



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

Local Co-ordinate Reference:
TVD Reference: Well Heaven Hill 3-3 HM (J)
MD Reference: RKB=1326+26 @ 1352.00usft
North Reference: RKB=1326+26 @ 1352.00usft
Survey Calculation Method: Grid
Database: Minimum Curvature
 DB_Jul2216dt_v14

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

System Datum: Mean Sea Level

Site Heaven Hill 3
Site Position: Northing: 14,457,178.77 usft Latitude: 39.80858060
From: Easting: 1,726,571.98 usft Longitude: -80.69321360
Position Uncertainty: Slot Radius: 0.00 usft
 Grid Convergence: 0.20 °

Well Heaven Hill 3-3 HM (J)
Well Position +N-S 0.00 usft Northing: 14,457,180.08 usft Latitude: 39.80858427
 +E-W 0.00 usft Easting: 1,726,566.13 usft Longitude: -80.69323444
Position Uncertainty Wellhead Elevation: 0.00 usft Ground Level: 1,326.00 usft

Wellbore Original Hole

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (mT)
	IGRF2015	2/10/2018	-8.72	66.92	52.107.39721634

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	153.70

Survey Program Date 9/8/2018
From (usft) To (usft) Survey (Wellbore) Tool Name Description
 160.00 6,748.00 MWD (Original Hole) MWD MWD - Standard
 6,777.00 18,196.00 MWD lat (Original Hole) MWD MWD - Standard
 18,243.00 18,243.00 Projection (Original Hole) MWD MWD - Standard

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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	
	0.00	0.00	0.00	0.00	0.00	0.00	14,457,180.08	1,726,566.13	39.80858427	-80.69323444	
	160.00	0.47	337.28	160.00	0.61	-0.25	14,457,180.69	1,726,565.87	39.80858594	-80.69323534	
MWD surveys											
	190.00	0.32	41.65	190.00	0.78	-0.25	14,457,180.86	1,726,565.88	39.80858642	-80.69323530	
	221.00	0.28	61.93	221.00	0.88	-0.12	14,457,180.96	1,726,566.01	39.80858669	-80.69323486	
	251.00	0.58	57.60	251.00	1.00	0.07	14,457,181.08	1,726,566.20	39.80858701	-80.69323417	
	281.00	0.48	41.27	281.00	1.17	0.28	14,457,181.26	1,726,566.41	39.80858749	-80.69323342	
	312.00	0.35	45.02	311.99	1.34	0.44	14,457,181.42	1,726,566.56	39.80858794	-80.69323287	
	342.00	0.44	39.14	341.99	1.49	0.57	14,457,181.57	1,726,566.70	39.80858836	-80.69323238	
	379.00	0.41	65.79	378.99	1.66	0.78	14,457,181.74	1,726,566.91	39.80858881	-80.69323163	



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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
410.00	0.25	68.56	409.99	1.73	0.95	14,457,181.81	1,726,567.07	39.80858901	-80.69323104
440.00	0.28	83.34	439.99	1.76	1.08	14,457,181.84	1,726,567.21	39.80858909	-80.69323057
470.00	0.35	329.40	469.99	1.85	1.11	14,457,181.93	1,726,567.23	39.80858933	-80.69323047
501.00	0.25	6.51	530.99	2.00	1.07	14,457,182.08	1,726,567.19	39.80858974	-80.69323062
531.00	0.43	344.56	530.99	2.17	1.04	14,457,182.25	1,726,567.17	39.80859022	-80.69323089
561.00	0.08	90.20	560.99	2.28	1.04	14,457,182.36	1,726,567.16	39.80859052	-80.69323073
591.00	0.12	62.80	590.99	2.29	1.08	14,457,182.37	1,726,567.21	39.80859055	-80.69323055
621.00	0.36	139.34	620.99	2.23	1.17	14,457,182.32	1,726,567.30	39.80859040	-80.69323023
652.00	0.15	193.83	651.99	2.12	1.23	14,457,182.20	1,726,567.35	39.80859009	-80.69323004
682.00	0.31	87.71	681.99	2.09	1.30	14,457,182.17	1,726,567.43	39.80858999	-80.69322979
713.00	0.06	212.45	712.99	2.08	1.37	14,457,182.16	1,726,567.50	39.80858996	-80.69322952
743.00	0.27	228.31	742.99	2.02	1.31	14,457,182.10	1,726,567.44	39.80858979	-80.69322974
774.00	0.05	353.30	773.99	1.98	1.26	14,457,182.06	1,726,567.36	39.80858970	-80.69322994
804.00	0.14	302.94	803.99	2.01	1.22	14,457,182.10	1,726,567.35	39.80858979	-80.69323006
834.00	0.17	29.83	833.99	2.07	1.22	14,457,182.15	1,726,567.34	39.80858995	-80.69323009
865.00	0.17	212.97	864.99	2.08	1.22	14,457,182.17	1,726,567.35	39.80858999	-80.69323007
896.00	0.17	16.21	895.99	2.10	1.22	14,457,182.18	1,726,567.34	39.80858977	-80.69322976
927.00	0.23	135.80	926.99	2.10	1.27	14,457,182.18	1,726,567.40	39.80859003	-80.69322988
959.00	0.11	223.38	958.99	2.03	1.30	14,457,182.12	1,726,567.42	39.80858984	-80.69322980
985.00	0.13	105.41	984.99	2.01	1.31	14,457,182.09	1,726,567.43	39.80858977	-80.69322976
1,022.00	0.10	209.20	1,021.99	1.97	1.33	14,457,182.05	1,726,567.46	39.80858966	-80.69322967
1,065.00	0.15	355.68	1,064.99	2.00	1.30	14,457,182.08	1,726,567.43	39.80858976	-80.69322975
1,145.00	0.34	62.33	1,144.99	2.16	1.45	14,457,182.24	1,726,567.58	39.80859020	-80.69322929
1,190.00	0.26	90.31	1,189.99	2.22	1.67	14,457,182.31	1,726,567.80	39.80859036	-80.69322846
1,285.00	0.27	64.34	1,284.99	2.32	2.09	14,457,182.40	1,726,568.21	39.80859062	-80.69322697
1,380.00	0.43	151.10	1,379.99	2.10	2.46	14,457,182.19	1,726,568.59	39.80859003	-80.69322565
1,474.00	1.10	163.87	1,473.99	0.93	2.88	14,457,181.01	1,726,569.01	39.80858680	-80.69322416
1,567.00	1.98	166.92	1,566.94	-1.49	3.50	14,457,178.59	1,726,569.62	39.80858014	-80.69322201
1,662.00	2.99	168.91	1,661.85	-5.52	4.34	14,457,174.56	1,726,570.47	39.80856906	-80.69321904
1,757.00	3.12	171.92	1,756.72	-10.51	5.18	14,457,169.57	1,726,571.31	39.80855535	-80.69321611
1,850.00	3.13	171.61	1,849.58	-15.53	5.91	14,457,164.55	1,726,572.04	39.80854156	-80.69321359
1,945.00	2.34	180.75	1,944.47	-20.04	6.26	14,457,160.05	1,726,572.39	39.80852919	-80.69321238
2,039.00	2.10	186.61	2,038.40	-23.67	6.04	14,457,156.42	1,726,572.17	39.80851922	-80.69321322
2,134.00	1.77	205.97	2,133.35	-26.71	5.20	14,457,153.37	1,726,571.32	39.80851086	-80.69321626
2,229.00	1.85	193.14	2,228.30	-29.53	4.21	14,457,150.56	1,726,570.33	39.80850314	-80.69321983
2,321.00	2.58	189.20	2,320.23	-33.02	3.54	14,457,147.06	1,726,569.66	39.80849356	-80.69322225
2,415.00	3.20	181.26	2,414.11	-37.73	3.14	14,457,142.35	1,726,569.27	39.80848063	-80.69322372
2,510.00	2.88	172.99	2,508.98	-42.75	3.37	14,457,137.33	1,726,569.50	39.80846684	-80.69322295
2,605.00	2.79	153.11	2,603.86	-47.18	4.71	14,457,132.90	1,726,570.84	39.80845466	-80.69321824
2,700.00	2.29	161.32	2,698.77	-51.04	6.36	14,457,129.04	1,726,572.49	39.80844404	-80.69321240
2,794.00	1.56	163.97	2,792.72	-54.05	7.32	14,457,126.03	1,726,573.45	39.80843577	-80.69320904
2,873.00	1.46	163.04	2,871.69	-56.04	7.91	14,457,124.04	1,726,574.04	39.80843028	-80.69320696
2,967.00	1.53	160.61	2,965.66	-58.37	8.68	14,457,121.71	1,726,574.80	39.80842388	-80.69320426
3,063.00	3.81	178.55	3,061.55	-62.77	9.18	14,457,117.31	1,726,575.31	39.80841180	-80.69320251
3,157.00	4.71	181.29	3,155.29	-69.75	9.17	14,457,110.33	1,726,575.30	39.80839263	-80.69320262
3,252.00	4.21	178.11	3,250.00	-77.14	9.20	14,457,102.95	1,726,575.33	39.80837235	-80.69320262
3,346.00	6.25	173.91	3,343.60	-85.67	9.86	14,457,094.41	1,726,575.98	39.808320038	-80.69319651
3,440.00	11.14	176.26	3,436.49	-99.83	10.99	14,457,080.25	1,726,577.12	39.80831000	-80.69319387
3,534.00	15.08	178.66	3,528.03	-121.13	11.87	14,457,058.96	1,726,576.00	39.80825152	-80.69319364
3,630.00	17.79	181.03	3,620.10	-148.28	11.90	14,457,031.80	1,726,576.03	39.80817695	-80.69319387
3,725.00	20.60	180.69	3,709.81	-179.51	11.44	14,457,000.57	1,726,577.56	39.80809119	-80.69319590
3,819.00	23.78	181.24	3,796.83	-215.00	10.83	14,456,965.08	1,726,576.96	39.80799373	-80.69319850
3,913.00	26.42	175.91	3,881.96	-254.82	11.81	14,456,925.26	1,726,578.04	39.80788437	-80.69319514
4,008.00	26.30	172.04	3,967.09	-296.75	16.33	14,456,883.34	1,726,582.46	39.80776918	-80.69317990
4,103.00	27.51	173.99	4,051.81	-339.41	21.55	14,456,840.67	1,726,587.67	39.80765196	-80.69316187



Survey Report - Geographic



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North Reference: Grid
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Database: DB_Jul2216ct_V14

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Table with columns: Measured Depth (usft), Inclination (°), Azimuth (°), Vertical Depth (usft), +N/-S (usft), +E/-W (usft), Map Northing (usft), Map Easting (usft), Latitude, Longitude. Contains 48 rows of survey data.



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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map		Map Easting (usft)	Map Easting (usft)	Latitude	Longitude
						Map Northing (usft)	Map Easting (usft)				
6,386.00	89.50	149.90	6,889.99	-2,856.18	751.09	14,454,323.90	1,727,317.21	39,80073339	1,727,317.21	-80.69059512	-80.69059512
8,480.00	89.50	149.50	6,890.61	-2,937.34	798.51	14,454,242.74	1,727,364.64	39,80051007	1,727,364.64	-80.69042727	-80.69042727
8,575.00	90.30	151.60	6,890.98	-3,020.06	845.22	14,454,160.03	1,727,411.34	39,80028246	1,727,411.34	-80.69026200	-80.69026200
8,669.00	90.60	151.20	6,890.24	-3,102.58	890.21	14,454,077.50	1,727,456.34	39,80005539	1,727,456.34	-80.69010282	-80.69010282
8,763.00	89.80	150.90	6,889.91	-3,184.84	935.71	14,453,995.24	1,727,501.84	39,79982907	1,727,501.84	-80.68994184	-80.68994184
8,858.00	90.80	150.10	6,889.42	-3,267.52	1,029.84	14,453,912.56	1,727,548.62	39,79960156	1,727,548.62	-80.68977631	-80.68977631
8,953.00	90.60	150.10	6,888.26	-3,349.87	1,076.77	14,453,830.21	1,727,595.97	39,79937496	1,727,595.97	-80.68960874	-80.68960874
9,047.00	88.80	150.00	6,888.75	-3,431.31	1,124.26	14,453,748.77	1,727,642.90	39,79915085	1,727,642.90	-80.68944267	-80.68944267
9,141.00	89.60	149.30	6,890.06	-3,512.42	1,172.95	14,453,667.66	1,727,690.39	39,79892765	1,727,690.39	-80.68927459	-80.68927459
9,235.00	89.60	148.30	6,890.72	-3,592.82	1,221.36	14,453,587.26	1,727,739.08	39,79870639	1,727,739.08	-80.68910222	-80.68910222
9,329.00	89.60	149.70	6,891.37	-3,673.39	1,268.79	14,453,506.69	1,727,787.49	39,79848466	1,727,787.49	-80.68893086	-80.68893086
9,424.00	89.00	150.40	6,892.53	-3,755.70	1,316.42	14,453,424.39	1,727,834.92	39,79825817	1,727,834.92	-80.68876304	-80.68876304
9,518.00	91.40	148.70	6,892.21	-3,836.72	1,363.76	14,453,343.36	1,727,882.55	39,79803520	1,727,882.55	-80.68859446	-80.68859446
9,611.00	89.50	150.10	6,891.47	-3,916.76	1,410.32	14,453,263.32	1,727,929.88	39,79781494	1,727,929.88	-80.68842692	-80.68842692
9,706.00	90.40	151.20	6,891.56	-3,999.57	1,457.20	14,453,180.52	1,727,976.45	39,79758709	1,727,976.45	-80.68826217	-80.68826217
10,084.00	90.90	151.30	6,891.96	-4,248.37	1,520.06	14,453,097.35	1,728,022.35	39,79735827	1,728,022.35	-80.68809976	-80.68809976
10,179.00	91.20	150.60	6,899.56	-4,330.86	1,572.31	14,452,931.71	1,728,068.19	39,79712933	1,728,068.19	-80.68793761	-80.68793761
10,274.00	87.40	152.90	6,890.72	-4,497.44	1,627.31	14,452,849.22	1,728,113.33	39,79690249	1,728,113.33	-80.68777794	-80.68777794
10,368.00	90.30	152.20	6,892.61	-4,580.68	1,678.88	14,452,766.15	1,728,158.39	39,79667553	1,728,158.39	-80.68761851	-80.68761851
10,462.00	89.90	150.40	6,892.44	-4,663.13	1,728.84	14,452,683.91	1,728,204.44	39,79644694	1,728,204.44	-80.68745560	-80.68745560
10,556.00	90.50	149.80	6,892.12	-4,744.61	1,772.31	14,452,601.53	1,728,250.02	39,79621719	1,728,250.02	-80.68729557	-80.68729557
10,651.00	89.80	148.50	6,891.87	-4,826.17	1,819.17	14,452,519.96	1,728,296.66	39,79598818	1,728,296.66	-80.68714135	-80.68714135
10,745.00	90.90	148.30	6,891.29	-4,906.23	1,867.88	14,452,435.47	1,728,343.43	39,79576132	1,728,343.43	-80.68699167	-80.68699167
10,840.00	91.90	148.80	6,891.96	-4,987.67	1,917.13	14,452,353.85	1,728,390.29	39,79553709	1,728,390.29	-80.68681587	-80.68681587
10,935.00	90.70	149.60	6,896.82	-5,069.67	1,965.97	14,452,273.85	1,728,434.00	39,79531265	1,728,434.00	-80.68664346	-80.68664346
11,030.00	90.40	150.20	6,895.91	-5,151.86	2,013.89	14,452,192.41	1,728,483.26	39,79509231	1,728,483.26	-80.68646911	-80.68646911
11,125.00	89.20	149.90	6,896.24	-5,234.17	2,061.53	14,452,110.41	1,728,532.10	39,79486817	1,728,532.10	-80.68629624	-80.68629624
11,205.00	89.90	150.30	6,896.67	-5,303.52	2,108.96	14,451,945.91	1,728,580.02	39,79464252	1,728,580.02	-80.68612668	-80.68612668
11,315.00	88.00	151.20	6,898.68	-5,389.47	2,148.84	14,451,876.56	1,728,627.66	39,79441636	1,728,627.66	-80.68595810	-80.68595810
11,410.00	88.70	150.70	6,891.62	-5,462.49	2,197.13	14,451,803.81	1,728,675.08	39,79418985	1,728,675.08	-80.68579028	-80.68579028
11,504.00	89.80	149.50	6,892.85	-5,533.97	2,242.96	14,451,730.60	1,728,723.75	39,79399902	1,728,723.75	-80.68564919	-80.68564919
11,599.00	88.60	150.60	6,894.17	-5,646.27	2,295.53	14,451,658.12	1,728,771.96	39,79373499	1,728,771.96	-80.68545908	-80.68545908
11,694.00	88.40	149.70	6,896.66	-5,728.64	2,342.96	14,451,583.81	1,728,820.08	39,79350567	1,728,820.08	-80.68529597	-80.68529597
11,789.00	88.70	152.10	6,899.06	-5,811.61	2,390.22	14,451,511.45	1,728,868.35	39,79328292	1,728,868.35	-80.68513019	-80.68513019
11,883.00	89.20	150.80	6,899.16	-5,894.16	2,436.41	14,451,439.63	1,728,916.66	39,79305587	1,728,916.66	-80.68496240	-80.68496240
11,978.00	93.00	155.10	6,896.96	-5,978.72	2,481.32	14,451,368.47	1,728,965.08	39,79282921	1,728,965.08	-80.68479516	-80.68479516
12,071.00	91.90	151.60	6,894.99	-6,061.82	2,524.50	14,451,295.92	1,729,013.75	39,79260090	1,729,013.75	-80.68463179	-80.68463179
12,166.00	91.20	149.60	6,892.42	-6,144.63	2,566.03	14,451,223.82	1,729,061.66	39,79237375	1,729,061.66	-80.68447292	-80.68447292
12,259.00	90.30	149.40	6,891.20	-6,224.76	2,612.50	14,451,151.26	1,729,110.12	39,79214112	1,729,110.12	-80.68432027	-80.68432027
12,353.00	91.00	148.80	6,890.13	-6,305.41	2,659.70	14,451,080.45	1,729,158.63	39,79191249	1,729,158.63	-80.68417348	-80.68417348
12,448.00	88.80	148.30	6,890.30	-6,386.45	2,707.97	14,451,009.45	1,729,207.02	39,79168462	1,729,207.02	-80.68400909	-80.68400909
12,542.00	88.70	147.70	6,892.35	-6,466.15	2,757.53	14,450,935.45	1,729,255.82	39,79146413	1,729,255.82	-80.68384208	-80.68384208
12,636.00	89.20	148.70	6,894.07	-6,546.02	2,807.33	14,450,864.06	1,729,303.66	39,79124217	1,729,303.66	-80.68367126	-80.68367126
12,731.00	90.90	149.70	6,893.99	-6,627.62	2,856.65	14,450,793.94	1,729,352.00	39,79101913	1,729,352.00	-80.68349584	-80.68349584
12,826.00	90.90	149.70	6,893.50	-6,709.63	2,905.42	14,450,723.45	1,729,400.53	39,79079978	1,729,400.53	-80.68331956	-80.68331956
12,921.00	91.40	149.20	6,890.59	-6,791.43	2,955.42	14,450,654.06	1,729,449.98	39,79057994	1,729,449.98	-80.68314426	-80.68314426
13,016.00	89.80	150.00	6,889.59	-6,873.36	3,001.70	14,450,586.66	1,729,497.62	39,79035538	1,729,497.62	-80.68297213	-80.68297213
13,110.00	90.60	150.30	6,889.27	-6,954.89	3,049.77	14,450,519.89	1,729,546.72	39,79012869	1,729,546.72	-80.68280256	-80.68280256
13,205.00	90.80	149.20	6,886.11	-7,036.94	3,096.55	14,450,450.45	1,729,595.82	39,78990469	1,729,595.82	-80.68263173	-80.68263173
13,300.00	89.80	149.50	6,887.61	-7,118.67	3,144.41	14,450,381.14	1,729,644.65	39,78967912	1,729,644.65	-80.68246165	-80.68246165
13,394.00	90.90	149.00	6,887.03	-7,199.45	3,192.83	14,450,312.14	1,729,693.66	39,78945477	1,729,693.66	-80.68229613	-80.68229613
13,489.00	89.50	150.40	6,886.70	-7,281.47	3,240.89	14,449,246.63	1,729,742.92	39,78922895	1,729,742.92	-80.68212692	-80.68212692
					3,288.62	14,449,180.61	1,729,792.06	39,78900474	1,729,792.06	-80.68195545	-80.68195545
								39,78878172		-80.68178539	-80.68178539
								39,78855601		-80.68161592	-80.68161592



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 3-3 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1326+26 @ 1352.00usft
Site:	Heaven Hill 3	MD Reference:	RKB=1326+26 @ 1352.00usft
Well:	Heaven Hill 3-3 HM (J)	North Reference:	Grid
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
13,583.00	88.10	152.10	6,888.67	-7,363.86	3,334.02	14,449,816.23	1,729,900.15	39.78832931	-80.68145596
13,678.00	89.50	153.30	6,890.66	-7,448.25	3,377.58	14,449,731.83	1,729,943.71	39.78809711	-80.68130197
13,773.00	89.10	152.00	6,891.82	-7,532.63	3,421.22	14,449,647.46	1,729,987.35	39.78786498	-80.68114768
13,868.00	89.30	151.70	6,893.15	-7,616.38	3,466.04	14,449,563.70	1,730,032.16	39.78763453	-80.68098922
13,963.00	90.60	152.60	6,893.23	-7,700.37	3,510.42	14,449,479.71	1,730,076.54	39.78740343	-80.68083231
14,057.00	90.80	152.20	6,893.67	-7,783.67	3,553.96	14,449,396.41	1,730,120.09	39.78717425	-80.68067835
14,152.00	91.20	151.30	6,890.42	-7,867.34	3,598.92	14,449,312.74	1,730,165.05	39.78694402	-80.68051938
14,247.00	89.50	151.70	6,889.84	-7,950.82	3,644.25	14,449,229.26	1,730,210.38	39.78671431	-80.68035909
14,341.00	89.60	149.10	6,890.58	-8,032.55	3,690.67	14,449,147.53	1,730,256.80	39.78648943	-80.68019487
14,436.00	88.90	147.50	6,891.83	-8,113.36	3,740.59	14,449,066.72	1,730,306.71	39.78626699	-80.68001822
14,531.00	90.30	148.60	6,892.49	-8,193.97	3,790.86	14,448,986.11	1,730,356.98	39.78604514	-80.67984031
14,625.00	90.50	148.80	6,891.83	-8,274.29	3,839.69	14,448,905.80	1,730,405.82	39.78582409	-80.67966750
14,719.00	90.60	148.70	6,890.93	-8,354.64	3,888.45	14,448,825.44	1,730,454.58	39.78560293	-80.67949495
14,814.00	90.90	148.20	6,889.69	-8,435.59	3,938.16	14,448,744.49	1,730,504.28	39.78538013	-80.67931906
14,909.00	90.00	149.00	6,888.94	-8,516.68	3,987.65	14,448,663.41	1,730,553.78	39.78515697	-80.67914391
15,003.00	90.20	148.30	6,888.78	-8,596.95	4,036.55	14,448,583.13	1,730,602.68	39.78493603	-80.67897086
15,098.00	89.00	149.60	6,889.44	-8,678.34	4,085.55	14,448,501.75	1,730,651.68	39.78479749	-80.67879749
15,193.00	89.70	151.30	6,890.52	-8,760.97	4,132.40	14,448,419.11	1,730,698.52	39.78448465	-80.67863179
15,287.00	89.40	151.10	6,891.26	-8,843.34	4,177.68	14,448,336.74	1,730,743.81	39.78425800	-80.67847165
15,380.00	90.90	151.80	6,891.01	-8,925.03	4,222.13	14,448,255.05	1,730,788.25	39.78403322	-80.67831449
15,474.00	90.80	151.20	6,889.62	-9,007.63	4,266.97	14,448,172.46	1,730,833.10	39.78380594	-80.67815591
15,568.00	89.40	152.00	6,889.45	-9,090.31	4,311.68	14,448,089.77	1,730,877.81	39.78357843	-80.67799784
15,663.00	89.10	150.40	6,890.70	-9,173.55	4,357.44	14,448,006.53	1,730,923.57	39.78334938	-80.67783602
15,757.00	88.90	149.60	6,892.34	-9,254.94	4,404.43	14,447,925.14	1,730,970.56	39.78312539	-80.67766979
15,851.00	91.10	150.00	6,892.34	-9,336.18	4,451.72	14,447,843.90	1,731,017.84	39.78290183	-80.67750253
15,947.00	90.80	150.40	6,890.75	-9,419.47	4,498.42	14,447,760.61	1,731,065.54	39.78267261	-80.67733381
16,042.00	89.20	150.10	6,890.75	-9,501.95	4,546.56	14,447,678.13	1,731,112.68	39.78244564	-80.67716707
16,136.00	88.50	150.10	6,892.63	-9,583.42	4,593.42	14,447,596.66	1,731,159.53	39.78222154	-80.67700137
16,230.00	90.30	150.30	6,893.62	-9,664.98	4,640.12	14,447,515.10	1,731,206.24	39.78199698	-80.67683615
16,325.00	90.20	150.80	6,893.20	-9,747.71	4,686.82	14,447,432.37	1,731,252.95	39.78176934	-80.67667096
16,420.00	90.10	151.20	6,892.95	-9,830.80	4,732.88	14,447,349.29	1,731,299.01	39.78154070	-80.67650609
16,515.00	91.30	149.60	6,891.79	-9,913.39	4,779.80	14,447,266.69	1,731,345.93	39.78131342	-80.67634216
16,608.00	89.10	150.10	6,891.47	-9,993.80	4,826.51	14,447,186.28	1,731,392.63	39.78109212	-80.67617694
16,704.00	88.60	149.40	6,893.40	-10,076.71	4,874.86	14,447,103.37	1,731,440.98	39.78086395	-80.67600591
16,798.00	88.40	149.70	6,895.86	-10,157.72	4,922.48	14,447,022.36	1,731,488.61	39.78064101	-80.67583745
16,893.00	87.90	149.50	6,898.92	-10,239.61	4,970.53	14,446,940.47	1,731,536.65	39.78041562	-80.67566748
16,987.00	89.10	151.00	6,901.38	-10,321.19	5,017.15	14,446,858.89	1,731,583.28	39.78019112	-80.67550258
17,082.00	88.90	150.80	6,903.04	-10,404.19	5,063.35	14,446,775.89	1,731,629.47	39.77996274	-80.67533923
17,176.00	89.00	150.10	6,904.77	-10,485.95	5,109.70	14,446,694.14	1,731,675.83	39.77973774	-80.67517530
17,271.00	88.10	148.30	6,907.17	-10,567.52	5,158.33	14,446,612.56	1,731,724.45	39.77951324	-80.67500328
17,366.00	89.00	149.90	6,909.57	-10,649.01	5,207.09	14,446,531.08	1,731,773.22	39.77928898	-80.67483075
17,460.00	88.70	149.20	6,911.46	-10,730.02	5,254.72	14,446,450.06	1,731,820.85	39.77906600	-80.67466228
17,555.00	88.80	151.70	6,913.53	-10,812.64	5,301.56	14,446,367.44	1,731,867.69	39.77883865	-80.67449664
17,650.00	89.00	150.60	6,915.36	-10,895.83	5,347.39	14,446,284.25	1,731,913.52	39.77860973	-80.67433480
17,744.00	90.00	151.70	6,916.18	-10,978.16	5,392.74	14,446,201.92	1,731,958.87	39.77838318	-80.67417424
17,839.00	90.50	151.20	6,915.76	-11,061.61	5,438.15	14,446,118.48	1,732,004.27	39.77815356	-80.67401372
17,933.00	91.20	151.00	6,914.37	-11,143.89	5,483.57	14,446,036.19	1,732,049.69	39.77792713	-80.67385312
18,028.00	91.60	150.70	6,912.05	-11,226.83	5,529.83	14,445,953.25	1,732,095.96	39.77769894	-80.67368954
18,123.00	92.20	150.80	6,908.90	-11,309.67	5,576.22	14,445,870.41	1,732,142.35	39.77747092	-80.67352549
18,196.00	92.60	151.10	6,905.84	-11,373.44	5,611.64	14,445,806.65	1,732,177.76	39.77729546	-80.67340027
Survey @ 18196.00 MD 6905.84 TVD									
18,243.00	92.60	151.10	6,903.71	-11,414.54	5,634.33	14,445,765.54	1,732,200.45	39.77718235	-80.67332004
Survey projected to 18243.00 MD 6903.71 TVD									



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

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

Well Heaven Hill 3-3 HM (J)
 RKB=1326+26 @ 1352.00usft
 RKB=1326+26 @ 1352.00usft
 Grid
 Minimum Curvature
 DB_Jul2216dt_v14

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Design Annotations

WV Department of Environmental Protection

Measured Depth (usft)	Vertical Depth (usft)	+N-S (usft)	Local Coordinates +E-W (usft)	Comment
160.00	160.00	0.61	-0.25	MWD surveys
18,196.00	6,905.84	-11,373.44	5,611.64	Survey @ 18196.00 MD 6905.84 TVD
18,243.00	6,903.71	-11,414.54	5,634.33	Survey projected to 18243.00 MD 6903.71 TVD