

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2W-10 HM (slot K)
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-10 HM (slot K)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_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-10 HM (slot K)					
Well Position	+N/-S	0.00 usft	Northing:	14,457,724.23 usft	Latitude:	39.81012904
	+E/-W	0.00 usft	Easting:	1,721,033.78 usft	Longitude:	-80.71292784
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	8/10/2018	-8.72	66.88	52,052.85164480

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	169.55

Survey Program	Date 8/13/2018		RECEIVED Office of Oil and Gas		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	JUN 10 2020
60.00	893.00	Gyro (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s	WV Department of Environmental Protection
928.00	6,758.00	MWD (Original Hole)	MWD	MWD - Standard	
6,785.00	16,633.00	MWD lat (Original Hole)	MWD	MWD - Standard	
16,687.00	16,687.00	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	14,457,724.23	1,721,033.78	39.81012904	-80.71292784	
60.00	0.13	55.91	60.00	0.04	0.06	14,457,724.27	1,721,033.84	39.81012915	-80.71292764	
Gyro										
90.00	0.14	43.64	90.00	0.08	0.11	14,457,724.31	1,721,033.89	39.81012927	-80.71292745	
120.00	0.11	83.71	120.00	0.11	0.16	14,457,724.34	1,721,033.95	39.81012935	-80.71292726	
150.00	0.16	132.98	150.00	0.09	0.22	14,457,724.32	1,721,034.01	39.81012928	-80.71292705	
180.00	0.17	92.61	180.00	0.06	0.30	14,457,724.29	1,721,034.08	39.81012920	-80.71292678	
210.00	0.29	101.30	210.00	0.04	0.42	14,457,724.27	1,721,034.20	39.81012915	-80.71292635	
240.00	0.28	81.91	240.00	0.04	0.56	14,457,724.27	1,721,034.35	39.81012914	-80.71292583	

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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	
270.00	0.35	89.02	270.00	0.05	0.73	14,457,724.28	1,721,034.51	39.81012917	-80.71292525	
300.00	0.20	91.59	300.00	0.05	0.87	14,457,724.28	1,721,034.66	39.81012917	-80.71292473	
330.00	0.22	66.88	330.00	0.07	0.98	14,457,724.30	1,721,034.76	39.81012922	-80.71292436	
360.00	0.05	121.03	360.00	0.09	1.04	14,457,724.31	1,721,034.83	39.81012927	-80.71292413	
390.00	0.05	274.38	390.00	0.08	1.04	14,457,724.31	1,721,034.82	39.81012925	-80.71292414	
420.00	0.18	217.04	420.00	0.04	1.00	14,457,724.27	1,721,034.78	39.81012915	-80.71292428	
450.00	0.15	150.95	450.00	-0.03	0.99	14,457,724.20	1,721,034.77	39.81012895	-80.71292432	
480.00	0.17	168.29	480.00	-0.11	1.02	14,457,724.12	1,721,034.80	39.81012874	-80.71292422	
510.00	0.17	143.17	510.00	-0.19	1.05	14,457,724.04	1,721,034.84	39.81012852	-80.71292409	
540.00	0.11	156.38	540.00	-0.25	1.09	14,457,723.98	1,721,034.88	39.81012835	-80.71292396	
570.00	0.21	121.06	570.00	-0.30	1.15	14,457,723.93	1,721,034.93	39.81012820	-80.71292375	
600.00	0.11	123.47	600.00	-0.35	1.22	14,457,723.88	1,721,035.00	39.81012808	-80.71292350	
630.00	0.14	128.55	630.00	-0.39	1.27	14,457,723.84	1,721,035.06	39.81012797	-80.71292331	
660.00	0.11	110.12	660.00	-0.42	1.33	14,457,723.81	1,721,035.11	39.81012788	-80.71292311	
690.00	0.12	156.06	690.00	-0.46	1.37	14,457,723.77	1,721,035.15	39.81012777	-80.71292297	
720.00	0.05	196.75	720.00	-0.50	1.38	14,457,723.73	1,721,035.16	39.81012766	-80.71292294	
750.00	0.09	192.97	750.00	-0.53	1.37	14,457,723.69	1,721,035.15	39.81012756	-80.71292297	
780.00	0.07	283.81	780.00	-0.55	1.35	14,457,723.68	1,721,035.13	39.81012751	-80.71292305	
810.00	0.08	254.06	810.00	-0.55	1.31	14,457,723.67	1,721,035.09	39.81012751	-80.71292319	
840.00	0.08	254.94	840.00	-0.57	1.27	14,457,723.66	1,721,035.05	39.81012748	-80.71292333	
870.00	0.07	267.63	870.00	-0.57	1.23	14,457,723.66	1,721,035.01	39.81012746	-80.71292347	
893.00	0.06	307.27	893.00	-0.56	1.21	14,457,723.66	1,721,034.99	39.81012748	-80.71292355	
928.00	0.40	215.91	928.00	-0.65	1.12	14,457,723.58	1,721,034.90	39.81012724	-80.71292386	
MWD surveys										
959.00	0.09	174.31	959.00	-0.76	1.06	14,457,723.46	1,721,034.84	39.81012693	-80.71292408	
988.00	0.09	316.91	988.00	-0.77	1.04	14,457,723.46	1,721,034.83	39.81012692	-80.71292413	
1,023.00	0.40	354.38	1,023.00	-0.63	1.01	14,457,723.60	1,721,034.80	39.81012731	-80.71292424	
1,054.00	0.40	289.02	1,054.00	-0.49	0.90	14,457,723.74	1,721,034.69	39.81012770	-80.71292464	
1,086.00	0.01	351.29	1,086.00	-0.45	0.80	14,457,723.78	1,721,034.58	39.81012781	-80.71292501	
1,117.00	0.09	74.01	1,116.99	-0.44	0.82	14,457,723.79	1,721,034.60	39.81012783	-80.71292493	
1,136.00	0.22	327.71	1,135.99	-0.40	0.81	14,457,723.83	1,721,034.60	39.81012793	-80.71292495	
1,182.00	0.22	333.31	1,181.99	-0.25	0.73	14,457,723.98	1,721,034.51	39.81012835	-80.71292526	
1,276.00	0.09	45.02	1,275.99	-0.04	0.70	14,457,724.19	1,721,034.48	39.81012894	-80.71292536	
1,371.00	0.31	246.19	1,370.99	-0.09	0.52	14,457,724.14	1,721,034.30	39.81012880	-80.71292601	
1,465.00	0.71	271.48	1,464.99	-0.17	-0.30	14,457,724.05	1,721,033.48	39.81012857	-80.71292891	
1,560.00	2.39	271.22	1,559.95	-0.12	-2.87	14,457,724.11	1,721,030.92	39.81012875	-80.71293806	
1,654.00	3.49	267.12	1,653.83	-0.22	-7.69	14,457,724.01	1,721,026.10	39.81012851	-80.71295521	
1,748.00	4.68	264.78	1,747.59	-0.71	-14.36	14,457,723.52	1,721,019.42	39.81012721	-80.71297899	
1,843.00	5.48	264.30	1,842.21	-1.51	-22.74	14,457,722.71	1,721,011.05	39.81012508	-80.71300882	
1,938.00	5.70	258.22	1,936.76	-2.93	-31.87	14,457,721.30	1,721,001.92	39.81012128	-80.71304135	
2,032.00	6.19	256.01	2,030.26	-5.11	-41.36	14,457,719.12	1,720,992.43	39.81011538	-80.71307516	
2,127.00	5.92	262.49	2,124.73	-6.99	-51.18	14,457,717.24	1,720,982.60	39.81011031	-80.71311018	
2,222.00	6.32	267.21	2,219.19	-7.88	-61.26	14,457,716.35	1,720,972.52	39.81010794	-80.71314608	
2,316.00	6.72	263.42	2,312.58	-8.76	-71.89	14,457,715.47	1,720,961.89	39.81010561	-80.71318395	
2,411.00	6.01	261.21	2,406.99	-10.16	-82.33	14,457,714.07	1,720,951.45	39.81010187	-80.71322113	
2,506.00	4.60	263.28	2,501.58	-11.36	-91.03	14,457,712.86	1,720,942.75	39.81009863	-80.71325211	
2,600.00	4.02	266.90	2,595.32	-11.98	-98.06	14,457,712.25	1,720,935.72	39.81009699	-80.71327717	
2,695.00	5.21	269.32	2,690.01	-12.22	-105.70	14,457,712.01	1,720,928.08	39.81009643	-80.71330437	
2,753.00	5.79	271.48	2,747.74	-12.17	-111.26	14,457,712.06	1,720,922.53	39.81009660	-80.71332416	
2,879.00	6.10	267.69	2,873.06	-12.28	-124.30	14,457,711.95	1,720,909.48	39.81009642	-80.71337061	
2,973.00	15.20	255.48	2,965.36	-15.57	-141.26	14,457,708.65	1,720,892.53	39.81008751	-80.71343103	
3,068.00	19.31	250.50	3,056.07	-23.94	-168.13	14,457,700.28	1,720,865.65	39.81006476	-80.71352682	
3,162.00	21.61	251.12	3,144.13	-34.74	-199.17	14,457,689.49	1,720,834.62	39.81003540	-80.71363745	
3,257.00	25.19	249.09	3,231.30	-47.62	-234.62	14,457,676.61	1,720,799.17	39.81000034	-80.71376383	
3,352.00	29.61	251.91	3,315.63	-62.13	-275.83	14,457,662.10	1,720,757.95	39.80996085	-80.71391076	



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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	
3,446.00	36.59	253.99	3,394.33	-77.08	-324.90	14,457,647.15	1,720,708.88	39.80992021	-80.71408565	
3,540.00	39.28	253.19	3,468.46	-93.42	-380.33	14,457,630.81	1,720,653.46	39.80987583	-80.71428320	
3,635.00	42.51	258.79	3,540.29	-108.36	-440.63	14,457,615.86	1,720,593.15	39.80983532	-80.71449812	
3,730.00	41.32	257.82	3,610.98	-121.22	-502.78	14,457,603.01	1,720,531.01	39.80980055	-80.71471955	
3,825.00	39.68	253.19	3,683.23	-136.61	-562.48	14,457,587.61	1,720,471.30	39.80975880	-80.71493234	
3,919.00	40.92	251.52	3,754.92	-155.05	-620.41	14,457,569.18	1,720,413.37	39.80970867	-80.71513882	
4,014.00	41.18	253.02	3,826.57	-174.05	-679.84	14,457,550.18	1,720,353.95	39.80965703	-80.71535063	
4,109.00	38.31	250.59	3,899.61	-192.97	-737.54	14,457,531.26	1,720,296.25	39.80960556	-80.71555631	
4,203.00	38.39	252.80	3,973.33	-211.29	-792.90	14,457,512.94	1,720,240.88	39.80955574	-80.71575366	
4,298.00	41.49	252.88	4,046.16	-229.28	-851.17	14,457,494.95	1,720,182.62	39.80950685	-80.71596135	
4,392.00	40.39	253.41	4,117.17	-247.14	-910.11	14,457,477.09	1,720,123.67	39.80945831	-80.71617145	
4,487.00	41.10	252.62	4,189.14	-265.26	-969.41	14,457,458.97	1,720,064.37	39.80940907	-80.71638281	
4,582.00	40.08	254.12	4,261.28	-282.95	-1,028.63	14,457,441.28	1,720,005.15	39.80936099	-80.71659388	
4,676.00	40.70	254.38	4,332.88	-299.49	-1,087.26	14,457,424.74	1,719,946.53	39.80931609	-80.71680281	
4,771.00	40.92	254.12	4,404.78	-316.34	-1,147.01	14,457,407.89	1,719,886.77	39.80927033	-80.71701579	
4,865.00	39.68	256.19	4,476.48	-331.93	-1,205.77	14,457,392.30	1,719,828.02	39.80922803	-80.71722519	
4,960.00	37.91	253.99	4,550.52	-347.22	-1,263.28	14,457,377.01	1,719,770.50	39.80918654	-80.71743015	
5,055.00	38.62	252.80	4,625.11	-364.03	-1,319.66	14,457,360.19	1,719,714.13	39.80914084	-80.71763109	
5,150.00	40.79	252.31	4,698.19	-382.23	-1,377.55	14,457,342.00	1,719,656.23	39.80909137	-80.71783744	
5,244.00	42.29	253.41	4,768.55	-400.59	-1,437.12	14,457,323.64	1,719,596.67	39.80904146	-80.71804975	
5,339.00	43.22	253.81	4,838.30	-418.79	-1,498.99	14,457,305.44	1,719,534.80	39.80899202	-80.71827026	
5,434.00	41.58	251.69	4,908.46	-437.77	-1,560.16	14,457,286.46	1,719,473.62	39.80894044	-80.71848831	
5,529.00	40.61	255.09	4,980.06	-455.63	-1,619.97	14,457,268.60	1,719,413.81	39.80889190	-80.71870149	
5,624.00	38.71	252.49	5,053.20	-472.52	-1,678.19	14,457,251.71	1,719,355.59	39.80884601	-80.71890898	
5,718.00	39.02	253.81	5,126.39	-489.62	-1,734.64	14,457,234.61	1,719,299.15	39.80879955	-80.71911018	
5,813.00	41.18	253.41	5,199.05	-506.89	-1,793.34	14,457,217.34	1,719,240.44	39.80875263	-80.71931939	
5,908.00	39.81	250.02	5,271.30	-526.21	-1,851.90	14,457,198.02	1,719,181.88	39.80870006	-80.71952814	
6,001.00	40.39	252.40	5,342.45	-545.50	-1,908.61	14,457,178.73	1,719,125.18	39.80864759	-80.71973027	
6,096.00	41.32	255.48	5,414.31	-562.67	-1,968.31	14,457,161.56	1,719,065.47	39.80860094	-80.71994307	
6,191.00	39.28	253.99	5,486.76	-578.83	-2,027.59	14,457,145.40	1,719,006.19	39.80855707	-80.72015431	
6,285.00	39.51	253.10	5,559.40	-595.73	-2,084.80	14,457,128.50	1,718,948.98	39.80851115	-80.72035823	
6,380.00	40.92	254.38	5,631.95	-612.89	-2,143.69	14,457,111.34	1,718,890.10	39.80846452	-80.72056809	
6,474.00	40.20	254.21	5,703.36	-629.44	-2,202.53	14,457,094.79	1,718,831.26	39.80841959	-80.72077779	
6,569.00	41.58	256.32	5,775.18	-645.23	-2,262.66	14,457,078.99	1,718,771.12	39.80837672	-80.72099211	
6,663.00	38.80	254.29	5,846.98	-660.59	-2,321.34	14,457,063.64	1,718,712.45	39.80833505	-80.72120120	
6,758.00	39.20	254.21	5,920.81	-676.82	-2,378.88	14,457,047.41	1,718,654.91	39.80829098	-80.72140627	
6,853.00	39.69	255.38	5,994.66	-693.15	-2,436.41	14,457,031.24	1,718,597.35	39.80824691	-80.72161134	
6,948.00	40.75	251.69	6,068.51	-709.48	-2,493.94	14,457,015.07	1,718,539.80	39.80820284	-80.72181641	
7,043.00	41.23	245.09	6,142.36	-725.81	-2,551.47	14,456,998.90	1,718,482.24	39.80815877	-80.72202148	
7,138.00	40.88	238.41	6,216.21	-742.14	-2,609.00	14,456,982.73	1,718,424.68	39.80811470	-80.72222655	
7,233.00	41.27	231.47	6,290.06	-758.47	-2,666.53	14,456,966.56	1,718,367.12	39.80807063	-80.72243162	
7,328.00	40.22	224.62	6,363.91	-774.80	-2,724.06	14,456,950.39	1,718,309.56	39.80802656	-80.72263669	
7,423.00	40.62	218.02	6,437.76	-791.13	-2,781.59	14,456,934.22	1,718,252.00	39.80798249	-80.72284176	
7,518.00	39.25	210.90	6,511.61	-807.46	-2,839.12	14,456,918.05	1,718,194.44	39.80793842	-80.72304683	
7,613.00	38.73	203.52	6,585.46	-823.79	-2,896.65	14,456,901.88	1,718,136.88	39.80789435	-80.72325190	
7,708.00	40.18	199.21	6,659.31	-840.12	-2,954.18	14,456,885.71	1,718,079.32	39.80785028	-80.72345697	
7,803.00	42.02	196.40	6,733.16	-856.45	-3,011.71	14,456,869.54	1,718,021.76	39.80780621	-80.72366204	
7,898.00	43.87	193.85	6,806.99	-872.78	-3,069.24	14,456,853.37	1,717,964.20	39.80776214	-80.72386711	
7,993.00	46.37	190.78	6,880.84	-889.11	-3,126.77	14,456,837.20	1,717,906.64	39.80771807	-80.72407218	
8,088.00	47.74	189.72	6,954.69	-905.44	-3,184.30	14,456,821.03	1,717,849.08	39.80767400	-80.72427725	
8,183.00	48.66	188.58	7,028.54	-921.77	-3,241.83	14,456,804.86	1,717,791.52	39.80762993	-80.72448232	
8,278.00	49.76	187.35	7,102.39	-938.10	-3,299.36	14,456,788.69	1,717,733.96	39.80758586	-80.72468739	
8,373.00	51.43	186.47	7,176.24	-954.43	-3,356.89	14,456,772.52	1,717,676.40	39.80754179	-80.72489246	
8,468.00	53.23	184.71	7,250.09	-970.76	-3,414.42	14,456,756.35	1,717,618.84	39.80749772	-80.72509753	
8,563.00	54.73	184.01	7,323.94	-987.09	-3,471.95	14,456,740.18	1,717,561.28	39.80745365	-80.72530260	
8,658.00			7,397.79	-1,003.42	-3,529.48	14,456,723.99	1,717,503.72	39.80740958	-80.72550767	

Company: Tug Hill Operating LLC	Local Co-ordinate Reference: Well Heaven Hill 2W-10 HM (slot K)
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-10 HM (slot K)	North Reference: Grid
Wellbore: Original Hole	Survey Calculation Method: Minimum Curvature
Design: Surveys Original Hole	Database: DB_Aug0116_LT_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		
7,731.00	56.13	183.04	6,614.68	-1,212.99	-2,676.30	14,456,511.24	1,718,357.48	39.80682104	-80.72247126		
7,778.00	57.19	181.29	6,640.51	-1,252.23	-2,677.78	14,456,472.00	1,718,356.00	39.80671331	-80.72247696		
7,826.00	58.20	180.32	6,666.16	-1,292.79	-2,678.35	14,456,431.44	1,718,355.44	39.80660191	-80.72247943		
7,873.00	59.43	178.03	6,690.50	-1,332.99	-2,677.76	14,456,391.24	1,718,356.02	39.80649151	-80.72247779		
7,921.00	61.89	175.22	6,714.02	-1,374.75	-2,675.29	14,456,349.48	1,718,358.49	39.80637680	-80.72246944		
7,968.00	64.88	172.14	6,735.08	-1,416.50	-2,670.65	14,456,307.73	1,718,363.13	39.80626211	-80.72245338		
8,015.00	68.53	168.54	6,753.67	-1,459.04	-2,663.39	14,456,265.19	1,718,370.39	39.80614523	-80.72242801		
8,062.00	71.87	165.38	6,769.59	-1,502.11	-2,653.40	14,456,222.12	1,718,380.38	39.80602687	-80.72239292		
8,110.00	73.85	162.13	6,783.74	-1,546.13	-2,640.57	14,456,178.10	1,718,393.22	39.80590586	-80.72234770		
8,157.00	76.35	159.14	6,795.83	-1,588.97	-2,625.50	14,456,135.26	1,718,408.28	39.80578808	-80.72229454		
8,204.00	78.99	155.45	6,805.86	-1,631.31	-2,607.78	14,456,092.92	1,718,426.00	39.80567165	-80.72223189		
8,251.00	81.32	152.63	6,813.90	-1,672.94	-2,587.51	14,456,051.29	1,718,446.28	39.80555716	-80.72216018		
8,299.00	83.12	151.31	6,820.40	-1,714.92	-2,565.16	14,456,009.31	1,718,468.62	39.80544169	-80.72208106		
8,346.00	86.81	149.91	6,824.52	-1,755.70	-2,542.19	14,455,968.53	1,718,491.60	39.80532949	-80.72199972		
8,394.00	88.35	149.47	6,826.55	-1,797.10	-2,517.98	14,455,927.13	1,718,515.80	39.80521559	-80.72191400		
8,489.00	88.88	149.21	6,828.85	-1,878.80	-2,469.55	14,455,845.43	1,718,564.23	39.80499082	-80.72174246		
8,584.00	89.67	149.29	6,830.05	-1,960.43	-2,420.99	14,455,763.80	1,718,612.80	39.80476621	-80.72157043		
8,678.00	90.02	149.47	6,830.30	-2,041.32	-2,373.11	14,455,682.90	1,718,660.68	39.80454365	-80.72140085		
8,773.00	89.36	147.89	6,830.82	-2,122.48	-2,323.73	14,455,601.75	1,718,710.06	39.80432036	-80.72122593		
8,867.00	89.41	147.01	6,831.83	-2,201.71	-2,273.16	14,455,522.52	1,718,760.63	39.80410234	-80.72104674		
8,962.00	89.10	146.74	6,833.06	-2,281.26	-2,221.25	14,455,442.97	1,718,812.54	39.80388342	-80.72086280		
9,057.00	88.92	148.15	6,834.70	-2,361.32	-2,170.13	14,455,362.91	1,718,863.65	39.80366312	-80.72068170		
9,151.00	90.11	149.29	6,835.50	-2,441.65	-2,121.33	14,455,282.58	1,718,912.45	39.80344210	-80.72050883		
9,246.00	90.73	149.64	6,834.80	-2,523.47	-2,073.07	14,455,200.76	1,718,960.72	39.80321698	-80.72033789		
9,340.00	90.68	149.03	6,833.65	-2,604.32	-2,025.13	14,455,119.91	1,719,008.66	39.80299454	-80.72016810		
9,435.00	90.90	149.21	6,832.34	-2,685.85	-1,976.38	14,455,038.38	1,719,057.41	39.80277023	-80.71999542		
9,530.00	91.12	149.29	6,830.66	-2,767.48	-1,927.81	14,454,956.75	1,719,105.97	39.80254563	-80.71982342		
9,624.00	89.89	149.03	6,829.83	-2,848.18	-1,879.62	14,454,876.05	1,719,154.16	39.80232358	-80.71965275		
9,719.00	88.84	149.29	6,830.89	-2,929.74	-1,830.93	14,454,794.49	1,719,202.86	39.80209918	-80.71948028		
9,814.00	89.14	148.94	6,832.56	-3,011.26	-1,782.17	14,454,712.97	1,719,251.61	39.80187489	-80.71930759		
9,908.00	89.19	148.68	6,833.93	-3,091.66	-1,733.49	14,454,632.57	1,719,300.29	39.80165366	-80.71913518		
10,002.00	88.66	149.64	6,835.69	-3,172.36	-1,685.32	14,454,551.87	1,719,348.47	39.80143164	-80.71896454		
10,097.00	90.33	150.70	6,836.53	-3,254.76	-1,638.06	14,454,469.47	1,719,395.72	39.80120493	-80.71879723		
10,191.00	91.16	151.14	6,835.31	-3,336.90	-1,592.38	14,454,387.33	1,719,441.40	39.80097895	-80.71863550		
10,286.00	89.63	150.70	6,834.65	-3,419.92	-1,546.21	14,454,304.31	1,719,487.57	39.80075056	-80.71847204		
10,381.00	90.20	150.52	6,834.80	-3,502.70	-1,499.59	14,454,221.53	1,719,534.19	39.80052284	-80.71830698		
10,474.00	90.77	151.14	6,834.01	-3,583.90	-1,454.26	14,454,140.33	1,719,579.52	39.80029945	-80.71814651		
10,569.00	90.07	149.64	6,833.31	-3,666.49	-1,407.33	14,454,057.74	1,719,626.46	39.80007223	-80.71798032		
10,663.00	90.11	149.21	6,833.16	-3,747.42	-1,359.51	14,453,976.81	1,719,674.27	39.79984956	-80.71781099		
10,758.00	89.85	148.06	6,833.20	-3,828.53	-1,310.07	14,453,895.70	1,719,723.72	39.79962637	-80.71763586		
10,852.00	90.24	146.83	6,833.12	-3,907.76	-1,259.49	14,453,816.47	1,719,774.30	39.79940835	-80.71745666		
10,947.00	89.89	148.33	6,833.02	-3,987.95	-1,208.56	14,453,736.28	1,719,825.23	39.79918768	-80.71727624		
11,041.00	89.14	150.79	6,833.81	-4,068.99	-1,160.94	14,453,655.24	1,719,872.85	39.79896473	-80.71710761		
11,136.00	88.70	150.61	6,835.60	-4,151.82	-1,114.46	14,453,572.41	1,719,919.33	39.79873685	-80.71694305		
11,230.00	88.40	150.26	6,837.98	-4,233.55	-1,068.09	14,453,490.68	1,719,965.69	39.79851198	-80.71677890		
11,325.00	89.93	151.23	6,839.36	-4,316.42	-1,021.67	14,453,407.81	1,720,012.11	39.79828400	-80.71661457		
11,420.00	90.15	151.31	6,839.30	-4,399.73	-976.01	14,453,324.50	1,720,057.78	39.79805482	-80.71645293		
11,514.00	90.99	151.31	6,838.36	-4,482.18	-930.88	14,453,242.05	1,720,102.90	39.79782799	-80.71629320		
11,609.00	90.77	151.67	6,836.90	-4,565.65	-885.54	14,453,158.58	1,720,148.24	39.79759836	-80.71613273		
11,704.00	90.55	151.23	6,835.81	-4,649.10	-840.14	14,453,075.13	1,720,193.64	39.79736881	-80.71597203		
11,798.00	90.51	151.67	6,834.94	-4,731.66	-795.22	14,452,992.57	1,720,238.56	39.79714168	-80.71581303		
11,893.00	90.99	152.11	6,833.70	-4,815.45	-750.46	14,452,908.78	1,720,283.32	39.79691119	-80.71565464		
11,988.00	90.73	150.70	6,832.27	-4,898.85	-705.00	14,452,825.38	1,720,328.78	39.79668175	-80.71549372		
12,082.00	91.65	149.73	6,830.32	-4,980.41	-658.32	14,452,743.82	1,720,375.47	39.79645735	-80.71532845		
12,177.00	91.34	146.92	6,827.84	-5,061.22	-608.46	14,452,662.00	1,720,425.33	39.79623498	-80.71515184		

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2W-10 HM (slot K)
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-10 HM (slot K)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_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
12,272.00	91.25	147.97	6,825.69	-5,141.28	-557.35	14,452,582.95	1,720,476.44	39.79601469	-80.71497080
12,366.00	88.48	148.59	6,825.91	-5,221.23	-507.93	14,452,503.00	1,720,525.85	39.79579469	-80.71479578
12,461.00	89.36	148.41	6,827.70	-5,302.21	-458.30	14,452,422.02	1,720,575.48	39.79557185	-80.71462001
12,556.00	88.57	147.80	6,829.42	-5,382.85	-408.12	14,452,341.37	1,720,625.67	39.79534995	-80.71444226
12,650.00	88.04	148.06	6,832.20	-5,462.47	-358.23	14,452,261.75	1,720,675.55	39.79513085	-80.71426556
12,745.00	88.35	148.15	6,835.19	-5,543.09	-308.06	14,452,181.14	1,720,725.72	39.79490902	-80.71408786
12,840.00	89.27	149.38	6,837.17	-5,624.30	-258.81	14,452,099.93	1,720,774.97	39.79468556	-80.71391345
12,934.00	89.76	149.38	6,837.96	-5,705.19	-210.93	14,452,019.04	1,720,822.85	39.79446300	-80.71374393
13,028.00	89.80	150.61	6,838.32	-5,786.59	-163.93	14,451,937.64	1,720,869.86	39.79423904	-80.71357751
13,123.00	90.55	151.40	6,838.03	-5,869.68	-117.88	14,451,854.55	1,720,915.90	39.79401045	-80.71341452
13,218.00	90.29	150.88	6,837.34	-5,952.88	-72.03	14,451,771.35	1,720,961.76	39.79378156	-80.71325223
13,313.00	90.73	150.79	6,836.49	-6,035.83	-25.73	14,451,688.40	1,721,008.05	39.79355334	-80.71308837
13,407.00	90.33	150.00	6,835.62	-6,117.56	20.70	14,451,606.67	1,721,054.49	39.79332850	-80.71292399
13,502.00	88.75	148.85	6,836.38	-6,199.34	69.02	14,451,524.89	1,721,102.81	39.79310347	-80.71275291
13,596.00	88.62	148.15	6,838.54	-6,279.47	118.12	14,451,444.76	1,721,151.91	39.79288299	-80.71257902
13,691.00	88.44	147.97	6,840.98	-6,360.06	168.36	14,451,364.17	1,721,202.15	39.79266122	-80.71240109
13,785.00	88.66	148.59	6,843.36	-6,439.99	217.77	14,451,284.24	1,721,251.55	39.79244127	-80.71222611
13,880.00	90.64	151.05	6,843.94	-6,522.10	265.52	14,451,202.13	1,721,299.31	39.79221535	-80.71205706
13,975.00	91.38	151.67	6,842.26	-6,605.47	311.05	14,451,118.76	1,721,344.83	39.79198601	-80.71189594
14,070.00	92.22	151.84	6,839.28	-6,689.11	355.98	14,451,035.12	1,721,389.77	39.79175590	-80.71173694
14,164.00	90.33	151.05	6,837.19	-6,771.65	400.90	14,450,952.58	1,721,434.69	39.79152883	-80.71157797
14,259.00	90.68	151.31	6,836.35	-6,854.88	446.70	14,450,869.35	1,721,480.48	39.79129985	-80.71141591
14,353.00	90.02	151.58	6,835.78	-6,937.45	491.63	14,450,786.78	1,721,525.41	39.79107271	-80.71125690
14,447.00	89.76	150.79	6,835.96	-7,019.81	536.93	14,450,704.42	1,721,570.72	39.79084613	-80.71109656
14,542.00	89.49	150.96	6,836.58	-7,102.79	583.17	14,450,621.44	1,721,616.95	39.79061782	-80.71093292
14,637.00	89.10	150.61	6,837.75	-7,185.70	629.53	14,450,538.53	1,721,663.32	39.79038972	-80.71076882
14,732.00	89.01	149.82	6,839.31	-7,268.14	676.72	14,450,456.09	1,721,710.50	39.79016290	-80.71060180
14,826.00	89.36	149.82	6,840.65	-7,349.39	723.97	14,450,374.84	1,721,757.75	39.78993935	-80.71043453
14,921.00	89.71	150.52	6,841.42	-7,431.80	771.22	14,450,292.43	1,721,805.01	39.78971261	-80.71026726
15,015.00	90.24	150.88	6,841.46	-7,513.77	817.22	14,450,210.45	1,721,851.01	39.78948708	-80.71010445
15,110.00	91.38	151.40	6,840.12	-7,596.97	863.07	14,450,127.26	1,721,896.86	39.78925821	-80.70994219
15,203.00	90.37	150.17	6,838.70	-7,678.12	908.46	14,450,046.11	1,721,942.24	39.78903492	-80.70978157
15,297.00	90.68	149.82	6,837.84	-7,759.52	955.46	14,449,964.71	1,721,989.25	39.78881096	-80.70961518
15,391.00	89.23	149.56	6,837.91	-7,840.67	1,002.90	14,449,883.56	1,722,036.69	39.78858768	-80.70944725
15,486.00	89.19	149.56	6,839.22	-7,922.57	1,051.03	14,449,801.66	1,722,084.81	39.78836234	-80.70927687
15,581.00	89.01	148.94	6,840.71	-8,004.20	1,099.59	14,449,720.03	1,722,133.38	39.78813773	-80.70910493
15,675.00	89.63	148.94	6,841.83	-8,084.72	1,148.09	14,449,639.51	1,722,181.87	39.78791617	-80.70893324
15,769.00	89.58	149.03	6,842.48	-8,165.28	1,196.52	14,449,558.95	1,722,230.31	39.78769450	-80.70876176
15,863.00	89.93	148.68	6,842.88	-8,245.73	1,245.14	14,449,478.50	1,722,278.92	39.78747313	-80.70858963
15,958.00	90.55	149.21	6,842.48	-8,327.11	1,294.14	14,449,397.12	1,722,327.93	39.78724920	-80.70841612
16,053.00	91.16	148.77	6,841.06	-8,408.52	1,343.08	14,449,315.71	1,722,376.87	39.78702518	-80.70824287
16,148.00	91.34	148.50	6,838.99	-8,489.62	1,392.52	14,449,234.61	1,722,426.30	39.78680202	-80.70806784
16,242.00	91.74	147.89	6,836.47	-8,569.48	1,442.04	14,449,154.75	1,722,475.82	39.78658227	-80.70789248
16,337.00	90.73	148.06	6,834.42	-8,650.00	1,492.40	14,449,074.23	1,722,526.19	39.78636068	-80.70771413
16,432.00	89.76	148.41	6,834.01	-8,730.77	1,542.41	14,448,993.46	1,722,576.20	39.78613842	-80.70753705
16,526.00	88.79	147.18	6,835.20	-8,810.30	1,592.51	14,448,913.93	1,722,626.29	39.78591957	-80.70735967
16,620.00	88.13	146.83	6,837.73	-8,889.11	1,643.68	14,448,835.12	1,722,677.46	39.78570267	-80.70717844
16,633.00	88.04	146.83	6,838.16	-8,899.98	1,650.79	14,448,824.25	1,722,684.57	39.78567274	-80.70715326
Survey @ 16633.00 MD 6838.16 TVD									
16,687.00	88.04	146.83	6,840.01	-8,945.16	1,680.31	14,448,779.07	1,722,714.10	39.78554842	-80.70704868
Survey Projected to 16687.00 MD 6840.01 TVD									

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Heaven Hill 2W-10 HM (slot K)
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-10 HM (slot K)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug0116_LT_v14

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Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
60.00	60.00	0.04	0.06	Gyro
928.00	928.00	-0.65	1.12	MWD surveys
16,633.00	6,838.16	-8,899.98	1,650.79	Survey @ 16633.00 MD 6838.16 TVD
16,687.00	6,840.01	-8,945.16	1,680.31	Survey Projected to 16687.00 MD 6840.01 TVD