



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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Thursday, March 12, 2020
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for FENDER 3H
47-095-02672-00-00

Extended Lateral Length

ANTERO RESOURCES CORPORATION

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

A handwritten signature in blue ink, appearing to read 'James A. Martin', is written over the typed name and title.

Operator's Well Number: FENDER 3H
Farm Name: MIDCAHEL J. & MELINDA R. HOGUE
U.S. WELL NUMBER: 47-095-02672-00-00
Horizontal 6A New Drill
Date Modification Issued: 3/12/2020

Promoting a healthy environment.

WW-6B
(04/15)

API NO. 47-095 - 02672
 OPERATOR WELL NO. Fender Unit 3H
 Well Pad Name: Hogue Pad

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

1) Well Operator: Antero Resources Corporation 494507062 095 - Tyler Ellsworth Middlebourne 7.5'
 Operator ID County District Quadrangle

2) Operator's Well Number: Fender Unit 3H Well Pad Name: Hogue Pad

3) Farm Name/Surface Owner: Michael J. & Melinda R. Hogue Public Road Access: Klondike Acres Road

4) Elevation, current ground: 1033' Elevation, proposed post-construction: ~1014.5

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

JEB
2/27/2020

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 6900' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#

8) Proposed Total Vertical Depth: 6900' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19500' MD

11) Proposed Horizontal Leg Length: 9988'

12) Approximate Fresh Water Strata Depths: 456'

13) Method to Determine Fresh Water Depths: 47-095-00704

14) Approximate Saltwater Depths: 1581'

15) Approximate Coal Seam Depths: 740'

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

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: _____

WW-6B
(04/15)

API NO. 47- 095 - 02672
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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	16"	New	H-40	94#	80	80	CTS, 63 Cu. Ft.
Fresh Water	10 3/4"	New	J-55	40.5#	506 *see # 19	506 *see # 19	CTS, 368 Cu. Ft.
Coal	7 5/8"	New	K-55	26.4#	2500	2500	CTS, 698 Cu. Ft.
Intermediate							
Production	5"	New	P-110	18#	19500	19500	4954 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

JCB
2/27/2020

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	16"	20"	0.438"	2630	50	Class A	~1.2
Fresh Water	10 3/4"	13 1/2"	0.35"	2730	1000	Class A	~1.2
Coal	7 5/8"	9 7/8"	0.328"	4140	1500	Class A	~1.2
Intermediate							
Production	5"	6 3/4"	0.362"	15840	2500	Class H	~1.26
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

WW-6B
(10/14)

API NO. 47- 095 - 02672

OPERATOR WELL NO. Fender Unit 3H

Well Pad Name: Hogue Pad

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

Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.

*Antero will be air drilling the fresh water string which makes it difficult to determine when fresh water is encountered. Therefore, we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The fluid will be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."

Anticipated Max Pressure - 9300 lbs

Anticipated Max Rate - 80 bpm

QCB
2/27/2020

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 28.10 acres

22) Area to be disturbed for well pad only, less access road (acres): 12.79 acres

23) Describe centralizer placement for each casing string:

Conductor: no centralizers

Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole to surface.

Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.

Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.

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

Conductor: no additives, Class A cement.

Surface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake

Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat

Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51

Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20

25) Proposed borehole conditioning procedures:

Conductor: blowhole clean with air, run casing, 10 bbls fresh water.

Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.

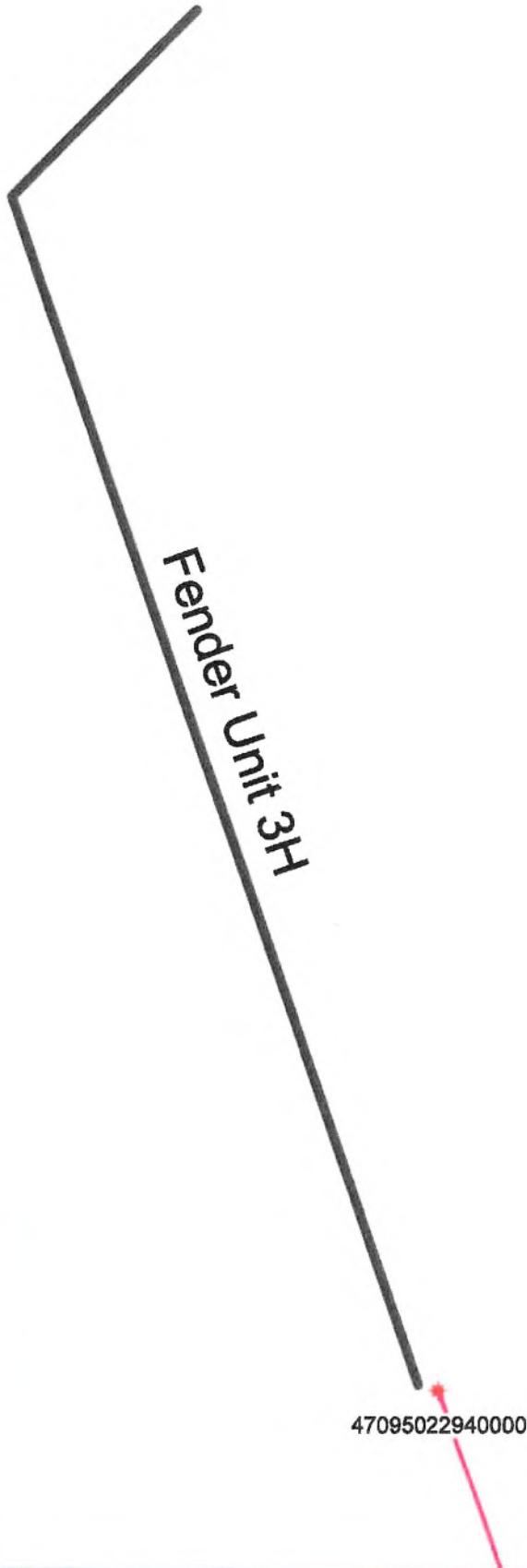
Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.

Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

*Note: Attach additional sheets as needed.

FENDER UNIT 3H (HOGUE PAD)- AREA OF REVIEW 35-8-5.11

PERMIT MODIFICATION API # 47-095-02672



Antero Resources Corporation

Fender Unit 3H - AOR



WELL SYMBOLS
Gas Well

November 21, 2019

RECEIVED
Office of Oil and Gas

FEB 05 2020

WY Dept. of
Environmental Protection

908
2/27/2020

Antero Resources
Well No. Fender Unit 3H
BHL MOD
Antero Resources Corporation



6,692' to Top Hole

4,903' to Bottom Hole

TOP HOLE LATITUDE 39 - 30 - 00
BTM HOLE LATITUDE 39 - 27 - 30

LONGITUDE 80 - 52 - 30

10,277' to Top Hole

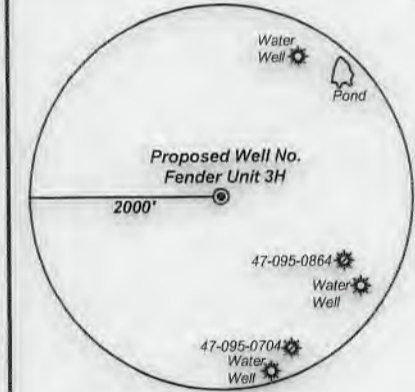
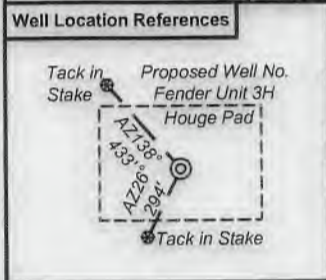
Notes:
 West Virginia Coordinate System of 1927, North Zone based upon Differential GPS Measurements.
 Well No. Fender Unit 3H Top Hole coordinates are
 N: 356,912.84' Latitude: 39°28'17.41"
 E: 1,605,316.28' Longitude: 80°53'53.32"
 Bottom Hole coordinates are
 N: 345,971.73' Latitude: 39°26'29.52"
 E: 1,606,873.10' Longitude: 80°53'31.31"
UTM Zone 17, NAD 1983
 Top Hole Coordinates Bottom Hole Coordinates
 N: 4,369,115.596m N: 4,365,790.275m
 E: 508,775.710m E: 509,305.645m
 Plat orientation and corner and well references are based upon the grid north meridian.
 Well location references are based upon the magnetic meridian.

Notes:
 Well No. Fender Unit 3H
 UTM Zone 17, NAD 1927
 Top Hole Coordinates
 N: 14,333,625.99'
 E: 1,669,160.87'
 Point of Entry Coordinates
 N: 14,332,190.81'
 E: 1,667,751.25'
 Bottom Hole Coordinates
 N: 14,322,716.14'
 E: 1,670,899.50'

	Bearing	Dist.
L1	S 47°21' E	1,401.3'
L2	S 26°21' E	1,539.5'
L3	N 74°37' W	915.1'
L4	N 08°29' W	1,436.3'
L5	S 45°27' W	2,012.3'

Wellhead Layout

⊙	Kramer Unit 2H (47-095-02677)
⊙	Kramer Unit 1H (47-095-02673)
⊙	Lancaster Unit 3H (47-095-02676)
⊙	Lancaster Unit 2H (47-095-02675)
⊙	Lancaster Unit 1H (47-095-02674)
⊙	Proposed Well Fender Unit 3H (47-095-02672)
⊙	Fender Unit 2H (47-095-02671)
⊙	Fender Unit 1H (47-095-02670)



Note: 3 water wells or springs were found within 2000' of proposed well. No occupied dwellings or buildings 2,500 square feet or larger used to house or shelter dairy cattle or poultry husbandry are located within 625' of the center of the well pad.

FILE NO: 17-54-E-19
 DRAWING NO: Fender Unit 3H Well Plat
 SCALE: 1" = 1500'
 MINIMUM DEGREE OF ACCURACY: Submeter
 PROVEN SOURCE OF ELEVATION: WVDOT, Harrisville, WV

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

DATE: February 11 2020
 OPERATOR'S WELL NO. Fender 3H
 API WELL NO
 47 - 095 - 02672
 STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
 LOCATION: ELEVATION: Existing 1,033' Proposed 1,014.5'
 DISTRICT: Ellsworth WATERSHED: Outlet Middle Island Creek QUADRANGLE: Middlebourne
 SURFACE OWNER: Michael J. & Melinda R. Hogue Ridgetop Capital, LP; Donald H. Lancaster, et ux; Jay Bee Royalty, LLC; Janet L. Dieng; BRC Appalachian Minerals I, LLC; James F. Doan, et ux; Anthony Matthew Goffi Irrevocable Trust; Clarence W. Mutschelknaus, et al; Denny L. Palmer, et ux; Eric D. Westbrook, et ux; Douglas J. Wince; COUNTY: Tyler 100; 310.393; 5.4
 ROYALTY OWNER: Michael J. & Melinda R. Hogue; David L. Lancaster, et ux; Ryan L. Walton, et ux(3); LEASE NO: ACREAGE: 192 9.36; 302.89875; 36.5; 1.03; 9.40; 191.5; 18.89; 35.9
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) BHL MOD 6,900' TVD
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 19,500' MD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System
 ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road
 Denver, CO 80202 Charleston, WV 25313

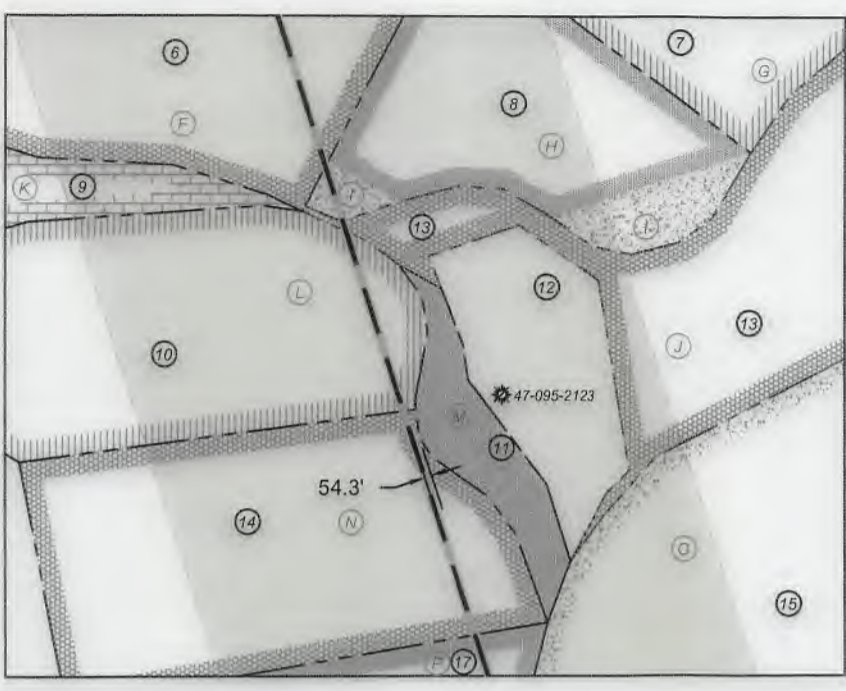
Legend

- ⊙ Proposed gas well
- ⊙ Monument, as noted
- ⊙ Existing Well, as noted
- ⊙ Existing Well, as noted
- Creek or Drain
- Existing Road
- Surface boundary (approx.)
- Interior surface tracts (approx.)

SEAL

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 the rules issued and prescribed by the Department of Environmental Protection.

Bradley D. Miller
 Bradley D. Miller, P.S. 2167



Leases	
A	Michael J. & Melinda R. Hogue
B	James F. Doan, et ux
C	David L. Lancaster, et ux
D	David L. Lancaster, et ux
E	Ryan L. Walton, et ux
F	Ryan L. Walton, et ux
G	James F. Doan, et ux
H	James F. Doan, et ux
I	Ryan L. Walton, et ux
J	Ridgetop Capital, LP
K	James Fallucco
L	Denny L. Palmer, et ux
M	Jay-Bee Royalty, LLC
N	Eric D. Westbrook, et ux
O	Anthony Mathew Goffi Irrevocable Trust
P	Clarence W. Mutschelknaus, et al
Q	Jay-Bee Royalty
R	Jay Bee Royalty
S	Merle G. Reed
T	Douglas J. Wince
U	Donald H. Lancaster, et ux
V	Janet L. Dieng
W	BRC Appalachian Minerals I, LLC
X	J&N Enterprises, LLC
Y	Ray E. Adkins, et ux

ID	TM/Par	Owner	Bk/Pg	Acres
1	20-108	Michael K. & Melinda R. Hogue	343/404	192.00
2	20-107	David L. & Kathy A. Lancaster	314/344	18.89
3	20-104	David Lancaster	210/505	57.004
4	26-21	Ryan Lee & Melinda Jo. Walton	342/687	35.9
5	26-46.5	Richard Doty	493/673	13.14
6	26-22	Ryan Lee & Melinda Jo. Walton	342/687	36.5
7	26-46.4	Timothy F. & Jasmine Y. Kanz	415/716	8.1
8	26-46.11	Ryan L. & Melinda J. Walton	332/342	6.43
9	26-19.5	James Fallucco	361/260	8.603
10	26-19.11	Denny L. & Sheila Palmer	352/100	9.40
11	26-19.9	Jay-Bee Oil & Gas Inc.	420/93	1.496
12	26-46.24	Jay-Bee Oil & Gas Inc.	420/93	3.059
13	26-46	Jay-Bee Production Co.	420/97	286.39
14	26-19.4	Eric D. & Wendy R. Westbrook	352/420	9.36
15	26-45	Anthony M.Goffi Irrevocable Trust	353/683	52.90
16	26-44	Anthony M.Goffi Irrevocable Trust	353/683	39
17	26-26.1	William Alan Marich	337/629	57.223
18	26-49	Anthony M.Goffi Irrevocable Trust	353/683	130.75
19	26-43	C.W. Red Est., et al	234/156	36.08
20	26-42	Charles Junior Reed	241/288	13
21	26-41	C.W. Reed Est.	30/487	1
22	26-40	C.W. Reed Est.	234/156	2.75
23	26-39	Rosa B. Reed Est.	234/156	8.17
24	26-37	Scott College	309/299	60.23
25	26-38	Anthony M.Goffi Irrevocable Trust	355/688	100
26	29-7	WV DNR	227/141	7.5
27	29-8	WV DNR	227/141	133
28	29-9	WV DNR	227/141	59
29	3-2	WV DNR	227/141	30.06
30	3-1	WV DNR	227/141	309.55
31	3-3	Edward R. & Susan P. Adkins	362/245	100

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 SURFACE OWNER: Michael J. & Melinda R. Hogue Janet L. Dieng; BRC Appalachian Minerals I, LLC; James F. Doan, et ux; 100; 7.50; 151.625;
 ROYALTY OWNER: Michael J. & Melinda R. Hogue; David L. Lancaster, et ux; Ryan L. Walton, et ux(3); Denny L. Palmer, et ux; Eric D. Westbrook, et ux; Douglas J. Wince; ACREAGE: 192 164.91; 47.5; 60.23;
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION 9.36; 302.89875;
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) BHL MOD 36.5; 1.03; 9.40;
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 19,500' MD 191.5; 18.89; 35.9

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System
 ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road
 Denver, CO 80202 Charleston, WV 25313

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:

Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
Anthony Matthew Goffi Irrevocable Trust Lease			
Anthony Matthew Goffi Irrevocable Trust	TNG LLC	1/8	0396/0632
TNG LLC	JB Exploration I LLC	Assignment	0396/0636
JB Exploration I LLC	SWN Production Company	Assignment	0531/0409
SWN Production Company	Antero Exchange Properties LLC	Assignment	0544/0242
Antero Exchange Properties LLC	Antero Resources Corporation	Name Change	Exhibit 1
Jay Bee Royalty Lease			
JB Royalty	Antero Resources Corporation	1/8+	0575/0217
Douglas J. Wince Lease			
Douglas J. Wince	Antero Resources Corporation	1/8+	0476/0335
Donald H. Lancaster et ux Lease			
Donald H. Lancaster et ux	Antero Resources Appalachian Corporation	1/8+	0402/0671
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
Janet L. Dieng Lease			
Janet L. Dieng	Antero Resources Corporation	1/8+	0598/0390

WW-6A1
(5/13)

Operator's Well No. Fender Unit 3H

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
BRC Appalachian Minerals Inc. Lease				
	BRC Appalachian Minerals Inc.	BRC Working Interest Company LLC	1/8	0369/0648
	BRC Working Interest Company LLC	Chesapeake Appalachia LLC	Assignment	0369/0784
	Chesapeake Appalachia LLC	SWN Production Company	Assignment	0465/0463
	SWN Production Company	Antero Exchange Properties LLC	Assignment	0544/0242
	Antero Exchange Properties LLC	Antero Resources Corporation	Name Change	Exhibit 1

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

**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: Antero Resources Corporation
 By: Tim Rady
 Its: VP of Land