



TUG HILL
OPERATING

Well: Yoder W-2HM
Site: Yoder
Project: Wetzel County, West Virginia (UTM17 NAD83)
Design: rev2
Rig: Nabors B 28

WV Department of
Environmental Protection

SEP 11 2018

RECEIVED
Office of Oil and Gas

Azimuths to Grid North
True North: -0.10°
Magnetic North: -8.71°

Magnetic Field
Strength: 52136.6snT
Dip Angle: 66.93°
Date: 11/22/2017
Model: IGRF2015



SECTION DETAILS

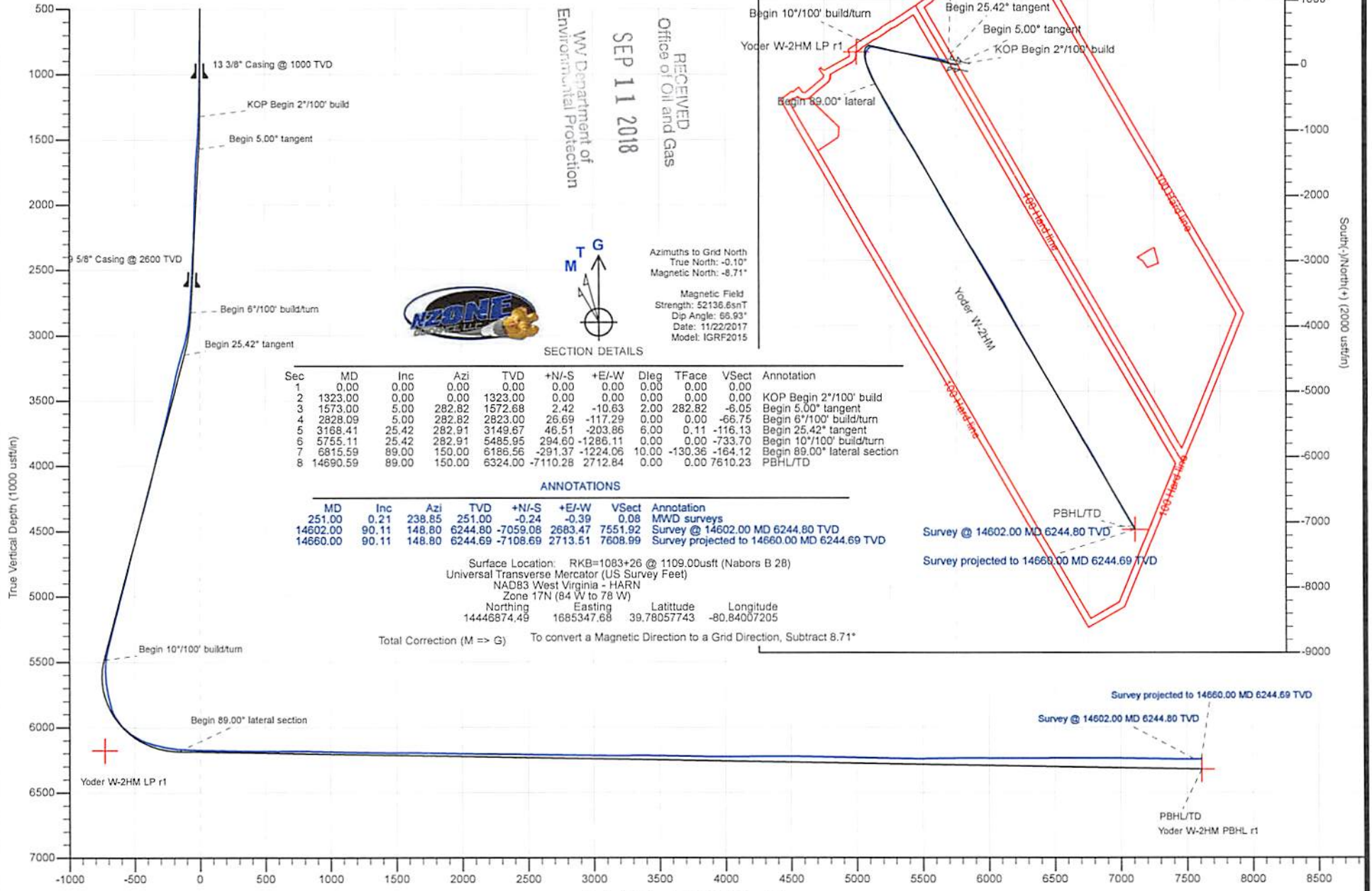
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1323.00	0.00	0.00	1323.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2'100' build
3	1573.00	5.00	282.82	1572.88	2.42	-10.63	2.00	282.82	-6.05	Begin 5.00° tangent
4	2828.09	5.00	282.82	2823.00	26.69	-117.29	0.00	0.00	-66.75	Begin 6'100' build/turn
5	3168.41	25.42	282.91	3149.67	46.51	-203.86	6.00	0.11	-116.13	Begin 25.42° tangent
6	5755.11	25.42	282.91	5485.95	294.60	-1286.11	0.00	0.00	-733.70	Begin 10'100' build/turn
7	6815.59	89.00	150.00	6186.56	-291.37	-1224.06	10.00	-130.36	-164.12	Begin 89.00° lateral section
8	14690.59	89.00	150.00	6324.00	-7110.28	2712.84	0.00	0.00	7610.23	PBHL/TD

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Annotation
251.00	0.21	238.85	251.00	-0.24	-0.39	0.08	MWD surveys
14602.00	90.11	148.80	6244.80	-7059.08	2683.47	7551.92	Survey @ 14602.00 MD 6244.80 TVD
14660.00	90.11	148.80	6244.69	-7108.69	2713.51	7608.99	Survey projected to 14660.00 MD 6244.69 TVD

Surface Location: RKB=1083+26 @ 1109.00usft (Nabors B 28)
Universal Transverse Mercator (US Survey Feet)
NAD83 West Virginia - HARN
Zone 17N (84 W to 78 W)
Northing Easting Latitude Longitude
14446874.49 1685347.68 39.78057743 -80.84007205

Total Correction (M => G) To convert a Magnetic Direction to a Grid Direction, Subtract 8.71°



Vertical Section at 159.12' (1000 usft/in)

SEP 11 2018



Survey Report

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-2HM
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Project	Wetzel County, West Virginia (UTM17 NAD83)		
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	Yoder				
Site Position:		Northing:	14,446,864.35 usft	Latitude:	39.78054955
From:	Lat/Long	Easting:	1,685,354.97 usft	Longitude:	-80.84004615
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.10 °

Well	Yoder W-2HM					
Well Position	+N/-S	0.00 usft	Northing:	14,446,874.49 usft	Latitude:	39.78057743
	+E/-W	0.00 usft	Easting:	1,685,347.68 usft	Longitude:	-80.84007205
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	1,083.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/22/2017	-8.61	66.93	52,136.62213043

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	159.12	

Survey Program	Date	12/7/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
251.00	2,569.00	MWD (Original Hole)	MWD	MWD - Standard	
2,684.00	14,660.00	MWD2 (Original Hole)	MWD	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251.00	0.21	238.85	251.00	-0.24	-0.39	0.08	0.08	0.08	0.08	0.00
MWD surveys										
342.00	0.33	230.04	342.00	-0.49	-0.74	0.20	0.14	0.13	-9.68	
433.00	0.30	217.37	433.00	-0.85	-1.08	0.41	0.08	-0.03	-13.92	
526.00	0.22	204.97	526.00	-1.21	-1.31	0.66	0.10	-0.09	-13.33	
616.00	0.41	230.34	615.99	-1.57	-1.63	0.88	0.26	0.21	28.19	
707.00	0.26	253.72	706.99	-1.83	-2.08	0.97	0.22	-0.16	25.69	
740.00	0.24	269.64	739.99	-1.85	-2.22	0.94	0.22	-0.06	48.24	
888.00	0.41	293.30	887.99	-1.65	-3.01	0.47	0.14	0.11	15.99	

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Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
982.00	0.66	300.31	981.99	-1.24	-3.79	-0.19	0.27	0.27	7.46
1,075.00	0.67	302.18	1,074.98	-0.68	-4.71	-1.04	0.03	0.01	2.01
1,170.00	1.05	303.93	1,169.97	0.10	-5.90	-2.20	0.40	0.40	1.84
1,265.00	1.40	307.61	1,264.95	1.29	-7.55	-3.90	0.38	0.37	3.87
1,360.00	2.62	308.37	1,359.89	3.35	-10.17	-6.75	1.28	1.28	0.80
1,455.00	4.51	299.23	1,454.70	6.52	-15.13	-11.49	2.07	1.99	-9.62
1,550.00	5.58	294.85	1,549.33	10.29	-22.58	-17.66	1.20	1.13	-4.61
1,645.00	6.04	286.63	1,643.84	13.66	-31.56	-24.01	1.00	0.48	-8.65
1,739.00	6.13	277.16	1,737.32	15.70	-41.28	-29.38	1.07	0.10	-10.07
1,832.00	6.31	270.24	1,829.77	16.34	-51.32	-33.56	0.83	0.19	-7.44
1,926.00	5.65	264.36	1,923.26	15.91	-61.09	-36.64	0.96	-0.70	-6.26
2,021.00	3.75	261.97	2,017.94	15.01	-68.82	-38.56	2.01	-2.00	-2.52
2,115.00	2.00	280.85	2,111.82	14.89	-73.47	-40.10	2.09	-1.86	20.09
2,208.00	2.24	295.05	2,204.75	15.97	-76.71	-42.26	0.62	0.26	15.27
2,303.00	3.13	298.15	2,299.65	17.98	-80.68	-45.55	0.95	0.94	3.26
2,398.00	3.74	295.55	2,394.48	20.54	-85.76	-49.76	0.66	0.64	-2.74
2,492.00	4.00	296.03	2,488.26	23.30	-91.48	-54.37	0.28	0.28	0.51
2,569.00	4.17	298.33	2,565.07	25.81	-96.35	-58.45	0.31	0.22	2.99
2,684.00	5.07	298.88	2,679.69	30.23	-104.49	-65.49	0.78	0.78	0.30
2,779.00	5.19	294.59	2,774.31	34.03	-112.08	-71.74	0.41	0.13	-4.31
2,873.00	7.32	291.90	2,867.75	38.03	-121.51	-78.84	2.29	2.27	-2.86
2,968.00	13.80	293.35	2,961.09	44.79	-137.54	-90.87	6.83	6.82	1.53
3,062.00	19.67	296.18	3,051.07	56.22	-162.05	-110.29	6.30	6.24	3.01
3,161.00	23.39	294.40	3,143.15	71.70	-194.91	-136.46	3.81	3.76	-1.80
3,256.00	23.12	285.67	3,230.45	84.53	-230.05	-160.97	3.64	-0.28	-9.19
3,351.00	24.02	280.74	3,317.54	93.17	-267.01	-182.22	2.28	0.95	-5.19
3,446.00	25.61	276.92	3,403.77	99.25	-306.40	-201.93	2.38	1.67	-4.02
3,540.00	25.92	276.20	3,488.42	103.92	-346.99	-220.76	0.47	0.33	-0.77
3,635.00	25.44	277.18	3,574.04	108.71	-387.88	-239.81	0.67	-0.51	1.03
3,730.00	25.61	277.06	3,659.77	113.78	-428.50	-259.03	0.19	0.18	-0.13
3,824.00	25.53	279.51	3,744.56	119.63	-468.64	-278.80	1.13	-0.09	2.61
3,919.00	25.61	280.07	3,830.26	126.60	-509.04	-299.71	0.27	0.08	0.59
4,013.00	25.49	279.87	3,915.07	133.62	-548.97	-320.50	0.16	-0.13	-0.21
4,109.00	25.40	279.32	4,001.75	140.49	-589.64	-341.42	0.26	-0.09	-0.57
4,204.00	25.25	280.84	4,087.63	147.60	-629.65	-362.32	0.70	-0.16	1.60
4,298.00	25.97	281.81	4,172.39	155.59	-669.48	-383.98	0.89	0.77	1.03
4,393.00	26.48	283.07	4,257.61	164.63	-710.47	-407.04	0.79	0.54	1.33
4,488.00	26.14	281.67	4,342.77	173.66	-751.60	-430.13	0.74	-0.36	-1.47
4,583.00	26.29	282.23	4,428.00	182.34	-792.66	-452.88	0.30	0.16	0.59
4,678.00	26.78	282.01	4,512.99	191.26	-834.15	-476.00	0.53	0.52	-0.23
4,772.00	26.64	281.17	4,596.96	199.74	-875.54	-498.68	0.43	-0.15	-0.89
4,867.00	25.59	280.16	4,682.26	207.49	-916.63	-520.56	1.20	-1.11	-1.06
4,962.00	24.50	281.90	4,768.33	215.17	-956.10	-541.81	1.38	-1.15	1.83

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Survey Report

WV Department of
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Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,057.00	24.61	282.93	4,854.74	223.66	-994.65	-563.48	0.47	0.12	1.08
5,150.00	25.04	282.92	4,939.15	232.39	-1,032.71	-585.20	0.46	0.46	-0.01
5,245.00	25.38	282.18	5,025.10	241.18	-1,072.21	-607.49	0.49	0.36	-0.78
5,339.00	25.30	282.32	5,110.05	249.72	-1,111.52	-629.48	0.11	-0.09	0.15
5,432.00	25.06	281.74	5,194.22	257.97	-1,150.22	-650.98	0.37	-0.26	-0.62
5,527.00	24.70	282.67	5,280.40	266.41	-1,189.29	-672.79	0.56	-0.38	0.98
5,621.00	23.26	283.54	5,366.28	275.07	-1,226.49	-694.14	1.58	-1.53	0.93
5,709.00	20.84	280.81	5,447.84	282.07	-1,258.77	-712.19	2.99	-2.75	-3.10
5,733.00	19.30	272.38	5,470.39	283.04	-1,266.93	-716.00	13.64	-6.42	-35.13
5,828.00	17.76	252.16	5,560.56	279.25	-1,296.44	-722.97	6.92	-1.62	-21.28
5,923.00	17.45	228.43	5,651.22	265.34	-1,320.92	-718.70	7.51	-0.33	-24.98
6,017.00	18.07	212.43	5,740.80	243.67	-1,339.29	-705.01	5.22	0.66	-17.02
6,064.00	19.78	207.69	5,785.26	230.47	-1,346.90	-695.39	4.89	3.64	-10.09
6,113.00	21.76	204.00	5,831.07	214.83	-1,354.44	-683.46	4.84	4.04	-7.53
6,145.00	23.91	200.13	5,860.56	203.32	-1,359.09	-674.37	8.19	6.72	-12.09
6,177.00	28.13	197.05	5,889.32	190.02	-1,363.54	-663.52	13.84	13.19	-9.63
6,207.00	32.57	193.54	5,915.20	175.39	-1,367.50	-651.27	15.93	14.80	-11.70
6,303.00	45.01	180.71	5,990.00	116.00	-1,374.01	-598.10	15.37	12.96	-13.36
6,398.00	54.15	165.41	6,051.74	44.75	-1,364.67	-528.20	15.54	9.62	-16.11
6,494.00	65.63	157.06	6,099.89	-33.53	-1,337.71	-445.45	14.11	11.96	-8.70
6,585.00	74.24	156.80	6,131.08	-112.09	-1,304.24	-360.12	9.47	9.46	-0.29
6,680.00	78.90	155.31	6,153.14	-196.51	-1,266.74	-267.87	5.14	4.91	-1.57
6,775.00	84.57	153.64	6,166.79	-281.31	-1,226.24	-174.21	6.22	5.97	-1.76
6,870.00	87.91	151.53	6,173.02	-365.44	-1,182.59	-80.05	4.16	3.52	-2.22
6,965.00	88.79	152.05	6,175.75	-449.12	-1,137.71	14.13	1.08	0.93	0.55
7,059.00	88.66	150.38	6,177.85	-531.48	-1,092.46	107.21	1.78	-0.14	-1.78
7,152.00	88.92	150.47	6,179.81	-612.34	-1,046.56	199.12	0.30	0.28	0.10
7,247.00	88.84	151.18	6,181.67	-695.28	-1,000.26	293.11	0.75	-0.08	0.75
7,341.00	89.10	149.59	6,183.36	-776.98	-953.82	386.00	1.71	0.28	-1.69
7,436.00	89.67	149.77	6,184.38	-858.98	-905.86	479.71	0.63	0.60	0.19
7,531.00	90.20	148.63	6,184.48	-940.58	-857.22	573.29	1.32	0.56	-1.20
7,626.00	91.12	148.10	6,183.39	-1,021.46	-807.40	666.61	1.12	0.97	-0.56
7,721.00	89.93	148.45	6,182.52	-1,102.26	-757.45	759.91	1.31	-1.25	0.37
7,816.00	88.13	147.40	6,184.13	-1,182.74	-707.01	853.08	2.19	-1.89	-1.11
7,911.00	89.54	149.68	6,186.06	-1,263.75	-657.44	946.44	2.82	1.48	2.40
8,006.00	88.18	150.21	6,187.95	-1,345.96	-609.87	1,040.20	1.54	-1.43	0.56
8,099.00	88.44	150.47	6,190.69	-1,426.74	-563.87	1,132.07	0.40	0.28	0.28
8,194.00	88.62	150.56	6,193.13	-1,509.41	-517.13	1,225.97	0.21	0.19	0.09
8,288.00	89.41	150.47	6,194.74	-1,591.22	-470.87	1,318.90	0.85	0.84	-0.10
8,383.00	89.67	150.56	6,195.51	-1,673.91	-424.11	1,412.83	0.29	0.27	0.09
8,478.00	90.51	150.56	6,195.36	-1,756.65	-377.42	1,506.77	0.88	0.88	0.00
8,573.00	89.10	152.05	6,195.68	-1,839.97	-331.81	1,600.88	2.16	-1.48	1.57
8,668.00	88.79	150.82	6,197.43	-1,923.40	-286.39	1,695.01	1.34	-0.33	-1.29

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8,763.00	88.66	150.82	6,199.54	-2,006.32	-240.09	1,788.99	0.14	-0.14	0.00
8,857.00	89.45	151.18	6,201.10	-2,088.52	-194.52	1,882.04	0.92	0.84	0.38
8,952.00	89.05	149.86	6,202.34	-2,171.21	-147.78	1,975.96	1.45	-0.42	-1.39
9,048.00	89.41	149.68	6,203.63	-2,254.15	-99.45	2,070.67	0.42	0.38	-0.19
9,142.00	89.98	149.42	6,204.13	-2,335.18	-51.81	2,163.36	0.67	0.61	-0.28
9,236.00	89.19	148.54	6,204.81	-2,415.74	-3.37	2,255.89	1.26	-0.84	-0.94
9,330.00	89.23	148.54	6,206.11	-2,495.91	45.68	2,348.28	0.04	0.04	0.00
9,425.00	89.71	148.71	6,206.98	-2,577.02	95.14	2,441.69	0.54	0.51	0.18
9,519.00	88.40	148.63	6,208.54	-2,657.30	144.01	2,534.12	1.40	-1.39	-0.09
9,614.00	88.66	148.63	6,210.97	-2,738.38	193.45	2,627.50	0.27	0.27	0.00
9,709.00	90.15	148.54	6,211.96	-2,819.45	242.96	2,720.89	1.57	1.57	-0.09
9,803.00	88.84	149.24	6,212.79	-2,899.93	291.53	2,813.39	1.58	-1.39	0.74
9,898.00	87.91	149.94	6,215.48	-2,981.82	339.59	2,907.04	1.23	-0.98	0.74
9,992.00	89.54	149.24	6,217.57	-3,062.87	387.16	2,999.71	1.89	1.73	-0.74
10,086.00	89.67	148.54	6,218.22	-3,143.34	435.73	3,092.22	0.76	0.14	-0.74
10,181.00	90.55	148.10	6,218.04	-3,224.19	485.62	3,185.53	1.04	0.93	-0.46
10,276.00	90.37	147.57	6,217.28	-3,304.60	536.19	3,278.69	0.59	-0.19	-0.56
10,369.00	90.24	148.80	6,216.78	-3,383.63	585.22	3,370.00	1.33	-0.14	1.32
10,463.00	88.75	150.21	6,217.61	-3,464.62	632.92	3,462.67	2.18	-1.59	1.50
10,558.00	88.88	150.38	6,219.57	-3,547.12	679.98	3,556.53	0.23	0.14	0.18
10,653.00	88.88	151.70	6,221.43	-3,630.22	725.97	3,650.56	1.39	0.00	1.39
10,748.00	89.23	152.14	6,223.00	-3,714.03	770.68	3,744.80	0.59	0.37	0.46
10,842.00	89.27	151.44	6,224.23	-3,796.85	815.11	3,838.02	0.75	0.04	-0.74
10,936.00	89.45	151.79	6,225.28	-3,879.55	859.79	3,931.21	0.42	0.19	0.37
11,029.00	90.11	151.18	6,225.64	-3,961.26	904.19	4,023.39	0.97	0.71	-0.66
11,124.00	90.29	150.65	6,225.30	-4,044.28	950.37	4,117.41	0.59	0.19	-0.56
11,219.00	90.37	150.30	6,224.76	-4,126.94	997.19	4,211.33	0.38	0.08	-0.37
11,313.00	90.68	150.38	6,223.89	-4,208.63	1,043.70	4,304.23	0.34	0.33	0.09
11,408.00	89.71	151.35	6,223.57	-4,291.60	1,089.95	4,398.24	1.44	-1.02	1.02
11,502.00	89.85	151.18	6,223.93	-4,374.03	1,135.14	4,491.36	0.23	0.15	-0.18
11,597.00	89.63	149.59	6,224.36	-4,456.61	1,182.09	4,585.25	1.69	-0.23	-1.67
11,692.00	88.44	150.12	6,225.96	-4,538.75	1,229.79	4,679.00	1.37	-1.25	0.56
11,787.00	88.62	150.21	6,228.40	-4,621.13	1,277.03	4,772.81	0.21	0.19	0.09
11,882.00	89.10	150.74	6,230.29	-4,703.78	1,323.84	4,866.71	0.75	0.51	0.56
11,977.00	88.75	149.94	6,232.07	-4,786.32	1,370.84	4,960.58	0.92	-0.37	-0.84
12,072.00	88.92	149.94	6,234.00	-4,868.52	1,418.42	5,054.34	0.18	0.18	0.00
12,166.00	88.53	149.51	6,236.10	-4,949.68	1,465.80	5,147.06	0.62	-0.41	-0.46
12,261.00	88.62	150.30	6,238.46	-5,031.85	1,513.42	5,240.80	0.84	0.09	0.83
12,354.00	89.19	150.38	6,240.24	-5,112.65	1,559.43	5,332.70	0.62	0.61	0.09
12,448.00	89.54	149.59	6,241.28	-5,194.04	1,606.45	5,425.50	0.92	0.37	-0.84
12,542.00	90.33	149.42	6,241.38	-5,275.03	1,654.15	5,518.18	0.86	0.84	-0.18
12,636.00	90.81	148.98	6,240.45	-5,355.77	1,702.28	5,610.77	0.69	0.51	-0.47
12,732.00	90.51	148.63	6,239.34	-5,437.89	1,752.00	5,705.21	0.48	-0.31	-0.36
12,827.00	90.20	149.59	6,238.75	-5,519.41	1,800.77	5,798.76	1.06	-0.33	1.01



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-2HM
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,922.00	90.33	149.15	6,238.32	-5,601.15	1,849.17	5,892.38	0.48	0.14	-0.46
13,016.00	89.71	149.15	6,238.28	-5,681.85	1,897.37	5,984.96	0.66	-0.66	0.00
13,111.00	89.45	149.86	6,238.98	-5,763.71	1,945.58	6,078.63	0.80	-0.27	0.75
13,206.00	89.76	149.24	6,239.63	-5,845.60	1,993.72	6,172.30	0.73	0.33	-0.65
13,301.00	90.24	150.91	6,239.63	-5,927.93	2,041.12	6,266.12	1.83	0.51	1.76
13,395.00	90.33	150.91	6,239.17	-6,010.07	2,086.82	6,359.15	0.10	0.10	0.00
13,490.00	90.37	151.18	6,238.59	-6,093.20	2,132.81	6,453.21	0.29	0.04	0.28
13,585.00	90.73	150.74	6,237.67	-6,176.25	2,178.92	6,547.24	0.60	0.38	-0.46
13,679.00	89.71	150.65	6,237.31	-6,258.22	2,224.93	6,640.23	1.09	-1.09	-0.10
13,774.00	89.98	150.91	6,237.57	-6,341.13	2,271.30	6,734.22	0.39	0.28	0.27
13,869.00	89.93	151.09	6,237.64	-6,424.22	2,317.36	6,828.27	0.20	-0.05	0.19
13,965.00	90.55	151.26	6,237.24	-6,508.32	2,363.64	6,923.35	0.67	0.65	0.18
14,060.00	88.79	150.30	6,237.79	-6,591.23	2,410.02	7,017.33	2.11	-1.85	-1.01
14,154.00	88.40	150.56	6,240.09	-6,672.96	2,456.39	7,110.23	0.50	-0.41	0.28
14,248.00	89.01	149.86	6,242.22	-6,754.52	2,503.08	7,203.07	0.99	0.65	-0.74
14,343.00	89.32	149.59	6,243.60	-6,836.55	2,550.97	7,296.78	0.43	0.33	-0.28
14,438.00	89.45	149.42	6,244.62	-6,918.41	2,599.17	7,390.44	0.23	0.14	-0.18
14,533.00	90.15	148.98	6,244.95	-7,000.01	2,647.82	7,484.02	0.87	0.74	-0.46
14,602.00	90.11	148.80	6,244.80	-7,059.08	2,683.47	7,551.93	0.27	-0.06	-0.26
Survey @ 14602.00 MD 6244.80 TVD									
14,660.00	90.11	148.80	6,244.69	-7,108.69	2,713.51	7,608.99	0.00	0.00	0.00
Survey projected to 14660.00 MD 6244.69 TVD									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
251.00	251.00	-0.24	-0.39	MWD surveys
14,602.00	6,244.80	-7,059.08	2,683.47	Survey @ 14602.00 MD 6244.80 TVD
14,660.00	6,244.69	-7,108.69	2,713.51	Survey projected to 14660.00 MD 6244.69 TVD

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Survey Report - Geographic

WV Department of
Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-2HM
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Project	Wetzel County, West Virginia (UTM17 NAD83)		
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	Yoder				
Site Position:		Northing:	14,446,864.35 usft	Latitude:	39.78054955
From:	Lat/Long	Easting:	1,685,354.97 usft	Longitude:	-80.84004615
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.10 °

Well	Yoder W-2HM					
Well Position	+N/-S	0.00 usft	Northing:	14,446,874.49 usft	Latitude:	39.78057743
	+E/-W	0.00 usft	Easting:	1,685,347.68 usft	Longitude:	-80.84007205
Position Uncertainty	0.00 usft		Wellhead Elevation:	0.00 usft	Ground Level:	1,083.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/22/2017	-8.61	66.93	52,136.62213043

Design	Surveys Original Hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:		Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
		0.00	0.00	0.00	159.12

Survey Program	Date	12/7/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
251.00	2,569.00	MWD (Original Hole)	MWD	MWD - Standard	
2,684.00	14,660.00	MWD2 (Original Hole)	MWD	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	14,446,874.49	1,685,347.68	39.78057743	-80.84007205	
251.00	0.21	238.85	251.00	-0.24	-0.39	14,446,874.26	1,685,347.28	39.78057678	-80.84007345	
MWD surveys										
342.00	0.33	230.04	342.00	-0.49	-0.74	14,446,874.00	1,685,346.94	39.78057608	-80.84007468	
433.00	0.30	217.37	433.00	-0.85	-1.08	14,446,873.64	1,685,346.59	39.78057510	-80.84007591	
526.00	0.22	204.97	526.00	-1.21	-1.31	14,446,873.29	1,685,346.37	39.78057413	-80.84007671	
616.00	0.41	230.34	615.99	-1.57	-1.63	14,446,872.93	1,685,346.05	39.78057313	-80.84007785	
707.00	0.26	253.72	706.99	-1.83	-2.08	14,446,872.66	1,685,345.60	39.78057241	-80.84007945	
740.00	0.24	269.64	739.99	-1.85	-2.22	14,446,872.64	1,685,345.46	39.78057235	-80.84007995	
888.00	0.41	293.30	887.99	-1.65	-3.01	14,446,872.85	1,685,344.66	39.78057292	-80.84008279	
982.00	0.66	300.31	981.99	-1.24	-3.79	14,446,873.25	1,685,343.89	39.78057404	-80.84008555	

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Survey Report - Geographic

WV Department of
Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-2HM
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
1,075.00	0.67	302.18	1,074.98	-0.68	-4.71	14,446,873.81	1,685,342.96	39.78057558	-80.84008883	
1,170.00	1.05	303.93	1,169.97	0.10	-5.90	14,446,874.59	1,685,341.77	39.78057774	-80.84009307	
1,265.00	1.40	307.61	1,264.95	1.29	-7.55	14,446,875.79	1,685,340.13	39.78058102	-80.84009890	
1,360.00	2.62	308.37	1,359.89	3.35	-10.17	14,446,877.84	1,685,337.51	39.78058668	-80.84010822	
1,455.00	4.51	299.23	1,454.70	6.52	-15.13	14,446,881.02	1,685,332.55	39.78059542	-80.84012586	
1,550.00	5.58	294.85	1,549.33	10.29	-22.58	14,446,884.78	1,685,325.10	39.78060580	-80.84015236	
1,645.00	6.04	286.63	1,643.84	13.66	-31.56	14,446,888.15	1,685,316.12	39.78061510	-80.84018430	
1,739.00	6.13	277.16	1,737.32	15.70	-41.28	14,446,890.19	1,685,306.40	39.78062075	-80.84021888	
1,832.00	6.31	270.24	1,829.77	16.34	-51.32	14,446,890.83	1,685,296.36	39.78062256	-80.84025461	
1,926.00	5.65	264.36	1,923.26	15.91	-61.09	14,446,890.40	1,685,286.59	39.78062142	-80.84028939	
2,021.00	3.75	261.97	2,017.94	15.01	-68.82	14,446,889.51	1,685,278.86	39.78061900	-80.84031691	
2,115.00	2.00	280.85	2,111.82	14.89	-73.47	14,446,889.39	1,685,274.20	39.78061869	-80.84033348	
2,208.00	2.24	295.05	2,204.75	15.97	-76.71	14,446,890.46	1,685,270.96	39.78062166	-80.84034501	
2,303.00	3.13	298.15	2,299.65	17.98	-80.68	14,446,892.47	1,685,266.99	39.78062720	-80.84035912	
2,398.00	3.74	295.55	2,394.48	20.54	-85.76	14,446,895.03	1,685,261.91	39.78063425	-80.84037719	
2,492.00	4.00	296.03	2,488.26	23.30	-91.48	14,446,897.79	1,685,256.20	39.78064187	-80.84039751	
2,569.00	4.17	298.33	2,565.07	25.81	-96.35	14,446,900.30	1,685,251.32	39.78064877	-80.84041485	
2,684.00	5.07	298.68	2,679.69	30.23	-104.49	14,446,904.72	1,685,243.18	39.78066096	-80.84044379	
2,779.00	5.19	294.59	2,774.31	34.03	-112.08	14,446,908.52	1,685,235.59	39.78067144	-80.84047078	
2,873.00	7.32	291.90	2,867.75	38.03	-121.51	14,446,912.53	1,685,226.17	39.78068248	-80.84050430	
2,968.00	13.80	293.35	2,961.09	44.79	-137.54	14,446,919.28	1,685,210.13	39.78070111	-80.84056133	
3,062.00	19.67	296.18	3,051.07	56.22	-162.05	14,446,930.72	1,685,185.62	39.78073263	-80.84064851	
3,161.00	23.39	294.40	3,143.15	71.70	-194.91	14,446,946.19	1,685,152.76	39.78077529	-80.84076537	
3,256.00	23.12	285.67	3,230.45	84.53	-230.05	14,446,959.02	1,685,117.62	39.78081070	-80.84089037	
3,351.00	24.02	280.74	3,317.54	93.17	-267.01	14,446,967.66	1,685,080.66	39.78083461	-80.84102187	
3,446.00	25.61	276.92	3,403.77	99.25	-306.40	14,446,973.74	1,685,041.28	39.78085150	-80.84116201	
3,540.00	25.92	276.20	3,488.42	103.92	-346.99	14,446,978.41	1,685,000.69	39.78086451	-80.84130647	
3,635.00	25.44	277.18	3,574.04	108.71	-387.88	14,446,983.20	1,684,959.80	39.78087787	-80.84145197	
3,730.00	25.61	277.06	3,659.77	113.78	-428.50	14,446,988.27	1,684,919.18	39.78089200	-80.84159652	
3,824.00	25.53	279.51	3,744.56	119.63	-468.64	14,446,994.12	1,684,879.04	39.78090824	-80.84173936	
3,919.00	25.61	280.07	3,830.26	126.60	-509.04	14,447,001.09	1,684,838.63	39.78092759	-80.84188314	
4,013.00	25.49	279.87	3,915.07	133.62	-548.97	14,447,008.11	1,684,798.70	39.78094706	-80.84202522	
4,109.00	25.40	279.32	4,001.75	140.49	-589.64	14,447,014.99	1,684,758.04	39.78096614	-80.84216993	
4,204.00	25.25	280.84	4,087.63	147.60	-629.65	14,447,022.10	1,684,718.03	39.78098586	-80.84231229	
4,298.00	25.97	281.81	4,172.39	155.59	-669.48	14,447,030.08	1,684,678.19	39.78100797	-80.84245404	
4,393.00	26.48	283.07	4,257.61	164.63	-710.47	14,447,039.13	1,684,637.20	39.78103302	-80.84259988	
4,488.00	26.14	281.67	4,342.77	173.66	-751.60	14,447,048.15	1,684,596.08	39.78105799	-80.84274621	
4,583.00	26.29	282.23	4,428.00	182.34	-792.66	14,447,056.84	1,684,555.02	39.78108206	-80.84289229	
4,678.00	26.78	282.01	4,512.99	191.26	-834.15	14,447,065.75	1,684,513.53	39.78110673	-80.84303993	
4,772.00	26.64	281.17	4,596.96	199.74	-875.54	14,447,074.24	1,684,472.14	39.78113024	-80.84318720	
4,867.00	25.59	280.16	4,682.26	207.49	-916.63	14,447,081.98	1,684,431.05	39.78115171	-80.84333341	
4,962.00	24.50	281.90	4,768.33	215.17	-956.10	14,447,089.66	1,684,391.58	39.78117299	-80.84347386	
5,057.00	24.61	282.93	4,854.74	223.66	-994.65	14,447,098.15	1,684,353.02	39.78119649	-80.84361103	
5,150.00	25.04	282.92	4,939.15	232.39	-1,032.71	14,447,106.89	1,684,314.96	39.78122065	-80.84374644	
5,245.00	25.38	282.18	5,025.10	241.18	-1,072.21	14,447,115.68	1,684,275.47	39.78124499	-80.84388697	
5,339.00	25.30	282.32	5,110.05	249.72	-1,111.52	14,447,124.21	1,684,236.15	39.78126862	-80.84402686	
5,432.00	25.06	281.74	5,194.22	257.97	-1,150.22	14,447,132.46	1,684,197.45	39.78129145	-80.84416455	
5,527.00	24.70	282.67	5,280.40	266.41	-1,189.29	14,447,140.91	1,684,158.39	39.78131484	-80.84430354	
5,621.00	23.26	283.54	5,366.28	275.07	-1,226.49	14,447,149.56	1,684,121.18	39.78133878	-80.84443593	
5,709.00	20.84	280.81	5,447.84	282.07	-1,258.77	14,447,156.57	1,684,088.91	39.78135817	-80.84455077	
5,733.00	19.30	272.38	5,470.39	283.04	-1,266.93	14,447,157.53	1,684,080.75	39.78136086	-80.84457980	
5,828.00	17.76	252.16	5,560.56	279.25	-1,296.44	14,447,153.74	1,684,051.24	39.78135059	-80.84468486	
5,923.00	17.45	228.43	5,651.22	265.34	-1,320.92	14,447,139.83	1,684,026.76	39.78131251	-80.84477209	
6,017.00	18.07	212.43	5,740.80	243.67	-1,339.29	14,447,118.16	1,684,008.38	39.78125309	-80.84483762	
6,064.00	19.78	207.69	5,785.26	230.47	-1,346.90	14,447,104.97	1,684,000.78	39.78121688	-80.84486477	

SEP 11 2018



Survey Report - Geographic

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-2HM
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,113.00	21.76	204.00	5,831.07	214.83	-1,354.44	14,447,089.32	1,683,993.23	39.78117397	-80.84489174
6,145.00	23.91	200.13	5,860.56	203.32	-1,359.09	14,447,077.82	1,683,988.59	39.78114238	-80.84490834
6,177.00	28.13	197.05	5,889.32	190.02	-1,363.54	14,447,064.51	1,683,984.14	39.78110585	-80.84492425
6,207.00	32.57	193.54	5,915.20	175.39	-1,367.50	14,447,049.89	1,683,980.17	39.78106572	-80.84493846
6,303.00	45.01	180.71	5,990.00	116.00	-1,374.01	14,446,990.49	1,683,973.67	39.78090264	-80.84496198
6,398.00	54.15	165.41	6,051.74	44.75	-1,364.67	14,446,919.25	1,683,983.00	39.78070693	-80.84492920
6,494.00	65.63	157.06	6,099.89	-33.53	-1,337.71	14,446,840.97	1,684,009.97	39.78049182	-80.84483369
6,585.00	74.24	156.80	6,131.08	-112.09	-1,304.24	14,446,762.40	1,684,043.44	39.78027590	-80.84471505
6,680.00	78.90	155.31	6,153.14	-196.51	-1,266.74	14,446,677.98	1,684,080.94	39.78004388	-80.84458209
6,775.00	84.57	153.64	6,166.79	-281.31	-1,226.24	14,446,593.19	1,684,121.44	39.77981082	-80.84443845
6,870.00	87.91	151.53	6,173.02	-365.44	-1,182.59	14,446,509.06	1,684,165.08	39.77957956	-80.84428364
6,965.00	88.79	152.05	6,175.75	-449.12	-1,137.71	14,446,425.37	1,684,209.97	39.77934953	-80.84412438
7,059.00	88.66	150.38	6,177.85	-531.48	-1,092.46	14,446,343.01	1,684,255.22	39.77912313	-80.84396383
7,152.00	88.92	150.47	6,179.81	-612.34	-1,046.56	14,446,262.15	1,684,301.11	39.77890083	-80.84380100
7,247.00	88.84	151.18	6,181.67	-695.28	-1,000.26	14,446,179.22	1,684,347.41	39.77867286	-80.84363671
7,341.00	89.10	149.59	6,183.36	-776.98	-953.82	14,446,097.51	1,684,393.86	39.77844825	-80.84347191
7,436.00	89.67	149.77	6,184.38	-858.98	-905.86	14,446,015.51	1,684,441.81	39.77822282	-80.84330174
7,531.00	90.20	148.63	6,184.48	-940.58	-857.22	14,445,933.91	1,684,490.45	39.77799849	-80.84312911
7,626.00	91.12	148.10	6,183.39	-1,021.46	-807.40	14,445,853.04	1,684,540.28	39.77777614	-80.84295228
7,721.00	89.93	148.45	6,182.52	-1,102.26	-757.45	14,445,772.24	1,684,590.23	39.77755400	-80.84277499
7,816.00	88.13	147.40	6,184.13	-1,182.74	-707.01	14,445,691.75	1,684,640.67	39.77733273	-80.84259598
7,911.00	89.54	149.68	6,186.06	-1,263.75	-657.44	14,445,610.74	1,684,690.23	39.77711001	-80.84242007
8,006.00	88.18	150.21	6,187.95	-1,345.96	-609.87	14,445,528.53	1,684,737.80	39.77688401	-80.84225128
8,099.00	88.44	150.47	6,190.69	-1,426.74	-563.87	14,445,447.75	1,684,783.80	39.77666194	-80.84208806
8,194.00	88.62	150.56	6,193.13	-1,509.41	-517.13	14,445,365.08	1,684,830.55	39.77643468	-80.84192221
8,288.00	89.41	150.47	6,194.74	-1,591.22	-470.87	14,445,283.27	1,684,876.80	39.77620978	-80.84175808
8,383.00	89.67	150.56	6,195.51	-1,673.91	-424.11	14,445,200.58	1,684,923.56	39.77598245	-80.84159218
8,478.00	90.51	150.56	6,195.36	-1,756.65	-377.42	14,445,117.85	1,684,970.26	39.77575502	-80.84142651
8,573.00	89.10	152.05	6,195.68	-1,839.97	-331.81	14,445,034.52	1,685,015.87	39.77552595	-80.84126470
8,668.00	88.79	150.82	6,197.43	-1,923.40	-286.39	14,444,951.10	1,685,061.28	39.77529663	-80.84110359
8,763.00	88.66	150.82	6,199.54	-2,006.32	-240.09	14,444,868.17	1,685,107.59	39.77506868	-80.84093930
8,857.00	89.45	151.18	6,201.10	-2,088.52	-194.52	14,444,785.97	1,685,153.15	39.77484270	-80.84077765
8,952.00	89.05	149.86	6,202.34	-2,171.21	-147.78	14,444,703.28	1,685,199.90	39.77461538	-80.84061180
9,048.00	89.41	149.68	6,203.63	-2,254.15	-99.45	14,444,620.34	1,685,248.23	39.77438738	-80.84044032
9,142.00	89.98	149.42	6,204.13	-2,335.18	-51.81	14,444,539.31	1,685,295.87	39.77416460	-80.84027129
9,236.00	89.19	148.54	6,204.81	-2,415.74	-3.37	14,444,458.76	1,685,344.31	39.77394314	-80.84009940
9,330.00	89.23	148.54	6,206.11	-2,495.91	45.68	14,444,378.58	1,685,393.36	39.77372272	-80.83992532
9,425.00	89.71	148.71	6,206.98	-2,577.02	95.14	14,444,297.48	1,685,442.82	39.77349974	-80.83974982
9,519.00	88.40	148.63	6,208.54	-2,657.30	144.01	14,444,217.20	1,685,491.69	39.77327902	-80.83957640
9,614.00	88.66	148.63	6,210.97	-2,738.38	193.45	14,444,136.11	1,685,541.12	39.77305609	-80.83940097
9,709.00	90.15	148.54	6,211.96	-2,819.45	242.96	14,444,055.04	1,685,590.64	39.77283321	-80.83922527
9,803.00	88.84	149.24	6,212.79	-2,899.93	291.53	14,443,974.57	1,685,639.20	39.77261196	-80.83905294
9,898.00	87.91	149.94	6,215.48	-2,981.82	339.59	14,443,892.67	1,685,687.27	39.77238682	-80.83888239
9,992.00	89.54	149.24	6,217.57	-3,062.87	387.16	14,443,811.63	1,685,734.84	39.77216401	-80.83871362
10,086.00	89.67	148.54	6,218.22	-3,143.34	435.73	14,443,731.15	1,685,783.40	39.77194275	-80.83854129
10,181.00	90.55	148.10	6,218.04	-3,224.19	485.62	14,443,650.31	1,685,833.30	39.77172049	-80.83836425
10,276.00	90.37	147.57	6,217.28	-3,304.60	536.19	14,443,569.89	1,685,883.87	39.77149939	-80.83818478
10,369.00	90.24	148.80	6,216.78	-3,383.63	585.22	14,443,490.86	1,685,932.89	39.77128212	-80.83801081
10,463.00	88.75	150.21	6,217.61	-3,464.62	632.92	14,443,409.87	1,685,980.59	39.77105946	-80.83784158
10,558.00	88.88	150.38	6,219.57	-3,547.12	679.98	14,443,327.38	1,686,027.66	39.77083266	-80.83767461
10,653.00	88.88	151.70	6,221.43	-3,630.22	725.97	14,443,244.27	1,686,073.65	39.77060421	-80.83751148
10,748.00	89.23	152.14	6,223.00	-3,714.03	770.68	14,443,160.47	1,686,118.36	39.77037383	-80.83735290
10,842.00	89.27	151.44	6,224.23	-3,796.85	815.11	14,443,077.64	1,686,162.79	39.77014614	-80.83719532
10,936.00	89.45	151.79	6,225.28	-3,879.55	859.79	14,442,994.95	1,686,207.47	39.76991882	-80.83703683
11,029.00	90.11	151.18	6,225.64	-3,961.26	904.19	14,442,913.23	1,686,251.87	39.76969418	-80.83687936



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-2HM
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
11,124.00	90.29	150.65	6,225.30	-4,044.28	950.37	14,442,830.21	1,686,298.05	39.76946595	-80.83671555	
11,219.00	90.37	150.30	6,224.76	-4,126.94	997.19	14,442,747.55	1,686,344.86	39.76923870	-80.83654948	
11,313.00	90.68	150.38	6,223.89	-4,208.63	1,043.70	14,442,665.87	1,686,391.38	39.76901415	-80.83638447	
11,408.00	89.71	151.35	6,223.57	-4,291.60	1,089.95	14,442,582.89	1,686,437.63	39.76878604	-80.83622042	
11,502.00	89.85	151.18	6,223.93	-4,374.03	1,135.14	14,442,500.47	1,686,482.82	39.76855945	-80.83606013	
11,597.00	89.63	149.59	6,224.36	-4,456.61	1,182.09	14,442,417.88	1,686,529.76	39.76833241	-80.83589360	
11,692.00	88.44	150.12	6,225.96	-4,538.75	1,229.79	14,442,335.74	1,686,577.46	39.76810659	-80.83572438	
11,787.00	88.62	150.21	6,228.40	-4,621.13	1,277.03	14,442,253.36	1,686,624.71	39.76788011	-80.83555678	
11,882.00	89.10	150.74	6,230.29	-4,703.78	1,323.84	14,442,170.71	1,686,671.52	39.76765290	-80.83539075	
11,977.00	88.75	149.94	6,232.07	-4,786.32	1,370.84	14,442,088.18	1,686,718.52	39.76742599	-80.83522402	
12,072.00	88.92	149.94	6,234.00	-4,868.52	1,418.42	14,442,005.97	1,686,766.10	39.76719999	-80.83505525	
12,166.00	88.53	149.51	6,236.10	-4,949.68	1,465.80	14,441,924.81	1,686,813.47	39.76697687	-80.83488718	
12,261.00	88.62	150.30	6,238.46	-5,031.85	1,513.42	14,441,842.64	1,686,861.09	39.76675097	-80.83471825	
12,354.00	89.19	150.38	6,240.24	-5,112.65	1,559.43	14,441,761.84	1,686,907.11	39.76652884	-80.83455503	
12,448.00	89.54	149.59	6,241.28	-5,194.04	1,606.45	14,441,680.46	1,686,954.13	39.76630508	-80.83438825	
12,542.00	90.33	149.42	6,241.38	-5,275.03	1,654.15	14,441,599.46	1,687,001.83	39.76608240	-80.83421903	
12,636.00	90.81	148.98	6,240.45	-5,355.77	1,702.28	14,441,518.72	1,687,049.96	39.76586042	-80.83404828	
12,732.00	90.51	148.63	6,239.34	-5,437.89	1,752.00	14,441,436.61	1,687,099.68	39.76563466	-80.83387189	
12,827.00	90.20	149.59	6,238.75	-5,519.41	1,800.77	14,441,355.09	1,687,148.45	39.76541053	-80.83369887	
12,922.00	90.33	149.15	6,238.32	-5,601.15	1,849.17	14,441,273.34	1,687,196.85	39.76518579	-80.83352717	
13,016.00	89.71	149.15	6,238.28	-5,681.85	1,897.37	14,441,192.64	1,687,245.05	39.76496392	-80.83335617	
13,111.00	89.45	149.86	6,238.98	-5,763.71	1,945.58	14,441,110.79	1,687,293.26	39.76473887	-80.83318517	
13,206.00	89.76	149.24	6,239.63	-5,845.60	1,993.72	14,441,028.89	1,687,341.40	39.76451372	-80.83301439	
13,301.00	90.24	150.91	6,239.63	-5,927.93	2,041.12	14,440,946.56	1,687,388.79	39.76428737	-80.83284629	
13,395.00	90.33	150.91	6,239.17	-6,010.07	2,086.82	14,440,864.42	1,687,434.49	39.76406155	-80.83268421	
13,490.00	90.37	151.18	6,238.59	-6,093.20	2,132.81	14,440,781.29	1,687,480.48	39.76383303	-80.83252110	
13,585.00	90.73	150.74	6,237.67	-6,176.25	2,178.92	14,440,698.24	1,687,526.59	39.76360471	-80.83235756	
13,679.00	89.71	150.65	6,237.31	-6,258.22	2,224.93	14,440,616.27	1,687,572.60	39.76337936	-80.83219439	
13,774.00	89.98	150.91	6,237.57	-6,341.13	2,271.30	14,440,533.36	1,687,618.98	39.76315143	-80.83202991	
13,869.00	89.93	151.09	6,237.64	-6,424.22	2,317.36	14,440,450.27	1,687,665.04	39.76292300	-80.83186658	
13,965.00	90.55	151.26	6,237.24	-6,508.32	2,363.64	14,440,366.17	1,687,711.32	39.76269179	-80.83170244	
14,060.00	88.79	150.30	6,237.79	-6,591.23	2,410.02	14,440,283.26	1,687,757.69	39.76246387	-80.83153797	
14,154.00	88.40	150.56	6,240.09	-6,672.96	2,456.39	14,440,201.53	1,687,804.07	39.76223917	-80.83137350	
14,248.00	89.01	149.86	6,242.22	-6,754.52	2,503.08	14,440,119.98	1,687,850.75	39.76201495	-80.83120791	
14,343.00	89.32	149.59	6,243.60	-6,836.55	2,550.97	14,440,037.94	1,687,898.64	39.76178941	-80.83103805	
14,438.00	89.45	149.42	6,244.62	-6,918.41	2,599.17	14,439,956.09	1,687,946.85	39.76156436	-80.83086706	
14,533.00	90.15	148.98	6,244.95	-7,000.01	2,647.82	14,439,874.49	1,687,995.49	39.76134001	-80.83069452	
14,602.00	90.11	148.80	6,244.80	-7,059.08	2,683.47	14,439,815.41	1,688,031.14	39.76117759	-80.83056805	
Survey @ 14602.00 MD 6244.80 TVD										
14,660.00	90.11	148.80	6,244.69	-7,108.69	2,713.51	14,439,765.80	1,688,061.19	39.76104119	-80.83046147	
Survey projected to 14660.00 MD 6244.69 TVD										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
251.00	251.00	-0.24	-0.39	MWD surveys	
14,602.00	6,244.80	-7,059.08	2,683.47	Survey @ 14602.00 MD 6244.80 TVD	
14,660.00	6,244.69	-7,108.69	2,713.51	Survey projected to 14660.00 MD 6244.69 TVD	

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