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west virginia department of environmental protection

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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)

Monday, June 18, 2018  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION  
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for JIM UNIT 2H  
47-095-02409-00-00

**Extend lateral**

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: JIM UNIT 2H  
Farm Name: WEESE, ROGER R.  
U.S. WELL NUMBER: 47-095-02409-00-00  
Horizontal 6A New Drill  
Date Modification Issued: June 18, 2018

Promoting a healthy environment.

06/22/2018

WW-6B  
(04/15)

API NO. 47-095 - 02409  
OPERATOR WELL NO. Jim Unit 2H  
Well Pad Name: Neat Pad

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

1) Well Operator: Antero Resources Corporation

<u>494507062</u>	<u>095 - Tyler</u>	<u>Meade</u>	<u>Middlebourne 7.5'</u>
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Operator ID County District Quadrangle

2) Operator's Well Number: Jim Unit 2H Well Pad Name: Neat Pad

3) Farm Name/Surface Owner: Weese, Roger R. Public Road Access: CR 7

4) Elevation, current ground: ~1032' Elevation, proposed post-construction: 1005'

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: 6600' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2800#

8) Proposed Total Vertical Depth: 6600' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 20150' MD

11) Proposed Horizontal Leg Length: 10824'

12) Approximate Fresh Water Strata Depths: 100', 121', 166'

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

14) Approximate Saltwater Depths: None Identified

15) Approximate Coal Seam Depths: 1441'

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  
FEB 26  
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Office of Oil and Gas  
FEB 26 2013  
WV Department of  
Environmental Protection

WW-6B  
(04/15)

API NO. 47- 095 - 02409  
OPERATOR WELL NO. Jim Unit 2H  
Well Pad Name: Neat 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#	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#	20150'	20150'	5133 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				REC Office c
Sizes:	N/A				FEB 6 2018
Depths Set:	N/A				WW Env Environmental Protection



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west virginia department of environmental protection

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

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Seam: \_\_\_\_\_

Owner: \_\_\_\_\_

RECEIVED  
Office of Oil  
FEB 26

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FEB 26 2013

WV Department of Environmental Protection

WW-6B  
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API NO. 47- 095 - 02409  
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Liners							

**PACKERS**

Kind:	N/A				REC'D Office c
Sizes:	N/A				FEB 6 2018
Depths Set:	N/A				WW Dept Environmental

WW-6B  
(10/14)

API# 47-095-02409 PERMIT MODIFICATION  
API NO. 47-095 - 02409  
OPERATOR WELL NO. Jim Unit 2H  
Well Pad Name: Neat 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.

\*Antero will be air drilling the fresh water string which makes it difficult to determine when fresh water 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."

Anticipated Max Pressure - 9300 lbs  
Anticipated Max Rate - 80 bpm

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 30.45 acres

22) Area to be disturbed for well pad only, less access road (acres): 8.93 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.

RECEIVED  
Office of Conservation  
FEB 26 2013  
WV Department of Environmental Protection

LATITUDE 39°27'30"

5,952'

3,970' TO BOTTOM HOLE

LATITUDE 39°25'00"

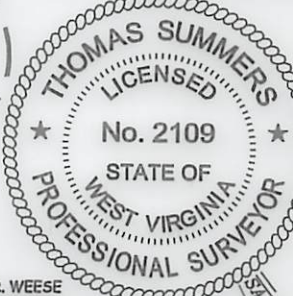
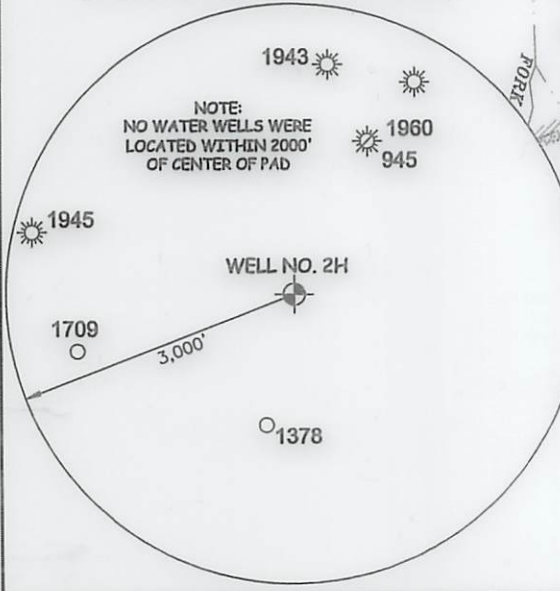
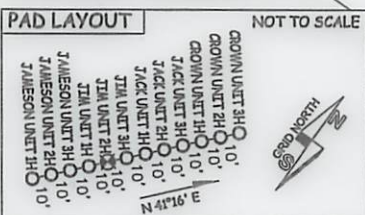
LONGITUDE 80°55'00"

13,428'

LONGITUDE 80°55'00"

### Antero Resources Corporation Well No. Jim Unit 2H

**NOTES:**  
**WELL 2H TOP HOLE INFORMATION:**  
 N: 338,868ft E: 1,593,850ft  
 LAT: 39°25'17.29" LON: 80°56'15.84"  
**BOTTOM HOLE INFORMATION:**  
 N: 327,997ft E: 1,595,660ft  
 LAT: 39°23'30.14" LON: 80°55'50.57"  
 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: 4,363,560m E: 505,374m  
**BOTTOM HOLE INFORMATION:**  
 N: 4,360,257m E: 505,981m



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

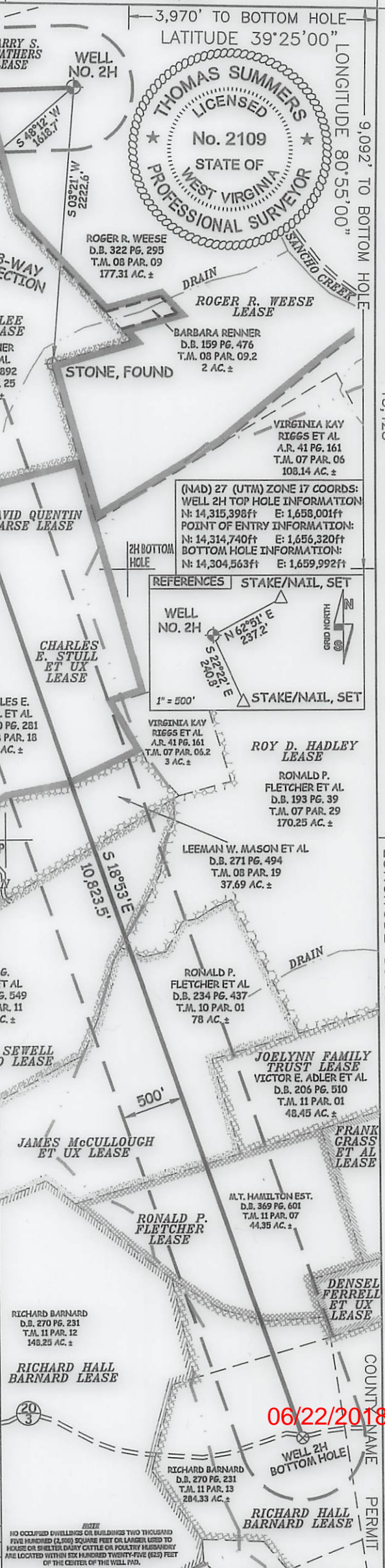
JOB # 14-128WA  
 DRAWING # JIM2HR2  
 SCALE 1" = 1000'  
 MINIMUM DEGREE OF ACCURACY SUBMETER  
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS  
 STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

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

THOMAS SUMMERS P.S. 2109  
 DATE 02/19/18  
 OPERATOR'S WELL# JIM UNIT #21H

WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL  
 (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X  
 LOCATION: ELEVATION 1,005' - PROPOSED 1,032' - ORIGINAL WATERSHED OUTLET MIDDLE ISLAND CREEK  
 QUADRANGLE MIDDLEBOURNE 7.5' DISTRICT MEADE COUNTY TYLER  
 SURFACE OWNER ROGER R. WEESE ACREAGE 177.31 ACRES +/-  
 OIL & GAS ROYALTY OWNER ROGER R. WEESE; JAMES A. SMITH; STEVEN P. CARSE; RONNIE LEE SMITH;  
 CHARLES E. STULL ET UX; LEEMAN W. MASON ET UX; GRACE SEWELL DeCARLO; ROY D. HADLEY;  
 JAMES McCULLOUGH ET UX; RONALD P. FLETCHER; RICHARD HALL BARNARD  
 OIL & GAS ROYALTY OWNER 196.709 AC±; 31.919 AC±; 81.57 AC±; 97.544 AC±;  
 105 AC±; 37.69 AC±; 85.52 AC±; 170.25 AC±; 78 AC±; 44.35 AC±; 284.33 AC±  
 PROPOSED WORK: DRILL X CONVERT DRILL DEEPER REDRILL  
 FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION  
 PLUG & ABANDON CLEAN OUT & REPLUG PERFORATE NEW FORMATION X  
 OTHER PHYSICAL CHANGE IN WELL (SPECIFY) MOD - BHL  
 TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,600' TVD 20,150' MD

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER  
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD  
 FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313



06/22/2018

47 - 095 - 02409  
 STATE COUNTY PERMIT



LATITUDE 39°27'30"

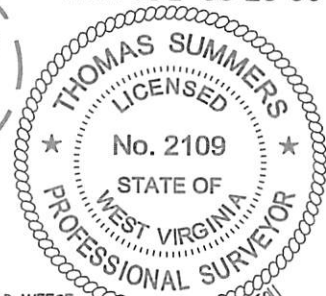
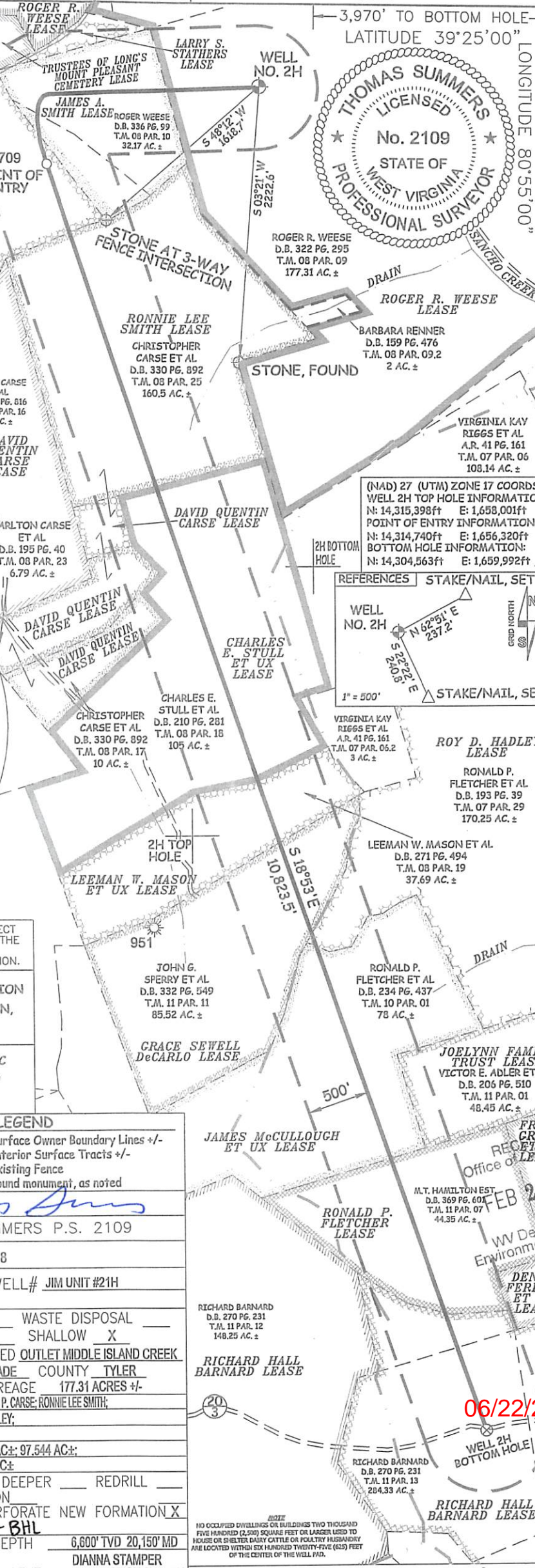
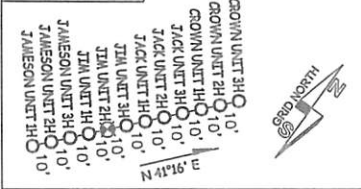
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PAD LAYOUT

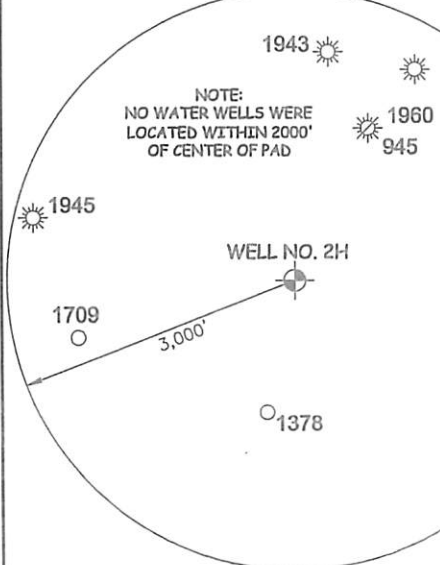


WV NORTH ZONE  
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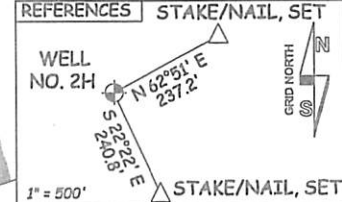
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LONGITUDE 80°55'00"

13,428'

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N: 14,315,398ft E: 1,658,001ft  
POINT OF ENTRY INFORMATION:  
N: 14,314,740ft E: 1,656,320ft  
BOTTOM HOLE INFORMATION:  
N: 14,304,563ft E: 1,659,992ft



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ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD  
FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

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.

FEB 26 2018

06/22/2018

47 - 095 - 02409  
STATE COUNTY PERMIT

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

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

(1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;

(2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<u>Roger Weese Lease</u>			
Roger R. Weese	Antero Resources Appalachian Corporation	1/8+	0435/0766
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>James A. Smith Lease</u>			
James A. Smith	Antero Resources Appalachian Corporation	1/8+	0420/0406
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Steven P. Carse Lease</u>			
Steven P. Carse	Antero Resources Corporation	1/8+	0449/0036
<u>Ronnie Lee Smith Lease (6-8 p/o 25)</u>			
Ronnie Lee Smith	Antero Resources Corporation	1/8+	0434/0519
<u>Charles E. Stull, et ux Lease</u>			
Charles E. Stull, et ux	Antero Resources Appalachian Corporation	1/8+	0433/0508
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Leeman W. Mason, et ux Lease</u>			
Leeman W. Mason, et ux	Antero Resources Corporation	1/8+	0456/0417
<u>Grace Sewell DeCarlo Lease</u>			
Grace Sewell DeCarlo	Antero Resources Corporation	1/8+	0430/0470
<u>James McCullough, et ux Lease</u>			
James McCullough, et ux	Chesapeake Appalachia, LLC	1/8	0376/0366
Chesapeake Appalachia, LLC	Statoil USA Onshore Properties, Inc.	Assignment	0384/0359
Statoil USA Onshore Properties, Inc.	Antero Resources Corporation	Assignment	0544/0291
<u>Ronald P. Fletcher Lease</u>			
Ronald P. Fletcher	Antero Resources Corporation	1/8+	0442/0581

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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)

Operator's Well No. Jim Unit 2H

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

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

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

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Richard Hall Barnard Lease</u>	Richard Hall Barnard	Antero Resources Corporation	Assignment	0442/0065

\*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.

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Office of  
  
FEB 16  
  
WV Dept.  
Environmental Protection

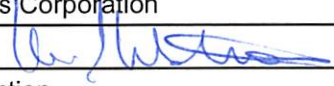
**Acknowledgement of Possible Permitting/Approval  
In Addition to the Office of Oil and Gas**

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

REC'D  
Office of  
  
FEB 16  
  
WV Dept.  
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 VP Production

FORM WW-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



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)

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:

- 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
- 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, listing a contact person and phone number may avoid having to return or reject the document.)  
Alwyn A. Schopp (303) 367-7310  
Contact Name Phone Number
- Signature information (See below \*Important Legal Notice Regarding Signature\*):  
Print Name of Signer: Alwyn A. Schopp Title/Capacity: Authorized Person  
Signature: [Handwritten Signature] Date: June 10, 2013

**\*Important Legal Notice Regarding Signature:** For 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.

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Office of Oil and Gas

FEB 26 2018

WV Department of  
Environmental Protection

06/22/2018