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west virginia department of environmental protection

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Office of Oil and Gas  
601 57<sup>th</sup> Street, S.E.  
Charleston, WV 25304  
(304) 926-0450  
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Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Thursday, April 12, 2018  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

SWN PRODUCTION COMPANY, LLC  
POST OFFICE BOX 12359

SPRING, TX 773914954

Re: Permit Modification Approval for MARGARET SUE KELLEY WTZ<sup>+</sup>  
47-103-03196-00-00

Modifying Formation at TVD to Onondaga for Pilot Hole

SWN PRODUCTION COMPANY, LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926- 0450.



James A. Martin  
Chief

Operator's Well Number: MARGARET SUE KELLEY WTZ 3H  
Farm Name: MARGARET SUE KELLEY  
U.S. WELL NUMBER: 47-103-03196-00-00  
Horizontal 6A New Drill  
Date Modification Issued: April 12, 2018

Promoting a healthy environment.

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

1) Well Operator: SWN Production Co., LLC 494512924 103- Wetzel 12-Proctor 681-Wileyville  
Operator ID County District Quadrangle

2) Operator's Well Number: Margaret Sue Kelley Wtz 3H Well Pad Name: Margaret Sue Kelley Wtz Pad

3) Farm Name/Surface Owner: Margaret Sue Kelley Public Road Access: Scheibelhood Hill Road

4) Elevation, current ground: 1422' Elevation, proposed post-construction: 1422'

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

(b) If Gas Shallow  Deep   
Horizontal

6) Existing Pad: Yes or No yes *DWH 12/7/17*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Target Formation- Marcellus, Target Top TVD- 7144', Target Base TVD- 7194', Anticipated Thickness- 40', Associated Pressure- 4670

8) Proposed Total Vertical Depth: 7288' Pilot Hole

9) Formation at Total Vertical Depth: Onondaga

10) Proposed Total Measured Depth: 12914/ 7291' (Pilot Hole)

11) Proposed Horizontal Leg Length: 5407.48'

12) Approximate Fresh Water Strata Depths: 512'

13) Method to Determine Fresh Water Depths: From salinity profile analysis

14) Approximate Saltwater Depths: 1930'

15) Approximate Coal Seam Depths: 1228'

16) Approximate Depth to Possible Void (coal mine, karst, other): none that we are aware of.

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: \_\_\_\_\_

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	20"	New	H-40	94#	100'	100'	CTS
Fresh Water	13 3/8"	New	H-40	48#	612'	612'	577 sx/CTS
Coal	9 5/8"	New	J-55	36#	2804'	2804'	1073 sx/CTS
Intermediate	7"	New	J-55	20#	If Needed	If Needed	If Needed/As Needed
Production	5 1/2"	New	HCP-110	20#	12909'	12909'	Last 82' on end 1427' on 1122' inside stringer
Tubing	2 3/8"	New	HCP-110	4.7#	Approx. 7166'	Approx. 7166'	
Liners							

*DMA 12/11/17*

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	20"	30"	0.25	2120	81	Class A	1.19/50% Excess
Fresh Water	13 3/8"	17.5"	0.380	2740	633	Class A	1.19/50% Excess
Coal	9 5/8"	12 1/4"	0.395	3950	1768	Class A	1.19/50% Excess
Intermediate	7"	8 3/4"	0.317	4360	3250	Class A	1.20/15% Excess
Production	5 1/2"	8 3/4"	0.361	12360	9500	Class A	1.20/15% Excess
Tubing	2 3/8"	4.778"	0.190				
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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

If a pilot hole is drilled, drill the pilot hole to approximately 100 ft below the top of the Onondaga Formation. Log and evaluate pilot hole to confirm the Onondaga Top and confirm Marcellus Interval formation characteristics. After pilot hole evaluation is completed, trip in hole with a cementing BHA and spot cement plug from Pilot Hole TD to approximately 200' above planned KOP to isolate Onondaga from shallower intervals. Trip in hole, tag top of plugback cement, and dress off cement plug to desired kickoff point. If necessary, install mechanical whipstock system to sidetrack well at kickoff point. Build angle to the planned land point and trajectory in the Marcellus Formation and drill horizontal lateral to planned TD.

*DWAH 12/7/17*  
20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Well will be perforated within the target formation and stimulated with a slurry of water, sand, and chemical additives at a high rate. This will be performed in stages with the plug and perf method along the wellbore until the entire lateral has been stimulated within the target formation. All stage plugs are then drilled out and the well is flowed back to surface. The well is produced through surface facilities consisting of high pressure production unites, vertical separation units, water and oil storage tanks. Max press and anticipated max rate- 9000 lbs @ 80 barrels a minute.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 28.24

22) Area to be disturbed for well pad only, less access road (acres): 13.80

23) Describe centralizer placement for each casing string:

All casing strings will be ran with a centralizer at a minimum of 1 per every 3 joints of casing.

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

See Attachment \*\*\*

25) Proposed borehole conditioning procedures:

All boreholes will be conditioned with circulation and rotation for a minimum of one bottoms up and continuing until operator is satisfied with borehole conditions.

\*Note: Attach additional sheets as needed.

