



Well: Hillrock 07 HM (J)
Site: Hillrock/Simms
Project: Marshall County, West Virginia
Design: rev3

SECTION DETAILS

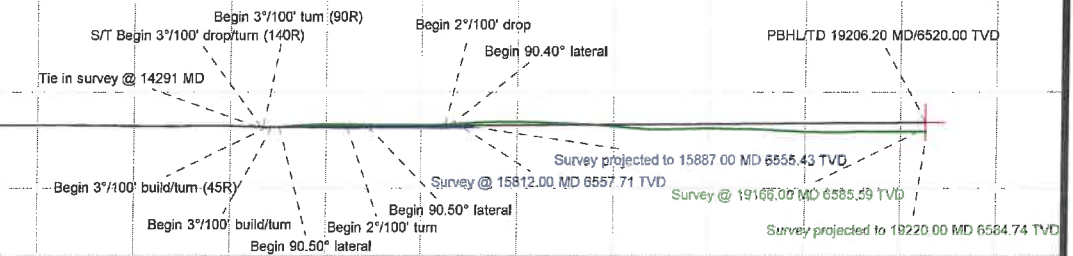
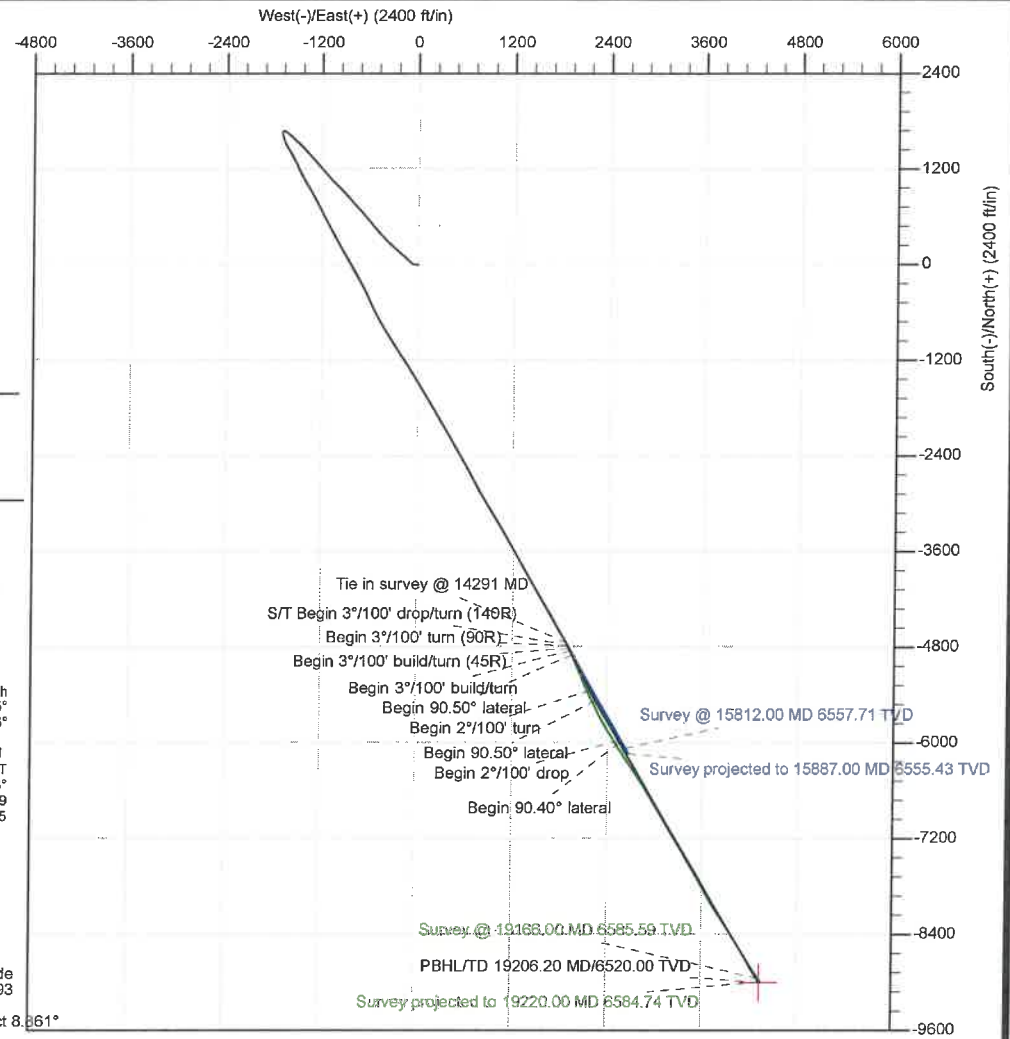
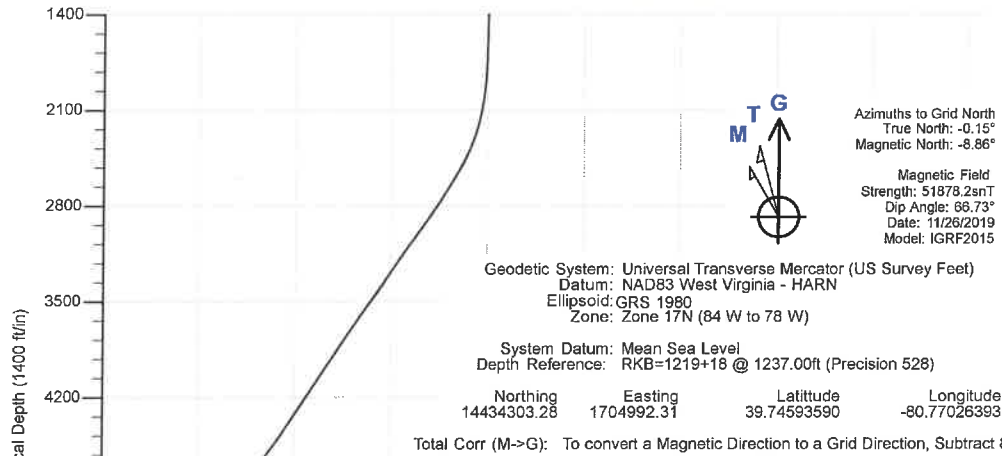
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	14291.00	87.52	150.490	6551.85	-4746.80	1880.55	0.00	0.000	5092.46	Tie in survey @ 14291 MD
2	14325.00	88.65	150.519	6552.99	-4776.37	1897.28	3.32	1.470	5126.37	S/T Begin 3°/100' drop/turn (140R)
3	14340.00	88.31	150.808	6553.38	-4789.45	1904.63	3.00	140.000	5141.33	Begin 3°/100' turn (90R)
4	14370.00	88.31	151.709	6554.27	-4815.74	1919.05	3.00	90.000	5171.28	Begin 3°/100' build/turn (45R)
5	14400.00	88.94	152.345	6554.99	-4842.23	1933.11	3.00	45.000	5201.25	Begin 3°/100' build/turn
6	14456.33	90.50	153.000	6555.27	-4892.27	1958.97	3.00	22.796	5257.56	Begin 90.50° lateral
7	14956.33	90.50	153.000	6550.90	-5337.76	2185.96	0.00	0.000	5757.42	Begin 2°/100' turn
8	15106.33	90.50	150.000	6549.59	-5469.56	2257.52	2.00	-90.000	5907.22	Begin 90.50° lateral
9	15682.30	90.50	150.000	6544.57	-5968.34	2545.49	0.00	0.000	6481.58	Begin 2°/100' drop
10	15714.00	90.40	149.374	6544.32	-5995.71	2561.49	2.00	-99.165	6513.18	Begin 90.40° lateral
11	19206.20	90.40	149.374	6520.00	-9000.71	4340.48	0.00	0.000	9992.63	PBHL/TD 19206.20 MD/6520.00 TVD

ANNOTATIONS SURVEYS ORIGINAL HOLE

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
182.00	0.05	155.610	182.00	-0.07	0.03	0.08	MWD surveys
15812.00	91.74	149.080	6557.71	-6065.40	2638.22	6609.26	Survey @ 15812.00 MD 6557.71 TVD
15887.00	91.74	149.080	6555.43	-6129.71	2676.74	6683.92	Survey projected to 15887.00 MD 6555.43 TVD

ANNOTATIONS SURVEYS SIDETRACK 01

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
14291.00	87.52	150.490	6551.85	-4746.80	1880.55	5091.61	Tie into original hole @ 14291 MD
19166.00	90.90	145.480	6585.59	-8948.61	4331.58	9941.84	Survey @ 19166.00 MD 6585.59 TVD
19220.00	90.90	145.480	6584.74	-8993.09	4362.18	9995.22	Survey projected to 19220.00 MD 6584.74 TVD



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_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	Hillrock/Simms				
Site Position:		Northing:	14,434,279.29 usft	Latitude:	39.74587001
From:	Lat/Long	Easting:	1,704,992.60 usft	Longitude:	-80.77026312
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.147 °

Well	Hillrock 07 HM (J)					
Well Position	+N/-S	0.00 ft	Northing:	14,434,303.28 usft	Latitude:	39.74593590
	+E/-W	0.00 ft	Easting:	1,704,992.31 usft	Longitude:	-80.77026393
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	1,219.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/7/2019	-8.712	66.733	51,884.36767949

Design	Surveys Original Hole				
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	154.250	

Survey Program	Date 5/8/2020			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
182.00	931.00	MWD surf (Original Hole)	MWD	MWD - Standard
1,031.00	2,785.00	MWD int (Original Hole)	MWD	MWD - Standard
2,907.00	15,812.00	MWD (Original Hole)	MWD	MWD - Standard
15,890.00	15,887.00	Projection (Original Hole)	MWD	MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
182.00	0.05	155.610	182.00	-0.07	0.03	0.08	0.03	0.03	0.00	
MWD surveys										
202.00	0.23	222.010	202.00	-0.11	0.01	0.10	1.07	0.90	332.00	
249.00	0.51	160.840	249.00	-0.38	0.02	0.35	0.95	0.60	-130.15	
296.00	0.44	174.460	296.00	-0.75	0.10	0.72	0.28	-0.15	28.98	
340.00	0.62	165.000	340.00	-1.15	0.18	1.12	0.45	0.41	-21.50	
387.00	0.32	180.380	386.99	-1.53	0.24	1.48	0.69	-0.64	32.72	

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Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
432.00	0.42	164.130	431.99	-1.81	0.29	1.76	0.32	0.22	-36.11
479.00	0.27	187.020	478.99	-2.09	0.32	2.02	0.43	-0.32	48.70
522.00	0.45	115.180	521.99	-2.26	0.46	2.24	1.04	0.42	-167.07
569.00	0.37	179.420	568.99	-2.49	0.63	2.52	0.94	-0.17	136.68
614.00	0.35	158.870	613.99	-2.77	0.68	2.79	0.29	-0.04	-45.67
661.00	0.09	175.150	660.99	-2.94	0.74	2.97	0.56	-0.55	34.64
704.00	0.21	204.220	703.99	-3.04	0.71	3.05	0.32	0.28	67.60
751.00	0.10	148.530	750.99	-3.16	0.69	3.14	0.37	-0.23	-118.49
794.00	0.14	125.150	793.99	-3.22	0.76	3.23	0.15	0.09	-54.37
889.00	0.18	177.030	888.99	-3.43	0.86	3.47	0.15	0.04	54.61
931.00	0.07	3.010	930.99	-3.47	0.86	3.50	0.59	-0.26	-414.33
1,031.00	0.15	359.600	1,030.99	-3.28	0.87	3.33	0.08	0.08	-3.41
1,077.00	0.02	98.800	1,076.99	-3.22	0.87	3.28	0.34	-0.28	215.65
1,124.00	0.07	138.910	1,123.99	-3.25	0.90	3.31	0.12	0.11	85.34
1,172.00	0.20	131.900	1,171.99	-3.32	0.98	3.42	0.27	0.27	-14.60
1,267.00	0.20	111.500	1,266.99	-3.50	1.26	3.70	0.07	0.00	-21.47
1,363.00	0.89	265.810	1,362.98	-3.61	0.67	3.54	1.12	0.72	160.74
1,458.00	1.76	272.160	1,457.96	-3.61	-1.52	2.59	0.93	0.92	6.68
1,553.00	3.03	273.860	1,552.87	-3.39	-5.49	0.67	1.34	1.34	1.79
1,648.00	4.00	271.260	1,647.69	-3.14	-11.30	-2.08	1.03	1.02	-2.74
1,743.00	5.36	268.820	1,742.37	-3.16	-19.05	-5.43	1.45	1.43	-2.57
1,836.00	6.92	271.490	1,834.84	-3.11	-29.00	-9.80	1.70	1.68	2.87
1,931.00	8.42	278.740	1,928.99	-1.90	-41.59	-16.36	1.88	1.58	7.63
2,026.00	10.95	292.880	2,022.64	2.67	-56.78	-27.07	3.64	2.66	14.88
2,121.00	13.66	302.520	2,115.46	12.21	-74.56	-43.39	3.57	2.85	10.15
2,217.00	16.72	311.810	2,208.11	27.51	-94.42	-65.80	4.06	3.19	9.68
2,312.00	19.25	315.840	2,298.46	47.86	-115.52	-93.30	2.97	2.66	4.24
2,407.00	23.73	312.770	2,386.84	72.09	-140.48	-125.96	4.86	4.72	-3.23
2,501.00	28.72	310.600	2,471.14	99.65	-171.53	-164.27	5.40	5.31	-2.31
2,595.00	32.16	310.040	2,552.17	130.45	-207.84	-207.79	3.67	3.66	-0.60
2,690.00	33.18	314.290	2,632.15	164.87	-245.81	-255.29	2.64	1.07	4.47
2,755.00	32.59	314.770	2,686.73	189.62	-270.97	-288.52	0.99	-0.91	0.74
2,785.00	33.09	315.630	2,711.94	201.17	-282.43	-303.89	2.28	1.67	2.87
2,907.00	35.75	313.270	2,812.57	249.41	-331.68	-368.74	2.44	2.18	-1.93
2,970.00	35.77	312.700	2,863.70	274.51	-358.62	-403.05	0.53	0.03	-0.90
3,064.00	36.86	314.810	2,939.44	313.02	-398.81	-455.20	1.76	1.16	2.24
3,158.00	37.40	318.810	3,014.39	354.38	-437.62	-509.31	2.63	0.57	4.26
3,254.00	36.65	316.710	3,091.04	397.17	-476.47	-564.73	1.53	-0.78	-2.19
3,349.00	35.89	318.420	3,167.63	438.64	-514.39	-618.56	1.33	-0.80	1.80
3,444.00	35.13	321.960	3,244.97	481.00	-549.72	-672.06	2.31	-0.80	3.73
3,537.00	33.72	319.760	3,321.69	521.79	-582.89	-723.20	2.02	-1.52	-2.37
3,632.00	34.82	319.030	3,400.19	562.40	-617.70	-774.91	1.24	1.16	-0.77
3,726.00	36.43	318.880	3,476.60	603.69	-653.66	-827.72	1.72	1.71	-0.16

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Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
3,821.00	37.08	318.930	3,552.71	646.53	-691.02	-882.54	0.68	0.68	0.05
3,916.00	36.20	317.010	3,628.94	688.64	-728.97	-936.96	1.52	-0.93	-2.02
4,011.00	35.47	317.320	3,705.96	729.43	-766.79	-990.12	0.79	-0.77	0.33
4,106.00	34.54	319.590	3,783.78	770.20	-802.93	-1,042.55	1.68	-0.98	2.39
4,201.00	34.39	320.120	3,862.10	811.29	-837.59	-1,094.62	0.35	-0.16	0.56
4,295.00	34.59	317.200	3,939.58	851.25	-872.74	-1,145.88	1.77	0.21	-3.11
4,390.00	34.97	315.810	4,017.61	890.55	-910.04	-1,197.48	0.93	0.40	-1.46
4,485.00	34.89	315.790	4,095.50	929.55	-947.97	-1,249.08	0.09	-0.08	-0.02
4,580.00	34.31	315.490	4,173.70	968.12	-985.68	-1,300.21	0.64	-0.61	-0.32
4,676.00	34.21	314.730	4,253.04	1,006.41	-1,023.82	-1,351.26	0.46	-0.10	-0.79
4,770.00	35.19	315.620	4,330.32	1,044.36	-1,061.54	-1,401.84	1.17	1.04	0.95
4,864.00	35.08	317.950	4,407.20	1,083.78	-1,098.58	-1,453.43	1.43	-0.12	2.48
4,959.00	35.74	318.900	4,484.63	1,124.96	-1,135.10	-1,506.39	0.90	0.69	1.00
5,053.00	36.74	319.460	4,560.44	1,167.02	-1,171.42	-1,560.05	1.12	1.06	0.60
5,148.00	35.37	318.650	4,637.24	1,209.25	-1,208.06	-1,614.01	1.53	-1.44	-0.85
5,242.00	34.18	317.480	4,714.45	1,249.14	-1,243.88	-1,665.49	1.45	-1.27	-1.24
5,337.00	35.33	317.320	4,792.50	1,289.00	-1,280.54	-1,717.32	1.21	1.21	-0.17
5,431.00	33.25	317.090	4,870.16	1,327.86	-1,316.51	-1,767.95	2.22	-2.21	-0.24
5,526.00	33.42	317.890	4,949.53	1,366.34	-1,351.79	-1,817.94	0.50	0.18	0.84
5,620.00	34.51	318.180	5,027.49	1,405.39	-1,386.90	-1,868.37	1.17	1.16	0.31
5,715.00	35.89	316.040	5,105.12	1,445.50	-1,424.18	-1,920.68	1.95	1.45	-2.25
5,810.00	35.76	314.910	5,182.15	1,485.14	-1,463.17	-1,973.33	0.71	-0.14	-1.19
5,905.00	35.27	314.780	5,259.48	1,524.06	-1,502.29	-2,025.38	0.52	-0.52	-0.14
5,967.00	34.17	313.840	5,310.44	1,548.73	-1,527.56	-2,058.58	1.97	-1.77	-1.52
6,039.00	33.71	313.080	5,370.17	1,576.38	-1,556.74	-2,096.16	0.87	-0.64	-1.06
6,133.00	33.41	313.000	5,448.50	1,611.84	-1,594.72	-2,144.60	0.32	-0.32	-0.09
6,228.00	25.32	310.620	5,531.23	1,642.96	-1,629.32	-2,187.66	8.60	-8.52	-2.51
6,323.00	18.24	304.120	5,619.40	1,664.55	-1,657.09	-2,219.18	7.86	-7.45	-6.84
6,419.00	10.33	290.670	5,712.39	1,676.04	-1,677.62	-2,238.44	8.88	-8.24	-14.01
6,513.00	8.26	245.760	5,805.26	1,676.24	-1,691.68	-2,244.73	7.80	-2.20	-47.78
6,609.00	9.89	209.200	5,900.13	1,666.21	-1,702.00	-2,240.18	6.12	1.70	-38.08
6,703.00	15.21	182.040	5,991.93	1,646.81	-1,706.38	-2,224.61	8.31	5.66	-28.89
6,798.00	22.42	168.240	6,081.84	1,616.56	-1,703.13	-2,195.95	8.87	7.59	-14.53
6,893.00	28.57	158.400	6,167.59	1,577.65	-1,691.06	-2,155.66	7.84	6.47	-10.36
6,988.00	35.87	153.740	6,247.91	1,531.50	-1,670.35	-2,105.10	8.11	7.68	-4.91
7,083.00	44.62	151.100	6,320.36	1,477.22	-1,641.85	-2,043.83	9.38	9.21	-2.78
7,178.00	53.93	149.520	6,382.28	1,414.79	-1,606.17	-1,972.09	9.88	9.80	-1.66
7,273.00	62.07	151.720	6,432.58	1,344.61	-1,566.75	-1,891.76	8.79	8.57	2.32
7,368.00	69.80	154.260	6,471.30	1,267.37	-1,527.44	-1,805.11	8.49	8.14	2.67
7,464.00	76.44	154.970	6,499.16	1,184.42	-1,488.09	-1,713.30	6.95	6.92	0.74
7,557.00	81.80	153.300	6,516.70	1,102.28	-1,448.25	-1,622.01	6.03	5.76	-1.80
7,651.00	85.67	149.260	6,526.96	1,020.38	-1,403.36	-1,528.73	5.93	4.12	-4.30
7,747.00	90.20	147.410	6,530.42	938.75	-1,353.01	-1,433.34	5.10	4.72	-1.93
7,840.00	90.59	150.930	6,529.78	858.90	-1,305.36	-1,340.72	3.81	0.42	3.78

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Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey										
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7,937.00	88.92	152.950	6,530.20	773.31	-1,259.73	-1,243.81	2.70	-1.72	2.08	
8,032.00	88.31	152.510	6,532.49	688.90	-1,216.22	-1,148.87	0.79	-0.64	-0.46	
8,127.00	87.74	152.420	6,535.77	604.71	-1,172.33	-1,053.97	0.61	-0.60	-0.09	
8,222.00	90.37	151.450	6,537.33	520.90	-1,127.64	-959.07	2.95	2.77	-1.02	
8,317.00	90.11	151.190	6,536.94	437.56	-1,082.05	-864.20	0.39	-0.27	-0.27	
8,412.00	89.98	150.220	6,536.86	354.71	-1,035.57	-769.38	1.03	-0.14	-1.02	
8,507.00	89.93	149.780	6,536.94	272.43	-988.07	-674.64	0.47	-0.05	-0.46	
8,602.00	90.99	151.190	6,536.17	189.77	-941.27	-579.85	1.86	1.12	1.48	
8,697.00	90.81	150.930	6,534.68	106.64	-895.30	-485.01	0.33	-0.19	-0.27	
8,792.00	90.51	150.400	6,533.59	23.83	-848.76	-390.20	0.64	-0.32	-0.56	
8,887.00	90.07	149.430	6,533.11	-58.37	-801.14	-295.48	1.12	-0.46	-1.02	
8,982.00	91.91	151.100	6,531.46	-140.84	-754.04	-200.73	2.62	1.94	1.76	
9,076.00	91.65	151.190	6,528.54	-223.13	-708.69	-106.91	0.29	-0.28	0.10	
9,172.00	91.91	153.030	6,525.56	-307.94	-663.81	-11.03	1.93	0.27	1.92	
9,267.00	89.49	154.530	6,524.40	-393.15	-621.85	83.95	3.00	-2.55	1.58	
9,362.00	89.80	155.670	6,524.99	-479.31	-581.85	178.94	1.24	0.33	1.20	
9,457.00	87.60	154.180	6,527.15	-565.33	-541.60	273.90	2.80	-2.32	-1.57	
9,551.00	87.16	152.330	6,531.44	-649.18	-499.35	367.78	2.02	-0.47	-1.97	
9,646.00	89.27	149.340	6,534.40	-732.08	-453.08	462.55	3.85	2.22	-3.15	
9,741.00	89.27	148.460	6,535.61	-813.42	-404.01	557.13	0.93	0.00	-0.93	
9,835.00	88.35	147.850	6,537.57	-893.25	-354.43	650.57	1.17	-0.98	-0.65	
9,929.00	90.86	147.850	6,538.21	-972.83	-304.41	743.98	2.67	2.67	0.00	
10,024.00	90.68	148.200	6,536.94	-1,053.41	-254.11	838.41	0.41	-0.19	0.37	
10,118.00	90.51	147.760	6,535.96	-1,133.11	-204.27	931.84	0.50	-0.18	-0.47	
10,213.00	90.46	147.150	6,535.16	-1,213.18	-153.17	1,026.17	0.64	-0.05	-0.64	
10,309.00	90.33	146.970	6,534.49	-1,293.75	-100.97	1,121.41	0.23	-0.14	-0.19	
10,404.00	90.73	149.520	6,533.62	-1,374.52	-50.98	1,215.88	2.72	0.42	2.68	
10,498.00	90.15	149.610	6,532.89	-1,455.56	-3.36	1,309.56	0.62	-0.62	0.10	
10,593.00	89.54	149.520	6,533.15	-1,537.47	44.76	1,404.24	0.65	-0.64	-0.09	
10,688.00	89.23	149.340	6,534.17	-1,619.26	93.07	1,498.90	0.38	-0.33	-0.19	
10,783.00	88.53	148.640	6,536.03	-1,700.67	142.01	1,593.48	1.04	-0.74	-0.74	
10,878.00	90.24	150.130	6,537.05	-1,782.42	190.38	1,688.13	2.39	1.80	1.57	
10,973.00	89.71	149.780	6,537.09	-1,864.65	237.95	1,782.86	0.67	-0.56	-0.37	
11,067.00	89.32	149.340	6,537.88	-1,945.69	285.57	1,876.54	0.63	-0.41	-0.47	
11,163.00	89.10	148.730	6,539.21	-2,028.00	334.96	1,972.14	0.68	-0.23	-0.64	
11,257.00	90.42	151.100	6,539.60	-2,109.33	382.07	2,065.86	2.89	1.40	2.52	
11,353.00	90.24	150.130	6,539.05	-2,192.97	429.18	2,161.66	1.03	-0.19	-1.01	
11,448.00	90.02	149.690	6,538.83	-2,275.17	476.80	2,256.39	0.52	-0.23	-0.46	
11,511.00	89.89	149.610	6,538.88	-2,329.54	508.64	2,319.19	0.24	-0.21	-0.13	
11,575.00	89.89	149.170	6,539.01	-2,384.62	541.22	2,382.96	0.69	0.00	-0.69	
11,637.00	89.89	148.820	6,539.12	-2,437.76	573.16	2,444.69	0.56	0.00	-0.56	
11,731.00	90.20	151.890	6,539.05	-2,519.45	619.65	2,538.47	3.28	0.33	3.27	
11,826.00	90.07	152.510	6,538.83	-2,603.48	663.96	2,633.40	0.67	-0.14	0.65	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
11,921.00	89.45	151.800	6,539.22	-2,687.48	708.33	2,728.34	0.99	-0.65	-0.75	
12,015.00	89.27	152.070	6,540.27	-2,770.42	752.55	2,822.26	0.35	-0.19	0.29	
12,110.00	91.03	150.310	6,540.03	-2,853.66	798.33	2,917.11	2.62	1.85	-1.85	
12,205.00	90.59	150.570	6,538.68	-2,936.28	845.19	3,011.89	0.54	-0.46	0.27	
12,300.00	89.89	149.960	6,538.29	-3,018.77	892.31	3,106.66	0.98	-0.74	-0.64	
12,395.00	89.19	150.220	6,539.05	-3,101.12	939.68	3,201.41	0.79	-0.74	0.27	
12,490.00	88.70	150.130	6,540.80	-3,183.52	986.92	3,296.15	0.52	-0.52	-0.09	
12,585.00	91.12	149.870	6,540.95	-3,265.79	1,034.41	3,390.88	2.56	2.55	-0.27	
12,680.00	90.90	149.870	6,539.27	-3,347.94	1,082.09	3,485.59	0.23	-0.23	0.00	
12,773.00	90.24	149.780	6,538.35	-3,428.33	1,128.84	3,578.31	0.72	-0.71	-0.10	
12,869.00	89.45	149.170	6,538.61	-3,511.02	1,177.59	3,673.97	1.04	-0.82	-0.64	
12,963.00	88.92	149.080	6,539.94	-3,591.69	1,225.83	3,767.59	0.57	-0.56	-0.10	
13,058.00	89.85	150.660	6,540.96	-3,673.85	1,273.51	3,862.30	1.93	0.98	1.66	
13,153.00	89.19	149.780	6,541.76	-3,756.30	1,320.69	3,957.06	1.16	-0.69	-0.93	
13,247.00	88.31	149.610	6,543.81	-3,837.44	1,368.11	4,050.74	0.95	-0.94	-0.18	
13,342.00	89.89	151.280	6,545.30	-3,920.06	1,414.96	4,145.51	2.42	1.66	1.76	
13,437.00	89.76	150.930	6,545.59	-4,003.23	1,460.87	4,240.37	0.39	-0.14	-0.37	
13,532.00	89.49	150.130	6,546.21	-4,085.94	1,507.60	4,335.17	0.89	-0.28	-0.84	
13,627.00	88.66	149.690	6,547.75	-4,168.12	1,555.22	4,429.86	0.99	-0.87	-0.46	
13,722.00	91.25	151.100	6,547.82	-4,250.71	1,602.15	4,524.66	3.10	2.73	1.48	
13,817.00	91.03	150.750	6,545.93	-4,333.72	1,648.31	4,619.48	0.44	-0.23	-0.37	
13,912.00	90.46	150.750	6,544.70	-4,416.60	1,694.72	4,714.29	0.60	-0.60	0.00	
14,007.00	89.58	150.570	6,544.66	-4,499.42	1,741.27	4,809.10	0.95	-0.93	-0.19	
14,102.00	88.79	150.930	6,546.01	-4,582.30	1,787.68	4,903.92	0.91	-0.83	0.38	
14,196.00	88.31	150.400	6,548.39	-4,664.21	1,833.72	4,997.70	0.76	-0.51	-0.56	
14,291.00	87.52	150.490	6,551.85	-4,746.80	1,880.55	5,092.43	0.84	-0.83	0.09	
14,386.00	90.68	150.570	6,553.34	-4,829.49	1,927.27	5,187.20	3.33	3.33	0.08	
14,481.00	90.11	151.010	6,552.69	-4,912.40	1,973.63	5,282.03	0.76	-0.60	0.46	
14,576.00	89.58	149.870	6,552.94	-4,995.04	2,020.50	5,376.82	1.32	-0.56	-1.20	
14,671.00	89.14	149.960	6,554.00	-5,077.23	2,068.12	5,471.54	0.47	-0.46	0.09	
14,766.00	88.31	149.870	6,556.12	-5,159.41	2,115.73	5,566.24	0.88	-0.87	-0.09	
14,861.00	88.13	149.870	6,559.07	-5,241.54	2,163.39	5,660.92	0.19	-0.19	0.00	
14,957.00	90.51	150.050	6,560.21	-5,324.63	2,211.44	5,756.64	2.49	2.48	0.19	
15,052.00	89.93	150.310	6,559.84	-5,407.05	2,258.68	5,851.40	0.67	-0.61	0.27	
15,147.00	91.25	150.310	6,558.87	-5,489.57	2,305.73	5,946.16	1.39	1.39	0.00	
15,242.00	90.77	150.050	6,557.19	-5,571.98	2,352.97	6,040.91	0.57	-0.51	-0.27	
15,337.00	89.98	150.490	6,556.57	-5,654.47	2,400.08	6,135.68	0.95	-0.83	0.46	
15,432.00	89.36	150.310	6,557.12	-5,737.07	2,447.00	6,230.46	0.68	-0.65	-0.19	
15,527.00	88.62	149.960	6,558.79	-5,819.44	2,494.30	6,325.20	0.86	-0.78	-0.37	
15,622.00	90.15	150.130	6,559.81	-5,901.75	2,541.73	6,419.94	1.62	1.61	0.18	
15,718.00	90.33	149.340	6,559.41	-5,984.66	2,590.11	6,515.64	0.84	0.19	-0.82	
15,812.00	91.74	149.080	6,557.71	-6,065.40	2,638.22	6,609.26	1.53	1.50	-0.28	
Survey @ 15812.00 MD 6557.71 TVD										
15,887.00	91.74	149.080	6,555.43	-6,129.71	2,676.74	6,683.92	0.00	0.00	0.00	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
Survey projected to 15887.00 MD 6555.43 TVD									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
182.00	182.00	-0.07	0.03	MWD surveys
15,812.00	6,557.71	-6,065.40	2,638.22	Survey @ 15812.00 MD 6557.71 TVD
15,887.00	6,555.43	-6,129.71	2,676.74	Survey projected to 15887.00 MD 6555.43 TVD



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_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	Hillrock/Simms				
Site Position:		Northing:	14,434,279.29 usft	Latitude:	39.74587001
From:	Lat/Long	Easting:	1,704,992.60 usft	Longitude:	-80.77026312
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.147 °

Well	Hillrock 07 HM (J)					
Well Position	+N/-S	0.00 ft	Northing:	14,434,303.28 usft	Latitude:	39.74593590
	+E/-W	0.00 ft	Easting:	1,704,992.31 usft	Longitude:	-80.77026393
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	1,219.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/7/2019	-8.712	66.733	51,884.36767949

Design	Surveys Original Hole				
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	154.250	

Survey Program	Date	5/8/2020			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
182.00	931.00	MWD surf (Original Hole)	MWD	MWD - Standard	
1,031.00	2,785.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,907.00	15,812.00	MWD (Original Hole)	MWD	MWD - Standard	
15,890.00	15,887.00	Projection (Original Hole)	MWD	MWD - Standard	

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude	
Depth (ft)	(°)	(°)	Depth (ft)	(ft)	(ft)	Northing (usft)	Easting (usft)			
0.00	0.00	0.000	0.00	0.00	0.00	14,434,303.28	1,704,992.31	39.74593590	-80.77026393	
182.00	0.05	155.610	182.00	-0.07	0.03	14,434,303.21	1,704,992.34	39.74593570	-80.77026381	
MWD surveys										
202.00	0.23	222.010	202.00	-0.11	0.01	14,434,303.17	1,704,992.32	39.74593560	-80.77026390	
249.00	0.51	160.840	249.00	-0.38	0.02	14,434,302.90	1,704,992.32	39.74593486	-80.77026388	
296.00	0.44	174.460	296.00	-0.75	0.10	14,434,302.53	1,704,992.41	39.74593383	-80.77026358	
340.00	0.62	165.000	340.00	-1.15	0.18	14,434,302.13	1,704,992.49	39.74593273	-80.77026330	
387.00	0.32	180.380	386.99	-1.53	0.24	14,434,301.75	1,704,992.55	39.74593170	-80.77026308	
432.00	0.42	164.130	431.99	-1.81	0.29	14,434,301.47	1,704,992.60	39.74593092	-80.77026292	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
479.00	0.27	187.020	478.99	-2.09	0.32	14,434,301.19	1,704,992.63	39.74593016	-80.77026280	
522.00	0.45	115.180	521.99	-2.26	0.46	14,434,301.02	1,704,992.77	39.74592969	-80.77026231	
569.00	0.37	179.420	568.99	-2.49	0.63	14,434,300.79	1,704,992.94	39.74592905	-80.77026171	
614.00	0.35	158.870	613.99	-2.77	0.68	14,434,300.52	1,704,992.99	39.74592830	-80.77026153	
661.00	0.09	175.150	660.99	-2.94	0.74	14,434,300.35	1,704,993.05	39.74592783	-80.77026134	
704.00	0.21	204.220	703.99	-3.04	0.71	14,434,300.24	1,704,993.02	39.74592754	-80.77026144	
751.00	0.10	148.530	750.99	-3.16	0.69	14,434,300.13	1,704,993.00	39.74592723	-80.77026149	
794.00	0.14	125.150	793.99	-3.22	0.76	14,434,300.06	1,704,993.06	39.74592706	-80.77026127	
889.00	0.18	177.030	888.99	-3.43	0.86	14,434,299.85	1,704,993.17	39.74592647	-80.77026091	
931.00	0.07	3.010	930.99	-3.47	0.86	14,434,299.81	1,704,993.17	39.74592635	-80.77026089	
1,031.00	0.15	359.600	1,030.99	-3.28	0.87	14,434,300.00	1,704,993.17	39.74592688	-80.77026088	
1,077.00	0.02	98.800	1,076.99	-3.22	0.87	14,434,300.06	1,704,993.18	39.74592704	-80.77026085	
1,124.00	0.07	138.910	1,123.99	-3.25	0.90	14,434,300.04	1,704,993.21	39.74592698	-80.77026076	
1,172.00	0.20	131.900	1,171.99	-3.32	0.98	14,434,299.96	1,704,993.29	39.74592677	-80.77026047	
1,267.00	0.20	111.500	1,266.99	-3.50	1.26	14,434,299.79	1,704,993.57	39.74592629	-80.77025948	
1,363.00	0.89	265.810	1,362.98	-3.61	0.67	14,434,299.67	1,704,992.98	39.74592598	-80.77026157	
1,458.00	1.76	272.160	1,457.96	-3.61	-1.52	14,434,299.67	1,704,990.79	39.74592600	-80.77026938	
1,553.00	3.03	273.860	1,552.87	-3.39	-5.49	14,434,299.90	1,704,986.82	39.74592664	-80.77028348	
1,648.00	4.00	271.260	1,647.69	-3.14	-11.30	14,434,300.14	1,704,981.01	39.74592735	-80.77030417	
1,743.00	5.36	268.820	1,742.37	-3.16	-19.05	14,434,300.12	1,704,973.26	39.74592735	-80.77033174	
1,836.00	6.92	271.490	1,834.84	-3.11	-29.00	14,434,300.17	1,704,963.31	39.74592757	-80.77036712	
1,931.00	8.42	278.740	1,928.99	-1.90	-41.59	14,434,301.38	1,704,950.72	39.74593097	-80.77041192	
2,026.00	10.95	292.880	2,022.64	2.67	-56.78	14,434,305.95	1,704,935.52	39.74594362	-80.77046592	
2,121.00	13.66	302.520	2,115.46	12.21	-74.56	14,434,315.49	1,704,917.75	39.74596995	-80.77052908	
2,217.00	16.72	311.810	2,208.11	27.51	-94.42	14,434,330.79	1,704,897.89	39.74601212	-80.77059959	
2,312.00	19.25	315.840	2,298.46	47.86	-115.52	14,434,351.14	1,704,876.79	39.74606816	-80.77067447	
2,407.00	23.73	312.770	2,386.84	72.09	-140.48	14,434,375.37	1,704,851.83	39.74613487	-80.77076303	
2,501.00	28.72	310.600	2,471.14	99.65	-171.53	14,434,402.93	1,704,820.78	39.74621077	-80.77087326	
2,595.00	32.16	310.040	2,552.17	130.45	-207.84	14,434,433.73	1,704,784.47	39.74629562	-80.771100216	
2,690.00	33.18	314.290	2,632.15	164.87	-245.81	14,434,468.16	1,704,746.50	39.74639042	-80.77113693	
2,755.00	32.59	314.770	2,686.73	189.62	-270.97	14,434,492.90	1,704,721.34	39.74645856	-80.77122622	
2,785.00	33.09	315.630	2,711.94	201.17	-282.43	14,434,504.45	1,704,709.87	39.74649035	-80.77126689	
2,907.00	35.75	313.270	2,812.57	249.41	-331.68	14,434,552.69	1,704,660.62	39.74662319	-80.77144167	
2,970.00	35.77	312.700	2,863.70	274.51	-358.62	14,434,577.80	1,704,633.69	39.74669231	-80.77153725	
3,064.00	36.86	314.810	2,939.44	313.02	-398.81	14,434,616.30	1,704,593.50	39.74679834	-80.77167990	
3,158.00	37.40	318.810	3,014.39	354.38	-437.62	14,434,657.66	1,704,554.69	39.74691219	-80.77181759	
3,254.00	36.65	316.710	3,091.04	397.17	-476.47	14,434,700.45	1,704,515.84	39.74703000	-80.77195541	
3,349.00	35.89	318.420	3,167.63	438.64	-514.39	14,434,741.92	1,704,477.92	39.74714415	-80.77208996	
3,444.00	35.13	321.960	3,244.97	481.00	-549.72	14,434,784.29	1,704,442.59	39.74726073	-80.77221526	
3,537.00	33.72	319.760	3,321.69	521.79	-582.89	14,434,825.07	1,704,409.42	39.74737296	-80.77233289	
3,632.00	34.82	319.030	3,400.19	562.40	-617.70	14,434,865.68	1,704,374.61	39.74748473	-80.77245639	
3,726.00	36.43	318.880	3,476.60	603.69	-653.66	14,434,906.97	1,704,338.65	39.74759838	-80.77258393	
3,821.00	37.08	318.930	3,552.71	646.53	-691.02	14,434,949.81	1,704,301.29	39.74771630	-80.77271648	
3,916.00	36.20	317.010	3,628.94	688.64	-728.97	14,434,991.92	1,704,263.34	39.74783222	-80.77285110	
4,011.00	35.47	317.320	3,705.96	729.43	-766.79	14,435,032.71	1,704,225.52	39.74794449	-80.77298527	
4,106.00	34.54	319.590	3,783.78	770.20	-802.93	14,435,073.48	1,704,189.38	39.74805671	-80.77311350	
4,201.00	34.39	320.120	3,862.10	811.29	-837.59	14,435,114.57	1,704,154.72	39.74816981	-80.77323644	
4,295.00	34.59	317.200	3,939.58	851.25	-872.74	14,435,154.53	1,704,119.57	39.74827977	-80.77336114	
4,390.00	34.97	315.810	4,017.61	890.55	-910.04	14,435,193.83	1,704,082.27	39.74838798	-80.77349349	
4,485.00	34.89	315.790	4,095.50	929.55	-947.97	14,435,232.83	1,704,044.34	39.74849534	-80.77362805	
4,580.00	34.31	315.490	4,173.70	968.12	-985.68	14,435,271.40	1,704,006.63	39.74860152	-80.77376189	
4,676.00	34.21	314.730	4,253.04	1,006.41	-1,023.82	14,435,309.69	1,703,968.49	39.74870693	-80.77389724	
4,770.00	35.19	315.620	4,330.32	1,044.36	-1,061.54	14,435,347.64	1,703,930.77	39.74881143	-80.77403109	
4,864.00	35.08	317.950	4,407.20	1,083.78	-1,098.58	14,435,387.06	1,703,893.73	39.74891994	-80.77416250	
4,959.00	35.74	318.900	4,484.63	1,124.96	-1,135.10	14,435,428.24	1,703,857.21	39.74903329	-80.77429208	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
5,053.00	36.74	319.460	4,560.44	1,167.02	-1,171.42	14,435,470.29	1,703,820.89	39.74914903	-80.77442093	
5,148.00	35.37	318.650	4,637.24	1,209.25	-1,208.06	14,435,512.53	1,703,784.25	39.74926528	-80.77455089	
5,242.00	34.18	317.480	4,714.45	1,249.14	-1,243.88	14,435,552.42	1,703,748.43	39.74937506	-80.77467797	
5,337.00	35.33	317.320	4,792.50	1,289.00	-1,280.54	14,435,592.28	1,703,711.77	39.74948479	-80.77480804	
5,431.00	33.25	317.090	4,870.16	1,327.86	-1,316.51	14,435,631.14	1,703,675.80	39.74959176	-80.77493568	
5,526.00	33.42	317.890	4,949.53	1,366.34	-1,351.79	14,435,669.62	1,703,640.53	39.74969769	-80.77506083	
5,620.00	34.51	318.180	5,027.49	1,405.39	-1,386.90	14,435,708.67	1,703,605.41	39.74980517	-80.77518542	
5,715.00	35.89	316.040	5,105.12	1,445.50	-1,424.18	14,435,748.78	1,703,568.13	39.74991557	-80.77531768	
5,810.00	35.76	314.910	5,182.15	1,485.14	-1,463.17	14,435,788.42	1,703,529.14	39.75002470	-80.77545604	
5,905.00	35.27	314.780	5,259.48	1,524.06	-1,502.29	14,435,827.33	1,703,490.02	39.75013185	-80.77559491	
5,967.00	34.17	313.840	5,310.44	1,548.73	-1,527.56	14,435,852.00	1,703,464.75	39.75019977	-80.77568458	
6,039.00	33.71	313.080	5,370.17	1,576.38	-1,556.74	14,435,879.66	1,703,435.57	39.75027591	-80.77578814	
6,133.00	33.41	313.000	5,448.50	1,611.84	-1,594.72	14,435,915.12	1,703,397.60	39.75037357	-80.77592294	
6,228.00	25.32	310.620	5,531.23	1,642.96	-1,629.32	14,435,946.24	1,703,362.99	39.75045926	-80.77604579	
6,323.00	18.24	304.120	5,619.40	1,664.55	-1,657.09	14,435,967.83	1,703,335.22	39.75051876	-80.77614439	
6,419.00	10.33	290.670	5,712.39	1,676.04	-1,677.62	14,435,979.32	1,703,314.69	39.75055045	-80.77621733	
6,513.00	8.26	245.760	5,805.26	1,676.24	-1,691.68	14,435,979.52	1,703,300.63	39.75055110	-80.77626735	
6,609.00	9.89	209.200	5,900.13	1,666.21	-1,702.00	14,435,969.49	1,703,290.31	39.75052361	-80.77630416	
6,703.00	15.21	182.040	5,991.93	1,646.81	-1,706.38	14,435,950.09	1,703,285.93	39.75047036	-80.77631993	
6,798.00	22.42	168.240	6,081.84	1,616.56	-1,703.13	14,435,919.84	1,703,289.18	39.75038728	-80.77630862	
6,893.00	28.57	158.400	6,167.59	1,577.65	-1,691.06	14,435,880.93	1,703,301.25	39.75028034	-80.77626601	
6,988.00	35.87	153.740	6,247.91	1,531.50	-1,670.35	14,435,834.78	1,703,321.96	39.75015345	-80.77619275	
7,083.00	44.62	151.100	6,320.36	1,477.22	-1,641.85	14,435,780.50	1,703,350.46	39.75000419	-80.77609185	
7,178.00	53.93	149.520	6,382.28	1,414.79	-1,606.17	14,435,718.06	1,703,386.14	39.74983248	-80.77596546	
7,273.00	62.07	151.720	6,432.58	1,344.61	-1,566.75	14,435,647.89	1,703,425.57	39.74963950	-80.77582581	
7,368.00	69.80	154.260	6,471.30	1,267.37	-1,527.44	14,435,570.65	1,703,464.87	39.74942710	-80.77568665	
7,464.00	76.44	154.970	6,499.16	1,184.42	-1,488.09	14,435,487.70	1,703,504.22	39.74919902	-80.77554739	
7,557.00	81.80	153.300	6,516.70	1,102.28	-1,448.25	14,435,405.56	1,703,544.06	39.74897316	-80.77540639	
7,651.00	85.67	149.260	6,526.96	1,020.38	-1,403.36	14,435,323.66	1,703,586.95	39.74874792	-80.77524740	
7,747.00	90.20	147.410	6,530.42	938.75	-1,353.01	14,435,242.03	1,703,639.30	39.74852340	-80.77506900	
7,840.00	90.59	150.930	6,529.78	858.90	-1,305.36	14,435,162.18	1,703,686.96	39.74830379	-80.77490018	
7,937.00	88.92	152.950	6,530.20	773.31	-1,259.73	14,435,076.59	1,703,732.58	39.74806842	-80.77473863	
8,032.00	88.31	152.510	6,532.49	688.90	-1,216.22	14,434,992.18	1,703,776.09	39.74783629	-80.77458457	
8,127.00	87.74	152.420	6,535.77	604.71	-1,172.33	14,434,907.99	1,703,819.99	39.74760478	-80.77442917	
8,222.00	90.37	151.450	6,537.33	520.90	-1,127.64	14,434,824.18	1,703,864.67	39.74737431	-80.77427095	
8,317.00	90.11	151.190	6,536.94	437.56	-1,082.05	14,434,740.84	1,703,910.26	39.74714511	-80.77410950	
8,412.00	89.98	150.220	6,536.86	354.71	-1,035.57	14,434,657.99	1,703,956.74	39.74691726	-80.77394487	
8,507.00	89.93	149.780	6,536.94	272.43	-988.07	14,434,575.71	1,704,004.24	39.74669098	-80.77377662	
8,602.00	90.99	151.190	6,536.17	189.77	-941.27	14,434,493.05	1,704,051.04	39.74646364	-80.77361087	
8,697.00	90.81	150.930	6,534.68	106.64	-895.30	14,434,409.92	1,704,097.01	39.74623503	-80.77344810	
8,792.00	90.51	150.400	6,533.59	23.83	-848.76	14,434,327.11	1,704,143.55	39.74600728	-80.77328328	
8,887.00	90.07	149.430	6,533.11	-58.37	-801.14	14,434,244.91	1,704,191.17	39.74578120	-80.77311460	
8,982.00	91.91	151.100	6,531.46	-140.84	-754.04	14,434,162.44	1,704,238.27	39.74555438	-80.77294775	
9,076.00	91.65	151.190	6,528.54	-223.13	-708.69	14,434,080.15	1,704,283.62	39.74532808	-80.77278719	
9,172.00	91.91	153.030	6,525.56	-307.94	-663.81	14,433,995.35	1,704,328.50	39.74509487	-80.77262828	
9,267.00	89.49	154.530	6,524.40	-393.15	-621.85	14,433,910.14	1,704,370.46	39.74486056	-80.77247976	
9,362.00	89.80	155.670	6,524.99	-479.31	-581.85	14,433,823.97	1,704,410.46	39.74462365	-80.77233824	
9,457.00	87.60	154.180	6,527.15	-565.33	-541.60	14,433,737.95	1,704,450.71	39.74438714	-80.77219584	
9,551.00	87.16	152.330	6,531.44	-649.18	-499.35	14,433,654.10	1,704,492.96	39.74415656	-80.77204628	
9,646.00	89.27	149.340	6,534.40	-732.08	-453.08	14,433,571.20	1,704,539.23	39.74392857	-80.77188243	
9,741.00	89.27	148.460	6,535.61	-813.42	-404.01	14,433,489.86	1,704,588.30	39.74370485	-80.77170862	
9,835.00	88.35	147.850	6,537.57	-893.25	-354.43	14,433,410.03	1,704,637.88	39.74348526	-80.77153294	
9,929.00	90.86	147.850	6,538.21	-972.83	-304.41	14,433,330.45	1,704,687.90	39.74326637	-80.77135574	
10,024.00	90.68	148.200	6,536.94	-1,053.41	-254.11	14,433,249.87	1,704,738.20	39.74304472	-80.77117752	
10,118.00	90.51	147.760	6,535.96	-1,133.11	-204.27	14,433,170.18	1,704,788.04	39.74282551	-80.77100095	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,213.00	90.46	147.150	6,535.16	-1,213.18	-153.17	14,433,090.10	1,704,839.14	39.74260523	-80.77081988	
10,309.00	90.33	146.970	6,534.49	-1,293.75	-100.97	14,433,009.54	1,704,891.34	39.74238361	-80.77063491	
10,404.00	90.73	149.520	6,533.62	-1,374.52	-50.98	14,432,928.77	1,704,941.33	39.74216144	-80.77045781	
10,498.00	90.15	149.610	6,532.89	-1,455.56	-3.36	14,432,847.72	1,704,988.95	39.74193853	-80.77028917	
10,593.00	89.54	149.520	6,533.15	-1,537.47	44.76	14,432,765.81	1,705,037.07	39.74171325	-80.77011872	
10,688.00	89.23	149.340	6,534.17	-1,619.26	93.07	14,432,684.02	1,705,085.38	39.74148829	-80.76994760	
10,783.00	88.53	148.640	6,536.03	-1,700.67	142.01	14,432,602.62	1,705,134.32	39.74126438	-80.76977427	
10,878.00	90.24	150.130	6,537.05	-1,782.42	190.38	14,432,520.87	1,705,182.69	39.74103953	-80.76960294	
10,973.00	89.71	149.780	6,537.09	-1,864.65	237.95	14,432,438.64	1,705,230.25	39.74081336	-80.76943448	
11,067.00	89.32	149.340	6,537.88	-1,945.69	285.57	14,432,357.60	1,705,277.88	39.74059046	-80.76926582	
11,163.00	89.10	148.730	6,539.21	-2,028.00	334.96	14,432,275.29	1,705,327.26	39.74036407	-80.76909088	
11,257.00	90.42	151.100	6,539.60	-2,109.33	382.07	14,432,193.96	1,705,374.38	39.74014038	-80.76892403	
11,353.00	90.24	150.130	6,539.05	-2,192.97	429.18	14,432,110.31	1,705,421.48	39.73991033	-80.76875723	
11,448.00	90.02	149.690	6,538.83	-2,275.17	476.80	14,432,028.11	1,705,469.11	39.73968426	-80.76858856	
11,511.00	89.89	149.610	6,538.88	-2,329.54	508.64	14,431,973.75	1,705,500.94	39.73953472	-80.76847582	
11,575.00	89.89	149.170	6,539.01	-2,384.62	541.22	14,431,918.67	1,705,533.53	39.73938322	-80.76836040	
11,637.00	89.89	148.820	6,539.12	-2,437.76	573.16	14,431,865.53	1,705,565.47	39.73923705	-80.76824728	
11,731.00	90.20	151.890	6,539.05	-2,519.45	619.65	14,431,783.84	1,705,611.96	39.73901239	-80.76808266	
11,826.00	90.07	152.510	6,538.83	-2,603.48	663.96	14,431,699.81	1,705,656.26	39.73878129	-80.76792583	
11,921.00	89.45	151.800	6,539.22	-2,687.48	708.33	14,431,615.81	1,705,700.64	39.73855029	-80.76776876	
12,015.00	89.27	152.070	6,540.27	-2,770.42	752.55	14,431,532.87	1,705,744.86	39.73832220	-80.76761222	
12,110.00	91.03	150.310	6,540.03	-2,853.66	798.33	14,431,449.63	1,705,790.63	39.73809328	-80.76745015	
12,205.00	90.59	150.570	6,538.68	-2,936.28	845.19	14,431,367.00	1,705,837.50	39.73786603	-80.76728422	
12,300.00	89.89	149.960	6,538.29	-3,018.77	892.31	14,431,284.52	1,705,884.61	39.73763916	-80.76711737	
12,395.00	89.19	150.220	6,539.05	-3,101.12	939.68	14,431,202.17	1,705,931.98	39.73741268	-80.76694963	
12,490.00	88.70	150.130	6,540.80	-3,183.52	986.92	14,431,119.77	1,705,979.22	39.73718604	-80.76678236	
12,585.00	91.12	149.870	6,540.95	-3,265.79	1,034.41	14,431,037.50	1,706,026.72	39.73695977	-80.76661417	
12,680.00	90.90	149.870	6,539.27	-3,347.94	1,082.09	14,430,955.35	1,706,074.40	39.73673382	-80.76644533	
12,773.00	90.24	149.780	6,538.35	-3,428.33	1,128.84	14,430,874.96	1,706,121.14	39.73651270	-80.76627980	
12,869.00	89.45	149.170	6,538.61	-3,511.02	1,177.59	14,430,792.26	1,706,169.90	39.73628525	-80.76610713	
12,963.00	88.92	149.080	6,539.94	-3,591.69	1,225.83	14,430,711.59	1,706,218.13	39.73606336	-80.76593631	
13,058.00	89.85	150.660	6,540.96	-3,673.85	1,273.51	14,430,629.44	1,706,265.82	39.73583739	-80.76576746	
13,153.00	89.19	149.780	6,541.76	-3,756.30	1,320.69	14,430,546.99	1,706,313.00	39.73561062	-80.76560040	
13,247.00	88.31	149.610	6,543.81	-3,837.44	1,368.11	14,430,465.85	1,706,360.42	39.73538746	-80.76543248	
13,342.00	89.89	151.280	6,545.30	-3,920.26	1,414.96	14,430,383.23	1,706,407.27	39.73516022	-80.76526660	
13,437.00	89.76	150.930	6,545.59	-4,003.23	1,460.87	14,430,300.06	1,706,453.17	39.73493147	-80.76510409	
13,532.00	89.49	150.130	6,546.21	-4,085.94	1,507.60	14,430,217.35	1,706,499.91	39.73470400	-80.76493863	
13,627.00	88.66	149.690	6,547.75	-4,168.12	1,555.22	14,430,135.17	1,706,547.53	39.73447795	-80.76477000	
13,722.00	91.25	151.100	6,547.82	-4,250.71	1,602.15	14,430,052.58	1,706,594.46	39.73425080	-80.76460385	
13,817.00	91.03	150.750	6,545.93	-4,333.72	1,648.31	14,429,969.57	1,706,640.61	39.73402249	-80.76444045	
13,912.00	90.46	150.750	6,544.70	-4,416.60	1,694.72	14,429,886.69	1,706,687.03	39.73379455	-80.76427613	
14,007.00	89.58	150.570	6,544.66	-4,499.42	1,741.27	14,429,803.87	1,706,733.58	39.73356678	-80.76411133	
14,102.00	88.79	150.930	6,546.01	-4,582.30	1,787.68	14,429,721.00	1,706,779.99	39.73333884	-80.76394702	
14,196.00	88.31	150.400	6,548.39	-4,664.21	1,833.72	14,429,639.08	1,706,826.03	39.73311353	-80.76378403	
14,291.00	87.52	150.490	6,551.85	-4,746.80	1,880.55	14,429,556.49	1,706,872.85	39.73288639	-80.76361824	
14,386.00	90.68	150.570	6,553.34	-4,829.49	1,927.27	14,429,473.81	1,706,919.58	39.73265897	-80.76345282	
14,481.00	90.11	151.010	6,552.69	-4,912.40	1,973.63	14,429,390.89	1,706,965.94	39.73243092	-80.76328870	
14,576.00	89.58	149.870	6,552.94	-4,995.04	2,020.50	14,429,308.26	1,707,012.80	39.73220364	-80.76312278	
14,671.00	89.14	149.960	6,554.00	-5,077.23	2,068.12	14,429,226.06	1,707,060.42	39.73197756	-80.76295418	
14,766.00	88.31	149.870	6,556.12	-5,159.41	2,115.73	14,429,143.88	1,707,108.03	39.73175153	-80.76278561	
14,861.00	88.13	149.870	6,559.07	-5,241.54	2,163.39	14,429,061.75	1,707,155.70	39.73152564	-80.76261685	
14,957.00	90.51	150.050	6,560.21	-5,324.63	2,211.44	14,428,978.66	1,707,203.75	39.73129709	-80.76244673	
15,052.00	89.93	150.310	6,559.84	-5,407.05	2,258.68	14,428,896.24	1,707,250.99	39.73107040	-80.76227948	
15,147.00	91.25	150.310	6,558.87	-5,489.57	2,305.73	14,428,813.72	1,707,298.04	39.73084343	-80.76211291	
15,242.00	90.77	150.050	6,557.19	-5,571.98	2,352.97	14,428,731.31	1,707,345.27	39.73061677	-80.76194568	



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
15,337.00	89.98	150.490	6,556.57	-5,654.47	2,400.08	14,428,648.82	1,707,392.38	39.73038987	-80.76177890	
15,432.00	89.36	150.310	6,557.12	-5,737.07	2,447.00	14,428,566.22	1,707,439.31	39.73016269	-80.76161278	
15,527.00	88.62	149.960	6,558.79	-5,819.44	2,494.30	14,428,483.85	1,707,486.60	39.72993613	-80.76144533	
15,622.00	90.15	150.130	6,559.81	-5,901.75	2,541.73	14,428,401.55	1,707,534.04	39.72970975	-80.76127741	
15,718.00	90.33	149.340	6,559.41	-5,984.66	2,590.11	14,428,318.63	1,707,582.42	39.72948169	-80.76110611	
15,812.00	91.74	149.080	6,557.71	-6,065.40	2,638.22	14,428,237.90	1,707,630.53	39.72925962	-80.76093577	
Survey @ 15812.00 MD 6557.71 TVD										
15,887.00	91.74	149.080	6,555.43	-6,129.71	2,676.74	14,428,173.59	1,707,669.05	39.72908272	-80.76079937	
Survey projected to 15887.00 MD 6555.43 TVD										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
182.00	182.00	-0.07	0.03	MWD surveys	
15,812.00	6,557.71	-6,065.40	2,638.22	Survey @ 15812.00 MD 6557.71 TVD	
15,887.00	6,555.43	-6,129.71	2,676.74	Survey projected to 15887.00 MD 6555.43 TVD	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_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	Hillrock/Simms				
Site Position:		Northing:	14,434,279.29 usft	Latitude:	39.74587001
From:	Lat/Long	Easting:	1,704,992.60 usft	Longitude:	-80.77026312
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.147 °

Well	Hillrock 07 HM (J)					
Well Position	+N/-S	0.00 ft	Northing:	14,434,303.28 usft	Latitude:	39.74593590
	+E/-W	0.00 ft	Easting:	1,704,992.31 usft	Longitude:	-80.77026393
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft	Ground Level:	1,219.00 ft	

Wellbore	Sidetrack 01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/26/2019	-8.714	66.728	51,878.22205836

Design	Surveys Sidetrack 01				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	14,291.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	154.250	

Survey Program	Date 12/4/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
182.00	931.00	MWD surf (Original Hole)	MWD	MWD - Standard
1,031.00	2,785.00	MWD int (Original Hole)	MWD	MWD - Standard
2,907.00	14,291.00	MWD (Original Hole)	MWD	MWD - Standard
14,336.00	19,166.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard
19,220.00	19,220.00	Projection (Sidetrack 01)	MWD	MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
182.00	0.05	155.610	182.00	-0.07	0.03	0.08	0.03	0.03	0.00	0.00
202.00	0.23	222.010	202.00	-0.11	0.01	0.10	1.07	0.90	332.00	
249.00	0.51	160.840	249.00	-0.38	0.02	0.35	0.95	0.60	-130.15	
296.00	0.44	174.460	296.00	-0.75	0.10	0.72	0.28	-0.15	28.98	
340.00	0.62	165.000	340.00	-1.15	0.18	1.12	0.45	0.41	-21.50	
387.00	0.32	180.380	386.99	-1.53	0.24	1.48	0.69	-0.64	32.72	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
432.00	0.42	164.130	431.99	-1.81	0.29	1.76	0.32	0.22	-36.11
479.00	0.27	187.020	478.99	-2.09	0.32	2.02	0.43	-0.32	48.70
522.00	0.45	115.180	521.99	-2.26	0.46	2.24	1.04	0.42	-167.07
569.00	0.37	179.420	568.99	-2.49	0.63	2.52	0.94	-0.17	136.68
614.00	0.35	158.870	613.99	-2.77	0.68	2.79	0.29	-0.04	-45.67
661.00	0.09	175.150	660.99	-2.94	0.74	2.97	0.56	-0.55	34.64
704.00	0.21	204.220	703.99	-3.04	0.71	3.05	0.32	0.28	67.60
751.00	0.10	148.530	750.99	-3.16	0.69	3.14	0.37	-0.23	-118.49
794.00	0.14	125.150	793.99	-3.22	0.76	3.23	0.15	0.09	-54.37
889.00	0.18	177.030	888.99	-3.43	0.86	3.47	0.15	0.04	54.61
931.00	0.07	3.010	930.99	-3.47	0.86	3.50	0.59	-0.26	-414.33
1,031.00	0.15	359.600	1,030.99	-3.28	0.87	3.33	0.08	0.08	-3.41
1,077.00	0.02	98.800	1,076.99	-3.22	0.87	3.28	0.34	-0.28	215.65
1,124.00	0.07	138.910	1,123.99	-3.25	0.90	3.31	0.12	0.11	85.34
1,172.00	0.20	131.900	1,171.99	-3.32	0.98	3.42	0.27	0.27	-14.60
1,267.00	0.20	111.500	1,266.99	-3.50	1.26	3.70	0.07	0.00	-21.47
1,363.00	0.89	265.810	1,362.98	-3.61	0.67	3.54	1.12	0.72	160.74
1,458.00	1.76	272.160	1,457.96	-3.61	-1.52	2.59	0.93	0.92	6.68
1,553.00	3.03	273.860	1,552.87	-3.39	-5.49	0.67	1.34	1.34	1.79
1,648.00	4.00	271.260	1,647.69	-3.14	-11.30	-2.08	1.03	1.02	-2.74
1,743.00	5.36	268.820	1,742.37	-3.16	-19.05	-5.43	1.45	1.43	-2.57
1,836.00	6.92	271.490	1,834.84	-3.11	-29.00	-9.80	1.70	1.68	2.87
1,931.00	8.42	278.740	1,928.99	-1.90	-41.59	-16.36	1.88	1.58	7.63
2,026.00	10.95	292.880	2,022.64	2.67	-56.78	-27.07	3.64	2.66	14.88
2,121.00	13.66	302.520	2,115.46	12.21	-74.56	-43.39	3.57	2.85	10.15
2,217.00	16.72	311.810	2,208.11	27.51	-94.42	-65.80	4.06	3.19	9.68
2,312.00	19.25	315.840	2,298.46	47.86	-115.52	-93.30	2.97	2.66	4.24
2,407.00	23.73	312.770	2,386.84	72.09	-140.48	-125.96	4.86	4.72	-3.23
2,501.00	28.72	310.600	2,471.14	99.65	-171.53	-164.27	5.40	5.31	-2.31
2,595.00	32.16	310.040	2,552.17	130.45	-207.84	-207.79	3.67	3.66	-0.60
2,690.00	33.18	314.290	2,632.15	164.87	-245.81	-255.29	2.64	1.07	4.47
2,755.00	32.59	314.770	2,686.73	189.62	-270.97	-288.52	0.99	-0.91	0.74
2,785.00	33.09	315.630	2,711.94	201.17	-282.43	-303.89	2.28	1.67	2.87
2,907.00	35.75	313.270	2,812.57	249.41	-331.68	-368.74	2.44	2.18	-1.93
2,970.00	35.77	312.700	2,863.70	274.51	-358.62	-403.05	0.53	0.03	-0.90
3,064.00	36.86	314.810	2,939.44	313.02	-398.81	-455.20	1.76	1.16	2.24
3,158.00	37.40	318.810	3,014.39	354.38	-437.62	-509.31	2.63	0.57	4.26
3,254.00	36.65	316.710	3,091.04	397.17	-476.47	-564.73	1.53	-0.78	-2.19
3,349.00	35.89	318.420	3,167.63	438.64	-514.39	-618.56	1.33	-0.80	1.80
3,444.00	35.13	321.960	3,244.97	481.00	-549.72	-672.06	2.31	-0.80	3.73
3,537.00	33.72	319.760	3,321.69	521.79	-582.89	-723.20	2.02	-1.52	-2.37
3,632.00	34.82	319.030	3,400.19	562.40	-617.70	-774.91	1.24	1.16	-0.77
3,726.00	36.43	318.880	3,476.60	603.69	-653.66	-827.72	1.72	1.71	-0.16

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
3,821.00	37.08	318.930	3,552.71	646.53	-691.02	-882.54	0.68	0.68	0.05
3,916.00	36.20	317.010	3,628.94	688.64	-728.97	-936.96	1.52	-0.93	-2.02
4,011.00	35.47	317.320	3,705.96	729.43	-766.79	-990.12	0.79	-0.77	0.33
4,106.00	34.54	319.590	3,783.78	770.20	-802.93	-1,042.55	1.68	-0.98	2.39
4,201.00	34.39	320.120	3,862.10	811.29	-837.59	-1,094.62	0.35	-0.16	0.56
4,295.00	34.59	317.200	3,939.58	851.25	-872.74	-1,145.88	1.77	0.21	-3.11
4,390.00	34.97	315.810	4,017.61	890.55	-910.04	-1,197.48	0.93	0.40	-1.46
4,485.00	34.89	315.790	4,095.50	929.55	-947.97	-1,249.08	0.09	-0.08	-0.02
4,580.00	34.31	315.490	4,173.70	968.12	-985.68	-1,300.21	0.64	-0.61	-0.32
4,676.00	34.21	314.730	4,253.04	1,006.41	-1,023.82	-1,351.26	0.46	-0.10	-0.79
4,770.00	35.19	315.620	4,330.32	1,044.36	-1,061.54	-1,401.84	1.17	1.04	0.95
4,864.00	35.08	317.950	4,407.20	1,083.78	-1,098.58	-1,453.43	1.43	-0.12	2.48
4,959.00	35.74	318.900	4,484.63	1,124.96	-1,135.10	-1,506.39	0.90	0.69	1.00
5,053.00	36.74	319.460	4,560.44	1,167.02	-1,171.42	-1,560.05	1.12	1.06	0.60
5,148.00	35.37	318.650	4,637.24	1,209.25	-1,208.06	-1,614.01	1.53	-1.44	-0.85
5,242.00	34.18	317.480	4,714.45	1,249.14	-1,243.88	-1,665.49	1.45	-1.27	-1.24
5,337.00	35.33	317.320	4,792.50	1,289.00	-1,280.54	-1,717.32	1.21	1.21	-0.17
5,431.00	33.25	317.090	4,870.16	1,327.86	-1,316.51	-1,767.95	2.22	-2.21	-0.24
5,526.00	33.42	317.890	4,949.53	1,366.34	-1,351.79	-1,817.94	0.50	0.18	0.84
5,620.00	34.51	318.180	5,027.49	1,405.39	-1,386.90	-1,868.37	1.17	1.16	0.31
5,715.00	35.89	316.040	5,105.12	1,445.50	-1,424.18	-1,920.68	1.95	1.45	-2.25
5,810.00	35.76	314.910	5,182.15	1,485.14	-1,463.17	-1,973.33	0.71	-0.14	-1.19
5,905.00	35.27	314.780	5,259.48	1,524.06	-1,502.29	-2,025.38	0.52	-0.52	-0.14
5,967.00	34.17	313.840	5,310.44	1,548.73	-1,527.56	-2,058.58	1.97	-1.77	-1.52
6,039.00	33.71	313.080	5,370.17	1,576.38	-1,556.74	-2,096.16	0.87	-0.64	-1.06
6,133.00	33.41	313.000	5,448.50	1,611.84	-1,594.72	-2,144.60	0.32	-0.32	-0.09
6,228.00	25.32	310.620	5,531.23	1,642.96	-1,629.32	-2,187.66	8.60	-8.52	-2.51
6,323.00	18.24	304.120	5,619.40	1,664.55	-1,657.09	-2,219.18	7.86	-7.45	-6.84
6,419.00	10.33	290.670	5,712.39	1,676.04	-1,677.62	-2,238.44	8.88	-8.24	-14.01
6,513.00	8.26	245.760	5,805.26	1,676.24	-1,691.68	-2,244.73	7.80	-2.20	-47.78
6,609.00	9.89	209.200	5,900.13	1,666.21	-1,702.00	-2,240.18	6.12	1.70	-38.08
6,703.00	15.21	182.040	5,991.93	1,646.81	-1,706.38	-2,224.61	8.31	5.66	-28.89
6,798.00	22.42	168.240	6,081.84	1,616.56	-1,703.13	-2,195.95	8.87	7.59	-14.53
6,893.00	28.57	158.400	6,167.59	1,577.65	-1,691.06	-2,155.66	7.84	6.47	-10.36
6,988.00	35.87	153.740	6,247.91	1,531.50	-1,670.35	-2,105.10	8.11	7.68	-4.91
7,083.00	44.62	151.100	6,320.36	1,477.22	-1,641.85	-2,043.83	9.38	9.21	-2.78
7,178.00	53.93	149.520	6,382.28	1,414.79	-1,606.17	-1,972.09	9.88	9.80	-1.66
7,273.00	62.07	151.720	6,432.58	1,344.61	-1,566.75	-1,891.76	8.79	8.57	2.32
7,368.00	69.80	154.260	6,471.30	1,267.37	-1,527.44	-1,805.11	8.49	8.14	2.67
7,464.00	76.44	154.970	6,499.16	1,184.42	-1,488.09	-1,713.30	6.95	6.92	0.74
7,557.00	81.80	153.300	6,516.70	1,102.28	-1,448.25	-1,622.01	6.03	5.76	-1.80
7,651.00	85.67	149.280	6,526.96	1,020.38	-1,403.36	-1,528.73	5.93	4.12	-4.30
7,747.00	90.20	147.410	6,530.42	938.75	-1,353.01	-1,433.34	5.10	4.72	-1.93
7,840.00	90.59	150.930	6,529.78	858.90	-1,305.36	-1,340.72	3.81	0.42	3.78



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
7,937.00	88.92	152.950	6,530.20	773.31	-1,259.73	-1,243.81	2.70	-1.72	2.08
8,032.00	88.31	152.510	6,532.49	688.90	-1,216.22	-1,148.87	0.79	-0.64	-0.46
8,127.00	87.74	152.420	6,535.77	604.71	-1,172.33	-1,053.97	0.61	-0.60	-0.09
8,222.00	90.37	151.450	6,537.33	520.90	-1,127.64	-959.07	2.95	2.77	-1.02
8,317.00	90.11	151.190	6,536.94	437.56	-1,082.05	-864.20	0.39	-0.27	-0.27
8,412.00	89.98	150.220	6,536.86	354.71	-1,035.57	-769.38	1.03	-0.14	-1.02
8,507.00	89.93	149.780	6,536.94	272.43	-988.07	-674.64	0.47	-0.05	-0.46
8,602.00	90.99	151.190	6,536.17	189.77	-941.27	-579.85	1.86	1.12	1.48
8,697.00	90.81	150.930	6,534.68	106.64	-895.30	-485.01	0.33	-0.19	-0.27
8,792.00	90.51	150.400	6,533.59	23.83	-848.76	-390.20	0.64	-0.32	-0.56
8,887.00	90.07	149.430	6,533.11	-58.37	-801.14	-295.48	1.12	-0.46	-1.02
8,982.00	91.91	151.100	6,531.46	-140.84	-754.04	-200.73	2.62	1.94	1.76
9,076.00	91.65	151.190	6,528.54	-223.13	-708.69	-106.91	0.29	-0.28	0.10
9,172.00	91.91	153.030	6,525.56	-307.94	-663.81	-11.03	1.93	0.27	1.92
9,267.00	89.49	154.530	6,524.40	-393.15	-621.85	83.95	3.00	-2.55	1.58
9,362.00	89.80	155.670	6,524.99	-479.31	-581.85	178.94	1.24	0.33	1.20
9,457.00	87.60	154.180	6,527.15	-565.33	-541.60	273.90	2.80	-2.32	-1.57
9,551.00	87.16	152.330	6,531.44	-649.18	-499.35	367.78	2.02	-0.47	-1.97
9,646.00	89.27	149.340	6,534.40	-732.08	-453.08	462.55	3.85	2.22	-3.15
9,741.00	89.27	148.460	6,535.61	-813.42	-404.01	557.13	0.93	0.00	-0.93
9,835.00	88.35	147.850	6,537.57	-893.25	-354.43	650.57	1.17	-0.98	-0.65
9,929.00	90.86	147.850	6,538.21	-972.83	-304.41	743.98	2.67	2.67	0.00
10,024.00	90.68	148.200	6,536.94	-1,053.41	-254.11	838.41	0.41	-0.19	0.37
10,118.00	90.51	147.760	6,535.96	-1,133.11	-204.27	931.84	0.50	-0.18	-0.47
10,213.00	90.46	147.150	6,535.16	-1,213.18	-153.17	1,026.17	0.64	-0.05	-0.64
10,309.00	90.33	146.970	6,534.49	-1,293.75	-100.97	1,121.41	0.23	-0.14	-0.19
10,404.00	90.73	149.520	6,533.62	-1,374.52	-50.98	1,215.88	2.72	0.42	2.68
10,498.00	90.15	149.610	6,532.89	-1,455.56	-3.36	1,309.56	0.62	-0.62	0.10
10,593.00	89.54	149.520	6,533.15	-1,537.47	44.76	1,404.24	0.65	-0.64	-0.09
10,688.00	89.23	149.340	6,534.17	-1,619.26	93.07	1,498.90	0.38	-0.33	-0.19
10,783.00	88.53	148.640	6,536.03	-1,700.67	142.01	1,593.48	1.04	-0.74	-0.74
10,878.00	90.24	150.130	6,537.05	-1,782.42	190.38	1,688.13	2.39	1.80	1.57
10,973.00	89.71	149.780	6,537.09	-1,864.65	237.95	1,782.86	0.67	-0.56	-0.37
11,067.00	89.32	149.340	6,537.88	-1,945.69	285.57	1,876.54	0.63	-0.41	-0.47
11,163.00	89.10	148.730	6,539.21	-2,028.00	334.96	1,972.14	0.68	-0.23	-0.64
11,257.00	90.42	151.100	6,539.60	-2,109.33	382.07	2,065.86	2.89	1.40	2.52
11,353.00	90.24	150.130	6,539.05	-2,192.97	429.18	2,161.66	1.03	-0.19	-1.01
11,448.00	90.02	149.690	6,538.83	-2,275.17	476.80	2,256.39	0.52	-0.23	-0.46
11,511.00	89.89	149.610	6,538.88	-2,329.54	508.64	2,319.19	0.24	-0.21	-0.13
11,575.00	89.89	149.170	6,539.01	-2,384.62	541.22	2,382.96	0.69	0.00	-0.69
11,637.00	89.89	148.820	6,539.12	-2,437.76	573.16	2,444.69	0.56	0.00	-0.56
11,731.00	90.20	151.890	6,539.05	-2,519.45	619.65	2,538.47	3.28	0.33	3.27
11,826.00	90.07	152.510	6,538.83	-2,603.48	663.96	2,633.40	0.67	-0.14	0.65

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
11,921.00	89.45	151.800	6,539.22	-2,687.48	708.33	2,728.34	0.99	-0.65	-0.75
12,015.00	89.27	152.070	6,540.27	-2,770.42	752.55	2,822.26	0.35	-0.19	0.29
12,110.00	91.03	150.310	6,540.03	-2,853.66	798.33	2,917.11	2.62	1.85	-1.85
12,205.00	90.59	150.570	6,538.68	-2,936.28	845.19	3,011.89	0.54	-0.46	0.27
12,300.00	89.89	149.960	6,538.29	-3,018.77	892.31	3,106.66	0.98	-0.74	-0.64
12,395.00	89.19	150.220	6,539.05	-3,101.12	939.68	3,201.41	0.79	-0.74	0.27
12,490.00	88.70	150.130	6,540.80	-3,183.52	986.92	3,296.15	0.52	-0.52	-0.09
12,585.00	91.12	149.870	6,540.95	-3,265.79	1,034.41	3,390.88	2.56	2.55	-0.27
12,680.00	90.90	149.870	6,539.27	-3,347.94	1,082.09	3,485.59	0.23	-0.23	0.00
12,773.00	90.24	149.780	6,538.35	-3,428.33	1,128.84	3,578.31	0.72	-0.71	-0.10
12,869.00	89.45	149.170	6,538.61	-3,511.02	1,177.59	3,673.97	1.04	-0.82	-0.64
12,963.00	88.92	149.080	6,539.94	-3,591.69	1,225.83	3,767.59	0.57	-0.56	-0.10
13,058.00	89.85	150.660	6,540.96	-3,673.85	1,273.51	3,862.30	1.93	0.98	1.66
13,153.00	89.19	149.780	6,541.76	-3,756.30	1,320.69	3,957.06	1.16	-0.69	-0.93
13,247.00	88.31	149.610	6,543.81	-3,837.44	1,368.11	4,050.74	0.95	-0.94	-0.18
13,342.00	89.89	151.280	6,545.30	-3,920.06	1,414.96	4,145.51	2.42	1.66	1.76
13,437.00	89.76	150.930	6,545.59	-4,003.23	1,460.87	4,240.37	0.39	-0.14	-0.37
13,532.00	89.49	150.130	6,546.21	-4,085.94	1,507.60	4,335.17	0.89	-0.28	-0.84
13,627.00	88.66	149.690	6,547.75	-4,168.12	1,555.22	4,429.88	0.99	-0.87	-0.46
13,722.00	91.25	151.100	6,547.82	-4,250.71	1,602.15	4,524.66	3.10	2.73	1.48
13,817.00	91.03	150.750	6,545.93	-4,333.72	1,648.31	4,619.48	0.44	-0.23	-0.37
13,912.00	90.46	150.750	6,544.70	-4,416.60	1,694.72	4,714.29	0.60	-0.60	0.00
14,007.00	89.58	150.570	6,544.66	-4,499.42	1,741.27	4,809.10	0.95	-0.93	-0.19
14,102.00	88.79	150.930	6,546.01	-4,582.30	1,787.68	4,903.92	0.91	-0.83	0.38
14,196.00	88.31	150.400	6,548.39	-4,664.21	1,833.72	4,997.70	0.76	-0.51	-0.56
14,291.00	87.52	150.490	6,551.85	-4,746.80	1,880.55	5,092.43	0.84	-0.83	0.09
Tie into original hole @ 14291 MD									
14,336.00	87.21	153.390	6,553.92	-4,786.46	1,901.69	5,137.34	6.47	-0.69	6.44
14,385.00	89.10	154.970	6,555.50	-4,830.54	1,923.02	5,186.31	5.03	3.86	3.22
14,480.00	94.86	157.520	6,552.21	-4,917.40	1,961.25	5,281.15	6.63	6.06	2.68
14,575.00	92.62	156.290	6,546.02	-5,004.59	1,998.43	5,375.84	2.69	-2.36	-1.29
14,670.00	93.36	155.580	6,541.06	-5,091.21	2,037.12	5,470.67	1.08	0.78	-0.75
14,765.00	91.69	155.410	6,536.88	-5,177.57	2,076.48	5,565.55	1.77	-1.76	-0.18
14,860.00	89.49	154.530	6,535.90	-5,263.64	2,116.67	5,660.53	2.49	-2.32	-0.93
14,956.00	90.29	154.620	6,536.08	-5,350.34	2,157.89	5,756.53	0.84	0.83	0.09
15,051.00	87.96	153.910	6,537.53	-5,435.90	2,199.13	5,851.51	2.56	-2.45	-0.75
15,146.00	88.84	155.320	6,540.19	-5,521.69	2,239.84	5,946.46	1.75	0.93	1.48
15,241.00	90.02	151.010	6,541.13	-5,606.44	2,282.71	6,041.42	4.70	1.24	-4.54
15,336.00	90.24	152.510	6,540.92	-5,690.12	2,327.66	6,136.33	1.60	0.23	1.58
15,431.00	91.12	151.800	6,539.79	-5,774.12	2,372.03	6,231.25	1.19	0.93	-0.75
15,526.00	89.80	148.200	6,539.03	-5,856.37	2,419.52	6,325.97	4.04	-1.39	-3.79
15,621.00	90.46	147.760	6,538.81	-5,936.92	2,469.89	6,420.40	0.83	0.69	-0.46
15,717.00	94.46	150.130	6,534.69	-6,019.06	2,519.35	6,515.88	4.84	4.17	2.47
15,811.00	93.27	146.440	6,528.35	-6,098.82	2,568.65	6,609.14	4.12	-1.27	-3.93

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
15,906.00	93.98	145.390	6,522.35	-6,177.34	2,621.78	6,702.94	1.33	0.75	-1.11
15,998.00	92.09	145.830	6,517.48	-6,253.15	2,673.67	6,793.77	2.11	-2.05	0.48
16,093.00	90.59	146.090	6,515.25	-6,331.85	2,726.83	6,887.75	1.60	-1.58	0.27
16,188.00	88.18	146.440	6,516.27	-6,410.85	2,779.58	6,981.81	2.56	-2.54	0.37
16,282.00	88.48	146.440	6,519.01	-6,489.14	2,831.53	7,074.90	0.32	0.32	0.00
16,377.00	88.79	146.270	6,521.28	-6,568.21	2,884.14	7,168.97	0.37	0.33	-0.18
16,473.00	87.60	148.730	6,524.30	-6,649.12	2,935.70	7,264.25	2.85	-1.24	2.56
16,568.00	87.21	149.260	6,528.60	-6,730.47	2,984.58	7,358.76	0.69	-0.41	0.56
16,662.00	87.52	148.730	6,532.92	-6,810.95	3,032.95	7,452.26	0.65	0.33	-0.56
16,754.00	86.20	149.520	6,537.96	-6,889.79	3,080.09	7,543.75	1.67	-1.43	0.86
16,849.00	86.33	149.430	6,544.15	-6,971.45	3,128.24	7,638.22	0.17	0.14	-0.09
16,943.00	84.88	149.780	6,551.35	-7,052.29	3,175.66	7,731.64	1.59	-1.54	0.37
17,039.00	83.91	149.870	6,560.73	-7,134.88	3,223.68	7,826.89	1.01	-1.01	0.09
17,133.00	87.43	148.460	6,567.83	-7,215.35	3,271.72	7,920.24	4.03	3.74	-1.50
17,227.00	89.49	148.020	6,570.35	-7,295.24	3,321.18	8,013.68	2.24	2.19	-0.47
17,322.00	90.99	150.490	6,569.95	-7,376.88	3,369.74	8,108.31	3.04	1.58	2.60
17,416.00	91.21	150.570	6,568.15	-7,458.70	3,415.97	8,202.09	0.25	0.23	0.09
17,511.00	91.56	150.050	6,565.85	-7,541.21	3,463.01	8,296.84	0.66	0.37	-0.55
17,606.00	89.32	150.050	6,565.12	-7,623.51	3,510.44	8,391.58	2.36	-2.36	0.00
17,701.00	89.63	150.050	6,565.99	-7,705.82	3,557.86	8,486.32	0.33	0.33	0.00
17,796.00	89.89	150.570	6,566.39	-7,788.35	3,604.92	8,581.09	0.61	0.27	0.55
17,891.00	87.74	149.690	6,568.36	-7,870.71	3,652.22	8,675.82	2.45	-2.26	-0.93
17,986.00	88.13	149.260	6,571.78	-7,952.49	3,700.44	8,770.43	0.61	0.41	-0.45
18,081.00	86.90	147.320	6,575.90	-8,033.22	3,750.32	8,864.82	2.42	-1.29	-2.04
18,177.00	86.99	146.620	6,581.02	-8,113.59	3,802.57	8,959.91	0.73	0.09	-0.73
18,271.00	87.25	146.440	6,585.74	-8,191.91	3,854.35	9,052.94	0.34	0.28	-0.19
18,365.00	88.48	148.900	6,589.24	-8,271.27	3,904.58	9,146.25	2.92	1.31	2.62
18,459.00	88.48	148.640	6,591.73	-8,351.62	3,953.30	9,239.78	0.28	0.00	-0.28
18,555.00	91.30	148.640	6,591.92	-8,433.59	4,003.25	9,335.31	2.94	2.94	0.00
18,650.00	91.96	148.550	6,589.22	-8,514.64	4,052.73	9,429.81	0.70	0.69	-0.09
18,745.00	91.08	148.200	6,586.70	-8,595.50	4,102.53	9,524.28	1.00	-0.93	-0.37
18,840.00	89.71	148.200	6,586.04	-8,676.24	4,152.59	9,618.75	1.44	-1.44	0.00
18,935.00	89.85	148.200	6,586.41	-8,756.98	4,202.65	9,713.22	0.15	0.15	0.00
19,029.00	89.63	145.560	6,586.83	-8,835.70	4,254.00	9,806.43	2.82	-0.23	-2.81
19,125.00	91.03	145.480	6,586.28	-8,914.83	4,308.35	9,901.31	1.46	1.46	-0.08
19,166.00	90.90	145.480	6,585.59	-8,948.61	4,331.58	9,941.83	0.32	-0.32	0.00
Survey @ 19166.00 MD 6585.59 TVD									
19,220.00	90.90	145.480	6,584.74	-8,993.09	4,362.18	9,995.19	0.00	0.00	0.00
Survey projected to 19220.00 MD 6584.74 TVD									



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
14,291.00	6,551.85	-4,746.80	1,880.55	Tie into original hole @ 14291 MD
19,166.00	6,585.59	-8,948.61	4,331.58	Survey @ 19166.00 MD 6585.59 TVD



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_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	Hillrock/Simms				
Site Position:		Northing:	14,434,279.29 usft	Latitude:	39.74587001
From:	Lat/Long	Easting:	1,704,992.60 usft	Longitude:	-80.77026312
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.147 °

Well	Hillrock 07 HM (J)					
Well Position	+N/-S	0.00 ft	Northing:	14,434,303.28 usft	Latitude:	39.74593590
	+E/-W	0.00 ft	Easting:	1,704,992.31 usft	Longitude:	-80.77026393
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	1,219.00 ft

Wellbore	Sidetrack 01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/26/2019	-8.714	66.728	51,878.22205836

Design	Surveys Sidetrack 01				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	14,291.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00		154.250

Survey Program	Date	12/4/2019			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
182.00	931.00	MWD surf (Original Hole)	MWD	MWD - Standard	
1,031.00	2,785.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,907.00	14,291.00	MWD (Original Hole)	MWD	MWD - Standard	
14,336.00	19,166.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
19,220.00	19,220.00	Projection (Sidetrack 01)	MWD	MWD - Standard	

Survey										
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	0.000	0.00	0.00	0.00	14,434,303.28	1,704,992.31	39.74593590	-80.77026393	
182.00	0.05	155.610	182.00	-0.07	0.03	14,434,303.21	1,704,992.34	39.74593570	-80.77026381	
202.00	0.23	222.010	202.00	-0.11	0.01	14,434,303.17	1,704,992.32	39.74593560	-80.77026390	
249.00	0.51	160.840	249.00	-0.38	0.02	14,434,302.90	1,704,992.32	39.74593486	-80.77026388	
296.00	0.44	174.460	296.00	-0.75	0.10	14,434,302.53	1,704,992.41	39.74593383	-80.77026358	
340.00	0.62	165.000	340.00	-1.15	0.18	14,434,302.13	1,704,992.49	39.74593273	-80.77026330	
387.00	0.32	180.380	386.99	-1.53	0.24	14,434,301.75	1,704,992.55	39.74593170	-80.77026308	
432.00	0.42	164.130	431.99	-1.81	0.29	14,434,301.47	1,704,992.60	39.74593092	-80.77026292	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
479.00	0.27	187.020	478.99	-2.09	0.32	14,434,301.19	1,704,992.63	39.74593016	-80.77026280	
522.00	0.45	115.180	521.99	-2.26	0.46	14,434,301.02	1,704,992.77	39.74592969	-80.77026231	
569.00	0.37	179.420	568.99	-2.49	0.63	14,434,300.79	1,704,992.94	39.74592905	-80.77026171	
614.00	0.35	158.870	613.99	-2.77	0.68	14,434,300.52	1,704,992.99	39.74592830	-80.77026153	
661.00	0.09	175.150	660.99	-2.94	0.74	14,434,300.35	1,704,993.05	39.74592783	-80.77026134	
704.00	0.21	204.220	703.99	-3.04	0.71	14,434,300.24	1,704,993.02	39.74592754	-80.77026144	
751.00	0.10	148.530	750.99	-3.16	0.69	14,434,300.13	1,704,993.00	39.74592723	-80.77026149	
794.00	0.14	125.150	793.99	-3.22	0.76	14,434,300.06	1,704,993.06	39.74592706	-80.77026127	
889.00	0.18	177.030	888.99	-3.43	0.86	14,434,299.85	1,704,993.17	39.74592647	-80.77026091	
931.00	0.07	3.010	930.99	-3.47	0.86	14,434,299.81	1,704,993.17	39.74592635	-80.77026089	
1,031.00	0.15	359.600	1,030.99	-3.28	0.87	14,434,300.00	1,704,993.17	39.74592688	-80.77026088	
1,077.00	0.02	98.800	1,076.99	-3.22	0.87	14,434,300.06	1,704,993.18	39.74592704	-80.77026085	
1,124.00	0.07	138.910	1,123.99	-3.25	0.90	14,434,300.04	1,704,993.21	39.74592698	-80.77026076	
1,172.00	0.20	131.900	1,171.99	-3.32	0.98	14,434,299.96	1,704,993.29	39.74592677	-80.77026047	
1,267.00	0.20	111.500	1,266.99	-3.50	1.26	14,434,299.79	1,704,993.57	39.74592629	-80.77025948	
1,363.00	0.89	265.810	1,362.98	-3.61	0.67	14,434,299.67	1,704,992.98	39.74592598	-80.77026157	
1,458.00	1.76	272.160	1,457.96	-3.61	-1.52	14,434,299.67	1,704,990.79	39.74592600	-80.77026938	
1,553.00	3.03	273.860	1,552.87	-3.39	-5.49	14,434,299.90	1,704,986.82	39.74592664	-80.77028348	
1,648.00	4.00	271.260	1,647.69	-3.14	-11.30	14,434,300.14	1,704,981.01	39.74592735	-80.77030417	
1,743.00	5.36	268.820	1,742.37	-3.16	-19.05	14,434,300.12	1,704,973.26	39.74592735	-80.77033174	
1,836.00	6.92	271.490	1,834.84	-3.11	-29.00	14,434,300.17	1,704,963.31	39.74592757	-80.77036712	
1,931.00	8.42	278.740	1,928.99	-1.90	-41.59	14,434,301.38	1,704,950.72	39.74593097	-80.77041192	
2,026.00	10.95	292.880	2,022.64	2.67	-56.78	14,434,305.95	1,704,935.52	39.74594362	-80.77046592	
2,121.00	13.66	302.520	2,115.46	12.21	-74.56	14,434,315.49	1,704,917.75	39.74596995	-80.77052908	
2,217.00	16.72	311.810	2,208.11	27.51	-94.42	14,434,330.79	1,704,897.89	39.74601212	-80.77059959	
2,312.00	19.25	315.840	2,298.46	47.86	-115.52	14,434,351.14	1,704,876.79	39.74606816	-80.77067447	
2,407.00	23.73	312.770	2,386.84	72.09	-140.48	14,434,375.37	1,704,851.83	39.74613487	-80.77076303	
2,501.00	28.72	310.600	2,471.14	99.65	-171.53	14,434,402.93	1,704,820.78	39.74621077	-80.77087326	
2,595.00	32.16	310.040	2,552.17	130.45	-207.84	14,434,433.73	1,704,784.47	39.74629562	-80.77100216	
2,690.00	33.18	314.290	2,632.15	164.87	-245.81	14,434,468.16	1,704,746.50	39.74639042	-80.77113693	
2,755.00	32.59	314.770	2,686.73	189.62	-270.97	14,434,492.90	1,704,721.34	39.74645856	-80.77122622	
2,785.00	33.09	315.630	2,711.94	201.17	-282.43	14,434,504.45	1,704,709.87	39.74649035	-80.77126689	
2,907.00	35.75	313.270	2,812.57	249.41	-331.68	14,434,552.69	1,704,660.62	39.74662319	-80.77144167	
2,970.00	35.77	312.700	2,863.70	274.51	-358.62	14,434,577.80	1,704,633.69	39.74669231	-80.77153725	
3,064.00	36.86	314.810	2,939.44	313.02	-398.81	14,434,616.30	1,704,593.50	39.74679834	-80.77167990	
3,158.00	37.40	318.810	3,014.39	354.38	-437.62	14,434,657.66	1,704,554.69	39.74691219	-80.77181759	
3,254.00	36.65	316.710	3,091.04	397.17	-476.47	14,434,700.45	1,704,515.84	39.74703000	-80.77195541	
3,349.00	35.89	318.420	3,167.63	438.64	-514.39	14,434,741.92	1,704,477.92	39.74714415	-80.77208996	
3,444.00	35.13	321.960	3,244.97	481.00	-549.72	14,434,784.29	1,704,442.59	39.74726073	-80.77221526	
3,537.00	33.72	319.760	3,321.69	521.79	-582.89	14,434,825.07	1,704,409.42	39.74737296	-80.77233289	
3,632.00	34.82	319.030	3,400.19	562.40	-617.70	14,434,865.68	1,704,374.61	39.74748473	-80.77245639	
3,726.00	36.43	318.880	3,476.60	603.69	-653.66	14,434,906.97	1,704,338.65	39.74759838	-80.77258393	
3,821.00	37.08	318.930	3,552.71	646.53	-691.02	14,434,949.81	1,704,301.29	39.74771630	-80.77271648	
3,916.00	36.20	317.010	3,628.94	688.64	-728.97	14,434,991.92	1,704,263.34	39.74783222	-80.77285110	
4,011.00	35.47	317.320	3,705.96	729.43	-766.79	14,435,032.71	1,704,225.52	39.74794449	-80.77298527	
4,106.00	34.54	319.590	3,783.78	770.20	-802.93	14,435,073.48	1,704,189.38	39.74805671	-80.77311350	
4,201.00	34.39	320.120	3,862.10	811.29	-837.59	14,435,114.57	1,704,154.72	39.74816981	-80.77323644	
4,295.00	34.59	317.200	3,939.58	851.25	-872.74	14,435,154.53	1,704,119.57	39.74827977	-80.77336114	
4,390.00	34.97	315.810	4,017.61	890.55	-910.04	14,435,193.83	1,704,082.27	39.74838798	-80.77349349	
4,485.00	34.89	315.790	4,095.50	929.55	-947.97	14,435,232.83	1,704,044.34	39.74849534	-80.77362805	
4,580.00	34.31	315.490	4,173.70	968.12	-985.68	14,435,271.40	1,704,006.63	39.74860152	-80.77376189	
4,676.00	34.21	314.730	4,253.04	1,006.41	-1,023.82	14,435,309.69	1,703,968.49	39.74870693	-80.77389724	
4,770.00	35.19	315.620	4,330.32	1,044.36	-1,061.54	14,435,347.64	1,703,930.77	39.74881143	-80.77403109	
4,864.00	35.08	317.950	4,407.20	1,083.78	-1,098.58	14,435,387.06	1,703,893.73	39.74891994	-80.77416250	
4,959.00	35.74	318.900	4,484.63	1,124.96	-1,135.10	14,435,428.24	1,703,857.21	39.74903329	-80.77429208	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
5,053.00	36.74	319.460	4,560.44	1,167.02	-1,171.42	14,435,470.29	1,703,820.89	39.74914903	-80.77442093	
5,148.00	35.37	318.650	4,637.24	1,209.25	-1,208.06	14,435,512.53	1,703,784.25	39.74926528	-80.77455089	
5,242.00	34.18	317.480	4,714.45	1,249.14	-1,243.88	14,435,552.42	1,703,748.43	39.74937506	-80.77467797	
5,337.00	35.33	317.320	4,792.50	1,289.00	-1,280.54	14,435,592.28	1,703,711.77	39.74948479	-80.77480804	
5,431.00	33.25	317.090	4,870.16	1,327.86	-1,316.51	14,435,631.14	1,703,675.80	39.74959176	-80.77493568	
5,526.00	33.42	317.890	4,949.53	1,366.34	-1,351.79	14,435,669.62	1,703,640.53	39.74969769	-80.77506083	
5,620.00	34.51	318.180	5,027.49	1,405.39	-1,386.90	14,435,708.67	1,703,605.41	39.74980517	-80.77518542	
5,715.00	35.89	316.040	5,105.12	1,445.50	-1,424.18	14,435,748.78	1,703,568.13	39.74991557	-80.77531768	
5,810.00	35.76	314.910	5,182.15	1,485.14	-1,463.17	14,435,788.42	1,703,529.14	39.75002470	-80.77545604	
5,905.00	35.27	314.780	5,259.48	1,524.06	-1,502.29	14,435,827.33	1,703,490.02	39.75013185	-80.77559491	
5,967.00	34.17	313.840	5,310.44	1,548.73	-1,527.56	14,435,852.00	1,703,464.75	39.75019977	-80.77568458	
6,039.00	33.71	313.080	5,370.17	1,576.38	-1,556.74	14,435,879.66	1,703,435.57	39.75027591	-80.77578814	
6,133.00	33.41	313.000	5,448.50	1,611.84	-1,594.72	14,435,915.12	1,703,397.60	39.75037357	-80.77592294	
6,228.00	25.32	310.620	5,531.23	1,642.96	-1,629.32	14,435,946.24	1,703,362.99	39.75045926	-80.77604579	
6,323.00	18.24	304.120	5,619.40	1,664.55	-1,657.09	14,435,967.83	1,703,335.22	39.75051876	-80.77614439	
6,419.00	10.33	290.670	5,712.39	1,676.04	-1,677.62	14,435,979.32	1,703,314.69	39.75055045	-80.77621733	
6,513.00	8.26	245.760	5,805.26	1,676.24	-1,691.68	14,435,979.52	1,703,300.63	39.75055110	-80.77626735	
6,609.00	9.89	209.200	5,900.13	1,666.21	-1,702.00	14,435,969.49	1,703,290.31	39.75052361	-80.77630416	
6,703.00	15.21	182.040	5,991.93	1,646.81	-1,706.38	14,435,950.09	1,703,285.93	39.75047036	-80.77631993	
6,798.00	22.42	168.240	6,081.84	1,616.56	-1,703.13	14,435,919.84	1,703,289.18	39.75038728	-80.77630862	
6,893.00	28.57	158.400	6,167.59	1,577.65	-1,691.06	14,435,880.93	1,703,301.25	39.75028034	-80.77626601	
6,988.00	35.87	153.740	6,247.91	1,531.50	-1,670.35	14,435,834.78	1,703,321.96	39.75015345	-80.77619275	
7,083.00	44.62	151.100	6,320.36	1,477.22	-1,641.85	14,435,780.50	1,703,350.46	39.75000419	-80.77609185	
7,178.00	53.93	149.520	6,382.28	1,414.79	-1,606.17	14,435,718.06	1,703,386.14	39.74983248	-80.77596546	
7,273.00	62.07	151.720	6,432.58	1,344.61	-1,566.75	14,435,647.89	1,703,425.57	39.74963950	-80.77582581	
7,368.00	69.80	154.260	6,471.30	1,267.37	-1,527.44	14,435,570.65	1,703,464.87	39.74942710	-80.77568665	
7,464.00	76.44	154.970	6,499.16	1,184.42	-1,488.09	14,435,487.70	1,703,504.22	39.74919902	-80.77554739	
7,557.00	81.80	153.300	6,516.70	1,102.28	-1,448.25	14,435,405.56	1,703,544.06	39.74897316	-80.77540639	
7,651.00	85.67	149.260	6,526.96	1,020.38	-1,403.36	14,435,323.66	1,703,588.95	39.74874792	-80.77524740	
7,747.00	90.20	147.410	6,530.42	938.75	-1,353.01	14,435,242.03	1,703,639.30	39.74852340	-80.77506900	
7,840.00	90.59	150.930	6,529.78	858.90	-1,305.36	14,435,162.18	1,703,686.96	39.74830379	-80.77490018	
7,937.00	88.92	152.950	6,530.20	773.31	-1,259.73	14,435,076.59	1,703,732.58	39.74806842	-80.77473863	
8,032.00	88.31	152.510	6,532.49	688.90	-1,216.22	14,434,992.18	1,703,776.09	39.74783629	-80.77458457	
8,127.00	87.74	152.420	6,535.77	604.71	-1,172.33	14,434,907.99	1,703,819.99	39.74760478	-80.77442917	
8,222.00	90.37	151.450	6,537.33	520.90	-1,127.64	14,434,824.18	1,703,864.67	39.74737431	-80.77427095	
8,317.00	90.11	151.190	6,536.94	437.56	-1,082.05	14,434,740.84	1,703,910.26	39.74714511	-80.77410950	
8,412.00	89.98	150.220	6,536.86	354.71	-1,035.57	14,434,657.99	1,703,956.74	39.74691726	-80.77394487	
8,507.00	89.93	149.780	6,536.94	272.43	-988.07	14,434,575.71	1,704,004.24	39.74669098	-80.77377662	
8,602.00	90.99	151.190	6,536.17	189.77	-941.27	14,434,493.05	1,704,051.04	39.74646364	-80.77361087	
8,697.00	90.81	150.930	6,534.68	106.64	-895.30	14,434,409.92	1,704,097.01	39.74623503	-80.77344810	
8,792.00	90.51	150.400	6,533.59	23.83	-848.76	14,434,327.11	1,704,143.55	39.74600728	-80.77328328	
8,887.00	90.07	149.430	6,533.11	-58.37	-801.14	14,434,244.91	1,704,191.17	39.74578120	-80.77311460	
8,982.00	91.91	151.100	6,531.46	-140.84	-754.04	14,434,162.44	1,704,238.27	39.74555438	-80.77294775	
9,076.00	91.65	151.190	6,528.54	-223.13	-708.69	14,434,080.15	1,704,283.62	39.74532808	-80.77278719	
9,172.00	91.91	153.030	6,525.56	-307.94	-663.81	14,433,995.35	1,704,328.50	39.74509487	-80.77262828	
9,267.00	89.49	154.530	6,524.40	-393.15	-621.85	14,433,910.14	1,704,370.46	39.74486056	-80.77247976	
9,362.00	89.80	155.670	6,524.99	-479.31	-581.85	14,433,823.97	1,704,410.46	39.74462365	-80.77233824	
9,457.00	87.60	154.180	6,527.15	-565.33	-541.60	14,433,737.95	1,704,450.71	39.74438714	-80.77219584	
9,551.00	87.16	152.330	6,531.44	-649.18	-499.35	14,433,654.10	1,704,492.96	39.74415656	-80.77204628	
9,646.00	89.27	149.340	6,534.40	-732.08	-453.08	14,433,571.20	1,704,539.23	39.74392857	-80.77188243	
9,741.00	89.27	148.460	6,535.61	-813.42	-404.01	14,433,489.86	1,704,588.30	39.74370485	-80.77170862	
9,835.00	88.35	147.850	6,537.57	-893.25	-354.43	14,433,410.03	1,704,637.88	39.74348526	-80.77153294	
9,929.00	90.86	147.850	6,538.21	-972.83	-304.41	14,433,330.45	1,704,687.90	39.74326637	-80.77135574	
10,024.00	90.68	148.200	6,536.94	-1,053.41	-254.11	14,433,249.87	1,704,738.20	39.74304472	-80.77117752	
10,118.00	90.51	147.760	6,535.96	-1,133.11	-204.27	14,433,170.18	1,704,788.04	39.74282551	-80.77100095	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,213.00	90.46	147.150	6,535.16	-1,213.18	-153.17	14,433,090.10	1,704,839.14	39.74260523	-80.77081988	
10,309.00	90.33	146.970	6,534.49	-1,293.75	-100.97	14,433,009.54	1,704,891.34	39.74238361	-80.77063491	
10,404.00	90.73	149.520	6,533.62	-1,374.52	-50.98	14,432,928.77	1,704,941.33	39.74216144	-80.77045781	
10,498.00	90.15	149.610	6,532.89	-1,455.56	-3.36	14,432,847.72	1,704,988.95	39.74193853	-80.77028917	
10,593.00	89.54	149.520	6,533.15	-1,537.47	44.76	14,432,765.81	1,705,037.07	39.74171325	-80.77011872	
10,688.00	89.23	149.340	6,534.17	-1,619.26	93.07	14,432,684.02	1,705,085.38	39.74148829	-80.76994760	
10,783.00	88.53	148.640	6,536.03	-1,700.67	142.01	14,432,602.62	1,705,134.32	39.74126438	-80.76977427	
10,878.00	90.24	150.130	6,537.05	-1,782.42	190.38	14,432,520.87	1,705,182.69	39.74103953	-80.76960294	
10,973.00	89.71	149.780	6,537.09	-1,864.65	237.95	14,432,438.64	1,705,230.25	39.74081336	-80.76943448	
11,067.00	89.32	149.340	6,537.88	-1,945.69	285.57	14,432,357.60	1,705,277.88	39.74059046	-80.76926582	
11,163.00	89.10	148.730	6,539.21	-2,028.00	334.96	14,432,275.29	1,705,327.26	39.74036407	-80.76909088	
11,257.00	90.42	151.100	6,539.60	-2,109.33	382.07	14,432,193.96	1,705,374.38	39.74014038	-80.76892403	
11,353.00	90.24	150.130	6,539.05	-2,192.97	429.18	14,432,110.31	1,705,421.48	39.73991033	-80.76875723	
11,448.00	90.02	149.690	6,538.83	-2,275.17	476.80	14,432,028.11	1,705,469.11	39.73968426	-80.76858856	
11,511.00	89.89	149.610	6,538.88	-2,329.54	508.64	14,431,973.75	1,705,500.94	39.73953472	-80.76847582	
11,575.00	89.89	149.170	6,539.01	-2,384.62	541.22	14,431,918.67	1,705,533.53	39.73938322	-80.76836040	
11,637.00	89.89	148.820	6,539.12	-2,437.76	573.16	14,431,865.53	1,705,565.47	39.73923705	-80.76824728	
11,731.00	90.20	151.890	6,539.05	-2,519.45	619.65	14,431,783.84	1,705,611.96	39.73901239	-80.76808266	
11,826.00	90.07	152.510	6,538.83	-2,603.48	663.96	14,431,699.81	1,705,656.26	39.73878129	-80.76792583	
11,921.00	89.45	151.800	6,539.22	-2,687.48	708.33	14,431,615.81	1,705,700.64	39.73855029	-80.76776876	
12,015.00	89.27	152.070	6,540.27	-2,770.42	752.55	14,431,532.87	1,705,744.86	39.73832220	-80.76761222	
12,110.00	91.03	150.310	6,540.03	-2,853.66	798.33	14,431,449.63	1,705,790.63	39.73809328	-80.76745015	
12,205.00	90.59	150.570	6,538.68	-2,936.28	845.19	14,431,367.00	1,705,837.50	39.73786603	-80.76728422	
12,300.00	89.89	149.960	6,538.29	-3,018.77	892.31	14,431,284.52	1,705,884.61	39.73763916	-80.76711737	
12,395.00	89.19	150.220	6,539.05	-3,101.12	939.68	14,431,202.17	1,705,931.98	39.73741268	-80.76694963	
12,490.00	88.70	150.130	6,540.80	-3,183.52	986.92	14,431,119.77	1,705,979.22	39.73718604	-80.76678236	
12,585.00	91.12	149.870	6,540.95	-3,265.79	1,034.41	14,431,037.50	1,706,026.72	39.73695977	-80.76661417	
12,680.00	90.90	149.870	6,539.27	-3,347.94	1,082.09	14,430,955.35	1,706,074.40	39.73673382	-80.76644533	
12,773.00	90.24	149.780	6,538.35	-3,428.33	1,128.84	14,430,874.96	1,706,121.14	39.73651270	-80.76627980	
12,869.00	89.45	149.170	6,538.61	-3,511.02	1,177.59	14,430,792.26	1,706,169.90	39.73628525	-80.76610713	
12,963.00	88.92	149.080	6,539.94	-3,591.69	1,225.83	14,430,711.59	1,706,218.13	39.73606336	-80.76593631	
13,058.00	89.85	150.660	6,540.96	-3,673.85	1,273.51	14,430,629.44	1,706,265.82	39.73583739	-80.76576746	
13,153.00	89.19	149.780	6,541.76	-3,756.30	1,320.69	14,430,546.99	1,706,313.00	39.73561062	-80.76560040	
13,247.00	88.31	149.610	6,543.81	-3,837.44	1,368.11	14,430,465.85	1,706,360.42	39.73538746	-80.76543248	
13,342.00	89.89	151.280	6,545.30	-3,920.06	1,414.96	14,430,383.23	1,706,407.27	39.73516022	-80.76526660	
13,437.00	89.76	150.930	6,545.59	-4,003.23	1,460.87	14,430,300.06	1,706,453.17	39.73493147	-80.76510409	
13,532.00	89.49	150.130	6,546.21	-4,085.94	1,507.60	14,430,217.35	1,706,499.91	39.73470400	-80.76493863	
13,627.00	88.66	149.690	6,547.75	-4,168.12	1,555.22	14,430,135.17	1,706,547.53	39.73447795	-80.76477000	
13,722.00	91.25	151.100	6,547.82	-4,250.71	1,602.15	14,430,052.58	1,706,594.46	39.73425080	-80.76460385	
13,817.00	91.03	150.750	6,545.93	-4,333.72	1,648.31	14,429,969.57	1,706,640.61	39.73402249	-80.76444045	
13,912.00	90.46	150.750	6,544.70	-4,416.60	1,694.72	14,429,886.69	1,706,687.03	39.73379455	-80.76427613	
14,007.00	89.58	150.570	6,544.66	-4,499.42	1,741.27	14,429,803.87	1,706,733.58	39.73356678	-80.76411133	
14,102.00	88.79	150.930	6,546.01	-4,582.30	1,787.68	14,429,721.00	1,706,779.99	39.73333884	-80.76394702	
14,196.00	88.31	150.400	6,548.39	-4,664.21	1,833.72	14,429,639.08	1,706,826.03	39.73311353	-80.76378403	
14,291.00	87.52	150.490	6,551.85	-4,746.80	1,880.55	14,429,556.49	1,706,872.85	39.73288639	-80.76361824	
Tie into original hole @ 14291 MD										
14,336.00	87.21	153.390	6,553.92	-4,786.46	1,901.69	14,429,516.83	1,706,894.00	39.73277731	-80.76354341	
14,385.00	89.10	154.970	6,555.50	-4,830.54	1,923.02	14,429,472.75	1,706,915.33	39.73265609	-80.76346796	
14,480.00	94.86	157.520	6,552.21	-4,917.40	1,961.25	14,429,385.89	1,706,953.56	39.73241729	-80.76333280	
14,575.00	92.62	156.290	6,546.02	-5,004.59	1,998.43	14,429,298.70	1,706,990.74	39.73217756	-80.76320136	
14,670.00	93.36	155.580	6,541.06	-5,091.21	2,037.12	14,429,212.08	1,707,029.42	39.73193939	-80.76306458	
14,765.00	91.69	155.410	6,536.88	-5,177.57	2,076.48	14,429,125.72	1,707,068.79	39.73170194	-80.76292538	
14,860.00	89.49	154.530	6,535.90	-5,263.64	2,116.67	14,429,039.65	1,707,108.98	39.73146529	-80.76278324	
14,956.00	90.29	154.620	6,536.08	-5,350.34	2,157.89	14,428,952.95	1,707,150.19	39.73122688	-80.76263746	
15,051.00	87.96	153.910	6,537.53	-5,435.90	2,199.13	14,428,867.39	1,707,191.43	39.73099160	-80.76249158	

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
15,146.00	88.84	155.320	6,540.19	-5,521.69	2,239.84	14,428,781.60	1,707,232.14	39.73075570	-80.76234759	
15,241.00	90.02	151.010	6,541.13	-5,606.44	2,282.71	14,428,696.86	1,707,275.01	39.73052266	-80.76219590	
15,336.00	90.24	152.510	6,540.92	-5,690.12	2,327.66	14,428,613.17	1,707,319.96	39.73029249	-80.76203682	
15,431.00	91.12	151.800	6,539.79	-5,774.12	2,372.03	14,428,529.18	1,707,364.33	39.73006150	-80.76187980	
15,526.00	89.80	148.200	6,539.03	-5,856.37	2,419.52	14,428,446.92	1,707,411.82	39.72983526	-80.76171167	
15,621.00	90.46	147.760	6,538.81	-5,936.92	2,469.89	14,428,366.38	1,707,462.19	39.72961369	-80.76153327	
15,717.00	94.46	150.130	6,534.69	-6,019.06	2,519.35	14,428,284.23	1,707,511.66	39.72938774	-80.76135811	
15,811.00	93.27	146.440	6,528.35	-6,098.82	2,568.65	14,428,204.47	1,707,560.95	39.72916833	-80.76118354	
15,906.00	93.98	145.390	6,522.35	-6,177.34	2,621.78	14,428,125.95	1,707,614.08	39.72895230	-80.76099531	
15,998.00	92.09	145.830	6,517.48	-6,253.15	2,673.67	14,428,050.14	1,707,665.97	39.72874372	-80.76081148	
16,093.00	90.59	146.090	6,515.25	-6,331.85	2,726.83	14,427,971.44	1,707,719.13	39.72852720	-80.76062314	
16,188.00	88.18	146.440	6,516.27	-6,410.85	2,779.58	14,427,892.45	1,707,771.89	39.72830988	-80.76043627	
16,282.00	88.48	146.440	6,519.01	-6,489.14	2,831.53	14,427,814.15	1,707,823.83	39.72809447	-80.76025227	
16,377.00	88.79	146.270	6,521.28	-6,568.21	2,884.14	14,427,735.09	1,707,876.45	39.72787695	-80.76006588	
16,473.00	87.60	148.730	6,524.30	-6,649.12	2,935.70	14,427,654.17	1,707,928.00	39.72765435	-80.75988330	
16,568.00	87.21	149.260	6,528.60	-6,730.47	2,984.58	14,427,572.83	1,707,976.88	39.72743060	-80.75971021	
16,662.00	87.52	148.730	6,532.92	-6,810.95	3,032.95	14,427,492.35	1,708,025.25	39.72720921	-80.75953894	
16,754.00	86.20	149.520	6,537.96	-6,889.79	3,080.09	14,427,413.50	1,708,072.39	39.72699234	-80.75937204	
16,849.00	86.33	149.430	6,544.15	-6,971.45	3,128.24	14,427,331.84	1,708,120.54	39.72676772	-80.75920157	
16,943.00	84.88	149.780	6,551.35	-7,052.29	3,175.66	14,427,251.00	1,708,167.96	39.72654536	-80.75903369	
17,039.00	83.91	149.870	6,560.73	-7,134.88	3,223.68	14,427,168.41	1,708,215.98	39.72631818	-80.75886368	
17,133.00	87.43	148.460	6,567.83	-7,215.35	3,271.72	14,427,087.95	1,708,264.02	39.72609684	-80.75869361	
17,227.00	89.49	148.020	6,570.35	-7,295.24	3,321.18	14,427,008.05	1,708,313.48	39.72587707	-80.75851847	
17,322.00	90.99	150.490	6,569.95	-7,376.88	3,369.74	14,426,926.42	1,708,362.04	39.72565251	-80.75834655	
17,416.00	91.21	150.570	6,568.15	-7,458.70	3,415.97	14,426,844.59	1,708,408.27	39.72542746	-80.75818289	
17,511.00	91.56	150.050	6,565.85	-7,541.21	3,463.01	14,426,762.09	1,708,455.31	39.72520053	-80.75801638	
17,606.00	89.32	150.050	6,565.12	-7,623.51	3,510.44	14,426,679.78	1,708,502.74	39.72497414	-80.75784851	
17,701.00	89.63	150.050	6,565.99	-7,705.82	3,557.86	14,426,597.47	1,708,550.16	39.72474774	-80.75768063	
17,796.00	89.89	150.570	6,566.39	-7,788.35	3,604.92	14,426,514.95	1,708,597.22	39.72452075	-80.75751408	
17,891.00	87.74	149.690	6,568.36	-7,870.71	3,652.22	14,426,432.59	1,708,644.52	39.72429422	-80.75734665	
17,986.00	88.13	149.260	6,571.78	-7,952.49	3,700.44	14,426,350.81	1,708,692.74	39.72406927	-80.75717594	
18,081.00	86.90	147.320	6,575.90	-8,033.22	3,750.32	14,426,270.07	1,708,742.62	39.72384717	-80.75699931	
18,177.00	86.99	146.620	6,581.02	-8,113.59	3,802.57	14,426,189.70	1,708,794.87	39.72362606	-80.75681425	
18,271.00	87.25	146.440	6,585.74	-8,191.91	3,854.35	14,426,111.39	1,708,846.65	39.72341061	-80.75663087	
18,365.00	88.48	148.900	6,589.24	-8,271.27	3,904.58	14,426,032.02	1,708,896.88	39.72319227	-80.75645300	
18,459.00	88.48	148.640	6,591.73	-8,351.62	3,953.30	14,425,951.67	1,708,945.60	39.72297124	-80.75628051	
18,555.00	91.30	148.640	6,591.92	-8,433.59	4,003.25	14,425,869.71	1,708,995.55	39.72274576	-80.75610364	
18,650.00	91.96	148.550	6,589.22	-8,514.64	4,052.73	14,425,788.66	1,709,045.03	39.72252280	-80.75592845	
18,745.00	91.08	148.200	6,586.70	-8,595.50	4,102.53	14,425,707.79	1,709,094.83	39.72230036	-80.75575214	
18,840.00	89.71	148.200	6,586.04	-8,676.24	4,152.59	14,425,627.06	1,709,144.89	39.72207826	-80.75557489	
18,935.00	89.85	148.200	6,586.41	-8,756.98	4,202.65	14,425,546.32	1,709,194.95	39.72185615	-80.75539764	
19,029.00	89.63	145.560	6,586.83	-8,835.70	4,254.00	14,425,467.60	1,709,246.30	39.72163958	-80.75521577	
19,125.00	91.03	145.480	6,586.28	-8,914.83	4,308.35	14,425,388.47	1,709,300.65	39.72142185	-80.75502327	
19,166.00	90.90	145.480	6,585.59	-8,948.61	4,331.58	14,425,354.69	1,709,323.88	39.72132892	-80.75494098	
Survey @ 19166.00 MD 6585.59 TVD										
19,220.00	90.90	145.480	6,584.74	-8,993.09	4,362.18	14,425,310.21	1,709,354.48	39.72120651	-80.75483260	
Survey projected to 19220.00 MD 6584.74 TVD										

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Hillrock 07 HM (J)
Project:	Marshall County, West Virginia	TVD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Site:	Hillrock/Simms	MD Reference:	RKB=1219+18 @ 1237.00ft (Precision 528)
Well:	Hillrock 07 HM (J)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Aug1919_v14

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
14,291.00	6,551.85	-4,746.80	1,880.55	Tie into original hole @ 14291 MD
19,166.00	6,585.59	-8,948.61	4,331.58	Survey @ 19166.00 MD 6585.59 TVD
19,220.00	6,584.74	-8,993.09	4,362.18	Survey projected to 19220.00 MD 6584.74 TVD