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west virginia department of environmental protection

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Office of Oil and Gas  
601 57<sup>th</sup> Street, S.E.  
Charleston, WV 25304  
(304) 926-0450  
fax: (304) 926-0452

Harold D. Ward, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Monday, March 27, 2023  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

TUG HILL OPERATING, LLC  
380 SOUTHPOINTE BOULEVARD, PLAZA II  
SUITE 200  
CANONSBURG, PA 15317

Re: Permit Modification Approval for PENDLETON S-1HM  
47-051-02468-00-00

**Lateral Extension**

TUG HILL OPERATING, LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926- 0450.

A handwritten signature in blue ink, appearing to read 'James A. Martin', is written over the typed name and title.

James A. Martin  
Chief

Operator's Well Number: PENDLETON S-1HM  
Farm Name: ALPINE FARM, LLC  
U.S. WELL NUMBER: 47-051-02468-00-00  
Horizontal 6A New Drill  
Date Modification Issued: 03/27/2023

Promoting a healthy environment.

03/31/2023

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
WELL WORK PERMIT APPLICATION

1) Well Operator: Tug Hill Operating, LLC 494510851 Marshall Franklin Glen Easton 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: Pendleton S-1HM Well Pad Name: Pendleton

3) Farm Name/Surface Owner: Alpine Farm, LLC Public Road Access: Rines Ridge Road (County Route 76)

4) Elevation, current ground: 1,272.08' Elevation, proposed post-construction: 1,272.08'

5) Well Type (a) Gas  Oil  Underground Storage   
Other

(b) If Gas Shallow  Deep   
Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus is the target formation at a depth of 6,659' - 6,709', thickness of 50' and anticipated pressure of approx. 3800 psi.

8) Proposed Total Vertical Depth: 6,809'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 16,441'

11) Proposed Horizontal Leg Length: 9,157.94'

12) Approximate Fresh Water Strata Depths: 70; 914'

13) Method to Determine Fresh Water Depths: Based on the depth of Pittsburgh Coal seam, per WVGES mapping contours

14) Approximate Saltwater Depths: 1,427'

15) Approximate Coal Seam Depths: Sewickley Coal - 816' and Pittsburgh Coal - 908'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes  No

(a) If Yes, provide Mine Info: Name: \_\_\_\_\_  
Depth: \_\_\_\_\_  
Seam: \_\_\_\_\_  
Owner: \_\_\_\_\_

*Handwritten signature and notes:*  
STRADER GOWSE  
12/14/2022

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18)

**CASING AND TUBING PROGRAM**

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120' /	259FT^3(CTS)
Fresh Water/Coal	13 3/8"	NEW	J55	54.5#	1,040'	1,040' /	1,073FT^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	2,841'	2,841' /	941FT^3(CTS)
Production	5 1/2"	NEW	P110	20#	16,441'	16,441' /	4,194FT^3(CTS)
Tubing	2 3/8"	NEW	P110	4.7#		6,593' /	
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	1.0	2,333	1,866	CLASS A	1.2
Fresh Water/ Coal	13 3/8"	17 1/2"	.38	2,740	2,192	SEE #24	1.2
Intermediate	9 5/8"	12 1/4"	.352	3,520	2,816	SEE #24	1.19
Production	5 1/2"	8 7/8" _ 8 3/4"	.361	12,640	10,112	SEE #24	1.17/1.19
Tubing	2 3/8"		.19	11,200	8,960		
Liners							

**PACKERS**

Kind:	N/A			RECEIVED Office of Oil and Gas
Sizes:	N/A			MAR 15 2023
Depths Set:	N/A			WV Department of Environmental Protection

*John Crowe  
STRADER CONSULT  
12/14/2022*



19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill through the Marcellus and TD Pilot Hole 100' into the Onondaga. Log vertical section and run a solid cement plug back to proposed KOP. Drill curve and lateral per proposed well plan, run and cement production casing. Perform CBL from 60 deg to surface, make cleanout run, and stimulate.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Well to be completed with approximately 22,900,000 lb proppant and 420,000 bbl of water. Max rate = 80 bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 26.23 acres

22) Area to be disturbed for well pad only, less access road (acres): 6.88 acres

23) Describe centralizer placement for each casing string:

Will run 3 centralizers on surface casing at equal distance. Intermediate will have 1 centralizer every other joint. Production casing will have one centralizer every other joint in lateral, one centralizer every joint through curve, one centralizer every other joint to surface.

24) Describe all cement additives associated with each cement type:

Sfc - Premium NE-1 + 2% CaCl; Int1 - Premium NE-1 + 1.5% CaCL + Flake; Int2 - Lead: Premium NE-1 + 5% BA-90 + .85% R-3 + 3% KCl + .75 gals/100sk FP-13L + 1% MPA-170 Tail: Premium NE-1 + .1% R-3 + 5% KCl + 1% CD-32 + .4% FL-52 +.2% ASA-301 + .6% Sodium Metasilicate; Kick Plug - Class H Cement + 1% CD-32 + .7% Sodium Metasilicate + .1% R-3 + .75 gal/100sk FP-13L; Prod - Lead: 50:50 (Poz:Class H) + .3% R-3 + .3% MPA-250 + .75 gal/100sk FP-13L Tail: 25:75 (Poz:Class H) + .3% R-3 + .3% MPA-250 + .375 gal/100sk FP-13L

25) Proposed borehole conditioning procedures:

Will circulate a minimum of 3 hours at TD, short trip to curve, circulate bottoms up, check for flow, POOH

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\*Note: Attach additional sheets as needed

*John Kowalski*  
*SRP/AD/62*  
*6/20/22*  
*12/14/2022*





**Tug Hill Operating, LLC Casing and Cement Program**

**Pendleton S-1HM**

**Casing**

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	13 3/8"	J55	17 1/2"	1,040'	CTS
Intermediate	9 5/8"	J55	12 1/4"	2,841'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4"	16,441'	CTS

**Cement**

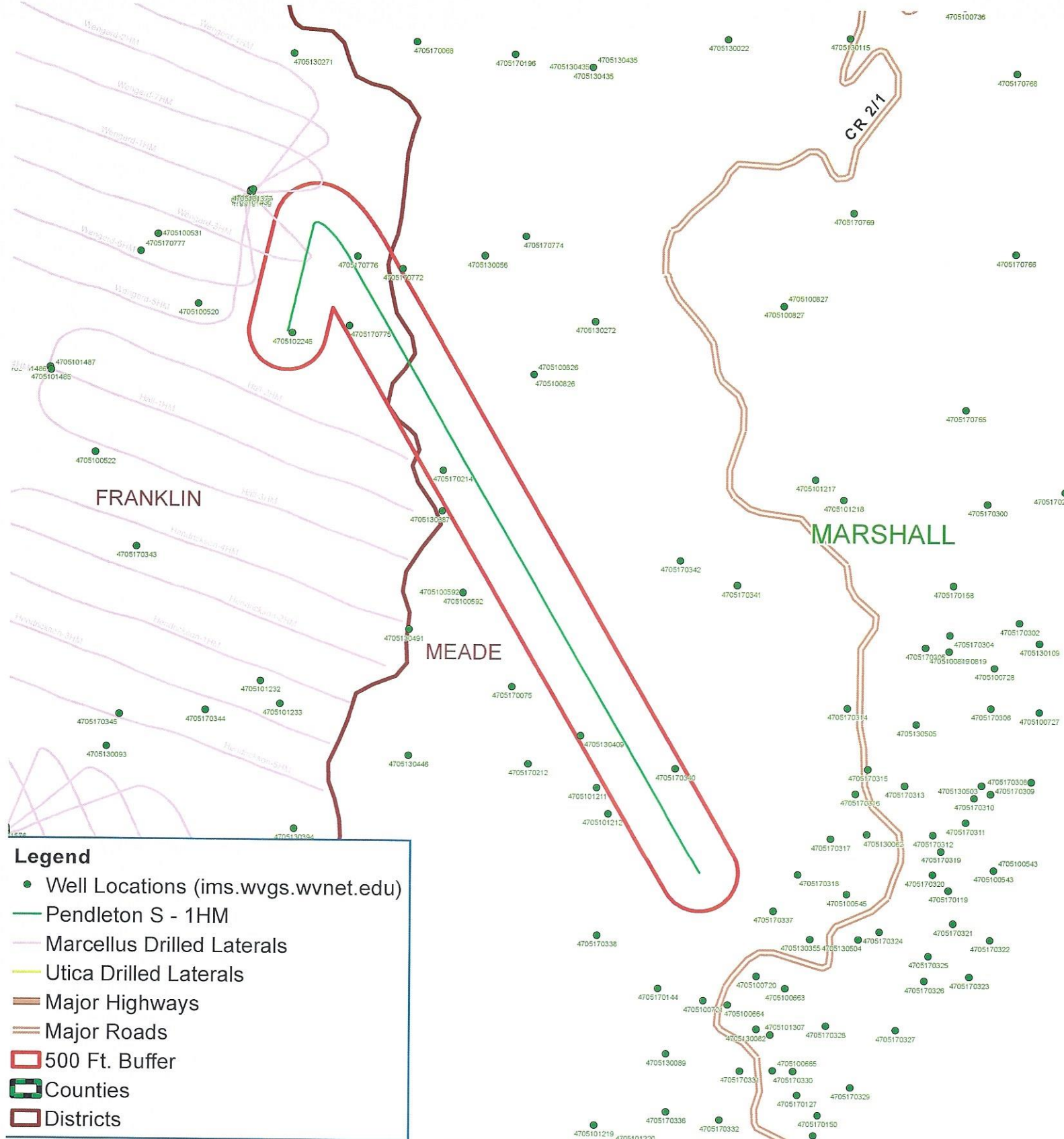
- Conductor: Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Conductor Cement mixed at 15.6 ppg, Y=1.2
- Surface: Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Surface Cement mixed at 15.6 ppg, Y=1.2
- Intermediate: Premium NE-1 + 1% bwoc CaC12 + 46.5% Fresh Water – Intermediate Cement mixed at 15 ppg, Y=1.38
- Kick Off Plug: Class H Cement + 1% CD-32 + .7% Sodium Metasilicate + .1% R-3 + .75 gal/100sk FP-13L - KOP Plug
- Production: 50:50 Poz: Premium NE-1 + .1% bwoc ASA-301 + 60lb/sk ASCA-1 + .35% bwoc BA-10A + .25% bwoc MPA-170, 44 lb sack + .5% bwoc R-3 + .75 gals/100sk FP-13L – Production Cement mixed at 14.5 ppg, Y = 1.3

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Office of Oil and Gas

MAR 15 2023

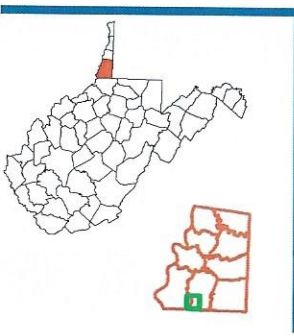
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03/31/2023



**Legend**

- Well Locations (ims.wvgs.wvnet.edu)
- Pendleton S - 1HM
- Marcellus Drilled Laterals
- Utica Drilled Laterals
- Major Highways
- Major Roads
- 500 Ft. Buffer
- ▭ Counties
- ▭ Districts



## Pendleton S - 1HM Franklin District Marshall County, WV



Map Created: January 25, 2022

Notes:  
All locations are approximate and are for visualization purposes only.

03/31/2023

**Area of Review****Sources of information to Support 35CSR8 - 5.11: 9.3 et seq.**

Description of process to identify potential pathways for well communication during hydraulic fracturing activities.

## Data Sources Reviewed:

1. Enverus and RS Energy Group Well Data service: Public nationwide data service that pulls directly from State agency Oil and Gas databases
2. Farm Maps
3. Topo Maps: Recent and older (contact WVGES)
4. Check with DPS

Contacted Adam Picard 724-485-9331, [apicard@dpslandservices.com](mailto:apicard@dpslandservices.com), DPS GIS (1/24/2022) to have him make maps of the wellbores with his information. DPS utilizes WVGES maps for their mapping seems it is the best publicly available. See attached map he provided.

## Request maps for:

1. Wellbore with Enverus All Wells Layer
2. Map with Farm lines overlain and any well spots identified on Farm Maps
3. More recent (1970s vintage) topos and older topos

## Discussion with Phil Dinterman WVGES GIS Department (7/15/2016)

- WVGES has plotted every well spot they have access to and are aware of with that contains a coordinate. 30000, 70000, and 90000 series wells are available via the WVGES online map. Some locations aren't great due to vintage and manipulation of maps through time
- 30000 series – any well drilled prior to 1929 – APIs were not assigned to original wells
- 70000 series – Well spots pulled from old Farm line maps that the WVGES has access to
- 90000 series – Any sources that the WVGES has access that shows a well spot but has no additional supporting information. DEP does not have 90000 series on their maps.
- There can be duplication between wells in the 3 series
- Phil indicated that other Operators are providing a screenshot of the WVGES map with their planned well and using that for permits



**Wells within 500' Buffer**

Note: Well spots depicted on Area of Review map are derived from State held coordinates. The spots may differ from those depicted on the Well Plat because the Plat locations represent actual field surveyed locations. Please refer to the Plat for surveyed well spots.

API Number	Operator Name	Total Depth	Perforated Fms	Producing zones not perforated	Is this well "known or reasonably expected to penetrate a depth that could be within the range of Fracture propagation"? 1000' is max limit I would assign to wells that might be within in range of fracture propagation	Comments
4705170775	unknown	unknown	unknown	unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be affected by fracturing of the proposed Marcellus well.	State records are incomplete.
4705170776	unknown	unknown	unknown	unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be affected by fracturing of the proposed Marcellus well.	State records are incomplete.
4705102245	Tug Hill Operating, LLC.	11787' TVD (proposed)	none	none	No, this well will not be drilled to the proposed depth or perforated. This is a canceled permit.	Permit canceled by Tug Hill Operating, LLC.
4705170214	unknown	unknown	unknown	unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be affected by fracturing of the proposed Marcellus well.	State records are incomplete.

API Number	Operator Name	Total Depth	Perforated Fms	Producing zones not perforated	Is this well "known or reasonably expected to penetrate a depth that could be within the range of Fracture propagation"? 1000' is max limit I would assign to wells that might be within in range of fracture propagation	Comments
4705130409	Wilhelm & Jackson	3034' TVD	Gordon	unknown	No, this well is not deep enough to be within the expected fracture propagation from a Marcellus stimulation. Well is plugged.	Well plugged 10/10/1960
4705170340	Hope Natural Gas Company	unknown	unknown	unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be affected by fracturing of the proposed Marcellus well.	State records are incomplete.

WV Geological &amp; Economic Survey:

Well: County = 51 Permit = 70775

Report Time: Wednesday, January 26, 2022 1:10:11 PM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4705170775	Marshall	70775	Franklin	Glen Easton	Cameron	39.753718	-80.73127	523020.9	4400457.5

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4705170775	-/-		unknown	Prpty Map Herbert Kelley								unknown	

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_AFT	O_BEF
4705170775	-/-	-/-						unclassified	unclassified	not available	unknown	unknown							

WV Geological &amp; Economic Survey:

Well: County = 51 Permit = 70776

Report Time: Wednesday, January 26, 2022 1:12:17 PM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4705170776	Marshall	70776	Franklin	Glen Easton	Cameron	39.756185	-80.730894	523052.3	4400731.4

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4705170776	-/-		unknown	Prpty Map Herbert Alley			1262					unknown	

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_AFT	O_BEF
4705170776	-/-	-/-						unclassified	unclassified	not available	unknown	unknown							

WV Geological &amp; Economic Survey:

Well: County = 51 Permit = 02245

Report Time: Wednesday, January 26, 2022 1:12:34 PM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4705102245	Marshall	2245	Franklin	Glen Easton	Cameron	39.753455	-80.733897	522795.9	4400427.6

Bottom Hole Location Information:

API	EP_FLAG	UTME	UTMN	LON_DD	LAT_DD
4705102245	1	As Proposed	520896.4	4403611.2	-80.755969

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM
4705102245	-/-		Dvtd Orgnl Loc Cancelled	Alpine Farm LLC		N-9HU	Pendleton		Eli A & Fannie Mae Wengerd et al	Tug Hill Operating, LLC	11787	PI Pleasant Fm

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_AFT	O_BEF	O_AFT
4705102245	-/-	-/-		1272	Ground Level															



WV Geological & Economic Survey:

Well: County = 51 Permit = 70214

Report Time: Wednesday, January 26, 2022 1:12:52 PM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4705170214	Marshall	70214	Meade	Wileyville	Littleton	39.748628	-80.726928	523394.6	4399893.7

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM
4705170214	--	Original Loc	Completed	James Mossey	1				OP=Whealing	Oper in Min. owner fid.no code assgn(Orphan well proj)		

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_AFT	O_BEF
4705170214	--	--						unclassified	unclassified	not available	unknown	unknown							

WV Geological &amp; Economic Survey:

Well: County = 51 Permit = 30409

Report Time: Wednesday, January 26, 2022 1:13:07 PM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4705130409	Marshall	30409	Meade	Wileyville	Littleton	39.739203	-80.720569	523942.6	4398849.3

There is no Bottom Hole Location data for this well

## Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4705130409	--		Original Loc Completed	Elizabeth Brinkmeir			HNG-277		2815	OP=AM Snider also Wilhelm & Jackson			

## Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_
4705130409	--	--	1301	Ground Level	Cameron-Garner	UDev undf.Beri/LoHURN	Gordon	Development Well	unclassified	Gas	Cable Tool	unknown	3034				3034

## Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4705130409	--	Pay	Gas	Vertical			2968	Gordon	0	0			

There is no Production Gas data for this well

There is no Production Oil data for this well \*\* some operators may have reported NGL under Oil

There is no Production NGL data for this well \*\* some operators may have reported NGL under Oil

There is no Production Water data for this well

## Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV	DATUM
4705130409	Original Loc	unidentified coal	Well Record	665	Reasonable	2	Reasonable	1301	Ground Level
4705130409	Original Loc	Sewickley coal	Well Record	865	Reasonable	5	Reasonable	1301	Ground Level
4705130409	Original Loc	Pittsburgh coal	Well Record	963	Reasonable	7	Reasonable	1301	Ground Level
4705130409	Original Loc	Salt Sands (undiff)	Well Record	1610	Reasonable	80	Reasonable	1301	Ground Level
4705130409	Original Loc	Big Lime	Well Record	2016	Reasonable	64	Reasonable	1301	Ground Level
4705130409	Original Loc	Big Injun (undiff)	Well Record	2080	Reasonable	314	Reasonable	1301	Ground Level
4705130409	Original Loc	Gordon	Well Record	2943	Reasonable	25	Reasonable	1301	Ground Level

There is no Wireline (E-Log) data for this well

## Plugging Information:

API	PLG_DT	DEPTH_PBT
4705130409	10/10/1960	0

WV Geological & Economic Survey:

Well: County = 51 Permit = 70340

Report Time: Wednesday, January 26, 2022 1:13:26 PM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4705170340	Marshall	70340	Meade	Wileyville	Littleton	39.738032	-80.716214	524316.3	4398720.5

There is no Bottom Hole Location data for this well

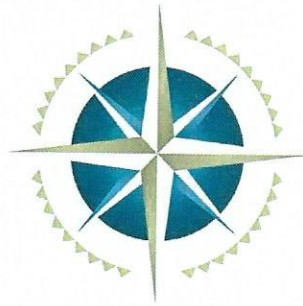
Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4705170340	--	unknown	Prpty Map	AJ Stein		270				Hope Natural Gas Company			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_AFT	O_BEF
4705170340	--	--						unclassified	unclassified	not available	unknown	unknown							





**TUG HILL**  
**OPERATING**

**Well Site Safety Plan**  
**Part A – Site Specific Data and Figures**

**Well Name: Pendleton S-1HM**

**Pad Name: Pendleton**

**County: Marshall**

UTM (meters), NAD83, Zone 17

Northing: 4,400,435.36

Easting: 522,777.64

**KEY CONTACT FOR WELL SITE SAFETY PLAN  
DEVELOPMENT AND MAINTENANCE**

Jerry V. DeRosa, Director EH&S Affairs

(724) 338-2029 (office)

(412) 736-5767 (cellular)

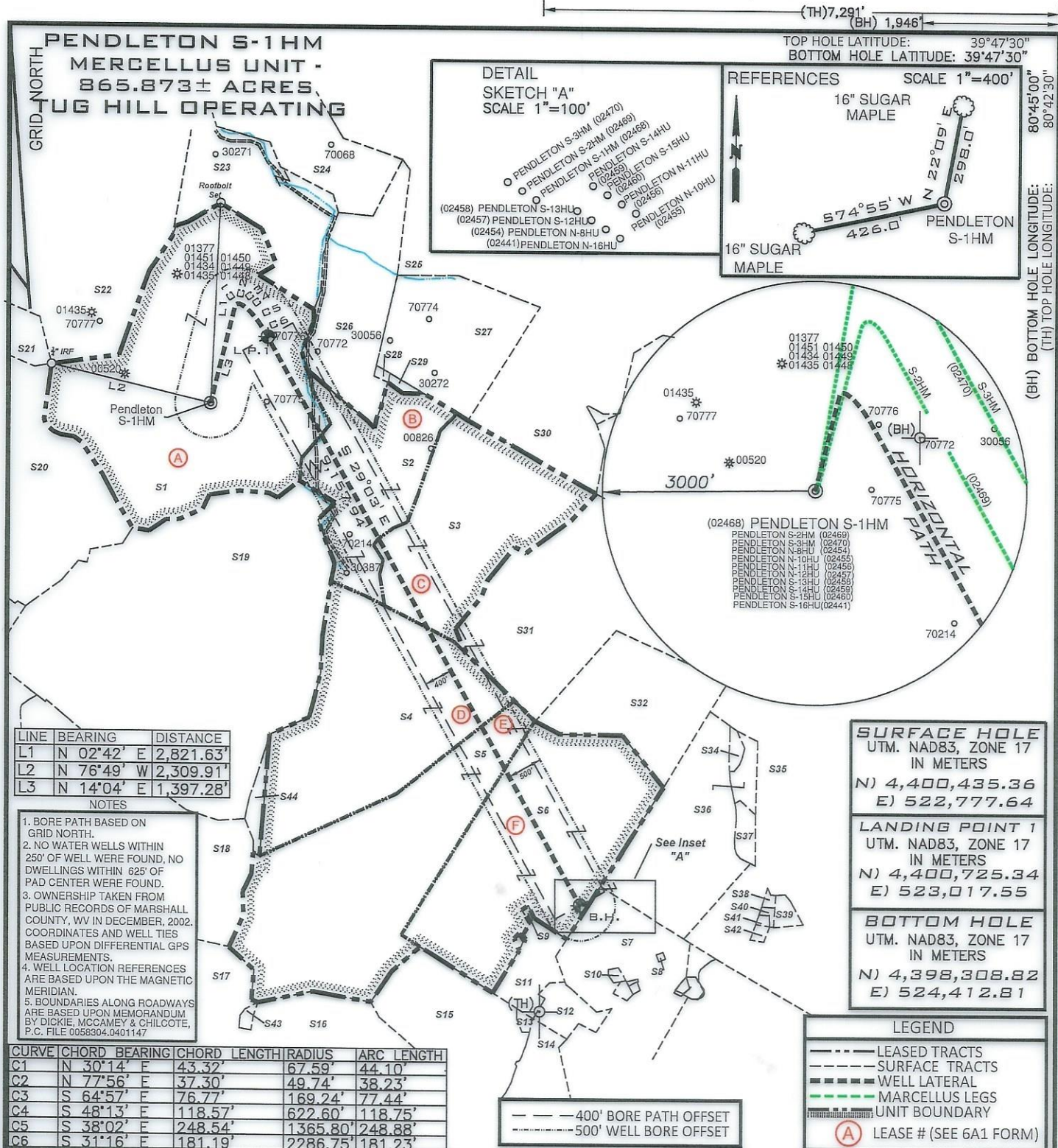
**24-HOUR EMERGENCY PHONE NUMBER**

**(800) 921-9745**

*Steve Card*  
STEVE CARD  
12/14/2022

03/31/2023





LINE	BEARING	DISTANCE
L1	N 02°42' E	2,821.63'
L2	N 76°49' W	2,309.91'
L3	N 14°04' E	1,397.28'

- 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, 2002. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
  - WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.
  - BOUNDARIES ALONG ROADWAYS ARE BASED UPON MEMORANDUM BY DICKIE, MCCAMEY & CHILCOTE, P.C. FILE 0058304.0401147.

CURVE	CHORD BEARING	CHORD LENGTH	RADIUS	ARC LENGTH
C1	N 30°14' E	43.32'	67.59'	44.10'
C2	N 77°56' E	37.30'	49.74'	38.23'
C3	S 64°57' E	76.77'	169.24'	77.44'
C4	S 48°13' E	118.57'	622.60'	118.75'
C5	S 38°02' E	248.54'	1365.80'	248.88'
C6	S 31°16' E	181.19'	2286.75'	181.23'

**SURFACE HOLE**  
UTM. NAD83, ZONE 17  
IN METERS  
N) 4,400,435.36  
E) 522,777.64

**LANDING POINT 1**  
UTM. NAD83, ZONE 17  
IN METERS  
N) 4,400,725.34  
E) 523,017.55

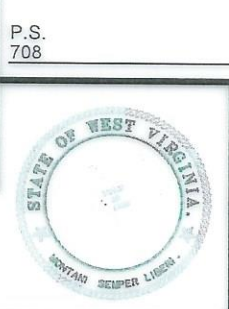
**BOTTOM HOLE**  
UTM. NAD83, ZONE 17  
IN METERS  
N) 4,398,308.82  
E) 524,412.81

**LEGEND**

- LEASED TRACTS
- SURFACE TRACTS
- WELL LATERAL
- MARCELLUS LEGS
- UNIT BOUNDARY
- (A) LEASE # (SEE 6A1 FORM)

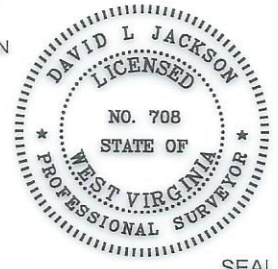
FILE NUMBER \_\_\_\_\_  
DRAWING NUMBER: PENDLETON S-1HM\_REVO  
SCALE: 1" = 2000'  
MINIMUM DEGREE OF ACCURACY: 1/200  
PROVEN SOURCE OF ELEVATION: SUBMETER MAPPING  
GRADE GPS

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



*David L Jackson*

JACKSON SURVEYING INC.  
P.O. Box 1460  
Clarksburg, WV 26302  
304-823-5851



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

DATE: MARCH 14, 2023  
OPERATORS WELL NO. PENDLETON S-1HM  
API WELL NO. 47-051-02468  
STATE WV COUNTY MARSHALL PERMIT 249.07

WELL TYPE: OIL \_\_\_ GAS X LIQUID INJECTION \_\_\_ WASTE DISPOSAL \_\_\_  
(IF "GAS") PRODUCTION X STORAGE \_\_\_ DEEP \_\_\_ SHALLOW X  
LOCATION ELEVATION 1271.82' WATERSHED (HUC 10) FISH CREEK  
DISTRICT FRANKLIN COUNTY MARSHALL  
QUADRANGLE GLEN EASTON 7.5' LEASE NUMBER SEE WW-6A1 Form

SURFACE OWNER ALPINE FARM, LLC ACREAGE 249.07  
OIL & GAS ROYALTY OWNER ELI A. & FANNIE MAE WENGERD, ET AL LEASE ACREAGE 249.07  
PROPOSED WORK: DRILL X CONVERT \_\_\_ DRILL DEEPER \_\_\_ REDRILL \_\_\_ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION \_\_\_  
PERFORATE NEW FORMATION \_\_\_ OTHER PHYSICAL CHANGE (SPECIFY) \_\_\_\_\_  
TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD: 6,809' TMD: 16,441'  
WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DARREN BROWN, CT CORP  
ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 FORT WORTH, TX 76107 ADDRESS 5098 WASHINGTON STREET WEST, SUITE 407 CHARLESTON, WV 25313-1561

**03/31/2023**

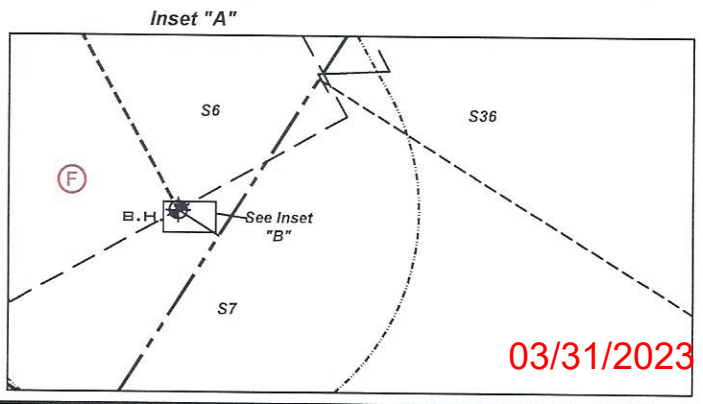
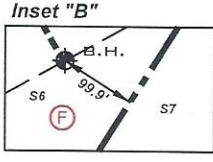
COUNTY NAME  
PERMIT



form ww6

**PENDLETON S-1HM  
MERCCELLUS UNIT -  
865.873± ACRES  
TUG HILL OPERATING**

Parcels within Unit Boundary				
Tags	Number	Tax Map -Parcel	Surface Owner	Acres
A	S1	05-17-06	ALPINE FARM LLC	249.07
B	S2	09-18-01	THOMAS THERESA MAE LONG ET AL	58.66
C	S3	09-18-02	BRIAN T KLUG	85.0
D	S4	09-20-02	MICHAEL JAMES PEKULA	138.0
E	S5	09-20-04	SHELLIE J PEKULA, HRS	171
F	S6	09-20-05	GERALD A FROHNAPFEL ET UX TRUST	164.143
Adjoining Parcels Ownership Table				
Tags	Number	Tax Map -Parcel	Surface Owner	Acres
	S7	09-20-22	CHARLES DILLION BLAKE & ALLISON R. KLUG	70.2398
	S8	09-20-22.3	GRANDVIEW-DOOLIN PUBLIC SERVICE DISTRICT	0.23
	S9	09-20-5.2	WHEELING CATHOLIC DIOCESE	0.447
	S10	09-20-22.8	JOAN LOUISE KLUG	.80
	S11	09-22-04	WHEELING CATHOLIC DIOCESE	20
	S12	09-22-5.1	HILARY G MILLER EST	10.62
	S13	09-22-3.1	MARGARET ANN MYSLIWIEC -LIFE	1.1
	S14	09-22-03	MARK HILARY MILLER	63.73
	S15	09-22-3.2	MARK H MILLER	75
	S16	09-22-01	LOUIS T FOX	124.57
	S17	05-25-03	S.D. & SUSAN SMITH FERTITTE	181.548
	S18	05-24-3.3	CHARLES E BERTRAND & DEBRA K BERTRAND	120.43
	S19	05-24-02	ROY FRIEND YOHO	316.8
	S20	05-17-08	ROGER H HALL JR	257.5
	S21	05-17-07	ALPINE FARM LLC	10.8
	S22	05-17-04	ALPINE FARM LLC	212
	S23	05-17-05	ALPINE FARM LLC	76.96
	S24	09-16-02	ROBERT & NANCY MCCARDLE	53.4
	S25	09-16-05	ROBERT M & NANCY MCCARDLE	133
	S26	09-16-03	BERTHA L KLUG	71
	S27	09-16-04	BERTHA L KLUG	73.39
	S28	09-18-04	BERTHA L KLUG	1
	S29	09-18-03	BERTHA L KLUG	1.33
	S30	09-18-05	BERTHA L KLUG	122.437
	S31	09-18-18	JAMES D FROHNAPFEL ET UX	154.03
	S32	09-20-06	KEITH & KRISTY FERRELL REVOCABLE LIVING TRUST	64.75
	S33	09-20-7.2	MICKEY R DULANEY JR	2.242
	S34	09-20-11	PATRICK A FROHNAPFEL ET UX	139.88
	S35	09-20-07	SONNY M & LINDA L TAGG	72.828
	S36	09-20-7.1	DAVID PAUL FROHNAPFEL	4.930
	S37	09-20-9.5	JAMES MILLER ET UX	0.666
	S38	09-20-9.6	JAMES MILLER ET UX	2.919
	S39	09-20-9.3	JAMES MILLER ET UX	0.804
	S40	09-20-10	JAMES MILLER ET UX	0.5
	S41	09-20-9.4	HELEN B SHUTLER - LIFE	0.78
	S42	09-22-1.1	CNG TRANSMISSION CO	1.43
	S43	09-20-1	MICHAEL JAMES PEKULA ET UX	5



P.S. 708 *David L Jackson*

03/31/2023



**TUG HILL  
OPERATING**

OPERATOR'S  
WELL #: PENDLETON S-1HM  
DISTRICT: Franklin  
COUNTY: Marshall  
STATE: WV  
API #: 47-051-02468

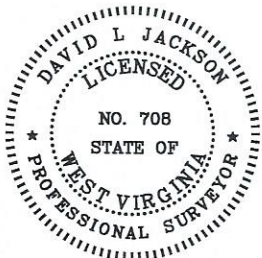
WELL PLAT  
PAGE 2 OF 3  
DATE: 3/14/2023



form wv6

**PENDLETON S-1HM  
 MERCELLUS UNIT -  
 865.873± ACRES  
 TUG HILL OPERATING**

LEASE ID	TMP	TAG	GRANTOR, LESSOR, ETC.	DEED BOOK/PAGE	
10*14114	5-17-6	A	ELI & FANNIE MAE WENGERD	671	323
10*28262	9-18-1	B	JAMES W MESSEY ET AL	67	487
10*28262	9-18-2	C	JAMES W MESSEY ET AL	67	487
10*39661	9-20-2	D	SHELLIE J PEKULA AND MICHAEL PEKULA	1126	542
10*31101	9-20-4	E	ELIZABETH BRINKMEIER ET AL	103	183
10*19555	9-20-5	F	MARY JEAN FROHNAPFEL	936	525



P.S.  
708

*David L Jackson*

03/31/2023



**TUG HILL  
 OPERATING**

OPERATOR'S  
 WELL #: PENDLETON S-1HM  
 DISTRICT: Franklin  
 COUNTY: Marshall  
 STATE: WV  
 API #: 47-051-02468

WELL PLAT  
 PAGE 3 OF 3  
 DATE: 03/14/2023

WW-6A1  
(5/13)

Operator's Well No. Pendleton S-1HM

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE  
Chapter 22, Article 6A, Section 5(a)(5)  
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
----------------------	-----------------------	-----------------------	---------	-----------

\*See attached pages

RECEIVED  
Office of Oil and Gas

MAR 15 2023

WV Department of  
Environmental Protection

**Acknowledgement of Possible Permitting/Approval  
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Tug Hill Operating, LLC  
 By: Amy L. Morris *Amy L. Morris*  
 Its: Permitting Specialist - Appalachia Region

LEASE ID	TMP	TAG	GRANTOR, LESSOR, ETC.	GRANTEE, LESSEE, ETC.	ROYALTY	DEED BOOK/PAGE	ASSIGNMENT	ASSIGNMENT	ASSIGNMENT	ASSIGNMENT	ASSIGNMENT	ASSIGNMENT	ASSIGNMENT	ASSIGNMENT
10*14114	5-17-6	A	ELI & FANNIE MAE WENGERD	GASTAR EXPLORATION USA INC	1/8+	671 323	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 23/353	Merger of Gastar Exploration Inc & Gastar Exploration USA Inc: 21/41	Gastar Exploration Inc to TH Exploration II LLC: 36/9	Atinum Marcellus I LLC to TH Exploration II LLC: 48/67	
10*28262	9-18-1	B	JAMES W MESSEY ET AL	ECLIPSE OIL COMPANY	1/8+	67 487	Eclipse Oil company to C.H. Stolzebach: DB 68/507	The Manufacturers Light & Heat Company to A.M. Snider & Duane M Snider dba Hundred Gas Company: AB 4/489	AM Snider, Duane M Snider & Kathleen Rinehart dba Hundred Gas Company to Hundred Gas Company: DB 256/189	Hundred Gas Company to Carl D Perkins: DB 451/132	Amendment - Hundred Gas Company to Carl D Perkins: DB 451/418	Carl D Perkins to Perkins Oil and Gas Inc: DB 583/72	Perkins Oil & Gas Inc to TH Exploration LLC: AB 45/87	
10*28262	9-18-2	C	JAMES W MESSEY ET AL	ECLIPSE OIL COMPANY	1/8+	67 487	Eclipse Oil company to C.H. Stolzebach: DB 68/507	The Manufacturers Light & Heat Company to A.M. Snider & Duane M Snider dba Hundred Gas Company: AB 4/489	AM Snider, Duane M Snider & Kathleen Rinehart dba Hundred Gas Company to Hundred Gas Company: DB 256/189	Hundred Gas Company to Carl D Perkins: DB 451/132	Amendment - Hundred Gas Company to Carl D Perkins: DB 451/418	Carl D Perkins to Perkins Oil and Gas Inc: DB 583/72	Perkins Oil & Gas Inc to TH Exploration LLC: AB 45/87	
10*39661	9-20-2	D	SHELLIE J PEKULA AND MICHAEL PEKULA	TH EXPLORATION LLC	1/8+	1126 542	N/A	N/A	N/A	CNG Producing Company merged with/into Dominion Exploration & Development Inc	N/A	N/A	N/A	
10*31101	9-20-4	E	ELIZABETH BRINKMEIER ET AL	HOPE NATURAL GAS CO	1/8+	103 183	Hope Natural Gas Company to Consolidated Gas Supply Corp: 374/234	Consolidated Gas Supply Corp to Consolidated Gas Transmission Corp: 505/406	Consolidated Gas Production Company on 3/13/1991 - Wyoming Bureau of Land Management	CNG Producing Company merged with/into Dominion Exploration & Development Inc on 6/2/2000 - WV Secretary of State	Dominion Exploration & Development Inc Merged with/into CONSOL Gas Company: CB 19/546	CONSOL Gas Company merged with/into CNX Gas Company LLC: MB 11/415	CNX Gas Company to TH Exploration LLC: 46/210	
10*19555	9-20-5	F	MARY JEAN FROHNAPFEL	TH EXPLORATION LLC	1/8+	936 525	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

4705102468

03/31/2023



STATE OF WEST VIRGINIA     §  
   §  
COUNTY OF MARSHALL       §

**ASSIGNMENT, BILL OF SALE AND CONVEYANCE**

THIS ASSIGNMENT, BILL OF SALE AND CONVEYANCE (this "*Assignment*"), dated effective as of 7:00 A.M., local time, where the respective Assets are located, on July 1, 2020 (the "*Effective Time*"), is between **Atinum Marcellus I, LLC**, a Delaware limited liability company ("*Assignor*"), whose mailing address is One Riverway, Suite 710, Houston, TX 77056-1988, and **TH Exploration II, LLC**, a Texas limited liability company, whose mailing address is 1320 S. University Drive, Suite 500, Fort Worth, Texas 76107 ("*Assignee*"). Assignor and Assignee are each, individually, referred to herein as a "*Party*" and, collectively, as the "*Parties*."

Capitalized terms used but not defined herein shall have the respective meanings set forth in that certain Asset Purchase Agreement dated as of November 13, 2020, by and among Assignor and Assignee (the "*Purchase Agreement*").

Section 1. Assignment. The conveyance and assignment herein shall be deemed effective as of the Effective Time.

For Ten Dollars (\$10.00) and other good and valuable consideration (the receipt and sufficiency of which are hereby acknowledged), Assignor does hereby forever GRANT, BARGAIN, SELL, CONVEY, ASSIGN, TRANSFER, SET OVER AND DELIVER unto Assignee, and Assignee does hereby acquire, the undivided interests in the Leases (as defined below) set forth on Exhibit A-1, and all other of Assignor's right, title and interest in and to the interests and properties described in subsections (a) through (k) of this Section 1 (without duplication) (such right, title and interest, less and except the Excluded Assets, collectively, the "*Assets*"):

(a) The oil and gas leases, mineral leases and Royalties located in the Covered Counties (which Covered Counties include, for the avoidance of doubt, the county in which this Assignment is filed of record), including those described on Exhibit A-1 together with any and all other right, title and interest in and to the leasehold estates created thereby, subject to the terms, conditions, covenants and obligations set forth in such leases or other instrument creating such rights or interests or on Exhibit A-1 (such leases, Royalties, and mineral interests, collectively, the "*Leases*"), together with any related interest in the lands covered by the Leases or lands unitized, pooled, communitized or consolidated therewith (the "*Lands*");

(b) All of the oil and/or gas wells identified on Exhibit A-2 hereto (the "*Wells*"), and any other oil, gas, or other wells located on any of the Leases or the Lands, in each case, whether producing, non-producing, shut-in, temporarily or permanently abandoned or otherwise;

(c) All rights, titles and interests arising under any unitization, pooling and/or communitization agreements, declarations or designations for drilling, spacing and/or production units related to any of the Leases, Wells or Lands, including the units described on Exhibit A-4;

MEMORANDUM OF PARTIAL ASSIGNMENT OF OIL AND GAS LEASES

STATE OF WEST VIRGINIA       §  
  §  
COUNTY OF MARSHALL       §

This MEMORANDUM OF PARTIAL ASSIGNMENT OF OIL AND GAS LEASES (hereinafter, the "Memorandum") has been executed by and between PERKINS OIL & GAS, INC., a West Virginia corporation, whose address is 2966 Northwest Turnpike, Pennsboro, West Virginia 26415 (hereinafter the "Assignor"), and TH EXPLORATION, LLC, a Texas limited liability company (hereinafter the "Assignee") whose address is 1320 South University Drive, Suite 500, Fort Worth, Texas 76107. Assignor and Assignee are sometimes referred to herein, collectively, as the "Parties" and, individually, as a "Party." This Memorandum is being executed for the purpose of providing notice to third parties of the execution of a certain Partial Assignment of Oil and Gas Leases (hereinafter, the "Assignment"), by and between the Parties.

WHEREAS, Assignor is the current owner and lessee of certain oil and gas leases located in Marshall County, West Virginia, covering specific parcels and being more particularly described on Exhibit "A" attached hereto and made a part hereof (collectively, the "Oil and Gas Leases").

In the Assignment dated, effective as of the 21<sup>st</sup> day of January, 2020 (hereinafter, the "Effective Date") and this Memorandum, Assignor does hereby GRANT, BARGAIN, SELL, CONVEY, TRANSFER and ASSIGN unto Assignee, all right, title and interest in and to the Oil and Gas Leases INsofar AND ONLY INsofar as each lease and parcel covers those formations lying between two hundred (200) feet above and two hundred (200) feet below the formations commonly known to as the Utica/Point Pleasant Shale formations, or the stratigraphic equivalent thereof (such depths and formations being referred to as the "Assigned Formations"). The Assigned Formations are included with and part of the Assigned Rights as defined in the Assignment.

EXCLUDING THEREFROM AND EXCEPTING AND RESERVING UNTO THE ASSIGNOR, ITS SUCCESSORS AND ASSIGNS, THE OVERRIDING ROYALTY INTEREST, as defined in the Assignment.

The Assignment contains various other terms, provisions and conditions, all of which are incorporated herein by reference, and made a part hereof in all respects as though the same were fully set forth herein. To the extent that there are any inconsistencies between this Memorandum and the Assignment, the terms and provisions of the Assignment shall prevail.

Assignor does hereby bind itself and its successors and assigns to warrant and forever defend all and singular title to the Assigned Formations unto Assignee and Assignee's successors and assigns, against every person whomsoever lawfully claiming or to claim the same or any part thereof, by through, or under Assignor, but not otherwise.

This Memorandum is made expressly subject to the terms and conditions of the Purchase and Sale Agreement dated September 23, 2019, by and between the Parties, all of which are fully incorporated herein by reference (the "Purchase Agreement").

This Memorandum may be executed in multiple counterparts, each of which shall be deemed an original instrument, but all such counterparts together shall constitute but one agreement.

[TWO SIGNATURE PAGES TO FOLLOW]



**ASSIGNMENT OF OIL AND GAS LEASES**

This **ASSIGNMENT OF OIL AND GAS LEASES** (hereinafter, "**Assignment**"), made the 2nd day of November, 2020 (hereinafter, "**Effective Date**"), is by and between **CNX GAS COMPANY LLC**, a Virginia limited liability company, whose address is 1000 CONSOL Energy Drive, Suite 400, Canonsburg, Pennsylvania 15317 (hereinafter "**Assignor**") and **TH EXPLORATION, LLC**, a Texas limited liability company, whose address is 1320 S. University Drive, Suite 500, Fort Worth, Texas 76107 (hereinafter "**Assignee**"). All references in this Assignment to "**Party**" shall be deemed at all times to mean Assignor or Assignee and to "**Parties**" shall be deemed to mean both Assignor and Assignee. Capitalized terms used but not defined herein shall have the meaning given such terms in the Acreage Trade Agreement, by and between Assignor and Assignee dated June 19, 2020, as amended, (the "**Trade Agreement**").

**WHEREAS**, Assignor desires to assign all of Assignor's right, title and interest in and to the Assigned Rights (as defined below), as more particularly described in this Assignment.

**NOW, THEREFORE**, for and in consideration of TEN AND NO/100 DOLLARS (\$10.00) and other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Assignor does hereby **GRANT, BARGAIN, ASSIGN, TRANSFER, AND CONVEY** unto Assignee the following "**Assigned Rights**" expressly excluding the Retained Rights (as defined below):

- (a) All of Assignor's right, title, and interest in and to the oil and gas leases described on Exhibit A attached hereto and made a part hereof located in Marshall County, West Virginia ("**Leases**"); and
- (b) all rights expressly granted under the Leases including rights related to, or necessary in connection with, the ownership, exploration, drilling, development, or operation of the Leases, including, without limitation, any pooling or unitization, any ability to shut-in a well(s), and the non-exclusive access rights to conduct seismic, geophysical, and other investigations, install pipelines, roadways, surface locations, water and/or power lines, impoundments, structures, tanks, gas gathering and/or metering facilities, and all other related facilities.

**TO HAVE AND TO HOLD** the Assigned Rights unto Assignee, its respective successors and assigns, subject to the terms of this Assignment and subject to and burdened by the contracts set forth on Exhibit B.

**"Retained Rights"** means: (i) any and all existing oil and/or gas wells currently in, on, or pertaining to the Leases ("**Retained Wells**"), (ii) all rights relating to, or necessary in connection with, the ownership, exploration, drilling, development, or operation of the Retained Wells, including, without limitation, any pooling or unitization, any ability to shut-in any Retained Wells, and the non-exclusive access rights to conduct seismic, geophysical, and other investigations, install pipelines, roadways, surface locations, water and/or power lines, impoundments, structures, tanks, gas gathering and/or metering facilities, and all other related facilities, and (iii) any and all assets not expressly being conveyed, assigned or leased, as applicable, by Assignor to Assignee at Closing pursuant to the Trade Agreement.

This Assignment is further made subject to the following:

1. **TRANSFER TAXES / RECORDING FEES**. Assignee agrees to pay any and all fees and taxes (including recording, real estate transfer, excise, and documentary) in connection with the filing





March 9, 2023

CHARLES T. BREWER  
WV DEP OFFICE OF OIL & GAS  
601 57<sup>TH</sup> STREET SE  
CHARLESTON, WV 25304-2345

VIA FEDEX

RE: Pendleton S-1HM 47-051-02468  
Franklin District, Marshall County, WV

Dear Taylor:

Tug Hill Operating, LLC is submitting a modification application for its well, Pendleton S-1HM, to explore for Marcellus Shale potential; it is located in Marshall County, WV. Therefore, enclosed please find the following:

- Check – Modification fee of \$2,500
- Updated WW-6B (including well bore diagram and casing information)
- Updated well plat
- Updated WW-6A1 information
- Updated Area of Review
- Updated WSSP

If you have any questions or need any additional information, please do not hesitate to call me at (304) 376-0111. Thank you for attention to this matter, it is greatly appreciated.

Sincerely,

AMY MORRIS  
PERMIT SPECIALIST-APPALACHIA REGION  
TUG HILL OPERATING, LLC

Enclosures

RECEIVED  
Office of Oil and Gas  
MAR 15 2023  
WV Department of  
Environmental Protection

Ch# 062873  
2500  
3/19/23

380 SOUTHPOINTE BLVD • SUITE 200 • CANONSBURG, PA 15317 • T 724.485-2000 • F 724.338.2030

03/31/2023