

Tug-Hill Operating
 Donovan 2-10AH Rev. 3
 Barber County, Kansas
 As Drilled



Minimum of Curvature
 Slot Location: 1473127.03', 1245854.04'
 Plane of Vertical Section: 178.57°

Measured Depth Feet	BORE Inc Degrees	HOLE Direction Degrees	True Vert. Depth Up Dip In Well Path	RECTANGULAR COORDINATES		LAMBERT COORDINATES		Vertical Section Feet	CLOSURES		Dogleg Severity Deg/100'
				North(-South) Feet	East(-West) Feet	Y Feet	X Feet		Distance Feet	Direction Deg	
0.00	0.00	0.00	0.00	0.00	0.00	1473127.0	1245854.0	0.00	0.00	0.00	0.00
100.00	0.19	272.59	100.00	0.01	-0.17	1473127.0	1245853.9	-0.01	0.17	272.59	0.19
200.00	0.28	125.07	200.00	-0.13	-0.13	1473126.9	1245853.9	0.12	0.18	226.31	0.45
300.00	0.36	235.19	300.00	-0.45	-0.19	1473126.6	1245853.9	0.44	0.48	203.03	0.53
400.00	0.29	127.95	400.00	-0.78	-0.25	1473126.2	1245853.8	0.77	0.82	197.61	0.52
500.00	0.26	247.32	500.00	-1.02	-0.26	1473126.0	1245853.8	1.02	1.06	194.12	0.48
600.00	0.14	114.53	600.00	-1.16	-0.36	1473125.9	1245853.7	1.15	1.21	197.02	0.37
700.00	0.07	198.58	700.00	-1.27	-0.26	1473125.8	1245853.8	1.26	1.30	191.74	0.15
800.00	0.16	178.68	800.00	-1.47	-0.28	1473125.6	1245853.8	1.46	1.49	190.81	0.10
845.00	0.16	290.52	845.00	-1.51	-0.34	1473125.5	1245853.7	1.50	1.55	192.62	0.59
968.00	0.30	241.45	968.00	-1.60	-0.78	1473125.4	1245853.3	1.58	1.78	206.00	0.19
1060.00	0.40	272.80	1059.99	-1.70	-1.31	1473125.3	1245852.7	1.67	2.15	217.67	0.23
1152.00	0.40	255.70	1151.99	-1.77	-1.95	1473125.3	1245852.1	1.72	2.63	227.78	0.13
1244.00	0.30	263.50	1243.99	-1.87	-2.50	1473125.2	1245851.5	1.81	3.12	233.13	0.12
1336.00	0.40	286.10	1335.99	-1.81	-3.04	1473125.2	1245851.0	1.73	3.54	239.26	0.18
1428.00	0.30	249.50	1427.99	-1.81	-3.58	1473125.2	1245850.5	1.72	4.01	243.23	0.26
1519.00	0.30	239.30	1518.99	-2.01	-4.01	1473125.0	1245850.0	1.91	4.48	243.35	0.06
1612.00	0.40	196.80	1611.98	-2.45	-4.31	1473124.6	1245849.7	2.34	4.95	240.43	0.29
1704.00	0.50	162.90	1703.98	-3.14	-4.28	1473123.9	1245849.8	3.03	5.31	233.79	0.30
1795.00	0.60	164.60	1794.98	-3.98	-4.04	1473123.1	1245850.0	3.87	5.67	225.47	0.11
1888.00	0.60	162.40	1887.97	-4.91	-3.76	1473122.1	1245850.3	4.81	6.19	217.48	0.02
1983.00	0.70	166.30	1982.97	-5.95	-3.48	1473121.1	1245850.6	5.86	6.89	210.31	0.12
2077.00	0.50	108.10	2076.96	-6.63	-2.95	1473120.4	1245851.1	6.56	7.26	203.98	0.65
2172.00	0.50	95.80	2171.96	-6.80	-2.14	1473120.2	1245851.9	6.75	7.13	197.49	0.11
2267.00	0.50	92.00	2266.95	-6.86	-1.32	1473120.2	1245852.7	6.82	6.98	190.87	0.03
2361.00	0.20	97.50	2360.95	-6.89	-0.74	1473120.1	1245853.3	6.87	6.93	186.17	0.32
2456.00	0.70	103.40	2455.95	-7.05	-0.02	1473120.0	1245854.0	7.05	7.05	180.13	0.53

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				North(-South) Feet	East(-West) Feet	Y Feet	X Feet		Distance Feet	Direction Deg	
2551.00	0.90	43.90	2550.94	-6.65	1.07	1473120.4	1245855.1	6.67	6.73	170.89	0.86
2645.00	0.90	32.80	2644.93	-5.50	1.98	1473121.5	1245856.0	5.54	5.84	160.21	0.19
2740.00	0.80	33.20	2739.92	-4.31	2.75	1473122.7	1245856.8	4.38	5.11	147.53	0.11
2834.00	0.90	40.90	2833.91	-3.21	3.59	1473123.8	1245857.6	3.29	4.81	131.79	0.16
2929.00	1.00	48.30	2928.90	-2.09	4.70	1473124.9	1245858.7	2.21	5.14	114.00	0.17
3023.00	1.10	51.60	3022.88	-0.98	6.01	1473126.0	1245860.1	1.13	6.09	99.30	0.12
3118.00	0.80	31.10	3117.87	0.15	7.07	1473127.2	1245861.1	0.03	7.07	88.79	0.47
3212.00	1.00	32.40	3211.86	1.40	7.85	1473128.4	1245861.9	-1.21	7.97	79.86	0.21
3307.00	0.90	350.60	3306.84	2.84	8.17	1473129.9	1245862.2	-2.64	8.65	70.84	0.72
3401.00	1.10	4.20	3400.83	4.47	8.12	1473131.5	1245862.2	-4.26	9.27	61.17	0.33
3495.00	1.00	11.40	3494.81	6.17	8.35	1473133.2	1245862.4	-5.96	10.38	53.52	0.18
3590.00	1.10	15.00	3589.80	7.87	8.75	1473134.9	1245862.8	-7.64	11.76	48.03	0.13
3685.00	0.60	317.90	3684.79	9.12	8.65	1473136.1	1245862.7	-8.90	12.57	43.49	0.97
3779.00	0.60	343.60	3778.78	9.95	8.18	1473137.0	1245862.2	-9.75	12.88	39.42	0.28
3874.00	0.50	352.60	3873.78	10.84	7.99	1473137.9	1245862.0	-10.64	13.47	36.38	0.14
3968.00	0.20	107.00	3967.78	11.20	8.09	1473138.2	1245862.1	-10.99	13.82	35.84	0.65
4062.00	0.30	128.50	4061.78	11.00	8.44	1473138.0	1245862.5	-10.78	13.86	37.50	0.14
4156.00	0.40	100.70	4155.78	10.78	8.95	1473137.8	1245863.0	-10.56	14.02	39.70	0.21
4250.00	0.20	121.20	4249.77	10.64	9.42	1473137.7	1245863.5	-10.40	14.21	41.52	0.24
4345.00	0.10	185.60	4344.77	10.47	9.55	1473137.5	1245863.6	-10.23	14.17	42.37	0.19
4380.00	4.60	195.70	4379.74	9.09	9.17	1473136.1	1245863.2	-8.86	12.91	45.25	12.86
4412.00	9.10	197.10	4411.50	5.43	8.08	1473132.5	1245862.1	-5.23	9.73	56.07	14.07
4443.00	13.50	195.60	4441.89	-0.40	6.38	1473126.6	1245860.4	0.56	6.39	93.58	14.22
4474.00	18.60	194.30	4471.67	-8.68	4.19	1473118.3	1245858.2	8.78	9.64	154.25	16.49
4506.00	21.70	193.00	4501.71	-19.39	1.59	1473107.6	1245855.6	19.43	19.46	175.30	9.79
4537.00	24.60	189.10	4530.21	-31.35	-0.72	1473095.7	1245853.3	31.32	31.36	181.31	10.58
4569.00	27.30	186.80	4558.98	-45.22	-2.64	1473081.8	1245851.4	45.14	45.29	183.34	9.00

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				North(-South) Feet	East(-West) Feet	Y Feet	X Feet		Distance Feet	Direction Deg	
4600.00	29.20	185.60	4586.29	-59.80	-4.22	1473067.2	1245849.8	59.68	59.95	184.04	6.40
4632.00	31.30	183.20	4613.93	-75.87	-5.44	1473051.2	1245848.6	75.71	76.07	184.10	7.57
4663.00	33.20	180.20	4640.15	-92.40	-5.92	1473034.6	1245848.1	92.23	92.59	183.67	8.01
4695.00	34.70	176.70	4666.70	-110.26	-5.43	1473016.8	1245848.6	110.09	110.39	182.82	7.70
4726.00	36.20	173.10	4691.95	-128.16	-3.82	1472998.9	1245850.2	128.03	128.22	181.71	8.29
4758.00	38.00	172.10	4717.47	-147.30	-1.33	1472979.7	1245852.7	147.22	147.31	180.52	5.93
4789.00	39.60	172.50	4741.63	-166.55	1.27	1472960.5	1245855.3	166.53	166.55	179.56	5.22
4821.00	41.40	174.20	4765.97	-187.19	3.67	1472939.8	1245857.7	187.22	187.23	178.88	6.60
4852.00	43.40	175.90	4788.86	-208.01	5.47	1472919.0	1245859.5	208.09	208.09	178.49	7.44
4884.00	46.50	176.80	4811.50	-230.57	6.90	1472896.5	1245860.9	230.67	230.68	178.29	9.89
4915.00	50.90	177.10	4831.96	-253.82	8.14	1472873.2	1245862.2	253.95	253.95	178.16	14.21
4947.00	56.40	177.10	4850.92	-279.55	9.44	1472847.5	1245863.5	279.70	279.71	178.07	17.19
4978.00	61.30	178.20	4866.95	-306.05	10.52	1472821.0	1245864.6	306.22	306.23	178.03	16.10
5010.00	63.00	178.50	4881.90	-334.33	11.34	1472792.7	1245865.4	334.51	334.53	178.06	5.38
5041.00	63.40	177.70	4895.87	-361.99	12.25	1472765.0	1245866.3	362.18	362.20	178.06	2.64
5073.00	63.40	178.40	4910.20	-390.58	13.23	1472736.4	1245867.3	390.79	390.81	178.06	1.96
5104.00	63.70	177.30	4924.01	-418.32	14.27	1472708.7	1245868.3	418.55	418.56	178.05	3.32
5135.00	65.40	177.70	4937.33	-446.28	15.49	1472680.7	1245869.5	446.53	446.55	178.01	5.61
5167.00	68.30	178.70	4949.91	-475.69	16.41	1472651.3	1245870.5	475.95	475.97	178.02	9.51
5198.00	72.00	179.60	4960.44	-504.84	16.84	1472622.2	1245870.9	505.10	505.12	178.09	12.24
5230.00	75.70	180.20	4969.34	-535.57	16.89	1472591.5	1245870.9	535.82	535.84	178.19	11.70
5261.00	79.10	180.70	4976.10	-565.82	16.65	1472561.2	1245870.7	566.06	566.06	178.31	11.08
5293.00	83.00	180.90	4981.07	-597.42	16.21	1472529.6	1245870.3	597.64	597.64	178.45	12.20
5324.00	88.10	181.00	4983.48	-628.31	15.70	1472498.7	1245869.7	628.51	628.51	178.57	16.45
5355.00	91.80	180.00	4983.51	-659.30	15.43	1472467.7	1245869.5	659.48	659.48	178.66	12.36
5387.00	92.40	180.40	4982.33	-691.28	15.32	1472435.7	1245869.4	691.45	691.45	178.73	2.25
5418.00	92.70	180.10	4980.95	-722.25	15.18	1472404.8	1245869.2	722.41	722.41	178.80	1.37

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				North(-South) Feet	East(-West) Feet	Y Feet	X Feet		Distance Feet	Direction Deg	
5449.00	93.30	180.30	4979.33	-753.21	15.08	1472373.8	1245869.1	753.35	753.36	178.85	2.04
5519.00	92.00	179.80	4976.10	-823.13	15.01	1472303.9	1245869.1	823.25	823.27	178.96	1.99
5611.00	88.30	177.80	4975.85	-915.09	16.94	1472211.9	1245871.0	915.23	915.25	178.94	4.57
5702.00	87.30	177.60	4979.35	-1005.95	20.59	1472121.1	1245874.6	1006.15	1006.16	178.83	1.12
5795.00	87.90	176.80	4983.24	-1098.76	25.13	1472028.3	1245879.2	1099.04	1099.04	178.69	1.07
5886.00	87.70	176.90	4986.74	-1189.55	30.13	1471937.5	1245884.2	1189.93	1189.93	178.55	0.25
5978.00	87.20	177.70	4990.83	-1281.36	34.46	1471845.7	1245888.5	1281.82	1281.82	178.46	1.02
6071.00	88.10	177.60	4994.64	-1374.20	38.27	1471752.8	1245892.3	1374.73	1374.73	178.40	0.97
6161.00	88.20	177.90	4997.55	-1464.08	41.80	1471662.9	1245895.8	1464.67	1464.68	178.36	0.35
6255.00	88.00	177.70	5000.66	-1557.96	45.40	1471569.1	1245899.4	1558.61	1558.62	178.33	0.30
6350.00	89.70	178.60	5002.57	-1652.89	48.47	1471474.1	1245902.5	1653.58	1653.60	178.32	2.02
6444.00	89.90	178.70	5002.90	-1746.86	50.68	1471380.2	1245904.7	1747.58	1747.60	178.34	0.24
6539.00	89.20	178.40	5003.64	-1841.83	53.09	1471285.2	1245907.1	1842.58	1842.59	178.35	0.80
6633.00	89.00	178.20	5005.12	-1935.78	55.88	1471191.3	1245909.9	1936.57	1936.58	178.35	0.30
6728.00	89.60	178.40	5006.28	-2030.73	58.69	1471096.3	1245912.7	2031.56	2031.57	178.34	0.67
6822.00	89.60	180.50	5006.94	-2124.71	59.60	1471002.3	1245913.6	2125.54	2125.55	178.39	2.23
6916.00	89.90	180.10	5007.35	-2218.71	59.10	1470908.3	1245913.1	2219.50	2219.50	178.47	0.53
7011.00	89.60	180.90	5007.76	-2313.71	58.28	1470813.3	1245912.3	2314.44	2314.44	178.56	0.90
7105.00	89.70	180.50	5008.34	-2407.70	57.13	1470719.3	1245911.2	2408.37	2408.37	178.64	0.44
7199.00	89.00	180.70	5009.40	-2501.69	56.14	1470625.3	1245910.2	2502.31	2502.32	178.71	0.77
7294.00	89.20	179.60	5010.90	-2596.67	55.89	1470530.4	1245909.9	2597.26	2597.27	178.77	1.18
7388.00	89.60	178.40	5011.88	-2690.65	57.53	1470436.4	1245911.6	2691.25	2691.27	178.78	1.35
7482.00	89.60	178.40	5012.54	-2784.61	60.16	1470342.4	1245914.2	2785.25	2785.26	178.76	0.00
7577.00	90.10	178.00	5012.79	-2879.56	63.14	1470247.5	1245917.2	2880.24	2880.26	178.74	0.67
7671.00	90.40	177.70	5012.38	-2973.50	66.67	1470153.5	1245920.7	2974.23	2974.24	178.72	0.45
7766.00	88.20	178.40	5013.54	-3068.43	69.90	1470058.6	1245923.9	3069.22	3069.22	178.69	2.43
7860.00	88.50	178.00	5016.24	-3162.34	72.85	1469964.7	1245926.9	3163.18	3163.18	178.68	0.53

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7954.00	90.40	178.70	5017.14	-3256.29	75.56	1469870.7	1245929.6	3257.17	3257.17	178.67	2.15
8049.00	89.90	178.60	5016.90	-3351.27	77.80	1469775.8	1245931.8	3352.16	3352.17	178.67	0.54
8143.00	90.40	177.90	5016.65	-3445.22	80.67	1469681.8	1245934.7	3446.16	3446.17	178.66	0.92
8237.00	88.70	177.30	5017.39	-3539.13	84.60	1469587.9	1245938.6	3540.14	3540.14	178.63	1.92
8332.00	88.90	177.30	5019.38	-3634.01	89.08	1469493.0	1245943.1	3635.10	3635.10	178.60	0.21
8431.00	89.70	177.70	5020.59	-3732.90	93.40	1469394.1	1245947.4	3734.07	3734.07	178.57	0.90
8526.00	90.30	177.90	5020.59	-3827.83	97.04	1469299.2	1245951.1	3829.06	3829.06	178.55	0.67
8621.00	88.70	177.70	5021.42	-3922.76	100.69	1469204.3	1245954.7	3924.05	3924.05	178.53	1.70
8716.00	89.20	177.50	5023.16	-4017.66	104.67	1469109.4	1245958.7	4019.02	4019.02	178.51	0.57
8810.00	89.40	178.00	5024.31	-4111.58	108.36	1469015.5	1245962.4	4113.00	4113.00	178.49	0.57
8905.00	89.40	178.90	5025.30	-4206.54	110.93	1468920.5	1245965.0	4207.99	4208.00	178.49	0.95
8999.00	89.90	179.10	5025.87	-4300.52	112.57	1468826.5	1245966.6	4301.99	4301.99	178.50	0.57
9094.00	88.00	179.40	5027.62	-4395.49	113.81	1468731.5	1245967.9	4396.96	4396.96	178.52	2.02
9188.00	90.10	179.10	5029.17	-4489.46	115.04	1468637.6	1245969.1	4490.94	4490.94	178.53	2.26
9283.00	89.20	178.90	5029.75	-4584.45	116.70	1468542.6	1245970.7	4585.93	4585.93	178.54	0.97
9377.00	88.70	178.90	5031.48	-4678.41	118.50	1468448.6	1245972.5	4679.91	4679.91	178.55	0.53
9431.00	90.10	178.40	5032.04	-4732.39	119.78	1468394.6	1245973.8	4733.91	4733.91	178.55	2.75
9479.00	90.10	178.40	5031.96	-4780.38	121.12	1468346.7	1245975.2	4781.91	4781.91	178.55	0.00

Final Station Closure Distance: 4781.91' Direction: 178.55°