



west virginia department of environmental protection

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

Jim Justice, Governor  
Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

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 516233  
47-017-06744-00-00

Modifying the target formation from the Geneseo to the Marcellus.

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: 516233  
Farm Name: WETZEL, CATHY  
U.S. WELL NUMBER: 47-017-06744-00-00  
Horizontal 6A / Horizontal 6A Well - 1  
Date Issued: 5/30/2017

Promoting a healthy environment.

06/02/2017

**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 Southwest Oxford  
Operator ID County District Quadrangle

2) Operator's Well Number: 516233 Well Pad Name: OXF43

3) Farm Name/Surface Owner: Cathy Wetzel Public Road Access: Rt 20

4) Elevation, current ground: 1254' Elevation, proposed post-construction: 1229'

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

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus, 6666' TVD, 57' thick, 2951 PSI

8) Proposed Total Vertical Depth: 6666'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 14896'

11) Proposed Horizontal Leg Length: 6765'

12) Approximate Fresh Water Strata Depths: 70, 221, 307, 382'

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

14) Approximate Saltwater Depths: No Saltwater present in offset wells

15) Approximate Coal Seam Depths: 321'

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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*DAF*  
*sl/117*

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	60 ft <sup>3</sup> / CTS
Fresh Water	13 3/8	New	J-55	54.5	532	532	487 ft <sup>3</sup> / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2426	2426	960 ft <sup>3</sup> / CTS
Production	5 1/2	New	P-110	20	14896	14896	500' above top producing zone
Tubing	2 3/8		J-55	4.7			
Liners						May not be run, if run set 40' above top perf or 80' inclination	

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	18	Class A	1.18
Fresh Water	13 3/8	17 1/2	.38	2700	2160	See variance 2014-17	1.19
Coal							
Intermediate	9 5/8	12 3/8	.395	3950	3160	See variance 2014-17	1.19
Production	5 1/2	8 1/2	.361	12640	10112	Class A/H	1.123/2.098
Tubing	2 3/8	NA	.19	7700			
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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 MAY 8 2017  
 WV Department of  
 Environmental Protection

DAF  
 5/1/17

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 2581'. 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, 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 250,000 gallons of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 250,000 pounds of sand per stage.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): +/- 77.67

22) Area to be disturbed for well pad only, less access road (acres): +/- 23.31

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  
 Intermediate (Type 1 Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries.  
 Production:  
 Lead (Class A 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. 80% Calcium 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.

DAC  
5/6/17

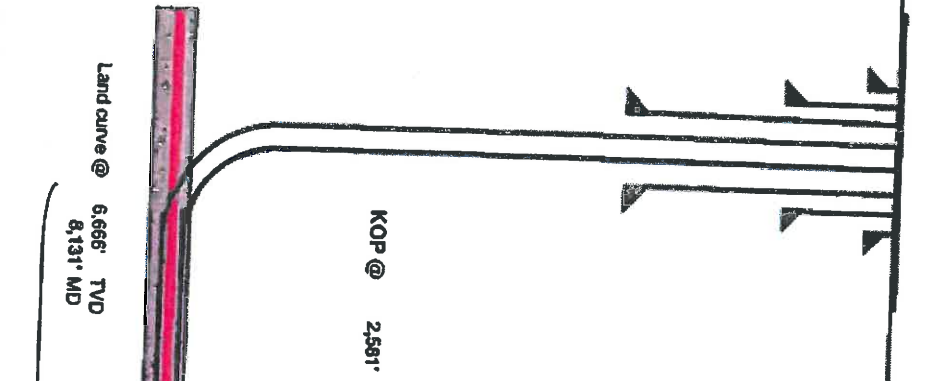
**Well** 516233(OXF43H25)  
**EOT Production**  
 Oxford Quad  
 Doddridge County, WV

Admth 337  
 Vertical Section 6798

Note: Diagram is not to scale

4701706744 MOD

Formations	Top TVD	Base TVD
Conductor	40	
Base Fresh Water	302	
Surface Casing	532	
<b>Base Red Rock</b>		
Maxton	1073	1088 - 1128
Big Lime	1964	1964 - 2032
Big Injun Well	2076	2076 - 2108
Intermediate Casing	2250	2250 - 2376
	2426	
Gantz	2450	2450 - 2532
Fifty foot	2532	2532 - 2599
Thirty foot	2630	2630 - 2666
Gordon	2672	2672 - 2721
Forth Sand	2772	2772 - 2839
Bayard	2952	2952 - 3023
Warren	3286	3286 - 3352
Speesley	3362	3362 - 3857
Baltimore A	3857	3857 - 4216
Riley	4455	4455 - 4831
Benson	4831	4831 - 4925
Alexander	5133	5133 - 5226
Smyea	6309	6309 - 6459
Middlesex	6459	6459 - 6449
Genesee	6449	6449 - 6558
Genesee	6568	6568 - 6600
Tully	6600	6600 - 6613
Hamilton	6613	6613 - 6631
Marcellus	6631	6631 - 6687
Production Casing	14896	14896 MND
Onondaga	6687	



Casing and Cementing		Disposal Fresh Water: 38%		Production
Type	Conductor	Surface	Intermediate	
Hole Size, In.	26	17 1/2	12 3/8	6 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'	532'	2,426'	14,896'
Weight	78.6#	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	A/H
Cement Yield	1 1/8	1 1/8	1 1/9	1 1/23 / 2,098
Top of Cement (Planned)	Surface	Surface	Surface	500' above top Producing Zone
Method	Surface	Surface	Surface	
Est. Volume (cu ft)	60	487	960	3,249
Displacement	Displacement	Displacement	Displacement	Displacement
Possible Additives	N/A	Calcium Chloride	Calcium Chloride	Calcium Carbonate, Fluid Loss Extender, Dispersant, Viscosifier, Defoamer, POZ, Bonding Agent, Retarder, Anti-Setting/Suspension Agent

Proposed Well Work:  
 Drill and complete a new horizontal well in the Marcellus formation.  
 Drill the vertical to an approximate depth of 2581'.  
 Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

DAE  
 5/1/17

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 Office of Oil and Gas

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WV Department of  
 Environmental Protection

06/02/2017

**WV 516233**  
**EOT Production Company**  
**Franklin Maxwell Heira L.P.**  
**255 Acres ±**

12.126° LATITUDE 3910'09" TH

4.626° LATITUDE 3012'30" BH

**LEGEND**

- ⊙ EXISTING OIL/GAS WELL
- ⊙ WATER FEATURE
- ⊙ WELL HEAD TOP HOLE
- ⊙ WELL LANDING POINT
- ⊙ WELL BOTTOM HOLE
- ⊙ REBAR FOUND
- ⊙ WELL LATERAL LINE
- ⊙ LEASE BOUNDARY
- ⊙ PROPERTY LINE
- ⊙ STREAM
- ⊙ 500' LATERAL COLLECTION BUFFER

**ADJACENT CORNER**

NO.	ADJACENT CORNER	NO.	SURFACE OWNER
1	MORRIS T L REE	1	CHARLES R & EVELYN GREATHOUSE GARDEN
2	HUFF WILLIAM LEE	2	JAMES P GREN
3	CHARLES WALTER BLUNCKWISER	3	CATHY JEAN WELLS
4		4	HUFF RANDY E DECEDENT'S BETTY M RYAN
5		5	EDWARD DALE PRUDY
6		6	EDNA LOURSE GRIND
7		7	RANDALL L & KELLY GRIMM
8		8	RANDALL L & KELLY GRIMM
9		9	UNITED STATES OF AMERICA
10		10	GREGORY L & ROSANNA J MORGAN
11		11	GREGORY L & ROSANNA J MORGAN
12		12	UNITED STATES OF AMERICA
13		13	EDWARD & GINA BASSETT
14		14	EDWARD & GINA BASSETT CARLTON W & PATRICIA MATHENY MARIAN G ZERN

**WV 516233 Well Point Coordinates**

**Top Hole Coordinates**

WV 27 S.P.C. (P)	N 245,663.159	E 1,633,255.550
WV 27 WFO	LAT. 53.157781	LONG. 80.780291
WV 23 UTM 17U (P)	N 4,334,239.0	E 572,823.5
WV 23 S.P.C. (P)	N 245,663.1	E 1,633,255.1

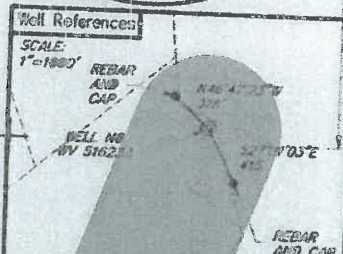
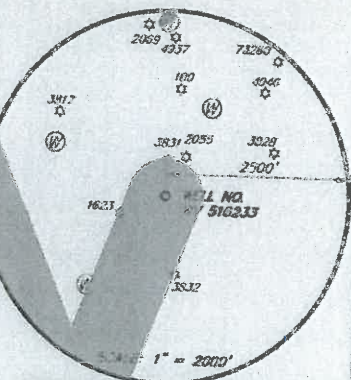
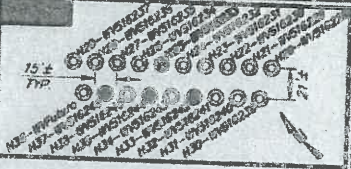
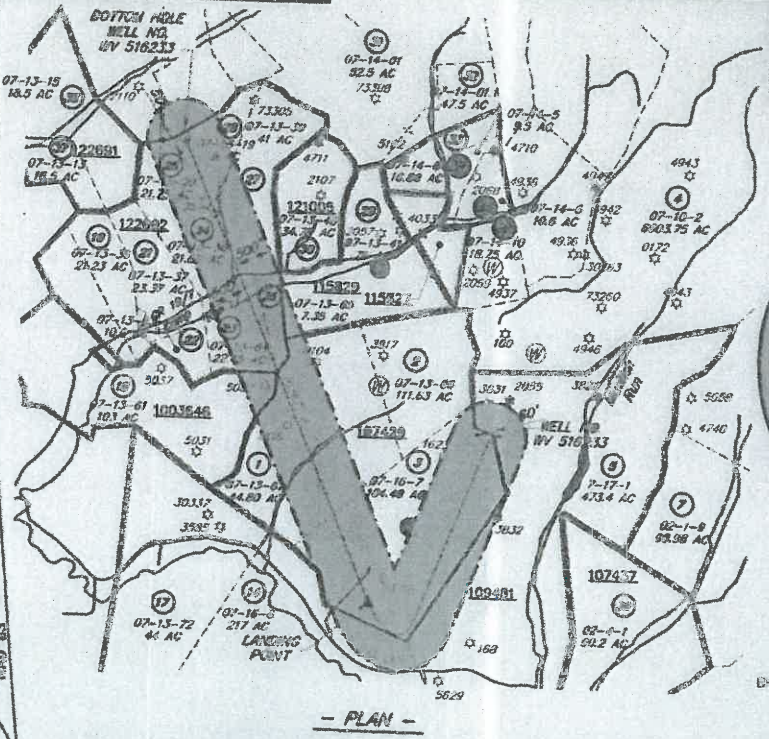
**Landing Point Coordinates**

WV 27 S.P.C. (P)	N 245,663.235	E 1,633,257.780
WV 27 WFO	LAT. 53.157781	LONG. 80.780291
WV 23 UTM 17U (P)	N 4,334,239.1	E 572,823.5
WV 23 S.P.C. (P)	N 245,663.4	E 1,633,257.8

**Bottom Hole Coordinates**

WV 27 S.P.C. (P)	N 245,669.280	E 1,633,263.590
WV 27 WFO	LAT. 53.157781	LONG. 80.780291
WV 23 UTM 17U (P)	N 4,334,239.4	E 572,823.5
WV 23 S.P.C. (P)	N 245,663.5	E 1,633,257.5

Lease No. 122682  
 Acton Owner: Jonathan D. Coats, et al



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS



I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

*[Signature]*



FILE NO.: EES-00635  
 DRAWING NO.: 01743 Well Plat  
 SCALE: 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY: ±3'  
 PROVEN SOURCE OF ELEVATION: GPS

STATE OF WEST VIRGINIA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 OFFICE OF OIL AND GAS

DATE: MARCH 23, 2017  
 OPERATORS WELL NO. WV 516233  
 API WELL NO. 47 017 OUTH  
 STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  (IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW  
 LOCATION, ELEVATION: 1254' (Ground) 1222' (PROP.) WATERSHED: Middle Fork Hughes River QUADRANGLE: OXFORD  
 DISTRICT: SOUTH WEST / COVE COUNTY: DODDRIDGE  
 SURFACE OWNER: Cathy Wetzel ACREAGE: 104.484 AC  
 ROYALTY OWNER: Franklin Maxwell Heira L.P. ACREAGE: 255.4 AC  
 PROPOSED WORK:  DRILL  CONVERT  DRILL DEEPER  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  
 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY) TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: 6066'  
 PLUG AND ABANDON  CLEAN OUT AND REPLUG

WELL OPERATOR: EOT Production Company  
 ADDRESS: 115 Professional Pl., P.O. Box 280  
 Bridgeport, WV 26330

DESIGNATED AGENT: Rex C. Roy  
 ADDRESS: 115 Professional Pl., P.O. Box 280  
 Bridgeport, WV 26330

Received  
 Office of Oil & Gas  
 MAY 8 2017

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 Mod  
 06/02/2017



west virginia department of environmental protection

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

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

March 18, 2014

Nabors Completion & Production Services Company  
1380 Route 286 Hwy E #121  
Indiana PA 15701

Re: Cement Variance Request

Dear Sir or Madam,

This agency is approving a variance request for the cement blend listed below to be used on surface and coal protection strings for the drilling of oil and gas wells in the state of West Virginia. The variance cannot be used without requesting its use on a permit application and approval by this agency:

- Type 1 (2% Calcium Chloride-Accelerator, 0.25% Super Flake-Lost Circulation, 5.2% Water, 94% Type "1" Cement)

If you have any questions regarding this matter feel free to contact me at 304-926-0499, ext. 1653.

Sincerely,

A handwritten signature in blue ink that reads "James Peterson" followed by a stylized initial "JCS".

James Peterson  
Environmental Resources Specialist / Permitting

Promoting a healthy environment

06/02/2017



west virginia department of environmental protection

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

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

**BEFORE THE OFFICE OF OIL AND GAS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
STATE OF WEST VIRGINIA**

**IN THE MATTER OF A VARIANCE FROM )  
REGULATION 35 CSR § 4-11.4/11.5/14.1 )  
AND 35 CSR § 8-9.2.h. 4/5/6/8 OF THE )  
THE OPERATIONAL )  
REGULATIONS OF CEMENTING OIL )  
AND GAS WELLS )**

**ORDER NO. 2014 - 17**

**REPORT OF THE OFFICE**

Nabors Completion & Production Services Co. requests approval of a different cement blend for use in cementing surface and coal protection casing of oil and gas wells.

**FINDINGS OF FACT**

- 1.) Nabors Completion & Production Services Co. proposes the following cement blend:
  - 2% Calcium Chloride (Accelerator)
  - 0.25 % Super Flake (Lost Circulation)
  - 94% Type "I" Cement
  - 5.20 % Water
- 2.) Laboratory testing results indicate that the blend listed in Fact No.1 will achieve a 500 psi compressive strength within 6 hours and a 2,435 psi compressive strength within 24 hours.

Promoting a healthy environment



**CONCLUSIONS OF LAW**

Pursuant to Articles 6 and 6A, Chapter 22 of the Code of West Virginia, the Office of Oil and Gas has jurisdiction over the subject matter embraced in said notice, and the persons interested therein, and jurisdiction to promulgate the hereinafter prescribed Order.

Pursuant to 35 CSR § 4-11.5 and 35 CSR § 8-9.2.h.8 the Chief of the Office of Oil and Gas may approve different cement blends upon the well operator providing satisfactory proof that different cement types are adequate.

**ORDER**

It is ordered that Nabors Completion & Production Services Co. may use the cement blend listed in Findings of Fact No.1 for the cementing of surface and coal protection casing of oil and gas wells in the State as may be requested by oil and gas operators. The waiting time on the cement blend shall be **8** hours. The cement blend shall be mixed in strict accordance with the specifications for each blend and weight measurements made on-site to assure the cement slurries meet the minimum weight specifications. A sample shall be collected and, if after **8** hours the cement is not set up, additional time will be required. Nabors Completion & Production Services Co. shall keep a record of cement blend jobs in which the cement blend approved under this order is to be used and made available to the Office of Oil and Gas upon request.

Dated this, the 18th day of March, 2014.

IN THE NAME OF THE STATE OF WEST VIRGINIA

OFFICE OF OIL AND GAS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
OF THE STATE OF WEST VIRGINIA

  
\_\_\_\_\_  
James Martin, Chief  
Office of Oil and Gas



470170674 4/Mod

March 28, 2017

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

Re: Casing on OXF43

Dear Mr. Smith,

EQT is requesting the 13-3/8" surface casing be set at 532' KB, 150' below the deepest fresh water.

For the 9 5/8" casing string, EQT is requesting that the first well set the 9 5/8" casing at 5276' KB, 50' below the Alexander formation. Prior to cementing the 9 5/8" casing, a test will be performed to determine if a deep 9 5/8" casing string is needed. If the test is successful, the remaining wells on the pad will have 9 5/8" casing set at a shallower depth of 2426' KB, 50' below the Weir formation. If the test is unsuccessful, the remaining wells on the pad will have 9 5/8" casing set at the original set depth of 5276' KB. Upon completion of the test, the WV DEP inspector will be notified of the test results and the casing depth for the remaining wells on the pad will be discussed.

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

Sincerely,

Vicki Roark  
Permitting Supervisor - WV

Enc.

**WV 516233**  
**EQT Production Company**  
**Franklin Maxwell Heirs L. P.**  
**255 Acres ±**

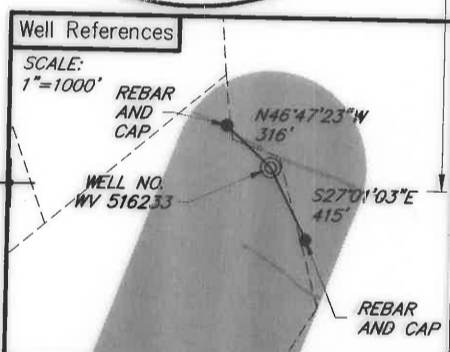
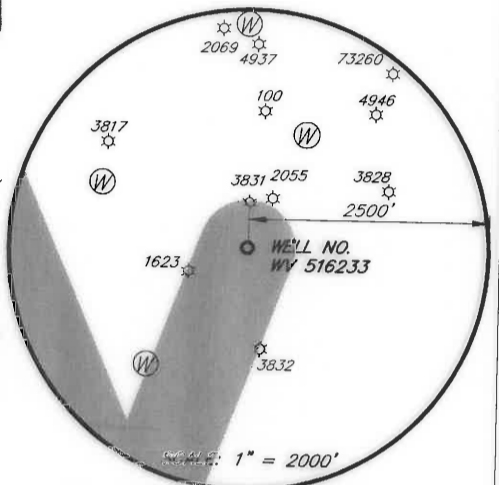
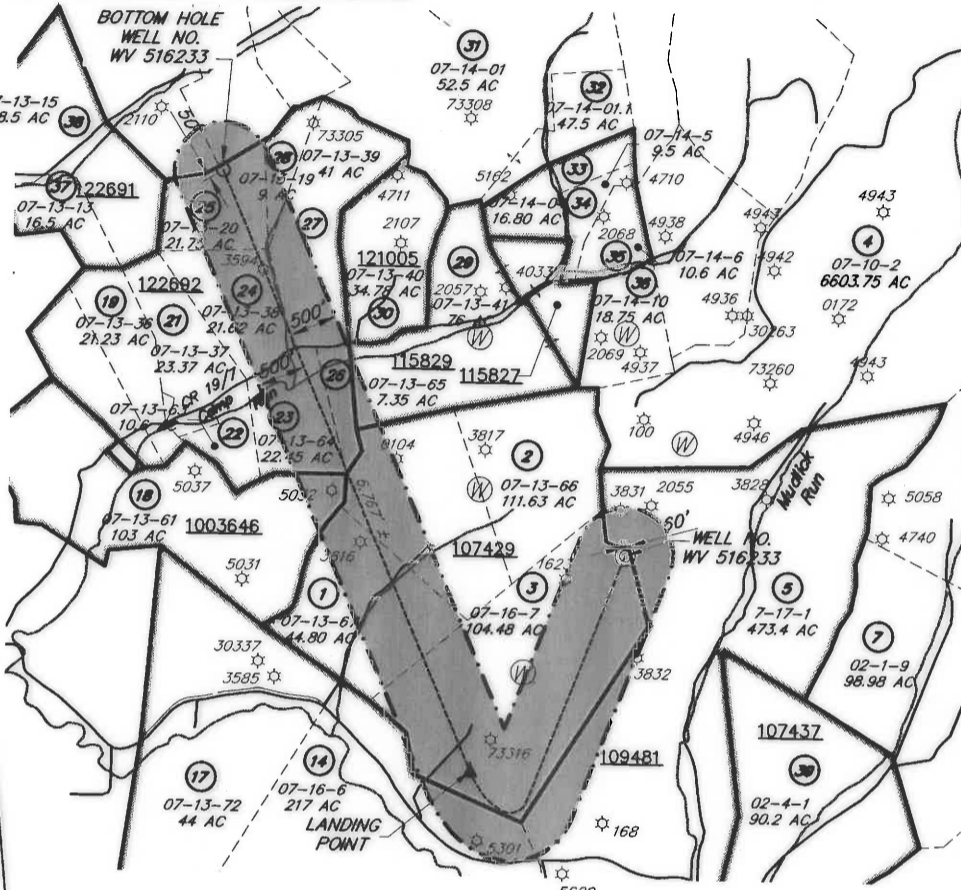
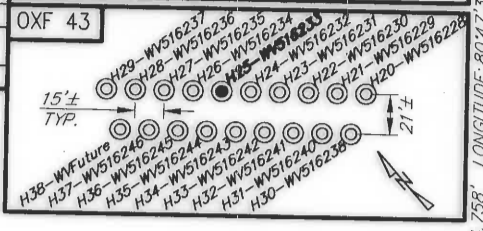
NO.	ADJACENT OWNER	NO.	SURFACE OWNER
4	MORRIS I L IKE	1	CHARLES R & EVELYN GREATHOUSE GAPN
7	HUFF WILLIAM LEE	2	JAMES P GREATHOUSE
36	CHARLES WALTER MUNCHMORE	3	CATHY JEAN WETZEL ETAL
<b>Coordinate Notes</b>			
West Virginia Coordinate System of 1927 (North Zone) Based upon Differential GPS Measurements. Plat orientation, Corner and well ties are based upon the grid north meridian. Well location references are based upon the grid north meridian. UTM Coordinates are NAD83. Zone 17 Meters.			
1		14	BETTY M. RYAN
2		17	EDWARD DALE PRUNTY
3		18	EDRA LOUISE GRIMM
4		21	RANDALL L & KELLY GRIMM
5		22	RANDALL L & KELLY GRIMM
14		23	UNITED STATES OF AMERICA
17		24	GREGORY L & ROXANNA J MORGAN
18		25	GREGORY L & ROXANNA J MORGAN
21		26	UNITED STATES OF AMERICA
22		27	EDWARD & GINA BASSETT
23		28	EDWARD & GINA BASSETT
24		29	CARLTON W & PATRICIA MATHENY
25		30	MARIAN G ZORN

**WV 516233 Well Point Coordinates**

Top Hole Coordinates		
NAD 27 S.P.C. (Ft.)	N: 241,963.119	E: 1,633,365.966
NAD 27 GEO	LAT: 39.157087	LONG: 80.792934
NAD 83 UTM 17N (M)	N 4,334,239.0	E: 517,905.5
NAD 83 S.P.C. (Ft.)	N 241,998.5	E: 1,601,925.1
Landing Point Coordinates		
NAD 27 S.P.C. (Ft.)	N: 239,692.095	E: 1,631,797.798
NAD 27 GEO	LAT: 39.150791	LONG: 80.798348
NAD 83 UTM 17N (M)	N 4,333,539.1	E: 517,439.3
NAD 83 S.P.C. (Ft.)	N 239,727.4	E: 1,600,357.0
Bottom Hole Coordinates		
NAD 27 S.P.C. (Ft.)	N: 245,899.290	E: 1,629,106.950
NAD 27 GEO	LAT: 39.167724	LONG: 80.808154
NAD 83 UTM 17N (M)	N 4,335,416.4	E: 516,588.0
NAD 83 S.P.C. (Ft.)	N 245,934.5	E: 1,597,666.1

- LEGEND**
- ☆ EXISTING OIL/GAS WELL
  - ⊙ WATER FEATURE
  - ⊙ WELL HEAD TOP HOLE
  - ▲ WELL LANDING POINT
  - WELL BOTTOM HOLE
  - REBAR FOUND
  - WELL LATERAL LINE
  - LEASE BOUNDARY
  - PROPERTY LINE
  - STREAM
  - 500' LATERAL COLLECTION BUFFER

Lease No. Acres Owner  
122692 200 Jonathan D. Casto, et al



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS



I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

*[Signature]*



FILE NO.: EES-60635  
 DRAWING NO.: OXF43 Well Plat  
 SCALE: 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY: ±3'  
 PROVEN SOURCE OF ELEVATION: GPS

STATE OF WEST VIRGINIA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 OFFICE OF OIL AND GAS

DATE MARCH 23, 20 17  
 OPERATORS WELL NO. WV 516233  
 API WELL NO. MOD 47 017 0674  
 STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  (IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW  
 LOCATION, ELEVATION: 1254' (Ground) 1229' (Prop.) WATERSHED: Middle Fork Hughes River QUADRANGLE: OXFORD 06/02/2017  
 DISTRICT: SOUTH WEST / COVE COUNTY: DODDRIDGE  
 SURFACE OWNER: Cathy Wetzel ACREAGE: 104.48± AC  
 ROYALTY OWNER: Franklin Maxwell Heirs L. P. LEASE NO.: 107429 ACREAGE: 255± AC  
 PROPOSED WORK:  DRILL  CONVERT  DRILL DEEPER  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  
 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY)  
 PLUG AND ABANDON  CLEAN OUT AND REPLUG TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: 6666'

WELL OPERATOR: EQT Production Company DESIGNATED AGENT: Rex C. Ray  
 ADDRESS: 115 Professional Pl. P.O. Box 280 ADDRESS: 115 Professional Pl. P.O. Box 280  
Bridgeport, WV 26330 Bridgeport, WV 26330



March 28, 2017

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

Re: Modification of API 47-017-06747, 06745, 06744

Dear Mr. Smith,

Enclosed are forms WW6B, schematic, and Mylar plat, for the above API number. EQT is modifying the target formation from the Geneseo to the Marcellus. No casing was changed.

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.



May 5, 2017

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

Re: Inspector sign offs 47-01706744, 06745, 06747

Dear Sir or Madam,

Enclosed are the inspector sign offs for the above API numbers.

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.

RECEIVED  
Office of Oil and Gas

MAY 8 2017

WV Department of  
Environmental Protection

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 Southwest Oxford  
Operator ID County District Quadrangle

2) Operator's Well Number: 516233 Well Pad Name: OXF43

3) Farm Name/Surface Owner: Cathy Wetzel Public Road Access: Rt 20

4) Elevation, current ground: 1254' Elevation, proposed post-construction: 1229'

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

(b) If Gas Shallow  Deep \_\_\_\_\_  
Horizontal

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus, 6666' TVD, 57' thick, 2951 PSI

8) Proposed Total Vertical Depth: 6666'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 14896'

11) Proposed Horizontal Leg Length: 6765'

12) Approximate Fresh Water Strata Depths: 70, 221, 307, 382'

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

14) Approximate Saltwater Depths: No Saltwater present in offset wells

15) Approximate Coal Seam Depths: 321'

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: \_\_\_\_\_



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	60 ft <sup>3</sup> / CTS
Fresh Water	13 3/8	New	J-55	54.5	532	532	487 ft <sup>3</sup> / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2426	2426	960 ft <sup>3</sup> / CTS
Production	5 1/2	New	P-110	20	14896	14896	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	18	Class A	1.18
Fresh Water	13 3/8	17 1/2	.38	2700	2160	See variance 2014-17	1.19
Coal							
Intermediate	9 5/8	12 3/8	.395	3950	3160	See variance 2014-17	1.19
Production	5 1/2	8 1/2	.361	12640	10112	Class A/H	1.123/2.098
Tubing	2 3/8	NA	.19	7700			
Liners							

**PACKERS**

Kind:				
Sizes:				
Depths Set:				



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 2581'. 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, 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 250,000 gallons of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 250,000 pounds of sand per stage.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): +/- 77.67

22) Area to be disturbed for well pad only, less access road (acres): +/- 23.31

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  
 Intermediate (Type 1 Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries.  
 Production:  
 Lead (Class A 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 % Calcium 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.

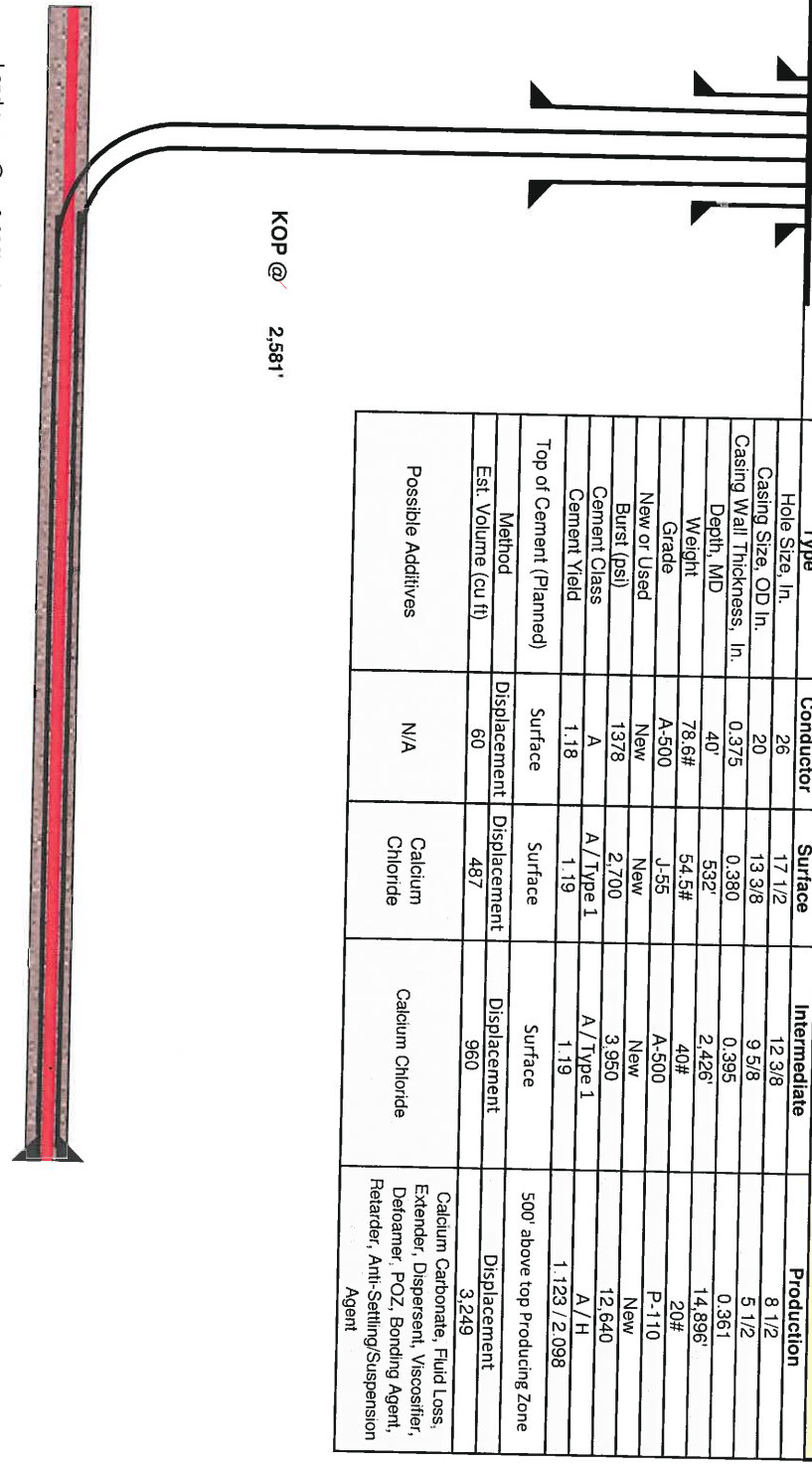




Well 516233(OXF43H25)  
 EQT Production Oxford Quad  
 Doddridge County, WV  
 Vertical Section 337  
 Azimuth 5799

Note: Diagram is not to scale

Formations	Top TVD	Base TVD
Conductor	40	
Base Fresh Water	382	
Surface Casing	532	
Base Red Rock	1073	
Maxton	1088	1128
Big Lime	1964	2032
Big Injln	2076	2108
Weir	2250	2376
Intermediate Casing	2426	
Gantz	2450	2532
Fifty foot	2532	2589
Thirty foot	2630	2666
Gordon	2672	2721
Forth Sand	2772	2839
Bayard	2952	3023
Warren	3286	3352
Speechley	3352	3857
Balltown A	3857	4215
Riley	4455	4831
Benson	4831	4925
Alexander	5133	5226
Sonyea	6309	6459
Middlesex	6459	6449
Genesee	6449	6558
Genesee	6558	6600
Tully	6600	6613
Hamilton	6613	6631
Marcellus	6631	6687
Production Casing	14896	MD
Onondaga	6687	



Casing and Cementing		Deepest Fresh Water: 382'		Production
Type	Conductor	Surface	Intermediate	
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'	532'	2,426'	14,896'
Weight	78.6#	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	A / H
Cement Yield	1.18	1.19	1.19	1.123 / 2.098
Top of Cement (Planned)	Surface	Surface	Surface	500' above top Producing Zone
Method				
Est. Volume (cu ft)	60	487	960	3,249
Possible Additives	N/A	Calcium Chloride	Calcium Chloride	Calcium Carbonate, Fluid Loss, Extender, Dispersant, Viscosifier, Defoamer, POZ, Bonding Agent, Retarder, Anti-Settling/Suspension Agent

Proposed Well Work:  
 Drill and complete a new horizontal well in the Marcellus formation.  
 Drill the vertical to an approximate depth of 2581'.  
 Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

Land curve @ 6,666' TVD  
 8,131' MD  
 Est. TD @ 6,666' TVD  
 14,896' MD

6,765' Lateral

