



west virginia department of environmental protection

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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Thursday, April 9, 2020
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET
DENVER, CO 80202

Re: Permit Modification Approval for RUSSELL UNIT 2H
47-017-06901-00-00

Extending Lateral Length & Point of Entry. Extend Lateral Length 2979' to 11287'. Extend Measured Depth 11500' to 20200'. Updated Leases

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: RUSSELL UNIT 2H
Farm Name: SAMUEL AND PEGGY SMITH
U.S. WELL NUMBER: 47-017-06901-00-00
Horizontal 6A New Drill
Date Modification Issued: 04/09/2020

Promoting a healthy environment.

WW-6B
(04/15)

API NO. 47- 017 - 06901
OPERATOR WELL NO. Russell Unit 2H
Well Pad Name: Peggy June 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: Russell Unit 2H Well Pad Name: Peggy June Pad

3) Farm Name/Surface Owner: Samuel and Peggy Smith Public Road Access: Smithton Rd (Old US-50)

4) Elevation, current ground: 1275' Elevation, proposed post-construction: _____

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

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 7400' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2950#

8) Proposed Total Vertical Depth: 7400' TVD RECEIVED Office of Oil and Gas

9) Formation at Total Vertical Depth: Marcellus MAR 27 2020

10) Proposed Total Measured Depth: 20200' MD ✓ WV Department of Environmental Protection

11) Proposed Horizontal Leg Length: 11287' ✓

12) Approximate Fresh Water Strata Depths: 145', 215', 320' ✓

13) Method to Determine Fresh Water Depths: 4701704853 4701705606 4701701318 ✓

14) Approximate Saltwater Depths: 1603' ✓

15) Approximate Coal Seam Depths: 1601' ✓

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: _____

WW-6B
(04/15)

API NO. 47- 017 - 06901
 OPERATOR WELL NO. Russell Unit 2H
 Well Pad Name: Peggy June 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#	370 *see #19	370 *see #19 ✓	CTS, 514 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#	20200	20200 ✓	5147 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
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-NIPOZ & Tab - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

Kind:	N/A			RECEIVED Office of Oil and Gas
Sizes:	N/A			MAR 27 2020
Depths Set:	N/A			WV Department of Environmental Protection

WW-6B
(10/14)

API NO. 47- 017 - 06901
OPERATOR WELL NO. Russell Unit 2H
Well Pad Name: Peggy June 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): 40.52 Acres

22) Area to be disturbed for well pad only, less access road (acres): 8.89 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.

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MAR 27 2020

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

WV Department of
Environmental Protection

25) Proposed borehole conditioning procedures:

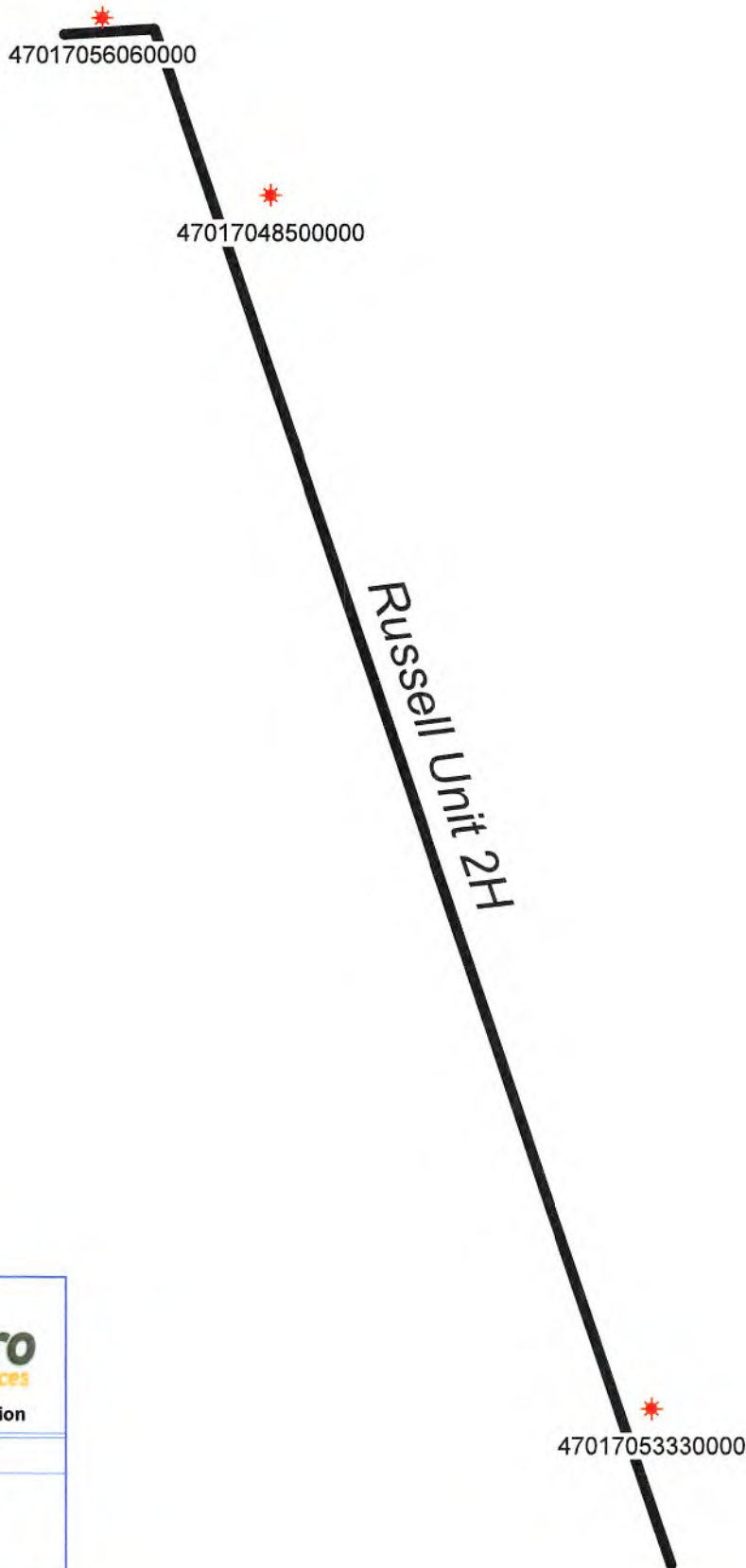
Conductor: blowhole clean with air, run casing, 10 bbls fresh water.
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.
Intermediate: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

Daniel A. Flack Digitally signed by Daniel A. Flack
Date: 2020.03.24 13:09:10 -04'00'

RUSSELL UNIT 2H (PEGGY JUNE PAD)- AREA OF REVIEW 35-8-5.11

PERMIT MODIFICATION API # 47-017-06901



Antero Resources Corporation

Russell Unit 2H - AOR



WELL SYMBOLS
Gas Well

October 14, 2019

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MAR 24 2020

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UWI (APINum)	Well Name	Well Number	Operator	Hist Oper	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Producible Formation(s) not perf'd
47017056060000	BARNES	1	ENERGY PROD INC	ENERGY PROD INC	5751	2825-5500	Gordon, Speechley, Riley, Benson, Alexander, Berea	Big Injun, Warren, Riley
47017048500000	BARNES R L	6791	ALLIANCE PETR CORP	DOMINION EXPL&PROD	5287	1820 - 5132	Big Injun	Speechley, Riley, Berea
47017053330000	DOTSON GERTRUDE ARBUTUS HEIRS	7197	ALLIANCE PETR CORP	DOMINION EXPL&PROD	5040	1616 - 4848	Squaw, Weir, Gordon, Benson, Alexander	Big Injun, Speechley, Warren, Berea

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 WV Department of
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LATITUDE 39°20'00"

10,789'

6,663' TO BOTTOM HOLE

LATITUDE 39°17'30"

6,423' TO BOTTOM HOLE

10,968'

LONGITUDE 80°42'30"

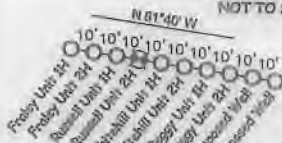
LONGITUDE 80°42'30"

Antero Resources Corporation Well No. Russell Unit 2H

NOTES: WELL 2H TOP HOLE INFORMATION: N: 294,995ft E: 1,647,283ft LAT: 39°18'11.59" LON: 80°44'47.25" BOTTOM HOLE INFORMATION: N: 284,310ft E: 1,651,265ft LAT: 39°16'26.52" LON: 80°43'54.73" 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: 4,350,466m E: 521,876m BOTTOM HOLE INFORMATION: N: 4,347,231m E: 523,143m

PAD LAYOUT NOT TO SCALE



NO WATER WELLS WERE LOCATED WITHIN 2000' OF CENTER OF PAD



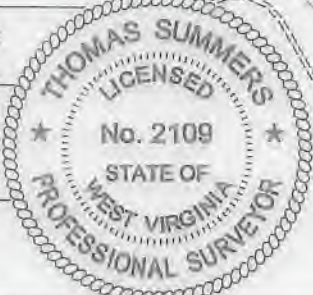
Table listing landowners and lease information for the West Union District - Doddridge County, including names like David Spaulding, Michael O'Brien, John Smith, etc.

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 # 19-030WA DRAWING # RUSSELL2HMOD 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 03/19/20 OPERATOR'S WELL# RUSSELL UNIT #2H

(NAD) 27 (UTM) ZONE 17 COORDS: WELL 2H TOP HOLE INFORMATION: N: 14,272,439ft E: 1,712,140ft POINT OF ENTRY INFORMATION: N: 14,272,523ft E: 1,712,713ft BOTTOM HOLE INFORMATION: N: 14,261,825ft E: 1,716,296ft REFERENCES: 1" = 300' STAKE/ NAIL, SET N 48°34' W 230.3' STAKE/ NAIL, SET N 58°19' E 192.4' WELL NO. 2H

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.

Form containing well details: WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL 47 - 017 - 06901 MOD I (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X STATE COUNTY PERMIT LOCATION: ELEVATION 1,275' - AS BUILT WATERSHED HEADWATERS MIDDLE ISLAND CREEK QUADRANGLE SMITHBURG 7.5 DISTRICT WEST UNION COUNTY DODDRIDGE SURFACE OWNER SAMUEL AND PEGGY SMITH ACREAGE 28.956 ACRES +/- OIL & GAS ROYALTY OWNER FLAINE DEBOLT; R.L. BARNES ET UX; EOT PRODUCTION COMPANY; HARLAND E. SISLER; WVSRA; WVDNR; PATHFINDER RESOURCES, LLC; MARY N. KISSINGER; LEASE ACREAGE 04.8 AC +/-; 222 AC +/-; 75 AC +/-; 7 AC +/-; 301.19 AC +/-; 54.48 AC +/-; 136.50 AC +/-; 61.58 AC +/-; W.L. DAVIS ET UX; CNX GAS COMPANY LLC; PAULA LAFFERTY; 265 AC +/-; 1.32 AC +/-; 44.9 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 7,400' TVD 20,200' MD WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM ADDRESS 1815 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD DENVER, CO 80202 CHARLESTON, WV 25313

LATITUDE 39°20'00"

10,789'

6,663' TO BOTTOM HOLE

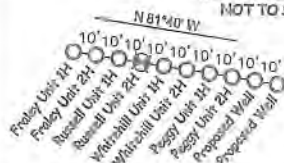
LATITUDE 39°17'30"

Antero Resources Corporation Well No. Russell Unit 2H

NOTES: WELL 2H TOP HOLE INFORMATION: N: 294,995ft E: 1,647,283ft ... WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE.

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PAD LAYOUT NOT TO SCALE



NO WATER WELL WERE LOCATED WITHIN 2000' OF CENTER OF PAD



Table listing well numbers and owners, including: 08-49 David Spanogle, 08-50 Michael O'Brien, 12-08 John Smith, etc.

5,423' TO BOTTOM HOLE

10,968'

LONGITUDE 80°42'30"

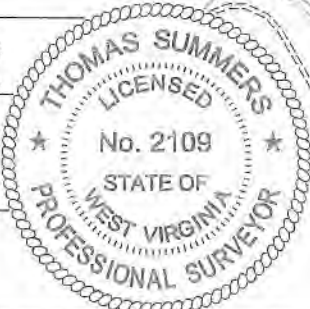
LONGITUDE 80°42'30"

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

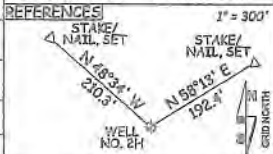
WILLOW LAND SURVEYING PLLC 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415



JOB # 19-030WA DRAWING # RUSSELL2HMOD SCALE 1" = 2000' MINIMUM DEGREE OF ACCURACY SUBMETER

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

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Form containing well details: WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL 47 - 017 - 06901 MOD 1; SURFACE OWNER SAMUEL AND PEGGY SMITH; OPERATOR'S WELL# RUSSELL UNIT #2H; ADDRESS 1815 WYNKOOP ST. DENVER, CO 80202

Operator's Well Number

Russell 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:

Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<u>Elaine Debolt Lease</u>			
Elaine Debolt	Antero Resources Corporation	1/8+	433/306
<u>R. L. Barnes, et ux Lease</u>			
R.L. Barnes, et ux	South Penn Oil Company	1/8	19/71
South Penn Oil Company	Hope Natural Gas Company	Assignment	23/424
Hope Natural Gas Company	Consolidated Gas Supply Corporation	Assignment	143/345
Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment	135/583
Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Name Change	332/563
CNG Transmission Corporation	Dominion Transmission Inc	Name Change	332/570
Dominion Transmission Inc	Consol Energy Holding LLC XVI	Assignment	245/1
Consol Energy Holding LLC XVI	Consol Gas Company	Merged	292/469
Consol Gas Company	CNX Gas Company LLC	Merged	293/252
CNX Gas Company LLC	Antero Resources Corporation	Assignment	317/379
<u>EQT Production Company Lease</u>			
EQT Production Company	Antero Resources Corporation	1/8+	0371/0288
<u>Harland E. Sisler Lease</u>			
Harland E. Sisler	Antero Resources Corporation	1/8+	0371/0288
<u>WVSRA Lease</u>			
WVSRA	Antero Resources Appalachian Corporation	1/8+	0253/0409
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Pathfinder Resources LLC Lease</u>			
Pathfinder Resources LLC	Antero Resources Corporation	1/8+	0483/0188
<u>Mary N. Kissinger Lease</u>			
Mary N. Kissinger	Antero Resources Corporation	1/8+	0471/0322
<u>CNX Gas Company LLC Lease</u>			
CNX Gas Company LLC	Antero Resources Corporation	1/8+	0447/0519

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Office of Oil and Gas

MAR 24 2020

WV Department of
Environmental Protection

WW-6A1
(5/13)

Operator's Well No. Russell Unit 2H

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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>W.L. Davis et al Lease</u>	W.L. Davis et al	The Fisher Oil Company	1/8	0014/0304
	The Fisher Oil Company	The Carter Oil Company	Assignment	0022/0126
	The Carter Oil Company	Hope Natural Gas Company	Assignment	0026/0196
	Hope Natural Gas Company	Consolidated Gas Supply Corporation	Conveyance	0143/0345
	Consolidated Gas Supply Corporation	CNG Gas Transmission Corporation	Name Change	0328/0398
	CNG Gas Transmission Corporation	Dominion Transmission Inc.	Name Change	0332/0570
	Dominion Transmission Inc.	Consol Energy Holdings LLC	Assignment	0245/0001
	Consol Energy Holdings LLC	CNX Gas Company LLC	Merger	0293/0252
	CNX Gas Company LLC	Antero Resources Corporation	Assignment	0387/0216

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

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

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Antero Resources Corporation
 By: Tim Rady
 Its: VP of Land

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Office of Oil and Gas

Page 1 of 1

MAR 24 2020

WV Department of
Environmental Protection

FILED

JUN 10 2013

Natalie B. Tumbert,
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.wvscd.com
E-mail: business@wvscd.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: \$28.00

*** 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 Appalachia 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.)
Allyn A. Schopp (304) 367-7310
Contact Name Phone Number

7. 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 §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.

RECEIVED
Office of Oil and Gas
MAR 24 2013
WV Dept.
Environmental Protection

WW-6B
(04/15)

API NO. 47-017 - 06901
OPERATOR WELL NO. Russell Unit 2H
Well Pad Name: Peggy June Pad

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

VOID

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Operator ID County District Quadrangle
- 2) Operator's Well Number: Russell Unit 2H Well Pad Name: Peggy June Pad
- 3) Farm Name/Surface Owner: Samuel and Peggy Smith Public Road Access: Smithton Rd (Old US-50)
- 4) Elevation, current ground: 1275' Elevation, proposed post-construction: _____
- 5) Well Type (a) Gas Oil _____ Underground Storage _____
Other _____
(b) If Gas Shallow Deep _____
Horizontal
- 6) Existing Pad: Yes or No Yes
- 7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 7400' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2950#
- 8) Proposed Total Vertical Depth: 7400' TVD
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- 13) Method to Determine Fresh Water Depths: 47017048530000, 47017056060000, 47017013180000
- 14) Approximate Saltwater Depths: 1603'
- 15) Approximate Coal Seam Depths: 1601'
- 16) Approximate Depth to Possible Void (coal mine, karst, other): None Anticipated
- 17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes _____ No
- (a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

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Office of Oil and Gas

MAR 24 2020

WW-6B
(04/15)

API NO. 47- 017 - 06901
OPERATOR WELL NO. Russell Unit 2H
Well Pad Name: Peggy June Pad

18) **CASING AND TUBING PROGRAM**

TYPE	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
Conductor	20"	New	H-40	94#	80	80	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	370 *see #19	370 *see #19	CTS, 514 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#	20200	20200	5147 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

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

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WV Department of
Environmental Protection

WW-6B
(10/14)

API NO. 47- 017 - 06901

OPERATOR WELL NO. Russell Unit 2H

Well Pad Name: Peggy June 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): 40.52 Acres

22) Area to be disturbed for well pad only, less access road (acres): 8.89 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.

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Page 3 of 3

LATITUDE 39°20'00"

10,789'

6,663' TO BOTTOM HOLE

LATITUDE 39°17'30"

Antero Resources Corporation Well No. Russell Unit 2H

NOTES: WELL 2H TOP HOLE INFORMATION: N: 294,995ft E: 1,647,283ft LAT: 39°18'11.59" LON: 80°44'47.25" BOTTOM HOLE INFORMATION: N: 284,310ft E: 1,651,265ft LAT: 39°16'26.52" LON: 80°43'54.73" 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: 4,350,466m E: 521,876m BOTTOM HOLE INFORMATION: N: 4,347,231m E: 523,143m

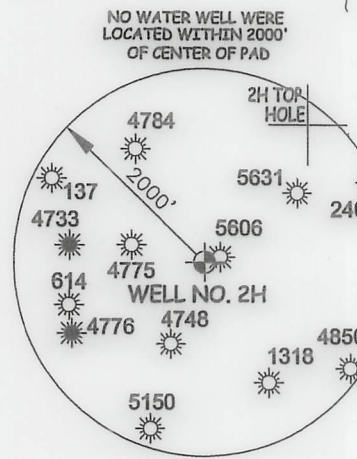
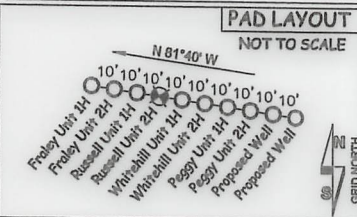


Table listing well numbers and owners, including West Union District - Doddridge County, David Sponaugle, Michael O'Brien, John Smith, etc.

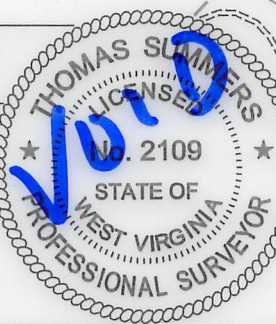
6,423' TO BOTTOM HOLE 10,968' LONGITUDE 80°42'30"

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 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 # 19-030WA DRAWING # RUSSELL2HMOD 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 03/19/20 OPERATOR'S WELL # RUSSELL UNIT #2H

(NAD) 27 (UTM) ZONE 17 COORDS: WELL 2H TOP HOLE INFORMATION: N: 14,272,439ft E: 1,712,140ft POINT OF ENTRY INFORMATION: N: 14,272,523ft E: 1,712,713ft BOTTOM HOLE INFORMATION: N: 14,261,825ft E: 1,716,298ft REFERENCES: 1" = 300'

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

WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL 47 017 06901 M651 (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X STATE COUNTY PERMIT LOCATION: ELEVATION 1,275' - AS BUILT WATERSHED HEADWATERS MIDDLE ISLAND CREEK QUADRANGLE SMITHBURG 7.5' DISTRICT WEST UNION COUNTY DODDRIDGE SURFACE OWNER SAMUEL AND PEGGY SMITH ACREAGE 28.956 ACRES +/- LEASE ACREAGE 84.8 AC +/- 222 AC +/- 75 AC +/- OIL & GAS ROYALTY OWNER ELAINE DEBOLT; R.L. BARNES ET UX; EQT PRODUCTION COMPANY; HARLAND E. SISLER; WWSRA; WVDNR; PATHFINDER RESOURCES, LLC; MARY N. KISSINGER; W.L. DAVIS ET UX; CNX GAS COMPANY LLC; PAULA LAFFERTY 7 AC +/- 301.19 AC +/- 54.48 AC +/- 138.58 AC +/- 61.58 AC +/- 285 AC +/- 1.32 AC +/- 44.9 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 7,400' TVD 20,200' MD WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM ADDRESS 1615 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

LATITUDE 39°20'00"

10,789'

6,663' TO BOTTOM HOLE

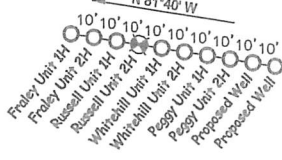
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PAD LAYOUT NOT TO SCALE



NO WATER WELL WERE LOCATED WITHIN 2000' OF CENTER OF PAD

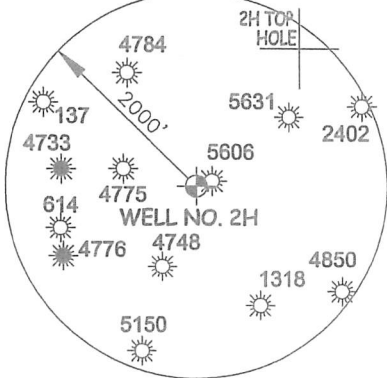


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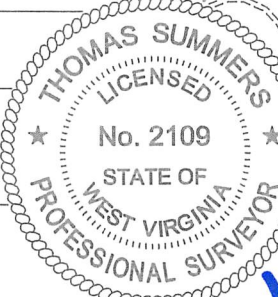
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STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

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



VOID

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