



---

west virginia department of environmental protection

---

Office of Oil and Gas  
601 57<sup>th</sup> Street, S.E.  
Charleston, WV 25304  
(304) 926-0450  
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Thursday, April 18, 2019  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION  
1615 WYNKOOP STREET  
DENVER, CO 80202

Re: Permit Modification Approval for CALLAHAN UNIT 1H  
47-017-06873-00-00

**Change Bottom Hole Location leading to a Horizontal Leg Length change from 9415' to 9444'.**

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: CALLAHAN UNIT 1H  
Farm Name: MARY E. DEETS AND/OR PAUL A. SMITH  
U.S. WELL NUMBER: 47-017-06873-00-00  
Horizontal 6A New Drill  
Date Modification Issued: 04/18/2019

WW-6B  
(04/15)

Permit Modification (API# 47-017-06873)  
 API NO. 47- 017 - 06873  
 OPERATOR WELL NO. Callahan Unit 1H  
 Well Pad Name: Deets 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 017 - Doddri West Uni Smithburg 7.5'  
 Operator ID County District Quadrangle
- 2) Operator's Well Number: Callahan Unit 1H Well Pad Name: Deets Pad
- 3) Farm Name/Surface Owner: Mary E. Deets and/or Paul A. Smith Public Road Access: Old US-50
- 4) Elevation, current ground: ~1422' Elevation, proposed post-construction: 1376'
- 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: 7600' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2950#
- 8) Proposed Total Vertical Depth: 7600' TVD
- 9) Formation at Total Vertical Depth: Marcellus
- 10) Proposed Total Measured Depth: 19300' MD
- 11) Proposed Horizontal Leg Length: 9444'
- 12) Approximate Fresh Water Strata Depths: 196', 221'
- 13) Method to Determine Fresh Water Depths: Offset well records. Depths have been adjusted according to surface elevations.
- 14) Approximate Saltwater Depths: 1381', 1843', 1966'
- 15) Approximate Coal Seam Depths: 583', 755', 891
- 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: \_\_\_\_\_

RECEIVED  
Office of Oil and Gas

MAR 29 2019

WV Department of  
Environmental Protection

DAF  
3/28/19

**Stansberry, Wade A**

---

**From:** Karin Cox <kcox@anteroresources.com>  
**Sent:** Wednesday, April 17, 2019 1:00 PM  
**To:** Stansberry, Wade A  
**Subject:** RE: 47-017-06873 mod Callahan Unit 1H

Wade,

The 19300 MD is correct. The MD is calculated with a 'buffer' and this lateral change wasn't enough to change the MD in this case.

Matthew Garland ([mgarland@anteroresources.com](mailto:mgarland@anteroresources.com) 303-357-6801) said you are more than welcome to call/email him if this isn't enough of an explanation.

Have a great day!

*Karin Cox*



Permitting Agent  
1615 Wynkoop St.  
Denver, CO 80202  
Main: (303) 357-7310  
Direct: (303) 357-6820

---

**From:** Stansberry, Wade A [<mailto:Wade.A.Stansberry@wv.gov>]  
**Sent:** Wednesday, April 17, 2019 10:23 AM  
**To:** Karin Cox  
**Subject:** RE: 47-017-06873 mod Callahan Unit 1H

Thank you. The others on that pad seem to be showing that the TMD has changed with the change to the horizontal/bottom hole.

**From:** Karin Cox <kcox@anteroresources.com>  
**Sent:** Wednesday, April 17, 2019 12:15 PM  
**To:** Stansberry, Wade A <[Wade.A.Stansberry@wv.gov](mailto:Wade.A.Stansberry@wv.gov)>  
**Subject:** RE: 47-017-06873 mod Callahan Unit 1H

Good morning Wade,

Just wanted to let you know that I received this and am going to check with our geotech once he's available so I can get you a better explanation. I should have something for you soon.

Thank you!

04/19/2019

**From:** Stansberry, Wade A [<mailto:Wade.A.Stansberry@wv.gov>]

**Sent:** Wednesday, April 17, 2019 10:04 AM

**To:** Karin Cox

**Subject:** 47-017-06873 mod Callahan Unit 1H

Karin,

Quick question regarding this modification. Should the TMD also change since the lateral is being extended/bottom hole is changing from 9415 ft to 9444 ft?

If it is not changing, please reply with an explanation and I will put it with the file.

Thank you,

**Wade A. Stansberry**

**Environmental Resources Specialist 3**

**West Virginia Department of Environmental Protection**

**Office of Oil & Gas**

**601 57th St. SE**

**Charleston, WV 25304**

**(304) 926-0499 ext. 1653**

**(304) 926-0452 fax**

**[Wade.A.Stansberry@wv.gov](mailto:Wade.A.Stansberry@wv.gov)**

WW-6B  
(04/15)

Permit Modification (API# 47-017-06873)  
 API NO. 47- 017 - 06873  
 OPERATOR WELL NO. Callahan Unit 1H  
 Well Pad Name: Deets Pad

18)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<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#	80'	80'	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	300'	300'	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500'	2500'	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	19300'	19300'	4899 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

<b>TYPE</b>	<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"/0.33"	2730/1730	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"	0.361"	12,630	2500	Lead-H/POZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

**PACKERS**

RECEIVED  
Office of Oil and Gas

Kind:	N/A			MAR 29 2019
Sizes:	N/A			WV Department of Environmental Protection
Depths Set:	N/A			

DAF  
3/28/10

WW-6B  
(10/14)

Permit Modification (API# 47-017-06873)  
 API NO. 47- 017 - 06873  
 OPERATOR WELL NO. Callahan Unit 1H  
 Well Pad Name: Deets 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): 41.13 acres

22) Area to be disturbed for well pad only, less access road (acres): 8.82 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

RECEIVED  
 Office of Oil and Gas  
 MAR 29 2019

25) Proposed borehole conditioning procedures:

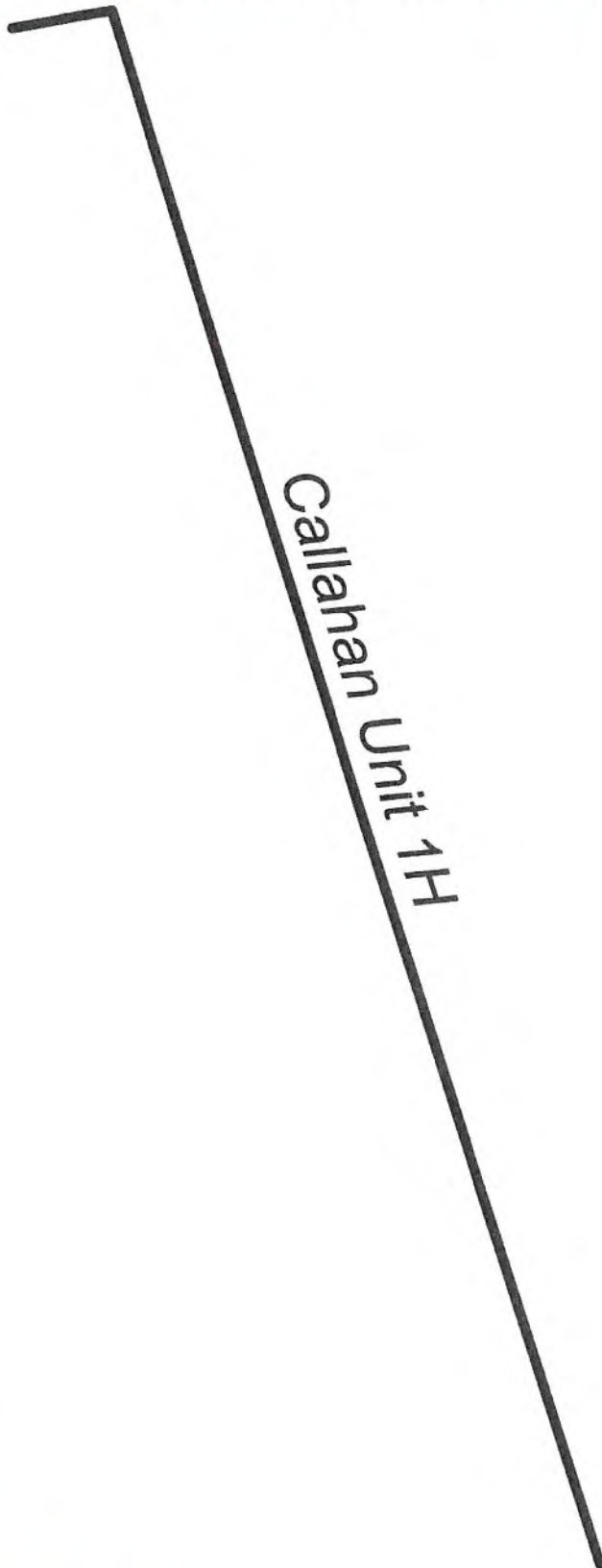
Conductor: blowhole clean with air, run casing, 10 bbls fresh water.  
 Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.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

WV Department of  
 Environmental Protection

\*Note: Attach additional sheets as needed.

DAF  
 3/28/19

CALLAHAN UNIT 1H (DEETS PAD) - AREA OF REVIEW 35-8-5.11



RECEIVED  
Office of Oil and Gas  
MAR 29 2019  
WV Department of  
Environmental Protection



Antero Resources Corporation

Callahan Unit 1H - AOR



No Wells of Interest REMARKS

September 19, 2018

DKF  
3/26/19

WW-6A1

Operator's Well Number

Callahan Unit 1H

Permit Modification (API# 47-017-06873)

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
<b><u>Johnson B. Smith et ux Lease</u></b>			
Johnson B. Smith, et ux	Eastern Oil Company	1/8	0022/0231
Eastern Oil Company	A.W. Stevens	Assignment	0042/0328
A.W. Stevens	Eastern Union Gas Company	Assignment	0042/0330
Eastern Union Gas Company	Pittsburgh & West Virginia Gas Company	Assignment	0085/0334
Pittsburgh & West Virginia Gas Company	Equitable Gas Company	Assignment	0121/0257
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	EQT Capital Corporation	Name Change	Exhibit 2
EQT Capital Corporation	Antero Resources Corporation	Assignment	0325/0528
<b><u>P.B McClain et ux Lease</u></b>			
P.B. McClain et ux	The West Union Gas Company	1/8	0014/0477
The West Union Gas Company	Eastern Oil Company	Assignment	Unrecorded
Eastern Oil Company	A.W. Stevenson	Assignment	0042/0328
A.W. Stevenson	Eastern Union Gas Company	Assignment	0042/0328
Eastern Union Gas Company	Pittsburgh & West Virginia Gas Company	Assignment	0085/0334
Pittsburgh & West Virginia Gas Company	Equitable Gas Company	Assignment	0121/0303
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	Equitrans, L.P.	Name Change	0302/0123
Equitrans, L.P.	Equitable Production-Eastern States, Inc.	Assignment	0192/0019
Equitable Production-Eastern States, Inc.	Equitable Production Company	Merged	Exhibit 3
Equitable Production Company	EQT Production Company	Name Change	281/346
EQT Production Company	Antero Resources Corporation	Assignment	0325/0539
<b><u>T.G. Baker et al Lease</u></b>			
T.G. Baker et al	J.D. Foley	1/8	0044/0483
J.D. Foley	Delta Petroleum Company	Assignment	Unrecorded
Delta Petroleum Company	Petroleum Development Corporation	Assignment	Unrecorded
Petroleum Development Corporation	PDC Mountaineer, LLC	Assignment	0240/0118
PDC Mountaineer, LLC	Antero Resources Corporation	Assignment	0371/0253

RECEIVED  
Office of Oil and Gas

MAR 29 2019

WV Department of  
Environmental Protection

\*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.

\*\*CONTINUED ON NEXT PAGE



WW-6A1

Operator's Well Number

Callahan Unit 1H

Permit Modification (API# 47-017-06873)

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
<b><u>G.I. Swentzel, et ux Lease</u></b>			
G.L. Swentzel, et ux	West Union Gas Company	1/8	0023/0482
West Union Gas Company	Eastern Oil Company	Assignment	0024/0136
Eastern Oil Company	A.W. Stevenson	Assignment	0042/0328
A.W. Stevenson	Eastern Union Gas Company	Assignment	0042/0328
Eastern Union Gas Company	Pittsburgh and West Virginia Gas Company	Assignment	0085/0334
Pittsburgh and West Virginia Gas Company	Equitable Gas Company	Assignment	0121/0257
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	Equitrans, L.P.	Assignment	0302/0123
Equitrans, L.P.	Equitable Production Eastern States, Inc.	Assignment	0192/0019
Equitable Production Eastern States, Inc.	Equitable Production Company	Merged	Exhibit 3
Equitable Production Company	EQT Production Company	Name Change	0281/0346
<b>EQT Production Company</b>	<b>Antero Resources Corporation</b>	<b>Agreement</b>	<b>0316/0603</b>
<b><u>Fannie A. Coulehan Lease</u></b>			
Fannie A. Coulehan	West Virginia Gas Company	1/8	0018/0297
West Virginia Gas Company	Eastern Oil Company	Assignment	0018/0299
Eastern Oil Company	A.W. Stevenson	Assignment	0042/0328
A.W. Stevenson	Eastern Union Gas Company	Assignment	0042/0330
Eastern Union Gas Company	Pittsburgh & W.VA Gas Company	Assignment	0085/0334
Pittsburgh & W.VA Gas Company	Equitable Gas Company	Assignment	0121/0303
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	Equitrans, L.P.	Name Change	0302/0123
Equitrans, L.P.	Equitable Production- Eastern States, Inc.	Assignment	0192/0019
Equitable Production- Eastern States, Inc.	Equitable Production Company	Merged	Exhibit 3
Equitable Production Company	EQT Production Company	Name Change	0281/0346
<b>EQT Production Co.</b>	<b>Antero Resources Corporation</b>	<b>Assignment</b>	<b>0325/0539</b>
<b><u>John C. Coulehan et ux Lease</u></b>			
John C. Coulehan et ux	West Union Gas Company	1/8	0018/0291
West Union Gas Company	Eastern Oil Company	Assignment	0018/0290
Eastern Oil Company	Eastern Union Gas Company, et al	Assignment	0042/0328
Eastern Union Gas Company, et al	Pittsburgh & West Virginia Gas Company	Deed	0085/0334
Pittsburgh & West Virginia Gas Company	Equitable Gas Company	Deed	0121/0257
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	Equitrans, L.P.	Name Change	0302/0123
Equitrans LP	Equitable Production- Eastern States INC	Assignment	0192/0019
Equitable Production- Eastern States INC	Equitable Production Company	Merged	Exhibit 3
Equitable Production Company	EQT Production Company	Name Change	0281/0346
<b>EQT Production Company</b>	<b>Antero Resources Corporation</b>	<b>Assignment</b>	<b>0325/0539</b>

MAR 29 2019

RECEIVED  
Office of Oil and Gas  
WV Department of Environmental Protection

\*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.

\*\*CONTINUED ON NEXT PAGE

WW-6A1

Operator's Well Number

Callahan Unit 1H

Permit Modification (API# 47-017-06873)

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
<b><u>Pansy Heflin et al Lease</u></b>			
Pansy Heflin et al	Royal Resources Corporation	1/8	0098/0058
Royal Resources Corporation	MERT Development, Inc.	Assignment	0113/0488
MERT Development, Inc.	Continental Reserves Oil Company	Assignment	0159/0098
Continental Reserves Oil Company	ABARTA Oil & Gas Co., Inc.	Assignment	0171/0111
ABARTA Oil & Gas Co., Inc.	Antero Resources Appalachian Corporation	Assignment	0261/0463
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>Olivia Jones Lease</u></b>			
Olivia Jones	E.D. Tate	1/8	0054/0362
E.D. Tate	P.D. Farr	Conveyance	0094/0128
P. D. Farr	Carolyn Farr	Conveyance	0015/0347
Carolyn Farr	The Carolyn Farr Trust	Conveyance	0220/0237
The Carolyn Farr Trust	Antero Resources Appalachian Corporation	Assignment	0271/0541
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>Monta McConnell et al Lease</u></b>			
Monta McConnell et al	E. D. Tate	1/8	0054/0164
E.D. Tate	P. Douglas Farr	Assignment	0094/0128
P. Douglas Farr	Carolyn Farr	Will	0015/0347
Carolyn Farr	Antero Resources Appalachian Corporation	Assignment	0271/0541
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>

RECEIVED  
Office of Oil and Gas

MAR 29 2019

WV Department of  
Environmental Protection

\*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)

Permit Modification (API# 47-017-06873)  
Operator's Well No. Callahan 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:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Mary F. Jones Lease</u>	Mary F. Jones	Tate and Gribble	1/8	0053/0404
	Tate and Gribble	Carolyn E. Farr	Assignment	0126/0065
	Carolyn E. Farr	P.D. Farr II	Assignment	0163/0368
	P.D. Farr II	Carolyn E. Farr	Assignment	0167/0234
	Carolyn E. Farr	Carolyn Elizabeth Farr Trust	Conveyance	0220/0237
	Carolyn Elizabeth Farr Trust	Antero Resources Appalachian Corporation	Assignment	0271/0541
	Antero Resources Appalachian Corporation	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

RECEIVED  
Office of Oil and Gas

MAR 29 2019

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: Kevin Kilstrom  
Its: Senior Vice President - Production

FORM WW-6A1  
EXHIBIT 1

FILED

JUN 10 2013

Natalie H. Turnant  
Secretary of State  
1900 Kanawha Blvd E  
Bldg 1, Suite 1574K  
Charleston, WV 25305



POSSY BARKER, Manager  
IN THE OFFICE OF  
SECRETARY OF STATE  
Corporations Division  
Tel: (304)538-6600  
Fax: (304)538-8381  
Website: www.wv.gov  
E-mail: business@wv.gov

FILE ONE ORIGINAL  
(Two if you want a filed  
stamped copy returned to you)  
FEE: \$25.00

APPLICATION FOR  
AMENDED CERTIFICATE  
OF AUTHORITY

Office Hours: Monday - Friday  
8:30 a.m. - 5:00 p.m. ET

\*\*\* In accordance with the provisions of the West Virginia Code, the undersigned corporation hereby \*\*\*  
applies for an Amended Certificate of Authority and submits the following statements:

- Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachia Corporation
- Date Certificate of Authority was issued in West Virginia: 6/28/2009
- Corporate name has been changed to: Antero Resources Corporation  
(Attach one Certified Copy of Name Change as filed in home State of Incorporation.)
- Name the corporation elects to use in WV: Antero Resources Corporation  
(due to home state name not being available)
- Other amendments: \_\_\_\_\_  
(attach additional pages if necessary)
- Name and phone number of contact person. (This is optional; however, if there is a problem with the filing, having a contact person and phone number may avoid having to return or reject the document.)  
Allyn A. Schopp (304) 367-7310  
Contact Name Phone Number
- Signature information (See below \*Important Legal Notice Regarding Signatures\*):  
Print Name of Signer: Allyn A. Schopp Title/Capacity: Authorized Person  
Signature: [Handwritten Signature] Date: June 10, 2013

**\*Important Legal Notice Regarding Signatures\*** For West Virginia Code: §21D-1-12b. Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.

Form CP-4

Issued by the Office of the Secretary of State

Revised 4/03

RECEIVED  
Office of Oil and Gas

MAR 29 2019

WV Department of  
Environmental Protection

FORM WV-6A1  
EXHIBIT 2, Page 1

BOOK 512 PAGE 781

ARTICLES OF MERGER  
OF  
KENTUCKY WEST VIRGINIA GAS COMPANY  
a West Virginia Company  
Into  
EQT CAPITAL CORPORATION  
a Delaware Company

FILED  
NOVEMBER 1995  
IN THE OFFICE OF  
SECRETARY OF STATE  
WEST VIRGINIA

Pursuant to the provisions of Section 38, Article 1, Chapter 31 of the Code of West Virginia, 1931, as amended, the undersigned corporation adopts the following Articles of Merger for the purpose of merging a subsidiary corporation into the undersigned as the surviving corporation:

The undersigned foreign corporation is incorporated under the laws of Delaware and the laws of such jurisdiction permit such a merger.

The following Plan of Merger was adopted by the undersigned corporation in the manner prescribed by the laws of the jurisdiction under which it is organized.

This Plan of Merger dated as of November 20, 1995, is among EQT Capital Corporation ("EQT"), a Delaware corporation, Equitrans, Inc. ("Equitrans"), a Delaware corporation and Kentucky West Virginia Gas Company ("Kentucky West"), a West Virginia corporation. The terms of the merger shall be as follows:

1. Equitrans and Kentucky West shall merge into EQT. EQT shall be the surviving corporation with its corporate identity, existence, purpose, powers, franchises, rights and immunities unimpaired.
2. The issued and outstanding shares of common stock of Equitrans and Kentucky West, shall without further action on the part of Equitrans, Kentucky West or EQT, be cancelled and of no further effect as of the Effective Date of the merger (as defined below).
3. A Certificate of Merger shall be filed as required by law with the Secretary of State of the State of West Virginia and the Secretary of State of the State of Delaware. The Effective Date of the merger shall be the last date of filing with the respective secretaries of state (the "Effective Date"). On the Effective Date, Equitrans and Kentucky West will cease to exist as separate corporations and EQT will succeed to all of the assets, rights, privileges, immunities, powers, duties and liabilities of Equitrans and Kentucky West in accordance with the provisions of the West Virginia Corporation Act and of the Delaware General Corporation Law.
4. The current Certificate of Incorporation of EQT shall be its Certificate of Incorporation on and after the Effective Date of the merger.

RECEIVED  
Office of Oil and Gas

MAR 29 2019

WV Department of  
Environmental Protection

**FORM WW-6A1  
EXHIBIT 2, Page 2**

BOOK **512** PAGE **782**

5. This Plan of Merger shall be executed by the corporate officers of Kentucky West, Equitrans and EQT.

The number of outstanding shares of each class of the subsidiary corporation and the number of such shares of each class owned by the surviving corporation are as follows:

<u>Name of Subsidiary</u>	<u>Number of Shares Outstanding</u>	<u>Designation of Class</u>	<u>Number of Shares Owned by Surviving Corporation</u>
Kentucky West Virginia Gas	331,754	Common	331,754

A copy of the Plan of Merger set forth above was mailed on September 1, 1995 to each shareholder of the subsidiary corporation.

The undersigned corporation hereby: (a) agrees that it may be served with process in the State of West Virginia in any proceeding for the enforcement of the rights of a dissenting shareholder of the above-mentioned subsidiary corporation against the surviving corporation; (b) irrevocably appoints the Secretary of State of the State of West Virginia as its agent to accept service of process in any such proceeding; and (c) agrees that it will promptly pay to the dissenting shareholders of such domestic corporation the amount, if any, to which they shall be entitled under Section 123, Article 1, Chapter 31 of the Code of West Virginia with respect to the rights of dissenting shareholders.

Dated November 20, 1995.

**EQT CAPITAL CORPORATION**

By *G. Mark Channon*  
Its President

and *James C. Walker*  
Its Corporate Secretary

RECEIVED  
Office of Oil and Gas

MAR 29 2019

WV Department of  
Environmental Protection

FORM WW-6A1  
EXHIBIT 3

# State of West Virginia



## Certificate

*I, Joe Manchin III, Secretary of State of the State of West Virginia, hereby certify that*

by the provisions of Chapter 31 of the West Virginia Code, Articles of Merger were received and filed  
MERGING EQUITABLE PRODUCTION - EASTERN STATES, INC., A QUALIFIED DE ORGANIZATION, WITH AND INTO  
EQUITABLE PRODUCTION COMPANY, A QUALIFIED ORGANIZATION.

Therefore, I hereby issue this

### CERTIFICATE OF MERGER

RECEIVED  
Office of Oil and Gas

MAR 29 2019

WV Department of  
Environmental Protection



*Given under my hand and the  
Great Seal of the State of  
West Virginia on this day of  
June 28, 2001*

*Secretary of State*

LATITUDE 39°20'00"

4,833'

139' TO BOTTOM HOLE  
LATITUDE 39°17'30" 1H BOTTOM HOLE

LONGITUDE 80°42'30"

6,852'

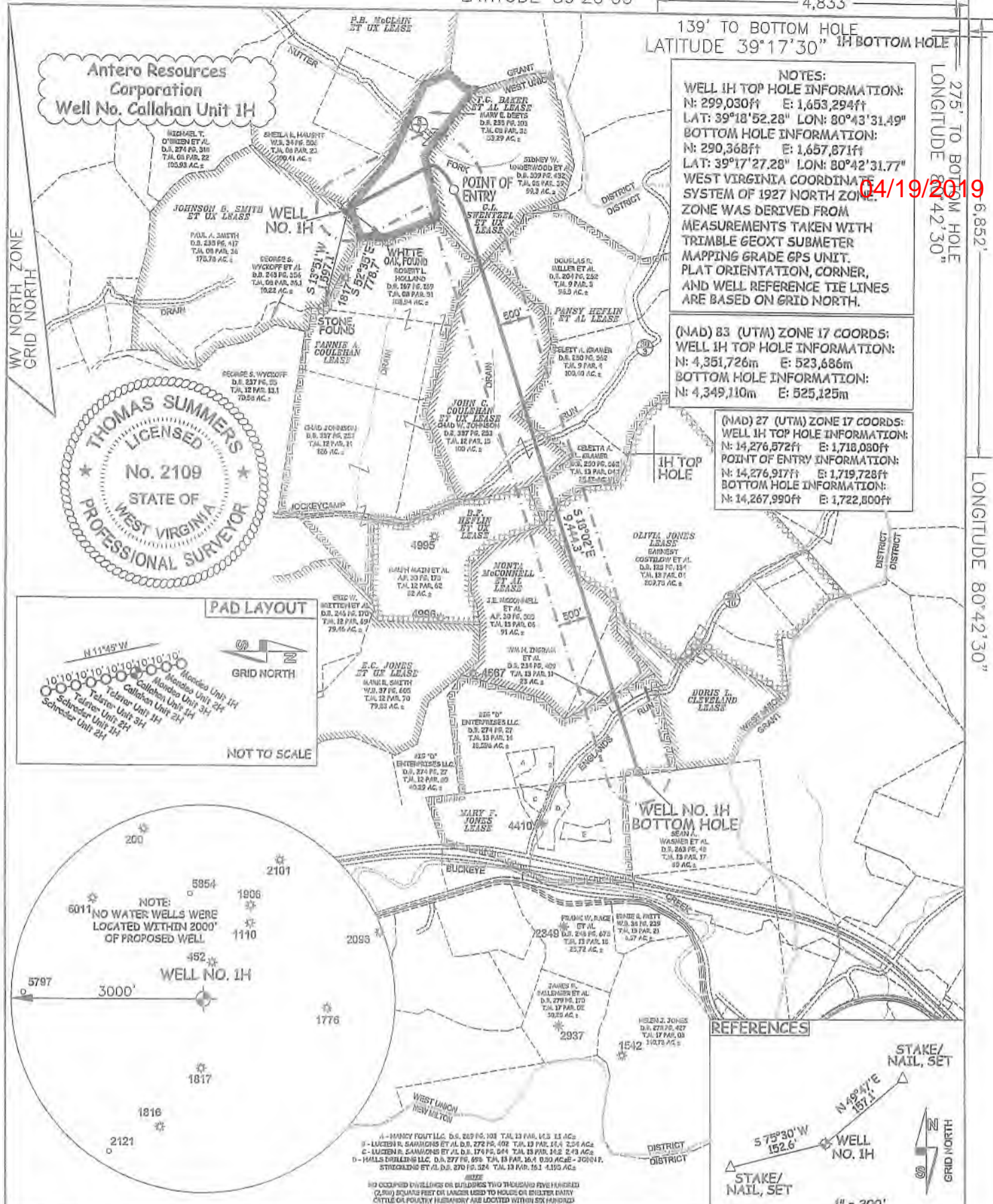
LONGITUDE 80°42'30"

NOTES:  
 WELL 1H TOP HOLE INFORMATION:  
 N: 299,030ft E: 1,653,294ft  
 LAT: 39°18'52.28" LON: 80°43'31.49"  
 BOTTOM HOLE INFORMATION:  
 N: 290,368ft E: 1,657,871ft  
 LAT: 39°17'27.28" LON: 80°42'31.77"  
 WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE.  
 ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

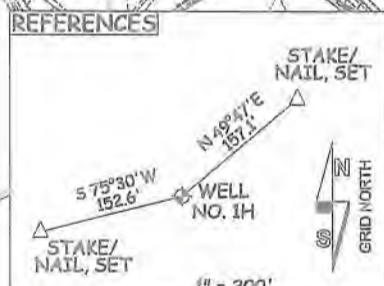
(NAD) 83 (UTM) ZONE 17 COORDS:  
 WELL 1H TOP HOLE INFORMATION:  
 N: 4,351,726m E: 523,686m  
 BOTTOM HOLE INFORMATION:  
 N: 4,349,110m E: 525,125m

(NAD) 27 (UTM) ZONE 17 COORDS:  
 WELL 1H TOP HOLE INFORMATION:  
 N: 14,276,572ft E: 1,718,080ft  
 POINT OF ENTRY INFORMATION:  
 N: 14,276,917ft E: 1,719,728ft  
 BOTTOM HOLE INFORMATION:  
 N: 14,267,990ft E: 1,722,800ft

04/19/2019



Antero Resources Corporation  
 Well No. Callahan Unit 1H



JOB # 13-028WA  
 DRAWING # CALLAHAN1HR5  
 SCALE 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY SUBMETER  
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

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 PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
 WILLOW LAND SURVEYING PLLC  
 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415

LEGEND  
 - - - - - Surface Owner Boundary Lines +/-  
 - - - - - Interior Surface Tracts +/-  
 - - - - - Existing Fence  
 ⊕ Found monument, as noted

*Thomas Summers*  
 THOMAS SUMMERS P.S. 2109

STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS  
 WELL TYPE: OIL \_\_\_ GAS X LIQUID INJECTION \_\_\_ WASTE DISPOSAL \_\_\_  
 (IF "GAS") PRODUCTION X STORAGE \_\_\_ DEEP \_\_\_ SHALLOW X  
 LOCATION: ELEVATION 1,422'-ORIGINAL 1,376'-PROPOSED WATERSHED HEADWATERS MIDDLE ISLAND CREEK  
 QUADRANGLE SMITHBURG 7.5' DISTRICT WEST UNION COUNTY DODDRIDGE

SURFACE OWNER MARY E. DEETS AND/OR PAUL A. SMITH ACREAGE 53.29 ACRES +/- AND/OR 175.78 ACRES±  
 OIL & GAS ROYALTY OWNER JOHNSON B. SMITH ET UX; T.G. BAKER ET AL; G.L. SWENTZEL ET UX; LEASE ACREAGE 180 ACRES±; 53.46 ACRES±; 103 ACRES±;  
 FANNIE A. COULEHAN; JOHN C. COULEHAN ET UX; PANSY HEFLIN ET AL; OLIVIA JONES; MONTA MCCONNELL ET AL; MARY F. JONES 260 ACRES±; 116 ACRES±; 222.5 ACRES±; 260 ACRES±; 114 ACRES±; 194 ACRES±

PROPOSED WORK: DRILL \_\_\_ CONVERT \_\_\_ DRILL DEEPER X REDRILL \_\_\_ FRACTURE OR STIMULATE X  
 PLUG OFF OLD FORMATION \_\_\_ PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL  
 (SPECIFY) MOD-POE PLUG & ABANDON \_\_\_ CLEAN OUT & REPLUG \_\_\_  
 TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,600' TVD 19,300' MD  
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DJANNA STAMPLER - CT CORPORATION SYSTEM  
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD  
 FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

COUNTY NAME

PERMIT



LATITUDE 39°20'00"

4,833'

139' TO BOTTOM HOLE  
LATITUDE 39°17'30" 1H BOTTOM HOLE

275' TO BOTTOM HOLE  
LONGITUDE 80°42'30"

6,852'

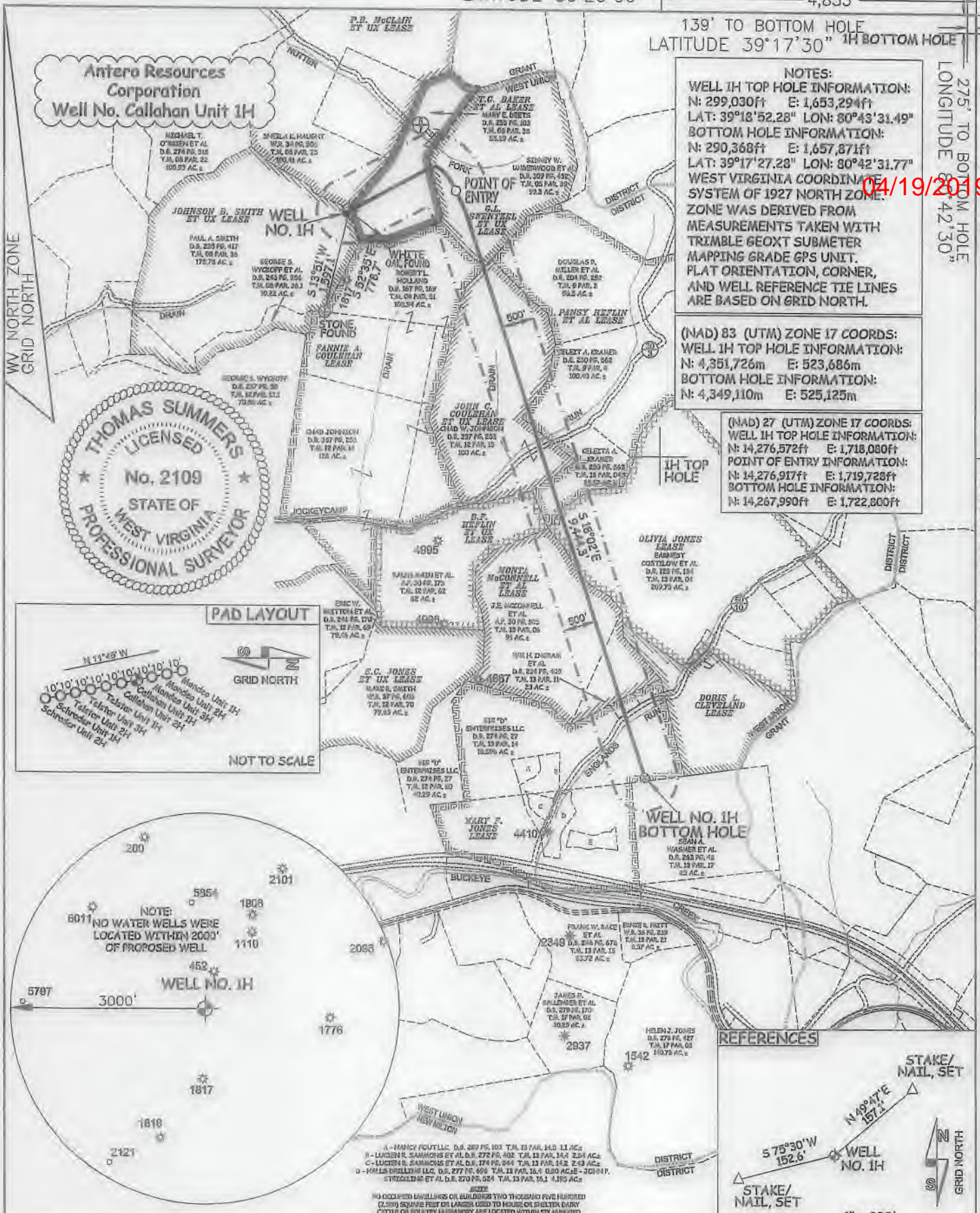
LONGITUDE 80°42'30"

NOTES:  
 WELL 1H TOP HOLE INFORMATION:  
 N: 299,030ft E: 1,653,294ft  
 LAT: 39°18'52.28" LON: 80°43'31.49"  
 BOTTOM HOLE INFORMATION:  
 N: 290,368ft E: 1,657,871ft  
 LAT: 39°17'27.28" LON: 80°42'31.77"  
 WEST VIRGINIA COORDINATE  
 SYSTEM OF 1927 NORTH ZONE.  
 ZONE WAS DERIVED FROM  
 MEASUREMENTS TAKEN WITH  
 TRIMBLE GEOXT SUBMETER  
 MAPPING GRADE GPS UNIT.  
 PLAT ORIENTATION, CORNER,  
 AND WELL REFERENCE TIE LINES  
 ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS:  
 WELL 1H TOP HOLE INFORMATION:  
 N: 4,351,726m E: 523,686m  
 BOTTOM HOLE INFORMATION:  
 N: 4,349,110m E: 525,125m

(NAD) 27 (UTM) ZONE 17 COORDS:  
 WELL 1H TOP HOLE INFORMATION:  
 N: 14,276,572ft E: 1,718,080ft  
 POINT OF ENTRY INFORMATION:  
 N: 14,276,917ft E: 1,719,728ft  
 BOTTOM HOLE INFORMATION:  
 N: 14,267,990ft E: 1,722,800ft

04/19/2019



JOB # 13-028WA  
 DRAWING # CALLAHAN1HRS  
 SCALE 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY SUBMETER  
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS  
 STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS  
 WELL TYPE: OIL    GAS X LIQUID INJECTION    WASTE DISPOSAL     
 (IF "GAS") PRODUCTION    STORAGE    DEEP    SHALLOW X  
 LOCATION: ELEVATION 1422'-ORIGINAL 1378'-PROPOSED WATERSHED HEADWATERS MIDDLE ISLAND CREEK  
 QUADRANGLE SMITHBURG 7.5' DISTRICT WEST UNION COUNTY DODDRIDGE  
 SURFACE OWNER MARY E. DEETS AND/OR PAUL A. SMITH ACREAGE 53.29 ACRES +/- AND/OR 175.78 ACRES +/-  
 OIL & GAS ROYALTY OWNER JOHNSON B. SMITH ET UX; T.G. BAKER ET AL; G.L. SWENTZEL ET UX; LEASE ACREAGE 180 ACRES +/-; 53.46 ACRES +/-; 103 ACRES +/-;  
FANNIE A. COULEHAN; JOHN C. COULEHAN ET UX; PANSY HEFLIN ET AL; OLIVIA JONES; MONTA MCCONNELL ET AL; MARY F. JONES 250 ACRES +/-; 118 ACRES +/-; 22.5 ACRES +/-; 200 ACRES +/-; 114 ACRES +/-; 194 ACRES +/-  
 PROPOSED WORK: DRILL    CONVERT    DRILL DEEPER    REDRILL    FRACTURE OR STIMULATE X  
 PLUG OFF OLD FORMATION    PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL  
 (SPECIFY) MOD-POE PLUG & ABANDON    CLEAN OUT & REPLUG     
 TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,600' TVD 19,300' MD  
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPLER - CT CORPORATION SYSTEM  
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD  
DENVER, CO 80202 CHARLESTON, WV 25313

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.

STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

WILLOW LAND SURVEYING PLLC  
 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415

LEGEND  
 - - - - - Surface Owner Boundary Lines +/-  
 - - - - - Interior Surface Tracts +/-  
 - - - - - Existing Fence  
 ⊕ Found monument, as noted

THOMAS SUMMERS P.S. 2109

DATE 03/08/19  
 OPERATOR'S WELL # CALLAHAN UNIT #1H  
 API WELL # 47 - 017 - 06873 MOD  
 STATE    COUNTY    PERMIT

# VOID

Section

WW-6B  
(04/15)

Permit Modification (API# 47-017-06873)  
API NO. 47-017 - 06873 **04/19/2019**  
OPERATOR WELL NO. Callahan Unit 1H  
Well Pad Name: Deets 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 017 - Dodd West Uni Smithburg 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: Callahan Unit 1H Well Pad Name: Deets Pad

3) Farm Name/Surface Owner: Mary E. Deets and/or Paul A. Smith Public Road Access: Old US-50

4) Elevation, current ground: ~1422' Elevation, proposed post-construction: 1376'

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: 7600' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2950#

8) Proposed Total Vertical Depth: 7600' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19300' MD

11) Proposed Horizontal Leg Length: 9444'

12) Approximate Fresh Water Strata Depths: 196', 221'

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

14) Approximate Saltwater Depths: 1381', 1843', 1966'

15) Approximate Coal Seam Depths: 583', 755', 891

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

RECEIVED  
Office of Oil and Gas  
**MAR 15 2019**  
WV Department of  
Environmental Protection

(a) If Yes, provide Mine Info: Name: \_\_\_\_\_  
Depth: \_\_\_\_\_  
Seam: \_\_\_\_\_  
Owner: \_\_\_\_\_

WW-6B  
(04/15)

Permit Modification (API# 47-017-06873)  
 API NO. 47- 017 - 06873 **04/19/2019**  
 OPERATOR WELL NO. Callahan Unit 1H  
 Well Pad Name: Deets Pad

18)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<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#	80'	80'	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	300'	300'	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500'	2500'	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	19300'	19300'	4899 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

<b>TYPE</b>	<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"/0.33"	2730/1730	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"	0.361"	12,630	2500	Lead-H/POZ & 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					

RECEIVED  
Office of Oil and Gas

MAR 15 2019

WV Department of  
Environmental Protection

WW-6B  
(10/14)

Permit Modification (API# 47-017-06873)  
API NO. 47- 017 - 06873 **04/19/2019**  
OPERATOR WELL NO. Callahan Unit 1H  
Well Pad Name: Deets 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): 41.13 acres

22) Area to be disturbed for well pad only, less access road (acres): 8.82 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.

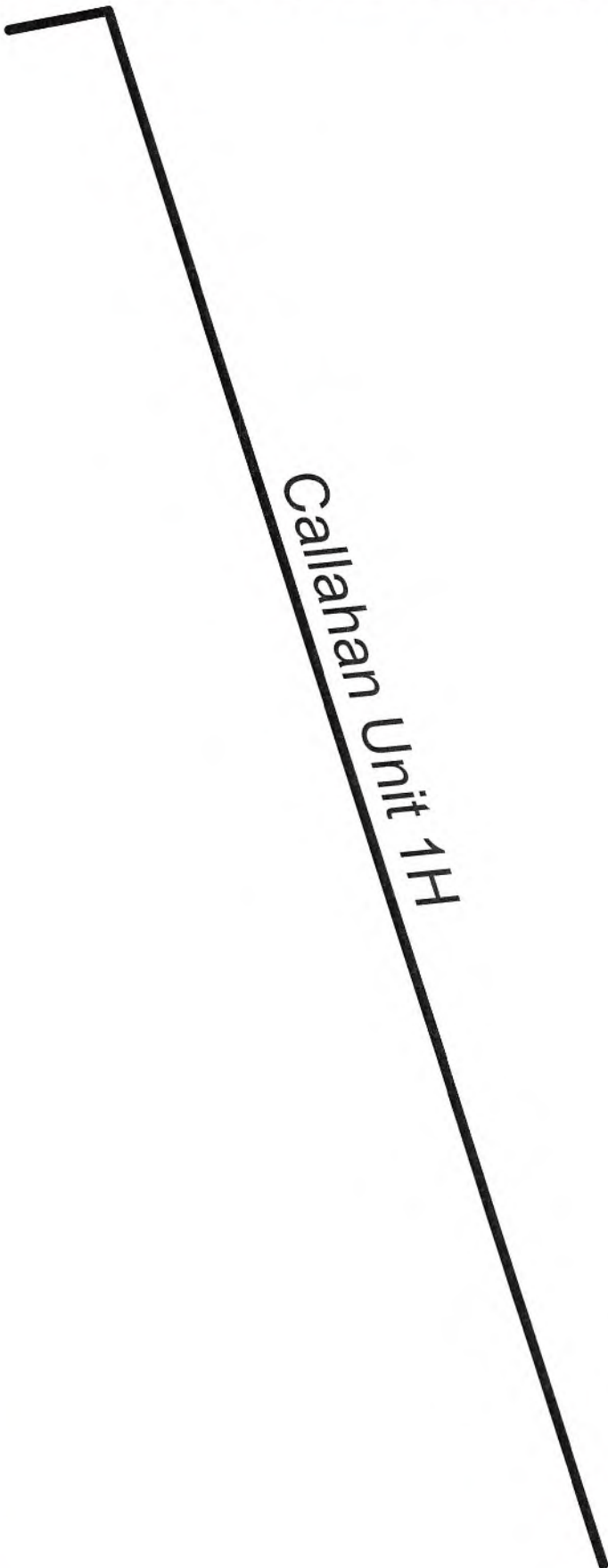
24) Describe all cement additives associated with each cement type:

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.



Callahan Unit 1H



Antero Resources Corporation

Callahan Unit 1H - AOR



FEET

REMARKS  
No Wells of Interest

September 19, 2018

RECEIVED  
Office of Oil and Gas  
MAR 15 2019  
WV Department of  
Environmental Protection

WW-6A1  
(5/13)

Operator's Well No. Callahan 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:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Mary F. Jones Lease</u>	Mary F. Jones	Tate and Gribble	1/8	0053/0404
	Tate and Gribble	Carolyn E. Farr	Assignment	0126/0065
	Carolyn E. Farr	P.D. Farr II	Assignment	0163/0368
	P.D. Farr II	Carolyn E. Farr	Assignment	0167/0234
	Carolyn E. Farr	Carolyn Elizabeth Farr Trust	Conveyance	0220/0237
	Carolyn Elizabeth Farr Trust	Antero Resources Appalachian Corporation	Assignment	0271/0541
	Antero Resources Appalachian Corporation	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

RECEIVED  
Office of Oil and Gas

MAR 15 2019

WV Department of  
Environmental Protection

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: Kevin Kilstrom   
 Its: Senior Vice President - Production

Operator's Well Number

Callahan Unit 1H

Permit Modification (API# 47-017-06873)

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
<b><u>Johnson B. Smith et ux Lease</u></b>			
Johnson B. Smith, et ux	Eastern Oil Company	1/8	0022/0231
Eastern Oil Company	A.W. Stevens	Assignment	0042/0328
A.W. Stevens	Eastern Union Gas Company	Assignment	0042/0330
Eastern Union Gas Company	Pittsburgh & West Virginia Gas Company	Assignment	0085/0334
Pittsburgh & West Virginia Gas Company	Equitable Gas Company	Assignment	0121/0257
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	EQT Capital Corporation	Name Change	Exhibit 2
<b>EQT Capital Corporation</b>	<b>Antero Resources Corporation</b>	<b>Assignment</b>	<b>0325/0528</b>
<b><u>P.B. McClain et ux Lease</u></b>			
P.B. McClain et ux	The West Union Gas Company	1/8	0014/0477
The West Union Gas Company	Eastern Oil Company	Assignment	Unrecorded
Eastern Oil Company	A.W. Stevenson	Assignment	0042/0328
A.W. Stevenson	Eastern Union Gas Company	Assignment	0042/0328
Eastern Union Gas Company	Pittsburgh & West Virginia Gas Company	Assignment	0085/0334
Pittsburgh & West Virginia Gas Company	Equitable Gas Company	Assignment	0121/0303
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	Equitrans, L.P.	Name Change	0302/0123
Equitrans, L.P.	Equitable Production-Eastern States, Inc.	Assignment	0192/0019
Equitable Production-Eastern States, Inc.	Equitable Production Company	Merged	Exhibit 3
Equitable Production Company	EQT Production Company	Name Change	281/346
<b>EQT Production Company</b>	<b>Antero Resources Corporation</b>	<b>Assignment</b>	<b>0325/0539</b>
<b><u>T.G. Baker et al Lease</u></b>			
T.G. Baker et al	J.D. Foley	1/8	0044/0483
J.D. Foley	Delta Petroleum Company	Assignment	Unrecorded
Delta Petroleum Company	Petroleum Development Corporation	Assignment	Unrecorded
Petroleum Development Corporation	PDC Mountaineer, LLC	Assignment	0240/0118
<b>PDC Mountaineer, LLC</b>	<b>Antero Resources Corporation</b>	<b>Assignment</b>	<b>0371/0253</b>

RECEIVED  
Office of Oil and Gas  
MAR 15 2019  
WV Department of  
Environmental Protection

\*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.

\*\*CONTINUED ON NEXT PAGE



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
<b><u>G.L Swentzel, et ux Lease</u></b>			
G.L. Swentzel, et ux	West Union Gas Company	1/8	0023/0482
West Union Gas Company	Eastern Oil Company	Assignment	0024/0136
Eastern Oil Company	A.W. Stevenson	Assignment	0042/0328
A.W. Stevenson	Eastern Union Gas Company	Assignment	0042/0328
Eastern Union Gas Company	Pittsburgh and West Virginia Gas Company	Assignment	0085/0334
Pittsburgh and West Virginia Gas Company	Equitable Gas Company	Assignment	0121/0257
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	Equitrans, L.P.	Assignment	0302/0123
Equitrans, L.P.	Equitable Production Eastern States, Inc.	Assignment	0192/0019
Equitable Production Eastern States, Inc.	Equitable Production Company	Merged	Exhibit 3
Equitable Production Company	EQT Production Company	Name Change	0281/0346
EQT Production Company	Antero Resources Corporation	Agreement	0316/0603
<b><u>Fannie A. Coulehan Lease</u></b>			
Fannie A. Coulehan	West Virginia Gas Company	1/8	0018/0297
West Virginia Gas Company	Eastern Oil Company	Assignment	0018/0299
Eastern Oil Company	A.W. Stevenson	Assignment	0042/0328
A.W. Stevenson	Eastern Union Gas Company	Assignment	0042/0330
Eastern Union Gas Company	Pittsburgh & W.VA Gas Company	Assignment	0085/0334
Pittsburgh & W.VA Gas Company	Equitable Gas Company	Assignment	0121/0303
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	Equitrans, L.P.	Name Change	0302/0123
Equitrans, L.P.	Equitable Production- Eastern States, Inc.	Assignment	0192/0019
Equitable Production- Eastern States, Inc.	Equitable Production Company	Merged	Exhibit 3
Equitable Production Company	EQT Production Company	Name Change	0281/0346
EQT Production Co.	Antero Resources Corporation	Assignment	0325/0539
<b><u>John C. Coulehan et ux Lease</u></b>			
John C. Coulehan et ux	West Union Gas Company	1/8	0018/0291
West Union Gas Company	Eastern Oil Company	Assignment	0018/0290
Eastern Oil Company	Eastern Union Gas Company, et al	Assignment	0042/0328
Eastern Union Gas Company, et al	Pittsburgh & West Virginia Gas Company	Deed	0085/0334
Pittsburgh & West Virginia Gas Company	Equitable Gas Company	Deed	0121/0257
Equitable Gas Company	Equitrans, Inc.	Assignment	0154/0475
Equitrans, Inc.	Equitrans, L.P.	Name Change	0302/0123
Equitrans LP	Equitable Production- Eastern States INC	Assignment	0192/0019
Equitable Production- Eastern States INC	Equitable Production Company	Merged	Exhibit 3
Equitable Production Company	EQT Production Company	Name Change	0281/0346
EQT Production Company	Antero Resources Corporation	Assignment	0325/0539

RECEIVED  
Office of Oil and Gas  
MAR 15 2019

WV Department of  
Environmental Protection

\*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.

Operator's Well Number

Callahan Unit 1H

Permit Modification (API# 47-017-06873)

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
<b><u>Pansy Heflin et al Lease</u></b>			
Pansy Heflin et al	Royal Resources Corporation	1/8	0098/0058
Royal Resources Corporation	MERT Development, Inc.	Assignment	0113/0488
MERT Development, Inc.	Continental Reserves Oil Company	Assignment	0159/0098
Continental Reserves Oil Company	ABARTA Oil & Gas Co., Inc.	Assignment	0171/0111
ABARTA Oil & Gas Co., Inc.	Antero Resources Appalachian Corporation	Assignment	0261/0463
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Olivia Jones Lease</u></b>			
Olivia Jones	E.D. Tate	1/8	0054/0362
E.D. Tate	P.D. Farr	Conveyance	0094/0128
P. D. Farr	Carolyn Farr	Conveyance	0015/0347
Carolyn Farr	The Carolyn Farr Trust	Conveyance	0220/0237
The Carolyn Farr Trust	Antero Resources Appalachian Corporation	Assignment	0271/0541
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Monta McConnell et al Lease</u></b>			
Monta McConnell et al	E. D. Tate	1/8	0054/0164
E.D. Tate	P. Douglas Farr	Assignment	0094/0128
P. Douglas Farr	Carolyn Farr	Will	0015/0347
Carolyn Farr	Antero Resources Appalachian Corporation	Assignment	0271/0541
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

RECEIVED  
Office of Oil and Gas  
MAR 15 2019  
WV Department of  
Environmental Protection

\*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.

FORM WV-6A1  
EXHIBIT 1

FILED

JUN 10 2013

Natalie E. Tennant,  
Secretary of State  
1900 Kanawha Blvd E  
Bldg 1, Suite 157-K  
Charleston, WV 25305



Peony Becker, Manager  
Corporations Division  
Tel: (304) 558-8008  
Fax: (304) 558-8381  
Webster: www.wv.gov  
E-mail: business@wv.gov

FILE ONE ORIGINAL  
(Two if you want a Med  
stamped copy returned to you)  
FEE: \$36.00

APPLICATION FOR  
AMENDED CERTIFICATE  
OF AUTHORITY

Office Hours: Monday - Friday  
8:30 a.m. - 5:00 p.m. ET

\*\*\* In accordance with the provisions of the West Virginia Code, the undersigned corporation hereby \*\*\*  
applies for an Amended Certificate of Authority and submits the following statements:

- Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation
- Date Certificate of Authority was issued in West Virginia: 6/25/2008
- Corporation name has been changed to: Antero Resources Corporation  
(Attach one Certified Copy of Name Change as filed in home State of incorporation.)
- Name the corporation elects to use in WV: Antero Resources Corporation  
(due to home state name not being available)
- Other amendments: \_\_\_\_\_  
(attach additional pages if necessary)
- Name and phone number of contact person. (This is optional; however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)  
Alwyn A. Schopp (303) 357-7310  
Contact Name Phone Number

7. Signature information (See below *\*Important Legal Notice Regarding Signatures\**):  
Print Name of Signer: Alwyn A. Schopp Title/Capacity: Authorized Person  
Signature: [Handwritten Signature] Date: June 10, 2013

RECEIVED  
Office of Oil and Gas  
MAR 15 2019  
WV Department of  
Environmental Protection

*\*Important Legal Notice Regarding Signatures\** For West Virginia Code §31D-1-12b. Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.

FORM WW-6A1  
EXHIBIT 2, Page 1

BOOK 512 PAGE 781

ARTICLES OF MERGER  
OF  
KENTUCKY WEST VIRGINIA GAS COMPANY

a West Virginia Company

Into

EQT CAPITAL CORPORATION

a Delaware Company

FILED  
NOVEMBER 1995  
IN THE OFFICE OF  
SECRETARY OF STATE  
WEST VIRGINIA

Pursuant to the provisions of Section 38, Article 1, Chapter 31 of the Code of West Virginia, 1931, as amended, the undersigned corporation adopts the following Articles of Merger for the purpose of merging a subsidiary corporation into the undersigned as the surviving corporation:

The undersigned foreign corporation is incorporated under the laws of Delaware and the laws of such jurisdiction permit such a merger.

The following Plan of Merger was adopted by the undersigned corporation in the manner prescribed by the laws of the jurisdiction under which it is organized.

This Plan of Merger dated as of November 20, 1995, is among EQT Capital Corporation ("EQT"), a Delaware corporation, Equitrans, Inc. ("Equitrans"), a Delaware corporation and Kentucky West Virginia Gas Company ("Kentucky West"), a West Virginia corporation. The terms of the merger shall be as follows:

1. Equitrans and Kentucky West shall merge into EQT. EQT shall be the surviving corporation with its corporate identity, existence, purposes, powers, franchises, rights and immunities unimpaired.
2. The issued and outstanding shares of common stock of Equitrans and Kentucky West, shall without further action on the part of Equitrans, Kentucky West or EQT, be cancelled and of no further effect as of the Effective Date of the merger (as defined below).
3. A Certificate of Merger shall be filed as required by law with the Secretary of State of the State of West Virginia and the Secretary of State of the State of Delaware. The Effective Date of the merger shall be the last date of filing with the respective secretaries of state (the "Effective Date"). On the Effective Date, Equitrans and Kentucky West will cease to exist as separate corporations and EQT will succeed to all of the assets, rights, privileges, immunities, powers, duties and liabilities of Equitrans and Kentucky West in accordance with the provisions of the West Virginia Corporation Act and of the Delaware General Corporation Law.
4. The current Certificate of Incorporation of EQT shall be its Certificate of Incorporation on and after the Effective Date of the merger.

RECEIVED  
Office of Oil and Gas  
MAR 15 2019  
WV Department of  
Environmental Protection

FORM WV-6A1  
EXHIBIT 2, Page 2

BOOK 512 PAGE 782

5. This Plan of Merger shall be executed by the corporate officers of Kentucky West, Equitrans and EQT.

The number of outstanding shares of each class of the subsidiary corporation and the number of such shares of each class owned by the surviving corporation are as follows:

Name of Subsidiary	Number of Shares Outstanding	Designation of Class	Number of Shares Owned by Surviving Corporation
Kentucky West Virginia Gas	331,754	Common	331,754

A copy of the Plan of Merger set forth above was mailed on September 1, 1995 to each Shareholder of the subsidiary corporation.

The undersigned corporation hereby: (a) agrees that it may be served with process in the State of West Virginia in any proceeding for the enforcement of the rights of a dissenting shareholder of the above-mentioned subsidiary corporation against the surviving corporation; (b) irrevocably appoints the Secretary of State of the State of West Virginia as its agent to accept service of process in any such proceeding; and (c) agrees that it will promptly pay to the dissenting shareholders of such domestic corporation the amount, if any, to which they shall be entitled under Section 123, Articles 1, Chapter 31 of the Code of West Virginia with respect to the rights of dissenting shareholders.

Dated November 20, 1995.

EQT CAPITAL CORPORATION

By *A. Michael Chumov*  
Its President

and *James C. Scheller*  
Its Corporate Secretary

RECEIVED  
Office of Oil and Gas

MAR 15 2019

WV Department of  
Environmental Protection

State of West Virginia  
  
Certificate

*I, Joe Manchin III, Secretary of State of the  
State of West Virginia, hereby certify that*

by the provisions of Chapter 31 of the West Virginia Code, Articles of Merger were received and filed  
MERGING EQUITABLE PRODUCTION - EASTERN STATES, INC., A QUALIFIED DE ORGANIZATION, WITH AND INTO  
EQUITABLE PRODUCTION COMPANY, A QUALIFIED ORGANIZATION.

Therefore, I hereby issue this

**CERTIFICATE OF MERGER**

RECEIVED  
Office of Oil and Gas  
MAR 15 2019  
WV Department of  
Environmental Protection



*Given under my hand and the  
Great Seal of the State of  
West Virginia on this day of  
June 28, 2001*

*Secretary of State*