

State of West Virginia
Department of Environmental Protection - Office of Oil and Gas
Well Operator's Report of Well Work

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

API 47 - 051 - 01924 County Marshall District Franklin
Quad Powhatan Point 7.5' Pad Name Yoder Field/Pool Name _____
Farm name Nathan D. Yoder, et al Well Number Yoder W-1HM
Operator (as registered with the OOG) Tug Hill Operating, LLC
Address 380 Southpointe Boulevard, Plaza II, Suite 200 City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4,403,413.06 Easting 513,697.22
Landing Point of Curve Northing 4,402,934.20 Easting 513,287.52
Bottom Hole Northing 4,400,941.42 Easting 514,439.93

Elevation (ft) 1,084' GL Type of Well New Existing Type of Report Interim Final
Permit Type Deviated Horizontal Horizontal 6A Vertical Depth Type Deep Shallow
Type of Operation Convert Deepen Drill Plug Back Redrilling Rework Stimulate
Well Type Brine Disposal CBM Gas Oil Secondary Recovery Solution Mining Storage Other _____
Type of Completion Single Multiple Fluids Produced Brine Gas NGL Oil Other _____
Drilled with Cable Rotary

Drilling Media Surface hole Air Mud Fresh Water Intermediate hole Air Mud Fresh Water Brine
Production hole Air Mud Fresh Water Brine

Mud Type(s) and Additive(s)
SOBM; Base oil, osmotic inhibitor, weighting agent, viscosifier, emulsifier, hardness buffer, fluid loss additive, LCM, shale inhibitor, de-foamer, soaping agent, coagulant, flocculant; Specific additives per WSSP and Permit.

Date permit issued 7/17/2017 Date drilling commenced 8/5/2017 Date drilling ceased 11/22/2017
Date completion activities began 3/8/2018 Date completion activities ceased 4/19/2018
Verbal plugging (Y/N) n/a Date permission granted n/a Granted by n/a

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

Freshwater depth(s) ft 70' Open mine(s) (Y/N) depths N
Salt water depth(s) ft 1450' Void(s) encountered (Y/N) depths N
Coal depth(s) ft Sewickley Coal - 589'; Pittsburgh Coal - 679' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed
Jim Nicholas 10/23/18

Reviewed by: _____

API 47-051 - 01924 Farm name Nathan D. Yoder, et al Well number Yoder W-1HM

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade w/ft	Basket Depth(s)	Did cement circulate (Y/N) * Provide details below*
Conductor	36	30	120	NEW	94.5#	N/A	YES
Surface	17 1/2	13 3/8	762	NEW	54.5#	N/A	YES
Coal	17 1/2	13 3/8	762	NEW	54.5#	N/A	YES
Intermediate 1	12 1/4	9 5/8	2619	NEW	36#	N/A	YES
Intermediate 2							
Intermediate 3							
Production	8 3/4	5 1/2	15,353	NEW	20#	N/A	YES
Tubing		2 3/8	6769	NEW	4.7#	N/A	
Packer type and depth set							

Comment Details _____

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	A	225	15.6	1.19	268	0	8
Surface	A	880	15.6	1.19	1047	0	8
Coal	A	880	15.6	1.19	1047	0	8
Intermediate 1	A	910	15.6	1.19	1083	0	8
Intermediate 2							
Intermediate 3							
Production	A	4325	14.5	1.17	5060	0	8
Tubing							

Drillers TD (ft) 15,379 Loggers TD (ft) _____
 Deepest formation penetrated Marcellus Plug back to (ft) n/a
 Plug back procedure n/a

Kick off depth (ft) 5798

Check all wireline logs run caliper density deviated/directional induction
 neutron resistivity gamma ray temperature sonic

Well cored Yes No Conventional Sidewall Were cuttings collected Yes No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING 3 centralizers on surface casing at equal distance.
Intermediate - 1 centralizer every other joint.
 Production - one centralizer every other joint in lateral, one centralizer every joint through curve, one centralizer every other joint to surface.

WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS _____

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED _____

**Yoder W-1HM
Perforation Record**

Stage	Date Perforated	Bottom Perf (ft)	Top Perf (ft)	Number of Perfs	Formation
1	3/9/2018	15,255	15,207	2	Marcellus
2	3/30/2018	15,113	14,982	48	Marcellus
3	3/31/2018	14,938	14,807	48	Marcellus
4	3/31/2018	14,763	14,632	48	Marcellus
5	4/1/2018	14,588	14,457	48	Marcellus
6	4/1/2018	14,413	14,282	48	Marcellus
7	4/1/2018	14,238	14,107	48	Marcellus
8	4/1/2018	14,063	13,932	48	Marcellus
9	4/2/2018	13,888	13,757	48	Marcellus
10	4/2/2018	13,713	13,582	48	Marcellus
11	4/2/2018	13,538	13,407	48	Marcellus
12	4/3/2018	13,363	13,232	48	Marcellus
13	4/3/2018	13,188	13,057	48	Marcellus
14	4/3/2018	13,013	12,882	48	Marcellus
15	4/4/2018	12,838	12,707	48	Marcellus
16	4/5/2018	12,663	12,532	48	Marcellus
17	4/5/2018	12,488	12,357	48	Marcellus
18	4/5/2018	12,313	12,182	48	Marcellus
19	4/6/2018	12,138	12,007	48	Marcellus
20	4/6/2018	11,963	11,832	48	Marcellus
21	4/6/2018	11,788	11,657	48	Marcellus
22	4/6/2018	11,613	11,482	48	Marcellus
23	4/6/2018	11,438	11,307	48	Marcellus
24	4/7/2018	11,263	11,132	48	Marcellus
25	4/7/2018	11,088	10,957	48	Marcellus
26	4/7/2018	10,913	10,782	48	Marcellus
27	4/8/2018	10,738	10,607	48	Marcellus
28	4/8/2018	10,563	10,432	48	Marcellus
29	4/8/2018	10,388	10,257	48	Marcellus
30	4/8/2018	10,213	10,082	48	Marcellus
31	4/9/2018	10,038	9,907	48	Marcellus
32	4/9/2018	9,863	9,732	48	Marcellus
33	4/9/2018	9,688	9,557	48	Marcellus
34	4/10/2018	9,513	9,382	48	Marcellus
35	4/10/2018	9,338	9,207	48	Marcellus
36	4/10/2018	9,163	9,032	48	Marcellus
37	4/10/2018	8,988	8,857	48	Marcellus
38	4/10/2018	8,813	8,682	48	Marcellus
39	4/11/2018	8,638	8,507	48	Marcellus
40	4/11/2018	8,463	8,332	48	Marcellus
41	4/11/2018	8,288	8,157	48	Marcellus
42	4/11/2018	8,113	7,982	48	Marcellus
43	4/12/2018	7,938	7,807	48	Marcellus
44	4/12/2018	7,763	7,632	48	Marcellus
45	4/12/2018	7,588	7,457	48	Marcellus
46	4/12/2018	7,413	7,282	48	Marcellus

RECEIVED
Office of Oil and Gas
SEP 11 2018
WV Department of
Environmental Protection

**Yoder W-1HM
Perforation Record**

47	4/13/2018	7,238	7,107	48	Marcellus
----	-----------	-------	-------	----	-----------

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

**Yoder W-1HM
Stimulation Summary**

Stage	Avg. Pump Rate (BPM)	Avg. Treating Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Proppant Total (lbs)	Water Total (bbls)	N2 Volume (scf)
1	88.1	6,944	6,011	2,901	358,330	8,109	0
2	87.3	7,647	5,963	3,568	355,930	7,936	0
3	87.9	7,663	5,779	4,080	358,510	7,906	0
4	86	7,732	5,611	3,859	459,490	8,758	0
5	89.9	7,675	5,187	4,259	456,770	8,801	0
6	88.4	7,635	5,488	4,056	459,840	8,814	0
7	87.2	7,636	5,374	3,762	459,150	8,724	0
8	85.8	7,503	5,778	4,624	456,910	8,544	0
9	89.5	7,573	5,541	3,888	457,930	8,679	0
10	88.4	7,580	5,912	3,993	461,380	8,787	0
11	89.5	7,614	5,929	3,770	458,450	8,668	0
12	86.1	7,386	5,960	3,988	460,670	8,630	0
13	86.6	7,549	5,742	3,907	459,000	10,425	0
14	89.6	7,505	5,332	3,949	458,940	8,614	0
15	84.8	7,655	5,625	4,201	459,180	8,795	0
16	90	7,513	5,212	4,119	453,860	8,544	0
17	89.6	7,627	5,273	4,720	458,100	8,586	0
18	89	7,649	5,496	4,014	455,810	8,686	0
19	88.8	7,181	5,360	4,076	450,425	9,577	0
20	89.1	7,460	5,537	4,463	451,225	8,349	0
21	89.5	7,493	5,466	3,839	453,965	8,762	0
22	89.4	7,375	5,292	4,119	449,010	8,573	0
23	89.8	7,264	5,075	4,403	446,040	8,426	0
24	82	7,738	5,514	4,154	450,855	9,124	0
25	89.1	7,296	5,070	4,138	449,055	8,570	0
26	89.7	7,273	5,195	4,078	450,120	8,368	0
27	89.7	7,169	4,826	4,103	446,880	8,326	0
28	88.7	7,323	5,422	3,773	448,550	8,729	0
29	89.3	6,872	5,345	4,346	450,390	8,475	0
30	89.9	6,587	5,063	4,402	448,725	7,521	0
31	89.9	6,496	5,036	4,032	445,585	6,830	0
32	89.2	6,540	5,119	3,911	449,770	8,455	0
33	89.6	6,664	5,205	4,349	450,810	8,448	0
34	87	6,354	4,957	4,155	446,585	6,282	0
35	88.9	6,444	4,965	4,123	450,385	6,026	0
36	89	6,670	5,410	3,864	448,310	8,602	0
37	88.3	6,899	5,613	4,039	450,570	8,546	0

RECEIVED
Office of Oil and Gas
SEP 11 2018
WV Department of
Environmental Protection

**Yoder W-1HM
Stimulation Summary**

38	88.3	6,403	4,963	4,263	447,475	5,865	0
39	89.5	6,583	5,322	4,034	446,735	8,489	0
40	89.6	6,452	4,902	3,950	451,727	8,638	0
41	89.5	6,378	4,952	4,159	451,505	8,235	0
42	89.8	6,343	5,055	4,148	448,685	8,251	0
43	88.7	6,492	5,376	4,222	450,570	8,384	0
44	89.4	6,508	4,764	3,707	448,570	8,372	0
45	89.7	6,373	6,138	3,983	454,375	8,325	0
46	88.9	6,285	6,114	4,016	450,295	8,526	0
47	89.9	6,177	5,723	3,721	449,780	8,379	0

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

YoderW-1HM
Formations/Lithology Information

FORMATION	TOP TVD	BASE TVD	TOP MD	BASE MD	DESCRIBE ROCKY TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H2S ETC)
Maxton	1640	1712	1640	1712	Sandstone
Big Lime	1712	1821	1712	1822	Limestone
Big Injun	1821	2129	1822	2131	Sandstone
Weir	2129	2319	2131	2322	Sandstone
Berea	2319	2637	2322	2641	Sandstone
Gordon	2637	2739	2641	2743	Sandstone
Fifty Foot	2739	3312	2743	3341	Sandstone
Speechley	3312	4648	3341	4960	Sandstone
Benson	4648	5017	4960	5416	Sandstone
Alexander	5017	5641	5416	6143	Siltstone
Rhinestreet	5641	5992	6143	6645	Black shale
Middlesex	5992	6077	6645	6844	Black shale
Geneseo/Burkett	6077	6108	6844	6934	Black shale
Tully	6108	6126	6934	6996	Limestone
Hamilton	6126	6131	6996	7017	Grey shale
Marcellus	6131	-	7017	-	Black shale

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	4/29/2018
Job End Date:	4/29/2018
State:	West Virginia
County:	Marshall
API Number:	47-051-01924-00-00
Operator Name:	Tug Hill Operating, LLC
Well Name and Number:	Yoder W1HM
Latitude:	39.78054955
Longitude:	-80.84004615
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,214
Total Base Water Volume (gal):	16,879,244
Total Base Non Water Volume:	0



RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Fresh Water	Operator	Base Fluid					
			Water	7732-18-5	100.00000	86.40674	Density = 8.330
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.60163	

SCALECHEK LP-50	Halliburton	Scale Inhibitor					
				Listed Below			
HYDROCHLORIC ACID	Halliburton	Solvent					
				Listed Below			
HAI-OS ACID INHIBITOR	Halliburton	Corrosion Inhibitor					
				Listed Below			
SAND-PREMIUM WHITE-40/70, BULK	Halliburton	Proppant					
				Listed Below			
SAND-COMMON WHITE-100 MESH, SSA-2, BULK (100003676)	Halliburton	Proppant					
				Listed Below			
SP BREAKER	Halliburton	Breaker					
				Listed Below			
LD-2850	Multi Chm	Friction Reducer					
				Listed Below			
OILPERM A	Halliburton	Non-ionic Surfactant					
				Listed Below			

RECEIVED
Office of Oil and Gas
SEP 11 2018

WG-36 GELLING AGENT	Halliburton	Gelling Agent					
				Listed Below			
MC B-8614	Halliburton	Biocide					
				Listed Below			
Items above are Trade Names with the exception of Base Water . Items below are the individual ingredients.							
			Crystalline silica, quartz	14808-60-7	100.00000	12.89627	
			Hydrochloric acid	7647-01-0	15.00000	0.08509	
			Sodium Chloride	7647-14-5	30.00000	0.01893	
			Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.01893	
			Guar gum	9000-30-0	100.00000	0.01695	
			Glutaraldehyde	111-30-8	30.00000	0.00776	
			Methanol	67-56-1	60.00000	0.00701	
			Phosphate of a Diamine, Sodium Salt	Proprietary	30.00000	0.00644	
			9-Octadecenamide	93-83-4	5.00000	0.00315	
			Alcohols, C12-16, ethoxylated	68551-12-2	5.00000	0.00315	
			Ammonium chloride	12125-02-9	5.00000	0.00315	
			Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1	5.00000	0.00129	
			Ethanol	64-17-5	60.00000	0.00080	
			Sodium persulfate	7775-27-1	100.00000	0.00054	
			Oxyalkylated phenolic resin	Proprietary	30.00000	0.00036	
			Heavy aromatic petroleum naphtha	64742-94-5	30.00000	0.00027	

RECEIVED
 Office of Oil and Gas
 SEP 11 2018

			Ethoxylated alcohols	Proprietary	30.00000	0.00027	Denise Tuck, Halliburton, 3000 N. Sam Houston Pkwy E., Houston, TX 77032, 281-871-6226
			Modified thiourea polymer	Proprietary	30.00000	0.00027	
			Fatty acids, tall oil	Proprietary	30.00000	0.00027	
			Olefins	Proprietary	5.00000	0.00011	
			Propargyl alcohol	107-19-7	10.00000	0.00009	
			Poly(oxy-1,2-ethanediyl), alpha-(4-nonylphenyl)- omega-hydroxy-, branched	127087-87-0	5.00000	0.00005	
			Naphthalene	91-20-3	5.00000	0.00005	
			Phosphoric acid	7664-38-2	0.10000	0.00003	
			1,2,4 Trimethylbenzene	95-63-6	1.00000	0.00001	
			Sodium sulfate	7757-82-6	0.10000	0.00000	

* Total Water Volume sources may include various types of water including fresh water, produced water, and recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

*** If you are calculating a percentage of total ingredients do not add the water volume below the green line to the water volume above the green line

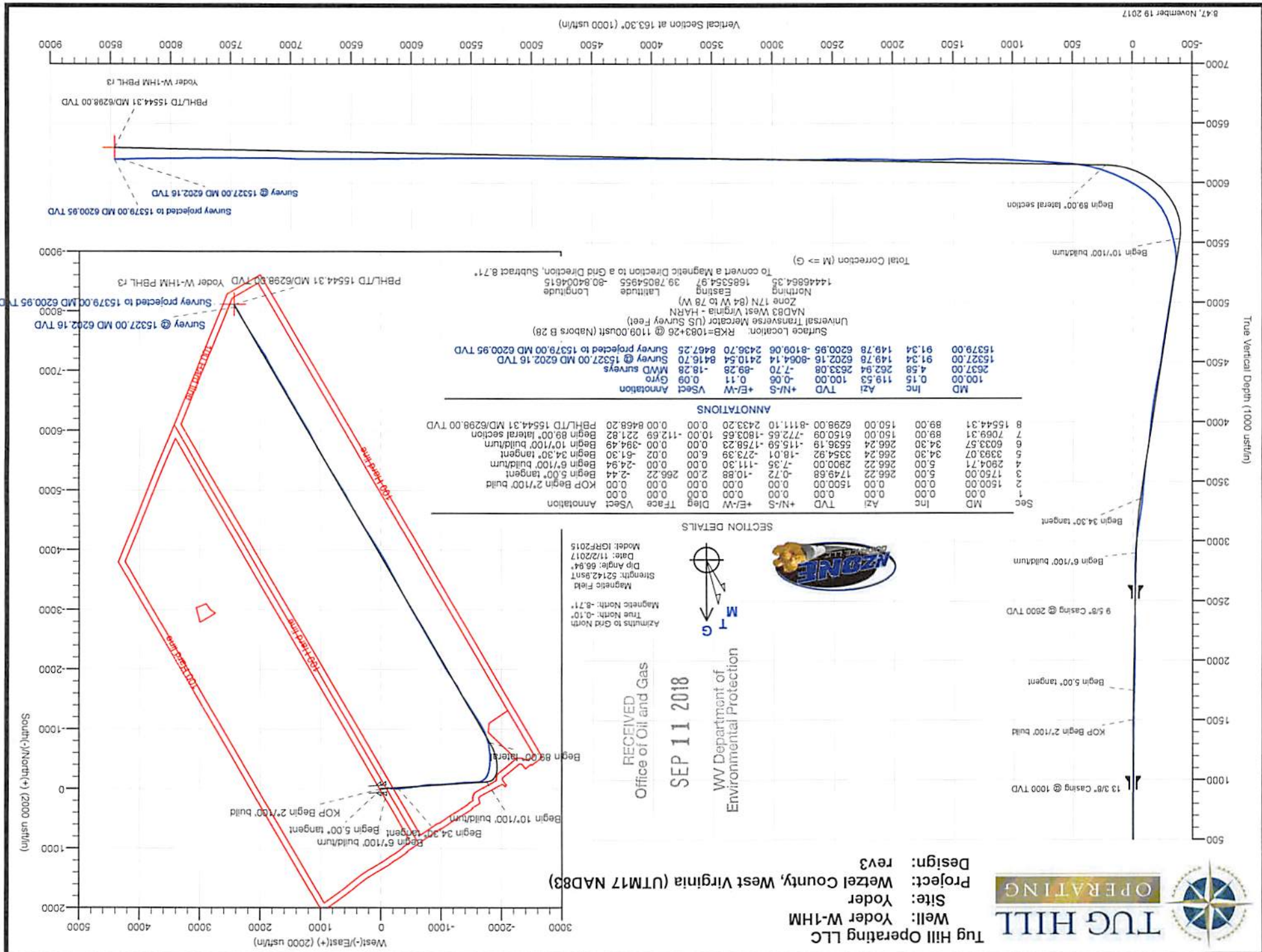
Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided.

Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection



Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Vsect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	
3	1750.00	5.00	-7.35	1749.68	-0.72	-10.88	266.22	KOP Begin 2'7100' build
4	2904.71	5.00	-11.30	2900.00	-7.35	-11.30	-2.44	KOP Begin 5.00' tangent
5	3393.07	34.30	-18.01	3354.92	-18.01	-273.39	6.00	Begin 6'7100' build/turn
6	6033.57	34.30	-115.59	6536.18	-115.59	-1758.23	0.00	Begin 10'100' lateral section
7	7069.31	89.00	-150.00	6150.09	-772.65	-1803.65	10.00	Begin 89.00' lateral section
8	15544.31	89.00	150.00	6298.00	-8111.10	2433.20	0.00	PHL/TD 15544.31 MD/6298.00 TVD
ANNOTATIONS								
MD	100.00	119.53	100.00	-0.06	0.11	0.09		
Inc	4.58	262.84	263.08	-7.70	-89.28	-18.28		
Azi	91.34	149.78	6202.16	-8064.14	2410.54	8416.70		
TVD	15379.00	91.34	149.78	6200.95	-8109.06	2436.70	8467.25	
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								
14446864.35								
1685354.97								
39.78054955								
-80.84004615								
To convert a Magnetic Direction to a Grid Direction, Subtract 8.71'								
Total Correction (M => G)								

SECTION DETAILS

13 3/8" Casing @ 1000 TVD

KOP Begin 2'7100' build

Begin 5.00' tangent

9 5/8" Casing @ 2000 TVD

Begin 6'7100' build/turn

Begin 34.30' tangent

Begin 10'100' lateral section

Begin 69.00' lateral section

RECEIVED
Office of Oil and Gas
SEP 11 2018
WV Department of
Environmental Protection

Magnetic Field
Strength: 52142.85nT
Dip Angle: 66.84°
Date: 11/2/2017
Model: IGRF2015

Azimuths to Grid North
True North: -8.71'
Magnetic North: -8.71'

Vertical Section at 163.30' (1000 usft/in)

Survey @ 15327.00 MD 6202.16 TVD

Survey projected to 15379.00 MD 6200.95 TVD

PHL/TD 15544.31 MD/6298.00 TVD

Yoder W-1HM PBL R3

Survey @ 15327.00 MD 6202.16 TVD

Survey projected to 15379.00 MD 6200.95 TVD

PHL/TD 15544.31 MD/6298.00 TVD

Yoder W-1HM PBL R3

Tug Hill Operating LLC
Well: Yoder W-1HM
Site: Yoder
Project: Wetzel County, West Virginia (UTM17 NAD83)
Design: rev3





Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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-1HM					
Well Position	+N/-S	0.00 usft	Northing:	14,446,864.35 usft	Latitude:	39.78054955
	+E/-W	0.00 usft	Easting:	1,685,354.97 usft	Longitude:	-80.84004615
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	11/2/2017	-8.61	66.94	52,142.93689188

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	163.30

Survey Program	Date	11/19/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,576.00	Gyro (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s	
2,637.00	15,379.00	MWD TIP=2576 MD (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	
100.00	0.15	119.53	100.00	-0.06	0.11	0.09	0.15	0.15	0.00	
Gyro										
200.00	0.21	344.81	200.00	0.05	0.18	0.01	0.33	0.06	-134.72	
300.00	0.12	137.82	300.00	0.15	0.20	-0.08	0.32	-0.09	153.01	
400.00	0.28	57.35	400.00	0.20	0.48	-0.06	0.29	0.16	-80.47	
500.00	0.09	208.73	500.00	0.26	0.65	-0.07	0.36	-0.19	151.38	
600.00	0.25	65.89	600.00	0.28	0.81	-0.04	0.33	0.16	-142.84	
700.00	0.22	304.99	700.00	0.48	0.85	-0.22	0.41	-0.03	-120.90	
800.00	0.18	20.96	800.00	0.74	0.75	-0.49	0.25	-0.04	75.97	

SEP 11 2018

RECEIVED
Office of Oil and GasWV Department of
Environmental Protection

Survey Report



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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)
900.00	0.01	168.16	900.00	0.88	0.81	-0.61	0.19	-0.17	147.20
1,000.00	0.27	80.52	1,000.00	0.91	1.04	-0.57	0.27	0.26	-87.64
1,100.00	0.36	77.16	1,100.00	1.02	1.58	-0.52	0.09	0.09	-3.36
1,200.00	0.20	329.18	1,199.99	1.24	1.80	-0.67	0.46	-0.16	-107.98
1,300.00	0.32	287.21	1,299.99	1.47	1.44	-0.99	0.22	0.12	-41.97
1,400.00	0.59	305.30	1,399.99	1.85	0.75	-1.56	0.30	0.27	18.09
1,500.00	1.30	301.04	1,499.98	2.73	-0.84	-2.80	0.71	0.71	-4.26
1,600.00	2.29	296.10	1,599.93	4.20	-3.41	-5.00	1.00	0.99	-4.94
1,700.00	3.52	276.37	1,699.80	5.42	-8.25	-7.56	1.57	1.23	-19.73
1,800.00	4.30	267.79	1,799.57	5.61	-15.05	-9.70	0.97	0.78	-8.58
1,900.00	5.64	263.37	1,899.19	4.90	-23.68	-11.50	1.39	1.34	-4.42
2,000.00	6.57	260.67	1,998.62	3.41	-34.20	-13.09	0.97	0.93	-2.70
2,100.00	6.15	256.82	2,098.00	1.26	-45.06	-14.15	0.60	-0.42	-3.85
2,200.00	5.08	255.27	2,197.52	-1.09	-54.56	-14.63	1.08	-1.07	-1.55
2,300.00	5.02	255.28	2,297.13	-3.33	-63.07	-14.94	0.06	-0.06	0.01
2,400.00	4.60	257.87	2,396.78	-5.28	-71.23	-15.41	0.47	-0.42	2.59
2,500.00	4.50	264.58	2,496.47	-6.50	-79.05	-16.49	0.54	-0.10	6.71
2,576.00	4.09	262.71	2,572.25	-7.12	-84.71	-17.52	0.57	-0.54	-2.46
2,637.00	4.58	262.94	2,633.08	-7.70	-89.28	-18.28	0.80	0.80	0.38
MWD surveys									
2,684.00	4.54	260.10	2,679.93	-8.25	-92.98	-18.82	0.49	-0.09	-6.04
2,779.00	3.87	258.11	2,774.67	-9.55	-99.82	-19.53	0.72	-0.71	-2.09
2,873.00	5.37	265.70	2,868.37	-10.54	-107.31	-20.74	1.72	1.60	8.07
2,967.00	11.38	273.05	2,961.33	-10.37	-120.97	-24.83	6.48	6.39	7.82
3,062.00	16.97	278.12	3,053.40	-7.91	-144.07	-33.82	6.02	5.88	5.34
3,157.00	22.00	279.94	3,142.93	-2.88	-175.34	-47.63	5.33	5.29	1.92
3,252.00	22.88	276.08	3,230.74	2.15	-211.24	-62.76	1.81	0.93	-4.06
3,347.00	24.05	268.43	3,317.90	3.57	-248.96	-74.96	3.43	1.23	-8.05
3,446.00	28.57	262.74	3,406.64	0.03	-292.64	-84.12	5.22	4.57	-5.75
3,540.00	31.36	261.81	3,488.07	-6.30	-339.16	-91.43	3.01	2.97	-0.99
3,635.00	30.93	261.45	3,569.37	-13.45	-387.77	-98.54	0.49	-0.45	-0.38
3,730.00	36.69	264.36	3,648.28	-19.88	-440.20	-107.46	6.30	6.06	3.06
3,824.00	39.40	264.73	3,722.30	-25.38	-497.87	-118.76	2.89	2.88	0.39
3,919.00	38.10	262.52	3,796.39	-31.96	-556.95	-129.43	2.00	-1.37	-2.33
4,013.00	38.00	260.64	3,870.42	-40.44	-614.26	-137.78	1.24	-0.11	-2.00
4,109.00	36.16	259.76	3,947.00	-50.29	-671.29	-144.74	1.99	-1.92	-0.92
4,204.00	32.88	263.30	4,025.27	-58.28	-724.50	-152.37	4.05	-3.45	3.73
4,298.00	32.64	265.51	4,104.32	-63.24	-775.12	-162.16	1.30	-0.26	2.35
4,393.00	32.64	267.64	4,184.32	-66.30	-826.26	-173.93	1.21	0.00	2.24
4,488.00	32.86	269.68	4,264.23	-67.50	-877.63	-187.54	1.18	0.23	2.15
4,583.00	33.51	270.87	4,343.73	-67.25	-929.63	-202.73	0.97	0.68	1.25
4,678.00	35.87	268.56	4,421.84	-67.55	-983.66	-217.97	2.84	2.48	-2.43
4,772.00	36.75	265.22	4,497.60	-70.58	-1,039.24	-231.03	2.30	0.94	-3.55

SEP 11 2018



Survey Report

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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)
4,867.00	37.03	263.53	4,573.58	-76.18	-1,095.99	-241.98	1.11	0.29	-1.78
4,962.00	37.31	264.76	4,649.28	-82.03	-1,153.09	-252.78	0.84	0.29	1.29
5,057.00	37.46	266.01	4,724.77	-86.67	-1,210.58	-264.86	0.81	0.16	1.32
5,150.00	35.96	264.14	4,799.32	-91.43	-1,265.96	-276.22	2.01	-1.61	-2.01
5,245.00	36.10	264.25	4,876.15	-97.08	-1,321.55	-286.78	0.16	0.15	0.12
5,339.00	34.96	266.22	4,952.65	-101.63	-1,375.98	-298.06	1.72	-1.21	2.10
5,432.00	32.43	268.69	5,030.02	-103.95	-1,427.51	-310.64	3.09	-2.72	2.66
5,527.00	31.24	268.22	5,110.73	-105.30	-1,477.60	-323.74	1.28	-1.25	-0.49
5,621.00	35.07	268.31	5,189.41	-106.86	-1,528.97	-337.02	4.07	4.07	0.10
5,714.00	34.70	267.66	5,265.70	-108.72	-1,582.13	-350.50	0.56	-0.40	-0.70
5,740.00	34.64	266.67	5,287.08	-109.46	-1,596.90	-354.05	2.18	-0.23	-3.81
5,835.00	30.68	254.54	5,367.13	-117.50	-1,647.29	-360.82	8.04	-4.17	-12.77
5,930.00	28.13	232.92	5,450.12	-137.52	-1,688.64	-353.53	11.43	-2.68	-22.76
6,024.00	25.63	227.56	5,533.97	-164.61	-1,721.33	-336.98	3.70	-2.66	-5.70
6,119.00	26.37	211.48	5,619.47	-196.51	-1,747.55	-313.96	7.44	0.78	-16.93
6,213.00	28.70	206.20	5,702.82	-234.57	-1,768.42	-283.49	3.59	2.48	-5.62
6,308.00	36.57	193.28	5,782.86	-282.72	-1,785.04	-242.16	11.03	8.28	-13.60
6,403.00	46.68	188.98	5,853.80	-344.57	-1,796.97	-186.34	11.05	10.64	-4.53
6,498.00	54.07	185.57	5,914.35	-417.10	-1,806.11	-119.50	8.25	7.78	-3.59
6,592.00	58.68	179.84	5,966.42	-495.21	-1,809.69	-45.71	7.06	4.90	-6.10
6,687.00	63.12	175.79	6,012.63	-578.11	-1,806.47	34.62	5.98	4.67	-4.26
6,782.00	65.80	174.39	6,053.58	-663.50	-1,799.12	118.52	3.12	2.82	-1.47
6,876.00	69.58	166.92	6,089.30	-749.21	-1,784.94	204.69	8.38	4.02	-7.95
6,971.00	73.14	160.50	6,119.69	-835.53	-1,759.66	294.63	7.42	3.75	-6.76
7,065.00	78.11	158.83	6,143.02	-920.87	-1,728.01	385.47	5.56	5.29	-1.78
7,159.00	84.75	151.62	6,157.04	-1,005.14	-1,689.06	477.38	10.36	7.06	-7.67
7,253.00	86.24	148.46	6,164.43	-1,086.32	-1,642.27	568.57	3.71	1.59	-3.36
7,347.00	86.29	148.46	6,170.55	-1,166.26	-1,593.20	659.25	0.05	0.05	0.00
7,443.00	86.46	148.28	6,176.62	-1,247.83	-1,542.96	751.82	0.26	0.18	-0.19
7,538.00	87.21	148.90	6,181.86	-1,328.79	-1,493.52	843.56	1.02	0.79	0.65
7,633.00	86.73	148.11	6,186.89	-1,409.68	-1,443.96	935.29	0.97	-0.51	-0.83
7,728.00	86.68	148.20	6,192.35	-1,490.25	-1,393.92	1,026.83	0.11	-0.05	0.09
7,823.00	88.04	148.55	6,196.72	-1,571.05	-1,344.16	1,118.53	1.48	1.43	0.37
7,917.00	90.55	154.88	6,197.88	-1,653.77	-1,299.65	1,210.55	7.24	2.67	6.73
8,012.00	89.45	149.08	6,197.88	-1,737.60	-1,255.04	1,303.66	6.21	-1.16	-6.11
8,106.00	88.79	144.51	6,199.32	-1,816.22	-1,203.58	1,393.76	4.91	-0.70	-4.86
8,200.00	91.12	145.56	6,199.40	-1,893.25	-1,149.72	1,483.01	2.72	2.48	1.12
8,295.00	91.12	146.97	6,197.54	-1,972.24	-1,096.97	1,573.82	1.48	0.00	1.48
8,389.00	91.38	150.39	6,195.49	-2,052.51	-1,048.13	1,664.75	3.65	0.28	3.64
8,484.00	90.64	151.71	6,193.81	-2,135.62	-1,002.15	1,757.57	1.59	-0.78	1.39
8,579.00	91.43	151.54	6,192.10	-2,219.19	-957.01	1,850.58	0.85	0.83	-0.18
8,674.00	87.25	149.52	6,193.19	-2,301.87	-910.29	1,943.20	4.89	-4.40	-2.13
8,769.00	87.47	150.57	6,197.57	-2,384.09	-862.91	2,035.57	1.13	0.23	1.11
8,864.00	89.49	149.78	6,200.09	-2,466.48	-815.68	2,128.05	2.28	2.13	-0.83

SEP 11 2018



Survey Report

WV Department of
Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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)
8,959.00	89.98	150.66	6,200.53	-2,548.93	-768.50	2,220.59	1.06	0.52	0.93
9,054.00	89.76	149.08	6,200.74	-2,631.09	-720.81	2,312.99	1.68	-0.23	-1.66
9,148.00	90.68	150.66	6,200.38	-2,712.39	-673.63	2,404.41	1.95	0.98	1.68
9,242.00	90.90	151.01	6,199.09	-2,794.46	-627.82	2,496.19	0.44	0.23	0.37
9,337.00	91.52	150.75	6,197.08	-2,877.43	-581.60	2,588.94	0.71	0.65	-0.27
9,432.00	90.15	150.39	6,195.70	-2,960.16	-534.93	2,681.59	1.49	-1.44	-0.38
9,526.00	89.71	148.90	6,195.81	-3,041.28	-487.43	2,772.93	1.65	-0.47	-1.59
9,621.00	88.84	150.04	6,197.01	-3,123.10	-439.18	2,865.17	1.51	-0.92	1.20
9,715.00	89.36	152.15	6,198.49	-3,205.37	-393.75	2,957.03	2.31	0.55	2.24
9,810.00	89.54	151.89	6,199.40	-3,289.26	-349.18	3,050.19	0.33	0.19	-0.27
9,905.00	90.29	152.06	6,199.54	-3,373.12	-304.54	3,143.34	0.81	0.79	0.18
9,998.00	89.23	151.27	6,199.93	-3,454.98	-260.40	3,234.42	1.42	-1.14	-0.85
10,093.00	88.40	151.10	6,201.90	-3,538.20	-214.63	3,327.29	0.89	-0.87	-0.18
10,188.00	88.75	151.45	6,204.26	-3,621.48	-168.98	3,420.17	0.52	0.37	0.37
10,282.00	88.57	152.86	6,206.46	-3,704.57	-125.09	3,512.37	1.51	-0.19	1.50
10,376.00	90.07	150.13	6,207.57	-3,787.16	-80.24	3,604.37	3.31	1.60	-2.90
10,470.00	90.46	150.04	6,207.14	-3,868.63	-33.36	3,695.88	0.43	0.41	-0.10
10,564.00	90.90	149.69	6,206.02	-3,949.92	13.83	3,787.30	0.60	0.47	-0.37
10,659.00	89.23	148.20	6,205.91	-4,031.30	62.83	3,879.33	2.36	-1.76	-1.57
10,755.00	89.76	147.76	6,206.76	-4,112.69	113.73	3,971.91	0.72	0.55	-0.46
10,848.00	90.15	147.58	6,206.83	-4,191.28	163.47	4,061.47	0.46	0.42	-0.19
10,943.00	91.03	148.81	6,205.86	-4,272.00	213.53	4,153.18	1.59	0.93	1.29
11,036.00	89.54	150.04	6,205.39	-4,352.07	260.83	4,243.46	2.08	-1.60	1.32
11,131.00	89.89	149.87	6,205.87	-4,434.30	308.40	4,335.90	0.41	0.37	-0.18
11,225.00	90.11	149.87	6,205.87	-4,515.60	355.58	4,427.33	0.23	0.23	0.00
11,319.00	90.42	149.25	6,205.43	-4,596.64	403.20	4,518.63	0.74	0.33	-0.66
11,414.00	90.02	150.57	6,205.07	-4,678.84	450.83	4,611.05	1.45	-0.42	1.39
11,509.00	90.24	150.92	6,204.85	-4,761.72	497.26	4,703.78	0.44	0.23	0.37
11,604.00	88.31	150.57	6,206.05	-4,844.59	543.68	4,796.49	2.06	-2.03	-0.37
11,699.00	88.26	151.19	6,208.90	-4,927.55	589.89	4,889.23	0.65	-0.05	0.65
11,794.00	89.36	149.87	6,210.87	-5,010.24	636.61	4,981.85	1.81	1.16	-1.39
11,889.00	89.93	149.43	6,211.46	-5,092.22	684.61	5,074.17	0.76	0.60	-0.46
11,983.00	90.24	149.34	6,211.32	-5,173.11	732.48	5,165.41	0.34	0.33	-0.10
12,078.00	90.59	149.08	6,210.63	-5,254.72	781.11	5,257.55	0.46	0.37	-0.27
12,173.00	90.20	148.90	6,209.97	-5,336.14	830.05	5,349.60	0.45	-0.41	-0.19
12,268.00	90.20	150.13	6,209.64	-5,418.01	878.25	5,441.86	1.29	0.00	1.29
12,360.00	89.80	148.81	6,209.64	-5,497.25	924.98	5,531.19	1.50	-0.43	-1.43
12,454.00	90.11	148.81	6,209.72	-5,577.66	973.66	5,622.20	0.33	0.33	0.00
12,549.00	89.89	148.20	6,209.72	-5,658.67	1,023.29	5,714.05	0.68	-0.23	-0.64
12,643.00	90.51	152.68	6,209.39	-5,740.41	1,069.65	5,805.67	4.81	0.66	4.77
12,738.00	91.25	153.91	6,207.93	-5,825.26	1,112.34	5,899.21	1.51	0.78	1.29
12,833.00	90.24	151.98	6,206.69	-5,909.86	1,155.54	5,992.65	2.29	-1.06	-2.03
12,928.00	89.76	150.13	6,206.69	-5,992.98	1,201.52	6,085.48	2.01	-0.51	-1.95

SEP 11 2018



Survey Report

WV Department of
Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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)
13,023.00	90.51	149.95	6,206.47	-6,075.29	1,248.96	6,177.95	0.81	0.79	-0.19
13,117.00	91.25	149.87	6,205.03	-6,156.61	1,296.08	6,269.38	0.79	0.79	-0.09
13,212.00	89.85	149.52	6,204.12	-6,238.62	1,344.02	6,361.71	1.52	-1.47	-0.37
13,307.00	90.64	150.22	6,203.71	-6,320.79	1,391.70	6,454.11	1.11	0.83	0.74
13,402.00	89.58	149.34	6,203.53	-6,402.87	1,439.52	6,546.48	1.45	-1.12	-0.93
13,497.00	89.93	150.22	6,203.93	-6,484.96	1,487.33	6,638.84	1.00	0.37	0.93
13,592.00	90.37	150.92	6,203.68	-6,567.70	1,534.01	6,731.51	0.87	0.46	0.74
13,686.00	90.73	150.57	6,202.78	-6,649.71	1,579.95	6,823.25	0.53	0.38	-0.37
13,781.00	88.04	149.52	6,203.80	-6,732.00	1,627.37	6,915.71	3.04	-2.83	-1.11
13,876.00	88.53	149.34	6,206.64	-6,813.76	1,675.67	7,007.90	0.55	0.52	-0.19
13,971.00	88.62	149.43	6,209.01	-6,895.50	1,724.03	7,100.08	0.13	0.09	0.09
14,066.00	88.57	150.57	6,211.34	-6,977.74	1,771.52	7,192.50	1.20	-0.05	1.20
14,161.00	90.20	152.33	6,212.36	-7,061.18	1,816.91	7,285.47	2.52	1.72	1.85
14,255.00	88.75	151.71	6,213.22	-7,144.19	1,861.01	7,377.64	1.68	-1.54	-0.66
14,350.00	90.99	151.45	6,213.43	-7,227.73	1,906.22	7,470.66	2.37	2.36	-0.27
14,445.00	90.51	148.46	6,212.19	-7,309.95	1,953.78	7,563.07	3.19	-0.51	-3.15
14,540.00	89.63	147.05	6,212.07	-7,390.30	2,004.46	7,654.59	1.75	-0.93	-1.48
14,634.00	89.27	146.79	6,212.98	-7,469.05	2,055.77	7,744.77	0.47	-0.38	-0.28
14,729.00	90.86	149.43	6,212.87	-7,549.71	2,105.95	7,836.44	3.24	1.67	2.78
14,824.00	91.08	148.99	6,211.26	-7,631.30	2,154.57	7,928.57	0.52	0.23	-0.46
14,918.00	89.89	147.93	6,210.46	-7,711.41	2,203.74	8,019.43	1.70	-1.27	-1.13
15,013.00	90.95	149.43	6,209.77	-7,792.56	2,253.12	8,111.35	1.93	1.12	1.58
15,107.00	92.22	150.39	6,207.17	-7,873.86	2,300.23	8,202.76	1.69	1.35	1.02
15,201.00	90.99	149.69	6,204.53	-7,955.27	2,347.15	8,294.21	1.51	-1.31	-0.74
15,296.00	91.08	149.87	6,202.82	-8,037.34	2,394.96	8,386.56	0.21	0.09	0.19
15,327.00	91.34	149.78	6,202.16	-8,064.14	2,410.54	8,416.70	0.89	0.84	-0.29
Survey @ 15327.00 MD 6202.16 TVD									
15,379.00	91.34	149.78	6,200.95	-8,109.06	2,436.70	8,467.25	0.00	0.00	0.00
Survey projected to 15379.00 MD 6200.95 TVD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
100.00	100.00	-0.06	0.11	Gyro
2,637.00	2,633.08	-7.70	-89.28	MWD surveys
15,327.00	6,202.16	-8,064.14	2,410.54	Survey @ 15327.00 MD 6202.16 TVD
15,379.00	6,200.95	-8,109.06	2,436.70	Survey projected to 15379.00 MD 6200.95 TVD

SEP 11 2018



Survey Report - Geographic

WV Department of
Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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-1HM					
Well Position	+N/-S	0.00 usft	Northing:	14,446,864.35 usft	Latitude:	39.78054955
	+E/-W	0.00 usft	Easting:	1,685,354.97 usft	Longitude:	-80.84004615
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	11/2/2017	-8.61	66.94	52,142.93689188

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	163.30	

Survey Program	Date	11/19/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,576.00	Gyro (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s	
2,637.00	15,379.00	MWD TIP=2576 MD (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	14,446,864.35	1,685,354.97	39.78054955	-80.84004615	
100.00	0.15	119.53	100.00	-0.06	0.11	14,446,864.29	1,685,355.08	39.78054937	-80.84004575	
Gyro										
200.00	0.21	344.81	200.00	0.05	0.18	14,446,864.40	1,685,355.15	39.78054968	-80.84004551	
300.00	0.12	137.82	300.00	0.15	0.20	14,446,864.50	1,685,355.17	39.78054995	-80.84004543	
400.00	0.28	57.35	400.00	0.20	0.48	14,446,864.56	1,685,355.45	39.78055010	-80.84004445	
500.00	0.09	208.73	500.00	0.26	0.65	14,446,864.62	1,685,355.62	39.78055027	-80.84004385	
600.00	0.25	65.89	600.00	0.28	0.81	14,446,864.64	1,685,355.78	39.78055033	-80.84004328	
700.00	0.22	304.99	700.00	0.48	0.85	14,446,864.84	1,685,355.82	39.78055088	-80.84004313	
800.00	0.18	20.96	800.00	0.74	0.75	14,446,865.09	1,685,355.72	39.78055158	-80.84004348	
900.00	0.01	168.16	900.00	0.88	0.81	14,446,865.23	1,685,355.78	39.78055196	-80.84004328	

SEP 11 2018



Survey Report - Geographic

WV Department of Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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
1,000.00	0.27	80.52	1,000.00	0.91	1.04	14,446,865.26	1,685,356.01	39.78055204	-80.84004244
1,100.00	0.36	77.16	1,100.00	1.02	1.58	14,446,865.37	1,685,356.55	39.78055234	-80.84004052
1,200.00	0.20	329.18	1,199.99	1.24	1.80	14,446,865.59	1,685,356.77	39.78055294	-80.84003975
1,300.00	0.32	287.21	1,299.99	1.47	1.44	14,446,865.82	1,685,356.41	39.78055358	-80.84004102
1,400.00	0.59	305.30	1,399.99	1.85	0.75	14,446,866.20	1,685,355.72	39.78055463	-80.84004346
1,500.00	1.30	301.04	1,499.98	2.73	-0.64	14,446,867.09	1,685,354.33	39.78055706	-80.84004841
1,600.00	2.29	296.10	1,599.93	4.20	-3.41	14,446,868.55	1,685,351.57	39.78056109	-80.84005825
1,700.00	3.52	276.37	1,699.80	5.42	-8.25	14,446,869.77	1,685,346.72	39.78056447	-80.84007548
1,800.00	4.30	267.79	1,799.57	5.61	-15.05	14,446,869.97	1,685,339.92	39.78056504	-80.84009988
1,900.00	5.64	263.37	1,899.19	4.90	-23.68	14,446,869.25	1,685,331.29	39.78056312	-80.84013039
2,000.00	6.57	260.67	1,998.62	3.41	-34.20	14,446,867.76	1,685,320.77	39.78055907	-80.84016787
2,100.00	6.15	256.82	2,098.00	1.26	-45.06	14,446,865.61	1,685,309.91	39.78055322	-80.84020654
2,200.00	5.08	255.27	2,197.52	-1.09	-54.56	14,446,863.26	1,685,300.41	39.78054682	-80.84024036
2,300.00	5.02	255.28	2,297.13	-3.33	-63.07	14,446,861.03	1,685,291.90	39.78054072	-80.84027068
2,400.00	4.60	257.87	2,396.78	-5.28	-71.23	14,446,859.07	1,685,283.74	39.78053539	-80.84029971
2,500.00	4.50	264.58	2,496.47	-6.50	-79.05	14,446,857.86	1,685,275.92	39.78053210	-80.84032757
2,576.00	4.09	262.71	2,572.25	-7.12	-84.71	14,446,857.23	1,685,270.26	39.78053041	-80.84034771
2,637.00	4.58	262.94	2,633.08	-7.70	-89.28	14,446,856.66	1,685,265.69	39.78052885	-80.84036399
MWD surveys									
2,684.00	4.54	260.10	2,679.93	-8.25	-92.98	14,446,856.11	1,685,261.99	39.78052736	-80.84037715
2,779.00	3.87	258.11	2,774.67	-9.55	-99.82	14,446,854.80	1,685,255.15	39.78052380	-80.84040151
2,873.00	5.37	265.70	2,868.37	-10.54	-107.31	14,446,853.82	1,685,247.66	39.78052114	-80.84042818
2,967.00	11.38	273.05	2,961.33	-10.37	-120.97	14,446,853.98	1,685,234.00	39.78052165	-80.84047680
3,062.00	16.97	278.12	3,053.40	-7.91	-144.07	14,446,856.44	1,685,210.90	39.78052852	-80.84055901
3,157.00	22.00	279.94	3,142.93	-2.88	-175.34	14,446,861.47	1,685,179.63	39.78054250	-80.84067029
3,252.00	22.88	276.08	3,230.74	2.15	-211.24	14,446,866.50	1,685,143.73	39.78055648	-80.84079802
3,347.00	24.05	268.43	3,317.90	3.57	-248.96	14,446,867.93	1,685,106.01	39.78056058	-80.84093229
3,446.00	28.57	262.74	3,406.64	0.03	-292.64	14,446,864.38	1,685,062.33	39.78055105	-80.84108778
3,540.00	31.36	261.81	3,488.07	-6.30	-339.16	14,446,858.05	1,685,015.81	39.78053391	-80.84125339
3,635.00	30.93	261.45	3,569.37	-13.45	-387.77	14,446,850.90	1,684,967.20	39.78051450	-80.84142646
3,730.00	36.69	264.36	3,648.28	-19.88	-440.20	14,446,844.48	1,684,914.77	39.78049711	-80.84161313
3,824.00	39.40	264.73	3,722.30	-25.38	-497.87	14,446,838.98	1,684,857.11	39.78048229	-80.84181841
3,919.00	38.10	262.52	3,796.39	-31.96	-556.95	14,446,832.39	1,684,798.02	39.78046449	-80.84202877
4,013.00	38.00	260.64	3,870.42	-40.44	-614.26	14,446,823.91	1,684,740.71	39.78044147	-80.84223280
4,109.00	36.16	259.76	3,947.00	-50.29	-671.29	14,446,814.07	1,684,683.68	39.78041472	-80.84243587
4,204.00	32.88	263.30	4,025.27	-58.28	-724.50	14,446,806.07	1,684,630.47	39.78039302	-80.84262532
4,298.00	32.64	265.51	4,104.32	-63.24	-775.12	14,446,801.11	1,684,579.85	39.78037964	-80.84280551
4,393.00	32.64	267.64	4,184.32	-66.30	-826.26	14,446,798.05	1,684,528.71	39.78037148	-80.84298755
4,488.00	32.86	269.68	4,264.23	-67.50	-877.63	14,446,796.85	1,684,477.34	39.78036844	-80.84317042
4,583.00	33.51	270.87	4,343.73	-67.25	-929.63	14,446,797.11	1,684,425.34	39.78036938	-80.84335548
4,678.00	35.87	268.56	4,421.84	-67.55	-983.68	14,446,796.81	1,684,371.29	39.78036882	-80.84354789
4,772.00	36.75	265.22	4,497.60	-70.58	-1,039.24	14,446,793.77	1,684,315.73	39.78036075	-80.84374567
4,867.00	37.03	263.53	4,573.58	-76.18	-1,095.99	14,446,788.18	1,684,258.98	39.78034566	-80.84394769
4,962.00	37.31	264.76	4,649.28	-82.03	-1,153.09	14,446,782.32	1,684,201.89	39.78032986	-80.84415095
5,057.00	37.46	266.01	4,724.77	-86.67	-1,210.58	14,446,777.68	1,684,144.39	39.78031739	-80.84435561
5,150.00	35.96	264.14	4,799.32	-91.43	-1,265.96	14,446,772.93	1,684,089.01	39.78030459	-80.84455276
5,245.00	36.10	264.25	4,876.15	-97.08	-1,321.55	14,446,767.28	1,684,033.42	39.78028934	-80.84475068
5,339.00	34.96	266.22	4,952.65	-101.63	-1,375.98	14,446,762.73	1,683,978.99	39.78027710	-80.84494444
5,432.00	32.43	268.69	5,030.02	-103.95	-1,427.51	14,446,760.40	1,683,927.46	39.78027095	-80.84512786
5,527.00	31.24	268.22	5,110.73	-105.30	-1,477.60	14,446,759.05	1,683,877.37	39.78026749	-80.84530616
5,621.00	35.07	268.31	5,189.41	-106.86	-1,528.97	14,446,757.50	1,683,826.00	39.78026347	-80.84548904
5,714.00	34.70	267.66	5,265.70	-108.72	-1,582.13	14,446,755.63	1,683,772.84	39.78025859	-80.84567825
5,740.00	34.64	266.67	5,287.08	-109.46	-1,596.90	14,446,754.90	1,683,758.07	39.78025665	-80.84573083
5,835.00	30.68	254.54	5,367.13	-117.50	-1,647.29	14,446,746.86	1,683,707.68	39.78023480	-80.84591023
5,930.00	28.13	232.92	5,450.12	-137.52	-1,688.64	14,446,726.83	1,683,666.33	39.78018001	-80.84605754

SEP 11 2018



Survey Report - Geographic

WV Department of
Environmental Protection

Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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
6,024.00	25.63	227.56	5,533.97	-164.61	-1,721.33	14,446,699.75	1,683,633.64	39.78010577	-80.84617406
6,119.00	26.37	211.48	5,619.47	-196.51	-1,747.55	14,446,667.85	1,683,607.42	39.78001829	-80.84626756
6,213.00	28.70	206.20	5,702.82	-234.57	-1,768.42	14,446,629.78	1,683,586.55	39.77991385	-80.84634209
6,308.00	36.57	193.28	5,782.86	-282.72	-1,785.04	14,446,581.64	1,683,569.93	39.77978171	-80.84640153
6,403.00	46.68	188.98	5,853.80	-344.57	-1,796.97	14,446,519.78	1,683,558.01	39.77961190	-80.84644437
6,498.00	54.07	185.57	5,914.35	-417.10	-1,806.11	14,446,447.26	1,683,548.86	39.77941276	-80.84647735
6,592.00	58.68	179.84	5,966.42	-495.21	-1,809.69	14,446,369.14	1,683,545.28	39.77919825	-80.84649059
6,687.00	63.12	175.79	6,012.63	-578.11	-1,806.47	14,446,286.24	1,683,548.50	39.77897057	-80.84647961
6,782.00	65.80	174.39	6,053.58	-663.50	-1,799.12	14,446,200.85	1,683,555.85	39.77873603	-80.84645398
6,876.00	69.58	166.92	6,089.30	-749.21	-1,784.94	14,446,115.15	1,683,570.03	39.77850060	-80.84640403
6,971.00	73.14	160.50	6,119.69	-835.53	-1,759.66	14,446,028.83	1,683,595.31	39.77826342	-80.84631458
7,065.00	78.11	158.83	6,143.02	-920.87	-1,728.01	14,445,943.48	1,683,626.96	39.77802888	-80.84620246
7,159.00	84.75	151.62	6,157.04	-1,005.14	-1,689.06	14,445,859.21	1,683,665.91	39.77779727	-80.84606435
7,253.00	86.24	148.46	6,164.43	-1,086.32	-1,642.27	14,445,778.04	1,683,712.70	39.77757413	-80.84589829
7,347.00	86.29	148.46	6,170.55	-1,166.26	-1,593.20	14,445,698.09	1,683,761.77	39.77735435	-80.84572415
7,443.00	86.46	148.28	6,176.62	-1,247.83	-1,542.96	14,445,616.52	1,683,812.01	39.77713008	-80.84554581
7,538.00	87.21	148.90	6,181.86	-1,328.79	-1,493.52	14,445,535.57	1,683,861.45	39.77690752	-80.84537037
7,633.00	86.73	148.11	6,186.89	-1,409.68	-1,443.96	14,445,454.67	1,683,911.01	39.77668513	-80.84519447
7,728.00	86.68	148.20	6,192.35	-1,490.25	-1,393.92	14,445,374.11	1,683,961.05	39.77646364	-80.84501686
7,823.00	88.04	148.55	6,196.72	-1,571.05	-1,344.16	14,445,293.30	1,684,010.81	39.77624149	-80.84484025
7,917.00	90.55	154.88	6,197.88	-1,653.77	-1,299.65	14,445,210.58	1,684,055.32	39.77601409	-80.84468234
8,012.00	89.45	149.08	6,197.88	-1,737.60	-1,255.04	14,445,126.75	1,684,099.93	39.77578367	-80.84452408
8,106.00	88.79	144.51	6,199.32	-1,816.22	-1,203.58	14,445,048.13	1,684,151.39	39.77556751	-80.84434142
8,200.00	91.12	145.56	6,199.40	-1,893.25	-1,149.72	14,444,971.10	1,684,205.25	39.77535571	-80.84411509
8,295.00	91.12	146.97	6,197.54	-1,972.24	-1,096.97	14,444,892.12	1,684,258.00	39.77513854	-80.84396294
8,389.00	91.38	150.39	6,195.49	-2,052.51	-1,048.13	14,444,811.85	1,684,306.84	39.77491786	-80.84378960
8,484.00	90.64	151.71	6,193.81	-2,135.62	-1,002.15	14,444,728.73	1,684,352.82	39.77468938	-80.84362649
8,579.00	91.43	151.54	6,192.10	-2,219.19	-957.01	14,444,645.16	1,684,397.96	39.77445965	-80.84346635
8,674.00	87.25	149.52	6,193.19	-2,301.87	-910.29	14,444,562.48	1,684,444.68	39.77423237	-80.84330058
8,769.00	87.47	150.57	6,197.57	-2,384.09	-862.91	14,444,480.26	1,684,492.06	39.77400633	-80.84313245
8,864.00	89.49	149.78	6,200.09	-2,466.48	-815.68	14,444,397.88	1,684,539.29	39.77377986	-80.84296487
8,959.00	89.98	150.66	6,200.53	-2,548.93	-768.50	14,444,315.42	1,684,586.47	39.77355319	-80.84279746
9,054.00	89.76	149.08	6,200.74	-2,631.09	-720.81	14,444,233.26	1,684,634.16	39.77332732	-80.84262826
9,148.00	90.68	150.66	6,200.38	-2,712.39	-673.63	14,444,151.97	1,684,681.34	39.77310384	-80.84246085
9,242.00	90.90	151.01	6,199.09	-2,794.46	-627.82	14,444,069.89	1,684,727.15	39.77287821	-80.84229834
9,337.00	91.52	150.75	6,197.08	-2,877.43	-581.60	14,443,986.92	1,684,773.37	39.77265012	-80.84213437
9,432.00	90.15	150.39	6,195.70	-2,960.16	-534.93	14,443,904.19	1,684,820.04	39.77242269	-80.84196878
9,526.00	89.71	148.90	6,195.81	-3,041.28	-487.43	14,443,823.08	1,684,867.54	39.77219971	-80.84180023
9,621.00	88.84	150.04	6,197.01	-3,123.10	-439.18	14,443,741.26	1,684,915.79	39.77197477	-80.84162901
9,715.00	89.36	152.15	6,198.49	-3,205.37	-393.75	14,443,658.98	1,684,961.22	39.77174860	-80.84146785
9,810.00	89.54	151.89	6,199.40	-3,289.26	-349.18	14,443,575.09	1,685,005.79	39.77151799	-80.84130977
9,905.00	90.29	152.06	6,199.54	-3,373.12	-304.54	14,443,491.23	1,685,050.43	39.77128747	-80.84115144
9,998.00	89.23	151.27	6,199.93	-3,454.98	-260.40	14,443,409.38	1,685,094.57	39.77106246	-80.84099487
10,093.00	88.40	151.10	6,201.90	-3,538.20	-214.63	14,443,326.16	1,685,140.34	39.77083369	-80.84083248
10,188.00	88.75	151.45	6,204.26	-3,621.48	-168.98	14,443,242.88	1,685,185.99	39.77060475	-80.84067056
10,282.00	88.57	152.86	6,206.46	-3,704.57	-125.09	14,443,159.78	1,685,229.88	39.77037634	-80.84051488
10,376.00	90.07	150.13	6,207.57	-3,787.16	-80.24	14,443,077.20	1,685,274.73	39.77014931	-80.84035578
10,470.00	90.46	150.04	6,207.14	-3,868.63	-33.36	14,442,995.72	1,685,321.61	39.76992533	-80.84018947
10,564.00	90.90	149.69	6,206.02	-3,949.92	13.83	14,442,914.43	1,685,368.80	39.76970185	-80.84002205
10,659.00	89.23	148.20	6,205.91	-4,031.30	62.83	14,442,833.05	1,685,417.80	39.76947812	-80.83984817
10,755.00	89.76	147.76	6,206.76	-4,112.69	113.73	14,442,751.66	1,685,468.70	39.76925435	-80.83966755
10,848.00	90.15	147.58	6,206.83	-4,191.28	163.47	14,442,673.08	1,685,518.44	39.76903829	-80.83949105
10,943.00	91.03	148.81	6,205.86	-4,272.00	213.53	14,442,592.35	1,685,568.50	39.76881634	-80.83931340
11,036.00	89.54	150.04	6,205.39	-4,352.07	260.83	14,442,512.28	1,685,615.80	39.76859623	-80.83914557
11,131.00	89.89	149.87	6,205.87	-4,434.30	308.40	14,442,430.05	1,685,663.37	39.76837015	-80.83897683

SEP 11 2018



Survey Report - Geographic

WV Department of
Environmental Protection



Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
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-1HM	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
11,225.00	90.11	149.87	6,205.87	-4,515.60	355.58	14,442,348.75	1,685,710.55	39.76814665	-80.83880943
11,319.00	90.42	149.25	6,205.43	-4,596.64	403.20	14,442,267.71	1,685,758.17	39.76792385	-80.83864047
11,414.00	90.02	150.57	6,205.07	-4,678.84	450.83	14,442,185.51	1,685,805.80	39.76769788	-80.83847150
11,509.00	90.24	150.92	6,204.85	-4,761.72	497.26	14,442,102.63	1,685,852.23	39.76747003	-80.83830682
11,604.00	88.31	150.57	6,206.05	-4,844.59	543.88	14,442,019.76	1,685,898.65	39.76724221	-80.83814215
11,699.00	88.26	151.19	6,208.90	-4,927.55	589.89	14,441,936.80	1,685,944.86	39.76701416	-80.83797824
11,794.00	89.36	149.87	6,210.87	-5,010.24	636.61	14,441,854.12	1,685,991.58	39.76678684	-80.83781249
11,889.00	89.93	149.43	6,211.46	-5,092.22	684.61	14,441,772.14	1,686,039.58	39.76656147	-80.83764220
11,983.00	90.24	149.34	6,211.32	-5,173.11	732.48	14,441,691.24	1,686,087.45	39.76633906	-80.83747237
12,078.00	90.59	149.08	6,210.63	-5,254.72	781.11	14,441,609.63	1,686,136.08	39.76611470	-80.83729984
12,173.00	90.20	148.90	6,209.97	-5,336.14	830.05	14,441,528.21	1,686,185.02	39.76589085	-80.83712620
12,268.00	90.20	150.13	6,209.64	-5,418.01	878.25	14,441,446.35	1,686,233.22	39.76566579	-80.83695523
12,360.00	89.80	148.81	6,209.64	-5,497.25	924.98	14,441,367.11	1,686,279.95	39.76544793	-80.83678943
12,454.00	90.11	148.81	6,209.72	-5,577.66	973.66	14,441,286.69	1,686,328.63	39.76522685	-80.83661672
12,549.00	89.89	148.20	6,209.72	-5,658.67	1,023.29	14,441,205.69	1,686,378.26	39.76500414	-80.83644063
12,643.00	90.51	152.68	6,209.39	-5,740.41	1,069.65	14,441,123.94	1,686,424.62	39.76477941	-80.83627618
12,738.00	91.25	153.91	6,207.93	-5,825.26	1,112.34	14,441,039.09	1,686,467.31	39.76454616	-80.83612483
12,833.00	90.24	151.98	6,206.69	-5,909.86	1,155.54	14,440,954.50	1,686,510.51	39.76431363	-80.83597164
12,928.00	89.76	150.13	6,206.69	-5,992.98	1,201.52	14,440,871.37	1,686,556.49	39.76408510	-80.83580858
13,023.00	90.51	149.95	6,206.47	-6,075.29	1,248.96	14,440,789.06	1,686,603.93	39.76385883	-80.83564029
13,117.00	91.25	149.87	6,205.03	-6,156.61	1,296.08	14,440,707.74	1,686,651.05	39.76363526	-80.83547313
13,212.00	89.85	149.52	6,204.12	-6,238.62	1,344.02	14,440,625.73	1,686,698.99	39.76340979	-80.83530310
13,307.00	90.64	150.22	6,203.71	-6,320.79	1,391.70	14,440,543.57	1,686,746.67	39.76318390	-80.83513395
13,402.00	89.58	149.34	6,203.53	-6,402.67	1,439.52	14,440,461.48	1,686,794.49	39.76295823	-80.83496434
13,497.00	89.93	150.22	6,203.93	-6,484.96	1,487.33	14,440,379.39	1,686,842.30	39.76273255	-80.83479473
13,592.00	90.37	150.92	6,203.68	-6,567.70	1,534.01	14,440,296.65	1,686,888.98	39.76250508	-80.83462917
13,686.00	90.73	150.57	6,202.78	-6,649.71	1,579.95	14,440,214.65	1,686,934.92	39.76227964	-80.83446625
13,781.00	88.04	149.52	6,203.80	-6,732.00	1,627.37	14,440,132.35	1,686,982.34	39.76205338	-80.83429802
13,876.00	88.53	149.34	6,206.64	-6,813.76	1,675.67	14,440,050.59	1,687,030.64	39.76182860	-80.83412671
13,971.00	88.62	149.43	6,209.01	-6,895.50	1,724.03	14,439,968.86	1,687,079.00	39.76160390	-80.83395514
14,066.00	88.57	150.57	6,211.34	-6,977.74	1,771.52	14,439,886.61	1,687,126.49	39.76137778	-80.83378671
14,161.00	90.20	152.33	6,212.36	-7,061.18	1,816.91	14,439,803.17	1,687,171.88	39.76114841	-80.83362572
14,255.00	88.75	151.71	6,213.22	-7,144.19	1,861.01	14,439,720.17	1,687,215.98	39.76092022	-80.83346935
14,350.00	90.99	151.45	6,213.43	-7,227.73	1,906.22	14,439,636.62	1,687,261.19	39.76069055	-80.83330903
14,445.00	90.51	148.46	6,212.19	-7,309.95	1,953.78	14,439,554.40	1,687,308.75	39.76046451	-80.83314036
14,540.00	89.63	147.05	6,212.07	-7,390.30	2,004.46	14,439,474.06	1,687,359.43	39.76024360	-80.83296054
14,634.00	89.27	146.79	6,212.98	-7,469.05	2,055.77	14,439,393.30	1,687,410.74	39.76002704	-80.83277850
14,729.00	90.86	149.43	6,212.87	-7,549.71	2,105.95	14,439,314.65	1,687,460.92	39.75980529	-80.83260048
14,824.00	91.08	148.99	6,211.26	-7,631.30	2,154.57	14,439,233.05	1,687,509.54	39.75958095	-80.83242800
14,918.00	89.89	147.93	6,210.46	-7,711.41	2,203.74	14,439,152.94	1,687,558.71	39.75936070	-80.83225358
15,013.00	90.95	149.43	6,209.77	-7,792.56	2,253.12	14,439,071.79	1,687,608.09	39.75913758	-80.83207842
15,107.00	92.22	150.39	6,207.17	-7,873.86	2,300.23	14,438,990.49	1,687,655.20	39.75891407	-80.83191134
15,201.00	90.99	149.69	6,204.53	-7,955.27	2,347.15	14,438,909.09	1,687,702.12	39.75869026	-80.83174491
15,296.00	91.08	149.87	6,202.82	-8,037.34	2,394.96	14,438,827.01	1,687,749.93	39.75846461	-80.83157535
15,327.00	91.34	149.78	6,202.16	-8,064.14	2,410.54	14,438,800.22	1,687,765.51	39.75839095	-80.83152010
Survey @ 15327.00 MD 6202.16 TVD									
15,379.00	91.34	149.78	6,200.95	-8,109.06	2,436.70	14,438,755.30	1,687,791.67	39.75826744	-80.83142729
Survey projected to 15379.00 MD 6200.95 TVD									



Survey Report - Geographic



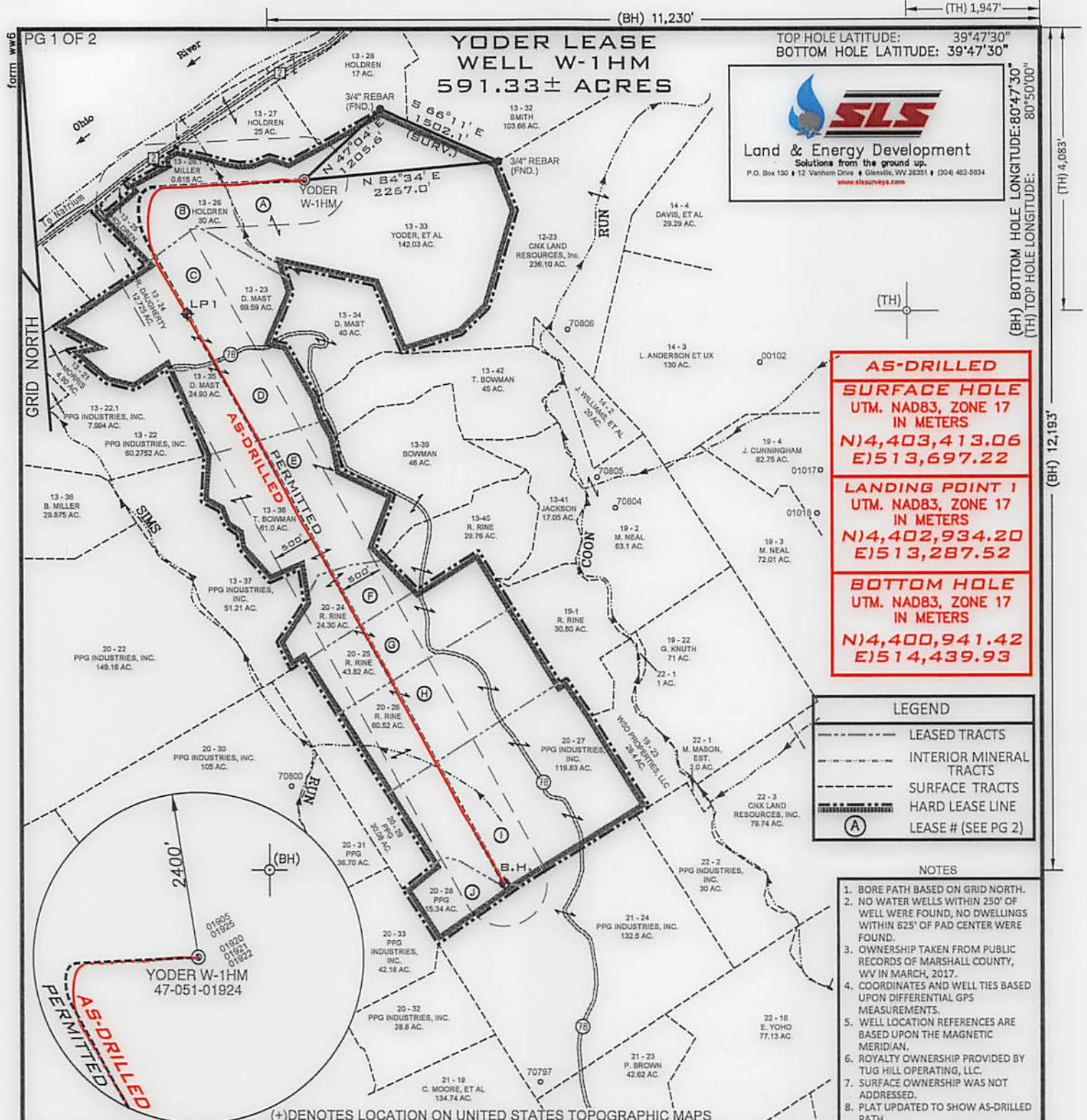
Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-1HM
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-1HM	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	DB_Jul2216dt_v14

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
100.00	100.00	-0.06	0.11	Gyro
2,637.00	2,633.08	-7.70	-89.28	MWD surveys
15,327.00	6,202.16	-8,064.14	2,410.54	Survey @ 15327.00 MD 6202.16 TVD
15,379.00	6,200.95	-8,109.06	2,436.70	Survey projected to 15379.00 MD 6200.95 TVD

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection



TOP HOLE LATITUDE: 39°47'30"
 BOTTOM HOLE LATITUDE: 39°47'30"

SLS
 Land & Energy Development
 Solutions from the ground up.
 P.O. Box 150 • 12. Vinton Drive • Glenville, WV 26031 • (304) 402-5934
 www.slsurvey.com

AS-DRILLED
SURFACE HOLE
 UTM. NAD83, ZONE 17
 IN METERS
 N)4,403,413.06
 E)513,697.22

LANDING POINT 1
 UTM. NAD83, ZONE 17
 IN METERS
 N)4,402,934.20
 E)513,287.52

BOTTOM HOLE
 UTM. NAD83, ZONE 17
 IN METERS
 N)4,400,941.42
 E)514,439.93

LEGEND

- LEASED TRACTS
- INTERIOR MINERAL TRACTS
- SURFACE TRACTS
- HARD LEASE LINE
- (A) LEASE # (SEE PG 2)

NOTES

1. BORE PATH BASED ON GRID NORTH.
2. NO WATER WELLS WITHIN 250' OF WELL WERE FOUND, NO DWELLINGS WITHIN 625' OF PAD CENTER WERE FOUND.
3. OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN MARCH, 2017.
4. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
5. WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.
6. ROYALTY OWNERSHIP PROVIDED BY TUG HILL OPERATING, LLC.
7. SURFACE OWNERSHIP WAS NOT ADDRESSED.
8. PLAT UPDATED TO SHOW AS-DRILLED PATH.

FILE NUMBER **8836**

DRAWING NUMBER **8836ADW1HM.dwg**

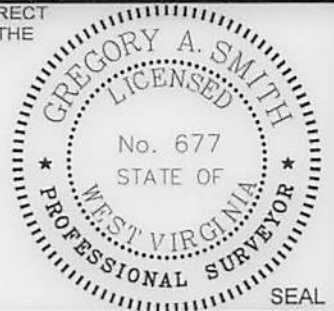
SCALE **1" = 1600'**

MINIMUM DEGREE OF ACCURACY **1/2500**

PROVEN SOURCE OF ELEVATION **SUBMETER MAPPING GRADE GPS**

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.S. 677
Gregory A. Smith



WVDEP
 OFFICE OF OIL & GAS
 601 57TH STREET, SE
 CHARLESTON, WV 25304



DATE: **JULY 17, 2018**

OPERATORS WELL NO. **YODER W-1HM (AS-DRILLED)**

API WELL NO. **47-051-01924**

STATE COUNTY PERMIT

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
 (IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION ELEVATION **1084'** WATERSHED (HUC 10) **FRENCH CREEK - OHIO RIVER**

DISTRICT **FRANKLIN** COUNTY **MARSHALL**

QUADRANGLE **POWHATAN POINT 7.5'** LEASE NUMBER **SEE ATTACHED PG 2 OF 2**

SURFACE OWNER **NATHAN D. YODER, et al** ACREAGE **142.03**

OIL & GAS ROYALTY OWNER **SEE PAGE 2** LEASE ACREAGE **591.33**

PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___
 PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE (SPECIFY) ___

TARGET FORMATION **MARCELLUS** PLUG & ABANDON ___ CLEAN OUT & REPLUG ___
 ESTIMATED DEPTH **TVD 6,201' TMD:15,379'**

WELL OPERATOR **TUG HILL OPERATING, LLC** DESIGNATED AGENT **DIANNA STAMPER CT CORPORATION SYSTEM**

ADDRESS **1320 SOUTH UNIVERSITY DRIVE, SUITE 500 FORT WORTH, TX 76107** ADDRESS **5400 D BIG TYLER ROAD CHARLESTON, WV 25313**

(BH) 11,230' (TH) 1,947'
 (BH) BOTTOM HOLE LONGITUDE: 80°47'30" (TH) TOP HOLE LONGITUDE: 80°50'00"
 (TH) 4,083'
 (BH) 12,193'

YODER LEASE WELL W-11M 251.33± ACRES



SLZ
Land & Energy Development
Solutions from the ground up
P.O. Box 107 • 12 Wadsworth Drive • Charleston, WV 25301 • (304) 883-8242
www.slzenergy.com

TOP HOLE LATITUDE: 39°47.30'
BOTTOM HOLE LATITUDE: 39°47.30'

(BH) BOLLOW HOLE COORDINATE: 80°20.00'
(HT) BOLLOW HOLE COORDINATE: 80°20.00'

AS-DRIILLED SURFACE HOLE
UTM. NAD83, ZONE 17
IN METERS
E1213, 697.22
N14, 403, 413.06

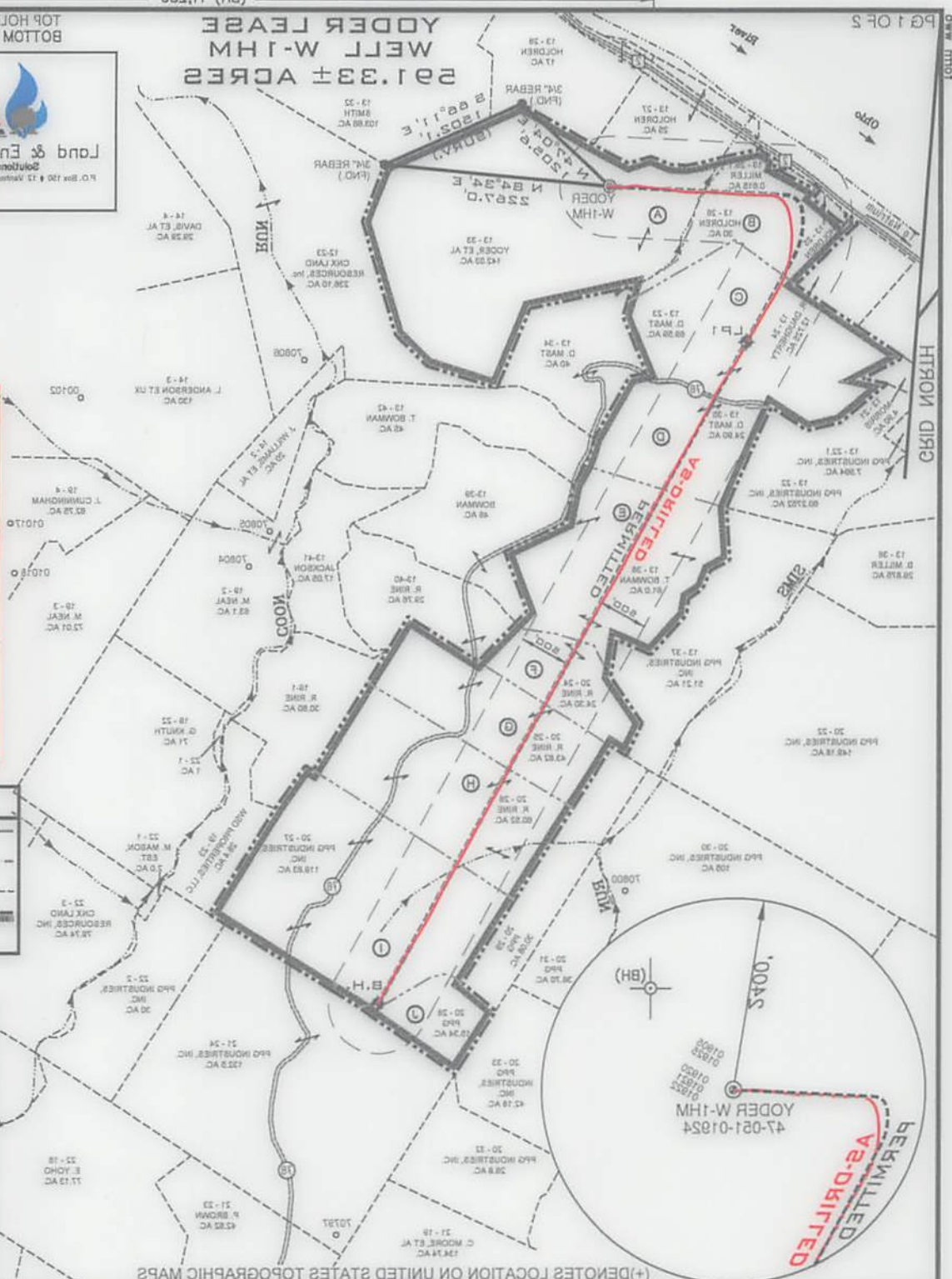
LANDING POINT 1
UTM. NAD83, ZONE 17
IN METERS
E1213, 287.22
N14, 402, 934.20

BOTTOM HOLE
UTM. NAD83, ZONE 17
IN METERS
E1214, 439.93
N14, 400, 941.42

LEGEND

LEASD TRACTS	---
INTERIOR MINERAL TRACTS	---
SURFACE TRACTS	---
HARD LEASE LINE	---
LEASE # (SEE PG 2)	(A)

- NOTES**
1. BORE PATH BASED ON GRID NORTH.
 2. NO WATER WELLS WITHIN 250' OF WELL WERE FOUND. NO DWELLINGS WITHIN 625' OF PAD CENTER WERE FOUND.
 3. OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN MARCH 2017.
 4. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
 5. WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.
 6. ROYALTY OWNERSHIP PROVIDED BY TUG HILL OPERATING, LLC.
 7. SURFACE OWNERSHIP WAS NOT ADDRESSED.
 8. PLAT UPDATED TO SHOW AS-DRIILLED PATH.



I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Gregory A. Smith
P.S. 677



FILE NUMBER	8836
DRAWING NUMBER	8836DW11M.dwg
SCALE	1" = 1800'
MINIMUM DEGREE OF ACCURACY	1/2500
PROVEN SOURCE OF ELEVATION	SUBMETER MAPPING
GRADE GPS	

WV DEP
OFFICE OF OIL & GAS
801 5TH STREET, SE
CHARLESTON, WV 25304

WELL OPERATOR TUG HILL OPERATING, LLC
Address 1320 SOUTH UNIVERSITY DRIVE, SUITE 500
FORT WORTH, TX 76107

DESIGNATED AGENT DIANNA STAMPER
CT CORPORATION SYSTEM
Address 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

TARGET FORMATION MARCELLUS
ESTIMATED DEPTH TVD @ 201', TMD: 15,379'
PLUG & ABANDON CLEAN OUT & REPLUG

PERMIT

REPERATE NEW FORMATION OTHER PHYSICAL CHANGE (SPECIFY)
PROPOSED WORK: DRILL X CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION
OIL & GAS ROYALTY OWNER SEE PAGE 2
LEASE ACRES 251.33
SURFACE OWNER NATHAN D. YODER, et al
ACRES 142.03

COUNTY NAME MARSHALL
QUADRANGLE POWHATAN POINT 7.5'
LEASE NUMBER SEE ATTACHED PG 2 OF 2
DISTRICT FRANKLIN
COUNTY MARSHALL
LOCATION ELEVATION 1084', WATERSHED (HUC 10) FRENCH CREEK - OHIO RIVER
STATE COUNTY PERMIT 47-051-01924

WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL
(IF GAS) PRODUCTION X STORAGE DEEP SHALLOW X
AP# WELL NO. 47-051-01924

OPERATORS WELL NO. YODER W-11M (AS-DRIILLED)
DATE: JULY 17, 2018

**YODER WELL W-1 HM
WELL PLAT LEASE INFORMATION**

Lease No.	TAG	Parcel	Oil & Gas Royalty Owner	Deed Book / Pg	
10*14702	A	5-13-33	NATHAN D. YODER	708	71
10*14701	A	5-13-33	ROSEITA THORNTON	885	600
10*14754	B	5-13-26	BERNARD KNOLLINGER	794	472
10*14763	B	5-13-26	BETTY J. MCKINLEY	815	240
10*14768	B	5-13-26	BONNIE DGINTO	844	77
10*14752	B	5-13-26	CHARLES BOWEN	792	648
10*14757	B	5-13-26	DOUGLAS W. KNOLLINGER	794	487
10*14771	B	5-13-26	ERIC W THORNGATE	846	464
10*14758	B	5-13-26	GARY R. KNOLLINGER	795	154
10*14759	B	5-13-26	GLORIA J. LUIKART BY MARK LUIK	804	245
10*14751	B	5-13-26	GRACE E. LUIKART	792	642
10*14772	B	5-13-26	GREG E THORNGATE	846	436
10*14749	B	5-13-26	JANICE E. FUTEY	792	116
10*14766	B	5-13-26	JANICE M. SANDERS	827	527
10*14769	B	5-13-26	JAYNE S KISSEL	844	79
10*14760	B	5-13-26	JEFFREY M. BROWN	809	535
10*14753	B	5-13-26	JERRY SMOYER	794	474
10*14755	B	5-13-26	JUDITH A. MCGRAIL	794	517
10*14773	B	5-13-26	JUSTIN J ANTHONY	846	438
10*14776	B	5-13-26	KAREN M SMOYER	876	457
10*14748	B	5-13-26	MARJORIE K. NIGHTENGALE	790	541
10*14764	B	5-13-26	MARY B. KNOLLINGER	821	40
10*14770	B	5-13-26	MARY M HALL	846	413
10*14750	B	5-13-26	MARY SUE ANTHONY	792	114
10*14549	B	5-13-26	REBECCA PAUKNER	829	603
10*14761	B	5-13-26	RONALD E CLARK	809	571
10*14765	B	5-13-26	RUTH A. KINNEY	821	42
10*14774	B	5-13-26	THOMAS R KNOLLINGER	846	406
10*14775	B	5-13-26	TODD HANNIG	849	522
10*14762	B	5-13-26	WILLIAM CARL KNOLLINGER	815	238
10*14767	B	5-13-26	WILLIAM J. SMOYER	829	332
10*14756	B	5-13-26	WOODROW J. KNOLLINGER	794	515
10*14700	C	5-13-23	DAVID J MAST AND MIRIAM A MAST	708	239
10*14701	C	5-13-23	ROSEITA THORNTON	885	600
10*14618	D	5-13-35	DAVID J MAST AND MIRIAM A MAST	707	645
10*14701	D	5-13-35	ROSEITA THORNTON	885	600
10*14526	E	5-13-38	THOMAS WILLIAM BOWMAN	761	432
10*14527	E	5-13-38	VICTORIA BOWMAN	761	434
10*14615	F	5-20-24	ROBERT E RINE	708	251
10*14685	G	5-20-25	ROBERT E RINE AND DONNA M RINE	708	253
10*14616	H	5-20-26	ROBERT E RINE AND DONNA M RINE	708	250
10*14325	I	5-20-27	ELIZABETH ANN STRAUSBAUGH	792	104
10*14326	I	5-20-27	JANET LEA BLANKENSHIP	792	580
10*14310	I	5-20-27	JEAN C. THOMAS	781	614
10*14308	I	5-20-27	MARY E. BASSETT	779	492
10*14300	I	5-20-27	PPG INDUSTRIES, INC.	725	123
10*14309	I	5-20-27	ROBERT B. THOMAS	779	484
10*14324	I	5-20-27	RUTH E. BASSETT MEADOWS	792	100
10*14307	I	5-20-27	SALLY CYNTHIA HOPKINS	777	572
10*14325	J	5-20-28	ELIZABETH ANN STRAUSBAUGH	792	104
10*14326	J	5-20-28	JANET LEA BLANKENSHIP	792	580
10*14310	J	5-20-28	JEAN C. THOMAS	781	614
10*14308	J	5-20-28	MARY E. BASSETT	779	492
10*14300	J	5-20-28	PPG INDUSTRIES, INC.	725	123
10*14309	J	5-20-28	ROBERT B. THOMAS	779	484
10*14324	J	5-20-28	RUTH E. BASSETT MEADOWS	792	100
10*14307	J	5-20-28	SALLY CYNTHIA HOPKINS	777	572

WELL OPERATOR TUG HILL OPERATING, LLC
 ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500
FORT WORTH, TX 76107

DESIGNATED AGENT DIANNA STAMPER
CT CORPORATION SYSTEM
 ADDRESS 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

ADDRESS FORT MORRIS, TX 76101
1350 SOUTH UNIVERSITY DRIVE, SUITE 200
MFG OPERATOR THE MFG OPERATING, LLC

ADDRESS CHARGESEION, WA 98113
2400 D BIG LAGER ROAD
DESIGNATED AGENT CI CORPORATION SYSTEM
DANINA STAMBER

10*14301	1	2-50-58	SALLY CLITHIA HOBKINS	111	215
10*14354	1	2-50-58	BETH E. BASSETT MEADOWS	105	100
10*14308	1	2-50-58	ROBERT B. THOMAS	110	484
10*14300	1	2-50-58	BPE INDUSTRIES, INC.	152	153
10*14308	1	2-50-58	MARY E. BASSETT	110	485
10*14310	1	2-50-58	JEAN C. THOMAS	181	814
10*14359	1	2-50-58	LAURET GEA BLANKENSHIP	105	280
10*14352	1	2-50-58	ELIZABETH ANN STRAUSSBAUGH	105	104
10*14301	1	2-50-51	SALLY CLITHIA HOBKINS	111	215
10*14354	1	2-50-51	BETH E. BASSETT MEADOWS	105	100
10*14308	1	2-50-51	ROBERT B. THOMAS	110	484
10*14300	1	2-50-51	BPE INDUSTRIES, INC.	152	153
10*14308	1	2-50-51	MARY E. BASSETT	110	485
10*14310	1	2-50-51	JEAN C. THOMAS	181	814
10*14359	1	2-50-51	LAURET GEA BLANKENSHIP	105	280
10*14352	1	2-50-51	ELIZABETH ANN STRAUSSBAUGH	105	104
10*14376	H	2-50-59	ROBERT E BINE AND DOINA M BINE	108	520
10*14382	C	2-50-52	ROBERT E BINE AND DOINA M BINE	108	523
10*14372	E	2-50-54	ROBERT E BINE	108	521
10*14251	E	2-13-38	VICTORIA BOWMAN	101	434
10*14259	E	2-13-38	THOMAS WILLIAM BOWMAN	101	435
10*14101	D	2-13-32	ROSITA THORNTON	882	000
10*14318	D	2-13-32	DAVID L MAST AND MIRIAM A MAST	101	442
10*14101	C	2-13-53	ROSITA THORNTON	882	000
10*14100	C	2-13-53	DAVID L MAST AND MIRIAM A MAST	108	530
10*14129	B	2-13-59	WOODROW L. KIOGPINCEB	104	212
10*14191	B	2-13-59	WILLIAM L. SIMOLEB	850	335
10*14195	B	2-13-59	WILLIAM CARL KIOGPINCEB	812	538
10*14112	B	2-13-59	TODD HANNIC	840	255
10*14114	B	2-13-59	THOMAS B KIOGPINCEB	840	400
10*14192	B	2-13-59	BETH A. KINNEY	851	45
10*14191	B	2-13-59	RONALD E CLARK	800	211
10*14240	B	2-13-59	REBECCA BAUKNER	850	003
10*14120	B	2-13-59	MARY SUE ANTHONY	105	114
10*14110	B	2-13-59	MARY M HALL	840	413
10*14194	B	2-13-59	MARY B. KIOGPINCEB	851	40
10*14148	B	2-13-59	MARJORIE K. NICHENSADE	100	241
10*14119	B	2-13-59	KAREN M SIMOLEB	810	421
10*14113	B	2-13-59	JUDITH A ANTHONY	840	438
10*14122	B	2-13-59	JUDITH A. MCEVAIG	104	211
10*14123	B	2-13-59	TERRY SIMOLEB	104	414
10*14100	B	2-13-59	TERRELL M. BROWN	800	232
10*14190	B	2-13-59	LAMIE S KISSEL	844	10
10*14199	B	2-13-59	LAURENCE M. SANDERS	851	251
10*14140	B	2-13-59	LAURENCE E. FULLEY	105	110
10*14115	B	2-13-59	ERES E THORNTON	840	430
10*14121	B	2-13-59	ERASE E. GUKART	105	045
10*14120	B	2-13-59	ERONIA L. GUKART BY MARK GUK	804	542
10*14128	B	2-13-59	DAVE B. KIOGPINCEB	102	124
10*14111	B	2-13-59	ERIC W THORNTON	840	444
10*14121	B	2-13-59	DOUGLAS W. KIOGPINCEB	104	481
10*14125	B	2-13-59	CHARGES WOMEN	105	048
10*14198	B	2-13-59	BOHNE DEINTO	844	11
10*14193	B	2-13-59	BETTY L. MCKINLEY	812	540
10*14124	B	2-13-59	BENJAMIN KIOGPINCEB	104	415
10*14101	A	2-13-33	ROSITA THORNTON	882	000
10*14101	A	2-13-33	MATHAN D. YODER	108	11
10*14101	DAT	1011	1011 011 011 011 011 011	000	000

WEIG PLAT LEASE INFORMATION
YODER WEIG W-1 HM