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west virginia department of environmental protection

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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](http://www.dep.wv.gov)

## PERMIT MODIFICATION APPROVAL

November 02, 2015

ANTERO RESOURCES CORPORATION  
1615 WYNKOOP STREET  
DENVER, CO 80202

Re: Permit Modification Approval for API Number 1706656, Well #: MCCUE UNIT 2H

### Extend Lateral and Change Spacing

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,

Gene Smith  
Assistant Chief of Permitting  
Office of Oil and Gas

Promoting a healthy environment.

11/06/2015



October 21, 2015

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. Melanie Hankins  
601 57<sup>th</sup> Street  
Charleston, WV 25304

Ms. Melanie Hankins:

Antero Resources Corporation (Antero) would like to submit the following permit modifications for approved wells on the existing Revival Pad. We are requesting to change the spacing of the laterals extend the horizontal lateral length which will change the bottom hole locations of the McCue Unit 1H (API# 47-017-06655), McCue Unit 2H (API# 47-017-06656), and Rollins Unit 1H (API# 47-017-06654).

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 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) 357-7330.

Thank you in advance for your consideration.

Sincerely,

Megan Darling  
Permitting Agent  
Antero Resources Corporation

4701706656 MOP

Enclosures

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

1) Well Operator: Antero Resources Corp. 494488557 017 - Doddridge Grant Smithburg 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: McCue Unit 2H Well Pad Name: Existing Revival Pad

3) Farm Name/Surface Owner: Williams, Larry et al Public Road Access: CR 30

4) Elevation, current ground: 1,376' Elevation, proposed post-construction: 1,376'

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

Other

(b) If Gas Shallow X Deep

Horizontal X

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus Shale: 7,500' TVD, Anticipated Thickness - 55 feet, Associated Pressure - 2,950#

8) Proposed Total Vertical Depth: 7,500'

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 16,000'

11) Proposed Horizontal Leg Length: 7,533'

12) Approximate Fresh Water Strata Depths: 450'

13) Method to Determine Fresh Water Depths: Gains-Koch Unit 1H (API# 47-017-06218) on same pad.

14) Approximate Saltwater Depths: 1079', 1808'

15) Approximate Coal Seam Depths: 328', 863'

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 OCT 22 2015

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

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WW-6B  
(04/15)

API# 47-017-06656 PERMIT MODIFICATION

API NO. 47- 017 - 06656

OPERATOR WELL NO. McCue Unit 2H

Well Pad Name: Existing Revival 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 109 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	510'	510' * See #19	CTS 708 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2,460'	2,460'	CTS 1,002 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	16,000'	16,000'	4,004 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7,100'	
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	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"	12630	2500	Lead-H/POZ & Tail-H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200			
Liners							

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**PACKERS**

Kind:	N/A			RECEIVED Office of Oil and Gas OCT 22 2015
Sizes:	N/A			
Depths Set:	N/A			

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

Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.  
\*Antero will be air drilling the fresh water string which makes it difficult to determine when freshwater is encountered, therefore we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

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

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

Max Pressure - 9300 lbs  
Max Rate - 80 bpm

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 15.45 Existing Acres

22) Area to be disturbed for well pad only, less access road (acres): 4.95 Existing 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:

4701706656 MCR

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 + 0.5% C51.  
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 wash and 10 bbls water.

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\*Note: Attach additional sheets as needed.

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>Larry G. Williams Lease</u></b>			
Larry G. Williams	ABA Oil & Gas, LLC	1/8	0202/0662
ABA Oil & Gas, LLC	R&K Oil & Gas, Inc.	Assignment	0210/0040
R&K Oil & Gas, Inc.	Bluestone Energy Partners	Assignment	0234/0080
Bluestone Energy Partners	Antero Resources Bluestone LLC, a wholly owned subsidiary of Antero Resources Appalachian Corporation	Affidavit Regarding Merger	DB 0288/0001
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>Mt. Salem Revival Grounds, Inc. Lease</u></b>			
Mt. Salem Revival Grounds, Inc.	Key Oil Company	1/8	0193/0292
Key Oil Company	Antero Resources Appalachian Corporation	Assignment	0260/0603
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>Mariette Lemley et al Lease</u></b>			
Mariette Lemley, et al	S&K Land Company	1/8	0114/0075
S&K Land Company	Mert Development, Inc.	Assignment	0115/0110
Mert Development, Inc.	Continental Reserves 1980-E	Assignment	0123/0022
Continental Reserves 1980-E	Appalachian Energy Development Corporation	Assignment	0150/0251
Appalachian Energy Development Corporation	Appalachian Energy Reserves, Inc.	Affidavit of Identity	Recital in MB 0019/0210
Appalachian Energy Reserves, Inc.	Jay Shearer	Assignment	0179/0146
Jay Shearer	Clowser Production Company	Assignment	0285/0420
Clowser Production Company	Antero Resources Appalachian Corporation	Assignment	0285/0417
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>Lydia Mae Rollins Lease</u></b>			
Lydia Mae Rollins, Executrix for the estate of Carl W. Rollins	Key Oil Company	1/8	0196/0675
Key Oil Company	Antero Resources Appalachian Corporation	Assignment	0256/0285
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>DEPI Lease</u></b>			
Dominion Exploration & Production, Inc.	Dominion Appalachian Development, LLC	1/8	0230/0407
Dominion Appalachian Development, LLC	Antero Resources Appalachian Corporation	Assignment	0231/0145
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>James P. Jones, Jr. Lease</u></b>			
James P. Jones, Jr.	Antero Resources Appalachian Corporation	1/8+	0300/0224
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>Clarence W. Mutschelknaus Lease</u></b>			
Clarence W. Mutschelknaus, et ux	Clarence W. Mutschelknaus	1/8	0239/0368
Clarence W. Mutschelknaus	Bluestone Energy Partners	Assignment	0247/0074
Bluestone Energy Partners	Antero Resources Bluestone LLC, a wholly owned subsidiary of Antero Resources Appalachian Corporation	Affidavit Regarding Merger	0205/0001
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>
<b><u>DEPI Lease</u></b>			
Dominion Exploration & Production, Inc.	Dominion Appalachian Development, LLC	1/8	0230/0362
Dominion Appalachian Development, LLC	Antero Resources Appalachian Corporation	Assignment	0231/0145
<b>Antero Resources Appalachian Corporation</b>	<b>Antero Resources Corporation</b>	<b>Name Change</b>	<b>Exhibit 1</b>

47-017-06656

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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.

11/06/2015

WW-6A1  
(5/13)

Operator's Well No. McCue Unit 2H

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE  
Chapter 22, Article 6A, Section 5(a)(5)  
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
Dominion Transmission, Inc. Lease	Dominion Transmission, Inc.	Antero Resources Corporation	1/8+	0412/0236

\*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

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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 **RECEIVED**  
 By: Kevin Kilstrom *[Signature]* **Office of Oil and Gas**  
 Its: VP - Production **OCT 22 2015**

WV Department of  
Environmental Protection

FILED

JUN 10 2013

Natalje 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](http://www.wvsos.com)  
E-mail: [business@wvsos.com](mailto:business@wvsos.com)

APPLICATION FOR  
AMENDED CERTIFICATE  
OF AUTHORITY

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

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

\*\*\*\* 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)

4701706656 *NOV*

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: *Alvyn A. Schopp* Date: June 10, 2013

**\*Important Legal Notice Regarding Signature:** Per West Virginia Code §31D-1-122. 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.

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OCT 22 2015  
Revised 4/15

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LATITUDE 39°20'00"

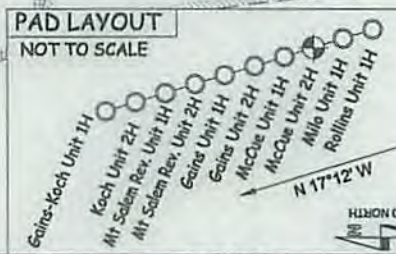
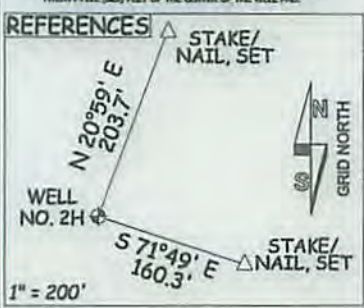
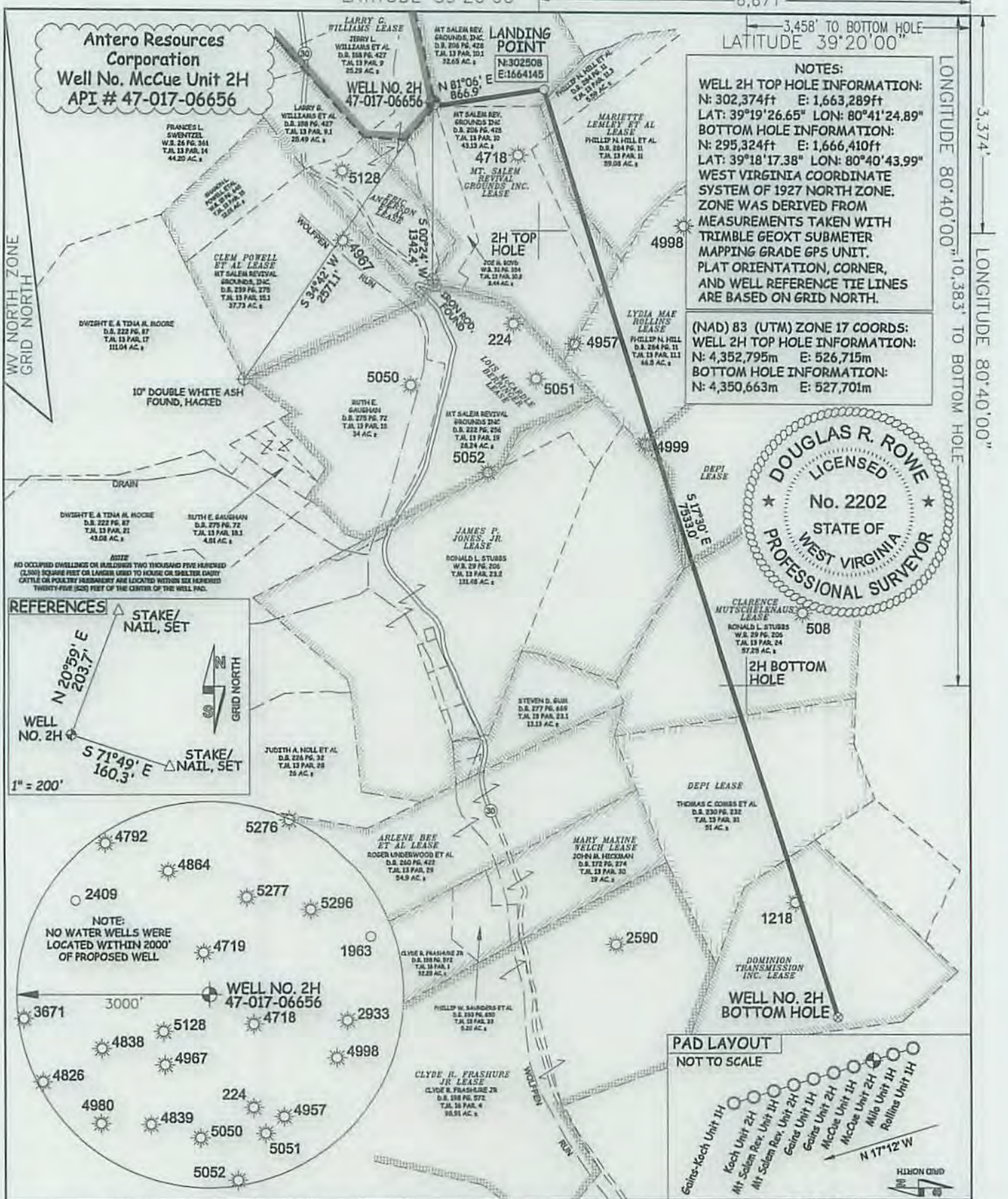
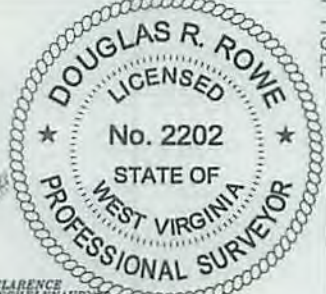
6,671'

3,458' TO BOTTOM HOLE  
LATITUDE 39°20'00"

LONGITUDE 80°40'00"  
10.383' TO BOTTOM HOLE  
LONGITUDE 80°40'00"

Antero Resources Corporation  
Well No. McCue Unit 2H  
API # 47-017-06656

NOTES:  
WELL 2H TOP HOLE INFORMATION:  
N: 302,374ft E: 1,663,289ft  
LAT: 39°19'26.65" LON: 80°41'24.89"  
BOTTOM HOLE INFORMATION:  
N: 295,324ft E: 1,666,410ft  
LAT: 39°18'17.38" LON: 80°40'43.99"  
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 2H TOP HOLE INFORMATION:  
N: 4,352,795m E: 526,715m  
BOTTOM HOLE INFORMATION:  
N: 4,350,663m E: 527,701m



JOB # 13-078WA  
DRAWING # MCCUEUNIT2HR2  
SCALE 1" = 1000'  
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 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

DOUGLAS R. ROWE P.S. 2202  
DATE 10/20/15  
OPERATOR'S WELL# MCCUE UNIT #2H  
API WELL # 47 - 017 - 06656

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 1,402' ORIGINAL - 1,376' AS-DRILLED WATERSHED HEADWATERS OF MIDDLE ISLAND CREEK  
QUADRANGLE SMITHBURG 7.5' DISTRICT GRANT COUNTY DODDRIDGE  
SURFACE OWNER LARRY WILLIAMS ET AL ACREAGE 25.49 ACRES +/-  
OIL & GAS ROYALTY OWNER LARRY G. WILLIAMS; MT. SALEM REVIVAL GROUNDS INC.; MARIETTE LEMLEY ET AL LEASE ACREAGE 35.11 ACRES +/-; 83 ACRES +/-; 66.87 ACRES +/-  
LYDIA MAE ROLLINS; DEPI; JAMES P. JONES, JR.; CLARENCE MUTSCHELKNAUS; DEPI; DOMINION TRANSMISSION INC. 66 AC +/-; 141 AC +/-; 57 AC +/-; 51 AC +/-; 46 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 7,500' TVD 16,000' MD  
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER  
ADDRESS 1615 WYNKOOP STREET ADDRESS CT CORPORATION SYSTEM  
FORM WW-6 DENVER, CO 80202 ADDRESS 5400 D BIG TYLER ROAD  
CHARLESTON, WV 25313

11/06/2015  
COUNTY NAME PERMIT