



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

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

September 29, 2016
PERMIT MODIFICATION APPROVAL
Horizontal 6A / Horizontal 6A Well - 1

EQT PRODUCTION COMPANY
120 PROFESSIONAL PLACE
BUILDING II
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for 514119
47-017-06774-00-00

Shorten 9 5/8" to 2960'

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: 514119
Farm Name: MEYER, ELEANOR
U.S. WELL NUMBER: 47-017-06774-00-00
Horizontal 6A / Horizontal 6A Well - 1
Date Issued: September 29, 2016

Promoting a healthy environment.

09/30/2016

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

1) Well Operator: EQT Production Company 306686 Doddridge West Union West Union
Operator ID County District Quadrangle

2) Operator's Well Number: 514119 Well Pad Name: WEU8

3) Farm Name/Surface Owner: Eleanor Meyer Public Road Access: Rt 50

4) Elevation, current ground: 1071 Elevation, proposed post-construction: 1071

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

(b) If Gas Shallow Deep
Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus, 6730' TVD, 55', 2951 PSI

8) Proposed Total Vertical Depth: 6730

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 13906

11) Proposed Horizontal Leg Length: 4727

12) Approximate Fresh Water Strata Depths: 129, 273, 304, 652

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

14) Approximate Saltwater Depths: 1705, 1854

15) Approximate Coal Seam Depths: 223, 840

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: _____

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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	A-500	78.6	40	40	44.8 ft ³ / CTS
Fresh Water	13 3/8	New	J-55	54.5	937	937	1016 ft ³ / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2960	2960	1158 ft ³ / CTS
Production	5 1/2	New	P-110	20	13906	13906	500' above top producing zone
Tubing	2 3/8		J-55	4.7		May not be run, if run set 40' above top perf or 80' inclination	
Liners							

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	26	.375	1378	1102	Class A	1.18
Fresh Water	13 3/8	17 1/2	.38	2700	2160	See Variance	1.19
Coal							
Intermediate	9 5/8	12 3/8	.395	3950	3160	See Variance	1.19
Production	5 1/2	8 1/2	.361	12640	10112	H	1.07/1.86
Tubing	2 3/8	NA	.19	7700			
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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9/20/16

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Environmental Protection

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

Drill and complete a new horizontal well in the Marcellus Formation. Drill the vertical to an approximate depth of 4158'. 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 0.3%) 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 internal casing pressure is expected to be approximately 10000 psi, maximum anticipated treating rates are expected to average approximately 100 bpm. Stage lengths vary from 150 to 300 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): +/- 15.1

22) Area to be disturbed for well pad only, less access road (acres): +/- 3.1

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 joint from production casing shoe to KOP

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

Conductor: Class A no additives
 Surface (Type 1 Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries. .25% Flake. Loss Circulation Material (LCM)
 Intermediate (Type 1 Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries. 0.25% Flake. Loss Circulation Material (LCM)
 Production:
 Lead (Class H Cement): 0.2% CD-20 (dispersant makes cement easier to mix). .15% SuperFL-300 (fluid loss/lengthens thickening time) .15% SEC-10 (fluid loss) 50:50 POZ (extender)
 Tail (Class H Cement): 0.2% Super CR-1 (Retarder). Lengthens thickening time. .3% Super FL-200 (fluid loss) .2% SEC-10 (fluid loss). 2% SuperFL-350 (fluid loss) Reduces amount of water lost to formation. 60 % Calcutm Carbonate. Acid solubility.

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: Pump marker sweep with nut 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.

Jul Chu
9/20/16

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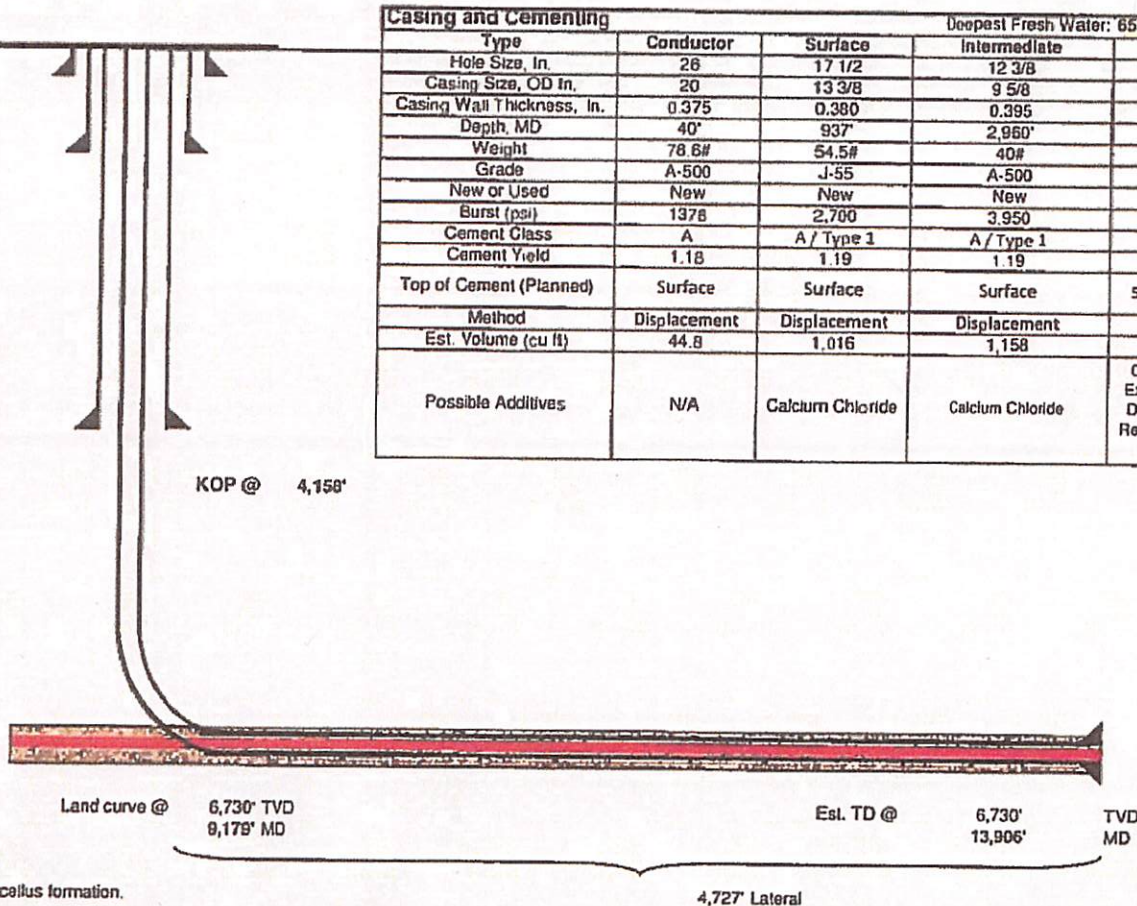
17-0674
new

Well 514119(WEU8H7)
EQT Production
West Union Quad
Doddridge County, WV

Azimuth 328
 Vertical Section 7402

Note: Diagram is not to scale

Formations	Top TVD	Base TVD
Conductor	40	
Base Fresh Water	652	
Surface Casing	937	
Base Red Rock	1149	
Maxton	1503 - 1750	
Big Lime	1997 - 2104	
Big Injun	2111 - 2135	
Weir	2235 - 2404	
Gantz	2487 - 2500	
Fifty foot	2614 - 2648	
Thirty foot	2687 - 2705	
Gordon	2769 - 2778	
Forth Sand	2818 - 2825	
Bayard	2900 - 2910	
Intermediate Casing	2960	
Warren	3336 - 3411	
Speechley	3427 - 3533	
Balltown A	4019 - 4188	
Riley	4557 - 4584	
Benson	4978 - 5004	
Alexander	5230 - 5309	
Sonyea	6294 - 6434	
Middlesex	6434 - 6486	
Genesee	6486 - 6551	
Genesee	6551 - 6590	
Tully	6590 - 6611	
Hamilton	6611 - 6629	
Marcellus	6629 - 6684	
Production Casing	13906 MD	
Onondaga	6684	



Casing and Cementing		Deepest Fresh Water: 652'		
Type	Conductor	Surface	Intermediate	Production
Hole Size, In.	26	17 1/2	12 3/8	8 1/2
Casing Size, OD In.	20	13 3/8	9 5/8	5 1/2
Casing Wall Thickness, In.	0.375	0.380	0.395	0.361
Depth, MD	40'	937'	2,960'	13,906'
Weight	78.8#	54.5#	40#	20#
Grade	A-500	J-55	A-500	P-110
New or Used	New	New	New	New
Burst (psi)	1378	2,700	3,950	12,640
Cement Class	A	A / Type 1	A / Type 1	H
Cement Yield	1.18	1.19	1.19	1.07/1.86
Top of Cement (Planned)	Surface	Surface	Surface	500' above top Producing Zone
Method	Displacement	Displacement	Displacement	Displacement
Est. Volume (cu ft)	44.8	1,016	1,158	2,796
Possible Additives	N/A	Calcium Chloride	Calcium Chloride	Calcium Carbonate, Fluid Loss, Extender, Dispersant, Viscosifier, Defoamer, POZ, Bonding Agent, Retarder, Anti-Settling/Suspension Agent

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 Drill the vertical to an approximate depth of 4158'.
 Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

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17-06774 (WEU8)

September 20, 2016

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

Re: Modification of 47-017-06774 (WEU8)

Dear Mr. Smith,

Enclosed is an updated WW-6B and schematic for the API number above on the WEU8 pad. While drilling the intermediate hole section, EQT encountered difficulties with red rock and needed to quickly make a decision on the 9 5/8" casing. Dan Doebereiner spoke with Joe McCourt and Dan Flack on Sunday and discussed shortening the 9 5/8" intermediate casing. Joe McCourt gave Dan a verbal approval, as did Dan Flack. Dan Flack has since signed off on the modification, which is attached.

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

Sincerely,

A handwritten signature in blue ink, appearing to read 'Vicki Roark'.

Vicki Roark
Permitting Supervisor-WV

Enc.

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