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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, August 27, 2018  
WELL WORK PERMIT  
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION  
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit approval for KAREN UNIT 2H  
47-085-10370-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless 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: KAREN UNIT 2H  
Farm Name: LYNWOOD IRELAND ET AL  
U.S. WELL NUMBER: 47-085-10370-00-00  
Horizontal 6A New Drill  
Date Issued: 8/27/2018

## PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

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### CONDITIONS

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1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than one hundred (100) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. 24 hours prior to the initiation of the completion process the operator shall notify the Chief or his designee.
8. During the completion process the operator shall monitor annular pressures and report any anomaly noticed to the chief or his designee immediately.
9. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
10. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

## PERMIT CONDITIONS

11. The operator shall provide to the Office of Oil and Gas the dates of each of the following within 30 days of their occurrence: completion of construction of the well pad, commencement of drilling, cessation of drilling, completion of any other permitted well work, and completion of the well. Such notice shall be provided by sending an email to [DEPOOGNotify@wv.gov](mailto:DEPOOGNotify@wv.gov).

WW-6B  
(04/15)

4708510370 <sup>7/10</sup> ARD

API NO. 47-085 -  
OPERATOR WELL NO. Karen 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: Karen 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 X Oil \_\_\_\_\_ Underground Storage \_\_\_\_\_

Other \_\_\_\_\_

(b) If Gas Shallow X Deep \_\_\_\_\_

Horizontal X

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: 24100' MD ✓

11) Proposed Horizontal Leg Length: 15028' ✓ *plus*

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 X

(a) If Yes, provide Mine Info: Name: \_\_\_\_\_

Depth: \_\_\_\_\_

Seam: \_\_\_\_\_

Owner: \_\_\_\_\_

*Michael Doff*  
*7-17-18*

4708510370

WW-6B  
(04/15)

API NO. 47-085  
OPERATOR WELL NO. Karen 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#	80'	80' ✓	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#	410'	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#	24100'	24100' ✓	6219 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

MAG  
7-17-18

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	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-HPCZ 4" x 11" 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			



WW-6B  
(10/14)

API NO. 47-085

OPERATOR WELL NO. Karen 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 air drills 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

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.

**4708510370**

**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: Karen 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#

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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  RECEIVED  
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**JUL 10 2018**

(a) If Yes, provide Mine Info: Name: \_\_\_\_\_  
Depth: \_\_\_\_\_  
Seam: \_\_\_\_\_  
Owner: \_\_\_\_\_  
WV Department of  
Environmental Protection

18)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<b>Size (in)</b>	<b>New or Used</b>	<b>Grade</b>	<b>Weight per ft. (lb/ft)</b>	<b>FOOTAGE: For Drilling (ft)</b>	<b>INTERVALS: Left in Well (ft)</b>	<b>CEMENT: Fill-up (Cu. Ft.)/CTS</b>
Conductor	20"	New	H-40	94#	80'	80'	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#	410'	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#	24100'	24100'	6219 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

<b>TYPE</b>	<b>Size (in)</b>	<b>Wellbore Diameter (in)</b>	<b>Wall Thickness (in)</b>	<b>Burst Pressure (psi)</b>	<b>Anticipated Max. Internal Pressure (psi)</b>	<b>Cement Type</b>	<b>Cement Yield (cu. ft./k)</b>
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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-HPOZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

**PACKERS**

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JUL 10 2018

Kind:	N/A			WV Department of Environmental Protection
Sizes:	N/A			
Depths Set:	N/A			



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.

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Anticipated Max Rate - 80 bpm

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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:

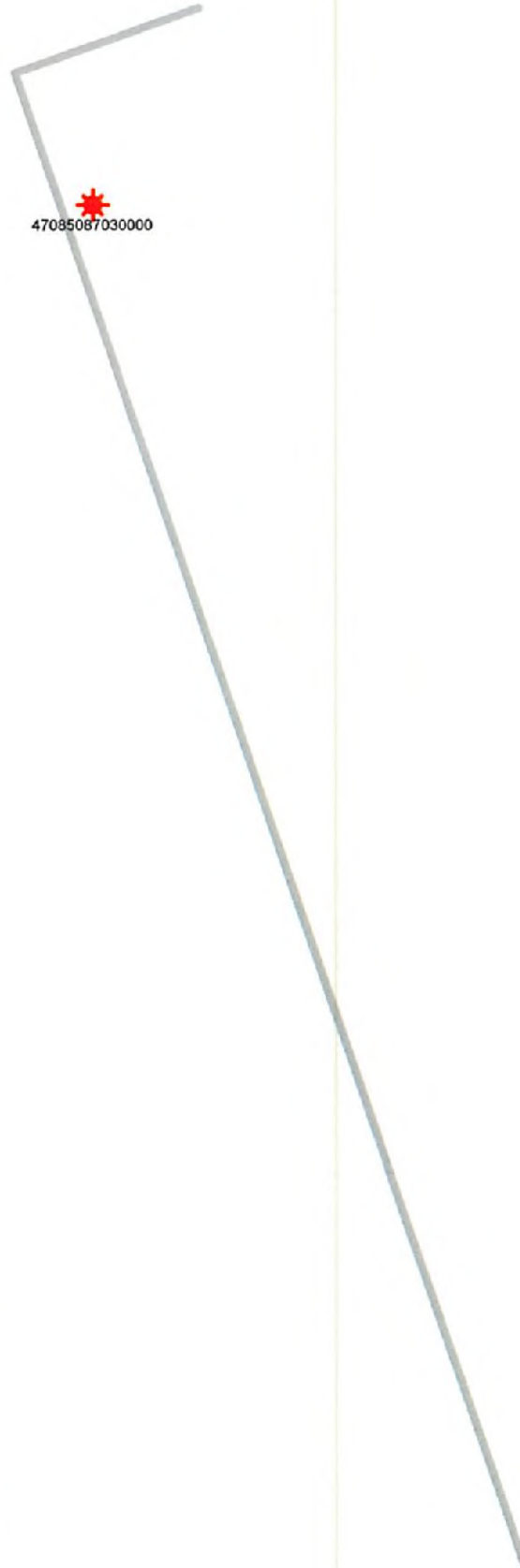
Conductor: no additives, Class A cement.  
Surface: Class A cement with 2-3% calcium chloride  
Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat  
Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51  
Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20

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Environmental Protection

25) Proposed borehole conditioning procedures:

Conductor: blowhole clean with air, run casing, 10 bbls fresh water.  
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.  
Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.  
Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

\*Note: Attach additional sheets as needed.




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Antero Resources Corporation

Karen East Unit 2H



 WELL SYMBOLS  
Gas Well

July 5, 2018

UWI (API Num)	Well Name	Well Number	Operator	Historical Operator	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Produccible Formation(s) not perf'd
47085087030000	IRELAND W	2	KEY OIL COMPANY	KEY OIL COMPANY	5,116	3113 - 4923	Warren, Speechley, Baltown, Riley, Benson, Elk, Alexander	Big Injun, Weir

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Environmental Protection

4708510370

WW-9  
(4/16)

API Number 47 - 085 -  
Operator's Well No. Karen Unit 2H

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Antero Resources Corporation OP Code 494507062

Watershed (HUC 10) South Fork Hughes River Quadrangle Pullman 7.5'

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes  No

Will a pit be used? Yes  No

If so, please describe anticipated pit waste: No pit will be used at this site (Drilling and Flowback Fluids will be stored in tanks. Cuttings will be tanked and hauled off site.)

Will a synthetic liner be used in the pit? Yes  No  If so, what ml.? N/A

MAC  
7-17-18

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number UIC Permit # will be provided on Form WR-34 ) ✓
- Reuse (at API Number Future permitted well locations when applicable. API# will be provided on Form WR-34 ) ✓
- Off Site Disposal (Supply form WW-9 for disposal location) (Meadowfill Landfill Permit #SWF-1032-98) ✓
- Other (Explain Northwestern Landfill Permit #SWF-1025/WV0109410) ✓

Will closed loop system be used? If so, describe: Yes

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Surface - Air/freshwater, Intermediate - Dust/silt foam, Production - Water Based Mud ✓

-If oil based, what type? Synthetic, petroleum, etc. N/A

Additives to be used in drilling medium? Please See Attachment ✓

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Stored in tanks, removed offsite and taken to landfill. ✓

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Meadowfill Landfill (Permit #SWF-1032-98), Northwestern Landfill (Permit # SWF-1025/WV0109410) ✓

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature Gretchen Kohler

Company Official (Typed Name) Gretchen Kohler

Company Official Title Senior Environmental & Regulatory Manager

Subscribed and sworn before me this 9 day of July 2018, 20

[Signature]

Notary Public

KARIN COX  
NOTARY PUBLIC  
STATE OF COLORADO  
NOTARY ID 20184014160  
MY COMMISSION EXPIRES MARCH 29, 2022

My commission expires 3/29/2022



**Antero Resources Corporation**

Proposed Revegetation Treatment: Acres Disturbed 28.7 acres Prevegetation pH \_\_\_\_\_

Lime 2-4 Tons/acre or to correct to pH 6.5

Fertilizer type Hay or straw or Wood Fiber (will be used where needed)

Fertilizer amount 500 lbs/acre

Mulch 2-3 Tons/acre

Access Road - (10.29 acres) + Well Pad (4.09 acres) + Additional Clearing (12.61 acres) + Excess/Topsoil Material Stockpiles (1.71 acres) = 28.7 Total Affected Acres

**Seed Mixtures**

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Annual Ryegrass	40	Crownvetch	10 - 15
Field Bromegrass	40	Tall Fescue	30

See attached Table IV-3 for additional seed type (Middle Pad Design Pg 23)      See attached Table IV-4A for additional seed type (Middle Pad Design Pg 23)

\*or type of grass seed requested by surface owner      \*or type of grass seed requested by surface owner

**Attach:**

Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, include dimensions (L x W x D) of the pit, and dimensions (L x W), and area in acreage, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Michael Goff

Comments: Preseed & mulch any disturbed areas per WVAEP regulations. Maintain & upgrade E-n-s as necessary.

Title: Oil & Gas Inspector Date: 7-17-18

Field Reviewed?  Yes  No



**Form WW-9 Additives Attachment****SURFACE INTERVAL**

1. Fresh Water
2. Soap –Foamer AC
3. Air

**INTERMEDIATE INTERVAL*****STIFF FOAM RECIPE:***

- 1) 1 ppb Soda Ash / Sodium Carbonate-Alkalinity Control Agent
- 2) 1 ppb Conqor 404 ( 11.76 ppg) / Corrosion Inhibitor
- 3) 4 ppb KLA-Gard ( 9.17 ppg) / Amine Acid Complex-Shale Stabilizer
- 4) 1ppb Mil Pac R / Sodium Carboxymethylcellulose-Filtration Control Agent
- 5) 12 ppb KCL / Potassium Chloride-inorganic Salt
- 6) Fresh Water 80 bbls
- 7) Air

**PRODUCTION INTERVAL**

1. Alpha 1655  
Salt Inhibitor
2. Mil-Carb  
Calcium Carbonate
3. Cottonseed Hulls  
Cellulose-Cottonseed Pellets – LCM
4. Mil-Seal  
Vegetable, Cotton & Cellulose-Based Fiber Blend – LCM
5. Clay-Trol  
Amine Acid Complex – Shale Stabilizer
6. Xan-Plex  
Viscosifier For Water Based Muds
7. Mil-Pac (All Grades)  
Sodium Carboxymethylcellulose – Filtration Control Agent
8. New Drill  
Anionic Polyacrylamide Copolymer Emulsion – Shale Stabilizer
9. Caustic Soda  
Sodium Hydroxide – Alkalinity Control
10. Mil-Lime  
Calcium Hydroxide – Lime
11. LD-9  
Polyether Polyol – Drilling Fluid Defoamer
12. Mil Mica  
Hydro-Biotite Mica – LCM

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13. Escaid 110  
Drilling Fluid Solvent – Aliphatic Hydrocarbon
14. Ligco  
Highly Oxidized Leonardite – Filtration Control Agent
15. Super Sweep  
Polypropylene – Hole Cleaning Agent
16. Sulfatrol K  
Drilling Fluid Additive – Sulfonated Asphalt Residuum
17. Sodium Chloride, Anhydrous  
Inorganic Salt
18. D-D  
Drilling Detergent – Surfactant
19. Terra-Rate  
Organic Surfactant Blend
20. W.O. Defoam  
Alcohol-Based Defoamer
21. Perma-Lose HT  
Fluid Loss Reducer For Water-Based Muds
22. Xan-Plex D  
Polysaccharide Polymer – Drilling Fluid Viscosifier
23. Walnut Shells  
Ground Cellulosic Material – Ground Walnut Shells – LCM
24. Mil-Graphite  
Natural Graphite – LCM
25. Mil Bar  
Barite – Weighting Agent
26. X-Cide 102  
Biocide
27. Soda Ash  
Sodium Carbonate – Alkalinity Control Agent
28. Clay Trol  
Amine Acid complex – Shale Stabilizer
29. Sulfatrol  
Sulfonated Asphalt – Shale Control Additive
30. Xanvis  
Viscosifier For Water-Based Muds
31. Milstarch  
Starch – Fluid Loss Reducer For Water Based Muds
32. Mil-Lube  
Drilling Fluid Lubricant

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JUL 10 2018

WV Department of  
Environmental Protection



**911 Address**  
**4392 Oxford Rd.**  
**West Union, WV 26456**

## **Well Site Safety Plan**

### **Antero Resources**

**Well Name:** Pritchard Unit 2H, Karen Unit 1H-3H, Hughes River Unit 1H-3H

**Pad Location:** IRELAND NORTH PAD  
Ritchie County/Union District

*Michael Doff*  
*7-17-18*

#### **GPS Coordinates:**

**Entrance** - Lat 39°11'20.1006"/Long -80°53'23.056" (NAD83)

**Entrance (at County Route)** - Lat 39°12'1.047"/Long -80°52'53.7636" (NAD83)

**Pad Center** - Lat 39°10'22.1658"/Long -80°53'56.7456" (NAD83)

#### **Driving Directions:**

From Pullman: Head northeast on Co Rd 9/Main St/Ash Hill St for 4.6 miles. Make a sharp right onto Possum Run Rd. In 0.6 miles, access road will be on the right.

#### **Alternate Route:**

From US 50 and 74, just south of Pennsboro: Head South on WV-74 (7.8mi). Turn left onto Oxford Rd. (3.8mi). Turn right on Possum Run Rd (.2 mi). Stay right and follow access road to Ireland North Pad.

**EMERGENCY (24 HOUR) CONTACT 1-800-878-1373**





EXHIBIT 1  
IRELAND NORTH  
PAD



PREVAILING WIND  
DIRECTION NNE



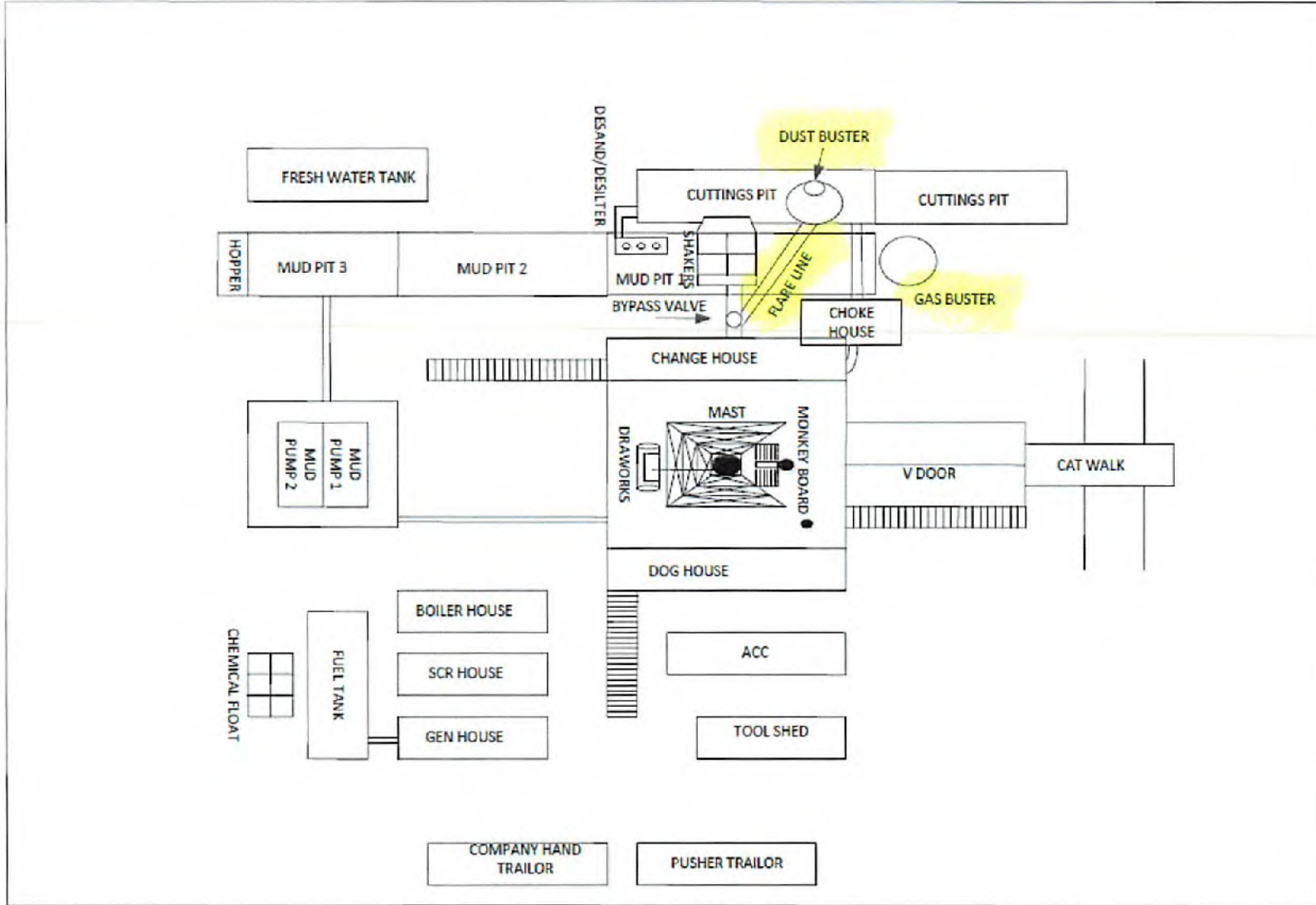
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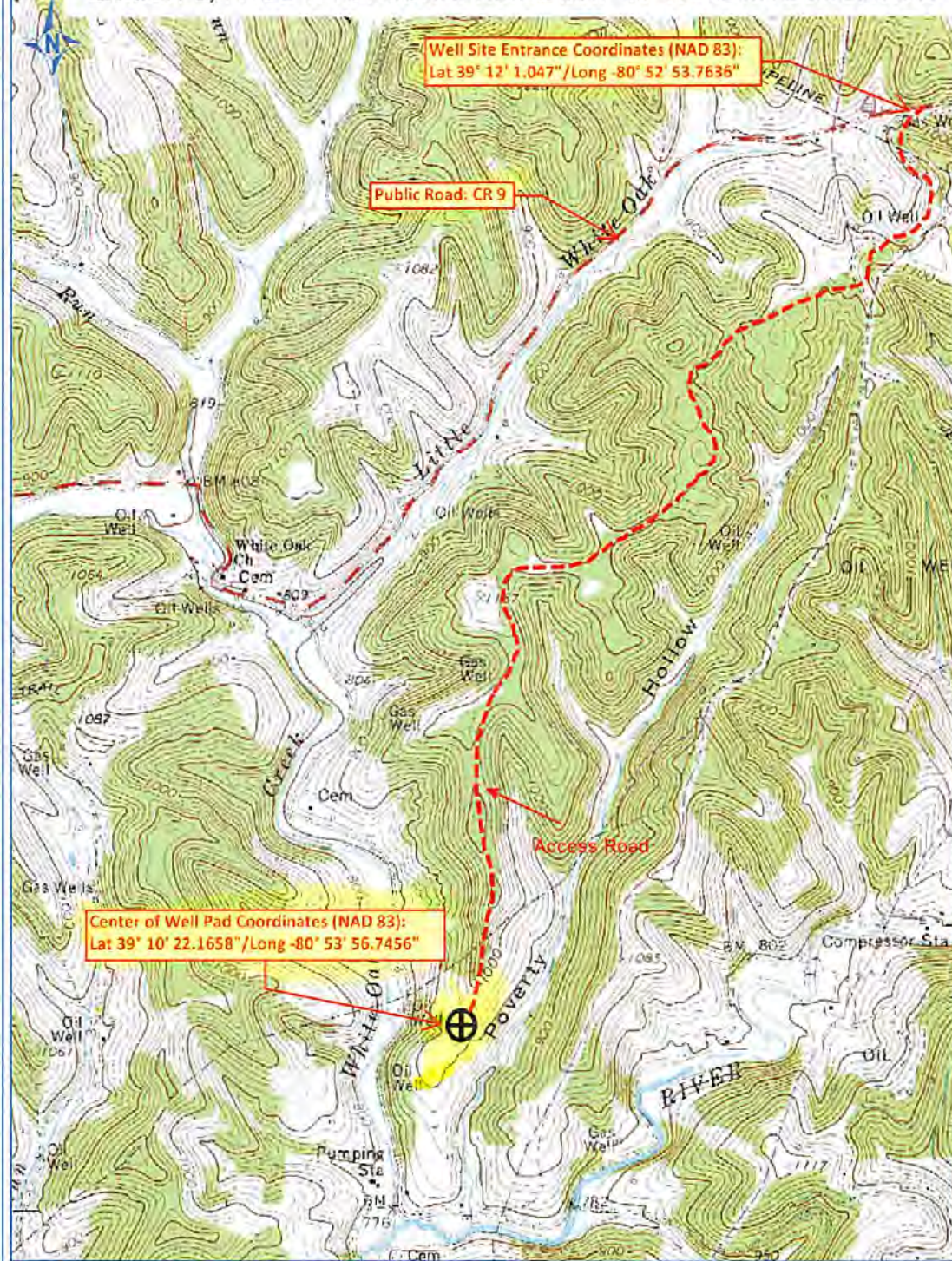
ACCESS ROAD

EXHIBIT 1, PAGE 3:  
DRILLING LAYOUT, FLARE LINES & PREVAILING WINDS





**EXHIBIT 2, PAGE 1: TOPOGRAPHICAL MAP OF WELL SITE LOCATION**



PETRA 5/2/2013 5:04:30 PM

**Antero Resources Corp**

APPALACHIAN BASIN

**Ireland North Pad**

Ritchie County

**REMARKS**

QUADRANGLE: PULLMAN 7.5'  
 WATERSHED: WHITE OAK CREEK  
 DISTRICT: UNION

By: ECM



07/06/18

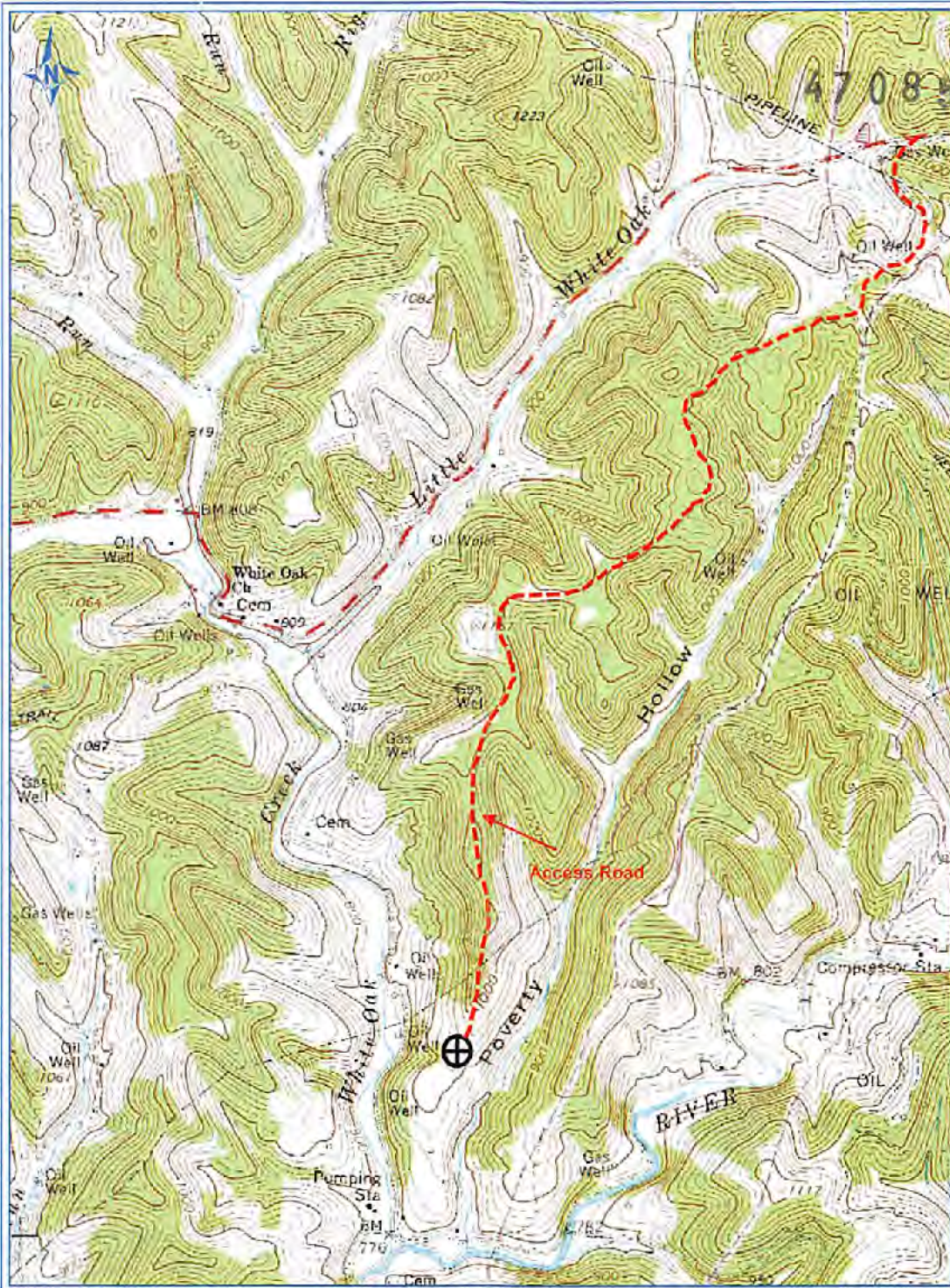
SSP Page 22

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WV Department of Environmental Protection





4708 1037

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**Antero Resources Corp**

APPALACHIAN BASIN

KAREN UNIT 2H

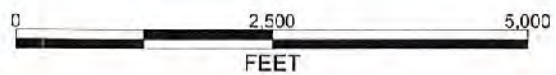
Ritchie County

**REMARKS**

QUADRANGLE: PULLMAN 7.5'  
WATERSHED: SOUTH FORK HUGHES RIVER

DISTRICT: UNION

By: ECM



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WV D:  
Environment



LATITUDE 39°12'30"

6,899'

LATITUDE 39°10'00"

3,778' TO BOTTOM HOLE

LONGITUDE 80°52'30"

12,631' TO BOTTOM HOLE

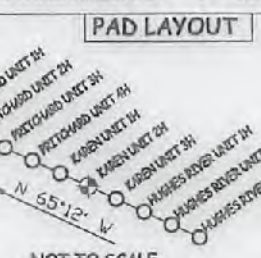
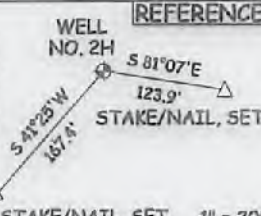
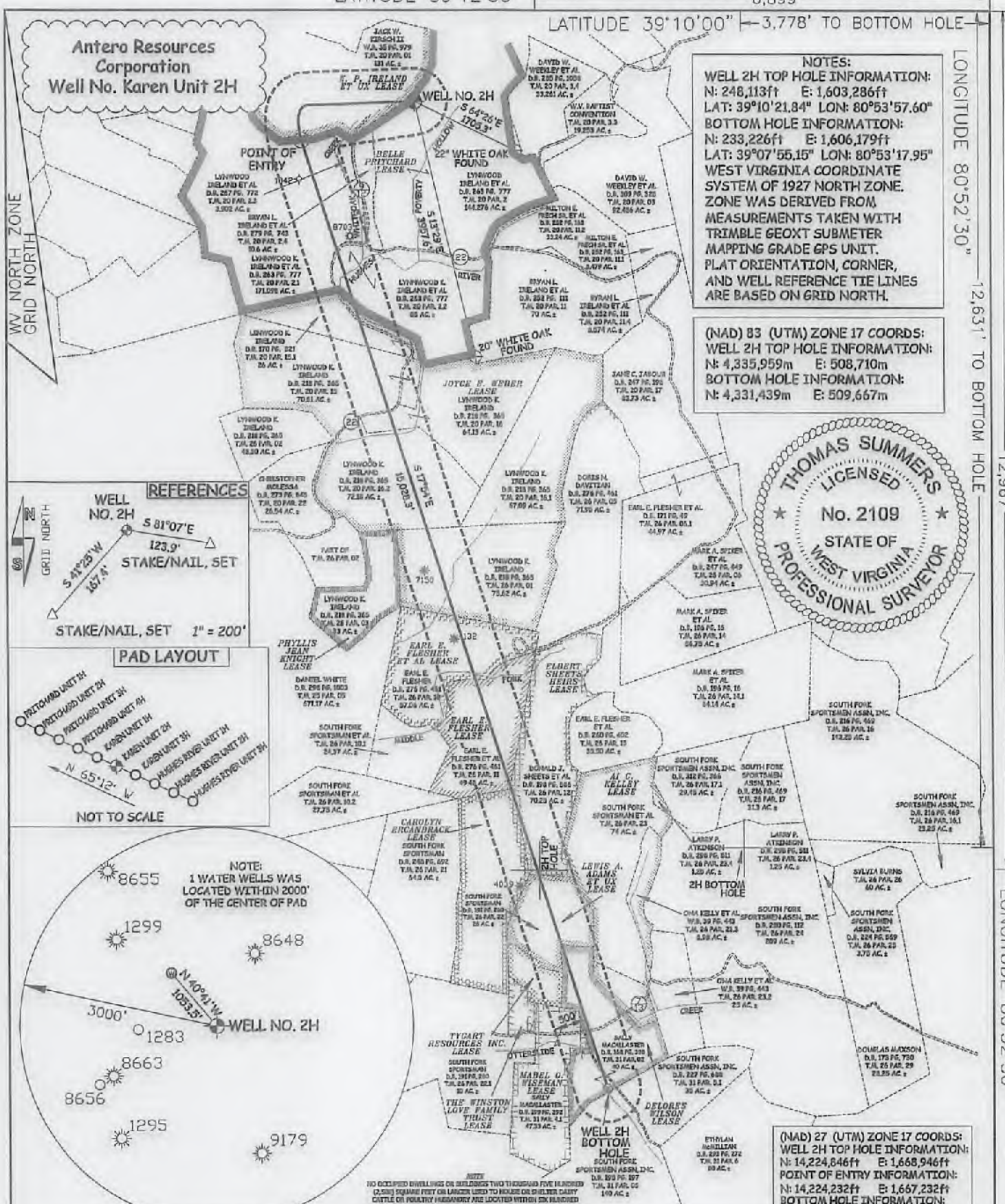
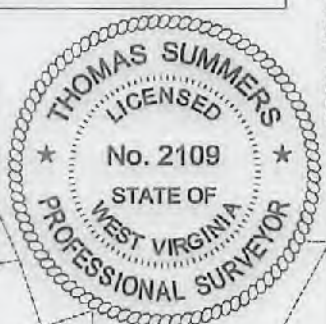
12,967'

LONGITUDE 80°52'30"

Antero Resources Corporation Well No. Karen Unit 2H

NOTES: WELL 2H TOP HOLE INFORMATION: N: 248,113ft E: 1,603,286ft LAT: 39°10'21.84" LON: 80°53'57.60" BOTTOM HOLE INFORMATION: N: 233,226ft E: 1,606,179ft LAT: 39°07'55.15" LON: 80°53'17.95" 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: 4,335,959m E: 508,710m BOTTOM HOLE INFORMATION: N: 4,331,439m E: 509,667m



NOTE: NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHEPHERD CATTLE OR FEEDSTUFF INVENTORY ARE LOCATED WITHIN ONE HUNDRED THIRTY-FIVE (135) FEET OF THE CENTER OF THE WELL PAD.

(NAD) 27 (UTM) ZONE 17 COORDS: WELL 2H TOP HOLE INFORMATION: N: 14,224,846ft E: 1,668,946ft POINT OF ENTRY INFORMATION: N: 14,224,232ft E: 1,667,232ft BOTTOM HOLE INFORMATION: N: 14,210,015ft E: 1,672,086ft

JOB # 14-127WA DRAWING # KAREN2HR 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 # KAREN UNIT #2H

API WELL # 47-085-10370 STATE COUNTY PERMIT

COUNTY RITCHIE ACREAGE 144.278 ACRES +/- LEASE ACREAGE 415 AC +/- 222 AC +/- 445.67 AC +/- 57 AC +/- 82 AC +/- 64.5 AC +/- 70.25 AC +/- 26 AC +/- 40 AC +/-

PROPOSED WORK: DRILL X CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL (SPECIFY) PLUG & ABANDON CLEAN OUT & REPLUG

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,800' TVD 24,100' MD

WELL OPERATOR ANTERO RESOURCES CORP. ADDRESS 1615 WYNKOOP STREET DENVER, CO 80202

DESIGNATED AGENT DIANNA STAMPER CT CORPORATION SYSTEM 5400 D BIG TYLER ROAD CHARLESTON, WV 25313

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
<b><u>Belle Pritchard Lease</u></b>			
Belle Pritchard	Ritchie A. Ireland	1/8	0077/0019
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
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>W. P. Ireland, et ux Lease</u></b>			
W.P. Ireland & L.M. Ireland	M.G. Taylor	1/8	0032/0016
M.G. Taylor	Carnegie Natural Gas Company	Assignment	Recited in 0068/0188
Carnegie Natural Gas Company	Coffman Oil & Gas Company	Assignment	0068/0188
Coffman Oil & Gas Company	United Operating Company, Inc.	Assignment	0117/0660
United Operating Company, Inc.	Buttes Resources Company	Assignment	0117/0738
Buttes Resources Company	Earl Stewart	Assignment	0128/0286
Earl Stewart	JCC	Assignment	0205/0483
JCC	Key Oil Company	Assignment	0229/0019
Key Oil Company	Antero Resources Appalachian Corporation	Partial Assignment of Oil & Gas Leases	0253/0747
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Joyce E. Webber Lease</u></b>			
Joyce E. Webber	Antero Resources Appalachian Corporation	1/8+	0254/0999
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Earl E. Flesher, et al Lease</u></b>			
Earl E. Flesher, et al	Antero Resources Appalachian Corporation	1/8+	0254/0385
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Earl E. Flesher Lease</u></b>			
Earl E. Flesher	Antero Resources Appalachian Corporation	1/8+	0254/0383
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Elbert Sheets Heirs Lease</u></b>			
Elbert Sheets Heirs	Tower Drilling Corporation	1/8	128/308
Tower Drilling Corporation	John R. Umstead	Assignment	180/706
John R. Umstead	Solomon Production Company	Assignment	225/765
Solomon Production Company	Antero Resources Appalachian Corporation	Partial Assignment of Oil and Gas Leases	258/715
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

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JUL 10 2018

\*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.

Operator's Well Number Karen 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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- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<b><u>Carolyn Ercanbrack Lease</u></b>			
Carolyn Ercanbrack	Antero Resources Appalachian Corporation	1/8+	255/170
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Lewis A. Adams et ux Lease</u></b>			
Lewis A. Adams et ux	Antero Resources Corporation	1/8+	0271/0671

\*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. Karen 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>Delores Wilson Lease</u>				
	Delores Wilson	J.F. Deem	1/8	0212/0715
	J.F. Deem	J.F. Deem Oil & Gas, LLC	Assignment	0228/0230
	J.F. Deem Oil & Gas, LLC	Chesapeake Appalachia, LLC	Assignment	0247/0891
	Chesapeake Appalachia, LLC	Statoilhydro USA Onshore Properties, Inc	Assignment	0249/0625
	Statoilhydro USA Onshore Properties, Inc	Statoil USA Onshore Properties	Name Change	Exhibit 2
	Statoil USA Onshore Properties	Antero Exchange Properties	Assignment	0301/0194
	Antero Exchange Properties, LLC	Antero Resources Corporation	Merger	0014/0598

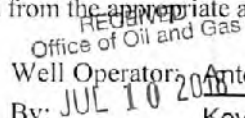
\*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

**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 Vice President - Production  
 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*

RECEIVED  
Office of Oil and Gas

JUL 10 2018

WV Department of Environmental Protection

*Mac Warner*

Secretary of State



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.wvsgos.com](http://www.wvsgos.com)  
E-mail: [business@wvsgos.com](mailto:business@wvsgos.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:

- Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation
- Date Certificate of Authority was issued in West Virginia: 6/25/2008
- Corporate name has been changed to: Antero Resources Corporation  
(Attach one Certified Copy of Name Change as filed in home State of incorporation.)
- Name the corporation elects to use in WV: Antero Resources Corporation  
(due to home state name not being available)
- Other amendments: (attach additional pages if necessary)
- 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
- 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 5311-1-129. 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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Office of Oil and Gas

JUL 10 2013

WV Department of  
Environmental Protection

FORM WW-6A1  
EXHIBIT 3



*J. Ken Hochler, 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 I, 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 Hochler*

Secretary of State  
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Office of Oil and Gas

JUL 10 2018

WV Department of  
Environmental Protection



470851037



Antero Resources  
1615 Wynkoop Street  
Denver, CO 80202  
Office 303.357.7310  
Fax 303.357.7315

July 6<sup>th</sup>, 2018

West Virginia Department of Environmental Protection  
Chief, Office of Oil and Gas  
Attn: Mr. James Martin  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304

RE: Karen Unit 2H  
Quadrangle: Pullman 7.5'  
Ritchie County/Union District, West Virginia

Mr. Martin:

Antero Resources Corporation (Antero) is submitting the following application for a new well work permit for the Karen Unit 2H horizontal shallow well. As an authorized representative, I certify that Antero has the right to extract, produce or market the oil or gas for all leases through which the Karen Unit 2H horizontal lateral will drill through including any and all roads crossed under as identified on the attached survey plat.

Sincerely,

A handwritten signature in blue ink, appearing to read "Tyler Adams", is written over a light blue horizontal line.

Tyler Adams  
Landman

RECEIVED  
Office of Oil and Gas

JUL 10 2018

WV Department of  
Environmental Protection



**STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
NOTICE CERTIFICATION**

Date of Notice Certification: 07/06/2018

API No. 47- 085 -  
Operator's Well No. Karen Unit 2H  
Well Pad Name: Ireland North Pad

**Notice has been given:**

Pursuant to the provisions in West Virginia Code § 22-6A, the Operator has provided the required parties with the Notice Forms listed below for the tract of land as follows:

State: <u>West Virginia</u>	UTM NAD 83	Easting: <u>508,710m</u>
County: <u>Ritchie</u>		Northing: <u>4,335,959m</u>
District: <u>Union</u>	Public Road Access: <u>CR 9</u>	
Quadrangle: <u>Pullman 7.5'</u>	Generally used farm name: <u>Lynwood Ireland et al</u>	
Watershed: <u>South Fork Hughes River</u>		

Pursuant to West Virginia Code § 22-6A-7(b), every permit application filed under this section shall be on a form as may be prescribed by the secretary, shall be verified and shall contain the following information: (14) A certification from the operator that (i) it has provided the owners of the surface described in subdivisions (1), (2) and (4), subsection (b), section ten of this article, the information required by subsections (b) and (c), section sixteen of this article; (ii) that the requirement was deemed satisfied as a result of giving the surface owner notice of entry to survey pursuant to subsection (a), section ten of this article six-a; or (iii) the notice requirements of subsection (b), section sixteen of this article were waived in writing by the surface owner; and Pursuant to West Virginia Code § 22-6A-11(b), the applicant shall tender proof of and certify to the secretary that the notice requirements of section ten of this article have been completed by the applicant.

<p>Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:</p> <p>*PLEASE CHECK ALL THAT APPLY</p> <p><input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED</p> <p><input type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input checked="" type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED</p> <p><input checked="" type="checkbox"/> 3. NOTICE OF INTENT TO DRILL or <input type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or</p> <p style="padding-left: 100px;"><input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)</p> <p><input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION</p> <p><input checked="" type="checkbox"/> 5. PUBLIC NOTICE</p> <p><input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION</p>	<p><b>OOG OFFICE USE ONLY</b></p> <p><input type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p>
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RECEIVED  
Office of Oil and Gas  
JUL 10 2018

WV Department of  
Environmental Protection

**Required Attachments:**

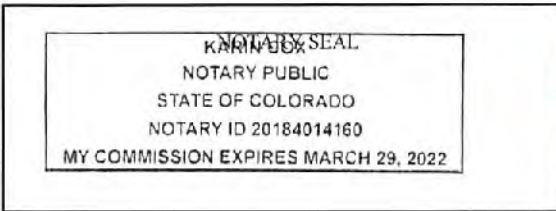
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication date verification or the associated Affidavit of Publication. The attached Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of personal service, the return receipt card or other postal receipt for certified mailing.

**Certification of Notice is hereby given:**

THEREFORE, I Kevin Kilstrom, have read and understand the notice requirements within West Virginia Code § 22-6A. I certify that as required under West Virginia Code § 22-6A, I have served the attached copies of the Notice Forms, identified above, to the required parties through personal service, by registered mail or by any method of delivery that requires a receipt or signature confirmation. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Notice Certification and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator: Antero Resources Corporation  
By: Kevin Kilstrom  
Its: Senior VP - Production  
Telephone: 303-357-7310

Address: 1615 Wynkoop Street  
Denver, CO 80202  
Facsimile: 303-357-7315  
Email: kcox@anteroresources.com



Subscribed and sworn before me this 6 day of July 2018.

[Signature] Notary Public

My Commission Expires 3/29/2022

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [deprivacyofficer@wv.gov](mailto:deprivacyofficer@wv.gov).

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

**STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
NOTICE OF APPLICATION**

**Notice Time Requirement:** notice shall be provided no later than the **filing date of permit application.**

**Date of Notice:** 7/9/2018 **Date Permit Application Filed:** 7/9/2018

**Notice of:**

- PERMIT FOR ANY WELL WORK
- CERTIFICATE OF APPROVAL FOR THE CONSTRUCTION OF AN IMPOUNDMENT OR PIT

**Delivery method pursuant to West Virginia Code § 22-6A-10(b)**

- PERSONAL SERVICE
- REGISTERED MAIL
- METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to W. Va. Code § 22-6A-10(b) no later than the filing date of the application, the applicant for a permit for any well work or for a certificate of approval for the construction of an impoundment or pit as required by this article shall deliver, by personal service or by registered mail or by any method of delivery that requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of this article, and the well plat to each of the following persons: (1) The owners of record of the surface of the tract on which the well is or is proposed to be located; (2) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for roads or other land disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The coal owner, operator or lessee, in the event the tract of land on which the well proposed to be drilled is located [sic] is known to be underlain by one or more coal seams; (4) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for the placement, construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this article; (5) Any surface owner or water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five hundred feet of the center of the well pad which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field within which the proposed well work activity is to take place. (c)(1) If more than three tenants in common or other co-owners of interests described in subsection (b) of this section hold interests in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be maintained pursuant to section eight, article one, chapter eleven-a of this code. (2) Notwithstanding any provision of this article to the contrary, notice to a lien holder is not notice to a landowner, unless the lien holder is the landowner. W. Va. Code R. § 35-8-5.7.a requires, in part, that the operator shall also provide the Well Site Safety Plan ("WSSP") to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Application Notice  WSSP Notice  E&S Plan Notice  Well Plat Notice is hereby provided to:

SURFACE OWNER(s)

Name: Lynwood K. & Karen L. Ireland  
Address: 342 Ireland Rd.  
Pullman, WV 26421

Name: Jack W. Kirsch II  
Address: 958 Holbrook Rd.  
Pullman, WV 26421

SURFACE OWNER(s) (Road and/or Other Disturbance)

\*PLEASE NOTE THE ADDITIONAL SURFACE TRACTS WITH DISTURBANCE SHOWN ON PAD DESIGN ARE **NOT** OVERLYING THE OIL & GAS LEASEHOLD BEING DEVELOPED BY THE PROPOSED WELL; THEREFORE, ARE NOT REQUIRED TO BE NOTIFIED PER WV CODE 22-6A-10. ANTERO HAS SECURED A SIGNED AGREEMENT WITH THE RELATED PARTIES

SURFACE OWNER(s) (Impoundments or Pits)

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

COAL OWNER OR LESSEE

Name: NO DECLARATIONS ON RECORD WITH COUNTY  
Address: \_\_\_\_\_

COAL OPERATOR

Name: NO DECLARATIONS ON RECORD WITH COUNTY  
Address: \_\_\_\_\_

WATER PURVEYOR(s)/OWNER(s) OF WATER WELL, SPRING OR OTHER WATER SUPPLY SOURCE

Name: Jack W. Kirsch II  
Address: 958 Holbrook Rd.  
Pullman, WV 26421

OPERATOR OF ANY NATURAL GAS STORAGE FIELD

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

\*Please attach additional forms if necessary

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Environmental Protection

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-10(b), notice is hereby given that the undersigned well operator has applied for a permit for well work or for a certificate of approval for the construction of an impoundment or pit.

**This Notice Shall Include:**

Pursuant to W. Va. Code § 22-6A-10(b), this notice shall include: (1) copies of the application; (2) the erosion and sediment control plan required by section seven of this article; and (3) the well plat.

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments; (2) who may file written comments; (3) the name and address of the secretary for the purpose of filing the comments and obtaining additional information; and (4) a statement that the persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Pursuant to W. Va. Code R. § 35-8-5.7.a, the operator shall provide the Well Site Safety Plan to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Pursuant to W. Va. Code R. § 35-8-15.2.c, this notice shall: (1) contain a statement of the surface owner's and water purveyor's right to request sampling and analysis; (2) advise the surface owner and water purveyor of the rebuttable presumption for contamination or deprivation of a fresh water source or supply; advise the surface owner and water purveyor that refusal to allow the operator to conduct a pre-drilling water well test constitutes a method to rebut the presumption of liability; (3) advise the surface owner and water purveyor of his or her independent right to sample and analyze any water supply at his or her own expense; advise the surface owner and water purveyor whether or not the operator will utilize an independent laboratory to analyze any sample; and (4) advise the surface owner and or water purveyor that he or she can obtain from the Chief a list of water testing laboratories in the subject area capable of and qualified to test water supplies in accordance with standard acceptable methods.

Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

**Well Location Restrictions**

Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any existing water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within six hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary. (c) Notwithstanding the foregoing provisions of this section, nothing contained in this section prevents an operator from conducting the activities permitted or authorized by a Clean Water Act Section 404 permit or other approval from the United States Army Corps of Engineers within any waters of the state or within the restricted areas referenced in this section. (d) The well location restrictions set forth in this section shall not apply to any well on a multiple well pad if at least one of the wells was permitted prior to the effective date of this article. (e) The secretary shall, by December 31, 2012, report to the Legislature on the noise, light, dust and volatile organic compounds generated by the drilling of horizontal wells as they relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding, if any, by the secretary that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items



WW-6A  
(8-13)

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

examined in the study required by this subsection, the secretary shall have the authority to propose for promulgation legislative rules establishing guidelines and procedures regarding reasonable levels of noise, light, dust and volatile organic compounds relating to drilling horizontal wells, including reasonable means of mitigating such factors, if necessary.

**Water Well Testing:**

Pursuant to West Virginia Code § 22-6A-10(d), notification shall be made, with respect to surface landowners identified in subsection (b) or water purveyors identified in subdivision (5), subsection (b) of this section, of the opportunity for testing their water well. The operator shall provide an analysis to such surface landowner or water purveyor at their request.

**Water Testing Laboratories:**

Pursuant to West Virginia Code § 22-6A-10(i), persons entitled to notice pursuant to subsection (b) of this section may contact the department to ascertain the names and locations of water testing laboratories in the subject area capable and qualified to test water supplies in accordance with standard accepted methods. In compiling that list of names the department shall consult with the state Bureau for Public Health and local health departments. A surface owner and water purveyor has an independent right to sample and analyze any water supply at his or her own expense. The laboratory utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section.

**Rebuttable Presumption for Contamination or Deprivation of a Fresh Water Source or Supply:**

W. Va. Code § 22-6A-18 requires that (b) unless rebutted by one of the defenses established in subsection (c) of this section, in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply. (c) In order to rebut the presumption of liability established in subsection (b) of this section, the operator must prove by a preponderance of the evidence one of the following defenses: (1) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration water well test. (2) The landowner or water purveyor refused to allow the operator access to the property to conduct a predrilling or prealteration water well test. (3) The water supply is not within one thousand five hundred feet of the well. (4) The pollution occurred more than six months after completion of drilling or alteration activities. (5) The pollution occurred as the result of some cause other than the drilling or alteration activity. (d) Any operator electing to preserve its defenses under subdivision (1), subsection (c) of this section shall retain the services of an independent certified laboratory to conduct the predrilling or prealteration water well test. A copy of the results of the test shall be submitted to the department and the surface owner or water purveyor in a manner prescribed by the secretary. (e) Any operator shall replace the water supply of an owner of interest in real property who obtains all or part of that owner's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source with a comparable water supply where the secretary determines that the water supply has been affected by contamination, diminution or interruption proximately caused by the oil or gas operation, unless waived in writing by that owner. (f) The secretary may order the operator conducting the oil or gas operation to: (1) Provide an emergency drinking water supply within twenty-four hours; (2) Provide temporary water supply within seventy-two hours; (3) Within thirty days begin activities to establish a permanent water supply or submit a proposal to the secretary outlining the measures and timetables to be used in establishing a permanent supply. The total time in providing a permanent water supply may not exceed two years. If the operator demonstrates that providing a permanent replacement water supply cannot be completed within two years, the secretary may extend the time frame on case-by-case basis; and (4) Pay all reasonable costs incurred by the real property owner in securing a water supply. (g) A person as described in subsection (b) of this section aggrieved under the provisions of subsections (b), (e) or (f) of this section may seek relief in court... (i) Notwithstanding the denial of the operator of responsibility for the damage to the real property owner's water supply or the status of any appeal on determination of liability for the damage to the real property owner's water supply, the operator may not discontinue providing the required water service until authorized to do so by the secretary or a court of competent jurisdiction.

**Written Comment:**

Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary. All persons described in West Virginia Code § 22-6A-10(b) may file written comments as to the location or construction of the applicant's proposed well work to the Secretary at:

Chief, Office of Oil and Gas  
Department of Environmental Protection  
601 57<sup>th</sup> St. SE  
Charleston, WV 25304  
(304) 926-0450

Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water. **NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.**

**Time Limits and Methods for Filing Comments.**

The law requires these materials to be served on or before the date the operator files its Application. You have **THIRTY (30) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Pursuant to West Virginia Code § 22-6A-11(c)(2), Any objections of the affected coal operators and coal seam owners and lessees shall be addressed through the processes and procedures that exist under sections fifteen, seventeen and forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article. The written comments filed by the parties entitled to notice under subdivisions (1), (2), (4), (5) and (6), subsection (b), section ten of this article shall be considered by the secretary in the permit issuance process, but the parties are not entitled to participate in the processes and proceedings that exist under sections fifteen, seventeen or forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article.

**Comment Requirements**

Your comments must be in writing and include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

Disclaimer: All comments received will be placed on our web site <http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/Pages/default.aspx> and the applicant will automatically be forwarded an email notice that such comments have been submitted. The applicant will be expected to provide a response to comments submitted by any surface owner, water purveyor or natural gas storage operator noticed within the application.

**Permit Denial or Condition**

The Chief has the power to deny or condition a well work permit. Pursuant to West Virginia Code § 22-6A-8(d), the permit may not be issued or be conditioned, including conditions with respect to the location of the well and access roads prior to issuance if the director determines that:

- (1) The proposed well work will constitute a hazard to the safety of persons;
- (2) The plan for soil erosion and sediment control is not adequate or effective;
- (3) Damage would occur to publicly owned lands or resources; or
- (4) The proposed well work fails to protect fresh water sources or supplies.

A permit may also be denied under West Virginia Code § 22-6A-7(k), the secretary shall deny the issuance of a permit if the secretary determines that the applicant has committed a substantial violation of a previously issued permit for a horizontal well, including the applicable erosion and sediment control plan associated with the previously issued permit, or a substantial violation of one or more of the rules promulgated under this article, and in each instance has failed to abate or seek review of the violation within the time prescribed by the secretary pursuant to the provisions of subdivisions (1) and (2), subsection (a), section five of this article and the rules promulgated hereunder, which time may not be unreasonable.

Pursuant to West Virginia Code § 22-6A-10(g), any person entitled to submit written comments to the secretary pursuant to subsection (a), section eleven of this article, shall also be entitled to receive from the secretary a copy of the permit as issued or a copy of the order modifying or denying the permit if the person requests receipt of them as a part of the written comments submitted concerning the permit application. Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

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WV Department of  
Environmental Protection

WW-6A  
(8-13)

API NO. 47-085 **4708510370**  
OPERATOR WELL NO. Karen Unit 2H  
Well Pad Name: Ireland North Pad

**Notice is hereby given by:**

Well Operator: Antero Resources Corporation  
Telephone: (303) 357-7310  
Email: kcox@anteroresources.com

Address: 1615 Wynkoop Street  
Denver, CO 80202  
Facsimile: 303-357-7315

**Oil and Gas Privacy Notice:**

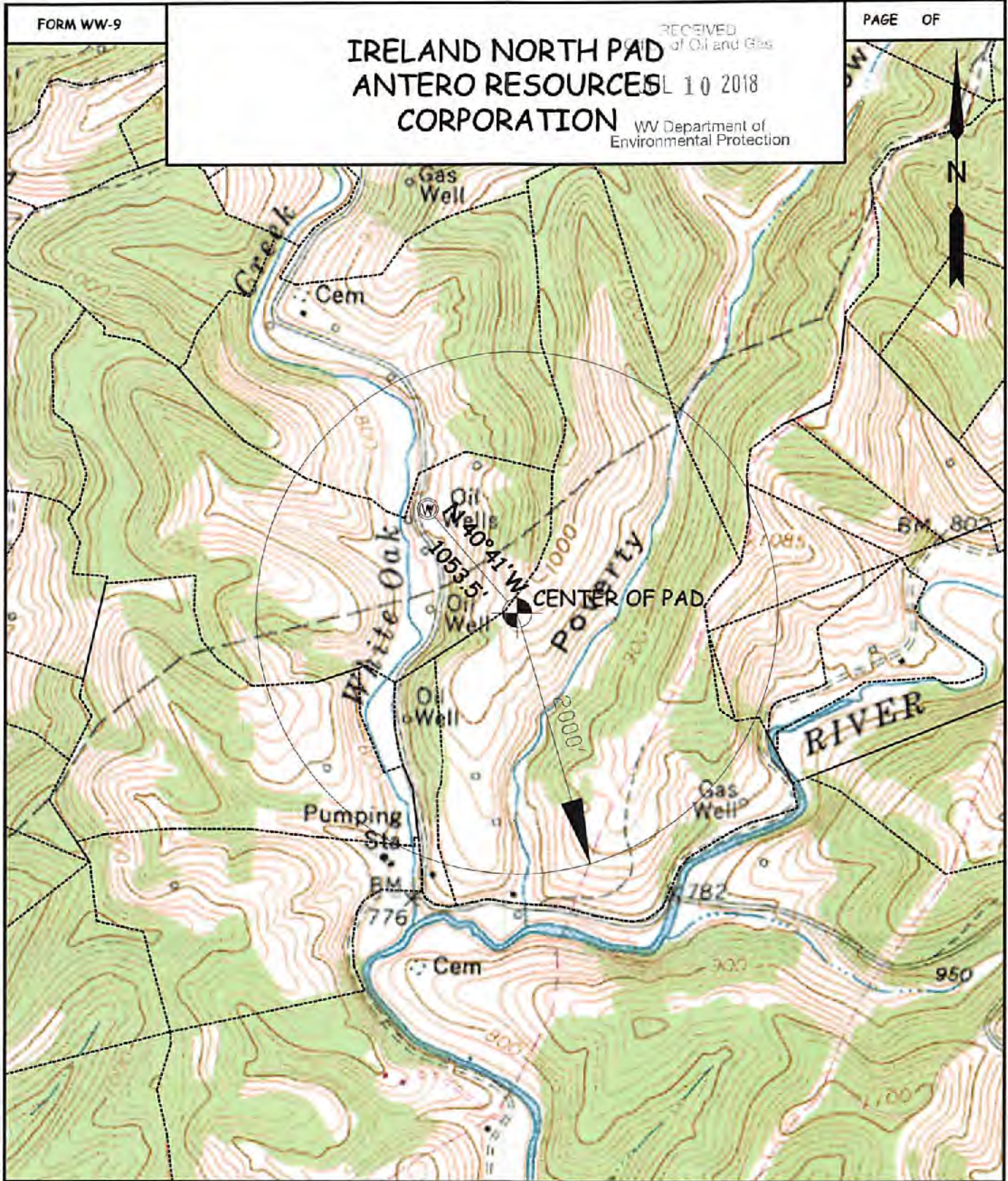
The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).

KARIN COX  
NOTARY PUBLIC  
STATE OF COLORADO  
NOTARY ID 20184014160  
MY COMMISSION EXPIRES MARCH 29, 2022

Subscribed and sworn before me this 9 day of July 2018.  
Karin Cox Notary Public  
My Commission Expires 3/29/2022

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JUL 10 2018  
WV Department of  
Environmental Protection





FORM WW-9		<b>IRELAND NORTH PAD</b> <b>ANTERO RESOURCES CORPORATION</b>		RECEIVED of Oil and Gas 10 2018 WV Department of Environmental Protection		PAGE OF	
WELL SURFACE OWNER		ADDRESS		WELL LATITUDE		WELL LONGITUDE	
W1 JACK W. KIRSCH II		958 HOLBROOK RD, PULLMAN WV, 26421		39°10'29.68"		80°54'06.65"	
WILLOW LAND SURVEYING, PLLC P.O. BOX 17, PENNSBORO, WV 26415 (304) 659-1717		TOPO SECTION(S) OF : PULLMAN 7.5' QUAD.		SCALE : 1-INCH = 1000-FEET			
DATE: 12/19/16		DRAWN BY: D.R.R.		0' 1000' 2000' 3000' 			
		JOB #: 12-123WA					
		FILE: IRELANDNORTHPADWATERMAP					



4708 10370

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
NOTICE OF INTENT TO DRILL

Pursuant to W. Va. Code § 22-6A-16(b), the Notice of Intent to Drill is only required if the notice requirements of W. Va. Code § 22-6A-10(a) have NOT been met or if the Notice of Intent to Drill requirement has NOT been waived in writing by the surface owner.

**Notice Time Requirement:** Notice shall be provided at least **TEN (10)** days prior to filing a permit application.  
**Date of Notice:** 06/14/2018      **Date Permit Application Filed:** 07/09/2018

**Delivery method pursuant to West Virginia Code § 22-6A-16(b)**

HAND DELIVERY       CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

Pursuant to W. Va. Code § 22-6A-16(b), at least ten days prior to filing a permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner notice of its intent to enter upon the surface owner's land for the purpose of drilling a horizontal well: *Provided*, That notice given pursuant to subsection (a), section ten of this article satisfies the requirements of this subsection as of the date the notice was provided to the surface owner; *Provided, however*, That the notice requirements of this subsection may be waived in writing by the surface owner. The notice, if required, shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative.

**Notice is hereby provided to the SURFACE OWNER(s):**

Name: Lynwood K. and Karen L. Ireland  
Address: 342 Ireland Rd.  
Pullman, WV 26421

Name: Jack W. Kirsch III  
Address: 958 Holbrook Rd.  
Pullman, WV 26421

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-16(b), notice is hereby given that the undersigned well operator has an intent to enter upon the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State: West Virginia      UTM NAD 83      Easting: 508710m  
County: Ritchie      Northing: 4335959m  
District: Union      Public Road Access: CR-9  
Quadrangle: Pullman 7.5'      Generally used farm name: Ireland, Lynwood, et al  
Watershed: South Fork Hughes River

**This Notice Shall Include:**

Pursuant to West Virginia Code § 22-6A-16(b), this notice shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

**Notice is hereby given by:**

Well Operator: Antero Resources Corporation  
Address: 1615 Wynkoop St.  
Denver, CO 80202  
Telephone: 303-357-6820  
Email: kcox@anteroresources.com  
Facsimile: 303-357-7315

Authorized Representative: Karin Cox  
Address: 1615 Wynkoop St.  
Denver, CO 80202  
Telephone: 303-357-6820  
Email: kcox@anteroresources.com  
Facsimile: 303-357-7315

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JUL 10 2018  
WV Department of Environmental Protection

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).



**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**NOTICE OF PLANNED OPERATION**

**Notice Time Requirement:** notice shall be provided no later than the **filing date of permit application.**

**Date of Notice:** 07/09/2018      **Date Permit Application Filed:** 07/09/2018

**Delivery method pursuant to West Virginia Code § 22-6A-16(c)**

- CERTIFIED MAIL                                       HAND  
RETURN RECEIPT REQUESTED                                      DELIVERY

Pursuant to W. Va. Code § 22-6A-16(c), no later than the date for filing the permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner whose land will be used for the drilling of a horizontal well notice of the planned operation. The notice required by this subsection shall include: (1) A copy of this code section; (2) The information required to be provided by subsection (b), section ten of this article to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. (d) The notices required by this section shall be given to the surface owner at the address listed in the records of the sheriff at the time of notice.

**Notice is hereby provided to the SURFACE OWNER(s)**  
(at the address listed in the records of the sheriff at the time of notice):

Name: Lynwood K. & Karen L. Ireland  
Address: 342 Ireland Rd.  
Pullman, WV 26421

Name: Jack W. Kirsch II  
Address: 958 Holbrook Rd.  
Pullman, WV 26421

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-16(c), notice is hereby given that the undersigned well operator has developed a planned operation on the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>4,335,959m</u>
County:	<u>Ritchie</u>		Northing:	<u>508,710m</u>
District:	<u>Union</u>	Public Road Access:		<u>CR 9</u>
Quadrangle:	<u>Pullman 7.5'</u>	Generally used farm name:		<u>Ireland, Lynwood, et al</u>
Watershed:	<u>South Fork Hughes River</u>			

**This Notice Shall Include:**

Pursuant to West Virginia Code § 22-6A-16(c), this notice shall include: (1) A copy of this code section; (2) The information required to be provided by **W. Va. Code § 22-6A-10(b)** to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

Well Operator: Antero Resources Corporation  
Telephone: (303) 357-7310  
Email: kcox@anteroresources.com

Address: 1615 Wynkoop Street  
Denver, CO 80202  
Facsimile: 303-357-7316

RECEIVED  
Office of Oil and Gas

JUL 10 2018

WV Department of  
Environmental Protection

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).



4708-10370  
4708510370

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

**Division of Highways**

1900 Kanawha Boulevard East • Building Five • Room 110  
Charleston, West Virginia 25305-0430 • (304) 558-3505

Thomas J. Smith, P. E.  
Secretary of Transportation/  
Commissioner of Highways

Reissued July 2, 2018

Jill M. Newman  
Deputy Commissioner

James A. Martin, Chief  
Office of Oil and Gas  
Department of Environmental Protection  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304

Subject: DOH Permit for the Ireland North Pad, Ritchie County  
Karen Unit 2H Well site

Dear Mr. Martin,

This well site will be accessed from a DOH permit #03-2013-0010 which has been issued to Antero Resources Corporation for access to the State Road for a well site located off of Ritchie County Route 9 SLS.

The operator has signed a STATEWIDE OIL AND GAS ROAD MAINTENANCE BONDING AGREEMENT and provided the required Bond. This operator is currently in compliance with the DOH OIL AND GAS POLICY dated January 3, 2012.

Very Truly Yours,

Gary K. Clayton, P.E.  
Regional Maintenance Engineer  
Central Office O&G Coordinator

Cc: Karin Cox  
Antero Resources Corporation  
CH, OM, D-3  
File

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Office of Oil and Gas

JUL 10 2018

WV Department of  
Environmental Protection

# List of Anticipated Additives Used for Fracturing or Stimulating Well

4708  
47085103770

Additives	Chemical Abstract Service Number (CAS #)
Fresh Water	7732-18-5
2 Phosphobutane 1,2,4 tricarboxylic acid	37971-36-1
Ammonium Persulfate	7727-54-0
Anionic copolymer	Proprietary
Anionic polymer	Proprietary
BTEX Free Hydrotreated Heavy Naphtha	64742-48-9
Cellulase enzyme	Proprietary
Demulsifier Base	Proprietary
Ethoxylated alcohol blend	Mixture
Ethoxylated Nonylphenol	68412-54-4
Ethoxylated oleylamine	26635-93-8
Ethylene Glycol	107-21-1
Glycol Ethers	111-76-2
Guar gum	9000-30-0
Hydrogen Chloride	7647-01-0
Hydrotreated light distillates, non-aromatic, BTEX free	64742-47-8
Isopropyl alcohol	67-63-0
liquid, 2,2-dibromo-3-nitrilopropionamide	10222-01-2
Microparticle	Proprietary
Petroleum Distillates (BTEX Below Detect)	64742-47-8
Polyacrylamide	57-55-6
Propargyl Alcohol	107-19-7
Propylene Glycol	57-55-6
Quartz	14808-60-7
Sillica, crystalline quartz	7631-86-9
Sodium Chloride	7647-14-5
Sodium Hydroxide	1310-73-2
Sugar	57-50-1
Surfactant	68439-51-0
Suspending agent (solid)	14808-60-7
Tar bases, quinoline derivs, benzyl chloride-quaternized	72480-70-7
Solvent Naphtha, petroleum, heavy aliph	64742-96-7
Soybean Oil, Me ester	67784-80-9
Copolymer of Maleic and Acrylic Acid	52255-49-9
DETA phosphonate	15827-60-8
Hexamethylene Triamine Penta	34690-00-1
Phosphino Carboxylic acid polymer	71050-62-9
Hexamethylene Diamine Tetra	23605-75-5
2-Propenoic acid, polymer with 2 propenamide	9003-06-9
Hexamethylene diamine penta (methylene phosphonic acid)	23605-74-5
Diethylene Glycol	111-46-6
Methenamine	100-97-0
Polyethylene polyamine	68603-67-8
Coco amine	61791-14-8
2-Propyn-1-olcompound with methyloxirane	38172-91-7

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Office of Oil and Gas

JUL 10 2018

WV Dept of Environmental Protection







# North Site

As-Built  
 Resources Corporation  
 Ritchie County  
 Union District  
 39.172824°  
 -80.899096°  
 Fork Hughes River Watershed

**Pertinent Site Information**  
 Ireland North Site  
 Emergency Number: 304-659-3770  
 Union District, Ritchie County, WV  
 Watershed: White Oak Creek Watershed  
 911 Address  
 4392 Oxford Rd  
 West Union, WV 26421  
 Antero Resources Emergency Number: 800-878-1373



**Property Owner Information - Ireland North Site Design**  
 Union District, Ritchie County

Owner	Yrs. Owned	Wetland	Vegetation	Typical Species	MAF Category	Total Disturbed Acres
Union District	14-17	0.00	3.25	1.00	1.25	1.25
James & Madeline Lougher	14-14	0.00	1.28	0.00	1.28	1.28
James & Madeline Lougher	14-14	0.00	1.28	0.00	1.28	1.28
Expwood & Sons Inc/land	2002	3.55	3.84	0.28	5.35	12.00
Jack Work 's	2011	1.54	0.03	0.00	0.35	2.35
<b>Total (Total Dist.)</b>	<b>10/29</b>	<b>1.74</b>	<b>12.64</b>	<b>28.30</b>		

NAD 83  
 North American Datum of 1983  
 WGS 84  
 World Geodetic System of 1984  
 UTM  
 Universal Transverse Mercator  
 Zone 18N  
 Datum  
 North American Datum of 1983  
 Spheroid  
 Clarke 1866  
 Projection  
 UTM  
 Units  
 Meters  
 Datum  
 North American Datum of 1983

**As-Built Disturbed Area**

Wetland Construction	4.09 AC
Wetland Disturbance	1.28 AC
Wetland Loss	1.28 AC
Wetland Total	5.65 AC
Additional Disturbance	12.64 AC
Yield Disturbed Area	28.30 AC

**Additional Information**  
 Total Acres Lost of Access Road: 7,925.77'

**Ireland North Site Design Quantities**

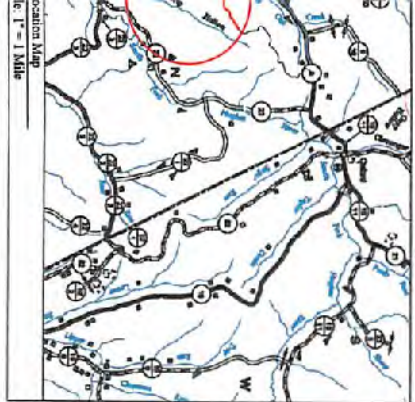
Description	Est. (CY)	Prop. (CY)	Final (CY)	Import/Export	(CY)	Max. Slope	Length of Slope
Wetland	27,862.61	22,189.15	5,600.42	N/A	N/A	N/A	N/A
Access Road	9,196.53	8,395.24	343.29	15,079	15,079	N/A	159.83'
Gravel	6,100	6,000	100	10,000	10,000	N/A	N/A
<b>Total</b>	<b>43,159.67</b>	<b>36,584.39</b>	<b>6,043.71</b>	<b>25,079</b>	<b>25,079</b>		

**Ireland North Site As-Built Quantities**

Description	Est. (CY)	Prop. (CY)	Final (CY)	Spill (CY)
Wetland	15,000	15,000	15,000	0
Access Road	15,000	15,000	15,000	0
Gravel	15,000	15,000	15,000	0
<b>Total</b>	<b>45,000</b>	<b>45,000</b>	<b>45,000</b>	<b>0</b>

**Site Locations (NAD 83)**

Station	Latitude (DD)	Longitude (DD)
Corner Station 9	39.202821°	-80.881621°
Station 10	39.183917°	-80.880719°
Corner of Well Pad	39.172824°	-80.899096°



**Revision**

Revision	Date
WVDEP Corrections to As-Built	06-24-2017

**Date**

Date
06-24-2017



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 CORPORATION



**Cover Sheet - As-Built**  
**Ireland North Site**  
 Union District  
 Ritchie County, WV

**Sheet**

Sheet	Description
1	Cover Sheet
2-4	Overall Plan View
5	Plan Views
6-9	Well Pad Plan View
10	Existing Access Road Plan Views
11-12	Existing Access Road Profile
13-15	Access Road Cross Sections
16	Well Pad Cross Sections
17	Well Pad Area
18	Well Pad Area
19	Well Pad Area
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50	Well Pad Area

**Scale**

Date: 02/01/2017
Scale: As Shown
Designed By: EC
File No:
Sheet Cover:

**Antero Resources**  
 4392 Oxford Rd  
 West Union, WV 26421  
 Phone: 800-878-1373  
 Fax: 304-659-3770



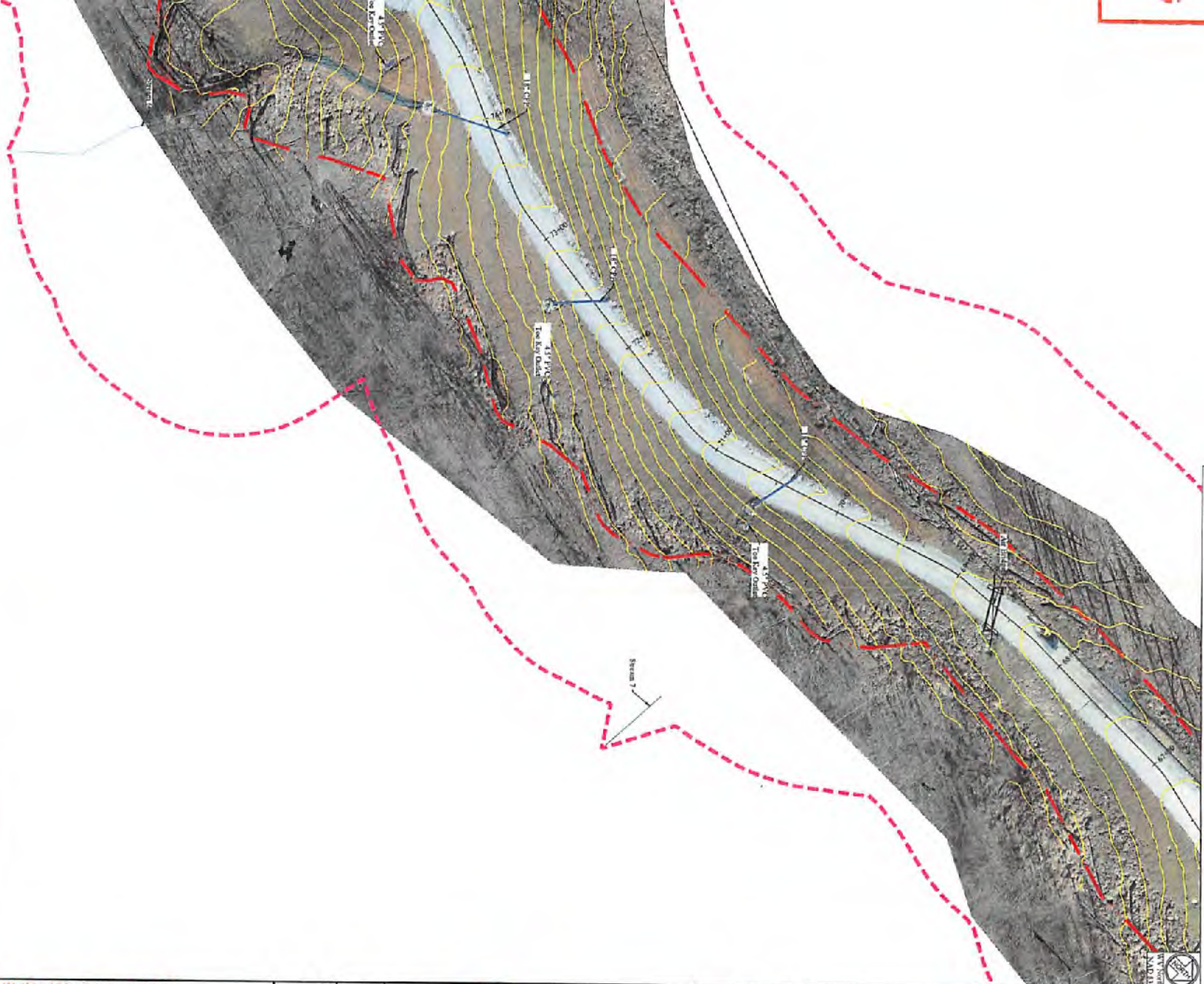
*Antero Staff  
 7-1-18*







**Ireland North Site**  
**Antero Resources Corporation**  
**Well Pad Plan View - As-Built**



- Legend**
- 12" Water
  - 24" Compact Fine Sand
  - 36" Compact Fine Sand
  - Orange Construction Fence
  - Property Line
  - Clearing Limit
  - As-Built Clearing Limit
  - Acre of Interest

- Field Vent
- Intermittent Stream
- Perennial Stream
- Seasonal Stream
- E-100
- Existing Utility Schedule

Image Date: 1-25-2017

**Well Pad Plan View - As-Built**

**Ireland North Site**

Union District  
 Ritchie County, WV



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 ANTERO RESOURCES  
 CORPORATION



Date	Revision
06-26-2017	Mountable Berm Derral WVDEP Corrections

Date: 02/01/2017  
 Scale: As Shown  
 Designed By: BC  
 File No:  
 Sheet 3 of 17