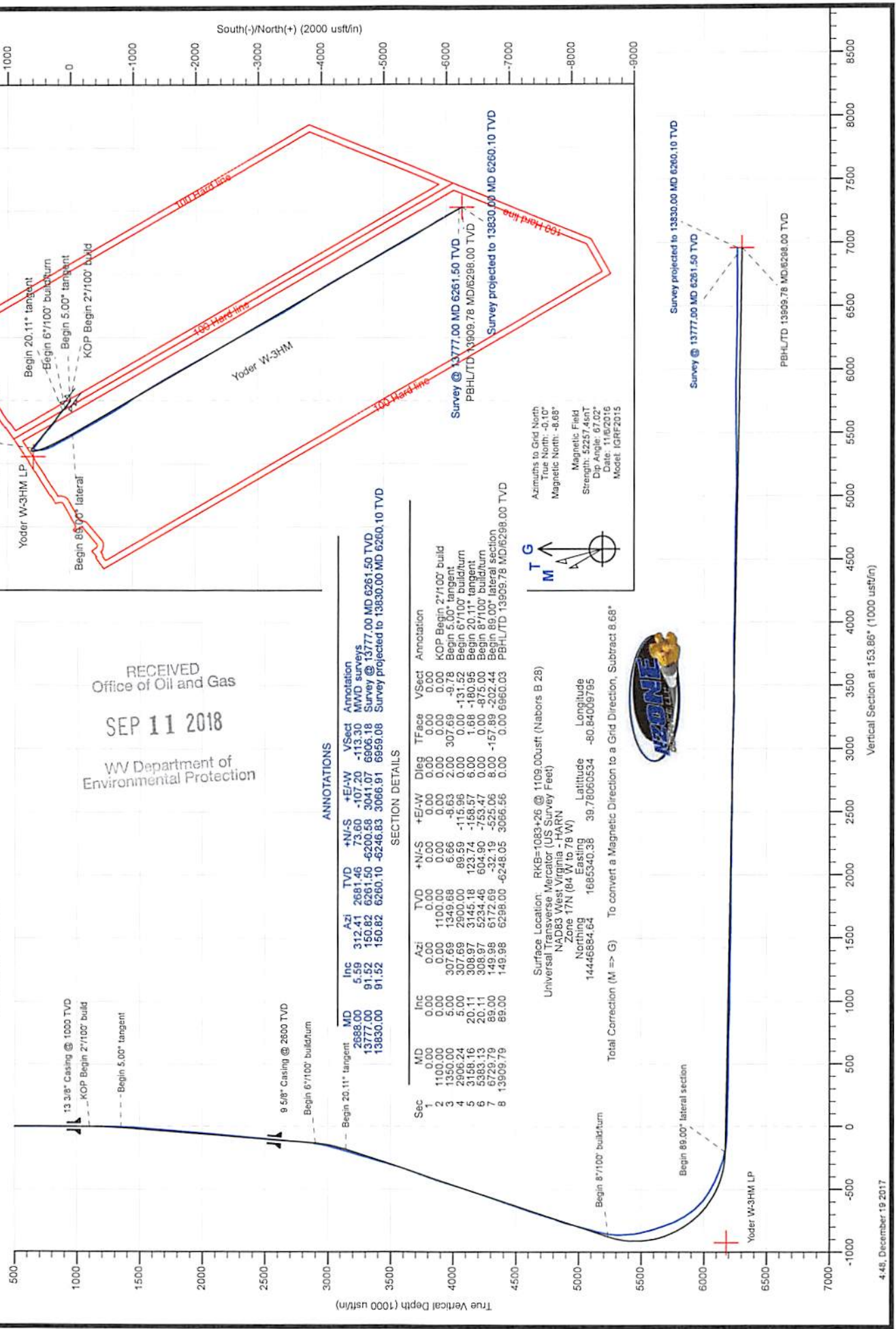




Tug Hill Operating LLC
 Well: Yoder W-3HM
 Site: Yoder
 Project: Wetzel County, West Virginia (UTM17 NAD83)
 Design: rev1

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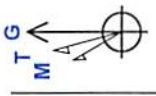


ANNOTATIONS

MD	Inc	Azi	TVD	+N/S	+E/W	V Sect	Annotation
2688.00	0.00	312.41	2681.46	73.60	-107.20	-113.30	MWD surveys
13777.00	5.59	150.82	6261.50	-6200.58	3041.07	6906.18	Survey @ 13777.00 MD 6261.50 TVD
13830.00	91.52	150.82	6260.10	-6246.83	3066.91	6959.08	Survey projected to 13830.00 MD 6260.10 TVD

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Dleg	TFace	V Sect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1100.00	0.00	1100.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2'100' build
3	1350.00	5.00	307.69	1349.68	6.66	-8.63	2.00	307.69	-9.78	Begin 5.00' tangent
4	2906.24	5.00	307.69	2900.00	89.59	-115.96	0.00	0.00	-131.52	Begin 6'7100' buildturn
5	3189.16	20.11	308.97	3145.18	123.74	-158.57	6.00	1.68	-180.95	Begin 20.11' tangent
6	5363.13	20.11	308.97	5234.46	694.90	-758.47	0.00	0.00	-873.00	Begin 8'7100' buildturn
7	5729.79	89.00	149.98	5722.69	-32.19	-525.66	8.00	-157.89	-202.44	Begin 89.00' lateral section
8	13909.79	89.00	149.98	6298.00	-6246.05	3066.56	0.00	0.00	6960.03	PBHLTD 13909.78 MD/6298.00 TVD



Surface Location: RKB=1083+26 @ 1109.00ustf (Nabors B 28)
 Universal Transverse Mercator (US Survey Feet)
 NAD83 West Virginia - HARN
 Zone 17N (84 W to 78 W)
 Northing 14446684.64
 Easting 1686340.38
 Latitude 39.78060534
 Longitude -80.84009795
 Total Correction (M => G) To convert a Magnetic Direction to a Grid Direction, Subtract 8.68°



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Survey Report

WV Department of
Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-3HM
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-3HM	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-3HM					
Well Position	+N/-S	0.00 usft	Northing:	14,446,884.64 usft	Latitude:	39.78060534
	+E/-W	0.00 usft	Easting:	1,685,340.38 usft	Longitude:	-80.84009795
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	11/6/2016	-8.57	67.02	52,257.44493641

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	153.86	

Survey Program	Date 12/19/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	2,575.00	Gyro VES (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s
2,688.00	13,830.00	MWD TIP=2575 (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
100.00	0.54	66.87	100.00	0.19	0.43	0.02	0.54	0.54	0.00	0.00
200.00	0.34	37.89	200.00	0.60	1.05	-0.08	0.29	-0.20	-28.98	
300.00	0.27	30.06	299.99	1.04	1.35	-0.34	0.08	-0.07	-7.83	
400.00	0.05	160.69	399.99	1.21	1.48	-0.43	0.30	-0.22	130.63	
500.00	0.06	317.61	499.99	1.20	1.46	-0.44	0.11	0.01	156.92	
600.00	0.11	18.75	599.99	1.33	1.46	-0.55	0.10	0.05	61.14	
700.00	0.04	142.78	699.99	1.40	1.51	-0.59	0.14	-0.07	124.03	
800.00	0.05	253.07	799.99	1.35	1.49	-0.56	0.07	0.01	110.29	
900.00	0.05	216.03	899.99	1.31	1.42	-0.55	0.03	0.00	-37.04	

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WV Department of
Environmental Protection



Survey Report

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-3HM
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-3HM	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)
1,000.00	0.11	244.04	999.99	1.23	1.31	-0.53	0.07	0.06	28.01
1,100.00	0.07	197.69	1,099.99	1.13	1.20	-0.48	0.08	-0.04	-46.35
1,200.00	0.68	43.91	1,199.99	1.50	1.60	-0.64	0.74	0.61	-153.78
1,300.00	1.71	307.18	1,299.97	2.83	0.82	-2.18	1.91	1.03	-96.73
1,400.00	2.63	323.65	1,399.90	5.58	-1.73	-5.77	1.10	0.92	16.47
1,500.00	4.02	323.08	1,499.73	10.23	-5.20	-11.47	1.39	1.39	-0.57
1,600.00	5.30	309.94	1,599.40	16.00	-10.84	-19.14	1.66	1.28	-13.14
1,700.00	5.05	298.38	1,699.00	21.05	-18.26	-26.94	1.07	-0.25	-11.56
1,800.00	5.56	294.81	1,798.57	25.18	-26.53	-34.29	0.61	0.51	-3.57
1,900.00	6.15	294.85	1,898.05	29.46	-35.78	-42.21	0.59	0.59	0.04
2,000.00	6.43	300.10	1,997.45	34.52	-45.49	-51.03	0.64	0.28	5.25
2,100.00	6.65	303.24	2,096.80	40.50	-55.18	-60.67	0.42	0.22	3.14
2,200.00	6.81	298.15	2,196.11	46.47	-65.25	-70.47	0.62	0.16	-5.09
2,300.00	6.72	289.81	2,295.41	51.25	-75.98	-79.49	0.99	-0.09	-8.34
2,400.00	5.82	297.71	2,394.82	55.59	-85.97	-87.79	1.24	-0.90	7.90
2,500.00	5.48	313.00	2,494.34	61.21	-93.95	-96.34	1.54	-0.34	15.29
2,575.00	5.53	313.53	2,568.99	66.14	-99.19	-103.08	0.10	0.07	0.71
2,688.00	5.59	312.41	2,681.46	73.60	-107.20	-113.30	0.11	0.05	-0.99
MWD surveys									
2,783.00	5.07	312.59	2,776.05	79.56	-113.71	-121.52	0.55	-0.55	0.19
2,877.00	6.32	311.83	2,869.58	85.83	-120.62	-130.19	1.33	1.33	-0.81
2,971.00	11.62	317.13	2,962.40	96.22	-130.93	-144.06	5.70	5.64	5.64
3,066.00	16.15	321.89	3,054.60	113.64	-145.60	-166.16	4.91	4.77	5.01
3,161.00	17.99	316.60	3,145.42	134.70	-163.84	-193.10	2.53	1.94	-5.57
3,256.00	19.41	305.41	3,235.43	154.51	-186.79	-221.00	4.05	1.49	-11.78
3,351.00	18.82	301.77	3,325.20	171.73	-212.68	-247.86	1.40	-0.62	-3.83
3,446.00	18.91	303.07	3,415.09	188.19	-238.61	-274.07	0.45	0.09	1.37
3,540.00	20.03	303.07	3,503.72	205.29	-264.87	-300.98	1.19	1.19	0.00
3,635.00	20.49	305.88	3,592.84	223.91	-291.97	-329.64	1.13	0.48	2.96
3,730.00	20.96	306.45	3,681.69	243.75	-319.11	-359.41	0.54	0.49	0.60
3,824.00	20.85	306.54	3,769.51	263.70	-346.08	-389.20	0.12	-0.12	0.10
3,919.00	20.29	309.63	3,858.45	284.27	-372.35	-419.24	1.29	-0.59	3.25
4,013.00	19.42	310.26	3,946.86	304.77	-396.83	-448.43	0.95	-0.93	0.67
4,109.00	19.27	311.69	4,037.44	325.62	-420.83	-477.72	0.52	-0.16	1.49
4,204.00	20.05	312.21	4,126.90	346.99	-444.60	-507.37	0.84	0.82	0.55
4,298.00	19.67	311.26	4,215.31	368.25	-468.43	-536.96	0.53	-0.40	-1.01
4,393.00	19.78	311.24	4,304.74	389.39	-492.54	-566.55	0.12	0.12	-0.02
4,488.00	21.17	309.34	4,393.74	410.86	-517.89	-597.00	1.62	1.46	-2.00
4,583.00	21.36	307.44	4,482.27	432.25	-544.90	-628.10	0.75	0.20	-2.00
4,678.00	20.87	306.74	4,570.89	452.89	-572.19	-658.66	0.58	-0.52	-0.74
4,772.00	20.24	306.04	4,658.91	472.47	-598.76	-687.94	0.72	-0.67	-0.74
4,867.00	19.46	306.29	4,748.26	491.51	-624.80	-716.50	0.83	-0.82	0.26
4,962.00	21.39	308.41	4,837.29	511.64	-651.14	-746.18	2.18	2.03	2.23

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Survey Report

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-3HM
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-3HM	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)
5,057.00	18.06	305.00	4,926.70	530.85	-676.78	-774.73	3.71	-3.51	-3.59
5,172.00	17.54	305.42	5,036.20	551.12	-705.50	-805.57	0.47	-0.45	0.37
5,267.00	16.57	304.02	5,127.02	567.00	-728.40	-829.91	1.11	-1.02	-1.47
5,361.00	14.02	300.77	5,217.68	580.32	-749.30	-851.08	2.86	-2.71	-3.46
5,408.00	9.01	281.96	5,263.74	584.00	-757.80	-858.13	13.19	-10.66	-40.02
5,456.00	8.62	247.33	5,311.20	583.40	-764.80	-860.67	10.92	-0.81	-72.15
5,503.00	10.73	225.97	5,357.55	579.00	-771.20	-859.54	8.78	4.49	-45.45
5,551.00	11.43	218.59	5,404.65	572.17	-777.38	-856.14	3.29	1.46	-15.38
5,598.00	11.60	203.12	5,450.72	564.18	-782.14	-851.06	6.56	0.36	-32.91
5,645.00	12.57	184.49	5,496.70	554.74	-784.39	-843.57	8.51	2.06	-39.64
5,739.00	18.15	177.28	5,587.31	529.89	-784.50	-821.32	6.26	5.94	-7.67
5,834.00	20.84	179.65	5,676.86	498.21	-783.69	-792.52	2.95	2.83	2.49
5,929.00	25.10	173.15	5,764.32	461.28	-781.19	-758.27	5.21	4.48	-6.84
6,023.00	32.88	168.49	5,846.49	416.41	-773.70	-714.69	8.61	8.28	-4.96
6,118.00	39.91	158.82	5,922.97	362.61	-757.51	-659.26	9.53	7.40	-10.18
6,213.00	49.63	153.55	5,990.36	301.63	-730.31	-592.53	10.95	10.23	-5.55
6,307.00	58.20	150.56	6,045.68	234.64	-694.66	-516.69	9.47	9.12	-3.18
6,402.00	65.80	151.79	6,090.25	161.20	-654.27	-432.96	8.08	8.00	1.29
6,497.00	69.63	152.49	6,126.27	83.49	-613.21	-345.11	4.09	4.03	0.74
6,591.00	72.48	149.42	6,156.79	5.80	-570.04	-256.34	4.33	3.03	-3.27
6,686.00	83.34	150.74	6,176.66	-74.60	-523.79	-163.79	11.51	11.43	1.39
6,781.00	88.92	149.42	6,183.07	-156.72	-476.53	-69.25	6.03	5.87	-1.39
6,876.00	88.13	149.59	6,185.51	-238.55	-428.34	25.44	0.85	-0.83	0.18
6,970.00	89.05	151.97	6,187.83	-320.56	-382.47	119.27	2.71	0.98	2.53
7,065.00	87.56	150.30	6,190.64	-403.71	-336.63	214.11	2.36	-1.57	-1.76
7,158.00	88.40	149.24	6,193.92	-484.01	-289.84	306.82	1.45	0.90	-1.14
7,252.00	89.27	149.33	6,195.83	-564.81	-241.84	400.50	0.93	0.93	0.10
7,347.00	90.15	148.54	6,196.31	-646.18	-192.82	495.14	1.24	0.93	-0.83
7,442.00	89.54	148.71	6,196.56	-727.29	-143.36	589.75	0.67	-0.64	0.18
7,537.00	90.86	149.24	6,196.23	-808.70	-94.39	684.40	1.50	1.39	0.56
7,632.00	86.95	144.93	6,198.05	-888.40	-42.81	778.68	6.12	-4.12	-4.54
7,727.00	87.34	146.78	6,202.78	-966.92	10.45	872.63	1.99	0.41	1.95
7,822.00	89.10	147.75	6,205.73	-1,046.79	61.79	966.95	2.12	1.85	1.02
7,916.00	90.07	148.01	6,206.41	-1,126.40	111.77	1,060.44	1.07	1.03	0.28
8,011.00	89.71	149.15	6,206.59	-1,207.47	161.29	1,155.03	1.26	-0.38	1.20
8,105.00	90.77	149.15	6,206.20	-1,288.17	209.49	1,248.71	1.13	1.13	0.00
8,199.00	88.22	148.01	6,207.03	-1,368.37	258.49	1,342.30	2.97	-2.71	-1.21
8,294.00	87.69	150.12	6,210.42	-1,449.80	307.29	1,436.90	2.29	-0.56	2.22
8,389.00	88.44	150.03	6,213.63	-1,532.09	354.66	1,531.64	0.80	0.79	-0.09
8,484.00	89.67	149.59	6,215.19	-1,614.19	402.42	1,626.39	1.38	1.29	-0.46
8,579.00	89.45	151.00	6,215.92	-1,696.70	449.50	1,721.20	1.50	-0.23	1.48
8,673.00	90.15	150.30	6,216.25	-1,778.64	495.57	1,815.05	1.05	0.74	-0.74
8,768.00	89.58	150.56	6,216.48	-1,861.26	542.45	1,909.88	0.66	-0.60	0.27

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Survey Report

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-3HM
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-3HM	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)
8,863.00	90.24	150.91	6,216.63	-1,944.14	588.89	2,004.74	0.79	0.69	0.37
8,958.00	88.84	151.26	6,217.39	-2,027.29	634.82	2,099.62	1.52	-1.47	0.37
9,053.00	89.10	150.74	6,219.10	-2,110.36	680.87	2,194.48	0.61	0.27	-0.55
9,148.00	89.63	150.74	6,220.15	-2,193.24	727.30	2,289.34	0.56	0.56	0.00
9,241.00	88.13	151.00	6,221.97	-2,274.46	772.56	2,382.19	1.64	-1.61	0.28
9,336.00	88.92	151.00	6,224.41	-2,357.52	818.60	2,477.04	0.83	0.83	0.00
9,431.00	90.68	150.30	6,224.74	-2,440.32	865.16	2,571.89	1.99	1.85	-0.74
9,525.00	89.58	149.68	6,224.53	-2,521.72	912.18	2,665.67	1.34	-1.17	-0.66
9,620.00	90.81	149.07	6,224.21	-2,603.46	960.57	2,760.38	1.45	1.29	-0.64
9,714.00	89.23	151.00	6,224.17	-2,684.89	1,007.52	2,854.16	2.65	-1.68	2.05
9,809.00	87.78	151.09	6,226.65	-2,767.99	1,053.49	2,949.01	1.53	-1.53	0.09
9,904.00	87.82	150.91	6,230.30	-2,851.01	1,099.51	3,043.82	0.19	0.04	-0.19
9,997.00	88.75	150.47	6,233.08	-2,932.07	1,145.02	3,136.64	1.11	1.00	-0.47
10,092.00	87.78	150.30	6,235.96	-3,014.62	1,191.94	3,231.42	1.04	-1.02	-0.18
10,187.00	88.13	151.18	6,239.35	-3,097.45	1,238.35	3,326.21	1.00	0.37	0.93
10,281.00	91.82	152.67	6,239.39	-3,180.37	1,282.58	3,420.14	4.23	3.93	1.59
10,375.00	89.71	151.70	6,238.13	-3,263.50	1,326.43	3,514.09	2.47	-2.24	-1.03
10,469.00	90.11	150.30	6,238.28	-3,345.71	1,372.00	3,607.97	1.55	0.43	-1.49
10,564.00	89.45	148.89	6,238.65	-3,427.64	1,420.08	3,702.70	1.64	-0.69	-1.48
10,659.00	90.46	148.98	6,238.72	-3,509.01	1,469.10	3,797.35	1.07	1.06	0.09
10,754.00	89.49	148.71	6,238.76	-3,590.31	1,518.25	3,891.98	1.06	-1.02	-0.28
10,848.00	88.35	148.27	6,240.53	-3,670.43	1,567.37	3,985.55	1.30	-1.21	-0.47
10,942.00	88.97	147.75	6,242.73	-3,750.14	1,617.15	4,079.04	0.86	0.66	-0.55
11,035.00	90.07	147.48	6,243.51	-3,828.67	1,666.96	4,171.48	1.22	1.18	-0.29
11,130.00	89.23	148.01	6,244.09	-3,909.01	1,717.66	4,265.94	1.05	-0.88	0.56
11,224.00	88.70	149.24	6,245.79	-3,989.25	1,766.59	4,359.53	1.42	-0.56	1.31
11,318.00	89.32	149.59	6,247.41	-4,070.16	1,814.41	4,453.23	0.76	0.66	0.37
11,413.00	90.59	149.24	6,247.49	-4,151.94	1,862.75	4,547.94	1.39	1.34	-0.37
11,508.00	90.68	150.47	6,246.44	-4,234.08	1,910.46	4,642.70	1.30	0.09	1.29
11,603.00	89.32	151.00	6,246.44	-4,316.95	1,956.89	4,737.56	1.54	-1.43	0.56
11,698.00	88.31	151.61	6,248.40	-4,400.27	2,002.50	4,832.44	1.24	-1.06	0.64
11,793.00	87.74	150.74	6,251.68	-4,483.45	2,048.27	4,927.28	1.09	-0.60	-0.92
11,888.00	88.18	151.09	6,255.06	-4,566.41	2,094.42	5,022.09	0.59	0.46	0.37
11,982.00	89.71	149.86	6,256.79	-4,648.19	2,140.74	5,115.91	2.09	1.63	-1.31
12,077.00	91.03	149.51	6,256.17	-4,730.20	2,188.69	5,210.85	1.44	1.39	-0.37
12,172.00	90.20	150.03	6,255.15	-4,812.27	2,236.51	5,305.41	1.03	-0.87	0.55
12,267.00	90.42	150.91	6,254.64	-4,894.93	2,283.34	5,400.24	0.95	0.23	0.93
12,359.00	91.47	151.18	6,253.12	-4,975.42	2,327.87	5,492.11	1.18	1.14	0.29
12,453.00	90.64	150.30	6,251.39	-5,057.41	2,373.80	5,585.95	1.29	-0.88	-0.94
12,548.00	89.71	150.56	6,251.10	-5,140.03	2,420.68	5,680.78	1.02	-0.98	0.27
12,642.00	90.64	151.26	6,250.82	-5,222.17	2,468.39	5,774.66	1.24	0.99	0.74
12,737.00	89.93	150.65	6,250.34	-5,305.22	2,512.51	5,869.53	0.99	-0.75	-0.64
12,832.00	88.31	148.89	6,251.80	-5,387.29	2,560.33	5,964.27	2.52	-1.71	-1.85
12,927.00	89.32	149.24	6,253.77	-5,468.76	2,609.15	6,058.92	1.13	1.06	0.37



Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-3HM
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-3HM	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)
13,022.00	88.04	148.19	6,255.95	-5,549.92	2,658.47	6,153.51	1.74	-1.35	-1.11
13,117.00	88.44	148.10	6,258.87	-5,630.57	2,708.58	6,247.99	0.43	0.42	-0.09
13,211.00	89.71	148.45	6,260.39	-5,710.52	2,758.01	6,341.53	1.40	1.35	0.37
13,306.00	89.14	149.94	6,261.34	-5,792.11	2,806.65	6,436.21	1.68	-0.60	1.57
13,401.00	90.02	149.94	6,262.04	-5,874.33	2,854.24	6,530.98	0.93	0.93	0.00
13,496.00	89.98	149.24	6,262.04	-5,956.26	2,902.32	6,625.72	0.74	-0.04	-0.74
13,591.00	89.27	150.30	6,262.66	-6,038.33	2,950.15	6,720.47	1.34	-0.75	1.12
13,685.00	90.33	150.91	6,262.99	-6,120.23	2,996.29	6,814.32	1.30	1.13	0.65
13,777.00	91.52	150.82	6,261.50	-6,200.58	3,041.07	6,906.18	1.30	1.29	-0.10
Survey @ 13777.00 MD 6261.50 TVD									
13,830.00	91.52	150.82	6,260.10	-6,246.83	3,066.91	6,959.08	0.00	0.00	0.00
Survey projected to 13830.00 MD 6260.10 TVD									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,688.00	2,681.46	73.60	-107.20	MWD surveys
13,777.00	6,261.50	-6,200.58	3,041.07	Survey @ 13777.00 MD 6261.50 TVD
13,830.00	6,260.10	-6,246.83	3,066.91	Survey projected to 13830.00 MD 6260.10 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-3HM
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-3HM	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-3HM					
Well Position	+N/-S	0.00 usft	Northing:	14,446,884.64 usft	Latitude:	39.78060534
	+E/-W	0.00 usft	Easting:	1,685,340.38 usft	Longitude:	-80.84009795
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	11/6/2016	-8.57	67.02	52,257.44493641

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	153.86	

Survey Program	Date	12/19/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,575.00	Gyro VES (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s	
2,688.00	13,830.00	MWD TIP=2575 (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	14,446,884.64	1,685,340.38	39.78060534	-80.84009795	
100.00	0.54	66.87	100.00	0.19	0.43	14,446,884.83	1,685,340.81	39.78060585	-80.84009641	
200.00	0.34	37.89	200.00	0.60	1.05	14,446,885.25	1,685,341.43	39.78060700	-80.84009421	
300.00	0.27	30.06	299.99	1.04	1.35	14,446,885.69	1,685,341.73	39.78060820	-80.84009314	
400.00	0.05	160.69	399.99	1.21	1.48	14,446,885.85	1,685,341.86	39.78060864	-80.84009267	
500.00	0.06	317.61	499.99	1.20	1.46	14,446,885.85	1,685,341.84	39.78060864	-80.84009274	
600.00	0.11	18.75	599.99	1.33	1.46	14,446,885.98	1,685,341.84	39.78060899	-80.84009276	
700.00	0.04	142.78	699.99	1.40	1.51	14,446,886.04	1,685,341.89	39.78060917	-80.84009257	
800.00	0.05	253.07	799.99	1.35	1.49	14,446,886.00	1,685,341.87	39.78060906	-80.84009265	
900.00	0.05	216.03	899.99	1.31	1.42	14,446,885.95	1,685,341.80	39.78060892	-80.84009289	
1,000.00	0.11	244.04	999.99	1.23	1.31	14,446,885.87	1,685,341.69	39.78060871	-80.84009329	

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Survey Report - Geographic

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-3HM
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-3HM	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	
1,100.00	0.07	197.69	1,099.99	1.13	1.20	14,446,885.77	1,685,341.58	39.78060844	-80.84009366	
1,200.00	0.68	43.91	1,199.99	1.50	1.60	14,446,886.14	1,685,341.98	39.78060945	-80.84009226	
1,300.00	1.71	307.18	1,299.97	2.83	0.82	14,446,887.47	1,685,341.20	39.78061310	-80.84009502	
1,400.00	2.63	323.65	1,399.90	5.58	-1.73	14,446,890.22	1,685,338.65	39.78062067	-80.84010407	
1,500.00	4.02	323.08	1,499.73	10.23	-5.20	14,446,894.87	1,685,335.19	39.78063346	-80.84011638	
1,600.00	5.30	309.94	1,599.40	16.00	-10.84	14,446,900.64	1,685,329.54	39.78064932	-80.84013644	
1,700.00	5.05	298.38	1,699.00	21.05	-18.26	14,446,905.70	1,685,322.13	39.78066325	-80.84016280	
1,800.00	5.56	294.81	1,798.57	25.18	-26.53	14,446,909.82	1,685,313.86	39.78067462	-80.84019221	
1,900.00	6.15	294.85	1,898.05	29.46	-35.78	14,446,914.10	1,685,304.60	39.78068643	-80.84022513	
2,000.00	6.43	300.10	1,997.45	34.52	-45.49	14,446,919.16	1,685,294.89	39.78070037	-80.84025964	
2,100.00	6.65	303.24	2,096.80	40.50	-55.18	14,446,925.15	1,685,285.21	39.78071685	-80.84029409	
2,200.00	6.81	298.15	2,196.11	46.47	-65.25	14,446,931.12	1,685,275.13	39.78073329	-80.84032989	
2,300.00	6.72	289.81	2,295.41	51.25	-75.98	14,446,935.90	1,685,264.40	39.78074647	-80.84036807	
2,400.00	5.82	297.71	2,394.82	55.59	-85.97	14,446,940.24	1,685,254.41	39.78075844	-80.84040361	
2,500.00	5.48	313.00	2,494.34	61.21	-93.95	14,446,945.85	1,685,246.43	39.78077390	-80.84043198	
2,575.00	5.53	313.53	2,568.99	66.14	-99.19	14,446,950.78	1,685,241.19	39.78078747	-80.84045068	
2,688.00	5.59	312.41	2,681.46	73.60	-107.20	14,446,958.25	1,685,233.18	39.78080800	-80.84047907	
MWD surveys										
2,783.00	5.07	312.59	2,776.05	79.56	-113.71	14,446,964.21	1,685,226.67	39.78082440	-80.84050219	
2,877.00	6.32	311.83	2,869.58	85.83	-120.62	14,446,970.47	1,685,219.76	39.78084163	-80.84052676	
2,971.00	11.62	317.13	2,962.40	96.22	-130.93	14,446,980.86	1,685,209.45	39.78087024	-80.84056336	
3,066.00	16.15	321.89	3,054.60	113.64	-145.60	14,446,998.28	1,685,194.78	39.78091814	-80.84061548	
3,161.00	17.99	316.60	3,145.42	134.70	-163.84	14,447,019.34	1,685,176.55	39.78097606	-80.84068025	
3,256.00	19.41	305.41	3,235.43	154.51	-186.79	14,447,039.15	1,685,153.59	39.78103059	-80.84076183	
3,351.00	18.82	301.77	3,325.20	171.73	-212.68	14,447,056.37	1,685,127.70	39.78107799	-80.84085389	
3,446.00	18.91	303.07	3,415.09	188.19	-238.61	14,447,072.84	1,685,101.77	39.78112334	-80.84094608	
3,540.00	20.03	303.07	3,503.72	205.29	-264.87	14,447,089.93	1,685,075.51	39.78117042	-80.84103942	
3,635.00	20.49	305.88	3,592.84	223.91	-291.97	14,447,108.56	1,685,048.41	39.78122170	-80.84113579	
3,730.00	20.96	306.45	3,681.69	243.75	-319.11	14,447,128.40	1,685,021.27	39.78127632	-80.84123227	
3,824.00	20.85	306.54	3,769.51	263.70	-346.08	14,447,148.34	1,684,994.30	39.78133123	-80.84132812	
3,919.00	20.29	309.63	3,858.45	284.27	-372.35	14,447,168.92	1,684,968.03	39.78138786	-80.84142149	
4,013.00	19.42	310.26	3,946.86	304.77	-396.83	14,447,189.41	1,684,943.56	39.78144426	-80.84150849	
4,109.00	19.27	311.69	4,037.44	325.62	-420.83	14,447,210.26	1,684,919.55	39.78150164	-80.84159382	
4,204.00	20.05	312.21	4,126.90	346.99	-444.60	14,447,231.63	1,684,895.78	39.78156043	-80.84167829	
4,298.00	19.67	311.26	4,215.31	368.25	-468.43	14,447,252.89	1,684,871.95	39.78161893	-80.84176297	
4,393.00	19.78	311.24	4,304.74	389.39	-492.54	14,447,274.03	1,684,847.84	39.78167711	-80.84184864	
4,488.00	21.17	309.34	4,393.74	410.86	-517.89	14,447,295.50	1,684,822.49	39.78173620	-80.84193876	
4,583.00	21.36	307.44	4,482.27	432.25	-544.90	14,447,316.89	1,684,795.48	39.78179508	-80.84203474	
4,678.00	20.87	306.74	4,570.89	452.89	-572.19	14,447,337.53	1,684,768.19	39.78185190	-80.84213178	
4,772.00	20.24	306.04	4,658.91	472.47	-598.76	14,447,357.12	1,684,741.62	39.78190580	-80.84222621	
4,867.00	19.46	306.29	4,748.26	491.51	-624.80	14,447,376.15	1,684,715.58	39.78195820	-80.84231879	
4,962.00	21.39	308.41	4,837.29	511.64	-651.14	14,447,396.28	1,684,689.25	39.78201362	-80.84241240	
5,057.00	18.06	305.00	4,926.70	530.85	-676.78	14,447,415.50	1,684,663.60	39.78206651	-80.84250356	
5,172.00	17.54	305.42	5,036.20	551.12	-705.50	14,447,435.76	1,684,634.88	39.78212231	-80.84260568	
5,267.00	16.57	304.02	5,127.02	567.00	-728.40	14,447,451.64	1,684,611.98	39.78216602	-80.84268707	
5,361.00	14.02	300.77	5,217.68	580.32	-749.30	14,447,464.97	1,684,591.09	39.78220272	-80.84276137	
5,408.00	9.01	281.96	5,263.74	584.00	-757.80	14,447,468.65	1,684,582.58	39.78221287	-80.84279160	
5,456.00	8.62	247.33	5,311.20	583.40	-764.80	14,447,468.04	1,684,575.58	39.78221123	-80.84281653	
5,503.00	10.73	225.97	5,357.55	579.00	-771.20	14,447,463.64	1,684,569.19	39.78219918	-80.84283933	
5,551.00	11.43	218.59	5,404.65	572.17	-777.38	14,447,456.81	1,684,563.01	39.78218047	-80.84286137	
5,598.00	11.60	203.12	5,450.72	564.18	-782.14	14,447,448.83	1,684,558.24	39.78215855	-80.84287837	
5,645.00	12.57	184.49	5,496.70	554.74	-784.39	14,447,439.38	1,684,555.99	39.78213262	-80.84288646	
5,739.00	18.15	177.28	5,587.31	529.89	-784.50	14,447,414.53	1,684,555.88	39.78206439	-80.84288699	
5,834.00	20.84	179.65	5,676.86	498.21	-783.69	14,447,382.85	1,684,556.69	39.78197737	-80.84288432	
5,929.00	25.10	173.15	5,764.32	461.28	-781.19	14,447,345.92	1,684,559.20	39.78187595	-80.84287562	

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Survey Report - Geographic

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Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-3HM
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-3HM	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
6,023.00	32.88	168.49	5,846.49	416.41	-773.70	14,447,301.05	1,684,566.68	39.78175268	-80.84284927
6,118.00	39.91	158.82	5,922.97	362.61	-757.51	14,447,247.25	1,684,582.87	39.78160486	-80.84279198
6,213.00	49.63	153.55	5,990.36	301.63	-730.31	14,447,186.27	1,684,610.07	39.78143725	-80.84269553
6,307.00	58.20	150.56	6,045.68	234.64	-694.66	14,447,119.29	1,684,645.73	39.78125312	-80.84256904
6,402.00	65.80	151.79	6,090.25	161.20	-654.27	14,447,045.84	1,684,686.11	39.78105122	-80.84242576
6,497.00	69.63	152.49	6,126.27	83.49	-613.21	14,446,968.14	1,684,727.17	39.78083763	-80.84228008
6,591.00	72.48	149.42	6,156.79	5.80	-570.04	14,446,890.44	1,684,770.35	39.78062404	-80.84212690
6,686.00	83.34	150.74	6,176.66	-74.60	-523.79	14,446,810.04	1,684,816.59	39.78040301	-80.84196280
6,781.00	88.92	149.42	6,183.07	-156.72	-476.53	14,446,727.92	1,684,863.85	39.78017727	-80.84179510
6,876.00	88.13	149.59	6,185.51	-238.55	-428.34	14,446,646.09	1,684,912.04	39.77995231	-80.84162408
6,970.00	89.05	151.97	6,187.83	-320.56	-382.47	14,446,564.09	1,684,957.91	39.77972687	-80.84146133
7,065.00	87.56	150.30	6,190.64	-403.71	-336.63	14,446,480.93	1,685,003.75	39.77949827	-80.84129870
7,158.00	88.40	149.24	6,193.92	-484.01	-289.84	14,446,400.63	1,685,050.54	39.77927752	-80.84113266
7,252.00	89.27	149.33	6,195.83	-564.81	-241.84	14,446,319.83	1,685,098.54	39.77905539	-80.84096231
7,347.00	90.15	148.54	6,196.31	-646.18	-192.82	14,446,238.46	1,685,147.56	39.77883168	-80.84078835
7,442.00	89.54	148.71	6,196.56	-727.29	-143.36	14,446,157.35	1,685,197.02	39.77860869	-80.84061282
7,537.00	90.86	149.24	6,196.23	-808.70	-94.39	14,446,075.94	1,685,245.99	39.77838489	-80.84043907
7,632.00	86.95	144.93	6,198.05	-888.40	-42.81	14,445,996.24	1,685,297.58	39.77816575	-80.84025595
7,727.00	87.34	146.78	6,202.78	-966.92	10.45	14,445,917.72	1,685,350.83	39.77794984	-80.84006691
7,822.00	89.10	147.75	6,205.73	-1,046.79	61.79	14,445,837.85	1,685,402.17	39.77773024	-80.83988467
7,916.00	90.07	148.01	6,206.41	-1,126.40	111.77	14,445,758.24	1,685,452.15	39.77751137	-80.83970730
8,011.00	89.71	149.15	6,206.59	-1,207.47	161.29	14,445,677.17	1,685,501.67	39.77728849	-80.83953155
8,105.00	90.77	149.15	6,206.20	-1,288.17	209.49	14,445,596.47	1,685,549.88	39.77706663	-80.83936050
8,199.00	88.22	148.01	6,207.03	-1,368.37	258.49	14,445,516.27	1,685,598.87	39.77684612	-80.83918663
8,294.00	87.69	150.12	6,210.42	-1,449.80	307.29	14,445,434.84	1,685,647.67	39.77662225	-80.83901345
8,389.00	88.44	150.03	6,213.63	-1,532.09	354.66	14,445,352.55	1,685,695.04	39.77639603	-80.83884540
8,484.00	89.67	149.59	6,215.19	-1,614.19	402.42	14,445,270.45	1,685,742.80	39.77617032	-80.83867592
8,579.00	89.45	151.00	6,215.92	-1,696.70	449.50	14,445,187.94	1,685,789.88	39.77594349	-80.83850891
8,673.00	90.15	150.30	6,216.25	-1,778.64	495.57	14,445,106.01	1,685,835.95	39.77571825	-80.83834545
8,768.00	89.58	150.56	6,216.48	-1,861.26	542.45	14,445,023.38	1,685,882.83	39.77549110	-80.83817913
8,863.00	90.24	150.91	6,216.63	-1,944.14	588.89	14,444,940.51	1,685,929.27	39.77526327	-80.83801438
8,958.00	88.84	151.26	6,217.39	-2,027.29	634.82	14,444,857.35	1,685,975.20	39.77503469	-80.83785144
9,053.00	89.10	150.74	6,219.10	-2,110.36	680.87	14,444,774.28	1,686,021.25	39.77480631	-80.83768808
9,148.00	89.63	150.74	6,220.15	-2,193.24	727.30	14,444,691.40	1,686,067.68	39.77457848	-80.83752336
9,241.00	88.13	151.00	6,221.97	-2,274.46	772.56	14,444,610.19	1,686,112.94	39.77435521	-80.83736280
9,336.00	88.92	151.00	6,224.41	-2,357.52	818.60	14,444,527.12	1,686,158.98	39.77412687	-80.83719947
9,431.00	90.68	150.30	6,224.74	-2,440.32	865.16	14,444,444.32	1,686,205.55	39.77389924	-80.83703429
9,525.00	89.58	149.68	6,224.53	-2,521.72	912.18	14,444,362.93	1,686,252.56	39.77367546	-80.83686750
9,620.00	90.81	149.07	6,224.21	-2,603.46	960.57	14,444,281.18	1,686,300.95	39.77345072	-80.83669580
9,714.00	89.23	151.00	6,224.17	-2,684.89	1,007.52	14,444,199.75	1,686,347.90	39.77322686	-80.83652924
9,809.00	87.78	151.09	6,226.65	-2,767.99	1,053.49	14,444,116.66	1,686,393.87	39.77299843	-80.83636616
9,904.00	87.82	150.91	6,230.30	-2,851.01	1,099.51	14,444,033.63	1,686,439.90	39.77277018	-80.83620290
9,997.00	88.75	150.47	6,233.08	-2,932.07	1,145.02	14,443,952.57	1,686,485.40	39.77254734	-80.83604147
10,092.00	87.78	150.30	6,235.96	-3,014.62	1,191.94	14,443,870.02	1,686,532.33	39.77232040	-80.83587501
10,187.00	88.13	151.18	6,239.35	-3,097.45	1,238.35	14,443,787.20	1,686,578.73	39.77209270	-80.83571040
10,281.00	91.82	152.67	6,239.39	-3,180.37	1,282.58	14,443,704.27	1,686,622.96	39.77186475	-80.83555353
10,375.00	89.71	151.70	6,238.13	-3,263.50	1,326.43	14,443,621.15	1,686,666.81	39.77163624	-80.83539800
10,469.00	90.11	150.30	6,238.28	-3,345.71	1,372.00	14,443,538.94	1,686,712.39	39.77141023	-80.83523635
10,564.00	89.45	148.89	6,238.65	-3,427.64	1,420.08	14,443,457.00	1,686,760.46	39.77118498	-80.83506578
10,659.00	90.46	148.98	6,238.72	-3,509.01	1,469.10	14,443,375.63	1,686,809.48	39.77096126	-80.83489185
10,754.00	89.49	148.71	6,238.76	-3,590.31	1,518.25	14,443,294.33	1,686,858.63	39.77073774	-80.83471748
10,848.00	88.35	148.27	6,240.53	-3,670.43	1,567.37	14,443,214.21	1,686,907.75	39.77051745	-80.83454319
10,942.00	88.97	147.75	6,242.73	-3,750.14	1,617.15	14,443,134.51	1,686,957.54	39.77029831	-80.83436654
11,035.00	90.07	147.48	6,243.51	-3,828.67	1,666.96	14,443,055.97	1,687,007.34	39.77008239	-80.83418979
11,130.00	89.23	148.01	6,244.09	-3,909.01	1,717.66	14,442,975.64	1,687,058.04	39.76986150	-80.83400989



Survey Report - Geographic



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-3HM
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-3HM	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
11,224.00	88.70	149.24	6,245.79	-3,989.25	1,766.59	14,442,895.40	1,687,106.97	39.76964089	-80.83383629
11,318.00	89.32	149.59	6,247.41	-4,070.16	1,814.41	14,442,814.49	1,687,154.80	39.76941844	-80.83366663
11,413.00	90.59	149.24	6,247.49	-4,151.94	1,862.75	14,442,732.71	1,687,203.13	39.76919360	-80.83349515
11,508.00	90.68	150.47	6,246.44	-4,234.08	1,910.46	14,442,650.56	1,687,250.84	39.76896776	-80.83332593
11,603.00	89.32	151.00	6,246.44	-4,316.95	1,956.89	14,442,567.69	1,687,297.28	39.76873993	-80.83316121
11,698.00	88.31	151.61	6,248.40	-4,400.27	2,002.50	14,442,484.37	1,687,342.88	39.76851090	-80.83299947
11,793.00	87.74	150.74	6,251.68	-4,483.45	2,048.27	14,442,401.20	1,687,388.65	39.76828223	-80.83283712
11,888.00	88.18	151.09	6,255.06	-4,566.41	2,094.42	14,442,318.23	1,687,434.80	39.76805414	-80.83267343
11,982.00	89.71	149.86	6,256.79	-4,648.19	2,140.74	14,442,236.45	1,687,481.12	39.76782932	-80.83250916
12,077.00	91.03	149.51	6,256.17	-4,730.20	2,188.69	14,442,154.45	1,687,529.07	39.76760386	-80.83233906
12,172.00	90.20	150.03	6,255.15	-4,812.27	2,236.51	14,442,072.37	1,687,576.89	39.76737821	-80.83216941
12,267.00	90.42	150.91	6,254.64	-4,894.93	2,283.34	14,441,989.71	1,687,623.72	39.76715097	-80.83200333
12,359.00	91.47	151.18	6,253.12	-4,975.42	2,327.87	14,441,909.23	1,687,668.25	39.76692970	-80.83184539
12,453.00	90.64	150.30	6,251.39	-5,057.41	2,373.80	14,441,827.24	1,687,714.19	39.76670429	-80.83168247
12,548.00	89.71	150.56	6,251.10	-5,140.03	2,420.68	14,441,744.61	1,687,761.07	39.76647713	-80.83151619
12,642.00	90.64	151.26	6,250.82	-5,222.17	2,466.39	14,441,662.47	1,687,806.77	39.76625132	-80.83135411
12,737.00	89.93	150.65	6,250.34	-5,305.22	2,512.51	14,441,579.42	1,687,852.89	39.76602300	-80.83119053
12,832.00	88.31	148.89	6,251.80	-5,387.29	2,560.33	14,441,497.35	1,687,900.71	39.76579737	-80.83102091
12,927.00	89.32	149.24	6,253.77	-5,468.76	2,609.15	14,441,415.89	1,687,949.53	39.76557338	-80.83084771
13,022.00	88.04	148.19	6,255.95	-5,549.92	2,658.47	14,441,334.72	1,687,998.85	39.76535023	-80.83067275
13,117.00	88.44	148.10	6,258.87	-5,630.57	2,708.58	14,441,254.07	1,688,048.97	39.76512848	-80.83049495
13,211.00	89.71	148.45	6,260.39	-5,710.52	2,758.01	14,441,174.13	1,688,098.39	39.76490867	-80.83031962
13,306.00	89.14	149.94	6,261.34	-5,792.11	2,806.65	14,441,092.54	1,688,147.03	39.76468435	-80.83014705
13,401.00	90.02	149.94	6,262.04	-5,874.33	2,854.24	14,441,010.32	1,688,194.62	39.76445830	-80.82997828
13,496.00	89.98	149.24	6,262.04	-5,956.26	2,902.32	14,440,928.39	1,688,242.71	39.76423305	-80.82980771
13,591.00	89.27	150.30	6,262.66	-6,038.33	2,950.15	14,440,846.31	1,688,290.53	39.76400739	-80.82963807
13,685.00	90.33	150.91	6,262.99	-6,120.23	2,996.29	14,440,764.41	1,688,336.67	39.76378224	-80.82947444
13,777.00	91.52	150.82	6,261.50	-6,200.58	3,041.07	14,440,684.07	1,688,381.46	39.76356134	-80.82931562
Survey @ 13777.00 MD 6261.50 TVD									
13,830.00	91.52	150.82	6,260.10	-6,246.83	3,066.91	14,440,637.81	1,688,407.29	39.76343417	-80.82922401
Survey projected to 13830.00 MD 6260.10 TVD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,688.00	2,681.46	73.60	-107.20	MWD surveys
13,777.00	6,261.50	-6,200.58	3,041.07	Survey @ 13777.00 MD 6261.50 TVD
13,830.00	6,260.10	-6,246.83	3,066.91	Survey projected to 13830.00 MD 6260.10 TVD

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Environmental Protection