

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 - 01905 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-3HM
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 4,403,419.3 Easting 513,692.8
Landing Point of Curve Northing 4,403,247.1 Easting 513,619.1
Bottom Hole Northing 4,401,515.2 Easting 514,627.6

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 2/24/2017 Date drilling commenced 7/31/2017 Date drilling ceased 12/21/2017
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 - 589' ; Pittsburgh Coal - 679' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed
Jim Miller 10/23/18

Reviewed by: _____

API 47-051 - 01905 Farm name Nathan D. Yoder, et al Well number Yoder W-3HM

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/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	760	NEW	54.5#	N/A	YES
Coal	17 1/2	13 3/8	760	NEW	54.5#	N/A	YES
Intermediate 1	12 1/4	9 5/8	2621	NEW	36#	N/A	YES
Intermediate 2							
Intermediate 3							
Production	8 3/4	5 1/2	13,811	NEW	20#	N/A	YES
Tubing		2 7/8	6388	NEW	4.7#	N/A	YES
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	3388	14.5	1.17	3964	0	8
Tubing							

Drillers TD (ft) 13,830 Loggers TD (ft) _____
 Deepest formation penetrated Marcellus Plug back to (ft) n/a
 Plug back procedure n/a

Kick off depth (ft) 5353

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 _____

RECEIVED
Office of Oil and Gas

SEP 11 2018

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED _____
 WV Department of Environmental Protection

API 47- 051 - 01905 Farm name Nathan D. Yoder, et al Well number Yoder W-3HM

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
	see attached				

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	attached							

Please insert additional pages as applicable.

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

API 47- 051 - 01905 Farm name Nathan D. Yoder, et al Well number Yoder W-3HM

PRODUCING FORMATION(S)	DEPTHS	
<u>Marcellus</u>	<u>6,191' - 6,260'</u> TVD	<u>7,085' - 13,830'</u> MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 1365 psi Bottom Hole _____ psi DURATION OF TEST 24 hrs

OPEN FLOW Gas _____ Oil 96 bpd NGL _____ bpd Water 1320 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	<u>0</u>		<u>0</u>		
<u>see attached</u>					

Please insert additional pages as applicable.

Drilling Contractor Nabors Drilling USA
Address 505 West Greens Road, Suite 1000 City Houston State TX Zip 77067

Logging Company n/a
Address _____ City _____ State _____ Zip _____

Cementing Company C&J Well Services
Address 390 Southpointe Boulevard, Suite 210 City Canonsburg State PA Zip 15317

Stimulating Company Halliburton Energy Services, Inc.
Address 121 Champlon Way, Suite 200 City Canonsburg State PA Zip 15317

Please insert additional pages as applicable.

Completed by Sean Gasser Telephone 817-632-5200
Signature _____ Title Engineer Date _____

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

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

**Yoder W-3HM
Perforation Record**

Stage	Date Perforated	Bottom Perf (ft)	Top Perf (ft)	Number of Perfs	Formation
1	3/9/2018	13,714	13,665	2	Marcellus
2	3/31/2018	13,555	13,424	48	Marcellus
3	3/31/2018	13,380	13,249	48	Marcellus
4	4/3/2018	13,205	13,074	48	Marcellus
5	4/3/2018	13,030	12,899	48	Marcellus
6	4/4/2018	12,855	12,724	48	Marcellus
7	4/5/2018	12,680	12,549	48	Marcellus
8	4/5/2018	12,505	12,374	48	Marcellus
9	4/6/2018	12,330	12,199	48	Marcellus
10	4/6/2018	12,155	12,024	48	Marcellus
11	4/7/2018	11,980	11,849	48	Marcellus
12	4/8/2018	11,805	11,674	48	Marcellus
13	4/8/2018	11,630	11,499	48	Marcellus
14	4/9/2018	11,455	11,324	48	Marcellus
15	4/9/2018	11,280	11,149	48	Marcellus
16	4/10/2018	11,105	10,974	48	Marcellus
17	4/10/2018	10,930	10,799	48	Marcellus
18	4/11/2018	10,755	10,624	48	Marcellus
19	4/11/2018	10,580	10,449	48	Marcellus
20	4/12/2018	10,405	10,274	48	Marcellus
21	4/12/2018	10,230	10,099	48	Marcellus
22	4/13/2018	10,055	9,924	48	Marcellus
23	4/14/2018	9,880	9,749	48	Marcellus
24	4/14/2018	9,705	9,574	48	Marcellus
25	4/14/2018	9,530	9,399	48	Marcellus
26	4/14/2018	9,355	9,224	48	Marcellus
27	4/15/2018	9,180	9,049	48	Marcellus
28	4/15/2018	9,005	8,874	48	Marcellus
29	4/15/2018	8,830	8,699	48	Marcellus
30	4/16/2018	8,655	8,524	48	Marcellus
31	4/16/2018	8,480	8,349	48	Marcellus
32	4/16/2018	8,305	8,174	48	Marcellus
33	4/17/2018	8,130	7,999	48	Marcellus
34	4/17/2018	7,955	7,824	48	Marcellus
35	4/17/2018	7,780	7,649	48	Marcellus
36	4/18/2018	7,605	7,474	48	Marcellus
37	4/18/2018	7,430	7,299	48	Marcellus
38	4/18/2018	7,255	7,124	48	Marcellus
39	4/18/2018	7,080	6,949	48	Marcellus
40	4/19/2018	6,905	6,774	48	Marcellus
41	4/19/2018	6,730	6,599	48	Marcellus

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

**Yoder W-3HM
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	86.7	7,339	4,715	3,375	357,590	7,934	0
2	87.7	7,630	5,442	3,548	355,890	7,939	0
3	89.8	7,574	5,040	3,857	340,150	7,758	0
4	87.8	7,505	5,342	3,334	456,610	8,682	0
5	87	7,313	5,711	3,948	459,440	8,515	0
6	87.2	7,439	5,044	3,934	460,640	8,786	0
7	87.4	7,645	6,355	3,824	459,860	8,809	0
8	90.4	7,406	5,673	4,095	450,445	8,425	0
9	88.9	7,533	5,783	3,835	451,610	8,646	0
10	89.8	7,352	5,555	3,917	451,030	8,437	0
11	88.3	7,341	5,410	4,037	449,540	8,758	0
12	88.4	7,264	5,293	4,103	445,890	8,437	0
13	88.6	7,011	5,323	4,368	448,825	8,491	0
14	89.8	6,981	5,310	4,431	447,330	8,574	0
15	88.3	6,779	4,722	4,288	448,525	6,894	0
16	89.4	6,950	5,341	3,909	448,710	8,509	0
17	88.2	6,744	5,616	4,248	450,495	6,389	0
18	89.3	6,836	5,287	4,267	452,667	8,598	0
19	89.7	6,887	5,064	4,529	452,805	8,356	0
20	89.3	6,914	5,188	3,865	449,590	8,466	0
21	89.5	6,863	5,362	3,746	447,615	9,600	0
22	89.4	6,825	5,594	3,848	451,080	8,453	0
23	89.8	6,681	5,502	3,949	448,040	8,521	0
24	89.4	6,660	5,331	4,322	449,695	8,766	0
25	89.5	6,576	5,433	4,110	446,220	8,492	0
26	89.6	6,502	5,166	4,165	444,480	8,441	0
27	89.7	6,532	4,621	3,701	447,680	8,394	0
28	88.3	6,734	4,616	3,605	445,680	9,954	0
29	89.7	6,309	5,096	3,844	454,110	8,445	0
30	89.8	6,401	5,025	3,688	444,990	8,329	0
31	89	6,293	4,473	3,987	448,370	8,468	0
32	89.3	6,162	5,022	4,028	435,950	8,464	0
33	89.7	6,231	4,646	4,059	443,090	8,352	0
34	88.9	6,232	5,208	3,822	455,790	8,546	0
35	89.2	6,138	5,753	3,834	446,730	8,393	0
36	89.2	5,337	5,337	4,318	448,725	8,370	0
37	89.1	6,119	4,004	3,977	450,805	8,222	0

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

**Yoder W-3HM
Stimulation Summary**

38	89.2	6,144	5,579	3,978	442,080	8,224	0
39	89.5	6,106	5,521	3,881	447,920	8,306	0
40	89.3	6,245	5,410	4,394	446,880	9,079	0
41	89.3	5,937	6,127	3,924	456,540	8,427	0

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

Yoder W-3HM
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	1641	1713	Sandstone
Big Lime	1712	1821	1713	1823	Limestone
Big Injun	1821	2129	1823	2132	Sandstone
Weir	2129	2319	2132	2324	Sandstone
Berea	2319	2637	2324	2643	Sandstone
Gordon	2637	2739	2643	2746	Sandstone
Fifty Foot	2739	3312	2746	3337	Sandstone
Speechley	3312	4648	3337	4760	Sandstone
Benson	4648	5017	4760	5152	Sandstone
Alexander	5017	5642	5152	5797	Siltstone
Rhinestreet	5642	5991	5797	6214	Black shale
Middlesex	5991	6077	6214	6374	Black shale
Geneseo/Burkett	6077	6109	6374	6451	Black shale
Tully	6109	6131	6451	6512	Limestone
Hamilton	6131	6135	6512	6524	Grey shale
Marcellus	6135	-	6524	-	Black shale

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

Hydraulic Fracturing Fluid Product Component Information Disclosure

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

Job Start Date:	3/30/2018
Job End Date:	4/23/2018
State:	West Virginia
County:	Marshall
API Number:	47-051-01905-00-00
Operator Name:	Tug Hill Operating, LLC
Well Name and Number:	Yoder W3HM
Latitude:	39.78060534
Longitude:	-80.84009795
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,263
Total Base Water Volume (gal):	14,731,968
Total Base Non Water Volume:	0



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	86.81540	Density = 8.340
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.27719	

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			
SCALECHEK LP-50	Halliburton	Scale Inhibitor					
				Listed Below			
LD-2850	Multi-Chem	Friction Reducer					
				Listed Below			
WG-36 GELLING AGENT	Halliburton	Gelling Agent					
				Listed Below			
HAI-OS ACID INHIBITOR	Halliburton	Corrosion Inhibitor					
				Listed Below			
MC B-8614	Halliburton	Biocide					
				Listed Below			

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

OILPERM A	Halliburton	Non-ionic Surfactant					
				Listed Below			
HYDROCHLORIC ACID	Halliburton	Solvent					
				Listed Below			
SAND-PREMIUM WHITE-30/50, BULK	Halliburton	Proppant					
				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	12.81774	
			Hydrochloric acid	7647-01-0	15.00000	0.03637	
			Sodium chloride	7647-14-5	30.00000	0.01738	
			Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.01738	
			Guar gum	9000-30-0	100.00000	0.01638	
			Glutaraldehyde	111-30-8	30.00000	0.00784	
			Methanol	67-56-1	60.00000	0.00706	
			Phosphate of a Diamine, Sodium Salt	Proprietary	30.00000	0.00649	
			9-Octadecenamamide,n,n-bis-2(hydroxyethyl)-,(Z)	93-83-4	5.00000	0.00290	
			Alcohols, C12-16, ethoxylated	68551-12-2	5.00000	0.00290	
			Ammonium chloride	12125-02-9	5.00000	0.00290	
			Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1	5.00000	0.00131	
			Ethanol	64-17-5	60.00000	0.00080	
			Sodium persulfate	7775-27-1	100.00000	0.00050	

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

			Oxyalkylated phenolic resin	Proprietary	30.00000	0.00036	
			Heavy aromatic petroleum naphtha	64742-94-5	30.00000	0.00027	
			Fatty acids, tall oil	Proprietary	30.00000	0.00026	
			Modified thiourea polymer	Proprietary	30.00000	0.00026	
			Ethoxylated alcohols	Proprietary	30.00000	0.00026	Denise Tuck, Halliburton, 3000 N. Sam Houston Pkwy E., Houston, TX 77032, 281-871-6226
			Olefins	Proprietary	5.00000	0.00011	
			Propargyl alcohol	107-19-7	10.00000	0.00009	
			Naphthalene	91-20-3	5.00000	0.00004	
			Poly(oxy-1,2-ethanediyl), alpha-(4-nonylphenyl)- omega-hydroxy-, branched	127087-87-0	5.00000	0.00004	
			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

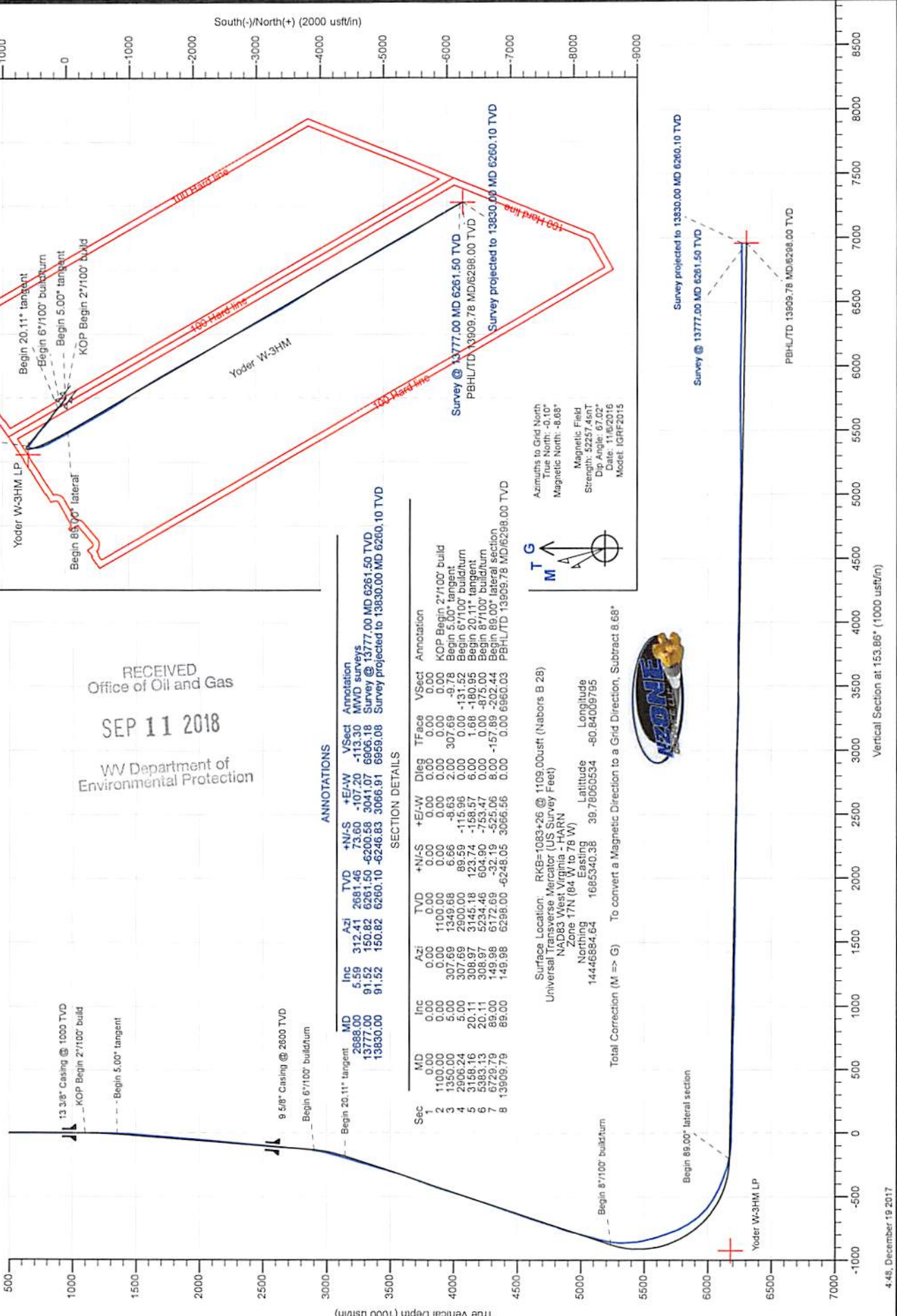
SEP 11 2018

WV Department of
Environmental Protection



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

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



ANNOTATIONS

Inc	MD	Azi	+N/S	+E/W	VSec	Annotation
5.59	312.41	2681.46	73.60	-107.20	-113.30	MWD surveys
91.52	150.82	6261.50	-6200.58	3041.07	6906.18	Survey @ 13777.00 MD 6261.50 TVD
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	+N/S	+E/W	Dleg	TFace	VSec	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1100.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2'7100' build
3	1350.00	5.00	0.00	0.00	2.00	307.69	-9.78	Begin 5.00' tangent
4	2906.24	5.00	307.69	1349.68	6.66	-8.63	2.00	Begin 6'7100' buildturn
5	3189.16	20.11	308.97	3145.18	123.74	-115.96	0.00	Begin 20.11' tangent
6	5363.13	20.11	308.97	5234.46	694.90	-158.57	6.00	Begin 8'7100' buildturn
7	5729.79	89.00	149.98	6172.69	-32.19	-525.66	8.00	Begin 89.00' lateral section
8	13909.79	89.00	149.98	6260.05	3066.56	0.00	0.00	PBHLTD 13909.78 MD 6266.00 TVD



SEP 11 2018



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	-28.98
300.00	0.27	30.06	299.99	1.04	1.35	-0.34	0.08	-0.07	-7.83	-7.83
400.00	0.05	160.69	399.99	1.21	1.48	-0.43	0.30	-0.22	130.63	130.63
500.00	0.06	317.61	499.99	1.20	1.46	-0.44	0.11	0.01	156.92	156.92
600.00	0.11	18.75	599.99	1.33	1.46	-0.55	0.10	0.05	61.14	61.14
700.00	0.04	142.78	699.99	1.40	1.51	-0.59	0.14	-0.07	124.03	124.03
800.00	0.05	253.07	799.99	1.35	1.49	-0.56	0.07	0.01	110.29	110.29
900.00	0.05	216.03	899.99	1.31	1.42	-0.55	0.03	0.00	-37.04	-37.04

SEP 11 2018

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

SEP 11 2018



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)	
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	

SEP 11 2018



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

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection

SEP 11 2018



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	



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

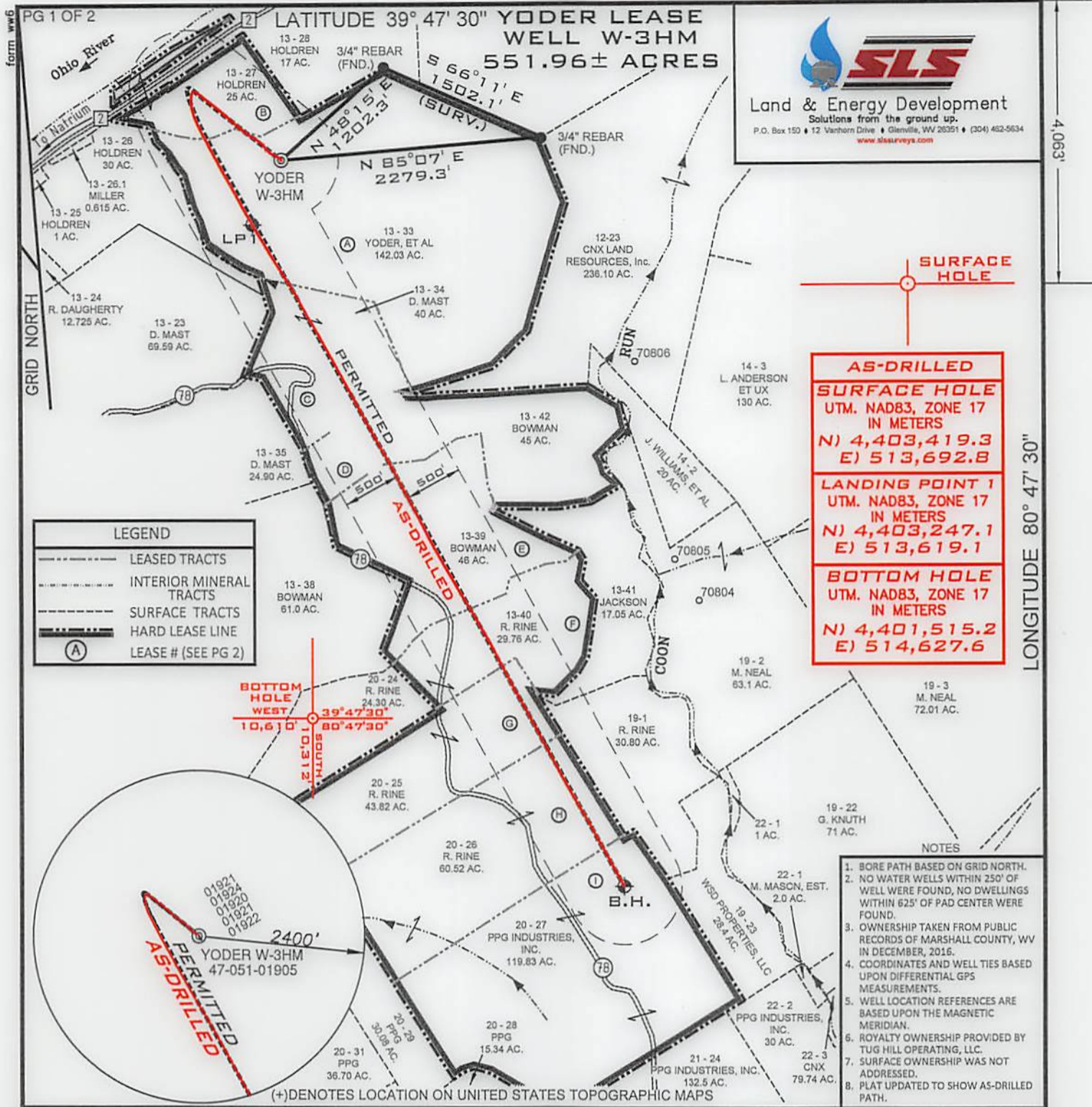
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,224.00	88.70	149.24	6,245.79	-3,989.25	1,766.59	14,442,895.40	1,687,106.97	39.76964089	-80.83383629
11,318.00	89.32	149.59	6,247.41	-4,070.16	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									

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

RECEIVED
Office of Oil and Gas

SEP 11 2018

WV Department of
Environmental Protection



1,962'

4,093'

LONGITUDE 80° 47' 30"

SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26031 • (304) 462-5634
www.slsurveys.com

SURFACE HOLE

AS-DRILLED

SURFACE HOLE
UTM. NAD83, ZONE 17
IN METERS
N) 4,403,419.3
E) 513,692.8

LANDING POINT 1
UTM. NAD83, ZONE 17
IN METERS
N) 4,403,247.1
E) 513,619.1

BOTTOM HOLE
UTM. NAD83, ZONE 17
IN METERS
N) 4,401,515.2
E) 514,627.6

LEGEND

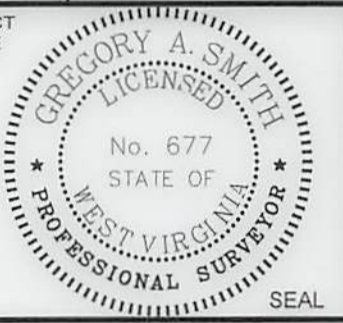
---	LEASED TRACTS
---	INTERIOR MINERAL TRACTS
---	SURFACE TRACTS
---	HARD LEASE LINE
(A)	LEASE # (SEE PG 2)

- NOTES**
- BORE PATH BASED ON GRID NORTH.
 - NO WATER WELLS WITHIN 250' OF WELL WERE FOUND, NO DWELLINGS WITHIN 625' OF PAD CENTER WERE FOUND.
 - OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN DECEMBER, 2016.
 - COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
 - WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.
 - ROYALTY OWNERSHIP PROVIDED BY TUG HILL OPERATING, LLC.
 - SURFACE OWNERSHIP WAS NOT ADDRESSED.
 - PLAT UPDATED TO SHOW AS-DRILLED PATH.

FILE NUMBER	8836
DRAWING NUMBER	8836ADW3HM.dwg
SCALE	1" = 1200'
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-3HM (AS-DRILLED)
 API WELL NO. 47-051-01905
 STATE COUNTY PERMIT

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 NATHAN D. YODER, et al - SEE PAGE 2 LEASE ACREAGE 551.96
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE (SPECIFY) _____

TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD 6,260' TMD:13,830'
 WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 ADDRESS 5400 D BIG TYLER ROAD
FORT WORTH, TX 76107 CHARLESTON, WV 25313

COUNTY NAME PERMIT



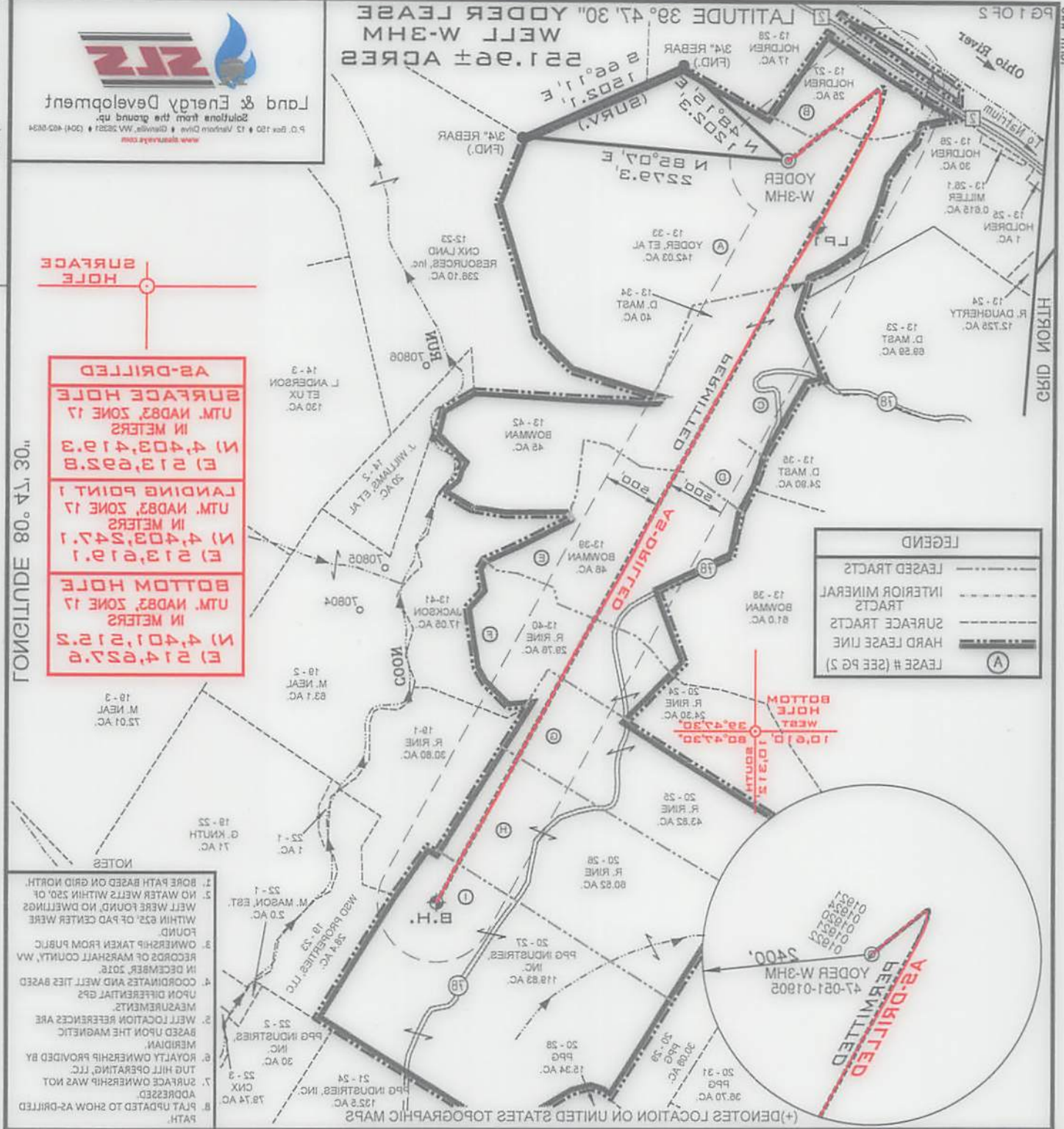
Land & Energy Development
Solutions from the ground up.
P.O. Box 122 • 13 Virginia Drive • Glenville, WV 26031 • (304) 463-8834
www.zlzenergy.com

SURFACE HOLE

AS-DRIILLED
SURFACE HOLE
UTM. NAD83, ZONE 17
IN METERS
(N) 4,403,419.3
(E) 213,927.8
LANDING POINT 1
UTM. NAD83, ZONE 17
IN METERS
(N) 4,403,247.1
(E) 213,919.1
BOTTOM HOLE
UTM. NAD83, ZONE 17
IN METERS
(N) 4,401,212.2
(E) 214,927.6

LONGITUDE 80° 47' 30"

251.96± ACRES
WELL W-3HM
LATITUDE 39° 47' 30" YODER LEASE



LEGEND

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

- 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 DECEMBER, 2018.
 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. PLOT UPDATED TO SHOW AS-DRIILLED PATH.



I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAN 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



FILE NUMBER	8836
DRAWING NUMBER	8836ADW3HM.qdw
SCALE	1" = 1200'
MINIMUM DEGREE OF ACCURACY	1/2500
PROVEN SOURCE OF ELEVATION	SUBMETER MAPPING
GRADE GPS	

DATE: JULY 17, 2018

OPERATORS WELL NO. YODER W-3HM (AS-DRIILLED)

API WELL NO. 47-051-01905

STATE COUNTY PERMIT

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

COUNTY NAME

PERMIT

TARGET FORMATION MARCELLUS

WELL OPERATOR TUG HILL OPERATING, LLC

DESIGNATED AGENT DIANNA STAMPER

CT CORPORATION SYSTEM

ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 FORT WORTH, TX 76102

ADDRESS 5400 D BIG TYLER ROAD CHARLESTON, WV 25313

ESTIMATED DEPTH TVD 6,260', TMD: 13,830'

PLUG & ABANDON CLEAN OUT & REPLUG

PROPOSED WORK: DRILL, CONVERT, DRILL DEEPER, REDRILL, FRACTURE OR STIMULATE, PLUG OFF OLD FORMATION

OIL & GAS ROYALTY OWNER NATHAN D. YODER, et al - SEE PAGE 2

SURFACE OWNER NATHAN D. YODER, et al

ACREAGE 142.03

SEE ATTACHED PG 2 OF 2

DISTRICT FRANKLIN COUNTY MARSHALL

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

(IF "GAS") PRODUCTION STORAGE DEEP SHALLOW

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL

OFFICE OF OIL & GAS 601 87TH STREET, SE CHARLESTON, WV 25304

WVDEP

YODER W-3HM
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*14506	B	5-13-27	JACK L MASON	754	240
10*14617	C	5-13-34	DAVID J MAST AND MIRIAM A MAST	716	628
10*14526	D	5-13-42	THOMAS WILLIAM BOWMAN	761	432
10*14527	D	5-13-42	VICTORIA BOWMAN	761	434
10*14526	E	5-13-39	THOMAS WILLIAM BOWMAN	761	432
10*14527	E	5-13-39	VICTORIA BOWMAN	761	434
10*14502	F	5-13-40	ROBERT E RINE AND DONNA M RINE	752	206
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

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 1001 NORTH IX' 18101
 1350 SOUTH UNIVERSITY DRIVE, SUITE 200
 MILE OPERATOR TUC HIGH OPERATING, LLC

ADDRESS CHATELAIN WAY 52113
 2400 D BIG LAGER ROAD
 DESIGNATED AGENT CI CORPORATION SYSTEM
 DIANNA STAMPER

10*14301	I	2-50-51	SALLY SMITHA HOBKINS	111	215
10*14354	I	2-50-51	BUTH E. BASSETT MEADOWS	185	100
10*14308	I	2-50-51	ROBERT B. THOMAS	118	484
10*14300	I	2-50-51	PPE INDUSTRIES, INC.	152	153
10*14308	I	2-50-51	MARY E. BASSETT	118	485
10*14310	I	2-50-51	LEAH C. THOMAS	181	814
10*14358	I	2-50-51	LANEY LEA BLANKENSHIP	185	280
10*14352	I	2-50-51	ELIZABETH ANN STRAUSSBAUGH	185	104
10*14418	H	2-50-52	ROBERT E BINE AND DOINA M BINE	108	520
10*14482	C	2-50-52	ROBERT E BINE AND DOINA M BINE	108	523
10*14205	E	2-13-40	ROBERT E BINE AND DOINA M BINE	125	508
10*14251	E	2-13-38	VICTORIA BOWMAN	181	434
10*14258	E	2-13-38	THOMAS WIGGAM BOWMAN	181	435
10*14251	D	2-13-45	VICTORIA BOWMAN	181	434
10*14258	D	2-13-45	THOMAS WIGGAM BOWMAN	181	435
10*14211	C	2-13-34	DAVID L MAST AND MIRIAM A MAST	118	858
10*14208	B	2-13-51	JACK L MASON	124	540
10*14101	A	2-13-33	ROSEITA THORNTON	882	800
10*14105	A	2-13-33	MATHAN D. YODER	108	11
10*14206	I	1981	Oil & Gas Royalty Owner	Deed Book \ pg	