



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Woodford 07HU (G)
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 07HU (G)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

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

Site	Woodford				
Site Position:		Northing:	14,455,471.78 usf	Latitude:	39.80414597
From:	Lat/Long	Easting:	1,693,217.70 usf	Longitude:	-80.81199526
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.120 °

Well	Woodford 07HU (G)				
Well Position		+N/-S	0.00 ft	Northing:	14,455,494.64 usf
		+E/-W	0.00 ft	Easting:	1,693,223.16 usf
Position Uncertainty			0.00 ft	Wellhead Elevation:	ft
					Ground Level:
					1,235.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/31/2019	-8.695	66.786	51,920.34226764

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	160.520

Survey Program	From (ft)	To (ft)	Date	Survey (Wellbore)	Tool Name	Description
	189.00	890.00	11/10/2019	MWD surf (Original Hole)	MWD	MWD - Standard
	979.00	2,733.00		MWD int (Original Hole)	MWD	MWD - Standard
	2,868.00	18,240.00		MWD (Original Hole)	MWD	MWD - Standard
	18,299.00	18,299.00		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	0.000	0.00	0.00	0.00	14,455,494.64	1,693,223.16	39.80420873	-80.81197566
	189.00	0.86	306.530	188.99	0.84	-1.14	14,455,495.48	1,693,222.02	39.80421106	-80.81197971
	MWD surveys									
	219.00	0.78	308.160	218.99	1.10	-1.48	14,455,495.74	1,693,221.68	39.80421177	-80.81198093
	249.00	0.74	300.030	248.99	1.33	-1.81	14,455,495.97	1,693,221.35	39.80421239	-80.81198209
	279.00	0.58	302.920	278.99	1.51	-2.10	14,455,496.15	1,693,221.05	39.80421288	-80.81198314
	316.00	0.60	309.260	315.98	1.73	-2.41	14,455,496.37	1,693,220.75	39.80421350	-80.81198424
	346.00	0.49	313.440	345.98	1.92	-2.63	14,455,496.56	1,693,220.53	39.80421402	-80.81198500
	376.00	0.33	294.180	375.98	2.04	-2.80	14,455,496.68	1,693,220.36	39.80421436	-80.81198561



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Well: Woodford 07HU (G)
Wellbore: Original Hole
Design: Surveys Original Hole

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TVD Reference: Well Woodford 07HU (G)
 RKB=1235+33 @ 1268.00ft (Nabors X08)
MD Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: 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
406.00	0.47	312.800	405.98	2.16	-2.97	14,455,496.80	1,693,220.19	39.80421469	-80.81198621
436.00	0.54	318.630	435.98	2.35	-3.15	14,455,496.99	1,693,220.01	39.80421521	-80.81198686
466.00	0.40	325.080	465.98	2.54	-3.30	14,455,497.18	1,693,219.85	39.80421574	-80.81198741
496.00	0.42	331.860	495.98	2.73	-3.42	14,455,497.37	1,693,219.74	39.80421624	-80.81198781
526.00	0.34	346.330	525.98	2.91	-3.49	14,455,497.55	1,693,219.67	39.80421674	-80.81198806
556.00	0.37	337.280	555.98	3.09	-3.55	14,455,497.73	1,693,219.61	39.80421723	-80.81198827
585.00	0.35	353.240	584.98	3.26	-3.59	14,455,497.90	1,693,219.56	39.80421770	-80.81198844
614.00	0.39	353.920	613.98	3.45	-3.62	14,455,498.09	1,693,219.54	39.80421822	-80.81198851
644.00	0.41	341.030	643.97	3.65	-3.66	14,455,498.29	1,693,219.50	39.80421877	-80.81198867
673.00	0.34	356.190	672.97	3.83	-3.70	14,455,498.47	1,693,219.46	39.80421928	-80.81198881
702.00	0.52	344.290	701.97	4.05	-3.74	14,455,498.69	1,693,219.42	39.80421986	-80.81198895
733.00	0.46	354.720	732.97	4.30	-3.79	14,455,498.94	1,693,219.37	39.80422058	-80.81198913
765.00	0.41	342.820	764.97	4.54	-3.84	14,455,499.18	1,693,219.30	39.80422184	-80.81198938
796.00	0.44	347.0	795.97	4.77	-3.86	14,455,499.41	1,693,219.32	39.80422213	-80.81198935
828.00	0.09	339.0	827.97	4.91	-3.89	14,455,499.67	1,693,219.27	39.80422258	-80.81198946
859.00	0.37	340.590	858.97	5.03	-3.89	14,455,499.87	1,693,219.27	39.80422258	-80.81198946
890.00	0.55	316.020	889.97	5.23	-4.02	14,455,499.87	1,693,219.27	39.80422258	-80.81198946
979.00	1.58	270.650	978.95	5.56	-5.55	14,455,500.20	1,693,217.61	39.80422402	-80.81199537
1,073.00	2.00	265.620	1,072.91	5.45	-8.48	14,455,500.09	1,693,214.68	39.80422374	-80.81200580
1,168.00	1.45	240.790	1,167.86	4.73	-11.18	14,455,499.37	1,693,211.98	39.80422179	-80.81201543
1,263.00	0.86	196.310	1,262.85	3.46	-12.43	14,455,497.10	1,693,210.73	39.80421831	-80.81201989
1,357.00	1.14	110.590	1,356.84	2.46	-11.75	14,455,496.45	1,693,213.77	39.80421376	-80.81200908
1,452.00	1.82	101.940	1,451.80	1.81	-9.39	14,455,496.45	1,693,213.77	39.80421376	-80.81200908
1,546.00	1.39	118.390	1,545.77	0.96	-6.93	14,455,495.60	1,693,216.23	39.80421141	-80.81199374
1,640.00	1.30	127.330	1,639.74	-0.23	-5.08	14,455,494.41	1,693,218.08	39.80420813	-80.81199374
1,735.00	0.72	211.990	1,734.73	-1.39	-4.54	14,455,493.25	1,693,218.62	39.80420495	-80.81199182
1,829.00	1.84	251.580	1,828.71	-2.37	-6.28	14,455,492.27	1,693,216.88	39.80420227	-80.81199804
1,924.00	2.20	252.190	1,923.65	-3.41	-9.46	14,455,491.23	1,693,213.69	39.80419943	-80.81200938
2,018.00	1.72	290.260	2,017.60	-3.47	-12.50	14,455,491.17	1,693,210.65	39.80419928	-80.81202021
2,113.00	2.93	337.610	2,112.52	-0.73	-14.77	14,455,493.91	1,693,208.39	39.80420681	-80.81202825
2,207.00	2.96	339.390	2,206.40	3.76	-16.54	14,455,498.40	1,693,206.62	39.80421916	-80.81203451
2,301.00	2.29	288.710	2,300.31	6.64	-19.17	14,455,501.28	1,693,203.99	39.80422707	-80.81204387
2,396.00	3.70	252.280	2,395.19	6.31	-23.89	14,455,500.95	1,693,199.27	39.80422621	-80.81206067
2,490.00	3.44	228.980	2,489.01	3.54	-28.91	14,455,498.18	1,693,194.25	39.80421862	-80.81207856
2,585.00	2.39	207.400	2,583.89	-0.09	-31.97	14,455,494.55	1,693,191.19	39.80420867	-80.81208949
2,679.00	0.48	287.210	2,677.86	-1.71	-33.25	14,455,492.93	1,693,189.91	39.80420422	-80.81209405
2,733.00	0.78	11.400	2,731.86	-1.29	-33.39	14,455,493.35	1,693,199.77	39.80420539	-80.81209456
2,868.00	1.75	29.390	2,866.82	1.41	-32.20	14,455,496.05	1,693,190.96	39.80421279	-80.81209029
2,962.00	1.04	1.650	2,960.80	3.51	-31.47	14,455,498.15	1,693,191.69	39.80421856	-80.81208768
3,057.00	1.91	305.580	3,055.77	5.30	-32.73	14,455,499.94	1,693,190.43	39.80422347	-80.81209216
3,152.00	2.67	293.010	3,150.69	7.08	-36.05	14,455,501.72	1,693,187.10	39.80422839	-80.81210398
3,246.00	2.92	300.690	3,244.58	9.18	-40.16	14,455,503.82	1,693,182.99	39.80423418	-80.81211860
3,341.00	2.92	301.940	3,339.45	11.72	-44.33	14,455,506.36	1,693,178.82	39.80424117	-80.81213343
3,435.00	4.87	295.520	3,433.23	14.70	-49.97	14,455,509.34	1,693,173.19	39.80424940	-80.81215346
3,530.00	7.83	294.380	3,527.64	19.11	-59.50	14,455,513.75	1,693,163.66	39.80426156	-80.81218738
3,625.00	9.44	297.280	3,621.56	25.36	-72.32	14,455,520.00	1,693,150.84	39.80427878	-80.81223298
3,717.00	10.25	297.630	3,712.20	32.61	-86.28	14,455,527.25	1,693,136.88	39.80429878	-80.81228262
3,812.00	10.42	289.220	3,805.67	39.36	-101.88	14,455,534.00	1,693,121.28	39.80431741	-80.81233812
3,906.00	11.22	285.030	3,898.00	44.53	-118.74	14,455,539.17	1,693,104.42	39.80433170	-80.81233981
4,001.00	12.09	285.430	3,991.04	49.57	-137.26	14,455,544.21	1,693,085.90	39.80434566	-80.81246401
4,099.00	12.82	285.460	4,086.73	55.20	-157.63	14,455,549.84	1,693,065.53	39.80436124	-80.81253650
4,194.00	12.95	289.690	4,179.34	61.60	-177.81	14,455,556.24	1,693,045.35	39.80437892	-80.81260831
4,288.00	13.99	297.920	4,270.88	70.24	-197.35	14,455,564.88	1,693,025.81	39.80440277	-80.81267781
4,382.00	13.55	300.210	4,362.29	80.88	-216.48	14,455,575.52	1,693,006.68	39.80443210	-80.81274566
4,477.00	14.32	299.960	4,454.50	92.35	-236.28	14,455,586.99	1,692,986.88	39.80446370	-80.81281626



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4,572.00	14.02	293.010	4,546.61	102.71	-257.05	14,455,597.35	1,692,966.11	39.80449229	-80.81289014
4,666.00	12.23	282.040	4,638.17	109.24	-277.27	14,455,603.88	1,692,945.89	39.80451034	-80.81296210
4,760.00	14.12	280.700	4,729.69	113.45	-298.28	14,455,608.09	1,692,924.88	39.80452201	-80.81303686
4,855.00	14.60	285.800	4,821.72	118.86	-321.18	14,455,613.50	1,692,901.97	39.80453700	-80.81311839
4,950.00	15.63	290.790	4,913.44	126.66	-344.67	14,455,621.30	1,692,878.49	39.80455857	-80.81320196
5,044.00	16.92	290.730	5,003.67	136.00	-369.30	14,455,630.64	1,692,853.85	39.80458435	-80.81328960
5,139.00	14.86	291.770	5,095.04	145.41	-393.55	14,455,640.05	1,692,829.61	39.80461034	-80.81337585
5,233.00	14.11	291.620	5,186.05	154.10	-415.40	14,455,648.74	1,692,807.76	39.80463433	-80.81345357
5,328.00	15.66	291.670	5,277.86	163.11	-438.08	14,455,657.75	1,692,785.08	39.80465918	-80.81353427
5,423.00	13.44	293.130	5,369.80	172.18	-460.15	14,455,666.82	1,692,763.01	39.80468422	-80.81361279
5,518.00	12.00	294.100	5,462.47	180.55	-479.32	14,455,675.19	1,692,725.03	39.80470732	-80.81368098
5,612.00	13.02	290.970	5,554.24	188.33	-498.13	14,455,682.97	1,692,704.60	39.80472879	-80.81374789
5,707.00	13.69	291.690	5,646.67	196.31	-518.56	14,455,690.95	1,692,684.47	39.80475084	-80.81382061
5,801.00	12.75	289.390	5,738.18	203.87	-538.68	14,455,698.51	1,692,665.11	39.80477170	-80.81389219
5,896.00	12.10	287.800	5,830.95	210.39	-558.05	14,455,705.03	1,692,646.05	39.80480701	-80.81402890
5,991.00	12.27	288.530	5,923.81	216.64	-577.11	14,455,711.28	1,692,626.95	39.80482435	-80.81416715
6,085.00	12.44	287.840	6,015.64	222.92	-596.21	14,455,717.56	1,692,607.20	39.80484138	-80.81423577
6,180.00	12.71	286.830	6,108.36	229.08	-615.96	14,455,723.72	1,692,587.92	39.80486011	-80.81430010
6,275.00	12.17	292.020	6,201.13	235.86	-635.24	14,455,738.24	1,692,569.83	39.80488147	-80.81436474
6,369.00	11.99	294.340	6,293.05	243.60	-653.33	14,455,750.50	1,692,551.66	39.80490759	-80.81442730
6,467.00	12.77	301.340	6,388.88	253.08	-671.50	14,455,767.98	1,692,534.07	39.80493675	-80.81449205
6,562.00	12.35	294.600	6,474.36	263.65	-689.09	14,455,782.29	1,692,515.86	39.80496346	-80.81455866
6,750.00	12.97	291.950	6,665.10	281.39	-726.02	14,455,776.03	1,692,497.14	39.80498565	-80.81463199
6,845.00	13.82	289.110	6,757.52	289.09	-746.63	14,455,783.73	1,692,478.53	39.80500692	-80.81470896
6,939.00	14.28	288.040	6,848.71	296.35	-768.26	14,455,790.99	1,692,454.90	39.80502699	-80.81478889
7,034.00	13.99	286.420	6,940.75	303.32	-790.73	14,455,797.96	1,692,432.43	39.80505625	-80.81486781
7,129.00	13.99	289.040	7,032.85	310.40	-812.91	14,455,805.04	1,692,410.25	39.80508583	-80.81494551
7,224.00	14.31	290.690	7,124.97	318.29	-834.74	14,455,812.93	1,692,388.42	39.80511003	-80.81502370
7,318.00	14.55	289.830	7,216.00	326.40	-856.72	14,455,821.04	1,692,366.44	39.80513179	-80.81510698
7,413.00	15.59	287.440	7,307.74	334.28	-880.12	14,455,828.92	1,692,343.04	39.80516193	-80.81521975
7,508.00	15.53	290.560	7,428.16	345.19	-911.82	14,455,839.83	1,692,311.34	39.80519020	-80.81527741
7,603.00	15.43	291.240	7,490.80	351.38	-928.03	14,455,846.02	1,692,295.13	39.80520320	-80.81535988
7,697.00	15.14	290.140	7,581.48	360.14	-951.21	14,455,854.77	1,692,271.95	39.80522642	-80.81543704
7,791.00	13.52	292.380	7,672.55	368.55	-972.89	14,455,863.19	1,692,250.27	39.80524963	-80.81550983
7,886.00	13.41	292.300	7,764.94	376.95	-993.35	14,455,871.59	1,692,229.81	39.80527287	-80.81558229
7,981.00	13.42	292.620	7,857.34	385.37	-1,013.72	14,455,880.01	1,692,209.44	39.80529610	-80.81565610
8,075.00	14.14	291.580	7,948.64	393.79	-1,034.47	14,455,888.43	1,692,188.69	39.80531936	-80.81573051
8,169.00	13.62	292.320	8,039.89	402.22	-1,055.38	14,455,896.86	1,692,167.78	39.805339874	-80.81586502
8,264.00	12.29	295.630	8,132.47	410.84	-1,074.85	14,455,905.48	1,692,148.31	39.80536923	-80.81593242
8,359.00	12.82	298.840	8,225.20	420.30	-1,093.20	14,455,914.94	1,692,129.96	39.80539874	-80.81600591
8,453.00	13.96	300.050	8,316.65	431.01	-1,112.15	14,455,925.65	1,692,111.01	39.80542853	-80.81617247
8,548.00	14.48	295.250	8,408.74	441.81	-1,132.81	14,455,936.37	1,692,090.35	39.80545859	-80.81626427
8,642.00	15.54	292.910	8,499.53	451.73	-1,155.04	14,455,946.45	1,692,068.12	39.80548521	-80.81635302
8,737.00	17.22	293.780	8,590.67	462.35	-1,179.63	14,455,956.99	1,692,043.53	39.80551578	-80.81644464
8,832.00	17.17	292.700	8,681.43	473.43	-1,205.43	14,455,968.07	1,692,017.73	39.80554415	-80.81653305
8,926.00	16.19	292.060	8,771.47	483.71	-1,230.38	14,455,978.35	1,691,992.78	39.80557247	-80.81661716
9,025.00	16.33	291.390	8,866.51	493.97	-1,256.13	14,455,988.61	1,691,967.03	39.80559974	-80.81669261
9,120.00	16.37	291.970	8,957.67	503.85	-1,280.98	14,455,998.49	1,691,942.18	39.80562826	-80.81676109
9,214.00	15.51	295.340	9,048.06	514.19	-1,304.62	14,456,008.82	1,691,918.54	39.80565691	-80.81683018
9,308.00	13.60	296.970	9,139.04	524.58	-1,325.84	14,456,019.22	1,691,897.33	39.80568640	-80.81690334
9,403.00	12.72	297.270	9,231.54	534.44	-1,345.09	14,456,029.07	1,691,878.07	39.80571097	-80.81697846
9,498.00	13.50	294.040	9,324.06	543.74	-1,364.51	14,456,038.38	1,691,858.65	39.80573425	-80.81690334
9,592.00	14.07	292.650	9,415.36	552.61	-1,385.08	14,456,047.25	1,691,838.08	39.80575808	-80.81697846
9,687.00	13.72	291.830	9,507.58	561.25	-1,406.19	14,456,055.89	1,691,816.97	39.80578464	-80.81697846



Survey Report - Geographic



Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Woodford
Well: Woodford 07HU (G)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference:
TVD Reference: Well Woodford 07HU (G)
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
9,781.00	13.65	292.110	9,598.91	569.57	-1,426.81	14,456,064.21	1,691,796.35	39.80578105	-80.81705184
9,876.00	14.08	293.320	9,691.14	578.36	-1,447.81	14,456,073.00	1,691,775.35	39.80580531	-80.81712654
9,971.00	13.65	291.420	9,783.33	587.09	-1,469.01	14,456,081.73	1,691,754.15	39.80582940	-80.81720195
10,015.00	14.23	290.640	9,826.02	590.92	-1,478.97	14,456,085.56	1,691,744.19	39.80583997	-80.81723740
10,087.00	14.81	292.570	9,895.72	597.57	-1,495.75	14,456,092.21	1,691,727.41	39.80585833	-80.81729710
10,134.00	13.49	283.950	9,941.30	601.20	-1,506.62	14,456,095.84	1,691,716.54	39.80586836	-80.81733577
10,181.00	12.97	266.360	9,987.07	602.19	-1,517.21	14,456,096.83	1,691,705.95	39.80587113	-80.81737347
10,228.00	12.26	253.100	10,032.94	600.41	-1,527.25	14,456,095.04	1,691,695.91	39.80588629	-80.81740923
10,276.00	11.30	239.130	10,079.94	596.51	-1,536.16	14,456,091.15	1,691,687.00	39.80589564	-80.81744100
10,323.00	11.25	221.730	10,126.05	590.72	-1,543.17	14,456,085.36	1,691,679.99	39.80589379	-80.81746599
10,370.00	12.62	207.140	10,172.04	592.73	-1,548.57	14,456,077.37	1,691,670.41	39.80587187	-80.81748526
10,417.00	14.37	198.440	10,217.75	572.63	-1,552.45	14,456,066.27	1,691,667.25	39.80579015	-80.81750024
10,465.00	15.56	189.560	10,264.12	560.63	-1,555.71	14,456,055.27	1,691,667.45	39.80575721	-80.81751493
10,512.00	17.19	180.590	10,309.22	547.46	-1,556.83	14,456,042.10	1,691,666.34	39.80572106	-80.81751134
10,559.00	19.52	171.890	10,353.84	532.74	-1,555.79	14,456,027.38	1,691,667.37	39.80568062	-80.81751134
10,606.00	21.98	165.300	10,397.79	516.45	-1,552.45	14,455,993.97	1,691,670.71	39.80563587	-80.81749957
10,652.00	24.13	159.150	10,440.12	499.33	-1,546.92	14,455,980.80	1,691,676.25	39.80558883	-80.81747999
10,699.00	26.42	156.160	10,482.62	480.79	-1,539.27	14,455,975.43	1,691,683.89	39.80563786	-80.81745290
10,746.00	29.01	154.840	10,524.22	460.91	-1,530.20	14,455,955.55	1,691,692.97	39.80548320	-80.81742074
10,793.00	31.34	154.140	10,564.85	439.59	-1,520.02	14,455,934.23	1,691,703.14	39.80542461	-80.81738465
10,840.00	34.11	155.460	10,604.39	416.60	-1,509.21	14,455,911.24	1,691,713.95	39.80536140	-80.81734634
10,887.00	36.31	155.630	10,642.79	391.93	-1,497.99	14,455,886.57	1,691,725.17	39.80529360	-80.81730658
10,935.00	38.42	156.250	10,680.94	365.33	-1,486.12	14,455,859.97	1,691,737.04	39.80522048	-80.81722119
10,982.00	40.79	155.630	10,717.15	337.98	-1,473.90	14,455,832.62	1,691,749.26	39.80514529	-80.81717364
11,030.00	45.10	155.900	10,752.27	308.16	-1,460.49	14,455,802.80	1,691,762.67	39.80506334	-80.81712404
11,077.00	49.19	156.160	10,784.23	276.68	-1,446.49	14,455,771.32	1,691,776.67	39.80497681	-80.81707021
11,125.00	52.88	155.810	10,814.41	242.60	-1,431.31	14,455,737.24	1,691,791.86	39.80486312	-80.81701453
11,172.00	56.44	155.810	10,841.59	207.63	-1,415.60	14,455,702.27	1,691,807.56	39.80478701	-80.81695597
11,219.00	59.47	155.190	10,866.53	171.39	-1,399.08	14,455,666.03	1,691,824.08	39.80468737	-80.81695597
11,266.00	62.81	155.630	10,889.21	133.96	-1,381.95	14,455,628.60	1,691,841.21	39.80458450	-80.81689527
11,314.00	66.86	155.190	10,909.62	94.47	-1,363.88	14,455,589.11	1,691,859.29	39.80447593	-80.81683119
11,361.00	69.01	155.110	10,927.27	54.95	-1,345.57	14,455,549.59	1,691,877.59	39.80436729	-80.81676631
11,409.00	71.69	153.960	10,943.41	14.14	-1,326.13	14,455,508.78	1,691,897.03	39.80425512	-80.81669740
11,456.00	76.04	152.290	10,956.47	-26.12	-1,305.72	14,455,468.52	1,691,917.44	39.80414444	-80.81662502
11,503.00	81.54	150.980	10,965.61	-66.67	-1,283.83	14,455,427.97	1,691,939.34	39.80403296	-80.81654734
11,550.00	85.01	150.360	10,971.11	-107.35	-1,260.96	14,455,387.29	1,691,962.20	39.80392110	-80.81646624
11,598.00	87.08	150.180	10,974.42	-148.93	-1,237.22	14,455,345.71	1,691,985.94	39.80380677	-80.81638199
11,692.00	88.66	149.740	10,977.91	-230.25	-1,190.20	14,455,264.39	1,692,032.96	39.80358320	-80.81621516
11,787.00	88.53	149.570	10,980.24	-312.21	-1,142.22	14,455,182.43	1,692,080.94	39.80335784	-80.81604492
11,881.00	89.89	150.450	10,981.54	-393.61	-1,095.24	14,455,101.03	1,692,127.92	39.80313402	-80.81587825
11,976.00	89.14	151.060	10,982.34	-476.50	-1,048.83	14,455,018.14	1,692,174.33	39.80290612	-80.81571361
12,070.00	90.24	150.540	10,982.85	-558.55	-1,002.97	14,454,936.09	1,692,220.19	39.80268053	-80.81555093
12,165.00	89.76	150.540	10,982.85	-641.27	-956.25	14,454,853.37	1,692,266.91	39.80245310	-80.81538519
12,260.00	89.19	150.710	10,983.72	-724.05	-909.65	14,454,770.59	1,692,313.51	39.80222550	-80.81521988
12,354.00	90.51	150.010	10,983.97	-805.75	-863.16	14,454,688.89	1,692,360.00	39.80200087	-80.81505497
12,448.00	89.85	149.920	10,983.67	-887.12	-816.11	14,454,607.52	1,692,407.05	39.80177712	-80.81488805
12,543.00	89.41	149.830	10,984.29	-969.29	-768.44	14,454,525.35	1,692,454.72	39.80155120	-80.81471890
12,637.00	89.19	150.180	10,985.44	-1,050.70	-721.45	14,454,443.95	1,692,501.71	39.80132737	-80.81455220
12,732.00	91.25	150.360	10,985.07	-1,133.19	-674.34	14,454,361.46	1,692,548.82	39.80110057	-80.81438508
12,827.00	90.59	150.270	10,983.54	-1,215.71	-627.30	14,454,278.94	1,692,595.86	39.80087367	-80.81421820
12,921.00	90.37	150.270	10,982.76	-1,297.33	-580.68	14,454,197.31	1,692,642.48	39.80064924	-80.81405284
13,016.00	89.54	150.800	10,982.83	-1,380.04	-533.95	14,454,114.60	1,692,689.21	39.80042183	-80.81388707
13,111.00	89.01	152.380	10,984.03	-1,463.59	-488.76	14,454,031.05	1,692,734.40	39.80019212	-80.81372678
13,205.00	88.62	151.940	10,985.98	-1,546.69	-444.87	14,453,947.95	1,692,778.29	39.79996365	-80.81357114
13,299.00	86.09	152.210	10,988.68	-1,629.71	-400.87	14,453,864.93	1,692,822.29	39.79973541	-80.81341509



Survey Report - Geographic



Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Woodford
Well: Woodford 07HU (G)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference:
TVD Reference: Well Woodford 07HU (G)
 RKB=1235+33 @ 1268.00ft (Nabors X08)
MD Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: 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
13,394.00	89.45	151.150	10,990.72	-1,713.32	-355.81	14,453,781.32	1,692,867.35	39.79950554	-80.81325529
13,488.00	89.14	148.780	10,991.87	-1,794.69	-308.77	14,453,699.96	1,692,914.39	39.79928182	-80.81308841
13,583.00	88.57	148.160	10,993.77	-1,875.64	-259.10	14,453,619.00	1,692,964.06	39.79905920	-80.81291217
13,678.00	88.00	147.810	10,996.61	-1,956.16	-208.76	14,453,538.48	1,693,014.40	39.79883780	-80.81273354
13,772.00	89.85	148.340	10,998.38	-2,035.92	-159.06	14,453,458.72	1,693,064.10	39.79861846	-80.81255720
13,867.00	89.05	148.070	10,999.29	-2,116.66	-109.01	14,453,377.98	1,693,114.15	39.79839644	-80.81237960
13,961.00	89.98	149.220	11,000.09	-2,196.93	-60.10	14,453,297.71	1,693,163.06	39.79817572	-80.81220607
14,055.00	89.14	147.280	11,000.81	-2,276.86	-10.64	14,453,217.79	1,693,212.52	39.79795594	-80.81203058
14,150.00	88.75	147.460	11,002.56	-2,356.85	40.57	14,453,137.80	1,693,263.73	39.79773596	-80.81184883
14,244.00	88.66	149.570	11,004.68	-2,436.98	89.65	14,453,057.66	1,693,312.81	39.79751560	-80.81167470
14,339.00	89.27	150.180	11,006.40	-2,519.14	137.32	14,452,975.51	1,693,360.48	39.79728971	-80.81150560
14,433.00	88.97	150.450	11,007.84	-2,600.79	183.87	14,452,893.85	1,693,407.03	39.79706520	-80.81134049
14,528.00	90.29	150.980	11,008.45	-2,683.65	230.34	14,452,811.00	1,693,453.49	39.79683738	-80.81117568
14,622.00	89.63	150.710	11,008.52	-2,765.74	276.13	14,452,728.91	1,693,499.29	39.79661168	-80.81101326
14,716.00	89.14	150.620	11,009.42	-2,847.72	322.12	14,452,646.93	1,693,545.27	39.79638628	-80.81085016
14,810.00	89.14	150.620	11,010.73	-2,929.66	368.16	14,452,564.99	1,693,591.32	39.79616098	-80.81068684
14,905.00	90.02	151.330	11,011.42	-3,012.72	414.26	14,452,481.93	1,693,637.41	39.79593260	-80.81052337
15,000.00	89.49	150.800	11,011.83	-3,095.86	460.22	14,452,398.79	1,693,683.37	39.79570400	-80.81036036
15,094.00	89.10	150.980	11,012.98	-3,177.98	505.94	14,452,316.67	1,693,729.10	39.79547821	-80.81019819
15,189.00	86.70	151.060	11,014.81	-3,261.07	551.96	14,452,233.58	1,693,775.12	39.79524976	-80.81003498
15,284.00	88.31	151.330	11,017.29	-3,344.29	597.72	14,452,150.36	1,693,820.88	39.79502096	-80.80987271
15,378.00	90.02	152.650	11,018.66	-3,427.26	641.86	14,452,067.38	1,693,865.01	39.79479283	-80.80971620
15,473.00	89.98	153.350	11,018.66	-3,511.91	684.99	14,451,982.74	1,693,908.14	39.79456012	-80.80956330
15,568.00	90.33	151.330	11,018.40	-3,596.05	729.09	14,451,898.60	1,693,952.24	39.79432879	-80.80940694
15,662.00	90.24	150.450	11,017.93	-3,678.17	774.81	14,451,816.48	1,693,997.97	39.79410299	-80.80924476
15,757.00	89.89	149.920	11,017.83	-3,760.60	822.05	14,451,734.05	1,694,042.20	39.79387635	-80.80909723
15,851.00	88.97	148.780	11,019.68	-3,843.29	868.47	14,451,652.90	1,694,086.33	39.79365319	-80.80890901
15,946.00	88.66	148.600	11,019.68	-3,923.29	918.21	14,451,571.36	1,694,131.37	39.79342899	-80.80873612
16,041.00	88.66	148.600	11,021.64	-4,004.43	967.57	14,451,490.21	1,694,176.41	39.79320585	-80.80856102
16,133.00	90.37	148.950	11,022.42	-4,083.10	1,015.26	14,451,411.55	1,694,238.41	39.79298953	-80.80839185
16,228.00	90.73	149.040	11,021.51	-4,164.52	1,064.19	14,451,330.13	1,694,287.35	39.79276563	-80.80821827
16,322.00	90.33	149.040	11,020.64	-4,245.13	1,112.55	14,451,249.52	1,694,335.70	39.79254399	-80.80804674
16,417.00	89.49	148.690	11,020.79	-4,326.44	1,161.67	14,451,168.21	1,694,384.82	39.79232039	-80.80787249
16,512.00	88.97	148.430	11,022.06	-4,407.49	1,211.21	14,451,087.16	1,694,434.37	39.79209752	-80.80769672
16,606.00	88.36	150.710	11,023.43	-4,488.52	1,258.82	14,451,006.13	1,694,481.97	39.79187469	-80.80752788
16,701.00	88.97	150.360	11,024.82	-4,571.23	1,305.54	14,450,923.42	1,694,528.70	39.79164729	-80.80736218
16,795.00	89.05	149.740	11,026.44	-4,652.66	1,352.46	14,450,841.99	1,694,575.62	39.79142337	-80.80719576
16,894.00	90.24	149.830	11,028.73	-4,734.93	1,399.95	14,450,759.72	1,694,623.10	39.79119717	-80.80702735
17,079.00	90.29	150.100	11,028.29	-4,816.37	1,446.87	14,450,678.28	1,694,670.03	39.79097323	-80.806866092
17,173.00	89.41	149.660	11,028.54	-4,898.61	1,494.42	14,450,596.04	1,694,717.58	39.79074709	-80.80669228
17,267.00	88.70	148.310	11,030.09	-4,979.92	1,541.59	14,450,514.73	1,694,764.75	39.79052352	-80.80652498
17,362.00	89.05	148.950	11,031.95	-5,060.99	1,589.32	14,450,433.76	1,694,812.47	39.79030087	-80.80635572
17,457.00	89.10	149.570	11,033.49	-5,142.41	1,638.05	14,450,352.24	1,694,861.21	39.79007669	-80.80618286
17,551.00	90.29	150.100	11,033.99	-5,224.05	1,686.60	14,450,270.60	1,694,909.76	39.78985219	-80.80601065
17,646.00	90.68	150.100	11,033.18	-5,305.32	1,733.84	14,450,189.33	1,694,956.99	39.78962873	-80.80584313
17,741.00	90.55	150.180	11,032.16	-5,387.67	1,781.19	14,450,106.98	1,695,004.34	39.78940228	-80.80567519
17,836.00	89.98	150.540	11,031.73	-5,470.06	1,828.49	14,450,024.59	1,695,051.64	39.78917575	-80.80550746
17,931.00	89.58	150.360	11,032.09	-5,552.63	1,875.47	14,449,942.03	1,695,098.62	39.78894872	-80.80534086
18,025.00	88.40	150.180	11,033.75	-5,635.27	1,922.32	14,449,859.38	1,695,145.47	39.78872148	-80.80517471
18,120.00	89.67	148.740	11,035.35	-5,716.98	1,968.93	14,449,777.77	1,695,192.08	39.78849707	-80.80500943
18,214.00	88.40	149.830	11,036.93	-5,799.11	2,016.48	14,449,695.55	1,695,239.63	39.78827097	-80.80484080
18,240.00	88.09	149.570	11,037.73	-5,880.32	2,063.77	14,449,614.33	1,695,286.93	39.78804765	-80.80467307
				-5,902.76	2,076.89	14,449,531.89	1,695,300.04	39.78798595	-80.80462657

Survey @ 18240.00 MD 11037.73 TVD



Survey Report - Geographic

Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Woodford
Well: Woodford 07HU (G)
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Woodford 07HU (G)
TVD Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
MD Reference: RKB=1235+33 @ 1268.00ft (Nabors X08)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: DB_Aug1919_v14

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/AW (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
18,299.00	88.09	149.570	11,039.69	-5,953.60	2,106.75	14,449,541.05	1,695,329.91	39.78784614	-80.80452065

Survey projected to 18299.00 MD 11039.69 TVD

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	Local Coordinates +E/AW (ft)	Comment
189.00	188.99	0.84	-1.14	MWD surveys
18,240.00	11,037.73	-5,902.76	2,076.89	Survey @ 18240.00 MD 11037.73 TVD
18,299.00	11,039.69	-5,953.60	2,106.75	Survey projected to 18299.00 MD 11039.69 TVD