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west virginia department of environmental protection

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

Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Monday, 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 3H  
47-085-10265-00-00

**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.

James A. Martin  
Chief

Operator's Well Number: HUGHES RIVER UNIT 3H  
Farm Name: LYNWOOD IRELAND  
U.S. WELL NUMBER: 47-085-10265-00-00  
Horizontal 6A Horizontal 6A Well - 1  
Date Modification Issued: 10/29/2018

Promoting a healthy environment.

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

1) Well Operator: Antero Resources Corporation

<u>494488557</u>	<u>085-Ritchie</u>	<u>Union</u>	<u>Pullman 7.5'</u>
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Operator ID County District Quadrangle

2) Operator's Well Number: Hughes River Unit 3H 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: 23700' MD

11) Proposed Horizontal Leg Length: 13726'

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)

API NO. 47-085 - 10265  
OPERATOR WELL NO. Hughes River Unit 3H  
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#	23700'	23700'	6109 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-HPOZ & 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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WW-6B  
(10/14)

API NO. 47-085 - 10265

OPERATOR WELL NO. Hughes River Unit 3H

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.

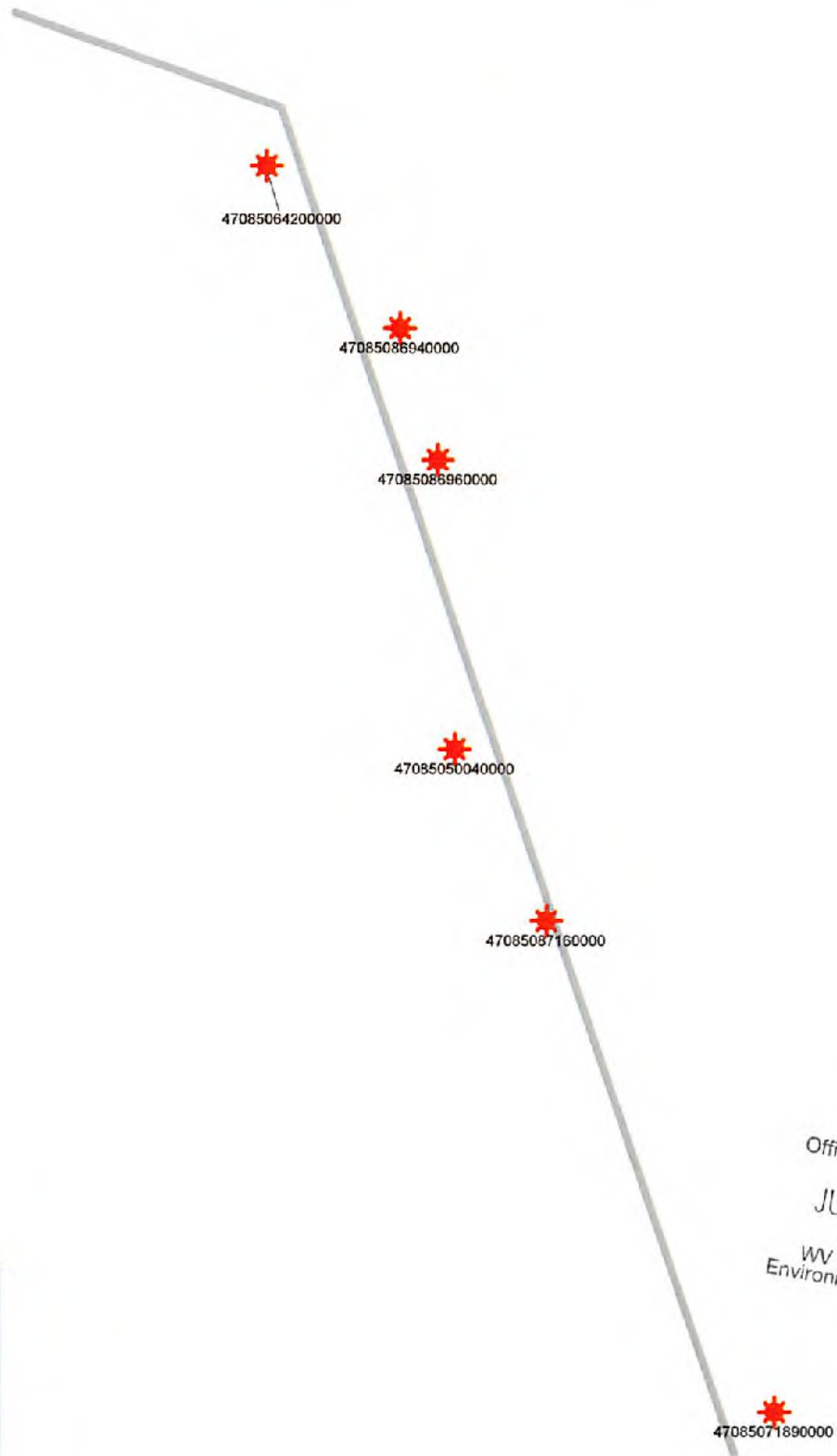
\*Note: Attach additional sheets as needed.

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API# 47-085-10265 PERMIT MODIFICATION



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Antero Resources Corporation

Hughes River East Unit 3H



WELL SYMBOLS  
Gas Well

July 5, 2018

UWI (API#)	Well Name	Well Number	Operator	Historical Operator	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Producing Formation(s) not per'ed
47085050040000	SPIKER BRADFORD Z	4	ABARTA O&G INC	CHASE PETROLEUM CO	5114	3806 - 4872	Bradford, Riley, Alexander	Big Injun, Weir
47085071890000	MAXSON ELSHA J HEIRS	A-1661	MINERAL RES MGMT LLC	ALAMCO INCORPORATED	5995	2100 - 5913	Weir, Riley, Misc. Sands-RILEY/BNSN, Benson, Sonyea Group	Big Injun, Alexander
47085064200000	DAVIS M H	1-A	SHALE SERVICE	PETRO-AM CORP	5271	3270 - 5200	Devonian, Alexander	Big Injun, Weir
47085086940000	BROOME/GANDER	1	KEY OIL COMPANY	KEY OIL COMPANY	5300	3323 - 5140	Warren, Speechley, Balltown, Riley, Benson, Elk, Alexander	Big Injun, Weir
47085086960000	BROOME/GANDER	2	KEY OIL COMPANY	KEY OIL COMPANY	5176	3739 - 4996	Riley, Alexander	Big Injun, Weir
47085087160000	SPIKER	1	KEY OIL COMPANY	KEY OIL COMPANY	5095	4203 - 4900	Riley, Benson, Elk, Alexander	Big Injun, Weir

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LATITUDE 39°12'30"

6,862'

11,697' TO BOTTOM HOLE

LATITUDE 39°10'00"

LONGITUDE 80°50'00"

11,692' TO BOTTOM HOLE

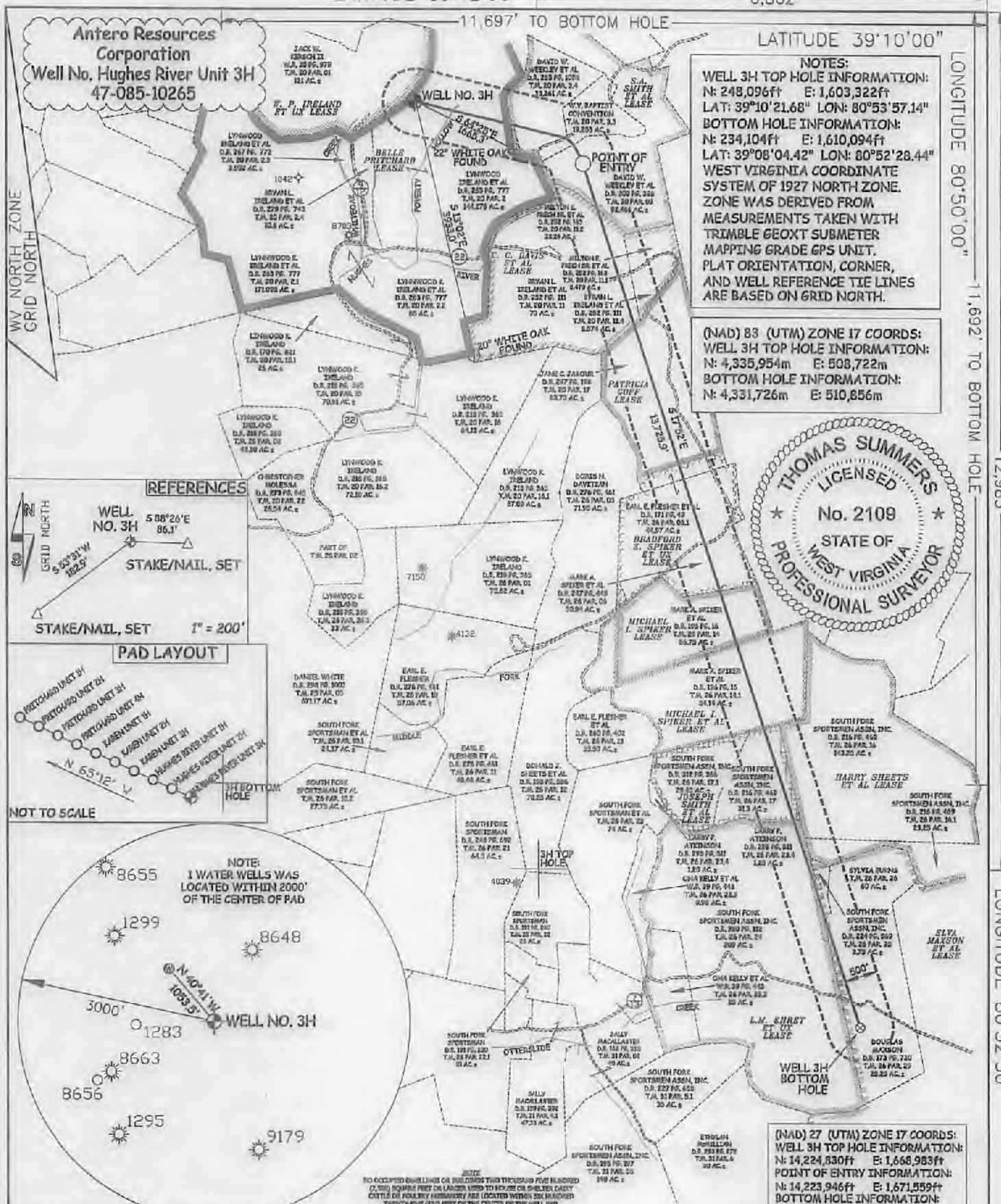
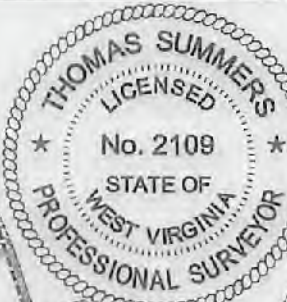
12,983'

LONGITUDE 80°52'30"

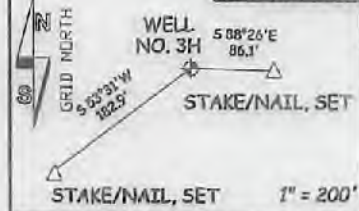
Antero Resources Corporation  
Well No. Hughes River Unit 3H  
47-085-10265

NOTES:  
WELL 3H TOP HOLE INFORMATION:  
N: 248,096ft E: 1,603,322ft  
LAT: 39°10'21.68" LON: 80°55'57.14"  
BOTTOM HOLE INFORMATION:  
N: 234,104ft E: 1,610,094ft  
LAT: 39°08'04.42" LON: 80°52'28.44"  
WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIABLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

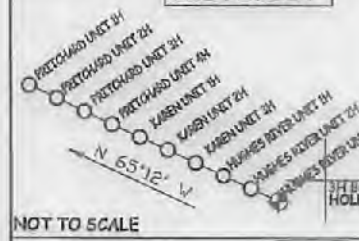
(NAD) 83 (UTM) ZONE 17 COORDS:  
WELL 3H TOP HOLE INFORMATION:  
N: 4,335,954m E: 508,722m  
BOTTOM HOLE INFORMATION:  
N: 4,331,726m E: 510,856m



REFERENCES

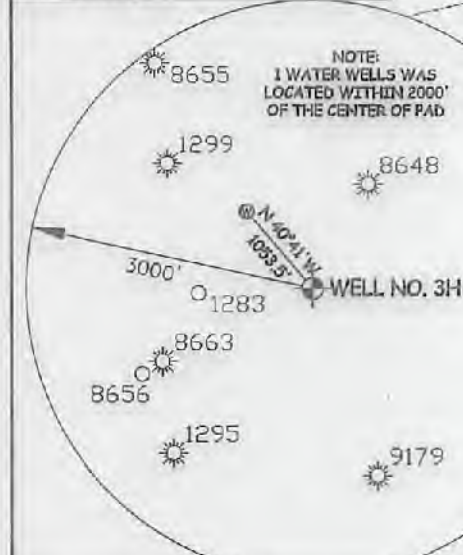


PAD LAYOUT



NOT TO SCALE

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



NOTE:  
NO OCCUPIED DWELLINGS OR BUILDINGS THIRTY THOUSAND FIVE HUNDRED (27,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHELTER DAIRY CATTLE OR POULTRY HERDSHIPS ARE LOCATED WITHIN SIX HUNDRED THIRTYFOUR (634) FEET OF THE CENTER OF THE WELL PAD.

(NAD) 27 (UTM) ZONE 17 COORDS:  
WELL 3H TOP HOLE INFORMATION:  
N: 14,224,830ft E: 1,668,983ft  
POINT OF ENTRY INFORMATION:  
N: 14,223,946ft E: 1,671,559ft  
BOTTOM HOLE INFORMATION:  
N: 14,210,958ft E: 1,675,985ft

JOB # 14-127WA  
DRAWING # HUGHESRIVER3HR2  
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 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

LEGEND  
----- Surface Owner Boundary Lines +/-  
----- Interior Surface Tracts +/-  
--- Existing Fence  
⊕ Found monument, as noted  
*Thomas Summers*  
THOMAS SUMMERS P.S. 2109  
DATE 06/26/18  
OPERATOR'S WELL# HUGHES RIVER UNIT #3H

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' (TH) OXFORD 7.5' (BH) DISTRICT UNION COUNTY RITCHIE  
SURFACE OWNER LYNNWOOD IRELAND ET AL  
OIL & GAS ROYALTY OWNER BELLE PRITCHARD; S. A. SMITH ET AL;  
C. C. DAVIS ET AL; PATRICIA GOFF; BRADFORD Z. SPIKER ET UX; MICHAEL I. SPIKER;  
MICHAEL I. SPIKER; JOSEPH SMITH ET AL; L. M. EHRET ET UX; ELVA MAXSON ET AL  
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 23,700' 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



**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
<b><u>Elva Maxson et al Lease</u></b>				
	Elva Maxson, et al	Hope Natural Gas Company	1/8	0074/0385
	Hope Natural Gas Company	Allegheny Land and Mineral Company	Assignment	0084/0597
	Allegheny Land and Mineral Company	Plymouth Oil Company	Assignment	0163/0083
	Plymouth Oil Company	Allegheny Land and Mineral Company	Assignment	0087/0183
	Allegheny Land and Mineral Company	Alamco, Inc	Name Change	0004/0452
	Alamco, Inc	Columbia Natural Resources, Inc	Merger	0269/0668
	Columbia Natural Resources, Inc	Columbia Natural Resources, LLC	Name Change	0008/0296
	Columbia 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 Inc	Name Change	Exhibit 2
	Statoil USA Onshore Properties Inc	Antero Resources Corporation	Assignment	0301/0194

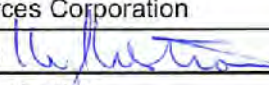
\*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

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 - Production

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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:

Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<b><u>Belle Pritchard Lease</u></b>			
Belle Pritchard	Ritchie A. Ireland	1/8	0079/0019
Ritchie A. Ireland	S. M. Vokel, et al	Assignment	0080/0386
S. M. Vokel, et al	Warren Associates, Inc.	Assignment	0126/0464
Warren Associates, Inc.	Haught, Inc.	Affidavit	0170/0461
Haught, 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
<b><u>S.A. Smith, et al Lease</u></b>			
S.A. Smith, et al	Antero Resources Appalachian Corporation	1/8+	0254/1061
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>C.C. Davis, et al Lease</u></b>			
C.C. Davis, et al	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	Merger	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
<b><u>Patricia Goff Lease</u></b>			
Patricia Goff	Key Oil Company	1/8	0228/0779
Key Oil Company	Antero Resources Appalachian Corporation	Assignment	0253/0747
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Bradford Z. Spiker, et ux Lease</u></b>			
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	0257/0992
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

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JUL 10 2018  
WV Department of Environmental Protection

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(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>Michael I. Spiker Lease</b>			
Michael I. Spiker	Antero Resources Corporation	1/8+	0285/0076
<b>Mike Spiker, et al Lease</b>			
Michael I. Spiker, Mark A. Spiker, Brada S. Stotts, Brianna 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
<b>Joseph Smith et al Lease</b>			
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
<b>L.M Ehret et ux Lease</b>			
L.M Ehret et ux	M. G. Taylor	1/8	31/9
M. G. Taylor	A.A. Rowe	Assignment	32/213
A.A. Rowe	Tri-State Gas Company	Assignment	32/235
Tri-State Gas Company	Hope Natural Gas Company	Assignment	29/192
Hope Natural Gas Company	Allegheny Land and Mineral Company	Assignment	31/9
Allegheny Land and Mineral Company	Alamco, Inc	Name Change	4/452
Alamco, Inc	Columbia Natural Resources, Inc	Merger	269/658
Columbia Natural Resources, Inc	Columbia Natural Resources, LLC	Name Change	8/296
Columbia Natural Resources, LLC	Chesapeake Appalachia, LLC	Merger	294/520
Chesapeake Appalachia, LLC	Statoilhydro USA Onshore Properties Inc	Agreement	247/884
Statoilhydro USA Onshore Properties Inc	Statoil USA Onshore Properties Inc	Name Change	Exhibit 2
Statoil USA Onshore Properties Inc	Antero Resources Corporation	Assignment	301/194

\*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.

1-18  
Sent of  
tion



**FILED**

**JUN 10 2013**

Natalie E. Tennant,  
Secretary of State  
1900 Kanawha Blvd E  
Bldg 1, Suite 157-K  
Charleston, WV 25305



IN THE OFFICE OF  
SECRETARY OF STATE

Penney Barker, Manager  
Corporations Division  
Tel: (304)558-8000  
Fax: (304)558-8381  
Website: [www.wvsos.com](http://www.wvsos.com)  
E-mail: [business@wvsos.com](mailto:business@wvsos.com)

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**

**APPLICATION FOR  
AMENDED CERTIFICATE  
OF AUTHORITY**

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

1. Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachia Corporation
2. Date Certificate of Authority was issued in West Virginia: 6/25/2008
3. Corporate name has been changed to: Antero Resources Corporation  
(Attach one **Certified Copy of Name Change** as filed in home State of Incorporation.)
4. Name the corporation elects to use in WV: Antero Resources Corporation  
(due to home state name not being available)
5. Other amendments: \_\_\_\_\_  
(attach additional pages if necessary)
6. Name and phone number of contact person. (This is optional; however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)  
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: *Alvyn A. Schopp* Date: June 10, 2013

***Important Legal Notice Regarding Signature:*** Per West Virginia Code §31D-1-129. Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.

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# 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.**

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

*Mac Warner*

Secretary of State





*J. Ken Fleckler, 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 38, 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 Fleckler*  
Secretary of State.

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**WEST VIRGINIA COUNTY MAP**



**APPROVED WVDEP OOG**  
6/27/2017

**Ireland North Site**

As-Built  
Antero Resources Corporation  
Ritchie County  
Union District  
Latitude 39.172824°  
Longitude -80.899096°

White Oak Creek - South Fork Hughes River Watershed

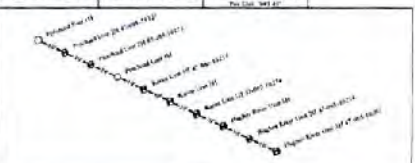
**Pertinent Site Information**  
Ireland North Site  
Emergency Number: 204-659-3770  
Union District, Ritchie County, WV  
Watershed: White Oak Creek Watershed  
911 Address:  
4192 Oxford Rd  
West Union, WV 26042  
Antero Resources Emergency Number: 800-878-1171

**Property Owner Information - Ireland North Site**

Parcel ID	Area (Acres)	Owner Name	Address	City	County	State	Zip
00000000000000000000	0.00	ANTERO RESOURCES CORP	4192 OXFORD RD	WEST UNION	WV	26042	

**Corner Data**

Corner Name	Coordinates (Easting, Northing)	Corner Name	Coordinates (Easting, Northing)
W1/4 CORNER	1000000.00, 1000000.00	E1/4 CORNER	1000000.00, 1000000.00



**Site Data**

Point	Coordinates (Easting, Northing)	Point	Coordinates (Easting, Northing)
1	1000000.00, 1000000.00	2	1000000.00, 1000000.00

**Project Contacts**

**Antero Resources:**  
Site Lead: [Name]  
Site Manager: [Name]

**West Virginia DEP:**  
Project Manager: [Name]



**As-Built Derivative Data**

Property	Value
Area	1.00

**Ireland North Site Design Quantities**

Item	Quantity
Excavation	1000

**Ireland North Site As-Built Quantities**

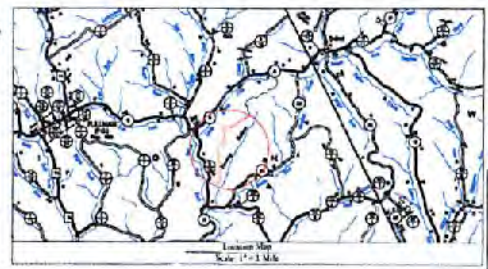
Item	Quantity
Excavation	1000



**Site Locations (NAD 83)**

Point	Coordinates (Easting, Northing)
1	1000000.00, 1000000.00

**Approach Route:**  
From US R 29, turn onto WV-29 South, follow WV-29 South for 1.4 mi. Turn left onto Co R Rd (Mile 5.9, Police Co R 9) for 1.1 mi. Turn right onto Power Run Rd (Site Entrance)



**Scale: 1" = 1 Mile**

**Sheet Description**

Sheet	Description
1	Cover Sheet
2-4	Overall Plan Views
5	Plan Views
6	Well Pad Plan View
7	Existing Access Road Plan Views
8-10	Existing Access Road Profile
11-13	Access Road Profile
14-15	Access Road Cross Sections
16	Well Pad Cross Sections
17	Disturbed Area
18	Other Details

**MISS UTILITY OF WEST VIRGINIA**  
811  
Call before you dig

**Horizontal Coordinates**

Point	Coordinates (Easting, Northing)
1	1000000.00, 1000000.00



THIS DOCUMENT PREPARED FOR ANTERO RESOURCES CORPORATION



**Ireland North Site**  
Union District  
Ritchie County, WV

MAG 7-17-18







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 3H 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  \_\_\_\_\_

*Michael Hoff*  
*8-22-18*

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: 23700' MD

11) Proposed Horizontal Leg Length: 13726'

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

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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: \_\_\_\_\_



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#	23700'	23700'	6109 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7,100	
Liners							

MAG  
8-22-18

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-HPOZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200			
Liners							

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

MAG  
8-22-18

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 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.





July 9<sup>th</sup>, 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 57<sup>th</sup> 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".

Karin Cox  
Permitting Agent  
Antero Resources Corporation

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Enclosures



LATITUDE 39°12'30"

6,862'

11,697' TO BOTTOM HOLE

LATITUDE 39°10'00"

LONGITUDE 80°50'00"

11,692' TO BOTTOM HOLE

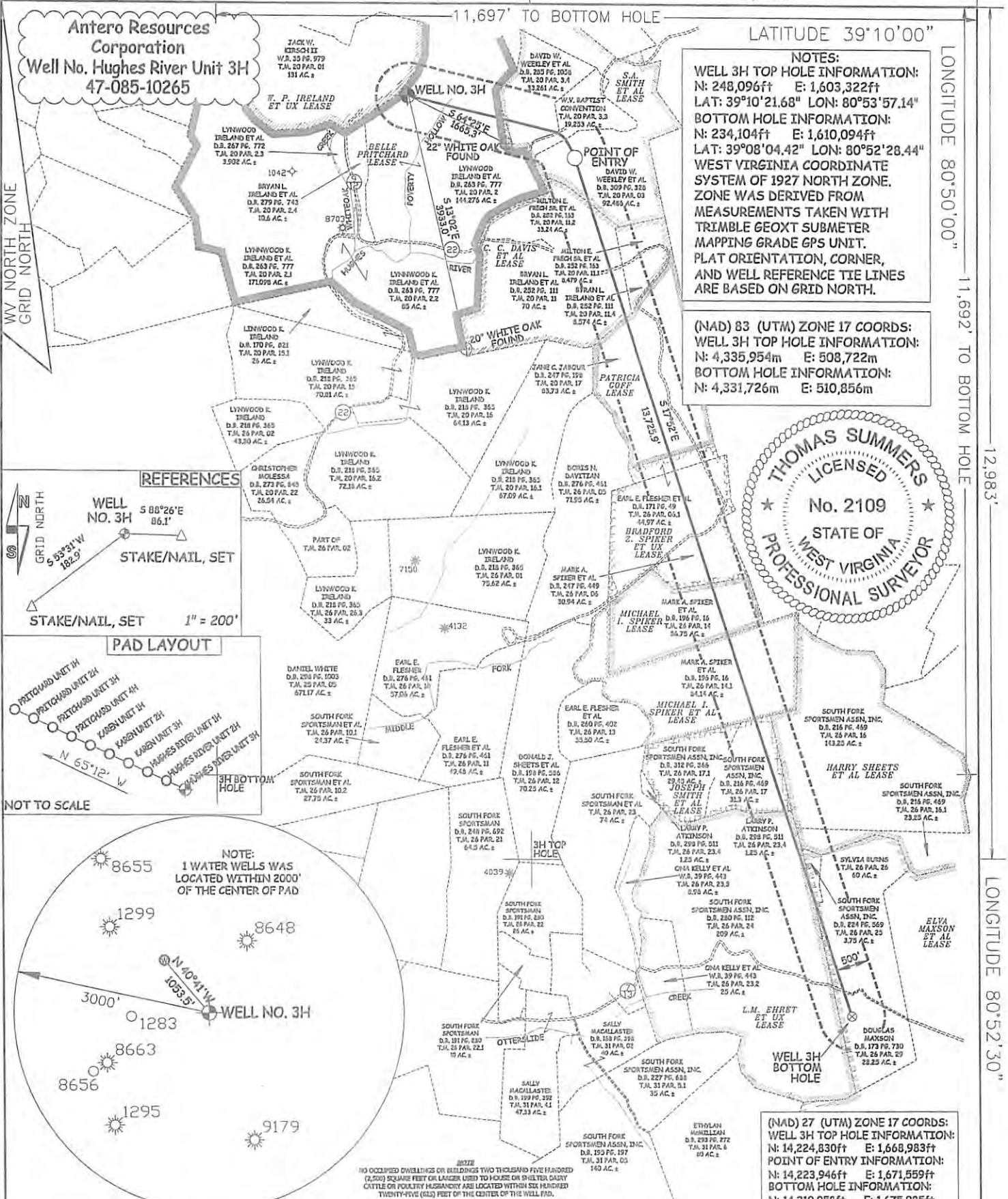
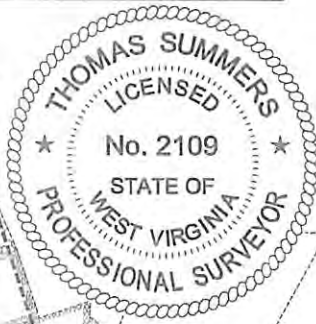
12,983'

LONGITUDE 80°52'30"

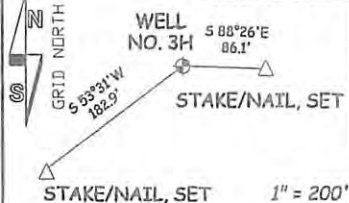
Antero Resources Corporation  
Well No. Hughes River Unit 3H  
47-085-10265

NOTES:  
WELL 3H TOP HOLE INFORMATION:  
N: 248,096ft E: 1,603,322ft  
LAT: 39°10'21.68" LON: 80°53'57.14"  
BOTTOM HOLE INFORMATION:  
N: 234,104ft E: 1,610,094ft  
LAT: 39°08'04.42" LON: 80°52'28.44"  
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.

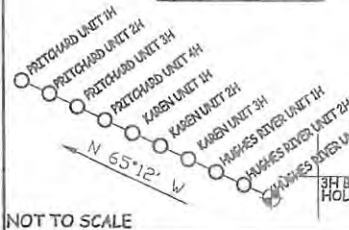
(NAD) 83 (UTM) ZONE 17 COORDS:  
WELL 3H TOP HOLE INFORMATION:  
N: 4,335,954m E: 508,722m  
BOTTOM HOLE INFORMATION:  
N: 4,331,726m E: 510,856m



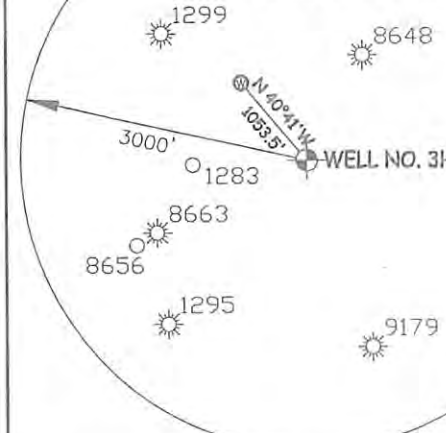
REFERENCES



PAD LAYOUT



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



NOTE:  
NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2500) SQUARE FEET OR LARGER USED TO HOUSE OR OVERSEER DAIRY CATTLE OR POULTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY-FIVE (625) FEET OF THE CENTER OF THE WELL PAD.

(NAD) 27 (UTM) ZONE 17 COORDS:  
WELL 3H TOP HOLE INFORMATION:  
N: 14,224,830ft E: 1,668,983ft  
POINT OF ENTRY INFORMATION:  
N: 14,223,946ft E: 1,671,559ft  
BOTTOM HOLE INFORMATION:  
N: 14,210,958ft E: 1,675,985ft

JOB # 14-127WA  
DRAWING # HUGHESRIVER3HR2  
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 06/26/18  
OPERATOR'S WELL# HUGHES RIVER UNIT #3H

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' (TH) OXFORD 7.5' (BH) DISTRICT UNION  
SURFACE OWNER LYNWOOD IRELAND ET AL  
OIL & GAS ROYALTY OWNER BELLE PRITCHARD; S. A. SMITH ET AL;  
C. C. DAVIS ET AL; PATRICIA GOFF; BRADFORD Z. SPIKER ET UX; MICHAEL I. SPIKER;  
MICHAEL I. SPIKER; JOSEPH SMITH ET AL; L. M. EHRET ET UX; ELVA MAXSON ET AL  
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 23,700' MD  
DIANNA STAMPER  
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT CT CORPORATION SYSTEM  
ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD  
FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

COUNTY NAME PERMIT