



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

Jim Justice, Governor
Austin Caperton, Cabinet Secretary
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 516235
47-017-06747-00-00

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: 516235
Farm Name: WETZEL, CATHY
U.S. WELL NUMBER: 47-017-06747-00-00
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: 516235 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: 12370'

11) Proposed Horizontal Leg Length: 5066'

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: _____

RECEIVED
Office of Oil and Gas

MAY 8 2017

WV Department of
Environmental Protection

*DAE
5/11/17*

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 ³ / CTS
Fresh Water	13 3/8	New	J-55	54.5	532	532	487 ft ³ / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2426	2426	960 ft ³ / CTS
Production	5 1/2	New	P-110	20	12370	12370	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:				

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MAY 8 2017

DAE
5/11/17

WV Department of
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 4956'. 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.

DAF
5/1/17

Received
Office of Oil & Gas Page 3 of 3

MAY 8 2017

06/02/2017

12.148' LATITUDE: 39°10'00" TH
 3.060' LATITUDE: 39°12'30" BH

WV 516235
EQT Production Company
Franklin Maxwell Hairs L. P.
255 Acres ±

LEGEND

- ☆ EXISTING OIL/GAS WELL
- ⊙ W/ARER FEATURE
- ⊙ WELL HEAD TOP HOLE
- ⊙ WELL LANDING POINT
- ⊙ WELL DOT/UM HOLE
- ⊙ REBAR FOUND
- WELL LATERAL LINE
- LEASE BOUNDARY
- PROPERTY LINE
- STREAM
- 500' LATERAL COLLECTION BUFFER

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
32	MICHAEL D & SUSAN H ZORN	3	CATHY JEAN WETZEL ETAL
33	MATHENY M & PATRICIA M CARLTON	5	HUFF RANDY E DECEDENT'S BETTY M RYAN
34	CHARLES WALTER LUKINSKY	17	EDWARD DALE PRUNTY EDNA LOUISE GRIMM
35	CHARLES WALTER LUKINSKY	18	RANDALL T GRIMM
36	CHARLES WALTER LUKINSKY	26	UNITED STATES OF AMERICA EDWARD & GINA BASSETT
		27	EDWARD & GINA BASSETT
		28	EDWARD & GINA BASSETT
		29	CARLTON M & PATRICIA MATHENY
		30	MARIAN C ZORN

WV 516235 Well Point Coordinates

Top Hole Coordinates

WAD 27 S.P.C. (PL) N 241,000.000 E 1,633,343.048
 WAD 27 G60 LAT. 38.187841 LONG. 83.720384
 WAD 03 UTM 17M (PL) N 4,393,243.0 N 242,000.0 E 1,637,302.8
 WAD 03 S.P.C. (PL) N 242,000.0 E 1,637,302.8

Landing Point Coordinates

WAD 27 S.P.C. (PL) N 241,000.000 E 1,634,674.407
 WAD 27 G60 LAT. 38.188200 LONG. 83.720384
 WAD 03 UTM 17M (PL) N 4,393,243.0 N 242,000.0 E 1,637,302.8
 WAD 03 S.P.C. (PL) N 242,000.0 E 1,637,302.8

Bottom Hole Coordinates

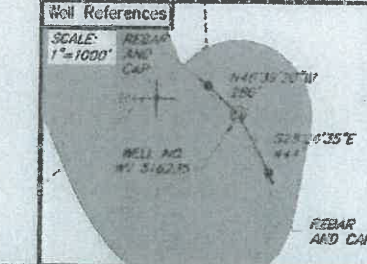
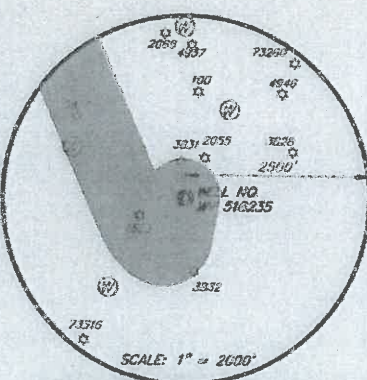
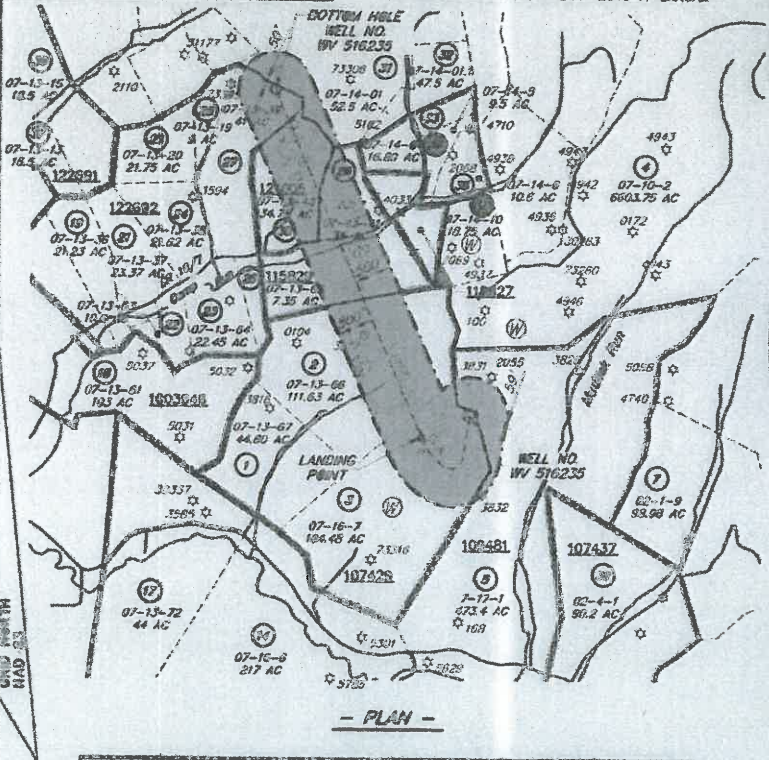
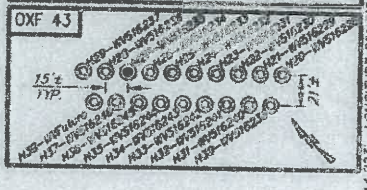
WAD 27 S.P.C. (PL) N 241,000.000 E 1,635,051.009
 WAD 27 G60 LAT. 38.188200 LONG. 83.720384
 WAD 03 UTM 17M (PL) N 4,393,243.0 N 242,000.0 E 1,637,302.8
 WAD 03 S.P.C. (PL) N 242,000.0 E 1,637,302.8

Legend, Area, Owner

115828 00 Carlton Matheny, et al
 121009 38.5 Marian G. Zorn
 122692 200 Jonathan D. Dasto, et al

Coordinate Notes

West Virginia Coordinate System of 1927 (North Zone) Based upon Differential GPS Measurements. Flat orientation, Corner and well loc are based upon the grid north meridian. Well location references are based upon the grid north meridian. UTM Coordinates are NAD83 Zone 17 Meters.



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

encompass

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAN 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]

WILLIAM J. WHITMAN, II
LICENSED
No. 2005
STATE OF
WEST VIRGINIA
PROFESSIONAL SURVEYOR

FILE NO.: EES-00035
 DRAWING NO.: OXF 43 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
 OPERATOR'S WELL NO. WV 516235
 API WELL NO. 47 017 01747
 STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL (IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
 LOCATION, ELEVATION: 1254' (Ground) 1229' (Prep.) WATERSHED: Middle Fork Hughes River QUADRANGLE: OXFORD
 DISTRICT: SOUTH WEST / COVE COUNTY: DODD
 SURFACE OWNER: Cathy Wetzel ACREAGE: 104.32± AC
 ROYALTY OWNER: Franklin Maxwell Hairs 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: 6696'

WELL OPERATOR: EQT Production Company DESIGNATED AGENT: Rev. C. Roy
 ADDRESS: 115 Professional Pl., P.O. Box 280 ADDRESS: 115 Professional Pl., P.O. Box 280
Bridgport, WV 26330 Bridgport, WV 26330

WVENCORP/ASSERVICES.COM PLOT DATE: 3/23/2017 CAD FILE: OXF 43 WELL PLAT-2017-05-20.DWG

[Handwritten signature]
 5/1/17

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 Office of Oil & Gas

MAY 8 2017

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06/02/2017



west virginia department of environmental protection

Office of Oil and Gas
601 57th 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,

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 57th 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) ORDER NO. 2014 - 17
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)

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 "1" 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

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MAR 29 2017

**WV Department of
Environmental Protection**

06/02/2017

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

WV 516235
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
32	MICHAEL D & SUSAN H ZORN	3	CATHY JEAN WETZEL ETAL
33	MATHENY M & PATRICIA M CARLTON	5	HUFF RANDY E DECEDENT'S BETTY M. RYAN
34	CHARLES WALTER MUNCHMORE	17	EDWARD DALE PRUNTY
35	UNKNOWN	18	EDRA LOUISE GRIMM
36	CHARLES WALTER MUNCHMORE	19	RANDALL L GRIMM
		26	UNITED STATES OF AMERICA
		27	EDWARD & GINA BASSETT
		28	EDWARD & GINA BASSETT
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		30	MARIAN G ZORN

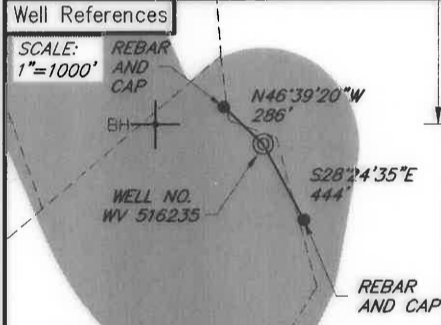
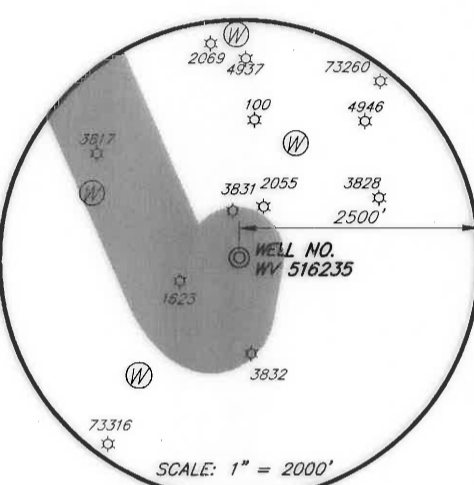
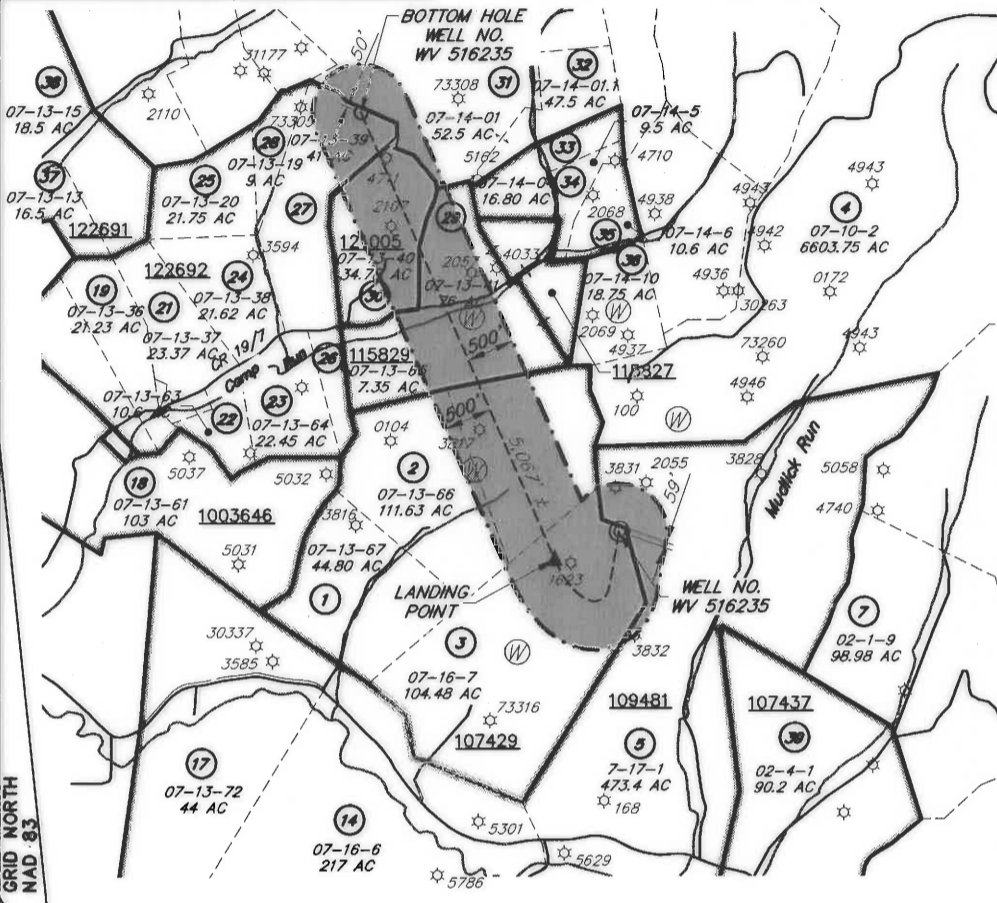
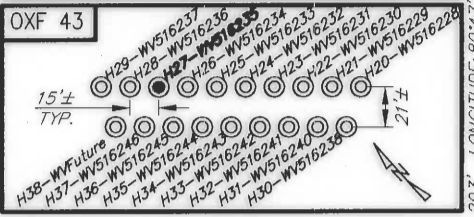
WV 516235 Well Point Coordinates

Top Hole Coordinates		
NAD 27 S.P.C. (Ft.)	N: 241,983.168	E: 1,633,343.648
NAD 27 GEO	LAT: 39.157141	LONG: 80.793014
NAD 83 UTM 17N (M)	N 4,334,245.0	E: 517,898.6
NAD 83 S.P.C. (Ft.)	N 242,018.5	E: 1,601,902.8
Landing Point Coordinates		
NAD 27 S.P.C. (Ft.)	N: 241,693.605	E: 1,632,674.487
NAD 27 GEO	LAT: 39.156320	LONG: 80.795359
NAD 83 UTM 17N (M)	N 4,334,153.3	E: 517,696.2
NAD 83 S.P.C. (Ft.)	N 241,728.9	E: 1,601,233.7
Bottom Hole Coordinates		
NAD 27 S.P.C. (Ft.)	N: 246,342.198	E: 1,630,658.809
NAD 27 GEO	LAT: 39.169002	LONG: 80.802704
NAD 83 UTM 17N (M)	N 4,335,559.2	E: 517,058.5
NAD 83 S.P.C. (Ft.)	N 246,377.4	E: 1,599,217.9

- 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
115829	60	Carlton Matheny, et al
121005	36.5	Marian G. Zorn
122692	200	Jonathan D. Casto, et al

Coordinate Notes
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.



(+) 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 of 20 17
 OPERATORS WELL NO. WV 516235
 API WELL NO. MOB
47 017 06747
 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
 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
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 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

WWW.ENCOMPASSSERVICES.COM PLOT DATE: 3/23/2017 CAD FILE: OXF 43_WELL PLAT-2017-03-20.DWG



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.

RECEIVED
Office of Oil and Gas
MAR 29 2017
WV Department of
Environmental Protection



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

<u>306686</u>	<u>Doddridge</u>	<u>Southwest /Cove</u>	<u>Oxford</u>
---------------	------------------	------------------------	---------------

Operator ID County District Quadrangle

2) Operator's Well Number: 516235 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):
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9) Formation at Total Vertical Depth: Marcellus

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11) Proposed Horizontal Leg Length: 5066'

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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: _____

RECEIVED
Office of Oil and Gas

MAR 29 2017



18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
Conductor	20	New	A-500	78.6	40	40	60 ft^3 / CTS
Fresh Water	13 3/8	New	J-55	54.5	532	532	487 ft^3 / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2426	2426	960 ft^3 / CTS
Production	5 1/2	New	P-110	20	12370	12370	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							

<u>TYPE</u>	<u>Size (in)</u>	<u>Wellbore Diameter (in)</u>	<u>Wall Thickness (in)</u>	<u>Burst Pressure (psi)</u>	<u>Anticipated Max. Internal Pressure (psi)</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
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:				

VOID

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 4956'. 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 % Calcuim 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.

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*Note: Attach additional sheets as needed.

MAR 29 2017

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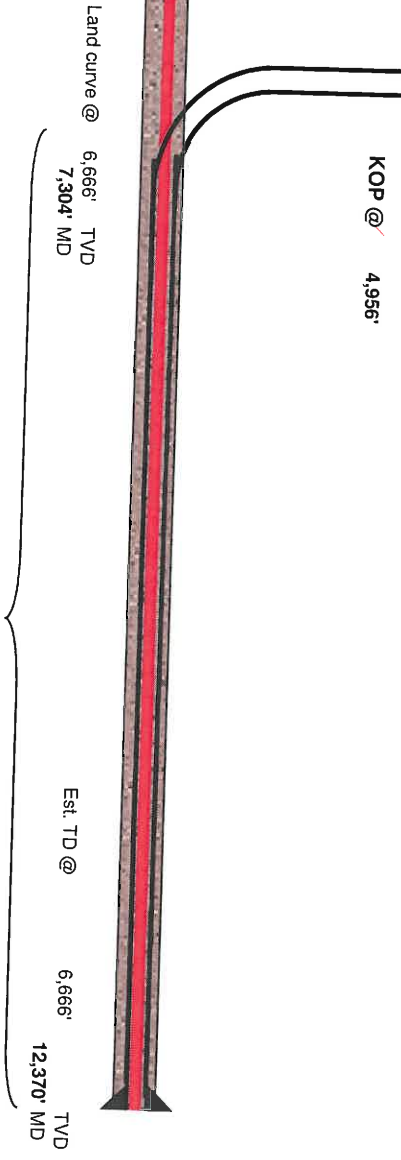
Well 516235(OXF43H27)
 EOT Production Oxford Quad
 Doddridge County, WV

Azimuth 337
 Vertical Section 5120

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 Injun	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	
Baltimore 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	12370	
Onondaga	6687	

Casing and Cementing		Deepest Fresh Water: 382'		
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'	532'	2,426'	12,370'
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	Displacement	Displacement	Displacement	Displacement
Est. Volume (cu ft)	60	487	960	2,612
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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WV Department of Environmental Protection
 06/02/2017

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