



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

Monday, June 22, 2020
WELL WORK PERMIT
Horizontal 6A / New Drill

TUG HILL OPERATING, LLC
380 SOUTHPOINTE BLVD

CANONSBURG, PA 15317

Re: Permit approval for FITZGERALD S-19HU
47-051-02326-00-00

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: FITZGERALD S-19HU
Farm Name: DANNY AND FRANCES KER+
U.S. WELL NUMBER: 47-051-02326-00-00
Horizontal 6A New Drill
Date Issued: 6/22/2020

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.



west virginia department of environmental protection

Oil and Gas Conservation Commission
601 57th Street SE, Charleston, WV 25304
304-926-0499 Ext 41239

Randall M. Albert, Chairman
dep.wv.gov

June 11, 2020

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

RE: Application for Deep Well Permit – API #47-051-02326

COMPANY: Tug Hill Operating, LLC

FARM: Danny and Frances Kerns Estate

Fitzgerald S-19HU

COUNTY: Marshall

DISTRICT: Liberty

QUAD: Glen Easton

The deep well review of the application for the above company is **Approved to drill to Trenton for Point Pleasant completion. Pooling Docket No. 294-298.**

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

1. Comments to Notice of Deviation filed? Yes
2. Provided a certified copy of duly acknowledged and recorded consent and easement form from all surface owners? Yes
3. Provided a tabulation of all deep wells within one mile of the proposed location, including the API number of all deep wells: **yes; Docket 294-298 Exception Location Hearing
4. Provided a plat showing that the proposed location is a distance of 400+ feet from the nearest lease line or unit boundary and showing the following wells drilled to or capable of producing from the objective formation within 3,000 feet of the proposed location.

Sincerely,

A handwritten signature in blue ink that reads 'Susan Rose'.

Susan Rose
Administrator

** Hudson S-13HU 47-051-02293; Hudson S-12HU 47-051-02292; Hudson S-11HU 47-051-02296, Ten High 1N-20HU 47-051-02021, Ten High 1N-1311U 47-051-01965; Ten High 1S-17HU 47-051-02033; Ten High 1S-16HU 47-051-02028; Ten High 1S-15HU 47-051-02027; Ten High 1S-14HU 47-051-01966; Fitzgerald S-17HU 47-051-02324; Fitzgerald S-18HU 47-051-02325

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 Liberty Glen Easton 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Fitzgerald S-19HU Well Pad Name: Fitzgerald

3) Farm Name/Surface Owner: Danny R. Kerns Public Road Access: County Route 90

4) Elevation, current ground: 1316.5' Elevation, proposed post-construction: 1293.30'

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

(b) If Gas Shallow _____ Deep x _____
Horizontal x _____

6) Existing Pad: Yes or No No

3/11/2020

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Point Pleasant is the target formation at a depth of 11,793' - 11,926' - thickness of 133' and anticipated pressure of approx. 9500 psi.

8) Proposed Total Vertical Depth: 12,076'

9) Formation at Total Vertical Depth: Trenton, plug back to Reedsville ✓

10) Proposed Total Measured Depth: 22,323' ✓

11) Proposed Horizontal Leg Length: 9,059.18' ✓

12) Approximate Fresh Water Strata Depths: 70' ; 927'

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

14) Approximate Saltwater Depths: 2,167'

15) Approximate Coal Seam Depths: Sewickley Coal - 835' ; Pittsburgh Coal - 921'

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 X No _____

(a) If Yes, provide Mine Info: Name: Marshall County Coal Co./Marshall County Mine
Depth: 1059' TVD and 291' subsea level
Seam: Pittsburgh #8
Owner: Murray Energy / Consolidated Coal Co.

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WW-6B
(04/15)

API NO. 47- 051 - 02326
 OPERATOR WELL NO. Fitzgerald S-19HU
 Well Pad Name: Fitzgerald

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	259FT^3(CTS)
Fresh Water	20"	NEW	J55	106.5#	1020'	1020'	1,644FT^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	2900'	2900'	2,044FT^3(CTS)
Intermediate	9 5/8"	NEW	HPP110	47#	11,600'	11,600'	3,777FT^3(CTS)
Production	5 1/2"	NEW	P110	23#	22,323'	22,323'	5,311FT^3(CTS)
Tubing	2 7/8"	NEW	P110	6.5#		12,330'	
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	1.0	2,333	1,866	CLASS A	1.2
Fresh Water	20"	26"	.5	2,410	1,928	SEE # 24	1.2
Coal	13 3/8"	17 1/2"	.38	2,740	2,192	SEE #24	1.2
Intermediate	9 5/8"	12 1/4"	.472	10,730	6,968	SEE #24	1.99
Production	5 1/2"	8 1/2"	.415	16,510	10,864	SEE #24	1.18
Tubing	2 7/8"			11,385	9,108		
Liners							

PACKERS

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

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18) **CASING AND TUBING PROGRAM**

TYPE	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
Conductor	30"	NEW	BW	BW	120'	120'	259FT^3(CTS)
Fresh Water	20"	NEW	J55	106.5#	1020'	1020'	1,644FT^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	2900'	2900'	2,044FT^3(CTS)
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Tubing	2 7/8"	NEW	P110	6.5#		12,330'	
Liners							

JW
3/11/2020

TYPE	<u>Size (in)</u>	<u>Wellbore Diameter (in)</u>	<u>Wall Thickness (in)</u>	<u>Burst Pressure (psi)</u>	<u>Anticipated Max. Internal Pressure (psi)</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	30"	36"	1.0	2,333	1,866	CLASS A	1.2
Fresh Water	20"	26"	.5	2,410	1,928	SEE # 24	1.2
Coal	13 3/8"	17 1/2"	.38	2,740	2,192	SEE #24	1.2
Intermediate	9 5/8"	12 1/4"	.472	10,730	6,968	SEE #24	1.99
Production	5 1/2"	8 1/2"	.415	16,510	10,864	SEE #24	1.18
Tubing	2 7/8"			* 11,385	* 11,624		
Liners							

PACKERS

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

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WW-6B
(10/14)

API NO. 47-051 - _____
OPERATOR WELL NO. Fitzgerald S-19HU
Well Pad Name: Fitzgerald

JW
3/11/2020

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

Drill through the Point Pleasant and TD Pilot Hole 150' into the Trenton. Log vertical section and run a solid cement plug back to proposed KOP (11,830'). Drill curve and lateral per proposed well plan, run and cement production casing. Perform CBL from 60 deg to surface, make cleanout run, and stimulate.

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

Well to be completed with approximately 22,645,000 lb proppant and 350,108 bbl of water. Max rate = 80 bpm; max psi = 12,000#.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 21.21 acres

22) Area to be disturbed for well pad only, less access road (acres): 7.44 acres

23) Describe centralizer placement for each casing string:

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

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

*See Attachment

25) Proposed borehole conditioning procedures:

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

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*Note: Attach additional sheets as needed.

WELL NAME: Fitzgerald S-19HU COUNTY: Marshall
 STATE: WV DISTRICT: Meade
 DP Elev: 1,293' GL Elev: 1,293'
 TD: 22,323'
 TH Latitude: 39.801177
 TH Longitude: -80.641177
 BH Latitude: 39.78270001
 BH Longitude: -80.63718301

CASING SUMMARY

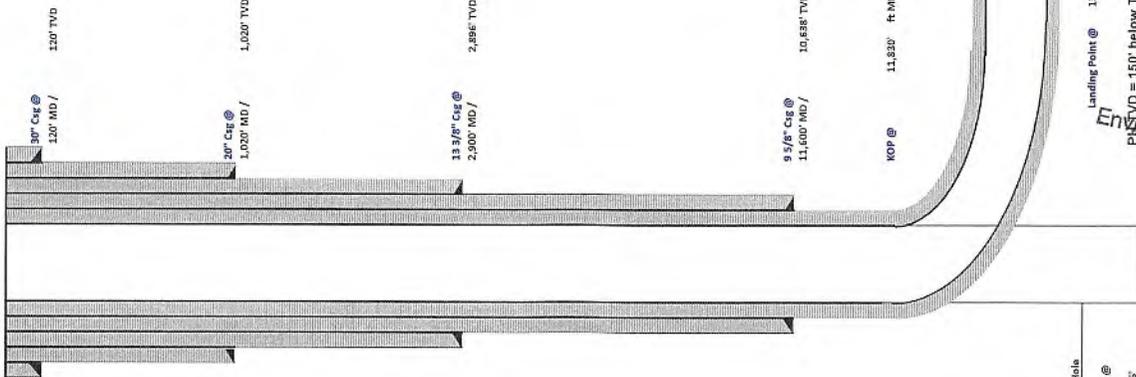
Type	Hole Size [in]	Csg Size [in]	Depth [MD]	Depth [TVD]	Weight [lb/ft]	Grade	Top of Cement
Conductor	36	30	120'	120'	BW	BW	Surface
Surface	26	20	1,020'	1,020'	106.5	J55	Surface
Intermediate 1	17 1/2	13 3/8	2,900'	2,896'	54.5	J55	Surface
Intermediate 2	12 1/4	9 5/8	11,600'	10,638'	47	HPP110	Surface
Production	8 1/2	5 1/2	22,323'	12,002'	23	HCP110	Surface

CEMENT SUMMARY

Soaks	Class	Density	Fluid Type	Centralizer/Notes
Conductor	A	15.6	Air	None
Surface	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	A	15	Air	1 Centralizer every other ft
Intermediate 2	A	14.5	Air	1 Centralizer every other ft
Production	A	15	Air / SORM	1 every other joint in lateral; 1 per joint in curve; 1 every other ft to 3ft

FORMATION TOPS

Formation	Depth TVD
Deepest Fresh Water	92'
Swoolekey Coal	83'
Pittsburgh Coal	92'
Big Lina	2,242'
Berea	2,460'
Tully	6,806'
Marcellus	6,919'
Onondaga	6,971'
Salina	7,694'
Lockport	8,703'
Utica	11,525'
Point Pleasant	11,793'
Landing Depth	11,843'
Trenton	11,926'
Pilot Hole TD	12,076'



Lateral TD @ 22,323' ft MD
 12,002' ft TVD

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Pilot Hole
 PH TD @ 12,076'



Tug Hill Operating, LLC Casing and Cement Program

Fitzgerald S-19HU

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	20"	J55	26"	1,020'	CTS
Intermediate 1	13 3/8"	J55	17 1/2"	2,900'	CTS
Intermediate 2	9 5/8"	HPP110	12 1/4"	11,600'	CTS
Production	5 1/2"	HCP110	8 1/2"	22,323'	CTS

Cement

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

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

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

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

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4705102326



Well Site Safety Plan
Tug Hill Operating, LLC

JW
3/11/2020

Well Name: Fitzgerald S-19HU

Location: Fitzgerald Pad

Marshall County, West Virginia

UTM (meters), NAD83, Zone 17:

Northing: 4,405,751.78

Easting: 530,717.69

February 2020

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Area of Review

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

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

Data Sources Reviewed:

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

Contacted Devin Ducoeur 724-705-0444, dducoeur@dpslandservices.com DPS GIS (03/06/2020) 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 - Fitzgerald S-19HU

Wells within 500' Buffer

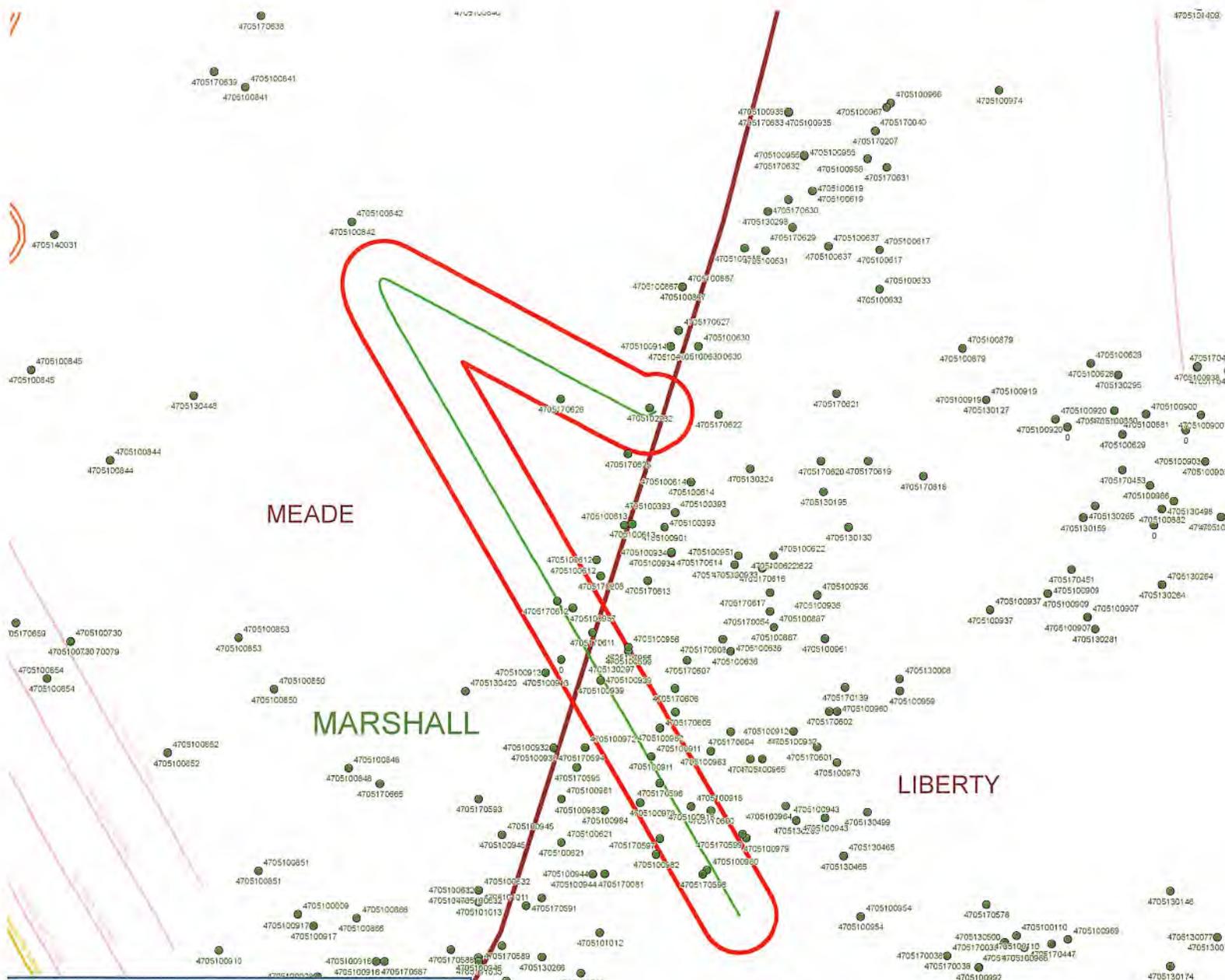
Note: Well spots depicted on Area of Review map (page 3) are derived from State held coordinates. The spots may differ from those depicted on the Well Plat because the Plat locations represent actual field surveyed locations. Please refer to the Plat for surveyed well spots

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
4705170626	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 Point Pleasant well.	State records are incomplete.
4705102232	Tug Hill Operating, LLC	7070' TVD	None	None	No, existing Marcellus permit. The well is not deep enough to be within the expected fracture propagation from a Point Pleasant stimulation.	Currently a permit.
4705170625	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 Point Pleasant well.	State records are incomplete.
4705100957	Consolidation Coal Co.	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 Point Pleasant well.	State records are incomplete.
4705170612	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 Point Pleasant well.	State records are incomplete.
4705100599	Consolidation Coal Co.	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 Point Pleasant well. Well is plugged.	Well was plugged 1/07/2004.
4705100939	Consolidation Coal Co.	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 Point Pleasant well. Well is plugged.	Well was plugged 10/20/2005.
4705100956	Consolidation Coal Co.	3121' TVD	Gordon	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Point Pleasant well. Well is plugged.	Well was plugged 8/19/1949.
4705130297	Raad Supply Company	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 Point Pleasant well.	State records are incomplete.
4705170611	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 Point Pleasant well.	State records are incomplete.
4705100911	Consolidation Coal Co.	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 Point Pleasant well.	State records are incomplete.
4705100962	Consolidation Coal Co.	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 Point Pleasant well. Well is plugged.	Well was plugged 9/8/2005.
4705100978	Consolidation Coal Co.	Unknown	Pittsburgh Coal	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Point Pleasant well. Well is plugged.	Well was plugged 3/24/2006.

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4705170596	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 Point Pleasant well.	State records are incomplete.
4705100918	Consolidation Coal Co.	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 Point Pleasant well. Well is plugged.	Well was plugged 4/14/2004.
4705170597	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 Point Pleasant well.	State records are incomplete.
4705170600	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 Point Pleasant well.	State records are incomplete.
4705100980	Consolidation Coal Co.	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 Point Pleasant well. Well is plugged.	Well was plugged 1/24/2006.
4705170598	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 Point Pleasant well.	State records are incomplete.

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Legend

- Well Locations (ims.wvgs.wvnet.edu)
- Fitzgerald S - 19HU
- 500 Ft. Buffer
- Major Highways
- Major Roads
- Marcellus Drilled Laterals
- Utica Drilled Laterals
- ▭ Counties
- ▭ Districts

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Fitzgerald S - 19HU

Meade District

Marshall County, WV



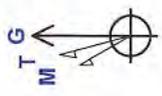


Well: Fitzgerald 19 HU (slot O)
Site: Fitzgerald
Project: Marshall County, West Virginia
Design: rev9
Rig:

Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD83 West Virginia - HARN
 Ellipsoid: GRS 1960
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level
 Depth Reference: GL @ 1292.91ft
 Northing 14454537.24 Easting 39.80117700 Longitude -80.64117700

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 9.01°



Azimuths to Grid North
 True North: -0.23°
 Magnetic North: -9.01°
 Magnetic Field Strength: 52002.0usT
 Dip Angle: 66.83°
 Date: 12/11/2018
 Model: IGRF2015

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N+S	+E+W	Dleg	TFace	VSEct	Annotation
1	1100.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
2	1500.00	0.00	0.000	1100.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 1°/100° build
3	3104.23	4.00	240.000	1499.68	-6.98	-12.09	1.00	240.000	4.84	Begin 4.00° tangent
4	4039.80	30.00	240.000	3100.00	-62.93	-105.00	0.00	0.000	43.67	Begin 3°/100° build/turm
5	6938.54	30.00	298.000	3969.62	32.47	-348.58	3.00	64.318	-90.73	Begin 30.00° tangent
6	7338.54	10.00	298.000	6500.00	712.91	-1628.30	0.00	0.000	-977.02	Begin 5°/100° drop
7	7568.06	10.00	298.000	6873.97	775.81	-1748.48	5.00	180.000	-1060.26	Begin 10.00° tangent
8	8234.72	30.00	298.000	7100.00	795.53	-1783.67	0.00	0.000	-1084.63	
9	11830.13	30.00	298.000	7723.29	902.03	-1963.96	3.00	0.000	-1223.35	Begin 30.00° tangent
10	11830.13	30.00	298.000	10837.00	1746.00	-3571.26	0.00	0.000	-2322.65	Begin 8°/100° build/turm
11	12774.77	50.00	154.600	11674.77	1492.10	-3633.94	8.00	-151	864	Begin 8°/100° build/turm
12	13265.42	89.00	149.692	11843.41	1094.92	-3421.16	8.00	-7770	-1655.59	Begin 89.00° lateral
13	22322.98	89.00	149.692	12002.00	-6723.50	1149.03	0.00	0.000	6820.97	PBHL/TD 22322.98 MD/12002.00 TVD

DESIGN TARGET DETAILS

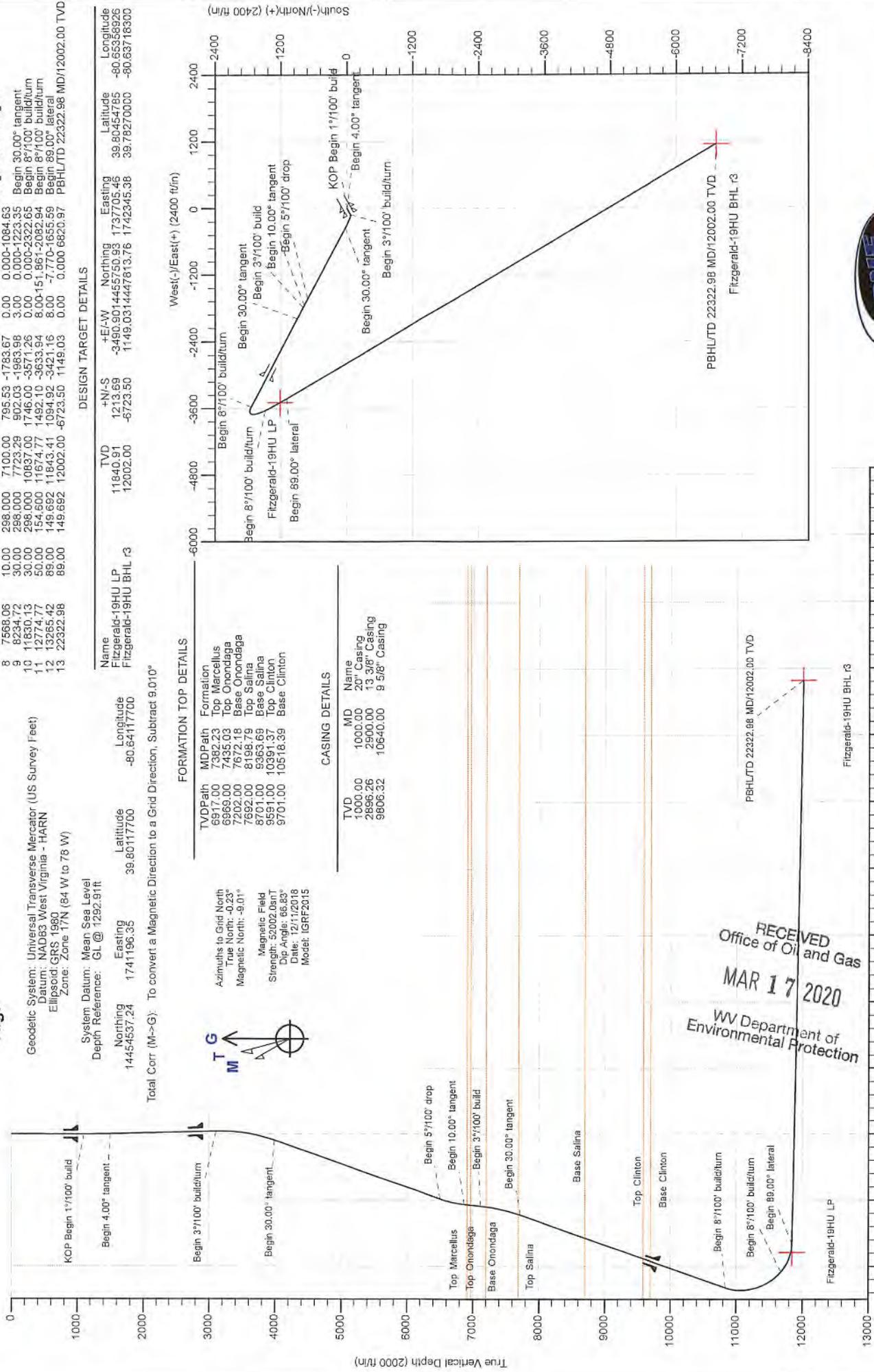
Name	TVD	+N+S	+E+W	Northing	Easting	Latitude	Longitude
Fitzgerald-19HU LP	11840.91	1213.69	-3490.50	14455750.93	1737705.48	39.80454795	-80.65358926
Fitzgerald-19HU BHL r3	12002.00	-5723.30	1149.03	14447813.76	1742345.38	39.78270000	-80.63718300

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
6917.00	7362.23	Top Marcellus
6868.00	7435.23	Top Onondaga
7202.00	7672.18	Base Onondaga
7892.00	8168.79	Top Salina
8751.00	8953.69	Base Salina
9591.00	10391.37	Top Clinton
9701.00	10518.39	Base Clinton

CASING DETAILS

TVD	MD	Name
1000.00	1000.00	20" Casing
2896.26	2900.00	13 3/8" Casing
9806.32	10640.00	9 3/8" Casing



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Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Fitzgerald 19 HU (slot O)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1292.91ft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1292.91ft
Site:	Fitzgerald	North Reference:	Grid
Well:	Fitzgerald 19 HU (slot O)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev9		

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	Fitzgerald				
Site Position:		Northing:	14,454,567.73 usft	Latitude:	39.80126184
From:	Lat/Long	Easting:	1,741,096.26 usft	Longitude:	-80.64153292
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.229 °

Well	Fitzgerald 19 HU (slot O)					
Well Position	+N/-S	0.00 ft	Northing:	14,454,537.24 usft	Latitude:	39.80117700
	+E/-W	0.00 ft	Easting:	1,741,196.35 usft	Longitude:	-80.64117700
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	1,292.91 ft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/11/2018	-8.781	66.834	52,002.03928139

Design	rev9				
Audit Notes:					
Version:	Phase:	PLAN	Tie On Depth:	0.00	
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	170.302	

Plan Survey Tool Program	Date	3/4/2020			
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks	
1	0.00	22,322.98 rev9 (Original Hole)	MWD MWD - Standard		

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Project:	Marshall County, West Virginia	MD Reference:	GL @ 1292.91ft
Site:	Fitzgerald	North Reference:	Grid
Well:	Fitzgerald 19 HU (slot O)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev9		

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.000	
1,100.00	0.00	0.000	1,100.00	0.00	0.00	0.00	0.00	0.00	0.000	
1,500.00	4.00	240.000	1,499.68	-6.98	-12.09	1.00	1.00	0.00	240.000	
3,104.23	4.00	240.000	3,100.00	-62.93	-109.00	0.00	0.00	0.00	0.000	
4,039.80	30.00	298.000	3,989.62	32.47	-348.58	3.00	2.78	6.20	64.318	
6,938.54	30.00	298.000	6,500.00	712.91	-1,628.30	0.00	0.00	0.00	0.000	
7,338.54	10.00	298.000	6,873.97	776.81	-1,748.48	5.00	-5.00	0.00	180.000	
7,568.06	10.00	298.000	7,100.00	795.53	-1,783.67	0.00	0.00	0.00	0.000	
8,234.72	30.00	298.000	7,723.29	902.03	-1,983.98	3.00	3.00	0.00	0.000	
11,830.13	30.00	298.000	10,837.00	1,746.00	-3,571.26	0.00	0.00	0.00	0.000	
12,774.77	50.00	154.600	11,674.77	1,492.10	-3,633.94	8.00	2.12	-15.18	-151.861	
13,265.42	89.00	149.692	11,843.41	1,094.92	-3,421.16	8.00	7.95	-1.00	-7.770	
22,322.98	89.00	149.692	12,002.00	-6,723.50	1,149.03	0.00	0.00	0.00	0.000	Fitzgerald-19HU BHL

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Planning Report - Geographic

Database: DB_Aug1919_v14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Fitzgerald
 Well: Fitzgerald 19 HU (slot O)
 Wellbore: Original Hole
 Design: rev9

Local Co-ordinate Reference: Well Fitzgerald 19 HU (slot O)
 TVD Reference: GL @ 1292.91ft
 MD Reference: GL @ 1292.91ft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.000	0.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
100.00	0.00	0.000	100.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
200.00	0.00	0.000	200.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
300.00	0.00	0.000	300.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
400.00	0.00	0.000	400.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
500.00	0.00	0.000	500.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
600.00	0.00	0.000	600.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
700.00	0.00	0.000	700.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
800.00	0.00	0.000	800.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
900.00	0.00	0.000	900.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
1,000.00	0.00	0.000	1,000.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
1,100.00	0.00	0.000	1,100.00	0.00	0.00	14,454,537.24	1,741,196.35	39.80117700	-80.64117700
KOP Begin 1°/100' build									
1,200.00	1.00	240.000	1,199.99	-0.44	-0.76	14,454,536.81	1,741,195.59	39.80117581	-80.64117970
1,300.00	2.00	240.000	1,299.96	-1.75	-3.02	14,454,535.50	1,741,193.32	39.80117224	-80.64118779
1,400.00	3.00	240.000	1,399.86	-3.93	-6.80	14,454,533.32	1,741,189.55	39.80116629	-80.64120127
1,500.00	4.00	240.000	1,499.68	-6.98	-12.09	14,454,530.26	1,741,184.26	39.80115797	-80.64122013
Begin 4.00° tangent									
1,600.00	4.00	240.000	1,599.43	-10.47	-18.13	14,454,526.78	1,741,178.22	39.80114846	-80.64124169
1,700.00	4.00	240.000	1,699.19	-13.95	-24.17	14,454,523.29	1,741,172.18	39.80113895	-80.64126325
1,800.00	4.00	240.000	1,798.94	-17.44	-30.21	14,454,519.80	1,741,166.14	39.80112943	-80.64128481
1,900.00	4.00	240.000	1,898.70	-20.93	-36.25	14,454,516.31	1,741,160.10	39.80111992	-80.64130637
2,000.00	4.00	240.000	1,998.46	-24.42	-42.29	14,454,512.82	1,741,154.05	39.80111041	-80.64132793
2,100.00	4.00	240.000	2,098.21	-27.91	-48.33	14,454,509.34	1,741,148.01	39.80110090	-80.64134949
2,200.00	4.00	240.000	2,197.97	-31.39	-54.37	14,454,505.85	1,741,141.97	39.80109139	-80.64137104
2,300.00	4.00	240.000	2,297.73	-34.88	-60.42	14,454,502.36	1,741,135.93	39.80108188	-80.64139260
2,400.00	4.00	240.000	2,397.48	-38.37	-66.46	14,454,498.87	1,741,129.89	39.80107236	-80.64141416
2,500.00	4.00	240.000	2,497.24	-41.86	-72.50	14,454,495.39	1,741,123.85	39.80106285	-80.64143572
2,600.00	4.00	240.000	2,597.00	-45.34	-78.54	14,454,491.90	1,741,117.81	39.80105334	-80.64145728
2,700.00	4.00	240.000	2,696.75	-48.83	-84.58	14,454,488.41	1,741,111.77	39.80104383	-80.64147884
2,800.00	4.00	240.000	2,796.51	-52.32	-90.62	14,454,484.92	1,741,105.73	39.80103432	-80.64150039
2,900.00	4.00	240.000	2,896.26	-55.81	-96.66	14,454,481.43	1,741,099.68	39.80102480	-80.64152195
3,000.00	4.00	240.000	2,996.02	-59.30	-102.70	14,454,477.95	1,741,093.64	39.80101529	-80.64154351
3,100.00	4.00	240.000	3,095.78	-62.78	-108.74	14,454,474.46	1,741,087.60	39.80100578	-80.64156507
3,104.23	4.00	240.000	3,100.00	-62.93	-109.00	14,454,474.31	1,741,087.35	39.80100538	-80.64156598
Begin 3°/100' build/turn									
3,200.00	5.85	266.315	3,195.42	-64.92	-116.76	14,454,472.33	1,741,079.58	39.80100001	-80.64159365
3,300.00	8.41	279.062	3,294.65	-64.09	-129.08	14,454,473.15	1,741,067.27	39.80100242	-80.64163748
3,400.00	11.20	285.710	3,393.18	-60.31	-145.65	14,454,476.93	1,741,050.69	39.80101298	-80.64169644
3,500.00	14.07	289.706	3,490.75	-53.58	-166.45	14,454,483.66	1,741,029.90	39.80103169	-80.64177038
3,600.00	16.98	292.362	3,587.09	-43.92	-191.40	14,454,493.32	1,741,004.94	39.80105849	-80.64185910
3,700.00	19.92	294.256	3,681.94	-31.36	-220.45	14,454,505.88	1,740,975.89	39.80109330	-80.64196234
3,800.00	22.88	295.679	3,775.03	-15.93	-253.51	14,454,521.31	1,740,942.83	39.80113603	-80.64207984
3,900.00	25.84	296.791	3,866.12	2.32	-290.50	14,454,539.56	1,740,905.85	39.80118656	-80.64221126
4,000.00	28.82	297.689	3,954.95	23.35	-331.31	14,454,560.59	1,740,865.04	39.80124476	-80.64235625
4,039.80	30.00	298.000	3,989.62	32.47	-348.58	14,454,569.72	1,740,847.76	39.80127002	-80.64241764
Begin 30.00° tangent									
4,100.00	30.00	298.000	4,041.75	46.61	-375.16	14,454,583.85	1,740,821.19	39.80130911	-80.64251206
4,200.00	30.00	298.000	4,128.36	70.08	-419.31	14,454,607.32	1,740,777.04	39.80137406	-80.64266891
4,300.00	30.00	298.000	4,214.96	93.55	-463.46	14,454,630.80	1,740,732.89	39.80143901	-80.64282576
4,400.00	30.00	298.000	4,301.56	117.03	-507.60	14,454,654.27	1,740,688.74	39.80150396	-80.64298261
4,500.00	30.00	298.000	4,388.16	140.50	-551.75	14,454,677.74	1,740,644.60	39.80156890	-80.64313946
4,600.00	30.00	298.000	4,474.77	163.97	-595.90	14,454,701.22	1,740,600.45	39.80163385	-80.64329631
4,700.00	30.00	298.000	4,561.37	187.45	-640.05	14,454,724.69	1,740,556.30	39.80169880	-80.64345316



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Database: DB_Aug1919_v14
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 Project: Marshall County, West Virginia
 Site: Fitzgerald
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Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,800.00	30.00	298.000	4,647.97	210.92	-684.19	14,454,748.16	1,740,512.16	39.80176375	-80.64361001
4,900.00	30.00	298.000	4,734.57	234.39	-728.34	14,454,771.64	1,740,468.01	39.80182869	-80.64376686
5,000.00	30.00	298.000	4,821.18	257.87	-772.49	14,454,795.11	1,740,423.86	39.80189364	-80.64392371
5,100.00	30.00	298.000	4,907.78	281.34	-816.63	14,454,818.58	1,740,379.71	39.80195858	-80.64408056
5,200.00	30.00	298.000	4,994.38	304.82	-860.78	14,454,842.06	1,740,335.57	39.80202353	-80.64423741
5,300.00	30.00	298.000	5,080.98	328.29	-904.93	14,454,865.53	1,740,291.42	39.80208848	-80.64439427
5,400.00	30.00	298.000	5,167.59	351.76	-949.08	14,454,889.00	1,740,247.27	39.80215342	-80.64455112
5,500.00	30.00	298.000	5,254.19	375.24	-993.22	14,454,912.48	1,740,203.12	39.80221837	-80.64470797
5,600.00	30.00	298.000	5,340.79	398.71	-1,037.37	14,454,935.95	1,740,158.98	39.80228331	-80.64486482
5,700.00	30.00	298.000	5,427.39	422.18	-1,081.52	14,454,959.42	1,740,114.83	39.80234826	-80.64502168
5,800.00	30.00	298.000	5,514.00	445.66	-1,125.67	14,454,982.90	1,740,070.68	39.80241320	-80.64517853
5,900.00	30.00	298.000	5,600.60	469.13	-1,169.81	14,455,006.37	1,740,026.53	39.80247815	-80.64533538
6,000.00	30.00	298.000	5,687.20	492.60	-1,213.96	14,455,029.85	1,739,982.39	39.80254309	-80.64549224
6,100.00	30.00	298.000	5,773.80	516.08	-1,258.11	14,455,053.32	1,739,938.24	39.80260803	-80.64564909
6,200.00	30.00	298.000	5,860.41	539.55	-1,302.26	14,455,076.79	1,739,894.09	39.80267298	-80.64580595
6,300.00	30.00	298.000	5,947.01	563.02	-1,346.40	14,455,100.27	1,739,849.95	39.80273792	-80.64596280
6,400.00	30.00	298.000	6,033.61	586.50	-1,390.55	14,455,123.74	1,739,805.80	39.80280286	-80.64611966
6,500.00	30.00	298.000	6,120.21	609.97	-1,434.70	14,455,147.21	1,739,761.65	39.80286781	-80.64627651
6,600.00	30.00	298.000	6,206.82	633.45	-1,478.85	14,455,170.69	1,739,717.50	39.80293275	-80.64643337
6,700.00	30.00	298.000	6,293.42	656.92	-1,522.99	14,455,194.16	1,739,673.36	39.80299769	-80.64659023
6,800.00	30.00	298.000	6,380.02	680.39	-1,567.14	14,455,217.63	1,739,629.21	39.80306263	-80.64674708
6,900.00	30.00	298.000	6,466.62	703.87	-1,611.29	14,455,241.11	1,739,585.06	39.80312758	-80.64690394
6,938.54	30.00	298.000	6,500.00	712.91	-1,628.30	14,455,250.15	1,739,568.05	39.80315261	-80.64696439
Begin 5°/100' drop									
7,000.00	26.93	298.000	6,554.02	726.66	-1,654.16	14,455,263.90	1,739,542.19	39.80319065	-80.64705627
7,100.00	21.93	298.000	6,645.04	746.07	-1,690.66	14,455,283.31	1,739,505.69	39.80324434	-80.64718596
7,200.00	16.93	298.000	6,739.32	761.68	-1,720.02	14,455,298.92	1,739,476.33	39.80328753	-80.64729027
7,300.00	11.93	298.000	6,836.14	773.37	-1,742.01	14,455,310.61	1,739,454.34	39.80331988	-80.64736841
7,338.54	10.00	298.000	6,873.97	776.81	-1,748.48	14,455,314.06	1,739,447.87	39.80332940	-80.64739140
Begin 10.00° tangent									
7,400.00	10.00	298.000	6,934.50	781.82	-1,757.91	14,455,319.07	1,739,438.44	39.80334326	-80.64742489
7,500.00	10.00	298.000	7,032.98	789.98	-1,773.24	14,455,327.22	1,739,423.11	39.80336581	-80.64747936
7,568.06	10.00	298.000	7,100.00	795.53	-1,783.67	14,455,332.77	1,739,412.68	39.80338116	-80.64751644
7,588.06	10.60	298.000	7,119.68	797.20	-1,786.83	14,455,334.45	1,739,409.52	39.80338581	-80.64752766
Begin 3°/100' build									
7,600.00	10.96	298.000	7,131.41	798.25	-1,788.80	14,455,335.49	1,739,407.55	39.80338871	-80.64753466
7,700.00	13.96	298.000	7,229.05	808.38	-1,807.85	14,455,345.62	1,739,388.50	39.80341672	-80.64760233
7,800.00	16.96	298.000	7,325.42	820.89	-1,831.38	14,455,358.13	1,739,364.97	39.80345134	-80.64768594
7,900.00	19.96	298.000	7,420.26	835.75	-1,859.33	14,455,372.99	1,739,337.02	39.80349246	-80.64778526
8,000.00	22.96	298.000	7,513.32	852.93	-1,891.63	14,455,390.17	1,739,304.72	39.80353996	-80.64790001
8,100.00	25.96	298.000	7,604.34	872.36	-1,928.18	14,455,409.60	1,739,268.17	39.80359373	-80.64802988
8,200.00	28.96	298.000	7,693.06	894.01	-1,968.89	14,455,431.25	1,739,227.46	39.80365361	-80.64817452
8,234.72	30.00	298.000	7,723.28	902.03	-1,983.98	14,455,439.27	1,739,212.37	39.80367581	-80.64822812
Begin 30.00° tangent									
8,300.00	30.00	298.000	7,779.82	917.35	-2,012.80	14,455,454.59	1,739,183.55	39.80371820	-80.64833052
8,400.00	30.00	298.000	7,866.42	940.83	-2,056.94	14,455,478.07	1,739,139.41	39.80378314	-80.64848738
8,500.00	30.00	298.000	7,953.02	964.30	-2,101.09	14,455,501.54	1,739,095.26	39.80384808	-80.64864424
8,600.00	30.00	298.000	8,039.63	987.77	-2,145.24	14,455,525.01	1,739,051.11	39.80391302	-80.64880110
8,700.00	30.00	298.000	8,126.23	1,011.25	-2,189.39	14,455,548.49	1,739,006.97	39.80397796	-80.64895796
8,800.00	30.00	298.000	8,212.83	1,034.72	-2,233.53	14,455,571.96	1,738,962.82	39.80404290	-80.64911483
8,900.00	30.00	298.000	8,299.43	1,058.19	-2,277.68	14,455,595.43	1,738,918.67	39.80410784	-80.64927169
9,000.00	30.00	298.000	8,386.04	1,081.67	-2,321.83	14,455,618.91	1,738,874.52	39.80417277	-80.64942855
9,100.00	30.00	298.000	8,472.64	1,105.14	-2,365.97	14,455,642.38	1,738,830.38	39.80423771	-80.64958541
9,200.00	30.00	298.000	8,559.24	1,128.61	-2,410.12	14,455,665.85	1,738,786.23	39.80430265	-80.64974227



Planning Report - Geographic

Database: DB_Aug1919_v14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Fitzgerald
 Well: Fitzgerald 19 HU (slot O)
 Wellbore: Original Hole
 Design: rev9

Local Co-ordinate Reference: Well Fitzgerald 19 HU (slot O)
 TVD Reference: GL @ 1292.91ft
 MD Reference: GL @ 1292.91ft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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MAR 17 2020

WV Department of
 Environmental Protection

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,300.00	30.00	298.000	8,645.84	1,152.09	-2,454.27	14,455,689.33	1,738,742.08	39.80436759	-80.64989913
9,400.00	30.00	298.000	8,732.45	1,175.56	-2,498.42	14,455,712.80	1,738,697.93	39.80443253	-80.65005600
9,500.00	30.00	298.000	8,819.05	1,199.03	-2,542.56	14,455,736.27	1,738,653.79	39.80449747	-80.65021286
9,600.00	30.00	298.000	8,905.65	1,222.51	-2,586.71	14,455,759.75	1,738,609.64	39.80456240	-80.65036972
9,700.00	30.00	298.000	8,992.25	1,245.98	-2,630.86	14,455,783.22	1,738,565.49	39.80462734	-80.65052659
9,800.00	30.00	298.000	9,078.86	1,269.46	-2,675.01	14,455,806.70	1,738,521.35	39.80469228	-80.65068345
9,900.00	30.00	298.000	9,165.46	1,292.93	-2,719.15	14,455,830.17	1,738,477.20	39.80475721	-80.65084032
10,000.00	30.00	298.000	9,252.06	1,316.40	-2,763.30	14,455,853.64	1,738,433.05	39.80482215	-80.65099718
10,100.00	30.00	298.000	9,338.66	1,339.88	-2,807.45	14,455,877.12	1,738,388.90	39.80488709	-80.65115405
10,200.00	30.00	298.000	9,425.27	1,363.35	-2,851.60	14,455,900.59	1,738,344.76	39.80495202	-80.65131091
10,300.00	30.00	298.000	9,511.87	1,386.82	-2,895.74	14,455,924.06	1,738,300.61	39.80501696	-80.65146778
10,400.00	30.00	298.000	9,598.47	1,410.30	-2,939.89	14,455,947.54	1,738,256.46	39.80508190	-80.65162464
10,500.00	30.00	298.000	9,685.07	1,433.77	-2,984.04	14,455,971.01	1,738,212.31	39.80514683	-80.65178151
10,600.00	30.00	298.000	9,771.68	1,457.24	-3,028.19	14,455,994.48	1,738,168.17	39.80521177	-80.65193837
10,700.00	30.00	298.000	9,858.28	1,480.72	-3,072.33	14,456,017.96	1,738,124.02	39.80527670	-80.65209524
10,800.00	30.00	298.000	9,944.88	1,504.19	-3,116.48	14,456,041.43	1,738,079.87	39.80534164	-80.65225211
10,900.00	30.00	298.000	10,031.49	1,527.66	-3,160.63	14,456,064.90	1,738,035.73	39.80540657	-80.65240898
11,000.00	30.00	298.000	10,118.09	1,551.14	-3,204.78	14,456,088.38	1,737,991.58	39.80547151	-80.65256584
11,100.00	30.00	298.000	10,204.69	1,574.61	-3,248.92	14,456,111.85	1,737,947.43	39.80553644	-80.65272271
11,200.00	30.00	298.000	10,291.29	1,598.09	-3,293.07	14,456,135.32	1,737,903.28	39.80560138	-80.65287958
11,300.00	30.00	298.000	10,377.90	1,621.56	-3,337.22	14,456,158.80	1,737,859.14	39.80566631	-80.65303645
11,400.00	30.00	298.000	10,464.50	1,645.03	-3,381.36	14,456,182.27	1,737,814.99	39.80573124	-80.65319332
11,500.00	30.00	298.000	10,551.10	1,668.51	-3,425.51	14,456,205.75	1,737,770.84	39.80579618	-80.65335019
11,600.00	30.00	298.000	10,637.70	1,691.98	-3,469.66	14,456,229.22	1,737,726.69	39.80586111	-80.65350705
11,700.00	30.00	298.000	10,724.31	1,715.45	-3,513.81	14,456,252.69	1,737,682.55	39.80592604	-80.65366392
11,800.00	30.00	298.000	10,810.91	1,738.93	-3,557.95	14,456,276.17	1,737,638.40	39.80599098	-80.65382079
11,830.13	30.00	298.000	10,837.00	1,746.00	-3,571.26	14,456,283.24	1,737,625.10	39.80601054	-80.65388606
Begin 8°/100' build/turn									
11,900.00	25.20	291.806	10,898.92	1,759.74	-3,600.51	14,456,296.97	1,737,595.84	39.80604857	-80.65397204
12,000.00	19.02	278.127	10,991.58	1,769.96	-3,636.47	14,456,307.20	1,737,559.89	39.80607704	-80.65409992
12,100.00	14.65	254.665	11,087.38	1,768.92	-3,664.84	14,456,306.16	1,737,531.51	39.80607448	-80.65420097
12,200.00	13.88	221.917	11,184.45	1,756.63	-3,685.08	14,456,293.87	1,737,511.27	39.80604095	-80.65427321
12,300.00	17.22	194.392	11,280.91	1,733.33	-3,696.79	14,456,270.57	1,737,499.56	39.80597709	-80.65431523
12,400.00	22.93	177.857	11,374.87	1,699.48	-3,699.75	14,456,236.72	1,737,496.61	39.80588414	-80.65432621
12,500.00	29.67	168.059	11,464.51	1,655.73	-3,693.89	14,456,192.96	1,737,502.46	39.80576393	-80.65430596
12,600.00	36.88	161.718	11,548.08	1,602.93	-3,679.33	14,456,140.17	1,737,517.02	39.80561878	-80.65425484
12,700.00	44.34	157.231	11,623.96	1,542.11	-3,656.35	14,456,079.35	1,737,540.00	39.80545152	-80.65417387
12,774.77	50.00	154.600	11,674.77	1,492.11	-3,633.94	14,456,029.34	1,737,562.42	39.80531395	-80.65409474
Begin 8°/100' build/turn									
12,800.00	52.00	154.254	11,690.65	1,474.42	-3,625.47	14,456,011.66	1,737,570.88	39.80526530	-80.65406485
12,900.00	59.94	153.043	11,746.57	1,400.24	-3,588.68	14,455,937.48	1,737,607.67	39.80506119	-80.65393487
13,000.00	67.88	152.013	11,790.51	1,320.63	-3,547.26	14,455,857.87	1,737,649.09	39.80484213	-80.65378848
13,100.00	75.84	151.093	11,821.62	1,237.15	-3,502.02	14,455,774.39	1,737,694.34	39.80461240	-80.65362853
13,200.00	83.79	150.236	11,839.29	1,151.43	-3,453.83	14,455,688.67	1,737,742.53	39.80437645	-80.65345813
13,265.42	89.00	149.692	11,843.41	1,094.92	-3,421.16	14,455,632.16	1,737,775.20	39.80422094	-80.65334259
Begin 89.00° lateral									
13,300.00	89.00	149.692	11,844.01	1,065.07	-3,403.71	14,455,602.31	1,737,792.64	39.80413878	-80.65328088
13,400.00	89.00	149.692	11,845.76	978.75	-3,353.25	14,455,515.99	1,737,843.10	39.80390119	-80.65310241
13,500.00	89.00	149.692	11,847.51	892.43	-3,302.79	14,455,429.68	1,737,893.56	39.80366360	-80.65292395
13,600.00	89.00	149.692	11,849.27	806.12	-3,252.34	14,455,343.36	1,737,944.02	39.80342601	-80.65274549
13,700.00	89.00	149.692	11,851.02	719.80	-3,201.88	14,455,257.04	1,737,994.47	39.80318842	-80.65256703
13,800.00	89.00	149.692	11,852.77	633.48	-3,151.42	14,455,170.72	1,738,044.93	39.80295083	-80.65238857
13,900.00	89.00	149.692	11,854.52	547.16	-3,100.97	14,455,084.40	1,738,095.39	39.80271324	-80.65221011
14,000.00	89.00	149.692	11,856.27	460.84	-3,050.51	14,454,998.08	1,738,145.84	39.80247565	-80.65203165



Planning Report - Geographic

4705102326

Database: DB_Aug1919_v14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Fitzgerald
 Well: Fitzgerald 19 HU (slot O)
 Wellbore: Original Hole
 Design: rev9

Local Co-ordinate Reference: Well Fitzgerald 19 HU (slot O)
 TVD Reference: GL @ 1292.91ft
 MD Reference: GL @ 1292.91ft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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 MAR 17 2020
 WV Department of
 Environmental Protection

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
14,100.00	89.00	149.692	11,858.02	374.52	-3,000.05	14,454,911.76	1,738,196.30	39.80223806	-80.65185320	
14,200.00	89.00	149.692	11,859.77	288.20	-2,949.59	14,454,825.44	1,738,246.76	39.80200046	-80.65167474	
14,300.00	89.00	149.692	11,861.52	201.88	-2,899.14	14,454,739.12	1,738,297.22	39.80176287	-80.65149629	
14,400.00	89.00	149.692	11,863.27	115.56	-2,848.68	14,454,652.80	1,738,347.67	39.80152528	-80.65131784	
14,500.00	89.00	149.692	11,865.02	29.24	-2,798.22	14,454,566.48	1,738,398.13	39.80128769	-80.65113938	
14,600.00	89.00	149.692	11,866.78	-57.08	-2,747.77	14,454,480.17	1,738,448.59	39.80105009	-80.65096094	
14,700.00	89.00	149.692	11,868.53	-143.40	-2,697.31	14,454,393.85	1,738,499.04	39.80081250	-80.65078249	
14,800.00	89.00	149.692	11,870.28	-229.72	-2,646.85	14,454,307.53	1,738,549.50	39.80057491	-80.65060404	
14,900.00	89.00	149.692	11,872.03	-316.03	-2,596.39	14,454,221.21	1,738,599.96	39.80033731	-80.65042559	
15,000.00	89.00	149.692	11,873.78	-402.35	-2,545.94	14,454,134.89	1,738,650.41	39.80009972	-80.65024715	
15,100.00	89.00	149.692	11,875.53	-488.67	-2,495.48	14,454,048.57	1,738,700.87	39.79986213	-80.65006871	
15,200.00	89.00	149.692	11,877.28	-574.99	-2,445.02	14,453,962.25	1,738,751.33	39.79962453	-80.64989026	
15,300.00	89.00	149.692	11,879.03	-661.31	-2,394.57	14,453,875.93	1,738,801.79	39.79938694	-80.64971182	
15,400.00	89.00	149.692	11,880.78	-747.63	-2,344.11	14,453,789.61	1,738,852.24	39.79914934	-80.64953338	
15,500.00	89.00	149.692	11,882.53	-833.95	-2,293.65	14,453,703.29	1,738,902.70	39.79891175	-80.64935494	
15,600.00	89.00	149.692	11,884.28	-920.27	-2,243.19	14,453,616.98	1,738,953.16	39.79867415	-80.64917651	
15,700.00	89.00	149.692	11,886.04	-1,006.59	-2,192.74	14,453,530.66	1,739,003.61	39.79843656	-80.64899807	
15,800.00	89.00	149.692	11,887.79	-1,092.91	-2,142.28	14,453,444.34	1,739,054.07	39.79819896	-80.64881964	
15,900.00	89.00	149.692	11,889.54	-1,179.23	-2,091.82	14,453,358.02	1,739,104.53	39.79796136	-80.64864120	
16,000.00	89.00	149.692	11,891.29	-1,265.55	-2,041.36	14,453,271.70	1,739,154.99	39.79772377	-80.64846277	
16,100.00	89.00	149.692	11,893.04	-1,351.87	-1,990.91	14,453,185.38	1,739,205.44	39.79748617	-80.64828434	
16,200.00	89.00	149.692	11,894.79	-1,438.18	-1,940.45	14,453,099.06	1,739,255.90	39.79724857	-80.64810591	
16,300.00	89.00	149.692	11,896.54	-1,524.50	-1,889.99	14,453,012.74	1,739,306.36	39.79701098	-80.64792748	
16,400.00	89.00	149.692	11,898.29	-1,610.82	-1,839.54	14,452,926.42	1,739,356.81	39.79677338	-80.64774905	
16,500.00	89.00	149.692	11,900.04	-1,697.14	-1,789.08	14,452,840.10	1,739,407.27	39.79653578	-80.64757063	
16,600.00	89.00	149.692	11,901.79	-1,783.46	-1,738.62	14,452,753.78	1,739,457.73	39.79629818	-80.64739220	
16,700.00	89.00	149.692	11,903.54	-1,869.78	-1,688.16	14,452,667.47	1,739,508.19	39.79606058	-80.64721378	
16,800.00	89.00	149.692	11,905.30	-1,956.10	-1,637.71	14,452,581.15	1,739,558.64	39.79582298	-80.64703535	
16,900.00	89.00	149.692	11,907.05	-2,042.42	-1,587.25	14,452,494.83	1,739,609.10	39.79558538	-80.64685693	
17,000.00	89.00	149.692	11,908.80	-2,128.74	-1,536.79	14,452,408.51	1,739,659.56	39.79534778	-80.64667851	
17,100.00	89.00	149.692	11,910.55	-2,215.06	-1,486.34	14,452,322.19	1,739,710.01	39.79511019	-80.64650009	
17,200.00	89.00	149.692	11,912.30	-2,301.38	-1,435.88	14,452,235.87	1,739,760.47	39.79487259	-80.64632168	
17,300.00	89.00	149.692	11,914.05	-2,387.70	-1,385.42	14,452,149.55	1,739,810.93	39.79463498	-80.64614326	
17,400.00	89.00	149.692	11,915.80	-2,474.01	-1,334.96	14,452,063.23	1,739,861.38	39.79439738	-80.64596484	
17,500.00	89.00	149.692	11,917.55	-2,560.33	-1,284.51	14,451,976.91	1,739,911.84	39.79415978	-80.64578643	
17,600.00	89.00	149.692	11,919.30	-2,646.65	-1,234.05	14,451,890.59	1,739,962.30	39.79392218	-80.64560802	
17,700.00	89.00	149.692	11,921.05	-2,732.97	-1,183.59	14,451,804.28	1,740,012.76	39.79368458	-80.64542961	
17,800.00	89.00	149.692	11,922.81	-2,819.29	-1,133.14	14,451,717.96	1,740,063.21	39.79344698	-80.64525120	
17,900.00	89.00	149.692	11,924.56	-2,905.61	-1,082.68	14,451,631.64	1,740,113.67	39.79320938	-80.64507279	
18,000.00	89.00	149.692	11,926.31	-2,991.93	-1,032.22	14,451,545.32	1,740,164.13	39.79297177	-80.64489438	
18,100.00	89.00	149.692	11,928.06	-3,078.25	-981.76	14,451,459.00	1,740,214.58	39.79273417	-80.64471597	
18,200.00	89.00	149.692	11,929.81	-3,164.57	-931.31	14,451,372.68	1,740,265.04	39.79249657	-80.64453757	
18,300.00	89.00	149.692	11,931.56	-3,250.89	-880.85	14,451,286.36	1,740,315.50	39.79225897	-80.64435916	
18,400.00	89.00	149.692	11,933.31	-3,337.21	-830.39	14,451,200.04	1,740,365.96	39.79202136	-80.64418076	
18,500.00	89.00	149.692	11,935.06	-3,423.53	-779.94	14,451,113.72	1,740,416.41	39.79178376	-80.64400236	
18,600.00	89.00	149.692	11,936.81	-3,509.85	-729.48	14,451,027.40	1,740,466.87	39.79154616	-80.64382396	
18,700.00	89.00	149.692	11,938.56	-3,596.16	-679.02	14,450,941.08	1,740,517.33	39.79130855	-80.64364556	
18,800.00	89.00	149.692	11,940.31	-3,682.48	-628.56	14,450,854.77	1,740,567.78	39.79107095	-80.64346716	
18,900.00	89.00	149.692	11,942.07	-3,768.80	-578.11	14,450,768.45	1,740,618.24	39.79083334	-80.64328876	
19,000.00	89.00	149.692	11,943.82	-3,855.12	-527.65	14,450,682.13	1,740,668.70	39.79059574	-80.64311037	
19,100.00	89.00	149.692	11,945.57	-3,941.44	-477.19	14,450,595.81	1,740,719.15	39.79035813	-80.64293197	
19,200.00	89.00	149.692	11,947.32	-4,027.76	-426.74	14,450,509.49	1,740,769.61	39.79012053	-80.64275358	
19,300.00	89.00	149.692	11,949.07	-4,114.08	-376.28	14,450,423.17	1,740,820.07	39.78988292	-80.64257519	
19,400.00	89.00	149.692	11,950.82	-4,200.40	-325.82	14,450,336.85	1,740,870.53	39.78964531	-80.64239680	
19,500.00	89.00	149.692	11,952.57	-4,286.72	-275.36	14,450,250.53	1,740,920.98	39.78940771	-80.64221841	



Planning Report - Geographic

Database: DB_Aug1919_v14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Fitzgerald
 Well: Fitzgerald 19 HU (slot O)
 Wellbore: Original Hole
 Design: rev9

Local Co-ordinate Reference: Well Fitzgerald 19 HU (slot O)
 TVD Reference: GL @ 1292.91ft
 MD Reference: GL @ 1292.91ft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

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 MAR 17 2020

WV Department of
 Environmental Protection

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
19,600.00	89.00	149.692	11,954.32	-4,373.04	-224.91	14,450,164.21	1,740,971.44	39.78917010	-80.64204002
19,700.00	89.00	149.692	11,956.07	-4,459.36	-174.45	14,450,077.89	1,741,021.90	39.78893249	-80.64186163
19,800.00	89.00	149.692	11,957.82	-4,545.68	-123.99	14,449,991.58	1,741,072.35	39.78869489	-80.64168324
19,900.00	89.00	149.692	11,959.58	-4,632.00	-73.54	14,449,905.26	1,741,122.81	39.78845728	-80.64150486
20,000.00	89.00	149.692	11,961.33	-4,718.31	-23.08	14,449,818.94	1,741,173.27	39.78821967	-80.64132648
20,100.00	89.00	149.692	11,963.08	-4,804.63	27.38	14,449,732.62	1,741,223.73	39.78798206	-80.64114809
20,200.00	89.00	149.692	11,964.83	-4,890.95	77.84	14,449,646.30	1,741,274.18	39.78774446	-80.64096971
20,300.00	89.00	149.692	11,966.58	-4,977.27	128.29	14,449,559.98	1,741,324.64	39.78750685	-80.64079133
20,400.00	89.00	149.692	11,968.33	-5,063.59	178.75	14,449,473.66	1,741,375.10	39.78726924	-80.64061295
20,500.00	89.00	149.692	11,970.08	-5,149.91	229.21	14,449,387.34	1,741,425.55	39.78703163	-80.64043458
20,600.00	89.00	149.692	11,971.83	-5,236.23	279.67	14,449,301.02	1,741,476.01	39.78679402	-80.64025620
20,700.00	89.00	149.692	11,973.58	-5,322.55	330.12	14,449,214.70	1,741,526.47	39.78655641	-80.64007783
20,800.00	89.00	149.692	11,975.33	-5,408.87	380.58	14,449,128.38	1,741,576.93	39.78631880	-80.63989945
20,900.00	89.00	149.692	11,977.08	-5,495.19	431.04	14,449,042.07	1,741,627.38	39.78608119	-80.63972108
21,000.00	89.00	149.692	11,978.84	-5,581.51	481.49	14,448,955.75	1,741,677.84	39.78584358	-80.63954271
21,100.00	89.00	149.692	11,980.59	-5,667.83	531.95	14,448,869.43	1,741,728.30	39.78560597	-80.63936434
21,200.00	89.00	149.692	11,982.34	-5,754.15	582.41	14,448,783.11	1,741,778.75	39.78536836	-80.63918597
21,300.00	89.00	149.692	11,984.09	-5,840.46	632.87	14,448,696.79	1,741,829.21	39.78513074	-80.63900760
21,400.00	89.00	149.692	11,985.84	-5,926.78	683.32	14,448,610.47	1,741,879.67	39.78489313	-80.63882924
21,500.00	89.00	149.692	11,987.59	-6,013.10	733.78	14,448,524.15	1,741,930.12	39.78465552	-80.63865087
21,600.00	89.00	149.692	11,989.34	-6,099.42	784.24	14,448,437.83	1,741,980.58	39.78441791	-80.63847251
21,700.00	89.00	149.692	11,991.09	-6,185.74	834.69	14,448,351.51	1,742,031.04	39.78418030	-80.63829414
21,800.00	89.00	149.692	11,992.84	-6,272.06	885.15	14,448,265.19	1,742,081.50	39.78394268	-80.63811578
21,900.00	89.00	149.692	11,994.59	-6,358.38	935.61	14,448,178.88	1,742,131.95	39.78370507	-80.63793742
22,000.00	89.00	149.692	11,996.34	-6,444.70	986.07	14,448,092.56	1,742,182.41	39.78346746	-80.63775906
22,100.00	89.00	149.692	11,998.10	-6,531.02	1,036.52	14,448,006.24	1,742,232.87	39.78322984	-80.63758071
22,200.00	89.00	149.692	11,999.85	-6,617.34	1,086.98	14,447,919.92	1,742,283.32	39.78299223	-80.63740235
22,300.00	89.00	149.692	12,001.60	-6,703.66	1,137.44	14,447,833.60	1,742,333.78	39.78275462	-80.63722399
22,322.98	89.00	149.692	12,002.00	-6,723.49	1,149.03	14,447,813.76	1,742,345.38	39.78270001	-80.63718301

PBHL/TD 22322.98 MD/12002.00 TVD

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Fitzgerald-19HU LP - hit/miss target - Shape - Point	0.00	0.000	11,840.91	1,213.69	-3,490.90	14,455,750.93	1,737,705.46	39.80454785	-80.65358926
- plan misses target center by 13.08ft at 13128.93ft MD (11828.14 TVD, 1212.51 N, -3488.34 E)									
Fitzgerald-19HU BHL r3 - plan hits target center - Point	0.00	0.005	12,002.00	-6,723.50	1,149.03	14,447,813.76	1,742,345.38	39.78270000	-80.63718300

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
1,000.00	1,000.00	20" Casing	20	26
2,900.00	2,896.26	13 3/8" Casing	13-3/8	17-1/2
10,640.00	9,806.32	9 5/8" Casing	9-5/8	12-1/4



Planning Report - Geographic

Database:	DB_Aug1919_v14	Local Co-ordinate Reference:	Well Fitzgerald 19 HU (slot O)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 1292.91ft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 1292.91ft
Site:	Fitzgerald	North Reference:	Grid
Well:	Fitzgerald 19 HU (slot O)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev9		

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
7,382.23	6,917.00	Top Marcellus		0.000		
7,435.03	6,969.00	Top Onondaga		0.000		
7,672.18	7,202.00	Base Onondaga		0.000		
8,196.79	7,692.00	Top Salina		0.000		
9,363.69	8,701.00	Base Salina		0.000		
10,391.37	9,591.00	Top Clinton		0.000		
10,518.39	9,701.00	Base Clinton		0.000		

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
1,100.00	1,100.00	0.00	0.00	KOP Begin 1°/100' build	
1,500.00	1,499.68	-6.98	-12.09	Begin 4.00° tangent	
3,104.23	3,100.00	-62.93	-109.00	Begin 3°/100' build/turn	
4,039.80	3,989.62	32.47	-348.58	Begin 30.00° tangent	
6,938.54	6,500.00	712.91	-1,628.30	Begin 5°/100' drop	
7,338.54	6,873.97	776.81	-1,748.48	Begin 10.00° tangent	
7,588.06	7,119.68	797.20	-1,786.83	Begin 3°/100' build	
8,234.72	7,723.28	902.03	-1,983.98	Begin 30.00° tangent	
11,830.13	10,837.00	1,746.00	-3,571.26	Begin 8°/100' build/turn	
12,774.77	11,674.77	1,492.11	-3,633.94	Begin 8°/100' build/turn	
13,265.42	11,843.41	1,094.92	-3,421.16	Begin 89.00° lateral	
22,322.98	12,002.00	-6,723.49	1,149.03	PBHL/TD 22322.98 MD/12002.00 TVD	

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Environmental Protection

WW-9
(4/16)

API Number 47 - 051 - _____
Operator's Well No. Fitzgerald S-19HU

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) Upper Fish Creek Quadrangle Glen Easton 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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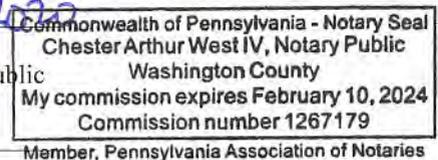
MAR 17 2020

WV Department of
Environmental Protection

Subscribed and sworn before me this 25th day of February, 20 2020

[Signature] Notary Public

My commission expires 2-10-2024



Tug Hill Operating, LLC

Proposed Revegetation Treatment: Acres Disturbed 7.44 Prevegetation pH 6.0

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch 2.5 Tons/acre

Seed Mixtures

Temporary

Permanent

Seed Type	lbs/acre
Annual Ryegrass	40
Spring Oats	96

Seed Type	lbs/acre
Orchard Grass	12
Ladino	3
White Clover	2

Attach:

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

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: _____

Jane Ueholzer

Comments: _____

Title: Oil and Gas Inspector

Date: 3/11/2020

Field Reviewed?

Yes

No

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Environmental Protection

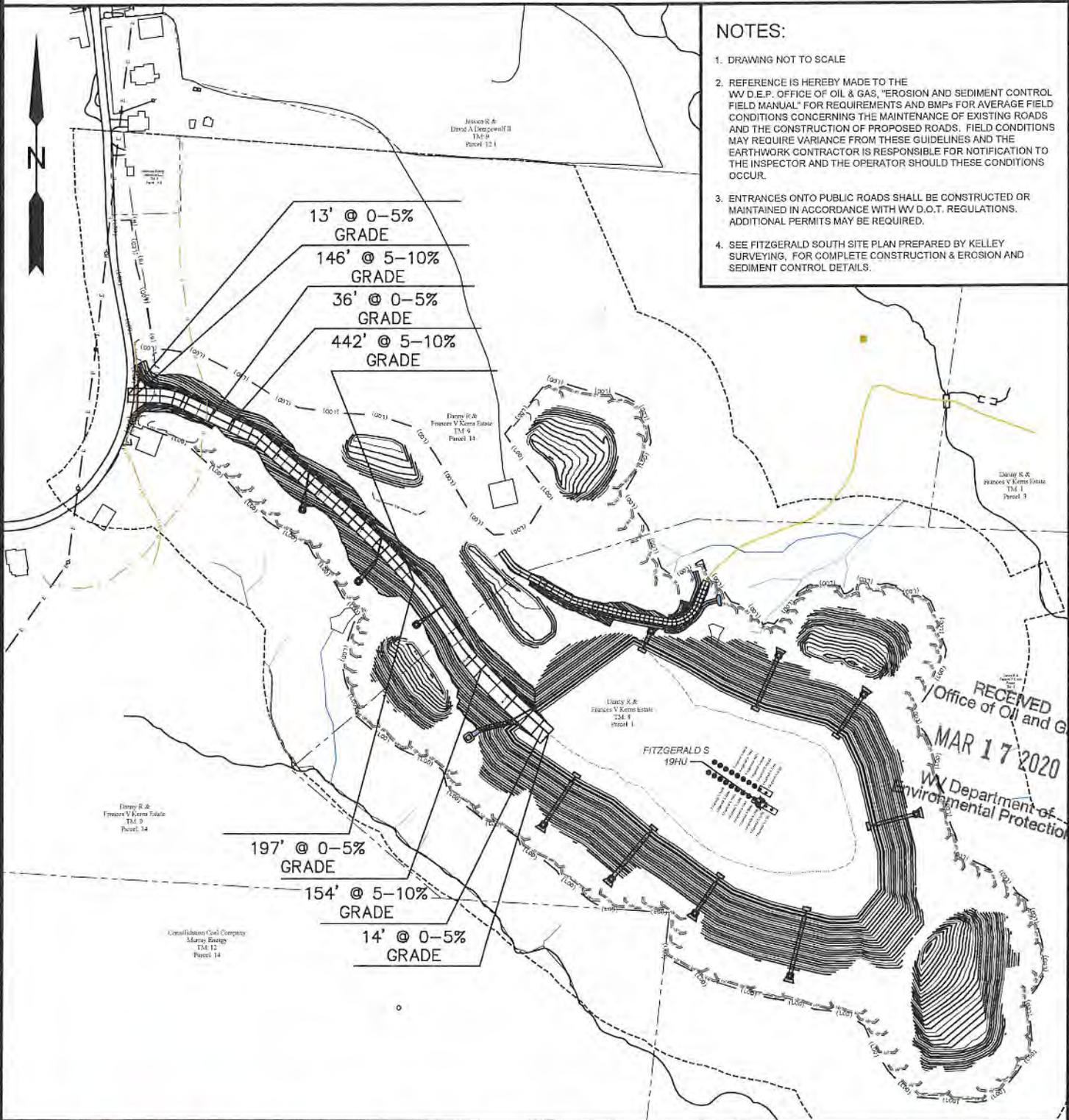
WW-9

PROPOSED FITZGERALD S - 19HU

SUPPLEMENT PG. 1

NOTES:

1. DRAWING NOT TO SCALE
2. 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.
3. ENTRANCES ONTO PUBLIC ROADS SHALL BE CONSTRUCTED OR MAINTAINED IN ACCORDANCE WITH WV D.O.T. REGULATIONS. ADDITIONAL PERMITS MAY BE REQUIRED.
4. SEE FITZGERALD SOUTH SITE PLAN PREPARED BY KELLEY SURVEYING, FOR COMPLETE CONSTRUCTION & EROSION AND SEDIMENT CONTROL DETAILS.



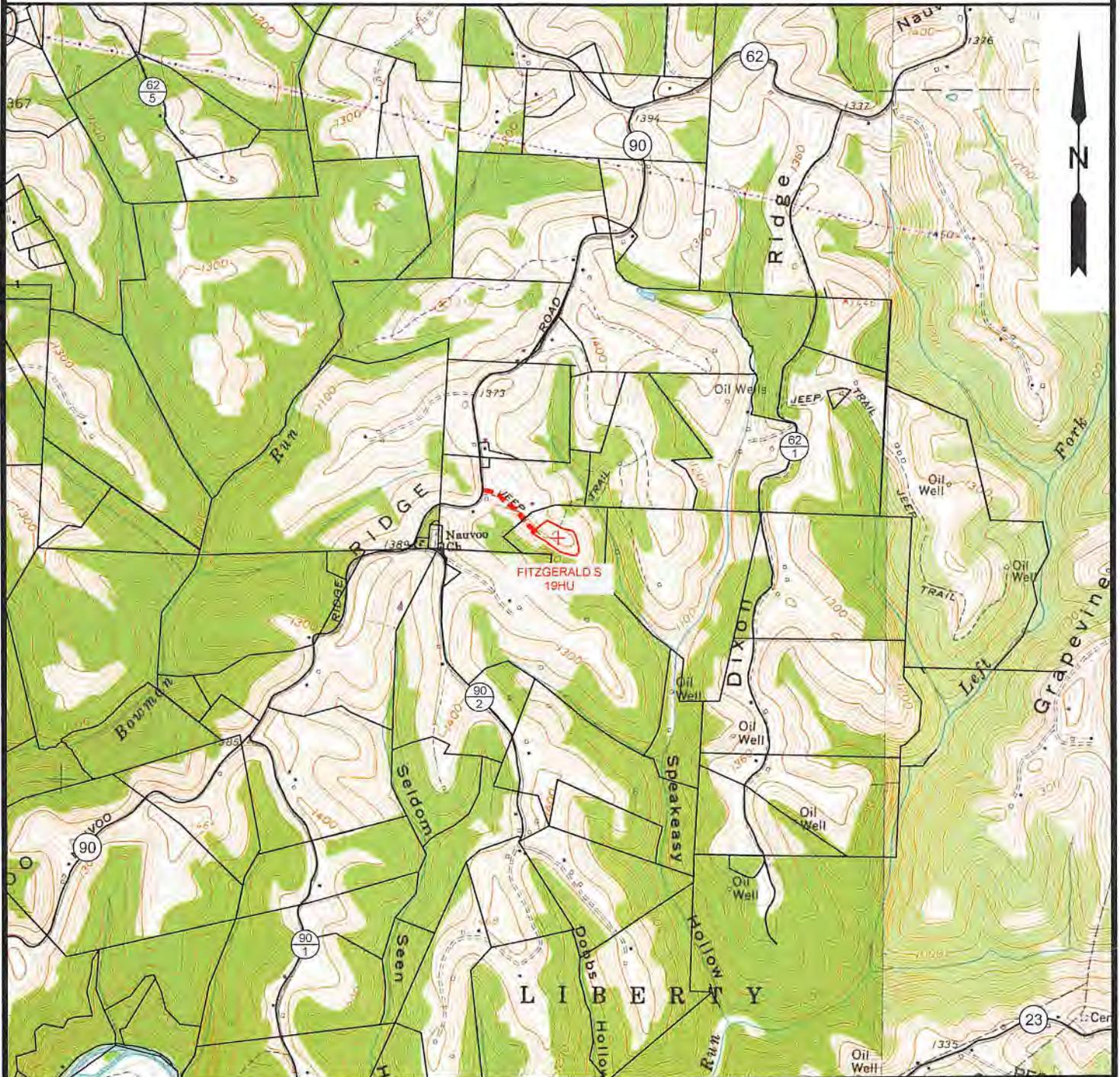
12 Vanhorn Drive | P.O. Box 150 | Glenville, WV 26351 | 304.482.5554
 1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.346.3952
 254 East Beckley Bypass | Beckley, WV 25801 | 304.255.5296
 slswv.com

TOPO SECTION:		OPERATOR:	
GLEN EASTON 7.5'		PREPARED FOR:	
COUNTY	DISTRICT	TUG HILL OPERATING, LLC	
MARSHALL	LIBERTY	380 SOUTHPOINTE BLVD	
		SUITE 200	
		CANONSBURG, PA 15317	
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8910	03/03/20	NONE



**TUG HILL
OPERATING**

PROPOSED FITZGERALD S - 19HU



NOTE: CLOSEST WATER PURVEYOR
CITY OF CAMERON - FRANK WALKER RESERVOIR
CAMDEN, WV

LAT: 39.829865
LON: -80.573724
LOCATED: N 62°00'46" E AT 21,684.26' FROM THE CENTER OF FITZGERALD S WELL PLAT LOCATION.

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12 Vanhorn Drive | P.O. Box 150 | Glenville, WV 26351 | 304.462.5634
1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.346.3952
254 East Beckley Bypass | Beckley, WV 25801 | 304.255.9296
slsw.com

TOPO SECTION:		OPERATOR:	
GLEN EASTON 7.5' & CAMERON 7.5'		PREPARED FOR:	
COUNTY	DISTRICT	TUG HILL OPERATING, LLC	
MARSHALL	LIBERTY & MEADE	380 SOUTHPOINTE BLVD	
DRAWN BY		DATE	SCALE
K.G.M.		03/03/2020	1" = 2000'



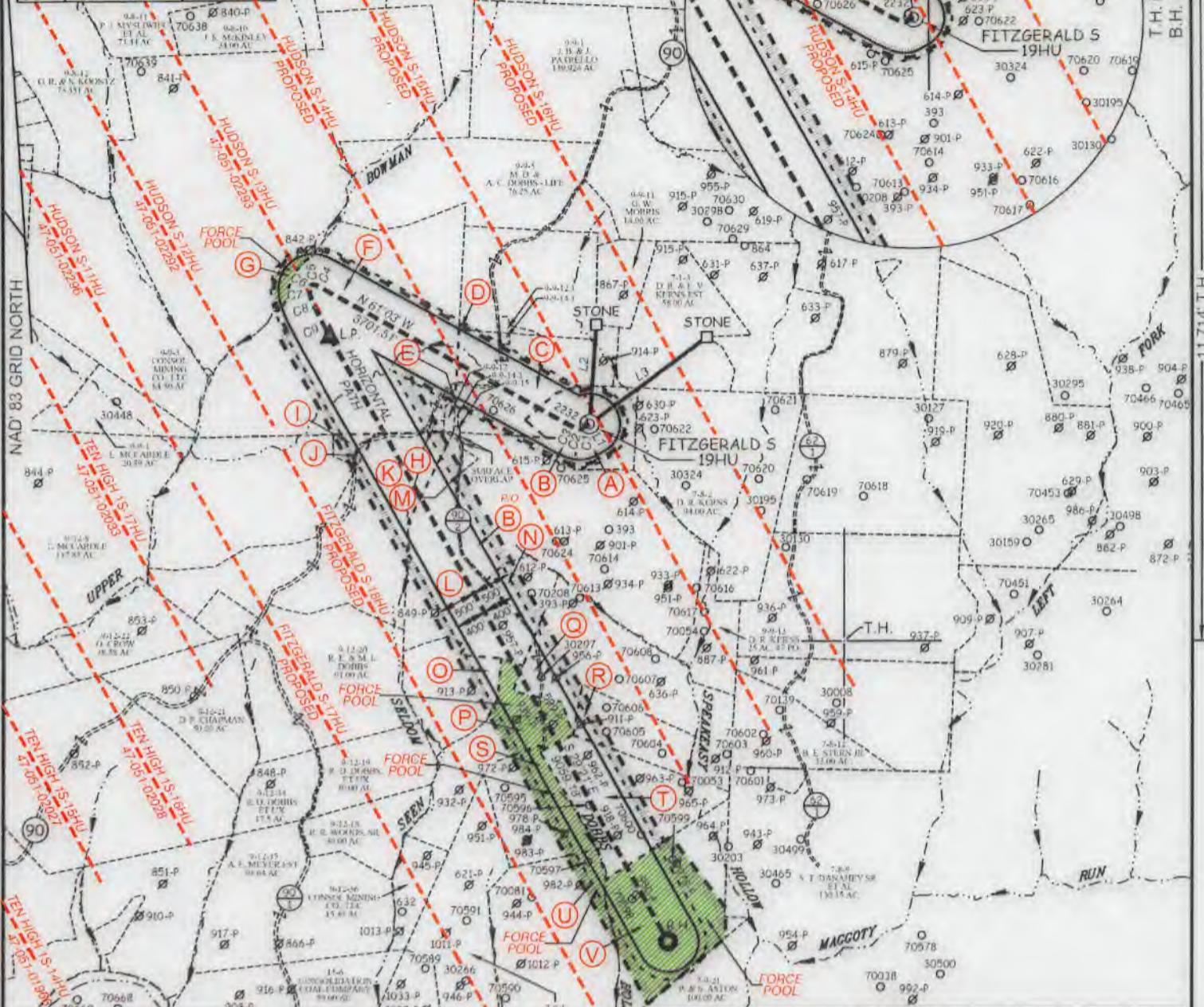
TUG HILL OPERATING

**FITZGERALD S LEASE
UTICA UNIT - 377.27 AC ±
WELL 19HU
TUG HILL OPERATING**

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

T.H. LONGITUDE 80°37'30"
B.H. LONGITUDE 80°37'30"

LINE TABLE		
LINE	BEARING	DISTANCE
L1	S 60°57' W	125.90'
L2	N 04°03' E	1299.78'
L3	N 53°29' E	1915.09'

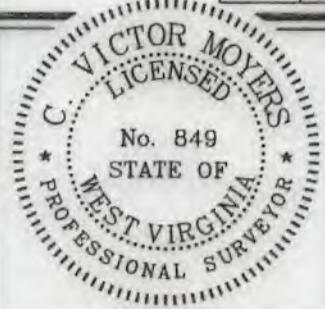


CURVE TABLE				
CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	20.32'	41.27'	S 87°39' W	20.12'
C2	38.87'	250.60'	N 73°20' W	38.83'
C3	136.17'	1287.06'	N 64°47' W	136.11'
C4	84.83'	258.98'	N 67°28' W	84.46'
C5	40.60'	66.37'	S 82°38' W	39.97'
C6	53.81'	60.38'	S 27°39' W	52.05'
C7	88.47'	278.59'	S 06°40' E	88.10'
C8	208.62'	1139.99'	S 21°38' E	208.33'
C9	390.81'	5958.89'	S 27°34' E	390.74'

Survey & Land Services, Inc.
100 West Virginia Avenue, Suite 200, Charleston, WV 25301
Tel: 304.762.1111 Fax: 304.762.1112
www.sls.com

P.S. 849 *C. Victor Moyers*

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)			
NAD'83 S.P.C. (FT)	N. 475,965.85	E. 1,647,885.21	
NAD'83 GEO.	LAT. (N) 39.801177	LONG. (W) 80.641177	
NAD'83 UTM (M)	N. 4,405,751.76	E. 530,717.71	
LANDING POINT			
NAD'83 S.P.C. (FT)	N. 477,118.2	E. 1,644,481.7	
NAD'83 GEO.	LAT. (N) 39.804221	LONG. (W) 80.653343	
NAD'83 UTM (M)	N. 4,406,085.5	E. 529,674.9	
BOTTOM HOLE			
NAD'83 S.P.C. (FT)	N. 469,221.9	E. 1,646,922.1	
NAD'83 GEO.	LAT. (N) 39.782700	LONG. (W) 80.637183	
NAD'83 UTM (M)	N. 4,403,702.4	E. 531,067.8	



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

LEGEND	
UNIT BOUNDARY	
LEASED TRACTS INSIDE	
UNIT BOUNDARY	
SURFACE LINE	
PROPOSED UTICA	
WELL LATERAL	
400' OFFSET LINE	
500' OFFSET LINE	
TIE LINE	
CREEK	
ROAD	
FORCE POOL TRACT	
COUNTY ROUTE	
PROPOSED WELL	
EXISTING WELL	
PERMITTED WELL	
SURFACE OWNER (SEE TABLE)	
LEASE # (SEE ADDITIONAL SHEETS)	

SCALE 1" = 2000' FILE NO. 8910P19HU.dwg
DATE APRIL 13 20 20
REVISED 20
OPERATORS WELL NO. FITZGERALD S-19HU
API WELL 47 - 051 - 02324 Deep
NO. STATE COUNTY PERMIT

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

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

**FITZGERALD S LEASE
UTICA UNIT - 377.27 AC±
WELL 19HU
TUG HILL OPERATING**

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

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

NAD'83 S.P.C.(FT)	N. 475,965.85	E. 1,647,885.21
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BOTTOM HOLE		
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NAD'83 GEO.	LAT-(N) 39.782700	LONG-(W) 80.637183
NAD'83 UTM (M)	N. 4,403,702.4	E. 531,067.9

TAG	SURFACE OWNER	PARCEL	ACRES
A	DANNY R. & FRANCES V. KERNS ESTATE	7-8-1	27.00
B	CONSOL MINING CO., LLC	9-12-14	127.61
C	DANNY R. & FRANCES V. KERNS ESTATE	9-9-14	48.308
D	GARY W. MORRIS	9-9-12	54.74
E	NAUVOO CEMETERY ASSOC. INC.	9-9-16.1	0.125
F	TODD L. SCHERICH, ET AL	9-9-16	168.204
G	MARY LOU RUBINI, DAVID & ERIC KATZMEYER	9-9-4	268.39
H	GARY W. MORRIS	9-9-22	0.15
I	ROBERT W. KNIGHT	9-12-10	3.00
J	CHARLES WILLIAM DOBBS, ET AL	9-12-9	82.26
K	WARREN BERYLE & ELEANOR LOU CHAMBERS - LIFE	9-12-11	91.00
L	WHIPKEY TRUST	9-12-12	61.00
M	VIRGINIA MCILVAIN ESTATE & THE WHIPKEY TRUST	9-9-18	LOT
N	WHIPKEY TRUST	9-12-15	12.00
O	VIRGINIA MCILVAIN ESTATE & THE WHIPKEY TRUST	9-12-16	30.00
P	VIRGINIA MCILVAIN ESTATE & THE WHIPKEY TRUST	9-12-17	37.27
Q	JOHN ALFRED & LEORA JEAN DOBBS - LIFE	7-8-4	65.65
R	JOHN ALFRED & LEORA JEAN DOBBS - LIFE	7-8-5	24.00
S	CONSOL MINING CO., LLC	7-8-7	31.99
T	JOHN ALFRED & LEORA JEAN DOBBS - LIFE	7-8-8	51.97
U	CONSOL MINING CO., LLC	7-9-22	101.36
V	JOHN ALFRED & LEORA JEAN DOBBS - LIFE	7-9-23	60.25

MAP/PARCEL	ADJOINING SURFACE OWNER LIST	ACRES
9-9-12.1	JESSICA R. & DAVID A. II DEMPEWOLF	1.26
9-9-14.1	AMERICAN ENERGY-MARCELLUS, LLC	0.40
9-9-14.2	NAUVOO CEMETERY ASSOCIATION, INC.	0.292
9-9-15	TRUSTEES OF THE REORGANIZED CHURCH OF LATTER DAY SAINTS	LOT
9-9-17	NAUVOO CEMETERY ASSOCIATION, INC.	1.00

NOTES ON SURVEY

- NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
- WELL SPOT CIRCLE & TOPO MARK SCALE ARE 1"=2000'
- PROPOSED LATERAL OR TOP HOLE OF FITZGERALD S-19HU IS WITHIN 3000' OF THE TOP HOLES OR LATERALS OF PROPOSED FITZGERALD S-17HU, PROPOSED FITZGERALD S-18HU, HUDSON S-11HU (47-051-02296), HUDSON S-12HU (47-051-02292), HUDSON S-13HU (47-051-02293), PROPOSED HUDSON S-14HU, PROPOSED HUDSON S-15HU, PROPOSED HUDSON S-16HU.

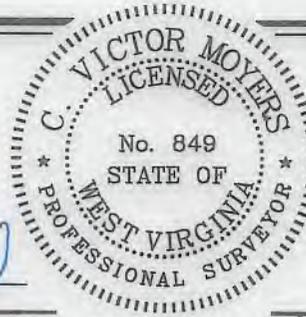
REFERENCES



12 Vanhorn Drive | P.O. Box 150 | Glenville, WV 26351 | 304.462.5634
1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.346.3952
254 East Beckley Bypass | Beckley, WV 25801 | 304.255.5295
sllsvv.com

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

P.S. 849 *C. Victor Moyers*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
DATE MARCH 13, 2020
REVISED _____, 20____
OPERATORS WELL NO. FITZGERALD S-19HU
API WELL NO. 47-051-02326 DEEP
STATE COUNTY PERMIT HGA

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8910P19HU.dwg
FITZGERALD S-19HU REV9
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 X LIQUID INJECTION ___ WASTE DISPOSAL ___ IF "GAS" PRODUCTION X STORAGE ___ DEEP X SHALLOW ___
LOCATION: GROUND = 1,320.00' ELEVATION PROPOSED = 1,344.81' WATERSHED SPEAKEASY HOLLOW OF MAGGOTY RUN
DISTRICT LIBERTY COUNTY MARSHALL QUADRANGLE GLEN EASTON 7.5'
SURFACE OWNER DANNY AND FRANCES KERNS ESTATE ACREAGE 27.00±
ROYALTY OWNER DANNY S. KERNS, ET AL ACREAGE 27.00±
PROPOSED WORK: LEASE NO. SEE WW-6A1
DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ PLUG AND ABANDON ___ CLEAN OUT AND REPLUG ___ OTHER ___
PHYSICAL CHANGE IN WELL (SPECIFY) TARGET FORMATION POINT PLEASANT ESTIMATED DEPTH TVD: 12,076' / TMD: 22,323'

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

T.H. LONGITUDE 80°37'30"
B.H. LONGITUDE 80°37'30"
3,267' B.H.
11,714' T.H.

**FITZGERALD S LEASE
UTICA UNIT - 377.27AC±
WELL 19HU
TUG HILL OPERATING**



12 Vanhorn Drive | P.O. Box 150 | Glenville, WV 26351 | 304.462.5634
1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.346.3952
254 East Beckley Bypass | Beckley, WV 25801 | 304.255.5296
slswv.com

NO.	Lease ID	Tags	Parcel	Grantor, Lessor, Etc.	Deed Book/Page	
1	10*25518	A	7-8-1	DANNY S KERNS, MARRIED MAN DEALING WITH HIS SOLE AND SEPARATE PROPERTY	1010	532
2	10*18339	B	9-12-14	RESOURCE MINERALS HEADWATER I LP	940	448
3	PENDING	C	9-9-14	REGINA DANETTE FIGUEROA	1075	137
4	10*21859	D	9-9-12	GARY WAYNE MORRIS	960	192
5	10*19987	E	9-9-16.1	LESLEY D BALLA	955	103
6	10*19987	F	9-9-16	LESLEY D BALLA	955	103
7	**	G	9-9-4	MARY LOU RUBINI AKA MARY LOU MILLER	793	287
8	10*24535	H	9-9-22	BOARD OF EDUCATION OF MARSHALL COUNTY	1026	64
9	10*23656	I	9-12-10	ROBERT W KNIGHT AND BARBARA J KNIGHT	1011	504
10	10*15999	J	9-12-9	CHARLES W DOBBS AND JUDITH M DOBBS	702	171
11	10*15494	K	9-12-11	CHRISTOPHER SINGER AND SHEREA SINGER	898	433
12	10*19557	L	9-12-12	TERRY L BLAKE	944	649
13	10*22524	M	9-9-18	ALYCE LYNN MCGUFFIE	1027	233
14	10*21512	N	9-12-15	THE WHIPKEY TRUST ACTING TRUSTEES DAVID L AND CAROL J WHIPKEY	949	266
15	10*21512	O	9-12-16	THE WHIPKEY TRUST	949	266
16	10*21532	P	9-12-17	CHARLES E RICHARDSON AND SHIRLEY S RICHARDSON	957	327
17	10*18988	Q	7-8-4	MICHAEL R DOBBS AND LEANNE DOBBS	957	307
18	10*21112	R	7-8-5	CLARENCE C STOVER JR AND LOU E STOVER	952	382
19	10*21532	S	7-8-7	CHARLES E RICHARDSON AND SHIRLEY S RICHARDSON	1017	620
20	10*21112	T	7-8-8	CLARENCE C STOVER JR AND LOU E STOVER	952	382
21	10*17930	U	7-9-22	BOUNTY MINERALS LLC	928	396
22	**	V	7-9-23	O E BURGE AND SARAH L BURGE ET AL	395	586

FILE NO. 8910P19HU.dwg
FITZGERALD S-19HU REV9

DATE MARCH 13, 2020

REVISED _____, 20____

OPERATORS WELL NO. FITZGERALD S-19HU

API WELL NO. 47 — 051 — 02326 ^{HGA} Deep
STATE COUNTY PERMIT



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



P.S. 849 C. Victor Moyers

WELL OPERATOR TUG HILL OPERATING, LLC
ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500
FORT WORTH, TX 76107

DESIGNATED AGENT DIANNA STAMPER
ADDRESS 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

COUNTY NAME

PERMIT

WW-6A1
(5/13)

Operator's Well No. Fitzgerald S-19HU

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

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

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

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

*See attached pages

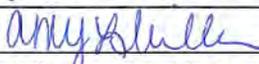
***Co-tenancy utilization – At least 7 mineral owners in tract. At least 75% of the royalty owners have executed a lease on the tract. The interests of the remaining co-tenants were acquired pursuant to the Co-tenancy Modernization and Majority Protection Act.**

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

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

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

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

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

WW-6A1 Supplement

Well No.	Owner	Operator	Lease No.	Section	Township	Range	Meridian	Acres	Production	Reserves	Other	Notes
107-28272	HERBERT S & CATHERINE CONNER *	THE EXPLORATION, LLC	1/8-	1071	568	NA	NA	NA	NA	NA	NA	NA
107-28276	HEITZ ROBERT TRUST *	THE EXPLORATION, LLC	1/8-	1021	512	NA	NA	NA	NA	NA	NA	NA
107-28281	MARGIE A SPINER *	THE EXPLORATION, LLC	1/8-	1071	556	NA	NA	NA	NA	NA	NA	NA
107-28284	VIRGINIA SHEROZA IVANG TRUST *	THE EXPLORATION, LLC	1/8-	1071	592	NA	NA	NA	NA	NA	NA	NA
107-28286	IVANIL MINOR *	THE EXPLORATION, LLC	1/8-	1071	574	NA	NA	NA	NA	NA	NA	NA
107-21112	CHARBNE C STOVER JR	THE EXPLORATION, LLC	1/8-	352	382	NA	NA	NA	NA	NA	NA	NA
107-21113	RAD LOU STOVER AND LORETTA STOVER	THE EXPLORATION, LLC	1/8-	352	380	NA	NA	NA	NA	NA	NA	NA
107-21114	MARK G ALEXANDER AND MARVIE S ALEXANDER	THE EXPLORATION, LLC	1/8-	378	NA	NA	NA	NA	NA	NA	NA	NA
107-21116	CHARLES E RICHARDSON AND SHIRLEY S RICHARDSON	THE EXPLORATION, LLC	1/8-	952	378	NA	NA	NA	NA	NA	NA	NA
107-28255	MARGIE M DAVENPORT	THE EXPLORATION, LLC	1/8-	1013	124	NA	NA	NA	NA	NA	NA	NA
107-28210	JOHN ARTHUR DOBBS AND LOUIA LEAN DOBBS	THE EXPLORATION, LLC	1/8-	3037	440	NA	NA	NA	NA	NA	NA	NA
107-22812	JOHN WYN WELTON JR AND LOUIA LEAN WYN WELTON	THE EXPLORATION, LLC	1/8-	3058	395	NA	NA	NA	NA	NA	NA	NA
**	SHIRLEY ANN DAVIS	NA	NA	UNLEASSED								
**	AFFLUCEIAN ROYALTES INC	NA	NA	UNLEASSED								
**	IC MCVORN AND M J MCVORN	SOUTH HANK OIL COMPANY	1/8-	40	428	NA	NA	NA	NA	NA	NA	NA
107-21292	BIRDAHARA AND SHIRLEY S RICHARDSON	THE EXPLORATION, LLC	1/8-	1017	620	NA	NA	NA	NA	NA	NA	NA
107-21333	ROCCO ALEXANDER AND MARVIE S ALEXANDER	THE EXPLORATION, LLC	1/8-	1025	380	NA	NA	NA	NA	NA	NA	NA
107-21289	JAMES H STOVER AND LORETTA STOVER	THE EXPLORATION, LLC	1/8-	1017	623	NA	NA	NA	NA	NA	NA	NA
107-21290	CHARBNE C STOVER JR AND LOUI STOVER	THE EXPLORATION, LLC	1/8-	1017	617	NA	NA	NA	NA	NA	NA	NA
107-22703	WILLIAM D MCVORN & CAROLYN M MCVORN	THE EXPLORATION, LLC	1/8-	910	84	NA	NA	NA	NA	NA	NA	NA
107-29208	MARGIE M DAVENPORT EUGENIE COFFIN	THE EXPLORATION, LLC	1/8-	1017	623	NA	NA	NA	NA	NA	NA	NA
107-24432	DAVIS SWIGER	THE EXPLORATION, LLC	1/8-	1025	422	NA	NA	NA	NA	NA	NA	NA
107-24472	DAVE ELLIOTT DAVIS	THE EXPLORATION, LLC	1/8-	1025	450	NA	NA	NA	NA	NA	NA	NA
107-24381	IRAN BUSE EDWARDS	THE EXPLORATION, LLC	1/8-	1026	206	NA	NA	NA	NA	NA	NA	NA
107-24899	RONALD J PEKERA AND MELINDA E DIXON AND KENNETH L DIXON	THE EXPLORATION, LLC	1/8-	1028	580	NA	NA	NA	NA	NA	NA	NA
107-25301	TULA ANN WALTON AIF MARY MAHAR	THE EXPLORATION, LLC	1/8-	1031	576	NA	NA	NA	NA	NA	NA	NA
107-21112	CHARBNE C STOVER JR AND LOUI STOVER	THE EXPLORATION, LLC	1/8-	1058	385	NA	NA	NA	NA	NA	NA	NA
107-21113	JAMES H STOVER AND LORETTA STOVER	THE EXPLORATION, LLC	1/8-	952	382	NA	NA	NA	NA	NA	NA	NA
107-21114	MARK G ALEXANDER AND MARVIE S ALEXANDER	THE EXPLORATION, LLC	1/8-	952	380	NA	NA	NA	NA	NA	NA	NA
107-21116	CHARLES E RICHARDSON AND SHIRLEY S RICHARDSON	THE EXPLORATION, LLC	1/8-	952	378	NA	NA	NA	NA	NA	NA	NA
107-22250	CATHERINE V GARRISON AND JOHN C GARRISON	THE EXPLORATION, LLC	1/8-	951	518	NA	NA	NA	NA	NA	NA	NA
107-21817	JOHN C GARRISON	THE EXPLORATION, LLC	1/8-	924	396	NA	NA	NA	NA	NA	NA	NA
107-21246	JAN K GEMMES SWANCKER	THE EXPLORATION, LLC	1/8-	1011	547	NA	NA	NA	NA	NA	NA	NA
107-25355	MARGIE M DAVENPORT AND LOUIA LEAN DOBBS	THE EXPLORATION, LLC	1/8-	1033	124	NA	NA	NA	NA	NA	NA	NA
107-28210	JOHN WYN WELTON JR AND LOUIA LEAN DOBBS	THE EXPLORATION, LLC	1/8-	1037	440	NA	NA	NA	NA	NA	NA	NA

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Office of Oil and Gas
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Environmental Protection
Operator's Well No. Fitzgerald S-19HU

ASSIGNMENT OF OIL AND GAS LEASES

This ASSIGNMENT OF OIL AND GAS LEASES (the "Assignment") is made and entered into this 8th day of March, 2018 (the "Effective Date"), from **Blue Roan Resources, LLC**, a West Virginia limited liability company, having an address at 3437 University Avenue, Morgantown, WV, 26505 (hereinafter "Assignor"), and **TH Exploration, LLC**, a Texas limited liability company, having an address at 1320 S. University Drive, Suite 500, Fort Worth, TX 76107 (hereinafter "Assignee").

WITNESSETH:

WHEREAS, Assignor is the owner of the right, title, and interest in those certain Oil and Gas Leases situated in Marshall County, West Virginia, which are described in Exhibit "A" attached hereto and made a part hereof (hereinafter the "Leases"); and

WHEREAS, subject to the exceptions and reservations herein contained, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to the Leases.

NOW, THEREFORE, for and in consideration of the sum of Ten Dollars (\$10.00), cash in hand paid, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and subject to the limited warranties, restrictions and conditions hereinafter mentioned, the parties hereto, intending to be legally bound, do covenant and agree as follows:

1. Assignment. Assignor does hereby grant, bargain, sell, convey, deliver, assign, set over and transfer, as of the Effective Date, to Assignee, its respective successors and assigns, forever, subject to the terms, reservations, waivers and provisions as hereinafter set forth, an undivided interest of all of Assignor's right, title and interest in and to the Leases and all oil, natural gas, natural gas liquids, condensate, casinghead gas and other liquefied or gaseous hydrocarbons or products ("Hydrocarbons") thereby held, in any and all depths and formations ("Assigned Formations"), together with any and all other rights that are reasonably necessary or convenient to explore for and produce Hydrocarbons from the Assigned Formations, including, but not limited to, the right of surface access, use and occupancy, the right of ingress and egress, the right to conduct geophysical and other exploratory activities, the right to lay pipeline, the right to drill through, but not perforate or stimulate, all other depths and formations necessary for the purpose of reaching the Assigned Formations and to conduct operations therein.

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

2. Representations and Warranties. Assignor represents and warrants that such Assignor has not conveyed or otherwise encumbered its interest in the Leases since the time that Assignor obtained its interests in the Leases.

Assignor represents and warrants that, as to its interests in the Leases, Assignor has paid all royalties, overriding royalties, and other payments required by the Leases which were due for the period in which Assignor held its interests in the Leases, including, but not limited to, the interests assigned hereunder, and that Assignor has fully performed all conditions necessary to maintain the Leases in full force and effect during such period.

3. Successors and Assigns. The terms of this Assignment shall be binding upon and inure to the benefit of the parties hereto and each of their respective successors and assigns, and such terms shall be covenants running with the land, and with each subsequent transfer or assignment thereof.

4. Further Assurances. Assignor and Assignee hereby agree to take all actions and execute, acknowledge, and deliver all such instruments as are necessary or advisable to effectuate the purposes of this Assignment.

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WV Department of
Environmental Protection

ASSIGNMENT AND CONVEYANCE

This Assignment and Conveyance (this "*Assignment*") is from EQUINOR USA ONSHORE PROPERTIES INC., a Delaware corporation ("*Assignor*"), to TH Exploration, LLC, a Texas limited liability company ("*Assignee*"), and is executed on December 9, 2019 (the "*Effective Date*"). Assignor and Assignee may be referred to herein collectively as the "*Parties*," or individually as a "*Party*." Capitalized terms used herein but not otherwise defined herein (including in Section 3.7) shall have the meanings given such terms in that certain Acreage Trade Agreement between the Assignor and the Assignee dated November 1, 2019 (the "*Acreage Trade Agreement*").

**ARTICLE 1
ASSIGNMENT OF ASSETS**

Section 1.1 Assignment. For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Assignor hereby GRANTS, BARGAINS, ASSIGNS, CONVEYS AND TRANSFERS unto Assignee all of Assignor's right, title and interest in and to (i) the oil and gas leases described in more detail on Exhibit A attached hereto (the "*Leases*") INsofar AND ONLY INsofar as they cover those lands described on Exhibit A (the "*Leasehold Rights*") and (ii) any surface use agreements that relate to such Leasehold Rights (collectively with the Leasehold Rights, the "*Conveyed Assets*").

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

Section 1.2 Assignment Subject to Acreage Trade Agreement. This Assignment is made in accordance with and is subject to the terms, covenants and conditions contained in that certain Acreage Trade Agreement. In the event of a conflict between the provisions of the Acreage Trade Agreement and this Assignment, the provisions of the Acreage Trade Agreement shall control. The execution and delivery of this Assignment by Assignor, and the execution and acceptance of this Assignment by Assignee, shall not operate to release or impair any surviving rights or obligations of either Party with respect to the other under the Acreage Trade Agreement.

**ARTICLE 2
SPECIAL WARRANTY OF TITLE AND DISCLAIMERS**

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

Section 2.2 Disclaimers of Warranties and Representations.

(a) EXCEPT AS EXPRESSLY REPRESENTED OTHERWISE IN SECTION VI OF THE ACREAGE TRADE AGREEMENT OR THIS ASSIGNMENT, ASSIGNOR MAKES NO, AND HEREBY EXPRESSLY DISCLAIMS, ANY REPRESENTATION OR WARRANTY, EXPRESS, IMPLIED OR STATUTORY, INCLUDING AS TO (I) TITLE TO THE LEASEHOLD RIGHTS, (II) THE CONTENTS, CHARACTER OR NATURE OF ANY DESCRIPTIVE MEMORANDUM, OR ANY REPORT OF ANY OF ITS PETROLEUM ENGINEERING CONSULTANTS, OR ANY GEOLOGICAL OR SEISMIC DATA OR INTERPRETATION, RELATING TO THE LEASEHOLD RIGHTS, (III) THE QUANTITY, QUALITY OR RECOVERABILITY OF PETROLEUM SUBSTANCES IN OR FROM THE LEASEHOLD RIGHTS, (IV) THE EXISTENCE OF ANY PROSPECT, OR ANY RECOMPLETION, INFILL OR STEP-OUT DRILLING OPPORTUNITIES, (V) ANY ESTIMATES OF THE VALUE OF THE LEASEHOLD RIGHTS, (VI) THE PRODUCTION OF PETROLEUM SUBSTANCES FROM THE LEASEHOLD RIGHTS, OR ANY PRODUCTION OR DECLINE RATES, (VII) THE MAINTENANCE, REPAIR, CONDITION, QUALITY, SUITABILITY, DESIGN OR MARKETABILITY OF THE LEASEHOLD RIGHTS, (VIII) INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT, AND (IX) ANY OTHER MATERIALS OR INFORMATION THAT MAY HAVE BEEN MADE AVAILABLE OR COMMUNICATED TO ASSIGNEE OR ITS AFFILIATES, OR ITS OR THEIR RESPECTIVE

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MAR 17 2020
WV Department of
Environmental Protection

ASSIGNMENT AND CONVEYANCE

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

ARTICLE 1 ASSIGNMENT OF ASSETS

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

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

Section 1.4 Assignment Subject to Acreage Trade Agreement. This Assignment is made in accordance with and is subject to the terms, covenants and conditions contained in that certain Acreage Trade Agreement. In the event of a conflict between the provisions of the Acreage Trade Agreement and this Assignment, the provisions of the Acreage Trade Agreement shall control. The execution and delivery of this Assignment by Assignor, and the execution and acceptance of this Assignment by Assignee, shall not operate to release or impair any surviving rights or obligations of either Party with respect to the other under the Acreage Trade Agreement.

ARTICLE 2 SPECIAL WARRANTY OF TITLE AND DISCLAIMERS

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

Section 2.2 Disclaimers of Warranties and Representations.

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

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WV Department of
Environmental Protection



March 10, 2020

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

RE: Fitzgerald S-19HU

Subject: Marshall County Route 90 and 90/2 Road Crossing Letter

Dear Laura:

Tug Hill Operating, LLC (THO) hereby submits this letter as confirmation that THO has obtained the right to drill, extract and produce the minerals under Marshall County Route 90 and 90/2 in the area reflected on the Fitzgerald S-19HU well plat. THO has conducted a full title search in the relevant Court House to confirm its ownership under said County Routes and is not currently aware of any recorded document that would suggest an ownership other than THO.

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

Sincerely,

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

Amy L. Miller
Permitting Specialist
Appalachia Region

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Office of Oil and Gas
MAR 17 2020
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: 05/23/2019

API No. 47- 051 -

Operator's Well No. Fitzgerald S-19HU

Well Pad Name: Fitzgerald

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>530,717.69</u>
County:	<u>Marshall</u>		Northing:	<u>4,405,751.78</u>
District:	<u>Liberty</u>	Public Road Access:	<u>Rines Ridge Road (County Route 76)</u>	
Quadrangle:	<u>Glen Easton 7.5'</u>	Generally used farm name:	<u>Danny S. Kerns, et al</u>	
Watershed:	<u>Upper Fish Creek</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 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><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p>
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Required Attachments:

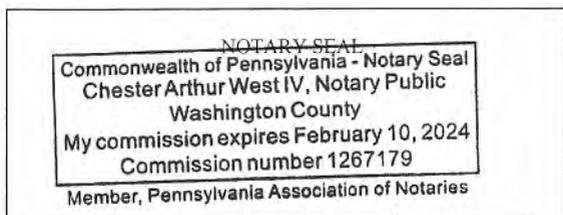
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication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

WW-6AC
(1/12)

Certification of Notice is hereby given:

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

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



Subscribed and sworn before me this 13th day of March 2020.

[Signature] Notary Public

My Commission Expires 2-10-2024

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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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: 3/12/2020 **Date Permit Application Filed:** 3/13/2020

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: Regina D. Figueroa
Address: 94 E. 700 N
Valparaiso, IN 46383

Name: Danny S. Kerns *See attached list
Address: 3500 West 80th Place
Merrillville, IN 46410

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

Name: Regina D. Figueroa
Address: 94 E. 700 N
Valparaiso, IN 46383

Name: Danny S. Kerns *See attached list
Address: 3500 West 80th Place
Merrillville, IN 46410

SURFACE OWNER(s) (Impoundments or Pits)

Name: _____
Address: _____

COAL OWNER OR LESSEE

Name: Consol Energy
Address: 1000 Consol Energy Drive
Canonsburg, PA 15317

COAL OPERATOR

Name: Murray American Energy, Inc. attn: Mason Smith
Address: 46226 National Road
St. Clairsville, OH 43905

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

Name: Danny R. Kerns *See attached list
Address: 3500 West 80th Place
Merrillville, IN 64610

OPERATOR OF ANY NATURAL GAS STORAGE FIELD

Name: _____
Address: _____

*Please attach additional forms if necessary

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Notice is hereby given:

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

This Notice Shall Include:

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

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

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

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

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

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Well Location Restrictions

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

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

Water Well Testing:

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

Water Testing Laboratories:

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

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

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

Written Comment:

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

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

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

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Time Limits and Methods for Filing Comments.

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

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

Comment Requirements

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

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

Permit Denial or Condition

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

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

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

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

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WW-6A
(8-13)

4705102326

API NO. 47-051 -
OPERATOR WELL NO. Fitzgerald S-19HU
Well Pad Name: Fitzgerald

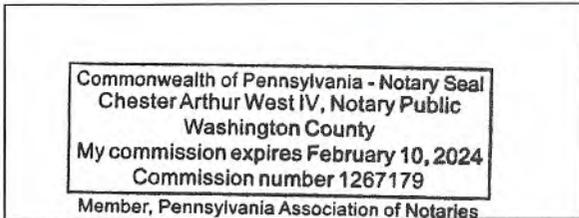
Notice is hereby given by:

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

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

Oil and Gas Privacy Notice:

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



Subscribed and sworn before me this 11th day of MARCH, 2020.
[Signature] Notary Public

My Commission Expires 2-10-2024

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Exhibit WW-6A**Supplement Pg. 1A**

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

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

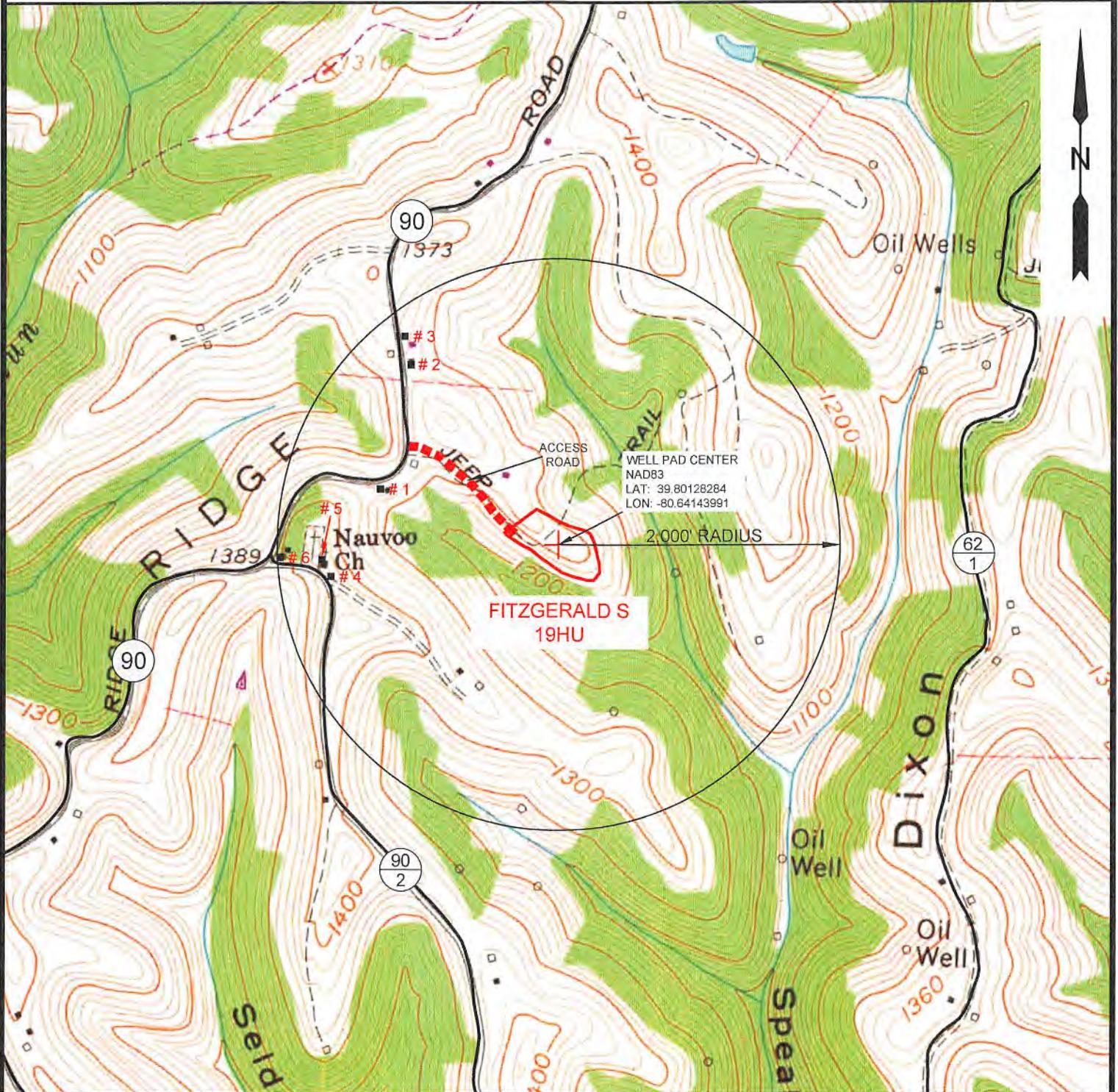
Well: Fitzgerald S – 19HU
 District: Liberty
 State: WV

There are four (4) residences, one (1) business or commercial site, one (1) church, no schools or no emergency facilities within two-thousand feet (2,000') of the above referenced well location.

<p>Residence (#1) TM 9 Pcl. 14 Danny R. Kerns, Et Al Phone: 219-887-6761 (Reverse Address – David A. & Regina D. Figueroa) Physical Address: 1352 Nauvoo Ridge Rd. Cameron, WV 26033 Tax Address: 94 E 700 N Valparaiso, IN 46383</p>	<p>Residence (#2) TM 9 Pcl. 12.1 Jessica R. & David A. II Dempewolf Phone: 304-810-0500 (Reverse Address – Jolene Morris) Physical Address: 1180 Nauvoo Ridge Rd. Cameron, WV 26033 Tax Address: Same</p>	<p>Residence (#3) TM 9 Pcl. 12 Gary W. Morris c/o Gary Morris & Cynthia Patrello Phone: None Found Physical Address: 1156 Nauvoo Ridge Rd. Cameron, WV 26033 Tax Address: Same</p>
<p>Business/Commercial Site (#4) TM 12 Pcl. 14 Consol Mining Co. LLC Consolidation Coal Company c/o Murray Energy c/o Land Dept. Physical Address: 90 The Corner Ln. Glen Easton, WV 26039 (Appears to be an underground mine vent or fan site or other related infrastructure) Tax Address: 46226 National Rd. Saint Clairsville, OH 43950</p>	<p>Church (#5) TM 9 Pcl. 15 Trustees of the Reorganized Church of Latter Day Saints Phone: None Physical Address: 88 The Corner Ln. Glen Easton, WV 26039 Tax Address: Exempt/None</p>	<p>Residence (#6) TM 9 Pcl. 22 Gary W. Morris Phone: None Found Physical Address: 1556 Nauvoo Ridge Rd. Cameron, WV 26033 Tax Address: 1156 Nauvoo RDG Glen Easton, WV 26039</p>

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PROPOSED FITZGERALD S - 19HU



NOTE: THERE APPEARS TO BE FIVE (5) POSSIBLE WATER SOURCES WITHIN 2,000'.

 <p>12 Vanhorn Drive P.O. Box 150 Glenville, WV 26351 304.462.5634 1412 Kanawha Boulevard, East Charleston, WV 25301 304.346.3952 254 East Beckley Bypass Beckley, WV 25801 304.255.5296 slsvv.com</p>	TOPO SECTION: GLEN EASTON 7.5' & CAMERON 7.5' COUNTY DISTRICT		OPERATOR: PREPARED FOR: TUG HILL OPERATING, LLC 380 SOUTHPOINTE BLVD SUITE 200 CANONSBURG, PA 15317		 <p>TUG HILL OPERATING</p>		
	MARSHALL	LIBERTY & MEADE	DRAWN BY K.G.M.	JOB NO. 8910		DATE 03/03/2020	SCALE 1" = 1000'

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: 4/24/2019 **Date of Planned Entry:** 5/3/2019

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: Regina D. Figueroa
Address: 94 E 700 N
Valparaiso, IN 46383

Name: Danny S. Kerns
Address: 3500 West 80th Pl.
Merrillville, IN 46410

Name: Deena J. Palomo
Address: 20 Maxwell St., Apt. 4
Hebron, IN 46341

COAL OWNER OR LESSEE

Name: Consol Energy Attn: Casey Saunders
Address: 1000 Consol Energy Drive
Canonsburg, PA 15317

MINERAL OWNER(s)

Name: Regina D. Figueroa
Address: 94 E 700 N
Valparaiso, IN 46383 *See attached list
*please attach additional forms if necessary

Notice is hereby given:

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

State: <u>West Virginia</u>	Approx. Latitude & Longitude: <u>39.80128284; -80.64143991</u>
County: <u>Marshall</u>	Public Road Access: <u>County Route 90</u>
District: <u>Liberty</u>	Watershed: <u>Upper Fish Creek</u>
Quadrangle: <u>Glen Easton 7.5'</u>	Generally used farm name: <u>Danny & Frances Kerns Estate</u>

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

Notice is hereby given by:

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

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

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MAR 17 2020
WV Department of
Environmental Protection

Oil and Gas Privacy Notice:

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

WW-6A3 NOTICE OF ENTRY FOR PLAT SURVEY
FITZGERALD PAD

MINERAL OWNERS

Danny S. Kerns
3500 West 80th Pl.
Merrillville, IN 46410

Deena J. Palomo
20 Maxwell Street, Apt. 4
Hebron, IN 46341

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Additional Party to Notice
WW-6A5
Fitzgerald Pad

Deana J. Palomo
20 Maxwell Street, Apt. 4
Hebron, IN 46341

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

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

Byrd E. White, III
Secretary of Transportation/
Commissioner of Highways

February 27, 2020

Jimmy Wriston, P. E.
Deputy Secretary/
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 Fitzgerald Pad, Marshall County
Fitzgerald S-19HU Well Site

Dear Mr. Martin,

This well site will be accessed from a DOH permit #06-2019-0351 which has been issued to Tug Hill Operating, LLC for access to the State Road for a well site located off Marshall County Route 90 SLS.

This operator is in compliance with §22-6A-20 of the WV Code. 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 October 1, 2018.

Very Truly Yours,

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

Cc: Amy Miller
Tug Hill Operating, LLC
CH, OM, D-6
File

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PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION

Well No. Fitzgerald S-19HU

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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