PERMIT MODIFICATION APPROVAL

May 29, 2014

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 1706383, Well #: 514665
Extend Surface Casing

Oil and Gas Operator:
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.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

Gene Smith
Regulatory/Compliance Manager
Office of Oil and Gas

Promoting a healthy environment.
May 21, 2014

Mr. Gene Smith  
West Virginia Department of Environmental Protection  
Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304

Re: Casing change on WEU51 (47-017-06381, 06386, 06385, 06384, 06383)

Dear Mr. Smith,

EQT is requesting the 13 3/8” surface casing to be set 7’ below the deepest red rock show to cover potential red rock issues. The proposed casing set depth is above ground elevation. The reason for this is the red rock swells during drilling of the intermediate section causing many drilling problems such as, but not limited to, lost drilling assemblies and casing running issues.

EQT is reviewing the OXF157, we would like to request to set the surface casing deeper on each well. The 13 3/8” casing will be set at a depth of approximately 1171’’ KB (7’ below the anticipated red rock show).

If you have any questions, please do not hesitate to contact me at (304) 848-0076.

Sincerely,

Vicki Roark  
Permitting Supervisor-WV

Enc.

Cc: Douglas Newlon  
4060 Dutchman Road  
Macfarlan, WV 26148
STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION

1) Well Operator: EQT Production Company
   Operator ID: 017
   County: 8
   District: 671
   Quadrangle:

2) Operator's Well Number: 514665
   Well Pad Name: WEU51

3) Farm Name/Surface Owner: Jane Hardin Trustee/Mary Holland
   Public Road Access: CR 13

4) Elevation, current ground: 1,225.0
   Elevation, proposed post-construction: 1,206.0

5) Well Type: (a) Gas • Oil • Underground Storage •
   (b) If Gas: Shallow • Deep •
   Horizontal •

6) Existing Pad? Yes or No: Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
   Target formation is Marcellus at a depth of 6686' with the anticipated thickness to be 57' and anticipated target pressure of 4500 psi

8) Proposed Total Vertical Depth: 6686'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 13,289

11) Proposed Horizontal Leg Length: 4,390

12) Approximate Fresh Water Strata Depths: 171, 176, 207, 334

13) Method to Determine Fresh Water Depth: By offset wells

14) Approximate Saltwater Depths: n/a

15) Approximate Coal Seam Depths: 177, 264

16) Approximate Depth to Possible Void (coal mine, karst, other): None reported

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

Page 1 of 3

05/30/2014
Office of Oil and Gas
MAY 27 2014
WV Department of Environmental Protection
## CASING AND TUBING PROGRAM

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Size</th>
<th>New or Used</th>
<th>Grade</th>
<th>Weight per ft</th>
<th>FOOTAGE for Staging</th>
<th>INTERVALS: Left in Well</th>
<th>CEMENT: Fill-up (Cu.Ft.)</th>
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May not be run, if run will be set 100' less than TD

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Note 1: EQT plans to bring the TOC on the production casing cement job 1,000' above kick off point, which is at least 500' above the shallowest production zone, to avoid communication.
19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill and complete a new horizontal well in the Marcelus Formation. The vertical drill to go down to an approximate depth of 5500'. Then kick off the horizontal leg using a slick water frac.

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 0.3%) of chemicals (including 15% Hydrochloric acid, gelling agent, gel breaker, friction reducer, biocide, and scale inhibitor), referred to in the industry as a "slickwater" completion. Maximum anticipated treating pressures are expected to average approximately 850 psi. Maximum anticipated treating rates are expected to average approximately 150 bpm. Stage lengths vary from 150 to 500 feet. Average approximately 200,000 barrels of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 200,000 pounds of sand per stage.

21) Total area to be disturbed, including roads, stockpile area, pits, etc. (acres): 51.8

22) Area to be disturbed for well pad only, less access road (acres): 11.5

23) Describe centralizer placement for each casing string:

- Surface: Bow spring centralizers – One at the shoe and one spaced every 500'.
- Intermediate: Bow spring centralizers– One cent at the shoe and one spaced every 500'.
- Production: One spaced every 1000' from KOP to last casing shoe

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

Surface (Type I Cement): 0-3% Calcium Chloride

Intermediate (Type I Cement): 0-3% Calcium Chloride. Salt is used in shallow, low temperature formations to speed the setting of cement slurries. 0.4% releases Loss Circulation Material (LCM) is used to combat the loss of whole drilling fluid or cement slurry (not filtrate) to a thief zone.

Production:

- Lead (Type I Cement): 0.2-0.7% Lignosulfonate (Retarder). Lengthens thickening time.
- 0.3% CFR (dispersant). Makes cement easier to mix.
- Tail (Type II Cement): 0.25-0.40% Lignosulfonate (Retarder). Lengthens thickening time.
- 0.2-0.3% CFR (dispersant). This is to make the cement easier to mix.
- 80% Calcium Carbonate. Acid solubility.
- 0.4-0.6% Halad (Fluid loss). Reduces amount of water lost to formation.

25) Proposed borehole conditioning procedures:

Surface: Circulate hole clean (approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. To ensure that there is no fill, short trip two stands with no circulation. If there is fill, bring compressors back on and circulate hole clean. A constant rate of higher than expected cuttings volume likely indicates washouts that will not clean up.

Intermediate: Circulate hole clean (approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. If foam drilling, to enhance hole cleaning use a soap sweep or increase injection rate & foam concentration.

Production: Pump marker sweep with mud plug to determine actual hole washout. Calculate a gauge holes bottoms up volume. Perform a cleanup cycle by pumping 3-5 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.
Well Name: 514655 (WEJ51HJ)
County: Doddridge
State: West Virginia

Elevation K/B:
Target: 1221
Prospect: 115
Azimuth: 5225
Vertical Section:

0'  334' Fresh Water Base
500'  
1,000'  1,164' Base Red Rock
1,500'  
2,000'  2,192' Big Lime
2,209'  Weir
2,500'  2,422' Gantz
2,502'  Fifty foot
2,616'  Thirty foot
2,659'  Gordon
2,761'  Forth Sand
2,936'  Bayard
3,000'  
3,278'  Warren
3,349'  Speechley
3,500'  
3,867'  Sullivan A
4,000'  
4,486'  -Riley
4,500'  
5,000'  4,900' Benson
5,172'  Alexander
5,322'  Int. csg pt
5,500'  
6,000'  6,297' Sonyoa
6,453'  Middlesex
6,507'  Geneseo
6,578'  Geneseo
6,619'  -Tully
6,642'  Hamilton
6,661'  -Marquis
6,717'  Ononda
6,800'  
7,000'  

0'  Hole Size 24" - 30" Conductor x 40'
8" Bit Size 17.5"

500'  
1,000'  TOC @ Surface
13 3/8", MC-50, 42@ @ 1,171' TMD
8" Bit Size 12.375"

1,500'  
2,000'  
2,500'  
3,000'  
3,500'  
4,000'  
4,500'  
5,000'  
5,500'  
6,000'  KOP =
10 Deg DLS

6,510' TMD
Land @
6,800' TMD
5 1/2", P-113, 200' 6,186' TVD

05/30/2014

WV Department of Environmental Protection
MAY 27 2014

4701706383

Received 6/23/2014

Oil and Gas
Well: S14665 (WEJUS1HS)
E&G Production
West Union
Doddridge
West Virginia


- 250'  Base Fresh Water  3 1/2  Surface  1 3/16  64# MC-50
- 650'  
- 1,000'  Base Red Rock  7 1/4
- 1,250'  
- 1,500'  
- 1,750'  Big Linn  10 1/2  Intermediate  9 5/8  40# MC-50
- 2,000'  Water  8 1/2  Production Casing  5 1/2  20# P-110
- 2,250'  Gas (I)  7 5/8
- 2,500'  Gas (II)  7 5/8
- 2,750'  Thistle Buttes  7 5/8
- 3,000'  Guernsey  7 5/8
- 3,250'  Payyette  7 5/8

Proposed Well Work:
- Drill and Complete a new horizontal well in the Mississippian formation.
- The vertical depth to go down to an approximate depth of 2,000'.

1 3/16