2	6,652.9	48.5	22.4	-91.61	2,450.0	-958.6	208.7	142.7	66.07	3.159	
9,000.0	6,649.2	6,769.6	6,651.3	50.3	22.4	-90.65	2,450.0	-958.6	127.0	59.1	67.93	1.869	
9,087.2	6,648.3	6,768.3	6,650.0	51.8	22.4	-89.82	2,450.0	-958.6	92.3	22.8	69.55	1.327	Level 3, CC, ES, SF
9,100.0	6,648.2	6,768.1	6,649.8	52.0	22.4	-89.70	2,450.0	-958.6	93.2	23.4	69.79	1.335	Level 3
9,200.0	6,647.1	6,766.6	6,648.3	53.8	22.4	-88.76	2,450.0	-958.6	145.7	74.1	71.63	2.034	
9,300.0	6,646.0	6,765.1	6,646.8	55.6	22.3	-87.82	2,450.0	-958.6	231.9	158.4	73.46	3.157	
9,400.0	6,644.9	6,763.6	6,645.3	57.4	22.3	-86.89	2,450.0	-958.6	326.1	250.8	75.28	4.331	
9,500.0	6,643.8	6,762.0	6,643.7	59.2	22.3	-85.91	2,450.0	-958.6	422.9	345.8	77.09	5.486	
9,600.0	6,642.7	6,760.6	6,642.3	61.0	22.3	-85.05	2,450.0	-958.6	520.9	442.1	78.88	6.604	
9,700.0	6,641.7	6,759.1	6,640.8	62.8	22.3	-84.15	2,450.0	-958.6	619.6	538.9	80.65	7.682	
9,800.0	6,640.6	6,757.7	6,639.4	64.6	22.3	-83.26	2,450.0	-958.6	718.6	636.2	82.41	8.720	
9,900.0	6,639.5	6,756.3	6,638.0	66.5	22.3	-82.39	2,450.0	-958.6	817.9	733.7	84.15	9.719	
10,000.0	6,638.4	6,754.8	6,636.5	68.3	22.3	-81.52	2,450.0	-958.6	917.3	831.4	85.87	10.682	

Reference Depths are relative to WELL @ 4611.0ft (RKB - 13')	Coordinates are relative to: Ledford 22T-321
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, Colorado Northern Zone
Central Meridian is -105.500000 °	Grid Convergence at Surface is: 0.63°



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-321
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-321	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-321

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: 0.63°

