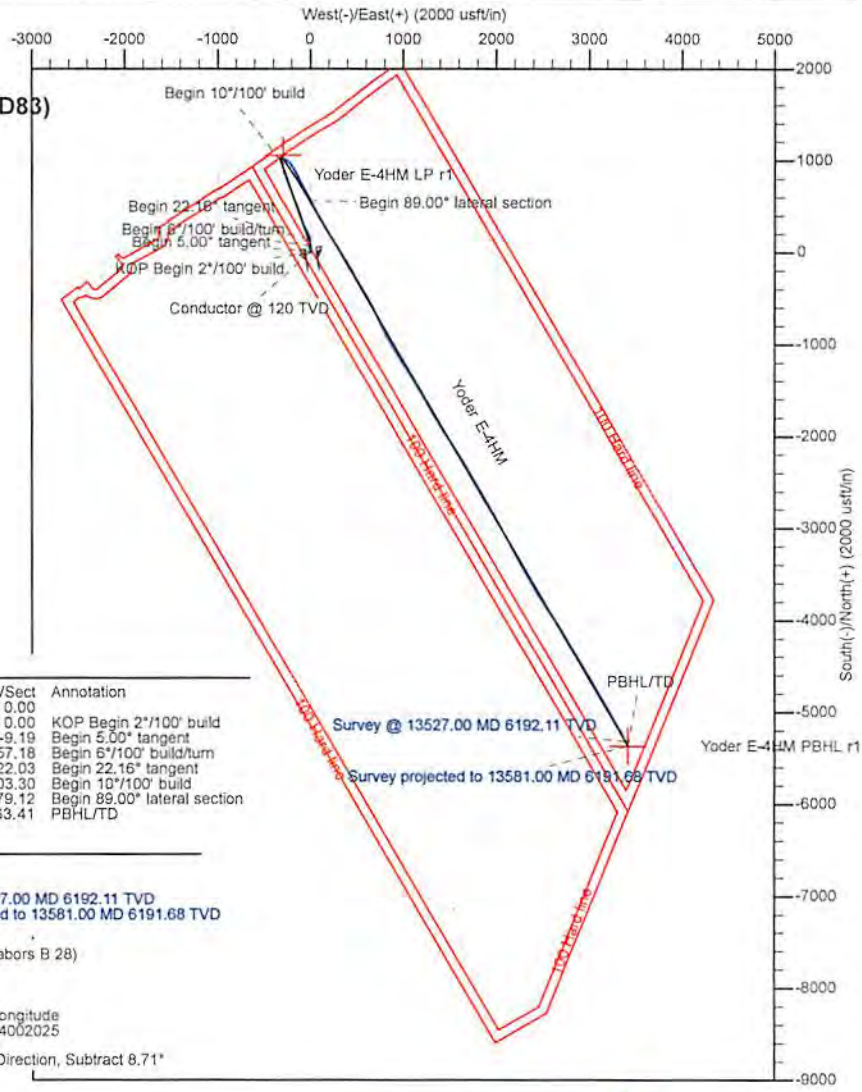
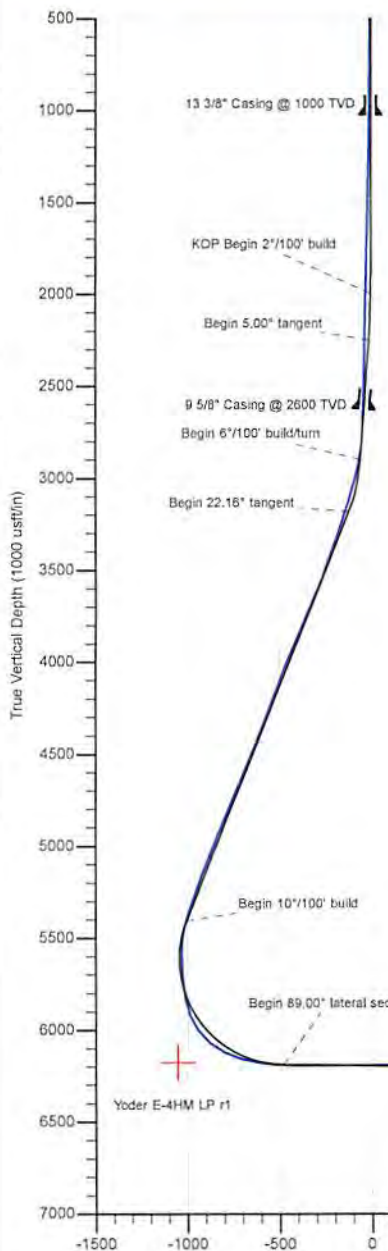




TUG HILL
OPERATING

Tug Hill Operating LLC
Well: Yoder E-4HM
Site: Yoder
Project: Wetzel County, West Virginia (UTM17 NAD83)
Design: rev1

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SECTION DETAILS

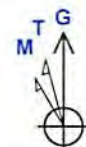
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	2000.00	0.00	0.00	2000.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2'/100' build
3	2250.00	5.00	0.00	2249.68	10.90	0.00	2.00	0.00	-9.19	Begin 5.00' tangent
4	2902.80	5.00	0.00	2900.00	67.80	0.00	0.00	0.00	-57.18	Begin 6'/100' build/turn
5	3194.74	22.16	340.63	3182.81	132.96	-18.41	6.00	-24.56	-122.03	Begin 22.16' tangent
6	5594.01	22.16	340.63	5404.88	985.64	-318.60	0.00	0.00	-1003.30	Begin 10'/100' build
7	6701.61	89.00	149.98	6188.00	563.45	-7.29	10.00	168.61	-479.12	Begin 89.00' lateral section
8	13551.61	89.00	149.98	6307.55	-5366.72	3419.26	0.00	0.00	6363.41	PBHL/TD

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
347.00	2.61	42.06	346.88	5.87	5.29	-2.10	MWD surveys
13527.00	90.46	152.32	6192.11	-5317.96	3392.38	6307.85	Survey @ 13527.00 MD 6192.11 TVD
13581.00	90.46	152.32	6191.68	-5365.78	3417.46	6361.66	Survey projected to 13581.00 MD 6191.68 TVD

Surface Location: RKB=10B3+26 @ 1109.00usft (Nabors B 28)
Universal Transverse Mercator (US Survey Feet)
NAD83 West Virginia - HARN
Zone 17N (84 W to 78 W)
Northing: 14446854.20 Easting: 1685362.27 Latitude: 39.76052164 Longitude: -80.84002025

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



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

Magnetic Field
Strength: 52127.75nT
Dip Angle: 66.93°
Date: 12/20/2017
Model: IGRF2015





Survey Report

SEP 11 2018
WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder E-4HM
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 E-4HM	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 E-4HM					
Well Position	+N/-S	0.00 usft	Northing:	14,446,854.20 usft	Latitude:	39.78052164
	+E/-W	0.00 usft	Easting:	1,685,362.27 usft	Longitude:	-80.84002025
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	12/20/2017	-8.61	66.93	52,127.72415954

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	147.50	

Survey Program	Date	1/6/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
347.00	13,581.00	MWD (Original Hole)	MWD	MWD - Standard	

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	
347.00	2.61	42.06	346.88	5.87	5.29	-2.10	0.75	0.75	0.00	
MWD surveys										
438.00	1.85	40.01	437.81	8.53	7.63	-3.10	0.84	-0.84	-2.25	
530.00	1.38	33.70	529.77	10.59	9.20	-3.99	0.55	-0.51	-6.86	
622.00	1.04	41.15	621.75	12.14	10.36	-4.67	0.41	-0.37	8.10	
713.00	0.79	30.23	712.74	13.30	11.22	-5.19	0.33	-0.27	-12.00	
803.00	0.42	56.28	802.74	14.02	11.81	-5.48	0.50	-0.41	28.94	
895.00	0.50	34.52	894.73	14.54	12.31	-5.65	0.21	0.09	-23.65	
989.00	0.76	5.32	988.73	15.50	12.60	-6.30	0.43	0.28	-31.06	
1,082.00	0.78	354.69	1,081.72	16.74	12.60	-7.35	0.15	0.02	-11.43	



Survey Report

SEP 11 2018

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder E-4HM
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 E-4HM	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)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
1,177.00	0.92	327.68	1,176.71	18.03	12.13	-8.69	0.44	0.15	-28.43
1,272.00	1.19	317.63	1,271.69	19.41	11.06	-10.42	0.34	0.28	-10.58
1,367.00	1.34	323.56	1,366.67	21.03	9.74	-12.50	0.21	0.16	6.24
1,462.00	1.36	331.06	1,461.64	22.91	8.53	-14.74	0.19	0.02	7.89
1,557.00	1.39	338.83	1,556.62	24.97	7.57	-16.99	0.20	0.03	8.18
1,652.00	1.40	340.80	1,651.59	27.14	6.77	-19.25	0.05	0.01	2.07
1,745.00	1.28	336.48	1,744.56	29.17	5.98	-21.38	0.17	-0.13	-4.65
1,838.00	1.40	330.84	1,837.54	31.11	5.02	-23.54	0.19	0.13	-6.06
1,933.00	1.54	328.81	1,932.51	33.22	3.79	-25.98	0.16	0.15	-2.14
2,028.00	1.47	329.73	2,027.47	35.36	2.51	-28.47	0.08	-0.07	0.97
2,122.00	1.37	320.92	2,121.45	37.27	1.20	-30.79	0.26	-0.11	-9.37
2,215.00	1.13	295.88	2,214.42	38.54	-0.33	-32.68	0.63	-0.26	-26.92
2,309.00	1.15	271.71	2,308.41	38.97	-2.10	-34.00	0.51	0.02	-25.71
2,404.00	1.34	298.13	2,403.38	39.52	-4.04	-35.50	0.63	0.20	27.81
2,499.00	1.52	323.09	2,498.36	41.05	-5.77	-37.73	0.68	0.19	26.27
2,583.00	1.71	330.34	2,582.32	43.03	-7.06	-40.09	0.33	0.23	8.63
2,684.00	1.92	337.46	2,683.27	45.90	-8.46	-43.26	0.30	0.21	7.05
2,778.00	3.79	356.44	2,777.15	50.46	-9.25	-47.53	2.20	1.99	20.19
2,873.00	12.10	5.54	2,871.16	63.53	-8.49	-58.14	8.82	8.75	9.58
2,971.00	18.11	6.21	2,965.73	88.92	-5.84	-78.13	6.14	6.13	0.68
3,066.00	18.59	2.64	3,055.90	118.72	-3.55	-102.04	1.29	0.51	-3.76
3,161.00	19.30	353.04	3,145.78	149.44	-4.75	-128.59	3.36	0.75	-10.11
3,255.00	19.22	337.56	3,234.58	179.18	-12.55	-157.86	5.42	-0.09	-16.47
3,350.00	19.24	331.57	3,324.28	207.40	-25.97	-188.87	2.08	0.02	-6.31
3,445.00	19.43	330.60	3,413.93	234.93	-41.18	-220.26	0.39	0.20	-1.02
3,540.00	20.11	333.49	3,503.33	263.31	-56.23	-252.29	1.25	0.72	3.04
3,634.00	22.62	338.50	3,590.87	294.60	-70.07	-286.11	3.30	2.67	5.33
3,729.00	23.45	340.28	3,678.29	329.39	-83.14	-322.48	1.14	0.87	1.87
3,824.00	23.17	340.80	3,765.54	364.84	-95.67	-359.10	0.37	-0.29	0.55
3,918.00	23.38	340.97	3,851.89	399.93	-107.83	-395.24	0.23	0.22	0.18
4,013.00	23.29	340.20	3,939.12	435.42	-120.34	-431.89	0.33	-0.09	-0.81
4,108.00	21.73	340.39	4,026.88	469.66	-132.60	-467.36	1.64	-1.64	0.20
4,203.00	20.75	338.78	4,115.43	501.92	-144.60	-501.00	1.20	-1.03	-1.69
4,298.00	21.12	340.35	4,204.16	533.72	-156.44	-534.19	0.71	0.39	1.65
4,393.00	21.39	341.00	4,292.69	566.22	-167.84	-567.73	0.38	0.28	0.68
4,487.00	21.70	339.86	4,380.13	598.75	-179.40	-601.37	0.55	0.33	-1.21
4,582.00	22.14	339.48	4,468.26	632.00	-191.72	-636.04	0.49	0.46	-0.40
4,677.00	22.79	339.14	4,556.05	665.96	-204.55	-671.57	0.70	0.68	-0.36
4,772.00	23.15	338.74	4,643.52	700.56	-217.87	-707.91	0.41	0.38	-0.42
4,867.00	23.09	337.79	4,730.89	735.21	-231.69	-744.55	0.40	-0.06	-1.00
4,962.00	23.22	338.06	4,818.23	769.82	-245.73	-781.29	0.18	0.14	0.28
5,057.00	23.22	340.07	4,905.54	804.80	-259.11	-817.98	0.83	0.00	2.12
5,150.00	23.27	339.81	4,990.99	839.28	-271.70	-853.82	0.12	0.05	-0.28



Survey Report

SEP 11 2018



WV Department of
Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder E-4HM
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 E-4HM	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)
5,244.00	22.76	341.50	5,077.51	873.95	-283.88	-889.61	0.89	-0.54	1.80
5,338.00	20.97	343.30	5,164.74	907.31	-294.48	-923.44	2.03	-1.90	1.91
5,455.00	19.82	343.66	5,274.41	946.40	-306.08	-962.64	0.99	-0.98	0.31
5,550.00	19.78	343.22	5,363.79	977.24	-315.25	-993.58	0.16	-0.04	-0.46
5,644.00	12.97	0.97	5,453.98	1,003.06	-319.67	-1,017.73	8.91	-7.24	18.88
5,737.00	6.02	32.17	5,545.70	1,017.65	-316.89	-1,028.54	9.04	-7.47	33.55
5,832.00	5.32	82.88	5,640.29	1,022.42	-309.86	-1,028.79	5.15	-0.74	53.38
5,927.00	8.62	94.66	5,734.58	1,022.38	-298.39	-1,022.60	3.77	3.47	12.40
6,023.00	13.63	104.86	5,828.76	1,018.90	-280.28	-1,009.92	5.59	5.22	10.63
6,118.00	22.59	123.84	5,919.03	1,005.83	-254.23	-984.90	11.18	9.43	19.98
6,212.00	36.48	138.78	6,000.73	974.56	-220.61	-940.47	16.62	14.78	15.89
6,306.00	50.29	150.82	6,068.99	921.63	-184.33	-876.33	17.07	14.69	12.81
6,401.00	64.35	152.32	6,120.16	851.45	-146.43	-796.78	14.86	14.80	1.58
6,495.00	72.92	153.28	6,154.37	773.65	-106.48	-709.70	9.17	9.12	1.02
6,589.00	79.38	152.05	6,176.86	692.63	-64.58	-618.85	6.99	6.87	-1.31
6,684.00	86.24	152.23	6,188.75	609.35	-20.56	-524.97	7.22	7.22	0.19
6,779.00	88.75	152.49	6,192.90	525.28	23.47	-430.41	2.66	2.64	0.27
6,874.00	92.04	153.11	6,192.25	440.80	66.88	-335.83	3.52	3.46	0.65
6,968.00	89.19	150.91	6,191.24	357.81	110.99	-242.14	3.83	-3.03	-2.34
7,063.00	89.10	149.42	6,192.65	275.41	158.25	-147.26	1.57	-0.09	-1.57
7,156.00	90.55	148.63	6,192.94	195.68	206.11	-54.29	1.78	1.56	-0.85
7,251.00	90.33	148.19	6,192.21	114.76	255.87	40.69	0.52	-0.23	-0.46
7,345.00	90.86	148.54	6,191.23	34.73	305.17	134.68	0.68	0.56	0.37
7,440.00	91.03	148.10	6,189.67	-46.10	355.06	229.65	0.50	0.18	-0.46
7,535.00	90.77	150.47	6,188.17	-127.76	403.57	324.59	2.51	-0.27	2.49
7,630.00	87.56	150.03	6,189.56	-210.22	450.70	419.46	3.41	-3.38	-0.46
7,725.00	89.32	150.30	6,192.14	-292.59	497.94	514.31	1.87	1.85	0.28
7,820.00	89.14	150.03	6,193.42	-374.99	545.20	609.20	0.34	-0.19	-0.28
7,915.00	89.85	150.12	6,194.26	-457.33	592.59	704.10	0.75	0.75	0.09
8,010.00	89.80	151.26	6,194.55	-540.16	639.10	798.95	1.20	-0.05	1.20
8,103.00	89.49	153.20	6,195.12	-622.44	682.42	891.63	2.11	-0.33	2.09
8,198.00	89.58	154.51	6,195.89	-707.72	724.28	986.04	1.38	0.09	1.38
8,292.00	89.98	153.55	6,196.26	-792.23	765.45	1,079.43	1.11	0.43	-1.02
8,387.00	89.76	152.67	6,196.47	-876.95	808.41	1,173.97	0.95	-0.23	-0.93
8,482.00	88.66	149.07	6,197.78	-959.92	854.64	1,268.78	3.96	-1.16	-3.79
8,577.00	89.23	149.24	6,199.53	-1,041.46	903.34	1,363.73	0.63	0.60	0.18
8,672.00	88.57	149.07	6,201.35	-1,123.01	952.04	1,458.67	0.72	-0.69	-0.18
8,766.00	91.47	148.10	6,201.32	-1,203.22	1,001.03	1,552.64	3.25	3.09	-1.03
8,861.00	91.78	147.75	6,198.63	-1,283.69	1,051.46	1,647.60	0.49	0.33	-0.37
8,956.00	90.86	148.98	6,196.44	-1,364.55	1,101.27	1,742.56	1.62	-0.97	1.29
9,051.00	90.64	149.33	6,195.20	-1,446.10	1,149.98	1,837.51	0.44	-0.23	0.37
9,146.00	88.84	149.24	6,195.63	-1,527.77	1,198.50	1,932.46	1.90	-1.89	-0.09
9,240.00	89.45	150.21	6,197.03	-1,608.94	1,245.88	2,026.38	1.22	0.65	1.03

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02/15/2019



Survey Report

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder E-4HM
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 E-4HM	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)
9,334.00	87.21	151.18	6,199.77	-1,690.87	1,291.87	2,120.19	2.60	-2.38	1.03
9,429.00	87.52	151.18	6,204.14	-1,774.02	1,337.61	2,214.89	0.33	0.33	0.00
9,523.00	90.48	149.33	6,205.79	-1,855.61	1,384.24	2,308.75	3.70	3.13	-1.97
9,618.00	91.25	148.45	6,204.38	-1,936.93	1,433.32	2,403.71	1.24	0.83	-0.93
9,713.00	89.71	148.01	6,203.58	-2,017.69	1,483.33	2,498.70	1.69	-1.62	-0.46
9,807.00	90.20	147.75	6,203.65	-2,097.31	1,533.31	2,592.70	0.59	0.52	-0.28
9,902.00	90.90	147.84	6,202.74	-2,177.68	1,583.94	2,687.69	0.74	0.74	0.09
9,996.00	89.67	149.07	6,202.27	-2,257.79	1,633.11	2,781.67	1.85	-1.31	1.31
10,090.00	90.07	148.36	6,202.49	-2,338.12	1,681.93	2,875.65	0.87	0.43	-0.76
10,185.00	89.49	149.86	6,202.85	-2,419.64	1,730.70	2,970.61	1.69	-0.61	1.58
10,280.00	89.54	150.82	6,203.66	-2,502.19	1,777.71	3,065.49	1.01	0.05	1.01
10,373.00	89.36	150.74	6,204.55	-2,583.35	1,823.10	3,158.33	0.21	-0.19	-0.09
10,467.00	90.51	150.91	6,204.66	-2,665.43	1,868.93	3,252.17	1.24	1.22	0.18
10,562.00	90.29	150.30	6,203.99	-2,748.19	1,915.55	3,347.03	0.68	-0.23	-0.64
10,657.00	90.37	150.82	6,203.45	-2,830.93	1,962.24	3,441.89	0.55	0.08	0.55
10,752.00	90.90	150.21	6,202.39	-2,913.62	2,009.00	3,536.75	0.85	0.56	-0.64
10,846.00	90.20	151.35	6,201.49	-2,995.65	2,054.88	3,630.59	1.42	-0.74	1.21
10,940.00	90.24	152.85	6,201.13	-3,078.72	2,098.87	3,724.29	1.60	0.04	1.60
11,033.00	89.45	151.70	6,201.38	-3,161.04	2,142.13	3,816.96	1.50	-0.85	-1.24
11,128.00	89.27	151.53	6,202.44	-3,244.61	2,187.29	3,911.71	0.26	-0.19	-0.18
11,222.00	89.49	150.82	6,203.46	-3,326.96	2,232.61	4,005.51	0.79	0.23	-0.76
11,317.00	89.93	150.82	6,203.94	-3,409.90	2,278.93	4,100.35	0.46	0.46	0.00
11,411.00	90.46	150.82	6,203.62	-3,491.97	2,324.76	4,194.19	0.56	0.56	0.00
11,506.00	90.68	150.65	6,202.67	-3,574.84	2,371.20	4,289.04	0.29	0.23	-0.18
11,601.00	88.79	149.24	6,203.11	-3,657.06	2,418.77	4,383.94	2.48	-1.99	-1.48
11,696.00	89.14	149.15	6,204.83	-3,738.65	2,467.41	4,478.88	0.38	0.37	-0.09
11,791.00	89.14	148.98	6,206.26	-3,820.12	2,516.24	4,573.84	0.18	0.00	-0.18
11,886.00	89.19	148.27	6,207.64	-3,901.22	2,565.70	4,668.81	0.75	0.05	-0.75
11,981.00	90.46	146.87	6,207.93	-3,981.40	2,616.64	4,763.80	1.99	1.34	-1.47
12,076.00	90.99	146.34	6,206.73	-4,060.71	2,668.93	4,858.78	0.79	0.56	-0.56
12,170.00	91.38	148.71	6,204.78	-4,139.99	2,719.38	4,952.76	2.55	0.41	2.52
12,265.00	90.95	151.00	6,202.85	-4,222.12	2,767.08	5,047.65	2.45	-0.45	2.41
12,358.00	91.03	150.47	6,201.25	-4,303.24	2,812.53	5,140.49	0.58	0.09	-0.57
12,451.00	89.27	149.68	6,201.00	-4,383.84	2,858.93	5,233.39	2.07	-1.89	-0.85
12,546.00	88.57	149.24	6,202.79	-4,465.64	2,907.19	5,328.32	0.87	-0.74	-0.46
12,640.00	90.11	149.24	6,203.88	-4,546.41	2,955.26	5,422.26	1.84	1.64	0.00
12,735.00	90.77	148.71	6,203.15	-4,627.82	3,004.22	5,517.23	0.89	0.69	-0.56
12,830.00	90.68	149.94	6,201.94	-4,709.51	3,052.69	5,612.17	1.30	-0.09	1.29
12,926.00	90.99	150.38	6,200.54	-4,792.78	3,100.45	5,708.06	0.56	0.32	0.46
13,020.00	91.21	150.47	6,198.74	-4,874.52	3,146.83	5,801.92	0.25	0.23	0.10
13,115.00	91.74	150.47	6,196.29	-4,957.15	3,193.64	5,896.76	0.56	0.56	0.00
13,210.00	91.30	150.21	6,193.77	-5,039.67	3,240.64	5,991.61	0.54	-0.46	-0.27
13,305.00	90.20	151.18	6,192.53	-5,122.50	3,287.13	6,086.45	1.54	-1.16	1.02
13,399.00	89.85	151.61	6,192.49	-5,205.03	3,332.13	6,180.23	0.59	-0.37	0.46



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder E-4HM
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 E-4HM	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)
13,494.00	90.33	152.05	6,192.34	-5,288.78	3,376.98	6,274.96	0.69	0.51	0.46
13,527.00	90.46	152.32	6,192.11	-5,317.96	3,392.38	6,307.85	0.91	0.39	0.82
Survey @ 13527.00 MD 6192.11 TVD									
13,581.00	90.46	152.32	6,191.68	-5,365.78	3,417.46	6,361.66	0.00	0.00	0.00
Survey projected to 13581.00 MD 6191.68 TVD									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
347.00	346.88	5.87	5.29	MWD surveys
13,527.00	6,192.11	-5,317.96	3,392.38	Survey @ 13527.00 MD 6192.11 TVD
13,581.00	6,191.68	-5,365.78	3,417.46	Survey projected to 13581.00 MD 6191.68 TVD

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02/15/2019



Survey Report - Geographic

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder E-4HM
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 E-4HM	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 E-4HM					
Well Position	+N/-S	0.00 usft	Northing:	14,446,854.20 usft	Latitude:	39.78052164
	+E/-W	0.00 usft	Easting:	1,685,362.27 usft	Longitude:	-80.84002025
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	12/20/2017	-8.61	66.93	52,127.72415954

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	147.50	

Survey Program	Date	1/6/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
347.00	13,581.00	MWD (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	14,446,854.20	1,685,362.27	39.78052164	-80.84002025	
347.00	2.61	42.06	346.88	5.87	5.29	14,446,860.07	1,685,367.56	39.78053773	-80.84000137	
MWD surveys										
438.00	1.85	40.01	437.81	8.53	7.63	14,446,862.73	1,685,369.89	39.78054503	-80.83999305	
530.00	1.38	33.70	529.77	10.59	9.20	14,446,864.79	1,685,371.46	39.78055068	-80.83998745	
622.00	1.04	41.15	621.75	12.14	10.36	14,446,866.34	1,685,372.62	39.78055493	-80.83998330	
713.00	0.79	30.23	712.74	13.30	11.22	14,446,867.51	1,685,373.48	39.78055812	-80.83998023	
803.00	0.42	56.28	802.74	14.02	11.81	14,446,868.23	1,685,374.07	39.78056009	-80.83997814	
895.00	0.50	34.52	894.73	14.54	12.31	14,446,868.75	1,685,374.58	39.78056151	-80.83997633	
989.00	0.76	5.32	988.73	15.50	12.60	14,446,869.70	1,685,374.87	39.78056415	-80.83997529	
1,082.00	0.78	354.69	1,081.72	16.74	12.60	14,446,870.95	1,685,374.87	39.78056756	-80.83997529	
1,177.00	0.92	327.68	1,176.71	18.03	12.13	14,446,872.24	1,685,374.40	39.78057110	-80.83997694	



Survey Report - Geographic

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WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder E-4HM
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 E-4HM	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	
1,272.00	1.19	317.63	1,271.69	19.41	11.06	14,446,873.61	1,685,373.33	39.78057488	-80.83998075	
1,367.00	1.34	323.56	1,366.67	21.03	9.74	14,446,875.23	1,685,372.00	39.78057934	-80.83998546	
1,462.00	1.36	331.06	1,461.64	22.91	8.53	14,446,877.11	1,685,370.80	39.78058451	-80.83998974	
1,557.00	1.39	338.83	1,556.62	24.97	7.57	14,446,879.17	1,685,369.84	39.78059018	-80.83999315	
1,652.00	1.40	340.80	1,651.59	27.14	6.77	14,446,881.34	1,685,369.04	39.78059614	-80.83999597	
1,745.00	1.28	336.48	1,744.56	29.17	5.98	14,446,883.37	1,685,368.25	39.78060171	-80.83999876	
1,838.00	1.40	330.84	1,837.54	31.11	5.02	14,446,885.31	1,685,367.28	39.78060705	-80.84000220	
1,933.00	1.54	328.81	1,932.51	33.22	3.79	14,446,887.42	1,685,366.06	39.78061284	-80.84000655	
2,028.00	1.47	329.73	2,027.47	35.36	2.51	14,446,889.56	1,685,364.78	39.78061874	-80.84001108	
2,122.00	1.37	320.92	2,121.45	37.27	1.20	14,446,891.48	1,685,363.46	39.78062400	-80.84001575	
2,215.00	1.13	295.88	2,214.42	38.54	-0.33	14,446,892.74	1,685,361.94	39.78062748	-80.84002117	
2,309.00	1.15	271.71	2,308.41	38.97	-2.10	14,446,893.17	1,685,360.16	39.78062867	-80.84002749	
2,404.00	1.34	298.13	2,403.38	39.52	-4.04	14,446,893.73	1,685,358.23	39.78063020	-80.84003437	
2,499.00	1.52	323.09	2,498.36	41.05	-5.77	14,446,895.26	1,685,356.49	39.78063441	-80.84004054	
2,583.00	1.71	330.34	2,582.32	43.03	-7.06	14,446,897.24	1,685,355.20	39.78063986	-80.84004511	
2,684.00	1.92	337.46	2,683.27	45.90	-8.46	14,446,900.11	1,685,353.81	39.78064775	-80.84005008	
2,778.00	3.79	356.44	2,777.15	50.46	-9.25	14,446,904.66	1,685,353.01	39.78066027	-80.84005287	
2,873.00	12.10	5.54	2,871.16	63.53	-8.49	14,446,917.73	1,685,353.78	39.78069615	-80.84005005	
2,971.00	18.11	6.21	2,965.73	88.92	-5.84	14,446,943.12	1,685,356.42	39.78076586	-80.84004049	
3,066.00	18.59	2.64	3,055.90	118.72	-3.55	14,446,972.93	1,685,358.72	39.78084770	-80.84003213	
3,161.00	19.30	353.04	3,145.78	149.44	-4.75	14,447,003.64	1,685,357.51	39.78093207	-80.84003622	
3,255.00	19.22	337.56	3,234.58	179.18	-12.55	14,447,033.38	1,685,349.72	39.78101378	-80.84006377	
3,350.00	19.24	331.57	3,324.28	207.40	-25.97	14,447,061.61	1,685,336.30	39.78109135	-80.84011137	
3,445.00	19.43	330.60	3,413.93	234.93	-41.18	14,447,089.14	1,685,321.09	39.78116703	-80.84016533	
3,540.00	20.11	333.49	3,503.33	263.31	-56.23	14,447,117.52	1,685,306.04	39.78124505	-80.84021671	
3,634.00	22.62	338.50	3,590.87	294.60	-70.07	14,447,148.81	1,685,292.20	39.78133104	-80.84026778	
3,729.00	23.45	340.28	3,678.29	329.39	-83.14	14,447,183.60	1,685,279.12	39.78142666	-80.84031409	
3,824.00	23.17	340.80	3,765.54	364.84	-95.67	14,447,219.04	1,685,266.60	39.78152406	-80.84035845	
3,918.00	23.38	340.97	3,851.89	399.93	-107.83	14,447,254.14	1,685,254.44	39.78162050	-80.84040152	
4,013.00	23.29	340.20	3,939.12	435.42	-120.34	14,447,289.63	1,685,241.93	39.78171803	-80.84044582	
4,108.00	21.73	340.39	4,026.88	469.66	-132.60	14,447,323.87	1,685,229.66	39.78181212	-80.84048926	
4,203.00	20.75	338.78	4,115.43	501.92	-144.60	14,447,356.12	1,685,217.67	39.78190076	-80.84053174	
4,298.00	21.12	340.35	4,204.16	533.72	-156.44	14,447,387.93	1,685,205.82	39.78199817	-80.84057371	
4,393.00	21.39	341.00	4,292.69	566.22	-167.84	14,447,420.43	1,685,194.43	39.78207747	-80.84061407	
4,487.00	21.70	339.86	4,380.13	598.75	-179.40	14,447,452.95	1,685,182.86	39.78216685	-80.84065502	
4,582.00	22.14	339.48	4,468.26	632.00	-191.72	14,447,486.21	1,685,170.54	39.78225824	-80.84069867	
4,677.00	22.79	339.14	4,556.05	665.96	-204.55	14,447,520.16	1,685,157.71	39.78235156	-80.84074411	
4,772.00	23.15	338.74	4,643.52	700.56	-217.87	14,447,554.76	1,685,144.39	39.78244664	-80.84079132	
4,867.00	23.09	337.79	4,730.89	735.21	-231.69	14,447,589.41	1,685,130.58	39.78254186	-80.84084027	
4,962.00	23.22	338.06	4,818.23	769.82	-245.73	14,447,624.03	1,685,116.54	39.78263700	-80.84089002	
5,057.00	23.22	340.07	4,905.54	804.80	-259.11	14,447,659.01	1,685,103.16	39.78273312	-80.84093743	
5,150.00	23.27	339.81	4,990.99	839.28	-271.70	14,447,693.48	1,685,090.57	39.78282787	-80.84098202	
5,244.00	22.76	341.50	5,077.51	873.95	-283.88	14,447,728.15	1,685,078.39	39.78292315	-80.84102515	
5,338.00	20.97	343.30	5,164.74	907.31	-294.48	14,447,761.51	1,685,067.79	39.78301481	-80.84106269	
5,455.00	19.82	343.66	5,274.41	946.40	-306.08	14,447,800.60	1,685,056.19	39.78312221	-80.84110372	
5,550.00	19.78	343.22	5,363.79	977.24	-315.25	14,447,831.44	1,685,047.02	39.78320696	-80.84113617	
5,644.00	12.97	0.97	5,453.98	1,003.06	-319.67	14,447,857.27	1,685,042.60	39.78327790	-80.84115175	
5,737.00	6.02	32.17	5,545.70	1,017.65	-316.89	14,447,871.86	1,685,045.37	39.78331795	-80.84114176	
5,832.00	5.32	82.88	5,640.29	1,022.42	-309.86	14,447,876.62	1,685,052.40	39.78333100	-80.84111672	
5,927.00	8.62	94.66	5,734.58	1,022.38	-298.39	14,447,876.59	1,685,063.87	39.78333086	-80.84107590	
6,023.00	13.63	104.86	5,828.76	1,018.90	-280.28	14,447,873.10	1,685,081.99	39.78332119	-80.84101143	
6,118.00	22.59	123.84	5,919.03	1,005.83	-254.23	14,447,860.03	1,685,108.04	39.78328517	-80.84091879	
6,212.00	36.48	138.78	6,000.73	974.56	-220.61	14,447,828.76	1,685,141.65	39.78319914	-80.84079932	
6,306.00	50.29	150.82	6,068.99	921.63	-184.33	14,447,775.83	1,685,177.93	39.78305360	-80.84067052	
6,401.00	64.35	152.32	6,120.16	851.45	-146.43	14,447,705.65	1,685,215.83	39.78286068	-80.84053607	



Survey Report - Geographic

SEP 11 2018



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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 E-4HM	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
6,495.00	72.92	153.28	6,154.37	773.65	-106.48	14,447,627.88	1,685,255.79	39.78264684	-80.84039433
6,589.00	79.38	152.05	6,176.86	692.63	-64.58	14,447,546.83	1,685,297.69	39.78242411	-80.84024571
6,684.00	86.24	152.23	6,188.75	609.35	-20.56	14,447,463.55	1,685,341.71	39.78219519	-80.84008956
6,779.00	88.75	152.49	6,192.90	525.28	23.47	14,447,379.48	1,685,385.73	39.78196409	-80.83993338
6,874.00	92.04	153.11	6,192.25	440.80	66.88	14,447,295.00	1,685,429.15	39.78173187	-80.83977938
6,968.00	89.19	150.91	6,191.24	357.81	110.99	14,447,212.02	1,685,473.26	39.78150375	-80.83962291
7,063.00	89.10	149.42	6,192.65	275.41	158.25	14,447,129.62	1,685,520.51	39.78127723	-80.83945523
7,156.00	90.55	148.63	6,192.94	195.68	206.11	14,447,049.88	1,685,568.37	39.78105802	-80.83928538
7,251.00	90.33	148.19	6,192.21	114.76	255.87	14,446,968.96	1,685,618.14	39.78083555	-80.83910877
7,345.00	90.86	148.54	6,191.23	34.73	305.17	14,446,888.94	1,685,667.44	39.78061552	-80.83893380
7,440.00	91.03	148.10	6,189.67	-46.10	355.06	14,446,808.10	1,685,717.32	39.78039329	-80.83875676
7,535.00	90.77	150.47	6,188.17	-127.76	403.57	14,446,726.45	1,685,765.84	39.78016879	-80.83858460
7,630.00	87.56	150.03	6,189.56	-210.22	450.70	14,446,643.99	1,685,812.96	39.77994210	-80.83841738
7,725.00	89.32	150.30	6,192.14	-292.59	497.94	14,446,561.61	1,685,860.21	39.77971564	-80.83824976
7,820.00	89.14	150.03	6,193.42	-374.99	545.20	14,446,479.21	1,685,907.47	39.77948911	-80.83808208
7,915.00	89.85	150.12	6,194.26	-457.33	592.59	14,446,396.88	1,685,954.86	39.77926277	-80.83791393
8,010.00	89.80	151.26	6,194.55	-540.16	639.10	14,446,314.04	1,686,001.36	39.77903504	-80.83774894
8,103.00	89.49	153.20	6,195.12	-622.44	682.42	14,446,231.76	1,686,044.69	39.77880886	-80.83759525
8,198.00	89.58	154.51	6,195.89	-707.72	724.28	14,446,146.48	1,686,086.55	39.77857446	-80.83744681
8,292.00	89.98	153.55	6,196.26	-792.23	765.45	14,446,061.98	1,686,127.71	39.77834217	-80.83730085
8,387.00	89.76	152.67	6,196.47	-878.95	808.41	14,445,977.25	1,686,170.88	39.77810927	-80.83714847
8,482.00	88.66	149.07	6,197.78	-959.92	854.64	14,445,894.29	1,686,216.91	39.77788121	-80.83698446
8,577.00	89.23	149.24	6,199.53	-1,041.46	903.34	14,445,812.74	1,686,265.61	39.77765701	-80.83681165
8,672.00	88.57	149.07	6,201.35	-1,123.01	952.04	14,445,731.19	1,686,314.31	39.77743281	-80.83663885
8,766.00	91.47	148.10	6,201.32	-1,203.22	1,001.03	14,445,650.98	1,686,363.30	39.77721228	-80.83646500
8,861.00	91.78	147.75	6,198.63	-1,283.69	1,051.46	14,445,570.52	1,686,413.72	39.77699104	-80.83628605
8,956.00	90.86	148.98	6,196.44	-1,364.55	1,101.27	14,445,489.66	1,686,463.54	39.77676873	-80.83610928
9,051.00	90.64	149.33	6,195.20	-1,446.10	1,149.98	14,445,408.10	1,686,512.24	39.77654451	-80.83593646
9,146.00	88.84	149.24	6,195.63	-1,527.77	1,198.50	14,445,326.43	1,686,560.76	39.77631998	-80.83576430
9,240.00	89.45	150.21	6,197.03	-1,608.94	1,245.88	14,445,245.26	1,686,608.15	39.77609682	-80.83559618
9,334.00	87.21	151.18	6,199.77	-1,690.87	1,291.87	14,445,163.33	1,686,654.13	39.77587159	-80.83543305
9,429.00	87.52	151.18	6,204.14	-1,774.02	1,337.61	14,445,080.19	1,686,699.88	39.77564302	-80.83527077
9,523.00	90.46	149.33	6,205.79	-1,855.61	1,384.24	14,444,998.60	1,686,746.50	39.77541872	-80.83510536
9,618.00	91.25	148.45	6,204.38	-1,936.93	1,433.32	14,444,917.27	1,686,795.58	39.77519512	-80.83493122
9,713.00	89.71	148.01	6,203.58	-2,017.69	1,483.33	14,444,836.51	1,686,845.60	39.77497308	-80.83475374
9,807.00	90.20	147.75	6,203.65	-2,097.31	1,533.31	14,444,756.90	1,686,895.58	39.77475419	-80.83457638
9,902.00	90.90	147.84	6,202.74	-2,177.68	1,583.94	14,444,676.52	1,686,946.20	39.77453318	-80.83439672
9,996.00	89.67	149.07	6,202.27	-2,257.79	1,633.11	14,444,596.41	1,686,995.38	39.77431294	-80.83422223
10,090.00	90.07	148.36	6,202.49	-2,338.12	1,681.93	14,444,516.08	1,687,044.19	39.77409208	-80.83404903
10,185.00	89.49	149.86	6,202.85	-2,419.64	1,730.70	14,444,434.56	1,687,092.96	39.77386795	-80.83387599
10,280.00	89.54	150.82	6,203.66	-2,502.19	1,777.71	14,444,352.01	1,687,139.97	39.77364101	-80.83370923
10,373.00	89.36	150.74	6,204.55	-2,583.35	1,823.10	14,444,270.85	1,687,185.37	39.77341788	-80.83354820
10,467.00	90.51	150.91	6,204.66	-2,665.43	1,868.93	14,444,188.78	1,687,231.19	39.77319225	-80.83338566
10,562.00	90.29	150.30	6,203.99	-2,748.19	1,915.55	14,444,106.01	1,687,277.82	39.77296471	-80.83322026
10,657.00	90.37	150.82	6,203.45	-2,830.93	1,962.24	14,444,023.28	1,687,324.51	39.77273727	-80.83305463
10,752.00	90.90	150.21	6,202.39	-2,913.62	2,009.00	14,443,940.59	1,687,371.27	39.77250994	-80.83288878
10,846.00	90.20	151.35	6,201.49	-2,995.65	2,054.88	14,443,858.56	1,687,417.15	39.77228442	-80.83272602
10,940.00	90.24	152.85	6,201.13	-3,078.72	2,098.87	14,443,775.48	1,687,461.13	39.77205605	-80.83257004
11,033.00	89.45	151.70	6,201.38	-3,161.04	2,142.13	14,443,693.16	1,687,504.40	39.77182976	-80.83241681
11,128.00	89.27	151.53	6,202.44	-3,244.61	2,187.29	14,443,609.59	1,687,549.56	39.77160001	-80.83225645
11,222.00	89.49	150.82	6,203.46	-3,326.96	2,232.61	14,443,527.24	1,687,594.88	39.77137362	-80.83209571
11,317.00	89.93	150.82	6,203.94	-3,409.90	2,278.93	14,443,444.30	1,687,641.19	39.77114560	-80.83193143
11,411.00	90.46	150.82	6,203.62	-3,491.97	2,324.76	14,443,362.23	1,687,687.02	39.77091998	-80.83176887
11,506.00	90.68	150.65	6,202.67	-3,574.84	2,371.20	14,443,279.36	1,687,733.46	39.77069215	-80.83160416
11,601.00	88.79	149.24	6,203.11	-3,657.06	2,418.77	14,443,197.14	1,687,781.04	39.77046610	-80.83143539



Survey Report - Geographic

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder E-4HM
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 E-4HM	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
11,696.00	89.14	149.15	6,204.83	-3,738.65	2,467.41	14,443,115.56	1,687,829.68	39.77024180	-80.83126283
11,791.00	89.14	148.98	6,206.26	-3,820.12	2,516.24	14,443,034.08	1,687,878.51	39.77001779	-80.83108959
11,886.00	89.19	148.27	6,207.64	-3,901.22	2,565.70	14,442,952.98	1,687,927.96	39.76979481	-80.83091413
11,981.00	90.46	146.87	6,207.93	-3,981.40	2,616.64	14,442,872.80	1,687,978.91	39.76957434	-80.83073337
12,076.00	90.99	146.34	6,206.73	-4,060.71	2,668.93	14,442,793.49	1,688,031.19	39.76935627	-80.83054784
12,170.00	91.38	148.71	6,204.78	-4,139.99	2,719.38	14,442,714.21	1,688,081.65	39.76913829	-80.83036880
12,265.00	90.95	151.00	6,202.85	-4,222.12	2,767.08	14,442,632.08	1,688,129.34	39.76891249	-80.83019962
12,358.00	91.03	150.47	6,201.25	-4,303.24	2,812.53	14,442,550.97	1,688,174.80	39.76868948	-80.83003840
12,451.00	89.27	149.68	6,201.00	-4,383.84	2,858.93	14,442,470.37	1,688,221.19	39.76846789	-80.82987384
12,546.00	88.57	149.24	6,202.79	-4,465.64	2,907.19	14,442,388.56	1,688,269.46	39.76824298	-80.82970264
12,640.00	90.11	149.24	6,203.88	-4,546.41	2,955.26	14,442,307.80	1,688,317.53	39.76802091	-80.82953211
12,735.00	90.77	148.71	6,203.15	-4,627.82	3,004.22	14,442,226.39	1,688,366.49	39.76779709	-80.82935842
12,830.00	90.88	149.94	6,201.94	-4,709.51	3,052.69	14,442,144.69	1,688,414.95	39.76757247	-80.82918651
12,926.00	90.99	150.38	6,200.54	-4,792.78	3,100.45	14,442,061.43	1,688,462.71	39.76734356	-80.82901710
13,020.00	91.21	150.47	6,198.74	-4,874.52	3,146.83	14,441,979.69	1,688,509.10	39.76711884	-80.82885258
13,115.00	91.74	150.47	6,196.29	-4,957.15	3,193.64	14,441,897.06	1,688,555.91	39.76689166	-80.82868657
13,210.00	91.30	150.21	6,193.77	-5,039.67	3,240.64	14,441,814.53	1,688,602.90	39.76666478	-80.82851990
13,305.00	90.20	151.18	6,192.53	-5,122.50	3,287.13	14,441,731.70	1,688,649.39	39.76643705	-80.82835501
13,399.00	89.85	151.61	6,192.49	-5,205.03	3,332.13	14,441,649.17	1,688,694.40	39.76621017	-80.82819542
13,494.00	90.33	152.05	6,192.34	-5,286.78	3,376.98	14,441,565.43	1,688,739.25	39.76597994	-80.82803639
13,527.00	90.46	152.32	6,192.11	-5,317.96	3,392.38	14,441,538.24	1,688,754.65	39.76589971	-80.82798179
Survey @ 13527.00 MD 6192.11 TVD									
13,581.00	90.46	152.32	6,191.68	-5,365.78	3,417.46	14,441,488.42	1,688,779.73	39.76576825	-80.82789285
Survey projected to 13581.00 MD 6191.68 TVD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
347.00	346.88	5.87	5.29	MWD surveys
13,527.00	6,192.11	-5,317.96	3,392.38	Survey @ 13527.00 MD 6192.11 TVD
13,581.00	6,191.68	-5,365.78	3,417.46	Survey projected to 13581.00 MD 6191.68 TVD