



Well: Van Winkle N-19 HU (slot H)
Site: Van Winkle
Project: Marshall County, West Virginia NAD83 UTM 17N
Design: rev6
Rig: Nabors B28

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Van Winkle N-19HU PBHL r5 - plan hits target center	10839.00	10428.42	-4915.71	114457726.303	1712238.761	39.810208000	-80.744246000

ANNOTATIONS SURVEYS ORIGINAS HOLE

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
174.00	0.180	276.700	174.00	0.03	-0.27	0.14	MWD surveys
20881.00	91.470	335.910	10847.43	8780.41	-3969.28	9634.69	Survey @ 20881.00 MD 10847.43 TVD
21008.00	91.470	335.910	10844.17	8696.31	-4021.10	9761.62	Survey Proj. to 21008 MD 10844.17 TVD OH

ANNOTATIONS SURVEYS SIDETRACK 01

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
20321.00	90.370	327.140	10859.55	8288.61	-3702.29	9075.84	Tie into original hole @ 20321 MD
22727.00	91.250	329.300	10818.61	10374.52	-4894.60	11471.17	Survey @ 22727.00 MD 10818.61 TVD
22783.00	91.250	329.300	10817.39	10422.66	-4923.18	11526.91	Survey Proj. to 22783.00 MD 10817.39 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=753+26 @ 779.00ft (Nabors B28)

Northing	Easting	Latitude	Longitude
14447297.900	1717154.458	39.781529000	-80.726855000

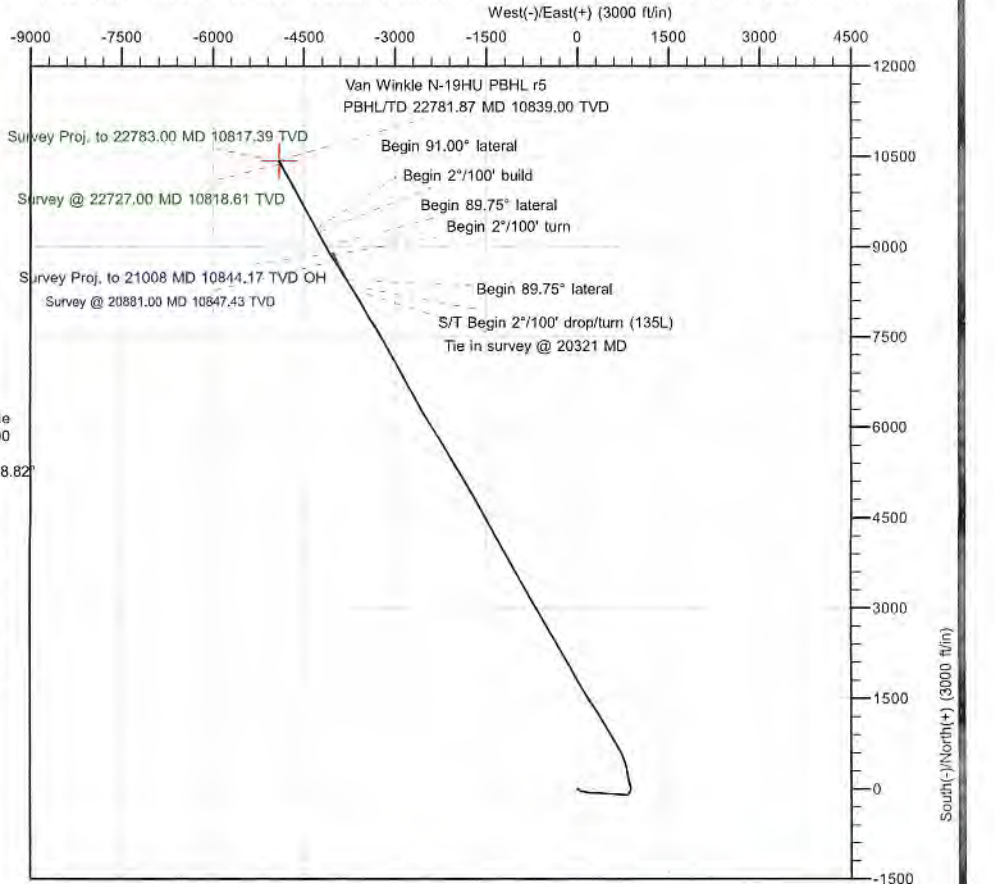
Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.82°



Azimuths to Grid North
 True North: -0.17°
 Magnetic North: -8.82°
 Magnetic Field
 Strength: 51631.8nT
 Dip Angle: 66.42°
 Date: 8/7/2022
 Model: IGRF2020

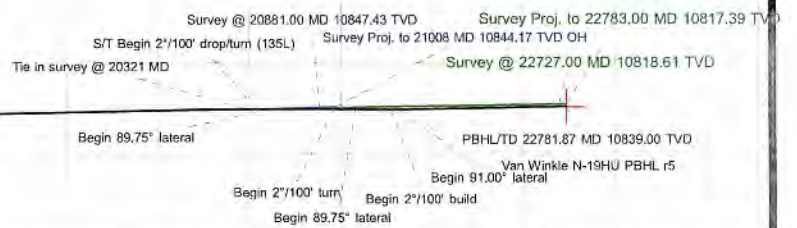
SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	20321.00	90.370	327.140	10859.55	8288.61	-3702.29	0.00	0.00	9075.99	Tie in survey @ 20321 MD
2	20400.00	91.160	329.612	10858.50	8355.87	-3743.71	3.28	72.26	9154.49	S/T Begin 2°/100' drop/turn (135L)
3	20500.00	89.746	328.198	10857.71	8441.49	-3795.35	2.00	-135.00	9253.96	Begin 89.75° lateral
4	21000.00	89.746	328.198	10859.93	8866.42	-4058.84	0.00	0.00	9750.68	Begin 2°/100' turn
5	21159.85	89.746	331.395	10860.64	9004.56	-4139.25	2.00	90.00	9909.91	Begin 89.75° lateral
6	21429.85	89.746	331.395	10861.83	9241.60	-4268.51	0.00	0.00	10179.44	Begin 2°/100' build
7	21492.41	90.997	331.396	10861.43	9296.51	-4298.46	2.00	0.03	10241.88	Begin 91.00° lateral
8	22781.87	90.997	331.396	10839.00	10428.42	-4915.71	0.00	0.00	11528.93	PBHL/TD 22781.87 MD 10839.00 TVD



True Vertical Depth (1400 ft/in)

South(-)/North(+)' (3000 ft/in)





Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Project	Marshall County, West Virginia NAD83 UTM 17N		
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	Van Winkle				
Site Position:		Northing:	14,447,369.493 usft	Latitude:	39.781725330
From:	Lat/Long	Easting:	1,717,188.440 usft	Longitude:	-80.726733270
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "		

Well	Van Winkle N-19 HU (slot H)					
Well Position	+N/-S	0.00 ft	Northing:	14,447,297.900 usft	Latitude:	39.781529000
	+E/-W	0.00 ft	Easting:	1,717,154.459 usft	Longitude:	-80.726855000
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft	Ground Level:	753.00 ft
Grid Convergence:	0.17 "					

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	7/5/2022	-8.65	66.43	51,641.17795116

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	334.760	

Survey Program	Date 8/7/2022				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
174.00	534.00	MWD surf (Original Hole)	MWD	MWD - Standard	
575.00	2,204.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,253.00	4,426.00	MWD 2253-4426 MD (Original Hole)	MWD	MWD - Standard	
4,441.00	20,881.00	MWD (Original Hole)	MWD	MWD - Standard	
21,008.00	21,008.00	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	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
174.00	0.180	276.700	174.00	0.03	-0.27	0.14	0.10	0.10	0.00	
MWD surveys										
203.00	0.260	280.540	203.00	0.05	-0.38	0.21	0.28	0.28	13.24	
233.00	0.170	302.920	233.00	0.09	-0.49	0.28	0.40	-0.30	74.60	
263.00	0.290	261.230	263.00	0.10	-0.60	0.34	0.66	0.40	-138.97	



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Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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)	
293.00	0.280	226.170	293.00	0.04	-0.73	0.34	0.57	-0.03	-116.87	
323.00	0.390	231.020	323.00	-0.08	-0.86	0.29	0.38	0.37	16.17	
355.00	0.470	249.160	355.00	-0.19	-1.07	0.28	0.49	0.25	56.69	
386.00	0.450	230.090	386.00	-0.32	-1.28	0.26	0.50	-0.06	-61.52	
418.00	0.580	220.060	418.00	-0.52	-1.48	0.16	0.49	0.41	-31.34	
449.00	0.920	200.830	448.99	-0.87	-1.67	-0.08	1.35	1.10	-62.03	
481.00	0.960	204.190	480.99	-1.36	-1.87	-0.43	0.21	0.13	10.50	
512.00	1.030	200.130	511.98	-1.86	-2.07	-0.80	0.32	0.23	-13.10	
534.00	1.150	204.880	533.98	-2.24	-2.23	-1.08	0.68	0.55	21.59	
575.00	1.260	212.590	574.97	-3.00	-2.65	-1.58	0.48	0.27	18.80	
607.00	1.260	211.200	606.96	-3.59	-3.02	-1.96	0.10	0.00	-4.34	
639.00	0.970	210.310	638.96	-4.13	-3.34	-2.31	0.91	-0.91	-2.78	
671.00	0.860	204.800	670.95	-4.58	-3.58	-2.62	0.44	-0.34	-17.22	
703.00	0.730	192.880	702.95	-5.00	-3.72	-2.93	0.66	-0.41	-37.25	
734.00	0.660	172.040	733.95	-5.37	-3.74	-3.26	0.84	-0.23	-67.23	
766.00	0.810	183.740	765.94	-5.78	-3.73	-3.63	0.66	0.47	36.56	
798.00	0.730	166.890	797.94	-6.20	-3.70	-4.03	0.75	-0.25	-52.66	
829.00	0.510	156.460	828.94	-6.52	-3.60	-4.36	0.79	-0.71	-33.65	
861.00	0.490	147.950	860.94	-6.76	-3.47	-4.64	0.24	-0.06	-26.59	
892.00	0.470	125.400	891.94	-6.95	-3.30	-4.88	0.61	-0.06	-72.74	
924.00	0.480	102.160	923.94	-7.05	-3.06	-5.08	0.60	0.03	-72.63	
956.00	0.600	82.060	955.94	-7.06	-2.76	-5.21	0.70	0.38	-62.81	
987.00	0.770	72.190	986.93	-6.97	-2.40	-5.28	0.67	0.55	-31.84	
1,019.00	0.770	80.020	1,018.93	-6.87	-1.99	-5.37	0.33	0.00	24.47	
1,051.00	0.950	63.660	1,050.93	-6.72	-1.54	-5.42	0.95	0.56	-51.13	
1,083.00	1.250	62.140	1,082.92	-6.44	-0.99	-5.40	0.94	0.94	-4.75	
1,115.00	1.370	59.690	1,114.91	-6.08	-0.35	-5.35	0.41	0.38	-7.66	
1,147.00	1.480	58.640	1,146.90	-5.67	0.33	-5.27	0.35	0.34	-3.28	
1,179.00	1.400	47.950	1,178.89	-5.19	0.98	-5.11	0.87	-0.25	-33.41	
1,211.00	1.300	44.960	1,210.88	-4.68	1.52	-4.88	0.38	-0.31	-9.34	
1,243.00	1.170	22.050	1,242.88	-4.12	1.90	-4.53	1.58	-0.41	-71.59	
1,275.00	1.430	14.870	1,274.87	-3.43	2.13	-4.01	0.96	0.81	-22.44	
1,307.00	1.440	1.250	1,306.86	-2.64	2.24	-3.34	1.06	0.03	-42.56	
1,339.00	1.490	0.410	1,338.85	-1.82	2.25	-2.61	0.17	0.16	-2.63	
1,370.00	1.540	346.270	1,369.84	-1.01	2.15	-1.83	1.21	0.16	-45.61	
1,402.00	1.360	350.120	1,401.83	-0.22	1.99	-1.05	0.64	-0.56	12.03	
1,434.00	0.950	337.360	1,433.82	0.40	1.82	-0.42	1.50	-1.28	-39.88	
1,465.00	0.810	325.870	1,464.82	0.82	1.60	0.06	0.72	-0.45	-37.06	
1,496.00	0.530	298.540	1,495.81	1.07	1.35	0.39	1.35	-0.90	-88.16	
1,528.00	0.480	279.930	1,527.81	1.16	1.09	0.59	0.53	-0.16	-58.16	
1,560.00	0.640	241.480	1,559.81	1.10	0.80	0.65	1.25	0.50	-120.16	
1,590.00	1.050	222.410	1,589.81	0.81	0.46	0.54	1.64	1.37	-63.57	
1,622.00	1.440	213.870	1,621.80	0.26	0.04	0.22	1.35	1.22	-26.69	
1,654.00	1.680	210.500	1,653.79	-0.47	-0.42	-0.25	0.80	0.75	-10.53	



Survey Report



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Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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)
1,686.00	1.940	207.370	1,685.77	-1.36	-0.91	-0.84	0.87	0.81	-9.78
1,718.00	2.060	197.790	1,717.75	-2.39	-1.33	-1.59	1.11	0.38	-29.94
1,749.00	1.690	188.490	1,748.74	-3.37	-1.57	-2.38	1.54	-1.19	-30.00
1,780.00	1.350	163.990	1,779.73	-4.17	-1.54	-3.12	2.34	-1.10	-79.03
1,811.00	1.220	123.960	1,810.72	-4.71	-1.16	-3.76	2.86	-0.42	-129.13
1,842.00	1.490	95.490	1,841.71	-4.93	-0.49	-4.25	2.31	0.87	-91.84
1,873.00	1.550	80.860	1,872.70	-4.90	0.33	-4.58	1.26	0.19	-47.19
1,905.00	1.860	62.980	1,904.69	-4.60	1.22	-4.68	1.91	0.97	-55.88
1,936.00	2.400	49.600	1,935.66	-3.95	2.16	-4.49	2.36	1.74	-43.16
1,969.00	2.600	48.670	1,968.63	-3.01	3.25	-4.11	0.62	0.61	-2.82
2,000.00	2.790	48.610	1,999.60	-2.04	4.34	-3.70	0.61	0.61	-0.19
2,032.00	2.810	45.400	2,031.56	-0.98	5.49	-3.22	0.49	0.06	-10.03
2,063.00	2.810	33.700	2,062.52	0.19	6.45	-2.58	1.85	0.00	-37.74
2,095.00	3.000	16.930	2,094.48	1.64	7.13	-1.56	2.71	0.59	-52.41
2,127.00	3.120	11.960	2,126.44	3.29	7.55	-0.24	0.91	0.38	-15.53
2,158.00	3.100	357.960	2,157.39	4.96	7.70	1.20	2.44	-0.06	-45.16
2,190.00	2.980	349.890	2,189.35	6.64	7.52	2.80	1.39	-0.38	-25.22
2,204.00	2.980	344.350	2,203.33	7.35	7.36	3.51	2.06	0.00	-39.57
2,253.00	3.010	332.600	2,252.26	9.72	6.42	6.05	1.25	0.06	-23.98
2,285.00	3.080	330.790	2,284.22	11.21	5.62	7.75	0.37	0.22	-5.66
2,317.00	2.200	323.300	2,316.18	12.46	4.83	9.21	2.95	-2.75	-23.41
2,349.00	1.500	307.390	2,348.17	13.20	4.13	10.18	2.69	-2.19	-49.72
2,381.00	1.100	285.450	2,380.16	13.54	3.50	10.75	1.97	-1.25	-68.56
2,413.00	1.010	252.060	2,412.15	13.53	2.94	10.99	1.91	-0.28	-104.34
2,444.00	1.610	215.700	2,443.15	13.10	2.42	10.81	3.21	1.94	-117.29
2,476.00	2.010	200.260	2,475.13	12.21	1.97	10.20	1.96	1.25	-48.25
2,508.00	2.590	196.640	2,507.10	10.99	1.56	9.27	1.87	1.81	-11.31
2,539.00	2.710	194.300	2,538.07	9.61	1.18	8.18	0.52	0.39	-7.55
2,570.00	3.030	191.460	2,569.03	8.09	0.84	6.96	1.13	1.03	-9.16
2,601.00	3.160	191.750	2,599.99	6.45	0.50	5.62	0.42	0.42	0.94
2,633.00	2.730	190.910	2,631.94	4.84	0.18	4.30	1.35	-1.34	-2.63
2,664.00	2.220	193.030	2,662.91	3.53	-0.10	3.23	1.67	-1.65	6.84
2,696.00	1.880	189.660	2,694.89	2.41	-0.32	2.32	1.13	-1.06	-10.53
2,728.00	1.450	183.070	2,726.88	1.49	-0.43	1.53	1.47	-1.34	-20.59
2,758.00	1.150	180.280	2,756.87	0.81	-0.46	0.92	1.02	-1.00	-9.30
2,790.00	0.870	163.170	2,788.87	0.25	-0.39	0.39	1.28	-0.88	-53.47
2,821.00	0.660	134.170	2,819.87	-0.10	-0.19	-0.01	1.40	-0.68	-93.55
2,853.00	0.540	87.430	2,851.86	-0.22	0.09	-0.24	1.53	-0.38	-146.06
2,885.00	0.460	61.660	2,883.86	-0.15	0.36	-0.29	0.74	-0.25	-80.53
2,916.00	0.670	63.470	2,914.86	-0.01	0.63	-0.28	0.68	0.68	5.84
2,948.00	0.970	57.360	2,946.86	0.22	1.02	-0.24	0.98	0.94	-19.09
2,980.00	0.990	79.300	2,978.85	0.42	1.52	-0.27	1.17	0.06	68.56
3,012.00	1.200	98.130	3,010.85	0.42	2.13	-0.53	1.29	0.66	58.84



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Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey										
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3,044.00	1.580	107.920	3,042.84	0.24	2.88	-1.01	1.40	1.19	30.59	
3,074.00	1.890	112.070	3,072.82	-0.07	3.73	-1.66	1.11	1.03	13.83	
3,105.00	2.460	117.760	3,103.80	-0.58	4.79	-2.57	1.96	1.84	18.35	
3,136.00	2.710	124.990	3,134.77	-1.31	5.98	-3.73	1.32	0.81	23.32	
3,168.00	2.900	122.760	3,166.73	-2.18	7.28	-5.08	0.68	0.59	-6.97	
3,200.00	3.270	129.300	3,198.69	-3.19	8.67	-6.59	1.59	1.16	20.44	
3,231.00	3.600	130.190	3,229.63	-4.38	10.10	-8.27	1.08	1.06	2.87	
3,263.00	3.840	131.070	3,261.56	-5.74	11.67	-10.16	0.77	0.75	2.75	
3,295.00	4.180	133.400	3,293.48	-7.24	13.33	-12.23	1.18	1.06	7.28	
3,326.00	4.460	132.850	3,324.40	-8.84	15.03	-14.40	0.91	0.90	-1.77	
3,358.00	4.680	134.680	3,356.29	-10.60	16.87	-16.78	0.82	0.69	5.72	
3,389.00	4.920	133.590	3,387.19	-12.41	18.73	-19.21	0.83	0.77	-3.52	
3,421.00	5.260	135.150	3,419.06	-14.39	20.76	-21.87	1.15	1.06	4.88	
3,452.00	5.180	137.140	3,449.93	-16.43	22.72	-24.54	0.64	-0.26	6.42	
3,484.00	4.180	137.330	3,481.82	-18.34	24.49	-27.03	3.13	-3.13	0.59	
3,516.00	3.780	140.970	3,513.75	-20.02	25.94	-29.17	1.48	-1.25	11.38	
3,548.00	3.610	140.760	3,545.68	-21.62	27.25	-31.17	0.53	-0.53	-0.66	
3,580.00	3.710	141.530	3,577.61	-23.21	28.53	-33.16	0.35	0.31	2.41	
3,612.00	3.870	138.460	3,609.54	-24.83	29.89	-35.20	0.81	0.50	-9.59	
3,643.00	4.130	139.130	3,640.47	-26.46	31.31	-37.28	0.85	0.84	2.16	
3,675.00	4.460	139.300	3,672.38	-28.27	32.88	-39.59	1.03	1.03	0.53	
3,707.00	4.450	140.200	3,704.28	-30.17	34.48	-41.99	0.22	-0.03	2.81	
3,738.00	3.820	133.800	3,735.20	-31.81	36.00	-44.12	2.52	-2.03	-20.65	
3,770.00	3.590	131.720	3,767.13	-33.21	37.51	-46.04	0.83	-0.72	-6.50	
3,802.00	3.650	130.640	3,799.07	-34.54	39.04	-47.89	0.28	0.19	-3.38	
3,833.00	3.830	129.180	3,830.01	-35.84	40.59	-49.72	0.66	0.58	-4.71	
3,865.00	4.040	128.610	3,861.93	-37.22	42.30	-51.70	0.67	0.66	-1.78	
3,897.00	4.370	126.990	3,893.84	-38.65	44.15	-53.79	1.10	1.03	-5.06	
3,928.00	4.310	125.640	3,924.75	-40.04	46.04	-55.85	0.38	-0.19	-4.35	
3,960.00	3.730	127.170	3,956.68	-41.37	47.85	-57.82	1.84	-1.81	4.78	
3,991.00	3.520	129.680	3,987.61	-42.59	49.38	-59.58	0.85	-0.68	8.10	
4,023.00	3.240	131.550	4,019.56	-43.82	50.82	-61.30	0.94	-0.88	5.84	
4,055.00	3.340	133.910	4,051.51	-45.06	52.16	-63.00	0.53	0.31	7.38	
4,087.00	2.900	131.550	4,083.46	-46.25	53.44	-64.62	1.43	-1.38	-7.38	
4,119.00	2.560	130.580	4,115.42	-47.25	54.59	-66.01	1.07	-1.06	-3.03	
4,150.00	2.420	129.220	4,146.39	-48.11	55.62	-67.24	0.49	-0.45	-4.39	
4,182.00	2.210	127.190	4,178.37	-48.91	56.64	-68.39	0.70	-0.66	-6.34	
4,214.00	1.640	132.180	4,210.35	-49.59	57.47	-69.36	1.86	-1.78	15.59	
4,246.00	1.150	131.010	4,242.34	-50.11	58.05	-70.08	1.53	-1.53	-3.66	
4,277.00	0.850	136.280	4,273.33	-50.48	58.44	-70.58	1.01	-0.97	17.00	
4,309.00	0.560	111.990	4,305.33	-50.71	58.75	-70.92	1.28	-0.91	-75.91	
4,340.00	0.230	101.670	4,336.33	-50.78	58.95	-71.07	1.08	-1.06	-33.29	
4,372.00	0.190	4.760	4,368.33	-50.74	59.02	-71.06	0.99	-0.13	-302.84	



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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)
4,404.00	0.480	341.710	4,400.33	-50.56	58.98	-70.88	0.98	0.91	-72.03
4,426.00	0.750	321.080	4,422.33	-50.36	58.87	-70.65	1.57	1.23	-93.77
4,441.00	0.680	325.900	4,437.33	-50.21	58.75	-70.47	0.61	-0.47	32.13
4,535.00	1.240	335.080	4,531.31	-48.83	58.01	-68.90	0.62	0.60	9.77
4,628.00	1.810	336.530	4,624.28	-46.57	57.00	-66.43	0.61	0.61	1.56
4,722.00	2.320	341.860	4,718.22	-43.40	55.82	-63.06	0.58	0.54	5.67
4,815.00	1.640	351.490	4,811.16	-40.29	55.04	-59.91	0.81	-0.73	10.35
4,908.00	0.730	27.140	4,904.14	-38.45	55.11	-58.28	1.21	-0.98	38.33
5,002.00	0.960	74.070	4,998.13	-37.70	56.14	-58.04	0.75	0.24	49.93
5,096.00	1.690	93.440	5,092.11	-37.57	58.28	-58.83	0.90	0.78	20.61
5,188.00	2.560	116.190	5,184.05	-38.55	61.48	-61.09	1.30	0.95	24.73
5,282.00	2.380	136.900	5,277.96	-40.91	64.70	-64.59	0.96	-0.19	22.03
5,375.00	1.240	135.030	5,370.91	-43.03	66.73	-67.37	1.23	-1.23	-2.01
5,469.00	0.190	347.330	5,464.91	-43.60	67.41	-68.18	1.49	-1.12	-157.13
5,563.00	0.680	334.060	5,558.90	-42.94	67.13	-67.47	0.53	0.52	-14.12
5,657.00	1.130	337.060	5,652.89	-41.59	66.53	-65.98	0.48	0.48	3.19
5,750.00	1.530	301.620	5,745.87	-40.09	65.11	-64.03	0.96	0.43	-38.11
5,845.00	1.420	285.940	5,840.84	-39.10	62.90	-62.19	0.44	-0.12	-16.51
5,939.00	1.060	226.850	5,934.82	-39.38	61.15	-61.69	1.34	-0.38	-62.86
6,031.00	1.210	214.470	6,026.80	-40.76	59.98	-62.44	0.31	0.16	-13.46
6,187.00	0.230	39.210	6,182.79	-41.88	59.24	-63.14	0.92	-0.63	-112.35
6,280.00	0.320	20.090	6,275.79	-41.49	59.45	-62.88	0.14	0.10	-20.56
6,311.00	0.310	41.280	6,306.79	-41.34	59.53	-62.78	0.38	-0.03	68.35
6,404.00	0.320	13.670	6,399.79	-40.90	59.76	-62.48	0.16	0.01	-29.69
6,497.00	0.220	42.370	6,492.79	-40.52	59.94	-62.21	0.18	-0.11	30.86
6,591.00	0.290	11.180	6,586.79	-40.15	60.11	-61.95	0.16	0.07	-33.18
6,685.00	0.350	29.160	6,680.78	-39.67	60.30	-61.59	0.12	0.06	19.13
6,779.00	0.400	40.880	6,774.78	-39.17	60.65	-61.29	0.10	0.05	12.47
6,873.00	0.420	1.590	6,868.78	-38.58	60.88	-60.85	0.29	0.02	-41.80
6,966.00	0.460	11.410	6,961.78	-37.87	60.96	-60.25	0.09	0.04	10.56
7,060.00	1.370	80.450	7,055.77	-37.31	62.14	-60.25	1.36	0.97	73.45
7,154.00	2.990	90.580	7,149.70	-37.15	65.70	-61.62	1.76	1.72	10.78
7,248.00	5.260	94.020	7,243.45	-37.48	72.45	-64.79	2.43	2.41	3.66
7,342.00	7.730	97.690	7,336.84	-38.63	83.02	-70.34	2.66	2.63	3.90
7,437.00	9.990	101.160	7,430.70	-41.08	97.44	-78.70	2.44	2.38	3.65
7,529.00	12.170	103.110	7,520.98	-44.82	114.71	-89.46	2.40	2.37	2.12
7,623.00	13.670	101.240	7,612.59	-49.23	135.26	-102.21	1.66	1.60	-1.99
7,717.00	15.270	99.550	7,703.61	-53.45	158.36	-115.88	1.76	1.70	-1.80
7,810.00	15.970	98.070	7,793.18	-57.28	183.10	-129.89	0.87	0.75	-1.59
7,903.00	16.850	96.830	7,882.39	-60.68	209.16	-144.07	1.02	0.95	-1.33
7,997.00	16.730	96.610	7,972.38	-63.86	236.12	-158.45	0.14	-0.13	-0.23
8,090.00	14.470	90.130	8,061.95	-65.42	261.04	-170.49	3.07	-2.43	-6.97
8,183.00	14.050	85.270	8,152.09	-64.52	283.91	-179.42	1.36	-0.45	-5.23
8,277.00	15.030	88.250	8,243.08	-63.21	307.47	-188.28	1.31	1.04	3.17



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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)
8,371.00	14.920	87.860	8,333.89	-62.38	331.74	-197.89	0.16	-0.12	-0.41
8,464.00	15.950	92.720	8,423.54	-62.54	356.47	-208.57	1.78	1.11	5.23
8,557.00	16.980	96.650	8,512.73	-64.72	382.73	-221.74	1.63	1.11	4.23
8,651.00	18.000	98.680	8,602.38	-68.50	410.72	-237.10	1.26	1.09	2.16
8,744.00	17.300	97.070	8,691.00	-72.37	438.65	-252.51	0.92	-0.75	-1.73
8,838.00	16.680	94.400	8,780.90	-75.13	465.97	-266.65	1.06	-0.66	-2.84
8,931.00	16.530	91.480	8,870.02	-76.49	492.50	-279.20	0.91	-0.16	-3.14
9,024.00	16.930	90.460	8,959.09	-76.94	519.27	-291.02	0.53	0.43	-1.10
9,117.00	16.190	92.380	9,048.23	-77.59	545.76	-302.90	0.99	-0.80	2.06
9,210.00	14.680	94.500	9,137.87	-79.05	570.47	-314.76	1.73	-1.62	2.28
9,303.00	14.930	94.580	9,227.79	-80.94	594.16	-326.56	0.27	0.27	0.09
9,395.00	15.460	95.370	9,316.57	-83.03	618.18	-338.70	0.62	0.58	0.86
9,488.00	15.170	93.320	9,406.27	-84.89	642.67	-350.83	0.66	-0.31	-2.20
9,580.00	15.630	92.880	9,494.96	-86.21	667.06	-362.43	0.52	0.50	-0.48
9,674.00	15.700	92.800	9,585.47	-87.47	692.41	-374.37	0.08	0.07	-0.09
9,767.00	15.930	93.220	9,674.95	-88.80	717.72	-386.37	0.28	0.25	0.45
9,861.00	14.230	90.480	9,765.71	-89.62	742.16	-397.53	1.96	-1.81	-2.91
9,954.00	15.240	92.130	9,855.65	-90.17	765.80	-408.11	1.18	1.09	1.77
10,010.00	15.780	94.950	9,909.61	-91.11	780.74	-415.33	1.66	0.96	5.04
10,079.00	16.700	98.390	9,975.86	-93.36	799.90	-425.53	1.93	1.33	4.99
10,126.00	16.480	88.250	10,020.92	-94.14	813.25	-431.93	6.17	-0.47	-21.57
10,173.00	15.690	67.500	10,066.11	-91.51	825.79	-434.90	12.28	-1.68	-44.15
10,220.00	15.290	45.200	10,111.45	-84.70	836.07	-433.12	12.63	-0.85	-47.45
10,268.00	15.470	34.320	10,157.74	-74.95	844.17	-427.76	6.01	0.38	-22.67
10,316.00	15.690	38.190	10,203.97	-64.56	851.79	-421.61	2.21	0.46	8.06
10,363.00	16.660	32.240	10,249.12	-53.87	859.32	-415.15	4.08	2.06	-12.66
10,410.00	18.160	25.110	10,293.97	-41.54	866.02	-406.85	5.54	3.19	-15.17
10,457.00	19.310	18.410	10,338.48	-27.53	871.58	-396.55	5.19	2.45	-14.26
10,504.00	21.260	10.480	10,382.57	-11.77	875.59	-384.01	7.16	4.15	-16.87
10,552.00	22.850	0.080	10,427.08	6.11	877.19	-368.51	8.77	3.31	-21.67
10,599.00	24.610	350.720	10,470.12	24.90	875.62	-350.85	8.83	3.74	-19.91
10,645.00	25.760	341.420	10,511.76	43.84	870.89	-331.70	8.95	2.50	-20.22
10,692.00	27.310	335.960	10,553.81	63.37	863.24	-310.77	6.15	3.30	-11.62
10,740.00	28.240	340.230	10,596.29	84.12	854.91	-288.46	4.57	1.94	8.90
10,787.00	29.470	347.810	10,637.46	105.89	848.71	-266.12	8.21	2.62	16.13
10,835.00	30.530	351.570	10,679.04	129.49	844.43	-242.94	4.50	2.21	7.83
10,882.00	33.270	347.940	10,718.94	153.92	839.98	-218.95	7.11	5.83	-7.72
10,929.00	35.880	347.020	10,757.63	179.95	834.19	-192.94	5.66	5.55	-1.96
10,976.00	40.390	349.710	10,794.60	208.37	828.38	-164.75	10.22	9.60	5.72
11,024.00	45.560	350.810	10,829.70	240.61	822.86	-133.24	10.88	10.77	2.29
11,071.00	51.300	351.530	10,860.88	275.34	817.47	-99.52	12.27	12.21	1.53
11,118.00	56.610	350.370	10,888.52	312.86	811.48	-63.04	11.47	11.30	-2.47
11,165.00	62.400	348.600	10,912.36	352.65	804.08	-23.88	12.74	12.32	-3.77



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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)
11,212.00	66.950	346.360	10,932.47	394.11	794.86	17.54	10.60	9.68	-4.77
11,259.00	70.130	343.670	10,949.66	436.35	783.54	60.58	8.61	6.77	-5.72
11,307.00	71.980	341.420	10,965.25	479.65	769.92	105.56	5.87	3.85	-4.69
11,354.00	71.900	339.920	10,979.82	521.81	755.13	150.00	3.04	-0.17	-3.19
11,402.00	73.000	334.550	10,994.30	563.99	737.42	195.70	10.91	2.29	-11.19
11,450.00	75.960	330.540	11,007.15	605.01	716.09	241.90	10.14	6.17	-8.35
11,497.00	80.160	330.850	11,016.87	645.10	693.59	287.76	8.96	8.94	0.66
11,544.00	85.150	331.200	11,022.88	685.87	671.02	334.26	10.64	10.62	0.74
11,591.00	87.320	330.140	11,025.96	726.75	648.05	381.04	5.14	4.62	-2.26
11,638.00	87.100	328.290	11,028.25	767.08	624.02	427.76	3.96	-0.47	-3.94
11,685.00	88.690	330.230	11,029.98	807.45	600.02	474.51	5.33	3.38	4.13
11,732.00	89.130	328.910	11,030.87	847.97	576.22	521.31	2.96	0.94	-2.81
11,779.00	90.060	329.130	11,031.20	888.26	552.03	568.07	2.03	1.98	0.47
11,874.00	90.150	329.520	11,031.03	969.97	503.56	662.64	0.42	0.09	0.41
11,968.00	91.120	328.250	11,029.99	1,050.44	454.99	756.14	1.70	1.03	-1.35
12,063.00	90.900	329.080	11,028.31	1,131.57	405.59	850.59	0.90	-0.23	0.87
12,158.00	91.250	329.570	11,026.53	1,213.26	357.14	945.14	0.63	0.37	0.52
12,252.00	91.120	329.790	11,024.59	1,294.38	309.69	1,038.75	0.27	-0.14	0.23
12,347.00	91.070	324.150	11,022.77	1,373.98	257.94	1,132.82	5.94	-0.05	-5.94
12,441.00	91.030	324.150	11,021.05	1,450.16	202.90	1,225.20	0.04	-0.04	0.00
12,536.00	90.900	332.610	11,019.44	1,530.97	153.14	1,319.51	8.91	-0.14	8.91
12,630.00	90.990	329.430	11,017.89	1,613.18	107.61	1,413.28	3.38	0.10	-3.38
12,724.00	91.070	329.740	11,016.20	1,694.23	60.03	1,506.89	0.34	0.09	0.33
12,817.00	91.030	329.920	11,014.50	1,774.62	13.30	1,599.53	0.20	-0.04	0.19
12,912.00	91.070	329.790	11,012.76	1,856.76	-34.40	1,694.16	0.14	0.04	-0.14
13,006.00	91.160	334.150	11,010.93	1,939.70	-78.56	1,788.01	4.64	0.10	4.64
13,101.00	91.120	332.560	11,009.04	2,024.59	-121.15	1,882.96	1.67	-0.04	-1.67
13,198.00	91.470	329.350	11,006.85	2,109.36	-168.22	1,979.71	3.33	0.36	-3.31
13,292.00	91.600	330.800	11,004.33	2,190.79	-215.10	2,073.36	1.55	0.14	1.54
13,387.00	91.160	330.400	11,002.04	2,273.54	-261.72	2,168.08	0.63	-0.46	-0.42
13,481.00	91.070	328.770	11,000.21	2,354.58	-309.30	2,261.68	1.74	-0.10	-1.73
13,574.00	91.070	329.880	10,998.47	2,434.55	-356.74	2,354.24	1.19	0.00	1.19
13,668.00	91.070	329.430	10,996.72	2,515.66	-404.22	2,447.85	0.48	0.00	-0.48
13,762.00	91.210	330.890	10,994.85	2,597.18	-450.98	2,541.53	1.56	0.15	1.55
13,855.00	91.030	329.040	10,993.03	2,677.67	-497.52	2,634.18	2.00	-0.19	-1.99
13,950.00	90.990	331.590	10,991.35	2,760.18	-544.55	2,728.87	2.68	-0.04	2.68
14,044.00	90.990	330.890	10,989.73	2,842.58	-589.77	2,822.68	0.74	0.00	-0.74
14,138.00	91.030	329.130	10,988.07	2,923.98	-636.75	2,916.34	1.87	0.04	-1.87
14,232.00	90.990	330.270	10,986.42	3,005.12	-684.17	3,009.96	1.21	-0.04	1.21
14,326.00	90.990	329.610	10,984.79	3,086.47	-731.25	3,103.61	0.70	0.00	-0.70
14,420.00	91.030	329.920	10,983.14	3,167.67	-778.57	3,197.24	0.33	0.04	0.33
14,514.00	91.030	330.490	10,981.45	3,249.23	-825.27	3,290.93	0.61	0.00	0.61
14,608.00	90.990	330.800	10,979.79	3,331.14	-871.35	3,384.67	0.33	-0.04	0.33



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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)
14,703.00	91.210	332.740	10,977.97	3,414.82	-916.27	3,479.52	2.05	0.23	2.04
14,797.00	91.520	333.050	10,975.73	3,498.48	-959.09	3,573.44	0.47	0.33	0.33
14,891.00	91.250	330.140	10,973.45	3,581.13	-1,003.79	3,667.26	3.11	-0.29	-3.10
14,985.00	91.430	330.010	10,971.26	3,662.57	-1,050.67	3,760.92	0.24	0.19	-0.14
15,079.00	91.430	330.490	10,968.91	3,744.16	-1,097.30	3,854.60	0.51	0.00	0.51
15,173.00	91.560	331.550	10,966.46	3,826.36	-1,142.82	3,948.37	1.14	0.14	1.13
15,266.00	90.990	331.240	10,964.39	3,907.99	-1,187.34	4,041.18	0.70	-0.61	-0.33
15,361.00	91.030	331.070	10,962.71	3,991.19	-1,233.16	4,135.98	0.18	0.04	-0.18
15,455.00	90.990	330.400	10,961.06	4,073.18	-1,279.11	4,229.73	0.71	-0.04	-0.71
15,549.00	90.900	329.170	10,959.51	4,154.39	-1,326.40	4,323.36	1.31	-0.10	-1.31
15,643.00	91.470	331.950	10,957.56	4,236.23	-1,372.59	4,417.08	3.02	0.61	2.96
15,735.00	91.470	330.540	10,955.20	4,316.85	-1,416.83	4,508.88	1.53	0.00	-1.53
15,828.00	91.650	332.260	10,952.67	4,398.47	-1,461.33	4,601.68	1.86	0.19	1.85
15,922.00	91.520	330.800	10,950.07	4,481.07	-1,506.13	4,695.49	1.56	-0.14	-1.55
16,016.00	91.470	331.640	10,947.62	4,563.43	-1,551.37	4,789.28	0.89	-0.05	0.89
16,110.00	91.430	328.160	10,945.24	4,644.72	-1,598.49	4,882.90	3.70	-0.04	-3.70
16,204.00	91.030	329.570	10,943.22	4,725.16	-1,647.08	4,976.37	1.56	-0.43	1.50
16,297.00	91.070	330.230	10,941.51	4,805.60	-1,693.71	5,069.02	0.71	0.04	0.71
16,391.00	91.210	331.020	10,939.64	4,887.50	-1,739.81	5,162.76	0.85	0.15	0.84
16,485.00	91.250	330.580	10,937.63	4,969.53	-1,785.66	5,256.51	0.47	0.04	-0.47
16,579.00	91.430	329.430	10,935.43	5,050.92	-1,832.64	5,350.16	1.24	0.19	-1.22
16,672.00	90.590	331.020	10,933.79	5,131.63	-1,878.81	5,442.85	1.93	-0.90	1.71
16,765.00	90.720	330.180	10,932.73	5,212.64	-1,924.46	5,535.60	0.91	0.14	-0.90
16,859.00	90.590	330.100	10,931.65	5,294.16	-1,971.26	5,629.29	0.16	-0.14	-0.09
16,953.00	91.160	330.580	10,930.22	5,375.83	-2,017.77	5,723.00	0.79	0.61	0.51
17,046.00	91.520	330.050	10,928.04	5,456.61	-2,063.81	5,815.69	0.69	0.39	-0.57
17,139.00	91.600	331.200	10,925.51	5,537.62	-2,109.41	5,908.42	1.24	0.09	1.24
17,233.00	91.520	329.130	10,922.95	5,619.12	-2,156.16	6,002.07	2.20	-0.09	-2.20
17,326.00	91.030	329.700	10,920.88	5,699.17	-2,203.47	6,094.65	0.81	-0.53	0.61
17,420.00	91.070	330.450	10,919.16	5,780.62	-2,250.35	6,188.32	0.80	0.04	0.80
17,512.00	90.990	326.090	10,917.50	5,858.84	-2,298.72	6,279.69	4.74	-0.09	-4.74
17,606.00	91.070	325.200	10,915.81	5,936.43	-2,351.75	6,372.49	0.95	0.09	-0.95
17,699.00	91.600	327.940	10,913.65	6,014.01	-2,402.97	6,464.50	3.00	0.57	2.95
17,793.00	91.560	328.330	10,911.05	6,093.81	-2,452.58	6,557.84	0.42	-0.04	0.41
17,887.00	91.560	331.240	10,908.49	6,175.00	-2,499.86	6,651.44	3.09	0.00	3.10
17,981.00	91.600	331.290	10,905.90	6,257.40	-2,545.03	6,745.23	0.07	0.04	0.05
18,075.00	91.340	331.510	10,903.49	6,339.90	-2,590.01	6,839.04	0.36	-0.28	0.23
18,169.00	91.250	333.000	10,901.37	6,423.07	-2,633.76	6,932.92	1.59	-0.10	1.59
18,263.00	91.430	331.550	10,899.17	6,506.25	-2,677.48	7,026.80	1.55	0.19	-1.54
18,356.00	91.430	328.600	10,896.85	6,586.82	-2,723.86	7,119.45	3.17	0.00	-3.17
18,449.00	91.300	328.640	10,894.63	6,666.19	-2,772.27	7,211.90	0.15	-0.14	0.04
18,542.00	91.210	332.960	10,892.59	6,747.34	-2,817.62	7,304.63	4.65	-0.10	4.65
18,636.00	91.380	331.240	10,890.47	6,830.39	-2,861.59	7,398.50	1.84	0.18	-1.83
18,728.00	91.430	335.380	10,888.21	6,912.54	-2,902.89	7,490.42	4.50	0.05	4.50



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

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)
18,821.00	91.300	331.240	10,886.00	6,995.59	-2,944.64	7,583.35	4.45	-0.14	-4.45
18,915.00	91.340	328.770	10,883.83	7,076.97	-2,991.62	7,676.99	2.63	0.04	-2.63
19,010.00	91.250	332.480	10,881.68	7,159.72	-3,038.20	7,771.70	3.91	-0.09	3.91
19,104.00	91.070	331.330	10,879.78	7,242.63	-3,082.46	7,865.57	1.24	-0.19	-1.22
19,197.00	91.070	332.300	10,878.04	7,324.59	-3,126.38	7,958.43	1.04	0.00	1.04
19,290.00	91.070	328.600	10,876.31	7,405.46	-3,172.23	8,051.13	3.98	0.00	-3.98
19,384.00	91.210	331.900	10,874.44	7,487.04	-3,218.85	8,144.81	3.51	0.15	3.51
19,478.00	91.160	332.030	10,872.49	7,570.00	-3,263.03	8,238.68	0.15	-0.05	0.14
19,572.00	91.120	327.360	10,870.62	7,651.11	-3,310.44	8,332.26	4.97	-0.04	-4.97
19,667.00	91.300	324.680	10,868.61	7,729.87	-3,363.51	8,426.13	2.83	0.19	-2.82
19,761.00	91.300	326.480	10,866.48	7,807.38	-3,416.63	8,518.90	1.91	0.00	1.91
19,853.00	91.030	330.320	10,864.61	7,885.71	-3,464.82	8,610.30	4.18	-0.29	4.17
19,948.00	91.120	332.920	10,862.83	7,969.27	-3,509.96	8,705.13	2.74	0.09	2.74
20,041.00	90.500	330.800	10,861.51	8,051.27	-3,553.82	8,798.00	2.37	-0.67	-2.28
20,134.00	90.540	327.100	10,860.67	8,130.92	-3,601.78	8,890.50	3.98	0.04	-3.98
20,227.00	90.230	327.850	10,860.04	8,209.34	-3,651.78	8,982.74	0.87	-0.33	0.81
20,321.00	90.370	327.140	10,859.55	8,288.61	-3,702.29	9,075.99	0.77	0.15	-0.76
20,414.00	91.340	330.050	10,858.16	8,367.97	-3,750.74	9,168.43	3.30	1.04	3.13
20,508.00	91.030	334.060	10,856.22	8,450.97	-3,794.77	9,262.28	4.28	-0.33	4.27
20,602.00	91.340	330.890	10,854.27	8,534.30	-3,838.20	9,356.18	3.39	0.33	-3.37
20,695.00	91.160	332.520	10,852.24	8,616.17	-3,882.27	9,449.02	1.76	-0.19	1.75
20,788.00	91.650	329.960	10,849.96	8,697.66	-3,927.00	9,541.81	2.80	0.53	-2.75
20,881.00	91.470	335.910	10,847.43	8,780.41	-3,969.28	9,634.69	6.40	-0.19	6.40
Survey @ 20881.00 MD 10847.43 TVD									
21,008.00	91.470	335.910	10,844.17	8,896.31	-4,021.10	9,761.62	0.00	0.00	0.00
Survey Proj. to 21008 MD 10844.17 TVD OH									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
174.00	174.00	0.03	-0.27	MWD surveys
20,881.00	10,847.43	8,780.41	-3,969.28	Survey @ 20881.00 MD 10847.43 TVD
21,008.00	10,844.17	8,896.31	-4,021.10	Survey Proj. to 21008 MD 10844.17 TVD OH



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Project	Marshall County, West Virginia NAD83 UTM 17N		
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	Van Winkle				
Site Position:		Northing:	14,447,369.493 usft	Latitude:	39.781725330
From:	Lat/Long	Easting:	1,717,188.440 usft	Longitude:	-80.726733270
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.17 °

Well	Van Winkle N-19 HU (slot H)					
Well Position	+N/-S	0.00 ft	Northing:	14,447,297.900 usft	Latitude:	39.781529000
	+E/-W	0.00 ft	Easting:	1,717,154.459 usft	Longitude:	-80.726855000
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	753.00 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	7/5/2022	-8.65	66.43	51,641.17795116

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	334.760

Survey Program	Date 8/7/2022				
	From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
	174.00	534.00	MWD surf (Original Hole)	MWD	MWD - Standard
	575.00	2,204.00	MWD int (Original Hole)	MWD	MWD - Standard
	2,253.00	4,426.00	MWD 2253-4426 MD (Original Hole)	MWD	MWD - Standard
	4,441.00	20,881.00	MWD (Original Hole)	MWD	MWD - Standard
	21,008.00	21,008.00	Projection (Original Hole)	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	0.000	0.000	0.00	0.00	0.00	14,447,297.900	1,717,154.459	39.781529000	-80.726855000	
174.00	0.180	276.700	174.00	0.03	-0.27	14,447,297.931	1,717,154.187	39.781529090	-80.726855966	
MWD surveys										
203.00	0.260	280.540	203.00	0.05	-0.38	14,447,297.949	1,717,154.077	39.781529139	-80.726856357	
233.00	0.170	302.920	233.00	0.09	-0.49	14,447,297.985	1,717,153.973	39.781529240	-80.726856728	
263.00	0.290	261.230	263.00	0.10	-0.60	14,447,297.998	1,717,153.861	39.781529276	-80.726857128	
293.00	0.280	226.170	293.00	0.04	-0.73	14,447,297.936	1,717,153.733	39.781529105	-80.726857584	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
323.00	0.390	231.020	323.00	-0.08	-0.86	14,447,297.821	1,717,153.601	39.781528791	-80.726858056	
355.00	0.470	249.160	355.00	-0.19	-1.07	14,447,297.706	1,717,153.393	39.781528476	-80.726858795	
386.00	0.450	230.090	386.00	-0.32	-1.28	14,447,297.582	1,717,153.181	39.781528139	-80.726859552	
418.00	0.580	220.060	418.00	-0.52	-1.48	14,447,297.378	1,717,152.980	39.781527579	-80.726860268	
449.00	0.920	200.830	448.99	-0.87	-1.67	14,447,297.025	1,717,152.791	39.781526612	-80.726860946	
481.00	0.960	204.190	480.99	-1.36	-1.87	14,447,296.540	1,717,152.590	39.781525283	-80.726861668	
512.00	1.030	200.130	511.98	-1.86	-2.07	14,447,296.042	1,717,152.387	39.781523915	-80.726862393	
534.00	1.150	204.880	533.98	-2.24	-2.23	14,447,295.656	1,717,152.227	39.781522857	-80.726862970	
575.00	1.260	212.590	574.97	-3.00	-2.65	14,447,294.903	1,717,151.811	39.781520792	-80.726864459	
607.00	1.260	211.200	606.96	-3.59	-3.02	14,447,294.305	1,717,151.439	39.781519155	-80.726865788	
639.00	0.970	210.310	638.96	-4.13	-3.34	14,447,293.771	1,717,151.120	39.781517689	-80.726866929	
671.00	0.860	204.800	670.95	-4.58	-3.58	14,447,293.319	1,717,150.882	39.781516450	-80.726867780	
703.00	0.730	192.880	702.95	-5.00	-3.72	14,447,292.902	1,717,150.736	39.781515307	-80.726868304	
734.00	0.660	172.040	733.95	-5.37	-3.74	14,447,292.533	1,717,150.717	39.781514293	-80.726868377	
766.00	0.810	183.740	765.94	-5.78	-3.73	14,447,292.124	1,717,150.728	39.781513171	-80.726868343	
798.00	0.730	166.890	797.94	-6.20	-3.70	14,447,291.700	1,717,150.759	39.781512006	-80.726868236	
829.00	0.510	156.460	828.94	-6.52	-3.60	14,447,291.381	1,717,150.859	39.781511130	-80.726867884	
861.00	0.490	147.950	860.94	-6.76	-3.47	14,447,291.135	1,717,150.989	39.781510452	-80.726867425	
892.00	0.470	125.400	891.94	-6.95	-3.30	14,447,290.949	1,717,151.163	39.781509939	-80.726868008	
924.00	0.480	102.160	923.94	-7.05	-3.06	14,447,290.845	1,717,151.401	39.781509651	-80.726865962	
956.00	0.600	82.060	955.94	-7.06	-2.76	14,447,290.840	1,717,151.698	39.781509635	-80.726864905	
987.00	0.770	72.190	986.93	-6.97	-2.40	14,447,290.926	1,717,152.057	39.781509868	-80.726863626	
1,019.00	0.770	80.020	1,018.93	-6.87	-1.99	14,447,291.029	1,717,152.473	39.781510148	-80.726862142	
1,051.00	0.950	63.660	1,050.93	-6.72	-1.54	14,447,291.184	1,717,152.923	39.781510569	-80.726860541	
1,083.00	1.250	62.140	1,082.92	-6.44	-0.99	14,447,291.464	1,717,153.469	39.781511336	-80.726858593	
1,115.00	1.370	59.690	1,114.91	-6.08	-0.35	14,447,291.821	1,717,154.108	39.781512309	-80.726856315	
1,147.00	1.480	58.640	1,146.90	-5.67	0.33	14,447,292.229	1,717,154.791	39.781513424	-80.726853879	
1,179.00	1.400	47.950	1,178.89	-5.19	0.98	14,447,292.706	1,717,155.434	39.781514728	-80.726851585	
1,211.00	1.300	44.960	1,210.88	-4.68	1.52	14,447,293.224	1,717,155.981	39.781516148	-80.726849633	
1,243.00	1.170	22.050	1,242.88	-4.12	1.90	14,447,293.784	1,717,156.360	39.781517682	-80.726848278	
1,275.00	1.430	14.870	1,274.87	-3.43	2.13	14,447,294.473	1,717,156.585	39.781519571	-80.726847469	
1,307.00	1.440	1.250	1,306.86	-2.64	2.24	14,447,295.261	1,717,156.696	39.781521734	-80.726847064	
1,339.00	1.490	0.410	1,338.85	-1.82	2.25	14,447,296.079	1,717,156.708	39.781523981	-80.726847014	
1,370.00	1.540	346.270	1,369.84	-1.01	2.15	14,447,296.886	1,717,156.612	39.781526199	-80.726847346	
1,402.00	1.360	350.120	1,401.83	-0.22	1.99	14,447,297.678	1,717,156.445	39.781528375	-80.726847933	
1,434.00	0.950	337.360	1,433.82	0.40	1.82	14,447,298.297	1,717,156.278	39.781530077	-80.726848522	
1,465.00	0.810	325.870	1,464.82	0.82	1.60	14,447,298.716	1,717,156.056	39.781531228	-80.726849307	
1,496.00	0.530	298.540	1,495.81	1.07	1.35	14,447,298.966	1,717,155.807	39.781531916	-80.726850190	
1,528.00	0.480	279.930	1,527.81	1.16	1.09	14,447,299.059	1,717,155.545	39.781532176	-80.726851122	
1,560.00	0.640	241.480	1,559.81	1.10	0.80	14,447,298.997	1,717,155.256	39.781532008	-80.726852151	
1,590.00	1.050	222.410	1,589.81	0.81	0.46	14,447,298.714	1,717,154.923	39.781531233	-80.726853338	
1,622.00	1.440	213.870	1,621.80	0.26	0.04	14,447,298.164	1,717,154.501	39.781529726	-80.726854846	
1,654.00	1.680	210.500	1,653.79	-0.47	-0.42	14,447,297.426	1,717,154.039	39.781527703	-80.726856499	
1,686.00	1.940	207.370	1,685.77	-1.36	-0.91	14,447,296.541	1,717,153.552	39.781525276	-80.726858242	
1,718.00	2.060	197.790	1,717.75	-2.39	-1.33	14,447,295.512	1,717,153.127	39.781522454	-80.726859765	
1,749.00	1.690	188.490	1,748.74	-3.37	-1.57	14,447,294.529	1,717,152.890	39.781519758	-80.726860622	
1,780.00	1.350	163.990	1,779.73	-4.17	-1.54	14,447,293.726	1,717,152.923	39.781517552	-80.726860512	
1,811.00	1.220	123.960	1,810.72	-4.71	-1.16	14,447,293.191	1,717,153.297	39.781516079	-80.726859185	
1,842.00	1.490	95.490	1,841.71	-4.93	-0.49	14,447,292.968	1,717,153.972	39.781515461	-80.726856786	
1,873.00	1.550	80.860	1,872.70	-4.90	0.33	14,447,292.996	1,717,154.787	39.781515531	-80.726853884	
1,905.00	1.860	62.980	1,904.69	-4.60	1.22	14,447,293.301	1,717,155.677	39.781516360	-80.726850713	
1,936.00	2.400	49.600	1,935.66	-3.95	2.16	14,447,293.950	1,717,156.620	39.781518135	-80.726847351	
1,969.00	2.600	48.670	1,968.63	-3.01	3.25	14,447,294.892	1,717,157.708	39.781520713	-80.726843467	
2,000.00	2.790	48.610	1,999.60	-2.04	4.34	14,447,295.855	1,717,158.802	39.781523349	-80.726839563	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
2,032.00	2.810	45.400	2,031.56	-0.98	5.49	14,447,296.921	1,717,159.945	39.781526267	-80.726835484	
2,063.00	2.810	33.700	2,062.52	0.19	6.45	14,447,298.087	1,717,160.907	39.781529460	-80.726832044	
2,095.00	3.000	16.930	2,094.48	1.64	7.13	14,447,299.540	1,717,161.587	39.781533446	-80.726829612	
2,127.00	3.120	11.960	2,126.44	3.29	7.55	14,447,301.193	1,717,162.011	39.781537982	-80.726828083	
2,158.00	3.100	357.960	2,157.39	4.96	7.70	14,447,302.856	1,717,162.156	39.781542548	-80.726827549	
2,190.00	2.980	349.890	2,189.35	-6.64	7.52	14,447,304.540	1,717,161.979	39.781547173	-80.726828160	
2,204.00	2.980	344.350	2,203.33	7.35	7.36	14,447,305.249	1,717,161.817	39.781549121	-80.726828729	
2,253.00	3.010	332.600	2,252.26	9.72	6.42	14,447,307.617	1,717,160.881	39.781555634	-80.726832034	
2,285.00	3.080	330.790	2,284.22	11.21	5.62	14,447,309.114	1,717,160.075	39.781559750	-80.726834887	
2,317.00	2.200	323.300	2,316.18	12.46	4.83	14,447,310.356	1,717,159.289	39.781563170	-80.726837674	
2,349.00	1.500	307.390	2,348.17	13.20	4.13	14,447,311.103	1,717,158.589	39.781565226	-80.726840157	
2,381.00	1.100	285.450	2,380.16	13.54	3.50	14,447,311.439	1,717,157.960	39.781566155	-80.726842391	
2,413.00	1.010	252.060	2,412.15	13.53	2.94	14,447,311.434	1,717,157.395	39.781566146	-80.726844400	
2,444.00	1.610	215.700	2,443.15	13.10	2.42	14,447,310.997	1,717,156.881	39.781564948	-80.726846235	
2,476.00	2.010	200.260	2,475.13	12.21	1.97	14,447,310.105	1,717,156.425	39.781562503	-80.726847870	
2,508.00	2.590	196.640	2,507.10	10.99	1.56	14,447,308.886	1,717,156.023	39.781559158	-80.726849312	
2,539.00	2.710	194.300	2,538.07	9.61	1.18	14,447,307.505	1,717,155.642	39.781555368	-80.726850685	
2,570.00	3.030	191.460	2,569.03	8.09	0.84	14,447,305.991	1,717,155.298	39.781551215	-80.726851925	
2,601.00	3.160	191.750	2,599.99	6.45	0.50	14,447,304.352	1,717,154.961	39.781546716	-80.726853142	
2,633.00	2.730	190.910	2,631.94	4.84	0.18	14,447,302.740	1,717,154.637	39.781542292	-80.726854312	
2,664.00	2.220	193.030	2,662.91	3.53	-0.10	14,447,301.430	1,717,154.362	39.781538697	-80.726855305	
2,696.00	1.880	189.660	2,694.89	2.41	-0.32	14,447,300.309	1,717,154.134	39.781535620	-80.726856128	
2,728.00	1.450	183.070	2,726.88	1.49	-0.43	14,447,299.387	1,717,154.025	39.781533089	-80.726856529	
2,758.00	1.150	180.280	2,756.87	0.81	-0.46	14,447,298.707	1,717,154.003	39.781531222	-80.726856614	
2,790.00	0.870	163.170	2,788.87	-0.25	-0.39	14,447,298.153	1,717,154.072	39.781529701	-80.726856375	
2,821.00	0.660	134.170	2,819.87	-0.10	-0.19	14,447,297.804	1,717,154.268	39.781528739	-80.726856581	
2,853.00	0.540	87.430	2,851.86	-0.22	0.09	14,447,297.682	1,717,154.551	39.781528402	-80.726854675	
2,885.00	0.460	61.660	2,883.86	-0.15	0.36	14,447,297.750	1,717,154.814	39.781528586	-80.726853736	
2,916.00	0.670	63.470	2,914.86	-0.01	0.63	14,447,297.890	1,717,155.086	39.781528968	-80.726852767	
2,948.00	0.970	57.360	2,946.86	0.22	1.02	14,447,298.120	1,717,155.482	39.781529596	-80.726851357	
2,980.00	0.990	79.300	2,978.85	0.42	1.52	14,447,298.317	1,717,155.981	39.781530134	-80.726849576	
3,012.00	1.200	98.130	3,010.85	0.42	2.13	14,447,298.321	1,717,156.585	39.781530139	-80.726847429	
3,044.00	1.580	107.920	3,042.84	0.24	2.88	14,447,298.138	1,717,157.336	39.781529630	-80.726844756	
3,074.00	1.890	112.070	3,072.82	-0.07	3.73	14,447,297.825	1,717,158.188	39.781528763	-80.726841727	
3,105.00	2.460	117.760	3,103.80	-0.58	4.79	14,447,297.323	1,717,159.251	39.781527376	-80.726837950	
3,136.00	2.710	124.990	3,134.77	-1.31	5.98	14,447,296.593	1,717,160.440	39.781525361	-80.726833726	
3,168.00	2.900	122.760	3,166.73	-2.18	7.28	14,447,295.721	1,717,161.740	39.781522956	-80.726829106	
3,200.00	3.270	129.300	3,198.69	-3.19	8.67	14,447,294.705	1,717,163.127	39.781520153	-80.726824180	
3,231.00	3.600	130.190	3,229.63	-4.38	10.10	14,447,293.517	1,717,164.555	39.781516879	-80.726819112	
3,263.00	3.840	131.070	3,261.56	-5.74	11.67	14,447,292.164	1,717,166.130	39.781513152	-80.726813519	
3,295.00	4.180	133.400	3,293.48	-7.24	13.33	14,447,290.659	1,717,167.785	39.781509004	-80.726807644	
3,326.00	4.460	132.850	3,324.40	-8.84	15.03	14,447,289.063	1,717,169.490	39.781504607	-80.726801594	
3,358.00	4.680	134.680	3,356.29	-10.60	16.87	14,447,287.299	1,717,171.330	39.781499747	-80.726795062	
3,389.00	4.920	133.590	3,387.19	-12.41	18.73	14,447,285.493	1,717,173.192	39.781494772	-80.726788454	
3,421.00	5.260	135.150	3,419.06	-14.39	20.76	14,447,283.507	1,717,175.221	39.781489301	-80.726781256	
3,452.00	5.180	137.140	3,449.93	-16.43	22.72	14,447,281.474	1,717,177.175	39.781483700	-80.726774323	
3,484.00	4.180	137.330	3,481.82	-18.34	24.49	14,447,279.557	1,717,178.948	39.781478423	-80.726768032	
3,516.00	3.780	140.970	3,513.75	-20.02	25.94	14,447,277.881	1,717,180.403	39.781473805	-80.726762873	
3,548.00	3.610	140.760	3,545.68	-21.62	27.25	14,447,276.281	1,717,181.704	39.781469401	-80.726758257	
3,580.00	3.710	141.530	3,577.61	-23.21	28.53	14,447,274.690	1,717,182.985	39.781465022	-80.726753714	
3,612.00	3.870	138.460	3,609.54	-24.83	29.89	14,447,273.071	1,717,184.346	39.781460564	-80.726748890	
3,643.00	4.130	139.130	3,640.47	-26.46	31.31	14,447,271.444	1,717,185.770	39.781456084	-80.726743838	
3,675.00	4.460	139.300	3,672.38	-28.27	32.88	14,447,269.629	1,717,187.335	39.781451087	-80.726738286	
3,707.00	4.450	140.200	3,704.28	-30.17	34.48	14,447,267.732	1,717,188.941	39.781445864	-80.726732591	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
3,738.00	3.820	133.800	3,735.20	-31.81	36.00	14,447,266.094	1,717,190.456	39.781441351	-80.726727215
3,770.00	3.590	131.720	3,767.13	-33.21	37.51	14,447,264.689	1,717,191.973	39.781437481	-80.726721830
3,802.00	3.650	130.640	3,799.07	-34.54	39.04	14,447,263.359	1,717,193.494	39.781433815	-80.726716432
3,833.00	3.830	129.180	3,830.01	-35.84	40.59	14,447,262.062	1,717,195.045	39.781430241	-80.726710924
3,865.00	4.040	128.610	3,861.93	-37.22	42.30	14,447,260.684	1,717,196.755	39.781426441	-80.726704855
3,897.00	4.370	126.990	3,893.84	-38.65	44.15	14,447,259.247	1,717,198.609	39.781422479	-80.726698269
3,928.00	4.310	125.640	3,924.75	-40.04	46.04	14,447,257.857	1,717,200.499	39.781418647	-80.726691557
3,960.00	3.730	127.170	3,956.68	-41.37	47.85	14,447,256.528	1,717,202.306	39.781414981	-80.726685141
3,991.00	3.520	129.680	3,987.61	-42.59	49.38	14,447,255.311	1,717,203.842	39.781411626	-80.726679687
4,023.00	3.240	131.550	4,019.56	-43.82	50.82	14,447,254.084	1,717,205.275	39.781408245	-80.726674601
4,055.00	3.340	133.910	4,051.51	-45.06	52.16	14,447,252.838	1,717,206.623	39.781404811	-80.726669815
4,087.00	2.900	131.550	4,083.46	-46.25	53.44	14,447,251.654	1,717,207.901	39.781401550	-80.726665281
4,119.00	2.560	130.580	4,115.42	-47.25	54.59	14,447,250.652	1,717,209.049	39.781398789	-80.726661204
4,150.00	2.420	129.220	4,146.39	-48.11	55.62	14,447,249.788	1,717,210.082	39.781396407	-80.726657537
4,182.00	2.210	127.190	4,178.37	-48.91	56.64	14,447,248.988	1,717,211.097	39.781394201	-80.726653933
4,214.00	1.640	132.180	4,210.35	-49.59	57.47	14,447,248.308	1,717,211.928	39.781392326	-80.726650983
4,246.00	1.150	131.010	4,242.34	-50.11	58.05	14,447,247.789	1,717,212.509	39.781390898	-80.726648918
4,277.00	0.850	136.280	4,273.33	-50.48	58.44	14,447,247.419	1,717,212.903	39.781389878	-80.726647521
4,309.00	0.560	111.990	4,305.33	-50.71	58.75	14,447,247.189	1,717,213.212	39.781389243	-80.726646424
4,340.00	0.230	101.670	4,336.33	-50.78	58.95	14,447,247.120	1,717,213.413	39.781389051	-80.726645707
4,372.00	0.190	4.760	4,368.33	-50.74	59.02	14,447,247.160	1,717,213.481	39.781389160	-80.726645467
4,404.00	0.480	341.710	4,400.33	-50.56	58.98	14,447,247.340	1,717,213.443	39.781389655	-80.726645599
4,426.00	0.750	321.080	4,422.33	-50.36	58.87	14,447,247.539	1,717,213.324	39.781390204	-80.726646022
4,441.00	0.680	325.900	4,437.33	-50.21	58.75	14,447,247.689	1,717,213.212	39.781390617	-80.726646418
4,535.00	1.240	335.080	4,531.31	-48.83	58.01	14,447,249.074	1,717,212.471	39.781394425	-80.726649041
4,628.00	1.810	336.530	4,624.28	-46.57	57.00	14,447,251.333	1,717,211.462	39.781400639	-80.726652608
4,722.00	2.320	341.860	4,718.22	-43.40	55.82	14,447,254.503	1,717,210.278	39.781409354	-80.726656786
4,815.00	1.640	351.490	4,811.16	-40.29	55.04	14,447,257.608	1,717,209.495	39.781417888	-80.726659540
4,908.00	0.730	27.140	4,904.14	-38.45	55.11	14,447,259.452	1,717,209.569	39.781422950	-80.726659259
5,002.00	0.960	74.070	4,998.13	-37.70	56.14	14,447,260.201	1,717,210.599	39.781424998	-80.726655583
5,096.00	1.690	93.440	5,092.11	-37.57	58.28	14,447,260.334	1,717,212.740	39.781425345	-80.726647961
5,188.00	2.560	116.190	5,184.05	-38.55	61.48	14,447,259.345	1,717,215.938	39.781422605	-80.726636589
5,282.00	2.380	136.900	5,277.96	-40.91	64.70	14,447,256.994	1,717,219.155	39.781416119	-80.726625163
5,375.00	1.240	135.030	5,370.91	-43.03	66.73	14,447,254.872	1,717,221.186	39.781410275	-80.726617958
5,469.00	0.190	347.330	5,464.91	-43.60	67.41	14,447,254.304	1,717,221.871	39.781408711	-80.726615527
5,563.00	0.680	334.060	5,558.90	-42.94	67.13	14,447,254.958	1,717,221.592	39.781410508	-80.726616510
5,657.00	1.130	337.060	5,652.89	-41.59	66.53	14,447,256.313	1,717,220.987	39.781414235	-80.726618650
5,750.00	1.530	301.620	5,745.87	-40.09	65.11	14,447,257.808	1,717,219.572	39.781418354	-80.726623669
5,845.00	1.420	285.940	5,840.84	-39.10	62.90	14,447,258.797	1,717,217.361	39.781421086	-80.726631531
5,939.00	1.060	226.850	5,934.82	-39.38	61.15	14,447,258.522	1,717,215.606	39.781420346	-80.726637778
6,031.00	1.210	214.470	6,026.80	-40.76	59.98	14,447,257.139	1,717,214.436	39.781416558	-80.726641960
6,187.00	0.230	39.210	6,182.79	-41.88	59.24	14,447,256.024	1,717,213.701	39.781413501	-80.726644586
6,280.00	0.320	20.090	6,275.79	-41.49	59.45	14,447,256.412	1,717,213.909	39.781414567	-80.726643844
6,311.00	0.310	41.280	6,306.79	-41.34	59.53	14,447,256.557	1,717,213.994	39.781414962	-80.726643540
6,404.00	0.320	13.670	6,399.79	-40.90	59.76	14,447,256.998	1,717,214.221	39.781416173	-80.726642726
6,497.00	0.220	42.370	6,492.79	-40.52	59.94	14,447,257.382	1,717,214.403	39.781417226	-80.726642075
6,591.00	0.290	11.180	6,586.79	-40.15	60.11	14,447,257.749	1,717,214.570	39.781418232	-80.726641474
6,685.00	0.350	29.160	6,680.78	-39.67	60.30	14,447,258.233	1,717,214.756	39.781419560	-80.726640807
6,779.00	0.400	40.880	6,774.78	-39.17	60.65	14,447,258.732	1,717,215.111	39.781420927	-80.726639539
6,873.00	0.420	1.590	6,868.78	-38.58	60.88	14,447,259.324	1,717,215.335	39.781422552	-80.726638734
6,966.00	0.460	11.410	6,961.78	-37.87	60.96	14,447,260.031	1,717,215.419	39.781424492	-80.726638430
7,060.00	1.370	80.450	7,055.77	-37.31	62.14	14,447,260.587	1,717,216.602	39.781426010	-80.726634213
7,154.00	2.990	90.580	7,149.70	-37.15	65.70	14,447,260.749	1,717,220.161	39.781426424	-80.726621541
7,248.00	5.260	94.020	7,243.45	-37.48	72.45	14,447,260.422	1,717,226.912	39.781425470	-80.726597516



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,342.00	7.730	97.690	7,336.84	-38.63	83.02	14,447,259.274	1,717,237.477	39.781422228	-80.726559925
7,437.00	9.990	101.160	7,430.70	-41.08	97.44	14,447,256.824	1,717,251.894	39.781415378	-80.726508633
7,529.00	12.170	103.110	7,520.98	-44.82	114.71	14,447,253.079	1,717,269.170	39.781404950	-80.726447182
7,623.00	13.670	101.240	7,612.59	-49.23	135.26	14,447,248.666	1,717,289.716	39.781392659	-80.726374099
7,717.00	15.270	99.550	7,703.61	-53.45	158.36	14,447,244.447	1,717,312.818	39.781380878	-80.726291913
7,810.00	15.970	98.070	7,793.18	-57.28	183.10	14,447,240.620	1,717,337.563	39.781370158	-80.726203880
7,903.00	16.850	96.830	7,882.39	-60.68	209.16	14,447,237.220	1,717,363.613	39.781360605	-80.726111191
7,997.00	16.730	96.610	7,972.38	-63.86	236.12	14,447,234.043	1,717,390.580	39.781351652	-80.726015241
8,090.00	14.470	90.130	8,061.95	-65.42	261.04	14,447,232.475	1,717,415.501	39.781347138	-80.725926554
8,183.00	14.050	85.270	8,152.09	-64.52	283.91	14,447,233.380	1,717,438.371	39.781349429	-80.725845140
8,277.00	15.030	88.250	8,243.08	-63.21	307.47	14,447,234.693	1,717,461.926	39.781352838	-80.725761285
8,371.00	14.920	87.860	8,333.89	-62.38	331.74	14,447,235.517	1,717,486.201	39.781354896	-80.725674870
8,464.00	15.950	92.720	8,423.54	-62.54	356.47	14,447,235.358	1,717,510.930	39.781354251	-80.725586850
8,557.00	16.980	96.650	8,512.73	-64.72	382.73	14,447,233.179	1,717,537.184	39.781348045	-80.725493426
8,651.00	18.000	98.680	8,602.38	-68.50	410.72	14,447,229.397	1,717,565.176	39.781337425	-80.725393833
8,744.00	17.300	97.070	8,691.00	-72.37	438.65	14,447,225.527	1,717,593.104	39.781326560	-80.725294468
8,838.00	16.680	94.400	8,780.90	-75.13	465.97	14,447,222.771	1,717,620.425	39.781318763	-80.725197250
8,931.00	16.530	91.480	8,870.02	-76.49	492.50	14,447,221.406	1,717,646.959	39.781314789	-80.725102822
9,024.00	16.930	90.460	8,959.09	-76.94	519.27	14,447,220.955	1,717,673.725	39.781313326	-80.725007555
9,117.00	16.190	92.380	9,048.23	-77.59	545.76	14,447,220.308	1,717,700.220	39.781311325	-80.724913255
9,210.00	14.680	94.500	9,137.87	-79.05	570.47	14,447,218.845	1,717,724.924	39.781307099	-80.724825341
9,303.00	14.930	94.580	9,227.79	-80.94	594.16	14,447,216.964	1,717,748.613	39.781301733	-80.724741040
9,395.00	15.460	95.370	9,316.57	-83.03	618.18	14,447,214.870	1,717,772.635	39.781295779	-80.724655560
9,488.00	15.170	93.320	9,406.27	-84.89	642.67	14,447,213.005	1,717,797.124	39.781290451	-80.724568414
9,580.00	15.630	92.880	9,494.96	-86.21	667.06	14,447,211.685	1,717,821.519	39.781286621	-80.724481596
9,674.00	15.700	92.800	9,585.47	-87.47	692.41	14,447,210.428	1,717,846.869	39.781282953	-80.724391379
9,767.00	15.930	93.220	9,674.95	-88.80	717.72	14,447,209.096	1,717,872.179	39.781279082	-80.724301304
9,861.00	14.230	90.480	9,765.71	-89.62	742.16	14,447,208.275	1,717,896.614	39.781276620	-80.724214341
9,954.00	15.240	92.130	9,855.65	-90.17	765.80	14,447,207.725	1,717,920.259	39.781274909	-80.724130184
10,010.00	15.780	94.950	9,909.61	-91.11	780.74	14,447,206.794	1,717,935.200	39.781272227	-80.724077012
10,079.00	16.700	98.390	9,975.86	-93.36	799.90	14,447,204.538	1,717,954.356	39.781265869	-80.724008853
10,126.00	16.480	88.250	10,020.92	-94.14	813.25	14,447,203.756	1,717,967.703	39.781263608	-80.723961355
10,173.00	15.690	67.500	10,066.11	-91.51	825.79	14,447,206.394	1,717,980.249	39.781270746	-80.723916672
10,220.00	15.290	45.200	10,111.45	-84.70	836.07	14,447,213.199	1,717,990.526	39.781280347	-80.723880014
10,268.00	15.470	34.320	10,157.74	-74.95	844.17	14,447,222.947	1,717,998.628	39.781316051	-80.723851069
10,316.00	15.690	38.190	10,203.97	-64.56	851.79	14,447,233.336	1,718,006.250	39.781344516	-80.723823824
10,363.00	16.660	32.240	10,249.12	-53.87	859.32	14,447,244.030	1,718,013.775	39.781373822	-80.723796926
10,410.00	18.160	25.110	10,293.97	-41.54	866.02	14,447,256.363	1,718,020.478	39.781407634	-80.723772930
10,457.00	19.310	18.410	10,338.48	-27.53	871.58	14,447,270.371	1,718,026.041	39.781446055	-80.723752975
10,504.00	21.260	10.480	10,382.57	-11.77	875.59	14,447,286.127	1,718,030.046	39.781489293	-80.723738546
10,552.00	22.850	0.080	10,427.08	6.11	877.19	14,447,304.012	1,718,031.643	39.781538397	-80.723732666
10,599.00	24.610	350.720	10,470.12	24.90	875.62	14,447,322.804	1,718,030.077	39.781590018	-80.723738034
10,645.00	25.760	341.420	10,511.76	43.84	870.89	14,447,341.740	1,718,025.345	39.781642060	-80.723754668
10,692.00	27.310	335.960	10,553.81	63.37	863.24	14,447,361.272	1,718,017.697	39.781695764	-80.723781676
10,740.00	28.240	340.230	10,596.29	84.12	854.91	14,447,382.017	1,718,009.369	39.781752807	-80.723811091
10,787.00	29.470	347.810	10,637.46	105.89	848.71	14,447,403.790	1,718,003.165	39.781812653	-80.723832937
10,835.00	30.530	351.570	10,679.04	129.49	844.43	14,447,427.393	1,717,998.884	39.781877512	-80.723847915
10,882.00	33.270	347.940	10,718.94	153.92	839.98	14,447,451.816	1,717,994.439	39.781944621	-80.723863469
10,929.00	35.880	347.020	10,757.63	179.95	834.19	14,447,477.849	1,717,988.651	39.782016164	-80.723883785
10,976.00	40.390	349.710	10,794.60	208.37	828.38	14,447,506.270	1,717,982.834	39.782094263	-80.723904179
11,024.00	45.560	350.810	10,829.70	240.61	822.86	14,447,538.509	1,717,977.315	39.782182848	-80.723923468
11,071.00	51.300	351.530	10,860.88	275.34	817.47	14,447,573.242	1,717,971.929	39.782278279	-80.723942257
11,118.00	56.610	350.370	10,888.52	312.86	811.48	14,447,610.754	1,717,965.941	39.782381348	-80.723963160
11,165.00	62.400	348.600	10,912.36	352.65	804.08	14,447,650.550	1,717,958.536	39.782490701	-80.723989082



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
11,212.00	66.950	346.360	10,932.47	394.11	794.86	14,447,692.005	1,717,949.314	39.782604625	-80.724021451	
11,259.00	70.130	343.670	10,949.66	436.35	783.54	14,447,734.246	1,717,937.996	39.782720725	-80.724061274	
11,307.00	71.980	341.420	10,965.25	479.65	769.92	14,447,777.548	1,717,924.375	39.782839761	-80.724109283	
11,354.00	71.900	339.920	10,979.82	521.81	755.13	14,447,819.712	1,717,909.585	39.782955679	-80.724161467	
11,402.00	73.000	334.550	10,994.30	563.99	737.42	14,447,861.891	1,717,891.878	39.783071664	-80.724224033	
11,450.00	75.960	330.540	11,007.15	605.01	716.09	14,447,902.913	1,717,870.551	39.783184500	-80.724299495	
11,497.00	80.160	330.850	11,016.87	645.10	693.59	14,447,943.003	1,717,848.050	39.783294787	-80.724379148	
11,544.00	85.150	331.200	11,022.88	685.87	671.02	14,447,983.770	1,717,825.477	39.783406935	-80.724459051	
11,591.00	87.320	330.140	11,025.96	726.75	648.05	14,448,024.653	1,717,802.506	39.783519406	-80.724540371	
11,638.00	87.100	328.290	11,028.25	767.08	624.02	14,448,064.981	1,717,778.480	39.783630359	-80.724625450	
11,685.00	88.690	330.230	11,029.98	807.45	600.02	14,448,105.347	1,717,754.475	39.783741418	-80.724710455	
11,732.00	89.130	328.910	11,030.87	847.97	576.22	14,448,145.864	1,717,730.675	39.783852890	-80.724794729	
11,779.00	90.060	329.130	11,031.20	888.26	552.03	14,448,186.158	1,717,706.483	39.783963751	-80.724880399	
11,874.00	90.150	329.520	11,031.03	969.97	503.56	14,448,267.864	1,717,658.017	39.784188548	-80.725052022	
11,968.00	91.120	328.250	11,029.99	1,050.44	454.99	14,448,348.333	1,717,609.447	39.784409946	-80.725224032	
12,063.00	90.900	329.080	11,028.31	1,131.57	405.59	14,448,429.463	1,717,560.051	39.784633166	-80.725398974	
12,158.00	91.250	329.570	11,026.53	1,213.26	357.14	14,448,511.155	1,717,511.594	39.784857923	-80.725570570	
12,252.00	91.120	329.790	11,024.59	1,294.38	309.69	14,448,592.280	1,717,464.151	39.785081113	-80.725738565	
12,347.00	91.070	324.150	11,022.77	1,373.98	257.94	14,448,671.880	1,717,412.399	39.785300150	-80.725921914	
12,441.00	91.030	324.150	11,021.05	1,450.16	202.90	14,448,748.059	1,717,357.355	39.785509820	-80.726117017	
12,536.00	90.900	332.610	11,019.44	1,530.97	153.14	14,448,828.870	1,717,307.601	39.785732168	-80.726293245	
12,630.00	90.990	329.430	11,017.89	1,613.18	107.61	14,448,911.079	1,717,262.070	39.785958315	-80.726454425	
12,724.00	91.070	329.740	11,016.20	1,694.23	60.03	14,448,992.129	1,717,214.489	39.786181300	-80.726622915	
12,817.00	91.030	329.920	11,014.50	1,774.62	13.30	14,449,072.517	1,717,167.758	39.786402460	-80.726788387	
12,912.00	91.070	329.790	11,012.76	1,856.76	-34.40	14,449,154.655	1,717,120.058	39.786628432	-80.726957292	
13,006.00	91.160	334.150	11,010.93	1,939.70	-78.56	14,449,237.593	1,717,075.904	39.786856571	-80.727113569	
13,101.00	91.120	332.560	11,009.04	2,024.59	-121.15	14,449,322.485	1,717,033.310	39.787090062	-80.727264269	
13,198.00	91.470	329.350	11,006.85	2,109.36	-168.22	14,449,407.253	1,716,986.235	39.787323251	-80.727430923	
13,292.00	91.600	330.800	11,004.33	2,190.79	-215.10	14,449,488.689	1,716,939.360	39.787547289	-80.727596903	
13,387.00	91.160	330.400	11,002.04	2,273.54	-261.72	14,449,571.430	1,716,892.738	39.787774906	-80.727761970	
13,481.00	91.070	328.770	11,000.21	2,354.58	-309.30	14,449,652.476	1,716,845.180	39.787997876	-80.727930458	
13,574.00	91.070	329.880	10,998.47	2,434.55	-356.74	14,449,732.447	1,716,797.724	39.788217894	-80.728098455	
13,668.00	91,070	329.430	10,996.72	2,515.66	-404.22	14,449,813.555	1,716,750.243	39.788441033	-80.728266600	
13,762.00	91.210	330.890	10,994.85	2,597.18	-450.98	14,449,895.073	1,716,703.481	39.788665294	-80.728432181	
13,855.00	91.030	329.040	10,993.03	2,677.67	-497.52	14,449,975.566	1,716,656.943	39.788886736	-80.728596979	
13,950.00	90.990	331.590	10,991.35	2,760.18	-544.55	14,450,058.079	1,716,609.907	39.789113729	-80.728763526	
14,044.00	90.990	330.890	10,989.73	2,842.58	-589.77	14,450,140.470	1,716,564.687	39.789340373	-80.728923614	
14,138.00	91.030	329.130	10,988.07	2,923.98	-636.75	14,450,221.869	1,716,517.710	39.789564306	-80.729089965	
14,232.00	90.990	330.270	10,986.42	3,005.12	-684.17	14,450,303.014	1,716,470.293	39.789787545	-80.729257890	
14,326.00	90.990	329.610	10,984.79	3,086.47	-731.25	14,450,384.358	1,716,423.215	39.790011329	-80.729424604	
14,420.00	91.030	329.920	10,983.14	3,167.67	-778.57	14,450,465.558	1,716,375.889	39.790234719	-80.729592205	
14,514.00	91.030	330.490	10,981.45	3,249.23	-825.27	14,450,547.119	1,716,329.189	39.790459092	-80.729757577	
14,608.00	90.990	330.800	10,979.79	3,331.14	-871.35	14,450,629.036	1,716,283.115	39.790684440	-80.729920713	
14,703.00	91.210	332.740	10,977.97	3,414.82	-916.27	14,450,712.717	1,716,238.190	39.790914621	-80.730079745	
14,797.00	91.520	333.050	10,975.73	3,498.48	-959.09	14,450,796.369	1,716,195.374	39.791144706	-80.730231269	
14,891.00	91.250	330.140	10,973.45	3,581.13	-1,003.79	14,450,879.018	1,716,150.676	39.791372054	-80.730389504	
14,985.00	91.430	330.010	10,971.26	3,662.57	-1,050.67	14,450,960.464	1,716,103.795	39.791596112	-80.730555523	
15,079.00	91.430	330.490	10,968.91	3,744.16	-1,097.30	14,451,042.049	1,716,057.165	39.791820551	-80.730720648	
15,173.00	91.560	331.550	10,966.46	3,826.36	-1,142.82	14,451,124.249	1,716,011.638	39.792046672	-80.730881843	
15,266.00	90.990	331.240	10,964.39	3,907.99	-1,187.34	14,451,205.877	1,715,967.124	39.792271210	-80.731039438	
15,361.00	91.030	331.070	10,962.71	3,991.19	-1,233.16	14,451,289.077	1,715,921.299	39.792495007	-80.731201684	
15,455.00	90.990	330.400	10,961.06	4,073.18	-1,279.11	14,451,371.066	1,715,875.354	39.792725620	-80.731364370	
15,549.00	90.900	329.170	10,959.51	4,154.39	-1,326.40	14,451,452.283	1,715,828.056	39.792949051	-80.731531882	
15,643.00	91.470	331.950	10,957.56	4,236.23	-1,372.59	14,451,534.119	1,715,781.869	39.793174174	-80.731695438	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
15,735.00	91.470	330.540	10,955.20	4,316.85	-1,416.83	14,451,614.745	1,715,737.626	39.793395959	-80.731852081	
15,828.00	91.650	332.260	10,952.67	4,398.47	-1,461.33	14,451,696.364	1,715,693.126	39.793620472	-80.732009633	
15,922.00	91.520	330.800	10,950.07	4,481.07	-1,506.13	14,451,778.962	1,715,648.335	39.793847676	-80.732168212	
16,016.00	91.470	331.640	10,947.62	4,563.43	-1,551.37	14,451,861.322	1,715,603.095	39.794074229	-80.732328393	
16,110.00	91.430	328.160	10,945.24	4,644.72	-1,598.49	14,451,942.607	1,715,555.975	39.794297847	-80.732495277	
16,204.00	91.030	329.570	10,943.22	4,725.16	-1,647.08	14,452,023.046	1,715,507.385	39.794519151	-80.732667409	
16,297.00	91.070	330.230	10,941.51	4,805.60	-1,693.71	14,452,103.491	1,715,460.752	39.794740456	-80.732832569	
16,391.00	91.210	331.020	10,939.64	4,887.50	-1,739.81	14,452,185.388	1,715,414.653	39.794965745	-80.732995819	
16,485.00	91.250	330.580	10,937.63	4,969.53	-1,785.66	14,452,267.423	1,715,368.805	39.795191411	-80.733158173	
16,579.00	91.430	329.430	10,935.43	5,050.92	-1,832.64	14,452,348.810	1,715,321.826	39.795415304	-80.733324561	
16,672.00	90.590	331.020	10,933.79	5,131.63	-1,878.81	14,452,429.516	1,715,275.652	39.795637323	-80.733488092	
16,765.00	90.720	330.180	10,932.73	5,212.64	-1,924.46	14,452,510.533	1,715,230.001	39.795860188	-80.733649756	
16,859.00	90.590	330.100	10,931.65	5,294.16	-1,971.26	14,452,592.049	1,715,183.203	39.796084433	-80.733815501	
16,953.00	91.160	330.580	10,930.22	5,375.83	-2,017.77	14,452,673.722	1,715,136.693	39.796309110	-80.733980222	
17,046.00	91.520	330.050	10,928.04	5,456.61	-2,063.81	14,452,754.494	1,715,090.649	39.796531307	-80.734143291	
17,139.00	91.600	331.200	10,925.51	5,537.62	-2,109.41	14,452,835.505	1,715,045.049	39.796754156	-80.734304783	
17,233.00	91.520	329.130	10,922.95	5,619.12	-2,156.16	14,452,917.012	1,714,998.303	39.796978375	-80.734470346	
17,326.00	91.030	329.700	10,920.88	5,699.17	-2,203.47	14,452,997.053	1,714,950.995	39.797198574	-80.734637927	
17,420.00	91.070	330.450	10,919.16	5,780.62	-2,250.35	14,453,078.506	1,714,904.110	39.797422648	-80.734803990	
17,512.00	90.990	326.090	10,917.50	5,858.84	-2,298.72	14,453,156.724	1,714,855.746	39.797637847	-80.734975356	
17,606.00	91.070	325.200	10,915.81	5,936.43	-2,351.75	14,453,234.313	1,714,802.709	39.797851357	-80.735163363	
17,699.00	91.600	327.940	10,913.65	6,014.01	-2,402.97	14,453,311.898	1,714,751.492	39.798064842	-80.735344890	
17,793.00	91.560	328.330	10,911.05	6,093.81	-2,452.58	14,453,391.701	1,714,701.887	39.798284404	-80.735520659	
17,887.00	91.560	331.240	10,908.49	6,175.00	-2,499.86	14,453,472.892	1,714,654.605	39.798507758	-80.735688145	
17,981.00	91.600	331.290	10,905.90	6,257.40	-2,545.03	14,453,555.285	1,714,609.430	39.798734396	-80.735848112	
18,075.00	91.340	331.510	10,903.49	6,339.90	-2,590.01	14,453,637.788	1,714,564.448	39.798961335	-80.736007396	
18,169.00	91.250	333.000	10,901.37	6,423.07	-2,633.76	14,453,720.957	1,714,520.700	39.799190092	-80.736162280	
18,263.00	91.430	331.550	10,899.17	6,506.25	-2,677.48	14,453,804.139	1,714,476.982	39.799418888	-80.736317059	
18,356.00	91.430	328.600	10,896.85	6,586.82	-2,723.86	14,453,884.706	1,714,430.607	39.799640520	-80.736481325	
18,449.00	91.300	328.640	10,894.63	6,666.19	-2,772.27	14,453,964.081	1,714,382.195	39.799858895	-80.736652859	
18,542.00	91.210	332.960	10,892.59	6,747.34	-2,817.62	14,454,045.224	1,714,336.846	39.800082100	-80.736813469	
18,636.00	91.380	331.240	10,890.47	6,830.39	-2,861.59	14,454,128.273	1,714,292.873	39.800310531	-80.736969159	
18,728.00	91.430	335.380	10,888.21	6,912.54	-2,902.89	14,454,210.428	1,714,251.572	39.800536482	-80.737115349	
18,821.00	91.300	331.240	10,886.00	6,995.59	-2,944.64	14,454,293.477	1,714,209.821	39.800764892	-80.737263132	
18,915.00	91.340	328.770	10,883.83	7,076.97	-2,991.62	14,454,374.859	1,714,162.844	39.800988768	-80.737429539	
19,010.00	91.250	332.480	10,881.68	7,159.72	-3,038.20	14,454,457.609	1,714,116.265	39.801216396	-80.737594518	
19,104.00	91.070	331.330	10,879.78	7,242.63	-3,082.46	14,454,540.514	1,714,072.007	39.801444431	-80.737751231	
19,197.00	91.070	332.300	10,878.04	7,324.59	-3,126.38	14,454,622.471	1,714,028.089	39.801669860	-80.737906743	
19,290.00	91.070	328.600	10,876.31	7,405.46	-3,172.23	14,454,703.346	1,713,982.239	39.801892332	-80.738069147	
19,384.00	91.210	331.900	10,874.44	7,487.04	-3,218.85	14,454,784.929	1,713,935.610	39.802116755	-80.738234318	
19,478.00	91.160	332.030	10,872.49	7,570.00	-3,263.03	14,454,867.881	1,713,891.439	39.802344917	-80.738390726	
19,572.00	91.120	327.360	10,870.62	7,651.11	-3,310.44	14,454,948.998	1,713,844.029	39.802568064	-80.738558686	
19,667.00	91.300	324.680	10,868.61	7,729.87	-3,363.51	14,455,027.750	1,713,790.950	39.802784764	-80.738746856	
19,761.00	91.300	326.480	10,866.48	7,807.38	-3,416.63	14,455,105.269	1,713,737.832	39.802998076	-80.738935178	
19,853.00	91.030	330.320	10,864.61	7,885.71	-3,464.82	14,455,183.597	1,713,689.645	39.803213571	-80.739105938	
19,948.00	91.120	332.920	10,862.83	7,969.27	-3,509.96	14,455,267.157	1,713,644.501	39.803443410	-80.739265806	
20,041.00	90.500	330.800	10,861.51	8,051.27	-3,553.82	14,455,349.151	1,713,600.647	39.803668937	-80.739421102	
20,134.00	90.540	327.100	10,860.67	8,130.92	-3,601.78	14,455,428.808	1,713,552.689	39.803888080	-80.739591033	
20,227.00	90.230	327.850	10,860.04	8,209.34	-3,651.78	14,455,507.219	1,713,502.688	39.804103816	-80.739768255	
20,321.00	90.370	327.140	10,859.55	8,288.61	-3,702.29	14,455,586.492	1,713,452.176	39.804321923	-80.739947287	
20,414.00	91.340	330.050	10,858.16	8,367.97	-3,750.74	14,455,665.849	1,713,403.726	39.804540245	-80.740118977	
20,508.00	91.030	334.060	10,856.22	8,450.97	-3,794.77	14,455,748.854	1,713,359.694	39.804768548	-80.740274900	
20,602.00	91.340	330.890	10,854.27	8,534.30	-3,838.20	14,455,832.185	1,713,316.269	39.804997743	-80.740428662	
20,695.00	91.160	332.520	10,852.24	8,616.17	-3,882.27	14,455,914.051	1,713,272.198	39.805222919	-80.740584737	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Feb2822

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
20,788.00	91.650	329.960	10,849.96	8,697.66	-3,927.00	14,455,995.547	1,713,227.469	39.805447084	-80.740743158
20,881.00	91.470	335.910	10,847.43	8,780.41	-3,969.28	14,456,078.295	1,713,185.189	39.805674667	-80.740892850
Survey @ 20881.00 MD 10847.43 TVD									
21,008.00	91.470	335.910	10,844.17	8,896.31	-4,021.10	14,456,194.195	1,713,133.368	39.805993371	-80.741076172
Survey Proj. to 21008 MD 10844.17 TVD OH									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
174.00	174.00	0.03	-0.27	MWD surveys
20,881.00	10,847.43	8,780.41	-3,969.28	Survey @ 20881.00 MD 10847.43 TVD
21,008.00	10,844.17	8,896.31	-4,021.10	Survey Proj. to 21008 MD 10844.17 TVD OH

Checked By: _____ Approved By: _____ Date: _____



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Project	Marshall County, West Virginia NAD83 UTM 17N		
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	Van Winkle				
Site Position:		Northing:	14,447,369.493 usft	Latitude:	39.781725330
From:	Lat/Long	Easting:	1,717,188.440 usft	Longitude:	-80.726733270
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "		

Well	Van Winkle N-19 HU (slot H)					
Well Position	+N/-S	0.00 ft	Northing:	14,447,297.900 usft	Latitude:	39.781529000
	+E/-W	0.00 ft	Easting:	1,717,154.459 usft	Longitude:	-80.726855000
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft	Ground Level:	753.00 ft
Grid Convergence:	0.17 °					

Wellbore	Sidetrack 01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	8/7/2022	-8.65	66.42	51,631.78046538

Design	Surveys Sidetrack 01				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	20,321.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	334.716	

Survey Program	Date 8/20/2022				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
174.00	534.00	MWD surf (Original Hole)	MWD	MWD - Standard	
575.00	2,204.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,253.00	4,426.00	MWD 2253-4426 MD (Original Hole)	MWD	MWD - Standard	
4,441.00	20,321.00	MWD (Original Hole)	MWD	MWD - Standard	
20,390.00	22,727.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
22,783.00	22,783.00	Projection ST1 (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	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
174.00	0.180	276.700	174.00	0.03	-0.27	0.14	0.10	0.10	0.00	0.00
203.00	0.260	280.540	203.00	0.05	-0.38	0.21	0.28	0.28	13.24	
233.00	0.170	302.920	233.00	0.09	-0.49	0.29	0.40	-0.30	74.60	
263.00	0.290	261.230	263.00	0.10	-0.60	0.34	0.66	0.40	-138.97	



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
293.00	0.280	226.170	293.00	0.04	-0.73	0.34	0.57	-0.03	-116.87
323.00	0.390	231.020	323.00	-0.08	-0.86	0.30	0.38	0.37	16.17
355.00	0.470	249.160	355.00	-0.19	-1.07	0.28	0.49	0.25	56.69
386.00	0.450	230.090	386.00	-0.32	-1.28	0.26	0.50	-0.06	-61.52
418.00	0.580	220.060	418.00	-0.52	-1.48	0.16	0.49	0.41	-31.34
449.00	0.920	200.830	448.99	-0.87	-1.67	-0.08	1.35	1.10	-62.03
481.00	0.960	204.190	480.99	-1.36	-1.87	-0.43	0.21	0.13	10.50
512.00	1.030	200.130	511.98	-1.86	-2.07	-0.80	0.32	0.23	-13.10
534.00	1.150	204.880	533.98	-2.24	-2.23	-1.08	0.68	0.55	21.59
575.00	1.260	212.590	574.97	-3.00	-2.65	-1.58	0.48	0.27	18.80
607.00	1.260	211.200	606.96	-3.59	-3.02	-1.96	0.10	0.00	-4.34
639.00	0.970	210.310	638.96	-4.13	-3.34	-2.31	0.91	-0.91	-2.78
671.00	0.860	204.800	670.95	-4.58	-3.58	-2.61	0.44	-0.34	-17.22
703.00	0.730	192.880	702.95	-5.00	-3.72	-2.93	0.66	-0.41	-37.25
734.00	0.660	172.040	733.95	-5.37	-3.74	-3.25	0.84	-0.23	-67.23
766.00	0.810	183.740	765.94	-5.78	-3.73	-3.63	0.66	0.47	36.56
798.00	0.730	166.890	797.94	-6.20	-3.70	-4.03	0.75	-0.25	-52.66
829.00	0.510	156.460	828.94	-6.52	-3.60	-4.36	0.79	-0.71	-33.65
861.00	0.490	147.950	860.94	-6.76	-3.47	-4.63	0.24	-0.06	-26.59
892.00	0.470	125.400	891.94	-6.95	-3.30	-4.88	0.61	-0.06	-72.74
924.00	0.480	102.160	923.94	-7.05	-3.06	-5.07	0.60	0.03	-72.63
956.00	0.600	82.060	955.94	-7.06	-2.76	-5.20	0.70	0.38	-62.81
987.00	0.770	72.190	986.93	-6.97	-2.40	-5.28	0.67	0.55	-31.84
1,019.00	0.770	80.020	1,018.93	-6.87	-1.99	-5.36	0.33	0.00	-24.47
1,051.00	0.950	63.660	1,050.93	-6.72	-1.54	-5.42	0.95	0.56	-51.13
1,083.00	1.250	62.140	1,082.92	-6.44	-0.99	-5.40	0.94	0.94	-4.75
1,115.00	1.370	59.690	1,114.91	-6.08	-0.35	-5.35	0.41	0.38	-7.66
1,147.00	1.480	58.640	1,146.90	-5.67	0.33	-5.27	0.35	0.34	-3.28
1,179.00	1.400	47.950	1,178.89	-5.19	0.98	-5.11	0.87	-0.25	-33.41
1,211.00	1.300	44.960	1,210.88	-4.68	1.52	-4.88	0.38	-0.31	-9.34
1,243.00	1.170	22.050	1,242.88	-4.12	1.90	-4.53	1.58	-0.41	-71.59
1,275.00	1.430	14.870	1,274.87	-3.43	2.13	-4.01	0.96	0.81	-22.44
1,307.00	1.440	1.250	1,306.86	-2.64	2.24	-3.34	1.06	0.03	-42.56
1,339.00	1.490	0.410	1,338.85	-1.82	2.25	-2.61	0.17	0.16	-2.63
1,370.00	1.540	346.270	1,369.84	-1.01	2.15	-1.84	1.21	0.16	-45.61
1,402.00	1.360	350.120	1,401.83	-0.22	1.99	-1.05	0.64	-0.56	12.03
1,434.00	0.950	337.360	1,433.82	0.40	1.82	-0.42	1.50	-1.28	-39.88
1,465.00	0.810	325.870	1,464.82	0.82	1.60	0.06	0.72	-0.45	-37.06
1,496.00	0.530	298.540	1,495.81	1.07	1.35	0.39	1.35	-0.90	-88.16
1,528.00	0.480	279.930	1,527.81	1.16	1.09	0.58	0.53	-0.16	-58.16
1,560.00	0.640	241.480	1,559.81	1.10	0.80	0.65	1.25	0.50	-120.16
1,590.00	1.050	222.410	1,589.81	0.81	0.46	0.54	1.64	1.37	-63.57
1,622.00	1.440	213.870	1,621.80	0.26	0.04	0.22	1.35	1.22	-26.69
1,654.00	1.680	210.500	1,653.79	-0.47	-0.42	-0.25	0.80	0.75	-10.53



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
1,686.00	1.940	207.370	1,685.77	-1.36	-0.91	-0.84	0.87	0.81	-9.78
1,718.00	2.060	197.790	1,717.75	-2.39	-1.33	-1.59	1.11	0.38	-29.94
1,749.00	1.690	188.490	1,748.74	-3.37	-1.57	-2.38	1.54	-1.19	-30.00
1,780.00	1.350	163.990	1,779.73	-4.17	-1.54	-3.12	2.34	-1.10	-79.03
1,811.00	1.220	123.960	1,810.72	-4.71	-1.16	-3.76	2.86	-0.42	-129.13
1,842.00	1.490	95.490	1,841.71	-4.93	-0.49	-4.25	2.31	0.87	-91.84
1,873.00	1.550	80.860	1,872.70	-4.90	0.33	-4.57	1.26	0.19	-47.19
1,905.00	1.860	62.980	1,904.69	-4.60	1.22	-4.68	1.91	0.97	-55.88
1,936.00	2.400	49.600	1,935.66	-3.95	2.16	-4.49	2.36	1.74	-43.16
1,969.00	2.600	48.670	1,968.63	-3.01	3.25	-4.11	0.62	0.61	-2.82
2,000.00	2.790	48.610	1,999.60	-2.04	4.34	-3.70	0.61	0.61	-0.19
2,032.00	2.810	45.400	2,031.56	-0.98	5.49	-3.23	0.49	0.06	-10.03
2,063.00	2.810	33.700	2,062.52	0.19	6.45	-2.59	1.85	0.00	-37.74
2,095.00	3.000	16.930	2,094.48	1.64	7.13	-1.56	2.71	0.59	-52.41
2,127.00	3.120	11.960	2,126.44	3.29	7.55	-0.25	0.91	0.38	-15.53
2,158.00	3.100	357.960	2,157.39	4.96	7.70	1.19	2.44	-0.06	-45.16
2,190.00	2.980	349.890	2,189.35	6.64	7.52	2.79	1.39	-0.38	-25.22
2,204.00	2.980	344.350	2,203.33	7.35	7.36	3.50	2.06	0.00	-39.57
2,253.00	3.010	332.600	2,252.26	9.72	6.42	6.04	1.25	0.06	-23.98
2,285.00	3.080	330.790	2,284.22	11.21	5.62	7.74	0.37	0.22	-5.66
2,317.00	2.200	323.300	2,316.18	12.46	4.83	9.20	2.95	-2.75	-23.41
2,349.00	1.500	307.390	2,348.17	13.20	4.13	10.17	2.69	-2.19	-49.72
2,381.00	1.100	285.450	2,380.16	13.54	3.50	10.75	1.97	-1.25	-68.56
2,413.00	1.010	252.060	2,412.15	13.53	2.94	10.98	1.91	-0.28	-104.34
2,444.00	1.610	215.700	2,443.15	13.10	2.42	10.81	3.21	1.94	-117.29
2,476.00	2.010	200.260	2,475.13	12.21	1.97	10.20	1.96	1.25	-48.25
2,508.00	2.590	196.640	2,507.10	10.99	1.56	9.27	1.87	1.81	-11.31
2,539.00	2.710	194.300	2,538.07	9.61	1.18	8.18	0.52	0.39	-7.55
2,570.00	3.030	191.460	2,569.03	8.09	0.84	6.96	1.13	1.03	-9.16
2,601.00	3.160	191.750	2,599.99	6.45	0.50	5.62	0.42	0.42	0.94
2,633.00	2.730	190.910	2,631.94	4.84	0.18	4.30	1.35	-1.34	-2.63
2,664.00	2.220	193.030	2,662.91	3.53	-0.10	3.23	1.67	-1.65	6.84
2,696.00	1.880	189.660	2,694.89	2.41	-0.32	2.32	1.13	-1.06	-10.53
2,728.00	1.450	183.070	2,726.88	1.49	-0.43	1.53	1.47	-1.34	-20.59
2,758.00	1.150	180.280	2,756.87	0.81	-0.46	0.92	1.02	-1.00	-9.30
2,790.00	0.870	163.170	2,788.87	0.25	-0.39	0.39	1.28	-0.88	-53.47
2,821.00	0.660	134.170	2,819.87	-0.10	-0.19	-0.01	1.40	-0.68	-93.55
2,853.00	0.540	87.430	2,851.86	-0.22	0.09	-0.24	1.53	-0.38	-146.06
2,885.00	0.460	61.660	2,883.86	-0.15	0.36	-0.29	0.74	-0.25	-80.53
2,916.00	0.670	63.470	2,914.86	-0.01	0.63	-0.28	0.68	0.68	5.84
2,948.00	0.970	57.360	2,946.86	0.22	1.02	-0.24	0.98	0.94	-19.09
2,980.00	0.990	79.300	2,978.85	0.42	1.52	-0.27	1.17	0.06	68.56
3,012.00	1.200	98.130	3,010.85	0.42	2.13	-0.53	1.29	0.66	58.84



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
3,044.00	1.580	107.920	3,042.84	0.24	2.88	-1.01	1.40	1.19	30.59
3,074.00	1.890	112.070	3,072.82	-0.07	3.73	-1.66	1.11	1.03	13.83
3,105.00	2.460	117.760	3,103.80	-0.58	4.79	-2.57	1.96	1.84	18.35
3,136.00	2.710	124.990	3,134.77	-1.31	5.98	-3.74	1.32	0.81	23.32
3,168.00	2.900	122.760	3,166.73	-2.18	7.28	-5.08	0.68	0.59	-6.97
3,200.00	3.270	129.300	3,198.69	-3.19	8.67	-6.59	1.59	1.16	20.44
3,231.00	3.600	130.190	3,229.63	-4.38	10.10	-8.28	1.08	1.06	2.87
3,263.00	3.840	131.070	3,261.56	-5.74	11.67	-10.17	0.77	0.75	2.75
3,295.00	4.180	133.400	3,293.48	-7.24	13.33	-12.24	1.18	1.06	7.28
3,326.00	4.460	132.850	3,324.40	-8.84	15.03	-14.41	0.91	0.90	-1.77
3,358.00	4.680	134.680	3,356.29	-10.60	16.87	-16.79	0.82	0.69	5.72
3,389.00	4.920	133.590	3,387.19	-12.41	18.73	-19.22	0.83	0.77	-3.52
3,421.00	5.260	135.150	3,419.06	-14.39	20.76	-21.88	1.15	1.06	4.88
3,452.00	5.180	137.140	3,449.93	-16.43	22.72	-24.55	0.64	-0.26	6.42
3,484.00	4.180	137.330	3,481.82	-18.34	24.49	-27.04	3.13	-3.13	0.59
3,516.00	3.780	140.970	3,513.75	-20.02	25.94	-29.18	1.48	-1.25	11.38
3,548.00	3.610	140.760	3,545.68	-21.62	27.25	-31.18	0.53	-0.53	-0.66
3,580.00	3.710	141.530	3,577.61	-23.21	28.53	-33.17	0.35	0.31	2.41
3,612.00	3.870	138.460	3,609.54	-24.83	29.89	-35.21	0.81	0.50	-9.59
3,643.00	4.130	139.130	3,640.47	-26.46	31.31	-37.29	0.85	0.84	2.16
3,675.00	4.460	139.300	3,672.38	-28.27	32.88	-39.60	1.03	1.03	0.53
3,707.00	4.450	140.200	3,704.28	-30.17	34.48	-42.00	0.22	-0.03	2.81
3,738.00	3.820	133.800	3,735.20	-31.81	36.00	-44.13	2.52	-2.03	-20.65
3,770.00	3.590	131.720	3,767.13	-33.21	37.51	-46.05	0.83	-0.72	-6.50
3,802.00	3.650	130.640	3,799.07	-34.54	39.04	-47.90	0.28	0.19	-3.38
3,833.00	3.830	129.180	3,830.01	-35.84	40.59	-49.74	0.66	0.58	-4.71
3,865.00	4.040	128.610	3,861.93	-37.22	42.30	-51.72	0.67	0.66	-1.78
3,897.00	4.370	126.990	3,893.84	-38.65	44.15	-53.81	1.10	1.03	-5.06
3,928.00	4.310	125.640	3,924.75	-40.04	46.04	-55.87	0.38	-0.19	-4.35
3,960.00	3.730	127.170	3,956.68	-41.37	47.85	-57.84	1.84	-1.81	4.78
3,991.00	3.520	129.680	3,987.61	-42.59	49.38	-59.60	0.85	-0.68	8.10
4,023.00	3.240	131.550	4,019.56	-43.82	50.82	-61.32	0.94	-0.88	5.84
4,055.00	3.340	133.910	4,051.51	-45.06	52.16	-63.02	0.53	0.31	7.38
4,087.00	2.900	131.550	4,083.46	-46.25	53.44	-64.64	1.43	-1.38	-7.38
4,119.00	2.560	130.580	4,115.42	-47.25	54.59	-66.04	1.07	-1.06	-3.03
4,150.00	2.420	129.220	4,146.39	-48.11	55.62	-67.26	0.49	-0.45	-4.39
4,182.00	2.210	127.190	4,178.37	-48.91	56.64	-68.42	0.70	-0.66	-6.34
4,214.00	1.640	132.180	4,210.35	-49.59	57.47	-69.39	1.86	-1.78	15.59
4,246.00	1.150	131.010	4,242.34	-50.11	58.05	-70.10	1.53	-1.53	-3.66
4,277.00	0.850	136.280	4,273.33	-50.48	58.44	-70.61	1.01	-0.97	17.00
4,309.00	0.560	111.990	4,305.33	-50.71	58.75	-70.95	1.28	-0.91	-75.91
4,340.00	0.230	101.670	4,336.33	-50.78	58.95	-71.10	1.08	-1.06	-33.29
4,372.00	0.190	4.760	4,368.33	-50.74	59.02	-71.09	0.99	-0.13	-302.84



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
4,404.00	0.480	341.710	4,400.33	-50.56	58.98	-70.91	0.98	0.91	-72.03
4,426.00	0.750	321.080	4,422.33	-50.36	58.87	-70.68	1.57	1.23	-93.77
4,441.00	0.680	325.900	4,437.33	-50.21	58.75	-70.49	0.61	-0.47	32.13
4,535.00	1.240	335.080	4,531.31	-48.83	58.01	-68.93	0.62	0.60	9.77
4,628.00	1.810	336.530	4,624.28	-46.57	57.00	-66.45	0.61	0.61	1.56
4,722.00	2.320	341.860	4,718.22	-43.40	55.82	-63.08	0.58	0.54	5.67
4,815.00	1.640	351.490	4,811.16	-40.29	55.04	-59.94	0.81	-0.73	10.35
4,908.00	0.730	27.140	4,904.14	-38.45	55.11	-58.30	1.21	-0.98	38.33
5,002.00	0.960	74.070	4,998.13	-37.70	56.14	-58.07	0.75	0.24	49.93
5,096.00	1.690	93.440	5,092.11	-37.57	58.28	-58.86	0.90	0.78	20.61
5,188.00	2.560	116.190	5,184.05	-38.55	61.48	-61.12	1.30	0.95	24.73
5,282.00	2.380	136.900	5,277.96	-40.91	64.70	-64.62	0.96	-0.19	22.03
5,375.00	1.240	135.030	5,370.91	-43.03	66.73	-67.41	1.23	-1.23	-2.01
5,469.00	0.190	347.330	5,464.91	-43.60	67.41	-68.21	1.49	-1.12	-157.13
5,563.00	0.680	334.060	5,558.90	-42.94	67.13	-67.50	0.53	0.52	-14.12
5,657.00	1.130	337.060	5,652.89	-41.59	66.53	-66.02	0.48	0.48	3.19
5,750.00	1.530	301.620	5,745.87	-40.09	65.11	-64.06	0.96	0.43	-38.11
5,845.00	1.420	285.940	5,840.84	-39.10	62.90	-62.22	0.44	-0.12	-16.51
5,939.00	1.060	226.850	5,934.82	-39.38	61.15	-61.72	1.34	-0.38	-62.86
6,031.00	1.210	214.470	6,026.80	-40.76	59.98	-62.47	0.31	0.16	-13.46
6,187.00	0.230	39.210	6,182.79	-41.88	59.24	-63.17	0.92	-0.63	-112.35
6,280.00	0.320	20.090	6,275.79	-41.49	59.45	-62.90	0.14	0.10	-20.56
6,311.00	0.310	41.280	6,306.79	-41.34	59.53	-62.81	0.38	-0.03	68.35
6,404.00	0.320	13.670	6,399.79	-40.90	59.76	-62.51	0.16	0.01	-29.69
6,497.00	0.220	42.370	6,492.79	-40.52	59.94	-62.24	0.18	-0.11	30.86
6,591.00	0.290	11.180	6,586.79	-40.15	60.11	-61.98	0.16	0.07	-33.18
6,685.00	0.350	29.160	6,680.78	-39.67	60.30	-61.62	0.12	0.06	19.13
6,779.00	0.400	40.880	6,774.78	-39.17	60.65	-61.32	0.10	0.05	12.47
6,873.00	0.420	1.590	6,868.78	-38.58	60.88	-60.88	0.29	0.02	-41.80
6,966.00	0.460	11.410	6,961.78	-37.87	60.96	-60.28	0.09	0.04	10.56
7,060.00	1.370	80.450	7,055.77	-37.31	62.14	-60.28	1.36	0.97	73.45
7,154.00	2.990	90.580	7,149.70	-37.15	65.70	-61.65	1.76	1.72	10.78
7,248.00	5.260	94.020	7,243.45	-37.48	72.45	-64.83	2.43	2.41	3.66
7,342.00	7.730	97.690	7,336.84	-38.63	83.02	-70.38	2.66	2.63	3.90
7,437.00	9.990	101.160	7,430.70	-41.08	97.44	-78.76	2.44	2.38	3.65
7,529.00	12.170	103.110	7,520.98	-44.82	114.71	-89.52	2.40	2.37	2.12
7,623.00	13.670	101.240	7,612.59	-49.23	135.26	-102.29	1.66	1.60	-1.99
7,717.00	15.270	99.550	7,703.61	-53.45	158.36	-115.97	1.76	1.70	-1.80
7,810.00	15.970	98.070	7,793.18	-57.28	183.10	-130.00	0.87	0.75	-1.59
7,903.00	16.850	96.830	7,882.39	-60.68	209.16	-144.20	1.02	0.95	-1.33
7,997.00	16.730	96.610	7,972.38	-63.86	236.12	-158.59	0.14	-0.13	-0.23
8,090.00	14.470	90.130	8,061.95	-65.42	261.04	-170.65	3.07	-2.43	-6.97
8,183.00	14.050	85.270	8,152.09	-64.52	283.91	-179.60	1.36	-0.45	-5.23
8,277.00	15.030	88.250	8,243.08	-63.21	307.47	-188.47	1.31	1.04	3.17



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
8,371.00	14.920	87.860	8,333.89	-62.38	331.74	-198.10	0.16	-0.12	-0.41
8,464.00	15.950	92.720	8,423.54	-62.54	356.47	-208.80	1.78	1.11	5.23
8,557.00	16.980	96.650	8,512.73	-64.72	382.73	-221.98	1.63	1.11	4.23
8,651.00	18.000	98.680	8,602.38	-68.50	410.72	-237.36	1.26	1.09	2.16
8,744.00	17.300	97.070	8,691.00	-72.37	438.65	-252.79	0.92	-0.75	-1.73
8,838.00	16.680	94.400	8,780.90	-75.13	465.97	-266.95	1.06	-0.66	-2.84
8,931.00	16.530	91.480	8,870.02	-76.49	492.50	-279.52	0.91	-0.16	-3.14
9,024.00	16.930	90.460	8,959.09	-76.94	519.27	-291.35	0.53	0.43	-1.10
9,117.00	16.190	92.380	9,048.23	-77.59	545.76	-303.26	0.99	-0.80	2.06
9,210.00	14.680	94.500	9,137.87	-79.05	570.47	-315.13	1.73	-1.62	2.28
9,303.00	14.930	94.580	9,227.79	-80.94	594.16	-326.95	0.27	0.27	0.09
9,395.00	15.460	95.370	9,316.57	-83.03	618.18	-339.10	0.62	0.58	0.86
9,488.00	15.170	93.320	9,406.27	-84.89	642.67	-351.25	0.66	-0.31	-2.20
9,580.00	15.630	92.880	9,494.96	-86.21	667.06	-362.86	0.52	0.50	-0.48
9,674.00	15.700	92.800	9,585.47	-87.47	692.41	-374.82	0.08	0.07	-0.09
9,767.00	15.930	93.220	9,674.95	-88.80	717.72	-386.84	0.28	0.25	0.45
9,861.00	14.230	90.480	9,765.71	-89.62	742.16	-398.02	1.96	-1.81	-2.91
9,954.00	15.240	92.130	9,855.65	-90.17	765.80	-408.61	1.18	1.09	1.77
10,010.00	15.780	94.950	9,909.61	-91.11	780.74	-415.84	1.66	0.96	5.04
10,079.00	16.700	98.390	9,975.86	-93.36	799.90	-426.06	1.93	1.33	4.99
10,126.00	16.480	88.250	10,020.92	-94.14	813.25	-432.47	6.17	-0.47	-21.57
10,173.00	15.690	67.500	10,066.11	-91.51	825.79	-435.44	12.28	-1.68	-44.15
10,220.00	15.290	45.200	10,111.45	-84.70	836.07	-433.68	12.63	-0.85	-47.45
10,268.00	15.470	34.320	10,157.74	-74.95	844.17	-428.32	6.01	0.38	-22.67
10,316.00	15.690	38.190	10,203.97	-64.56	851.79	-422.18	2.21	0.46	8.06
10,363.00	16.660	32.240	10,249.12	-53.87	859.32	-415.73	4.08	2.06	-12.66
10,410.00	18.160	25.110	10,293.97	-41.54	866.02	-407.44	5.54	3.19	-15.17
10,457.00	19.310	18.410	10,338.48	-27.53	871.58	-397.15	5.19	2.45	-14.26
10,504.00	21.260	10.480	10,382.57	-11.77	875.59	-384.61	7.16	4.15	-16.87
10,552.00	22.850	0.080	10,427.08	6.11	877.19	-369.12	8.77	3.31	-21.67
10,599.00	24.610	350.720	10,470.12	24.90	875.62	-351.46	8.83	3.74	-19.91
10,645.00	25.760	341.420	10,511.76	43.84	870.89	-332.32	8.95	2.50	-20.22
10,692.00	27.310	335.960	10,553.81	63.37	863.24	-311.39	6.15	3.30	-11.62
10,740.00	28.240	340.230	10,596.29	84.12	854.91	-289.08	4.57	1.94	8.90
10,787.00	29.470	347.810	10,637.46	105.89	848.71	-266.74	8.21	2.62	16.13
10,835.00	30.530	351.570	10,679.04	129.49	844.43	-243.57	4.50	2.21	7.83
10,882.00	33.270	347.940	10,718.94	153.92	839.98	-219.59	7.11	5.83	-7.72
10,929.00	35.880	347.020	10,757.63	179.95	834.19	-193.58	5.66	5.55	-1.96
10,976.00	40.390	349.710	10,794.60	208.37	828.38	-165.39	10.22	9.60	5.72
11,024.00	45.560	350.810	10,829.70	240.61	822.86	-133.89	10.88	10.77	2.29
11,071.00	51.300	351.530	10,860.88	275.34	817.47	-100.18	12.27	12.21	1.53
11,118.00	56.610	350.370	10,888.52	312.86	811.48	-63.70	11.47	11.30	-2.47
11,165.00	62.400	348.600	10,912.36	352.65	804.08	-24.56	12.74	12.32	-3.77



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
11,212.00	66.950	346.360	10,932.47	394.11	794.86	16.87	10.60	9.68	-4.77
11,259.00	70.130	343.670	10,949.66	436.35	783.54	59.89	8.61	6.77	-5.72
11,307.00	71.980	341.420	10,965.25	479.65	769.92	104.87	5.87	3.85	-4.69
11,354.00	71.900	339.920	10,979.82	521.81	755.13	149.31	3.04	-0.17	-3.19
11,402.00	73.000	334.550	10,994.30	563.99	737.42	195.01	10.91	2.29	-11.19
11,450.00	75.960	330.540	11,007.15	605.01	716.09	241.21	10.14	6.17	-8.35
11,497.00	80.160	330.850	11,016.87	645.10	693.59	287.07	8.96	8.94	0.66
11,544.00	85.150	331.200	11,022.88	685.87	671.02	333.57	10.64	10.62	0.74
11,591.00	87.320	330.140	11,025.96	726.75	648.05	380.35	5.14	4.62	-2.26
11,638.00	87.100	328.290	11,028.25	767.08	624.02	427.08	3.96	-0.47	-3.94
11,685.00	88.690	330.230	11,029.98	807.45	600.02	473.83	5.33	3.38	4.13
11,732.00	89.130	328.910	11,030.87	847.97	576.22	520.63	2.96	0.94	-2.81
11,779.00	90.060	329.130	11,031.20	888.26	552.03	567.39	2.03	1.98	0.47
11,874.00	90.150	329.520	11,031.03	969.97	503.56	661.97	0.42	0.09	0.41
11,968.00	91.120	328.250	11,029.99	1,050.44	454.99	755.48	1.70	1.03	-1.35
12,063.00	90.900	329.080	11,028.31	1,131.57	405.59	849.93	0.90	-0.23	0.87
12,158.00	91.250	329.570	11,026.53	1,213.26	357.14	944.50	0.63	0.37	0.52
12,252.00	91.120	329.790	11,024.59	1,294.38	309.69	1,038.11	0.27	-0.14	0.23
12,347.00	91.070	324.150	11,022.77	1,373.98	257.94	1,132.19	5.94	-0.05	-5.94
12,441.00	91.030	324.150	11,021.05	1,450.16	202.90	1,224.58	0.04	-0.04	0.00
12,536.00	90.900	332.610	11,019.44	1,530.97	153.14	1,318.90	8.91	-0.14	8.91
12,630.00	90.990	329.430	11,017.89	1,613.18	107.61	1,412.68	3.38	0.10	-3.38
12,724.00	91.070	329.740	11,016.20	1,694.23	60.03	1,506.29	0.34	0.09	0.33
12,817.00	91.030	329.920	11,014.50	1,774.62	13.30	1,598.94	0.20	-0.04	0.19
12,912.00	91.070	329.790	11,012.76	1,856.76	-34.40	1,693.58	0.14	0.04	-0.14
13,006.00	91.160	334.150	11,010.93	1,939.70	-78.56	1,787.43	4.64	0.10	4.64
13,101.00	91.120	332.560	11,009.04	2,024.59	-121.15	1,882.38	1.67	-0.04	-1.67
13,198.00	91.470	329.350	11,006.85	2,109.36	-168.22	1,979.14	3.33	0.36	-3.31
13,292.00	91.600	330.800	11,004.33	2,190.79	-215.10	2,072.79	1.55	0.14	1.54
13,387.00	91.160	330.400	11,002.04	2,273.54	-261.72	2,167.52	0.63	-0.46	-0.42
13,481.00	91.070	328.770	11,000.21	2,354.58	-309.30	2,261.12	1.74	-0.10	-1.73
13,574.00	91.070	329.880	10,998.47	2,434.55	-356.74	2,353.69	1.19	0.00	1.19
13,668.00	91.070	329.430	10,996.72	2,515.66	-404.22	2,447.31	0.48	0.00	-0.48
13,762.00	91.210	330.890	10,994.85	2,597.18	-450.98	2,540.99	1.56	0.15	1.55
13,855.00	91.030	329.040	10,993.03	2,677.67	-497.52	2,633.65	2.00	-0.19	-1.99
13,950.00	90.990	331.590	10,991.35	2,760.18	-544.55	2,728.35	2.68	-0.04	2.68
14,044.00	90.990	330.890	10,989.73	2,842.58	-589.77	2,822.16	0.74	0.00	-0.74
14,138.00	91.030	329.130	10,988.07	2,923.98	-636.75	2,915.82	1.87	0.04	-1.87
14,232.00	90.990	330.270	10,986.42	3,005.12	-684.17	3,009.45	1.21	-0.04	1.21
14,326.00	90.990	329.610	10,984.79	3,086.47	-731.25	3,103.11	0.70	0.00	-0.70
14,420.00	91.030	329.920	10,983.14	3,167.67	-778.57	3,196.74	0.33	0.04	0.33
14,514.00	91.030	330.490	10,981.45	3,249.23	-825.27	3,290.44	0.61	0.00	0.61
14,608.00	90.990	330.800	10,979.79	3,331.14	-871.35	3,384.18	0.33	-0.04	0.33



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
14,703.00	91.210	332.740	10,977.97	3,414.82	-916.27	3,479.04	2.05	0.23	2.04
14,797.00	91.520	333.050	10,975.73	3,498.48	-959.09	3,572.96	0.47	0.33	0.33
14,891.00	91.250	330.140	10,973.45	3,581.13	-1,003.79	3,666.78	3.11	-0.29	-3.10
14,985.00	91.430	330.010	10,971.26	3,662.57	-1,050.67	3,760.45	0.24	0.19	-0.14
15,079.00	91.430	330.490	10,968.91	3,744.16	-1,097.30	3,854.14	0.51	0.00	0.51
15,173.00	91.560	331.550	10,966.46	3,826.36	-1,142.82	3,947.91	1.14	0.14	1.13
15,266.00	90.990	331.240	10,964.39	3,907.99	-1,187.34	4,040.73	0.70	-0.61	-0.33
15,361.00	91.030	331.070	10,962.71	3,991.19	-1,233.16	4,135.53	0.18	0.04	-0.18
15,455.00	90.990	330.400	10,961.06	4,073.18	-1,279.11	4,229.29	0.71	-0.04	-0.71
15,549.00	90.900	329.170	10,959.51	4,154.39	-1,326.40	4,322.92	1.31	-0.10	-1.31
15,643.00	91.470	331.950	10,957.56	4,236.23	-1,372.59	4,416.65	3.02	0.61	2.96
15,735.00	91.470	330.540	10,955.20	4,316.85	-1,416.83	4,508.45	1.53	0.00	-1.53
15,828.00	91.650	332.260	10,952.67	4,398.47	-1,461.33	4,601.25	1.86	0.19	1.85
15,922.00	91.520	330.800	10,950.07	4,481.07	-1,506.13	4,695.07	1.56	-0.14	-1.55
16,016.00	91.470	331.640	10,947.62	4,563.43	-1,551.37	4,788.86	0.89	-0.05	0.89
16,110.00	91.430	328.160	10,945.24	4,644.72	-1,598.49	4,882.48	3.70	-0.04	-3.70
16,204.00	91.030	329.570	10,943.22	4,725.16	-1,647.08	4,975.97	1.56	-0.43	1.50
16,297.00	91.070	330.230	10,941.51	4,805.60	-1,693.71	5,068.63	0.71	0.04	0.71
16,391.00	91.210	331.020	10,939.64	4,887.50	-1,739.81	5,162.37	0.85	0.15	0.84
16,485.00	91.250	330.580	10,937.63	4,969.53	-1,785.66	5,256.13	0.47	0.04	-0.47
16,579.00	91.430	329.430	10,935.43	5,050.92	-1,832.64	5,349.78	1.24	0.19	-1.22
16,672.00	90.590	331.020	10,933.79	5,131.63	-1,878.81	5,442.48	1.93	-0.90	1.71
16,765.00	90.720	330.180	10,932.73	5,212.64	-1,924.46	5,535.23	0.91	0.14	-0.90
16,859.00	90.590	330.100	10,931.65	5,294.16	-1,971.26	5,628.93	0.16	-0.14	-0.09
16,953.00	91.160	330.580	10,930.22	5,375.83	-2,017.77	5,722.64	0.79	0.61	0.51
17,046.00	91.520	330.050	10,928.04	5,456.61	-2,063.81	5,815.34	0.69	0.39	-0.57
17,139.00	91.600	331.200	10,925.51	5,537.62	-2,109.41	5,908.07	1.24	0.09	1.24
17,233.00	91.520	329.130	10,922.95	5,619.12	-2,156.16	6,001.73	2.20	-0.09	-2.20
17,326.00	91.030	329.700	10,920.88	5,699.17	-2,203.47	6,094.31	0.81	-0.53	0.61
17,420.00	91.070	330.450	10,919.16	5,780.62	-2,250.35	6,187.98	0.80	0.04	0.80
17,512.00	90.990	326.090	10,917.50	5,858.84	-2,298.72	6,279.37	4.74	-0.09	-4.74
17,606.00	91.070	325.200	10,915.81	5,936.43	-2,351.75	6,372.17	0.95	0.09	-0.95
17,699.00	91.600	327.940	10,913.65	6,014.01	-2,402.97	6,464.20	3.00	0.57	2.95
17,793.00	91.560	328.330	10,911.05	6,093.81	-2,452.58	6,557.55	0.42	-0.04	0.41
17,887.00	91.560	331.240	10,908.49	6,175.00	-2,499.86	6,651.15	3.09	0.00	3.10
17,981.00	91.600	331.290	10,905.90	6,257.40	-2,545.03	6,744.95	0.07	0.04	0.05
18,075.00	91.340	331.510	10,903.49	6,339.90	-2,590.01	6,838.76	0.36	-0.28	0.23
18,169.00	91.250	333.000	10,901.37	6,423.07	-2,633.76	6,932.65	1.59	-0.10	1.59
18,263.00	91.430	331.550	10,899.17	6,506.25	-2,677.48	7,026.53	1.55	0.19	-1.54
18,356.00	91.430	328.600	10,896.85	6,586.82	-2,723.86	7,119.19	3.17	0.00	-3.17
18,449.00	91.300	328.640	10,894.63	6,666.19	-2,772.27	7,211.64	0.15	-0.14	0.04
18,542.00	91.210	332.960	10,892.59	6,747.34	-2,817.62	7,304.38	4.65	-0.10	4.65
18,636.00	91.380	331.240	10,890.47	6,830.39	-2,861.59	7,398.25	1.84	0.18	-1.83
18,728.00	91.430	335.380	10,888.21	6,912.54	-2,902.89	7,490.17	4.50	0.05	4.50



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
18,821.00	91.300	331.240	10,886.00	6,995.59	-2,944.64	7,583.10	4.45	-0.14	-4.45
18,915.00	91.340	328.770	10,883.83	7,076.97	-2,991.62	7,676.75	2.63	0.04	-2.63
19,010.00	91.250	332.480	10,881.68	7,159.72	-3,038.20	7,771.47	3.91	-0.09	3.91
19,104.00	91.070	331.330	10,879.78	7,242.63	-3,082.46	7,865.33	1.24	-0.19	-1.22
19,197.00	91.070	332.300	10,878.04	7,324.59	-3,126.38	7,958.20	1.04	0.00	1.04
19,290.00	91.070	328.600	10,876.31	7,405.46	-3,172.23	8,050.91	3.98	0.00	-3.98
19,384.00	91.210	331.900	10,874.44	7,487.04	-3,218.85	8,144.59	3.51	0.15	3.51
19,478.00	91.160	332.030	10,872.49	7,570.00	-3,263.03	8,238.46	0.15	-0.05	0.14
19,572.00	91.120	327.360	10,870.62	7,651.11	-3,310.44	8,332.06	4.97	-0.04	-4.97
19,667.00	91.300	324.680	10,868.61	7,729.87	-3,363.51	8,425.93	2.83	0.19	-2.82
19,761.00	91.300	326.480	10,866.48	7,807.38	-3,416.63	8,518.71	1.91	0.00	1.91
19,853.00	91.030	330.320	10,864.61	7,885.71	-3,464.82	8,610.12	4.18	-0.29	4.17
19,948.00	91.120	332.920	10,862.83	7,969.27	-3,509.96	8,704.96	2.74	0.09	2.74
20,041.00	90.500	330.800	10,861.51	8,051.27	-3,553.82	8,797.83	2.37	-0.67	-2.28
20,134.00	90.540	327.100	10,860.67	8,130.92	-3,601.78	8,890.34	3.98	0.04	-3.98
20,227.00	90.230	327.850	10,860.04	8,209.34	-3,651.78	8,982.59	0.87	-0.33	0.81
20,321.00	90.370	327.140	10,859.55	8,288.61	-3,702.29	9,075.84	0.77	0.15	-0.76
Tie into original hole @ 20321 MD									
20,390.00	90.990	327.980	10,858.73	8,346.84	-3,739.30	9,144.30	1.51	0.90	1.22
20,405.00	91.380	328.940	10,858.42	8,359.62	-3,747.14	9,159.21	6.91	2.60	6.40
20,444.00	91.030	330.000	10,857.60	8,393.20	-3,766.95	9,198.03	2.86	-0.90	2.72
20,474.00	90.810	331.490	10,857.12	8,419.37	-3,781.61	9,227.96	5.02	-0.73	4.97
20,483.00	90.950	332.020	10,856.98	8,427.30	-3,785.87	9,236.94	6.09	1.56	5.89
20,513.00	90.680	333.340	10,856.55	8,453.95	-3,799.63	9,266.92	4.49	-0.90	4.40
20,567.00	90.240	333.690	10,856.12	8,502.28	-3,823.72	9,320.91	1.04	-0.81	0.65
20,577.00	88.970	333.780	10,856.19	8,511.25	-3,828.14	9,330.91	12.73	-12.70	0.90
20,592.00	87.340	333.160	10,856.67	8,524.66	-3,834.84	9,345.89	11.63	-10.87	-4.13
20,624.00	87.030	330.440	10,858.24	8,552.83	-3,849.94	9,377.81	8.54	-0.97	-8.50
20,671.00	88.400	326.130	10,860.12	8,592.77	-3,874.62	9,424.47	9.62	2.91	-9.17
20,727.00	92.310	322.440	10,859.77	8,638.22	-3,907.30	9,479.52	9.60	6.98	-6.59
20,764.00	92.970	322.260	10,858.07	8,667.48	-3,929.88	9,515.62	1.85	1.78	-0.49
20,857.00	91.470	324.370	10,854.47	8,742.00	-3,985.39	9,606.71	2.78	-1.61	2.27
20,950.00	92.000	326.220	10,851.65	8,818.41	-4,038.31	9,698.41	2.07	0.57	1.99
21,044.00	92.090	331.490	10,848.29	8,898.78	-4,086.88	9,791.83	5.60	0.10	5.61
21,137.00	91.870	331.840	10,845.08	8,980.59	-4,130.99	9,884.64	0.44	-0.24	0.38
21,231.00	92.400	331.760	10,841.58	9,063.38	-4,175.38	9,978.45	0.57	0.56	-0.09
21,323.00	90.420	331.930	10,839.31	9,144.46	-4,218.78	10,070.30	2.16	-2.15	0.18
21,416.00	90.290	332.200	10,838.74	9,226.63	-4,262.35	10,163.20	0.32	-0.14	0.29
21,509.00	90.460	331.580	10,838.13	9,308.65	-4,306.16	10,256.09	0.69	0.18	-0.67
21,601.00	91.870	331.320	10,836.26	9,389.45	-4,350.12	10,347.92	1.56	1.53	-0.28
21,694.00	90.990	331.400	10,833.94	9,471.04	-4,394.68	10,440.73	0.95	-0.95	0.09
21,786.00	90.460	332.900	10,832.77	9,552.38	-4,437.66	10,532.62	1.73	-0.58	1.63
21,880.00	90.150	332.720	10,832.27	9,635.99	-4,480.61	10,626.57	0.38	-0.33	-0.19



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

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)
21,973.00	90.420	332.550	10,831.81	9,718.58	-4,523.36	10,719.51	0.34	0.29	-0.18
22,067.00	90.370	332.810	10,831.16	9,802.09	-4,566.50	10,813.45	0.28	-0.05	0.28
22,160.00	91.250	330.880	10,829.85	9,884.08	-4,610.37	10,906.32	2.28	0.95	-2.08
22,253.00	91.250	330.700	10,827.82	9,965.23	-4,655.75	10,999.07	0.19	0.00	-0.19
22,347.00	91.470	330.530	10,825.59	10,047.11	-4,701.86	11,092.81	0.30	0.23	-0.18
22,441.00	90.730	329.560	10,823.78	10,128.54	-4,748.78	11,186.48	1.30	-0.79	-1.03
22,535.00	90.900	329.120	10,822.45	10,209.39	-4,796.71	11,280.05	0.50	0.18	-0.47
22,629.00	91.210	329.470	10,820.72	10,290.20	-4,844.70	11,373.62	0.50	0.33	0.37
22,727.00	91.250	329.300	10,818.61	10,374.52	-4,894.60	11,471.17	0.18	0.04	-0.17
Survey @ 22727.00 MD 10818.61 TVD									
22,783.00	91.250	329.300	10,817.39	10,422.66	-4,923.18	11,526.91	0.00	0.00	0.00
Survey Proj. to 22783.00 MD 10817.39 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
20,321.00	10,859.55	8,288.61	-3,702.29	Tie into original hole @ 20321 MD
22,727.00	10,818.61	10,374.52	-4,894.60	Survey @ 22727.00 MD 10818.61 TVD



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Project	Marshall County, West Virginia NAD83 UTM 17N		
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	Van Winkle				
Site Position:		Northing:	14,447,369.493 usft	Latitude:	39.781725330
From:	Lat/Long	Easting:	1,717,188.440 usft	Longitude:	-80.726733270
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.17 °

Well	Van Winkle N-19 HU (slot H)					
Well Position	+N/-S	0.00 ft	Northing:	14,447,297.900 usft	Latitude:	39.781529000
	+E/-W	0.00 ft	Easting:	1,717,154.459 usft	Longitude:	-80.726855000
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	753.00 ft

Wellbore	Sidetrack 01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	8/7/2022	-8.65	66.42	51,631.78046538

Design	Surveys Sidetrack 01				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	20,321.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00		334.716

Survey Program	Date 8/20/2022				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
174.00	534.00	MWD surf (Original Hole)	MWD	MWD - Standard	
575.00	2,204.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,253.00	4,426.00	MWD 2253-4426 MD (Original Hole)	MWD	MWD - Standard	
4,441.00	20,321.00	MWD (Original Hole)	MWD	MWD - Standard	
20,390.00	22,727.00	MWD ST1 (Sidetrack 01)	MWD	MWD - Standard	
22,783.00	22,783.00	Projection ST1 (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	0.000	0.000	0.00	0.00	0.00	14,447,297.900	1,717,154.459	39.781529000	-80.726855000	
174.00	0.180	276.700	174.00	0.03	-0.27	14,447,297.931	1,717,154.187	39.781529090	-80.726855966	
203.00	0.260	280.540	203.00	0.05	-0.38	14,447,297.949	1,717,154.077	39.781529139	-80.726856357	
233.00	0.170	302.920	233.00	0.09	-0.49	14,447,297.985	1,717,153.973	39.781529240	-80.726856728	
263.00	0.290	261.230	263.00	0.10	-0.60	14,447,297.998	1,717,153.861	39.781529276	-80.726857128	
293.00	0.280	226.170	293.00	0.04	-0.73	14,447,297.936	1,717,153.733	39.781529105	-80.726857584	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
323.00	0.390	231.020	323.00	-0.08	-0.86	14,447,297.821	1,717,153.601	39.781528791	-80.726858056	
355.00	0.470	249.160	355.00	-0.19	-1.07	14,447,297.706	1,717,153.393	39.781528476	-80.726858795	
386.00	0.450	230.090	386.00	-0.32	-1.28	14,447,297.582	1,717,153.181	39.781528139	-80.726859552	
418.00	0.580	220.060	418.00	-0.52	-1.48	14,447,297.378	1,717,152.980	39.781527579	-80.726860268	
449.00	0.920	200.830	448.99	-0.87	-1.67	14,447,297.025	1,717,152.791	39.781526612	-80.726860946	
481.00	0.960	204.190	480.99	-1.36	-1.87	14,447,296.540	1,717,152.590	39.781525283	-80.726861668	
512.00	1.030	200.130	511.98	-1.86	-2.07	14,447,296.042	1,717,152.387	39.781523915	-80.726862393	
534.00	1.150	204.880	533.98	-2.24	-2.23	14,447,295.656	1,717,152.227	39.781522857	-80.726862970	
575.00	1.260	212.590	574.97	-3.00	-2.65	14,447,294.903	1,717,151.811	39.781520792	-80.726864459	
607.00	1.260	211.200	606.96	-3.59	-3.02	14,447,294.305	1,717,151.439	39.781519155	-80.726865788	
639.00	0.970	210.310	638.96	-4.13	-3.34	14,447,293.771	1,717,151.120	39.781517689	-80.726866929	
671.00	0.860	204.800	670.95	-4.58	-3.58	14,447,293.319	1,717,150.882	39.781516450	-80.726867780	
703.00	0.730	192.880	702.95	-5.00	-3.72	14,447,292.902	1,717,150.736	39.781515307	-80.726868304	
734.00	0.660	172.040	733.95	-5.37	-3.74	14,447,292.533	1,717,150.717	39.781514293	-80.726868377	
766.00	0.810	183.740	765.94	-5.78	-3.73	14,447,292.124	1,717,150.728	39.781513171	-80.726868343	
798.00	0.730	166.890	797.94	-6.20	-3.70	14,447,291.700	1,717,150.759	39.781512006	-80.726868236	
829.00	0.510	156.460	828.94	-6.52	-3.60	14,447,291.381	1,717,150.859	39.781511130	-80.726867884	
861.00	0.490	147.950	860.94	-6.76	-3.47	14,447,291.135	1,717,150.989	39.781510452	-80.726867425	
892.00	0.470	125.400	891.94	-6.95	-3.30	14,447,290.949	1,717,151.163	39.781509939	-80.726866808	
924.00	0.480	102.160	923.94	-7.05	-3.06	14,447,290.845	1,717,151.401	39.781509651	-80.726865962	
956.00	0.600	82.060	955.94	-7.06	-2.76	14,447,290.840	1,717,151.698	39.781509635	-80.726864905	
987.00	0.770	72.190	986.93	-6.97	-2.40	14,447,290.926	1,717,152.057	39.781509868	-80.726863626	
1,019.00	0.770	80.020	1,018.93	-6.87	-1.99	14,447,291.029	1,717,152.473	39.781510148	-80.726862142	
1,051.00	0.950	63.660	1,050.93	-6.72	-1.54	14,447,291.184	1,717,152.923	39.781510569	-80.726860541	
1,083.00	1.250	62.140	1,082.92	-6.44	-0.99	14,447,291.464	1,717,153.469	39.781511336	-80.726858593	
1,115.00	1.370	59.690	1,114.91	-6.08	-0.35	14,447,291.821	1,717,154.108	39.781512309	-80.726856315	
1,147.00	1.480	58.640	1,146.90	-5.67	0.33	14,447,292.229	1,717,154.791	39.781513424	-80.726853879	
1,179.00	1.400	47.950	1,178.89	-5.19	0.98	14,447,292.706	1,717,155.434	39.781514728	-80.726851585	
1,211.00	1.300	44.960	1,210.88	-4.68	1.52	14,447,293.224	1,717,155.981	39.781516148	-80.726849633	
1,243.00	1.170	22.050	1,242.88	-4.12	1.90	14,447,293.784	1,717,156.360	39.781517682	-80.726848278	
1,275.00	1.430	14.870	1,274.87	-3.43	2.13	14,447,294.473	1,717,156.585	39.781519571	-80.726847469	
1,307.00	1.440	1.250	1,306.86	-2.64	2.24	14,447,295.261	1,717,156.696	39.781521734	-80.726847064	
1,339.00	1.490	0.410	1,338.85	-1.82	2.25	14,447,296.079	1,717,156.708	39.781523981	-80.726847014	
1,370.00	1.540	346.270	1,369.84	-1.01	2.15	14,447,296.886	1,717,156.612	39.781526199	-80.726847346	
1,402.00	1.360	350.120	1,401.83	-0.22	1.99	14,447,297.678	1,717,156.445	39.781528375	-80.726847933	
1,434.00	0.950	337.360	1,433.82	0.40	1.82	14,447,298.297	1,717,156.278	39.781530077	-80.726848522	
1,465.00	0.810	325.870	1,464.82	0.82	1.60	14,447,298.716	1,717,156.056	39.781531228	-80.726849307	
1,496.00	0.530	298.540	1,495.81	1.07	1.35	14,447,298.966	1,717,155.807	39.781531916	-80.726850190	
1,528.00	0.480	279.930	1,527.81	1.16	1.09	14,447,299.059	1,717,155.545	39.781532176	-80.726851122	
1,560.00	0.640	241.480	1,559.81	1.10	0.80	14,447,298.997	1,717,155.256	39.781532008	-80.726852151	
1,590.00	1.050	222.410	1,589.81	0.81	0.46	14,447,298.714	1,717,154.923	39.781531233	-80.726853338	
1,622.00	1.440	213.870	1,621.80	0.26	0.04	14,447,298.164	1,717,154.501	39.781529726	-80.726854846	
1,654.00	1.680	210.500	1,653.79	-0.47	-0.42	14,447,297.426	1,717,154.039	39.781527703	-80.726856499	
1,686.00	1.940	207.370	1,685.77	-1.36	-0.91	14,447,296.541	1,717,153.552	39.781525276	-80.726858242	
1,718.00	2.060	197.790	1,717.75	-2.39	-1.33	14,447,295.512	1,717,153.127	39.781522454	-80.726859765	
1,749.00	1.690	188.490	1,748.74	-3.37	-1.57	14,447,294.529	1,717,152.890	39.781519758	-80.726860622	
1,780.00	1.350	163.990	1,779.73	-4.17	-1.54	14,447,293.726	1,717,152.923	39.781517552	-80.726860512	
1,811.00	1.220	123.960	1,810.72	-4.71	-1.16	14,447,293.191	1,717,153.297	39.781516079	-80.726859185	
1,842.00	1.490	95.490	1,841.71	-4.93	-0.49	14,447,292.968	1,717,153.972	39.781515461	-80.726856786	
1,873.00	1.550	80.860	1,872.70	-4.90	0.33	14,447,292.996	1,717,154.787	39.781515531	-80.726853884	
1,905.00	1.860	62.980	1,904.69	-4.60	1.22	14,447,293.301	1,717,155.677	39.781516360	-80.726850713	
1,936.00	2.400	49.600	1,935.66	-3.95	2.16	14,447,293.950	1,717,156.620	39.781518135	-80.726847351	
1,969.00	2.600	48.670	1,968.63	-3.01	3.25	14,447,294.892	1,717,157.706	39.781520713	-80.726843467	
2,000.00	2.790	48.610	1,999.60	-2.04	4.34	14,447,295.855	1,717,158.802	39.781523349	-80.726839563	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
2,032.00	2.810	45.400	2,031.56	-0.98	5.49	14,447,296.921	1,717,159.945	39.781526267	-80.726835484	
2,063.00	2.810	33.700	2,062.52	0.19	6.45	14,447,298.087	1,717,160.907	39.781529460	-80.726832044	
2,095.00	3.000	16.930	2,094.48	1.64	7.13	14,447,299.540	1,717,161.587	39.781533446	-80.726829612	
2,127.00	3.120	11.960	2,126.44	3.29	7.55	14,447,301.193	1,717,162.011	39.781537982	-80.726828083	
2,158.00	3.100	357.960	2,157.39	-4.96	7.70	14,447,302.856	1,717,162.156	39.781542548	-80.726827549	
2,190.00	2.980	349.890	2,189.35	6.64	7.52	14,447,304.540	1,717,161.979	39.781547173	-80.726828160	
2,204.00	2.980	344.350	2,203.33	7.35	7.36	14,447,305.249	1,717,161.817	39.781549121	-80.726828729	
2,253.00	3.010	332.600	2,252.26	9.72	6.42	14,447,307.617	1,717,160.881	39.781555634	-80.726832034	
2,285.00	3.080	330.790	2,284.22	11.21	5.62	14,447,309.114	1,717,160.075	39.781559750	-80.726834887	
2,317.00	2.200	323.300	2,316.18	12.46	4.83	14,447,310.356	1,717,159.289	39.781563170	-80.726837674	
2,349.00	1.500	307.390	2,348.17	13.20	4.13	14,447,311.103	1,717,158.589	39.781565226	-80.726840157	
2,381.00	1.100	285.450	2,380.16	13.54	3.50	14,447,311.439	1,717,157.960	39.781566155	-80.726842391	
2,413.00	1.010	252.060	2,412.15	13.53	2.94	14,447,311.434	1,717,157.395	39.781566146	-80.726844400	
2,444.00	1.610	215.700	2,443.15	13.10	2.42	14,447,310.997	1,717,156.881	39.781564948	-80.726846235	
2,476.00	2.010	200.260	2,475.13	12.21	1.97	14,447,310.105	1,717,156.425	39.781562503	-80.726847870	
2,508.00	2.590	196.640	2,507.10	10.99	1.56	14,447,308.886	1,717,156.023	39.781559158	-80.726849312	
2,539.00	2.710	194.300	2,538.07	9.61	1.18	14,447,307.505	1,717,155.642	39.781555368	-80.726850685	
2,570.00	3.030	191.460	2,569.03	8.09	0.84	14,447,305.991	1,717,155.298	39.781551215	-80.726851925	
2,601.00	3.160	191.750	2,599.99	6.45	0.50	14,447,304.352	1,717,154.961	39.781546716	-80.726853142	
2,633.00	2.730	190.910	2,631.94	4.84	0.18	14,447,302.740	1,717,154.637	39.781542292	-80.726854312	
2,664.00	2.220	193.030	2,662.91	3.53	-0.10	14,447,301.430	1,717,154.362	39.781538697	-80.726855305	
2,696.00	1.880	189.660	2,694.89	2.41	-0.32	14,447,300.309	1,717,154.134	39.781535620	-80.726856128	
2,728.00	1.450	183.070	2,726.88	1.49	-0.43	14,447,299.387	1,717,154.025	39.781533089	-80.726856529	
2,758.00	1.150	180.280	2,756.87	0.81	-0.46	14,447,298.707	1,717,154.003	39.781531222	-80.726856614	
2,790.00	0.870	163.170	2,788.87	0.25	-0.39	14,447,298.153	1,717,154.072	39.781529701	-80.726856375	
2,821.00	0.660	134.170	2,819.87	-0.10	-0.19	14,447,297.804	1,717,154.268	39.781528739	-80.726856681	
2,853.00	0.540	87.430	2,851.86	-0.22	0.09	14,447,297.682	1,717,154.551	39.781528402	-80.726854675	
2,885.00	0.460	61.660	2,883.86	-0.15	0.36	14,447,297.750	1,717,154.814	39.781528586	-80.726853736	
2,916.00	0.670	63.470	2,914.86	-0.01	0.63	14,447,297.890	1,717,155.086	39.781528968	-80.726852767	
2,948.00	0.970	57.360	2,946.86	0.22	1.02	14,447,298.120	1,717,155.482	39.781529596	-80.726851357	
2,980.00	0.990	79.300	2,978.85	0.42	1.52	14,447,298.317	1,717,155.981	39.781530134	-80.726849576	
3,012.00	1.200	98.130	3,010.85	0.42	2.13	14,447,298.321	1,717,156.585	39.781530139	-80.726847429	
3,044.00	1.580	107.920	3,042.84	0.24	2.88	14,447,298.138	1,717,157.336	39.781529630	-80.726844756	
3,074.00	1.890	112.070	3,072.82	-0.07	3.73	14,447,297.825	1,717,158.188	39.781528763	-80.726841727	
3,105.00	2.460	117.760	3,103.80	-0.58	4.79	14,447,297.323	1,717,159.251	39.781527376	-80.726837950	
3,136.00	2.710	124.990	3,134.77	-1.31	5.98	14,447,296.593	1,717,160.440	39.781525361	-80.726833726	
3,168.00	2.900	122.760	3,166.73	-2.18	7.28	14,447,295.721	1,717,161.740	39.781522956	-80.726829106	
3,200.00	3.270	129.300	3,198.69	-3.19	8.67	14,447,294.705	1,717,163.127	39.781520153	-80.726824180	
3,231.00	3.600	130.190	3,229.63	-4.38	10.10	14,447,293.517	1,717,164.555	39.781516879	-80.726819112	
3,263.00	3.840	131.070	3,261.56	-5.74	11.67	14,447,292.164	1,717,166.130	39.781513152	-80.726813519	
3,295.00	4.180	133.400	3,293.48	-7.24	13.33	14,447,290.659	1,717,167.785	39.781509004	-80.726807644	
3,326.00	4.460	132.850	3,324.40	-8.84	15.03	14,447,289.063	1,717,169.490	39.781504607	-80.726801594	
3,358.00	4.680	134.680	3,356.29	-10.60	16.87	14,447,287.299	1,717,171.330	39.781499747	-80.726795062	
3,389.00	4.920	133.590	3,387.19	-12.41	18.73	14,447,285.493	1,717,173.192	39.781494772	-80.726788454	
3,421.00	5.260	135.150	3,419.06	-14.39	20.76	14,447,283.507	1,717,175.221	39.781489301	-80.726781256	
3,452.00	5.180	137.140	3,449.93	-16.43	22.72	14,447,281.474	1,717,177.175	39.781483700	-80.726774323	
3,484.00	4.180	137.330	3,481.82	-18.34	24.49	14,447,279.557	1,717,178.948	39.781478423	-80.726770802	
3,516.00	3.780	140.970	3,513.75	-20.02	25.94	14,447,277.881	1,717,180.403	39.781473805	-80.726762873	
3,548.00	3.610	140.760	3,545.68	-21.62	27.25	14,447,276.281	1,717,181.704	39.781469401	-80.726758257	
3,580.00	3.710	141.530	3,577.61	-23.21	28.53	14,447,274.890	1,717,182.985	39.781465022	-80.726753714	
3,612.00	3.870	138.460	3,609.54	-24.83	29.89	14,447,273.071	1,717,184.346	39.781460564	-80.726743838	
3,643.00	4.130	139.130	3,640.47	-26.46	31.31	14,447,271.444	1,717,185.770	39.781456084	-80.726738286	
3,675.00	4.460	139.300	3,672.38	-28.27	32.88	14,447,269.629	1,717,187.335	39.781451087	-80.726732591	
3,707.00	4.450	140.200	3,704.28	-30.17	34.48	14,447,267.732	1,717,188.941	39.781445864	-80.726732591	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
3,738.00	3.820	133.800	3,735.20	-31.81	36.00	14,447,266.094	1,717,190.456	39.781441351	-80.726727215	
3,770.00	3.590	131.720	3,767.13	-33.21	37.51	14,447,264.689	1,717,191.973	39.781437481	-80.726721830	
3,802.00	3.650	130.640	3,799.07	-34.54	39.04	14,447,263.359	1,717,193.494	39.781433815	-80.726716432	
3,833.00	3.830	129.180	3,830.01	-35.84	40.59	14,447,262.062	1,717,195.045	39.781430241	-80.726710924	
3,865.00	4.040	128.610	3,861.93	-37.22	42.30	14,447,260.684	1,717,196.755	39.781426441	-80.726704855	
3,897.00	4.370	126.990	3,893.84	-38.65	44.15	14,447,259.247	1,717,198.609	39.781422479	-80.726698269	
3,928.00	4.310	125.640	3,924.75	-40.04	46.04	14,447,257.857	1,717,200.499	39.781418647	-80.726691557	
3,960.00	3.730	127.170	3,956.68	-41.37	47.85	14,447,256.528	1,717,202.306	39.781414981	-80.726685141	
3,991.00	3.520	129.680	3,987.61	-42.59	49.38	14,447,255.311	1,717,203.842	39.781411626	-80.726679687	
4,023.00	3.240	131.550	4,019.56	-43.82	50.82	14,447,254.084	1,717,205.275	39.781408245	-80.726674601	
4,055.00	3.340	133.910	4,051.51	-45.06	52.16	14,447,252.838	1,717,206.623	39.781404811	-80.726669815	
4,087.00	2.900	131.550	4,083.46	-46.25	53.44	14,447,251.654	1,717,207.901	39.781401550	-80.726665281	
4,119.00	2.560	130.580	4,115.42	-47.25	54.59	14,447,250.652	1,717,209.049	39.781398789	-80.726661204	
4,150.00	2.420	129.220	4,146.39	-48.11	55.62	14,447,249.788	1,717,210.082	39.781396407	-80.726657537	
4,182.00	2.210	127.190	4,178.37	-48.91	56.64	14,447,248.988	1,717,211.097	39.781394201	-80.726653933	
4,214.00	1.640	132.180	4,210.35	-49.59	57.47	14,447,248.308	1,717,211.928	39.781392326	-80.726650983	
4,246.00	1.150	131.010	4,242.34	-50.11	58.05	14,447,247.789	1,717,212.509	39.781390898	-80.726648918	
4,277.00	0.850	136.280	4,273.33	-50.48	58.44	14,447,247.419	1,717,212.903	39.781389878	-80.726647521	
4,309.00	0.560	111.990	4,305.33	-50.71	58.75	14,447,247.189	1,717,213.212	39.781389243	-80.726646424	
4,340.00	0.230	101.670	4,336.33	-50.78	58.95	14,447,247.120	1,717,213.413	39.781389051	-80.726645707	
4,372.00	0.190	4.760	4,368.33	-50.74	59.02	14,447,247.160	1,717,213.481	39.781389160	-80.726645467	
4,404.00	0.480	341.710	4,400.33	-50.56	58.98	14,447,247.340	1,717,213.443	39.781389655	-80.726645599	
4,426.00	0.750	321.080	4,422.33	-50.36	58.87	14,447,247.539	1,717,213.324	39.781390204	-80.726646022	
4,441.00	0.680	325.900	4,437.33	-50.21	58.75	14,447,247.689	1,717,213.212	39.781390617	-80.726646418	
4,535.00	1.240	335.080	4,531.31	-48.83	58.01	14,447,249.074	1,717,212.471	39.781394425	-80.726649041	
4,628.00	1.810	336.530	4,624.28	-46.57	57.00	14,447,251.333	1,717,211.462	39.781400639	-80.726652608	
4,722.00	2.320	341.860	4,718.22	-43.40	55.82	14,447,254.503	1,717,210.278	39.781409354	-80.726656786	
4,815.00	1.640	351.490	4,811.16	-40.29	55.04	14,447,257.608	1,717,209.495	39.781417888	-80.726659540	
4,908.00	0.730	27.140	4,904.14	-38.45	55.11	14,447,259.452	1,717,209.569	39.781422950	-80.726659259	
5,002.00	0.960	74.070	4,998.13	-37.70	56.14	14,447,260.201	1,717,210.599	39.781424998	-80.726655583	
5,096.00	1.690	93.440	5,092.11	-37.57	58.28	14,447,260.334	1,717,212.740	39.781425345	-80.726647961	
5,188.00	2.560	116.190	5,184.05	-38.55	61.48	14,447,259.345	1,717,215.938	39.781422605	-80.726636589	
5,282.00	2.380	136.900	5,277.96	-40.91	64.70	14,447,256.994	1,717,219.155	39.781416119	-80.726625163	
5,375.00	1.240	135.030	5,370.91	-43.03	66.73	14,447,254.872	1,717,221.186	39.781410275	-80.726617958	
5,469.00	0.190	347.330	5,464.91	-43.60	67.41	14,447,254.304	1,717,221.871	39.781408711	-80.726615527	
5,563.00	0.680	334.060	5,558.90	-42.94	67.13	14,447,254.958	1,717,221.592	39.781410508	-80.726616510	
5,657.00	1.130	337.060	5,652.89	-41.59	66.53	14,447,256.313	1,717,220.987	39.781414235	-80.726618650	
5,750.00	1.530	301.620	5,745.87	-40.09	65.11	14,447,257.808	1,717,219.572	39.781418354	-80.726623669	
5,845.00	1.420	285.940	5,840.84	-39.10	62.90	14,447,258.797	1,717,217.361	39.781421086	-80.726631531	
5,939.00	1.060	226.850	5,934.82	-39.38	61.15	14,447,258.522	1,717,215.606	39.781420346	-80.726637778	
6,031.00	1.210	214.470	6,026.80	-40.76	59.98	14,447,257.139	1,717,214.436	39.781416558	-80.726641960	
6,187.00	0.230	39.210	6,182.79	-41.88	59.24	14,447,256.024	1,717,213.701	39.781413501	-80.726644586	
6,280.00	0.320	20.090	6,275.79	-41.49	59.45	14,447,256.412	1,717,213.909	39.781414567	-80.726643844	
6,311.00	0.310	41.280	6,306.79	-41.34	59.53	14,447,256.557	1,717,213.994	39.781414962	-80.726643540	
6,404.00	0.320	13.670	6,399.79	-40.90	59.76	14,447,256.998	1,717,214.221	39.781416173	-80.726642726	
6,497.00	0.220	42.370	6,492.79	-40.52	59.94	14,447,257.382	1,717,214.403	39.781417226	-80.726642075	
6,591.00	0.290	11.180	6,586.79	-40.15	60.11	14,447,257.749	1,717,214.570	39.781418232	-80.726641474	
6,685.00	0.350	29.160	6,680.78	-39.67	60.30	14,447,258.233	1,717,214.756	39.781419560	-80.726640807	
6,779.00	0.400	40.880	6,774.78	-39.17	60.65	14,447,258.732	1,717,215.111	39.781420927	-80.726639539	
6,873.00	0.420	1.590	6,868.78	-38.58	60.88	14,447,259.324	1,717,215.335	39.781422552	-80.726638734	
6,966.00	0.460	11.410	6,961.78	-37.87	60.96	14,447,260.031	1,717,215.419	39.781424492	-80.726638430	
7,060.00	1.370	80.450	7,055.77	-37.31	62.14	14,447,260.587	1,717,216.602	39.781426010	-80.726634213	
7,154.00	2.990	90.580	7,149.70	-37.15	65.70	14,447,260.749	1,717,220.161	39.781426424	-80.726621541	
7,248.00	5.260	94.020	7,243.45	-37.48	72.45	14,447,260.422	1,717,226.912	39.781425470	-80.726597516	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,342.00	7.730	97.690	7,336.84	-38.63	83.02	14,447,259.274	1,717,237.477	39.781422228	-80.726559925
7,437.00	9.990	101.160	7,430.70	-41.08	97.44	14,447,256.824	1,717,251.894	39.781415378	-80.726508633
7,529.00	12.170	103.110	7,520.98	-44.82	114.71	14,447,253.079	1,717,269.170	39.781404950	-80.726447182
7,623.00	13.670	101.240	7,612.59	-49.23	135.26	14,447,248.666	1,717,289.716	39.781392659	-80.726374099
7,717.00	15.270	99.550	7,703.61	-53.45	158.36	14,447,244.447	1,717,312.818	39.781380878	-80.726291913
7,810.00	15.970	98.070	7,793.18	-57.28	183.10	14,447,240.620	1,717,337.563	39.781370158	-80.726203880
7,903.00	16.850	96.830	7,882.39	-60.68	209.16	14,447,237.220	1,717,363.613	39.781360605	-80.726111191
7,997.00	16.730	96.610	7,972.38	-63.86	236.12	14,447,234.043	1,717,390.580	39.781351652	-80.726015241
8,090.00	14.470	90.130	8,061.95	-65.42	261.04	14,447,232.475	1,717,415.501	39.781347138	-80.725926554
8,183.00	14.050	85.270	8,152.09	-64.52	283.91	14,447,233.380	1,717,438.371	39.781349429	-80.725845140
8,277.00	15.030	88.250	8,243.08	-63.21	307.47	14,447,234.693	1,717,461.926	39.781352838	-80.725761285
8,371.00	14.920	87.860	8,333.89	-62.38	331.74	14,447,235.517	1,717,486.201	39.781354896	-80.725674870
8,464.00	15.950	92.720	8,423.54	-62.54	356.47	14,447,235.358	1,717,510.930	39.781354251	-80.725586850
8,557.00	16.980	96.650	8,512.73	-64.72	382.73	14,447,233.179	1,717,537.184	39.781348045	-80.725493426
8,651.00	18.000	98.680	8,602.38	-68.50	410.72	14,447,229.397	1,717,565.176	39.781337425	-80.725393833
8,744.00	17.300	97.070	8,691.00	-72.37	438.65	14,447,225.527	1,717,593.104	39.781326560	-80.725294468
8,838.00	16.680	94.400	8,780.90	-75.13	465.97	14,447,222.771	1,717,620.425	39.781318763	-80.725197250
8,931.00	16.530	91.480	8,870.02	-76.49	492.50	14,447,221.406	1,717,646.959	39.781314789	-80.725102822
9,024.00	16.930	90.460	8,959.09	-76.94	519.27	14,447,220.955	1,717,673.725	39.781313326	-80.725007555
9,117.00	16.190	92.380	9,048.23	-77.59	545.76	14,447,220.308	1,717,700.220	39.781311325	-80.724913251
9,210.00	14.680	94.500	9,137.87	-79.05	570.47	14,447,218.845	1,717,724.924	39.781307099	-80.724825341
9,303.00	14.930	94.580	9,227.79	-80.94	594.16	14,447,216.964	1,717,748.613	39.781301733	-80.724741040
9,395.00	15.460	95.370	9,316.57	-83.03	618.18	14,447,214.870	1,717,772.635	39.781295779	-80.724655560
9,488.00	15.170	93.320	9,406.27	-84.89	642.67	14,447,213.005	1,717,797.124	39.781290451	-80.724568414
9,580.00	15.630	92.880	9,494.96	-86.21	667.06	14,447,211.685	1,717,821.519	39.781286621	-80.724481596
9,674.00	15.700	92.800	9,585.47	-87.47	692.41	14,447,210.428	1,717,846.869	39.781282953	-80.724391379
9,767.00	15.930	93.220	9,674.95	-88.80	717.72	14,447,209.096	1,717,872.179	39.781279082	-80.724301304
9,861.00	14.230	90.480	9,765.71	-89.62	742.16	14,447,208.275	1,717,896.614	39.781276620	-80.724214341
9,954.00	15.240	92.130	9,855.65	-90.17	765.80	14,447,207.725	1,717,920.259	39.781274909	-80.724130184
10,010.00	15.780	94.950	9,909.61	-91.11	780.74	14,447,206.794	1,717,935.200	39.781272227	-80.724040853
10,079.00	16.700	98.390	9,975.86	-93.36	799.90	14,447,204.538	1,717,954.356	39.781265869	-80.723961355
10,126.00	16.480	88.250	10,020.92	-94.14	813.25	14,447,203.756	1,717,967.703	39.781263608	-80.723916672
10,173.00	15.690	67.500	10,066.11	-91.51	825.79	14,447,206.394	1,717,980.249	39.781270746	-80.723880014
10,220.00	15.290	45.200	10,111.45	-84.70	836.07	14,447,213.199	1,717,990.526	39.781289347	-80.723851069
10,268.00	15.470	34.320	10,157.74	-74.95	844.17	14,447,222.947	1,717,998.628	39.781316051	-80.723851069
10,316.00	15.690	38.190	10,203.97	-64.56	851.79	14,447,233.336	1,718,006.250	39.781344516	-80.723823824
10,363.00	16.660	32.240	10,249.12	-53.87	859.32	14,447,244.030	1,718,013.775	39.781373822	-80.723796926
10,410.00	18.160	25.110	10,293.97	-41.54	866.02	14,447,256.363	1,718,020.478	39.781407634	-80.723772930
10,457.00	19.310	18.410	10,338.48	-27.53	871.58	14,447,270.371	1,718,026.041	39.781446055	-80.723738546
10,504.00	21.260	10.480	10,382.57	-11.77	875.59	14,447,286.127	1,718,030.046	39.781489293	-80.723732666
10,552.00	22.850	0.080	10,427.08	6.11	877.19	14,447,304.012	1,718,031.643	39.781538397	-80.723738034
10,599.00	24.610	350.720	10,470.12	24.90	875.62	14,447,322.804	1,718,030.077	39.781590018	-80.723754668
10,645.00	25.760	341.420	10,511.76	43.84	870.89	14,447,341.740	1,718,025.345	39.781642060	-80.723781676
10,692.00	27.310	335.960	10,553.81	63.37	863.24	14,447,361.272	1,718,017.697	39.781752807	-80.723811091
10,740.00	28.240	340.230	10,596.29	84.12	854.91	14,447,382.017	1,718,009.369	39.781812653	-80.723832937
10,787.00	29.470	347.810	10,637.46	105.89	848.71	14,447,403.790	1,717,998.884	39.781877512	-80.723863469
10,835.00	30.530	351.570	10,679.04	129.49	844.43	14,447,427.393	1,717,994.439	39.782016164	-80.723883785
10,882.00	33.270	347.940	10,718.94	153.92	839.98	14,447,451.816	1,717,982.834	39.782094263	-80.723904179
10,929.00	35.880	347.020	10,757.63	179.95	834.19	14,447,477.849	1,717,977.315	39.782182848	-80.723923468
10,976.00	40.390	349.710	10,794.60	208.37	828.38	14,447,506.270	1,717,971.929	39.782278279	-80.723963160
11,024.00	45.560	350.810	10,829.70	240.61	822.86	14,447,538.509	1,717,965.941	39.782381348	-80.723989082
11,071.00	51.300	351.530	10,860.88	275.34	817.47	14,447,573.242	1,717,958.536		
11,118.00	56.610	350.370	10,888.52	312.86	811.48	14,447,610.754			
11,165.00	62.400	348.600	10,912.36	352.65	804.08	14,447,650.550			



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,212.00	66.950	346.360	10,932.47	394.11	794.86	14,447,692.005	1,717,949.314	39.782604625	-80.724021451
11,259.00	70.130	343.670	10,949.66	436.35	783.54	14,447,734.246	1,717,937.996	39.782720725	-80.724061274
11,307.00	71.980	341.420	10,965.25	479.65	769.92	14,447,777.548	1,717,924.375	39.782839761	-80.724109283
11,354.00	71.900	339.920	10,979.82	521.81	755.13	14,447,819.712	1,717,909.585	39.782955679	-80.724161467
11,402.00	73.000	334.550	10,994.30	563.99	737.42	14,447,861.891	1,717,891.878	39.783071664	-80.724224033
11,450.00	75.960	330.540	11,007.15	605.01	716.09	14,447,902.913	1,717,870.551	39.783184500	-80.724299495
11,497.00	80.160	330.850	11,016.87	645.10	693.59	14,447,943.003	1,717,848.050	39.783294787	-80.724379148
11,544.00	85.150	331.200	11,022.88	685.87	671.02	14,447,983.770	1,717,825.477	39.783406935	-80.724459051
11,591.00	87.320	330.140	11,025.96	726.75	648.05	14,448,024.653	1,717,802.506	39.783519406	-80.724540371
11,638.00	87.100	328.290	11,028.25	767.08	624.02	14,448,064.981	1,717,778.480	39.783630359	-80.724625450
11,685.00	88.690	330.230	11,029.98	807.45	600.02	14,448,105.347	1,717,754.475	39.783741418	-80.724710455
11,732.00	89.130	328.910	11,030.87	847.97	576.22	14,448,145.864	1,717,730.675	39.783852890	-80.724794729
11,779.00	90.060	329.130	11,031.20	888.26	552.03	14,448,186.158	1,717,706.483	39.783963751	-80.724880399
11,874.00	90.150	329.520	11,031.03	969.97	503.56	14,448,267.864	1,717,658.017	39.784188548	-80.725052022
11,968.00	91.120	328.250	11,029.99	1,050.44	454.99	14,448,348.333	1,717,609.447	39.784409946	-80.725224032
12,063.00	90.900	329.080	11,028.31	1,131.57	405.59	14,448,429.463	1,717,560.051	39.784633166	-80.725398974
12,158.00	91.250	329.570	11,026.53	1,213.26	357.14	14,448,511.155	1,717,511.594	39.784857923	-80.725570570
12,252.00	91.120	329.790	11,024.59	1,294.38	309.69	14,448,592.280	1,717,464.151	39.785081113	-80.725738565
12,347.00	91.070	324.150	11,022.77	1,373.98	257.94	14,448,671.880	1,717,412.399	39.785300150	-80.725921914
12,441.00	91.030	324.150	11,021.05	1,450.16	202.90	14,448,748.059	1,717,357.355	39.785509820	-80.726117017
12,536.00	90.900	332.610	11,019.44	1,530.97	153.14	14,448,828.870	1,717,307.601	39.785732168	-80.726293245
12,630.00	90.990	329.430	11,017.89	1,613.18	107.61	14,448,911.079	1,717,262.070	39.785958315	-80.726465442
12,724.00	91.070	329.740	11,016.20	1,694.23	60.03	14,448,992.129	1,717,214.489	39.786181300	-80.726622915
12,817.00	91.030	329.920	11,014.50	1,774.62	13.30	14,449,072.517	1,717,167.758	39.786402460	-80.726788387
12,912.00	91.070	329.790	11,012.76	1,856.76	-34.40	14,449,154.655	1,717,120.058	39.786628432	-80.726957292
13,006.00	91.160	334.150	11,010.93	1,939.70	-78.56	14,449,237.593	1,717,075.904	39.786856571	-80.727113569
13,101.00	91.120	332.560	11,009.04	2,024.59	-121.15	14,449,322.485	1,717,033.310	39.787090062	-80.727264269
13,198.00	91.470	329.350	11,006.85	2,109.36	-168.22	14,449,407.253	1,716,986.235	39.787323251	-80.727430923
13,292.00	91.600	330.800	11,004.33	2,190.79	-215.10	14,449,488.689	1,716,939.360	39.787547289	-80.727596903
13,387.00	91.160	330.400	11,002.04	2,273.54	-261.72	14,449,571.430	1,716,892.738	39.787774906	-80.727761970
13,481.00	91.070	328.770	11,000.21	2,354.58	-309.30	14,449,652.476	1,716,845.160	39.787997876	-80.727930458
13,574.00	91.070	329.880	10,998.47	2,434.55	-356.74	14,449,732.447	1,716,797.724	39.788217894	-80.728098455
13,668.00	91.070	329.430	10,996.72	2,515.66	-404.22	14,449,813.555	1,716,750.243	39.788441033	-80.728266600
13,762.00	91.210	330.890	10,994.85	2,597.18	-450.98	14,449,895.073	1,716,703.481	39.788665294	-80.728432181
13,855.00	91.030	329.040	10,993.03	2,677.67	-497.52	14,449,975.566	1,716,656.943	39.788886736	-80.728596979
13,950.00	90.990	331.590	10,991.35	2,760.18	-544.55	14,450,058.079	1,716,609.907	39.789113729	-80.728763526
14,044.00	90.990	330.890	10,989.73	2,842.58	-589.77	14,450,140.470	1,716,564.687	39.789340373	-80.728923614
14,138.00	91.030	329.130	10,988.07	2,923.98	-636.75	14,450,221.869	1,716,517.710	39.789564306	-80.729089965
14,232.00	90.990	330.270	10,986.42	3,005.12	-684.17	14,450,303.014	1,716,470.293	39.789787545	-80.729257890
14,326.00	90.990	329.610	10,984.79	3,086.47	-731.25	14,450,384.358	1,716,423.215	39.790011329	-80.729424604
14,420.00	91.030	329.920	10,983.14	3,167.67	-778.57	14,450,465.558	1,716,375.889	39.790234719	-80.729592205
14,514.00	91.030	330.490	10,981.45	3,249.23	-825.27	14,450,547.119	1,716,329.189	39.790459092	-80.729757577
14,608.00	90.990	330.800	10,979.79	3,331.14	-871.35	14,450,629.036	1,716,283.115	39.790684440	-80.729920713
14,703.00	91.210	332.740	10,977.97	3,414.82	-916.27	14,450,712.717	1,716,238.190	39.790914621	-80.730079745
14,797.00	91.520	333.050	10,975.73	3,498.48	-959.09	14,450,796.369	1,716,195.374	39.791144706	-80.730231269
14,891.00	91.250	330.140	10,973.45	3,581.13	-1,003.79	14,450,879.018	1,716,150.676	39.791372054	-80.730389504
14,985.00	91.430	330.010	10,971.26	3,662.57	-1,050.67	14,450,960.464	1,716,103.795	39.791596112	-80.730555523
15,079.00	91.430	330.490	10,968.91	3,744.16	-1,097.30	14,451,042.049	1,716,057.165	39.791820551	-80.730720648
15,173.00	91.560	331.550	10,966.46	3,826.36	-1,142.82	14,451,124.249	1,716,011.638	39.792046672	-80.730881843
15,266.00	90.990	331.240	10,964.39	3,907.99	-1,187.34	14,451,205.877	1,715,967.124	39.792271210	-80.731039438
15,361.00	91.030	331.070	10,962.71	3,991.19	-1,233.16	14,451,289.077	1,715,921.299	39.792500077	-80.731201684
15,455.00	90.990	330.400	10,961.06	4,073.18	-1,279.11	14,451,371.066	1,715,875.354	39.792725620	-80.731364370
15,549.00	90.900	329.170	10,959.51	4,154.39	-1,326.40	14,451,452.283	1,715,828.056	39.792949051	-80.731531882
15,643.00	91.470	331.950	10,957.56	4,236.23	-1,372.59	14,451,534.119	1,715,781.869	39.793174174	-80.731695438



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,735.00	91.470	330.540	10,955.20	4,316.85	-1,416.83	14,451,614.745	1,715,737.626	39.793395959	-80.731852081
15,828.00	91.650	332.260	10,952.67	4,398.47	-1,461.33	14,451,696.364	1,715,693.126	39.793620472	-80.732009633
15,922.00	91.520	330.800	10,950.07	4,481.07	-1,506.13	14,451,778.962	1,715,648.335	39.793847676	-80.732168212
16,016.00	91.470	331.640	10,947.62	4,563.43	-1,551.37	14,451,861.322	1,715,603.095	39.794074229	-80.732328393
16,110.00	91.430	328.160	10,945.24	4,644.72	-1,598.49	14,451,942.607	1,715,555.975	39.794297847	-80.732495277
16,204.00	91.030	329.570	10,943.22	4,725.16	-1,647.08	14,452,023.046	1,715,507.385	39.794519151	-80.732667409
16,297.00	91.070	330.230	10,941.51	4,805.60	-1,693.71	14,452,103.491	1,715,460.752	39.794740456	-80.732832569
16,391.00	91.210	331.020	10,939.64	4,887.50	-1,739.81	14,452,185.388	1,715,414.653	39.794965745	-80.732995819
16,485.00	91.250	330.580	10,937.63	4,969.53	-1,785.66	14,452,267.423	1,715,368.805	39.795191411	-80.733158173
16,579.00	91.430	329.430	10,935.43	5,050.92	-1,832.64	14,452,348.810	1,715,321.826	39.795415304	-80.733324561
16,672.00	90.590	331.020	10,933.79	5,131.63	-1,878.81	14,452,429.516	1,715,275.652	39.795637323	-80.733488092
16,765.00	90.720	330.180	10,932.73	5,212.64	-1,924.46	14,452,510.533	1,715,230.001	39.795860188	-80.733649756
16,859.00	90.590	330.100	10,931.65	5,294.16	-1,971.26	14,452,592.049	1,715,183.203	39.796084433	-80.733811501
16,953.00	91.160	330.580	10,930.22	5,375.83	-2,017.77	14,452,673.722	1,715,136.693	39.796309110	-80.733980222
17,046.00	91.520	330.050	10,928.04	5,456.61	-2,063.81	14,452,754.494	1,715,090.649	39.796531307	-80.734143291
17,139.00	91.600	331.200	10,925.51	5,537.62	-2,109.41	14,452,835.505	1,715,045.490	39.796754156	-80.734304783
17,233.00	91.520	329.130	10,922.95	5,619.12	-2,156.16	14,452,917.012	1,714,998.303	39.796978375	-80.734470346
17,326.00	91.030	329.700	10,920.88	5,699.17	-2,203.47	14,452,997.053	1,714,950.995	39.797198574	-80.734637927
17,420.00	91.070	330.450	10,919.16	5,780.62	-2,250.35	14,453,078.506	1,714,904.110	39.797422648	-80.734803990
17,512.00	90.990	326.090	10,917.50	5,858.84	-2,298.72	14,453,156.724	1,714,855.746	39.797637847	-80.734975356
17,606.00	91.070	325.200	10,915.81	5,936.43	-2,351.75	14,453,234.313	1,714,802.709	39.797851357	-80.735163363
17,699.00	91.600	327.940	10,913.65	6,014.01	-2,402.97	14,453,311.898	1,714,751.492	39.798064842	-80.735344890
17,793.00	91.560	328.330	10,911.05	6,093.81	-2,452.58	14,453,391.701	1,714,701.887	39.798284404	-80.735520659
17,887.00	91.560	331.240	10,908.49	6,175.00	-2,499.86	14,453,472.892	1,714,654.605	39.798507758	-80.735688145
17,981.00	91.600	331.290	10,905.90	6,257.40	-2,545.03	14,453,555.285	1,714,609.430	39.798734396	-80.735848112
18,075.00	91.340	331.510	10,903.49	6,339.90	-2,590.01	14,453,637.788	1,714,564.448	39.798961335	-80.736007396
18,169.00	91.250	333.000	10,901.37	6,423.07	-2,633.76	14,453,720.957	1,714,520.700	39.799190092	-80.736162280
18,263.00	91.430	331.550	10,899.17	6,506.25	-2,677.48	14,453,804.139	1,714,476.982	39.799418888	-80.736317059
18,356.00	91.430	328.600	10,896.85	6,586.82	-2,723.86	14,453,884.706	1,714,430.607	39.799640520	-80.736481325
18,449.00	91.300	328.640	10,894.63	6,666.19	-2,772.27	14,453,964.081	1,714,382.195	39.799865895	-80.736652859
18,542.00	91.210	332.960	10,892.59	6,747.34	-2,817.62	14,454,045.224	1,714,336.846	39.800082100	-80.736813469
18,636.00	91.380	331.240	10,890.47	6,830.39	-2,861.59	14,454,128.273	1,714,292.873	39.800310531	-80.736969159
18,728.00	91.430	335.380	10,888.21	6,912.54	-2,902.89	14,454,210.428	1,714,251.572	39.800536482	-80.737115349
18,821.00	91.300	331.240	10,886.00	6,995.59	-2,944.64	14,454,293.477	1,714,209.821	39.800764892	-80.737263132
18,915.00	91.340	328.770	10,883.83	7,076.97	-2,991.62	14,454,374.859	1,714,162.844	39.800988768	-80.737429539
19,010.00	91.250	332.480	10,881.68	7,159.72	-3,038.20	14,454,457.609	1,714,116.265	39.801216396	-80.737594518
19,104.00	91.070	331.330	10,879.78	7,242.63	-3,082.46	14,454,540.514	1,714,072.007	39.801444431	-80.737751231
19,197.00	91.070	332.300	10,878.04	7,324.59	-3,126.38	14,454,622.471	1,714,028.089	39.801669860	-80.737906743
19,290.00	91.070	328.600	10,876.31	7,405.46	-3,172.23	14,454,703.346	1,713,982.239	39.801892332	-80.738069147
19,384.00	91.210	331.900	10,874.44	7,487.04	-3,218.85	14,454,784.929	1,713,935.610	39.802116755	-80.738234318
19,478.00	91.160	332.030	10,872.49	7,570.00	-3,263.03	14,454,867.881	1,713,891.439	39.802344917	-80.738390726
19,572.00	91.120	327.360	10,870.62	7,651.11	-3,310.44	14,454,948.998	1,713,844.029	39.802568064	-80.738558686
19,667.00	91.300	324.680	10,868.61	7,729.87	-3,363.51	14,455,027.750	1,713,790.950	39.802784764	-80.738746856
19,761.00	91.300	326.480	10,866.48	7,807.38	-3,416.63	14,455,105.269	1,713,737.832	39.802998076	-80.738935178
19,853.00	91.030	330.320	10,864.61	7,885.71	-3,464.82	14,455,183.597	1,713,689.645	39.803213571	-80.739105938
19,948.00	91.120	332.920	10,862.83	7,969.27	-3,509.96	14,455,267.157	1,713,644.501	39.803443410	-80.739265806
20,041.00	90.500	330.800	10,861.51	8,051.27	-3,553.82	14,455,349.151	1,713,600.647	39.803668937	-80.739421102
20,134.00	90.540	327.100	10,860.67	8,130.92	-3,601.78	14,455,428.808	1,713,552.689	39.803888080	-80.739591033
20,227.00	90.230	327.850	10,860.04	8,209.34	-3,651.78	14,455,507.219	1,713,502.688	39.804103816	-80.739768255
20,321.00	90.370	327.140	10,859.55	8,288.61	-3,702.29	14,455,586.492	1,713,452.176	39.804321923	-80.739947287
Tie into original hole @ 20321 MD									
20,390.00	90.990	327.980	10,858.73	8,346.84	-3,739.30	14,455,644.719	1,713,415.166	39.804482126	-80.740078461
20,405.00	91.380	326.940	10,858.42	8,359.62	-3,747.14	14,455,657.501	1,713,407.322	39.804517289	-80.740106261
20,444.00	91.030	330.000	10,857.60	8,393.20	-3,766.95	14,455,691.086	1,713,387.515	39.804609681	-80.740176438



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle N-19 HU (slot H)
Project:	Marshall County, West Virginia NAD83 UTM 17N	TVD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Site:	Van Winkle	MD Reference:	RKB=753+26 @ 779.00ft (Nabors B28)
Well:	Van Winkle N-19 HU (slot H)	North Reference:	Grid
Wellbore:	Sidetrack 01	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Sidetrack 01	Database:	DB_Feb2822

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
20,474.00	90.810	331.490	10,857.12	8,419.37	-3,781.61	14,455,717.255	1,713,372.856	39.804681665	-80.740228361
20,483.00	90.950	332.020	10,856.98	8,427.30	-3,785.87	14,455,725.183	1,713,368.598	39.804703470	-80.740243442
20,513.00	90.680	333.340	10,856.55	8,453.95	-3,799.63	14,455,751.833	1,713,354.831	39.804776769	-80.740292186
20,567.00	90.240	333.690	10,856.12	8,502.28	-3,823.72	14,455,800.164	1,713,330.750	39.804909690	-80.740377431
20,577.00	88.970	333.780	10,856.19	8,511.25	-3,828.14	14,455,809.131	1,713,326.325	39.804934351	-80.740393094
20,592.00	87.340	333.160	10,856.67	8,524.66	-3,834.84	14,455,822.544	1,713,319.628	39.804971240	-80.740416798
20,624.00	87.030	330.440	10,858.24	8,552.83	-3,849.94	14,455,850.709	1,713,304.527	39.805048709	-80.740470279
20,671.00	88.400	326.130	10,860.12	8,592.77	-3,874.62	14,455,890.648	1,713,279.844	39.805158588	-80.740557752
20,727.00	92.310	322.440	10,859.77	8,638.22	-3,907.30	14,455,936.099	1,713,247.167	39.805283667	-80.740673634
20,764.00	92.970	322.260	10,858.07	8,667.48	-3,929.88	14,455,965.362	1,713,224.590	39.805364212	-80.740753720
20,857.00	91.470	324.370	10,854.47	8,742.00	-3,985.39	14,456,039.880	1,713,169.078	39.805569299	-80.740950612
20,950.00	92.000	326.220	10,851.65	8,818.41	-4,038.31	14,456,116.296	1,713,116.155	39.805779577	-80.741138266
21,044.00	92.090	331.490	10,848.29	8,898.78	-4,086.88	14,456,196.667	1,713,067.586	39.806000682	-80.741310378
21,137.00	91.870	331.840	10,845.08	8,980.59	-4,130.99	14,456,278.475	1,713,023.472	39.806225699	-80.741466612
21,231.00	92.400	331.760	10,841.58	9,063.38	-4,175.38	14,456,361.260	1,712,979.083	39.806453399	-80.741623815
21,323.00	90.420	331.930	10,839.31	9,144.46	-4,218.78	14,456,442.345	1,712,935.688	39.806676424	-80.741777501
21,416.00	90.290	332.200	10,838.74	9,226.63	-4,262.35	14,456,524.507	1,712,892.121	39.806902406	-80.741931786
21,509.00	90.460	331.580	10,838.13	9,308.65	-4,306.16	14,456,606.535	1,712,848.304	39.807128022	-80.742086966
21,601.00	91.870	331.320	10,836.26	9,389.45	-4,350.12	14,456,687.329	1,712,804.345	39.807350251	-80.742242663
21,694.00	90.990	331.400	10,833.94	9,471.04	-4,394.68	14,456,768.923	1,712,759.784	39.807574684	-80.742400497
21,786.00	90.460	332.900	10,832.77	9,552.38	-4,437.66	14,456,850.258	1,712,716.811	39.807798390	-80.742552683
21,880.00	90.150	332.720	10,832.27	9,635.99	-4,480.61	14,456,933.869	1,712,673.859	39.808028346	-80.742704769
21,973.00	90.420	332.550	10,831.81	9,718.58	-4,523.36	14,457,016.461	1,712,631.112	39.808255502	-80.742856139
22,067.00	90.370	332.810	10,831.16	9,802.09	-4,566.50	14,457,099.974	1,712,587.970	39.808485190	-80.743008902
22,160.00	91.250	330.880	10,829.85	9,884.08	-4,610.37	14,457,181.956	1,712,544.095	39.808710681	-80.743164298
22,253.00	91.250	330.700	10,827.82	9,965.23	-4,655.75	14,457,263.111	1,712,498.721	39.808933909	-80.743325039
22,347.00	91.470	330.530	10,825.59	10,047.11	-4,701.86	14,457,344.994	1,712,452.610	39.809159144	-80.743488394
22,441.00	90.730	329.560	10,823.78	10,128.54	-4,748.78	14,457,426.420	1,712,405.684	39.809383131	-80.743654662
22,535.00	90.900	329.120	10,822.45	10,209.39	-4,796.71	14,457,507.271	1,712,357.754	39.809605546	-80.743824508
22,629.00	91.210	329.470	10,820.72	10,290.20	-4,844.70	14,457,588.079	1,712,309.764	39.809827842	-80.743994570
22,727.00	91.250	329.300	10,818.61	10,374.52	-4,894.60	14,457,672.399	1,712,259.868	39.810059798	-80.744171388
Survey @ 22727.00 MD 10818.61 TVD									
22,783.00	91.250	329.300	10,817.39	10,422.66	-4,923.18	14,457,720.539	1,712,231.284	39.810192228	-80.744272681
Survey Proj. to 22783.00 MD 10817.39 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
20,321.00	10,859.55	8,288.61	-3,702.29	Tie into original hole @ 20321 MD
22,727.00	10,818.61	10,374.52	-4,894.60	Survey @ 22727.00 MD 10818.61 TVD
22,783.00	10,817.39	10,422.66	-4,923.18	Survey Proj. to 22783.00 MD 10817.39 TVD

Checked By: _____ Approved By: _____ Date: _____