PERMIT MODIFICATION APPROVAL

June 30, 2014

ANTERO RESOURCES APPALACHIAN CORPORATION
1625 17TH STREET, SUITE 300
DENVER, CO 80202

Re: Permit Modification Approval for API Number 1706218, Well #: GAINS-KOCH UNIT 1H
Name changed/Bottom hole changed

Oil and Gas Operator:
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.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

[Signature]

Gene Smith
Regulatory/Compliance Manager
Office of Oil and Gas

Promoting a healthy environment.
March 21, 2014

West Virginia Department of Environmental Protection
Office of Oil and Gas
Attn: Ms. Laura Cooper
601 57th Street
Charleston, WV 25304

RE: Permit Modification to Approved Well Permit
   Koch Unit 1H  API#: 47-017-06218
   Quadrangle: Smithburg 7.5'
   Doddridge County/Grant District, West Virginia

Ms. Laura Cooper:

Antero Resources Corporation (Antero) would like to submit the following permit modification for an approved well on the Revival Pad. We are requesting to change the name of the Koch Unit 1H to Gains-Koch Unit 1H and revise the bottom hole location.

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the revised name, Measured Depth and Production Casing/Cement program
- REVISED Form WW-6A1, which shows the new leases Antero will be drilling into
- REVISED Mylar Plat, which shows the new bottom hole location and well name

If you have any questions please feel free to contact me at (303) 357-7323.

Thank you in advance for your consideration.

Sincerely,

Ashlie Mihalcev
Permit Representative
Antero Resources Corporation

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

1) Well Operator: Antero Resources Corporation 494488557 Operator ID
017- Doddridge County
Grant District
Smithburg 7.5' Quadrangle

2) Operator's Well Number: Gains-Koch Unit 1H
Well Pad Name: Revival Pad (existing)

3) Farm Name/Surface Owner: Williams, Larry et al
Public Road Access: CR 30

4) Elevation, current ground: 1375'
Elevation, proposed post-construction: 1375'

5) Well Type
(a) Gas
Oil
Underground Storage

(b) If Gas
Shallow
Deep
Horizontal

6) Existing Pad: Yes or No
Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus Shale: 7400' TVD, Anticipated Thickness- 55 Feet, Associated Pressure- 2950#

8) Proposed Total Vertical Depth: 7400' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 16,400' MD

11) Proposed Horizontal Leg Length: 7001'

12) Approximate Fresh Water Strata Depths: 450'

13) Method to Determine Fresh Water Depths:
Fresh water was encountered on this well that was preset to KOP.

14) Approximate Saltwater Depths: 1079', 1808'

15) Approximate Coal Seam Depths: 328', 863'

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:

Received
MAR 24 2014

Office of Oil and Gas
WV Dept. of Environmental Protection
### CASING AND TUBING PROGRAM

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Size</th>
<th>New or Used</th>
<th>Grade</th>
<th>Weight per ft. (lb/ft)</th>
<th>FOOTAGE: For Drilling</th>
<th>INTERVALS: Left in Well</th>
<th>CEMENT: Fill-up (Cu. Ft.)</th>
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<tbody>
<tr>
<td>Conductor</td>
<td>20&quot;</td>
<td>New</td>
<td>H-40</td>
<td>94#</td>
<td>40'</td>
<td>40'</td>
<td>CTS, 38 Cu. Ft.</td>
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<tr>
<td>Fresh Water</td>
<td>13-3/8&quot;</td>
<td>New</td>
<td>J-55/H-40</td>
<td>54.5#/ 48#</td>
<td>515'</td>
<td>515' *see #19</td>
<td>CTS, 715 Cu. Ft.</td>
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<td>Intermediate</td>
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<td></td>
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<tr>
<td>Production</td>
<td>5-1/2&quot;</td>
<td>New</td>
<td>P-110</td>
<td>20#</td>
<td>16400'</td>
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<td>4092 Cu. Ft.</td>
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<td>N-80</td>
<td>4.7#</td>
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<td>7200'</td>
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### Wellbore Details

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<tr>
<th>TYPE</th>
<th>Size</th>
<th>Wellbore Diameter</th>
<th>Wall Thickness</th>
<th>Burst Pressure</th>
<th>Cement Type</th>
<th>Cement Yield (cu. ft/k)</th>
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<td>Fresh Water</td>
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<td>17-1/2&quot;</td>
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<td>Class A</td>
<td>1.18</td>
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<td>12-1/4&quot;</td>
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<td>Production</td>
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<td>8-3/4&quot; &amp; 8-1/2&quot;</td>
<td>0.361&quot;</td>
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<td>Lead-HPOZ &amp; Tail - H</td>
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### PACKERS

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

Received
MAR 24 2014
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."

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 15.45 (existing)

22) Area to be disturbed for well pad only, less access road (acres): 4.95 (existing)

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% calcium and 1/4 lb flake, 5 gallons of clay treat
- **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.*