

PETROLEUM DEVELOPMENT CORP Weld County CO

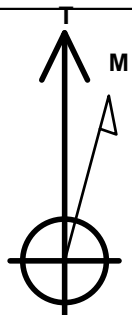
Well Name: **Ledford 22T-421**

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

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1382173.71	3270940.59	40.378390	-104.527470	
RKB - 15' WELL @ 4613.0ft (RKB - 15')						

WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 276'FSL & 307'FEL	1.0	0.0	0.0	Point
BHL 500'FNL & 941'FEL	6736.0	4484.7	-646.0	Point



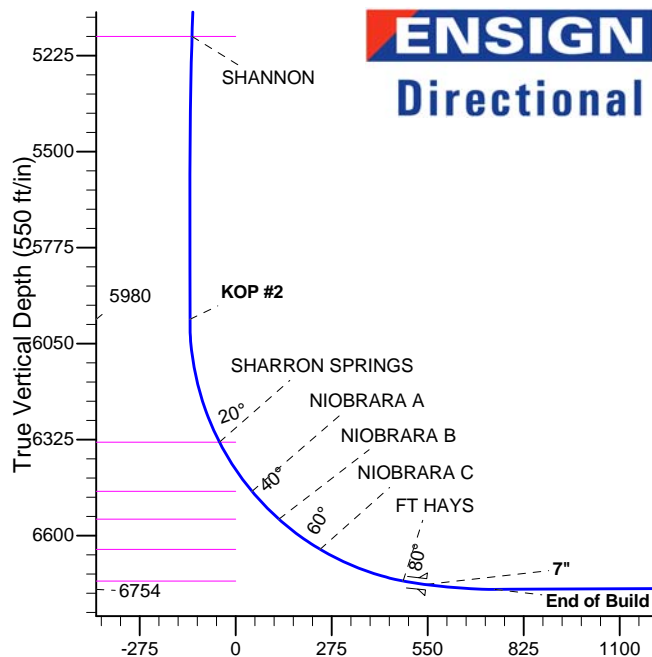
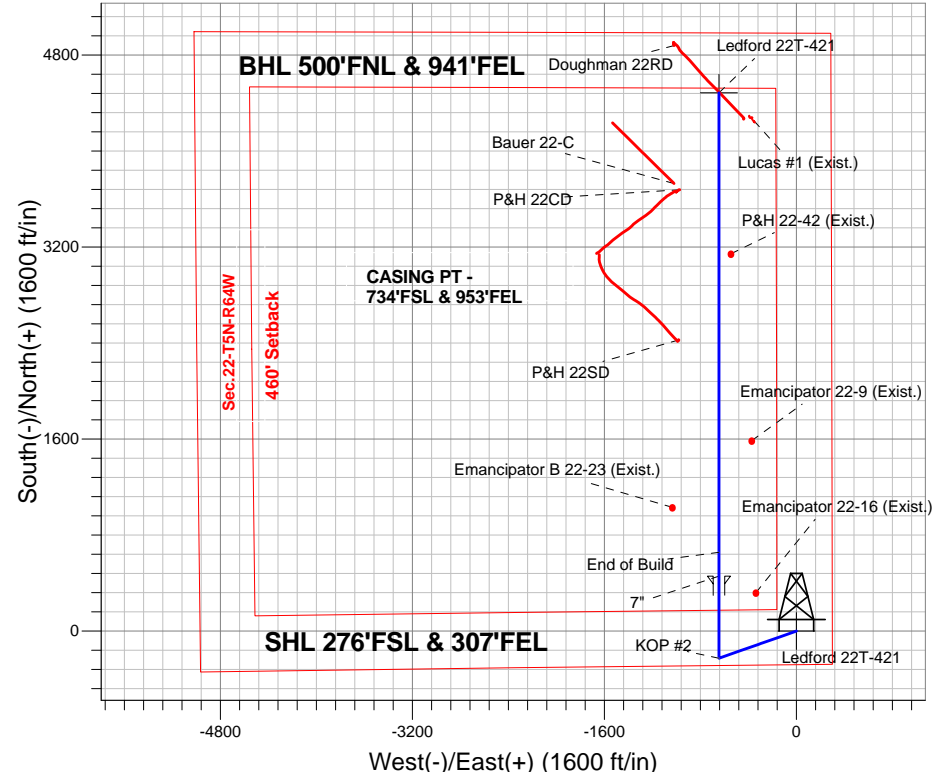
Azimuths to True North
Magnetic North: 8.32°

Magnetic Field
Strength: 52889.5nT
Dip Angle: 66.99°
Date: 2/25/2014
Model: IGRF200510

Ledford 22Y-HZ Pad Sec.22-T5N-R64W
Ledford 22T-421
Plan #1 (2-25-14)
10:07, March 07 2014

ANNOTATIONS

TVD	MD	Annotation
1000.0	1000.0	KOP
5980.2	6036.8	KOP #2
6754.0	7356.2	End of Build



ENSIGN
Directional

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	1000.0	0.00	0.00	1000.0	0.0	0.0	0.00	0.00	0.0	
3	2010.5	10.11	250.72	2005.3	-29.4	-83.9	1.00	250.72	-17.1	
4	5151.3	10.11	250.72	5097.4	-211.3	-604.1	0.00	0.00	-123.0	
5	5656.6	0.00	0.00	5600.0	-226.0	-646.0	2.00	180.00	-131.6	
6	6036.8	0.00	0.00	5980.3	-226.0	-646.0	0.00	0.00	-131.6	
7	7156.8	84.00	360.00	6740.0	458.1	-646.0	7.50	360.00	545.5	
8	7230.8	84.00	360.00	6747.8	531.7	-646.0	0.00	0.00	618.4	
9	7356.2	90.27	360.00	6754.0	656.9	-646.0	5.00	0.00	742.3	
10	11184.1	90.27	360.00	6736.0	4484.7	-646.0	0.00	0.00	4531.0	BHL 500'FNL & 941'FEL

BHL 500'FNL & 941'FEL

Vertical Section at 351.80° (550 ft/in)



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.22-T5N-R64W

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

Ledford 22T-421

Wellbore #1

Plan: Plan #1 (2-25-14)

Standard Planning Report

07 March, 2014

Database:	landmark	Local Co-ordinate Reference:	Well Ledford 22T-421
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Project:	SEC.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-25-14)		

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-421					
Well Position	+N/-S	21.9 ft	Northing:	1,382,173.71 ft	Latitude:	40.378390
	+E/-W	22.3 ft	Easting:	3,270,940.59 ft	Longitude:	-104.527470
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,598.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2/25/2014	8.32	66.99	52,889

Design	Plan #1 (2-25-14)			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	351.80

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,010.5	10.11	250.72	2,005.3	-29.4	-83.9	1.00	1.00	0.00	250.72	
5,151.3	10.11	250.72	5,097.4	-211.3	-604.1	0.00	0.00	0.00	0.00	
5,656.6	0.00	0.00	5,600.0	-226.0	-646.0	2.00	-2.00	0.00	180.00	
6,036.8	0.00	0.00	5,980.3	-226.0	-646.0	0.00	0.00	0.00	0.00	
7,156.8	84.00	360.00	6,740.0	458.1	-646.0	7.50	7.50	0.00	360.00	
7,230.8	84.00	360.00	6,747.8	531.7	-646.0	0.00	0.00	0.00	0.00	
7,356.2	90.27	360.00	6,754.0	656.9	-646.0	5.00	5.00	0.00	0.00	
11,184.1	90.27	360.00	6,736.0	4,484.7	-646.0	0.00	0.00	0.00	0.00	BHL 500'FNL & 941

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Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Project:	SEC.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-25-14)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
1.0	0.00	0.00	1.0	0.0	0.0	0.0	0.00	0.00	0.00
SHL 276'FSL & 307'FEL									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
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
KOP									
1,100.0	1.00	250.72	1,100.0	-0.3	-0.8	-0.2	1.00	1.00	0.00
1,200.0	2.00	250.72	1,200.0	-1.2	-3.3	-0.7	1.00	1.00	0.00
1,300.0	3.00	250.72	1,299.9	-2.6	-7.4	-1.5	1.00	1.00	0.00
1,400.0	4.00	250.72	1,399.7	-4.6	-13.2	-2.7	1.00	1.00	0.00
1,500.0	5.00	250.72	1,499.4	-7.2	-20.6	-4.2	1.00	1.00	0.00
1,600.0	6.00	250.72	1,598.9	-10.4	-29.6	-6.0	1.00	1.00	0.00
1,700.0	7.00	250.72	1,698.3	-14.1	-40.3	-8.2	1.00	1.00	0.00
1,800.0	8.00	250.72	1,797.4	-18.4	-52.6	-10.7	1.00	1.00	0.00
1,900.0	9.00	250.72	1,896.3	-23.3	-66.6	-13.6	1.00	1.00	0.00
2,000.0	10.00	250.72	1,994.9	-28.7	-82.2	-16.7	1.00	1.00	0.00
2,010.5	10.11	250.72	2,005.3	-29.4	-83.9	-17.1	1.00	1.00	0.00
2,100.0	10.11	250.72	2,093.4	-34.5	-98.7	-20.1	0.00	0.00	0.00
2,200.0	10.11	250.72	2,191.8	-40.3	-115.3	-23.5	0.00	0.00	0.00
2,300.0	10.11	250.72	2,290.3	-46.1	-131.8	-26.9	0.00	0.00	0.00
2,400.0	10.11	250.72	2,388.7	-51.9	-148.4	-30.2	0.00	0.00	0.00
2,500.0	10.11	250.72	2,487.2	-57.7	-165.0	-33.6	0.00	0.00	0.00
2,600.0	10.11	250.72	2,585.6	-63.5	-181.5	-37.0	0.00	0.00	0.00
2,700.0	10.11	250.72	2,684.1	-69.3	-198.1	-40.3	0.00	0.00	0.00
2,800.0	10.11	250.72	2,782.5	-75.1	-214.6	-43.7	0.00	0.00	0.00
2,900.0	10.11	250.72	2,881.0	-80.9	-231.2	-47.1	0.00	0.00	0.00
3,000.0	10.11	250.72	2,979.4	-86.7	-247.8	-50.5	0.00	0.00	0.00
3,100.0	10.11	250.72	3,077.9	-92.5	-264.3	-53.8	0.00	0.00	0.00
3,200.0	10.11	250.72	3,176.3	-98.3	-280.9	-57.2	0.00	0.00	0.00
3,300.0	10.11	250.72	3,274.8	-104.1	-297.5	-60.6	0.00	0.00	0.00
3,400.0	10.11	250.72	3,373.2	-109.9	-314.0	-64.0	0.00	0.00	0.00
3,427.2	10.11	250.72	3,400.0	-111.4	-318.5	-64.9	0.00	0.00	0.00
PARKMAN									
3,500.0	10.11	250.72	3,471.7	-115.6	-330.6	-67.3	0.00	0.00	0.00
3,600.0	10.11	250.72	3,570.1	-121.4	-347.1	-70.7	0.00	0.00	0.00
3,700.0	10.11	250.72	3,668.6	-127.2	-363.7	-74.1	0.00	0.00	0.00
3,800.0	10.11	250.72	3,767.0	-133.0	-380.3	-77.5	0.00	0.00	0.00
3,900.0	10.11	250.72	3,865.5	-138.8	-396.8	-80.8	0.00	0.00	0.00
4,000.0	10.11	250.72	3,963.9	-144.6	-413.4	-84.2	0.00	0.00	0.00
4,100.0	10.11	250.72	4,062.4	-150.4	-429.9	-87.6	0.00	0.00	0.00
4,200.0	10.11	250.72	4,160.8	-156.2	-446.5	-91.0	0.00	0.00	0.00
4,290.6	10.11	250.72	4,250.0	-161.5	-461.5	-94.0	0.00	0.00	0.00
SUSSEX									
4,300.0	10.11	250.72	4,259.3	-162.0	-463.1	-94.3	0.00	0.00	0.00
4,400.0	10.11	250.72	4,357.7	-167.8	-479.6	-97.7	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-421	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-25-14)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,500.0	10.11	250.72	4,456.2	-173.6	-496.2	-101.1	0.00	0.00	0.00
4,600.0	10.11	250.72	4,554.6	-179.4	-512.7	-104.4	0.00	0.00	0.00
4,700.0	10.11	250.72	4,653.0	-185.2	-529.3	-107.8	0.00	0.00	0.00
4,800.0	10.11	250.72	4,751.5	-191.0	-545.9	-111.2	0.00	0.00	0.00
4,900.0	10.11	250.72	4,849.9	-196.8	-562.4	-114.6	0.00	0.00	0.00
5,000.0	10.11	250.72	4,948.4	-202.6	-579.0	-117.9	0.00	0.00	0.00
5,100.0	10.11	250.72	5,046.8	-208.4	-595.6	-121.3	0.00	0.00	0.00
5,151.3	10.11	250.72	5,097.4	-211.3	-604.1	-123.0	0.00	0.00	0.00
5,200.0	9.13	250.72	5,145.4	-214.0	-611.7	-124.6	2.00	-2.00	0.00
5,224.9	8.63	250.72	5,170.0	-215.3	-615.4	-125.3	2.00	-2.00	0.00
SHANNON									
5,300.0	7.13	250.72	5,244.4	-218.7	-625.1	-127.3	2.00	-2.00	0.00
5,400.0	5.13	250.72	5,343.8	-222.2	-635.2	-129.4	2.00	-2.00	0.00
5,500.0	3.13	250.72	5,443.5	-224.6	-642.0	-130.8	2.00	-2.00	0.00
5,600.0	1.13	250.72	5,543.4	-225.8	-645.5	-131.5	2.00	-2.00	0.00
5,656.6	0.00	0.00	5,600.0	-226.0	-646.0	-131.6	2.00	-2.00	0.00
5,700.0	0.00	0.00	5,643.4	-226.0	-646.0	-131.6	0.00	0.00	0.00
5,800.0	0.00	0.00	5,743.4	-226.0	-646.0	-131.6	0.00	0.00	0.00
5,900.0	0.00	0.00	5,843.4	-226.0	-646.0	-131.6	0.00	0.00	0.00
6,000.0	0.00	0.00	5,943.4	-226.0	-646.0	-131.6	0.00	0.00	0.00
6,036.8	0.00	0.00	5,980.2	-226.0	-646.0	-131.6	0.00	0.00	0.00
KOP #2									
6,100.0	4.74	360.00	6,043.4	-223.4	-646.0	-129.0	7.49	7.49	0.00
6,200.0	12.24	360.00	6,142.2	-208.6	-646.0	-114.4	7.50	7.50	0.00
6,300.0	19.74	360.00	6,238.3	-181.1	-646.0	-87.2	7.50	7.50	0.00
6,400.0	27.24	360.00	6,329.9	-141.3	-646.0	-47.8	7.50	7.50	0.00
6,402.4	27.41	360.00	6,332.0	-140.2	-646.0	-46.7	7.50	7.50	0.00
SHARRON SPRINGS									
6,500.0	34.74	360.00	6,415.6	-89.9	-646.0	3.2	7.50	7.50	0.00
6,572.4	40.16	360.00	6,473.0	-45.9	-646.0	46.7	7.50	7.50	0.00
NIOBRARA A									
6,600.0	42.24	360.00	6,493.8	-27.7	-646.0	64.7	7.50	7.50	0.00
6,684.4	48.56	360.00	6,553.0	32.4	-646.0	124.1	7.50	7.50	0.00
NIOBRARA B									
6,700.0	49.74	360.00	6,563.2	44.2	-646.0	135.9	7.50	7.50	0.00
6,800.0	57.24	360.00	6,622.7	124.5	-646.0	215.3	7.50	7.50	0.00
6,831.1	59.57	360.00	6,639.0	151.0	-646.0	241.6	7.50	7.50	0.00
NIOBRARA C									
6,900.0	64.74	360.00	6,671.2	211.9	-646.0	301.8	7.50	7.50	0.00
7,000.0	72.24	360.00	6,707.8	304.9	-646.0	393.9	7.50	7.50	0.00
7,089.2	78.93	360.00	6,730.0	391.2	-646.0	479.3	7.50	7.50	0.00
FT HAYS									
7,100.0	79.74	360.00	6,732.0	401.8	-646.0	489.8	7.50	7.50	0.00
7,156.8	84.00	360.00	6,740.0	458.0	-646.0	545.5	7.50	7.50	0.00
7"									
7,200.0	84.00	360.00	6,744.5	501.0	-646.0	588.0	0.01	0.01	0.00
7,230.8	84.00	360.00	6,747.8	531.7	-646.0	618.4	0.00	0.00	0.00
7,300.0	87.46	360.00	6,752.9	600.6	-646.0	686.6	5.00	5.00	0.00
7,356.2	90.27	360.00	6,754.0	656.8	-646.0	742.2	5.00	5.00	0.00
End of Build									
7,400.0	90.27	360.00	6,753.8	700.6	-646.0	785.6	0.01	0.01	0.00
7,500.0	90.27	360.00	6,753.4	800.6	-646.0	884.5	0.00	0.00	0.00

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Project:	SEC.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-25-14)		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
7,600.0	90.27	360.00	6,752.9	900.6	-646.0	983.5	0.00	0.00	0.00
7,700.0	90.27	360.00	6,752.4	1,000.6	-646.0	1,082.5	0.00	0.00	0.00
7,800.0	90.27	360.00	6,751.9	1,100.6	-646.0	1,181.5	0.00	0.00	0.00
7,900.0	90.27	360.00	6,751.5	1,200.6	-646.0	1,280.4	0.00	0.00	0.00
8,000.0	90.27	360.00	6,751.0	1,300.6	-646.0	1,379.4	0.00	0.00	0.00
8,100.0	90.27	360.00	6,750.5	1,400.6	-646.0	1,478.4	0.00	0.00	0.00
8,200.0	90.27	360.00	6,750.1	1,500.6	-646.0	1,577.4	0.00	0.00	0.00
8,300.0	90.27	360.00	6,749.6	1,600.6	-646.0	1,676.4	0.00	0.00	0.00
8,400.0	90.27	360.00	6,749.1	1,700.6	-646.0	1,775.3	0.00	0.00	0.00
8,500.0	90.27	360.00	6,748.6	1,800.6	-646.0	1,874.3	0.00	0.00	0.00
8,600.0	90.27	360.00	6,748.2	1,900.6	-646.0	1,973.3	0.00	0.00	0.00
8,700.0	90.27	360.00	6,747.7	2,000.6	-646.0	2,072.3	0.00	0.00	0.00
8,800.0	90.27	360.00	6,747.2	2,100.6	-646.0	2,171.2	0.00	0.00	0.00
8,900.0	90.27	360.00	6,746.8	2,200.6	-646.0	2,270.2	0.00	0.00	0.00
9,000.0	90.27	360.00	6,746.3	2,300.6	-646.0	2,369.2	0.00	0.00	0.00
9,100.0	90.27	360.00	6,745.8	2,400.6	-646.0	2,468.2	0.00	0.00	0.00
9,200.0	90.27	360.00	6,745.3	2,500.6	-646.0	2,567.2	0.00	0.00	0.00
9,300.0	90.27	360.00	6,744.9	2,600.6	-646.0	2,666.1	0.00	0.00	0.00
9,400.0	90.27	360.00	6,744.4	2,700.6	-646.0	2,765.1	0.00	0.00	0.00
9,500.0	90.27	360.00	6,743.9	2,800.6	-646.0	2,864.1	0.00	0.00	0.00
9,600.0	90.27	360.00	6,743.5	2,900.6	-646.0	2,963.1	0.00	0.00	0.00
9,700.0	90.27	360.00	6,743.0	3,000.6	-646.0	3,062.0	0.00	0.00	0.00
9,800.0	90.27	360.00	6,742.5	3,100.6	-646.0	3,161.0	0.00	0.00	0.00
9,900.0	90.27	360.00	6,742.1	3,200.6	-646.0	3,260.0	0.00	0.00	0.00
10,000.0	90.27	360.00	6,741.6	3,300.6	-646.0	3,359.0	0.00	0.00	0.00
10,100.0	90.27	360.00	6,741.1	3,400.6	-646.0	3,458.0	0.00	0.00	0.00
10,200.0	90.27	360.00	6,740.6	3,500.6	-646.0	3,556.9	0.00	0.00	0.00
10,300.0	90.27	360.00	6,740.2	3,600.6	-646.0	3,655.9	0.00	0.00	0.00
10,400.0	90.27	360.00	6,739.7	3,700.6	-646.0	3,754.9	0.00	0.00	0.00
10,500.0	90.27	360.00	6,739.2	3,800.6	-646.0	3,853.9	0.00	0.00	0.00
10,600.0	90.27	360.00	6,738.8	3,900.6	-646.0	3,952.8	0.00	0.00	0.00
10,700.0	90.27	360.00	6,738.3	4,000.6	-646.0	4,051.8	0.00	0.00	0.00
10,800.0	90.27	360.00	6,737.8	4,100.6	-646.0	4,150.8	0.00	0.00	0.00
10,900.0	90.27	360.00	6,737.3	4,200.6	-646.0	4,249.8	0.00	0.00	0.00
11,000.0	90.27	360.00	6,736.9	4,300.6	-646.0	4,348.7	0.00	0.00	0.00
11,100.0	90.27	360.00	6,736.4	4,400.6	-646.0	4,447.7	0.00	0.00	0.00
11,184.1	90.27	360.00	6,736.0	4,484.7	-646.0	4,531.0	0.00	0.00	0.00
BHL 500'FNL & 941'FEL									

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,156.8	6,740.0	7"	7	7-1/2

Database:	landmark	Local Co-ordinate Reference:	Well Ledford 22T-421
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Project:	SEC.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	North Reference:	True
Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (2-25-14)		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,427.2	3,400.0	PARKMAN		0.00	
4,290.6	4,250.0	SUSSEX		0.00	
5,224.9	5,170.0	SHANNON		0.00	
6,402.4	6,332.0	SHARRON SPRINGS		0.00	
6,572.4	6,473.0	NIOBRARA A		0.00	
6,684.4	6,553.0	NIOBRARA B		0.00	
6,831.1	6,639.0	NIOBRARA C		0.00	
7,089.2	6,730.0	FT HAYS		0.00	

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,000.0	1,000.0	0.0	0.0	KOP
6,036.8	5,980.2	-226.0	-646.0	KOP #2
7,356.2	6,754.0	656.8	-646.0	End of Build



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.22-T5N-R64W

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

Ledford 22T-421

Wellbore #1

Plan #1 (2-25-14)

Anticollision Report

07 March, 2014



Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Reference	Plan #1 (2-25-14)		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0ft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.0ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date 3/6/2014			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,184.1	Plan #1 (2-25-14) (Wellbore #1)	MWD	MWD - Standard

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Bauer 22-C Sec. 22-T5N-R64W						
Bauer 22-C - Wellbore #1 - Design #1	10,430.0	6,783.5	374.9	283.6	4.104	CC, ES, SF
Doughman 22VD Pad Sec.22-T5N-R64W						
Doughman 22RD - Wellbore #1 - Wellbore #1	11,184.1	6,815.8	546.1	440.4	5.165	CC, ES, SF
Lucas #1 (Exist.) - Wellbore #1 - Wellbore #1	10,950.7	6,650.0	299.8	204.2	3.136	CC, ES, SF
Existing Wells Sec.22-T5N-R64W						
Emancipator 22-16 (Exist.) - Wellbore #1 - Wellbore #1	7,016.4	6,699.6	308.9	158.3	2.051	CC, ES, SF
Emancipator 22-9 (Exist.) - Wellbore #1 - Wellbore #1	8,287.8	6,739.6	272.7	103.2	1.609	CC, ES
Emancipator 22-9 (Exist.) - Wellbore #1 - Wellbore #1	8,300.0	6,739.6	273.0	103.3	1.609	SF
Emancipator B 22-23 (Exist.) - Wellbore #1 - Wellbore #1	7,730.4	6,740.3	387.6	227.3	2.418	CC, ES, SF
P&H 22-42 (Exist.) - Wellbore #1 - Wellbore #1	9,843.4	6,709.3	100.0	-97.1	0.507	Level 1, CC, ES, SF
Ledford 22Y-HZ Pad Sec.22-T5N-R64W						
Ledford 22T-321 - Wellbore #1 - Plan #1 (2-25-14)	400.0	400.0	31.2	29.6	19.844	CC
Ledford 22T-321 - Wellbore #1 - Plan #1 (2-25-14)	11,184.1	11,113.7	166.9	23.7	1.165	Level 2, ES, SF
Ledford 22Y-241 - Wellbore #1 - Plan #1 (2-25-14)	1,000.0	1,000.0	29.3	25.0	6.860	CC, ES
Ledford 22Y-241 - Wellbore #1 - Plan #1 (2-25-14)	11,184.1	10,993.3	565.0	398.0	3.382	SF
Ledford 22Y-401 - Wellbore #1 - Plan #1 (2-25-14)	1,000.0	1,000.0	61.4	57.1	14.367	CC, ES
Ledford 22Y-401 - Wellbore #1 - Plan #1 (2-25-14)	11,184.1	11,147.1	795.1	619.5	4.529	SF
P&H 22CD Pad Sec.22-T5N-R64W						
P&H 22CD - Wellbore #1 - Wellbore #1	10,376.6	6,842.2	332.4	242.0	3.679	CC, ES
P&H 22CD - Wellbore #1 - Wellbore #1	10,400.0	6,842.2	333.2	242.4	3.670	SF
P&H 22SD - Wellbore #1 - Wellbore #1	9,126.9	6,862.6	335.3	266.1	4.845	CC, ES, SF

Offset Design	Bauer 22-C Sec. 22-T5N-R64W - Bauer 22-C - Wellbore #1 - Design #1											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
9,600.0	6,743.5	6,787.4	6,716.5	59.1	19.8	-90.60	3,730.6	-1,020.9	910.8	834.9	75.84	12.008	
9,700.0	6,743.0	6,786.9	6,716.0	61.0	19.8	-90.53	3,730.6	-1,020.9	820.7	743.0	77.70	10.562	
9,800.0	6,742.5	6,786.5	6,715.5	62.8	19.8	-90.45	3,730.6	-1,020.9	733.1	653.6	79.56	9.214	
9,900.0	6,742.1	6,786.0	6,715.1	64.6	19.8	-90.38	3,730.6	-1,020.9	649.2	567.8	81.43	7.973	

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-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design Bauer 22-C Sec. 22-T5N-R64W - Bauer 22-C - Wellbore #1 - Design #1												Offset Site Error:	0.0 ft
Survey Program: 0-MWD												Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,000.0	6,741.6	6,785.5	6,714.6	66.5	19.8	-90.31	3,730.6	-1,020.9	570.5	487.2	83.30	6.849	
10,100.0	6,741.1	6,785.1	6,714.1	68.3	19.8	-90.24	3,730.6	-1,020.9	499.5	414.3	85.17	5.865	
10,200.0	6,740.6	6,784.6	6,713.6	70.2	19.8	-90.17	3,730.6	-1,020.9	439.9	352.8	87.04	5.053	
10,300.0	6,740.2	6,784.1	6,713.2	72.1	19.8	-90.09	3,730.6	-1,020.9	396.8	307.9	88.92	4.463	
10,400.0	6,739.7	6,783.6	6,712.7	73.9	19.8	-90.02	3,730.6	-1,020.9	376.1	285.3	90.80	4.142	
10,430.0	6,739.6	6,783.5	6,712.6	74.5	19.8	-90.00	3,730.6	-1,020.9	374.9	283.6	91.36	4.104	CC, ES, SF
10,500.0	6,739.2	6,783.2	6,712.2	75.8	19.8	-89.95	3,730.6	-1,020.9	381.4	288.7	92.68	4.115	
10,600.0	6,738.8	6,782.7	6,711.8	77.7	19.8	-89.88	3,730.6	-1,020.9	411.7	317.1	94.56	4.353	
10,700.0	6,738.3	6,782.2	6,711.3	79.5	19.8	-89.81	3,730.6	-1,020.9	462.0	365.6	96.44	4.790	
10,800.0	6,737.8	6,781.8	6,710.8	81.4	19.8	-89.73	3,730.6	-1,020.9	526.7	428.4	98.33	5.357	
10,900.0	6,737.3	6,781.3	6,710.3	83.3	19.8	-89.66	3,730.6	-1,020.9	601.2	501.0	100.22	5.999	
11,000.0	6,736.9	6,780.8	6,709.9	85.2	19.8	-89.59	3,730.6	-1,020.9	682.2	580.1	102.10	6.682	
11,100.0	6,736.4	6,780.3	6,709.4	87.0	19.8	-89.52	3,730.6	-1,020.9	767.7	663.7	103.99	7.383	
11,184.1	6,736.0	6,779.9	6,709.0	88.6	19.8	-89.46	3,730.6	-1,020.9	842.1	736.6	105.58	7.976	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 ft
Survey Program: 765-MWD												Offset Well Error:	0.0 ft
Doughman 22VD Pad Sec.22-T5N-R64W - Doughman 22RD - 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)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,700.0	6,738.3	6,829.2	6,732.1	79.5	20.3	-93.95	4,880.9	-1,021.3	957.2	860.9	96.37	9.933	
10,800.0	6,737.8	6,826.5	6,729.4	81.4	20.3	-93.54	4,880.9	-1,021.4	866.2	767.9	98.31	8.811	
10,900.0	6,737.3	6,823.8	6,726.6	83.3	20.3	-93.13	4,881.0	-1,021.4	777.3	677.0	100.24	7.754	
11,000.0	6,736.9	6,821.0	6,723.9	85.2	20.3	-92.71	4,881.1	-1,021.4	691.5	589.3	102.18	6.767	
11,100.0	6,736.4	6,818.2	6,721.1	87.0	20.3	-92.28	4,881.1	-1,021.4	609.9	505.8	104.12	5.858	
11,184.1	6,736.0	6,815.8	6,718.7	88.6	20.3	-91.92	4,881.2	-1,021.4	546.1	440.4	105.74	5.165 CC, ES, SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	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
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	
10,000.0	6,741.6	6,650.0	6,648.4	66.5	13.9	78.71	4,251.0	-352.0	996.8	918.8	78.02	12.777	
10,100.0	6,741.1	6,650.0	6,648.4	68.3	13.9	78.71	4,251.0	-352.0	902.0	822.1	79.86	11.295	
10,200.0	6,740.6	6,650.0	6,648.4	70.2	13.9	78.71	4,251.0	-352.0	808.3	726.6	81.70	9.894	
10,300.0	6,740.2	6,650.0	6,648.4	72.1	13.9	78.71	4,251.0	-352.0	716.4	632.9	83.55	8.575	
10,400.0	6,739.7	6,650.0	6,648.4	73.9	13.9	78.71	4,251.0	-352.0	627.0	541.6	85.39	7.342	
10,500.0	6,739.2	6,650.0	6,648.4	75.8	13.9	78.71	4,251.0	-352.0	541.3	454.1	87.24	6.204	
10,600.0	6,738.8	6,650.0	6,648.4	77.7	13.9	78.71	4,251.0	-352.0	461.4	372.3	89.10	5.178	
10,700.0	6,738.3	6,650.0	6,648.4	79.5	13.9	78.71	4,251.0	-352.0	390.8	299.9	90.95	4.297	
10,800.0	6,737.8	6,650.0	6,648.4	81.4	13.9	78.71	4,251.0	-352.0	335.6	242.8	92.81	3.616	
10,900.0	6,737.3	6,650.0	6,648.4	83.3	13.9	78.71	4,251.0	-352.0	304.1	209.4	94.66	3.212	
10,950.7	6,737.1	6,650.0	6,648.4	84.2	13.9	78.71	4,251.0	-352.0	299.8	204.2	95.60	3.136 CC, ES, SF	
11,000.0	6,736.9	6,650.0	6,648.4	85.2	13.9	78.71	4,251.0	-352.0	303.9	207.4	96.52	3.148	
11,100.0	6,736.4	6,650.0	6,648.4	87.0	13.9	78.71	4,251.0	-352.0	335.0	236.6	98.38	3.405	
11,184.1	6,736.0	6,650.0	6,648.4	88.6	13.9	78.71	4,251.0	-352.0	380.0	280.1	99.95	3.802	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	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: 6906-UNKNOWN													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)	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	-46.44	320.6	-337.1	465.4					
100.0	100.0	87.0	87.0	0.1	1.7	-46.44	320.6	-337.1	465.2	463.4	1.85	251.119		
200.0	200.0	187.0	187.0	0.3	3.7	-46.44	320.6	-337.1	465.2	461.1	4.08	114.098		
300.0	300.0	287.0	287.0	0.6	5.7	-46.44	320.6	-337.1	465.2	458.9	6.30	73.820		
400.0	400.0	387.0	387.0	0.8	7.7	-46.44	320.6	-337.1	465.2	456.7	8.53	54.559		
500.0	500.0	487.0	487.0	1.0	9.7	-46.44	320.6	-337.1	465.2	454.5	10.75	43.270		
600.0	600.0	587.0	587.0	1.2	11.7	-46.44	320.6	-337.1	465.2	452.2	12.98	35.851		
700.0	700.0	687.0	687.0	1.5	13.7	-46.44	320.6	-337.1	465.2	450.0	15.20	30.604		
800.0	800.0	787.0	787.0	1.7	15.7	-46.44	320.6	-337.1	465.2	447.8	17.43	26.697		
900.0	900.0	887.0	887.0	1.9	17.7	-46.44	320.6	-337.1	465.2	445.6	19.65	23.674		
1,000.0	1,000.0	987.0	987.0	2.1	19.7	-46.44	320.6	-337.1	465.2	443.3	21.88	21.267		
1,100.0	1,100.0	1,087.0	1,087.0	2.3	21.7	62.94	320.6	-337.1	464.8	440.7	24.08	19.303		
1,200.0	1,200.0	1,187.0	1,187.0	2.5	23.7	63.24	320.6	-337.1	463.6	437.4	26.27	17.648		
1,300.0	1,299.9	1,286.9	1,286.9	2.7	25.7	63.74	320.6	-337.1	461.7	433.2	28.46	16.220		
1,400.0	1,399.7	1,386.7	1,386.7	2.9	27.7	64.45	320.6	-337.1	459.0	428.4	30.66	14.969		
1,500.0	1,499.4	1,486.4	1,486.4	3.2	29.7	65.37	320.6	-337.1	455.7	422.8	32.87	13.863		
1,600.0	1,598.9	1,585.9	1,585.9	3.4	31.7	66.50	320.6	-337.1	451.8	416.7	35.08	12.876		
1,700.0	1,698.3	1,685.3	1,685.3	3.7	33.7	67.87	320.6	-337.1	447.3	410.0	37.31	11.990		
1,800.0	1,797.4	1,784.4	1,784.4	3.9	35.7	69.46	320.6	-337.1	442.6	403.0	39.55	11.189		
1,900.0	1,896.3	1,883.3	1,883.3	4.2	37.7	71.31	320.6	-337.1	437.5	395.7	41.81	10.464		
2,000.0	1,994.9	1,981.9	1,981.9	4.5	39.6	73.40	320.6	-337.1	432.5	388.4	44.10	9.807		
2,100.0	2,093.4	2,080.4	2,080.4	4.9	41.6	75.63	320.6	-337.1	427.7	381.3	46.41	9.216		
2,200.0	2,191.8	2,178.8	2,178.8	5.2	43.6	77.89	320.6	-337.1	423.6	374.9	48.74	8.692		
2,300.0	2,290.3	2,277.3	2,277.3	5.6	45.5	80.19	320.6	-337.1	420.3	369.2	51.08	8.228		
2,400.0	2,388.7	2,375.7	2,375.7	5.9	47.5	82.53	320.6	-337.1	417.6	364.2	53.42	7.817		
2,500.0	2,487.2	2,474.2	2,474.2	6.3	49.5	84.89	320.6	-337.1	415.6	359.9	55.77	7.453		
2,600.0	2,585.6	2,572.6	2,572.6	6.7	51.5	87.27	320.6	-337.1	414.4	356.3	58.12	7.131		
2,700.0	2,684.1	2,671.1	2,671.1	7.0	53.4	89.66	320.6	-337.1	413.9	353.5	60.47	6.846		
2,714.1	2,698.0	2,685.0	2,685.0	7.1	53.7	90.00	320.6	-337.1	413.9	353.1	60.80	6.808		
2,800.0	2,782.5	2,769.5	2,769.5	7.4	55.4	92.05	320.6	-337.1	414.2	351.4	62.81	6.595		
2,900.0	2,881.0	2,868.0	2,868.0	7.8	57.4	94.43	320.6	-337.1	415.2	350.1	65.15	6.373		
3,000.0	2,979.4	2,966.4	2,966.4	8.2	59.3	96.80	320.6	-337.1	417.0	349.5	67.48	6.179		
3,100.0	3,077.9	3,064.9	3,064.9	8.6	61.3	99.15	320.6	-337.1	419.4	349.6	69.80	6.009		
3,200.0	3,176.3	3,163.3	3,163.3	9.0	63.3	101.46	320.6	-337.1	422.6	350.5	72.12	5.860		
3,300.0	3,274.8	3,261.8	3,261.8	9.4	65.2	103.74	320.6	-337.1	426.5	352.1	74.42	5.731		
3,400.0	3,373.2	3,360.2	3,360.2	9.8	67.2	105.97	320.6	-337.1	431.1	354.4	76.71	5.619		
3,500.0	3,471.7	3,458.7	3,458.7	10.2	69.2	108.16	320.6	-337.1	436.3	357.3	78.99	5.523		
3,600.0	3,570.1	3,557.1	3,557.1	10.5	71.1	110.29	320.6	-337.1	442.2	360.9	81.26	5.441		
3,700.0	3,668.6	3,655.6	3,655.6	10.9	73.1	112.36	320.6	-337.1	448.6	365.1	83.51	5.372		
3,800.0	3,767.0	3,754.0	3,754.0	11.3	75.1	114.38	320.6	-337.1	455.7	369.9	85.76	5.313		
3,900.0	3,865.5	3,852.5	3,852.5	11.7	77.0	116.33	320.6	-337.1	463.3	375.3	87.99	5.265		
4,000.0	3,963.9	3,950.9	3,950.9	12.1	79.0	118.22	320.6	-337.1	471.4	381.2	90.22	5.226		
4,100.0	4,062.4	4,049.4	4,049.4	12.5	81.0	120.04	320.6	-337.1	480.1	387.6	92.43	5.194		
4,200.0	4,160.8	4,147.8	4,147.8	12.9	83.0	121.80	320.6	-337.1	489.2	394.6	94.63	5.169		
4,300.0	4,259.3	4,246.3	4,246.3	13.3	84.9	123.50	320.6	-337.1	498.8	401.9	96.83	5.151		
4,400.0	4,357.7	4,344.7	4,344.7	13.7	86.9	125.13	320.6	-337.1	508.8	409.7	99.02	5.138		
4,500.0	4,456.2	4,443.2	4,443.2	14.1	88.9	126.69	320.6	-337.1	519.2	418.0	101.20	5.130		
4,600.0	4,554.6	4,541.6	4,541.6	14.5	90.8	128.20	320.6	-337.1	529.9	426.5	103.38	5.126		
4,700.0	4,653.0	4,640.0	4,640.0	15.0	92.8	129.65	320.6	-337.1	541.1	435.5	105.55	5.126		
4,800.0	4,751.5	4,738.5	4,738.5	15.4	94.8	131.04	320.6	-337.1	552.5	444.8	107.72	5.129		
4,900.0	4,849.9	4,836.9	4,836.9	15.8	96.7	132.37	320.6	-337.1	564.3	454.4	109.89	5.135		

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-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	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: 6906-UNKNOWN													Offset Well Error: 0.0 ft	
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
5,000.0	4,948.4	4,935.4	4,935.4	16.2	98.7	133.65	320.6	-337.1	576.4	464.3	112.05	5.144		
5,100.0	5,046.8	5,033.8	5,033.8	16.6	100.7	134.87	320.6	-337.1	588.7	474.5	114.20	5.155		
5,200.0	5,145.4	5,132.4	5,132.4	16.9	102.6	136.11	320.6	-337.1	601.0	484.5	116.49	5.159		
5,300.0	5,244.4	5,231.4	5,231.4	17.2	104.6	137.16	320.6	-337.1	611.3	492.5	118.86	5.143		
5,400.0	5,343.8	5,330.8	5,330.8	17.4	106.6	137.94	320.6	-337.1	619.2	498.1	121.19	5.110		
5,500.0	5,443.5	5,430.5	5,430.5	17.6	108.6	138.45	320.6	-337.1	624.6	501.2	123.47	5.059		
5,600.0	5,543.4	5,530.4	5,530.4	17.8	110.6	138.71	320.6	-337.1	627.4	501.7	125.68	4.992		
5,700.0	5,643.4	5,630.4	5,630.4	17.9	112.6	29.47	320.6	-337.1	627.8	500.0	127.84	4.911		
5,800.0	5,743.4	5,730.4	5,730.4	18.1	114.6	29.47	320.6	-337.1	627.8	497.8	130.00	4.829		
5,900.0	5,843.4	5,830.4	5,830.4	18.2	116.6	29.47	320.6	-337.1	627.8	495.7	132.17	4.750		
6,000.0	5,943.4	5,930.4	5,930.4	18.3	118.6	29.47	320.6	-337.1	627.8	493.5	134.33	4.674		
6,100.0	6,043.4	6,030.4	6,030.4	18.5	120.6	29.67	320.6	-337.1	625.6	489.5	136.08	4.597		
6,200.0	6,142.2	6,129.2	6,129.2	18.6	122.6	30.85	320.6	-337.1	612.8	476.7	136.10	4.503		
6,300.0	6,238.3	6,225.3	6,225.3	18.6	124.5	33.19	320.6	-337.1	589.2	454.6	134.54	4.379		
6,400.0	6,329.9	6,316.9	6,316.9	18.7	126.3	36.95	320.6	-337.1	555.7	423.6	132.10	4.206		
6,500.0	6,415.6	6,402.6	6,402.6	18.7	128.1	42.48	320.6	-337.1	513.7	383.6	130.12	3.948		
6,600.0	6,493.8	6,480.8	6,480.8	18.7	129.6	50.15	320.6	-337.1	465.5	334.9	130.57	3.565		
6,700.0	6,563.2	6,550.2	6,550.2	18.7	131.0	59.96	320.6	-337.1	414.5	279.6	134.88	3.073		
6,800.0	6,622.7	6,609.7	6,609.7	18.8	132.2	71.04	320.6	-337.1	365.9	224.1	141.73	2.581		
6,900.0	6,671.2	6,658.2	6,658.2	19.0	133.2	81.46	320.6	-337.1	327.4	180.0	147.48	2.220		
7,000.0	6,707.8	6,694.8	6,694.8	19.3	133.9	89.11	320.6	-337.1	309.3	159.0	150.33	2.057		
7,016.4	6,712.6	6,699.6	6,699.6	19.4	134.0	90.00	320.6	-337.1	308.9	158.3	150.61	2.051 CC, ES, SF		
7,100.0	6,732.0	6,719.0	6,719.0	19.8	134.4	92.68	320.6	-337.1	319.4	167.8	151.62	2.106		
7,200.0	6,744.5	6,731.5	6,731.5	20.6	134.6	93.49	320.6	-337.1	357.7	204.9	152.81	2.341		
7,300.0	6,752.9	6,739.9	6,739.9	21.5	134.8	92.30	320.6	-337.1	416.9	262.7	154.25	2.703		
7,400.0	6,753.8	6,740.8	6,740.8	22.6	134.8	89.67	320.6	-337.1	489.7	334.2	155.55	3.148		
7,500.0	6,753.4	6,740.4	6,740.4	23.9	134.8	89.58	320.6	-337.1	570.8	413.9	156.88	3.638		
7,600.0	6,752.9	6,739.9	6,739.9	25.2	134.8	89.49	320.6	-337.1	657.1	498.8	158.30	4.151		
7,700.0	6,752.4	6,739.4	6,739.4	26.6	134.8	89.41	320.6	-337.1	746.9	587.1	159.78	4.674		
7,800.0	6,751.9	6,738.9	6,738.9	28.1	134.8	89.32	320.6	-337.1	838.9	677.6	161.31	5.201		
7,900.0	6,751.5	6,738.5	6,738.5	29.6	134.8	89.23	320.6	-337.1	932.7	769.8	162.89	5.725		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.22-T5N-R64W - Emancipator 22-9 (Exist.) - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 ft
Survey Program: 6919-UNKNOWN												Offset Well Error:	0.0 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
7,400.0	6,753.8	6,743.8	6,743.8	22.6	134.9	90.88	1,588.4	-373.3	928.7	773.1	155.64	5.967	
7,500.0	6,753.4	6,743.4	6,743.4	23.9	134.9	90.78	1,588.4	-373.3	833.6	676.7	156.98	5.310	
7,600.0	6,752.9	6,742.9	6,742.9	25.2	134.9	90.68	1,588.4	-373.3	739.9	581.5	158.40	4.671	
7,700.0	6,752.4	6,742.4	6,742.4	26.6	134.8	90.58	1,588.4	-373.3	648.0	488.1	159.89	4.053	
7,800.0	6,751.9	6,741.9	6,741.9	28.1	134.8	90.48	1,588.4	-373.3	558.8	397.4	161.43	3.462	
7,900.0	6,751.5	6,741.5	6,741.5	29.6	134.8	90.38	1,588.4	-373.3	474.1	311.0	163.01	2.908	
8,000.0	6,751.0	6,741.0	6,741.0	31.2	134.8	90.28	1,588.4	-373.3	396.5	231.8	164.63	2.408	
8,100.0	6,750.5	6,740.5	6,740.5	32.8	134.8	90.19	1,588.4	-373.3	331.1	164.8	166.29	1.991	
8,200.0	6,750.1	6,740.1	6,740.1	34.4	134.8	90.09	1,588.4	-373.3	286.5	118.5	167.97	1.705	
8,287.8	6,749.6	6,739.6	6,739.6	35.9	134.8	90.00	1,588.4	-373.3	272.7	103.2	169.47	1.609 CC, ES	
8,300.0	6,749.6	6,739.6	6,739.6	36.1	134.8	89.99	1,588.4	-373.3	273.0	103.3	169.68	1.609 SF	
8,400.0	6,749.1	6,739.1	6,739.1	37.8	134.8	89.89	1,588.4	-373.3	294.9	123.5	171.40	1.720	
8,500.0	6,748.6	6,738.6	6,738.6	39.5	134.8	89.79	1,588.4	-373.3	345.5	172.4	173.14	1.996	
8,600.0	6,748.2	6,738.2	6,738.2	41.2	134.8	89.69	1,588.4	-373.3	414.5	239.6	174.90	2.370	
8,700.0	6,747.7	6,737.7	6,737.7	42.9	134.8	89.59	1,588.4	-373.3	494.2	317.6	176.67	2.798	
8,800.0	6,747.2	6,737.2	6,737.2	44.7	134.7	89.49	1,588.4	-373.3	580.3	401.8	178.45	3.252	
8,900.0	6,746.8	6,736.8	6,736.8	46.5	134.7	89.39	1,588.4	-373.3	670.2	490.0	180.24	3.718	
9,000.0	6,746.3	6,736.3	6,736.3	48.3	134.7	89.29	1,588.4	-373.3	762.6	580.6	182.03	4.189	
9,100.0	6,745.8	6,735.8	6,735.8	50.0	134.7	89.20	1,588.4	-373.3	856.8	672.9	183.84	4.660	
9,200.0	6,745.3	6,735.3	6,735.3	51.8	134.7	89.10	1,588.4	-373.3	952.1	766.4	185.65	5.128	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design Existing Wells Sec.22-T5N-R64W - Emancipator B 22-23 (Exist.) - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 ft
Survey Program: 7912-UNKNOWN													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)			
6,800.0	6,622.7	6,610.7	6,610.7	18.8	132.2	-38.31	1,031.0	-1,033.6	985.9	872.6	113.31	8.701		
6,900.0	6,671.2	6,659.2	6,659.2	19.0	133.2	-47.95	1,031.0	-1,033.6	906.2	785.9	120.31	7.532		
7,000.0	6,707.8	6,695.8	6,695.8	19.3	133.9	-60.25	1,031.0	-1,033.6	823.1	689.5	133.64	6.159		
7,100.0	6,732.0	6,720.0	6,720.0	19.8	134.4	-73.87	1,031.0	-1,033.6	739.0	592.5	146.51	5.044		
7,200.0	6,744.5	6,732.5	6,732.5	20.6	134.7	-81.87	1,031.0	-1,033.6	656.6	504.9	151.76	4.327		
7,300.0	6,752.9	6,740.9	6,740.9	21.5	134.8	-87.18	1,031.0	-1,033.6	579.2	425.0	154.23	3.756		
7,400.0	6,753.8	6,741.8	6,741.8	22.6	134.8	-90.23	1,031.0	-1,033.6	509.3	353.7	155.57	3.274		
7,500.0	6,753.4	6,741.4	6,741.4	23.9	134.8	-90.16	1,031.0	-1,033.6	450.9	294.0	156.92	2.874		
7,600.0	6,752.9	6,740.9	6,740.9	25.2	134.8	-90.09	1,031.0	-1,033.6	409.0	250.6	158.34	2.583		
7,700.0	6,752.4	6,740.4	6,740.4	26.6	134.8	-90.02	1,031.0	-1,033.6	388.8	229.0	159.83	2.433		
7,730.4	6,752.3	6,740.3	6,740.3	27.0	134.8	-90.00	1,031.0	-1,033.6	387.6	227.3	160.30	2.418	CC, ES, SF	
7,800.0	6,751.9	6,739.9	6,739.9	28.1	134.8	-89.95	1,031.0	-1,033.6	393.8	232.4	161.37	2.440		
7,900.0	6,751.5	6,739.5	6,739.5	29.6	134.8	-89.88	1,031.0	-1,033.6	423.1	260.1	162.96	2.596		
8,000.0	6,751.0	6,739.0	6,739.0	31.2	134.8	-89.81	1,031.0	-1,033.6	472.1	307.5	164.59	2.869		
8,100.0	6,750.5	6,738.5	6,738.5	32.8	134.8	-89.74	1,031.0	-1,033.6	535.6	369.3	166.25	3.221		
8,200.0	6,750.1	6,738.1	6,738.1	34.4	134.8	-89.67	1,031.0	-1,033.6	608.9	441.0	167.94	3.626		
8,300.0	6,749.6	6,737.6	6,737.6	36.1	134.8	-89.60	1,031.0	-1,033.6	689.0	519.3	169.65	4.061		
8,400.0	6,749.1	6,737.1	6,737.1	37.8	134.7	-89.53	1,031.0	-1,033.6	773.7	602.3	171.38	4.514		
8,500.0	6,748.6	6,736.6	6,736.6	39.5	134.7	-89.46	1,031.0	-1,033.6	861.7	688.6	173.12	4.977		
8,600.0	6,748.2	6,736.2	6,736.2	41.2	134.7	-89.39	1,031.0	-1,033.6	952.1	777.2	174.89	5.444		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	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: 6896-UNKNOWN													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)			
8,900.0	6,746.8	6,713.8	6,713.8	46.5	134.3	92.55	3,144.0	-546.0	948.7	769.0	179.73	5.278		
9,000.0	6,746.3	6,713.3	6,713.3	48.3	134.3	92.28	3,144.0	-546.0	849.3	667.8	181.56	4.678		
9,100.0	6,745.8	6,712.8	6,712.8	50.0	134.3	92.01	3,144.0	-546.0	750.1	566.7	183.39	4.090		
9,200.0	6,745.3	6,712.3	6,712.3	51.8	134.2	91.74	3,144.0	-546.0	651.1	465.9	185.23	3.515		
9,300.0	6,744.9	6,711.9	6,711.9	53.7	134.2	91.47	3,144.0	-546.0	552.5	365.5	187.07	2.954		
9,400.0	6,744.4	6,711.4	6,711.4	55.5	134.2	91.20	3,144.0	-546.0	454.5	265.6	188.91	2.406		
9,500.0	6,743.9	6,710.9	6,710.9	57.3	134.2	90.93	3,144.0	-546.0	357.7	166.9	190.75	1.875		
9,600.0	6,743.5	6,710.5	6,710.5	59.1	134.2	90.66	3,144.0	-546.0	263.2	70.6	192.60	1.366	Level 3	
9,700.0	6,743.0	6,710.0	6,710.0	61.0	134.2	90.39	3,144.0	-546.0	174.8	-19.6	194.44	0.899	Level 1	
9,800.0	6,742.5	6,709.5	6,709.5	62.8	134.2	90.12	3,144.0	-546.0	109.0	-87.3	196.29	0.555	Level 1	
9,843.4	6,742.3	6,709.3	6,709.3	63.6	134.2	90.00	3,144.0	-546.0	100.0	-97.1	197.09	0.507	Level 1, CC, ES, SF	
9,900.0	6,742.1	6,709.1	6,709.1	64.6	134.2	89.85	3,144.0	-546.0	114.9	-83.2	198.13	0.580	Level 1	
10,000.0	6,741.6	6,708.6	6,708.6	66.5	134.2	89.58	3,144.0	-546.0	185.8	-14.2	199.98	0.929	Level 1	
10,100.0	6,741.1	6,708.1	6,708.1	68.3	134.2	89.31	3,144.0	-546.0	275.4	73.6	201.82	1.364	Level 3	
10,200.0	6,740.6	6,707.6	6,707.6	70.2	134.2	89.04	3,144.0	-546.0	370.3	166.7	203.66	1.818		
10,300.0	6,740.2	6,707.2	6,707.2	72.1	134.1	88.77	3,144.0	-546.0	467.4	261.9	205.50	2.274		
10,400.0	6,739.7	6,706.7	6,706.7	73.9	134.1	88.50	3,144.0	-546.0	565.5	358.2	207.33	2.727		
10,500.0	6,739.2	6,706.2	6,706.2	75.8	134.1	88.23	3,144.0	-546.0	664.1	455.0	209.17	3.175		
10,600.0	6,738.8	6,705.8	6,705.8	77.7	134.1	87.96	3,144.0	-546.0	763.2	552.2	211.00	3.617		
10,700.0	6,738.3	6,705.3	6,705.3	79.5	134.1	87.69	3,144.0	-546.0	862.4	649.6	212.83	4.052		
10,800.0	6,737.8	6,704.8	6,704.8	81.4	134.1	87.42	3,144.0	-546.0	961.8	747.1	214.65	4.481		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	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	-134.45	-134.45	-21.9	-22.3	31.2				
100.0	100.0	100.0	100.0	0.1	0.1	-134.45	-134.45	-21.9	-22.3	31.2	31.0	0.22	138.906	
200.0	200.0	200.0	200.0	0.3	0.3	-134.45	-134.45	-21.9	-22.3	31.2	30.5	0.67	46.302	
300.0	300.0	300.0	300.0	0.6	0.6	-134.45	-134.45	-21.9	-22.3	31.2	30.1	1.12	27.781	
400.0	400.0	400.0	400.0	0.8	0.8	-134.45	-134.45	-21.9	-22.3	31.2	29.6	1.57	19.844 CC	
500.0	500.0	499.0	499.0	1.0	1.0	-132.98	-132.98	-22.3	-23.9	32.7	30.7	2.01	16.326	
600.0	600.0	597.8	597.6	1.2	1.2	-129.33	-129.33	-23.7	-28.9	37.4	35.0	2.44	15.350	
700.0	700.0	696.1	695.6	1.5	1.4	-124.94	-124.94	-25.9	-37.0	45.4	42.5	2.89	15.701	
800.0	800.0	793.7	792.5	1.7	1.7	-120.92	-120.92	-29.0	-48.4	56.9	53.5	3.38	16.833	
900.0	900.0	890.8	888.4	1.9	2.0	-117.66	-117.66	-32.9	-62.7	71.8	67.9	3.90	18.396	
1,000.0	1,000.0	989.4	985.6	2.1	2.3	-115.34	-115.34	-37.2	-78.5	88.0	83.6	4.46	19.750	
1,100.0	1,100.0	1,088.1	1,083.0	2.3	2.7	-4.48	-4.48	-41.5	-94.3	103.5	98.9	4.67	22.186	
1,200.0	1,200.0	1,187.2	1,180.7	2.5	3.0	-3.37	-3.37	-45.8	-110.1	117.3	112.3	5.09	23.067	
1,300.0	1,299.9	1,286.4	1,278.5	2.7	3.4	-2.53	-2.53	-50.1	-126.0	129.5	124.0	5.52	23.466	
1,400.0	1,399.7	1,385.8	1,376.6	2.9	3.8	-1.86	-1.86	-54.4	-141.9	139.9	134.0	5.96	23.490	
1,500.0	1,499.4	1,485.5	1,474.8	3.2	4.2	-1.30	-1.30	-58.8	-157.8	148.6	142.2	6.40	23.221	
1,600.0	1,598.9	1,585.2	1,573.2	3.4	4.5	-0.81	-0.81	-63.1	-173.7	155.6	148.7	6.85	22.716	
1,700.0	1,698.3	1,685.1	1,671.7	3.7	4.9	-0.36	-0.36	-67.4	-189.7	160.8	153.5	7.30	22.023	
1,800.0	1,797.4	1,785.0	1,770.2	3.9	5.3	0.05	0.05	-71.8	-205.7	164.4	156.6	7.76	21.178	
1,900.0	1,896.3	1,885.0	1,868.8	4.2	5.7	0.46	0.46	-76.1	-221.7	166.1	157.9	8.22	20.207	
2,000.0	1,994.9	1,985.0	1,967.4	4.5	6.1	0.86	0.86	-80.5	-237.7	166.2	157.5	8.69	19.131	
2,100.0	2,093.4	2,084.9	2,066.0	4.9	6.5	1.27	1.27	-84.8	-253.6	165.2	156.0	9.16	18.023	
2,200.0	2,191.8	2,184.9	2,164.7	5.2	6.9	1.69	1.69	-89.2	-269.6	164.2	154.5	9.65	17.016	
2,300.0	2,290.3	2,284.9	2,263.3	5.6	7.2	2.11	2.11	-93.6	-285.6	163.2	153.0	10.13	16.101	
2,400.0	2,388.7	2,384.9	2,361.9	5.9	7.6	2.54	2.54	-97.9	-301.6	162.2	151.6	10.62	15.267	
2,500.0	2,487.2	2,484.9	2,460.5	6.3	8.0	2.97	2.97	-102.3	-317.6	161.2	150.1	11.12	14.503	
2,600.0	2,585.6	2,584.9	2,559.1	6.7	8.4	3.41	3.41	-106.6	-333.6	160.2	148.6	11.61	13.802	
2,700.0	2,684.1	2,684.9	2,657.7	7.0	8.8	3.85	3.85	-111.0	-349.5	159.3	147.2	12.11	13.156	
2,800.0	2,782.5	2,784.9	2,756.3	7.4	9.2	4.30	4.30	-115.3	-365.5	158.3	145.7	12.61	12.559	
2,900.0	2,881.0	2,884.8	2,854.9	7.8	9.6	4.75	4.75	-119.7	-381.5	157.4	144.3	13.11	12.006	
3,000.0	2,979.4	2,984.8	2,953.5	8.2	10.0	5.21	5.21	-124.0	-397.5	156.5	142.9	13.62	11.492	
3,100.0	3,077.9	3,084.8	3,052.1	8.6	10.4	5.67	5.67	-128.4	-413.5	155.6	141.4	14.12	11.014	
3,200.0	3,176.3	3,184.8	3,150.7	9.0	10.8	6.14	6.14	-132.7	-429.5	154.7	140.0	14.64	10.568	
3,300.0	3,274.8	3,284.8	3,249.3	9.4	11.1	6.62	6.62	-137.1	-445.5	153.8	138.6	15.15	10.151	
3,400.0	3,373.2	3,384.8	3,347.9	9.8	11.5	7.10	7.10	-141.4	-461.4	152.9	137.2	15.67	9.760	
3,500.0	3,471.7	3,484.8	3,446.5	10.2	11.9	7.58	7.58	-145.8	-477.4	152.0	135.8	16.18	9.392	
3,600.0	3,570.1	3,584.8	3,545.1	10.5	12.3	8.07	8.07	-150.1	-493.4	151.1	134.4	16.71	9.047	
3,700.0	3,668.6	3,684.7	3,643.7	10.9	12.7	8.57	8.57	-154.5	-509.4	150.3	133.1	17.23	8.721	
3,800.0	3,767.0	3,784.7	3,742.3	11.3	13.1	9.07	9.07	-158.8	-525.4	149.5	131.7	17.76	8.414	
3,900.0	3,865.5	3,884.7	3,840.9	11.7	13.5	9.58	9.58	-163.2	-541.4	148.6	130.3	18.30	8.123	
4,000.0	3,963.9	3,984.7	3,939.6	12.1	13.9	10.10	10.10	-167.5	-557.4	147.8	129.0	18.83	7.848	
4,100.0	4,062.4	4,084.7	4,038.2	12.5	14.3	10.62	10.62	-171.9	-573.3	147.0	127.6	19.38	7.587	
4,200.0	4,160.8	4,184.7	4,136.8	12.9	14.7	11.14	11.14	-176.2	-589.3	146.2	126.3	19.92	7.339	
4,300.0	4,259.3	4,284.7	4,235.4	13.3	15.1	11.67	11.67	-180.6	-605.3	145.4	125.0	20.47	7.104	
4,400.0	4,357.7	4,384.7	4,334.0	13.7	15.5	12.21	12.21	-184.9	-621.3	144.7	123.6	21.03	6.880	
4,500.0	4,456.2	4,484.7	4,432.6	14.1	15.9	12.75	12.75	-189.3	-637.3	143.9	122.3	21.59	6.666	
4,600.0	4,554.6	4,584.6	4,531.2	14.5	16.2	13.30	13.30	-193.7	-653.3	143.2	121.0	22.15	6.463	
4,700.0	4,653.0	4,684.6	4,629.8	15.0	16.6	13.85	13.85	-198.0	-669.3	142.4	119.7	22.72	6.268	
4,800.0	4,751.5	4,784.6	4,728.4	15.4	17.0	14.41	14.41	-202.4	-685.2	141.7	118.4	23.30	6.083	
4,900.0	4,849.9	4,884.6	4,827.0	15.8	17.4	14.98	14.98	-206.7	-701.2	141.0	117.1	23.88	5.905	
5,000.0	4,948.4	4,984.6	4,925.6	16.2	17.8	15.55	15.55	-211.1	-717.2	140.3	115.9	24.47	5.735	

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-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Reference														
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,046.8	5,084.6	5,024.2	16.6	18.2	16.12	16.12	-215.4	-733.2	139.7	114.6	25.07	5.572	
5,200.0	5,145.4	5,189.5	5,127.9	16.9	18.5	16.85	16.85	-219.5	-748.2	137.7	112.0	25.63	5.372	
5,300.0	5,244.4	5,294.3	5,232.1	17.2	18.7	17.56	17.56	-222.6	-759.5	135.0	108.9	26.11	5.170	
5,400.0	5,343.8	5,398.9	5,336.5	17.4	18.9	18.21	18.21	-224.6	-767.1	132.1	105.6	26.55	4.977	
5,500.0	5,443.5	5,503.5	5,440.9	17.6	19.1	18.79	18.79	-225.7	-771.0	129.1	102.1	26.94	4.792	
5,600.0	5,543.4	5,606.0	5,543.4	17.8	19.2	19.26	19.26	-225.9	-771.6	126.1	98.8	27.27	4.624	
5,681.7	5,625.1	5,687.7	5,625.1	17.9	19.3	19.40	19.40	-225.9	-771.6	125.2	97.7	27.53	4.548	
5,700.0	5,643.4	5,706.0	5,643.4	17.9	19.3	-89.94	-89.94	-225.9	-771.6	125.6	98.0	27.58	4.554	
5,800.0	5,743.4	5,806.0	5,743.4	18.1	19.5	-89.94	-89.94	-225.9	-771.6	125.6	97.7	27.93	4.497	
5,900.0	5,843.4	5,906.0	5,843.4	18.2	19.6	-89.94	-89.94	-225.9	-771.6	125.6	97.3	28.28	4.441	
5,952.6	5,896.0	5,958.6	5,896.0	18.3	19.7	-89.94	-89.94	-225.9	-771.6	125.6	97.1	28.47	4.412	
6,000.0	5,943.4	6,006.0	5,943.4	18.3	19.7	-89.51	-89.51	-224.9	-771.6	125.6	96.9	28.68	4.379	
6,100.0	6,043.4	6,104.9	6,041.6	18.5	19.8	-85.51	-85.51	-213.6	-771.6	126.0	96.5	29.53	4.266	
6,200.0	6,142.2	6,202.6	6,136.3	18.6	19.9	-81.25	-81.25	-190.1	-771.6	127.1	96.7	30.33	4.190	
6,300.0	6,238.3	6,300.0	6,227.1	18.6	19.9	-77.22	-77.22	-154.9	-771.6	128.8	97.9	30.93	4.164	
6,400.0	6,329.9	6,394.6	6,310.2	18.7	20.0	-73.58	-73.58	-109.8	-771.6	131.0	99.7	31.23	4.193	
6,500.0	6,415.6	6,489.2	6,387.1	18.7	20.0	-70.30	-70.30	-54.9	-771.6	133.4	102.2	31.27	4.268	
6,600.0	6,493.8	6,583.0	6,456.1	18.7	20.0	-67.45	-67.45	8.6	-771.6	136.0	104.9	31.09	4.375	
6,700.0	6,563.2	6,676.0	6,516.4	18.7	20.1	-65.02	-65.02	79.4	-771.6	138.6	107.7	30.90	4.485	
6,800.0	6,622.7	6,768.5	6,567.3	18.8	20.2	-63.03	-63.03	156.5	-771.6	141.0	110.2	30.76	4.582	
6,900.0	6,671.2	6,860.4	6,608.3	19.0	20.4	-61.46	-61.46	238.7	-771.6	143.0	112.0	30.99	4.614	
7,000.0	6,707.8	6,950.0	6,638.5	19.3	20.7	-60.33	-60.33	323.0	-771.6	144.6	112.9	31.71	4.559	
7,100.0	6,732.0	7,043.2	6,659.2	19.8	21.2	-59.58	-59.58	413.8	-771.6	145.7	112.6	33.09	4.402	
7,200.0	6,744.5	7,134.3	6,668.6	20.6	21.9	-58.87	-58.87	504.4	-771.6	146.8	112.0	34.83	4.214	
7,300.0	6,752.9	7,229.7	6,668.8	21.5	22.7	-56.21	-56.21	599.7	-771.6	151.2	114.7	36.44	4.149	
7,400.0	6,753.8	7,329.6	6,667.7	22.6	23.8	-55.54	-55.54	699.7	-771.6	152.3	113.6	38.71	3.935	
7,500.0	6,753.4	7,429.6	6,666.6	23.9	24.9	-55.35	-55.35	799.7	-771.6	152.7	111.7	40.98	3.725	
7,600.0	6,752.9	7,529.6	6,665.5	25.2	26.2	-55.16	-55.16	899.7	-771.6	153.0	109.7	43.37	3.528	
7,700.0	6,752.4	7,629.6	6,664.4	26.6	27.6	-54.96	-54.96	999.6	-771.6	153.4	107.5	45.85	3.345	
7,800.0	6,751.9	7,729.6	6,663.3	28.1	29.0	-54.77	-54.77	1,099.6	-771.6	153.8	105.3	48.41	3.176	
7,900.0	6,751.5	7,829.6	6,662.2	29.6	30.5	-54.58	-54.58	1,199.6	-771.6	154.1	103.1	51.03	3.020	
8,000.0	6,751.0	7,929.6	6,661.1	31.2	32.0	-54.39	-54.39	1,299.6	-771.6	154.5	100.8	53.70	2.877	
8,100.0	6,750.5	8,029.6	6,660.0	32.8	33.6	-54.20	-54.20	1,399.6	-771.6	154.9	98.4	56.41	2.745	
8,200.0	6,750.1	8,129.6	6,658.9	34.4	35.2	-54.02	-54.02	1,499.6	-771.6	155.2	96.1	59.16	2.624	
8,300.0	6,749.6	8,229.6	6,657.8	36.1	36.9	-53.83	-53.83	1,599.6	-771.6	155.6	93.7	61.93	2.512	
8,400.0	6,749.1	8,329.6	6,656.7	37.8	38.6	-53.64	-53.64	1,699.6	-771.6	156.0	91.2	64.73	2.409	
8,500.0	6,748.6	8,429.6	6,655.6	39.5	40.2	-53.46	-53.46	1,799.6	-771.6	156.3	88.8	67.54	2.315	
8,600.0	6,748.2	8,529.6	6,654.5	41.2	42.0	-53.27	-53.27	1,899.6	-771.6	156.7	86.3	70.37	2.227	
8,700.0	6,747.7	8,629.6	6,653.4	42.9	43.7	-53.09	-53.09	1,999.6	-771.6	157.1	83.9	73.21	2.146	
8,800.0	6,747.2	8,729.6	6,652.3	44.7	45.4	-52.91	-52.91	2,099.6	-771.6	157.5	81.4	76.05	2.070	
8,900.0	6,746.8	8,829.6	6,651.2	46.5	47.2	-52.72	-52.72	2,199.5	-771.6	157.8	78.9	78.91	2.000	
9,000.0	6,746.3	8,929.6	6,650.1	48.3	49.0	-52.54	-52.54	2,299.5	-771.6	158.2	76.5	81.76	1.935	
9,100.0	6,745.8	9,029.6	6,649.0	50.0	50.7	-52.36	-52.36	2,399.5	-771.6	158.6	74.0	84.62	1.874	
9,200.0	6,745.3	9,129.6	6,647.9	51.8	52.5	-52.18	-52.18	2,499.5	-771.6	159.0	71.5	87.48	1.818	
9,300.0	6,744.9	9,229.6	6,646.8	53.7	54.3	-52.01	-52.01	2,599.5	-771.6	159.4	69.0	90.34	1.764	
9,400.0	6,744.4	9,329.6	6,645.7	55.5	56.1	-51.83	-51.83	2,699.5	-771.6	159.8	66.6	93.20	1.714	
9,500.0	6,743.9	9,429.6	6,644.6	57.3	57.9	-51.65	-51.65	2,799.5	-771.6	160.2	64.1	96.05	1.667	
9,600.0	6,743.5	9,529.6	6,643.5	59.1	59.8	-51.48	-51.48	2,899.5	-771.6	160.6	61.6	98.91	1.623	
9,700.0	6,743.0	9,629.6	6,642.4	61.0	61.6	-51.30	-51.30	2,999.5	-771.6	160.9	59.2	101.75	1.582	
9,800.0	6,742.5	9,729.6	6,641.3	62.8	63.4	-51.13	-51.13	3,099.5	-771.6	161.3	56.7	104.60	1.542	
9,900.0	6,742.1	9,829.6	6,640.2	64.6	65.3	-50.95	-50.95	3,199.5	-771.6	161.7	54.3	107.44	1.505	

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-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22T-321 - Wellbore #1 - Plan #1 (2-25-14)												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
10,000.0	6,741.6	9,929.6	6,639.1	66.5	67.1	-50.78	3,299.5	-771.6	162.1	51.9	110.27	1.470	Level 3
10,100.0	6,741.1	10,029.6	6,638.0	68.3	69.0	-50.61	3,399.5	-771.6	162.5	49.4	113.09	1.437	Level 3
10,200.0	6,740.6	10,129.6	6,636.9	70.2	70.8	-50.44	3,499.4	-771.6	162.9	47.0	115.91	1.406	Level 3
10,300.0	6,740.2	10,229.6	6,635.8	72.1	72.7	-50.27	3,599.4	-771.6	163.3	44.6	118.73	1.376	Level 3
10,400.0	6,739.7	10,329.6	6,634.7	73.9	74.5	-50.10	3,699.4	-771.6	163.7	42.2	121.53	1.347	Level 3
10,500.0	6,739.2	10,429.6	6,633.6	75.8	76.4	-49.93	3,799.4	-771.6	164.1	39.8	124.33	1.320	Level 3
10,600.0	6,738.8	10,529.6	6,632.5	77.7	78.2	-49.77	3,899.4	-771.6	164.5	37.4	127.12	1.294	Level 3
10,700.0	6,738.3	10,629.6	6,631.4	79.5	80.1	-49.60	3,999.4	-771.6	165.0	35.0	129.91	1.270	Level 3
10,800.0	6,737.8	10,729.6	6,630.3	81.4	82.0	-49.43	4,099.4	-771.6	165.4	32.7	132.68	1.246	Level 2
10,900.0	6,737.3	10,829.6	6,629.2	83.3	83.8	-49.27	4,199.4	-771.6	165.8	30.3	135.45	1.224	Level 2
11,000.0	6,736.9	10,929.5	6,628.1	85.2	85.7	-49.10	4,299.4	-771.6	166.2	28.0	138.21	1.202	Level 2
11,100.0	6,736.4	11,029.5	6,627.0	87.0	87.6	-48.94	4,399.4	-771.6	166.6	25.6	140.95	1.182	Level 2
11,184.1	6,736.0	11,113.7	6,626.1	88.6	89.2	-48.80	4,483.5	-771.6	166.9	23.7	143.26	1.165	Level 2, ES, SF

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 ft
Survey Program: 0-MWD												Offset Well Error:	0.0 ft
Reference													
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	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	0.0	0.0	0.0	0.0	41.74	21.9	19.5	29.3				
100.0	100.0	100.0	100.0	0.1	0.1	41.74	21.9	19.5	29.3	29.1	0.22	130.333	
200.0	200.0	200.0	200.0	0.3	0.3	41.74	21.9	19.5	29.3	28.6	0.67	43.444	
300.0	300.0	300.0	300.0	0.6	0.6	41.74	21.9	19.5	29.3	28.2	1.12	26.067	
400.0	400.0	400.0	400.0	0.8	0.8	41.74	21.9	19.5	29.3	27.7	1.57	18.619	
500.0	500.0	500.0	500.0	1.0	1.0	41.74	21.9	19.5	29.3	27.3	2.02	14.481	
600.0	600.0	600.0	600.0	1.2	1.2	41.74	21.9	19.5	29.3	26.8	2.47	11.848	
700.0	700.0	700.0	700.0	1.5	1.5	41.74	21.9	19.5	29.3	26.4	2.92	10.026	
800.0	800.0	800.0	800.0	1.7	1.7	41.74	21.9	19.5	29.3	25.9	3.37	8.689	
900.0	900.0	900.0	900.0	1.9	1.9	41.74	21.9	19.5	29.3	25.5	3.82	7.667	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	41.74	21.9	19.5	29.3	25.0	4.27	6.860 CC, ES	
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.4	151.82	21.9	19.5	30.1	25.4	4.70	6.394	
1,200.0	1,200.0	1,200.0	1,200.0	2.5	2.6	154.00	21.9	19.5	32.4	27.3	5.12	6.329	
1,300.0	1,299.9	1,299.9	1,299.9	2.7	2.8	157.00	21.9	19.5	36.4	30.8	5.54	6.566	
1,400.0	1,399.7	1,399.7	1,399.7	2.9	3.0	160.23	21.9	19.5	42.1	36.1	5.96	7.054	
1,500.0	1,499.4	1,499.4	1,499.4	3.2	3.3	163.28	21.9	19.5	49.5	43.1	6.39	7.752	
1,600.0	1,598.9	1,598.9	1,598.9	3.4	3.5	165.95	21.9	19.5	58.8	51.9	6.81	8.624	
1,700.0	1,698.3	1,698.3	1,698.3	3.7	3.7	168.18	21.9	19.5	69.8	62.6	7.24	9.641	
1,800.0	1,797.4	1,797.4	1,797.4	3.9	3.9	170.01	21.9	19.5	82.6	74.9	7.67	10.776	
1,900.0	1,896.3	1,897.7	1,897.7	4.2	4.1	171.80	21.1	19.1	96.5	88.5	8.07	11.964	
2,000.0	1,994.9	1,998.0	1,998.0	4.5	4.3	173.79	18.8	17.9	110.8	102.4	8.45	13.122	
2,100.0	2,093.4	2,098.6	2,098.6	4.9	4.5	175.88	15.0	15.9	124.9	116.1	8.85	14.121	
2,200.0	2,191.8	2,199.4	2,199.1	5.2	4.7	178.03	9.5	13.0	137.8	128.6	9.26	14.886	
2,300.0	2,290.3	2,300.4	2,299.8	5.6	4.9	-179.73	2.5	9.3	149.6	139.9	9.68	15.452	
2,400.0	2,388.7	2,401.6	2,400.5	5.9	5.1	-177.37	-6.1	4.8	160.4	150.2	10.12	15.845	
2,500.0	2,487.2	2,502.9	2,501.1	6.3	5.3	-174.86	-16.3	-0.5	170.1	159.6	10.58	16.088	
2,600.0	2,585.6	2,604.2	2,601.6	6.7	5.5	-172.20	-28.0	-6.7	179.1	168.0	11.05	16.199	
2,700.0	2,684.1	2,705.5	2,701.7	7.0	5.8	-169.36	-41.3	-13.7	187.3	175.7	11.56	16.199	
2,800.0	2,782.5	2,805.5	2,800.4	7.4	6.1	-166.44	-55.8	-21.3	195.1	183.0	12.10	16.123	
2,900.0	2,881.0	2,904.7	2,898.2	7.8	6.3	-163.75	-70.2	-28.9	203.3	190.7	12.67	16.052	
3,000.0	2,979.4	3,003.9	2,996.1	8.2	6.6	-161.26	-84.6	-36.5	212.0	198.7	13.26	15.988	
3,100.0	3,077.9	3,103.1	3,094.0	8.6	6.9	-158.98	-99.0	-44.1	221.0	207.1	13.87	15.930	
3,200.0	3,176.3	3,202.3	3,191.8	9.0	7.2	-156.87	-113.5	-51.6	230.3	215.8	14.50	15.878	
3,300.0	3,274.8	3,301.6	3,289.7	9.4	7.5	-154.93	-127.9	-59.2	239.9	224.7	15.15	15.830	
3,400.0	3,373.2	3,400.8	3,387.6	9.8	7.9	-153.14	-142.3	-66.8	249.7	233.9	15.82	15.788	
3,500.0	3,471.7	3,500.0	3,485.5	10.2	8.2	-151.49	-156.7	-74.4	259.8	243.3	16.50	15.750	
3,600.0	3,570.1	3,599.2	3,583.3	10.5	8.5	-149.96	-171.2	-82.0	270.1	252.9	17.19	15.717	
3,700.0	3,668.6	3,698.4	3,681.2	10.9	8.9	-148.54	-185.6	-89.6	280.6	262.7	17.89	15.687	
3,800.0	3,767.0	3,796.4	3,777.9	11.3	9.2	-147.32	-199.5	-96.8	291.3	272.7	18.57	15.690	
3,900.0	3,865.5	3,893.2	3,873.9	11.7	9.4	-146.74	-210.7	-102.7	302.8	283.7	19.16	15.807	
4,000.0	3,963.9	3,989.9	3,970.1	12.1	9.7	-146.77	-219.0	-107.1	315.2	295.5	19.70	16.004	
4,100.0	4,062.4	4,086.2	4,066.3	12.5	9.9	-147.36	-224.4	-109.9	328.5	308.3	20.18	16.279	
4,200.0	4,160.8	4,182.1	4,162.0	12.9	10.1	-148.43	-226.9	-111.3	342.6	322.0	20.60	16.632	
4,300.0	4,259.3	4,279.3	4,259.3	13.3	10.3	-149.84	-227.1	-111.4	357.6	336.7	20.98	17.046	
4,400.0	4,357.7	4,377.7	4,357.7	13.7	10.4	-151.19	-227.1	-111.4	373.0	351.6	21.36	17.460	
4,500.0	4,456.2	4,476.2	4,456.2	14.1	10.6	-152.43	-227.1	-111.4	388.5	366.8	21.75	17.864	
4,600.0	4,554.6	4,574.6	4,554.6	14.5	10.8	-153.58	-227.1	-111.4	404.2	382.0	22.14	18.258	
4,700.0	4,653.0	4,673.1	4,653.0	15.0	11.0	-154.64	-227.1	-111.4	420.0	397.5	22.53	18.642	
4,800.0	4,751.5	4,771.5	4,751.5	15.4	11.2	-155.62	-227.1	-111.4	436.0	413.0	22.93	19.016	
4,900.0	4,849.9	4,870.0	4,849.9	15.8	11.4	-156.54	-227.1	-111.4	452.1	428.7	23.33	19.378	
5,000.0	4,948.4	4,968.4	4,948.4	16.2	11.5	-157.39	-227.1	-111.4	468.2	444.5	23.73	19.730	

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

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Reference														
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,046.8	5,066.9	5,046.8	16.6	11.7	-158.19		-227.1	-111.4	484.5	460.4	24.14	20.071	
5,200.0	5,145.4	5,165.4	5,145.4	16.9	11.9	-158.97		-227.1	-111.4	500.5	475.9	24.56	20.381	
5,300.0	5,244.4	5,264.4	5,244.4	17.2	12.1	-159.63		-227.1	-111.4	513.8	488.8	24.94	20.598	
5,400.0	5,343.8	5,363.8	5,343.8	17.4	12.3	-160.10		-227.1	-111.4	523.8	498.5	25.31	20.694	
5,500.0	5,443.5	5,463.5	5,443.5	17.6	12.5	-160.42		-227.1	-111.4	530.6	504.9	25.66	20.674	
5,600.0	5,543.4	5,563.5	5,543.4	17.8	12.7	-160.57		-227.1	-111.4	534.1	508.1	26.00	20.545	
5,700.0	5,643.4	5,663.5	5,643.4	17.9	12.9	90.12		-227.1	-111.4	534.6	508.3	26.34	20.292	
5,800.0	5,743.4	5,763.5	5,743.4	18.1	13.1	90.12		-227.1	-111.4	534.6	507.9	26.72	20.006	
5,900.0	5,843.4	5,863.5	5,843.5	18.2	13.3	90.10		-227.0	-111.4	534.6	507.5	27.10	19.728	
5,927.5	5,870.9	5,891.0	5,870.9	18.2	13.3	89.99		-225.9	-111.4	534.6	507.4	27.19	19.662	
6,000.0	5,943.4	5,962.7	5,942.3	18.3	13.4	89.18		-218.4	-111.4	534.7	507.3	27.37	19.538	
6,100.0	6,043.4	6,058.9	6,036.1	18.5	13.5	87.22		-197.9	-111.4	535.3	507.8	27.49	19.473	
6,200.0	6,142.2	6,152.6	6,124.5	18.6	13.6	85.23		-166.8	-111.4	536.5	509.0	27.53	19.490	
6,300.0	6,238.3	6,244.4	6,206.7	18.6	13.6	83.33		-126.0	-111.4	538.4	510.8	27.54	19.546	
6,400.0	6,329.9	6,334.5	6,282.0	18.7	13.7	81.56		-76.8	-111.4	540.6	513.0	27.59	19.597	
6,500.0	6,415.6	6,423.1	6,350.0	18.7	13.7	79.95		-20.0	-111.4	543.1	515.4	27.71	19.602	
6,600.0	6,493.8	6,510.3	6,410.0	18.7	13.8	78.50		43.2	-111.4	545.8	517.8	27.95	19.523	
6,700.0	6,563.2	6,596.5	6,461.9	18.7	14.1	77.23		112.0	-111.4	548.3	520.0	28.37	19.326	
6,800.0	6,622.7	6,681.8	6,505.2	18.8	14.5	76.16		185.4	-111.4	550.7	521.7	29.01	18.985	
6,900.0	6,671.2	6,766.3	6,539.9	19.0	15.1	75.30		262.4	-111.4	552.8	522.9	29.88	18.502	
7,000.0	6,707.8	6,850.0	6,565.6	19.3	15.7	74.65		342.0	-111.4	554.4	523.4	30.99	17.889	
7,100.0	6,732.0	6,933.9	6,582.5	19.8	16.5	74.22		424.1	-111.4	555.6	523.2	32.38	17.159	
7,200.0	6,744.5	7,017.2	6,590.3	20.6	17.4	73.93		507.0	-111.4	556.4	522.4	34.07	16.332	
7,300.0	6,752.9	7,109.2	6,590.3	21.5	18.5	73.10		599.1	-111.4	558.8	522.8	35.98	15.530	
7,400.0	6,753.8	7,209.2	6,589.3	22.6	19.8	72.90		699.0	-111.4	559.3	521.0	38.30	14.605	
7,500.0	6,753.4	7,309.2	6,588.4	23.9	21.2	72.85		799.0	-111.4	559.5	518.6	40.92	13.673	
7,600.0	6,752.9	7,409.2	6,587.4	25.2	22.7	72.80		899.0	-111.4	559.6	515.9	43.69	12.808	
7,700.0	6,752.4	7,509.2	6,586.5	26.6	24.2	72.75		999.0	-111.4	559.8	513.2	46.59	12.014	
7,800.0	6,751.9	7,609.2	6,585.5	28.1	25.8	72.71		1,099.0	-111.4	559.9	510.3	49.60	11.289	
7,900.0	6,751.5	7,709.2	6,584.5	29.6	27.4	72.66		1,199.0	-111.4	560.1	507.4	52.69	10.630	
8,000.0	6,751.0	7,809.2	6,583.6	31.2	29.1	72.61		1,299.0	-111.4	560.2	504.4	55.84	10.031	
8,100.0	6,750.5	7,909.2	6,582.6	32.8	30.8	72.56		1,399.0	-111.4	560.3	501.3	59.06	9.487	
8,200.0	6,750.1	8,009.2	6,581.7	34.4	32.5	72.51		1,499.0	-111.4	560.5	498.2	62.33	8.992	
8,300.0	6,749.6	8,109.2	6,580.7	36.1	34.2	72.47		1,599.0	-111.4	560.6	495.0	65.64	8.541	
8,400.0	6,749.1	8,209.2	6,579.7	37.8	36.0	72.42		1,699.0	-111.4	560.8	491.8	68.99	8.129	
8,500.0	6,748.6	8,309.2	6,578.8	39.5	37.8	72.37		1,799.0	-111.4	560.9	488.6	72.36	7.752	
8,600.0	6,748.2	8,409.2	6,577.8	41.2	39.6	72.32		1,899.0	-111.4	561.1	485.3	75.76	7.406	
8,700.0	6,747.7	8,509.2	6,576.9	42.9	41.4	72.28		1,999.0	-111.4	561.2	482.0	79.19	7.087	
8,800.0	6,747.2	8,609.2	6,575.9	44.7	43.2	72.23		2,099.0	-111.4	561.4	478.7	82.63	6.794	
8,900.0	6,746.8	8,709.2	6,574.9	46.5	45.0	72.18		2,199.0	-111.4	561.5	475.4	86.09	6.522	
9,000.0	6,746.3	8,809.2	6,574.0	48.3	46.8	72.13		2,298.9	-111.4	561.7	472.1	89.57	6.271	
9,100.0	6,745.8	8,909.2	6,573.0	50.0	48.6	72.09		2,398.9	-111.4	561.8	468.8	93.05	6.038	
9,200.0	6,745.3	9,009.2	6,572.1	51.8	50.5	72.04		2,498.9	-111.4	562.0	465.4	96.55	5.820	
9,300.0	6,744.9	9,109.2	6,571.1	53.7	52.3	71.99		2,598.9	-111.4	562.1	462.1	100.06	5.618	
9,400.0	6,744.4	9,209.2	6,570.1	55.5	54.2	71.94		2,698.9	-111.4	562.3	458.7	103.58	5.428	
9,500.0	6,743.9	9,309.2	6,569.2	57.3	56.0	71.90		2,798.9	-111.4	562.4	455.3	107.11	5.251	
9,600.0	6,743.5	9,409.2	6,568.2	59.1	57.9	71.85		2,898.9	-111.4	562.6	451.9	110.64	5.085	
9,700.0	6,743.0	9,509.2	6,567.3	61.0	59.8	71.80		2,998.9	-111.4	562.7	448.6	114.18	4.929	
9,800.0	6,742.5	9,609.2	6,566.3	62.8	61.6	71.76		3,098.9	-111.4	562.9	445.2	117.72	4.781	
9,900.0	6,742.1	9,709.2	6,565.3	64.6	63.5	71.71		3,198.9	-111.4	563.0	441.8	121.27	4.643	
10,000.0	6,741.6	9,809.2	6,564.4	66.5	65.4	71.66		3,298.9	-111.4	563.2	438.4	124.82	4.512	

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-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-241 - Wellbore #1 - Plan #1 (2-25-14)												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	6,741.1	9,909.2	6,563.4	68.3	67.3	71.61	3,398.9	-111.4	563.3	435.0	128.38	4.388	
10,200.0	6,740.6	10,009.2	6,562.5	70.2	69.1	71.57	3,498.9	-111.4	563.5	431.6	131.94	4.271	
10,300.0	6,740.2	10,109.2	6,561.5	72.1	71.0	71.52	3,598.9	-111.4	563.7	428.1	135.50	4.160	
10,400.0	6,739.7	10,209.2	6,560.5	73.9	72.9	71.47	3,698.9	-111.4	563.8	424.7	139.07	4.054	
10,500.0	6,739.2	10,309.2	6,559.6	75.8	74.8	71.43	3,798.9	-111.4	564.0	421.3	142.63	3.954	
10,600.0	6,738.8	10,409.2	6,558.6	77.7	76.7	71.38	3,898.9	-111.4	564.1	417.9	146.20	3.858	
10,700.0	6,738.3	10,509.2	6,557.7	79.5	78.6	71.33	3,998.8	-111.4	564.3	414.5	149.77	3.768	
10,800.0	6,737.8	10,609.2	6,556.7	81.4	80.4	71.28	4,098.8	-111.4	564.4	411.1	153.34	3.681	
10,900.0	6,737.3	10,709.2	6,555.7	83.3	82.3	71.24	4,198.8	-111.4	564.6	407.7	156.92	3.598	
11,000.0	6,736.9	10,809.2	6,554.8	85.2	84.2	71.19	4,298.8	-111.4	564.7	404.3	160.49	3.519	
11,100.0	6,736.4	10,909.2	6,553.8	87.0	86.1	71.14	4,398.8	-111.4	564.9	400.8	164.06	3.443	
11,184.1	6,736.0	10,993.3	6,553.0	88.6	87.7	71.10	4,482.9	-111.4	565.0	398.0	167.07	3.382 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	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	39.47	47.4	39.0	61.4					
100.0	100.0	100.0	100.0	0.1	0.1	39.47	47.4	39.0	61.4	61.1	0.22	272.973		
200.0	200.0	200.0	200.0	0.3	0.3	39.47	47.4	39.0	61.4	60.7	0.67	90.991		
300.0	300.0	300.0	300.0	0.6	0.6	39.47	47.4	39.0	61.4	60.2	1.12	54.595		
400.0	400.0	400.0	400.0	0.8	0.8	39.47	47.4	39.0	61.4	59.8	1.57	38.996		
500.0	500.0	500.0	500.0	1.0	1.0	39.47	47.4	39.0	61.4	59.3	2.02	30.330		
600.0	600.0	600.0	600.0	1.2	1.2	39.47	47.4	39.0	61.4	58.9	2.47	24.816		
700.0	700.0	700.0	700.0	1.5	1.5	39.47	47.4	39.0	61.4	58.4	2.92	20.998		
800.0	800.0	800.0	800.0	1.7	1.7	39.47	47.4	39.0	61.4	58.0	3.37	18.198		
900.0	900.0	900.0	900.0	1.9	1.9	39.47	47.4	39.0	61.4	57.5	3.82	16.057		
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	39.47	47.4	39.0	61.4	57.1	4.27	14.367 CC, ES		
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.4	149.17	47.4	39.0	62.1	57.4	4.70	13.209		
1,200.0	1,200.0	1,200.0	1,200.0	2.5	2.6	150.35	47.4	39.0	64.4	59.2	5.12	12.576		
1,300.0	1,299.9	1,299.9	1,299.9	2.7	2.8	152.15	47.4	39.0	68.2	62.7	5.54	12.311		
1,400.0	1,399.7	1,399.7	1,399.7	2.9	3.0	154.34	47.4	39.0	73.6	67.7	5.96	12.349		
1,500.0	1,499.4	1,499.4	1,499.4	3.2	3.3	156.72	47.4	39.0	80.8	74.4	6.39	12.643		
1,600.0	1,598.9	1,598.9	1,598.9	3.4	3.5	159.11	47.4	39.0	89.7	82.9	6.82	13.153		
1,700.0	1,698.3	1,698.3	1,698.3	3.7	3.7	161.38	47.4	39.0	100.3	93.1	7.25	13.846		
1,800.0	1,797.4	1,797.4	1,797.4	3.9	3.9	163.46	47.4	39.0	112.8	105.1	7.68	14.694		
1,900.0	1,896.3	1,896.3	1,896.3	4.2	4.1	165.32	47.4	39.0	127.0	118.9	8.11	15.673		
2,000.0	1,994.9	1,994.9	1,994.9	4.5	4.4	166.96	47.4	39.0	143.1	134.6	8.54	16.764		
2,100.0	2,093.4	2,093.8	2,093.8	4.9	4.6	168.65	46.6	39.3	160.1	151.2	8.95	17.881		
2,200.0	2,191.8	2,192.5	2,192.5	5.2	4.7	170.57	44.4	40.2	177.1	167.7	9.35	18.933		
2,300.0	2,290.3	2,291.2	2,291.0	5.6	4.9	172.66	40.5	41.8	194.0	184.3	9.75	19.894		
2,400.0	2,388.7	2,389.6	2,389.3	5.9	5.1	174.87	35.1	44.0	211.1	201.0	10.16	20.776		
2,500.0	2,487.2	2,487.8	2,487.2	6.3	5.3	177.17	28.1	46.8	228.5	217.9	10.58	21.595		
2,600.0	2,585.6	2,585.6	2,584.6	6.7	5.5	179.54	19.7	50.3	246.3	235.2	11.01	22.359		
2,700.0	2,684.1	2,683.1	2,681.5	7.0	5.7	-178.06	9.7	54.3	264.5	253.0	11.46	23.077		
2,800.0	2,782.5	2,780.1	2,777.7	7.4	5.9	-175.64	-1.8	59.0	283.3	271.4	11.93	23.753		
2,900.0	2,881.0	2,876.7	2,873.3	7.8	6.1	-173.22	-14.7	64.2	302.8	290.4	12.42	24.392		
3,000.0	2,979.4	2,972.7	2,968.1	8.2	6.4	-170.82	-29.0	70.0	323.2	310.3	12.93	25.000		
3,100.0	3,077.9	3,069.1	3,062.9	8.6	6.6	-168.47	-44.5	76.3	344.3	330.9	13.46	25.575		
3,200.0	3,176.3	3,165.8	3,158.2	9.0	6.9	-166.36	-60.3	82.7	366.0	352.0	14.02	26.109		
3,300.0	3,274.8	3,262.6	3,253.4	9.4	7.2	-164.49	-76.0	89.1	388.2	373.6	14.59	26.607		
3,400.0	3,373.2	3,359.4	3,348.7	9.8	7.5	-162.82	-91.8	95.5	410.7	395.5	15.17	27.070		
3,500.0	3,471.7	3,456.1	3,444.0	10.2	7.8	-161.32	-107.5	101.9	433.5	417.7	15.76	27.502		
3,600.0	3,570.1	3,552.9	3,539.2	10.5	8.1	-159.97	-123.3	108.3	456.5	440.1	16.36	27.904		
3,700.0	3,668.6	3,649.7	3,634.5	10.9	8.5	-158.75	-139.0	114.7	479.8	462.8	16.97	28.278		
3,800.0	3,767.0	3,746.4	3,729.7	11.3	8.8	-157.64	-154.8	121.1	503.2	485.7	17.58	28.629		
3,900.0	3,865.5	3,843.2	3,825.0	11.7	9.1	-156.63	-170.5	127.5	526.8	508.7	18.19	28.956		
4,000.0	3,963.9	3,942.2	3,922.5	12.1	9.5	-155.69	-186.5	134.0	550.6	531.7	18.82	29.261		
4,100.0	4,062.4	4,049.0	4,028.1	12.5	9.8	-155.03	-201.2	140.0	573.2	553.8	19.41	29.524		
4,200.0	4,160.8	4,156.9	4,135.3	12.9	10.1	-154.77	-212.3	144.5	594.2	574.2	19.97	29.748		
4,300.0	4,259.3	4,265.6	4,243.8	13.3	10.3	-154.87	-219.7	147.5	613.5	593.0	20.50	29.923		
4,400.0	4,357.7	4,374.9	4,353.0	13.7	10.5	-155.30	-223.3	149.0	631.0	610.1	20.99	30.059		
4,500.0	4,456.2	4,478.1	4,456.2	14.1	10.7	-155.95	-223.6	149.1	647.2	625.8	21.45	30.180		
4,600.0	4,554.6	4,576.5	4,554.6	14.5	10.9	-156.57	-223.6	149.1	663.3	641.4	21.89	30.307		
4,700.0	4,653.0	4,675.0	4,653.0	15.0	11.1	-157.15	-223.6	149.1	679.5	657.2	22.33	30.431		
4,800.0	4,751.5	4,773.4	4,751.5	15.4	11.3	-157.71	-223.6	149.1	695.7	673.0	22.77	30.553		
4,900.0	4,849.9	4,871.9	4,849.9	15.8	11.5	-158.25	-223.6	149.1	712.0	688.8	23.21	30.673		
5,000.0	4,948.4	4,970.3	4,948.4	16.2	11.6	-158.76	-223.6	149.1	728.4	704.7	23.66	30.790		

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-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 ft
Survey Program: 0-MWD													Offset Well Error:	0.0 ft
Reference														
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	
5,100.0	5,046.8	5,068.8	5,046.8	16.6	11.8	-159.25	-223.6	149.1	744.8	720.7	24.10	30.905		
5,200.0	5,145.4	5,167.3	5,145.4	16.9	12.0	-159.76	-223.6	149.1	760.9	736.3	24.56	30.982		
5,300.0	5,244.4	5,266.3	5,244.4	17.2	12.2	-160.21	-223.6	149.1	774.2	749.2	24.99	30.982		
5,400.0	5,343.8	5,365.7	5,343.8	17.4	12.4	-160.54	-223.6	149.1	784.3	758.9	25.39	30.885		
5,500.0	5,443.5	5,465.4	5,443.5	17.6	12.6	-160.76	-223.6	149.1	791.1	765.3	25.77	30.695		
5,600.0	5,543.4	5,565.4	5,543.4	17.8	12.8	-160.87	-223.6	149.1	794.6	768.5	26.12	30.416		
5,700.0	5,643.4	5,665.4	5,643.4	17.9	13.0	89.83	-223.6	149.1	795.1	768.6	26.48	30.028		
5,800.0	5,743.4	5,765.4	5,743.4	18.1	13.2	89.83	-223.6	149.1	795.1	768.3	26.85	29.608		
5,900.0	5,843.4	5,865.4	5,843.4	18.2	13.4	89.83	-223.6	149.1	795.1	767.9	27.23	29.197		
6,000.0	5,943.4	5,965.4	5,943.4	18.3	13.6	89.83	-223.6	149.1	795.1	767.5	27.61	28.796		
6,100.0	6,043.4	6,065.2	6,043.2	18.5	13.8	89.83	-221.0	149.1	795.1	767.1	27.96	28.433		
6,200.0	6,142.2	6,164.9	6,141.7	18.6	13.9	89.83	-206.4	149.1	795.1	766.9	28.20	28.196		
6,300.0	6,238.3	6,264.6	6,237.5	18.6	14.0	89.84	-179.0	149.1	795.1	766.8	28.33	28.064		
6,400.0	6,329.9	6,364.3	6,328.9	18.7	14.0	89.85	-139.4	149.1	795.1	766.7	28.41	27.985		
6,500.0	6,415.6	6,464.0	6,414.5	18.7	14.0	89.86	-88.2	149.1	795.1	766.6	28.51	27.889		
6,600.0	6,493.8	6,563.8	6,492.6	18.7	14.1	89.87	-26.4	149.1	795.1	766.4	28.71	27.697		
6,700.0	6,563.2	6,663.6	6,562.1	18.7	14.2	89.89	45.2	149.1	795.1	766.0	29.09	27.329		
6,800.0	6,622.7	6,763.4	6,621.6	18.8	14.5	89.91	125.2	149.1	795.1	765.4	29.75	26.725		
6,900.0	6,671.2	6,863.2	6,670.2	19.0	15.0	89.93	212.3	149.1	795.1	764.4	30.74	25.865		
7,000.0	6,707.8	6,963.1	6,707.1	19.3	15.6	89.95	305.1	149.1	795.1	763.0	32.09	24.777		
7,100.0	6,732.0	7,063.0	6,731.6	19.8	16.5	89.97	401.9	149.1	795.1	761.3	33.80	23.527		
7,200.0	6,744.5	7,163.0	6,744.3	20.6	17.5	89.98	501.0	149.1	795.1	759.3	35.83	22.194		
7,205.0	6,745.1	7,168.0	6,744.8	20.6	17.6	89.98	506.0	149.1	795.1	759.2	35.94	22.126		
7,300.0	6,752.9	7,263.0	6,752.8	21.5	18.7	89.99	600.6	149.1	795.1	757.0	38.12	20.856		
7,378.2	6,754.9	7,341.2	6,753.9	22.4	19.6	89.93	678.8	149.1	795.1	755.0	40.07	19.841		
7,400.0	6,753.8	7,363.0	6,753.8	22.6	19.9	90.00	700.6	149.1	795.1	754.5	40.63	19.567		
7,500.0	6,753.4	7,463.0	6,753.4	23.9	21.3	90.00	800.6	149.1	795.1	751.8	43.35	18.343		
7,600.0	6,752.9	7,563.0	6,752.9	25.2	22.7	90.00	900.6	149.1	795.1	748.9	46.21	17.205		
7,700.0	6,752.4	7,663.0	6,752.4	26.6	24.2	90.00	1,000.6	149.1	795.1	745.9	49.21	16.156		
7,800.0	6,751.9	7,763.0	6,751.9	28.1	25.8	90.00	1,100.6	149.1	795.1	742.8	52.33	15.195		
7,900.0	6,751.5	7,863.0	6,751.5	29.6	27.4	90.00	1,200.6	149.1	795.1	739.6	55.53	14.319		
8,000.0	6,751.0	7,963.0	6,751.0	31.2	29.0	90.00	1,300.6	149.1	795.1	736.3	58.81	13.520		
8,100.0	6,750.5	8,063.0	6,750.5	32.8	30.7	90.00	1,400.6	149.1	795.1	733.0	62.15	12.793		
8,200.0	6,750.1	8,163.0	6,750.1	34.4	32.4	90.00	1,500.6	149.1	795.1	729.6	65.55	12.130		
8,300.0	6,749.6	8,263.0	6,749.6	36.1	34.1	90.00	1,600.6	149.1	795.1	726.1	69.00	11.524		
8,400.0	6,749.1	8,363.0	6,749.1	37.8	35.9	90.00	1,700.6	149.1	795.1	722.6	72.48	10.970		
8,500.0	6,748.6	8,463.0	6,748.6	39.5	37.6	90.00	1,800.6	149.1	795.1	719.1	76.00	10.462		
8,600.0	6,748.2	8,563.0	6,748.2	41.2	39.4	90.00	1,900.6	149.1	795.1	715.6	79.55	9.995		
8,700.0	6,747.7	8,663.0	6,747.7	42.9	41.2	90.00	2,000.6	149.1	795.1	712.0	83.12	9.565		
8,800.0	6,747.2	8,763.0	6,747.2	44.7	43.0	90.00	2,100.6	149.1	795.1	708.4	86.72	9.169		
8,900.0	6,746.8	8,863.0	6,746.8	46.5	44.8	90.00	2,200.6	149.1	795.1	704.8	90.34	8.801		
9,000.0	6,746.3	8,963.0	6,746.3	48.3	46.6	90.00	2,300.6	149.1	795.1	701.1	93.97	8.461		
9,100.0	6,745.8	9,063.0	6,745.8	50.0	48.5	90.00	2,400.6	149.1	795.1	697.5	97.62	8.144		
9,200.0	6,745.3	9,163.0	6,745.3	51.8	50.3	90.00	2,500.6	149.1	795.1	693.8	101.29	7.850		
9,300.0	6,744.9	9,263.0	6,744.9	53.7	52.2	90.00	2,600.6	149.1	795.1	690.1	104.97	7.575		
9,400.0	6,744.4	9,363.0	6,744.4	55.5	54.0	90.00	2,700.6	149.1	795.1	686.4	108.66	7.318		
9,500.0	6,743.9	9,463.0	6,743.9	57.3	55.8	90.00	2,800.6	149.1	795.1	682.7	112.36	7.077		
9,600.0	6,743.5	9,563.0	6,743.5	59.1	57.7	90.00	2,900.6	149.1	795.1	679.0	116.07	6.851		
9,700.0	6,743.0	9,663.0	6,743.0	61.0	59.6	90.00	3,000.6	149.1	795.1	675.3	119.78	6.638		
9,800.0	6,742.5	9,763.0	6,742.5	62.8	61.4	90.00	3,100.6	149.1	795.1	671.6	123.51	6.438		
9,900.0	6,742.1	9,863.0	6,742.1	64.6	63.3	90.00	3,200.6	149.1	795.1	667.9	127.24	6.249		

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-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Offset Design Ledford 22Y-HZ Pad Sec.22-T5N-R64W - Ledford 22Y-401 - Wellbore #1 - Plan #1 (2-25-14)												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
10,000.0	6,741.6	9,963.0	6,741.6	66.5	65.2	90.00	3,300.6	149.1	795.1	664.1	130.98	6.071	
10,100.0	6,741.1	10,063.0	6,741.1	68.3	67.0	90.00	3,400.6	149.1	795.1	660.4	134.72	5.902	
10,200.0	6,740.6	10,163.0	6,740.6	70.2	68.9	90.00	3,500.6	149.1	795.1	656.6	138.47	5.742	
10,300.0	6,740.2	10,263.0	6,740.2	72.1	70.8	90.00	3,600.6	149.1	795.1	652.9	142.22	5.591	
10,400.0	6,739.7	10,363.0	6,739.7	73.9	72.7	90.00	3,700.6	149.1	795.1	649.1	145.98	5.447	
10,500.0	6,739.2	10,463.0	6,739.2	75.8	74.6	90.00	3,800.6	149.1	795.1	645.4	149.74	5.310	
10,600.0	6,738.8	10,563.0	6,738.8	77.7	76.4	90.00	3,900.6	149.1	795.1	641.6	153.51	5.180	
10,700.0	6,738.3	10,663.0	6,738.3	79.5	78.3	90.00	4,000.6	149.1	795.1	637.8	157.28	5.055	
10,800.0	6,737.8	10,763.0	6,737.8	81.4	80.2	90.00	4,100.6	149.1	795.1	634.1	161.05	4.937	
10,900.0	6,737.3	10,863.0	6,737.3	83.3	82.1	90.00	4,200.6	149.1	795.1	630.3	164.83	4.824	
11,000.0	6,736.9	10,963.0	6,736.9	85.2	84.0	90.00	4,300.6	149.1	795.1	626.5	168.61	4.716	
11,100.0	6,736.4	11,063.0	6,736.4	87.0	85.9	90.00	4,400.6	149.1	795.1	622.7	172.39	4.612	
11,150.5	6,736.2	11,113.5	6,736.2	88.0	86.8	90.00	4,451.1	149.1	795.1	620.8	174.30	4.562	
11,184.1	6,736.0	11,147.1	6,736.0	88.6	87.5	90.00	4,484.7	149.1	795.1	619.5	175.57	4.529 SF	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	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			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
9,500.0	6,743.9	6,841.7	6,751.0	57.3	20.9	-91.93	3,677.2	-978.2	937.5	863.5	74.00	12.668	
9,600.0	6,743.5	6,841.7	6,751.0	59.1	20.9	-91.94	3,677.2	-978.2	844.7	768.9	75.85	11.136	
9,700.0	6,743.0	6,841.8	6,751.1	61.0	20.9	-91.95	3,677.2	-978.2	753.8	676.1	77.71	9.700	
9,800.0	6,742.5	6,841.8	6,751.1	62.8	20.9	-91.96	3,677.2	-978.2	665.5	585.9	79.57	8.364	
9,900.0	6,742.1	6,841.9	6,751.2	64.6	20.9	-91.96	3,677.2	-978.2	581.0	499.6	81.43	7.135	
10,000.0	6,741.6	6,842.0	6,751.3	66.5	20.9	-91.97	3,677.2	-978.2	502.3	419.0	83.29	6.030	
10,100.0	6,741.1	6,842.0	6,751.3	68.3	20.9	-91.98	3,677.2	-978.2	432.4	347.2	85.16	5.077	
10,200.0	6,740.6	6,842.1	6,751.4	70.2	20.9	-91.99	3,677.2	-978.2	376.4	289.3	87.04	4.324	
10,300.0	6,740.2	6,842.1	6,751.4	72.1	20.9	-92.00	3,677.2	-978.2	341.1	252.2	88.91	3.836	
10,376.6	6,739.8	6,842.2	6,751.5	73.5	20.9	-92.01	3,677.2	-978.2	332.4	242.0	90.35	3.679 CC, ES	
10,400.0	6,739.7	6,842.2	6,751.5	73.9	20.9	-92.01	3,677.2	-978.2	333.2	242.4	90.79	3.670 SF	
10,500.0	6,739.2	6,842.2	6,751.5	75.8	20.9	-92.02	3,677.2	-978.2	354.5	261.9	92.66	3.826	
10,600.0	6,738.8	6,842.3	6,751.6	77.7	20.9	-92.03	3,677.2	-978.2	400.5	305.9	94.55	4.236	
10,700.0	6,738.3	6,842.3	6,751.6	79.5	20.9	-92.04	3,677.2	-978.2	463.8	367.3	96.43	4.809	
10,800.0	6,737.8	6,842.4	6,751.7	81.4	20.9	-92.05	3,677.2	-978.2	538.3	440.0	98.31	5.475	
10,900.0	6,737.3	6,842.4	6,751.7	83.3	20.9	-92.05	3,677.2	-978.1	620.0	519.8	100.20	6.188	
11,000.0	6,736.9	6,842.5	6,751.8	85.2	20.9	-92.06	3,677.2	-978.1	706.5	604.4	102.08	6.921	
11,100.0	6,736.4	6,842.5	6,751.8	87.0	20.9	-92.07	3,677.2	-978.1	796.1	692.2	103.97	7.657	
11,184.1	6,736.0	6,842.6	6,751.9	88.6	20.9	-92.08	3,677.2	-978.1	873.3	767.7	105.56	8.272	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	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	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)			
8,200.0	6,750.1	6,874.1	6,755.8	34.4	22.5	-91.73	2,427.4	-981.3	985.6	933.0	52.66	18.717		
8,300.0	6,749.6	6,872.9	6,754.6	36.1	22.5	-91.52	2,427.4	-981.3	892.2	837.9	54.38	16.406		
8,400.0	6,749.1	6,871.7	6,753.4	37.8	22.5	-91.31	2,427.4	-981.3	800.5	744.3	56.13	14.261		
8,500.0	6,748.6	6,870.4	6,752.1	39.5	22.5	-91.10	2,427.5	-981.3	710.9	653.0	57.89	12.280		
8,600.0	6,748.2	6,869.2	6,750.9	41.2	22.5	-90.89	2,427.5	-981.3	624.5	564.8	59.67	10.467		
8,700.0	6,747.7	6,868.0	6,749.6	42.9	22.5	-90.68	2,427.5	-981.3	542.8	481.3	61.45	8.833		
8,800.0	6,747.2	6,866.7	6,748.4	44.7	22.5	-90.46	2,427.5	-981.3	468.3	405.0	63.25	7.403		
8,900.0	6,746.8	6,865.5	6,747.2	46.5	22.5	-90.25	2,427.5	-981.3	404.8	339.8	65.06	6.222		
9,000.0	6,746.3	6,864.2	6,745.9	48.3	22.5	-90.04	2,427.5	-981.3	358.5	291.6	66.88	5.360		
9,100.0	6,745.8	6,863.0	6,744.7	50.0	22.5	-89.83	2,427.5	-981.3	336.3	267.6	68.70	4.896		
9,126.9	6,745.7	6,862.6	6,744.3	50.5	22.5	-89.77	2,427.5	-981.3	335.3	266.1	69.20	4.845 CC, ES, SF		
9,200.0	6,745.3	6,861.7	6,743.4	51.8	22.5	-89.61	2,427.5	-981.2	343.1	272.6	70.53	4.865		
9,300.0	6,744.9	6,860.5	6,742.2	53.7	22.5	-89.40	2,427.5	-981.2	377.3	304.9	72.37	5.213		
9,400.0	6,744.4	6,859.2	6,740.9	55.5	22.5	-89.19	2,427.5	-981.2	432.4	358.2	74.21	5.826		
9,500.0	6,743.9	6,858.0	6,739.7	57.3	22.5	-88.98	2,427.6	-981.2	501.6	425.5	76.05	6.595		
9,600.0	6,743.5	6,856.8	6,738.5	59.1	22.5	-88.77	2,427.6	-981.2	579.8	501.9	77.90	7.442		
9,700.0	6,743.0	6,855.6	6,737.3	61.0	22.5	-88.56	2,427.6	-981.2	663.9	584.1	79.76	8.324		
9,800.0	6,742.5	6,854.4	6,736.1	62.8	22.5	-88.35	2,427.6	-981.2	751.9	670.3	81.61	9.213		
9,900.0	6,742.1	6,853.2	6,734.9	64.6	22.5	-88.15	2,427.6	-981.2	842.6	759.1	83.47	10.095		
10,000.0	6,741.6	6,852.0	6,733.7	66.5	22.5	-87.95	2,427.6	-981.2	935.2	849.8	85.33	10.960		

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Ledford 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
Reference Site:	Ledford 22Y-HZ Pad Sec.22-T5N-R64W	MD Reference:	WELL @ 4613.0ft (RKB - 15')
Site Error:	0.0ft	North Reference:	True
Reference Well:	Ledford 22T-421	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0ft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	landmark
Reference Design:	Plan #1 (2-25-14)	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 4613.0ft (RKB - 15')

Offset Depths are relative to Offset Datum

Central Meridian is -105.500000 °

Coordinates are relative to: Ledford 22T-421

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 22T-421
Project:	SEC.22-T5N-R64W	TVD Reference:	WELL @ 4613.0ft (RKB - 15')
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