



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 29, 2020
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for SISTERVILLE UNIT 1H
47-095-02618-00-00

Modified Lateral for a TMD of 20,000'

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.

A handwritten signature in blue ink, appearing to read 'James A. Martin', is positioned above the printed name and title.

James A. Martin
Chief

Operator's Well Number: SISTERVILLE UNIT 1H
Farm Name: JOHN D. MENDENHALL & JEFFREY A. DAVIS
U.S. WELL NUMBER: 47-095-02618-00-00
Horizontal 6A New Drill
Date Modification Issued: January 29, 2020

Promoting a healthy environment.

WW-6B
(04/15)

API NO. 47-095 - 02618

OPERATOR WELL NO. Sisterville Unit 1H

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 Paden City/ Porter Falls 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Sisterville Unit 1H 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

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: 20000' MD

11) Proposed Horizontal Leg Length: 10608'

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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(04/15)

API NO. 47- 095 - 02618

OPERATOR WELL NO. Sisterville Unit 1H

Well Pad Name: State Ridge Pad

18)

CASING AND TUBING PROGRAM

TYPE	<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	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#	20000'	20000'	5092 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

TYPE	<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"	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-H/POZ & Tall - 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 - 02618
OPERATOR WELL NO. Sisterville Unit 1H
Well Pad Name: State 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.

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.

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.

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*Note: Attach additional sheets as needed.

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SISTERVILLE UNIT 1H (STATE RIDGE PAD)- AREA OF REVIEW 35-8-5.11

PERMIT MODIFICATION API # 47-095-02618

Sisterville Unit 1H

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Antero Resources Corporation

Sisterville Unit 1H - AOR



REMARKS
No Wells of Interest

December 18, 2018

WW-6A1

Operator's Well Number Sisterville Unit 1H

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
<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>Ronald K. Blair and Martin L. Blair Lease</u> Ronald K. Blair and Martin L. Blair	Antero Resources Corporation	1/8+	0559/0664
<u>Patsy J. Oliverio Lease</u> Patsy J. Oliverio	Antero Resources Corporation	1/8+	0494/0488
<u>Rosemary Haught Lease</u> Rosemary Haught	Antero Resources Corporation	1/8+	0459/0179
<u>Michael E. Neff Lease</u> Michael E. Neff	Antero Resources Corporation	1/8+	0450/0613
<u>Rosemary Smith Haught Lease</u> Rosemary Smith Haught	Antero Resources Corporation	1/8+	0585/0529
<u>Paul A. Marks Lease</u> Paul A. Marks	Antero Resources Corporation	1/8+	0557/0267
<u>Patricia Ann Heintzman Lease</u> Patricia Ann Heintzman Statoil USA Onshore Properties EQT Production Company	Statoil USA Onshore EQT Production Company Antero Resources Corporation	1/8 Assignment Assignment	0503/0519 0539/0239 0663/0001
<u>John E. Roberts Lease</u> John E. Roberts Stone Energy Corporation	Stone Energy Corporation Antero Resources Corporation	1/8+ Assignment	0402/0266 0447/0115

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*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.

WW-6A1
(5/13)

Operator's Well No. Sisterville Unit 1H

**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)**

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- (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>Michael S. Mercer Lease</u>	Michael S. Mercer	Antero Resources Corporation	1/8+	0547/0416

*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: Diana Hoff *Diana O. Hoff*
 Its: VP of Operations

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11,804' to Top Hole

2,084' to Bottom Hole

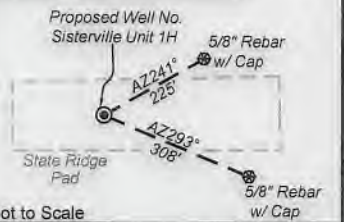
Antero Resources
Well No. Sisterville Unit 1H

Antero Resources Corporation

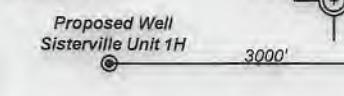


Notes:
Well No. Sisterville Unit 1H
UTM Zone 17, NAD 1927
Top Hole Coordinates
N: 14,347,059.921'
E: 1,675,804.29'
Point of Entry Coordinates
N: 14,348,643.39'
E: 1,677,020.56'
Bottom Hole Coordinates
N: 14,358,675.02'
E: 1,673,581.41'

Well Location References



Note: 0 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.



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	Chris Folger
B	John W. Starkey, et ux
C	Richard A. Mercer

	Bearing	Dist.
L1	S 56°35' W	3,015.7'
L2	N 78°20' W	3,483.2'
L3	N 59°05' E	2,645.6'
L4	N 65°50' E	3,810.6'
L5	N 38°29' E	1,997.3'

Bottom Hole

7.5' Spot

LATITUDE 39 - 32 - 30

ID	TM/Par	Owner	Bk/Pg	Acres
1	15/17	David Mendenhall, et al	288/662	85.71
2	15/23	David Mendenhall, et al	326/13	97.25
3	15/15	David Mendenhall, et al	289/4	50.00
4	15/16	Robert M. Feldmeier	330/109	52.37
5	15/37	John D. Mendenhall & Jeffrey A. Davis	444/531	154.17
6	15/3	John W. Eddy Estate	77/319	40.33
7	15/14	John W. & Leah D. Starkey	345/93	50.75
8	15/5	Earl H. Jr. & Bernadette Warriner	308/141	48.50
9	15/4	Board of Education	86/145	0.334
10	15/2	John W. Eddy Estate	71/13	49.00
11	15/1	Martin L. Blair, Jr. & Ronald K. Blair Sr.	WB18/361	47.00
12	10/62	Haessley Land & Timber, LLC	334/833	268.91
13	10/65	Daniel R. Deetz & Kevin Richardson	321/713	131.94
14	10/35	Michael E. Neff	299/601	105.56
15	10/34	Oliver T. & Maxine M. Ankrom	265/399	11.00
16	10/33	Oliver T. & Maxine M. Ankrom	265/399	17.00
17	10/32	Ralph D. & Sylvia Harter	311/200	15.00
18	10/31	Ralph D. & Sylvia Harter	286/73	38.80
19	10/34.1	Robert P. & Sharon L. Thomas	542/657	2.21
20	10/26	John E. Roberts	WB30/108	4.00
21	10/27	John E. Roberts	WB30/108	4.00
22	10/24.1	Ralph D. & Sylvia Harter	334/277	18.44
23	10/24.2	Michael Van & Debra Kay Smith	400/612	0.15
24	10/25	Michael Van & Debra Kay Smith	400/612	0.29
25	10/24	Michael Van & Debra Kay Smith	400/612	1.25
26	10/23	Betty & Teresa J. Roggs	214/638	0.29
27	10/24.3	Tammy Sue & James R. Underwood Jr	317/651	4.16
28	10/35.3	James H. & Mildred G. Bassett	273/538	0.39
29	10/35.4	Mary Jane Woolfer	319/73	0.75
30	10/35.5	James H. & Mildred G. Bassett	281/543	0.76
31	10/20	James H. & Mildred G. Bassett	311/637	0.72
32	10/19	James H. & Mildred G. Bassett	264/548	29.52
33	10/21	Patricia Ann Heintzman	WB13/384	3.00
34	10/22	Michael V. & Debra K. Smith	335/619	59.42
35	10/28	John E. Roberts	WB30/142	38.99
36	10/1	Patricia Ann Heintzman	150/15	48.50
37	10/2	Patricia Ann Heintzman	WB13/384	73.26
38	10/64	John E. Roberts	WB30/108	100.00
39	6/40	Alan D. Wyke	WB40/195	42.25
40	9/13	Richard A. Mercer	321/197	16.00
41	6/41	Donald E. Forrester	125/421	20.05

TOP HOLE LONGITUDE 80 - 50 - 00
BOTTOM HOLE LONGITUDE 80 - 52 - 30

471' to Bottom Hole

11,949' to Top Hole

Wellhead

Layout



Detail Not to Scale

Legend

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

Notes:

West Virginia Coordinate System of 1927, North Zone based upon Differential GPS Measurements.
Well No. Sisterville Unit 1H Top Hole coordinates are
N: 370,238.57' Latitude: 39°30'30.16"
E: 1,812,185.37' Longitude: 80°52'28.33"
Bottom Hole coordinates are
N: 381,893.13' Latitude: 39°32'25.03"
E: 1,610,158.00' Longitude: 80°52'56.51"
UTM Zone 17, NAD 1983
Top Hole Coordinates Bottom Hole Coordinates
N: 4,373,210.336m N: 4,376,750.639m
E: 510,800.652m E: 510,123.230m
Plat orientation and corner and well references are based upon the grid north meridian.
Well location references are based upon the magnetic meridian.

FILE NO: 07-54-E-19
DRAWING NO: 07-19 Sisterville 1H 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: August 1 2019
OPERATOR'S WELL NO. Sisterville Unit 1H
API WELL NO mod
47 - 095 - 02618
STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
(IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
LOCATION: ELEVATION: Proposed 1,064' Existing 1,090' WATERSHED: Outlet Middle Island Creek QUADRANGLE: Paden City/Porter Falls
DISTRICT: Ellsworth COUNTY: Tyler
SURFACE OWNER: John D. Mendenhall, et ux; Patricia Ann Heintzman; Michael S. Mercer, et ux; & Jeffrey A. Davis ACREAGE: 154.17
ROYALTY OWNER: Dianne T. Carpenter; Herbert Stephenson Boreman Jr.; Michael A. Eddy LEASE NO: ACREAGE: 85.8; 84.0; 48.5
PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) BHL MOD
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 20,000' MD 6,900' TVD

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



December 17, 2019

Antero Resources
1615 Wynkoop Street
Denver, CO 80202
Office 303.357.7310
Fax 303.357.7315

West Virginia Department of Environmental Protection
Office of Oil and Gas
Attn: Ms. Laura Adkins
601 57th Street
Charleston, WV 25304

Ms. Laura Adkins:

Antero Resources Corporation (Antero) would like to submit the following permit modifications for approved wells on the existing State Ridge Pad: Sisterville Unit 1H (API # 47-095-02618) & Sisterville Unit 2H (API # 47-095-02619).

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the updated POE & Measured Depth
- REVISED Form WW-6A1, which shows the new leases we will be drilling into
- REVISED Mylar Plat, which shows the new Lateral Length & Estimated Measured Depth
- AOR & As-Built Design

If you have any questions please feel free to contact me at (303) 357-7223.

Thank you in advance for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "MGriffith", written over a light blue horizontal line.

Megan Griffith
Permitting Agent
Antero Resources Corporation

Enclosures

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