



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Woodford 08HU (H)
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 08HU (H)	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	Northing:	14,455,471.78 usft	Latitude:	39.80414597
Site Position:		Easting:	1,693,217.70 usft	Longitude:	-80.81196526
From:	Lat/Long	Slot Radius:	13-3/16 "	Grid Convergence:	0.120 °
Position Uncertainty:	0.00 ft				

Well	Woodford 08HU (H)	+N/-S	0.00 ft	Northing:	14,455,506.32 usft	Latitude:	39.80424078
Well Position		+E/-W	0.00 ft	Easting:	1,693,225.91 usft	Longitude:	-80.81196578
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	6/16/2019	-8.683	66.817	51,963.63501924		

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	149.180		

Survey Program	From (ft)	To (ft)	Date	Survey (Wellbore)	Tool Name	Description
	209.00	896.00	10/30/2019	MWD surf (Original Hole)	MWD	MWD - Standard
	1,030.00	2,686.00		MWD int (Original Hole)	MWD	MWD - Standard
	2,812.00	18,755.00		MWD (Original Hole)	MWD	MWD - Standard
	18,814.00	18,814.00		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	14,455,506.32	1,693,225.91	39.80424078	-80.81196578	
	209.00	0.30	133.060	209.00	-0.37	0.40	14,455,505.94	1,693,226.31	39.80423975	-80.81196436	
	MWD surveys										
	254.00	0.32	139.940	254.00	-0.55	0.57	14,455,505.77	1,693,226.47	39.80423927	-80.81196377	
	294.00	0.29	148.340	284.00	-0.68	0.66	14,455,505.64	1,693,226.57	39.80423891	-80.81196343	
	314.00	0.26	149.840	314.00	-0.80	0.73	14,455,505.51	1,693,226.64	39.80423857	-80.81196317	
	344.00	0.14	120.680	344.00	-0.88	0.80	14,455,505.44	1,693,226.71	39.80423836	-80.81196294	
	376.00	0.36	98.240	376.00	-0.91	0.93	14,455,505.40	1,693,226.84	39.80423827	-80.81196246	
	406.00	0.36	144.140	406.00	-1.00	1.08	14,455,505.31	1,693,226.99	39.80423802	-80.81196194	



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Wellbore: Original Hole
Design: Surveys Original Hole

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TVD Reference: Well Woodford 08HU (H)
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
435.00	0.27	104.520	435.00	-1.10	1.20	14,455,505.22	1,693,227.11	39.80423777	-80.81196151
465.00	0.05	257.450	465.00	-1.12	1.26	14,455,505.20	1,693,227.17	39.80423771	-80.81196131
495.00	0.22	171.350	495.00	-1.18	1.25	14,455,505.14	1,693,227.16	39.80423755	-80.81196133
524.00	0.09	97.000	524.00	-1.23	1.28	14,455,505.08	1,693,227.19	39.80423739	-80.81196122
555.00	0.27	150.930	555.00	-1.30	1.34	14,455,505.02	1,693,227.25	39.80423720	-80.81196101
585.00	0.15	77.680	585.00	-1.35	1.42	14,455,504.96	1,693,227.32	39.80423703	-80.81196075
614.00	0.24	105.840	614.00	-1.36	1.51	14,455,504.95	1,693,227.42	39.80423703	-80.81196041
644.00	0.12	186.260	644.00	-1.41	1.57	14,455,504.91	1,693,227.48	39.80423690	-80.81196021
676.00	0.31	116.870	676.00	-1.48	1.64	14,455,504.83	1,693,227.55	39.80423670	-80.81195994
707.00	0.17	126.560	706.99	-1.55	1.75	14,455,504.77	1,693,227.66	39.80423652	-80.81195955
739.00	0.13	227.790	738.99	-1.60	1.77	14,455,504.66	1,693,227.67	39.80423638	-80.81195951
770.00	0.18	133.250	769.99	-1.66	1.77	14,455,504.66	1,693,227.68	39.80423622	-80.81195947
801.00	0.15	17.930	800.99	-1.65	1.82	14,455,504.66	1,693,227.73	39.80423623	-80.81195930
896.00	0.47	261.440	895.99	-1.59	1.48	14,455,504.72	1,693,227.38	39.80423640	-80.81196054
1,030.00	1.11	263.060	1,029.98	-1.83	-0.36	14,455,504.49	1,693,225.55	39.80423576	-80.81196706
1,080.00	1.08	267.820	1,079.97	-1.91	-1.31	14,455,504.41	1,693,224.60	39.80423555	-80.81197045
1,174.00	0.31	137.590	1,173.97	-2.13	-2.02	14,455,504.19	1,693,223.89	39.80423495	-80.81197300
1,269.00	0.55	97.860	1,268.96	-2.38	-1.40	14,455,503.94	1,693,224.51	39.80423425	-80.81197077
1,364.00	0.39	167.570	1,363.96	-2.76	-0.88	14,455,503.56	1,693,225.03	39.80423321	-80.81196892
1,458.00	0.47	147.110	1,457.96	-3.40	-0.60	14,455,502.92	1,693,225.31	39.80423146	-80.81196793
1,552.00	0.40	222.260	1,551.96	-3.96	-0.61	14,455,502.35	1,693,225.30	39.80422991	-80.81196791
1,647.00	0.63	190.410	1,646.95	-4.72	-0.93	14,455,501.60	1,693,224.98	39.80422782	-80.81196911
1,741.00	0.30	319.160	1,740.95	-5.04	-1.18	14,455,501.27	1,693,224.73	39.80422694	-80.81197002
1,835.00	0.22	350.210	1,834.95	-4.68	-1.37	14,455,501.64	1,693,224.54	39.80422794	-80.81197070
1,930.00	0.09	170.870	1,929.95	-4.57	-1.39	14,455,501.74	1,693,224.52	39.80422823	-80.81197222
2,025.00	0.57	279.890	2,024.95	-4.57	-1.84	14,455,501.75	1,693,224.06	39.80422825	-80.81197238
2,119.00	1.01	272.420	2,118.94	-4.45	-3.13	14,455,502.11	1,693,222.78	39.80422858	-80.81197697
2,213.00	0.58	295.570	2,212.93	-4.21	-4.39	14,455,502.11	1,693,221.52	39.80422925	-80.81198144
2,307.00	0.48	288.010	2,306.93	-3.88	-5.19	14,455,502.43	1,693,220.71	39.80423015	-80.81198430
2,402.00	0.79	61.660	2,401.92	-3.45	-5.00	14,455,502.87	1,693,220.91	39.80423134	-80.81198559
2,496.00	1.35	81.180	2,495.91	-2.97	-3.33	14,455,503.34	1,693,222.58	39.80423264	-80.81197766
2,591.00	0.63	54.000	2,590.89	-2.49	-1.80	14,455,503.82	1,693,224.11	39.80423395	-80.81197222
2,686.00	0.66	354.610	2,685.89	-1.64	-1.43	14,455,504.68	1,693,224.48	39.80423628	-80.81197089
2,812.00	0.74	11.350	2,811.88	-0.12	-1.34	14,455,506.20	1,693,224.57	39.80424046	-80.81197055
2,874.00	1.04	14.150	2,873.87	0.82	-1.12	14,455,507.13	1,693,224.79	39.80424303	-80.81196977
2,969.00	1.08	15.380	2,968.85	2.52	-0.67	14,455,508.83	1,693,225.23	39.80424770	-80.81196816
3,064.00	0.81	353.140	3,063.84	4.05	-0.52	14,455,510.36	1,693,225.39	39.80425190	-80.81196759
3,159.00	0.58	314.210	3,158.84	5.05	-0.94	14,455,511.36	1,693,224.97	39.80425465	-80.81196910
3,253.00	0.81	306.160	3,252.83	5.77	-1.82	14,455,512.09	1,693,224.09	39.80425664	-80.81197222
3,348.00	0.97	311.800	3,347.82	6.70	-2.96	14,455,513.02	1,693,222.95	39.80425921	-80.81197628
3,442.00	1.16	314.820	3,441.80	7.91	-4.23	14,455,514.22	1,693,221.68	39.80426252	-80.81198078
3,540.00	1.11	319.170	3,539.78	9.32	-5.55	14,455,515.64	1,693,220.35	39.80426642	-80.81198549
3,632.00	2.74	322.670	3,631.73	11.75	-7.47	14,455,518.06	1,693,218.44	39.80427308	-80.81199229
3,727.00	4.47	328.900	3,726.53	16.72	-10.76	14,455,523.04	1,693,215.15	39.80428677	-80.81200397
3,822.00	6.35	335.350	3,821.11	24.67	-14.86	14,455,530.98	1,693,211.05	39.80430861	-80.81201852
3,917.00	8.65	335.320	3,915.29	35.93	-20.04	14,455,542.25	1,693,205.87	39.80433958	-80.81203686
4,011.00	10.69	335.980	4,007.95	50.32	-26.54	14,455,556.64	1,693,199.37	39.80437913	-80.81205990
4,106.00	12.61	338.710	4,100.99	68.03	-33.89	14,455,574.35	1,693,192.02	39.80442782	-80.81208595
4,200.00	14.66	340.120	4,192.33	88.78	-41.66	14,455,595.10	1,693,184.25	39.80446485	-80.81211346
4,295.00	16.19	339.590	4,283.91	112.50	-50.37	14,455,618.82	1,693,175.54	39.804455003	-80.81214429
4,389.00	16.79	331.160	4,374.06	136.68	-61.49	14,455,643.00	1,693,164.42	39.804461650	-80.81218370
4,484.00	15.66	330.410	4,465.27	159.85	-74.44	14,455,666.17	1,693,151.47	39.804468020	-80.81222964
4,578.00	15.91	332.190	4,565.73	182.28	-86.72	14,455,688.59	1,693,139.19	39.80447187	-80.81227318
4,673.00	15.93	334.120	4,647.08	205.53	-98.48	14,455,711.84	1,693,127.43	39.804480578	-80.81231490
4,767.00	15.69	335.390	4,737.53	228.69	-109.41	14,455,735.00	1,693,116.50	39.804486945	-80.81235362



TUG HILL
OPERATING

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Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,862.00	16.10	335.290	4,828.90	252.33	-120.26	14,455,758.65	1,693,105.65	39.804993445	-80.81239210
4,956.00	16.94	332.350	4,919.02	276.30	-132.07	14,455,782.62	1,693,093.84	39.805000035	-80.81243395
5,051.00	17.31	332.240	5,009.80	301.07	-145.07	14,455,807.39	1,693,080.84	39.805068844	-80.81248008
5,145.00	15.75	329.450	5,099.92	324.43	-158.07	14,455,830.75	1,693,067.84	39.80513267	-80.81252619
5,240.00	15.75	328.260	5,191.35	346.50	-171.41	14,455,852.82	1,693,054.50	39.80519336	-80.81257351
5,335.00	15.56	327.840	5,282.83	368.25	-184.97	14,455,874.57	1,693,040.94	39.80525317	-80.81262165
5,430.00	14.90	327.890	5,374.49	389.39	-198.25	14,455,895.70	1,693,027.66	39.80531128	-80.81266876
5,525.00	13.70	331.810	5,466.55	409.65	-210.05	14,455,915.96	1,693,015.86	39.80536700	-80.81271065
5,619.00	14.71	333.990	5,557.67	430.19	-220.55	14,455,936.50	1,693,005.36	39.80542346	-80.81274785
5,714.00	16.80	335.810	5,648.10	453.55	-231.46	14,455,959.87	1,692,994.45	39.80548769	-80.81278655
5,808.00	17.44	335.730	5,738.93	478.79	-242.82	14,455,985.10	1,692,983.09	39.80555705	-80.81282680
5,903.00	16.90	334.360	5,829.70	504.21	-254.64	14,456,010.53	1,692,971.27	39.80562696	-80.81286870
5,998.00	16.00	329.720	5,920.81	527.97	-267.21	14,456,034.29	1,692,958.69	39.80569228	-80.81291330
6,092.00	16.27	327.270	6,011.11	550.24	-280.87	14,456,056.55	1,692,945.04	39.80575350	-80.81296174
6,187.00	15.83	329.340	6,102.41	572.58	-294.67	14,456,078.89	1,692,931.24	39.80581493	-80.81301072
6,282.00	15.29	332.070	6,193.93	594.79	-307.14	14,456,101.11	1,692,918.76	39.80587601	-80.81305498
6,377.00	13.86	332.740	6,285.87	615.98	-318.22	14,456,122.29	1,692,907.69	39.80593425	-80.81309427
6,474.00	13.95	332.770	6,380.03	636.70	-328.89	14,456,143.02	1,692,897.01	39.80599122	-80.81313211
6,569.00	14.11	332.510	6,472.19	657.15	-339.48	14,456,163.47	1,692,886.43	39.80604746	-80.81316965
6,664.00	14.52	331.380	6,564.24	677.88	-350.53	14,456,184.20	1,692,875.38	39.80610444	-80.81320884
6,755.00	15.09	330.430	6,652.22	698.20	-361.84	14,456,204.51	1,692,864.07	39.80616030	-80.81324896
6,850.00	15.66	330.320	6,743.82	720.09	-374.29	14,456,226.41	1,692,851.62	39.80622050	-80.81329313
6,945.00	16.15	329.590	6,835.18	742.63	-387.33	14,456,248.94	1,692,838.58	39.80628246	-80.81333393
7,039.00	16.48	329.190	6,925.40	765.35	-400.77	14,456,271.67	1,692,825.14	39.80634495	-80.81338709
7,134.00	17.54	330.910	7,016.24	789.44	-414.64	14,456,295.75	1,692,811.27	39.80641117	-80.81343627
7,229.00	15.61	332.690	7,107.29	813.30	-427.46	14,456,319.62	1,692,798.45	39.80647679	-80.81348176
7,323.00	13.45	332.990	7,198.28	834.28	-438.23	14,456,340.60	1,692,787.68	39.80653447	-80.81351995
7,418.00	14.23	332.860	7,290.52	854.52	-448.57	14,456,360.83	1,692,777.34	39.80659009	-80.81355664
7,513.00	15.43	331.180	7,382.35	875.98	-459.99	14,456,382.30	1,692,765.92	39.80664911	-80.81359714
7,607.00	15.58	329.270	7,472.93	897.79	-472.47	14,456,404.10	1,692,753.44	39.80670906	-80.81364141
7,702.00	15.23	331.840	7,564.52	919.76	-484.88	14,456,426.07	1,692,741.03	39.80676946	-80.81368543
7,797.00	15.16	334.110	7,656.20	941.93	-496.19	14,456,448.25	1,692,729.72	39.80683043	-80.81372554
7,891.00	14.61	331.560	7,747.05	963.42	-507.20	14,456,469.73	1,692,718.70	39.80689439	-80.81376460
7,985.00	15.39	332.800	7,837.84	984.94	-518.55	14,456,491.25	1,692,707.36	39.80694865	-80.81380485
8,080.00	16.25	334.980	7,929.25	1,008.19	-529.94	14,456,514.51	1,692,695.97	39.80701259	-80.81384521
8,175.00	16.18	334.910	8,020.47	1,032.22	-541.17	14,456,538.54	1,692,684.74	39.80707865	-80.81388503
8,269.00	16.01	334.720	8,110.78	1,055.81	-552.26	14,456,562.12	1,692,673.65	39.80714348	-80.81392435
8,364.00	15.81	337.010	8,202.22	1,079.31	-562.80	14,456,585.62	1,692,663.11	39.80720808	-80.81396170
8,458.00	15.81	337.670	8,292.75	1,102.69	-572.56	14,456,609.00	1,692,653.35	39.80727234	-80.81403062
8,553.00	15.85	338.390	8,384.14	1,126.72	-582.25	14,456,633.03	1,692,643.66	39.80733839	-80.8140818
8,648.00	17.47	335.970	8,475.15	1,151.80	-592.85	14,456,658.11	1,692,633.06	39.80740733	-80.81411154
8,742.00	18.14	333.740	8,564.65	1,177.81	-605.09	14,456,684.12	1,692,620.82	39.80747882	-80.814145621
8,837.00	17.67	332.690	8,655.05	1,203.88	-618.24	14,456,710.19	1,692,607.66	39.80755050	-80.81420411
8,931.00	16.34	331.070	8,744.94	1,228.13	-631.19	14,456,734.44	1,692,594.72	39.80761177	-80.81424688
9,026.00	14.47	331.890	8,836.52	1,250.30	-643.24	14,456,756.61	1,692,582.66	39.80767811	-80.81428496
9,120.00	14.24	333.250	8,927.59	1,270.98	-653.98	14,456,777.29	1,692,571.93	39.80773498	-80.81428496
9,214.00	15.46	331.020	9,018.45	1,292.26	-665.26	14,456,798.58	1,692,560.65	39.80779349	-80.81432495
9,308.00	16.88	327.920	9,109.73	1,314.79	-676.58	14,456,821.10	1,692,547.33	39.80785543	-80.81437221
9,403.00	16.25	328.580	9,199.78	1,337.82	-692.83	14,456,844.13	1,692,533.08	39.80791876	-80.81442280
9,497.00	14.88	333.940	9,290.34	1,359.89	-704.99	14,456,866.20	1,692,520.92	39.80797843	-80.81446593
9,592.00	15.94	335.530	9,381.95	1,382.64	-715.72	14,456,888.96	1,692,510.19	39.80804199	-80.81450397
9,687.00	15.10	333.880	9,473.50	1,405.56	-726.54	14,456,911.87	1,692,499.37	39.80810497	-80.81454232
9,781.00	14.31	330.770	9,564.42	1,426.69	-737.60	14,456,933.00	1,692,486.31	39.80816307	-80.81458156
9,876.00	15.80	328.960	9,656.16	1,448.02	-750.00	14,456,954.33	1,692,475.91	39.80822171	-80.81462557
9,970.00	17.28	327.760	9,746.27	1,470.79	-764.05	14,456,977.10	1,692,461.86	39.80828434	-80.81467542



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Woodford 08HU (H)
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 08HU (H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	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
10,030.00	18.47	327.700	9,803.37	1,486.36	-773.88	14,456,992.67	1,692,452.03	39.80832716	-80.81471032
10,134.00	18.90	328.350	9,901.89	1,514.63	-791.53	14,457,020.94	1,692,434.38	39.80840488	-80.81477293
10,181.00	17.89	327.560	9,946.49	1,527.20	-799.39	14,457,033.51	1,692,426.52	39.80843945	-80.81480085
10,228.00	13.58	327.730	9,991.72	1,537.96	-806.21	14,457,044.27	1,692,419.70	39.80846905	-80.81482506
10,276.00	9.49	328.790	10,038.74	1,546.11	-811.27	14,457,052.43	1,692,414.64	39.80849147	-80.81484302
10,323.00	4.75	325.620	10,085.36	1,551.04	-814.38	14,457,057.35	1,692,411.53	39.80850500	-80.81485405
10,370.00	0.84	281.150	10,132.30	1,552.71	-815.82	14,457,059.02	1,692,410.09	39.80850961	-80.81485916
10,417.00	2.77	182.980	10,179.28	1,551.64	-816.22	14,457,057.96	1,692,409.69	39.80850668	-80.81486058
10,465.00	6.42	179.200	10,227.12	1,547.80	-816.24	14,457,054.11	1,692,409.67	39.80849612	-80.81486069
10,512.00	10.29	170.410	10,273.61	1,541.03	-815.50	14,457,047.34	1,692,410.41	39.80847753	-80.81485812
10,559.00	14.86	162.320	10,319.48	1,531.14	-812.97	14,457,037.46	1,692,412.94	39.80845036	-80.81484918
10,606.00	18.86	154.590	10,364.45	1,518.53	-807.88	14,457,024.85	1,692,418.03	39.80841570	-80.81483114
10,652.00	22.46	151.070	10,407.49	1,504.12	-800.44	14,457,010.43	1,692,425.47	39.80837608	-80.81480474
10,699.00	25.76	148.350	10,450.38	1,487.56	-790.73	14,456,993.88	1,692,435.18	39.80833056	-80.81477030
10,746.00	29.01	144.570	10,492.12	1,469.58	-778.76	14,456,975.89	1,692,447.15	39.80828109	-80.81472781
10,793.00	32.09	144.130	10,532.59	1,450.17	-764.84	14,456,956.48	1,692,461.07	39.80822771	-80.81467837
10,840.00	34.77	144.740	10,571.81	1,429.11	-749.78	14,456,912.62	1,692,476.13	39.80816978	-80.81462492
10,887.00	37.45	146.060	10,609.77	1,406.30	-734.06	14,456,861.10	1,692,491.85	39.80810707	-80.81456912
10,935.00	40.70	146.330	10,647.03	1,381.16	-717.23	14,456,887.48	1,692,508.67	39.80803794	-80.81450938
10,982.00	43.43	147.470	10,681.92	1,354.78	-700.05	14,456,832.65	1,692,525.86	39.80796539	-80.81444837
11,030.00	45.78	147.730	10,716.10	1,326.33	-681.99	14,456,803.46	1,692,542.03	39.80788715	-80.81438429
11,077.00	48.18	148.610	10,748.17	1,297.14	-663.88	14,456,832.65	1,692,562.03	39.80770286	-80.81432501
11,125.00	50.68	149.560	10,779.39	1,265.86	-645.16	14,456,772.17	1,692,580.75	39.80772066	-80.81425358
11,172.00	53.45	149.670	10,808.28	1,233.88	-626.42	14,456,740.19	1,692,599.49	39.80763293	-80.81418708
11,220.00	56.26	149.230	10,835.91	1,200.08	-606.47	14,456,706.40	1,692,619.44	39.80754001	-80.81411629
11,267.00	58.29	148.250	10,861.31	1,166.29	-585.95	14,456,672.60	1,692,639.96	39.80744708	-80.81404348
11,315.00	60.75	147.280	10,885.66	1,131.30	-563.88	14,456,637.62	1,692,662.03	39.80735088	-80.81396516
11,362.00	64.66	147.200	10,907.21	1,096.19	-541.28	14,456,602.50	1,692,684.63	39.80725431	-80.81388496
11,409.00	67.12	148.070	10,926.41	1,059.95	-518.32	14,456,566.27	1,692,707.59	39.80715467	-80.81380347
11,456.00	70.02	150.710	10,943.58	1,022.30	-496.06	14,456,528.62	1,692,729.85	39.80705114	-80.81372448
11,504.00	74.24	151.330	10,958.31	982.34	-473.93	14,456,488.66	1,692,751.98	39.80694128	-80.81364599
11,551.00	78.68	150.450	10,969.31	942.43	-451.71	14,456,448.75	1,692,774.20	39.80683155	-80.81356714
11,598.00	83.56	150.540	10,976.56	902.03	-428.84	14,456,408.35	1,692,797.07	39.80672047	-80.81348603
11,692.00	88.88	151.680	10,982.75	819.94	-383.55	14,456,326.25	1,692,842.36	39.80649476	-80.81332535
11,787.00	88.65	151.410	10,984.80	736.44	-338.29	14,456,242.75	1,692,887.62	39.80628518	-80.81316484
11,882.00	89.54	150.620	10,986.30	653.35	-292.26	14,456,159.66	1,692,933.64	39.80603673	-80.81300156
11,976.00	89.41	149.920	10,987.16	571.72	-245.65	14,456,078.04	1,692,980.26	39.80581230	-80.81283619
12,070.00	88.35	149.740	10,989.00	490.47	-198.42	14,455,996.79	1,693,027.49	39.80558890	-80.81266862
12,166.00	90.02	149.230	10,990.37	407.78	-149.68	14,455,914.10	1,693,076.23	39.80536152	-80.81249569
12,260.00	90.20	149.230	10,990.19	327.01	-101.59	14,455,833.33	1,693,124.32	39.80513944	-80.81232507
12,355.00	90.59	149.930	10,989.53	245.10	-53.49	14,455,751.41	1,693,172.42	39.80491419	-80.81215441
12,449.00	90.33	150.190	10,988.78	163.64	-6.58	14,455,669.96	1,693,219.33	39.80469023	-80.81198798
12,543.00	89.80	150.810	10,988.67	81.83	39.71	14,455,588.15	1,693,265.62	39.80446528	-80.81182378
12,638.00	88.48	151.070	10,990.10	-1.20	85.85	14,455,505.12	1,693,311.76	39.80423699	-80.81166612
12,733.00	88.66	150.900	10,992.47	-84.25	131.91	14,455,422.07	1,693,357.82	39.80400865	-80.81149673
12,827.00	88.97	151.070	10,994.41	-166.44	177.50	14,455,339.88	1,693,403.40	39.80378268	-80.81133504
12,922.00	88.84	150.900	10,996.23	-249.50	223.57	14,455,256.82	1,693,449.47	39.80355431	-80.81117163
13,017.00	88.70	150.990	10,998.27	-332.52	269.69	14,455,173.79	1,693,495.60	39.80332603	-80.81100802
13,112.00	87.87	149.320	11,001.11	-414.88	366.18	14,455,091.43	1,693,542.85	39.80309957	-80.81084039
13,206.00	88.48	147.470	11,004.10	-494.90	366.18	14,455,011.42	1,693,592.09	39.80287955	-80.81066569
13,300.00	89.41	147.470	11,005.83	-574.13	416.72	14,454,932.18	1,693,642.63	39.80266164	-80.81048634
13,394.00	89.89	148.350	11,006.41	-653.77	466.65	14,454,852.55	1,693,692.56	39.80244265	-80.81030914
13,489.00	90.33	148.350	11,006.23	-734.64	516.50	14,454,771.68	1,693,742.41	39.80222027	-80.81013227
13,584.00	89.89	148.350	11,006.04	-815.51	566.35	14,454,690.81	1,693,792.26	39.80199789	-80.80995539
13,678.00	89.76	147.730	11,006.33	-895.26	616.11	14,454,611.06	1,693,842.02	39.80177858	-80.80977884



Survey Report - Geographic



Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Woodford
Well: Woodford 08HU (H)
Wellbore: Original Hole
Design: Surveys Original Hole

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

Well Woodford 08HU (H)
RKB=1235+33 @ 1268.00ft (Nabors X08)
RKB=1235+33 @ 1268.00ft (Nabors X08)
Grid
Minimum Curvature
DB_Aug1919_v14

Survey

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 40 rows of survey data.

Survey @ 18755.00 MD 11065.91 TVD



Survey Report - Geographic

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Woodford 08HU (H)
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 08HU (H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	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
18,814.00	90.24	149.490	11,065.66	-5,339.46	3,187.81	14,450,166.87	1,696,413.71	39.78955826	-80.80065759

Survey projected to 18814.00 MD 11065.66 TVD

Design Annotations		Local Coordinates		Comment
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	
209.00	209.00	-0.37	0.40	MWD surveys
18,755.00	11,065.91	-5,288.63	3,157.86	Survey @ 18755.00 MD 11065.91 TVD
18,814.00	11,065.66	-5,339.46	3,187.81	Survey projected to 18814.00 MD 11065.66 TVD