



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

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-4HM
47-051-02251-00-00

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-4HM
Farm Name: CNX LAND LLC
U.S. WELL NUMBER: 47-051-02251-00-00
Horizontal 6A New Drill
Date Modification Issued: 9/29/2023

Promoting a healthy environment.

09/29/2023

CK#0000599656
CKB 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-4HM 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

(b) If Gas Shallow Deep

Horizontal

RECEIVED
Office of Oil and Gas

SEP 21 2023

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s) Marcellus, 6,983', 51', 3,800 psi

8) Proposed Total Vertical Depth: 6,983'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19,860'

11) Proposed Horizontal Leg Length: 12,180'

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
12:23:44 -04'00'

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	443 ft ³ / CTS
Fresh Water	13 3/8	New	J-55	54.5	1300	1300	1460 ft ³ / CTS
Coal							
Intermediate	9 5/8	New	J-55	36	2425	2425	910 ft ³ / CTS
Production	5 1/2	New	P-110	20	19860	19860	500' above intermediate casing
Tubing							RECEIVED Office of Oil and Gas
Liners							

Gayne
Knitowski,
Inspector

Digitally signed by
Gayne Knitowski,
Inspector
Date: 2023.09.12
12:24:10 -04'00'

SEP 21 2023

WV Department of
Environmental Protection

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.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 22.94 RECEIVED Office of Oil and Gas

22) Area to be disturbed for well pad only, less access road (acres): 6.18 SEP 21 2023

23) Describe centralizer placement for each casing string: WV Department of Environmental Protection

- 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.

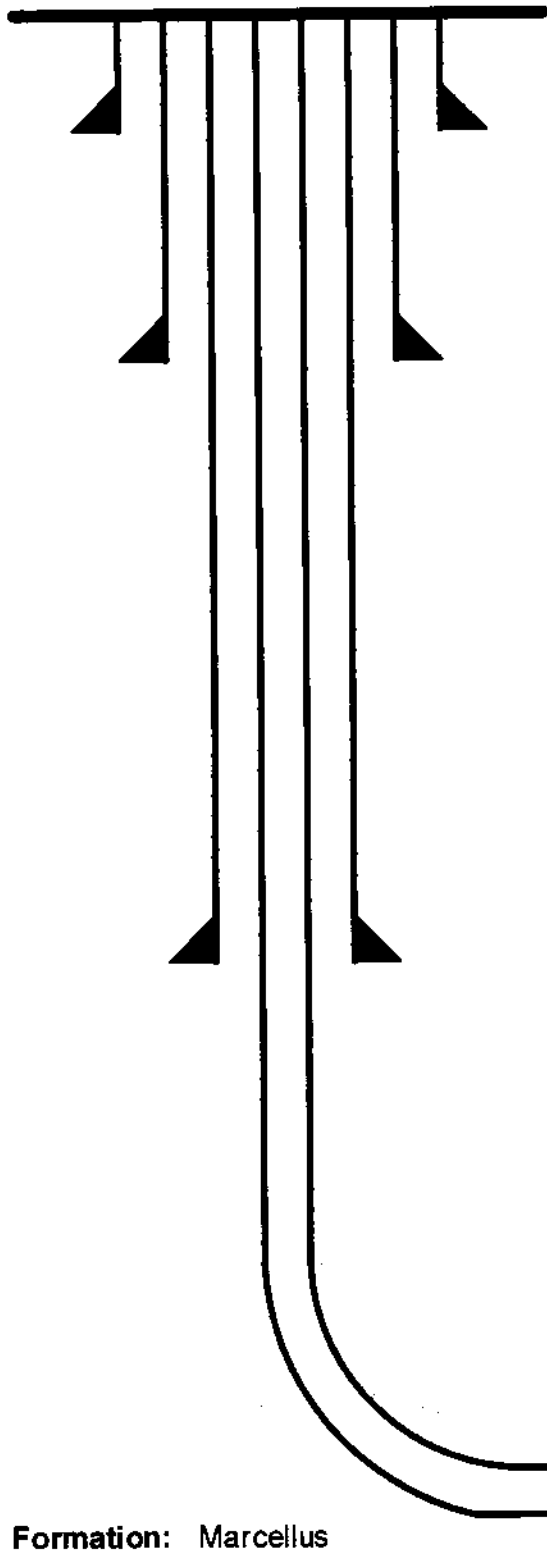
*Note: Attach additional sheets as needed.

EQT Production (Tug Hill)

Wellbore Diagram

Well: Hudson S-4HM
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

RECEIVED
Office of Oil and Gas
SEP 21 2023
WV Department of
Environmental Protection

Intermediate @ 2,425'
9-5/8", 36#, J-55, cement to surface w/ Class A

Production @ 19,860' MD / 6,983' TVD
5-1/2", 20#, P-110, cement to 500' inside 9-5/8" w/ Class A

Formation: Marcellus

Gayne Knitowski,
Inspector
Digitally signed by
Gayne Knitowski,
Inspector
Date: 2023.09.12
12:22:52 -04'00'

09/29/2023 SCALE