





<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Heaven Hill 3-9HM (M)
<b>Project:</b>	Marshall County, West Virginia.	<b>TVD Reference:</b>	RKB=1326+26 @ 1352.00usft (Neighbors B-28)
<b>Site:</b>	Heaven Hill 3	<b>MD Reference:</b>	RKB=1326+26 @ 1352.00usft (Neighbors B-28)
<b>Well:</b>	Heaven Hill 3-9HM (M)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Jul2216cd_v14

**RECEIVED**  
Office of Oil and Gas

Survey

**JUL 1 0 2020**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N+S (usft)	+E+W (usft)	Map		Map Easting (usft)	Latitude	WV Department of Environmental Protection Longitude
						Map Northing (usft)	Map Easting (usft)			
436.00	0.56	113.58	436.00	-0.75	1.27	14,457,187.48	1,726,530.98	39,80860492	-80.69335948	
466.00	0.25	317.87	486.00	-0.76	1.36	14,457,187.47	1,726,531.07	39,80860490	-80.69335916	
496.00	0.21	172.11	496.00	-0.77	1.32	14,457,187.47	1,726,531.04	39,80860488	-80.69335929	
526.00	0.36	68.19	526.00	-0.79	1.42	14,457,187.45	1,726,531.13	39,80860483	-80.69335895	
557.00	0.20	18.54	557.00	-0.70	1.53	14,457,187.53	1,726,531.24	39,80860506	-80.69335857	
587.00	0.17	57.60	587.00	-0.63	1.58	14,457,187.61	1,726,531.29	39,80860527	-80.69335838	
618.00	0.43	106.16	618.00	-0.63	1.73	14,457,187.60	1,726,531.45	39,80860524	-80.69335784	
649.00	0.14	345.98	648.99	-0.63	1.83	14,457,187.60	1,726,531.55	39,80860525	-80.69335747	
679.00	0.25	261.74	678.99	-0.60	1.76	14,457,187.63	1,726,531.47	39,80860533	-80.69335774	
711.00	0.22	202.88	710.99	-0.67	1.67	14,457,187.56	1,726,531.38	39,80860514	-80.69335807	
742.00	0.29	259.32	741.99	-0.74	1.57	14,457,187.49	1,726,531.26	39,80860496	-80.69335843	
774.00	0.13	321.25	773.99	-0.73	1.47	14,457,187.51	1,726,531.18	39,80860499	-80.69335879	
806.00	0.35	55.96	805.99	-0.64	1.52	14,457,187.59	1,726,531.24	39,80860522	-80.69335858	
837.00	0.42	80.18	836.99	-0.57	1.71	14,457,187.66	1,726,531.43	39,80860542	-80.69335790	
869.00	0.39	317.77	868.99	-0.47	1.76	14,457,187.76	1,726,531.47	39,80860569	-80.69335775	
901.00	0.27	80.60	900.99	-0.38	1.76	14,457,187.86	1,726,531.47	39,80860595	-80.69335775	
932.00	0.38	115.59	931.99	-0.41	1.92	14,457,187.82	1,726,531.64	39,80860586	-80.69335716	
964.00	0.26	28.99	963.99	-0.39	2.05	14,457,187.84	1,726,531.77	39,80860591	-80.69335689	
984.00	0.52	150.18	983.99	-0.43	2.12	14,457,187.80	1,726,531.83	39,80860580	-80.69335645	
1,089.00	0.29	188.35	1,088.99	-1.11	2.32	14,457,187.13	1,726,532.03	39,80860394	-80.69335576	
1,182.00	0.09	352.87	1,181.99	-1.27	2.28	14,457,186.97	1,726,531.99	39,80860359	-80.69335591	
1,276.00	0.59	212.44	1,275.98	-2.30	1.57	14,457,185.94	1,726,531.28	39,80860068	-80.69335845	
1,370.00	4.13	208.48	1,369.85	-6.37	-0.75	14,457,181.86	1,726,528.97	39,80858951	-80.69336674	
1,464.00	7.50	204.85	1,463.36	-14.92	-4.94	14,457,173.32	1,726,524.77	39,80856608	-80.69336177	
1,559.00	10.45	202.53	1,557.18	-28.50	-10.85	14,457,159.73	1,726,518.86	39,80852883	-80.69340298	
1,654.00	12.74	201.16	1,650.24	-46.23	-17.93	14,457,142.00	1,726,511.78	39,80848020	-80.69345472	
1,748.00	15.43	196.59	1,741.41	-67.89	-25.25	14,457,120.35	1,726,504.47	39,80842080	-80.69345472	
1,842.00	16.52	191.02	1,831.78	-92.99	-31.37	14,457,095.24	1,726,498.34	39,80835192	-80.69347694	
1,937.00	17.68	188.43	1,922.58	-120.52	-36.07	14,457,067.71	1,726,493.65	39,80827636	-80.69349390	
2,031.00	19.07	189.58	2,011.79	-149.78	-40.72	14,457,038.45	1,726,489.00	39,80819604	-80.69351091	
2,125.00	20.73	198.18	2,100.19	-180.74	-48.46	14,457,007.49	1,726,481.25	39,80811110	-80.69353878	
2,220.00	24.56	204.22	2,187.86	-214.74	-61.82	14,456,973.50	1,726,467.90	39,80801786	-80.69358673	
2,314.00	29.67	204.10	2,271.50	-253.52	-79.34	14,456,934.42	1,726,450.37	39,80791071	-80.69364962	
2,408.00	34.39	201.63	2,351.17	-299.76	-98.64	14,456,888.48	1,726,431.07	39,80778472	-80.69371899	
2,502.00	38.36	195.66	2,426.87	-352.56	-116.31	14,456,835.67	1,726,413.40	39,80763988	-80.69378246	
2,597.00	37.68	191.32	2,501.72	-409.42	-129.97	14,456,778.81	1,726,399.74	39,80748384	-80.69383178	
2,692.00	36.25	187.93	2,576.62	-467.03	-139.73	14,456,721.21	1,726,389.99	39,80732575	-80.69386723	
2,787.00	36.13	188.20	2,652.30	-523.88	-147.78	14,456,664.36	1,726,381.93	39,80716969	-80.69389659	
2,881.00	33.46	189.40	2,729.49	-576.88	-155.97	14,456,611.35	1,726,373.75	39,80702420	-80.69392639	
2,955.00	33.09	189.49	2,791.35	-616.93	-162.63	14,456,571.30	1,726,367.08	39,80691428	-80.69395060	
3,050.00	33.66	189.67	2,870.69	-668.47	-171.33	14,456,519.77	1,726,356.39	39,80677284	-80.69398220	
3,165.00	39.86	194.27	2,962.79	-735.68	-185.78	14,456,452.56	1,726,343.93	39,80658640	-80.69403448	
3,260.00	42.48	194.43	3,034.30	-796.26	-201.28	14,456,391.98	1,726,326.43	39,80642217	-80.69409041	
3,355.00	41.43	196.49	3,104.95	-857.47	-218.20	14,456,330.77	1,726,311.52	39,80625424	-80.69415139	
3,449.00	41.99	194.95	3,175.12	-917.67	-235.14	14,456,270.57	1,726,294.58	39,80608907	-80.69421244	
3,544.00	39.35	195.77	3,247.17	-977.37	-251.52	14,456,210.87	1,726,278.19	39,80592526	-80.69427152	
3,639.00	36.79	201.03	3,321.98	-1,032.93	-269.93	14,456,155.31	1,726,259.79	39,80577287	-80.69433771	
3,734.00	38.69	200.13	3,397.10	-1,087.36	-290.35	14,456,100.87	1,726,239.36	39,80562356	-80.69441112	
3,828.00	38.09	196.30	3,470.79	-1,142.79	-306.61	14,456,045.45	1,726,221.11	39,80547153	-80.69447678	
3,923.00	37.63	198.37	3,545.79	-1,198.44	-325.97	14,455,989.80	1,726,203.74	39,80531886	-80.69453929	
4,018.00	37.49	195.35	3,621.11	-1,253.94	-342.77	14,455,934.39	1,726,186.95	39,80516696	-80.69459976	
4,112.00	36.83	196.71	3,696.02	-1,308.41	-358.44	14,455,879.82	1,726,171.27	39,80501714	-80.69465623	
4,207.00	37.71	200.08	3,771.63	-1,362.98	-376.60	14,455,825.25	1,726,153.11	39,80486746	-80.69472157	
4,301.00	38.07	197.82	3,845.82	-1,417.57	-395.34	14,455,770.66	1,726,134.37	39,80471770	-80.69478696	
4,396.00	38.04	194.39	3,920.63	-1,473.82	-411.58	14,455,714.42	1,726,118.13	39,80456340	-80.69484746	



Survey Report - Geographic



**Company:** Tug Hill Operating LLC  
**Project:** Marshall County, West Virginia.  
**Site:** Heaven Hill 3  
**Well:** Heaven Hill 3-9HM (M)  
**Wellbore:** Original Hole  
**Design:** Surveys Original Hole

**Local Co-ordinate Reference:**  
**TVD Reference:** Well Heaven Hill 3-9HM (M)  
**MD Reference:** RKB=1326+26 @ 1352.00usft (Neighbors B-28)  
**North Reference:** RKB=1326+26 @ 1352.00usft (Neighbors B-28)  
**Survey Calculation Method:** Grid  
**Database:** Minimum Curvature  
 DB\_Jul2216ct\_v14

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Survey

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map		Map Easting (usft)	Latitude	Longitude
						Map Northing (usft)	Map Easting (usft)			
4,491.00	36.50	196.35	3,996.23	-1,529.29	-426.81	14,455,666.95	1,726,102.90	39,80441121	-80.69490236	
4,586.00	35.38	197.75	4,073.15	-1,582.59	-443.15	14,455,605.64	1,726,086.56	39,80426497	-80.69496118	
4,681.00	35.73	194.43	4,150.44	-1,635.65	-458.45	14,455,552.58	1,726,071.26	39,80411939	-80.69501630	
4,776.00	35.04	196.35	4,227.90	-1,688.69	-473.04	14,455,489.55	1,726,056.67	39,80397388	-80.69506899	
4,871.00	36.51	198.16	4,304.97	-1,741.72	-489.53	14,455,446.52	1,726,040.19	39,80382641	-80.69512824	
4,966.00	37.64	195.96	4,380.77	-1,796.46	-506.31	14,455,391.77	1,726,023.40	39,80367622	-80.69518867	
5,060.00	37.77	193.06	4,455.14	-1,852.11	-520.71	14,455,336.13	1,726,009.00	39,80352555	-80.69524091	
5,155.00	36.61	195.42	4,530.63	-1,907.76	-534.82	14,455,280.47	1,725,994.90	39,80337284	-80.69529151	
5,250.00	36.16	196.73	4,607.31	-1,961.62	-551.35	14,455,226.62	1,725,978.36	39,80322509	-80.69535103	
5,344.00	36.31	197.63	4,682.15	-2,015.65	-569.08	14,455,172.58	1,725,960.63	39,80307686	-80.69541482	
5,439.00	39.00	194.70	4,756.34	-2,072.64	-585.59	14,455,115.60	1,725,944.12	39,80292052	-80.69547428	
5,534.00	37.41	194.49	4,830.99	-2,129.49	-600.40	14,455,058.74	1,725,929.32	39,80276452	-80.69552769	
5,629.00	37.30	191.10	4,906.51	-2,185.68	-613.16	14,455,002.55	1,725,916.55	39,80261032	-80.69557391	
5,724.00	36.41	192.86	4,982.53	-2,241.42	-624.98	14,454,946.81	1,725,904.74	39,80245737	-80.69561656	
5,818.00	35.29	196.46	5,058.73	-2,294.97	-638.88	14,454,893.57	1,725,890.83	39,80231127	-80.69566672	
5,911.00	35.61	201.09	5,134.50	-2,347.74	-656.24	14,454,840.54	1,725,873.47	39,80217128	-80.69572913	
6,006.00	35.66	199.23	5,211.72	-2,397.65	-675.31	14,454,792.58	1,725,854.40	39,80202879	-80.69579787	
6,101.00	36.86	197.94	5,288.32	-2,450.91	-693.21	14,454,737.33	1,725,836.50	39,80189270	-80.69586204	
6,194.00	37.40	194.64	5,362.47	-2,504.75	-709.04	14,454,683.48	1,725,820.68	39,80173498	-80.69591904	
6,289.00	35.86	195.39	5,436.71	-2,559.47	-723.81	14,454,628.76	1,725,805.90	39,80158494	-80.69597231	
6,383.00	36.53	197.23	5,514.57	-2,612.74	-739.41	14,454,575.49	1,725,790.31	39,80143870	-80.69602848	
6,478.00	36.82	193.55	5,590.77	-2,667.43	-754.45	14,454,520.81	1,725,775.26	39,80128865	-80.69608271	
6,572.00	36.33	194.76	5,666.26	-2,721.74	-768.15	14,454,466.50	1,725,761.57	38,80113963	-80.69613212	
6,665.00	36.72	193.80	5,741.00	-2,775.98	-781.80	14,454,412.86	1,725,747.92	39,80099245	-80.69618137	
<b>Survey @ 6665.00 MD 5741.00 TVD</b>										
6,778.00	36.70	191.60	5,831.59	-2,841.26	-796.64	14,454,346.97	1,725,733.07	39,80081165	-80.69623503	
6,825.00	34.20	194.60	5,869.88	-2,867.81	-802.80	14,454,320.43	1,725,726.91	39,80073981	-80.69625727	
6,873.00	31.30	199.60	5,910.25	-2,892.62	-810.39	14,454,295.62	1,725,719.33	39,80067074	-80.69628458	
6,920.00	28.30	205.40	5,951.04	-2,914.19	-819.26	14,454,274.04	1,725,710.45	39,80061158	-80.69631645	
6,966.00	25.50	210.70	5,992.06	-2,932.56	-829.00	14,454,255.67	1,725,700.71	39,80056122	-80.69635133	
7,013.00	21.90	216.30	6,035.10	-2,948.33	-839.36	14,454,239.90	1,725,690.36	39,80051800	-80.69638841	
7,061.00	19.10	222.40	6,080.06	-2,961.35	-849.96	14,454,226.88	1,725,679.76	39,80048235	-80.69642630	
7,108.00	17.00	230.50	6,124.75	-2,971.40	-860.45	14,454,216.83	1,725,669.20	39,80044465	-80.69646377	
7,155.00	15.50	240.50	6,169.88	-2,978.97	-871.22	14,454,209.37	1,725,658.50	39,80043445	-80.69650220	
7,202.00	15.90	248.70	6,215.13	-2,984.30	-882.68	14,454,203.93	1,725,647.03	39,80041964	-80.69654309	
7,250.00	16.00	251.80	6,261.28	-2,988.76	-895.09	14,454,199.48	1,725,634.62	39,80040752	-80.69658733	
7,297.00	17.00	262.30	6,306.36	-2,991.70	-908.06	14,454,196.53	1,725,621.66	39,80039955	-80.69663353	
7,344.00	18.90	269.10	6,351.07	-2,992.74	-922.46	14,454,195.49	1,725,607.23	39,80039863	-80.69668489	
7,391.00	20.40	275.10	6,395.34	-2,992.13	-938.25	14,454,196.10	1,725,591.46	39,80039685	-80.69674104	
7,439.00	23.30	278.40	6,439.89	-2,990.00	-955.98	14,454,198.23	1,725,573.73	39,80040467	-80.69680413	
7,486.00	26.10	294.50	6,482.63	-2,984.35	-974.61	14,454,203.89	1,725,555.10	39,80042036	-80.69687039	
7,534.00	28.60	308.70	6,525.31	-2,972.77	-993.21	14,454,215.46	1,725,536.51	39,80045233	-80.69693646	
7,581.00	33.60	317.90	6,565.56	-2,956.07	-1,010.73	14,454,232.17	1,725,518.99	39,80049836	-80.69699864	
7,629.00	38.10	325.40	6,604.48	-2,934.00	-1,028.06	14,454,254.23	1,725,501.66	39,80055912	-80.69706007	
7,676.00	44.60	328.20	6,639.75	-2,908.01	-1,045.01	14,454,280.22	1,725,484.71	39,80063065	-80.69712010	
7,706.00	48.90	329.00	6,660.30	-2,889.36	-1,056.38	14,454,298.87	1,725,473.33	39,80068197	-80.69716039	
7,724.00	51.10	329.20	6,671.87	-2,877.53	-1,063.46	14,454,310.70	1,725,466.25	39,80077453	-80.69718545	
7,771.00	57.30	329.10	6,699.35	-2,844.82	-1,083.00	14,454,343.41	1,725,446.71	39,80080454	-80.69725463	
7,818.00	60.80	327.70	6,723.52	-2,810.50	-1,104.13	14,454,377.73	1,725,425.59	39,80089899	-80.69732943	
7,865.00	63.70	327.40	6,745.40	-2,775.41	-1,126.44	14,454,412.83	1,725,403.27	39,80099558	-80.69740846	
7,913.00	67.00	326.70	6,765.41	-2,738.81	-1,150.17	14,454,449.43	1,725,379.54	39,80109631	-80.69749250	
7,960.00	67.30	326.60	6,783.66	-2,702.63	-1,173.98	14,454,485.61	1,725,355.73	39,80119589	-80.69757664	
8,007.00	67.60	326.00	6,801.69	-2,666.51	-1,198.07	14,454,521.72	1,725,331.65	39,80129529	-80.69766216	
8,054.00	68.30	326.90	6,819.33	-2,630.21	-1,222.14	14,454,558.02	1,725,307.57	39,80139521	-80.69774743	
8,102.00	69.40	329.40	6,836.66	-2,592.19	-1,245.76	14,454,596.05	1,725,283.96	39,80149985	-80.69783107	



Survey Report - Geographic



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Heaven Hill 3-SHM (M)
<b>Project:</b>	Marshall County, West Virginia.	<b>TVD Reference:</b>	RKB=1326+26 @ 1352.00usft (Nabors B-28)
<b>Site:</b>	Heaven Hill 3	<b>MD Reference:</b>	RKB=1326+26 @ 1352.00usft (Nabors B-28)
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<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
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8,149.00	74.10	329.60	6,851.37	-2,553.74	-1,268.40	14,454,634.50	1,725,261.31	39,80160565	-80.69791124	
8,197.00	77.20	330.40	6,863.26	-2,513.47	-1,291.65	14,454,674.77	1,725,238.06	39,80171646	-80.69799352	
8,244.00	80.60	332.50	6,872.31	-2,472.96	-1,313.68	14,454,715.27	1,725,216.03	39,80182790	-80.69807148	
8,292.00	83.50	332.90	6,878.95	-2,430.72	-1,335.48	14,454,757.51	1,725,194.23	39,80194410	-80.69814860	
8,323.00	86.30	332.60	6,881.71	-2,403.28	-1,349.62	14,454,784.96	1,725,180.09	39,80201961	-80.69819860	
8,386.00	88.60	333.00	6,884.51	-2,347.30	-1,378.39	14,454,840.93	1,725,151.33	39,80217360	-80.69830035	
8,433.00	90.10	331.70	6,885.04	-2,305.67	-1,400.20	14,454,862.56	1,725,129.52	39,80228612	-80.69837750	
8,481.00	90.50	332.00	6,884.79	-2,263.35	-1,422.64	14,454,924.88	1,725,106.87	39,80240455	-80.69845762	
8,575.00	91.30	331.80	6,883.31	-2,180.44	-1,467.11	14,455,007.79	1,725,062.60	39,80263265	-80.69861425	
8,670.00	90.90	329.90	6,881.49	-2,097.49	-1,513.37	14,455,090.74	1,725,016.34	39,80286088	-80.69877797	
8,764.00	88.80	329.50	6,881.74	-2,016.34	-1,560.80	14,455,171.89	1,724,968.92	39,80308419	-80.69884585	
8,859.00	88.90	329.40	6,883.64	-1,934.54	-1,609.08	14,455,253.69	1,724,920.64	39,80330926	-80.69911677	
8,954.00	89.00	329.10	6,885.38	-1,852.91	-1,657.64	14,455,335.32	1,724,872.07	39,80353389	-80.69928871	
9,048.00	89.70	329.20	6,886.45	-1,772.22	-1,705.84	14,455,416.01	1,724,823.87	39,80375594	-80.69945936	
9,142.00	90.40	331.30	6,886.37	-1,690.91	-1,752.48	14,455,497.62	1,724,777.23	39,80398048	-80.69962445	
9,236.00	91.20	331.70	6,885.06	-1,608.01	-1,797.33	14,455,580.22	1,724,732.38	39,80420773	-80.69978315	
9,330.00	90.40	332.30	6,883.74	-1,525.03	-1,841.45	14,455,663.21	1,724,686.26	39,80443604	-80.69993927	
9,425.00	90.80	332.50	6,882.75	-1,440.94	-1,885.46	14,455,747.39	1,724,644.25	39,80466784	-80.70009497	
9,518.00	91.60	332.20	6,880.80	-1,358.48	-1,928.61	14,455,829.75	1,724,601.10	39,80489422	-80.70024762	
9,612.00	90.40	333.80	6,879.16	-1,274.74	-1,971.28	14,455,913.49	1,724,558.43	39,80512458	-80.70039854	
9,707.00	90.40	337.50	6,878.50	-1,188.21	-2,010.44	14,456,000.02	1,724,519.27	39,80536258	-80.70053695	
9,801.00	88.70	331.20	6,879.24	-1,103.52	-2,051.11	14,456,084.71	1,724,478.61	39,80559553	-80.70068074	
9,897.00	89.70	329.00	6,880.58	-1,020.32	-2,098.95	14,456,167.92	1,724,430.76	39,80582447	-80.70085012	
9,991.00	89.80	329.10	6,880.99	-939.70	-2,147.30	14,456,248.53	1,724,382.42	39,80604631	-80.70102129	
10,085.00	90.50	328.80	6,880.74	-859.17	-2,195.78	14,456,329.06	1,724,333.93	39,80626791	-80.70119297	
10,179.00	90.50	328.30	6,879.92	-776.98	-2,244.82	14,456,409.25	1,724,284.89	39,80648857	-80.70136664	
10,274.00	91.10	330.80	6,878.59	-697.10	-2,292.96	14,456,491.13	1,724,236.75	39,80671388	-80.70153707	
10,369.00	92.00	330.90	6,876.02	-614.16	-2,339.22	14,456,574.07	1,724,190.50	39,80694207	-80.70170079	
10,463.00	90.60	330.30	6,873.89	-532.29	-2,385.35	14,456,655.94	1,724,144.37	39,80716733	-80.70186408	
10,557.00	90.90	329.70	6,872.66	-450.99	-2,432.34	14,456,737.34	1,724,097.37	39,80739130	-80.70203045	
10,651.00	88.80	329.20	6,872.91	-369.95	-2,480.12	14,456,818.29	1,724,049.59	39,80761404	-80.70219961	
10,746.00	88.90	329.00	6,874.81	-288.45	-2,528.90	14,456,899.79	1,724,000.82	39,80783830	-80.70237233	
10,841.00	90.70	330.30	6,875.15	-206.47	-2,576.89	14,456,981.76	1,723,952.82	39,80806386	-80.70254227	
10,936.00	91.70	331.20	6,873.16	-123.61	-2,623.30	14,457,064.63	1,723,906.41	39,80829186	-80.70270654	
11,031.00	92.80	331.60	6,869.43	-40.26	-2,668.74	14,457,147.97	1,723,860.97	39,80852115	-80.70286736	
11,126.00	91.90	332.90	6,865.53	43.74	-2,712.94	14,457,231.97	1,723,816.78	39,80875224	-80.70302373	
11,221.00	90.50	332.50	6,863.54	128.14	-2,756.50	14,457,316.37	1,723,773.22	39,80898442	-80.70317785	
11,316.00	89.50	330.40	6,863.54	211.58	-2,801.90	14,457,399.81	1,723,727.82	39,80921388	-80.70333652	
11,410.00	89.50	330.30	6,864.36	293.27	-2,848.40	14,457,481.50	1,723,681.32	39,80943674	-80.70350314	
11,505.00	91.00	330.00	6,863.95	375.66	-2,895.68	14,457,563.89	1,723,634.03	39,80966545	-80.70367053	
11,600.00	91.50	330.20	6,861.87	458.00	-2,943.03	14,457,646.23	1,723,586.69	39,80989199	-80.70383815	
11,695.00	92.40	330.90	6,858.64	540.87	-2,989.71	14,457,728.90	1,723,540.01	39,81011946	-80.70400340	
11,789.00	90.90	331.60	6,855.94	623.05	-3,034.90	14,457,811.28	1,723,494.81	39,81034609	-80.70416336	
11,884.00	91.10	331.90	6,854.28	706.72	-3,079.86	14,457,894.95	1,723,449.86	39,81057629	-80.70432247	
11,978.00	91.60	331.70	6,852.06	789.94	-3,124.26	14,457,977.77	1,723,405.45	39,81080413	-80.70447962	
12,072.00	92.60	331.50	6,848.62	872.17	-3,168.94	14,458,060.40	1,723,360.77	39,81103146	-80.70463775	
12,166.00	90.80	331.30	6,845.83	954.66	-3,213.92	14,458,142.89	1,723,315.80	39,81125641	-80.70479693	
12,260.00	91.50	330.80	6,843.94	1,036.89	-3,259.41	14,458,225.13	1,723,270.31	39,81148466	-80.70495796	
12,354.00	92.10	330.00	6,840.99	1,116.59	-3,305.82	14,458,306.82	1,723,223.90	39,81170942	-80.70512225	
12,448.00	89.50	328.10	6,839.68	1,199.18	-3,354.15	14,458,387.42	1,723,175.57	39,81193120	-80.70529342	
12,542.00	90.40	328.10	6,839.76	1,278.99	-3,403.82	14,458,467.22	1,723,125.89	39,81215081	-80.70546936	
12,637.00	92.40	331.70	6,837.44	1,361.13	-3,451.44	14,458,549.37	1,723,078.27	39,81237693	-80.70563798	
12,732.00	90.90	331.70	6,834.70	1,444.74	-3,496.46	14,458,632.97	1,723,033.25	39,81260685	-80.70579731	
12,827.00	91.90	331.60	6,832.38	1,526.32	-3,541.56	14,458,716.55	1,722,988.16	39,81283679	-80.70595692	
12,922.00	89.90	332.60	6,830.89	1,612.26	-3,586.00	14,458,800.50	1,722,943.71	39,81306771	-80.70611421	



Survey Report - Geographic



Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia.  
 Site: Heaven Hill 3  
 Well: Heaven Hill 3-SHM (M)  
 Wellbore: Original Hole  
 Designic: Surveys Original Hole

Local Co-ordinate Reference:  
 TVD Reference: Well Heaven Hill 3-SHM (M)  
 MD Reference: RKB=1326+26 @ 1352.00usft (Nabors B-28)  
 North Reference: RKB=1326+26 @ 1352.00usft (Nabors B-28)  
 Survey Calculation Method: Grid  
 Database: Minimum Curvature  
 RECEIVED  
 Office of Oil and Gas

Survey

JUL 10 2020

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	WV Department of Environmental Protection
13,016.00	90.50	332.60	6,830.56	1,695.72	-3,623.26	14,458,883.95	1,722,900.45	39.81329729	-80.70626728	
13,111.00	91.70	333.20	6,828.74	1,780.27	-3,672.53	14,458,968.50	1,722,867.19	39.81352986	-80.70642037	
13,206.00	91.10	331.30	6,826.42	1,864.31	-3,716.75	14,459,052.55	1,722,812.97	39.81376109	-80.70657685	
13,301.00	92.10	331.10	6,823.76	1,947.53	-3,762.49	14,459,135.76	1,722,767.22	39.81399003	-80.70673890	
13,385.00	92.40	330.00	6,820.07	2,029.32	-3,808.67	14,459,217.55	1,722,721.04	39.81421506	-80.70690229	
13,490.00	93.00	329.70	6,815.60	2,111.37	-3,856.34	14,459,299.61	1,722,673.38	39.81444083	-80.70707106	
13,584.00	91.30	330.10	6,812.07	2,192.64	-3,903.44	14,459,380.87	1,722,626.27	39.81468443	-80.70723787	
13,679.00	91.60	330.30	6,809.67	2,275.05	-3,950.64	14,459,463.28	1,722,579.07	39.81489117	-80.70740499	
13,774.00	92.40	330.10	6,806.35	2,357.44	-3,997.82	14,459,545.67	1,722,531.89	39.81511785	-80.70757205	
13,869.00	91.30	330.90	6,803.29	2,440.08	-4,044.56	14,459,628.31	1,722,485.14	39.81534522	-80.70773759	
13,963.00	90.50	329.50	6,801.81	2,521.63	-4,091.29	14,459,709.87	1,722,438.43	39.81556961	-80.70790298	
14,058.00	91.30	328.90	6,800.32	2,603.22	-4,139.92	14,459,791.46	1,722,389.79	39.81579411	-80.70807524	
14,153.00	92.40	329.10	6,797.25	2,684.61	-4,188.83	14,459,872.84	1,722,340.89	39.81601806	-80.70824844	
14,248.00	91.40	330.40	6,794.10	2,766.63	-4,236.66	14,459,954.86	1,722,293.06	39.81624373	-80.70841792	
14,342.00	88.90	330.80	6,793.85	2,848.51	-4,282.80	14,460,036.75	1,722,246.92	39.81646902	-80.70858119	
14,437.00	90.30	331.80	6,794.52	2,931.84	-4,328.42	14,460,120.07	1,722,201.30	39.81669263	-80.70874288	
14,532.00	92.60	331.00	6,792.11	3,015.21	-4,373.87	14,460,203.45	1,722,155.84	39.81692763	-80.70890360	
14,625.00	93.80	331.00	6,786.92	3,096.42	-4,418.89	14,460,284.66	1,722,110.82	39.81715106	-80.70906298	
14,720.00	92.60	331.10	6,781.62	3,179.42	-4,464.80	14,460,367.66	1,722,064.91	39.81737940	-80.70922552	
14,815.00	92.40	328.60	6,777.48	3,261.48	-4,512.47	14,460,449.72	1,722,017.25	39.81760519	-80.70939432	
14,910.00	93.80	333.10	6,772.34	3,344.31	-4,558.66	14,460,532.54	1,721,971.05	39.81783305	-80.70955788	
15,003.00	90.80	332.10	6,768.60	3,426.80	-4,601.42	14,460,615.03	1,721,928.29	39.81805997	-80.70970920	
15,099.00	91.70	333.20	6,766.51	3,512.04	-4,645.52	14,460,700.28	1,721,884.20	39.81829447	-80.70986525	
15,173.00	92.40	333.60	6,763.86	3,578.17	-4,678.63	14,460,766.40	1,721,851.09	39.81847636	-80.70998241	
<b>Survey @ 16173.00 MD 6763.87 TVD</b>										
15,224.00	92.40	333.60	6,761.73	3,623.81	-4,701.28	14,460,812.04	1,721,828.43	39.81860190	-80.71006257	
<b>Survey projected to 15224.00 MD 6761.73 TVD</b>										

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
195.00	195.00	-0.23	0.53	MOWD surveys
6,665.00	5,741.00	-2,775.36	-761.80	Survey @ 6665.00 MD 5741.00 TVD
15,173.00	6,763.86	3,578.17	-4,678.63	Survey @ 15173.00 MD 6763.87 TVD
15,224.00	6,761.73	3,623.81	-4,701.28	Survey projected to 15224.00 MD 6761.73 TVD