



west virginia department of environmental protection

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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Thursday, November 19, 2020
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 GOUDY 1S-8HM
47-051-02228-00-00

Extend Lateral 5421'

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 positioned above the printed name and title.

James A. Martin
Chief

Operator's Well Number: GOUDY 1S-8HM
Farm Name: TH EXPLORATION III, LLC
U.S. WELL NUMBER: 47-051-02228-00-00
Horizontal 6A New Drill
Date Modification Issued: 11/19/2020

Promoting a healthy environment.

Modification

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 New Martinsville
Operator ID County District Quadrangle

2) Operator's Well Number: Goudy 1S-8HM Well Pad Name: Goudy

3) Farm Name/Surface Owner: TH Exploration III, LLC Public Road Access: Wells Hill Road (County Route 2/2)

4) Elevation, current ground: 1242' Elevation, proposed post-construction: 1239.4'

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

(b) If Gas Shallow x Deep
Horizontal X

JM 9/2/2020

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 6379 - 6437' thickness of 58' and anticipated pressure of approx. 3800 psi

8) Proposed Total Vertical Depth: 6,537'

9) Formation at Total Vertical Depth: Onondaga

10) **Proposed Total Measured Depth:** 17,926'

11) **Proposed Horizontal Leg Length:** 10,970.70'

12) Approximate Fresh Water Strata Depths: 70', 863'

13) Method to Determine Fresh Water Depths: Use shallow offset wells to determine deepest freshwater. Or determine using predrill tests, testing while drilling or petrophysical evaluation of resistivity.

14) Approximate Saltwater Depths: 2,169'

15) Approximate Coal Seam Depths: Sewickly Coal - 762' and Pittsburgh Coal - 857'

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 X

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

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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	13 3/8"	NEW	H40	48#	970'	970'	1024ft^3(CTS)
Coal	13 3/8"	NEW	H40	48#	970'	970'	1024ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	2,654'	2,654'	879ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	17,926'	17,926'	4570ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#		6,482'	
Liners							

JN 9/2/2020

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	13 3/8"	17 1/2"	.33	1,730	1,384	SEE #24	1.2
Coal	13 3/8"	17 1/2"	.33	1,730	1,384	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	9,000	SEE#24	1.17/1.19
Tubing	2 3/8"		.19	11,200	8,960		
Liners							

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

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WW-6B
(10/14)

API NO. 47- 051 - 02228 MOY
OPERATOR WELL NO. Goudy 1S-8HM
Well Pad Name: Goudy

JM 9/2/2020

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 13,867,500 lb. proppant and 214,402 bbl of water. Max rate = 80 bpm; max psi = 9,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 11.56 acres

22) Area to be disturbed for well pad only, less access road (acres): 5.81 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:

*See Attachment

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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

*Note: Attach additional sheets as needed.

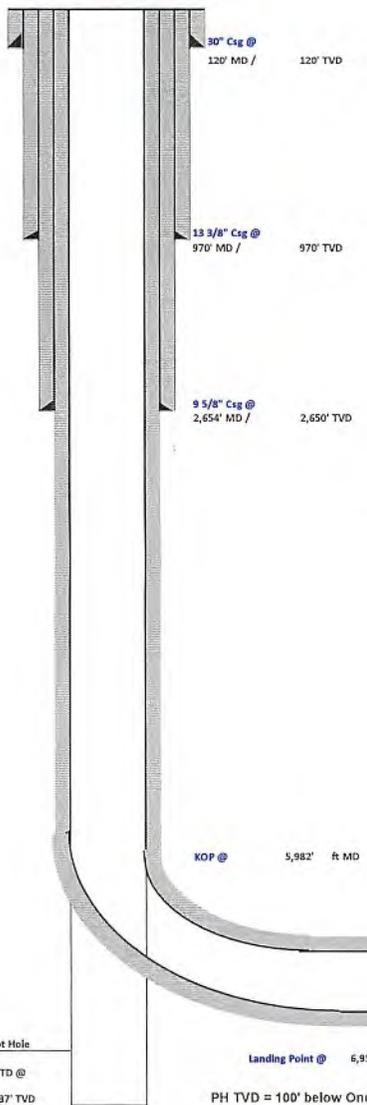


WELL NAME: Goudy 15-BHM
STATE: WV **COUNTY:** Marshall
DISTRICT: Franklin
DF Elev: 1,242' **GL Elev:** 1,242'
TD: 17,926'
TH Latitude: 39.73698552
TH Longitude: -80.82870249
BH Latitude: 39.707369
BH Longitude: -80.812084

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	863
Sewickley Coal	762
Pittsburgh Coal	857
Big Lime	1922
Welr	2310
Berea	2465
Gordon	2811
Rhinestraet	5818
Genesco/Burkett	6330
Tully	6350
Hamilton	6370
Marcellus	6379
Landing Depth	6414
Onondaga	6437
Pilot Hole Depth	6537

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	120'	120'	8W	BW	Surface
Surface	17.5	13 3/8	970'	970'	54.5	J55	Surface
Intermediate 1	12 1/4	9 5/8	2,654'	2,650'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	17,926'	6,605'	20	CYHP110	Surface

	CEMENT SUMMARY			DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	1,030	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	886	A	15	Air	1 Centralizer every other jt
Production	4,195	A	14.5	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc



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Pilot Hole
 PH TD @ 6,537' TVD
 Landing Point @ 6,957' MD / 6,414' TVD
 PH TVD = 100' below Onondaga Top

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Lateral TD @ 17,926' ft MD
 6,605' ft TVD

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Tug Hill Operating, LLC Casing and Cement Program

Goudy 1S-8HM

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	13 3/8"	J55	17 1/2"	970'	CTS
Intermediate	9 5/8"	J55	12 1/4"	2,654'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4	17,926'	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 15.6 ppg, Y=1.19

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 15.2ppg, Y = 1.19

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TUG HILL
OPERATING

Well: Goudy 1S-08HM (I)
Site: Goudy
Project: Marshall County, West Virginia.
Design: rev3

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	0.000	0.00	
2	1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.000	0.00	KOP Begin 1 1/100' build
3	1700.00	5.00	255.00	1699.37	-5.64	-21.06	1.00	255.000	0.00	Begin 5.00' tangent
4	2804.84	5.00	255.00	2800.00	-30.57	-114.07	0.00	0.000	-17.54	Begin 3 1/100' turn
5	2877.92	5.00	229.64	2872.81	-33.45	-119.58	3.00	-102.633	-17.09	Begin 3 1/100' build/turn
6	3378.57	20.01	232.36	3360.19	-100.28	-204.53	3.00	3.597	10.24	Begin 20.01' tangent
7	5981.72	20.01	232.36	5806.16	-644.28	-909.98	0.00	0.000	227.18	Begin 8 1/100' build/turn
8	6536.56	50.00	167.33	6268.51	-923.71	-940.07	8.00	-83.116	471.34	Begin 10 1/100' build/turn
9	6957.31	89.00	149.98	6414.00	-1279.19	-792.80	10.00	-26.424	856.05	Begin 89.00' lateral
10	17925.95	89.00	149.98	6605.00	-10774.70	4694.44	0.00	0.000	1752.96	PBHL/TD 17925.95 MD/6605.00 TVD

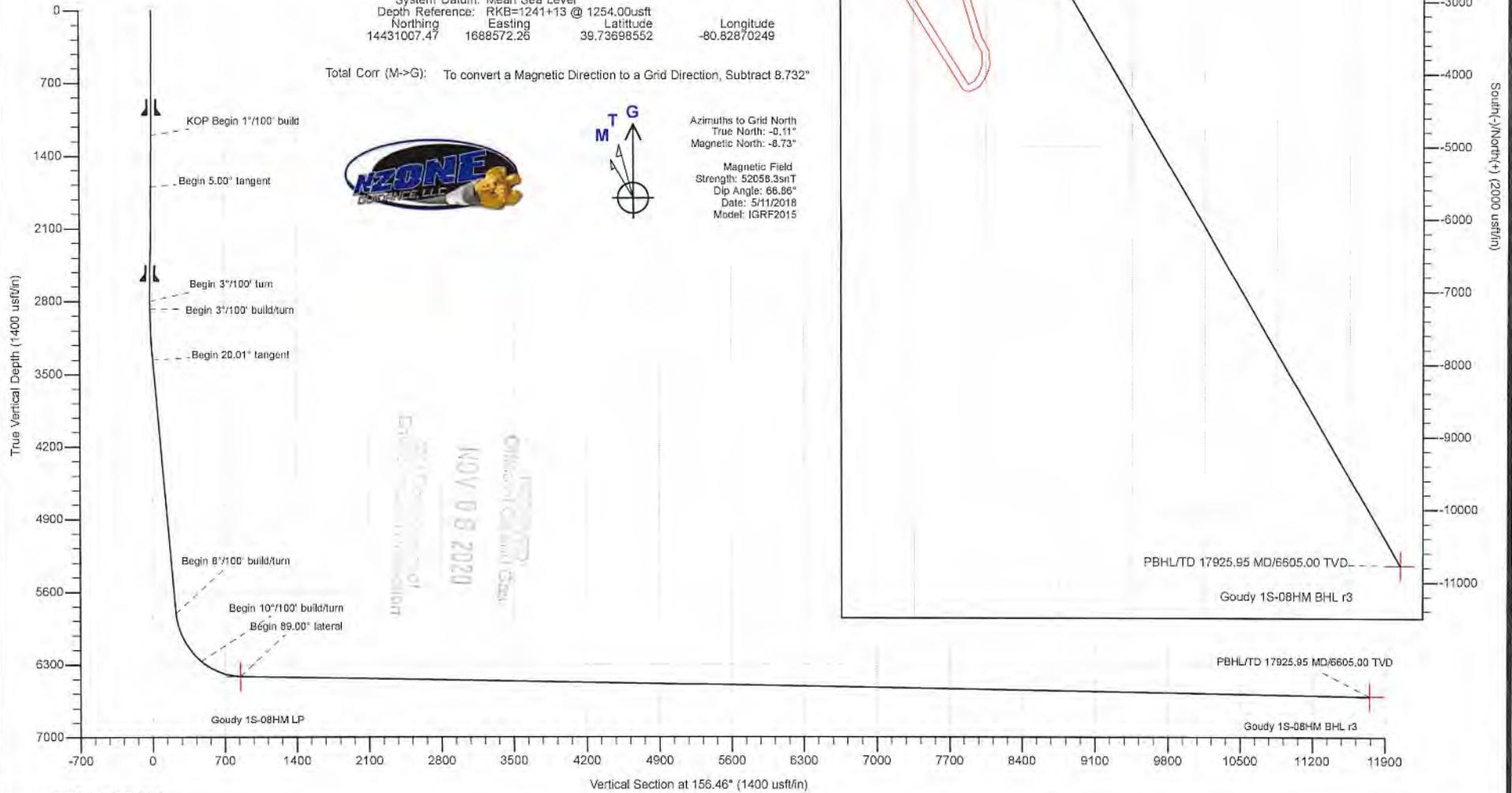
Geodetic System: Universal Transverse Mercator (US Survey Feet)
Datum: NAD83 West Virginia - HARN
Ellipsoid: GRS 1980
Zone: Zone 17N (84 W to 78 W)
System Datum: Mean Sea Level
Depth Reference: RKB=1241+13 @ 1254.00usft
Northing Easting Latitude Longitude
14431007.47 1688572.26 39.73698552 -80.82870249

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.732°



Azimuths to Grid North
True North: -0.11°
Magnetic North: -8.73°

Magnetic Field
Strength: 52058.3nT
Dip Angle: 66.86°
Date: 5/11/2018
Model: IGRF2015



4705102228.MXD

4705102228 MOD



Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Goudy 1S-08HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1241+13 @ 1254.00usft
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1241+13 @ 1254.00usft
Site:	Goudy	North Reference:	Grid
Well:	Goudy 1S-08HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev3		

Project	Marshall County, West Virginia.		
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	Goudy				
Site Position:		Northing:	14,430,942.40 usft	Latitude:	39.73680688
From:	Lat/Long	Easting:	1,688,559.77 usft	Longitude:	-80.82874732
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.109 °

Well	Goudy 1S-08HM (I)					
Well Position	+N/-S	0.00 usft	Northing:	14,431,007.47 usft	Latitude:	39.73698552
	+E/-W	0.00 usft	Easting:	1,688,572.25 usft	Longitude:	-80.82870249
Position Uncertainty	0.00 usft		Wellhead Elevation:		Ground Level:	1,241.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	5/11/2018	-8.623	66.859	52,058.29004157

Design	rev3				
Audit Notes:					
Version:	Phase:	PLAN	Tie On Depth:	0.00	
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	156.46	

Plan Survey Tool Program	Date	8/5/2020			
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks	
1	0.00	17,925.87 rev3 (Original Hole)	MWD	MWD - Standard	

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Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Goudy 1S-08HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1241+13 @ 1254.00usft
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1241+13 @ 1254.00usft
Site:	Goudy	North Reference:	Grid
Well:	Goudy 1S-08HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev3		

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.000	
1,700.00	5.00	255.00	1,699.37	-5.64	-21.06	1.00	1.00	0.00	255.000	
2,804.84	5.00	255.00	2,800.00	-30.57	-114.07	0.00	0.00	0.00	0.000	
2,877.92	5.00	229.64	2,872.81	-33.45	-119.58	3.00	0.00	-34.70	-102.633	
3,378.57	20.01	232.36	3,360.19	-100.28	-204.53	3.00	3.00	0.54	3.597	
5,981.72	20.01	232.36	5,806.16	-644.28	-909.98	0.00	0.00	0.00	0.000	
6,536.56	50.00	167.33	6,268.51	-923.71	-940.07	8.00	5.40	-11.72	-83.115	
6,957.31	89.00	149.98	6,414.00	-1,279.19	-792.80	10.00	9.27	-4.12	-26.424	
17,925.95	89.00	149.98	6,605.00	-10,774.70	4,694.44	0.00	0.00	0.00	0.000	Goudy 1S-08HM BHL

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Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Goudy 1S-08HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1241+13 @ 1254.00usft
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1241+13 @ 1254.00usft
Site:	Goudy	North Reference:	Grid
Well:	Goudy 1S-08HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev3		

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Planned 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	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
100.00	0.00	0.00	100.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
200.00	0.00	0.00	200.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
300.00	0.00	0.00	300.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
400.00	0.00	0.00	400.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
500.00	0.00	0.00	500.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
600.00	0.00	0.00	600.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
700.00	0.00	0.00	700.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
800.00	0.00	0.00	800.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
900.00	0.00	0.00	900.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,431,007.47	1,688,572.25	39.73698552	-80.82870249	
KOP Begin 1°/100' build										
1,300.00	1.00	255.00	1,299.99	-0.23	-0.84	14,431,007.25	1,688,571.41	39.73698491	-80.82870549	
1,400.00	2.00	255.00	1,399.96	-0.90	-3.37	14,431,006.57	1,688,568.88	39.73698306	-80.82871449	
1,500.00	3.00	255.00	1,499.86	-2.03	-7.58	14,431,005.44	1,688,564.67	39.73697998	-80.82872948	
1,600.00	4.00	255.00	1,599.67	-3.61	-13.48	14,431,003.86	1,688,558.77	39.73697567	-80.82875047	
1,700.00	5.00	255.00	1,699.37	-5.64	-21.06	14,431,001.83	1,688,551.19	39.73697013	-80.82877744	
Begin 5.00° tangent										
1,800.00	5.00	255.00	1,798.98	-7.90	-29.48	14,430,999.57	1,688,542.77	39.73696398	-80.82880740	
1,900.00	5.00	255.00	1,898.60	-10.15	-37.90	14,430,997.32	1,688,534.36	39.73695783	-80.82883736	
2,000.00	5.00	255.00	1,998.22	-12.41	-46.32	14,430,995.06	1,688,525.94	39.73695168	-80.82886733	
2,100.00	5.00	255.00	2,097.84	-14.67	-54.73	14,430,992.81	1,688,517.52	39.73694553	-80.82889729	
2,200.00	5.00	255.00	2,197.46	-16.92	-63.15	14,430,990.55	1,688,509.10	39.73693938	-80.82892725	
2,300.00	5.00	255.00	2,297.08	-19.18	-71.57	14,430,988.30	1,688,500.68	39.73693323	-80.82895721	
2,400.00	5.00	255.00	2,396.70	-21.43	-79.99	14,430,986.04	1,688,492.26	39.73692708	-80.82898717	
2,500.00	5.00	255.00	2,496.32	-23.69	-88.41	14,430,983.78	1,688,483.84	39.73692093	-80.82901713	
2,599.99	5.00	255.00	2,595.94	-25.94	-96.83	14,430,981.53	1,688,475.43	39.73691478	-80.82904710	
2,699.99	5.00	255.00	2,695.56	-28.20	-105.25	14,430,979.27	1,688,467.01	39.73690863	-80.82907706	
2,799.99	5.00	255.00	2,795.17	-30.46	-113.66	14,430,977.02	1,688,458.59	39.73690248	-80.82910702	
2,804.84	5.00	255.00	2,800.00	-30.57	-114.07	14,430,976.91	1,688,458.18	39.73690218	-80.82910847	
Begin 3°/100' turn										
2,877.92	5.00	229.64	2,872.81	-33.45	-119.58	14,430,974.02	1,688,452.68	39.73689428	-80.82912807	
Begin 3°/100' build/turn										
2,899.99	5.66	230.06	2,894.79	-34.77	-121.14	14,430,972.70	1,688,451.11	39.73689066	-80.82913365	
2,999.99	8.66	231.17	2,994.00	-42.66	-130.79	14,430,964.81	1,688,441.46	39.73686904	-80.82916802	
3,099.99	11.66	231.70	3,092.42	-53.65	-144.58	14,430,953.83	1,688,427.67	39.73683895	-80.82921717	
3,199.99	14.66	232.03	3,189.79	-67.69	-162.49	14,430,939.78	1,688,409.76	39.73680047	-80.82928095	
3,299.99	17.66	232.24	3,285.82	-84.77	-184.46	14,430,922.71	1,688,387.80	39.73675369	-80.82935920	
3,378.57	20.01	232.36	3,360.19	-100.28	-204.53	14,430,907.20	1,688,367.73	39.73671120	-80.82943070	
Begin 20.01° tangent										
3,399.99	20.01	232.36	3,380.32	-104.75	-210.33	14,430,902.72	1,688,361.92	39.73669894	-80.82945138	
3,499.99	20.01	232.36	3,474.28	-125.65	-237.43	14,430,881.82	1,688,334.82	39.73664169	-80.82954792	
3,599.99	20.01	232.36	3,568.24	-146.55	-264.53	14,430,860.92	1,688,307.72	39.73658444	-80.82964446	
3,699.99	20.01	232.36	3,662.20	-167.45	-291.63	14,430,840.03	1,688,280.62	39.73652719	-80.82974100	
3,799.99	20.01	232.36	3,756.17	-188.34	-318.73	14,430,819.13	1,688,253.52	39.73646994	-80.82983754	
3,899.99	20.01	232.36	3,850.13	-209.24	-345.83	14,430,798.23	1,688,226.42	39.73641269	-80.82993408	
3,999.99	20.01	232.36	3,944.09	-230.14	-372.93	14,430,777.33	1,688,199.32	39.73635544	-80.83003062	
4,099.99	20.01	232.36	4,038.05	-251.04	-400.03	14,430,756.44	1,688,172.22	39.73629818	-80.83012716	
4,199.99	20.01	232.36	4,132.01	-271.94	-427.13	14,430,735.54	1,688,145.12	39.73624093	-80.83022370	
4,299.99	20.01	232.36	4,225.98	-292.83	-454.23	14,430,714.64	1,688,118.02	39.73618368	-80.83032023	
4,399.99	20.01	232.36	4,319.94	-313.73	-481.33	14,430,693.74	1,688,090.92	39.73612643	-80.83041677	
4,499.99	20.01	232.36	4,413.90	-334.63	-508.43	14,430,672.84	1,688,063.82	39.73606918	-80.83051331	

1705102228 MOD



Planning Report - Geographic

4705102228 MOD

Database: DB_Aug1919_v14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia.
 Site: Goudy
 Well: Goudy 1S-08HM (I)
 Wellbore: Original Hole
 Design: rev3

Local Co-ordinate Reference: Well Goudy 1S-08HM (I)
 TVD Reference: RKB=1241+13 @ 1254.00usft
 MD Reference: RKB=1241+13 @ 1254.00usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
4,599.99	20.01	232.36	4,507.86	-355.53	-535.53	14,430,651.95	1,688,036.72	39.73601193	-80.83060985	
4,699.99	20.01	232.36	4,601.82	-376.42	-562.63	14,430,631.05	1,688,009.62	39.73595468	-80.83070639	
4,799.99	20.01	232.36	4,695.79	-397.32	-589.73	14,430,610.15	1,687,982.52	39.73589743	-80.83080292	
4,899.99	20.01	232.36	4,789.75	-418.22	-616.83	14,430,589.25	1,687,955.42	39.73584018	-80.83089946	
4,999.99	20.01	232.36	4,883.71	-439.12	-643.93	14,430,568.36	1,687,928.32	39.73578293	-80.83099600	
5,099.99	20.01	232.36	4,977.67	-460.02	-671.03	14,430,547.46	1,687,901.22	39.73572567	-80.83109254	
5,199.99	20.01	232.36	5,071.63	-480.91	-698.13	14,430,526.56	1,687,874.12	39.73566842	-80.83118907	
5,299.99	20.01	232.36	5,165.59	-501.81	-725.23	14,430,505.66	1,687,847.02	39.73561117	-80.83128561	
5,399.99	20.01	232.36	5,259.56	-522.71	-752.33	14,430,484.76	1,687,819.92	39.73555392	-80.83138215	
5,499.99	20.01	232.36	5,353.52	-543.61	-779.43	14,430,463.87	1,687,792.82	39.73549667	-80.83147869	
5,599.99	20.01	232.36	5,447.48	-564.50	-806.53	14,430,442.97	1,687,765.72	39.73543942	-80.83157522	
5,699.99	20.01	232.36	5,541.44	-585.40	-833.63	14,430,422.07	1,687,738.62	39.73538216	-80.83167176	
5,799.99	20.01	232.36	5,635.40	-606.30	-860.73	14,430,401.17	1,687,711.52	39.73532491	-80.83176829	
5,899.99	20.01	232.36	5,729.37	-627.20	-887.83	14,430,380.28	1,687,684.42	39.73526766	-80.83186483	
5,981.72	20.01	232.36	5,806.16	-644.28	-909.98	14,430,363.20	1,687,662.27	39.73522087	-80.83194373	
Begin 8°/100' build/turn										
5,999.99	20.24	228.17	5,823.32	-648.29	-914.81	14,430,359.18	1,687,657.44	39.73520986	-80.83196094	
6,099.99	23.06	207.74	5,916.39	-677.21	-936.85	14,430,330.26	1,687,635.40	39.73513056	-80.83203952	
6,199.99	27.87	192.77	6,006.74	-717.40	-951.16	14,430,290.07	1,687,621.10	39.73502025	-80.83209068	
6,299.99	33.83	182.31	6,092.61	-768.09	-957.45	14,430,239.38	1,687,614.80	39.73488108	-80.83211342	
6,399.99	40.42	174.78	6,172.34	-828.29	-955.62	14,430,179.18	1,687,616.63	39.73471575	-80.83210730	
6,499.99	47.39	169.09	6,244.37	-896.82	-945.69	14,430,110.65	1,687,626.56	39.73452748	-80.83207243	
6,536.56	50.00	167.33	6,268.51	-923.71	-940.07	14,430,083.76	1,687,632.18	39.73445361	-80.83205262	
Begin 10°/100' build/turn										
6,599.99	55.73	163.92	6,306.79	-972.65	-927.47	14,430,034.83	1,687,644.78	39.73431915	-80.83200812	
6,699.99	64.93	159.38	6,356.26	-1,054.95	-900.01	14,429,952.53	1,687,672.25	39.73409299	-80.83191099	
6,799.99	74.24	155.49	6,391.12	-1,141.34	-864.01	14,429,866.13	1,687,708.25	39.73385555	-80.83178351	
6,899.99	83.61	151.94	6,410.31	-1,229.20	-820.56	14,429,778.28	1,687,751.69	39.73361404	-80.83162956	
6,957.31	89.00	149.98	6,414.00	-1,279.19	-792.80	14,429,728.29	1,687,779.45	39.73347661	-80.83153116	
Begin 89.00° lateral										
6,999.99	89.00	149.98	6,414.74	-1,316.13	-771.45	14,429,691.34	1,687,800.80	39.73337504	-80.83145546	
7,099.99	89.00	149.98	6,416.48	-1,402.70	-721.42	14,429,604.77	1,687,850.83	39.73313703	-80.83127810	
7,199.99	89.00	149.98	6,418.23	-1,488.27	-671.40	14,429,518.20	1,687,900.86	39.73289903	-80.83110074	
7,299.99	89.00	149.98	6,419.97	-1,575.84	-621.37	14,429,431.63	1,687,950.88	39.73266102	-80.83092338	
7,399.99	89.00	149.98	6,421.71	-1,662.41	-571.34	14,429,345.07	1,688,000.91	39.73242302	-80.83074602	
7,499.99	89.00	149.98	6,423.45	-1,748.98	-521.32	14,429,258.50	1,688,050.93	39.73218501	-80.83056866	
7,599.99	89.00	149.98	6,425.19	-1,835.55	-471.29	14,429,171.93	1,688,100.96	39.73194701	-80.83039130	
7,699.99	89.00	149.98	6,426.93	-1,922.12	-421.27	14,429,085.36	1,688,150.99	39.73170900	-80.83021395	
7,799.99	89.00	149.98	6,428.67	-2,008.69	-371.24	14,428,998.79	1,688,201.01	39.73147099	-80.83003659	
7,899.99	89.00	149.98	6,430.41	-2,095.26	-321.21	14,428,912.22	1,688,251.04	39.73123298	-80.82985924	
7,999.99	89.00	149.98	6,432.16	-2,181.83	-271.19	14,428,825.65	1,688,301.07	39.73099498	-80.82968189	
8,099.99	89.00	149.98	6,433.90	-2,268.39	-221.16	14,428,739.08	1,688,351.09	39.73075697	-80.82950454	
8,199.99	89.00	149.98	6,435.64	-2,354.96	-171.13	14,428,652.51	1,688,401.12	39.73051896	-80.82932719	
8,299.99	89.00	149.98	6,437.38	-2,441.53	-121.11	14,428,565.94	1,688,451.15	39.73028095	-80.82914984	
8,399.99	89.00	149.98	6,439.12	-2,528.10	-71.08	14,428,479.37	1,688,501.17	39.73004294	-80.82897249	
8,499.99	89.00	149.98	6,440.86	-2,614.67	-21.05	14,428,392.80	1,688,551.20	39.72980494	-80.82879515	
8,599.99	89.00	149.98	6,442.60	-2,701.24	28.97	14,428,306.23	1,688,601.23	39.72956693	-80.82861780	
8,699.99	89.00	149.98	6,444.35	-2,787.81	79.00	14,428,219.66	1,688,651.25	39.72932892	-80.82844046	
8,799.99	89.00	149.98	6,446.09	-2,874.38	129.03	14,428,133.09	1,688,701.28	39.72909091	-80.82826312	
8,899.99	89.00	149.98	6,447.83	-2,960.95	179.05	14,428,046.52	1,688,751.31	39.72885290	-80.82808577	
8,999.99	89.00	149.98	6,449.57	-3,047.52	229.08	14,427,959.95	1,688,801.33	39.72861489	-80.82790843	
9,099.99	89.00	149.98	6,451.31	-3,134.09	279.11	14,427,873.38	1,688,851.36	39.72837688	-80.82773110	
9,199.99	89.00	149.98	6,453.05	-3,220.66	329.13	14,427,786.81	1,688,901.39	39.72813887	-80.82755376	
9,299.99	89.00	149.98	6,454.79	-3,307.23	379.16	14,427,700.24	1,688,951.41	39.72790085	-80.82737642	



Planning Report - Geographic

4705102228 Mod

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Goudy 1S-08HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1241+13 @ 1254.00usft
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1241+13 @ 1254.00usft
Site:	Goudy	North Reference:	Grid
Well:	Goudy 1S-08HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev3		

NOV 05 2020

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
9,399.98	89.00	149.98	6,456.53	-3,393.80	429.19	14,427,613.68	1,689,001.44	39.72766284	-80.82719909	
9,499.98	89.00	149.98	6,458.28	-3,480.37	479.21	14,427,527.11	1,689,051.46	39.72742483	-80.82702175	
9,599.98	89.00	149.98	6,460.02	-3,568.94	529.24	14,427,440.54	1,689,101.49	39.72718882	-80.82684442	
9,699.98	89.00	149.98	6,461.76	-3,653.51	579.26	14,427,353.97	1,689,151.52	39.72694881	-80.82666709	
9,799.98	89.00	149.98	6,463.50	-3,740.08	629.29	14,427,267.40	1,689,201.54	39.72671080	-80.82648976	
9,899.98	89.00	149.98	6,465.24	-3,826.65	679.32	14,427,180.83	1,689,251.57	39.72647278	-80.82631243	
9,999.98	89.00	149.98	6,466.98	-3,913.22	729.34	14,427,094.26	1,689,301.60	39.72623477	-80.82613510	
10,099.98	89.00	149.98	6,468.72	-3,999.78	779.37	14,427,007.69	1,689,351.62	39.72599676	-80.82595778	
10,199.98	89.00	149.98	6,470.47	-4,086.35	829.40	14,426,921.12	1,689,401.65	39.72575874	-80.82578045	
10,299.98	89.00	149.98	6,472.21	-4,172.92	879.42	14,426,834.55	1,689,451.68	39.72552073	-80.82560313	
10,399.98	89.00	149.98	6,473.95	-4,259.49	929.45	14,426,747.98	1,689,501.70	39.72528271	-80.82542580	
10,499.98	89.00	149.98	6,475.69	-4,346.06	979.48	14,426,661.41	1,689,551.73	39.72504470	-80.82524848	
10,599.98	89.00	149.98	6,477.43	-4,432.63	1,029.50	14,426,574.84	1,689,601.76	39.72480669	-80.82507116	
10,699.98	89.00	149.98	6,479.17	-4,519.20	1,079.53	14,426,488.27	1,689,651.78	39.72456867	-80.82489384	
10,799.98	89.00	149.98	6,480.91	-4,605.77	1,129.56	14,426,401.70	1,689,701.81	39.72433065	-80.82471652	
10,899.98	89.00	149.98	6,482.65	-4,692.34	1,179.58	14,426,315.13	1,689,751.84	39.72409264	-80.82453921	
10,999.98	89.00	149.98	6,484.40	-4,778.91	1,229.61	14,426,228.56	1,689,801.86	39.72385462	-80.82436189	
11,099.98	89.00	149.98	6,486.14	-4,865.48	1,279.64	14,426,141.99	1,689,851.89	39.72361661	-80.82418458	
11,199.98	89.00	149.98	6,487.88	-4,952.05	1,329.66	14,426,055.42	1,689,901.92	39.72337859	-80.82400726	
11,299.98	89.00	149.98	6,489.62	-5,038.62	1,379.69	14,425,968.85	1,689,951.94	39.72314057	-80.82382995	
11,399.98	89.00	149.98	6,491.36	-5,125.19	1,429.72	14,425,882.29	1,690,001.97	39.72290256	-80.82365264	
11,499.98	89.00	149.98	6,493.10	-5,211.76	1,479.74	14,425,795.72	1,690,051.99	39.72266454	-80.82347533	
11,599.98	89.00	149.98	6,494.84	-5,298.33	1,529.77	14,425,709.15	1,690,102.02	39.72242652	-80.82329802	
11,699.98	89.00	149.98	6,496.59	-5,384.90	1,579.79	14,425,622.58	1,690,152.05	39.72218850	-80.82312072	
11,799.98	89.00	149.98	6,498.33	-5,471.47	1,629.82	14,425,536.01	1,690,202.07	39.72195049	-80.82294341	
11,899.98	89.00	149.98	6,500.07	-5,558.04	1,679.85	14,425,449.44	1,690,252.10	39.72171247	-80.82276611	
11,999.98	89.00	149.98	6,501.81	-5,644.61	1,729.87	14,425,362.87	1,690,302.13	39.72147445	-80.82258880	
12,099.98	89.00	149.98	6,503.55	-5,731.17	1,779.90	14,425,276.30	1,690,352.15	39.72123643	-80.82241150	
12,199.98	89.00	149.98	6,505.29	-5,817.74	1,829.93	14,425,189.73	1,690,402.18	39.72099841	-80.82223420	
12,299.98	89.00	149.98	6,507.03	-5,904.31	1,879.95	14,425,103.16	1,690,452.21	39.72076039	-80.82205690	
12,399.98	89.00	149.98	6,508.77	-5,990.88	1,929.98	14,425,016.59	1,690,502.23	39.72052237	-80.82187960	
12,499.98	89.00	149.98	6,510.52	-6,077.45	1,980.01	14,424,930.02	1,690,552.26	39.72028435	-80.82170231	
12,599.98	89.00	149.98	6,512.26	-6,164.02	2,030.03	14,424,843.45	1,690,602.29	39.72004633	-80.82152501	
12,699.97	89.00	149.98	6,514.00	-6,250.59	2,080.06	14,424,756.88	1,690,652.31	39.71980831	-80.82134771	
12,799.97	89.00	149.98	6,515.74	-6,337.16	2,130.09	14,424,670.31	1,690,702.34	39.71957029	-80.82117042	
12,899.97	89.00	149.98	6,517.48	-6,423.73	2,180.11	14,424,583.74	1,690,752.37	39.71933227	-80.82099313	
12,999.97	89.00	149.98	6,519.22	-6,510.30	2,230.14	14,424,497.17	1,690,802.39	39.71909425	-80.82081584	
13,099.97	89.00	149.98	6,520.96	-6,596.87	2,280.17	14,424,410.60	1,690,852.42	39.71885623	-80.82063855	
13,199.97	89.00	149.98	6,522.71	-6,683.44	2,330.19	14,424,324.03	1,690,902.45	39.71861820	-80.82046126	
13,299.97	89.00	149.98	6,524.45	-6,770.01	2,380.22	14,424,237.46	1,690,952.47	39.71838018	-80.82028397	
13,399.97	89.00	149.98	6,526.19	-6,856.58	2,430.25	14,424,150.90	1,691,002.50	39.71814216	-80.82010668	
13,499.97	89.00	149.98	6,527.93	-6,943.15	2,480.27	14,424,064.33	1,691,052.52	39.71790414	-80.81992940	
13,599.97	89.00	149.98	6,529.67	-7,029.72	2,530.30	14,423,977.76	1,691,102.55	39.71766611	-80.81975212	
13,699.97	89.00	149.98	6,531.41	-7,116.29	2,580.32	14,423,891.19	1,691,152.58	39.71742809	-80.81957483	
13,799.97	89.00	149.98	6,533.15	-7,202.86	2,630.35	14,423,804.62	1,691,202.60	39.71719007	-80.81939755	
13,899.97	89.00	149.98	6,534.89	-7,289.43	2,680.38	14,423,718.05	1,691,252.63	39.71695204	-80.81922027	
13,999.97	89.00	149.98	6,536.64	-7,376.00	2,730.40	14,423,631.48	1,691,302.66	39.71671402	-80.81904299	
14,099.97	89.00	149.98	6,538.38	-7,462.56	2,780.43	14,423,544.91	1,691,352.68	39.71647599	-80.81886571	
14,199.97	89.00	149.98	6,540.12	-7,549.13	2,830.46	14,423,458.34	1,691,402.71	39.71623797	-80.81868844	
14,299.97	89.00	149.98	6,541.86	-7,635.70	2,880.48	14,423,371.77	1,691,452.74	39.71599995	-80.81851116	
14,399.97	89.00	149.98	6,543.60	-7,722.27	2,930.51	14,423,285.20	1,691,502.76	39.71576192	-80.81833389	
14,499.97	89.00	149.98	6,545.34	-7,808.84	2,980.54	14,423,198.63	1,691,552.79	39.71552389	-80.81815662	
14,599.97	89.00	149.98	6,547.08	-7,895.41	3,030.56	14,423,112.06	1,691,602.82	39.71528587	-80.81797934	
14,699.97	89.00	149.98	6,548.83	-7,981.98	3,080.59	14,423,025.49	1,691,652.84	39.71504784	-80.81780207	
14,799.97	89.00	149.98	6,550.57	-8,068.55	3,130.62	14,422,938.92	1,691,702.87	39.71480982	-80.81762480	

4705102228 MOD



Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Goudy 1S-08HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1241+13 @ 1254.00usft
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1241+13 @ 1254.00usft
Site:	Goudy	North Reference:	Grid
Well:	Goudy 1S-08HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev3		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
14,899.97	89.00	149.98	6,552.31	-8,155.12	3,180.64	14,422,852.35	1,691,752.90	39.71457179	-80.81744754	
14,999.97	89.00	149.98	6,554.05	-8,241.69	3,230.67	14,422,765.78	1,691,802.92	39.71433376	-80.81727027	
15,099.97	89.00	149.98	6,555.79	-8,328.26	3,280.70	14,422,679.21	1,691,852.95	39.71409574	-80.81709300	
15,199.97	89.00	149.98	6,557.53	-8,414.83	3,330.72	14,422,592.64	1,691,902.98	39.71385771	-80.81691574	
15,299.97	89.00	149.98	6,559.27	-8,501.40	3,380.75	14,422,506.07	1,691,953.00	39.71361968	-80.81673848	
15,399.97	89.00	149.98	6,561.01	-8,587.97	3,430.78	14,422,419.51	1,692,003.03	39.71338165	-80.81656121	
15,499.97	89.00	149.98	6,562.76	-8,674.54	3,480.80	14,422,332.94	1,692,053.05	39.71314362	-80.81638395	
15,599.97	89.00	149.98	6,564.50	-8,761.11	3,530.83	14,422,246.37	1,692,103.08	39.71290559	-80.81620669	
15,699.97	89.00	149.98	6,566.24	-8,847.68	3,580.85	14,422,159.80	1,692,153.11	39.71266757	-80.81602943	
15,799.97	89.00	149.98	6,567.98	-8,934.25	3,630.88	14,422,073.23	1,692,203.13	39.71242954	-80.81585218	
15,899.97	89.00	149.98	6,569.72	-9,020.82	3,680.91	14,421,986.66	1,692,253.16	39.71219151	-80.81567492	
15,999.97	89.00	149.98	6,571.46	-9,107.39	3,730.93	14,421,900.09	1,692,303.19	39.71195348	-80.81549767	
16,099.97	89.00	149.98	6,573.20	-9,193.95	3,780.96	14,421,813.52	1,692,353.21	39.71171545	-80.81532041	
16,199.97	89.00	149.98	6,574.95	-9,280.52	3,830.99	14,421,726.95	1,692,403.24	39.71147742	-80.81514316	
16,299.97	89.00	149.98	6,576.69	-9,367.09	3,881.01	14,421,640.38	1,692,453.27	39.71123939	-80.81496591	
16,399.97	89.00	149.98	6,578.43	-9,453.66	3,931.04	14,421,553.81	1,692,503.29	39.71100136	-80.81478866	
16,499.97	89.00	149.98	6,580.17	-9,540.23	3,981.07	14,421,467.24	1,692,553.32	39.71076333	-80.81461141	
16,599.97	89.00	149.98	6,581.91	-9,626.80	4,031.09	14,421,380.67	1,692,603.35	39.71052529	-80.81443416	
16,699.97	89.00	149.98	6,583.65	-9,713.37	4,081.12	14,421,294.10	1,692,653.37	39.71028726	-80.81425692	
16,799.97	89.00	149.98	6,585.39	-9,799.94	4,131.15	14,421,207.53	1,692,703.40	39.71004923	-80.81407967	
16,899.97	89.00	149.98	6,587.13	-9,886.51	4,181.17	14,421,120.96	1,692,753.43	39.70981120	-80.81390243	
16,999.97	89.00	149.98	6,588.88	-9,973.08	4,231.20	14,421,034.39	1,692,803.45	39.70957317	-80.81372519	
17,099.97	89.00	149.98	6,590.62	-10,059.65	4,281.23	14,420,947.82	1,692,853.48	39.70933513	-80.81354795	
17,199.97	89.00	149.98	6,592.36	-10,146.22	4,331.25	14,420,861.25	1,692,903.51	39.70909710	-80.81337071	
17,299.97	89.00	149.98	6,594.10	-10,232.79	4,381.28	14,420,774.68	1,692,953.53	39.70885907	-80.81319347	
17,399.97	89.00	149.98	6,595.84	-10,319.36	4,431.31	14,420,688.12	1,693,003.56	39.70862103	-80.81301623	
17,499.97	89.00	149.98	6,597.58	-10,405.93	4,481.33	14,420,601.55	1,693,053.58	39.70838300	-80.81283899	
17,599.97	89.00	149.98	6,599.32	-10,492.50	4,531.36	14,420,514.98	1,693,103.61	39.70814496	-80.81266176	
17,699.96	89.00	149.98	6,601.06	-10,579.07	4,581.38	14,420,428.41	1,693,153.64	39.70790693	-80.81248452	
17,799.96	89.00	149.98	6,602.81	-10,665.64	4,631.41	14,420,341.84	1,693,203.66	39.70766890	-80.81230729	
17,899.96	89.00	149.98	6,604.55	-10,752.21	4,681.44	14,420,255.27	1,693,253.69	39.70743086	-80.81213006	
17,925.95	89.00	149.98	6,605.00	-10,774.70	4,694.44	14,420,232.77	1,693,266.69	39.70736900	-80.81208400	

PBHL/TD 17925.95 MD/6605.00 TVD

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
Goudy 1S-08HM LP	0.00	0.01	6,414.00	-1,279.02	-792.71	14,429,728.45	1,687,779.54	39.73347706	-80.83153085	
- plan misses target center by 0.16usft at 6957.21usft MD (6414.00 TVD, -1279.10 N, -792.85 E)										
- Point										
Goudy 1S-08HM BHL r3	0.00	0.01	6,605.00	-10,774.70	4,694.44	14,420,232.77	1,693,266.69	39.70736900	-80.81208400	
- plan hits target center										
- Point										

NOV 05 2020



Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Goudy 1S-08HM (I)
Company:	Tug Hill Operating LLC	TVD Reference:	RKB=1241+13 @ 1254.00usft
Project:	Marshall County, West Virginia.	MD Reference:	RKB=1241+13 @ 1254.00usft
Site:	Goudy	North Reference:	Grid
Well:	Goudy 1S-08HM (I)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev3		

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,000.00	1,000.00	13 3/8" Casing	13-3/8	17
2,604.07	2,600.00	9 5/8" Casing	9-5/8	12-1/4

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,200.00	1,200.00	0.00	0.00	KOP Begin 1°/100' build
1,700.00	1,699.37	-5.64	-21.06	Begin 5.00° tangent
2,804.84	2,800.00	-30.57	-114.07	Begin 3°/100' turn
2,877.92	2,872.81	-33.45	-119.58	Begin 3°/100' build/turn
3,378.57	3,360.19	-100.28	-204.53	Begin 20.01° tangent
5,981.72	5,806.16	-644.28	-909.98	Begin 8°/100' build/turn
6,536.56	6,268.51	-923.71	-940.07	Begin 10°/100' build/turn
6,957.31	6,414.00	-1,279.19	-792.80	Begin 89.00° lateral
17,925.95	6,605.00	-10,774.70	4,694.44	PBHL/TD 17925.95 MD/6605.00 TVD

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Office of Oil and Gas

NOV 06 2020

WV Department of
Environmental Protection



JM 9/2/2020

Well Site Safety Plan

Tug Hill Operating, LLC

Well Name: Goudy 1S-8HM

Pad Location: Goudy Pad

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing: 4,398,579.87

Easting: 514,677.85

RECEIVED
Office of Oil and Gas
September 2020
NOV 06 2020

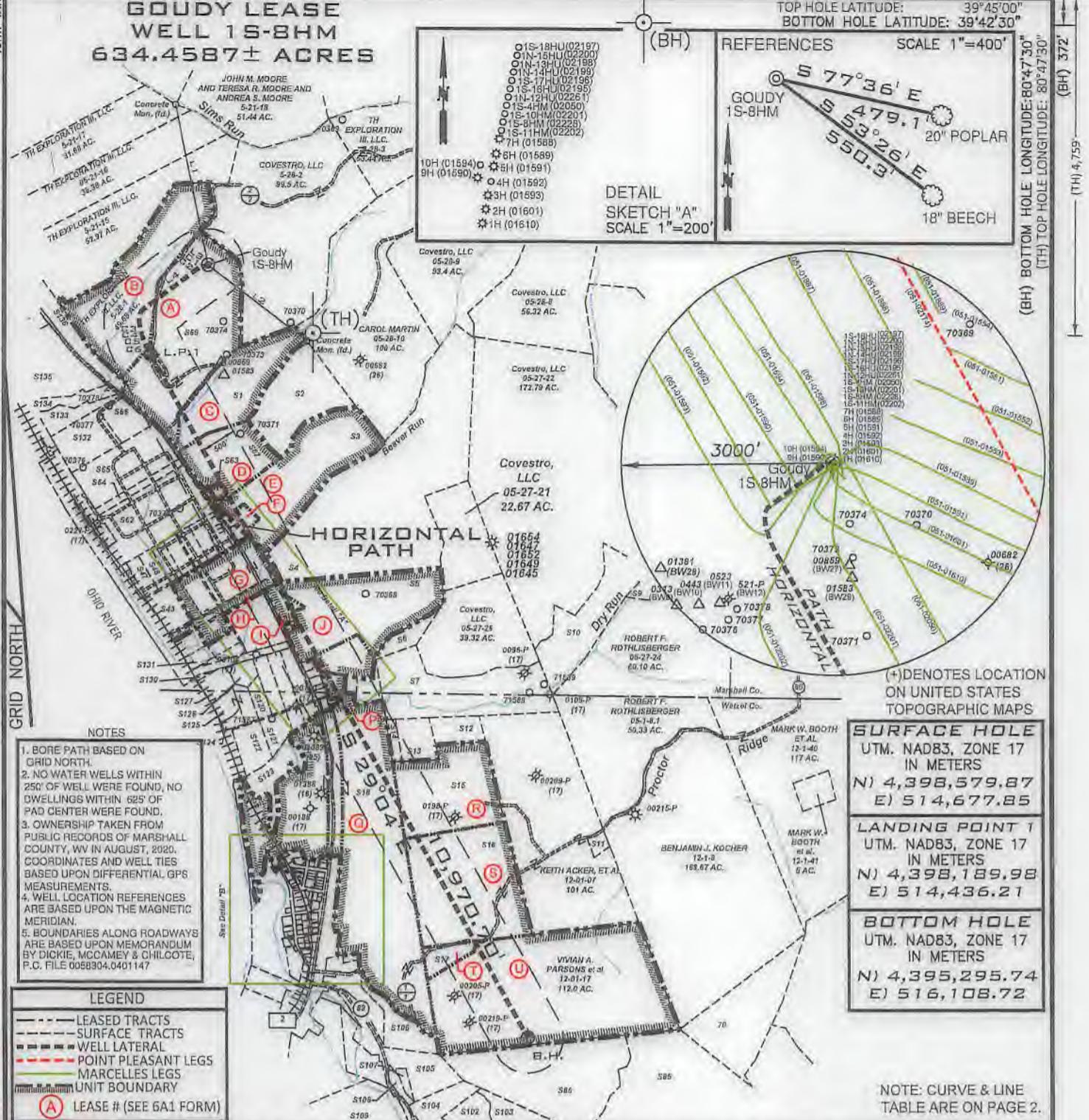
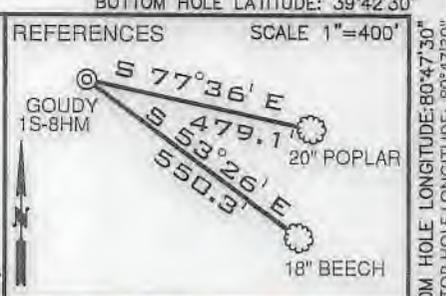
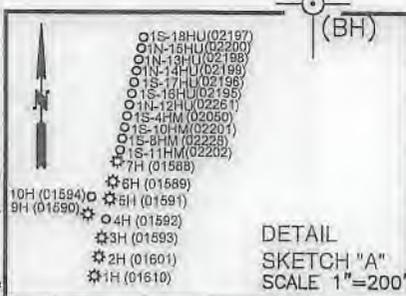
WV Department of
Environmental Protection

form ww6

GOUDY LEASE WELL 1S-8HM 634.4587± ACRES

(TH) 10,461' (BH) 5,790'

TOP HOLE LATITUDE: 39°45'00"
BOTTOM HOLE LATITUDE: 39°42'30"



- NOTES**
1. BORE PATH BASED ON GRID NORTH.
 2. NO WATER WELLS WITHIN 250' OF WELL WERE FOUND, NO DWELLINGS WITHIN 625' OF PAD CENTER WERE FOUND.
 3. OWNERSHIP TAKEN FROM PUBLIC RECORDS OF MARSHALL COUNTY, WV IN AUGUST, 2020. COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS.
 4. WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.
 5. BOUNDARIES ALONG ROADWAYS ARE BASED UPON MEMORANDUM BY DICKIE, MCCAMEY & CHILCOTE, P.C. FILE 0058904.0401147

LEGEND

- LEASE TRACTS
- SURFACE TRACTS
- WELL LATERAL
- POINT PLEASANT LEGS
- MARCELLES LEGS
- UNIT BOUNDARY
- (A) LEASE # (SEE 6A1 FORM)

SURFACE HOLE
UTM. NAD83, ZONE 17
IN METERS
N) 4,398,579.87
E) 514,677.85

LANDING POINT 1
UTM. NAD83, ZONE 17
IN METERS
N) 4,398,189.98
E) 514,436.21

BOTTOM HOLE
UTM. NAD83, ZONE 17
IN METERS
N) 4,395,295.74
E) 516,108.72

NOTE: CURVE & LINE TABLE ARE ON PAGE 2.

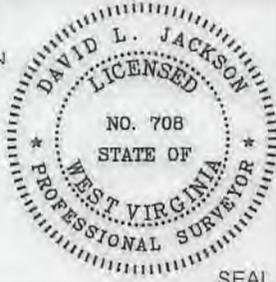
FILE NUMBER _____
DRAWING NUMBER GOUDY_1S-8HM_REV3
SCALE 1" = 2000'
MINIMUM DEGREE OF ACCURACY 1/200
PROVEN SOURCE OF ELEVATION SUBMETER MAPPING
GRADE GPS

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
304-623-5951



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

DATE: AUGUST 24, 2020
OPERATORS WELL NO. GOUDY 1S-8HM
API WELL NO. 47-051-02228 MOD
STATE COUNTY PERMIT

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

LOCATION ELEVATION 1239.4' WATERSHED (HUC 10) FRENCH CREEK - OHIO RIVER
DISTRICT FRANKLIN COUNTY MARSHALL
QUADRANGLE NEW MARTINSVILLE 7.5' LEASE NUMBER _____ SEE WW-6A1 FORM

SURFACE OWNER TH EXPLORATION III, LLC. ACREAGE 70.0
OIL & GAS ROYALTY OWNER TH EXPLORATION III, LLC. LEASE ACREAGE 70.0
PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___
PERFORME NEW FORMATION ___ OTHER PHYSICAL CHANGE (SPECIFY) _____
PLUG & ABANDON ___ CLEAN OUT & REPLUG ___
TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD 6,537' TMD: 17,926'
WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 ADDRESS 5400 D BIG TYLER ROAD
FORT WORTH, TX 76107 CHARLESTON, WV 25313

COUNTY NAME PERMIT

**GOUDY LEASE
WELL 1S-8HM
634.4587± ACRES**

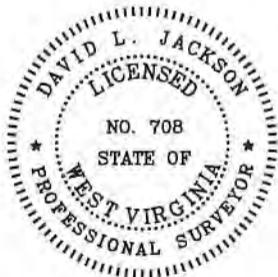
Detail "A"



Detail "B"



LINE	BEARING	DISTANCE
L1	N 11°47' W	2288.53'
L2	S 52°53' E	1751.23'
L3	S 75°58' W	118.14'
L4	S 53°19' W	891.15'



RECEIVED
Office of Oil and Gas
NOV 06 2020

WV
Engineering

P.S. 708 *David L Jackson*

Number	TAX MAP -PARCEL	SURFACE OWNER	ACRES
S1	C 05-28-12	TH Exploration III, LLC.	20.226
S2	05-28-11	Carol A. Martin	24.681
S3	E 05-27-19	Covestro, LLC	33.786
S4	05-27-20	Covestro, LLC	93.027
S5	J 05-27-20.1	Appalachian Power Co.	43.973
S6	05-27-27	James Andrew & Karen Lynne Richmond	8.9353
S7	05-27-25	James Andrew & Karen Lynne Richmond	41.35
S8	12-23-14	Robert F. Rothlisberger	0.27
S9	05-26-19	Eric Jay Booth & Karrol S. Booth	50.0
S10	05-27-23	Robert F. Rothlisberger	35.77
S11	12-01-7.1	Harry Wayman Estate	2.0
S12	12-01-04	Robert F. Rothlisberger	6.0
S13	12-01-03	Charles D. & Edith Feenerty Harrison	7.8
S14	12-01-02	James A. & Karen L. Richmond	2.7
S15	R 12-01-05	Irvin L. Hoyt, Jr. & David L. Hoyt	36.8
S16	S 12-01-06	Mona Parsons, et al	52.75
S17	T 12-01-16	Vivian A. Parsons, et al	5.125
S18	Q 12-01-01	Covestro, LLC	135.0
S19	12-01-1.7	Colombia Gas Transmission, Corp.	0.15
S20	P 12-23-15	Paul E. & Donna Jo Cain	0.7
S21	O 12-23-15.1	Robert F. Rothlisberger	0.47
S22	N 12-23-13	Paul E. & Donna Jo Cain	0.38
S23	M 05-27-27.2	Paul E. Cain, et ux	0.1767
S24	L 05-27-27.1	Donald P. Cain	1.645
S25	05-27-27.3	Paul E. Cain, et ux	1.018
S26	K 05-27-28	Covestro, LLC	8.0
S27	12-23-12	Paul E. & Donna Jo Cain	0.37
S28	12-23-11	Covestro, LLC	1.25
S29	12-23-10	Covestro, LLC	1.28
S30	12-23-05	Covestro, LLC	3.69
S31	05-27-40	Covestro, LLC	3.36
S32	12-23-06	Covestro, LLC	0.34
S33	05-27-44	Covestro, LLC	0.21
S34	05-27-43	Covestro, LLC	0.63
S35	05-27-42	Covestro, LLC	0.52
S36	05-27-42.1	Covestro, LLC	0.52
S37	05-27-41	Martha Jean Arrick	0.99
S38	05-27-31.2	Appalachian Power Co.	3.33
S39	05-27-31	Covestro, LLC	16.1
S40	05-27-30	Covestro, LLC	0.371
S41	I 05-27-31.1	Covestro, LLC	3.0
S42	H 05-27-32.2	Covestro, LLC	3.95
S43	05-27-29	Covestro, LLC	9.0
S44	05-27-45	Covestro, LLC	0.3627
S45	G 05-27-32	Covestro, LLC	33.53
S46	05-27-03	Covestro, LLC	1.27
S47	05-27-04	Covestro, LLC	2.52
S48	05-27-05	Covestro, LLC	2.52
S49	05-27-06	Covestro, LLC	2.52
S50	05-27-07	Covestro, LLC	2.52
S51	05-27-08	Covestro, LLC	2.52
S52	05-27-09	Covestro, LLC	1.87
S53	05-27-10	Covestro, LLC	0.52
S54	05-27-12	Covestro, LLC	1.0
S55	05-27-13	Covestro, LLC	0.34
S56	05-27-14	Covestro, LLC	0.25
S57	05-27-15	Covestro, LLC	0.47
S58	05-27-16	Covestro, LLC	0.23
S59	05-27-18	Covestro, LLC	0.97
S60	05-27-17	Covestro, LLC	0.88
S61	F 05-27-19.3	Cemetery	2.0
S62	05-27-02	Covestro, LLC	28.099
S63	05-27-19.2	Wheeling Electric Co.	0.75
S64	05-28-12.2	Covestro, LLC	3.1
S65	05-28-12.3	Covestro, LLC	18.784
S66	05-28-13.1	Air Products & Chemicals, Inc	5.522
S67	D 05-27-19.1	Covestro, LLC	21.267
S68	05-27-11	Covestro, LLC	0.03
S69	A 05-28-13	TH Exploration III, LLC.	70.0

CURVE	CHORD BEARING	CHORD LENGTH	RADIUS	ARC LENGTH
C1	S 60°11' W	8.23'	19.22'	8.30'
C2	S 52°48' W	106.07'	3219.38'	106.08'
C3	S 35°05' W	82.43'	115.12'	63.23'
C4	S 08°02' W	101.84'	280.52'	102.51'
C5	S 08°46' E	178.20'	724.32'	178.68'
C6	S 22°46' E	334.81'	1397.15'	335.72'



**TUG HILL
OPERATING**

OPERATOR'S
WELL #: Goudy 1S-8HM
DISTRICT: Franklin
COUNTY: Marshall
STATE: WV
API # 47-051-02228mod

WELL PLAT
PAGE 2 OF 3
DATE: 8/24/2020

**GOUDY LEASE
WELL 1S-8HM
634.4587± ACRES**

Number	TAX MAP -PARCEL	SURFACE OWNER	ACRES
S70	12-01-19	Steven J. & Susan L. Hafer	36.5
S71	12-01-31	Steven Jack & Susan Louise Hafer	20.0
S72	12-01-20	Charles E. Frohnappfel, Trustee of the Charles E. Frohnappfel Living Trust Dated October 3, 2017	126.0
S73	12-02-01	Nelson M. & Mary D. Miller	49.0
S74	12-01-34.1	Herbert Parsons & Virginia Yoho Roy	2.0
S75	12-01-34	John D. Amnah	38.0
S76	12-02-07	John D. Amnah	44.5
S77	12-06-52	John D. Amnah	6.46
S78	12-01-33	James & Charlene Lemley	1.06
S79	12-01-29	Baxter Farm, LLC	2.0
S80	12-06-26.3	Richard L. & Donna L. Eriewine	20.96
S81	12-06-26	Larry K. Keene	6.69
S82	12-06-24	Mark D. Baxter	84.92
S83	12-06-06	Baxter Farm, LLC	88.8
S84	12-01-32	Baxter Farm, LLC	78.74
S85	12-01-28	Steven J. & Susan L. Hafer	88.39
S86	12-01-18	Travis Darrell Blake & Angela Dawn Mitchell	48.4
S87	12-6A-11.2	Robert L. & Mary Ellen Stillwagener	0.38
S88	12-06-18.1	Janice Haudenschilt	1.15
S89	12-06-18	Shelia Diane Gore	0.34
S90	12-6A-11.1	Robert L. & Mary Ellen Stillwagener	0.66
S91	12-6A-11	Robert L. & Mary Ellen Stillwagener	2.38
S92	12-6A-10	Jay Edward & Kathleen S. Smith	3.35
S93	12-6A-09	Joyce Kay Morris (L/E), Robert D. Jr. & Marsha J. Morris	3.52
S94	12-6A-08	Candis Darlene Clark	3.43
S95	12-6A-07	Janice Capobianco	8.47
S96	12-6A-06	Ronald E. & Susan L. McCoy	2.09
S97	12-6A-03	Ronald E. & Susan L. McCoy	3.47
S98	12-6A-02	Ronald E. & Susan L. McCoy	3.49
S99	12-6A-01	Ronald E. & Susan L. McCoy	6.51
S100	12-06-05	Steven & Susan Louis Hafer	8.93
S101	12-06-04	Steven & Susan Hafer	6.2
S102	12-01-27	Steven J. & Susan Hafer	83.69
S103	12-01-26	Roland S. Fitzsimmons & William Joseph Blake	13.83
S104	12-01-25	Jack R. & Linda S. Blake	17.42
S105	12-01-15.3	Daniel L. & Vickie L Williams	7.0
S106	12-01-1.1	W.V. D.O.H	10.59
S107	12-01-15.2	Michael Goddard	1.09
S108	12-01-15.1	Marshall & Tara Cecil (L/C), Roy Yoho	1.46

Number	TAX MAP -PARCEL	SURFACE OWNER	ACRES
S109	12-01-22	W.D. & R.A. Glover	18.84
S110	12-01-23.2	Sharon Maye McKinney	0.782
S111	12-01-23	Danny E. & Jill L. McKinney	1.55
S112	12-01-23.1	W.E & R.A. Glover	34.17
S113	12-01-25.1	Timothy Q. & Ronda K. Bohrer	1.2
S114	12-01-24	Mitzilou Cecil, Trustee of the Tiger Cecil Irrevocable	0.85
S115	12-06-02	Brock T. Conner	23.83
S116	12-06-49	Kirkland Enterprises, LLC.	10.32
S117	12-06-51	Steven & Susan Hafer	0.599
S118	12-06-48	Ronald E. & Susan L. McCoy	0.36
S119 L	05-27-39	Covestro, LLC	3.74
S120	12-23-04	Pittsburgh Plate Glass Corp.	2.41
S121	12-23-09	Covestro, LLC	3.95
S122	12-23-08	Dora N. Moore Hrs., Et al	6.95
S123	12-01-1.5	United States of America	7.14
S124	12-23-02	Covestro, LLC	1.27
S125	12-23-03	Covestro, LLC	4.67
S126	12-27-38	Covestro, LLC	2.72
S127	12-27-37	Covestro, LLC	3.20
S128	12-27-35	Covestro, LLC	1.79
S129	12-27-34	Covestro, LLC	1.91
S130	12-27-36	Covestro, LLC	1.58
S131	12-27-33	Covestro, LLC	1.95
S132	05-28-13.2	Covestro, LLC	11.02
S133	05-28-1.1	Covestro, LLC	5.2217
S134	05-28-1.4	Covestro, LLC	11.69
S135	05-28-1.2	Covestro, LLC	21.62
S136	05-21-3.1	Eagle Natruim, LLC	98.61
S137	12-01-1.2	West Virginia Dept. of Transportation	0.27
S138	12-22-59	June M. Morris, Hrs.	2.00
S139	12-22-60	Franklin W. & Barabara J. Cogar	0.5
S140	12-22-09	M.B. Investment	0.20
S141	12-22-10	M.B. Investment	0.24
S142	12-22-12	Jack Ray & Linda S. Blake	0.16
S143	12-22-13	Dewayne E. & Patricia A. Yost	0.07
S144	12-22-28	June M. Morris, Hrs	0.12
S145	12-22-29	Jack R. & Linda S. Blake	0.50
S146	12-22-30	Jack R. & Linda S. Blake	0.24
S147	12-22-32	Ren Realty, LLC.	0.27
S148	12-22-33	Ren Realty, LLC.	0.08
S149	12-22-34	Ren Realty, LLC.	0.08
S150	12-22-51	Eric R. & Debra S. Sims	0.10
S151	12-22-52	Eric R. & Debra S. Sims	0.10
S152	12-22-53	Eric R. & Debra S. Sims	0.10
S153	12-22-54	Eric R. & Debra S. Sims	0.10
S154	12-22-55	Eric R. & Debra S. Sims	0.19
S155	12-22-56	Michael L. & Joyce D. Durig	0.22
S156	12-22-57	Michael L. & Joyce D. Durig	0.11
S157	12-22-58	Michael L. & Joyce D. Durig	0.15
S158	12-22-50	Michael L. & Joyce D. Durig	0.17
S159	12-22-49	Daniel J. Stillwagener	0.13
S160	12-22-62	Virginia Bohrer, et al	0.05
S161	12-22-62.1	John R. & Toni Wright	0.314
S162	12-22-44	John R. & Toni Wright	0.52
S163	12-01-1.9	Grandview Doolin Public Service District	0.13
S164	12-22-27	Grandview Doolin Public Service District	0.27
S165	12-01-1.12	United States of America	22.55
S166	12-01-1.8	Grandview Doolin Public Service District	0.0895



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Office of State Gas
NOV 03 2020
West Virginia Department of Environmental Protection

P.S. 708 *David L Jackson*



**TUG HILL
OPERATING**

OPERATOR'S
WELL #: Goudy 1S-8HM
DISTRICT: Franklin
COUNTY: Marshall
STATE: WV
API # 47-051-02228 MOD

WELL PLAT
PAGE 3 OF 3
DATE: 8/24/2020

4705102228 mo v

WW-6A1
(5/13)

Operator's Well No. Goudy 1S-8HM

**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
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*See attached pages

***Co-tenancy utilization – At least 7 mineral owners in tract. At least 75% of the royalty owners have executed a lease on the tract. The interests of the remaining co-tenants were acquired pursuant to the Co-tenancy Modernization and Majority Protection Act.**

**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

Permitted
Office of Oil and Gas

NOV 06 2020

WV Department of
Environmental Protection

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 Morris*
 Its: Permitting Specialist - Appalachia Region

Lease ID	TMP	Tags	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page	Assignment				
10*14300	5-28-13	A	PPG INDUSTRIES INC	GASTAR EXPLORATION USA INC	1/8+	725 123	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 24/332	Merger of Gastar Exploration Inc and 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: 43/563
10*14300	5-28-1	B	PPG INDUSTRIES INC	GASTAR EXPLORATION USA INC	1/8+	725 123	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 24/332	Merger of Gastar Exploration Inc and 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: 43/563
10*14300	5-28-12	C	PPG INDUSTRIES INC	GASTAR EXPLORATION USA INC	1/8+	725 123	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 24/332	Merger of Gastar Exploration Inc and 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: 43/563
10*14658	5-28-12	C	THOMAS WILLIAM ABERSOLD	GASTAR EXPLORATION USA INC	1/8+	775 314	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 28/499	Merger of Gastar Exploration Inc and 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: 43/563
10*14659	5-28-12	C	JUDITH LEE ABERSOLD	GASTAR EXPLORATION USA INC	1/8+	781 609	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 28/499	Merger of Gastar Exploration Inc and 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: 43/563
10*14493	5-27-19.1	D	BETTY JEAN NEELY	GASTAR EXPLORATION USA INC	1/8+	748 468	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14494	5-27-19.1	D	MARY LOU WILSON	GASTAR EXPLORATION USA INC	1/8+	748 471	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14495	5-27-19.1	D	PATRICIA HARTMAN	GASTAR EXPLORATION USA INC	1/8+	752 197	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14496	5-27-19.1	D	STEPHANIE L HALL	GASTAR EXPLORATION USA INC	1/8+	752 215	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14497	5-27-19.1	D	CAROL DEEN GARDNER	GASTAR EXPLORATION USA INC	1/8+	752 212	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14498	5-27-19.1	D	BAYER MATERIALSCIENCE LLC	GASTAR EXPLORATION USA INC	1/8+	757 340	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14493	5-27-19	E	BETTY JEAN NEELY	GASTAR EXPLORATION USA INC	1/8+	748 468	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14494	5-27-19	E	MARY LOU WILSON	GASTAR EXPLORATION USA INC	1/8+	748 471	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14495	5-27-19	E	PATRICIA HARTMAN	GASTAR EXPLORATION USA INC	1/8+	752 197	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14496	5-27-19	E	STEPHANIE L HALL	GASTAR EXPLORATION USA INC	1/8+	752 215	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14497	5-27-19	E	CAROL DEEN GARDNER	GASTAR EXPLORATION USA INC	1/8+	752 212	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563

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| Lease ID | TMP | Tags | Grantor, Lessor, Etc. | Grantee, Lessee, Etc. | Royalty | Deed Book/Page | Assignment |
|----------|-----------|------|--|----------------------------|---------|----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 10*14498 | 5-27-19 | E | BAYER MATERIALSCIENCE LLC | GASTAR EXPLORATION USA INC | 1/8+ | 757 340 | N/A |
| 10*22926 | 5-27-19 | E | COVESTRO LLC | TH EXPLORATION LLC | 1/8+ | 976 27 | N/A |
| 10*14493 | 5-27-19.3 | F | BETTY JEAN NEELY | GASTAR EXPLORATION USA INC | 1/8+ | 748 468 | N/A |
| 10*14494 | 5-27-19.3 | F | MARY LOU WILSON | GASTAR EXPLORATION USA INC | 1/8+ | 748 471 | N/A |
| 10*14495 | 5-27-19.3 | F | PATRICIA HARTMAN | GASTAR EXPLORATION USA INC | 1/8+ | 752 197 | N/A |
| 10*14496 | 5-27-19.3 | F | STEPHANIE L BATES | GASTAR EXPLORATION USA INC | 1/8+ | 752 215 | N/A |
| 10*14497 | 5-27-19.3 | F | CAROL DEEN GARDNER | GASTAR EXPLORATION USA INC | 1/8+ | 752 212 | N/A |
| 10*25473 | 5-27-19.3 | F | ETHEL J EVANS | TH EXPLORATION LLC | 1/8+ | 1033 115 | N/A |
| 10*25494 | 5-27-19.3 | F | MARIE ERLEWINE | TH EXPLORATION LLC | 1/8+ | 1033 113 | N/A |
| 10*25558 | 5-27-19.3 | F | MARLENE RECTOR AND EUGENE RECTOR | TH EXPLORATION LLC | 1/8+ | 1033 304 | N/A |
| 10*25655 | 5-27-19.3 | F | HILLARY MONTGOMERY AND VIRGIE MONTGOMERY | TH EXPLORATION LLC | 1/8+ | 1033 306 | N/A |
| 10*25715 | 5-27-19.3 | F | ANNA JONES AND ALAN JONES | TH EXPLORATION LLC | 1/8+ | 1035 163 | N/A |
| 10*26457 | 5-27-19.3 | F | SHARDN COLVIN AND JIMMY LEE COLVIN | TH EXPLORATION LLC | 1/8+ | 1035 3 | N/A |
| 10*26508 | 5-27-19.3 | F | CECELIA EDWARDS | TH EXPLORATION LLC | 1/8+ | 1057 335 | N/A |
| 10*26582 | 5-27-19.3 | F | LINDA E HILL AND JOHN S HILL | TH EXPLORATION LLC | 1/8+ | 1038 532 | N/A |
| 10*26583 | 5-27-19.3 | F | CRAIG DOUGLAS ERLEWINE AND DOREEN E ERLEWINE | TH EXPLORATION LLC | 1/8+ | 1038 538 | N/A |
| 10*26584 | 5-27-19.3 | F | RICHARD LEE ERLEWINE AND DONNA L ERLEWINE | TH EXPLORATION LLC | 1/8+ | 1038 524 | N/A |
| 10*26585 | 5-27-19.3 | F | KELLY R ROOT | TH EXPLORATION LLC | 1/8+ | 1038 528 | N/A |
| 10*26825 | 5-27-19.3 | F | ROBERT C EVANS * | TH EXPLORATION LLC | 1/8+ | 1040 579 | N/A |
| 10*26826 | 5-27-19.3 | F | WILLIAM R MOORE * | TH EXPLORATION LLC | 1/8+ | 1040 585 | N/A |
| 10*26827 | 5-27-19.3 | F | ALBERT L MOORE * | TH EXPLORATION LLC | 1/8+ | 1040 553 | N/A |
| 10*26828 | 5-27-19.3 | F | MICHAEL J MOORE * | TH EXPLORATION LLC | 1/8+ | 1040 547 | N/A |
| 10*26829 | 5-27-19.3 | F | REBECCA M COWARD AND EDWARD S COWARD * | TH EXPLORATION LLC | 1/8+ | 1040 529 | N/A |
| 10*26911 | 5-27-19.3 | F | RACHAEL M MOORE * | TH EXPLORATION LLC | 1/8+ | 1040 541 | N/A |
| 10*22926 | 5-27-32 | G | COVESTRO LLC | TH EXPLORATION LLC | 1/8+ | 976 27 | N/A |
| 10*22926 | 5-27-32.2 | H | COVESTRO LLC | TH EXPLORATION LLC | 1/8+ | 976 27 | N/A |
| 10*22926 | 5-27-31.1 | I | COVESTRO LLC | TH EXPLORATION LLC | 1/8+ | 976 27 | N/A |
| 10*14493 | 5-27-20.1 | J | BETTY JEAN NEELY | GASTAR EXPLORATION USA INC | 1/8+ | 748 468 | N/A |
| 10*14494 | 5-27-20.1 | J | MARY LOU WILSON | GASTAR EXPLORATION USA INC | 1/8+ | 748 471 | N/A |
| 10*14495 | 5-27-20.1 | J | PATRICIA HARTMAN | GASTAR EXPLORATION USA INC | 1/8+ | 752 197 | N/A |
| 10*14496 | 5-27-20.1 | J | STEPHANIE L HALL | GASTAR EXPLORATION USA INC | 1/8+ | 752 215 | N/A |
| 10*14497 | 5-27-20.1 | J | CAROL DEEN GARDNER | GASTAR EXPLORATION USA INC | 1/8+ | 752 212 | N/A |

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Lease ID	TMP	Tags	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment			
10*14499	5-27-20.1	J	UNION CARBIDE CORPORATION	GASTAR EXPLORATION USA INC	1/8+	815 221	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14493	5-27-28	K	BETTY JEAN NEELY	GASTAR EXPLORATION USA INC	1/8+	748 468	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14494	5-27-28	K	MARY LOU WILSON	GASTAR EXPLORATION USA INC	1/8+	748 471	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14495	5-27-28	K	PATRICIA HARTMAN	GASTAR EXPLORATION USA INC	1/8+	752 197	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14496	5-27-28	K	STEPHANIE L HALL	GASTAR EXPLORATION USA INC	1/8+	752 215	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*14497	5-27-28	K	CAROL DEEN GARDNER	GASTAR EXPLORATION USA INC	1/8+	752 212	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 26/639	Merger of Gastar Exploration Inc and 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: 43/563
10*22926	5-27-28	K	COVESTRO LLC	TH EXPLORATION LLC	1/8+	976 27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18446	5-27-27.1	L	DONALD P CAIN	TH EXPLORATION LLC	1/8+	933 96	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18445	5-27-27.2	M	PAUL E CAIN AND DONNA JO CAIN	TH EXPLORATION LLC	1/8+	933 93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18438	12-23-13	N	PAUL E CAIN AND DONNA JO CAIN	TH EXPLORATION LLC	1/8+	190A 191	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*23506	12-23-15.1	O	ROBERT F ROTHLSBERGER	TH EXPLORATION LLC	1/8+	210A 805	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18438	12-23-15	P	PAUL E CAIN AND DONNA JO CAIN	TH EXPLORATION LLC	1/8+	190A 191	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*31402	12-1-1	Q	VIRGINIA R BOHRER	CLAY RESOURCES INC	1/8+	68A 328	Clay Resources Inc to Murvin Oil Company: 71A/404	Murvin Oil Co, Conord O&G Corp, & American Ridge O&G Inc to Applied Mechanics Corp: 74A/426	Applied Mechanics Corp to Cobham Gas Industries: 74A/676	Cobham Gas Industries & Belmont Energy Inc to Tri-County O&G Inc: 80/639	Tri-County O&G Inc to B&R Construction: 83A/483	B&R Construction Inc to Stone Energy Corp: 110A/41	B&R Construction Inc to B&R Holdings Inc: 118A/685	Participation Agreement - B&R Holdings and ICO Marcellus I LLC: 127A/670	ICO Marcellus I LLC to Stone Energy Corp: 179A/844	B&R Holdings Inc and Blue Group Operating Inc to Stone Energy Corp: 179A/848	Stone Energy Corp to EQT Production Company: 183A/305	EQT Production Company to TH Exploration LLC: 250A/651			
10*31404	12-1-1	Q	JACK LANG MASON AND JEAN M MASON	CLAY RESOURCES INC	1/8+	68A 330	Clay Resources Inc to Murvin Oil Company: 71A/404	Murvin Oil Co, Conord O&G Corp, & American Ridge O&G Inc to Applied Mechanics Corp: 74A/426	Applied Mechanics Corp to Cobham Gas Industries: 74A/676	Cobham Gas Industries & Belmont Energy Inc to Tri-County O&G Inc: 80/639	Tri-County O&G Inc to B&R Construction: 83A/483	B&R Construction Inc to Stone Energy Corp: 110A/41	B&R Construction Inc to B&R Holdings Inc: 118A/685	Participation Agreement - B&R Holdings and ICO Marcellus I LLC: 127A/670	ICO Marcellus I LLC to Stone Energy Corp: 179A/844	B&R Holdings Inc and Blue Group Operating Inc to Stone Energy Corp: 179A/848	Stone Energy Corp to EQT Production Company: 183A/305	EQT Production Company to TH Exploration LLC: 250A/651			
10*31403	12-1-1	Q	HELEN MASON BAGGS AND ROBERT B BAGGS	CLAY RESOURCES INC	1/8+	68A 326	Clay Resources Inc to Murvin Oil Company: 71A/404	Murvin Oil Co, Conord O&G Corp, & American Ridge O&G Inc to Applied Mechanics Corp: 74A/426	Applied Mechanics Corp to Cobham Gas Industries: 74A/676	Cobham Gas Industries & Belmont Energy Inc to Tri-County O&G Inc: 80/639	Tri-County O&G Inc to B&R Construction: 83A/483	B&R Construction Inc to Stone Energy Corp: 110A/41	B&R Construction Inc to B&R Holdings Inc: 118A/685	Participation Agreement - B&R Holdings and ICO Marcellus I LLC: 127A/670	ICO Marcellus I LLC to Stone Energy Corp: 179A/844	B&R Holdings Inc and Blue Group Operating Inc to Stone Energy Corp: 179A/848	Stone Energy Corp to EQT Production Company: 183A/305	EQT Production Company to TH Exploration LLC: 250A/651			
10*15075	12-1-5	R	BARBARA P MAZER AS TRSTEE OF THE BARBARA MAZER TRST UNDER AGMT DTD APR 17 2013	GASTAR EXPLORATION USA INC	1/8+	129A 693	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 135A/284	Merger of Gastar Exploration Inc and Gastar Exploration USA Inc: 13/270	Gastar Exploration Inc to TH Exploration II LLC: 173A/431	Atinum Marcellus I LLC To TH Exploration II, LLC: 43/563
10*15076	12-1-5	R	EDWARD PENNINGTON	GASTAR EXPLORATION USA INC	1/8+	130A 979	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 135A/284	Merger of Gastar Exploration Inc and Gastar Exploration USA Inc: 13/270	Gastar Exploration Inc to TH Exploration II LLC: 173A/431	Atinum Marcellus I LLC To TH Exploration II, LLC: 43/563
10*15079	12-1-5	R	JAMES K. HALL	GASTAR EXPLORATION USA INC	1/8+	132A 704	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 135A/284	Merger of Gastar Exploration Inc and Gastar Exploration USA Inc: 13/270	Gastar Exploration Inc to TH Exploration II LLC: 173A/431	Atinum Marcellus I LLC To TH Exploration II, LLC: 43/563
10*18122	12-1-5	R	ANNE L HALL AND RICHARD S WURST	TH EXPLORATION LLC	1/8+	187A 626	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18175	12-1-5	R	STONE HILL MINERALS HOLDINGS LLC	TH EXPLORATION LLC	1/8+	188A 791	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18177	12-1-5	R	STONE HILL MINERALS HOLDINGS LLC	TH EXPLORATION LLC	1/8+	188A 793	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18233	12-1-5	R	SUSAN G HALL	TH EXPLORATION LLC	1/8+	188A 429	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18286	12-1-5	R	ELIZABETH H HALL	TH EXPLORATION LLC	1/8+	188A 431	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18376	12-1-6	S	VICTORIA K MCCLINTOCK	TH EXPLORATION LLC	1/8+	189A 492	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10*18377	12-1-6	S	TERRY W GILBERT	TH EXPLORATION LLC	1/8+	189A 494	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Lease ID	TMP	Tags	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	
10*18378	12-1-6	S	CARL J GILBERT SR AND LAURA A GILBERT	TH EXPLORATION LLC	1/8+	189A 496	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*18817	12-1-6	S	JUDITH R WHITE AND FRANKIE D WHITE	TH EXPLORATION LLC	1/8+	192A 518	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*19682	12-1-6	S	NEIL D PATTERSON JR & THERESA PATTERSON	TH EXPLORATION LLC	1/8+	195A 279	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*19998	12-1-6	S	MALISSA D PATTERSON AS AIF FOR CLARK ELWOOD PATTERSON	TH EXPLORATION LLC	1/8+	196A 577	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*24538	12-1-6	S	BRC MINERALS, LP	BRC WORKING INTEREST COMPANY LLC	1/8+	103A 320	N/A	N/A	N/A	BRC Working Interest Company LLC to Chesapeake Appalachia LLC: 103A/470	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 120A/109	Chesapeake Appalachia LLC to SWN Production Company: 157A/540	Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC: 158A/801	SWN Exchange Titleholder LLC merged with and into SWN Production Company LLC: 13/296	SWN Production Company LLC to Antero Exchange Properties LLC: 177A/533	Statoil USA Onshore Properties Inc to Antero Exchange Properties LLC: 177A/738	Antero Exchange Properties LLC merged with and into Antero Resources Corporation: 13/311	Antero Resources Corporation to TH Exploration LLC: 218A/755	N/A
10*23818	12-1-16	T	JOHN M PARSONS & ANTOINETTE L COSTANTINO	TH EXPLORATION LLC	1/8+	214A 345	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*23819	12-1-16	T	JAMES H PARSONS JR	TH EXPLORATION LLC	1/8+	214A 348	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*24089	12-1-16	T	VIVIAN A PARSONS	TH EXPLORATION LLC	1/8+	216A 365	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*24306	12-1-16	T	ROY C PARSONS	TH EXPLORATION LLC	1/8+	216A 368	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*22580	12-1-17	U	JAMES H PARSONS JR	TH EXPLORATION LLC	1/8+	209A 265	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*23524	12-1-17	U	HAMMETT LAND & MINERALS LLC SAMUEL C HAMMETT MANAGING MEMBER	TH EXPLORATION LLC	1/8+	210A 807	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*23525	12-1-17	U	HAMMETT LAND & MINERALS LLC SAMUEL C HAMMETT MANAGING MEMBER	TH EXPLORATION LLC	1/8+	210A 809	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*23906	12-1-17	U	JOHN M PARSONS & ANTOINETTE L COSTANTINO	TH EXPLORATION LLC	1/8+	214A 675	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*24090	12-1-17	U	VIVIAN A PARSONS	TH EXPLORATION LLC	1/8+	216A 371	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*24317	12-1-17	U	ROY C PARSONS	TH EXPLORATION LLC	1/8+	218A 480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*25450	12-1-17	U	MURIEL A MILLER	TH EXPLORATION LLC	1/8+	222A 465	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*25644	12-1-17	U	JOHN P SNYDER	TH EXPLORATION LLC	1/8+	222A 434	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10*26612	12-1-17	U	DOROTHY J HAAS	TH EXPLORATION LLC	1/8+	224A 549	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

* Co-tenancy utilization -- At least 7 mineral owners in tract. At least 75% of the royalty owners have executed a lease on the tract. The interests of the remaining co-tenants were acquired pursuant to the Co-tenancy Modernization and Majority Protection Act.

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DPB LAND SERVICES CORP
6000 TOWN CENTER BOULEVARD, SUITE 145
CANONSBURG PA 15317-5841

BOOK 0043 PAGE 0563

STATE OF WEST VIRGINIA §
 §
COUNTIES OF MARSHALL AND WETZEL §

ASSIGNMENT AND CONVEYANCE

THIS ASSIGNMENT AND CONVEYANCE (the "Assignment") is made and entered into this 30th day of April, 2019 (the "Effective Date"), by and between Atinum Marcellus I, LLC (hereinafter "Assignor") and TH Exploration II, LLC, (hereinafter "Assignee" and, together with Assignor, the "Parties"). Capitalized terms used but not defined herein shall have the meanings commonly given to such terms in the industry.

WITNESSETH:

WHEREAS, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to one hundred feet (100 ft.) above the formation commonly referred to as the Marcellus Shale formation down to one hundred feet (100 ft.) below the same, in those certain Oil and Gas Leases, or the portions of those certain Oil and Gas Leases, situated in Marshall and Wetzel Counties, West Virginia, as described in Exhibit "A-1" and limited and described in Exhibit "A-2", attached hereto and made a part hereof. It being the Parties intention to assign all of Assignor's interest in each unit as described in Exhibit "A-1", including any changes, revisions, or amendments to the same, now or at any time in the future. (hereinafter the "Leases"); and

WHEREAS, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to the Leases as described below.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and subject to the limited warranties, restrictions and conditions hereinafter mentioned, the parties hereto, intending to be legally bound, do covenant and agree as follows:

1. Assignment. Assignor does hereby grant, bargain, sell, convey, deliver, assign, set over and transfer, as of the Effective Date, to Assignee, its respective successors and assigns, forever, all of Assignor's right, title, and interest in and to one hundred feet (100 ft.) above the formation commonly referred to as the Marcellus Shale formation down to one hundred feet (100 ft.) below the same, in the Leases, and the lands covered thereby, together with all rights incident thereto and appurtenances thereon. It being the Parties intention to assign all of Assignor's interest in each unit as described in Exhibit "A-1", including any changes, revisions, or amendments to the same, now or at any time in the future.

TO HAVE AND TO HOLD such right, title and interest in and to the Leases unto Assignee or its designee, and their respective successors and assigns, forever, in accordance with the provisions of this Assignment.

2. Special Warranty. Assignor represents and warrants that Assignor has not conveyed or otherwise encumbered (other than permits or easements, rights of way, surface leases and other rights with respect to surface operations that do not materially interfere with, impair or prohibit the operation of the affected Leases, hereinafter "Permitted Encumbrances") its interest in the Leases since the time that Assignor obtained its interests in the Leases. Assignor does covenant, promise and agree, to and with the

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STE 145
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Execution Version

ASSIGNMENT AND BILL OF SALE

This ASSIGNMENT AND BILL OF SALE (this "*Assignment*") dated as of October 13, 2020 (the "*Execution Date*"), is made by and between EQT PRODUCTION COMPANY, a Pennsylvania corporation, with an address at 625 Liberty Avenue, Suite 1700, Pittsburgh, Pennsylvania 15222 ("*EQT*"), and TH EXPLORATION, LLC, a Texas limited liability company, with an address at 1320 S. University Drive, Suite 500, Fort Worth, Texas 76107 ("*TH*") pursuant to the terms of that certain Acreage Trade Agreement by and among EQT, TH and TH Exploration II, LLC, dated July 8, 2020 (the "*Agreement*"). EQT and TH may be referred to herein together as the "*Parties*", and each individually as a "*Party*".

RECITALS

WHEREAS, EQT desires to transfer, convey and assign to TH certain of EQT's oil and gas leasehold interests located in Wetzel County, West Virginia set forth on Exhibit A attached hereto and incorporated herein ("*EQT Leases*") in accordance with this Assignment and the Agreement; and

WHEREAS, TH desires to receive from EQT, all of EQT's right, title and interest in and to the EQT Leases in accordance with this Assignment and the Agreement.

NOW, THEREFORE, for and in consideration of the mutual promises contained herein and in the Agreement, the benefits to be derived by each Party hereunder and under the Agreement, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

ARTICLE I DEFINED TERMS

1.1 Definitions. Capitalized terms used herein and not otherwise defined throughout this Assignment shall have the meanings given such terms in the Agreement.

ARTICLE II ASSIGNMENT OF ASSETS

2.1 Assignment. Subject to the terms and conditions of this Assignment and the Agreement, EQT does hereby assign, convey and transfer to TH all of the right, title and interest of EQT in and to the following (collectively for purposes of this Assignment, the "*EQT Assets*"):

(a) The EQT Leases and appurtenances thereto (including rights of access and to install facilities), and all Hydrocarbons within, produced from, derived from, or sold from the EQT Leases (and all proceeds related thereto), on and after the Valuation Date; and

(b) Copies of deeds, files and all other ownership information directly related to the acquisition, operations and maintenance of the EQT Leases, lease files for the EQT Leases and all other information directly related to the acquisition, operations, and maintenance of the EQT Leases, and all related ownership, encumbrance or contract records including all abstracts, runsheets, certified title opinions, take-off sheets, surface use agreements, royalty and rental

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EXHIBIT A

EQT Leases

ID	AGREEMENT NAME	LESSEE	EFFECTIVE DATE	BK - PG	INST. NO.	COUNTY	DISTRICT	GROSS ACRES	APN
TBD	Virginia R. Bohrer, widow	Clay Resources, Inc	6/7/1985	68A-328		Wetzel	Proctor	155.0000	12-1-1
TBD	Jack Lang Mason and Jean M. Mason, husband and wife	Clay Resources, Inc	6/7/1985	68A-330		Wetzel	Proctor	155.0000	12-1-1
TBD	Helen Mason Baggs and Robert B. Baggs, wife and husband	Clay Resources, Inc	6/7/1985	68A-326		Wetzel	Proctor	155.0000	12-1-1

EXHIBIT A TO ASSIGNMENT AND BILL OF SALE

Wetzel County
 Carol S Haught, Clerk
 Instrument 293416
 10/20/2020 @ 11:22:24 AM
 OIL AND GAS
 Book 250A @ Page 651
 Pages Recorded 9
 Recording Cost \$ 15.00

RECORDED
Office of CH

NOV 06 2020

WV Department of
Environmental Protection

DPS
6000 TOWN CENTER BLVD STE 145
CANDONSBURG PA 15317-5870

Wetzel County
Carol S Haught, Clerk
Instrument 260482
12/11/2018 @ 01:23:35 PM
OIL AND GAS
Book 218A @ Page 755
Pages Recorded 6
Recording Cost \$ 12.00

PARTIAL ASSIGNMENT AND CONVEYANCE OF OIL AND GAS LEASE

STATE OF WEST VIRGINIA)
) §
COUNTY OF WETZEL)

This Partial Assignment and Conveyance of Oil and Gas Leases (this "Assignment"), dated effective as of December 7, 2018 at 7:00 a.m. Central Time (the "Effective Time"), is made by Antero Resources Corporation, a Delaware corporation, whose address is 1615 Wynkoop Street, Denver, CO 80202 ("Assignor"), to TH Exploration, LLC, a Texas limited liability company, whose address is 1320 S. University Drive, Suite 500, Fort Worth, TX 76107 ("Assignee"). Assignor and Assignee are sometimes referred to herein together as the "Parties" and individually as a "Party."

WHEREAS, Assignor owns an undivided working interest in the Leases (as defined below).

WHEREAS, Assignor desires to assign to Assignee, and Assignee desires to accept such assignment of, the Leasehold Rights (as defined below), as more particularly described in this Assignment.

NOW, THEREFORE, for and in consideration of Ten Dollars (\$10.00) and other valuable consideration, the receipt and sufficiency of which is hereby acknowledged:

Assignor does hereby GRANT, BARGAIN, TRANSFER, ASSIGN and CONVEY to Assignee 100% of Assignor's right, title and interest in and to the oil and gas leases described in more detail on Exhibit A, less and except those certain portions, if any, retained by Assignor as described on Exhibit A, (such oil and gas leases, the "Leases", and 100% of Assignor's collective right, title and interest in and to the Leases less an except those portions, if any, retained by Assignor, the "Leasehold Rights").

This Assignment is further made subject to the following:

1. **Assignment Subject to Trade Agreement.** This Assignment is made in accordance with and is subject to the terms, covenants and conditions contained in that certain Trade Agreement, dated October 12, 2018 by and between Assignor and Assignee (as the same may be amended from time to time, the "Trade Agreement"). In the event of a conflict between the provisions of the Trade Agreement and this Assignment, the provisions of the Trade Agreement shall control. The execution and delivery of this Assignment by Assignor, and the execution and acceptance of this Assignment by Assignee, shall not operate to release or impair any surviving rights or obligations of Assignor or Assignee under the Trade Agreement. Capitalized terms used but not otherwise defined in this Assignment shall have the respective meanings given to such terms in the Trade Agreement.
2. **Assumption of Liabilities.** Subject to the terms of the Trade Agreement, effective as of the Effective Time, Assignee hereby acknowledges, assumes, and agrees to assume, pay, perform, fulfill and discharge the Tug Hill Assumed Liabilities.
3. **Special Warranty of Title.** Assignor (a) hereby warrants, and shall defend, title to the Leasehold Rights unto Assignee and its successors in interest against every person whomsoever lawfully claiming, or to claim the same or any part thereof by, through or under Assignor or its Affiliates, but not otherwise, subject to the Permitted Encumbrances and (b) hereby subrogates Assignee to all covenants and warranties of title by third persons (other than Assignor and its Affiliates) heretofore given or made to Assignor or its predecessors in title or Affiliates in respect of any of the Leasehold Rights.

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TUG HILL

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November 5, 2020

Check # 045457

9/3/2020

\$5,000.⁰⁰

MS LAURA ADKINS
WV DEP OFFICE OF OIL & GAS
601 57TH STREET SE
CHARLESTON, WV 25304-2345

VIA USPS

RE: **Goudy 1S-8HM API #47-051-02228 (H6A Permit Modification)**
Franklin District, Marshall County, WV
EXPEDITED REVIEW REQUESTED

Dear Laura:

Tug Hill Operating, LLC is submitting a permit modification for its permitted well, Goudy 1S-8HM, to add 5,421' to the lateral length. Therefore, enclosed please find the following:

- Check – Fee of \$5,000 for expedited review
- Modified WW-6B with changes highlighted in yellow
- Updated well plat
- Updated WW-6A1 information
- Updated Water Management Plan
- Updated Site Safety Plan (The only information that has changed is the contact information for the Inspector Supervisor on the contact list at the end of the plan).

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

Sincerely,

Amy L. Morris

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

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Enclosures