

06/14/2019



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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)

Thursday, June 13, 2019  
WELL WORK PERMIT  
Horizontal 6A / New Drill

TUG HILL OPERATING, LLC  
380 SOUTHPOINTE BLVD

CANONSBURG, PA 15317

Re: Permit approval for OLD CROW N-20HU  
47-051-02191-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless 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: OLD CROW N-20HU  
Farm Name: DONNA VIVIAN YOHO (TOP)  
U.S. WELL NUMBER: 47-051-02191-00-00  
Horizontal 6A New Drill  
Date Issued: 6/13/2019

# PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

## CONDITIONS

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1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than one hundred (100) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. 24 hours prior to the initiation of the completion process the operator shall notify the Chief or his designee.
8. During the completion process the operator shall monitor annular pressures and report any anomaly noticed to the chief or his designee immediately.
9. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
10. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

## PERMIT CONDITIONS

11. The operator shall provide to the Office of Oil and Gas the dates of each of the following within 30 days of their occurrence: completion of construction of the well pad, commencement of drilling, cessation of drilling, completion of any other permitted well work, and completion of the well. Such notice shall be provided by sending an email to [DEPOOGNotify@wv.gov](mailto:DEPOOGNotify@wv.gov).




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Oil and Gas Conservation Commission  
601 57<sup>th</sup> Street SE, Charleston, WV 25304  
304-926-0499 Ext 1274

Barry K. Lay, Chairman  
dep.wv.gov

May 8, 2019

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

RE: Application for Deep Well Permit – API #47-051-02191

COMPANY: Tug Hill Operating, LLC

FARM: Donna Vivian Yoho (TOD) Gary Lance Yoho Old Crow N-20HU

COUNTY: Marshall DISTRICT: Franklin QUAD: Powhatan Point

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? Yes – withdrawn prior to hearing
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; BRYAN N-12HU 47-051-02029, BRYAN N-13HU 47-051-02030, BRYAN N-14HU 47-051-02031, OLD CROW N-17HU 47-051-02122, OLD CROW N-18HU 47-051-02123, MND 20 AU 47-051-02011, MND 20 BU 47-051-02012, MND 20 CU 47-051-02013, MND 20 DU 47-051-02014, and WOODFORD 10HU 47-051-02152
4. Provided a plat showing that the proposed location is a distance of 400+ feet from the nearest lease line or unit boundary and showing the following wells drilled to or capable of producing from the objective formation within 3,000 feet of the proposed location.

Sincerely,

Susan Rose  
 Administrator

WW-6B  
(04/15)

API NO. 47-051 - 02191 **06/14/2019**  
OPERATOR WELL NO. Old Crow N-20HU  
Well Pad Name: Old Crow

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

1) Well Operator: Tug Hill Operating, LLC 494510851 Marshall Franklin Powhatan Point Z<sub>1</sub>  
Operator ID County District Quadrangle

2) Operator's Well Number: Old Crow N-20HU Well Pad Name: Old Crow

3) Farm Name/Surface Owner: Donna Vivian Yoho (TOD) Gary Lance Yoho Public Road Access: Rines Ridge Road (County Route 76)

4) Elevation, current ground: 1265' Elevation, proposed post-construction: 1265'

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

(b) If Gas Shallow \_\_\_\_\_ Deep   
Horizontal

6) Existing Pad: Yes or No Yes *Ju 3/14/19*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Point Pleasant is the target formation at a depth of 11,290' - 11,411' - thickness of 121' and anticipated pressure of approx. 9500 psi. ✓

8) Proposed Total Vertical Depth: 11,561' ✓

9) Formation at Total Vertical Depth: Trenton ✓

10) Proposed Total Measured Depth: 25,369' ✓

11) Proposed Horizontal Leg Length: 12,762.27'

12) Approximate Fresh Water Strata Depths: 70' ; 886'

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: 2,167'

15) Approximate Coal Seam Depths: Sewickley Coal - 788' ; Pittsburgh Coal - 880'

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

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

WW-6B  
(04/15)

API NO. 47-051 - 02191 **06/14/2019**  
 OPERATOR WELL NO. Old Crow N-20HU  
 Well Pad Name: Old Crow

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  | 20"       | NEW         | J55    | 106.5#                 | 980'                       | 980' ✓                       | 1,583FT^3(CTS) ✓              |
| Coal         | 13 3/8"   | NEW         | J55    | 54.5#                  | 2805'                      | 2805'                        | 1,978FT^3(CTS) ✓              |
| Intermediate | 9 5/8"    | NEW         | HPP110 | 47#                    | 10,960'                    | 10,960'                      | 3,572FT^3(CTS) ✓              |
| Production   | 5 1/2"    | NEW         | P110   | 23#                    | 25,359'                    | 25,359' ✓                    | 5,995FT^3(CTS) ✓              |
| Tubing       | 2 7/8"    | NEW         | P110   | 6.5#                   |                            | 12,163' ✓                    |                               |
| Liners       |           |             |        |                        |                            |                              |                               |

*JU 3/14/19*

| 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  | 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"    |                        |                     | 11,385               | 11,624                                   |             |                          |
| Liners       |           |                        |                     |                      |  |             |                          |

PACKERS

|             |     |  |  |  |  |
|-------------|-----|--|--|--|--|
| Kind:       | N/A |  |  |  | RECEIVED<br>Office of Oil and Gas<br>MAR 19 2019 |
| Sizes:      | N/A |  |  |  | WV Department of<br>Environmental Protection     |
| Depths Set: | N/A |  |  |  |  |

WW-6B  
(10/14)

API NO. 47- 051 - 02191 <sup>06/14/2019</sup>  
OPERATOR WELL NO. Old Crow N-20HU  
Well Pad Name: Old Crow

*Ju*  
*3/14/19*

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. 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 31,900,000 lb proppant and 493,197 bbl of water. Max rate = 80 bpm; max psi = 12,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 19.18 acres

22) Area to be disturbed for well pad only, less access road (acres): 6.64 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.

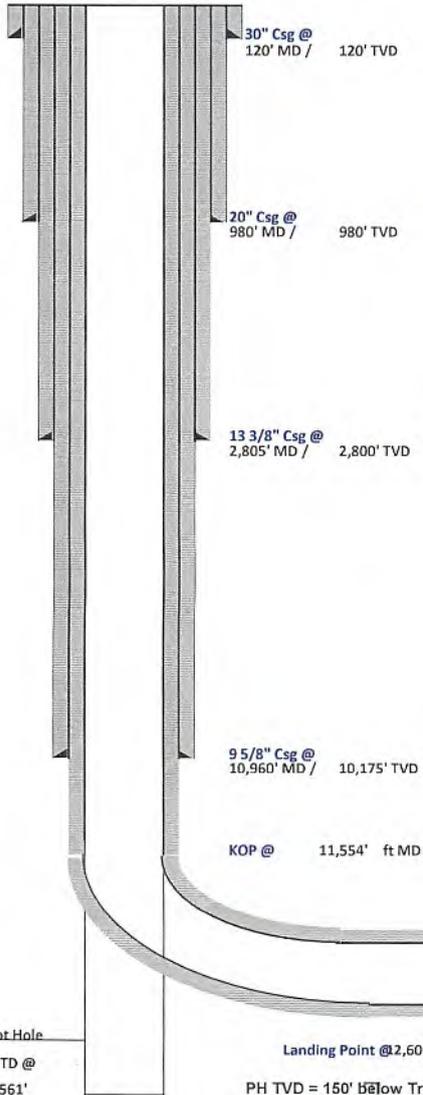


**WELL NAME:** Old Crow N-20HU  
**STATE:** WV **COUNTY:** Marshall  
**DISTRICT:** Franklin  
**DF Elev:** 1,265' **GL Elev:** 1,265'  
**TD:** 25,369'  
**TH Latitude:** 39.77843034  
**TH Longitude:** -80.76295392  
**BH Latitude:** 39.814863  
**BH Longitude:** 80.773318

| FORMATION TOPS      |           |
|---------------------|-----------|
| Formation           | Depth TVD |
| Deepest Fresh Water | 886'      |
| Sewickley Coal      | 788'      |
| Pittsburgh Coal     | 880'      |
| Big Lime            | 2,089'    |
| Berea               | 2,637'    |
| Tully               | 6,481'    |
| Marcellus           | 6,562'    |
| Onondaga            | 6,615'    |
| Salina              | 7,312'    |
| Lockport            | 8,347'    |
| Utica               | 11,034'   |
| Point Pleasant      | 11,290'   |
| Landing Depth       | 11,340'   |
| Trenton             | 11,411'   |
| Pilot Hole TD       | 11,561'   |

| CASING SUMMARY |                |               |            |             |                |        |              |
|----------------|----------------|---------------|------------|-------------|----------------|--------|--------------|
| Type           | Hole Size (in) | Csg Size (in) | Depth (MD) | Depth (TVD) | Weight (lb/ft) | Grade  | Top of Cemen |
| Conductor      | 36             | 30            | 120'       | 120'        | BW             | BW     | Surface      |
| Surface        | 26             | 20            | 980'       | 980'        | 106.5          | J55    | Surface      |
| Intermediate 1 | 17 1/2         | 13 3/8        | 2,805'     | 2,800'      | 54.5           | J55    | Surface      |
| Intermediate 2 | 12 1/4         | 9 5/8         | 10,960'    | 10,175'     | 47             | HPP110 | Surface      |
| Production     | 8 1/2          | 5 1/2         | 25,369'    | 11,118'     | 23             | HCP110 | Surface      |

| CEMENT SUMMARY |       |       |         | DRILLING DETAILS |   |
|----------------|-------|-------|---------|------------------|---|
|                | Sacks | Class | Density | Fluid Type       | Centralizer Notes   |
| Conductor      | 338   | A     | 15.6    | Air              | None  |
| Surface        | 1,707 | A     | 15.6    | Air              | 3 Centralizers at equal distance  |
| Intermediate 1 | 2,143 | A     | 15      | Air              | 1 Centralizer every other jt  |
| Intermediate 2 | 2,969 | A     | 14.5    | Air              | 1 Centralizer every other jt  |
| Production     | 5,322 | A     | 15      | Air / SOBM       | 1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc |



PH TVD = 150' below Trenton Top

Lateral TD @ 25,369' ft MD  
11,118' ft TVD

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51-02191

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## Tug Hill Operating, LLC Casing and Cement Program

### Old Crow N-20HU

#### Casing

|                | String  | Grade  | Bit Size | Depth (Measured) | Cement Fill Up |
|----------------|---------|--------|----------|------------------|----------------|
| Conductor      | 30"     | BW     | 36"      | 120'             | CTS            |
| Surface        | 20"     | J55    | 26"      | 980'             | CTS            |
| Intermediate 1 | 13 3/8" | J55    | 17 1/2"  | 2,805'           | CTS            |
| Intermediate 2 | 9 5/8"  | HPP110 | 12 1/4"  | 10,960'          | CTS            |
| Production     | 5 1/2"  | HCP110 | 8 1/2"   | 25,369'          | 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

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## Area of Review

### Sources of information to Support 35CSR8 - 5.11: 9.3 et seq.

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

#### Data Sources Reviewed:

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

Contacted Devin Ducoeur 724-705-0444, [dducoeur@dpslandservices.com](mailto:dducoeur@dpslandservices.com) DPS GIS (12/10/2018) to have him make maps of the wellbores with his information. DPS utilizes WVGES maps for their mapping seems it as the best publicly available. See attached map he provided.

#### Request maps for:

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

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

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

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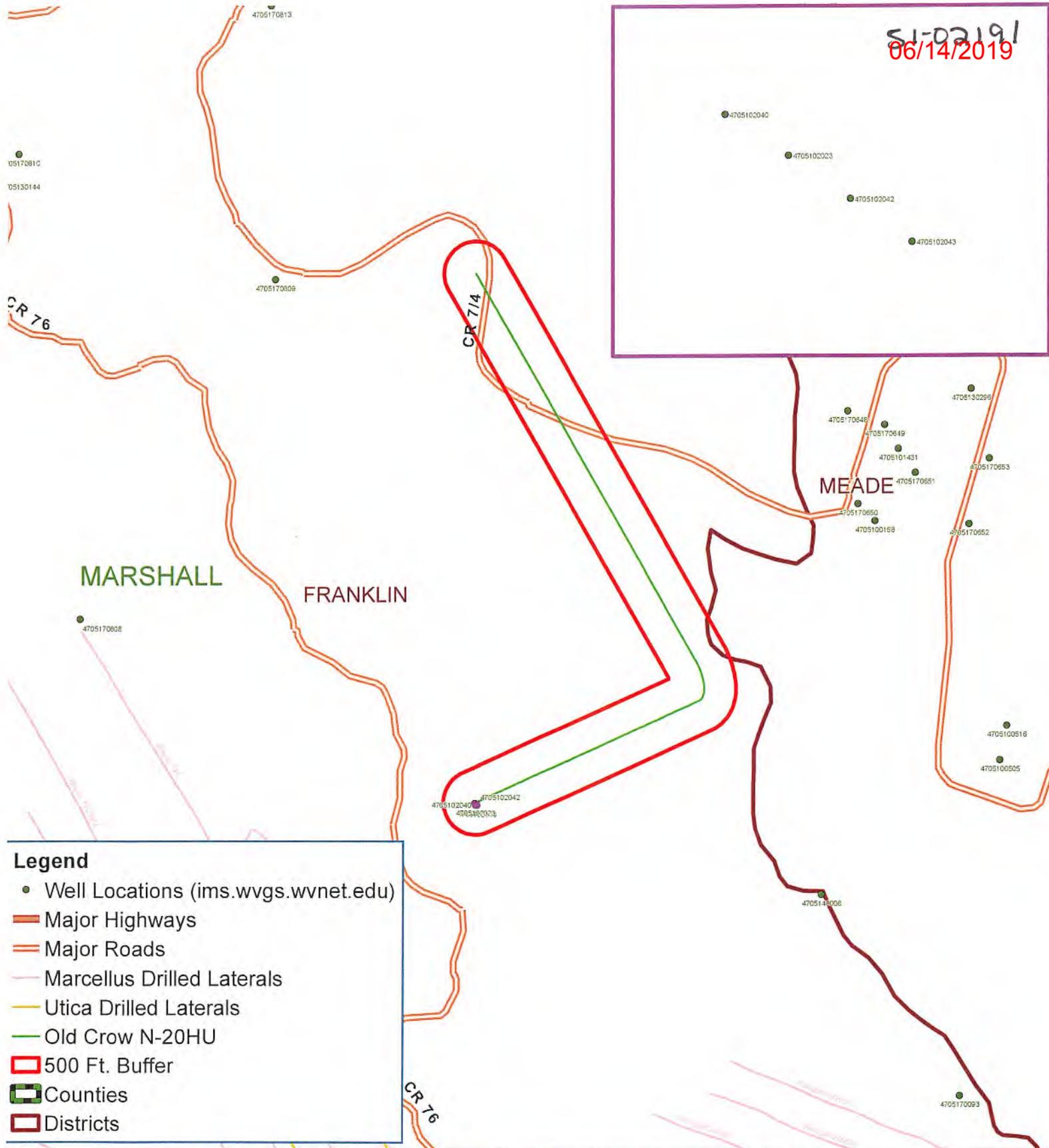
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**Legend**

- Well Locations (ims.wvgs.wvnet.edu)
- Major Highways
- Major Roads
- Marcellus Drilled Laterals
- Utica Drilled Laterals
- Old Crow N-20HU
- 500 Ft. Buffer
- Counties
- Districts



Old Crow N - 20HU  
Franklin District  
Marshall County, WV



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Map Created: February 13, 2019

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



**Well: Old Crow N-20 HU (slot F)**  
**Site: Old Crow Pad**  
**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 @ 1265.00usft

Northing 14446140.70 Easting 1707015.75 Latitude 39.77843034 Longitude -80.76295392

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.82°

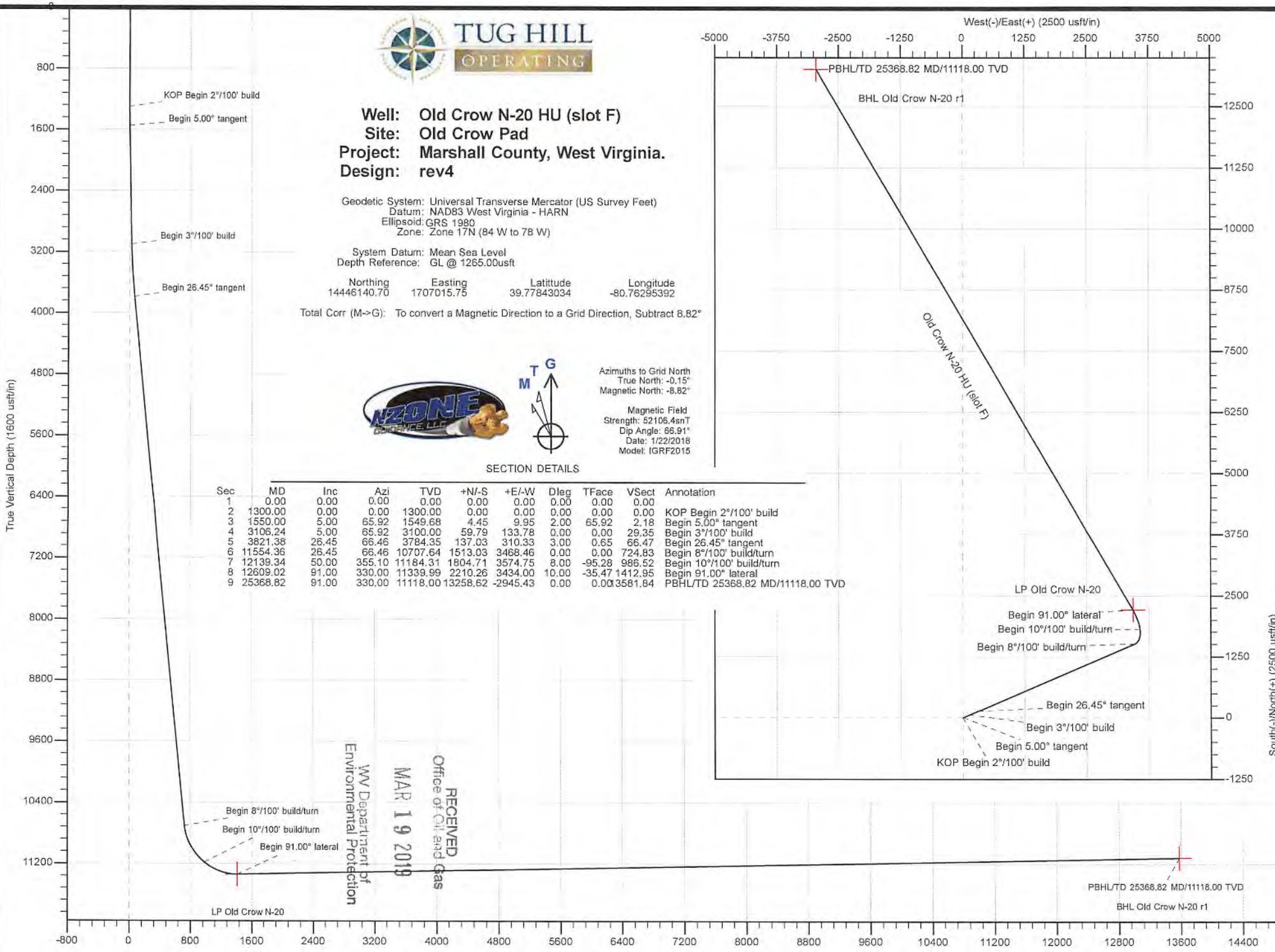


Azimuths to Grid North  
 True North: -0.15°  
 Magnetic North: -8.82°

Magnetic Field  
 Strength: 52106.4snT  
 Dip Angle: 66.91°  
 Date: 1/22/2018  
 Model: IGRF2015

**SECTION DETAILS**

| Sec | MD       | Inc   | Azi    | TVD      | +N/-S    | +E/-W    | Dleg  | TFace  | VSect   | Annotation                       |
|-----|----------|-------|--------|----------|----------|----------|-------|--------|---------|----------------------------------|
| 1   | 0.00     | 0.00  | 0.00   | 0.00     | 0.00     | 0.00     | 0.00  | 0.00   | 0.00    |                                  |
| 2   | 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  | 65.92  | 1549.68  | 4.45     | 9.95     | 2.00  | 65.92  | 2.18    | Begin 5.00° tangent              |
| 4   | 3106.24  | 5.00  | 65.92  | 3100.00  | 59.79    | 133.78   | 0.00  | 0.00   | 29.35   | Begin 3°/100' build              |
| 5   | 3821.36  | 26.45 | 66.46  | 3784.35  | 137.03   | 310.33   | 3.00  | 0.65   | 66.47   | Begin 26.45° tangent             |
| 6   | 11554.36 | 26.45 | 66.46  | 10707.64 | 1513.03  | 3468.46  | 0.00  | 0.00   | 724.83  | Begin 8°/100' build/turn         |
| 7   | 12139.34 | 50.00 | 355.10 | 11184.31 | 1804.71  | 3574.75  | 8.00  | -95.28 | 986.52  | Begin 10°/100' build/turn        |
| 8   | 12609.02 | 91.00 | 330.00 | 11339.99 | 2210.26  | 3434.00  | 10.00 | -35.47 | 1412.95 | Begin 91.00° lateral             |
| 9   | 25368.82 | 91.00 | 330.00 | 11118.00 | 13258.62 | -2945.43 | 0.00  | 0.00   | 3581.84 | PBHL/TD 25368.82 MD/11118.00 TVD |



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Vertical Section at 347.48° (1600 usft/in)



Planning Report - Geographic

|           |                                 |                              |                                |
|-----------|---------------------------------|------------------------------|--------------------------------|
| Database: | DB_Jul2216dt_v14                | Local Co-ordinate Reference: | Well Old Crow N-20 HU (slot F) |
| Company:  | Tug Hill Operating LLC          | TVD Reference:               | GL @ 1265.00usft               |
| Project:  | Marshall County, West Virginia. | MD Reference:                | GL @ 1265.00usft               |
| Site:     | Old Crow Pad                    | North Reference:             | Grid                           |
| Well:     | Old Crow N-20 HU (slot F)       | 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                  | Old Crow Pad |              |                    |                   |              |
| Site Position:        |              | Northing:    | 14,446,179.89 usft | Latitude:         | 39.77853828  |
| From:                 | Lat/Long     | Easting:     | 1,706,970.33 usft  | Longitude:        | -80.76311519 |
| Position Uncertainty: | 0.00 usft    | Slot Radius: | 13-3/16 "          | Grid Convergence: | 0.15 °       |

|                      |                           |                     |           |                    |               |              |
|----------------------|---------------------------|---------------------|-----------|--------------------|---------------|--------------|
| Well                 | Old Crow N-20 HU (slot F) |                     |           |                    |               |              |
| Well Position        | +N/-S                     | 0.00 usft           | Northing: | 14,446,140.70 usft | Latitude:     | 39.77843034  |
|                      | +E/-W                     | 0.00 usft           | Easting:  | 1,707,015.74 usft  | Longitude:    | -80.76295392 |
| Position Uncertainty | 0.00 usft                 | Wellhead Elevation: |           | Ground Level:      | 1,265.00 usft |              |

|           |               |             |                 |               |                     |
|-----------|---------------|-------------|-----------------|---------------|---------------------|
| Wellbore  | Original Hole |             |                 |               |                     |
| Magnetics | Model Name    | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|           | IGRF2015      | 1/22/2018   | -8.67           | 66.91         | 52,106.41019616     |

|                   |                         |              |               |               |  |
|-------------------|-------------------------|--------------|---------------|---------------|--|
| 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          | 347.48        |  |

|                          |                 |                                |                       |         |  |
|--------------------------|-----------------|--------------------------------|-----------------------|---------|--|
| Plan Survey Tool Program | Date            | 3/13/2019                      |                       |         |  |
| Depth From (usft)        | Depth To (usft) | Survey (Wellbore)              | Tool Name             | Remarks |  |
| 1                        | 0.00            | 25,368.82 rev4 (Original Hole) | MWD<br>MWD - Standard |         |  |

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| 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                  | 0.00    |                     |
| 1,300.00              | 0.00            | 0.00        | 1,300.00              | 0.00         | 0.00         | 0.00                    | 0.00                   | 0.00                  | 0.00    |                     |
| 1,550.00              | 5.00            | 65.92       | 1,549.68              | 4.45         | 9.95         | 2.00                    | 2.00                   | 0.00                  | 65.92   |                     |
| 3,106.24              | 5.00            | 65.92       | 3,100.00              | 59.79        | 133.78       | 0.00                    | 0.00                   | 0.00                  | 0.00    |                     |
| 3,821.38              | 26.45           | 66.46       | 3,784.35              | 137.03       | 310.33       | 3.00                    | 3.00                   | 0.08                  | 0.65    |                     |
| 11,554.36             | 26.45           | 66.46       | 10,707.64             | 1,513.03     | 3,468.46     | 0.00                    | 0.00                   | 0.00                  | 0.00    |                     |
| 12,139.34             | 50.00           | 355.10      | 11,184.31             | 1,804.71     | 3,574.75     | 8.00                    | 4.03                   | -12.20                | -95.28  |                     |
| 12,609.02             | 91.00           | 330.00      | 11,340.00             | 2,210.26     | 3,434.00     | 10.00                   | 8.73                   | -5.34                 | -35.47  |                     |
| 25,368.82             | 91.00           | 330.00      | 11,118.00             | 13,258.62    | -2,945.43    | 0.00                    | 0.00                   | 0.00                  | 0.00    | BHL Old Crow N-20 r |



Planning Report - Geographic

|           |                                 |                              |                                |
|-----------|---------------------------------|------------------------------|--------------------------------|
| Database: | DB_Jul2216dt_v14                | Local Co-ordinate Reference: | Well Old Crow N-20 HU (slot F) |
| Company:  | Tug Hill Operating LLC          | TVD Reference:               | GL @ 1265.00usft               |
| Project:  | Marshall County, West Virginia. | MD Reference:                | GL @ 1265.00usft               |
| Site:     | Old Crow Pad                    | North Reference:             | Grid                           |
| Well:     | Old Crow N-20 HU (slot F)       | Survey Calculation Method:   | Minimum Curvature              |
| Wellbore: | Original Hole                   |                              |                                |
| Design:   | rev4                            |                              |                                |

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| Planned Survey                 |                    |                |                             |                 |                 |                           |                          |             |              | WV Department of<br>Environmental Protection |
|--------------------------------|--------------------|----------------|-----------------------------|-----------------|-----------------|---------------------------|--------------------------|-------------|--------------|--|
| Measured<br>Depth<br>(usft)    | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Map<br>Northing<br>(usft) | Map<br>Easting<br>(usft) | Latitude    | Longitude    |  |
| 0.00                           | 0.00               | 0.00           | 0.00                        | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 100.00                         | 0.00               | 0.00           | 100.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 200.00                         | 0.00               | 0.00           | 200.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 300.00                         | 0.00               | 0.00           | 300.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 400.00                         | 0.00               | 0.00           | 400.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 500.00                         | 0.00               | 0.00           | 500.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 600.00                         | 0.00               | 0.00           | 600.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 700.00                         | 0.00               | 0.00           | 700.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 800.00                         | 0.00               | 0.00           | 800.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 900.00                         | 0.00               | 0.00           | 900.00                      | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 1,000.00                       | 0.00               | 0.00           | 1,000.00                    | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 1,100.00                       | 0.00               | 0.00           | 1,100.00                    | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 1,200.00                       | 0.00               | 0.00           | 1,200.00                    | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| 1,300.00                       | 0.00               | 0.00           | 1,300.00                    | 0.00            | 0.00            | 14,446,140.70             | 1,707,015.74             | 39.77843034 | -80.76295392 |  |
| <b>KOP Begin 2°/100' build</b> |                    |                |                             |                 |                 |                           |                          |             |              |  |
| 1,400.00                       | 2.00               | 65.92          | 1,399.98                    | 0.71            | 1.59            | 14,446,141.42             | 1,707,017.34             | 39.77843229 | -80.76294824 |  |
| 1,500.00                       | 4.00               | 65.92          | 1,499.84                    | 2.85            | 6.37            | 14,446,143.55             | 1,707,022.11             | 39.77843811 | -80.76293122 |  |
| 1,550.00                       | 5.00               | 65.92          | 1,549.68                    | 4.45            | 9.95            | 14,446,145.15             | 1,707,025.70             | 39.77844248 | -80.76291845 |  |
| <b>Begin 5.00° tangent</b>     |                    |                |                             |                 |                 |                           |                          |             |              |  |
| 1,600.00                       | 5.00               | 65.92          | 1,599.49                    | 6.23            | 13.93           | 14,446,146.93             | 1,707,029.68             | 39.77844734 | -80.76290428 |  |
| 1,700.00                       | 5.00               | 65.92          | 1,699.11                    | 9.78            | 21.89           | 14,446,150.49             | 1,707,037.63             | 39.77845705 | -80.76287592 |  |
| 1,800.00                       | 5.00               | 65.92          | 1,798.73                    | 13.34           | 29.85           | 14,446,154.04             | 1,707,045.59             | 39.77846675 | -80.76284757 |  |
| 1,900.00                       | 5.00               | 65.92          | 1,898.35                    | 16.89           | 37.80           | 14,446,157.60             | 1,707,053.55             | 39.77847646 | -80.76281921 |  |
| 2,000.00                       | 5.00               | 65.92          | 1,997.97                    | 20.45           | 45.76           | 14,446,161.15             | 1,707,061.50             | 39.77848617 | -80.76279086 |  |
| 2,100.00                       | 5.00               | 65.92          | 2,097.59                    | 24.01           | 53.72           | 14,446,164.71             | 1,707,069.46             | 39.77849588 | -80.76276250 |  |
| 2,200.00                       | 5.00               | 65.92          | 2,197.21                    | 27.56           | 61.67           | 14,446,168.27             | 1,707,077.42             | 39.77850559 | -80.76273415 |  |
| 2,300.00                       | 5.00               | 65.92          | 2,296.83                    | 31.12           | 69.63           | 14,446,171.82             | 1,707,085.37             | 39.77851529 | -80.76270579 |  |
| 2,400.00                       | 5.00               | 65.92          | 2,396.45                    | 34.67           | 77.59           | 14,446,175.38             | 1,707,093.33             | 39.77852500 | -80.76267744 |  |
| 2,500.00                       | 5.00               | 65.92          | 2,496.07                    | 38.23           | 85.55           | 14,446,178.93             | 1,707,101.29             | 39.77853471 | -80.76264908 |  |
| 2,600.00                       | 5.00               | 65.92          | 2,595.69                    | 41.79           | 93.50           | 14,446,182.49             | 1,707,109.25             | 39.77854442 | -80.76262073 |  |
| 2,700.00                       | 5.00               | 65.92          | 2,695.31                    | 45.34           | 101.46          | 14,446,186.05             | 1,707,117.20             | 39.77855413 | -80.76259237 |  |
| 2,800.00                       | 5.00               | 65.92          | 2,794.93                    | 48.90           | 109.42          | 14,446,189.60             | 1,707,125.16             | 39.77856383 | -80.76256402 |  |
| 2,900.00                       | 5.00               | 65.92          | 2,894.55                    | 52.45           | 117.37          | 14,446,193.16             | 1,707,133.12             | 39.77857354 | -80.76253566 |  |
| 3,000.00                       | 5.00               | 65.92          | 2,994.17                    | 56.01           | 125.33          | 14,446,196.72             | 1,707,141.07             | 39.77858325 | -80.76250731 |  |
| 3,100.00                       | 5.00               | 65.92          | 3,093.78                    | 59.57           | 133.29          | 14,446,200.27             | 1,707,149.03             | 39.77859296 | -80.76247895 |  |
| 3,106.24                       | 5.00               | 65.92          | 3,100.00                    | 59.79           | 133.78          | 14,446,200.49             | 1,707,149.53             | 39.77859356 | -80.76247718 |  |
| <b>Begin 3°/100' build</b>     |                    |                |                             |                 |                 |                           |                          |             |              |  |
| 3,200.00                       | 7.81               | 66.16          | 3,193.17                    | 64.03           | 143.35          | 14,446,204.74             | 1,707,159.09             | 39.77860515 | -80.76244311 |  |
| 3,300.00                       | 10.81              | 66.27          | 3,291.84                    | 70.56           | 158.15          | 14,446,211.26             | 1,707,173.90             | 39.77862296 | -80.76239035 |  |
| 3,400.00                       | 13.81              | 66.34          | 3,389.53                    | 79.12           | 177.68          | 14,446,219.83             | 1,707,193.42             | 39.77864634 | -80.76232077 |  |
| 3,500.00                       | 16.81              | 66.38          | 3,485.96                    | 89.71           | 201.87          | 14,446,230.41             | 1,707,217.61             | 39.77867524 | -80.76223457 |  |
| 3,600.00                       | 19.81              | 66.41          | 3,580.89                    | 102.29          | 230.66          | 14,446,242.99             | 1,707,246.40             | 39.77870957 | -80.76213198 |  |
| 3,700.00                       | 22.81              | 66.44          | 3,674.04                    | 116.82          | 263.97          | 14,446,257.53             | 1,707,279.71             | 39.77874924 | -80.76201329 |  |
| 3,800.00                       | 25.81              | 66.45          | 3,765.16                    | 133.27          | 301.70          | 14,446,273.98             | 1,707,317.45             | 39.77879415 | -80.76187882 |  |
| 3,821.38                       | 26.45              | 66.46          | 3,784.35                    | 137.03          | 310.34          | 14,446,277.74             | 1,707,326.08             | 39.77880441 | -80.76184806 |  |
| <b>Begin 26.45° tangent</b>    |                    |                |                             |                 |                 |                           |                          |             |              |  |
| 3,900.00                       | 26.45              | 66.46          | 3,854.74                    | 151.02          | 342.44          | 14,446,291.73             | 1,707,358.19             | 39.77884260 | -80.76173364 |  |
| 4,000.00                       | 26.45              | 66.46          | 3,944.27                    | 168.82          | 383.28          | 14,446,309.52             | 1,707,399.03             | 39.77889117 | -80.76158811 |  |
| 4,100.00                       | 26.45              | 66.46          | 4,033.80                    | 186.61          | 424.12          | 14,446,327.32             | 1,707,439.87             | 39.77893973 | -80.76144258 |  |
| 4,200.00                       | 26.45              | 66.46          | 4,123.33                    | 204.41          | 464.96          | 14,446,345.11             | 1,707,480.71             | 39.77898830 | -80.76129705 |  |
| 4,300.00                       | 26.45              | 66.46          | 4,212.86                    | 222.20          | 505.80          | 14,446,362.90             | 1,707,521.55             | 39.77903687 | -80.76115152 |  |
| 4,400.00                       | 26.45              | 66.46          | 4,302.39                    | 239.99          | 546.64          | 14,446,380.70             | 1,707,562.39             | 39.77908544 | -80.76100599 |  |
| 4,500.00                       | 26.45              | 66.46          | 4,391.92                    | 257.79          | 587.48          | 14,446,398.49             | 1,707,603.23             | 39.77913400 | -80.76086046 |  |
| 4,600.00                       | 26.45              | 66.46          | 4,481.45                    | 275.58          | 628.32          | 14,446,416.28             | 1,707,644.07             | 39.77918257 | -80.76071493 |  |



Planning Report - Geographic

06/14/2019  
SI-02191

|           |                                 |                              |                                |
|-----------|---------------------------------|------------------------------|--------------------------------|
| Database: | DB_Jul2216dt_v14                | Local Co-ordinate Reference: | Well Old Crow N-20 HU (slot F) |
| Company:  | Tug Hill Operating LLC          | TVD Reference:               | GL @ 1265.00usft               |
| Project:  | Marshall County, West Virginia. | MD Reference:                | GL @ 1265.00usft               |
| Site:     | Old Crow Pad                    | North Reference:             | Grid                           |
| Well:     | Old Crow N-20 HU (slot F)       | Survey Calculation Method:   | Minimum Curvature              |
| Wellbore: | Original Hole                   |                              |                                |
| Design:   | rev4                            |                              |                                |

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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    |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-------------|--------------|
| 4,700.00              | 26.45           | 66.46       | 4,570.98              | 293.37       | 669.16       | 14,446,434.08       | 1,707,684.91       | 39.77923114 | -80.76056940 |
| 4,800.00              | 26.45           | 66.46       | 4,660.51              | 311.17       | 710.00       | 14,446,451.87       | 1,707,725.74       | 39.77927971 | -80.76042387 |
| 4,900.00              | 26.45           | 66.46       | 4,750.04              | 328.96       | 750.84       | 14,446,469.67       | 1,707,766.58       | 39.77932827 | -80.76027834 |
| 5,000.00              | 26.45           | 66.46       | 4,839.57              | 346.76       | 791.68       | 14,446,487.46       | 1,707,807.42       | 39.77937684 | -80.76013281 |
| 5,100.00              | 26.45           | 66.46       | 4,929.09              | 364.55       | 832.52       | 14,446,505.25       | 1,707,848.26       | 39.77942540 | -80.75998728 |
| 5,200.00              | 26.45           | 66.46       | 5,018.62              | 382.34       | 873.36       | 14,446,523.05       | 1,707,889.10       | 39.77947397 | -80.75984175 |
| 5,300.00              | 26.45           | 66.46       | 5,108.15              | 400.14       | 914.20       | 14,446,540.84       | 1,707,929.94       | 39.77952254 | -80.75969622 |
| 5,400.00              | 26.45           | 66.46       | 5,197.68              | 417.93       | 955.04       | 14,446,558.64       | 1,707,970.78       | 39.77957110 | -80.75955068 |
| 5,500.00              | 26.45           | 66.46       | 5,287.21              | 435.72       | 995.88       | 14,446,576.43       | 1,708,011.62       | 39.77961967 | -80.75940515 |
| 5,600.00              | 26.45           | 66.46       | 5,376.74              | 453.52       | 1,036.72     | 14,446,594.22       | 1,708,052.46       | 39.77966823 | -80.75925962 |
| 5,700.00              | 26.45           | 66.46       | 5,466.27              | 471.31       | 1,077.56     | 14,446,612.02       | 1,708,093.30       | 39.77971680 | -80.75911409 |
| 5,800.00              | 26.45           | 66.46       | 5,555.80              | 489.11       | 1,118.40     | 14,446,629.81       | 1,708,134.14       | 39.77976536 | -80.75896855 |
| 5,900.00              | 26.45           | 66.46       | 5,645.33              | 506.90       | 1,159.24     | 14,446,647.60       | 1,708,174.98       | 39.77981393 | -80.75882302 |
| 6,000.00              | 26.45           | 66.46       | 5,734.86              | 524.69       | 1,200.08     | 14,446,665.40       | 1,708,215.82       | 39.77986249 | -80.75867749 |
| 6,100.00              | 26.45           | 66.46       | 5,824.39              | 542.49       | 1,240.92     | 14,446,683.19       | 1,708,256.66       | 39.77991106 | -80.75853196 |
| 6,200.00              | 26.45           | 66.46       | 5,913.92              | 560.28       | 1,281.76     | 14,446,700.99       | 1,708,297.50       | 39.77995962 | -80.75838642 |
| 6,300.00              | 26.45           | 66.46       | 6,003.45              | 578.08       | 1,322.60     | 14,446,718.78       | 1,708,338.34       | 39.78000818 | -80.75824089 |
| 6,400.00              | 26.45           | 66.46       | 6,092.98              | 595.87       | 1,363.44     | 14,446,736.57       | 1,708,379.18       | 39.78005675 | -80.75809535 |
| 6,500.00              | 26.45           | 66.46       | 6,182.51              | 613.66       | 1,404.28     | 14,446,754.37       | 1,708,420.02       | 39.78010531 | -80.75794982 |
| 6,600.00              | 26.45           | 66.46       | 6,272.03              | 631.46       | 1,445.12     | 14,446,772.16       | 1,708,460.86       | 39.78015387 | -80.75780429 |
| 6,700.00              | 26.45           | 66.46       | 6,361.56              | 649.25       | 1,485.96     | 14,446,789.95       | 1,708,501.70       | 39.78020244 | -80.75765875 |
| 6,800.00              | 26.45           | 66.46       | 6,451.09              | 667.04       | 1,526.79     | 14,446,807.75       | 1,708,542.54       | 39.78025100 | -80.75751322 |
| 6,900.00              | 26.45           | 66.46       | 6,540.62              | 684.84       | 1,567.63     | 14,446,825.54       | 1,708,583.38       | 39.78029956 | -80.75736768 |
| 7,000.00              | 26.45           | 66.46       | 6,630.15              | 702.63       | 1,608.47     | 14,446,843.34       | 1,708,624.22       | 39.78034813 | -80.75722215 |
| 7,100.00              | 26.45           | 66.46       | 6,719.68              | 720.43       | 1,649.31     | 14,446,861.13       | 1,708,665.06       | 39.78039669 | -80.75707661 |
| 7,200.00              | 26.45           | 66.46       | 6,809.21              | 738.22       | 1,690.15     | 14,446,878.92       | 1,708,705.90       | 39.78044525 | -80.75693108 |
| 7,300.00              | 26.45           | 66.46       | 6,898.74              | 756.01       | 1,730.99     | 14,446,896.72       | 1,708,746.74       | 39.78049381 | -80.75678554 |
| 7,400.00              | 26.45           | 66.46       | 6,988.27              | 773.81       | 1,771.83     | 14,446,914.51       | 1,708,787.58       | 39.78054238 | -80.75664000 |
| 7,500.00              | 26.45           | 66.46       | 7,077.80              | 791.60       | 1,812.67     | 14,446,932.31       | 1,708,828.42       | 39.78059094 | -80.75649447 |
| 7,600.00              | 26.45           | 66.46       | 7,167.33              | 809.39       | 1,853.51     | 14,446,950.10       | 1,708,869.26       | 39.78063950 | -80.75634893 |
| 7,700.00              | 26.45           | 66.46       | 7,256.86              | 827.19       | 1,894.35     | 14,446,967.89       | 1,708,910.10       | 39.78068806 | -80.75620339 |
| 7,800.00              | 26.45           | 66.46       | 7,346.39              | 844.98       | 1,935.19     | 14,446,985.69       | 1,708,950.94       | 39.78073662 | -80.75605786 |
| 7,900.00              | 26.45           | 66.46       | 7,435.92              | 862.78       | 1,976.03     | 14,447,003.48       | 1,708,991.78       | 39.78078518 | -80.75591232 |
| 8,000.00              | 26.45           | 66.46       | 7,525.45              | 880.57       | 2,016.87     | 14,447,021.27       | 1,709,032.62       | 39.78083374 | -80.75576678 |
| 8,100.00              | 26.45           | 66.46       | 7,614.97              | 898.36       | 2,057.71     | 14,447,039.07       | 1,709,073.45       | 39.78088230 | -80.75562125 |
| 8,200.00              | 26.45           | 66.46       | 7,704.50              | 916.16       | 2,098.55     | 14,447,056.86       | 1,709,114.29       | 39.78093086 | -80.75547571 |
| 8,300.00              | 26.45           | 66.46       | 7,794.03              | 933.95       | 2,139.39     | 14,447,074.66       | 1,709,155.13       | 39.78097942 | -80.75533017 |
| 8,400.00              | 26.45           | 66.46       | 7,883.56              | 951.75       | 2,180.23     | 14,447,092.45       | 1,709,195.97       | 39.78102798 | -80.75518463 |
| 8,500.00              | 26.45           | 66.46       | 7,973.09              | 969.54       | 2,221.07     | 14,447,110.24       | 1,709,236.81       | 39.78107654 | -80.75503909 |
| 8,600.00              | 26.45           | 66.46       | 8,062.62              | 987.33       | 2,261.91     | 14,447,128.04       | 1,709,277.65       | 39.78112510 | -80.75489356 |
| 8,700.00              | 26.45           | 66.46       | 8,152.15              | 1,005.13     | 2,302.75     | 14,447,145.83       | 1,709,318.49       | 39.78117366 | -80.75474802 |
| 8,800.00              | 26.45           | 66.46       | 8,241.68              | 1,022.92     | 2,343.59     | 14,447,163.62       | 1,709,359.33       | 39.78122222 | -80.75460248 |
| 8,900.00              | 26.45           | 66.46       | 8,331.21              | 1,040.71     | 2,384.43     | 14,447,181.42       | 1,709,400.17       | 39.78127078 | -80.75445694 |
| 9,000.00              | 26.45           | 66.46       | 8,420.74              | 1,058.51     | 2,425.27     | 14,447,199.21       | 1,709,441.01       | 39.78131934 | -80.75431140 |
| 9,100.00              | 26.45           | 66.46       | 8,510.27              | 1,076.30     | 2,466.11     | 14,447,217.01       | 1,709,481.85       | 39.78136790 | -80.75416586 |
| 9,200.00              | 26.45           | 66.46       | 8,599.80              | 1,094.10     | 2,506.95     | 14,447,234.80       | 1,709,522.69       | 39.78141646 | -80.75402032 |
| 9,300.00              | 26.45           | 66.46       | 8,689.33              | 1,111.89     | 2,547.79     | 14,447,252.59       | 1,709,563.53       | 39.78146502 | -80.75387478 |
| 9,400.00              | 26.45           | 66.46       | 8,778.86              | 1,129.68     | 2,588.63     | 14,447,270.39       | 1,709,604.37       | 39.78151358 | -80.75372924 |
| 9,500.00              | 26.45           | 66.46       | 8,868.39              | 1,147.48     | 2,629.47     | 14,447,288.18       | 1,709,645.21       | 39.78156213 | -80.75358370 |
| 9,600.00              | 26.45           | 66.46       | 8,957.91              | 1,165.27     | 2,670.31     | 14,447,305.98       | 1,709,686.05       | 39.78161069 | -80.75343816 |
| 9,700.00              | 26.45           | 66.46       | 9,047.44              | 1,183.06     | 2,711.15     | 14,447,323.77       | 1,709,726.89       | 39.78165925 | -80.75329262 |
| 9,800.00              | 26.45           | 66.46       | 9,136.97              | 1,200.86     | 2,751.99     | 14,447,341.56       | 1,709,767.73       | 39.78170781 | -80.75314708 |
| 9,900.00              | 26.45           | 66.46       | 9,226.50              | 1,218.65     | 2,792.83     | 14,447,359.36       | 1,709,808.57       | 39.78175636 | -80.75300154 |
| 10,000.00             | 26.45           | 66.46       | 9,316.03              | 1,236.45     | 2,833.67     | 14,447,377.15       | 1,709,849.41       | 39.78180492 | -80.75285600 |
| 10,100.00             | 26.45           | 66.46       | 9,405.56              | 1,254.24     | 2,874.50     | 14,447,394.94       | 1,709,890.25       | 39.78185348 | -80.75271046 |



Planning Report - Geographic

S 0674/2019

|           |                                 |                              |                                |
|-----------|---------------------------------|------------------------------|--------------------------------|
| Database: | DB_Jul2216dt_v14                | Local Co-ordinate Reference: | Well Old Crow N-20 HU (slot F) |
| Company:  | Tug Hill Operating LLC          | TVD Reference:               | GL @ 1265.00usft               |
| Project:  | Marshall County, West Virginia. | MD Reference:                | GL @ 1265.00usft               |
| Site:     | Old Crow Pad                    | North Reference:             | Grid                           |
| Well:     | Old Crow N-20 HU (slot F)       | Survey Calculation Method:   | Minimum Curvature              |
| Wellbore: | Original Hole                   |                              |                                |
| Design:   | rev4                            |                              |                                |

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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    |  |
| 10,200.00                        | 26.45           | 66.46       | 9,495.09              | 1,272.03     | 2,915.34     | 14,447,412.74       | 1,709,931.09       | 39.78190203 | -80.75256491 |  |
| 10,300.00                        | 26.45           | 66.46       | 9,584.62              | 1,289.83     | 2,956.18     | 14,447,430.53       | 1,709,971.93       | 39.78195059 | -80.75241937 |  |
| 10,400.00                        | 26.45           | 66.46       | 9,674.15              | 1,307.62     | 2,997.02     | 14,447,448.33       | 1,710,012.77       | 39.78199915 | -80.75227383 |  |
| 10,500.00                        | 26.45           | 66.46       | 9,763.68              | 1,325.42     | 3,037.86     | 14,447,466.12       | 1,710,053.61       | 39.78204770 | -80.75212829 |  |
| 10,600.00                        | 26.45           | 66.46       | 9,853.21              | 1,343.21     | 3,078.70     | 14,447,483.91       | 1,710,094.45       | 39.78209626 | -80.75198275 |  |
| 10,700.00                        | 26.45           | 66.46       | 9,942.74              | 1,361.00     | 3,119.54     | 14,447,501.71       | 1,710,135.29       | 39.78214482 | -80.75183720 |  |
| 10,800.00                        | 26.45           | 66.46       | 10,032.27             | 1,378.80     | 3,160.38     | 14,447,519.50       | 1,710,176.13       | 39.78219337 | -80.75169166 |  |
| 10,900.00                        | 26.45           | 66.46       | 10,121.80             | 1,396.59     | 3,201.22     | 14,447,537.29       | 1,710,216.97       | 39.78224193 | -80.75154612 |  |
| 11,000.00                        | 26.45           | 66.46       | 10,211.32             | 1,414.38     | 3,242.06     | 14,447,555.09       | 1,710,257.81       | 39.78229048 | -80.75140057 |  |
| 11,100.00                        | 26.45           | 66.46       | 10,300.85             | 1,432.18     | 3,282.90     | 14,447,572.88       | 1,710,298.65       | 39.78233904 | -80.75125503 |  |
| 11,200.00                        | 26.45           | 66.46       | 10,390.38             | 1,449.97     | 3,323.74     | 14,447,590.68       | 1,710,339.49       | 39.78238759 | -80.75110949 |  |
| 11,300.00                        | 26.45           | 66.46       | 10,479.91             | 1,467.77     | 3,364.58     | 14,447,608.47       | 1,710,380.33       | 39.78243615 | -80.75096394 |  |
| 11,400.00                        | 26.45           | 66.46       | 10,569.44             | 1,485.56     | 3,405.42     | 14,447,626.26       | 1,710,421.16       | 39.78248470 | -80.75081840 |  |
| 11,500.00                        | 26.45           | 66.46       | 10,658.97             | 1,503.35     | 3,446.26     | 14,447,644.06       | 1,710,462.00       | 39.78253326 | -80.75067285 |  |
| 11,554.36                        | 26.45           | 66.46       | 10,707.64             | 1,513.03     | 3,468.46     | 14,447,653.73       | 1,710,484.20       | 39.78255965 | -80.75059374 |  |
| <b>Begin 8°/100' build/turn</b>  |                 |             |                       |              |              |                     |                    |             |              |  |
| 11,600.00                        | 26.35           | 58.24       | 10,748.53             | 1,522.42     | 3,486.40     | 14,447,663.12       | 1,710,502.14       | 39.78258531 | -80.75052979 |  |
| 11,700.00                        | 27.73           | 40.85       | 10,837.74             | 1,551.75     | 3,520.55     | 14,447,692.45       | 1,710,536.29       | 39.78266559 | -80.75040796 |  |
| 11,800.00                        | 31.03           | 25.94       | 10,924.98             | 1,592.59     | 3,547.08     | 14,447,733.29       | 1,710,562.83       | 39.78277755 | -80.75031310 |  |
| 11,900.00                        | 35.70           | 14.09       | 11,008.57             | 1,644.15     | 3,565.49     | 14,447,784.85       | 1,710,581.23       | 39.78291900 | -80.75024707 |  |
| 12,000.00                        | 41.29           | 4.87        | 11,086.87             | 1,705.42     | 3,575.41     | 14,447,846.12       | 1,710,591.15       | 39.78308719 | -80.75021114 |  |
| 12,100.00                        | 47.46           | 357.57      | 11,158.36             | 1,775.21     | 3,576.65     | 14,447,915.92       | 1,710,592.40       | 39.78327886 | -80.75020603 |  |
| 12,139.34                        | 50.00           | 355.10      | 11,184.31             | 1,804.71     | 3,574.75     | 14,447,945.42       | 1,710,590.49       | 39.78335989 | -80.75021251 |  |
| <b>Begin 10°/100' build/turn</b> |                 |             |                       |              |              |                     |                    |             |              |  |
| 12,200.00                        | 55.02           | 350.81      | 11,221.23             | 1,852.44     | 3,568.79     | 14,447,993.14       | 1,710,584.53       | 39.78349100 | -80.75023325 |  |
| 12,300.00                        | 63.58           | 344.77      | 11,272.27             | 1,936.30     | 3,550.44     | 14,448,077.00       | 1,710,566.18       | 39.78372144 | -80.75029775 |  |
| 12,400.00                        | 72.35           | 339.58      | 11,309.78             | 2,024.38     | 3,521.98     | 14,448,165.08       | 1,710,537.72       | 39.78396354 | -80.75039818 |  |
| 12,500.00                        | 81.24           | 334.88      | 11,332.62             | 2,114.00     | 3,484.28     | 14,448,254.70       | 1,710,500.02       | 39.78420996 | -80.75053148 |  |
| 12,600.00                        | 90.19           | 330.40      | 11,340.09             | 2,202.44     | 3,438.48     | 14,448,343.14       | 1,710,454.23       | 39.78445319 | -80.75069361 |  |
| 12,609.02                        | 91.00           | 330.00      | 11,340.00             | 2,210.26     | 3,434.00     | 14,448,350.97       | 1,710,449.74       | 39.78447472 | -80.75070949 |  |
| <b>Begin 91.00° lateral</b>      |                 |             |                       |              |              |                     |                    |             |              |  |
| 12,700.00                        | 91.00           | 330.00      | 11,338.41             | 2,289.04     | 3,388.51     | 14,448,429.74       | 1,710,404.26       | 39.78469141 | -80.75087062 |  |
| 12,800.00                        | 91.00           | 330.00      | 11,336.67             | 2,375.63     | 3,338.52     | 14,448,516.33       | 1,710,354.26       | 39.78492958 | -80.75104773 |  |
| 12,900.00                        | 91.00           | 330.00      | 11,334.93             | 2,462.21     | 3,288.52     | 14,448,602.92       | 1,710,304.26       | 39.78516775 | -80.75122484 |  |
| 13,000.00                        | 91.00           | 330.00      | 11,333.19             | 2,548.80     | 3,238.52     | 14,448,689.51       | 1,710,254.27       | 39.78540593 | -80.75140196 |  |
| 13,100.00                        | 91.00           | 330.00      | 11,331.45             | 2,635.39     | 3,188.53     | 14,448,776.09       | 1,710,204.27       | 39.78564410 | -80.75157907 |  |
| 13,200.00                        | 91.00           | 330.00      | 11,329.71             | 2,721.98     | 3,138.53     | 14,448,862.68       | 1,710,154.28       | 39.78588227 | -80.75175618 |  |
| 13,300.00                        | 91.00           | 330.00      | 11,327.97             | 2,808.56     | 3,088.54     | 14,448,949.27       | 1,710,104.28       | 39.78612045 | -80.75193330 |  |
| 13,400.00                        | 91.00           | 330.00      | 11,326.23             | 2,895.15     | 3,038.54     | 14,449,035.86       | 1,710,054.28       | 39.78635862 | -80.75211042 |  |
| 13,500.00                        | 91.00           | 330.00      | 11,324.49             | 2,981.74     | 2,988.54     | 14,449,122.44       | 1,710,004.29       | 39.78659679 | -80.75228753 |  |
| 13,600.00                        | 91.00           | 330.00      | 11,322.75             | 3,068.33     | 2,938.55     | 14,449,209.03       | 1,709,954.29       | 39.78683496 | -80.75246465 |  |
| 13,700.00                        | 91.00           | 330.00      | 11,321.01             | 3,154.91     | 2,888.55     | 14,449,295.62       | 1,709,904.29       | 39.78707313 | -80.75264177 |  |
| 13,800.00                        | 91.00           | 330.00      | 11,319.27             | 3,241.50     | 2,838.55     | 14,449,382.20       | 1,709,854.30       | 39.78731130 | -80.75281889 |  |
| 13,900.00                        | 91.00           | 330.00      | 11,317.53             | 3,328.09     | 2,788.56     | 14,449,468.79       | 1,709,804.30       | 39.78754947 | -80.75299602 |  |
| 14,000.00                        | 91.00           | 330.00      | 11,315.79             | 3,414.67     | 2,738.56     | 14,449,555.38       | 1,709,754.31       | 39.78778764 | -80.75317314 |  |
| 14,100.00                        | 91.00           | 330.00      | 11,314.06             | 3,501.26     | 2,688.57     | 14,449,641.97       | 1,709,704.31       | 39.78802581 | -80.75335027 |  |
| 14,200.00                        | 91.00           | 330.00      | 11,312.32             | 3,587.85     | 2,638.57     | 14,449,728.55       | 1,709,654.31       | 39.78826398 | -80.75352739 |  |
| 14,300.00                        | 91.00           | 330.00      | 11,310.58             | 3,674.44     | 2,588.57     | 14,449,815.14       | 1,709,604.32       | 39.78850215 | -80.75370452 |  |
| 14,400.00                        | 91.00           | 330.00      | 11,308.84             | 3,761.02     | 2,538.58     | 14,449,901.73       | 1,709,554.32       | 39.78874032 | -80.75388165 |  |
| 14,500.00                        | 91.00           | 330.00      | 11,307.10             | 3,847.61     | 2,488.58     | 14,449,988.31       | 1,709,504.32       | 39.78897849 | -80.75405878 |  |
| 14,600.00                        | 91.00           | 330.00      | 11,305.36             | 3,934.20     | 2,438.58     | 14,450,074.90       | 1,709,454.33       | 39.78921666 | -80.75423591 |  |
| 14,700.00                        | 91.00           | 330.00      | 11,303.62             | 4,020.78     | 2,388.59     | 14,450,161.49       | 1,709,404.33       | 39.78945483 | -80.75441304 |  |
| 14,800.00                        | 91.00           | 330.00      | 11,301.88             | 4,107.37     | 2,338.59     | 14,450,248.08       | 1,709,354.33       | 39.78969300 | -80.75459018 |  |
| 14,900.00                        | 91.00           | 330.00      | 11,300.14             | 4,193.96     | 2,288.59     | 14,450,334.66       | 1,709,304.34       | 39.78993116 | -80.75476731 |  |

WV Department of Environmental Protection



Planning Report - Geographic

06/14/2019

51-02191

Database: DB\_Jul2216dt\_v14  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia.  
 Site: Old Crow Pad  
 Well: Old Crow N-20 HU (slot F)  
 Wellbore: Original Hole  
 Design: rev4

Local Co-ordinate Reference: Well Old Crow N-20 HU (slot F)  
 TVD Reference: GL @ 1265.00usft  
 MD Reference: GL @ 1265.00usft  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

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MAR 19 2019

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    |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|-------------|--------------|
| 15,000.00             | 91.00           | 330.00      | 11,298.40             | 4,280.55     | 2,238.60     | 14,450,421.25       | 1,709,254.34       | 39.79016933 | -80.75494445 |
| 15,100.00             | 91.00           | 330.00      | 11,296.66             | 4,367.13     | 2,188.60     | 14,450,507.64       | 1,709,204.35       | 39.79040750 | -80.75512159 |
| 15,200.00             | 91.00           | 330.00      | 11,294.92             | 4,453.72     | 2,138.61     | 14,450,594.42       | 1,709,154.35       | 39.79064567 | -80.75529872 |
| 15,300.00             | 91.00           | 330.00      | 11,293.18             | 4,540.31     | 2,088.61     | 14,450,681.01       | 1,709,104.35       | 39.79088383 | -80.75547586 |
| 15,400.00             | 91.00           | 330.00      | 11,291.44             | 4,626.89     | 2,038.61     | 14,450,767.60       | 1,709,054.36       | 39.79112200 | -80.75565301 |
| 15,500.00             | 91.00           | 330.00      | 11,289.70             | 4,713.48     | 1,988.62     | 14,450,854.19       | 1,709,004.36       | 39.79136017 | -80.75583015 |
| 15,600.00             | 91.00           | 330.00      | 11,287.96             | 4,800.07     | 1,938.62     | 14,450,940.77       | 1,708,954.36       | 39.79159833 | -80.75600729 |
| 15,700.00             | 91.00           | 330.00      | 11,286.22             | 4,886.66     | 1,888.62     | 14,451,027.36       | 1,708,904.37       | 39.79183650 | -80.75618444 |
| 15,800.00             | 91.00           | 330.00      | 11,284.48             | 4,973.24     | 1,838.63     | 14,451,113.95       | 1,708,854.37       | 39.79207466 | -80.75636158 |
| 15,900.00             | 91.00           | 330.00      | 11,282.74             | 5,059.83     | 1,788.63     | 14,451,200.54       | 1,708,804.38       | 39.79231283 | -80.75653873 |
| 16,000.00             | 91.00           | 330.00      | 11,281.00             | 5,146.42     | 1,738.64     | 14,451,287.12       | 1,708,754.38       | 39.79255099 | -80.75671588 |
| 16,100.00             | 91.00           | 330.00      | 11,279.26             | 5,233.01     | 1,688.64     | 14,451,373.71       | 1,708,704.38       | 39.79278916 | -80.75689303 |
| 16,200.00             | 91.00           | 330.00      | 11,277.52             | 5,319.59     | 1,638.64     | 14,451,460.30       | 1,708,654.39       | 39.79302732 | -80.75707018 |
| 16,300.00             | 91.00           | 330.00      | 11,275.78             | 5,406.18     | 1,588.65     | 14,451,546.88       | 1,708,604.39       | 39.79326549 | -80.75724733 |
| 16,400.00             | 91.00           | 330.00      | 11,274.04             | 5,492.77     | 1,538.65     | 14,451,633.47       | 1,708,554.39       | 39.79350365 | -80.75742448 |
| 16,500.00             | 91.00           | 330.00      | 11,272.30             | 5,579.35     | 1,488.65     | 14,451,720.06       | 1,708,504.40       | 39.79374181 | -80.75760164 |
| 16,600.00             | 91.00           | 330.00      | 11,270.56             | 5,665.94     | 1,438.66     | 14,451,806.65       | 1,708,454.40       | 39.79397998 | -80.75777879 |
| 16,700.00             | 91.00           | 330.00      | 11,268.82             | 5,752.53     | 1,388.66     | 14,451,893.23       | 1,708,404.40       | 39.79421814 | -80.75795595 |
| 16,800.00             | 91.00           | 330.00      | 11,267.08             | 5,839.12     | 1,338.66     | 14,451,979.82       | 1,708,354.41       | 39.79445630 | -80.75813311 |
| 16,900.00             | 91.00           | 330.00      | 11,265.34             | 5,925.70     | 1,288.67     | 14,452,066.41       | 1,708,304.41       | 39.79469446 | -80.75831027 |
| 17,000.00             | 91.00           | 330.00      | 11,263.60             | 6,012.29     | 1,238.67     | 14,452,152.99       | 1,708,254.42       | 39.79493263 | -80.75848743 |
| 17,100.00             | 91.00           | 330.00      | 11,261.86             | 6,098.88     | 1,188.68     | 14,452,239.58       | 1,708,204.42       | 39.79517079 | -80.75866459 |
| 17,200.00             | 91.00           | 330.00      | 11,260.12             | 6,185.46     | 1,138.68     | 14,452,326.17       | 1,708,154.42       | 39.79540895 | -80.75884175 |
| 17,300.00             | 91.00           | 330.00      | 11,258.38             | 6,272.05     | 1,088.68     | 14,452,412.76       | 1,708,104.43       | 39.79564711 | -80.75901892 |
| 17,400.00             | 91.00           | 330.00      | 11,256.64             | 6,358.64     | 1,038.69     | 14,452,499.34       | 1,708,054.43       | 39.79588527 | -80.75919608 |
| 17,500.00             | 91.00           | 330.00      | 11,254.90             | 6,445.23     | 988.69       | 14,452,585.93       | 1,708,004.43       | 39.79612343 | -80.75937325 |
| 17,600.00             | 91.00           | 330.00      | 11,253.16             | 6,531.81     | 938.69       | 14,452,672.52       | 1,707,954.44       | 39.79636159 | -80.75955042 |
| 17,700.00             | 91.00           | 330.00      | 11,251.42             | 6,618.40     | 888.70       | 14,452,759.10       | 1,707,904.44       | 39.79659975 | -80.75972759 |
| 17,800.00             | 91.00           | 330.00      | 11,249.68             | 6,704.99     | 838.70       | 14,452,845.69       | 1,707,854.45       | 39.79683791 | -80.75990476 |
| 17,900.00             | 91.00           | 330.00      | 11,247.94             | 6,791.57     | 788.71       | 14,452,932.28       | 1,707,804.45       | 39.79707607 | -80.76008193 |
| 18,000.00             | 91.00           | 330.00      | 11,246.20             | 6,878.16     | 738.71       | 14,453,018.87       | 1,707,754.45       | 39.79731423 | -80.76025910 |
| 18,100.00             | 91.00           | 330.00      | 11,244.46             | 6,964.75     | 688.71       | 14,453,105.45       | 1,707,704.46       | 39.79755239 | -80.76043627 |
| 18,200.00             | 91.00           | 330.00      | 11,242.72             | 7,051.34     | 638.72       | 14,453,192.04       | 1,707,654.46       | 39.79779055 | -80.76061345 |
| 18,300.00             | 91.00           | 330.00      | 11,240.98             | 7,137.92     | 588.72       | 14,453,278.63       | 1,707,604.46       | 39.79802871 | -80.76079063 |
| 18,400.00             | 91.00           | 330.00      | 11,239.24             | 7,224.51     | 538.72       | 14,453,365.22       | 1,707,554.47       | 39.79826687 | -80.76096780 |
| 18,500.00             | 91.00           | 330.00      | 11,237.50             | 7,311.10     | 488.73       | 14,453,451.80       | 1,707,504.47       | 39.79850502 | -80.76114498 |
| 18,600.00             | 91.00           | 330.00      | 11,235.76             | 7,397.69     | 438.73       | 14,453,538.39       | 1,707,454.48       | 39.79874318 | -80.76132216 |
| 18,700.00             | 91.00           | 330.00      | 11,234.02             | 7,484.27     | 388.74       | 14,453,624.98       | 1,707,404.48       | 39.79898134 | -80.76149934 |
| 18,800.00             | 91.00           | 330.00      | 11,232.28             | 7,570.86     | 338.74       | 14,453,711.56       | 1,707,354.48       | 39.79921950 | -80.76167653 |
| 18,900.00             | 91.00           | 330.00      | 11,230.54             | 7,657.45     | 288.74       | 14,453,798.15       | 1,707,304.49       | 39.79945765 | -80.76185371 |
| 19,000.00             | 91.00           | 330.00      | 11,228.80             | 7,744.03     | 238.75       | 14,453,884.74       | 1,707,254.49       | 39.79969581 | -80.76203090 |
| 19,100.00             | 91.00           | 330.00      | 11,227.07             | 7,830.62     | 188.75       | 14,453,971.33       | 1,707,204.49       | 39.79993397 | -80.76220808 |
| 19,200.00             | 91.00           | 330.00      | 11,225.33             | 7,917.21     | 138.75       | 14,454,057.91       | 1,707,154.50       | 39.80017212 | -80.76238527 |
| 19,300.00             | 91.00           | 330.00      | 11,223.59             | 8,003.80     | 88.76        | 14,454,144.50       | 1,707,104.50       | 39.80041028 | -80.76256246 |
| 19,400.00             | 91.00           | 330.00      | 11,221.85             | 8,090.38     | 38.76        | 14,454,231.09       | 1,707,054.50       | 39.80064843 | -80.76273965 |
| 19,500.00             | 91.00           | 330.00      | 11,220.11             | 8,176.97     | -11.24       | 14,454,317.67       | 1,707,004.51       | 39.80088659 | -80.76291684 |
| 19,600.00             | 91.00           | 330.00      | 11,218.37             | 8,263.56     | -61.23       | 14,454,404.26       | 1,706,954.51       | 39.80112474 | -80.76309403 |
| 19,700.00             | 91.00           | 330.00      | 11,216.63             | 8,350.14     | -111.23      | 14,454,490.85       | 1,706,904.52       | 39.80136290 | -80.76327122 |
| 19,800.00             | 91.00           | 330.00      | 11,214.89             | 8,436.73     | -161.22      | 14,454,577.44       | 1,706,854.52       | 39.80160105 | -80.76344842 |
| 19,900.00             | 91.00           | 330.00      | 11,213.15             | 8,523.32     | -211.22      | 14,454,664.02       | 1,706,804.52       | 39.80183921 | -80.76362562 |
| 20,000.00             | 91.00           | 330.00      | 11,211.41             | 8,609.91     | -261.22      | 14,454,750.61       | 1,706,754.53       | 39.80207736 | -80.76380281 |
| 20,100.00             | 91.00           | 330.00      | 11,209.67             | 8,696.49     | -311.21      | 14,454,837.20       | 1,706,704.53       | 39.80231551 | -80.76398001 |
| 20,200.00             | 91.00           | 330.00      | 11,207.93             | 8,783.08     | -361.21      | 14,454,923.78       | 1,706,654.53       | 39.80255367 | -80.76415721 |
| 20,300.00             | 91.00           | 330.00      | 11,206.19             | 8,869.67     | -411.21      | 14,455,010.37       | 1,706,604.54       | 39.80279182 | -80.76433441 |
| 20,400.00             | 91.00           | 330.00      | 11,204.45             | 8,956.25     | -461.20      | 14,455,096.96       | 1,706,554.54       | 39.80302997 | -80.76451161 |



Planning Report - Geographic

Database: DB\_Jul2216dt\_v14  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia.  
 Site: Old Crow Pad  
 Well: Old Crow N-20 HU (slot F)  
 Wellbore: Original Hole  
 Design: rev4

Local Co-ordinate Reference: Well Old Crow N-20 HU (slot F)  
 TVD Reference: GL @ 1265.00usft  
 MD Reference: GL @ 1265.00usft  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

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MAR 19 2019

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    |
|-----------------------|-----------------|-------------|-----------------------|-------------|-------------|---------------------|--------------------|-------------|--------------|
| 20,500.00             | 91.00           | 330.00      | 11,202.71             | 9,042.84    | -511.20     | 14,455,183.55       | 1,706,504.55       | 39.80326813 | -80.76468882 |
| 20,600.00             | 91.00           | 330.00      | 11,200.97             | 9,129.43    | -561.19     | 14,455,270.13       | 1,706,454.55       | 39.80350628 | -80.76486602 |
| 20,700.00             | 91.00           | 330.00      | 11,199.23             | 9,216.02    | -611.19     | 14,455,356.72       | 1,706,404.55       | 39.80374443 | -80.76504323 |
| 20,800.00             | 91.00           | 330.00      | 11,197.49             | 9,302.60    | -661.19     | 14,455,443.31       | 1,706,354.56       | 39.80398258 | -80.76522043 |
| 20,900.00             | 91.00           | 330.00      | 11,195.75             | 9,389.19    | -711.18     | 14,455,529.90       | 1,706,304.56       | 39.80422073 | -80.76539764 |
| 21,000.00             | 91.00           | 330.00      | 11,194.01             | 9,475.78    | -761.18     | 14,455,616.48       | 1,706,254.56       | 39.80445888 | -80.76557485 |
| 21,100.00             | 91.00           | 330.00      | 11,192.27             | 9,562.37    | -811.18     | 14,455,703.07       | 1,706,204.57       | 39.80469703 | -80.76575206 |
| 21,200.00             | 91.00           | 330.00      | 11,190.53             | 9,648.95    | -861.17     | 14,455,789.66       | 1,706,154.57       | 39.80493518 | -80.76592927 |
| 21,300.00             | 91.00           | 330.00      | 11,188.79             | 9,735.54    | -911.17     | 14,455,876.24       | 1,706,104.57       | 39.80517333 | -80.76610649 |
| 21,400.00             | 91.00           | 330.00      | 11,187.05             | 9,822.13    | -961.17     | 14,455,962.83       | 1,706,054.58       | 39.80541148 | -80.76628370 |
| 21,500.00             | 91.00           | 330.00      | 11,185.31             | 9,908.71    | -1,011.16   | 14,456,049.42       | 1,706,004.58       | 39.80564963 | -80.76646092 |
| 21,600.00             | 91.00           | 330.00      | 11,183.57             | 9,995.30    | -1,061.16   | 14,456,136.01       | 1,705,954.59       | 39.80588778 | -80.76663813 |
| 21,700.00             | 91.00           | 330.00      | 11,181.83             | 10,081.89   | -1,111.15   | 14,456,222.59       | 1,705,904.59       | 39.80612593 | -80.76681535 |
| 21,800.00             | 91.00           | 330.00      | 11,180.09             | 10,168.48   | -1,161.15   | 14,456,309.18       | 1,705,854.59       | 39.80636408 | -80.76699257 |
| 21,900.00             | 91.00           | 330.00      | 11,178.35             | 10,255.06   | -1,211.15   | 14,456,395.77       | 1,705,804.60       | 39.80660223 | -80.76716979 |
| 22,000.00             | 91.00           | 330.00      | 11,176.61             | 10,341.65   | -1,261.14   | 14,456,482.35       | 1,705,754.60       | 39.80684038 | -80.76734701 |
| 22,100.00             | 91.00           | 330.00      | 11,174.87             | 10,428.24   | -1,311.14   | 14,456,568.94       | 1,705,704.60       | 39.80707853 | -80.76752423 |
| 22,200.00             | 91.00           | 330.00      | 11,173.13             | 10,514.82   | -1,361.14   | 14,456,655.53       | 1,705,654.61       | 39.80731667 | -80.76770146 |
| 22,300.00             | 91.00           | 330.00      | 11,171.39             | 10,601.41   | -1,411.13   | 14,456,742.12       | 1,705,604.61       | 39.80755482 | -80.76787868 |
| 22,400.00             | 91.00           | 330.00      | 11,169.65             | 10,688.00   | -1,461.13   | 14,456,828.70       | 1,705,554.62       | 39.80779297 | -80.76805591 |
| 22,500.00             | 91.00           | 330.00      | 11,167.91             | 10,774.59   | -1,511.12   | 14,456,915.29       | 1,705,504.62       | 39.80803111 | -80.76823314 |
| 22,600.00             | 91.00           | 330.00      | 11,166.17             | 10,861.17   | -1,561.12   | 14,457,001.88       | 1,705,454.62       | 39.80826926 | -80.76841037 |
| 22,700.00             | 91.00           | 330.00      | 11,164.43             | 10,947.76   | -1,611.12   | 14,457,088.46       | 1,705,404.63       | 39.80850741 | -80.76858760 |
| 22,800.00             | 91.00           | 330.00      | 11,162.69             | 11,034.35   | -1,661.11   | 14,457,175.05       | 1,705,354.63       | 39.80874555 | -80.76876483 |
| 22,900.00             | 91.00           | 330.00      | 11,160.95             | 11,120.93   | -1,711.11   | 14,457,261.64       | 1,705,304.63       | 39.80898370 | -80.76894206 |
| 23,000.00             | 91.00           | 330.00      | 11,159.21             | 11,207.52   | -1,761.11   | 14,457,348.23       | 1,705,254.64       | 39.80922185 | -80.76911929 |
| 23,100.00             | 91.00           | 330.00      | 11,157.47             | 11,294.11   | -1,811.10   | 14,457,434.81       | 1,705,204.64       | 39.80945999 | -80.76929653 |
| 23,200.00             | 91.00           | 330.00      | 11,155.73             | 11,380.70   | -1,861.10   | 14,457,521.40       | 1,705,154.65       | 39.80969814 | -80.76947377 |
| 23,300.00             | 91.00           | 330.00      | 11,153.99             | 11,467.28   | -1,911.09   | 14,457,607.99       | 1,705,104.65       | 39.80993628 | -80.76965100 |
| 23,400.00             | 91.00           | 330.00      | 11,152.25             | 11,553.87   | -1,961.09   | 14,457,694.58       | 1,705,054.65       | 39.81017442 | -80.76982824 |
| 23,500.00             | 91.00           | 330.00      | 11,150.51             | 11,640.46   | -2,011.09   | 14,457,781.16       | 1,705,004.66       | 39.81041257 | -80.77000548 |
| 23,600.00             | 91.00           | 330.00      | 11,148.77             | 11,727.05   | -2,061.08   | 14,457,867.75       | 1,704,954.66       | 39.81065071 | -80.77018272 |
| 23,700.00             | 91.00           | 330.00      | 11,147.03             | 11,813.63   | -2,111.08   | 14,457,954.34       | 1,704,904.66       | 39.81088886 | -80.77035997 |
| 23,800.00             | 91.00           | 330.00      | 11,145.29             | 11,900.22   | -2,161.08   | 14,458,040.92       | 1,704,854.67       | 39.81112700 | -80.77053721 |
| 23,900.00             | 91.00           | 330.00      | 11,143.55             | 11,986.81   | -2,211.07   | 14,458,127.51       | 1,704,804.67       | 39.81136514 | -80.77071445 |
| 24,000.00             | 91.00           | 330.00      | 11,141.81             | 12,073.39   | -2,261.07   | 14,458,214.10       | 1,704,754.67       | 39.81160328 | -80.77089170 |
| 24,100.00             | 91.00           | 330.00      | 11,140.08             | 12,159.98   | -2,311.07   | 14,458,300.69       | 1,704,704.68       | 39.81184143 | -80.77106895 |
| 24,200.00             | 91.00           | 330.00      | 11,138.34             | 12,246.57   | -2,361.06   | 14,458,387.27       | 1,704,654.68       | 39.81207957 | -80.77124620 |
| 24,300.00             | 91.00           | 330.00      | 11,136.60             | 12,333.16   | -2,411.06   | 14,458,473.86       | 1,704,604.69       | 39.81231771 | -80.77142344 |
| 24,400.00             | 91.00           | 330.00      | 11,134.86             | 12,419.74   | -2,461.05   | 14,458,560.45       | 1,704,554.69       | 39.81255585 | -80.77160070 |
| 24,500.00             | 91.00           | 330.00      | 11,133.12             | 12,506.33   | -2,511.05   | 14,458,647.03       | 1,704,504.69       | 39.81279399 | -80.77177795 |
| 24,600.00             | 91.00           | 330.00      | 11,131.38             | 12,592.92   | -2,561.05   | 14,458,733.62       | 1,704,454.70       | 39.81303214 | -80.77195520 |
| 24,700.00             | 91.00           | 330.00      | 11,129.64             | 12,679.50   | -2,611.04   | 14,458,820.21       | 1,704,404.70       | 39.81327028 | -80.77213246 |
| 24,800.00             | 91.00           | 330.00      | 11,127.90             | 12,766.09   | -2,661.04   | 14,458,906.80       | 1,704,354.70       | 39.81350842 | -80.77230971 |
| 24,900.00             | 91.00           | 330.00      | 11,126.16             | 12,852.68   | -2,711.04   | 14,458,993.38       | 1,704,304.71       | 39.81374656 | -80.77248697 |
| 25,000.00             | 91.00           | 330.00      | 11,124.42             | 12,939.27   | -2,761.03   | 14,459,079.97       | 1,704,254.71       | 39.81398470 | -80.77266423 |
| 25,100.00             | 91.00           | 330.00      | 11,122.68             | 13,025.85   | -2,811.03   | 14,459,166.56       | 1,704,204.72       | 39.81422284 | -80.77284149 |
| 25,200.00             | 91.00           | 330.00      | 11,120.94             | 13,112.44   | -2,861.02   | 14,459,253.14       | 1,704,154.72       | 39.81446098 | -80.77301875 |
| 25,300.00             | 91.00           | 330.00      | 11,119.20             | 13,199.03   | -2,911.02   | 14,459,339.73       | 1,704,104.72       | 39.81469911 | -80.77319601 |
| 25,368.82             | 91.00           | 330.00      | 11,118.00             | 13,258.62   | -2,945.43   | 14,459,399.32       | 1,704,070.32       | 39.81486300 | -80.77331800 |

PBHL/TD 25368.82 MD/11118.00 TVD



|                  |                                 |                                     |                                |
|------------------|---------------------------------|-------------------------------------|--------------------------------|
| <b>Database:</b> | DB_Jul2216dt_v14                | <b>Local Co-ordinate Reference:</b> | Well Old Crow N-20 HU (slot F) |
| <b>Company:</b>  | Tug Hill Operating LLC          | <b>TVD Reference:</b>               | GL @ 1265.00usft               |
| <b>Project:</b>  | Marshall County, West Virginia. | <b>MD Reference:</b>                | GL @ 1265.00usft               |
| <b>Site:</b>     | Old Crow Pad                    | <b>North Reference:</b>             | Grid                           |
| <b>Well:</b>     | Old Crow N-20 HU (slot F)       | <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  |           |          |           |           |           |               |              |             |              |
| BHL Old Crow N-20 r1<br>- plan hits target center<br>- Point   | 0.00      | 0.01     | 11,118.00 | 13,258.62 | -2,945.43 | 14,459,399.32 | 1,704,070.32 | 39.81486300 | -80.77331800 |
| LP Old Crow N-20<br>- plan misses target center by 0.21usft at 12608.97usft MD (11340.00 TVD, 2210.22 N, 3434.03 E)<br>- Point | 0.00      | 0.00     | 11,340.00 | 2,210.11  | 3,433.84  | 14,448,350.82 | 1,710,449.58 | 39.78447430 | -80.75071006 |

| Plan Annotations      |                       |                   |              |                                  |  |
|-----------------------|-----------------------|-------------------|--------------|----------------------------------|--|
| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates |              | Comment                          |  |
|                       |                       | +N/-S (usft)      | +E/-W (usft) |                                  |  |
| 1,300.00              | 1,300.00              | 0.00              | 0.00         | KOP Begin 2°/100' build          |  |
| 1,550.00              | 1,549.68              | 4.45              | 9.95         | Begin 5.00° tangent              |  |
| 3,106.24              | 3,100.00              | 59.79             | 133.78       | Begin 3°/100' build              |  |
| 3,821.38              | 3,784.35              | 137.03            | 310.34       | Begin 26.45° tangent             |  |
| 11,554.36             | 10,707.64             | 1,513.03          | 3,468.46     | Begin 8°/100' build/turn         |  |
| 12,139.34             | 11,184.31             | 1,804.71          | 3,574.75     | Begin 10°/100' build/turn        |  |
| 12,609.02             | 11,340.00             | 2,210.26          | 3,434.00     | Begin 91.00° lateral             |  |
| 25,368.82             | 11,118.00             | 13,258.62         | -2,945.43    | PBHL/TD 25368.82 MD/11118.00 TVD |  |

WW-9  
(4/16)

API Number 47 - 051 - \_\_\_\_\_

Operator's Well No. Old Crow N-20HU

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Tug Hill Operating, LLC OP Code 494510851

Watershed (HUC 10) Fish Creek Quadrangle Powhatan Point 7.5'

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes  No

Will a pit be used? Yes  No

If so, please describe anticipated pit waste: AST Tanks with proper containment will be used for staging fresh water for frac and flow back water

Will a synthetic liner be used in the pit? Yes  No  If so, what ml.? AST Tanks will be used with proper containment

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number UIC 2459, UIC 965, UIC 359, UIC 2D0732540, UIC 2D0732523 )
- Reuse (at API Number \_\_\_\_\_ )
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain \_\_\_\_\_ )

Will closed loop system be used? If so, describe: Yes - For Vertical and Horizontal Drilling

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air for vertical / Oil for Horizontal

-If oil based, what type? Synthetic, petroleum, etc. Synthetic Oil Base

Additives to be used in drilling medium? Barite for weight

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. All drill cuttings to be disposed of in a Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Wetzel County Sanitary Landfill (SWF-1021 / WV0109185) and Westmoreland Sanitary Landfill, LLC (SAN1405 / PA DEP EC#1386428)

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature Jim Pancake  
Company Official (Typed Name) Jim Pancake  
Company Official Title Vice President, Geoscience

RECEIVED  
Office of Oil and Gas

FEB 26 2019

WV Department of  
Environmental Protection

Subscribed and sworn before me this 21 day of FEBRUARY, 2019

Maureen A Stead

Notary Public

My commission expires 1/28/23

Commonwealth of Pennsylvania - Notary Seal  
MAUREEN A STEAD - Notary Public  
Washington County  
My Commission Expires Jan 28, 2023  
Commission Number 1259926

Tug Hill Operating, LLC

Proposed Revegetation Treatment: Acres Disturbed 19.18 Prevegetation pH 6.0

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch 2.5 Tons/acre

Seed Mixtures

| Temporary       |          | Permanent     |          |
|-----------------|----------|---------------|----------|
| Seed Type       | lbs/acre | Seed Type     | lbs/acre |
| Annual Ryegrass | 40       | Orchard Grass | 12       |
| Spring Oats     | 96       | Ladino        | 3        |
|                 |          | White Clover  | 2        |

Attach:

Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, include dimensions (L x W x D) of the pit, and dimensions (L x W), and area in acreage, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by:

*Jim Nicholson*

Comments:

Title: Oil and Gas Inspector

Date:

2/20/19

Field Reviewed?

Yes

No

RECEIVED  
Office of Oil and Gas

FEB 26 2019

WV Department of  
Environmental Protection

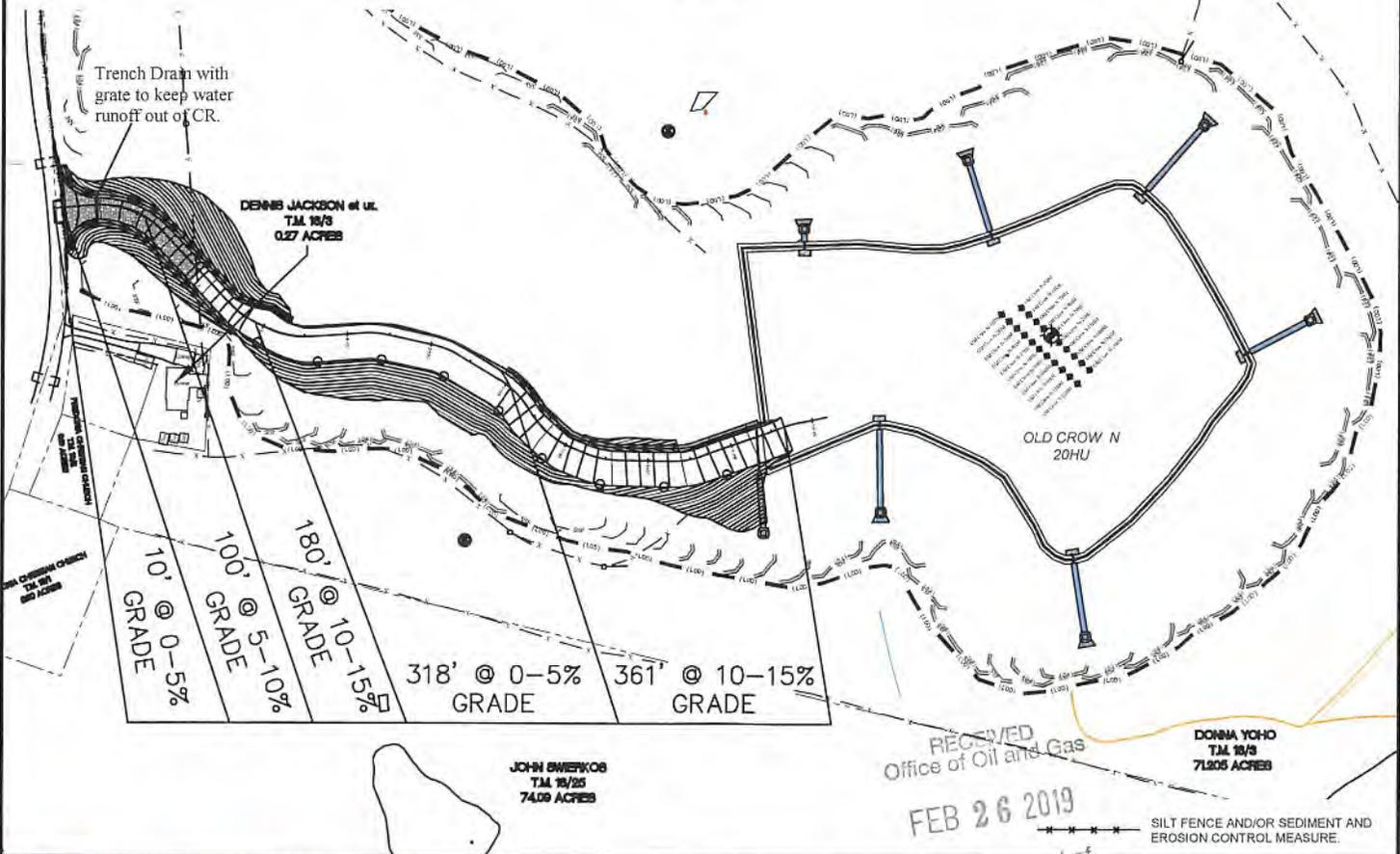
# PROPOSED OLD CROW N - 20HU

**NOTES:**

1. Ⓞ - DENOTES INSTALL 18" PVC CULVERT AND APPLY APPROPRIATE SEDIMENT OUTLET CONTROL (RIP RAP SPLASH PAD)
2. DRAWING NOT TO SCALE
3. REFERENCE IS HEREBY MADE TO THE WV D.E.P. OFFICE OF OIL & GAS, "EROSION AND SEDIMENT CONTROL FIELD MANUAL" FOR REQUIREMENTS AND BMPs FOR AVERAGE FIELD CONDITIONS CONCERNING THE MAINTENANCE OF EXISTING ROADS AND THE CONSTRUCTION OF PROPOSED ROADS. FIELD CONDITIONS MAY REQUIRE VARIANCE FROM THESE GUIDELINES AND THE EARTHWORK CONTRACTOR IS RESPONSIBLE FOR NOTIFICATION TO THE INSPECTOR AND THE OPERATOR SHOULD THESE CONDITIONS OCCUR.
4. INSTALL CULVERTS AS SHOWN ON RECLAMATION PLAN OR AS FIELD CONDITIONS REQUIRE.
5. ENTRANCES ONTO PUBLIC ROADS SHALL BE CONSTRUCTED OR MAINTAINED IN ACCORDANCE WITH WV D.O.T. REGULATIONS. ADDITIONAL PERMITS MAY BE REQUIRED.
6. TEMPORARILY SEED AND MULCH ALL SLOPS UPON CONSTRUCTION OF LOCATION.
7. ALL CUT AND FILL SLOPES ARE 2H : 1V SLOPE.
8. ALL TREES 8-INCHES AND ABOVE ARE TO BE CUT AND STACKED. BRUSH SLASHINGS ARE TO BE UTILIZED DOWN SLOPE OF SITE AND STRUCTURES TO ACT AS A CONTROL BARRIER IF AVAILABLE.
9. SEE OLD CROW N SITE PLAN PREPARED BY KELLEY SURVEYING, FOR COMPLETE CONSTRUCTION & EROSION AND SEDIMENT CONTROL DETAILS.



DONNA YCHO  
TM 18/3  
71205 ACRES



JOHN BWERKOB  
TM 18/25  
7409 ACRES

DONNA YCHO  
TM 18/3  
71205 ACRES

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|                     |          |   |       |
|---------------------|----------|---|-------|
| TOPO SECTION:       |          | OPERATOR: WV Environmental Protection   |       |
| POWHATAN POINT 7.5' |          | PREPARED FOR:<br>TUG HILL OPERATING, L.L.C<br>380 SOUTHPOINTE BLVD<br>SUITE 200<br>CANONSBURG, PA 15317 |       |
| COUNTY              | DISTRICT | DATE  | SCALE |
| MARSHALL            | FRANKLIN | 01/23/19  | NONE  |
| DRAWN BY            | JOB NO.  |   |       |
| K.G.M.              | 8769     |   |       |

**TUG HILL**  
OPERATING

51-02161

06/14/2019



## Well Site Safety Plan

Tug Hill Operating, LLC

*JS 3/7/19*

Well Name: Old Crow N-20HU

Pad Location: Old Crow Pad

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing: 4,403,192.49

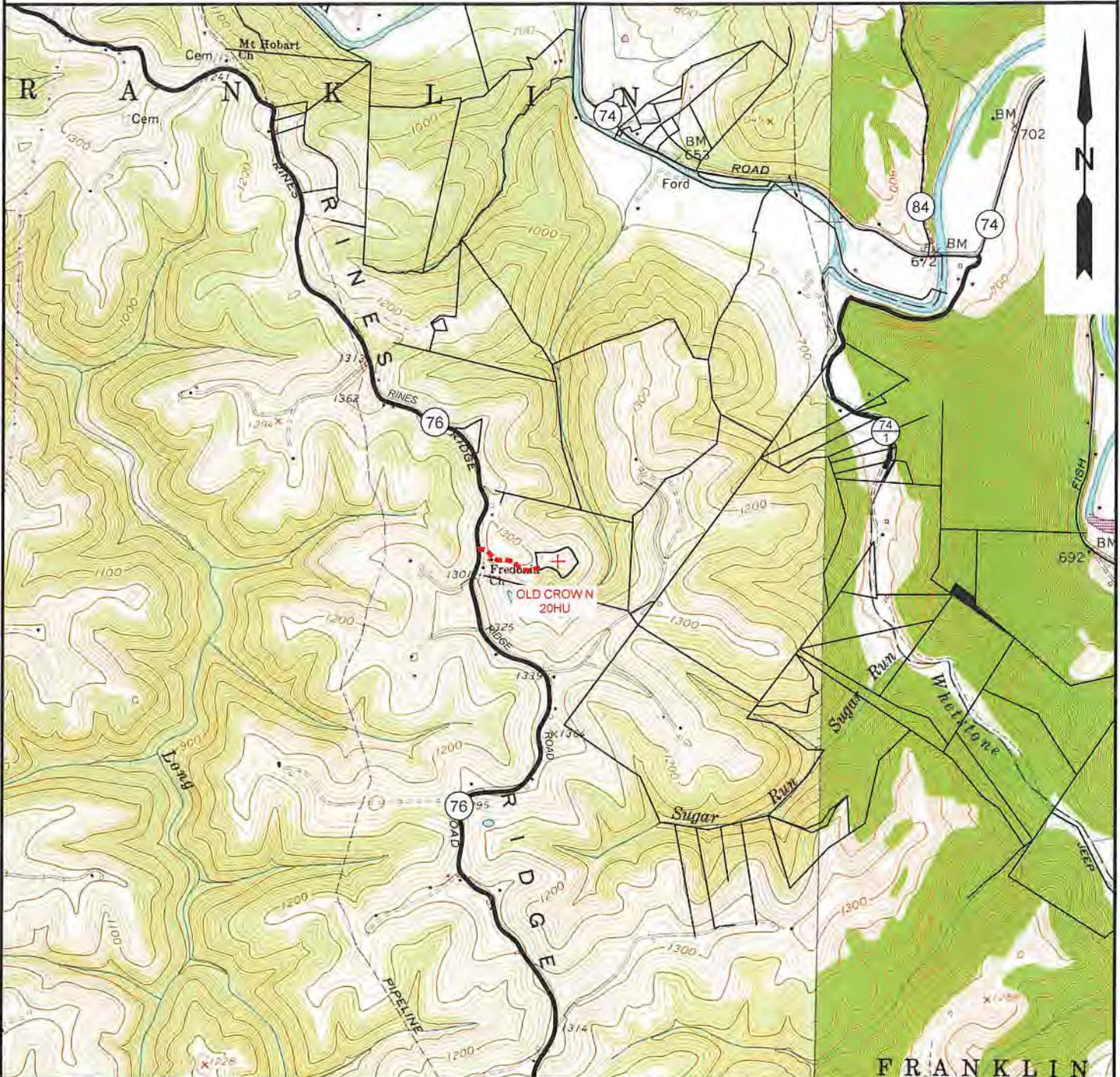
Easting: 520,299.44

February 2019

WW-9

# PROPOSED OLD CROW N - 20HU

SUPPLEMENT PG. 2



NOTE: CLOSEST WATER PURVEYOR  
GRANDVIEW - DOOLIN PUBLIC SERVICE DISTRICT  
PROCTOR, WV

LAT: 39.7137712  
LON: -80.8258327  
LOCATED: S 37°38'00" W AT 29,404.13' FROM OLD CROW N - 20HU SURFACE LOCATION

RECEIVED  
Office of Oil and Gas  
LOCATION

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|                                   |          |                         |  |
|-----------------------------------|----------|-------------------------|--|
| TOPO SECTION:                     |          | OPERATOR:               |  |
| GLEN EASTON & POWHATAN POINT 7.5' |          | PREPARED FOR:           |  |
| COUNTY                            | DISTRICT | TUG HILL OPERATING, LLC |  |
| MARSHALL                          | FRANKLIN | 380 SOUTHPOINTE BLVD    |  |
| DRAWN BY                          | JOB NO.  | SUITE 200               |  |
| K.G.M.                            | 8796     | CANONSBURG, PA 15317    |  |
|                                   | DATE     | SCALE                   |  |
|                                   | 01/23/19 | 1" = 2000'              |  |

FEB 26 2019

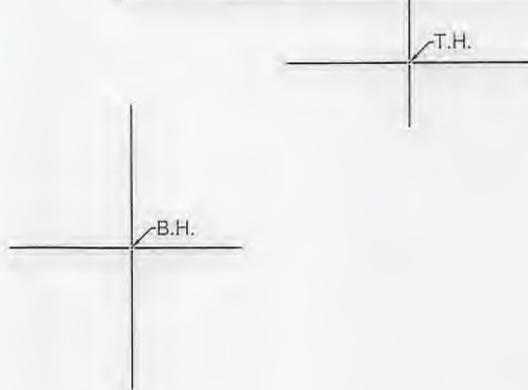
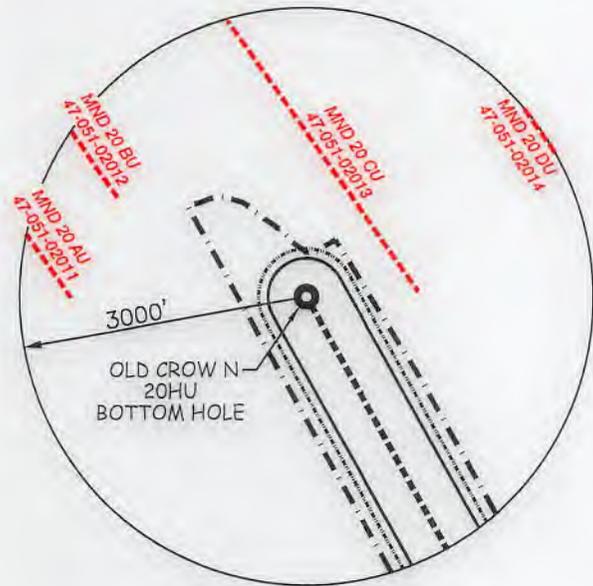
WV Department of Environmental Protection  
**TUG HILL OPERATING**

**OLD CROW N LEASE  
UTICA UNIT - 503.48 AC±  
WELL 20HU  
TUG HILL OPERATING**

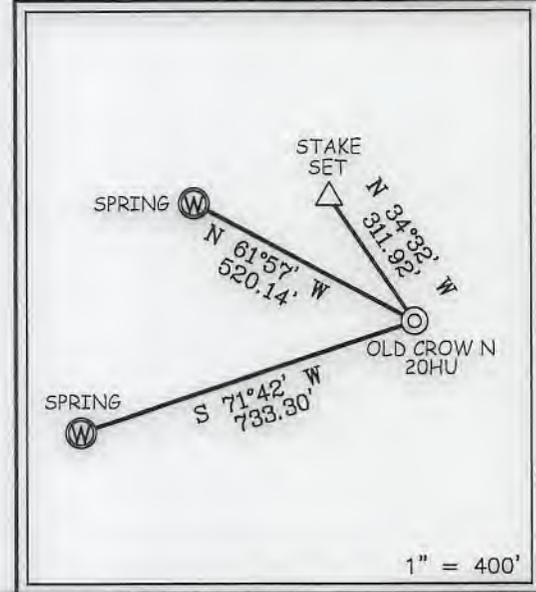
T.H. LATITUDE 39°47'30"  
B.H. LATITUDE 39°50'00"

|  |                   |                    |
|--|-------------------|--------------------|
| (S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH) |                   |                    |
| NAD'83 S.P.C.(FT)                          | N. 468,138.92     | E. 1,613,557.53    |
| NAD'83 GEO.                                | LAT-(N) 39.778430 | LONG-(W) 80.762954 |
| NAD'83 UTM (M)                             | N. 4,403,192.49   | E. 520,299.44      |
| <u>LANDING POINT</u>                       |                   |                    |
| NAD'83 S.P.C.(FT)                          | N. 470,292.2      | E. 1,617,029.2     |
| NAD'83 GEO.                                | LAT-(N) 39.784475 | LONG-(W) 80.750709 |
| NAD'83 UTM (M)                             | N. 4,403,866.2    | E. 521,346.1       |
| <u>BOTTOM HOLE</u>                         |                   |                    |
| NAD'83 S.P.C.(FT)                          | N. 481,449.4      | E. 1,610,833.1     |
| NAD'83 GEO.                                | LAT-(N) 39.814863 | LONG-(W) 80.773318 |
| NAD'83 UTM (M)                             | N. 4,407,233.7    | E. 519,401.7       |

T.H. LONGITUDE 80°45'00"  
B.H. LONGITUDE 80°45'00"  
4,822' T.H.  
6,729' B.H.



**REFERENCES**

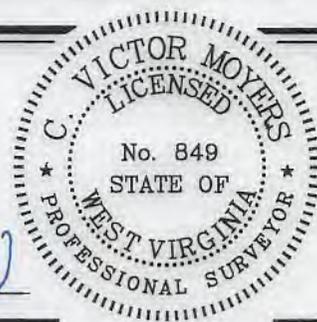


**NOTES ON SURVEY**

- NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
- WELL SPOT CIRCLE & TOPO MARK SCALE ARE 1"=2000'
- PROPOSED LATERAL OR TOP HOLE OF OLD CROW N-20HU IS WITHIN 3000' OF THE TOP HOLES OR LATERALS OF EXISTING WELLS  
BRYAN N 13HU (47-051-02030),  
BRYAN N 14HU (47-051-02031),  
OLD CROW N-17HU (47-051-02122),  
OLD CROW N-18HU (47-051-02123),  
MND20 AU (47-051-02011),  
MND20 BU (47-051-02012),  
MND20 CU (47-051-02013),  
MND20 DU (47-051-02014) &  
PROPOSED OLD CROW N-19HU.
- THE ASSESSMENT OF THE 1/10 ACRE LOT, OWNED BY JASON J. STEED AND DESCRIBED AS THE SECOND PARCEL IN DEED BOOK 643 PAGE 319 AND CORRECTIVE DEED 843 PAGE 300, IS NOT CURRENTLY ACCOUNTED FOR WITHIN THE 135.61 ACRE ASSESSMENT OF SURFACE TAX MAP 5-9-13.2

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www.slewy.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 FEBRUARY 22, 20 19  
REVISED 03-08-19, 03-14-19 & 04-05-19  
OPERATORS WELL NO. OLD CROW N-20HU  
API WELL NO. 47-051-02191 HGA  
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8796P20HUR4.dwg  
OLD CROW NORTH 20HU 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 <input type="checkbox"/>                         | GAS <input checked="" type="checkbox"/> | LIQUID INJECTION <input type="checkbox"/> | WASTE DISPOSAL <input type="checkbox"/> | IF "GAS" PRODUCTION <input checked="" type="checkbox"/> | STORAGE <input type="checkbox"/> | DEEP <input checked="" type="checkbox"/> | SHALLOW <input type="checkbox"/> |                                     |                         |                          |                          |                          |                   |                          |                       |                          |        |                          |
| LOCATION:                          | GROUND = 1,288.00'<br>ELEVATION PROPOSED = 1,264.99' |   |   |   |   |                                  |  |                                  |                                     |                         |                          |                          |                          |                   |                          |                       |                          |        |                          |
| DISTRICT:                          | FRANKLIN   |   | COUNTY:                                   | MARSHALL                                |   | QUADRANGLE:                      | POWHATAN POINT 7.5'                      |                                  |                                     |                         |                          |                          |                          |                   |                          |                       |                          |        |                          |
| SURFACE OWNER:                     | DONNA VIVIAN YOHO (TOD) GARY LANCE YOHO              |   |   |   | ACREAGE:  | 71.205±                          |  |                                  |                                     |                         |                          |                          |                          |                   |                          |                       |                          |        |                          |
| ROYALTY OWNER:                     | DONNA VIVIAN YOHO, ET AL - SEE ADDITIONAL SHEETS     |   |   |   | ACREAGE:  | 71.205±                          |  |                                  |                                     |                         |                          |                          |                          |                   |                          |                       |                          |        |                          |
| PROPOSED WORK:                     | LEASE NO. <u>SEE ADDITIONAL SHEETS</u>               |   |   |   |   |                                  |  |                                  |                                     |                         |                          |                          |                          |                   |                          |                       |                          |        |                          |
| DRILL:                             | <input checked="" type="checkbox"/>                  | CONVERT:                                | <input type="checkbox"/>                  | DRILL DEEPER:                           | <input type="checkbox"/>                                | REDRILL:                         | <input type="checkbox"/>                 | FRACTURE OR STIMULATE:           | <input checked="" type="checkbox"/> | PLUG OFF OLD FORMATION: | <input type="checkbox"/> | PERFORATE NEW FORMATION: | <input type="checkbox"/> | PLUG AND ABANDON: | <input type="checkbox"/> | CLEAN OUT AND REPLUG: | <input type="checkbox"/> | OTHER: | <input type="checkbox"/> |
| PHYSICAL CHANGE IN WELL (SPECIFY): |  |   |   |   | TARGET FORMATION:                                       | POINT PLEASANT                   |  |                                  |                                     |                         |                          |                          |                          |                   |                          |                       |                          |        |                          |
|                                    |  |   |   |   | ESTIMATED DEPTH:  | TVD: 11,561' / TMD: 25,369'      |  |                                  |                                     |                         |                          |                          |                          |                   |                          |                       |                          |        |                          |

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 ADDRESS CHARLESTON, WV 25313

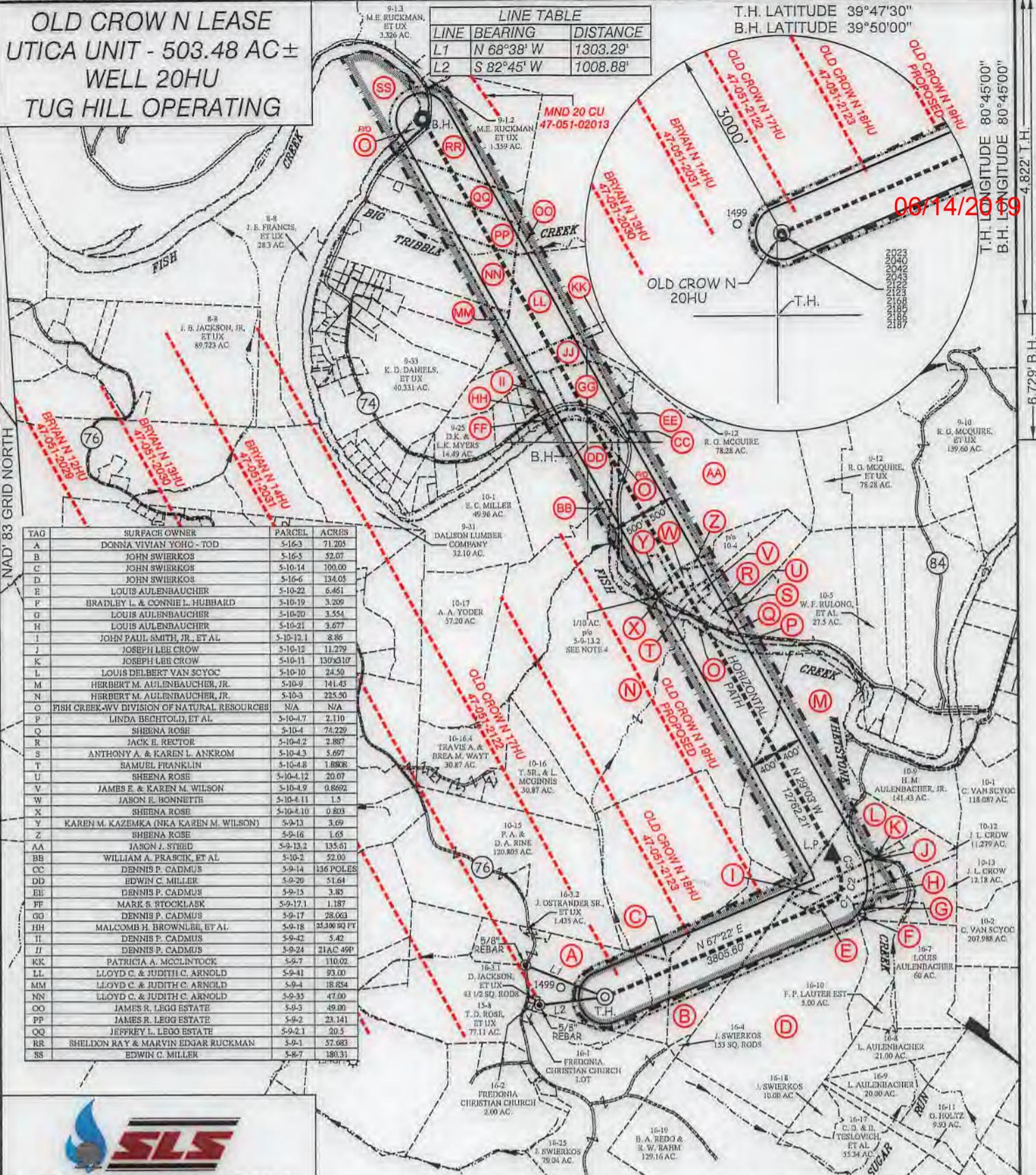
COUNTY NAME  
PERMIT

**OLD CROW N LEASE  
UTICA UNIT - 503.48 AC ±  
WELL 20HU  
TUG HILL OPERATING**

**LINE TABLE**

| LINE | BEARING    | DISTANCE |
|------|------------|----------|
| L1   | N 68°38' W | 1303.29' |
| L2   | S 82°45' W | 1008.88' |

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



| TAG | SURFACE OWNER                               | PARCEL    | ACRES        |
|-----|---|-----------|--------------|
| A   | DONNA VIVIAN YOHG - TOD                     | 5-16-3    | 71.205       |
| B   | JOHN SWIERKOS                               | 5-16-5    | 52.07        |
| C   | JOHN SWIERKOS                               | 5-10-14   | 100.00       |
| D   | JOHN SWIERKOS                               | 5-16-6    | 134.03       |
| E   | LOUIS AULENBAUCHER                          | 5-10-22   | 6.461        |
| F   | BRADLEY L. & CONNIE L. HUBBARD              | 5-10-19   | 3.209        |
| G   | LOUIS AULENBAUCHER                          | 5-10-20   | 3.554        |
| H   | LOUIS AULENBAUCHER                          | 5-10-21   | 3.677        |
| I   | JOHN PAUL SMITH, JR., ET AL                 | 5-10-12.1 | 2.86         |
| J   | JOSEPH LEE CROW                             | 5-10-12   | 11.279       |
| K   | JOSEPH LEE CROW                             | 5-10-11   | 130x310'     |
| L   | LOUIS DELBERT VAN SOYOC                     | 5-10-10   | 24.50        |
| M   | HERBERT M. AULENBAUCHER, JR.                | 5-10-9    | 141.43       |
| N   | HERBERT M. AULENBAUCHER, JR.                | 5-10-3    | 225.50       |
| O   | FISH CREEK-WV DIVISION OF NATURAL RESOURCES | N/A       | N/A          |
| P   | LINDA BECHTOLD, ET AL                       | 5-10-4.7  | 2.110        |
| Q   | SHEENA ROSE                                 | 5-10-4    | 74.229       |
| R   | JACK E. RECTOR                              | 5-10-4.2  | 2.887        |
| S   | ANTHONY A. & KAREN L. ANKROM                | 5-10-4.3  | 5.697        |
| T   | SAMUEL FRANKLIN                             | 5-10-4.8  | 1.8808       |
| U   | SHEENA ROSE                                 | 5-10-4.12 | 20.07        |
| V   | JAMES E. & KAREN M. WILSON                  | 5-10-4.9  | 0.8692       |
| W   | JASON E. BONNETT                            | 5-10-4.11 | 1.5          |
| X   | SHEENA ROSE                                 | 5-10-4.10 | 0.803        |
| Y   | KAREN M. KAZEMKA (NKA KAREN M. WILSON)      | 5-9-13    | 3.69         |
| Z   | SHEENA ROSE                                 | 5-9-16    | 1.65         |
| AA  | JASON J. STREB                              | 5-9-13.2  | 135.61       |
| BB  | WILLIAM A. PRASCIK, ET AL                   | 5-10-2    | 52.03        |
| CC  | DENNIS P. CADMUS                            | 5-9-14    | 136 POLES    |
| DD  | EDWIN C. MILLER                             | 5-9-20    | 51.64        |
| EE  | DENNIS P. CADMUS                            | 5-9-15    | 3.85         |
| FF  | MARK S. STOCKLASK                           | 5-9-17.1  | 1.187        |
| GG  | DENNIS P. CADMUS                            | 5-9-17    | 28.003       |
| HH  | MALCOMB H. BROWNLEE, ET AL                  | 5-9-18    | 25,100 SQ FT |
| II  | DENNIS P. CADMUS                            | 5-9-42    | 5.42         |
| JJ  | DENNIS P. CADMUS                            | 5-9-24    | 21AC 49P     |
| KK  | PATRICIA A. MCCLINTOCK                      | 5-5-7     | 110.02       |
| LL  | LLOYD C. & JUDITH C. ARNOLD                 | 5-9-41    | 93.00        |
| MM  | LLOYD C. & JUDITH C. ARNOLD                 | 5-9-4     | 18.854       |
| NN  | LLOYD C. & JUDITH C. ARNOLD                 | 5-9-35    | 47.00        |
| OO  | JAMES R. LEGG ESTATE                        | 5-9-3     | 49.00        |
| PP  | JAMES R. LEGG ESTATE                        | 5-9-2     | 23.141       |
| QQ  | JEFFREY L. LEGG ESTATE                      | 5-9-2.1   | 20.5         |
| RR  | SHELDON RAY & MARVIN EDGAR RUCKMAN          | 5-9-1     | 57.683       |
| SS  | EDWIN C. MILLER                             | 5-8-7     | 180.31       |

**CURVE TABLE**

| CURVE | ARC LENGTH | RADIUS   | CHORD BEARING | CHORD LENGTH |
|-------|------------|----------|---------------|--------------|
| C1    | 210.52'    | 235.33'  | N 26°54' E    | 203.57'      |
| C2    | 155.72'    | 907.18'  | N 02°02' W    | 155.53'      |
| C3    | 375.71'    | 1234.94' | N 19°55' W    | 374.26'      |

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P.S. 849 *C. Victor Moyers*



(+) 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
- CREEK
- ROAD
- COUNTY ROUTE
- PROPOSED WELL
- EXISTING WELL
- PERMITTED WELL
- SURFACE OWNER (SEE TABLE)
- LEASE # (SEE ADDITIONAL SHEETS)

SCALE 1" = 2000' FILE NO. 8796P20HUR4.dwg  
OLD CROW NORTH 20HU REV 4  
DATE FEBRUARY 22, 2019  
REVISED 03-08-19, 03-14-19 & 04-05-19  
OPERATORS WELL NO. OLD CROW N-20HU  
API WELL 47-051-02191 H6A  
NO. STATE COUNTY PERMIT

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

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

COUNTY NAME  
PERMIT

**OLD CROW N LEASE  
UTICA UNIT - 503.48 AC ±  
WELL 20HU  
TUG HILL OPERATING**



06/14/2019

| No. | Lease Name or No. | Tag | Parcel     | Oil & Gas Royalty Owners  | Deed Book/Page |
|-----|-------------------|-----|------------|---|----------------|
| 1   | 10*19340          | A   | 5-16-3     | DONNA V YOHO  | 665 407        |
| 2   | 10*14919          | B   | 5-16-5     | CHESTNUT HOLDINGS INC   | 836 117        |
| 3   | 10*14920          | C   | 5-10-14    | CHESTNUT HOLDINGS INC   | 836 119        |
| 4   | 10*21468          | D   | 5-16-6     | JOHN A SWIERKOS   | 953 317        |
| 5   | 10*18396          | E   | 5-10-22    | LOUIS AULENBACHER   | 932 468        |
| 6   | 10*21468          | E   | 5-10-22    | JOHN A SWIERKOS   | 953 317        |
| 7   | 10*21468          | F   | 5-10-19    | JOHN A SWIERKOS   | 953 317        |
| 8   | 10*47051.261.4    | F   | 5-10-19    | BRADLEY L HUBBARD AND CONNIE L HUBBARD                                    | 898 573        |
| 9   | 10*18396          | G   | 5-10-20    | LOUIS AULENBACHER   | 932 468        |
| 10  | 10*21468          | G   | 5-10-20    | JOHN A SWIERKOS   | 953 317        |
| 11  | 10*18396          | H   | 5-10-21    | LOUIS AULENBACHER   | 932 468        |
| 12  | 10*21468          | H   | 5-10-21    | JOHN A SWIERKOS   | 953 317        |
| 13  | 10*21468          | I   | 5-10-12.1  | JOHN A SWIERKOS   | 953 317        |
| 14  | 10*47051.261.1    | I   | 5-10-12.1  | WILLIAM HUBBARD   | 882 536        |
| 15  | 10*47051.261.2    | I   | 5-10-12.1  | BONNIE G ZELIC  | 882 539        |
| 16  | 10*47051.261.3    | I   | 5-10-12.1  | JOHN P SMITH JR   | 882 542        |
| 17  | 10*47051.261.4    | J   | 5-10-12.1  | BRADLEY L HUBBARD AND CONNIE L HUBBARD                                    | 898 573        |
| 18  | 10*18892          | J   | 5-10-12    | JOSEPH LEE CROW   | 966 88         |
| 19  | 10*18302          | K   | 5-10-11    | JOSEPH L CROW, R AND LORRY CROW   | 929 316        |
| 20  | 10*21468          | L   | 5-10-10    | JOHN A SWIERKOS   | 953 317        |
| 21  | PENDING           | L   | 5-10-10    | LOUIS VAN SCYOC AND PATRICIA VAN SCYOC                                    | 697 461        |
| 22  | 10*22295          | L   | 5-10-10    | RACHEL B OSTRANDER  | 822 210        |
| 23  | 10*22319          | L   | 5-10-10    | SHARON G VAN SCYOC  | 822 204        |
| 24  | 10*19249          | M   | 5-10-9     | HERBERT M AULENBACHER   | 914 551        |
| 25  | 10*14918          | N   | 5-10-3     | CHESTNUT HOLDINGS INC   | 836 115        |
| 26  | Q091960000        | O   | FISH CREEK | STATE OF WEST VIRGINIA DIVISION OF NATURAL RESOURCES                      | 865 558        |
| 27  | 10*18594          | P   | 5-10-4.7   | LEE JONATHAN BECHTOLD   | 934 646        |
| 28  | 10*18594          | P   | 5-10-4.7   | LINDA L & THOMAS G MCCORMICK  | 934 645        |
| 29  | 10*18594          | P   | 5-10-4.7   | LW BECHTOLD   | 934 641        |
| 30  | 10*19248          | Q   | 5-10-4     | ALBERT F KAZEMKA  | 848 419        |
| 31  | 10*21571          | R   | 5-10-4.2   | JACK E RECTOR   | 957 476        |
| 32  | 10*19163          | S   | 5-10-4.3   | ANTHONY A ANKROM KAREN L ANKROM   | 711 468        |
| 33  | 10*18158          | T   | 5-10-4.8   | SAMUEL D FRANKLIN AND RHONDA K FRANKLIN                                   | 938 462        |
| 34  | 10*19248          | U   | 5-10-4.12  | ALBERT F KAZEMKA  | 848 419        |
| 35  | 10*19131          | V   | 5-10-4.9   | USA D ELSON   | 764 16         |
| 36  | 10*19108          | W   | 5-10-4.11  | JASON E BONNETTE  | 848 438        |
| 37  | 10*19107          | X   | 5-10-4.10  | ALBERT F KAZEMKA  | 853 73         |
| 38  | 10*47051.162.0    | Y   | 5-9-13     | KAREN M WILSON  | 873 150        |
| 39  | 10*19107          | Z   | 5-9-16     | ALBERT F KAZEMKA  | 853 73         |
| 40  | 10*47051.170.0    | AA  | 5-9-13.2   | JASON J STEED   | 865 344        |
| 41  | 10*47051.260.0    | BB  | 5-10-2     | WILLIAM A PRASCIC, CATHERINE A PRASCIC, LORI J PRASCIC, FRANCIS C PRASCIC | 879 302        |
| 42  | Q078672000        | CC  | 5-9-14     | DENNIS P CADMUS   | 808 311        |
| 43  | 10*47051.127.1    | DD  | 5-9-20     | EDWIN C MILLER AND KIMBERLY ANN MILLER                                    | 885 61         |
| 44  | 10*18796          | EE  | 5-9-15     | DWG OIL & GAS ACQUISITIONS LLC  | 938 475        |
| 45  | 10*21424          | EE  | 5-9-15     | CHARLES R STOCKTON AND BETTY M HUDSON STOCKTON                            | 959 310        |
| 46  | 10*21473          | EE  | 5-9-15     | MARY E BISHOP   | 957 232        |
| 47  | 10*21475          | EE  | 5-9-15     | WOODROW N WARD AND HILDA A WARD   | 957 124        |
| 48  | 10*21478          | EE  | 5-9-15     | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                                   | 960 173        |
| 49  | 10*21547          | EE  | 5-9-15     | GARY A MILLER AND MARCELLE T MILLER                                       | 952 370        |
| 50  | 10*21548          | EE  | 5-9-15     | JEANNE M MILLER   | 952 386        |
| 51  | 10*21608          | EE  | 5-9-15     | BONNIE LOU POSTLEWAIT   | 959 313        |
| 52  | 10*21719          | EE  | 5-9-15     | ROBERT A MILLER   | 952 389        |
| 53  | 10*21835          | EE  | 5-9-15     | KENNETH ALLEN AND CARLA JO ALLEN  | 962 572        |
| 54  | 10*21937          | EE  | 5-9-15     | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT             | 960 33         |
| 55  | 10*22044          | EE  | 5-9-15     | MICHAEL A BISHOP  | 960 421        |
| 56  | 10*22045          | EE  | 5-9-15     | DOUGLAS R BISHOP  | 961 417        |
| 57  | 10*22296          | EE  | 5-9-15     | NOAH BAKER AND AUSA BAKER   | 962 200        |
| 58  | 10*22326          | EE  | 5-9-15     | RACHEL SONDA AND SCOTT SONDA  | 962 532        |
| 59  | 10*22407          | EE  | 5-9-15     | BRADLEY MURPHY  | 962 575        |
| 60  | 10*22430          | EE  | 5-9-15     | DEBORAH VANVRANKEN  | 964 510        |
| 61  | 10*22451          | EE  | 5-9-15     | GERALD L BISHOP III   | 964 31         |
| 62  | 10*22492          | EE  | 5-9-15     | FAITH MARIE FREESTONE AND ERIC FREESTONE                                  | 972 50         |
| 63  | 10*22547          | EE  | 5-9-15     | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                              | 966 628        |
| 64  | 10*22566          | EE  | 5-9-15     | KENNETH A MILLER  | 964 233        |
| 65  | 10*22606          | EE  | 5-9-15     | ROBERT B MURPHY AND LINDA MURPHY  | 966 469        |
| 66  | 10*22636          | EE  | 5-9-15     | CHANDA WILSON AND DANIEL WILSON   | 968 226        |
| 67  | 10*23035          | EE  | 5-9-15     | DEAN S CARR   | 977 364        |
| 68  | 10*23508          | EE  | 5-9-15     | MICHAEL A MURPHY  | 1009 98        |
| 69  | 10*24888          | EE  | 5-9-15     | ARTHUR LEE MILLER ET AL   | 1027 187       |
| 70  | 10*24984          | EE  | 5-9-15     | JONATHAN BAKER  | 1027 558       |
| 71  | Q090332002        | EE  | 5-9-15     | LORETTA JEAN RIGGLE ET VIR  | 860 538        |
| 72  | Q090332003        | EE  | 5-9-15     | PATTY BERISFORD ET VIR  | 860 555        |
| 73  | Q090332007        | EE  | 5-9-15     | ROBERT RANDOLPH WOODBURN ET UX  | 860 568        |
| 74  | Q090332001        | EE  | 5-9-15     | WILLIAM E MILLER AND KAREN S MILLER                                       | 858 256        |
| 75  | PENDING           | EE  | 5-9-15     | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI                | 1031 544       |
| 76  | 10*18796          | FF  | 5-9-17.1   | DWG OIL & GAS ACQUISITIONS LLC  | 938 476        |
| 77  | 10*21414          | FF  | 5-9-17.1   | CHARLES R STOCKTON AND BETTY M HUDSON                                     | 959 310        |
| 78  | 10*21473          | FF  | 5-9-17.1   | MARY E BISHOP   | 957 232        |
| 79  | 10*21475          | FF  | 5-9-17.1   | WOODROW N WARD AND HILDA A WARD   | 957 124        |
| 80  | 10*21478          | FF  | 5-9-17.1   | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                                   | 960 173        |
| 81  | 10*21547          | FF  | 5-9-17.1   | GARY A MILLER AND MARCELLE T MILLER                                       | 952 370        |
| 82  | 10*21548          | FF  | 5-9-17.1   | JEANNE M MILLER   | 952 386        |
| 83  | 10*21608          | FF  | 5-9-17.1   | BONNIE LOU POSTLEWAIT   | 959 313        |
| 84  | 10*21719          | FF  | 5-9-17.1   | ROBERT A MILLER   | 952 389        |
| 85  | 10*21835          | FF  | 5-9-17.1   | KENNETH ALLEN AND CARLA JO ALLEN  | 962 572        |
| 86  | 10*21937          | FF  | 5-9-17.1   | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT             | 960 33         |
| 87  | 10*22044          | FF  | 5-9-17.1   | MICHAEL A BISHOP  | 960 421        |
| 88  | 10*22045          | FF  | 5-9-17.1   | DOUGLAS R BISHOP  | 961 417        |
| 89  | 10*22296          | FF  | 5-9-17.1   | NOAH BAKER AND AUSA BAKER   | 962 200        |
| 90  | 10*22326          | FF  | 5-9-17.1   | RACHEL SONDA AND SCOTT SONDA  | 962 532        |
| 91  | 10*22407          | FF  | 5-9-17.1   | BRADLEY MURPHY  | 962 575        |
| 92  | 10*22430          | FF  | 5-9-17.1   | DEBORAH VANVRANKEN  | 964 510        |
| 93  | 10*22451          | FF  | 5-9-17.1   | GERALD L BISHOP III   | 964 31         |
| 94  | 10*22492          | FF  | 5-9-17.1   | FAITH MARIE FREESTONE AND ERIC FREESTONE                                  | 972 50         |
| 95  | 10*22547          | FF  | 5-9-17.1   | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                              | 966 628        |
| 96  | 10*22566          | FF  | 5-9-17.1   | KENNETH A MILLER  | 964 233        |
| 97  | 10*22606          | FF  | 5-9-17.1   | ROBERT B MURPHY AND LINDA MURPHY  | 966 469        |
| 98  | 10*22636          | FF  | 5-9-17.1   | CHANDA WILSON AND DANIEL WILSON   | 968 226        |
| 99  | 10*23035          | FF  | 5-9-17.1   | DEAN S CARR   | 977 364        |
| 100 | 10*23508          | FF  | 5-9-17.1   | MICHAEL A MURPHY  | 1009 98        |

FILE NO. 8796P20HUR4.dwg  
OLD CROW NORTH 20HU REV 4

DATE FEBRUARY 22, 20 19

REVISED 03-08-19, 03-14-19 & 04-05-19

OPERATORS WELL NO. OLD CROW N-20HU

API WELL NO. 47 — DS1 — 02191 H6A  
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 CT CORPORATION SYSTEM  
5400 D BIG TYLER ROAD  
CHARLESTON, WV 25313

COUNTY NAME  
PERMIT

**OLD CROW N LEASE  
UTICA UNIT - 503.48 AC ±  
WELL 20HU  
TUG HILL OPERATING**



06/14/2019

| No. | Lease Name or No. | Tag | Parcel   | Oil & Gas Royalty Owners                                      | Deed Book/Page |
|-----|-------------------|-----|----------|---|----------------|
| 101 | 10*24883          | FF  | 5-9-17.1 | ARTHUR LEE MILLER ET AL                                       | 1027 187       |
| 102 | 10*24984          | FF  | 5-9-17.1 | JONATHAN BAKER  | 1027 558       |
| 103 | Q090332002        | FF  | 5-9-17.1 | LORETTA JEAN RIGGLE ET VIR                                    | 860 538        |
| 104 | Q090332003        | FF  | 5-9-17.1 | PATTY BERISFORD ET VIR  | 860 555        |
| 105 | Q090332007        | FF  | 5-9-17.1 | ROBERT RANDOLPH WOODBURN ET UX                                | 860 568        |
| 106 | Q090332001        | FF  | 5-9-17.1 | WILLIAM E MILLER AND KAREN S MILLER                           | 858 256        |
| 107 | PENDING           | FF  | 5-9-17.1 | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI    | 1031 544       |
| 108 | 10*18796          | GG  | 5-9-17   | DWG OIL & GAS ACQUISITIONS LLC                                | 938 476        |
| 109 | 10*21414          | GG  | 5-9-17   | CHARLES R STOCKTON AND BETTY M HUDSON                         | 959 310        |
| 110 | 10*21473          | GG  | 5-9-17   | MARY E BISHOP   | 957 232        |
| 111 | 10*21475          | GG  | 5-9-17   | WOODROW N WARD AND HILDA A WARD                               | 957 124        |
| 112 | 10*21478          | GG  | 5-9-17   | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                       | 960 173        |
| 113 | 10*21547          | GG  | 5-9-17   | GARY A MILLER AND MARCELLE T MILLER                           | 952 370        |
| 114 | 10*21548          | GG  | 5-9-17   | JEANNE M MILLER   | 952 386        |
| 115 | 10*21608          | GG  | 5-9-17   | BONNIE LOU POSTLEWAIT   | 959 313        |
| 116 | 10*21719          | GG  | 5-9-17   | ROBERT A MILLER   | 952 389        |
| 117 | 10*21835          | GG  | 5-9-17   | KENNETH ALLEN AND CARLA JO ALLEN                              | 962 572        |
| 118 | 10*21937          | GG  | 5-9-17   | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT | 960 33         |
| 119 | 10*22044          | GG  | 5-9-17   | MICHAEL A BISHOP  | 960 421        |
| 120 | 10*22045          | GG  | 5-9-17   | DOUGLAS R BISHOP  | 961 417        |
| 121 | 10*22296          | GG  | 5-9-17   | NOAH BAKER AND ALISA BAKER                                    | 962 200        |
| 122 | 10*22326          | GG  | 5-9-17   | RACHEL SONDA AND SCOTT SONDA                                  | 962 532        |
| 123 | 10*22407          | GG  | 5-9-17   | BRADLEY MURPHY  | 962 575        |
| 124 | 10*22430          | GG  | 5-9-17   | DEBORAH VANVRANKEN  | 964 510        |
| 125 | 10*22451          | GG  | 5-9-17   | GERALD L BISHOP III   | 964 31         |
| 126 | 10*22492          | GG  | 5-9-17   | FAITH MARIE FREESTONE AND ERIC FREESTONE                      | 972 50         |
| 127 | 10*22547          | GG  | 5-9-17   | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                  | 966 628        |
| 128 | 10*22566          | GG  | 5-9-17   | KENNETH A MILLER  | 964 233        |
| 129 | 10*22606          | GG  | 5-9-17   | ROBERT B MURPHY AND LINDA MURPHY                              | 966 469        |
| 130 | 10*22636          | GG  | 5-9-17   | CHANDA WILSON AND DANIEL WILSON                               | 968 226        |
| 131 | 10*23035          | GG  | 5-9-17   | DEAN S CARR   | 977 364        |
| 132 | 10*23508          | GG  | 5-9-17   | MICHAEL A MURPHY  | 1009 96        |
| 133 | 10*24883          | GG  | 5-9-17   | ARTHUR LEE MILLER ET AL                                       | 1027 187       |
| 134 | 10*24984          | GG  | 5-9-17   | JONATHAN BAKER  | 1027 558       |
| 135 | Q090332002        | GG  | 5-9-17   | LORETTA JEAN RIGGLE ET VIR                                    | 860 538        |
| 136 | Q090332003        | GG  | 5-9-17   | PATTY BERISFORD ET VIR  | 860 555        |
| 137 | Q090332007        | GG  | 5-9-17   | ROBERT RANDOLPH WOODBURN ET UX                                | 860 568        |
| 138 | Q090332001        | GG  | 5-9-17   | WILLIAM E MILLER AND KAREN S MILLER                           | 858 256        |
| 139 | PENDING           | GG  | 5-9-17   | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI    | 1031 544       |
| 140 | 10*18796          | HH  | 5-9-18   | DWG OIL & GAS ACQUISITIONS LLC                                | 938 476        |
| 141 | 10*21414          | HH  | 5-9-18   | CHARLES R STOCKTON AND BETTY M HUDSON                         | 959 310        |
| 142 | 10*21473          | HH  | 5-9-18   | MARY E BISHOP   | 957 232        |
| 143 | 10*21475          | HH  | 5-9-18   | WOODROW N WARD AND HILDA A WARD                               | 957 124        |
| 144 | 10*21478          | HH  | 5-9-18   | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                       | 960 173        |
| 145 | 10*21547          | HH  | 5-9-18   | GARY A MILLER AND MARCELLE T MILLER                           | 952 370        |
| 146 | 10*21548          | HH  | 5-9-18   | JEANNE M MILLER   | 952 386        |
| 147 | 10*21608          | HH  | 5-9-18   | BONNIE LOU POSTLEWAIT   | 959 313        |
| 148 | 10*21719          | HH  | 5-9-18   | ROBERT A MILLER   | 952 389        |
| 149 | 10*21835          | HH  | 5-9-18   | KENNETH ALLEN AND CARLA JO ALLEN                              | 962 572        |
| 150 | 10*21937          | HH  | 5-9-18   | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT | 960 33         |
| 151 | 10*22044          | HH  | 5-9-18   | MICHAEL A BISHOP  | 960 421        |
| 152 | 10*22045          | HH  | 5-9-18   | DOUGLAS R BISHOP  | 961 417        |
| 153 | 10*22296          | HH  | 5-9-18   | NOAH BAKER AND ALISA BAKER                                    | 962 200        |
| 154 | 10*22326          | HH  | 5-9-18   | RACHEL SONDA AND SCOTT SONDA                                  | 962 532        |
| 155 | 10*22407          | HH  | 5-9-18   | BRADLEY MURPHY  | 962 575        |
| 156 | 10*22430          | HH  | 5-9-18   | DEBORAH VANVRANKEN  | 964 510        |
| 157 | 10*22451          | HH  | 5-9-18   | GERALD L BISHOP III   | 964 31         |
| 158 | 10*22492          | HH  | 5-9-18   | FAITH MARIE FREESTONE AND ERIC FREESTONE                      | 972 50         |
| 159 | 10*22547          | HH  | 5-9-18   | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                  | 966 628        |
| 160 | 10*22566          | HH  | 5-9-18   | KENNETH A MILLER  | 964 233        |
| 161 | 10*22606          | HH  | 5-9-18   | ROBERT B MURPHY AND LINDA MURPHY                              | 966 469        |
| 162 | 10*22636          | HH  | 5-9-18   | CHANDA WILSON AND DANIEL WILSON                               | 968 226        |
| 163 | 10*23035          | HH  | 5-9-18   | DEAN S CARR   | 977 364        |
| 164 | 10*23508          | HH  | 5-9-18   | MICHAEL A MURPHY  | 1009 96        |
| 165 | 10*24883          | HH  | 5-9-18   | ARTHUR LEE MILLER ET AL                                       | 1027 187       |
| 166 | 10*24984          | HH  | 5-9-18   | JONATHAN BAKER  | 1027 558       |
| 167 | Q090332002        | HH  | 5-9-18   | LORETTA JEAN RIGGLE ET VIR                                    | 860 538        |
| 168 | Q090332003        | HH  | 5-9-18   | PATTY BERISFORD ET VIR  | 860 555        |
| 169 | Q090332007        | HH  | 5-9-18   | ROBERT RANDOLPH WOODBURN ET UX                                | 860 568        |
| 170 | Q090332001        | HH  | 5-9-18   | WILLIAM E MILLER AND KAREN S MILLER                           | 858 256        |
| 171 | PENDING           | HH  | 5-9-18   | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI    | 1031 544       |
| 172 | 10*18796          | II  | 5-9-42   | DWG OIL & GAS ACQUISITIONS LLC                                | 938 476        |
| 173 | 10*21414          | II  | 5-9-42   | CHARLES R STOCKTON AND BETTY M HUDSON                         | 959 310        |
| 174 | 10*21473          | II  | 5-9-42   | MARY E BISHOP   | 957 232        |
| 175 | 10*21475          | II  | 5-9-42   | WOODROW N WARD AND HILDA A WARD                               | 957 124        |
| 176 | 10*21478          | II  | 5-9-42   | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                       | 960 173        |
| 177 | 10*21547          | II  | 5-9-42   | GARY A MILLER AND MARCELLE T MILLER                           | 952 370        |
| 178 | 10*21548          | II  | 5-9-42   | JEANNE M MILLER   | 952 386        |
| 179 | 10*21608          | II  | 5-9-42   | BONNIE LOU POSTLEWAIT   | 959 313        |
| 180 | 10*21719          | II  | 5-9-42   | ROBERT A MILLER   | 952 389        |
| 181 | 10*21835          | II  | 5-9-42   | KENNETH ALLEN AND CARLA JO ALLEN                              | 962 572        |
| 182 | 10*21937          | II  | 5-9-42   | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT | 960 33         |
| 183 | 10*22043          | II  | 5-9-42   | CHILDRENS HOME SOCIETY OF WV                                  | 957 235        |
| 184 | 10*22044          | II  | 5-9-42   | MICHAEL A BISHOP  | 960 421        |
| 185 | 10*22045          | II  | 5-9-42   | DOUGLAS R BISHOP  | 961 417        |
| 186 | 10*22296          | II  | 5-9-42   | NOAH BAKER AND ALISA BAKER                                    | 962 200        |
| 187 | 10*22326          | II  | 5-9-42   | RACHEL SONDA AND SCOTT SONDA                                  | 962 532        |
| 188 | 10*22407          | II  | 5-9-42   | BRADLEY MURPHY  | 962 575        |
| 189 | 10*22430          | II  | 5-9-42   | DEBORAH VANVRANKEN  | 964 510        |
| 190 | 10*22451          | II  | 5-9-42   | GERALD L BISHOP III   | 964 31         |
| 191 | 10*22492          | II  | 5-9-42   | FAITH MARIE FREESTONE AND ERIC FREESTONE                      | 972 50         |
| 192 | 10*22547          | II  | 5-9-42   | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                  | 966 628        |
| 193 | 10*22566          | II  | 5-9-42   | KENNETH A MILLER  | 964 233        |
| 194 | 10*22606          | II  | 5-9-42   | ROBERT B MURPHY AND LINDA MURPHY                              | 966 469        |
| 195 | 10*22636          | II  | 5-9-42   | CHANDA WILSON AND DANIEL WILSON                               | 968 226        |
| 196 | 10*23035          | II  | 5-9-42   | DEAN S CARR   | 977 364        |
| 197 | 10*23508          | II  | 5-9-42   | MICHAEL A MURPHY  | 1009 96        |
| 198 | 10*24883          | II  | 5-9-42   | ARTHUR LEE MILLER ET AL                                       | 1027 187       |
| 199 | 10*24984          | II  | 5-9-42   | JONATHAN BAKER  | 1027 558       |
| 200 | Q090332002        | II  | 5-9-42   | LORETTA JEAN RIGGLE ET VIR                                    | 860 538        |

FILE NO. 8796P20HUR4.dwg  
OLD CROW NORTH 20HU REV 4

DATE FEBRUARY 22, 20 19  
REVISED 03-08-19, 03-14-19 & 04-05-19

OPERATORS WELL NO. OLD CROW N-20HU

API WELL NO. 47 — 051 — 02191  
STATE COUNTY PERMIT  
HoA



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

COUNTY NAME  
PERMIT

**OLD CROW N LEASE  
UTICA UNIT - 503.48 AC ±  
WELL 20HU  
TUG HILL OPERATING**



06/14/2019

| No. | Lease Name or No. | Tag | Parcel  | Grantor, Lessor, etc.                                      | Deed Book/Page |
|-----|-------------------|-----|---------|--|----------------|
| 201 | Q09032003         | II  | 5-9-42  | PATTY BERISFORD ET VIR                                     | 860 555        |
| 202 | Q09032007         | II  | 5-9-42  | ROBERT RANDOLPH WOODBURN ET UX                             | 860 568        |
| 203 | Q09032001         | II  | 5-9-42  | WILLIAM E MILLER AND KAREN S MILLER                        | 858 256        |
| 204 | PENDING           | II  | 5-9-42  | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI | 1031 544       |
| 205 | CVX866958         | JJ  | 5-9-24  | ANITA L SLOUGH ET AL                                       | 696 7          |
| 206 | CVX866959         | JJ  | 5-9-24  | PAUL SCHEIBELHOOD ET AL                                    | 595 629        |
| 207 | CVX935271         | JJ  | 5-9-24  | CHARLES W. MILLER  | 853 59         |
| 208 | CVX936061         | JJ  | 5-9-24  | CLARA MAE CLIFTON  | 853 426        |
| 209 | CVX936112         | JJ  | 5-9-24  | DONNA FAE KYLE   | 853 449        |
| 210 | CVX936062         | JJ  | 5-9-24  | GEORGE EDWARDS ET UX                                       | 853 418        |
| 211 | CVX936113         | JJ  | 5-9-24  | JUDITH MAY CONNER  | 853 445        |
| 212 | CVX936053         | JJ  | 5-9-24  | LLOYD C. ARNOLD ET UX                                      | 864 39         |
| 213 | CVX936054         | JJ  | 5-9-24  | MARY JO CRONIN   | 864 43         |
| 214 | CVX935273         | JJ  | 5-9-24  | PAUL PARSONS ET UX   | 853 430        |
| 215 | CVX936058         | JJ  | 5-9-24  | RICHARD KURPILE ET UX                                      | 863 594        |
| 216 | CVX935276         | JJ  | 5-9-24  | SHARON LYN RUSSELL   | 853 422        |
| 217 | CVX935969         | JJ  | 5-9-24  | TIMOTHY HUFF ET UX   | 864 47         |
| 218 | 10*47051.097.0    | KK  | 5-9-7   | P, R, D REALTY   | 859 434        |
| 219 | PENDING           | LL  | 5-9-41  | LLOYD C ARNOLD AND JUDITH C ARNOLD                         | 915 625        |
| 220 | CVX939752         | MM  | 5-9-4   | LLOYD C ARNOLD AND JUDITH C ARNOLD                         | 915 582        |
| 221 | CVX866959         | NN  | 5-9-35  | ANITA L SLOUGH ET AL                                       | 696 7          |
| 222 | CVX866958         | NN  | 5-9-35  | PAUL SCHEIBELHOOD ET AL                                    | 695 629        |
| 223 | CVX936061         | NN  | 5-9-35  | CLARA MAE CLIFTON  | 853 426        |
| 224 | CVX936112         | NN  | 5-9-35  | DONNA FAE KYLE   | 853 449        |
| 225 | CVX936062         | NN  | 5-9-35  | GEORGE EDWARDS ET UX                                       | 853 418        |
| 226 | CVX936113         | NN  | 5-9-35  | JUDITH MAY CONNER  | 853 445        |
| 227 | CVX936053         | NN  | 5-9-35  | LLOYD C. ARNOLD ET UX                                      | 864 39         |
| 228 | CVX936054         | NN  | 5-9-35  | MARY JO CRONIN   | 864 43         |
| 229 | CVX935273         | NN  | 5-9-35  | PAUL PARSONS ET UX   | 853 430        |
| 230 | CVX936058         | NN  | 5-9-35  | RICHARD KURPILE ET UX                                      | 863 594        |
| 231 | CVX935276         | NN  | 5-9-35  | SHARON LYN RUSSELL   | 853 422        |
| 232 | CVX935969         | NN  | 5-9-35  | TIMOTHY HUFF ET UX   | 864 47         |
| 233 | Q081124002        | OO  | 5-9-3   | JAMES REDMAN LEGG II ET AL                                 | 879 580        |
| 234 | Q081124002        | PP  | 5-9-2   | JAMES REDMAN LEGG II ET AL                                 | 879 580        |
| 235 | Q081123002        | QQ  | 5-9-2.1 | JEFFREY L LEGG   | 879 575        |
| 236 | Q083757000        | RR  | 5-9-1   | JESSIE GLADYS RUCKMAN ET AL                                | 831 58         |
| 237 | 10*21546          | SS  | 5-8-7   | EDWIN C MILLER AND KIMBERLY ANN MILLER                     | 957 257        |

FILE NO. 8796P20HUR4.dwg  
 OLD CROW NORTH 20HU REV 4  
 DATE FEBRUARY 22, 20 19  
 REVISED 03-08-19, 03-14-19 & 04-05-19  
 OPERATORS WELL NO. OLD CROW N-20HU  
 API WELL NO. 47 — 051 — 02191  
 STATE COUNTY PERMIT H6A



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

COUNTY NAME

PERMIT

WW-6A1  
(5/13)

Operator's Well No. Old Crow N-20HU

**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

**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. Miller *amy miller* ✓

Its: Permitting Specialist - Appalachia Region

51-02191

WW - 6A1 Supplement

Operator's Well No. Old Crow N - 20HU

| Lease ID       | Parcel     | Tags | Grantor, Lessor, Etc.                                | Grantee, Lessee, Etc.      | Royalty | Deed Book/Page | Assignment | Assignment   | Assignment                                  | Assignment  | Assignment   | Assignment   | Assignment   |   |
|----------------|------------|------|--|----------------------------|---------|----------------|------------|--|---|---|--|--|--|---|
| 10*19340       | 5-16-3     | A ✓  | DONNA V YOHO   | GASTAR EXPLORATION USA INC | 1/8+    | 665 407        | N/A        | Gastar Exploration USA Inc to Atinum Marcellus I LLC: 23/353 | Gastar & Atinum to AB Resources LLC: 23/617 | AB Resources LLC to Chief Exploration & Development LLC & Radler 2000: 24/319 | Chief, Chief Oil & Gas LLC, Radler & Enerplus Resources (USA) Corp to Chevron USA Inc: 25/1 & 25/105 | AB Resources LLC to Chevron USA Inc: 756/397             | Chevron USA Inc to TH Exploration II LLC: 40/57  |   |
| 10*14919       | 5-16-5     | B ✓  | CHESTNUT HOLDINGS INC                                | GASTAR EXPLORATION INC     | 1/8+    | 836 117        | N/A        | N/A  | N/A   | N/A   | N/A  | Gastar Exploration Inc to Atinum Marcellus I LLC: 32/428 | Gastar Exploration Inc to TH Exploration II LLC: 36/9  |   |
| 10*14920       | 5-10-14    | C ✓  | CHESTNUT HOLDINGS INC                                | GASTAR EXPLORATION INC     | 1/8+    | 836 119        | N/A        | N/A  | N/A   | N/A   | N/A  | Gastar Exploration Inc to Atinum Marcellus I LLC: 32/428 | Gastar Exploration Inc to TH Exploration II LLC: 36/9  |   |
| 10*21468       | 5-16-6     | D ✓  | JOHN A SWIERKOS                                      | TH EXPLORATION LLC         | 1/8+    | 953 317        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*18396       | 5-10-22    | E ✓  | LOUIS AULENBACHER                                    | TH EXPLORATION LLC         | 1/8+    | 932 468        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*21468       | 5-10-22    | E ✓  | JOHN A SWIERKOS                                      | TH EXPLORATION LLC         | 1/8+    | 953 317        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*21468       | 5-10-19    | F ✓  | JOHN A SWIERKOS                                      | TH EXPLORATION LLC         | 1/8+    | 953 317        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*47051.261.4 | 5-10-19    | F ✓  | BRADLEY L HUBBARD AND CONNIE L HUBBARD               | TH EXPLORATION LLC         | 1/8+    | 898 573        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*18396       | 5-10-20    | G ✓  | LOUIS AULENBACHER                                    | TH EXPLORATION LLC         | 1/8+    | 932 468        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*21468       | 5-10-20    | G ✓  | JOHN A SWIERKOS                                      | TH EXPLORATION LLC         | 1/8+    | 953 317        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*18396       | 5-10-21    | H ✓  | LOUIS AULENBACHER                                    | TH EXPLORATION LLC         | 1/8+    | 932 468        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*21468       | 5-10-21    | H ✓  | JOHN A SWIERKOS                                      | TH EXPLORATION LLC         | 1/8+    | 953 317        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*21468       | 5-10-12.1  | I ✓  | JOHN A SWIERKOS                                      | TH EXPLORATION LLC         | 1/8+    | 953 317        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*47051.261.1 | 5-10-12.1  | I ✓  | WILLIAM HUBBARD                                      | TH EXPLORATION LLC         | 1/8+    | 882 536        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*47051.261.2 | 5-10-12.1  | I ✓  | BONNIE G ZELIC                                       | TH EXPLORATION LLC         | 1/8+    | 882 539        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*47051.261.3 | 5-10-12.1  | I ✓  | JOHN P SMITH JR                                      | TH EXPLORATION LLC         | 1/8+    | 882 542        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*47051.261.4 | 5-10-12.1  | I ✓  | BRADLEY L HUBBARD AND CONNIE L HUBBARD               | TH EXPLORATION LLC         | 1/8+    | 898 573        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*18892       | 5-10-12    | J ✓  | JOSEPH LEE CROW                                      | TH EXPLORATION LLC         | 1/8+    | 966 88         | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*18302       | 5-10-11    | K ✓  | JOSEPH L CROW JR AND LORRY CROW                      | TH EXPLORATION LLC         | 1/8+    | 929 316        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| 10*21468       | 5-10-10    | L ✓  | JOHN A SWIERKOS                                      | TH EXPLORATION LLC         | 1/8+    | 953 317        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | N/A  |   |
| PENDING        | 5-10-10    | L ✓  | LOUIS VAN SCYOC AND PATRICIA VAN SCYOC               | AB RESOURCES LLC           | 1/8+    | 697 461        | N/A        | N/A  | N/A   | N/A   | N/A  | AB Resources LLC to NPAR LLC: 25/484                     | NPAR LLC to Chevron USA Inc: 765/332   | Chevron USA Inc to TH Exploration LLC: 43/164                           |
| 10*22295       | 5-10-10    | L ✓  | RACHEL B OSTRANDER                                   | FOSSIL CREEK OHIO, LLC     | 1/8+    | 822 210        | N/A        | N/A  | N/A   | N/A   | N/A  | Fossil Creek Ohio LLC to Gulfport Energy Corp.: 34/366   | Gulfport Energy Corp & Fossil Creek Ohio LLC to American Petroleum Partners Operating LLC: 36/588      | American Petroleum Partners Operating LLC to TH Exploration LLC: 40/408 |
| 10*22319       | 5-10-10    | L ✓  | SHARON G VAN SCYOC                                   | FOSSIL CREEK OHIO, LLC     | 1/8+    | 822 204        | N/A        | N/A  | N/A   | N/A   | N/A  | Fossil Creek Ohio LLC to Gulfport Energy Corp.: 34/366   | Gulfport Energy Corp & Fossil Creek Ohio LLC to American Petroleum Partners Operating LLC: 36/588      | American Petroleum Partners Operating LLC to TH Exploration LLC: 40/408 |
| 10*19249       | 5-10-9     | M ✓  | HERBERT M AULENBACHER                                | CHEVRON USA INC            | 1/8+    | 914 551        | N/A        | N/A  | N/A   | N/A   | N/A  | N/A  | Chevron USA Inc to TH Exploration LLC: 40/127  |   |
| 10*14918       | 5-10-3     | N ✓  | CHESTNUT HOLDINGS INC                                | GASTAR EXPLORATION INC     | 1/8+    | 836 115        | N/A        | N/A  | N/A   | N/A   | N/A  | Gastar Exploration Inc to Atinum Marcellus I LLC: 32/428 | Gastar Exploration Inc to TH Exploration II LLC: 36/9  |   |
| Q091960000     | FISH CREEK | O ✓  | STATE OF WEST VIRGINIA DIVISION OF NATURAL RESOURCES | NOBLE ENERGY INC           | 1/8+    | 865 558        | N/A        | N/A  | N/A   | N/A   | N/A  | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1    | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |   |

51-02191

| Lease ID       | Parcel    | Tags | Grantor, Lessor, Etc.  | Grantee, Lessee, Etc.   | Royalty | Deed Book/Page |     | Assignment | Assignment                                 | Assignment   | Assignment   | Assignment                           | Assignment  | Assignment  |
|----------------|-----------|------|--|-------------------------|---------|----------------|-----|------------|--|--|--|--------------------------------------|---|---|
| 10*18594       | 5-10-4.7  | P ✓  | LEE JONATHAN BECHTOLD  | TH EXPLORATION, LLC     | 1/8+    | 934            | 646 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*18594       | 5-10-4.7  | P ✓  | LINDA L & THOMAS G MCCORMICK   | TH EXPLORATION, LLC     | 1/8+    | 934            | 643 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*18594       | 5-10-4.7  | P ✓  | LW BECHTOLD  | TH EXPLORATION, LLC     | 1/8+    | 934            | 641 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*19248       | 5-10-4    | Q ✓  | ALBERT F KAZEMKA   | CHEVRON USA INC         | 1/8+    | 848            | 419 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | Chevron USA Inc to TH Exploration LLC: 40/127   |
| 10*21571       | 5-10-4.2  | R ✓  | JACK E RECTOR  | TH EXPLORATION LLC      | 1/8+    | 957            | 476 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*19163       | 5-10-4.3  | S ✓  | ANTHONY A ANKROM KAREN L ANKROM  | TRIENERGY HOLDINGS, LLC | 1/8+    | 711            | 468 | N/A        | TriEnergy Holdings LLC to NPAR LLC: 24/430 | AB Resources LLC & NPAR LLC to Chief Exploration & Development LLC & Radler 2000: 24/466 | Chief, Radler & Enerplus to Chevron USA Inc: 25/1 & 25/105 | NPAR LLC to Chevron USA Inc: 756/332 | TriEnergy Holdings LLC & TriEnergy Inc to Chevron USA Inc: 28/356 | Chevron USA Inc to TH Exploration LLC: 40/127   |
| 10*18158       | 5-10-4.8  | T ✓  | SAMUEL D FRANKLIN AND RHONDA K FRANKLIN                                    | TH EXPLORATION LLC      | 1/8+    | 938            | 462 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*19248       | 5-10-4.12 | U ✓  | ALBERT F KAZEMKA   | CHEVRON USA INC         | 1/8+    | 848            | 419 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | Chevron USA Inc to TH Exploration LLC: 40/127   |
| 10*19131       | 5-10-4.9  | V ✓  | LISA D ELSON   | CHEVRON USA INC         | 1/8+    | 764            | 16  | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | Chevron USA Inc to TH Exploration LLC: 40/127   |
| 10*19108       | 5-10-4.11 | W ✓  | JASON E BONNETTE   | CHEVRON USA INC         | 1/8+    | 848            | 438 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | Chevron USA Inc to TH Exploration LLC: 40/127   |
| 10*19107       | 5-10-4.10 | X ✓  | ALBERT F KAZEMKA   | CHEVRON USA INC         | 1/8+    | 853            | 73  | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | Chevron USA Inc to TH Exploration LLC: 40/127   |
| 10*47051.162.0 | 5-9-13    | Y ✓  | KAREN M WILSON   | TH EXPLORATION LLC      | 1/8+    | 873            | 150 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*19107       | 5-9-16    | Z ✓  | ALBERT F KAZEMKA   | CHEVRON USA INC         | 1/8+    | 853            | 73  | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | Chevron USA Inc to TH Exploration LLC: 40/127   |
| 10*47051.170.0 | 5-9-13.2  | AA   | JASON J STEED  | TH EXPLORATION LLC      | 1/8+    | 865            | 344 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*47051.260.0 | 5-10-2    | BB ✓ | WILLIAM A PRASCIK , CATHERINE A PRASCIK, LORI J PRASCIK, FRANCIS C PRASCIK | TH EXPLORATION LLC      | 1/8+    | 879            | 302 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| Q078672000     | 5-9-14    | CC ✓ | DENNIS P CADMUS  | NOBLE ENERGY INC        | 1/8+    | 808            | 311 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia LLC: 988/286 |
| 10*47051.127.1 | 5-9-20    | DD ✓ | EDWIN C MILLER AND KIMBERLY ANN MILLER                                     | TH EXPLORATION LLC      | 1/8+    | 885            | 61  | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*18796       | 5-9-15    | EE ✓ | DWG OIL & GAS ACQUISITIONS LLC   | TH EXPLORATION LLC      | 1/8+    | 938            | 476 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21414       | 5-9-15    | EE ✓ | CHARLES R STOCKTON AND BETTY M HUDSON STOCKTON                             | TH EXPLORATION LLC      | 1/8+    | 959            | 310 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21473       | 5-9-15    | EE ✓ | MARY E BISHOP  | TH EXPLORATION LLC      | 1/8+    | 957            | 232 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21475       | 5-9-15    | EE ✓ | WOODROW N WARD AND HILDA A WARD  | TH EXPLORATION LLC      | 1/8+    | 957            | 124 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21478       | 5-9-15    | EE ✓ | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                                    | TH EXPLORATION LLC      | 1/8+    | 960            | 173 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21547       | 5-9-15    | EE ✓ | GARY A MILLER AND MARCELLE T MILLER  | TH EXPLORATION LLC      | 1/8+    | 952            | 370 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21548       | 5-9-15    | EE ✓ | JEANNE M MILLER  | TH EXPLORATION LLC      | 1/8+    | 952            | 386 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21608       | 5-9-15    | EE ✓ | BONNIE LOU POSTLEWAIT  | TH EXPLORATION LLC      | 1/8+    | 959            | 313 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21719       | 5-9-15    | EE ✓ | ROBERT A MILLER  | TH EXPLORATION LLC      | 1/8+    | 952            | 389 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21835       | 5-9-15    | EE ✓ | KENNETH ALLEN AND CARLA JO ALLEN   | TH EXPLORATION LLC      | 1/8+    | 962            | 572 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*21937       | 5-9-15    | EE ✓ | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT              | TH EXPLORATION LLC      | 1/8+    | 960            | 33  | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*22044       | 5-9-15    | EE ✓ | MICHAEL A BISHOP   | TH EXPLORATION LLC      | 1/8+    | 960            | 421 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*22045       | 5-9-15    | EE ✓ | DOUGLAS R BISHOP   | TH EXPLORATION LLC      | 1/8+    | 961            | 417 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*22296       | 5-9-15    | EE ✓ | NOAH BAKER AND ALISA BAKER   | TH EXPLORATION LLC      | 1/8+    | 962            | 200 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*22326       | 5-9-15    | EE ✓ | RACHEL SONDA AND SCOTT SONDA   | TH EXPLORATION LLC      | 1/8+    | 962            | 532 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |
| 10*22407       | 5-9-15    | EE ✓ | BRADLEY MURPHY   | TH EXPLORATION LLC      | 1/8+    | 962            | 575 | N/A        | N/A  | N/A  | N/A  | N/A                                  | N/A   | N/A   |

51-02191

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|------------|----------|------|---|-----------------------|---------|----------------|------------|------------|------------|------------|------------|---|--|
| 10*22430   | 5-9-15   | EE / | DEBORAH VANVRANKEN  | TH EXPLORATION LLC    | 1/8+    | 964 510        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22451   | 5-9-15   | EE / | GERALD L BISHOP III   | TH EXPLORATION LLC    | 1/8+    | 964 31         | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22492   | 5-9-15   | EE / | FAITH MARIE FREESTONE AND ERIC FREESTONE                      | TH EXPLORATION LLC    | 1/8+    | 972 50         | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22547   | 5-9-15   | EE / | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                  | TH EXPLORATION LLC    | 1/8+    | 966 628        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22566   | 5-9-15   | EE / | KENNETH A MILLER  | TH EXPLORATION LLC    | 1/8+    | 964 233        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22606   | 5-9-15   | EE / | ROBERT B MURPHY AND LINDA MURPHY                              | TH EXPLORATION LLC    | 1/8+    | 966 469        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22636   | 5-9-15   | EE / | CHANDA WILSON AND DANIEL WILSON                               | TH EXPLORATION LLC    | 1/8+    | 968 226        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*23035   | 5-9-15   | EE / | DEAN S CARR   | TH EXPLORATION LLC    | 1/8+    | 977 364        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*23508   | 5-9-15   | EE / | MICHAEL A MURPHY  | TH EXPLORATION LLC    | 1/8+    | 1009 98        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*24888   | 5-9-15   | EE / | ARTHUR LEE MILLER ET AL                                       | TH EXPLORATION LLC    | 1/8+    | 1027 187       | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*24984   | 5-9-15   | EE / | JONATHAN BAKER  | TH EXPLORATION LLC    | 1/8+    | 1027 558       | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| Q090332002 | 5-9-15   | EE / | LORETTA JEAN RIGGLE ET VIR                                    | NOBLE ENERGY INC      | 1/8+    | 860 538        | N/A        | N/A        | N/A        | N/A        | N/A        | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332003 | 5-9-15   | EE / | PATTY BERISFORD ET VIR  | NOBLE ENERGY INC      | 1/8+    | 860 555        | N/A        | N/A        | N/A        | N/A        | N/A        | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332007 | 5-9-15   | EE / | ROBERT RANDOLPH WOODBURN ET UX                                | NOBLE ENERGY INC      | 1/8+    | 860 568        | N/A        | N/A        | N/A        | N/A        | N/A        | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332001 | 5-9-15   | EE / | WILLIAM E MILLER AND KAREN S MILLER                           | NOBLE ENERGY INC      | 1/8+    | 858 256        | N/A        | N/A        | N/A        | N/A        | N          | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| PENDING    | 5-9-15   | EE / | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI    | TH EXPLORATION LLC    | 1/8+    | 1031 544       | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*18796   | 5-9-17.1 | FF / | DWG OIL & GAS ACQUISITIONS LLC                                | TH EXPLORATION LLC    | 1/8+    | 938 476        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21414   | 5-9-17.1 | FF / | CHARLES R STOCKTON AND BETTY M HUDSON                         | TH EXPLORATION LLC    | 1/8+    | 959 310        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21473   | 5-9-17.1 | FF / | MARY E BISHOP   | TH EXPLORATION LLC    | 1/8+    | 957 232        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21475   | 5-9-17.1 | FF / | WOODROW N WARD AND HILDA A WARD                               | TH EXPLORATION LLC    | 1/8+    | 957 124        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21478   | 5-9-17.1 | FF / | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                       | TH EXPLORATION LLC    | 1/8+    | 960 173        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21547   | 5-9-17.1 | FF / | GARY A MILLER AND MARCELLE T MILLER                           | TH EXPLORATION LLC    | 1/8+    | 952 370        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21548   | 5-9-17.1 | FF / | JEANNE M MILLER   | TH EXPLORATION LLC    | 1/8+    | 952 386        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21608   | 5-9-17.1 | FF / | BONNIE LOU POSTLEWAIT   | TH EXPLORATION LLC    | 1/8+    | 959 313        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21719   | 5-9-17.1 | FF / | ROBERT A MILLER   | TH EXPLORATION LLC    | 1/8+    | 952 389        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21835   | 5-9-17.1 | FF / | KENNETH ALLEN AND CARLA JO ALLEN                              | TH EXPLORATION LLC    | 1/8+    | 962 572        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21937   | 5-9-17.1 | FF / | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT | TH EXPLORATION LLC    | 1/8+    | 960 33         | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22044   | 5-9-17.1 | FF / | MICHAEL A BISHOP  | TH EXPLORATION LLC    | 1/8+    | 960 421        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |

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|------------|----------|------|--|-----------------------|---------|----------------|------------|------------|------------|------------|------------|------------|--|
| 10*22045   | 5-9-17.1 | FF   | DOUGLAS R BISHOP   | TH EXPLORATION LLC    | 1/8+    | 961 417        | N/A  |
| 10*22296   | 5-9-17.1 | FF   | NOAH BAKER AND ALISA BAKER                                 | TH EXPLORATION LLC    | 1/8+    | 962 200        | N/A  |
| 10*22326   | 5-9-17.1 | FF   | RACHEL SONDA AND SCOTT SONDA                               | TH EXPLORATION LLC    | 1/8+    | 962 532        | N/A  |
| 10*22407   | 5-9-17.1 | FF   | BRADLEY MURPHY   | TH EXPLORATION LLC    | 1/8+    | 962 575        | N/A  |
| 10*22430   | 5-9-17.1 | FF   | DEBORAH VANVRANKEN   | TH EXPLORATION LLC    | 1/8+    | 964 510        | N/A  |
| 10*22451   | 5-9-17.1 | FF   | GERALD L BISHOP III  | TH EXPLORATION LLC    | 1/8+    | 964 31         | N/A  |
| 10*22492   | 5-9-17.1 | FF   | FAITH MARIE FREESTONE AND ERIC FREESTONE                   | TH EXPLORATION LLC    | 1/8+    | 972 50         | N/A  |
| 10*22547   | 5-9-17.1 | FF   | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY               | TH EXPLORATION LLC    | 1/8+    | 966 628        | N/A  |
| 10*22566   | 5-9-17.1 | FF   | KENNETH A MILLER   | TH EXPLORATION LLC    | 1/8+    | 964 233        | N/A  |
| 10*22606   | 5-9-17.1 | FF   | ROBERT B MURPHY AND LINDA MURPHY                           | TH EXPLORATION LLC    | 1/8+    | 966 469        | N/A  |
| 10*22636   | 5-9-17.1 | FF   | CHANDA WILSON AND DANIEL WILSON                            | TH EXPLORATION LLC    | 1/8+    | 968 226        | N/A  |
| 10*23035   | 5-9-17.1 | FF   | DEAN S CARR  | TH EXPLORATION LLC    | 1/8+    | 977 364        | N/A  |
| 10*23508   | 5-9-17.1 | FF   | MICHAEL A MURPHY   | TH EXPLORATION LLC    | 1/8+    | 1009 98        | N/A  |
| 10*24888   | 5-9-17.1 | FF   | ARTHUR LEE MILLER ET AL                                    | TH EXPLORATION LLC    | 1/8+    | 1027 187       | N/A  |
| 10*24984   | 5-9-17.1 | FF   | JONATHAN BAKER   | TH EXPLORATION LLC    | 1/8+    | 1027 558       | N/A  |
| Q090332002 | 5-9-17.1 | FF   | LORETTA JEAN RIGGLE ET VIR                                 | NOBLE ENERGY INC      | 1/8+    | 860 538        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332003 | 5-9-17.1 | FF   | PATTY BERISFORD ET VIR                                     | NOBLE ENERGY INC      | 1/8+    | 860 555        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332007 | 5-9-17.1 | FF   | ROBERT RANDOLPH WOODBURN ET UX                             | NOBLE ENERGY INC      | 1/8+    | 860 568        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332001 | 5-9-17.1 | FF   | WILLIAM E MILLER AND KAREN S MILLER                        | NOBLE ENERGY INC      | 1/8+    | 858 256        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| PENDING    | 5-9-17.1 | FF   | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI | TH EXPLORATION LLC    | 1/8+    | 1031 544       | N/A  |
| 10*18796   | 5-9-17   | GG   | DWG OIL & GAS ACQUISITIONS LLC                             | TH EXPLORATION LLC    | 1/8+    | 938 476        | N/A  |
| 10*21414   | 5-9-17   | GG   | CHARLES R STOCKTON AND BETTY M HUDSON                      | TH EXPLORATION LLC    | 1/8+    | 959 310        | N/A  |
| 10*21473   | 5-9-17   | GG   | MARY E BISHOP  | TH EXPLORATION LLC    | 1/8+    | 957 232        | N/A  |
| 10*21475   | 5-9-17   | GG   | WOODROW N WARD AND HILDA A WARD                            | TH EXPLORATION LLC    | 1/8+    | 957 124        | N/A  |
| 10*21478   | 5-9-17   | GG   | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                    | TH EXPLORATION LLC    | 1/8+    | 960 173        | N/A  |
| 10*21547   | 5-9-17   | GG   | GARY A MILLER AND MARCELLE T MILLER                        | TH EXPLORATION LLC    | 1/8+    | 952 370        | N/A  |
| 10*21548   | 5-9-17   | GG   | JEANNE M MILLER  | TH EXPLORATION LLC    | 1/8+    | 952 386        | N/A  |
| 10*21608   | 5-9-17   | GG   | BONNIE LOU POSTLEWAIT                                      | TH EXPLORATION LLC    | 1/8+    | 959 313        | N/A  |
| 10*21719   | 5-9-17   | GG   | ROBERT A MILLER  | TH EXPLORATION LLC    | 1/8+    | 952 389        | N/A  |

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|------------|--------|------|---|-----------------------|---------|----------------|------------|------------|------------|------------|------------|------------|--|
| 10*21835   | 5-9-17 | GG   | KENNETH ALLEN AND CARLA JO ALLEN                              | TH EXPLORATION LLC    | 1/8+    | 962 572        | N/A  |
| 10*21937   | 5-9-17 | GG   | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT | TH EXPLORATION LLC    | 1/8+    | 960 33         | N/A  |
| 10*22044   | 5-9-17 | GG   | MICHAEL A BISHOP  | TH EXPLORATION LLC    | 1/8+    | 960 421        | N/A  |
| 10*22045   | 5-9-17 | GG   | DOUGLAS R BISHOP  | TH EXPLORATION LLC    | 1/8+    | 961 417        | N/A  |
| 10*22296   | 5-9-17 | GG   | NOAH BAKER AND ALISA BAKER                                    | TH EXPLORATION LLC    | 1/8+    | 962 200        | N/A  |
| 10*22326   | 5-9-17 | GG   | RACHEL SONDA AND SCOTT SONDA                                  | TH EXPLORATION LLC    | 1/8+    | 962 532        | N/A  |
| 10*22407   | 5-9-17 | GG   | BRADLEY MURPHY  | TH EXPLORATION LLC    | 1/8+    | 962 575        | N/A  |
| 10*22430   | 5-9-17 | GG   | DEBORAH VANVRANKEN  | TH EXPLORATION LLC    | 1/8+    | 964 510        | N/A  |
| 10*22451   | 5-9-17 | GG   | GERALD L BISHOP III   | TH EXPLORATION LLC    | 1/8+    | 964 31         | N/A  |
| 10*22492   | 5-9-17 | GG   | FAITH MARIE FREESTONE AND ERIC FREESTONE                      | TH EXPLORATION LLC    | 1/8+    | 972 50         | N/A  |
| 10*22547   | 5-9-17 | GG   | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                  | TH EXPLORATION LLC    | 1/8+    | 966 628        | N/A  |
| 10*22566   | 5-9-17 | GG   | KENNETH A MILLER  | TH EXPLORATION LLC    | 1/8+    | 964 233        | N/A  |
| 10*22606   | 5-9-17 | GG   | ROBERT B MURPHY AND LINDA MURPHY                              | TH EXPLORATION LLC    | 1/8+    | 966 469        | N/A  |
| 10*22636   | 5-9-17 | GG   | CHANDA WILSON AND DANIEL WILSON                               | TH EXPLORATION LLC    | 1/8+    | 968 226        | N/A  |
| 10*23035   | 5-9-17 | GG   | DEAN S CARR   | TH EXPLORATION LLC    | 1/8+    | 977 364        | N/A  |
| 10*23508   | 5-9-17 | GG   | MICHAEL A MURPHY  | TH EXPLORATION LLC    | 1/8+    | 1009 98        | N/A  |
| 10*24888   | 5-9-17 | GG   | ARTHUR LEE MILLER ET AL                                       | TH EXPLORATION LLC    | 1/8+    | 1027 187       | N/A  |
| 10*24984   | 5-9-17 | GG   | JONATHAN BAKER  | TH EXPLORATION LLC    | 1/8+    | 1027 558       | N/A  |
| Q090332002 | 5-9-17 | GG   | LORETTA JEAN RIGGLE ET VIR                                    | NOBLE ENERGY INC      | 1/8+    | 860 538        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia LLC: 988/286  |
| Q090332003 | 5-9-17 | GG   | PATTY BERISFORD ET VIR  | NOBLE ENERGY INC      | 1/8+    | 860 555        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332007 | 5-9-17 | GG   | ROBERT RANDOLPH WOODBURN ET UX                                | NOBLE ENERGY INC      | 1/8+    | 860 568        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332001 | 5-9-17 | GG   | WILLIAM E MILLER AND KAREN S MILLER                           | NOBLE ENERGY INC      | 1/8+    | 858 256        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| PENDING    | 5-9-17 | GG   | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI    | TH EXPLORATION LLC    | 1/8+    | 1031 544       | N/A  |
| 10*18796   | 5-9-18 | HH   | DWG OIL & GAS ACQUISITIONS LLC                                | TH EXPLORATION LLC    | 1/8+    | 938 476        | N/A  |
| 10*21414   | 5-9-18 | HH   | CHARLES R STOCKTON AND BETTY M HUDSON                         | TH EXPLORATION LLC    | 1/8+    | 959 310        | N/A  |
| 10*21473   | 5-9-18 | HH   | MARY E BISHOP   | TH EXPLORATION LLC    | 1/8+    | 957 232        | N/A  |
| 10*21475   | 5-9-18 | HH   | WOODROW N WARD AND HILDA A WARD                               | TH EXPLORATION LLC    | 1/8+    | 957 124        | N/A  |
| 10*21478   | 5-9-18 | HH   | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                       | TH EXPLORATION LLC    | 1/8+    | 960 173        | N/A  |

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|------------|--------|------|---|-----------------------|---------|----------------|------------|------------|------------|------------|------------|---|--|
| 10*21547   | 5-9-18 | HH   | GARY A MILLER AND MARCELLE T MILLER                           | TH EXPLORATION LLC    | 1/8+    | 952 370        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21548   | 5-9-18 | HH   | JEANNE M MILLER   | TH EXPLORATION LLC    | 1/8+    | 952 386        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21608   | 5-9-18 | HH   | BONNIE LOU POSTLEWAIT   | TH EXPLORATION LLC    | 1/8+    | 959 313        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21719   | 5-9-18 | HH   | ROBERT A MILLER   | TH EXPLORATION LLC    | 1/8+    | 952 389        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21835   | 5-9-18 | HH   | KENNETH ALLEN AND CARLA JO ALLEN                              | TH EXPLORATION LLC    | 1/8+    | 962 572        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*21937   | 5-9-18 | HH   | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT | TH EXPLORATION LLC    | 1/8+    | 960 33         | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22044   | 5-9-18 | HH   | MICHAEL A BISHOP  | TH EXPLORATION LLC    | 1/8+    | 960 421        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22045   | 5-9-18 | HH   | DOUGLAS R BISHOP  | TH EXPLORATION LLC    | 1/8+    | 961 417        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22296   | 5-9-18 | HH   | NOAH BAKER AND ALISA BAKER                                    | TH EXPLORATION LLC    | 1/8+    | 962 200        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22326   | 5-9-18 | HH   | RACHEL SONDA AND SCOTT SONDA                                  | TH EXPLORATION LLC    | 1/8+    | 962 532        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22407   | 5-9-18 | HH   | BRADLEY MURPHY  | TH EXPLORATION LLC    | 1/8+    | 962 575        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22430   | 5-9-18 | HH   | DEBORAH VANVRANKEN  | TH EXPLORATION LLC    | 1/8+    | 964 510        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22451   | 5-9-18 | HH   | GERALD L BISHOP III   | TH EXPLORATION LLC    | 1/8+    | 964 31         | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22492   | 5-9-18 | HH   | FAITH MARIE FREESTONE AND ERIC FREESTONE                      | TH EXPLORATION LLC    | 1/8+    | 972 50         | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22547   | 5-9-18 | HH   | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                  | TH EXPLORATION LLC    | 1/8+    | 966 628        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22566   | 5-9-18 | HH   | KENNETH A MILLER  | TH EXPLORATION LLC    | 1/8+    | 964 233        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22606   | 5-9-18 | HH   | ROBERT B MURPHY AND LINDA MURPHY                              | TH EXPLORATION LLC    | 1/8+    | 966 469        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*22636   | 5-9-18 | HH   | CHANDA WILSON AND DANIEL WILSON                               | TH EXPLORATION LLC    | 1/8+    | 968 226        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*23035   | 5-9-18 | HH   | DEAN S CARR   | TH EXPLORATION LLC    | 1/8+    | 977 364        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*23508   | 5-9-18 | HH   | MICHAEL A MURPHY  | TH EXPLORATION LLC    | 1/8+    | 1009 98        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*24888   | 5-9-18 | HH   | ARTHUR LEE MILLER ET AL                                       | TH EXPLORATION LLC    | 1/8+    | 1027 187       | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*24984   | 5-9-18 | HH   | JONATHAN BAKER  | TH EXPLORATION LLC    | 1/8+    | 1027 558       | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| Q090332002 | 5-9-18 | HH   | LORETTA JEAN RIGGLE ET VIR                                    | NOBLE ENERGY INC      | 1/8+    | 860 538        | N/A        | N/A        | N/A        | N/A        | N/A        | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332003 | 5-9-18 | HH   | PATTY BERISFORD ET VIR  | NOBLE ENERGY INC      | 1/8+    | 860 555        | N/A        | N/A        | N/A        | N/A        | N/A        | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332007 | 5-9-18 | HH   | ROBERT RANDOLPH WOODBURN ET UX                                | NOBLE ENERGY INC      | 1/8+    | 860 568        | N/A        | N/A        | N/A        | N/A        | N/A        | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332001 | 5-9-18 | HH   | WILLIAM E MILLER AND KAREN S MILLER                           | NOBLE ENERGY INC      | 1/8+    | 858 256        | N/A        | N/A        | N/A        | N/A        | N          | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| PENDING    | 5-9-18 | HH   | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI    | TH EXPLORATION LLC    | 1/8+    | 1031 544       | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |
| 10*18796   | 5-9-42 | II   | DWG OIL & GAS ACQUISITIONS LLC                                | TH EXPLORATION LLC    | 1/8+    | 938 476        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A   | N/A  |

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| Lease ID   | Parcel | Tags | Grantor, Lessor, Etc.   | Grantee, Lessee, Etc. | Royalty | Deed Book/Page | Assignment   |
|------------|--------|------|---|-----------------------|---------|----------------|------------|------------|------------|------------|------------|------------|--|
| 10*21414   | 5-9-42 | II * | CHARLES R STOCKTON AND BETTY M HUDSON                         | TH EXPLORATION LLC    | 1/8+    | 959 310        | N/A  |
| 10*21473   | 5-9-42 | II * | MARY E BISHOP   | TH EXPLORATION LLC    | 1/8+    | 957 232        | N/A  |
| 10*21475   | 5-9-42 | II * | WOODROW N WARD AND HILDA A WARD                               | TH EXPLORATION LLC    | 1/8+    | 957 124        | N/A  |
| 10*21478   | 5-9-42 | II * | CHILDRENS HOME SOCIETY OF WEST VIRGINIA                       | TH EXPLORATION LLC    | 1/8+    | 960 173        | N/A  |
| 10*21547   | 5-9-42 | II * | GARY A MILLER AND MARCELLE T MILLER                           | TH EXPLORATION LLC    | 1/8+    | 952 370        | N/A  |
| 10*21548   | 5-9-42 | II * | JEANNE M MILLER   | TH EXPLORATION LLC    | 1/8+    | 952 386        | N/A  |
| 10*21608   | 5-9-42 | II * | BONNIE LOU POSTLEWAIT   | TH EXPLORATION LLC    | 1/8+    | 959 313        | N/A  |
| 10*21719   | 5-9-42 | II * | ROBERT A MILLER   | TH EXPLORATION LLC    | 1/8+    | 952 389        | N/A  |
| 10*21835   | 5-9-42 | II * | KENNETH ALLEN AND CARLA JO ALLEN                              | TH EXPLORATION LLC    | 1/8+    | 962 572        | N/A  |
| 10*21937   | 5-9-42 | II * | WHEELING SOCIETY FOR CRIPPLED CHILDREN JAY E PRAGER PRESIDENT | TH EXPLORATION LLC    | 1/8+    | 960 33         | N/A  |
| 10*22043   | 5-9-42 | II * | CHILDRENS HOME SOCIETY OF WV                                  | TH EXPLORATION, LLC   | 1/8+    | 957 235        | N/A  |
| 10*22044   | 5-9-42 | II * | MICHAEL A BISHOP  | TH EXPLORATION LLC    | 1/8+    | 960 421        | N/A  |
| 10*22045   | 5-9-42 | II * | DOUGLAS R BISHOP  | TH EXPLORATION LLC    | 1/8+    | 961 417        | N/A  |
| 10*22296   | 5-9-42 | II * | NOAH BAKER AND ALISA BAKER                                    | TH EXPLORATION LLC    | 1/8+    | 962 200        | N/A  |
| 10*22326   | 5-9-42 | II * | RACHEL SONDA AND SCOTT SONDA                                  | TH EXPLORATION LLC    | 1/8+    | 962 532        | N/A  |
| 10*22407   | 5-9-42 | II * | BRADLEY MURPHY  | TH EXPLORATION LLC    | 1/8+    | 962 575        | N/A  |
| 10*22430   | 5-9-42 | II * | DEBORAH VANVRANKEN  | TH EXPLORATION LLC    | 1/8+    | 964 510        | N/A  |
| 10*22451   | 5-9-42 | II * | GERALD L BISHOP III   | TH EXPLORATION LLC    | 1/8+    | 964 31         | N/A  |
| 10*22492   | 5-9-42 | II * | FAITH MARIE FREESTONE AND ERIC FREESTONE                      | TH EXPLORATION LLC    | 1/8+    | 972 50         | N/A  |
| 10*22547   | 5-9-42 | II * | LAWRENCE EDWARD MURPHY AND JOAN MARIE MURPHY                  | TH EXPLORATION LLC    | 1/8+    | 966 628        | N/A  |
| 10*22566   | 5-9-42 | II * | KENNETH A MILLER  | TH EXPLORATION LLC    | 1/8+    | 964 233        | N/A  |
| 10*22606   | 5-9-42 | II * | ROBERT B MURPHY AND LINDA MURPHY                              | TH EXPLORATION LLC    | 1/8+    | 966 469        | N/A  |
| 10*22636   | 5-9-42 | II * | CHANDA WILSON AND DANIEL WILSON                               | TH EXPLORATION LLC    | 1/8+    | 968 226        | N/A  |
| 10*23035   | 5-9-42 | II * | DEAN S CARR   | TH EXPLORATION LLC    | 1/8+    | 977 364        | N/A  |
| 10*23508   | 5-9-42 | II * | MICHAELA A MURPHY   | TH EXPLORATION LLC    | 1/8+    | 1009 98        | N/A  |
| 10*24888   | 5-9-42 | II * | ARTHUR LEE MILLER ET AL                                       | TH EXPLORATION LLC    | 1/8+    | 1027 187       | N/A  |
| 10*24984   | 5-9-42 | II * | JONATHAN BAKER  | TH EXPLORATION LLC    | 1/8+    | 1027 558       | N/A  |
| Q090332002 | 5-9-42 | II * | LORETTA JEAN RIGGLE ET VIR                                    | NOBLE ENERGY INC      | 1/8+    | 860 538        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332003 | 5-9-42 | II * | PATTY BERISFORD ET VIR  | NOBLE ENERGY INC      | 1/8+    | 860 555        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| Q090332007 | 5-9-42 | II * | ROBERT RANDOLPH WOODBURN ET UX                                | NOBLE ENERGY INC      | 1/8+    | 860 568        | N/A        | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |

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|------------|--------|------|--|-----------------------|---------|----------------|-----|--|--|--|--------------------------------------|----------------------------------|--|
| Q090332001 | 5-9-42 | II   | WILLIAM E MILLER AND KAREN S MILLER                        | NOBLE ENERGY INC      | 1/8+    | 858            | 256 | N/A  | N/A  | N/A  | N/A                                  | N                                | Noble Energy Inc to HG Energy II Appalachia LLC: 39/1<br>Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286  |
| PENDING    | 5-9-42 | II   | SANDRA PARDINI AKA KATHERINE S PARDINI AND ALLEN F PARDINI | TH EXPLORATION LLC    | 1/8+    | 1031           | 544 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | N/A  |
| CVX866958  | 5-9-24 | JJ   | ANITA L. SLOUGH ET AL                                      | AB RESOURCES LLC      | 1/8+    | 696            | 7   | AB Resources LLC to Chief Exploration & Development LLC & Radler 2000 LP: 24/484 | Chief Exploration & Development LLC, Radler 2000, & Enerplus Resources Corp to Chevron USA Inc: 25/1 | Chief Exploration & Development LLC, Radler 2000, & Enerplus Resources Corp to Chevron USA Inc: 25/105 | AB Resources LLC to NPAR LLC: 25/484 | NPAR LLC to Chevron USA: 756/332 | Chevron USA Inc to HG Energy II Appalachia LLC: 41/155<br>Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX866959  | 5-9-24 | JJ   | PAUL SCHEIBELHOOD ET AL                                    | AB RESOURCES LLC      | 1/8+    | 695            | 629 | AB Resources LLC to Chief Exploration & Development LLC & Radler 2000 LP: 24/485 | Chief Exploration & Development LLC, Radler 2000, & Enerplus Resources Corp to Chevron USA Inc: 25/2 | Chief Exploration & Development LLC, Radler 2000, & Enerplus Resources Corp to Chevron USA Inc: 25/106 | AB Resources LLC to NPAR LLC: 25/485 | NPAR LLC to Chevron USA: 756/333 | Chevron USA Inc to HG Energy II Appalachia LLC: 41/156<br>Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX935271  | 5-9-24 | JJ   | CHARLES W. MILLER  | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 59  | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154<br>Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936061  | 5-9-24 | JJ   | CLARA MAE CLIFTON  | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 426 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154<br>Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936112  | 5-9-24 | JJ   | DONNA FAE KYLE   | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 449 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154<br>Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936062  | 5-9-24 | JJ   | GEORGE EDWARDS ET UX                                       | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 418 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154<br>Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936113  | 5-9-24 | JJ   | JUDITH MAY CONNER  | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 445 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154<br>Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |

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|----------------|--------|------|------------------------------------|-----------------------|---------|----------------|-----|--|--|--|--------------------------------------|----------------------------------|--|
| CVX936053      | 5-9-24 | JJ   | LLOYD C. ARNOLD ET UX              | CHEVRON U.S.A., INC.  | 1/8+    | 864            | 39  | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| CVX936054      | 5-9-24 | JJ   | MARY JO CRONIN                     | CHEVRON U.S.A., INC.  | 1/8+    | 864            | 43  | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| CVX935273      | 5-9-24 | JJ   | PAUL PARSONS ET UX                 | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 430 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| CVX936058      | 5-9-24 | JJ   | RICHARD KURPIL ET UX               | CHEVRON U.S.A., INC.  | 1/8+    | 863            | 594 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| CVX935276      | 5-9-24 | JJ   | SHARON LYN RUSSELL                 | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 422 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| CVX935969      | 5-9-24 | JJ   | TIMOTHY HUFF ET UX                 | CHEVRON U.S.A., INC.  | 1/8+    | 864            | 47  | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| 10*47051.097.0 | 5-9-7  | KK   | P & D REALITY                      | TH EXPLORATION LLC    | 1/8+    | 859            | 434 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | N/A  |
| PENDING        | 5-9-41 | LL   | LLOYD C ARNOLD AND JUDITH C ARNOLD | CHEVRON USA INC       | 1/8+    | 915            | 625 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to TH Exploration LLC: 43/164  |
| CVX939752      | 5-9-4  | MM   | LLOYD C ARNOLD AND JUDITH C ARNOLD | CHEVRON USA INC       | 1/8+    | 915            | 582 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| CVX866959      | 5-9-35 | NN   | ANITA L. SLOUGH ET AL              | AB RESOURCES LLC      | 1/8+    | 696            | 7   | AB Resources LLC to Chief Exploration & Development LLC & Radler 2000 LP: 24/484 | Chief Exploration & Development LLC, Radler 2000, & Enerplus Resources Corp to Chevron USA Inc: 25/1 | Chief Exploration & Development LLC, Radler 2000, & Enerplus Resources Corp to Chevron USA Inc: 25/105 | AB Resources LLC to NPAR LLC: 25/484 | NPAR LLC to Chevron USA: 756/332 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/155 |

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|-----------|--------|------|-------------------------|-----------------------|---------|----------------|-----|--|--|--|--------------------------------------|----------------------------------|--|--|
| CVX866958 | 5-9-35 | NN   | PAUL SCHEIBELHOOD ET AL | AB RESOURCES LLC      | 1/8+    | 695            | 629 | AB Resources LLC to Chief Exploration & Development LLC & Radler 2000 LP: 24/485 | Chief Exploration & Development LLC, Radler 2000, & Enerplus Resources Corp to Chevron USA Inc: 25/2 | Chief Exploration & Development LLC, Radler 2000, & Enerplus Resources Corp to Chevron USA Inc: 25/106 | AB Resources LLC to NPAR LLC: 25/485 | NPAR LLC to Chevron USA: 756/333 | Chevron USA Inc to HG Energy II Appalachia LLC: 41/156 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936061 | 5-9-35 | NN   | CLARA MAE CLIFTON       | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 426 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936112 | 5-9-35 | NN   | DONNA FAE KYLE          | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 449 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936062 | 5-9-35 | NN   | GEORGE EDWARDS ET UX    | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 418 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936113 | 5-9-35 | NN   | JUDITH MAY CONNER       | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 445 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936053 | 5-9-35 | NN   | LLOYD C. ARNOLD ET UX   | CHEVRON U.S.A., INC.  | 1/8+    | 864            | 39  | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX936054 | 5-9-35 | NN   | MARY JO CRONIN          | CHEVRON U.S.A., INC.  | 1/8+    | 864            | 43  | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |
| CVX935273 | 5-9-35 | NN   | PAUL PARSONS ET UX      | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 430 | N/A  | N/A  | N/A  | N/A                                  | N/A                              | Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286 |

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Operator's Well No. Old Crow N - 20HU

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|------------|---------|------|--|-----------------------|---------|----------------|-----|------------|------------|------------|------------|------------|--|
| CVX936058  | 5-9-35  | NN   | RICHARD KURPIL ET UX                   | CHEVRON U.S.A., INC.  | 1/8+    | 863            | 594 | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| CVX935276  | 5-9-35  | NN   | SHARON LYN RUSSELL                     | CHEVRON U.S.A., INC.  | 1/8+    | 853            | 422 | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| CVX935969  | 5-9-35  | NN   | TIMOTHY HUFF ET UX                     | CHEVRON U.S.A., INC.  | 1/8+    | 864            | 47  | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Chevron USA Inc to HG Energy II Appalachia LLC: 41/154 |
| Q081124002 | 5-9-3   | OO   | JAMES REDMAN LEGG II ET AL             | NOBLE ENERGY INC      | 1/8+    | 879            | 580 | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Noble Energy Inc to HG Energy II Appalachia LLC: 39/1  |
| Q081124002 | 5-9-2   | PP   | JAMES REDMAN LEGG II ET AL             | NOBLE ENERGY INC      | 1/8+    | 879            | 580 | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Noble Energy Inc to HG Energy II Appalachia LLC: 39/1  |
| Q081123002 | 5-9-2.1 | QQ   | JEFFREY L LEGG                         | NOBLE ENERGY INC      | 1/8+    | 879            | 575 | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Noble Energy Inc to HG Energy II Appalachia LLC: 39/1  |
| Q083757000 | 5-9-1   | RR   | JESSIE GLADYS RUCKMAN ET AL            | NOBLE ENERGY INC      | 1/8+    | 831            | 58  | N/A        | N/A        | N/A        | N/A        | N/A        | Memorandum of Operating Agreement between TH Exploration LLC and HG Energy II Appalachia, LLC: 988/286<br>Noble Energy Inc to HG Energy II Appalachia LLC: 39/1  |
| 10*21546   | 5-8-7   | SS   | EDWIN C MILLER AND KIMBERLY ANN MILLER | TH EXPLORATION LLC    | 1/8+    | 957            | 257 | N/A        | N/A        | N/A        | N/A        | N/A        | N/A  |

AFFIDAVIT

**COPY** 06/14/2019

51-02191

STATE OF TEXAS §  
§ SS  
COUNTY OF TARRANT §

On this 18<sup>th</sup> day of October, 2016, before me, the undersigned authority, personally appeared David D. Kalish ("Affiant") who being first duly sworn under oath, deposes and saith:

1. TH Exploration, LLC, TH Exploration II, LLC and TH Exploration III, LLC are wholly owned subsidiaries of THQ Appalachia I, LLC.
2. Tug Hill Operating, LLC provides oil and gas operations services to THQ Appalachia I, LLC under an Operating Services Agreement dated July 23, 2014.
3. David D. Kalish, the Affiant, is the Vice President of Tug Hill Operating, LLC, THQ Appalachia I, LLC, TH Exploration, LLC, TH Exploration II, LLC and TH Exploration III, LLC, and;
3. Tug Hill Operating, LLC is authorized to operate and maintain the assets owned by THQ Appalachia I, LLC, including, as referenced above, TH Exploration, LLC, TH Exploration II, LLC, and TH Exploration III, LLC, including oil and gas leases, wells, pipelines, surface facilities, and other all other assets that support the business of THQ Appalachia I, LLC, and;
4. Specifically, Tug Hill Operating, LLC is authorized to submit and obtain well work permits and carry out all activities pursuant to such work permits for assets owned by TH Exploration, LLC, TH Exploration II, LLC, TH Exploration III, LLC.

FURTHER, AFFIANT SAITH NOT.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this 18<sup>th</sup> day of October, 2016.

David D. Kalish  
Affiant: David D. Kalish

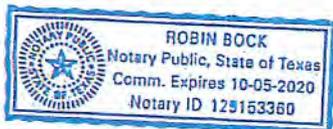
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Instrument No 1416299  
Date Recorded 10/19/2016  
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STATE OF TEXAS §  
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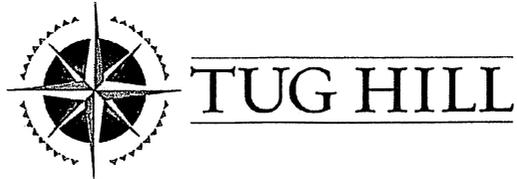
Sworn and subscribed to (or affirmed) before me on this, the 18<sup>th</sup> day of October, 2016, by David D. Kalish

IN WITNESS WHEREOF, I hereunto set my hand and official seal.



My Commission Expires: 10-05-2020  
Signature/Notary Public: Robin Bock  
Name/Notary Public (Print): Robin Bock

51-02191  
06/14/2019



June 11, 2019

WV Department of Environmental Protection  
Office of Oil & Gas  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
Attention: Laura Adkins

RE: Old Crow N-20HU  
Subject: Marshall County Route 74 Road Crossing Letter

Dear Laura:

Tug Hill Operating, LLC (THO) hereby submits this letter as confirmation that THO has obtained the right to drill, extract and produce the minerals under Marshall County Route 74 in the area reflected on the Old Crow N-20HU well plat. THO has conducted a full title search in the relevant Court House to confirm its ownership under said County Routes and is not currently aware of any recorded document that would suggest an ownership other than THO.

If your office has any questions or concerns regarding the contents of this letter, please do not hesitate to contact me directly at 304-376-0111, or by email at [amiller@tug-hilop.com](mailto:amiller@tug-hilop.com).

Sincerely,

A handwritten signature in cursive script that reads "Amy Miller".

Amy Miller  
Permit Specialist – Appalachia Region  
Cell 304-376-0111  
Email: [amiller@tug-hilop.com](mailto:amiller@tug-hilop.com)

STATE OF WEST VIRGINIA           §  
  §  
COUNTY OF MARSHALL           §

**ASSIGNMENT AND BILL OF SALE**

This **ASSIGNMENT AND BILL OF SALE** (this "Assignment") dated as of August 1, 2017 (the "Signing Date"), but effective from and after 7:00 a.m., Eastern Standard Time on August 2, 2017 being the day immediately following the Signing Date (the "Effective Date"), is made by **Chevron U.S.A. Inc.**, a Pennsylvania corporation, with an address at 700 Cherrington Parkway, Coraopolis, PA 15108 ("Chevron" or "Assignor") to **TH Exploration II, LLC** and **TH Exploration, LLC**, Texas limited liability companies, with an address at 1320 S. University Drive, Suite 500, Fort Worth, TX 76107 (collectively "Assignee") and is accepted by Assignee upon the following terms and conditions.

**RECITALS**

- A. Assignor desires to sell, convey, transfer, assign and deliver to Assignee Assignor's Bryan 1H well and certain related assets, including certain leasehold interests, located in Marshall County, West Virginia.
- B. Through an Acreage Trade Agreement to be executed contemporaneously with this Assignment, Assignor desires to transfer, convey and assign to Assignee certain of Assignor's oil and gas leasehold interests located in Marshall County, West Virginia in exchange for the transfer, conveyance and assignment to Assignor by Assignee certain of Assignee's oil and gas leasehold interests located in Marshall County, West Virginia and Greene County, West Virginia.
- C. In consideration of the mutual promises set out in this Assignment, including execution of the Acreage Trade Agreement, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree to be bound by the terms of this Assignment.

**1. DEFINITIONS**

1.1 **Definitions.** As used in this Assignment, these words and expressions have the following meanings:

"Acreage Trade Agreement" means that certain Acreage Trade Agreement by and between Chevron U.S.A. Inc. and TH Exploration, LLC with an Effective Date of August 1, 2017 to be contemporaneously executed with this Assignment.

"Act" has the meaning given to such term in Section 9.1(C).

"Affiliate" means any legal entity which controls, is controlled by, or is under common control with, another legal entity. An entity is deemed to "control" another if it owns directly or indirectly at least fifty percent of either of the following: (A) the shares entitled to vote at a general election of directors of such other entity or (B) the voting interest in such other entity if such entity does not have either shares or directors.

"Applicable Law(s)" means all laws, principles of common law, regulations, statutes, codes, rules, orders, ordinances, permits, enforceable policies, licenses, certifications, decrees, constitutions, standards or other requirements with similar effect of any Government Entity and any binding interpretations of the foregoing.

"Assets" has the meaning given to such term in Section 2.1 of this Assignment.

"Assigned Hydrocarbons" means all Hydrocarbons produced and severed from, or allocable, after severance, to the Leases, Units, and Wells on and after the Effective Date.

STATE OF WEST VIRGINIA §  
§  
COUNTY OF MARSHALL §

**ASSIGNMENT AND CONVEYANCE**

THIS ASSIGNMENT AND CONVEYANCE (the "Assignment") is made and entered into this 14<sup>th</sup> day of October, 2017 (the "Effective Date"), by and between AMERICAN PETROLEUM PARTNERS OPERATING, LLC, (hereinafter "Assignor") and TH EXPLORATION, LLC (hereinafter "Assignee") pursuant to the terms of that certain Acreage Trade Agreement between the Assignor and the Assignee dated August 4, 2017 (the "Acreage Trade Agreement"). Capitalized terms used but not defined herein and defined in the Acreage Trade Agreement shall have the meanings given to such terms in the Acreage Trade Agreement.

**WITNESSETH:**

WHEREAS, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to those certain Oil and Gas Leases situated in Marshall County, West Virginia, as described in Exhibit "A", attached hereto and made a part hereof (hereinafter the "Leases"); and

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

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

1. Assignment. Assignor does hereby grant, bargain, sell, convey, deliver, assign, set over and transfer, as of the Effective Date, to Assignee, its respective successors and assigns, forever, all of Assignor's right, title and interest in and to the Leases, and the lands covered thereby, together with all rights incident thereto and appurtenances thereon.

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

2. Special Warranty. Assignor represents and warrants that Assignor has not conveyed or otherwise encumbered (other than Permitted Encumbrances) its interest in the





Jan Pest  
MARSHALL County 01:22:38 PM  
Instrument No 1403489  
Date Recorded 04/27/2016  
Document Type ABN  
Pages Recorded 77  
Book-Page 36-9  
Recording Fee \$77.00  
Additional \$13.00

51-02191  
06/14/2019

WHEN RECORDED RETURN TO:  
TH Exploration II, LLC  
1320 South University Drive, Suite 500  
Fort Worth, Texas 76107  
Attn: David Kalish

Execution Version

ASSIGNMENT AND BILL OF SALE

STATE OF WV

KNOW ALL MEN BY THESE PRESENTS:

COUNTY OF MARSHALL

THIS ASSIGNMENT AND BILL OF SALE (this "Assignment"), dated April 7, 2016, but effective as of 7:00 A.M. Houston time on January 1, 2016 (the "Effective Time"), is between Gasar Exploration Inc., a Delaware corporation, whose address is 1331 Lamar Street, Suite 650 Houston, Texas 77010 ("Assignor"), and TH Exploration II, LLC, a Texas limited liability company, whose address is 1320 South University Drive, Suite 500, Fort Worth, Texas 76107 ("Assignee"). Assignor and Assignee are each, individually, referred to herein as a "Party" and, collectively, as the "Parties".

Capitalized terms used but not defined herein shall have the respective meanings set forth in that certain Purchase and Sale Agreement (the "Purchase Agreement"), dated as of February 19, 2016, by and between Assignor and Assignee (as successor-in-interest).

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

For Ten Dollars (\$10.00) and other good and valuable consideration (the receipt and sufficiency of which are hereby acknowledged), Assignor does hereby forever GRANT, BARGAIN, SELL, CONVEY, ASSIGN, TRANSFER, SET OVER AND DELIVER unto Assignee, all of Assignor's right, title and interest in and to the following interests and properties (such right, title and interest described in subsections (a) through (b) of this Section 1, less and except the Excluded Assets, collectively, the "Conveyed Interests");

(a) all oil, gas and/or mineral leases of Assignor, together with any and all other right, title and interest of Assignor in and to the leasehold estates created thereby, including subleases, royalties, overriding royalties, net profits interest, carried interests or similar rights or interests in such leases, and together with all rights, privileges, benefits and powers conferred upon Assignor with respect to the use and occupation of the lands covered thereby that may be necessary, convenient or incidental to the possession and enjoyment of such leases, located in Marshall, Wetzel, Doddridge, Harrison, Lewis, Marion, and Monongalia Counties, West Virginia and Greene, Butler, Fayette, Somerset, and Clearfield Counties, Pennsylvania, including those described on Exhibit A—Part 1 attached hereto (subject to any reservations, limitations or depth restrictions described on Exhibit A—Part 1), (Assignor's interest in such leases and other right, title and interest as so limited, the "Leases");

(b) all rights and interests in, under or derived from all unitization agreements in effect with respect to any of the Leases and the units created thereby, including those described

**MEMORANDUM OF OPERATING AGREEMENT AND FINANCING STATEMENT**

This Memorandum of Operating Agreement and Financing Statement (hereinafter referred to as "Memorandum") is executed to be effective concurrently with that certain Operating Agreement (the "Operating Agreement") by and between TH Exploration, LLC, as Operator, and HG Energy II Appalachia, LLC and TH Exploration II, LLC, as Non-Operators, covering, among other things, the development and production of crude oil, natural gas and associated substances from the leases (hereinafter called the "Contract Area") described on Exhibit "A-1" and Exhibit "A-2" attached hereto and owned by Operator and Non-Operator in the respective percentages of shares indicated on Exhibit "A" to the Operating Agreement.

The Operating Agreement contains an Accounting Procedure, along with provisions giving the parties hereto mutual liens and security interests where one or more parties hereto are or may become Debtors to one or more other parties hereto. This Memorandum incorporates by reference all of the terms and conditions of the Operating Agreement, including but not limited to the lien and security interest provisions.

The purpose of this Memorandum is to place third parties on notice of the Operating Agreement, and to secure and perfect the mutual liens and security interests of the parties hereto.

The Operating Agreement specifically provides and the parties do hereby confirm and agree that:

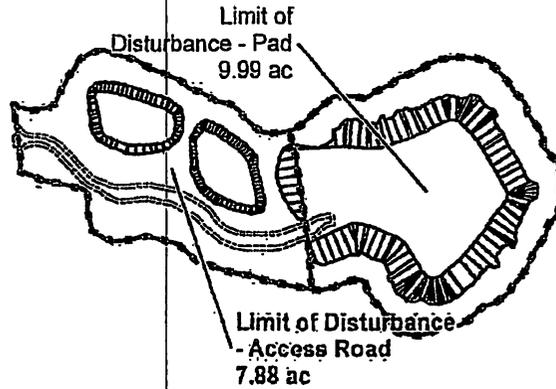
1. The Operator shall conduct and direct and have full control of all operations on the Contract Area as permitted and required by, and within the limits of, the Operating Agreement.
2. The liability of the parties under the Operating Agreement shall be several, not joint or collective. Each party shall be responsible only for its obligations and shall be liable only for its proportionate share of costs.
3. Each Non-Operator grants to Operator a lien upon its oil and gas rights, oil and gas leases and mineral interests in the Contract Area, and a security interest in its share of oil and/or gas when extracted and its interest in all fixtures, inventory, personal property and equipment located on or used on the Contract Area and in all its contract rights and receivables related thereto and arising therefrom to secure payment of its present and future share of costs and expenses, together with interest thereon at the rate provided in the Accounting Procedure referred to above. To the extent that Operator has a security interest under the Uniform Commercial Code ("Code") of the state or states in which the Contract Area is located, Operator without prejudice and in addition to all other legal, equitable and contractual remedies which are expressly reserved, shall be entitled to exercise the rights and remedies of a secured party under the Code. The bringing of a suit and the obtaining of judgment by Operator for the secured indebtedness shall not be deemed an election of remedies or otherwise affect the rights or security interests for the payment thereof.
4. The Operator grants to Non-Operator a lien and security interest equivalent to that granted to Operator as described in Paragraph 3 above, to secure payment by Operator of its own share of costs and expenses when due.





BOOK 1021 PAGE 0451

5-16-3  
DONNA  
YOHO



- Limit of Disturbance - Access Road
- Limit of Disturbance - Pad
- Road Breakline
- Pad
- Padsite Road

1 Inch: 472 feet

0 110 220 440 Feet



### Exhibit "A"

DONNA YOHO  
Marshall, WV

Date: 11-27-17

Name: Donna Vivian Yoho

Name: \_\_\_\_\_



RECEIVED

Office of Oil and Gas

FEB 26 2019

WV Department of  
Environmental Protection

STATE OF WEST VIRGINIA, MARSHALL COUNTY, SCT.:

I, JAN PEST, Clerk of the County Commission of said County, do hereby certify that the annexed writing, bearing

SI-0291  
06/14/2019



February 22, 2019

WV Department of Environmental Protection  
Office of Oil & Gas  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
Attention: Laura Adkins

RE: Old Crow N-20HU

Subject: Road Crossing Letter

Dear Laura:

Tug Hill Operating, LLC will not be drilling, extracting or producing any minerals under any WV County or State Routes in the area reflected on the Old Crow N-20HU well plat.

If your office has any questions or concerns regarding the contents of this letter, please do not hesitate to contact me directly at 304-376-0111, or by email at [amiller@tug-hilop.com](mailto:amiller@tug-hilop.com).

Sincerely,

A handwritten signature in blue ink that reads "Amy L. Miller".

Amy L. Miller  
Permitting Specialist – Appalachia Region

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Office of Oil and Gas  
FEB 26 2019  
WV Dept. of Environmental Protection

**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**NOTICE CERTIFICATION**

Date of Notice Certification: 02/21/2019

API No. 47- 051 -  
Operator's Well No. Old Crow N-19HU  
Well Pad Name: Old Crow

**Notice has been given:**

Pursuant to the provisions in West Virginia Code § 22-6A, the Operator has provided the required parties with the Notice Forms listed below for the tract of land as follows:

|  |   |                               |
|--|---|-------------------------------|
| State: <u>West Virginia</u>            | UTM NAD 83  | Easting: <u>520,295.26</u>    |
| County: <u>Marshall</u>                |   | Northing: <u>4,403,187.65</u> |
| District: <u>Franklin</u>              | Public Road Access: <u>Rines Ridge Road (CR 76)</u> |                               |
| Quadrangle: <u>Powhatan Point 7.5'</u> | Generally used farm name: <u>Donna Yoho</u>         |                               |
| Watershed: <u>Fish Creek (HUC 10)</u>  |   |                               |

Pursuant to West Virginia Code § 22-6A-7(b), every permit application filed under this section shall be on a form as may be prescribed by the secretary, shall be verified and shall contain the following information: (14) A certification from the operator that (i) it has provided the owners of the surface described in subdivisions (1), (2) and (4), subsection (b), section ten of this article, the information required by subsections (b) and (c), section sixteen of this article; (ii) that the requirement was deemed satisfied as a result of giving the surface owner notice of entry to survey pursuant to subsection (a), section ten of this article six-a; or (iii) the notice requirements of subsection (b), section sixteen of this article were waived in writing by the surface owner; and Pursuant to West Virginia Code § 22-6A-11(b), the applicant shall tender proof of and certify to the secretary that the notice requirements of section ten of this article have been completed by the applicant.

|  |   |
|--|---|
| <p>Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:</p> <p>*PLEASE CHECK ALL THAT APPLY</p> <p><input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED</p> <p><input checked="" type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED</p> <p><input type="checkbox"/> 3. NOTICE OF INTENT TO DRILL or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or</p> <p style="padding-left: 100px;"><input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)</p> <p><input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION</p> <p><input checked="" type="checkbox"/> 5. PUBLIC NOTICE</p> <p><input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION</p> | <p><b>OOG OFFICE USE ONLY</b></p> <p><input type="checkbox"/> RECEIVED/<br/>NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED/<br/>NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p> |
|--|---|

**Required Attachments:**

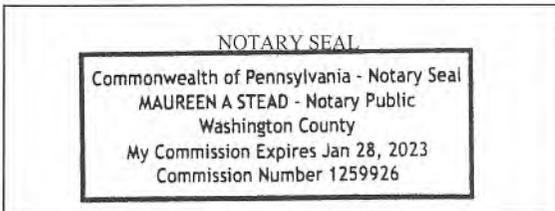
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication date verification or the associated Affidavit of Publication. The attached Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of personal service, the return receipt card or other postal receipt for certified mailing.

RECEIVED  
Office of Oil and Gas  
FEB 28 2019  
Your  
Assistant

**Certification of Notice is hereby given:**

THEREFORE, I Amy L. Miller, have read and understand the notice requirements within West Virginia Code § 22-6A. I certify that as required under West Virginia Code § 22-6A, I have served the attached copies of the Notice Forms, identified above, to the required parties through personal service, by registered mail or by any method of delivery that requires a receipt or signature confirmation. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Notice Certification and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

|                |  |            |   |
|----------------|--|------------|---|
| Well Operator: | <u>Tug Hill Operating, LLC</u>                   | Address:   | <u>380 Southpointe Boulevard, Plaza II, Suite 200</u> |
| By:            | <u>Amy L. Miller <i>Amy L. Miller</i></u>        |            | <u>Canonsburg, PA 15317</u>                           |
| Its:           | <u>Permitting Specialist - Appalachia Region</u> | Facsimile: | <u>724-338-2030</u>                                   |
| Telephone:     | <u>724-749-8388</u>                              | Email:     | <u>amiller@tug-hillop.com</u>                         |



Subscribed and sworn before me this 21 day of FEB, 2019.  
Maureen A Stead Notary Public  
My Commission Expires 1/28/23

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).

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Office of Oil and Gas  
FEB 26 2019  
WV Department of  
Environmental Protection

WW-6A  
(9-13)

API NO. 47- 051 - 06/14/2019  
OPERATOR WELL NO. Old Crow N-20HU  
Well Pad Name: Old Crow

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
NOTICE OF APPLICATION

Notice Time Requirement: notice shall be provided no later than the filing date of permit application.

Date of Notice: 2/21/2019 Date Permit Application Filed: 2/22/2019

Notice of:

- PERMIT FOR ANY WELL WORK
- CERTIFICATE OF APPROVAL FOR THE CONSTRUCTION OF AN IMPOUNDMENT OR PIT

Delivery method pursuant to West Virginia Code § 22-6A-10(b)

- PERSONAL SERVICE
- REGISTERED MAIL
- METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to W. Va. Code § 22-6A-10(b) no later than the filing date of the application, the applicant for a permit for any well work or for a certificate of approval for the construction of an impoundment or pit as required by this article shall deliver, by personal service or by registered mail or by any method of delivery that requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of this article, and the well plat to each of the following persons: (1) The owners of record of the surface of the tract on which the well is or is proposed to be located; (2) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for roads or other land disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The coal owner, operator or lessee, in the event the tract of land on which the well proposed to be drilled is located [sic] is known to be underlain by one or more coal seams; (4) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for the placement, construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this article; (5) Any surface owner or water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five hundred feet of the center of the well pad which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field within which the proposed well work activity is to take place. (c)(1) If more than three tenants in common or other co-owners of interests described in subsection (b) of this section hold interests in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be maintained pursuant to section eight, article one, chapter eleven-a of this code. (2) Notwithstanding any provision of this article to the contrary, notice to a lien holder is not notice to a landowner, unless the lien holder is the landowner. W. Va. Code R. § 35-8-5.7.a requires, in part, that the operator shall also provide the Well Site Safety Plan ("WSSP") to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Application Notice  WSSP Notice  E&S Plan Notice  Well Plat Notice is hereby provided to:

SURFACE OWNER(s)

Name: Donna Yoho  
 Address: 3682 Rines Ridge Road  
 Proctor, WV 26055  
 Name: \_\_\_\_\_  
 Address: \_\_\_\_\_

SURFACE OWNER(s) (Road and/or Other Disturbance)

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Name: \_\_\_\_\_  
 Address: \_\_\_\_\_

SURFACE OWNER(s) (Impoundments or Pits)

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_

COAL OWNER OR LESSEE

Name: Consol Energy, Inc. Leatherwood, Inc. Attn: Casey Saunders  
 Address: 1000 CONSOL Energy DRive  
 Canonsburg, PA 15317

COAL OPERATOR

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_

SURFACE OWNER OF WATER WELL AND/OR WATER PURVEYOR(s)

Name: \*See attached list  
 Address: \_\_\_\_\_

OPERATOR OF ANY NATURAL GAS STORAGE FIELD

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_

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Office of Oil and Gas

FEB 26 2019

WV Department of  
Environmental Protection

\*Please attach additional forms if necessary

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-10(b), notice is hereby given that the undersigned well operator has applied for a permit for well work or for a certificate of approval for the construction of an impoundment or pit.

**This Notice Shall Include:**

Pursuant to W. Va. Code § 22-6A-10(b), this notice shall include: (1) copies of the application; (2) the erosion and sediment control plan required by section seven of this article; and (3) the well plat.

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments; (2) who may file written comments; (3) the name and address of the secretary for the purpose of filing the comments and obtaining additional information; and (4) a statement that the persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Pursuant to W. Va. Code R. § 35-8-5.7.a, the operator shall provide the Well Site Safety Plan to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Pursuant to W. Va. Code R. § 35-8-15.2.c, this notice shall: (1) contain a statement of the surface owner's and water purveyor's right to request sampling and analysis; (2) advise the surface owner and water purveyor of the rebuttable presumption for contamination or deprivation of a fresh water source or supply; advise the surface owner and water purveyor that refusal to allow the operator to conduct a pre-drilling water well test constitutes a method to rebut the presumption of liability; (3) advise the surface owner and water purveyor of his or her independent right to sample and analyze any water supply at his or her own expense; advise the surface owner and water purveyor whether or not the operator will utilize an independent laboratory to analyze any sample; and (4) advise the surface owner and or water purveyor that he or she can obtain from the Chief a list of water testing laboratories in the subject area capable of and qualified to test water supplies in accordance with standard acceptable methods.

Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

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Office of Oil and Gas  
FEB 26 2019

**Well Location Restrictions**

Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within six hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary. (c) Notwithstanding the foregoing provisions of this section, nothing contained in this section prevents an operator from conducting the activities permitted or authorized by a Clean Water Act Section 404 permit or other approval from the United States Army Corps of Engineers within any waters of the state or within the restricted areas referenced in this section. (d) The well location restrictions set forth in this section shall not apply to any well on a multiple well pad if at least one of the wells was permitted prior to the effective date of this article. (e) The secretary shall, by December 31, 2012, report to the Legislature on the noise, light, dust and volatile organic compounds generated by the drilling of horizontal wells as they relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding, if any, by the secretary that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

WV Department of Environmental Protection

examined in the study required by this subsection, the secretary shall have the authority to propose for promulgation legislative rules establishing guidelines and procedures regarding reasonable levels of noise, light, dust and volatile organic compounds relating to drilling horizontal wells, including reasonable means of mitigating such factors, if necessary.

**Water Well Testing:**

Pursuant to West Virginia Code § 22-6A-10(d), notification shall be made, with respect to surface landowners identified in subsection (b) or water purveyors identified in subdivision (5), subsection (b) of this section, of the opportunity for testing their water well. The operator shall provide an analysis to such surface landowner or water purveyor at their request.

**Water Testing Laboratories:**

Pursuant to West Virginia Code § 22-6A-10(i), persons entitled to notice pursuant to subsection (b) of this section may contact the department to ascertain the names and locations of water testing laboratories in the subject area capable and qualified to test water supplies in accordance with standard accepted methods. In compiling that list of names the department shall consult with the state Bureau for Public Health and local health departments. A surface owner and water purveyor has an independent right to sample and analyze any water supply at his or her own expense. The laboratory utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section.

**Rebuttable Presumption for Contamination or Deprivation of a Fresh Water Source or Supply:**

W. Va. Code § 22-6A-18 requires that (b) unless rebutted by one of the defenses established in subsection (c) of this section, in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply. (c) In order to rebut the presumption of liability established in subsection (b) of this section, the operator must prove by a preponderance of the evidence one of the following defenses: (1) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration water well test. (2) The landowner or water purveyor refused to allow the operator access to the property to conduct a predrilling or prealteration water well test. (3) The water supply is not within one thousand five hundred feet of the well. (4) The pollution occurred more than six months after completion of drilling or alteration activities. (5) The pollution occurred as the result of some cause other than the drilling or alteration activity. (d) Any operator electing to preserve its defenses under subdivision (1), subsection (c) of this section shall retain the services of an independent certified laboratory to conduct the predrilling or prealteration water well test. A copy of the results of the test shall be submitted to the department and the surface owner or water purveyor in a manner prescribed by the secretary. (e) Any operator shall replace the water supply of an owner of interest in real property who obtains all or part of that owner's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source with a comparable water supply where the secretary determines that the water supply has been affected by contamination, diminution or interruption proximately caused by the oil or gas operation, unless waived in writing by that owner. (f) The secretary may order the operator conducting the oil or gas operation to: (1) Provide an emergency drinking water supply within twenty-four hours; (2) Provide temporary water supply within seventy-two hours; (3) Within thirty days begin activities to establish a permanent water supply or submit a proposal to the secretary outlining the measures and timetables to be used in establishing a permanent supply. The total time in providing a permanent water supply may not exceed two years. If the operator demonstrates that providing a permanent replacement water supply cannot be completed within two years, the secretary may extend the time frame on case-by-case basis; and (4) Pay all reasonable costs incurred by the real property owner in securing a water supply. (g) A person as described in subsection (b) of this section aggrieved under the provisions of subsections (b), (e) or (f) of this section may seek relief in court... (i) Notwithstanding the denial of the operator of responsibility for the damage to the real property owner's water supply or the status of any appeal on determination of liability for the damage to the real property owner's water supply, the operator may not discontinue providing the required water service until authorized to do so by the secretary or a court of competent jurisdiction.

**Written Comment:**

Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary. All persons described in West Virginia Code § 22-6A-10(b) may file written comments as to the location or construction of the applicant's proposed well work to the Secretary at:

Chief, Office of Oil and Gas  
Department of Environmental Protection  
601 57<sup>th</sup> St. SE  
Charleston, WV 25304  
(304) 926-0450

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Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water. **NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.**

**Time Limits and Methods for Filing Comments.**

The law requires these materials to be served on or before the date the operator files its Application. You have **THIRTY (30) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Pursuant to West Virginia Code § 22-6A-11(c)(2), Any objections of the affected coal operators and coal seam owners and lessees shall be addressed through the processes and procedures that exist under sections fifteen, seventeen and forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article. The written comments filed by the parties entitled to notice under subdivisions (1), (2), (4), (5) and (6), subsection (b), section ten of this article shall be considered by the secretary in the permit issuance process, but the parties are not entitled to participate in the processes and proceedings that exist under sections fifteen, seventeen or forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article.

**Comment Requirements**

Your comments must be in writing and include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

Disclaimer: All comments received will be placed on our web site <http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/Pages/default.aspx> and the applicant will automatically be forwarded an email notice that such comments have been submitted. The applicant will be expected to provide a response to comments submitted by any surface owner, water purveyor or natural gas storage operator noticed within the application.

**Permit Denial or Condition**

The Chief has the power to deny or condition a well work permit. Pursuant to West Virginia Code § 22-6A-8(d), the permit may not be issued or be conditioned, including conditions with respect to the location of the well and access roads prior to issuance if the director determines that:

- (1) The proposed well work will constitute a hazard to the safety of persons;
- (2) The plan for soil erosion and sediment control is not adequate or effective;
- (3) Damage would occur to publicly owned lands or resources; or
- (4) The proposed well work fails to protect fresh water sources or supplies.

A permit may also be denied under West Virginia Code § 22-6A-7(k), the secretary shall deny the issuance of a permit if the secretary determines that the applicant has committed a substantial violation of a previously issued permit for a horizontal well, including the applicable erosion and sediment control plan associated with the previously issued permit, or a substantial violation of one or more of the rules promulgated under this article, and in each instance has failed to abate or seek review of the violation within the time prescribed by the secretary pursuant to the provisions of subdivisions (1) and (2), subsection (a), section five of this article and the rules promulgated hereunder, which time may not be unreasonable.

Pursuant to West Virginia Code § 22-6A-10(g), any person entitled to submit written comments to the secretary pursuant to subsection (a), section eleven of this article, shall also be entitled to receive from the secretary a copy of the permit as issued or a copy of the order modifying or denying the permit if the person requests receipt of them as a part of the written comments submitted concerning the permit application. Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

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WW-6A  
(8-13)

4705102191  
API NO. 47-051 - 06/14/2019  
OPERATOR WELL NO. Old Crow N-20HU  
Well Pad Name: Old Crow

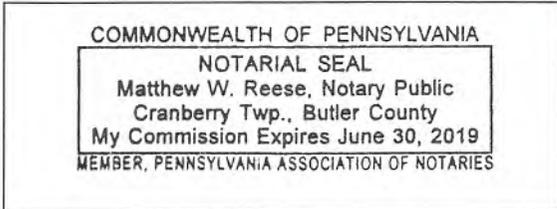
**Notice is hereby given by:**

Well Operator: Tug Hill Operating, LLC  
Telephone: 724-749-8388  
Email: amiller@tug-hilop.com *amy miller*

Address: 380 Southpointe Boulevard, Plaza II, Suite 200  
Canonsburg, PA 15317  
Facsimile: 724-338-2030

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).



Subscribed and sworn before me this 21 day of Feb, 2019.  
*Matthew W. Reese* Notary Public  
My Commission Expires 6-30-2019

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**Exhibit WW-6A**

Tug Hill Operating, LLC  
380 Southpointe Blvd, Suite 200  
Cannonsburg, PA 15137

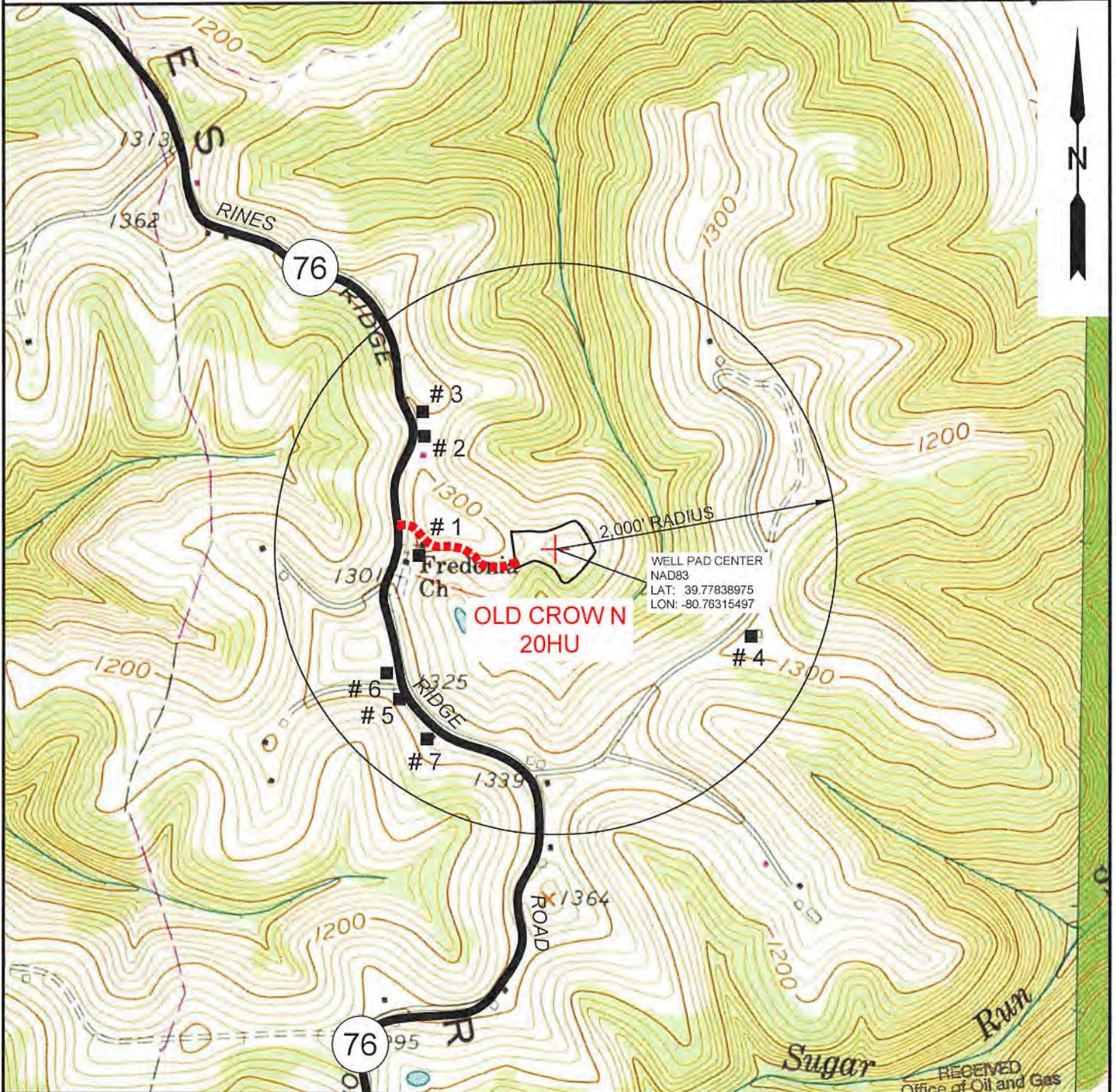
**Residences within Two-Thousand Feet (2,000')**

Well: Old Crow N – 19HU  
District: Franklin (Residence #'s 1-7)  
State: WV

There are seven (7) residences, no businesses, no churches, no schools or no emergency facilities within two-thousand feet (2,000') of the above referenced well location.

|  |  |   |
|--|--|---|
| <p><b>Residence 1</b><br/>TM 16 Pcl. 3.1 /<br/>Dennis Jackson, Et Ux<br/>Phone: 304-843-1762<br/><b>Physical Address:</b><br/>4004 Rines Ridge Rd.<br/>Proctor, WV 26055<br/><b>Tax Address:</b><br/>P.O. Box 109<br/>Woodsfield, OH 43793</p> | <p><b>Residence 2</b><br/>TM 16 Pcl. 3 )<br/>Donna Vivian Yoho - TOD<br/>Phone: 304-845-5590 (Rev. Address)<br/><b>Physical Address:</b><br/>3862 Rines Ridge Rd.<br/>Proctor, WV 26055<br/><b>Tax Address:</b><br/>Same</p> | <p><b>Residence 3</b><br/>TM 16 Pcl. 3.2<br/>Jimmy Ostrander, Sr., Et Ux<br/>Phone: 304-845-5599, 304-845-5590<br/><b>Physical Address:</b><br/>3810 Rines Ridge Rd. )<br/>Proctor, WV 26055<br/><b>Tax Address:</b><br/>Same</p> |
| <p><b>Residence 4</b><br/>TM 16 Pcl. 6 /<br/>John Swierkos<br/>Phone: 304-810-4092<br/><b>Physical Address:</b><br/>110 Rahm Dr.<br/>Proctor, WV 26055<br/><b>Tax Address:</b><br/>Same</p>  | <p><b>Residence 5</b><br/>TM 16 Pcl. 23.3 )<br/>Greg &amp; Christina Riddle<br/>Phone: 304-843-0173<br/><b>Physical Address:</b><br/>4205 Rines Ridge Rd.<br/>Proctor, WV 26055<br/><b>Tax Address:</b><br/>Same</p>         | <p><b>Residence 6</b><br/>TM 16 Pcl. 23.1 /<br/>Ray E. Minor, Et Ux<br/>Phone: 304-843-1713<br/><b>Physical Address:</b><br/>4193 Rines Ridge Rd.<br/>Proctor, WV 26055<br/><b>Tax Address:</b><br/>Same</p>                      |
| <p><b>Residence 7</b><br/>TM 16 Pcl. 24 )<br/>Alan M. Beyser, Et Ux<br/>Phone: 304-810-0617<br/><b>Physical Address:</b><br/>4271 Rines Ridge Rd.<br/>Proctor, WV 26055<br/><b>Tax Address:</b><br/>Same</p>                                   |  | <p style="text-align: center;">RECEIVED<br/>Office of Oil and Gas<br/>FEB 26 2019<br/><br/>WV Department of<br/>Environmental Protection</p>  |

# PROPOSED OLD CROW N - 20HU



NOTE: THERE APPEARS TO BE SEVEN (7) POSSIBLE WATER SOURCES WITHIN 2,000'.

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www.slsurveys.com

|                                   |          |                         |            |
|-----------------------------------|----------|-------------------------|------------|
| TOPO SECTION:                     |          | OPERATOR:               |            |
| GLEN EASTON & POWHATAN POINT 7.5' |          | PREPARED FOR:           |            |
| COUNTY                            | DISTRICT | TUG HILL OPERATING, LLC |            |
| MARSHALL                          | FRANKLIN | 380 SOUTHPOINTE BLVD    |            |
|                                   |          | SUITE 200               |            |
|                                   |          | CANONSBURG, PA 15317    |            |
| DRAWN BY                          | JOB NO.  | DATE                    | SCALE      |
| K.G.M.                            | 8796     | 01/23/19                | 1" = 1000' |

WV Department of  
Environmental Protection  
**TUG HILL**  
OPERATING

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
NOTICE OF ENTRY FOR PLAT SURVEY

**Notice Time Requirement:** Notice shall be provided at least SEVEN (7) days but no more than FORTY-FIVE (45) days prior to entry

**Date of Notice:** 11/16/2018 **Date of Planned Entry:** 11/17/2018

**Delivery method pursuant to West Virginia Code § 22-6A-10a**

- PERSONAL SERVICE
- REGISTERED MAIL
- METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to West Virginia Code § 22-6A-10(a), Prior to filing a permit application, the operator shall provide notice of planned entry on to the surface tract to conduct any plat surveys required pursuant to this article. Such notice shall be provided at least seven days but no more than forty-five days prior to such entry to: (1) The surface owner of such tract; (2) to any owner or lessee of coal seams beneath such tract that has filed a declaration pursuant to section thirty-six, article six, chapter twenty-two of this code; and (3) any owner of minerals underlying such tract in the county tax records. The notice shall include a statement that copies of the state Erosion and Sediment Control Manual and the statutes and rules related to oil and gas exploration and production may be obtained from the Secretary, which statement shall include contact information, including the address for a web page on the Secretary's web site, to enable the surface owner to obtain copies from the secretary.

**Notice is hereby provided to:**

SURFACE OWNER(s)

Name: Donna Yoho ✓  
 Address: 3682 Rines Ridge Road  
Proctor, WV 26055  
 Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Name: \_\_\_\_\_  
 Address: \_\_\_\_\_

COAL OWNER OR LESSEE

Name: Consol Energy, Inc. Leatherwood, Inc. Attn: Casey Saunders  
 Address: 1000 CONSOL Energy Drive ✓  
Canonsburg, PA 15317

MINERAL OWNER(s)

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_

\*please attach additional forms if necessary

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-10(a), notice is hereby given that the undersigned well operator is planning entry to conduct a plat survey on the tract of land as follows:

|  |   |
|--|---|
| State: <u>West Virginia</u>            | Approx. Latitude & Longitude: <u>39.7784004; -80.7631353</u>  |
| County: <u>Marshall</u>                | Public Road Access: <u>Rines Ridge Road (County Route 76)</u> |
| District: <u>Franklin</u>              | Watershed: <u>Trubutary of Fish Creek (HUC 10)</u>            |
| Quadrangle: <u>Powhatan Point 7.5'</u> | Generally used farm name: <u>Donna Yoho</u>                   |

Copies of the state Erosion and Sediment Control Manual and the statutes and rules related to oil and gas exploration and production may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450). Copies of such documents or additional information related to horizontal drilling may be obtained from the Secretary by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

**Notice is hereby given by:**

Well Operator: Tug Hill Operating, LLC  
 Telephone: 724-749-8388  
 Email: amiller@tug-hillop.com

Address: 380 Southpointe Boulevard, Plaza II, Suite 200  
Canonsburg, PA 15317  
 Facsimile: 724-338-2030

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**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).

WW-6A5  
(1/12)

**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**NOTICE OF PLANNED OPERATION**

**Notice Time Requirement:** notice shall be provided no later than the **filing date of permit application.**

**Date of Notice:** 02/22/2019      **Date Permit Application Filed:** 02/22/2019

**Delivery method pursuant to West Virginia Code § 22-6A-16(c)**

CERTIFIED MAIL                       HAND  
RETURN RECEIPT REQUESTED              DELIVERY

Pursuant to W. Va. Code § 22-6A-16(c), no later than the date for filing the permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner whose land will be used for the drilling of a horizontal well notice of the planned operation. The notice required by this subsection shall include: (1) A copy of this code section; (2) The information required to be provided by subsection (b), section ten of this article to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. (d) The notices required by this section shall be given to the surface owner at the address listed in the records of the sheriff at the time of notice.

**Notice is hereby provided to the SURFACE OWNER(s)**

(at the address listed in the records of the sheriff at the time of notice):

Name: Donna Yoho

Address: 3862 Rines Ridge Road

Proctor, WV 26055

Name: \_\_\_\_\_

Address: \_\_\_\_\_

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-16(c), notice is hereby given that the undersigned well operator has developed a planned operation on the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

|             |   |                           |   |                     |
|-------------|---|---------------------------|---|---------------------|
| State:      | <u>West Virginia</u>                    | UTM NAD 83                | Easting:                                  | <u>520,299.44</u>   |
| County:     | <u>Marshall</u>                         |                           | Northing:                                 | <u>4,403,192.49</u> |
| District:   | <u>Franklin</u>                         | Public Road Access:       | <u>Rines Ridge Road (County Route 76)</u> |                     |
| Quadrangle: | <u>Powhatan Point 7.5'</u>              | Generally used farm name: | <u>Donna Yoho</u>                         |                     |
| Watershed:  | <u>Tributary of Fish Creek (HUC 10)</u> |                           |   |                     |

**This Notice Shall Include:**

Pursuant to West Virginia Code § 22-6A-16(c), this notice shall include: (1) A copy of this code section; (2) The information required to be provided by **W. Va. Code § 22-6A-10(b)** to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

Well Operator: Tug Hill Operating, LLC  
Telephone: 724-749-8388  
Email: amiller@tug-hillop.com

Address: 380 Southpointe Boulevard, Plaza II, Suite 200  
Canonsburg, PA 15317  
Facsimile: 724-338-2030

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).

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## WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

## Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110  
Charleston, West Virginia 25305-0430 • (304) 558-3505Thomas J. Smith, P. E.  
Secretary of Transportation/  
Commissioner of HighwaysJill M. Newman  
Deputy Commissioner

March 2, 2018 ✓

James A. Martin, Chief  
Office of Oil and Gas  
Department of Environmental Protection  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304Subject: DOH Permit for the Old Crow Pad, Marshall County  
Old Crow N-20HU Well site

Dear Mr. Martin,

This well site will be accessed from a DOH permit #06-2018-0130 which has been issued to Tug Hill Operating, LLC for access to the State Road for a well site located off of Marshall County Route 76 SLS.

The operator has signed a STATEWIDE OIL AND GAS ROAD MAINTENANCE BONDING AGREEMENT and provided the required Bond. This operator is currently in compliance with the DOH OIL AND GAS POLICY dated January 3, 2012.

Very Truly Yours,

Handwritten signature of Gary K. Clayton in blue ink.

Gary K. Clayton, P.E.  
Regional Maintenance Engineer  
Central Office O&G CoordinatorCc: Jonathan White  
Tug Hill Operating, LLC  
CH, OM, D-6  
FileRECEIVED  
Office of Oil and Gas ✓

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**PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION**

| <b>PRODUCT NAME:</b> | <b>CHEMICAL DESCRIPTION:</b>     | <b>PRODUCT USE:</b> | <b>HAZARDOUS COMPONENT:</b>  |
|----------------------|----------------------------------|---------------------|--|
| GBW-20C              | Hemicellulase Breaker            | Breaker - Water     | None   |
| ALPHA 1427           |                                  | Biocide             | Glutaraldehyde – CAS#000111-30-8<br>Quaternary ammonium chloride<br>CAS# 007173-51-5<br>Alky dimethyl benzyl ammonium<br>Chloride (C12-16) – CAS#068424-85-1<br>Ethanol – CAS# 000064-17-5<br>Water – CAS# 007732-18-5 |
| FRAC SAND            | Silica Sand (various Mesh sizes) | Proppant            | Crystalline silica (quartz)<br>CAS# 14808-60-7   |
| S-8C, Sand           | Silica Sand (100 mesh)           | Sand                | Silica – CAS# 14808-60-7   |
| GW-3LDF              |                                  | Gellant - Water     | Petroleum Distillate Blend – Proprietary,<br>(Not Associated with Diesel Fuel)<br>Guar gum – CAS# 009000-30-0  |
| FRW-18               |                                  | Friction Reducer    | Hydrotreated light distillate<br>CAS# 064742-47-8  |
| Scaletrol            |                                  | Scale Inhibitor     | Ethylene glycol – CAS# 000107-21-1<br>Diethylene glycol – CAS# 000111-46-6   |

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06/14/2019

# Old Crow Well Site

Site Design, Construction Plan, &  
Erosion and Sediment Control Plans  
Tug Hill Operating  
Marshall County  
Franklin District  
Latitude 39.77838678°  
Longitude -80.76316840°  
Lower Fish Creek Watershed

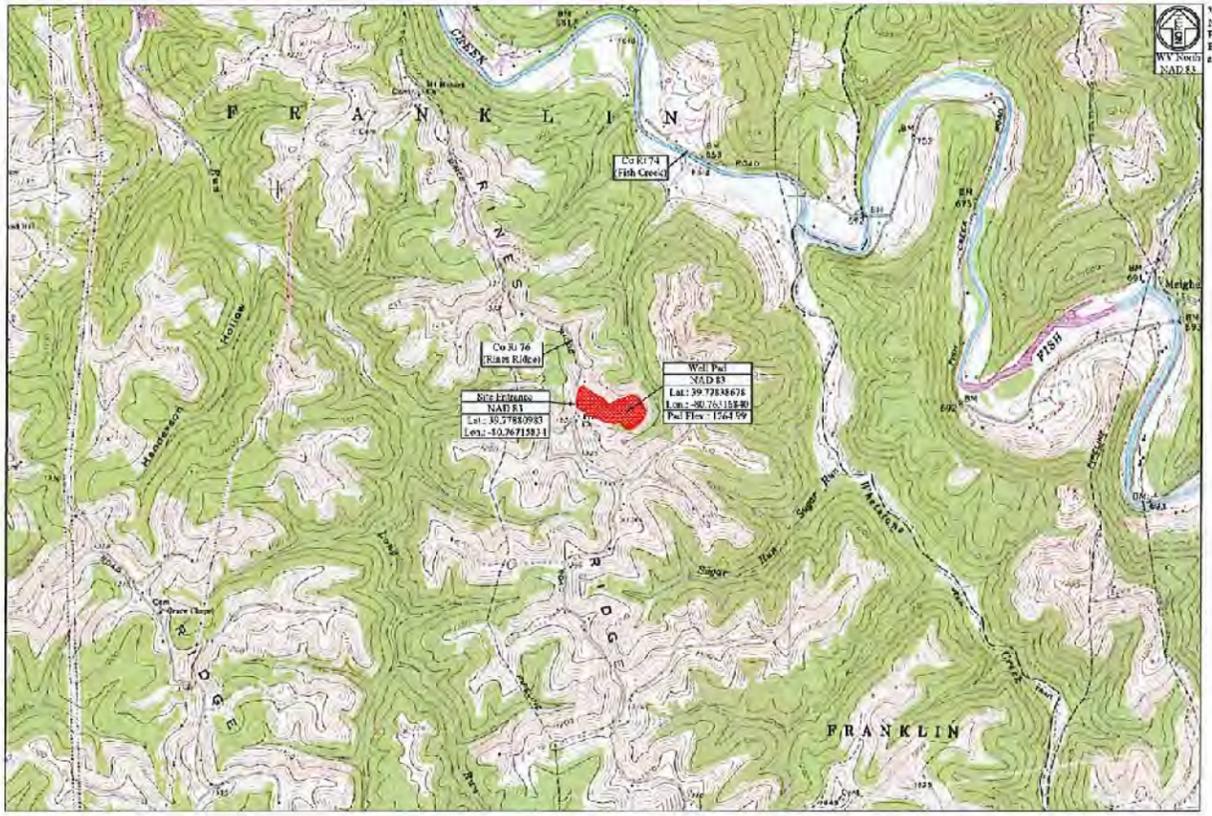
**Pertinent Site Information**  
Old Crow Well Site  
Emergency Number: 304-845-1920  
Franklin District, Marshall County, WV  
Watershed: Lower Fish Creek Watershed  
Tug Hill Contact Number: 1-817-632-3400

**WVDEP OOG  
ACCEPTED AS-BUILT**  
WV 3/4/2019



| Property Owner Information - Old Crow Well Site |           |         |             |               |               |                 |
|---|-----------|---------|-------------|---------------|---------------|-----------------|
| Franklin District - Marshall County             |           |         |             |               |               |                 |
| Owner   | EM Parcel | Well ID | Access Road | Topsoil Excav | Acc. Clearing | Total Disturbed |
| Dwain Yoho                                      | 16-3      | 664     | LJ1         | LJ1           | 6.92          | 19.18           |
| Site Total (Ac): 6.64 1.31 1.01 6.92 19.18      |           |         |             |               |               |                 |

## Exhibit A: Site As-Built



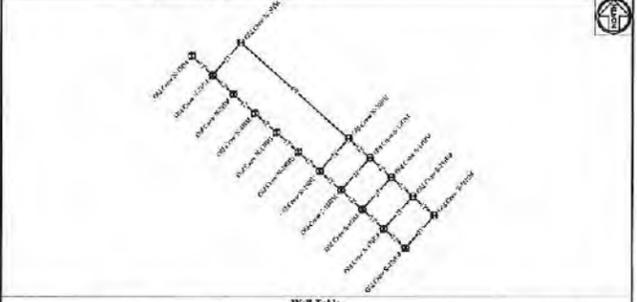
WV State Plane Coordinate System  
North Zone, NAD 83  
Elevations Based on NAVD83  
Established By Survey Grade GPS  
and OPUS Post Processing

| Access Road   |           |            |                              |
|---------------|-----------|------------|------------------------------|
| Surface Owner | TM Parcel | Row Length | Type                         |
| Dwain Yoho    | 16-3      | LJ1,FJ1    | New Access Road Construction |

| Disturbed Area              |                 |
|-----------------------------|-----------------|
| Well Pad Construction       | 6.92 Ac         |
| Access Road Construction    | 1.31 Ac         |
| Topsoil Excav Material      | 1.01 Ac         |
| Additional Clearing         | 6.92 Ac         |
| <b>Total Disturbed Area</b> | <b>19.18 Ac</b> |

| Old Crow Well Site Quantities  |                  |                   |                  |                       |            |                 |
|--------------------------------|------------------|-------------------|------------------|-----------------------|------------|-----------------|
| Description                    | Dist. (CY)       | Fill (CY)         | Spill (CY)       | Remov. (CY)           | Max. Slope | Length of Slope |
| Well Pad                       | 52,153.23        | 86,413.87         | 15,001.38        | N/A                   | 3:1        | 754             |
| Access Road                    | 8,492.11         | 8,711.95          | N/A              | 28.7:1                | 34.00%     | 178.99          |
| Topsoil Excav Material Storage | 0.00             | 17,008.29         | 17,008.29        | N/A                   | N/A        | N/A             |
| <b>Totals</b>                  | <b>60,645.34</b> | <b>107,134.11</b> | <b>17,008.67</b> | <b>17,997.84</b>      |            |                 |
| Total Spill (CY)               |                  | -1,255.85         |                  | Excess Spill Capacity |            |                 |

| Site Entrance             |                            | Center of Well Pad        |                            |
|---------------------------|----------------------------|---------------------------|----------------------------|
| WV-NAD 83 N: 408183.78    | WV-NAD 83 E: 161277.51     | WV-NAD 83 N: 408183.00    | WV-NAD 83 E: 161419.03     |
| WV-NAD 83 N: 408257.51    | WV-NAD 83 E: 161481.62     | WV-NAD 83 N: 408183.00    | WV-NAD 83 E: 161481.62     |
| WV-NAD 83 N: 408257.51    | WV-NAD 83 E: 161481.62     | WV-NAD 83 N: 408183.00    | WV-NAD 83 E: 161481.62     |
| UTM 17 NAD 83 E: 51999.28 | UTM 17 NAD 83 N: 408183.00 | UTM 17 NAD 83 E: 51999.28 | UTM 17 NAD 83 N: 408183.00 |



| Well Pads              |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| OH Well 2-1011         | OH Well 2-1012         | OH Well 2-1013         | OH Well 2-1014         | OH Well 2-1015         | OH Well 2-1016         | OH Well 2-1017         | OH Well 2-1018         | OH Well 2-1019         | OH Well 2-1020         | OH Well 2-1021         | OH Well 2-1022         |
| WV-NAD 83 N: 408183.78 |
| WV-NAD 83 E: 161277.51 |

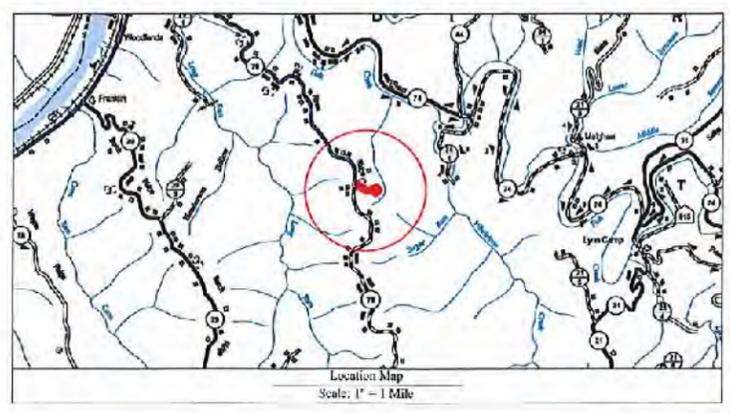
### EXISTING API NUMBERS

- 47-051-02023
- 47-051-02040
- 47-051-02042
- 47-051-02043
- 47-051-02122
- 47-051-02123

*John*  
2/20/19



| Site Locations (NAD 27) |               |                | Site Locations (NAD 83) |               |                |
|-------------------------|---------------|----------------|-------------------------|---------------|----------------|
| Structure               | Latitude (DD) | Longitude (DD) | Structure               | Latitude (DD) | Longitude (DD) |
| Site Entrance           | 39.77838678   | -80.76316840   | Site Entrance           | 39.77838678   | -80.76316840   |
| Center of Well Pad      | 39.77838678   | -80.76316840   | Center of Well Pad      | 39.77838678   | -80.76316840   |



**Well Location Restrictions**

All Well and construction complies with the following restrictions:

- 250' from an existing well or developed spring used for human or domestic animals.
- 625' from an occupied dwelling or barn greater than 2,500 SF used for poultry or dairy inventory from the center of the well.
- 100' from the edge of a disturbance to wetlands, perennial streams, natural or artificial lake, pond or reservoir.
- 500' from the edge of a disturbance to a naturally reproducing trout stream.
- 41,000' of a surface or ground water intake to a public water supply.

(Well Location Restrictions of WV Code 22-6-12)



**As-Built Certification**

The as-built certification certifies that the project was constructed in accordance with the approved plans and specifications. It is not intended to be used for any other purpose.

Zachary C. Summers  
P.E. 22214  
1401 Sycamore Rd. E.  
CVA, WV 26029

**Project Contacts**

**Tug Hill Operating**  
Jonathan White - Regulatory Analyst  
724-853-2000 Cell: 301-649-7675 Cell  
Gail Butler - V.P. Production  
817-632-5200 Cell

**Survey and Engineer**  
Kewell Kelly  
784-338-6533 Cell  
John P. Siz  
304-447-0220 Cell  
Zachary Summers  
304-338-6787 Cell

**Environmental:**  
Weedab Delimitations as provided by Alliant Ecology dated November 6, 2017

**Topographic Information:**  
The topographic information shown herein is based on aerial photography by Dins Mountain Aerial Mapping, Burns, WV

**MISS UTILITY OF WEST VIRGINIA**  
1-800-245-4848  
West Virginia State Law Section 41V, Chapter 24-6 requires that you call the numbers days prior to the start of West Virginia utility work.

**811**  
Know what's below. Call before you dig.

Tug Hill Operating will obtain an Encroachment Permit (Form MM-109) from the WV Department of Transportation, Division of Highways, prior to the commencement of any construction activities.

The WV Mines Website was consulted. Previous (Current) mining activities are not within the ADO.

WVDEP Website files show that there are no active and/or abandoned gas wells within the ADO.

| Floodplain Conditions                                       |              |
|---|--------------|
| Do site construction activities take place in a floodplain? | NO           |
| Permit needed from county floodplain coordinator?           | NO           |
| Flood Hazard Zone   | N/A          |
| Flood Hazard Study completed?                               | N/A          |
| Floodplain shown on drawings?                               | N/A          |
| FIRM Map Number(s) for site                                 | 5001C, 0413E |
| Average of construction in floodplain                       | N/A          |



THIS DOCUMENT PREPARED FOR TUG HILL OPERATING



**Old Crow Well Site**  
Franklin District  
Marshall County, WV

**Cover Sheet**

Date: 02/20/19  
Scale: As Shown  
Designed By: ZS  
File No.  
Sheet 1 of 9

| Sheet | Description                          |
|-------|--------------------------------------|
| 1     | Cover Sheet                          |
| 1     | Schedule of Quantities               |
| 1     | Site Notes                           |
| 2     | Pre-Construction Site Conditions     |
| 3     | Site Soil Map                        |
| 4     | Overall Plan View                    |
| 5     | Plan View                            |
| 6-8   | Cross Sections - Well Pad            |
| 9     | Cross Sections - Access Road         |
| 10    | Geotechnical Exhibit                 |
| 11    | Landward Disturbed Area Exhibit      |
| G1    | Site Reclamation                     |
| M1-M3 | Production Exhibit                   |
| D1-D2 | Erosion and Sediment Control Details |
| R1    | Access Road Details                  |
| P1    | Pad Details                          |

