



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

Harold D. Ward, Cabinet Secretary
www.dep.wv.gov

Tuesday, June 14, 2022
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 N-7HM
47-051-02101-00-00

Extended Lateral

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

A handwritten signature in blue ink, appearing to read 'James A. Martin', is written over the typed name and title.

Operator's Well Number: KEITH STERN N-7HM
Farm Name: TH EXPLORATION, LLC
U.S. WELL NUMBER: 47-051-02101-00-00
Horizontal 6A New Drill
Date Modification Issued: 6/14/2022

Promoting a healthy environment.

06/17/2022

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 N-7HM 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

ju
10/16/2020

Digitally signed by
Gayne Knitowski
Date: 2022.06.13
15:20:01 -0400
Gayne
Knitowski

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus is the target formation at a depth of 6266' - 6317', thickness of 51' and an anticipated approximate pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6,417'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 14,479'

11) Proposed Horizontal Leg Length: 6,701.12'

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

WV Department of
Environmental Protection

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	259ft^3(CTS)
Fresh Water	13 3/8"	NEW	J55	54.5#	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#	2,229'	2,229'	722ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	14,479'	14,479'	3710ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#	6,976'		
Liners							

JK
10/16/2020

Digitally signed by
 Gayne Knitowski
 Date: 2022.06.13
 15:20:21 -04'00'

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 - 02101
OPERATOR WELL NO. Keith Stern N-7HM
Well Pad Name: Keith Stern

Digitally signed by
Gayne Knitowski
Date: 2022.06.13
15:20:40 -04'00'

DK
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 16,060,000 lb. proppant and 248,299 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.

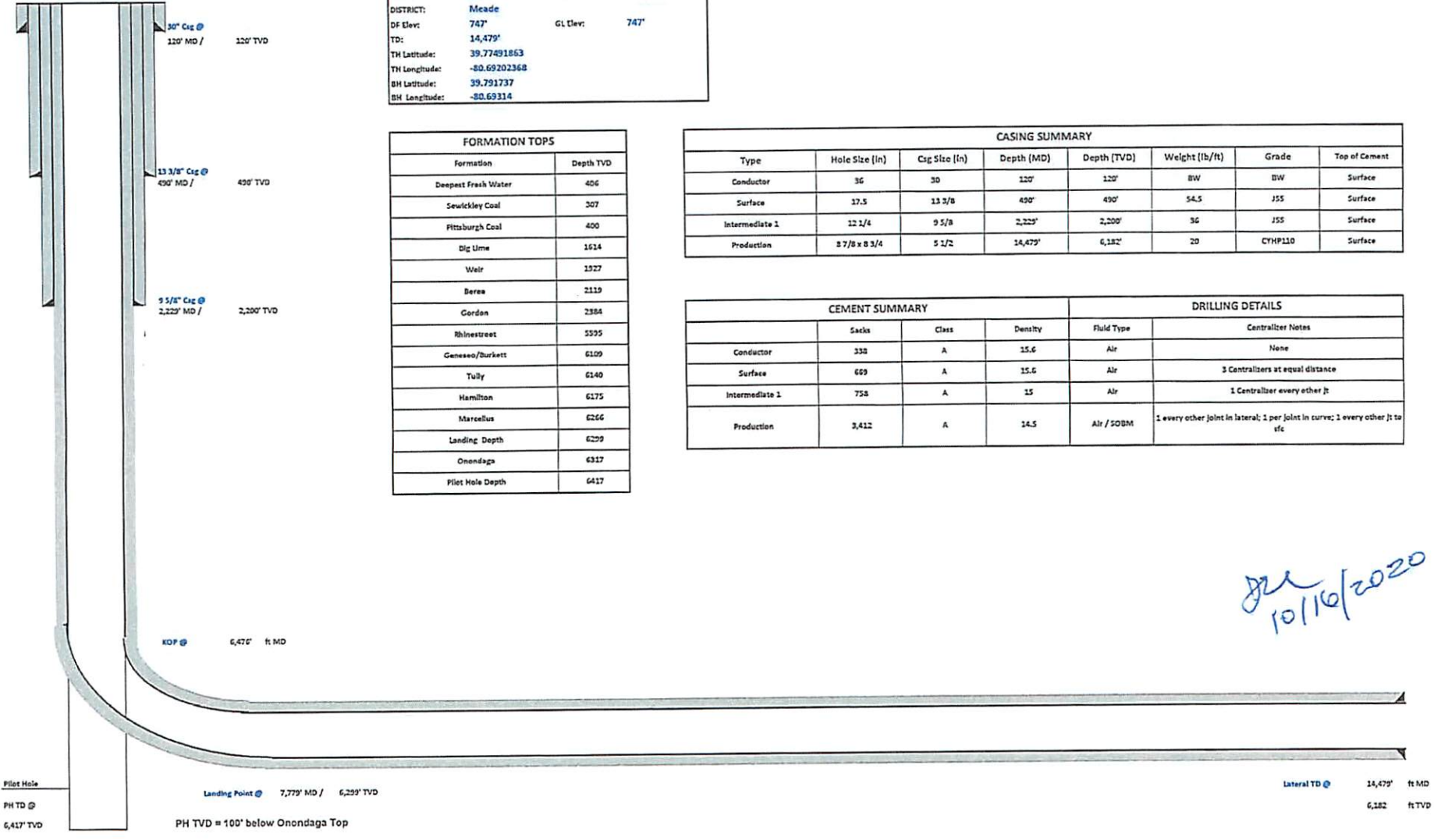


WELL NAME: Keith Stern N-7HM
STATE: WV **COUNTY:** Marshall
DISTRICT: Meade
DF Elev: 747' **GL Elev:** 747'
TD: 14,479'
TH Latitude: 39.77491863
TH Longitude: -80.69202368
BH Latitude: 39.791737
BH Longitude: -80.69314

FORMATION TOPS	
Formation	Depth TVD
Deepest Fresh Water	406
Sewickley Coal	307
Pittsburgh Coal	400
Dig Lime	1614
Weir	1927
Berea	2119
Gordon	2384
Rhinestreet	3335
Genesee/Burkett	6109
Tully	6140
Hamilton	6175
Marcellus	6264
Landing Depth	6299
Onondaga	6317
Pilot Hole Depth	6417

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'	8W	8W	Surface
Surface	17.5	11 3/8	490'	490'	54.5	J55	Surface
Intermediate 1	12 1/4	9 5/8	2,329'	2,300'	36	J55	Surface
Production	8 7/8 x 8 3/4	5 1/2	14,479'	6,182'	20	CYMP110	Surface

CEMENT SUMMARY				DRILLING DETAILS	
	Sacks	Class	Density	Fluid Type	Centralizer Notes
Conductor	330	A	15.6	Air	None
Surface	669	A	15.6	Air	3 Centralizers at equal distance
Intermediate 1	758	A	15	Air	1 Centralizer every other jt
Production	3,412	A	14.5	Air / SOBIM	1 every other joint in lateral; 1 per joint in curve; 1 every other jt to etc



JK
10/16/2020



Tug Hill Operating, LLC Casing and Cement Program

Keith Stern N-7HM

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"	2,229'	CTS
Production	5 1/2"	CYHP110	8 7/8 x 8 3/4"	14,479'	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



Well: Keith Stern N-07 HM (slot T)
 Site: Keith Stern
 Project: Marshall County, West Virginia.
 Design: rev2

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 14444922.64 Easting 1726948.32 Latitude 39.77491863 Longitude -80.69202368

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.910°

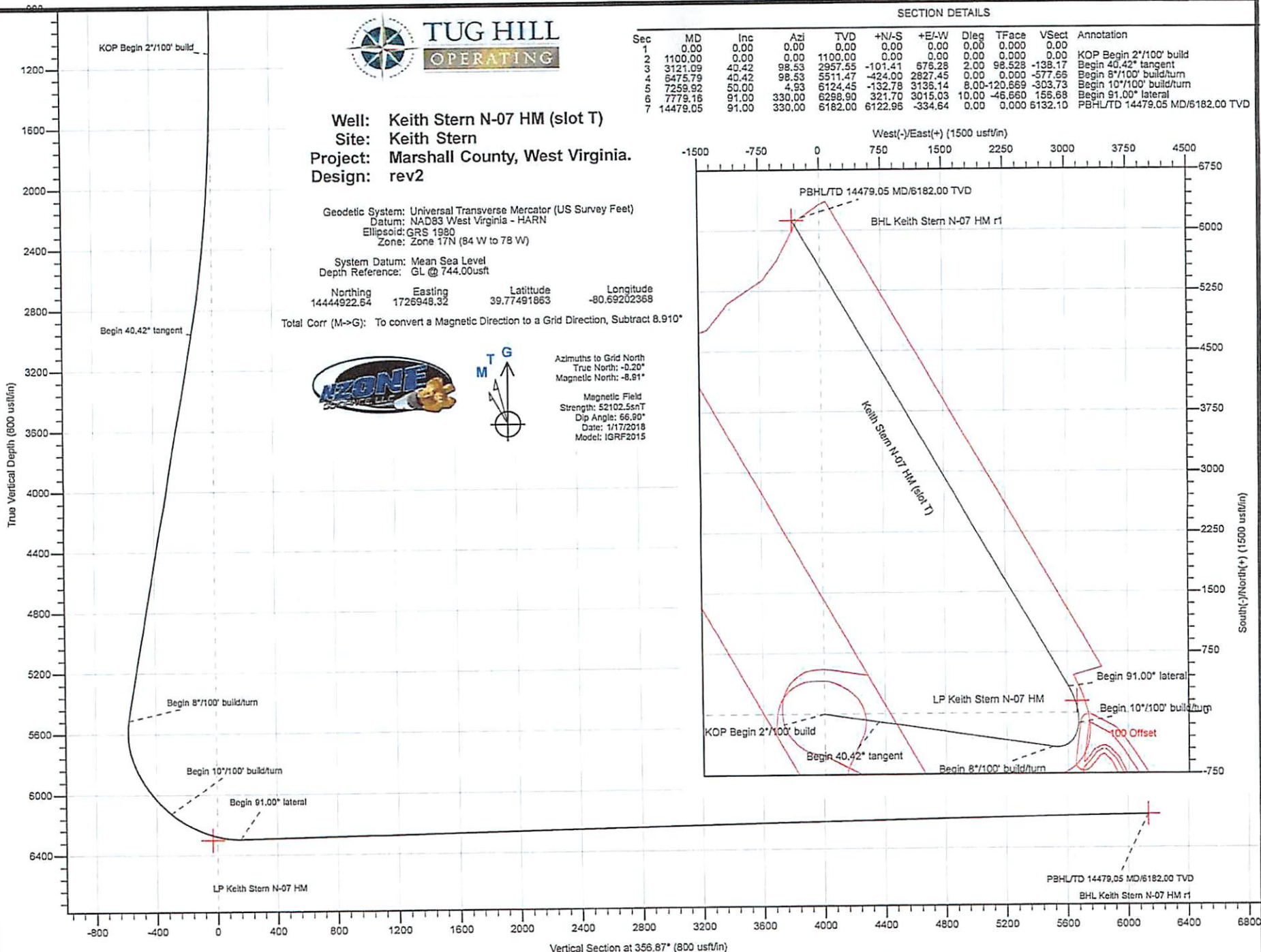


Azimuths to Grid North
 True North: -0.20°
 Magnetic North: -8.91°

Magnetic Field
 Strength: 52102.55nT
 Dip Angle: 66.80°
 Date: 1/17/2018
 Model: IGRF2015

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	1100.00	0.00	0.00	1100.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 2°/100' build
3	3121.09	40.42	98.53	2957.55	-101.41	675.28	2.00	98.528	-138.17	Begin 40.42° tangent
4	6475.79	40.42	98.53	5511.47	-424.00	2827.45	0.00	0.000	-577.66	Begin 8°/100' build/turn
5	7259.92	50.00	4.93	6124.45	-132.78	3135.14	8.00	-120.669	-303.73	Begin 10°/100' build/turn
6	7779.16	91.00	330.00	6298.90	321.70	3015.03	10.00	-46.660	156.68	Begin 91.00° lateral
7	14479.05	91.00	330.00	6182.00	6122.96	-334.64	0.00	0.000	6132.10	PBHL/TD 14479.05 MD/6182.00 TVD





Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Keith Stern N-07 HM (slot T)
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 N-07 HM (slot T)	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				
Site Position:	Northing:	14,444,890.33 usft	Latitude:	39.77483004	
From:	Lat/Long	Easting:	1,726,932.47 usft	Longitude:	-80.69208048
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.197 °

Well	Keith Stern N-07 HM (slot T)					
Well Position	+N/-S	0.00 usft	Northing:	14,444,922.64 usft	Latitude:	39.77491863
	+E/-W	0.00 usft	Easting:	1,726,948.32 usft	Longitude:	-80.69202368
Position Uncertainty	0.00 usft	Wellhead Elevation:		Ground Level:	744.00 usft	

Wellbore	Original Hole					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)	
	IGRF2015	1/17/2018	-8.713	66.896	52,102.54613207	

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	356.87	

Plan Survey Tool Program	Date 6/4/2019				
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks	
1	0.00	14,479.05 rev2 (Original Hole)	MWD	MWD - Standard	

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	0.000	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.000	
3,121.09	40.42	98.53	2,957.55	-101.41	676.28	2.00	2.00	0.00	98.528	
6,475.79	40.42	98.53	5,511.47	-424.00	2,827.45	0.00	0.00	0.00	0.000	
7,259.92	50.00	4.93	6,124.45	-132.78	3,136.14	8.00	1.22	-11.94	-120.669	
7,779.16	91.00	330.00	6,298.90	321.70	3,015.03	10.00	7.90	-6.73	-46.660	
14,479.05	91.00	330.00	6,182.00	6,122.96	-334.64	0.00	0.00	0.00	0.000	BHL Keith Stern N-07



Planning Report - Geographic

Database:	DB_Jul2216dL_v14	Local Co-ordinate Reference:	Well Keith Stern N-07 HM (slot T)
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 N-07 HM (slot T)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
100.00	0.00	0.00	100.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
200.00	0.00	0.00	200.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
300.00	0.00	0.00	300.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
400.00	0.00	0.00	400.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
500.00	0.00	0.00	500.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
600.00	0.00	0.00	600.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
700.00	0.00	0.00	700.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
800.00	0.00	0.00	800.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
900.00	0.00	0.00	900.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
1,000.00	0.00	0.00	1,000.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
1,100.00	0.00	0.00	1,100.00	0.00	0.00	14,444,922.64	1,726,948.32	39.77491863	-80.69202368
KOP Begin 2°/100' build									
1,200.00	2.00	98.53	1,199.98	-0.26	1.73	14,444,922.38	1,726,950.04	39.77491790	-80.69201754
1,300.00	4.00	98.53	1,299.84	-1.03	6.90	14,444,921.60	1,726,955.22	39.77491572	-80.69199913
1,400.00	6.00	98.53	1,399.45	-2.33	15.52	14,444,920.31	1,726,963.84	39.77491209	-80.69196847
1,500.00	8.00	98.53	1,498.70	-4.13	27.57	14,444,918.50	1,726,975.89	39.77490702	-80.69192560
1,600.00	10.00	98.53	1,597.46	-6.45	43.04	14,444,916.18	1,726,991.36	39.77490050	-80.69187057
1,700.00	12.00	98.53	1,695.62	-9.28	61.91	14,444,913.36	1,727,010.23	39.77489255	-80.69180345
1,800.00	14.00	98.53	1,793.05	-12.62	84.15	14,444,910.02	1,727,032.47	39.77488318	-80.69172432
1,900.00	16.00	98.53	1,889.64	-16.46	109.75	14,444,906.18	1,727,058.07	39.77487240	-80.69163328
2,000.00	18.00	98.53	1,985.26	-20.79	138.66	14,444,901.85	1,727,086.98	39.77486022	-80.69153043
2,100.00	20.00	98.53	2,079.81	-25.62	170.86	14,444,897.02	1,727,119.17	39.77484665	-80.69141591
2,200.00	22.00	98.53	2,173.16	-30.94	206.29	14,444,891.70	1,727,154.61	39.77483172	-80.69128984
2,300.00	24.00	98.53	2,265.21	-36.73	244.93	14,444,885.91	1,727,193.25	39.77481545	-80.69115240
2,400.00	26.00	98.53	2,355.84	-43.00	286.73	14,444,879.64	1,727,235.04	39.77479784	-80.69100373
2,500.00	28.00	98.53	2,444.93	-49.73	331.62	14,444,872.91	1,727,279.94	39.77477893	-80.69084403
2,599.99	30.00	98.53	2,532.39	-56.92	379.56	14,444,865.72	1,727,327.88	39.77475873	-80.69067349
2,699.99	32.00	98.53	2,618.10	-64.56	430.49	14,444,858.08	1,727,378.81	39.77473727	-80.69049232
2,799.99	34.00	98.53	2,701.97	-72.63	484.35	14,444,850.01	1,727,432.67	39.77471458	-80.69030073
2,899.99	36.00	98.53	2,783.88	-81.14	541.07	14,444,841.50	1,727,489.39	39.77469068	-80.69009896
2,999.99	38.00	98.53	2,863.74	-90.06	600.59	14,444,832.58	1,727,548.90	39.77466561	-80.68988727
3,099.99	40.00	98.53	2,941.45	-99.39	662.82	14,444,823.24	1,727,611.14	39.77463938	-80.68966589
3,121.09	40.42	98.53	2,957.55	-101.41	676.28	14,444,821.23	1,727,624.60	39.77463371	-80.68961799
Begin 40.42° tangent									
3,199.99	40.42	98.53	3,017.63	-109.00	726.88	14,444,813.64	1,727,675.20	39.77461239	-80.68943800
3,299.99	40.42	98.53	3,093.75	-118.62	791.01	14,444,804.02	1,727,739.33	39.77458537	-80.68920990
3,399.99	40.42	98.53	3,169.88	-128.23	855.13	14,444,794.41	1,727,803.45	39.77455835	-80.68898180
3,499.99	40.42	98.53	3,246.01	-137.85	919.25	14,444,784.79	1,727,867.57	39.77453133	-80.68875370
3,599.99	40.42	98.53	3,322.14	-147.46	983.38	14,444,775.17	1,727,931.70	39.77450431	-80.68852559
3,699.99	40.42	98.53	3,398.27	-157.08	1,047.50	14,444,765.56	1,727,995.82	39.77447729	-80.68829749
3,799.99	40.42	98.53	3,474.40	-166.70	1,111.63	14,444,755.94	1,728,059.94	39.77445027	-80.68806939
3,899.99	40.42	98.53	3,550.53	-176.31	1,175.75	14,444,746.33	1,728,124.07	39.77442325	-80.68784129
3,999.99	40.42	98.53	3,626.66	-185.93	1,239.87	14,444,736.71	1,728,188.19	39.77439623	-80.68761319
4,099.99	40.42	98.53	3,702.79	-195.54	1,304.00	14,444,727.10	1,728,252.32	39.77436921	-80.68738510
4,199.99	40.42	98.53	3,778.92	-205.16	1,368.12	14,444,717.48	1,728,316.44	39.77434219	-80.68715700
4,299.99	40.42	98.53	3,855.05	-214.78	1,432.24	14,444,707.86	1,728,380.56	39.77431516	-80.68692890
4,399.99	40.42	98.53	3,931.17	-224.39	1,496.37	14,444,698.25	1,728,444.69	39.77428814	-80.68670080
4,499.99	40.42	98.53	4,007.30	-234.01	1,560.49	14,444,688.63	1,728,508.81	39.77426112	-80.68647270
4,599.99	40.42	98.53	4,083.43	-243.62	1,624.62	14,444,679.02	1,728,572.93	39.77423409	-80.68624460
4,699.99	40.42	98.53	4,159.56	-253.24	1,688.74	14,444,669.40	1,728,637.06	39.77420707	-80.68601650
4,799.99	40.42	98.53	4,235.69	-262.85	1,752.86	14,444,659.78	1,728,701.18	39.77418004	-80.68578840
4,899.99	40.42	98.53	4,311.82	-272.47	1,816.99	14,444,650.17	1,728,765.31	39.77415302	-80.68556031
4,999.99	40.42	98.53	4,387.95	-282.09	1,881.11	14,444,640.55	1,728,829.43	39.77412599	-80.68533221



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Keith Stern N-07 HM (slot T)
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 N-07 HM (slot T)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,099.99	40.42	98.53	4,464.08	-291.70	1,945.23	14,444,630.94	1,728,893.55	39.77409896	-80.68510411
5,199.99	40.42	98.53	4,540.21	-301.32	2,009.36	14,444,621.32	1,728,957.68	39.77407194	-80.68487601
5,299.99	40.42	98.53	4,616.34	-310.93	2,073.48	14,444,611.71	1,729,021.80	39.77404491	-80.68464792
5,399.99	40.42	98.53	4,692.47	-320.55	2,137.61	14,444,602.09	1,729,085.92	39.77401788	-80.68441982
5,499.99	40.42	98.53	4,768.60	-330.17	2,201.73	14,444,592.47	1,729,150.05	39.77399085	-80.68419172
5,599.99	40.42	98.53	4,844.72	-339.78	2,265.85	14,444,582.86	1,729,214.17	39.77396382	-80.68396362
5,699.99	40.42	98.53	4,920.85	-349.40	2,329.98	14,444,573.24	1,729,278.30	39.77393680	-80.68373553
5,799.99	40.42	98.53	4,996.98	-359.01	2,394.10	14,444,563.63	1,729,342.42	39.77390977	-80.68350743
5,899.99	40.42	98.53	5,073.11	-368.63	2,458.22	14,444,554.01	1,729,406.54	39.77388274	-80.68327933
5,999.99	40.42	98.53	5,149.24	-378.24	2,522.35	14,444,544.39	1,729,470.67	39.77385571	-80.68305124
6,099.99	40.42	98.53	5,225.37	-387.86	2,586.47	14,444,534.78	1,729,534.79	39.77382867	-80.68282314
6,199.99	40.42	98.53	5,301.50	-397.48	2,650.60	14,444,525.16	1,729,598.91	39.77380164	-80.68259505
6,299.99	40.42	98.53	5,377.63	-407.09	2,714.72	14,444,515.55	1,729,663.04	39.77377461	-80.68236695
6,399.99	40.42	98.53	5,453.76	-416.71	2,778.84	14,444,505.93	1,729,727.16	39.77374758	-80.68213886
6,475.79	40.42	98.53	5,511.47	-424.00	2,827.45	14,444,498.64	1,729,775.77	39.77372709	-80.68196595
Begin 8°/100' build/turn									
6,499.99	39.46	95.91	5,530.02	-425.95	2,842.86	14,444,496.69	1,729,791.18	39.77372157	-80.68191114
6,599.99	36.20	83.98	5,609.09	-426.12	2,903.94	14,444,496.51	1,729,852.26	39.77372050	-80.68169376
6,699.99	34.30	70.49	5,690.88	-413.60	2,959.95	14,444,509.04	1,729,908.27	39.77375436	-80.68149425
6,799.99	33.98	56.22	5,773.79	-388.61	3,009.81	14,444,534.03	1,729,958.13	39.77382249	-80.68131648
6,899.99	35.29	42.31	5,856.20	-351.65	3,052.55	14,444,570.99	1,730,000.87	39.77392358	-80.68116392
6,999.99	38.06	29.72	5,936.51	-303.44	3,087.33	14,444,619.20	1,730,035.64	39.77405563	-80.68103953
7,099.99	42.00	18.87	6,013.16	-244.91	3,113.47	14,444,677.73	1,730,061.79	39.77421610	-80.68094573
7,199.99	46.81	9.72	6,084.65	-177.21	3,130.48	14,444,745.42	1,730,078.79	39.77440186	-80.68088436
7,259.92	50.00	4.93	6,124.45	-132.78	3,136.14	14,444,789.86	1,730,084.46	39.77452383	-80.68086363
Begin 10°/100' build/turn									
7,299.99	52.81	1.27	6,149.44	-101.53	3,137.81	14,444,821.11	1,730,086.13	39.77460964	-80.68085728
7,399.99	60.24	353.23	6,204.63	-18.39	3,133.57	14,444,904.25	1,730,081.89	39.77483799	-80.68087132
7,499.99	68.08	346.33	6,248.23	70.00	3,117.45	14,444,992.64	1,730,065.77	39.77508091	-80.68092757
7,599.98	76.18	340.17	6,278.91	160.98	3,089.95	14,445,083.62	1,730,038.27	39.77533102	-80.68102431
7,699.98	84.43	334.42	6,295.75	251.77	3,051.89	14,445,174.41	1,730,000.21	39.77558073	-80.68115861
7,779.16	91.00	330.00	6,298.90	321.70	3,015.03	14,445,244.34	1,729,963.35	39.77577312	-80.68128892
Begin 91.00° lateral									
7,799.98	91.00	330.00	6,298.54	339.73	3,004.62	14,445,262.37	1,729,952.93	39.77582275	-80.68132575
7,899.98	91.00	330.00	6,296.80	426.32	2,954.62	14,445,348.96	1,729,902.94	39.77606103	-80.68150259
7,999.98	91.00	330.00	6,295.05	512.90	2,904.63	14,445,435.54	1,729,852.94	39.77629931	-80.68167944
8,099.98	91.00	330.00	6,293.31	599.49	2,854.63	14,445,522.13	1,729,802.95	39.77653758	-80.68185628
8,199.98	91.00	330.00	6,291.56	686.08	2,804.63	14,445,608.72	1,729,752.95	39.77677586	-80.68203313
8,299.98	91.00	330.00	6,289.82	772.67	2,754.64	14,445,695.30	1,729,702.96	39.77701414	-80.68220998
8,399.98	91.00	330.00	6,288.07	859.25	2,704.64	14,445,781.89	1,729,652.96	39.77725242	-80.68238683
8,499.98	91.00	330.00	6,286.33	945.84	2,654.65	14,445,868.48	1,729,602.96	39.77749070	-80.68256368
8,599.98	91.00	330.00	6,284.58	1,032.43	2,604.65	14,445,955.07	1,729,552.97	39.77772897	-80.68274054
8,699.98	91.00	330.00	6,282.84	1,119.01	2,554.66	14,446,041.65	1,729,502.97	39.77796725	-80.68291739
8,799.98	91.00	330.00	6,281.09	1,205.60	2,504.66	14,446,128.24	1,729,452.98	39.77820553	-80.68309425
8,899.98	91.00	330.00	6,279.35	1,292.19	2,454.66	14,446,214.83	1,729,402.98	39.77844380	-80.68327110
8,999.98	91.00	330.00	6,277.60	1,378.78	2,404.67	14,446,301.41	1,729,352.99	39.77868208	-80.68344796
9,099.98	91.00	330.00	6,275.86	1,465.36	2,354.67	14,446,388.00	1,729,302.99	39.77892035	-80.68362482
9,199.98	91.00	330.00	6,274.11	1,551.95	2,304.68	14,446,474.59	1,729,252.99	39.77915863	-80.68380168
9,299.98	91.00	330.00	6,272.37	1,638.54	2,254.68	14,446,561.18	1,729,203.00	39.77939691	-80.68397854
9,399.98	91.00	330.00	6,270.62	1,725.12	2,204.68	14,446,647.76	1,729,153.00	39.77963518	-80.68415540
9,499.98	91.00	330.00	6,268.88	1,811.71	2,154.69	14,446,734.35	1,729,103.01	39.77987346	-80.68433227
9,599.98	91.00	330.00	6,267.13	1,898.30	2,104.69	14,446,820.94	1,729,053.01	39.78011173	-80.68450913
9,699.98	91.00	330.00	6,265.39	1,984.89	2,054.70	14,446,907.53	1,729,003.02	39.78035000	-80.68468600
9,799.98	91.00	330.00	6,263.64	2,071.47	2,004.70	14,446,994.11	1,728,953.02	39.78058828	-80.68486287



Planning Report - Geographic

Database:	DB_Jul2216d_v14	Local Co-ordinate Reference:	Well Keith Stern N-07 HM (slot T)
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 N-07 HM (slot T)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Deslgn:	rev2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
9,899.98	91.00	330.00	6,261.90	2,158.06	1,954.71	14,447,080.70	1,728,903.02	39.78082655	-80.68503973	
9,999.98	91.00	330.00	6,260.15	2,244.65	1,904.71	14,447,167.29	1,728,853.03	39.78106483	-80.68521660	
10,099.98	91.00	330.00	6,258.41	2,331.23	1,854.71	14,447,253.87	1,728,803.03	39.78130310	-80.68539348	
10,199.98	91.00	330.00	6,256.66	2,417.82	1,804.72	14,447,340.46	1,728,753.04	39.78154137	-80.68557035	
10,299.98	91.00	330.00	6,254.92	2,504.41	1,754.72	14,447,427.05	1,728,703.04	39.78177964	-80.68574722	
10,399.98	91.00	330.00	6,253.17	2,591.00	1,704.73	14,447,513.64	1,728,653.05	39.78201792	-80.68592410	
10,499.98	91.00	330.00	6,251.43	2,677.58	1,654.73	14,447,600.22	1,728,603.05	39.78225619	-80.68610097	
10,599.98	91.00	330.00	6,249.69	2,764.17	1,604.74	14,447,686.81	1,728,553.05	39.78249446	-80.68627785	
10,699.98	91.00	330.00	6,247.94	2,850.76	1,554.74	14,447,773.40	1,728,503.06	39.78273273	-80.68645473	
10,799.98	91.00	330.00	6,246.20	2,937.35	1,504.74	14,447,859.98	1,728,453.06	39.78297100	-80.68663161	
10,899.98	91.00	330.00	6,244.45	3,023.93	1,454.75	14,447,946.57	1,728,403.07	39.78320927	-80.68680849	
10,999.98	91.00	330.00	6,242.71	3,110.52	1,404.75	14,448,033.16	1,728,353.07	39.78344754	-80.68698537	
11,099.98	91.00	330.00	6,240.96	3,197.11	1,354.76	14,448,119.75	1,728,303.08	39.78368581	-80.68716225	
11,199.98	91.00	330.00	6,239.22	3,283.69	1,304.76	14,448,206.33	1,728,253.08	39.78392408	-80.68733914	
11,299.98	91.00	330.00	6,237.47	3,370.28	1,254.77	14,448,292.92	1,728,203.08	39.78416235	-80.68751602	
11,399.98	91.00	330.00	6,235.73	3,456.87	1,204.77	14,448,379.51	1,728,153.09	39.78440062	-80.68769291	
11,499.98	91.00	330.00	6,233.98	3,543.46	1,154.77	14,448,466.09	1,728,103.09	39.78463889	-80.68786980	
11,599.98	91.00	330.00	6,232.24	3,630.04	1,104.78	14,448,552.68	1,728,053.10	39.78487716	-80.68804669	
11,699.98	91.00	330.00	6,230.49	3,716.63	1,054.78	14,448,639.27	1,728,003.10	39.78511543	-80.68822358	
11,799.98	91.00	330.00	6,228.75	3,803.22	1,004.79	14,448,725.86	1,727,953.11	39.78535370	-80.68840047	
11,899.98	91.00	330.00	6,227.00	3,889.80	954.79	14,448,812.44	1,727,903.11	39.78559197	-80.68857736	
11,999.98	91.00	330.00	6,225.26	3,976.39	904.80	14,448,899.03	1,727,853.11	39.78583024	-80.68875426	
12,099.98	91.00	330.00	6,223.51	4,062.98	854.80	14,448,985.62	1,727,803.12	39.78606850	-80.68893115	
12,199.98	91.00	330.00	6,221.77	4,149.57	804.80	14,449,072.21	1,727,753.12	39.78630677	-80.68910805	
12,299.98	91.00	330.00	6,220.02	4,236.15	754.81	14,449,158.79	1,727,703.13	39.78654504	-80.68928495	
12,399.98	91.00	330.00	6,218.28	4,322.74	704.81	14,449,245.38	1,727,653.13	39.78678330	-80.68946185	
12,499.98	91.00	330.00	6,216.53	4,409.33	654.82	14,449,331.97	1,727,603.14	39.78702157	-80.68963875	
12,599.98	91.00	330.00	6,214.79	4,495.91	604.82	14,449,418.55	1,727,553.14	39.78725984	-80.68981565	
12,699.97	91.00	330.00	6,213.04	4,582.50	554.83	14,449,505.14	1,727,503.14	39.78749810	-80.68999255	
12,799.97	91.00	330.00	6,211.30	4,669.09	504.83	14,449,591.73	1,727,453.15	39.78773637	-80.69016946	
12,899.97	91.00	330.00	6,209.55	4,755.68	454.83	14,449,678.32	1,727,403.15	39.78797463	-80.69034636	
12,999.97	91.00	330.00	6,207.81	4,842.26	404.84	14,449,764.90	1,727,353.16	39.78821290	-80.69052327	
13,099.97	91.00	330.00	6,206.06	4,928.85	354.84	14,449,851.49	1,727,303.16	39.78845116	-80.69070018	
13,199.97	91.00	330.00	6,204.32	5,015.44	304.85	14,449,938.08	1,727,253.17	39.78868943	-80.69087709	
13,299.97	91.00	330.00	6,202.57	5,102.03	254.85	14,450,024.66	1,727,203.17	39.78892769	-80.69105400	
13,399.97	91.00	330.00	6,200.83	5,188.61	204.86	14,450,111.25	1,727,153.17	39.78916596	-80.69123091	
13,499.97	91.00	330.00	6,199.08	5,275.20	154.86	14,450,197.84	1,727,103.18	39.78940422	-80.69140782	
13,599.97	91.00	330.00	6,197.34	5,361.79	104.86	14,450,284.43	1,727,053.18	39.78964248	-80.69158473	
13,699.97	91.00	330.00	6,195.59	5,448.37	54.87	14,450,371.01	1,727,003.19	39.78988075	-80.69176165	
13,799.97	91.00	330.00	6,193.85	5,534.96	4.87	14,450,457.60	1,726,953.19	39.79011901	-80.69193856	
13,899.97	91.00	330.00	6,192.10	5,621.55	-45.12	14,450,544.19	1,726,903.19	39.79035727	-80.69211548	
13,999.97	91.00	330.00	6,190.36	5,708.14	-95.12	14,450,630.77	1,726,853.20	39.79059554	-80.69229240	
14,099.97	91.00	330.00	6,188.61	5,794.72	-145.11	14,450,717.36	1,726,803.20	39.79083380	-80.69246932	
14,199.97	91.00	330.00	6,186.87	5,881.31	-195.11	14,450,803.95	1,726,753.21	39.79107206	-80.69264624	
14,299.97	91.00	330.00	6,185.12	5,967.90	-245.11	14,450,890.54	1,726,703.21	39.79131032	-80.69282316	
14,399.97	91.00	330.00	6,183.38	6,054.48	-295.10	14,450,977.12	1,726,653.22	39.79154858	-80.69300009	
14,479.05	91.00	330.00	6,182.00	6,122.96	-334.64	14,451,045.60	1,726,613.68	39.79173700	-80.69314000	

PBHL/TD 14479.05 MD/6182.00 TVD



Planning Report - Geographic

Database:	DB_Jul2216dt_v14	Local Co-ordinate Reference:	Well Keith Stern N-07 HM (slot T)
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 N-07 HM (slot T)	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Hole		
Design:	rev2		

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									
BHL Keith Stern N-07 HI - plan hits target center - Point	0.00	0.00	6,182.00	6,122.96	-334.64	14,451,045.60	1,726,613.68	39.79173700	-80.69314000
LP Keith Stern N-07 HM - plan misses target center by 36.86usft at 7581.83usft MD (6274.35 TVD, 144.39 N, 3095.75 E) - Point	0.00	0.01	6,303.00	141.66	3,118.77	14,445,064.30	1,730,067.09	39.77527769	-80.68092196

Plan Annotations					
Measured Depth	Vertical Depth	Local Coordinates		Comment	
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)		
1,100.00	1,100.00	0.00	0.00		KOP Begin 2°/100' build
3,121.09	2,957.55	-101.41	676.28		Begin 40.42° tangent
6,475.79	5,511.47	-424.00	2,827.45		Begin 8°/100' build/turn
7,259.92	6,124.45	-132.78	3,136.14		Begin 10°/100' build/turn
7,779.16	6,298.90	321.70	3,015.03		Begin 91.00° lateral
14,479.05	6,182.00	6,122.96	-334.64		PBHL/TD 14479.05 MD/6182.00 TVD



TUG HILL
OPERATING

Well Site Safety Plan
Part A – Site Specific Data and Figures

Well Name: Keith Stern N-7HM

Pad Name: Keith Stern

County: Marshall

UTM (meters), NAD83, Zone 17

Northing: 4,402,821.23

Easting: 526,374.90

Digitally signed by
Gayne Knitowski
Date: 2022.06.14
08:22:12 -04'00'

RECEIVED
Office of Oil and Gas

JUN 14 2022

WV Department of
Environmental Protection

**KEY CONTACT FOR WELL SITE SAFETY PLAN
DEVELOPMENT AND MAINTENANCE**

Jerry V. DeRosa, Director EH&S Affairs
(724) 338-2029 (office)
(412) 736-5767 (cellular)

24-HOUR EMERGENCY PHONE NUMBER

(800) 921-9745

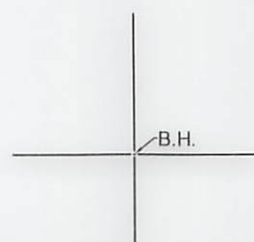
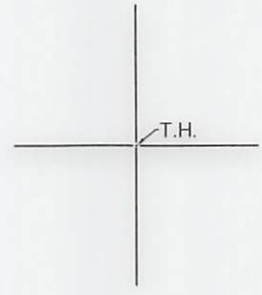
06/17/2022

**KEITH STERN N LEASE
WELL 7HM
TUG HILL OPERATING**

7,439' B.H.
7,127' T.H.
T.H. LATITUDE 39°47'30"
B.H. LATITUDE 39°50'00"

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)		
NAD'83 S.P.C.(FT)	N. 466,587.52	E. 1,633,473.69
NAD'83 GEO.	LAT-(N) 39.774919	LONG-(W) 80.692024
NAD'83 UTM (M)	N. 4,402,821.23	E. 526,374.90
LANDING POINT		
NAD'83 S.P.C.(FT)	N. 466,858.9	E. 1,636,494.7
NAD'83 GEO.	LAT-(N) 39.775773	LONG-(W) 80.681289
NAD'83 UTM (M)	N. 4,402,919.3	E. 527,293.9
BOTTOM HOLE		
NAD'83 S.P.C.(FT)	N. 472,717.3	E. 1,633,241.3
NAD'83 GEO.	LAT-(N) 39.791737	LONG-(W) 80.693140
NAD'83 UTM (M)	N. 4,404,687.5	E. 526,272.9

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



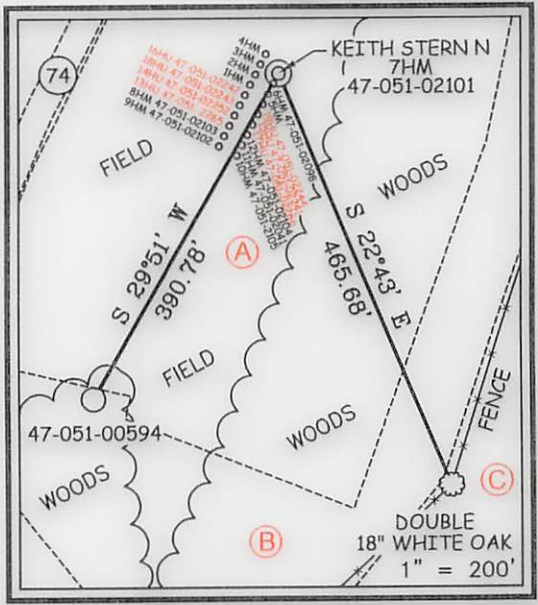
NOTES ON SURVEY

1. 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.
2. WELL SPOT CIRCLE & TOPO MARK SCALE IS 1"=2000'

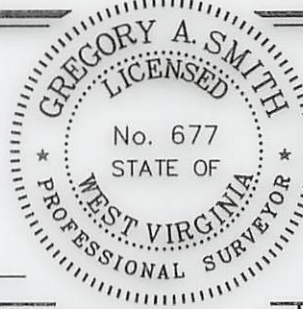


17 Madison Drive | P.O. Box 100 | Glenville, WV 26034 | 304-462-5854
1012 Kanawha Boulevard, East | Charleston, WV 25301 | 304-346-8952
254 East Rockway Avenue | Beckley, WV 25801 | 304-355-5266
slsw.com

REFERENCES



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



P.S. 677 *Gregory A. Smith*

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
 DATE JULY 31, 20 18
 REVISED 4-9-2020 & 6-3-2022
 OPERATORS WELL NO. KEITH STERN N-7HM
 API WELL NO. 47 - 051 - 02101
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8811P7HMR2.dwg
KEITH STERN N-7HM-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: ELEVATION GROUND = 741.20' 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 ISAAC CROW, ET AL - SEE WW-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: 6,417' / TMD: 14,479'

WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DARREN BROWN
 ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 ADDRESS 5098 WASHINGTON ST. W, STE 407
FORT WORTH, TX 76107 CHARLESTON, WV 25313-1561

6,101' T.H.

15,152' B.H.

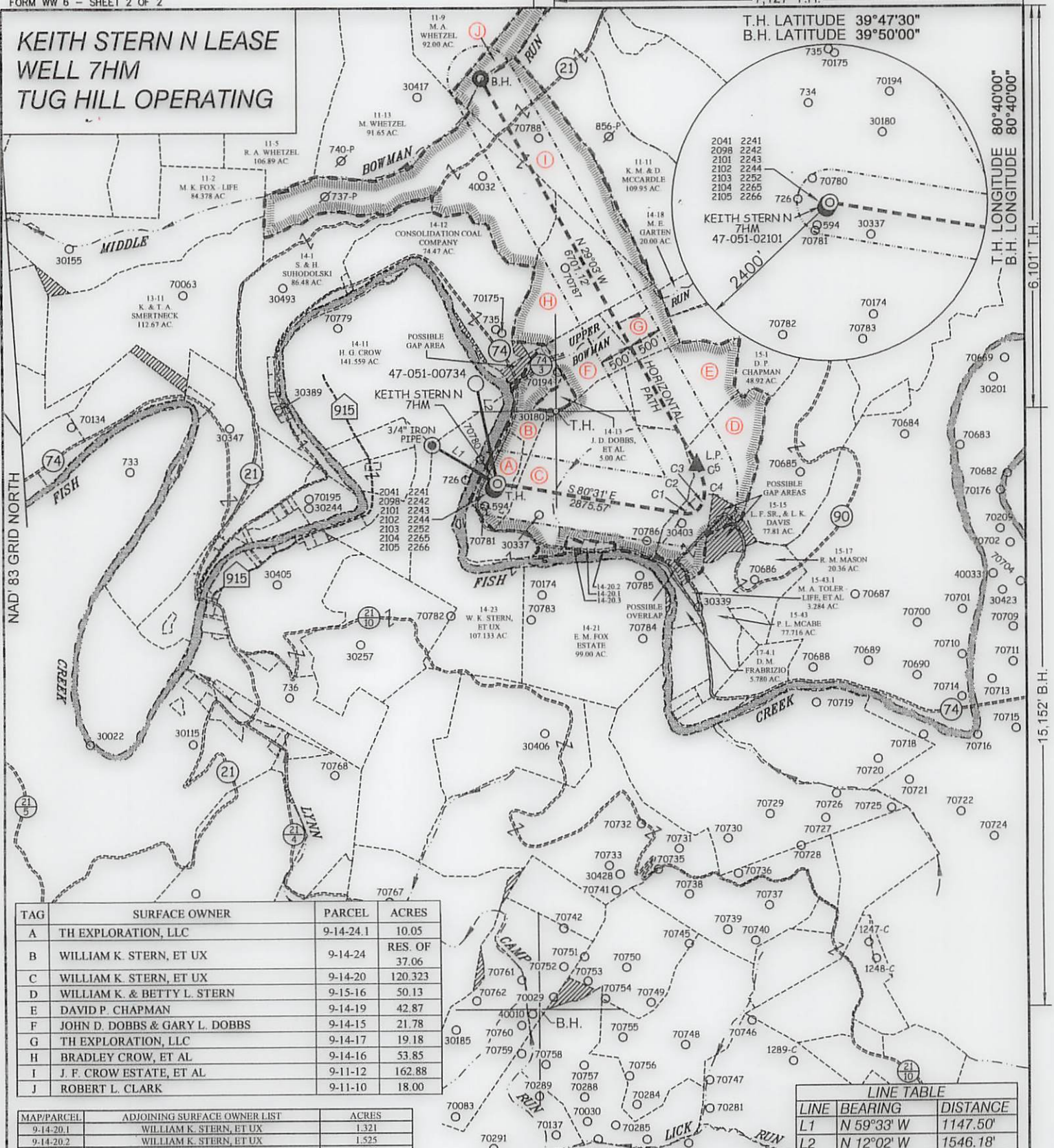
COUNTY NAME PERMIT

06/17/2022

**KEITH STERN N LEASE
WELL 7HM
TUG HILL OPERATING**

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

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



TAG	SURFACE OWNER	PARCEL	ACRES
A	TH EXPLORATION, LLC	9-14-24.1	10.05
B	WILLIAM K. STERN, ET UX	9-14-24	RES. OF 37.06
C	WILLIAM K. STERN, ET UX	9-14-20	120.323
D	WILLIAM K. & BETTY L. STERN	9-15-16	50.13
E	DAVID P. CHAPMAN	9-14-19	42.87
F	JOHN D. DOBBS & GARY L. DOBBS	9-14-15	21.78
G	TH EXPLORATION, LLC	9-14-17	19.18
H	BRADLEY CROW, ET AL	9-14-16	53.85
I	J. F. CROW ESTATE, ET AL	9-11-12	162.88
J	ROBERT L. CLARK	9-11-10	18.00

MAP/PARCEL	ADJOINING SURFACE OWNER LIST	ACRES
9-14-20.1	WILLIAM K. STERN, ET UX	1.321
9-14-20.2	WILLIAM K. STERN, ET UX	1.525
9-14-20.3	WILLIAM K. STERN, ET UX	0.831

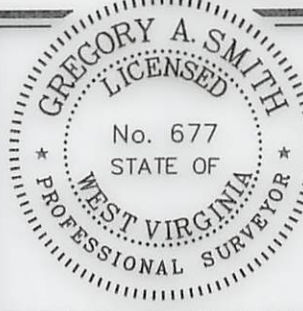
LINE TABLE		
LINE	BEARING	DISTANCE
L1	N 59°33' W	1147.50'
L2	N 12°02' W	1546.18'

CURVE TABLE				
CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	118.72'	271.59'	N 84°56' E	117.78'
C2	112.58'	228.17'	N 57°10' E	111.44'
C3	230.76'	372.08'	N 22°22' E	227.08'
C4	259.24'	656.21'	N 05°49' W	257.55'
C5	225.66'	1031.27'	N 22°37' W	225.21'



12 Mountain Drive | PO Box 450 | Glenwood, WV 26554 | 304-862-5656
142 Kanawha Boulevard, East | Charleston, WV 25304 | 204-546-9952
254 East Backley Bypass | Beckley, WV 25801 | 304-255-5296
slsw.com

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)			
NAD'83 S.P.C.(FT)	N. 466,587.52	E. 1,633,473.69	
NAD'83 GEO.	LAT.-(N) 39.774919	LONG-(W) 80.692024	
NAD'83 UTM (M)	N. 4,402,821.23	E. 526,374.90	
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NAD'83 S.P.C.(FT)	N. 466,858.9	E. 1,636,494.7	
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BOTTOM HOLE			
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NAD'83 UTM (M)	N. 4,404,687.5	E. 526,272.9	



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

P.S. 677 *Gregory A. Smith*

SCALE 1" = 2000' FILE NO. 8811P7HMR2.dwg
KEITH STERN N-7HM-REV2
DATE JULY 31, 2018
REVISED 4-9-2020 & 6-3-2022
OPERATORS WELL NO. KEITH STERN N-7HM
API WELL NO. 47-051-02101
NO. STATE COUNTY PERMIT

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

LEGEND	
LEASE LINE	
SURFACE LINE	
WELL LATERAL	
OFFSET LINE	
TIE LINE	
CREEK	
ROAD	
COUNTY ROUTE	
PROPOSED WELL	
EXISTING WELL	
PERMITTED WELL	
TAX MAP-PARCEL	00-00
LEASE # (SEE WW-6A1)	
SURFACE OWNER (SEE TABLE)	(A)

WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DARREN BROWN
ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 ADDRESS 5098 WASHINGTON ST. W, STE 407
FORT WORTH, TX 76107 CHARLESTON, WV 25313-1561

06/17/2022

COUNTY NAME PERMIT

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

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

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

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
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*See attached pages

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

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

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

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

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

Lease No.	Tag	Parcel	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment			
10*15603	A	9-14-24.1	ISAAC CROW ET UX	JOHN G CRAWFORD	1/8+	74	394	148/389 Wheeling Natural Gas Company to Manufacturers Light & Heat Company	197/120 Manufacturers Light & Heat Company to Union Gasoline & Oil Corporation	2/136 Union Gasoline & Oil Corporation to Preston Oil Company	2/225 Preston Oil Company to Manufacturers Light & Heat Company	422/204 Manufacturers Light & Heat Company to Columbia Gas Transmission Corporation	537/518 Columbia Gas Transmission Corporation to Columbia Natural Resources, Inc	13/623 Columbia Natural Resources, Inc. to Nicole Gas Production, LTD	619/499 Nicole Gas Production, LTD to and Nicole Energy Marketing, Inc. to Pennsylvania Land Holdings Corporation	34/471 Dennis N. Broglio, Successor Trustee to Tri-County Oil & Gas, Inc.	Certificate of Merger Tri-County Oil and Gas, Inc. and Leatherwood, Inc.	42/140 CNX Gas Company LLC to TH Exploration, LLC		
10*15605	B	9-14-24	ISAAC CROW ET UX	JOHN G CRAWFORD	1/8+	74	394	148/389 Wheeling Natural Gas Company to Manufacturers Light & Heat Company	197/120 Manufacturers Light & Heat Company to Union Gasoline & Oil Corporation	2/136 Union Gasoline & Oil Corporation to Preston Oil Company	2/225 Preston Oil Company to Manufacturers Light & Heat Company	422/204 Manufacturers Light & Heat Company to Columbia Gas Transmission Corporation	537/518 Columbia Gas Transmission Corporation to Columbia Natural Resources, Inc	13/623 Columbia Natural Resources, Inc. to Nicole Gas Production, LTD	619/499 Nicole Gas Production, LTD to and Nicole Energy Marketing, Inc. to Pennsylvania Land Holdings Corporation	34/471 Dennis N. Broglio, Successor Trustee to Tri-County Oil & Gas, Inc.	Certificate of Merger Tri-County Oil and Gas, Inc. and Leatherwood, Inc.	42/140 CNX Gas Company LLC to TH Exploration, LLC		
10*15509	C	9-14-20	WILLIAM K STERN AND BETTY L STERN	NPAR, LLC	1/8+	718	320	NA	NA	NA	NA	NA	NA	NA	NA	24/466 NPAR, LLC and AB Resources, LLC to Chief Exploration & Development, LLC, Radler 2000 Limited Partnership, and Enerplus Resources (USA) Corporation to Chevron U.S.A., Inc.	26/130 Chief Exploration & Development, LLC, Radler 2000 Limited Partnership, and Enerplus Resources (USA) Corporation to Chevron U.S.A., Inc.	756/382 NPAR, LLC to Chevron U.S.A., Inc.	36/148 Chevron U.S.A., Inc. to TH Exploration, LLC	
10*15813	D	9-15-16	ROBERT B THOMAS	CHESAPEAKE APPALACHIA LLC	1/8+	692	235	NA	NA	NA	NA	NA	NA	NA	32/247 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC	
10*21814	D	9-15-16	STONE HILL MINERALS HOLDINGS LLC	TH EXPLORATION LLC	1/8+	953	333	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10*21862	D	9-15-16	NOBLE MARCELLUS LP	TH EXPLORATION LLC	1/8+	961	641	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10*15818	D	9-15-16	ELIZABETH ANN STRAUSBAUGH	CHESAPEAKE APPALACHIA LLC	1/8+	703	578	NA	NA	NA	NA	NA	NA	NA	29/325 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC	
10*15819	D	9-15-16	JANET LEA BLANKENSHIP	CHESAPEAKE APPALACHIA LLC	1/8+	703	114	NA	NA	NA	NA	NA	NA	NA	29/325 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC	
10*15814	D	9-15-16	MARY E BASSETT	CHESAPEAKE APPALACHIA LLC	1/8+	694	499	NA	NA	NA	NA	NA	NA	NA	24/84 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC	
10*21818	D	9-15-16	STONE HILL MINERALS HOLDINGS LLC	TH EXPLORATION LLC	1/8+	953	337	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10*17443	D	9-15-16	GENEVA BASSETT SANCHEZ	TH EXPLORATION LLC	1/8+	929	292	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10*15817	D	9-15-16	RUTH MEADOWS	CHESAPEAKE APPALACHIA LLC	1/8+	703	583	NA	NA	NA	NA	NA	NA	NA	29/325 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC	
10*15815	D	9-15-16	FORREST M THOMAS	CHESAPEAKE APPALACHIA LLC	1/8+	694	515	NA	NA	NA	NA	NA	NA	NA	23/479 Chesapeake Appalachia LLC to Statoil USA Onshore Properties	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC	

Lease No.	Tag	Percol	Lessor	Lessee	Royalty	Book	Page	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	Assignment	
10*15816	D	9-15-16	SALLY CYNTHIA HOPKINS	CHESAPEAKE APPALACHIA LLC	1/8+	697	116	NA	NA	NA	NA	NA	NA	NA	23/512 Chesapeake Appalachia LLC to Statoil USA Onshore Properties	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC
10*15833	E	9-14-19	ROBERT B THOMAS	CHESAPEAKE APPALACHIA LLC	1/8+	692	235	NA	NA	NA	NA	NA	NA	NA	32/247 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC
10*21814	E	9-14-19	STONE HILL MINERALS HOLDINGS LLC	TH EXPLORATION LLC	1/8+	953	335	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10*21882	E	9-14-19	NOBLE MARCELLUS LP	TH EXPLORATION LLC	1/8+	961	641	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10*15818	E	9-14-19	ELIZABETH ANN STRAUSBAUGH	CHESAPEAKE APPALACHIA LLC	1/8+	703	578	NA	NA	NA	NA	NA	NA	NA	29/325 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC
10*15819	E	9-14-19	JANET LEA BLANKENSHIP	CHESAPEAKE APPALACHIA LLC	1/8+	703	114	NA	NA	NA	NA	NA	NA	NA	29/325 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC
10*15814	E	9-14-19	MARY E BASSETT	CHESAPEAKE APPALACHIA LLC	1/8+	694	499	NA	NA	NA	NA	NA	NA	NA	24/84 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC
10*21818	E	9-14-19	STONE HILL MINERALS HOLDINGS LLC	TH EXPLORATION LLC	1/8+	953	337	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10*17445	E	9-14-19	GENEVA BASSETT SANCHEZ	TH EXPLORATION LLC	1/8+	929	292	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10*15817	E	9-14-19	RUTH MEADOWS	CHESAPEAKE APPALACHIA LLC	1/8+	703	583	NA	NA	NA	NA	NA	NA	NA	29/325 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC
10*15815	E	9-14-19	FORREST M THOMAS	CHESAPEAKE APPALACHIA LLC	1/8+	694	516	NA	NA	NA	NA	NA	NA	NA	23/479 Chesapeake Appalachia LLC to Statoil USA Onshore Properties	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC
10*15816	E	9-14-19	SALLY CYNTHIA HOPKINS	CHESAPEAKE APPALACHIA LLC	1/8+	697	116	NA	NA	NA	NA	NA	NA	NA	23/512 Chesapeake Appalachia LLC to Statoil USA Onshore Properties	33/110 Chesapeake Appalachia LLC to SWN Production Company, LLC	33/424 Statoil USA Onshore Properties Inc to SWN Exchange Titleholder LLC	19/624 SWN Exchange Titleholder LLC and SWN Production Company, LLC merger	36/431 SWN Production Company, LLC to TH Exploration, LLC
10*15592	F	9-14-15	JOHN DANIEL DOBBS	CHESAPEAKE APPALACHIA LLC	1/8+	694	125	NA	NA	NA	NA	NA	NA	NA	23/479 Chesapeake Appalachia LLC to Statoil USA Onshore Properties	24/84 Chesapeake Appalachia LLC to Statoil USA Onshore Properties Inc	30/427 Statoil USA Onshore Properties, Inc (formerly StatoilHydro) to Chevron U.S.A., Inc.	30/461 Chesapeake Appalachia LLC to Chevron U.S.A., Inc.	36/148 Chevron U.S.A., Inc. to TH Exploration, LLC

Lease No.	Tract	Part	Leasee	Lease	Reg. No.	Book	Page	Assignment	Lease No.	Tract	Part	Leasee	Lease	Reg. No.	Book	Page	Assignment
10*16187	H	9-14-16	PATRICIA D BARL AND JOHN J BARL	TH EXPLORATION LLC	1/8+	920	31	NA	10*16187	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	920	31	NA
10*16152	H	9-14-16	CONNIE HECKLE	TH EXPLORATION LLC	1/8+	920	29	NA	10*16152	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	920	29	NA
10*16158	H	9-14-16	LARRY JACK EMBRY	TH EXPLORATION LLC	1/8+	920	13	NA	10*16158	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	920	13	NA
10*17409	H	9-14-16	JUDY A AND CLYDE E ELZEY	TH EXPLORATION LLC	1/8+	924	569	NA	10*17409	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	924	569	NA
10*15741	H	9-14-16	JOHN S GORBY	TH EXPLORATION LLC	1/8+	929	641	NA	10*15741	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	929	641	NA
10*15694	H	9-14-16	DEBORAH L MENCER	TH EXPLORATION LLC	1/8+	921	271	NA	10*15694	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	921	271	NA
10*15695	H	9-14-16	JOHN R AND LOS L GORBY	TH EXPLORATION LLC	1/8+	929	259	NA	10*15695	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	929	259	NA
10*15696	H	9-14-16	JOSEPH JEREMY PALMER	TH EXPLORATION LLC	1/8+	921	275	NA	10*15696	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	921	275	NA
10*15488	H	9-14-16	NANCY F FYE & STEPHEN M FYE	TH EXPLORATION LLC	1/8+	921	226	NA	10*15488	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	921	226	NA
10*15495	H	9-14-16	BARBARA BARNHART AND WALTER BARNHART	TH EXPLORATION LLC	1/8+	921	222	NA	10*15495	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	921	222	NA
10*15470	H	9-14-16	BETTY L LOGES	TH EXPLORATION LLC	1/8+	921	286	NA	10*15470	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	921	286	NA
10*15473	H	9-14-16	WILLIAM F McDONALD AND SHIRLEY McDONALD	TH EXPLORATION LLC	1/8+	921	198	NA	10*15473	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	921	198	NA
10*17601	H	9-14-16	JOHN M HAUGHT JR AND CHERYL A HAUGHT	TH EXPLORATION LLC	1/8+	925	182	NA	10*17601	NA	NA	TH EXPLORATION LLC	Assignment	1/8+	925	182	NA

Lease No.	Type	Part	Lessee	Book	Page	Acct	Area	Section	Township	Range	County	State	Year	Month	Day	Owner	TH EXPLORATION LLC	Acct	Area	Section	Township	Range	County	State
10*17402	H		DIANA LYNN BUMGARDNER	920	68	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*17958	H		SANDRA KAY RICHMOND	929	832	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*17902	H		SUSAN LYNN SEDGEMER	920	59	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*17821	H		GREGORY S CROW	929	889	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*17811	H		PAISY M ASTON AND ELMER L ASTON	921	216	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*19564	H		ANNA MAY FOLTZ	934	93	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*19517	H		EARL B FOLTZ III	934	57	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*17720	H		DEBRA JEAN LANCASTER AND DARRYL R LANCASTER	929	834	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*18191	H		MADRYN E MOSSOR DO NOT USE	920	78	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*16468	H		LARRY W JOHNSON	920	57	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*16716	H		BERNARD O CROW AND KAREN S CROW	813	183	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*16548	H		JULIE KAY OKEL AND JEFFREY S OKEL	909	77	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA
10*16584	H		SHERWOOD O CROW AND GOLDIE CROW	908	544	1/8+	NA	NA	NA	NA	NA	NA	9-14-16				TH EXPLORATION LLC	NA	NA	NA	NA	NA	NA	NA

Assignment

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Section

ASSIGNMENT AND CONVEYANCE

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

ARTICLE 1 ASSIGNMENT OF ASSETS

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

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

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

ARTICLE 2 SPECIAL WARRANTY OF TITLE AND DISCLAIMERS

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

Section 2.2 Disclaimers of Warranties and Representations.

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

RECORDED
MAR 17 2016
MARSHALL COUNTY CLERK
MARSHALL, WV 24701

STATE OF WEST VIRGINIA §
§
COUNTY OF MARSHALL §

RECORDED
MAR 17 2016
MARSHALL COUNTY CLERK
MARSHALL, WV 24701

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.

#1
#2
#3
#4

PARTIAL ASSIGNMENT OF OIL AND GAS LEASES

This **PARTIAL ASSIGNMENT OF OIL AND GAS LEASES** (hereinafter, "**Assignment**"), made the 31 day of May, 2018 (hereinafter, "**Effective Date**"), is by and between CNX GAS COMPANY LLC, a Virginia limited liability company, whose address is 1000 CONSOL Energy Drive, Suite 400, Canonsburg, Pennsylvania 15317 (hereinafter "**Assignor**") and TH EXPLORATION, LLC, a Texas limited liability company, whose address is 1320 S. University Drive, Suite 500, Fort Worth, TX 76107 (hereinafter "**Assignee**"). All references in this Assignment to "**Party**" or "**Parties**" shall be deemed at all times to mean Assignor or Assignee or both. Capitalized terms used but not defined herein shall have the meaning given such terms in the Acreage Trade Agreement, by and between Assignor and Assignee dated April 9, 2018 (the "**ATA**").

WHEREAS, Assignor desires to assign all of Assignor's right, title and interest in and to those Oil and Gas Lease(s) as same may have been previously or will in the future be modified, extended, or amended (hereinafter, "**Lease**" or "**Leases**"), covering certain tracts of land (hereinafter, "**Lands**") located in Marshall County, West Virginia; such Leases and Lands covered thereby being more particularly described on Exhibit "**A**" attached hereto and made a part hereof insofar and only insofar as such Leases cover the Target Formations (as defined below).

NOW, THEREFORE, for and in consideration of TEN AND NO/100 DOLLARS (\$10.00) and other valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Assignor does hereby **GRANT, BARGAIN, ASSIGN, TRANSFER, AND CONVEY** unto Assignee the following "**Assigned Rights**":

- (a) All of Assignor's right, title, and interest in and to those Leases set forth on Exhibit A attached hereto **INSOFAR AND ONLY INSOFAR** as to the particular Target Formation(s) (defined below) described and delineated on Exhibit A for each Lease:
 - i. "**Target Formation(s)**" means, with respect to each Lease, two hundred feet (200') above the top and two hundred feet (200') below the base of the Marcellus Formation or the Utica Formation or both, as specified for each Lease on Exhibit A. For the purposes of this Assignment, the Marcellus Formation shall be defined as the formation commonly known as the Marcellus Shale Formation, with the top of the Marcellus Shale Formation defined as the correlative stratigraphic equivalent to that point found at 6517 feet (6517') measured depth on the Halliburton Simms U-5H Composite_DLL_DEN_NEU Log dated June 14, 2014 (the "**Log**")

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:

SURFACE OWNER(s)
 Name: TH Exploration, LLC (Access Road and Well Pad)
 Address: 380 Southpointe Boulevard, Plaza II, Suite 200
Canonsburg, PA 16318
 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

Notice is hereby given:

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

This Notice Shall Include:

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

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

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

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

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

Well Location Restrictions

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

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

Water Well Testing:

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

Water Testing Laboratories:

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

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

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

Written Comment:

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

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

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

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.

WW-6A
(8-13)

API NO. 47-051 -
OPERATOR WELL NO. see attached list
Well Pad Name: Keith Stern

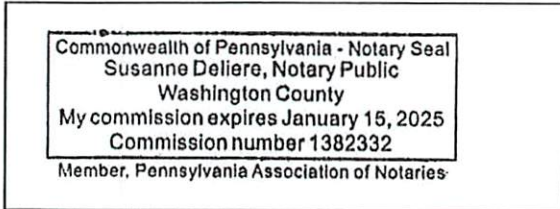
Notice is hereby given by:

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

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

Oil and Gas Privacy Notice:

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



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

06/17/2022

**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)

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')

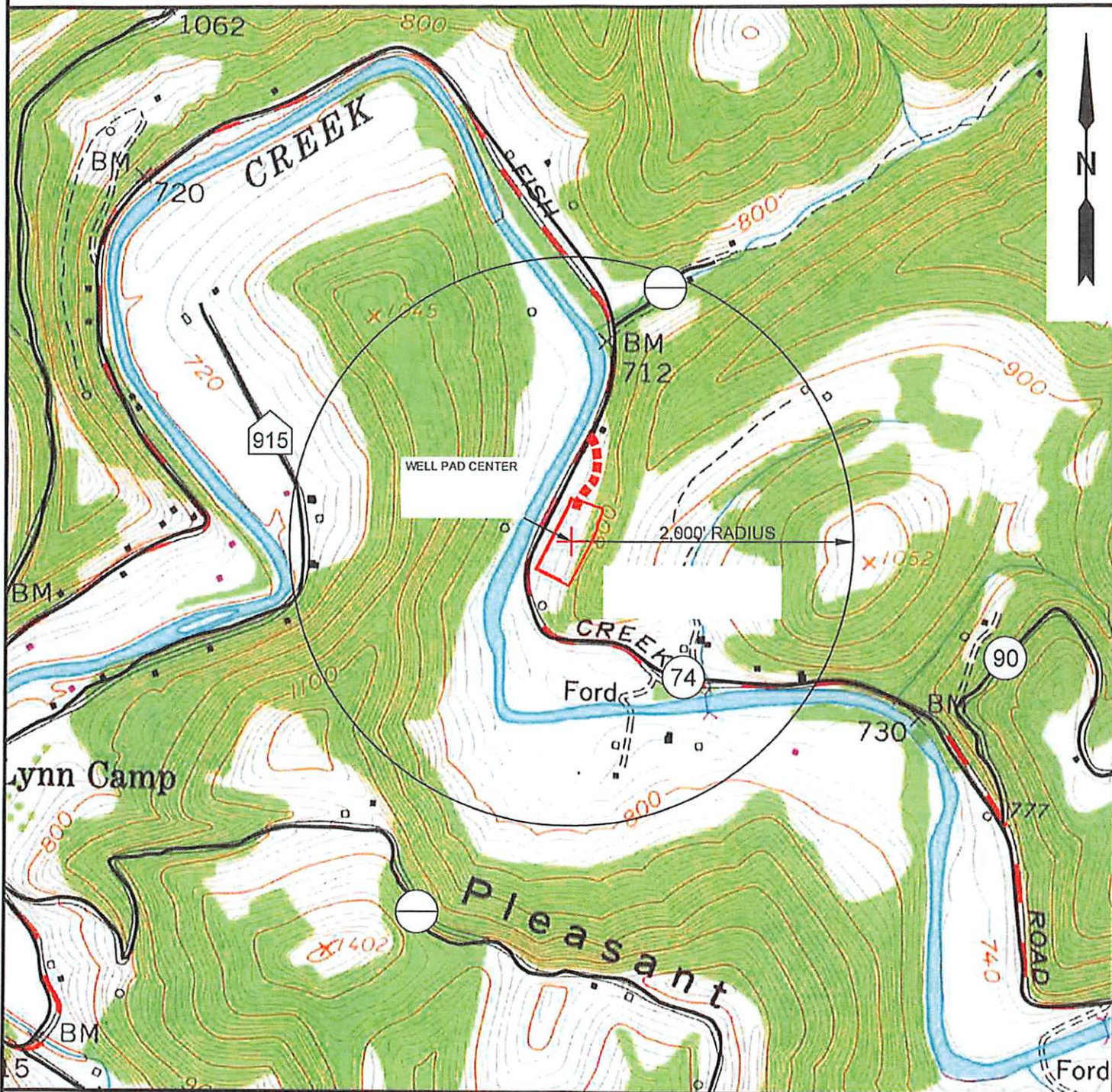
Well: KEITH STERN N – 7HM
District: Meade (House #'s 1-5)
State: WV

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.

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	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	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
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 7 th St. Moundsville, WV 26041	House 5 TM 14 Pcl. 25 Patricia A. Dugas Phone: None Found Physical Address: 681 Crow Dr. Glen Easton, WV 26039 Tax Address: Same	

KK ✓

PROPOSED KEITH STERN N - 7HM



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 26351 • (304) 462-5634
www.slsurveys.com

TOPO SECTION:		OPERATOR:	
GLEN EASTON 7.5'		PREPARED FOR: TUG HILL OPERATING, LLC 380 SOUTHPOINTE BLVD SUITE 200 CANONSBURG, PA 15317	
COUNTY	DISTRICT		
MARSHALL	MEADE		
DRAWN BY	JOB NO.	DATE	SCALE
K.G.M.	8811	07/31/2018	1" = 1000'

TUG HILL
OPERATING

06/17/2022

7019 1640 0002 2948 7534

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Adult Signature Restricted Delivery \$

Postage \$

Total \$

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

City: _____

PS Form 3800, April 2012 Edition (PSN 7530-02-000-9000) See Reverse for Instructions

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

City: _____

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

City: _____

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Adult Signature Restricted Delivery \$

Postage \$

Total \$

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

City: _____

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Adult Signature Restricted Delivery \$

Postage \$

Total \$

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

City: _____

PS Form 3800, April 2012 Edition (PSN 7530-02-000-9000) See Reverse for Instructions

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Return Receipt (electronic) \$

Certified Mail Restricted Delivery \$

Adult Signature Required \$

Adult Signature Restricted Delivery \$

Postage \$

Total \$

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

City: _____

PS Form 3800, April 2012 Edition (PSN 7530-02-000-9000) See Reverse for Instructions

WK ✓



June 3, 2022

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

VIA USPS

RE: Keith Stern N-7HM API # 47-051-02101 (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 N-7HM to add 507.41' to the lateral length. Therefore, enclosed please find the following:

- Updated WW-6A with certified receipts (change in freshwater/coal string required new notifications).
- Modified WW-6B with changes highlighted in yellow.
- Updated well plat.
- Updated WW-6A1 information.

If you have any questions or need any additional information, please do not hesitate to call me on (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

Exp 2 Cks = \$5k
1- 055804 - 3/24/22
\$2500
2- 055805 - 3/24/22
\$2500

Expedited Permit Modification

Received date: 6/6/22

Expedited Final Date: 6-24-22

Operator: Tug Hill

Well Name: N-74M

Pad Name: Keith Stern

API: 51-02101

	MODIFIED PERMIT	ORIGINAL PERMIT
TVD	* 6417	6414
TMD	* 14479	14187
HL	* 6701.12	6424.73
FW	✓	70', 460'
SW	✓	1740
COAL	307,400	309,454
CONDUCTOR	120 ✓	120 ✓
FRESHWATER	* 490.	560
INTERMEDIATE 1	* 2229	2200
INTERMEDIATE 2		
PRODUCTION	* 14479	14187

Notes: A Crew ✓
 B Crew ✓
 C Stern ✓
 D Thomas ✓
 E Thomas ✓
 F Dobbs ✓
 G Stone ✓
 H Goddard ✓
 I Silbaugh ✓
 J Clark 9-11-10

A 9-14-24.1 Crew
 B 9-14-24 Crew
 C 9-14-20 Stern
 D 9-15-16 Thomas
 E 9-15-19 Thomas
 F 9-14-15 Dobbs
 G 9-14-17 Stone Mill
 H 9-14-16 Goddard
 I 9-11-12 Silbaugh

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

<u>494510851</u>	<u>Marshall</u>	<u>Meade</u>	<u>Glen Easton 7.5'</u>
------------------	-----------------	--------------	-------------------------

Operator ID County District Quadrangle

2) Operator's Well Number: Keith Stern N-7HM 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

Ju
10/16/2020

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marceus is the target formation at a depth of 6265' - 6317', thickness of 51' and an anticipated approximate pressure of 3800 psi.

8) Proposed Total Vertical Depth: 6,417'

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 14,479'

11) Proposed Horizontal Leg Length: 6,701.12'

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: _____

WW-6B
(04/15)

API NO. 47- 051 - 02101
 OPERATOR WELL NO. Keith Stern N-7HM
 Well Pad Name: Keith Stern

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	NEW	BW	BW	120'	120'	259ft^3(CTS)
Fresh Water	13 3/8"	NEW	J55	54.5#	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#	2,229'	2,229'	722ft^3(CTS)
Production	5 1/2"	NEW	P110	20#	14,479'	14,479'	3710ft^3(CTS)
Tubing	2 3/8"	NEW	N80	4.7#	6,976'		
Liners							

JW
12/16/2020

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			

WW-6B
(10/14)

API NO. 47- 051 - 02101
OPERATOR WELL NO. Keith Stern N-7HM
Well Pad Name: Keith Stern

DK
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 16,060,000 lb. proppant and 248,299 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.

*Note: Attach additional sheets as needed.



Stansberry, Wade A <wade.a.stansberry@wv.gov>

Expedited Modification Horizontal H6A Well Work Permits API: (47-051-02098 & 47-051-02101)

1 message

Stansberry, Wade A <wade.a.stansberry@wv.gov>

Tue, Jun 14, 2022 at 9:54 AM

To: Amy Morris <amorris@tug-hillop.com>, Strader C Gower <strader.c.gower@wv.gov>, "Gayne J. Knitowski" <gayne.j.knitowski@wv.gov>, Eric Buzzard <ebuzzard@marshallcountywv.org>

I have attached a copy of the newly issued well permit numbers:

47-051-02098 - KEITH STERN N-6HM
47-051-02101 - KEITH STERN N-7HM

These will serve as your copy.

Thank you,

Wade A. Stansberry

Environmental Resource Specialist 3

West Virginia Department of Environmental Protection

Office of Oil & Gas

601 57th St. SE


Charleston, WV 25304


(304) 926-0499 ext. 41115

(304) 926-0452 fax

Wade.A.Stansberry@wv.gov

2 attachments

 **47-051-02098 - mod.pdf**
9232K

 **47-051-02101 - mod.pdf**
8956K

06/17/2022