

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2W-11 HM (slot L)
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 2W-11 HM (slot L)	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)		

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

Well	Heaven Hill 2W-11 HM (slot L)					
Well Position	+N/-S	0.00 usft	Northing:	14,457,714.25 usft	Latitude:	39.81010170
	+E/-W	0.00 usft	Easting:	1,721,026.26 usft	Longitude:	-80.71295473
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	4/30/2018	-8.71	66.90	52,085.08163957
	IGRF2015	8/14/2018	-8.72	66.88	52,051.57587705

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	173.96	

Survey Program	Date 8/26/2018				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	RECEIVED Office of Oil and Gas JUN 10 2020 WV Department of Environmental Protection
60.00	891.00	Gyro (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing ms	
899.00	7,574.00	MWD EM (Original Hole)	MWD	MWD - Standard	
7,648.00	17,189.00	MWD lat (Original Hole)	MWD	MWD - Standard	
17,242.00	17,242.00	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	14,457,714.25	1,721,026.26	39.81010170	-80.71295473	
60.00	0.11	47.19	60.00	0.04	0.04	14,457,714.29	1,721,026.31	39.81010181	-80.71295458	
Gyro										
90.00	0.27	3.94	90.00	0.13	0.07	14,457,714.38	1,721,026.33	39.81010206	-80.71295449	
120.00	0.31	333.59	120.00	0.27	0.04	14,457,714.52	1,721,026.30	39.81010245	-80.71295460	
150.00	0.28	304.29	150.00	0.39	-0.06	14,457,714.64	1,721,026.20	39.81010276	-80.71295494	
180.00	0.19	347.22	180.00	0.48	-0.13	14,457,714.73	1,721,026.13	39.81010301	-80.71295519	
210.00	0.09	272.58	210.00	0.53	-0.17	14,457,714.78	1,721,026.10	39.81010315	-80.71295531	

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Well:	Heaven Hill 2W-11 HM (slot L)	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
240.00	0.19	355.82	240.00	0.58	-0.19	14,457,714.83	1,721,026.07	39.81010329	-80.71295541
270.00	0.25	11.52	270.00	0.69	-0.18	14,457,714.94	1,721,026.08	39.81010360	-80.71295538
300.00	0.24	328.65	300.00	0.81	-0.20	14,457,715.06	1,721,026.06	39.81010392	-80.71295544
330.00	0.25	310.15	330.00	0.90	-0.29	14,457,715.15	1,721,025.98	39.81010419	-80.71295574
360.00	0.07	229.94	360.00	0.93	-0.35	14,457,715.18	1,721,025.91	39.81010427	-80.71295597
390.00	0.04	199.43	390.00	0.91	-0.37	14,457,715.16	1,721,025.90	39.81010421	-80.71295603
420.00	0.08	287.63	420.00	0.91	-0.39	14,457,715.16	1,721,025.87	39.81010420	-80.71295611
450.00	0.08	17.62	450.00	0.94	-0.40	14,457,715.18	1,721,025.86	39.81010427	-80.71295616
480.00	0.16	331.86	480.00	0.99	-0.42	14,457,715.24	1,721,025.85	39.81010443	-80.71295621
510.00	0.16	312.13	510.00	1.06	-0.47	14,457,715.31	1,721,025.80	39.81010461	-80.71295639
540.00	0.18	290.93	540.00	1.10	-0.54	14,457,715.35	1,721,025.72	39.81010473	-80.71295665
570.00	0.14	278.87	570.00	1.12	-0.62	14,457,715.37	1,721,025.64	39.81010480	-80.71295694
600.00	0.21	280.11	600.00	1.14	-0.71	14,457,715.39	1,721,025.55	39.81010484	-80.71295726
630.00	0.14	270.38	630.00	1.15	-0.81	14,457,715.40	1,721,025.46	39.81010487	-80.71295758
660.00	0.07	220.39	660.00	1.14	-0.85	14,457,715.39	1,721,025.41	39.81010483	-80.71295776
690.00	0.09	216.30	690.00	1.10	-0.88	14,457,715.35	1,721,025.39	39.81010474	-80.71295785
720.00	0.05	223.48	720.00	1.07	-0.90	14,457,715.32	1,721,025.36	39.81010466	-80.71295793
750.00	0.02	235.77	750.00	1.06	-0.92	14,457,715.31	1,721,025.35	39.81010463	-80.71295798
780.00	0.17	349.26	780.00	1.10	-0.93	14,457,715.35	1,721,025.34	39.81010474	-80.71295802
810.00	0.25	9.80	810.00	1.21	-0.93	14,457,715.46	1,721,025.34	39.81010504	-80.71295801
840.00	0.26	347.22	840.00	1.34	-0.93	14,457,715.59	1,721,025.34	39.81010540	-80.71295802
870.00	0.12	314.05	870.00	1.43	-0.97	14,457,715.68	1,721,025.30	39.81010564	-80.71295816
891.00	0.35	18.02	891.00	1.51	-0.96	14,457,715.76	1,721,025.30	39.81010585	-80.71295814
899.00	0.31	120.68	899.00	1.52	-0.94	14,457,715.77	1,721,025.33	39.81010588	-80.71295805
EM surveys									
930.00	0.40	321.81	930.00	1.56	-0.93	14,457,715.81	1,721,025.33	39.81010600	-80.71295803
962.00	0.09	279.81	962.00	1.65	-1.03	14,457,715.90	1,721,025.24	39.81010625	-80.71295836
993.00	0.01	351.29	993.00	1.66	-1.05	14,457,715.91	1,721,025.21	39.81010627	-80.71295845
1,025.00	0.31	338.51	1,025.00	1.74	-1.08	14,457,715.99	1,721,025.18	39.81010650	-80.71295856
1,056.00	0.22	343.88	1,056.00	1.88	-1.13	14,457,716.13	1,721,025.14	39.81010687	-80.71295873
1,088.00	0.22	305.59	1,087.99	1.97	-1.20	14,457,716.22	1,721,025.07	39.81010713	-80.71295897
1,119.00	0.09	239.62	1,118.99	2.00	-1.27	14,457,716.25	1,721,025.00	39.81010719	-80.71295921
1,151.00	0.31	274.30	1,150.99	1.99	-1.37	14,457,716.24	1,721,024.89	39.81010718	-80.71295960
1,182.00	0.22	85.12	1,181.99	2.00	-1.40	14,457,716.25	1,721,024.87	39.81010721	-80.71295969
1,277.00	0.22	148.00	1,276.99	1.86	-1.12	14,457,716.11	1,721,025.14	39.81010682	-80.71295870
1,371.00	0.49	187.49	1,370.99	1.31	-1.08	14,457,715.56	1,721,025.19	39.81010531	-80.71295855
1,466.00	0.62	192.82	1,465.99	0.41	-1.24	14,457,714.66	1,721,025.02	39.81010283	-80.71295915
1,560.00	0.88	254.29	1,559.98	-0.29	-2.05	14,457,713.96	1,721,024.21	39.81010094	-80.71296204
1,655.00	2.61	268.00	1,654.93	-0.56	-4.92	14,457,713.69	1,721,021.35	39.81010021	-80.71297224
1,749.00	4.51	268.62	1,748.75	-0.72	-10.75	14,457,713.53	1,721,015.52	39.81009981	-80.71299302
1,844.00	5.92	267.21	1,843.35	-1.05	-19.38	14,457,713.20	1,721,006.89	39.81009899	-80.71302374
1,938.00	6.58	255.09	1,936.80	-2.67	-29.42	14,457,711.58	1,720,996.84	39.81009462	-80.71305954
2,033.00	7.69	251.69	2,031.06	-6.07	-40.72	14,457,708.18	1,720,985.55	39.81008539	-80.71309979
2,128.00	7.38	248.39	2,125.24	-10.31	-52.43	14,457,703.94	1,720,973.84	39.81007384	-80.71314153
2,222.00	7.69	245.61	2,218.43	-15.13	-63.77	14,457,699.12	1,720,962.50	39.81006070	-80.71318197
2,317.00	7.60	243.72	2,312.58	-20.54	-75.19	14,457,693.71	1,720,951.08	39.81004596	-80.71322270
2,411.00	7.51	238.12	2,405.77	-26.54	-85.98	14,457,687.71	1,720,940.29	39.81002958	-80.71326119
2,506.00	7.20	234.68	2,499.99	-33.26	-96.11	14,457,680.99	1,720,930.16	39.81001121	-80.71329734
2,601.00	6.41	238.69	2,594.32	-39.46	-105.50	14,457,674.79	1,720,920.77	39.80999428	-80.71333084
2,696.00	6.19	249.49	2,688.75	-44.01	-114.82	14,457,670.24	1,720,911.44	39.80998186	-80.71336411
2,790.00	6.19	254.29	2,782.20	-47.15	-124.45	14,457,667.10	1,720,901.82	39.80997330	-80.71339842
2,880.00	6.01	253.21	2,871.69	-49.83	-133.63	14,457,664.42	1,720,892.63	39.80996604	-80.71343114
2,974.00	12.42	255.90	2,964.43	-53.72	-148.16	14,457,660.53	1,720,878.10	39.80995549	-80.71348293
3,069.00	12.59	245.24	3,057.19	-60.54	-167.47	14,457,653.71	1,720,858.79	39.80993691	-80.71355178
3,164.00	11.80	238.41	3,150.05	-69.97	-185.15	14,457,644.28	1,720,841.11	39.80991118	-80.71361483



Survey Report - Geographic



Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Heaven Hill 2
Well: Heaven Hill 2W-11 HM (slot L)
Wellbore: Original Hole
Design: Surveys Original Hole

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

Well Heaven Hill 2W-11 HM (slot L)
 RKB=1331+33 @ 1364.00usft (Nabors X08)
 RKB=1331+33 @ 1364.00usft (Nabors X08)
 Grid
 Minimum Curvature
 DB_Jul2216dt_v14

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 Office of Oil and Gas

Survey

JUN 10 2020

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	WV Department of Environmental Protection	
								Latitude	Longitude
3,258.00	11.40	244.31	3,242.13	-79.03	-201.71	14,457,635.22	1,720,824.55	39.80988644	-80.71367390
3,353.00	14.18	248.01	3,334.77	-87.46	-220.96	14,457,626.79	1,720,805.30	39.80986346	-80.71374256
3,447.00	17.41	250.04	3,425.21	-96.57	-244.87	14,457,617.68	1,720,781.40	39.80983864	-80.71382777
3,542.00	20.42	248.54	3,515.07	-107.49	-273.65	14,457,606.76	1,720,752.61	39.80980891	-80.71393041
3,636.00	22.80	247.92	3,602.45	-120.34	-305.80	14,457,593.91	1,720,720.47	39.80977391	-80.71404501
3,731.00	23.69	252.02	3,689.75	-133.15	-341.01	14,457,581.10	1,720,685.25	39.80973904	-80.71417055
3,826.00	25.72	249.73	3,776.05	-146.18	-378.51	14,457,568.07	1,720,647.76	39.80970357	-80.71430421
3,920.00	27.22	247.92	3,860.20	-161.33	-417.56	14,457,552.92	1,720,608.70	39.80966231	-80.71444346
4,015.00	28.28	247.62	3,944.27	-178.07	-458.51	14,457,536.18	1,720,567.76	39.80961671	-80.71458945
4,110.00	29.52	248.72	4,027.44	-195.13	-501.13	14,457,519.12	1,720,525.14	39.80957022	-80.71474141
4,204.00	31.82	249.51	4,108.28	-212.21	-545.93	14,457,502.04	1,720,480.34	39.80952370	-80.71490112
4,299.00	35.40	248.54	4,187.39	-231.05	-595.01	14,457,483.20	1,720,431.25	39.80947239	-80.71507612
4,393.00	38.00	248.41	4,262.75	-251.67	-647.27	14,457,462.58	1,720,379.00	39.80941624	-80.71526242
4,488.00	39.02	247.31	4,337.09	-273.96	-702.05	14,457,440.29	1,720,324.21	39.80935549	-80.71545776
4,583.00	39.81	247.44	4,410.48	-297.17	-757.73	14,457,417.08	1,720,268.54	39.80929225	-80.71565627
4,677.00	42.20	249.20	4,481.41	-319.93	-815.04	14,457,394.32	1,720,211.23	39.80923025	-80.71586061
4,772.00	46.80	250.13	4,549.16	-343.04	-877.47	14,457,371.21	1,720,148.80	39.80916732	-80.71608316
4,866.00	45.29	247.31	4,614.40	-367.57	-940.51	14,457,346.68	1,720,085.75	39.80910049	-80.71630795
4,961.00	47.02	248.32	4,680.21	-393.43	-1,003.96	14,457,320.82	1,720,022.31	39.80903002	-80.71653415
5,056.00	50.20	247.22	4,743.02	-420.41	-1,069.91	14,457,293.84	1,719,956.35	39.80895652	-80.71676931
5,151.00	52.81	247.62	4,802.14	-448.95	-1,138.56	14,457,265.30	1,719,887.70	39.80887873	-80.71701408
5,246.00	54.71	248.23	4,858.30	-477.74	-1,209.57	14,457,236.51	1,719,816.70	39.80880028	-80.71726724
5,340.00	52.89	245.24	4,913.83	-507.67	-1,279.25	14,457,206.58	1,719,747.02	39.80871868	-80.71751569
5,435.00	53.69	247.70	4,970.62	-538.07	-1,349.07	14,457,176.18	1,719,677.20	39.80863582	-80.71776465
5,530.00	55.41	249.51	5,025.72	-566.28	-1,421.12	14,457,147.97	1,719,605.15	39.80855895	-80.71802153
5,625.00	55.19	253.04	5,079.81	-591.35	-1,495.07	14,457,122.90	1,719,531.20	39.80849075	-80.71828513
5,719.00	53.60	249.91	5,134.54	-615.61	-1,567.52	14,457,098.64	1,719,458.74	39.80842476	-80.71854340
5,814.00	53.91	251.14	5,190.71	-641.15	-1,639.76	14,457,073.10	1,719,386.51	39.80835524	-80.71880089
5,909.00	51.39	248.72	5,248.35	-667.04	-1,710.68	14,457,047.21	1,719,315.58	39.80828476	-80.71905374
6,002.00	52.19	248.54	5,305.87	-693.66	-1,778.73	14,457,020.59	1,719,247.53	39.80821222	-80.71929635
6,097.00	53.38	245.41	5,363.34	-723.26	-1,848.34	14,456,990.99	1,719,177.93	39.80813153	-80.71954453
6,192.00	55.28	244.93	5,418.73	-755.67	-1,918.38	14,456,958.58	1,719,107.89	39.80804313	-80.71979428
6,286.00	55.19	247.92	5,472.34	-786.55	-1,989.14	14,456,927.70	1,719,037.13	39.80795893	-80.72004659
6,381.00	53.69	248.01	5,527.59	-815.55	-2,060.77	14,456,898.70	1,718,965.49	39.80787992	-80.72030200
6,476.00	54.31	245.41	5,583.43	-845.94	-2,131.35	14,456,868.31	1,718,894.91	39.80779707	-80.72055366
6,570.00	52.98	246.73	5,639.15	-876.65	-2,200.54	14,456,837.60	1,718,825.72	39.80771332	-80.72080037
6,664.00	54.79	248.41	5,694.56	-905.61	-2,270.73	14,456,808.64	1,718,755.53	39.80763439	-80.72105061
6,759.00	52.72	246.03	5,750.73	-935.25	-2,341.37	14,456,779.00	1,718,684.90	39.80755360	-80.72130246
6,854.00	52.98	246.91	5,808.10	-965.48	-2,410.79	14,456,748.77	1,718,615.47	39.80747117	-80.72155000
6,949.00	54.79	247.44	5,864.09	-995.24	-2,481.53	14,456,719.01	1,718,544.74	39.80739004	-80.72180219
7,044.00	58.29	248.72	5,916.46	-1,024.81	-2,555.04	14,456,689.44	1,718,471.22	39.80730947	-80.72206430
7,138.00	56.92	251.54	5,966.83	-1,051.79	-2,629.67	14,456,662.45	1,718,396.59	39.80723600	-80.72233033
7,233.00	54.71	250.30	6,020.21	-1,077.47	-2,703.94	14,456,636.78	1,718,322.33	39.80716611	-80.72259505
7,328.00	52.72	248.63	6,076.43	-1,104.32	-2,775.65	14,456,609.93	1,718,250.62	39.80709300	-80.72285069
7,422.00	52.98	247.70	6,133.20	-1,132.18	-2,845.19	14,456,582.07	1,718,181.07	39.80701706	-80.72309863
7,517.00	53.12	248.23	6,190.30	-1,160.67	-2,915.57	14,456,553.58	1,718,110.70	39.80693944	-80.72334953
7,574.00	53.78	248.63	6,224.25	-1,177.50	-2,958.15	14,456,536.75	1,718,068.11	39.80689357	-80.72350134
7,683.00	50.59	243.86	6,291.09	-1,212.09	-3,036.95	14,456,502.16	1,717,989.32	39.80679923	-80.72378229
7,731.00	49.98	239.03	6,321.77	-1,229.73	-3,069.36	14,456,484.52	1,717,956.90	39.80675108	-80.72389791
7,778.00	50.99	233.76	6,351.69	-1,249.79	-3,099.54	14,456,464.46	1,717,926.73	39.80669623	-80.72400557
7,825.00	51.60	229.27	6,381.09	-1,272.61	-3,128.23	14,456,441.64	1,717,898.04	39.80663381	-80.72410799
7,872.00	52.88	224.44	6,409.88	-1,298.02	-3,155.32	14,456,416.23	1,717,870.95	39.80656427	-80.72420472
7,920.00	54.33	219.87	6,438.37	-1,326.66	-3,181.22	14,456,387.59	1,717,845.04	39.80648584	-80.72429728
7,967.00	56.09	216.18	6,465.19	-1,357.06	-3,204.98	14,456,357.19	1,717,821.28	39.80640254	-80.72438221
8,015.00	57.27	212.75	6,491.56	-1,390.13	-3,227.67	14,456,324.12	1,717,798.60	39.80631193	-80.72446335

Company: Tug Hill Operating LLC
Project: Marshall County, West Virginia
Site: Heaven Hill 2
Well: Heaven Hill 2W-11 HM (slot L)
Wellbore: Original Hole
Design: Surveys Original Hole

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

Well Heaven Hill 2W-11 HM (slot L)
 RKB=1331+33 @ 1364.00usft (Nabors X08)
 RKB=1331+33 @ 1364.00usft (Nabors X08)
 Grid
 Minimum Curvature
 DB_Jul2216dt_v14

 RECEIVED
 Office of Oil and Gas

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,062.00	57.76	208.44	6,516.81	-1,424.24	-3,247.84	14,456,290.01	1,717,778.43	39.80621841	-80.72453554
8,109.00	58.77	204.14	6,541.54	-1,460.07	-3,265.53	14,456,254.18	1,717,760.74	39.80612016	-80.72459892
8,156.00	59.60	199.48	6,565.63	-1,497.53	-3,280.51	14,456,216.72	1,717,745.75	39.80601741	-80.72465268
8,204.00	60.00	195.79	6,589.78	-1,537.06	-3,293.07	14,456,177.19	1,717,733.19	39.80590897	-80.72469784
8,251.00	60.35	191.66	6,613.16	-1,576.66	-3,302.74	14,456,137.59	1,717,723.52	39.80580030	-80.72473270
8,299.00	61.54	188.05	6,636.48	-1,617.99	-3,309.91	14,456,096.26	1,717,716.35	39.80568686	-80.72475870
8,346.00	63.34	183.92	6,658.23	-1,659.41	-3,314.24	14,456,054.84	1,717,712.02	39.80557313	-80.72477457
8,394.00	63.38	179.79	6,679.76	-1,702.28	-3,315.63	14,456,011.97	1,717,710.63	39.80545541	-80.72477998
8,441.00	63.34	174.96	6,700.85	-1,744.23	-3,313.71	14,455,970.02	1,717,712.56	39.80534019	-80.72477359
8,489.00	65.54	170.83	6,721.56	-1,787.18	-3,308.34	14,455,927.06	1,717,717.92	39.80522218	-80.72475495
8,536.00	68.75	166.52	6,739.82	-1,829.63	-3,299.82	14,455,884.62	1,717,726.44	39.80510555	-80.72472508
8,583.00	71.65	163.18	6,755.75	-1,872.30	-3,288.26	14,455,841.95	1,717,738.01	39.80498827	-80.72468436
8,630.00	74.55	159.93	6,769.41	-1,914.94	-3,274.02	14,455,799.31	1,717,752.24	39.80487103	-80.72463415
8,678.00	77.10	157.47	6,781.17	-1,958.29	-3,257.11	14,455,755.96	1,717,769.15	39.80475184	-80.72457442
8,725.00	79.65	154.83	6,790.64	-2,000.39	-3,238.50	14,455,713.86	1,717,787.77	39.80463608	-80.72450860
8,772.00	82.55	152.72	6,797.91	-2,042.04	-3,217.98	14,455,672.21	1,717,808.28	39.80452154	-80.72443600
8,826.00	86.15	150.61	6,803.22	-2,089.32	-3,192.48	14,455,624.93	1,717,833.79	39.80439146	-80.72434572
8,867.00	87.03	149.29	6,805.66	-2,124.75	-3,171.98	14,455,589.50	1,717,854.28	39.80429400	-80.72427313
8,962.00	87.96	149.91	6,809.82	-2,206.61	-3,123.96	14,455,507.64	1,717,902.31	39.80406878	-80.72410303
9,056.00	91.12	149.12	6,810.57	-2,287.60	-3,076.28	14,455,426.65	1,717,949.99	39.80384596	-80.72393415
9,151.00	91.56	148.94	6,808.35	-2,369.03	-3,027.41	14,455,345.22	1,717,998.86	39.80362190	-80.72376103
9,245.00	90.20	147.71	6,806.90	-2,449.02	-2,978.05	14,455,265.23	1,718,048.21	39.80340183	-80.72358619
9,340.00	90.37	147.97	6,806.43	-2,529.44	-2,927.49	14,455,184.81	1,718,098.78	39.80318054	-80.72340703
9,435.00	90.86	148.33	6,805.41	-2,610.13	-2,877.36	14,455,104.12	1,718,148.91	39.80295851	-80.72322944
9,529.00	91.03	147.54	6,803.86	-2,689.78	-2,827.46	14,455,024.47	1,718,198.80	39.80273935	-80.72305266
9,624.00	90.15	147.97	6,802.88	-2,770.12	-2,776.78	14,454,944.13	1,718,249.48	39.80251828	-80.72287309
9,719.00	88.97	147.89	6,803.61	-2,850.62	-2,726.34	14,454,863.63	1,718,299.92	39.80229678	-80.72269439
9,813.00	90.20	148.33	6,804.29	-2,930.43	-2,676.69	14,454,783.82	1,718,349.58	39.80207718	-80.72251847
9,908.00	89.54	148.85	6,804.51	-3,011.51	-2,627.18	14,454,702.74	1,718,399.09	39.80185410	-80.72234309
10,002.00	89.80	150.96	6,805.05	-3,092.83	-2,580.04	14,454,621.42	1,718,446.22	39.80163037	-80.72217618
10,097.00	89.85	154.48	6,805.34	-3,177.25	-2,536.51	14,454,537.00	1,718,489.76	39.80139816	-80.72202211
10,191.00	88.48	154.48	6,806.71	-3,262.07	-2,496.02	14,454,452.18	1,718,530.25	39.80116488	-80.72187887
10,286.00	87.78	153.86	6,809.81	-3,347.53	-2,454.65	14,454,366.72	1,718,571.62	39.80092983	-80.72173253
10,380.00	87.74	153.16	6,813.49	-3,431.60	-2,412.75	14,454,282.65	1,718,613.51	39.80069860	-80.72158429
10,474.00	90.55	151.58	6,814.89	-3,514.86	-2,369.17	14,454,199.39	1,718,657.10	39.80046957	-80.72143004
10,568.00	89.76	151.05	6,814.63	-3,597.32	-2,324.05	14,454,116.93	1,718,702.21	39.80024273	-80.72127031
10,663.00	89.41	150.26	6,815.32	-3,680.13	-2,277.50	14,454,034.12	1,718,748.77	39.80001492	-80.72110548
10,757.00	89.93	150.35	6,815.86	-3,761.78	-2,230.93	14,453,952.47	1,718,795.33	39.79979028	-80.72094060
10,852.00	90.33	150.52	6,815.65	-3,844.41	-2,184.06	14,453,869.84	1,718,842.21	39.79956295	-80.72077463
10,946.00	90.20	150.52	6,815.21	-3,926.24	-2,137.80	14,453,788.01	1,718,888.47	39.79933783	-80.72061084
11,041.00	90.29	150.08	6,814.81	-4,008.76	-2,090.73	14,453,705.49	1,718,935.53	39.79911081	-80.72044418
11,135.00	90.15	149.64	6,814.45	-4,090.05	-2,043.53	14,453,624.20	1,718,982.73	39.79888716	-80.72027704
11,230.00	89.93	149.82	6,814.38	-4,172.10	-1,995.64	14,453,542.15	1,719,030.62	39.79866143	-80.72010746
11,325.00	89.80	149.73	6,814.60	-4,254.18	-1,947.82	14,453,460.07	1,719,078.44	39.79843559	-80.71993811
11,420.00	89.58	149.03	6,815.12	-4,335.93	-1,899.44	14,453,378.32	1,719,126.83	39.79821066	-80.71976676
11,514.00	89.14	149.21	6,816.17	-4,416.60	-1,851.19	14,453,297.65	1,719,175.07	39.79798871	-80.71959590
11,609.00	90.29	148.59	6,816.64	-4,497.95	-1,802.12	14,453,216.30	1,719,224.14	39.79776490	-80.71942211
11,703.00	90.59	148.59	6,815.92	-4,578.17	-1,753.14	14,453,136.08	1,719,273.13	39.79754416	-80.71924860
11,798.00	90.99	148.94	6,814.61	-4,659.39	-1,703.88	14,453,054.86	1,719,322.38	39.79732069	-80.71907414
11,893.00	91.08	148.33	6,812.89	-4,740.49	-1,654.44	14,452,973.76	1,719,371.82	39.79709753	-80.71889903
11,987.00	91.56	148.24	6,810.73	-4,820.44	-1,605.04	14,452,893.81	1,719,421.22	39.79687756	-80.71872405
12,082.00	89.49	150.26	6,809.86	-4,902.07	-1,556.47	14,452,812.18	1,719,469.79	39.79665296	-80.71855206
12,177.00	89.76	151.05	6,810.48	-4,984.88	-1,509.92	14,452,729.37	1,719,516.34	39.79642515	-80.71838724
12,271.00	90.37	152.37	6,810.37	-5,067.65	-1,465.37	14,452,646.60	1,719,560.89	39.79619745	-80.71822957
12,366.00	89.14	152.02	6,810.78	-5,151.67	-1,421.06	14,452,562.58	1,719,605.21	39.79596630	-80.71807275

JUN 10 2020

 WV Department of
 Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2W-11 HM (slot L)
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 2W-11 HM (slot L)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
12,460.00	89.32	152.02	6,812.04	-5,234.68	-1,376.96	14,452,479.57	1,719,649.30	39.79573797	-80.71791668
12,555.00	90.02	152.81	6,812.59	-5,318.88	-1,332.97	14,452,395.37	1,719,693.29	39.79550636	-80.71776102
12,650.00	89.89	151.49	6,812.66	-5,402.87	-1,288.59	14,452,311.38	1,719,737.67	39.79527530	-80.71760397
12,745.00	89.36	150.26	6,813.28	-5,485.86	-1,242.36	14,452,228.39	1,719,783.91	39.79504701	-80.71744029
12,839.00	89.85	149.82	6,813.93	-5,567.29	-1,195.41	14,452,146.96	1,719,830.85	39.79482295	-80.71727409
12,934.00	90.11	149.56	6,813.97	-5,649.31	-1,147.47	14,452,064.94	1,719,878.79	39.79459731	-80.71710433
13,028.00	90.37	149.38	6,813.57	-5,730.28	-1,099.72	14,451,983.97	1,719,926.55	39.79437453	-80.71693524
13,123.00	90.46	149.47	6,812.88	-5,812.06	-1,051.40	14,451,902.19	1,719,974.87	39.79414950	-80.71676413
13,217.00	90.81	149.03	6,811.84	-5,892.84	-1,003.34	14,451,821.41	1,720,022.93	39.79392724	-80.71659395
13,312.00	91.08	149.38	6,810.28	-5,974.44	-954.71	14,451,739.81	1,720,071.56	39.79370274	-80.71642175
13,407.00	91.56	148.50	6,808.09	-6,055.79	-905.71	14,451,658.45	1,720,120.56	39.79347889	-80.71624822
13,502.00	89.67	146.92	6,807.07	-6,136.09	-854.97	14,451,578.16	1,720,171.30	39.79325793	-80.71606848
13,596.00	90.11	146.22	6,807.25	-6,214.54	-803.18	14,451,499.71	1,720,223.08	39.79304204	-80.71588501
13,691.00	90.07	149.03	6,807.10	-6,294.77	-752.32	14,451,419.48	1,720,273.95	39.79282127	-80.71570484
13,785.00	90.20	148.77	6,806.88	-6,375.25	-703.76	14,451,339.00	1,720,322.50	39.79259981	-80.71553290
13,880.00	90.73	149.03	6,806.11	-6,456.60	-654.69	14,451,257.65	1,720,371.57	39.79237599	-80.71535914
13,975.00	88.09	148.15	6,807.08	-6,537.66	-605.19	14,451,176.59	1,720,421.07	39.79215293	-80.71518383
14,070.00	88.26	147.45	6,810.11	-6,618.01	-554.59	14,451,096.24	1,720,471.67	39.79193183	-80.71500462
14,164.00	90.37	148.06	6,811.23	-6,697.50	-504.45	14,451,016.75	1,720,521.82	39.79171309	-80.71482700
14,258.00	90.24	150.35	6,810.73	-6,778.24	-456.33	14,450,936.01	1,720,569.94	39.79149094	-80.71465661
14,353.00	90.24	150.70	6,810.33	-6,860.95	-409.58	14,450,853.30	1,720,616.68	39.79126340	-80.71449114
14,447.00	89.01	146.74	6,810.95	-6,941.26	-360.79	14,450,772.99	1,720,665.48	39.79104240	-80.71431835
14,542.00	88.84	148.24	6,812.73	-7,021.36	-309.74	14,450,692.89	1,720,716.52	39.79082199	-80.71413754
14,637.00	88.97	147.97	6,814.55	-7,102.00	-259.56	14,450,612.25	1,720,766.71	39.79060009	-80.71395980
14,732.00	88.18	150.79	6,816.91	-7,183.72	-211.19	14,450,530.53	1,720,815.08	39.79037524	-80.71378855
14,826.00	88.40	150.88	6,819.72	-7,265.77	-165.40	14,450,448.48	1,720,860.86	39.79014952	-80.71362648
14,921.00	89.89	153.25	6,821.13	-7,349.68	-120.91	14,450,364.57	1,720,905.36	39.78991868	-80.71346904
15,015.00	90.24	153.69	6,821.03	-7,433.78	-78.92	14,450,280.47	1,720,947.35	39.78968735	-80.71332053
15,108.00	90.51	153.07	6,820.42	-7,516.92	-37.25	14,450,197.33	1,720,989.02	39.78945866	-80.71317315
15,202.00	91.08	153.60	6,819.11	-7,600.91	4.93	14,450,113.33	1,721,031.20	39.78922762	-80.71302395
15,297.00	89.49	151.67	6,818.64	-7,685.28	48.59	14,450,028.97	1,721,074.86	39.78899555	-80.71286948
15,391.00	89.76	151.75	6,819.26	-7,768.05	93.14	14,449,946.20	1,721,119.41	39.78876785	-80.71271184
15,486.00	90.20	152.55	6,819.29	-7,852.04	137.52	14,449,862.21	1,721,163.79	39.78853679	-80.71255482
15,580.00	90.59	152.98	6,818.64	-7,935.62	180.54	14,449,778.63	1,721,206.80	39.78830688	-80.71240264
15,675.00	88.79	150.26	6,819.16	-8,019.19	225.69	14,449,695.06	1,721,251.95	39.78807698	-80.71224288
15,769.00	89.01	150.17	6,820.96	-8,100.76	272.37	14,449,613.49	1,721,298.64	39.78785256	-80.71207762
15,863.00	89.32	150.61	6,822.33	-8,182.47	318.81	14,449,531.78	1,721,345.08	39.78762774	-80.71191325
15,958.00	90.15	149.38	6,822.77	-8,264.74	366.32	14,449,449.51	1,721,392.58	39.78740140	-80.71174508
16,053.00	90.46	148.41	6,822.26	-8,346.08	415.40	14,449,368.17	1,721,441.66	39.78717759	-80.71157132
16,147.00	90.95	148.33	6,821.11	-8,426.11	464.69	14,449,288.14	1,721,490.95	39.78695737	-80.71139677
16,242.00	91.30	147.54	6,819.24	-8,506.60	515.11	14,449,207.65	1,721,541.38	39.78673587	-80.71122180
16,337.00	91.08	148.85	6,817.27	-8,587.31	565.17	14,449,126.94	1,721,591.43	39.78651376	-80.71104095
16,431.00	90.68	148.41	6,815.83	-8,667.56	614.09	14,449,046.69	1,721,640.36	39.78629294	-80.71086770
16,526.00	89.67	150.00	6,815.54	-8,749.16	662.73	14,448,965.09	1,721,688.99	39.78606841	-80.71069552
16,620.00	88.44	152.11	6,817.09	-8,831.40	708.21	14,448,882.85	1,721,734.48	39.78584215	-80.71053456
16,715.00	88.44	151.40	6,819.67	-8,915.06	753.15	14,448,799.19	1,721,779.42	39.78561201	-80.71037555
16,810.00	88.62	151.23	6,822.11	-8,998.37	798.74	14,448,715.87	1,721,825.00	39.78538281	-80.71021425
16,904.00	88.75	151.31	6,824.27	-9,080.78	843.91	14,448,633.47	1,721,870.17	39.78515610	-80.71005440
16,999.00	89.05	151.58	6,826.09	-9,164.21	889.31	14,448,550.04	1,721,915.58	39.78492658	-80.70989375
17,093.00	90.77	150.79	6,826.24	-9,246.57	934.62	14,448,467.68	1,721,960.88	39.78470000	-80.70973344
17,189.00	91.52	151.49	6,824.32	-9,330.63	980.94	14,448,383.62	1,722,007.21	39.78446874	-80.70956950
Survey @ 17189.00 MD 6823.68 TVD									
17,242.00	91.52	151.49	6,822.91	-9,377.18	1,006.23	14,448,337.07	1,722,032.50	39.78434066	-80.70948002
Survey projected to 17242.00 MD 6822.28 TVD									

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2W-11 HM (slot L)
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 2W-11 HM (slot L)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
60.00	60.00	0.04	0.04	Gyro
899.00	899.00	1.52	-0.94	EM surveys
17,189.00	6,824.32	-9,330.63	980.94	Survey @ 17189.00 MD 6823.68 TVD
17,242.00	6,822.91	-9,377.18	1,006.23	Survey projected to 17242.00 MD 6822.28 TVD

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