



Well: Hillrock 1S-12 HU (D)  
 Site: Hillrock/Simms  
 Project: Marshall County, West Virginia  
 Design: rev5  
 Rig: Nabors B28

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	10267.00	15.30	280.280	10164.38	95.19	-1066.04	0.00	0.000	-517.64	Tie in survey @ 10267 MD
2	10330.00	12.50	275.872	10225.53	97.37	-1081.00	4.75	-161.413	-525.68	S/T Begin 3°/100' build/turn (90R)
3	10360.00	12.53	280.023	10254.82	98.27	-1087.44	3.00	90.000	-529.10	Begin 12.53° tangent
4	10410.00	12.53	280.023	10303.62	100.16	-1098.12	0.00	0.000	-535.15	Begin 6.03°/100' build/turn
5	11313.11	48.37	165.466	11105.73	-235.18	-1110.88	6.03	-123.346	-233.53	Begin 6.03°/100' build/turn
6	11363.49	50.00	168.860	11138.66	-272.35	-1102.42	6.03	58.791	-196.11	Begin 8°/100' build/turn
7	11897.21	89.10	150.001	11323.00	-725.16	-921.04	8.00	-28.465	291.38	Begin 89.10° lateral
8	22449.70	89.10	150.001	11489.00	-9862.80	4354.46	0.00	0.000	0781.29	PBHL/TD 22449.70 MD/11489.00 TVD

ANNOTATIONS SURVEYS ORIGINAL HOLE

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
249.00	0.53	251.100	249.00	-0.37	-1.09	-0.10	MWD surveys
10598.00	17.19	217.530	10486.73	75.77	-1131.49	-526.32	Survey @ 10598.00 MD 10486.73 TVD
10689.00	21.02	203.000	10572.75	50.06	-1146.07	-508.69	Survey projected to 10689.00 MD 10572.75 TVD

ANNOTATIONS SURVEYS SIDETRACK 01

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
10267.00	15.30	280.280	10164.38	95.19	-1066.04	-517.64	Tie into original hole @ 10267 MD
22406.00	88.53	148.800	11505.33	-9813.71	4320.94	10722.84	Survey @ 22406.00 MD 11505.33 TVD
22462.00	88.53	148.800	11506.76	-9861.60	4349.94	10778.36	Survey projected to 22462.00 MD 11506.76 TVD

Geodetic System: Universal Transverse Mercator (US Survey Feet)  
 Datum: NAD83 West Virginia - HARN  
 Ellipsoid: GRS 1980  
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level  
 Depth Reference: RKB=1219+26 @ 1245.00ft (Nabors B28)

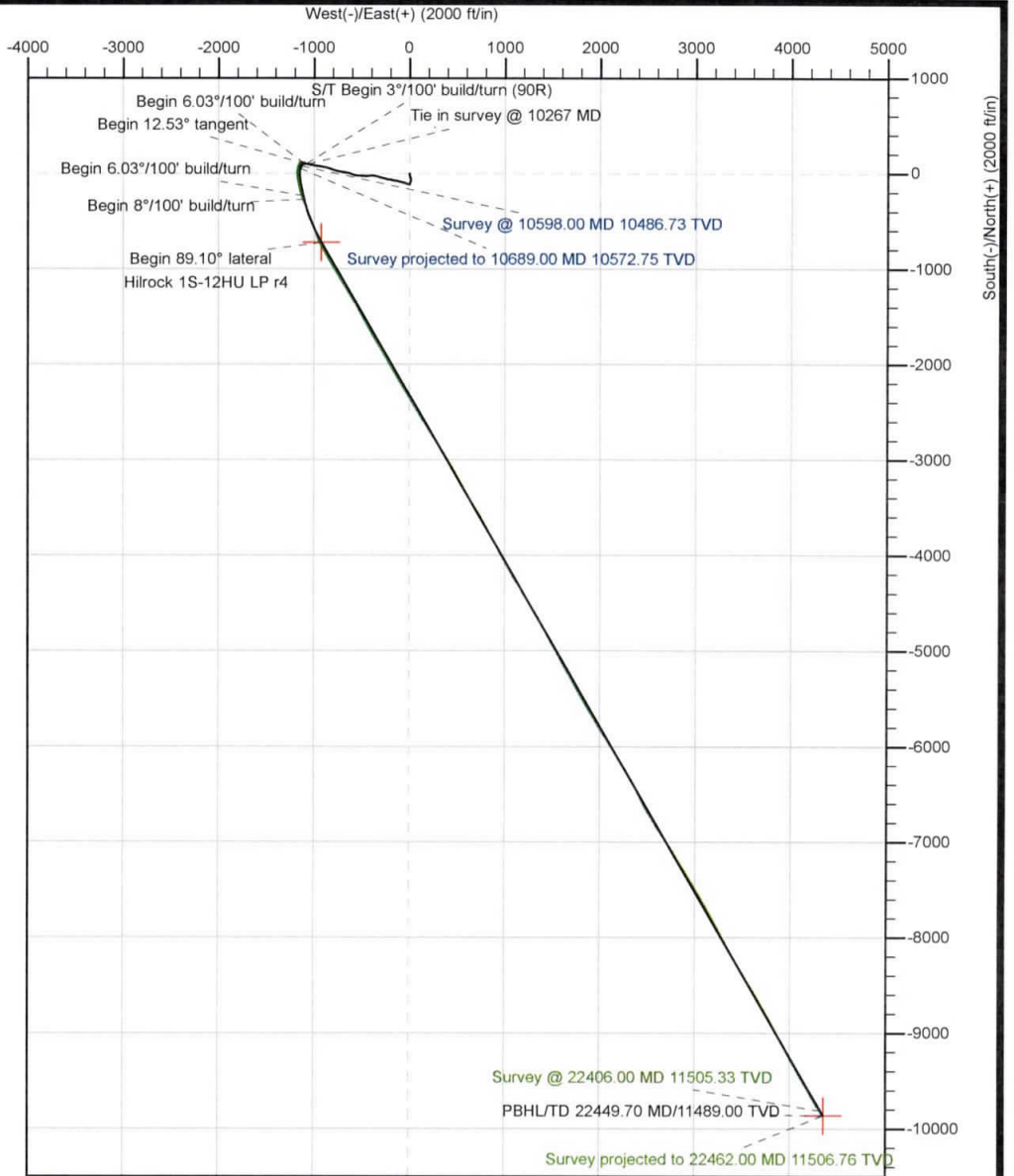
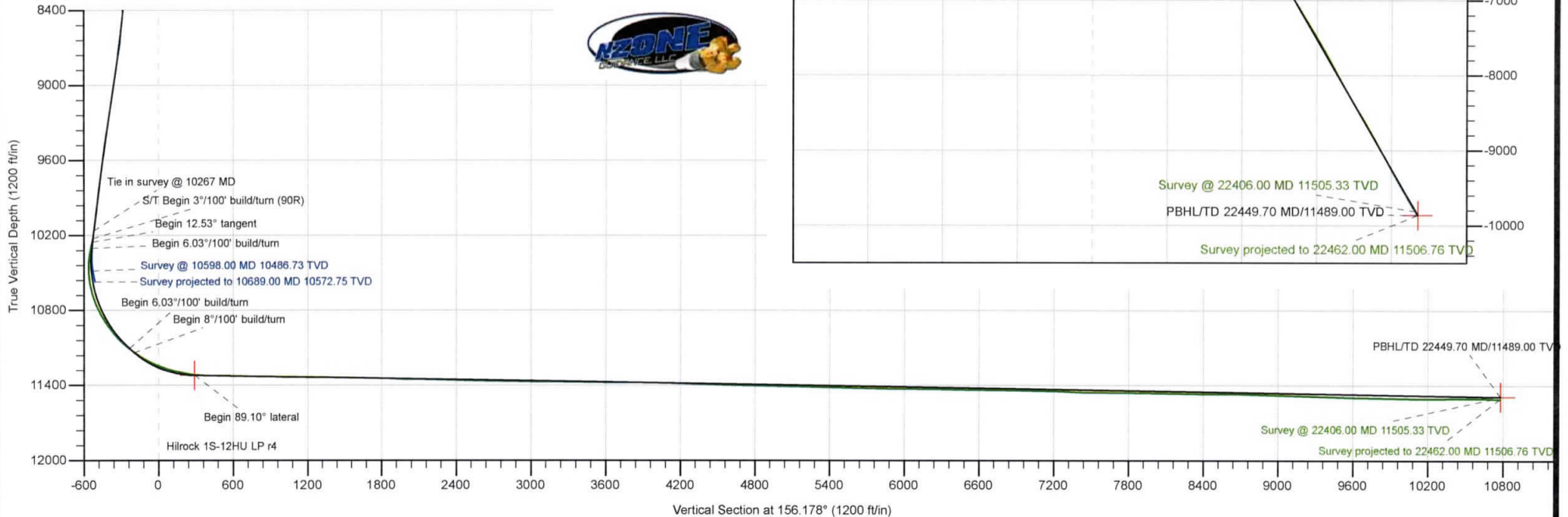
Northing	Easting	Latitude	Longitude
14434227.87	1704993.21	39.74572880	-80.77026140



Azimuths to Grid North  
 True North: -0.15°  
 Magnetic North: -8.88°

Magnetic Field  
 Strength: 51805.0snT  
 Dip Angle: 66.67°  
 Date: 7/15/2020  
 Model: IGRF2015

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.881°



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Aug1919_v14

<b>Project</b>	Marshall County, West Virginia		
<b>Map System:</b>	Universal Transverse Mercator (US Survey Feet)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD83 West Virginia - HARN		
<b>Map Zone:</b>	Zone 17N (84 W to 78 W)		

<b>Site</b>	Hillrock/Simms				
<b>Site Position:</b>		<b>Northing:</b>	14,434,279.29 usft	<b>Latitude:</b>	39.74587001
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,704,992.60 usft	<b>Longitude:</b>	-80.77026142
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.147 °

<b>Well</b>	Hillrock 1S-12 HU (D)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,434,227.87 usft	<b>Latitude:</b>	39.74572880
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,704,993.21 usft	<b>Longitude:</b>	-80.77026140
<b>Position Uncertainty</b>	0.00 ft		<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,219.00 ft

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	6/23/2020	-8.733	66.680	51,811.89336436

<b>Design</b>	Surveys Original Hole				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	156.178	

<b>Survey Program</b>	<b>Date</b>	7/15/2020			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
249.00	938.00	MWD surf (Original Hole)	MWD	MWD - Standard	
983.00	6,399.00	MWD int (Original Hole)	MWD	MWD - Standard	
6,559.00	10,239.00	MWD (Original Hole)	MWD	MWD - Standard	
10,267.00	10,598.00	MWD lat (Original Hole)	MWD	MWD - Standard	
10,650.00	10,689.00	Projection (Original Hole)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
249.00	0.53	251.100	249.00	-0.37	-1.09	-0.10	0.21	0.21	0.00	
<b>MWD surveys</b>										
294.00	0.66	232.730	293.99	-0.60	-1.49	-0.06	0.51	0.29	-40.82	
341.00	0.57	228.600	340.99	-0.92	-1.88	0.08	0.21	-0.19	-8.79	
386.00	0.48	248.730	385.99	-1.13	-2.23	0.14	0.45	-0.20	44.73	
432.00	0.44	229.040	431.99	-1.32	-2.54	0.18	0.35	-0.09	-42.80	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	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)	
477.00	0.31	232.640	476.99	-1.51	-2.77	0.26	0.29	-0.29	8.00	
523.00	0.35	229.480	522.99	-1.67	-2.97	0.33	0.10	0.09	-6.87	
613.00	0.22	235.810	612.99	-1.95	-3.32	0.44	0.15	-0.14	7.03	
705.00	0.18	261.120	704.98	-2.07	-3.61	0.43	0.10	-0.04	27.51	
795.00	0.13	170.420	794.98	-2.19	-3.74	0.50	0.25	-0.06	-100.78	
890.00	0.09	160.050	889.98	-2.37	-3.69	0.67	0.05	-0.04	-10.92	
938.00	0.18	195.030	937.98	-2.48	-3.70	0.77	0.25	0.19	72.88	
983.00	0.18	215.240	982.98	-2.60	-3.76	0.86	0.14	0.00	44.91	
1,078.00	0.48	135.700	1,077.98	-3.01	-3.57	1.31	0.51	0.32	-83.73	
1,171.00	1.01	146.600	1,170.97	-3.97	-2.84	2.49	0.59	0.57	11.72	
1,266.00	1.63	167.160	1,265.95	-5.99	-2.08	4.64	0.81	0.65	21.64	
1,361.00	3.08	177.980	1,360.87	-9.86	-1.69	8.33	1.59	1.53	11.39	
1,456.00	3.52	170.330	1,455.71	-15.28	-1.11	13.53	0.65	0.46	-8.05	
1,550.00	4.04	169.010	1,549.50	-21.38	0.00	19.56	0.56	0.55	-1.40	
1,648.00	4.35	158.460	1,647.24	-28.22	2.03	26.64	0.85	0.32	-10.77	
1,743.00	3.69	147.130	1,742.01	-34.14	5.01	33.26	1.08	-0.69	-11.93	
1,837.00	2.68	155.210	1,835.86	-38.68	7.57	38.44	1.17	-1.07	8.60	
1,932.00	3.34	171.560	1,930.74	-43.43	8.91	43.33	1.13	0.69	17.21	
2,026.00	4.44	164.260	2,024.52	-49.64	10.30	49.57	1.28	1.17	-7.77	
2,121.00	4.92	166.370	2,119.20	-57.14	12.26	57.22	0.54	0.51	2.22	
2,216.00	4.53	166.810	2,213.88	-64.75	14.07	64.92	0.41	-0.41	0.46	
2,310.00	3.47	174.720	2,307.65	-71.20	15.18	71.27	1.27	-1.13	8.41	
2,405.00	3.25	198.190	2,402.49	-76.62	14.60	75.99	1.46	-0.23	24.71	
2,499.00	3.56	220.510	2,496.33	-81.37	11.88	79.24	1.44	0.33	23.74	
2,594.00	3.65	206.630	2,591.14	-86.32	8.61	82.44	0.92	0.09	-14.61	
2,689.00	4.09	198.010	2,685.93	-92.24	6.20	86.89	0.77	0.46	-9.07	
2,777.00	4.44	191.330	2,773.68	-98.57	4.56	92.01	0.69	0.40	-7.59	
2,871.00	3.69	194.410	2,867.44	-105.06	3.10	97.36	0.83	-0.80	3.28	
2,966.00	2.29	192.390	2,962.31	-109.88	1.93	101.30	1.48	-1.47	-2.13	
3,060.00	0.88	194.760	3,056.27	-112.41	1.34	103.38	1.50	-1.50	2.52	
3,155.00	0.97	250.840	3,151.26	-113.38	0.39	103.88	0.92	0.09	59.03	
3,247.00	2.42	271.320	3,243.22	-113.59	-2.28	102.99	1.68	1.58	22.26	
3,341.00	4.09	279.310	3,337.07	-113.00	-7.58	100.32	1.84	1.78	8.50	
3,436.00	4.31	283.360	3,431.81	-111.63	-14.39	96.31	0.39	0.23	4.26	
3,529.00	4.44	286.610	3,524.54	-109.79	-21.24	91.86	0.30	0.14	3.49	
3,624.00	4.83	288.450	3,619.23	-107.48	-28.56	86.79	0.44	0.41	1.94	
3,719.00	5.23	290.480	3,713.87	-104.70	-36.41	81.07	0.46	0.42	2.14	
3,813.00	5.23	297.160	3,807.47	-101.24	-44.23	74.75	0.65	0.00	7.11	
3,907.00	5.93	298.210	3,901.03	-96.99	-52.33	67.59	0.75	0.74	1.12	
4,004.00	5.84	294.870	3,997.52	-92.55	-61.22	59.94	0.36	-0.09	-3.44	
4,098.00	6.02	280.630	4,091.02	-89.63	-70.40	53.56	1.57	0.19	-15.15	
4,193.00	5.41	279.660	4,185.55	-87.96	-79.71	48.27	0.65	-0.64	-1.02	
4,287.00	5.76	282.650	4,279.10	-86.18	-88.68	43.02	0.48	0.37	3.18	
4,381.00	5.36	280.720	4,372.66	-84.33	-97.60	37.73	0.47	-0.43	-2.05	

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	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)
4,476.00	5.36	278.790	4,467.24	-82.83	-106.35	32.82	0.19	0.00	-2.03
4,570.00	6.72	283.000	4,560.72	-80.92	-116.04	27.16	1.52	1.45	4.48
4,663.00	6.20	279.400	4,653.13	-78.87	-126.30	21.14	0.71	-0.56	-3.87
4,758.00	5.49	275.890	4,747.64	-77.57	-135.88	16.08	0.84	-0.75	-3.69
4,853.00	5.01	275.800	4,842.24	-76.68	-144.53	11.78	0.51	-0.51	-0.09
4,946.00	4.92	279.580	4,934.89	-75.61	-152.50	7.57	0.36	-0.10	4.06
5,041.00	5.93	281.250	5,029.46	-73.98	-161.33	2.51	1.08	1.06	1.76
5,135.00	4.92	282.920	5,123.04	-72.13	-170.02	-2.69	1.09	-1.07	1.78
5,229.00	4.75	287.400	5,216.70	-70.06	-177.67	-7.67	0.44	-0.18	4.77
5,324.00	6.06	290.560	5,311.28	-67.12	-186.12	-13.77	1.41	1.38	3.33
5,417.00	6.64	289.420	5,403.71	-63.61	-195.78	-20.88	0.64	0.62	-1.23
5,512.00	5.45	281.330	5,498.18	-60.90	-205.39	-27.24	1.54	-1.25	-8.52
5,605.00	3.65	267.540	5,590.89	-60.16	-212.68	-30.87	2.25	-1.94	-14.83
5,700.00	4.26	260.420	5,685.66	-60.88	-219.18	-32.83	0.82	0.64	-7.49
5,795.00	4.39	272.990	5,780.39	-61.27	-226.29	-35.34	1.01	0.14	13.23
5,890.00	4.44	286.520	5,875.11	-60.04	-233.44	-39.36	1.10	0.05	14.24
5,984.00	5.49	287.840	5,968.76	-57.63	-241.21	-44.71	1.12	1.12	1.40
6,078.00	5.19	285.470	6,062.35	-55.11	-249.59	-50.39	0.40	-0.32	-2.52
6,173.00	5.41	281.160	6,156.95	-53.10	-258.12	-55.68	0.48	0.23	-4.54
6,268.00	6.37	282.920	6,251.44	-51.06	-267.65	-61.40	1.03	1.01	1.85
6,363.00	8.31	287.140	6,345.66	-47.85	-279.35	-69.05	2.12	2.04	4.44
6,399.00	8.70	286.080	6,381.26	-46.33	-284.45	-72.50	1.17	1.08	-2.94
6,559.00	9.18	286.080	6,539.32	-39.45	-308.35	-88.45	0.30	0.30	0.00
6,653.00	10.11	287.050	6,631.99	-34.95	-323.44	-98.66	1.00	0.99	1.03
6,748.00	12.26	286.080	6,725.18	-29.71	-341.10	-110.59	2.27	2.26	-1.02
6,843.00	13.01	279.050	6,817.89	-25.24	-361.36	-122.87	1.80	0.79	-7.40
6,938.00	12.39	269.820	6,910.57	-23.59	-382.11	-132.76	2.23	-0.65	-9.72
7,032.00	12.44	269.120	7,002.37	-23.77	-402.32	-140.75	0.17	0.05	-0.74
7,127.00	12.74	265.070	7,095.09	-24.83	-422.99	-148.13	0.98	0.32	-4.26
7,221.00	10.81	266.040	7,187.11	-26.33	-442.11	-154.48	2.06	-2.05	1.03
7,315.00	9.54	269.730	7,279.63	-26.97	-458.69	-160.59	1.52	-1.35	3.93
7,410.00	9.58	275.880	7,373.31	-26.20	-474.43	-167.65	1.08	0.04	6.47
7,505.00	9.45	275.620	7,467.00	-24.63	-490.06	-175.40	0.14	-0.14	-0.27
7,692.00	11.65	270.520	7,650.84	-22.95	-524.22	-190.73	1.28	1.18	-2.73
7,787.00	12.04	270.880	7,743.81	-22.71	-543.72	-198.83	0.42	0.41	0.38
7,882.00	13.14	281.860	7,836.54	-20.34	-564.20	-209.27	2.77	1.16	11.56
7,977.00	12.66	289.420	7,929.15	-14.66	-584.58	-222.70	1.85	-0.51	7.96
8,071.00	13.18	288.810	8,020.77	-7.78	-604.44	-237.01	0.57	0.55	-0.65
8,165.00	12.22	292.230	8,112.47	-0.56	-623.80	-251.44	1.30	-1.02	3.64
8,260.00	11.82	285.820	8,205.39	5.89	-642.46	-264.88	1.47	-0.42	-6.75
8,355.00	11.29	279.230	8,298.47	10.04	-661.01	-276.16	1.50	-0.56	-6.94
8,450.00	9.98	277.200	8,391.84	12.56	-678.35	-285.48	1.43	-1.38	-2.14
8,544.00	9.36	276.760	8,484.50	14.48	-694.02	-293.56	0.66	-0.66	-0.47



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<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	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)
8,639.00	10.33	275.970	8,578.10	16.28	-710.17	-301.73	1.03	1.02	-0.83
8,733.00	11.51	282.830	8,670.40	19.24	-727.70	-311.51	1.87	1.26	7.30
8,827.00	13.23	280.810	8,762.21	23.34	-747.41	-323.22	1.89	1.83	-2.15
8,922.00	13.32	284.500	8,854.68	28.12	-768.68	-336.19	0.90	0.09	3.88
9,017.00	12.66	290.740	8,947.25	34.54	-789.01	-350.28	1.63	-0.69	6.57
9,116.00	12.17	289.600	9,043.94	41.89	-808.99	-365.07	0.55	-0.49	-1.15
9,210.00	13.13	287.750	9,135.65	48.47	-828.49	-378.96	1.11	1.02	-1.97
9,305.00	12.92	286.960	9,228.21	54.85	-848.93	-393.06	0.29	-0.22	-0.83
9,399.00	13.93	285.110	9,319.64	60.87	-869.90	-407.03	1.17	1.07	-1.97
9,494.00	14.33	282.570	9,411.77	66.41	-892.42	-421.19	0.78	0.42	-2.67
9,589.00	13.40	278.790	9,504.00	70.65	-914.77	-434.10	1.37	-0.98	-3.98
9,684.00	13.71	277.560	9,596.35	73.81	-936.81	-445.90	0.45	0.33	-1.29
9,778.00	13.62	279.930	9,687.69	77.19	-958.76	-457.85	0.60	-0.10	2.52
9,872.00	12.52	282.570	9,779.26	81.31	-979.60	-470.04	1.33	-1.17	2.81
9,965.00	11.91	281.420	9,870.15	85.41	-998.85	-481.56	0.71	-0.66	-1.24
10,059.00	12.39	278.870	9,962.05	88.88	-1,018.32	-492.60	0.77	0.51	-2.71
10,153.00	12.96	275.970	10,053.76	91.53	-1,038.77	-503.29	0.91	0.61	-3.09
10,239.00	14.41	278.080	10,137.31	94.04	-1,058.95	-513.74	1.78	1.69	2.45
10,267.00	15.30	280.280	10,164.38	95.19	-1,066.04	-517.65	3.76	3.18	7.86
10,362.00	11.12	272.810	10,256.85	97.88	-1,087.53	-528.79	4.74	-4.40	-7.86
10,457.00	10.11	262.790	10,350.23	97.28	-1,104.96	-535.28	2.21	-1.06	-10.55
10,504.00	13.19	236.330	10,396.29	93.78	-1,113.52	-535.54	12.95	6.55	-56.30
10,552.00	16.48	224.030	10,442.69	85.85	-1,122.82	-532.04	9.45	6.85	-25.63
10,598.00	17.19	217.530	10,486.73	75.77	-1,131.49	-526.32	4.37	1.54	-14.13
<b>Survey @ 10598.00 MD 10486.73 TVD</b>									
10,689.00	21.02	203.000	10,572.75	50.06	-1,146.07	-508.69	6.68	4.21	-15.97
<b>Survey projected to 10689.00 MD 10572.75 TVD</b>									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
249.00	249.00	-0.37	-1.09	MWD surveys
10,598.00	10,486.73	75.77	-1,131.49	Survey @ 10598.00 MD 10486.73 TVD
10,689.00	10,572.75	50.06	-1,146.07	Survey projected to 10689.00 MD 10572.75 TVD

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	DB_Aug1919_v14

<b>Project</b>	Marshall County, West Virginia		
<b>Map System:</b>	Universal Transverse Mercator (US Survey Feet)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD83 West Virginia - HARN		
<b>Map Zone:</b>	Zone 17N (84 W to 78 W)		

<b>Site</b>	Hillrock/Simms				
<b>Site Position:</b>		<b>Northing:</b>	14,434,279.29 usft	<b>Latitude:</b>	39.74587001
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,704,992.60 usft	<b>Longitude:</b>	-80.77026312
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.147 °

<b>Well</b>	Hillrock 1S-12 HU (D)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,434,227.87 usft	<b>Latitude:</b>	39.74572880
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,704,993.21 usft	<b>Longitude:</b>	-80.77026140
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,219.00 ft

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	6/23/2020	-8.733	66.680	51,811.89336436

<b>Design</b>	Surveys Original Hole				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	156.178	

<b>Survey Program</b>	<b>Date</b>	7/15/2020			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
249.00	938.00	MWD surf (Original Hole)	MWD	MWD - Standard	
983.00	6,399.00	MWD int (Original Hole)	MWD	MWD - Standard	
6,559.00	10,239.00	MWD (Original Hole)	MWD	MWD - Standard	
10,267.00	10,598.00	MWD lat (Original Hole)	MWD	MWD - Standard	
10,650.00	10,689.00	Projection (Original Hole)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Map Northing (usft)</b>	<b>Map Easting (usft)</b>	<b>Latitude</b>	<b>Longitude</b>	
0.00	0.00	0.000	0.00	0.00	0.00	14,434,227.87	1,704,993.21	39.74572880	-80.77026140	
249.00	0.53	251.100	249.00	-0.37	-1.09	14,434,227.50	1,704,992.12	39.74572778	-80.77026528	
<b>MWD surveys</b>										
294.00	0.66	232.730	293.99	-0.60	-1.49	14,434,227.28	1,704,991.72	39.74572717	-80.77026672	
341.00	0.57	228.600	340.99	-0.92	-1.88	14,434,226.96	1,704,991.33	39.74572630	-80.77026811	
386.00	0.48	248.730	385.99	-1.13	-2.23	14,434,226.74	1,704,990.99	39.74572571	-80.77026933	
432.00	0.44	229.040	431.99	-1.32	-2.54	14,434,226.56	1,704,990.67	39.74572520	-80.77027045	
477.00	0.31	232.640	476.99	-1.51	-2.77	14,434,226.37	1,704,990.45	39.74572469	-80.77027126	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	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	
523.00	0.35	229.480	522.99	-1.67	-2.97	14,434,226.20	1,704,990.24	39.74572423	-80.77027199	
613.00	0.22	235.810	612.99	-1.95	-3.32	14,434,225.93	1,704,989.89	39.74572348	-80.77027325	
705.00	0.18	261.120	704.98	-2.07	-3.61	14,434,225.80	1,704,989.60	39.74572314	-80.77027428	
795.00	0.13	170.420	794.98	-2.19	-3.74	14,434,225.68	1,704,989.48	39.74572281	-80.77027471	
890.00	0.09	160.050	889.98	-2.37	-3.69	14,434,225.51	1,704,989.52	39.74572232	-80.77027456	
938.00	0.18	195.030	937.98	-2.48	-3.70	14,434,225.40	1,704,989.51	39.74572203	-80.77027459	
983.00	0.18	215.240	982.98	-2.60	-3.76	14,434,225.27	1,704,989.45	39.74572168	-80.77027480	
1,078.00	0.48	135.700	1,077.98	-3.01	-3.57	14,434,224.86	1,704,989.65	39.74572056	-80.77027412	
1,171.00	1.01	146.600	1,170.97	-3.97	-2.84	14,434,223.90	1,704,990.37	39.74571791	-80.77027155	
1,266.00	1.63	167.160	1,265.95	-5.99	-2.08	14,434,221.88	1,704,991.13	39.74571237	-80.77026886	
1,361.00	3.08	177.980	1,360.87	-9.86	-1.69	14,434,218.02	1,704,991.52	39.74570174	-80.77026751	
1,456.00	3.52	170.330	1,455.71	-15.28	-1.11	14,434,212.59	1,704,992.10	39.74568684	-80.77026550	
1,550.00	4.04	169.010	1,549.50	-21.38	0.00	14,434,206.50	1,704,993.22	39.74567009	-80.77026158	
1,648.00	4.35	158.460	1,647.24	-28.22	2.03	14,434,199.65	1,704,995.24	39.74565128	-80.77025445	
1,743.00	3.69	147.130	1,742.01	-34.14	5.01	14,434,193.73	1,704,998.22	39.74563500	-80.77024390	
1,837.00	2.68	155.210	1,835.86	-38.68	7.57	14,434,189.20	1,705,000.78	39.74562253	-80.77023482	
1,932.00	3.34	171.560	1,930.74	-43.43	8.91	14,434,184.44	1,705,002.12	39.74560946	-80.77023010	
2,026.00	4.44	164.260	2,024.52	-49.64	10.30	14,434,178.23	1,705,003.51	39.74559239	-80.77022522	
2,121.00	4.92	166.370	2,119.20	-57.14	12.26	14,434,170.73	1,705,005.47	39.74557179	-80.77021832	
2,216.00	4.53	166.810	2,213.88	-64.75	14.07	14,434,163.12	1,705,007.28	39.74555087	-80.77021193	
2,310.00	3.47	174.720	2,307.65	-71.20	15.18	14,434,156.67	1,705,008.39	39.74553316	-80.77020805	
2,405.00	3.25	198.190	2,402.49	-76.62	14.60	14,434,151.25	1,705,007.82	39.74551827	-80.77021014	
2,499.00	3.56	220.510	2,496.33	-81.37	11.88	14,434,146.50	1,705,005.09	39.74550525	-80.77021989	
2,594.00	3.65	206.630	2,591.14	-86.32	8.61	14,434,141.56	1,705,001.82	39.74549169	-80.77023157	
2,689.00	4.09	198.010	2,685.93	-92.24	6.20	14,434,135.63	1,704,999.42	39.74547543	-80.77024018	
2,777.00	4.44	191.330	2,773.68	-98.57	4.56	14,434,129.31	1,704,997.78	39.74545807	-80.77024607	
2,871.00	3.69	194.410	2,867.44	-105.06	3.10	14,434,122.81	1,704,996.31	39.74544024	-80.77025135	
2,966.00	2.29	192.390	2,962.31	-109.88	1.93	14,434,117.99	1,704,995.14	39.74542703	-80.77025555	
3,060.00	0.88	194.760	3,056.27	-112.41	1.34	14,434,115.46	1,704,994.55	39.74542008	-80.77025766	
3,155.00	0.97	250.840	3,151.26	-113.38	0.39	14,434,114.49	1,704,993.61	39.74541742	-80.77026103	
3,247.00	2.42	271.320	3,243.22	-113.59	-2.28	14,434,114.28	1,704,990.93	39.74541686	-80.77027056	
3,341.00	4.09	279.310	3,337.07	-113.00	-7.58	14,434,114.87	1,704,985.64	39.74541851	-80.77028938	
3,436.00	4.31	283.360	3,431.81	-111.63	-14.39	14,434,116.24	1,704,978.82	39.74542233	-80.77031362	
3,529.00	4.44	286.610	3,524.54	-109.79	-21.24	14,434,118.08	1,704,971.97	39.74542742	-80.77033797	
3,624.00	4.83	288.450	3,619.23	-107.48	-28.56	14,434,120.40	1,704,964.65	39.74543384	-80.77036398	
3,719.00	5.23	290.480	3,713.87	-104.70	-36.41	14,434,123.18	1,704,956.80	39.74544153	-80.77039188	
3,813.00	5.23	297.160	3,807.47	-101.24	-44.23	14,434,126.63	1,704,948.98	39.74545107	-80.77041969	
3,907.00	5.93	298.210	3,901.03	-96.99	-52.33	14,434,130.88	1,704,940.89	39.74546280	-80.77044844	
4,004.00	5.84	294.870	3,997.52	-92.55	-61.22	14,434,135.33	1,704,931.99	39.74547507	-80.77048003	
4,098.00	6.02	280.630	4,091.02	-89.63	-70.40	14,434,138.25	1,704,922.81	39.74548316	-80.77051268	
4,193.00	5.41	279.660	4,185.55	-87.96	-79.71	14,434,139.92	1,704,913.50	39.74548781	-80.77054579	
4,287.00	5.76	282.650	4,279.10	-86.18	-88.68	14,434,141.69	1,704,904.53	39.74549275	-80.77057769	
4,381.00	5.36	280.720	4,372.66	-84.33	-97.60	14,434,143.54	1,704,895.61	39.74549789	-80.77060939	
4,476.00	5.36	278.790	4,467.24	-82.83	-106.35	14,434,145.05	1,704,886.87	39.74550208	-80.77064049	
4,570.00	6.72	283.000	4,560.72	-80.92	-116.04	14,434,146.95	1,704,877.17	39.74550739	-80.77067497	
4,663.00	6.20	279.400	4,653.13	-78.87	-126.30	14,434,149.00	1,704,866.91	39.74551308	-80.77071144	
4,758.00	5.49	275.890	4,747.64	-77.57	-135.88	14,434,150.30	1,704,857.33	39.74551673	-80.77074552	
4,853.00	5.01	275.800	4,842.24	-76.68	-144.53	14,434,151.19	1,704,848.68	39.74551922	-80.77077627	
4,946.00	4.92	279.580	4,934.89	-75.61	-152.50	14,434,152.26	1,704,840.71	39.74552223	-80.77080463	
5,041.00	5.93	281.250	5,029.46	-73.98	-161.33	14,434,153.90	1,704,831.88	39.74552678	-80.77083603	
5,135.00	4.92	282.920	5,123.04	-72.13	-170.02	14,434,155.75	1,704,823.19	39.74553192	-80.77086693	
5,229.00	4.75	287.400	5,216.70	-70.06	-177.67	14,434,157.81	1,704,815.55	39.74553764	-80.77089410	
5,324.00	6.06	290.560	5,311.28	-67.12	-186.12	14,434,160.75	1,704,807.10	39.74554577	-80.77092413	
5,417.00	6.64	289.420	5,403.71	-63.61	-195.78	14,434,164.26	1,704,797.43	39.74555548	-80.77095849	
5,512.00	5.45	281.330	5,498.18	-60.90	-205.39	14,434,166.97	1,704,787.83	39.74556300	-80.77099263	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	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	
5,605.00	3.65	267.540	5,590.89	-60.16	-212.68	14,434,167.71	1,704,780.54	39.74556508	-80.77101856	
5,700.00	4.26	260.420	5,685.66	-60.88	-219.18	14,434,167.00	1,704,774.04	39.74556316	-80.77104169	
5,795.00	4.39	272.990	5,780.39	-61.27	-226.29	14,434,166.60	1,704,766.93	39.74556212	-80.77106699	
5,890.00	4.44	286.520	5,875.11	-60.04	-233.44	14,434,167.84	1,704,759.77	39.74556556	-80.77109244	
5,984.00	5.49	287.840	5,968.76	-57.63	-241.21	14,434,170.25	1,704,752.00	39.74557224	-80.77112005	
6,078.00	5.19	285.470	6,062.35	-55.11	-249.59	14,434,172.76	1,704,743.62	39.74557920	-80.77114984	
6,173.00	5.41	281.160	6,156.95	-53.10	-258.12	14,434,174.77	1,704,735.09	39.74558478	-80.77118018	
6,268.00	6.37	282.920	6,251.44	-51.06	-267.65	14,434,176.82	1,704,725.56	39.74559047	-80.77121407	
6,363.00	8.31	287.140	6,345.66	-47.85	-279.35	14,434,180.02	1,704,713.86	39.74559934	-80.77125566	
6,399.00	8.70	286.080	6,381.26	-46.33	-284.45	14,434,181.54	1,704,708.76	39.74560356	-80.77127379	
6,559.00	9.18	286.080	6,539.32	-39.45	-308.35	14,434,188.43	1,704,684.87	39.74562264	-80.77135873	
6,653.00	10.11	287.050	6,631.99	-34.95	-323.44	14,434,192.92	1,704,669.77	39.74563509	-80.77141238	
6,748.00	12.26	286.080	6,725.18	-29.71	-341.10	14,434,198.16	1,704,652.11	39.74564960	-80.77147518	
6,843.00	13.01	279.050	6,817.89	-25.24	-361.36	14,434,202.64	1,704,631.86	39.74566204	-80.77154719	
6,938.00	12.39	269.820	6,910.57	-23.59	-382.11	14,434,204.29	1,704,611.10	39.74566671	-80.77162101	
7,032.00	12.44	269.120	7,002.37	-23.77	-402.32	14,434,204.10	1,704,590.89	39.74566634	-80.77169290	
7,127.00	12.74	265.070	7,095.09	-24.83	-422.99	14,434,203.04	1,704,570.23	39.74566358	-80.77176644	
7,221.00	10.81	266.040	7,187.11	-26.33	-442.11	14,434,201.54	1,704,551.10	39.74565960	-80.77183448	
7,315.00	9.54	269.730	7,279.63	-26.97	-458.69	14,434,200.90	1,704,534.52	39.74565794	-80.77189349	
7,410.00	9.58	275.880	7,373.31	-26.20	-474.43	14,434,201.67	1,704,518.78	39.74566017	-80.77194947	
7,505.00	9.45	275.620	7,467.00	-24.63	-490.06	14,434,203.24	1,704,503.16	39.74566460	-80.77200504	
7,692.00	11.65	270.520	7,650.84	-22.95	-524.22	14,434,204.92	1,704,469.00	39.74566944	-80.77212656	
7,787.00	12.04	270.880	7,743.81	-22.71	-543.72	14,434,205.16	1,704,449.50	39.74567023	-80.77219593	
7,882.00	13.14	281.860	7,836.54	-20.34	-564.20	14,434,207.53	1,704,429.02	39.74567689	-80.77226876	
7,977.00	12.66	289.420	7,929.15	-14.66	-584.58	14,434,213.21	1,704,408.63	39.74569263	-80.77234124	
8,071.00	13.18	288.810	8,020.77	-7.78	-604.44	14,434,220.09	1,704,388.77	39.74571167	-80.77241182	
8,165.00	12.22	292.230	8,112.47	-0.56	-623.80	14,434,227.31	1,704,369.42	39.74573163	-80.77248061	
8,260.00	11.82	285.820	8,205.39	5.89	-642.46	14,434,233.77	1,704,350.75	39.74574949	-80.77254697	
8,355.00	11.29	279.230	8,298.47	10.04	-661.01	14,434,237.91	1,704,332.21	39.74576100	-80.77261289	
8,450.00	9.98	277.200	8,391.84	12.56	-678.35	14,434,240.44	1,704,314.86	39.74576805	-80.77267458	
8,544.00	9.36	276.760	8,484.50	14.48	-694.02	14,434,242.36	1,704,299.19	39.74577344	-80.77273032	
8,639.00	10.33	275.970	8,578.10	16.28	-710.17	14,434,244.15	1,704,283.05	39.74577848	-80.77278774	
8,733.00	11.51	282.830	8,670.40	19.24	-727.70	14,434,247.11	1,704,265.52	39.74578673	-80.77285007	
8,827.00	13.23	280.810	8,762.21	23.34	-747.41	14,434,251.21	1,704,245.81	39.74579813	-80.77292015	
8,922.00	13.32	284.500	8,854.68	28.12	-768.68	14,434,255.99	1,704,224.53	39.74581140	-80.77299579	
9,017.00	12.66	290.740	8,947.25	34.54	-789.01	14,434,262.42	1,704,204.20	39.74582919	-80.77306807	
9,116.00	12.17	289.600	9,043.94	41.89	-808.99	14,434,269.76	1,704,184.23	39.74584949	-80.77313907	
9,210.00	13.13	287.750	9,135.65	48.47	-828.49	14,434,276.34	1,704,164.72	39.74586770	-80.77320839	
9,305.00	12.92	286.960	9,228.21	54.85	-848.93	14,434,282.73	1,704,144.29	39.74588538	-80.77328104	
9,399.00	13.93	285.110	9,319.64	60.87	-869.90	14,434,288.74	1,704,123.31	39.74590205	-80.77335560	
9,494.00	14.33	282.570	9,411.77	66.41	-892.42	14,434,294.28	1,704,100.80	39.74591742	-80.77343565	
9,589.00	13.40	278.790	9,504.00	70.65	-914.77	14,434,298.52	1,704,078.44	39.74592922	-80.77351514	
9,684.00	13.71	277.560	9,596.35	73.81	-936.81	14,434,301.68	1,704,056.40	39.74593806	-80.77359352	
9,778.00	13.62	279.930	9,687.69	77.19	-958.76	14,434,305.06	1,704,034.46	39.74594748	-80.77367156	
9,872.00	12.52	282.570	9,779.26	81.31	-979.60	14,434,309.19	1,704,013.61	39.74595895	-80.77374569	
9,965.00	11.91	281.420	9,870.15	85.41	-998.85	14,434,313.28	1,703,994.37	39.74597033	-80.77381412	
10,059.00	12.39	278.870	9,962.05	88.88	-1,018.32	14,434,316.75	1,703,974.90	39.74598001	-80.77388336	
10,153.00	12.96	275.970	10,053.76	91.53	-1,038.77	14,434,319.41	1,703,954.45	39.74598743	-80.77395608	
10,239.00	14.41	278.080	10,137.31	94.04	-1,058.95	14,434,321.91	1,703,934.26	39.74599446	-80.77402788	
10,267.00	15.30	280.280	10,164.38	95.19	-1,066.04	14,434,323.06	1,703,927.18	39.74599766	-80.77405307	
10,362.00	11.12	272.810	10,256.85	97.88	-1,087.53	14,434,325.75	1,703,905.68	39.74600519	-80.77412951	
10,457.00	10.11	262.790	10,350.23	97.28	-1,104.96	14,434,325.15	1,703,888.26	39.74600367	-80.77419151	
10,504.00	13.19	236.330	10,396.29	93.78	-1,113.52	14,434,321.66	1,703,879.69	39.74599413	-80.77422200	
10,552.00	16.48	224.030	10,442.69	85.85	-1,122.82	14,434,313.72	1,703,870.40	39.74597241	-80.77425514	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Original Hole	<b>Database:</b>	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
10,598.00	17.19	217.530	10,486.73	75.77	-1,131.49	14,434,303.64	1,703,861.72	39.74594478	-80.77428610
<b>Survey @ 10598.00 MD 10486.73 TVD</b>									
10,689.00	21.02	203.000	10,572.75	50.06	-1,146.07	14,434,277.93	1,703,847.14	39.74587427	-80.77433821
<b>Survey projected to 10689.00 MD 10572.75 TVD</b>									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Local Coordinates	
					Comment
249.00	249.00	-0.37	-1.09		MWD surveys
10,598.00	10,486.73	75.77	-1,131.49		Survey @ 10598.00 MD 10486.73 TVD
10,689.00	10,572.75	50.06	-1,146.07		Survey projected to 10689.00 MD 10572.75 TVD

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	DB_Aug1919_v14

<b>Project</b>	Marshall County, West Virginia		
<b>Map System:</b>	Universal Transverse Mercator (US Survey Feet)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD83 West Virginia - HARN		
<b>Map Zone:</b>	Zone 17N (84 W to 78 W)		

<b>Site</b>	Hillrock/Simms				
<b>Site Position:</b>		<b>Northing:</b>	14,434,279.29 usft	<b>Latitude:</b>	39.74587001
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,704,992.60 usft	<b>Longitude:</b>	-80.77026312
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.147 °

<b>Well</b>	Hillrock 1S-12 HU (D)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,434,227.87 usft	<b>Latitude:</b>	39.74572880
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,704,993.21 usft	<b>Longitude:</b>	-80.77026140
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,219.00 ft

<b>Wellbore</b>	Sidetrack 01				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	7/15/2020	-8.735	66.675	51,804.96762739

<b>Design</b>	Surveys Sidetrack 01				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	10,267.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	156.178	

<b>Survey Program</b>	<b>Date</b>	7/31/2020			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
249.00	938.00	MWD surf (Original Hole)	MWD	MWD - Standard	
983.00	6,399.00	MWD int (Original Hole)	MWD	MWD - Standard	
6,559.00	10,239.00	MWD (Original Hole)	MWD	MWD - Standard	
10,267.00	10,267.00	MWD lat (Original Hole)	MWD	MWD - Standard	
10,331.00	22,406.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
22,462.00	22,462.00	Projection ST1 (Sidetrack 01)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
249.00	0.53	251.100	249.00	-0.37	-1.09	-0.10	0.21	0.21	0.00	
294.00	0.66	232.730	293.99	-0.60	-1.49	-0.06	0.51	0.29	-40.82	
341.00	0.57	228.600	340.99	-0.92	-1.88	0.08	0.21	-0.19	-8.79	
386.00	0.48	248.730	385.99	-1.13	-2.23	0.14	0.45	-0.20	44.73	
432.00	0.44	229.040	431.99	-1.32	-2.54	0.18	0.35	-0.09	-42.80	



**Company:** Tug Hill Operating LLC  
**Project:** Marshall County, West Virginia  
**Site:** Hillrock/Simms  
**Well:** Hillrock 1S-12 HU (D)  
**Wellbore:** Sidetrack 01  
**Design:** Surveys Sidetrack 01

**Local Co-ordinate Reference:** Well Hillrock 1S-12 HU (D)  
**TVD Reference:** RKB=1219+26 @ 1245.00ft (Nabors B28)  
**MD Reference:** RKB=1219+26 @ 1245.00ft (Nabors B28)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**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)	
477.00	0.31	232.640	476.99	-1.51	-2.77	0.26	0.29	-0.29	8.00	
523.00	0.35	229.480	522.99	-1.67	-2.97	0.33	0.10	0.09	-6.87	
613.00	0.22	235.810	612.99	-1.95	-3.32	0.44	0.15	-0.14	7.03	
705.00	0.18	261.120	704.98	-2.07	-3.61	0.43	0.10	-0.04	27.51	
795.00	0.13	170.420	794.98	-2.19	-3.74	0.50	0.25	-0.06	-100.78	
890.00	0.09	160.050	889.98	-2.37	-3.69	0.67	0.05	-0.04	-10.92	
938.00	0.18	195.030	937.98	-2.48	-3.70	0.77	0.25	0.19	72.88	
983.00	0.18	215.240	982.98	-2.60	-3.76	0.86	0.14	0.00	44.91	
1,078.00	0.48	135.700	1,077.98	-3.01	-3.57	1.31	0.51	0.32	-83.73	
1,171.00	1.01	146.600	1,170.97	-3.97	-2.84	2.49	0.59	0.57	11.72	
1,266.00	1.63	167.160	1,265.95	-5.99	-2.08	4.64	0.81	0.65	21.64	
1,361.00	3.08	177.980	1,360.87	-9.86	-1.69	8.33	1.59	1.53	11.39	
1,456.00	3.52	170.330	1,455.71	-15.28	-1.11	13.53	0.65	0.46	-8.05	
1,550.00	4.04	169.010	1,549.50	-21.38	0.00	19.56	0.56	0.55	-1.40	
1,648.00	4.35	158.460	1,647.24	-28.22	2.03	26.64	0.85	0.32	-10.77	
1,743.00	3.69	147.130	1,742.01	-34.14	5.01	33.26	1.08	-0.69	-11.93	
1,837.00	2.68	155.210	1,835.86	-38.68	7.57	38.44	1.17	-1.07	8.60	
1,932.00	3.34	171.560	1,930.74	-43.43	8.91	43.33	1.13	0.69	17.21	
2,026.00	4.44	164.260	2,024.52	-49.64	10.30	49.57	1.28	1.17	-7.77	
2,121.00	4.92	166.370	2,119.20	-57.14	12.26	57.22	0.54	0.51	2.22	
2,216.00	4.53	166.810	2,213.88	-64.75	14.07	64.92	0.41	-0.41	0.46	
2,310.00	3.47	174.720	2,307.65	-71.20	15.18	71.27	1.27	-1.13	8.41	
2,405.00	3.25	198.190	2,402.49	-76.62	14.60	75.99	1.46	-0.23	24.71	
2,499.00	3.56	220.510	2,496.33	-81.37	11.88	79.24	1.44	0.33	23.74	
2,594.00	3.65	206.630	2,591.14	-86.32	8.61	82.44	0.92	0.09	-14.61	
2,689.00	4.09	198.010	2,685.93	-92.24	6.20	86.89	0.77	0.46	-9.07	
2,777.00	4.44	191.330	2,773.68	-98.57	4.56	92.01	0.69	0.40	-7.59	
2,871.00	3.69	194.410	2,867.44	-105.06	3.10	97.36	0.83	-0.80	3.28	
2,966.00	2.29	192.390	2,962.31	-109.88	1.93	101.30	1.48	-1.47	-2.13	
3,060.00	0.88	194.760	3,056.27	-112.41	1.34	103.38	1.50	-1.50	2.52	
3,155.00	0.97	250.840	3,151.26	-113.38	0.39	103.88	0.92	0.09	59.03	
3,247.00	2.42	271.320	3,243.22	-113.59	-2.28	102.99	1.68	1.58	22.26	
3,341.00	4.09	279.310	3,337.07	-113.00	-7.58	100.32	1.84	1.78	8.50	
3,436.00	4.31	283.360	3,431.81	-111.63	-14.39	96.31	0.39	0.23	4.26	
3,529.00	4.44	286.610	3,524.54	-109.79	-21.24	91.86	0.30	0.14	3.49	
3,624.00	4.83	288.450	3,619.23	-107.48	-28.56	86.79	0.44	0.41	1.94	
3,719.00	5.23	290.480	3,713.87	-104.70	-36.41	81.07	0.46	0.42	2.14	
3,813.00	5.23	297.160	3,807.47	-101.24	-44.23	74.75	0.65	0.00	7.11	
3,907.00	5.93	298.210	3,901.03	-96.99	-52.33	67.59	0.75	0.74	1.12	
4,004.00	5.84	294.870	3,997.52	-92.55	-61.22	59.94	0.36	-0.09	-3.44	
4,098.00	6.02	280.630	4,091.02	-89.63	-70.40	53.56	1.57	0.19	-15.15	
4,193.00	5.41	279.660	4,185.55	-87.96	-79.71	48.27	0.65	-0.64	-1.02	
4,287.00	5.76	282.650	4,279.10	-86.18	-88.68	43.02	0.48	0.37	3.18	
4,381.00	5.36	280.720	4,372.66	-84.33	-97.60	37.73	0.47	-0.43	-2.05	

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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)
4,476.00	5.36	278.790	4,467.24	-82.83	-106.35	32.82	0.19	0.00	-2.03
4,570.00	6.72	283.000	4,560.72	-80.92	-116.04	27.16	1.52	1.45	4.48
4,663.00	6.20	279.400	4,653.13	-78.87	-126.30	21.14	0.71	-0.56	-3.87
4,758.00	5.49	275.890	4,747.64	-77.57	-135.88	16.08	0.84	-0.75	-3.69
4,853.00	5.01	275.800	4,842.24	-76.68	-144.53	11.78	0.51	-0.51	-0.09
4,946.00	4.92	279.580	4,934.89	-75.61	-152.50	7.57	0.36	-0.10	4.06
5,041.00	5.93	281.250	5,029.46	-73.98	-161.33	2.51	1.08	1.06	1.76
5,135.00	4.92	282.920	5,123.04	-72.13	-170.02	-2.69	1.09	-1.07	1.78
5,229.00	4.75	287.400	5,216.70	-70.06	-177.67	-7.67	0.44	-0.18	4.77
5,324.00	6.06	290.560	5,311.28	-67.12	-186.12	-13.76	1.41	1.38	3.33
5,417.00	6.64	289.420	5,403.71	-63.61	-195.78	-20.88	0.64	0.62	-1.23
5,512.00	5.45	281.330	5,498.18	-60.90	-205.39	-27.24	1.54	-1.25	-8.52
5,605.00	3.65	267.540	5,590.89	-60.16	-212.68	-30.86	2.25	-1.94	-14.83
5,700.00	4.26	260.420	5,685.66	-60.88	-219.18	-32.83	0.82	0.64	-7.49
5,795.00	4.39	272.990	5,780.39	-61.27	-226.29	-35.34	1.01	0.14	13.23
5,890.00	4.44	286.520	5,875.11	-60.04	-233.44	-39.36	1.10	0.05	14.24
5,984.00	5.49	287.840	5,968.76	-57.63	-241.21	-44.71	1.12	1.12	1.40
6,078.00	5.19	285.470	6,062.35	-55.11	-249.59	-50.39	0.40	-0.32	-2.52
6,173.00	5.41	281.160	6,156.95	-53.10	-258.12	-55.68	0.48	0.23	-4.54
6,268.00	6.37	282.920	6,251.44	-51.06	-267.65	-61.40	1.03	1.01	1.85
6,363.00	8.31	287.140	6,345.66	-47.85	-279.35	-69.05	2.12	2.04	4.44
6,399.00	8.70	286.080	6,381.26	-46.33	-284.45	-72.50	1.17	1.08	-2.94
6,559.00	9.18	286.080	6,539.32	-39.45	-308.35	-88.45	0.30	0.30	0.00
6,653.00	10.11	287.050	6,631.99	-34.95	-323.44	-98.66	1.00	0.99	1.03
6,748.00	12.26	286.080	6,725.18	-29.71	-341.10	-110.59	2.27	2.26	-1.02
6,843.00	13.01	279.050	6,817.89	-25.24	-361.36	-122.86	1.80	0.79	-7.40
6,938.00	12.39	269.820	6,910.57	-23.59	-382.11	-132.76	2.23	-0.65	-9.72
7,032.00	12.44	269.120	7,002.37	-23.77	-402.32	-140.75	0.17	0.05	-0.74
7,127.00	12.74	265.070	7,095.09	-24.83	-422.99	-148.13	0.98	0.32	-4.26
7,221.00	10.81	266.040	7,187.11	-26.33	-442.11	-154.48	2.06	-2.05	1.03
7,315.00	9.54	269.730	7,279.63	-26.97	-458.69	-160.59	1.52	-1.35	3.93
7,410.00	9.58	275.880	7,373.31	-26.20	-474.43	-167.65	1.08	0.04	6.47
7,505.00	9.45	275.620	7,467.00	-24.63	-490.06	-175.40	0.14	-0.14	-0.27
7,692.00	11.65	270.520	7,650.84	-22.95	-524.22	-190.73	1.28	1.18	-2.73
7,787.00	12.04	270.880	7,743.81	-22.71	-543.72	-198.82	0.42	0.41	0.38
7,882.00	13.14	281.860	7,836.54	-20.34	-564.20	-209.26	2.77	1.16	11.56
7,977.00	12.66	289.420	7,929.15	-14.66	-584.58	-222.70	1.85	-0.51	7.96
8,071.00	13.18	288.810	8,020.77	-7.78	-604.44	-237.01	0.57	0.55	-0.65
8,165.00	12.22	292.230	8,112.47	-0.56	-623.80	-251.43	1.30	-1.02	3.64
8,260.00	11.82	285.820	8,205.39	5.89	-642.46	-264.88	1.47	-0.42	-6.75
8,355.00	11.29	279.230	8,298.47	10.04	-661.01	-276.16	1.50	-0.56	-6.94
8,450.00	9.98	277.200	8,391.84	12.56	-678.35	-285.47	1.43	-1.38	-2.14
8,544.00	9.36	276.760	8,484.50	14.48	-694.02	-293.56	0.66	-0.66	-0.47



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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)	
8,639.00	10.33	275.970	8,578.10	16.28	-710.17	-301.72	1.03	1.02	-0.83	
8,733.00	11.51	282.830	8,670.40	19.24	-727.70	-311.51	1.87	1.26	7.30	
8,827.00	13.23	280.810	8,762.21	23.34	-747.41	-323.22	1.89	1.83	-2.15	
8,922.00	13.32	284.500	8,854.68	28.12	-768.68	-336.18	0.90	0.09	3.88	
9,017.00	12.66	290.740	8,947.25	34.54	-789.01	-350.28	1.63	-0.69	6.57	
9,116.00	12.17	289.600	9,043.94	41.89	-808.99	-365.06	0.55	-0.49	-1.15	
9,210.00	13.13	287.750	9,135.65	48.47	-828.49	-378.96	1.11	1.02	-1.97	
9,305.00	12.92	286.960	9,228.21	54.85	-848.93	-393.05	0.29	-0.22	-0.83	
9,399.00	13.93	285.110	9,319.64	60.87	-869.90	-407.03	1.17	1.07	-1.97	
9,494.00	14.33	282.570	9,411.77	66.41	-892.42	-421.19	0.78	0.42	-2.67	
9,589.00	13.40	278.790	9,504.00	70.65	-914.77	-434.10	1.37	-0.98	-3.98	
9,684.00	13.71	277.560	9,596.35	73.81	-936.81	-445.89	0.45	0.33	-1.29	
9,778.00	13.62	279.930	9,687.69	77.19	-958.76	-457.84	0.60	-0.10	2.52	
9,872.00	12.52	282.570	9,779.26	81.31	-979.60	-470.04	1.33	-1.17	2.81	
9,965.00	11.91	281.420	9,870.15	85.41	-998.85	-481.56	0.71	-0.66	-1.24	
10,059.00	12.39	278.870	9,962.05	88.88	-1,018.32	-492.60	0.77	0.51	-2.71	
10,153.00	12.96	275.970	10,053.76	91.53	-1,038.77	-503.28	0.91	0.61	-3.09	
10,239.00	14.41	278.080	10,137.31	94.04	-1,058.95	-513.73	1.78	1.69	2.45	
10,267.00	15.30	280.280	10,164.38	95.19	-1,066.04	-517.64	3.76	3.18	7.86	
<b>Tie into original hole @ 10267 MD</b>										
10,331.00	14.64	285.470	10,226.21	98.85	-1,082.14	-527.50	2.33	-1.03	8.11	
10,360.00	13.76	301.900	10,254.33	101.65	-1,088.61	-532.67	14.18	-3.03	56.66	
10,407.00	13.05	312.450	10,300.06	108.19	-1,097.27	-542.15	5.41	-1.51	22.45	
10,455.00	11.74	292.580	10,346.96	113.73	-1,105.78	-550.65	9.24	-2.73	-41.40	
10,502.00	13.05	274.570	10,392.88	115.99	-1,115.49	-556.64	8.64	2.79	-38.32	
10,550.00	13.41	260.070	10,439.62	115.46	-1,126.38	-560.56	6.94	0.75	-30.21	
10,597.00	14.24	240.820	10,485.28	111.70	-1,136.80	-561.32	9.90	1.77	-40.96	
10,645.00	15.56	225.000	10,531.69	104.26	-1,146.51	-558.45	8.88	2.75	-32.96	
10,692.00	16.88	211.990	10,576.83	94.01	-1,154.58	-552.33	8.21	2.81	-27.68	
10,739.00	18.68	201.970	10,621.59	81.24	-1,161.02	-543.25	7.54	3.83	-21.32	
10,786.00	20.31	194.150	10,665.91	66.35	-1,165.83	-531.57	6.54	3.47	-16.64	
10,833.00	22.68	189.140	10,709.64	49.49	-1,169.26	-517.53	6.37	5.04	-10.66	
10,880.00	24.79	185.450	10,752.66	30.73	-1,171.64	-501.33	5.49	4.49	-7.85	
10,928.00	27.03	182.020	10,795.84	9.81	-1,172.98	-482.73	5.61	4.67	-7.15	
10,975.00	30.24	176.220	10,837.09	-12.68	-1,172.57	-461.99	9.03	6.83	-12.34	
11,023.00	32.84	172.170	10,878.00	-37.64	-1,170.00	-438.12	6.98	5.42	-8.44	
11,070.00	35.60	170.070	10,916.86	-63.75	-1,165.91	-412.58	6.39	5.87	-4.47	
11,118.00	38.37	168.570	10,955.20	-92.12	-1,160.55	-384.46	6.07	5.77	-3.13	
11,165.00	41.05	166.900	10,991.36	-121.45	-1,154.16	-355.05	6.14	5.70	-3.55	
11,211.00	43.74	165.670	11,025.32	-151.58	-1,146.79	-324.51	6.12	5.85	-2.67	
11,258.00	46.59	164.530	11,058.46	-183.78	-1,138.22	-291.59	6.30	6.06	-2.43	
11,305.00	49.67	163.470	11,089.83	-217.42	-1,128.56	-256.92	6.76	6.55	-2.26	
11,352.00	52.97	162.070	11,119.20	-252.45	-1,117.69	-220.48	7.40	7.02	-2.98	

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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)
11,398.00	55.25	160.660	11,146.16	-287.76	-1,105.78	-183.37	5.54	4.96	-3.07
11,445.00	58.02	160.220	11,172.01	-324.74	-1,092.63	-144.23	5.95	5.89	-0.94
11,493.00	61.71	159.690	11,196.10	-363.73	-1,078.40	-102.81	7.75	7.69	-1.10
11,540.00	64.70	159.520	11,217.29	-403.05	-1,063.78	-60.94	6.37	6.36	-0.36
11,588.00	66.77	159.690	11,237.01	-444.07	-1,048.54	-17.26	4.32	4.31	0.35
11,635.00	69.23	159.610	11,254.62	-484.92	-1,033.38	26.23	5.24	5.23	-0.17
11,682.00	72.44	159.520	11,270.05	-526.52	-1,017.88	70.55	6.83	6.83	-0.19
11,729.00	75.03	158.900	11,283.21	-568.69	-1,001.87	115.60	5.65	5.51	-1.32
11,777.00	77.14	158.200	11,294.75	-612.05	-984.83	162.15	4.62	4.40	-1.46
11,824.00	79.25	156.790	11,304.37	-654.55	-967.22	208.14	5.36	4.49	-3.00
11,871.00	81.63	155.560	11,312.17	-696.94	-948.50	254.48	5.68	5.06	-2.62
11,918.00	84.66	153.630	11,317.78	-739.09	-928.48	301.12	7.63	6.45	-4.11
11,965.00	85.58	151.170	11,321.78	-780.58	-906.79	347.84	5.57	1.96	-5.23
12,060.00	89.98	148.440	11,325.46	-862.60	-859.06	442.15	5.45	4.63	-2.87
12,154.00	90.24	149.500	11,325.28	-943.15	-810.60	535.41	1.16	0.28	1.13
12,248.00	88.57	149.060	11,326.26	-1,023.95	-762.59	628.72	1.84	-1.78	-0.47
12,343.00	88.92	148.970	11,328.34	-1,105.38	-713.69	722.95	0.38	0.37	-0.09
12,462.00	89.85	149.320	11,329.61	-1,207.53	-652.66	841.05	0.84	0.78	0.29
12,557.00	89.10	149.760	11,330.48	-1,289.41	-604.51	935.41	0.92	-0.79	0.46
12,651.00	89.67	150.380	11,331.49	-1,370.87	-557.61	1,028.87	0.90	0.61	0.66
12,744.00	88.40	150.910	11,333.06	-1,451.92	-512.03	1,121.42	1.48	-1.37	0.57
12,839.00	88.92	151.430	11,335.28	-1,535.12	-466.23	1,216.03	0.77	0.55	0.55
12,934.00	88.79	150.200	11,337.18	-1,618.04	-419.91	1,310.59	1.30	-0.14	-1.29
13,028.00	89.45	148.970	11,338.62	-1,699.09	-372.33	1,403.96	1.48	0.70	-1.31
13,123.00	88.79	149.760	11,340.08	-1,780.82	-323.93	1,498.28	1.08	-0.69	0.83
13,217.00	89.14	150.470	11,341.78	-1,862.31	-277.10	1,591.73	0.84	0.37	0.76
13,312.00	87.96	149.320	11,344.18	-1,944.46	-229.47	1,686.13	1.73	-1.24	-1.21
13,405.00	88.40	149.590	11,347.14	-2,024.52	-182.23	1,778.44	0.56	0.47	0.29
13,500.00	88.75	150.290	11,349.50	-2,106.71	-134.66	1,872.85	0.82	0.37	0.74
13,594.00	89.14	150.990	11,351.23	-2,188.63	-88.58	1,966.40	0.85	0.41	0.74
13,689.00	88.97	149.940	11,352.80	-2,271.27	-41.75	2,060.91	1.12	-0.18	-1.11
13,784.00	89.10	148.970	11,354.40	-2,353.07	6.52	2,155.24	1.03	0.14	-1.02
13,879.00	89.23	149.850	11,355.78	-2,434.84	54.86	2,249.57	0.94	0.14	0.93
13,973.00	87.96	148.270	11,358.09	-2,515.44	103.17	2,342.81	2.16	-1.35	-1.68
14,068.00	87.96	148.360	11,361.47	-2,596.23	153.04	2,436.86	0.09	0.00	0.09
14,163.00	88.18	148.710	11,364.67	-2,677.21	202.60	2,530.96	0.43	0.23	0.37
14,258.00	88.79	148.440	11,367.18	-2,758.25	252.11	2,625.09	0.70	0.64	-0.28
14,352.00	89.36	148.970	11,368.70	-2,838.56	300.93	2,718.28	0.83	0.61	0.56
14,447.00	89.23	148.360	11,369.87	-2,919.70	350.33	2,812.46	0.66	-0.14	-0.64
14,542.00	89.58	149.670	11,370.85	-3,001.14	399.24	2,906.71	1.43	0.37	1.38
14,636.00	89.89	150.110	11,371.29	-3,082.45	446.39	3,000.14	0.57	0.33	0.47
14,731.00	89.93	150.030	11,371.44	-3,164.78	493.79	3,094.60	0.09	0.04	-0.08
14,826.00	89.98	150.200	11,371.51	-3,247.15	541.12	3,189.07	0.19	0.05	0.18
14,920.00	88.84	151.340	11,372.48	-3,329.17	587.02	3,282.64	1.72	-1.21	1.21



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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)
15,015.00	89.05	150.380	11,374.23	-3,412.13	633.27	3,377.22	1.03	0.22	-1.01
15,110.00	88.92	148.090	11,375.91	-3,493.75	681.86	3,471.50	2.41	-0.14	-2.41
15,205.00	89.27	148.530	11,377.41	-3,574.57	731.76	3,565.59	0.59	0.37	0.46
15,299.00	89.67	151.780	11,378.28	-3,656.09	778.53	3,659.06	3.48	0.43	3.46
15,394.00	89.76	152.220	11,378.75	-3,739.97	823.13	3,753.80	0.47	0.09	0.46
15,489.00	89.85	151.610	11,379.08	-3,823.78	867.85	3,848.54	0.65	0.09	-0.64
15,584.00	88.84	150.110	11,380.16	-3,906.75	914.11	3,943.12	1.90	-1.06	-1.58
15,678.00	89.10	150.110	11,381.85	-3,988.23	960.94	4,036.58	0.28	0.28	0.00
15,773.00	88.48	150.820	11,383.86	-4,070.87	1,007.76	4,131.08	0.99	-0.65	0.75
15,868.00	87.43	149.500	11,387.25	-4,153.22	1,055.00	4,225.50	1.77	-1.11	-1.39
15,963.00	87.87	149.410	11,391.15	-4,234.97	1,103.24	4,319.76	0.47	0.46	-0.09
16,057.00	87.91	149.320	11,394.61	-4,315.79	1,151.11	4,413.04	0.10	0.04	-0.10
16,152.00	88.66	149.590	11,397.45	-4,397.57	1,199.36	4,507.34	0.84	0.79	0.28
16,247.00	88.66	148.970	11,399.67	-4,479.22	1,247.88	4,601.63	0.65	0.00	-0.65
16,342.00	88.97	148.530	11,401.64	-4,560.42	1,297.15	4,695.81	0.57	0.33	-0.46
16,436.00	88.35	150.110	11,403.83	-4,641.23	1,345.10	4,789.11	1.81	-0.66	1.68
16,530.00	89.01	150.640	11,406.00	-4,722.92	1,391.55	4,882.60	0.90	0.70	0.56
16,625.00	89.10	150.910	11,407.57	-4,805.82	1,437.93	4,977.17	0.30	0.09	0.28
16,720.00	89.05	151.870	11,409.10	-4,889.21	1,483.42	5,071.82	1.01	-0.05	1.01
16,815.00	88.62	152.050	11,411.03	-4,973.04	1,528.06	5,166.54	0.49	-0.45	0.19
16,909.00	88.35	150.820	11,413.52	-5,055.57	1,572.99	5,260.19	1.34	-0.29	-1.31
17,003.00	88.40	150.640	11,416.18	-5,137.53	1,618.93	5,353.72	0.20	0.05	-0.19
17,098.00	88.44	150.550	11,418.80	-5,220.26	1,665.56	5,448.24	0.10	0.04	-0.09
17,193.00	88.44	150.290	11,421.39	-5,302.85	1,712.44	5,542.72	0.27	0.00	-0.27
17,287.00	88.53	150.470	11,423.87	-5,384.54	1,758.88	5,636.21	0.21	0.10	0.19
17,382.00	88.88	151.170	11,426.02	-5,467.46	1,805.19	5,730.77	0.82	0.37	0.74
17,477.00	89.32	150.110	11,427.51	-5,550.25	1,851.76	5,825.31	1.21	0.46	-1.12
17,572.00	89.41	149.410	11,428.57	-5,632.31	1,899.60	5,919.71	0.74	0.09	-0.74
17,665.00	89.67	148.880	11,429.31	-5,712.15	1,947.29	6,012.01	0.63	0.28	-0.57
17,761.00	90.37	148.710	11,429.28	-5,794.26	1,997.03	6,107.21	0.75	0.73	-0.18
17,856.00	90.02	148.880	11,428.96	-5,875.51	2,046.25	6,201.42	0.41	-0.37	0.18
17,950.00	88.22	148.620	11,430.40	-5,955.86	2,095.01	6,294.62	1.93	-1.91	-0.28
18,045.00	88.13	148.180	11,433.42	-6,036.73	2,144.76	6,388.70	0.47	-0.09	-0.46
18,140.00	89.58	149.500	11,435.32	-6,118.01	2,193.90	6,482.89	2.06	1.53	1.39
18,234.00	89.67	149.670	11,435.94	-6,199.07	2,241.49	6,576.27	0.20	0.10	0.18
18,329.00	88.62	149.240	11,437.36	-6,280.88	2,289.77	6,670.61	1.19	-1.11	-0.45
18,424.00	89.05	150.200	11,439.29	-6,362.90	2,337.66	6,764.98	1.11	0.45	1.01
18,519.00	89.05	152.400	11,440.86	-6,446.21	2,383.27	6,859.62	2.32	0.00	2.32
18,613.00	88.84	152.840	11,442.59	-6,529.66	2,426.49	6,953.42	0.52	-0.22	0.47
18,707.00	89.19	152.050	11,444.21	-6,612.99	2,469.97	7,047.21	0.92	0.37	-0.84
18,802.00	88.48	150.470	11,446.14	-6,696.27	2,515.64	7,141.83	1.82	-0.75	-1.66
18,897.00	88.35	148.090	11,448.77	-6,777.90	2,564.14	7,236.10	2.51	-0.14	-2.51
18,991.00	88.00	148.270	11,451.76	-6,857.73	2,613.68	7,329.14	0.42	-0.37	0.19

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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)
19,085.00	88.62	148.180	11,454.53	-6,937.61	2,663.16	7,422.20	0.67	0.66	-0.10
19,180.00	89.14	148.090	11,456.39	-7,018.27	2,713.30	7,516.24	0.56	0.55	-0.09
19,274.00	89.23	147.920	11,457.73	-7,097.99	2,763.10	7,609.28	0.20	0.10	-0.18
19,369.00	89.58	149.850	11,458.71	-7,179.31	2,812.19	7,703.50	2.06	0.37	2.03
19,463.00	89.80	149.940	11,459.22	-7,260.63	2,859.34	7,796.94	0.25	0.23	0.10
19,558.00	89.36	149.500	11,459.92	-7,342.67	2,907.24	7,891.33	0.65	-0.46	-0.46
19,653.00	89.19	148.880	11,461.12	-7,424.25	2,955.89	7,985.62	0.68	-0.18	-0.65
19,748.00	88.66	149.320	11,462.90	-7,505.75	3,004.67	8,079.87	0.73	-0.56	0.46
19,843.00	89.32	149.500	11,464.58	-7,587.52	3,053.01	8,174.20	0.72	0.69	0.19
19,938.00	88.57	147.480	11,466.33	-7,668.49	3,102.65	8,268.32	2.27	-0.79	-2.13
20,032.00	89.54	151.700	11,467.88	-7,749.53	3,150.21	8,361.67	4.61	1.03	4.49
20,127.00	90.11	152.930	11,468.17	-7,833.65	3,194.34	8,456.45	1.43	0.60	1.29
20,222.00	89.98	151.610	11,468.09	-7,917.74	3,238.55	8,551.22	1.40	-0.14	-1.39
20,316.00	89.41	151.340	11,468.60	-8,000.33	3,283.44	8,644.91	0.67	-0.61	-0.29
20,411.00	88.97	151.700	11,469.94	-8,083.82	3,328.73	8,739.58	0.60	-0.46	0.38
20,506.00	87.87	150.380	11,472.56	-8,166.91	3,374.71	8,834.16	1.81	-1.16	-1.39
20,600.00	88.04	149.940	11,475.91	-8,248.39	3,421.45	8,927.58	0.50	0.18	-0.47
20,694.00	87.91	149.760	11,479.23	-8,329.63	3,468.64	9,020.95	0.24	-0.14	-0.19
20,789.00	87.78	149.670	11,482.81	-8,411.60	3,516.51	9,115.28	0.17	-0.14	-0.09
20,884.00	88.48	149.670	11,485.91	-8,493.56	3,564.46	9,209.62	0.74	0.74	0.00
20,978.00	88.75	149.150	11,488.18	-8,574.45	3,612.28	9,302.94	0.62	0.29	-0.55
21,072.00	88.62	149.500	11,490.34	-8,655.28	3,660.22	9,396.24	0.40	-0.14	0.37
21,166.00	88.48	149.410	11,492.71	-8,736.21	3,707.98	9,489.56	0.18	-0.15	-0.10
21,260.00	88.26	149.320	11,495.39	-8,817.05	3,755.86	9,582.86	0.25	-0.23	-0.10
21,355.00	89.32	151.260	11,497.39	-8,899.54	3,802.93	9,677.33	2.33	1.12	2.04
21,449.00	89.36	151.260	11,498.48	-8,981.96	3,848.13	9,770.98	0.04	0.04	0.00
21,544.00	89.14	151.610	11,499.72	-9,065.38	3,893.55	9,865.65	0.44	-0.23	0.37
21,639.00	89.14	151.610	11,501.15	-9,148.95	3,938.71	9,960.33	0.00	0.00	0.00
21,734.00	88.66	151.340	11,502.97	-9,232.40	3,984.07	10,055.00	0.58	-0.51	-0.28
21,828.00	88.57	150.110	11,505.24	-9,314.37	4,030.02	10,148.54	1.31	-0.10	-1.31
21,923.00	90.46	150.290	11,506.05	-9,396.80	4,077.23	10,243.02	2.00	1.99	0.19
22,017.00	91.03	149.940	11,504.82	-9,478.30	4,124.06	10,336.48	0.71	0.61	-0.37
22,111.00	91.25	149.670	11,502.95	-9,559.53	4,171.33	10,429.88	0.37	0.23	-0.29
22,206.00	90.15	149.410	11,501.79	-9,641.41	4,219.48	10,524.24	1.19	-1.16	-0.27
22,298.00	88.70	149.940	11,502.72	-9,720.81	4,265.93	10,615.64	1.68	-1.58	0.58
22,406.00	88.53	148.800	11,505.33	-9,813.71	4,320.94	10,722.84	1.07	-0.16	-1.06
<b>Survey @ 22406.00 MD 11505.33 TVD</b>									
22,462.00	88.53	148.800	11,506.76	-9,861.60	4,349.94	10,778.36	0.00	0.00	0.00
<b>Survey projected to 22462.00 MD 11506.76 TVD</b>									



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	DB_Aug1919_v14

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
10,267.00	10,164.38	95.19	-1,066.04	Tie into original hole @ 10267 MD
22,406.00	11,505.33	-9,813.71	4,320.94	Survey @ 22406.00 MD 11505.33 TVD

<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	DB_Aug1919_v14

<b>Project</b>	Marshall County, West Virginia		
<b>Map System:</b>	Universal Transverse Mercator (US Survey Feet)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD83 West Virginia - HARN		
<b>Map Zone:</b>	Zone 17N (84 W to 78 W)		

<b>Site</b>	Hillrock/Simms				
<b>Site Position:</b>		<b>Northing:</b>	14,434,279.29 usft	<b>Latitude:</b>	39.74587001
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,704,992.60 usft	<b>Longitude:</b>	-80.77026312
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.147 °

<b>Well</b>	Hillrock 1S-12 HU (D)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	14,434,227.87 usft	<b>Latitude:</b>	39.74572880
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,704,993.21 usft	<b>Longitude:</b>	-80.77026140
<b>Position Uncertainty</b>	0.00 ft		<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	1,219.00 ft

<b>Wellbore</b>	Sidetrack 01				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	7/15/2020	-8.735	66.675	51,804.96762739

<b>Design</b>	Surveys Sidetrack 01				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	10,267.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	156.178	

<b>Survey Program</b>	<b>Date</b>	7/31/2020			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
249.00	938.00	MWD surf (Original Hole)	MWD	MWD - Standard	
983.00	6,399.00	MWD int (Original Hole)	MWD	MWD - Standard	
6,559.00	10,239.00	MWD (Original Hole)	MWD	MWD - Standard	
10,267.00	10,267.00	MWD lat (Original Hole)	MWD	MWD - Standard	
10,331.00	22,406.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
22,462.00	22,462.00	Projection ST1 (Sidetrack 01)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Map Northing (usft)</b>	<b>Map Easting (usft)</b>	<b>Latitude</b>	<b>Longitude</b>	
0.00	0.00	0.000	0.00	0.00	0.00	14,434,227.87	1,704,993.21	39.74572880	-80.77026140	
249.00	0.53	251.100	249.00	-0.37	-1.09	14,434,227.50	1,704,992.12	39.74572778	-80.77026528	
294.00	0.66	232.730	293.99	-0.60	-1.49	14,434,227.28	1,704,991.72	39.74572717	-80.77026672	
341.00	0.57	228.600	340.99	-0.92	-1.88	14,434,226.96	1,704,991.33	39.74572630	-80.77026811	
386.00	0.48	248.730	385.99	-1.13	-2.23	14,434,226.74	1,704,990.99	39.74572571	-80.77026933	
432.00	0.44	229.040	431.99	-1.32	-2.54	14,434,226.56	1,704,990.67	39.74572520	-80.77027045	
477.00	0.31	232.640	476.99	-1.51	-2.77	14,434,226.37	1,704,990.45	39.74572469	-80.77027126	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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	
523.00	0.35	229.480	522.99	-1.67	-2.97	14,434,226.20	1,704,990.24	39.74572423	-80.77027199	
613.00	0.22	235.810	612.99	-1.95	-3.32	14,434,225.93	1,704,989.89	39.74572348	-80.77027325	
705.00	0.18	261.120	704.98	-2.07	-3.61	14,434,225.80	1,704,989.60	39.74572314	-80.77027428	
795.00	0.13	170.420	794.98	-2.19	-3.74	14,434,225.68	1,704,989.48	39.74572281	-80.77027471	
890.00	0.09	160.050	889.98	-2.37	-3.69	14,434,225.51	1,704,989.52	39.74572232	-80.77027456	
938.00	0.18	195.030	937.98	-2.48	-3.70	14,434,225.40	1,704,989.51	39.74572203	-80.77027459	
983.00	0.18	215.240	982.98	-2.60	-3.76	14,434,225.27	1,704,989.45	39.74572168	-80.77027480	
1,078.00	0.48	135.700	1,077.98	-3.01	-3.57	14,434,224.86	1,704,989.65	39.74572056	-80.77027412	
1,171.00	1.01	146.600	1,170.97	-3.97	-2.84	14,434,223.90	1,704,990.37	39.74571791	-80.77027155	
1,266.00	1.63	167.160	1,265.95	-5.99	-2.08	14,434,221.88	1,704,991.13	39.74571237	-80.77026886	
1,361.00	3.08	177.980	1,360.87	-9.86	-1.69	14,434,218.02	1,704,991.52	39.74570174	-80.77026751	
1,456.00	3.52	170.330	1,455.71	-15.28	-1.11	14,434,212.59	1,704,992.10	39.74568684	-80.77026550	
1,550.00	4.04	169.010	1,549.50	-21.38	0.00	14,434,206.50	1,704,993.22	39.74567009	-80.77026158	
1,648.00	4.35	158.460	1,647.24	-28.22	2.03	14,434,199.65	1,704,995.24	39.74565128	-80.77025445	
1,743.00	3.69	147.130	1,742.01	-34.14	5.01	14,434,193.73	1,704,998.22	39.74563500	-80.77024390	
1,837.00	2.68	155.210	1,835.86	-38.68	7.57	14,434,189.20	1,705,000.78	39.74562253	-80.77023482	
1,932.00	3.34	171.560	1,930.74	-43.43	8.91	14,434,184.44	1,705,002.12	39.74560946	-80.77023010	
2,026.00	4.44	164.260	2,024.52	-49.64	10.30	14,434,178.23	1,705,003.51	39.74559239	-80.77022522	
2,121.00	4.92	166.370	2,119.20	-57.14	12.26	14,434,170.73	1,705,005.47	39.74557179	-80.77021832	
2,216.00	4.53	166.810	2,213.88	-64.75	14.07	14,434,163.12	1,705,007.28	39.74555087	-80.77021193	
2,310.00	3.47	174.720	2,307.65	-71.20	15.18	14,434,156.67	1,705,008.39	39.74553316	-80.77020805	
2,405.00	3.25	198.190	2,402.49	-76.62	14.60	14,434,151.25	1,705,007.82	39.74551827	-80.77021014	
2,499.00	3.56	220.510	2,496.33	-81.37	11.88	14,434,146.50	1,705,005.09	39.74550525	-80.77021989	
2,594.00	3.65	206.630	2,591.14	-86.32	8.61	14,434,141.56	1,705,001.82	39.74549169	-80.77023157	
2,689.00	4.09	198.010	2,685.93	-92.24	6.20	14,434,135.63	1,704,999.42	39.74547543	-80.77024018	
2,777.00	4.44	191.330	2,773.68	-98.57	4.56	14,434,129.31	1,704,997.78	39.74545807	-80.77024607	
2,871.00	3.69	194.410	2,867.44	-105.06	3.10	14,434,122.81	1,704,996.31	39.74544024	-80.77025135	
2,966.00	2.29	192.390	2,962.31	-109.88	1.93	14,434,117.99	1,704,995.14	39.74542703	-80.77025555	
3,060.00	0.88	194.760	3,056.27	-112.41	1.34	14,434,115.46	1,704,994.55	39.74542008	-80.77025766	
3,155.00	0.97	250.840	3,151.26	-113.38	0.39	14,434,114.49	1,704,993.61	39.74541742	-80.77026103	
3,247.00	2.42	271.320	3,243.22	-113.59	-2.28	14,434,114.28	1,704,990.93	39.74541686	-80.77027056	
3,341.00	4.09	279.310	3,337.07	-113.00	-7.58	14,434,114.87	1,704,985.64	39.74541851	-80.77028938	
3,436.00	4.31	283.360	3,431.81	-111.63	-14.39	14,434,116.24	1,704,978.82	39.74542233	-80.77031362	
3,529.00	4.44	286.610	3,524.54	-109.79	-21.24	14,434,118.08	1,704,971.97	39.74542742	-80.77033797	
3,624.00	4.83	288.450	3,619.23	-107.48	-28.56	14,434,120.40	1,704,964.65	39.74543384	-80.77036398	
3,719.00	5.23	290.480	3,713.87	-104.70	-36.41	14,434,123.18	1,704,956.80	39.74544153	-80.77039188	
3,813.00	5.23	297.160	3,807.47	-101.24	-44.23	14,434,126.63	1,704,948.98	39.74545107	-80.77041969	
3,907.00	5.93	298.210	3,901.03	-96.99	-52.33	14,434,130.88	1,704,940.89	39.74546280	-80.77044844	
4,004.00	5.84	294.870	3,997.52	-92.55	-61.22	14,434,135.33	1,704,931.99	39.74547507	-80.77048003	
4,098.00	6.02	280.630	4,091.02	-89.63	-70.40	14,434,138.25	1,704,922.81	39.74548316	-80.77051268	
4,193.00	5.41	279.660	4,185.55	-87.96	-79.71	14,434,139.92	1,704,913.50	39.74548781	-80.77054579	
4,287.00	5.76	282.650	4,279.10	-86.18	-88.68	14,434,141.69	1,704,904.53	39.74549275	-80.77057769	
4,381.00	5.36	280.720	4,372.66	-84.33	-97.60	14,434,143.54	1,704,895.61	39.74549789	-80.77060939	
4,476.00	5.36	278.790	4,467.24	-82.83	-106.35	14,434,145.05	1,704,886.87	39.74550208	-80.77064049	
4,570.00	6.72	283.000	4,560.72	-80.92	-116.04	14,434,146.95	1,704,877.17	39.74550739	-80.77067497	
4,663.00	6.20	279.400	4,653.13	-78.87	-126.30	14,434,149.00	1,704,866.91	39.74551308	-80.77071144	
4,758.00	5.49	275.890	4,747.64	-77.57	-135.88	14,434,150.30	1,704,857.33	39.74551673	-80.77074552	
4,853.00	5.01	275.800	4,842.24	-76.68	-144.53	14,434,151.19	1,704,848.68	39.74551922	-80.77077627	
4,946.00	4.92	279.580	4,934.89	-75.61	-152.50	14,434,152.26	1,704,840.71	39.74552223	-80.77080463	
5,041.00	5.93	281.250	5,029.46	-73.98	-161.33	14,434,153.90	1,704,831.88	39.74552678	-80.77083603	
5,135.00	4.92	282.920	5,123.04	-72.13	-170.02	14,434,155.75	1,704,823.19	39.74553192	-80.77086693	
5,229.00	4.75	287.400	5,216.70	-70.06	-177.67	14,434,157.81	1,704,815.55	39.74553764	-80.77089410	
5,324.00	6.06	290.560	5,311.28	-67.12	-186.12	14,434,160.75	1,704,807.10	39.74554577	-80.77092413	
5,417.00	6.64	289.420	5,403.71	-63.61	-195.78	14,434,164.26	1,704,797.43	39.74555548	-80.77095849	
5,512.00	5.45	281.330	5,498.18	-60.90	-205.39	14,434,166.97	1,704,787.83	39.74556300	-80.77099263	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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
5,605.00	3.65	267.540	5,590.89	-60.16	-212.68	14,434,167.71	1,704,780.54	39.74556508	-80.77101856
5,700.00	4.26	260.420	5,685.66	-60.88	-219.18	14,434,167.00	1,704,774.04	39.74556316	-80.77104169
5,795.00	4.39	272.990	5,780.39	-61.27	-226.29	14,434,166.60	1,704,766.93	39.74556212	-80.77106699
5,890.00	4.44	286.520	5,875.11	-60.04	-233.44	14,434,167.84	1,704,759.77	39.74556556	-80.77109244
5,984.00	5.49	287.840	5,968.76	-57.63	-241.21	14,434,170.25	1,704,752.00	39.74557224	-80.77112005
6,078.00	5.19	285.470	6,062.35	-55.11	-249.59	14,434,172.76	1,704,743.62	39.74557920	-80.77114984
6,173.00	5.41	281.160	6,156.95	-53.10	-258.12	14,434,174.77	1,704,735.09	39.74558478	-80.77118018
6,268.00	6.37	282.920	6,251.44	-51.06	-267.65	14,434,176.82	1,704,725.56	39.74559047	-80.77121407
6,363.00	8.31	287.140	6,345.66	-47.85	-279.35	14,434,180.02	1,704,713.86	39.74559934	-80.77125566
6,399.00	8.70	286.080	6,381.26	-46.33	-284.45	14,434,181.54	1,704,708.76	39.74560356	-80.77127379
6,559.00	9.18	286.080	6,539.32	-39.45	-308.35	14,434,188.43	1,704,684.87	39.74562264	-80.77135873
6,653.00	10.11	287.050	6,631.99	-34.95	-323.44	14,434,192.92	1,704,669.77	39.74563509	-80.77141238
6,748.00	12.26	286.080	6,725.18	-29.71	-341.10	14,434,198.16	1,704,652.11	39.74564960	-80.77147518
6,843.00	13.01	279.050	6,817.89	-25.24	-361.36	14,434,202.64	1,704,631.86	39.74566204	-80.77154719
6,938.00	12.39	269.820	6,910.57	-23.59	-382.11	14,434,204.29	1,704,611.10	39.74566671	-80.77162101
7,032.00	12.44	269.120	7,002.37	-23.77	-402.32	14,434,204.10	1,704,590.89	39.74566634	-80.77169290
7,127.00	12.74	265.070	7,095.09	-24.83	-422.99	14,434,203.04	1,704,570.23	39.74566358	-80.77176644
7,221.00	10.81	266.040	7,187.11	-26.33	-442.11	14,434,201.54	1,704,551.10	39.74565960	-80.77183448
7,315.00	9.54	269.730	7,279.63	-26.97	-458.69	14,434,200.90	1,704,534.52	39.74565794	-80.77189349
7,410.00	9.58	275.880	7,373.31	-26.20	-474.43	14,434,201.67	1,704,518.78	39.74566017	-80.77194947
7,505.00	9.45	275.620	7,467.00	-24.63	-490.06	14,434,203.24	1,704,503.16	39.74566460	-80.77200504
7,692.00	11.65	270.520	7,650.84	-22.95	-524.22	14,434,204.92	1,704,469.00	39.74566944	-80.77212656
7,787.00	12.04	270.880	7,743.81	-22.71	-543.72	14,434,205.16	1,704,449.50	39.74567023	-80.77219593
7,882.00	13.14	281.860	7,836.54	-20.34	-564.20	14,434,207.53	1,704,429.02	39.74567689	-80.77226876
7,977.00	12.66	289.420	7,929.15	-14.66	-584.58	14,434,213.21	1,704,408.63	39.74569263	-80.77234124
8,071.00	13.18	288.810	8,020.77	-7.78	-604.44	14,434,220.09	1,704,388.77	39.74571167	-80.77241182
8,165.00	12.22	292.230	8,112.47	-0.56	-623.80	14,434,227.31	1,704,369.42	39.74573163	-80.77248061
8,260.00	11.82	285.820	8,205.39	5.89	-642.46	14,434,233.77	1,704,350.75	39.74574949	-80.77254697
8,355.00	11.29	279.230	8,298.47	10.04	-661.01	14,434,237.91	1,704,332.21	39.74576100	-80.77261289
8,450.00	9.98	277.200	8,391.84	12.56	-678.35	14,434,240.44	1,704,314.86	39.74576805	-80.77267458
8,544.00	9.36	276.760	8,484.50	14.48	-694.02	14,434,242.36	1,704,299.19	39.74577344	-80.77273032
8,639.00	10.33	275.970	8,578.10	16.28	-710.17	14,434,244.15	1,704,283.05	39.74577848	-80.77278774
8,733.00	11.51	282.830	8,670.40	19.24	-727.70	14,434,247.11	1,704,265.52	39.74578673	-80.77285007
8,827.00	13.23	280.810	8,762.21	23.34	-747.41	14,434,251.21	1,704,245.81	39.74579813	-80.77292015
8,922.00	13.32	284.500	8,854.68	28.12	-768.68	14,434,255.99	1,704,224.53	39.74581140	-80.77299579
9,017.00	12.66	290.740	8,947.25	34.54	-789.01	14,434,262.42	1,704,204.20	39.74582919	-80.77306807
9,116.00	12.17	289.600	9,043.94	41.89	-808.99	14,434,269.76	1,704,184.23	39.74584949	-80.77313907
9,210.00	13.13	287.750	9,135.65	48.47	-828.49	14,434,276.34	1,704,164.72	39.74586770	-80.77320839
9,305.00	12.92	286.960	9,228.21	54.85	-848.93	14,434,282.73	1,704,144.29	39.74588538	-80.77328104
9,399.00	13.93	285.110	9,319.64	60.87	-869.90	14,434,288.74	1,704,123.31	39.74590205	-80.77335560
9,494.00	14.33	282.570	9,411.77	66.41	-892.42	14,434,294.28	1,704,100.80	39.74591742	-80.77343565
9,589.00	13.40	278.790	9,504.00	70.65	-914.77	14,434,298.52	1,704,078.44	39.74592922	-80.77351514
9,684.00	13.71	277.560	9,596.35	73.81	-936.81	14,434,301.68	1,704,056.40	39.74593806	-80.77359352
9,778.00	13.62	279.930	9,687.69	77.19	-958.76	14,434,305.06	1,704,034.46	39.74594748	-80.77367156
9,872.00	12.52	282.570	9,779.26	81.31	-979.60	14,434,309.19	1,704,013.61	39.74595895	-80.77374569
9,965.00	11.91	281.420	9,870.15	85.41	-998.85	14,434,313.28	1,703,994.37	39.74597033	-80.77381412
10,059.00	12.39	278.870	9,962.05	88.88	-1,018.32	14,434,316.75	1,703,974.90	39.74598001	-80.77388336
10,153.00	12.96	275.970	10,053.76	91.53	-1,038.77	14,434,319.41	1,703,954.45	39.74598743	-80.77395608
10,239.00	14.41	278.080	10,137.31	94.04	-1,058.95	14,434,321.91	1,703,934.26	39.74599446	-80.77402788
10,267.00	15.30	280.280	10,164.38	95.19	-1,066.04	14,434,323.06	1,703,927.18	39.74599766	-80.77405307
<b>Tie into original hole @ 10267 MD</b>									
10,331.00	14.64	285.470	10,226.21	98.85	-1,082.14	14,434,326.73	1,703,911.07	39.74600784	-80.77411033
10,360.00	13.76	301.900	10,254.33	101.65	-1,088.61	14,434,329.53	1,703,904.61	39.74601557	-80.77413330
10,407.00	13.05	312.450	10,300.06	108.19	-1,097.27	14,434,336.06	1,703,895.95	39.74603358	-80.77416405
10,455.00	11.74	292.580	10,346.96	113.73	-1,105.78	14,434,341.60	1,703,887.44	39.74604885	-80.77419429



**Company:** Tug Hill Operating LLC  
**Project:** Marshall County, West Virginia  
**Site:** Hillrock/Simms  
**Well:** Hillrock 1S-12 HU (D)  
**Wellbore:** Sidetrack 01  
**Design:** Surveys Sidetrack 01

**Local Co-ordinate Reference:** Well Hillrock 1S-12 HU (D)  
**TVD Reference:** RKB=1219+26 @ 1245.00ft (Nabors B28)  
**MD Reference:** RKB=1219+26 @ 1245.00ft (Nabors B28)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**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	
10,502.00	13.05	274.570	10,392.88	115.99	-1,115.49	14,434,343.86	1,703,877.73	39.74605512	-80.77422881	
10,550.00	13.41	260.070	10,439.62	115.46	-1,126.38	14,434,343.33	1,703,866.84	39.74605374	-80.77426754	
10,597.00	14.24	240.820	10,485.28	111.70	-1,136.80	14,434,339.57	1,703,856.42	39.74604349	-80.77430465	
10,645.00	15.56	225.000	10,531.69	104.26	-1,146.51	14,434,332.14	1,703,846.71	39.74602314	-80.77433927	
10,692.00	16.88	211.990	10,576.83	94.01	-1,154.58	14,434,321.89	1,703,838.63	39.74599505	-80.77436809	
10,739.00	18.68	201.970	10,621.59	81.24	-1,161.02	14,434,309.12	1,703,832.20	39.74596002	-80.77439109	
10,786.00	20.31	194.150	10,665.91	66.35	-1,165.83	14,434,294.22	1,703,827.39	39.74591915	-80.77440834	
10,833.00	22.68	189.140	10,709.64	49.49	-1,169.26	14,434,277.36	1,703,823.95	39.74587288	-80.77442071	
10,880.00	24.79	185.450	10,752.66	30.73	-1,171.64	14,434,258.61	1,703,821.58	39.74582138	-80.77442933	
10,928.00	27.03	182.020	10,795.84	9.81	-1,172.98	14,434,237.68	1,703,820.24	39.74576393	-80.77443428	
10,975.00	30.24	176.220	10,837.09	-12.68	-1,172.57	14,434,215.19	1,703,820.64	39.74572016	-80.77443305	
11,023.00	32.84	172.170	10,878.00	-37.64	-1,170.00	14,434,190.23	1,703,823.21	39.74563359	-80.77442412	
11,070.00	35.60	170.070	10,916.86	-63.75	-1,165.91	14,434,164.12	1,703,827.31	39.74556186	-80.77440979	
11,118.00	38.37	168.570	10,955.20	-92.12	-1,160.55	14,434,135.75	1,703,832.67	39.74548391	-80.77439096	
11,165.00	41.05	166.900	10,991.36	-121.45	-1,154.16	14,434,106.42	1,703,839.06	39.74540331	-80.77436849	
11,211.00	43.74	165.670	11,025.32	-151.58	-1,146.79	14,434,076.29	1,703,846.42	39.74532052	-80.77434257	
11,258.00	46.59	164.530	11,058.46	-183.78	-1,138.22	14,434,044.09	1,703,855.00	39.74523203	-80.77431235	
11,305.00	49.67	163.470	11,089.83	-217.42	-1,128.56	14,434,010.46	1,703,864.65	39.74513959	-80.77427831	
11,352.00	52.97	162.070	11,119.20	-252.45	-1,117.69	14,433,975.42	1,703,875.53	39.74504330	-80.77423993	
11,398.00	55.25	160.660	11,146.16	-287.76	-1,105.78	14,433,940.11	1,703,887.44	39.74494625	-80.77419787	
11,445.00	58.02	160.220	11,172.01	-324.74	-1,092.63	14,433,903.13	1,703,900.58	39.74484459	-80.77415144	
11,493.00	61.71	159.690	11,196.10	-363.73	-1,078.40	14,433,864.14	1,703,914.81	39.74473742	-80.77410117	
11,540.00	64.70	159.520	11,217.29	-403.05	-1,063.78	14,433,824.82	1,703,929.43	39.74462933	-80.77404951	
11,588.00	66.77	159.690	11,237.01	-444.07	-1,048.54	14,433,783.81	1,703,944.68	39.74451659	-80.77399564	
11,635.00	69.23	159.610	11,254.62	-484.92	-1,033.38	14,433,742.95	1,703,959.83	39.74440429	-80.77394209	
11,682.00	72.44	159.520	11,270.05	-526.52	-1,017.88	14,433,701.36	1,703,975.33	39.74428995	-80.77388733	
11,729.00	75.03	158.900	11,283.21	-568.69	-1,001.87	14,433,659.18	1,703,991.35	39.74417401	-80.77383074	
11,777.00	77.14	158.200	11,294.75	-612.05	-984.83	14,433,615.82	1,704,008.38	39.74405481	-80.77377051	
11,824.00	79.25	156.790	11,304.37	-654.55	-967.22	14,433,573.32	1,704,025.99	39.74393797	-80.77370825	
11,871.00	81.63	155.560	11,312.17	-696.94	-948.50	14,433,530.93	1,704,044.72	39.74382142	-80.77364203	
11,918.00	84.66	153.630	11,317.78	-739.09	-928.48	14,433,488.79	1,704,064.73	39.74370554	-80.77357119	
11,965.00	85.58	151.170	11,321.78	-780.58	-906.79	14,433,447.29	1,704,086.43	39.74359143	-80.77349438	
12,060.00	89.98	148.440	11,325.46	-862.60	-859.06	14,433,365.27	1,704,134.16	39.74336585	-80.77332532	
12,154.00	90.24	149.500	11,325.28	-943.15	-810.60	14,433,284.72	1,704,182.61	39.74314431	-80.77315367	
12,248.00	88.57	149.060	11,326.26	-1,023.95	-762.59	14,433,203.92	1,704,230.63	39.74292207	-80.77298359	
12,343.00	88.92	148.970	11,328.34	-1,105.38	-713.69	14,433,122.50	1,704,279.52	39.74269812	-80.77281038	
12,462.00	89.85	149.320	11,329.61	-1,207.53	-652.66	14,433,020.35	1,704,340.55	39.74241716	-80.77259420	
12,557.00	89.10	149.760	11,330.48	-1,289.41	-604.51	14,432,938.46	1,704,388.71	39.74219194	-80.77242363	
12,651.00	89.67	150.380	11,331.49	-1,370.87	-557.61	14,432,857.01	1,704,435.61	39.74196791	-80.77225754	
12,744.00	88.40	150.910	11,333.06	-1,451.92	-512.03	14,432,775.96	1,704,481.19	39.74174502	-80.77209611	
12,839.00	88.92	151.430	11,335.28	-1,535.12	-466.23	14,432,692.76	1,704,526.99	39.74151620	-80.77193395	
12,934.00	88.79	150.200	11,337.18	-1,618.04	-419.91	14,432,609.84	1,704,573.30	39.74128815	-80.77176994	
13,028.00	89.45	148.970	11,338.62	-1,699.09	-372.33	14,432,528.79	1,704,620.88	39.74106522	-80.77160141	
13,123.00	88.79	149.760	11,340.08	-1,780.82	-323.93	14,432,447.06	1,704,669.28	39.74084043	-80.77142997	
13,217.00	89.14	150.470	11,341.78	-1,862.31	-277.10	14,432,365.57	1,704,716.11	39.74061632	-80.77126412	
13,312.00	87.96	149.320	11,344.18	-1,944.46	-229.47	14,432,283.41	1,704,763.75	39.74039036	-80.77109542	
13,405.00	88.40	149.590	11,347.14	-2,024.52	-182.23	14,432,203.36	1,704,810.99	39.74017017	-80.77092810	
13,500.00	88.75	150.290	11,349.50	-2,106.71	-134.66	14,432,121.16	1,704,858.56	39.73994411	-80.77075963	
13,594.00	89.14	150.990	11,351.23	-2,188.63	-88.58	14,432,039.25	1,704,904.64	39.73971883	-80.77059645	
13,689.00	88.97	149.940	11,352.80	-2,271.27	-41.75	14,431,956.61	1,704,951.46	39.73949154	-80.77043064	
13,784.00	89.10	148.970	11,354.40	-2,353.07	6.52	14,431,874.81	1,704,999.73	39.73926654	-80.77025967	
13,879.00	89.23	149.850	11,355.78	-2,434.84	54.86	14,431,793.04	1,705,048.07	39.73904164	-80.77008846	
13,973.00	87.96	148.270	11,358.09	-2,515.44	103.17	14,431,712.44	1,705,096.38	39.73881996	-80.76991734	
14,068.00	87.96	148.360	11,361.47	-2,596.23	153.04	14,431,631.65	1,705,146.25	39.73859773	-80.76974069	
14,163.00	88.18	148.710	11,364.67	-2,677.21	202.60	14,431,550.67	1,705,195.81	39.73837498	-80.76956514	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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	
14,258.00	88.79	148.440	11,367.18	-2,758.25	252.11	14,431,469.63	1,705,245.32	39.73815208	-80.76938975	
14,352.00	89.36	148.970	11,368.70	-2,838.56	300.93	14,431,389.32	1,705,294.14	39.73793117	-80.76921682	
14,447.00	89.23	148.360	11,369.87	-2,919.70	350.33	14,431,308.18	1,705,343.54	39.73770799	-80.76904184	
14,542.00	89.58	149.670	11,370.85	-3,001.14	399.24	14,431,226.74	1,705,392.45	39.73748400	-80.76886863	
14,636.00	89.89	150.110	11,371.29	-3,082.45	446.39	14,431,145.43	1,705,439.60	39.73726035	-80.76870163	
14,731.00	89.93	150.030	11,371.44	-3,164.78	493.79	14,431,063.10	1,705,487.00	39.73703391	-80.76853378	
14,826.00	89.98	150.200	11,371.51	-3,247.15	541.12	14,430,980.73	1,705,534.34	39.73680737	-80.76836616	
14,920.00	88.84	151.340	11,372.48	-3,329.17	587.02	14,430,898.71	1,705,580.23	39.73658178	-80.76820365	
15,015.00	89.05	150.380	11,374.23	-3,412.13	633.27	14,430,815.75	1,705,626.49	39.73635362	-80.76803990	
15,110.00	88.92	148.090	11,375.91	-3,493.75	681.86	14,430,734.13	1,705,675.07	39.73612914	-80.76786783	
15,205.00	89.27	148.530	11,377.41	-3,574.57	731.76	14,430,653.31	1,705,724.97	39.73590682	-80.76769108	
15,299.00	89.67	151.780	11,378.28	-3,656.09	778.53	14,430,571.79	1,705,771.74	39.73568261	-80.76752546	
15,394.00	89.76	152.220	11,378.75	-3,739.97	823.13	14,430,487.91	1,705,816.34	39.73545194	-80.76736760	
15,489.00	89.85	151.610	11,379.08	-3,823.78	867.85	14,430,404.10	1,705,861.06	39.73522144	-80.76720929	
15,584.00	88.84	150.110	11,380.16	-3,906.75	914.11	14,430,321.13	1,705,907.32	39.73499326	-80.76704552	
15,678.00	89.10	150.110	11,381.85	-3,988.23	960.94	14,430,239.65	1,705,954.15	39.73476915	-80.76687968	
15,773.00	88.48	150.820	11,383.86	-4,070.87	1,007.76	14,430,157.01	1,706,000.97	39.73454187	-80.76671391	
15,868.00	87.43	149.500	11,387.25	-4,153.22	1,055.00	14,430,074.66	1,706,048.21	39.73431538	-80.76654664	
15,963.00	87.87	149.410	11,391.15	-4,234.97	1,103.24	14,429,992.92	1,706,096.45	39.73409053	-80.76637581	
16,057.00	87.91	149.320	11,394.61	-4,315.79	1,151.11	14,429,912.09	1,706,144.32	39.73386822	-80.76620630	
16,152.00	88.66	149.590	11,397.45	-4,397.57	1,199.36	14,429,830.31	1,706,192.57	39.73364328	-80.76603541	
16,247.00	88.66	148.970	11,399.67	-4,479.22	1,247.88	14,429,748.67	1,706,241.09	39.73341871	-80.76586359	
16,342.00	88.97	148.530	11,401.64	-4,560.42	1,297.15	14,429,667.47	1,706,290.36	39.73319536	-80.76568909	
16,436.00	88.35	150.110	11,403.83	-4,641.23	1,345.10	14,429,586.65	1,706,338.31	39.73297307	-80.76551929	
16,530.00	89.01	150.640	11,406.00	-4,722.92	1,391.55	14,429,504.96	1,706,384.77	39.73274839	-80.76535482	
16,625.00	89.10	150.910	11,407.57	-4,805.82	1,437.93	14,429,422.06	1,706,431.14	39.73252040	-80.76519064	
16,720.00	89.05	151.870	11,409.10	-4,889.21	1,483.42	14,429,338.68	1,706,476.63	39.73229106	-80.76502963	
16,815.00	88.62	152.050	11,411.03	-4,973.04	1,528.06	14,429,254.84	1,706,521.27	39.73206051	-80.76487160	
16,909.00	88.35	150.820	11,413.52	-5,055.57	1,572.99	14,429,172.32	1,706,566.20	39.73183355	-80.76471256	
17,003.00	88.40	150.640	11,416.18	-5,137.53	1,618.93	14,429,090.35	1,706,612.14	39.73160811	-80.76454992	
17,098.00	88.44	150.550	11,418.80	-5,220.26	1,665.56	14,429,007.62	1,706,658.77	39.73138058	-80.76438486	
17,193.00	88.44	150.290	11,421.39	-5,302.85	1,712.44	14,428,925.03	1,706,705.65	39.73115343	-80.76421889	
17,287.00	88.53	150.470	11,423.87	-5,384.54	1,758.88	14,428,843.35	1,706,752.09	39.73092875	-80.76405447	
17,382.00	88.88	151.170	11,426.02	-5,467.46	1,805.19	14,428,760.43	1,706,798.40	39.73070069	-80.76389054	
17,477.00	89.32	150.110	11,427.51	-5,550.25	1,851.76	14,428,677.64	1,706,844.97	39.73047300	-80.76372567	
17,572.00	89.41	149.410	11,428.57	-5,632.31	1,899.60	14,428,595.57	1,706,892.81	39.73024727	-80.76355628	
17,665.00	89.67	148.880	11,429.31	-5,712.15	1,947.29	14,428,515.74	1,706,940.50	39.73002768	-80.76338739	
17,761.00	90.37	148.710	11,429.28	-5,794.26	1,997.03	14,428,433.63	1,706,990.24	39.72980182	-80.76321126	
17,856.00	90.02	148.880	11,428.96	-5,875.51	2,046.25	14,428,352.37	1,707,039.46	39.72957831	-80.76303696	
17,950.00	88.22	148.620	11,430.40	-5,955.86	2,095.01	14,428,272.02	1,707,088.22	39.72935730	-80.76286430	
18,045.00	88.13	148.180	11,433.42	-6,036.73	2,144.76	14,428,191.15	1,707,137.97	39.72913484	-80.76268810	
18,140.00	89.58	149.500	11,435.32	-6,118.01	2,193.90	14,428,109.88	1,707,187.11	39.72891128	-80.76251408	
18,234.00	89.67	149.670	11,435.94	-6,199.07	2,241.49	14,428,028.82	1,707,234.70	39.72868831	-80.76234559	
18,329.00	88.62	149.240	11,437.36	-6,280.88	2,289.77	14,427,947.01	1,707,282.97	39.72846329	-80.76217467	
18,424.00	89.05	150.200	11,439.29	-6,362.90	2,337.66	14,427,864.99	1,707,330.86	39.72823769	-80.76200511	
18,519.00	89.05	152.400	11,440.86	-6,446.21	2,383.27	14,427,781.68	1,707,376.48	39.72800856	-80.76184367	
18,613.00	88.84	152.840	11,442.59	-6,529.66	2,426.49	14,427,698.22	1,707,419.70	39.72777905	-80.76169073	
18,707.00	89.19	152.050	11,444.21	-6,612.99	2,469.97	14,427,614.90	1,707,463.18	39.72754990	-80.76153688	
18,802.00	88.48	150.470	11,446.14	-6,696.27	2,515.64	14,427,531.62	1,707,508.84	39.72732086	-80.76137524	
18,897.00	88.35	148.090	11,448.77	-6,777.90	2,564.14	14,427,449.99	1,707,557.35	39.72709632	-80.76120349	
18,991.00	88.00	148.270	11,451.76	-6,857.73	2,613.68	14,427,370.16	1,707,606.89	39.72687672	-80.76102807	
19,085.00	88.62	148.180	11,454.53	-6,937.61	2,663.16	14,427,290.28	1,707,656.37	39.72665699	-80.76085285	
19,180.00	89.14	148.090	11,456.39	-7,018.27	2,713.30	14,427,209.61	1,707,706.51	39.72643509	-80.76067528	
19,274.00	89.23	147.920	11,457.73	-7,097.99	2,763.10	14,427,129.90	1,707,756.31	39.72621581	-80.76049892	
19,369.00	89.58	149.850	11,458.71	-7,179.31	2,812.19	14,427,048.58	1,707,805.40	39.72599211	-80.76032511	



<b>Company:</b>	Tug Hill Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Hillrock 1S-12 HU (D)
<b>Project:</b>	Marshall County, West Virginia	<b>TVD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Site:</b>	Hillrock/Simms	<b>MD Reference:</b>	RKB=1219+26 @ 1245.00ft (Nabors B28)
<b>Well:</b>	Hillrock 1S-12 HU (D)	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Sidetrack 01	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys Sidetrack 01	<b>Database:</b>	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
19,463.00	89.80	149.940	11,459.22	-7,260.63	2,859.34	14,426,967.26	1,707,852.54	39.72576844	-80.76015820
19,558.00	89.36	149.500	11,459.92	-7,342.67	2,907.24	14,426,885.22	1,707,900.44	39.72554279	-80.75998862
19,653.00	89.19	148.880	11,461.12	-7,424.25	2,955.89	14,426,803.64	1,707,949.10	39.72531837	-80.75981636
19,748.00	88.66	149.320	11,462.90	-7,505.75	3,004.67	14,426,722.14	1,707,997.88	39.72509419	-80.75964366
19,843.00	89.32	149.500	11,464.58	-7,587.52	3,053.01	14,426,640.37	1,708,046.21	39.72486928	-80.75947253
19,938.00	88.57	147.480	11,466.33	-7,668.49	3,102.65	14,426,559.40	1,708,095.85	39.72464653	-80.75929675
20,032.00	89.54	151.700	11,467.88	-7,749.53	3,150.21	14,426,478.36	1,708,143.41	39.72442363	-80.75912837
20,127.00	90.11	152.930	11,468.17	-7,833.65	3,194.34	14,426,394.24	1,708,187.55	39.72419228	-80.75897220
20,222.00	89.98	151.610	11,468.09	-7,917.74	3,238.55	14,426,310.15	1,708,231.75	39.72396102	-80.75881580
20,316.00	89.41	151.340	11,468.60	-8,000.33	3,283.44	14,426,227.56	1,708,276.64	39.72373388	-80.75865695
20,411.00	88.97	151.700	11,469.94	-8,083.82	3,328.73	14,426,144.07	1,708,321.94	39.72350425	-80.75849666
20,506.00	87.87	150.380	11,472.56	-8,166.91	3,374.71	14,426,060.98	1,708,367.92	39.72327573	-80.75833393
20,600.00	88.04	149.940	11,475.91	-8,248.39	3,421.45	14,425,979.50	1,708,414.66	39.72305160	-80.75816847
20,694.00	87.91	149.760	11,479.23	-8,329.63	3,468.64	14,425,898.26	1,708,461.84	39.72282816	-80.75800145
20,789.00	87.78	149.670	11,482.81	-8,411.60	3,516.51	14,425,816.29	1,708,509.72	39.72260267	-80.75783198
20,884.00	88.48	149.670	11,485.91	-8,493.56	3,564.46	14,425,734.33	1,708,557.67	39.72237725	-80.75766224
20,978.00	88.75	149.150	11,488.18	-8,574.45	3,612.28	14,425,653.44	1,708,605.49	39.72215473	-80.75749295
21,072.00	88.62	149.500	11,490.34	-8,655.28	3,660.22	14,425,572.62	1,708,653.43	39.72193241	-80.75732323
21,166.00	88.48	149.410	11,492.71	-8,736.21	3,707.98	14,425,491.69	1,708,701.19	39.72170980	-80.75715417
21,260.00	88.26	149.320	11,495.39	-8,817.05	3,755.86	14,425,410.84	1,708,749.07	39.72148741	-80.75698467
21,355.00	89.32	151.260	11,497.39	-8,899.54	3,802.93	14,425,328.35	1,708,796.14	39.72126052	-80.75681807
21,449.00	89.36	151.260	11,498.48	-8,981.96	3,848.13	14,425,245.94	1,708,841.33	39.72103385	-80.75665813
21,544.00	89.14	151.610	11,499.72	-9,065.38	3,893.55	14,425,162.51	1,708,886.75	39.72080439	-80.75649741
21,639.00	89.14	151.610	11,501.15	-9,148.95	3,938.71	14,425,078.94	1,708,931.92	39.72057456	-80.75633760
21,734.00	88.66	151.340	11,502.97	-9,232.40	3,984.07	14,424,995.49	1,708,977.27	39.72034503	-80.75617710
21,828.00	88.57	150.110	11,505.24	-9,314.37	4,030.02	14,424,913.52	1,709,023.23	39.72011958	-80.75601448
21,923.00	90.46	150.290	11,506.05	-9,396.80	4,077.23	14,424,831.09	1,709,070.43	39.71989285	-80.75584739
22,017.00	91.03	149.940	11,504.82	-9,478.30	4,124.06	14,424,749.60	1,709,117.27	39.71966869	-80.75568163
22,111.00	91.25	149.670	11,502.95	-9,559.53	4,171.33	14,424,668.37	1,709,164.53	39.71944526	-80.75551432
22,206.00	90.15	149.410	11,501.79	-9,641.41	4,219.48	14,424,586.49	1,709,212.69	39.71922003	-80.75534387
22,298.00	88.70	149.940	11,502.72	-9,720.81	4,265.93	14,424,507.08	1,709,259.14	39.71900161	-80.75517946
22,406.00	88.53	148.800	11,505.33	-9,813.71	4,320.94	14,424,414.18	1,709,314.14	39.71874606	-80.75498475
<b>Survey @ 22406.00 MD 11505.33 TVD</b>									
22,462.00	88.53	148.800	11,506.76	-9,861.60	4,349.94	14,424,366.29	1,709,343.14	39.71861433	-80.75488208
<b>Survey projected to 22462.00 MD 11506.76 TVD</b>									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
10,267.00	10,164.38	95.19	-1,066.04	Tie into original hole @ 10267 MD
22,406.00	11,505.33	-9,813.71	4,320.94	Survey @ 22406.00 MD 11505.33 TVD
22,462.00	11,506.76	-9,861.60	4,349.94	Survey projected to 22462.00 MD 11506.76 TVD