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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)

Tuesday, November 24, 2020  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION  
1615 WYNKOOP STREET  
DENVER, CO 80202

Re: Permit Modification Approval for SPECTER UNIT 2H  
47-095-02706-00-00

**Lateral Extension**

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.

A handwritten signature in blue ink, appearing to read 'James A. Martin', is positioned above the printed name and title.

James A. Martin  
Chief

Operator's Well Number: SPECTER UNIT 2H  
Farm Name: KAYLA LEEK  
U.S. WELL NUMBER: 47-095-02706-00-00  
Horizontal 6A New Drill  
Date Modification Issued: 11/24/2020

Promoting a healthy environment.

Ck# 2203533  
11/5/20  
\$5000<sup>00</sup>

WW-6B  
(04/15)

API NO. 47-095 - 02706  
OPERATOR WELL NO. Specter Unit 2H  
Well Pad Name: Margery 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 095-Tyler Ellsworth Porter Falls 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: Specter Unit 2H Well Pad Name: Margery Pad

3) Farm Name/Surface Owner: Kayla Leek Public Road Access: CR 11

4) Elevation, current ground: 1070' Elevation, proposed post-construction: ~1042'

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: 7000' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#

8) Proposed Total Vertical Depth: 7000' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 21700' MD

11) Proposed Horizontal Leg Length: 11661'

12) Approximate Fresh Water Strata Depths: 102'

13) Method to Determine Fresh Water Depths: 47-095-01958

14) Approximate Saltwater Depths: 1998'

15) Approximate Coal Seam Depths: None Identified

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: \_\_\_\_\_

John Cragin Blevins Digitally signed by John Cragin Blevins Date: 2020.11.23 13:57:00 -05'00' *JCB* 11/23/2020

WW-6B  
(04/15)

API NO. 47- 095 - 02706  
OPERATOR WELL NO. Specter Unit 2H  
Well Pad Name: Margery Pad

18) **CASING AND TUBING PROGRAM**

<b>TYPE</b>	<b>Size (in)</b>	<b>New or Used</b>	<b>Grade</b>	<b>Weight per ft. (lb/ft)</b>	<b>FOOTAGE: For Drilling (ft)</b>	<b>INTERVALS: Left in Well (ft)</b>	<b>CEMENT: Fill-up (Cu. Ft.)/CTS</b>
Conductor	20"	New	H-40	94#	80	80 ✓	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	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	23#	21700	21700 ✓	CTS, 5559 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

*JCB*  
11/23/2020

<b>TYPE</b>	<b>Size (in)</b>	<b>Wellbore Diameter (in)</b>	<b>Wall Thickness (in)</b>	<b>Burst Pressure (psi)</b>	<b>Anticipated Max. Internal Pressure (psi)</b>	<b>Cement Type</b>	<b>Cement Yield (cu. ft./k)</b>
Conductor	20"	24"	0.438"	1530	50	Class A	~1.18
Fresh Water	13-3/8"	17-1/2"	0.38"	2730	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"	0.415"	12,630 ✓	2500	Lead-HIPOZ & 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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WW-6B  
(10/14)

API NO. 47-095 - 02706  
OPERATOR WELL NO. Specter Unit 2H  
Well Pad Name: Margery 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.

*JCB*  
10/23/2020

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): 51.65 acres

22) Area to be disturbed for well pad only, less access road (acres): 13.44 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

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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.

PERMIT MODIFICATION API # 47-095-02706



Specter Unit 2H

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Antero Resources Corporation

Specter Unit 2H - AOR



FEET

REMARKS  
No Wells of Interest

August 13, 2020

JCB  
11/23/2020



WW-6A1

Operator's Well Number Specter 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
<b>X</b> <u>Ridgetop Capital LP Lease</u>			
Ridgetop Capital LP	Petroedge Energy LLC	1/8	0420/0643
Petroedge Energy LLC	Statoil USA Onshore Properties Inc.	Assignment	0436/0001
Statoil USA Onshore Properties Inc.	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<b>W</b> <u>BRC Appalachia Minerals I LLC Lease</u>			
BRC Appalachia Minerals I LLC	BRC Working Interest Company	1/8	0369/0300
BRC Working Interest Company	Chesapeake Appalachia LLC	Assignment	0369/0784
Chesapeake Appalachia LLC	Statoil USA Onshore Properties	Assignment	0378/0764
Statoil USA Onshore Properties	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<b>W/V</b> <u>Ridgetop Capital LP Lease</u>			
Ridgetop Capital LP	Petroedge Energy LLC	1/8	0420/0643
Petroedge Energy LLC	Statoil USA Onshore Properties Inc.	Assignment	0436/0001
Statoil USA Onshore Properties Inc.	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<b>S</b> <u>Michael W. Eddy Lease</u>			
Michael W. Eddy	Stone Energy Corporation	1/8	0397/0691
Stone Energy Corporation	EQT Production Company	Assignment	0556/0132
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<b>R</b> <u>Melissa Dawn Pilant Lease</u>			
Melissa Dawn Pilant	TH Exploration LLC	1/8	0562/0305
TH Exploration LLC	Antero Resources Corporation	Assignment	0052/0053
<b>R1</b> <u>Charles R. Ferrell et ux Lease</u>			
Charles R. Ferrell et ux	Antero Exchange Properties LLC	Assignment	0544/0242
Antero Exchange Properties LLC	Antero Resources Corporation	Merger	0552/0315
<b>P</b> <u>Gary A. Sole Lease (TM 11 PCL 28)</u>			
Gary L. Sole	Antero Resources Corporation	1/8+	0066/0147
<b>Q</b> <u>J. Maurice Carlisle Jr. Lease</u>			
J. Maurice Carlisle Jr.	Antero Resources Corporation	1/8+	0655/0460
<b>X</b> <u>Gary A. Sole Lease (TM 11 PCL 29)</u>			
Gary L. Sole	Antero Resources Corporation	1/8+	0066/0147

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WV Department of Environmental Protection

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

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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<b>O</b> <u>Ralph D. Thacker Lease</u> Ralph D. Thacker	Antero Resources Corporation	1/8+	0032/0432
<b>A</b> <u>Charles Ray Jobs Lease</u> Charles Ray Jobs Antero Exchange Properties LLC	Antero Exchange Properties LLC Antero Resources Corporation	Assignment Merger	0544/0242 0552/0315
<b>I1</b> <u>Bounty Minerals LLC Lease</u> Bounty Minerals LLC	Antero Resources Corporation	1/8+	0055/0306
<b>F</b> <u>Fisher Oil Company Lease (TM 11 PCL 5)</u> Fisher Oil Company	Antero Resources Corporation	1/8+	0019/0535
<b>H</b> <u>Fisher Oil Company Lease (TM 11 PCL 75)</u> Fisher Oil Company	Antero Resources Corporation	1/8+	0019/0535
<b>Z</b> <u>Justus A. Eakin Lease</u> Justus A. Eakin	Antero Resources Corporation	1/8+	0580/104
<b>I2</b> <u>Fisher Oil Company Lease (TM 11 PCL 76)</u> Fisher Oil Company	Antero Resources Corporation	1/8+	0019/0535

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WW-6A1  
(5/13)

Operator's Well No. Specter Unit 2H

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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
B REOP LLC Lease	REOP LLC	Antero Resources Corporation	1/8+	0059/0089

\*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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WV Division of Environmental Protection

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

\*Co-tenancy utilization – At least 7 mineral owners in tract. At least 75% of the royalty owners have executed a lease on the tract. The interests of the remaining co-tenants were acquired pursuant to the Co-tenancy Modernization and Majority Protection Act

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

LATITUDE 39°32'30"

10,730'

LATITUDE 39°35'00"

1,272' TO BOTTOM HOLE

Antero Resources Corporation Well No. Specter Unit 2H

Table with 3 columns: Letter (A-Z), Owner Name, and Acres. Lists various landowners and their respective acreage for the well pad area.

NOTES: WELL 2H TOP HOLE INFORMATION: N: 373,269ft E: 1,624,882ft LAT: 39°31'01.99" LON: 80°49'46.92" BOTTOM HOLE INFORMATION: N: 384,900ft E: 1,622,758ft LAT: 39°32'56.63" LON: 80°50'16.24" 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: 4,374,198m E: 514,653m BOTTOM HOLE INFORMATION: N: 4,377,731m E: 513,947m (NAD) 27 (UTM) ZONE 17 COORDS: WELL 2H TOP HOLE INFORMATION: N: 14,350,301ft E: 1,688,445ft POINT OF ENTRY INFORMATION: N: 14,350,857ft E: 1,689,887ft BOTTOM HOLE INFORMATION: N: 14,361,891ft E: 1,686,127ft

WV NORTH ZONE GRID NORTH

12,482' TO BOTTOM HOLE

8,904'

LONGITUDE 80°47'30"

LONGITUDE 80°50'00"

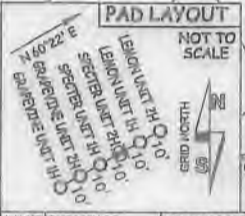
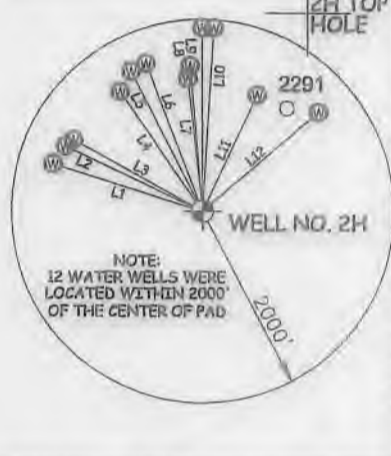


Table with 3 columns: LINE, BEARING, and DISTANCE. Lists 12 lines (L1-L12) with their bearings and distances from the center of the well pad.

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.

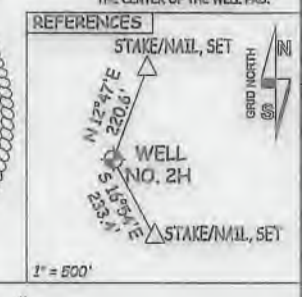
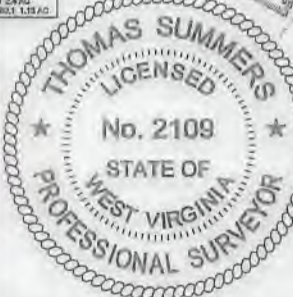


STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS. WILLOW LAND SURVEYING PLLC, 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415

A-LINE ROY HOWARD D.B. 11/14/11 132.60 AC S-ROBERT G. HILLER D.B. 10/01/11 111-12 230.07 AC S-LEO ROY HOWARD D.B. 12/02/11 114-23 83.9 AC S-ROBERT D. HILLER D.B. 10/01/11 114-23 83.9 AC S-JOHN E. CHAMBERLAIN D.B. 10/01/11 114-23 83.9 AC F-RICHARD L. JONES D.B. 10/01/11 114-23 83.9 AC G-DANIEL R. FERRELL D.B. 11/14/11 114-23 83.9 AC H-ROBERT J. FERRELL D.B. 10/01/11 114-23 83.9 AC I-CURTIS J. FERRELL D.B. 10/01/11 114-23 100.40 AC J-RICHARD L. JONES D.B. 10/01/11 114-23 83.9 AC K-ROBERT J. FERRELL D.B. 10/01/11 114-23 83.9 AC L-ROBERT J. FERRELL D.B. 10/01/11 114-23 83.9 AC

JOB # 20-007WA DRAWING # SPECTER2HR2 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 +/-, Adjoining Surface Tracts +/-, Found monument, as noted. Signature of Thomas Summers, P.S. 2109, DATE 10/29/20, OPERATOR'S WELL # SPECTER UNIT #2H



WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL 47 095 02706 (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X STATE COUNTY PERMIT LOCATION: ELEVATION ORIGINAL -1,070' PROPOSED -1,042' WATERSHED OUTLET MIDDLE ISLAND CREEK QUADRANGLE PORTER FALLS 7.5' DISTRICT ELLSWORTH COUNTY TYLER SURFACE OWNER KAYLA LEEK ACREAGE 69.06 ACRES +/- OIL & GAS ROYALTY OWNER RIDGETOP CAPITAL LP; BRC APPALACHIAN MINERALS I LLC LEASE ACREAGE 69.06 AC +/- 58.58 AC +/- RIDGETOP CAPITAL IV LP; MICHAEL W. EDDY; MELISSA DAWN PILANT; GARY A. SOLE; J. MAURICE CARLISLE JR.; 43.5 AC +/- 33.74 AC +/- 50.05 AC +/- 92.5 AC +/- 19 AC +/- RALPH D. THACKER; CHARLES RAY JOES; BOUNTY MINERALS, LLC; FISHER OIL COMPANY; 25 AC +/- 48.74 AC +/- 1.09 AC +/- 45.67 AC +/- RONALD R. JONES; JUSTUS A. EAKIN; REOP, LLC; 38 AC +/- 12 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) BHL-MOD PLUG & ABANDON CLEAN OUT & REPLUG TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,000' TVD 21,700' 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°32'30"

10,730'

LATITUDE 39°35'00"

1,272' TO BOTTOM HOLE

Antero Resources Corporation Well No. Specter Unit 2H

Table with 2 columns: Well Owner and Acres. Lists owners from A to Z including Charles Ray Jobes, Reop, LLC, Heritage Resources-Marcellus Minerals, LLC, Fisher Oil Company, Linda K. Loehr, Ryan Greenlee et ux, etc.

WV NORTH ZONE GRID NORTH

NOTES: WELL 2H TOP HOLE INFORMATION: N: 373,269ft E: 1,624,882ft LAT: 39°31'01.99" LON: 80°49'46.92" BOTTOM HOLE INFORMATION: N: 384,900ft E: 1,622,758ft LAT: 39°32'56.63" LON: 80°50'16.24" 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.

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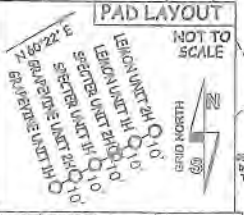
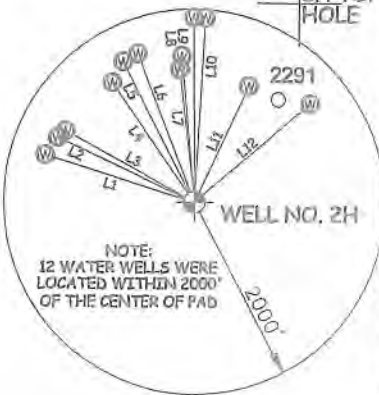


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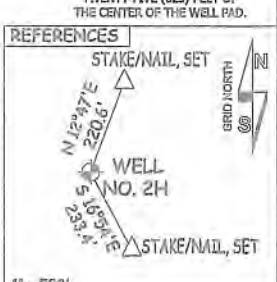
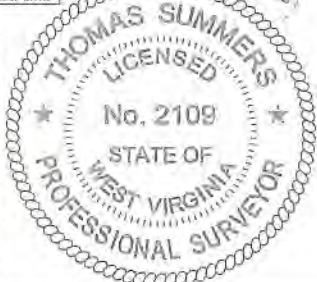
STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

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

A-LEIGH HENNING D.B. 2199 AC. B-ROBERT D. MILLER D.B. 2000 AC. C-LEIGH HENNING D.B. 2199 AC. D-ROBERT D. MILLER D.B. 2000 AC. E-JOHN E. KEPLER D.B. 2000 AC. F-ROBERT D. MILLER D.B. 2000 AC. G-CHARLES M. FERRELL D.B. 2000 AC. H-RICHARD J. FERRELL D.B. 2000 AC. I-ROBERT D. MILLER D.B. 2000 AC. J-ROBERT D. MILLER D.B. 2000 AC. K-ROBERT D. MILLER D.B. 2000 AC. L-ROBERT D. MILLER D.B. 2000 AC.

JOB # 20-007WA DRAWING # SPECTER2HRZ SCALE 1" = 2000' MINIMUM DEGREE OF ACCURACY SUBMETER PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

LEGEND Surface Owner Boundary Lines +/- Adjoining Surface Tracts +/- Found monument, as noted THOMAS SUMMERS P.S. 2109



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

DATE 10/29/20 OPERATOR'S WELL# SPECTER UNIT #2H

WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL 47 - 095 - 02706 (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X STATE COUNTY PERMIT LOCATION: ELEVATION ORIGINAL -1,070' PROPOSED -1,042' WATERSHED OUTLET MIDDLE ISLAND CREEK QUADRANGLE PORTER FALLS 7.5' DISTRICT ELLSWORTH COUNTY TYLER

SURFACE OWNER KAYLA LEEK ACREAGE 69.06 ACRES +/-

OIL & GAS ROYALTY OWNER RIDGETOP CAPITAL LP; BRC APPALACHIAN MINERALS I LLC LEASE ACREAGE 69.06 AC.±; 58.56 AC.±; RIDGETOP CAPITAL IV LP; MICHAEL W. EDDY; MELISSA DAWN PILANT; GARY A. SOLE; J. MAURICE CARLISLE JR.; 43.5 AC.±; 33.74 AC.±; 50.05 AC.±; 92.5 AC.±; 19 AC.±; RALPH D. THACKER; CHARLES RAY JOBES; BOUNTY MINERALS, LLC; FISHER OIL COMPANY; 25 AC.±; 48.74 AC.±; 1.09 AC.±; 45.67 AC.±; RONALD R. JONES; JUSTUS A. FAKIN; REOP, LLC; 38 AC.±; 12 AC.±; 17 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) BHL-MOD PLUG & ABANDON CLEAN OUT & REPLUG TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,000' TVD 21,700' 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

Supplement

95-02706



November 5, 2020

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. Laura Adkins  
601 57<sup>th</sup> Street  
Charleston, WV 25304

Ms. Laura Adkins:

Antero Resources Corporation (Antero) would like to submit the following permit modification for the following expedited approved well on the existing Margery Pad: Lemon Unit 2H (API # 47-095-02704), Grapevine Unit 2H (API # 47-095-02708), Specter Unit 1H (API # 47-095-02705) & Specter Unit 2H (API # 47-095-02706).

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the updated POE & Measured Depth
- REVISED Form WW-6A1, which shows the new leases we will be drilling into
- REVISED Mylar Plat, which shows the new Lateral Length & Estimated Measured Depth
- AOR & As-Built Design

If you have any questions please feel free to contact me at (303) 357-7223.

Thank you in advance for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Megan Griffith", with a long horizontal flourish extending to the right.

Megan Griffith  
Permitting Agent  
Antero Resources Corporation

Enclosures

WW-6B  
(04/15)

Check # 2203533  
11/5/2020  
\$5,000.00

PERMIT MODIFICATION API # 47-095-02706

API NO. 47-095 - 02706  
OPERATOR WELL NO. Specter Unit 2H  
Well Pad Name: Margery 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 095-Tyler Ellsworth Porter Falls 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: Specter Unit 2H Well Pad Name: Margery Pad

3) Farm Name/Surface Owner: Kayla Leek Public Road Access: CR 11

4) Elevation, current ground: 1070' Elevation, proposed post-construction: ~1042'

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: 7000' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#

8) Proposed Total Vertical Depth: 7000' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 21700' MD

11) Proposed Horizontal Leg Length: 11661'

12) Approximate Fresh Water Strata Depths: 102'

13) Method to Determine Fresh Water Depths: 47-095-01958

14) Approximate Saltwater Depths: 1998'

15) Approximate Coal Seam Depths: None Identified

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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West Virginia  
Department of  
Environmental Protection

WW-6B  
(04/15)

API NO. 47- 095 - 02706  
OPERATOR WELL NO. Specter Unit 2H  
Well Pad Name: Margery 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	54.5#	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	23#	21700	21700	CTS, 5559 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

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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"	2730	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"	0.415"	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**

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Kind:	N/A				NOV 06 2010
Sizes:	N/A				W.M.C. Environmental Protection
Depths Set:	N/A				

WW-6B  
(10/14)

API NO. 47-095 - 02706  
OPERATOR WELL NO. Specter Unit 2H  
Well Pad Name: Margery 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.

**VOID**

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): 51.65 acres

22) Area to be disturbed for well pad only, less access road (acres): 13.44 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

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Environmental Protection

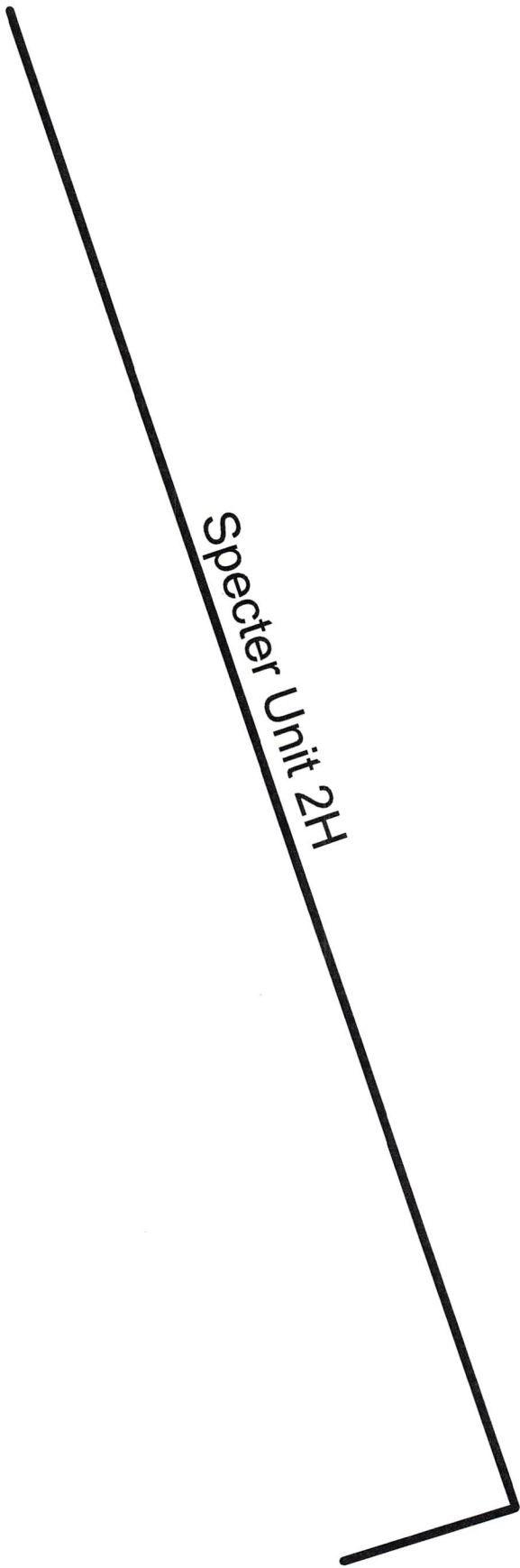
25) Proposed borehole conditioning procedures:

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.



PERMIT MODIFICATION API # 47-095-02706



Specter Unit 2H

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WV Department of Environmental Protection



Antero Resources Corporation

Specter Unit 2H - AOR



REMARKS  
No Wells of Interest

August 13, 2020



WW-6A1

Operator's Well Number Specter 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)

**VOID**

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>Ridgetop Capital LP Lease</u></b>			
Ridgetop Capital LP	Petroedge Energy LLC	1/8	0420/0643
Petroedge Energy LLC	Statoil USA Onshore Properties Inc.	Assignment	0436/0001
Statoil USA Onshore Properties Inc.	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<b><u>BRC Appalachia Minerals I LLC Lease</u></b>			
BRC Appalachia Minerals I LLC	BRC Working Interest Company	1/8	0369/0300
BRC Working Interest Company	Chesapeake Appalachia LLC	Assignment	0369/0784
Chesapeake Appalachia LLC	Statoil USA Onshore Properties	Assignment	0378/0764
Statoil USA Onshore Properties	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<b><u>Ridgetop Capital LP Lease</u></b>			
Ridgetop Capital LP	Petroedge Energy LLC	1/8	0420/0643
Petroedge Energy LLC	Statoil USA Onshore Properties Inc.	Assignment	0436/0001
Statoil USA Onshore Properties Inc.	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<b><u>Michael W. Eddy Lease</u></b>			
Michael W. Eddy	Stone Energy Corporation	1/8	0397/0691
Stone Energy Corporation	EQT Production Company	Assignment	0556/0132
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<b><u>Melissa Dawn Pilant Lease</u></b>			
Melissa Dawn Pilant	TH Exploration LLC	1/8	0562/0305
TH Exploration LLC	Antero Resources Corporation	Assignment	0052/0053
<b><u>Charles R. Ferrell et ux Lease</u></b>			
Charles R. Ferrell et ux	Antero Exchange Properties LLC	Assignment	0544/0242
Antero Exchange Properties LLC	Antero Resources Corporation	Merger	0552/0315
<b><u>Gary A. Sole Lease (TM 11 PCL 28)</u></b>			
Gary L. Sole	Antero Resources Corporation	1/8+	0066/0147
<b><u>J. Maurice Carlisle Jr. Lease</u></b>			
J. Maurice Carlisle Jr.	Antero Resources Corporation	1/8+	0655/0460
<b><u>Gary A. Sole Lease (TM 11 PCL 29)</u></b>			
Gary L. Sole	Antero Resources Corporation	1/8+	0066/0147

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WV Department of Environmental Protection

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

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)

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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<b><u>Ralph D. Thacker Lease</u></b>			
Ralph D. Thacker	Antero Resources Corporation	1/8+	0032/0432
<b><u>Charles Ray Jobs Lease</u></b>			
Charles Ray Jobs	Antero Exchange Properties LLC	Assignment	0544/0242
Antero Exchange Properties LLC	Antero Resources Corporation	Merger	0552/0315
<b><u>Bounty Minerals LLC Lease</u></b>			
Bounty Minerals LLC	Antero Resources Corporation	1/8+	0055/0306
<b><u>Fisher Oil Company Lease (TM 11 PCL 5)</u></b>			
Fisher Oil Company	Antero Resources Corporation	1/8+	0019/0535
<b><u>Fisher Oil Company Lease (TM 11 PCL 75)</u></b>			
Fisher Oil Company	Antero Resources Corporation	1/8+	0019/0535
<b><u>Justus A. Eakin Lease</u></b>			
Justus A. Eakin	Antero Resources Corporation	1/8+	0580/104
<b><u>Fisher Oil Company Lease (TM 11 PCL 76)</u></b>			
Fisher Oil Company	Antero Resources Corporation	1/8+	0019/0535

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 Environmental

WW-6A1  
(5/13)

Operator's Well No. Specter 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)**

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- (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
REOP LLC Lease	REOP LLC	Antero Resources Corporation	1/8+	0059/0089

**VOID**

\*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.

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NOV 23 2020  
WV Department of Environmental Protection

\*Co-tenancy utilization – At least 7 mineral owners in tract. At least 75% of the royalty owners have executed a lease on the tract. The interests of the remaining co-tenants were acquired pursuant to the Co-tenancy Modernization and Majority Protection Act

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