



 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

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

TUG HILL OPERATING, LLC
 380 SOUTHPOINTE BLVD

CANONSBURG, PA 15317


Re: Permit approval for OLD CROW S-14HM
 47-051-02185-00-00

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

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

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

James A. Martin
 Chief

Operator's Well Number: OLD CROW S-14HM
 Farm Name: DONNA VIVIAN YOGO (TO) 
 U.S. WELL NUMBER: 47-051-02185-00-00
 Horizontal 6A New Drill
 Date Issued: 4/12/2019

PERMIT CONDITIONS

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

CONDITIONS

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

PERMIT CONDITIONS

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

Area of Review**Sources of information to Support 35CSR8 - 5.11: 9.3 et seq.**

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

Data Sources Reviewed:

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

Contacted Devin Ducoeur 724-705-0444, dducoeur@dpslandservices.com DPS GIS (11/1/2018) to have him make maps of the wellbores with his information. DPS utilizes WVGES maps for their mapping seems it as the best publicly available. See attached map he provided.

Request maps for:

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

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

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

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Permit well - Old Crow S-14HM

Wells within 500' Buffer

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

API Number	Operator Name	Total Depth	Perforated Fms	Producing zones not perforated	Is this well "known or reasonably expected to penetrate a depth that could be within the range of Fracture propagation"? 1000' is max limit I would assign to wells that might be within in range of fracture propagation	Comments
4705102040	Tug Hill Operating	6689' TVD	None	Unknown	No, currently only a permit. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Permitted Marcellus horizontal well.
4705102023	Tug Hill Operating	6681' TVD	None	Unknown	No, currently only a permit. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Permitted Marcellus horizontal well.
4705102042	Tug Hill Operating	6693' TVD	None	Unknown	No, currently only a permit. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Permitted Marcellus horizontal well.
4705102046	Tug Hill Operating	11395' TVD	None	Unknown	No, currently only a permit. Proper casing and cement should prevent migration of fluids from new wellbore to existing wellbore	Permitted Point Pleasant horizontal well.
4705140008	Unknown	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete

WV Geological & Economic Survey Well: County = 51 Permit = 02040 Report Title: This

Location Information: [View Map](#)
 API: COUNTY PERMIT TAX DISTRICT QUAD 75 QUAD 15 LAT 00 LONG 00 UTM 18N 427010000 4400000 4400000
 State: WV Parcel: Point Pleasant Range 30 21100 40 70000 42000 4400000

Bottom Hole Location Information:
 API: EP FLAG UTM LAT 00 LONG 00 427010000 4400000 4400000

Owner Information:
 API: COMP_OI SURFPR STATUS SURFACE_OWNER WELL_NUM CO_NUM LEASE LEASE_NUM MINERAL_OWN OPERATOR_AT_COMPLETION PROSP_VID PROSP_TACTO_FM TRACTO_FM 427010000 4400000 4400000 Point Pleasant Range 30 21100 40 70000 42000 4400000 Tug Hill Operating LLC West Marcellus FM

Completion Information:
 API: COMP_OI SPUD_DT ELEV DATUM FIELD DEEPEST_FM DEEPEST_FHT INITIAL_CLASS FINAL_CLASS TYPE WID COMP_MTHD TVD TWD NEW_FG ROD G_REF G_AFT O_REF O_AFT NGL_REF NGL_A 427010000 4400000 4400000

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

WV Geological & Economic Survey Well: County = 51 Permit = 02023 Report Title: This

Location Information: [View Map](#)
 API: COUNTY PERMIT TAX DISTRICT QUAD 75 QUAD 15 LAT 00 LONG 00 UTM 18N 427010000 4400000 4400000
 State: WV Parcel: Point Pleasant Range 30 21100 40 70000 42000 4400000

Bottom Hole Location Information:
 API: EP FLAG UTM LAT 00 LONG 00 427010000 4400000 4400000

Owner Information:
 API: COMP_OI SURFPR STATUS SURFACE_OWNER WELL_NUM CO_NUM LEASE LEASE_NUM MINERAL_OWN OPERATOR_AT_COMPLETION PROSP_VID PROSP_TACTO_FM TRACTO_FM 427010000 4400000 4400000 Point Pleasant Range 30 21100 40 70000 42000 4400000 Tug Hill Operating LLC West Marcellus FM

Completion Information:
 API: COMP_OI SPUD_DT ELEV DATUM FIELD DEEPEST_FM DEEPEST_FHT INITIAL_CLASS FINAL_CLASS TYPE WID COMP_MTHD TVD TWD NEW_FG ROD G_REF G_AFT O_REF O_AFT NGL_REF NGL_A 427010000 4400000 4400000

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 There is no Production Water data for this well
 There is no Stratigraphy data for this well
 There is no Wireline (E-Log) data for this well
 There is no Plugging data for this well
 There is no Sample data for this well

WV Geological & Economic Survey Well: County = 51 Permit = 02042 Report Title: This

Location Information: [View Map](#)
 API: COUNTY PERMIT TAX DISTRICT QUAD 75 QUAD 15 LAT 00 LONG 00 UTM 18N 427010000 4400000 4400000
 State: WV Parcel: Point Pleasant Range 30 21100 40 70000 42000 4400000

Bottom Hole Location Information:
 API: EP FLAG UTM LAT 00 LONG 00 427010000 4400000 4400000

Owner Information:
 API: COMP_OI SURFPR STATUS SURFACE_OWNER WELL_NUM CO_NUM LEASE LEASE_NUM MINERAL_OWN OPERATOR_AT_COMPLETION PROSP_VID PROSP_TACTO_FM TRACTO_FM 427010000 4400000 4400000 Point Pleasant Range 30 21100 40 70000 42000 4400000 Tug Hill Operating LLC West Marcellus FM

Completion Information:
 API: COMP_OI SPUD_DT ELEV DATUM FIELD DEEPEST_FM DEEPEST_FHT INITIAL_CLASS FINAL_CLASS TYPE WID COMP_MTHD TVD TWD NEW_FG ROD G_REF G_AFT O_REF O_AFT NGL_REF NGL_A 427010000 4400000 4400000

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

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WV Geological & Economic Survey Well: County = 51 Permit = 02046 Report Title: T0

Location Information [View Map](#)

WELL	COUNTY	PERMIT	TAX DISTRICT	QUAD 7N	QUAD 16	LAT 00'	LONG 00'	UTM E	UTM N
02046006	Wayne	506	1000	1000000	000000	392020	5080100	5080100	420000

Bottom Hole Location Information

WELL	DEPTH	DEPTH	DEPTH	LAT 00'	LONG 00'
02046006	14	10000	10000	392020	5080100

Owner/Completion Information

WELL	COMP. DT	SUFFIX	STATUS	SURFACE CHARGE	WELL NUM	CO. NUM	LEASE	LEASE NUM	MINERAL OWN	OPERATOR	AT. COMPLETION	PROP. VO	PROP. TRST.	TR. TRCEPT.	TR. TR
02046006	00		Produced	1.0000	0	0	0	0	0	0	0	0	0	0	0

Completion Information

WELL	COMP. DT	SPUD DT	ELEV DATUM	FIELD	DEPTH, FM	DEPTH, FM	INITIAL CLASS	FINAL CLASS	TYPE	NO	COMP. MTHD	TVD	NO.	NEW, FTD	KCD	G. BEF	O. BEF	O. APT	NGL, BEF	WGL, BEF
02046006	00	00	1000	00000000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

WV Geological & Economic Survey Well: County = 51 Permit = 40008

Location Information [View Map](#)

WELL	COUNTY	PERMIT	TAX DISTRICT	QUAD 7N	QUAD 16	LAT 00'	LONG 00'	UTM E	UTM N
02046008	Wayne	4008	1000	1000000	000000	392020	5074300	5074300	420000

There is no Bottom Hole Location data for this well.
 There is no Owner/Completion data for this well.
 There is no Owner/Completion data for this well.
 There is no Pay data for this well.
 There is no Production Gas data for this well.
 There is no Production Oil data for this well. ** some operators may have reported NGL under Oil.
 There is no Production NGL data for this well. ** some operators may have reported NGL under Oil.
 There is no Production Water data for this well.

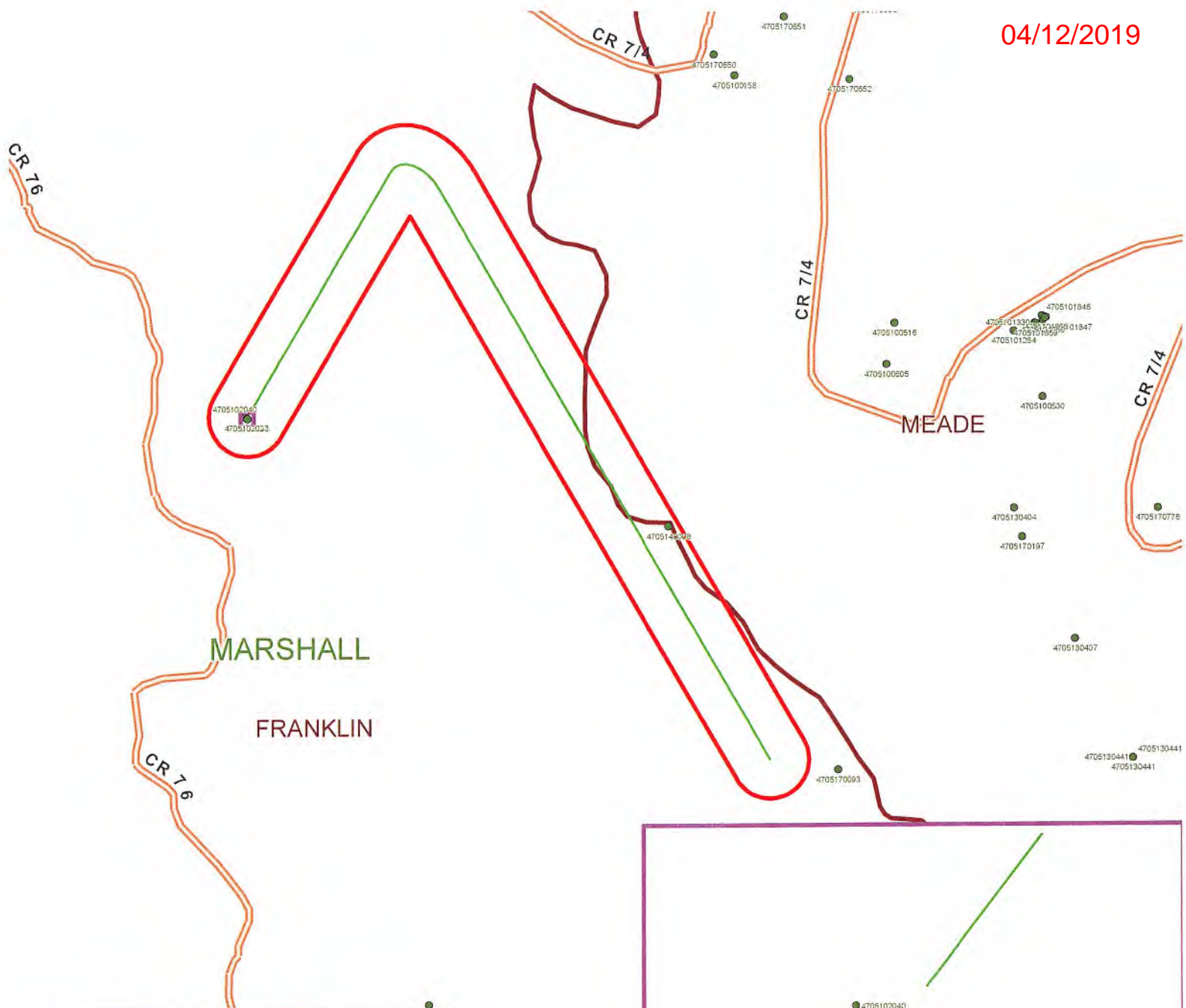
Stratigraphy Information

WELL	SUFFIX	FM	FM QUALITY	DEPTH, TOP	DEPTH, QUALITY	THICKNESS	THICKNESS QUALITY	ELEV DATUM
02046008	000000	000000	000000	0000	0000	0000	0000	0000

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

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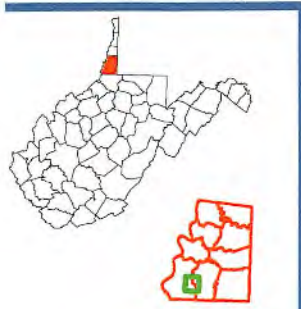
04/12/2019



Legend

- Well Locations (ims.wvgs.wvnet.edu)
- Major Highways
- Major Roads
- Old Crow S-14HM
- 500 Ft. Buffer
- Counties
- Districts

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Old Crow S - 14HM Franklin District Marshall County, WV



Map Prepared by:
DPS
LAND SERVICES

Notes:

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

1) Well Operator: Tug Hill Operating, LLC 494510851 Marshall Franklin Powhatan Point 7
Operator ID County District Quadrangle

2) Operator's Well Number: Old Crow S-14HM Well Pad Name: Old Crow

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

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

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

Other

(b) If Gas Shallow x Deep

Horizontal x

6) Existing Pad: Yes or No No *John 11/7/18*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus is the target formation at a depth of 6562' - 6613', thickness of 51' and an anticipated approximate pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6713'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 16,690'

11) Proposed Horizontal Leg Length: 8,386'

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

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

14) Approximate Saltwater Depths: 1,740'

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

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

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

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

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WW-6B
(04/15)

API NO. 47- 051 -
OPERATOR WELL NO. Old Crow S-14HM
Well Pad Name: Old Crow

18) CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	259ft^3(CTS)
Fresh Water	13 3/8"	NEW	J55	54.5#	1,076'	1,076'	1098ft^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	1,076'	1,076'	1098ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	3,039'	3,039'	1005ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	16,690'	16,690'	4268ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#	7,727'		
Liners							

JW
11/8/18

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

PACKERS

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

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WW-6B
(10/14)

API NO. 47- 051 - _____
OPERATOR WELL NO. Old Crow S-14HM
Well Pad Name: Old Crow

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

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

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

Well to completed with approximately 20,965,000 lb. proppant and 324,134 barrels of water. Max rate = 80bpm; max psi = 9,000#.

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

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

23) Describe centralizer placement for each casing string:

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

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

*See attachment

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.



Tug Hill Operating, LLC Casing and Cement Program

Old Crow S-14HM

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	13 3/8"	J55	17 1/2"	1,076'	CTS
Intermediate	9 5/8"	J55	12 1/4"	3,039'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4"	16,690'	CTS

Cement

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

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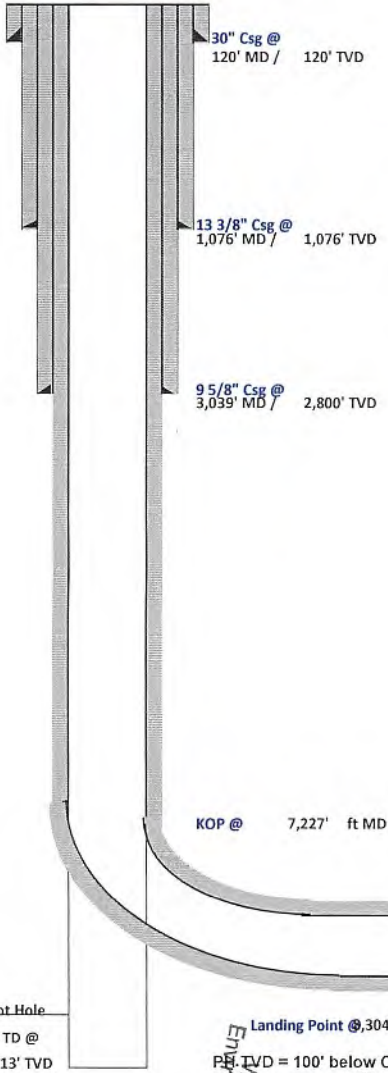


WELL NAME: Old Crow S-14HM
 STATE: WV COUNTY: Marshall
 DISTRICT: Franklin
 DF Elev: 1,265' GL Elev: 1,265'
 TD: 16,690'
 TH Latitude: 39.77838716
 TH Longitude: -80.76288942
 BH Latitude: 39.76632829
 BH Longitude: -80.73506772

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	981
Sewickley Coal	890
Pittsburgh Coal	975
Big Lime	2077
Weir	2431
Berea	2626
Gordon	2971
Rhinestreet	5944
Geneseo/Burkett	6434
Tully	6469
Hamilton	6504
Marcellus	6562
Landing Depth	6602
Onondaga	6613
Pilot Hole Depth	6713

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	120'	120'	BW	BW	Surface
Surface	17.5	13 3/8	1,076'	1,076'	54.5	J55	Surface
Intermediate 1	12 1/4	9 5/8	3,039'	2,800'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	16,690'	6,748'	20	CYHP110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	1,110	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	988	A	15	Air	1 Centralizer every other jt
Production	3,765	A	14.5	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc



JW
11/7/18

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Landing Point @ 3,304' MD / 6,602' TVD
 PH TD @ 6,713' TVD
 Lateral TD @ 16,690' ft MD / 6,748' ft TVD



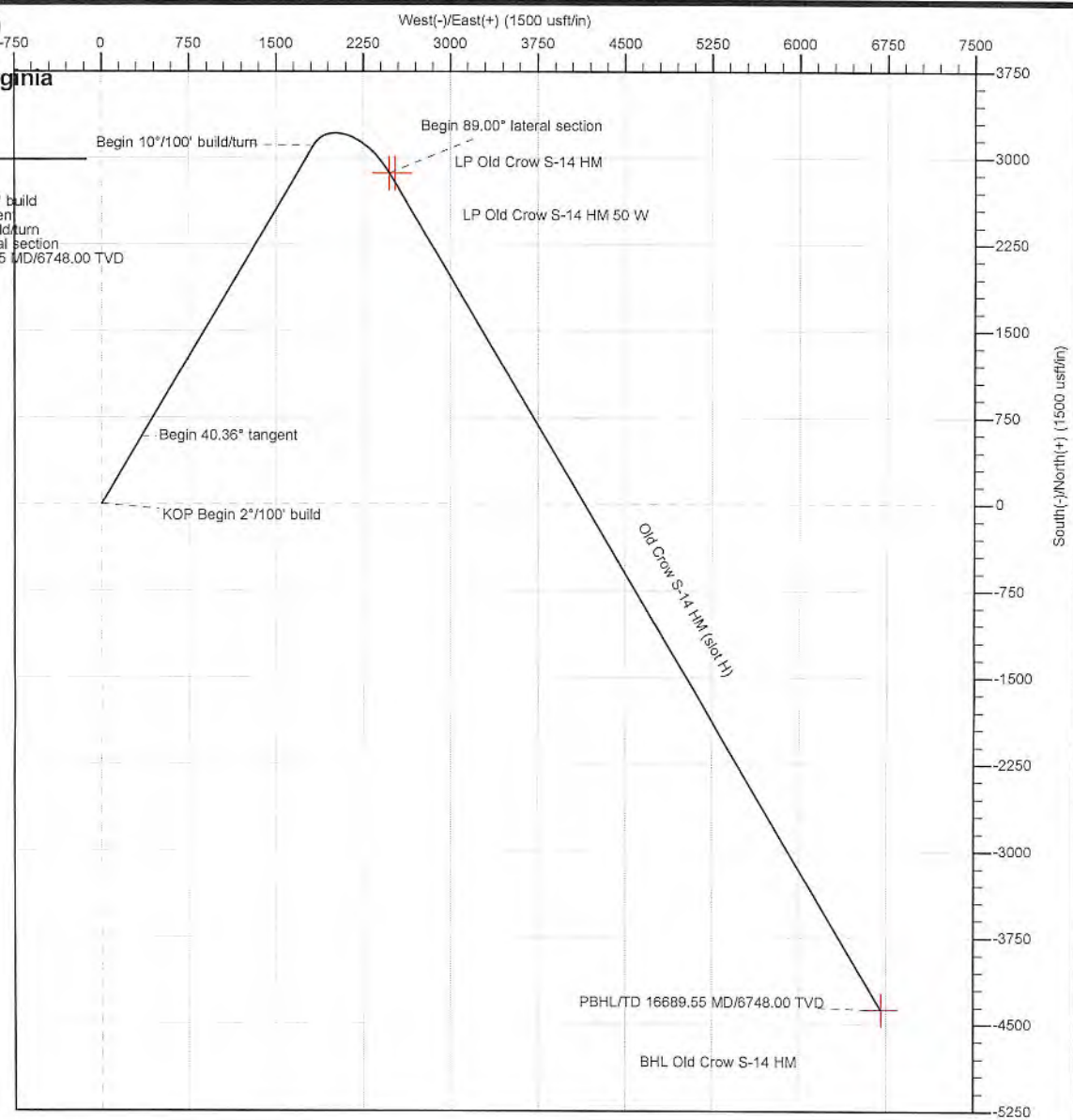
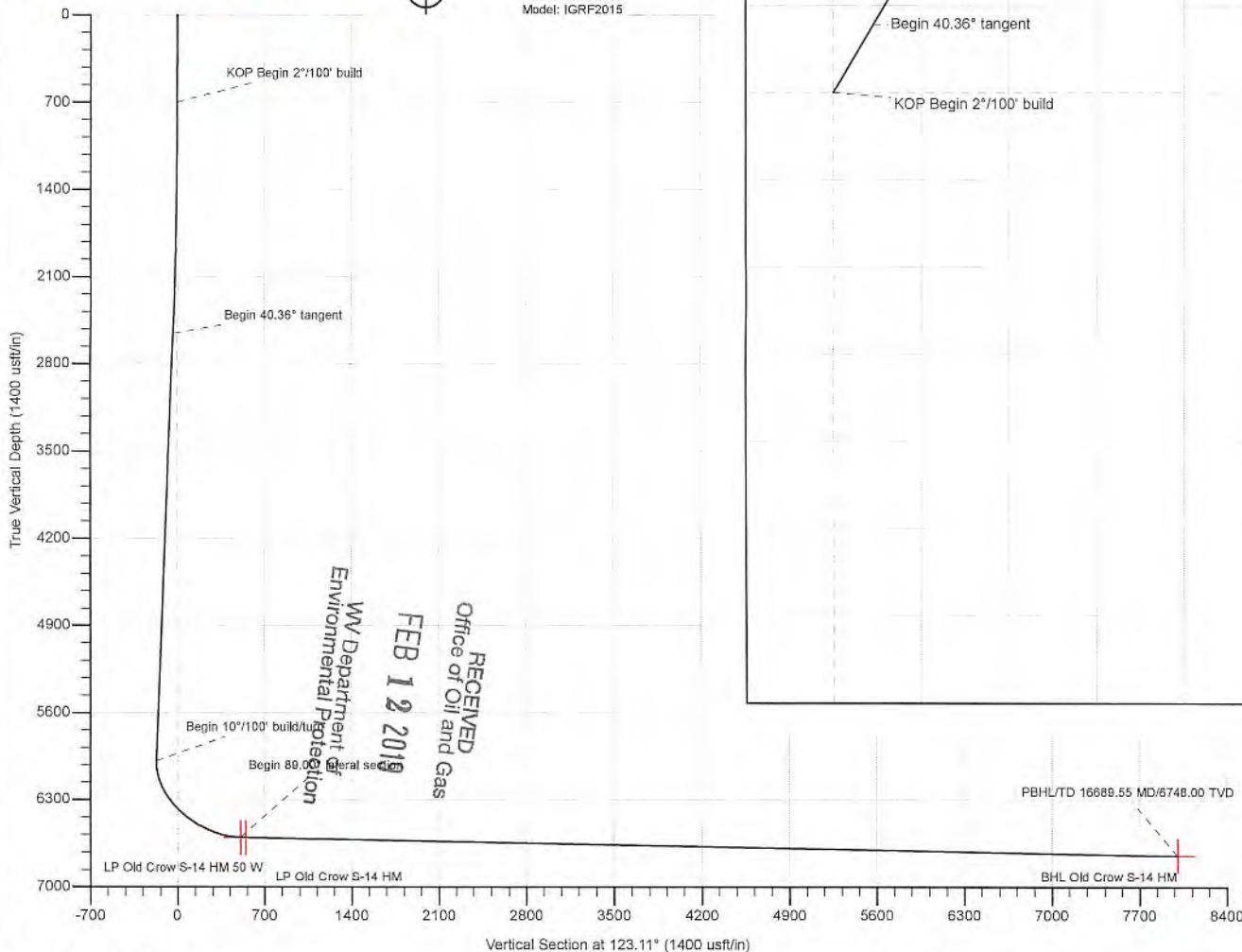
Well: Old Crow S-14 HM (slot H)
 Site: Old Crow Pad
 Project: Marshall County, West Virginia
 Design: rev0

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2°/100' build
2	2717.97	40.36	30.42	2555.18	587.98	345.20	2.00	30.42	-31.99	Begin 40.36° tangent
3	7227.07	40.36	30.42	5991.10	3106.08	1823.57	0.00	0.00	-168.98	Begin 10°/100' build/turn
4	8303.73	89.00	149.70	6602.00	2867.14	2475.89	10.00	113.76	507.95	Begin 89.00° lateral section
5	16689.55	89.00	149.70	6748.00	-4372.35	6705.61	0.00	0.00	8005.16	PBHL/TD 16689.55 MD/6748.00 TVD



Azimuths to Grid North
 True North: -0.15°
 Magnetic North: -8.82°
 Magnetic Field
 Strength: 52106.4nT
 Dip Angle: 66.91°
 Date: 1/22/2018
 Model: IGRF2015



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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 14446125.03 Easting 1707033.91 Latitude 39.77838716 Longitude -80.76288942

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



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Old Crow S-14 HM (slot H)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1265.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow S-14 HM (slot H)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

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

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

Well	Old Crow S-14 HM (slot H)					
Well Position	+N/-S	0.00 usft	Northing:	14,446,125.03 usft	Latitude:	39.77838716
	+E/-W	0.00 usft	Easting:	1,707,033.91 usft	Longitude:	-80.76288942
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	68.91	52,106.38115679

Design	rev0				
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	123.11	

Plan Survey Tool Program	Date	1/23/2018			
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks	
1	0.00	16,689.55 rev0 (Original Hole)	MWD MWD - Standard		

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Plan Sections											
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00		
2,717.97	40.36	30.42	2,555.18	587.98	345.20	2.00	2.00	0.00	30.42		
7,227.07	40.36	30.42	5,991.10	3,106.08	1,823.57	0.00	0.00	0.00	0.00		
8,303.73	89.00	149.70	6,602.00	2,867.14	2,475.89	10.00	4.52	11.08	113.76	LP Old Crow S-14 HM	
16,689.55	89.00	149.70	6,748.00	-4,372.35	6,705.61	0.00	0.00	0.00	0.00	BHL Old Crow S-14 H	

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Planning Report - Geographic

Database: DB_Jul2216dt_v14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Old Crow Pad
 Well: Old Crow S-14 HM (slot H)
 Wellbore: Original Hole
 Design: rev0

Local Co-ordinate Reference: Well Old Crow S-14 HM (slot H)
 TVD Reference: GL @ 1265.00usft
 MD Reference: GL @ 1265.00usft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	14,446,125.03	1,707,033.91	39.77838716	-80.76288942
100.00	0.00	0.00	100.00	0.00	0.00	14,446,125.03	1,707,033.91	39.77838716	-80.76288942
200.00	0.00	0.00	200.00	0.00	0.00	14,446,125.03	1,707,033.91	39.77838716	-80.76288942
300.00	0.00	0.00	300.00	0.00	0.00	14,446,125.03	1,707,033.91	39.77838716	-80.76288942
400.00	0.00	0.00	400.00	0.00	0.00	14,446,125.03	1,707,033.91	39.77838716	-80.76288942
500.00	0.00	0.00	500.00	0.00	0.00	14,446,125.03	1,707,033.91	39.77838716	-80.76288942
600.00	0.00	0.00	600.00	0.00	0.00	14,446,125.03	1,707,033.91	39.77838716	-80.76288942
700.00	0.00	0.00	700.00	0.00	0.00	14,446,125.03	1,707,033.91	39.77838716	-80.76288942
KOP Begin 2°/100' build									
800.00	2.00	30.42	799.98	1.50	0.88	14,446,126.53	1,707,034.79	39.77839129	-80.76288626
900.00	4.00	30.42	899.84	6.02	3.53	14,446,131.05	1,707,037.44	39.77840366	-80.76287679
1,000.00	6.00	30.42	999.45	13.53	7.95	14,446,138.56	1,707,041.85	39.77842427	-80.76286101
1,100.00	8.00	30.42	1,098.70	24.04	14.12	14,446,149.07	1,707,048.02	39.77845309	-80.76283895
1,200.00	10.00	30.42	1,197.46	37.53	22.03	14,446,162.56	1,707,055.94	39.77849007	-80.76281064
1,300.00	12.00	30.42	1,295.62	53.99	31.69	14,446,179.01	1,707,065.60	39.77853519	-80.76277610
1,400.00	14.00	30.42	1,393.05	73.38	43.08	14,446,198.41	1,707,076.99	39.77858838	-80.76273538
1,500.00	16.00	30.42	1,489.64	95.70	56.19	14,446,220.73	1,707,090.09	39.77864958	-80.76268854
1,600.00	18.00	30.42	1,585.27	120.91	70.99	14,446,245.94	1,707,104.89	39.77871871	-80.76263561
1,700.00	20.00	30.42	1,679.81	148.99	87.47	14,446,274.02	1,707,121.38	39.77879569	-80.76257668
1,800.00	22.00	30.42	1,773.17	179.89	105.61	14,446,304.92	1,707,139.52	39.77888042	-80.76251182
1,900.00	24.00	30.42	1,865.21	213.58	125.39	14,446,338.61	1,707,159.30	39.77897281	-80.76244109
2,000.00	26.00	30.42	1,955.84	250.03	146.79	14,446,375.06	1,707,180.70	39.77907273	-80.76236459
2,100.00	28.00	30.42	2,044.93	289.17	169.77	14,446,414.20	1,707,203.68	39.77918008	-80.76228242
2,200.00	30.00	30.42	2,132.39	330.98	194.32	14,446,456.01	1,707,228.22	39.77929471	-80.76219466
2,300.00	32.00	30.42	2,218.10	375.39	220.39	14,446,500.42	1,707,254.30	39.77941649	-80.76210144
2,400.00	34.00	30.42	2,301.97	422.36	247.97	14,446,547.39	1,707,281.87	39.77954527	-80.76200285
2,500.00	36.00	30.42	2,383.88	471.82	277.00	14,446,596.85	1,707,310.91	39.77968089	-80.76189903
2,599.99	38.00	30.42	2,463.74	523.71	307.47	14,446,648.74	1,707,341.38	39.77982318	-80.76179009
2,699.99	40.00	30.42	2,541.45	577.98	339.33	14,446,703.01	1,707,373.24	39.77997198	-80.76167617
2,717.97	40.36	30.42	2,555.18	587.98	345.20	14,446,713.01	1,707,379.11	39.77999940	-80.76165518
Begin 40.36° tangent									
2,799.99	40.36	30.42	2,617.68	633.79	372.10	14,446,758.82	1,707,406.00	39.78012501	-80.76155902
2,899.99	40.36	30.42	2,693.88	689.63	404.88	14,446,814.66	1,707,438.79	39.78027813	-80.76144180
2,999.99	40.36	30.42	2,770.08	745.48	437.67	14,446,870.51	1,707,471.58	39.78043126	-80.76132457
3,099.99	40.36	30.42	2,846.28	801.32	470.45	14,446,926.35	1,707,504.36	39.78058438	-80.76120734
3,199.99	40.36	30.42	2,922.48	857.17	503.24	14,446,982.20	1,707,537.15	39.78073751	-80.76109011
3,299.99	40.36	30.42	2,998.68	913.01	536.03	14,447,038.04	1,707,569.93	39.78089063	-80.76097288
3,399.99	40.36	30.42	3,074.88	968.86	568.81	14,447,093.89	1,707,602.72	39.78104375	-80.76085565
3,499.99	40.36	30.42	3,151.08	1,024.70	601.60	14,447,149.73	1,707,635.51	39.78119688	-80.76073842
3,599.99	40.36	30.42	3,227.28	1,080.55	634.39	14,447,205.58	1,707,668.29	39.78135000	-80.76062119
3,699.99	40.36	30.42	3,303.48	1,136.39	667.17	14,447,261.42	1,707,701.08	39.78150313	-80.76050396
3,799.99	40.36	30.42	3,379.68	1,192.24	699.96	14,447,317.27	1,707,733.87	39.78165625	-80.76038672
3,899.99	40.36	30.42	3,455.88	1,248.08	732.75	14,447,373.11	1,707,766.65	39.78180938	-80.76026949
3,999.99	40.36	30.42	3,532.08	1,303.93	765.53	14,447,428.95	1,707,799.44	39.78196250	-80.76015226
4,099.99	40.36	30.42	3,608.28	1,359.77	798.32	14,447,484.80	1,707,832.22	39.78211562	-80.76003502
4,199.99	40.36	30.42	3,684.48	1,415.61	831.10	14,447,540.64	1,707,865.01	39.78226875	-80.75991779
4,299.99	40.36	30.42	3,760.68	1,471.46	863.89	14,447,596.49	1,707,897.80	39.78242187	-80.75980055
4,399.99	40.36	30.42	3,836.88	1,527.30	896.68	14,447,652.33	1,707,930.58	39.78257499	-80.75968332
4,499.99	40.36	30.42	3,913.08	1,583.15	929.46	14,447,708.18	1,707,963.37	39.78272812	-80.75956608
4,599.99	40.36	30.42	3,989.28	1,638.99	962.25	14,447,764.02	1,707,996.16	39.78288124	-80.75944885
4,699.99	40.36	30.42	4,065.48	1,694.84	995.04	14,447,819.87	1,708,028.94	39.78303436	-80.75933161
4,799.99	40.36	30.42	4,141.68	1,750.68	1,027.82	14,447,875.71	1,708,061.73	39.78318748	-80.75921437
4,899.99	40.36	30.42	4,217.88	1,806.53	1,060.61	14,447,931.56	1,708,094.52	39.78334061	-80.75909713
4,999.99	40.36	30.42	4,294.08	1,862.37	1,093.39	14,447,987.40	1,708,127.30	39.78349373	-80.75897989



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Old Crow S-14 HM (slot H)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1265.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow S-14 HM (slot H)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

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Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
5,099.99	40.36	30.42	4,370.27	1,918.22	1,126.18	14,448,043.25	1,708,160.09	39.78364685	-80.75886265	
5,199.99	40.36	30.42	4,446.47	1,974.06	1,158.97	14,448,099.09	1,708,192.87	39.78379997	-80.75874541	
5,299.99	40.36	30.42	4,522.67	2,029.91	1,191.75	14,448,154.94	1,708,225.66	39.78395310	-80.75862817	
5,399.99	40.36	30.42	4,598.87	2,085.75	1,224.54	14,448,210.78	1,708,258.45	39.78410622	-80.75851093	
5,499.99	40.36	30.42	4,675.07	2,141.60	1,257.33	14,448,266.63	1,708,291.23	39.78425934	-80.75839369	
5,599.99	40.36	30.42	4,751.27	2,197.44	1,290.11	14,448,322.47	1,708,324.02	39.78441246	-80.75827645	
5,699.99	40.36	30.42	4,827.47	2,253.29	1,322.90	14,448,378.31	1,708,356.81	39.78456558	-80.75815921	
5,799.99	40.36	30.42	4,903.67	2,309.13	1,355.69	14,448,434.16	1,708,389.59	39.78471870	-80.75804197	
5,899.99	40.36	30.42	4,979.87	2,364.98	1,388.47	14,448,490.00	1,708,422.38	39.78487183	-80.75792472	
5,999.99	40.36	30.42	5,056.07	2,420.82	1,421.26	14,448,545.85	1,708,455.16	39.78502495	-80.75780748	
6,099.99	40.36	30.42	5,132.27	2,476.66	1,454.04	14,448,601.69	1,708,487.95	39.78517807	-80.75769023	
6,199.99	40.36	30.42	5,208.47	2,532.51	1,486.83	14,448,657.54	1,708,520.74	39.78533119	-80.75757299	
6,299.99	40.36	30.42	5,284.67	2,588.35	1,519.62	14,448,713.38	1,708,553.52	39.78548431	-80.75745574	
6,399.99	40.36	30.42	5,360.87	2,644.20	1,552.40	14,448,769.23	1,708,586.31	39.78563743	-80.75733850	
6,499.99	40.36	30.42	5,437.07	2,700.04	1,585.19	14,448,825.07	1,708,619.10	39.78579055	-80.75722125	
6,599.99	40.36	30.42	5,513.27	2,755.89	1,617.98	14,448,880.92	1,708,651.88	39.78594367	-80.75710400	
6,699.99	40.36	30.42	5,589.47	2,811.73	1,650.76	14,448,936.76	1,708,684.67	39.78609679	-80.75698676	
6,799.99	40.36	30.42	5,665.67	2,867.58	1,683.55	14,448,992.61	1,708,717.46	39.78624991	-80.75686951	
6,899.99	40.36	30.42	5,741.87	2,923.42	1,716.33	14,449,048.45	1,708,750.24	39.78640303	-80.75675226	
6,999.99	40.36	30.42	5,818.07	2,979.27	1,749.12	14,449,104.30	1,708,783.03	39.78655615	-80.75663501	
7,099.99	40.36	30.42	5,894.27	3,035.11	1,781.91	14,449,160.14	1,708,815.81	39.78670927	-80.75651776	
7,199.99	40.36	30.42	5,970.47	3,090.96	1,814.69	14,449,215.99	1,708,848.60	39.78686239	-80.75640051	
7,227.07	40.36	30.42	5,991.10	3,106.08	1,823.57	14,449,231.11	1,708,857.48	39.78690386	-80.75636876	
Begin 10°/100' build/tum										
7,299.99	37.91	41.31	6,047.73	3,143.32	1,850.35	14,449,268.35	1,708,884.26	39.78700592	-80.75627307	
7,399.99	36.38	57.72	6,127.63	3,182.33	1,895.82	14,449,307.36	1,708,929.73	39.78711272	-80.75611083	
7,499.99	37.17	74.41	6,207.93	3,206.35	1,950.13	14,449,331.38	1,708,984.04	39.78717828	-80.75591728	
7,599.98	40.15	89.72	6,286.19	3,214.65	2,011.63	14,449,339.67	1,709,045.53	39.78720060	-80.75569829	
7,699.98	44.88	102.80	6,360.02	3,206.97	2,078.44	14,449,331.99	1,709,112.35	39.78717901	-80.75546052	
7,799.98	50.85	113.64	6,427.19	3,183.54	2,148.54	14,449,308.57	1,709,182.45	39.78711416	-80.75521120	
7,899.98	57.66	122.67	6,485.65	3,145.09	2,219.81	14,449,270.12	1,709,253.72	39.78700803	-80.75495789	
7,999.98	65.03	130.40	6,533.63	3,092.78	2,290.07	14,449,217.81	1,709,323.97	39.78686383	-80.75470831	
8,099.98	72.74	137.22	6,569.66	3,028.19	2,357.18	14,449,153.22	1,709,391.09	39.78668596	-80.75447002	
8,199.98	80.67	143.49	6,592.66	2,953.30	2,419.12	14,449,078.33	1,709,453.03	39.78647980	-80.75425028	
8,299.98	88.70	149.48	6,601.93	2,870.37	2,474.00	14,448,995.39	1,709,507.90	39.78625164	-80.75405575	
8,303.73	89.00	149.70	6,602.00	2,867.14	2,475.89	14,448,992.17	1,709,509.80	39.78624276	-80.75404904	
Begin 89.00° lateral section										
8,399.98	89.00	149.70	6,603.68	2,784.04	2,524.44	14,448,909.07	1,709,558.35	39.78601418	-80.75387703	
8,499.98	89.00	149.70	6,605.42	2,697.71	2,574.88	14,448,822.74	1,709,608.79	39.78577672	-80.75369833	
8,599.98	89.00	149.70	6,607.16	2,611.38	2,625.32	14,448,736.41	1,709,659.23	39.78553925	-80.75351963	
8,699.98	89.00	149.70	6,608.90	2,525.05	2,675.76	14,448,650.08	1,709,709.66	39.78530179	-80.75334093	
8,799.98	89.00	149.70	6,610.64	2,438.72	2,726.20	14,448,563.75	1,709,760.10	39.78506432	-80.75316223	
8,899.98	89.00	149.70	6,612.38	2,352.39	2,776.63	14,448,477.42	1,709,810.54	39.78482685	-80.75298354	
8,999.98	89.00	149.70	6,614.12	2,266.06	2,827.07	14,448,391.09	1,709,860.98	39.78458938	-80.75280485	
9,099.98	89.00	149.70	6,615.86	2,179.73	2,877.51	14,448,304.76	1,709,911.42	39.78435192	-80.75262615	
9,199.98	89.00	149.70	6,617.60	2,093.40	2,927.95	14,448,218.43	1,709,961.86	39.78411445	-80.75244746	
9,299.98	89.00	149.70	6,619.35	2,007.07	2,978.39	14,448,132.10	1,710,012.30	39.78387698	-80.75226877	
9,399.98	89.00	149.70	6,621.09	1,920.74	3,028.83	14,448,045.77	1,710,062.74	39.78363951	-80.75209008	
9,499.98	89.00	149.70	6,622.83	1,834.41	3,079.27	14,447,959.44	1,710,113.17	39.78340204	-80.75191140	
9,599.98	89.00	149.70	6,624.57	1,748.08	3,129.71	14,447,873.11	1,710,163.61	39.78316457	-80.75173271	
9,699.98	89.00	149.70	6,626.31	1,661.75	3,180.15	14,447,786.78	1,710,214.05	39.78292710	-80.75155402	
9,799.98	89.00	149.70	6,628.05	1,575.42	3,230.58	14,447,700.45	1,710,264.49	39.78268963	-80.75137534	
9,899.98	89.00	149.70	6,629.79	1,489.09	3,281.02	14,447,614.12	1,710,314.93	39.78245216	-80.75119666	
9,999.98	89.00	149.70	6,631.53	1,402.76	3,331.46	14,447,527.79	1,710,365.37	39.78221469	-80.75101798	



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Old Crow S-14 HM (slot H)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1265.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow S-14 HM (slot H)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

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Environmental Protection

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,099.98	89.00	149.70	6,633.27	1,316.43	3,381.90	14,447,441.46	1,710,415.81	39.78197722	-80.75083930	
10,199.98	89.00	149.70	6,635.01	1,230.10	3,432.34	14,447,355.13	1,710,466.25	39.78173975	-80.75066062	
10,299.98	89.00	149.70	6,636.76	1,143.77	3,482.78	14,447,268.80	1,710,516.69	39.78150228	-80.75048194	
10,399.98	89.00	149.70	6,638.50	1,057.44	3,533.22	14,447,182.47	1,710,567.12	39.78126481	-80.75030326	
10,499.98	89.00	149.70	6,640.24	971.11	3,583.66	14,447,096.14	1,710,617.56	39.78102734	-80.75012459	
10,599.98	89.00	149.70	6,641.98	884.78	3,634.10	14,447,009.81	1,710,668.00	39.78078987	-80.74994591	
10,699.98	89.00	149.70	6,643.72	798.45	3,684.53	14,446,923.48	1,710,718.44	39.78055239	-80.74976724	
10,799.98	89.00	149.70	6,645.46	712.12	3,734.97	14,446,837.15	1,710,768.88	39.78031492	-80.74958857	
10,899.98	89.00	149.70	6,647.20	625.79	3,785.41	14,446,750.82	1,710,819.32	39.78007745	-80.74940990	
10,999.98	89.00	149.70	6,648.94	539.46	3,835.85	14,446,664.49	1,710,869.76	39.77983998	-80.74923123	
11,099.98	89.00	149.70	6,650.68	453.13	3,886.29	14,446,578.16	1,710,920.20	39.77960250	-80.74905256	
11,199.98	89.00	149.70	6,652.42	366.80	3,936.73	14,446,491.83	1,710,970.64	39.77936503	-80.74887389	
11,299.98	89.00	149.70	6,654.17	280.47	3,987.17	14,446,405.50	1,711,021.07	39.77912755	-80.74869523	
11,399.98	89.00	149.70	6,655.91	194.14	4,037.61	14,446,319.17	1,711,071.51	39.77889008	-80.74851656	
11,499.98	89.00	149.70	6,657.65	107.81	4,088.05	14,446,232.84	1,711,121.95	39.77865261	-80.74833790	
11,599.98	89.00	149.70	6,659.39	21.48	4,138.48	14,446,146.51	1,711,172.39	39.77841513	-80.74815924	
11,699.98	89.00	149.70	6,661.13	-64.85	4,188.92	14,446,060.18	1,711,222.83	39.77817766	-80.74798058	
11,799.98	89.00	149.70	6,662.87	-151.18	4,239.36	14,445,973.85	1,711,273.27	39.77794018	-80.74780192	
11,899.98	89.00	149.70	6,664.61	-237.51	4,289.80	14,445,887.52	1,711,323.71	39.77770271	-80.74762326	
11,999.98	89.00	149.70	6,666.35	-323.84	4,340.24	14,445,801.19	1,711,374.15	39.77746523	-80.74744460	
12,099.98	89.00	149.70	6,668.09	-410.17	4,390.68	14,445,714.86	1,711,424.59	39.77722775	-80.74726595	
12,199.98	89.00	149.70	6,669.84	-496.50	4,441.12	14,445,628.53	1,711,475.02	39.77699028	-80.74708729	
12,299.98	89.00	149.70	6,671.58	-582.83	4,491.56	14,445,542.20	1,711,525.46	39.77675280	-80.74690864	
12,399.98	89.00	149.70	6,673.32	-669.16	4,542.00	14,445,455.87	1,711,575.90	39.77651532	-80.74672999	
12,499.98	89.00	149.70	6,675.06	-755.49	4,592.43	14,445,369.54	1,711,626.34	39.77627785	-80.74655134	
12,599.98	89.00	149.70	6,676.80	-841.82	4,642.87	14,445,283.21	1,711,676.78	39.77604037	-80.74637269	
12,699.97	89.00	149.70	6,678.54	-928.15	4,693.31	14,445,196.88	1,711,727.22	39.77580289	-80.74619404	
12,799.97	89.00	149.70	6,680.28	-1,014.48	4,743.75	14,445,110.55	1,711,777.66	39.77556541	-80.74601539	
12,899.97	89.00	149.70	6,682.02	-1,100.81	4,794.19	14,445,024.22	1,711,828.10	39.77532793	-80.74583675	
12,999.97	89.00	149.70	6,683.76	-1,187.14	4,844.63	14,444,937.89	1,711,878.54	39.77509045	-80.74565810	
13,099.97	89.00	149.70	6,685.50	-1,273.47	4,895.07	14,444,851.56	1,711,928.97	39.77485298	-80.74547946	
13,199.97	89.00	149.70	6,687.25	-1,359.80	4,945.51	14,444,765.23	1,711,979.41	39.77461550	-80.74530082	
13,299.97	89.00	149.70	6,688.99	-1,446.13	4,995.94	14,444,678.90	1,712,029.85	39.77437802	-80.74512218	
13,399.97	89.00	149.70	6,690.73	-1,532.46	5,046.38	14,444,592.57	1,712,080.29	39.77414054	-80.74494354	
13,499.97	89.00	149.70	6,692.47	-1,618.79	5,096.82	14,444,506.24	1,712,130.73	39.77390306	-80.74476490	
13,599.97	89.00	149.70	6,694.21	-1,705.11	5,147.26	14,444,419.91	1,712,181.17	39.77366558	-80.74458626	
13,699.97	89.00	149.70	6,695.95	-1,791.44	5,197.70	14,444,333.58	1,712,231.61	39.77342810	-80.74440762	
13,799.97	89.00	149.70	6,697.69	-1,877.77	5,248.14	14,444,247.25	1,712,282.05	39.77319061	-80.74422899	
13,899.97	89.00	149.70	6,699.43	-1,964.10	5,298.58	14,444,160.92	1,712,332.49	39.77295313	-80.74405036	
13,999.97	89.00	149.70	6,701.17	-2,050.43	5,349.02	14,444,074.59	1,712,382.92	39.77271565	-80.74387172	
14,099.97	89.00	149.70	6,702.91	-2,136.76	5,399.46	14,443,988.26	1,712,433.36	39.77247817	-80.74369309	
14,199.97	89.00	149.70	6,704.66	-2,223.09	5,449.89	14,443,901.94	1,712,483.80	39.77224069	-80.74351446	
14,299.97	89.00	149.70	6,706.40	-2,309.42	5,500.33	14,443,815.61	1,712,534.24	39.77200321	-80.74333583	
14,399.97	89.00	149.70	6,708.14	-2,395.75	5,550.77	14,443,729.28	1,712,584.68	39.77176572	-80.74315721	
14,499.97	89.00	149.70	6,709.88	-2,482.08	5,601.21	14,443,642.95	1,712,635.12	39.77152824	-80.74297858	
14,599.97	89.00	149.70	6,711.62	-2,568.41	5,651.65	14,443,556.62	1,712,685.56	39.77129076	-80.74279995	
14,699.97	89.00	149.70	6,713.36	-2,654.74	5,702.09	14,443,470.29	1,712,736.00	39.77105327	-80.74262133	
14,799.97	89.00	149.70	6,715.10	-2,741.07	5,752.53	14,443,383.96	1,712,786.43	39.77081579	-80.74244271	
14,899.97	89.00	149.70	6,716.84	-2,827.40	5,802.97	14,443,297.63	1,712,836.87	39.77057831	-80.74226409	
14,999.97	89.00	149.70	6,718.58	-2,913.73	5,853.41	14,443,211.30	1,712,887.31	39.77034082	-80.74208547	
15,099.97	89.00	149.70	6,720.33	-3,000.06	5,903.84	14,443,124.97	1,712,937.75	39.77010334	-80.74190685	
15,199.97	89.00	149.70	6,722.07	-3,086.39	5,954.28	14,443,038.64	1,712,988.19	39.76986585	-80.74172823	
15,299.97	89.00	149.70	6,723.81	-3,172.72	6,004.72	14,442,952.31	1,713,038.63	39.76962837	-80.74154961	
15,399.97	89.00	149.70	6,725.55	-3,259.05	6,055.16	14,442,865.98	1,713,089.07	39.76939088	-80.74137100	
15,499.97	89.00	149.70	6,727.29	-3,345.38	6,105.60	14,442,779.65	1,713,139.51	39.76915340	-80.74119238	



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Old Crow S-14 HM (slot H)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1265.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1265.00usft
Site:	Old Crow Pad	North Reference:	Grid
Well:	Old Crow S-14 HM (slot H)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev0		

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Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,599.97	89.00	149.70	6,729.03	-3,431.71	6,156.04	14,442,693.32	1,713,189.95	39.76891591	-80.74101377
15,699.97	89.00	149.70	6,730.77	-3,518.04	6,206.48	14,442,606.99	1,713,240.38	39.76867842	-80.74083516
15,799.97	89.00	149.70	6,732.51	-3,604.37	6,256.92	14,442,520.66	1,713,290.82	39.76844094	-80.74065655
15,899.97	89.00	149.70	6,734.25	-3,690.70	6,307.36	14,442,434.33	1,713,341.26	39.76820345	-80.74047794
15,999.97	89.00	149.70	6,735.99	-3,777.03	6,357.79	14,442,348.00	1,713,391.70	39.76796596	-80.74029933
16,099.97	89.00	149.70	6,737.74	-3,863.36	6,408.23	14,442,261.67	1,713,442.14	39.76772848	-80.74012073
16,199.97	89.00	149.70	6,739.48	-3,949.69	6,458.67	14,442,175.34	1,713,492.58	39.76749099	-80.73994212
16,299.97	89.00	149.70	6,741.22	-4,036.02	6,509.11	14,442,089.01	1,713,543.02	39.76725350	-80.73976352
16,399.97	89.00	149.70	6,742.96	-4,122.35	6,559.55	14,442,002.68	1,713,593.46	39.76701601	-80.73958491
16,499.97	89.00	149.70	6,744.70	-4,208.68	6,609.99	14,441,916.35	1,713,643.90	39.76677852	-80.73940631
16,599.97	89.00	149.70	6,746.44	-4,295.01	6,660.43	14,441,830.02	1,713,694.33	39.76654103	-80.73922771
16,689.55	89.00	149.70	6,748.00	-4,372.35	6,705.61	14,441,752.68	1,713,739.52	39.76632829	-80.73906772

PBHL/TD 16689.55 MD/6748.00 TVD

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
LP Old Crow S-14 HM 5 - plan hits target center - Point	0.00	0.00	6,602.00	2,867.14	2,475.89	14,448,992.17	1,709,509.80	39.78624276	-80.75404904
LP Old Crow S-14 HM - plan misses target center by 43.17usft at 8328.95usft MD (6602.44 TVD, 2845.36 N, 2488.61 E) - Point	0.00	0.00	6,602.00	2,867.14	2,525.89	14,448,992.17	1,709,559.80	39.78624238	-80.75387105
BHL Old Crow S-14 HM - plan hits target center - Point	0.00	0.01	6,748.00	-4,372.35	6,705.61	14,441,752.68	1,713,739.52	39.76632829	-80.73906772

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
700.00	700.00	0.00	0.00	KOP Begin 2°/100' build
2,717.97	2,555.18	587.98	345.20	Begin 40.36° tangent
7,227.07	5,991.10	3,106.08	1,823.57	Begin 10°/100' build/turn
8,303.73	6,602.00	2,867.14	2,475.89	Begin 89.00° lateral section
16,689.55	6,748.00	-4,372.35	6,705.61	PBHL/TD 16689.55 MD/6748.00 TVD

WW-9
(4/16)

04/12/2019

API Number 47 - 051 - _____
Operator's Well No. Old Crow S-14HM

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Tug Hill Operating, LLC OP Code 494510851

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

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

Will a pit be used? Yes No

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

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

Proposed Disposal Method For Treated Pit Wastes:

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

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

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

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

Additives to be used in drilling medium? Barite for weight

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

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

-Landfill or offsite name/permit number? Wetzel County Sanitary Landfill (SWF-1021 / WV0109185) and Westmoreland Sanitary Landfill, LLC (SAN1405 / PA DEP EC#1386426)

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

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

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

Company Official Signature James A. Pancake
Company Official (Typed Name) Jim Pancake
Company Official Title Vice President, Geosciences

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FEB 12 2019

WV Department of
Environmental Protection

Subscribed and sworn before me this 6 day of NOVEMBER, 20 18

Maureen A. Stead
1/28/19

Notary Public

My commission expires _____

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 Mahler*
Comments: _____

Title: Oil and Gas Inspector

Date: 11/7/15

Field Reviewed? () Yes () No

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WV Department of
Environmental Protection

PROPOSED OLD CROW S - 14HM

NOTES:

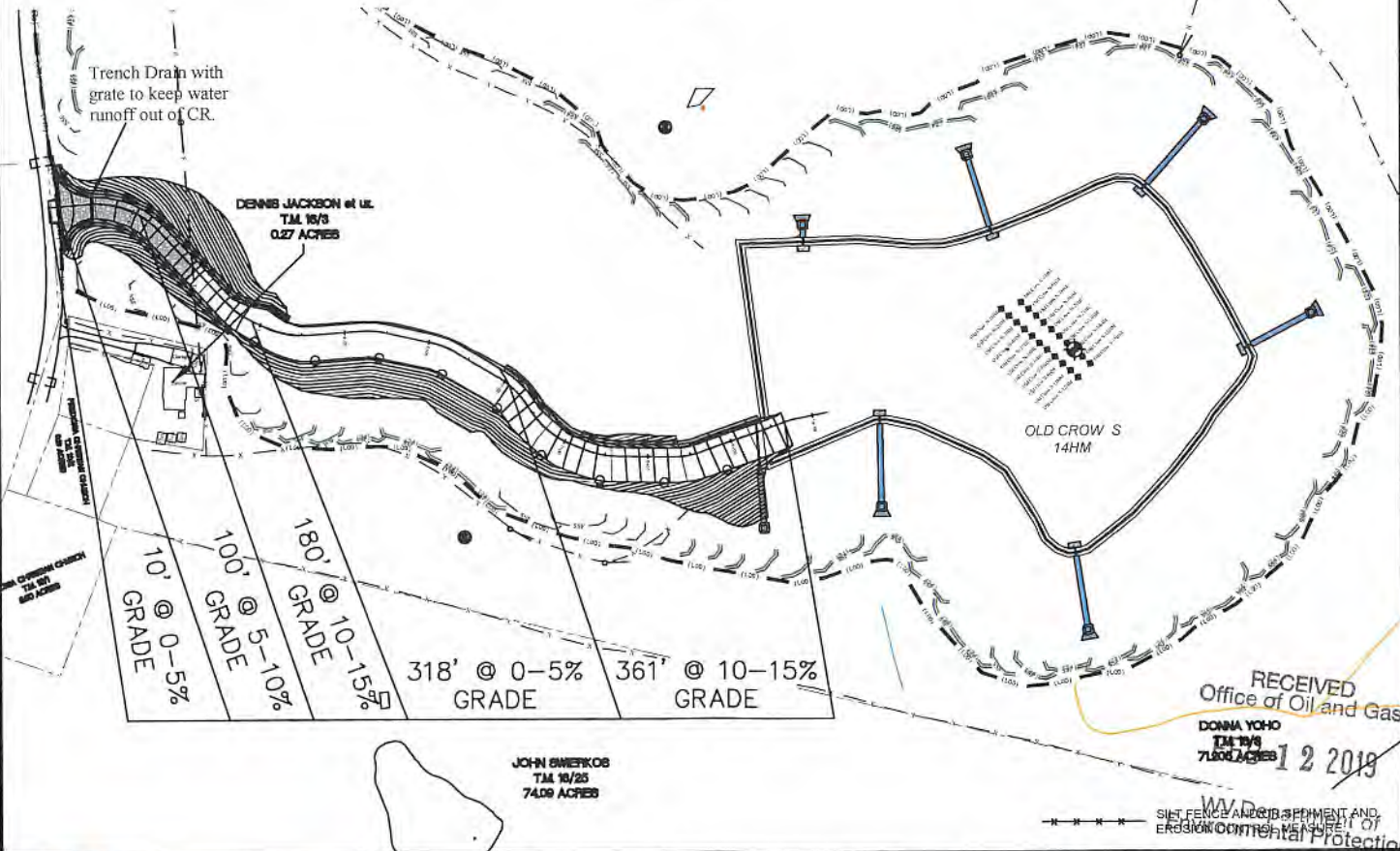
1. DENOTES INSTALL 18" PVC CULVERT AND APPLY APPROPRIATE SEDIMENT OUTLET CONTROL (RIP RAP SPLASH PAD)
2. DRAWING NOT TO SCALE
3. REFERENCE IS HEREBY MADE TO THE WV D.E.P. OFFICE OF OIL & GAS, "EROSION AND SEDIMENT CONTROL FIELD MANUAL" FOR REQUIREMENTS AND BMPs FOR AVERAGE FIELD CONDITIONS CONCERNING 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.



DONNA YOHO
T.M. 16/3
71205 ACRES

DENNIS JACKSON et al.
T.M. 16/3
0.27 ACRES

JOHN SWERKOS
T.M. 16/25
7409 ACRES



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DONNA YOHO
T.M. 16/3
71205 ACRES
12 2019

WV D.E.P. OFFICE OF OIL AND GAS
EROSION AND SEDIMENT CONTROL MEASURES

SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vasham Drive • Glenville, WV 26331 • (304) 462-5634
www.slsurveys.com

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

TUG HILL
OPERATING



Well Site Safety Plan

Tug Hill Operating, LLC

John
11/7/18

Well Name: Old Crow S-14HM

Pad Location: Old Crow Pad

Marshall County, West Virginia

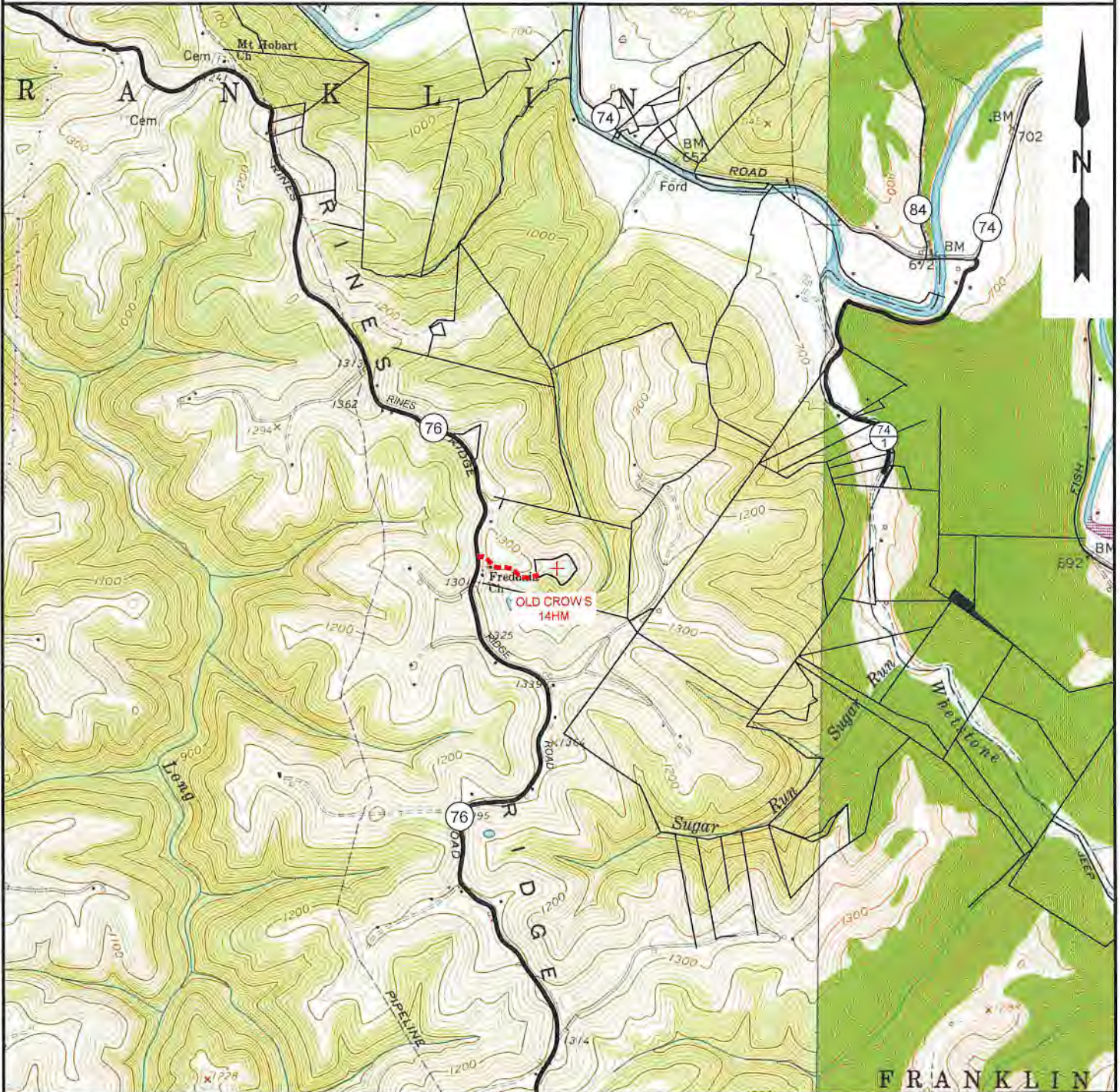
UTM (meters), NAD83, Zone 17:

Northing: 4,403,187.72

Easting: 520,304.98

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November 2018
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Environmental Protection

PROPOSED OLD CROW S - 14HM



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

LAT: 39.7137712
LON: -80.8258327
LOCATED: S 37°39'00" W AT 29,404.13' FROM OLD CROW S - 14HM SURFACE LOCATION

RECEIVED
Office of Oil and Gas

FEB 12 2019

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TOPO SECTION:		OPERATOR:	
GLEN EASTON & POWHATAN POINT 7.5'		PREPARED FOR:	
COUNTY	DISTRICT	TUG HILL OPERATING, LLC	
MARSHALL	FRANKLIN	380 SOUTHPOINTE BLVD	
		SUITE 200	
		CANONSBURG, PA 15317	
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8796	06/22/18	1" = 2000'

WV Department of Environmental Protection
TUG HILL OPERATING

8,639' B.H.

3,623' T.H.

**OLD CROW S LEASE
WELL 14HM
TUG HILL OPERATING**

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

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

NAD'83 S.P.C.(FT)	N. 468,122.95	E. 1,613,575.44
NAD'83 GEO.	LAT-(N) 39.778387	LONG-(W) 80.762889
NAD'83 UTM (M)	N. 4,403,187.72	E. 520,304.98

LANDING POINT

NAD'83 S.P.C.(FT)	N. 470,949.3	E. 1,616,099.7
NAD'83 GEO.	LAT-(N) 39.786243	LONG-(W) 80.754049
NAD'83 UTM (M)	N. 4,404,061.6	E. 521,059.6

BOTTOM HOLE

NAD'83 S.P.C.(FT)	N. 463,637.7	E. 1,620,208.3
NAD'83 GEO.	LAT-(N) 39.766328	LONG-(W) 80.739068
NAD'83 UTM (M)	N. 4,401,855.0	E. 522,348.9

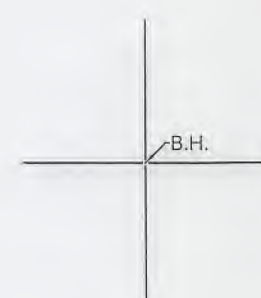
T.H. LONGITUDE 80°45'00"
B.H. LONGITUDE 80°42'30"

MAP/PARCEL	ADJOINING SURFACE OWNER LIST	ACRES
5-10-5	WILLIAM F. RULONG, ET AL	27.50
5-10-6	WILLIAM F. RULONG, ET AL	P/O ACRE
5-10-7	WILLIAM F. RULONG, ET AL	22.872
5-10-8	WILLIAM F. RULONG, ET AL	70.6672
5-10-11	JOSEPH LEE CROW	P/O PCL 5
5-10-13.1	DAVID LEE QUIGLEY, JR.	2.88
5-10-19	BRADLEY L. & CONNIE L. HUBBARD	3.209
5-10-20	LOUIS AULENBACHER	3.534
5-10-21	LOUIS AULENBACHER	3.677
5-16-4	JOHN SWIERKOS	153 SQ. RODS
5-17-1.6	LOLA M. SLAUGHTER	6.347
5-17-3.1	WILBUR L. RIDDLE, ET UX	10.148
5-17-16	GLEN GUNTO	9.702

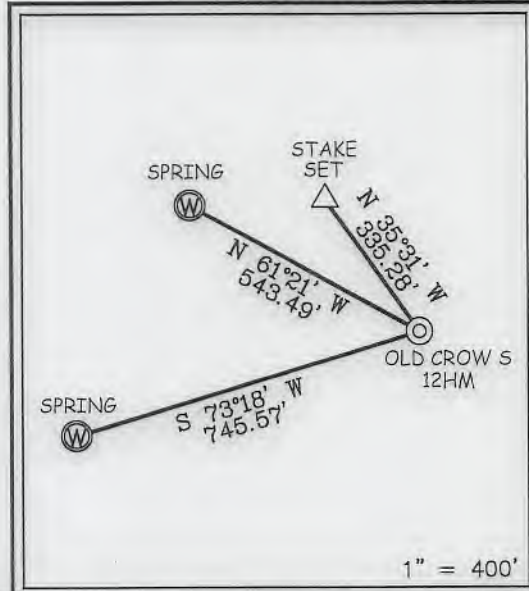


NOTES ON SURVEY

- 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'

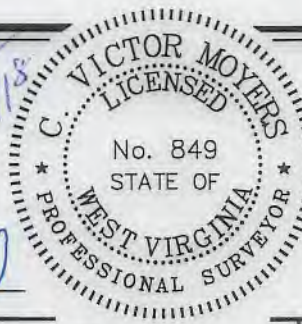


REFERENCES



I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 849 *C. Victor Moyers*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
 DATE JUNE 22, 20 18
 REVISED OCTOBER 23, 20 18
 OPERATORS WELL NO. OLD CROW S-14HM
 API WELL NO. 47 - 051 - 02185
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8796P14HMR.dwg
OLD CROW NORTH 14HM REV0
 HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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



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

LOCATION: ELEVATION GROUND = 1,287.50' PROPOSED = 1,264.99' WATERSHED TRIBUTARY OF FISH CREEK (HUC-10)
 DISTRICT FRANKLIN COUNTY MARSHALL QUADRANGLE POWHATAN POINT 7.5'

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

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

PHYSICAL CHANGE IN WELL (SPECIFY) _____ TARGET FORMATION MARCELLUS
 ESTIMATED DEPTH TVD: 6,713' / TMD: 16,690'

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

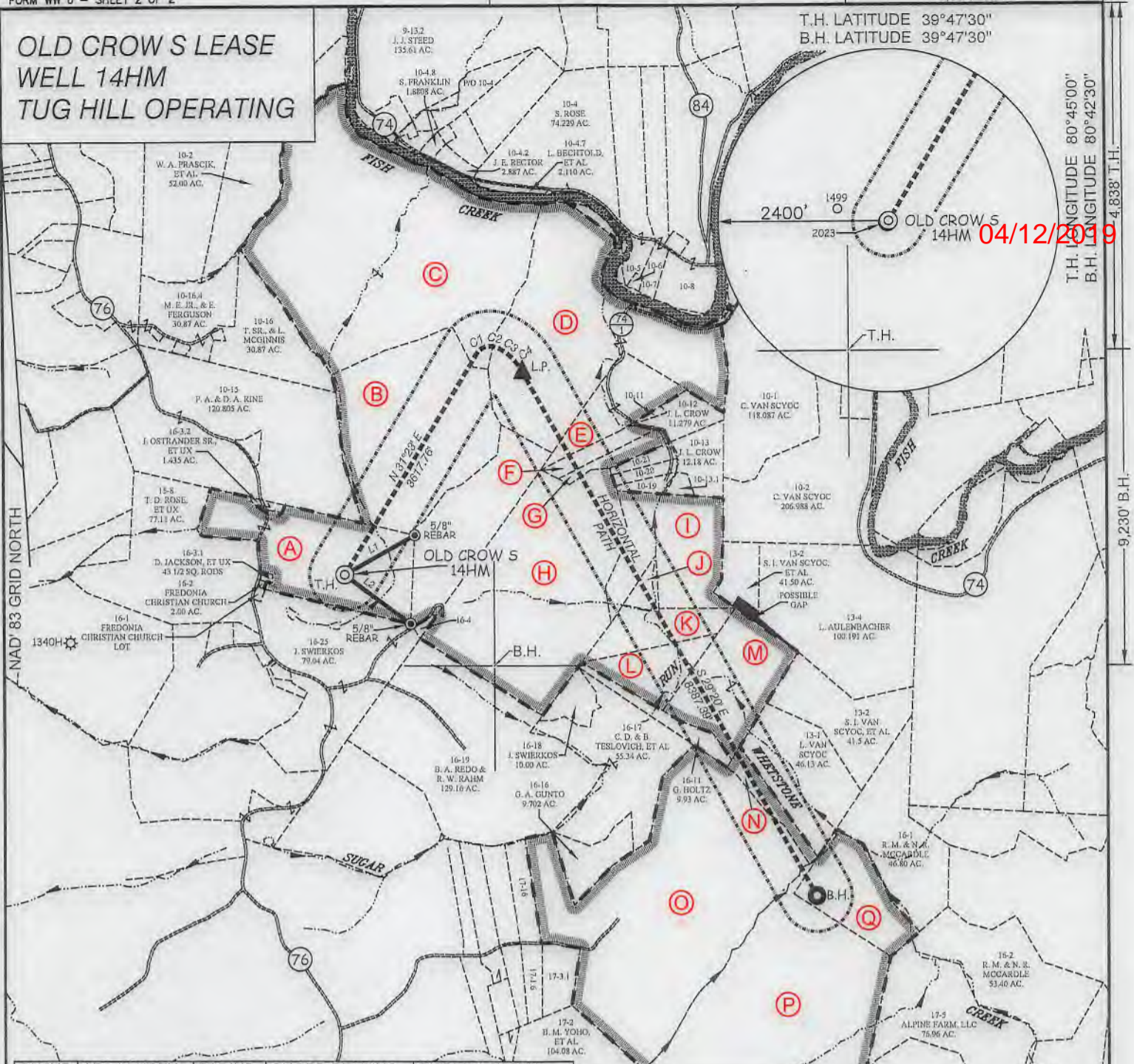
COUNTY NAME
PERMIT

8,639' B.H.

3,623' T.H.

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

**OLD CROW S LEASE
WELL 14HM
TUG HILL OPERATING**



T.H. LONGITUDE 80°45'00"
B.H. LONGITUDE 80°42'30"
4,838' T.H.
9,230' B.H.

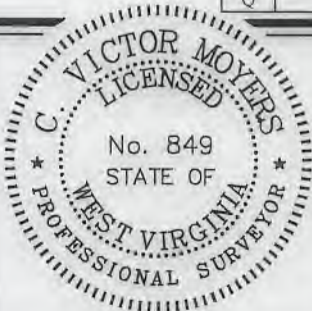
04/12/2019

CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	181.65'	208.67'	N 58°41' E	175.96'
C2	173.36'	301.51'	S 79°17' E	170.98'
C3	214.70'	640.66'	S 54°20' E	213.70'
C4	247.69'	941.84'	S 36°58' E	246.97'

TAG	SURFACE OWNER	PARCEL	ACRES
A	DONNA VIVIAN YOHO (TOD) GARY LANCE YOHO	5-16-3	71.205
B	JOHN SWIERKOS	5-10-14	100.00
C	HERBERT M. AULENBACHER, JR.	5-10-3	225.50
D	HERBERT M. AULENBACHER, JR.	5-10-9	141.43
E	LOUIS DELBERT VAN SCYOC	5-10-10	24.50
F	JOHN PAUL SMITH, JR., ET AL	5-10-12.1	8.86
G	LOUIS AULENBACHER	5-10-22	6-4.61
H	JOHN SWIERKOS	5-16-6	134.05
I	LOUIS AULENBACHER	5-16-7	50.00
J	FRANK P. LAUTER EST.	5-16-10	5.00
K	LOUIS AULENBACHER	5-16-8	21.00
L	LOUIS AULENBACHER	5-16-9	20.00
M	LOUIS VAN SCYOC	9-13-3	52.40
N	LOUIS VAN SCYOC	5-16-12	10.80
O	SOUTHERN COUNTRY FARMS, INC.	5-17-3	190.132
P	ALPINE FARM LLC	5-17-4	212.00
Q	DAVID ALAN RUBCICH, ET AL	5-16-13	33.31

LINE	BEARING	DISTANCE
L1	N 60°34' E	1134.62'
L2	S 53°05' E	1156.27'

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

P.S. 849 *C. Victor Moyers*

LEGEND

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

SCALE 1" = 2000' FILE NO. 8796P14HMR.dwg
OLD CROW NORTH 14HM REV0
DATE JUNE 22, 2018
REVISED OCTOBER 23, 2018
OPERATORS WELL NO. OLD CROW S-14HM
API WELL NO. 47-051-02185
STATE COUNTY PERMIT

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

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

COUNTY NAME PERMIT

WW-6A1
(5/13)

Operator's Well No. Old Crow S-14HM

**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
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*See attached pages

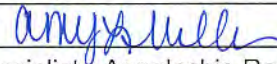
**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

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

Well Operator: Tug Hill Operating, LLC

By: Amy L. Miller 

Its: Permitting Specialist - Appalachia Region

WW-6A1 Supplement

Operator's Well No. Old Crow S - 14HM

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*19340	5-16-3	A	DONNA VIVIAN YOHO	GASTAR EXPLORATION USA INC	1/8+	665 407	Gastar Exploration USA Inc to Atinum Marcellus I LLC: 23/353	Gastar & Atinum to AB Resources LLC: 23/617	AB Resources LLC to Chief Exploration & Development LLC and Radler 2000 Ltd Partnership: 24/319	Chief, Radler and Enerplus Resources (USA) Corp to Chevron USA Inc: 25/1 & 25/105	AB Resources to Chevron: 756/397	Chevron to TH Exploration LLC: 40/57
10*19673	5-10-14	B	CHESTNUT HOLDINGS INC	TH EXPLORATION LLC	1/8+	949 313	N/A	N/A	N/A	N/A	N/A	N/A
10*19673	5-10-3	C	CHESTNUT HOLDINGS INC	TH EXPLORATION LLC	1/8+	949 313	N/A	N/A	N/A	N/A	N/A	N/A
10*19249	5-10-9	D	HERBERT M AULENBACHER	CHEVRON USA INC	1/8+	914 551						Chevron to TH Exploration LLC: 40/127
10*21468	5-10-10	E	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953 317	N/A	N/A	N/A	N/A	N/A	N/A
10*22295	5-10-10	E	RACHEL B OSTRANDER	FOSSIL CREEK OHIO, LLC	1/8+	822 210	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22319	5-10-10	E	SHARON G VAN SCYOC	FOSSIL CREEK OHIO, LLC	1/8+	822 204	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*21468	5-10-12.1	F	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953 317	N/A	N/A	N/A	N/A	N/A	N/A
10*47051.261.1	5-10-12.1	F	WILLIAM HUBBARD	TH EXPLORATION LLC	1/8+	882 536	N/A	N/A	N/A	N/A	N/A	N/A
10*47051.261.2	5-10-12.1	F	BONNIE G ZELIC	TH EXPLORATION LLC	1/8+	882 539	N/A	N/A	N/A	N/A	N/A	N/A
10*47051.261.3	5-10-12.1	F	JOHN P SMITH JR	TH EXPLORATION LLC	1/8+	882 542	N/A	N/A	N/A	N/A	N/A	N/A
10*47051.261.4	5-10-12.1	F	BRADLEY L HUBBARD AND CONNIE L HUBBARD	TH EXPLORATION LLC	1/8+	898 573	N/A	N/A	N/A	N/A	N/A	N/A
10*18396	5-10-22	G	LOUIS AULENBAUCHER	TH EXPLORATION LLC	1/8+	932 468	N/A	N/A	N/A	N/A	N/A	N/A
10*21468	5-10-22	G	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953 317	N/A	N/A	N/A	N/A	N/A	N/A
10*21468	5-16-6	H	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953 317	N/A	N/A	N/A	N/A	N/A	N/A
10*18339	5-16-7	I	RESOURCE MINERALS HEADWATER I LP	TH EXPLORATION LLC	1/8+	940 448	N/A	N/A	N/A	N/A	N/A	N/A
10*18526	5-16-7	I	ANN TURNER YOUNG SHRIVER	TH EXPLORATION LLC	1/8+	933 591	N/A	N/A	N/A	N/A	N/A	N/A
10*18597	5-16-7	I	MARK ALLEN LENENBERG	TH EXPLORATION LLC	1/8+	934 638	N/A	N/A	N/A	N/A	N/A	N/A
10*18636	5-16-7	I	CHERYL STEFFEN AND GREGORY STEFFEN	TH EXPLORATION LLC	1/8+	936 240	N/A	N/A	N/A	N/A	N/A	N/A
10*18637	5-16-7	I	THOMAS RICHMOND YOUNG ANITA A YOUNG	TH EXPLORATION LLC	1/8+	936 244	N/A	N/A	N/A	N/A	N/A	N/A
10*19467	5-16-7	I	ROBERT R FISHER AND AUDREY L IRVIN	TH EXPLORATION LLC	1/8+	942 592	N/A	N/A	N/A	N/A	N/A	N/A
10*19788	5-16-7	I	REX B FISHER AND DEBORAH FISHER	TH EXPLORATION LLC	1/8+	948 295	N/A	N/A	N/A	N/A	N/A	N/A
10*21014	5-16-7	I	JAMES P MCLAUGHLIN & ALICE W MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946 29	N/A	N/A	N/A	N/A	N/A	N/A
10*21015	5-16-7	I	ROBERT L MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946 339	N/A	N/A	N/A	N/A	N/A	N/A
10*21189	5-16-7	I	NATALIE GIBBS	TH EXPLORATION LLC	1/8+	941 261	N/A	N/A	N/A	N/A	N/A	N/A
10*21267	5-16-7	I	JAMES E NICHOLAS AND BEVERLY D NICHOLAS	TH EXPLORATION LLC	1/8+	943 513	N/A	N/A	N/A	N/A	N/A	N/A
10*21468	5-16-7	I	JOHN A SWIERKOS	TH EXPLORATION LLC	1/8+	953 317	N/A	N/A	N/A	N/A	N/A	N/A
10*21504	5-16-7	I	PAULETA LINDA CHEATHAM AND CARL WOHLERS	TH EXPLORATION LLC	1/8+	951 142	N/A	N/A	N/A	N/A	N/A	N/A
10*21638	5-16-7	I	THE MILDRED Y MILLS TRUST JULY 5TH 2007	TH EXPLORATION LLC	1/8+	956 172	N/A	N/A	N/A	N/A	N/A	N/A
10*21709	5-16-7	I	THOMAS YOUNG AND JANE CLAIRE YOUNG	TH EXPLORATION LLC	1/8+	959 350	N/A	N/A	N/A	N/A	N/A	N/A
10*21710	5-16-7	I	PENELOPE A JONES	TH EXPLORATION LLC	1/8+	959 355	N/A	N/A	N/A	N/A	N/A	N/A

WW-6A1 Supplement

Operator's Well No. Old Crow S - 14HM

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*22295	5-16-7	I	RACHEL B OSTRANDER	FOSSIL CREEK OHIO, LLC	1/8+	822 210	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22319	5-16-7	I	SHARON G VAN SCYOC	FOSSIL CREEK OHIO, LLC	1/8+	822 204	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22865	5-16-7	I	JAMES H CAMPBELL	TH EXPLORATION LLC	1/8+	977 60	N/A	N/A	N/A	N/A	N/A	N/A
10*22866	5-16-7	I	MARGARET R DONOFRIO	TH EXPLORATION LLC	1/8+	977 57	N/A	N/A	N/A	N/A	N/A	N/A
10*19551	5-16-10	J	KAREN A JOSEPH	TH EXPLORATION LLC	1/8+	937 359	N/A	N/A	N/A	N/A	N/A	N/A
10*19552	5-16-10	J	LISA ANN JACKSON	TH EXPLORATION LLC	1/8+	937 362	N/A	N/A	N/A	N/A	N/A	N/A
10*19553	5-16-10	J	PAUL D LAUTAR AND JUDY B LAUTAR	TH EXPLORATION LLC	1/8+	937 356	N/A	N/A	N/A	N/A	N/A	N/A
10*19554	5-16-10	J	LESLIE KAYE HARCLERODE	TH EXPLORATION LLC	1/8+	945 205	N/A	N/A	N/A	N/A	N/A	N/A
10*18339	5-16-8	K	RESOURCE MINERALS HEADWATER I LP	TH EXPLORATION LLC	1/8+	940 448	N/A	N/A	N/A	N/A	N/A	N/A
10*18526	5-16-8	K	ANN TURNER YOUNG SHRIVER	TH EXPLORATION LLC	1/8+	933 591	N/A	N/A	N/A	N/A	N/A	N/A
10*18597	5-16-8	K	MARK ALLEN LENENBERG	TH EXPLORATION LLC	1/8+	934 638	N/A	N/A	N/A	N/A	N/A	N/A
10*18636	5-16-8	K	CHERYL STEFFEN AND GREGORY STEFFEN	TH EXPLORATION LLC	1/8+	936 240	N/A	N/A	N/A	N/A	N/A	N/A
10*18637	5-16-8	K	THOMAS RICHMOND YOUNG ANITA A YOUNG	TH EXPLORATION LLC	1/8+	936 244	N/A	N/A	N/A	N/A	N/A	N/A
10*19467	5-16-8	K	ROBERT R FISHER AND AUDREY L IRVIN	TH EXPLORATION LLC	1/8+	942 592	N/A	N/A	N/A	N/A	N/A	N/A
10*19788	5-16-8	K	REX B FISHER AND DEBORAH FISHER	TH EXPLORATION LLC	1/8+	948 295	N/A	N/A	N/A	N/A	N/A	N/A
10*21014	5-16-8	K	JAMES P MCLAUGHLIN & ALICE W MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946 29	N/A	N/A	N/A	N/A	N/A	N/A
10*21015	5-16-8	K	ROBERT L MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946 339	N/A	N/A	N/A	N/A	N/A	N/A
10*21189	5-16-8	K	NATALIE GIBBS	TH EXPLORATION LLC	1/8+	941 261	N/A	N/A	N/A	N/A	N/A	N/A
10*21267	5-16-8	K	JAMES E NICHOLAS AND BEVERLY D NICHOLAS	TH EXPLORATION LLC	1/8+	943 513	N/A	N/A	N/A	N/A	N/A	N/A
10*21504	5-16-8	K	PAULETA LINDA CHEATHAM AND CARL WOHLERS	TH EXPLORATION LLC	1/8+	951 142	N/A	N/A	N/A	N/A	N/A	N/A
10*21638	5-16-8	K	THE MILDRED Y MILLS TRUST JULY 5TH 2007	TH EXPLORATION LLC	1/8+	956 172	N/A	N/A	N/A	N/A	N/A	N/A
10*21709	5-16-8	K	THOMAS YOUNG AND JANE CLAIRE YOUNG	TH EXPLORATION LLC	1/8+	959 350	N/A	N/A	N/A	N/A	N/A	N/A
10*21710	5-16-8	K	PENELOPE A JONES	TH EXPLORATION LLC	1/8+	959 355	N/A	N/A	N/A	N/A	N/A	N/A
10*22295	5-16-8	K	RACHEL B OSTRANDER	FOSSIL CREEK OHIO, LLC	1/8+	822 210	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22319	5-16-8	K	SHARON G VAN SCYOC	FOSSIL CREEK OHIO, LLC	1/8+	822 204	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22865	5-16-8	K	JAMES H CAMPBELL	TH EXPLORATION LLC	1/8+	977 60	N/A	N/A	N/A	N/A	N/A	N/A
10*22866	5-16-8	K	MARGARET R DONOFRIO	TH EXPLORATION LLC	1/8+	977 57	N/A	N/A	N/A	N/A	N/A	N/A
10*18339	5-16-9	L	RESOURCE MINERALS HEADWATER I LP	TH EXPLORATION LLC	1/8+	940 448	N/A	N/A	N/A	N/A	N/A	N/A
10*18526	5-16-9	L	ANN TURNER YOUNG SHRIVER	TH EXPLORATION LLC	1/8+	933 591	N/A	N/A	N/A	N/A	N/A	N/A
10*18597	5-16-9	L	MARK ALLEN LENENBERG	TH EXPLORATION LLC	1/8+	934 638	N/A	N/A	N/A	N/A	N/A	N/A

WW-6A1 Supplement

Operator's Well No. Old Crow S - 14HM

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*18636	5-16-9	L	CHERYL STEFFEN AND GREGORY STEFFEN	TH EXPLORATION LLC	1/8+	936 240	N/A	N/A	N/A	N/A	N/A	N/A
10*18637	5-16-9	L	THOMAS RICHMOND YOUNG ANITA A YOUNG	TH EXPLORATION LLC	1/8+	936 244	N/A	N/A	N/A	N/A	N/A	N/A
10*19467	5-16-9	L	ROBERT R FISHER AND AUDREY L IRVIN	TH EXPLORATION LLC	1/8+	942 592	N/A	N/A	N/A	N/A	N/A	N/A
10*19788	5-16-9	L	REX B FISHER AND DEBORAH FISHER	TH EXPLORATION LLC	1/8+	948 295	N/A	N/A	N/A	N/A	N/A	N/A
10*21014	5-16-9	L	JAMES P MCLAUGHLIN & ALICE W MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946 29	N/A	N/A	N/A	N/A	N/A	N/A
10*21015	5-16-9	L	ROBERT L MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946 339	N/A	N/A	N/A	N/A	N/A	N/A
10*21189	5-16-9	L	NATALIE GIBBS	TH EXPLORATION LLC	1/8+	941 261	N/A	N/A	N/A	N/A	N/A	N/A
10*21267	5-16-9	L	JAMES E NICHOLAS AND BEVERLY D NICHOLAS	TH EXPLORATION LLC	1/8+	943 513	N/A	N/A	N/A	N/A	N/A	N/A
10*21504	5-16-9	L	PAULETA LINDA CHEATHAM AND CARL WOHLERS	TH EXPLORATION LLC	1/8+	951 142	N/A	N/A	N/A	N/A	N/A	N/A
10*21638	5-16-9	L	THE MILDRED Y MILLS TRUST JULY 5TH 2007	TH EXPLORATION LLC	1/8+	956 172	N/A	N/A	N/A	N/A	N/A	N/A
10*21709	5-16-9	L	THOMAS YOUNG AND JANE CLAIRE YOUNG	TH EXPLORATION LLC	1/8+	959 350	N/A	N/A	N/A	N/A	N/A	N/A
10*21710	5-16-9	L	PENELOPE A JONES	TH EXPLORATION LLC	1/8+	959 355	N/A	N/A	N/A	N/A	N/A	N/A
10*22295	5-16-9	L	RACHEL B OSTRANDER	FOSSIL CREEK OHIO, LLC	1/8+	822 210	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	Fossil Creek Ohio LLC & Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22319	5-16-9	L	SHARON G VAN SCYOC	FOSSIL CREEK OHIO, LLC	1/8+	822 204	N/A	N/A	N/A	Fossil Creek Ohio LLC to Gulfport Energy Corp: 32/54 & 34/366	& Gulfport Energy Corp to American Petroleum Partners Operating LLC: 36/588	American Petroleum Partners Operating LLC to TH Exploration LLC: 42/109
10*22865	5-16-9	L	JAMES H CAMPBELL	TH EXPLORATION LLC	1/8+	977 60	N/A	N/A	N/A	N/A	N/A	N/A
10*22866	5-16-9	L	MARGARET R DONOFRIO	TH EXPLORATION LLC	1/8+	977 57	N/A	N/A	N/A	N/A	N/A	N/A
10*18526	9-13-3	M	ANN TURNER YOUNG SHRIVER	TH EXPLORATION LLC	1/8+	933 591	N/A	N/A	N/A	N/A	N/A	N/A
10*18597	9-13-3	M	MARK ALLEN LENENBERG	TH EXPLORATION LLC	1/8+	934 638	N/A	N/A	N/A	N/A	N/A	N/A
10*18636	9-13-3	M	CHERYL STEFFEN AND GREGORY STEFFEN	TH EXPLORATION LLC	1/8+	936 240	N/A	N/A	N/A	N/A	N/A	N/A
10*18637	9-13-3	M	THOMAS RICHMOND YOUNG ANITA A YOUNG	TH EXPLORATION LLC	1/8+	936 244	N/A	N/A	N/A	N/A	N/A	N/A
10*19467	9-13-3	M	ROBERT R FISHER AND AUDREY L IRVIN	TH EXPLORATION LLC	1/8+	942 592	N/A	N/A	N/A	N/A	N/A	N/A
10*19788	9-13-3	M	REX B FISHER AND DEBORAH FISHER	TH EXPLORATION LLC	1/8+	948 295	N/A	N/A	N/A	N/A	N/A	N/A
10*21014	9-13-3	M	JAMES P MCLAUGHLIN & ALICE W MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946 29	N/A	N/A	N/A	N/A	N/A	N/A
10*21015	9-13-3	M	ROBERT L MCLAUGHLIN	TH EXPLORATION LLC	1/8+	946 339	N/A	N/A	N/A	N/A	N/A	N/A
10*21189	9-13-3	M	NATALIE GIBBS	TH EXPLORATION LLC	1/8+	941 261	N/A	N/A	N/A	N/A	N/A	N/A
10*21267	9-13-3	M	JAMES E NICHOLAS AND BEVERLY D NICHOLAS	TH EXPLORATION LLC	1/8+	943 513	N/A	N/A	N/A	N/A	N/A	N/A
10*21504	9-13-3	M	PAULETA LINDA CHEATHAM AND CARL WOHLERS	TH EXPLORATION LLC	1/8+	951 142	N/A	N/A	N/A	N/A	N/A	N/A
10*21638	9-13-3	M	THE MILDRED Y MILLS TRUST JULY 5TH 2007	TH EXPLORATION LLC	1/8+	956 172	N/A	N/A	N/A	N/A	N/A	N/A
10*21709	9-13-3	M	THOMAS YOUNG AND JANE CLAIRE YOUNG	TH EXPLORATION LLC	1/8+	959 350	N/A	N/A	N/A	N/A	N/A	N/A
10*21710	9-13-3	M	PENELOPE A JONES	TH EXPLORATION LLC	1/8+	959 355	N/A	N/A	N/A	N/A	N/A	N/A
10*22865	9-13-3	M	JAMES H CAMPBELL	TH EXPLORATION LLC	1/8+	977 60	N/A	N/A	N/A	N/A	N/A	N/A
10*22866	9-13-3	M	MARGARET R DONOFRIO	TH EXPLORATION LLC	1/8+	977 57	N/A	N/A	N/A	N/A	N/A	N/A
10*14099	5-16-12	N	SOUTHERN COUNTRY FARMS INC	GASTAR EXPLORATION USA INC	1/8+	666 489	N/A	N/A	N/A	N/A	N/A	Gastar Exploration Inc to TH Exploration II LLC: 36/9
10*14099	5-17-3	O	SOUTHERN COUNTRY FARMS INC	GASTAR EXPLORATION USA INC	1/8+	666 489	N/A	N/A	N/A	N/A	N/A	Gastar Exploration Inc to TH Exploration II LLC: 36/9

WW-6A1 Supplement

Operator's Well No. Old Crow S - 14HM

Lease ID	Parcel	Tag	Grantor, Lessor, Etc.	Grantee, Lessee, Etc.	Royalty	Deed Book/Page		Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10*14125	5-17-4	P	SHIBEN ESTATES INC	GASTAR EXPLORATION USA INC	1/8+	695	460	N/A	N/A	N/A	N/A	N/A	Gastar Exploration Inc to TH Exploration II LLC: 36/9
10*18666	5-16-13	Q	LESLIE A RUBCICH	TH EXPLORATION LLC	1/8+	936	83	N/A	N/A	N/A	N/A	N/A	N/A
10*18745	5-16-13	Q	MARTA J RUBCICH	TH EXPLORATION LLC	1/8+	938	454	N/A	N/A	N/A	N/A	N/A	N/A
10*19472	5-16-13	Q	DAVID RUBCICH AND CYNTHIA Y RUBCICH	TH EXPLORATION LLC	1/8+	933	83	N/A	N/A	N/A	N/A	N/A	N/A

AFFIDAVIT

COPY 04/12/2019

STATE OF TEXAS §
§ SS
COUNTY OF TARRANT §

On this 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

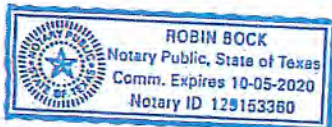
JURAT

Jan Pest
MARSHALL County 03:44:28 PM
Instrument No 1416299
Date Recorded 10/19/2016
Document Type HIS
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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Office of Oil and Gas
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WV Department of
Environmental Protection

Jag Post
MARSHALL County 01:22:38 PM
Instrument No 1403499
Date Recorded 04/27/2016
Document Type ASH
Pages Recorded 77
Book Page 36-9
Recording Fee \$77.00
Additional \$13.00

04/12/2019

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

Execution Version

ASSIGNMENT AND BILL OF SALE

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

THIS ASSIGNMENT AND BILL OF SALE (this "Assignment"), dated April 7, 2016, but effective as of 7:00 A.M. Houston time on January 1, 2016 (the "Effective Time"), is between Gasar Exploration Inc., a Delaware corporation, whose address is 1331 Lamar Street, Suite 650 Houston, Texas 77010 ("Assignor"), and TE 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, 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, Wetzell, 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

US-4080690

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WV Department of
Environmental Protection

04/12/2019



February 7, 2019

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

RE: Old Crow S-14HM

Subject: Road Crossing Letter

Dear Laura:

Tug Hill Operating, LLC will not be drilling, extracting or producing any minerals under any WV County or State Routes in the area reflected on the Old Crow S-14HM 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,

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

Amy L. Miller
Permitting Specialist – Appalachia Region

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WV Department of
Environmental Protection

WW-6AC
(1/12)

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

Date of Notice Certification: 02/07/2019

API No. 47- 051

Operator's Well No. Old Crow S-14HM

Well Pad Name: Old Crow

Notice has been given:

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

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>520,304.98</u>
County:	<u>Marshall</u>		Northing:	<u>4,403,187.72</u>
District:	<u>Franklin</u>	Public Road Access:	<u>Rines Ridge Road (County Route 76)</u>	
Quadrangle:	<u>Powhatan Point 7.5'</u>	Generally used farm name:	<u>Donna Yoho</u>	
Watershed:	<u>Tributary of Fish Creek (HUC-10)</u>			

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

<p>Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:</p> <p>*PLEASE CHECK ALL THAT APPLY</p> <p><input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED</p> <p><input checked="" type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED</p> <p><input type="checkbox"/> 3. NOTICE OF INTENT TO DRILL or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or</p> <p style="padding-left: 100px;"><input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)</p> <p><input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION</p> <p><input checked="" type="checkbox"/> 5. PUBLIC NOTICE</p> <p><input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION</p>	<p style="text-align: center;">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 style="text-align: center;">RECEIVED Office of Oil and Gas FEB 12 2019 WV Department of Environmental Protection</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p>
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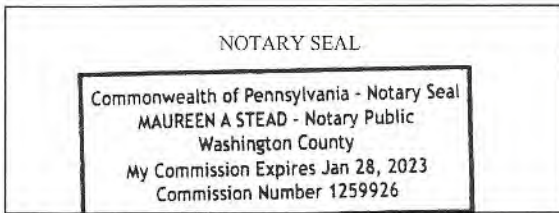
Required Attachments:

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 Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of personal service, the return receipt card or other postal receipt for certified mailing.

Certification of Notice is hereby given:

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

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



Subscribed and sworn before me this 7 day of FEBRUARY, 2019
Maureen A Stead Notary Public
 My Commission Expires 1/28/23

Oil and Gas Privacy Notice:

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

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 Office of Oil and Gas
 FEB 12 2019
 WV Department of
 Environmental Protection

WW-6A
(9-13)

API NO. 47-051
OPERATOR WELL NO. 4705102185 04/12/2019
Well Pad Name: Old Crow

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

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

Date of Notice: 1/30/2019 **Date Permit Application Filed:** 2/1/2019

Notice of:

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

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

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

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

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

SURFACE OWNER(s)
Name: Donna Yoho
Address: 3682 Rines Ridge Road
Proctor, WV 26055

Name: _____
Address: _____

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

Name: _____
Address: _____

Name: _____
Address: _____

SURFACE OWNER(s) (Impoundments or Pits)

Name: _____
Address: _____

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

COAL OPERATOR
Name: _____
Address: _____

SURFACE OWNER OF WATER WELL AND/OR WATER PURVEYOR(s)
Name: *See attached list
Address: _____

OPERATOR OF ANY NATURAL GAS STORAGE FIELD

Name: _____
Address: _____

*Please attach additional forms if necessary

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Office of Oil and Gas
FEB 12 2019
WV Department of
Environmental Protection

Notice is hereby given:

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

This Notice Shall Include:

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

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments 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 that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

WW-6A
(8-13)

4705102185
API NO. 47-051 - 04/12/2019
OPERATOR WELL NO. Old Crow S-14HM
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

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

Time Limits and Methods for Filing Comments.

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

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

Comment Requirements

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

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

Permit Denial or Condition

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

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

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

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

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WW-6A
(8-13)

API NO. 47-451 **4705102185**
OPERATOR WELL NO. Old Crow S-14HM
Well Pad Name: Old Crow

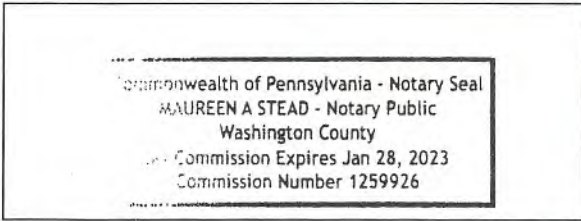
Notice is hereby given by:

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

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

Oil and Gas Privacy Notice:

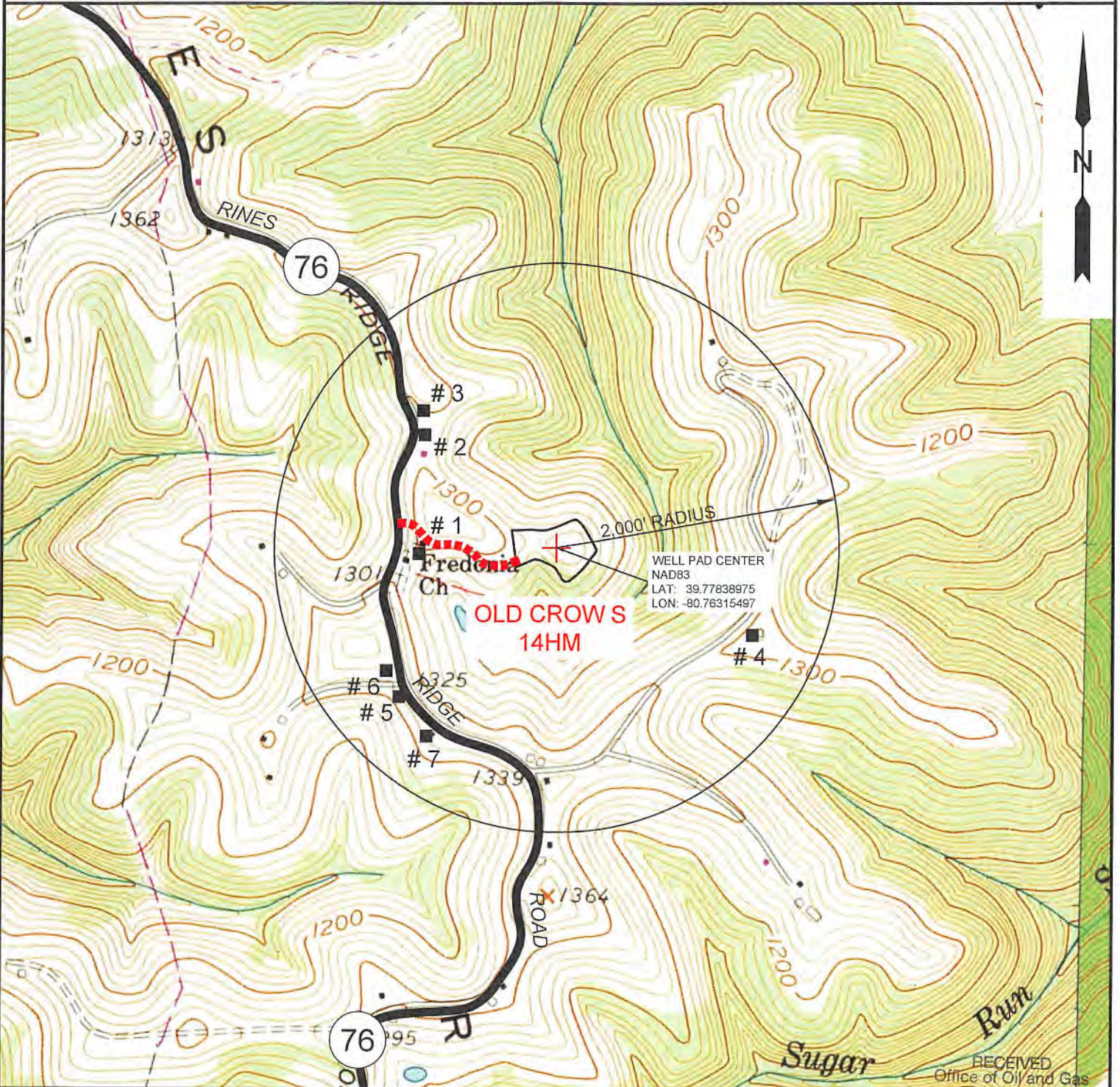
The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory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



Subscribed and sworn before me this 30 day of JANUARY 2019
Maureen A Stead Notary Public
My Commission Expires 1/28/23

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PROPOSED OLD CROW S - 14HM



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

FEB 12 2019

SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26351 • (304) 462-5634
www.slsurveys.com

TOPO SECTION:		OPERATOR:	
GLEN EASTON & POWHATAN POINT 7.5'		PREPARED FOR:	
COUNTY	DISTRICT	TUG HILL OPERATING, LLC	
MARSHALL	FRANKLIN	380 SOUTHPOINTE BLVD	
		SUITE 200	
		CANONSBURG, PA 15317	
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8796	06/22/18	1" = 1000'

WV Department of Environmental Protection

TUG HILL
OPERATING

04/12/2019

Exhibit WW-6A

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

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

Well: Old Crow S – 14HM
 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.

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	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	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
Residence 4 TM 16 Pcl. 6 John Swierkos Phone: 304-810-4092 Physical Address: 110 Rahm Dr. Proctor, WV 26055 Tax Address: Same	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	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
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		RECEIVED Office of Oil and Gas FEB 12 2019 WV Department of Environmental Protection

WW-6A3
(1/12)

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

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

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

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

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

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

Notice is hereby provided to:

SURFACE OWNER(s) ✓

Name: Donna Yoho

Address: 3682 Rines Ridge Road
Proctor, WV 26055

Name: _____

Address: _____

Name: _____

Address: _____

COAL OWNER OR LESSEE ✓

Name: Consol Energy, Inc. Leatherwood, Inc. Attn: Casey Saunders

Address: 1000 CONSOL Energy Drive
Canonsburg, PA 15317

MINERAL OWNER(s)

Name: _____

Address: _____

*please attach additional forms if necessary

Notice is hereby given:

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

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

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@tug-hillop.com

Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317

Facsimile: 724-338-2030

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Oil and Gas Privacy Notice:

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

04/12/2019



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-14HM 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,

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

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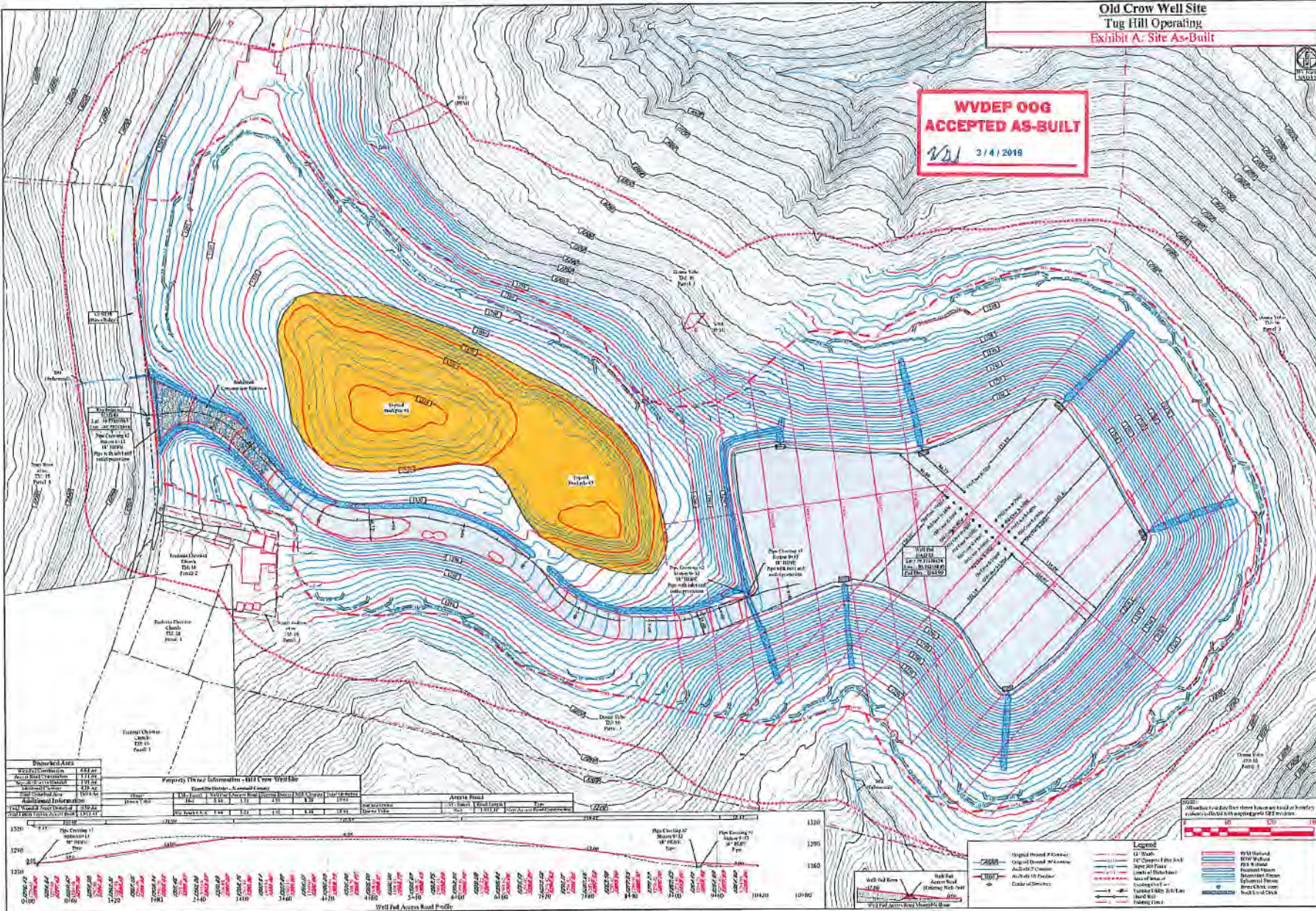
PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION

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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Old Crow Well Site
Tug Hill Operating
Exhibit A: Site As-Built

**WV DEP O&G
ACCEPTED AS-BUILT**
2/21 3/4/2018



Well Pad Access Road Profile

Station	Elevation (ft)	Notes
0+00	1280	Start of Profile
0+10	1275	Top of Embankment
0+20	1270	Bottom of Embankment
0+30	1265	Top of Embankment
0+40	1260	Bottom of Embankment
0+50	1255	Top of Embankment
0+60	1250	Bottom of Embankment
0+70	1245	Top of Embankment
0+80	1240	Bottom of Embankment
0+90	1235	Top of Embankment
1+00	1230	Bottom of Embankment
1+10	1225	Top of Embankment
1+20	1220	Bottom of Embankment
1+30	1215	Top of Embankment
1+40	1210	Bottom of Embankment
1+50	1205	Top of Embankment
1+60	1200	Bottom of Embankment
1+70	1195	Top of Embankment
1+80	1190	Bottom of Embankment
1+90	1185	Top of Embankment
2+00	1180	Bottom of Embankment
2+10	1175	Top of Embankment
2+20	1170	Bottom of Embankment
2+30	1165	Top of Embankment
2+40	1160	Bottom of Embankment
2+50	1155	Top of Embankment
2+60	1150	Bottom of Embankment
2+70	1145	Top of Embankment
2+80	1140	Bottom of Embankment
2+90	1135	Top of Embankment
3+00	1130	Bottom of Embankment

TUG HILL OPERATING

THIS DOCUMENT IS VALID FOR TUG HILL OPERATING

Old Crow Well Site
Franklin District
Marshall County, WV

Date: 07/29/2018
Scale: AS SHOWN
User: JLS
File No: 18-001
Sheet: 1 of 1