

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

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WV Department of
Environmental Protection

API 47-051-01925 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-2HM
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 4,403,416.15 Easting 513,695.00
Landing Point of Curve Northing 4,403,279.26 Easting 513,348.23
Bottom Hole Northing 4,401,249.26 Easting 514,522.08

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 8/3/2017 Date drilling ceased 12/8/2017
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 Coa - 589'; Pittsburgh Coal - 649' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed
Jan Nicholas 10/23/18

Reviewed by: _____

API 47-051 - 01925 Farm name Nathan D. Yoder, et al Well number Yoder W-2HM

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	751	NEW	54.5#	N/A	YES
Coal	17 1/2	13 3/8	751	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	14,630	NEW	20#	N/A	YES
Tubing		2 3/4	6453	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	920	15.6	1.19	1095	0	8
Intermediate 2							
Intermediate 3							
Production	A	4017	14.5	1.17	4700	0	8
Tubing							

Drillers TD (ft) 14,660 Loggers TD (ft) _____
 Deepest formation penetrated Marcellus Plug back to (ft) n/a
 Plug back procedure n/a

Kick off depth (ft) 5700

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 _____ RECEIVED Office of Oil and Gas

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____ SEP 11 2018

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

API 47- 051 - 01925 Farm name Nathan D. Yoder, et al Well number Yoder W-2HM

PRODUCING FORMATION(S)	DEPTHS	
<u>Marcellus</u>	<u>6,171' - 6,245'</u> TVD	<u>6,831' - 14,660'</u> MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 1400 psi Bottom Hole _____ psi DURATION OF TEST 24 hrs

OPEN FLOW Gas 1728 mcfpd Oil 288 bpd NGL _____ bpd Water 1824 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
	<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 380 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

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**Yoder W-2HM
Perforation Record**

Stage	Date Perforated	Bottom Perf (ft)	Top Perf (ft)	Number of Perfs	Formation
1	3/31/2018	14,533	14,484	2	Marcellus
2	3/31/2018	14,345	14,214	48	Marcellus
3	3/31/2018	14,170	14,039	48	Marcellus
4	3/31/2018	13,995	13,864	48	Marcellus
5	4/1/2018	13,820	13,689	48	Marcellus
6	4/1/2018	13,645	13,514	48	Marcellus
7	4/2/2018	13,470	13,339	48	Marcellus
8	4/2/2018	13,295	13,164	48	Marcellus
9	4/2/2018	13,120	12,989	48	Marcellus
10	4/3/2018	12,945	12,814	48	Marcellus
11	4/4/2018	12,770	12,639	48	Marcellus
12	4/4/2018	12,595	12,464	48	Marcellus
13	4/5/2018	12,420	12,289	48	Marcellus
14	4/6/2018	12,245	12,114	48	Marcellus
15	4/6/2018	12,070	11,939	48	Marcellus
16	4/7/2018	11,895	11,764	48	Marcellus
17	4/7/2018	11,720	11,589	48	Marcellus
18	4/8/2018	11,545	11,414	48	Marcellus
19	4/8/2018	11,370	11,239	48	Marcellus
20	4/9/2018	11,195	11,064	48	Marcellus
21	4/10/2018	11,020	10,889	48	Marcellus
22	4/10/2018	10,845	10,714	48	Marcellus
23	4/10/2018	10,670	10,539	48	Marcellus
24	4/10/2018	10,495	10,364	48	Marcellus
25	4/12/2018	10,320	10,189	48	Marcellus
26	4/12/2018	10,145	10,014	48	Marcellus
27	4/13/2018	9,970	9,839	48	Marcellus
28	4/13/2018	9,795	9,664	48	Marcellus
29	4/14/2018	9,620	9,489	48	Marcellus
30	4/14/2018	9,445	9,314	48	Marcellus
31	4/14/2018	9,270	9,139	48	Marcellus
32	4/15/2018	9,095	8,964	48	Marcellus
33	4/15/2018	8,920	8,789	48	Marcellus
34	4/15/2018	8,745	8,614	48	Marcellus
35	4/16/2018	8,570	8,439	48	Marcellus
36	4/16/2018	8,395	8,264	48	Marcellus
37	4/16/2018	8,220	8,089	48	Marcellus
38	4/16/2018	8,045	7,914	48	Marcellus
39	4/17/2018	7,870	7,739	48	Marcellus
40	4/17/2018	7,695	7,564	48	Marcellus
41	4/18/2018	7,520	7,389	48	Marcellus
42	4/18/2018	7,345	7,214	48	Marcellus
43	4/18/2018	7,170	7,039	48	Marcellus
44	4/19/2018	6,995	6,864	48	Marcellus
45	4/19/2018	6,820	6,689	48	Marcellus

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WMD Division

**Yoder W-2HM
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	89.4	7,596	4,450	3,825	343,830	6,398	0
2	88.9	7,513	5,644	3,841	329,250	6,248	0
3	87.4	7,780	5,975	2,408	336,340	6,355	0
4	88.5	7,454	5,870	3,719	456,500	7,564	0
5	88.6	7,441	5,721	4,083	456,270	7,611	0
6	88.3	7,505	5,486	4,367	457,190	7,634	0
7	88.6	7,540	5,480	3,699	450,650	7,537	0
8	89.1	7,520	5,676	3,795	456,720	7,690	0
9	88.1	7,565	5,079	4,406	451,550	7,522	0
10	88.8	7,410	5,526	3,874	456,340	7,564	0
11	88.2	7,614	5,604	4,363	453,220	7,529	0
12	88.4	7,575	5,264	4,000	452,285	7,570	0
13	89.8	7,577	5,645	4,283	449,525	7,355	0
14	89.8	7,436	5,586	4,492	451,070	7,365	0
15	88.5	7,334	5,622	4,167	449,630	7,480	0
16	89.3	7,329	5,797	4,139	449,720	7,406	0
17	89.2	7,349	6,371	4,153	446,730	7,485	0
18	89.9	6,966	5,785	3,902	453,945	6,752	0
19	89.2	6,992	5,637	4,645	446,510	7,464	0
20	89.7	7,145	5,746	4,416	449,105	5,936	0
21	89.2	6,988	5,583	4,308	450,970	7,518	0
22	88.9	6,851	5,170	4,625	451,955	5,789	0
23	89.5	7,014	5,388	4,236	450,527	7,319	0
24	89.2	6,975	5,357	4,285	450,865	7,382	0
25	89.5	6,971	5,595	4,320	444,630	7,218	0
26	80.3	7,139	5,688	4,085	447,215	7,894	0
27	89.7	6,773	4,967	4,130	444,220	7,431	0
28	89.6	6,731	5,132	4,061	444,135	7,336	0
29	89.3	6,619	5,364	4,135	449,290	7,378	0
30	89.1	6,506	5,363	3,927	445,520	7,282	0
31	89.7	6,460	4,945	3,971	446,380	7,368	0
32	89.6	6,634	5,382	3,896	447,840	7,382	0
33	89.1	6,523	5,057	3,945	444,765	7,165	0
34	89.8	6,347	5,353	3,696	443,265	7,267	0
35	89.8	6,497	5,629	4,090	443,360	7,143	0
36	88.6	6,518	5,279	4,218	444,770	7,331	0
37	89.8	6,406	5,239	3,859	447,670	7,213	0

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**Yoder W-2HM
Stimulation Summary**

38	89.7	6,258	5,059	3,721	446,430	7,117	0
39	89.5	6,291	6,351	3,878	436,645	7,720	0
40	89.6	6,604	5,525	4,200	445,285	7,266	0
41	89.6	6,186	5,020	3,879	442,285	7,220	0
42	89.4	6,255	5,142	3,842	446,045	7,293	0
43	89.5	6,349	5,528	4,212	441,900	7,098	0
44	89.7	6,244	5,984	4,459	447,300	7,228	0
45	89.5	6,081	5,905	4,581	448,940	7,377	0

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YoderW-2HM
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	1714	Sandstone
Big Lime	1712	1821	1714	1823	Limestone
Big Injun	1821	2129	1823	2132	Sandstone
Weir	2129	2319	2132	2322	Sandstone
Berea	2319	2637	2322	2641	Sandstone
Gordon	2637	2739	2641	2744	Sandstone
Fifty Foot	2739	3312	2744	3345	Sandstone
Speechley	3312	4648	3345	4829	Sandstone
Benson	4648	5017	4829	5236	Sandstone
Alexander	5017	5630	5236	5907	Siltstone
Rhinestreet	5630	5981	5907	6291	Black shale
Middlesex	5981	6077	6291	6448	Black shale
Geneseo/Burkett	6077	6095	6448	6484	Black shale
Tully	6095	6114	6484	6535	Limestone
Hamilton	6114	6118	6535	6547	Grey shale
Marcellus	6118	-	6547	-	Black shale

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	3/30/2018
Job End Date:	4/22/2018
State:	West Virginia
County:	Marshall
API Number:	47-051-01925-00-00
Operator Name:	Tug Hill Operating, LLC
Well Name and Number:	Yoder W2HM
Latitude:	39.78057743
Longitude:	-80.84007205
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,161
Total Base Water Volume (gal):	14,054,502
Total Base Non Water Volume:	0



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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	5.57340	Density = 8.340
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.04300	

MC B-8614	Halliburton	Biocide					
				Listed Below			
LD-2850	Multi-Chem Group LLC	Friction Reducer					
				Listed Below			
HYDROCHLORIC ACID	Halliburton	Solvent					
				Listed Below			
SAND-COMMON WHITE-100 MESH, SSA-2, BULK (100003676)	Halliburton	Proppant					
				Listed Below			
WG-36 GELLING AGENT	Halliburton	Gelling Agent					
				Listed Below			
SP BREAKER	Halliburton	Breaker					
				Listed Below			
SAND-PREMIUM WHITE-40/70, BULK	Halliburton	Proppant					
				Listed Below			
SAND-PREMIUM WHITE-30/50, BULK	Halliburton	Proppant					

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				Listed Below			
OILPERM A	Halliburton	Non-ionic Surfactant					
				Listed Below			
MC MX 2-2822	Halliburton	Scale Inhibitor					
				Listed Below			
HAI-OS ACID INHIBITOR	Halliburton	Corrosion Inhibitor					
				Listed Below			

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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	94.37782
			Hydrochloric acid	7647-01-0	15.00000	0.00608
			Guar gum	9000-30-0	100.00000	0.00138
			Sodium Chloride	7647-14-5	30.00000	0.00110
			Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.00110
			Glutaraldehyde	111-30-8	30.00000	0.00050
			Methanol	67-56-1	60.00000	0.00045
			Phosphonate of a Diamine, Sodium Salt	Proprietary	30.00000	0.00041
			Alcohols, C12-16, ethoxylated	68551-12-2	5.00000	0.00018
			9-Octadecenamamide, n, n-bis-2(hydroxy-ethyl)-, (Z)	93-83-4	5.00000	0.00018
			Ammonium Chloride	12125-02-9	5.00000	0.00018
			Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1	5.00000	0.00008
			Sodium chloride	7647-14-5	5.00000	0.00007
			Ethanol	64-17-5	60.00000	0.00006

			Sodium persulfate	7775-27-1	100.00000	0.00004	
			Oxyalkylated phenolic resin	Proprietary	30.00000	0.00003	
			Heavy aromatic petroleum naphtha	64742-94-5	30.00000	0.00002	
			Reaction product of acetophenone, formaldehyde, thiourea and oleic acid in dimethyl formamide	68527-49-1	30.00000	0.00002	
			Fatty acids, tall oil	Proprietary	30.00000	0.00002	
			Ethoxylated alcohols	Proprietary	30.00000	0.00002	Denise Tuck, Halliburton, 3000 N. Sam Houston Pkwy E., Houston, TX 77032, 281-871-6226
			Olefins	Proprietary	5.00000	0.00001	
			Propargyl alcohol	107-19-7	10.00000	0.00001	
			Poly(oxy-1,2-ethanediyl), alpha-(4-nonylphenyl)-omega-hydroxy-, branched	127087-87-0	5.00000	0.00000	
			Naphthalene	91-20-3	5.00000	0.00000	
			Phosphoric acid	7664-38-2	0.10000	0.00000	
			Formaldehyde	50-00-0	0.09000	0.00000	
			1,2,4 Trimethylbenzene	95-63-6	1.00000	0.00000	
			Sodium sulfate	7757-82-6	0.10000	0.00000	

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* 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)



TUG HILL
OPERATING

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

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

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



SECTION DETAILS

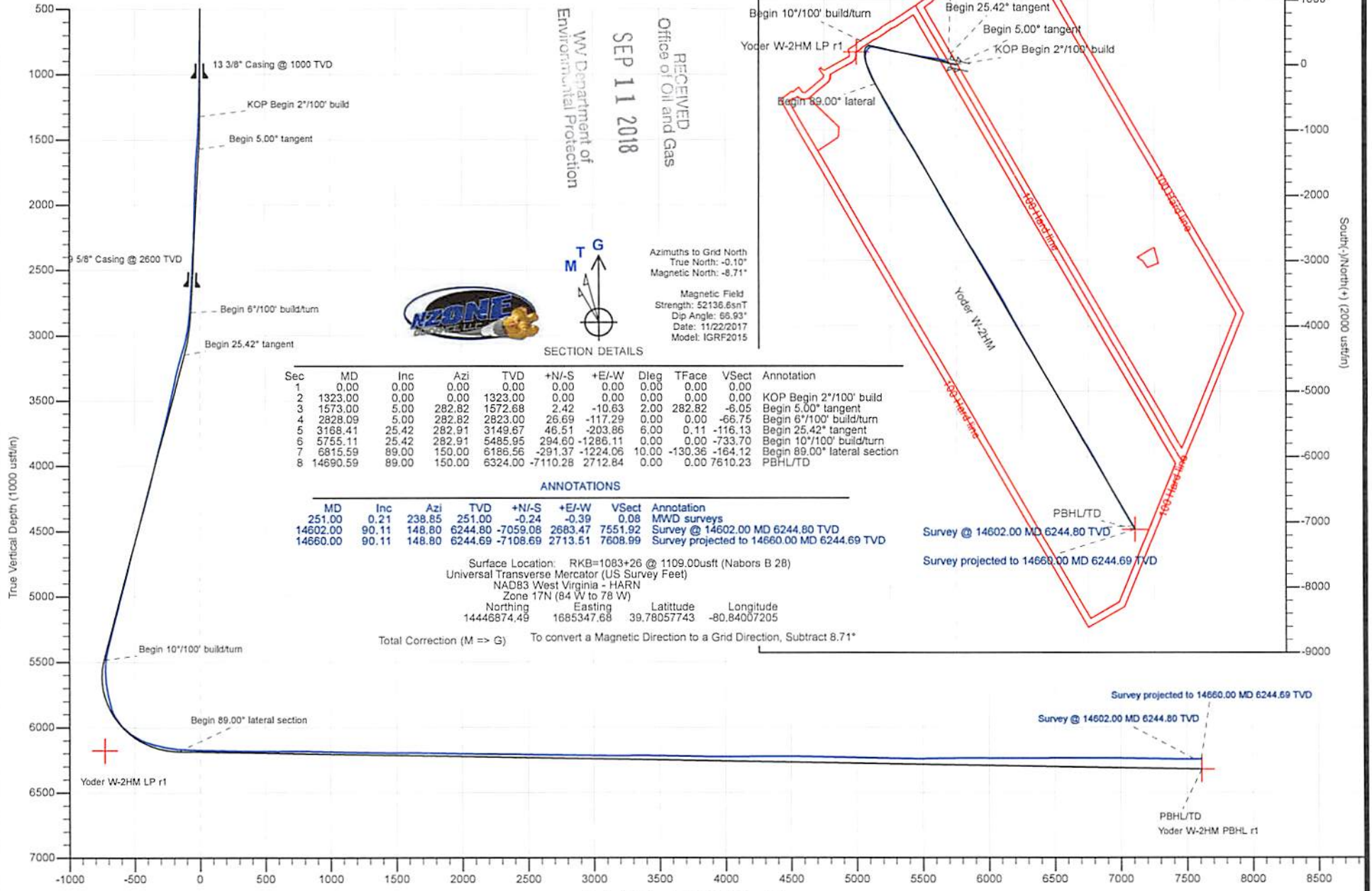
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1323.00	0.00	0.00	1323.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2'100' build
3	1573.00	5.00	282.82	1572.88	2.42	-10.63	2.00	282.82	-6.05	Begin 5.00° tangent
4	2828.09	5.00	282.82	2823.00	26.69	-117.29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

ANNOTATIONS

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

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

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



Vertical Section at 159.12' (1000 usft/in)

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Survey Report

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

Project	Wetzel County, West Virginia (UTM17 NAD83)		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD83 West Virginia - HARN		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	Yoder				
Site Position:		Northing:	14,446,864.35 usft	Latitude:	39.78054955
From:	Lat/Long	Easting:	1,685,354.97 usft	Longitude:	-80.84004615
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.10 °

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

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

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

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

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

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Survey Report

WV Department of
Environmental Protection



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

Survey

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

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Survey Report

WV Department of
Environmental Protection

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

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

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Survey Report

WV Department of
Environmental Protection

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

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



Survey Report



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

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

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

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Survey Report - Geographic

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WV Department of
Environmental Protection

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

Project	Wetzel County, West Virginia (UTM17 NAD83)		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD83 West Virginia - HARN		
Map Zone:	Zone 17N (84 W to 78 W)		

Site		Yoder			
Site Position:		Northing:	14,446,864.35 usft	Latitude:	39.78054955
From:	Lat/Long	Easting:	1,685,354.97 usft	Longitude:	-80.84004615
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.10 °

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

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

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

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

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

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Survey Report - Geographic

WV Department of
Environmental Protection

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

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

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Survey Report - Geographic

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

Survey

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



Survey Report - Geographic



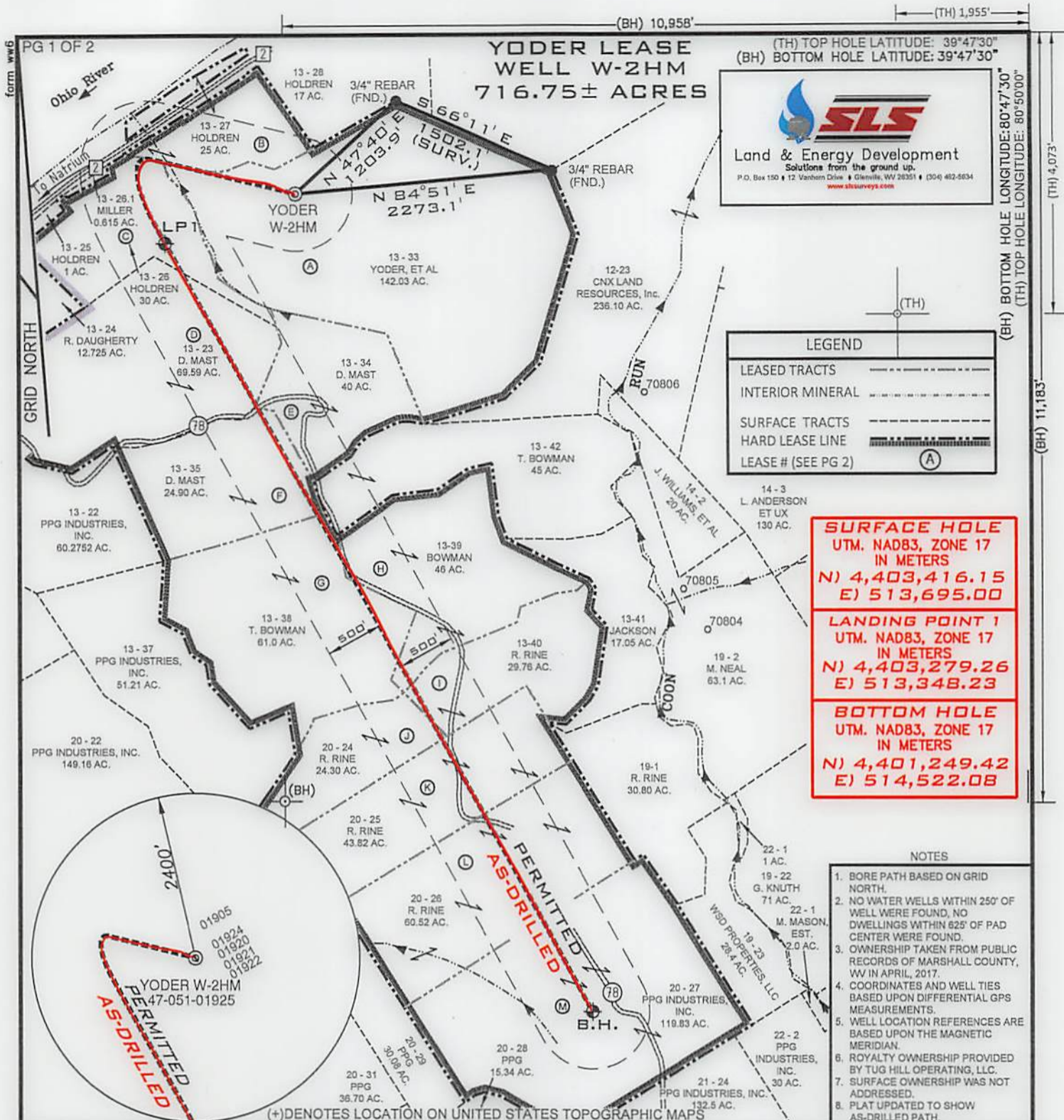
Company:	Tug Hill Operating LLC	Local Co-ordinate Reference:	Well Yoder W-2HM
Project:	Wetzel County, West Virginia (UTM17 NAD83)	TVD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Site:	Yoder	MD Reference:	RKB=1083+26 @ 1109.00usft (Nabors B 28)
Well:	Yoder W-2HM	North Reference:	Grid
Wellbore: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

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

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

RECEIVED
Office of Oil and Gas

SEP 11 2018



(TH) TOP HOLE LATITUDE: 39°47'30"
 (BH) BOTTOM HOLE LATITUDE: 39°47'30"

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 www.slsurveys.com

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

SURFACE HOLE
 UTM, NAD83, ZONE 17
 IN METERS
 N) 4,403,416.15
 E) 513,695.00

LANDING POINT 1
 UTM, NAD83, ZONE 17
 IN METERS
 N) 4,403,279.26
 E) 513,348.23

BOTTOM HOLE
 UTM, NAD83, ZONE 17
 IN METERS
 N) 4,401,249.42
 E) 514,522.08

- 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 APRIL, 2017.
 - 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 **8836ADW2HM.dwg**

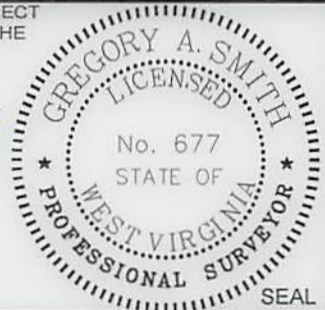
SCALE **1" = 1200'**

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-2HM (AS-DRILLED)**

API WELL NO. **47-051-01925**

STATE COUNTY PERMIT

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

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 **716.75**

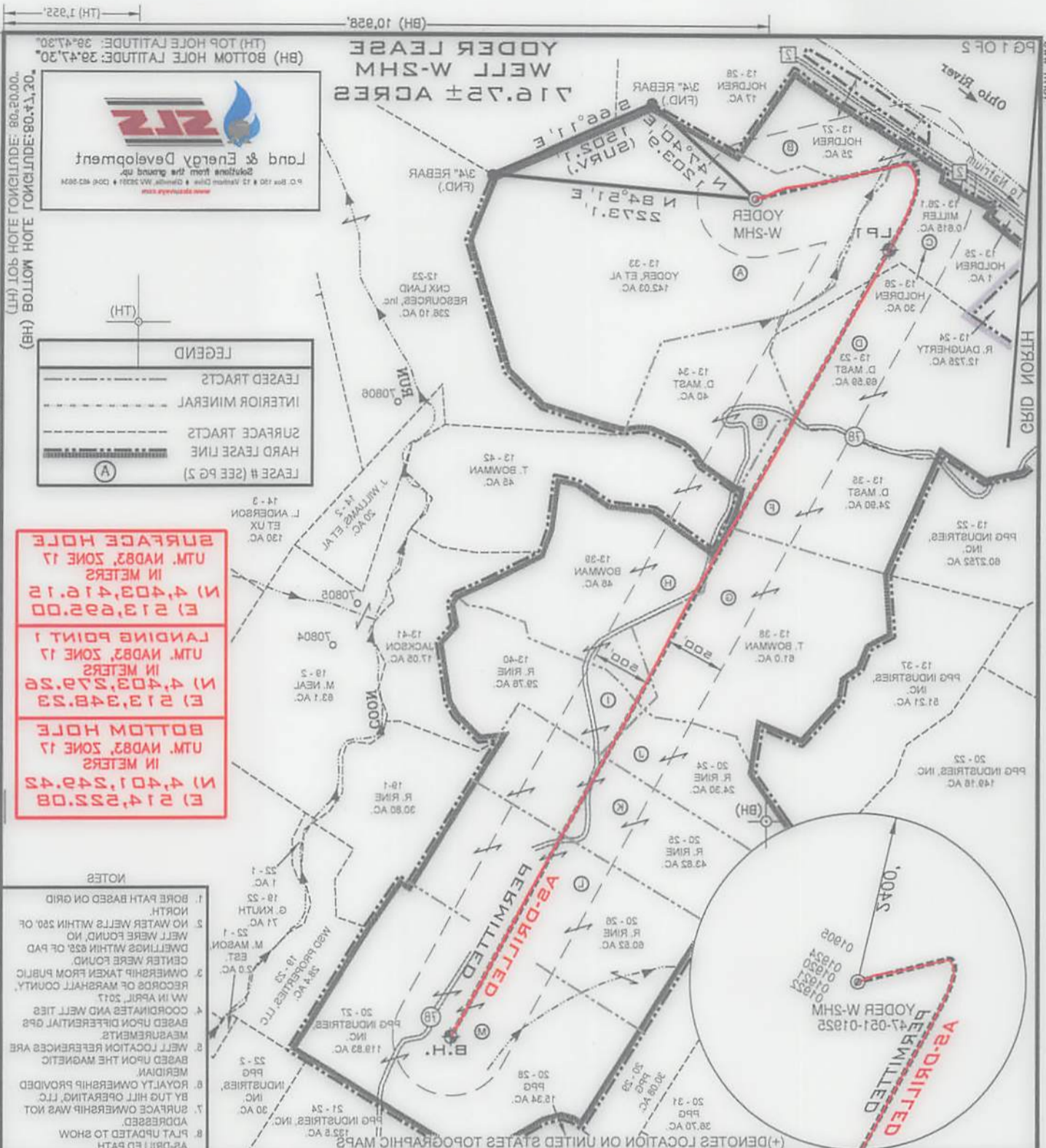
PROPOSED WORK: DRILL CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE PLUG OFF OLD FORMATION ___
 PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE (SPECIFY) ___

TARGET FORMATION **MARCELLUS** ESTIMATED DEPTH **TVD 6,245' TMD:14,660'**

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**

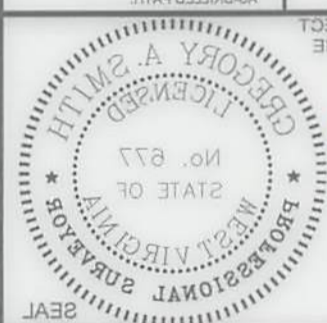
COUNTY NAME
 PERMIT



FILE NUMBER 8836
 DRAWING NUMBER 8836ADW2HM.dwg
 SCALE 1" = 1200'
 MINIMUM DEGREE OF ACCURACY 1/2500
 PROVEN SOURCE SUBMITTER MAPPING
 GRADE GPS

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

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 ("IF GAS") PRODUCTION STORAGE DEEP SHALLOW
 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 145.03
 OIL & GAS ROYALTY OWNER SEE PAGE 2 LEASE ACREAGE 716.75
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORM NEW FORMATION _____ OTHER PHYSICAL CHANGE (SPECIFY) _____
 TARGET FORMATION MARCELLUS
 WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER
 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 CT CORPORATION SYSTEM
 CHARLESTON, WV 25313 ADDRESS 5400 D BIG TYLER ROAD
 PERMIT 47-051-01925 STATE COUNTY PERMIT 01925
 AP# WELL NO. _____ OPERATORS WELL NO. YODER W-SHM (AS-DRILLED)
 DATE: JULY 17, 2018



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
 P.S. 877
Gregory A. Smith

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

BOTTOM HOLE
 UTM. NAD83, ZONE 17
 IN METERS
 E) 214,222.08
 N) 4,401,249.42

LANDING POINT 1
 UTM. NAD83, ZONE 17
 IN METERS
 E) 213,348.23
 N) 4,403,279.26

SURFACE HOLE
 UTM. NAD83, ZONE 17
 IN METERS
 E) 213,622.00
 N) 4,403,416.12

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 www.landenergy.com

LEGEND

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

(BH) 10,258' (TH) 1,922'

(BH) 11,182' (HT) 2,000'

(BH) BOTTOM HOLE LONGITUDE: 80.17, 20. (HT) TOP HOLE LATITUDE: 38.47, 30.

**YODER WELL W-2HM
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*16538	B	5-13-27	AMP FUND III LP	915 187
10*14754	C	5-13-26	BERNARD KNOLLINGER	794 472
10*14763	C	5-13-26	BETTY J. MCKINLEY	815 240
10*14768	C	5-13-26	BONNIE DGINTO	844 77
10*14752	C	5-13-26	CHARLES BOWEN	792 648
10*14757	C	5-13-26	DOUGLAS W. KNOLLINGER	794 487
10*14771	C	5-13-26	ERIC W THORNGATE	846 464
10*14758	C	5-13-26	GARY R. KNOLLINGER	795 154
10*14759	C	5-13-26	GLORIA J. LUIKART BY MARK LUIKART	804 245
10*14751	C	5-13-26	GRACE E. LUIKART	792 642
10*14772	C	5-13-26	GREG E THORNGATE	846 436
10*14749	C	5-13-26	JANICE E. FUTEY	792 116
10*14766	C	5-13-26	JANICE M. SANDERS	827 527
10*14769	C	5-13-26	JAYNES KISSEL	844 79
10*14760	C	5-13-26	JEFFREY M. BROWN	809 535
10*14753	C	5-13-26	JERRY SMOYER	794 474
10*14755	C	5-13-26	JUDITH A. MCGRAIL	794 517
10*14773	C	5-13-26	JUSTIN J ANTHONY	846 438
10*14776	C	5-13-26	KAREN M SMOYER	876 457
10*14748	C	5-13-26	MARJORIE K. NIGHTENGALE	790 541
10*14764	C	5-13-26	MARY B. KNOLLINGER	821 40
10*14770	C	5-13-26	MARY M HALL	846 413
10*14750	C	5-13-26	MARY SUE ANTHONY	792 114
10*14549	C	5-13-26	REBECCA PAUKNER	829 603
10*14761	C	5-13-26	RONALD E CLARK	809 571
10*14765	C	5-13-26	RUTH A. KINNEY	821 42
10*14774	C	5-13-26	THOMAS R KNOLLINGER	846 406
10*14775	C	5-13-26	TODD HANNIG	849 522
10*14762	C	5-13-26	WILLIAM CARL KNOLLINGER	815 238
10*14767	C	5-13-26	WILLIAM J. SMOYER	829 332
10*14756	C	5-13-26	WOODROW J. KNOLLINGER	794 515
10*14700	D	5-13-23	DAVID J MAST AND MIRIAM A MAST	708 239
10*14701	D	5-13-23	ROSEITA THORNTON	885 600
10*14617	E	5-13-34	DAVID J MAST AND MIRIAM A MAST	716 628
10*14618	F	5-13-35	DAVID J MAST AND MIRIAM A MAST	707 645
10*14701	F	5-13-35	ROSEITA THORNTON	885 600
10*14526	G	5-13-38	THOMAS WILLIAM BOWMAN	761 432
10*14527	G	5-13-38	VICTORIA BOWMAN	761 434
10*14878	H	5-13-39	ARTHUR BRUCE COULTER	839 519
10*14539	H	5-13-39	BERNEICE K. CUNNINGHAM	796 158
10*14534	H	5-13-39	BEVERLY J. MOORE	792 640
10*14550	H	5-13-39	CARRIE C WARREN	840 156
10*14542	H	5-13-39	CHRISTINE M. BERMAN	800 410
10*14541	H	5-13-39	CHRISTINE M. BOWMAN	800 412
10*14531	H	5-13-39	CORA A. WEST	791 641
10*14545	H	5-13-39	DEBRA A. BOWMAN	803 156
10*14547	H	5-13-39	ELIZABETH B. COULTER	809 537
10*14540	H	5-13-39	ELIZABETH P. SMITH & RICHARD J SMITH	800 414
10*14552	H	5-13-39	GLORIA J SILVERIO	844 81
10*14529	H	5-13-39	HELEN Y. BOWMAN	790 523
10*14536	H	5-13-39	JAMES L. BOYLE	795 150
10*14544	H	5-13-39	JANICE O. BOWMAN	803 158
10*14528	H	5-13-39	JO ANN SZAFRAN	790 525
10*14532	H	5-13-39	JOAN E. MENKEMELLER	791 639
10*14537	H	5-13-39	LOUISE V. TEGARDEN	796 162
10*14533	H	5-13-39	NANCY L FEISZLI	792 644
10*14530	H	5-13-39	NANCY L VENSOSKE	790 521
10*14535	H	5-13-39	RALPH W. CONNER	794 513
10*14548	H	5-13-39	RAYMOND N. RUTAN & RHONDA B. R RUTAN	821 38
10*14549	H	5-13-39	REBECCA PAUKNER	829 603
10*14551	H	5-13-39	SHARON S ANTAUS	842 392
10*14538	H	5-13-39	SONDRA L. LANTZ	796 160
10*14546	H	5-13-39	SUZAN R. MELLIS	803 154
10*14526	H	5-13-39	THOMAS WILLIAM BOWMAN	761 432
10*14543	H	5-13-39	TRAVIS STOUT	803 144
10*14527	H	5-13-39	VICTORIA BOWMAN	761 434
10*14878	I	5-13-40	ARTHUR BRUCE COULTER	839 519
10*14502	I	5-13-40	ROBERT E RINE AND DONNA M RINE	752 206
10*14615	J	5-20-24	ROBERT E RINE	708 251
10*14685	K	5-20-25	ROBERT E RINE AND DONNA M RINE	708 253
10*14616	L	5-20-26	ROBERT E RINE AND DONNA M RINE	708 250
10*14325	M	5-20-27	ELIZABETH ANN STRAUSBAUGH	792 104
10*14326	M	5-20-27	JANET LEA BLANKENSHIP	792 580
10*14310	M	5-20-27	JEAN C. THOMAS	781 614
10*14308	M	5-20-27	MARY E. BASSETT	779 492
10*14300	M	5-20-27	PPG INDUSTRIES, INC.	725 123
10*14309	M	5-20-27	ROBERT B. THOMAS	779 484
10*14324	M	5-20-27	RUTH E. BASSETT MEADOWS	792 100
10*14307	M	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

WELL PLAT LEASE INFORMATION
YORDER WELL W-2HM

Lease No.	TAG	Parcel	Oil & Gas Royalty Owner	Deed Book \ Pg
10*14307	M	2-20-27	SALLY CYNTHIA HOPKINS	777
10*14324	M	2-20-27	RUTH E. BASSETT MEADOWS	782
10*14309	M	2-20-27	ROBERT B. THOMAS	779
10*14300	M	2-20-27	PPG INDUSTRIES, INC.	722
10*14308	M	2-20-27	MARY E. BASSETT	779
10*14310	M	2-20-27	JEAN C. THOMAS	781
10*14326	M	2-20-27	JANET LEE BLANKENSHIP	782
10*14325	M	2-20-27	ELIZABETH ANN STRAUSSBAUGH	782
10*14316	L	2-20-26	ROBERT E RINE AND DONNA M RINE	708
10*14885	K	2-20-25	ROBERT E RINE AND DONNA M RINE	708
10*14312	L	2-20-24	ROBERT E RINE	708
10*14302	I	2-13-40	ROBERT E RINE AND DONNA M RINE	722
10*14878	I	2-13-40	ARTHUR BRUCE COULTER	839
10*14257	H	2-13-39	VICTORIA BOWMAN	781
10*14243	H	2-13-39	TRAVIS STOUT	803
10*14256	H	2-13-39	THOMAS WILLIAM BOWMAN	781
10*14246	H	2-13-39	SUZAN R. MELLIS	803
10*14238	H	2-13-39	SONDRA J. LANZ	786
10*14251	H	2-13-39	SHARON S. ANTALIS	842
10*14249	H	2-13-39	REBECCA PANKNER	829
10*14248	H	2-13-39	RAYMOND N. RUTAN & RHONDA B. RUTAN	821
10*14235	H	2-13-39	RALPH W. CONNER	794
10*14230	H	2-13-39	NANCY J. VENSOKOSKE	790
10*14233	H	2-13-39	NANCY L. FEISZLI	782
10*14237	H	2-13-39	LOUISE V. TEGARDEN	786
10*14232	H	2-13-39	LOAN E. MEKKEMELLER	791
10*14228	H	2-13-39	JO ANN SZAFRAN	790
10*14244	H	2-13-39	JANICE O. BOWMAN	803
10*14236	H	2-13-39	JAMES L. BOYLE	782
10*14259	H	2-13-39	HELEN Y. BOWMAN	790
10*14252	H	2-13-39	GLORIA J. SILVERIO	844
10*14240	H	2-13-39	ELIZABETH P. SMITH & RICHARD J. SMITH	800
10*14247	H	2-13-39	ELIZABETH B. COULTER	809
10*14245	H	2-13-39	DEBRA A. BOWMAN	803
10*14231	H	2-13-39	CORA A. WEST	791
10*14241	H	2-13-39	CHRISTINE M. BOWMAN	800
10*14242	H	2-13-39	CHRISTINE M. BERMAN	800
10*14250	H	2-13-39	CARRIE C. WARREN	840
10*14234	H	2-13-39	BEVERLY J. MOORE	782
10*14239	H	2-13-39	BERNICE K. CUNNINGHAM	786
10*14878	H	2-13-39	ARTHUR BRUCE COULTER	839
10*14257	G	2-13-38	VICTORIA BOWMAN	781
10*14256	G	2-13-38	THOMAS WILLIAM BOWMAN	781
10*14252	F	2-13-35	DAVID J MAST AND MIRIAM A MAST	707
10*14218	F	2-13-35	DAVID J MAST AND MIRIAM A MAST	707
10*14217	E	2-13-34	DAVID J MAST AND MIRIAM A MAST	716
10*14201	D	2-13-23	ROSEITA THORNTON	882
10*14200	D	2-13-23	DAVID J MAST AND MIRIAM A MAST	708
10*14256	C	2-13-26	WOODROW J. KNOLLINGER	794
10*14267	C	2-13-26	WILLIAM J. SMOYER	829
10*14262	C	2-13-26	WILLIAM CARL KNOLLINGER	812
10*14272	C	2-13-26	TODD HANNIG	849
10*14274	C	2-13-26	THOMAS R KNOLLINGER	846
10*14266	C	2-13-26	RUTH A. KINNEY	821
10*14261	C	2-13-26	RONALD E. CLARK	809
10*14249	C	2-13-26	REBECCA PANKNER	829
10*14250	C	2-13-26	MARY SUE ANTHONY	782
10*14270	C	2-13-26	MARY M HALL	846
10*14264	C	2-13-26	MARY B. KNOLLINGER	821
10*14248	C	2-13-26	MARJORIE K. NIGHTENGALE	790
10*14276	C	2-13-26	KAREN M SMOYER	826
10*14273	C	2-13-26	JUSTIN J ANTHONY	846
10*14252	C	2-13-26	LUDITH A. MCGRAIL	794
10*14253	C	2-13-26	JERRY SMOYER	794
10*14260	C	2-13-26	JEFFREY M. BROWN	809
10*14269	C	2-13-26	JAYNE S KISSEL	844
10*14266	C	2-13-26	JANICE M. SANDERS	827
10*14249	C	2-13-26	JANICE E. FUTEY	782
10*14272	C	2-13-26	GREG E THORNGATE	846
10*14251	C	2-13-26	GRACE E. LUKART	782
10*14259	C	2-13-26	GLORIA J. LUKART BY MARK LUKART	804
10*14258	C	2-13-26	GARY R. KNOLLINGER	782
10*14271	C	2-13-26	ERIC W THORNGATE	846
10*14257	C	2-13-26	DOUGLAS W. KNOLLINGER	794
10*14252	C	2-13-26	CHARLES BOWEN	782
10*14268	C	2-13-26	BONNIE DGINTO	844
10*14263	C	2-13-26	BETTY J. MCKINLEY	812
10*14254	C	2-13-26	BERNARD KNOLLINGER	794
10*14238	B	2-13-27	AMP FUND III LP	812
10*14201	A	2-13-33	ROSEITA THORNTON	882
10*14202	A	2-13-33	NATHAN D. YORDER	708

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 FORT WORTH, TX 76107
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 DIANNA STAMPER
 CHARLESTON, WY 25313
 ADDRESS 5400 D BIG TYLER ROAD