



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 516238
47-017-06746-00-00

Lengthening the lateral leg

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: 516238
Farm Name: WETZEL, CATHY
U.S. WELL NUMBER: 47-017-06746-00-00
Horizontal 6A / Horizontal 6A Well - 1
Date Issued: 8/10/2017

Promoting a healthy environment.

08/11/2017



App Issued
8/7/15

July 5, 2017

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JUL 6 2017

WV Department of
Environmental Protection

Laura Adkins
West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, WV 25304

Re: Inspector sign off 47-017-06746

Dear Ms. Adkins,

Attached is a modification of the above API number and the inspector's signature. The modification is to lengthen the lateral leg.

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.

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 / Cove Oxford
Operator ID County District Quadrangle

2) Operator's Well Number: 516238 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

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6) Existing Pad: Yes or No No

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

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8) Proposed Total Vertical Depth: 6666'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19289

11) Proposed Horizontal Leg Length: 9615

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

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

14) Approximate Saltwater Depths: None found

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: _____

DAF
6/26/17

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	26	New	A-500	85.6	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	19289	19289	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	26	30	.375	1378	18	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	Class H	1.07/1.86
Tubing	2 3/8	NA	.19	7700			
Liners							

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PACKERS

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Kind:				
Sizes:				
Depths Set:				

DAP
6/26/17

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 4816'. 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 350,000 barrels of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 400,000 pounds of sand per stage.

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21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 87.28

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22) Area to be disturbed for well pad only, less access road (acres): 32.92

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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 (Type 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 (Type 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.

EDP
6/26/17

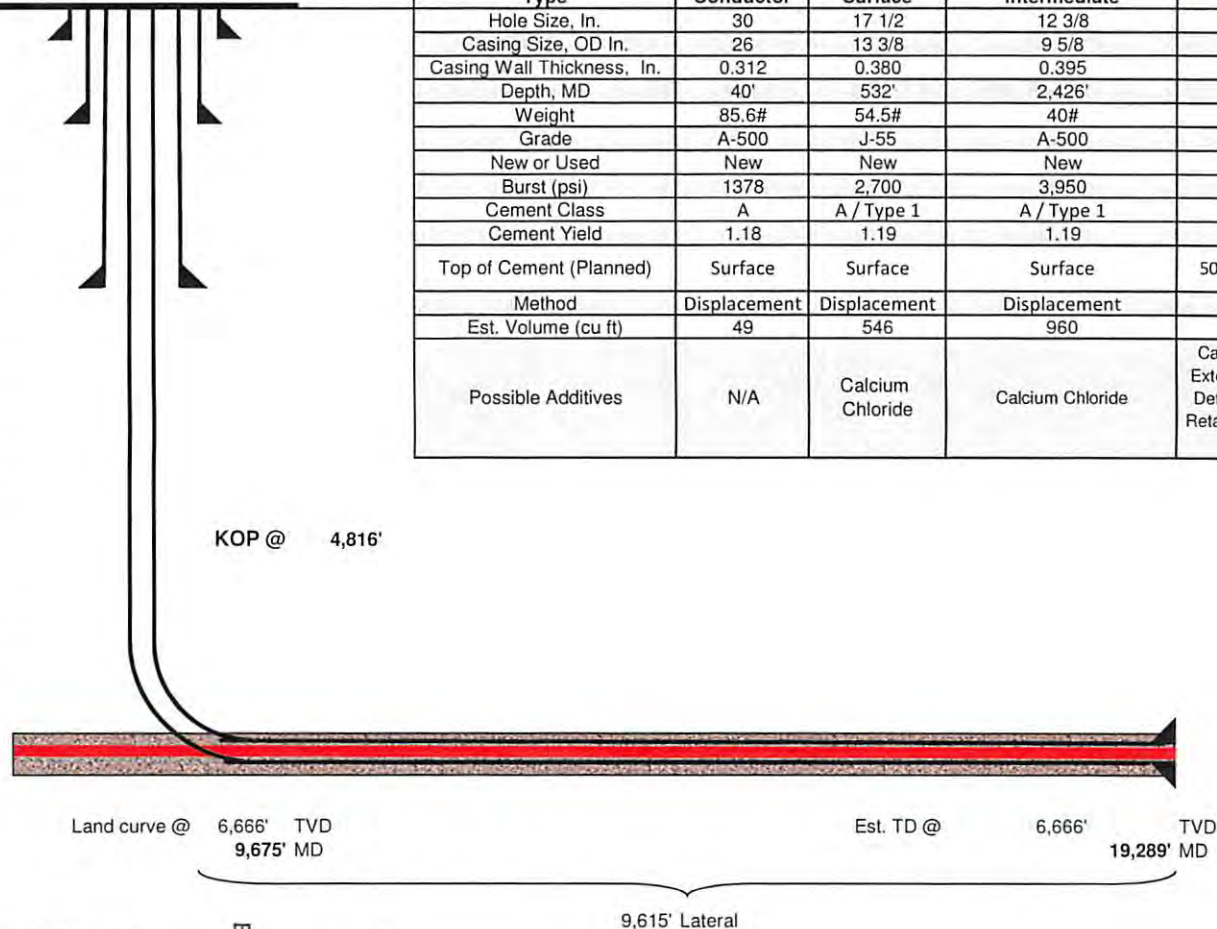
Well 516238(OXF43H30)
EQT Production
Oxford Quad
Doddridge County, WV

Azimuth 348
 Vertical Section 11026

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	
Balltown A	3857 - 4215	
Riley	4455 - 4831	
Benson	4831 - 4925	
Alexander	5133 - 5226	
Sonyea	6309 - 6459	
Middlesex	6459 - 6449	
Genesee	6449 - 6558	
Geneseo	6558 - 6600	
Tully	6600 - 6613	
Hamilton	6613 - 6631	
Marcellus	6631 - 6687	
Production Casing	19289 MD	
Onondaga	6687	

Casing and Cementing			Deepest Fresh Water: 382'	
Type	Conductor	Surface	Intermediate	Production
Hole Size, In.	30	17 1/2	12 3/8	8 1/2
Casing Size, OD In.	26	13 3/8	9 5/8	5 1/2
Casing Wall Thickness, In.	0.312	0.380	0.395	0.361
Depth, MD	40'	532'	2,426'	19,289'
Weight	85.6#	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		1.123 / 2.098
Top of Cement (Planned)	Surface	Surface	Surface	500' above top Producing Zone
Method	Displacement	Displacement	Displacement	Displacement
Est. Volume (cu ft)	49	546	960	4,356
Possible Additives	N/A	Calcium Chloride	Calcium Chloride	Calcium Carbonate, Fluid Loss, Extender, Dispersent, 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 4816'.
 Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

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 Environmental Protection

472017-06740

47-017-06746

WW-6A1
(5/13)

Operator's Well No. 516238

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
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see attached

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**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: EQT Production Company
 By: Victoria J Roark
 Its: Permitting Supervisor

47-017-06746

WW-6A1 attachment

Operator's Well No.

516238

Lease No.	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
✓ 107429	Franklin Maxwell Heirs L.P. (current royalty owner)		**	
	W. Brent Maxwell, et al (original lessor)	Fisher Oil Co.		LB23/337
	Fisher Oil Co.	The Philadelphia Oil Co.		LB24/64
	The Philadelphia Oil Co.	The Philadelphia Co. of West Virginia		DB87/90
	The Philadelphia Co. of West Virginia	Equitable Gas Co.		LB95/88
	Equitable Gas Co.	Equitrans, Inc.		LB154/475
	Equitrans, Inc.	Equitable Production-Eastern States, Inc.		LB 192/19
	Equitable Production-Eastern States, Inc.	Equitable Production Company		CB281/346
	Equitable Production Company	EQT Production Co.		CB281/346
✓ 109481	Adele McDougal et al (current royalty owner)		**	
	Jackson Leeson, et al (original lessor)	The Philadelphia Co. of West Virginia		LB21/76
	The Philadelphia Co. of West Virginia	Pittsburgh & West Virginia Gas Co.		DB87/90
	Pittsburgh & West Virginia Gas Co.	Equitable Gas Company		DB121/303
	Equitable Gas Company	Equitrans, Inc.		LB154/475
	Equitrans, Inc.	Equitable Production-Eastern States, Inc.		LB192/19
	Equitable Production-Eastern States, Inc.	Equitable Production Company		CB281/346
	Equitable Production Company	EQT Production Company		CB281/346
✓ 1003646	ET Blue Grass LLC, et al (current royalty owner)		**	
	Cyril Scott, et ux, et al (original lessor)	Hugh Spencer		LB91/637
	Hugh Spencer	J & J Enterprises		LB111/390
	J & J Enterprises	Eastern American Energy Corp.		LB211/137
	Eastern American Energy Corp.	Energy Corporation of America		LB240/498
	Energy Corporation of America	Antero Resources Corp.		LB272/339
	Antero Resources Corp.	EQT Production Co.		DB330/617
✓ 122692	Jonathan D. Casto, et al (current royalty owner)		**	
	R. J. Gaston, et al (original lessor)	Carter Oil Co.		LB36/362
	Carter Oil Co.	Hope Natural Gas Co.		LB42/410
	Hope Natural Gas Co.	Pittsburgh & WV Gas Co.		LB53/82
	Pittsburgh & WV Gas Co.	Equitable Gas Co.		DB121/303
	Equitable Gas Co.	Equitrans, Inc.		LB154/475
	Equitrans, Inc.	Equitable Production-Eastern States, Inc.		LB192/19
	Equitable Production-Eastern States, Inc.	Equitable Production Company		CB281/346
	Equitable Production Company	EQT Production Co.		CB281/346
✓ 122691	Samuel J. Hileman, et al (current royalty owner)		**	
	John M. Gaston, et ux (original lessor)	J. C. Trainer		LB31/311
	J. C. Trainer	Carter Oil Co.		LB37/389
	Carter Oil Co.	Hope Natural Gas Co.		LB42/411
	Hope Natural Gas Co.	Equitable Gas Co.		LB157/389
	Equitable Gas Co.	Equitrans, Inc.		DB154/475
	Equitrans, Inc.	Equitable Production-Eastern States, Inc.		LB192/19
	Equitable Production-Eastern States, Inc.	Equitable Production Company		CB281/346
	Equitable Production Company	EQT Production Co.		CB281/346
✓ 122689	Melinda Chambers, et al (current royalty owner)		**	
	M.L. Haught, et ux (original lessor)	Hope Natural Gas Company		35/10
	Hope Natural Gas Company	Equitable Gas Company		157/349
	Equitable Gas Company	Equitrans, Inc.		DB154/475
	Equitrans, Inc.	Equitable Production-Eastern States, Inc.		LB192/19
	Equitable Production-Eastern States, Inc.	Equitable Production Company		CB281/346
	Equitable Production Company	EQT Production Co.		CB281/346

** Per West Virginia Code Section 22-6-8.

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08/11/2017

516238
OXF43
EQT Production Company

NO.	ADJACENT OWNER	NO.	SURFACE OWNER
5	RANDY E HUFF DECEDENT'S TRUST B, ET AL	1	CHARLES R GREATHOUSE
		2	EVELYN G GREATHOUSE
20	ERNEST JONES, ET AL	3	CATHY JEAN WETZEL, ET AL
21	RANDALL L & KELLY GRIMM	17	DARLENE K PRUNTY
22	RANDALL L & KELLY GRIMM	18	EDRA LOUISE GRIMM
41	KATHRYN GOODWIN, ET AL	19	RANDALL L GRIMM
42	JERRI KATHRYN FOWLER	37	CAROLYN S. GASTON, ET AL
43	JERRI KATHRYN FOWLER	38	SAMUEL D GASTON
		39	CAROLYN S. GASTON, ET AL
		40	JOAN H CASSIDY TRUST

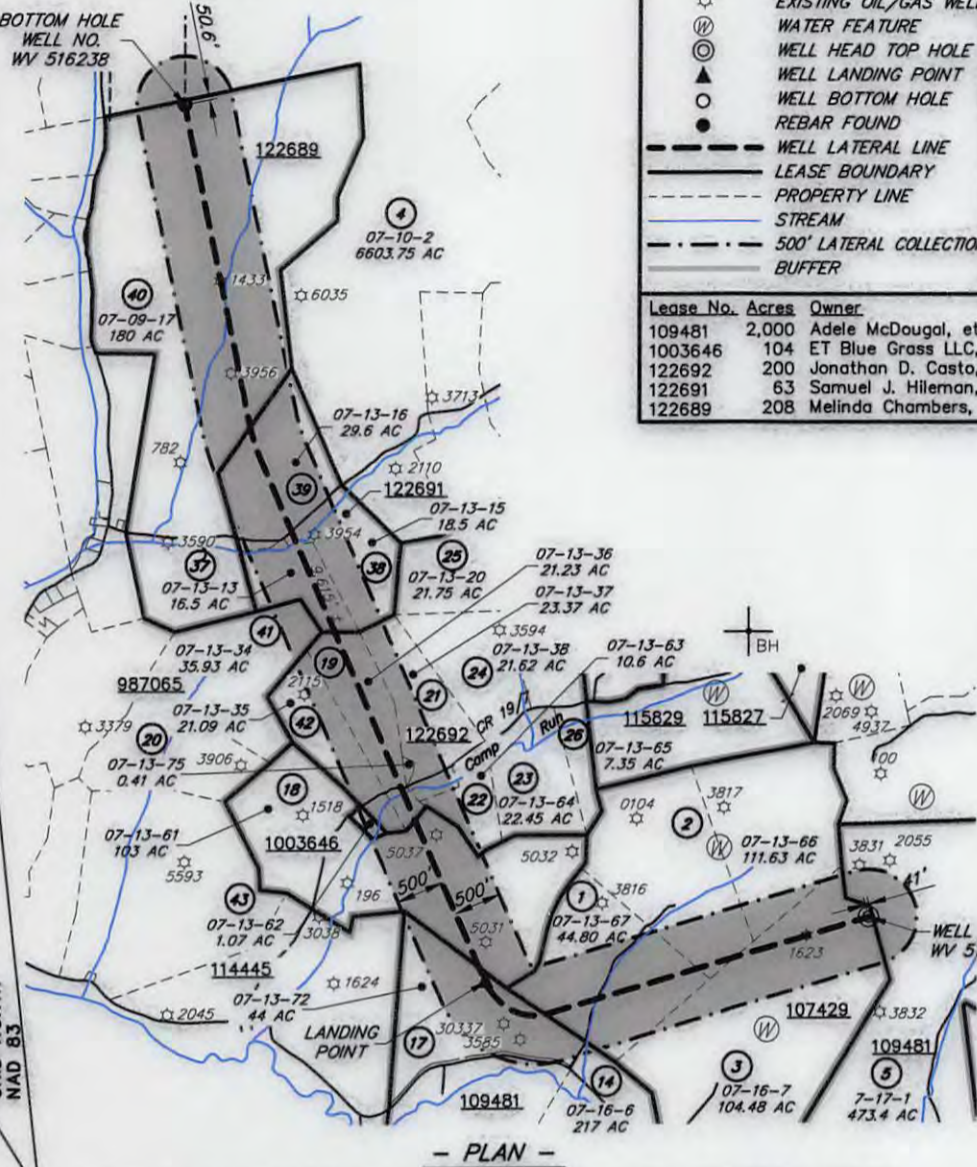
WV 516238 Well Point Coordinates

Top Hole Coordinates		
NAD 27 S.P.C. (Ft.)	N: 241,902.39	E: 1,633,402.15
NAD 27 GEO	LAT: 39.156922	LONG: 80.792804
NAD 83 UTM 17N (M)	N 4,334,220.6	E: 517,916.8
NAD 83 S.P.C. (Ft.)	N 241,937.7	E: 1,601,961.3

Landing Point Coordinates		
NAD 27 S.P.C. (Ft.)	N: 241,243.61	E: 1,629,381.25
NAD 27 GEO	LAT: 39.154954	LONG: 80.806947
NAD 83 UTM 17N (M)	N 4,333,999.5	E: 516,695.2
NAD 83 S.P.C. (Ft.)	N 241,278.8	E: 1,597,940.4

Bottom Hole Coordinates		
NAD 27 S.P.C. (Ft.)	N: 250,282.79	E: 1,626,237.31
NAD 27 GEO	LAT: 39.179643	LONG: 80.818500
NAD 83 UTM 17N (M)	N 4,336,737.2	E: 515,691.5
NAD 83 S.P.C. (Ft.)	N 250,317.9	E: 1,594,796.4

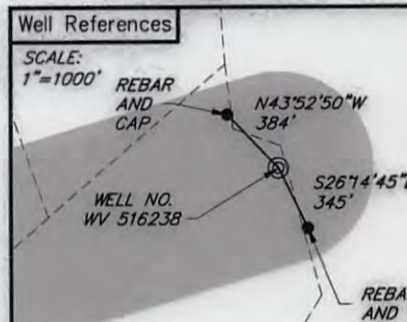
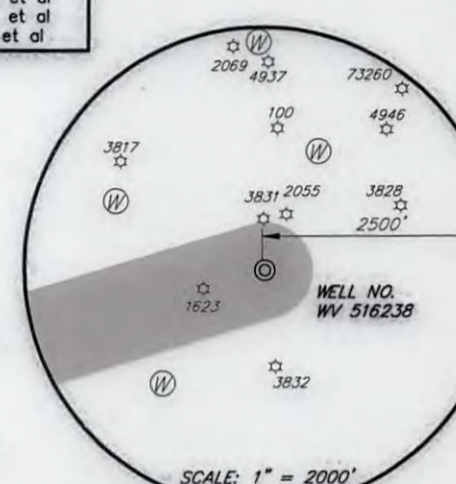
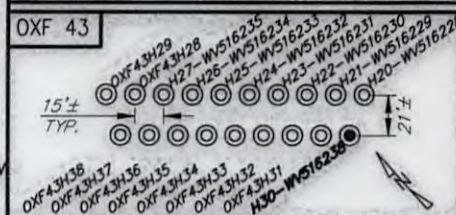
Coordinate Notes
West Virginia Coordinate System of 1927 (North Zone) Based upon Differential GPS Measurements. Plat orientation, Corner and well ties are based upon the grid north meridian. Well location references are based upon the grid north meridian. UTM Coordinates are NAD83. Zone 17 Meters.



LEGEND

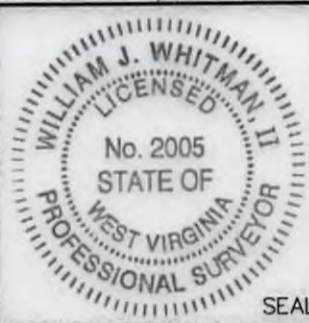
- ☆ EXISTING OIL/GAS WELL
- ⊙ WATER FEATURE
- ⊙ WELL HEAD TOP HOLE
- ⊙ WELL LANDING POINT
- WELL BOTTOM HOLE
- REBAR FOUND
- WELL LATERAL LINE
- LEASE BOUNDARY
- PROPERTY LINE
- STREAM
- 500' LATERAL COLLECTION BUFFER

Lease No.	Acres	Owner
109481	2,000	Adele McDougal, et al
1003646	104	ET Blue Grass LLC, et al
122692	200	Jonathan D. Casto, et al
122691	63	Samuel J. Hileman, et al
122689	208	Melinda Chambers, et al



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.

[Handwritten 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: JUNE 8, 2017
 OPERATORS WELL NO.: WV 516238
 API WELL NO.: 47 17 06746
 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 08/11/2017
 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. Roy
 ADDRESS: 115 Professional Pl. P.O. Box 280 ADDRESS: 115 Professional Pl. P.O. Box 280
 Bridgeport, WV 26330 Bridgeport, WV 26330