

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Dillard 20T-221**

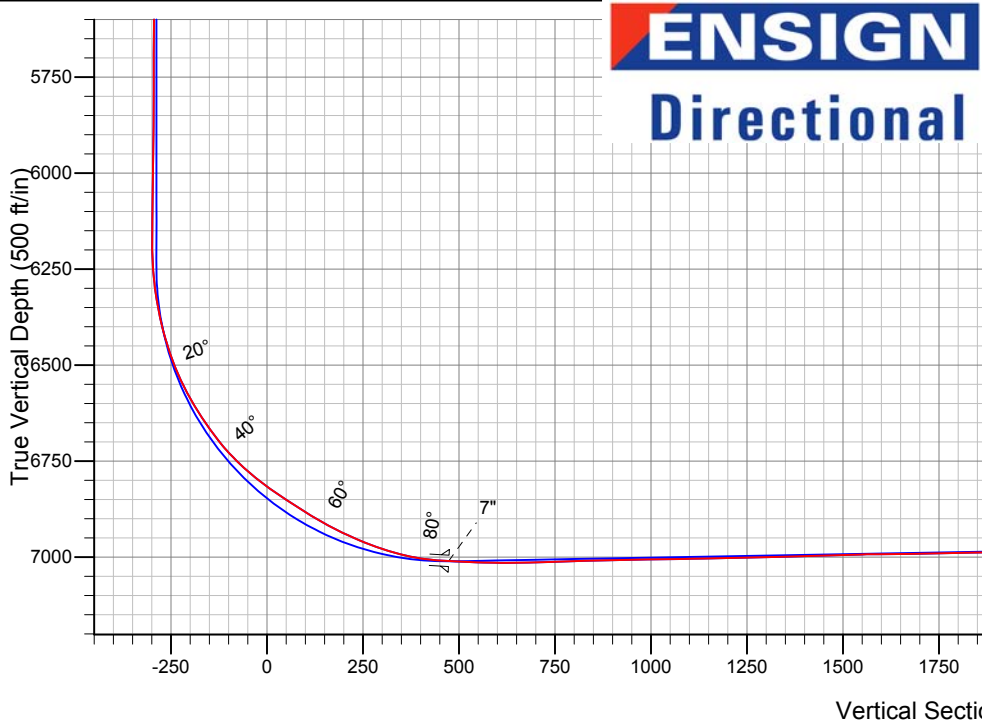
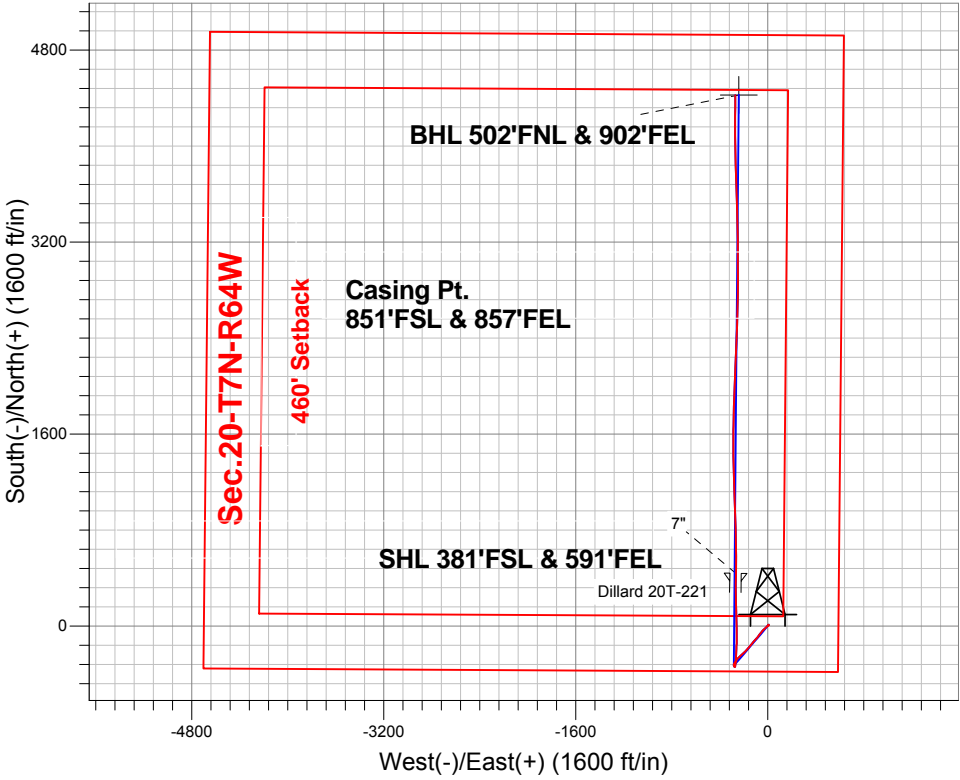
Surface Location: Dillard 20Y-HZ Pad Sec.20-T7N-R64W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

Ground Elevation: 4865.0

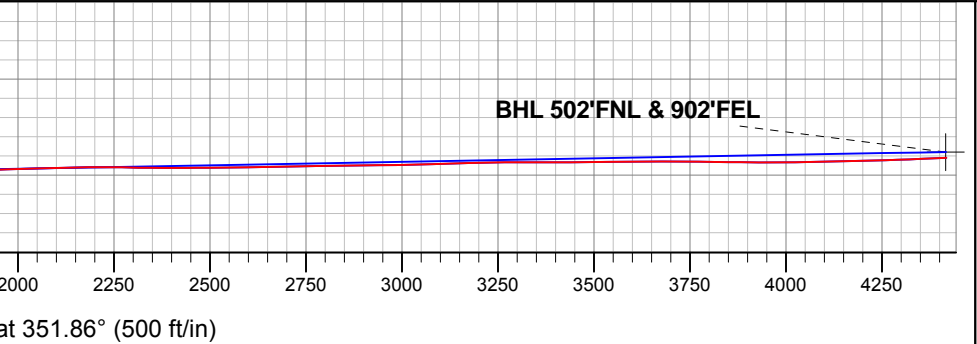
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1445348.05	3259476.22	40.552130	-104.566230	
RKB - 15' WELL @ 4880.0ft (RKB - 15')						

FINAL SURVEY

Projected Bottom Hole Location
11450'MD 6955'TVD 4424'N & 270'W
92.4 degree Incl @ 359.8 degree AZM



Dillard 20Y-HZ Pad Sec.20-T7N-R64W Dillard 20T-221 Wellbore #1 11:35, November 12 2013	ANNOTATIONS
	No annotation data is available.
LEGEND	
Dillard 20T-221, Wellbore #1, Plan #1 (10-25-13)R V0	
Wellbore #1	
Survey #1	





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.20-T7N-R64W

Dillard 20Y-HZ Pad Sec.20-T7N-R64W

Dillard 20T-221

Wellbore #1

Survey: Survey #1

Standard Survey Report

12 November, 2013

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Dillard 20T-221
Project:	SEC.20-T7N-R64W	TVD Reference:	WELL @ 4880.0ft (RKB - 15')
Site:	Dillard 20Y-HZ Pad Sec.20-T7N-R64W	MD Reference:	WELL @ 4880.0ft (RKB - 15')
Well:	Dillard 20T-221	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	SEC.20-T7N-R64W, Weld County, CO		
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	Dillard 20Y-HZ Pad Sec.20-T7N-R64W				
Site Position:		Northing:	1,445,348.38 ft	Latitude:	40.552130
From:	Lat/Long	Easting:	3,259,506.78 ft	Longitude:	-104.566120
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.60 °

Well	Dillard 20T-221					
Well Position	+N-S	0.0 ft	Northing:	1,445,348.05 ft	Latitude:	40.552130
	+E-W	0.0 ft	Easting:	3,259,476.22 ft	Longitude:	-104.566230
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,865.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/15/2012	8.58	67.16	53,082

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	351.86	

Survey Program	Date	11/12/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
146.0	11,450.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

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	
146.0	0.80	35.30	146.0	0.8	0.6	0.7	0.55	0.55	0.00	
238.0	0.80	48.00	238.0	1.8	1.4	1.6	0.19	0.00	13.80	
330.0	1.00	52.20	330.0	2.7	2.5	2.3	0.23	0.22	4.57	
422.0	1.30	37.30	422.0	4.0	3.8	3.4	0.46	0.33	-16.20	
514.0	1.30	42.10	513.9	5.6	5.1	4.8	0.12	0.00	5.22	
606.0	0.90	31.50	605.9	7.0	6.2	6.1	0.49	-0.43	-11.52	
697.0	0.80	53.40	696.9	8.0	7.1	6.9	0.37	-0.11	24.07	
788.0	0.80	16.20	787.9	9.0	7.8	7.8	0.56	0.00	-40.88	
881.0	0.80	40.20	880.9	10.1	8.4	8.8	0.36	0.00	25.81	
972.0	0.90	55.80	971.9	11.0	9.4	9.6	0.28	0.11	17.14	
1,064.0	0.90	312.40	1,063.9	11.9	9.5	10.4	1.54	0.00	-112.39	

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Site:	Dillard 20Y-HZ Pad Sec.20-T7N-R64W	MD Reference:	WELL @ 4880.0ft (RKB - 15')
Well:	Dillard 20T-221	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

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)
1,155.0	1.50	221.90	1,154.9	11.5	8.1	10.2	1.93	0.66	-99.45
1,249.0	3.30	220.30	1,248.8	8.5	5.6	7.6	1.92	1.91	-1.70
1,344.0	5.30	222.10	1,343.5	3.2	0.9	3.0	2.11	2.11	1.89
1,439.0	6.80	224.10	1,438.0	-4.1	-6.0	-3.2	1.59	1.58	2.11
1,534.0	7.10	227.10	1,532.3	-12.2	-14.2	-10.0	0.50	0.32	3.16
1,629.0	7.20	229.00	1,626.5	-20.1	-23.0	-16.6	0.27	0.11	2.00
1,724.0	7.50	228.90	1,720.8	-28.0	-32.2	-23.2	0.32	0.32	-0.11
1,819.0	7.30	222.00	1,815.0	-36.6	-40.9	-30.4	0.96	-0.21	-7.26
1,914.0	6.80	220.70	1,909.2	-45.3	-48.6	-38.0	0.55	-0.53	-1.37
2,009.0	6.10	220.50	2,003.6	-53.5	-55.5	-45.0	0.74	-0.74	-0.21
2,104.0	6.70	216.70	2,098.0	-61.7	-62.1	-52.3	0.77	0.63	-4.00
2,199.0	6.50	216.70	2,192.4	-70.5	-68.7	-60.1	0.21	-0.21	0.00
2,295.0	6.20	215.00	2,287.8	-79.1	-74.9	-67.7	0.37	-0.31	-1.77
2,389.0	6.50	217.00	2,381.3	-87.5	-81.0	-75.1	0.40	0.32	2.13
2,485.0	7.50	219.30	2,476.5	-96.7	-88.2	-83.2	1.08	1.04	2.40
2,580.0	6.60	220.40	2,570.8	-105.6	-95.7	-91.0	0.96	-0.95	1.16
2,675.0	6.70	221.10	2,665.2	-114.0	-102.9	-98.3	0.14	0.11	0.74
2,771.0	7.70	221.90	2,760.4	-123.0	-110.8	-106.0	1.05	1.04	0.83
2,866.0	7.30	220.50	2,854.6	-132.3	-119.0	-114.1	0.46	-0.42	-1.47
2,961.0	6.70	218.70	2,948.9	-141.2	-126.4	-121.9	0.67	-0.63	-1.89
3,056.0	7.40	218.30	3,043.2	-150.3	-133.7	-129.9	0.74	0.74	-0.42
3,151.0	7.60	219.40	3,137.4	-160.0	-141.4	-138.4	0.26	0.21	1.16
3,246.0	7.30	220.90	3,231.6	-169.4	-149.4	-146.6	0.38	-0.32	1.58
3,341.0	7.30	221.20	3,325.8	-178.5	-157.3	-154.4	0.04	0.00	0.32
3,436.0	7.00	221.80	3,420.1	-187.4	-165.1	-162.1	0.33	-0.32	0.63
3,531.0	5.80	221.90	3,514.5	-195.3	-172.2	-168.9	1.26	-1.26	0.11
3,626.0	6.40	226.00	3,608.9	-202.5	-179.2	-175.1	0.78	0.63	4.32
3,721.0	6.80	223.80	3,703.3	-210.3	-186.9	-181.7	0.50	0.42	-2.32
3,816.0	6.40	224.40	3,797.7	-218.1	-194.5	-188.4	0.43	-0.42	0.63
3,912.0	7.00	225.80	3,893.0	-226.0	-202.5	-195.1	0.65	0.63	1.46
4,007.0	7.80	227.00	3,987.2	-234.4	-211.3	-202.1	0.86	0.84	1.26
4,103.0	8.40	229.60	4,082.3	-243.4	-221.4	-209.6	0.73	0.63	2.71
4,198.0	9.10	225.50	4,176.2	-253.2	-232.1	-217.8	0.99	0.74	-4.32
4,293.0	9.30	225.40	4,269.9	-263.8	-242.9	-226.8	0.21	0.21	-0.11
4,388.0	9.60	220.60	4,363.6	-275.2	-253.5	-236.6	0.89	0.32	-5.05
4,483.0	8.80	212.80	4,457.4	-287.4	-262.6	-247.3	1.56	-0.84	-8.21
4,578.0	7.60	215.80	4,551.5	-298.6	-270.2	-257.3	1.34	-1.26	3.16
4,674.0	6.10	211.60	4,646.8	-308.1	-276.6	-265.8	1.65	-1.56	-4.38
4,769.0	4.90	203.90	4,741.3	-316.1	-280.9	-273.1	1.48	-1.26	-8.11
4,864.0	3.50	187.00	4,836.1	-322.7	-282.9	-279.3	1.95	-1.47	-17.79
4,959.0	1.80	167.90	4,931.0	-327.0	-282.9	-283.6	1.99	-1.79	-20.11
5,054.0	1.60	166.00	5,025.9	-329.7	-282.3	-286.4	0.22	-0.21	-2.00
5,149.0	1.50	166.30	5,120.9	-332.2	-281.7	-289.0	0.11	-0.11	0.32
5,244.0	0.50	199.80	5,215.9	-333.8	-281.5	-290.6	1.18	-1.05	35.26
5,339.0	0.40	161.70	5,310.9	-334.5	-281.6	-291.3	0.32	-0.11	-40.11
5,434.0	0.50	142.40	5,405.9	-335.2	-281.2	-292.0	0.19	0.11	-20.32
5,529.0	0.80	115.60	5,500.9	-335.8	-280.4	-292.7	0.44	0.32	-28.21
5,623.0	1.40	117.80	5,594.8	-336.6	-278.7	-293.8	0.64	0.64	2.34
5,718.0	0.80	101.40	5,689.8	-337.3	-277.1	-294.7	0.71	-0.63	-17.26
5,812.0	1.20	82.80	5,783.8	-337.3	-275.5	-294.9	0.54	0.43	-19.79
5,907.0	0.70	124.90	5,878.8	-337.5	-274.0	-295.3	0.87	-0.53	44.32
6,002.0	0.70	153.00	5,973.8	-338.4	-273.2	-296.2	0.36	0.00	29.58
6,097.0	0.90	165.90	6,068.8	-339.6	-272.8	-297.5	0.28	0.21	13.58

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

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)
6,161.0	0.80	175.00	6,132.8	-340.5	-272.6	-298.5	0.26	-0.16	14.22
6,190.0	0.70	160.30	6,161.8	-340.9	-272.6	-298.9	0.74	-0.34	-50.69
6,221.0	0.80	18.00	6,192.8	-340.9	-272.4	-298.9	4.58	0.32	-459.03
6,253.0	2.80	9.70	6,224.8	-339.9	-272.2	-297.9	6.29	6.25	-25.94
6,285.0	4.80	7.80	6,256.7	-337.8	-271.9	-295.9	6.26	6.25	-5.94
6,316.0	6.90	8.30	6,287.5	-334.7	-271.5	-292.8	6.78	6.77	1.61
6,348.0	8.90	8.60	6,319.2	-330.3	-270.8	-288.6	6.25	6.25	0.94
6,380.0	11.00	8.40	6,350.7	-324.8	-270.0	-283.3	6.56	6.56	-0.63
6,412.0	13.10	7.50	6,382.0	-318.2	-269.1	-276.9	6.59	6.56	-2.81
6,443.0	15.30	6.30	6,412.1	-310.7	-268.2	-269.6	7.16	7.10	-3.87
6,475.0	17.40	5.30	6,442.8	-301.7	-267.3	-260.8	6.62	6.56	-3.13
6,507.0	19.70	4.10	6,473.1	-291.6	-266.5	-250.9	7.29	7.19	-3.75
6,539.0	22.10	3.10	6,503.0	-280.2	-265.7	-239.7	7.58	7.50	-3.13
6,570.0	24.50	2.90	6,531.5	-267.9	-265.1	-227.7	7.75	7.74	-0.65
6,602.0	27.30	2.70	6,560.3	-254.0	-264.4	-214.0	8.75	8.75	-0.63
6,633.0	29.90	3.10	6,587.5	-239.2	-263.7	-199.4	8.41	8.39	1.29
6,665.0	32.40	2.90	6,614.9	-222.6	-262.8	-183.2	7.82	7.81	-0.63
6,697.0	34.50	3.20	6,641.6	-205.0	-261.9	-165.9	6.58	6.56	0.94
6,729.0	36.20	3.40	6,667.7	-186.5	-260.8	-147.7	5.32	5.31	0.63
6,761.0	38.20	2.80	6,693.2	-167.2	-259.7	-128.7	6.35	6.25	-1.88
6,792.0	41.20	2.00	6,717.0	-147.4	-258.9	-109.3	9.82	9.68	-2.58
6,824.0	44.60	1.10	6,740.4	-125.7	-258.3	-87.8	10.80	10.63	-2.81
6,856.0	47.60	359.90	6,762.6	-102.6	-258.1	-65.0	9.76	9.38	-3.75
6,888.0	50.10	359.70	6,783.7	-78.5	-258.2	-41.2	7.83	7.81	-0.63
6,919.0	52.50	359.10	6,803.1	-54.3	-258.5	-17.2	7.89	7.74	-1.94
6,951.0	54.80	359.10	6,822.0	-28.6	-258.9	8.4	7.19	7.19	0.00
6,982.0	56.10	359.10	6,839.6	-3.0	-259.3	33.7	4.19	4.19	0.00
7,014.0	57.10	359.20	6,857.2	23.7	-259.7	60.2	3.14	3.13	0.31
7,046.0	57.70	358.90	6,874.5	50.6	-260.1	87.0	2.03	1.88	-0.94
7,077.0	58.60	359.00	6,890.8	77.0	-260.6	113.1	2.92	2.90	0.32
7,109.0	60.40	358.20	6,907.1	104.5	-261.3	140.5	6.02	5.63	-2.50
7,141.0	62.70	358.50	6,922.3	132.7	-262.1	168.4	7.23	7.19	0.94
7,172.0	64.50	358.30	6,936.1	160.4	-262.9	196.0	5.84	5.81	-0.65
7,204.0	66.30	357.80	6,949.4	189.5	-263.9	224.9	5.80	5.63	-1.56
7,236.0	68.10	357.90	6,961.8	219.0	-265.0	254.3	5.63	5.63	0.31
7,267.0	70.40	358.40	6,972.8	247.9	-265.9	283.1	7.57	7.42	1.61
7,299.0	72.70	359.00	6,982.9	278.3	-266.6	313.2	7.40	7.19	1.88
7,330.0	75.40	359.50	6,991.4	308.1	-267.0	342.8	8.85	8.71	1.61
7,362.0	78.20	359.50	6,998.7	339.2	-267.3	373.7	8.75	8.75	0.00
7,393.0	81.70	0.10	7,004.2	369.7	-267.4	403.9	11.45	11.29	1.94
7,425.0	85.60	1.00	7,007.7	401.5	-267.1	435.3	12.50	12.19	2.81
7,464.0	86.62	0.94	7,010.3	440.4	-266.4	473.7	2.61	2.61	-0.15
7"									
7,494.0	87.40	0.90	7,011.9	470.4	-265.9	503.3	2.61	2.61	-0.14
7,524.0	87.50	0.70	7,013.2	500.4	-265.5	532.9	0.74	0.33	-0.67
7,555.0	88.50	0.80	7,014.3	531.3	-265.1	563.5	3.24	3.23	0.32
7,585.0	89.10	1.00	7,014.9	561.3	-264.6	593.2	2.11	2.00	0.67
7,615.0	90.10	0.50	7,015.2	591.3	-264.2	622.8	3.73	3.33	-1.67
7,646.0	90.90	0.60	7,014.9	622.3	-263.9	653.4	2.60	2.58	0.32
7,676.0	91.40	0.50	7,014.3	652.3	-263.6	683.1	1.70	1.67	-0.33
7,707.0	91.60	0.10	7,013.5	683.3	-263.5	713.7	1.44	0.65	-1.29
7,737.0	91.50	359.30	7,012.7	713.3	-263.6	743.4	2.69	-0.33	-2.67
7,768.0	91.60	358.30	7,011.8	744.3	-264.3	774.2	3.24	0.32	-3.23

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Site:	Dillard 20Y-HZ Pad Sec.20-T7N-R64W	MD Reference:	WELL @ 4880.0ft (RKB - 15')
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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

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)
7,798.0	92.00	358.40	7,010.9	774.3	-265.2	804.0	1.37	1.33	0.33
7,829.0	92.30	357.80	7,009.7	805.2	-266.2	834.8	2.16	0.97	-1.94
7,860.0	92.10	357.80	7,008.5	836.2	-267.4	865.6	0.65	-0.65	0.00
7,890.0	91.40	357.30	7,007.6	866.1	-268.6	895.4	2.87	-2.33	-1.67
7,920.0	91.10	357.20	7,007.0	896.1	-270.1	925.3	1.05	-1.00	-0.33
7,951.0	90.20	358.00	7,006.6	927.1	-271.4	956.1	3.88	-2.90	2.58
7,981.0	90.40	357.40	7,006.4	957.0	-272.6	986.0	2.11	0.67	-2.00
8,012.0	90.60	357.90	7,006.2	988.0	-273.9	1,016.8	1.74	0.65	1.61
8,042.0	91.00	358.10	7,005.8	1,018.0	-274.9	1,046.7	1.49	1.33	0.67
8,072.0	91.30	357.90	7,005.2	1,048.0	-276.0	1,076.5	1.20	1.00	-0.67
8,103.0	91.60	357.80	7,004.4	1,078.9	-277.1	1,107.3	1.02	0.97	-0.32
8,133.0	91.10	358.10	7,003.7	1,108.9	-278.2	1,137.1	1.94	-1.67	1.00
8,164.0	90.90	358.60	7,003.1	1,139.9	-279.1	1,167.9	1.74	-0.65	1.61
8,194.0	91.60	358.40	7,002.5	1,169.9	-279.9	1,197.7	2.43	2.33	-0.67
8,225.0	91.10	359.30	7,001.7	1,200.9	-280.5	1,228.5	3.32	-1.61	2.90
8,255.0	90.90	357.90	7,001.2	1,230.8	-281.2	1,258.3	4.71	-0.67	-4.67
8,286.0	91.40	357.90	7,000.6	1,261.8	-282.4	1,289.1	1.61	1.61	0.00
8,316.0	91.90	358.40	6,999.7	1,291.8	-283.3	1,318.9	2.36	1.67	1.67
8,347.0	91.70	359.10	6,998.8	1,322.8	-284.0	1,349.6	2.35	-0.65	2.26
8,377.0	91.60	358.80	6,997.9	1,352.7	-284.6	1,379.4	1.05	-0.33	-1.00
8,408.0	91.40	359.30	6,997.1	1,383.7	-285.1	1,410.2	1.74	-0.65	1.61
8,438.0	91.30	359.70	6,996.4	1,413.7	-285.3	1,439.9	1.37	-0.33	1.33
8,469.0	91.80	359.20	6,995.5	1,444.7	-285.6	1,470.6	2.28	1.61	-1.61
8,500.0	92.00	0.30	6,994.5	1,475.7	-285.8	1,501.3	3.60	0.65	3.55
8,530.0	91.70	359.90	6,993.5	1,505.7	-285.7	1,531.0	1.67	-1.00	-1.33
8,562.0	90.50	0.00	6,992.9	1,537.7	-285.7	1,562.6	3.76	-3.75	0.31
8,594.0	89.90	359.90	6,992.8	1,569.7	-285.8	1,594.3	1.90	-1.88	-0.31
8,626.0	90.70	0.20	6,992.6	1,601.7	-285.7	1,626.0	2.67	2.50	0.94
8,658.0	91.80	1.20	6,991.9	1,633.7	-285.3	1,657.6	4.65	3.44	3.13
8,690.0	90.50	1.00	6,991.3	1,665.6	-284.7	1,689.2	4.11	-4.06	-0.63
8,722.0	90.90	1.30	6,990.9	1,697.6	-284.1	1,720.8	1.56	1.25	0.94
8,753.0	91.20	1.30	6,990.3	1,728.6	-283.4	1,751.3	0.97	0.97	0.00
8,785.0	91.40	1.20	6,989.6	1,760.6	-282.7	1,782.9	0.70	0.63	-0.31
8,817.0	91.60	0.90	6,988.8	1,792.6	-282.1	1,814.5	1.13	0.63	-0.94
8,848.0	90.80	0.60	6,988.1	1,823.6	-281.7	1,845.1	2.76	-2.58	-0.97
8,881.0	90.60	1.00	6,987.7	1,856.6	-281.2	1,877.7	1.36	-0.61	1.21
8,913.0	91.20	1.20	6,987.2	1,888.6	-280.6	1,909.3	1.98	1.88	0.63
8,945.0	91.80	1.30	6,986.4	1,920.5	-279.9	1,940.8	1.90	1.88	0.31
8,976.0	91.60	1.40	6,985.5	1,951.5	-279.2	1,971.4	0.72	-0.65	0.32
9,008.0	92.10	2.00	6,984.4	1,983.5	-278.2	2,002.9	2.44	1.56	1.88
9,040.0	92.30	2.90	6,983.2	2,015.4	-276.9	2,034.3	2.88	0.63	2.81
9,071.0	91.60	3.30	6,982.2	2,046.4	-275.2	2,064.7	2.60	-2.26	1.29
9,103.0	91.00	3.00	6,981.4	2,078.3	-273.4	2,096.1	2.10	-1.88	-0.94
9,134.0	91.20	3.40	6,980.8	2,109.3	-271.7	2,126.5	1.44	0.65	1.29
9,166.0	91.50	2.90	6,980.1	2,141.2	-270.0	2,157.9	1.82	0.94	-1.56
9,198.0	90.60	3.10	6,979.5	2,173.2	-268.3	2,189.2	2.88	-2.81	0.63
9,230.0	89.30	3.40	6,979.5	2,205.1	-266.5	2,220.6	4.17	-4.06	0.94
9,262.0	89.10	2.50	6,980.0	2,237.1	-264.8	2,252.0	2.88	-0.63	-2.81
9,294.0	89.50	2.30	6,980.4	2,269.0	-263.5	2,283.5	1.40	1.25	-0.63
9,325.0	89.50	2.10	6,980.6	2,300.0	-262.3	2,314.0	0.65	0.00	-0.65
9,356.0	89.60	2.00	6,980.9	2,331.0	-261.2	2,344.5	0.46	0.32	-0.32
9,388.0	89.70	2.30	6,981.1	2,363.0	-260.0	2,376.0	0.99	0.31	0.94
9,420.0	90.00	2.50	6,981.2	2,394.9	-258.6	2,407.4	1.13	0.94	0.63

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Dillard 20T-221
Project:	SEC.20-T7N-R64W	TVD Reference:	WELL @ 4880.0ft (RKB - 15')
Site:	Dillard 20Y-HZ Pad Sec.20-T7N-R64W	MD Reference:	WELL @ 4880.0ft (RKB - 15')
Well:	Dillard 20T-221	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

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)
9,452.0	90.20	2.00	6,981.1	2,426.9	-257.4	2,438.9	1.68	0.63	-1.56
9,483.0	90.50	1.50	6,980.9	2,457.9	-256.4	2,469.4	1.88	0.97	-1.61
9,515.0	90.40	2.20	6,980.7	2,489.9	-255.4	2,500.9	2.21	-0.31	2.19
9,547.0	90.50	1.70	6,980.4	2,521.8	-254.3	2,532.4	1.59	0.31	-1.56
9,578.0	90.50	1.60	6,980.1	2,552.8	-253.4	2,563.0	0.32	0.00	-0.32
9,610.0	90.70	0.83	6,979.8	2,584.8	-252.7	2,594.6	2.49	0.63	-2.41
9,642.0	90.90	1.30	6,979.4	2,616.8	-252.2	2,626.2	1.60	0.63	1.47
9,673.0	91.00	1.10	6,978.8	2,647.8	-251.5	2,656.7	0.72	0.32	-0.65
9,705.0	91.10	0.80	6,978.3	2,679.8	-251.0	2,688.3	0.99	0.31	-0.94
9,737.0	91.50	0.90	6,977.5	2,711.8	-250.5	2,719.9	1.29	1.25	0.31
9,769.0	91.60	0.50	6,976.7	2,743.8	-250.1	2,751.5	1.29	0.31	-1.25
9,800.0	90.70	0.70	6,976.0	2,774.8	-249.8	2,782.2	2.97	-2.90	0.65
9,832.0	90.50	0.60	6,975.7	2,806.8	-249.4	2,813.8	0.70	-0.63	-0.31
9,863.0	90.50	0.40	6,975.4	2,837.8	-249.1	2,844.4	0.65	0.00	-0.65
9,895.0	90.50	0.30	6,975.2	2,869.8	-249.0	2,876.1	0.31	0.00	-0.31
9,927.0	90.70	0.10	6,974.8	2,901.8	-248.8	2,907.7	0.88	0.63	-0.63
9,958.0	90.80	0.20	6,974.4	2,932.7	-248.8	2,938.4	0.46	0.32	0.32
9,990.0	91.00	359.40	6,973.9	2,964.7	-248.9	2,970.1	2.58	0.63	-2.50
10,022.0	91.00	359.80	6,973.4	2,996.7	-249.1	3,001.8	1.25	0.00	1.25
10,053.0	91.10	359.80	6,972.8	3,027.7	-249.2	3,032.5	0.32	0.32	0.00
10,085.0	91.40	359.80	6,972.1	3,059.7	-249.3	3,064.2	0.94	0.94	0.00
10,116.0	91.50	359.80	6,971.3	3,090.7	-249.4	3,094.9	0.32	0.32	0.00
10,147.0	91.70	359.70	6,970.4	3,121.7	-249.6	3,125.6	0.72	0.65	-0.32
10,179.0	92.30	359.70	6,969.3	3,153.7	-249.7	3,157.3	1.88	1.88	0.00
10,211.0	91.60	359.70	6,968.2	3,185.7	-249.9	3,188.9	2.19	-2.19	0.00
10,243.0	91.30	359.70	6,967.4	3,217.7	-250.1	3,220.6	0.94	-0.94	0.00
10,274.0	90.50	359.60	6,966.9	3,248.6	-250.2	3,251.3	2.60	-2.58	-0.32
10,306.0	90.00	359.50	6,966.8	3,280.6	-250.5	3,283.1	1.59	-1.56	-0.31
10,338.0	90.00	359.00	6,966.8	3,312.6	-250.9	3,314.8	1.56	0.00	-1.56
10,370.0	90.00	359.00	6,966.8	3,344.6	-251.5	3,346.5	0.00	0.00	0.00
10,401.0	90.00	358.30	6,966.8	3,375.6	-252.2	3,377.3	2.26	0.00	-2.26
10,434.0	90.20	358.40	6,966.7	3,408.6	-253.2	3,410.1	0.68	0.61	0.30
10,465.0	90.30	358.60	6,966.6	3,439.6	-254.0	3,440.9	0.72	0.32	0.65
10,497.0	90.50	358.20	6,966.4	3,471.6	-254.9	3,472.7	1.40	0.63	-1.25
10,529.0	90.60	358.20	6,966.1	3,503.6	-255.9	3,504.5	0.31	0.31	0.00
10,560.0	90.60	357.90	6,965.7	3,534.6	-256.9	3,535.3	0.97	0.00	-0.97
10,592.0	90.80	357.80	6,965.4	3,566.5	-258.1	3,567.1	0.70	0.63	-0.31
10,624.0	90.90	357.30	6,964.9	3,598.5	-259.5	3,599.0	1.59	0.31	-1.56
10,655.0	90.30	357.90	6,964.6	3,629.5	-260.8	3,629.8	2.74	-1.94	1.94
10,687.0	89.60	358.60	6,964.6	3,661.5	-261.8	3,661.6	3.09	-2.19	2.19
10,718.0	89.60	358.30	6,964.8	3,692.4	-262.6	3,692.4	0.97	0.00	-0.97
10,751.0	89.50	358.20	6,965.1	3,725.4	-263.6	3,725.2	0.43	-0.30	-0.30
10,783.0	89.60	357.90	6,965.3	3,757.4	-264.7	3,757.0	0.99	0.31	-0.94
10,814.0	89.80	358.10	6,965.5	3,788.4	-265.8	3,787.8	0.91	0.65	0.65
10,846.0	89.50	359.10	6,965.7	3,820.4	-266.6	3,819.6	3.26	-0.94	3.13
10,877.0	89.20	358.80	6,966.0	3,851.4	-267.1	3,850.4	1.37	-0.97	-0.97
10,909.0	89.10	358.70	6,966.5	3,883.4	-267.8	3,882.1	0.44	-0.31	-0.31
10,941.0	89.10	357.70	6,967.0	3,915.3	-268.8	3,913.9	3.12	0.00	-3.13
10,972.0	89.80	358.80	6,967.3	3,946.3	-269.8	3,944.8	4.21	2.26	3.55
11,004.0	90.50	0.00	6,967.2	3,978.3	-270.1	3,976.5	4.34	2.19	3.75
11,035.0	90.80	0.00	6,966.9	4,009.3	-270.1	4,007.2	0.97	0.97	0.00
11,067.0	91.00	359.20	6,966.4	4,041.3	-270.3	4,038.9	2.58	0.63	-2.50
11,099.0	91.30	359.10	6,965.7	4,073.3	-270.8	4,070.6	0.99	0.94	-0.31
11,131.0	91.20	359.90	6,965.0	4,105.3	-271.1	4,102.3	2.52	-0.31	2.50

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Dillard 20T-221
Project:	SEC.20-T7N-R64W	TVD Reference:	WELL @ 4880.0ft (RKB - 15')
Site:	Dillard 20Y-HZ Pad Sec.20-T7N-R64W	MD Reference:	WELL @ 4880.0ft (RKB - 15')
Well:	Dillard 20T-221	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

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)
11,163.0	91.30	359.60	6,964.3	4,137.3	-271.2	4,134.0	0.99	0.31	-0.94
11,194.0	91.40	0.60	6,963.6	4,168.3	-271.2	4,164.7	3.24	0.32	3.23
11,226.0	91.30	0.50	6,962.8	4,200.3	-270.9	4,196.3	0.44	-0.31	-0.31
11,258.0	91.30	0.90	6,962.1	4,232.3	-270.5	4,227.9	1.25	0.00	1.25
11,290.0	91.80	0.70	6,961.2	4,264.2	-270.0	4,259.5	1.68	1.56	-0.63
11,321.0	91.90	0.50	6,960.2	4,295.2	-269.7	4,290.1	0.72	0.32	-0.65
11,353.0	92.20	0.50	6,959.1	4,327.2	-269.4	4,321.7	0.94	0.94	0.00
11,385.0	92.20	359.90	6,957.9	4,359.2	-269.3	4,353.4	1.87	0.00	-1.88
11,396.0	92.40	359.80	6,957.4	4,370.2	-269.3	4,364.3	2.03	1.82	-0.91
11,450.0	92.40	359.80	6,955.2	4,424.1	-269.5	4,417.7	0.00	0.00	0.00

Casing Points				
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,464.0	7,010.3	7"	7	7-1/2

Checked By: _____	Approved By: _____	Date: _____
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