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west virginia department of environmental protection

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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

March 31, 2014

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

Re: Permit Modification Approval for API Number 1706399 , Well #: HOSKINSON UNIT 1H  
**Extended Lateral**

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,

Gene Smith  
Regulatory/Compliance Manager  
Office of Oil and Gas



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

January 28, 2013

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

Ms. Laura Cooper:

Antero Resources Corporation (Antero) would like to submit the following permit modification for an approved well on the existing Chestnut Pad. We are requesting to extend the horizontal lateral length which will change the bottom hole location of the Hoskinson Unit 1H (API# 47-017-06399).

Attached you will find the following documents:

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

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

Thank you in advance for your consideration.

Sincerely,

Ashlie Mihalcin  
Permit Representative  
Antero Resources Corporation

Enclosures

Received

JAN 31 2014

Office of Oil and Gas  
WV Dept. of Environmental Protection

04/04/2014

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: Hoskinson Unit 1H Well Pad Name: Chestnut Pad (existing)

3) Farm Name/Surface Owner: Trustees of Chestnut Grove Church Public Road Access: CR 14

4) Elevation, current ground: 1115' Elevation, proposed post-construction: 1115'

5) Well Type (a) Gas  Oil  Underground Storage

Other \_\_\_\_\_

(b) If Gas Shallow  Deep

Horizontal

*Dec  
1-30-2014*

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Marcellus Shale: 7200' TVD, Anticipated Thickness- 55 Feet, Associated Pressure- 2950#

8) Proposed Total Vertical Depth: 7200' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 19,200' MD

11) Proposed Horizontal Leg Length: 10,693'

12) Approximate Fresh Water Strata Depths: 222', 249'

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

14) Approximate Saltwater Depths: 1020', 1514'

15) Approximate Coal Seam Depths: 295', 812', 1122'

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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Office of Oil and Gas  
WV Dept. of Environmental Protection

WW-6B  
(9/13)

18) **CASING AND TUBING PROGRAM**

<b>TYPE</b>	<b>Size</b>	<b>New or Used</b>	<b>Grade</b>	<b>Weight per ft. (lb/ft)</b>	<b>FOOTAGE: For Drilling</b>	<b>INTERVALS: Left in Well</b>	<b>CEMENT: Fill-up (Cu. Ft.)</b>
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#	310'	310'	CTS, 431 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2455'	2455'	CTS, 1000 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	19200'	19200'	4886 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

*DCW  
1-30-2014*

<b>TYPE</b>	<b>Size</b>	<b>Wellbore Diameter</b>	<b>Wall Thickness</b>	<b>Burst Pressure</b>	<b>Cement Type</b>	<b>Cement Yield (cu. ft./k)</b>
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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Office of Oil and Gas  
WV Dept. of Environmental Protection



WW-5B  
(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.

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): 19 acres (existing)

22) Area to be disturbed for well pad only, less access road (acres): 2.69 acres (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 2-3% 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.

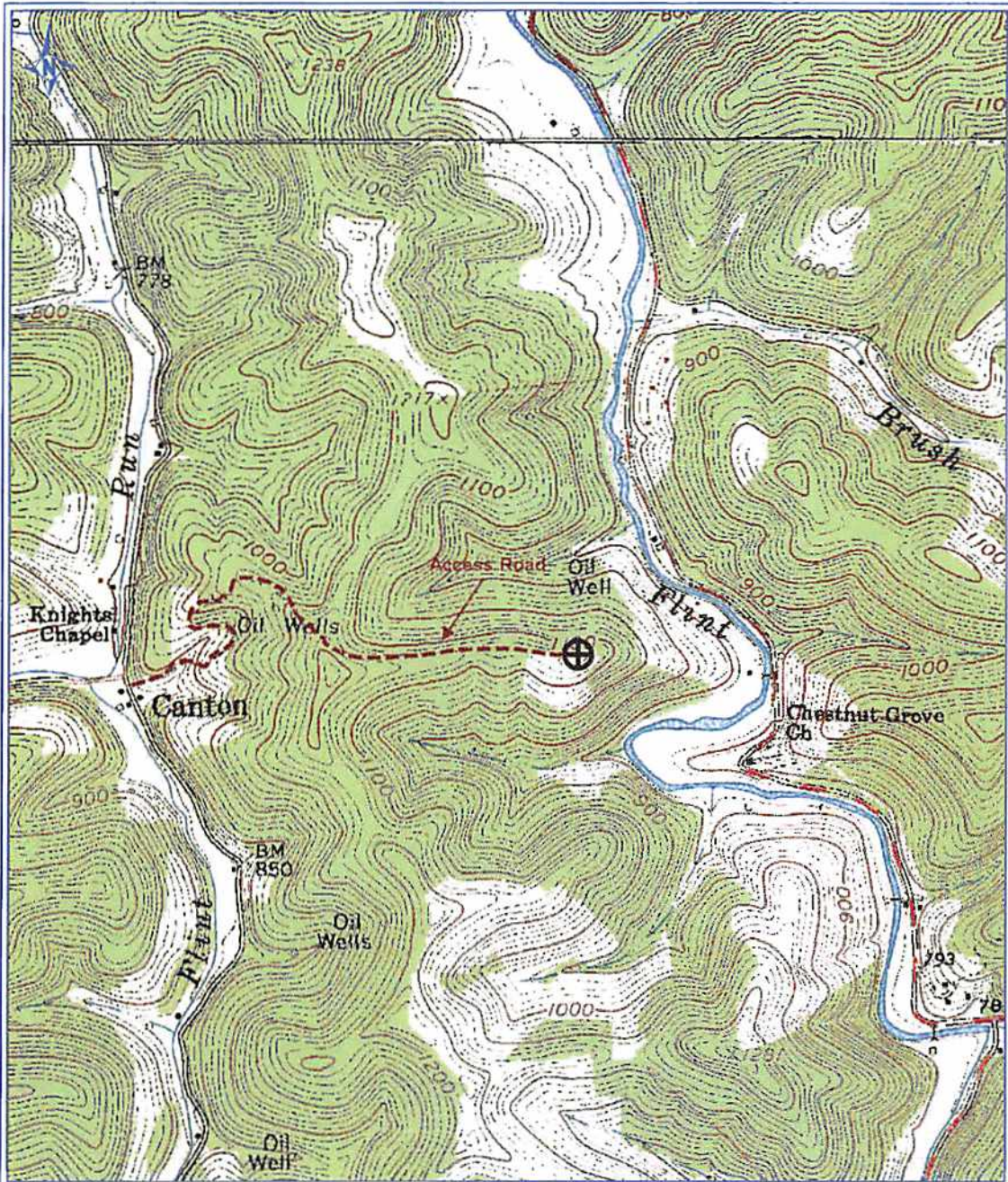
Received

JAN 3 2014

\*Note: Attach additional sheets as needed.



plat spotted ✓  
170 06399



PETRA 4/18/2013 5:03:01 PM

*DCW  
10-29-2013*

### Antero Resources Corp

APPALACHIAN BASIN

**Hoskinson Unit 1H**

Doddridge County

REMARKS  
QUADRANGLE: SMITHBURG  
WATERSHED: LITTLE FLINT RUN  
DISTRICT: GRANT

By: ECM



04/04/2014



LATITUDE 39°22'30"

3,662'

320' TO BOTTOM HOLE  
LATITUDE 39°22'30"

LONGITUDE 80°42'30"

4,289'

LONGITUDE 80°42'30"

14,508' TO BOTTOM HOLE

### Antero Resources Corporation Well No. Hoskinson Unit 1H

NOTE:  
NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,000) 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.

ERIC S. GESSLER  
D.B. 245 PG. 242  
T.M. 2 PAR. 11  
387 AC. ±

STEPHEN W. TRENT ET AL  
D.B. 175 PG. 633  
T.M. 5 PAR. 05.1  
11.88 AC. ±

TRUSTEES CHESTNUT GROVE CHURCH  
D.B. 183 PG. 581  
T.M. 5 PAR. 30.1  
28.29 AC. ±

WM. H. HOSKINSON ET UX LEASE

TRUSTEES CHESTNUT GROVE CHURCH  
D.B. 183 PG. 581  
T.M. 5 PAR. 30  
65.159 AC. ±

CHESTNUT GROVE CHURCH  
D.B. 183 PG. 581  
T.M. 5 PAR. 22  
17.5 AC. ±

CHESTNUT GROVE CHRISTIAN CHURCH & CEMETERY LEASE

CHESTNUT GROVE CHURCH  
D.B. 183 PG. 581  
T.M. 5 PAR. 23  
18.19 AC. ±

MARK D. WILLIAMS ET AL  
D.B. 252 PG. 174  
T.M. 6 PAR. 13  
50.75 AC. ±

TOBY D. STANLEY  
D.S. 282 PG. 174  
T.M. 6 PAR. 18.3  
50.2 AC. ±

CHARLEEN UNDERWOOD  
W.B. 7 PG. 237  
T.M. 6 PAR. 18  
33.2 AC. ±

TOBY D. STANLEY  
D.B. 282 PG. 174  
T.M. 6 PAR. 18.1  
122.38 AC. ±

WALLACE C. ASH ET AL  
D.B. 232 PG. 151  
T.M. 6 PAR. 24  
68.89 AC. ±

F.H. UNDERWOOD ET AL LEASE

VANCE JACKSON  
W.B. 17 PG. 322  
T.M. 8 PAR. 3  
138.25 AC. ±

ZINITH D. BOYCE ET AL  
D.B. 215 PG. 96  
T.M. 8 PAR. 8.1  
30.87 AC. ±

ALYDORF SMITH ET UX LEASE

JOHN M. STOVER ET AL  
D.B. 191 PG. 203  
T.M. 8 PAR. 8  
34.13 AC. ±

GAETAN MARDIN ET AL  
D.B. 248 PG. 303  
T.M. 9 PAR. 35  
61.243 AC. ±

MARIE MARIN  
D.B. 185 PG. 281  
T.M. 9 PAR. 1.1  
20.59 AC. ±

AMANDA SWEENEY EST  
AP. 16 PG. 482  
T.M. 9 PAR. 01  
51.43 AC. ±

AMANDA SWEENEY EST  
AP. 16 PG. 482  
T.M. 9 PAR. 01.1  
78 AC. ±

JAMES P. BANKERT ET AL  
D.B. 254 PG. 71  
T.M. 9 PAR. 21  
9 AC. ±

SCOTTY W. RUBLE ET AL  
D.B. 245 PG. 97  
T.M. 9 PAR. 2  
30.04 AC. ±

BRIAN P. MCMILLAN ET AL  
W.B. 41 PG. 714  
T.M. 9 PAR. 2.2  
28.62 AC. ±

WV NORTH ZONE GRID NORTH

**NOTES:**  
WELL 1H TOP HOLE INFORMATION:  
N: 316,751ft E: 1,654,703ft  
LAT: 39°21'47.61" LON: 80°43'16.63"  
BOTTOM HOLE INFORMATION:  
N: 306,487ft E: 1,657,907ft  
LAT: 39°20'06.60" LON: 80°42'34.07"  
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: 4,357,132m E: 524,026m  
BOTTOM HOLE INFORMATION:  
N: 4,354,021m E: 525,054m

JOB # 12-136WA  
DRAWING # HOSKINSON1HR2  
SCALE 1" = 1000'  
MINIMUM DEGREE OF ACCURACY SUBMETER  
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

**LEGEND**

- Surface Owner Boundary Lines +/-
- Interior Surface Tracts +/-
- Existing Fence
- Found monument, as noted

*Thomas Summers*  
THOMAS SUMMERS P.S. 2109  
DATE 01/24/13  
OPERATOR'S WELL# HOSKINSON UNIT #1H

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

STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

API WELL # 47 - 017

STATE COUNTY PERMIT MOD 06399 H6A

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL   
(IF "GAS") PRODUCTION  STORAGE  DEEP  SHALLOW

LOCATION: ELEVATION 1,115' WATERSHED FLINT RUN

QUADRANGLE SMITHBURG 7.5' DISTRICT GRANT COUNTY DODDRIDGE

SURFACE OWNER TRUSTEES CHESTNUT GROVE CHURCH ACREAGE 65.159 ACRES +/-

OIL & GAS ROYALTY OWNER WM. H. HOSKINSON ET UX; CHESTNUT GROVE CHURCH; CHESTNUT GROVE CHRISTIAN CHURCH & CEMETERY; CHARLEEN UNDERWOOD ET VIR; F.H. UNDERWOOD ET AL; S.B. MCMILLAN; JAMES J. FOX

LEASE ACREAGE 228.5 ACRES±; 17.5 ACRES±; 18.19 ACRES±; 127.11 ACRES±; 102 ACRES±; 432 ACRES±; 37.608 ACRES±

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

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,200' TVD 19,200' MD

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT CT CORPORATION SYSTEM - DIANNA STAMPER

ADDRESS 1625 17TH STREET DENVER, CO 80202 ADDRESS 5400 D BIG TYLER ROAD CHARLESTON, WV 25313



04/04/2014

COUNTY NAME PERMIT