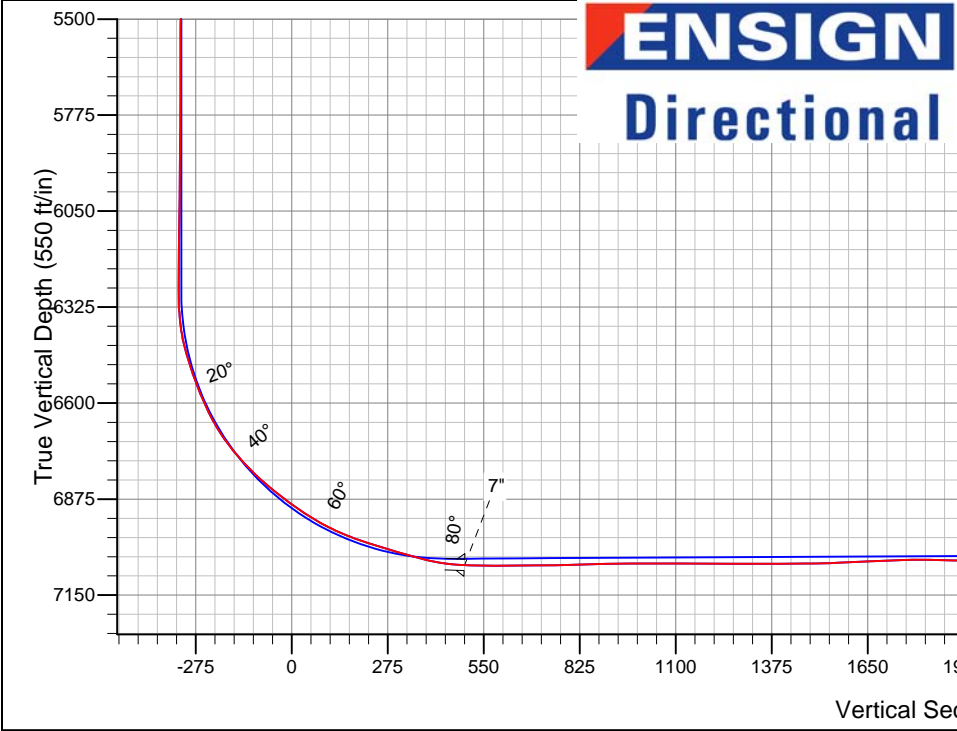
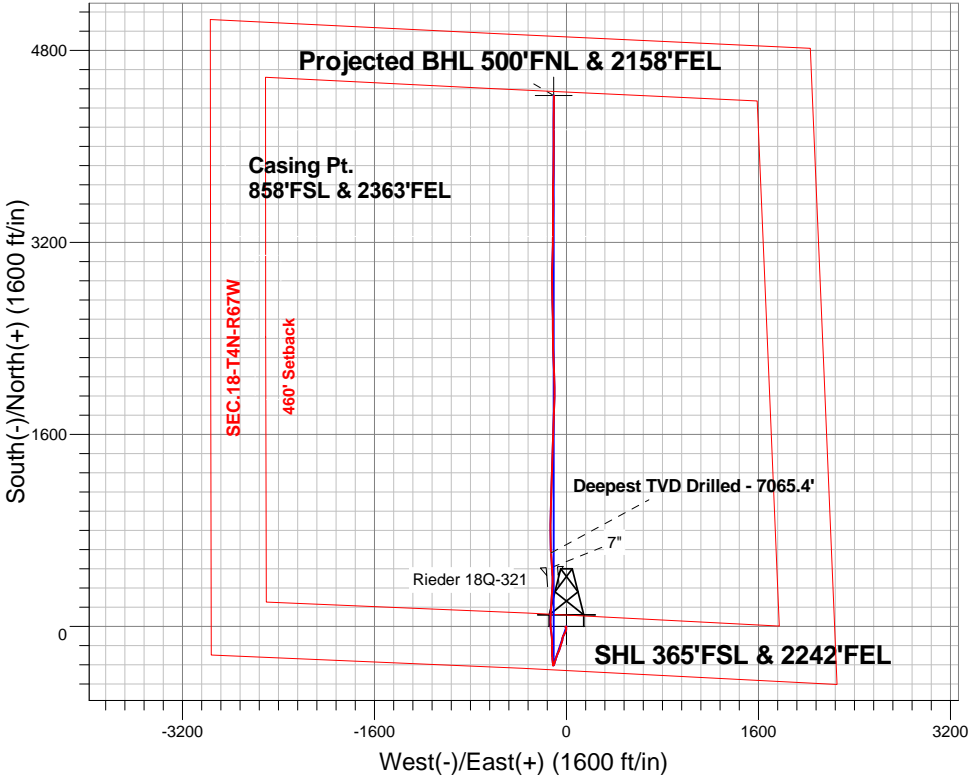


PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: <b>Rieder 18Q-321</b>						
Surface Location: Rieder 4N67W18Q Pad Sec.18-T4N-R67W						
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone						
Ground Elevation: 4812.0						
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1355266.48	3158651.95	40.307210	-104.931130	
Ensign Rig #134 RKB - 13' WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')						


FINAL SURVEY


Projected Bottom Hole Location  
11482'MD 7019'TVD 4422'N & 104'W of SHL  
91.2 degree Incl @ .70 degree AZM




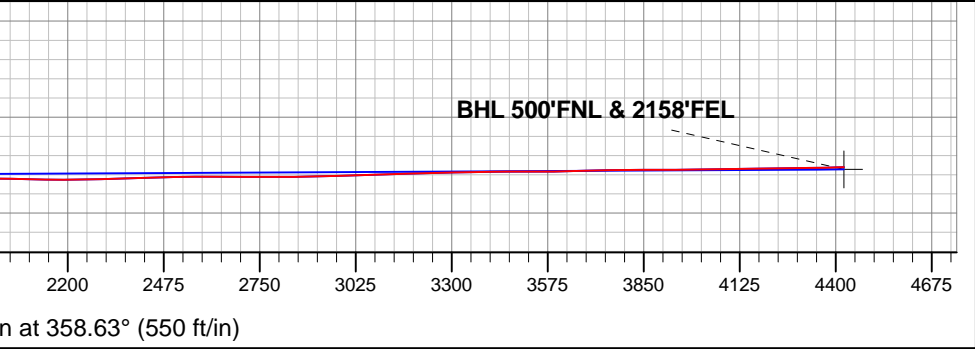
Rieder 4N67W18Q Pad Sec.18-T4N-R67W Rieder 18Q-321 Wellbore #1	ANNOTATIONS		
	TVD 7065.4	MD 7670.0	Annotation Deepest TVD Drilled - 7065.4

LEGEND

 Rieder 18Q-321, Wellbore #1, Plan #2 (5-18-15)R V0

 Wellbore #1

 Survey #1





## **Directional**

# **PETROLEUM DEVELOPMENT CORP Weld County CO**

**SEC.18-T4N-R67W**

**Rieder 4N67W18Q Pad Sec.18-T4N-R67W**

**Rieder 18Q-321**

**Wellbore #1**

**Survey: Survey #1**

## **Standard Survey Report**

**27 May, 2015**

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Rieder 18Q-321
<b>Project:</b>	SEC.18-T4N-R67W	<b>TVD Reference:</b>	WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')
<b>Site:</b>	Rieder 4N67W18Q Pad Sec.18-T4N-R67W	<b>MD Reference:</b>	WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')
<b>Well:</b>	Rieder 18Q-321	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	EDM 2003.21 Single User Db

<b>Project</b>	SEC.18-T4N-R67W, Weld County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		Using Well Reference Point
<b>Map Zone:</b>	Colorado Northern Zone		Using geodetic scale factor

Site		Rieder 4N67W18Q Pad Sec.18-T4N-R67W			
Site Position:		Northing:	1,355,266.69ft	Latitude:	40.307210
From:	Lat/Long	Easting:	3,158,679.84ft	Longitude:	-104.931030
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.37 °

Well	Rieder 18Q-321					
Well Position	+N-S	0.0 ft	Northing:	1,355,266.48 ft	Latitude:	40.307210
	+E-W	0.0 ft	Easting:	3,158,651.95 ft	Longitude:	-104.931130
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,812.0 ft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	5/18/2015	8.42	66.81	52,652

<b>Design</b>	Wellbore #1				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	358.63	

<b>Survey Program</b>	<b>Date</b> 5/27/2015				
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
168.0	11,482.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
168.0	1.10	199.30	168.0	-1.5	-0.5	-1.5	0.65	0.65	0.00	
260.0	1.10	233.60	260.0	-2.9	-1.5	-2.8	0.71	0.00	37.28	
352.0	1.00	275.10	352.0	-3.3	-3.0	-3.3	0.82	-0.11	45.11	
444.0	0.50	260.30	444.0	-3.3	-4.2	-3.2	0.58	-0.54	-16.09	
537.0	0.90	287.00	536.9	-3.2	-5.3	-3.1	0.54	0.43	28.71	
629.0	0.30	262.80	628.9	-3.0	-6.3	-2.9	0.69	-0.65	-26.30	
722.0	0.40	265.20	721.9	-3.1	-6.8	-2.9	0.11	0.11	2.58	
814.0	0.60	271.20	813.9	-3.1	-7.6	-2.9	0.22	0.22	6.52	
875.0	1.10	264.50	874.9	-3.1	-8.5	-2.9	0.83	0.82	-10.98	
1,017.0	0.80	137.10	1,016.9	-4.0	-9.2	-3.8	1.20	-0.21	-89.72	
1,109.0	1.10	119.70	1,108.9	-4.9	-8.0	-4.7	0.45	0.33	-18.91	

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Rieder 18Q-321
<b>Project:</b>	SEC.18-T4N-R67W	<b>TVD Reference:</b>	WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')
<b>Site:</b>	Rieder 4N67W18Q Pad Sec.18-T4N-R67W	<b>MD Reference:</b>	WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')
<b>Well:</b>	Rieder 18Q-321	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	EDM 2003.21 Single User Db

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)
1,201.0	0.90	141.70	1,200.9	-5.9	-6.8	-5.7	0.47	-0.22	23.91
1,294.0	1.10	135.70	1,293.9	-7.1	-5.7	-7.0	0.24	0.22	-6.45
1,386.0	1.40	145.20	1,385.9	-8.7	-4.5	-8.6	0.40	0.33	10.33
1,479.0	0.70	139.20	1,478.8	-10.0	-3.4	-9.9	0.76	-0.75	-6.45
1,571.0	1.00	160.80	1,570.8	-11.2	-2.8	-11.1	0.47	0.33	23.48
1,663.0	1.90	193.20	1,662.8	-13.5	-2.9	-13.4	1.29	0.98	35.22
1,756.0	2.00	167.90	1,755.7	-16.5	-2.9	-16.5	0.92	0.11	-27.20
1,848.0	3.30	176.60	1,847.6	-20.8	-2.4	-20.7	1.48	1.41	9.46
1,941.0	4.20	188.20	1,940.4	-26.8	-2.7	-26.7	1.26	0.97	12.47
2,033.0	5.40	197.40	2,032.1	-34.3	-4.5	-34.1	1.55	1.30	10.00
2,126.0	6.90	205.50	2,124.6	-43.5	-8.2	-43.3	1.86	1.61	8.71
2,218.0	7.00	205.50	2,215.9	-53.5	-13.0	-53.2	0.11	0.11	0.00
2,311.0	6.70	206.30	2,308.2	-63.5	-17.9	-63.1	0.34	-0.32	0.86
2,403.0	6.90	208.60	2,399.6	-73.2	-22.9	-72.6	0.37	0.22	2.50
2,496.0	6.90	208.60	2,491.9	-83.0	-28.2	-82.3	0.00	0.00	0.00
2,591.0	6.90	189.50	2,586.3	-93.6	-31.9	-92.8	2.40	0.00	-20.11
2,687.0	5.90	188.60	2,681.7	-104.2	-33.6	-103.4	1.05	-1.04	-0.94
2,782.0	6.80	184.20	2,776.1	-114.6	-34.7	-113.8	1.08	0.95	-4.63
2,877.0	7.10	202.30	2,870.4	-125.7	-37.4	-124.7	2.32	0.32	19.05
2,972.0	7.00	199.70	2,964.7	-136.5	-41.6	-135.5	0.35	-0.11	-2.74
3,068.0	6.60	194.00	3,060.0	-147.4	-44.9	-146.3	0.82	-0.42	-5.94
3,163.0	6.10	190.70	3,154.4	-157.7	-47.1	-156.5	0.65	-0.53	-3.47
3,258.0	6.80	203.40	3,248.8	-167.8	-50.3	-166.5	1.67	0.74	13.37
3,354.0	6.40	196.30	3,344.2	-178.1	-54.1	-176.8	0.95	-0.42	-7.40
3,449.0	6.20	195.10	3,438.6	-188.2	-56.9	-186.8	0.25	-0.21	-1.26
3,544.0	7.70	203.90	3,532.9	-198.9	-60.8	-197.4	1.93	1.58	9.26
3,639.0	7.80	202.80	3,627.0	-210.7	-65.9	-209.1	0.19	0.11	-1.16
3,735.0	8.00	202.50	3,722.1	-222.9	-71.0	-221.1	0.21	0.21	-0.31
3,830.0	7.80	202.50	3,816.2	-234.9	-76.0	-233.1	0.21	-0.21	0.00
3,925.0	7.00	202.80	3,910.4	-246.2	-80.7	-244.2	0.84	-0.84	0.32
4,020.0	6.20	194.20	4,004.8	-256.6	-84.2	-254.5	1.34	-0.84	-9.05
4,116.0	5.80	196.90	4,100.3	-266.2	-86.8	-264.1	0.51	-0.42	2.81
4,211.0	6.20	200.20	4,194.8	-275.6	-90.0	-273.4	0.56	0.42	3.47
4,306.0	6.20	197.40	4,289.2	-285.3	-93.3	-283.0	0.32	0.00	-2.95
4,401.0	6.20	198.80	4,383.6	-295.1	-96.5	-292.7	0.16	0.00	1.47
4,496.0	5.80	198.30	4,478.1	-304.5	-99.7	-302.0	0.42	-0.42	-0.53
4,592.0	3.90	199.50	4,573.8	-312.2	-102.3	-309.6	1.98	-1.98	1.25
4,687.0	2.80	212.50	4,668.6	-317.2	-104.6	-314.6	1.40	-1.16	13.68
4,782.0	0.80	211.60	4,763.6	-319.7	-106.2	-317.1	2.11	-2.11	-0.95
4,877.0	0.20	291.30	4,858.6	-320.2	-106.7	-317.6	0.83	-0.63	83.89
4,972.0	0.30	293.50	4,953.6	-320.1	-107.1	-317.4	0.11	0.11	2.32
5,067.0	0.40	280.20	5,048.6	-319.9	-107.6	-317.2	0.13	0.11	-14.00
5,163.0	0.20	255.70	5,144.6	-319.9	-108.1	-317.2	0.24	-0.21	-25.52
5,258.0	0.10	194.70	5,239.6	-320.0	-108.3	-317.3	0.18	-0.11	-64.21
5,353.0	0.30	200.90	5,334.6	-320.3	-108.4	-317.6	0.21	0.21	6.53
5,448.0	0.50	261.90	5,429.6	-320.6	-108.9	-317.9	0.46	0.21	64.21
5,544.0	0.50	247.30	5,525.6	-320.8	-109.7	-318.1	0.13	0.00	-15.21
5,639.0	0.60	287.60	5,620.5	-320.8	-110.6	-318.1	0.41	0.11	42.42
5,734.0	0.50	169.40	5,715.5	-321.1	-111.0	-318.3	1.00	-0.11	-124.42
5,829.0	0.40	218.30	5,810.5	-321.8	-111.1	-319.0	0.40	-0.11	51.47
5,925.0	0.60	199.30	5,906.5	-322.5	-111.5	-319.7	0.27	0.21	-19.79
6,020.0	1.10	194.40	6,001.5	-323.8	-111.9	-321.1	0.53	0.53	-5.16
6,115.0	1.10	109.80	6,096.5	-325.0	-111.2	-322.3	1.56	0.00	-89.05

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Rieder 18Q-321
<b>Project:</b>	SEC.18-T4N-R67W	<b>TVD Reference:</b>	WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')
<b>Site:</b>	Rieder 4N67W18Q Pad Sec.18-T4N-R67W	<b>MD Reference:</b>	WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')
<b>Well:</b>	Rieder 18Q-321	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	EDM 2003.21 Single User Db

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)
6,211.0	0.80	117.60	6,192.5	-325.7	-109.8	-322.9	0.34	-0.31	8.13
6,306.0	0.60	115.10	6,287.5	-326.2	-108.7	-323.5	0.21	-0.21	-2.63
6,401.0	7.70	344.50	6,382.2	-320.2	-110.0	-317.5	8.53	7.47	-137.47
6,496.0	17.90	349.80	6,474.7	-299.7	-114.3	-296.9	10.80	10.74	5.58
6,592.0	21.40	356.60	6,565.1	-267.7	-117.9	-264.8	4.35	3.65	7.08
6,687.0	28.50	358.80	6,651.2	-227.7	-119.4	-224.7	7.54	7.47	2.32
6,782.0	38.80	1.40	6,730.2	-175.1	-119.2	-172.2	10.95	10.84	2.74
6,878.0	46.20	355.90	6,801.0	-110.4	-120.9	-107.4	8.62	7.71	-5.73
6,973.0	52.30	352.40	6,863.0	-38.8	-128.4	-35.8	7.00	6.42	-3.68
7,068.0	56.70	0.00	6,918.2	38.2	-133.3	41.4	7.99	4.63	8.00
7,164.0	65.20	3.30	6,964.7	122.0	-130.8	125.1	9.35	8.85	3.44
7,259.0	72.70	4.00	6,998.8	210.4	-125.2	213.4	7.92	7.89	0.74
7,354.0	73.10	3.50	7,026.8	301.0	-119.2	303.8	0.66	0.42	-0.53
7,450.0	76.90	359.60	7,051.6	393.7	-116.8	396.4	5.57	3.96	-4.06
7,510.0	84.40	357.00	7,061.4	452.8	-118.5	455.5	13.21	12.50	-4.33
7,550.0	87.42	355.89	7,064.2	492.6	-121.0	495.4	8.03	7.54	-2.77
7"									
7,575.0	89.30	355.20	7,064.9	517.6	-122.9	520.4	8.03	7.54	-2.76
7,670.0	90.10	357.00	7,065.4	612.3	-129.4	615.3	2.07	0.84	1.89
Deepest TVD Drilled - 7065.4'									
7,765.0	90.20	358.80	7,065.2	707.3	-132.9	710.2	1.90	0.11	1.89
7,860.0	91.70	359.60	7,063.6	802.2	-134.2	805.2	1.79	1.58	0.84
7,955.0	91.80	1.40	7,060.7	897.2	-133.4	900.1	1.90	0.11	1.89
8,050.0	90.10	2.30	7,059.1	992.1	-130.3	995.0	2.02	-1.79	0.95
8,146.0	89.30	1.20	7,059.6	1,088.1	-127.4	1,090.8	1.42	-0.83	-1.15
8,240.0	89.60	2.30	7,060.5	1,182.0	-124.5	1,184.7	1.21	0.32	1.17
8,336.0	90.50	1.70	7,060.5	1,278.0	-121.2	1,280.5	1.13	0.94	-0.63
8,431.0	90.70	2.10	7,059.5	1,372.9	-118.0	1,375.3	0.47	0.21	0.42
8,526.0	89.30	1.60	7,059.5	1,467.9	-115.0	1,470.2	1.56	-1.47	-0.53
8,621.0	93.20	1.00	7,057.4	1,562.8	-112.8	1,565.0	4.15	4.11	-0.63
8,716.0	92.30	1.90	7,052.8	1,657.6	-110.4	1,659.8	1.34	-0.95	0.95
8,811.0	91.70	2.40	7,049.5	1,752.5	-106.8	1,754.6	0.82	-0.63	0.53
8,907.0	88.50	2.60	7,049.4	1,848.4	-102.6	1,850.3	3.34	-3.33	0.21
9,002.0	89.70	0.20	7,050.8	1,943.4	-100.3	1,945.2	2.82	1.26	-2.53
9,097.0	89.00	358.60	7,051.9	2,038.4	-101.3	2,040.2	1.84	-0.74	-1.68
9,192.0	88.70	357.90	7,053.8	2,133.3	-104.2	2,135.2	0.80	-0.32	-0.74
9,287.0	91.30	357.70	7,053.8	2,228.2	-107.9	2,230.2	2.74	2.74	-0.21
9,382.0	91.20	358.40	7,051.8	2,323.1	-111.1	2,325.1	0.74	-0.11	0.74
9,478.0	92.30	359.80	7,048.8	2,419.1	-112.6	2,421.1	1.85	1.15	1.46
9,573.0	90.70	359.60	7,046.3	2,514.0	-113.1	2,516.0	1.70	-1.68	-0.21
9,668.0	89.70	358.60	7,046.0	2,609.0	-114.6	2,611.0	1.49	-1.05	-1.05
9,763.0	90.20	358.20	7,046.1	2,704.0	-117.3	2,706.0	0.67	0.53	-0.42
9,858.0	89.40	359.80	7,046.4	2,799.0	-118.9	2,801.0	1.88	-0.84	1.68
9,953.0	91.30	359.60	7,045.8	2,894.0	-119.4	2,896.0	2.01	2.00	-0.21
10,048.0	92.20	1.00	7,042.9	2,988.9	-118.9	2,990.9	1.75	0.95	1.47
10,144.0	92.10	2.10	7,039.3	3,084.8	-116.3	3,086.7	1.15	-0.10	1.15
10,239.0	91.00	1.40	7,036.8	3,179.7	-113.4	3,181.5	1.37	-1.16	-0.74
10,334.0	91.50	0.00	7,034.7	3,274.7	-112.3	3,276.4	1.56	0.53	-1.47
10,429.0	91.30	0.50	7,032.4	3,369.7	-111.8	3,371.4	0.57	-0.21	0.53
10,524.0	90.20	0.70	7,031.1	3,464.6	-110.8	3,466.3	1.18	-1.16	0.21
10,619.0	89.90	359.10	7,031.0	3,559.6	-111.0	3,561.3	1.71	-0.32	-1.68
10,715.0	91.90	0.50	7,029.5	3,655.6	-111.3	3,657.2	2.54	2.08	1.46
10,810.0	91.00	0.70	7,027.1	3,750.6	-110.4	3,752.2	0.97	-0.95	0.21

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Rieder 18Q-321
<b>Project:</b>	SEC.18-T4N-R67W	<b>TVD Reference:</b>	WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')
<b>Site:</b>	Rieder 4N67W18Q Pad Sec.18-T4N-R67W	<b>MD Reference:</b>	WELL @ 4825.0ft (Ensign Rig #134 RKB - 13')
<b>Well:</b>	Rieder 18Q-321	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	EDM 2003.21 Single User Db

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)	
10,905.0	90.10	1.60	7,026.2	3,845.6	-108.4	3,847.1	1.34	-0.95	0.95	
11,000.0	90.20	0.70	7,026.0	3,940.5	-106.5	3,942.0	0.95	0.11	-0.95	
11,095.0	91.10	359.50	7,024.9	4,035.5	-106.4	4,036.9	1.58	0.95	-1.26	
11,190.0	90.60	359.50	7,023.5	4,130.5	-107.2	4,131.9	0.53	-0.53	0.00	
11,285.0	91.10	0.70	7,022.1	4,225.5	-107.0	4,226.9	1.37	0.53	1.26	
11,381.0	90.80	1.20	7,020.5	4,321.5	-105.4	4,322.8	0.61	-0.31	0.52	
11,427.0	91.20	0.70	7,019.7	4,367.5	-104.7	4,368.7	1.39	0.87	-1.09	
11,482.0	91.20	0.70	7,018.5	4,422.4	-104.0	4,423.7	0.00	0.00	0.00	

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude	
SHL 365'FSL & 2242' - hit/miss target - Shape - Point	0.00	0.00	1.0	0.0	0.0	1,355,266.51	3,158,651.95	40.307210	-104.931130	
BHL 500'FNL & 2160' - survey hits target - survey misses by 6.8ft at 11482.0ft MD (7018.5 TVD, 4422.4 N, -104.0 E) - Point	0.00	0.00	7,025.0	4,422.7	-106.0	1,359,688.22	3,158,517.62	40.319350	-104.931510	

Casing Points							Casing Diameter (")	Hole Diameter (")
Measured Depth (ft)	Vertical Depth (ft)	Name						
7,550.0	7,064.2	7"					7	7-1/2

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment	
7,670.0	7,065.4	612.3	-129.4	Deepest TVD Drilled - 7065.4'	

Checked By: _____	Approved By: _____	Date: _____
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