

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Blake 08 HM (slot B)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1326+18 @ 1344.00ft (Precision 528)
Site:	Blake Pad	MD Reference:	RKB=1326+18 @ 1344.00ft (Precision 528)
Well:	Blake 08 HM (slot B)	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	Blake Pad				
Site Position:		Northing:	14,440,917.72 usft	Latitude:	39.76416471
From:	Lat/Long	Easting:	1,695,217.29 usft	Longitude:	-80.80498839
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.12 °

Well	Blake 08 HM (slot B)					
Well Position	+N/-S	0.00 ft	Northing:	14,440,973.54 usft	Latitude:	39.76431787
	+E/-W	0.00 ft	Easting:	1,695,239.24 usft	Longitude:	-80.80490984
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	1,326.00 ft

Wellbore	Original Hole				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	4/29/2018	-8.64	66.88	52,072.72781884

Design	Surveys Original Hole				
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Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	331.65

Survey Program	Date	2/15/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
184.00	2,018.00	MWD surf (Original Hole)	MWD	MWD - Standard	RECEIVED Office of Oil and Gas JUL 10 2020 WV Department of Environmental Protection
2,113.00	17,456.00	MWD (Original Hole)	MWD	MWD - Standard	
17,512.00	17,512.00	Projection (Original Hole)	MWD	MWD - Standard	

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	14,440,973.54	1,695,239.24	39.76431787	-80.80490984
184.00	0.28	334.00	184.00	0.40	-0.20	14,440,973.94	1,695,239.04	39.76431898	-80.80491054
MWD surveys									
215.00	0.18	260.05	215.00	0.46	-0.28	14,440,974.00	1,695,238.96	39.76431915	-80.80491083
246.00	0.06	25.59	246.00	0.47	-0.32	14,440,974.01	1,695,238.92	39.76431916	-80.80491097
269.00	0.16	95.76	269.00	0.48	-0.28	14,440,974.02	1,695,238.96	39.76431919	-80.80491084
300.00	0.34	294.57	300.00	0.51	-0.32	14,440,974.05	1,695,238.92	39.76431928	-80.80491099
331.00	0.24	65.12	331.00	0.58	-0.35	14,440,974.12	1,695,238.89	39.76431946	-80.80491107
361.00	0.25	193.59	361.00	0.54	-0.31	14,440,974.08	1,695,238.93	39.76431936	-80.80491092
391.00	0.27	160.13	391.00	0.41	-0.30	14,440,973.95	1,695,238.94	39.76431900	-80.80491090



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Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Survey									WV Department of Environmental Protection	
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ustf)	Map Easting (ustf)	Latitude	Longitude	
421.00	0.10	259.18	421.00	0.34	-0.30	14,440,973.88	1,695,238.94	39.76431880	-80.80491090	
451.00	0.50	159.10	451.00	0.21	-0.28	14,440,973.75	1,695,238.96	39.76431845	-80.80491083	
481.00	0.26	46.60	481.00	0.14	-0.18	14,440,973.68	1,695,239.06	39.76431825	-80.80491049	
511.00	0.14	257.65	511.00	0.17	-0.17	14,440,973.71	1,695,239.07	39.76431835	-80.80491044	
541.00	0.43	132.59	541.00	0.09	-0.12	14,440,973.63	1,695,239.12	39.76431812	-80.80491027	
572.00	0.12	0.43	572.00	0.04	-0.04	14,440,973.58	1,695,239.20	39.76431799	-80.80490997	
602.00	0.28	211.62	602.00	0.01	-0.07	14,440,973.55	1,695,239.16	39.76431791	-80.80491010	
632.00	0.30	315.62	632.00	0.01	-0.17	14,440,973.55	1,695,239.07	39.76431789	-80.80491043	
663.00	0.09	262.03	663.00	0.06	-0.25	14,440,973.60	1,695,238.99	39.76431804	-80.80491072	
693.00	0.37	333.98	693.00	0.15	-0.31	14,440,973.68	1,695,238.92	39.76431827	-80.80491095	
723.00	0.13	168.32	723.00	0.20	-0.35	14,440,973.74	1,695,238.89	39.76431842	-80.80491108	
754.00	0.44	281.43	754.00	0.19	-0.46	14,440,973.73	1,695,238.78	39.76431839	-80.80491147	
784.00	0.20	280.27	784.00	0.22	-0.62	14,440,973.76	1,695,238.62	39.76431848	-80.80491206	
879.00	0.38	309.11	878.99	0.45	-1.03	14,440,973.99	1,695,238.21	39.76431911	-80.80491350	
975.00	0.17	198.06	974.99	0.51	-1.32	14,440,974.05	1,695,237.92	39.76431929	-80.80491454	
1,068.00	0.16	269.08	1,067.99	0.38	-1.49	14,440,973.92	1,695,237.74	39.76431893	-80.80491516	
1,156.00	0.18	102.53	1,155.99	0.35	-1.48	14,440,973.89	1,695,237.76	39.76431884	-80.80491511	
1,259.00	0.06	267.27	1,258.99	0.31	-1.38	14,440,973.85	1,695,237.86	39.76431873	-80.80491474	
1,354.00	1.50	329.03	1,353.98	1.38	-2.07	14,440,974.91	1,695,237.17	39.76432166	-80.80491719	
1,449.00	3.30	339.69	1,448.89	5.01	-3.66	14,440,978.55	1,695,235.58	39.76433164	-80.80492281	
1,544.00	3.69	338.60	1,543.72	10.42	-5.72	14,440,983.96	1,695,233.52	39.76434651	-80.80493012	
1,639.00	2.94	342.33	1,638.56	15.58	-7.58	14,440,989.12	1,695,231.66	39.76436072	-80.80493668	
1,733.00	2.52	330.89	1,732.45	19.69	-9.31	14,440,993.23	1,695,229.92	39.76437199	-80.80494283	
1,829.00	1.73	340.09	1,828.39	22.89	-10.83	14,440,996.43	1,695,228.40	39.76438081	-80.80494822	
1,924.00	1.08	340.89	1,923.36	25.09	-11.61	14,440,998.63	1,695,227.62	39.76438684	-80.80495098	
2,018.00	0.51	357.02	2,017.35	26.34	-11.93	14,440,999.88	1,695,227.31	39.76439029	-80.80495208	
2,113.00	0.62	358.55	2,112.34	27.28	-11.96	14,441,000.82	1,695,227.28	39.76439286	-80.80495220	
2,208.00	0.43	9.25	2,207.34	28.14	-11.92	14,441,001.68	1,695,227.32	39.76439523	-80.80495203	
2,304.00	0.47	8.64	2,303.34	28.89	-11.80	14,441,002.43	1,695,227.44	39.76439728	-80.80495161	
2,399.00	1.20	323.07	2,398.33	30.07	-12.34	14,441,003.61	1,695,226.90	39.76440052	-80.80495352	
2,494.00	2.06	323.04	2,493.29	32.23	-13.96	14,441,005.77	1,695,225.27	39.76440646	-80.80495928	
2,587.00	2.51	322.32	2,586.21	35.18	-16.21	14,441,008.72	1,695,223.02	39.76441457	-80.80496727	
2,682.00	2.48	322.08	2,681.12	38.44	-18.75	14,441,011.98	1,695,220.49	39.76442356	-80.80497626	
2,777.00	2.16	317.48	2,776.04	41.38	-21.22	14,441,014.92	1,695,218.02	39.76443165	-80.80498504	
2,872.00	1.92	318.81	2,870.98	43.90	-23.48	14,441,017.44	1,695,215.76	39.76443858	-80.80499305	
2,968.00	3.94	344.94	2,966.86	48.30	-25.40	14,441,021.84	1,695,213.84	39.76445066	-80.80499984	
3,062.00	6.81	354.60	3,060.44	56.97	-26.76	14,441,030.51	1,695,212.48	39.76447448	-80.80500463	
3,157.00	8.17	3.49	3,154.63	69.31	-26.88	14,441,042.85	1,695,212.36	39.76450838	-80.80500495	
3,252.00	9.91	10.73	3,248.45	84.08	-24.95	14,441,057.62	1,695,214.29	39.76454894	-80.80499796	
3,348.00	12.43	10.43	3,342.62	102.36	-21.54	14,441,075.90	1,695,217.70	39.76459912	-80.80498569	
3,443.00	14.99	13.49	3,434.91	124.37	-16.82	14,441,097.91	1,695,222.42	39.76465953	-80.80496873	
3,538.00	17.65	14.79	3,526.07	150.25	-10.28	14,441,123.79	1,695,228.96	39.76473055	-80.80494524	
3,632.00	21.03	28.29	3,614.80	178.90	1.37	14,441,152.44	1,695,240.60	39.76480917	-80.80490360	
3,726.00	23.34	33.00	3,701.84	209.37	19.50	14,441,182.91	1,695,258.74	39.76489276	-80.80483881	
3,822.00	24.43	25.04	3,789.64	243.32	38.27	14,441,216.86	1,695,277.51	39.76498587	-80.80477177	
3,917.00	26.30	20.77	3,875.49	280.80	54.05	14,441,254.34	1,695,293.29	39.76508871	-80.80471532	
4,012.00	32.19	23.36	3,958.34	323.75	71.56	14,441,297.29	1,695,310.80	39.76520656	-80.80465267	
4,106.00	36.47	21.42	4,035.95	372.77	91.70	14,441,346.31	1,695,330.94	39.76534105	-80.80458062	
4,153.00	35.93	19.30	4,073.88	398.79	101.36	14,441,372.33	1,695,340.60	39.76541245	-80.80454604	
4,202.00	34.69	18.00	4,113.87	425.62	110.42	14,441,399.16	1,695,349.66	39.76548608	-80.80451359	
4,294.00	36.32	16.78	4,188.76	476.61	126.38	14,441,450.15	1,695,365.62	39.76562602	-80.80445641	
4,388.00	37.00	17.51	4,264.17	530.24	142.93	14,441,503.77	1,695,382.17	39.76577319	-80.80439710	
4,483.00	35.99	17.62	4,340.54	584.10	159.98	14,441,557.64	1,695,399.22	39.76592103	-80.80433601	
4,576.00	36.12	23.12	4,415.74	635.37	179.02	14,441,608.91	1,695,418.26	39.76606170	-80.80426785	
4,671.00	36.73	26.87	4,492.19	686.47	202.86	14,441,660.01	1,695,442.09	39.76620189	-80.80418263	

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Survey								WV Department of Environmental Protection		
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ustf)	Map Easting (ustf)	Latitude	Longitude	
4,766.00	35.60	25.11	4,568.89	736.85	227.43	14,441,710.39	1,695,466.67	39.76634010	-80.80409479	
4,861.00	37.62	22.48	4,645.15	788.69	250.25	14,441,762.22	1,695,489.49	39.76648233	-80.80401316	
4,956.00	35.76	19.15	4,721.33	841.71	270.45	14,441,815.25	1,695,509.69	39.76662783	-80.80394087	
5,051.00	33.37	15.32	4,799.56	893.15	286.46	14,441,866.68	1,695,525.70	39.76676898	-80.80388349	
5,145.00	32.19	18.70	4,878.60	941.80	301.32	14,441,915.34	1,695,540.56	39.76690252	-80.80383023	
5,240.00	33.23	21.50	4,958.54	989.99	318.98	14,441,963.53	1,695,558.22	39.76703476	-80.80376702	
5,335.00	34.76	20.03	5,037.30	1,039.66	337.80	14,442,013.20	1,695,577.03	39.76717104	-80.80369967	
5,429.00	32.72	17.59	5,115.47	1,089.06	354.65	14,442,062.60	1,695,593.89	39.76730661	-80.80363929	
5,524.00	33.80	17.75	5,194.90	1,138.70	370.47	14,442,112.24	1,695,609.71	39.76744285	-80.80358262	
5,618.00	34.78	21.80	5,272.58	1,188.50	388.40	14,442,162.04	1,695,627.64	39.76757951	-80.80351843	
5,714.00	36.39	21.02	5,350.65	1,240.51	408.78	14,442,214.05	1,695,648.02	39.76772222	-80.80344548	
5,808.00	33.89	19.12	5,427.51	1,291.31	427.37	14,442,264.85	1,695,666.61	39.76786161	-80.80337893	
5,903.00	34.43	19.30	5,506.12	1,341.68	444.92	14,442,315.22	1,695,684.16	39.76799984	-80.80331607	
5,997.00	33.67	20.80	5,584.01	1,391.13	462.96	14,442,364.66	1,695,702.20	39.76813551	-80.80325150	
6,091.00	33.69	19.93	5,662.23	1,439.99	481.10	14,442,413.53	1,695,720.34	39.76826961	-80.80318656	
6,185.00	35.56	17.58	5,739.58	1,490.57	498.25	14,442,464.10	1,695,737.48	39.76840840	-80.80312515	
6,280.00	36.31	18.25	5,816.50	1,543.61	515.40	14,442,517.15	1,695,754.64	39.76855398	-80.80306369	
6,375.00	35.13	20.87	5,893.63	1,595.87	533.95	14,442,569.41	1,695,773.18	39.76869738	-80.80299728	
6,470.00	33.79	26.05	5,971.98	1,645.16	552.29	14,442,618.69	1,695,794.53	39.76883260	-80.80292093	
6,512.00	33.63	29.62	6,006.92	1,665.76	566.17	14,442,639.30	1,695,805.41	39.76888912	-80.80288206	
6,605.00	32.75	27.27	6,084.75	1,710.51	590.42	14,442,684.05	1,695,829.66	39.76901187	-80.80279539	
6,652.00	32.97	22.96	6,124.23	1,733.59	601.24	14,442,707.13	1,695,840.48	39.76907519	-80.80275672	
6,700.00	33.49	13.55	6,164.41	1,758.51	609.44	14,442,732.05	1,695,848.68	39.76914357	-80.80272733	
6,747.00	35.91	5.82	6,203.07	1,784.84	613.88	14,442,758.38	1,695,853.12	39.76921587	-80.80271133	
6,795.00	38.68	359.23	6,241.26	1,813.86	615.11	14,442,787.40	1,695,854.34	39.76929555	-80.80270673	
6,842.00	42.24	356.15	6,277.02	1,844.32	613.85	14,442,817.86	1,695,853.09	39.76937921	-80.80271097	
6,890.00	45.98	354.22	6,311.48	1,877.60	611.03	14,442,851.14	1,695,850.26	39.76947063	-80.80272076	
6,937.00	49.98	354.04	6,342.94	1,912.33	607.45	14,442,885.87	1,695,846.69	39.76956602	-80.80273320	
6,985.00	54.29	351.14	6,372.40	1,949.89	602.54	14,442,923.42	1,695,841.78	39.76966919	-80.80275039	
7,032.00	57.93	347.36	6,398.61	1,988.20	595.24	14,442,961.73	1,695,834.48	39.76977444	-80.80277607	
7,080.00	60.66	345.25	6,423.12	2,028.28	585.46	14,443,001.82	1,695,824.70	39.76988459	-80.80281056	
7,127.00	62.81	342.62	6,445.37	2,068.05	574.00	14,443,041.59	1,695,813.24	39.76999388	-80.80285104	
7,173.00	65.80	338.84	6,465.32	2,107.16	560.31	14,443,080.70	1,695,799.54	39.77010137	-80.80289946	
7,220.00	68.75	334.71	6,483.48	2,146.98	543.20	14,443,120.51	1,695,782.44	39.77021082	-80.80296002	
7,268.00	72.00	331.98	6,499.61	2,187.37	522.92	14,443,160.91	1,695,762.15	39.77032187	-80.80303190	
7,315.00	75.08	331.10	6,512.92	2,226.99	501.44	14,443,200.53	1,695,740.67	39.77043080	-80.80310803	
7,363.00	78.42	330.14	6,523.92	2,267.70	478.52	14,443,241.23	1,695,717.75	39.77054273	-80.80318929	
7,410.00	81.32	328.82	6,532.19	2,307.55	455.02	14,443,281.08	1,695,694.26	39.77065231	-80.80327259	
7,458.00	84.40	325.30	6,538.16	2,347.50	429.13	14,443,321.04	1,695,668.36	39.77076220	-80.80336444	
7,506.00	88.79	324.60	6,541.01	2,386.72	401.61	14,443,360.25	1,695,640.85	39.77087007	-80.80346204	
7,553.00	89.41	324.42	6,541.74	2,424.98	374.33	14,443,398.52	1,695,613.57	39.77097531	-80.80355884	
7,648.00	89.54	323.72	6,542.61	2,501.90	318.59	14,443,475.44	1,695,557.83	39.77118690	-80.80375662	
7,743.00	88.97	323.46	6,543.85	2,578.35	262.21	14,443,551.89	1,695,501.44	39.77139718	-80.80395669	
7,835.00	90.07	323.46	6,544.62	2,652.27	207.43	14,443,625.80	1,695,446.67	39.77160050	-80.80415104	
7,930.00	90.29	324.07	6,544.32	2,728.89	151.28	14,443,702.43	1,695,390.52	39.77181127	-80.80435029	
8,025.00	90.11	322.58	6,543.99	2,805.08	94.54	14,443,778.62	1,695,333.78	39.77202085	-80.80455163	
8,072.00	91.30	322.14	6,543.41	2,842.30	65.84	14,443,815.83	1,695,305.08	39.77212322	-80.80465349	
8,117.00	91.38	321.87	6,542.36	2,877.75	38.15	14,443,851.28	1,695,277.38	39.77222075	-80.80475177	
8,164.00	92.18	321.26	6,540.90	2,914.55	8.94	14,443,888.08	1,695,248.18	39.77232199	-80.80485542	
8,212.00	92.00	321.44	6,539.15	2,952.01	-21.01	14,443,925.54	1,695,218.22	39.77242505	-80.80496175	
8,307.00	91.69	320.91	6,536.09	3,025.98	-80.54	14,443,999.51	1,695,158.70	39.77262855	-80.80517303	
8,402.00	91.12	320.82	6,533.76	3,099.65	-140.48	14,444,073.18	1,695,098.75	39.77283121	-80.80538579	
8,498.00	90.73	322.93	6,532.21	3,175.15	-199.74	14,444,148.69	1,695,039.50	39.77303893	-80.80559611	
8,593.00	90.29	323.11	6,531.37	3,251.04	-256.88	14,444,224.57	1,694,982.35	39.77324768	-80.80579889	
8,688.00	91.08	323.54	6,530.23	3,327.23	-313.62	14,444,300.76	1,694,925.62	39.77345724	-80.80600023	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Blake 08 HM (slot B)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1326+18 @ 1344.00ft (Precision 528)
Site:	Blake Pad	MD Reference:	RKB=1326+18 @ 1344.00ft (Precision 528)
Well:	Blake 08 HM (slot B)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	WV Department of Environmental Protection	
								Latitude	Longitude
8,783.00	91.16	323.46	6,528.37	3,403.58	-370.12	14,444,377.11	1,694,869.12	39.77366726	-80.80620072
8,877.00	90.73	322.75	6,526.82	3,478.74	-426.54	14,444,452.28	1,694,812.70	39.77387402	-80.80640096
8,972.00	91.96	323.98	6,524.59	3,554.95	-483.21	14,444,528.48	1,694,756.03	39.77408365	-80.80660206
9,067.00	91.12	324.25	6,522.04	3,631.89	-538.88	14,444,605.42	1,694,700.36	39.77429528	-80.80679959
9,162.00	92.48	323.19	6,519.06	3,708.43	-595.06	14,444,681.97	1,694,644.18	39.77450582	-80.80699896
9,257.00	92.04	322.75	6,515.31	3,784.22	-652.23	14,444,757.75	1,694,587.01	39.77471427	-80.80720185
9,352.00	91.56	323.02	6,512.33	3,859.93	-709.53	14,444,833.46	1,694,529.71	39.77492255	-80.80740519
9,447.00	90.90	323.02	6,510.29	3,935.81	-766.66	14,444,909.34	1,694,472.58	39.77513126	-80.80760795
9,542.00	90.46	322.84	6,509.16	4,011.60	-823.92	14,444,985.13	1,694,415.32	39.77533975	-80.80781117
9,636.00	89.67	323.81	6,509.05	4,086.99	-880.06	14,445,060.52	1,694,359.18	39.77554712	-80.80801041
9,732.00	89.05	323.37	6,510.12	4,164.24	-937.04	14,445,137.78	1,694,302.20	39.77575962	-80.80821261
9,827.00	90.46	323.37	6,510.53	4,240.48	-993.72	14,445,214.01	1,694,245.52	39.77596931	-80.80841376
9,922.00	92.62	323.19	6,507.98	4,316.60	-1,050.50	14,445,290.13	1,694,188.74	39.77617869	-80.80861526
10,017.00	92.44	322.84	6,503.78	4,392.41	-1,107.59	14,445,365.94	1,694,131.65	39.77638722	-80.80881790
10,112.00	91.87	322.40	6,500.21	4,467.84	-1,165.23	14,445,441.37	1,694,074.01	39.77659472	-80.80902245
10,206.00	91.21	323.81	6,497.69	4,542.99	-1,221.64	14,445,516.52	1,694,017.60	39.77680143	-80.80922266
10,263.00	91.12	323.90	6,496.53	4,589.01	-1,255.25	14,445,562.54	1,693,983.99	39.77692800	-80.80934195
10,302.00	90.77	324.51	6,495.88	4,620.64	-1,278.06	14,445,594.17	1,693,961.18	39.77701500	-80.80942288
10,349.00	90.95	324.42	6,495.18	4,658.88	-1,305.37	14,445,632.41	1,693,933.87	39.77712018	-80.80951981
10,397.00	89.19	324.07	6,495.12	4,697.83	-1,333.42	14,445,671.36	1,693,905.82	39.77722732	-80.80961933
10,492.00	88.53	323.63	6,497.01	4,774.53	-1,389.45	14,445,748.06	1,693,849.79	39.77743827	-80.80981817
10,588.00	89.89	323.63	6,498.33	4,851.82	-1,446.37	14,445,825.35	1,693,792.87	39.77765086	-80.81002018
10,635.00	89.58	323.28	6,498.55	4,889.58	-1,474.35	14,445,863.11	1,693,764.89	39.77775472	-80.81011951
10,683.00	89.58	323.54	6,498.90	4,928.11	-1,502.96	14,445,901.64	1,693,736.28	39.77786073	-80.81022105
10,730.00	91.43	323.19	6,498.49	4,965.83	-1,531.01	14,445,939.36	1,693,708.23	39.77796446	-80.81032058
10,778.00	91.21	323.63	6,497.38	5,004.36	-1,559.61	14,445,977.89	1,693,679.63	39.77807044	-80.81042210
10,872.00	90.55	322.93	6,495.94	5,079.69	-1,615.81	14,446,053.22	1,693,623.43	39.77827766	-80.81062155
10,967.00	91.82	323.28	6,493.97	5,155.65	-1,672.83	14,446,129.18	1,693,566.41	39.77848659	-80.81082393
11,062.00	91.30	323.19	6,491.39	5,231.73	-1,729.67	14,446,205.26	1,693,509.57	39.77869585	-80.81102566
11,157.00	90.64	323.37	6,489.78	5,307.86	-1,786.46	14,446,281.39	1,693,452.78	39.77890527	-80.81122723
11,251.00	90.29	323.02	6,489.02	5,383.13	-1,842.77	14,446,356.65	1,693,396.47	39.77911229	-80.81142710
11,346.00	89.67	321.96	6,489.05	5,458.48	-1,900.62	14,446,432.01	1,693,338.62	39.77931957	-80.81163242
11,441.00	90.59	322.49	6,488.83	5,533.57	-1,958.81	14,446,507.10	1,693,280.43	39.77952612	-80.81183899
11,536.00	89.93	321.70	6,488.40	5,608.53	-2,017.17	14,446,582.06	1,693,222.07	39.77973231	-80.81204616
11,632.00	91.03	323.28	6,487.60	5,684.67	-2,075.62	14,446,658.20	1,693,163.62	39.77994176	-80.81225363
11,727.00	90.81	322.14	6,486.07	5,760.24	-2,133.17	14,446,733.77	1,693,106.07	39.78014963	-80.81245790
11,821.00	92.00	322.84	6,483.77	5,834.78	-2,190.39	14,446,808.31	1,693,048.86	39.78035467	-80.81266101
11,916.00	91.60	323.02	6,480.78	5,910.55	-2,247.62	14,446,884.07	1,692,991.62	39.78056306	-80.81286417
12,010.00	91.21	322.75	6,478.48	5,985.48	-2,304.33	14,446,959.01	1,692,934.92	39.78076918	-80.81306544
12,105.00	90.68	322.49	6,476.91	6,060.96	-2,361.99	14,447,034.49	1,692,877.25	39.78097680	-80.81327014
12,200.00	91.74	322.75	6,474.91	6,136.43	-2,419.65	14,447,109.96	1,692,819.59	39.78118439	-80.81347482
12,295.00	91.16	322.67	6,472.50	6,211.99	-2,477.19	14,447,185.51	1,692,762.05	39.78139222	-80.81367906
12,390.00	90.73	322.84	6,470.94	6,287.60	-2,534.68	14,447,261.13	1,692,704.56	39.78160020	-80.81388312
12,484.00	90.11	322.49	6,470.25	6,362.34	-2,591.69	14,447,335.87	1,692,647.56	39.78180578	-80.81408548
12,579.00	92.18	322.23	6,468.35	6,437.55	-2,649.69	14,447,411.07	1,692,589.56	39.78201265	-80.81429138
12,674.00	91.60	322.67	6,465.22	6,512.82	-2,707.55	14,447,486.35	1,692,531.69	39.78221971	-80.81449680
12,769.00	91.16	322.67	6,462.93	6,588.34	-2,765.15	14,447,561.87	1,692,474.10	39.78242743	-80.81470124
12,864.00	90.46	324.07	6,461.58	6,664.57	-2,821.82	14,447,638.10	1,692,417.42	39.78263710	-80.81490241
12,957.00	89.98	323.02	6,461.23	6,739.37	-2,877.08	14,447,712.90	1,692,362.17	39.78284283	-80.81509855
13,052.00	89.80	322.40	6,461.41	6,814.95	-2,934.63	14,447,788.48	1,692,304.61	39.78305072	-80.81530286
13,145.00	89.27	321.70	6,462.16	6,888.28	-2,991.82	14,447,861.81	1,692,247.42	39.78325243	-80.81550589
13,240.00	90.24	323.02	6,462.57	6,963.50	-3,049.84	14,447,937.03	1,692,189.41	39.78345935	-80.81571184
13,287.00	89.89	323.37	6,462.52	7,001.14	-3,077.99	14,447,974.66	1,692,161.25	39.78356285	-80.81581179
13,336.00	89.89	323.72	6,462.61	7,040.55	-3,107.11	14,448,014.07	1,692,132.13	39.78367125	-80.81591514
13,383.00	91.21	325.13	6,462.16	7,078.77	-3,134.45	14,448,052.30	1,692,104.79	39.78377638	-80.81601218



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Blake 08 HM (slot B)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1326+18 @ 1344.00ft (Precision 528)
Site:	Blake Pad	MD Reference:	RKB=1326+18 @ 1344.00ft (Precision 528)
Well:	Blake 08 HM (slot B)	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 (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
13,430.00	91.12	325.13	6,461.20	7,117.33	-3,161.32	14,448,090.85	1,692,077.93	39.78388241	-80.81610753	
13,525.00	90.64	324.42	6,459.75	7,194.92	-3,216.10	14,448,168.45	1,692,023.14	39.78409582	-80.81630198	
13,620.00	90.29	324.07	6,458.97	7,272.01	-3,271.61	14,448,245.54	1,691,967.63	39.78430785	-80.81649901	
13,715.00	91.87	323.90	6,457.18	7,348.84	-3,327.46	14,448,322.36	1,691,911.78	39.78451915	-80.81669724	
13,809.00	91.78	324.16	6,454.19	7,424.88	-3,382.64	14,448,398.40	1,691,856.60	39.78472828	-80.81689312	
13,903.00	91.56	323.11	6,451.45	7,500.54	-3,438.35	14,448,474.06	1,691,800.89	39.78493637	-80.81709088	
13,999.00	91.08	322.75	6,449.24	7,577.11	-3,496.21	14,448,550.64	1,691,743.04	39.78514700	-80.81729625	
14,094.00	90.86	322.40	6,447.63	7,652.55	-3,553.93	14,448,626.07	1,691,685.31	39.78535449	-80.81750119	
14,188.00	90.24	322.31	6,446.73	7,726.97	-3,611.34	14,448,700.50	1,691,627.90	39.78555920	-80.81770500	
14,282.00	89.67	322.49	6,446.80	7,801.45	-3,668.69	14,448,774.97	1,691,570.55	39.78576405	-80.81790862	
14,377.00	90.86	321.96	6,446.36	7,876.54	-3,726.89	14,448,850.06	1,691,512.36	39.78597059	-80.81811522	
14,472.00	90.59	321.08	6,445.16	7,950.90	-3,785.99	14,448,924.42	1,691,453.25	39.78617513	-80.81832509	
14,568.00	91.25	322.49	6,443.62	8,026.31	-3,845.37	14,448,999.84	1,691,393.87	39.78638257	-80.81853591	
14,663.00	91.25	325.13	6,441.55	8,102.96	-3,901.45	14,449,076.48	1,691,337.80	39.78659338	-80.81873497	
14,757.00	90.81	325.39	6,439.86	8,180.19	-3,955.00	14,449,153.71	1,691,284.24	39.78680577	-80.81892506	
14,852.00	90.64	325.13	6,438.66	8,258.25	-4,009.14	14,449,231.77	1,691,230.11	39.78702045	-80.81911719	
14,947.00	90.11	324.42	6,438.03	8,335.85	-4,063.93	14,449,309.38	1,691,175.32	39.78723387	-80.81931168	
15,042.00	89.98	323.28	6,437.96	8,412.56	-4,119.97	14,449,386.08	1,691,119.28	39.78744484	-80.81951062	
15,135.00	89.54	323.11	6,438.35	8,487.02	-4,175.68	14,449,460.55	1,691,063.56	39.78764965	-80.81970842	
15,229.00	88.66	323.46	6,439.82	8,562.37	-4,231.87	14,449,535.89	1,691,007.37	39.78785687	-80.81990789	
15,324.00	90.15	324.16	6,440.81	8,639.03	-4,287.96	14,449,612.55	1,690,951.28	39.78806772	-80.82010701	
15,419.00	92.75	324.60	6,438.41	8,716.22	-4,343.27	14,449,689.75	1,690,895.98	39.78828002	-80.82030334	
15,514.00	92.22	324.34	6,434.29	8,793.46	-4,398.42	14,449,766.98	1,690,840.82	39.78849244	-80.82049913	
15,610.00	91.96	324.60	6,430.79	8,871.54	-4,454.17	14,449,845.06	1,690,785.07	39.78870716	-80.82069703	
15,704.00	90.51	322.75	6,428.76	8,947.25	-4,509.84	14,449,920.77	1,690,729.41	39.78891539	-80.82089465	
15,751.00	90.42	322.49	6,428.38	9,024.59	-4,566.02	14,449,995.37	1,690,672.23	39.78912059	-80.82109767	
15,798.00	90.37	322.40	6,428.06	9,101.85	-4,622.82	14,450,071.25	1,690,613.42	39.78932929	-80.82130646	
15,894.00	90.51	322.05	6,427.32	9,179.73	-4,679.63	14,450,147.13	1,690,555.45	39.78953800	-80.82151231	
15,988.00	88.62	321.79	6,428.03	9,257.61	-4,736.44	14,450,223.01	1,690,496.21	39.78974671	-80.82172268	
16,084.00	88.31	321.96	6,430.60	9,335.49	-4,793.25	14,450,298.89	1,690,437.00	39.78995542	-80.82193305	
16,178.00	89.49	322.14	6,432.41	9,413.37	-4,850.06	14,450,374.77	1,690,377.79	39.79016413	-80.82214342	
16,272.00	89.27	320.82	6,433.43	9,491.25	-4,906.87	14,450,450.65	1,690,318.58	39.79037284	-80.82235379	
16,367.00	90.99	323.02	6,433.21	9,569.13	-4,963.68	14,450,526.53	1,690,259.37	39.79058155	-80.82256416	
16,432.00	91.03	323.72	6,432.06	9,647.01	-5,020.49	14,450,602.41	1,690,200.16	39.79079026	-80.82277453	
16,462.00	91.21	324.07	6,431.48	9,724.89	-5,077.30	14,450,678.29	1,690,140.95	39.79100000	-80.82298490	
16,558.00	91.21	323.81	6,429.45	9,802.77	-5,134.11	14,450,754.17	1,690,081.74	39.79120974	-80.82319527	
16,650.00	90.55	323.63	6,428.04	9,880.65	-5,190.92	14,450,830.05	1,690,022.53	39.79141948	-80.82340564	
16,745.00	90.20	323.28	6,427.42	9,958.53	-5,247.73	14,450,905.93	1,689,963.32	39.79162922	-80.82361601	
16,838.00	92.09	323.54	6,425.56	10,036.41	-5,304.54	14,450,981.81	1,689,904.11	39.79183896	-80.82382638	
16,933.00	92.04	323.11	6,422.13	10,114.29	-5,361.35	14,451,057.69	1,689,844.90	39.79204870	-80.82403675	
17,029.00	90.90	322.49	6,419.67	10,192.17	-5,418.16	14,451,133.57	1,689,785.69	39.79225844	-80.82424712	
17,123.00	91.08	322.49	6,418.05	10,270.05	-5,474.97	14,451,209.45	1,689,726.48	39.79246818	-80.82445749	
17,218.00	90.46	321.79	6,416.77	10,347.93	-5,531.78	14,451,285.33	1,689,667.27	39.79267792	-80.82466786	
17,313.00	90.29	321.26	6,416.15	10,425.81	-5,588.59	14,451,361.21	1,689,608.06	39.79288766	-80.82487823	
17,408.00	90.07	320.38	6,415.85	10,503.69	-5,645.40	14,451,437.09	1,689,548.85	39.79309740	-80.82508860	
17,456.00	89.80	320.38	6,415.91	10,581.57	-5,702.21	14,451,512.97	1,689,489.64	39.79330714	-80.82529897	
Survey @ 17456.00 MD 6415.91 TVD										
17,512.00	89.80	320.38	6,416.10	10,378.99	-5,613.02	14,451,352.51	1,689,626.23	39.79285334	-80.82481181	
Survey projected to 17512.00 MD 6416.10 TVD										



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Blake 08 HM (slot B)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1326+18 @ 1344.00ft (Precision 528)
Site:	Blake Pad	MD Reference:	RKB=1326+18 @ 1344.00ft (Precision 528)
Well:	Blake 08 HM (slot B)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
184.00	184.00	0.40	-0.20	MWD surveys	RECEIVED Office of Oil and Gas JUL 10 2020 WV Department of Environmental Protection
17,456.00	6,415.91	10,335.85	-5,577.31	Survey @ 17456.00 MD 6415.91 TVD	
17,512.00	6,416.10	10,378.99	-5,613.02	Survey projected to 17512.00 MD 6416.10 TVD	