



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

Wednesday, January 8, 2020
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for SHIMANO UNIT 2H
47-095-02617-00-00

Extend 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

Operator's Well Number: SHIMANO UNIT 2H
Farm Name: JOHN D. MENDENHALL & JEFFERY A. DAVIS
U.S. WELL NUMBER: 47-095-02617-00-00
Horizontal 6A New Drill
Date Modification Issued: 1/8/2020

Promoting a healthy environment.

WW-6B
(04/15)

API NO. 47-095 - 02617
 OPERATOR WELL NO. Shimano Unit 2H
 Well Pad Name: State Ridge 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 Shirley/ Porter Falls 7.5'
 Operator ID County District Quadrangle

2) Operator's Well Number: Shimano Unit 2H Well Pad Name: State Ridge Pad

3) Farm Name/Surface Owner: John D. Mendenhall & Jeffrey A. Davis Public Road Access: State Ridge Road

4) Elevation, current ground: 1090' Elevation, proposed post-construction: ~1064'

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

Other _____

(b) If Gas Shallow Deep _____

Horizontal _____

JCB
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6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 7000' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#

8) Proposed Total Vertical Depth: 7000' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 18200' MD

11) Proposed Horizontal Leg Length: 8151'

12) Approximate Fresh Water Strata Depths: 44'

13) Method to Determine Fresh Water Depths: Offset well records. Depths have been adjusted according to surface elevations.

14) Approximate Saltwater Depths: 1490'

15) Approximate Coal Seam Depths: 100'

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: _____

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WW-6B
(04/15)

API NO. 47- 095 - 02617
 OPERATOR WELL NO. Shimano Unit 2H
 Well Pad Name: State Ridge Pad

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	H-40	94#	95'	95'	CTS, 91 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	300'	300'	CTS, 417Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500'	2500'	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	23#	18200'	18200'	4597 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

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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"	24"	0.438"	1530	50	Class A	~1.18
Fresh Water	13-3/8"	17-1/2"	0.38"	2730	1000	Class A	~1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	1500	Class A	~1.18
Intermediate							
Production	5-1/2"	8-3/4" & 8-1/2"	0.415"	12,630	2500	Lead-HPOZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

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

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WW-6B
(10/14)

API NO. 47- 095 - 02617

OPERATOR WELL NO. Shimano Unit 2H

Well Pad Name: Slate Ridge 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.

PCB
11/18/2019

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

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 38.85 acres

22) Area to be disturbed for well pad only, less access road (acres): 7.96 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.

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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

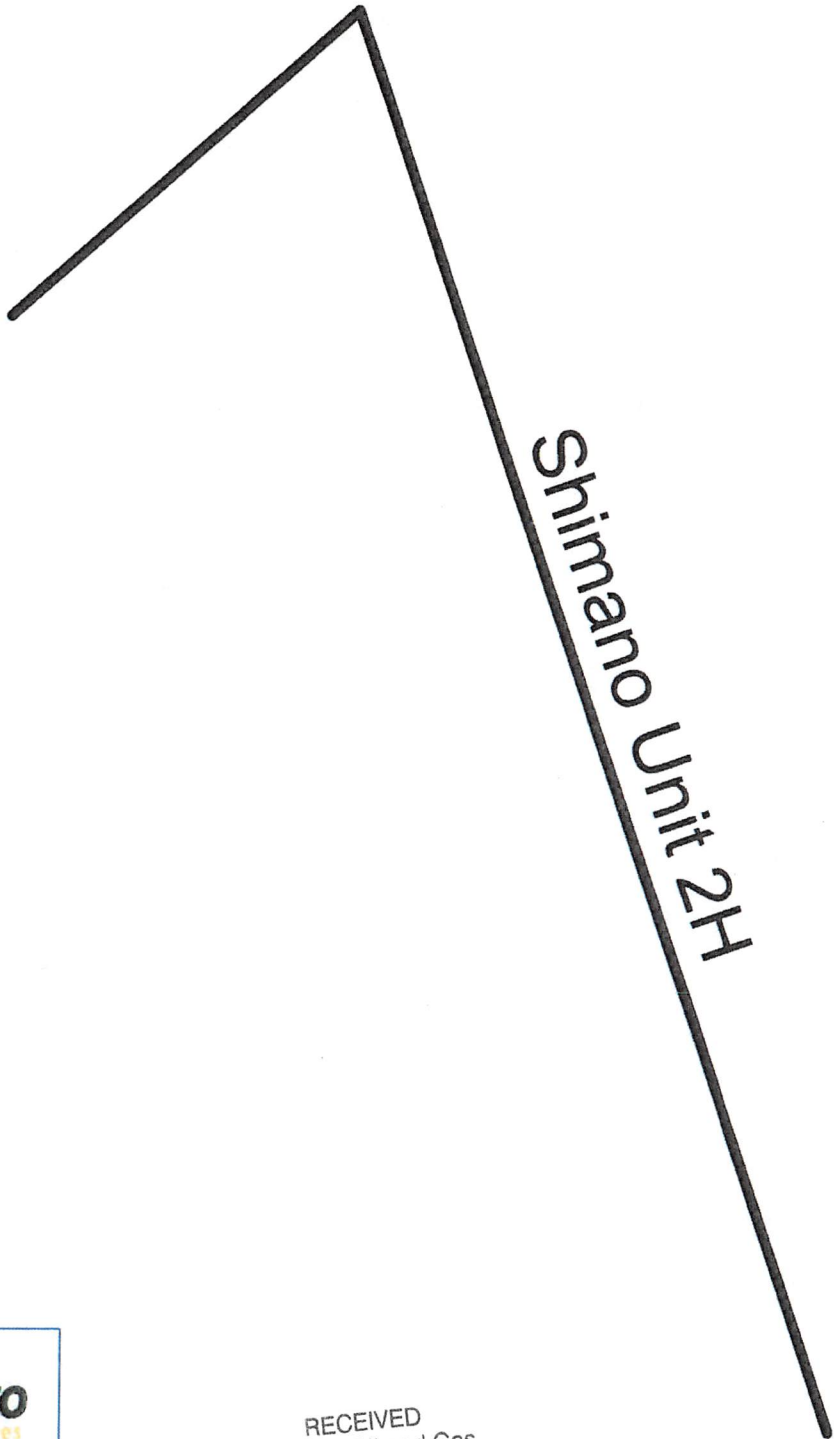
25) Proposed borehole conditioning procedures:

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.

SHIMANO UNIT 2H (STATE RIDGE PAD)- AREA OF REVIEW 35-8-5.11

PERMIT MODIFICATION API # 47-095-02617



Shimano Unit 2H

47095023260000
47095023670000

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11/19/2019

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Antero Resources Corporation

Shimano Unit 2H - AOR



WELL SYMBOLS
Gas Well

December 19, 2018

UWI (API/Inj)	Well Name	Well Number	Operator	Hist Oper	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Productible Formation(s) not perf'd
47095023670000	OWENS UNIT	2H	ANTERO RESOURCES CORPORATION		15,781	6696 - 15680	Marcellus	N/A
47095023260000	OWENS UNIT	3H	ANTERO RESOURCES CORPORATION		16,185	6967 - 16085	Marcellus	N/A

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WW-6A1
(5/13)

Operator's Well No. Shimano Unit 2H

**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
<u>Carl E. Taylor et ux Lease</u>	Carl E. Taylor et ux PetroEdge Energy LLC Statoil USA Onshore Properties Inc EQT Production Company	PetroEdge Energy LLC Statoil USA Onshore Properties Inc EQT Production Company Antero Resources Corporation	1/8 Assignment Assignment Agreement	0392/0435 0406/0147 0577/0128 0653/0844

*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.

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Well Operator: Antero Resources Corporation
By: Diana Hoff
Its: VP of Operations

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Operator's Well Number Shimano Unit 2H

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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<u>Dianne T. Carpenter Lease</u> Dianne T. Carpenter	Antero Resources Corporation	1/8+	0565/0483
<u>Herbert Stephenson Boreman, Jr. Lease</u> Herbert Stephenson Boreman, Jr.	Antero Resources Corporation	1/8+	0554/0637
<u>Michael A. Eddy Lease</u> Michael A. Eddy	Antero Resources Corporation	1/8+	0601/0832
<u>Karen F Quinn Lease</u> Karen F Quinn	Antero Resources Corporation	1/8+	0507/0604
<u>B. Fred Hill Jr. Lease</u> B. Fred Hill Jr.	Antero Resources Corporation	1/8+	0531/0516
<u>Cliff & Virginia Perkins Irrevocable Trust Lease</u> Cliff & Virginia Perkins Irrevocable Trust	Antero Resources Corporation	1/8+	0480/0714

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