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west virginia department of environmental protection

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

Harold D. Ward, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Monday, April 5, 2021  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

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

Re: Permit Modification Approval for KEITH STERN S-10HM  
47-051-02105-00-00

**Casing Modification**

TUG HILL OPERATING, LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before 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-10HM  
Farm Name: TH EXPLORATION LLC  
U.S. WELL NUMBER: 47-051-02105-00-00  
Horizontal 6A New Drill  
Date Modification Issued: 4/5/2021

Promoting a healthy environment.

04/09/2021



March 3, 2021

WADE STANSBERRY  
WV DEP OFFICE OF OIL & GAS  
601 57<sup>TH</sup> STREET SE  
CHARLESTON, WV 25304-2345

**VIA USPS**

**RE: Keith Stern S-10HM API #47-051-02105 (H6A Permit Modification)  
Meade District, Marshall County, WV**

Dear Wade:

Tug Hill Operating, LLC is submitting a permit modification for its permitted well, Keith Stern S-10HM to update the freshwater depth as well as freshwater/coal casing string. Therefore, enclosed please find the following:

- Modified WW-6B with changes highlighted in yellow.
- WW-6A with certified mail receipts to notice appropriate parties of freshwater and coal string changes.

If you have any questions or need any additional information, please do not hesitate to call me at (304) 376-0111. Thank you for attention to this matter, it is greatly appreciated.

Sincerely,

AMY MORRIS  
PERMIT SPECIALIST-APPALACHIA REGION  
TUG HILL OPERATING, LLC

Enclosures

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# Modification

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-10HM      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

*JM*  
*10/16/2020*

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 6257' - 6308', thickness of 51' and an anticipated approximate pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6408'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 13,996'

11) Proposed Horizontal Leg Length: 7,251.45'

12) Approximate Fresh Water Strata Depths: 70'; 406'

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**

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	259ft <sup>3</sup> (CTS)
Fresh Water	13 3/8"	NEW	J55	54.5#	490'	490'	690ft <sup>3</sup> (CTS)
Coal	13 3/8"	NEW	J55	54.5#	490'	490'	690ft <sup>3</sup> (CTS)
Intermediate	9 5/8"	NEW	J55	36#	2,203'	2,203'	714ft <sup>3</sup> (CTS)
Production	5 1/2"	NEW	P110	20#	13,996'	13,996'	3583ft <sup>3</sup> (CTS)
Tubing	2 3/8"	NEW	N80	4.7#	6,591'		
Liners							

*JM 10/16/2020*

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

**PACKERS**

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

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WW-6B  
(10/14)

API NO. 47- 051 - 02105  
OPERATOR WELL NO. Keith Stern S-10HM  
Well Pad Name: Keith Stern

*KS*  
*10/16/2020*

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 18,125,000 lb. proppant and 280,226 barrels of water.  
Max rate = 80bpm; max psi = 9,000#.

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:

Sfc - Premium NE-1 + 2% CaCl; Int1 - Premium NE-1 + 1.5% CaCL + Flake; Int2 - Lead: Premium NE-1 + 5% BA-90 + .85% R-3 + 3% KCl + .75 gals/100sk FP-13L + 1% MPA-170 Tail: Premium NE-1 + .1% R-3 + 5% KCl + 1% CD-32 + .4% FL-52 + .2% ASA-301 + .6% Sodium Metasilicate; Kick Plug - Class H Cement + 1% CD-32 + .7% Sodium Metasilicate + .1% R-3 + .75 gal/100sk FP-13L; Prod - Lead: 50:50 (Poz:Class H) + .3% R-3 + .3% MPA-250 + .75 gal/100sk FP-13L Tail: 25:75 (Poz:Class H) + .3% R-3 + .3% MPA-250 + .375 gal/100sk FP-13L

25) Proposed borehole conditioning procedures:

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

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\*Note: Attach additional sheets as needed.

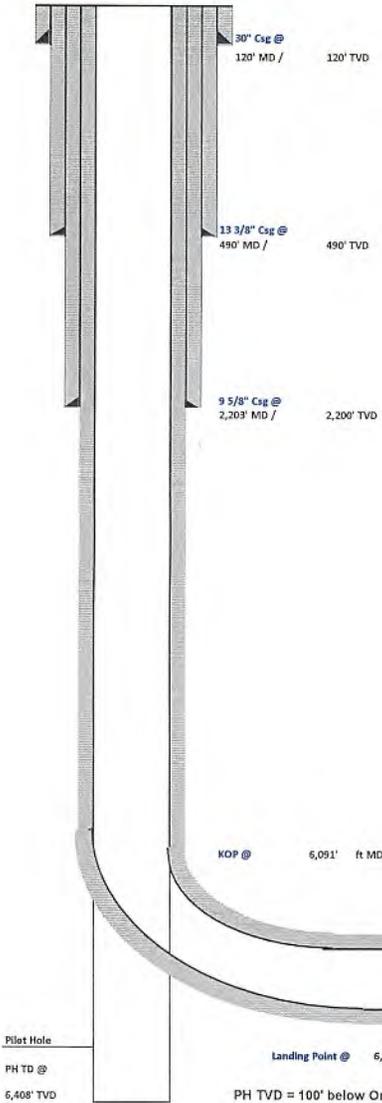


WELL NAME: Keith Stern S-10HM  
 STATE: WV COUNTY: Marshall  
 DISTRICT: Meade  
 DF Elev: 747' GL Elev: 747'  
 TD: 13,996'  
 TH Latitude: 39.7746824  
 TH Longitude: -80.69217513  
 BH Latitude: 39.753828  
 BH Longitude: -80.677299

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	406
Sevickley Coal	307
Pittsburgh Coal	400
Big Lime	1614
Weir	1927
Berea	2119
Gordon	2384
Rhinestreet	5595
Genesee/Burkett	6109
Tully	6140
Hamilton	6175
Marcellus	6257
Landing Depth	6294
Onondaga	6308
Pilot Hole Depth	6408

CASING SUMMARY							
Type	Hole Size (in)	Csg Size (in)	Depth (MD)	Depth (TVD)	Weight (lb/ft)	Grade	Top of Cement
Conductor	36	30	120'	120'	BW	BW	Surface
Surface	17.5	13 3/8	490'	490'	54.5	J55	Surface
Intermediate 1	12 1/4	9 5/8	2,203'	2,200'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	13,996'	6,420'	20	CYHP110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	338	A	15.6	Air	None
Surface	669	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	727	A	15	Air	1 Centralizer every other jt
Production	3,166	A	14.5	Air / SOBMM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to sfc



*JM*  
10/16/2020

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Lateral TD @ 13,996' ft MD  
 6,420' ft TVD

Landing Point @ 6,746' MD / 6,294' TVD  
 PH TD @ 6,408' TVD  
 PH TVD = 100' below Onondaga Top



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

**Keith Stern S-10HM**

**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"	2,203'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4"	13,996'	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-10 HM (slot L)  
 Site: Keith Stern  
 Project: Marshall County, West Virginia  
 Design: rev1

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1300.00	0.00	0.00	1300.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2°/100' build
3	1550.00	5.00	140.00	1549.68	-8.35	7.01	2.00	140.00	10.70	Begin 5.00° tangent
4	4009.68	5.00	140.00	4000.00	-172.57	144.80	0.00	0.00	221.16	Begin 2°/100' build/turn
5	4977.79	23.96	160.78	4933.46	-392.61	237.51	2.00	25.76	458.54	Begin 23.96° tangent
6	6091.30	23.96	160.78	5951.01	-819.61	386.37	0.00	0.00	904.12	Begin 10°/100' build/turn
7	6746.00	89.00	150.32	6294.00	-1280.81	617.94	10.00	-11.51	1419.76	Begin 89.00° lateral section
8	13996.12	89.00	150.32	6420.00	-7578.93	4207.10	0.00	0.00	8668.33	PBHL/TD 13996.11 MD/6420.00 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 @ 744.00usft

Northing: 14444836.47 Easting: 1726906.06 Latitude: 39.77468240 Longitude: -80.69217513

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.91°

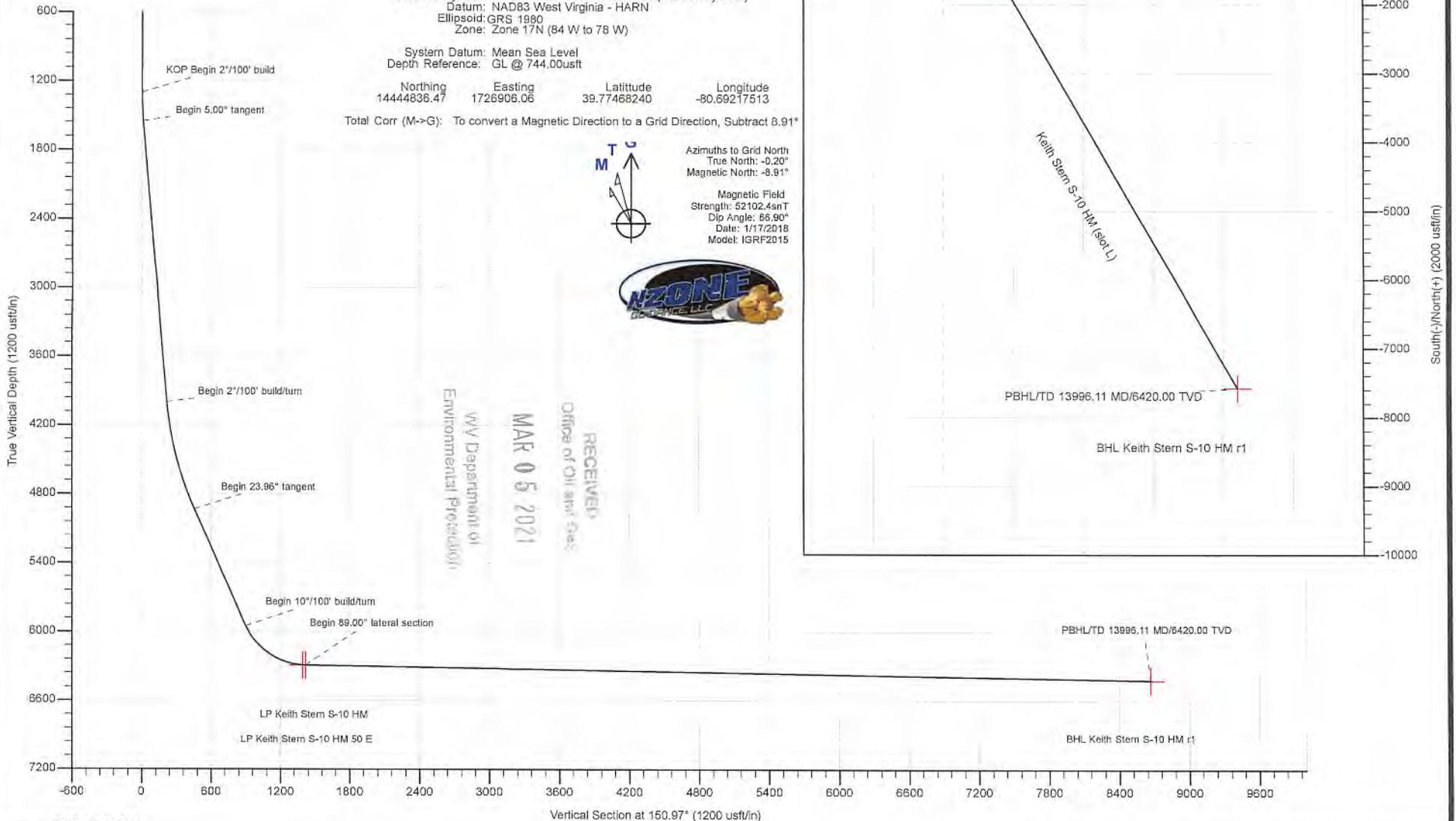


Azimuths to Grid North  
 True North: -0.20°  
 Magnetic North: -8.91°

Magnetic Field  
 Strength: 52102.4snT  
 Dip Angle: 66.90°  
 Date: 1/17/2018  
 Model: IGRF2015



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Planning Report - Geographic

<b>Database:</b>	DB_Jul2216dt_v14	<b>Local Co-ordinate Reference:</b>	Well Keith Stern S-10 HM (slot L)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 744.00usft
<b>Project:</b>	Marshall County, West Virginia	<b>MD Reference:</b>	GL @ 744.00usft
<b>Site:</b>	Keith Stern	<b>North Reference:</b>	Grid
<b>Well:</b>	Keith Stern S-10 HM (slot L)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev1		

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

<b>Site</b>	Keith Stern				
<b>Site Position:</b>		<b>Northing:</b>	14,444,890.33 usft	<b>Latitude:</b>	39.77483004
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,726,932.47 usft	<b>Longitude:</b>	-80.69208048
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	0.20 °

<b>Well</b>	Keith Stern S-10 HM (slot L)					
<b>Well Position</b>	<b>+N/-S</b>	0.00 usft	<b>Northing:</b>	14,444,836.48 usft	<b>Latitude:</b>	39.77468240
	<b>+E/-W</b>	0.00 usft	<b>Easting:</b>	1,726,906.06 usft	<b>Longitude:</b>	-80.69217513
<b>Position Uncertainty</b>	0.00 usft		<b>Wellhead Elevation:</b>		<b>Ground Level:</b>	744.00 usft

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	1/17/2018	-8.71	66.90	52,102.44339524

<b>Design</b>	rev1				
<b>Audit Notes:</b>					
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.00	
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	150.97	

<b>Plan Survey Tool Program</b>	<b>Date</b>	7/21/2018			
<b>Depth From (usft)</b>	<b>Depth To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Remarks</b>	
1	0.00	13,996.12 rev1 (Original Hole)	MWD	MWD - Standard	

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<b>Plan Sections</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	<b>TFO (°)</b>	<b>Target</b>
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,550.00	5.00	140.00	1,549.68	-8.35	7.01	2.00	2.00	0.00	140.00	
4,009.68	5.00	140.00	4,000.00	-172.57	144.80	0.00	0.00	0.00	0.00	
4,977.79	23.96	160.78	4,933.46	-392.61	237.51	2.00	1.96	2.15	25.76	
6,091.30	23.96	160.78	5,951.02	-819.61	386.37	0.00	0.00	0.00	0.00	
6,746.00	89.00	150.32	6,294.00	-1,280.81	617.94	10.00	9.93	-1.60	-11.51	LP Keith Stern S-10 H
13,996.12	89.00	150.32	6,420.00	-7,578.93	4,207.10	0.00	0.00	0.00	0.00	BHL Keith Stern S-10

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Planning Report - Geographic

Database: DB\_Jul2216dt\_v14  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia  
 Site: Keith Stern  
 Well: Keith Stern S-10 HM (slot L)  
 Wellbore: Original Hole  
 Design: rev1

Local Co-ordinate Reference: Well Keith Stern S-10 HM (slot L)  
 TVD Reference: GL @ 744.00usft  
 MD Reference: GL @ 744.00usft  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

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Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
100.00	0.00	0.00	100.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
200.00	0.00	0.00	200.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
300.00	0.00	0.00	300.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
400.00	0.00	0.00	400.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
500.00	0.00	0.00	500.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
600.00	0.00	0.00	600.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
700.00	0.00	0.00	700.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
800.00	0.00	0.00	800.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
900.00	0.00	0.00	900.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
1,200.00	0.00	0.00	1,200.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
1,300.00	0.00	0.00	1,300.00	0.00	0.00	14,444,836.48	1,726,906.06	39.77468240	-80.69217513
<b>KOP Begin 2°/100' build</b>									
1,400.00	2.00	140.00	1,399.98	-1.34	1.12	14,444,835.14	1,726,907.18	39.77467872	-80.69217115
1,500.00	4.00	140.00	1,499.83	-5.35	4.49	14,444,831.13	1,726,910.55	39.77466768	-80.69215923
1,550.00	5.00	140.00	1,549.68	-8.35	7.01	14,444,828.12	1,726,913.07	39.77465940	-80.69215029
<b>Begin 5.00° tangent</b>									
1,600.00	5.00	140.00	1,599.49	-11.69	9.81	14,444,824.79	1,726,915.87	39.77465021	-80.69214037
1,700.00	5.00	140.00	1,699.11	-18.37	15.41	14,444,818.11	1,726,921.47	39.77463182	-80.69212051
1,800.00	5.00	140.00	1,798.73	-25.04	21.01	14,444,811.43	1,726,927.07	39.77461343	-80.69210065
1,900.00	5.00	140.00	1,898.35	-31.72	26.61	14,444,804.76	1,726,932.68	39.77459504	-80.69208079
2,000.00	5.00	140.00	1,997.97	-38.40	32.22	14,444,798.08	1,726,938.28	39.77457665	-80.69206094
2,100.00	5.00	140.00	2,097.59	-45.07	37.82	14,444,791.40	1,726,943.88	39.77455827	-80.69204108
2,200.00	5.00	140.00	2,197.21	-51.75	43.42	14,444,784.73	1,726,949.48	39.77453988	-80.69202122
2,300.00	5.00	140.00	2,296.82	-58.42	49.02	14,444,778.05	1,726,955.08	39.77452149	-80.69200137
2,400.00	5.00	140.00	2,396.44	-65.10	54.63	14,444,771.37	1,726,960.69	39.77450310	-80.69198151
2,500.00	5.00	140.00	2,496.06	-71.78	60.23	14,444,764.70	1,726,966.29	39.77448471	-80.69196165
2,599.99	5.00	140.00	2,595.68	-78.45	65.83	14,444,758.02	1,726,971.89	39.77446632	-80.69194180
2,699.99	5.00	140.00	2,695.30	-85.13	71.43	14,444,751.34	1,726,977.49	39.77444794	-80.69192194
2,799.99	5.00	140.00	2,794.92	-91.81	77.04	14,444,744.67	1,726,983.10	39.77442955	-80.69190208
2,899.99	5.00	140.00	2,894.54	-98.48	82.64	14,444,737.99	1,726,988.70	39.77441116	-80.69188222
2,999.99	5.00	140.00	2,994.16	-105.16	88.24	14,444,731.32	1,726,994.30	39.77439277	-80.69186237
3,099.99	5.00	140.00	3,093.78	-111.84	93.84	14,444,724.64	1,726,999.90	39.77437438	-80.69184251
3,199.99	5.00	140.00	3,193.40	-118.51	99.44	14,444,717.96	1,727,005.51	39.77435599	-80.69182265
3,299.99	5.00	140.00	3,293.02	-125.19	105.05	14,444,711.29	1,727,011.11	39.77433761	-80.69180280
3,399.99	5.00	140.00	3,392.64	-131.87	110.65	14,444,704.61	1,727,016.71	39.77431922	-80.69178294
3,499.99	5.00	140.00	3,492.26	-138.54	116.25	14,444,697.93	1,727,022.31	39.77430083	-80.69176308
3,599.99	5.00	140.00	3,591.87	-145.22	121.85	14,444,691.26	1,727,027.91	39.77428244	-80.69174323
3,699.99	5.00	140.00	3,691.49	-151.90	127.46	14,444,684.58	1,727,033.52	39.77426405	-80.69172337
3,799.99	5.00	140.00	3,791.11	-158.57	133.06	14,444,677.90	1,727,039.12	39.77424566	-80.69170351
3,899.99	5.00	140.00	3,890.73	-165.25	138.66	14,444,671.23	1,727,044.72	39.77422728	-80.69168366
3,999.99	5.00	140.00	3,990.35	-171.93	144.26	14,444,664.55	1,727,050.32	39.77420889	-80.69166380
4,009.68	5.00	140.00	4,000.00	-172.57	144.80	14,444,663.90	1,727,050.87	39.77420711	-80.69166188
<b>Begin 2°/100' build/tum</b>									
4,099.99	6.67	146.77	4,089.84	-179.98	150.21	14,444,656.50	1,727,056.27	39.77418672	-80.69164273
4,199.99	8.59	151.14	4,188.96	-191.38	157.00	14,444,645.10	1,727,063.06	39.77415535	-80.69161871
4,299.99	10.54	153.91	4,287.56	-206.13	164.62	14,444,630.35	1,727,070.69	39.77411476	-80.69159175
4,399.99	12.50	155.83	4,385.54	-224.21	173.08	14,444,612.26	1,727,079.14	39.77406502	-80.69156189
4,499.99	14.47	157.23	4,482.78	-245.61	182.34	14,444,590.87	1,727,088.40	39.77400617	-80.69152917
4,599.99	16.45	158.30	4,579.16	-270.29	192.42	14,444,566.19	1,727,098.48	39.77393830	-80.69149362
4,699.99	18.44	159.15	4,674.55	-298.22	203.28	14,444,538.25	1,727,109.34	39.77386148	-80.69145529
4,799.99	20.42	159.83	4,768.85	-329.38	214.93	14,444,507.09	1,727,120.99	39.77377581	-80.69141423



Planning Report - Geographic

Database: DB\_Jul2216dt\_v14  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia  
 Site: Keith Stern  
 Well: Keith Stern S-10 HM (slot L)  
 Wellbore: Original Hole  
 Design: rev1

Local Co-ordinate Reference: Well Keith Stern S-10 HM (slot L)  
 TVD Reference: GL @ 744.00usft  
 MD Reference: GL @ 744.00usft  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

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 MAR 05 2021  
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 Environmental Protection

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,899.99	22.41	160.40	4,861.95	-363.72	227.34	14,444,472.76	1,727,133.40	39.77368138	-80.69137048
4,977.79	23.96	160.78	4,933.46	-392.61	237.51	14,444,443.87	1,727,143.58	39.77360195	-80.69133462
<b>Begin 23.96° tangent</b>									
4,999.99	23.96	160.78	4,953.75	-401.12	240.48	14,444,435.35	1,727,146.54	39.77357854	-80.69132416
5,099.99	23.96	160.78	5,045.13	-439.47	253.85	14,444,397.01	1,727,159.91	39.77347310	-80.69127706
5,199.99	23.96	160.78	5,136.51	-477.82	267.22	14,444,358.66	1,727,173.28	39.77336767	-80.69122995
5,299.99	23.96	160.78	5,227.89	-516.16	280.59	14,444,320.31	1,727,186.65	39.77326223	-80.69118285
5,399.99	23.96	160.78	5,319.28	-554.51	293.95	14,444,281.96	1,727,200.01	39.77315679	-80.69113574
5,499.99	23.96	160.78	5,410.66	-592.86	307.32	14,444,243.62	1,727,213.38	39.77305135	-80.69108864
5,599.99	23.96	160.78	5,502.04	-631.21	320.69	14,444,205.27	1,727,226.75	39.77294591	-80.69104153
5,699.99	23.96	160.78	5,593.42	-669.55	334.06	14,444,166.92	1,727,240.12	39.77284048	-80.69099443
5,799.99	23.96	160.78	5,684.81	-707.90	347.42	14,444,128.58	1,727,253.48	39.77273504	-80.69094732
5,899.99	23.96	160.78	5,776.19	-746.25	360.79	14,444,090.23	1,727,266.85	39.77262960	-80.69090022
5,999.99	23.96	160.78	5,867.57	-784.59	374.16	14,444,051.88	1,727,280.22	39.77252416	-80.69085312
6,091.30	23.96	160.78	5,951.01	-819.61	386.37	14,444,016.87	1,727,292.43	39.77242788	-80.69081011
<b>Begin 10°/100' build/turn</b>									
6,099.99	24.81	160.37	5,958.93	-822.99	387.56	14,444,013.48	1,727,293.62	39.77241858	-80.69080590
6,199.99	34.67	156.99	6,045.65	-869.05	405.77	14,443,967.42	1,727,311.83	39.77229191	-80.69074164
6,299.99	44.59	154.97	6,122.57	-927.19	431.81	14,443,909.28	1,727,337.87	39.77213201	-80.69064969
6,399.99	54.53	153.56	6,187.35	-995.63	464.88	14,443,840.84	1,727,370.94	39.77194373	-80.69053285
6,499.99	64.49	152.46	6,238.03	-1,072.31	503.97	14,443,764.17	1,727,410.03	39.77173280	-80.69039467
6,599.99	74.45	151.54	6,273.05	-1,154.88	547.90	14,443,681.60	1,727,453.96	39.77150562	-80.69023934
6,699.99	84.42	150.70	6,291.36	-1,240.84	595.33	14,443,595.64	1,727,501.39	39.77126909	-80.69007159
6,746.00	89.00	150.32	6,294.00	-1,280.81	617.94	14,443,555.66	1,727,524.00	39.77115910	-80.68999162
<b>Begin 89.00° lateral section</b>									
6,799.99	89.00	150.32	6,294.94	-1,327.71	644.67	14,443,508.76	1,727,550.73	39.77103005	-80.68989708
6,899.99	89.00	150.32	6,296.68	-1,414.58	694.17	14,443,421.89	1,727,600.23	39.77079101	-80.68972197
6,999.99	89.00	150.32	6,298.41	-1,501.45	743.68	14,443,335.03	1,727,649.74	39.77055198	-80.68954686
7,099.99	89.00	150.32	6,300.15	-1,588.32	793.18	14,443,248.16	1,727,699.24	39.77031294	-80.68937176
7,199.99	89.00	150.32	6,301.89	-1,675.19	842.69	14,443,161.29	1,727,748.75	39.77007391	-80.68919665
7,299.99	89.00	150.32	6,303.63	-1,762.06	892.19	14,443,074.42	1,727,798.25	39.76983487	-80.68902155
7,399.99	89.00	150.32	6,305.37	-1,848.93	941.70	14,442,987.55	1,727,847.76	39.76959583	-80.68884644
7,499.99	89.00	150.32	6,307.10	-1,935.79	991.20	14,442,900.68	1,727,897.26	39.76935679	-80.68867134
7,599.98	89.00	150.32	6,308.84	-2,022.66	1,040.71	14,442,813.81	1,727,946.77	39.76911776	-80.68849624
7,699.98	89.00	150.32	6,310.58	-2,109.53	1,090.21	14,442,726.94	1,727,996.27	39.76887872	-80.68832114
7,799.98	89.00	150.32	6,312.32	-2,196.40	1,139.72	14,442,640.07	1,728,045.78	39.76863968	-80.68814604
7,899.98	89.00	150.32	6,314.06	-2,283.27	1,189.22	14,442,553.20	1,728,095.28	39.76840064	-80.68797094
7,999.98	89.00	150.32	6,315.79	-2,370.14	1,238.73	14,442,466.34	1,728,144.79	39.76816160	-80.68779584
8,099.98	89.00	150.32	6,317.53	-2,457.01	1,288.23	14,442,379.47	1,728,194.29	39.76792256	-80.68762075
8,199.98	89.00	150.32	6,319.27	-2,543.88	1,337.73	14,442,292.60	1,728,243.80	39.76768352	-80.68744565
8,299.98	89.00	150.32	6,321.01	-2,630.75	1,387.24	14,442,205.73	1,728,293.30	39.76744448	-80.68727056
8,399.98	89.00	150.32	6,322.74	-2,717.62	1,436.74	14,442,118.86	1,728,342.81	39.76720545	-80.68709547
8,499.98	89.00	150.32	6,324.48	-2,804.48	1,486.25	14,442,031.99	1,728,392.31	39.76696641	-80.68692038
8,599.98	89.00	150.32	6,326.22	-2,891.35	1,535.75	14,441,945.12	1,728,441.81	39.76672736	-80.68674529
8,699.98	89.00	150.32	6,327.96	-2,978.22	1,585.26	14,441,858.25	1,728,491.32	39.76648832	-80.68657020
8,799.98	89.00	150.32	6,329.70	-3,065.09	1,634.76	14,441,771.38	1,728,540.82	39.76624928	-80.68639511
8,899.98	89.00	150.32	6,331.43	-3,151.96	1,684.27	14,441,684.51	1,728,590.33	39.76601024	-80.68622003
8,999.98	89.00	150.32	6,333.17	-3,238.83	1,733.77	14,441,597.65	1,728,639.83	39.76577120	-80.68604494
9,099.98	89.00	150.32	6,334.91	-3,325.70	1,783.28	14,441,510.78	1,728,689.34	39.76553216	-80.68586986
9,199.98	89.00	150.32	6,336.65	-3,412.57	1,832.78	14,441,423.91	1,728,738.84	39.76529312	-80.68569478
9,299.98	89.00	150.32	6,338.39	-3,499.44	1,882.29	14,441,337.04	1,728,788.35	39.76505407	-80.68551970
9,399.98	89.00	150.32	6,340.12	-3,586.31	1,931.79	14,441,250.17	1,728,837.85	39.76481503	-80.68534462
9,499.98	89.00	150.32	6,341.86	-3,673.17	1,981.30	14,441,163.30	1,728,887.36	39.76457599	-80.68516954
9,599.98	89.00	150.32	6,343.60	-3,760.04	2,030.80	14,441,076.43	1,728,936.86	39.76433695	-80.68499446



Planning Report - Geographic

Database: DB\_Jul2216dt\_v14  
 Company: Tug Hill Operating LLC  
 Project: Marshall County, West Virginia  
 Site: Keith Stern  
 Well: Keith Stern S-10 HM (slot L)  
 Wellbore: Original Hole  
 Design: rev1

Local Co-ordinate Reference: Well Keith Stern S-10 HM (slot L)  
 TVD Reference: GL @ 744.00usft  
 MD Reference: GL @ 744.00usft  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

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 MAR 05 2021  
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Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
9,699.98	89.00	150.32	6,345.34	-3,846.91	2,080.31	14,440,989.56	1,728,986.37	39.76409790	-80.68481938	
9,799.98	89.00	150.32	6,347.08	-3,933.78	2,129.81	14,440,902.69	1,729,035.87	39.76385886	-80.68464431	
9,899.98	89.00	150.32	6,348.81	-4,020.65	2,179.32	14,440,815.83	1,729,085.38	39.76361982	-80.68446924	
9,999.98	89.00	150.32	6,350.55	-4,107.52	2,228.82	14,440,728.96	1,729,134.88	39.76338077	-80.68429416	
10,099.98	89.00	150.32	6,352.29	-4,194.39	2,278.33	14,440,642.09	1,729,184.39	39.76314173	-80.68411909	
10,199.98	89.00	150.32	6,354.03	-4,281.26	2,327.83	14,440,555.22	1,729,233.89	39.76290268	-80.68394402	
10,299.98	89.00	150.32	6,355.76	-4,368.13	2,377.34	14,440,468.35	1,729,283.40	39.76266364	-80.68376895	
10,399.98	89.00	150.32	6,357.50	-4,454.99	2,426.84	14,440,381.48	1,729,332.90	39.76242459	-80.68359389	
10,499.98	89.00	150.32	6,359.24	-4,541.86	2,476.34	14,440,294.61	1,729,382.41	39.76218555	-80.68341882	
10,599.98	89.00	150.32	6,360.98	-4,628.73	2,525.85	14,440,207.74	1,729,431.91	39.76194650	-80.68324375	
10,699.98	89.00	150.32	6,362.72	-4,715.60	2,575.35	14,440,120.87	1,729,481.42	39.76170745	-80.68306869	
10,799.98	89.00	150.32	6,364.45	-4,802.47	2,624.86	14,440,034.00	1,729,530.92	39.76146841	-80.68289363	
10,899.98	89.00	150.32	6,366.19	-4,889.34	2,674.36	14,439,947.14	1,729,580.42	39.76122936	-80.68271857	
10,999.98	89.00	150.32	6,367.93	-4,976.21	2,723.87	14,439,860.27	1,729,629.93	39.76099032	-80.68254350	
11,099.98	89.00	150.32	6,369.67	-5,063.08	2,773.37	14,439,773.40	1,729,679.43	39.76075127	-80.68236845	
11,199.98	89.00	150.32	6,371.41	-5,149.95	2,822.88	14,439,686.53	1,729,728.94	39.76051222	-80.68219339	
11,299.98	89.00	150.32	6,373.14	-5,236.82	2,872.38	14,439,599.66	1,729,778.44	39.76027317	-80.68201833	
11,399.98	89.00	150.32	6,374.88	-5,323.68	2,921.89	14,439,512.79	1,729,827.95	39.76003413	-80.68184328	
11,499.98	89.00	150.32	6,376.62	-5,410.55	2,971.39	14,439,425.92	1,729,877.45	39.75979508	-80.68166822	
11,599.98	89.00	150.32	6,378.36	-5,497.42	3,020.90	14,439,339.05	1,729,926.96	39.75955603	-80.68149317	
11,699.98	89.00	150.32	6,380.10	-5,584.29	3,070.40	14,439,252.18	1,729,976.46	39.75931698	-80.68131812	
11,799.98	89.00	150.32	6,381.83	-5,671.16	3,119.91	14,439,165.31	1,730,025.97	39.75907793	-80.68114306	
11,899.98	89.00	150.32	6,383.57	-5,758.03	3,169.41	14,439,078.45	1,730,075.47	39.75883888	-80.68096802	
11,999.98	89.00	150.32	6,385.31	-5,844.90	3,218.92	14,438,991.58	1,730,124.98	39.75859983	-80.68079297	
12,099.98	89.00	150.32	6,387.05	-5,931.77	3,268.42	14,438,904.71	1,730,174.48	39.75836078	-80.68061792	
12,199.98	89.00	150.32	6,388.78	-6,018.64	3,317.93	14,438,817.84	1,730,223.99	39.75812173	-80.68044287	
12,299.98	89.00	150.32	6,390.52	-6,105.51	3,367.43	14,438,730.97	1,730,273.49	39.75788268	-80.68026783	
12,399.98	89.00	150.32	6,392.26	-6,192.37	3,416.94	14,438,644.10	1,730,323.00	39.75764363	-80.68009279	
12,499.98	89.00	150.32	6,394.00	-6,279.24	3,466.44	14,438,557.23	1,730,372.50	39.75740458	-80.67991774	
12,599.98	89.00	150.32	6,395.74	-6,366.11	3,515.94	14,438,470.36	1,730,422.01	39.75716553	-80.67974270	
12,699.97	89.00	150.32	6,397.47	-6,452.98	3,565.45	14,438,383.49	1,730,471.51	39.75692648	-80.67956766	
12,799.97	89.00	150.32	6,399.21	-6,539.85	3,614.95	14,438,296.63	1,730,521.02	39.75668743	-80.67939262	
12,899.97	89.00	150.32	6,400.95	-6,626.72	3,664.46	14,438,209.76	1,730,570.52	39.75644837	-80.67921759	
12,999.97	89.00	150.32	6,402.69	-6,713.59	3,713.96	14,438,122.89	1,730,620.02	39.75620932	-80.67904255	
13,099.97	89.00	150.32	6,404.43	-6,800.46	3,763.47	14,438,036.02	1,730,669.53	39.75597027	-80.67886751	
13,199.97	89.00	150.32	6,406.16	-6,887.33	3,812.97	14,437,949.15	1,730,719.03	39.75573122	-80.67869248	
13,299.97	89.00	150.32	6,407.90	-6,974.19	3,862.48	14,437,862.28	1,730,768.54	39.75549216	-80.67851745	
13,399.97	89.00	150.32	6,409.64	-7,061.06	3,911.98	14,437,775.41	1,730,818.04	39.75525311	-80.67834242	
13,499.97	89.00	150.32	6,411.38	-7,147.93	3,961.49	14,437,688.54	1,730,867.55	39.75501406	-80.67816739	
13,599.97	89.00	150.32	6,413.12	-7,234.80	4,010.99	14,437,601.67	1,730,917.05	39.75477500	-80.67799236	
13,699.97	89.00	150.32	6,414.85	-7,321.67	4,060.50	14,437,514.80	1,730,966.56	39.75453595	-80.67781733	
13,799.97	89.00	150.32	6,416.59	-7,408.54	4,110.00	14,437,427.94	1,731,016.06	39.75429689	-80.67764230	
13,899.97	89.00	150.32	6,418.33	-7,495.41	4,159.51	14,437,341.07	1,731,065.57	39.75405784	-80.67746728	
13,996.11	89.00	150.32	6,420.00	-7,578.92	4,207.10	14,437,254.19	1,731,114.16	39.75381879	-80.67729202	
PBHL/TD 13996.11 MD/6420.00 TVD										
13,996.12	89.00	150.32	6,420.00	-7,578.93	4,207.10	14,437,257.55	1,731,113.16	39.75382800	-80.67729900	



Planning Report - Geographic

<b>Database:</b>	DB_Jul2216dt_v14	<b>Local Co-ordinate Reference:</b>	Well Keith Stern S-10 HM (slot L)
<b>Company:</b>	Tug Hill Operating LLC	<b>TVD Reference:</b>	GL @ 744.00usft
<b>Project:</b>	Marshall County, West Virginia	<b>MD Reference:</b>	GL @ 744.00usft
<b>Site:</b>	Keith Stern	<b>North Reference:</b>	Grid
<b>Well:</b>	Keith Stern S-10 HM (slot L)	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Hole		
<b>Design:</b>	rev1		

Design Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
LP Keith Stern S-10 HM - plan misses target center by 43.49usft at 6721.42usft MD (6293.05 TVD, -1259.45 N, 605.82 E) - Point	0.00	0.00	6,294.00	-1,280.81	567.94	14,443,555.66	1,727,474.00	39.77115958	-80.69016956
LP Keith Stern S-10 HM - plan hits target center - Point	0.00	0.00	6,294.00	-1,280.81	617.94	14,443,555.66	1,727,524.00	39.77115911	-80.68999163
BHL Keith Stern S-10 H# - plan hits target center - Point	0.00	0.00	6,420.00	-7,578.93	4,207.10	14,437,257.55	1,731,113.16	39.75382800	-80.67729900

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
1,300.00	1,300.00	0.00	0.00	KOP Begin 2°/100' build
1,550.00	1,549.68	-8.35	7.01	Begin 5.00° tangent
4,009.68	4,000.00	-172.57	144.80	Begin 2°/100' build/turn
4,977.79	4,933.46	-392.61	237.51	Begin 23.96° tangent
6,091.30	5,951.01	-819.61	386.37	Begin 10°/100' build/turn
6,746.00	6,294.00	-1,280.81	617.94	Begin 89.00° lateral section
13,996.11	6,420.00	-7,578.92	4,207.10	PBHL/TD 13996.11 MD/6420.00 TVD

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WV Department of  
Environmental Protection

**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:** 2/24/2021 **Date Permit Application Filed:** 2/25/2021

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:

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Office of Oil and Gas

SURFACE OWNER(s)

Name: TH Exploration, LLC (Access Road and Well Pad)  
Address: 380 Southpointe Boulevard, Plaza II, Suite 200  
Canonsburg, PA 15318

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

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

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

SURFACE OWNER(s) (Impoundments or Pits)

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

\_\_\_\_\_

COAL OWNER OR LESSEE

Name: CONSOL Energy, Inc. Attn: Casey Saunders  
Address: 1000 CONSOL Energy Drive  
Canonsburg, PA 15317

COAL OPERATOR  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_

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

Name: \*See attached list  
Address: \_\_\_\_\_

OPERATOR OF ANY NATURAL GAS STORAGE FIELD

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

\*Please attach additional forms if necessary

MAR 05 2021

WV Department of  
Environmental Protection

**Notice is hereby given:**

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

**This Notice Shall Include:**

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

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

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

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

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

**Well Location Restrictions**

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

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

**Water Well Testing:**

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

**Water Testing Laboratories:**

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

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

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

**Written Comment:**

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

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

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

04/09/2021

**Time Limits and Methods for Filing Comments.**

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

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

**Comment Requirements**

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

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

**Permit Denial or Condition**

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

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

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

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

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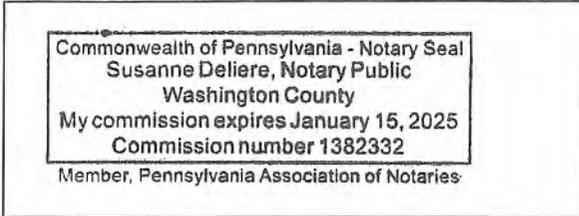
**Notice is hereby given by:**

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

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

**Oil and Gas Privacy Notice:**

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



Subscribed and sworn before me this 23<sup>rd</sup> day of February, 2021  
Susanne Deliere Notary Public  
My Commission Expires 1/15/2025

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**WW-6A Notice of Application  
Well Number Attachment**

Keith Stern N-1HM

Keith Stern N-2HM

Keith Stern N-3HM

Keith Stern N-4HM

Keith Stern N-5HM

Keith Stern N-6HM (47-051-02098)

Keith Stern N-7HM (47-051-02101)

Keith Stern S-8HM (47-051-02103)

Keith Stern S-9HM (47-051-02102)

Keith Stern S-10HM (47-051-02105)

Keith Stern S-12HM (47-051-02104)

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04/09/2021

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

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

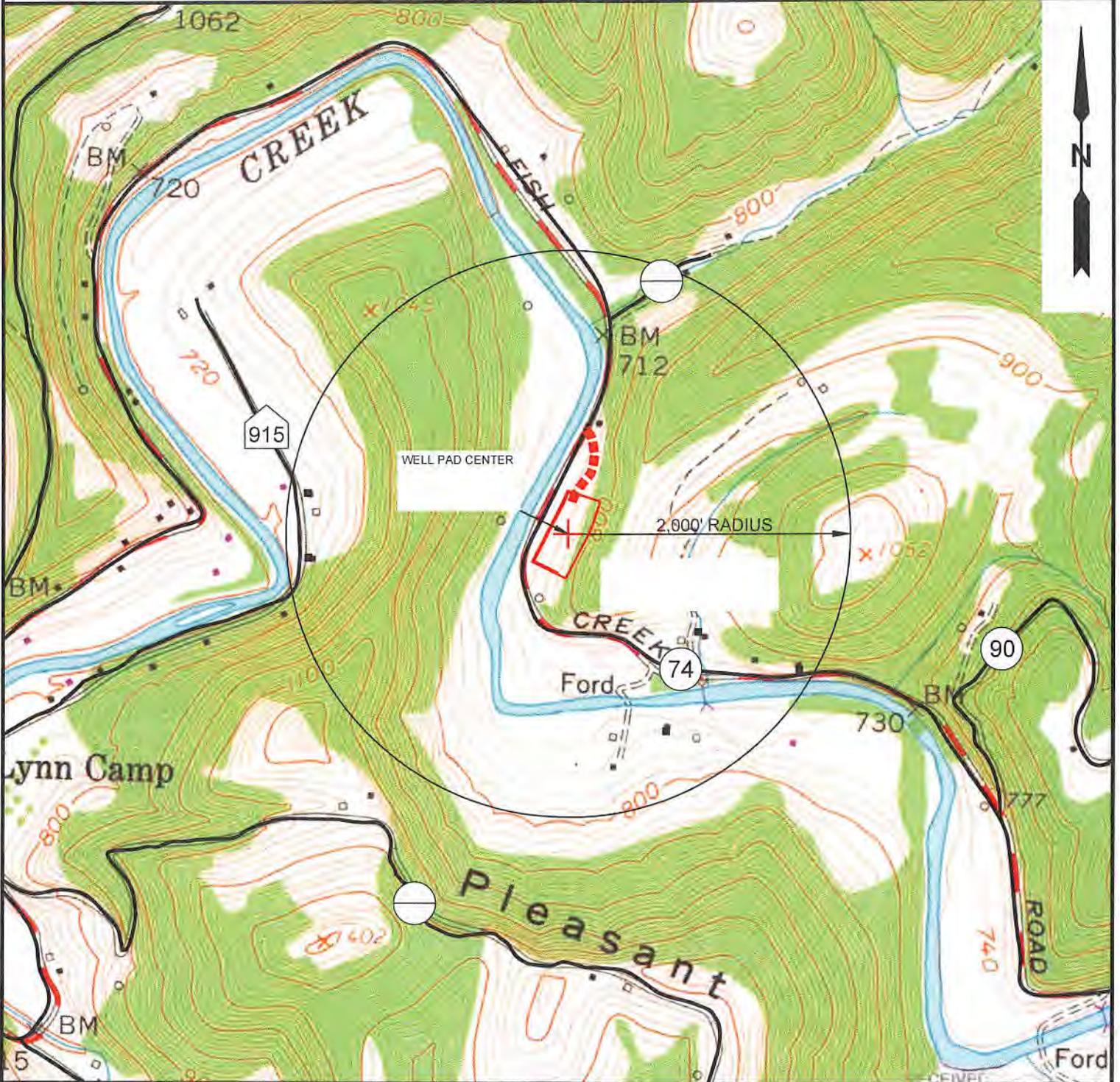
Well: KEITH STERN S – 10HM  
 District: Meade (House #'s 1-5)  
 State: WV

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

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 Environmental Protection

# PROPOSED KEITH STERN S - 10HM



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

Office of Oil and Gas

MAR 05 2021



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	07/31/2018	1" = 1000'



7019 1640 0002 2948 7572

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**OFFICIAL USE**

Certified Mail Fee \$

Extra Services & Fees (check box, add fee as appropriate)

Return Receipt (hardcopy) \$

Return Receipt (electronic) \$

Certified Mail Restricted Delivery \$

Adult Signature Required \$

Adult Signature Restricted Delivery \$

Postage \$

Total \$

To: TH Exploration, LLC  
1320 S. University Drive  
Suite 500  
Fort Worth, TX 76107

PS Form 3800, April 2010 (PSN 7530-01-000-9000) See Reverse for Instructions



7019 1640 0002 2948 7570

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**OFFICIAL USE**

Certified Mail Fee \$

Extra Services & Fees (check box, add fee as appropriate)

Return Receipt (hardcopy) \$

Return Receipt (electronic) \$

Certified Mail Restricted Delivery \$

Adult Signature Required \$

Adult Signature Restricted Delivery \$

Postage \$

Total \$

To: CONSOL Energy, Inc.  
Attn: Casey Saunders  
1000 CONSOL Energy Drive  
Canonsburg, PA 15317

PS Form 3800, April 2010 (PSN 7530-01-000-9000) See Reverse for Instructions



7019 1640 0002 2948 7527

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Certified Mail Fee \$

Extra Services & Fees (check box, add fee as appropriate)

Return Receipt (hardcopy) \$

Return Receipt (electronic) \$

Certified Mail Restricted Delivery \$

Adult Signature Required \$

Adult Signature Restricted Delivery \$

Postage \$

Total \$

To: William K. Stern, Et Ux  
14912 Fish Creek Road  
Glen Easton, WV 26039

PS Form 3800, April 2010 (PSN 7530-01-000-9000) See Reverse for Instructions



7019 1640 0002 2948 7534

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**OFFICIAL USE**

Certified Mail Fee \$

Extra Services & Fees (check box, add fee as appropriate)

Return Receipt (hardcopy) \$

Return Receipt (electronic) \$

Certified Mail Restricted Delivery \$

Adult Signature Required \$

Adult Signature Restricted Delivery \$

Postage \$

Total \$

To: William K. Stern, Et Ux  
15056 Fish Creek Road  
Glen Easton, WV 26039

PS Form 3800, April 2010 (PSN 7530-01-000-9000) See Reverse for Instructions



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To: Eleanore M. Fox Est.  
100 Lynn Camp Lane  
Glen Easton, WV 26039-9707

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To: Patrick J. Shellhase  
593 Crow Drive  
Glen Easton, WV 26039

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To: Patricia A. Dugas  
681 Crow Drive  
Glen Easton, WV 26039

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