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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

Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Monday, September 21, 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 KNOB CREEK N-11HU  
47-051-02287-00-00

**Lateral Extension to 10' within lease line for TMD of 25,044'**

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: KNOB CREEK N-11HU  
Farm Name: DAVID LEE FRANKLIN  
U.S. WELL NUMBER: 47-051-02287-00-00  
Horizontal 6A New Drill  
Date Modification Issued: September 21, 2020

Promoting a healthy environment.



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west virginia department of environmental protection

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Oil and Gas Conservation Commission  
601 57<sup>th</sup> Street SE, Charleston, WV 25304  
304-414-1239

Randall M. Albert, Chairman  
dep.wv.gov

September 17, 2020

Department of Environmental Protection  
Office of Oil and Gas  
Charleston, WV 25304

RE: Application for Deep Well Permit – API #47-051-02287 Modification

COMPANY: Tug Hill Operating, LLC

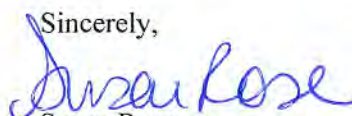
FARM: David Lee Franklin Knob Creek N-11HU

COUNTY: Marshall DISTRICT: Meade QUAD: Glen Easton

The deep well review of the application for the above company is Approved to drill to Trenton for Point Pleasant completion.

The applicant has complied with the provision of Chapter 22C-9, of the Code of West Virginia, nineteen hundred and thirty-one (1931), as amended, Oil and Gas Conservation Commission as follows:

1. Comments to Notice of Deviation filed? No
2. Provided a certified copy of duly acknowledged and recorded consent and easement form from all surface owners? Yes
3. Provided a tabulation of all deep wells within one mile of the proposed location, including the API number of all deep wells: \*\*yes
4. Provided a plat showing that the productive interval of the well meets the requirements of the Rules of the Commission W. Va. C.S.R. § 39-1-4.2.

Sincerely,  
  
Susan Rose  
Administrator

\*\*Heaven Hill 2-6HU 47-051-01910; Heaven Hill 2-7HU 47-051-01911; Heaven Hill 2-8HU 47-051-01912; Heaven Hill 2W-12HU 47-051-01952; Heaven Hill 2W-13HU 47-051-01957; Keith Stern N-13HU 47-051-02265; Keith Stern N-14HU 47-051-02252; Keith Stern N-15HU 47-051-02241; Keith Stern N-16HU 47-051-02242; Keith Stern S-19HU 47-051-02244; Keith Stern S-18HU 47-051-02243; Keith Stern S-17HU 47-051-02266; Knob Creek N-13HU 47-051-02269; Knob Creek S-14HU 47-051-02288; Knob Creek S-15HU 47-051-02289; Knob Creek S-16HU 47-051-02290; Knob Creek N-12HU 47-051-02268

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 Meade Glen Easton 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: Knob Creek N-11HU Well Pad Name: Knob Creek

3) Farm Name/Surface Owner: David Lee Franklin Public Road Access: St. Joseph Road - CR 21

4) Elevation, current ground: 737' Elevation, proposed post-construction: 737'

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

(b) If Gas Shallow  Deep   
Horizontal  *JM* 8/27/2020

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):

Point Pleasant is the target formation at a depth of 11,017' - 11,148' - thickness of 131' and anticipated pressure of approx. 9500 psi.

8) Proposed Total Vertical Depth: 11,298'

9) Formation at Total Vertical Depth: Trenton, plug back to Reedsville

10) Proposed Total Measured Depth: 25,044'

11) Proposed Horizontal Leg Length: 13,418.57'

12) Approximate Fresh Water Strata Depths: 70' ; 380'

13) Method to Determine Fresh Water Depths: Offset well reports or noticeable flow at the flowline or when need to start soaping

14) Approximate Saltwater Depths: 1,740'

15) Approximate Coal Seam Depths: Sewickley Coal - 292' ; Pittsburgh Coal - 374'

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

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: \_\_\_\_\_

18) **CASING AND TUBING PROGRAM**

<b>TYPE</b>	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
Conductor	30"	NEW	BW	BW	120'	120'	259FT^3(CTS)
Fresh Water	20"	NEW	J55	106.5#	480'	480'	831 FT^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	2200'	2200'	1,558FT^3(CTS)
Intermediate	9 5/8"	NEW	HPP110	47#	9,940'	9,940'	3,222FT^3(CTS)
Production	5 1/2"	NEW	P110	23#	25,044'	25,044'	5,906FT^3(CTS)
Tubing	2 7/8"	NEW	P110	6.5#		10,735'	
Liners							

*JM* 8/27/2020

<b>TYPE</b>	<u>Size (in)</u>	<u>Wellbore Diameter (in)</u>	<u>Wall Thickness (in)</u>	<u>Burst Pressure (psi)</u>	<u>Anticipated Max. Internal Pressure (psi)</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	30"	36"	1.0	2,333	1,866	CLASS A	1.2
Fresh Water	20"	26"	.5	2,410	1,928	SEE # 24	1.2
Coal	13 3/8"	17 1/2"	.38	2,740	2,192	SEE #24	1.2
Intermediate	9 5/8"	12 1/4"	.472	10,730	6,968	SEE #24	1.99
Production	5 1/2"	8 1/2"	.415	16,510	10,864	SEE #24	1.18
Tubing	2 7/8"			11,624	11,385		
Liners							

**PACKERS**

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

*JM* 8/27/2020

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

Drill through the Point Pleasant and TD Pilot Hole 150' into the Trenton. Log vertical section and run a solid cement plug back to proposed KOP (10,235'). 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 32,442,500 lb proppant and 501,585 bbl of water. Max rate = 80 bpm; max psi = 12,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 12.93 acres

22) Area to be disturbed for well pad only, less access road (acres): 5.55 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 third joint. Production casing will have one centralizer every third joint in lateral, one centralizer every joint through curve, one centralizer every third joint to surface.

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

\*See Attachment

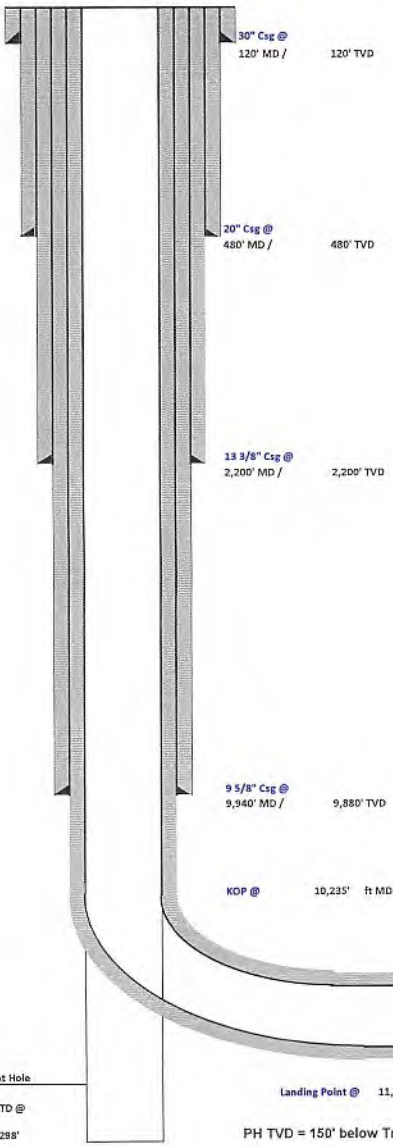
25) Proposed borehole conditioning procedures:

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:** Knob Creek N-11HU  
**STATE:** WV **COUNTY:** Marshall  
**DISTRICT:** Meade  
**DF Elev:** 737' **GL Elev:** 737'  
**TD:** 25,044'  
**TH Latitude:** 39.76999525  
**TH Longitude:** -80.70547243  
**BH Latitude:** 39.802393  
**BH Longitude:** -80.73307



FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	380'
Sewickley Coal	292'
Pittsburgh Coal	374'
Blg Lime	1,591'
Berea	2,092'
Tully	6,689'
Marcellus	6,193'
Onondaga	6,244'
Salina	6,961'
Lockport	8,012'
Utica	10,754'
Point Pleasant	11,017'
Landing Depth	11,067'
Trenton	11,148'
Pilot Hole TD	11,298'

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'	BW	BW	Surface
Surface	26	20	480'	480'	106.5	J55	Surface
Intermediate 1	17 1/2	13 3/8	2,200'	2,200'	54.5	J55	Surface
Intermediate 2	12 1/4	9 5/8	9,940'	9,880'	47	HPP110	Surface
Production	8 1/2	5 1/2	25,044'	10,834'	23	HCP110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	891	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	1,688	A	15	Air	1 Centralizer every other jt
Intermediate 2	2,781	A	14.5	Air	1 Centralizer every other jt
Production	5,258	A	15	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc

*JM* 8/27/2020

51-07287 MDD

Pilot Hole  
 PH TD @ 11,298'  
 PH TVD = 150' below Trenton Top

Lateral TD @ 25,044' ft MD  
 10,834' ft TVD



## Tug Hill Operating, LLC Casing and Cement Program

### Knob Creek N-11HU

#### Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	20"	J55	26"	480'	CTS
Intermediate 1	13 3/8"	J55	17 1/2"	2,200'	CTS
Intermediate 2	9 5/8"	HPP110	12 1/4"	9,940'	CTS
Production	5 1/2"	HCP110	8 1/2"	25,044'	CTS

#### Cement

Surface: Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Surface Cement mixed at 15.6 ppg, Y=1.2

Intermediate 1: Premium NE-1 + 1% bwoc CaC12 + 46.5% Fresh Water – Intermediate Cement mixed at 15.6 ppg, Y=1.2

Intermediate 2: Premium NE-1 + 1% bwoc CaC12 + 46.5% Fresh Water – Intermediate Cement mixed at 15.6 ppg, Y=1.99

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 = 1.18



**TUG HILL**  
OPERATING

**Well:** Knob Creek N-11HU (slot K)  
**Site:** Knob Creek  
**Project:** Marshall County, West Virginia.  
**Design:** rev4

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: GL=737 @ 737.00usft  
Surface location  
Northing Easting Latitude Longitude  
14443117.19 1723175.53 39.76999525 -80.70547243

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.881°



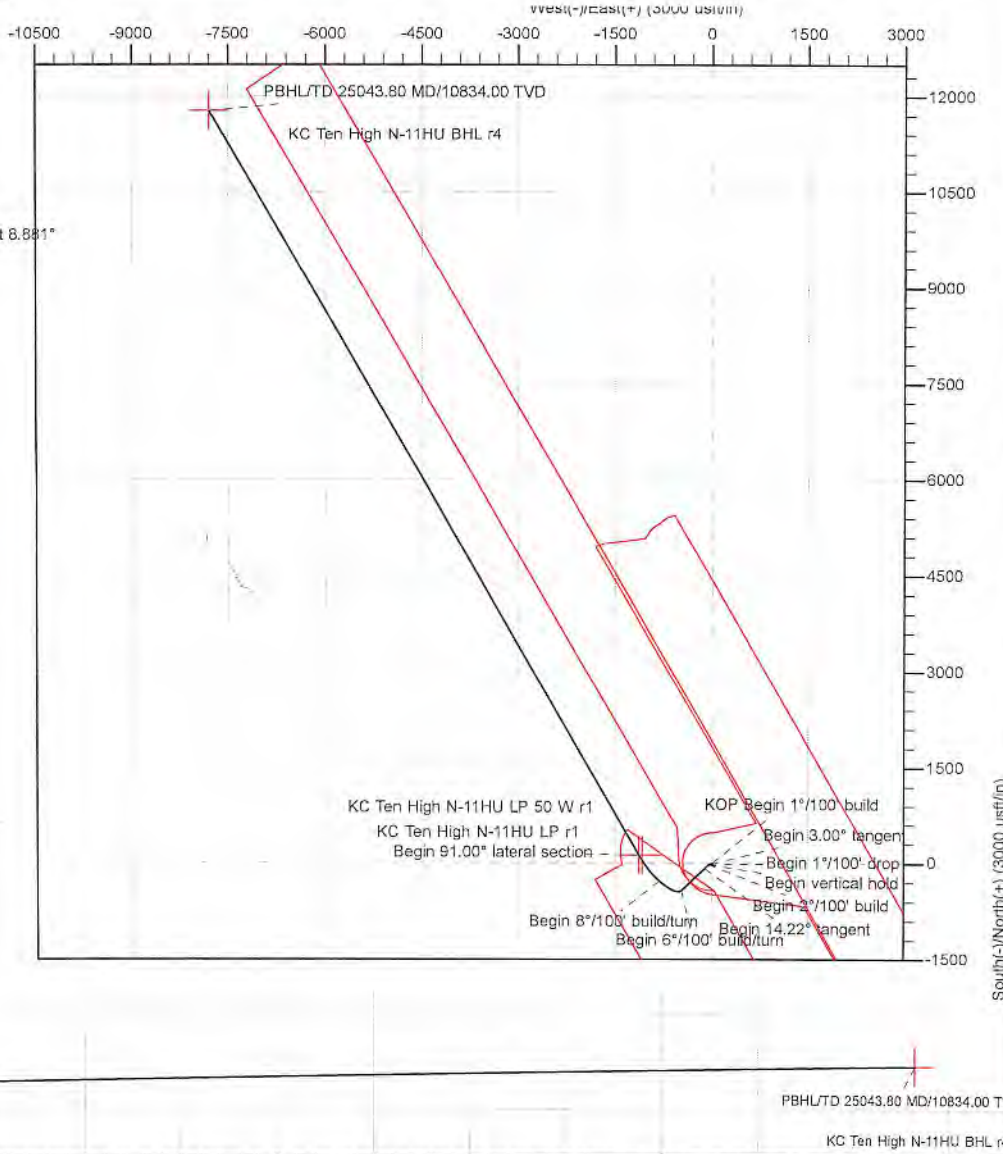
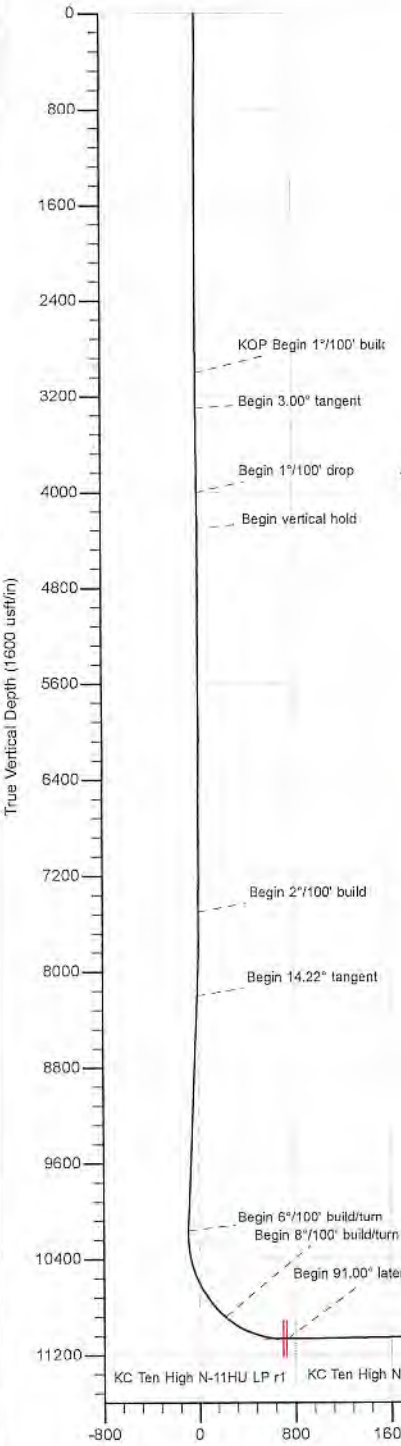
Azimuths to Grid North  
True North: -0.19°  
Magnetic North: -8.88°

Magnetic Field  
Strength: 52139.6snT  
Dip Angle: 66.92°  
Date: 9/19/2017  
Model: IGRF2015



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V/Sect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	
2	3000.00	0.00	0.00	3000.00	0.00	0.00	0.00	0.000	0.00	KOP Begin 1°/100' build
3	3300.00	3.00	247.49	3299.86	-3.01	-7.25	1.00	247.490	1.50	Begin 3.00° tangent
4	4000.00	3.00	247.49	3998.90	-17.03	-41.10	0.00	0.000	8.47	Begin 1°/100' drop
5	4300.00	0.00	247.49	4298.77	-20.04	-48.35	1.00	180.000	9.97	Begin vertical hold
6	7501.23	0.00	247.49	7500.00	-20.04	-48.35	0.00	247.490	9.97	Begin 2°/100' build
7	8212.33	14.22	226.69	8203.81	-80.27	-112.24	2.00	226.686	-5.01	Begin 14.22° tangent
8	10235.46	14.22	226.69	10164.94	-421.24	-473.88	0.00	0.000	-89.80	Begin 6°/100' build/turn
9	11068.84	50.00	310.69	10882.86	-273.88	-812.15	6.00	96.021	219.76	Begin 8°/100' build/turn
10	11627.74	91.00	330.23	11067.08	128.87	-1129.47	8.00	28.381	730.74	Begin 91.00° lateral section
11	25043.81	91.00	330.23	10834.00	11772.61	-7789.78	0.00	0.000	4116.48	PBHLTD 25043.80 MD/10834.00 TVD



51-01287 MD D





Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Knob Creek N-11HU (slot K)
Company:	Tug Hill Operating LLC	TVD Reference:	GL=737 @ 737.00usft
Project:	Marshall County, West Virginia.	MD Reference:	GL=737 @ 737.00usft
Site:	Knob Creek	North Reference:	Grid
Well:	Knob Creek N-11HU (slot K)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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	Knob Creek				
Site Position:		Northing:	14,443,053.74 usft	Latitude:	39.76982148
From:	Lat/Long	Easting:	1,723,120.29 usft	Longitude:	-80.70566975
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.188 °

Well	Knob Creek N-11HU (slot K)					
Well Position	+N/-S	0.00 usft	Northing:	14,443,117.19 usft	Latitude:	39.76999525
	+E/-W	0.00 usft	Easting:	1,723,175.53 usft	Longitude:	-80.70547243
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	737.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	9/19/2017	-8.693	66.922	52,139.57560550

Design	rev4			
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	326.51

Plan Survey Tool Program	Date	8/25/2020		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	25,043.72 rev4 (Original Hole)	MWD	MWD - Standard



Planning Report - Geographic

<b>Database:</b>	DB_Aug1919_v14	<b>Local Co-ordinate Reference:</b>	Well Knob Creek N-11HU (slot K)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL=737 @ 737.00usft
<b>Project:</b>	Marshall County, West Virginia.	<b>MD Reference:</b>	GL=737 @ 737.00usft
<b>Site:</b>	Knob Creek	<b>North Reference:</b>	Grid
<b>Well:</b>	Knob Creek N-11HU (slot K)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev4		

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	
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.000	
3,300.00	3.00	247.49	3,299.86	-3.01	-7.25	1.00	1.00	0.00	247.490	
4,000.00	3.00	247.49	3,998.90	-17.03	-41.10	0.00	0.00	0.00	0.000	
4,300.00	0.00	247.49	4,298.77	-20.04	-48.35	1.00	-1.00	0.00	180.000	
7,501.23	0.00	247.49	7,500.00	-20.04	-48.35	0.00	0.00	0.00	247.490	
8,212.33	14.22	226.69	8,203.81	-80.27	-112.24	2.00	2.00	-2.93	226.686	
10,235.46	14.22	226.69	10,164.94	-421.24	-473.88	0.00	0.00	0.00	0.000	
11,068.84	50.00	310.69	10,882.86	-273.88	-812.15	6.00	4.29	10.08	96.021	
11,627.74	91.00	330.23	11,067.08	128.87	-1,129.47	8.00	7.33	3.50	28.381	
25,043.81	91.00	330.23	10,834.00	11,772.61	-7,789.78	0.00	0.00	0.00	0.000	KC Ten High N-11HU



Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Knob Creek N-11HU (slot K)
Company:	Tug Hill Operating LLC	TVD Reference:	GL=737 @ 737.00usft
Project:	Marshall County, West Virginia.	MD Reference:	GL=737 @ 737.00usft
Site:	Knob Creek	North Reference:	Grid
Well:	Knob Creek N-11HU (slot K)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

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	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
100.00	0.00	0.00	100.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
200.00	0.00	0.00	200.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
300.00	0.00	0.00	300.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
400.00	0.00	0.00	400.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
500.00	0.00	0.00	500.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
600.00	0.00	0.00	600.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
700.00	0.00	0.00	700.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
800.00	0.00	0.00	800.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
900.00	0.00	0.00	900.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,700.00	0.00	0.00	1,700.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,800.00	0.00	0.00	1,800.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
1,900.00	0.00	0.00	1,900.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,000.00	0.00	0.00	2,000.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,100.00	0.00	0.00	2,100.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,200.00	0.00	0.00	2,200.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,300.00	0.00	0.00	2,300.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,400.00	0.00	0.00	2,400.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,500.00	0.00	0.00	2,500.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,600.00	0.00	0.00	2,600.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,700.00	0.00	0.00	2,700.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,800.00	0.00	0.00	2,800.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
2,900.00	0.00	0.00	2,900.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
3,000.00	0.00	0.00	3,000.00	0.00	0.00	14,443,117.19	1,723,175.53	39.76999525	-80.70547243	
<b>KOP Begin 1°/100' build</b>										
3,100.00	1.00	247.49	3,099.99	-0.33	-0.81	14,443,116.86	1,723,174.73	39.76999434	-80.70547530	
3,200.00	2.00	247.49	3,199.96	-1.34	-3.22	14,443,115.86	1,723,172.31	39.76999161	-80.70548392	
3,300.00	3.00	247.49	3,299.86	-3.01	-7.25	14,443,114.19	1,723,168.28	39.76999706	-80.70549828	
<b>Begin 3.00° tangent</b>										
3,400.00	3.00	247.49	3,399.73	-5.01	-12.09	14,443,112.18	1,723,163.44	39.76998160	-80.70551551	
3,500.00	3.00	247.49	3,499.59	-7.01	-16.92	14,443,110.18	1,723,158.61	39.76997614	-80.70553274	
3,600.00	3.00	247.49	3,599.45	-9.02	-21.76	14,443,108.18	1,723,153.77	39.76997068	-80.70554997	
3,700.00	3.00	247.49	3,699.31	-11.02	-26.59	14,443,106.17	1,723,148.94	39.76996523	-80.70556720	
3,800.00	3.00	247.49	3,799.18	-13.02	-31.43	14,443,104.17	1,723,144.10	39.76995977	-80.70558443	
3,900.00	3.00	247.49	3,899.04	-15.03	-36.26	14,443,102.16	1,723,139.27	39.76995431	-80.70560166	
4,000.00	3.00	247.49	3,998.90	-17.03	-41.10	14,443,100.16	1,723,134.43	39.76994885	-80.70561889	
<b>Begin 1°/100' drop</b>										
4,100.00	2.00	247.49	4,098.81	-18.70	-45.13	14,443,098.49	1,723,130.40	39.76994430	-80.70563325	
4,200.00	1.00	247.49	4,198.77	-19.70	-47.55	14,443,097.49	1,723,127.99	39.76994157	-80.70564187	
4,300.00	0.00	0.00	4,298.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
<b>Begin vertical hold</b>										
4,400.00	0.00	247.49	4,398.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
4,500.00	0.00	247.49	4,498.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
4,600.00	0.00	247.49	4,598.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
4,700.00	0.00	247.49	4,698.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
4,800.00	0.00	247.49	4,798.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
4,900.00	0.00	247.49	4,898.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	



Planning Report - Geographic

<b>Database:</b>	DB_Aug1919_v14	<b>Local Co-ordinate Reference:</b>	Well Knob Creek N-11HU (slot K)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL=737 @ 737.00usft
<b>Project:</b>	Marshall County, West Virginia.	<b>MD Reference:</b>	GL=737 @ 737.00usft
<b>Site:</b>	Knob Creek	<b>North Reference:</b>	Grid
<b>Well:</b>	Knob Creek N-11HU (slot K)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev4		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
5,000.00	0.00	247.49	4,998.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,100.00	0.00	247.49	5,098.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,200.00	0.00	247.49	5,198.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,300.00	0.00	247.49	5,298.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,400.00	0.00	247.49	5,398.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,500.00	0.00	247.49	5,498.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,600.00	0.00	247.49	5,598.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,700.00	0.00	247.49	5,698.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,800.00	0.00	247.49	5,798.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
5,900.00	0.00	247.49	5,898.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,000.00	0.00	247.49	5,998.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,100.00	0.00	247.49	6,098.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,200.00	0.00	247.49	6,198.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,300.00	0.00	247.49	6,298.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,400.00	0.00	247.49	6,398.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,500.00	0.00	247.49	6,498.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,600.00	0.00	247.49	6,598.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,700.00	0.00	247.49	6,698.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,800.00	0.00	247.49	6,798.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
6,900.00	0.00	247.49	6,898.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
7,000.00	0.00	247.49	6,998.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
7,100.00	0.00	247.49	7,098.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
7,200.00	0.00	247.49	7,198.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
7,300.00	0.00	247.49	7,298.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
7,400.00	0.00	247.49	7,398.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
7,500.00	0.00	247.49	7,498.77	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
7,501.23	0.00	247.49	7,500.00	-20.04	-48.35	14,443,097.15	1,723,127.18	39.76994066	-80.70564474	
<b>Begin 2°/100' build</b>										
7,600.00	1.98	226.69	7,598.75	-21.21	-49.59	14,443,095.99	1,723,125.94	39.76993746	-80.70564916	
7,700.00	3.98	226.69	7,698.61	-24.77	-53.37	14,443,092.43	1,723,122.16	39.76992772	-80.70566264	
7,800.00	5.98	226.69	7,798.23	-30.72	-59.68	14,443,086.48	1,723,115.85	39.76991144	-80.70568517	
7,900.00	7.98	226.69	7,897.48	-39.05	-68.51	14,443,078.15	1,723,107.02	39.76988864	-80.70571671	
8,000.00	9.98	226.69	7,996.25	-49.75	-79.86	14,443,067.45	1,723,095.67	39.76985935	-80.70575723	
8,100.00	11.98	226.69	8,094.42	-62.81	-93.72	14,443,054.39	1,723,081.82	39.76982361	-80.70580668	
8,200.00	13.98	226.69	8,191.86	-78.21	-110.05	14,443,038.98	1,723,065.48	39.76978146	-80.70586500	
8,212.33	14.22	226.69	8,203.82	-80.27	-112.24	14,443,036.92	1,723,063.30	39.76977582	-80.70587280	
<b>Begin 14.22° tangent</b>										
8,300.00	14.22	226.69	8,288.80	-95.05	-127.91	14,443,022.15	1,723,047.62	39.76973539	-80.70592874	
8,400.00	14.22	226.69	8,385.74	-111.90	-145.78	14,443,005.29	1,723,029.75	39.76968926	-80.70599255	
8,500.00	14.22	226.69	8,482.67	-128.75	-163.66	14,442,988.44	1,723,011.87	39.76964314	-80.70605637	
8,600.00	14.22	226.69	8,579.61	-145.61	-181.53	14,442,971.59	1,722,994.00	39.76959702	-80.70612018	
8,700.00	14.22	226.69	8,676.54	-162.46	-199.41	14,442,954.73	1,722,976.12	39.76955089	-80.70618399	
8,800.00	14.22	226.69	8,773.48	-179.31	-217.29	14,442,937.88	1,722,958.25	39.76950477	-80.70624780	
8,900.00	14.22	226.69	8,870.41	-196.17	-235.16	14,442,921.03	1,722,940.37	39.76945865	-80.70631161	
9,000.00	14.22	226.69	8,967.35	-213.02	-253.04	14,442,904.17	1,722,922.50	39.76941252	-80.70637543	
9,100.00	14.22	226.69	9,064.28	-229.87	-270.91	14,442,887.32	1,722,904.62	39.76936640	-80.70643924	
9,200.00	14.22	226.69	9,161.22	-246.73	-288.79	14,442,870.47	1,722,886.74	39.76932028	-80.70650305	
9,300.00	14.22	226.69	9,258.15	-263.58	-306.66	14,442,853.61	1,722,868.87	39.76927415	-80.70656686	
9,400.00	14.22	226.69	9,355.09	-280.43	-324.54	14,442,836.76	1,722,850.99	39.76922803	-80.70663067	
9,500.00	14.22	226.69	9,452.02	-297.29	-342.41	14,442,819.91	1,722,833.12	39.76918191	-80.70669448	
9,600.00	14.22	226.69	9,548.96	-314.14	-360.29	14,442,803.05	1,722,815.24	39.76913578	-80.70675829	
9,700.00	14.22	226.69	9,645.89	-330.99	-378.16	14,442,786.20	1,722,797.37	39.76908966	-80.70682211	
9,800.00	14.22	226.69	9,742.83	-347.85	-396.04	14,442,769.34	1,722,779.49	39.76904354	-80.70688592	
9,900.00	14.22	226.69	9,839.76	-364.70	-413.92	14,442,752.49	1,722,761.62	39.76899741	-80.70694973	



Planning Report - Geographic

<b>Database:</b>	DB_Aug1919_v14	<b>Local Co-ordinate Reference:</b>	Well Knob Creek N-11HU (slot K)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL=737 @ 737.00usft
<b>Project:</b>	Marshall County, West Virginia.	<b>MD Reference:</b>	GL=737 @ 737.00usft
<b>Site:</b>	Knob Creek	<b>North Reference:</b>	Grid
<b>Well:</b>	Knob Creek N-11HU (slot K)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev4		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,000.00	14.22	226.69	9,936.70	-381.56	-431.79	14,442,735.64	1,722,743.74	39.76895129	-80.70701354	
10,100.00	14.22	226.69	10,033.63	-398.41	-449.67	14,442,718.78	1,722,725.87	39.76890517	-80.70707735	
10,200.00	14.22	226.69	10,130.57	-415.26	-467.54	14,442,701.93	1,722,707.99	39.76885904	-80.70714116	
10,235.46	14.22	226.69	10,164.94	-421.24	-473.88	14,442,695.95	1,722,701.65	39.76884269	-80.70716379	
<b>Begin 6°/100' build/turn</b>										
10,300.00	14.33	242.43	10,227.51	-430.38	-486.73	14,442,686.82	1,722,688.80	39.76881770	-80.70720964	
10,400.00	16.38	263.89	10,324.02	-437.61	-511.75	14,442,679.58	1,722,663.78	39.76879806	-80.70729874	
10,500.00	20.04	279.21	10,419.04	-436.37	-542.71	14,442,680.82	1,722,632.82	39.76880175	-80.70740892	
10,600.00	24.61	289.52	10,511.56	-426.66	-579.28	14,442,690.53	1,722,596.25	39.76882674	-80.70753895	
10,700.00	29.66	296.64	10,600.55	-408.59	-621.06	14,442,708.60	1,722,554.47	39.76887874	-80.70768743	
10,800.00	35.00	301.80	10,685.03	-382.36	-667.60	14,442,734.83	1,722,507.94	39.76895120	-80.70785273	
10,900.00	40.49	305.73	10,764.09	-348.25	-718.37	14,442,768.94	1,722,457.16	39.76904531	-80.70803302	
11,000.00	46.10	308.86	10,836.85	-306.65	-772.83	14,442,810.55	1,722,402.70	39.76916006	-80.70822634	
11,068.84	50.00	310.69	10,882.86	-273.88	-812.15	14,442,843.31	1,722,363.38	39.76925040	-80.70836590	
<b>Begin 8°/100' build/turn</b>										
11,100.00	52.20	312.19	10,902.43	-257.83	-830.32	14,442,859.36	1,722,345.21	39.76929464	-80.70843039	
11,200.00	59.38	316.46	10,958.63	-200.01	-889.33	14,442,917.18	1,722,286.20	39.76945396	-80.70863972	
11,300.00	66.68	320.14	11,003.96	-133.46	-948.50	14,442,983.73	1,722,227.03	39.76963725	-80.70884951	
11,400.00	74.06	323.43	11,037.53	-59.48	-1,006.67	14,443,057.71	1,722,168.87	39.76984093	-80.70905566	
11,500.00	81.48	326.48	11,058.71	20.49	-1,062.71	14,443,137.68	1,722,112.83	39.77006105	-80.70925417	
11,600.00	88.93	329.42	11,067.06	104.89	-1,115.53	14,443,222.08	1,722,060.01	39.77029331	-80.70944118	
11,627.74	91.00	330.23	11,067.08	128.87	-1,129.47	14,443,246.06	1,722,046.06	39.77035929	-80.70949052	
<b>Begin 91.00° lateral section</b>										
11,700.00	91.00	330.23	11,065.82	191.58	-1,165.34	14,443,308.78	1,722,010.19	39.77053184	-80.70961746	
11,800.00	91.00	330.23	11,064.09	278.37	-1,214.99	14,443,395.56	1,721,960.55	39.77077063	-80.70979314	
11,900.00	91.00	330.23	11,062.35	365.16	-1,264.63	14,443,482.35	1,721,910.90	39.77100942	-80.70996882	
12,000.00	91.00	330.23	11,060.61	451.95	-1,314.27	14,443,569.14	1,721,861.26	39.77124820	-80.71014449	
12,100.00	91.00	330.23	11,058.87	538.74	-1,363.92	14,443,655.93	1,721,811.61	39.77148699	-80.71032017	
12,200.00	91.00	330.23	11,057.14	625.53	-1,413.56	14,443,742.72	1,721,761.97	39.77172578	-80.71049585	
12,300.00	91.00	330.23	11,055.40	712.32	-1,463.21	14,443,829.51	1,721,712.32	39.77196457	-80.71067154	
12,400.00	91.00	330.23	11,053.66	799.11	-1,512.85	14,443,916.30	1,721,662.68	39.77220336	-80.71084722	
12,500.00	91.00	330.23	11,051.92	885.90	-1,562.50	14,444,003.09	1,721,613.04	39.77244214	-80.71102290	
12,600.00	91.00	330.23	11,050.19	972.69	-1,612.14	14,444,089.88	1,721,563.39	39.77268093	-80.71119859	
12,700.00	91.00	330.23	11,048.45	1,059.48	-1,661.78	14,444,176.67	1,721,513.75	39.77291972	-80.71137427	
12,800.00	91.00	330.23	11,046.71	1,146.27	-1,711.43	14,444,263.46	1,721,464.10	39.77315850	-80.71154996	
12,900.00	91.00	330.23	11,044.98	1,233.06	-1,761.07	14,444,350.25	1,721,414.46	39.77339729	-80.71172565	
13,000.00	91.00	330.23	11,043.24	1,319.85	-1,810.72	14,444,437.04	1,721,364.81	39.77363608	-80.71190134	
13,100.00	91.00	330.23	11,041.50	1,406.64	-1,860.36	14,444,523.83	1,721,315.17	39.77387486	-80.71207703	
13,200.00	91.00	330.23	11,039.76	1,493.43	-1,910.01	14,444,610.62	1,721,265.53	39.77411365	-80.71225273	
13,300.00	91.00	330.23	11,038.03	1,580.22	-1,959.65	14,444,697.41	1,721,215.88	39.77435243	-80.71242842	
13,400.00	91.00	330.23	11,036.29	1,667.00	-2,009.29	14,444,784.20	1,721,166.24	39.77459122	-80.71260412	
13,500.00	91.00	330.23	11,034.55	1,753.79	-2,058.94	14,444,870.99	1,721,116.59	39.77483000	-80.71277981	
13,600.00	91.00	330.23	11,032.81	1,840.58	-2,108.58	14,444,957.78	1,721,066.95	39.77506879	-80.71295551	
13,700.00	91.00	330.23	11,031.08	1,927.37	-2,158.23	14,445,044.57	1,721,017.30	39.77530757	-80.71313121	
13,800.00	91.00	330.23	11,029.34	2,014.16	-2,207.87	14,445,131.36	1,720,967.66	39.77554635	-80.71330691	
13,900.00	91.00	330.23	11,027.60	2,100.95	-2,257.52	14,445,218.15	1,720,918.02	39.77578514	-80.71348261	
14,000.00	91.00	330.23	11,025.86	2,187.74	-2,307.16	14,445,304.93	1,720,868.37	39.77602392	-80.71365831	
14,100.00	91.00	330.23	11,024.13	2,274.53	-2,356.81	14,445,391.72	1,720,818.73	39.77626270	-80.71383402	
14,200.00	91.00	330.23	11,022.39	2,361.32	-2,406.45	14,445,478.51	1,720,769.08	39.77650149	-80.71400972	
14,300.00	91.00	330.23	11,020.65	2,448.11	-2,456.09	14,445,565.30	1,720,719.44	39.77674027	-80.71418543	
14,400.00	91.00	330.23	11,018.92	2,534.90	-2,505.74	14,445,652.09	1,720,669.79	39.77697905	-80.71436113	
14,500.00	91.00	330.23	11,017.18	2,621.69	-2,555.38	14,445,738.88	1,720,620.15	39.77721783	-80.71453684	
14,600.00	91.00	330.23	11,015.44	2,708.48	-2,605.03	14,445,825.67	1,720,570.51	39.77745661	-80.71471255	
14,700.00	91.00	330.23	11,013.70	2,795.27	-2,654.67	14,445,912.46	1,720,520.86	39.77769539	-80.71488826	

51-02287 MOD



Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Knob Creek N-11HU (slot K)
Company:	Tug Hill Operating LLC	TVD Reference:	GL=737 @ 737.00usft
Project:	Marshall County, West Virginia.	MD Reference:	GL=737 @ 737.00usft
Site:	Knob Creek	North Reference:	Grid
Well:	Knob Creek N-11HU (slot K)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev4		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
14,800.00	91.00	330.23	11,011.97	2,882.06	-2,704.32	14,445,999.25	1,720,471.22	39.77793418	-80.71506397	
14,900.00	91.00	330.23	11,010.23	2,968.85	-2,753.96	14,446,086.04	1,720,421.57	39.77817296	-80.71523969	
15,000.00	91.00	330.23	11,008.49	3,055.64	-2,803.60	14,446,172.83	1,720,371.93	39.77841174	-80.71541540	
15,100.00	91.00	330.23	11,006.75	3,142.43	-2,853.25	14,446,259.62	1,720,322.28	39.77865052	-80.71559112	
15,200.00	91.00	330.23	11,005.02	3,229.22	-2,902.89	14,446,346.41	1,720,272.64	39.77888930	-80.71576683	
15,300.00	91.00	330.23	11,003.28	3,316.01	-2,952.54	14,446,433.20	1,720,223.00	39.77912808	-80.71594255	
15,400.00	91.00	330.23	11,001.54	3,402.80	-3,002.18	14,446,519.99	1,720,173.35	39.77936686	-80.71611827	
15,500.00	91.00	330.23	10,999.81	3,489.59	-3,051.83	14,446,606.78	1,720,123.71	39.77960564	-80.71629399	
15,600.00	91.00	330.23	10,998.07	3,576.37	-3,101.47	14,446,693.57	1,720,074.06	39.77984441	-80.71646971	
15,700.00	91.00	330.23	10,996.33	3,663.16	-3,151.11	14,446,780.36	1,720,024.42	39.78008319	-80.71664544	
15,800.00	91.00	330.23	10,994.59	3,749.95	-3,200.76	14,446,867.15	1,719,974.77	39.78032197	-80.71682116	
15,900.00	91.00	330.23	10,992.86	3,836.74	-3,250.40	14,446,953.94	1,719,925.13	39.78056075	-80.71699689	
16,000.00	91.00	330.23	10,991.12	3,923.53	-3,300.05	14,447,040.73	1,719,875.48	39.78079953	-80.71717261	
16,100.00	91.00	330.23	10,989.38	4,010.32	-3,349.69	14,447,127.52	1,719,825.84	39.78103830	-80.71734834	
16,200.00	91.00	330.23	10,987.64	4,097.11	-3,399.34	14,447,214.30	1,719,776.20	39.78127708	-80.71752407	
16,300.00	91.00	330.23	10,985.91	4,183.90	-3,448.98	14,447,301.09	1,719,726.55	39.78151586	-80.71769980	
16,400.00	91.00	330.23	10,984.17	4,270.69	-3,498.62	14,447,387.88	1,719,676.91	39.78175464	-80.71787553	
16,500.00	91.00	330.23	10,982.43	4,357.48	-3,548.27	14,447,474.67	1,719,627.26	39.78199341	-80.71805127	
16,600.00	91.00	330.23	10,980.69	4,444.27	-3,597.91	14,447,561.46	1,719,577.62	39.78223219	-80.71822700	
16,700.00	91.00	330.23	10,978.96	4,531.06	-3,647.56	14,447,648.25	1,719,527.97	39.78247096	-80.71840273	
16,800.00	91.00	330.23	10,977.22	4,617.85	-3,697.20	14,447,735.04	1,719,478.33	39.78270974	-80.71857847	
16,900.00	91.00	330.23	10,975.48	4,704.64	-3,746.85	14,447,821.83	1,719,428.69	39.78294851	-80.71875421	
17,000.00	91.00	330.23	10,973.75	4,791.43	-3,796.49	14,447,908.62	1,719,379.04	39.78318729	-80.71892995	
17,100.00	91.00	330.23	10,972.01	4,878.22	-3,846.13	14,447,995.41	1,719,329.40	39.78342606	-80.71910569	
17,200.00	91.00	330.23	10,970.27	4,965.01	-3,895.78	14,448,082.20	1,719,279.75	39.78366484	-80.71928143	
17,300.00	91.00	330.23	10,968.53	5,051.80	-3,945.42	14,448,168.99	1,719,230.11	39.78390361	-80.71945717	
17,400.00	91.00	330.23	10,966.80	5,138.59	-3,995.07	14,448,255.78	1,719,180.46	39.78414239	-80.71963291	
17,500.00	91.00	330.23	10,965.06	5,225.38	-4,044.71	14,448,342.57	1,719,130.82	39.78438116	-80.71980866	
17,600.00	91.00	330.23	10,963.32	5,312.17	-4,094.36	14,448,429.36	1,719,081.18	39.78461993	-80.71998440	
17,700.00	91.00	330.23	10,961.58	5,398.96	-4,144.00	14,448,516.15	1,719,031.53	39.78485871	-80.72016015	
17,800.00	91.00	330.23	10,959.85	5,485.74	-4,193.64	14,448,602.94	1,718,981.89	39.78509748	-80.72033590	
17,900.00	91.00	330.23	10,958.11	5,572.53	-4,243.29	14,448,689.73	1,718,932.24	39.78533625	-80.72051165	
18,000.00	91.00	330.23	10,956.37	5,659.32	-4,292.93	14,448,776.52	1,718,882.60	39.78557503	-80.72068740	
18,100.00	91.00	330.23	10,954.64	5,746.11	-4,342.58	14,448,863.31	1,718,832.95	39.78581380	-80.72086315	
18,200.00	91.00	330.23	10,952.90	5,832.90	-4,392.22	14,448,950.10	1,718,783.31	39.78605257	-80.72103891	
18,300.00	91.00	330.23	10,951.16	5,919.69	-4,441.87	14,449,036.89	1,718,733.67	39.78629134	-80.72121466	
18,400.00	91.00	330.23	10,949.42	6,006.48	-4,491.51	14,449,123.67	1,718,684.02	39.78653011	-80.72139042	
18,500.00	91.00	330.23	10,947.69	6,093.27	-4,541.15	14,449,210.46	1,718,634.38	39.78676888	-80.72156617	
18,600.00	91.00	330.23	10,945.95	6,180.06	-4,590.80	14,449,297.25	1,718,584.73	39.78700765	-80.72174193	
18,700.00	91.00	330.23	10,944.21	6,266.85	-4,640.44	14,449,384.04	1,718,535.09	39.78724642	-80.72191769	
18,800.00	91.00	330.23	10,942.47	6,353.64	-4,690.09	14,449,470.83	1,718,485.44	39.78748519	-80.72209345	
18,900.00	91.00	330.23	10,940.74	6,440.43	-4,739.73	14,449,557.62	1,718,435.80	39.78772396	-80.72226921	
19,000.00	91.00	330.23	10,939.00	6,527.22	-4,789.38	14,449,644.41	1,718,386.16	39.78796273	-80.72244498	
19,100.00	91.00	330.23	10,937.26	6,614.01	-4,839.02	14,449,731.20	1,718,336.51	39.78820150	-80.72262074	
19,200.00	91.00	330.23	10,935.52	6,700.80	-4,888.66	14,449,817.99	1,718,286.87	39.78844027	-80.72279651	
19,300.00	91.00	330.23	10,933.79	6,787.59	-4,938.31	14,449,904.78	1,718,237.22	39.78867904	-80.72297227	
19,400.00	91.00	330.23	10,932.05	6,874.38	-4,987.95	14,449,991.57	1,718,187.58	39.78891781	-80.72314804	
19,500.00	91.00	330.23	10,930.31	6,961.17	-5,037.60	14,450,078.36	1,718,137.93	39.78915658	-80.72332381	
19,600.00	91.00	330.23	10,928.58	7,047.96	-5,087.24	14,450,165.15	1,718,088.29	39.78939535	-80.72349958	
19,700.00	91.00	330.23	10,926.84	7,134.75	-5,136.89	14,450,251.94	1,718,038.65	39.78963411	-80.72367535	
19,800.00	91.00	330.23	10,925.10	7,221.54	-5,186.53	14,450,338.73	1,717,989.00	39.78987288	-80.72385112	
19,900.00	91.00	330.23	10,923.36	7,308.33	-5,236.17	14,450,425.52	1,717,939.36	39.79011165	-80.72402690	
20,000.00	91.00	330.23	10,921.63	7,395.11	-5,285.82	14,450,512.31	1,717,889.71	39.79035041	-80.72420267	
20,100.00	91.00	330.23	10,919.89	7,481.90	-5,335.46	14,450,599.10	1,717,840.07	39.79058918	-80.72437845	
20,200.00	91.00	330.23	10,918.15	7,568.69	-5,385.11	14,450,685.89	1,717,790.42	39.79082795	-80.72455423	



Planning Report - Geographic

<b>Database:</b>	DB_Aug1919_v14	<b>Local Co-ordinate Reference:</b>	Well Knob Creek N-11HU (slot K)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL=737 @ 737.00usft
<b>Project:</b>	Marshall County, West Virginia.	<b>MD Reference:</b>	GL=737 @ 737.00usft
<b>Site:</b>	Knob Creek	<b>North Reference:</b>	Grid
<b>Well:</b>	Knob Creek N-11HU (slot K)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev4		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
20,300.00	91.00	330.23	10,916.41	7,655.48	-5,434.75	14,450,772.68	1,717,740.78	39.79106671	-80.72473000	
20,400.00	91.00	330.23	10,914.68	7,742.27	-5,484.40	14,450,859.47	1,717,691.14	39.79130548	-80.72490578	
20,500.00	91.00	330.23	10,912.94	7,829.06	-5,534.04	14,450,946.26	1,717,641.49	39.79154424	-80.72508157	
20,600.00	91.00	330.23	10,911.20	7,915.85	-5,583.68	14,451,033.04	1,717,591.85	39.79178301	-80.72525735	
20,700.00	91.00	330.23	10,909.47	8,002.64	-5,633.33	14,451,119.83	1,717,542.20	39.79202178	-80.72543313	
20,800.00	91.00	330.23	10,907.73	8,089.43	-5,682.97	14,451,206.62	1,717,492.56	39.79226054	-80.72560892	
20,900.00	91.00	330.23	10,905.99	8,176.22	-5,732.62	14,451,293.41	1,717,442.91	39.79249930	-80.72578470	
21,000.00	91.00	330.23	10,904.25	8,263.01	-5,782.26	14,451,380.20	1,717,393.27	39.79273807	-80.72596049	
21,100.00	91.00	330.23	10,902.52	8,349.80	-5,831.91	14,451,466.99	1,717,343.63	39.79297683	-80.72613628	
21,200.00	91.00	330.23	10,900.78	8,436.59	-5,881.55	14,451,553.78	1,717,293.98	39.79321560	-80.72631207	
21,300.00	91.00	330.23	10,899.04	8,523.38	-5,931.19	14,451,640.57	1,717,244.34	39.79345436	-80.72648786	
21,400.00	91.00	330.23	10,897.30	8,610.17	-5,980.84	14,451,727.36	1,717,194.69	39.79369312	-80.72666365	
21,500.00	91.00	330.23	10,895.57	8,696.96	-6,030.48	14,451,814.15	1,717,145.05	39.79393189	-80.72683944	
21,600.00	91.00	330.23	10,893.83	8,783.75	-6,080.13	14,451,900.94	1,717,095.40	39.79417065	-80.72701524	
21,700.00	91.00	330.23	10,892.09	8,870.54	-6,129.77	14,451,987.73	1,717,045.76	39.79440941	-80.72719103	
21,800.00	91.00	330.23	10,890.36	8,957.33	-6,179.42	14,452,074.52	1,716,996.12	39.79464817	-80.72736683	
21,900.00	91.00	330.23	10,888.62	9,044.12	-6,229.06	14,452,161.31	1,716,946.47	39.79488693	-80.72754263	
22,000.00	91.00	330.23	10,886.88	9,130.91	-6,278.71	14,452,248.10	1,716,896.83	39.79512570	-80.72771843	
22,100.00	91.00	330.23	10,885.14	9,217.70	-6,328.35	14,452,334.89	1,716,847.18	39.79536446	-80.72789423	
22,200.00	91.00	330.23	10,883.41	9,304.48	-6,377.99	14,452,421.68	1,716,797.54	39.79560322	-80.72807003	
22,300.00	91.00	330.23	10,881.67	9,391.27	-6,427.64	14,452,508.47	1,716,747.89	39.79584198	-80.72824583	
22,400.00	91.00	330.23	10,879.93	9,478.06	-6,477.28	14,452,595.26	1,716,698.25	39.79608074	-80.72842164	
22,500.00	91.00	330.23	10,878.19	9,564.85	-6,526.93	14,452,682.05	1,716,648.61	39.79631950	-80.72859744	
22,600.00	91.00	330.23	10,876.46	9,651.64	-6,576.57	14,452,768.84	1,716,598.96	39.79655826	-80.72877325	
22,700.00	91.00	330.23	10,874.72	9,738.43	-6,626.22	14,452,855.63	1,716,549.32	39.79679702	-80.72894906	
22,800.00	91.00	330.23	10,872.98	9,825.22	-6,675.86	14,452,942.41	1,716,499.67	39.79703578	-80.72912487	
22,900.00	91.00	330.23	10,871.24	9,912.01	-6,725.50	14,453,029.20	1,716,450.03	39.79727454	-80.72930068	
23,000.00	91.00	330.23	10,869.51	9,998.80	-6,775.15	14,453,115.99	1,716,400.38	39.79751329	-80.72947649	
23,100.00	91.00	330.23	10,867.77	10,085.59	-6,824.79	14,453,202.78	1,716,350.74	39.79775205	-80.72965230	
23,200.00	91.00	330.23	10,866.03	10,172.38	-6,874.44	14,453,289.57	1,716,301.10	39.79799081	-80.72982812	
23,300.00	91.00	330.23	10,864.30	10,259.17	-6,924.08	14,453,376.36	1,716,251.45	39.79822957	-80.73000393	
23,400.00	91.00	330.23	10,862.56	10,345.96	-6,973.73	14,453,463.15	1,716,201.81	39.79846833	-80.73017975	
23,500.00	91.00	330.23	10,860.82	10,432.75	-7,023.37	14,453,549.94	1,716,152.16	39.79870708	-80.73035556	
23,600.00	91.00	330.23	10,859.08	10,519.54	-7,073.01	14,453,636.73	1,716,102.52	39.79894584	-80.73053138	
23,700.00	91.00	330.23	10,857.35	10,606.33	-7,122.66	14,453,723.52	1,716,052.87	39.79918460	-80.73070720	
23,800.00	91.00	330.23	10,855.61	10,693.12	-7,172.30	14,453,810.31	1,716,003.23	39.79942335	-80.73088302	
23,900.00	91.00	330.23	10,853.87	10,779.91	-7,221.95	14,453,897.10	1,715,953.58	39.79966211	-80.73105885	
24,000.00	91.00	330.23	10,852.13	10,866.70	-7,271.59	14,453,983.89	1,715,903.94	39.79990087	-80.73123467	
24,100.00	91.00	330.23	10,850.40	10,953.49	-7,321.24	14,454,070.68	1,715,854.30	39.80013962	-80.73141049	
24,200.00	91.00	330.23	10,848.66	11,040.28	-7,370.88	14,454,157.47	1,715,804.65	39.80037838	-80.73158632	
24,300.00	91.00	330.23	10,846.92	11,127.07	-7,420.52	14,454,244.26	1,715,755.01	39.80061713	-80.73176215	
24,400.00	91.00	330.23	10,845.19	11,213.85	-7,470.17	14,454,331.05	1,715,705.36	39.80085589	-80.73193798	
24,500.00	91.00	330.23	10,843.45	11,300.64	-7,519.81	14,454,417.84	1,715,655.72	39.80109464	-80.73211381	
24,600.00	91.00	330.23	10,841.71	11,387.43	-7,569.46	14,454,504.63	1,715,606.07	39.80133340	-80.73228964	
24,700.00	91.00	330.23	10,839.97	11,474.22	-7,619.10	14,454,591.42	1,715,556.43	39.80157215	-80.73246547	
24,800.00	91.00	330.23	10,838.24	11,561.01	-7,668.75	14,454,678.21	1,715,506.79	39.80181091	-80.73264130	
24,900.00	91.00	330.23	10,836.50	11,647.80	-7,718.39	14,454,765.00	1,715,457.14	39.80204966	-80.73281714	
25,000.00	91.00	330.23	10,834.76	11,734.59	-7,768.03	14,454,851.78	1,715,407.50	39.80228841	-80.73299297	
25,043.80	91.00	330.23	10,834.00	11,772.61	-7,789.78	14,454,889.80	1,715,385.75	39.80239299	-80.73306999	
<b>PBHL/TD 25043.80 MD/10834.00 TVD</b>										
25,043.81	91.00	330.23	10,834.00	11,772.61	-7,789.78	14,454,889.80	1,715,385.75	39.80239300	-80.73307000	



Planning Report - Geographic

<b>Database:</b>	DB_Aug1919_v14	<b>Local Co-ordinate Reference:</b>	Well Knob Creek N-11HU (slot K)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL=737 @ 737.00usft
<b>Project:</b>	Marshall County, West Virginia.	<b>MD Reference:</b>	GL=737 @ 737.00usft
<b>Site:</b>	Knob Creek	<b>North Reference:</b>	Grid
<b>Well:</b>	Knob Creek N-11HU (slot K)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev4		

Design Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
KC Ten High N-11HU BF - plan hits target center - Point	0.00	0.00	10,834.00	11,772.61	-7,789.78	14,454,889.80	1,715,385.75	39.80239300	-80.73307000
KC Ten High N-11HU LF - plan misses target center by 43.18usft at 11602.47usft MD (11067.10 TVD, 107.01 N, -1116.78 E) - Point	0.00	0.00	11,067.00	128.71	-1,079.45	14,443,245.91	1,722,096.08	39.77035842	-80.70931252
KC Ten High N-11HU LF - plan misses target center by 0.10usft at 11627.60usft MD (11067.08 TVD, 128.74 N, -1129.40 E) - Point	0.00	0.01	11,067.00	128.71	-1,129.45	14,443,245.91	1,722,046.08	39.77035887	-80.70949045

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
3,000.00	3,000.00	0.00	0.00	KOP Begin 1°/100' build
3,300.00	3,299.86	-3.01	-7.25	Begin 3.00° tangent
4,000.00	3,998.90	-17.03	-41.10	Begin 1°/100' drop
4,300.00	4,298.77	-20.04	-48.35	Begin vertical hold
7,501.23	7,500.00	-20.04	-48.35	Begin 2°/100' build
8,212.33	8,203.82	-80.27	-112.24	Begin 14.22° tangent
10,235.46	10,164.94	-421.24	-473.88	Begin 6°/100' build/turn
11,068.84	10,882.86	-273.88	-812.15	Begin 8°/100' build/turn
11,627.74	11,067.08	128.87	-1,129.47	Begin 91.00° lateral section
25,043.80	10,834.00	11,772.61	-7,789.78	PBHL/TD 25043.80 MD/10834.00 TVD





# Well Site Safety Plan

## Tug Hill Operating, LLC

*JM* 8/27/2020

Well Name: Knob Creek N-12HU

Pad Location: Knob Creek

Wetzel County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing: 4,402,276.64

Easting: 525,229.52

August 2020

**KNOB CREEK N LEASE  
UTICA UNIT - 458.32 AC±  
WELL 11HU  
TUG HILL OPERATING**

T.H. LATITUDE 39°47'30"  
B.H. LATITUDE 39°50'00"

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

NAD'83 S.P.C.(FT) N. 464,844.77 E. 1,629,670.00  
NAD'83 GEO. LAT-(N) 39.769995 LONG-(W) 80.705472  
NAD'83 UTM (M) N. 4,402,270.92 E. 525,224.95

**LANDING POINT**

NAD'83 S.P.C.(FT) N. 464,992.5 E. 1,628,542.5  
NAD'83 GEO. LAT-(N) 39.770359 LONG-(W) 80.709491  
NAD'83 UTM (M) N. 4,402,310.2 E. 524,880.7

**BOTTOM HOLE**

NAD'83 S.P.C.(FT) N. 476,749.9 E. 1,622,075.4  
NAD'83 GEO. LAT-(N) 39.802393 LONG-(W) 80.733070  
NAD'83 UTM (M) N. 4,405,859.2 E. 522,850.6

MAR/PARCEL	ADJOINING SURFACE OWNER LIST	ACRES
9-11-1	GERALD F. PADLOW	1.033
9-13-10	ARTHUR L. MOORE	3.96
9-13-13.1	THOMAS JOHN FOX	0.827
9-14-2	MICHAEL L. ALVAREZ	0.75
9-14-35	PAUL G. FOX	0.338
9-14-37	MARGARET FOX - LIFE	LOT
9-14-40	MARGARET FOX - LIFE	19,560 SQ. FT.
9-14-41	MARGARET FOX - LIFE	9163 SQ. FT.
9-16-14	LYNN CAMP METHODIST CHURCH	0.762
9-16-15	RONALD R. YOUNG, ET UX - LIFE	52.02
9-16-15.1	ERIC J. YOUNG	1.98

T.H. LONGITUDE 80°40'00"  
B.H. LONGITUDE 80°42'30"

7,894' T.H.

TAG	SURFACE OWNER	PARCEL	ACRES
A	DAVID LEE FRANKLIN	9-19-39	65.824
B	RONALD R. YOUNG, ET UX - LIFE	9-16-15	52.02
C	LYNN CAMP METHODIST CHURCH	9-16-14	0.762
D	PAUL G. FOX	9-14-35	0.338
E	MARGARET FOX - LIFE	9-14-38	0.631
F	MARGARET FOX - LIFE	9-14-37	LOT
G	MARGARET FOX - LIFE	9-14-40	19,560 SQ. FT.
H	MARGARET FOX - LIFE	9-14-36	1,000 SQ. FT.
I	MARGARET FOX - LIFE	9-14-39	8,675 SQ. FT.
J	MARGARET FOX - LIFE	9-14-41	9,163 SQ. FT.
K	DAVID LEE FRANKLIN	9-14-44	2.973
L	STATE OF WEST VIRGINIA (FISH CREEK)	N/A	N/A
M	JAMES RICHMOND	9-16-12	28.628
N	THOMAS JOHN FOX	9-13-13.1	0.827
O	MARGARET FOX - LIFE	9-13-13	15.313
P	JOHN C. LAGOS, ET UX	9-14-42	1.87
Q	NILA JEAN FROHNAPPEL	9-13-12	91.1097
R	DANIEL JAY FITZWATER	9-13-20	105.5
S	ELEANOR M. FOX ESTATE	9-13-18	30.00
T	ELEANOR M. FOX ESTATE	9-13-19	19.20
U	TRICYCLE LLC	9-13-22	42.27
V	KENNETH & TERESA A. SMERTNECK	9-13-11	112.67
W	SHUTLER FAMILY TRUST	9-13-8	36.04
X	MARY VIRGINIA PETHTELL - LIFE	9-13-7	96.00
Y	ARTHUR L. MOORE	9-13-9	50' X 100' SQ. FT.
Z	ARTHUR L. MOORE	9-13-10	3.96
AA	MARGARET FOX - LIFE	9-11-2	84.378
BB	GERLAD PADLOW, ET UX	9-11-2.2	0.291
CC	GERLAD PADLOW, ET UX	9-11-1	1.033
DD	RAY A. WHETZAL, JR., ET AL.	9-10-13	71.119
EE	WILLIAM MCCONNELL	9-10-14	15.03
FF	MARY VIRGINIA PETHTELL - LIFE	9-13-6	66.36
GG	WILLIAM D. MCCONNELL	9-10-16	0.839
HH	JOSEPH MICHAEL BONENE	9-10-15	41.00
II	COBLENTZ BROS. INC.	9-10-18	67.83
JJ	KENNETH W. MASON ESTATE	9-10-6	43.06
KK	KENNETH W. MASON ESTATE	9-10-4	67.00
LL	KENNETH W. MASON ESTATE	9-10-5	21.62
MM	J. F. CROW ESTATE, ET AL.	9-6-15	33.23
NN	JANE RICHARDSON HEIRS, ET AL.	9-6-16	23.05
OO	WILLIAM N. ROUPE	9-10-3	52.00
PP	ROBERT LEE CARNEY, ET UX	9-6-4	118.17
QQ	WILLIAM N. ROUPE	9-6-5	110.09
RR	CONSOLIDATION COAL COMPANY/MURRAY ENERGY	9-6-3.1	16.00

**NOTES ON SURVEY**

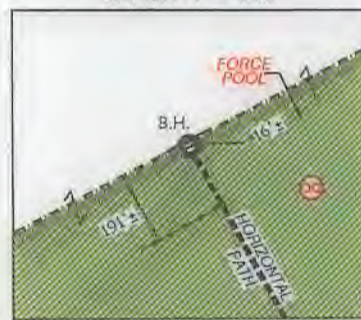
- NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
- SEE REFERENCES FOR DWELLINGS LOCATED WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
- WELL SPOT CIRCLE & TOPD MARK SCALE IS 1"=2000'.
- BASED ON WV DOT COUNTY ROUTE 74 IS A 40' STRIP OF LAND ACQUIRED IN NUMEROUS DEEDS. PROPOSED LATERAL OR TOP HOLE OF KNOB CREEK N-11HU (47-051-02287) IS WITHIN 3000' OF THE TOP HOLES OR LATERALS OF EXISTING WELLS:  
KNOB CREEK N-12HU (47-051-02268),  
KNOB CREEK N-13HU (47-051-02269),  
KNOB CREEK S-14HU (47-051-02288),  
KNOB CREEK S-15HU (47-051-02289),  
KNOB CREEK S-16HU (47-051-02290),  
HEAVEN HILL 2W-13HU (47-051-01957),  
KEITH STERN N-13HU (47-051-02285).

T.H.

B.H.

11,271' B.H.

**DETAIL  
SCALE: 1" = 500'**



12 Vanhorn Drive | P.O. Box 150 | Glenville, WV 26351 | 304.462.5634  
1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.346.3952  
254 East Beckley Bypass | Beckley, WV 25801 | 304.255.5296  
slsvv.com

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 REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

DATE OCTOBER 1, 2019

REVISED 08/27/2020

OPERATORS WELL NO. KNOB CREEK N-11HU

API WELL NO. 47 - 051 - 02287  
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1/2500 FILE NO. 8789P11HUR.dwg  
KNOB CREEK N-11HU REV4  
HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

STATE OF WEST VIRGINIA  
DIVISION OF ENVIRONMENTAL PROTECTION  
OFFICE OF OIL AND GAS



WELL TYPE: OIL  GAS  INJECTION  WASTE DISPOSAL  IF "GAS" PRODUCTION  STORAGE  DEEP  SHALLOW

LOCATION: GROUND = 734.20' ELEVATION PROPOSED = 734.67' WATERSHED FISH CREEK (HUC 10)

DISTRICT MEADE COUNTY MARSHALL QUADRANGLE GLEN EASTON 7.5'

SURFACE OWNER DAVID LEE FRANKLIN ACREAGE 65.824±

ROYALTY OWNER DAVID LEE FRANKLIN, ET AL - SEE ADDITIONAL SHEETS ACREAGE 65.824±

PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  PERFORATE NEW FORMATION  PLUG AND ABANDON  CLEAN OUT AND REPLUG  OTHER

PHYSICAL CHANGE IN WELL (SPECIFY) \_\_\_\_\_ TARGET FORMATION POINT PLEASANT  
ESTIMATED DEPTH TVD: 11,298' TMD: 25,044'

COUNTY NAME

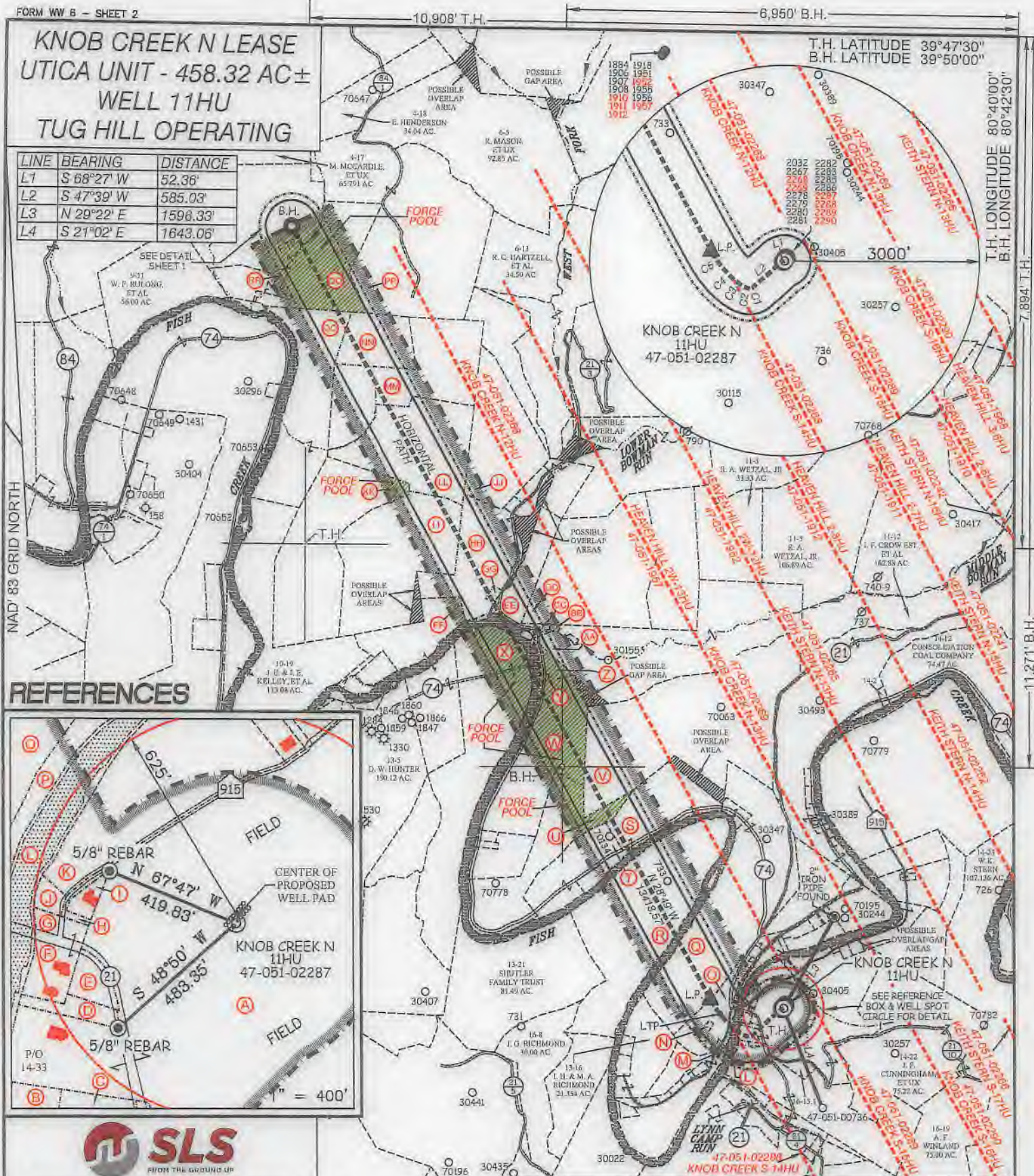
PERMIT

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

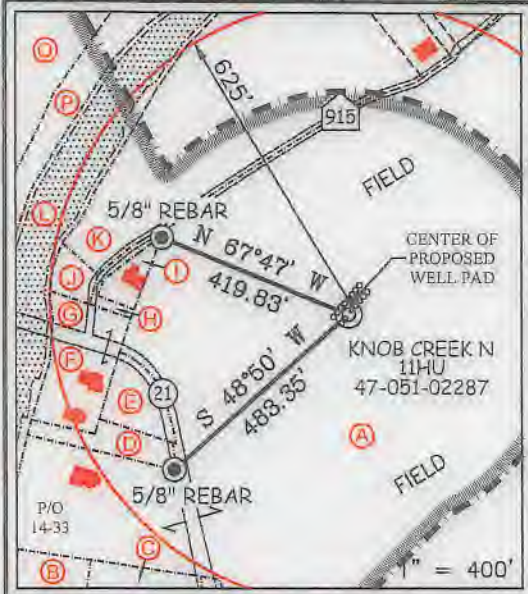
DESIGNATED AGENT DIANNA STAMPER  
CT CORPORATION SYSTEM  
ADDRESS 5400 D BIG TYLER ROAD  
CHARLESTON, WV 25313

**KNOB CREEK N LEASE  
UTICA UNIT - 458.32 AC ±  
WELL 11HU  
TUG HILL OPERATING**

LINE	BEARING	DISTANCE
L1	S 68°27' W	52.36'
L2	S 47°39' W	585.03'
L3	N 29°22' E	1598.33'
L4	S 21°02' E	1643.06'



**REFERENCES**

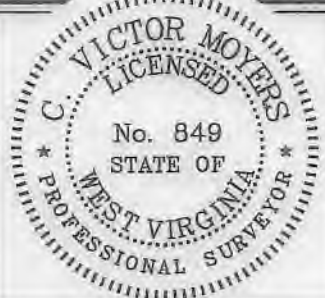


12 Vanhook Drive | P.O. Box 150 | Glenview, WV 26351 | 304.462.5634  
1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.546.3952  
254 East Beckley Bypass | Beckley, WV 25801 | 304.255.5295  
sllsv.com

P.S. 849 *C. Victor Moyers*

**CURVE TABLE**

CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	56.78'	70.73'	S 73°15' W	55.26'
C2	99.70'	256.68'	N 71°44' W	99.07'
C3	220.06'	996.75'	N 54°12' W	219.62'
C4	161.65'	1120.16'	N 44°42' W	161.51'
C5	367.90'	1775.97'	N 34°28' W	367.24'



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

**LEGEND**

- UNIT BOUNDARY
- LEASED TRACTS INSIDE UNIT BOUNDARY
- SURFACE LINE
- PROPOSED UTICA
- WELL LATERAL
- 400' OFFSET LINE
- 500' OFFSET LINE
- TIE LINE
- FORCE POOL TRACT
- CREEK
- ROAD
- PROPOSED FIRST TAKE POINT
- PROPOSED LAST TAKE POINT
- COUNTY ROUTE
- PROPOSED WELL
- EXISTING WELL
- PERMITTED WELL
- SURFACE OWNER (SEE TABLE)
- LEASE # (SEE ADDITIONAL SHEETS)

SCALE 1" = 2000' FILE NO. 8789P11HUR.dwg  
 DATE OCTOBER 1, 2019  
 REVISED 08/27/2020  
 OPERATORS WELL NO. KNOB CREEK N-11HU  
 API WELL NO. 47-051-02287  
 STATE COUNTY PERMIT

STATE OF WEST VIRGINIA  
 DIVISION OF ENVIRONMENTAL PROTECTION  
 OFFICE OF OIL AND GAS  
 MOD

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

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

COUNTY NAME PERMIT

**KNOB CREEK N LEASE  
UTICA UNIT - 458.32 AC±  
WELL 11HU  
TUG HILL OPERATING**



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1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.346.3952  
254 East Beckley Bypass | Beckley, WV 25801 | 304.255.5296  
sllwv.com

NO.	Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Deed Book/Page	
1	10*47051.219.1	9-14-33	A	DAVID LEE FRANKLIN	874	312
2	10*23112	9-16-15	B	JOHN V AND RACHEL M SHEPHERD	63	219
3	10*23112	9-16-14	C	JOHN V AND RACHEL M SHEPHERD	63	219
4	10*47051.219.1	9-14-35	D	DAVID LEE FRANKLIN	937	385
5	10*47051.293.1	9-14-38	E	MARY A FOX, ET AL	879	332
6	10*47051.219.1	9-14-37	F	DAVID LEE FRANKLIN, ET AL.	937	385
7	10*18298	9-14-40	G	MAUREEN GREGG, ET AL.	929	273
8	10*47051.219.1	9-14-36	H	DAVID LEE FRANKLIN	937	385
9	10*47051.219.1	9-14-39	I	DAVID LEE FRANKLIN	937	385
10	10*47051.219.1	9-14-41	J	DAVID LEE FRANKLIN	937	385
11	10*47051.219.1	9-14-44	K	DAVID LEE FRANKLIN	937	385
12	10*23458	FISH CREEK	L	WEST VIRGINIA DIVISION OF NATURAL RESOURCES	1019	373
13	10*16481	9-16-12	M	JAMES GRICHMOND AND CINDY L RICHMOND	829	71
14	10*18732	9-13-13.1	N	SHERILL M LEAVERS AND JAMES H LEAVERS, ET AL.	938	245
15	10*18732	9-13-13	O	SHERILL M LEAVERS AND JAMES H LEAVERS, ET AL.	938	245
16	10*19538	9-14-42	P	JOHN C LAGOS AND CYNTHIA M LAGOS	936	531
17	10*24858	9-13-12	Q	NILA JEAN FROHNAPFEL	1028	119
18	10*17193	9-13-20	R	JOHN P. ICARD, ET AL.	716	12
19	10*18351	9-13-18	S	MARK ALLEN LENENBERG, ET AL.	931	399
20	10*18351	9-13-19	T	MARK ALLEN LENENBERG, ET AL.	931	399
21	*FORCE POOL*	9-13-22	U	TRICYCLE, LLC	881	615
22	10*27247	9-13-22	U	DANIEL R AND JOANNA L JOHNSON	1053	3
23	10*27248	9-13-22	U	NILA K & THOMAS R MOWDER	1053	5
24	10*18265	9-13-11	V	KENNETH NELSON SMERTNECK AND TERESA ANN SMERTNECK	933	103
25	*FORCE POOL*	9-13-8	W	ROBERT LEE SHUTLER AND PAATRICIA A. SHULER, TRUSTEES OF THE SHUTLER FAMILY TRUST	702	386
26	*FORCE POOL*	9-13-7	X	FRANK E. PETHEL AND MARY VIRGINIA PETHEL (LIFE ESTATE)	668 672 771	525 171 11
27	10*19534	9-13-9	Y	ARTHUR L MOORE AND SHARON A MOORE	936	553
28	*FORCE POOL*	9-13-9	Y	ROBERT LEE SHUTLER AND PAATRICIA A. SHULER, TRUSTEES OF THE SHUTLER FAMILY TRUST	702	386
29	10*19534	9-13-10	Z	ARTHUR L MOORE AND SHARON A MOORE	936	553
30	*FORCE POOL*	9-13-10	Z	ROBERT LEE SHUTLER AND PAATRICIA A. SHULER, TRUSTEES OF THE SHUTLER FAMILY TRUST	702	386
31	10*47051.243.1	9-11-2	AA	MARY A FOX, ET AL.	879	332
32	10*16526	9-11-2.2	BB	JUDITH PADLOW AKA JUDI L PADLOW	957	134
33	10*16526	9-11-1	CC	JUDITH PADLOW AKA JUDI L PADLOW	957	134
34	10*15567	9-10-13	DD	VICKIE J MASON, ET AL.	680	409
35	10*15600	9-10-14	EE	WILLIAM D MCCONNELL	715	447
36	"FORCE POOL"	9-13-6	FF	FRANK E. PETHEL AND MARY VIRGINIA PETHEL (LIFE ESTATE)	668 672 771	525 171 11
37	10*16510	9-10-16	GG	WILLIAM D MCCONNELL	957	148
38	10*47051.117.1	9-10-15	HH	JOSEPH MICHAEL BONENE	876	79
39	10*17383	9-10-18	II	JACQUES ROY, ET AL.	919	631
40	10*17385	9-10-18	II	GABRIEL ARTHUR KRAUSE ROY	919	633
41	10*17386	9-10-18	II	LYNNE MERYL KRAUSE	919	629
42	10*17387	9-10-18	II	JACINTHE KRAUSE-ROY	919	636
43	10*15504	9-10-6	JJ	JAMES MASON ET AL.	692	461
44	*FORCE POOL*	9-10-4	KK	JAMES MASON ET AL.	692	461
45	10*19749	9-10-4	KK	JOHN CALVERT	944	428
46	10*19750	9-10-4	KK	DELORES J MYERS	944	430
47	10*19824	9-10-4	KK	ROBERT BRADLEY HIGGINS	946	57
48	10*19972	9-10-4	KK	ALBERT J WARSINKY A/F ELLEN K NYLES	948	209
49	10*15504	9-10-5	LL	JAMES MASON ET AL.	692	461
50	10*15511	9-6-15	MM	DAVID E CROW, ET AL.	718	376
51	10*15464	9-6-16	NN	MARY ALICE THOMAS MELLOTT, ET AL.	906	527
52	10*23561	9-10-3	OO	VINCENT PATRELLO AND AMANDA PATRELLO, ET AL.	988	97
53	10*19116	9-6-4	PP	ROBERT LEE CARNEY AND BONNIE ANNE CARNEY	682	255
54	10*18839	9-6-3	QQ	MARGARET DARLENE DUTTON, ET AL.	937	607
55	*FORCE POOL*	9-6-3	QQ	VICKY JO GRIFFIN AKA VICKIE JO GRIFFIN	870	134
56	*FORCE POOL*	9-6-3	QQ	THOMAS MICHAEL GRIFFIN	870	128
57	*FORCE POOL*	9-6-3	QQ	THE DERROW FAMILY IRREVOCABLE TRUST	874	500
58	*FORCE POOL*	9-6-3	QQ	SONDRA S. MENENDEZ	864	565
59	*FORCE POOL*	9-6-3	QQ	RUTH FUNNER	870	132
60	*FORCE POOL*	9-6-3	QQ	JOSEPH MARK MENENDEZ	868	440
61	*FORCE POOL*	9-6-3	QQ	CATHERINE E. GRIFFIN	889	13
62	10*18839	9-6-3.1	RR	MARGARET DARLENE DUTTON, ET AL.	937	607
63	*FORCE POOL*	9-6-3.1	RR	VICKY JO GRIFFIN AKA VICKIE JO GRIFFIN	870	134
64	*FORCE POOL*	9-6-3.1	RR	THOMAS MICHAEL GRIFFIN	870	128
65	*FORCE POOL*	9-6-3.1	RR	THE DERROW FAMILY IRREVOCABLE TRUST	874	500
66	*FORCE POOL*	9-6-3.1	RR	SONDRA S. MENENDEZ	864	565
67	*FORCE POOL*	9-6-3.1	RR	RUTH FUNNER	870	132
68	*FORCE POOL*	9-6-3.1	RR	JOSEPH MARK MENENDEZ	868	440
69	*FORCE POOL*	9-6-3.1	RR	CATHERINE E. GRIFFIN	889	13

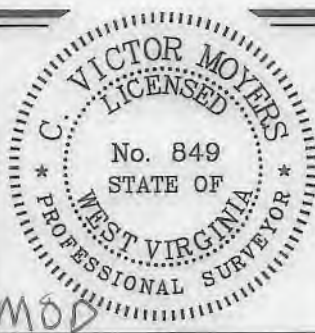
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KNOB CREEK N-11HU REV4

DATE OCTOBER 1, 20 19

REVISED 08/27/2020

OPERATORS WELL NO. KNOB CREEK N-11HU

API WELL NO. 47 — 051 — 02287  
STATE COUNTY PERMIT



STATE OF WEST VIRGINIA  
DIVISION OF ENVIRONMENTAL PROTECTION  
OFFICE OF OIL AND GAS

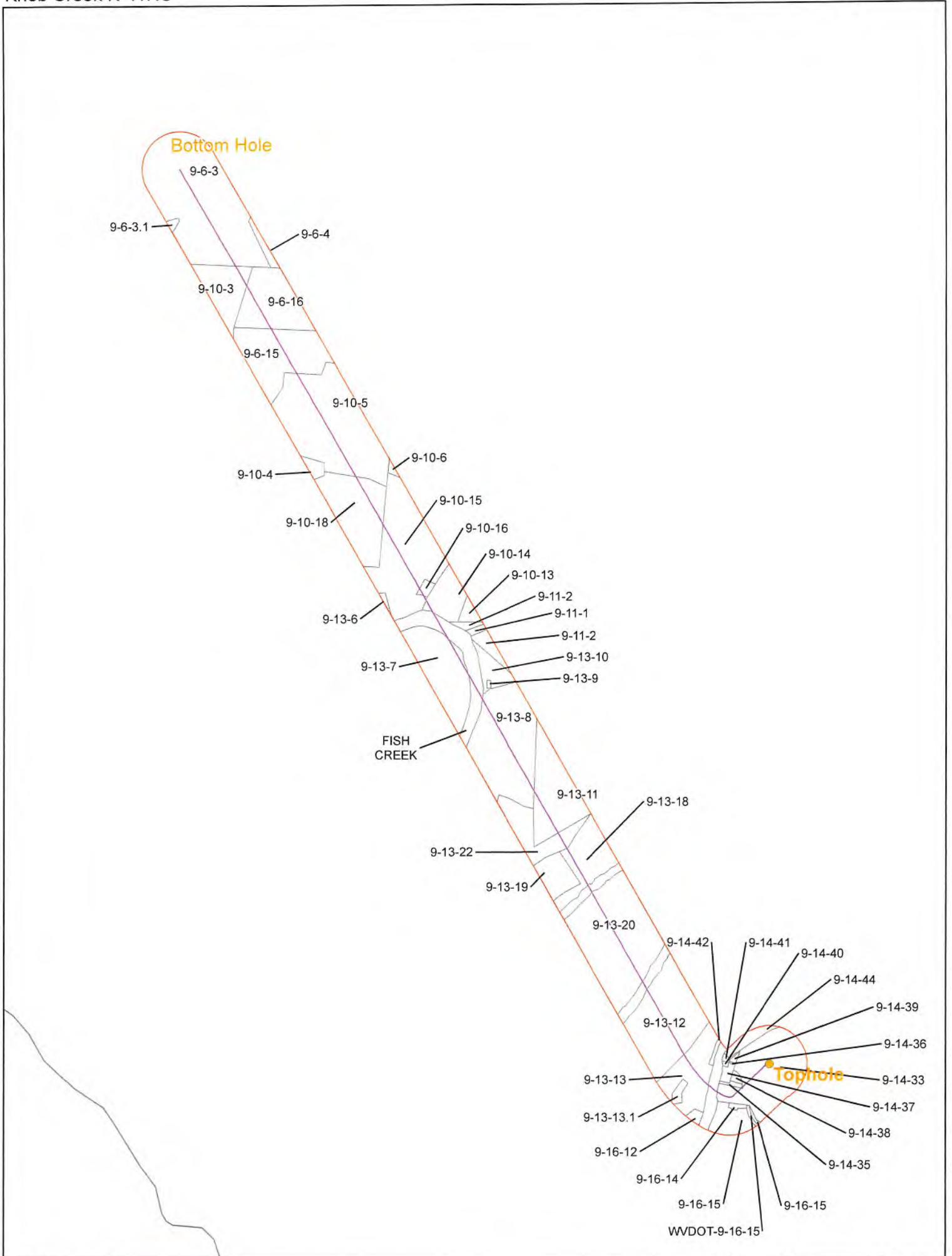


P.S. 849 *C. Victor Moyers*

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

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

COUNTY NAME  
PERMIT



Coordinate System: NAD 1983 UTM Zone 17N  
Projection: Transverse Mercator  
Datum: North American 1983  
False Easting: 1,000,000.0000  
False Northing: 0.0000  
Central Meridian: -81.0000  
Scale Factor: 0.9999  
Latitude Of Origin: 38.0000  
Units: Feet US

**CONFIDENTIAL**

0 12,000 24,000 48,000 Feet

**TUG HILL OPERATING**

— Utica Well  
— 500' Buffer

**Knob Creek N-11HU**  
**Operators within 500 Feet of Well Borehole**



Offset Operators within 500' Knob Creek N - 11HU				
County	District	Parcel	Owner	Address
MARSHALL	MEADE	9-6-3	EQT CORPORATION	625 Liberty Ave. Suite 1700 Pittsburgh, PA 15222
MARSHALL	MEADE	9-6-3	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-6-3.1	EQT CORPORATION	625 Liberty Ave. Suite 1700 Pittsburgh, PA 15222
MARSHALL	MEADE	9-6-3.1	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-6-4	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-6-4	CHEVRON USA INC	700 Cherrington Pkwy Coraopolis, PA 15108
MARSHALL	MEADE	9-6-15	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-6-16	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-3	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-4	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-4	EQT CORPORATION	625 Liberty Ave. Suite 1700 Pittsburgh, PA 15222
MARSHALL	MEADE	9-10-5	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-6	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-13	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-14	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-15	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-16	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-10-18	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-11-1	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-11-2	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-6	EQT CORPORATION	625 Liberty Ave. Suite 1700 Pittsburgh, PA 15222

51-02287 mod

MARSHALL	MEADE	9-13-7	EQT CORPORATION	625 Liberty Ave. Suite 1700 Pittsburgh, PA 15222
MARSHALL	MEADE	9-13-9	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-10	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-11	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-12	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-13	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-13.1	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-18	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-19	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-20	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-13-22	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-33	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-35	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-36	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-37	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-38	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-39	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-40	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-41	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-42	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-14-44	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-16-12	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317

MARSHALL	MEADE	9-16-14	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	9-16-15	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	WVDOT - 9-16-15	TH EXPLORATION LLC	381 Southpointe Blvd., Ste 200 Canonsburg, PA 15317
MARSHALL	MEADE	Fish Creek	TH EXPLORATION LLC	380 Southpointe Blvd., Ste 200 Canonsburg, PA 15317





*found on Jacob's desk*  
RECEIVED  
Office of Oil and Gas  
SEP 04 2020  
WV Department of  
Environmental Protection

August 27, 2020

Laura Adkins  
WVDEP – Office of Oil and Gas  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304-2345

RE: Knob Creek N-11HU

Dear Laura,

Enclosed please find a permit modification on the Knob Creek N-11HU (API# 47-051-02287) to lengthen the lateral to within 10' of our unit boundary. Please see the enclosed information;

- Updated WW-6B electronically signed by Jim Nicholson, Inspector.
- Updated Well Site Safety Plan on CD and signed cover page by Jim Nicholson.
- Updated Well Plat

Please note that the WW-6A1 information for this well has not changed. If you have any questions or concerns, please feel free to call me at 304-376-0111.

Sincerely,

Amy L. Morris  
Permitting Specialist – Appalachia Region

alm