west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

PERMIT MODIFICATION APPROVAL

August 19, 2015

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET
DENVER, CO 80202

Re: Permit Modification Approval for API Number 9502254, Well #: HARE UNIT 1H

Extend Lateral

Oil and Gas Operator:
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.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

for Gene Smith

Gene Smith
Assistant Chief of Permitting
Office of Oil and Gas

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

August 11, 2015

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

Ms. Hankins:

Antero Resources Corporation (Antero) would like to submit the following permit modification for one approved well on the Estlack Pad. We are requesting to extend the horizontal lateral length which will change the bottom hole location of the Hare Unit 1H (API# 47-095-02254).

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the revised MD and Production Casing/Cement program
- REVISED Form WW-6A1, which shows the new leases we will be drilling into
- REVISED Mylar Plat, which shows the new bottom hole location

If you have any questions please feel free to contact me at (303) 357-7323.

Thank you in advance for your consideration.

Sincerely,

Ashlie Steele
Permitting Supervisor
Antero Resources Corporation

Enclosures

RECEIVED
Office of Oil and Gas
AUG 12 2015
WV Department of
Environmental Protection

PERMIT MODIFICATION API# 47-095-02254

WW-6B
(04/15)

API NO. 47- 095 - 02254
OPERATOR WELL NO. Hare Unit 1H
Well Pad Name: Estlack Pad

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

1) Well Operator: Antero Resources Corporat

494488557	095 - Tyler	Centervill	Middlebourne 7.5'
Operator ID	County	District	Quadrangle

2) Operator's Well Number: Hare Unit 1H Well Pad Name: Estlack Pad

3) Farm Name/Surface Owner: Edna Monroe Public Road Access: CR 30/1

4) Elevation, current ground: 1160' Elevation, proposed post-construction: 1141'

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

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 6800' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2800#

8) Proposed Total Vertical Depth: 6800' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 18,300' MD

11) Proposed Horizontal Leg Length: 10,958'

12) Approximate Fresh Water Strata Depths: 131', 161', 208'

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

14) Approximate Saltwater Depths: 772', 847', 1890', 1968'

15) Approximate Coal Seam Depths: 200'

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 X

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

RECEIVED
Office of Oil and Gas
AUG 12 2015
WV Department of
Environmental Protection

WW-6B
(04/15)

API NO. 47- 095 - 02254
OPERATOR WELL NO. Hare Unit 1H
Well Pad Name: Estlack 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#	40'	40'	CTS, 38 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, 998 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	18,300'	18,300'	CTS, 4625 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	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

AUG 12 2015

WV Department of
Environmental Protection

WW-6B
(10/14)

API NO. 47- 095 - 02254
OPERATOR WELL NO. Hare Unit 1H
Well Pad Name: Estlack 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.

RECEIVED
Office of Oil and Gas
AUG 12 2015
WV Department of
Environmental Protection

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): 38.12 acres

22) Area to be disturbed for well pad only, less access road (acres): 13.58 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.

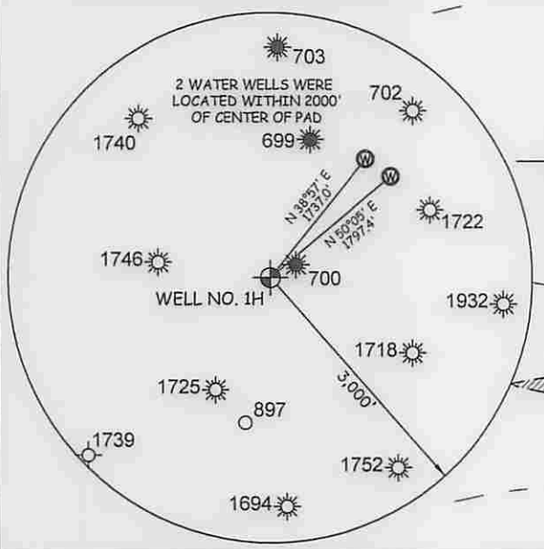
Antero Resources Corporation
Well No. Hare Unit 1H

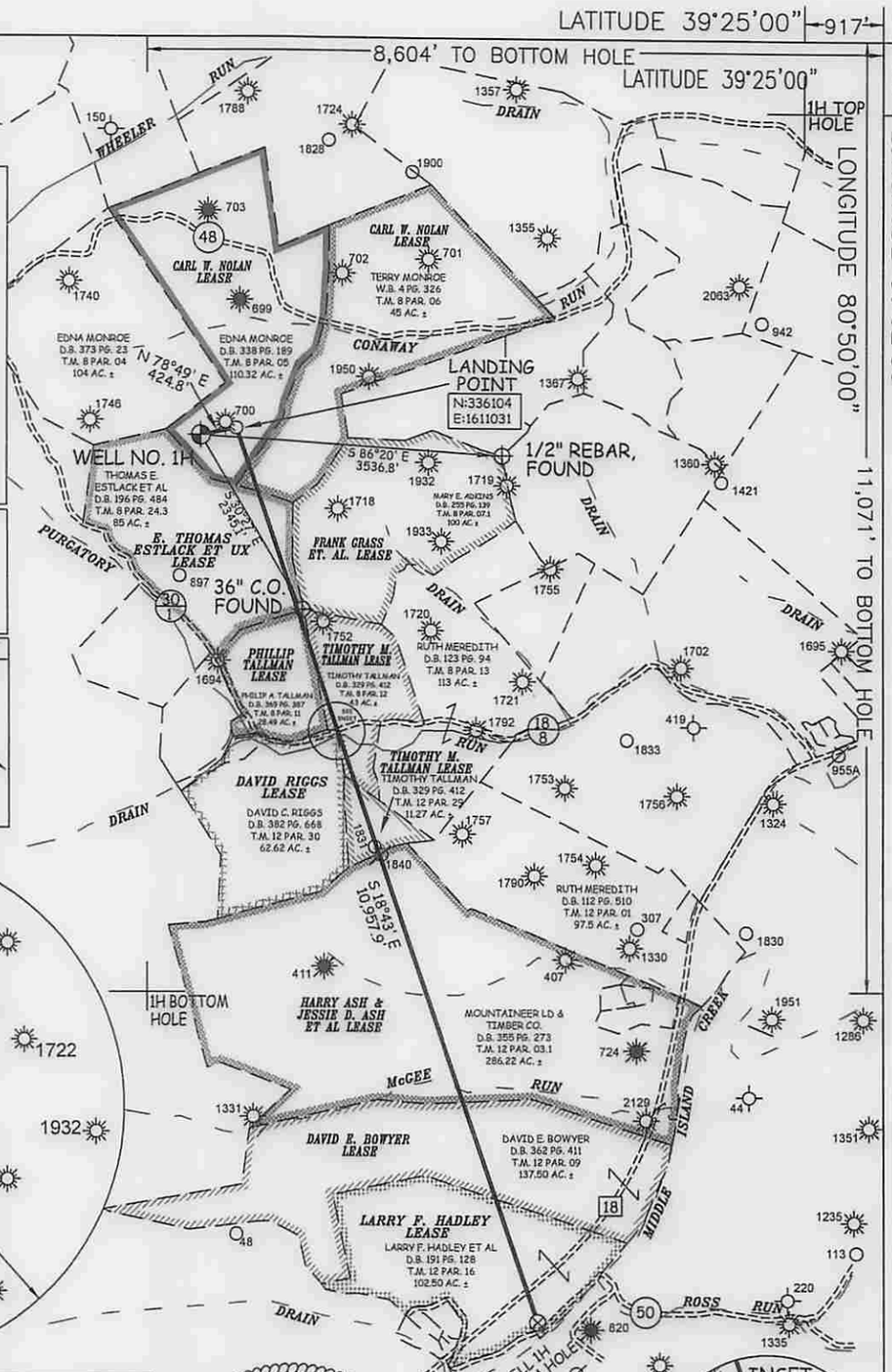
NOTES:
WELL 1H TOP HOLE INFORMATION:
N: 336,021ft E: 1,610,614ft
LAT: 39°24'51.75" LON: 80°52'41.68"
BOTTOM HOLE INFORMATION:
N: 325,725ft E: 1,614,547ft
LAT: 39°23'10.59" LON: 80°51'49.58"
WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE.
ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT 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: 4,362,778m E: 510,496m
BOTTOM HOLE INFORMATION:
N: 4,359,661m E: 511,746m

PAD LAYOUT
NOT TO SCALE

WV NORTH ZONE GRID NORTH





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 DEPTARTMENT 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

THOMAS SUMMERS LICENSED No. 2109 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

NOTE
NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHELTER DAIRY CATTLE OR POULTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY-FIVE (625) FEET OF THE CENTER OF THE WELL PAD.

JOB # 15-009WA
DRAWING # HARE1H
SCALE 1" = 2000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

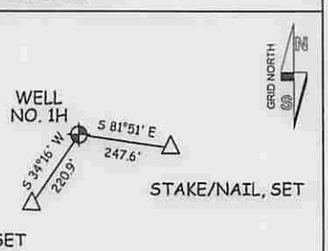
STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

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

THOMAS SUMMERS P.S. 2109

DATE 07/08/15
OPERATOR'S WELL# HARE UNIT #1H

REFERENCES



1" = 500'

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X
47 – 095 – 02254 MOD
STATE COUNTY PERMIT
LOCATION: ELEVATION 1,160' - ORIGINAL 1,141' - PROPOSED WATERSHED HEADWATERS MIDDLE ISLAND CREEK
QUADRANGLE MIDDLEBOURNE 7.5' (TH) SHIRLEY 7.5; (BH) DISTRICT CENTERVILLE COUNTY TYLER
SURFACE OWNER EDNA MONROE ACREAGE 110.32 ACRES +/-
OIL & GAS ROYALTY OWNER CARL W. NOLAN; CARL W. NOLAN; E. THOMAS ESTLACK ET UX; PHILLIP TALLMAN; TIMOTHY M. TALLMAN; TIMOTHY M. TALLMAN; HARRY ASH & JESSIE D. ASH ET AL; DAVID E. BOWYER; LARRY F. HADLEY LEASE ACREAGE 116 AC.±; 120 AC.±; 85.5 AC±; 28 AC±; 43 AC±; 11 AC.±; 291 AC.±; 138 AC±; 102.5 AC±
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-BHL PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,800' TVD 18,300' MD
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM
ADDRESS 1615 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD
DENVER, CO 80202 CHARLESTON, WV 25313

COUNTY NAME PERMIT

FORM WW-6

RECEIVED
Office of Oil and Gas
AUG 12 2015
WV Department of
Environmental Protection

WW-6A1

Operator's Well Number Hare Unit 1H
PERMIT MODIFICATION API# 47-095-02254

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
Carl W. Nolan Lease (Tracts 8-5 and 8-6)			
Carl W. Nolan	Warren R. Haught	1/8	DB 0214/0578
Warren R. Haught	Haught, Inc.	Assignment	DB 0242/0027
Haught, Inc.	Haught Oil Producing Corporation	Merger	Exhibit 2
Haught Oil Producing Corporation	TIG Corporation	Assignment	DB 0265/0158
TIG Corporation	Connoco Oil & Gas Leasing and Redevelopment	Assignment	DB 0274/0269
Connoco Oil & Gas Leasing and Redevelopment	Jay-Bee Oil and Gas Company	Assignment	DB 0275/0161
Jay-Bee Oil and Gas Company	Sancho Oil and Gas Corporation	Assignment	DB 0330/0831
Sancho Oil and Gas Corporation	Trans Energy, Inc.	Assignment	DB 0375/0792
Trans Energy, Inc.	Republic Energy Ventures, LLC	Assignment	DB 0375/0800
Republic Energy Ventures, LLC	**Antero Resources Corporation**	**Assignment**	**DB 0436/0177**
E. Thomas Estlack, et ux Lease			
E. Thomas Estlack, et ux	Sancho Oil and Gas Corporation	1/8	DB 0330/0834
Sancho Oil and Gas Corporation	**Antero Resources Corporation**	**Assignment**	**DB 0437/0381**
Frank Grass, et al Lease			
Frank Grass, Anne Abington, and Mary Adkins	Sancho Oil and Gas Corporation	1/8	DB 0335/0601
Sancho Oil and Gas Corporation	**Antero Resources Corporation**	**Assignment**	**DB 0436/0177**
Phillip Tallman Lease			
Phillip Tallman	Sancho Oil and Gas Corporation	1/8	DB 0335/0606
Sancho Oil and Gas Corporation	**Antero Resources Corporation**	**Assignment**	**DB 0436/0177**
Timothy M. Tallman Lease (Tracts 8-12 and 12-29)			
Timothy M. Tallman, married	Sancho Oil and Gas Corporation	1/8	DB 0346/0790
Sancho Oil and Gas Corporation	**Antero Resources Corporation**	**Assignment**	**DB 0436/0177**
David Riggs Lease			
David Riggs	**Antero Resources Corporation**	**1/8**	**DB 0429/0610**
Harry Ash & Jessie D. Ash, et al Lease			
Harry Ash & Jessie D. Ash, et al	J.A. Underwood	1/8	0171/0365
J.A. Underwood	Quaker State Oil Refining Corporation	Assignment	0171/0528
Quaker State Oil Refining Corporation	Petro Mark, Inc., A Corporation	Assignment	0246/0324
Petro Mark, Inc., A Corporation	Sancho Oil & Gas Corporation	Assignment	0268/0194
Sancho Oil & Gas Corporation	**Antero Resources Corporation**	**Assignment**	**0436/0177**
David E. Bowyer Lease			
David E. Bowyer	Antero Resources Appalachian Corporation	1/8+	0399/0369
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.**

****CONTINUED ON NEXT PAGE****

WW-6A1
(5/13)

Operator's Well No. Hare 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
Larry F. Hadley Lease				
	Larry F. Hadley, et ux	Antero Resources Corporation	1/8+	0452/0567

*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.

RECEIVED
Office of Oil and Gas

AUG 12 2015

WV Department of
Environmental Protection

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: Ward McNeilly
Its: VP, Reserves, Planning & Midstream

FORM WW-6A1
EXHIBIT 1

FILED
JUN 10 2013
IN THE OFFICE OF SECRETARY OF STATE

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

Penney Barker, Manager
Corporations Division
Tel: (304)558-8000
Fax: (304)558-8381
Website: www.wvsos.com
E-mail: business@wvsos.com

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 statement:**

1. Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation
2. Date Certificate of Authority was issued in West Virginia: 6/25/2008
3. Corporate name has been changed to: Antero Resources Corporation
   (Attach one Certified Copy of Name Change as filed in home State of incorporation.)
4. Name the corporation elects to use in WV: Antero Resources Corporation
   (due to home state name not being available)
5. Other amendments:
   (attach additional pages if necessary)

6. **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.)

Alvyn A. Schopp	(303) 357-7310
Contact Name	Phone Number

7. **Signature information** (See below **Important Legal Notice Regarding Signature*):

Print Name of Signer: Alvyn A. Schopp Title/Capacity: Authorized Person

Signature: [signature] Date: June 10, 2013

**Important Legal Notice Regarding Signature:* Per West Virginia Code §31D-1-129. 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 CF-4 Issued by the Office of the Secretary of State Revised 4/13

WV032 - 04/16/2013 Walters Kluwer Online

RECEIVED
Office of Oil and Gas
AUG 12 2015
WV Department of Environmental Protection

FORM WW-6A1
EXHIBIT 2

State of West Virginia

CERTIFICATE

I, Ken Hechler, Secretary of State of the State of West Virginia, hereby certify that

THE FOLLOWING IS A TRUE AND CORRECT COPY OF THE ARTICLES OF MERGER OF:

HAUGHT, INC., A WEST VIRGINIA CORPORATION AND HAUGHT OIL PRODUCING CORP., A UTAH CORPORATION DULY SIGNED AND VERIFIED PURSUANT TO THE PROVISIONS OF SECTION 38, ARTICLE 1, CHAPTER 31 OF THE CODE OF WEST VIRGINIA, 1931, AS AMENDED, HAVE BEEN RECEIVED AND ARE FOUND TO CONFORM TO LAW.

ACCORDINGLY, I HEREBY ISSUE THIS CERTIFICATE OF MERGER, MERGING HAUGHT, INC., WITH AND INTO HAUGHT OIL PRODUCING CORP., THE SURVIVOR AND ATTACH A DUPLICATE ORIGINAL OF SAID ARTICLES OF MERGER AS APPEARS FROM THE RECORDS OF MY SAID OFFICE.

Given under my hand and the Great Seal of the State of West Virginia, on this

TWELFTH *day of*

JANUARY *19* 87

Ken Hechler

Secretary of State.

RECEIVED
Office of Oil and Gas
AUG 12 2013
WV Department of
Environmental Protection