



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, October 29, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / Horizontal 6A Well - 1

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET
DENVER, CO 80202

Re: Permit Modification Approval for HUGHES RIVER UNIT 2H
47-085-10214-00-00

Bottom Hole Extension with updated lease(s)

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: HUGHES RIVER UNIT 2H
Farm Name: LYNWOOD IRELAND
U.S. WELL NUMBER: 47-085-10214-00-00
Horizontal 6A Horizontal 6A Well - 1
Date Modification Issued: 10/28/2018

Promoting a healthy environment.

WW-6B
(04/15)

API# 47-085-10214 PERMIT MODIFICATION

API NO. 47-085 - 10214

OPERATOR WELL NO. Hughes River Unit 2H

Well Pad Name: Ireland North Pad

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

1) Well Operator: Antero Resources Corporation 494488557 085-Ritchie Union Pullman 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Hughes River Unit 2H Well Pad Name: Ireland North Pad

3) Farm Name/Surface Owner: Lynwood Ireland et al Public Road Access: CR 9

4) Elevation, current ground: 945.5' 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: 6800' TVD, Anticipated Thickness- 50 feet, Associated Pressure- 3000#

8) Proposed Total Vertical Depth: 6800' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 23600' MD

11) Proposed Horizontal Leg Length: 15109'

12) Approximate Fresh Water Strata Depths: 69', 279', 359'

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

14) Approximate Saltwater Depths: 1451, 1807'

15) Approximate Coal Seam Depths: 343'

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: _____

Michael Goff
8-16-18

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Office of Oil and Gas
OCT 26

WV Department of
Environmental Protection

WW-6B
(04/15)

API# 47-085-10214 PERMIT MODIFICATION

API NO. 47- 085 - 10214
 OPERATOR WELL NO. Hughes River Unit 2H
 Well Pad Name: Ireland North Pad

18)

CASING AND TUBING PROGRAM

| TYPE | Size (in) | New or Used | Grade | Weight per ft. (lb/ft) | FOOTAGE: For Drilling (ft) | INTERVALS: Left in Well (ft) | CEMENT: Fill-up (Cu. Ft.)/CTS |
|--------------|-----------|-------------|-----------|------------------------|----------------------------|------------------------------|-------------------------------|
| Conductor | 20" | New | H-40 | 94# | 40' | 40' | CTS, 38 Cu. Ft. |
| Fresh Water | 13-3/8" | New | J-55/H-40 | 54.5#/48# | 410' *see #19 | 410' *see #19 | CTS, 570 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# | 23600' | 23600' | 6081 Cu. Ft. |
| Tubing | 2-3/8" | New | N-80 | 4.7# | | 7,100 | |
| Liners | | | | | | | |

| TYPE | Size (in) | Wellbore Diameter (in) | Wall Thickness (in) | Burst Pressure (psi) | Anticipated Max. Internal Pressure (psi) | Cement Type | Cement Yield (cu. ft./k) |
|--------------|-----------|------------------------|---------------------|----------------------|--|---------------------|--------------------------|
| Conductor | 20" | 24" | 0.438" | 1530 | 50 | Class A | 1.18 |
| Fresh Water | 13-3/8" | 17-1/2" | 0.38"/0.33" | 2730/1730 | 1000 | Class A | 1.18 |
| Coal | 9-5/8" | 12-1/4" | 0.352" | 3520 | 1500 | Class A | 1.18 |
| Intermediate | | | | | | | |
| Production | 5-1/2" | 8-3/4" & 8-1/2" | 0.361" | 12630 | 2500 | Lead-HPCZ & Tel - H | H/POZ-1.44 & H-1.8 |
| Tubing | 2-3/8" | 4.778" | 0.19" | 11200 | | | |
| Liners | | | | | | | |

MDC
8-16-18

PACKERS

| | | | | |
|-------------|-----|--|--|--|
| Kind: | N/A | | | |
| Sizes: | N/A | | | |
| Depths Set: | N/A | | | |

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OCT 26 2018

WW-6B
(10/14)

API NO. 47-085 - 10214
OPERATOR WELL NO. Hughes River Unit 2H
Well Pad Name: Ireland North 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 freshwater is encountered, therefore we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

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

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

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

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 28.70 acres

22) Area to be disturbed for well pad only, less access road (acres): 4.09 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 Oil and Gas

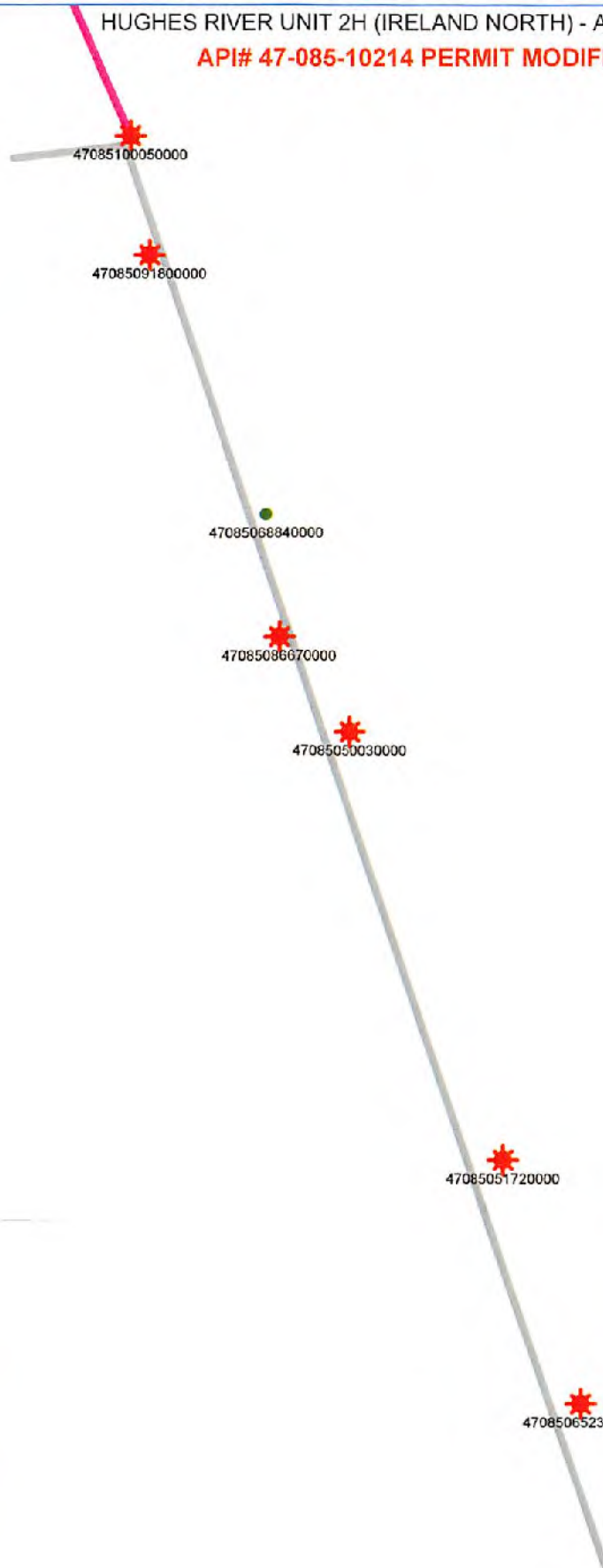
Page 3 of 3

26 2018

MDC
8-14-18



API# 47-085-10214 PERMIT MODIFICATION

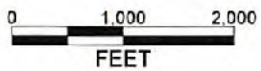


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JUL 10 2018
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Environmental Protection



Antero Resources Corporation

Hughes River West Unit 2H



- WELL SYMBOLS
- Gas Well (Red star symbol)
 - Oil Well (Green dot symbol)

July 5, 2018

| UWI (API#) | Well Name | Well Number | Operator | Historical Operator | TD | Perforated Interval (shallowest, deepest) | Perforated Formation(s) | Productive Formation(s) not perf'd |
|----------------|-------------------|-------------|------------------------------|------------------------------|-------|---|--|------------------------------------|
| 47085090030000 | SPIKER BRADFORD Z | 3 | ASARTA O&G CO INC | CHASE PETROLEUM CO | 5324 | 4274 - 5212 | Pennsylvanian System, Warren, Balltown, Riley, Benson, Alexander | Weir |
| 47085095230000 | BROWN W R HEIRS | A-1314 | MINERAL RES MGMT LLC | ALLEGHENY LAND&MNRL | 5200 | 3981 - 5034 | Weir, Balltown, Riley, Alexander | Big Injun |
| 47085100050000 | IRELAND UNIT | 1H | ANTERO RESOURCES CORPORATION | ANTERO RESOURCES CORPORATION | 15017 | 6318 - 14927 | Pennsylvanian System, Marcellus Shale | Big Injun, Weir |
| 47085051720000 | SMITH HIRAM HEIRS | 3-1846 | EQT PRODUCTION CO | CARNegie NAT GAS CRP | 5375 | 2655 - 5299 | Big Injun (Grmb), Alexander | Weir |
| 47085068840000 | DAVIS M H | 1-F | ZICKFOOSE W F & R L | FOX DRILLING | 5327 | 3214 - 5235 | Udev undf:Ber,LoHURN, Lower Huron, Angola Fm | Big Injun, Weir |
| 47085086620000 | FLESHER | 1 | KEY OIL COMPANY | KEY OIL COMPANY | 5341 | 3350 - 5143 | Warren, Balltown, Riley, Benson, Alexander | Big Injun, Weir |
| 47085091800000 | IRELAND W | 6 | KEY OIL COMPANY | KEY OIL COMPANY | 5221 | 3251 - 5077 | Mississippian, Warren, Balltown, Riley, Benson, Elk, Alexander | Big Injun, Weir |

HUGHES RIVER UNIT 2H (IRELAND NORTH) - AREA OF REVIEW 35-8-5.11 PAGE 2

API# 47-085-10214 PERMIT MODIFICATION

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Office of Oil and Gas
JUL 10 2018
WV Department of
Environmental Protection

LATITUDE 39°12'30"

6,871'

LATITUDE 39°10'00" 834' TO BOTTOM HOLE

LONGITUDE 80°52'30"

12,014' TO BOTTOM HOLE

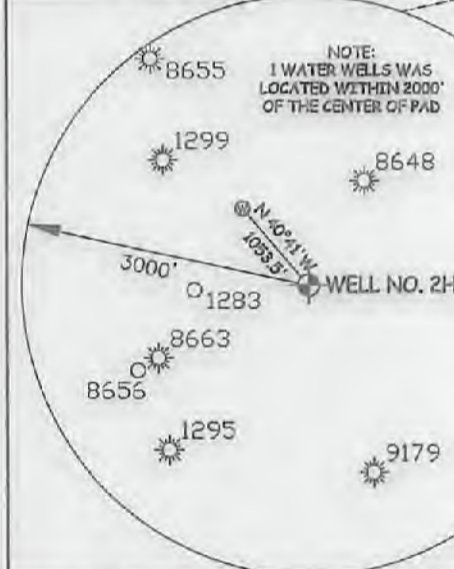
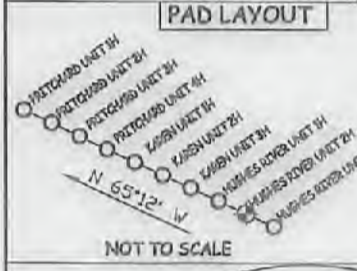
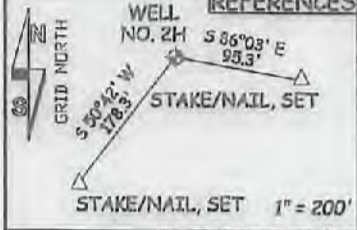
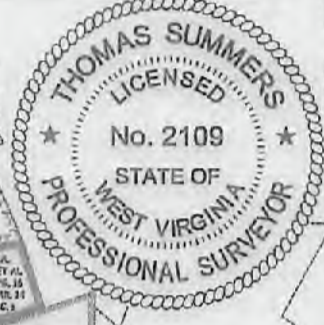
12,979'

LONGITUDE 80°52'30"

Antero Resources Corporation
Well No. Hughes River Unit 2H
47-085-10214

NOTES:
WELL 2H TOP HOLE INFORMATION:
N: 248,100.4ft E: 1,603,313.0ft
LAT: 39°10'21.72" LON: 80°53'57.25"
BOTTOM HOLE INFORMATION:
N: 233,797ft E: 1,609,132ft
LAT: 39°08'01.25" LON: 80°52'40.59"
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: 4,335,956m E: 508,719m
BOTTOM HOLE INFORMATION:
N: 4,331,628m E: 510,564m



JOB # 14-127WA
DRAWING # HUGHESRIVER2HRS
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

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

LEGEND
Surface Owner Boundary Lines +/-
Interior Surface Tracts +/-
Existing Fence
Found monument, as noted
THOMAS SUMMERS P.S. 2109
DATE 07/08/18
OPERATOR'S WELL# HUGHES RIVER UNIT #2H

WELL TYPE: OIL CAS X LIQUID INJECTION WASTE DISPOSAL
(IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
LOCATION: ELEVATION 945.5' AS BUILT WATERSHED SOUTH FORK HUGHES RIVER
QUADRANGLE PULLMAN 7.5' DISTRICT UNION COUNTY RITCHIE
SURFACE OWNER LYNWOOD IRELAND ET AL ACREAGE 144.276 ACRES +/-
OIL & GAS ROYALTY OWNER BELLE PRITCHARD; C. G. DAVIS ET AL; LEASE ACREAGE 415 AC±; 130 AC±;
JOYCE E. WEBER; CHARLES CARSON; BRADFORD Z. SPIKER ET UX; MICHAEL I. SPIKER; 445.67 AC±; 71.95 AC±; 80 AC±; 56 AC±;
MICHAEL I. SPIKER ET AL; JOSEPH SMITH ET AL; L. M. EHRET ET UX 84.14 AC±; 63 AC±; 234 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 6,800' TYD 23,600' MD
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS CT CORPORATION SYSTEM
FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 26313

WW-6A1
(5/13)

Operator's Well No. Hughes River 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>L.M. Ehret et ux Lease</u> | | | | |
| | L.M. Ehret et ux | M.G Taylor | 1/8 | 0031/0009 |
| | M.G. Taylor | A.A Rowe | Assignment | 0032/0213 |
| | A.A Rowe | Tri-State Gas Company | Assignment | 0032/0235 |
| | Tri-State Gas Company | Hope Natural Gas Company | Assignment | 0029/0192 |
| | Hope Natural Gas Company | Allegheny Land and Mineral Company | Assignment | 0031/0009 |
| | Allegheny Land and Mineral Company | Alamco, Inc | Name Change | 0004/0452 |
| | Alamco, Inc | Colombia Natural Resources, Inc | Merger | 0269/0668 |
| | Colombia Natural Resources, Inc | Colombia Natural Resources, LLC | Name Change | 0008/0296 |
| | Colombia Natural Resources, LLC | Chesapeake Appalachia, LLC | Merger | 0294/0520 |
| | Chesapeake Appalachia, LLC | Statoilhydro USA Onshore Properties Inc | Agreement | 0247/0884 |
| | Statoilhydro USA Onshore Properties, Inc | Statoil USA Onshore Properties | Name Change | Exhibit 2 |
| | Statoil Usa Onshore Properties | Antero Resources Corporation | Assignment | 0301/0194 |

*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: Kevin Kilstrom
 Its: Senior VP of Production

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| Grantor, lessor, etc. | Grantee, lessee, etc. | Royalty | Book/Page |
|---|---|---|------------------|
| <u>Belle Pritchard Lease</u> | | | |
| Belle Pritchard | Ritchie A. Ireland | 1/8 | 0079/0019 |
| Ritchie A. Ireland | S. M. Vokel, H.R. Jackson, Sam T. Mallison & Charles E. Young | Assignment | 0080/0386 |
| S. M. Vokel, H.R. Jackson, Sam T. Mallison & Charles E. Young | Warren Associates, Inc. | Assignment | 0126/0464 |
| Warren Associates, Inc. | Haught, Inc. | Affidavit | 0170/0461 |
| Haughts, Inc. | Haught Oil Producing Corporation | Merger | Exhibit 3 |
| Haught Oil Producing Corporation | 710 Corporation | Assignment | 0180/0791 |
| 710 Corporation | Lynwood K. Ireland | Assignment | 0204/0553 |
| Lynwood K. Ireland | Antero Resources Appalachian Corporation | *Partial Assignment of Oil & Gas Leases | 0255/0652 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |
| <u>C.C. Davis, et al Lease</u> | | | |
| C.C.Davis, et ux; Janie D. Prunty, R.M. Davis, Blanche Davis & Scott Maxwell, et ux | C.A. Stricklin | 1/8 | 0091/0431 |
| C.A. Stricklin | Big A Oil Corporation | Assignment | 0152/0591 |
| Big A Oil Corporation | Lamar Oil & Gas Company | Merge | CR 0005/0669 |
| Lamar Oil & Gas Company | Antero Resources Appalachian Corporation | Assignment | 0257/0778 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |
| <u>Joyce E. Webber Lease</u> | | | |
| Joyce E. Webber | Antero Resources Appalachian Corporation | 1/8+ | 0254/0999 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |
| <u>Charles Carson Lease</u> | | | |
| Charles Carson | Antero Resources Appalachian Corporation | 1/8+ | 0259/0556 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |
| <u>Bradford Z. Spiker et ux Lease</u> | | | |
| Bradford Z. Spiker, et ux | Alton Skinner | 1/8 | 0132/0388 |
| Alton Skinner | Alton L. Skinner II, Crystal G. Skinner, & Desari S. Garrett | Assignment | 0216/0391 |
| Alton L. Skinner II, Crystal G. Skinner, & Desari S. Garrett | DC Petroleum, Inc. | Assignment | 0247/0245 |
| DC Petroleum, Inc. | Antero Resources Appalachian Corporation | Assignment | 0254/0902 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |

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 Office of Oil and Gas
 JUL 10 2018
 WV Department of Environmental Protection

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INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
 Chapter 22, Article 6A, Section 5(a)(5)
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| Grantor, lessor, etc. | Grantee, lessee, etc. | Royalty | Book/Page |
|---|--|---|-----------|
| Michael I. Spiker Lease | | | |
| Michael I. Spiker | Antero Resources Corporation | 1/8+ | 0285/0076 |
| Mike Spiker, et al Lease | | | |
| Mike I Spiker, Mark A. Spiker, Brada S. Stotts, and Briana S. Spiker | Key Oil Company | 1/8 | 0240/0219 |
| Key Oil Company | Antero Resources Appalachian Corporation | Assignment | 0253/0747 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |
| Joseph Smith et al Lease | | | |
| Joseph Smith et al | Carnegie Natural Gas Company | 1/8 | 0050/0588 |
| Carnegie Natural Gas Company | Carnegie Production Company | Merge | 0228/0859 |
| Carnegie Production Company | EQT Production Company | Amendment & Ratification | 0252/0385 |
| EQT Production Company | Antero Resources Corporation | Partial Assignment of Oil and Gas Leases | 0277/0836 |

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**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)558-3000
Fax: (304)558-3381
Website: www.wvsos.com
E-mail: business@wvsos.com

**APPLICATION FOR
AMENDED CERTIFICATE
OF AUTHORITY**

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

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

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

1. Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation
2. Date Certificate of Authority was issued in West Virginia: 6/25/2008
3. Corporate name has been changed to: Antero Resources Corporation
(Attach one Certified Copy of Name Change as filed in home State of Incorporation.)
4. Name the corporation elects to use in WV: Antero Resources Corporation
(due to home state name not being available)
5. Other amendments: (attach additional pages if necessary)

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) 367-7310
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: [Handwritten Signature] Date: June 10, 2013

***Important Legal Notice Regarding Signature:** Per West Virginia Code §31D-1-122, Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.

RECEIVED
Office of Oil and Gas
JUL 10 2013
WV Department of
Environmental Protection

State of West Virginia



Certificate

*I, Mac Warner, Secretary of State of the
State of West Virginia, hereby certify that*

an Amended Certificate of Authority of

STATOILHYDRO USA ONSHORE PROPERTIES INC.

was filed in my office as required by the provisions of the West Virginia Code and was found
to conform to law.

Therefore I issue this

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the corporation to

STATOIL USA ONSHORE PROPERTIES INC.



*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
November 30, 2009*

Mac Warner

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Secretary of State
JUL 10 2018

WV Department of
Environmental Protection



*I, Ken Heckler, Secretary of State of the
State of West Virginia, hereby certify that*

THE FOLLOWING IS A TRUE AND CORRECT COPY OF THE ARTICLES OF MERGER
OF:

HAUGHT, INC., A WEST VIRGINIA CORPORATION AND HAUGHT OIL
PRODUCING CORP., A UTAH CORPORATION DULY SIGNED AND VERIFIED
PURSUANT TO THE PROVISIONS OF SECTION 36, ARTICLE 1, CHAPTER
31 OF THE CODE OF WEST VIRGINIA, 1931, AS AMENDED, HAVE
BEEN RECEIVED AND ARE FOUND TO CONFORM TO LAW.

ACCORDINGLY, I HEREBY ISSUE THIS CERTIFICATE OF MERGER, MERGING
HAUGHT, INC., WITH AND INTO HAUGHT OIL PRODUCING CORP., THE
SURVIVOR AND ATTACH A DUPLICATE ORIGINAL OF SAID ARTICLES
OF MERGER AS APPEARS FROM THE RECORDS OF MY SAID OFFICE.

*Given under my hand and the
Great Seal of the State of
West Virginia, on this*

TWELFTH day of
JANUARY 19 87



Ken Heckler
Secretary of State.

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JUL 19 2008
WV Department
Environmental Protection

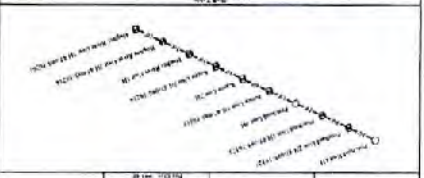
811
 Know what's below
 Call 811
 1-800-252-8888
 www.811va.com

NOTICE TO THE PUBLIC
 The project is located within the South Fork Hughes River Watershed, which is a designated watershed for the protection of the South Fork Hughes River, a tributary of the Shenandoah River. The project is located within the watershed boundary shown on the map attached to this notice. The project is located within the watershed boundary shown on the map attached to this notice. The project is located within the watershed boundary shown on the map attached to this notice.

Project Description
 The project consists of the construction of a new water supply system for the Ireland North Site. The project includes the construction of a new water supply system for the Ireland North Site. The project includes the construction of a new water supply system for the Ireland North Site.

| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |

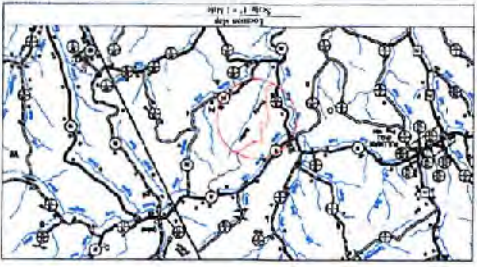
| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |



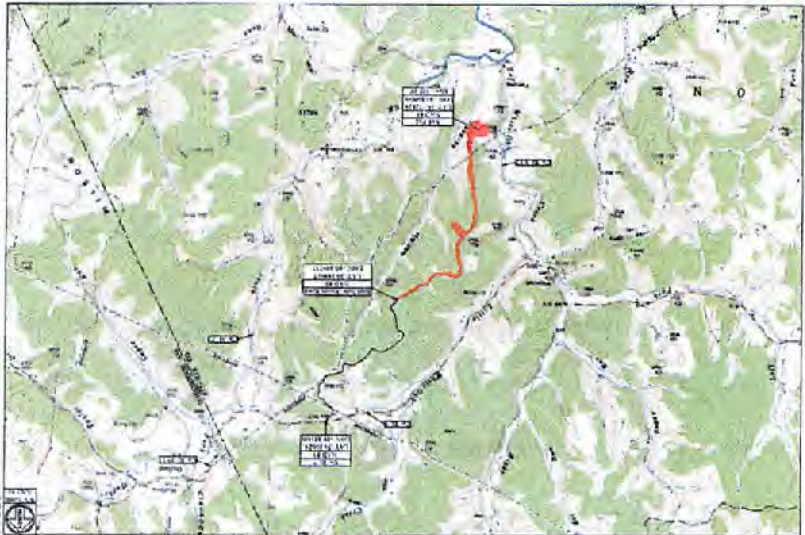
| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |



APPROVED
 WDEP OOG
 6/27/2017



| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |



Ireland North Site
 As-Built
 Antero Resources Corporation
 Ritchie County
 Union District
 Latitude -80.899096°
 Longitude 39.172824°
 White Oak Creek - South Fork Hughes River Watershed

Antero Resources Corporation
 511 Ardmore Rd
 5102 Kinnard Rd
 West (Corner W V 2042)
 Ireland North Site
 Longway, Norton, Ritchie County, WV
 Watershed: White Oak Creek Watershed
 Union District, Ritchie County, WV

| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |

| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |

| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |

| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |

Ireland North Site
 Union District
 Ritchie County, WV

K+S
 CORPORATION
 WATER RESOURCES



| Item | Description | Quantity | Unit |
|------|---------------------|----------|---------|
| 1 | Water Supply System | 1 | System |
| 2 | Construction | 1 | Project |



July 9th, 2018

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 57th Street
Charleston, WV 25304

Ms. Adkins:

Antero Resources Corporation (Antero) would like to submit the following permit modification for five approved wells on the Ireland North Pad. We are requesting to change the bottom hole locations of the Karen Unit 1H (API# 47-085-10215), Karen Unit 3H (API# 47-085-10216), Hughes River Unit 2H (API# 47-085-10214), Hughes River Unit 3H, (API# 47-085-10265) and Pritchard Unit 2H (API# 47-085-10323).

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the revised lateral length, Measured Depth and Production Casing/Cement program
- REVISED Form WW-6A1, which shows the new leases we will be drilling into
- REVISED Mylar Plats, which shows the new bottom hole location

If you have any questions please feel free to contact me at (303) 357-7233.

Thank you in advance for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Karin Cox", written over a light blue horizontal line.

Karin Cox
Permitting Agent
Antero Resources Corporation

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Enclosures

LATITUDE 39°12'30"

6,871'

LATITUDE 39°10'00" 834' TO BOTTOM HOLE

LONGITUDE 80°52'30"

12,014' TO BOTTOM HOLE

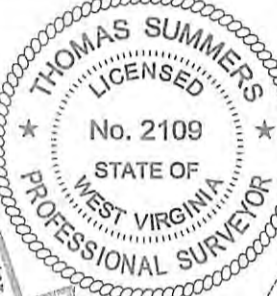
12,979'

LONGITUDE 80°52'30"

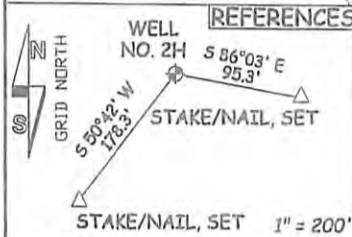
Antero Resources Corporation
Well No. Hughes River Unit 2H
47-085-10214

NOTES:
WELL 2H TOP HOLE INFORMATION:
N: 248,100.4ft E: 1,603,313.0ft
LAT: 39°10'21.72" LON: 80°53'57.25"
BOTTOM HOLE INFORMATION:
N: 233,797ft E: 1,609,132ft
LAT: 39°08'01.25" LON: 80°52'40.59"
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.

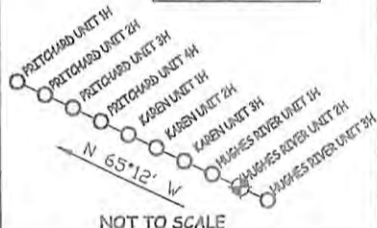
(NAD) 83 (UTM) ZONE 17 COORDS:
WELL 2H TOP HOLE INFORMATION:
N: 4,335,956m E: 508,719m
BOTTOM HOLE INFORMATION:
N: 4,331,628m E: 510,564m



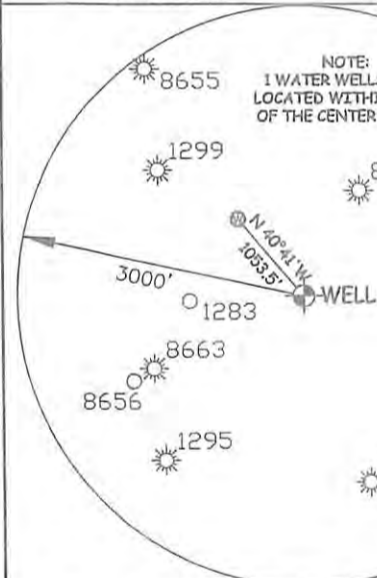
WV NORTH ZONE GRID NORTH



REFERENCES



PAD LAYOUT



NOTE: 1 WATER WELL WAS LOCATED WITHIN 2000' OF THE CENTER OF PAD

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 ONE HUNDRED TWENTY-FIVE (125) FEET OF THE CENTER OF THE WELL PAD.

JOB # 14-127WA
DRAWING # HUGHESRIVER2HR3
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



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

LEGEND
----- Surface Owner Boundary Lines +/-
----- Interior Surface Tracts +/-
----- Existing Fence
Found monument, as noted
THOMAS SUMMERS P.S. 2109
DATE 07/06/18
OPERATOR'S WELL# HUGHES RIVER UNIT #2H

WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL
(IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
LOCATION: ELEVATION 945.5' AS BUILT WATERSHED SOUTH FORK HUGHES RIVER
QUADRANGLE PULLMAN 7.5' DISTRICT UNION COUNTY RITCHIE
SURFACE OWNER LYNWOOD IRELAND ET AL ACREAGE 144.276 ACRES +/-
OIL & GAS ROYALTY OWNER BELLE PRITCHARD; C. C. DAVIS ET AL;
JOYCE E. WEBER; CHARLES CARSON; BRADFORD Z. SPIKER ET UX; MICHAEL I. SPIKER;
MICHAEL I. SPIKER ET AL; JOSEPH SMITH ET AL; L. M. EHRET ET UX
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 6,800' TVD 23,600' 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

COUNTY NAME PERMIT

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

1) Well Operator: Antero Resources Corporation 494488557 085-Ritchie Union Pullman 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Hughes River Unit 2H Well Pad Name: Ireland North Pad

3) Farm Name/Surface Owner: Lynwood Ireland et al Public Road Access: CR 9

4) Elevation, current ground: 945.5' 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: 6800' TVD, Anticipated Thickness- 50 feet, Associated Pressure- 3000#

8) Proposed Total Vertical Depth: 6800' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 23600' MD

11) Proposed Horizontal Leg Length: 15109'

12) Approximate Fresh Water Strata Depths: 69', 279', 359'

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

14) Approximate Saltwater Depths: 1451, 1807'

15) Approximate Coal Seam Depths: 343'

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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WW-6B
(04/15)

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# | 40' | 40' | CTS, 38 Cu. Ft. |
| Fresh Water | 13-3/8" | New | J-55/H-40 | 54.5#/48# | 410' *see #19 | 410' *see #19 | CTS, 570 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# | 23600' | 23600' | 6081 Cu. Ft. |
| Tubing | 2-3/8" | New | N-80 | 4.7# | | 7,100 | |
| 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 | 20" | 24" | 0.438" | 1530 | 50 | Class A | 1.18 |
| Fresh Water | 13-3/8" | 17-1/2" | 0.38"/0.33" | 2730/1730 | 1000 | Class A | 1.18 |
| Coal | 9-5/8" | 12-1/4" | 0.352" | 3520 | 1500 | Class A | 1.18 |
| Intermediate | | | | | | | |
| Production | 5-1/2" | 8-3/4" & 8-1/2" | 0.361" | 12630 | 2500 | Lead-H/POZ & Tail - H | H/POZ-1.44 & H-1.8 |
| Tubing | 2-3/8" | 4.778" | 0.19" | 11200 | | | |
| Liners | | | | | | | |

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- 085 - 10214
OPERATOR WELL NO. Hughes River Unit 2H
Well Pad Name: Ireland North 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 freshwater is encountered, therefore we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

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

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

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

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 28.70 acres

22) Area to be disturbed for well pad only, less access road (acres): 4.09 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 10 bbls brine 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