



 west virginia department of environmental protection

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

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

Wednesday, December 26, 2018

WELL WORK PERMIT
 Horizontal 6A / New Drill

TUG HILL OPERATING, LLC
 380 SOUTHPOINTE BLVD

CANONSBURG, PA 15317

Re: Permit approval for OLD CROW N-18HU
 47-051-02123-00-00

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

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

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
 Chief

Operator's Well Number: OLD CROW N-18HU
 Farm Name: DONNA VIVIAN YOHO (TOD)
 U.S. WELL NUMBER: 47-051-02123-00-00
 Horizontal 6A New Drill
 Date Issued: 12/26/2018

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.

12/28/2018



west virginia department of environmental protection

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

Barry K. Lay, Chairman
dep.wv.gov

December 6, 2018

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

RE: Application for Deep Well Permit – API #47-051-02123

COMPANY: Tug Hill Operating, LLC

FARM: Donna Vivian Yoho (TOD) Gary Lance Yoho Old Crow N-18HU

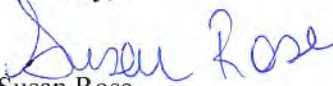
COUNTY: Marshall DISTRICT: Franklin QUAD: Powhatan Point

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

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

1. Comments to Notice of Deviation filed? No
2. Provided a certified copy of duly acknowledged and recorded consent and easement form from all surface owners? Yes
3. Provided a tabulation of all deep wells within one mile of the proposed location, including the API number of all deep wells: yes; Old Crow N-17HU 47-051-02122; Bryan N-14HU 47-051-02031
4. Provided a plat showing that the proposed location is a distance of 400+ feet from the nearest lease line or unit boundary and showing the following wells drilled to or capable of producing from the objective formation within 3,000 feet of the proposed location.

Sincerely,


Susan Rose
Administrator

4705102123

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 N-18HU Well Pad Name: Old Crow

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

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

5) Well Type (a) Gas Oil Underground Storage

Other _____

(b) If Gas Shallow _____ Deep

Horizontal

6) Existing Pad: Yes or No No

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7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Point Pleasant is the target formation at a depth of 11,381' - 11,259' - thickness of 122' and anticipated pressure of approx. 9500 psi.

8) Proposed Total Vertical Depth: 11,531'

9) Formation at Total Vertical Depth: Trenton

10) Proposed Total Measured Depth: 17,807'

11) Proposed Horizontal Leg Length: 5,858'

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

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

14) Approximate Saltwater Depths: 2,167'

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

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

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

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

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18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	259FT^3(CTS)
Fresh Water	20"	NEW	J55	106.5#	986'	986'	1,592FT^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	2703'	2703'	1,907FT^3(CTS)
Intermediate	9 5/8"	NEW	HPP110	47#	10,373'	10,373'	3,383FT^3(CTS)
Production	5 1/2"	NEW	P110	23#	17,807'	17,807'	4,255FT^3(CTS)
Tubing	2 7/8"	NEW	P110	6.5#		11,480'	
Liners							

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9/27/18

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	20"	26"	.5	2,410	1,928	SEE # 24	1.2
Coal	13 3/8"	17 1/2"	.38	2,740	2,192	SEE #24	1.2
Intermediate	9 5/8"	12 1/4"	.472	10,730	6,968	SEE #24	1.99
Production	5 1/2"	8 1/2"	.415	16,510	10,864	SEE #24	1.18
Tubing	2 7/8"			11,385	11,624		
Liners							

PACKERS

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

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47051021-218
9/1=2/3

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

Drill through the Point Pleasant and TD Pilot Hole 150' into the Trenton. Log vertical section and run a solid cement plug back to proposed KOP. Drill curve and lateral per proposed well plan, run and cement production casing. Perform CBL from 60 deg to surface, make cleanout run, and stimulate.

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

Well to be completed with approximately 14,645,000 lb proppant and 226,442 bbl of water. Max rate = 80 bpm; max psi = 12,000#.

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

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

23) Describe centralizer placement for each casing string:

Will run 3 centralizers on surface casing at equal distance. Intermediate will have 1 centralizer every third joint. Production casing will have one centralizer every third joint in lateral, one centralizer every joint through curve, one centralizer every third joint to surface.

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

*See Attachment

25) Proposed borehole conditioning procedures:

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

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*Note: Attach additional sheets as needed.

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Conductor and Fresh Water Casing Cement:

Premium NE-1 + 2% CaCl

- Premium NE-1 – Class A Portland API Spec
- CaCl – Calcium Chloride

Coal Casing Cement:

Premium NE-1 + 1.5% CaCl + Flake

- Premium NE-1 – Class A Portland API spec
- CaCl – Calcium Chloride
- CelloFlake

Intermediate Casing Cement:

Lead: *Premium NE-1 + 5% BA-90 + .85% R-3 + 3% KCl + .75 gals/100sk FP-13L + 1% MPA-170*

Tail: *Premium NE-1 + .1% R-3 + 5% KCl + 1% CD-32 + .4% FL-52 + .2% ASA-301 + .6% Sodium Metasilicate*

- Premium NE-1 – Class A Portland API spec
- BA-90 – Gas Migration Mitigator
- R-3 – Cement Retarder
- KCl – Potassium Chloride
- FP-13L – Anti-Foaming Agent
- MPA-170 – Gelling Agent
- CD-32 – Dispersant
- FL-52 – Fluid Loss Agent
- ASA-301 – Free Water Control Agent
- Sodium Metasilicate – Extending Agent

Kick Off Plug:

Class H Cement + 1% CD-32 + .7% Sodium Metasilicate + .1% R-3 + .75 gal/100sk FP-13L

- CD-32 – Dispersant
- Sodium Metasilicate – Extending Agent
- R-3 – Cement Retarder
- FP-13L – Anti-Foaming Agent

Production Casing Cement:

Lead: *50:50 (Poz:Class H) + .3% R-3 + .3% MPA-250 + .75 gal/100sk FP-13L*

Tail: *25:75 (Poz:Class H) + .3% R-3 + .3% MPA-250 + .375 gal/100sk FP-13L*

- R-3 – Cement Retarder
- MPA-250 – Gelling Agent
- FP-13L – Anti-Foaming Agent

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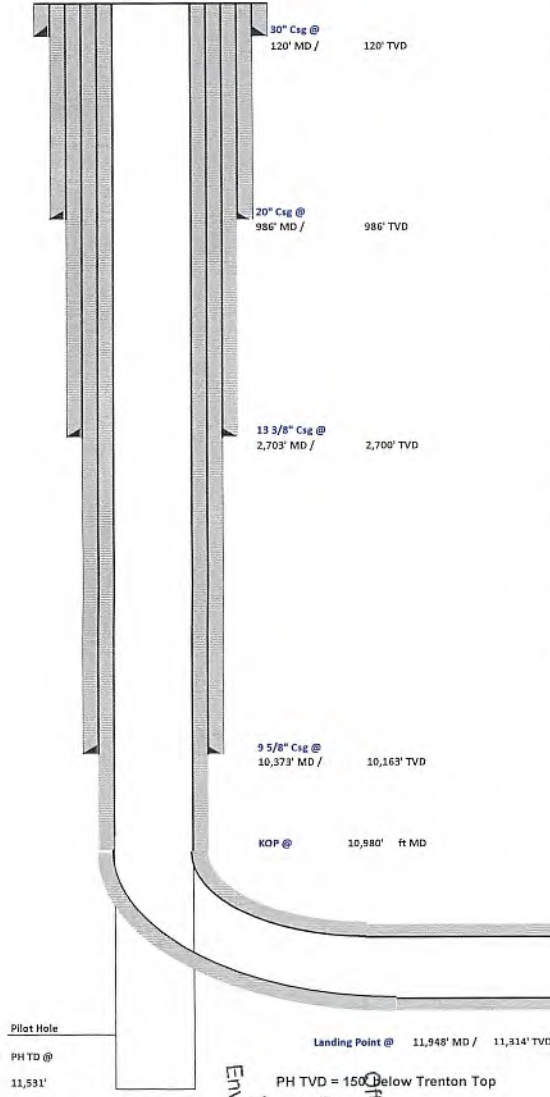


WELL NAME: Old Crow N-18HU
 STATE: WV COUNTY: Marshall
 DISTRICT: Franklin
 DF Elev: 1,265' GL Elev: 1,265'
 TD: 17,807'
 TH Latitude: 39.77840838
 TH Longitude: -80.76303514
 BH Latitude: 39.79501
 BH Longitude: -80.768805

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	886'
Sewickley Coal	788'
Pittsburgh Coal	880'
Big Lime	2,077'
Berea	2,626'
Tully	6,469'
Marcellus	6,550'
Onondaga	6,603'
Salina	7,300'
Lockport	8,336'
Utica	11,022'
Point Pleasant	11,259'
Landing Depth	11,314'
Trenton	11,381'
Pilot Hole TD	11,531'

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	120'	120'	BW	BW	Surface
Surface	26	20	986'	986'	106.5	J55	Surface
Intermediate 1	17 1/2	13 3/8	2,703'	2,700'	54.5	J55	Surface
Intermediate 2	12 1/4	9 5/8	10,373'	10,163'	47	HPP110	Surface
Production	8 1/2	5 1/2	17,807'	11,212'	23	HCP110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	1,717	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	2,066	A	15	Air	1 Centralizer every other jt
Intermediate 2	2,772	A	14.5	Air	1 Centralizer every other jt
Production	3,651	A	15	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc



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 Lateral TD @ 17,807' ft MD
 11,212' ft TVD

PH TVD = 150' Below Trenton Top
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Tug Hill Operating, LLC Casing and Cement Program

Old Crow N-18HU

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	20"	J55	26"	986'	CTS
Intermediate 1	13 3/8"	J55	17 1/2"	2,703'	CTS
Intermediate 2	9 5/8"	HPP110	12 1/4"	10,373'	CTS
Production	5 1/2"	HCP110	8 1/2"	17,807'	CTS

Cement

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

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

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

Production: 50:50 Poz: Premium NE-1 + .1% bwoc ASA-301 + 60lb/sk ASCA-1 + .35% bwoc BA-10A + .25% bwoc MPA-170, 44 lb sack + .5% bwoc R-3 + .75 gals/100sk FP-13L – Production Cement mixed at 15.2ppg, Y = 1.18

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Well: Old Crow N-18 HU (slot P)
 Site: Old Crow Pad 12/28/2018
 Project: Marshall County, West Virginia
 Design: rev2 4705902123

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSeet	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 1 1/100' build
3	2000.00	5.00	70.00	1999.37	7.46	20.49	1.00	70.00	1.84	Begin 5.00° tangent
4	2400.00	5.00	70.00	2397.84	19.38	53.25	0.00	0.00	4.78	Begin 1 1/100' drop
5	2900.00	0.00	70.00	2897.21	26.84	73.74	1.00	180.00	6.62	Begin vertical hold
6	7002.79	0.00	70.00	7000.00	26.84	73.74	0.00	70.00	6.62	Begin 3 1/100' build
7	7731.75	21.87	76.07	7711.39	59.93	207.13	3.00	78.07	3.68	Begin 21.87° tangent
8	10979.94	21.87	76.07	10725.84	351.24	1381.43	0.00	0.00	-22.23	Begin 10 1/100' build/turn
9	11948.42	91.00	330.00	11314.00	968.43	1292.02	10.00	-104.60	596.86	Begin 91.00° lateral section
10	17806.53	91.00	330.00	11212.00	6040.87	-1636.68	0.00	0.00	6258.68	PBHL/TD 17806.53 MD/11212.00 TVD

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

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

Northing 14448132.64 Easting 1706992.95 Latitude 39.77840838 Longitude -80.76303514

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



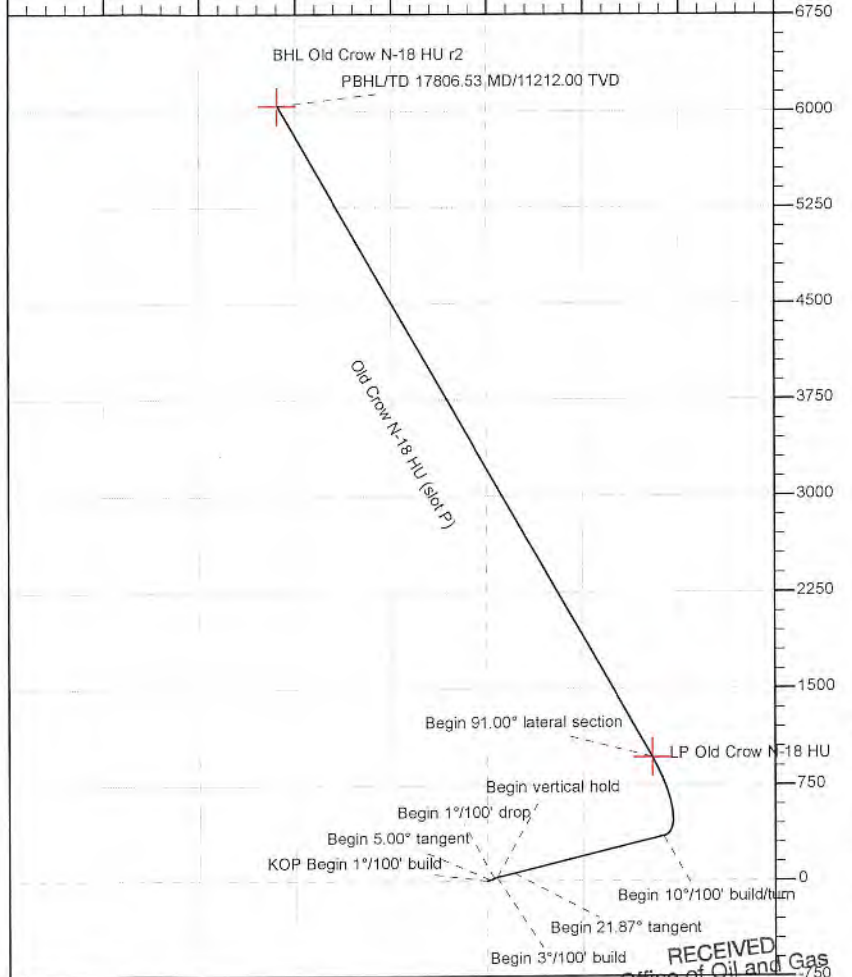
Azimuths to Grid North
 True North: -0.15°
 Magnetic North: -8.82°

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

True Vertical Depth (1200 usf/in)



West(-)/East(+) (1500 usf/in)



South(-)/North(+) (1500 usf/in)

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Vertical Section at 344.84° (1200 usf/in)

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Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Old Crow N-18 HU (slot P)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1265.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow N-18 HU (slot P)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,500.00	1,500.00	0.00	0.00	KOP Begin 1°/100' build
2,000.00	1,999.37	7.46	20.49	Begin 5.00° tangent
2,400.00	2,397.84	19.38	53.25	Begin 1°/100' drop
2,900.00	2,897.21	26.84	73.74	Begin vertical hold
7,002.79	7,000.00	26.84	73.74	Begin 3°/100' build
7,731.75	7,711.39	59.93	207.13	Begin 21.87° tangent
10,979.94	10,725.84	351.24	1,381.43	Begin 10°/100' build/turn
11,948.43	11,314.00	968.43	1,292.02	Begin 91.00° lateral section
17,806.53	11,212.00	6,040.87	-1,636.68	PBHL/TD 17806.53 MD/11212.00 TVD

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Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow N-18 HU (slot P)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Project	Marshall County, West Virginia		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD83 West Virginia - HARN		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	Old Crow Pad				
Site Position:		Northing:	14,446,179.89 usft	Latitude:	39.77853828
From:	Lat/Long	Easting:	1,706,970.33 usft	Longitude:	-80.76311519
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.15 °

Well	Old Crow N-18 HU (slot P)					
Well Position	+N/-S	0.00 usft	Northing:	14,446,132.65 usft	Latitude:	39.77840838
	+E/-W	0.00 usft	Easting:	1,706,992.95 usft	Longitude:	-80.76303514
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	52,106.40810462

Design	rev2			
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	344.84

Plan Survey Tool Program	Date	9/10/2018		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	17,806.53 rev2 (Original Hole)	MWD	MWD - Standard

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Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1265.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow N-18 HU (slot P)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,000.00	5.00	70.00	1,999.37	7.46	20.49	1.00	1.00	0.00	70.00	
2,400.00	5.00	70.00	2,397.84	19.38	53.25	0.00	0.00	0.00	0.00	
2,900.00	0.00	70.00	2,897.21	26.84	73.74	1.00	-1.00	0.00	180.00	
7,002.79	0.00	70.00	7,000.00	26.84	73.74	0.00	0.00	0.00	70.00	
7,731.75	21.87	76.07	7,711.39	59.93	207.13	3.00	3.00	0.83	76.07	
10,979.94	21.87	76.07	10,725.84	351.24	1,381.43	0.00	0.00	0.00	0.00	
11,948.42	91.00	330.00	11,314.00	968.43	1,292.02	10.00	7.14	-10.95	-104.60	LP Old Crow N-18 HL
17,806.53	91.00	330.00	11,212.00	6,040.87	-1,636.68	0.00	0.00	0.00	0.00	BHL Old Crow N-18 H

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 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Old Crow Pad
 Well: Old Crow N-18 HU (slot P)
 Wellbore: Original Hole
 Design: rev2

Local Co-ordinate Reference: Well Old Crow N-18 HU (slot P)
 TVD Reference: GL @ 1265.00usft
 MD Reference: GL @ 1265.00usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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 Office of Oil and Gas
 SEP 28 2018

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	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
100.00	0.00	0.00	100.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
200.00	0.00	0.00	200.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
300.00	0.00	0.00	300.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
400.00	0.00	0.00	400.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
500.00	0.00	0.00	500.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
600.00	0.00	0.00	600.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
700.00	0.00	0.00	700.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
800.00	0.00	0.00	800.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
900.00	0.00	0.00	900.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	14,446,132.65	1,706,992.95	39.77840838	-80.76303514	
KOP Begin 1°/100' build										
1,600.00	1.00	70.00	1,599.99	0.30	0.82	14,446,132.95	1,706,993.77	39.77840920	-80.76303222	
1,700.00	2.00	70.00	1,699.96	1.19	3.28	14,446,133.84	1,706,996.23	39.77841164	-80.76302346	
1,800.00	3.00	70.00	1,799.86	2.69	7.38	14,446,135.33	1,707,000.32	39.77841570	-80.76300885	
1,900.00	4.00	70.00	1,899.68	4.77	13.12	14,446,137.42	1,707,006.06	39.77842140	-80.76298842	
2,000.00	5.00	70.00	1,999.37	7.46	20.49	14,446,140.10	1,707,013.43	39.77842871	-80.76296215	
Begin 5.00° tangent										
2,100.00	5.00	70.00	2,098.99	10.44	28.68	14,446,143.09	1,707,021.62	39.77843684	-80.76293297	
2,200.00	5.00	70.00	2,198.60	13.42	36.87	14,446,146.07	1,707,029.81	39.77844497	-80.76290379	
2,300.00	5.00	70.00	2,298.22	16.40	45.06	14,446,149.05	1,707,038.00	39.77845309	-80.76287461	
2,400.00	5.00	70.00	2,397.84	19.38	53.25	14,446,152.03	1,707,046.19	39.77846122	-80.76284544	
Begin 1°/100' drop										
2,500.00	4.00	70.00	2,497.53	22.06	60.62	14,446,154.71	1,707,053.57	39.77846853	-80.76281917	
2,600.00	3.00	70.00	2,597.35	24.15	66.36	14,446,156.80	1,707,059.30	39.77847423	-80.76279873	
2,700.00	2.00	70.00	2,697.25	25.64	70.46	14,446,158.29	1,707,063.40	39.77847829	-80.76278413	
2,800.00	1.00	70.00	2,797.21	26.54	72.92	14,446,159.19	1,707,065.86	39.77848074	-80.76277536	
2,900.00	0.00	70.00	2,897.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
Begin vertical hold										
3,000.00	0.00	70.00	2,997.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,100.00	0.00	70.00	3,097.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,200.00	0.00	70.00	3,197.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,300.00	0.00	0.00	3,297.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,400.00	0.00	70.00	3,397.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,500.00	0.00	0.00	3,497.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,600.00	0.00	70.00	3,597.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,700.00	0.00	0.00	3,697.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,800.00	0.00	70.00	3,797.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
3,900.00	0.00	70.00	3,897.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,000.00	0.00	70.00	3,997.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,100.00	0.00	0.00	4,097.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,200.00	0.00	70.00	4,197.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,300.00	0.00	0.00	4,297.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,400.00	0.00	70.00	4,397.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,500.00	0.00	70.00	4,497.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,600.00	0.00	0.00	4,597.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,700.00	0.00	70.00	4,697.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,800.00	0.00	0.00	4,797.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	
4,900.00	0.00	70.00	4,897.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244	

Database: DB_Jul2216dt_v14
 Company: Tug Hill Operating LLC
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Local Co-ordinate Reference: Well Old Crow N-18 HU (slot P)
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 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
5,000.00	0.00	70.00	4,997.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,100.00	0.00	70.00	5,097.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,200.00	0.00	0.00	5,197.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,300.00	0.00	70.00	5,297.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,400.00	0.00	0.00	5,397.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,500.00	0.00	70.00	5,497.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,600.00	0.00	0.00	5,597.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,700.00	0.00	70.00	5,697.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,800.00	0.00	70.00	5,797.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
5,900.00	0.00	70.00	5,897.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,000.00	0.00	70.00	5,997.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,100.00	0.00	70.00	6,097.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,200.00	0.00	70.00	6,197.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,300.00	0.00	0.00	6,297.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,400.00	0.00	70.00	6,397.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,500.00	0.00	0.00	6,497.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,600.00	0.00	70.00	6,597.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,700.00	0.00	0.00	6,697.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,800.00	0.00	70.00	6,797.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
6,900.00	0.00	70.00	6,897.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
7,000.00	0.00	70.00	6,997.21	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
7,002.79	0.00	70.00	7,000.00	26.84	73.74	14,446,159.49	1,707,066.68	39.77848155	-80.76277244
Begin 3°/100' build									
7,100.00	2.92	76.07	7,097.17	27.43	76.14	14,446,160.08	1,707,069.08	39.77848317	-80.76276389
7,200.00	5.92	76.07	7,196.86	29.29	83.61	14,446,161.93	1,707,076.55	39.77848820	-80.76273728
7,300.00	8.92	76.07	7,296.01	32.39	96.14	14,446,165.04	1,707,089.08	39.77849665	-80.76269266
7,400.00	11.92	76.07	7,394.35	36.75	113.68	14,446,169.39	1,707,106.63	39.77850847	-80.76263017
7,500.00	14.92	76.07	7,491.61	42.33	136.20	14,446,174.98	1,707,129.14	39.77852365	-80.76254997
7,600.00	17.92	76.07	7,587.52	49.14	163.63	14,446,181.78	1,707,156.57	39.77854213	-80.76245229
7,700.00	20.92	76.07	7,681.83	57.14	195.89	14,446,189.79	1,707,188.83	39.77856388	-80.76233739
7,731.75	21.87	76.07	7,711.39	59.93	207.13	14,446,192.58	1,707,200.07	39.77857145	-80.76229735
Begin 21.87° tangent									
7,800.00	21.87	76.07	7,774.73	66.05	231.80	14,446,198.70	1,707,224.75	39.77858808	-80.76220947
7,900.00	21.87	76.07	7,867.53	75.02	267.95	14,446,207.67	1,707,260.90	39.77861245	-80.76208071
8,000.00	21.87	76.07	7,960.34	83.99	304.11	14,446,216.63	1,707,297.05	39.77863682	-80.76195195
8,100.00	21.87	76.07	8,053.14	92.95	340.26	14,446,225.60	1,707,333.20	39.77866118	-80.76182319
8,200.00	21.87	76.07	8,145.94	101.92	376.41	14,446,234.57	1,707,369.36	39.77868555	-80.76169443
8,300.00	21.87	76.07	8,238.75	110.89	412.56	14,446,243.54	1,707,405.51	39.77870991	-80.76156567
8,400.00	21.87	76.07	8,331.55	119.86	448.72	14,446,252.51	1,707,441.66	39.77873428	-80.76143690
8,500.00	21.87	76.07	8,424.35	128.83	484.87	14,446,261.48	1,707,477.81	39.77875864	-80.76130814
8,600.00	21.87	76.07	8,517.16	137.80	521.02	14,446,270.44	1,707,513.97	39.77878301	-80.76117938
8,700.00	21.87	76.07	8,609.96	146.76	557.17	14,446,279.41	1,707,550.12	39.77880737	-80.76105062
8,800.00	21.87	76.07	8,702.77	155.73	593.33	14,446,288.38	1,707,586.27	39.77883174	-80.76092186
8,900.00	21.87	76.07	8,795.57	164.70	629.48	14,446,297.35	1,707,622.42	39.77885610	-80.76079310
9,000.00	21.87	76.07	8,888.37	173.67	665.63	14,446,306.32	1,707,658.58	39.77888047	-80.76066433
9,100.00	21.87	76.07	8,981.18	182.64	701.78	14,446,315.29	1,707,694.73	39.77890483	-80.76053557
9,200.00	21.87	76.07	9,073.98	191.61	737.93	14,446,324.25	1,707,730.88	39.77892919	-80.76040681
9,300.00	21.87	76.07	9,166.79	200.58	774.09	14,446,333.22	1,707,767.03	39.77895356	-80.76027805
9,400.00	21.87	76.07	9,259.59	209.54	810.24	14,446,342.19	1,707,803.19	39.77897792	-80.76014928
9,500.00	21.87	76.07	9,352.39	218.51	846.39	14,446,351.16	1,707,839.34	39.77900229	-80.76002052
9,600.00	21.87	76.07	9,445.20	227.48	882.54	14,446,360.13	1,707,875.49	39.77902665	-80.75989176
9,700.00	21.87	76.07	9,538.00	236.45	918.70	14,446,369.10	1,707,911.64	39.77905101	-80.75976299
9,800.00	21.87	76.07	9,630.81	245.42	954.85	14,446,378.06	1,707,947.79	39.77907538	-80.75963423
9,900.00	21.87	76.07	9,723.61	254.39	991.00	14,446,387.03	1,707,983.95	39.77909974	-80.75950547

Database: DB_Jul2216dt_v14	Local Co-ordinate Reference: Well Old Crow N-18 HU (slot P)
Company: Tug Hill Operating LLC	TVD Reference: GL @ 1265.00usft
Project: Marshall County, West Virginia	MD Reference: GL @ 1265.00usft
Site: Old Crow Pad	North Reference: Grid
Well: Old Crow N-18 HU (slot P)	Survey Calculation Method: Minimum Curvature
Wellbore: Original Hole	RECEIVED Office of Oil and Gas
Design: rev2	SEP 28 2018

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
10,000.00	21.87	76.07	9,816.41	263.35	1,027.15	14,446,396.00	1,708,020.10	39.77912410	-80.75937671
10,100.00	21.87	76.07	9,909.22	272.32	1,063.31	14,446,404.97	1,708,056.25	39.77914846	-80.75924794
10,200.00	21.87	76.07	10,002.02	281.29	1,099.46	14,446,413.94	1,708,092.40	39.77917283	-80.75911918
10,300.00	21.87	76.07	10,094.83	290.26	1,135.61	14,446,422.91	1,708,128.56	39.77919719	-80.75899042
10,400.00	21.87	76.07	10,187.63	299.23	1,171.76	14,446,431.88	1,708,164.71	39.77922155	-80.75886165
10,500.00	21.87	76.07	10,280.43	308.20	1,207.92	14,446,440.84	1,708,200.86	39.77924591	-80.75873289
10,600.00	21.87	76.07	10,373.24	317.16	1,244.07	14,446,449.81	1,708,237.01	39.77927028	-80.75860412
10,700.00	21.87	76.07	10,466.04	326.13	1,280.22	14,446,458.78	1,708,273.17	39.77929464	-80.75847536
10,800.00	21.87	76.07	10,558.85	335.10	1,316.37	14,446,467.75	1,708,309.32	39.77931900	-80.75834660
10,900.00	21.87	76.07	10,651.65	344.07	1,352.53	14,446,476.72	1,708,345.47	39.77934336	-80.75821783
10,979.94	21.87	76.07	10,725.84	351.24	1,381.43	14,446,483.89	1,708,374.37	39.77936284	-80.75811490
Begin 10°/100' build/turn									
11,000.00	21.45	70.75	10,744.48	353.35	1,388.51	14,446,486.00	1,708,381.46	39.77936858	-80.75808965
11,100.00	21.99	43.54	10,837.62	372.99	1,418.75	14,446,505.64	1,708,411.69	39.77942230	-80.75798185
11,200.00	26.41	21.47	10,929.00	407.35	1,439.83	14,446,539.99	1,708,432.78	39.77951649	-80.75790646
11,300.00	33.20	6.58	11,015.84	455.37	1,451.14	14,446,588.01	1,708,444.08	39.77964828	-80.75786577
11,400.00	41.20	356.58	11,095.50	515.59	1,452.31	14,446,648.24	1,708,445.26	39.77981367	-80.75786101
11,500.00	49.81	349.44	11,165.57	586.19	1,443.32	14,446,718.84	1,708,436.27	39.78000763	-80.75789233
11,600.00	58.77	343.94	11,223.90	665.03	1,424.44	14,446,797.68	1,708,417.39	39.78022427	-80.75795877
11,700.00	67.91	339.41	11,268.75	749.70	1,396.24	14,446,882.34	1,708,389.19	39.78045700	-80.75805832
11,800.00	77.17	335.43	11,298.73	837.63	1,359.59	14,446,970.28	1,708,352.53	39.78069876	-80.75818795
11,900.00	86.48	331.75	11,312.94	926.15	1,315.58	14,447,058.80	1,708,308.53	39.78094219	-80.75834373
11,948.42	91.00	330.00	11,314.00	968.43	1,292.02	14,447,101.08	1,708,284.97	39.78105847	-80.75842718
11,948.43	91.00	330.00	11,314.00	968.43	1,292.02	14,447,101.08	1,708,284.97	39.78105848	-80.75842719
Begin 91.00° lateral section									
12,000.00	91.00	330.00	11,313.10	1,013.09	1,266.24	14,447,145.73	1,708,259.19	39.78118131	-80.75851853
12,100.00	91.00	330.00	11,311.36	1,099.68	1,216.25	14,447,232.32	1,708,209.19	39.78141947	-80.75869565
12,200.00	91.00	330.00	11,309.62	1,186.26	1,166.25	14,447,318.91	1,708,159.20	39.78165764	-80.75887277
12,300.00	91.00	330.00	11,307.88	1,272.85	1,116.26	14,447,405.50	1,708,109.20	39.78189580	-80.75904989
12,400.00	91.00	330.00	11,306.14	1,359.44	1,066.26	14,447,492.09	1,708,059.21	39.78213397	-80.75922701
12,500.00	91.00	330.00	11,304.40	1,446.03	1,016.27	14,447,578.68	1,708,009.21	39.78237213	-80.75940414
12,600.00	91.00	330.00	11,302.66	1,532.62	966.28	14,447,665.27	1,707,959.22	39.78261030	-80.75958126
12,700.00	91.00	330.00	11,300.91	1,619.21	916.28	14,447,751.85	1,707,909.23	39.78284846	-80.75975839
12,800.00	91.00	330.00	11,299.17	1,705.80	866.29	14,447,838.44	1,707,859.23	39.78308662	-80.75993552
12,900.00	91.00	330.00	11,297.43	1,792.38	816.29	14,447,925.03	1,707,809.24	39.78332479	-80.76011264
13,000.00	91.00	330.00	11,295.69	1,878.97	766.30	14,448,011.62	1,707,759.24	39.78356295	-80.76028977
13,100.00	91.00	330.00	11,293.95	1,965.56	716.30	14,448,098.21	1,707,709.25	39.78380111	-80.76046690
13,200.00	91.00	330.00	11,292.21	2,052.15	666.31	14,448,184.80	1,707,659.26	39.78403928	-80.76064404
13,300.00	91.00	330.00	11,290.47	2,138.74	616.32	14,448,271.39	1,707,609.26	39.78427744	-80.76082117
13,400.00	91.00	330.00	11,288.73	2,225.33	566.32	14,448,357.97	1,707,559.27	39.78451560	-80.76099830
13,500.00	91.00	330.00	11,286.98	2,311.91	516.33	14,448,444.56	1,707,509.27	39.78475376	-80.76117544
13,600.00	91.00	330.00	11,285.24	2,398.50	466.33	14,448,531.15	1,707,459.28	39.78499193	-80.76135258
13,700.00	91.00	330.00	11,283.50	2,485.09	416.34	14,448,617.74	1,707,409.29	39.78523009	-80.76152972
13,800.00	91.00	330.00	11,281.76	2,571.68	366.35	14,448,704.33	1,707,359.29	39.78546825	-80.76170686
13,900.00	91.00	330.00	11,280.02	2,658.27	316.35	14,448,790.92	1,707,309.30	39.78570641	-80.76188400
14,000.00	91.00	330.00	11,278.28	2,744.86	266.36	14,448,877.50	1,707,259.30	39.78594457	-80.76206114
14,100.00	91.00	330.00	11,276.54	2,831.45	216.36	14,448,964.09	1,707,209.31	39.78618273	-80.76223828
14,200.00	91.00	330.00	11,274.80	2,918.03	166.37	14,449,050.68	1,707,159.32	39.78642089	-80.76241543
14,300.00	91.00	330.00	11,273.06	3,004.62	116.38	14,449,137.27	1,707,109.32	39.78665905	-80.76259257
14,400.00	91.00	330.00	11,271.31	3,091.21	66.38	14,449,223.86	1,707,059.33	39.78689721	-80.76276972
14,500.00	91.00	330.00	11,269.57	3,177.80	16.39	14,449,310.45	1,707,009.33	39.78713537	-80.76294687
14,600.00	91.00	330.00	11,267.83	3,264.39	-33.61	14,449,397.04	1,706,959.34	39.78737353	-80.76312402
14,700.00	91.00	330.00	11,266.09	3,350.98	-83.60	14,449,483.62	1,706,909.35	39.78761168	-80.76330117
14,800.00	91.00	330.00	11,264.35	3,437.56	-133.59	14,449,570.21	1,706,859.35	39.78784984	-80.76347832

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Old Crow N-18 HU (slot P)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1265.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow N-18 HU (slot P)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
14,900.00	91.00	330.00	11,262.61	3,524.15	-183.59	14,449,656.80	1,706,809.36	39.78808800	-80.76365547	
15,000.00	91.00	330.00	11,260.87	3,610.74	-233.58	14,449,743.39	1,706,759.36	39.78832616	-80.76383263	
15,100.00	91.00	330.00	11,259.13	3,697.33	-283.58	14,449,829.98	1,706,709.37	39.78856432	-80.76400978	
15,200.00	91.00	330.00	11,257.38	3,783.92	-333.57	14,449,916.57	1,706,659.38	39.78880247	-80.76418694	
15,300.00	91.00	330.00	11,255.64	3,870.51	-383.56	14,450,003.15	1,706,609.38	39.78904063	-80.76436410	
15,400.00	91.00	330.00	11,253.90	3,957.10	-433.56	14,450,089.74	1,706,559.39	39.78927879	-80.76454125	
15,500.00	91.00	330.00	11,252.16	4,043.68	-483.55	14,450,176.33	1,706,509.39	39.78951694	-80.76471841	
15,600.00	91.00	330.00	11,250.42	4,130.27	-533.55	14,450,262.92	1,706,459.40	39.78975510	-80.76489558	
15,700.00	91.00	330.00	11,248.68	4,216.86	-583.54	14,450,349.51	1,706,409.41	39.78999325	-80.76507274	
15,800.00	91.00	330.00	11,246.94	4,303.45	-633.53	14,450,436.10	1,706,359.41	39.79023141	-80.76524990	
15,900.00	91.00	330.00	11,245.20	4,390.04	-683.53	14,450,522.69	1,706,309.42	39.79046956	-80.76542707	
16,000.00	91.00	330.00	11,243.46	4,476.63	-733.52	14,450,609.27	1,706,259.42	39.79070772	-80.76560423	
16,100.00	91.00	330.00	11,241.71	4,563.21	-783.52	14,450,695.86	1,706,209.43	39.79094587	-80.76578140	
16,200.00	91.00	330.00	11,239.97	4,649.80	-833.51	14,450,782.45	1,706,159.44	39.79118403	-80.76595857	
16,300.00	91.00	330.00	11,238.23	4,736.39	-883.50	14,450,869.04	1,706,109.44	39.79142218	-80.76613574	
16,400.00	91.00	330.00	11,236.49	4,822.98	-933.50	14,450,955.63	1,706,059.45	39.79166034	-80.76631291	
16,500.00	91.00	330.00	11,234.75	4,909.57	-983.49	14,451,042.22	1,706,009.45	39.79189849	-80.76649008	
16,600.00	91.00	330.00	11,233.01	4,996.16	-1,033.49	14,451,128.80	1,705,959.46	39.79213664	-80.76666726	
16,700.00	91.00	330.00	11,231.27	5,082.75	-1,083.48	14,451,215.39	1,705,909.46	39.79237480	-80.76684443	
16,800.00	91.00	330.00	11,229.53	5,169.33	-1,133.47	14,451,301.98	1,705,859.47	39.79261295	-80.76702161	
16,900.00	91.00	330.00	11,227.78	5,255.92	-1,183.47	14,451,388.57	1,705,809.48	39.79285110	-80.76719879	
17,000.00	91.00	330.00	11,226.04	5,342.51	-1,233.46	14,451,475.16	1,705,759.48	39.79308925	-80.76737597	
17,100.00	91.00	330.00	11,224.30	5,429.10	-1,283.46	14,451,561.75	1,705,709.49	39.79332741	-80.76755315	
17,200.00	91.00	330.00	11,222.56	5,515.69	-1,333.45	14,451,648.34	1,705,659.49	39.79356556	-80.76773033	
17,300.00	91.00	330.00	11,220.82	5,602.28	-1,383.45	14,451,734.92	1,705,609.50	39.79380371	-80.76790751	
17,400.00	91.00	330.00	11,219.08	5,688.86	-1,433.44	14,451,821.51	1,705,559.51	39.79404186	-80.76808469	
17,500.00	91.00	330.00	11,217.34	5,775.45	-1,483.43	14,451,908.10	1,705,509.51	39.79428001	-80.76826188	
17,600.00	91.00	330.00	11,215.60	5,862.04	-1,533.43	14,451,994.69	1,705,459.52	39.79451816	-80.76843906	
17,700.00	91.00	330.00	11,213.86	5,948.63	-1,583.42	14,452,081.28	1,705,409.52	39.79475631	-80.76861625	
17,800.00	91.00	330.00	11,212.11	6,035.22	-1,633.42	14,452,167.87	1,705,359.53	39.79499446	-80.76879344	
17,806.53	91.00	330.00	11,212.00	6,040.87	-1,636.68	14,452,173.52	1,705,356.27	39.79501000	-80.76880500	

PBHL/TD 17806.53 MD/11212.00 TVD

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
BHL Old Crow N-18 HU - plan hits target center - Point	0.00	0.00	11,212.00	6,040.87	-1,636.68	14,452,173.52	1,705,356.27	39.79501000	-80.76880500	
LP Old Crow N-18 HU - plan hits target center - Point	0.00	0.01	11,314.00	968.43	1,292.02	14,447,101.08	1,708,284.97	39.78105847	-80.75842718	

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SEP 28 2018

 WV Department of
 Environmental Protection

4705102123

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Old Crow N-18 HU (slot P)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1265.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow N-18 HU (slot P)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,500.00	1,500.00	0.00	0.00	KOP Begin 1°/100' build
2,000.00	1,999.37	7.46	20.49	Begin 5.00° tangent
2,400.00	2,397.84	19.38	53.25	Begin 1°/100' drop
2,900.00	2,897.21	26.84	73.74	Begin vertical hold
7,002.79	7,000.00	26.84	73.74	Begin 3°/100' build
7,731.75	7,711.39	59.93	207.13	Begin 21.87° tangent
10,979.94	10,725.84	351.24	1,381.43	Begin 10°/100' build/turn
11,948.43	11,314.00	968.43	1,292.02	Begin 91.00° lateral section
17,806.53	11,212.00	6,040.87	-1,636.68	PBHL/TD 17806.53 MD/11212.00 TVD

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SEP 28 2018

 WV Department of
 Environmental Protection

4705 02123

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Tug Hill Operating, LLC OP Code 494510851

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

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

Will a pit be used? Yes No

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

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

Proposed Disposal Method For Treated Pit Wastes:

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

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

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

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

Additives to be used in drilling medium? Barite for weight

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

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

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

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SEP 28 2018

WV Department of
Environmental Protection

Subscribed and sworn before me this 26 day of SEPT., 2018

Maureen A Stead

Notary Public

My commission expires 1/29/19

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
MAUREEN A STEAD
Notary Public
CECIL TWP, WASHINGTON COUNTY
My Commission Expires Jan 28, 2019

Tug Hill Operating, LLC

Proposed Revegetation Treatment: Acres Disturbed 19.18 Prevegetation pH 6.0

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch 2.5 Tons/acre

Seed Mixtures

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

Attach:

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

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: *Jim Nichols*

Comments: _____

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SEP 28 2018

WV Department of
Environmental Protection

Title: Oil and Gas Inspector

Date: 9/27/18

Field Reviewed? Yes

No

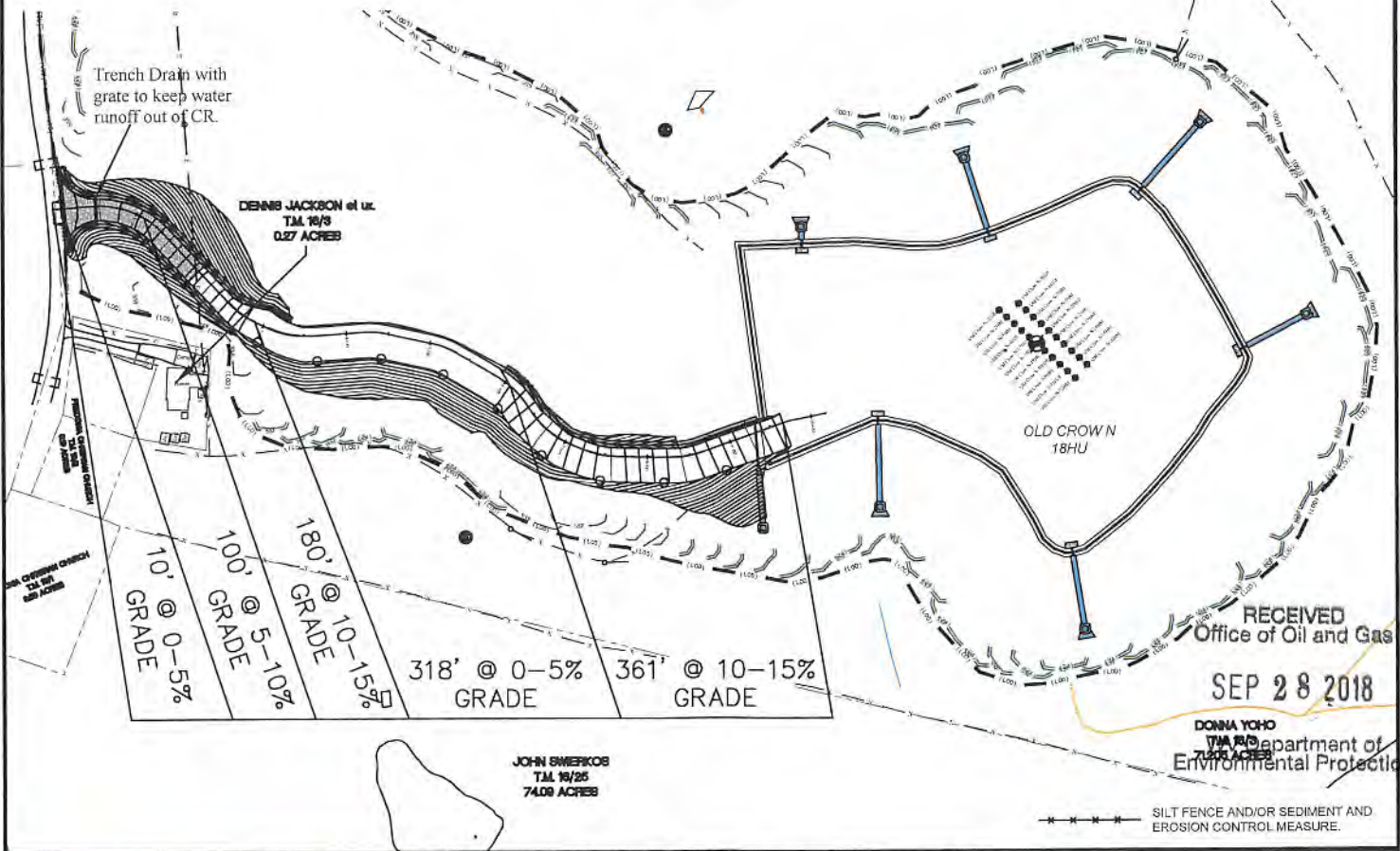
4705102123
 12/28/2018
 4705102123
 SUPPLEMENT PG1

WW-9

PROPOSED OLD CROW N - 18HU

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 6-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.



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 Land & Energy Development
 Solutions from the ground up.
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 www.slsurveys.com

TOPO SECTION:		OPERATOR:	
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	09/26/18	NONE

TUG HILL
 OPERATING



Well Site Safety Plan
Tug Hill Operating, LLC

9/27/18

Well Name: Old Crow N-18HU

Pad Location: Old Crow

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

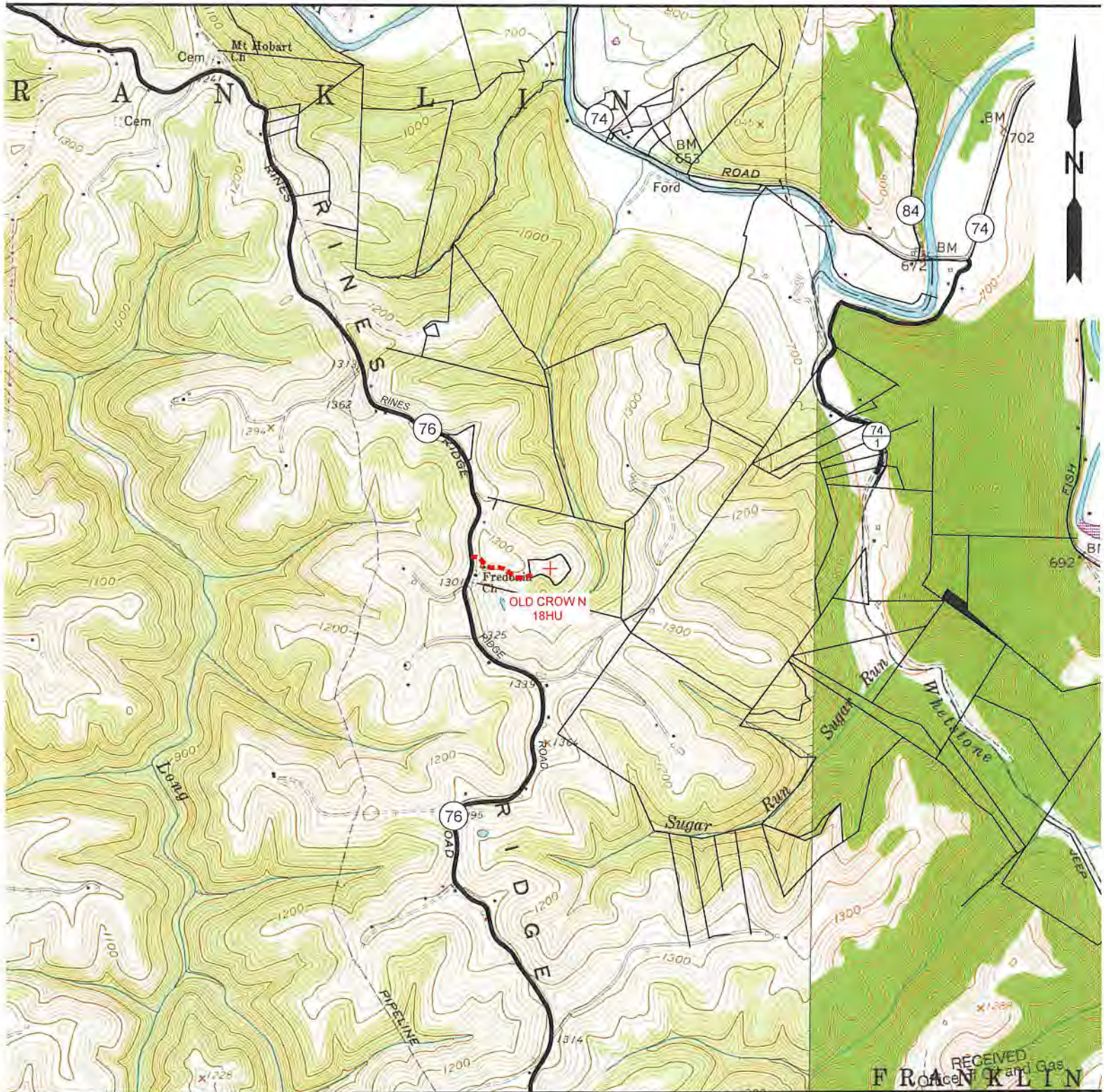
NORTHING -4,403,190.04

EASTING -520,292.49

September 2018

PROPOSED OLD CROWN - 18HU

47051021
4705102123
SUPPLEMENT PG. 2
12/28/2018



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 CROWN - 1HM SURFACE LOCATION

SEP 28 2018

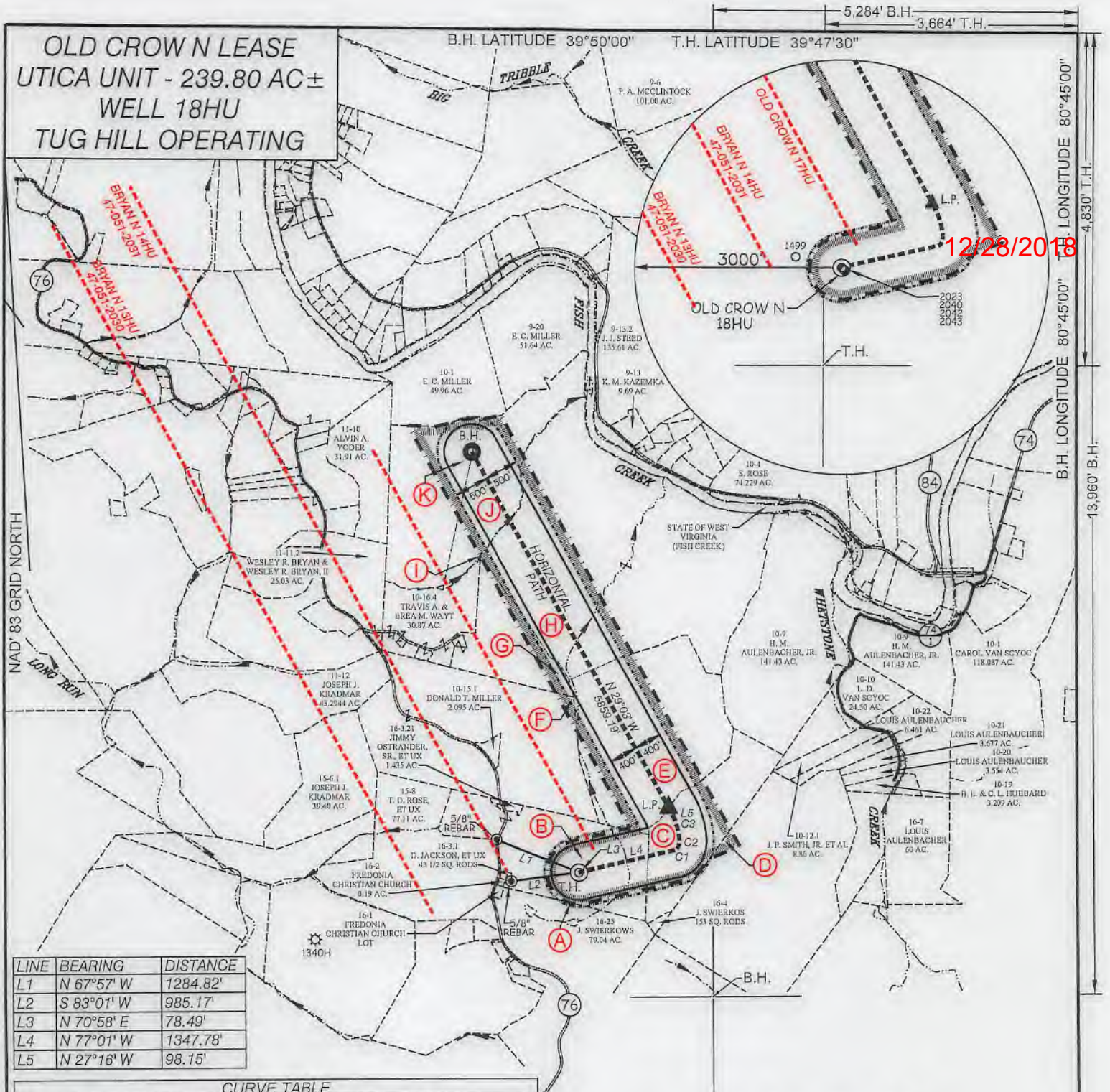
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FRANKLIN
WV Department of Environmental Protection

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TOPO SECTION:		OPERATOR:	
GLEN EASTON & POWHATAN POINT 7.5'		PREPARED FOR:	
COUNTY	DISTRICT	TUG HILL OPERATING, LLC	
MARSHALL	FRANKLIN	380 SOUTHPOINTE BLVD	
DRAWN BY		DATE	SCALE
JOB NO.			

TUG HILL
OPERATING

**OLD CROW N LEASE
UTICA UNIT - 239.80 AC±
WELL 18HU
TUG HILL OPERATING**



LINE	BEARING	DISTANCE
L1	N 67°57' W	1284.82'
L2	S 83°01' W	985.17'
L3	N 70°58' E	78.49'
L4	N 77°01' W	1347.78'
L5	N 27°16' W	98.15'

CURVE	ARC LENGTH	RADIUS	CHORD LENGTH	CHORD BEARING
C1	84.31'	86.57'	81.02'	N 47°06'30" E
C2	146.55'	299.66'	145.10'	N 04°18'50" E
C3	349.48'	1025.10'	347.79'	N 17°28'10" W

47-051-02123 H6A

TAG	SURFACE OWNER	PARCEL	ACRES
A	JOHN SWIERKOS	5-16-25	79.04
B	DONNA VIVIAN YOHO - TOD	5-16-3	71.205
C	JOHN SWIERKOS	5-16-5	52.07
D	JOHN SWIERKOS	5-16-6	134.05
E	JOHN SWIERKOS	5-10-14	100.00
F	PAUL ANDREW & DEBRA A. RINE	5-10-15	120.80
G	TIMOTHY SR. & LINDA MCGINNIS	5-10-16	30.87
H	HERBERT M. AULENBACHER, JR.	5-10-3	225.50
I	MELVIN E., JR. & ELIZABETH A. FERGUSON	5-10-16.4	30.87
J	WILLIAM A. PRASCIK ET AL	5-10-2	52.00
K	ALVIN A. YODER	5-10-17	57.28

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P.S. 849 *C. Victor Moyers*

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)	
NAD'83 S.P.C.(FT)	N. 468,131.25 E. 1,613,534.59
NAD'83 GEO.	LAT-(N) 39.778408 LONG-(W) 80.763035
NAD'83 UTM (M)	N. 4,403,190.04 E. 520,292.49
LANDING POINT	
NAD'83 S.P.C.(FT)	N. 469,078.30 E. 1,614,843.10
NAD'83 GEO.	LAT-(N) 39.781058 LONG-(W) 80.758427
NAD'83 UTM (M)	N. 4,403,485.2 E. 520,686.3
BOTTOM HOLE	
NAD'83 S.P.C.(FT)	N. 474,200.70 E. 1,611,998.50
NAD'83 GEO.	LAT-(N) 39.795010 LONG-(W) 80.768805
NAD'83 UTM (M)	N. 4,405,031.3 E. 519,793.6



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

UNIT BOUNDARY	
LEASED TRACTS INSIDE	
UNIT BOUNDARY	
SURFACE LINE	
PROPOSED UTICA	
WELL LATERAL	
400' OFFSET LINE	
500' OFFSET LINE	
TIE LINE	
CREEK	
ROAD	
COUNTY ROUTE	
PROPOSED WELL	
EXISTING WELL	
PERMITTED WELL	
SURFACE OWNER (SEE TABLE)	
LEASE # (SEE SHEETS 1, 3, & 4)	

SCALE 1" = 2000' FILE NO. 8796P18HU.dwg
 OLD CROW NORTH 18HU_REV2
 DATE SEPTEMBER 26, 20
 REVISED _____, 20_____
 OPERATORS WELL NO. OLD CROW N-18HU
 API WELL NO. 47
 STATE COUNTY PERMIT

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

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

COUNTY NAME PERMIT

**OLD CROW N LEASE
UTICA UNIT - 239.80 AC±
WELL 18HU
TUG HILL OPERATING**

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

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

NAD'83 S.P.C.(FT)	N. 468,131.25	E. 1,613,534.59
NAD'83 GEO.	LAT-(N) 39.778408	LONG-(W) 80.763035
NAD'83 UTM (M)	N. 4,403,190.04	E. 520,292.49

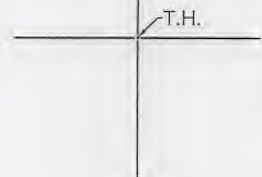
LANDING POINT

NAD'83 S.P.C.(FT)	N. 469,078.30	E. 1,614,843.10
NAD'83 GEO.	LAT-(N) 39.781058	LONG-(W) 80.758427
NAD'83 UTM (M)	N. 4,403,485.2	E. 520,686.3

BOTTOM HOLE

NAD'83 S.P.C.(FT)	N. 474,200.70	E. 1,611,998.50
NAD'83 GEO.	LAT-(N) 39.795010	LONG-(W) 80.768805
NAD'83 UTM (M)	N. 4,405,031.3	E. 519,793.6

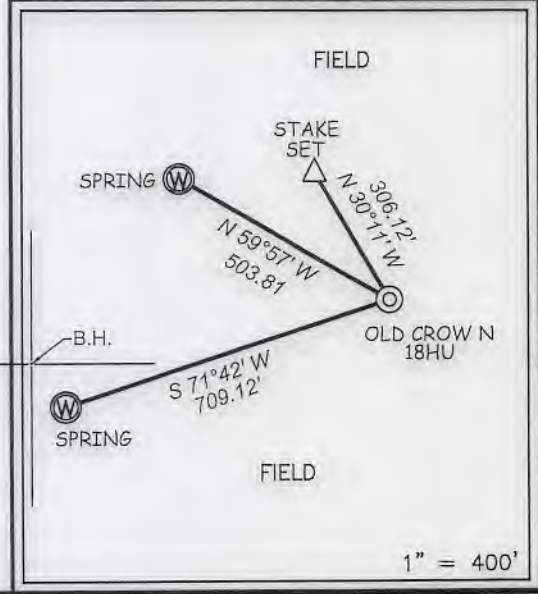
NO.	Lease ID	Tag	Parcel	Oil & Gas Royalty Owner	Deed Book/Page
1	10*21468	A	5-16-25	JOHN A SWIERKOS	953 317
2	10*19340	B	5-16-3	DONNA VIVIAN YOHO	665 407
3	10*14919	C	5-16-5	CHESTNUT HOLDINGS INC	836 117
4	10*21468	D	5-16-6	JOHN A SWIERKOS	953 317
5	10*14920	E	5-10-14	CHESTNUT HOLDINGS INC	836 119
6	10*19017	F	5-10-15	PAUL A RINE AND DEBRA A RINE	796 24
7	10*19126	G	5-10-16	KEVIN R. CORLEY AND ANITA L. CORLEY, HUSBAND AND WIFE	859 44
8	10*14918	H	5-10-3	CHESTNUT HOLDINGS INC	836 115
9	10*19109	J	5-10-16.4	JOHN W. MILLER AND MARY ALICE MILLER, HUSBAND AND WIFE	863 275
10	10*47051.260.0	J	5-10-2	WILLIAM A PRASCIK ET AL	879 302
11	10*19021	K	5-10-17	MARCELLUS TX MINERAL PARTNERS LTD	800 216
12	10*19034	K	5-10-17	JMK IRREVOCABLE TRUST	813 145
13	10*19035	K	5-10-17	PURPLEBURGH VENTURES, LLC	813 138



NOTES ON SURVEY

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

REFERENCES



SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26351 • (304) 482-5634
www.slsurveys.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 SEPTEMBER 26, 20 18
 REVISED _____, 20 _____
 OPERATORS WELL NO. OLD CROW N-18HU
 API WELL NO. 47-051-02123H6A
 STATE 47 COUNTY 051 PERMIT 02123H6A

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8796P18HU.dwg
OLD CROW NORTH 18HU_REV2
 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 = 1286.70' ELEVATION PROPOSED = 1264.99' 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 TABLE

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

PHYSICAL CHANGE IN WELL (SPECIFY) _____ TARGET FORMATION POINT PLEASANT
 ESTIMATED DEPTH TVD: 11,531' / TMD: 17,807'

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

B.H. LONGITUDE 80°45'00" 13,960' B.H. 4,830' T.H. B.H. LONGITUDE 80°45'00"

WW-6A1
(5/13)

Operator's Well No. Old Crow N-18HU

**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 Miller *amy Miller*
 Its: Permitting Specialist

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Lease ID	Parcel	Tag	Grantor, Lessor, Etc	Grantee, Lessee, Etc	Royalty	Deed Book/Page		Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment			
10*21468	5-16-25	A	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953	317	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓		
10*19340	5-16-3	B	DONNA VIVIAN YOHO	GASTAR EXPLORATION USA INC	1/8+	665	407	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 23/353	Gastar Exploration SA Inc & Atinum Marcellus I LLC to AB Resources LLC: 23/617	AB Resources LLC to TriEnergy Holdings LLC: 23/633	AB Resources LLC to Chief Exploration & Development LLC & Radler 2000 Ltd Partnership: 24/319	Chief Explor. & Devel. LLC, Chief O&G LLC, Radler 2000 Ltd Prtnshp and Enerplus Resources (USA) Corp to Chevron USA Inc: 25/1	Chief Explor. & Devel. LLC, Chief O&G LLC, Radler 2000 Ltd Prtnshp and Enerplus Resources (USA) Corp to Chevron USA Inc: 25/105	AB Resources LLC to Chevron USA Inc: 756/397	Chevron USA Inc to TH Exploration LLC: 40/57	✓		
10*14919	5-16-5	C	CHESTNUT HOLDINGS INC	GASTAR EXPLORATION INC	1/8+	836	117	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration Inc to Atinum Marcellus I LLC: 32/428	Gastar Exploration Inc to TH Exploration II LLC: 36/9	✓
10*21468	5-16-6	D	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953	317	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓
10*14920	5-10-14	E	CHESTNUT HOLDINGS INC	GASTAR EXPLORATION INC	1/8+	836	119	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration Inc to Atinum Marcellus I LLC: 32/428	Gastar Exploration Inc to TH Exploration II LLC: 36/9	✓
10*19017	5-10-15	F	PAUL A RINE AND DEBRA A RINE	CHEVRON USA INC	1/8+	796	24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127	✓
10*19126	5-10-16	G	KEVIN R. CORLEY AND ANITA L. CORLEY, HUSBAND AND WIFE	CHEVRON USA INC	1/8+	859	44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127	✓
10*14918	5-10-3	H	CHESTNUT HOLDINGS INC	GASTAR EXPLORATION INC	1/8+	836	115	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gastar Exploration Inc to Atinum Marcellus I LLC: 32/428	Gastar Exploration Inc to TH Exploration II LLC: 36/9	✓
10*19109	5-10-16.4	I	JOHN W. MILLER AND MARY ALICE MILLER, HUSBAND AND WIFE	CHEVRON USA INC	1/8+	863	275	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127	✓
10*47051.260.0	5-10-2	J	WILLIAM A PRASCIK ET AL	TH EXPLORATION LLC	1/8+	879	302	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓
10*19021	5-10-17	K	MARCELLUS TX MINERAL PARTNERS LTD	CHEVRON USA INC	1/8+	800	216	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127	✓
10*19034	5-10-17	K	JMK IRREVOCABLE TRUST	CHEVRON USA INC	1/8+	813	145	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127	✓
10*19035	5-10-17	K	PURPLEBURGH VENTURES, LLC	CHEVRON USA INC	1/8+	813	138	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Chevron USA Inc to TH Exploration LLC: 40/127	✓

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4705102123

AFFIDAVIT

STATE OF TEXAS §
 § SS
COUNTY OF TARRANT §

On this 18th 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 18th day of October, 2016.

David D. Kalish
Affiant: David D. Kalish

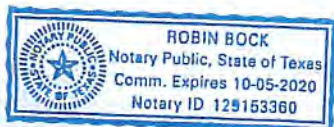
JURAT

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

STATE OF TEXAS §
 § SS
COUNTY OF TARRANT §

Sworn and subscribed to (or affirmed) before me on this, the 18th 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

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Top Page
MARSHALL County 01:22:38 PM
Instrument No 1407489
Date Recorded 04/27/2016
Document Type ASB
Pages Recorded 77
Book-Page 56-9
Recording Fee \$77.00
Additional \$13.00

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

Execution Version

ASSIGNMENT AND BILL OF SALE

STATE OF WV §
COUNTY OF MARSHALL § KNOW ALL MEN BY THESE PRESENTS:
§

THIS ASSIGNMENT AND BILL OF SALE (this "Assignment"), dated April 7, 2016, but effective as of 7:00 A.M. Houston time on January 1, 2016 (the "Effective Time"), is between Gasbar Exploration Inc., a Delaware corporation, whose address is 1331 Lamar Street, Suite 630 Houston, Texas 77010 ("Assignor"), and TH Exploration II, LLC, a Texas limited liability company, whose address is 1320 South University Drive, Suite 500, Fort Worth, Texas 76107 ("Assignee"). Assignor and Assignee are each, individually, referred to herein as a "Party" and, collectively, as the "Parties".

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

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

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

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

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

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STATE OF WEST VIRGINIA
COUNTY OF MARSHALL

§
§
§

4705102123

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

BOOK 0040 PAGE 0127 12/28/2018

4705102123

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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TUG HILL

4705102123 12/28/2018

September 27, 2018

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

RE: Old Crow N-18HU

Subject: Road Crossing Letter

Dear Laura:

Tug Hill Operating, LLC will not be drilling, extracting or producing any minerals under any WV County or State Routes in the area reflected on the Old Crow N-18HU 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-hillop.com.

Sincerely,

Amy L. Miller
Permitting Specialist – Appalachia Region

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

Date of Notice Certification: 03/13/2018

API No. 47- 051

Operator's Well No. Old Crow N-18HU

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:	West Virginia	UTM NAD 83 Easting:	520,292.49
County:	Marshall	UTM NAD 83 Northing:	4,403,190.04
District:	Franklin	Public Road Access:	Rines Ridge Road (County Route 76)
Quadrangle:	Powhatan Point 7.5'	Generally used farm name:	Donna Yoho
Watershed:	Tributary of Fish Creek (HUC-10)		

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><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>OOG OFFICE USE ONLY</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><input type="checkbox"/> RECEIVED</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 Notices, Certifications of Notice shall serve as proof that the required parties have been noticed as required under 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.

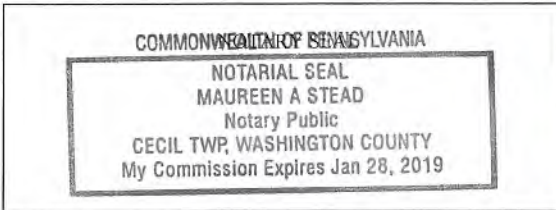
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12/28/2018
4705902123

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 27 day of SEPT. 2018.
Maureen A Stead Notary Public
 My Commission Expires 1/28/19

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.

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API NO. 47- 051 - 12/28/2018
OPERATOR WELL NO. Old Crow N-18HU
Well Pad Name: Old Crow

4705902123

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: 9/27/2018 Date Permit Application Filed: 9/28/2018

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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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 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

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 and Gas the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

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API NO. 47-051 - 12/28/2018
OPERATOR WELL NO. Old Crow N-18HU
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 57th 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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API NO. 47-051 - **12/28/2018**

OPERATOR WELL NO. Old Crow N-18HU

Well Pad Name Old Crow
4705102123

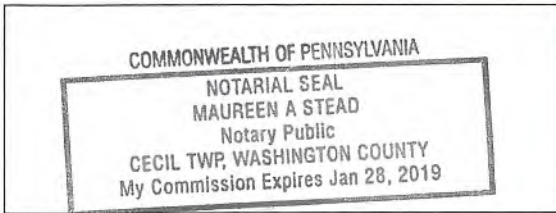
Notice is hereby given by:

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

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

Oil and Gas Privacy Notice:

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



Subscribed and sworn before me this 27 day of SEPT. 2018.

Maureen A Stead Notary Public

My Commission Expires 1/28/19

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Exhibit WW-6A

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

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

Well: Old Crow N – 18HU
 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>Residence 1 TM 16 Pcl. 3.1 Dennis Jackson, Et Ux Phone: 304-843-1762 Physical Address: 4004 Rines Ridge Rd. Proctor, WV 26055 Tax Address: P.O. Box 109 Woodsfield, OH 43793</p>	<p>Residence 2 TM 16 Pcl. 3 Donna Vivian Yoho - TOD Phone: 304-845-5590 (Rev. Address) Physical Address: 3862 Rines Ridge Rd. Proctor, WV 26055 Tax Address: Same</p>	<p>Residence 3 TM 16 Pcl. 3.2 Jimmy Ostrander, Sr., Et Ux Phone: 304-845-5599, 304-845-5590 Physical Address: 3810 Rines Ridge Rd. Proctor, WV 26055 Tax Address: Same</p>
<p>Residence 4 TM 16 Pcl. 6 John Swierkos Phone: 304-810-4092 Physical Address: 110 Rahm Dr. Proctor, WV 26055 Tax Address: Same</p>	<p>Residence 5 TM 16 Pcl. 23.3 Greg & Christina Riddle Phone: 304-843-0173 Physical Address: 4205 Rines Ridge Rd. Proctor, WV 26055 Tax Address: Same</p>	<p>Residence 6 TM 16 Pcl. 23.1 Ray E. Minor, Et Ux Phone: 304-843-1713 Physical Address: 4193 Rines Ridge Rd. Proctor, WV 26055 Tax Address: Same</p>
<p>Residence 7 TM 16 Pcl. 24 Alan M. Beyser, Et Ux Phone: 304-810-0617 Physical Address: 4271 Rines Ridge Rd. Proctor, WV 26055 Tax Address: Same</p>		

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SUPPLEMENT PG. 1B

PROPOSED OLD CROW N - 18HU 4705102123



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

SEP 28 2018

 <p>SLS Land & Energy Development <i>Solutions from the ground up.</i> P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26035 • (304) 482-6634 www.slsurveys.com</p>	TOPO SECTION: GLEN EASTON & POWHATAN POINT 7.5' COUNTY DISTRICT MARSHALL FRANKLIN		OPERATOR: PREPARED FOR: TUG HILL OPERATING, LLC 380 SOUTHPOINTE BLVD SUITE 200 CANONSBURG, PA 15317		 <p>WV Department of Environmental Protection TUG HILL OPERATING</p>
	DRAWN BY: K.G.M.	JOB NO.: 8796	DATE: 09/26/18	SCALE: 1" = 1000'	
	RECEIVED Office of Oil and Gas				
	RECEIVED Office of Oil and Gas				

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**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: 11/16/2017 **Date of Planned Entry:** 11/24/2017

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 Vivian Yoho (Well Pad and Access Road)
 Address: 3862 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: Donna Vivian Yoho
 Address: 3862 Rines Ridge Road
Proctor, WV 26055
 *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>Fish Creek (HUC-10)</u>
Quadrangle: <u>Powhatan Point 7.5'</u>	Generally used farm name: <u>Donna Vivian 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 57th 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.

Notice is hereby given by:

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

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

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Office of Oil and Gas
SEP 28 2018
WV Department of
Environmental Protection

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.

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: 09/27/2018 **Date Permit Application Filed:** 09/28/2018

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

- CERTIFIED MAIL RETURN RECEIPT REQUESTED
- HAND 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> <u>Proctor, WV 26055</u>	Address: _____

Notice is hereby given:

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

State: <u>West Virginia</u>	UTM NAD 83	Easting: <u>520,292.49</u>
County: <u>Marshall</u>		Northing: <u>4,403,190.04</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 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting 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-hillcop.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.

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Environmental Protection

12/28/2018



4705102123

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0430 • (304) 558-3505

Thomas J. Smith, P. E.
Secretary of Transportation/
Commissioner of Highways

March 2, 2018

Jill M. Newman
Deputy Commissioner

James A. Martin, Chief
Office of Oil and Gas
Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304

Subject: DOH Permit for the Old Crow Pad, Marshall County
Old Crow N-18HU 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,

A handwritten signature in blue ink that reads "Gary K. Clayton".

Gary K. Clayton, P.E.
Regional Maintenance Engineer
Central Office O&G Coordinator

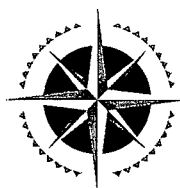
Cc: Jonathan White
Tug Hill Operating, LLC
CH, OM, D-6
File

RECEIVED
Office of Oil and Gas

SEP 28 2018

WV Department of
Environmental Protection

12/28/2018



TUG HILL

4705102123

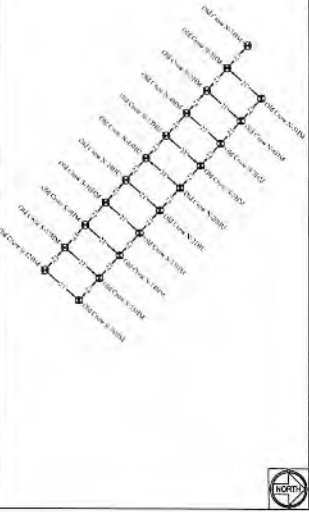
PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION

PRODUCT NAME:	CHEMICAL DESCRIPTION:	PRODUCT USE:	HAZARDOUS COMPONENT:
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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WV Department of
Environmental Protection



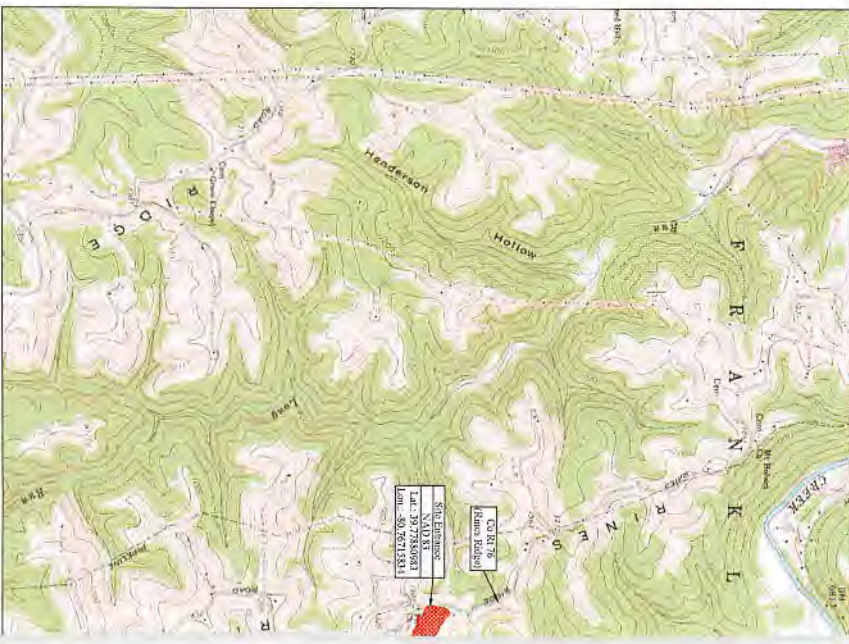
Site Entrance	Center of Well Pad
WV-NAD 83 N: 4633174	WV-NAD 83 E: 468123.90
WV-NAD 83 E: 16131734	WV-NAD 83 E: 16138197.03
WV-NAD 27 E: 16435136	WV-NAD 27 E: 16469144.42
LA-NAD 83: 39 7783084	LA-NAD 83: 39 77834878
LA-NAD 83: 40 27713534	LA-NAD 83: 40 76316160
LA-NAD 27: 39 7783224	LA-NAD 27: 39 77839171
LA-NAD 27: 39 7783977	LA-NAD 27: 39 7783977
UTM 17NAD 83 N: 440323.67	UTM 17NAD 83 E: 52081.05
UTM 17NAD 83 E: 5199923.8	
Pad Elev: 1264.09'	



APPROVED
WVDEP OOG
5/11/2018

Old Crow
Site Design, Cor
Erosion and Sedi
Tug Hill
Marshal
Franklin
Latitude 3
Longitude -8
Lower Fish Cr

Exhibit A: Final Design



Well Field		Well Field		Well Field		Well Field		Well Field	
WV-NAD 83 N: 4633174	WV-NAD 83 E: 468123.90	WV-NAD 83 N: 4633174	WV-NAD 83 E: 468123.90	WV-NAD 83 N: 4633174	WV-NAD 83 E: 468123.90	WV-NAD 83 N: 4633174	WV-NAD 83 E: 468123.90	WV-NAD 83 N: 4633174	WV-NAD 83 E: 468123.90

Project Contacts

Team Hill Operating:
Kennedy White, Regulatory Analyst
724-485-2000 O/E 301-498-7676 Cell

Client/Owner - V.P. Production:
Dean J. Soss
304-949-2920 O/E

Stevens and Erdreich:
Kamran Khalil
304-338-6085 O/E

The Hill Operating LLC
380 Stonepointe Blvd.
Schenectady, NY 12319

Geotechnical Engineer:
Anderson Geotech, Inc.
3919-400-271 O/E

Wetland Delineation as provided by: Albur Ecology
dated November 6, 2017

Topographic Information:
The topographic information shown here is based on aerial photography from the National Aerial Photography Inventory (NAPI) for the area.

West Virginia
MISS UTILITY OF
WEST VIRGINIA
1-800-245-4848
Great Western State Bank
Branches in all major West Virginia cities.
For 40+ years we've been serving West Virginia.
IT'S THE LAW
Know what's below,
Call before you dig.

Tug Hill Operating will obtain an Environmental Permit (from MMA-109) from the WV Department of Transportation, Division of Highways, prior to the commencement of any construction activities. The WV Mines Website was consulted. Previous (Current) mining activities are not within the AOI. WVDEP Website files show that there are no active and/or abandoned gas wells within the AOI.

Approach Routes:
From the intersection of OH Rt 7 and WV Rt 2 near New Martinsville, WV, Travel North on WV Rt 2 for 13.0 mi, Turn right onto Co Rt 27 (Woodland and Graysville), Follow Co Rt 27 for 1.0 mi, Turn Right onto Co Rt 76 (Raines Ridge), Follow Co Rt 76 for 4.0 mi. The site entrance will be on the Left (East) side of the road.

Site Locations (NAD 27)

Structure	Latitude (NAD 27)	Longitude (NAD 27)
Site Entrance	40 765522.5	-81 033577.0
Center of Well Pad	39 77839971	-80 76338715

Floodplain Conditions

Do the construction activities take place in a floodplain:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO
Are there any floodplains that cross the project area:	NO



Well Site

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77838678°

76316840°

k Watershed

Issue for Permitting

Pertinent Site Information

Old Crow Well Site
Emergency Number: 304-845-1920
Franklin District, Marshall County, WV
Watershed: Lower Fish Creek Watershed
Site 911 Address:
Tug Hill Contact Number: 1-817-632-3400

Property Owner Information - Old Crow Well Site

Franklin District - Marshall County						
Owner	TM - Parcel	Well Pad	Access Road	Final Access	Add. Channel	Total Disturbed
Danya Yoho	16-4	6-84	1-71	1-91	8-75	19-18
Site (incl. pad)	6-84	1-71	1-91	8-75		19-18



WV State Plane Coordinate System
North Zone, NAD 83
Elevation based on NAVD83
Horizontal coordinates in UTM
and UTM S Post Processing

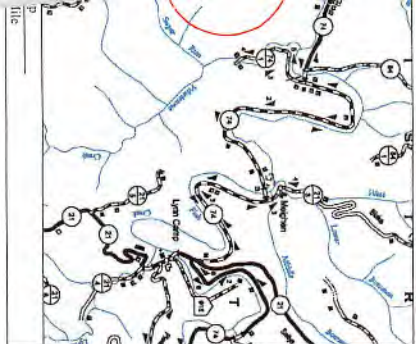


Well Pad	3817.4
NAD 83	
UTM Zone 18N	
Easting	3817.4
NAD 83	
UTM Zone 18N	
Northing	76316.84
Well Pad	1264.097



Site Locations (NAD 83)

Station	Latitude (DMS)	Longitude (DD)
Site Entrance	35° 27' 18.0643"	80° 56' 17.1534"
Center of Well Pad	35° 27' 53.8678"	80° 56' 17.0827"



Access Road

Surface Owner	TM - Parcel	Road Length	Type
Danya Yoho	16-4	1,017.41'	New Access Road Construction

Disturbed Area

Well Pad Construction	1,71 AC
Access Road	1,391 AC
Topsoil / Forest Material	8,792 AC
Additional Clearing	8,792 AC
Total Disturbed Area	19,118 AC

Additional Information

Total Wooded Area Disturbed	1,079.7 AC
Total Area	6,853.03 Acres (Road)
Total Area	1,017.41'

Old Crow Well Site Quantities

Description	Calc (CY)	Field (CY)	1 Spill (CY)	Storm (CY)	Max. Slope	Length of Slope
Well Pad	3,243.25	36,413.87	0.00138	388.74	N/A	N/A
Access Road	8,349.91	8,349.91			N/A	178.99
Topsoil / Forest Material	6,843.67	6,843.67			N/A	N/A
Topsoil / Forest Material Stockpile	6,843.67	6,843.67			N/A	N/A
Total	19,280.50	52,421.32				

Well Location Restrictions

- All Pad and construction activities with the following restrictions:
 - 250' from an existing well or developed spring used for human or domestic intake.
 - 625' from an occupied dwelling or farm greater than 2,500 SF used for poultry or dairy measured from the center of the pad.
 - 100' from the edge of disturbance to wetland, perennial stream, natural or artificial lake, pond or reservoir.
 - 100' from the edge of disturbance to a naturally reproducing trout stream.
 - 1,000' of a surface or ground water intake for a public water supply.
- (Well Location Restrictions of WV Code 22-6A-13)



Design Corrections

The drawings, computations, notes, and reference diagrams presented herein have been prepared or checked by the undersigned Professional Engineer, and I hereby certify that I am a duly Licensed Professional Engineer in the State of West Virginia, and I am duly Licensed in the State of West Virginia. I am duly Licensed in the State of West Virginia, and I am duly Licensed in the State of West Virginia. I am duly Licensed in the State of West Virginia, and I am duly Licensed in the State of West Virginia.

Zachary C. Sumnerfield
Professional Engineer
West Virginia License No. 22214
Date: 02/28/2018

Sheet	Description
1	Cover Sheet
V1	Schedule of Quantities
N1-N4	Site Notes
2	Pre-Construction Site Conditions
3	Site Soil Map
4	Cleaning Exhibit
5	Overall Plan View
6	E&S Plan View
7	Top Key Exhibit
8	Plan View
8-11	Cross Sections - Well Pad
12	Gravel Pit
G1-G2	Gravel Pit Access Road
L1	Landowner Distributed Area Exhibit
SI	Site Reclamation
M1-M3	Production Exhibit
DI-D2	Erosion and Sediment Control Details
R1	Access Road Details
P1	Pad Details

Date	Revision
02-28-2018	Design
03-27-2018	Design: WVDEP Corrections

Cover Sheet

Old Crow Well Site

Franklin District
Marshall County, WV

THIS DOCUMENT
PREPARED FOR
TUG HILL
OPERATING

Date: 02/28/2018
Scale: As Shown
Designed By: ZS
File No:
Sheet 1 of 12



Disturbed Area

Well Pad Construction	6,221 AC
Other Construction	1,211 AC
Regional Forest Habitat	1,917 AC
Additional Clearing	8,979 AC
Total Disturbed Area	13,328 AC

Property Owner Information - Old Crow Well Site

Owner	T/V Parcel	Well Pad Access Road	Topog/Access	Yield	Clearing	Foot Drainage
Franklin Chisham	1-4-3	6-54	1-31	1-31	1-31	1-31
Danae Johnson	3-1-10	6-54	1-31	1-31	1-31	1-31

Access Road

Access Road	Well Pad	Topog/Access	Yield	Clearing	Foot Drainage
Well Pad Access Road	1-31	1-31	1-31	1-31	1-31

Well Pad Access Road Profile

Station	Elevation (ft)
0+00	1272.82
1+00	1270.47
2+00	1268.12
3+00	1265.77
4+00	1263.42
5+00	1261.07
6+00	1258.72
7+00	1256.37
8+00	1254.02
9+00	1251.67
10+00	1249.32
11+00	1246.97
12+00	1244.62
13+00	1242.27
14+00	1239.92
15+00	1237.57
16+00	1235.22
17+00	1232.87
18+00	1230.52
19+00	1228.17
20+00	1225.82
21+00	1223.47
22+00	1221.12
23+00	1218.77
24+00	1216.42
25+00	1214.07
26+00	1211.72
27+00	1209.37
28+00	1207.02
29+00	1204.67
30+00	1202.32
31+00	1200.00

Top of Well at T.M. 15 Parcel 8

Top of Well at T.M. 15 Parcel 8

Top of Well at T.M. 15 Parcel 8

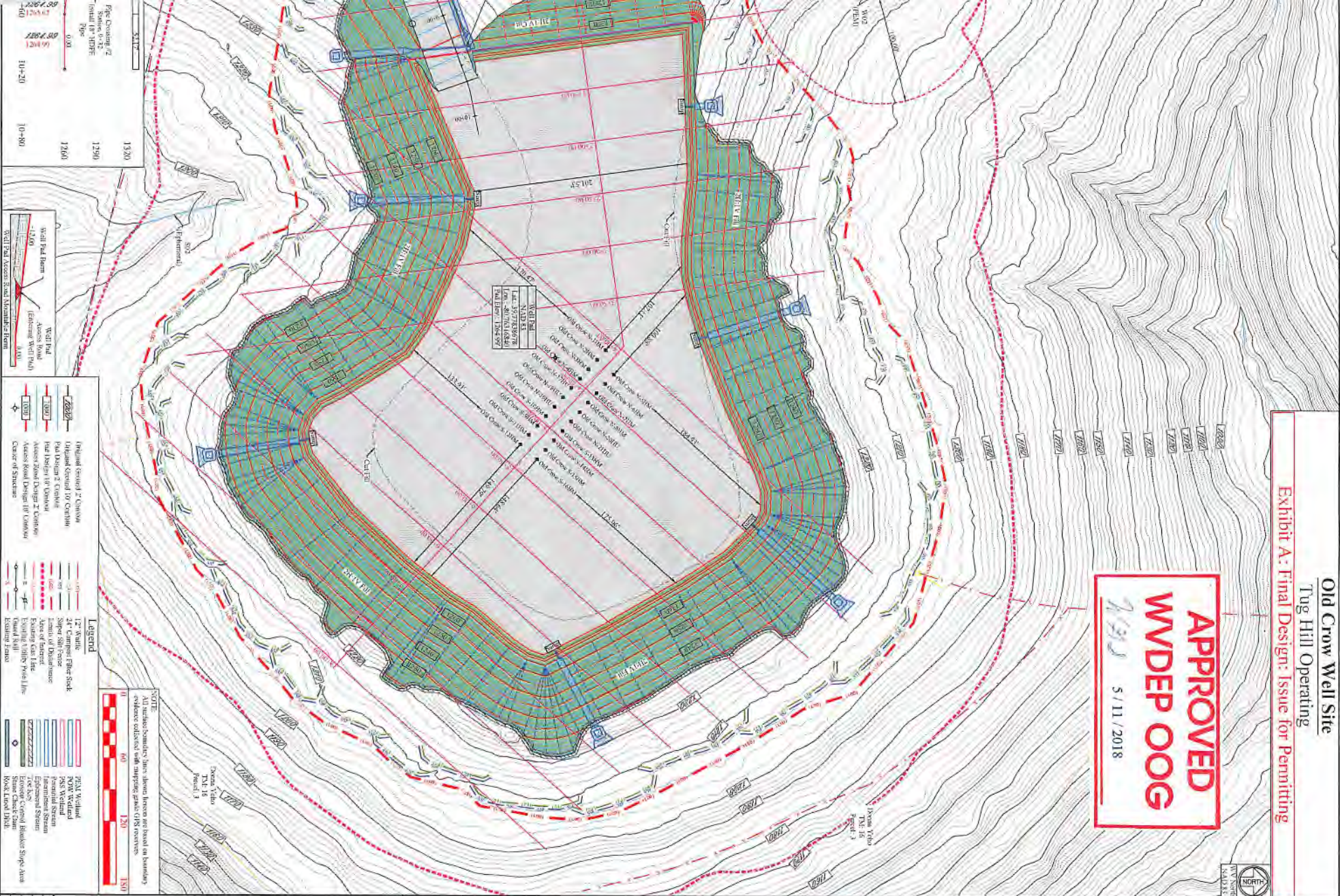
Top of Well at T.M. 15 Parcel 3

Old Crow Well Site
 Tug Hill Operating
 Exhibit A: Final Design: Issue for Permitting

APPROVED
WVDEP OOG
 7/23/18 5/11/2018



Date	Revision
02-28-2018	Design



Site Plan View

Old Crow Well Site

Franklin District
Marshall County, WV

K&S Surveying
 2000 W. STATE ST.
 CHARLOTTE, NC 28203
 PHONE: 704.363.1111
 FAX: 704.363.1112
 WWW.KANDS.COM

TUG HILL
 OPERATING