



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

Monday, June 25, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for COOL UNIT 2H
47-017-06834-00-00

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.

James A. Martin
Chief

Operator's Well Number: COOL UNIT 2H
Farm Name: STANLEY WEBB ET AL
U.S. WELL NUMBER: 47-017-06834-00-00
Horizontal 6A New Drill
Date Modification Issued: June 25, 2018

A handwritten signature in blue ink, appearing to read 'James A. Martin', is written over the text of the permit details.

Promoting a healthy environment.

06/29/2018

WW-6B
(04/15)

API NO. 47- 017 - 06834

OPERATOR WELL NO. Cool Unit 2H

Well Pad Name: Stanley 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 Central Pullman 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Cool Unit 2H Well Pad Name: Stanley Pad

3) Farm Name/Surface Owner: Stanley Webb et al Public Road Access: Cabin Run Rd (CR 21/1)

4) Elevation, current ground: 1095' Elevation, proposed post-construction: 1095'

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- 50 feet, Associated Pressure- 3000#

8) Proposed Total Vertical Depth: 7000' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 17200' MD

11) Proposed Horizontal Leg Length: 9530'

12) Approximate Fresh Water Strata Depths: 168', 322', 433'

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

14) Approximate Saltwater Depths: 660', 1083', 2090'

15) Approximate Coal Seam Depths: 170', 877'

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

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(a) If Yes, provide Mine Info: Name: _____

Depth: _____

Seam: _____

Owner: _____

WV Department of
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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#	485' *see #19	485' *see #19	CTS, 674 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#	17200'	17200'	4322 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#		7100'	
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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Environmental Protection

WW-6B
(10/14)

Permit Modification API# 47-017-06834
API NO. 47- 017 - 06834
OPERATOR WELL NO. Cool Unit 2H
Well Pad Name: Stanley 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): 43.30 Acres

22) Area to be disturbed for well pad only, less access road (acres): 9.00 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.

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*Note: Attach additional sheets as needed.

LATITUDE 39°15'00" ← 1,308'

9,279' TO BOTTOM HOLE

LATITUDE 39°15'00"

LONGITUDE 80°50'00"

4,792'

LONGITUDE 80°52'30"

13,630' TO BOTTOM HOLE

Antero Resources Corporation Well No. Cool Unit 2H

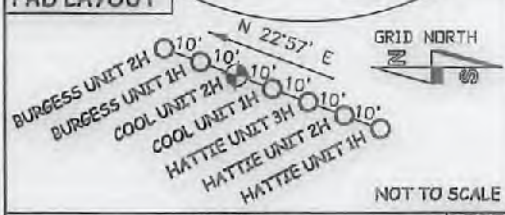
LINE	BEARING	DISTANCE
L1	S 77°58' E	1375.64'
L2	S 73°33' E	1804.51'
L3	S 75°04' E	1554.82'
L4	S 65°46' E	1596.34'
L5	S 64°01' E	1381.04'
L6	S 63°52' E	1636.75'
L7	S 60°31' E	1513.41'
L8	S 56°06' E	1345.05'
L9	S 51°10' E	1175.61'
L10	S 48°41' E	1080.76'
L11	S 44°24' E	1202.08'
L12	S 41°37' E	1125.54'
L13	S 32°54' E	947.53'
L14	S 26° E	1151.29'
L15	S 17°05' E	1113.08'
L16	S 08°23' E	1115.22'
L17	S 01°55' W	1414.85'
L18	S 05°17' W	1425.29'
L19	S 23°05' W	1806.45'
L20	S 42°21' W	1298.64'
L21	S 67°20' W	1616.97'
L22	S 73°44' W	1425.05'

NOTES:
 WELL 2H TOP HOLE INFORMATION:
 N: 271,374ft E: 1,609,233ft
 LAT: 39°14'12.64" LON: 80°52'46.63"
 BOTTOM HOLE INFORMATION:
 N: 262,479ft E: 1,612,933ft
 LAT: 39°12'45.28" LON: 80°51'57.89"
 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: 4,343,076m E: 510,404m
 BOTTOM HOLE INFORMATION:
 N: 4,340,385m E: 511,576m



(NAD 27 (UTM) ZONE 17 COORDS:
 WELL 2H TOP HOLE INFORMATION:
 N: 14,248,195ft E: 1,674,503ft
 POINT OF ENTRY INFORMATION:
 N: 14,248,115ft E: 1,674,583ft
 BOTTOM HOLE INFORMATION:
 N: 14,239,365ft E: 1,678,349ft



LEGEND		
---	Surface Owner Boundary Lines +/-	
---	Interior Surface Tracts +/-	
---	Existing Fence	
⊕	Iron Pipe, Found	

REFERENCES		
⊕	STAKE/NAIL, SET	
⊕	WELL NO. 2H	
⊕	STAKE/NAIL, SET	

THOMAS SUMMERS P.S. 2109
DATE 04/24/18
OPERATOR'S WELL# COOL UNIT #2H
API WELL # 47 - 017 - 06834
STATE COUNTY PERMIT

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



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

JOB # 14-066WA
 DRAWING # COOL2HR6
 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
 WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
 LOCATION: ELEVATION 1,095' AS BUILT WATERSHED NORTH FORK HUGHES RIVER

QUADRANGLE PULLMAN 7.5 (TOP HOLE) OXFORD 7.5 (BOTTOM HOLE) DISTRICT CENTRAL COUNTY DODD
 SURFACE OWNER STANLEY WEBB ET AL ACREAGE 59.18 ACRES +/-
 OIL & GAS ROYALTY OWNER RALPH LEGGETT ET UX; C.E. ROSS; SUE ELLEN ABERNATHY; S. BYRL ROSS ET UX; F.R. INGRAM ET AL; JEFFREY C. POLAN; RUSSELL GRAY ET AL LEASE ACREAGE 75 ACRES +/-; 60 ACRES +/-; 65 ACRES +/-; 195 ACRES +/-; 130 ACRES +/-; 50 ACRES +/-; 225 ACRES +/-
 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 7,000' TVD 17,200' MD
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
 DENVER, CO 80202 CHARLESTON, WV 25313

06/29/2018

LATITUDE 39°15'00" — 1,308'

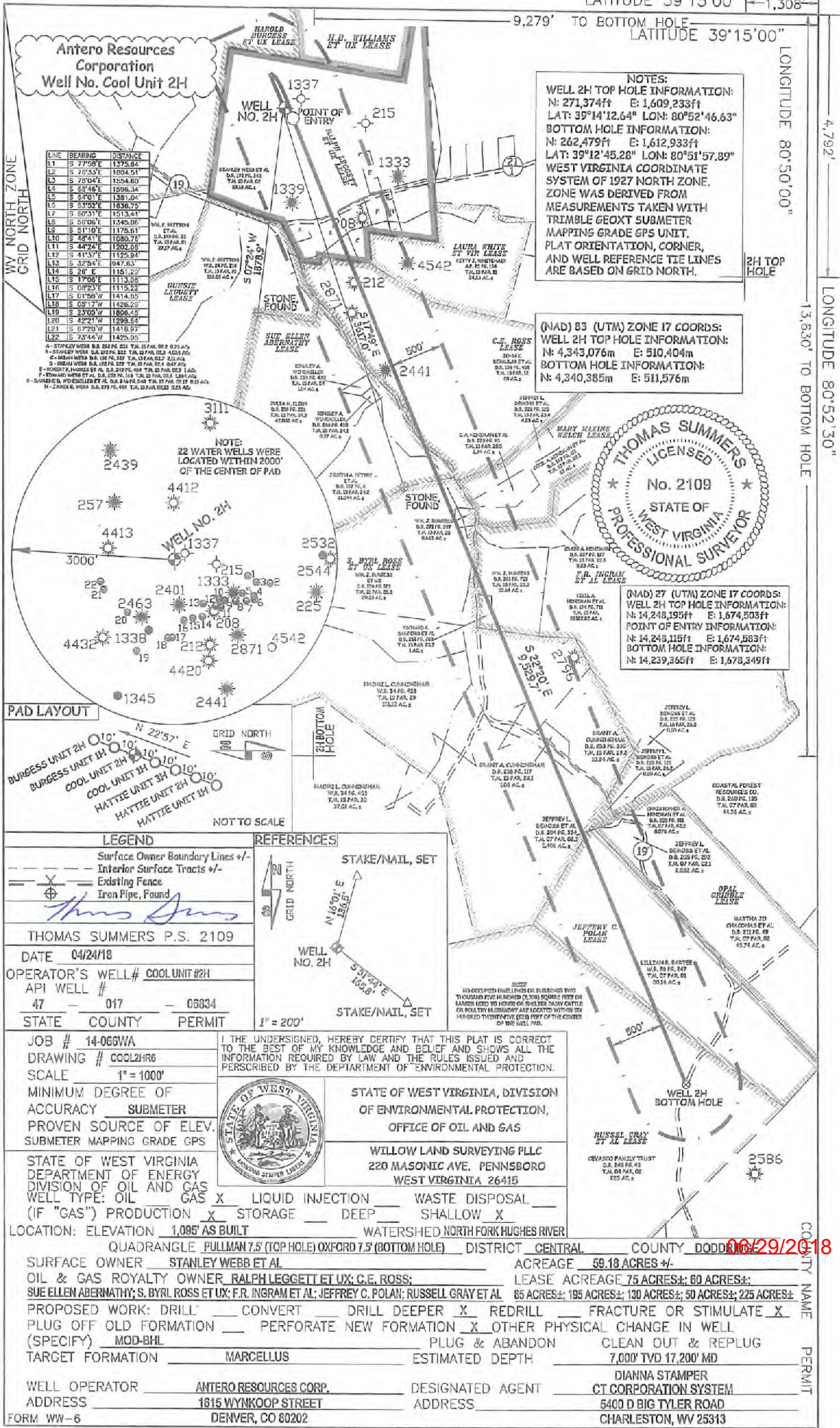
9,279' TO BOTTOM HOLE
LATITUDE 39°15'00"

LONGITUDE 80°50'00"

4,792'

LONGITUDE 80°52'30"

13,630' TO BOTTOM HOLE



06/29/2018

COUNTY NAME 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
Ralph Leggett et ux Lease			
Ralph Leggett et ux	Harold B. Smith	1/8	0088/0228
Harold B. Smith	Reeves Lewenthal	Assignment	0088/0232
Reeves Lewenthal	Ray Resources Corporation	Assignment	0099/0332
Ray Resources Corporation	Bow Valley Petroleum, Inc.	Assignment	0115/0031
Bow Valley Petroleum, Inc.	G.W. Petroleum, Inc.	Name Change	Recital in 0166/0312
G.W. Petroleum, Inc.	Great Western Onshore, Inc.	Name Change	Recital in 0166/0312
Great Western Onshore, Inc.	Eastern American Energy Corporation	Assignment	0166/0312
Eastern American Energy Corporation	Targa Development, Inc.	Assignment	0219/0529
Targa Development, Inc.	Antero Resources Appalachian Corporation	Assignment	0257/0362
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
C. E. Ross Lease			
C. E. Ross	Carnegie Natural Gas Company	1/8	0031/0272
Carnegie Natural Gas Company	H.L. Pernell & Luther Davis	Assignment	0058/0329
H.L. Pernell & Luther Davis	David M. Harrison, Helen F. Young, and James E. Young Executors of the estate of Charles E. Young	Assignment	0128/0453
David M. Harrison, Helen F. Young, and James E. Young Executors of the estate of Charles E. Young	Don D. Debrular & Charles Brady Debrular	Assignment	0095/0485
Don D. Debrular & Charles Brady Debrular	Vinson Gas & Oil Drilling Co.	Assignment	108/0458
Vinson Gas & Oil Drilling Co.	West Virginia Joint Venture No. Two Limited	Assignment	0112/0552
West Virginia Joint Venture No. Two Limited	Key Oil Company	Assignment	0181/0729
Key Oil Company	Antero Resources Appalachian Corporation	Assignment	0256/0285
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit
Sue Ellen Abernathy Lease			
Sue Ellen Abernathy	Antero Resources Appalachian Corporation	1/8+	0303/0363
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
S. Burl Ross et ux Lease			
S. Burl Ross & Elinor K. Ross	Alton Skinner	1/8	0114/0441
Alton L. Skinner, II, et al, as co-administrators of the estate of Alton L. Skinner, deceased	Crystal Skinner, et al	Assignment	0169/0193
Crystal Skinner, et al	DC Petroleum, Inc., et al	Assignment	0257/0062
DC Petroleum, Inc., et al	Antero Resources Appalachian Corporation	Assignment	0257/0062
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

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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.

WW-6A1
(5/13)

Operator's Well No. Cool 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
<u>Russel Gray et al Lease</u>	Russel Gray et al	Alton Skinner	1/8	0121/0123
	Alton L. Skinner, II et al, as co-administrators of the estate of Alton L. Skinner, deceased	Crystal Skinner, et al	Assignment	0169/0193
	Crystal Skinner, et al	DC Petroleum, Inc. , et al	Assignment	0170/0583
	DC Petroleum, Inc. and Chase Petroleum, Inc.	Antero Resources Appalachian Corporation	Assignment	0257/0062
	Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

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

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

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

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

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

Well Operator: Antero Resources Corporation
By: Diana Hoff *Diana Hoff*
Its: Vice President - Operations

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
<u>F. R. Ingram, et al Lease</u>			
F. R. Ingram, et al	Pennzoil Company	1/8	0103/0172
Pennzoil Company	Consolidated Gas Supply Corporation	Assignment	0108/0206
Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment	0135/0583
Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Amended Certificate of Authority	0051/0795
CNG Transmission Corporation	Dominion Transmission, Inc	Amended Certificate of Authority	0058/0362
Dominion Transmission, Inc	CONSOL Energy Holdings, LLC XVI	Assignment	0245/0001
CONSOL Energy Holdings, LLC XVI	CNX Gas Company, LLC	Affidavit of Name Changes and Merger	0293/0252
CNX Gas Company, LLC and Noble Energy, Inc	Antero Resources Corporation	Assignment	0235/0507
<u>Jeffrey C. Polan Lease</u>			
Jeffrey C. Polan	Antero Resources Corporation	1/8+	0356/0537

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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.

**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.wvsof.com
E-mail: business@wvsof.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: \$35.00

**** In accordance with the provisions of the West Virginia Code, the undersigned corporation hereby ****
applies for an Amended Certificate of Authority and submits the following statement:

1. Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation
2. Date Certificate of Authority was issued in West Virginia: 6/25/2008
3. Corporate name has been changed to: Antero Resources Corporation
(Attach one Certified Copy of Name Change as filed in home State of incorporation.)
4. Name the corporation elects to use in WV: Antero Resources Corporation
(due to home state name not being available)
5. Other amendments: _____
(attach additional pages if necessary)
6. Name and phone number of contact person. (This is optional, however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)
Alvyn A. Schopp (303) 357-7310
Contact Name Phone Number
7. Signature information (See below **Important Legal Notice Regarding Signature**):
Print Name of Signer: Alvyn A. Schopp Title/Capacity: Authorized Person
Signature: *Alvyn A. Schopp* Date: June 10, 2013

**Important Legal Notice Regarding Signature:* For West Virginia Code §3111-1-129. Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.

Form CF-4

Issued by the Office of the Secretary of State.

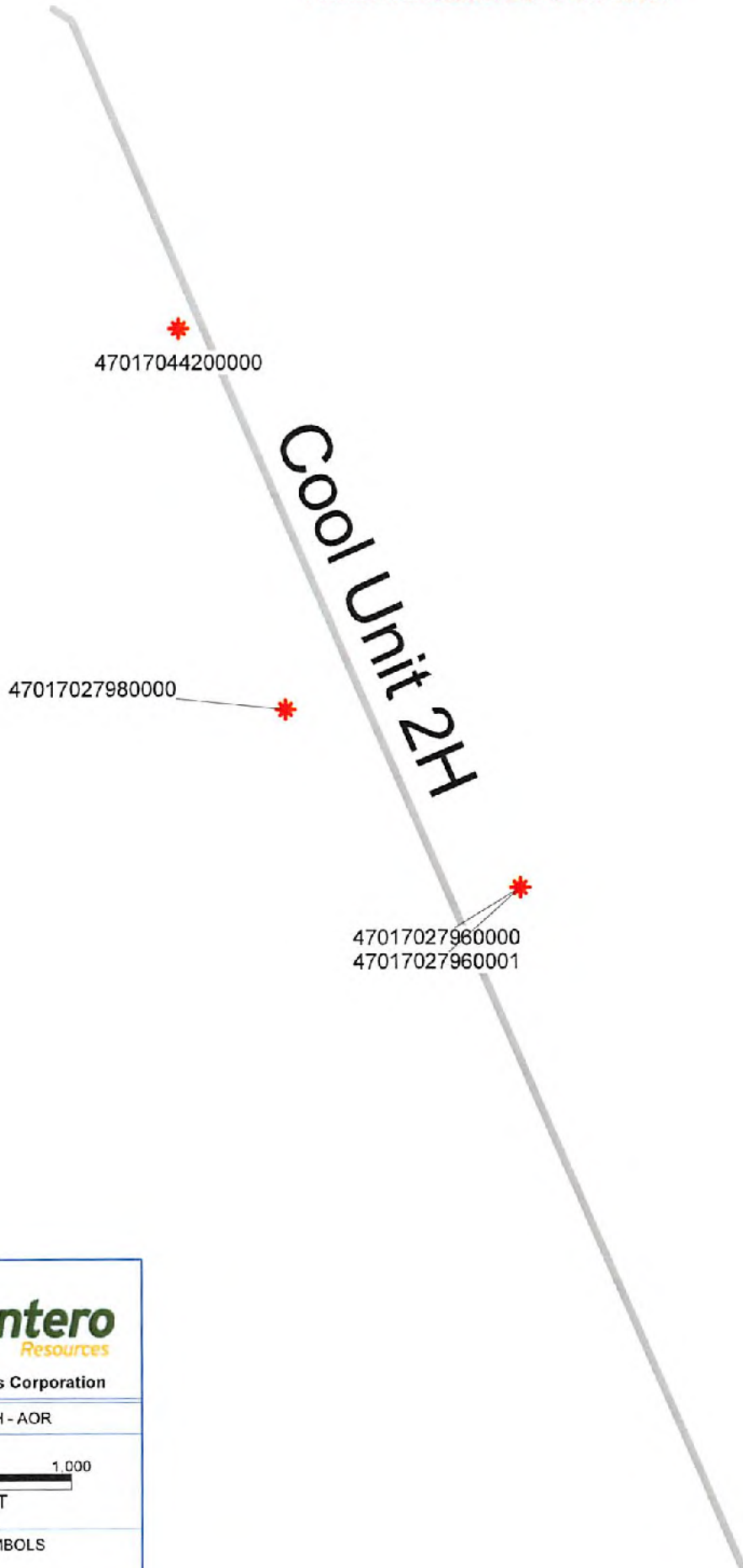
WV013 • 04/16/2012 Webin Klover Office

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Office of Oil and Gas
APR 27 2018
WV Department of
Environmental Protection
Revised 4/12

06/29/2018



Permit Modification API# 47-017-06834



Antero Resources Corporation

Cool Unit 2H - AOR



WELL SYMBOLS
Gas Well

April 17, 2018

RECEIVED
Office of Oil and Gas
APR 27 2018
WV Department of
Environmental Protection

06/29/2018

