



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Woodford 10HU (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1235+33 @ 1268.00ft (Nabors X08)
Site:	Woodford	MD Reference:	RKB=1235+33 @ 1268.00ft (Nabors X08)
Well:	Woodford 10HU (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Project	Marshall County, West Virginia
Map System:	Universal Transverse Mercator (US Survey Feet)
Geo Datum:	NAD83 West Virginia - HARN
Map Zone:	Zone 17N (84 W to 78 W)
System Datum:	Mean Sea Level

Site	Woodford
Site Position:	Latitude: 39.80414597
From:	Longitude: -80.81199526
Position Uncertainty:	Slot Radius: 13-3/16 " Grid Convergence: 0.120 °
	Northing: 14,455,471.78 usft
	Easting: 1,693,217.70 usft
	Latitude: 39.80430488
	Longitude: -80.81194602
	Ground Level: 1,235.00 ft

Well	Woodford 10HU (J)
Well Position	+N/-S 0.00 ft Northing: 14,455,529.67 usft
	+E/-W 0.00 ft Easting: 1,693,231.41 usft
Position Uncertainty	Wellhead Elevation: 0.00 ft
	Latitude: 39.80430488
	Longitude: -80.81194602
	Ground Level: 1,235.00 ft

Wellbore	Original Hole
Magnetics	Model Name: IGRF2015 Sample Date: 9/21/2019 Declination (°): -8.691 Dip Angle (°): 66.795 Field Strength (nT): 51,933.01953187

Design	Surveys Original Hole
Audit Notes:	
Version:	1.0 Phase: ACTUAL Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (ft) +N/-S (ft) +E/-W (ft) Direction (°)
	0.00 0.00 0.00 138.932

Survey Program	Date: 10/3/2019
From (ft)	To (ft) Survey (Wellbore) Tool Name Description
218.00	800.00 MWD surf (Original Hole) MWD MWD - Standard
863.00	2,820.00 MWD int (Original Hole) MWD MWD - Standard
2,973.00	22,618.00 MWD (Original Hole) MWD MWD - Standard
22,680.00	22,680.00 Projection (Original Hole) MWD MWD - Standard

Survey	Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
	0.00	0.00	0.00	0.00	0.00	0.00	14,455,529.67	1,693,231.41	39.80430488	-80.81194602
	218.00	0.74	279.510	217.99	0.23	-1.39	14,455,529.90	1,693,230.02	39.80430553	-80.81195096
	MWD surveys									
	248.00	0.52	276.020	247.99	0.28	-1.71	14,455,529.95	1,693,229.69	39.80430566	-80.81195213
	278.00	0.43	269.010	277.99	0.29	-1.96	14,455,529.96	1,693,229.45	39.80430569	-80.81195301
	308.00	0.33	281.600	307.99	0.31	-2.16	14,455,529.98	1,693,229.25	39.80430574	-80.81195371
	338.00	0.41	290.620	337.99	0.36	-2.35	14,455,530.03	1,693,228.06	39.80430589	-80.81195437
	368.00	0.34	270.600	367.99	0.40	-2.53	14,455,530.07	1,693,228.87	39.80430600	-80.81195504
	398.00	0.43	295.910	397.99	0.45	-2.72	14,455,530.12	1,693,228.68	39.80430614	-80.81195572



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Site: Woodford
Well: Woodford 10HU (J)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference:
TVL Reference: Well Woodford 10HU (J)
MD Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
North Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
Survey Calculation Method: Grid
Database: Minimum Curvature
 DB_Aug1919_v14

Survey	Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/S (ft)	+E/W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
	428.00	0.49	284.820	427.99	0.53	-2.95	14,455,530.20	1,693,228.46	39.80430636	-80.81195652
	458.00	0.50	288.040	457.99	0.61	-3.20	14,455,530.27	1,693,228.21	39.80430656	-80.81195741
	488.00	0.49	280.870	487.99	0.67	-3.45	14,455,530.34	1,693,227.96	39.80430674	-80.81195630
	518.00	0.53	305.920	517.98	0.78	-3.69	14,455,530.44	1,693,227.72	39.80430704	-80.81195914
	549.00	0.47	322.600	548.98	0.96	-3.88	14,455,530.63	1,693,227.53	39.80430754	-80.81195983
	580.00	0.37	306.380	579.98	1.12	-4.04	14,455,530.79	1,693,227.37	39.80430799	-80.81196039
	611.00	0.58	312.090	610.98	1.29	-4.24	14,455,530.95	1,693,227.17	39.80430844	-80.81196109
	643.00	0.68	304.030	642.98	1.50	-4.51	14,455,531.17	1,693,226.90	39.80430903	-80.81196208
	674.00	0.69	312.270	673.98	1.73	-4.80	14,455,531.40	1,693,226.61	39.80430966	-80.81196311
	705.00	0.84	309.560	704.97	1.97	-5.08	14,455,531.63	1,693,226.33	39.80431031	-80.81196408
	737.00	0.83	309.760	736.97	2.23	-5.39	14,455,531.90	1,693,226.02	39.80431103	-80.81196520
	768.00	0.68	307.790	767.97	2.48	-5.71	14,455,532.15	1,693,225.70	39.80431174	-80.81196633
	800.00	0.73	313.330	799.97	2.74	-6.01	14,455,532.41	1,693,225.40	39.80431244	-80.81196739
	863.00	0.61	318.260	862.96	3.27	-6.52	14,455,532.93	1,693,224.89	39.80431389	-80.81196922
	907.00	1.16	299.050	906.96	3.66	-7.07	14,455,533.33	1,693,224.34	39.80431497	-80.81197116
	992.00	1.71	288.870	991.93	4.48	-9.02	14,455,534.15	1,693,222.39	39.80431725	-80.81197811
	1,087.00	1.13	280.740	1,086.90	5.12	-11.28	14,455,534.79	1,693,220.13	39.80431900	-80.81198615
	1,181.00	0.84	337.620	1,180.89	5.93	-12.45	14,455,535.60	1,693,218.95	39.80432123	-80.81198032
	1,276.00	1.13	55.850	1,275.88	7.10	-11.94	14,455,536.77	1,693,219.46	39.80432444	-80.81198850
	1,371.00	2.21	65.930	1,370.84	8.37	-9.50	14,455,538.04	1,693,221.91	39.80432792	-80.81197977
	1,464.00	2.97	74.560	1,463.74	9.74	-5.54	14,455,539.41	1,693,225.87	39.80433167	-80.81196566
	1,559.00	2.98	93.470	1,558.62	10.25	-0.70	14,455,539.92	1,693,230.71	39.80433303	-80.81194844
	1,654.00	2.12	114.970	1,653.52	9.36	3.36	14,455,539.03	1,693,234.77	39.80433056	-80.81193400
	1,748.00	2.79	176.860	1,747.45	6.34	5.06	14,455,536.01	1,693,236.47	39.80432226	-80.81192796
	1,842.00	2.70	186.440	1,841.34	1.85	4.94	14,455,531.52	1,693,236.35	39.80430995	-80.81192843
	1,937.00	2.15	214.930	1,936.26	-1.83	3.67	14,455,527.84	1,693,235.07	39.80429984	-80.81193298
	2,031.00	1.16	293.430	2,030.23	-2.90	1.78	14,455,526.77	1,693,233.19	39.80429691	-80.81193970
	2,125.00	2.64	3.660	2,124.19	-0.36	1.05	14,455,529.31	1,693,232.46	39.80431942	-80.81194229
	2,220.00	3.30	34.850	2,219.06	4.07	2.75	14,455,533.74	1,693,234.16	39.80431604	-80.81193620
	2,314.00	1.64	72.600	2,312.98	6.69	5.58	14,455,536.36	1,693,236.99	39.80432323	-80.81192610
	2,409.00	1.28	210.770	2,407.97	6.19	6.33	14,455,535.86	1,693,237.74	39.80432184	-80.81192342
	2,503.00	2.03	247.660	2,501.93	4.65	4.26	14,455,534.32	1,693,232.25	39.80431763	-80.81193083
	2,598.00	2.33	285.640	2,596.86	4.53	0.84	14,455,534.20	1,693,232.25	39.80431733	-80.81194299
	2,693.00	1.91	316.780	2,691.80	6.21	-2.10	14,455,535.88	1,693,229.31	39.80432194	-80.81195346
	2,787.00	1.03	4.420	2,785.77	8.19	-3.11	14,455,537.86	1,693,228.30	39.80432740	-80.81195704
	2,820.00	1.21	24.490	2,818.77	8.80	-2.94	14,455,538.47	1,693,228.47	39.80432908	-80.81195644
	2,973.00	1.35	45.180	2,971.73	11.54	-1.00	14,455,541.21	1,693,230.41	39.80433659	-80.81194948
	3,071.00	2.53	97.980	3,069.68	12.06	1.97	14,455,541.73	1,693,233.37	39.80433799	-80.81193893
	3,165.00	3.21	113.410	3,163.56	10.72	6.44	14,455,540.39	1,693,237.84	39.80433430	-80.81192303
	3,259.00	3.52	123.690	3,257.40	8.08	11.25	14,455,537.75	1,693,242.66	39.80432700	-80.81190590
	3,354.00	4.33	122.040	3,352.18	4.56	16.72	14,455,534.23	1,693,248.13	39.80431730	-80.81188646
	3,449.00	6.65	118.590	3,446.73	0.02	24.59	14,455,529.69	1,693,256.00	39.80430480	-80.81185847
	3,541.00	8.44	112.330	3,537.94	-5.09	35.51	14,455,524.58	1,693,266.92	39.80429069	-80.81181961
	3,636.00	9.18	112.750	3,631.81	-10.67	48.95	14,455,519.00	1,693,280.36	39.80427529	-80.81177180
	3,731.00	10.18	111.330	3,725.46	-16.66	63.76	14,455,513.01	1,693,295.17	39.80425877	-80.81171912
	3,826.00	12.46	108.540	3,818.61	-22.97	81.30	14,455,506.70	1,693,312.71	39.80424133	-80.81165672
	3,917.00	15.25	107.850	3,906.95	-29.76	102.00	14,455,499.91	1,693,333.41	39.80422256	-80.81158305
	4,011.00	17.43	103.990	3,997.87	-37.01	127.66	14,455,492.66	1,693,359.07	39.80420250	-80.81149174
	4,106.00	20.44	95.520	4,086.87	-42.11	158.22	14,455,487.56	1,693,389.63	39.80418683	-80.81138297
	4,200.00	22.20	96.480	4,174.43	-45.69	192.21	14,455,483.98	1,693,423.62	39.80417829	-80.81126199
	4,295.00	20.32	99.210	4,262.96	-50.36	226.33	14,455,479.31	1,693,457.74	39.80416528	-80.81114054
	4,389.00	23.13	99.600	4,350.28	-56.05	260.65	14,455,473.62	1,693,492.06	39.80414945	-80.8101837
	4,484.00	24.86	101.170	4,437.07	-63.03	298.64	14,455,466.64	1,693,530.05	39.80413006	-80.81088315
	4,578.00	26.10	99.790	4,521.92	-70.37	338.40	14,455,459.30	1,693,569.81	39.80410966	-80.81074163
	4,672.00	25.66	99.110	4,606.50	-77.11	378.87	14,455,452.56	1,693,610.28	39.80409092	-80.81059758



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Wellbore: Original Hole
Design: Surveys Original Hole

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TVD Reference: Well Woodford 10HU (J)
MD Reference: RKB=1235+33 @ 1268.00ft. (Nabors X08)
North Reference: RKB=1235+33 @ 1268.00ft. (Nabors X08)
Survey Calculation Method: Grid
Database: Minimum Curvature
 DB_Aug1919_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,767.00	25.15	97.880	4,692.31	-83.14	419.18	14,455,446.53	1,693,650.59	39.80407414	-80.81045411
4,862.00	24.60	93.180	4,778.50	-87.00	458.92	14,455,442.67	1,693,690.33	39.80406330	-80.81031263
4,956.00	24.06	89.950	4,864.16	-88.07	497.82	14,455,441.60	1,693,729.03	39.80406014	-80.81017484
5,051.00	24.70	88.560	4,950.69	-87.55	536.83	14,455,442.12	1,693,768.24	39.80406132	-80.81003523
5,146.00	23.17	96.080	5,037.54	-89.03	575.27	14,455,440.63	1,693,806.68	39.80405703	-80.80989838
5,241.00	22.97	101.760	5,124.95	-94.79	612.01	14,455,434.88	1,693,843.41	39.80404100	-80.80976762
5,335.00	24.09	101.170	5,211.13	-102.25	648.79	14,455,427.42	1,693,880.19	39.80402332	-80.80963672
5,430.00	25.92	100.970	5,297.23	-109.96	688.19	14,455,419.71	1,693,919.60	39.80399892	-80.80949647
5,525.00	25.62	98.170	5,382.78	-116.83	728.91	14,455,412.84	1,693,960.32	39.80397981	-80.80935155
5,619.00	25.44	96.770	5,467.60	-122.09	769.07	14,455,407.58	1,694,000.48	39.80396511	-80.80920857
5,714.00	23.89	97.320	5,553.93	-126.95	808.42	14,455,402.72	1,694,039.83	39.80395154	-80.80906852
5,809.00	24.28	101.320	5,640.67	-133.24	846.65	14,455,396.43	1,694,078.06	39.80393406	-80.80893243
5,903.00	24.10	101.750	5,726.41	-140.94	884.39	14,455,388.73	1,694,115.80	39.80391268	-80.80879811
5,998.00	24.79	100.800	5,812.90	-148.62	922.95	14,455,381.05	1,694,154.35	39.80389136	-80.80866090
6,093.00	24.65	98.940	5,899.19	-155.43	962.08	14,455,374.24	1,694,193.49	39.80387243	-80.80852161
6,190.00	25.67	96.200	5,986.99	-161.57	1,002.86	14,455,368.10	1,694,232.87	39.80385533	-80.80837646
6,285.00	22.67	98.860	6,073.65	-166.69	1,041.41	14,455,362.98	1,694,272.82	39.80384103	-80.80823923
6,380.00	22.94	94.880	6,161.23	-170.45	1,078.04	14,455,359.21	1,694,309.44	39.80383048	-80.80810886
6,475.00	23.66	97.210	6,248.48	-174.42	1,115.39	14,455,355.25	1,694,346.80	39.80381937	-80.80797587
6,569.00	24.39	99.140	6,334.34	-179.87	1,153.27	14,455,349.80	1,694,384.68	39.80380418	-80.80784105
6,664.00	24.51	98.710	6,420.82	-185.97	1,192.11	14,455,343.70	1,694,423.52	39.80378720	-80.80770279
6,758.00	25.70	99.540	6,505.94	-192.26	1,231.50	14,455,330.50	1,694,462.90	39.80376969	-80.80756262
6,853.00	26.70	99.540	6,591.18	-199.17	1,272.87	14,455,324.80	1,694,504.27	39.80375047	-80.80741537
6,945.00	25.00	96.710	6,673.97	-204.87	1,312.56	14,455,320.60	1,694,543.97	39.80373459	-80.80731912
7,040.00	22.35	95.880	6,760.97	-209.06	1,350.47	14,455,317.12	1,694,581.88	39.80372284	-80.80719291
7,135.00	21.70	95.330	6,849.03	-212.55	1,385.93	14,455,312.68	1,694,617.33	39.80371307	-80.807071291
7,229.00	23.33	98.730	6,935.87	-216.99	1,421.63	14,455,307.25	1,694,653.04	39.80370067	-80.80688582
7,324.00	22.92	98.020	7,023.24	-222.42	1,458.54	14,455,300.93	1,694,689.95	39.80368552	-80.80675443
7,419.00	23.43	101.400	7,110.58	-228.74	1,495.38	14,455,293.38	1,694,726.78	39.80366796	-80.80662333
7,513.00	25.48	100.990	7,196.14	-236.29	1,533.55	14,455,285.86	1,694,764.95	39.80364700	-80.80648747
7,607.00	24.96	100.660	7,281.18	-243.81	1,572.89	14,455,285.86	1,694,804.29	39.80362611	-80.80634746
7,702.00	26.04	100.770	7,412.05	-255.42	1,634.22	14,455,274.25	1,694,865.63	39.80359386	-80.80612916
7,797.00	26.39	100.790	7,452.42	-259.13	1,663.75	14,455,270.53	1,694,895.16	39.80358334	-80.80605966
7,891.00	24.06	98.740	7,537.45	-265.96	1,693.22	14,455,263.71	1,694,924.62	39.80356456	-80.80591919
7,985.00	22.33	99.570	7,623.85	-271.84	1,729.77	14,455,257.93	1,694,961.17	39.80354819	-80.80578910
8,080.00	23.46	97.590	7,711.37	-277.34	1,766.31	14,455,252.33	1,694,997.72	39.80353288	-80.80565903
8,175.00	23.75	97.440	7,798.42	-282.31	1,804.02	14,455,247.36	1,695,035.43	39.80351899	-80.80552478
8,269.00	25.10	98.730	7,884.01	-287.79	1,842.50	14,455,241.88	1,695,073.91	39.80350372	-80.80538782
8,364.00	26.03	97.360	7,969.70	-293.52	1,883.09	14,455,236.15	1,695,114.50	39.80348774	-80.80524334
8,458.00	23.65	99.340	8,055.00	-299.22	1,922.16	14,455,230.45	1,695,153.56	39.80347185	-80.80510429
8,553.00	22.24	100.400	8,142.48	-305.56	1,958.65	14,455,224.11	1,695,190.05	39.80345422	-80.80497442
8,648.00	22.17	100.140	8,230.44	-311.96	1,993.97	14,455,217.71	1,695,225.38	39.80343643	-80.80484869
8,742.00	22.94	101.650	8,317.25	-318.78	2,029.37	14,455,210.89	1,695,260.78	39.80341749	-80.80472269
8,837.00	22.85	100.480	8,404.77	-325.88	2,065.64	14,455,203.79	1,695,297.05	39.80339779	-80.80459361
8,931.00	24.48	98.600	8,490.86	-332.11	2,102.85	14,455,197.56	1,695,334.26	39.80338050	-80.80446118
9,029.00	25.29	100.020	8,579.76	-338.79	2,143.54	14,455,190.88	1,695,374.95	39.80336186	-80.80431635
9,123.00	25.39	101.750	8,664.72	-346.38	2,183.04	14,455,183.28	1,695,414.45	39.80334076	-80.80417576
9,217.00	25.51	102.090	8,749.67	-354.70	2,222.42	14,455,174.97	1,695,453.83	39.80331770	-80.804043561
9,312.00	25.37	102.800	8,835.45	-363.49	2,262.27	14,455,166.18	1,695,493.68	39.80329330	-80.80393802
9,401.00	25.34	100.650	8,915.82	-371.27	2,299.72	14,455,158.40	1,695,531.12	39.80327172	-80.80383650
9,496.00	25.14	99.020	9,001.75	-378.19	2,339.63	14,455,151.48	1,695,571.03	39.80325248	-80.80361848
9,590.00	25.43	102.580	9,086.75	-385.72	2,379.05	14,455,143.95	1,695,610.45	39.80323157	-80.80347818
9,687.00	24.81	101.860	9,174.57	-394.43	2,419.29	14,455,135.24	1,695,650.70	39.80320738	-80.80333496
9,779.00	24.20	102.330	9,258.29	-402.43	2,456.60	14,455,127.61	1,695,688.01	39.80318520	-80.80320217
9,873.00	23.81	100.670	9,344.16	-410.06	2,494.07	14,455,119.61	1,695,725.48	39.80316403	-80.80306882



Survey Report - Geographic



Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Woodford
Well: Woodford 10HU (J)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference:
TVD Reference: Well Woodford 10HU (J)
MD Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
North Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
Survey Calculation Method: Grid
Database: Minimum Curvature
 DB_Aug1919_v14

Survey	Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
	9,968.00	23.56	97.800	9,431.16	-416.18	2,531.73	14,455,113.49	1,695,763.13	39.80314698	-80.80293479
	10,062.00	22.96	97.950	9,517.52	-421.27	2,568.50	14,455,108.40	1,695,799.90	39.80313279	-80.80280391
	10,157.00	24.01	97.180	9,604.65	-426.25	2,606.03	14,455,103.42	1,695,837.43	39.80311889	-80.80267032
	10,252.00	23.46	99.460	9,691.61	-431.77	2,643.86	14,455,097.90	1,695,875.26	39.80310349	-80.80253567
	10,346.00	22.84	101.450	9,778.04	-438.47	2,680.20	14,455,091.20	1,695,911.60	39.80308488	-80.80240634
	10,440.00	22.54	105.270	9,864.77	-446.83	2,715.46	14,455,082.83	1,695,946.86	39.80306188	-80.80228085
	10,560.00	22.02	108.000	9,975.82	-459.84	2,759.04	14,455,069.93	1,695,990.45	39.80300656	-80.80212577
	10,653.00	22.59	94.810	10,061.91	-466.73	2,793.45	14,455,062.94	1,696,024.85	39.80300656	-80.80212577
	10,748.00	24.04	95.780	10,149.15	-470.21	2,830.88	14,455,059.46	1,696,062.28	39.80299678	-80.80187007
	10,842.00	25.19	91.910	10,234.62	-472.81	2,869.93	14,455,056.86	1,696,101.33	39.80298942	-80.80173106
	10,936.00	25.32	92.180	10,319.63	-474.24	2,910.01	14,455,055.43	1,696,141.14	39.80298316	-80.80143981
	11,031.00	26.81	89.710	10,404.97	-474.90	2,951.73	14,455,054.77	1,696,183.14	39.80298316	-80.80136462
	11,078.00	26.59	88.920	10,446.96	-474.65	2,972.85	14,455,055.02	1,696,204.25	39.80298373	-80.80136462
	11,126.00	29.49	96.660	10,489.33	-475.82	2,995.34	14,455,053.85	1,696,226.74	39.80298038	-80.80128456
	11,173.00	33.10	105.970	10,529.51	-480.70	3,019.19	14,455,048.97	1,696,250.59	39.80296684	-80.80119918
	11,221.00	34.68	110.020	10,569.36	-488.98	3,044.62	14,455,040.69	1,696,276.03	39.80294394	-80.80119918
	11,268.00	35.52	111.860	10,607.82	-498.64	3,069.86	14,455,031.03	1,696,301.26	39.80291725	-80.80101940
	11,316.00	37.36	117.580	10,646.44	-510.58	3,095.72	14,455,019.09	1,696,327.12	39.80288431	-80.80092742
	11,363.00	36.88	117.400	10,683.92	-523.67	3,120.88	14,455,006.00	1,696,352.28	39.80284820	-80.80083794
	11,410.00	37.36	116.260	10,721.39	-536.47	3,146.19	14,454,993.20	1,696,377.59	39.80281289	-80.80074792
	11,457.00	39.47	119.250	10,758.22	-550.08	3,172.02	14,454,979.59	1,696,403.42	39.80277535	-80.80065607
	11,505.00	42.37	121.620	10,794.49	-566.02	3,199.11	14,454,963.65	1,696,430.51	39.80273141	-80.80055974
	11,552.00	45.98	125.130	10,828.20	-584.06	3,226.43	14,454,945.19	1,696,457.83	39.80268172	-80.80046261
	11,600.00	45.98	127.420	10,861.56	-604.48	3,254.25	14,454,925.19	1,696,485.66	39.80262547	-80.80036371
	11,647.00	48.53	130.230	10,893.46	-626.13	3,281.12	14,454,903.54	1,696,512.53	39.80256595	-80.80026820
	11,694.00	51.21	132.870	10,923.75	-649.97	3,308.00	14,454,882.03	1,696,539.40	39.80250021	-80.80017270
	11,741.00	56.66	136.820	10,957.42	-676.77	3,334.89	14,454,852.90	1,696,566.29	39.80242644	-80.80007718
	11,788.00	59.30	140.250	10,976.34	-706.64	3,361.25	14,454,823.03	1,696,592.65	39.80234426	-80.79998355
	11,835.00	64.53	143.420	10,998.46	-739.24	3,386.84	14,454,790.43	1,696,618.24	39.80225457	-80.79989270
	11,883.00	68.35	145.960	11,017.65	-775.14	3,412.25	14,454,754.53	1,696,643.65	39.80215582	-80.79980251
	11,930.00	72.66	146.930	11,033.33	-812.06	3,436.73	14,454,717.61	1,696,668.13	39.80205429	-80.79971564
	11,977.00	78.33	147.190	11,045.10	-850.23	3,461.46	14,454,679.44	1,696,692.86	39.80194930	-80.79962789
	12,024.00	84.35	147.990	11,052.17	-889.44	3,486.35	14,454,640.23	1,696,717.75	39.80184147	-80.79953959
	12,072.00	89.10	150.010	11,054.91	-930.50	3,511.02	14,454,599.17	1,696,742.42	39.80172855	-80.79945207
	12,167.00	89.41	149.480	11,056.15	-1,012.55	3,558.88	14,454,517.12	1,696,790.29	39.80150291	-80.79928232
	12,261.00	89.27	149.300	11,057.23	-1,093.45	3,606.74	14,454,436.22	1,696,838.15	39.80128046	-80.79911256
	12,356.00	89.54	150.100	11,058.22	-1,175.47	3,654.67	14,454,354.20	1,696,886.07	39.80105492	-80.79894257
	12,450.00	89.93	150.710	11,058.65	-1,257.20	3,701.09	14,454,272.47	1,696,932.50	39.80083017	-80.79877794
	12,544.00	90.81	150.890	11,058.04	-1,339.25	3,746.95	14,454,190.42	1,696,978.35	39.80060455	-80.79861533
	12,639.00	90.73	150.530	11,056.77	-1,422.10	3,793.42	14,454,107.57	1,697,024.83	39.80037674	-80.79845053
	12,733.00	90.86	150.530	11,055.46	-1,503.93	3,839.67	14,454,025.74	1,697,071.07	39.80015173	-80.79828655
	12,828.00	91.12	150.710	11,053.82	-1,586.70	3,886.27	14,453,942.97	1,697,117.67	39.79996963	-80.79795717
	12,923.00	90.58	150.970	11,053.24	-1,669.66	3,928.55	14,453,860.02	1,697,163.95	39.79984674	-80.79779417
	13,018.00	89.02	151.150	11,053.57	-1,752.79	3,978.52	14,453,776.88	1,697,209.92	39.79972457	-80.79763004
	13,112.00	87.30	149.830	11,055.77	-1,834.57	4,024.80	14,453,695.11	1,697,256.21	39.79942527	-80.79746023
	13,207.00	87.60	149.570	11,060.00	-1,916.51	4,072.69	14,453,613.16	1,697,304.09	39.79901724	-80.79728876
	13,301.00	90.15	148.510	11,061.84	-1,997.09	4,121.03	14,453,532.58	1,697,352.43	39.79878563	-80.79711186
	13,396.00	90.46	148.160	11,061.34	-2,077.95	4,170.90	14,453,451.72	1,697,402.30	39.79857327	-80.79702777
	13,491.00	89.49	148.780	11,061.38	-2,158.92	4,220.58	14,453,370.04	1,697,451.98	39.79835058	-80.79693564
	13,585.00	89.27	149.570	11,062.40	-2,239.64	4,268.74	14,453,290.04	1,697,500.14	39.79812862	-80.79676481
	13,680.00	88.23	150.100	11,063.64	-2,321.77	4,316.48	14,453,207.91	1,697,547.88	39.79790277	-80.79659554
	13,775.00	89.71	150.010	11,064.52	-2,404.08	4,363.89	14,453,125.59	1,697,595.29	39.79767642	-80.79642738
	13,869.00	89.23	150.100	11,065.39	-2,485.53	4,410.81	14,453,044.15	1,697,642.21	39.79745245	-80.79626099
	13,964.00	89.89	150.270	11,066.12	-2,567.95	4,458.05	14,452,961.72	1,697,689.45	39.79722580	-80.79609350
	14,058.00	89.45	150.620	11,066.66	-2,649.72	4,504.41	14,452,879.96	1,697,735.81	39.79700096	-80.79592909



Survey Report - Geographic



Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Woodford
Well: Woodford 10HU (J)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well Woodford 10HU (J)
RKB=1235+33 @ 1268.00ft (Nabors X08)
RKB=1235+33 @ 1268.00ft (Nabors X08)
Grid
Minimum Curvature
DB_Aug1919_v14

Table with columns: Measured Depth (ft), Inclination (°), Azimuth (°), Vertical Depth (ft), +N/S (ft), +E/W (ft), Map Northing (usft), Map Easting (usft), Latitude, Longitude. Contains 48 rows of survey data.



Survey Report - Geographic



Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Woodford
Well: Woodford 10HU (J)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference:
TVD Reference: Well Woodford 10HU (J)
MD Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
North Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
Survey Calculation Method: Grid
Database: Minimum Curvature
 DB_Aug1919_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/S (ft)	+E/W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
19,353.00	86.73	150.100	11,171.81	-7,237.91	7,143.06	14,448,291.78	1,700,374.46	39.78438366	-80.78657383
19,448.00	87.74	150.620	11,176.39	-7,320.38	7,189.99	14,448,209.31	1,700,421.38	39.78415686	-80.78640750
19,542.00	87.08	150.360	11,180.64	-7,402.10	7,236.24	14,448,127.56	1,700,467.64	39.78393213	-80.78624354
19,637.00	88.18	150.620	11,184.57	-7,484.70	7,283.00	14,448,044.98	1,700,514.39	39.78370497	-80.78607782
19,732.00	87.60	150.450	11,188.06	-7,567.36	7,329.70	14,447,962.33	1,700,561.09	39.78347767	-80.78591230
19,826.00	88.53	150.800	11,191.24	-7,649.22	7,375.78	14,447,880.46	1,700,607.17	39.78325254	-80.78574897
19,921.00	88.13	149.630	11,194.01	-7,731.72	7,422.81	14,447,797.96	1,700,654.20	39.78302567	-80.78558228
20,016.00	88.70	148.690	11,196.63	-7,813.34	7,471.34	14,447,716.34	1,700,702.74	39.78280121	-80.78541020
20,110.00	89.27	148.430	11,198.30	-7,893.53	7,520.37	14,447,636.16	1,700,751.76	39.78258067	-80.78523639
20,205.00	89.71	148.690	11,199.15	-7,974.58	7,569.92	14,447,555.11	1,700,801.31	39.78235776	-80.78506071
20,299.00	89.45	148.600	11,199.83	-8,054.85	7,618.83	14,447,474.84	1,700,850.22	39.78213699	-80.78487730
20,394.00	88.75	148.340	11,201.33	-8,135.81	7,668.50	14,447,393.87	1,700,899.89	39.78191432	-80.78471118
20,488.00	89.67	149.130	11,202.62	-8,216.15	7,717.28	14,447,313.54	1,700,948.67	39.78169336	-80.78453824
20,583.00	89.19	149.220	11,203.57	-8,297.73	7,765.96	14,447,231.96	1,700,997.35	39.78146901	-80.78436568
20,678.00	88.88	149.040	11,205.17	-8,379.26	7,814.70	14,447,150.43	1,701,046.09	39.78124478	-80.78419290
20,772.00	88.40	150.970	11,207.40	-8,460.64	7,861.67	14,447,069.05	1,701,093.07	39.78102097	-80.78402639
20,867.00	87.87	151.060	11,210.49	-8,543.70	7,907.68	14,446,985.99	1,701,139.08	39.78079257	-80.78386333
20,961.00	88.44	150.620	11,213.52	-8,625.74	7,953.46	14,446,903.95	1,701,184.85	39.78056695	-80.78370110
21,056.00	87.74	150.530	11,216.68	-8,708.44	8,000.11	14,446,821.25	1,701,231.50	39.78033953	-80.78353578
21,151.00	86.31	150.710	11,219.96	-8,791.17	8,046.69	14,446,738.52	1,701,278.08	39.78011201	-80.78337070
21,245.00	88.62	149.660	11,222.48	-8,872.70	8,093.41	14,446,656.99	1,701,324.80	39.77988781	-80.78320511
21,340.00	88.88	150.360	11,224.55	-8,954.96	8,140.88	14,446,574.73	1,701,372.27	39.77966158	-80.78303684
21,434.00	89.45	150.710	11,225.92	-9,036.79	8,187.11	14,446,492.90	1,701,418.50	39.77943654	-80.78287299
21,529.00	89.05	150.270	11,227.16	-9,119.46	8,233.90	14,446,410.23	1,701,465.29	39.77920920	-80.78270717
21,623.00	88.57	149.390	11,228.11	-9,200.71	8,281.13	14,446,328.98	1,701,512.52	39.77898576	-80.78253976
21,717.00	89.27	149.920	11,230.88	-9,281.81	8,328.61	14,446,247.87	1,701,560.01	39.77876270	-80.78237146
21,812.00	89.71	149.740	11,231.73	-9,363.94	8,376.35	14,446,165.75	1,701,607.75	39.77853663	-80.78220225
21,906.00	89.23	150.360	11,232.60	-9,445.38	8,423.28	14,446,084.30	1,701,654.67	39.77831285	-80.78203593
22,001.00	88.62	150.970	11,234.38	-9,528.19	8,469.81	14,446,001.50	1,701,701.21	39.77808514	-80.78187102
22,096.00	87.65	150.890	11,237.47	-9,611.17	8,515.95	14,445,918.51	1,701,747.34	39.77785693	-80.78170754
22,191.00	89.14	150.360	11,240.13	-9,693.92	8,562.53	14,445,835.76	1,701,793.92	39.77762936	-80.78154247
22,285.00	88.75	150.890	11,241.87	-9,775.82	8,608.63	14,445,753.86	1,701,840.02	39.77740413	-80.78137910
22,380.00	87.82	150.100	11,244.71	-9,858.47	8,655.39	14,445,671.22	1,701,886.79	39.77717686	-80.78121337
22,474.00	88.00	149.830	11,248.14	-9,939.79	8,702.41	14,445,589.90	1,701,933.80	39.77695321	-80.78104673
22,569.00	87.65	151.240	11,251.74	-10,022.44	8,749.11	14,445,507.25	1,701,980.50	39.77672592	-80.78089125
22,618.00	87.65	151.150	11,253.75	-10,065.34	8,772.70	14,445,464.35	1,702,004.09	39.77660794	-80.78079767
Survey @ 22618.00 MD 11253.75 TVD									
22,680.00	87.65	151.150	11,256.29	-10,119.60	8,802.59	14,445,410.09	1,702,033.98	39.77645873	-80.78069175
Survey projected to 22680.00 MD 11256.29 TVD									

Design Annotations	Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
			+N/S (ft)	+E/W (ft)	
	218.00	217.99	0.23	-1.39	MWD surveys
	22,618.00	11,253.75	-10,065.34	8,772.70	Survey @ 22618.00 MD 11253.75 TVD
	22,680.00	11,256.29	-10,119.60	8,802.59	Survey projected to 22680.00 MD 11256.29 TVD