



Well: Van Winkle S-22 HU (slot C)
 Site: Van Winkle
 Project: Marshall County, West Virginia NAD83 UTM 17N
 Design: rev5
 Rig: Nabors B28

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
2	4419.00	4.02	298.87	4416.43	49.46	-60.55	0.00	0.00	-72.59	Survey @ 4419.00 MD 4416.43 TVD
3	4619.00	4.02	298.87	4615.94	56.23	-72.83	0.00	0.00	-84.46	KOP Begin 1'/'100' drop
4	5021.00	0.00	298.87	5017.61	63.03	-85.18	1.00	180.00	-96.39	Begin vertical hold
5	8031.39	0.00	298.87	8028.00	63.03	-85.18	0.00	298.87	-96.39	Begin 2'/'100' build
6	8969.16	18.76	317.87	8949.11	175.84	-187.23	2.00	317.87	-244.51	Begin 18.76° tangent
7	9912.42	18.76	317.87	9842.29	400.75	-390.70	0.00	0.00	-539.81	Begin 6'/'100' build/turn
8	11049.04	50.00	153.46	10870.02	111.85	-308.83	6.00	-167.19	-247.40	Begin 8'/'100' build/turn
9	11537.98	89.00	150.18	11038.00	-283.22	-95.22	8.00	-5.20	201.69	Begin 89.00° lateral
9	26229.47	89.00	150.18	11294.00	-13027.44	7209.50	0.00	0.00	14889.30	PBHL/TD 26229.47 MD 11294.00 TVD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Van Winkle S-22HU LP r5 - plan hits target center	11038.00	-283.22	-95.22	14447307.299	1717036.734	39.780778000	-80.727277000
Van Winkle S-22HU PBHL r5 - plan hits target center	11294.00	-13027.44	7209.50	144434279.881	1724341.439	39.745715000	-80.701428000

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)

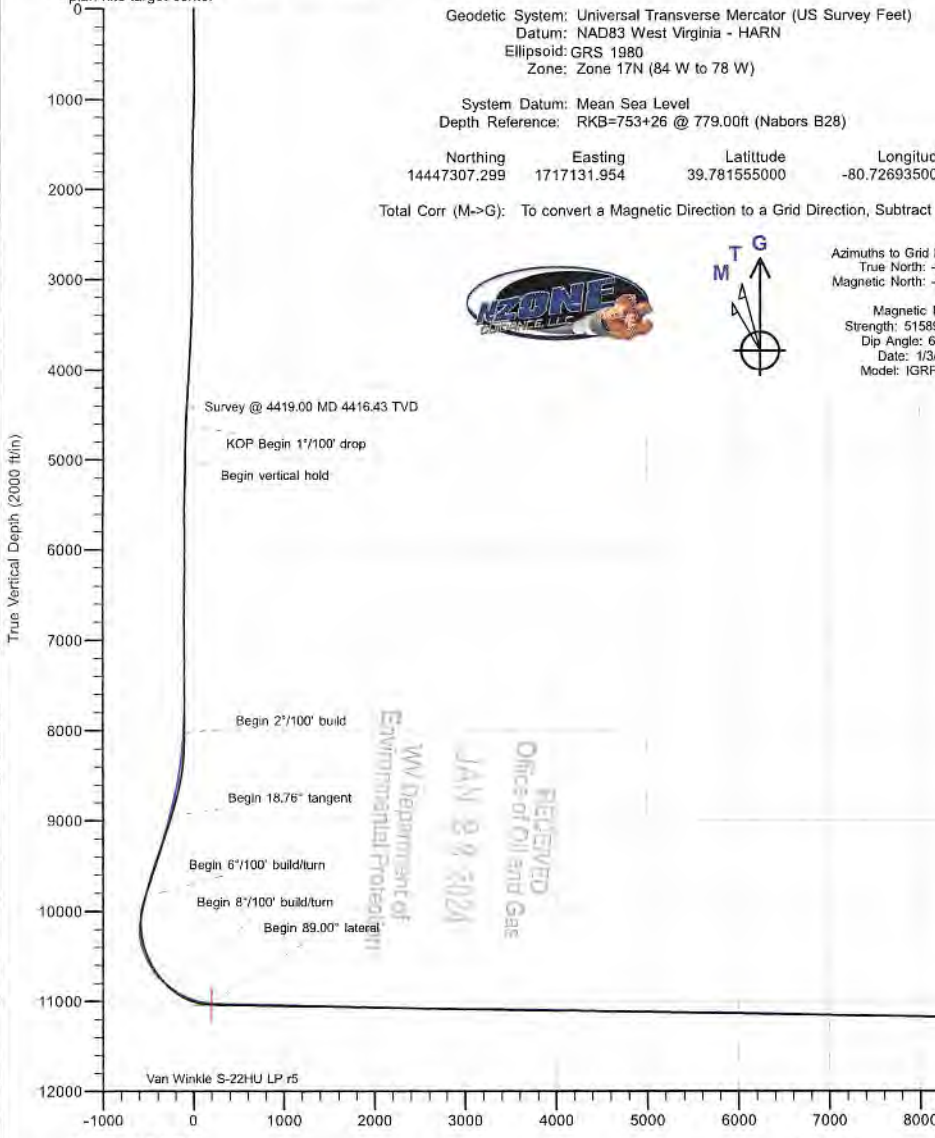
Northing	Easting	Latitude	Longitude
14447307.299	1717131.954	39.781555000	-80.726935000

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.83°



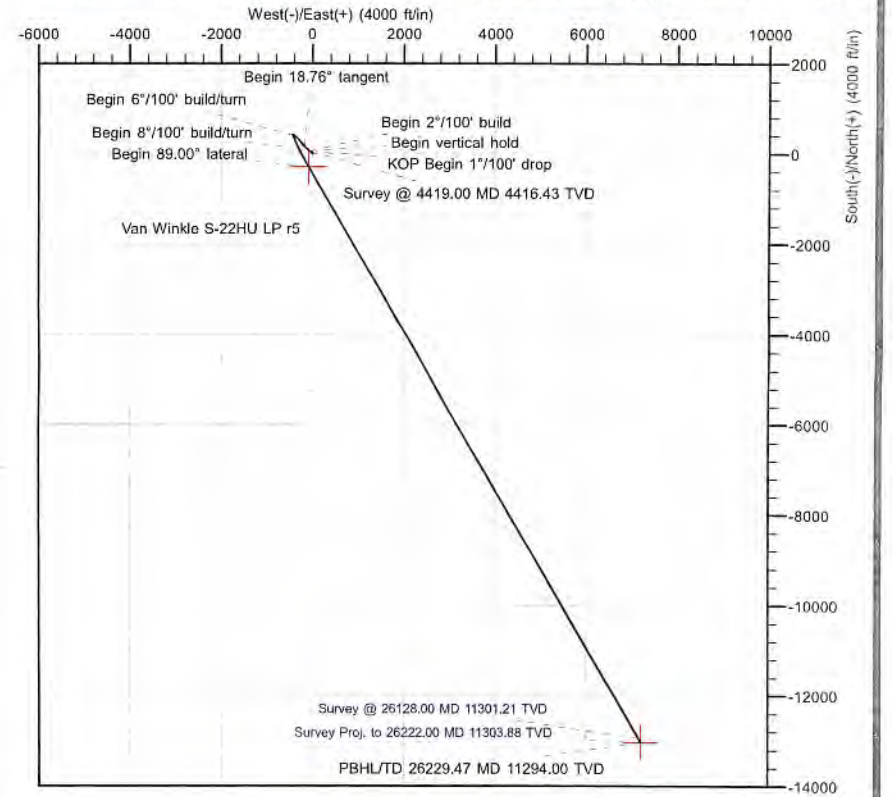
Azimuths to Grid North
 True North: -0.17°
 Magnetic North: -8.83°

Magnetic Field
 Strength: 51589.4nT
 Dip Angle: 66.38°
 Date: 1/3/2023
 Model: IGRF2020



ANNOTATIONS SURVEYS

MD	Inc	Azi	TVD	+N/-S	+E/-W	V/Sect	Annotation
153.00	0.47	154.83	153.00	-0.52	0.24	0.57	MWD surveys
26128.00	88.37	150.08	11301.21	-12941.80	7160.97	14790.87	Survey @ 26128.00 MD 11301.21 TVD
26222.00	88.37	150.08	11303.88	-13023.24	7207.84	14884.82	Survey Proj. to 26222.00 MD 11303.88 TVD



REVIEWED
 Office of Oil and Gas
 JAN 29 2024
 WV Department of
 Environmental Protection



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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 S-22 HU (slot C)					
Well Position	+N/-S	0.00 ft	Northing:	14,447,307.298 usft	Latitude:	39.781555000
	+E/-W	0.00 ft	Easting:	1,717,131.955 usft	Longitude:	-80.726935000
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	1/3/2023	-8.65	66.38	51,589.38798041

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	151.04	

Survey Program	Date 3/6/2023				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
14.00	516.00	MWD surf (Original Hole)	MWD	MWD - Standard	
569.00	2,197.00	MWD int (Original Hole)	MWD	MWD - Standard	
2,245.00	4,419.00	MWD 2245-4419 MD (Original Hole)	MWD	MWD - Standard	
4,504.00	26,128.00	MWD (Original Hole)	MWD	MWD - Standard	
26,222.00	26,222.00	Projection (Original Hole)	MWD	MWD - Standard	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
14.00	0.00	0.00	14.00	0.00	0.00	0.00	0.00	0.00	0.00	
153.00	0.47	154.83	153.00	-0.52	0.24	0.57	0.34	0.34	0.00	
MWD surveys										
181.00	0.38	170.47	181.00	-0.71	0.31	0.77	0.52	-0.32	55.86	
209.00	0.36	156.22	209.00	-0.88	0.36	0.95	0.34	-0.07	-50.89	



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Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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)	
239.00	0.44	140.29	239.00	-1.06	0.47	1.15	0.45	0.27	-53.10	
267.00	0.64	161.24	267.00	-1.29	0.59	1.41	0.99	0.71	74.82	
296.00	0.58	144.19	295.99	-1.56	0.73	1.72	0.66	-0.21	-58.79	
326.00	0.68	160.06	325.99	-1.85	0.88	2.04	0.67	0.33	52.90	
358.00	0.61	164.07	357.99	-2.19	0.99	2.40	0.26	-0.22	12.53	
389.00	0.87	163.18	388.99	-2.58	1.10	2.79	0.84	0.84	-2.87	
421.00	0.91	158.05	420.98	-3.05	1.27	3.28	0.28	0.13	-16.03	
453.00	0.95	168.93	452.98	-3.54	1.41	3.78	0.56	0.13	34.00	
484.00	1.24	169.52	483.97	-4.12	1.52	4.35	0.94	0.94	1.90	
516.00	1.26	179.62	515.97	-4.82	1.59	4.98	0.69	0.06	31.56	
569.00	1.18	157.75	568.95	-5.90	1.80	6.04	0.89	-0.15	-41.26	
601.00	1.15	136.41	600.95	-6.44	2.14	6.67	1.35	-0.09	-66.69	
632.00	1.06	124.62	631.94	-6.83	2.59	7.23	0.79	-0.29	-38.03	
664.00	1.23	106.74	663.94	-7.10	3.17	7.74	1.23	0.53	-55.88	
696.00	1.30	93.25	695.93	-7.22	3.86	8.18	0.95	0.22	-42.16	
727.00	1.38	77.22	726.92	-7.15	4.57	8.47	1.23	0.26	-51.71	
759.00	1.46	63.40	758.91	-6.89	5.31	8.60	1.10	0.25	-43.19	
791.00	1.31	51.48	790.90	-6.48	5.96	8.55	1.01	-0.47	-37.25	
822.00	1.48	27.12	821.89	-5.90	6.42	8.27	1.97	0.55	-78.58	
854.00	1.42	14.48	853.88	-5.15	6.71	7.75	1.01	-0.19	-39.50	
886.00	1.50	355.98	885.87	-4.35	6.78	7.09	1.49	0.25	-57.81	
918.00	1.45	339.17	917.86	-3.55	6.61	6.31	1.36	-0.16	-52.53	
949.00	1.46	321.92	948.85	-2.87	6.23	5.53	1.41	0.03	-55.65	
981.00	1.31	302.54	980.84	-2.35	5.67	4.80	1.53	-0.47	-60.56	
1,013.00	1.63	285.91	1,012.83	-2.03	4.92	4.16	1.66	1.00	-51.97	
1,044.00	1.73	276.85	1,043.82	-1.86	4.03	3.58	0.91	0.32	-29.23	
1,076.00	1.95	272.95	1,075.80	-1.77	3.01	3.01	0.79	0.69	-12.19	
1,108.00	2.23	269.43	1,107.78	-1.75	1.84	2.42	0.96	0.88	-11.00	
1,140.00	2.14	272.54	1,139.76	-1.73	0.62	1.81	0.47	-0.28	9.72	
1,172.00	1.85	287.01	1,171.74	-1.55	-0.47	1.13	1.81	-0.91	45.22	
1,204.00	1.76	286.43	1,203.72	-1.26	-1.43	0.41	0.29	-0.28	-1.81	
1,235.00	1.85	296.02	1,234.71	-0.91	-2.34	-0.34	1.02	0.29	30.94	
1,267.00	2.07	300.88	1,266.69	-0.38	-3.30	-1.26	0.86	0.69	15.19	
1,299.00	1.99	305.41	1,298.67	0.23	-4.25	-2.26	0.56	-0.25	14.16	
1,330.00	2.09	312.31	1,329.65	0.93	-5.11	-3.28	0.85	0.32	22.26	
1,362.00	2.44	316.02	1,361.62	1.81	-6.01	-4.49	1.19	1.09	11.59	
1,394.00	2.58	320.44	1,393.59	2.86	-6.94	-5.86	0.75	0.44	13.81	
1,426.00	2.33	324.50	1,425.56	3.94	-7.78	-7.21	0.95	-0.78	12.69	
1,457.00	2.63	329.09	1,456.53	5.06	-8.51	-8.55	1.16	0.97	14.81	
1,489.00	2.52	333.42	1,488.50	6.32	-9.20	-9.99	0.70	-0.34	13.53	
1,520.00	2.07	338.14	1,519.48	7.45	-9.72	-11.22	1.57	-1.45	15.23	
1,550.00	1.52	336.42	1,549.46	8.32	-10.08	-12.16	1.84	-1.83	-5.73	
1,581.00	0.93	346.96	1,580.45	8.94	-10.30	-12.81	2.03	-1.90	34.00	
1,612.00	0.75	351.17	1,611.45	9.39	-10.39	-13.24	0.61	-0.58	13.58	



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Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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)
1,644.00	0.74	343.31	1,643.45	9.79	-10.48	-13.64	0.32	-0.03	-24.56
1,676.00	0.77	357.85	1,675.45	10.20	-10.54	-14.03	0.60	0.09	45.44
1,706.00	0.95	356.91	1,705.44	10.65	-10.57	-14.44	0.60	0.60	-3.13
1,738.00	0.81	8.27	1,737.44	11.14	-10.55	-14.86	0.70	-0.44	35.50
1,769.00	0.94	18.33	1,768.44	11.60	-10.44	-15.20	0.65	0.42	32.45
1,800.00	0.93	19.08	1,799.43	12.08	-10.27	-15.54	0.05	-0.03	2.42
1,832.00	0.93	29.96	1,831.43	12.55	-10.06	-15.85	0.55	0.00	34.00
1,864.00	1.02	39.54	1,863.42	13.00	-9.75	-16.09	0.58	0.28	29.94
1,896.00	0.92	39.80	1,895.42	13.41	-9.40	-16.29	0.31	-0.31	0.81
1,927.00	0.91	41.78	1,926.41	13.79	-9.08	-16.46	0.11	-0.03	6.39
1,959.00	0.59	46.35	1,958.41	14.09	-8.79	-16.58	1.02	-1.00	14.28
1,991.00	0.46	37.68	1,990.41	14.31	-8.59	-16.68	0.47	-0.41	-27.09
2,022.00	0.53	41.92	2,021.41	14.51	-8.42	-16.77	0.25	0.23	13.68
2,054.00	0.34	56.22	2,053.41	14.67	-8.24	-16.83	0.68	-0.59	44.69
2,086.00	0.20	67.38	2,085.41	14.75	-8.11	-16.83	0.47	-0.44	34.88
2,118.00	0.07	195.11	2,117.41	14.75	-8.07	-16.81	0.78	-0.41	399.16
2,149.00	0.08	188.18	2,148.41	14.71	-8.07	-16.78	0.04	0.03	-22.35
2,181.00	0.28	229.32	2,180.41	14.64	-8.14	-16.75	0.71	0.63	128.56
2,197.00	0.24	215.53	2,196.41	14.59	-8.19	-16.73	0.46	-0.25	-86.19
2,245.00	0.52	226.96	2,244.41	14.35	-8.40	-16.63	0.60	0.58	23.81
2,277.00	0.59	227.96	2,276.40	14.15	-8.63	-16.56	0.22	0.22	3.13
2,308.00	0.69	231.19	2,307.40	13.92	-8.90	-16.49	0.34	0.32	10.42
2,340.00	0.89	230.15	2,339.40	13.64	-9.24	-16.41	0.63	0.63	-3.25
2,371.00	1.00	233.51	2,370.39	13.33	-9.64	-16.33	0.40	0.35	10.84
2,402.00	0.95	244.38	2,401.39	13.05	-10.09	-16.31	0.62	-0.16	35.06
2,434.00	0.87	254.71	2,433.39	12.88	-10.56	-16.38	0.57	-0.25	32.28
2,465.00	0.83	256.67	2,464.38	12.76	-11.01	-16.50	0.16	-0.13	6.32
2,497.00	0.74	246.77	2,496.38	12.63	-11.42	-16.58	0.51	-0.28	-30.94
2,529.00	0.62	236.07	2,528.38	12.45	-11.76	-16.58	0.54	-0.38	-33.44
2,560.00	0.56	218.26	2,559.38	12.24	-11.99	-16.51	0.62	-0.19	-57.45
2,592.00	0.63	201.39	2,591.37	11.95	-12.15	-16.34	0.59	0.22	-52.72
2,624.00	0.85	184.37	2,623.37	11.55	-12.23	-16.03	0.96	0.69	-53.19
2,656.00	0.87	184.30	2,655.37	11.07	-12.27	-15.63	0.06	0.06	-0.22
2,687.00	0.91	174.93	2,686.36	10.59	-12.26	-15.20	0.49	0.13	-30.23
2,719.00	0.95	168.43	2,718.36	10.08	-12.19	-14.72	0.35	0.13	-20.31
2,750.00	1.12	161.65	2,749.36	9.54	-12.04	-14.18	0.67	0.55	-21.87
2,782.00	1.18	163.23	2,781.35	8.93	-11.85	-13.55	0.21	0.19	4.94
2,813.00	1.30	157.11	2,812.34	8.30	-11.62	-12.88	0.58	0.39	-19.74
2,845.00	1.31	156.04	2,844.33	7.63	-11.33	-12.16	0.08	0.03	-3.34
2,876.00	1.14	144.95	2,875.33	7.05	-11.01	-11.50	0.94	-0.55	-35.77
2,907.00	1.03	132.92	2,906.32	6.61	-10.63	-10.93	0.81	-0.35	-38.81
2,937.00	0.75	120.41	2,936.32	6.33	-10.26	-10.50	1.13	-0.93	-41.70
2,970.00	0.50	85.11	2,969.32	6.23	-9.93	-10.26	1.36	-0.76	-106.97



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3,001.00	0.56	59.04	3,000.31	6.32	-9.67	-10.21	0.79	0.19	-84.10
3,033.00	0.67	41.76	3,032.31	6.54	-9.41	-10.28	0.67	0.34	-54.00
3,064.00	0.86	17.89	3,063.31	6.89	-9.22	-10.50	1.18	0.61	-77.00
3,096.00	1.08	7.42	3,095.30	7.42	-9.10	-10.90	0.88	0.69	-32.72
3,128.00	1.15	359.47	3,127.30	8.04	-9.07	-11.43	0.53	0.22	-24.84
3,159.00	1.28	348.08	3,158.29	8.69	-9.14	-12.03	0.88	0.42	-36.74
3,191.00	1.42	335.00	3,190.28	9.40	-9.38	-12.77	1.05	0.44	-40.88
3,222.00	1.51	326.05	3,221.27	10.09	-9.77	-13.56	0.79	0.29	-28.87
3,254.00	1.74	321.32	3,253.26	10.82	-10.31	-14.46	0.83	0.72	-14.78
3,286.00	1.82	314.14	3,285.24	11.55	-10.98	-15.42	0.74	0.25	-22.44
3,318.00	1.94	313.37	3,317.23	12.28	-11.74	-16.43	0.38	0.38	-2.41
3,349.00	2.12	309.42	3,348.21	13.00	-12.56	-17.46	0.74	0.58	-12.74
3,381.00	2.26	307.22	3,380.18	13.76	-13.52	-18.59	0.51	0.44	-6.88
3,412.00	2.40	306.78	3,411.16	14.52	-14.53	-19.74	0.46	0.45	-1.42
3,444.00	2.48	306.65	3,443.13	15.33	-15.62	-20.98	0.25	0.25	-0.41
3,476.00	2.54	309.03	3,475.10	16.19	-16.73	-22.27	0.38	0.19	7.44
3,508.00	2.63	308.29	3,507.07	17.09	-17.86	-23.60	0.30	0.28	-2.31
3,539.00	2.66	308.27	3,538.03	17.98	-18.98	-24.92	0.10	0.10	-0.06
3,571.00	2.77	308.19	3,570.00	18.92	-20.17	-26.32	0.34	0.34	-0.25
3,603.00	2.84	310.40	3,601.96	19.91	-21.38	-27.77	0.40	0.22	6.91
3,635.00	2.88	313.63	3,633.92	20.98	-22.57	-29.28	0.52	0.13	10.09
3,666.00	3.08	314.37	3,664.88	22.10	-23.72	-30.82	0.66	0.65	2.39
3,698.00	3.01	316.46	3,696.83	23.31	-24.92	-32.46	0.41	-0.22	6.53
3,730.00	2.98	317.68	3,728.79	24.53	-26.06	-34.08	0.22	-0.09	3.81
3,762.00	2.98	319.59	3,760.75	25.78	-27.16	-35.70	0.31	0.00	5.97
3,794.00	3.08	319.53	3,792.70	27.07	-28.25	-37.36	0.31	0.31	-0.19
3,825.00	3.00	316.01	3,823.66	28.28	-29.36	-38.96	0.66	-0.26	-11.35
3,857.00	2.93	315.45	3,855.61	29.47	-30.51	-40.56	0.24	-0.22	-1.75
3,889.00	2.99	313.64	3,887.57	30.63	-31.69	-42.14	0.35	0.19	-5.66
3,921.00	3.00	310.11	3,919.53	31.74	-32.93	-43.72	0.58	0.03	-11.03
3,952.00	3.03	307.19	3,950.49	32.76	-34.21	-45.23	0.50	0.10	-9.42
3,984.00	3.17	306.05	3,982.44	33.79	-35.60	-46.80	0.48	0.44	-3.56
4,016.00	3.31	304.91	4,014.39	34.84	-37.07	-48.44	0.48	0.44	-3.56
4,048.00	3.66	304.43	4,046.33	35.95	-38.67	-50.18	1.10	1.09	-1.50
4,079.00	3.60	306.59	4,077.27	37.09	-40.27	-51.95	0.48	-0.19	6.97
4,111.00	3.61	306.93	4,109.20	38.29	-41.88	-53.78	0.07	0.03	1.06
4,142.00	3.89	304.79	4,140.14	39.48	-43.52	-55.62	1.01	0.90	-6.90
4,174.00	4.08	303.33	4,172.06	40.72	-45.37	-57.60	0.67	0.59	-4.56
4,205.00	4.10	302.78	4,202.98	41.93	-47.22	-59.55	0.14	0.06	-1.77
4,237.00	4.17	302.31	4,234.90	43.17	-49.16	-61.58	0.24	0.22	-1.47
4,269.00	4.24	300.80	4,266.81	44.40	-51.16	-63.62	0.41	0.22	-4.72
4,300.00	4.14	297.64	4,297.73	45.50	-53.14	-65.54	0.81	-0.32	-10.19
4,332.00	4.21	297.91	4,329.64	46.59	-55.20	-67.49	0.23	0.22	0.84



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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)
4,364.00	3.93	297.93	4,361.56	47.65	-57.21	-69.39	0.88	-0.88	0.06
4,396.00	3.96	298.27	4,393.49	48.69	-59.15	-71.24	0.12	0.09	1.06
4,419.00	4.02	298.87	4,416.43	49.46	-60.55	-72.59	0.32	0.26	2.61
4,504.00	4.69	303.27	4,501.18	52.80	-66.07	-78.19	0.88	0.79	5.18
4,597.00	3.99	304.64	4,593.92	56.73	-71.91	-84.45	0.76	-0.75	1.47
4,690.00	2.55	307.03	4,686.76	59.81	-76.22	-89.24	1.55	-1.55	2.57
4,783.00	1.38	313.02	4,779.71	61.82	-78.69	-92.19	1.28	-1.26	6.44
4,876.00	1.04	323.08	4,872.69	63.26	-80.02	-94.10	0.43	-0.37	10.82
4,970.00	0.97	295.09	4,966.67	64.28	-81.25	-95.58	0.52	-0.07	-29.78
5,063.00	1.13	289.03	5,059.66	64.91	-82.83	-96.90	0.21	0.17	-6.52
5,156.00	0.30	311.31	5,152.65	65.37	-83.88	-97.81	0.92	-0.89	23.96
5,249.00	0.28	55.51	5,245.65	65.66	-83.88	-98.06	0.49	-0.02	112.04
5,342.00	0.23	91.58	5,338.65	65.78	-83.50	-97.99	0.18	-0.05	38.78
5,435.00	0.48	115.26	5,431.65	65.61	-82.97	-97.58	0.31	0.27	25.46
5,528.00	0.62	116.80	5,524.64	65.22	-82.16	-96.85	0.15	0.15	1.66
5,621.00	0.40	158.57	5,617.64	64.69	-81.60	-96.11	0.45	-0.24	44.91
5,714.00	0.44	219.09	5,710.64	64.11	-81.70	-95.66	0.46	0.04	65.08
5,808.00	0.60	217.58	5,804.63	63.44	-82.23	-95.33	0.17	0.17	-1.61
5,901.00	0.72	221.73	5,897.63	62.62	-82.92	-94.94	0.14	0.13	4.46
5,992.00	0.51	26.71	5,988.62	62.55	-83.12	-94.98	1.34	-0.23	181.30
6,085.00	0.72	35.76	6,081.62	63.40	-82.59	-95.46	0.25	0.23	9.73
6,180.00	0.81	33.23	6,176.61	64.44	-81.87	-96.03	0.10	0.09	-2.66
6,273.00	0.43	25.91	6,269.60	65.31	-81.36	-96.54	0.42	-0.41	-7.87
6,367.00	0.26	346.25	6,363.60	65.83	-81.26	-96.94	0.30	-0.18	-42.19
6,460.00	0.36	326.68	6,456.60	66.28	-81.47	-97.44	0.16	0.11	-21.04
6,555.00	0.44	320.79	6,551.60	66.81	-81.86	-98.10	0.09	0.08	-6.20
6,643.00	0.84	329.64	6,639.59	67.63	-82.40	-99.07	0.47	0.45	10.06
6,736.00	0.66	352.49	6,732.59	68.75	-82.81	-100.25	0.37	-0.19	24.57
6,829.00	0.57	8.57	6,825.58	69.74	-82.82	-101.12	0.21	-0.10	17.29
6,922.00	0.84	43.73	6,918.57	70.69	-82.28	-101.69	0.54	0.29	37.81
7,014.00	0.31	109.73	7,010.57	71.09	-81.57	-101.70	0.83	-0.58	71.74
7,107.00	0.57	153.77	7,103.57	70.59	-81.13	-101.05	0.44	0.28	47.35
7,201.00	0.88	219.95	7,197.56	69.62	-81.39	-100.32	0.89	0.33	70.40
7,294.00	1.32	224.78	7,290.54	68.31	-82.60	-99.77	0.48	0.47	5.19
7,387.00	0.75	207.56	7,383.53	67.01	-83.64	-99.13	0.69	-0.61	-18.52
7,480.00	1.01	201.76	7,476.52	65.71	-84.23	-98.28	0.30	0.28	-6.24
7,572.00	0.66	186.46	7,568.51	64.43	-84.59	-97.33	0.45	-0.38	-16.63
7,666.00	0.75	266.09	7,662.50	63.85	-85.26	-97.15	0.96	0.10	84.71
7,759.00	0.79	318.39	7,755.49	64.29	-86.29	-98.03	0.73	0.04	56.24
7,852.00	1.49	321.90	7,848.48	65.72	-87.47	-99.85	0.76	0.75	3.77
7,945.00	2.64	321.46	7,941.41	68.35	-89.55	-103.16	1.24	1.24	-0.47
8,038.00	4.18	320.67	8,034.25	72.65	-93.03	-108.61	1.66	1.66	-0.85
8,132.00	5.67	317.07	8,127.90	78.70	-98.36	-116.48	1.62	1.59	-3.83
8,225.00	6.73	314.96	8,220.35	85.91	-105.35	-126.18	1.17	1.14	-2.27



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
8,317.00	7.69	316.28	8,311.62	94.17	-113.42	-137.31	1.06	1.04	1.43
8,410.00	8.22	315.22	8,403.73	103.38	-122.40	-149.72	0.59	0.57	-1.14
8,503.00	9.05	314.96	8,495.67	113.27	-132.26	-163.15	0.89	0.89	-0.28
8,596.00	11.52	314.34	8,587.17	124.93	-144.08	-179.07	2.66	2.66	-0.67
8,689.00	12.79	313.11	8,678.08	138.46	-158.24	-197.76	1.39	1.37	-1.32
8,783.00	14.24	313.29	8,769.48	153.50	-174.25	-218.67	1.54	1.54	0.19
8,876.00	14.20	311.71	8,859.63	168.93	-191.09	-240.33	0.42	-0.04	-1.70
8,969.00	13.49	312.85	8,949.93	183.90	-207.56	-261.40	0.82	-0.76	1.23
9,062.00	15.69	319.53	9,039.93	200.84	-223.68	-284.03	2.97	2.37	7.18
9,155.00	18.20	323.75	9,128.89	222.13	-240.43	-310.77	3.00	2.70	4.54
9,248.00	18.59	323.84	9,217.14	245.81	-257.76	-339.88	0.42	0.42	0.10
9,341.00	19.16	324.45	9,305.14	270.19	-275.38	-369.75	0.65	0.61	0.66
9,435.00	18.20	324.10	9,394.18	294.64	-292.96	-399.65	1.03	-1.02	-0.37
9,527.00	18.24	322.52	9,481.57	317.70	-310.15	-428.15	0.54	0.04	-1.72
9,621.00	18.46	319.53	9,570.79	340.70	-328.76	-457.28	1.03	0.23	-3.18
9,714.00	17.23	317.24	9,659.32	362.01	-347.67	-485.08	1.52	-1.32	-2.46
9,807.00	15.91	314.96	9,748.45	381.13	-366.04	-510.71	1.58	-1.42	-2.45
9,900.00	14.59	312.94	9,838.18	398.12	-383.63	-534.09	1.53	-1.42	-2.17
9,935.00	13.98	311.44	9,872.10	403.92	-390.03	-542.27	2.04	-1.74	-4.29
9,973.00	14.16	310.56	9,908.96	409.98	-397.00	-550.94	0.74	0.47	-2.32
10,020.00	13.45	310.21	9,954.60	417.25	-405.54	-561.44	1.52	-1.51	-0.74
10,066.00	11.87	308.63	9,999.48	423.66	-413.33	-570.81	3.52	-3.43	-3.43
10,113.00	10.82	307.22	10,045.56	429.34	-420.62	-579.32	2.31	-2.23	-3.00
10,159.00	9.76	306.52	10,090.82	434.27	-427.19	-586.82	2.32	-2.30	-1.52
10,210.00	9.15	304.59	10,141.13	439.15	-434.00	-594.38	1.35	-1.20	-3.78
10,257.00	5.45	282.44	10,187.75	441.75	-439.26	-599.20	9.75	-7.87	-47.13
10,304.00	4.48	219.69	10,234.60	440.82	-442.61	-600.01	11.13	-2.06	-133.51
10,349.00	7.83	182.95	10,279.35	436.40	-443.89	-596.77	11.14	7.44	-81.64
10,396.00	12.05	160.27	10,325.65	428.58	-442.40	-589.20	12.09	8.98	-48.26
10,442.00	15.65	153.77	10,370.31	418.49	-438.04	-578.26	8.51	7.83	-14.13
10,489.00	19.52	151.13	10,415.11	405.93	-431.44	-564.07	8.41	8.23	-5.62
10,535.00	21.19	155.17	10,458.23	391.65	-424.24	-548.09	4.74	3.63	8.78
10,582.00	22.95	161.50	10,501.79	375.25	-417.76	-530.60	6.29	3.74	13.47
10,628.00	25.68	163.79	10,543.71	357.17	-412.13	-512.06	6.28	5.93	4.98
10,675.00	29.02	164.67	10,585.45	336.39	-406.27	-491.04	7.16	7.11	1.87
10,721.00	32.10	163.26	10,625.06	313.92	-399.80	-468.25	6.87	6.70	-3.07
10,768.00	35.88	162.73	10,664.02	288.80	-392.11	-442.55	8.07	8.04	-1.13
10,814.00	39.48	162.73	10,700.42	261.95	-383.77	-415.02	7.83	7.83	0.00
10,861.00	42.65	160.10	10,735.85	232.70	-373.91	-384.65	7.68	6.74	-5.60
10,907.00	45.81	156.76	10,768.82	202.88	-362.09	-352.84	8.53	6.87	-7.26
10,954.00	48.98	153.42	10,800.63	171.53	-347.50	-318.35	8.53	6.74	-7.11
11,000.00	51.62	152.54	10,830.01	140.01	-331.42	-282.98	5.92	5.74	-1.91
11,047.00	54.17	152.01	10,858.37	106.83	-313.98	-245.50	5.50	5.43	-1.13



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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)
11,093.00	56.63	151.66	10,884.48	73.46	-296.11	-207.65	5.38	5.35	-0.76
11,140.00	59.44	151.13	10,909.36	38.45	-277.02	-167.78	6.05	5.98	-1.13
11,186.00	62.34	150.78	10,931.74	3.32	-257.51	-127.59	6.34	6.30	-0.76
11,233.00	66.04	150.25	10,952.20	-33.50	-236.68	-85.29	7.94	7.87	-1.13
11,279.00	69.47	149.90	10,969.61	-70.39	-215.45	-42.73	7.49	7.46	-0.76
11,321.00	72.28	150.08	10,983.37	-104.75	-195.60	-3.06	6.70	6.69	0.43
11,372.00	75.18	150.60	10,997.66	-147.29	-171.38	45.89	5.77	5.69	1.02
11,419.00	78.26	151.13	11,008.45	-187.24	-149.11	91.63	6.64	6.55	1.13
11,465.00	81.07	151.48	11,016.70	-226.94	-127.39	136.88	6.15	6.11	0.76
11,512.00	84.15	151.83	11,022.75	-267.95	-105.26	183.48	6.59	6.55	0.74
11,558.00	87.76	151.83	11,025.99	-308.40	-83.60	229.35	7.85	7.85	0.00
11,651.00	88.64	149.72	11,028.91	-389.51	-38.22	322.30	2.46	0.95	-2.27
11,744.00	88.64	150.08	11,031.12	-469.95	8.41	-415.26	0.39	0.00	0.39
11,836.00	88.55	149.37	11,033.38	-549.38	54.77	507.20	0.78	-0.10	-0.77
11,929.00	88.46	150.43	11,035.80	-629.81	101.40	600.15	1.14	-0.10	1.14
12,023.00	88.90	150.78	11,037.97	-711.68	147.52	694.12	0.60	0.47	0.37
12,116.00	88.90	148.67	11,039.76	-791.98	194.40	787.08	2.27	0.00	-2.27
12,209.00	88.81	148.67	11,041.61	-871.40	242.75	879.98	0.10	-0.10	0.00
12,302.00	88.90	149.55	11,043.47	-951.19	290.48	972.91	0.95	0.10	0.95
12,395.00	88.81	148.32	11,045.33	-1,030.84	338.46	1,065.82	1.33	-0.10	-1.32
12,488.00	88.90	149.20	11,047.19	-1,110.34	386.68	1,158.73	0.95	0.10	0.95
12,581.00	88.81	148.85	11,049.05	-1,190.06	434.54	1,251.65	0.39	-0.10	-0.38
12,674.00	88.72	149.20	11,051.05	-1,269.78	482.39	1,344.57	0.39	-0.10	0.38
12,767.00	88.37	149.55	11,053.41	-1,349.78	529.75	1,437.50	0.53	-0.38	0.38
12,860.00	88.64	152.36	11,055.84	-1,431.05	574.88	1,530.46	3.03	0.29	3.02
12,953.00	88.37	151.48	11,058.27	-1,513.07	618.64	1,623.42	0.99	-0.29	-0.95
13,046.00	88.72	150.78	11,060.63	-1,594.49	663.53	1,716.39	0.84	0.38	-0.75
13,139.00	88.90	153.94	11,062.56	-1,676.85	706.66	1,809.33	3.40	0.19	3.40
13,231.00	88.90	153.24	11,064.33	-1,759.23	747.57	1,901.22	0.76	0.00	-0.76
13,324.00	89.16	151.31	11,065.90	-1,841.54	790.83	1,994.18	2.09	0.28	-2.08
13,417.00	88.81	150.25	11,067.55	-1,922.69	836.22	2,087.17	1.20	-0.38	-1.14
13,511.00	88.99	149.02	11,069.35	-2,003.78	883.73	2,181.12	1.32	0.19	-1.31
13,605.00	88.99	149.02	11,071.01	-2,084.36	932.10	2,275.05	0.00	0.00	0.00
13,698.00	88.55	147.97	11,073.01	-2,163.63	980.69	2,367.93	1.22	-0.47	-1.13
13,791.00	88.37	148.67	11,075.51	-2,242.74	1,029.52	2,460.79	0.78	-0.19	0.75
13,884.00	88.72	150.08	11,077.87	-2,322.74	1,076.87	2,553.72	1.56	0.38	1.52
13,977.00	88.55	148.49	11,080.08	-2,402.67	1,124.36	2,646.65	1.72	-0.18	-1.71
14,071.00	88.55	150.08	11,082.46	-2,483.45	1,172.36	2,740.57	1.69	0.00	1.69
14,164.00	88.46	150.08	11,084.89	-2,564.03	1,218.73	2,833.53	0.10	-0.10	0.00
14,258.00	89.87	153.24	11,086.26	-2,646.74	1,263.34	2,927.50	3.68	1.50	3.36
14,351.00	90.04	149.55	11,086.33	-2,728.38	1,307.86	3,020.48	3.97	0.18	-3.97
14,444.00	89.87	146.56	11,086.40	-2,807.29	1,357.06	3,113.34	3.22	-0.18	-3.22
14,537.00	89.43	148.49	11,086.97	-2,885.74	1,406.99	3,206.16	2.13	-0.47	2.08



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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)
14,630.00	89.69	149.37	11,087.69	-2,965.39	1,454.98	3,299.09	0.99	0.28	0.95
14,724.00	89.69	151.48	11,088.19	-3,047.14	1,501.37	3,393.08	2.24	0.00	2.24
14,817.00	89.43	150.78	11,088.91	-3,128.58	1,546.27	3,486.08	0.80	-0.28	-0.75
14,912.00	89.34	149.90	11,089.93	-3,211.13	1,593.28	3,581.07	0.93	-0.09	-0.93
15,006.00	89.16	152.54	11,091.16	-3,293.50	1,638.53	3,675.05	2.81	-0.19	2.81
15,100.00	89.25	152.36	11,092.46	-3,376.83	1,682.00	3,769.01	0.21	0.10	-0.19
15,192.00	89.08	154.65	11,093.80	-3,459.16	1,723.04	3,860.91	2.50	-0.18	2.49
15,285.00	89.16	154.65	11,095.23	-3,543.19	1,762.85	3,953.71	0.09	0.09	0.00
15,378.00	88.72	151.13	11,096.95	-3,625.95	1,805.22	4,046.64	3.81	-0.47	-3.78
15,471.00	88.99	147.44	11,098.81	-3,705.87	1,852.70	4,139.56	3.98	0.29	-3.97
15,564.00	88.72	144.28	11,100.67	-3,782.82	1,904.88	4,232.15	3.41	-0.29	-3.40
15,657.00	88.29	146.38	11,103.10	-3,859.27	1,957.76	4,324.65	2.30	-0.46	2.26
15,750.00	88.29	148.67	11,105.87	-3,937.69	2,007.67	4,417.43	2.46	0.00	2.46
15,844.00	88.90	149.02	11,108.18	-4,018.11	2,056.29	4,511.33	0.75	0.65	0.37
15,937.00	88.90	149.02	11,109.96	-4,097.83	2,104.15	4,604.25	0.00	0.00	0.00
16,030.00	89.08	149.72	11,111.60	-4,177.84	2,151.52	4,697.20	0.78	0.19	0.75
16,124.00	89.08	150.43	11,113.11	-4,259.30	2,198.41	4,791.17	0.76	0.00	0.76
16,217.00	88.90	151.66	11,114.75	-4,340.66	2,243.43	4,884.16	1.34	-0.19	1.32
16,309.00	88.81	151.48	11,116.59	-4,421.55	2,287.22	4,976.13	0.22	-0.10	-0.20
16,403.00	88.99	151.48	11,118.40	-4,504.12	2,332.09	5,070.11	0.19	0.19	0.00
16,496.00	88.81	153.24	11,120.18	-4,586.49	2,375.22	5,163.07	1.90	-0.19	1.89
16,590.00	89.34	152.19	11,121.70	-4,670.02	2,418.31	5,257.01	1.25	0.56	-1.12
16,682.00	89.69	151.66	11,122.48	-4,751.19	2,461.60	5,349.00	0.69	0.38	-0.58
16,775.00	88.55	149.72	11,123.91	-4,832.27	2,507.12	5,441.98	2.42	-1.23	-2.09
16,868.00	89.60	148.85	11,125.41	-4,912.21	2,554.62	5,534.92	1.47	1.13	-0.94
16,892.00	89.08	149.55	11,125.68	-4,932.83	2,566.91	5,558.91	3.63	-2.17	2.92
16,986.00	89.52	151.48	11,126.83	-5,014.64	2,613.17	5,652.89	2.11	0.47	2.05
17,079.00	89.52	152.01	11,127.61	-5,096.56	2,657.19	5,745.88	0.57	0.00	0.57
17,172.00	90.13	151.31	11,127.89	-5,178.41	2,701.34	5,838.88	1.00	0.66	-0.75
17,265.00	89.78	151.48	11,127.97	-5,260.06	2,745.86	5,931.87	0.42	-0.38	0.18
17,358.00	89.08	149.72	11,128.89	-5,341.07	2,791.51	6,024.86	2.04	-0.75	-1.89
17,450.00	88.29	149.72	11,131.00	-5,420.50	2,837.89	6,116.81	0.86	-0.86	0.00
17,544.00	88.55	149.55	11,133.60	-5,501.58	2,885.39	6,210.75	0.33	0.28	-0.18
17,637.00	87.76	150.60	11,136.59	-5,582.13	2,931.76	6,303.68	1.41	-0.85	1.13
17,729.00	88.02	150.43	11,139.98	-5,662.16	2,977.01	6,395.62	0.34	0.28	-0.18
17,822.00	87.93	150.08	11,143.26	-5,742.86	3,023.12	6,488.55	0.39	-0.10	-0.38
17,915.00	88.64	150.08	11,146.05	-5,823.43	3,069.49	6,581.50	0.76	0.76	0.00
18,008.00	88.72	150.43	11,148.19	-5,904.15	3,115.62	6,674.46	0.39	0.09	0.38
18,101.00	89.08	150.25	11,149.98	-5,984.95	3,161.63	6,767.44	0.43	0.39	-0.19
18,194.00	89.16	149.02	11,151.40	-6,065.18	3,208.63	6,860.40	1.33	0.09	-1.32
18,286.00	88.72	148.85	11,153.11	-6,143.98	3,256.10	6,952.32	0.51	-0.48	-0.18
18,379.00	88.90	148.14	11,155.04	-6,223.25	3,304.69	7,045.21	0.79	0.19	-0.76
18,472.00	89.08	148.49	11,156.68	-6,302.37	3,353.53	7,138.09	0.42	0.19	0.38
18,565.00	88.99	148.49	11,158.24	-6,381.65	3,402.13	7,230.98	0.10	-0.10	0.00



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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)
18,658.00	88.81	149.37	11,160.03	-6,461.29	3,450.11	7,323.90	0.97	-0.19	0.95
18,751.00	88.81	149.55	11,161.96	-6,541.37	3,497.36	7,416.85	0.19	0.00	0.19
18,844.00	89.43	150.08	11,163.39	-6,621.75	3,544.11	7,509.81	0.88	0.67	0.57
18,938.00	89.43	149.37	11,164.32	-6,702.93	3,591.50	7,603.78	0.76	0.00	-0.76
19,031.00	89.43	149.72	11,165.25	-6,783.09	3,638.64	7,696.75	0.38	0.00	0.38
19,124.00	89.34	149.72	11,166.25	-6,863.40	3,685.53	7,789.72	0.10	-0.10	0.00
19,217.00	88.99	150.43	11,167.60	-6,943.99	3,731.92	7,882.69	0.85	-0.38	0.76
19,310.00	88.72	150.78	11,169.46	-7,025.00	3,777.56	7,975.67	0.48	-0.29	0.38
19,402.00	88.99	151.31	11,171.30	-7,105.49	3,822.09	8,067.65	0.65	0.29	0.58
19,496.00	88.37	151.31	11,173.46	-7,187.92	3,867.20	8,161.63	0.66	-0.66	0.00
19,589.00	87.85	150.96	11,176.53	-7,269.33	3,912.07	8,254.57	0.67	-0.56	-0.38
19,683.00	87.58	150.96	11,180.28	-7,351.44	3,957.66	8,348.50	0.29	-0.29	0.00
19,776.00	87.32	150.96	11,184.42	-7,432.67	4,002.76	8,441.41	0.28	-0.28	0.00
19,870.00	86.70	151.31	11,189.32	-7,514.88	4,048.08	8,535.28	0.76	-0.66	0.37
19,963.00	89.52	152.36	11,192.39	-7,596.81	4,091.95	8,628.21	3.24	3.03	1.13
20,056.00	89.25	151.66	11,193.38	-7,678.93	4,135.59	8,721.19	0.81	-0.29	-0.75
20,150.00	89.78	151.31	11,194.18	-7,761.52	4,180.46	8,815.18	0.68	0.56	-0.37
20,243.00	90.13	150.78	11,194.25	-7,842.90	4,225.49	8,908.18	0.68	0.38	-0.57
20,336.00	89.96	149.02	11,194.18	-7,923.35	4,272.13	9,001.16	1.90	-0.18	-1.89
20,429.00	89.96	148.67	11,194.25	-8,002.94	4,320.24	9,094.09	0.38	0.00	-0.38
20,523.00	89.87	149.20	11,194.38	-8,083.46	4,368.74	9,188.03	0.57	-0.10	0.56
20,616.00	89.78	148.85	11,194.67	-8,163.20	4,416.61	9,280.97	0.39	-0.10	-0.38
20,709.00	89.87	148.85	11,194.95	-8,242.79	4,464.71	9,373.90	0.10	0.10	0.00
20,802.00	89.87	149.02	11,195.16	-8,322.45	4,512.70	9,466.84	0.18	0.00	0.18
20,896.00	89.34	150.08	11,195.81	-8,403.48	4,560.34	9,560.80	1.26	-0.56	1.13
20,989.00	89.34	150.08	11,196.88	-8,484.08	4,606.72	9,653.78	0.00	0.00	0.00
21,082.00	89.25	150.08	11,198.03	-8,564.68	4,653.11	9,746.76	0.10	-0.10	0.00
21,175.00	89.25	150.08	11,199.24	-8,645.28	4,699.49	9,839.74	0.00	0.00	0.00
21,269.00	89.25	150.08	11,200.48	-8,726.74	4,746.37	9,933.72	0.00	0.00	0.00
21,361.00	89.25	150.08	11,201.68	-8,806.47	4,792.26	10,025.70	0.00	0.00	0.00
21,455.00	89.25	150.08	11,202.91	-8,887.94	4,839.14	10,119.68	0.00	0.00	0.00
21,547.00	89.34	149.90	11,204.04	-8,967.60	4,885.15	10,211.66	0.22	0.10	-0.20
21,639.00	88.99	150.60	11,205.38	-9,047.46	4,930.80	10,303.64	0.85	-0.38	0.76
21,733.00	88.99	150.60	11,207.04	-9,129.35	4,976.93	10,397.62	0.00	0.00	0.00
21,826.00	89.08	150.43	11,208.61	-9,210.29	5,022.70	10,490.60	0.21	0.10	-0.18
21,919.00	88.99	150.25	11,210.17	-9,291.09	5,068.72	10,583.58	0.22	-0.10	-0.19
22,012.00	88.99	150.60	11,211.81	-9,371.96	5,114.61	10,676.56	0.38	0.00	0.38
22,105.00	88.99	150.78	11,213.45	-9,453.04	5,160.13	10,769.55	0.19	0.00	0.19
22,197.00	89.08	150.43	11,215.00	-9,533.19	5,205.28	10,861.53	0.39	0.10	-0.38
22,290.00	89.25	150.60	11,216.36	-9,614.13	5,251.05	10,954.52	0.26	0.18	0.18
22,383.00	89.34	150.08	11,217.50	-9,694.94	5,297.07	11,047.50	0.57	0.10	-0.56
22,476.00	89.43	150.60	11,218.50	-9,775.75	5,343.09	11,140.49	0.57	0.10	0.56
22,570.00	89.43	150.60	11,219.43	-9,857.64	5,389.23	11,234.48	0.00	0.00	0.00



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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)
22,663.00	89.43	150.25	11,220.36	-9,938.52	5,435.13	11,327.47	0.38	0.00	-0.38
22,756.00	89.52	150.08	11,221.21	-10,019.19	5,481.39	11,420.46	0.21	0.10	-0.18
22,849.00	89.43	150.25	11,222.06	-10,099.86	5,527.66	11,513.44	0.21	-0.10	0.18
22,943.00	89.34	150.43	11,223.07	-10,181.54	5,574.17	11,607.43	0.21	-0.10	0.19
23,036.00	89.43	150.25	11,224.07	-10,262.35	5,620.19	11,700.42	0.22	0.10	-0.19
23,130.00	89.43	150.60	11,225.00	-10,344.10	5,666.58	11,794.41	0.37	0.00	-0.37
23,223.00	89.52	150.25	11,225.86	-10,424.98	5,712.48	11,887.40	0.39	0.10	-0.38
23,317.00	89.52	149.72	11,226.64	-10,506.37	5,759.50	11,981.38	0.56	0.00	-0.56
23,410.00	89.52	150.08	11,227.42	-10,586.83	5,806.14	12,074.36	0.39	0.00	0.39
23,504.00	89.16	149.72	11,228.51	-10,668.15	5,853.28	12,168.33	0.54	-0.38	-0.38
23,597.00	89.08	150.43	11,229.93	-10,748.74	5,899.67	12,261.31	0.77	-0.09	0.76
23,691.00	88.90	149.90	11,231.59	-10,830.27	5,946.43	12,355.28	0.60	-0.19	-0.56
23,785.00	88.72	150.78	11,233.54	-10,911.93	5,992.93	12,449.25	0.96	-0.19	0.94
23,878.00	88.81	150.43	11,235.55	-10,992.94	6,038.57	12,542.23	0.39	0.10	-0.38
23,971.00	89.08	150.08	11,237.26	-11,073.67	6,084.70	12,635.20	0.48	0.29	-0.38
24,065.00	88.90	149.90	11,238.92	-11,155.06	6,131.71	12,729.17	0.27	-0.19	-0.19
24,158.00	88.90	149.90	11,240.70	-11,235.50	6,178.34	12,822.14	0.00	0.00	0.00
24,252.00	88.55	149.55	11,242.79	-11,316.66	6,225.72	12,916.09	0.53	-0.37	-0.37
24,345.00	88.55	150.43	11,245.15	-11,397.17	6,272.22	13,009.04	0.95	0.00	0.95
24,439.00	87.85	150.60	11,248.10	-11,478.95	6,318.46	13,102.99	0.77	-0.74	0.18
24,533.00	87.85	150.43	11,251.63	-11,560.72	6,364.69	13,196.92	0.18	0.00	-0.18
24,627.00	87.76	150.08	11,255.23	-11,642.27	6,411.30	13,290.84	0.38	-0.10	-0.37
24,722.00	87.58	149.72	11,259.09	-11,724.40	6,458.90	13,385.75	0.42	-0.19	-0.38
24,817.00	87.58	150.08	11,263.10	-11,806.51	6,506.50	13,480.64	0.38	0.00	0.38
24,911.00	88.55	149.90	11,266.27	-11,887.86	6,553.49	13,574.57	1.05	1.03	-0.19
25,007.00	88.90	150.25	11,268.41	-11,971.04	6,601.37	13,670.53	0.52	0.36	0.36
25,102.00	88.29	149.72	11,270.74	-12,053.28	6,648.88	13,765.49	0.85	-0.64	-0.56
25,197.00	88.29	149.90	11,273.58	-12,135.35	6,696.63	13,860.42	0.19	0.00	0.19
25,289.00	88.11	149.90	11,276.46	-12,214.91	6,742.74	13,952.36	0.20	-0.20	0.00
25,384.00	88.20	149.90	11,279.52	-12,297.06	6,790.36	14,047.29	0.09	0.09	0.00
25,477.00	88.02	150.08	11,282.59	-12,377.54	6,836.85	14,140.23	0.27	-0.19	0.19
25,570.00	88.02	150.25	11,285.80	-12,458.17	6,883.09	14,233.16	0.18	0.00	0.18
25,663.00	88.46	150.78	11,288.66	-12,539.09	6,928.84	14,326.11	0.74	0.47	0.57
25,757.00	88.29	149.72	11,291.33	-12,620.66	6,975.47	14,420.06	1.14	-0.18	-1.13
25,849.00	88.55	149.90	11,293.86	-12,700.15	7,021.71	14,512.01	0.34	0.28	0.20
25,943.00	88.64	149.90	11,296.17	-12,781.45	7,068.84	14,605.96	0.10	0.10	0.00
26,036.00	88.37	150.25	11,298.59	-12,862.03	7,115.22	14,698.92	0.48	-0.29	0.38
26,128.00	88.37	150.08	11,301.21	-12,941.80	7,160.97	14,790.87	0.18	0.00	-0.18
Survey @ 26128.00 MD 11301.21 TVD									
26,222.00	88.37	150.08	11,303.88	-13,023.24	7,207.84	14,884.82	0.00	0.00	0.00
Survey Proj. to 26222.00 MD 11303.88 TVD									



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
153.00	153.00	-0.52	0.24	MWD surveys
26,128.00	11,301.21	-12,941.80	7,160.97	Survey @ 26128.00 MD 11301.21 TVD



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

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 S-22 HU (slot C)					
Well Position	+N/-S	0.00 ft	Northing:	14,447,307.298 usft	Latitude:	39.781555000
	+E/-W	0.00 ft	Easting:	1,717,131.955 usft	Longitude:	-80.726935000
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	1/3/2023	-8.65	66.38	51,589.38798041

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	151.04

Survey Program	Date 3/6/2023			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
14.00	516.00	MWD surf (Original Hole)	MWD	MWD - Standard
569.00	2,197.00	MWD int (Original Hole)	MWD	MWD - Standard
2,245.00	4,419.00	MWD 2245-4419 MD (Original Hole)	MWD	MWD - Standard
4,504.00	26,128.00	MWD (Original Hole)	MWD	MWD - Standard
26,222.00	26,222.00	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	0.00	0.00	0.00	0.00	0.00	14,447,307.298	1,717,131.955	39.781555000	-80.726935000	
14.00	0.00	0.00	14.00	0.00	0.00	14,447,307.298	1,717,131.955	39.781555000	-80.726935000	
153.00	0.47	154.83	153.00	-0.52	0.24	14,447,306.782	1,717,132.197	39.781553581	-80.726934143	
MWD surveys										
181.00	0.38	170.47	181.00	-0.71	0.31	14,447,306.587	1,717,132.261	39.781553044	-80.726933916	
209.00	0.36	156.22	209.00	-0.88	0.36	14,447,306.415	1,717,132.312	39.781552571	-80.726933737	
239.00	0.44	140.29	239.00	-1.06	0.47	14,447,306.240	1,717,132.424	39.781552090	-80.726933342	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
267.00	0.64	161.24	267.00	-1.29	0.59	14,447,306.009	1,717,132.543	39.781551455	-80.726932921
296.00	0.58	144.19	295.99	-1.56	0.73	14,447,305.737	1,717,132.681	39.781550706	-80.726932433
326.00	0.68	160.06	325.99	-1.85	0.88	14,447,305.446	1,717,132.830	39.781549907	-80.726931903
358.00	0.61	164.07	357.99	-2.19	0.99	14,447,305.104	1,717,132.942	39.781548966	-80.726931510
389.00	0.87	163.18	388.99	-2.58	1.10	14,447,304.720	1,717,133.055	39.781547910	-80.726931111
421.00	0.91	158.05	420.98	-3.05	1.27	14,447,304.252	1,717,133.220	39.781546623	-80.726930528
453.00	0.95	168.93	452.98	-3.54	1.41	14,447,303.756	1,717,133.366	39.781545259	-80.726930014
484.00	1.24	169.52	483.97	-4.12	1.52	14,447,303.174	1,717,133.477	39.781543660	-80.726929627
516.00	1.26	179.62	515.97	-4.82	1.59	14,447,302.481	1,717,133.542	39.781537158	-80.726929402
569.00	1.18	157.75	568.95	-5.90	1.80	14,447,301.394	1,717,133.752	39.781538769	-80.726928665
601.00	1.15	136.41	600.95	-6.44	2.14	14,447,300.856	1,717,134.099	39.781537290	-80.726927438
632.00	1.06	124.62	631.94	-6.83	2.59	14,447,300.468	1,717,134.549	39.781536220	-80.726925839
664.00	1.23	106.74	663.94	-7.10	3.17	14,447,300.201	1,717,135.122	39.781535482	-80.726929402
696.00	1.30	93.25	695.93	-7.22	3.86	14,447,300.081	1,717,135.813	39.781535148	-80.726921345
727.00	1.38	77.22	726.92	-7.15	4.57	14,447,300.144	1,717,136.528	39.781535314	-80.726918799
759.00	1.46	63.40	758.91	-6.89	5.31	14,447,300.412	1,717,137.268	39.781536043	-80.726916161
791.00	1.31	51.48	790.90	-6.48	5.96	14,447,300.822	1,717,137.919	39.781537164	-80.726913840
822.00	1.48	27.12	821.89	-5.90	6.42	14,447,301.399	1,717,138.379	39.781538745	-80.726912198
854.00	1.42	14.48	853.88	-5.15	6.71	14,447,302.151	1,717,138.666	39.781540807	-80.726911166
886.00	1.50	355.98	885.87	-4.35	6.78	14,447,302.952	1,717,138.736	39.781543008	-80.726910909
918.00	1.45	339.17	917.86	-3.55	6.61	14,447,303.749	1,717,138.563	39.781545196	-80.726911517
949.00	1.46	321.92	948.85	-2.87	6.23	14,447,304.426	1,717,138.180	39.781547060	-80.726912873
981.00	1.31	302.54	980.84	-2.35	5.67	14,447,304.944	1,717,137.620	39.781548486	-80.726914860
1,013.00	1.63	285.91	1,012.83	-2.03	4.92	14,447,305.265	1,717,136.874	39.781549376	-80.726917512
1,044.00	1.73	276.85	1,043.82	-1.86	4.03	14,447,305.442	1,717,135.985	39.781549868	-80.726920673
1,076.00	1.95	272.95	1,075.80	-1.77	3.01	14,447,305.528	1,717,134.962	39.781550112	-80.726924315
1,108.00	2.23	269.43	1,107.78	-1.75	1.84	14,447,305.549	1,717,133.796	39.781550182	-80.726928466
1,140.00	2.14	272.54	1,139.76	-1.73	0.62	14,447,305.570	1,717,132.576	39.781550248	-80.726932806
1,172.00	1.85	287.01	1,171.74	-1.55	-0.47	14,447,305.747	1,717,131.485	39.781550744	-80.726936687
1,204.00	1.76	286.43	1,203.72	-1.26	-1.43	14,447,306.037	1,717,130.520	39.781551549	-80.726940119
1,235.00	1.85	296.02	1,234.71	-0.91	-2.34	14,447,306.392	1,717,129.614	39.781552529	-80.726943341
1,267.00	2.07	300.88	1,266.69	-0.38	-3.30	14,447,306.915	1,717,128.654	39.781553974	-80.726946753
1,299.00	1.99	305.41	1,298.67	0.23	-4.25	14,447,307.533	1,717,127.705	39.781555681	-80.726950124
1,330.00	2.09	312.31	1,329.65	0.93	-5.11	14,447,308.226	1,717,126.848	39.781557590	-80.726953166
1,362.00	2.44	316.02	1,361.62	1.81	-6.01	14,447,309.109	1,717,125.944	39.781560022	-80.726956376
1,394.00	2.58	320.44	1,393.59	2.86	-6.94	14,447,310.154	1,717,125.012	39.781562901	-80.726959681
1,426.00	2.33	324.50	1,425.56	3.94	-7.78	14,447,311.239	1,717,124.176	39.781565887	-80.726962646
1,457.00	2.63	329.09	1,456.53	5.06	-8.51	14,447,312.362	1,717,123.444	39.781568978	-80.726965237
1,489.00	2.52	333.42	1,488.50	6.32	-9.20	14,447,313.621	1,717,122.752	39.781572441	-80.726967686
1,520.00	2.07	338.14	1,519.48	7.45	-9.72	14,447,314.750	1,717,122.239	39.781575546	-80.726969501
1,550.00	1.52	336.42	1,549.46	8.32	-10.08	14,447,315.618	1,717,121.878	39.781577932	-80.726970777
1,581.00	0.93	346.96	1,580.45	8.94	-10.30	14,447,316.240	1,717,121.657	39.781579642	-80.726971557
1,612.00	0.75	351.17	1,611.45	9.39	-10.39	14,447,316.685	1,717,121.569	39.781580866	-80.726971865
1,644.00	0.74	343.31	1,643.45	9.79	-10.48	14,447,317.090	1,717,121.477	39.781581979	-80.726972187
1,676.00	0.77	357.85	1,675.45	10.20	-10.54	14,447,317.503	1,717,121.410	39.781583113	-80.726972422
1,706.00	0.95	356.91	1,705.44	10.65	-10.57	14,447,317.953	1,717,121.389	39.781584348	-80.726972492
1,738.00	0.81	8.27	1,737.44	11.14	-10.55	14,447,318.441	1,717,121.407	39.781585690	-80.726972422
1,769.00	0.94	18.33	1,768.44	11.60	-10.44	14,447,318.900	1,717,121.519	39.781586948	-80.726972020
1,800.00	0.93	19.08	1,799.43	12.08	-10.27	14,447,319.379	1,717,121.681	39.781588262	-80.726971437
1,832.00	0.93	29.96	1,831.43	12.55	-10.06	14,447,319.849	1,717,121.895	39.781589552	-80.726970668
1,864.00	1.02	39.54	1,863.42	13.00	-9.75	14,447,320.294	1,717,122.206	39.781590771	-80.726969557
1,896.00	0.92	39.80	1,895.42	13.41	-9.40	14,447,320.711	1,717,122.552	39.781591913	-80.726968321
1,927.00	0.91	41.78	1,926.41	13.79	-9.08	14,447,321.086	1,717,122.876	39.781592940	-80.726967166
1,959.00	0.59	46.35	1,958.41	14.09	-8.79	14,447,321.389	1,717,123.164	39.781593770	-80.726966136



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,991.00	0.46	37.68	1,990.41	14.31	-8.59	14,447,321.604	1,717,123.362	39.781594360	-80.726965430
2,022.00	0.53	41.92	2,021.41	14.51	-8.42	14,447,321.809	1,717,123.534	39.781594922	-80.726964816
2,054.00	0.34	56.22	2,053.41	14.67	-8.24	14,447,321.972	1,717,123.711	39.781595368	-80.726964181
2,086.00	0.20	67.38	2,085.41	14.75	-8.11	14,447,322.047	1,717,123.842	39.781595571	-80.726963716
2,118.00	0.07	195.11	2,117.41	14.75	-8.07	14,447,322.049	1,717,123.888	39.781595578	-80.726963551
2,149.00	0.08	188.18	2,148.41	14.71	-8.07	14,447,322.009	1,717,123.880	39.781595469	-80.726963580
2,181.00	0.28	229.32	2,180.41	14.64	-8.14	14,447,321.936	1,717,123.818	39.781595268	-80.726963803
2,197.00	0.24	215.53	2,196.41	14.59	-8.19	14,447,321.884	1,717,123.769	39.781595124	-80.726963978
2,245.00	0.52	226.96	2,244.41	14.35	-8.40	14,447,321.653	1,717,123.551	39.781594493	-80.726964755
2,277.00	0.59	227.96	2,276.40	14.15	-8.63	14,447,321.444	1,717,123.323	39.781593920	-80.726965571
2,308.00	0.69	231.19	2,307.40	13.92	-8.90	14,447,321.220	1,717,123.059	39.781593307	-80.726966513
2,340.00	0.89	230.15	2,339.40	13.64	-9.24	14,447,320.940	1,717,122.718	39.781592541	-80.726967730
2,371.00	1.00	233.51	2,370.39	13.33	-9.64	14,447,320.625	1,717,122.315	39.781591679	-80.726969165
2,402.00	0.95	244.38	2,401.39	13.05	-10.09	14,447,320.353	1,717,121.866	39.781590936	-80.726970767
2,434.00	0.87	254.71	2,433.39	12.88	-10.56	14,447,320.174	1,717,121.393	39.781590449	-80.726972454
2,465.00	0.83	256.67	2,464.38	12.76	-11.01	14,447,320.060	1,717,120.947	39.781590140	-80.726974041
2,497.00	0.74	246.77	2,496.38	12.63	-11.42	14,447,319.925	1,717,120.532	39.781589773	-80.726975522
2,529.00	0.62	236.07	2,528.38	12.45	-11.76	14,447,319.747	1,717,120.198	39.781589286	-80.726976711
2,560.00	0.56	218.26	2,559.38	12.24	-11.99	14,447,319.534	1,717,119.965	39.781588704	-80.726977542
2,592.00	0.63	201.39	2,591.37	11.95	-12.15	14,447,319.248	1,717,119.804	39.781587919	-80.726978118
2,624.00	0.85	184.37	2,623.37	11.55	-12.23	14,447,318.847	1,717,119.722	39.781586819	-80.726978415
2,656.00	0.87	184.30	2,655.37	11.07	-12.27	14,447,318.368	1,717,119.686	39.781585504	-80.726978550
2,687.00	0.91	174.93	2,686.36	10.59	-12.26	14,447,317.889	1,717,119.690	39.781584187	-80.726978540
2,719.00	0.95	168.43	2,718.36	10.08	-12.19	14,447,317.376	1,717,119.766	39.781582777	-80.726978277
2,750.00	1.12	161.65	2,749.36	9.54	-12.04	14,447,316.836	1,717,119.912	39.781581295	-80.726977760
2,782.00	1.18	163.23	2,781.35	8.93	-11.85	14,447,316.224	1,717,120.106	39.781579611	-80.726977077
2,813.00	1.30	157.11	2,812.34	8.30	-11.62	14,447,315.594	1,717,120.335	39.781577881	-80.726976270
2,845.00	1.31	156.04	2,844.33	7.63	-11.33	14,447,314.926	1,717,120.625	39.781576042	-80.726975246
2,876.00	1.14	144.95	2,875.33	7.05	-11.01	14,447,314.349	1,717,120.946	39.781574456	-80.726974109
2,907.00	1.03	132.92	2,906.32	6.61	-10.63	14,447,313.907	1,717,121.327	39.781573239	-80.726972757
2,937.00	0.75	120.41	2,936.32	6.33	-10.26	14,447,313.624	1,717,121.694	39.781572459	-80.726971455
2,970.00	0.50	85.11	2,969.32	6.23	-9.93	14,447,313.527	1,717,122.023	39.781572189	-80.726970282
3,001.00	0.56	59.04	3,000.31	6.32	-9.67	14,447,313.617	1,717,122.288	39.781572433	-80.726969339
3,033.00	0.67	41.76	3,032.31	6.54	-9.41	14,447,313.837	1,717,122.547	39.781573035	-80.726968416
3,064.00	0.86	17.89	3,063.31	6.89	-9.22	14,447,314.193	1,717,122.739	39.781574013	-80.726967728
3,096.00	1.08	7.42	3,095.30	7.42	-9.10	14,447,314.721	1,717,122.852	39.781575460	-80.726967321
3,128.00	1.15	359.47	3,127.30	8.04	-9.07	14,447,315.341	1,717,122.887	39.781577163	-80.726967186
3,159.00	1.28	348.08	3,158.29	8.69	-9.14	14,447,315.991	1,717,122.813	39.781578949	-80.726967444
3,191.00	1.42	335.00	3,190.28	9.40	-9.38	14,447,316.700	1,717,122.572	39.781580898	-80.726968296
3,222.00	1.51	326.05	3,221.27	10.09	-9.77	14,447,317.387	1,717,122.181	39.781582788	-80.726969678
3,254.00	1.74	321.32	3,253.26	10.82	-10.31	14,447,318.116	1,717,121.642	39.781584794	-80.726971589
3,286.00	1.82	314.14	3,285.24	11.55	-10.98	14,447,318.849	1,717,120.974	39.781586813	-80.726973960
3,318.00	1.94	313.37	3,317.23	12.28	-11.74	14,447,319.575	1,717,120.215	39.781588813	-80.726976651
3,349.00	2.12	309.42	3,348.21	13.00	-12.56	14,447,320.299	1,717,119.391	39.781590809	-80.726979578
3,381.00	2.26	307.22	3,380.18	13.76	-13.52	14,447,321.057	1,717,118.431	39.781592898	-80.726982985
3,412.00	2.40	306.78	3,411.16	14.52	-14.53	14,447,321.815	1,717,117.425	39.781594989	-80.726986560
3,444.00	2.48	306.65	3,443.13	15.33	-15.62	14,447,322.629	1,717,116.333	39.781597234	-80.726990438
3,476.00	2.54	309.03	3,475.10	16.19	-16.73	14,447,323.489	1,717,115.226	39.781599605	-80.726994367
3,508.00	2.63	308.29	3,507.07	17.09	-17.86	14,447,324.391	1,717,114.099	39.781602090	-80.726998369
3,539.00	2.66	308.27	3,538.03	17.98	-18.98	14,447,325.277	1,717,112.976	39.781604533	-80.727002356
3,571.00	2.77	308.19	3,570.00	18.92	-20.17	14,447,326.215	1,717,111.786	39.781607119	-80.727006584
3,603.00	2.84	310.40	3,601.96	19.91	-21.38	14,447,327.207	1,717,110.574	39.781609853	-80.727010886
3,635.00	2.88	313.63	3,633.92	20.98	-22.57	14,447,328.275	1,717,109.389	39.781612797	-80.727015094
3,666.00	3.08	314.37	3,664.88	22.10	-23.72	14,447,329.395	1,717,108.230	39.781615882	-80.727019207



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
3,698.00	3.01	316.46	3,696.83	23.31	-24.92	14,447,330.605	1,717,107.036	39.781619216	-80.727023442	
3,730.00	2.98	317.68	3,728.79	24.53	-26.06	14,447,331.829	1,717,105.898	39.781622587	-80.727027482	
3,762.00	2.98	319.59	3,760.75	25.78	-27.16	14,447,333.078	1,717,104.798	39.781626024	-80.727031381	
3,794.00	3.08	319.53	3,792.70	27.07	-28.25	14,447,334.365	1,717,103.701	39.781629569	-80.727035272	
3,825.00	3.00	316.01	3,823.66	28.28	-29.36	14,447,335.582	1,717,102.597	39.781632921	-80.727039188	
3,857.00	2.93	315.45	3,855.61	29.47	-30.51	14,447,336.767	1,717,101.442	39.781636186	-80.727043288	
3,889.00	2.99	313.64	3,887.57	30.63	-31.69	14,447,337.926	1,717,100.264	39.781639378	-80.727047467	
3,921.00	3.00	310.11	3,919.53	31.74	-32.93	14,447,339.042	1,717,099.020	39.781642452	-80.727051885	
3,952.00	3.03	307.19	3,950.49	32.76	-34.21	14,447,340.060	1,717,097.747	39.781645258	-80.727056405	
3,984.00	3.17	306.05	3,982.44	33.79	-35.60	14,447,341.092	1,717,096.358	39.781648103	-80.727061338	
4,016.00	3.31	304.91	4,014.39	34.84	-37.07	14,447,342.141	1,717,094.885	39.781650997	-80.727066570	
4,048.00	3.66	304.43	4,046.33	35.95	-38.67	14,447,343.247	1,717,093.285	39.781654049	-80.727072253	
4,079.00	3.60	306.59	4,077.27	37.09	-40.27	14,447,344.387	1,717,091.687	39.781657192	-80.727077927	
4,111.00	3.61	306.93	4,109.20	38.29	-41.88	14,447,345.591	1,717,090.075	39.781660512	-80.727083651	
4,142.00	3.89	304.79	4,140.14	39.48	-43.52	14,447,346.777	1,717,088.431	39.781663784	-80.727089489	
4,174.00	4.08	303.33	4,172.06	40.72	-45.37	14,447,348.022	1,717,086.589	39.781667218	-80.727096034	
4,205.00	4.10	302.78	4,202.98	41.93	-47.22	14,447,349.228	1,717,084.736	39.781670545	-80.727102617	
4,237.00	4.17	302.31	4,234.90	43.17	-49.16	14,447,350.469	1,717,082.791	39.781673970	-80.727109527	
4,269.00	4.24	300.80	4,266.81	44.40	-51.16	14,447,351.697	1,717,080.791	39.781677358	-80.727116631	
4,300.00	4.14	297.64	4,297.73	45.50	-53.14	14,447,352.803	1,717,078.815	39.781680412	-80.727123651	
4,332.00	4.21	297.91	4,329.64	46.59	-55.20	14,447,353.888	1,717,076.754	39.781683411	-80.727130976	
4,364.00	3.93	297.93	4,361.56	47.65	-57.21	14,447,354.952	1,717,074.747	39.781686348	-80.727138108	
4,396.00	3.96	298.27	4,393.49	48.69	-59.15	14,447,355.989	1,717,072.805	39.781689212	-80.727145009	
4,419.00	4.02	298.87	4,416.43	49.46	-60.55	14,447,356.754	1,717,071.400	39.781691326	-80.727150004	
4,504.00	4.69	303.27	4,501.18	52.80	-66.07	14,447,360.099	1,717,065.885	39.781700558	-80.727169596	
4,597.00	3.99	304.64	4,593.92	56.73	-71.91	14,447,364.024	1,717,060.044	39.781711386	-80.727190344	
4,690.00	2.55	307.03	4,686.76	59.81	-76.22	14,447,367.109	1,717,055.730	39.781719895	-80.727205666	
4,783.00	1.38	313.02	4,779.71	61.82	-78.69	14,447,369.119	1,717,053.260	39.781725436	-80.727214437	
4,876.00	1.04	323.08	4,872.69	63.26	-80.02	14,447,370.558	1,717,051.934	39.781729398	-80.727219140	
4,970.00	0.97	295.09	4,966.67	64.28	-81.25	14,447,371.578	1,717,050.701	39.781732208	-80.727223518	
5,063.00	1.13	289.03	5,059.66	64.91	-82.83	14,447,372.210	1,717,049.121	39.781733959	-80.727229135	
5,156.00	0.30	311.31	5,152.65	65.37	-83.88	14,447,372.670	1,717,048.072	39.781735230	-80.727232866	
5,249.00	0.28	55.51	5,245.65	65.66	-83.88	14,447,372.959	1,717,048.076	39.781736025	-80.727232848	
5,342.00	0.23	91.58	5,338.65	65.78	-83.50	14,447,373.083	1,717,048.450	39.781736361	-80.727231515	
5,435.00	0.48	115.26	5,431.65	65.61	-82.97	14,447,372.912	1,717,048.989	39.781735886	-80.727229599	
5,528.00	0.62	116.80	5,524.64	65.22	-82.16	14,447,372.519	1,717,049.790	39.781734800	-80.727226751	
5,621.00	0.40	158.57	5,617.64	64.69	-81.60	14,447,371.989	1,717,050.358	39.781733342	-80.727224736	
5,714.00	0.44	219.09	5,710.64	64.11	-81.70	14,447,371.410	1,717,050.251	39.781731752	-80.727225121	
5,808.00	0.60	217.58	5,804.63	63.44	-82.23	14,447,370.740	1,717,049.724	39.781729916	-80.727227007	
5,901.00	0.72	221.73	5,897.63	62.62	-82.92	14,447,369.918	1,717,049.038	39.781727664	-80.727229457	
5,992.00	0.51	26.71	5,988.62	62.55	-83.12	14,447,369.853	1,717,048.839	39.781727488	-80.727230165	
6,085.00	0.72	35.76	6,081.62	63.40	-82.59	14,447,370.697	1,717,049.367	39.781729801	-80.727228278	
6,180.00	0.81	33.23	6,176.61	64.44	-81.87	14,447,371.743	1,717,050.083	39.781732668	-80.727225715	
6,273.00	0.43	25.91	6,269.60	65.31	-81.36	14,447,372.607	1,717,050.596	39.781735035	-80.727223881	
6,367.00	0.26	346.25	6,363.60	65.83	-81.26	14,447,373.131	1,717,050.700	39.781736475	-80.727223507	
6,460.00	0.36	326.68	6,456.60	66.28	-81.47	14,447,373.580	1,717,050.489	39.781737710	-80.727224252	
6,555.00	0.44	320.79	6,551.60	66.81	-81.86	14,447,374.112	1,717,050.094	39.781739174	-80.727225650	
6,643.00	0.84	329.64	6,639.59	67.63	-82.40	14,447,374.931	1,717,049.555	39.781741426	-80.727227562	
6,736.00	0.66	352.49	6,732.59	68.75	-82.81	14,447,376.050	1,717,049.140	39.781744504	-80.727229026	
6,829.00	0.57	8.57	6,825.58	69.74	-82.82	14,447,377.038	1,717,049.139	39.781747218	-80.727229019	
6,922.00	0.84	43.73	6,918.57	70.69	-82.28	14,447,377.988	1,717,049.679	39.781749823	-80.727227086	
7,014.00	0.31	109.73	7,010.57	71.09	-81.57	14,447,378.392	1,717,050.380	39.781750924	-80.727224588	
7,107.00	0.57	153.77	7,103.57	70.59	-81.13	14,447,377.892	1,717,050.821	39.781749548	-80.727223023	
7,201.00	0.88	219.95	7,197.56	69.62	-81.39	14,447,376.919	1,717,050.564	39.781746878	-80.727223948	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
7,294.00	1.32	224.78	7,290.54	68.31	-82.60	14,447,375.611	1,717,049.351	39.781743297	-80.727228280	
7,387.00	0.75	207.56	7,383.53	67.01	-83.64	14,447,374.311	1,717,048.315	39.781739736	-80.727231982	
7,480.00	1.01	201.76	7,476.52	65.71	-84.23	14,447,373.010	1,717,047.729	39.781736168	-80.727234080	
7,572.00	0.66	186.46	7,568.51	64.43	-84.59	14,447,371.731	1,717,047.369	39.781732657	-80.727235376	
7,666.00	0.75	266.09	7,662.50	63.85	-85.26	14,447,371.151	1,717,046.695	39.781731070	-80.727237784	
7,759.00	0.79	318.39	7,755.49	64.29	-86.29	14,447,371.589	1,717,045.662	39.781732281	-80.727241456	
7,852.00	1.49	321.90	7,848.48	65.72	-87.47	14,447,373.020	1,717,044.490	39.781736221	-80.727245612	
7,945.00	2.64	321.46	7,941.41	68.35	-89.55	14,447,375.647	1,717,042.409	39.781743452	-80.727252989	
8,038.00	4.18	320.67	8,034.25	72.65	-93.03	14,447,410.683	1,717,038.926	39.781755282	-80.727265340	
8,132.00	5.67	317.07	8,127.90	78.70	-98.36	14,447,385.994	1,717,033.592	39.781771942	-80.727284261	
8,225.00	6.73	314.96	8,220.35	85.91	-105.35	14,447,393.208	1,717,026.607	39.781791814	-80.727309046	
8,317.00	7.69	316.28	8,311.62	94.17	-113.42	14,447,401.467	1,717,018.538	39.781814560	-80.727337678	
8,410.00	8.22	315.22	8,403.73	103.38	-122.40	14,447,410.683	1,717,009.554	39.781839945	-80.727369554	
8,503.00	9.05	314.96	8,495.67	113.27	-132.26	14,447,420.570	1,716,999.696	39.781867182	-80.727404538	
8,596.00	11.52	314.34	8,587.17	124.93	-144.08	14,447,432.231	1,716,987.876	39.781899304	-80.727446481	
8,689.00	12.79	313.11	8,678.08	138.46	-158.24	14,447,445.757	1,716,973.719	39.781936568	-80.727496728	
8,783.00	14.24	313.29	8,769.48	153.50	-174.25	14,447,460.796	1,716,957.707	39.781978003	-80.727553559	
8,876.00	14.20	311.71	8,859.63	168.93	-191.09	14,447,476.229	1,716,940.866	39.782020526	-80.727613337	
8,969.00	13.49	312.85	8,949.93	183.90	-207.56	14,447,491.195	1,716,924.397	39.782061767	-80.727671793	
9,062.00	15.69	319.53	9,039.93	200.84	-223.68	14,447,508.142	1,716,908.280	39.782108442	-80.727728979	
9,155.00	18.20	323.75	9,128.89	222.13	-240.43	14,447,529.425	1,716,891.527	39.782167030	-80.727788381	
9,248.00	18.59	323.84	9,217.14	245.81	-257.76	14,447,553.106	1,716,874.192	39.782232209	-80.727849826	
9,341.00	19.16	324.45	9,305.14	270.19	-275.38	14,447,577.492	1,716,856.572	39.782299326	-80.727912281	
9,435.00	18.20	324.10	9,394.18	294.64	-292.96	14,447,601.934	1,716,838.995	39.782366597	-80.727974581	
9,527.00	18.24	322.52	9,481.57	317.70	-310.15	14,447,624.998	1,716,821.809	39.782430080	-80.728035503	
9,621.00	18.46	319.53	9,570.79	340.70	-328.76	14,447,647.994	1,716,803.198	39.782493389	-80.728101500	
9,714.00	17.23	317.24	9,659.32	362.01	-347.67	14,447,669.309	1,716,784.290	39.782552083	-80.728168575	
9,807.00	15.91	314.96	9,748.45	381.13	-366.04	14,447,688.430	1,716,765.917	39.782604747	-80.728233763	
9,900.00	14.59	312.94	9,838.18	398.12	-383.63	14,447,705.417	1,716,748.322	39.782651546	-80.728296211	
9,935.00	13.98	311.44	9,872.10	403.92	-390.03	14,447,711.219	1,716,741.925	39.782667531	-80.728318916	
9,973.00	14.16	310.56	9,908.96	409.98	-397.00	14,447,717.279	1,716,734.953	39.782684232	-80.728343668	
10,020.00	13.45	310.21	9,954.60	417.25	-405.54	14,447,724.546	1,716,726.411	39.782704260	-80.728373995	
10,066.00	11.87	308.63	9,999.48	423.66	-413.33	14,447,730.953	1,716,718.630	39.782721922	-80.728401624	
10,113.00	10.82	307.22	10,045.56	429.34	-420.62	14,447,736.640	1,716,711.340	39.782737599	-80.728427509	
10,159.00	9.76	306.52	10,090.82	434.27	-427.19	14,447,741.572	1,716,704.768	39.782751198	-80.728450848	
10,210.00	9.15	304.59	10,141.13	439.15	-434.00	14,447,746.446	1,716,697.956	39.782764642	-80.728475044	
10,257.00	5.45	282.44	10,187.75	441.75	-439.26	14,447,749.050	1,716,692.697	39.782771836	-80.728493734	
10,304.00	4.48	219.69	10,234.60	440.82	-442.61	14,447,748.118	1,716,689.343	39.782769303	-80.728505683	
10,349.00	7.83	182.95	10,279.35	436.40	-443.89	14,447,743.701	1,716,688.062	39.782757185	-80.728510291	
10,396.00	12.05	160.27	10,325.65	428.58	-442.40	14,447,735.880	1,716,689.555	39.782735693	-80.728505062	
10,442.00	15.65	153.77	10,370.31	418.49	-438.04	14,447,725.790	1,716,693.920	39.782707949	-80.728489634	
10,489.00	19.52	151.13	10,415.11	405.93	-431.44	14,447,713.223	1,716,700.516	39.782673379	-80.728466293	
10,535.00	21.19	155.17	10,458.23	391.65	-424.24	14,447,698.946	1,716,707.718	39.782634111	-80.728440809	
10,582.00	22.95	161.50	10,501.79	375.25	-417.76	14,447,682.543	1,716,714.194	39.782589012	-80.728417935	
10,628.00	25.68	163.79	10,543.71	357.17	-412.13	14,447,664.464	1,716,719.823	39.782539314	-80.728398093	
10,675.00	29.02	164.67	10,585.45	336.39	-406.27	14,447,643.685	1,716,725.682	39.782482200	-80.728377465	
10,721.00	32.10	163.26	10,625.06	313.92	-399.80	14,447,621.214	1,716,732.154	39.782420436	-80.728354671	
10,768.00	35.88	162.73	10,664.02	288.80	-392.11	14,447,596.094	1,716,739.842	39.782351386	-80.728327575	
10,814.00	39.48	162.73	10,700.42	261.95	-383.77	14,447,569.249	1,716,748.188	39.782277592	-80.728298158	
10,861.00	42.65	160.10	10,735.85	232.70	-373.91	14,447,540.000	1,716,758.047	39.782197185	-80.728263383	
10,907.00	45.81	156.76	10,768.82	202.88	-362.09	14,447,510.183	1,716,769.863	39.782115200	-80.728221647	
10,954.00	48.98	153.42	10,800.63	171.53	-347.50	14,447,478.830	1,716,784.451	39.782028977	-80.728170060	
11,000.00	51.62	152.54	10,830.01	140.01	-331.42	14,447,447.307	1,716,800.532	39.781942271	-80.728113158	
11,047.00	54.17	152.01	10,858.37	106.83	-313.98	14,447,414.131	1,716,817.972	39.781851015	-80.728051442	



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,093.00	56.63	151.66	10,884.48	73.46	-296.11	14,447,380.754	1,716,835.844	39.781759203	-80.727988187
11,140.00	59.44	151.13	10,909.36	38.45	-277.02	14,447,345.752	1,716,854.935	39.781662921	-80.727920614
11,186.00	62.34	150.78	10,931.74	3.32	-257.51	14,447,310.622	1,716,874.446	39.781566280	-80.727851545
11,233.00	66.04	150.25	10,952.20	-33.50	-236.68	14,447,273.798	1,716,895.271	39.781464979	-80.727777820
11,279.00	69.47	149.90	10,969.61	-70.39	-215.45	14,447,236.905	1,716,916.509	39.781363482	-80.727702625
11,321.00	72.28	150.08	10,983.37	-104.75	-195.60	14,447,202.546	1,716,936.353	39.781268958	-80.727632362
11,372.00	75.18	150.60	10,997.66	-147.29	-171.38	14,447,160.007	1,716,960.576	39.781151932	-80.727546605
11,419.00	78.26	151.13	11,008.45	-187.24	-149.11	14,447,120.056	1,716,982.843	39.781042030	-80.727467781
11,465.00	81.07	151.48	11,016.70	-226.94	-127.39	14,446,080.364	1,717,004.568	39.780932843	-80.727390881
11,512.00	84.15	151.83	11,022.75	-267.95	-105.26	14,447,039.347	1,717,026.694	39.780820016	-80.727312570
11,558.00	87.76	151.83	11,025.99	-308.40	-83.60	14,446,998.904	1,717,048.353	39.780708766	-80.727235918
11,651.00	88.64	149.72	11,028.91	-389.51	-38.22	14,446,917.788	1,717,093.734	39.780485620	-80.727075269
11,744.00	88.64	150.08	11,031.12	-469.95	8.41	14,446,837.351	1,717,140.361	39.780264330	-80.726910179
11,836.00	88.55	149.37	11,033.38	-549.38	54.77	14,446,757.923	1,717,186.729	39.780045811	-80.726746003
11,929.00	88.46	150.43	11,035.80	-629.81	101.40	14,446,677.493	1,717,233.353	39.779824537	-80.726580927
12,023.00	88.90	150.78	11,037.97	-711.68	147.52	14,446,595.617	1,717,279.478	39.779599297	-80.726417642
12,116.00	88.90	148.67	11,039.76	-791.98	194.40	14,446,515.320	1,717,326.353	39.779378387	-80.726251674
12,209.00	88.81	148.67	11,041.61	-871.40	242.75	14,446,435.897	1,717,374.700	39.779159864	-80.726080456
12,302.00	88.90	149.55	11,043.47	-951.19	290.48	14,446,356.105	1,717,422.435	39.778940334	-80.725911421
12,395.00	88.81	148.32	11,045.33	-1,030.84	338.46	14,446,276.461	1,717,470.413	39.778721205	-80.725741521
12,488.00	88.90	149.20	11,047.19	-1,110.34	386.68	14,446,196.963	1,717,518.635	39.778502476	-80.725570753
12,581.00	88.81	148.85	11,049.05	-1,190.06	434.54	14,446,117.241	1,717,566.489	39.778283137	-80.725401298
12,674.00	88.72	149.20	11,051.05	-1,269.78	482.39	14,446,037.523	1,717,614.342	39.778063805	-80.725231850
12,767.00	88.37	149.55	11,053.41	-1,349.78	529.75	14,445,957.521	1,717,661.702	39.777843699	-80.725064157
12,860.00	88.64	152.36	11,055.84	-1,431.05	574.88	14,445,876.252	1,717,706.833	39.777620134	-80.724904414
12,953.00	88.37	151.48	11,058.27	-1,513.07	618.64	14,445,794.228	1,717,750.593	39.777394504	-80.724749560
13,046.00	88.72	150.78	11,060.63	-1,594.49	663.53	14,445,712.814	1,717,795.481	39.777170539	-80.724590687
13,139.00	88.90	153.94	11,062.56	-1,676.85	706.66	14,445,630.455	1,717,838.610	39.776943996	-80.724438084
13,231.00	88.90	153.24	11,064.33	-1,759.23	747.57	14,445,548.073	1,717,879.523	39.776717406	-80.724293370
13,324.00	89.16	151.31	11,065.90	-1,841.54	790.83	14,445,465.766	1,717,922.780	39.776491004	-80.724140310
13,417.00	88.81	150.25	11,067.55	-1,922.69	836.22	14,445,384.614	1,717,968.172	39.776267755	-80.723979645
13,511.00	88.99	149.02	11,069.35	-2,003.78	883.73	14,445,303.526	1,718,015.680	39.776044662	-80.723811447
13,605.00	88.99	149.02	11,071.01	-2,084.36	932.10	14,445,222.948	1,718,064.058	39.775822963	-80.723640149
13,698.00	88.55	147.97	11,073.01	-2,163.63	980.69	14,445,143.676	1,718,112.645	39.775604850	-80.723468093
13,791.00	88.37	148.67	11,075.51	-2,242.74	1,029.52	14,445,064.563	1,718,161.468	39.775387170	-80.723295195
13,884.00	88.72	150.08	11,077.87	-2,322.74	1,076.87	14,444,984.563	1,718,208.827	39.775167066	-80.723127520
13,977.00	88.55	148.49	11,080.08	-2,402.67	1,124.36	14,444,904.634	1,718,256.313	39.774947158	-80.722959392
14,071.00	88.55	150.08	11,082.46	-2,483.45	1,172.36	14,444,823.849	1,718,304.308	39.774724893	-80.722789463
14,164.00	88.46	150.08	11,084.89	-2,564.03	1,218.73	14,444,743.272	1,718,350.680	39.774503211	-80.722625312
14,258.00	89.87	153.24	11,086.26	-2,646.74	1,263.34	14,444,660.559	1,718,395.290	39.774275681	-80.722467454
14,351.00	90.04	149.55	11,086.33	-2,728.38	1,307.86	14,444,578.925	1,718,439.808	39.774051112	-80.722309915
14,444.00	89.87	146.56	11,086.40	-2,807.29	1,357.06	14,444,500.018	1,718,489.009	39.773833995	-80.722135678
14,537.00	89.43	148.49	11,086.97	-2,885.74	1,406.99	14,444,421.567	1,718,538.940	39.773618120	-80.721958838
14,630.00	89.69	149.37	11,087.69	-2,965.39	1,454.98	14,444,341.912	1,718,586.934	39.773398957	-80.721788908
14,724.00	89.69	151.48	11,088.19	-3,047.14	1,501.37	14,444,260.165	1,718,633.325	39.773174063	-80.721624705
14,817.00	89.43	150.78	11,088.91	-3,128.58	1,546.27	14,444,178.727	1,718,678.226	39.772950027	-80.721465805
14,912.00	89.34	149.90	11,089.93	-3,211.13	1,593.28	14,444,096.180	1,718,725.234	39.772722929	-80.721299420
15,006.00	89.16	152.54	11,091.16	-3,293.50	1,638.53	14,444,013.806	1,718,770.482	39.772496321	-80.721139296
15,100.00	89.25	152.36	11,092.46	-3,376.83	1,682.00	14,443,930.473	1,718,813.955	39.772267095	-80.720985503
15,192.00	89.08	154.65	11,093.80	-3,459.16	1,723.04	14,443,848.150	1,718,854.991	39.772040662	-80.720840372
15,285.00	89.16	154.65	11,095.23	-3,543.19	1,762.85	14,443,764.115	1,718,894.803	39.771818939	-80.720699613
15,378.00	88.72	151.13	11,096.95	-3,625.95	1,805.22	14,443,681.360	1,718,937.169	39.771581909	-80.720549755
15,471.00	88.99	147.44	11,098.81	-3,705.87	1,852.70	14,443,601.436	1,718,984.653	39.771362010	-80.720381653
15,564.00	88.72	144.28	11,100.67	-3,782.82	1,904.88	14,443,524.488	1,719,036.829	39.771150242	-80.720196820



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,657.00	88.29	146.38	11,103.10	-3,859.27	1,957.76	14,443,448.032	1,719,089.711	39.770939819	-80.720009471
15,750.00	88.29	148.67	11,105.87	-3,937.69	2,007.67	14,443,369.615	1,719,139.620	39.770724036	-80.719832724
15,844.00	88.90	149.02	11,108.18	-4,018.11	2,056.29	14,443,289.197	1,719,188.236	39.770502770	-80.719660601
15,937.00	88.90	149.02	11,109.96	-4,097.83	2,104.15	14,443,209.479	1,719,236.098	39.770283430	-80.719491156
16,030.00	89.08	149.72	11,111.60	-4,177.84	2,151.52	14,443,129.468	1,719,283.473	39.770063291	-80.719323449
16,124.00	89.08	150.43	11,113.11	-4,259.30	2,198.41	14,443,048.011	1,719,330.360	39.769839185	-80.719157495
16,217.00	88.90	151.66	11,114.75	-4,340.66	2,243.43	14,442,966.651	1,719,375.375	39.769615359	-80.718998202
16,309.00	88.81	151.48	11,116.59	-4,421.55	2,287.22	14,442,885.762	1,719,419.166	39.769392840	-80.718843262
16,403.00	88.99	151.48	11,118.40	-4,504.12	2,332.09	14,442,803.184	1,719,464.039	39.769165673	-80.718684490
16,496.00	88.81	153.24	11,120.18	-4,586.49	2,375.22	14,442,720.816	1,719,507.174	39.768939095	-80.718531906
16,590.00	89.34	152.19	11,121.70	-4,670.02	2,418.31	14,442,637.288	1,719,550.259	39.768709331	-80.718379511
16,682.00	89.69	151.66	11,122.48	-4,751.19	2,461.60	14,442,556.116	1,719,593.554	39.768486039	-80.718226341
16,775.00	88.55	149.72	11,123.91	-4,832.27	2,507.12	14,442,475.037	1,719,639.073	39.768262979	-80.718065262
16,868.00	89.60	148.85	11,125.41	-4,912.21	2,554.62	14,442,395.095	1,719,686.567	39.768043028	-80.717897139
16,892.00	89.08	149.55	11,125.68	-4,932.83	2,566.91	14,442,374.482	1,719,698.855	39.767986311	-80.717853640
16,986.00	89.52	151.48	11,126.83	-5,014.64	2,613.17	14,442,292.667	1,719,745.115	39.767761224	-80.717689929
17,079.00	89.52	152.01	11,127.61	-5,096.56	2,657.19	14,442,210.751	1,719,789.139	39.767535881	-80.717534180
17,172.00	90.13	151.31	11,127.89	-5,178.41	2,701.34	14,442,128.899	1,719,833.286	39.767310710	-80.717377995
17,265.00	89.78	151.48	11,127.97	-5,260.06	2,745.86	14,442,047.251	1,719,877.811	39.767086096	-80.717220460
17,358.00	89.08	149.72	11,128.89	-5,341.07	2,791.51	14,441,966.236	1,719,923.461	39.766863211	-80.717058919
17,450.00	88.29	149.72	11,131.00	-5,420.50	2,837.89	14,441,886.809	1,719,969.837	39.766644681	-80.716894776
17,544.00	88.55	149.55	11,133.60	-5,501.58	2,885.39	14,441,805.735	1,720,017.336	39.766421617	-80.716726654
17,637.00	87.76	150.60	11,136.59	-5,582.13	2,931.76	14,441,725.177	1,720,063.706	39.766199981	-80.716562549
17,729.00	88.02	150.43	11,139.98	-5,662.16	2,977.01	14,441,645.147	1,720,108.957	39.765979804	-80.716402419
17,822.00	87.93	150.08	11,143.26	-5,742.86	3,023.12	14,441,564.452	1,720,155.069	39.765757790	-80.716239233
17,915.00	88.64	150.08	11,146.05	-5,823.43	3,069.49	14,441,483.883	1,720,201.435	39.765536124	-80.716075142
18,008.00	88.72	150.43	11,148.19	-5,904.15	3,115.62	14,441,403.158	1,720,247.564	39.765314030	-80.715911900
18,101.00	89.08	150.25	11,149.98	-5,984.95	3,161.63	14,441,322.359	1,720,293.577	39.765091732	-80.715749073
18,194.00	89.16	149.02	11,151.40	-6,065.18	3,208.63	14,441,242.127	1,720,340.582	39.764870985	-80.715582707
18,286.00	88.72	148.85	11,153.11	-6,143.98	3,256.10	14,441,163.336	1,720,388.047	39.764654187	-80.715414692
18,379.00	88.90	148.14	11,155.04	-6,223.25	3,304.69	14,441,084.062	1,720,436.635	39.764436057	-80.715242685
18,472.00	89.08	148.49	11,156.68	-6,302.37	3,353.53	14,441,004.937	1,720,485.476	39.764218330	-80.715069780
18,565.00	88.99	148.49	11,158.24	-6,381.65	3,402.13	14,440,925.661	1,720,534.075	39.764000193	-80.714897737
18,658.00	88.81	149.37	11,160.03	-6,461.29	3,450.11	14,440,846.019	1,720,582.061	39.763781054	-80.714727879
18,751.00	88.81	149.55	11,161.96	-6,541.37	3,497.36	14,440,765.937	1,720,629.308	39.763560716	-80.714560659
18,844.00	89.43	150.08	11,163.39	-6,621.75	3,544.11	14,440,685.558	1,720,676.062	39.763339563	-80.714395198
18,938.00	89.43	149.37	11,164.32	-6,702.93	3,591.50	14,440,604.383	1,720,723.449	39.763116219	-80.714227493
19,031.00	89.43	149.72	11,165.25	-6,783.09	3,638.64	14,440,524.219	1,720,770.585	39.762895653	-80.714060672
19,124.00	89.34	149.72	11,166.25	-6,863.40	3,685.53	14,440,443.911	1,720,817.475	39.762674696	-80.713894728
19,217.00	88.99	150.43	11,167.60	-6,943.99	3,731.92	14,440,363.319	1,720,863.864	39.762452962	-80.713730571
19,310.00	88.72	150.78	11,169.46	-7,025.00	3,777.56	14,440,282.309	1,720,909.502	39.762230085	-80.713569095
19,402.00	88.99	151.31	11,171.30	-7,105.49	3,822.09	14,440,201.826	1,720,954.032	39.762008664	-80.713411554
19,496.00	88.37	151.31	11,173.46	-7,187.92	3,867.20	14,440,119.388	1,720,999.146	39.761781873	-80.713251958
19,589.00	87.85	150.96	11,176.53	-7,269.33	3,912.07	14,440,037.988	1,721,044.017	39.761557930	-80.713093217
19,683.00	87.58	150.96	11,180.28	-7,351.44	3,957.66	14,439,955.871	1,721,089.610	39.761332013	-80.712931916
19,776.00	87.32	150.96	11,184.42	-7,432.67	4,002.76	14,439,874.643	1,721,134.709	39.761108544	-80.712772362
19,870.00	86.70	151.31	11,189.32	-7,514.88	4,048.08	14,439,792.435	1,721,180.025	39.760882377	-80.712612049
19,963.00	89.52	152.36	11,192.39	-7,596.81	4,091.95	14,439,710.501	1,721,223.893	39.760656977	-80.712456989
20,056.00	89.25	151.66	11,193.38	-7,678.93	4,135.59	14,439,628.384	1,721,267.537	39.760431079	-80.712302529
20,150.00	89.78	151.31	11,194.18	-7,761.52	4,180.46	14,439,545.791	1,721,312.409	39.760203859	-80.712143801
20,243.00	90.13	150.78	11,194.25	-7,842.90	4,225.49	14,439,464.417	1,721,357.432	39.759979986	-80.711984526
20,336.00	89.96	149.02	11,194.18	-7,923.35	4,272.13	14,439,383.961	1,721,404.071	39.759758621	-80.711819493
20,429.00	89.96	148.67	11,194.25	-8,002.94	4,320.24	14,439,304.374	1,721,452.185	39.759539629	-80.711649201
20,523.00	89.87	149.20	11,194.38	-8,083.46	4,368.74	14,439,223.856	1,721,500.689	39.759318076	-80.711477531



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
20,616.00	89.78	148.85	11,194.67	-8,163.20	4,416.61	14,439,144.119	1,721,548.553	39.759098673	-80.711308134
20,709.00	89.87	148.85	11,194.95	-8,242.79	4,464.71	14,439,064.529	1,721,596.659	39.758879670	-80.711137871
20,802.00	89.87	149.02	11,195.16	-8,322.45	4,512.70	14,438,984.867	1,721,644.648	39.758660472	-80.710968030
20,896.00	89.34	150.08	11,195.81	-8,403.48	4,560.34	14,438,903.836	1,721,692.284	39.758437516	-80.710799461
20,989.00	89.34	150.08	11,196.88	-8,484.08	4,606.72	14,438,823.236	1,721,738.668	39.758215756	-80.710635341
21,082.00	89.25	150.08	11,198.03	-8,564.68	4,653.11	14,438,742.638	1,721,785.052	39.757993998	-80.710471224
21,175.00	89.25	150.08	11,199.24	-8,645.28	4,699.49	14,438,662.039	1,721,831.436	39.757772242	-80.710307110
21,269.00	89.25	150.08	11,200.48	-8,726.74	4,746.37	14,438,580.575	1,721,878.318	39.757548101	-80.710141232
21,361.00	89.25	150.08	11,201.68	-8,806.47	4,792.26	14,438,500.843	1,721,924.202	39.757328728	-80.709978884
21,455.00	89.25	150.08	11,202.91	-8,887.94	4,839.14	14,438,419.378	1,721,971.085	39.757104587	-80.709813008
21,547.00	89.34	149.90	11,204.04	-8,967.60	4,885.15	14,438,339.718	1,722,017.095	39.756885409	-80.709650215
21,639.00	88.99	150.60	11,205.38	-9,047.46	4,930.80	14,438,259.853	1,722,062.742	39.756665671	-80.709488719
21,733.00	88.99	150.60	11,207.04	-9,129.35	4,976.93	14,438,177.972	1,722,108.879	39.756440392	-80.709325500
21,826.00	89.08	150.43	11,208.61	-9,210.29	5,022.70	14,438,097.029	1,722,154.647	39.756217692	-80.709163588
21,919.00	88.99	150.25	11,210.17	-9,291.09	5,068.72	14,438,016.225	1,722,200.661	39.755995374	-80.709000797
22,012.00	88.99	150.60	11,211.81	-9,371.96	5,114.61	14,437,935.355	1,722,246.555	39.755772872	-80.708838437
22,105.00	88.99	150.78	11,213.45	-9,453.04	5,160.13	14,437,854.274	1,722,292.075	39.755549793	-80.708677412
22,197.00	89.08	150.43	11,215.00	-9,533.19	5,205.28	14,437,774.130	1,722,337.225	39.755329293	-80.708517694
22,290.00	89.25	150.60	11,216.36	-9,614.13	5,251.05	14,437,693.183	1,722,382.994	39.755106583	-80.708355782
22,383.00	89.34	150.08	11,217.50	-9,694.94	5,297.07	14,437,612.375	1,722,429.011	39.754884250	-80.708192985
22,476.00	89.43	150.60	11,218.50	-9,775.75	5,343.09	14,437,531.565	1,722,475.030	39.754661912	-80.708030187
22,570.00	89.43	150.60	11,219.43	-9,857.64	5,389.23	14,437,449.675	1,722,521.172	39.754436607	-80.707866960
22,663.00	89.43	150.25	11,220.36	-9,938.52	5,435.13	14,437,368.797	1,722,567.071	39.754214081	-80.707704590
22,756.00	89.52	150.08	11,221.21	-10,019.19	5,481.39	14,437,288.126	1,722,613.337	39.753992123	-80.707540913
22,849.00	89.43	150.25	11,222.06	-10,099.86	5,527.66	14,437,207.456	1,722,659.603	39.753770165	-80.707377237
22,943.00	89.34	150.43	11,223.07	-10,181.54	5,574.17	14,437,125.777	1,722,706.116	39.753545435	-80.707212693
23,036.00	89.43	150.25	11,224.07	-10,262.35	5,620.19	14,437,044.967	1,722,752.134	39.753323096	-80.707049900
23,130.00	89.43	150.60	11,225.00	-10,344.10	5,666.58	14,436,963.219	1,722,798.527	39.753098175	-80.706885789
23,223.00	89.52	150.25	11,225.86	-10,424.98	5,712.48	14,436,882.339	1,722,844.426	39.752875646	-80.706723424
23,317.00	89.52	149.72	11,226.64	-10,506.37	5,759.50	14,436,800.948	1,722,891.445	39.752651702	-80.706557080
23,410.00	89.52	150.08	11,227.42	-10,586.83	5,806.14	14,436,720.492	1,722,938.084	39.752430328	-80.706392081
23,504.00	89.16	149.72	11,228.51	-10,668.15	5,853.28	14,436,639.174	1,722,985.223	39.752206581	-80.706225315
23,597.00	89.08	150.43	11,229.93	-10,748.74	5,899.67	14,436,558.583	1,723,031.611	39.751984838	-80.706061209
23,691.00	88.90	149.90	11,231.59	-10,830.27	5,946.43	14,436,477.055	1,723,078.369	39.751760518	-80.705895802
23,785.00	88.72	150.78	11,233.54	-10,911.93	5,992.93	14,436,395.390	1,723,124.875	39.751535823	-80.705731295
23,878.00	88.81	150.43	11,235.55	-10,992.94	6,038.57	14,436,314.382	1,723,170.511	39.751312942	-80.705569874
23,971.00	89.08	150.08	11,237.26	-11,073.67	6,084.70	14,436,233.649	1,723,216.644	39.751090812	-80.705406684
24,065.00	88.90	149.90	11,238.92	-11,155.06	6,131.71	14,436,152.264	1,723,263.651	39.750866881	-80.705240393
24,158.00	88.90	149.90	11,240.70	-11,235.50	6,178.34	14,436,071.820	1,723,310.283	39.750645538	-80.705075428
24,252.00	88.55	149.55	11,242.79	-11,316.66	6,225.72	14,435,990.661	1,723,357.661	39.750422223	-80.704907816
24,345.00	88.55	150.43	11,245.15	-11,397.17	6,272.22	14,435,910.155	1,723,404.159	39.750200712	-80.704743326
24,439.00	87.85	150.60	11,248.10	-11,478.95	6,318.46	14,435,828.371	1,723,450.403	39.749975691	-80.704579762
24,533.00	87.85	150.43	11,251.63	-11,560.72	6,364.69	14,435,746.603	1,723,496.636	39.749750716	-80.704416231
24,627.00	87.76	150.08	11,255.23	-11,642.27	6,411.30	14,435,665.048	1,723,543.239	39.749526322	-80.704251387
24,722.00	87.58	149.72	11,259.09	-11,724.40	6,458.90	14,435,582.927	1,723,590.843	39.749300363	-80.704082988
24,817.00	87.58	150.08	11,263.10	-11,806.51	6,506.50	14,435,500.811	1,723,638.444	39.749074419	-80.703914601
24,911.00	88.55	149.90	11,266.27	-11,887.86	6,553.49	14,435,419.461	1,723,685.431	39.748850581	-80.703748391
25,007.00	88.90	150.25	11,268.41	-11,971.04	6,601.37	14,435,336.281	1,723,733.310	39.748621710	-80.703579030
25,102.00	88.29	149.72	11,270.74	-12,053.28	6,648.88	14,435,254.046	1,723,780.816	39.748395440	-80.703410982
25,197.00	88.29	149.90	11,273.58	-12,135.35	6,696.63	14,435,171.969	1,723,828.568	39.748169598	-80.703242065
25,289.00	88.11	149.90	11,276.46	-12,214.91	6,742.74	14,435,092.414	1,723,874.684	39.747950700	-80.703078935
25,384.00	88.20	149.90	11,279.52	-12,297.06	6,790.36	14,435,010.268	1,723,922.302	39.747724669	-80.702910492
25,477.00	88.02	150.08	11,282.59	-12,377.54	6,836.85	14,434,929.779	1,723,968.791	39.747503203	-80.702746051
25,570.00	88.02	150.25	11,285.80	-12,458.17	6,883.09	14,434,849.154	1,724,015.031	39.747281361	-80.702582496



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Van Winkle S-22 HU (slot C)
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 S-22 HU (slot C)	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Decv0422v16

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
25,663.00	88.46	150.78	11,288.66	-12,539.09	6,928.84	14,434,768.237	1,724,060.783	39.747058726	-80.702420682
25,757.00	88.29	149.72	11,291.33	-12,620.66	6,975.47	14,434,686.661	1,724,107.408	39.746834269	-80.702255772
25,849.00	88.55	149.90	11,293.86	-12,700.15	7,021.71	14,434,607.170	1,724,153.654	39.746615543	-80.702092185
25,943.00	88.64	149.90	11,296.17	-12,781.45	7,068.84	14,434,525.871	1,724,200.782	39.746391841	-80.701925485
26,036.00	88.37	150.25	11,298.59	-12,862.03	7,115.22	14,434,445.297	1,724,247.161	39.746170141	-80.701761442
26,128.00	88.37	150.08	11,301.21	-12,941.80	7,160.97	14,434,365.523	1,724,292.912	39.745950641	-80.701599621
Survey @ 26128.00 MD 11301.21 TVD									
26,222.00	88.37	150.08	11,303.88	-13,023.24	7,207.84	14,434,284.084	1,724,339.780	39.745726559	-80.701433853
Survey Proj. to 26222.00 MD 11303.88 TVD									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
153.00	153.00	-0.52	0.24	MWD surveys
26,128.00	11,301.21	-12,941.80	7,160.97	Survey @ 26128.00 MD 11301.21 TVD
26,222.00	11,303.88	-13,023.24	7,207.84	Survey Proj. to 26222.00 MD 11303.88 TVD