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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)

Friday, April 12, 2019  
 WELL WORK PERMIT  
 Horizontal 6A / New Drill

TUG HILL OPERATING, LLC  
 380 SOUTHPOINTE BLVD

CANONSBURG, PA 15317


Re: Permit approval for OLD CROW S-16HM  
 47-051-02187-00-00

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 S-16HM  
 Farm Name: DONNA VIVIAN YOHO (TO)   
 U.S. WELL NUMBER: 47-051-02187-00-00  
 Horizontal 6A New Drill  
 Date Issued: 4/12/2019

# 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

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).

## 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 (11/6/2018) 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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Permit well - Old Crow 5-16HM

Wells within 500' Buffer

Note: Well spots depicted on Area of Review map (page 3) are derived from State held coordinates. The spots may differ from those depicted on the Well Plat because the Plat locations represent actual field surveyed locations. Please refer to the Plat for surveyed well spots

API Number	Operator Name	Total Depth	Perforated Fms	Producing zones not perforated	Is this well "known or reasonably expected to penetrate a depth that could be within the range of Fracture propagation"? 1000' is max limit I would assign to wells that might be within in range of fracture propagation	Comments
4705102040	Tug Hill Operating	6689' TVD	None	Unknown	No, currently only a permit. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Permitted Marcellus horizontal well.
4705102023	Tug Hill Operating	6681' TVD	None	Unknown	No, currently only a permit. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Permitted Marcellus horizontal well.
4705102042	Tug Hill Operating	6693' TVD	None	Unknown	No, currently only a permit. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Permitted Marcellus horizontal well.
4705102046	Tug Hill Operating	11395' TVD	None	Unknown	No, currently only a permit. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Permitted Point Pleasant horizontal well.

WV Geological & Economic Survey **Well: County = 51 Permit = 02040** Report Time: Thu

Location Information: [View Map](#)  
 API: 4705102040 COUNTY: Wayne PERMIT: 02040 TAX DISTRICT: QUAD: 26 QUAD: 26 LAY: 00 LON: 00 UTM: 078N  
 STATE: WV DISTRICT: 0000 Permit: 02040

Business Name Location Information:  
 API: 4705102040 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02040

Owner Information:  
 API: 4705102040 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02040

Completion Information:  
 API: 4705102040 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02040

There is no Pay data for this well.  
 There is no Production Gas data for this well.  
 There is no Production Oil data for this well. \*\* some operators may have reported NGL under Oil  
 There is no Production NGL data for this well. \*\* some operators may have reported NGL under Oil  
 There is no Production Water data for this well.  
 There is no Stratigraphy data for this well.  
 There is no Wireline (E-Log) data for this well.  
 There is no Plugging data for this well.  
 There is no Sample data for this well.

WV Geological & Economic Survey **Well: County = 51 Permit = 02023** Report Time: Thu

Location Information: [View Map](#)  
 API: 4705102023 COUNTY: Wayne PERMIT: 02023 TAX DISTRICT: QUAD: 26 QUAD: 26 LAY: 00 LON: 00 UTM: 078N  
 STATE: WV DISTRICT: 0000 Permit: 02023

Business Name Location Information:  
 API: 4705102023 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02023

Owner Information:  
 API: 4705102023 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02023

Completion Information:  
 API: 4705102023 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02023

There is no Pay data for this well.  
 There is no Production Gas data for this well.  
 There is no Production Oil data for this well. \*\* some operators may have reported NGL under Oil  
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 There is no Production Water data for this well.  
 There is no Stratigraphy data for this well.  
 There is no Wireline (E-Log) data for this well.  
 There is no Plugging data for this well.  
 There is no Sample data for this well.

WV Geological & Economic Survey **Well: County = 51 Permit = 02042** Report Time: Thu

Location Information: [View Map](#)  
 API: 4705102042 COUNTY: Wayne PERMIT: 02042 TAX DISTRICT: QUAD: 26 QUAD: 26 LAY: 00 LON: 00 UTM: 078N  
 STATE: WV DISTRICT: 0000 Permit: 02042

Business Name Location Information:  
 API: 4705102042 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02042

Owner Information:  
 API: 4705102042 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02042

Completion Information:  
 API: 4705102042 STATE: WV UTM: 078N LON: 00 LAY: 00  
 STATE: WV DISTRICT: 0000 Permit: 02042

There is no Pay data for this well.  
 There is no Production Gas data for this well.  
 There is no Production Oil data for this well. \*\* some operators may have reported NGL under Oil  
 There is no Production NGL data for this well. \*\* some operators may have reported NGL under Oil  
 There is no Production Water data for this well.  
 There is no Stratigraphy data for this well.  
 There is no Wireline (E-Log) data for this well.  
 There is no Plugging data for this well.  
 There is no Sample data for this well.

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WV Geological & Economic Survey Well: County = 51 Permit = 02046 Report Time: To

Location Information View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_16	QUAD_15	LAT_00	LON_00	UTM_E	UTM_N
42912204	51	02046		160000	160000	42912204	80807000	18	6200000

Bottom Hole Location Information

API	PP_FLAG	TRNG	TRNG	LON_00	LAT_00
42912204	1	42912204	42912204	80807000	42912204

Owner Information

API	CMP_ID	SUFFN	STATUS	SURFACE_OWNER	WELL_NUM	OL_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AC	COMPLETION	PROP_ID	PROP_TRNG	TYM_EST_PR
42912204	001	001	001	001	001	001	001	001	001	001	001	001	001	001

Completion Information

API	CMP_ID	SUFFN	FIELD	DEEPEST_FM	DEEPEST_FTH	INITIAL_CLASS	FINAL_CLASS	TYPE	NO	CMP_MTHD	TVD	NEW_FTH	R00	O_BEF	G_AFT	O_BEF	G_AFT	NGL_BEF	NGL_A
42912204	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001

There is no Pay data for this well

There is no Production Gas data for this well

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

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

There is no Production Water data for this well

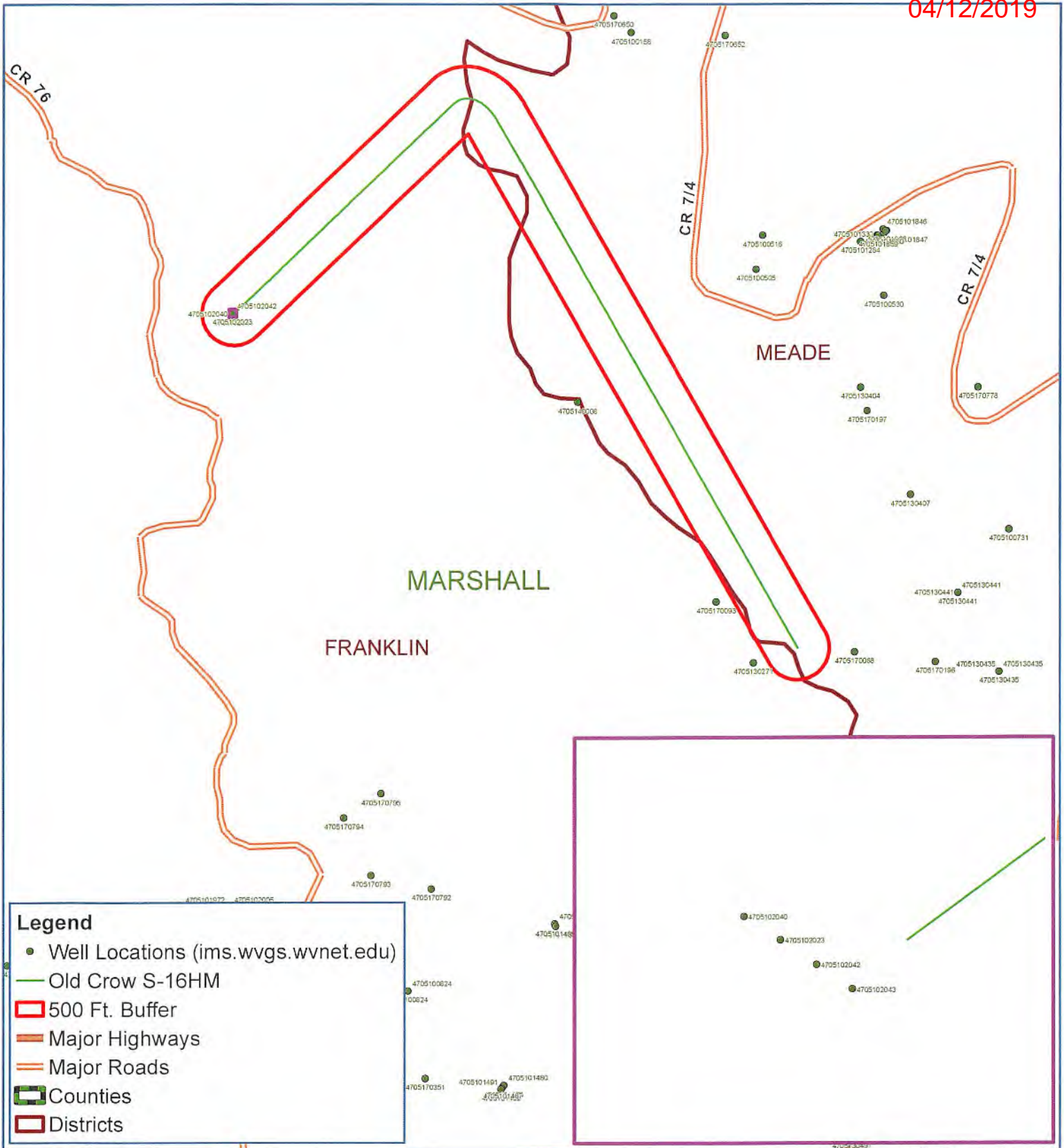
There is no Stratigraphy data for this well

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

There is no Plugging data for this well

There is no Sample data for this well

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**Legend**

- Well Locations (ims.wvgs.wvnet.edu)
- Old Crow S-16HM
- 500 Ft. Buffer
- Major Highways
- Major Roads
- ▭ Counties
- ▭ Districts



# Old Crow S - 16HM

## Franklin District

### Marshall County, WV



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

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Map Prepared by:



WW-6B  
(04/15)

4705102187  
04/12/2019  
API NO. 47-051 -  
OPERATOR WELL NO. Old Crow S-16HM  
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 7  
Operator ID      County      District      Quadrangle

2) Operator's Well Number: Old Crow S-16HM      Well Pad Name: Old Crow

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

4) Elevation, current ground: 1286'      Elevation, proposed post-construction: 1264.99'

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

Other \_\_\_\_\_

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

Horizontal

6) Existing Pad: Yes or No No

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

Marcellus is the target formation at a depth of 6579' - 8630', thickness of 51' and an anticipated approximate pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6,730'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 18,460'

11) Proposed Horizontal Leg Length: 9,484'

12) Approximate Fresh Water Strata Depths: 70'; 981'

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

14) Approximate Saltwater Depths: 1,740'

15) Approximate Coal Seam Depths: Sewickley Coal - 890' and Pittsburgh Coal - 975'

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: \_\_\_\_\_ FEB 12 2019

Depth: \_\_\_\_\_ WV Department of

Seam: \_\_\_\_\_ Environmental Protection

Owner: \_\_\_\_\_



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 <sup>3</sup> (CTS)
Fresh Water	13 3/8"	NEW	J55	54.5#	1,076'	1,076'	1104ft <sup>3</sup> (CTS)
Coal	13 3/8"	NEW	J55	54.5#	1,076'	1,076'	1104ft <sup>3</sup> (CTS)
Intermediate	9 5/8"	NEW	J55	36#	3,329'	3,329'	1096ft <sup>3</sup> (CTS)
Production	5 1/2"	NEW	P110	20#	18,460'	18,460'	4721ft <sup>3</sup> (CTS)
Tubing	2 3/8"	NEW	N80	4.7#	7,278'		
Liners							

*JW*  
*11/7/18*

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	1.0	2,333	1,866	CLASS A	1.2
Fresh Water	13 3/8"	17.5"	.33	2,740	2,192	SEE #24	1.2
Coal	13 3/8"	17.5"	.33	2,740	2,192	SEE #24	1.2
Intermediate	9 5/8"	12 1/4"	.352	3,520	2,816	SEE #24	1.19
Production	5 1/2"	8 7/8" _ 8 3/4"	.361	12,640	10,112	SEE #24	1.17/1.19
Tubing	2 3/8"		.19	11,200	8,960		
Liners							

PACKERS

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

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*Handwritten signature and date: 11/2/18*

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

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

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

Well to completed with approximately 23,710,000 lb. proppant and 366,574 barrels of water. Max rate = 80bpm; max psi = 9,000#.

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

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

\*See attachment

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25) Proposed borehole conditioning procedures:

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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.

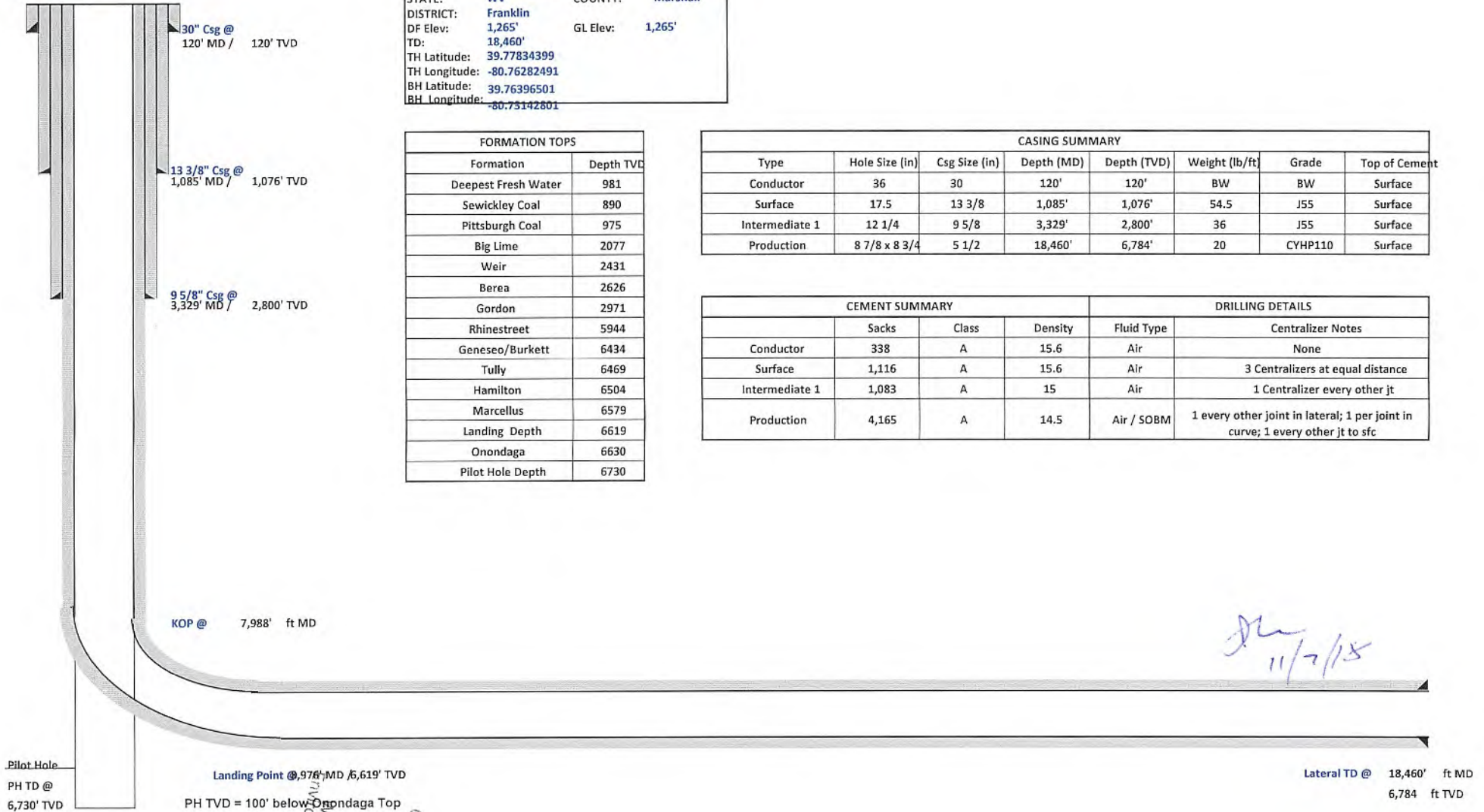


WELL NAME: Old Crow S-16HM  
 STATE: WV COUNTY: Marshall  
 DISTRICT: Franklin  
 DF Elev: 1,265' GL Elev: 1,265'  
 TD: 18,460'  
 TH Latitude: 39.77834399  
 TH Longitude: -80.76282491  
 BH Latitude: 39.76396501  
 BH Longitude: -80.75142801

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	981
Sewickley Coal	890
Pittsburgh Coal	975
Big Lime	2077
Weir	2431
Berea	2626
Gordon	2971
Rhinestreet	5944
Geneseo/Burkett	6434
Tully	6469
Hamilton	6504
Marcellus	6579
Landing Depth	6619
Onondaga	6630
Pilot Hole Depth	6730

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	120'	120'	BW	BW	Surface
Surface	17.5	13 3/8	1,085'	1,076'	54.5	J55	Surface
Intermediate 1	12 1/4	9 5/8	3,329'	2,800'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	18,460'	6,784'	20	CYHP110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	1,116	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	1,083	A	15	Air	1 Centralizer every other jt
Production	4,165	A	14.5	Air / SOBM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc



*Handwritten signature and date: 11/2/15*

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Landing Point @ 9,976' MD / 6,619' TVD  
 PH TVD = 100' below Onondaga Top



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

**Old Crow S-16HM**

**Casing**

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	13 3/8"	J55	17 1/2"	1,085'	CTS
Intermediate	9 5/8"	J55	12 1/4"	3,329'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4"	18,460'	CTS

**Cement**

- Conductor: Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Conductor Cement mixed at 15.6 ppg, Y=1.2
- Surface: Premium NE-1 + 2% bwoc CaC12 + 46.5% Fresh Water – Surface Cement mixed at 15.6 ppg, Y=1.2
- Intermediate: Premium NE-1 + 1% bwoc CaC12 + 46.5% Fresh Water – Intermediate Cement mixed at 15.6 ppg, Y=1.19
- Kick Off Plug: Class H Cement + 1% CD-32 + .7% Sodium Metasilicate + .1% R-3 + .75 gal/100sk FP-13L - KOP Plug
- Production: 50:50 Poz: Premium NE-1 + .1% bwoc ASA-301 + 60lb/sk ASCA-1 + .35% bwoc BA-10A + .25% bwoc MPA-170, 44 lb sack + .5% bwoc R-3 + .75 gals/100sk FP-13L – Production Cement mixed at 15.2ppg, Y = 1.19

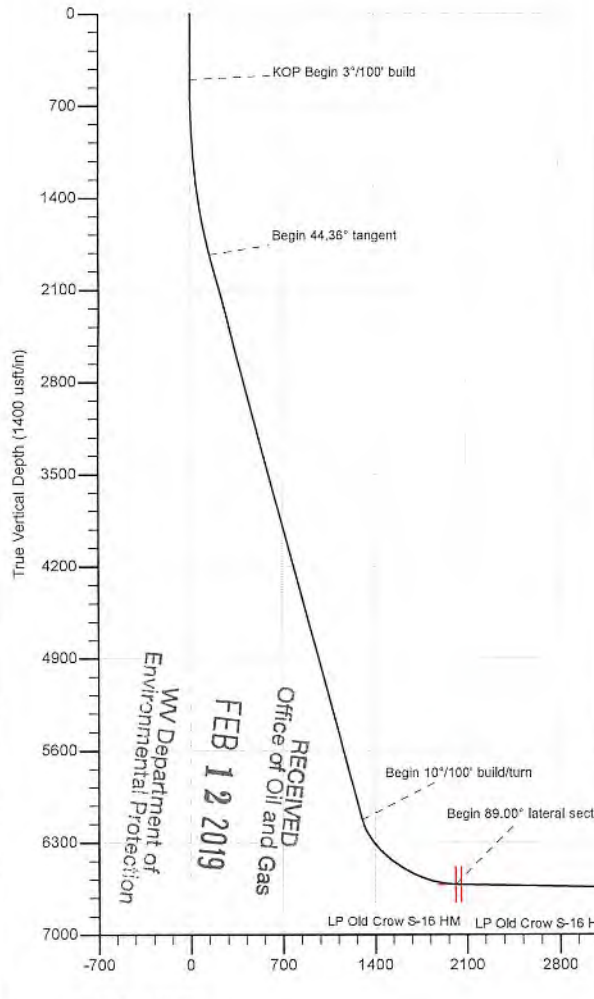
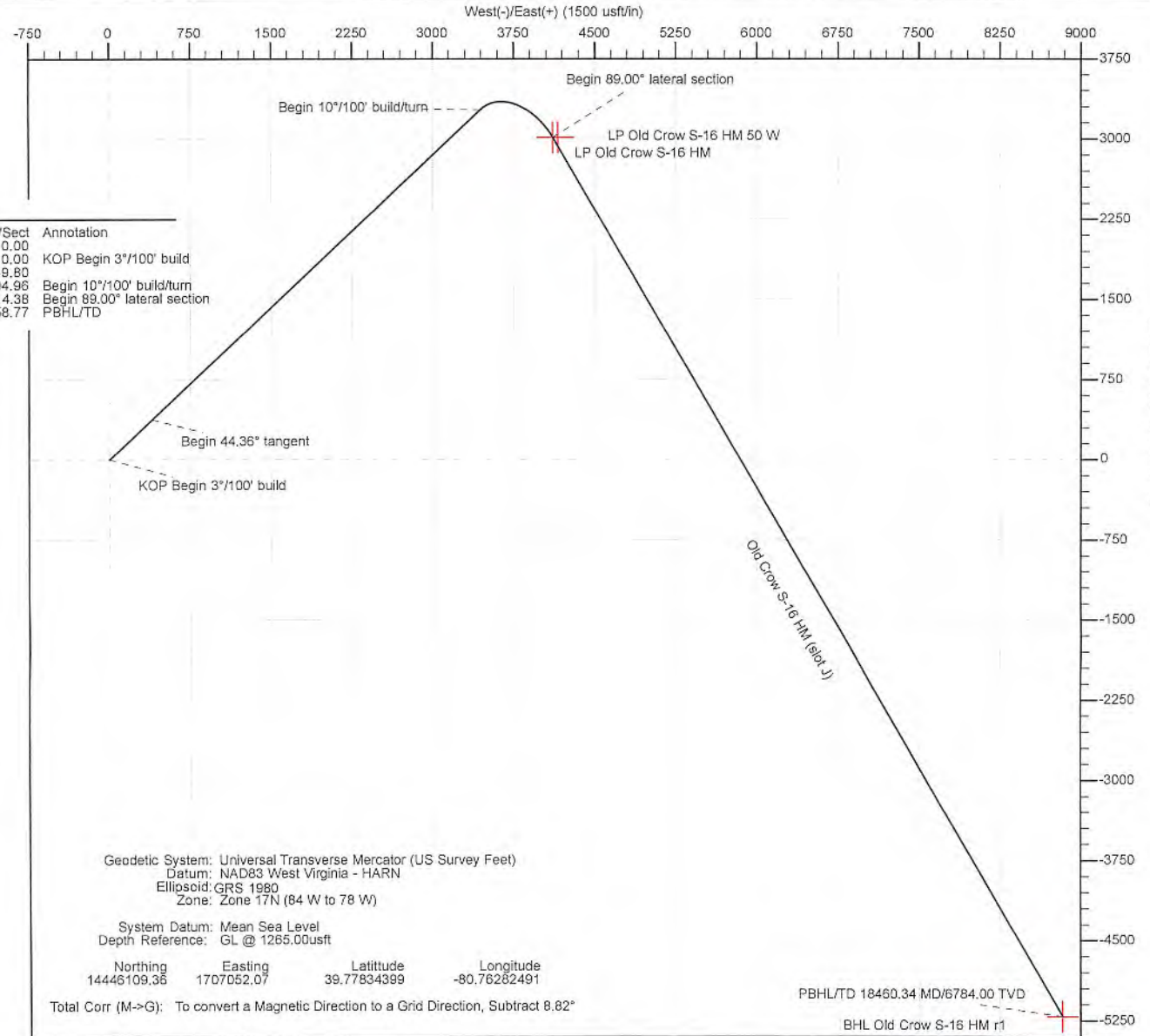
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Well: Old Crow S-16 HM (slot J)  
 Site: Old Crow Pad  
 Project: Marshall County, West Virginia.  
 Design: rev1

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	500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 3°/100' build
3	1979.69	44.39	48.48	1838.04	375.38	395.26	3.00	48.48	149.80	
4	7988.46	44.39	48.48	6129.82	3270.00	3443.19	0.00	0.00	1304.96	Begin 10°/100' build/turn
5	8976.30	89.00	150.14	6819.00	3012.48	4114.91	10.00	100.55	2014.38	Begin 89.00° lateral section
6	18460.34	89.00	150.14	6784.00	-5210.87	8836.81	0.00	0.00	0258.77	PBHL/TD



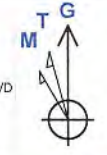
Geodetic System: Universal Transverse Mercator (US Survey Feet)  
 Datum: NAD83 West Virginia - HARN  
 Ellipsoid: GRS 1980  
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level  
 Depth Reference: GL @ 1265.00usft

Northing	Easting	Latitude	Longitude
14446109.36	1707052.07	39.77834399	-80.76282491

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

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

Magnetic Field  
 Strength: 52106.45nT  
 Dip Angle: 68.91°  
 Date: 1/22/2018  
 Model: IGRF2015





Planning Report - Geographic



Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Old Crow S-16 HM (slot J)
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 S-16 HM (slot J)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev1		

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 S-16 HM (slot J)					
Well Position	+N/-S	0.00 usft	Northing:	14,446,109.36 usft	Latitude:	39.77834399
	+E/-W	0.00 usft	Easting:	1,707,052.07 usft	Longitude:	-80.76282491
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	52,106.35212131

Design	rev1				
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	120.53	

Plan Survey Tool Program	Date	10/23/2018			
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks	
1	0.00	18,460.35 rev1 (Original Hole)	MWD	MWD - Standard	

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Plan Sections	WV Department of Environmental Protection										
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		
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00		
1,979.69	44.39	46.48	1,836.04	375.38	395.26	3.00	3.00	0.00	46.48		
7,988.46	44.39	46.48	6,129.82	3,270.00	3,443.19	0.00	0.00	0.00	0.00		
8,976.30	89.00	150.14	6,619.00	3,012.48	4,114.91	10.00	4.52	10.49	100.55	LP Old Crow S-16 HM	
18,460.35	89.00	150.14	6,784.00	-5,210.87	8,836.81	0.00	0.00	0.00	0.00	BHL Old Crow S-16 H	



Planning Report - Geographic



Database: DB\_Jul2216dt\_v14  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia.  
 Site: Old Crow Pad  
 Well: Old Crow S-16 HM (slot J)  
 Wellbore: Original Hole  
 Design: rev1

Local Co-ordinate Reference: Well Old Crow S-16 HM (slot J)  
 TVD Reference: GL @ 1265.00usft  
 MD Reference: GL @ 1265.00usft  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

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Planned Survey

WV Department of  
 Environmental Protection

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	14,446,109.36	1,707,052.07	39.77834399	-80.76282491
100.00	0.00	0.00	100.00	0.00	0.00	14,446,109.36	1,707,052.07	39.77834399	-80.76282491
200.00	0.00	0.00	200.00	0.00	0.00	14,446,109.36	1,707,052.07	39.77834399	-80.76282491
300.00	0.00	0.00	300.00	0.00	0.00	14,446,109.36	1,707,052.07	39.77834399	-80.76282491
400.00	0.00	0.00	400.00	0.00	0.00	14,446,109.36	1,707,052.07	39.77834399	-80.76282491
500.00	0.00	0.00	500.00	0.00	0.00	14,446,109.36	1,707,052.07	39.77834399	-80.76282491
<b>KOP Begin 3°/100' build</b>									
600.00	3.00	46.48	599.95	1.80	1.90	14,446,111.16	1,707,053.97	39.77834893	-80.76281814
700.00	6.00	46.48	699.63	7.20	7.59	14,446,116.56	1,707,059.66	39.77836372	-80.76279784
800.00	9.00	46.48	798.77	16.19	17.05	14,446,125.55	1,707,069.12	39.77838834	-80.76276407
900.00	12.00	46.48	897.08	28.74	30.26	14,446,138.10	1,707,082.34	39.77842270	-80.76271693
1,000.00	15.00	46.48	994.31	44.81	47.19	14,446,154.17	1,707,099.26	39.77846672	-80.76265653
1,100.00	18.00	46.48	1,090.18	64.37	67.78	14,446,173.73	1,707,119.85	39.77852028	-80.76258306
1,200.00	21.00	46.48	1,184.43	87.35	91.98	14,446,196.71	1,707,144.05	39.77858322	-80.76249670
1,300.00	24.00	46.48	1,276.81	113.70	119.73	14,446,223.06	1,707,171.80	39.77865538	-80.76239770
1,400.00	27.00	46.48	1,367.06	143.35	150.94	14,446,252.71	1,707,203.01	39.77873657	-80.76228632
1,500.00	30.00	46.48	1,454.93	176.20	185.54	14,446,285.56	1,707,237.61	39.77882654	-80.76216288
1,600.00	33.00	46.48	1,540.18	212.18	223.42	14,446,321.54	1,707,275.49	39.77892507	-80.76202770
1,700.00	36.00	46.48	1,622.59	251.18	264.48	14,446,360.54	1,707,316.56	39.77903187	-80.76188117
1,800.00	39.00	46.48	1,701.91	293.10	308.62	14,446,402.46	1,707,360.69	39.77914667	-80.76172367
1,900.00	42.00	46.48	1,777.95	337.82	355.71	14,446,447.17	1,707,407.78	39.77926913	-80.76155565
1,978.60	44.36	46.48	1,835.25	374.85	394.70	14,446,484.21	1,707,446.77	39.77937055	-80.76141651
<b>Begin 44.36° tangent</b>									
1,979.69	44.39	46.48	1,836.04	375.38	395.26	14,446,484.73	1,707,447.33	39.77937199	-80.76141453
2,000.00	44.39	46.48	1,850.55	385.16	405.56	14,446,494.52	1,707,457.63	39.77939879	-80.76137777
2,100.00	44.39	46.48	1,922.01	433.33	456.28	14,446,542.69	1,707,508.36	39.77953071	-80.76119677
2,200.00	44.39	46.48	1,993.47	481.51	507.01	14,446,590.86	1,707,559.08	39.77966264	-80.76101576
2,300.00	44.39	46.48	2,064.93	529.68	557.73	14,446,639.04	1,707,609.81	39.77979456	-80.76083476
2,400.00	44.39	46.48	2,136.38	577.85	608.46	14,446,687.21	1,707,660.53	39.77992649	-80.76065375
2,500.00	44.39	46.48	2,207.84	626.03	659.18	14,446,735.38	1,707,711.25	39.78005841	-80.76047275
2,600.00	44.39	46.48	2,279.30	674.20	709.91	14,446,783.56	1,707,761.98	39.78019034	-80.76029174
2,700.00	44.39	46.48	2,350.76	722.37	760.63	14,446,831.73	1,707,812.70	39.78032226	-80.76011073
2,800.00	44.39	46.48	2,422.22	770.55	811.36	14,446,879.90	1,707,863.43	39.78045419	-80.75992973
2,900.00	44.39	46.48	2,493.68	818.72	862.08	14,446,928.08	1,707,914.15	39.78058611	-80.75974872
3,000.00	44.39	46.48	2,565.14	866.89	912.81	14,446,976.25	1,707,964.88	39.78071803	-80.75956771
3,100.00	44.39	46.48	2,636.59	915.07	963.53	14,447,024.42	1,708,015.60	39.78084996	-80.75938670
3,200.00	44.39	46.48	2,708.05	963.24	1,014.25	14,447,072.60	1,708,066.33	39.78098188	-80.75920569
3,300.00	44.39	46.48	2,779.51	1,011.41	1,064.98	14,447,120.77	1,708,117.05	39.78111380	-80.75902468
3,400.00	44.39	46.48	2,850.97	1,059.59	1,115.70	14,447,168.95	1,708,167.78	39.78124573	-80.75884367
3,500.00	44.39	46.48	2,922.43	1,107.76	1,166.43	14,447,217.12	1,708,218.50	39.78137765	-80.75866265
3,600.00	44.39	46.48	2,993.89	1,155.93	1,217.15	14,447,265.29	1,708,269.23	39.78150957	-80.75848164
3,700.00	44.39	46.48	3,065.35	1,204.11	1,267.88	14,447,313.47	1,708,319.95	39.78164149	-80.75830063
3,800.00	44.39	46.48	3,136.80	1,252.28	1,318.60	14,447,361.64	1,708,370.68	39.78177341	-80.75811961
3,900.00	44.39	46.48	3,208.26	1,300.45	1,369.33	14,447,409.81	1,708,421.40	39.78190533	-80.75793860
4,000.00	44.39	46.48	3,279.72	1,348.63	1,420.05	14,447,457.99	1,708,472.13	39.78203725	-80.75775758
4,100.00	44.39	46.48	3,351.18	1,396.80	1,470.78	14,447,506.16	1,708,522.85	39.78216917	-80.75757657
4,200.00	44.39	46.48	3,422.64	1,444.97	1,521.50	14,447,554.33	1,708,573.57	39.78230109	-80.75739555
4,300.00	44.39	46.48	3,494.10	1,493.15	1,572.23	14,447,602.51	1,708,624.30	39.78243301	-80.75721453
4,400.00	44.39	46.48	3,565.56	1,541.32	1,622.95	14,447,650.68	1,708,675.02	39.78256493	-80.75703351
4,500.00	44.39	46.48	3,637.01	1,589.49	1,673.68	14,447,698.85	1,708,725.75	39.78269685	-80.75685249
4,600.00	44.39	46.48	3,708.47	1,637.67	1,724.40	14,447,747.03	1,708,776.47	39.78282877	-80.75667147
4,700.00	44.39	46.48	3,779.93	1,685.84	1,775.13	14,447,795.20	1,708,827.20	39.78296069	-80.75649045
4,800.00	44.39	46.48	3,851.39	1,734.01	1,825.85	14,447,843.37	1,708,877.92	39.78309261	-80.75630943
4,900.00	44.39	46.48	3,922.85	1,782.19	1,876.57	14,447,891.55	1,708,928.65	39.78322452	-80.75612841



Planning Report - Geographic



Database: DB\_Jul2216dt\_v14  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia.  
 Site: Old Crow Pad  
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 Wellbore: Original Hole  
 Design: rev1

Local Co-ordinate Reference: Well Old Crow S-16 HM (slot J)  
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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	
5,000.00	44.39	46.48	3,994.31	1,830.36	1,927.30	14,447,939.72	1,708,979.37	39.78335644	-80.75594738	
5,100.00	44.39	46.48	4,065.77	1,878.54	1,978.02	14,447,987.89	1,709,030.10	39.78348836	-80.75576636	
5,200.00	44.39	46.48	4,137.22	1,926.71	2,028.75	14,448,036.07	1,709,080.82	39.78362028	-80.75558534	
5,300.00	44.39	46.48	4,208.68	1,974.88	2,079.47	14,448,084.24	1,709,131.55	39.78375219	-80.75540431	
5,400.00	44.39	46.48	4,280.14	2,023.06	2,130.20	14,448,132.41	1,709,182.27	39.78388411	-80.75522329	
5,500.00	44.39	46.48	4,351.60	2,071.23	2,180.92	14,448,180.59	1,709,233.00	39.78401603	-80.75504226	
5,600.00	44.39	46.48	4,423.06	2,119.40	2,231.65	14,448,228.76	1,709,283.72	39.78414794	-80.75486123	
5,700.00	44.39	46.48	4,494.52	2,167.58	2,282.37	14,448,276.93	1,709,334.45	39.78427986	-80.75468021	
5,800.00	44.39	46.48	4,565.98	2,215.75	2,333.10	14,448,325.11	1,709,385.17	39.78441177	-80.75449918	
5,900.00	44.39	46.48	4,637.43	2,263.92	2,383.82	14,448,373.28	1,709,435.89	39.78454369	-80.75431815	
6,000.00	44.39	46.48	4,708.89	2,312.10	2,434.55	14,448,421.45	1,709,486.62	39.78467560	-80.75413712	
6,100.00	44.39	46.48	4,780.35	2,360.27	2,485.27	14,448,469.63	1,709,537.34	39.78480752	-80.75395609	
6,200.00	44.39	46.48	4,851.81	2,408.44	2,536.00	14,448,517.80	1,709,588.07	39.78493943	-80.75377506	
6,300.00	44.39	46.48	4,923.27	2,456.62	2,586.72	14,448,565.97	1,709,638.79	39.78507135	-80.75359403	
6,400.00	44.39	46.48	4,994.73	2,504.79	2,637.45	14,448,614.15	1,709,689.52	39.78520326	-80.75341299	
6,500.00	44.39	46.48	5,066.19	2,552.96	2,688.17	14,448,662.32	1,709,740.24	39.78533517	-80.75323196	
6,600.00	44.39	46.48	5,137.64	2,601.14	2,738.89	14,448,710.49	1,709,790.97	39.78546709	-80.75305093	
6,700.00	44.39	46.48	5,209.10	2,649.31	2,789.62	14,448,758.67	1,709,841.69	39.78559900	-80.75286999	
6,800.00	44.39	46.48	5,280.56	2,697.48	2,840.34	14,448,806.84	1,709,892.42	39.78573091	-80.75268886	
6,900.00	44.39	46.48	5,352.02	2,745.66	2,891.07	14,448,855.01	1,709,943.14	39.78586282	-80.75250782	
7,000.00	44.39	46.48	5,423.48	2,793.83	2,941.79	14,448,903.19	1,709,993.87	39.78599474	-80.75232678	
7,100.00	44.39	46.48	5,494.94	2,842.00	2,992.52	14,448,951.36	1,710,044.59	39.78612665	-80.75214575	
7,200.00	44.39	46.48	5,566.40	2,890.18	3,043.24	14,448,999.53	1,710,095.32	39.78625856	-80.75196471	
7,300.00	44.39	46.48	5,637.85	2,938.35	3,093.97	14,449,047.71	1,710,146.04	39.78639047	-80.75178367	
7,400.00	44.39	46.48	5,709.31	2,986.52	3,144.69	14,449,095.88	1,710,196.77	39.78652238	-80.75160263	
7,500.00	44.39	46.48	5,780.77	3,034.70	3,195.42	14,449,144.05	1,710,247.49	39.78665429	-80.75142159	
7,600.00	44.39	46.48	5,852.23	3,082.87	3,246.14	14,449,192.23	1,710,298.21	39.78678620	-80.75124055	
7,700.00	44.39	46.48	5,923.69	3,131.04	3,296.87	14,449,240.40	1,710,348.94	39.78691811	-80.75105951	
7,800.00	44.39	46.48	5,995.15	3,179.22	3,347.59	14,449,288.57	1,710,399.66	39.78705002	-80.75087847	
7,900.00	44.39	46.48	6,066.61	3,227.39	3,398.32	14,449,336.75	1,710,450.39	39.78718193	-80.75069742	
7,988.46	44.39	46.48	6,129.82	3,270.00	3,443.19	14,449,379.36	1,710,495.26	39.78729862	-80.75053727	
<b>Begin 10°/100' build/turn</b>										
8,000.00	44.19	48.11	6,138.08	3,275.47	3,449.11	14,449,384.83	1,710,501.18	39.78731358	-80.75051614	
8,100.00	43.46	62.53	6,210.41	3,314.71	3,505.71	14,449,424.07	1,710,557.78	39.78742091	-80.75031427	
8,200.00	44.55	76.86	6,282.51	3,338.61	3,570.55	14,449,447.97	1,710,622.62	39.78748605	-80.75008323	
8,300.00	47.33	90.24	6,352.21	3,346.45	3,641.65	14,449,455.81	1,710,693.72	39.78750703	-80.74983004	
8,400.00	51.52	102.22	6,417.38	3,337.99	3,716.86	14,449,447.35	1,710,768.93	39.78748322	-80.74956241	
8,500.00	56.78	112.73	6,476.04	3,313.48	3,793.88	14,449,422.84	1,710,845.96	39.78741533	-80.74928846	
8,600.00	62.81	121.96	6,526.41	3,273.68	3,870.39	14,449,383.04	1,710,922.46	39.78730542	-80.74901651	
8,700.00	69.39	130.21	6,566.96	3,219.78	3,944.05	14,449,329.14	1,710,996.12	39.78715685	-80.74875484	
8,800.00	76.33	137.75	6,596.45	3,153.44	4,012.63	14,449,262.79	1,711,064.70	39.78697412	-80.74851139	
8,900.00	83.48	144.86	6,613.99	3,076.65	4,074.04	14,449,186.01	1,711,126.11	39.78676278	-80.74829355	
8,976.30	89.00	150.14	6,619.00	3,012.48	4,114.91	14,449,121.84	1,711,166.98	39.78658623	-80.74814871	
<b>Begin 89.00° lateral section</b>										
9,000.00	89.00	150.14	6,619.41	2,991.94	4,126.71	14,449,101.29	1,711,178.78	39.78652971	-80.74810691	
9,100.00	89.00	150.14	6,621.15	2,905.23	4,176.50	14,449,014.59	1,711,228.57	39.78629120	-80.74793055	
9,200.00	89.00	150.14	6,622.89	2,818.52	4,226.28	14,448,927.88	1,711,278.36	39.78605270	-80.74775419	
9,300.00	89.00	150.14	6,624.63	2,731.81	4,276.07	14,448,841.17	1,711,328.15	39.78581419	-80.74757783	
9,400.00	89.00	150.14	6,626.37	2,645.11	4,325.86	14,448,754.46	1,711,377.93	39.78557568	-80.74740148	
9,500.00	89.00	150.14	6,628.11	2,558.40	4,375.65	14,448,667.76	1,711,427.72	39.78533718	-80.74722512	
9,600.00	89.00	150.14	6,629.85	2,471.69	4,425.44	14,448,581.05	1,711,477.51	39.78509867	-80.74704877	
9,700.00	89.00	150.14	6,631.59	2,384.98	4,475.22	14,448,494.34	1,711,527.30	39.78486016	-80.74687241	
9,800.00	89.00	150.14	6,633.33	2,298.28	4,525.01	14,448,407.64	1,711,577.08	39.78462165	-80.74669606	
9,900.00	89.00	150.14	6,635.07	2,211.57	4,574.80	14,448,320.93	1,711,626.87	39.78438314	-80.74651971	

WV Department of Environmental Protection





Planning Report - Geographic



<b>Database:</b>	DB_Jul2216dt_v14	<b>Local Co-ordinate Reference:</b>	Well Old Crow S-16 HM (slot J)
<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 S-16 HM (slot J)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev1		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,000.00	89.00	150.14	6,636.81	2,124.86	4,624.59	14,448,234.22	1,711,676.66	39.78414464	-80.74634336	
10,100.00	89.00	150.14	6,638.55	2,038.16	4,674.38	14,448,147.51	1,711,726.45	39.78390613	-80.74616701	
10,200.00	89.00	150.14	6,640.29	1,951.45	4,724.16	14,448,060.81	1,711,776.24	39.78366762	-80.74599067	
10,300.00	89.00	150.14	6,642.03	1,864.74	4,773.95	14,447,974.10	1,711,826.02	39.78342911	-80.74581432	
10,400.00	89.00	150.14	6,643.77	1,778.03	4,823.74	14,447,887.39	1,711,875.81	39.78319060	-80.74563798	
10,500.00	89.00	150.14	6,645.51	1,691.33	4,873.53	14,447,800.69	1,711,925.60	39.78295209	-80.74546163	
10,600.00	89.00	150.14	6,647.25	1,604.62	4,923.31	14,447,713.98	1,711,975.39	39.78271358	-80.74528529	
10,700.00	89.00	150.14	6,648.99	1,517.91	4,973.10	14,447,627.27	1,712,025.18	39.78247507	-80.74510895	
10,800.00	89.00	150.14	6,650.73	1,431.21	5,022.89	14,447,540.56	1,712,074.96	39.78223656	-80.74493261	
10,900.00	89.00	150.14	6,652.47	1,344.50	5,072.68	14,447,453.86	1,712,124.75	39.78199805	-80.74475627	
11,000.00	89.00	150.14	6,654.21	1,257.79	5,122.47	14,447,367.15	1,712,174.54	39.78175954	-80.74457994	
11,100.00	89.00	150.14	6,655.95	1,171.08	5,172.25	14,447,280.44	1,712,224.33	39.78152102	-80.74440360	
11,200.00	89.00	150.14	6,657.69	1,084.38	5,222.04	14,447,193.73	1,712,274.12	39.78128251	-80.74422727	
11,300.00	89.00	150.14	6,659.43	997.67	5,271.83	14,447,107.03	1,712,323.90	39.78104400	-80.74405093	
11,400.00	89.00	150.14	6,661.17	910.96	5,321.62	14,447,020.32	1,712,373.69	39.78080549	-80.74387460	
11,500.00	89.00	150.14	6,662.91	824.26	5,371.41	14,446,933.61	1,712,423.48	39.78056698	-80.74369827	
11,600.00	89.00	150.14	6,664.65	737.55	5,421.19	14,446,846.91	1,712,473.27	39.78032846	-80.74352194	
11,700.00	89.00	150.14	6,666.39	650.84	5,470.98	14,446,760.20	1,712,523.05	39.78008995	-80.74334561	
11,800.00	89.00	150.14	6,668.13	564.13	5,520.77	14,446,673.49	1,712,572.84	39.77985144	-80.74316928	
11,900.00	89.00	150.14	6,669.87	477.43	5,570.56	14,446,586.78	1,712,622.63	39.77961292	-80.74299296	
12,000.00	89.00	150.14	6,671.61	390.72	5,620.35	14,446,500.08	1,712,672.42	39.77937441	-80.74281663	
12,100.00	89.00	150.14	6,673.35	304.01	5,670.13	14,446,413.37	1,712,722.21	39.77913589	-80.74264031	
12,200.00	89.00	150.14	6,675.08	217.30	5,719.92	14,446,326.66	1,712,771.99	39.77889738	-80.74246399	
12,300.00	89.00	150.14	6,676.82	130.60	5,769.71	14,446,239.96	1,712,821.78	39.77865886	-80.74228766	
12,400.00	89.00	150.14	6,678.56	43.89	5,819.50	14,446,153.25	1,712,871.57	39.77842035	-80.74211134	
12,500.00	89.00	150.14	6,680.30	-42.82	5,869.28	14,446,066.54	1,712,921.36	39.77818183	-80.74193502	
12,600.00	89.00	150.14	6,682.04	-129.52	5,919.07	14,445,979.83	1,712,971.15	39.77794332	-80.74175871	
12,700.00	89.00	150.14	6,683.78	-216.23	5,968.86	14,445,893.13	1,713,020.93	39.77770480	-80.74158239	
12,800.00	89.00	150.14	6,685.52	-302.94	6,018.65	14,445,806.42	1,713,070.72	39.77746629	-80.74140608	
12,900.00	89.00	150.14	6,687.26	-389.65	6,068.44	14,445,719.71	1,713,120.51	39.77722777	-80.74122976	
13,000.00	89.00	150.14	6,689.00	-476.35	6,118.22	14,445,633.01	1,713,170.30	39.77698925	-80.74105345	
13,100.00	89.00	150.14	6,690.74	-563.06	6,168.01	14,445,546.30	1,713,220.09	39.77675074	-80.74087714	
13,200.00	89.00	150.14	6,692.48	-649.77	6,217.80	14,445,459.59	1,713,269.87	39.77651222	-80.74070083	
13,300.00	89.00	150.14	6,694.22	-736.47	6,267.59	14,445,372.88	1,713,319.66	39.77627370	-80.74052452	
13,400.00	89.00	150.14	6,695.96	-823.18	6,317.38	14,445,286.18	1,713,369.45	39.77603518	-80.74034821	
13,500.00	89.00	150.14	6,697.70	-909.89	6,367.16	14,445,199.47	1,713,419.24	39.77579667	-80.74017190	
13,600.00	89.00	150.14	6,699.44	-996.60	6,416.95	14,445,112.76	1,713,469.02	39.77555815	-80.73999560	
13,700.00	89.00	150.14	6,701.18	-1,083.30	6,466.74	14,445,026.05	1,713,518.81	39.77531963	-80.73981929	
13,800.00	89.00	150.14	6,702.92	-1,170.01	6,516.53	14,444,939.35	1,713,568.60	39.77508111	-80.73964299	
13,900.00	89.00	150.14	6,704.66	-1,256.72	6,566.32	14,444,852.64	1,713,618.39	39.77484259	-80.73946669	
14,000.00	89.00	150.14	6,706.40	-1,343.42	6,616.10	14,444,765.93	1,713,668.18	39.77460407	-80.73929039	
14,100.00	89.00	150.14	6,708.14	-1,430.13	6,665.89	14,444,679.23	1,713,717.96	39.77436555	-80.73911409	
14,200.00	89.00	150.14	6,709.88	-1,516.84	6,715.68	14,444,592.52	1,713,767.75	39.77412703	-80.73893779	
14,300.00	89.00	150.14	6,711.62	-1,603.55	6,765.47	14,444,505.81	1,713,817.54	39.77388851	-80.73876149	
14,400.00	89.00	150.14	6,713.36	-1,690.25	6,815.25	14,444,419.10	1,713,867.33	39.77364999	-80.73858520	
14,500.00	89.00	150.14	6,715.10	-1,776.96	6,865.04	14,444,332.40	1,713,917.12	39.77341147	-80.73840890	
14,600.00	89.00	150.14	6,716.84	-1,863.67	6,914.83	14,444,245.69	1,713,966.90	39.77317295	-80.73823261	
14,700.00	89.00	150.14	6,718.58	-1,950.38	6,964.62	14,444,158.98	1,714,016.69	39.77293443	-80.73805632	
14,800.00	89.00	150.14	6,720.32	-2,037.08	7,014.41	14,444,072.28	1,714,066.48	39.77269591	-80.73788002	
14,900.00	89.00	150.14	6,722.06	-2,123.79	7,064.19	14,443,985.57	1,714,116.27	39.77245738	-80.73770373	
15,000.00	89.00	150.14	6,723.80	-2,210.50	7,113.98	14,443,898.86	1,714,166.06	39.77221886	-80.73752745	
15,100.00	89.00	150.14	6,725.54	-2,297.20	7,163.77	14,443,812.15	1,714,215.84	39.77198034	-80.73735116	
15,200.00	89.00	150.14	6,727.28	-2,383.91	7,213.56	14,443,725.45	1,714,265.63	39.77174182	-80.73717487	
15,300.00	89.00	150.14	6,729.02	-2,470.62	7,263.35	14,443,638.74	1,714,315.42	39.77150329	-80.73699859	
15,400.00	89.00	150.14	6,730.76	-2,557.33	7,313.13	14,443,552.03	1,714,365.21	39.77126477	-80.73682230	



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<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 S-16 HM (slot J)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev1		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
15,500.00	89.00	150.14	6,732.50	-2,644.03	7,362.92	14,443,465.32	1,714,414.99	39.77102625	-80.73664802	
15,600.00	89.00	150.14	6,734.24	-2,730.74	7,412.71	14,443,378.62	1,714,464.78	39.77078772	-80.73646974	
15,700.00	89.00	150.14	6,735.98	-2,817.45	7,462.50	14,443,291.91	1,714,514.57	39.77054920	-80.73629346	
15,800.00	89.00	150.14	6,737.72	-2,904.15	7,512.29	14,443,205.20	1,714,564.36	39.77031067	-80.73611718	
15,900.00	89.00	150.14	6,739.46	-2,990.86	7,562.07	14,443,118.50	1,714,614.15	39.77007215	-80.73594090	
16,000.00	89.00	150.14	6,741.20	-3,077.57	7,611.86	14,443,031.79	1,714,663.93	39.76983362	-80.73576463	
16,100.00	89.00	150.14	6,742.94	-3,164.28	7,661.65	14,442,945.08	1,714,713.72	39.76959510	-80.73558835	
16,200.00	89.00	150.14	6,744.68	-3,250.98	7,711.44	14,442,858.37	1,714,763.51	39.76935657	-80.73541208	
16,300.00	89.00	150.14	6,746.42	-3,337.69	7,761.22	14,442,771.67	1,714,813.30	39.76911805	-80.73523580	
16,400.00	89.00	150.14	6,748.16	-3,424.40	7,811.01	14,442,684.96	1,714,863.09	39.76887952	-80.73505953	
16,500.00	89.00	150.14	6,749.89	-3,511.10	7,860.80	14,442,598.25	1,714,912.87	39.76864100	-80.73488326	
16,600.00	89.00	150.14	6,751.63	-3,597.81	7,910.59	14,442,511.55	1,714,962.66	39.76840247	-80.73470699	
16,700.00	89.00	150.14	6,753.37	-3,684.52	7,960.38	14,442,424.84	1,715,012.45	39.76816394	-80.73453073	
16,800.00	89.00	150.14	6,755.11	-3,771.23	8,010.16	14,442,338.13	1,715,062.24	39.76792541	-80.73435446	
16,900.00	89.00	150.14	6,756.85	-3,857.93	8,059.95	14,442,251.42	1,715,112.03	39.76768689	-80.73417819	
17,000.00	89.00	150.14	6,758.59	-3,944.64	8,109.74	14,442,164.72	1,715,161.81	39.76744836	-80.73400193	
17,100.00	89.00	150.14	6,760.33	-4,031.35	8,159.53	14,442,078.01	1,715,211.60	39.76720983	-80.73382567	
17,200.00	89.00	150.14	6,762.07	-4,118.06	8,209.32	14,441,991.30	1,715,261.39	39.76697130	-80.73364940	
17,300.00	89.00	150.14	6,763.81	-4,204.76	8,259.10	14,441,904.60	1,715,311.18	39.76673278	-80.73347314	
17,400.00	89.00	150.14	6,765.55	-4,291.47	8,308.89	14,441,817.89	1,715,360.96	39.76649425	-80.73329688	
17,500.00	89.00	150.14	6,767.29	-4,378.18	8,358.68	14,441,731.18	1,715,410.75	39.76625572	-80.73312063	
17,600.00	89.00	150.14	6,769.03	-4,464.88	8,408.47	14,441,644.47	1,715,460.54	39.76601719	-80.73294437	
17,700.00	89.00	150.14	6,770.77	-4,551.59	8,458.26	14,441,557.77	1,715,510.33	39.76577866	-80.73276811	
17,800.00	89.00	150.14	6,772.51	-4,638.30	8,508.04	14,441,471.06	1,715,560.12	39.76554013	-80.73259186	
17,900.00	89.00	150.14	6,774.25	-4,725.01	8,557.83	14,441,384.35	1,715,609.90	39.76530160	-80.73241561	
18,000.00	89.00	150.14	6,775.99	-4,811.71	8,607.62	14,441,297.64	1,715,659.69	39.76506307	-80.73223935	
18,100.00	89.00	150.14	6,777.73	-4,898.42	8,657.41	14,441,210.94	1,715,709.48	39.76482454	-80.73206310	
18,200.00	89.00	150.14	6,779.47	-4,985.13	8,707.19	14,441,124.23	1,715,759.27	39.76458601	-80.73188685	
18,300.00	89.00	150.14	6,781.21	-5,071.83	8,756.98	14,441,037.52	1,715,809.06	39.76434748	-80.73171060	
18,400.00	89.00	150.14	6,782.95	-5,158.54	8,806.77	14,440,950.82	1,715,858.84	39.76410894	-80.73153436	
18,460.34	89.00	150.14	6,784.00	-5,210.86	8,836.81	14,440,898.50	1,715,888.89	39.76396501	-80.73142801	

PBHL/TD 18460.34 MD/6784.00 TVD

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
LP Old Crow S-16 HM - hit/miss target - Shape	0.00	0.00	6,619.00	3,012.48	4,164.91	14,449,121.84	1,711,216.98	39.78658584	-80.74797072	
- plan misses target center by 43.36usft at 9001.20usft MD (6619.43 TVD, 2990.90 N, 4127.30 E)										
- Point										
LP Old Crow S-16 HM 5 - plan hits target center - Point	0.00	0.00	6,619.00	3,012.48	4,114.91	14,449,121.84	1,711,166.98	39.78658623	-80.74814870	
BHL Old Crow S-16 HM - plan hits target center - Point	0.00	0.00	6,784.00	-5,210.87	8,836.81	14,440,898.49	1,715,888.89	39.76396500	-80.73142800	

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04/12/2019



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<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 S-16 HM (slot J)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev1		

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.00	500.00	0.00	0.00	KOP Begin 3°/100' build
1,978.60	1,835.25	374.85	394.70	Begin 44.36° tangent
7,988.46	6,129.82	3,270.00	3,443.19	Begin 10°/100' build/turn
8,976.30	6,619.00	3,012.48	4,114.91	Begin 89.00° lateral section
18,460.34	6,784.00	-5,210.86	8,836.81	PBHL/TD 18460.34 MD/6784.00 TVD

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FEB 12 2019

WV Department of  
Environmental Protection

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

Operator's Well No. Old Crow S-16HM

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 contain

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#1386426)

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 James A Pancake

Company Official (Typed Name) Jim Pancake

Company Official Title Vice President, Geosciences

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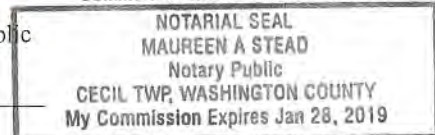
FEB 12 2019

Subscribed and sworn before me this 6 day of NOVEMBER, 2018

Maureen A Stead Notary Public

My commission expires 1/28/19

WV Department of Environmental Protection  
COMMONWEALTH OF WEST VIRGINIA



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
Annual Ryegrass	40
Spring Oats	96

Seed Type	lbs/acre
Orchard Grass	12
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: *James Nielsen*

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

RECEIVED  
Office of Oil and Gas

FEB 12 2019

Title: Oil and Gas Inspector

Date: 11/7/18

WV Department of  
Environmental Protection

Field Reviewed?  Yes

No

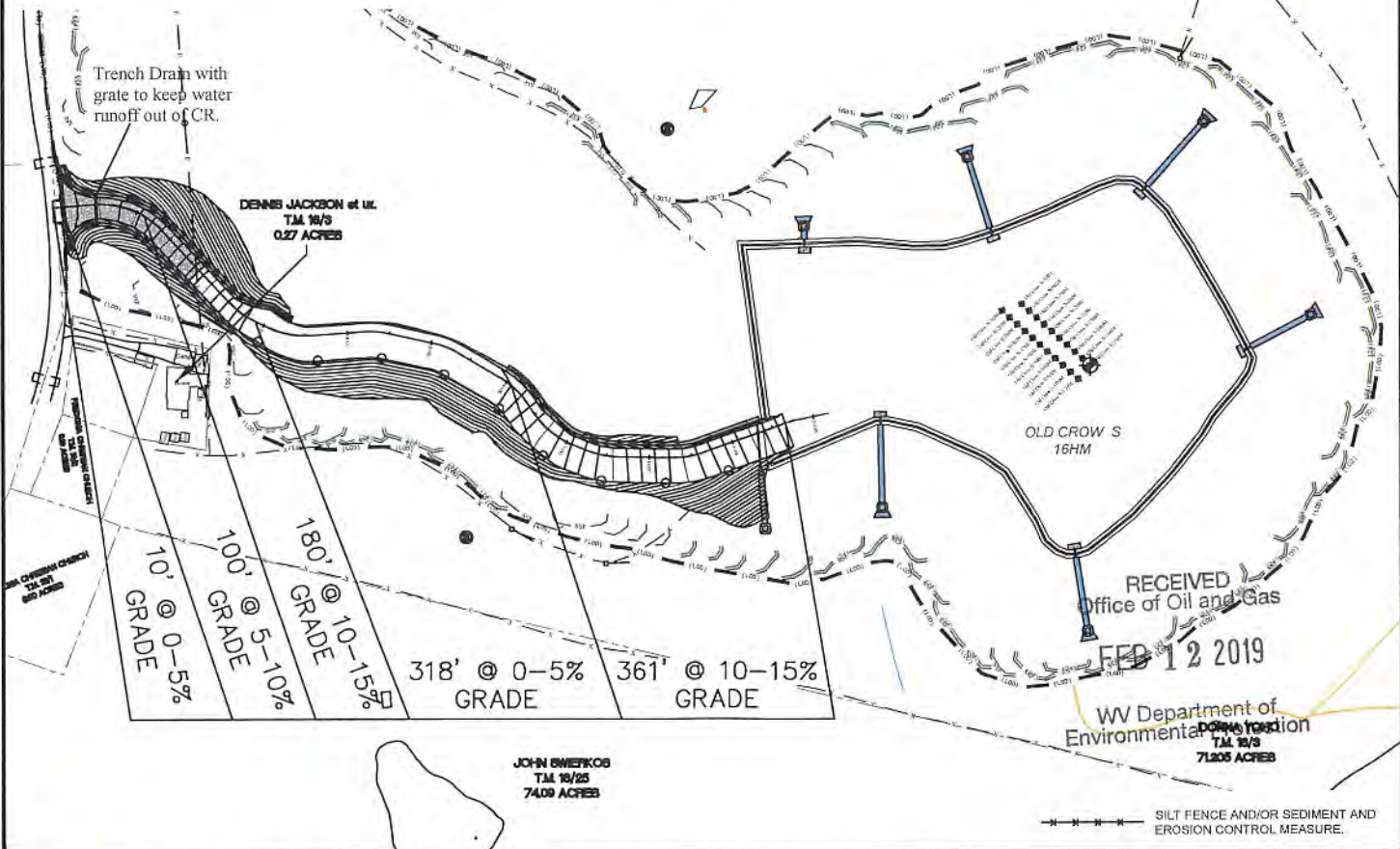
# PROPOSED OLD CROW S - 16HM

**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  
T.M. 18/3  
71205 ACRES



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Solutions from the ground up.  
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www.slsurveys.com

TOPO SECTION:		OPERATOR:	
POWHATAN POINT 7.5'		PREPARED FOR: TUG HILL OPERATING, LLC 380 SOUTHPOINTE BLVD SUITE 200 CANONSBURG, PA 15317	
COUNTY	DISTRICT		
MARSHALL	FRANKLIN		
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8769	06/22/18	NONE

**TUG HILL**  
OPERATING



# Well Site Safety Plan

## Tug Hill Operating, LLC

*juw*  
*11/2/18*

Well Name: Old Crow S-16HM

Pad Location: Old Crow Pad

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing: 4,403,182.94

Easting: 520,310.51

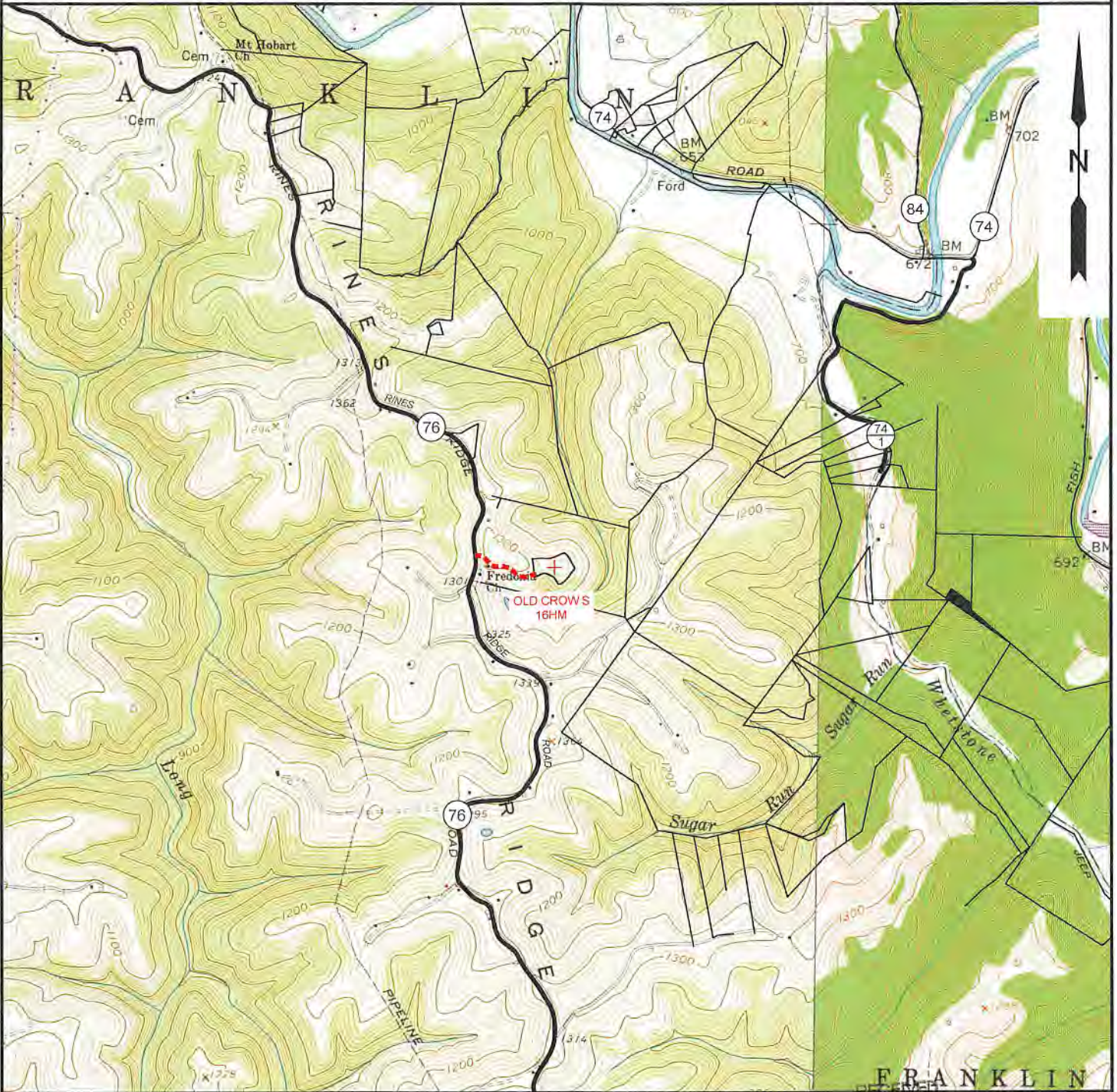
November 2018

RECEIVED  
Office of Oil and Gas

FEB 12 2019

WV Department of  
Environmental Protection

# PROPOSED OLD CROW S - 16HM



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

LAT: 39.7137712  
LON: -80.8258327  
LOCATED: S 37°39'00" W AT 29,404.13' FROM OLD CROW S - 16HM SURFACE LOCATION

FRANKLIN  
Office of Oil and Gas

FEB 12 2019

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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	
		SUITE 200	
		CANONSBURG, PA 15317	
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8796	06/22/18	1" = 2000'

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



**OLD CROW S LEASE  
WELL 16HM  
TUG HILL OPERATING**

MAP/PARCEL	ADJOINING SURFACE OWNER LIST	ACRES
5-10-5	WILLIAM F. RULONG, ET AL	27.50
5-10-6	WILLIAM F. RULONG, ET AL	P/O ACRE
5-10-7	WILLIAM F. RULONG, ET AL	22.872
5-10-8	WILLIAM F. RULONG, ET AL	70.6672
5-10-12.1	JOHN PAUL SMITH, JR., ET AL	8.86
5-10-13.1	DAVID LEE QUIGLEY, JR.	2.88
5-10-19	BRADLEY L. & CONNIE L. HUBBARD	3.209
5-10-20	LOUIS AULENBACHER	3.554
5-10-21	LOUIS AULENBACHER	3.677
5-10-22	LOUIS AULENBACHER	6.461
5-16-10	FRANK P. LAUTAR EST.	5.00

6,435' B.H. 3,604' T.H.

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

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

NAD'83 S.P.C.(FT)	N. 468,106.97	E. 1,613,593.34
NAD'83 GEO.	LAT-(N) 39.778344	LONG-(W) 80.762825
NAD'83 UTM (M)	N. 4,403,182.94	E. 520,310.51
<u>LANDING POINT</u>		
NAD'83 S.P.C.(FT)	N. 471,050.2	E. 1,617,760.0
NAD'83 GEO.	LAT-(N) 39.786583	LONG-(W) 80.748147
NAD'83 UTM (M)	N. 4,404,100.8	E. 521,564.9
<u>BOTTOM HOLE</u>		
NAD'83 S.P.C.(FT)	N. 462,779.2	E. 1,622,402.3
NAD'83 GEO.	LAT-(N) 39.764054	LONG-(W) 80.731225
NAD'83 UTM (M)	N. 4,401,604.6	E. 523,021.3

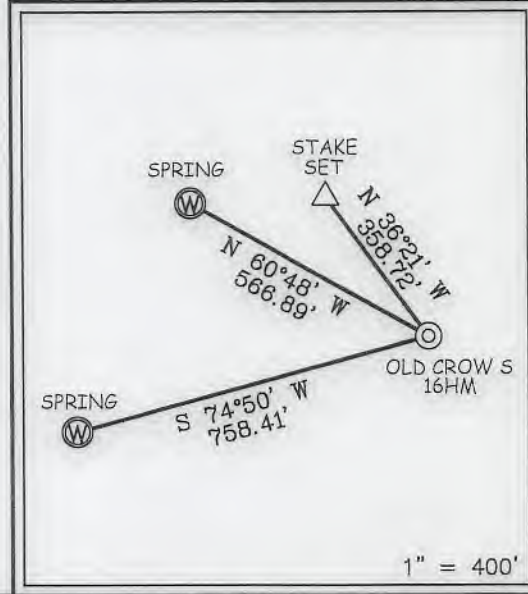
T.H. LENGTH 80°45'00"  
B.H. LENGTH 80°42'30"

04/12/2019

**NOTES ON SURVEY**

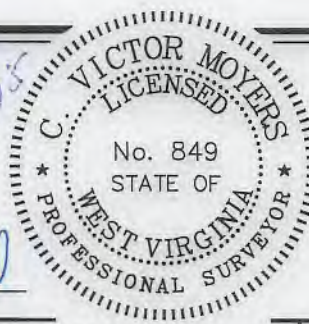
1. NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
2. WELL SPOT CIRCLE & TOPO MARK SCALE ARE 1"=2000'

**REFERENCES**



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Solutions from the ground up.  
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www.slsurveyors.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.



P.S. 849 *C. Victor Moyers*

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.  
DATE JUNE 22, 20 18  
REVISED OCTOBER 23, 20 18  
OPERATORS WELL NO. OLD CROW S-16HM  
API WELL NO. 47 - 051 - 02187  
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8796P16HMR.dwg  
OLD CROW NORTH 16HM REV0  
HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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

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

LOCATION: GROUND = 1,285.40' ELEVATION PROPOSED = 1,264.99' WATERSHED TRIBUTARY OF FISH CREEK (HUC-10)  
DISTRICT FRANKLIN COUNTY MARSHALL QUADRANGLE POWHATAN POINT 7.5'

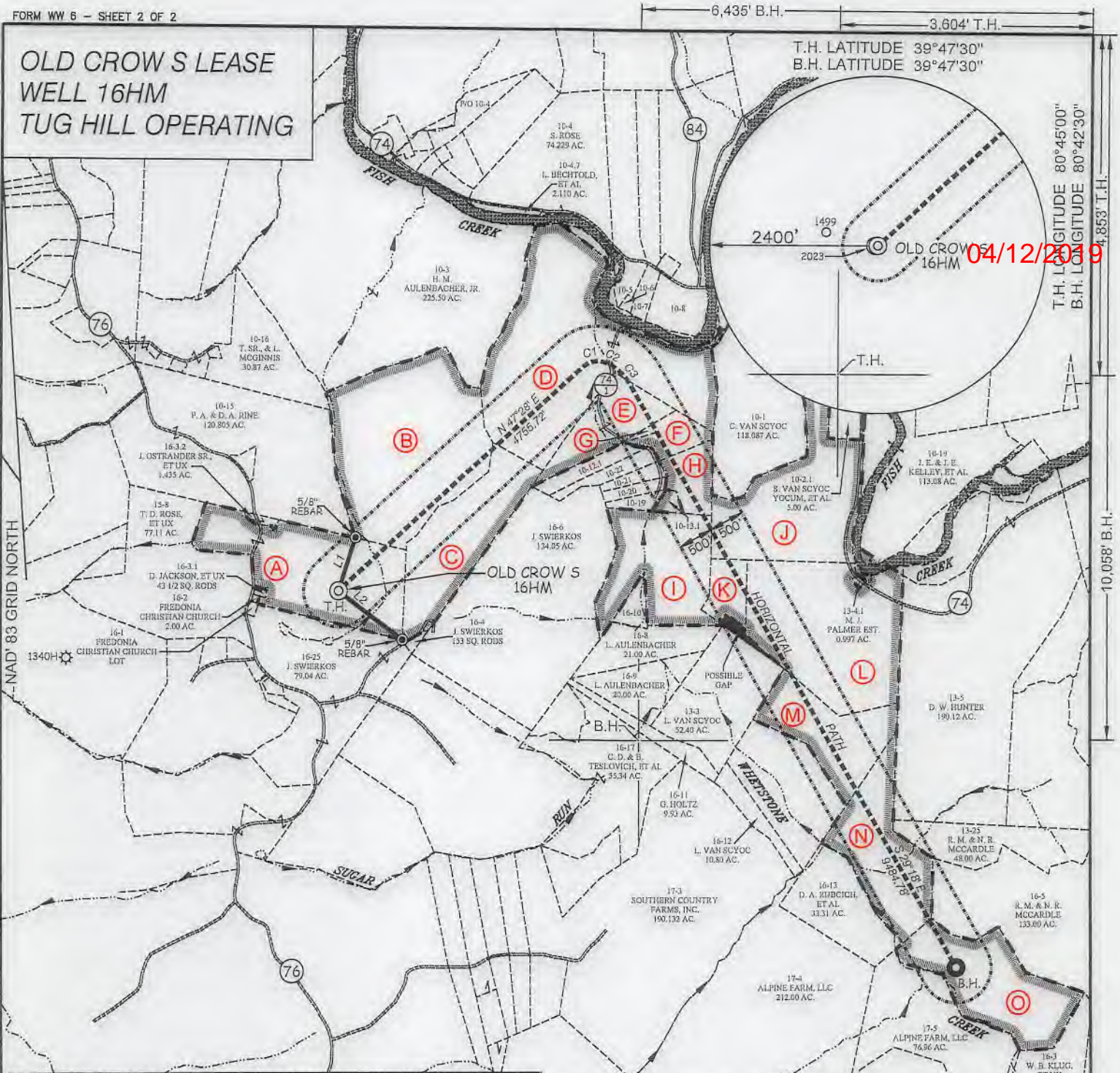
SURFACE OWNER DONNA VIVIAN YOHO (TOD) GARY LANCE YOHO ACREAGE 71.205±  
ROYALTY OWNER DONNA VIVIAN YOHO, ET AL ACREAGE 71.205±

PROPOSED WORK: LEASE NO. SEE WW-6A1  
DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  PERFORATE NEW FORMATION  PLUG AND ABANDON  CLEAN OUT AND REPLUG  OTHER   
PHYSICAL CHANGE IN WELL (SPECIFY) \_\_\_\_\_ TARGET FORMATION MARCELLUS  
ESTIMATED DEPTH TVD: 6,730' / TMD: 18,460'

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

COUNTY NAME PERMIT

**OLD CROW S LEASE  
WELL 16HM  
TUG HILL OPERATING**



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

T.H. LONGITUDE 80°45'00"  
B.H. LONGITUDE 80°42'30"

04/12/2019

NAD'83 GRID NORTH

CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	247.47'	294.06'	N 74°20' E	240.23'
C2	251.38'	498.99'	S 66°25' E	248.73'
C3	314.87'	739.81'	S 40°35' E	312.50'

TAG	SURFACE OWNER	PARCEL	ACRES
A	DONNA VIVIAN YOHO (TOD) GARY LANCE YOHO	5-16-3	71.205
B	JOHN SWIERKOS	5-10-14	100.00
C	JOHN SWIERKOS	5-16-5	52.07
D	HERBERT M. AULENBACHER, JR.	5-10-9	141.43
E	LOUIS DELBERT VAN SCYOC	5-10-10	24.50
F	JOSEPH LEE CROW	5-10-12	11.279
G	JOSEPH LEE CROW	5-10-11	130'x310'
H	JOSEPH LEE CROW	5-10-13	12.18
I	LOUIS AULENBACHER	5-16-7	50.00
J	CAROL VAN SCYOC	9-10-2	207.988
K	SYLVIA I. VAN SCYOC, ET AL.	P/O 9-13-2	41.5
L	LOUIS AULENBACHER	9-13-4	100.191
M	SYLVIA I. VAN SCYOC, ET AL.	9-13-2	41.5
N	ROBERT N. & NANCY R. MCCARDLE	9-16-1	46.80
O	ROBERT N. & NANCY R. MCCARDLE	9-16-2	53.40

LINE	BEARING	DISTANCE
L1	N 17°49' E	788.08'
L2	S 53°12' E	1132.36'

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www.slsurveys.com

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

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**LANDING POINT**

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**BOTTOM HOLE**

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NAD'83 UTM (M)	N. 4,401,604.6	E. 523,021.3



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

P.S. 849 *C. Victor Moyers*

SCALE 1" = 2000' FILE NO. 8796P16HMR.dwg  
OLD CROW NORTH 16HM REV0

DATE JUNE 22, 20 18  
REVISED OCTOBER 23, 20 18

OPERATORS WELL NO. OLD CROW S-16HM

API WELL NO. 47 — 051 — 02187  
STATE COUNTY PERMIT

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

**LEGEND**

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

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

WW-6A1  
(5/13)

Operator's Well No. Old Crow S-16HM

**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
-------------------------	-----------------------	-----------------------	---------	-----------

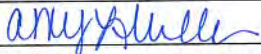
\*See attached pages

**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   
 Its: Permitting Specialist - Appalachia Region

WW-6A1 Supplement

Operator's Well No. Old Crow S - 16HM

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page		Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*19340	5-16-3	A	DONNA VIVIAN YOHO	GASTAR EXPLORATION USA INC	1/8+	665	407	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 and Radler 2000 Ltd Partnership: 24/319	Chief, Radler and Enerplus Resources (USA) Corp to Chevron USA Inc: 25/1 & 25/105	AB Resources to Chevron: 756/397	Chevron to TH Exploration LLC: 40/57
10*19673	5-10-14	B	CHESTNUT HOLDINGS INC	TH EXPLORATION LLC	1/8+	949	313	N/A	N/A	N/A	N/A	N/A	N/A
10*19673	5-16-5	C	CHESTNUT HOLDINGS INC	TH EXPLORATION LLC	1/8+	949	313	N/A	N/A	N/A	N/A	N/A	N/A
10*19249	5-10-9	D	HERBERT M AULENBACHER	CHEVRON USA INC	1/8+	914	551	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127
10*21468	5-10-10	E	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953	317	N/A	N/A	N/A	N/A	N/A	N/A
10*22295	5-10-10	E	RACHEL B OSTRANDER	FOSSIL CREEK OHIO, LLC	1/8+	822	210	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22319	5-10-10	E	SHARON G VAN SCYOC	FOSSIL CREEK OHIO, LLC	1/8+	822	204	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*18892	5-10-12	F	JOSEPH LEE CROW	TH EXPLORATION LLC	1/8+	966	88	N/A	N/A	N/A	N/A	N/A	N/A
10*18302	5-10-11	G	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
10*18892	5-10-13	H	JOSEPH LEE CROW	TH EXPLORATION LLC	1/8+	966	88	N/A	N/A	N/A	N/A	N/A	N/A
10*18339	5-16-7	I	RESOURCE MINERALS HEADWATER I LP	TH EXPLORATION LLC	1/8+	940	448	N/A	N/A	N/A	N/A	N/A	N/A
10*18526	5-16-7	I	ANN TURNER YOUNG SHRIVER	TH EXPLORATION LLC	1/8+	933	591	N/A	N/A	N/A	N/A	N/A	N/A
10*18597	5-16-7	I	MARK ALLEN LENENBERG	TH EXPLORATION LLC	1/8+	934	638	N/A	N/A	N/A	N/A	N/A	N/A
10*18636	5-16-7	I	CHERYL STEFFEN AND GREGORY STEFFEN	TH EXPLORATION LLC	1/8+	936	240	N/A	N/A	N/A	N/A	N/A	N/A
10*18637	5-16-7	I	THOMAS RICHMOND YOUNG ANITA A YOUNG	TH EXPLORATION LLC	1/8+	936	244	N/A	N/A	N/A	N/A	N/A	N/A
10*19467	5-16-7	I	ROBERT R FISHER AND AUDREY L IRVIN	TH EXPLORATION LLC	1/8+	942	592	N/A	N/A	N/A	N/A	N/A	N/A
10*19788	5-16-7	I	REX B FISHER AND DEBORAH FISHER	TH EXPLORATION LLC	1/8+	948	295	N/A	N/A	N/A	N/A	N/A	N/A
10*21014	5-16-7	I	JAMES P MCLAUGHLIN & ALICE W MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946	29	N/A	N/A	N/A	N/A	N/A	N/A
10*21015	5-16-7	I	ROBERT L MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946	339	N/A	N/A	N/A	N/A	N/A	N/A
10*21189	5-16-7	I	NATALIE GIBBS	TH EXPLORATION LLC	1/8+	941	261	N/A	N/A	N/A	N/A	N/A	N/A
10*21267	5-16-7	I	JAMES E NICHOLAS AND BEVERLY D NICHOLAS	TH EXPLORATION LLC	1/8+	943	513	N/A	N/A	N/A	N/A	N/A	N/A
10*21468	5-16-7	I	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953	317	N/A	N/A	N/A	N/A	N/A	N/A
10*21504	5-16-7	I	PAULETA LINDA CHEATHAM AND CARL WOHLERS	TH EXPLORATION LLC	1/8+	951	142	N/A	N/A	N/A	N/A	N/A	N/A
10*21638	5-16-7	I	THE MILDRED Y MILLS TRUST JULY 5TH 2007	TH EXPLORATION LLC	1/8+	956	172	N/A	N/A	N/A	N/A	N/A	N/A
10*21709	5-16-7	I	THOMAS YOUNG AND JANE CLAIRE YOUNG	TH EXPLORATION LLC	1/8+	959	350	N/A	N/A	N/A	N/A	N/A	N/A
10*21710	5-16-7	I	PENELOPE A JONES	TH EXPLORATION LLC	1/8+	959	355	N/A	N/A	N/A	N/A	N/A	N/A
10*22295	5-16-7	I	RACHEL B OSTRANDER	FOSSIL CREEK OHIO, LLC	1/8+	822	210	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page		Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*22319	5-16-7	I	SHARON G VAN SCYOC	FOSSIL CREEK OHIO, LLC	1/8+	822	204	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22865	5-16-7	I	JAMES H CAMPBELL	TH EXPLORATION LLC	1/8+	977	60	N/A	N/A	N/A	N/A	N/A	N/A
10*22866	5-16-7	I	MARGARET R DONOFRIO	TH EXPLORATION LLC	1/8+	977	57	N/A	N/A	N/A	N/A	N/A	N/A
10*19894	9-10-2	J	CAROL L VANSCYOC	TH EXPLORATION LLC	1/8+	941	392	N/A	N/A	N/A	N/A	N/A	N/A
10*19256	9-13-2	K	RACHEL B OSTRANDER	CHEVRON USA INC	1/8+	915	516	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127
10*19257	9-13-2	K	DELBERT M VAN SCYOC AND SYLVIA I VAN SCYOC	CHEVRON USA INC	1/8+	911	485	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127
10*19258	9-13-2	K	SHARON G VAN SCYOC	CHEVRON USA INC	1/8+	911	488	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127
10*19250	9-13-4	L	LOUIS AULENBAUCHER	CHEVRON USA INC	1/8+	902	444	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127
10*22355	9-13-4	L	DEL T KELLEY AND DEBORAH A KELLEY	AMERICAN PETROLEUM PARTNERS LLC	1/8+	916	84	N/A	N/A	N/A	N/A	N/A	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22362	9-13-4	L	TOD M KELLEY	AMERICAN PETROLEUM PARTNERS LLC	1/8+	916	81	N/A	N/A	N/A	N/A	N/A	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22382	9-13-4	L	BETTY LOU KAMPE	AMERICAN PETROLEUM PARTNERS LLC	1/8+	919	399	N/A	N/A	N/A	N/A	N/A	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*19256	9-13-2	M	RACHEL B OSTRANDER	CHEVRON USA INC	1/8+	915	516	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127
10*19257	9-13-2	M	DELBERT M VAN SCYOC AND SYLVIA I VAN SCYOC	CHEVRON USA INC	1/8+	911	485	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127
10*19258	9-13-2	M	SHARON G VAN SCYOC	CHEVRON USA INC	1/8+	911	488	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127
10*21131	9-16-1	N	ROBERT M MCCARDLE & NANCY R MCCARDLE	TH EXPLORATION LLC	1/8+	951	621	N/A	N/A	N/A	N/A	N/A	N/A

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page		Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*22295	9-16-1	N	RACHEL B OSTRANDER	FOSSIL CREEK OHIO, LLC	1/8+	822	210	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22319	9-16-1	N	SHARON G VAN SCYOC	FOSSIL CREEK OHIO, LLC	1/8+	822	204	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*19083	9-16-2	O	RITA RAE STEPHENS	CHESAPEAKE APPALACHIA LLC	1/8+	683	302	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/481	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19084	9-16-2	O	GEORGE WILLIAM MCCAIN	CHESAPEAKE APPALACHIA LLC	1/8+	683	308	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/26	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19085	9-16-2	O	LESTER M MERCER	CHESAPEAKE APPALACHIA LLC	1/8+	683	305	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/26	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19086	9-16-2	O	HILDA IOLA MCCAIN	CHESAPEAKE APPALACHIA LLC	1/8+	684	151	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/481	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19087	9-16-2	O	BECKY ANN ROSS	CHESAPEAKE APPALACHIA LLC	1/8+	684	126	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/481	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19090	9-16-2	O	JENNIFER M. FOSTER	CHESAPEAKE APPALACHIA LLC	1/8+	683	314	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/481	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19091	9-16-2	O	HELEN LOUISE MCCAIN GATTS	CHESAPEAKE APPALACHIA LLC	1/8+	685	618	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/481	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19093	9-16-2	O	LEROY EUGENE RICHARDS	CHESAPEAKE APPALACHIA LLC	1/8+	685	621	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/26	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19094	9-16-2	O	MICHAEL EARL RICHARDS	CHESAPEAKE APPALACHIA LLC	1/8+	685	630	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 23/26	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page		Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*19095	9-16-2	O	BETTY ANN STROSNIDER	CHESAPEAKE APPALACHIA LLC	1/8+	684	148	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/481	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19096	9-16-2	O	RONNIE CUSANO	CHESAPEAKE APPALACHIA LLC	1/8+	683	326	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/481	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19112	9-16-2	O	CHARLES E FOOCE AND MARY FOOCE	CHESAPEAKE APPALACHIA LLC	1/8+	695	539	N/A	N/A	N/A	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19113	9-16-2	O	GEORGE DAVID FOOCE	CHESAPEAKE APPALACHIA LLC	1/8+	695	543	N/A	N/A	N/A	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19114	9-16-2	O	LARRY WAYNE FOOCE	CHESAPEAKE APPALACHIA LLC	1/8+	694	371	N/A	N/A	N/A	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19115	9-16-2	O	KATHY WILLIAMS	CHESAPEAKE APPALACHIA LLC	1/8+	694	522	N/A	N/A	N/A	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19119	9-16-2	O	MICHAEL WESLEY HALL	CHESAPEAKE APPALACHIA LLC	1/8+	694	366	N/A	N/A	N/A	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19120	9-16-2	O	SHARON L SCHULER AND JOSEPH A SCHULER	CHESAPEAKE APPALACHIA LLC	1/8+	694	503	N/A	N/A	N/A	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19122	9-16-2	O	JAMES L. FOOCE	CHESAPEAKE APPALACHIA LLC	1/8+	696	631	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/84	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19123	9-16-2	O	TAMMY SUE FOOCE	CHESAPEAKE APPALACHIA LLC	1/8+	696	635	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/84	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19124	9-16-2	O	JENNIFER LYNN FOOCE	CHESAPEAKE APPALACHIA LLC	1/8+	696	627	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/84	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127
10*19125	9-16-2	O	MARK A. FOOCE	CHESAPEAKE APPALACHIA LLC	1/8+	694	344	N/A	N/A	Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc: 22/479	Statoil USA Onshore Properties Inc to Chevron USA Inc: 30/427	Chesapeake Appalachia LLC to Chevron USA Inc: 30/461	Chevron USA Inc to TH Exploration LLC: 40/127

WW-6A1 Supplement

Operator's Well No. Old Crow S - 16HM

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page		Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*21082	9-16-2	O	HUBERT C AND JANE E OTTE	TH EXPLORATION LLC	1/8+	951	618	N/A	N/A	N/A	N/A	N/A	N/A
10*21083	9-16-2	O	KARLA JO ALLEN	TH EXPLORATION LLC	1/8+	949	372	N/A	N/A	N/A	N/A	N/A	N/A
10*21119	9-16-2	O	MICHAEL WESLEY HALL	TH EXPLORATION LLC	1/8+	952	199	N/A	N/A	N/A	N/A	N/A	N/A
10*21120	9-16-2	O	SHARON L SCHULER AND JOSEPH A SCHULER	TH EXPLORATION LLC	1/8+	952	201	N/A	N/A	N/A	N/A	N/A	N/A
10*21131	9-16-2	O	ROBERT M MCCARDLE & NANCY R MCCARDLE	TH EXPLORATION LLC	1/8+	951	621	N/A	N/A	N/A	N/A	N/A	N/A
10*22498	9-16-2	O	H3 LLC	TH EXPLORATION LLC	1/8+	PENDING		N/A	N/A	N/A	N/A	N/A	N/A



AFFIDAVIT

**COPY** 04/12/2019

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

JURAT

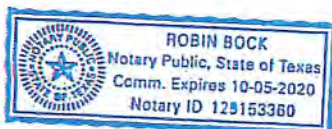
STATE OF TEXAS §  
§ SS  
COUNTY OF TARRANT §

Jan Pest  
MARSHALL County 03:44:28 PM  
Instrument No 1416299  
Date Recorded 10/19/2016  
Document Type HIS  
Pages Recorded 1  
Book-Page 28-62  
Recording Fee \$5.00  
Additional \$5.00

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WV Department of  
Environmental Protection

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

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.

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Office of Oil and Gas  
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WV Department of  
Environmental Protection

MICHAEL MORAN  
BRIGHTON RESOURCES  
5851 ELLSWORTH AVENUE, #1  
PITTSBURGH PA 15232-1707

04/12/2019

BOOK 0:040 PAGE 0127

STATE OF WEST VIRGINIA §  
  §  
COUNTY OF MARSHALL §

Marshall County  
Jan Pest, Clerk  
Instrument 1428356  
08/16/2017 @ 12:08:49 PM  
ASSIGNMENTS  
Book 40 @ Page 127  
Pages Recorded 25  
Recording Cost \$ 33.00

ASSIGNMENT AND CONVEYANCE

THIS ASSIGNMENT AND CONVEYANCE (the "Assignment") is made and entered into this 1 day of AUGUST, 2017 (the "Effective Date"), by and between CHEVRON U.S.A. INC. (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 the 1st day of August, 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"), less and except certain overriding royalty interests and exclusions; 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, subject to certain overriding royalty interests and less and except certain exclusions.

**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, except that Assignor excepts and reserves from this Assignment the following:

A. The Chevron ORRI previously conveyed to Assignor and as described in that certain Memorandum of Assignment of Oil and Gas Lease Interests dated November 6, 2012 by and between Cornell Holdings Incorporated and Chevron U.S.A. Inc., which is recorded at Book 0028, Page 0239 in the Office of the County Clerk of Marshall County, West Virginia, and

B. As to each of the Leases and all oil, gas, and associated hydrocarbons produced, saved and sold thereunder, an overriding royalty interest equal to the difference between 82% and the

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WV Department of  
Environmental Protection



04/12/2019



February 7, 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 S-16HM

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 S-16HM 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 12 2019  
WV Department of  
Environmental Protection

WW-6AC  
(1/12)

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

Date of Notice Certification: 02/07/2019

API No. 47- 051

Operator's Well No. Old Crow S-16HM

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>520,310.51</u>
County: <u>Marshall</u>		Northing: <u>4,403,182.94</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>		

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: 40px;"><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 align="center"><b>O&amp;G OFFICE USE ONLY</b></p> <p><input type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p> <p align="center"><b>RECEIVED</b> Office of Oil and Gas <b>FEB 12 2019</b></p> <p align="right">WV Department of Environmental Protection</p>
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**Required Attachments:**

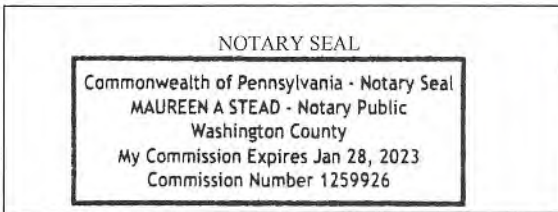
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication 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.

WW-6AC  
(1/12)

**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 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 7 day of FEBRUARY 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).

WW-6A  
(9-13)

API NO. 4705108187 - 04/12/2019  
OPERATOR WELL NO. Old Crow S-16HM  
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:** 1/30/2019    **Date Permit Application Filed:** 2/1/2019

**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: \_\_\_\_\_

\*Please attach additional forms if necessary

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WV Department of  
Environmental Protection



**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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**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 existing 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

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(8-13)

4705102187  
API NO. 47-051 - 04/12/2019  
OPERATOR WELL NO. Old Crow S-16HM  
Well Pad Name: Old Crow

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

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.**

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### 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)

API NO. 47-~~251~~ **470510** / ~~10/21/2019~~ **104/22/2019**  
OPERATOR WELL NO. Old Crow S-16HM  
Well Pad Name: Old Crow

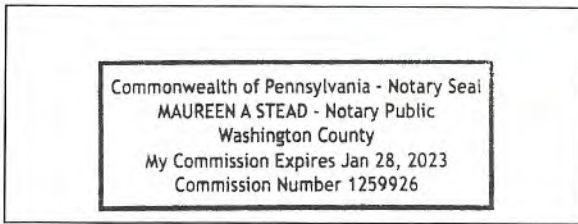
**Notice is hereby given by:**

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

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 [deprivacyofficer@wv.gov](mailto:deprivacyofficer@wv.gov).



Subscribed and sworn before me this 30 day of JANUARY, 2019  
Maureen A Stead Notary Public  
My Commission Expires 1/20/23

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WV Department of  
Environmental Protection

**Exhibit WW-6A**

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

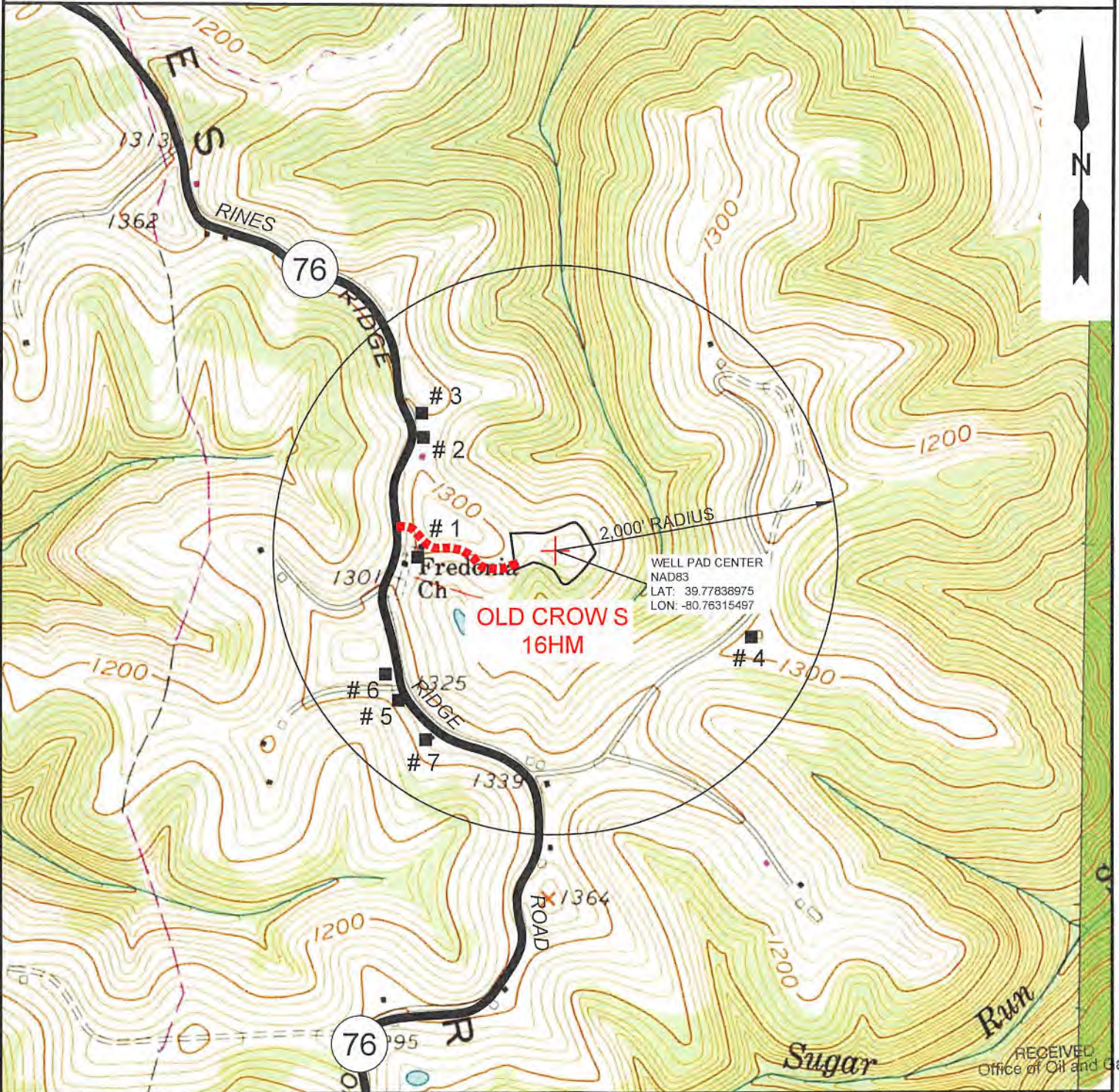
**Residences within Two-Thousand Feet (2,000')**

Well: Old Crow S – 16HM  
 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>                  TM 16 Pcl. 3.1                  Dennis Jackson, Et Ux                  Phone: 304-843-1762  <b>Physical Address:</b>                  4004 Rines Ridge Rd.                  Proctor, WV 26055  <b>Tax Address:</b>                  P.O. Box 109                  Woodsfield, OH 43793</p>	<p><b>Residence 2</b>                  TM 16 Pcl. 3                  Donna Vivian Yoho - TOD                  Phone: 304-845-5590 (Rev. Address)  <b>Physical Address:</b>                  3862 Rines Ridge Rd.                  Proctor, WV 26055  <b>Tax Address:</b>                  Same</p>	<p><b>Residence 3</b>                  TM 16 Pcl. 3.2                  Jimmy Ostrander, Sr., Et Ux                  Phone: 304-845-5599, 304-845-5590  <b>Physical Address:</b>                  3810 Rines Ridge Rd.                  Proctor, WV 26055  <b>Tax Address:</b>                  Same</p>
<p><b>Residence 4</b>                  TM 16 Pcl. 6                  John Swierkos                  Phone: 304-810-4092  <b>Physical Address:</b>                  110 Rahm Dr.                  Proctor, WV 26055  <b>Tax Address:</b>                  Same</p>	<p><b>Residence 5</b>                  TM 16 Pcl. 23.3                  Greg &amp; Christina Riddle                  Phone: 304-843-0173  <b>Physical Address:</b>                  4205 Rines Ridge Rd.                  Proctor, WV 26055  <b>Tax Address:</b>                  Same</p>	<p><b>Residence 6</b>                  TM 16 Pcl. 23.1                  Ray E. Minor, Et Ux                  Phone: 304-843-1713  <b>Physical Address:</b>                  4193 Rines Ridge Rd.                  Proctor, WV 26055  <b>Tax Address:</b>                  Same</p>
<p><b>Residence 7</b>                  TM 16 Pcl. 24                  Alan M. Beyser, Et Ux                  Phone: 304-810-0617  <b>Physical Address:</b>                  4271 Rines Ridge Rd.                  Proctor, WV 26055  <b>Tax Address:</b>                  Same</p>		<p style="text-align: right;">RECEIVED                  Office of Oil and Gas                  FEB 12 2019                  WV Department of                  Environmental Protection</p>

# PROPOSED OLD CROW S - 16HM



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

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Land & Energy Development  
Solutions from the ground up.  
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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	
DRAWN BY		DATE	SCALE
K.G.M.		06/22/18	1" = 1000'

**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>Tributary 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).

WV Department of  
Environmental Protection

04/12/2019

**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:** 01/30/2019      **Date Permit Application Filed:** 02/01/2019

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

- |  |                               |
|--|-------------------------------|
| <input checked="" type="checkbox"/> CERTIFIED MAIL | <input type="checkbox"/> 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: <u>Donna Yoho</u>	Name: _____
Address: <u>3862 Rines Ridge Road</u>	Address: _____
<u>Proctor, WV 26055</u>	_____

**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>520,307.74</u>
County: <u>Marshall</u>	Northing: <u>4,403,185.33</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: <u>Tug Hill Operating, LLC</u>	Address: <u>380 Southpointe Boulevard, Plaza II, Suite 200</u>
Telephone: <u>724-749-8388</u>	<u>Canonsburg, PA 15317</u>
Email: <u>amiller@tug-hillop.com</u>	Facsimile: <u>724-338-2030</u>

**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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**FEB 12 2019**  
WV Department of  
Environmental Protection





## 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 Highways

March 2, 2018

Jill M. Newman  
Deputy CommissionerJames 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-16HM 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  
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WV Department of  
Environmental Protection



**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 Quaternary ammonium chloride CAS# 007173-51-5 Alky dimethyl benzyl ammonium Chloride (C12-16) – CAS#068424-85-1 Ethanol – CAS# 000064-17-5 Water – CAS# 007732-18-5
FRAC SAND	Silica Sand (various Mesh sizes)	Proppant	Crystalline silica (quartz) 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, (Not Associated with Diesel Fuel) Guar gum – CAS# 009000-30-0
FRW-18		Friction Reducer	Hydrotreated light distillate CAS# 064742-47-8
Scaletrol		Scale Inhibitor	Ethylene glycol – CAS# 000107-21-1 Diethylene glycol – CAS# 000111-46-6

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Environmental Protection

WEST VIRGINIA COUNTY MAP



PROJECT LOCATION

**WVDEP OOG  
ACCEPTED AS-BUILT**

3/4/2019

**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: 304-645-1920  
Franklin District, Marshall County, WV  
Watershed: Lower Fish Creek Watershed  
Tug Hill Contact Number: 1-817-632-3400

Property Owner Information - Old Crow Well Site

Owner	Parcel ID	Area (Ac)	Value	Assessed	Year
Franklin District	171	1.71	1.00	8/02	1918

**Exhibit A: Site As-Built**

Table with columns: Station, Elevation, and Notes. Contains detailed survey data for the site.



Access Road table with columns: Station, Elevation, and Notes.

Disturbed Area table with columns: Item, Quantity, and Unit.

Old Crow Well Site Quantities table with columns: Item, Quantity, and Unit.

**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

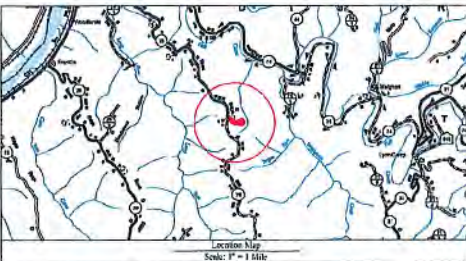
**Project Contacts**  
Tug Hill Operating  
300 Eastover Drive  
Franklin, WV 26037

**Site Location (NAD 83)**  
Station: 171  
Elevation: 1000.00  
Coordinates: 39.77838678, -80.76316840

**Approach Route:**

From the intersection of US Rt 7 and WV Rt 2 near New Martins Hill, WV. Turn left onto WV Rt 2 for 15.0 mi. Turn right onto Co Rt 27 (Dundonald and Croywell). Follow Co Rt 27 for 1.8 mi. Turn right onto Co Rt 7a (Olson Ridge). Follow Co Rt 7a for 4.0 mi. The site entrance will be on the Left (East) side of the road.

Table with columns: Station, Elevation, and Notes. Contains additional survey data.



**Well Location Restrictions**  
All well and construction activities shall be in accordance with the following restrictions:  
1. 25' from an existing well or proposed well location shall be maintained.  
2. 100' from any existing or proposed well location shall be maintained.  
3. 100' from the edge of a stream, pond, or other water body shall be maintained.  
4. 100' from the edge of a stream, pond, or other water body shall be maintained.  
5. 100' from the edge of a stream, pond, or other water body shall be maintained.



**MISS UTILITY OF WEST VIRGINIA**  
1-800-245-4848  
www.missutility.com

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

**Franklin District**  
The WV Mines Website is available for viewing at: [www.wvmines.com](http://www.wvmines.com)

Vertical sidebar containing:  
- TUG HILL OPERATING logo  
- North arrow  
- THIS DOCUMENT PREPARED FOR TUG HILL OPERATING  
- K&S SURVEYING logo  
- Old Crow Well Site, Franklin District, Marshall County, WV  
- Date: 02/20/19  
- Prepped By: JES  
- Scale: As Shown  
- Sheet 1 of 2

