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west virginia department of environmental protection

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

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

Friday, September 29, 2023  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

EQT PRODUCTION COMPANY  
625 LIBERTY AVE., SUITE 1700  
  
PITTSBURGH, PA 15222

Re: Permit Modification Approval for HUDSON S-8HM  
47-051-02379-00-00

Updated casing program

EQT PRODUCTION COMPANY

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: HUDSON S-8HM  
Farm Name: CNX LAND LLC  
U.S. WELL NUMBER: 47-051-02379-00-00  
Horizontal 6A New Drill  
Date Modification Issued: 9/29/2023

Promoting a healthy environment.

09/29/2023

CK# 0000 599658  
CISB 7,500.00

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

1) Well Operator: EQT Production Company 306686 Marshall Meade Glen Easton  
Operator ID County District Quadrangle

2) Operator's Well Number: S-8HM Well Pad Name: Hudson

3) Farm Name/Surface Owner: CNX Land, LLC Public Road Access: Roberts Ridge Road (CR 21)

4) Elevation, current ground: 1,346' Elevation, proposed post-construction: 1,346'

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

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(b) If Gas Shallow  Deep   
Horizontal

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6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus, 7,070', 51', 3,800 psi

8) Proposed Total Vertical Depth: 7,070'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 22,976'

11) Proposed Horizontal Leg Length: 15,053'

12) Approximate Fresh Water Strata Depths: 90', 585', 635', 779', 929', 1049'

13) Method to Determine Fresh Water Depths: Offset wells - 051-00554, 051-00568

14) Approximate Saltwater Depths: 1,749', 1,900', 2,089'

15) Approximate Coal Seam Depths: 901'-904', 983'-989'

16) Approximate Depth to Possible Void (coal mine, karst, other): N/A

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: Marshall County Mine  
Depth: 983'-989'  
Seam: Pittsburgh  
Owner: Marshall County Coal Resources, Inc.

Digitally signed by  
Gayne Knitowski,  
Inspector  
Date: 2023.09.12  
12:28:52 -04'00'

Gayne  
Knitowski,  
Inspector

09/29/2023

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	415 ft <sup>3</sup> / CTS
Fresh Water	13 3/8	New	J-55	54.5	1300	1300	1460 ft <sup>3</sup> / CTS
Coal							
Intermediate	9 5/8	New	J-55	36	2425	2425	910 ft <sup>3</sup> / CTS
Production	5 1/2	New	P-110	20	22976	22976	500' above intermediate casing
Tubing							
Liners							

Gayne  
Knitowski,  
Inspector

Digitally signed by Gayne  
Knitowski, Inspector  
Date: 2023.09.12 12:29:23  
-0400'

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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	2333	1866	Class A	1.2
Fresh Water	13 3/8	17 1/2	0.380	2730	2184	Class A	1.04 - 1.20
Coal							
Intermediate	9 5/8	12 3/8 - 12 1/4	0.352	3520	2816	Class A	1.04 - 1.20
Production	5 1/2	8 3/4 - 8 1/2	0.361	14360	11488	Class A	1.04 - 2.10
Tubing							
Liners							

**PACKERS**

Kind:				
Sizes:				
Depths Set:				

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

Resume drilling and complete a new horizontal well in the Marcellus Formation. Drill the vertical, kick off and drill curve. Drill the lateral in the Marcellus. Cement casing.

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

Hydraulic fracturing is completed in accordance with state regulations using water recycled from previously fractured wells and obtained from freshwater sources. This water is mixed with sand and a small percentage (less than 0.1%) of chemicals (including 15% Hydrochloric acid, friction reducer, biocide, and scale inhibitor), referred to in the industry as a "slickwater" completion. Maximum anticipated internal casing pressure is expected to be approximately 10,000 psi, maximum anticipated treating rates are expected to average approximately 100 bpm. Stage lengths vary from 150 to 300 feet. Average approximately 350,000 gallons of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 200,000-600,000 pounds of proppant per stage.

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21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 22.94 SEP 21 2023

22) Area to be disturbed for well pad only, less access road (acres): 6.18 WV Department of Environmental Protection

23) Describe centralizer placement for each casing string:

- Surface: Bow spring centralizers – One centralizer at the shoe and one spaced every 500’.
- Intermediate: Bow spring centralizers– One centralizer at the shoe and one spaced every 500’.
- Production: One solid body centralizer spaced every other joint from production casing shoe to landing point. One solid body centralizer spaced every joint from landing point to planned top of cement.

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

Conductor: No additives  
Surface: Calcium Chloride. Used to speed the setting of cement slurries  
Intermediate: Calcium Chloride. Used to speed the setting of cement slurries.  
Production: Calcium Carbonate, Fluid Loss, Extender, Dispersent, Viscosifier, Defoamer, POZ, Bonding Agent, Retarder, Anti-Settling/Suspension Agent

25) Proposed borehole conditioning procedures:

Surface: Circulate hole clean while rotating & reciprocating the drill string until cuttings diminish at surface.  
Intermediate: Circulate hole clean while rotating & reciprocating the drill string until cuttings diminish at surface.  
Production: Perform a cleanup cycle by pumping 3-8 bottoms up or until the shakers are clean. Check volume of cuttings coming across the shakers every 15 minutes.

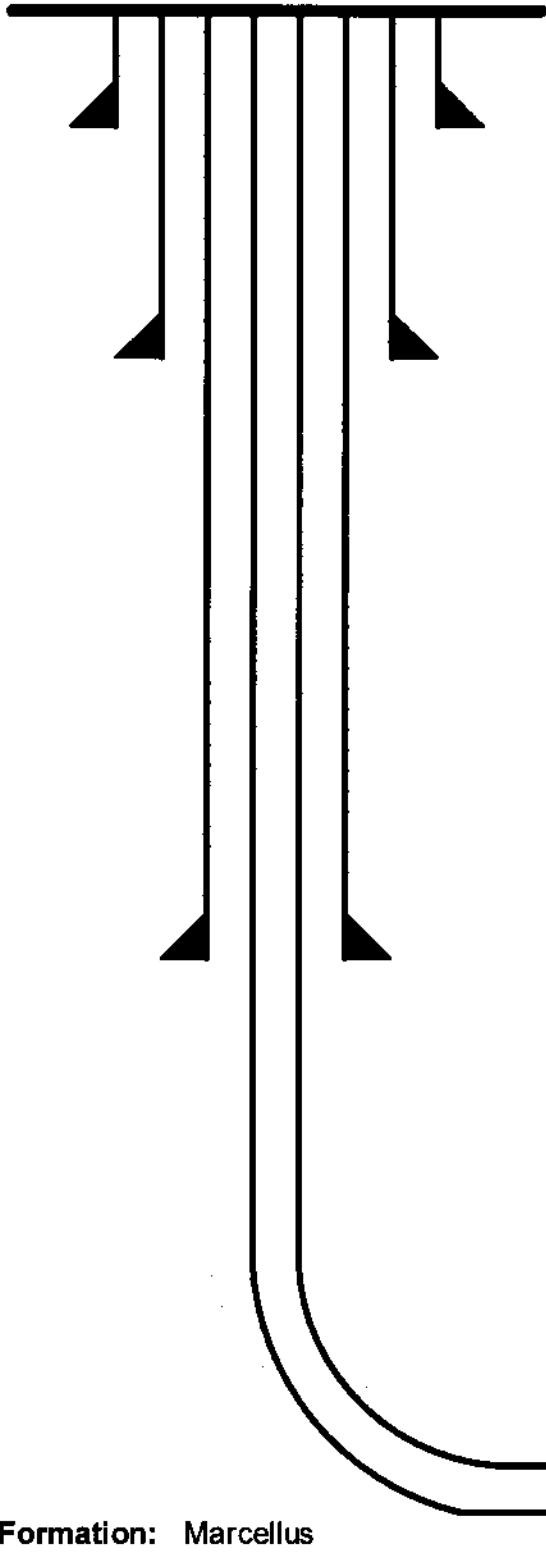
\*Note: Attach additional sheets as needed.

**EQT Production (Tug Hill)**

**Wellbore Diagram**

Well: Hudson S-8HM  
Pad: Hudson  
Elevation: 1346' GL 1359' KB

County: Marshall  
State: West Virginia



**Conductor @ 120'**

30", BW, BW, cement to surface w/ Class A

**Surface @ 1,300'**

13-3/8", 54.5#, J-55, cement to surface w/ Class A

**Intermediate @ 2,425'**

9-5/8", 36#, J-55, cement to surface w/ Class A

**Production @ 22,976' MD / 7,070' TVD**

5-1/2", 20#, P-110, cement to 500' inside 9-5/8" w/ Class A

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**Formation: Marcellus**

Gayne  
Knitowski,  
Inspector

Digitally signed by  
Gayne Knitowski,  
Inspector  
Date: 2023.09.12  
12:28:02 -04'00'

09/29/2023 SALE