



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Blake 05 HM (slot C)
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 05 HM (slot C)	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 05 HM (slot C)					
Well Position	+N/-S	0.00 ft	Northing:	14,440,962.38 usft	Latitude:	39.76428724
	+E/-W	0.00 ft	Easting:	1,695,234.85 usft	Longitude:	-80.80492555
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	1/10/2019	-8.67	66.82	51,991.60454813

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	326.52

Survey Program	Date	1/29/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	RECEIVED Office of Oil and Gas
185.00	2,831.00	MWD surf (Original Hole)	MWD	MWD - Standard	JUL 10 2020 WV Department of Environmental Protection
2,876.00	16,923.00	MWD (Original Hole)	MWD	MWD - Standard	
16,978.00	16,978.00	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	14,440,962.38	1,695,234.85	39.76428724	-80.80492555
185.00	1.29	166.71	184.98	-2.03	0.48	14,440,960.35	1,695,235.33	39.76428167	-80.80492386
MWD surveys									
216.00	1.03	176.99	215.98	-2.64	0.57	14,440,959.73	1,695,235.42	39.76427998	-80.80492353
247.00	0.90	175.02	246.97	-3.17	0.61	14,440,959.21	1,695,235.46	39.76427854	-80.80492341
277.00	0.90	153.72	276.97	-3.61	0.73	14,440,958.77	1,695,235.58	39.76427732	-80.80492297
307.00	1.06	153.09	306.97	-4.07	0.96	14,440,958.31	1,695,235.81	39.76427606	-80.80492215
337.00	0.92	150.02	336.96	-4.53	1.21	14,440,957.85	1,695,236.06	39.76427480	-80.80492128
367.00	0.75	152.01	366.96	-4.91	1.42	14,440,957.47	1,695,236.27	39.76427375	-80.80492053
397.00	0.49	157.91	396.96	-5.20	1.56	14,440,957.18	1,695,236.41	39.76427295	-80.80492003

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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 (usft)	Map Easting (usft)	Latitude	Longitude		
427.00	0.58	156.19	426.95	-5.46	1.67	14,440,956.92	1,695,236.52	39.76427224	-80.80491964		
457.00	0.38	157.81	456.95	-5.69	1.77	14,440,956.69	1,695,236.62	39.76427161	-80.80491929		
488.00	0.58	208.89	487.95	-5.92	1.73	14,440,956.45	1,695,236.58	39.76427097	-80.80491943		
518.00	0.42	138.21	517.95	-6.14	1.73	14,440,956.24	1,695,236.58	39.76427038	-80.80491943		
548.00	0.35	176.71	547.95	-6.31	1.81	14,440,956.07	1,695,236.66	39.76426990	-80.80491915		
579.00	0.36	141.44	578.95	-6.48	1.88	14,440,955.90	1,695,236.73	39.76426943	-80.80491892		
609.00	0.35	185.55	608.95	-6.65	1.93	14,440,955.73	1,695,236.78	39.76426898	-80.80491874		
639.00	0.38	171.53	638.95	-6.84	1.93	14,440,955.54	1,695,236.78	39.76426846	-80.80491872		
670.00	0.43	154.87	669.95	-7.04	2.00	14,440,955.33	1,695,236.85	39.76426789	-80.80491849		
701.00	0.27	212.22	700.95	-7.21	2.01	14,440,955.17	1,695,236.86	39.76426743	-80.80491846		
732.00	0.35	128.31	731.95	-7.33	2.04	14,440,955.05	1,695,236.89	39.76426710	-80.80491833		
764.00	0.46	147.51	763.95	-7.50	2.19	14,440,954.88	1,695,237.04	39.76426663	-80.80491781		
795.00	0.21	167.88	794.95	-7.66	2.27	14,440,954.72	1,695,237.12	39.76426619	-80.80491753		
827.00	0.36	217.15	826.95	-7.80	2.22	14,440,954.58	1,695,237.07	39.76426582	-80.80491771		
858.00	0.24	169.21	857.95	-7.94	2.17	14,440,954.44	1,695,237.02	39.76426543	-80.80491788		
891.00	0.45	153.05	890.95	-8.12	2.25	14,440,954.26	1,695,237.09	39.76426492	-80.80491762		
921.00	0.40	196.77	920.94	-8.33	2.27	14,440,954.05	1,695,237.12	39.76426436	-80.80491754		
952.00	0.37	150.51	951.94	-8.52	2.29	14,440,953.86	1,695,237.13	39.76426384	-80.80491748		
984.00	0.38	185.88	983.94	-8.71	2.33	14,440,953.66	1,695,237.17	39.76426330	-80.80491734		
1,015.00	0.14	79.94	1,014.94	-8.81	2.35	14,440,953.57	1,695,237.20	39.76426304	-80.80491724		
1,047.00	0.36	93.49	1,046.94	-8.81	2.49	14,440,953.57	1,695,237.34	39.76426304	-80.80491675		
1,079.00	0.31	92.07	1,078.94	-8.82	2.68	14,440,953.56	1,695,237.53	39.76426301	-80.80491608		
1,120.00	0.41	109.34	1,119.94	-8.87	2.93	14,440,953.51	1,695,237.78	39.76426286	-80.80491520		
1,147.00	0.03	94.15	1,146.94	-8.90	3.03	14,440,953.47	1,695,237.87	39.76426278	-80.80491485		
1,262.00	0.63	72.91	1,261.94	-8.72	3.66	14,440,953.66	1,695,238.51	39.76426328	-80.80491259		
1,357.00	2.03	0.11	1,356.92	-6.88	4.16	14,440,955.49	1,695,239.01	39.76426832	-80.80491079		
1,452.00	2.82	344.57	1,451.83	-2.95	3.55	14,440,959.43	1,695,238.39	39.76427913	-80.80491296		
1,546.00	2.56	345.39	1,545.73	1.31	2.40	14,440,963.69	1,695,237.25	39.76429083	-80.80491700		
1,641.00	0.64	304.64	1,640.69	3.67	1.43	14,440,966.04	1,695,236.28	39.76429731	-80.80492044		
1,736.00	0.64	263.60	1,735.68	3.91	0.47	14,440,966.29	1,695,235.31	39.76429798	-80.80492387		
1,831.00	0.91	270.64	1,830.67	3.86	-0.82	14,440,966.24	1,695,234.03	39.76429785	-80.80492843		
1,926.00	0.38	255.09	1,925.67	3.79	-1.88	14,440,966.16	1,695,232.97	39.76429765	-80.80493220		
2,021.00	0.25	161.60	2,020.67	3.51	-2.11	14,440,965.89	1,695,232.73	39.76429689	-80.80493305		
2,116.00	0.37	169.79	2,115.66	3.01	-1.99	14,440,965.39	1,695,232.85	39.76429552	-80.80493263		
2,211.00	0.70	169.66	2,210.66	2.14	-1.84	14,440,964.51	1,695,233.01	39.76429312	-80.80493207		
2,306.00	0.80	131.17	2,305.65	1.13	-1.23	14,440,963.51	1,695,233.62	39.76429035	-80.80492993		
2,401.00	0.97	129.69	2,400.64	0.18	-0.11	14,440,962.56	1,695,234.73	39.76428774	-80.80492596		
2,496.00	0.58	320.66	2,495.64	0.04	0.20	14,440,962.42	1,695,235.05	39.76428735	-80.80492484		
2,590.00	1.01	319.25	2,589.63	1.03	-0.64	14,440,963.41	1,695,234.20	39.76429009	-80.80492783		
2,684.00	0.46	291.07	2,683.62	1.80	-1.54	14,440,964.17	1,695,233.31	39.76429219	-80.80493100		
2,779.00	0.49	258.17	2,778.62	1.85	-2.29	14,440,964.23	1,695,232.56	39.76429234	-80.80493368		
2,831.00	0.40	245.32	2,830.62	1.73	-2.67	14,440,964.11	1,695,232.18	39.76429201	-80.80493505		
2,876.00	0.47	280.94	2,875.61	1.70	-3.00	14,440,964.08	1,695,231.85	39.76429193	-80.80493620		
2,971.00	0.51	310.47	2,970.61	2.05	-3.70	14,440,964.42	1,695,231.15	39.76429289	-80.80493870		
3,066.00	1.75	34.45	3,065.59	3.52	-3.20	14,440,965.90	1,695,231.65	39.76429692	-80.80493691		
3,161.00	2.27	33.07	3,160.54	6.29	-1.35	14,440,968.67	1,695,233.49	39.76430453	-80.80493032		
3,256.00	3.69	36.53	3,255.41	10.32	1.49	14,440,972.70	1,695,236.34	39.76431559	-80.80492016		
3,351.00	6.19	29.49	3,350.05	17.24	5.83	14,440,979.62	1,695,240.68	39.76433455	-80.80490466		
3,446.00	8.83	29.12	3,444.22	28.07	11.90	14,440,990.45	1,695,246.75	39.76436426	-80.80488297		
3,541.00	11.43	27.42	3,537.73	42.80	19.79	14,441,005.18	1,695,254.64	39.76440466	-80.80485480		
3,637.00	16.15	25.70	3,630.94	63.28	29.97	14,441,025.66	1,695,264.81	39.76446086	-80.80481843		
3,731.00	16.49	32.92	3,721.16	86.27	42.89	14,441,048.64	1,695,277.73	39.76452389	-80.80477227		
3,826.00	19.16	38.30	3,811.60	109.82	59.88	14,441,072.20	1,695,294.73	39.76458849	-80.80471161		
3,921.00	22.71	34.48	3,900.32	137.18	79.93	14,441,099.56	1,695,314.78	39.76466351	-80.80464005		
4,016.00	25.17	33.48	3,987.14	169.16	101.46	14,441,131.53	1,695,336.31	39.76475119	-80.80456318		



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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
4,110.00	25.99	33.25	4,071.93	203.05	123.78	14,441,165.43	1,695,358.63	39.76484414	-80.80448349
4,205.00	24.13	31.39	4,157.98	237.04	145.31	14,441,199.42	1,695,380.16	39.76493735	-80.80440662
4,298.00	24.68	31.55	4,242.67	269.81	165.37	14,441,232.19	1,695,400.22	39.76502724	-80.80433497
4,392.00	25.38	30.52	4,327.84	303.89	185.87	14,441,266.27	1,695,420.72	39.76512071	-80.80426176
4,486.00	25.72	31.82	4,412.65	338.58	206.86	14,441,300.96	1,695,441.70	39.76521584	-80.80418681
4,579.00	27.14	32.84	4,495.93	373.55	229.00	14,441,335.93	1,695,463.85	39.76531174	-80.80410774
4,674.00	25.47	31.05	4,581.09	409.26	251.29	14,441,371.63	1,695,486.14	39.76540967	-80.80402815
4,769.00	26.76	30.84	4,666.39	445.12	272.79	14,441,407.50	1,695,507.64	39.76550804	-80.80395135
4,864.00	25.59	29.97	4,751.65	481.26	294.00	14,441,443.64	1,695,528.85	39.76560716	-80.80387558
4,959.00	25.69	32.56	4,837.29	516.39	315.33	14,441,478.77	1,695,550.18	39.76570350	-80.80379940
5,054.00	23.82	30.96	4,923.56	550.20	336.29	14,441,512.57	1,695,571.13	39.76579623	-80.80372457
5,149.00	24.11	30.05	5,010.37	583.44	355.87	14,441,545.82	1,695,590.72	39.76588741	-80.80365461
5,244.00	24.78	32.27	5,096.86	617.07	376.22	14,441,579.45	1,695,611.07	39.76597965	-80.80358195
5,338.00	24.18	31.91	5,182.41	650.07	396.91	14,441,612.45	1,695,631.76	39.76607015	-80.80350805
5,432.00	25.35	34.68	5,267.76	682.97	418.54	14,441,645.34	1,695,653.39	39.76616035	-80.80343083
5,527.00	25.90	35.51	5,353.42	716.58	442.16	14,441,678.95	1,695,677.01	39.76625252	-80.80334650
5,622.00	24.38	33.37	5,439.42	749.85	465.00	14,441,712.22	1,695,699.85	39.76634374	-80.80326496
5,717.00	24.46	34.49	5,525.92	782.43	486.92	14,441,744.81	1,695,721.77	39.76643310	-80.80318669
5,811.00	25.54	31.33	5,611.12	815.78	508.48	14,441,778.16	1,695,743.33	39.76652456	-80.80310972
5,906.00	27.51	29.62	5,696.11	852.35	529.98	14,441,814.73	1,695,764.82	39.76662486	-80.80303294
6,000.00	25.14	31.88	5,780.36	888.19	551.25	14,441,850.56	1,695,786.10	39.76672314	-80.80295693
6,108.00	24.48	27.95	5,878.40	927.44	573.86	14,441,889.81	1,695,808.71	39.76683080	-80.80287618
6,132.00	24.48	27.16	5,900.24	936.25	578.46	14,441,898.63	1,695,813.31	39.76685498	-80.80285974
6,226.00	23.65	22.37	5,986.08	971.02	594.53	14,441,933.40	1,695,829.37	39.76695037	-80.80280229
6,241.00	24.00	17.31	5,999.80	976.72	596.58	14,441,939.09	1,695,831.43	39.76696599	-80.80279494
6,273.00	25.76	6.94	6,028.85	989.84	599.36	14,441,952.21	1,695,834.21	39.76700202	-80.80278495
6,321.00	27.52	1.67	6,071.75	1,011.28	600.94	14,441,973.66	1,695,835.79	39.76706090	-80.80277914
6,368.00	29.93	358.77	6,112.97	1,033.86	601.01	14,441,996.24	1,695,835.85	39.76712291	-80.80277874
6,416.00	32.13	357.01	6,154.10	1,058.59	600.09	14,442,020.96	1,695,834.93	39.76719081	-80.80278183
6,463.00	34.55	354.99	6,193.36	1,084.35	598.27	14,442,046.72	1,695,833.12	39.76726157	-80.80278809
6,511.00	37.49	352.88	6,232.18	1,112.41	595.27	14,442,074.78	1,695,830.12	39.76733865	-80.80279854
6,558.00	39.38	353.23	6,269.00	1,141.41	591.74	14,442,103.78	1,695,826.58	39.76741832	-80.80281088
6,605.00	42.99	352.09	6,304.36	1,172.10	587.77	14,442,134.47	1,695,822.62	39.76750262	-80.80282475
6,652.00	46.15	350.59	6,337.84	1,204.70	582.80	14,442,167.07	1,695,817.64	39.76759218	-80.80284221
6,700.00	48.88	347.43	6,370.26	1,239.43	576.03	14,442,201.80	1,695,810.88	39.76768761	-80.80286602
6,747.00	53.01	346.11	6,399.87	1,274.95	567.67	14,442,237.32	1,695,802.51	39.76778519	-80.80289550
6,795.00	58.07	345.50	6,427.02	1,313.30	557.96	14,442,275.68	1,695,792.81	39.76789059	-80.80292975
6,842.00	62.33	343.21	6,450.38	1,352.56	546.95	14,442,314.93	1,695,781.79	39.76799846	-80.80296863
6,890.00	65.89	337.59	6,471.35	1,393.20	532.44	14,442,355.57	1,695,767.29	39.76811016	-80.80301993
6,937.00	69.27	332.23	6,489.28	1,432.51	514.01	14,442,394.89	1,695,748.85	39.76821823	-80.80308523
6,985.00	72.70	327.74	6,504.92	1,471.78	491.30	14,442,434.15	1,695,726.15	39.76832621	-80.80316572
7,032.00	75.82	325.28	6,517.67	1,509.49	466.34	14,442,471.87	1,695,701.19	39.76842994	-80.80325427
7,080.00	79.82	322.56	6,527.80	1,547.40	438.71	14,442,509.77	1,695,673.56	39.76853420	-80.80335230
7,127.00	82.15	317.81	6,535.17	1,583.04	408.99	14,442,545.41	1,695,643.84	39.76863225	-80.80345777
7,173.00	85.36	317.81	6,540.17	1,616.91	378.29	14,442,579.29	1,695,613.13	39.76872547	-80.80356678
7,220.00	90.73	317.90	6,541.77	1,651.73	346.78	14,442,614.10	1,695,581.63	39.76882127	-80.80367864
7,268.00	91.47	318.16	6,540.85	1,687.41	314.69	14,442,649.78	1,695,549.53	39.76891945	-80.80379258
7,363.00	89.80	318.43	6,539.80	1,758.33	251.49	14,442,720.70	1,695,486.34	39.76911460	-80.80401693
7,458.00	89.98	317.46	6,539.98	1,828.86	187.85	14,442,791.24	1,695,422.70	39.76930869	-80.80424284
7,553.00	89.01	318.69	6,540.82	1,899.54	124.38	14,442,861.91	1,695,359.23	39.76950317	-80.80446817
7,648.00	89.67	320.98	6,541.91	1,972.13	63.12	14,442,934.50	1,695,297.97	39.76970289	-80.80468564
7,743.00	91.74	319.83	6,540.75	2,045.32	2.58	14,443,007.69	1,695,237.43	39.76990426	-80.80490052
7,836.00	91.52	320.01	6,538.10	2,116.45	-57.28	14,443,078.82	1,695,177.57	39.77009996	-80.80511298
7,931.00	91.47	319.57	6,535.62	2,188.98	-118.59	14,443,151.35	1,695,116.26	39.77029950	-80.80533062
8,025.00	91.38	319.83	6,533.28	2,260.65	-179.37	14,443,223.02	1,695,055.48	39.77049668	-80.80554637

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Blake 05 HM (slot C)
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 05 HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	WV Department of Environmental Protection
8,117.00	91.52	319.13	6,530.96	2,330.56	-239.12	14,443,292.93	1,694,995.73	39.77068904	-80.80575848	
8,212.00	89.58	318.87	6,530.04	2,402.25	-301.44	14,443,364.62	1,694,933.41	39.77088629	-80.80597972	
8,307.00	88.88	318.60	6,531.32	2,473.65	-364.09	14,443,436.02	1,694,870.76	39.77108276	-80.80620214	
8,403.00	90.77	318.87	6,531.61	2,545.81	-427.40	14,443,508.18	1,694,807.45	39.77128129	-80.80642690	
8,498.00	91.38	319.22	6,529.83	2,617.54	-489.66	14,443,579.91	1,694,745.19	39.77147866	-80.80664792	
8,593.00	91.34	317.81	6,527.58	2,688.69	-552.57	14,443,651.06	1,694,682.28	39.77167442	-80.80687127	
8,688.00	90.59	319.92	6,525.98	2,760.22	-615.05	14,443,722.59	1,694,619.80	39.77187125	-80.80709309	
8,783.00	91.78	320.54	6,524.01	2,833.22	-675.81	14,443,795.59	1,694,559.04	39.77207209	-80.80730877	
8,878.00	91.65	321.24	6,521.17	2,906.90	-735.71	14,443,869.27	1,694,499.14	39.77227479	-80.80752138	
8,973.00	92.44	321.42	6,517.78	2,981.03	-795.03	14,443,943.40	1,694,439.82	39.77247871	-80.80773194	
9,067.00	91.69	320.98	6,514.39	3,054.24	-853.89	14,444,016.61	1,694,380.96	39.77268011	-80.80794087	
9,162.00	91.12	320.71	6,512.06	3,127.88	-913.86	14,444,090.25	1,694,320.99	39.77288271	-80.80815372	
9,257.00	90.59	320.89	6,510.64	3,201.49	-973.90	14,444,163.86	1,694,260.95	39.77308522	-80.80836683	
9,353.00	90.86	319.92	6,509.43	3,275.46	-1,035.08	14,444,237.83	1,694,199.77	39.77328871	-80.80858401	
9,448.00	90.77	319.48	6,508.08	3,347.91	-1,096.52	14,444,310.28	1,694,138.33	39.77348803	-80.80880212	
9,543.00	91.38	319.13	6,506.30	3,419.92	-1,158.45	14,444,382.29	1,694,076.40	39.77368617	-80.80902199	
9,637.00	91.69	318.87	6,503.78	3,490.84	-1,220.09	14,444,453.21	1,694,014.76	39.77388129	-80.80924086	
9,732.00	91.78	318.95	6,500.90	3,562.41	-1,282.50	14,444,524.77	1,693,952.35	39.77407819	-80.80946243	
9,827.00	92.09	318.34	6,497.69	3,633.67	-1,345.24	14,444,596.04	1,693,889.61	39.77427428	-80.80968516	
9,922.00	90.77	318.43	6,495.32	3,704.67	-1,408.31	14,444,667.04	1,693,826.54	39.77446964	-80.80990910	
10,017.00	90.24	318.95	6,494.49	3,776.03	-1,471.02	14,444,738.40	1,693,763.83	39.77466597	-80.81013175	
10,112.00	89.71	318.16	6,494.53	3,847.24	-1,533.90	14,444,809.61	1,693,700.95	39.77486190	-80.81035500	
10,206.00	90.20	317.55	6,494.60	3,916.94	-1,596.97	14,444,879.31	1,693,637.88	39.77505367	-80.81057897	
10,302.00	90.73	319.04	6,493.82	3,988.60	-1,660.84	14,444,950.97	1,693,574.02	39.77525085	-80.81080573	
10,397.00	90.46	320.36	6,492.84	4,061.05	-1,722.28	14,445,023.42	1,693,512.58	39.77545017	-80.81102386	
10,493.00	91.12	318.95	6,491.51	4,134.21	-1,784.42	14,445,096.58	1,693,450.43	39.77565145	-80.81124448	
10,588.00	90.33	320.45	6,490.31	4,206.65	-1,845.85	14,445,169.02	1,693,389.00	39.77585076	-80.81146260	
10,683.00	90.42	320.71	6,489.69	4,280.04	-1,906.18	14,445,242.41	1,693,328.67	39.77605265	-80.81167675	
10,779.00	89.01	321.15	6,490.17	4,354.57	-1,966.68	14,445,316.94	1,693,268.17	39.77625767	-80.81189153	
10,873.00	88.97	321.15	6,491.82	4,427.77	-2,025.64	14,445,390.13	1,693,209.21	39.77645903	-80.81210082	
10,968.00	88.62	320.89	6,493.82	4,501.60	-2,085.38	14,445,463.97	1,693,149.47	39.77666214	-80.81231292	
11,062.00	90.51	319.75	6,494.53	4,573.94	-2,145.40	14,445,536.30	1,693,089.45	39.77686114	-80.81252598	
11,157.00	90.59	319.57	6,493.62	4,646.34	-2,206.89	14,445,608.71	1,693,027.96	39.77706035	-80.81274430	
11,252.00	90.73	319.66	6,492.53	4,718.70	-2,268.44	14,445,681.07	1,692,966.41	39.77725941	-80.81296283	
11,347.00	90.86	318.51	6,491.21	4,790.48	-2,330.65	14,445,752.85	1,692,904.20	39.77745690	-80.81318372	
11,442.00	90.55	317.99	6,490.04	4,861.35	-2,393.90	14,445,823.72	1,692,840.95	39.77765189	-80.81340833	
11,536.00	90.33	318.08	6,489.32	4,931.24	-2,456.76	14,445,893.61	1,692,778.09	39.77784419	-80.81363152	
11,632.00	90.02	317.02	6,489.03	5,002.08	-2,521.55	14,445,964.45	1,692,713.30	39.77803909	-80.81386162	
11,727.00	91.21	318.34	6,488.01	5,072.31	-2,585.51	14,446,034.68	1,692,649.35	39.77823235	-80.81408873	
11,821.00	90.90	318.34	6,486.28	5,142.53	-2,647.98	14,446,104.90	1,692,586.88	39.77842553	-80.81431056	
11,916.00	90.90	317.81	6,484.78	5,213.20	-2,711.44	14,446,175.57	1,692,523.41	39.77861998	-80.81453594	
12,010.00	91.25	318.16	6,483.02	5,283.03	-2,774.35	14,446,245.40	1,692,460.50	39.77881210	-80.81475932	
12,105.00	91.47	321.59	6,480.76	5,355.64	-2,835.55	14,446,318.00	1,692,399.31	39.77901186	-80.81497661	
12,200.00	91.43	321.15	6,478.36	5,429.83	-2,894.84	14,446,392.19	1,692,340.02	39.77921594	-80.81518709	
12,295.00	91.74	321.42	6,475.73	5,503.93	-2,954.23	14,446,466.29	1,692,280.62	39.77941976	-80.81539795	
12,390.00	92.00	321.85	6,472.63	5,578.37	-3,013.16	14,446,540.74	1,692,221.69	39.77962455	-80.81560716	
12,484.00	91.34	319.92	6,469.89	5,651.27	-3,072.44	14,446,613.64	1,692,162.42	39.77982508	-80.81581760	
12,579.00	90.99	319.39	6,467.96	5,723.66	-3,133.93	14,446,686.03	1,692,100.93	39.78002423	-80.81603594	
12,674.00	91.08	319.39	6,466.25	5,795.77	-3,195.75	14,446,758.13	1,692,039.10	39.78022261	-80.81625547	
12,769.00	90.02	318.60	6,465.33	5,867.46	-3,258.08	14,446,829.82	1,691,976.78	39.78041983	-80.81647679	
12,864.00	89.58	317.02	6,465.67	5,937.84	-3,321.88	14,446,900.20	1,691,912.98	39.78061349	-80.81670336	
12,957.00	89.71	320.10	6,466.24	6,007.55	-3,383.42	14,446,969.91	1,691,851.43	39.78080527	-80.81692191	
13,052.00	89.89	320.18	6,466.57	6,080.47	-3,444.31	14,447,042.83	1,691,790.55	39.78100588	-80.81713810	
13,146.00	89.63	319.22	6,466.97	6,152.16	-3,505.10	14,447,114.52	1,691,729.75	39.78120310	-80.81735398	
13,241.00	91.43	319.22	6,466.09	6,224.09	-3,567.15	14,447,186.45	1,691,667.71	39.78140099	-80.81757430	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Blake 05 HM (slot C)
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 05 HM (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

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Survey								JUL 10 2020		
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	
13,336.00	91.16	319.04	6,463.94	6,295.91	-3,629.29	14,447,258.27	1,691,605.56	39.78159857	-80.81779499	
13,430.00	91.16	319.13	6,462.04	6,366.93	-3,690.85	14,447,329.29	1,691,544.01	39.78179395	-80.81801356	
13,525.00	90.95	318.87	6,460.29	6,438.61	-3,753.16	14,447,400.98	1,691,481.69	39.78199117	-80.81823485	
13,620.00	90.59	318.78	6,459.01	6,510.11	-3,815.70	14,447,472.48	1,691,419.16	39.78218788	-80.81845694	
13,715.00	90.07	317.90	6,458.47	6,581.09	-3,878.85	14,447,543.45	1,691,356.01	39.78238314	-80.81868119	
13,809.00	90.90	318.78	6,457.67	6,651.31	-3,941.32	14,447,613.67	1,691,293.53	39.78257634	-80.81890308	
13,904.00	91.30	319.04	6,455.85	6,722.90	-4,003.75	14,447,685.26	1,691,231.10	39.78277328	-80.81912477	
13,999.00	91.08	319.66	6,453.87	6,794.96	-4,065.62	14,447,757.32	1,691,169.23	39.78297152	-80.81934449	
14,094.00	90.81	319.75	6,452.31	6,867.41	-4,127.05	14,447,829.77	1,691,107.80	39.78317083	-80.81956263	
14,188.00	90.37	319.04	6,451.34	6,938.77	-4,188.23	14,447,901.13	1,691,046.63	39.78336715	-80.81977988	
14,283.00	90.33	320.18	6,450.76	7,011.12	-4,249.79	14,447,973.49	1,690,985.07	39.78356619	-80.81999847	
14,377.00	89.85	320.71	6,450.61	7,083.60	-4,309.65	14,448,045.96	1,690,925.21	39.78376556	-80.82021103	
14,473.00	90.07	320.36	6,450.68	7,157.71	-4,370.66	14,448,120.07	1,690,864.19	39.78396943	-80.82042770	
14,568.00	91.56	320.45	6,449.33	7,230.91	-4,431.21	14,448,193.27	1,690,803.65	39.78417077	-80.82064267	
14,663.00	91.34	320.10	6,446.92	7,303.95	-4,491.90	14,448,266.31	1,690,742.96	39.78437170	-80.82085820	
14,758.00	91.08	319.48	6,444.92	7,376.48	-4,553.22	14,448,338.84	1,690,681.64	39.78457124	-80.82107595	
14,853.00	90.90	319.75	6,443.27	7,448.83	-4,614.76	14,448,411.19	1,690,620.10	39.78477027	-80.82129451	
14,947.00	90.51	319.39	6,442.12	7,520.38	-4,675.72	14,448,482.74	1,690,559.14	39.78496709	-80.82151098	
15,042.00	90.20	318.25	6,441.53	7,591.88	-4,738.27	14,448,554.24	1,690,496.59	39.78516379	-80.82173312	
15,135.00	90.20	320.10	6,441.20	7,662.25	-4,799.06	14,448,624.61	1,690,435.80	39.78535738	-80.82194903	
15,229.00	90.46	320.01	6,440.66	7,734.31	-4,859.41	14,448,696.68	1,690,375.44	39.78555562	-80.82216335	
15,325.00	90.20	319.66	6,440.11	7,807.67	-4,921.33	14,448,770.04	1,690,313.53	39.78575743	-80.82238324	
15,419.00	89.71	318.69	6,440.18	7,878.80	-4,982.78	14,448,841.17	1,690,252.08	39.78595310	-80.82260148	
15,515.00	90.86	319.83	6,439.71	7,951.54	-5,045.43	14,448,913.90	1,690,189.43	39.78615319	-80.82282398	
15,610.00	90.86	319.83	6,438.28	8,024.12	-5,106.71	14,448,986.48	1,690,128.15	39.78635286	-80.82304159	
15,703.00	89.93	319.39	6,437.64	8,094.95	-5,166.97	14,449,057.31	1,690,067.89	39.78654771	-80.82325560	
15,798.00	89.54	318.60	6,438.08	8,166.64	-5,229.30	14,449,129.00	1,690,005.56	39.78674493	-80.82347697	
15,893.00	89.89	320.89	6,438.55	8,239.14	-5,290.68	14,449,201.50	1,689,944.18	39.78694435	-80.82369497	
15,988.00	91.34	320.71	6,437.53	8,312.75	-5,350.72	14,449,275.11	1,689,884.14	39.78714684	-80.82390817	
16,083.00	91.03	320.62	6,435.57	8,386.22	-5,410.92	14,449,348.58	1,689,823.94	39.78734891	-80.82412196	
16,177.00	90.73	319.39	6,434.12	8,458.22	-5,471.33	14,449,420.58	1,689,763.53	39.78754698	-80.82433650	
16,272.00	91.69	319.57	6,432.12	8,530.42	-5,533.04	14,449,492.78	1,689,701.82	39.78774560	-80.82455566	
16,367.00	91.60	319.04	6,429.39	8,602.42	-5,594.95	14,449,564.78	1,689,639.91	39.78794366	-80.82477557	
16,462.00	90.95	318.95	6,427.28	8,674.09	-5,657.27	14,449,636.45	1,689,577.59	39.78814083	-80.82499690	
16,557.00	90.73	317.90	6,425.88	8,745.15	-5,720.30	14,449,707.51	1,689,514.56	39.78833631	-80.82522079	
16,651.00	91.65	318.95	6,423.93	8,815.45	-5,782.67	14,449,777.81	1,689,452.19	39.78852972	-80.82544231	
16,746.00	91.60	318.34	6,421.24	8,886.74	-5,845.41	14,449,849.09	1,689,389.45	39.78872581	-80.82566516	
16,841.00	90.90	319.92	6,419.16	8,958.55	-5,907.56	14,449,920.91	1,689,327.30	39.78892338	-80.82588589	
16,923.00	91.16	320.45	6,417.69	9,021.53	-5,960.05	14,449,983.89	1,689,274.81	39.78909661	-80.82607234	
Survey @ 16923.00 MD 6417.69 TVD										
16,978.00	91.16	320.45	6,416.58	9,063.93	-5,995.07	14,450,026.29	1,689,239.79	39.78921324	-80.82619669	
Survey projected to 16978.00 MD 6416.58 TVD										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
185.00	184.98	-2.03	0.48	MWD surveys	
16,923.00	6,417.69	9,021.53	-5,960.05	Survey @ 16923.00 MD 6417.69 TVD	
16,978.00	6,416.58	9,063.93	-5,995.07	Survey projected to 16978.00 MD 6416.58 TVD	