



# Actual Wellpath Report

Heaven Hill 3N-10HU AWP Proj: 19300'  
Page 1 of 11

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JUL 10 2020

WV Department of  
Environmental Protection



## REFERENCE WELLPATH IDENTIFICATION

Operator	TUG HILL OPERATING	Slot	Slot #10
Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

## REPORT SETUP INFORMATION

Projection System	NAD83 / UTM Zone 17 North, US feet	Software System	WellArchitect® 5.1
North Reference	Grid	User	Delaset
Scale	0.999608	Report Generated	12/31/2018 at 3:34:04 PM
Convergence at slot	0.20° East	Database/Source file	WA_MPL_EasternUS_Defn/Heaven_Hill_3N-10HU_AWP_Proj_19300_.xml

## WELLPATH LOCATION

	Local coordinates		Grid coordinates		Geographic coordinates	
	North[ft]	East[ft]	Easting[US ft]	Northing[US ft]	Latitude	Longitude
Slot Location	8.46	-36.67	1726534.14	14457209.00	39°48'31.190"N	80°41'36.053"W
Facility Reference Pt			<b>1726570.79</b>	<b>14457200.55</b>	39°48'31.106"N	80°41'35.583"W
Field Reference Pt			1920470.12	14528304.49	40°00'00.000"N	80°00'00.000"W

## WELLPATH DATUM

Calculation method	Minimum curvature	Nabors B28 (RKB) to Facility Vertical Datum	26.00ft
Horizontal Reference Pt	Slot	Nabors B28 (RKB) to Mean Sea Level	1352.00ft
Vertical Reference Pt	Nabors B28 (RKB)	Nabors B28 (RKB) to Mud Line at Slot (Slot #10)	26.00ft
MD Reference Pt	Nabors B28 (RKB)	Section Origin	N 0.00, E 0.00 ft
Field Vertical Reference	Mean Sea Level	Section Azimuth	297.71°



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Page 2 of 11

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Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

## WELLPATH DATA (228 stations) † = interpolated/extrapolated station

MD (ft)	Inclination (°)	Azimuth (°)	TVD (ft)	Vert Sect (ft)	North (ft)	East (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	Closure Dist (ft)	Closure Dir (°)	DLS (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Comments
0.00	0.000	351.580	0.00	0.00	0.00	0.00	1726534.14	14457209.00	39°48'31.190"N	80°41'36.053"W	0.00	0.000	0.00	0.00	0.00	
26.00	0.000	351.580	26.00	0.00	0.00	0.00	1726534.14	14457209.00	39°48'31.190"N	80°41'36.053"W	0.00	0.000	0.00	0.00	0.00	
157.00	0.420	351.580	157.00	0.28	0.47	-0.07	1726534.07	14457209.48	39°48'31.195"N	80°41'36.054"W	0.48	351.580	0.32	0.32	-6.43	Benchtree MWD Surveys <12-1/4">(157'-9597')
188.00	0.370	313.280	188.00	0.45	0.66	-0.16	1726533.98	14457209.66	39°48'31.197"N	80°41'36.055"W	0.68	346.308	0.85	-0.16	-123.55	
219.00	0.290	302.690	219.00	0.62	0.77	-0.30	1726533.84	14457209.77	39°48'31.198"N	80°41'36.057"W	0.82	338.721	0.32	-0.26	-34.16	
248.00	0.370	301.600	248.00	0.79	0.86	-0.44	1726533.70	14457209.86	39°48'31.199"N	80°41'36.058"W	0.96	332.775	0.28	0.28	-3.76	
279.00	0.400	307.370	279.00	0.99	0.97	-0.61	1726533.53	14457209.98	39°48'31.200"N	80°41'36.061"W	1.15	327.874	0.16	0.10	18.61	
309.00	0.350	331.340	309.00	1.17	1.12	-0.74	1726533.40	14457210.12	39°48'31.201"N	80°41'36.062"W	1.34	326.542	0.54	-0.17	79.90	
340.00	0.380	316.640	340.00	1.35	1.28	-0.85	1726533.28	14457210.28	39°48'31.203"N	80°41'36.064"W	1.54	326.178	0.32	0.10	-47.42	
370.00	0.370	313.290	369.99	1.54	1.41	-0.99	1726533.14	14457210.42	39°48'31.204"N	80°41'36.065"W	1.73	324.915	0.08	-0.03	-11.17	
400.00	0.440	21.410	399.99	1.64	1.59	-1.02	1726533.12	14457210.59	39°48'31.206"N	80°41'36.066"W	1.89	327.238	1.52	0.23	227.07	
430.00	0.490	15.420	429.99	1.68	1.82	-0.95	1726533.19	14457210.82	39°48'31.208"N	80°41'36.065"W	2.05	332.528	0.23	0.17	-19.97	
461.00	0.480	25.470	460.99	1.72	2.06	-0.85	1726533.28	14457211.07	39°48'31.211"N	80°41'36.064"W	2.23	337.506	0.28	-0.03	32.42	
491.00	0.370	43.130	490.99	1.70	2.25	-0.73	1726533.40	14457211.25	39°48'31.213"N	80°41'36.062"W	2.36	341.909	0.57	-0.37	58.87	
522.00	0.450	39.730	521.99	1.64	2.41	-0.59	1726533.55	14457211.42	39°48'31.214"N	80°41'36.060"W	2.49	346.311	0.27	0.26	-10.97	
552.00	0.220	4.950	551.99	1.64	2.56	-0.51	1726533.63	14457211.56	39°48'31.216"N	80°41'36.059"W	2.61	348.790	0.99	-0.77	-115.93	
582.00	0.490	359.750	581.99	1.72	2.75	-0.50	1726533.63	14457211.75	39°48'31.218"N	80°41'36.059"W	2.79	349.619	0.91	0.90	-17.33	
613.00	0.460	38.230	612.99	1.76	2.98	-0.43	1726533.71	14457211.98	39°48'31.220"N	80°41'36.058"W	3.01	351.841	1.01	-0.10	124.13	
644.00	0.320	21.370	643.99	1.75	3.16	-0.32	1726533.82	14457212.16	39°48'31.222"N	80°41'36.057"W	3.17	354.239	0.58	-0.45	-54.39	
674.00	0.350	42.950	673.99	1.74	3.30	-0.23	1726533.91	14457212.30	39°48'31.223"N	80°41'36.056"W	3.31	356.093	0.43	0.10	71.93	
705.00	0.380	65.090	704.99	1.65	3.41	-0.07	1726534.07	14457212.42	39°48'31.224"N	80°41'36.054"W	3.42	358.863	0.46	0.10	71.42	
736.00	0.520	72.930	735.99	1.49	3.50	0.16	1726534.30	14457212.50	39°48'31.225"N	80°41'36.051"W	3.50	2.617	0.49	0.45	25.29	
768.00	0.390	100.120	767.98	1.28	3.52	0.41	1726534.54	14457212.52	39°48'31.225"N	80°41'36.047"W	3.55	6.573	0.78	-0.41	84.97	
802.00	0.640	89.020	801.98	1.00	3.51	0.71	1726534.85	14457212.51	39°48'31.225"N	80°41'36.044"W	3.58	11.445	0.79	0.74	-32.65	
834.00	0.610	86.990	833.98	0.70	3.52	1.06	1726535.19	14457212.52	39°48'31.225"N	80°41'36.039"W	3.67	16.747	0.12	-0.09	-6.34	
866.00	0.780	77.500	865.98	0.39	3.57	1.44	1726535.58	14457212.57	39°48'31.226"N	80°41'36.034"W	3.85	21.963	0.64	0.53	-29.66	
897.00	0.590	83.430	896.98	0.09	3.64	1.81	1726535.94	14457212.64	39°48'31.226"N	80°41'36.030"W	4.06	26.400	0.65	-0.61	19.13	
929.00	0.810	52.960	928.97	-0.14	3.79	2.15	1726536.29	14457212.79	39°48'31.228"N	80°41'36.025"W	4.36	29.548	1.33	0.69	-95.22	
961.00	0.780	80.290	960.97	-0.41	3.97	2.55	1726536.68	14457212.97	39°48'31.230"N	80°41'36.020"W	4.71	32.693	1.18	-0.09	85.41	
992.00	0.790	83.040	981.97	-0.64	4.01	2.83	1726536.97	14457213.01	39°48'31.230"N	80°41'36.016"W	4.91	35.228	0.19	0.05	13.10	



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Heaven Hill 3N-10HU AWP Proj: 19300'  
Page 3 of 11

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Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

WELLPATH DATA (228 stations)																
MD (ft)	Inclination (°)	Azimuth (°)	TVD (ft)	Vert Sect (ft)	North (ft)	East (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	Closure Dist (ft)	Closure Dir (°)	DLS (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Comments
1086.00	0.600	90.470	1085.96	-1.72	4.09	4.09	1726538.22	14457213.09	39°48'31.231"N	80°41'36.000"W	5.78	44.973	0.20	-0.18	7.14	
1106.00	0.620	109.050	1105.96	-1.92	4.05	4.29	1726538.43	14457213.05	39°48'31.230"N	80°41'35.998"W	5.90	46.643	0.99	0.10	92.90	
1213.00	0.710	252.520	1212.96	-2.02	3.67	4.21	1726538.34	14457212.67	39°48'31.226"N	80°41'35.999"W	5.58	48.940	1.18	0.08	134.08	
1307.00	1.510	241.700	1306.94	-0.92	2.90	2.56	1726536.70	14457211.90	39°48'31.219"N	80°41'36.020"W	3.87	41.424	0.88	0.85	-11.51	
1401.00	1.740	276.560	1400.90	1.11	2.48	0.05	1726534.19	14457211.48	39°48'31.215"N	80°41'36.052"W	2.48	1.239	1.06	0.24	37.09	
1496.00	1.870	303.300	1495.86	3.99	3.50	-2.67	1726531.46	14457212.50	39°48'31.225"N	80°41'36.087"W	4.40	322.574	0.89	0.14	28.15	
1591.00	3.030	329.360	1590.77	7.67	6.51	-5.25	1726528.89	14457215.51	39°48'31.255"N	80°41'36.120"W	8.36	321.100	1.66	1.22	27.43	
1682.00	3.270	2.370	1681.64	10.83	11.17	-6.37	1726527.77	14457220.17	39°48'31.301"N	80°41'36.134"W	12.86	330.309	1.98	0.26	36.27	
1776.00	2.200	26.400	1775.54	12.02	15.46	-5.46	1726528.68	14457224.46	39°48'31.343"N	80°41'36.122"W	16.40	340.568	1.64	-1.14	25.56	
1871.00	2.140	76.840	1870.48	10.72	17.50	-2.92	1726531.22	14457226.50	39°48'31.363"N	80°41'36.089"W	17.74	350.536	1.95	-0.06	53.09	
1965.00	1.850	126.180	1964.43	7.89	17.01	0.02	1726534.15	14457226.00	39°48'31.358"N	80°41'36.052"W	17.01	0.056	1.79	-0.31	52.49	
2060.00	2.420	187.270	2059.37	5.68	14.11	1.00	1726535.14	14457223.11	39°48'31.330"N	80°41'36.039"W	14.15	4.056	2.34	0.60	64.31	
2154.00	2.480	213.910	2153.29	5.20	10.45	-0.39	1726533.75	14457219.45	39°48'31.294"N	80°41'36.057"W	10.46	357.890	1.20	0.06	28.34	
2248.00	2.360	236.980	2247.21	6.37	7.71	-3.14	1726531.00	14457216.71	39°48'31.267"N	80°41'36.093"W	8.33	337.828	1.04	-0.13	24.54	
2342.00	1.590	286.030	2341.16	8.59	7.02	-6.02	1726528.12	14457216.02	39°48'31.260"N	80°41'36.130"W	9.24	319.377	1.90	-0.82	52.18	
2437.00	2.670	354.230	2436.10	11.10	9.58	-7.51	1726526.63	14457218.58	39°48'31.285"N	80°41'36.149"W	12.17	321.920	2.68	1.14	71.79	
2532.00	4.030	9.260	2530.94	13.38	15.08	-7.19	1726526.95	14457224.08	39°48'31.340"N	80°41'36.144"W	16.71	334.496	1.69	1.43	15.82	
2627.00	3.390	20.280	2625.74	14.80	21.01	-5.68	1726528.46	14457230.00	39°48'31.398"N	80°41'36.125"W	21.76	344.863	1.01	-0.67	11.60	
2721.00	1.320	50.320	2719.66	14.74	24.31	-3.89	1726530.25	14457233.30	39°48'31.431"N	80°41'36.102"W	24.62	350.917	2.49	-2.20	31.96	
2816.00	1.650	153.450	2814.64	13.21	23.78	-2.43	1726531.71	14457232.78	39°48'31.426"N	80°41'36.083"W	23.91	354.160	2.46	0.35	108.56	
2852.00	1.890	173.370	2850.62	12.46	22.73	-2.13	1726532.01	14457231.72	39°48'31.415"N	80°41'36.079"W	22.83	354.641	1.82	0.67	55.33	
2995.00	2.800	185.980	2993.50	9.83	16.91	-2.22	1726531.91	14457225.91	39°48'31.358"N	80°41'36.081"W	17.06	352.509	0.73	0.64	8.82	
3090.00	2.510	188.100	3088.40	8.28	12.55	-2.76	1726531.38	14457221.54	39°48'31.314"N	80°41'36.088"W	12.85	347.598	0.32	-0.31	2.23	
3185.00	2.360	185.850	3183.32	6.85	8.54	-3.25	1726530.89	14457217.54	39°48'31.275"N	80°41'36.094"W	9.14	339.159	0.19	-0.16	-2.37	
3280.00	1.260	139.800	3278.27	5.15	5.80	-2.78	1726531.36	14457214.80	39°48'31.248"N	80°41'36.088"W	6.43	334.408	1.83	-1.16	-48.47	
3375.00	1.970	94.950	3373.24	2.68	4.86	-0.48	1726533.66	14457213.86	39°48'31.238"N	80°41'36.059"W	4.88	354.413	1.47	0.75	-47.21	
3470.00	2.340	77.770	3468.17	-0.31	5.13	3.05	1726537.18	14457214.13	39°48'31.241"N	80°41'36.014"W	5.96	30.718	0.78	0.35	-18.08	
3564.00	2.660	56.350	3562.08	-2.83	6.74	6.74	1726540.87	14457215.74	39°48'31.257"N	80°41'35.966"W	9.53	44.979	1.04	0.34	-22.79	
3659.00	3.330	16.670	3656.96	-3.36	10.61	9.37	1726543.50	14457219.61	39°48'31.295"N	80°41'35.932"W	14.15	41.438	2.24	0.71	-41.77	
3753.00	3.750	3.290	3750.78	-1.56	16.29	10.32	1726544.46	14457225.29	39°48'31.351"N	80°41'35.920"W	19.29	32.362	0.98	0.45	-14.23	



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Page 4 of 11

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3848.00	4.050	1.390	3345.56	1.21	22.75	10.58	1726544.72	14457231.74	39°48'31.415"N	80°41'35.916"W	25.09	24.952	0.34	0.32	-2.00	
3943.00	2.610	335.790	3940.41	4.40	28.08	9.78	1726543.91	14457237.07	39°48'31.468"N	80°41'35.926"W	29.73	19.203	2.14	-1.52	-26.95	
4037.00	1.600	298.640	4034.34	7.39	30.66	7.75	1726541.88	14457239.65	39°48'31.493"N	80°41'35.952"W	31.62	14.186	1.75	-1.07	-39.52	
4132.00	2.120	232.330	4129.30	9.45	30.22	5.19	1726539.33	14457239.21	39°48'31.489"N	80°41'35.985"W	30.66	9.753	2.19	0.55	-69.80	
4227.00	3.390	225.530	4224.19	11.04	27.18	1.80	1726535.93	14457236.17	39°48'31.458"N	80°41'36.029"W	27.24	3.786	1.38	1.34	-7.16	
4322.00	4.320	222.050	4318.98	12.79	22.55	-2.60	1726531.54	14457231.55	39°48'31.413"N	80°41'36.085"W	22.70	353.417	1.01	0.98	-3.66	
4417.00	5.120	220.440	4413.65	14.81	16.67	-7.75	1726526.39	14457225.66	39°48'31.355"N	80°41'36.151"W	18.38	335.068	0.85	0.84	-1.69	
4512.00	5.820	216.230	4508.22	16.26	9.56	-13.35	1726520.80	14457218.56	39°48'31.285"N	80°41'36.223"W	16.41	305.608	0.85	0.74	-4.43	
4606.00	6.520	204.330	4601.68	16.65	0.85	-18.36	1726515.78	14457209.85	39°48'31.199"N	80°41'36.288"W	18.38	272.648	1.55	0.74	-12.66	
4701.00	6.960	192.900	4696.03	14.86	-9.68	-21.87	1726512.28	14457199.33	39°48'31.096"N	80°41'36.333"W	23.91	246.131	1.48	0.46	-12.03	
4796.00	8.170	190.570	4790.20	11.40	-21.92	-24.39	1726509.75	14457187.09	39°48'30.975"N	80°41'36.366"W	32.80	228.051	1.31	1.27	-2.45	
4891.00	10.380	190.720	4883.95	6.91	-36.97	-27.22	1726506.93	14457172.05	39°48'30.826"N	80°41'36.403"W	45.91	216.365	2.33	2.33	0.16	
4985.00	12.600	192.510	4978.06	1.75	-55.30	-31.02	1726503.13	14457153.72	39°48'30.645"N	80°41'36.453"W	63.41	209.288	2.39	2.36	1.90	
5081.00	14.450	192.260	5069.40	-4.19	-77.23	-35.83	1726498.32	14457131.80	39°48'30.428"N	80°41'36.515"W	85.14	204.889	1.93	1.93	-0.26	
5175.00	15.960	193.180	5160.10	-10.56	-101.28	-41.27	1726492.88	14457107.77	39°48'30.191"N	80°41'36.586"W	109.36	202.170	1.63	1.61	0.98	
5270.00	16.580	192.740	5251.30	-17.34	-127.21	-47.24	1726486.92	14457081.84	39°48'29.935"N	80°41'36.664"W	135.70	200.370	0.67	0.65	-0.46	
5364.00	18.910	195.230	5340.82	-24.09	-155.00	-54.20	1726479.96	14457054.07	39°48'29.660"N	80°41'36.754"W	164.20	199.272	2.61	2.48	2.65	
5459.00	21.170	194.920	5430.06	-31.22	-186.43	-62.66	1726471.50	14457022.65	39°48'29.350"N	80°41'36.864"W	196.68	198.577	2.38	2.38	-0.33	
5554.00	23.430	194.680	5517.95	-39.27	-221.28	-71.86	1726462.30	14456987.81	39°48'29.006"N	80°41'36.983"W	232.66	197.991	2.38	2.38	-0.25	
5648.00	24.790	193.190	5603.75	-48.43	-258.55	-81.09	1726453.07	14456950.56	39°48'28.638"N	80°41'37.103"W	270.97	197.414	1.58	1.45	-1.59	
5742.00	24.450	191.010	5689.21	-58.96	-296.83	-89.31	1726444.87	14456912.29	39°48'28.260"N	80°41'37.210"W	309.97	196.745	1.03	-0.36	-2.32	
5837.00	24.120	190.970	5775.80	-70.20	-335.19	-96.76	1726437.42	14456873.95	39°48'27.881"N	80°41'37.307"W	348.87	196.101	0.35	-0.35	-0.04	
5931.00	22.970	190.930	5861.97	-81.03	-372.05	-103.89	1726430.29	14456837.10	39°48'27.517"N	80°41'37.400"W	386.28	195.601	1.22	-1.22	-0.04	
6025.00	23.390	191.770	5948.38	-91.45	-408.33	-111.17	1726423.01	14456800.84	39°48'27.159"N	80°41'37.495"W	423.19	195.230	0.57	0.45	0.89	
6119.00	24.690	193.510	6034.23	-101.39	-445.68	-119.56	1726414.62	14456763.49	39°48'26.790"N	80°41'37.604"W	461.44	195.017	1.58	1.38	1.85	
6214.00	25.930	194.450	6120.11	-111.02	-485.09	-129.38	1726404.80	14456724.10	39°48'26.401"N	80°41'37.732"W	502.05	194.934	1.37	1.31	0.99	
6290.00	27.950	194.350	6187.86	-118.95	-518.44	-137.94	1726396.25	14456690.77	39°48'26.072"N	80°41'37.843"W	536.48	194.900	2.66	2.66	-0.13	
6385.00	30.300	189.860	6270.85	-131.44	-563.63	-147.57	1726386.63	14456645.59	39°48'25.625"N	80°41'37.988"W	582.63	194.672	3.38	2.47	-4.73	
6479.00	28.850	188.610	6352.60	-146.13	-609.42	-155.03	1726379.17	14456599.82	39°48'25.173"N	80°41'38.066"W	628.83	194.272	1.68	-1.54	-1.33	
6574.00	26.460	190.170	6438.74	-160.01	-652.92	-162.19	1726372.01	14456556.34	39°48'24.743"N	80°41'38.160"W	672.76	193.951	2.63	-2.52	1.64	



# Actual Wellpath Report

Heaven Hill 3N-10HU AWP Proj: 19300'  
Page 5 of 11

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### REFERENCE WELLPATH IDENTIFICATION

Operator	TUG HILL OPERATING	Slot	Slot #10
Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

### WELLPATH DATA (228 stations)

MD (ft)	Inclination (°)	Azimuth (°)	TVD (ft)	Vert Sect (ft)	North (ft)	East (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	Closure Dist (ft)	Closure Dir (°)	DLS (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Comments
6667.00	24.500	189.310	6520.70	-172.34	-692.35	-168.97	1726365.23	14456516.93	39°48'24.354"N	80°41'38.248"W	712.67	193.715	2.14	-2.11	-0.92	
6761.00	27.100	195.550	6605.33	-183.01	-732.22	-177.87	1726356.34	14456477.07	39°48'23.960"N	80°41'38.364"W	753.52	193.654	4.00	2.77	6.64	
6855.00	27.840	194.600	6688.74	-192.50	-774.09	-189.14	1726345.07	14456435.22	39°48'23.547"N	80°41'38.510"W	796.86	193.731	0.91	0.79	-1.01	
6950.00	26.760	193.450	6773.15	-202.80	-816.36	-199.71	1726334.51	14456392.96	39°48'23.129"N	80°41'38.648"W	840.43	193.746	1.27	-1.14	-1.21	
7045.00	25.800	191.870	6858.33	-213.71	-857.39	-208.94	1726325.28	14456351.95	39°48'22.724"N	80°41'38.768"W	882.48	193.695	1.25	-1.01	-1.66	
7140.00	26.930	191.630	6943.45	-225.31	-898.70	-217.53	1726316.70	14456310.86	39°48'22.316"N	80°41'38.879"W	924.65	193.606	1.19	1.19	-0.25	
7234.00	27.910	192.660	7026.89	-236.92	-941.01	-226.64	1726307.59	14456268.36	39°48'21.898"N	80°41'38.998"W	967.92	193.542	1.16	1.04	1.10	
7329.00	26.950	190.450	7111.21	-249.08	-983.88	-235.42	1726298.81	14456225.51	39°48'21.475"N	80°41'39.112"W	1011.65	193.456	1.47	-1.01	-2.33	
7424.00	25.200	187.640	7196.54	-262.41	-1025.10	-242.01	1726292.22	14456184.31	39°48'21.068"N	80°41'39.199"W	1053.28	193.283	2.25	-1.84	-2.96	
7518.00	23.340	187.880	7282.23	-275.60	-1063.38	-247.22	1726287.01	14456146.04	39°48'20.690"N	80°41'39.267"W	1091.74	193.088	1.98	-1.98	0.26	
7613.00	23.100	190.250	7369.54	-287.57	-1100.36	-253.12	1726281.12	14456109.07	39°48'20.325"N	80°41'39.344"W	1129.10	192.955	1.02	-0.25	2.49	
7708.00	23.120	194.130	7456.92	-297.54	-1136.79	-260.99	1726273.25	14456072.66	39°48'19.965"N	80°41'39.447"W	1166.36	192.930	1.60	0.02	4.08	
7803.00	23.040	195.430	7544.32	-305.88	-1172.80	-270.49	1726263.75	14456036.67	39°48'19.609"N	80°41'39.570"W	1203.58	192.987	0.54	-0.08	1.37	
7896.00	23.300	195.050	7629.81	-313.78	-1208.10	-280.11	1726254.14	14456001.38	39°48'19.261"N	80°41'39.695"W	1240.15	193.054	0.32	0.28	-0.41	
7992.00	23.360	195.920	7717.97	-321.83	-1244.74	-290.26	1726243.99	14455964.75	39°48'18.899"N	80°41'39.827"W	1278.13	193.126	0.36	0.06	0.91	
8085.00	23.580	196.560	7803.27	-329.19	-1280.30	-300.62	1726233.64	14455929.21	39°48'18.548"N	80°41'39.961"W	1315.12	193.214	0.36	0.24	0.69	
8179.00	24.470	192.100	7889.13	-338.07	-1317.36	-310.06	1726224.20	14455892.16	39°48'18.182"N	80°41'40.083"W	1353.36	193.244	2.15	0.95	-4.74	
8273.00	24.870	189.950	7974.56	-349.34	-1355.87	-317.55	1726216.71	14455853.67	39°48'17.802"N	80°41'40.181"W	1392.56	193.182	1.05	0.43	-2.29	
8368.00	24.900	190.760	8060.74	-361.26	-1395.19	-324.74	1726209.52	14455814.36	39°48'17.413"N	80°41'40.275"W	1432.48	193.103	0.36	0.03	0.85	
8462.00	25.240	190.500	8145.88	-372.96	-1434.34	-332.09	1726202.18	14455775.23	39°48'17.027"N	80°41'40.371"W	1472.28	193.036	0.38	0.36	-0.28	
8557.00	25.370	193.520	8231.77	-383.94	-1474.04	-340.54	1726193.73	14455735.54	39°48'16.635"N	80°41'40.481"W	1512.87	193.008	1.37	0.14	3.18	
8651.00	25.940	196.210	8316.50	-392.98	-1513.36	-350.98	1726183.29	14455696.23	39°48'16.246"N	80°41'40.616"W	1553.53	193.057	1.38	0.61	2.86	
8746.00	26.240	196.850	8401.82	-401.08	-1553.42	-362.87	1726171.41	14455656.20	39°48'15.851"N	80°41'40.771"W	1595.24	193.148	0.43	0.32	0.67	
8841.00	25.540	193.380	8487.29	-410.10	-1593.44	-373.70	1726160.58	14455616.19	39°48'15.456"N	80°41'40.911"W	1636.68	193.199	1.76	-0.74	-3.65	
8935.00	25.220	191.660	8572.22	-420.66	-1632.77	-382.44	1726151.85	14455576.88	39°48'15.067"N	80°41'41.025"W	1676.96	193.182	0.85	-0.34	-1.83	
9030.00	25.250	191.680	8658.16	-431.85	-1672.43	-390.63	1726143.66	14455537.23	39°48'14.676"N	80°41'41.131"W	1717.45	193.147	0.03	0.03	0.02	
9125.00	25.610	191.350	8743.95	-443.23	-1712.41	-398.77	1726135.52	14455497.27	39°48'14.281"N	80°41'41.237"W	1758.22	193.109	0.41	0.38	-0.35	
9219.00	25.130	192.690	8828.89	-454.12	-1751.80	-407.15	1726127.14	14455457.89	39°48'13.892"N	80°41'41.347"W	1798.49	193.084	0.80	-0.51	1.43	
9313.00	25.020	194.640	8914.03	-463.79	-1790.50	-416.56	1726117.74	14455419.20	39°48'13.510"N	80°41'41.469"W	1838.32	193.097	0.89	-0.12	2.07	
9407.00	25.900	193.390	8998.90	-473.36	-1829.71	-426.34	1726107.96	14455380.01	39°48'13.123"N	80°41'41.596"W	1878.72	193.116	1.10	0.94	-1.33	



# Actual Wellpath Report

Heaven Hill 3N-10HU AWP Proj: 19300'

Page 6 of 11

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## REFERENCE WELLPATH IDENTIFICATION

Operator	TUG HILL OPERATING	Slot	Slot #10
Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

## WELLPATH DATA (228 stations) † = interpolated/extrapolated station

MD (ft)	Inclination (°)	Azimuth (°)	TVD (ft)	Vert Sect (ft)	North (ft)	East (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	Closure Dist (ft)	Closure Dir (°)	DLS ("/100ft)	Build Rate ("/100ft)	Turn Rate (°/100ft)	Comments
9502.00	26.320	193.420	9084.21	-483.69	-1870.38	-436.03	1726098.27	14455339.36	39°48'12.721"N	80°41'41.722"W	1920.53	193.123	0.44	0.44	0.03	
9597.00	25.670	193.710	9169.59	-493.87	-1910.85	-445.80	1726088.51	14455298.90	39°48'12.321"N	80°41'41.849"W	1962.17	193.132	0.70	-0.66	0.31	
9659.00	25.600	194.470	9225.49	-500.19	-1936.87	-452.33	1726081.99	14455272.89	39°48'12.064"N	80°41'41.933"W	1988.99	193.145	0.54	-0.11	1.23	APS EM <12-1/4">(9597)(9659-10507)
9754.00	24.140	193.930	9311.68	-509.51	-1975.60	-462.13	1726072.18	14455234.18	39°48'11.682"N	80°41'42.061"W	2028.93	193.166	1.56	-1.54	-0.57	
9848.00	23.470	196.440	9397.68	-517.75	-2012.21	-472.06	1726062.26	14455197.58	39°48'11.320"N	80°41'42.190"W	2066.84	193.203	1.29	-0.71	2.67	
9943.00	22.630	196.080	9485.10	-525.13	-2047.92	-482.48	1726051.85	14455161.89	39°48'10.968"N	80°41'42.325"W	2103.98	193.257	0.90	-0.88	-0.38	
10036.00	21.890	197.660	9571.23	-531.74	-2081.49	-492.65	1726041.89	14455128.33	39°48'10.637"N	80°41'42.456"W	2138.99	193.316	1.20	-1.01	1.70	
10131.00	19.810	196.300	9660.06	-537.99	-2113.67	-502.49	1726031.84	14455096.17	39°48'10.319"N	80°41'42.584"W	2172.58	193.373	2.04	-1.98	-1.43	
10226.00	19.400	196.760	9749.56	-544.17	-2144.23	-511.56	1726022.78	14455065.62	39°48'10.017"N	80°41'42.701"W	2204.40	193.418	0.46	-0.43	0.48	
10320.00	18.960	196.470	9838.34	-550.11	-2173.82	-520.39	1726013.95	14455036.04	39°48'09.725"N	80°41'42.816"W	2235.24	193.463	0.48	-0.47	-0.31	
10413.00	19.500	195.900	9926.15	-556.23	-2203.24	-528.93	1726005.42	14455006.63	39°48'09.435"N	80°41'42.927"W	2265.84	193.499	0.61	0.58	-0.61	
10507.00	20.100	196.470	10014.59	-562.59	-2233.81	-537.80	1725996.55	14454976.07	39°48'09.133"N	80°41'43.042"W	2297.64	193.537	0.67	0.64	0.61	NZone Guidance <12-1/4">(10507)(10511-11138)
10511.00	19.960	196.490	10018.35	-562.86	-2235.13	-538.19	1725996.16	14454974.75	39°48'09.120"N	80°41'43.047"W	2299.01	193.538	3.50	-3.50	0.50	
10567.00†	21.919	195.828	10070.65	-566.87	-2254.35	-543.76	1725990.59	14454955.54	39°48'08.930"N	80°41'43.119"W	2319.00	193.561	3.52	3.50	-1.18	Projected MD: 10567
10805.00	23.250	195.440	10105.73	-569.93	-2268.40	-547.69	1725986.66	14454941.49	39°48'08.791"N	80°41'43.170"W	2333.59	193.574	3.52	3.50	-1.02	
10701.00	24.750	192.630	10193.43	-579.18	-2306.28	-557.13	1725977.23	14454903.63	39°48'08.417"N	80°41'43.292"W	2372.62	193.581	1.96	1.56	-2.93	
10795.00	26.550	189.990	10278.17	-590.70	-2346.18	-565.07	1725969.28	14454863.75	39°48'08.023"N	80°41'43.396"W	2413.27	193.542	2.27	1.91	-2.81	
10889.00	27.650	186.480	10361.85	-604.99	-2388.54	-571.18	1725963.18	14454821.40	39°48'07.605"N	80°41'43.476"W	2455.89	193.449	2.06	1.17	-3.73	
10984.00	29.100	183.310	10445.44	-622.52	-2433.51	-575.00	1725959.36	14454776.45	39°48'07.160"N	80°41'43.527"W	2500.52	193.294	2.20	1.53	-3.34	
11078.00	30.290	183.660	10527.10	-641.62	-2479.99	-577.84	1725956.53	14454729.99	39°48'06.701"N	80°41'43.565"W	2546.42	193.116	1.28	1.27	0.37	
11138.00	29.190	183.310	10579.19	-653.83	-2509.70	-579.65	1725954.72	14454700.29	39°48'06.408"N	80°41'43.590"W	2575.77	193.005	1.86	-1.83	-0.58	
11262.00	28.570	185.880	10687.78	-677.35	-2569.38	-584.43	1725949.94	14454640.63	39°48'05.818"N	80°41'43.654"W	2635.01	192.814	1.12	-0.50	2.07	BH AT Curve <8-1/2"> (11138)(11262-19275)
11357.00	30.080	188.810	10770.60	-693.51	-2615.51	-590.40	1725943.96	14454594.52	39°48'05.362"N	80°41'43.732"W	2681.32	192.720	2.19	1.59	3.08	
11452.00	31.620	191.960	10852.17	-707.98	-2663.41	-599.21	1725935.16	14454546.64	39°48'04.889"N	80°41'43.847"W	2729.98	192.679	2.35	1.62	3.32	
11546.00	33.450	198.700	10931.44	-718.73	-2712.07	-612.63	1725921.75	14454498.00	39°48'04.409"N	80°41'44.021"W	2780.41	192.729	4.32	1.95	7.17	
11641.00	26.690	209.200	11013.66	-722.29	-2755.58	-631.47	1725902.92	14454454.51	39°48'03.979"N	80°41'44.264"W	2827.01	192.907	8.99	-7.12	11.05	
11736.00	24.130	231.020	11099.65	-714.03	-2786.49	-657.03	1725877.36	14454423.61	39°48'03.675"N	80°41'44.593"W	2862.90	193.268	10.16	-2.69	22.97	
11831.00	24.620	257.300	11186.44	-691.21	-2803.10	-691.53	1725842.87	14454407.00	39°48'03.512"N	80°41'45.036"W	2887.15	193.858	11.34	0.52	27.66	
11925.00	28.400	275.390	11270.68	-655.55	-2805.31	-732.97	1725801.45	14454404.79	39°48'03.491"N	80°41'45.567"W	2899.49	194.643	9.44	4.02	19.24	
12020.00	33.680	279.990	11352.06	-609.52	-2798.62	-781.45	1725753.00	14454411.49	39°48'03.559"N	80°41'46.188"W	2905.67	195.601	6.09	5.56	4.84	



# Actual Wellpath Report

Heaven Hill 3N-10HU AWP Proj: 19300'  
Page 7 of 11

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 WV Department of  
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REFERENCE WELLPATH IDENTIFICATION			
Operator	TUG HILL OPERATING	Slot	Slot #10
Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

WELLPATH DATA (228 stations)																
MD (ft)	Inclination (°)	Azimuth (°)	TVD (ft)	Vert Sect	North (ft)	East (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	Closure Dist (ft)	Closure Dir (°)	DLS (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Comments
12113.00	39.020	290.710	11427.01	-555.81	-2783.76	-834.32	1725700.14	14454426.33	39°48'03.708"N	80°41'46.865"W	2906.10	196.684	8.91	5.74	11.53	
12208.00	46.310	305.140	11496.99	-491.82	-2753.30	-890.59	1725643.89	14454456.78	39°48'04.011"N	80°41'47.584"W	2893.76	197.924	12.80	7.67	15.19	
12301.00	53.950	319.310	11556.74	-423.22	-2705.23	-942.83	1725591.68	14454504.84	39°48'04.487"N	80°41'48.252"W	2864.82	199.215	14.26	8.22	15.24	
12395.00	61.750	327.780	11606.79	-351.86	-2641.21	-989.82	1725544.71	14454568.83	39°48'05.122"N	80°41'48.851"W	2820.59	200.544	11.26	8.30	9.01	
12490.00	67.780	334.480	11647.31	-280.29	-2565.99	-1031.15	1725503.40	14454644.02	39°48'05.866"N	80°41'49.377"W	2765.42	201.893	9.00	6.35	7.05	
12584.00	75.000	336.820	11677.29	-210.01	-2484.94	-1067.96	1725466.60	14454725.04	39°48'06.669"N	80°41'49.845"W	2704.71	203.257	7.98	7.68	2.28	
12678.00	83.220	336.480	11695.03	-138.17	-2400.33	-1104.66	1725429.91	14454809.62	39°48'07.506"N	80°41'50.312"W	2642.32	204.713	8.75	8.74	-0.15	
12773.00	89.480	334.410	11701.08	-63.23	-2314.14	-1144.04	1725390.54	14454895.77	39°48'08.359"N	80°41'50.813"W	2581.49	206.306	6.94	6.59	-2.18	
12868.00	89.080	332.590	11702.27	13.82	-2229.13	-1186.43	1725348.18	14454980.74	39°48'09.201"N	80°41'51.352"W	2525.20	208.024	1.96	-0.42	-1.92	
12963.00	90.400	331.330	11702.70	92.34	-2145.29	-1231.08	1725303.54	14455064.56	39°48'10.031"N	80°41'51.921"W	2473.43	209.850	1.92	1.39	-1.33	
13058.00	90.000	332.250	11702.37	171.02	-2061.58	-1275.99	1725258.65	14455148.24	39°48'10.860"N	80°41'52.492"W	2424.51	211.755	1.06	-0.42	0.97	
13152.00	89.970	330.780	11702.40	249.13	-1978.96	-1320.82	1725213.84	14455230.82	39°48'11.678"N	80°41'53.063"W	2379.25	213.720	1.56	-0.03	-1.56	
13247.00	89.970	329.880	11702.45	329.14	-1896.41	-1367.85	1725166.83	14455313.33	39°48'12.495"N	80°41'53.662"W	2338.24	215.802	0.95	0.00	-0.95	
13342.00	89.880	327.860	11702.57	410.43	-1815.10	-1416.96	1725117.74	14455394.62	39°48'13.300"N	80°41'54.288"W	2302.68	217.977	2.13	-0.09	-2.13	
13436.00	89.850	330.150	11702.79	490.75	-1734.53	-1465.38	1725069.35	14455475.16	39°48'14.098"N	80°41'54.905"W	2270.65	220.192	2.44	-0.03	2.44	
13531.00	90.860	328.470	11702.20	571.66	-1652.84	-1513.84	1725020.89	14455556.82	39°48'14.907"N	80°41'55.522"W	2241.34	222.487	2.06	1.06	-1.77	
13625.00	91.050	327.100	11700.84	652.99	-1573.32	-1563.95	1724970.81	14455636.30	39°48'15.694"N	80°41'56.161"W	2218.39	224.829	1.47	0.20	-1.46	
13720.00	90.890	330.690	11699.03	734.24	-1492.00	-1613.01	1724921.76	14455717.58	39°48'16.500"N	80°41'56.786"W	2197.24	227.232	3.78	-0.17	3.78	
13815.00	91.140	334.300	11697.34	812.24	-1407.77	-1656.87	1724877.92	14455801.79	39°48'17.334"N	80°41'57.344"W	2174.17	229.647	3.81	0.26	3.80	
13910.00	90.950	334.360	11695.61	888.47	-1322.16	-1698.01	1724836.79	14455887.36	39°48'18.181"N	80°41'57.868"W	2152.06	232.094	0.21	-0.20	0.06	
14005.00	90.890	333.010	11694.09	965.34	-1237.02	-1740.12	1724794.70	14455972.47	39°48'19.024"N	80°41'58.404"W	2135.00	234.592	1.42	-0.06	-1.42	
14099.00	90.980	329.550	11692.55	1043.64	-1154.61	-1785.28	1724749.56	14456054.85	39°48'19.840"N	80°41'58.979"W	2126.11	237.108	3.88	0.10	-3.68	
14194.00	91.020	328.930	11690.89	1124.60	-1072.98	-1833.86	1724701.00	14456136.44	39°48'20.648"N	80°41'59.598"W	2124.69	239.668	0.65	0.04	-0.65	
14289.00	91.020	331.030	11689.20	1204.91	-990.75	-1881.38	1724653.50	14456218.65	39°48'21.462"N	80°42'00.203"W	2126.30	242.228	2.21	0.00	2.21	
14383.00	90.830	331.700	11687.69	1283.15	-908.25	-1926.42	1724608.48	14456301.11	39°48'22.279"N	80°42'00.777"W	2129.79	244.757	0.74	-0.20	0.71	
14478.00	90.860	331.540	11686.28	1361.98	-824.68	-1971.57	1724563.34	14456384.65	39°48'23.106"N	80°42'01.352"W	2137.10	247.301	0.17	0.03	-0.17	
14573.00	90.860	329.160	11684.86	1441.96	-742.13	-2018.56	1724516.38	14456467.16	39°48'23.924"N	80°42'01.950"W	2150.66	249.814	2.50	0.00	-2.51	
14667.00	90.830	327.200	11683.47	1522.97	-662.27	-2068.11	1724466.84	14456546.99	39°48'24.715"N	80°42'02.582"W	2171.56	252.243	2.09	-0.03	-2.09	
14761.00	90.980	325.920	11681.99	1605.29	-583.85	-2119.90	1724415.07	14456625.39	39°48'25.491"N	80°42'03.242"W	2198.83	254.602	1.37	0.16	-1.36	
14856.00	91.080	326.210	11680.28	1688.88	-505.04	-2172.93	1724362.06	14456704.16	39°48'26.272"N	80°42'03.918"W	2230.85	256.915	0.32	0.11	0.31	



# Actual Wellpath Report

Heaven Hill 3N-10HU AWP Proj: 19300'  
Page 8 of 11

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WV Department of  
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REFERENCE WELLPATH IDENTIFICATION			
Operator	TUG HILL OPERATING	Slot	Slot #10
Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

WELLPATH DATA (228 stations)																
MD (ft)	Inclination (°)	Azimuth (°)	TVD (ft)	Vert Sect (ft)	North (ft)	East (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	Closure Dist (ft)	Closure Dir (°)	DLS (°/100ft)	Buid Rate (°/100ft)	Turn Rate (°/100ft)	Comments
14951.00	90.890	326.940	11678.65	1772.06	-425.76	-2225.25	1724309.76	14456783.40	39°48'27.057"N	80°42'04.585"W	2265.62	259.168	0.79	-0.20	0.77	
15045.00	90.800	329.280	11677.28	1853.13	-345.98	-2274.91	1724260.12	14456863.16	39°48'27.847"N	80°42'05.218"W	2301.07	281.353	2.47	-0.10	2.47	
15140.00	90.980	330.970	11675.78	1933.33	-263.62	-2322.24	1724212.81	14456945.48	39°48'28.663"N	80°42'05.821"W	2337.16	263.523	1.81	0.19	1.80	
15235.00	90.830	332.420	11674.28	2012.09	-179.99	-2367.28	1724167.79	14457029.08	39°48'29.491"N	80°42'06.395"W	2374.11	265.652	1.53	-0.16	1.53	
15329.00	91.020	333.470	11672.77	2088.85	-96.29	-2410.03	1724125.06	14457112.75	39°48'30.319"N	80°42'06.939"W	2411.95	267.712	1.14	0.20	1.12	
15422.00	90.950	335.490	11671.17	2163.34	-12.38	-2450.09	1724085.01	14457196.63	39°48'31.150"N	80°42'07.448"W	2450.12	269.710	2.17	-0.08	2.17	
15516.00	91.020	335.680	11669.55	2237.52	73.20	-2488.94	1724046.18	14457282.17	39°48'31.997"N	80°42'07.943"W	2490.01	271.685	0.22	0.07	0.20	
15610.00	90.950	330.850	11667.93	2313.97	157.11	-2531.21	1724003.93	14457366.05	39°48'32.828"N	80°42'08.481"W	2536.08	273.552	5.14	-0.07	-5.14	
15705.00	90.920	330.110	11666.38	2393.83	239.77	-2578.01	1723957.14	14457448.68	39°48'33.646"N	80°42'09.077"W	2589.13	275.314	0.78	-0.03	-0.78	
15799.00	90.920	332.150	11664.87	2472.28	322.07	-2623.39	1723911.78	14457530.95	39°48'34.461"N	80°42'09.655"W	2643.08	276.999	2.17	0.00	2.17	
15893.00	90.920	331.860	11663.37	2550.02	404.99	-2667.65	1723867.54	14457613.83	39°48'35.282"N	80°42'10.218"W	2698.21	278.632	0.52	0.00	-0.52	
15989.00	90.890	331.480	11661.85	2629.73	489.40	-2713.35	1723821.86	14457698.21	39°48'36.117"N	80°42'10.800"W	2757.13	280.224	0.19	-0.03	-0.19	
16084.00	90.950	327.540	11660.32	2710.44	571.23	-2761.53	1723773.69	14457780.01	39°48'36.928"N	80°42'11.414"W	2819.99	281.687	4.15	0.06	-4.15	
16177.00	90.980	325.120	11658.76	2792.06	648.62	-2813.08	1723722.16	14457857.36	39°48'37.694"N	80°42'12.072"W	2886.89	282.984	2.60	0.03	-2.60	
16272.00	91.050	325.590	11657.07	2876.20	726.76	-2867.08	1723668.19	14457935.47	39°48'38.468"N	80°42'12.760"W	2957.76	284.224	0.50	0.07	0.49	
16367.00	90.890	325.530	11655.47	2960.18	805.10	-2920.80	1723614.49	14458013.78	39°48'39.244"N	80°42'13.445"W	3029.73	285.410	0.18	-0.17	-0.06	
16462.00	91.050	329.380	11653.86	3042.64	885.15	-2971.89	1723563.42	14458093.80	39°48'40.037"N	80°42'14.097"W	3100.90	286.586	4.06	0.17	4.05	
16557.00	90.580	332.450	11652.51	3122.11	968.15	-3018.06	1723517.27	14458176.77	39°48'40.859"N	80°42'14.685"W	3169.54	287.786	3.27	-0.49	3.23	
16650.00	90.650	333.250	11651.51	3198.16	1050.90	-3060.49	1723474.85	14458259.49	39°48'41.678"N	80°42'15.225"W	3235.89	288.951	0.86	0.08	0.86	
16745.00	90.650	332.360	11650.43	3275.88	1135.39	-3103.91	1723431.45	14458343.95	39°48'42.514"N	80°42'15.778"W	3305.05	290.092	0.94	0.00	-0.94	
16840.00	90.710	331.230	11649.30	3354.55	1219.10	-3148.80	1723386.58	14458427.63	39°48'43.343"N	80°42'16.350"W	3376.56	291.165	1.19	0.06	-1.19	
16935.00	90.710	328.930	11648.12	3434.78	1301.43	-3196.18	1723339.22	14458509.92	39°48'44.158"N	80°42'16.953"W	3450.98	292.155	2.42	0.00	-2.42	
17029.00	90.740	329.150	11646.94	3515.07	1382.03	-3244.53	1723290.88	14458590.49	39°48'44.966"N	80°42'17.569"W	3526.61	293.072	0.24	0.03	0.23	
17124.00	90.710	328.300	11645.73	3596.48	1463.22	-3293.85	1723241.59	14458671.65	39°48'45.760"N	80°42'18.198"W	3604.23	293.952	0.90	-0.03	-0.89	
17218.00	90.650	329.540	11644.62	3676.87	1543.72	-3342.37	1723193.08	14458752.11	39°48'46.557"N	80°42'18.816"W	3681.64	294.791	1.32	-0.06	1.32	
17313.00	90.580	330.420	11643.60	3757.19	1625.97	-3389.89	1723145.58	14458834.33	39°48'47.372"N	80°42'19.422"W	3759.88	295.625	0.93	-0.07	0.93	
17408.00	90.740	332.580	11642.50	3836.13	1709.45	-3435.22	1723100.27	14458917.78	39°48'48.198"N	80°42'19.999"W	3837.05	296.456	2.28	0.17	2.27	
17502.00	90.830	333.520	11641.22	3912.80	1793.23	-3477.82	1723057.69	14459001.53	39°48'49.028"N	80°42'20.542"W	3912.91	297.277	1.00	0.10	1.00	
17597.00	90.800	333.930	11639.86	3989.63	1878.41	-3519.87	1723015.66	14459086.67	39°48'49.871"N	80°42'21.077"W	3989.72	298.087	0.43	-0.03	0.43	
17691.00	90.950	333.700	11638.43	4065.57	1962.75	-3561.34	1722974.20	14459170.98	39°48'50.706"N	80°42'21.605"W	4065.39	298.860	0.29	0.16	-0.24	





# Actual Wellpath Report

Heaven Hill 3N-10HU AWP Proj: 19300'  
Page 9 of 11

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REFERENCE WELLPATH IDENTIFICATION			
Operator	TUG HILL OPERATING	Slot	Slot #10
Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

WELLPATH DATA (228 stations)																
MD (ft)	Inclination (°)	Azimuth (°)	TVD (ft)	Vert Sect (ft)	North (ft)	East (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude	Closure Dist (ft)	Closure Dir (°)	DLS (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Comments
17786.00	90.920	332.860	11636.88	4142.83	2047.59	-3604.05	1722931.51	14459255.79	39°48'51.545"N	80°42'22.149"W	4145.09	299.602	0.88	-0.03	-0.88	
17881.00	90.950	330.990	11635.33	4221.38	2131.40	-3648.75	1722886.82	14459339.56	39°48'52.375"N	80°42'22.718"W	4225.67	300.291	1.97	0.03	-1.97	
17975.00	90.950	327.560	11633.77	4301.45	2212.18	-3696.76	1722838.83	14459420.31	39°48'53.175"N	80°42'23.330"W	4308.11	300.897	3.65	0.00	-3.65	
18070.00	90.950	326.140	11632.19	4384.41	2291.71	-3748.70	1722786.91	14459499.81	39°48'53.963"N	80°42'23.992"W	4393.71	301.439	1.49	0.00	-1.49	
18165.00	90.890	328.720	11630.67	4466.90	2371.75	-3799.84	1722735.80	14459579.82	39°48'54.755"N	80°42'24.644"W	4479.28	301.971	2.72	-0.06	2.72	
18259.00	90.860	331.190	11629.23	4546.38	2453.10	-3846.89	1722688.76	14459661.14	39°48'55.561"N	80°42'25.243"W	4562.49	302.525	2.63	-0.03	2.63	
18354.00	90.920	332.080	11627.76	4625.20	2536.69	-3892.02	1722643.65	14459744.69	39°48'56.388"N	80°42'25.818"W	4645.70	303.095	0.94	0.06	0.94	
18449.00	90.920	332.640	11626.23	4703.34	2620.83	-3936.08	1722599.60	14459828.80	39°48'57.221"N	80°42'26.379"W	4728.80	303.658	0.59	0.00	0.59	
18544.00	91.010	333.920	11624.63	4780.60	2705.67	-3978.79	1722556.91	14459913.61	39°48'58.061"N	80°42'26.923"W	4811.60	304.217	1.35	0.09	1.35	
18638.00	90.920	334.040	11623.05	4856.38	2790.13	-4020.02	1722515.70	14459998.04	39°48'58.897"N	80°42'27.448"W	4893.41	304.763	0.16	-0.10	0.13	
18733.00	90.950	331.970	11621.50	4933.90	2874.77	-4063.14	1722472.60	14460082.64	39°48'59.735"N	80°42'27.997"W	4977.28	305.280	2.18	0.03	-2.18	
18827.00	90.920	327.770	11619.96	5013.45	2956.04	-4110.30	1722425.45	14460163.88	39°49'00.540"N	80°42'28.598"W	5062.88	305.723	4.47	-0.03	-4.47	
18921.00	90.950	327.080	11618.43	5095.08	3035.24	-4160.91	1722374.87	14460243.05	39°49'01.324"N	80°42'29.243"W	5150.32	306.109	0.73	0.03	-0.73	
19016.00	90.920	329.440	11616.88	5176.87	3116.02	-4210.87	1722324.92	14460323.79	39°49'02.124"N	80°42'29.880"W	5238.42	306.501	2.48	-0.03	2.48	
19111.00	90.920	330.320	11615.35	5257.28	3198.18	-4258.54	1722277.28	14460405.92	39°49'02.937"N	80°42'30.488"W	5325.74	306.907	0.93	0.00	0.93	
19205.00	90.950	333.180	11613.82	5335.15	3280.96	-4303.02	1722232.81	14460488.67	39°49'03.757"N	80°42'31.054"W	5411.16	307.325	3.04	0.03	3.04	
19275.00	90.950	335.770	11612.66	5391.22	3344.12	-4333.18	1722202.67	14460551.80	39°49'04.382"N	80°42'31.438"W	5473.53	307.659	3.70	0.00	3.70	
19300.00	90.950	335.770	11612.24	5410.90	3366.91	-4343.43	1722192.41	14460574.59	39°49'04.608"N	80°42'31.569"W	5495.59	307.782	0.00	0.00	0.00	Projected MD: 19300'



# Actual Wellpath Report

Heaven Hill 3N-10HU AWP Proj: 19300'  
Page 10 of 11

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REFERENCE WELLPATH IDENTIFICATION			
Operator	TUG HILL OPERATING	Slot	Slot #10
Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

HOLE & CASING SECTIONS - Ref Wellbore: Heaven Hill 3N-10HU AWB Ref Wellpath: Heaven Hill 3N-10HU AWP Proj: 19300'									
String/Diameter	Start MD [ft]	End MD [ft]	Interval [ft]	Start TVD [ft]	End TVD [ft]	Start N/S [ft]	Start E/W [ft]	End N/S [ft]	End E/W [ft]
20in Conductor	26.00	1123.00	1097.00	26.00	1122.96	0.00	0.00	3.99	4.44
17.5in Open Hole	1123.00	2901.00	1778.00	1122.96	2899.59	3.99	4.44	20.99	-2.02
13.375in Casing Surface	26.00	2901.00	2875.00	26.00	2899.59	0.00	0.00	20.99	-2.02
12.25in Open Hole	2901.00	11200.00	8299.00	2899.59	10633.40	20.99	-2.02	-2539.71	-581.72
9.625in Casing Intermediate	26.00	11200.00	11174.00	26.00	10633.40	0.00	0.00	-2539.71	-581.72
8.5in Open Hole	11200.00	19300.00	8100.00	10633.40	11612.24	-2539.71	-581.72	3366.91	-4343.43
5.5in Casing Production	26.00	19300.00	19274.00	26.00	11612.24	0.00	0.00	3366.91	-4343.43

TARGETS								
Name	TVD [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Shape
Heaven Hill 3N-10HU BHL - Rev-2	11586.78	3348.46	-4352.91	1722182.94	14460556.15	39°49'04.426"N	80°42'31.691"W	point
Heaven Hill 3N-10HU LP - Rev-2	11701.00	-2338.80	-1116.86	1725417.72	14454871.12	39°48'08.115"N	80°41'50.465"W	point

WELLPATH COMPOSITION - Ref Wellbore: Heaven Hill 3N-10HU AWB Ref Wellpath: Heaven Hill 3N-10HU AWP Proj: 19300'				
Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore
26.00	9597.00	ISCWSA MWD, Rev. 4 (Standard)	01 Benchtree MWD Surveys <12-1/4">(157'-9597')	Heaven Hill 3N-10HU AWB
9597.00	10507.00	BHI NaviTrak (Axial)	02 APS EM <12-1/4">(9597')(9659'-10507')	Heaven Hill 3N-10HU AWB
10507.00	11138.00	ISCWSA MWD, Rev. 4 (Standard)	03 NZone Guidance <12-1/4">(10507')(10511'-11138')	Heaven Hill 3N-10HU AWB
11138.00	19275.00	BHI AutoTrak Curve (Short)	04 BH AT Curve <8-1/2"> (11138')(11262'-19275')	Heaven Hill 3N-10HU AWB
19275.00	19300.00	Blind Drilling (std)	Projection to bit	Heaven Hill 3N-10HU AWB



# Actual Wellpath Report

Heaven Hill 3N-10HU AWP Proj: 19300'  
Page 11 of 11

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REFERENCE WELLPATH IDENTIFICATION			
Operator	TUG HILL OPERATING	Slot	Slot #10
Area	Marshall County, WV	Well	Heaven Hill 3N-10HU
Field	Marshall	Wellbore	Heaven Hill 3N-10HU AWB
Facility	Heaven Hill 3 Pad		

COMMENTS
<p><b>Wellpath general comments</b> API: 47-051-02016-0000 BHI Job #: 109524561A Rig: Nabors B28 Duration: 12.24.2018 - 12.29.2018 Benchtree MWD Surveys &lt;12-1/4"&gt;(157'-9597') APS EM &lt;12-1/4"&gt;(9597')(9659'-10507') NZone Guidance &lt;12-1/4"&gt;(10507')(10511'-11138') BH AT Curve &lt;8-1/2"&gt; (11138')(11262'-19275') Projected MD: 19300'</p>