



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

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,

for Gene Smith
Regulatory/Compliance Manager
Office of Oil and Gas



March 21, 2014

Antero Resources
1625 17th Street
Denver, Colorado 80202
Office 303.357.7310
Fax 303.357.7315

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 Mihalein
Permit Representative
Antero Resources Corporation

Received

MAR 24 2014

Enclosures

Office of Oil and Gas
WV Dept. of Environmental Protection

07/04/2014

WW-6B
(9/13)

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

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

(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: _____

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WW-6B
(9/13)

18)

CASING AND TUBING PROGRAM

| TYPE | Size | New or Used | Grade | Weight per ft. (lb/ft) | FOOTAGE: For Drilling | INTERVALS: Left in Well | CEMENT: Fill-up (Cu. Ft.) |
|--------------|-------------|----------------------------|--------------|-----------------------------------|----------------------------------|------------------------------------|--|
| Conductor | 20" | New | H-40 | 94# | 40' | 40' | CTS, 38 Cu. Ft. |
| Fresh Water | 13-3/8" | New | J-55/H-40 | 54.5#/ 48# | 515' | 515' *see #19 | CTS, 715 Cu. Ft. |
| Coal | 9-5/8" | New | J-55 | 36# | 2525' | 2525' | CTS, 1028 Cu. Ft. |
| Intermediate | | | | | | | |
| Production | 5-1/2" | New | P-110 | 20# | 16400' | 16400' | 4092 Cu. Ft. |
| Tubing | 2-3/8" | New | N-80 | 4.7# | | 7200' | |
| Liners | | | | | | | |

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

PACKERS

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

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WW-6B
(9/13)

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:

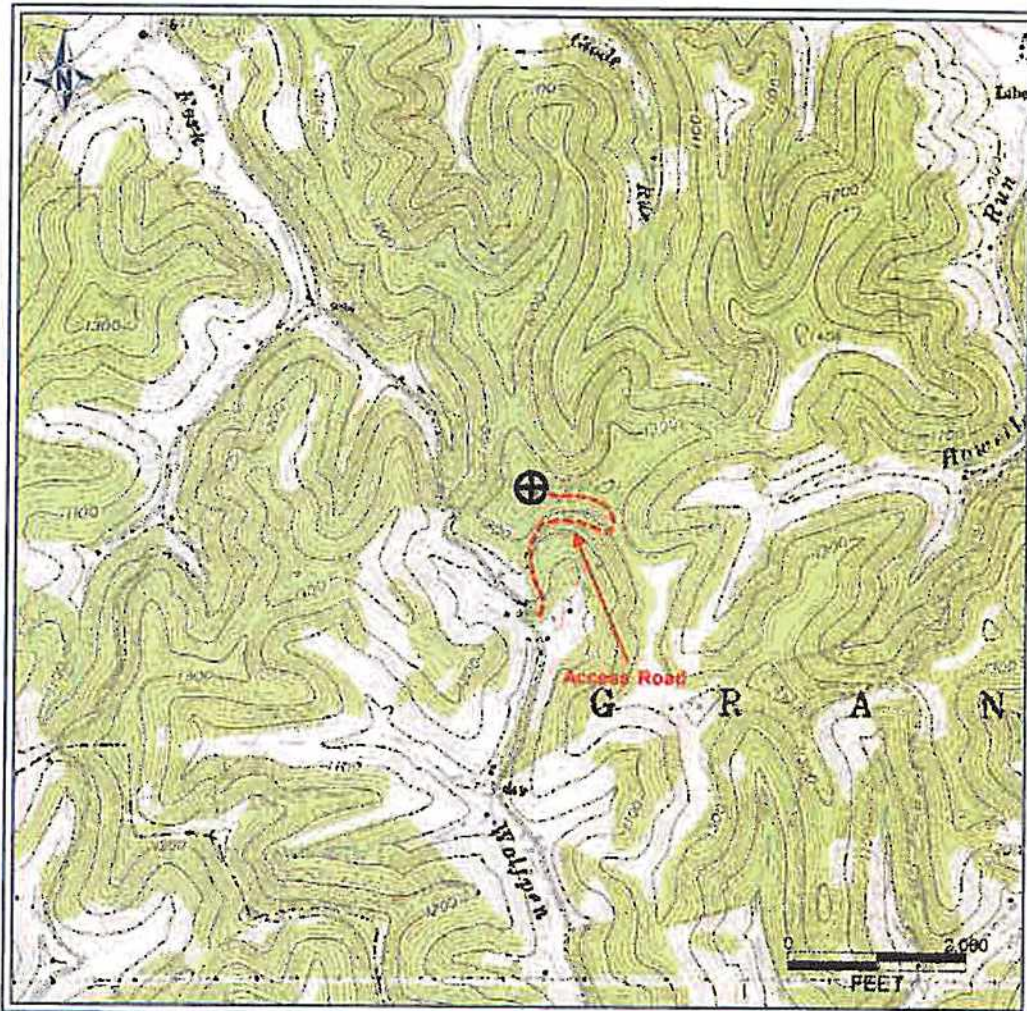
Conductor: blowhole clean with air, run casing, 10 bbls fresh water.
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.
Intermediate: 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.

Received

*Note: Attach additional sheets as needed.

MAR 24 2014

Page 3 of 3
07/04/2014



PETRA 11/28/2012 4:00:03 PM

Revised
Office of Oil & Gas

*DCW
4-18-13*

APR 23 2013

**17-06218 H6A KOCH UNIT 1H
ANTERO RESOURCES**

PAD NAME: REVIVAL

| |
|---|
| Antero Resources Corporation |
| APPALACHIAN BASIN |
| Koch Unit 1H Doddridge County |
| 0 2,000 4,000 FEET |
| REMARKS QUADRANGLE: SMITHBURG WATERSHED: DISTRICT: GRANT |
| Date: 12/04/12 |

07/04/2014

LATITUDE 39°20'00"

6,692'

5,828' TO BOTTOM HOLE
LATITUDE 39°20'00"

LONGITUDE 80°40'00"
10,605' TO BOTTOM HOLE
LONGITUDE 80°40'00"

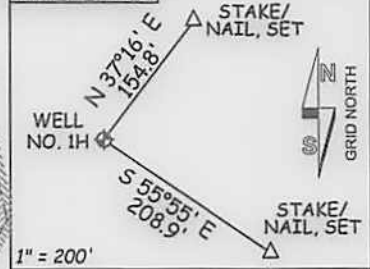
Antero Resources Corporation
Well No. Gains-Koch Unit 1H

LANDING POINT
N:301810
E:1661933

NOTES:
WELL 1H TOP HOLE INFORMATION:
N: 302,441ft E: 1,663,268ft
LAT: 39°19'27.31" LON: 80°41'25.16"
BOTTOM HOLE INFORMATION:
N: 295,133ft E: 1,664,038ft
LAT: 39°18'15.19" LON: 80°41'14.14"
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 1H TOP HOLE INFORMATION:
N: 4,352,816m E: 526,708m
BOTTOM HOLE INFORMATION:
N: 4,350,593m E: 526,980m

REFERENCES

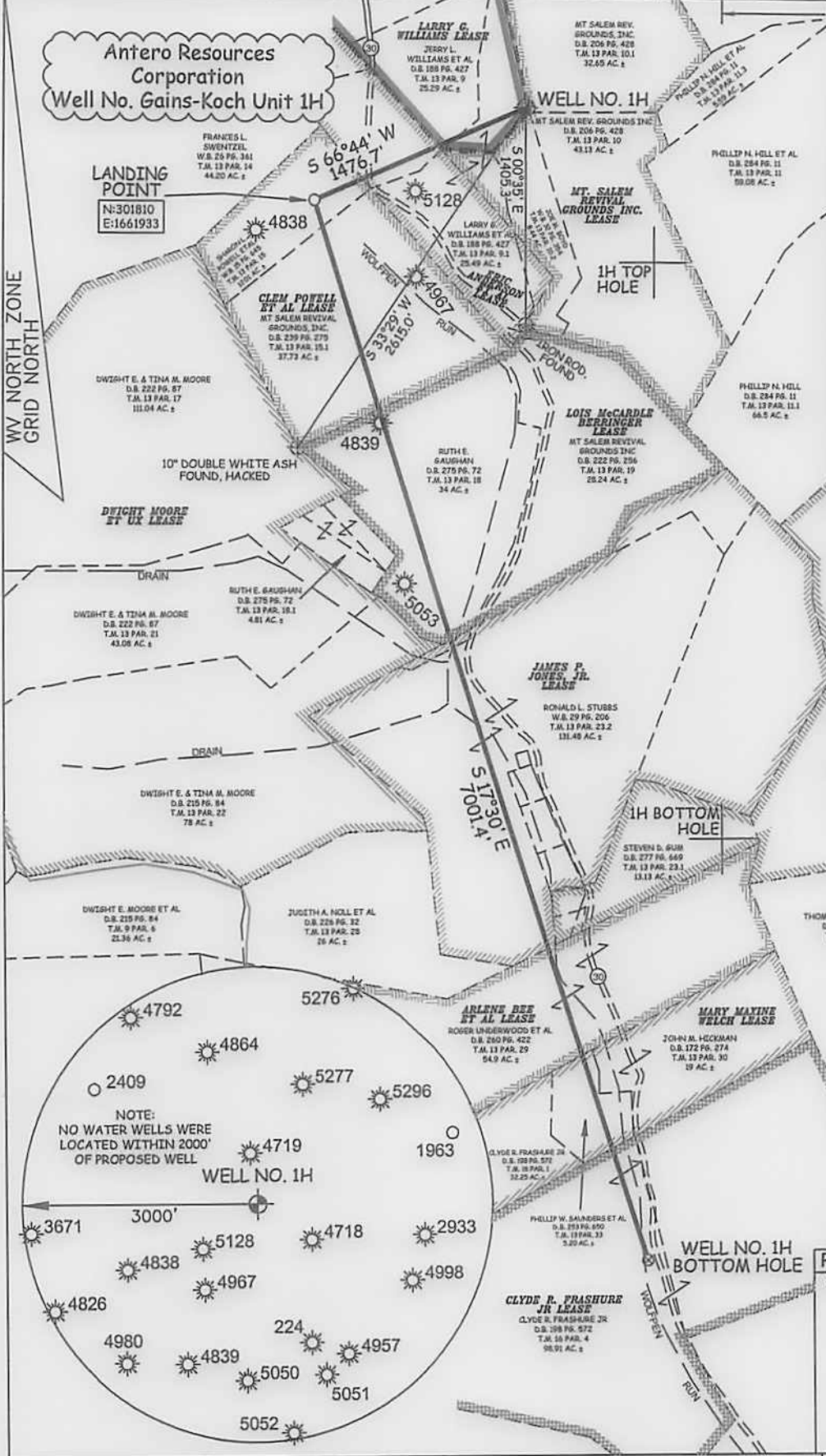
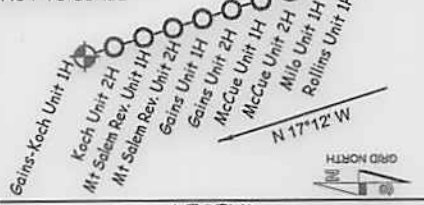


CLARENCE MUTSCHELNAUS LEASE
RONALD L. STUBBS
W.B. 29 PG. 206
T.M. 13 PAR. 24
57.25 AC ±

NOTE
NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHELTER DAIRY CATTLE OR POULTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY-FIVE (625) FEET OF THE CENTER OF THE WELL PAD.



PAD LAYOUT
NOT TO SCALE



JOB # 13-077WA
DRAWING # GAINS-KOCHUNIT1H
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

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
DOUGLAS R. ROWE P.S. 2202

DATE 03/20/14
OPERATOR'S WELL# GAINS-KOCH UNIT #1H
API WELL # MOD
47 - 017 - 06218 H 6A
STATE COUNTY PERMIT

STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS
WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL
(IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
LOCATION: ELEVATION 1,375' WATERSHED WOLFPEN RUN
QUADRANGLE SMITHBURG 7.5' DISTRICT GRANT COUNTY DODDERIDGE
SURFACE OWNER LARRY WILLIAMS ET AL ACREAGE 25.49 ACRES +/-
OIL & GAS ROYALTY OWNER LARRY G. WILLIAMS; ERIC ANDERSON ET AL; GLEM POWELL ET AL; LOIS McCARDLE BERRINGER; JAMES P. JONES, JR.; ARLENE BEE ET AL; MARY MAXINE WELCH; CLYDE RYLAN FRASHURE JR. ET UX. 67.5 ACRES±; 141 ACRES±; 55 ACRES±; 63.434 ACRES±; 131 ACRES±
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) Permit: Mod - Name Change + BHL PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,400' TVD 16,400' MD
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1625 17TH STREET ADDRESS 5400 D BIG TYLER ROAD
DENVER, CO 80202 CHARLESTON, WV 25313

COUNTY NAME PERMIT