



west virginia department of environmental protection

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

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

Friday, September 11, 2020
WELL WORK PERMIT
Horizontal 6A / New Drill

TUG HILL OPERATING, LLC
380 SOUTHPOINTE BOULEVARD, PLAZA II
SUITE 200
CANONSBURG, PA 15317

Re: Permit approval for KEITH STERN S-11HM
47-051-02331-00-00

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: KEITH STERN S-11HM
Farm Name: TH EXPLORATION, LLC
U.S. WELL NUMBER: 47-051-02331-00-00
Horizontal 6A New Drill
Date Issued: 9/11/2020

PERMIT CONDITIONS 4705102331

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.

API Number: _____

PERMIT CONDITIONS

4705102331

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.

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 Meade Glen Easton 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Keith Stern S-11HM Well Pad Name: Keith Stern

3) Farm Name/Surface Owner: TH Exploration, LLC Public Road Access: Fish Creek Road (County Route 74)

4) Elevation, current ground: 747' Elevation, proposed post-construction: 747'

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

Other _____

(b) If Gas Shallow Deep _____

Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus is the target formation at a depth of 6281' - 6312', thickness of 51' and an anticipated approximate pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6412'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 14,044'

11) Proposed Horizontal Leg Length: 7,249.52'

12) Approximate Fresh Water Strata Depths: 70'; 393'

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

14) Approximate Saltwater Depths: 1,740'

15) Approximate Coal Seam Depths: Sewickley Coal - 307' and Pittsburgh Coal - 400'

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

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

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

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18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<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	13 3/8"	NEW	J55	54.5#	490'	490'	690ft^3(CTS)
Coal	13 3/8"	NEW	J55	54.5#	490'	490'	690ft^3(CTS)
Intermediate	9 5/8"	NEW	J55	36#	2,202'	2,202'	714ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	14,044'	14,044'	3596ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#	6,594'		
Liners							

gpc
6/6/2020

<u>TYPE</u>	<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	13 3/8"	17.5"	.33	2,740	2,192	SEE #24	1.2
Coal	13 3/8"	17.5"	.33	2,740	2,192	SEE #24	1.2
Intermediate	9 5/8"	12 1/4"	.352	3,520	2,816	SEE #24	1.19
Production	5 1/2"	8 7/8" _ 8 3/4"	.361	12,640	10,112	SEE #24	1.17/1.19
Tubing	2 3/8"		.19	11,200	8,960		
Liners							

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

Jun 6/6/2020

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

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

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

Well to completed with approximately 18,120,000 lb. proppant and 280,148 barrels of water.
Max rate = 80bpm; max psi = 9,000#.

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21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 10.35 acres

22) Area to be disturbed for well pad only, less access road (acres): 4.32 acres

23) Describe centralizer placement for each casing string:

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

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

*See attachment

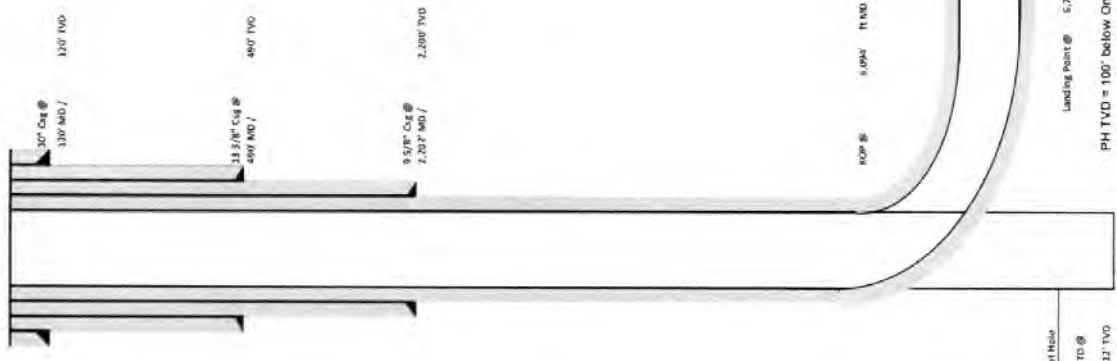
25) Proposed borehole conditioning procedures:

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

*Note: Attach additional sheets as needed.



WELL NAME: 66th Stern S-11HM
 STATE: WV COUNTY: Marshall
 DISTRICT: Meade
 8" Elev: 747' GL Elev: 747'
 TD: 14,044'
 True Latitude: 39.77471195
 True Longitude: -80.6921562
 Well Latitude: 39.75483301
 Well Longitude: -80.67504401



Formation	Depth TVD
Deepart Fresh Water	393
Sewickley Coal	307
Pittsburgh Coal	400
Big Lime	1614
W&P	1927
Berra	2119
Gedda	2384
Phenestreet	3595
Serravallo/Burnett	6309
Tuffy	6140
Hamilton	8175
Marcellus	6261
Landing Depth	6298
Groundlog	6313
Pilot Hole Depth	6412

CASING SUMMARY						
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36"	30"	120'	0W	BW	Surface
Surface	17.5"	13 3/8"	490'	54.5	J55	Surface
Intermediates 1	12 1/4"	9 5/8"	2,202'	16	55	Surface
Production	8 7/8" x 8 1/4"	5 1/2"	14,044'	20	C19P110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
Setback	Class	Density	Fluid Type	Centralizer Notes	
538	A	15.6	Air	None	
648	A	15.6	Air	3 Centralizers at equal dilution	
749	A	15	Air	1 Centralizer every other ft	
3,105	A	14.3	Air / SOBMA	1 every other joint in lateral, 1 per joint in curve, 1 every other ft in etc	

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Landing Point @ 5,795 MD / 6,288 TVD
 PH TVD = 100' below Onondaga Top

Lateral TD @ 14,042 ft MD
 8,425 ft TVD

Pilot Hole
 PH TD @ 6,412 TVD



Tug Hill Operating, LLC Casing and Cement Program

Keith Stern S-11HM

Casing

	String	Grade	Bit Size	Depth (Measured)	Cement Fill Up
Conductor	30"	BW	36"	120'	CTS
Surface	13 3/8"	J55	17 1/2"	490'	CTS
Intermediate	9 5/8"	J55	12 1/4"	2,202'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4"	14,044'	CTS

Cement

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

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Well: Keith Stern S-11 HM (slot M)
Site: Keith Stern
Project: Marshall County, West Virginia
Design: rev2



SECTION DETAILS

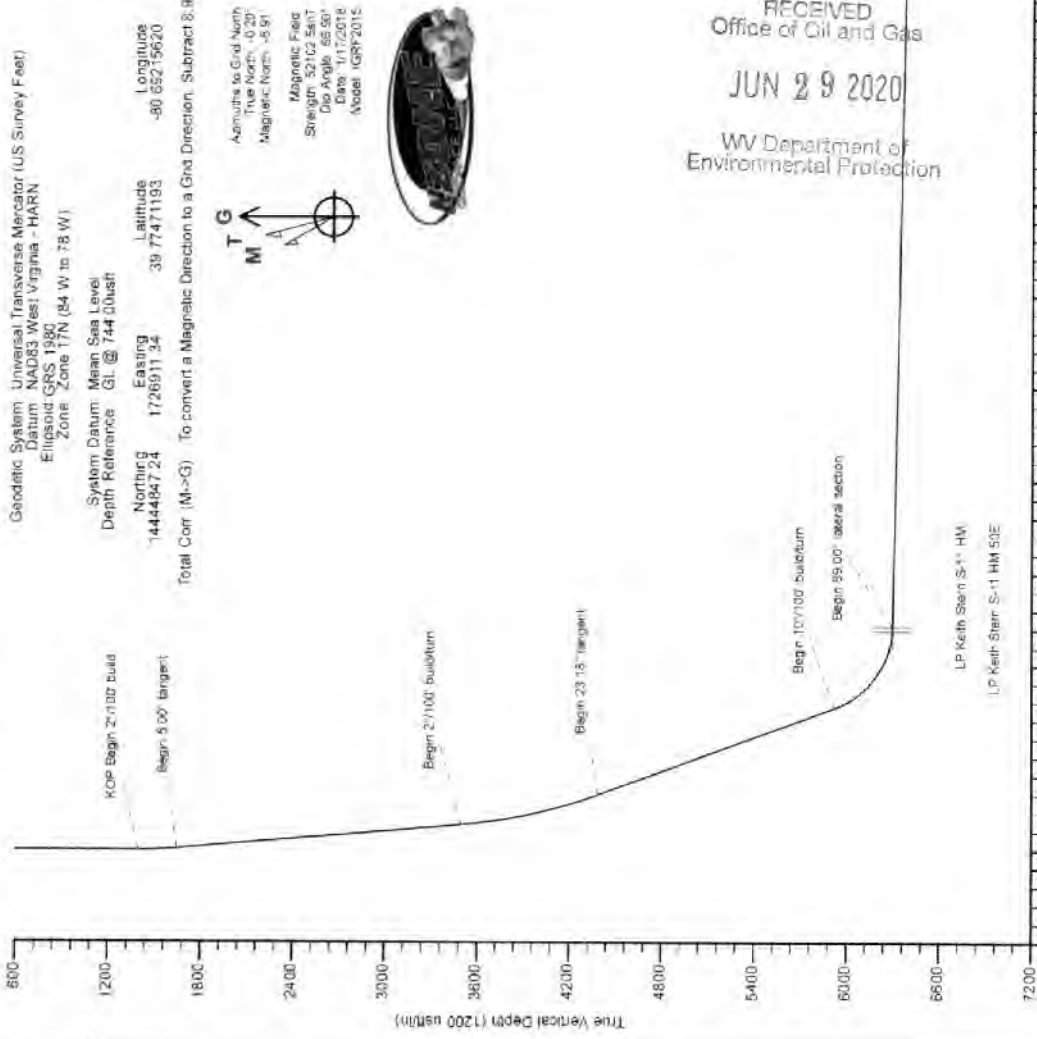
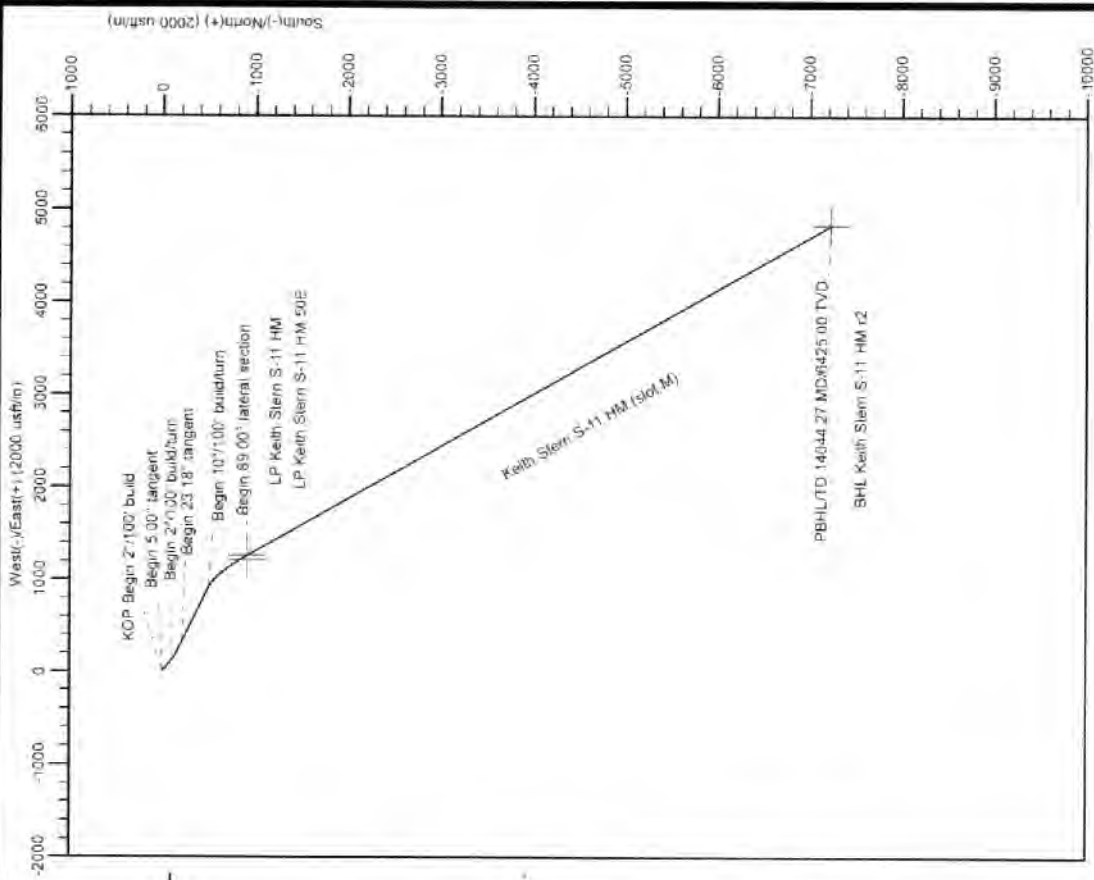
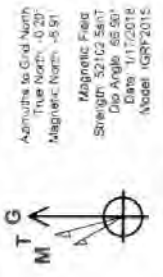
Sec	MD	Intc	Azi	TVD	N-S	E-W	Depth	Face	V-Sect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1400.00	0.00	0.00	1400.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2'7100' build
3	1850.00	5.00	130.00	1649.68	-2.97	8.35	2.00	130.00	10.47	Begin 5.00' tangent
4	3507.38	5.00	130.00	3500.00	-11.96	132.36	0.00	0.00	185.92	Begin 2'7100' build/burn
5	4428.52	23.18	115.48	4387.51	-21.55	328.03	2.00	-18.23	361.60	Begin 23.18' tangent
6	6083.97	89.00	150.47	5920.72	-497.99	920.68	0.00	0.00	925.91	Begin 10'7100' build/burn
7	6795.05	89.00	150.47	6298.00	-916.58	1262.18	10.00	37.53	1463.78	Begin 85.00' lateral section
8	14044.27	89.00	150.47	6425.00	-7222.19	4834.28	0.00	0.00	9850.81	PBHLTD 14044.27 MD/6425.00 TVD

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

System Datum: Mean Sea Level
 Depth Reference: GL @ 744 Obust

Northing: 14444847.24
 Easting: 1728911.34
 Latitude: 39.77471193
 Longitude: -80.85215620

Total Cor (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.81°



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Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Keith Stern S-11 HM (slot M)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 744.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 744.00usft
Site:	Keith Stern	North Reference:	Grid
Well:	Keith Stern S-11 HM (slot M)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

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

Site	Keith Stern			RECEIVED Office of Oil and Gas
Site Position:		Northing:	14,444,890.33 usft	39.77483004
From:	Lal/Long	Easting:	1,726,932.47 usft	-80.69208048
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	0.20°
				JUN 29 2020

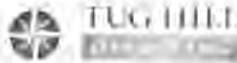
Well	Keith Stern S-11 HM (slot M)			WV Department of Environmental Protection
Well Position	+N/-S	0.00 usft	Northing:	14,444,847.25 usft
	+E/-W	0.00 usft	Easting:	1,726,911.34 usft
Position Uncertainty	0.00 usft		Wellhead Elevation:	
			Latitude:	39.77471193
			Longitude:	-80.69215620
			Ground Level:	744.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (")	Dip Angle (")	Field Strength (nT)
	IGRF2015	1/17/2018	-8.71	66.90	52,102.45623818

Design	rev2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (")
	0.00	0.00	0.00	146.20

Plan Survey Tool Program	Date	7/21/2018		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	14,044.27 rev2 (Original Hole)	MWD	MWD - Standard

Plan Sections											
Measured Depth (usft)	Inclination (")	Azimuth (")	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate ("/100usft)	Build Rate ("/100usft)	Turn Rate ("/100usft)	TFO (")	Target	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,650.00	5.00	130.00	1,649.68	-7.01	8.35	2.00	2.00	0.00	0.00	130.00	
3,507.39	5.00	130.00	3,500.00	111.06	132.36	0.00	0.00	0.00	0.00	0.00	
4,426.52	23.18	115.49	4,387.91	-215.55	328.03	2.00	1.98	-1.58	-18.23		
6,093.97	23.18	115.49	5,920.72	-497.99	920.58	0.00	0.00	0.00	0.00		
6,796.06	89.00	150.47	6,298.00	-916.58	1,262.18	10.00	9.37	4.98	37.53	LP Keith Stern S-11	
14,044.27	89.00	150.47	6,425.00	-7,222.19	4,834.28	0.00	0.00	0.00	0.00	BHL Keith Stern S-11	



Planning Report - Geographic

Database: DB_Jun221601_V14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Keith Stern
 Well: Keith Stern 5-11 HM (slot M)
 Wellbore: Original Hole
 Design: rev2

Local Co-ordinate Reference:
 TVD Reference:
 MD Reference:
 North Reference:
 Survey Calculation Method:

Well Keith Stern 5-11 HM (slot M) RECEIVED
 GL @ 744.00well
 GL @ 744.00well
 Grid
 Minimum Curvature
 JUN 29 2020
 WV Department of Environmental Protection

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
100.00	0.00	0.00	100.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
200.00	0.00	0.00	200.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
300.00	0.00	0.00	300.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
400.00	0.00	0.00	400.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
500.00	0.00	0.00	500.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
600.00	0.00	0.00	600.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
700.00	0.00	0.00	700.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
800.00	0.00	0.00	800.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
900.00	0.00	0.00	900.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
1,400.00	0.00	0.00	1,400.00	0.00	0.00	14,444,847.25	1,726,911.34	39.77471193	-80.69215620
KOP Begin 2°100' build									
1,500.00	2.00	130.00	1,499.98	-1.12	-1.34	14,444,846.12	1,726,912.68	39.77470884	-80.69215146
1,600.00	4.00	130.00	1,600.83	-4.49	-5.35	14,444,842.76	1,726,916.69	39.77469996	-80.69213723
1,650.00	5.00	130.00	1,649.68	-7.01	-8.35	14,444,840.24	1,726,919.69	39.77469261	-80.69212656
Begin 5.00° tangent									
1,700.00	5.00	130.00	1,699.49	-8.81	-11.69	14,444,837.44	1,726,923.03	39.77468469	-80.69211472
1,800.00	5.00	130.00	1,799.11	-15.41	-18.37	14,444,831.84	1,726,929.71	39.77466944	-80.69209103
1,900.00	5.00	130.00	1,898.73	-21.01	-25.04	14,444,826.23	1,726,936.38	39.77465399	-80.69206733
2,000.00	5.00	130.00	1,998.35	-26.61	-31.72	14,444,820.63	1,726,943.06	39.77463854	-80.69204364
2,100.00	5.00	130.00	2,097.97	-32.22	-38.39	14,444,815.03	1,726,949.74	39.77462309	-80.69201994
2,200.00	5.00	130.00	2,197.59	-37.82	-45.07	14,444,809.43	1,726,956.41	39.77460764	-80.69199625
2,300.00	5.00	130.00	2,297.20	-43.42	-51.75	14,444,803.82	1,726,963.09	39.77459220	-80.69197256
2,400.00	5.00	130.00	2,396.82	-49.02	-58.42	14,444,798.22	1,726,969.77	39.77457675	-80.69194886
2,500.00	5.00	130.00	2,496.44	-54.63	-65.10	14,444,792.62	1,726,976.44	39.77456130	-80.69192517
2,599.99	5.00	130.00	2,596.06	-60.23	-71.79	14,444,787.02	1,726,983.12	39.77454585	-80.69190148
2,699.99	5.00	130.00	2,695.68	-65.83	-78.45	14,444,781.42	1,726,989.80	39.77453040	-80.69187778
2,799.99	5.00	130.00	2,795.30	-71.43	-85.13	14,444,775.81	1,726,996.47	39.77451495	-80.69185409
2,899.99	5.00	130.00	2,894.92	-77.04	-91.81	14,444,770.21	1,727,003.15	39.77449951	-80.69183040
2,999.99	5.00	130.00	2,994.54	-82.64	-98.48	14,444,764.61	1,727,009.83	39.77448406	-80.69180670
3,099.99	5.00	130.00	3,094.16	-88.24	-105.16	14,444,759.01	1,727,016.50	39.77446861	-80.69178301
3,199.99	5.00	130.00	3,193.78	-93.84	-111.84	14,444,753.40	1,727,023.18	39.77445316	-80.69175932
3,299.99	5.00	130.00	3,293.40	-99.44	-118.51	14,444,747.80	1,727,029.86	39.77443771	-80.69173562
3,399.99	5.00	130.00	3,393.02	-105.05	-125.19	14,444,742.20	1,727,036.53	39.77442226	-80.69171193
3,499.99	5.00	130.00	3,492.64	-110.65	-131.87	14,444,736.60	1,727,043.21	39.77440682	-80.69168824
3,507.39	5.00	130.00	3,500.00	-111.06	-132.36	14,444,736.16	1,727,043.70	39.77440567	-80.69168649
Begin 2°100' build/turn									
3,599.99	6.78	125.09	3,592.12	-116.80	-139.93	14,444,730.44	1,727,051.27	39.77438984	-80.69166275
3,699.99	8.74	122.05	3,691.19	-124.23	-151.20	14,444,723.02	1,727,062.54	39.77436933	-80.69163906
3,799.99	10.72	120.12	3,789.75	-132.93	-165.69	14,444,714.32	1,727,077.03	39.77434631	-80.69161536
3,899.99	12.70	118.79	3,887.67	-142.89	-183.36	14,444,704.36	1,727,094.70	39.77431779	-80.69159166
3,999.99	14.68	117.81	3,984.82	-154.09	-204.21	14,444,693.15	1,727,115.55	39.77428662	-80.69156813
4,099.99	16.67	117.06	4,081.09	-168.53	-228.19	14,444,680.71	1,727,139.54	39.77425243	-80.69154460
4,199.99	18.67	116.48	4,176.37	-180.19	-255.30	14,444,667.05	1,727,166.64	39.77421466	-80.69152107
4,299.99	20.66	115.88	4,270.54	-195.05	-285.48	14,444,652.19	1,727,196.83	39.77417356	-80.69149754
4,399.99	22.65	115.38	4,363.47	-211.10	-318.71	14,444,636.15	1,727,230.06	39.77412919	-80.69147401
4,426.52	23.18	115.49	4,357.91	-215.55	-328.03	14,444,631.70	1,727,239.36	39.77411667	-80.69146935
4,426.53	23.18	115.49	4,387.92	-215.55	-328.04	14,444,631.69	1,727,239.38	39.77411666	-80.69146934
Begin 23.18° tangent									
4,499.99	23.18	115.49	4,455.45	-228.00	-354.14	14,444,619.25	1,727,265.49	39.77408245	-80.69145558



Database: DB_Jul2216dr_v1A
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Keith Stem
 Well: Keith Stem 3-11 HM (slot M)
 Wellbore: Original Hole
 Design: rev2

Local Co-ordinate Reference:
 TVD Reference:
 MD Reference:
 North Reference:
 Survey Calculation Method:

Well Keith Stem 3-11 HM (slot M)
 GL @ 744.00usft
 GL @ 744.00usft
 Grid
 Minimum Curvature

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 Office of Oil and Gas

JUN 29 2020

WV Department of Environmental Protection

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,599.99	23.18	115.49	4,547.37	-244.83	389.88	14,444,602.31	1,727,301.02	39.77403589	-80.69077232
4,699.99	23.18	115.49	4,639.30	-261.87	425.22	14,444,585.37	1,727,336.56	39.77398974	-80.69064606
4,799.99	23.18	115.49	4,731.22	-278.81	460.75	14,444,568.43	1,727,372.09	39.77394186	-80.69051979
4,899.99	23.18	115.49	4,823.15	-295.75	496.29	14,444,551.50	1,727,407.63	39.77389503	-80.69039352
4,999.99	23.18	115.49	4,915.07	-312.69	531.82	14,444,534.56	1,727,443.17	39.77384817	-80.69026726
5,099.99	23.18	115.49	5,007.00	-329.63	567.36	14,444,517.62	1,727,478.70	39.77380122	-80.69014100
5,199.99	23.18	115.49	5,098.92	-346.57	602.89	14,444,500.68	1,727,514.24	39.77375446	-80.69001473
5,299.99	23.18	115.49	5,190.85	-363.50	638.43	14,444,483.74	1,727,549.77	39.77370760	-80.68988847
5,399.99	23.18	115.49	5,282.77	-380.44	673.97	14,444,466.80	1,727,585.31	39.77366075	-80.68976221
5,499.99	23.18	115.49	5,174.70	-397.38	709.50	14,444,449.86	1,727,620.84	39.77361389	-80.68963594
5,599.99	23.18	115.49	5,466.62	-414.32	745.04	14,444,432.93	1,727,656.38	39.77356704	-80.68950968
5,699.99	23.18	115.49	5,558.55	-431.26	780.57	14,444,415.99	1,727,691.92	39.77352018	-80.68938342
5,799.99	23.18	115.49	5,650.47	-448.20	816.11	14,444,399.05	1,727,727.45	39.77347333	-80.68925716
5,899.99	23.18	115.49	5,742.40	-465.14	851.64	14,444,382.11	1,727,762.99	39.77342647	-80.68913089
5,999.99	23.18	115.49	5,834.33	-482.07	887.18	14,444,365.17	1,727,798.52	39.77337961	-80.68900463
6,093.07	23.18	115.49	5,920.72	-497.99	920.58	14,444,349.25	1,727,831.92	39.77333275	-80.68887837
6,093.97	23.18	115.49	5,920.72	-497.99	920.58	14,444,349.25	1,727,831.92	39.77333275	-80.68885261
Begin 10°/100' build/turn									
6,099.99	23.66	116.40	5,926.24	-499.04	922.73	14,444,346.21	1,727,834.07	39.77333268	-80.68887833
6,199.99	32.21	127.60	6,014.57	-524.30	961.91	14,444,322.95	1,727,873.25	39.77328295	-80.68873919
6,299.99	41.36	134.42	6,094.61	-563.79	1,006.73	14,444,283.46	1,727,918.07	39.77315407	-80.68858018
6,300.99	50.78	139.08	6,163.93	-610.31	1,055.82	14,444,230.93	1,727,967.16	39.77300935	-80.68840612
6,499.99	60.34	142.63	6,220.43	-680.20	1,107.69	14,444,166.97	1,728,019.03	39.77283318	-80.68822229
6,599.99	69.99	145.65	6,262.38	-753.74	1,160.77	14,444,093.50	1,728,072.12	39.77263093	-80.68803429
6,699.99	79.67	148.14	6,288.53	-834.47	1,213.45	14,444,012.76	1,728,124.79	39.77240873	-80.68784782
6,790.06	89.00	150.47	6,298.00	-916.59	1,262.18	14,443,930.66	1,728,173.53	39.77218274	-80.68765740
Begin 89.00° lateral section									
6,799.99	89.00	150.47	6,298.07	-920.00	1,264.12	14,443,927.24	1,728,175.46	39.77217334	-80.68766855
6,899.99	89.00	150.47	6,299.82	-1,007.00	1,313.40	14,443,840.26	1,728,224.74	39.77193396	-80.68749424
6,999.99	89.00	150.47	6,301.57	-1,093.99	1,362.68	14,443,753.25	1,728,274.02	39.77169458	-80.68731993
7,099.99	89.00	150.47	6,303.33	-1,180.99	1,411.96	14,443,666.26	1,728,323.31	39.77145519	-80.68714562
7,199.99	89.00	150.47	6,305.08	-1,267.98	1,461.25	14,443,579.27	1,728,372.59	39.77121581	-80.68697131
7,299.99	89.00	150.47	6,306.83	-1,354.98	1,510.53	14,443,492.27	1,728,421.87	39.77097642	-80.68679701
7,399.99	89.00	150.47	6,308.58	-1,441.97	1,559.81	14,443,405.27	1,728,471.15	39.77073704	-80.68662270
7,499.99	89.00	150.47	6,310.33	-1,528.97	1,609.09	14,443,318.28	1,728,520.44	39.77049765	-80.68644840
7,599.99	89.00	150.47	6,312.09	-1,615.96	1,658.38	14,443,231.29	1,728,569.72	39.77025827	-80.68627409
7,699.99	89.00	150.47	6,313.84	-1,702.96	1,707.66	14,443,144.29	1,728,619.00	39.77001888	-80.68610079
7,799.99	89.00	150.47	6,315.59	-1,789.95	1,756.94	14,443,057.29	1,728,668.28	39.76977950	-80.68592649
7,899.99	89.00	150.47	6,317.34	-1,876.95	1,806.22	14,442,970.30	1,728,717.57	39.76954011	-80.68575219
7,999.99	89.00	150.47	6,319.09	-1,963.94	1,855.50	14,442,883.30	1,728,766.85	39.76930072	-80.68557789
8,099.99	89.00	150.47	6,320.85	-2,050.94	1,904.79	14,442,796.31	1,728,816.13	39.76906134	-80.68540359
8,199.99	89.00	150.47	6,322.60	-2,137.93	1,954.07	14,442,709.31	1,728,865.41	39.76882196	-80.68522929
8,299.99	89.00	150.47	6,324.35	-2,224.93	2,003.35	14,442,622.32	1,728,914.69	39.76858258	-80.68505499
8,399.99	89.00	150.47	6,326.10	-2,311.92	2,052.63	14,442,535.32	1,728,963.98	39.76834318	-80.68487971
8,499.99	89.00	150.47	6,327.85	-2,398.92	2,101.92	14,442,448.33	1,729,013.26	39.76810379	-80.68470542
8,599.99	89.00	150.47	6,329.61	-2,485.92	2,151.20	14,442,361.33	1,729,062.54	39.76786440	-80.68453113
8,699.99	89.00	150.47	6,331.36	-2,572.91	2,200.48	14,442,274.34	1,729,111.82	39.76762501	-80.68435684
8,799.99	89.00	150.47	6,333.11	-2,659.91	2,249.76	14,442,187.34	1,729,161.11	39.76738563	-80.68418255
8,899.99	89.00	150.47	6,334.86	-2,746.90	2,299.05	14,442,100.35	1,729,210.39	39.76714624	-80.68400826
8,999.99	89.00	150.47	6,336.62	-2,833.90	2,348.33	14,442,013.35	1,729,259.67	39.76690685	-80.68383397
9,099.99	89.00	150.47	6,338.37	-2,920.89	2,397.61	14,441,926.36	1,729,308.95	39.76666746	-80.68365968
9,199.99	89.00	150.47	6,340.12	-3,007.89	2,446.89	14,441,839.36	1,729,358.24	39.76642807	-80.68348540
9,299.99	89.00	150.47	6,341.87	-3,094.88	2,496.17	14,441,752.37	1,729,407.52	39.76618868	-80.68331112
9,399.99	89.00	150.47	6,343.62	-3,181.88	2,545.46	14,441,665.37	1,729,456.80	39.76594929	-80.68313684



Planning Report - Geographic

Database: DB Jul2216dt v14
 Company: Tug Hill Operating LLC
 Project: Marshall County, West Virginia
 Site: Keith Stern
 Well: Keith Stern S-11 HM (sig M)
 Wellbore: Original Hole
 Design: mv2

Local Co-ordinate Reference:
 TVD Reference:
 MD Reference:
 North Reference:
 Survey Calculation Method:

Well Keith Stern S-11 HM (sig M)
 GL @ 744.00usft
 GL @ 744.00usft
 Grid
 Minimum Curvature

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 Office of Oil and Gas
 JUN 30 2020

WV Department of Environmental Protection

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9.499 98	89.00	150.47	6.345 38	-3.268 87	2.594 74	14,441,578.35	1,729,506.08	39.76570990	-80.68296256
9.599 98	89.00	150.47	6.347 13	-3.355 87	2.644 02	14,441,491.38	1,729,555.36	39.76547051	-80.68278828
9.699 98	89.00	150.47	6.348 88	-3.442 86	2.693 30	14,441,404.39	1,729,604.65	39.76523112	-80.68261400
9.799 98	89.00	150.47	6.350 63	-3.529 86	2.742 59	14,441,317.39	1,729,653.93	39.76499173	-80.68243973
9.899 98	89.00	150.47	6.352 38	-3.616 85	2.791 87	14,441,230.39	1,729,703.21	39.76475234	-80.68226545
9.999 98	89.00	150.47	6.354 14	-3.703 85	2.841 15	14,441,143.40	1,729,752.49	39.76451294	-80.68209118
10.099 98	89.00	150.47	6.355 89	-3.790 84	2.890 43	14,441,056.40	1,729,801.78	39.76427355	-80.68191690
10.199 98	89.00	150.47	6.357 64	-3.877 84	2.939 72	14,440,969.41	1,729,851.06	39.76403416	-80.68174263
10.299 98	89.00	150.47	6.359 39	-3.964 83	2.989 00	14,440,882.41	1,729,900.34	39.76379477	-80.68156836
10.399 98	89.00	150.47	6.361 15	-4.051 83	3.038 28	14,440,795.42	1,729,949.62	39.76355537	-80.68139409
10.499 98	89.00	150.47	6.362 90	-4.138 82	3.087 56	14,440,708.42	1,729,998.90	39.76331598	-80.68121982
10.599 98	89.00	150.47	6.364 65	-4.225 82	3.136 84	14,440,621.43	1,730,048.19	39.76307659	-80.68104555
10.699 98	89.00	150.47	6.366 40	-4.312 81	3.186 13	14,440,534.43	1,730,097.47	39.76283719	-80.68087129
10.799 98	89.00	150.47	6.368 16	-4.399 81	3.235 41	14,440,447.44	1,730,146.75	39.76259780	-80.68069702
10.899 98	89.00	150.47	6.369 91	-4.486 80	3.284 69	14,440,360.44	1,730,196.03	39.76235841	-80.68052275
10.999 98	89.00	150.47	6.371 66	-4.573 80	3.333 97	14,440,273.45	1,730,245.32	39.76211901	-80.68034850
11.099 98	89.00	150.47	6.373 41	-4.660 79	3.383 26	14,440,186.45	1,730,294.60	39.76187962	-80.68017424
11.199 98	89.00	150.47	6.375 16	-4.747 79	3.432 54	14,440,099.46	1,730,343.88	39.76164023	-80.67999998
11.299 98	89.00	150.47	6.376 92	-4.834 78	3.481 82	14,440,012.46	1,730,393.16	39.76140083	-80.67982572
11.399 98	89.00	150.47	6.378 67	-4.921 78	3.531 10	14,439,925.47	1,730,442.45	39.76116143	-80.67965146
11.499 98	89.00	150.47	6.380 42	-5.008 77	3.580 39	14,439,838.47	1,730,491.73	39.76092204	-80.67947720
11.599 98	89.00	150.47	6.382 17	-5.095 77	3.629 67	14,439,751.48	1,730,541.01	39.76068264	-80.67930295
11.699 98	89.00	150.47	6.383 92	-5.182 76	3.678 95	14,439,664.48	1,730,590.29	39.76044325	-80.67912869
11.799 98	89.00	150.47	6.385 68	-5.269 76	3.728 23	14,439,577.49	1,730,639.57	39.76020385	-80.67895444
11.899 98	89.00	150.47	6.387 43	-5.356 75	3.777 51	14,439,490.49	1,730,688.86	39.75996445	-80.67878019
11.999 98	89.00	150.47	6.389 18	-5.443 75	3.826 80	14,439,403.50	1,730,738.14	39.75972506	-80.67860594
12.099 98	89.00	150.47	6.390 93	-5.530 74	3.876 08	14,439,316.50	1,730,787.42	39.75948566	-80.67843168
12.199 98	89.00	150.47	6.392 68	-5.617 74	3.925 36	14,439,229.51	1,730,836.70	39.75924626	-80.67825744
12.299 98	89.00	150.47	6.394 44	-5.704 73	3.974 64	14,439,142.51	1,730,885.99	39.75900686	-80.67808320
12.399 98	89.00	150.47	6.396 19	-5.791 73	4.023 93	14,439,055.52	1,730,935.27	39.75876747	-80.67790895
12.499 98	89.00	150.47	6.397 94	-5.878 72	4.073 21	14,438,968.52	1,730,984.55	39.75852807	-80.67773471
12.599 98	89.00	150.47	6.399 69	-5.965 72	4.122 49	14,438,881.53	1,731,033.83	39.75828867	-80.67756046
12.699 97	89.00	150.47	6.401 45	-6.052 71	4.171 77	14,438,794.53	1,731,083.12	39.75804927	-80.67738622
12.799 97	89.00	150.47	6.403 20	-6.139 71	4.221 06	14,438,707.54	1,731,132.40	39.75780987	-80.67721198
12.899 97	89.00	150.47	6.404 95	-6.226 70	4.270 34	14,438,620.54	1,731,181.68	39.75757047	-80.67703774
12.999 97	89.00	150.47	6.406 70	-6.313 70	4.319 62	14,438,533.55	1,731,230.96	39.75733107	-80.67686350
13.099 97	89.00	150.47	6.408 45	-6.400 69	4.368 90	14,438,446.56	1,731,280.24	39.75709167	-80.67668927
13.199 97	89.00	150.47	6.410 21	-6.487 69	4.418 18	14,438,359.56	1,731,329.53	39.75685227	-80.67651503
13.299 97	89.00	150.47	6.411 96	-6.574 68	4.467 47	14,438,272.56	1,731,378.81	39.75661287	-80.67634079
13.399 97	89.00	150.47	6.413 71	-6.661 68	4.516 75	14,438,185.57	1,731,428.09	39.75637347	-80.67616655
13.499 97	89.00	150.47	6.415 46	-6.748 67	4.566 03	14,438,098.57	1,731,477.37	39.75613407	-80.67599233
13.599 97	89.00	150.47	6.417 22	-6.835 67	4.615 31	14,438,011.58	1,731,526.66	39.75589467	-80.67581810
13.699 97	89.00	150.47	6.418 97	-6.922 66	4.664 60	14,437,924.58	1,731,575.94	39.75565527	-80.67564387
13.799 97	89.00	150.47	6.420 72	-7.009 66	4.713 88	14,437,837.59	1,731,625.22	39.75541587	-80.67546964
13.899 97	89.00	150.47	6.422 47	-7.096 66	4.763 16	14,437,750.59	1,731,674.50	39.75517646	-80.67529541
13.999 97	89.00	150.47	6.424 22	-7.183 65	4.812 44	14,437,663.60	1,731,723.79	39.75493706	-80.67512119
14.044 27	89.00	150.47	6.425 00	-7.272 19	4.834 27	14,437,625.06	1,731,745.82	39.75483101	-80.67504401

PBHL/TD 14044.27 MD/8425.00 TVD



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Keith Stern S-11 HM (slot M)
Company:	Tug Hill Operating LLC	TVD Reference:	GL @ 744.00usft
Project:	Marshall County, West Virginia	MD Reference:	GL @ 744.00usft
Site:	Keith Stern	North Reference:	Grid
Well:	Keith Stern S-11 HM (slot M)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		JUN 29 2020
Design:	rev2		

WV Department of Environmental Protection

Design Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hi/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
LP Keith Stern S-11 HM - plan misses target center by 43.39usft at 6770.63usft MD (6297.01 TVD, -894.55 N, 1249.54 E) - Point	0.00	0.00	6,298.00	-916.58	1,212.18	14,443,930.66	1,728,123.52	39.77218323	-80.68785335
LP Keith Stern S-11 HM - plan hits target center - Point	0.00	0.01	6,298.00	-916.58	1,262.18	14,443,930.66	1,728,173.52	39.77218275	-80.68767541
BHL Keith Stern S-11 HI - plan hits target center - Point	0.00	0.01	6,425.00	-7,222.19	4,834.28	14,437,625.06	1,731,745.62	39.75483100	-80.67504400

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
1,400.00	1,400.00	0.00	0.00	KOP Begin 2°/100' build
1,650.00	1,649.68	-7.01	8.35	Begin 5.00° tangent
3,507.39	3,500.00	-111.06	132.36	Begin 2°/100' build/turn
4,426.53	4,387.92	-215.55	328.04	Begin 23.18° tangent
6,093.97	5,920.72	-497.99	920.58	Begin 10°/100' build/turn
6,796.06	6,298.00	-916.59	1,262.18	Begin 89.00° lateral section
14,044.27	6,425.00	7,222.19	4,834.27	PBHL/TD 14044.27 MD/6425.00 TVD

Area of Review

4705102331

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 Dev'n Ducoeur 724-705-0444, dducoeur@dpslandservices.com DPS GIS (12/19/2016) 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

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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

4705102331

Permit well - Keith Stern S-11HM

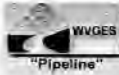
Wells within 500' Buffer

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
47-051-00594	Leatherwood Incorporated	2,375' TVD 2,375' MD	Gordon	Unknown	No, the well is not deep enough to be within the expected fracture propagation from a Marcellus stimulation.	Producing from the Gordon. Most recent production was 2016
47-051-00726	Perkins Oil & Gas	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete but have recent production as of 2016
47-051-30337	Valley Steel Products Company	2,436' TVD	Unknown	Unknown	No, the well is not deep enough to be within the expected fracture propagation from a Marcellus stimulation.	Well was plugged on 10/30/1951
47-051-70730	Unknown	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete
47-051-70736	Unknown	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete
47-051-70737	Unknown	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete
47-051-70740	Unknown	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete
47-051-70780	Unknown	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete
47-051-70781	Manufacturers Light & Heat	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete
47-051-70784	South Penn Oil	Unknown	Unknown	Unknown	Unknown but unlikely. The well likely represents an old shallow well that is too shallow to be effected by fracturing in the planned Marcellus well.	State records are incomplete

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WV Department of Environmental Protection

4705102331



Select County: (051) Marshall Select datatypes: [X] Check All
Enter permit: 00594
[OK] [Cancel] [Print] [Refresh] [Close]

Map Information:
County Code: Transmission
Permit Category: Station
Cadastral Information:
Map Scale: 1:50000
Projection: NAD 83

WV Geological & Economic Survey

Well: County = 51 Permit = 00594

Well Reassignment Information: Reassigned From:
OLD COUNTY OLD PERMIT NEW COUNTY NEW PERMIT
51 31 51 31

Location information: Map View

Table with columns: API, COUNTY, PERMIT, TAX DISTRICT, QUAD, 76 QUAD, 75, LRI, 06 LOR, 03 UTM, UTM

There is no Bottom Hole Location data for this well.

Owner Information:

Table with columns: API, CMP_DT, SURF_U, STATUS, SURFACE_OWNER, WELL_NUM, CC_NUM, LEASE, LEASE_NUM, MINERAL_OWN, OPERATOR, AT_COMPLETION, PROP_VO, PROP_TRTG_FM, TFM_EST_P

Completion Information:

Table with columns: API, CMP_DT, SPUD_DT, ELEV, DATUM, WELD, DEEPST_FW, DEEPST_FHT, INITIAL_CLASS, FINAL_CLASS, TYPE, RIG, CMP_MTHD, FID, TIME, NEW_FIG, D_SEE, FLAT

There is no Pay data for this well.

Production Gas Information (Volumes in Mcf)

Table with columns: API, PRODUCING_OPERATOR, PROD_YEAR, ANN_GAS, JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC

Production Oil Information (Volumes in Bbl)

Table with columns: API, PRODUCING_OPERATOR, PROD_YEAR, ANN_OIL, JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC

Production NGL Information (Volumes in Bbl)

Table with columns: API, PRODUCING_OPERATOR, PROD_YEAR, ANN_NGL, JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC

Production Water Information (Volumes in Gallons)

Table with columns: API, PRODUCING_OPERATOR, PROD_YEAR, ANN_WTG, JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC

There is no Stratigraphy data for this well.

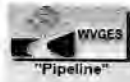
There is no Wireline (E-Log) data for this well.

There is no Plugging data for this well.

There is no Sample data for this well.

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Environmental Protection

4705102331



Select County: (051) Marshall
 Enter Permit #: 00726
 Select井types: (Check All)
 Location Production Plugging
 Owns/Completion Syn/gram Gas/Oil
 Pay/Show/Rate Log Bld Hdw Lot

Get Data Reset

Title: Data Tables
 County: State Transitions
 Permit: Gas/Oil Series
 Using: None
 Loaded: Information
 Location:
 Operator:
 W/SCS Map
 Database: EPL

W/ Geological & Economic Survey

Well: County = 51 Permit = 00726

Location Information View Map

API	COUNTY	PERMIT	TAX DISTRICT	QUAD 75	QUAD 15	LAT_DD	LONG_DD	UTME	UTNM
4705100726	Marshall	726	Meade	Gen Station	Canister	35 77 3004	50 05 0315	828345 S	4402621 N

There is no Bottom Hole Location data for this well

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROG_V0	PROP_TRGT_FM	TFM_EST_PR
4705100726	4/1	Original Log	Completed	Gen & Auley	489					Hayes Steel Products			

Completion Information

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FWT	INITIAL_CLASS	FINAL_CLASS	TYPE	INC	CMP_MTHD	TVD	TMD	NEW_FTG	G_BFF	G_AFT	O_BEP	O_AFT
4705100726	4/1	4/1	700	Ground Level			unclassified	unclassified		CR	unclassified	unclassified	2458					

There is no Pay data for this well

Production Gas Information (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4705100726	Perkins Oil and Gas Inc	1997	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	1998	2,315	5	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	1999	2,902	361	196	464	336	567	271	184	208	428	474	360	266
4705100726	Perkins Oil and Gas Inc	2000	4,465	284	309	273	127	64	6	151	196	95	122	83	42
4705100726	Perkins Oil and Gas Inc	2001	2,704	420	260	291	52	105	10	156	152	107	415	196	285
4705100726	Perkins Oil and Gas Inc	2002	2,041	383	323	387	136	107	131	121	44	15	154	2	235
4705100726	Perkins Oil and Gas Inc	2003	2,226	587	241	375	410	773	36	72	84	120	211	629	264
4705100726	Perkins Oil and Gas Inc	2004	4,856	416	340	448	428	375	245	146	480	435	211	629	264
4705100726	Perkins Oil and Gas Inc	2005	4,180	517	371	470	498	527	362	405	421	497	430	338	332
4705100726	Perkins Oil and Gas Inc	2006	4,502	707	1,118	373	513	343	381	253	481	493	422	371	163
4705100726	Perkins Oil and Gas Inc	2007	4,502	607	379	360	74	481	484	421	370	357	461	451	392
4705100726	Perkins Oil and Gas Inc	2008	4,795	269	269	460	457	280	430	427	410	366	499	464	370
4705100726	Perkins Oil and Gas Inc	2010	2,112	1,933	88	404	123	125	775	183	238	184	4	160	112
4705100726	Perkins Oil and Gas Inc	2011	1,922	153	104	130	184	137	158	210	237	307	57	101	83
4705100726	Perkins Oil and Gas Inc	2012	4,256	109	84	127	206	373	500	51	60	137	315	244	203
4705100726	Perkins Oil and Gas Inc	2013	4,582	254	558	695	1,121	524	742	781	60	181	180	188	216
4705100726	Perkins Oil and Gas Inc	2014	4,238	326	320	201	444	561	336	377	352	359	360	391	337
4705100726	Perkins Oil and Gas Inc	2015	4,119	556	22	130	141	338	322	778	236	342	359	330	359
4705100726	Perkins Oil and Gas Inc	2016	1,608	325	345	136	227	140	53	95	108	89	23	30	197

Production Oil Information (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4705100726	Perkins Oil and Gas Inc	1997	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	1998	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	1999	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2001	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2002	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2003	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2004	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2005	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2006	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2007	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2008	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2009	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2010	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2011	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2012	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2016	0	0	0	0	0	0	0	0	0	0	0	0	0

Production NGL Information (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4705100726	Perkins Oil and Gas Inc	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4705100726	Perkins Oil and Gas Inc	2016	0	0	0	0	0	0	0	0	0	0	0	0	0

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 Environmental Protection



Select County: (051) Marshall
 Enter Permit #: 30337
 Select井types: (Check All)
 Location Production Plugging
 Owns/Completion Syn/gram Sample
 Pay/Show/Rate Log Bld Hdw Lot

Get Data Reset

Title: Data Tables
 County: State Transitions
 Permit: Gas/Oil Series
 Using: None
 Loaded: Information
 Location:
 Operator:
 W/SCS Map
 Database: EPL

W/ Geological & Economic Survey

Well: County = 51 Permit = 30337

Location Information View Map

API	COUNTY	PERMIT	TAX DISTRICT	QUAD 75	QUAD 15	LAT_DD	LONG_DD	UTME	UTNM
4705100337	Marshall	30337	Meade	Gen Station	Canister	26 77 2678	49 09 0776	508167 S	4402377 N

There is no Bottom Hole Location data for this well

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROG_V0	PROP_TRGT_FM	TFM_EST_PR
4705100337	4/1/13	Original Log	Completed	Jacko Baxton	490					Hayes Steel Products			

Completion Information

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FWT	INITIAL_CLASS	FINAL_CLASS	TYPE	INC	CMP_MTHD	TVD	TMD	NEW_FTG	G_BFF	G_AFT	O_BEP	O_AFT
4705100337	4/1/13	4/1/13					unclassified	unclassified	CR	unclassified	unclassified	unclassified	2458					

There is no Pay data for this well

There is no Production Gas data for this well

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

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

There is no Production Water data for this well

There is no Stratigraphy data for this well

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

Plugging Information

API	PLG_DT	DEPTH_FBT
4705100337	10/20/19	0

There is no Sample data for this well

4705102331

WVGES Pipeline

Select County: (051) Marshall Select datatypes: (Check All)
 Enter Permit #: 70730
 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Shim Hole Log

Table Descriptions
 County Code, Translations
 Permit Number(s) Series
 Lease Notes
 Contact Information
 Checkboxes
 W/GEIS Map
 Pipeline Page View

WV Geological & Economic Survey Well: County = 51 Permit = 70730

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_76	QUAD_16	LAT_DD	LON_DD	UTME	UTMN
470510730	Marshall	70730	Meigs	06m Easton	Canaan	39.792951	-80.679448	507457.7	4421137.1

 There is no Bottom Hole Location data for this well

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT_FM	TFM_EST_PR
470510730			unknown	Pratt, Marc J M Meigs									

 Completion Information

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FIG	G_BEF	G_AFT	G_BEF
470510730								unclassified	unclassified		not available	unknown	unknown					

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

WVGES Pipeline

Select County: (051) Marshall Select datatypes: (Check All)
 Enter Permit #: 70738
 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Shim Hole Log

Table Descriptions
 County Code, Translations
 Permit Number(s) Series
 Lease Notes
 Contact Information
 Checkboxes
 W/GEIS Map
 Pipeline Page View

WV Geological & Economic Survey Well: County = 51 Permit = 70738

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_76	QUAD_16	LAT_DD	LON_DD	UTME	UTMN
470510738	Marshall	70738	Meigs	06m Easton	Canaan	39.7338	-80.673984	527596.6	4401236.2

 There is no Bottom Hole Location data for this well

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT_FM	TFM_EST_PR
470510738			unknown	Pratt, Marc J M Meigs									

 Completion Information

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FIG	G_BEF	G_AFT	G_BEF
470510738								unclassified	unclassified		not available	unknown	unknown					

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

WVGES Pipeline

Select County: (051) Marshall Select datatypes: (Check All)
 Enter Permit #: 70737
 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Shim Hole Log

Table Descriptions
 County Code, Translations
 Permit Number(s) Series
 Lease Notes
 Contact Information
 Checkboxes
 W/GEIS Map
 Pipeline Page View

WV Geological & Economic Survey Well: County = 51 Permit = 70737

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_76	QUAD_16	LAT_DD	LON_DD	UTME	UTMN
470510737	Marshall	70737	Meigs	06m Easton	Canaan	39.797489	-80.677191	507652.1	4405821.7

 There is no Bottom Hole Location data for this well

Owner Information

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT_FM	TFM_EST_PR
470510737			unknown	Pratt, Marc J M Meigs									

 Completion Information

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FIG	G_BEF	G_AFT	G_BEF
470510737								unclassified	unclassified		not available	unknown	unknown					

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

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JUN 29 2020

WV Department of
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4705102331

WGES "Pipeline"

Select County: (051) Marshall Select datatypes: (Check All)
 Enter Permit #: 70740 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Btm Hole Log

Table Descriptions: County Code, Transitions, Permit-Numbering Suffix, Lease Index, Contact Information, Ownership, WUGES Menu, "Process-Flow" View

WV Geological & Economic Survey **Well: County = 51 Permit = 70740**

Location Information [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_16	LAT_DD	LONG_DD	UTIME	UTMM
4705170740	Marshall	70740	Marble	Star Eastern	Carverton	35.755042	-80.877843	527551.5	4402770.4

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT_FM	TFM_EST_PR
4705170740	---	---	---	unknown	Bryce Mac	Hercy Mason	8	---	---	unknown	---	---	---

Completion Information:

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTC	G_BEF	G_AFT	O_BEF
4705170740	---	---	---	---	unclassified	unclassified	---	---	---	---	---	---	---	---	---	---	---

There is no Pay data for this well

There is no Production Gas data for this well

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

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

There is no Production Water data for this well

There is no Stratigraphy data for this well

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

There is no Plugging data for this well

There is no Sample data for this well

WGES "Pipeline"

Select County: (051) Marshall Select datatypes: (Check All)
 Enter Permit #: 70780 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Btm Hole Log

Table Descriptions: County Code, Transitions, Permit-Numbering Suffix, Lease Index, Contact Information, Ownership, WUGES Menu, "Process-Flow" View

WV Geological & Economic Survey **Well: County = 51 Permit = 70780**

Location Information [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_16	LAT_DD	LONG_DD	UTIME	UTMM
4705170780	Marshall	70780	Marble	Star Eastern	Carverton	35.775925	-80.882654	528251.2	4402632.6

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT_FM	TFM_EST_PR
4705170780	---	---	---	unknown	Rygo Mac	J.A. Alley	---	---	---	unknown	---	---	---

Completion Information:

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTC	G_BEF	G_AFT	O_BEF
4705170780	---	---	---	---	unclassified	unclassified	---	---	not available	unknown	---	---	---	---	---	---	---

There is no Pay data for this well

There is no Production Gas data for this well

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

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

There is no Production Water data for this well

There is no Stratigraphy data for this well

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

There is no Plugging data for this well

There is no Sample data for this well

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WGES "Pipeline"

Select County: (051) Marshall Select datatypes: (Check All)
 Enter Permit #: 70751 Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Btm Hole Log

Table Descriptions: County Code, Transitions, Permit-Numbering Suffix, Lease Index, Contact Information, Ownership, WUGES Menu, "Process-Flow" View

WV Geological & Economic Survey **Well: County = 51 Permit = 70751**

Location Information [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_16	LAT_DD	LONG_DD	UTIME	UTMM
4705170751	Marshall	70751	Marble	Star Eastern	Carverton	35.737748	-80.803767	523255.1	4402662.1

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VO	PROP_TRGT_FM	TFM_EST_PR
4705170751	---	---	---	unknown	Patty Mac	J.L. Nelson	---	---	---	Marshall/Louis & Ross Co.	---	---	---

Completion Information:

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTC	G_BEF	G_AFT	O_BEF
4705170751	---	---	---	---	unclassified	unclassified	---	---	not available	unknown	---	---	---	---	---	---	---

There is no Pay data for this well

There is no Production Gas data for this well

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

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

There is no Production Water data for this well

There is no Stratigraphy data for this well

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

There is no Plugging data for this well

There is no Sample data for this well

705102331

4705102331

WV Geological & Economic Survey

Well: County = 51 Permit = 70784

WVGES "Pipeline"

Select County: (051) Marshall Select datatypes: (Check All)

Enter Permit #: 70784

Get Data Reset

Location Production Plugging
 Owner/Completion Stratigraphy Sample
 Pay/Show/Water Logs Btm Hole Log

Table Descriptions
 County Code Translation
 Permit Numbering Series
 Usage Notes
 Contact Information
 Disclaimer
 WY Data Menu
 "Pipeline-Flka" View

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LONG_DD	UTME	UTMN
4705170784	Marshall	70784	Meade	Olea Station	Cameron	39.733523	-80.634143	5270519	4472113.5

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR	AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TRM_EST_PR
4705170784	Praty, Msp, J F Young	1					South Penn Oil & Penn Nat Gas				

Completion Information:

API	CMP_DT	SPUD_DT	ELEV DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	Q_BEF	C_AFT	O_BEF
4705170784				unclassified	unclassified	not available	unknown	unknown						

There is no Pay data for this well

There is no Production Gas data for this well

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

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

There is no Production Water data for this well

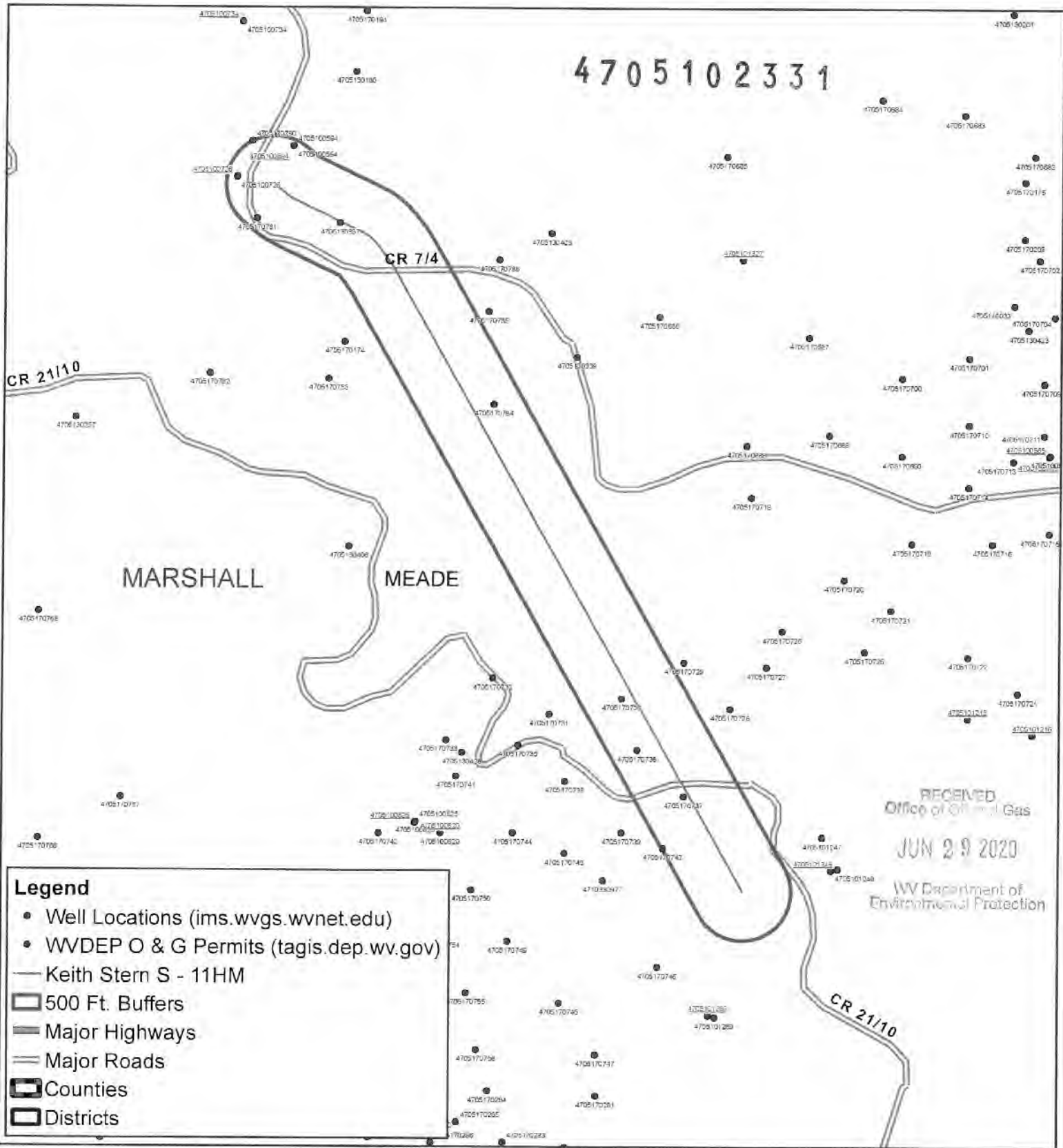
There is no Stratigraphy data for this well

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

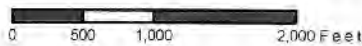
There is no Plugging data for this well

There is no Sample data for this well

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Keith Stern S-11HM Meade District Marshall County, WV



Map Created: May 1, 2018
Map Current As Of: May 1, 2018

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

Map Prepared by:
DPS
LAND SERVICES

WW-9
(4/16)

API Number 47 - 051
Operator's Well No. Kaith Stern S-11HM

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Tug Hill Operating, LLC OP Code 494510851

Watershed (HUC 10) Fish Creek Quadrangle 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 lining

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? Wayne County Sanitary Landfill (SWF-1021 / WYO102162) and Westmoreland Sanitary Landfill, LLC (SAH1408 / PA DEP BCR1280438)

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.

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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 _____

Company Official (Typed Name) Sean Gasser

Company Official Title Engineer

Subscribed and sworn before me this 25 day of April, 2018

Sarah Henry Notary Public

My commission expires _____



Tug Hill Operating, LLC

Proposed Revegetation Treatment: Acres Disturbed 19.18 Prevegetation pH 6.0

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch 2.5 Tons/acre

Seed Mixtures

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

Attach:

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

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Jan [Signature]

Comments: _____

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Title: Oil and Gas Inspector

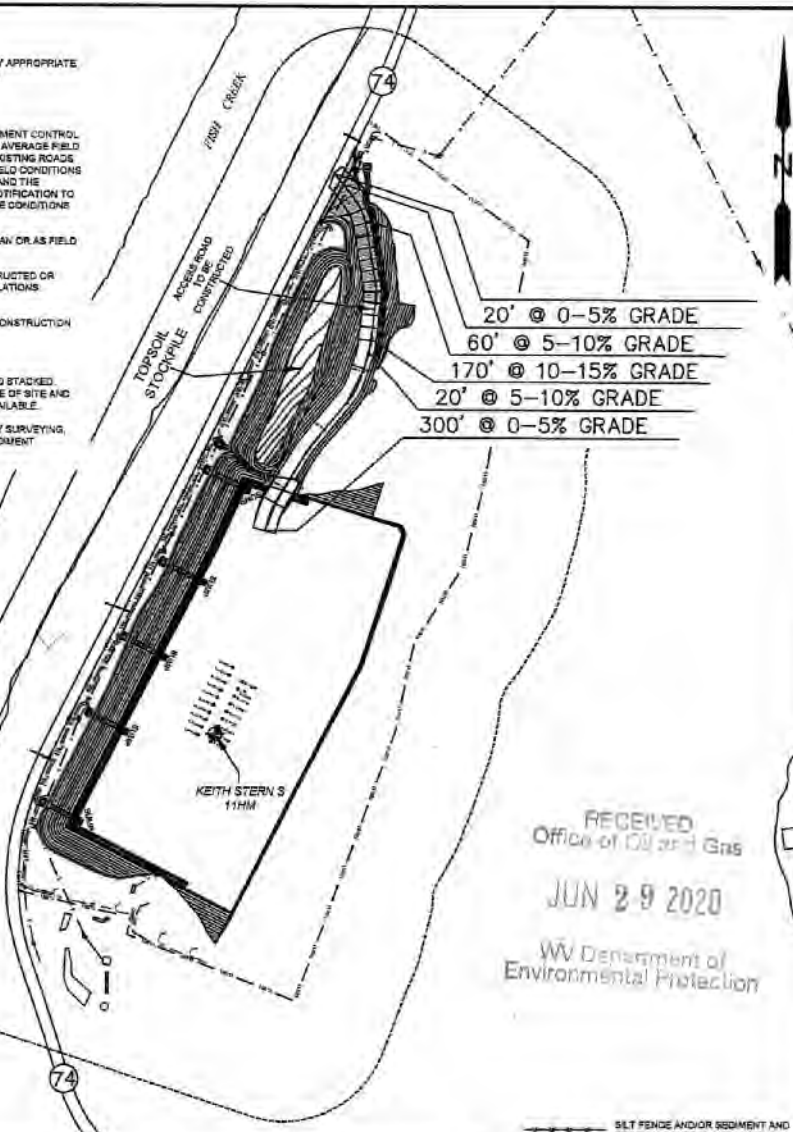
Date: 4/25/18

Field Reviewed? Yes No

PROPOSED KEITH STERN S - 11HM

NOTES:

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



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www.slsurvey.com

TOPO SECTION:		OPERATOR:	
GLEN EASTON 7.5'		PREPARED FOR:	
COUNTY	DISTRICT	TUG HILL OPERATING, LLC	
MARSHALL	MEADE	380 SOUTHPOINTE BLVD	
		SUITE 200	
		CANONSBURG, PA 15317	
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8811	04/17/2018	NONE

TUG HILL
OPERATING



Well Site Safety Plan

Tug Hill Operating, LLC

Ju
6/8/2020

Well Name: Keith Stern S-11HM

Pad Location: Keith Stern Pad

Marshall County, West Virginia

UTM meters , NADD83, Zone 17:

Northing: 4,402,798.24

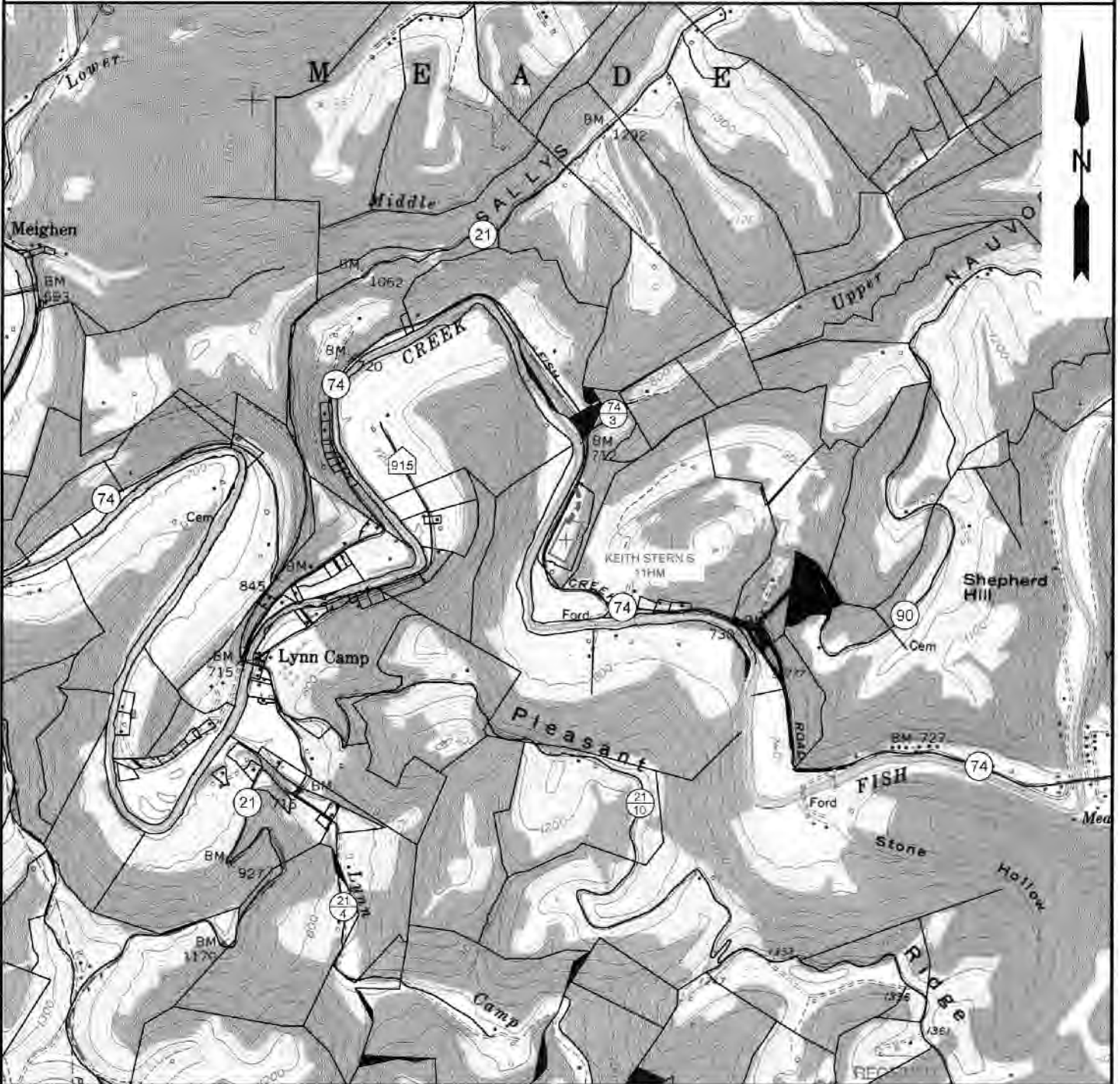
Easting: 526,363.63

JUN 29 2020

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Environmental Protection

May 2020

PROPOSED KEITH STERN S - 11HM



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

LAT: 39.7137712
LON: -80.8258327
LOCATED: S 60°11'49" W AT 43,719.31' FROM THE CENTER OF KEITH STERN S WELL PAD LOCATION.

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www.slssurveys.com

TOPO SECTION:		OPERATOR:	
GLEN EASTON 7.5'		PREPARED FOR:	
COUNTY	DISTRICT	TUG HILL OPERATING, LLC	
MARSHALL	MEADE	380 SOUTHPOINTE BLVD	
		SUITE 200	
		CANONSBURG, PA 15317	
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8811	04/17/2018	1" = 2000'

WV Department of
Environmental Protection
TUG HILL
OPERATING

7,164' T.H.

2,355' B.H.

**KEITH STERN S LEASE
WELL 11HM
TUG HILL OPERATING**

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

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

NAD'83 S.P.C.(FT) N. 466,512.72 E. 1,633,435.45
NAD'83 GEO. LAT-(N) 39.774712 LONG-(W) 80.692156
NAD'83 UTM (M) N. 4,402,798.24 E. 526,363.63

LANDING POINT

NAD'83 S.P.C.(FT) N. 465,574.9 E. 1,634,682.6
NAD'83 GEO. LAT-(N) 39.772183 LONG-(W) 80.687675
NAD'83 UTM (M) N. 4,402,518.9 E. 526,748.3

BOTTOM HOLE

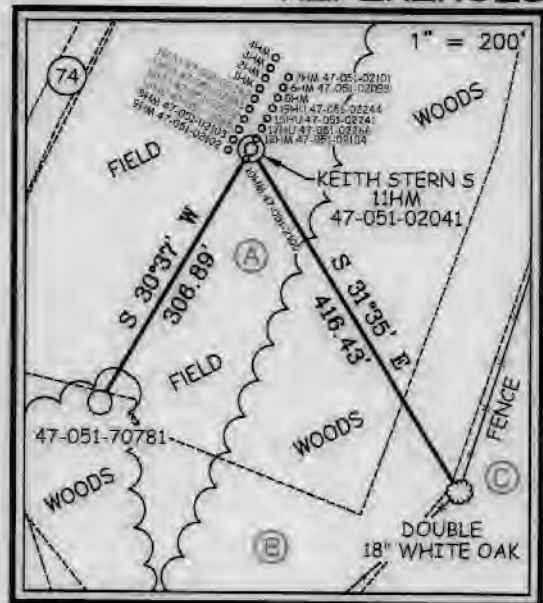
NAD'83 S.P.C.(FT) N. 459,208.3 E. 1,638,160.0
NAD'83 GEO. LAT-(N) 39.754831 LONG-(W) 80.675044
NAD'83 UTM (M) N. 4,400,596.9 E. 527,837.1

T.H. LONGITUDE 80°40'00"
B.H. LONGITUDE 80°40'00"

TAX MAP/PCL	ADJOINING SURFACE OWNER	ACRES
17-4	PHILIP L. MCCABE	7.097
17-4.1	DAVID M. FRABRIZIO	5.780
17-4.2	RICKY E DAVIS	1.301
17-4.3	SYLVIA JEAN NECHOUSE	1.329
17-5	KENNETH E. JANISZEWSKI, ET UX	5.00
17-38.1	RYAN J. & MICHELLE L. RIDDLE	3.00
19-4.1	SAMUEL YOHO	3.97



REFERENCES



13,418' B.H.

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 IS 1"=2000'



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1300 University Drive, Suite 500, Fort Worth, TX 76107
Tel: 817-342-2200
Fax: 817-342-2200
www.sls.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 APRIL 17, 20 18
REVISED APRIL 9, MAY 18, 20 20
OPERATORS WELL NO. KEITH STERN N-11HM
API WELL NO. 47 - 051 - 02331
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8811P11HMR2.dwg
KEITH STERN S-11HM-REV2
HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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



WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL IF "GAS" PRODUCTION STORAGE DEEP SHALLOW
LOCATION: GROUND = 741.50' ELEVATION PROPOSED = 744.65' WATERSHED FISH CREEK (HUC 10)
DISTRICT MEADE COUNTY MARSHALL QUADRANGLE GLEN EASTON 7.5'
SURFACE OWNER TH EXPLORATION, LLC ACREAGE 10.05±
ROYALTY OWNER TH EXPLORATION, LLC, ET AL - SEE WV-6A1 ACREAGE 10.05±
PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON CLEAN OUT AND REPLUG OTHER
PHYSICAL CHANGE IN WELL (SPECIFY) _____ TARGET FORMATION MARCELLUS
ESTIMATED DEPTH TVD: 6,412' / TMD: 14,044'

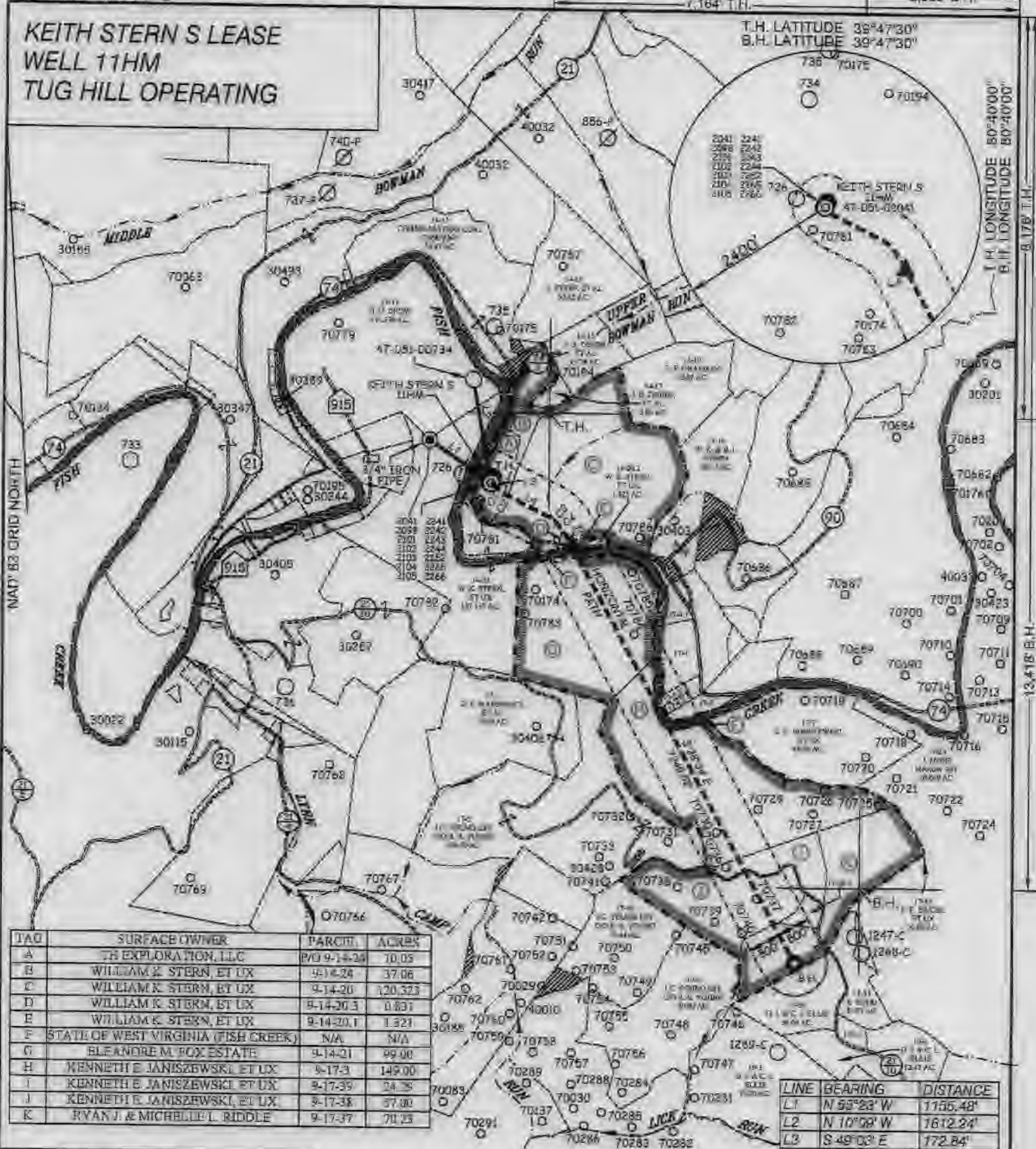
WELL OPERATOR TUG HILL OPERATING, LLC ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 FORT WORTH, TX 76107
DESIGNATED AGENT DIANNA STAMPER GT CORPORATION SYSTEM ADDRESS 5400 D BIG TYLER ROAD CHARLESTON, WV 25313

COUNTY NAME PERMIT

**KEITH STERN S LEASE
WELL 11HM
TUG HILL OPERATING**

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

T.H. LONGITUDE 80°40'00"
B.H. LONGITUDE 80°40'00"



TAG	SURFACE OWNER	PARCEL	ACRES
A	TH EXPLORATION, LLC	P/O 9-14-24	10.05
B	WILLIAM K. STERN, ET UX	9-14-24	37.06
C	WILLIAM K. STERN, ET UX	9-14-20	120.323
D	WILLIAM K. STERN, ET UX	9-14-20.3	0.831
E	WILLIAM K. STERN, ET UX	9-14-20.1	1.321
F	STATE OF WEST VIRGINIA (FISH CREEK)	N/A	N/A
G	BLEANDRE M. FOX ESTATE	9-14-21	99.00
H	KENNETH E. JANISZEWSKI, ET UX	9-17-3	149.00
I	KENNETH E. JANISZEWSKI, ET UX	9-17-35	24.35
J	KENNETH E. JANISZEWSKI, ET UX	9-17-38	37.80
K	RYAN J. & MICHELLE L. RIDDLE	9-17-37	70.25

LINE	BEARING	DISTANCE
L1	N 53°23' W	1155.48'
L2	N 10°58' W	1612.24'
L3	S 49°03' E	172.84'
L4	S 68°32' E	706.28'

CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	39.91'	298.07'	S 55°48' E	39.88'
C2	136.01'	2182.98'	S 61°38' E	184.99
C3	106.44'	382.12'	S 51°25' E	106.99
C4	198.77'	7264.23'	S 39°00' E	198.56
C5	238.16'	2285.77'	S 31°35' E	288.05



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266 8th Street, Dunbar, WV 26031 | 304.335.5290
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(*) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

P.S. 849 *C. Victor Moyers*

LEGEND

- LEASE LINE
- SURFACE LINE
- WELL LATERAL
- OFFSET LINE
- TIE LINE
- CREEK
- ROAD
- COUNTY ROUTE
- PROPOSED WELL
- EXISTING WELL
- PERMITTED WELL
- TAX MAP-PARCEL
- LEASE # (SEE WW-8A1)
- SURFACE OWNER (SEE TABLE)

SCALE 1" = 2000 FILE NO. 8811P11HMR2.dwg
KEITH STERN S-11HM-REV2
DATE APRIL 17, 2018
REVISED APRIL 9, MAY 18, 2020
OPERATORS WELL NO. KEITH STERN N-11HM
API WELL NO. 47-51-02341
STATE COUNTY PERMIT

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

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

COUNTY NAME PERMIT

WW-6A1
(5/13)

Operator's Well No. Keith Stern S-11HM

**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

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Office of Oil and Gas

JUN 29 2020

WV Department of
Environmental Protection

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

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

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

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

Well Operator: Tug Hill Operating, LLC

By: Amy L. Miller *Amy Miller*

Its: Permitting Specialist - Appalachia Region

Legal ID	Tag	Parcel No.	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	
10*15609	A	9-14-20.1	ISAAC CROW ET UX	JOHN G BRAWFORD	1/8+	74 394 148/889	Wheeling Natural Gas Company to The Manufacturers Light & Heat Company	Manufacturers to Union Gasoline & Oil Corp	Union to The Preston Oil Company 2/136	Preston to Manufacturers Light & Heat Company 2/225	Cert. of Merger of Manufacturers Light & Heat Company into Columbia Gas Transmission Corp 4/22/204	Columbia Gas Trans. Corp. to Columbia Natural Resources, Inc 5/31/518	Columbia Natural Resource Inc. to Pennsylvania Land Holdings Corp 5/18/205	Dennis N. Roglio, Successor Trustee to Tri-County Oil & Gas, Inc. on Oct. 24, 2007	Tri-County Oil & Gas Inc merged into Leathwood, Inc on Oct. 24, 2007	Sublease from Leathwood, Inc to CHK Gas Company LLC 8/84/252	Sublease from Leathwood, Inc to CHK Gas Company LLC 9/6/460	Assignment of Agreement between Tug Hill and CHK Gas Company LLC 9/8/460	Assignment of Agreement between Tug Hill and CHK Gas Company LLC 9/8/460	Assignment of Agreement between Tug Hill and CHK Gas Company LLC 9/8/460
10*15605	B	9-14-24	ISAAC CROW ET UX	JOHN G BRAWFORD	1/8+	74 394 148/889	Wheeling Natural Gas Company to The Manufacturers Light & Heat Company	Manufacturers to Union Gasoline & Oil Corp 1/9/120	Union to The Preston Oil Company 2/136	Preston to Manufacturers Light & Heat Company 2/225	Cert. of Merger of Manufacturers Light & Heat Company into Columbia Gas Transmission Corp 4/22/204	Columbia Gas Trans. Corp. to Columbia Natural Resources, Inc 5/31/518	Columbia Natural Resource Inc. to Pennsylvania Land Holdings Corp 5/18/205	Dennis N. Roglio, Successor Trustee to Tri-County Oil & Gas, Inc. on Oct. 24, 2007	Tri-County Oil & Gas Inc merged into Leathwood, Inc on Oct. 24, 2007	Sublease from Leathwood, Inc to CHK Gas Company LLC 8/84/252	Sublease from Leathwood, Inc to CHK Gas Company LLC 9/6/460	Assignment of Agreement between Tug Hill and CHK Gas Company LLC 9/8/460	Assignment of Agreement between Tug Hill and CHK Gas Company LLC 9/8/460	Assignment of Agreement between Tug Hill and CHK Gas Company LLC 9/8/460
10*15509	C	9-14-20	WILLIAM K AND BETTY L STERN	HWAC LLC	1/8+	718 370	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assignment of Agreement between Tug Hill and Chevron 2/5/332	
10*15597	D	9-14-20.3	BRAADLEY CROW AND BETTY L CROW	CHESSPEAKE APPALACHIA LLC	1/8+	788 350	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assignment of Agreement between Tug Hill and Chevron 2/5/332	
10*15588	D	9-14-20.3	GLADYS CROW	CHESSPEAKE APPALACHIA LLC	1/8+	789 600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assignment of Agreement between Tug Hill and Chevron 2/5/332	
10*15589	I	9-14-20.3	LEWIS M DUGLEY AND MAXINE V DUGLEY	CHESSPEAKE APPALACHIA LLC	1/8+	789 605	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assignment of Agreement between Tug Hill and Chevron 2/5/332	
10*15586	D	9-14-20.3	CONNIE HECKLE	CHESSPEAKE APPALACHIA LLC	1/8+	770 547	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assignment of Agreement between Tug Hill and Chevron 2/5/332	
10*15967	D	9-14-20.3	H GLENN CROW	CHESSPEAKE APPALACHIA LLC	1/8+	770 565	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assignment of Agreement between Tug Hill and Chevron 2/5/332	
10*15964	E	9-14-20.1	GLADYS CROW	CHESSPEAKE APPALACHIA LLC	1/8+	769 410	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assignment of Agreement between Tug Hill and Chevron 2/5/332	
10*15985	E	9-14-20.1	H GLENN CROW	CHESSPEAKE APPALACHIA LLC	1/8+	770 535	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assignment of Agreement between Tug Hill and Chevron 2/5/332	

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Tract No.	Parcel No.	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Deed Book/Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment
10-15805	9-17-37	JOANNE FOX	CHESAPEAKE APPALACHIA LLC	1/8+	683	634	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-15805	9-17-37	GIORR VAN SOYOC	CHESAPEAKE APPALACHIA LLC	1/8+	685	190	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-15808	9-17-37	ANGELA VOHO	CHESAPEAKE APPALACHIA LLC	1/8+	685	199	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-15809	9-17-37	RYAN J AND MICHELE L RIDDIE	CHESAPEAKE APPALACHIA LLC	1/8+	687	225	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-15810	9-17-37	ROSSIE P RUTAN	CHESAPEAKE APPALACHIA LLC	1/8+	690	266	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-15811	9-17-37	SANDRA M WINSTON	CHESAPEAKE APPALACHIA LLC	1/8+	719	51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-21969	9-17-37	MARR WISLIV RICHARDSON	THE EXPLORATION LLC	1/8+	960	507	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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MEMORANDUM OF AGREEMENT

This Memorandum of Agreement is entered into this 23rd day of March, 2018, between TUG HILL OPERATING, LLC (THQ), a Texas limited liability company, whose address is 1320 S. University Blvd., Suite 500, Fort Worth, TX 76107 and CNX GAS COMPANY LLC (CNX), a Virginia limited liability company, whose address is 1000 Consol Energy Drive, Suite 400, Canonsburg, PA 15317.

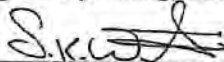
PARTIES AND AGREEMENT REFERENCE: THQ and CNX entered into a letter agreement ("Letter Agreement") dated March 29, 2018 (the "Commencement Date") granting THQ the right to permit, drill, extract, produce and market oil and gas from those certain oil and gas interests controlled by CNX in the Meade, Cameron, and Franklin Districts of Marshall County, West Virginia, as more fully described in Exhibit A attached hereto, made a part hereof, and incorporated herein by reference.

1. **TERM:** The Letter Agreement shall remain in full force and effect for a term of one hundred eighty (180) days.

2. **MEMORANDUM FOR RECORDING PURPOSES ONLY:** This Memorandum is for recording purposes only and does not enlarge, supplement or supersede the parties' respective rights set forth in the Letter Agreement or other agreements.

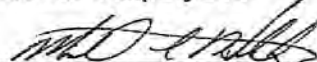
IN WITNESS WHEREOF, the parties have signed their names hereto as of the date first above written.

Tug Hill Operating, LLC



By: Sean Willis
Its: SVP – Engineering & Development

CNX Gas Company LLC



By: Michael Holiday
Its: Assistant Vice President

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Prepared by Tug Hill Operating, LLC
1320 S. University Dr., Suite 500, Fort Worth, TX 76107

Marshall County
Jan Pest, Clerk
Instrument 1439654
04/27/2018 @ 10:03:48 AM
AGREEMENT
Book 968 @ Page 460
Pages Recorded 3
Recording Cost \$ 11.00

STATE OF WEST VIRGINIA §
§
COUNTY OF MARSHALL §

RECORDED
INDEXED
MAR 17 2016
MARSHALL COUNTY CLERK
OFFICE
100 MARKET STREET
MARSHALL, WV 24701
PHONE: 206-288-1234
FAX: 206-288-1235
WWW.MARSHALLCOUNTYCLERK.COM

ASSIGNMENT AND CONVEYANCE

THIS ASSIGNMENT AND CONVEYANCE (the "**Assignment**") is made and entered into this 17th day of May, 2016 (the "**Effective Date**"), by and between **CHEVRON U.S.A. INC.** (hereinafter "**Assignor**") and **TH EXPLORATION, LLC** (hereinafter "**Assignee**") pursuant to the terms of that certain Acreage Trade Agreement between the Assignor and the Assignee dated May 2, 2016 (the "**Acreage Trade Agreement**"). Capitalized terms used but not defined herein and defined in the Acreage Trade Agreement shall have the meanings given to such terms in the Acreage Trade Agreement.

WITNESSETH:

WHEREAS, Assignor desires to assign, set over, and transfer to Assignee all of Assignor's right, title, and interest in and to those certain Oil and Gas Leases situated in Marshall County, West Virginia, as described in **Exhibit "A"**, and as depicted in **Exhibits "A-1"** and **"A-2"**, attached hereto and made a part hereof (hereinafter the "**Leases**"); and

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

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

1. **Assignment.** Assignor does hereby grant, bargain, sell, convey, deliver, assign, set over and transfer, as of the Effective Date, to Assignee, its respective successors and assigns, forever, all of Assignor's right, title and interest in and to the Leases, and the lands covered thereby, together with all rights incident thereto and appurtenances thereon, except that Assignor accepts and reserves from this Assignment the Chevron ORRI previously conveyed to Assignor and as described in that certain Memorandum of Assignment of Oil and Gas Lease Interests dated November 6, 2012 by and between Cornell Holdings Incorporated and Chevron U.S.A. Inc., which is recorded at Book 0028, Page 0239 in the Office of the County Clerk of Marshall County, West Virginia.

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

2. **Special Warranty.** Assignor represents and warrants that Assignor has not conveyed or otherwise encumbered (other than Permitted Encumbrances) its interest in the Conveyed Interests since the time that Assignor obtained its interests in the Leases. Assignor does covenant, promise and agree, to and with the Assignee, its respective successors and assigns, to forever specially warrant and defend the title to the Leases or portions thereof included under this Assignment, unto the Assignee and its respective successors and assigns, against the lawful claims of Assignor, and all persons claiming, or to claim, the same or any part thereof, by, through or under Assignor.

RECORDED
Official of Clerk's Office

JUN 29 2016

WV Dept of Environmental Protection

2016
MAR 17 2016



TUG HILL

June 23, 2020

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

RE: Keith Stern S-11HM

Subject: Road Crossing Letter

Dear Laura:

Tug Hill Operating, LLC will not be drilling, extracting or producing any minerals under any WV County or State Routes in the area reflected on the Keith Stern S-11HM well plat.

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

Sincerely,

Amy L. Miller
Permitting Specialist – Appalachia Region

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JUN 29 2020
WV Department of
Environmental Protection

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

Date of Notice Certification: 06/23/2020

API No. 47-051
Operator's Well No. Keith Stern S-111M
Well Pad Name: Keith Stern

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>526,363.63</u>
County:	<u>Marshall</u>	UTM NAD 83 Northing:	<u>4,402,798.24</u>
District:	<u>Meade</u>	Public Road Access:	<u>Fish Creek Road (County Route 74)</u>
Quadrangle:	<u>Glen Easton 7.5'</u>	Generally used farm name:	<u>TH Exploration, LLC</u>
Watershed:	<u>Fish Creek (HUC 10)</u>		

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

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: *PLEASE CHECK ALL THAT APPLY		OOG OFFICE USE ONLY
<input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED		<input type="checkbox"/> RECEIVED/NOT REQUIRED
<input checked="" type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED		<input checked="" type="checkbox"/> RECEIVED
<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 <input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)		<input type="checkbox"/> RECEIVED/NOT REQUIRED
<input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION	RECEIVED OFFICE OF OIL AND GAS JUN 24 2020 WV Department of Environmental Protection	<input checked="" type="checkbox"/> RECEIVED
<input checked="" type="checkbox"/> 5. PUBLIC NOTICE		<input checked="" type="checkbox"/> RECEIVED
<input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION		<input checked="" type="checkbox"/> RECEIVED

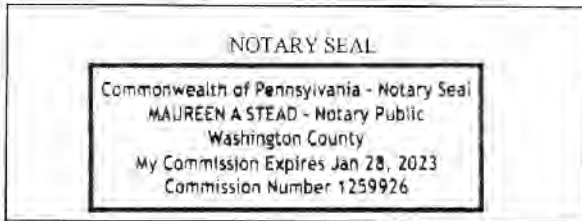
Required Attachments:

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

Certification of Notice is hereby given:

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

Well Operator:	<u>Tug Hill Operating, LLC</u>	Address:	<u>360 Southpointe Boulevard, Plaza II, Suite 200</u>
By:	<u>Amy L. Miller <i>[Signature]</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-hilop.com</u>



Subscribed and sworn before me this 23 day of JUNE, 2020.
[Signature] Notary Public
 My Commission Expires 1/28/23

Oil and Gas Privacy Notice:

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

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JUN 29 2020
WV Division of Environmental Protection

WW-6A
(9-13)

API NO. 47-051
OPERATOR WELL NO. Keith Stern 3-111M
Well Pad Name: Keith Stern

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: 6/22/2020 Date Permit Application Filed: 6/24/2020

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: TE Exploration, LLC (Access Road and Well Pad)
Address: 980 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15318
Name: _____
Address: _____

COAL OWNER OR LESSEE
Name: CONSOL Energy, Inc. Attn: Casey Saunders
Address: 1000 CONSOL Energy Drive
Canonsburg, PA 15317
 COAL OPERATOR
Name: _____
Address: _____

SURFACE OWNER(s) (Road and/or Other Disturbance)
Name: _____
Address: _____
Name: _____
Address: _____

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

SURFACE OWNER(s) (Impoundments or Pits)
Name: _____
Address: _____

OPERATOR OF ANY NATURAL GAS STORAGE FIELD
Name: _____
Address: _____

*Please attach additional forms if necessary

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OFFICE OF OIL AND GAS
JUN 23 2020
WV DEPARTMENT OF ENVIRONMENTAL PROTECTION

4705102331

WV-6A
(R-1.1)

API NO. 47-051
OPERATOR WELL NO. Keith Stern 6 11FM
Well Pad Name: Keith Stern

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 plan.

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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JUN 29 2010

Well Location Restrictions

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

WW-6A
(R-13)

API NO. 47-051
OPERATOR WELL NO. Keith Stern S-11HM
Well Pad Name: Keith Stern

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

JUN 9 8 1999

Enclosure

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

Time Limits and Methods for Filing Comments.

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

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

Comment Requirements

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

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

Permit Denial or Condition

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

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

Office of Oil and Gas
JUN 29 2020
WV Department of Environmental Protection

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.

WW-6A
(8-13)

4705102331

API NO. 47-051
OPERATOR WELL NO. Keith Stern S-11HM
Well Pad Name: Keith Stern

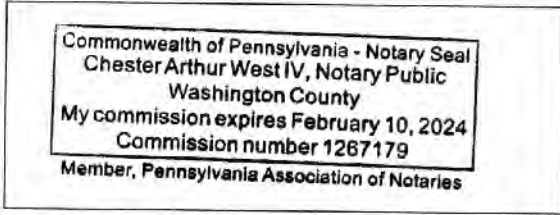
Notice is hereby given by:

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

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

Oil and Gas Privacy Notice:

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



Subscribed and sworn before me this 6 day of 22, 2020.

[Signature]

Notary Public
My Commission Expires 2-10-2024

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WV Department of
Environmental Protection

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: KEITH STERN S – 11HM
 District: Meade (House #'s 1-5)
 State: WV

There are five (5) residences, no businesses, no churches, no schools or no emergency facilities within two-thousand feet (2,000') of the above referenced well location.

<p>House 1 TM 14 Pcl. 20 William K. Stern, Et Ux Phone: 304-843-1478 (Per Address – Keith, Betty & Ginger Sue Stern) Physical Address: 14912 Fish Creek Rd. Glen Easton, WV 26039 Tax Address: Same</p>	<p>House 2 TM 14 Pcl. 20.1 William K. Stern, Et Ux Phone: 304-843-1478 (Per Address – Keith, Betty & Ginger Sue Stern) Physical Address: 15056 Fish Creek Rd. Glen Easton, WV 26039 Tax Address: 14912 Fish Creek Rd. Glen Easton, WV 26039</p>	<p>House 3 TM 14 Pcl. 21 Eleanore M. Fox Est. Phone: 304-845-6016 (Per Tax Address – Thomas Fox) Physical Address: None Found – Appears to be an old home. Tax Address: 100 Lynn Camp Ln. Glen Easton, WV 26039-9707</p>
<p>House 4 TM 14 Pcl. 27 Patrick J. Shellhase Phone: 304-845-0742; 304-810-0258 Physical Address: 593 Crow Dr. Glen Easton, WV 26039 Tax Address: 2300 7th St. Moundsville, WV 26041</p>	<p>House 5 TM 14 Pcl. 25 Patricia A. Dugas Phone: None Found Physical Address: 681 Crow Dr. Glen Easton, WV 26039 Tax Address: Same</p>	<p>RECEIVED Office of Oil and Gas JUN 29 2020 WV Department of Environmental Protection</p>

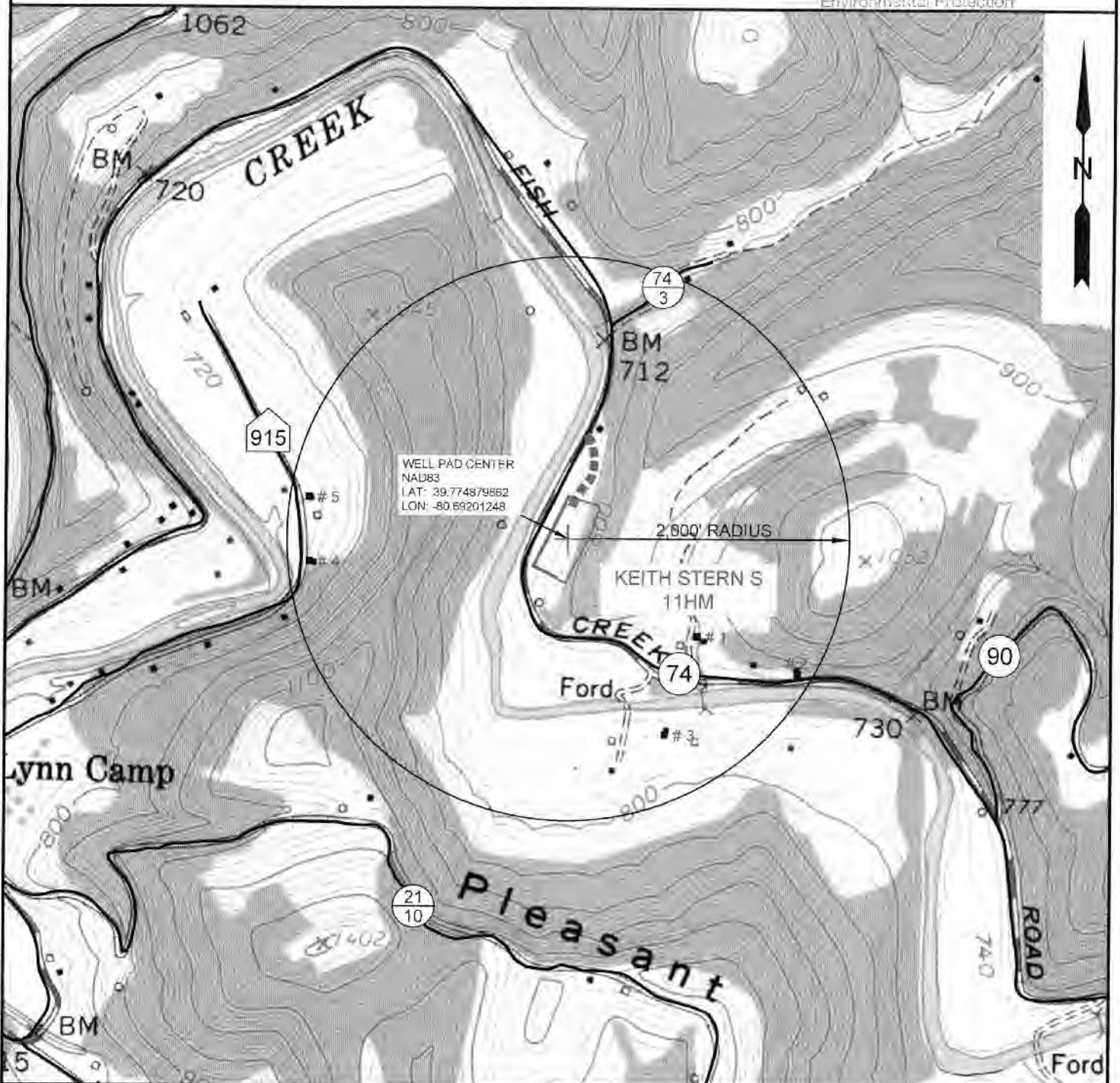
WW-6A

PROPOSED KEITH STERN S - 11HM

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SUPPLEMENT PG. 1B

JUN 29 2020

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Environmental Protection



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

SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26354 • (304) 482-6634
www.slsurveys.com

TOPO SECTION:		OPERATOR:	
GLEN EASTON 7.5'		PREPARED FOR:	
COUNTY	DISTRICT	TUG HILL OPERATING, LLC	
MARSHALL	MEADE	380 SOUTHPOINTE BLVD	
		SUITE 200	
		CANONSBURG, PA. 15317	
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8811	04/17/2018	1" = 1000'

TUG HILL
OPERATING

**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF INTENT TO DRILL**

Pursuant to W. Va. Code § 22-6A-16(b), the Notice of Intent to Drill is only required if the notice requirements of W. Va. Code § 22-6A-10(a) have NOT been met or if the Notice of Intent to Drill requirement has NOT been waived in writing by the surface owner.

Notice Time Requirement: Notice shall be provided at least **TEN (10)** days prior to filing a permit application.

Date of Notice: 06/12/2020 **Date Permit Application Filed:** 06/22/2020

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

HAND DELIVERY CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Pursuant to W. Va. Code § 22-6A-16(b), at least ten days prior to filing a permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner notice of its intent to enter upon the surface owner's land for the purpose of drilling a horizontal well: *Provided*, That notice given pursuant to subsection (a), section ten of this article satisfies the requirements of this subsection as of the date the notice was provided to the surface owner; *Provided, however*, That the notice requirements of this subsection may be waived in writing by the surface owner. The notice, if required, shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative.

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

Name: TH Exploration, LLC (Access Road and Well Pad)
Address: 1520 S University Drive, Suite 500
Ford Worth, TX 76102

Name: _____
Address: _____

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JUN 29 2020

WV Department of
Environmental Protection

Notice is hereby given:

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

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>526,383.63</u>
County:	<u>Marshall</u>		Northing:	<u>4,402,798.24</u>
District:	<u>Meade</u>	Public Road Access:	<u>Fish Creek Road (CR 74)</u>	
Quadrangle:	<u>Glen Easton 7.5</u>	Generally used farm name:	<u>Th Exploration, LLC</u>	
Watershed:	<u>Fish Creek (HUC-10)</u>			

This Notice Shall Include:

Pursuant to West Virginia Code § 22-6A-16(b), this notice shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative. 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.

Notice is hereby given by:

Well Operator: Tug Hill Operating, LLC
Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Telephone: 724-749-8386
Email: amiller@tug-hill-op.com
Facsimile: 724-338-2030

Authorized Representative: Amy L. Miller
Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 15317
Telephone: 724-749-8386
Email: amiller@tug-hill-op.com
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 of your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
Division of Highways

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

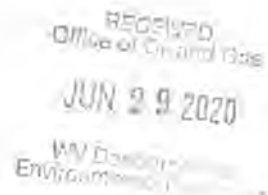
June 22, 2020

Byrd E. White, III
 Secretary of Transportation

Jimmy Wriston, P. E.
 Deputy Secretary/
 Acting 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 Keith Stern Pad, Marshall County
 Keith Stern S-11HM Well site



Dear Mr. Martin,

This well site will be accessed from a DOH permit #06-2018-0068 issued to Tug Hill Operating for access to the State Road for a well site located off of Marshall County Route 74 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
 CH, OM, D-6
 File



TUG HILL

PLANNED ADDITIVES TO BE USED IN FRACTURING OR STIMULATION

Well No. Keith Stern S-11HM

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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JUN 29 2020

PA Department of Environmental Protection

WW-6A7
(6-12)

OPERATOR: Tug Hill Operating, LLC WELL NO: Keith Stern S-11HM

PAD NAME: Keith Stern

REVIEWED BY: Amy L. Miller SIGNATURE: *Amy Miller*

WELL RESTRICTIONS CHECKLIST

HORIZONTAL 6A WELL

Well Restrictions

- At Least 100 Feet from Pad and LOD (including any E&S Control Feature) to any Perennial Stream, Lake, Pond, Reservoir or Wetland; OR
- DEP Waiver and Permit Conditions
- At Least 300 Feet from Pad and LOD (including any E&S Control Feature) to any Naturally Producing Trout Stream; OR
- DEP Waiver and Permit Conditions
- At Least 1000 Feet from Pad and LOD (including any E&S Control Feature) to any Groundwater Intake or Public Water Supply; OR
- DEP Waiver and Permit Conditions
- At Least 250 Feet from an Existing Water Well or Developed Spring to Well Being Drilled; OR
- Surface Owner Waiver and Recorded with County Clerk; OR
- DEP Variance and Permit Conditions
- At Least 625 Feet from an Occupied Dwelling Structure to Center of the Pad; OR
- Surface Owner Waiver and Recorded with County Clerk; OR
- DEP Variance and Permit Conditions
- At Least 625 Feet from Agricultural Buildings Larger than 2500 Square Feet to the Center of the Pad; OR
- Surface Owner Waiver and Recorded with County Clerk; OR
- DEP Variance and Permit Conditions

DEPARTMENT OF
ENVIRONMENTAL PROTECTION
JUN 29 2020
WV DEPARTMENT OF
ENVIRONMENTAL PROTECTION