

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2-03 HM (slot D)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1331+33 @ 1364.00usft (Nabors X08)
Site:	Heaven Hill 2	MD Reference:	RKB=1331+33 @ 1364.00usft (Nabors X08)
Well:	Heaven Hill 2-03 HM (slot D)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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

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Site	Heaven Hill 2		
Site Position:		Northing:	14,457,660.30 usft
From:	Lat/Long	Easting:	1,720,974.97 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	39.80995400
		Longitude:	-80.71313800
		Grid Convergence:	0.18 °

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Environmental Protection

Well	Heaven Hill 2-03 HM (slot D)					
Well Position	+N/-S	0.00 usft	Northing:	14,457,701.63 usft	Latitude:	39.81006690
	+E/-W	0.00 usft	Easting:	1,721,043.02 usft	Longitude:	-80.71289520
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	1,331.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	7/15/2017	-8.69	66.97	52,176.49237019
	IGRF2015	6/29/2018	-8.72	66.89	52,066.09143994

Design	Surveys Original Hole			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	
		Tie On Depth:	0.00	
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	150.00

Survey Program	Date 7/6/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
50.00	916.00	Gyro (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s
921.00	1,130.00	MWD 17 1/2 (Original Hole)	MWD	MWD - Standard
1,199.00	5,664.00	MWD 12 1/4 (Original Hole)	MWD	MWD - Standard
5,746.00	16,385.00	MWD lat (Original Hole)	MWD	MWD - Standard
16,435.00	16,435.00	Projection (Original Hole)	MWD	MWD - Standard

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	14,457,701.63	1,721,043.02	39.81006690	-80.71289520	
50.00	0.37	351.29	50.00	0.16	-0.02	14,457,701.79	1,721,043.00	39.81006734	-80.71289529	
100.00	0.39	17.48	100.00	0.48	0.00	14,457,702.11	1,721,043.03	39.81006822	-80.71289519	
150.00	0.26	15.91	150.00	0.75	0.08	14,457,702.38	1,721,043.11	39.81006897	-80.71289489	
200.00	0.13	335.51	200.00	0.91	0.09	14,457,702.55	1,721,043.11	39.81006941	-80.71289486	
250.00	0.16	349.12	250.00	1.03	0.06	14,457,702.67	1,721,043.08	39.81006974	-80.71289499	
300.00	0.15	12.00	300.00	1.17	0.06	14,457,702.80	1,721,043.08	39.81007010	-80.71289499	

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Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Survey										WV Department of Environmental Protection	
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude		
350.00	0.13	14.36	350.00	1.29	0.08	14,457,702.92	1,721,043.11	39.81007043	-80.71289489		
400.00	0.14	57.73	400.00	1.37	0.15	14,457,703.00	1,721,043.17	39.81007067	-80.71289465		
450.00	0.10	242.20	450.00	1.39	0.16	14,457,703.02	1,721,043.18	39.81007070	-80.71289461		
500.00	0.16	80.61	500.00	1.38	0.19	14,457,703.01	1,721,043.22	39.81007068	-80.71289450		
550.00	0.12	294.21	550.00	1.41	0.21	14,457,703.04	1,721,043.24	39.81007077	-80.71289442		
600.00	0.18	351.84	600.00	1.51	0.15	14,457,703.14	1,721,043.18	39.81007104	-80.71289463		
650.00	0.12	241.16	650.00	1.56	0.10	14,457,703.19	1,721,043.12	39.81007119	-80.71289483		
700.00	0.08	161.79	700.00	1.50	0.06	14,457,703.13	1,721,043.09	39.81007103	-80.71289496		
750.00	0.13	312.68	750.00	1.51	0.03	14,457,703.14	1,721,043.05	39.81007104	-80.71289507		
800.00	0.11	278.12	800.00	1.55	-0.06	14,457,703.18	1,721,042.97	39.81007117	-80.71289539		
850.00	0.22	234.29	850.00	1.50	-0.18	14,457,703.14	1,721,042.84	39.81007103	-80.71289583		
900.00	0.10	252.17	900.00	1.43	-0.30	14,457,703.07	1,721,042.72	39.81007084	-80.71289626		
916.00	0.27	270.91	916.00	1.43	-0.35	14,457,703.06	1,721,042.67	39.81007083	-80.71289644		
921.00	0.15	250.62	921.00	1.43	-0.37	14,457,703.06	1,721,042.65	39.81007083	-80.71289651		
MWD surveys											
952.00	0.30	298.52	952.00	1.45	-0.48	14,457,703.09	1,721,042.54	39.81007090	-80.71289690		
983.00	0.14	303.61	983.00	1.51	-0.58	14,457,703.15	1,721,042.44	39.81007106	-80.71289726		
1,015.00	0.21	208.65	1,015.00	1.48	-0.64	14,457,703.12	1,721,042.38	39.81007098	-80.71289748		
1,047.00	0.06	27.32	1,047.00	1.45	-0.66	14,457,703.08	1,721,042.36	39.81007088	-80.71289755		
1,078.00	0.21	264.75	1,078.00	1.46	-0.71	14,457,703.09	1,721,042.31	39.81007091	-80.71289773		
1,109.00	0.45	327.94	1,109.99	1.55	-0.84	14,457,703.19	1,721,042.19	39.81007118	-80.71289816		
1,130.00	0.12	117.66	1,129.99	1.61	-0.86	14,457,703.25	1,721,042.16	39.81007134	-80.71289824		
1,199.00	0.36	50.26	1,198.99	1.72	-0.63	14,457,703.35	1,721,042.39	39.81007163	-80.71289742		
1,294.00	0.83	50.71	1,293.99	2.35	0.13	14,457,703.98	1,721,043.16	39.81007334	-80.71289470		
1,388.00	0.40	88.44	1,387.98	2.79	0.99	14,457,704.42	1,721,044.01	39.81007454	-80.71289165		
1,483.00	0.54	203.91	1,482.98	2.39	1.14	14,457,704.02	1,721,044.16	39.81007344	-80.71289112		
1,578.00	1.12	213.04	1,577.97	1.20	0.45	14,457,702.83	1,721,043.47	39.81007019	-80.71289358		
1,672.00	0.72	211.89	1,671.96	-0.07	-0.36	14,457,701.56	1,721,042.66	39.81006670	-80.71289649		
1,767.00	0.89	329.55	1,766.95	0.06	-1.05	14,457,701.69	1,721,041.97	39.81006706	-80.71289894		
1,862.00	2.13	337.81	1,861.92	2.33	-2.09	14,457,703.96	1,721,040.93	39.81007331	-80.71290262		
1,956.00	3.04	335.27	1,955.82	6.21	-3.79	14,457,707.84	1,721,039.23	39.81008398	-80.71290864		
2,051.00	4.05	331.37	2,050.64	11.44	-6.46	14,457,713.07	1,721,036.57	39.81009838	-80.71291806		
2,145.00	4.77	326.97	2,144.36	17.63	-10.18	14,457,719.26	1,721,032.85	39.81011541	-80.71293124		
2,240.00	5.43	322.04	2,238.98	24.49	-15.09	14,457,726.12	1,721,027.93	39.81013428	-80.71294867		
2,335.00	5.73	324.51	2,333.53	31.89	-20.61	14,457,733.52	1,721,022.41	39.81015467	-80.71296824		
2,429.00	4.40	328.75	2,427.17	38.80	-25.21	14,457,740.43	1,721,017.81	39.81017367	-80.71298452		
2,524.00	3.87	329.58	2,521.92	44.68	-28.72	14,457,746.31	1,721,014.30	39.81018985	-80.71299697		
2,618.00	5.06	330.45	2,615.63	51.02	-32.37	14,457,752.65	1,721,010.65	39.81020729	-80.71300989		
2,713.00	4.77	322.85	2,710.28	57.81	-36.82	14,457,759.44	1,721,006.20	39.81022599	-80.71302567		
2,807.00	4.73	308.95	2,803.96	63.36	-42.20	14,457,764.99	1,721,000.82	39.81024128	-80.71304474		
2,856.00	5.06	305.92	2,852.78	65.90	-45.52	14,457,767.53	1,720,997.50	39.81024828	-80.71305654		
2,887.00	5.32	309.17	2,883.66	67.61	-47.74	14,457,769.24	1,720,995.28	39.81025300	-80.71306443		
2,982.00	3.88	308.65	2,978.35	72.40	-53.67	14,457,774.03	1,720,989.36	39.81026620	-80.71308547		
3,077.00	3.64	325.20	3,073.15	76.88	-57.90	14,457,778.51	1,720,985.13	39.81027855	-80.71310049		
3,172.00	4.63	330.09	3,167.90	82.68	-61.53	14,457,784.31	1,720,981.49	39.81029451	-80.71311336		
3,266.00	5.73	332.77	3,261.51	90.14	-65.57	14,457,791.78	1,720,977.45	39.81031504	-80.71312766		
3,361.00	5.63	331.82	3,356.05	98.47	-69.94	14,457,800.10	1,720,973.08	39.81033794	-80.71314313		
3,456.00	5.84	334.00	3,450.57	106.92	-74.26	14,457,808.55	1,720,968.76	39.81036119	-80.71315841		
3,550.00	5.59	334.66	3,544.10	115.36	-78.32	14,457,816.99	1,720,964.71	39.81038439	-80.71317276		
3,645.00	6.41	337.77	3,638.58	124.45	-82.30	14,457,826.08	1,720,960.72	39.81040939	-80.71318685		
3,740.00	7.80	334.07	3,732.85	135.15	-87.13	14,457,836.79	1,720,955.90	39.81043884	-80.71320391		
3,834.00	9.49	330.53	3,825.78	147.64	-93.73	14,457,849.27	1,720,949.29	39.81047318	-80.71322728		
3,928.00	11.15	332.52	3,918.26	162.45	-101.74	14,457,864.08	1,720,941.29	39.81051392	-80.71325562		
4,023.00	11.85	332.12	4,011.35	179.22	-110.54	14,457,880.85	1,720,932.49	39.81056006	-80.71328676		
4,117.00	13.36	331.50	4,103.08	197.30	-120.23	14,457,898.93	1,720,922.79	39.81060979	-80.71332108		

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Survey										WV Department of Environmental Protection	
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude		
4,212.00	15.94	331.32	4,194.99	218.39	-131.73	14,457,920.02	1,720,911.29	39.81066782	-80.71336179		
4,307.00	17.22	326.31	4,286.04	241.54	-145.79	14,457,943.17	1,720,897.23	39.81073151	-80.71341160		
4,401.00	19.65	328.46	4,375.21	266.59	-161.78	14,457,968.22	1,720,881.24	39.81080045	-80.71346825		
4,496.00	21.21	327.26	4,464.23	294.66	-179.43	14,457,996.29	1,720,863.59	39.81087769	-80.71353078		
4,590.00	19.55	323.16	4,552.35	321.55	-198.06	14,458,023.18	1,720,844.96	39.81095171	-80.71359681		
4,685.00	18.75	322.47	4,642.09	346.38	-216.89	14,458,048.01	1,720,826.13	39.81102006	-80.71366358		
4,780.00	21.83	325.94	4,731.19	373.13	-236.09	14,458,074.76	1,720,806.93	39.81109369	-80.71373165		
4,875.00	22.18	326.29	4,819.27	402.68	-255.94	14,458,104.31	1,720,787.09	39.81117501	-80.71380197		
4,970.00	21.28	324.39	4,907.52	431.61	-275.93	14,458,133.24	1,720,767.10	39.81125465	-80.71387283		
5,064.00	19.53	325.89	4,995.62	458.49	-294.67	14,458,160.12	1,720,748.35	39.81132863	-80.71393927		
5,159.00	16.66	328.60	5,085.91	483.27	-310.67	14,458,184.90	1,720,732.35	39.81139681	-80.71399598		
5,254.00	15.48	330.64	5,177.20	505.94	-323.99	14,458,207.57	1,720,719.04	39.81145920	-80.71404312		
5,348.00	15.62	328.85	5,267.76	527.71	-336.68	14,458,229.34	1,720,706.34	39.81151908	-80.71408809		
5,443.00	15.12	326.69	5,359.36	549.01	-350.10	14,458,250.64	1,720,692.92	39.81157769	-80.71413563		
5,538.00	13.60	332.56	5,451.39	569.28	-362.06	14,458,270.91	1,720,680.97	39.81163346	-80.71417797		
5,623.00	12.54	336.00	5,534.19	586.58	-370.41	14,458,288.21	1,720,672.61	39.81168104	-80.71420753		
5,664.00	11.52	335.34	5,574.29	594.36	-373.93	14,458,295.99	1,720,669.09	39.81170246	-80.71421998		
5,746.00	10.02	334.93	5,654.84	608.27	-380.37	14,458,309.90	1,720,662.65	39.81174070	-80.71424275		
5,840.00	9.63	335.72	5,747.47	622.84	-387.07	14,458,324.47	1,720,655.95	39.81178078	-80.71426643		
5,935.00	5.76	324.21	5,841.60	633.96	-393.13	14,458,335.59	1,720,649.89	39.81181136	-80.71428788		
6,030.00	3.12	267.78	5,936.34	637.73	-398.50	14,458,339.36	1,720,644.52	39.81182176	-80.71430698		
6,125.00	5.54	218.74	6,031.09	634.05	-403.96	14,458,335.68	1,720,639.06	39.81181170	-80.71432644		
6,219.00	5.80	193.07	6,124.65	625.88	-407.87	14,458,327.51	1,720,635.15	39.81178931	-80.71434048		
6,314.00	8.53	179.98	6,218.90	614.16	-408.96	14,458,315.79	1,720,634.07	39.81175712	-80.71434447		
6,362.00	12.84	181.82	6,266.06	605.26	-409.12	14,458,306.89	1,720,633.90	39.81173269	-80.71434517		
6,408.00	16.97	177.34	6,310.50	593.44	-408.97	14,458,295.07	1,720,634.05	39.81170023	-80.71434477		
6,455.00	20.44	169.96	6,355.02	578.50	-407.23	14,458,280.13	1,720,635.80	39.81165919	-80.71433871		
6,504.00	22.33	160.20	6,400.66	561.31	-402.58	14,458,262.94	1,720,640.44	39.81161194	-80.71432236		
6,551.00	25.23	152.56	6,443.68	544.01	-394.93	14,458,245.64	1,720,648.09	39.81156437	-80.71429533		
6,598.00	29.23	151.06	6,485.46	525.07	-384.76	14,458,226.70	1,720,658.26	39.81151226	-80.71425932		
6,645.00	33.85	151.06	6,525.51	503.56	-372.87	14,458,205.19	1,720,670.15	39.81145309	-80.71421721		
6,693.00	38.42	150.53	6,564.26	478.87	-359.05	14,458,180.50	1,720,683.97	39.81138514	-80.71416831		
6,740.00	41.58	150.53	6,600.26	452.57	-344.19	14,458,154.20	1,720,698.83	39.81131279	-80.71411569		
6,787.00	47.78	149.83	6,633.66	423.91	-327.76	14,458,125.55	1,720,715.26	39.81123396	-80.71405749		
6,834.00	52.70	150.89	6,663.72	392.52	-309.91	14,458,094.15	1,720,733.12	39.81114757	-80.71399427		
6,883.00	57.27	151.59	6,691.82	357.34	-290.61	14,458,058.97	1,720,752.41	39.81105081	-80.71392596		
6,930.00	60.53	152.20	6,716.10	321.85	-271.66	14,458,023.48	1,720,771.37	39.81095316	-80.71385887		
6,978.00	63.52	152.29	6,738.61	284.34	-251.92	14,457,985.97	1,720,791.11	39.81084998	-80.71378901		
7,023.00	67.43	151.85	6,757.29	248.17	-232.74	14,457,949.80	1,720,810.28	39.81075049	-80.71372114		
7,072.00	69.36	152.38	6,775.33	207.91	-211.44	14,457,909.54	1,720,831.58	39.81063973	-80.71364574		
7,119.00	72.13	152.29	6,790.83	168.61	-190.84	14,457,870.24	1,720,852.18	39.81053163	-80.71357283		
7,167.00	73.58	149.83	6,804.98	128.48	-168.64	14,457,830.11	1,720,874.38	39.81042122	-80.71349425		
7,214.00	76.40	148.69	6,817.15	89.47	-145.44	14,457,791.10	1,720,897.58	39.81031388	-80.71341207		
7,262.00	79.34	148.25	6,827.23	49.47	-120.90	14,457,751.10	1,720,922.12	39.81020383	-80.71332515		
7,309.00	83.65	147.63	6,834.18	10.09	-96.23	14,457,711.72	1,720,946.79	39.81009546	-80.71323775		
7,356.00	86.64	148.34	6,838.16	-29.62	-71.41	14,457,672.02	1,720,971.62	39.80998620	-80.71314981		
7,450.00	89.19	149.30	6,841.58	-109.98	-22.78	14,457,591.66	1,721,020.24	39.80976508	-80.71297757		
7,544.00	87.82	147.19	6,844.03	-189.87	26.67	14,457,511.76	1,721,069.69	39.80954523	-80.71280240		
7,639.00	88.75	147.46	6,846.88	-269.80	77.94	14,457,431.83	1,721,120.96	39.80932527	-80.71262077		
7,733.00	88.18	148.51	6,849.39	-349.47	127.75	14,457,352.16	1,721,170.77	39.80910603	-80.71244429		
7,828.00	88.84	148.95	6,851.86	-430.65	177.05	14,457,270.99	1,721,220.07	39.80888268	-80.71226969		
7,923.00	89.10	149.57	6,853.57	-512.28	225.60	14,457,189.35	1,721,268.62	39.80865805	-80.71209775		
8,017.00	88.18	148.42	6,855.80	-592.83	274.00	14,457,108.80	1,721,317.02	39.80843643	-80.71192631		
8,112.00	89.14	148.69	6,858.03	-673.85	323.55	14,457,027.78	1,721,366.57	39.80821347	-80.71175082		
8,206.00	87.21	149.13	6,861.02	-754.31	372.06	14,456,947.32	1,721,415.08	39.80799210	-80.71157899		

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2-03 HM (slot D)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1331+33 @ 1364.00usft (Nabors X08)
Site:	Heaven Hill 2	MD Reference:	RKB=1331+33 @ 1364.00usft (Nabors X08)
Well:	Heaven Hill 2-03 HM (slot D)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,301.00	88.53	148.25	6,864.55	-835.41	421.39	14,456,866.22	1,721,464.42	39.80776893	-80.71140426
8,396.00	88.57	147.81	6,866.95	-915.98	471.68	14,456,785.65	1,721,514.70	39.80754723	-80.71122614
8,491.00	89.71	149.57	6,868.38	-997.13	521.04	14,456,704.50	1,721,564.06	39.80732393	-80.71105131
8,586.00	88.84	150.36	6,869.58	-1,079.36	568.58	14,456,622.27	1,721,611.61	39.80709767	-80.71088296
8,680.00	89.76	150.80	6,870.73	-1,161.24	614.75	14,456,540.40	1,721,657.77	39.80687242	-80.71071951
8,775.00	90.11	150.97	6,870.84	-1,244.23	660.98	14,456,457.40	1,721,704.00	39.80664409	-80.71055587
8,870.00	88.75	149.39	6,871.78	-1,326.64	708.21	14,456,374.99	1,721,751.23	39.80641734	-80.71038863
8,964.00	89.98	148.86	6,872.82	-1,407.32	756.45	14,456,294.32	1,721,799.47	39.80619536	-80.71021781
9,059.00	90.20	147.90	6,872.68	-1,488.21	806.25	14,456,213.42	1,721,849.27	39.80597276	-80.71004140
9,153.00	88.84	147.72	6,873.46	-1,567.76	856.32	14,456,133.87	1,721,899.35	39.80575386	-80.70986402
9,248.00	89.41	150.97	6,874.91	-1,649.46	904.75	14,456,052.17	1,721,947.77	39.80552905	-80.70969254
9,343.00	90.42	150.89	6,875.05	-1,732.49	950.91	14,455,969.14	1,721,993.93	39.80530062	-80.70952915
9,437.00	89.63	149.74	6,875.01	-1,814.15	997.46	14,455,887.48	1,722,040.48	39.80507594	-80.70936434
9,532.00	88.88	146.93	6,876.25	-1,895.00	1,047.32	14,455,806.64	1,722,090.34	39.80485348	-80.70918774
9,627.00	89.32	150.27	6,877.74	-1,976.06	1,096.80	14,455,725.57	1,722,139.82	39.80463041	-80.70901249
9,721.00	89.58	151.15	6,878.64	-2,058.04	1,142.79	14,455,643.59	1,722,185.81	39.80440487	-80.70884971
9,816.00	90.24	152.64	6,878.79	-2,141.84	1,187.54	14,455,559.80	1,722,230.56	39.80417435	-80.70869134
9,910.00	89.98	152.20	6,878.61	-2,225.15	1,231.06	14,455,476.48	1,722,274.08	39.80394515	-80.70853735
10,004.00	90.11	152.29	6,878.54	-2,308.34	1,274.83	14,455,393.29	1,722,317.86	39.80371631	-80.70838245
10,099.00	89.36	151.94	6,878.98	-2,392.31	1,319.26	14,455,309.33	1,722,362.29	39.80348531	-80.70822522
10,194.00	90.51	151.59	6,879.09	-2,476.00	1,364.21	14,455,225.63	1,722,407.23	39.80325507	-80.70806618
10,288.00	90.90	150.97	6,877.93	-2,558.43	1,409.37	14,455,143.20	1,722,452.40	39.80302829	-80.70790632
10,383.00	89.85	148.07	6,877.31	-2,640.29	1,457.55	14,455,061.34	1,722,500.58	39.80280305	-80.70773522
10,476.00	89.32	148.16	6,877.98	-2,719.25	1,506.68	14,454,982.38	1,722,549.70	39.80258575	-80.70756174
10,571.00	89.93	148.42	6,878.60	-2,800.07	1,556.61	14,454,901.56	1,722,599.63	39.80236336	-80.70738489
10,665.00	90.64	147.72	6,878.14	-2,879.85	1,606.32	14,454,821.79	1,722,649.35	39.80214383	-80.70720882
10,760.00	88.79	146.58	6,878.61	-2,959.65	1,657.85	14,454,741.98	1,722,700.87	39.80192421	-80.70702628
10,854.00	89.36	148.95	6,880.13	-3,039.14	1,707.98	14,454,662.49	1,722,751.00	39.80170544	-80.70684873
10,949.00	91.21	149.30	6,879.65	-3,120.68	1,756.73	14,454,580.95	1,722,799.75	39.80148110	-80.70667611
11,043.00	91.03	149.22	6,877.82	-3,201.45	1,804.77	14,454,500.18	1,722,847.79	39.80125883	-80.70650602
11,138.00	91.25	150.45	6,875.93	-3,283.57	1,852.49	14,454,418.06	1,722,895.51	39.80103289	-80.70633705
11,233.00	89.23	150.89	6,875.53	-3,366.39	1,899.02	14,454,335.24	1,722,942.05	39.80080503	-80.70617235
11,327.00	89.14	150.09	6,876.87	-3,448.19	1,945.32	14,454,253.45	1,722,988.34	39.80057998	-80.70600847
11,422.00	90.33	149.30	6,877.30	-3,530.20	1,993.26	14,454,171.43	1,723,036.28	39.80035431	-80.70583876
11,516.00	90.29	151.59	6,876.80	-3,611.96	2,039.62	14,454,089.67	1,723,082.64	39.80012935	-80.70567465
11,611.00	90.07	151.15	6,876.50	-3,695.35	2,085.14	14,454,006.28	1,723,128.16	39.79989995	-80.70551356
11,706.00	89.71	151.06	6,876.68	-3,778.52	2,131.04	14,453,923.11	1,723,174.06	39.79967112	-80.70535110
11,800.00	88.97	150.62	6,877.76	-3,860.60	2,176.84	14,453,841.03	1,723,219.86	39.79944529	-80.70518900
11,895.00	89.67	150.09	6,878.89	-3,943.16	2,223.83	14,453,758.47	1,723,266.85	39.79921814	-80.70502269
11,990.00	88.97	150.80	6,880.02	-4,025.79	2,270.68	14,453,675.84	1,723,313.70	39.79899079	-80.70485684
12,085.00	88.40	151.59	6,882.20	-4,109.01	2,316.44	14,453,592.62	1,723,359.47	39.79876182	-80.70469489
12,179.00	88.57	151.41	6,884.68	-4,191.59	2,362.28	14,453,510.04	1,723,404.30	39.79853463	-80.70453623
12,274.00	90.02	151.41	6,885.85	-4,275.00	2,406.74	14,453,426.63	1,723,449.76	39.79830516	-80.70437537
12,368.00	89.80	151.15	6,886.00	-4,357.44	2,451.91	14,453,344.20	1,723,494.93	39.79807836	-80.70421552
12,463.00	87.47	150.62	6,888.26	-4,440.40	2,498.11	14,453,261.23	1,723,541.14	39.79785010	-80.70405199
12,558.00	87.43	149.48	6,892.49	-4,522.63	2,545.49	14,453,179.00	1,723,588.52	39.79762384	-80.70388427
12,652.00	89.67	149.30	6,894.87	-4,603.50	2,593.34	14,453,098.13	1,723,636.36	39.79740131	-80.70371488
12,747.00	91.87	148.78	6,893.59	-4,684.96	2,642.20	14,453,016.67	1,723,685.23	39.79717718	-80.70354187
12,842.00	90.77	149.39	6,891.40	-4,766.44	2,691.00	14,452,935.19	1,723,734.02	39.79695297	-80.70336912
12,936.00	89.36	148.34	6,891.30	-4,846.89	2,739.60	14,452,854.74	1,723,782.62	39.79673158	-80.70319704
13,030.00	91.30	147.37	6,890.75	-4,926.48	2,789.61	14,452,775.15	1,723,832.63	39.79651256	-80.70301993
13,125.00	90.68	150.18	6,889.11	-5,007.69	2,838.84	14,452,693.94	1,723,881.87	39.79628907	-80.70284561
13,220.00	89.58	147.55	6,888.90	-5,089.00	2,887.96	14,452,612.63	1,723,930.98	39.79606533	-80.70267171
13,315.00	89.10	150.09	6,889.99	-5,170.27	2,937.14	14,452,531.37	1,723,980.16	39.79584171	-80.70249759
13,409.00	89.63	148.25	6,891.03	-5,250.97	2,985.31	14,452,450.66	1,724,028.33	39.79561963	-80.70232706

WV Department of Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2-03 HM (slot D)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1331+33 @ 1364.00usft (Nabors X08)
Site:	Heaven Hill 2	MD Reference:	RKB=1331+33 @ 1364.00usft (Nabors X08)
Well:	Heaven Hill 2-03 HM (slot D)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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WV Department of Environmental Protection

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
13,504.00	89.32	148.16	6,891.90	-5,331.71	3,035.36	14,452,369.92	1,724,078.38	39.79539743	-80.70214982
13,598.00	90.15	150.89	6,892.34	-5,412.72	3,083.02	14,452,288.91	1,724,126.05	39.79517454	-80.70198108
13,693.00	91.56	149.74	6,890.92	-5,495.24	3,130.06	14,452,206.39	1,724,173.09	39.79494749	-80.70181459
13,787.00	89.76	150.01	6,889.84	-5,576.53	3,177.24	14,452,125.10	1,724,220.26	39.79472380	-80.70164762
13,882.00	88.62	149.92	6,891.18	-5,658.77	3,224.78	14,452,042.86	1,724,267.80	39.79449753	-80.70147933
13,977.00	88.00	150.62	6,893.98	-5,741.23	3,271.87	14,451,960.40	1,724,314.89	39.79427065	-80.70131266
14,072.00	89.58	153.08	6,895.99	-5,824.96	3,316.68	14,451,876.67	1,724,359.70	39.79404028	-80.70115415
14,166.00	91.47	153.70	6,895.13	-5,909.00	3,358.78	14,451,792.63	1,724,401.80	39.79380911	-80.70100527
14,261.00	90.42	153.87	6,893.56	-5,994.21	3,400.74	14,451,707.42	1,724,443.76	39.79357470	-80.70085691
14,355.00	90.24	152.29	6,893.02	-6,078.02	3,443.29	14,451,623.61	1,724,486.31	39.79334415	-80.70070641
14,449.00	90.02	149.22	6,892.81	-6,160.03	3,489.21	14,451,541.60	1,724,532.23	39.79311851	-80.70054392
14,545.00	89.93	147.37	6,892.85	-6,241.70	3,539.66	14,451,459.93	1,724,582.68	39.79289376	-80.70036529
14,639.00	89.36	147.98	6,893.43	-6,321.13	3,589.92	14,451,380.50	1,724,632.94	39.79267516	-80.70018730
14,734.00	90.15	150.62	6,893.84	-6,402.81	3,638.42	14,451,298.82	1,724,681.44	39.79245041	-80.70001563
14,828.00	89.71	149.22	6,893.95	-6,484.15	3,685.53	14,451,217.48	1,724,728.55	39.79222660	-80.69984888
14,923.00	89.93	147.28	6,894.25	-6,564.93	3,735.52	14,451,136.70	1,724,778.54	39.79200430	-80.69967189
15,018.00	91.38	149.57	6,893.16	-6,645.85	3,785.25	14,451,055.78	1,724,828.28	39.79178160	-80.69949580
15,112.00	91.30	150.97	6,890.97	-6,727.45	3,831.86	14,450,974.18	1,724,874.88	39.79155707	-80.69933088
15,205.00	89.98	152.29	6,889.93	-6,809.27	3,876.04	14,450,892.36	1,724,919.06	39.79133196	-80.69917456
15,299.00	89.01	152.91	6,890.76	-6,892.72	3,919.30	14,450,808.91	1,724,962.32	39.79110239	-80.69902157
15,394.00	89.85	152.38	6,891.70	-6,977.10	3,962.95	14,450,724.54	1,725,005.97	39.79087028	-80.69886719
15,488.00	88.79	152.03	6,892.82	-7,060.24	4,006.78	14,450,641.39	1,725,049.80	39.79064153	-80.69871216
15,583.00	90.73	152.03	6,893.21	-7,144.14	4,051.33	14,450,557.49	1,725,094.35	39.79041071	-80.69855456
15,677.00	89.80	150.71	6,892.78	-7,226.64	4,096.37	14,450,474.99	1,725,139.39	39.79018372	-80.69839522
15,771.00	88.57	149.74	6,894.12	-7,308.22	4,143.04	14,450,393.41	1,725,186.06	39.78995925	-80.69823004
15,865.00	90.02	148.78	6,895.27	-7,389.01	4,191.08	14,450,312.62	1,725,234.11	39.78973695	-80.69805999
15,960.00	89.45	149.04	6,895.71	-7,470.36	4,240.14	14,450,231.27	1,725,283.16	39.78951308	-80.69788634
16,055.00	90.20	149.83	6,896.00	-7,552.16	4,288.45	14,450,149.47	1,725,331.47	39.78928800	-80.69771535
16,150.00	88.79	151.06	6,896.84	-7,634.79	4,335.30	14,450,066.84	1,725,378.33	39.78906063	-80.69754955
16,244.00	89.36	149.74	6,898.36	-7,716.51	4,381.73	14,449,985.12	1,725,424.75	39.78883578	-80.69738528
16,339.00	91.16	149.30	6,897.93	-7,798.38	4,429.91	14,449,903.25	1,725,472.93	39.78861050	-80.69721473
16,385.00	91.43	148.60	6,896.89	-7,837.78	4,453.63	14,449,863.86	1,725,496.65	39.78850208	-80.69713077
Survey @ 16385.00 MD 6896.89 TVD									
16,435.00	91.43	148.60	6,895.64	-7,880.44	4,479.67	14,449,821.19	1,725,522.70	39.78838467	-80.69703858
Survey projected to 16435.00 MD 6895.64 TVD									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
921.00	921.00	1.43	-0.37	MWD surveys
16,385.00	6,896.89	-7,837.78	4,453.63	Survey @ 16385.00 MD 6896.89 TVD
16,435.00	6,895.64	-7,880.44	4,479.67	Survey projected to 16435.00 MD 6895.64 TVD