



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

Harold D. Ward, Cabinet Secretary
www.dep.wv.gov

Monday, March 15, 2021
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 S-7HM
47-051-02282-00-00

Lateral Extension

TUG HILL OPERATING, LLC

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

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

James A. Martin
Chief

Operator's Well Number: KNOB CREEK S-7HM
Farm Name: DAVID LEE FRANKLIN
U.S. WELL NUMBER: 47-051-02282-00-00
Horizontal 6A New Drill
Date Modification Issued: 3/15/2021

Promoting a healthy environment.

03/19/2021



February 15, 2021

WADE STANSBERRY
WV DEP OFFICE OF OIL & GAS
601 57TH STREET SE
CHARLESTON, WV 25304-2345

VIA USPS

**RE: Knob Creek S-7HM API # 47-051-02282 (H6A Permit Modification)
Meade District, Marshall County, WV**

Dear Wade:

Tug Hill Operating, LLC is submitting a permit modification for its permitted well, Knob Creek S-7HM to add 8,118.23' to the lateral length. Therefore, enclosed please find the following:

- Modified WW-6B with changes highlighted in yellow
- Updated well plat
- Updated WW-6A1 information
- Updated Site Safety Plan (The only information that has changed is the contact information for the Inspector at 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 MORRIS
PERMIT SPECIALIST-APPALACHIA REGION
TUG HILL OPERATING, LLC

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Enclosures

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

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

2) Operator's Well Number: Knob Creek S-7HM 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

6) Existing Pad: Yes or No Yes

MJ
10/29/2020

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus is the target formation at a depth of 6197' - 6248', thickness of 51' and an anticipated approximate pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6,348'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 15,590'

11) Proposed Horizontal Leg Length: 8,759.77'

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

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

14) Approximate Saltwater Depths: 1,740'

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

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

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

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

WW-6B
(04/15)

API NO. 47-051 - 02282 *Mod*
 OPERATOR WELL NO. Knob Creek S-7HM
 Well Pad Name: Knob Creek

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 | J55 | 54.5# | 480' | 480' | 683ft ³ (CTS) |
| Coal | 13 3/8" | NEW | J55 | 54.5# | 480' | 480' | 683ft ³ (CTS) |
| Intermediate | 9 5/8" | NEW | J55 | 36# | 2,303' | 2,303' | 745ft ³ (CTS) |
| Production | 5 1/2" | NEW | P110 | 20# | 15,590' | 15,590' | 3,978ft ³ (CTS) |
| Tubing | 2 3/8" | NEW | N80 | 4.7# | 5,986' | | |
| Liners | | | | | | | |

JK 10/29/2020

| 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" | 17.5" | .33 | 2,740 | 2,192 | SEE #24 | 1.2 |
| Coal | 13 3/8" | 17.5" | .33 | 2,740 | 2,192 | SEE #24 | 1.2 |
| Intermediate | 9 5/8" | 12 1/4" | .352 | 3,520 | 2,816 | SEE #24 | 1.19 |
| Production | 5 1/2" | 8 7/8" _ 8 3/4" | .361 | 12,640 | 10,112 | SEE #24 | 1.17/1.19 |
| Tubing | 2 3/8" | | .19 | 11,200 | 8,960 | | |
| Liners | | | | | | | |

PACKERS

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

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WW-6B
(10/14)

API NO. 47-051 - 02282 *Mod*
OPERATOR WELL NO. Knob Creek S-7HM
Well Pad Name: Knob Creek

ru
10/29/2020

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

Drill through the Marcellus tagging less than 100' from the top of the Onondaga to get depths and log data. Plug back to proposed kick off point. Drill the horizontal section to planned and proposed TD. Run casing and cement to surface. Run Bond Log from app. 60 deg to surface. Make clean out run and stimulate.

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

Well to completed with approximately 22,000,000 lb. proppant and 390,000 barrels of water. Max rate = 80bpm; max psi = 9,000#.

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 other joint. Production casing will have one centralizer every other joint in lateral, one centralizer every joint through curve, one centralizer every other joint to surface.

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

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

25) Proposed borehole conditioning procedures:

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

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*Note: Attach additional sheets as needed.

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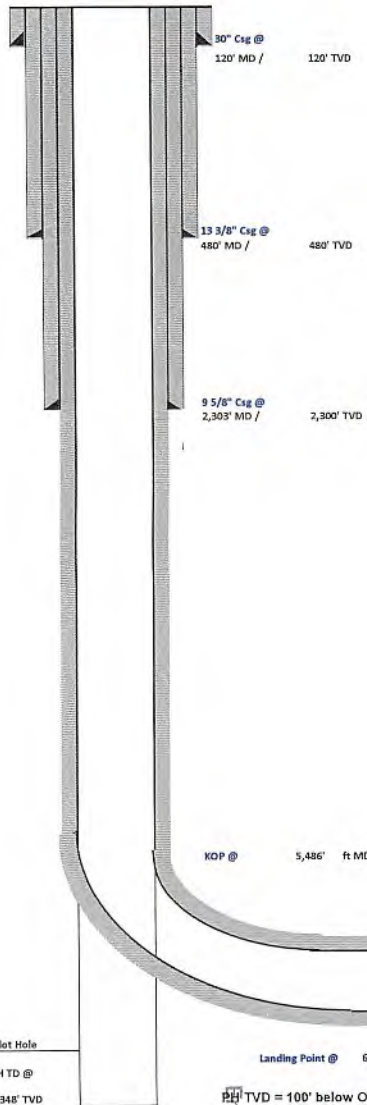


WELL NAME: Knob Creek S-7HM
STATE: WV **COUNTY:** Marshall
DISTRICT: Meade
DF Elev: 737' **GL Elev:** 737'
TD: 15,590'
TH Latitude: 39.77008272
TH Longitude: -80.70547719
BH Latitude: 39.74957216
BH Longitude: -80.69259803

| FORMATION TOPS | |
|---------------------|-----------|
| Formation | Depth TVD |
| Deepest Fresh Water | 380 |
| Sewickley Coal | 292 |
| Pittsburgh Coal | 374 |
| Big Lime | 1692 |
| Weir | 1993 |
| Berea | 2177 |
| Gordon | 2440 |
| Rhinestreet | 5554 |
| Genesee/Burkett | 6066 |
| Tully | 6096 |
| Hamilton | 6129 |
| Marcellus | 6197 |
| Landing Depth | 6232 |
| Onondaga | 6248 |
| Pilot Hole Depth | 6348 |

| 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 | 8W | Surface |
| Surface | 17.5 | 13 3/8 | 480' | 480' | 54.5 | J55 | Surface |
| Intermediate 1 | 12 1/4 | 9 5/8 | 2,303' | 2,300' | 36 | J55 | Surface |
| Production | 8 7/8 x 8 3/4 | 5 1/2 | 15,590' | 6,385' | 20 | CYHP110 | Surface |

| CEMENT SUMMARY | | | | DRILLING DETAILS | |
|----------------|-------|-------|---------|------------------|-------------------------------------------------------------------------------|
| | Sacks | Class | Density | Fluid Type | Centralizer Notes |
| Conductor | 338 | A | 15.6 | Air | None |
| Surface | 661 | A | 15.6 | Air | 3 Centralizers at equal distance |
| Intermediate 1 | 784 | A | 15 | Air | 1 Centralizer every other jt |
| Production | 3,654 | A | 14.5 | Air / SOBM | 1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc |



Handwritten signature and date: 10/28/2020

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Pilot Hole
 PH TD @ 6,348' TVD
 Landing Point @ 6,832' MD / 6,232' TVD
 TVD = 100' below Onondaga Top

Lateral TD @ 15,590' r MD
 6,385' r TVD



Tug Hill Operating, LLC Casing and Cement Program

Knob Creek S-7HM

Casing

| | String | Grade | Bit Size | Depth (Measured) | Cement Fill Up |
|--------------|---------|---------|----------------|------------------|----------------|
| Conductor | 30" | BW | 36" | 120' | CTS |
| Surface | 13 3/8" | J55 | 17 1/2" | 480' | CTS |
| Intermediate | 9 5/8" | J55 | 12 1/4" | 2,303' | CTS |
| Production | 5 1/2" | CYHP110 | 8 7/8 x 8 3/4" | 15,590' | 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: Knob Creek S-07HM (slot E)
Site: Knob Creek
Project: Marshall County, West Virginia.
Design: rev3

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
14443149.04 1723174.09 39.77038272 -80.70547718

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



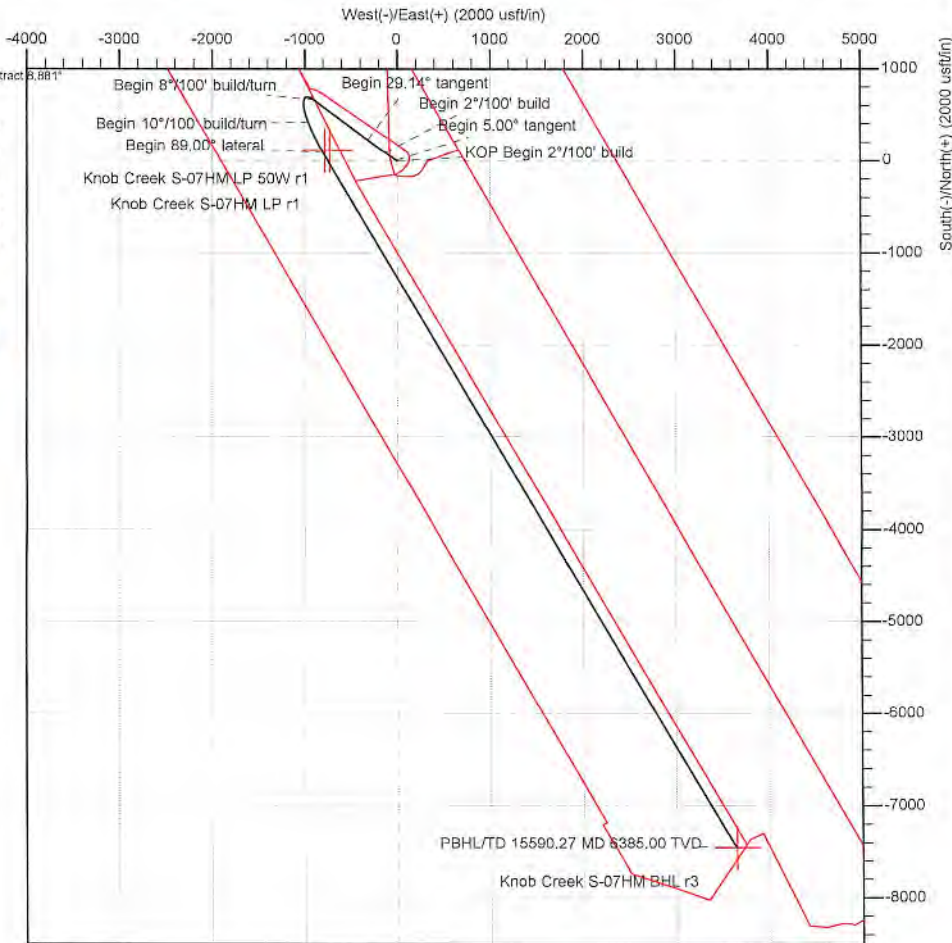
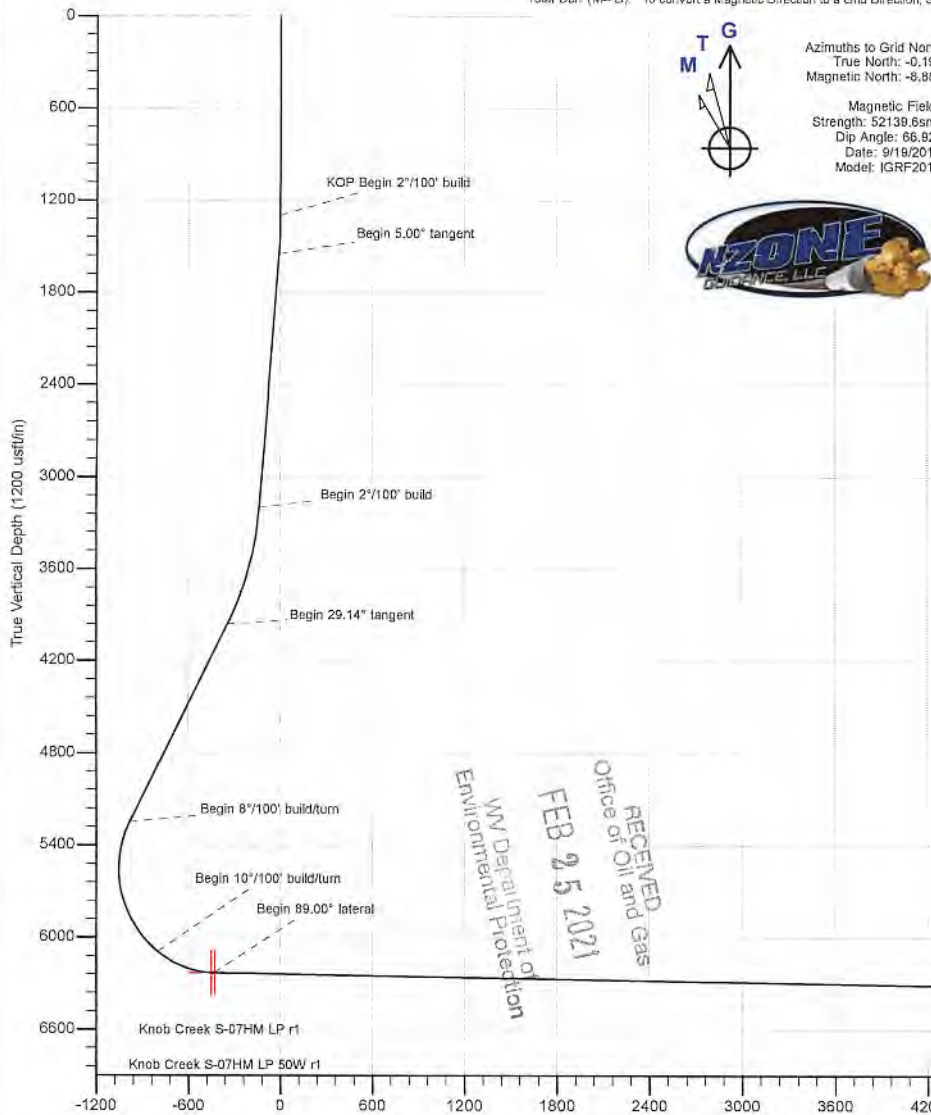
Azimuths to Grid North
True North: -0.19°
Magnetic North: -8.88°

Magnetic Field
Strength: 52139.6snT
Dip Angle: 66.82°
Date: 9/18/2017
Model: IGRF2015



SECTION DETAILS

| Sec | MD | Inc | Azi | TVD | +N-S | +E-W | Dleg | TFace | VSec | Annotation |
|-----|----------|-------|--------|---------|----------|---------|-------|----------|---------|---------------------------------|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2 | 1300.00 | 0.00 | 0.00 | 1300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | KOP Begin 2°/100' build |
| 3 | 1550.00 | 5.00 | 304.45 | 1549.68 | 6.17 | -8.99 | 2.00 | 304.450 | -8.49 | Begin 5.00° tangent |
| 4 | 3206.62 | 5.00 | 304.45 | 3200.00 | 87.84 | -128.05 | 0.00 | 0.000 | -135.15 | Begin 2°/100' build |
| 5 | 4011.40 | 29.14 | 305.76 | 3963.65 | 227.01 | -316.74 | 3.00 | 2.751 | -343.04 | Begin 29.14° tangent |
| 6 | 5486.02 | 29.14 | 305.76 | 5251.66 | 656.73 | -891.98 | 0.00 | 0.000 | -981.72 | Begin 8°/100' build/turn |
| 7 | 6431.13 | 50.00 | 159.74 | 6094.12 | 419.34 | -961.34 | 8.00 | -154.501 | -798.90 | Begin 10°/100' build/turn |
| 8 | 6832.11 | 89.00 | 149.50 | 6232.17 | 88.94 | -799.77 | 10.00 | -16.018 | -431.11 | Begin 89.00° lateral |
| 9 | 15590.27 | 89.00 | 149.50 | 6385.00 | -7458.28 | 3644.53 | 0.00 | 0.000 | 8299.32 | PBHL/TD 15590.27 MD 6385.00 TVD |



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PBHL/TD 15590.27 MD 6385.00 TVD
Knob Creek S-07HM BHL r3

Vertical Section at 153.95° (1200 usft/in)



Planning Report - Geographic

| | | | |
|------------------|---------------------------------|-------------------------------------|---------------------------------|
| Database: | DB_Jul2216dt_v14 It | Local Co-ordinate Reference: | Well Knob Creek S-07HM (slot E) |
| 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 S-07HM (slot E) | 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 | 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 S-07HM (slot E) | | | | | |
| Well Position | +N/-S | 0.00 usft | Northing: | 14,443,149.04 usft | Latitude: | 39.77008272 |
| | +E/-W | 0.00 usft | Easting: | 1,723,174.09 usft | Longitude: | -80.70547719 |
| 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 | 52,139.62043861 |

| | | | | | |
|--------------------------|--------------------------------|---------------------|----------------------|----------------------|--|
| 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 | 153.95 | |

| | | | | | |
|---------------------------------|------------------------|--------------------------------|------------------|----------------|--|
| Plan Survey Tool Program | Date | 8/11/2019 | | | |
| Depth From (usft) | Depth To (usft) | Survey (Wellbore) | Tool Name | Remarks | |
| 1 | 0.00 | 15,590.26 rev3 (Original Hole) | MWD | | |
| | | | MWD - Standard | | |

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| 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 | |
| 1,300.00 | 0.00 | 0.00 | 1,300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | |
| 1,550.00 | 5.00 | 304.45 | 1,549.68 | 6.17 | -8.99 | 2.00 | 2.00 | 0.00 | 304.450 | |
| 3,206.62 | 5.00 | 304.45 | 3,200.00 | 87.84 | -128.05 | 0.00 | 0.00 | 0.00 | 0.000 | |
| 4,011.40 | 29.14 | 306.76 | 3,963.65 | 227.01 | -316.74 | 3.00 | 3.00 | 0.29 | 2.751 | |
| 5,486.02 | 29.14 | 306.76 | 5,251.66 | 656.73 | -891.98 | 0.00 | 0.00 | 0.00 | 0.000 | |
| 6,431.13 | 50.00 | 159.74 | 6,094.12 | 419.34 | -961.34 | 8.00 | 2.21 | -15.56 | -154.501 | |
| 6,832.11 | 89.00 | 149.50 | 6,232.17 | 88.94 | -799.77 | 10.00 | 9.73 | -2.55 | -16.018 | |
| 15,590.27 | 89.00 | 149.50 | 6,385.00 | -7,456.28 | 3,644.53 | 0.00 | 0.00 | 0.00 | 0.000 | Knob Creek S-07HM |

03/19/2021



Planning Report - Geographic

| | | | |
|-----------|---------------------------------|------------------------------|---------------------------------|
| Database: | DB_Jul2216dt_v14 lt | Local Co-ordinate Reference: | Well Knob Creek S-07HM (slot E) |
| 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 S-07HM (slot E) | 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 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 100.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 200.00 | 0.00 | 0.00 | 200.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 300.00 | 0.00 | 0.00 | 300.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 400.00 | 0.00 | 0.00 | 400.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 500.00 | 0.00 | 0.00 | 500.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 600.00 | 0.00 | 0.00 | 600.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 700.00 | 0.00 | 0.00 | 700.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 800.00 | 0.00 | 0.00 | 800.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 900.00 | 0.00 | 0.00 | 900.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 1,000.00 | 0.00 | 0.00 | 1,000.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 1,100.00 | 0.00 | 0.00 | 1,100.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 1,200.00 | 0.00 | 0.00 | 1,200.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| 1,300.00 | 0.00 | 0.00 | 1,300.00 | 0.00 | 0.00 | 14,443,149.04 | 1,723,174.09 | 39.77008272 | -80.70547719 |
| KOP Begin 2°/100' build | | | | | | | | | |
| 1,400.00 | 2.00 | 304.45 | 1,399.98 | 0.99 | -1.44 | 14,443,150.03 | 1,723,172.65 | 39.77008545 | -80.70548230 |
| 1,500.00 | 4.00 | 304.45 | 1,499.84 | 3.95 | -5.75 | 14,443,152.99 | 1,723,168.33 | 39.77009361 | -80.70549762 |
| 1,550.00 | 5.00 | 304.45 | 1,549.68 | 6.17 | -8.99 | 14,443,155.21 | 1,723,165.10 | 39.77009974 | -80.70550911 |
| Begin 5.00° tangent | | | | | | | | | |
| 1,600.00 | 5.00 | 304.45 | 1,599.49 | 8.63 | -12.58 | 14,443,157.67 | 1,723,161.51 | 39.77010654 | -80.70552187 |
| 1,700.00 | 5.00 | 304.45 | 1,699.11 | 13.56 | -19.77 | 14,443,162.60 | 1,723,154.32 | 39.77012015 | -80.70554739 |
| 1,800.00 | 5.00 | 304.45 | 1,798.73 | 18.49 | -26.96 | 14,443,167.53 | 1,723,147.13 | 39.77013375 | -80.70557291 |
| 1,900.00 | 5.00 | 304.45 | 1,898.35 | 23.42 | -34.14 | 14,443,172.46 | 1,723,139.95 | 39.77014736 | -80.70559843 |
| 2,000.00 | 5.00 | 304.45 | 1,997.97 | 28.35 | -41.33 | 14,443,177.39 | 1,723,132.76 | 39.77016096 | -80.70562395 |
| 2,100.00 | 5.00 | 304.45 | 2,097.59 | 33.28 | -48.52 | 14,443,182.32 | 1,723,125.57 | 39.77017456 | -80.70564947 |
| 2,200.00 | 5.00 | 304.45 | 2,197.21 | 38.21 | -55.71 | 14,443,187.25 | 1,723,118.38 | 39.77018817 | -80.70567499 |
| 2,300.00 | 5.00 | 304.45 | 2,296.83 | 43.14 | -62.89 | 14,443,192.18 | 1,723,111.20 | 39.77020177 | -80.70570051 |
| 2,400.00 | 5.00 | 304.45 | 2,396.45 | 48.07 | -70.08 | 14,443,197.11 | 1,723,104.01 | 39.77021538 | -80.70572603 |
| 2,500.00 | 5.00 | 304.45 | 2,496.07 | 53.00 | -77.27 | 14,443,202.04 | 1,723,096.82 | 39.77022898 | -80.70575155 |
| 2,600.00 | 5.00 | 304.45 | 2,595.69 | 57.93 | -84.45 | 14,443,206.97 | 1,723,089.64 | 39.77024259 | -80.70577707 |
| 2,700.00 | 5.00 | 304.45 | 2,695.31 | 62.87 | -91.64 | 14,443,211.90 | 1,723,082.45 | 39.77025619 | -80.70580259 |
| 2,800.00 | 5.00 | 304.45 | 2,794.93 | 67.80 | -98.83 | 14,443,216.83 | 1,723,075.26 | 39.77026980 | -80.70582811 |
| 2,900.00 | 5.00 | 304.45 | 2,894.55 | 72.73 | -106.01 | 14,443,221.76 | 1,723,068.08 | 39.77028340 | -80.70585363 |
| 3,000.00 | 5.00 | 304.45 | 2,994.17 | 77.66 | -113.20 | 14,443,226.69 | 1,723,060.89 | 39.77029701 | -80.70587915 |
| 3,100.00 | 5.00 | 304.45 | 3,093.78 | 82.59 | -120.39 | 14,443,231.62 | 1,723,053.70 | 39.77031061 | -80.70590467 |
| 3,200.00 | 5.00 | 304.45 | 3,193.40 | 87.52 | -127.58 | 14,443,236.56 | 1,723,046.51 | 39.77032422 | -80.70593019 |
| 3,206.62 | 5.00 | 304.45 | 3,200.00 | 87.84 | -128.05 | 14,443,236.88 | 1,723,046.04 | 39.77032512 | -80.70593188 |
| Begin 2°/100' build | | | | | | | | | |
| 3,300.00 | 7.80 | 305.44 | 3,292.79 | 93.82 | -136.57 | 14,443,242.86 | 1,723,037.52 | 39.77034161 | -80.70596213 |
| 3,400.00 | 10.80 | 305.93 | 3,391.46 | 103.25 | -149.69 | 14,443,252.29 | 1,723,024.40 | 39.77036763 | -80.70600869 |
| 3,500.00 | 13.80 | 306.21 | 3,489.16 | 115.80 | -166.90 | 14,443,264.84 | 1,723,007.19 | 39.77040224 | -80.70606979 |
| 3,600.00 | 16.80 | 306.40 | 3,585.60 | 131.42 | -188.15 | 14,443,280.46 | 1,722,985.94 | 39.77044534 | -80.70614526 |
| 3,700.00 | 19.80 | 306.52 | 3,680.54 | 150.08 | -213.40 | 14,443,299.12 | 1,722,960.69 | 39.77049680 | -80.70623488 |
| 3,800.00 | 22.80 | 306.62 | 3,773.70 | 171.72 | -242.56 | 14,443,320.76 | 1,722,931.53 | 39.77055650 | -80.70633642 |
| 3,900.00 | 25.80 | 306.69 | 3,864.83 | 196.28 | -275.57 | 14,443,345.32 | 1,722,898.52 | 39.77062425 | -80.70645559 |
| 4,000.00 | 28.80 | 306.75 | 3,953.68 | 223.70 | -312.32 | 14,443,372.74 | 1,722,861.77 | 39.77069989 | -80.70658607 |
| 4,011.40 | 29.14 | 306.76 | 3,963.66 | 227.01 | -316.74 | 14,443,376.05 | 1,722,857.35 | 39.77070900 | -80.70660177 |
| Begin 29.14° tangent | | | | | | | | | |
| 4,100.00 | 29.14 | 306.76 | 4,041.04 | 252.83 | -351.30 | 14,443,401.87 | 1,722,822.79 | 39.77078022 | -80.70672447 |
| 4,200.00 | 29.14 | 306.76 | 4,128.39 | 281.97 | -390.31 | 14,443,431.01 | 1,722,783.78 | 39.77086060 | -80.70686296 |
| 4,300.00 | 29.14 | 306.76 | 4,215.73 | 311.11 | -429.32 | 14,443,460.15 | 1,722,744.77 | 39.77094098 | -80.70700145 |
| 4,400.00 | 29.14 | 306.76 | 4,303.08 | 340.25 | -468.33 | 14,443,489.29 | 1,722,705.76 | 39.77102136 | -80.70713994 |
| 4,500.00 | 29.14 | 306.76 | 4,390.42 | 369.39 | -507.34 | 14,443,518.43 | 1,722,666.75 | 39.77110173 | -80.70727843 |
| 4,600.00 | 29.14 | 306.76 | 4,477.77 | 398.53 | -546.35 | 14,443,547.57 | 1,722,627.74 | 39.77118211 | -80.70741692 |



Planning Report - Geographic

Database: DB_Jul2216dt_v14 lt
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia.
 Site: Knob Creek
 Well: Knob Creek S-07HM (slot E)
 Wellbore: Original Hole
 Design: rev3

Local Co-ordinate Reference: Well Knob Creek S-07HM (slot E)
 TVD Reference: GL=737 @ 737.00usft
 MD Reference: GL=737 @ 737.00usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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WV Department of
 Environmental Protection

Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|----------------------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-------------|--------------|
| 4,700.00 | 29.14 | 306.76 | 4,565.11 | 427.67 | -585.36 | 14,443,576.71 | 1,722,588.73 | 39.77126249 | -80.70755542 |
| 4,800.00 | 29.14 | 306.76 | 4,652.46 | 456.81 | -624.37 | 14,443,605.85 | 1,722,549.72 | 39.77134287 | -80.70769391 |
| 4,900.00 | 29.14 | 306.76 | 4,739.80 | 485.95 | -663.38 | 14,443,634.99 | 1,722,510.71 | 39.77142325 | -80.70783240 |
| 5,000.00 | 29.14 | 306.76 | 4,827.14 | 515.10 | -702.39 | 14,443,664.13 | 1,722,471.70 | 39.77150363 | -80.70797089 |
| 5,100.00 | 29.14 | 306.76 | 4,914.49 | 544.24 | -741.40 | 14,443,693.28 | 1,722,432.69 | 39.77158401 | -80.70810938 |
| 5,200.00 | 29.14 | 306.76 | 5,001.83 | 573.38 | -780.41 | 14,443,722.42 | 1,722,393.68 | 39.77166438 | -80.70824788 |
| 5,300.00 | 29.14 | 306.76 | 5,089.18 | 602.52 | -819.42 | 14,443,751.56 | 1,722,354.67 | 39.77174476 | -80.70838637 |
| 5,400.00 | 29.14 | 306.76 | 5,176.52 | 631.66 | -858.43 | 14,443,780.70 | 1,722,315.66 | 39.77182514 | -80.70852486 |
| 5,486.02 | 29.14 | 306.76 | 5,251.66 | 656.73 | -891.98 | 14,443,805.77 | 1,722,282.11 | 39.77189428 | -80.70864400 |
| Begin 8°/100' build/turn | | | | | | | | | |
| 5,500.00 | 28.13 | 305.74 | 5,263.93 | 660.69 | -897.36 | 14,443,809.73 | 1,722,276.71 | 39.77190521 | -80.70866318 |
| 5,600.00 | 21.24 | 295.91 | 5,354.77 | 682.41 | -932.87 | 14,443,831.45 | 1,722,241.22 | 39.77196518 | -80.70878923 |
| 5,700.00 | 15.40 | 278.25 | 5,449.73 | 692.25 | -962.35 | 14,443,841.28 | 1,722,211.74 | 39.77199245 | -80.70889403 |
| 5,800.00 | 12.20 | 246.93 | 5,546.97 | 690.01 | -985.25 | 14,443,839.05 | 1,722,188.84 | 39.77198651 | -80.70897555 |
| 5,900.00 | 13.67 | 211.19 | 5,644.58 | 675.73 | -1,001.12 | 14,443,824.77 | 1,722,172.97 | 39.77194745 | -80.70903219 |
| 6,000.00 | 18.73 | 188.59 | 5,740.67 | 649.71 | -1,009.65 | 14,443,798.75 | 1,722,164.44 | 39.77187605 | -80.70906285 |
| 6,100.00 | 25.32 | 176.32 | 5,833.37 | 612.43 | -1,010.68 | 14,443,761.47 | 1,722,163.41 | 39.77177369 | -80.70906695 |
| 6,200.00 | 32.51 | 169.03 | 5,920.87 | 564.63 | -1,004.19 | 14,443,713.67 | 1,722,169.90 | 39.77164237 | -80.70904439 |
| 6,300.00 | 39.99 | 164.19 | 6,001.48 | 507.24 | -990.29 | 14,443,656.28 | 1,722,183.79 | 39.77148464 | -80.70899561 |
| 6,400.00 | 47.61 | 160.66 | 6,073.62 | 441.38 | -969.28 | 14,443,590.42 | 1,722,204.81 | 39.77130357 | -80.70892157 |
| 6,431.13 | 50.00 | 159.74 | 6,094.12 | 419.34 | -961.34 | 14,443,568.38 | 1,722,212.75 | 39.77124298 | -80.70889358 |
| Begin 10°/100' build/turn | | | | | | | | | |
| 6,500.00 | 56.64 | 157.47 | 6,135.24 | 367.97 | -941.16 | 14,443,517.00 | 1,722,232.93 | 39.77110171 | -80.70882236 |
| 6,600.00 | 66.35 | 154.72 | 6,182.91 | 287.77 | -905.51 | 14,443,436.81 | 1,722,268.58 | 39.77088116 | -80.70869641 |
| 6,700.00 | 76.09 | 152.35 | 6,215.07 | 203.15 | -863.32 | 14,443,352.19 | 1,722,310.77 | 39.77064839 | -80.70854726 |
| 6,800.00 | 85.86 | 150.18 | 6,230.73 | 116.67 | -815.88 | 14,443,265.71 | 1,722,358.20 | 39.77041046 | -80.70837943 |
| 6,832.11 | 89.00 | 149.50 | 6,232.17 | 88.94 | -799.77 | 14,443,237.98 | 1,722,374.32 | 39.77033416 | -80.70832240 |
| Begin 89.00° lateral | | | | | | | | | |
| 6,900.00 | 89.00 | 149.50 | 6,233.36 | 30.45 | -765.32 | 14,443,179.49 | 1,722,408.77 | 39.77017323 | -80.70820048 |
| 7,000.00 | 89.00 | 149.50 | 6,235.10 | -55.70 | -714.58 | 14,443,093.34 | 1,722,459.51 | 39.76993618 | -80.70802089 |
| 7,100.00 | 89.00 | 149.50 | 6,236.85 | -141.85 | -663.83 | 14,443,007.19 | 1,722,510.26 | 39.76969914 | -80.70784130 |
| 7,200.00 | 89.00 | 149.50 | 6,238.59 | -228.00 | -613.09 | 14,442,921.04 | 1,722,561.00 | 39.76946209 | -80.70766171 |
| 7,300.00 | 89.00 | 149.50 | 6,240.34 | -314.15 | -562.34 | 14,442,834.89 | 1,722,611.75 | 39.76922504 | -80.70748212 |
| 7,400.00 | 89.00 | 149.50 | 6,242.08 | -400.30 | -511.60 | 14,442,748.74 | 1,722,662.49 | 39.76898799 | -80.70730253 |
| 7,500.00 | 89.00 | 149.50 | 6,243.83 | -486.45 | -460.85 | 14,442,662.59 | 1,722,713.24 | 39.76875094 | -80.70712294 |
| 7,600.00 | 89.00 | 149.50 | 6,245.57 | -572.60 | -410.11 | 14,442,576.44 | 1,722,763.98 | 39.76851390 | -80.70694336 |
| 7,700.00 | 89.00 | 149.50 | 6,247.32 | -658.75 | -359.36 | 14,442,490.29 | 1,722,814.73 | 39.76827685 | -80.70676378 |
| 7,800.00 | 89.00 | 149.50 | 6,249.06 | -744.90 | -308.62 | 14,442,404.13 | 1,722,865.47 | 39.76803980 | -80.70658419 |
| 7,900.00 | 89.00 | 149.50 | 6,250.81 | -831.05 | -257.87 | 14,442,317.98 | 1,722,916.22 | 39.76780275 | -80.70640461 |
| 8,000.00 | 89.00 | 149.50 | 6,252.55 | -917.21 | -207.13 | 14,442,231.83 | 1,722,966.96 | 39.76756570 | -80.70622503 |
| 8,100.00 | 89.00 | 149.50 | 6,254.30 | -1,003.36 | -156.38 | 14,442,145.68 | 1,723,017.70 | 39.76732865 | -80.70604545 |
| 8,200.00 | 89.00 | 149.50 | 6,256.04 | -1,089.51 | -105.64 | 14,442,059.53 | 1,723,068.45 | 39.76709160 | -80.70586588 |
| 8,300.00 | 89.00 | 149.50 | 6,257.79 | -1,175.66 | -54.90 | 14,441,973.38 | 1,723,119.19 | 39.76685455 | -80.70568630 |
| 8,400.00 | 89.00 | 149.50 | 6,259.53 | -1,261.81 | -4.15 | 14,441,887.23 | 1,723,169.94 | 39.76661750 | -80.70550673 |
| 8,500.00 | 89.00 | 149.50 | 6,261.28 | -1,347.96 | 46.59 | 14,441,801.08 | 1,723,220.68 | 39.76638045 | -80.70532715 |
| 8,600.00 | 89.00 | 149.50 | 6,263.02 | -1,434.11 | 97.34 | 14,441,714.93 | 1,723,271.43 | 39.76614340 | -80.70514758 |
| 8,700.00 | 89.00 | 149.50 | 6,264.77 | -1,520.26 | 148.08 | 14,441,628.78 | 1,723,322.17 | 39.76590634 | -80.70496801 |
| 8,800.00 | 89.00 | 149.50 | 6,266.51 | -1,606.41 | 198.83 | 14,441,542.63 | 1,723,372.92 | 39.76566929 | -80.70478844 |
| 8,900.00 | 89.00 | 149.50 | 6,268.26 | -1,692.56 | 249.57 | 14,441,456.48 | 1,723,423.66 | 39.76543224 | -80.70460887 |
| 9,000.00 | 89.00 | 149.50 | 6,270.00 | -1,778.71 | 300.32 | 14,441,370.33 | 1,723,474.41 | 39.76519519 | -80.70442930 |
| 9,100.00 | 89.00 | 149.50 | 6,271.75 | -1,864.86 | 351.06 | 14,441,284.18 | 1,723,525.15 | 39.76495813 | -80.70424974 |
| 9,200.00 | 89.00 | 149.50 | 6,273.49 | -1,951.01 | 401.81 | 14,441,198.03 | 1,723,575.90 | 39.76472108 | -80.70407017 |
| 9,300.00 | 89.00 | 149.50 | 6,275.24 | -2,037.16 | 452.55 | 14,441,111.87 | 1,723,626.64 | 39.76448403 | -80.70389061 |
| 9,400.00 | 89.00 | 149.50 | 6,276.98 | -2,123.31 | 503.30 | 14,441,025.72 | 1,723,677.39 | 39.76424697 | -80.70371105 |

03/19/2021



Planning Report - Geographic

Database: DB_Jul2216dt_v14 lt
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia.
 Site: Knob Creek
 Well: Knob Creek S-07HM (slot E)
 Wellbore: Original Hole
 Design: rev3

Local Co-ordinate Reference: Well Knob Creek S-07HM (slot E)
 TVD Reference: GL=737 @ 737.00usft
 MD Reference: GL=737 @ 737.00usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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| Planned Survey | | | | | | | | | | WV Department of Environmental Protection |
|-----------------------|-----------------|-------------|-----------------------|-------------|-------------|---------------------|--------------------|-------------|--------------|-------------------------------------------|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N-S (usft) | +E-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude | |
| 9,500.00 | 89.00 | 149.50 | 6,278.73 | -2,209.47 | 554.04 | 14,440,939.57 | 1,723,728.13 | 39.76400992 | -80.70353148 | |
| 9,600.00 | 89.00 | 149.50 | 6,280.47 | -2,295.62 | 604.79 | 14,440,853.42 | 1,723,778.87 | 39.76377287 | -80.70335192 | |
| 9,700.00 | 89.00 | 149.50 | 6,282.22 | -2,381.77 | 655.53 | 14,440,767.27 | 1,723,829.62 | 39.76353581 | -80.70317237 | |
| 9,800.00 | 89.00 | 149.50 | 6,283.96 | -2,467.92 | 706.27 | 14,440,681.12 | 1,723,880.36 | 39.76329876 | -80.70299281 | |
| 9,900.00 | 89.00 | 149.50 | 6,285.71 | -2,554.07 | 757.02 | 14,440,594.97 | 1,723,931.11 | 39.76306170 | -80.70281325 | |
| 10,000.00 | 89.00 | 149.50 | 6,287.45 | -2,640.22 | 807.76 | 14,440,508.82 | 1,723,981.85 | 39.76282465 | -80.70263370 | |
| 10,100.00 | 89.00 | 149.50 | 6,289.20 | -2,726.37 | 858.51 | 14,440,422.67 | 1,724,032.60 | 39.76258759 | -80.70245414 | |
| 10,200.00 | 89.00 | 149.50 | 6,290.94 | -2,812.52 | 909.25 | 14,440,336.52 | 1,724,083.34 | 39.76235053 | -80.70227459 | |
| 10,300.00 | 89.00 | 149.50 | 6,292.69 | -2,898.67 | 960.00 | 14,440,250.37 | 1,724,134.09 | 39.76211348 | -80.70209504 | |
| 10,400.00 | 89.00 | 149.50 | 6,294.43 | -2,984.82 | 1,010.74 | 14,440,164.22 | 1,724,184.83 | 39.76187642 | -80.70191549 | |
| 10,500.00 | 89.00 | 149.50 | 6,296.18 | -3,070.97 | 1,061.49 | 14,440,078.07 | 1,724,235.58 | 39.76163936 | -80.70173594 | |
| 10,600.00 | 89.00 | 149.50 | 6,297.92 | -3,157.12 | 1,112.23 | 14,439,991.92 | 1,724,286.32 | 39.76140231 | -80.70155639 | |
| 10,700.00 | 89.00 | 149.50 | 6,299.67 | -3,243.27 | 1,162.98 | 14,439,905.77 | 1,724,337.07 | 39.76116525 | -80.70137684 | |
| 10,800.00 | 89.00 | 149.50 | 6,301.41 | -3,329.42 | 1,213.72 | 14,439,819.61 | 1,724,387.81 | 39.76092819 | -80.70119730 | |
| 10,900.00 | 89.00 | 149.50 | 6,303.16 | -3,415.57 | 1,264.47 | 14,439,733.46 | 1,724,438.55 | 39.76069113 | -80.70101775 | |
| 11,000.00 | 89.00 | 149.50 | 6,304.90 | -3,501.73 | 1,315.21 | 14,439,647.31 | 1,724,489.30 | 39.76045408 | -80.70083821 | |
| 11,100.00 | 89.00 | 149.50 | 6,306.65 | -3,587.88 | 1,365.95 | 14,439,561.16 | 1,724,540.04 | 39.76021702 | -80.70065867 | |
| 11,200.00 | 89.00 | 149.50 | 6,308.39 | -3,674.03 | 1,416.70 | 14,439,475.01 | 1,724,590.79 | 39.75997996 | -80.70047913 | |
| 11,300.00 | 89.00 | 149.50 | 6,310.14 | -3,760.18 | 1,467.44 | 14,439,388.86 | 1,724,641.53 | 39.75974290 | -80.70029959 | |
| 11,400.00 | 89.00 | 149.50 | 6,311.88 | -3,846.33 | 1,518.19 | 14,439,302.71 | 1,724,692.28 | 39.75950584 | -80.70012005 | |
| 11,500.00 | 89.00 | 149.50 | 6,313.63 | -3,932.48 | 1,568.93 | 14,439,216.56 | 1,724,743.02 | 39.75926878 | -80.69994051 | |
| 11,600.00 | 89.00 | 149.50 | 6,315.37 | -4,018.63 | 1,619.68 | 14,439,130.41 | 1,724,793.77 | 39.75903172 | -80.69976098 | |
| 11,700.00 | 89.00 | 149.50 | 6,317.12 | -4,104.78 | 1,670.42 | 14,439,044.26 | 1,724,844.51 | 39.75879466 | -80.69958145 | |
| 11,800.00 | 89.00 | 149.50 | 6,318.86 | -4,190.93 | 1,721.17 | 14,438,958.11 | 1,724,895.26 | 39.75855760 | -80.69940191 | |
| 11,900.00 | 89.00 | 149.50 | 6,320.61 | -4,277.08 | 1,771.91 | 14,438,871.96 | 1,724,946.00 | 39.75832054 | -80.69922238 | |
| 12,000.00 | 89.00 | 149.50 | 6,322.35 | -4,363.23 | 1,822.66 | 14,438,785.81 | 1,724,996.75 | 39.75808348 | -80.69904285 | |
| 12,100.00 | 89.00 | 149.50 | 6,324.10 | -4,449.38 | 1,873.40 | 14,438,699.66 | 1,725,047.49 | 39.75784642 | -80.69886332 | |
| 12,200.00 | 89.00 | 149.50 | 6,325.84 | -4,535.53 | 1,924.15 | 14,438,613.51 | 1,725,098.24 | 39.75760936 | -80.69868379 | |
| 12,300.00 | 89.00 | 149.50 | 6,327.59 | -4,621.68 | 1,974.89 | 14,438,527.35 | 1,725,148.98 | 39.75737229 | -80.69850426 | |
| 12,400.00 | 89.00 | 149.50 | 6,329.33 | -4,707.83 | 2,025.64 | 14,438,441.20 | 1,725,199.72 | 39.75713523 | -80.69832474 | |
| 12,500.00 | 89.00 | 149.50 | 6,331.08 | -4,793.99 | 2,076.38 | 14,438,355.05 | 1,725,250.47 | 39.75689817 | -80.69814521 | |
| 12,600.00 | 89.00 | 149.50 | 6,332.82 | -4,880.14 | 2,127.12 | 14,438,268.90 | 1,725,301.21 | 39.75666111 | -80.69796569 | |
| 12,700.00 | 89.00 | 149.50 | 6,334.57 | -4,966.29 | 2,177.87 | 14,438,182.75 | 1,725,351.96 | 39.75642404 | -80.69778617 | |
| 12,800.00 | 89.00 | 149.50 | 6,336.31 | -5,052.44 | 2,228.61 | 14,438,096.60 | 1,725,402.70 | 39.75618698 | -80.69760665 | |
| 12,900.00 | 89.00 | 149.50 | 6,338.06 | -5,138.59 | 2,279.36 | 14,438,010.45 | 1,725,453.45 | 39.75594992 | -80.69742713 | |
| 13,000.00 | 89.00 | 149.50 | 6,339.80 | -5,224.74 | 2,330.10 | 14,437,924.30 | 1,725,504.19 | 39.75571285 | -80.69724761 | |
| 13,100.00 | 89.00 | 149.50 | 6,341.55 | -5,310.89 | 2,380.85 | 14,437,838.15 | 1,725,554.94 | 39.75547579 | -80.69706809 | |
| 13,200.00 | 89.00 | 149.50 | 6,343.29 | -5,397.04 | 2,431.59 | 14,437,752.00 | 1,725,605.68 | 39.75523872 | -80.69688858 | |
| 13,300.00 | 89.00 | 149.50 | 6,345.04 | -5,483.19 | 2,482.34 | 14,437,665.85 | 1,725,656.43 | 39.75500166 | -80.69670906 | |
| 13,400.00 | 89.00 | 149.50 | 6,346.78 | -5,569.34 | 2,533.08 | 14,437,579.70 | 1,725,707.17 | 39.75476459 | -80.69652955 | |
| 13,500.00 | 89.00 | 149.50 | 6,348.53 | -5,655.49 | 2,583.83 | 14,437,493.55 | 1,725,757.92 | 39.75452753 | -80.69635004 | |
| 13,600.00 | 89.00 | 149.50 | 6,350.27 | -5,741.64 | 2,634.57 | 14,437,407.40 | 1,725,808.66 | 39.75429046 | -80.69617053 | |
| 13,700.00 | 89.00 | 149.50 | 6,352.02 | -5,827.79 | 2,685.32 | 14,437,321.25 | 1,725,859.40 | 39.75405340 | -80.69599102 | |
| 13,800.00 | 89.00 | 149.50 | 6,353.76 | -5,913.94 | 2,736.06 | 14,437,235.09 | 1,725,910.15 | 39.75381633 | -80.69581151 | |
| 13,900.00 | 89.00 | 149.50 | 6,355.51 | -6,000.09 | 2,786.80 | 14,437,148.94 | 1,725,960.89 | 39.75357927 | -80.69563200 | |
| 14,000.00 | 89.00 | 149.50 | 6,357.25 | -6,086.25 | 2,837.55 | 14,437,062.79 | 1,726,011.64 | 39.75334220 | -80.69545249 | |
| 14,100.00 | 89.00 | 149.50 | 6,359.00 | -6,172.40 | 2,888.29 | 14,436,976.64 | 1,726,062.38 | 39.75310513 | -80.69527299 | |
| 14,200.00 | 89.00 | 149.50 | 6,360.74 | -6,258.55 | 2,939.04 | 14,436,890.49 | 1,726,113.13 | 39.75286806 | -80.69509349 | |
| 14,300.00 | 89.00 | 149.50 | 6,362.49 | -6,344.70 | 2,989.78 | 14,436,804.34 | 1,726,163.87 | 39.75263100 | -80.69491398 | |
| 14,400.00 | 89.00 | 149.50 | 6,364.23 | -6,430.85 | 3,040.53 | 14,436,718.19 | 1,726,214.62 | 39.75239393 | -80.69473448 | |
| 14,500.00 | 89.00 | 149.50 | 6,365.98 | -6,517.00 | 3,091.27 | 14,436,632.04 | 1,726,265.36 | 39.75215686 | -80.69455498 | |
| 14,600.00 | 89.00 | 149.50 | 6,367.72 | -6,603.15 | 3,142.02 | 14,436,545.89 | 1,726,316.11 | 39.75191979 | -80.69437548 | |
| 14,700.00 | 89.00 | 149.50 | 6,369.46 | -6,689.30 | 3,192.76 | 14,436,459.74 | 1,726,366.85 | 39.75168272 | -80.69419599 | |
| 14,800.00 | 89.00 | 149.50 | 6,371.21 | -6,775.45 | 3,243.51 | 14,436,373.59 | 1,726,417.60 | 39.75144566 | -80.69401649 | |
| 14,900.00 | 89.00 | 149.50 | 6,372.95 | -6,861.60 | 3,294.25 | 14,436,287.44 | 1,726,468.34 | 39.75120859 | -80.69383699 | |



Planning Report - Geographic

| | | | |
|------------------|---------------------------------|-------------------------------------|---------------------------------|
| Database: | DB_Jul2216dt_v14 It | Local Co-ordinate Reference: | Well Knob Creek S-07HM (slot E) |
| 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 S-07HM (slot E) | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Original Hole | | |
| Design: | rev3 | | |

RECEIVED
Office of Oil and Gas
FEB 25 2021

Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-------------|--------------|
| 15,000.00 | 89.00 | 149.50 | 6,374.70 | -6,947.75 | 3,345.00 | 14,436,201.29 | 1,726,519.09 | 39.75097152 | -80.69365750 |
| 15,100.00 | 89.00 | 149.50 | 6,376.44 | -7,033.90 | 3,395.74 | 14,436,115.14 | 1,726,569.83 | 39.75073445 | -80.69347801 |
| 15,200.00 | 89.00 | 149.50 | 6,378.19 | -7,120.05 | 3,446.49 | 14,436,028.99 | 1,726,620.57 | 39.75049738 | -80.69329852 |
| 15,300.00 | 89.00 | 149.50 | 6,379.93 | -7,206.20 | 3,497.23 | 14,435,942.83 | 1,726,671.32 | 39.75026031 | -80.69311903 |
| 15,400.00 | 89.00 | 149.50 | 6,381.68 | -7,292.35 | 3,547.97 | 14,435,856.68 | 1,726,722.06 | 39.75002324 | -80.69293954 |
| 15,500.00 | 89.00 | 149.50 | 6,383.42 | -7,378.50 | 3,598.72 | 14,435,770.53 | 1,726,772.81 | 39.74978617 | -80.69276005 |
| 15,590.27 | 89.00 | 149.50 | 6,385.00 | -7,456.27 | 3,644.53 | 14,435,692.77 | 1,726,818.62 | 39.74957216 | -80.69259803 |

PBHL/TD 15590.27 MD 6385.00 TVD

WV Department of Environmental Protection

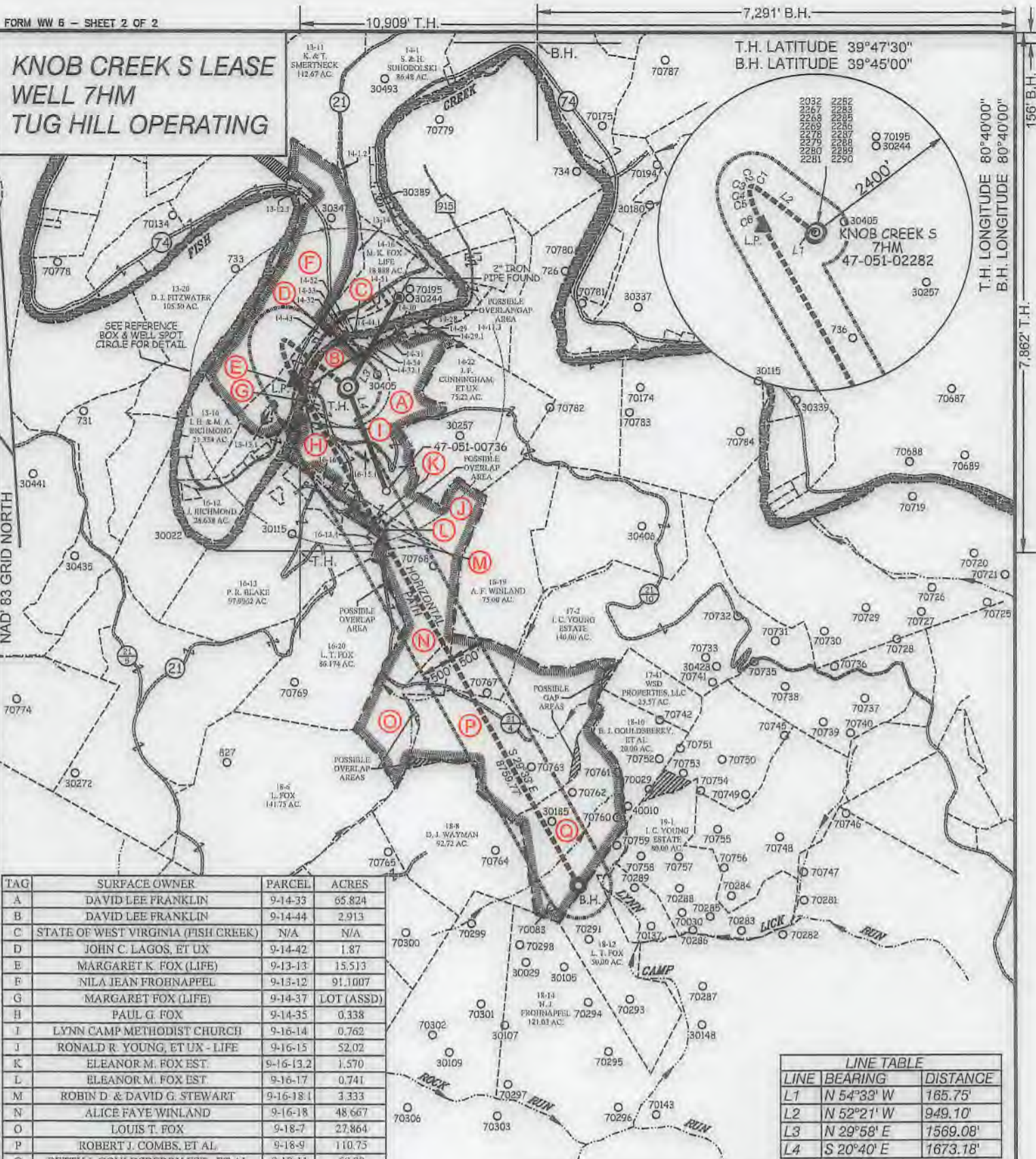
Design Targets

| Target Name | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude | Longitude |
|----------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|------------|--------------|--------------|-----------------|----------------|-------------|--------------|
| Knob Creek S-07HM LP - hit/miss target - Shape - Point | 0.00 | 0.00 | 6,232.00 | 117.12 | -728.11 | 14,443,266.16 | 1,722,445.98 | 39.77041091 | -80.70806705 |
| - plan misses target center by 76.05usft at 6844.19usft MD (6232.38 TVD, 78.53 N, -793.64 E) | | | | | | | | | |
| Knob Creek S-07HM LP - plan misses target center by 32.93usft at 6818.63usft MD (6231.78 TVD, 100.57 N, -806.58 E) - Point | 0.00 | 0.00 | 6,232.00 | 117.12 | -778.11 | 14,443,266.16 | 1,722,395.98 | 39.77041136 | -80.70824501 |
| Knob Creek S-07HM BH - plan hits target center - Point | 0.00 | 0.00 | 6,385.00 | -7,456.28 | 3,644.53 | 14,435,692.76 | 1,726,818.62 | 39.74957215 | -80.69259802 |

Plan Annotations

| Measured Depth (usft) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Comment |
|-----------------------|-----------------------|--------------|--------------|---------------------------------|
| 1,300.00 | 1,300.00 | 0.00 | 0.00 | KOP Begin 2°/100' build |
| 1,550.00 | 1,549.68 | 6.17 | -8.99 | Begin 5.00° tangent |
| 3,206.62 | 3,200.00 | 87.84 | -128.05 | Begin 2°/100' build |
| 4,011.40 | 3,963.66 | 227.01 | -316.74 | Begin 29.14° tangent |
| 5,486.02 | 5,251.66 | 656.73 | -891.98 | Begin 8°/100' build/turn |
| 6,431.13 | 6,094.12 | 419.34 | -961.34 | Begin 10°/100' build/turn |
| 6,832.11 | 6,232.17 | 88.94 | -799.77 | Begin 89.00° lateral |
| 15,590.27 | 6,385.00 | -7,456.27 | 3,644.53 | PBHL/TD 15590.27 MD 6385.00 TVD |

**KNOB CREEK S LEASE
WELL 7HM
TUG HILL OPERATING**



| TAG | SURFACE OWNER | PARCEL | ACRES |
|-----|-------------------------------------|-----------|------------|
| A | DAVID LEE FRANKLIN | 9-14-33 | 65.824 |
| B | DAVID LEE FRANKLIN | 9-14-44 | 2.913 |
| C | STATE OF WEST VIRGINIA (FISH CREEK) | N/A | N/A |
| D | JOHN C. LAGOS, ET UX | 9-14-42 | 1.87 |
| E | MARGARET K. FOX (LIFE) | 9-13-13 | 15.513 |
| F | NILA JEAN FROHNAPPEL | 9-13-12 | 91.1007 |
| G | MARGARET FOX (LIFE) | 9-14-37 | LOT (ASSD) |
| H | PAUL G. FOX | 9-14-35 | 0.338 |
| J | LYNN CAMP METHODIST CHURCH | 9-16-14 | 0.762 |
| J | RONALD R. YOUNG, ET UX - LIFE | 9-16-15 | 52.02 |
| K | ELEANOR M. FOX EST. | 9-16-13.2 | 1.570 |
| L | ELEANOR M. FOX EST. | 9-16-17 | 0.741 |
| M | ROBIN D. & DAVID G. STEWART | 9-16-18.1 | 3.333 |
| N | ALICE FAYE WINLAND | 9-16-18 | 48.667 |
| O | LOUIS T. FOX | 9-18-7 | 27.864 |
| P | ROBERT J. COMBS, ET AL | 9-18-9 | 110.75 |
| Q | BETTY J. GOULDSBERRY EST., ET AL. | 9-18-11 | 60.00 |

| LINE TABLE | | |
|------------|------------|----------|
| LINE | BEARING | DISTANCE |
| L1 | N 54°33' W | 165.75' |
| L2 | N 52°21' W | 949.10' |
| L3 | N 29°58' E | 1569.08' |
| L4 | S 20°40' E | 1673.18' |

| CURVE TABLE | | | | |
|-------------|------------|----------|---------------|--------------|
| CURVE | ARC LENGTH | RADIUS | CHORD BEARING | CHORD LENGTH |
| C1 | 72.77' | 175.89' | N 63°08' W | 72.25' |
| C2 | 44.87' | 36.87' | S 67°53' W | 42.15' |
| C3 | 44.81' | 101.50' | S 13°57' W | 44.45' |
| C4 | 96.49' | 406.33' | S 06°47' E | 96.27' |
| C5 | 138.10' | 1162.65' | S 16°45' E | 138.02' |
| C6 | 353.71' | 2218.34' | S 25°20' E | 353.33' |



12 Vanhorn Drive | P.O. Box 150 | Glenville, WV 26331 | 304.462.5534
 1413 Kanawha Boulevard, East | Charleston, WV 25301 | 804.546.2932
 254 East Beckley Bypass | Beckley, WV 25801 | 304.355.3295
 slsww.com



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

P.S. 849 *C. Victor Moyers*

LEGEND

- LEASE LINE
- SURFACE LINE
- WELL LATERAL
- OFFSET LINE
- TIE LINE
- CREEK
- ROAD
- COUNTY ROUTE
- PROPOSED WELL
- EXISTING WELL
- PERMITTED WELL
- TAX MAP-PARCEL
- SURFACE OWNER (SEE TABLE)
- LEASE # (SEE WW-6A1)

SCALE 1" = 2000' FILE NO. 8789P7HMR3.dwg
 KNOB CREEK S-7HM-REV3
 DATE JULY 27, 20 18
 REVISED 09-30-2019, 08-28-2020, 10-29-2020
 OPERATORS WELL NO. KNOB CREEK S-7HM
 API WELL NO. 47 - 051 - 02282 MOD
 NO. STATE COUNTY PERMIT

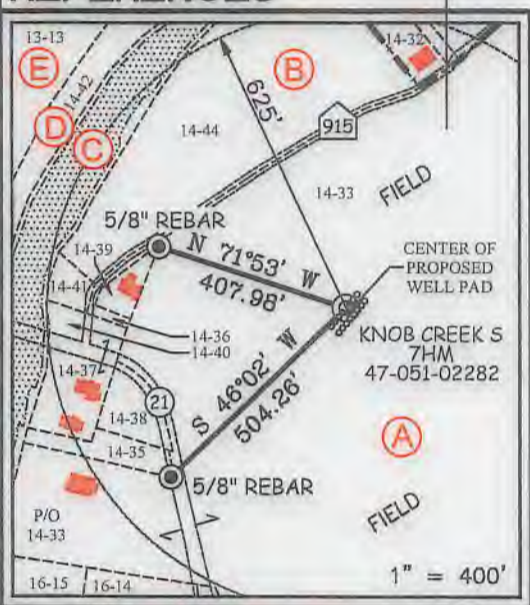
STATE OF WEST VIRGINIA
 DIVISION OF ENVIRONMENTAL PROTECTION
 OFFICE OF OIL AND GAS

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

**Knob Creek S Lease
Well 7HM
Tug Hill Operating**

REFERENCES



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 | 304.255.5298
 slsvv.com

| | | |
|--------------------------------------------|-------------------|--------------------|
| T.H. LATITUDE 39°47'30" | | |
| B.H. LATITUDE 39°45'00" | | |
| (S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH) | | |
| NAD'83 S.P.C.(FT) | N. 464,876.65 | E. 1,629,669.09 |
| NAD'83 GEO. | LAT-(N) 39.770083 | LONG-(W) 80.705477 |
| NAD'83 UTM (M) | N. 4,402,280.63 | E. 525,224.51 |
| LANDING POINT | | |
| NAD'83 S.P.C.(FT) | N. 464,979.0 | E. 1,628,870.6 |
| NAD'83 GEO. | LAT-(N) 39.770334 | LONG-(W) 80.708322 |
| NAD'83 UTM (M) | N. 4,402,307.7 | E. 524,980.7 |
| BOTTOM HOLE | | |
| NAD'83 S.P.C.(FT) | N. 467,358.0 | E. 1,633,189.7 |
| NAD'83 GEO. | LAT-(N) 39.749572 | LONG-(W) 80.692598 |
| NAD'83 UTM (M) | N. 4,400,008.0 | E. 526,335.4 |

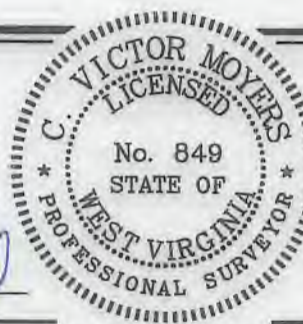
| MAP/PARCEL | ADJOINING SURFACE OWNER LIST | ACRES |
|------------|----------------------------------------|----------------|
| 9-13-12.1 | ROBERT T. & BARBARA A. ANKROM | 2.632 |
| 9-13-13.1 | THOMAS JOHN FOX | 0.827 |
| 9-13-14 | MARGARET K. FOX - LIFE | 3.00 |
| 9-14-1.2 | KENNETH N. & TERESA A. SMERTNECK | 1.02 |
| 9-14-11.3 | PATRICK J. SCHELLHASE - TRUST | 23.424 |
| 9-14-28 | CHARLES R. SCHELLHASE, ET UX | 3.029 |
| 9-14-29 | ANDREW FASOULETOS, ET UX | 0.209 |
| 9-14-29.1 | ANDREW FASOULETOS, ET UX | 1.171 |
| 9-14-30 | WILLIAM C. GROFT, ET UX | 0.35 |
| 9-14-31 | WILFORD F. NELSON, JR., ET UX | 0.954 |
| 9-14-32 | TWILA C. COFFIELD | 0.583 |
| 9-14-32.1 | TWILA C. COFFIELD | 0.184 |
| 9-14-36 | MARGARET FOX - LIFE | 1600 SQ. FT. |
| 9-14-38 | MARGARET FOX - LIFE | 0.651 |
| 9-14-39 | MARGARET FOX - LIFE | 8675 SQ. FT. |
| 9-14-40 | MARGARET FOX - LIFE | 19,560 SQ. FT. |
| 9-14-41 | MARGARET FOX - LIFE | 9165 SQ. FT. |
| 9-14-43 | JAMES G. FOX | 0.66 |
| 9-14-44.1 | GEORGE R. TAYLOR, ET UX | 4.423 |
| 9-14-51 | GEORGE R. TAYLOR, ET UX | 1.621 |
| 9-14-52 | JAMES E. PEELMAN | 0.439 |
| 9-14-53 | JAMES E. PEELMAN | 0.555 |
| 9-14-54 | RICHARD L. HARVETH, ET UX | 1.649 |
| 9-16-13.4 | JOHN FOX | 0.533 |
| 9-16-15.1 | ERIC J. YOUNG | 1.98 |
| 9-16-16 | CLINTON B. WHITELATCH, SR., ET UX ESTS | 1.98 |

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 & TOPO MARK SCALE IS 1"=2000'.
- BASED ON WV DOT COUNTY ROUTE 74 IS A 40' STRIP OF LAND ACQUIRED IN NUMEROUS DEEDS.

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.

P.S. 849 *C. Victor Moyers*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
 DATE JULY 27, 20 18
 REVISED 09-30-2019, 08-28-2020, 10-29-2020
 OPERATORS WELL NO. Knob Creek S-7HM
 API WELL NO. 47-051-02282
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8789P7HMR3.dwg
Knob Creek S-7HM-REV3
 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 LIQUID INJECTION WASTE DISPOSAL IF "GAS" PRODUCTION STORAGE DEEP SHALLOW

LOCATION:
 ELEVATION 737.50' WATERSHED FISH CREEK (HUC 10)
 DISTRICT MEADE COUNTY MARSHALL QUADRANGLE B.H. - WILEYVILLE 7.5'
T.H. - GLEN EASTON 7.5'

SURFACE OWNER DAVID LEE FRANKLIN ACREAGE 65.824±
 ROYALTY OWNER DAVID LEE FRANKLIN, ET AL - SEE WV-6A1 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 MARCELLUS
 ESTIMATED DEPTH TVD: 6,348' / TMD: 15,590'

WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 ADDRESS CT CORPORATION SYSTEM
FORT WORTH, TX 76107 ADDRESS 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

T.H. LONGITUDE 80°40'00" B.H. LONGITUDE 80°40'00" 156' B.H. 7,862' T.H.

COUNTY NAME PERMIT

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

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

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

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

*See attached pages

*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

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

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

| Lease ID | Parcel | Tags | Grantor, Lessor, Etc. | Grantee, Lessee, Etc. | Royalty | Deed Book/Page | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | |
|----------------|-----------|------|-----------------------------------------------------|---------------------------|---------|----------------|------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------|
| 10*23112 | 9-16-14 | I | JOHN V AND RACHEL M SHEPHERD | TG STILES | 1/8+ | 63 219 | N/A | N/A | N/A | N/A | N/A | Hope Natural Gas Company to A.M. Snider & Duane M. Snider, d/b/a Hundred Gas Company: 446/186 | Hundred Gas Company to Carl D. Perkins: 451/132 & 451/418 | Carl D. Perkins to Perkins Oil and Gas Inc: 583/72 | Perkins Oil & Gas Inc to Stone Energy Corporation: 26/322 | Stone Energy Corp to EQT Production Company: 38/75 | EQT Production Company to TH Exploration LLC: 48/21 |
| 10*23112 | 9-16-15 | J | JOHN V AND RACHEL M SHEPHERD | TG STILES | 1/8+ | 63 219 | N/A | N/A | N/A | N/A | N/A | Hope Natural Gas Company to A.M. Snider & Duane M. Snider, d/b/a Hundred Gas Company: 446/186 | Hundred Gas Company to Carl D. Perkins: 451/132 & 451/418 | Carl D. Perkins to Perkins Oil and Gas Inc: 583/72 | Perkins Oil & Gas Inc to Stone Energy Corporation: 26/322 | Stone Energy Corp to EQT Production Company: 38/75 | EQT Production Company to TH Exploration LLC: 48/21 |
| 10*28223 | 9-16-15 | J | WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION | TH EXPLORATION LLC | 1/8+ | 1068 313 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.1 | 9-16-13.2 | K | MARY A FOX | TH EXPLORATION LLC | 1/8+ | 879 332 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.2 | 9-16-13.2 | K | PAUL G FOX | TH EXPLORATION LLC | 1/8+ | 879 335 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.3 | 9-16-13.2 | K | MARK H FOX | TH EXPLORATION LLC | 1/8+ | 879 338 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.4 | 9-16-13.2 | K | DAVID E FOX | TH EXPLORATION LLC | 1/8+ | 876 55 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.5 | 9-16-13.2 | K | LOUIS T FOX AND KAREN A FOX | TH EXPLORATION LLC | 1/8+ | 876 58 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.6 | 9-16-13.2 | K | THOMAS J FOX | TH EXPLORATION LLC | 1/8+ | 876 61 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.1 | 9-16-17 | L | MARY A FOX | TH EXPLORATION LLC | 1/8+ | 879 332 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.2 | 9-16-17 | L | PAUL G FOX | TH EXPLORATION LLC | 1/8+ | 879 335 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.3 | 9-16-17 | L | MARK H FOX | TH EXPLORATION LLC | 1/8+ | 879 338 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.4 | 9-16-17 | L | DAVID E FOX | TH EXPLORATION LLC | 1/8+ | 876 55 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.5 | 9-16-17 | L | LOUIS T FOX AND KAREN A FOX | TH EXPLORATION LLC | 1/8+ | 876 58 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.243.6 | 9-16-17 | L | THOMAS J FOX | TH EXPLORATION LLC | 1/8+ | 876 61 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.161.0 | 9-16-18.1 | M | DAVID G STEWART & ROBIN D STEWART | TH EXPLORATION LLC | 1/8+ | 885 65 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*47051.187.1 | 9-16-18 | N | ALICE F WINLAND | TH EXPLORATION LLC | 1/8+ | 881 133 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*21293 | 9-18-7 | O | LOUIS T FOX AND KAREN A FOX | TH EXPLORATION LLC | 1/8+ | 952 364 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*27824 | 9-18-9 | P | CATHARINE V B YOUNG AND A J YOUNG | J S MASON | 1/8+ | 164 534 | J S Mason to Frnk Marling: 164/571 | Frank Marling to Lynn Camp Oil & Gas Company: 164/572 | Lynn Camp Oil & Gas Company to Cameron Heat & Light Company: 220/423 | Cameron Heat & Light Company to Zogg and Zogg Inc: 227/258 | Zogg & Zogg Inc to Gerald Wells: 239/160 | Gerald Wells & Hazel Wells to Paul J Klug and E J Klug: 380/359 | E J Klug, Paul Klug & Lena Klug to Carl D. Perkins: 453/390 | Carl D Perkins & Dorothy Louise Perkins to Perkins Oil & Gas Inc: 484/281 & 17/593 | Perkins Oil & Gas Inc. to Stone Energy Corp: 26/322 | Stone Energy Corp to EQT Production Company: 38/75 | EQT Production Co to TH Exploration LLC: 48/21 |
| 10*15938 | 9-18-11 | Q | MARK W YOHO | CHESAPEAKE APPALACHIA LLC | 1/8+ | 695 157 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/512 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |
| 10*15940 | 9-18-11 | Q | JANICE N HAUDENSCHILT | CHESAPEAKE APPALACHIA LLC | 1/8+ | 695 166 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/512 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |
| 10*15941 | 9-18-11 | Q | NICOLETTA MILICIA BLOODWORTH | CHESAPEAKE APPALACHIA LLC | 1/8+ | 698 370 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/512 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |
| 10*15942 | 9-18-11 | Q | CLARA YOHO | CHESAPEAKE APPALACHIA LLC | 1/8+ | 698 197 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/512 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |
| 10*15943 | 9-18-11 | Q | DANA MILICIA HUMPHREYS | CHESAPEAKE APPALACHIA LLC | 1/8+ | 700 90 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/512 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |
| 10*15944 | 9-18-11 | Q | DEWEY A MILICIA AND ROBIN MILICIA | CHESAPEAKE APPALACHIA LLC | 1/8+ | 700 109 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/512 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |
| 10*15945 | 9-18-11 | Q | HELEN V MCMASTERS AND KENNETH MCMASTERS | CHESAPEAKE APPALACHIA LLC | 1/8+ | 707 148 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 29/325 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |
| 10*15946 | 9-18-11 | Q | JOSEPH M EMERY | CHESAPEAKE APPALACHIA LLC | 1/8+ | 707 150 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 29/325 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |
| 10*15947 | 9-18-11 | Q | GERALD ARTHUR EBERT | CHESAPEAKE APPALACHIA LLC | 1/8+ | 703 588 | N/A | N/A | N/A | N/A | N/A | Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 29/325 | Chesapeake Appalachia LLC to SWN Production Company: 33/110 | Statoil USA Onshore Exchange Titleholder LLC: 33/424 | SWN Exchange Titleholder LLC merged into and with SWN Production Company LLC: 19/624 | SWN Production Company LLC to TH Exploraton LLC: 36/431 | Statoil USA Onshore Properties Inc to TH Exploration LLC: 36/455 |

| Lease ID | Parcel | Tags | Grantor, Lessor, Etc. | Grantee, Lessee, Etc. | Royalty | Deed Book/Page | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment | Assignment |
|----------|---------|------|------------------------------------------|-----------------------|---------|----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 10*26725 | 9-18-11 | Q | HAZEL B KOFFLER AND RALPH KOFFLER | TH EXPLORATION LLC | 1/8+ | 1041 197 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*26726 | 9-18-11 | Q | MILLIE F LUND AND DAVID LUND | TH EXPLORATION LLC | 1/8+ | 1041 199 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*26727 | 9-18-11 | Q | CHARLOTTE R MCMILLEN AND MARK E MCMILLEN | TH EXPLORATION LLC | 1/8+ | 1041 195 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*26728 | 9-18-11 | Q | WRETHA M RICE AND AARON RICE | TH EXPLORATION LLC | 1/8+ | 1041 193 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*27352 | 9-18-11 | Q | *JOYCE E ROSPERT AND RICHARD ROSPERT | TH EXPLORATION LLC | 1/8+ | 1053 646 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*27353 | 9-18-11 | Q | *ROBERT E RIGGLE JR AND TAMI S RIGGLE | TH EXPLORATION LLC | 1/8+ | 1054 4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*27354 | 9-18-11 | Q | *MARK D RIGGLE AND ALICIA RIGGLE | TH EXPLORATION LLC | 1/8+ | 1053 634 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*27355 | 9-18-11 | Q | *KATHY L SULLIVAN AND MICHAEL SULLIVAN | TH EXPLORATION LLC | 1/8+ | 1053 628 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*27356 | 9-18-11 | Q | *LARRY G TAYLOR AND ROXANNE D TAYLOR | TH EXPLORATION LLC | 1/8+ | 1053 640 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*27615 | 9-18-11 | Q | *REBECCA K HICKS | TH EXPLORATION LLC | 1/8+ | 1054 308 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*27947 | 9-18-11 | Q | STONE HILL MINERALS HOLDINGS LLC | TH EXPLORATION LLC | 1/8+ | 1063 568 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10*28158 | 9-18-11 | Q | STONE HILL MINERALS HOLDINGS LLC | TH EXPLORATION LLC | 1/8+ | 1068 140 | 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.

ASSIGNMENT AND BILL OF SALE

This ASSIGNMENT AND BILL OF SALE (this "*Assignment*") dated as of December 1, 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 ("*TH II*"), 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 Marshall 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) Subject to the conveyance of the Wells Assets from EQT to TH II as described in the Agreement, the EQT Leases and appurtenances thereto (including rights of access and to install facilities), 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 all Surface Contracts including but not limited to those set forth on Exhibit B attached hereto and incorporated herein (the "*EQT Surface Contracts*") related to the EQT Leases and such Hydrocarbons; 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

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Environmental Protection

03/19/2021

ASSIGNMENT AND CONVEYANCE

This Assignment and Conveyance (this "*Assignment*") is from STATOIL USA ONSHORE PROPERTIES INC., a Delaware corporation ("*Assignor*"), to TH Exploration, LLC, a Texas limited liability company ("*Assignee*"), and is executed on August 22, 2016 (the "*Effective Date*"). Assignor and Assignee may be referred to herein collectively as the "*Parties*," or individually as a "*Party*." Capitalized terms used herein but not otherwise defined herein (including in Section 3.7) shall have the meanings given such terms in that certain Acreage Trade Agreement between the Assignor and the Assignee dated June 19, 2016 (the "*Acreage Trade Agreement*").

ARTICLE 1 ASSIGNMENT OF ASSETS

Section 1.1 Assignment. For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Assignor hereby GRANTS, BARGAINS, ASSIGNS, CONVEYS AND TRANSFERS unto Assignee all of Assignor's right, title and interest in and to (i) the oil and gas leases described in more detail on Exhibit A attached hereto (the "*Leases*") INsofar AND ONLY INsofar as they cover the Target Formations and INsofar AND ONLY INsofar as they cover those lands described on Exhibit A (the "*Leasehold Rights*") and (ii) any surface use agreements that relate to such Leasehold Rights (collectively with the Leasehold Rights, the "*Conveyed Assets*"). Assignor does hereby reserve unto itself the right and subsurface easement to drill through the Leasehold Rights to access the those depths and formations in the Leases other than the Target Formations and (y) to shoot seismic, sonic, or other energy or waves through the Leasehold Rights and to receive, record and evaluate such energy or waves, including those reflected from or in any way pertaining to the reserved depths, and to utilize any and all other exploration technologies that image the subsurface of the leasehold including the reserved depths and to receive, record and evaluate all images resulting therefrom.

TO HAVE AND TO HOLD the Conveyed Assets, together with all and singular the rights, privileges, contracts and appurtenances, in any way appertaining or belonging thereto, unto Assignee, its successors and assigns, forever, subject, to the terms and conditions of this Assignment.

Section 1.4 Assignment Subject to Acreage Trade Agreement. This Assignment is made in accordance with and is subject to the terms, covenants and conditions contained in that certain Acreage Trade Agreement. In the event of a conflict between the provisions of the Acreage Trade Agreement and this Assignment, the provisions of the Acreage 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 either Party with respect to the other under the Acreage Trade Agreement.

ARTICLE 2 SPECIAL WARRANTY OF TITLE AND DISCLAIMERS

Section 2.1 Special Warranty of Title. Assignor hereby agrees to warrant and defend Defensible Title to the Leases unto Assignee, its successors and assigns, against every Person whomsoever lawfully claiming or to claim the same or any part thereof by, through or under Assignor or any of its Affiliates, but not otherwise.

Section 2.2 Disclaimers of Warranties and Representations.

(a) EXCEPT AS EXPRESSLY REPRESENTED OTHERWISE IN SECTION VI OF THE ACREAGE TRADE AGREEMENT OR THIS ASSIGNMENT, ASSIGNOR MAKES NO, AND HEREBY EXPRESSLY DISCLAIMS, ANY REPRESENTATION OR WARRANTY, EXPRESS, IMPLIED OR STATUTORY, INCLUDING AS TO (I) TITLE TO THE LEASEHOLD RIGHTS, (II) THE CONTENTS, CHARACTER OR NATURE OF ANY

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Well Site Safety Plan

Tug Hill Operating, LLC

JW
10/29/2020

Well Name: Knob Creek S-7HM

Pad Location: Knob Creek

Wetzel County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing: 4,402,280.63

Easting: 525,224.51

October 2020

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03/19/2021