



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

October 18, 2013

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

Re: Permit Modification Approval for API Number 1706230 , Well #: GOLDEN UNIT 2H
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

17-06230 MOD



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

October 16, 2013

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

Ms. Laura Cooper:

Antero Resources Corporation (Antero) would like to submit the following permit modifications for three approved wells on the existing Marsden Pad. We are requesting to modify the horizontal lateral orientation which will change the bottom hole location of the Golden Unit 2H (API# 47-017-06230).

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 new 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

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WW - 6B
(3/13)

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

4 252

1) Well Operator: Antero Resources Corporation 494488557 017- Doddridge Greenbrier Big Isaac
Operator ID County District Quadrangle

2) Operator's Well Number: Golden Unit 2H Well Pad Name: Marsden Pad

3 Elevation, current ground: ~975' Elevation, proposed post-construction: 971'

4) Well Type: (a) Gas Oil Underground Storage
Other _____
(b) If Gas: Shallow Deep
Horizontal

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Marcellus Shale: 7,300' TVD, Anticipated Thickness- 50' feet, Associated Pressure- 3,200#

7) Proposed Total Vertical Depth: 7,300' TVD

8) Formation at Total Vertical Depth: Marcellus Shale

9) Proposed Total Measured Depth: 17,400' MD

10) Approximate Fresh Water Strata Depths: 29', 40'

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

12) Approximate Saltwater Depths: 427', 1131'

13) Approximate Coal Seam Depths: 92', 136', 686'

14) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: No

16) Describe proposed well work: Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale

17) Describe fracturing/stimulating methods in detail:
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."

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6.13 acres
OCT 7 2013
3.32 acres
WV Department of Environmental Protection Page 1 of 3

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 6.13 acres

19) Area to be disturbed for well pad only, less access road (acres): 3.32 acres

20)

CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill -up (Cu. Ft.)
Conductor	20"	New	H-40	94#	90'	90'	CTS, 86 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	300'	300'	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2510'	2510'	CTS, 1022 Cu Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	17400'	17400'	4380 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
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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21) 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.

22) 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

23) Proposed borehole conditioning procedures. Conductor: blowhole clean with air, run casing, 10 bbls fresh water.

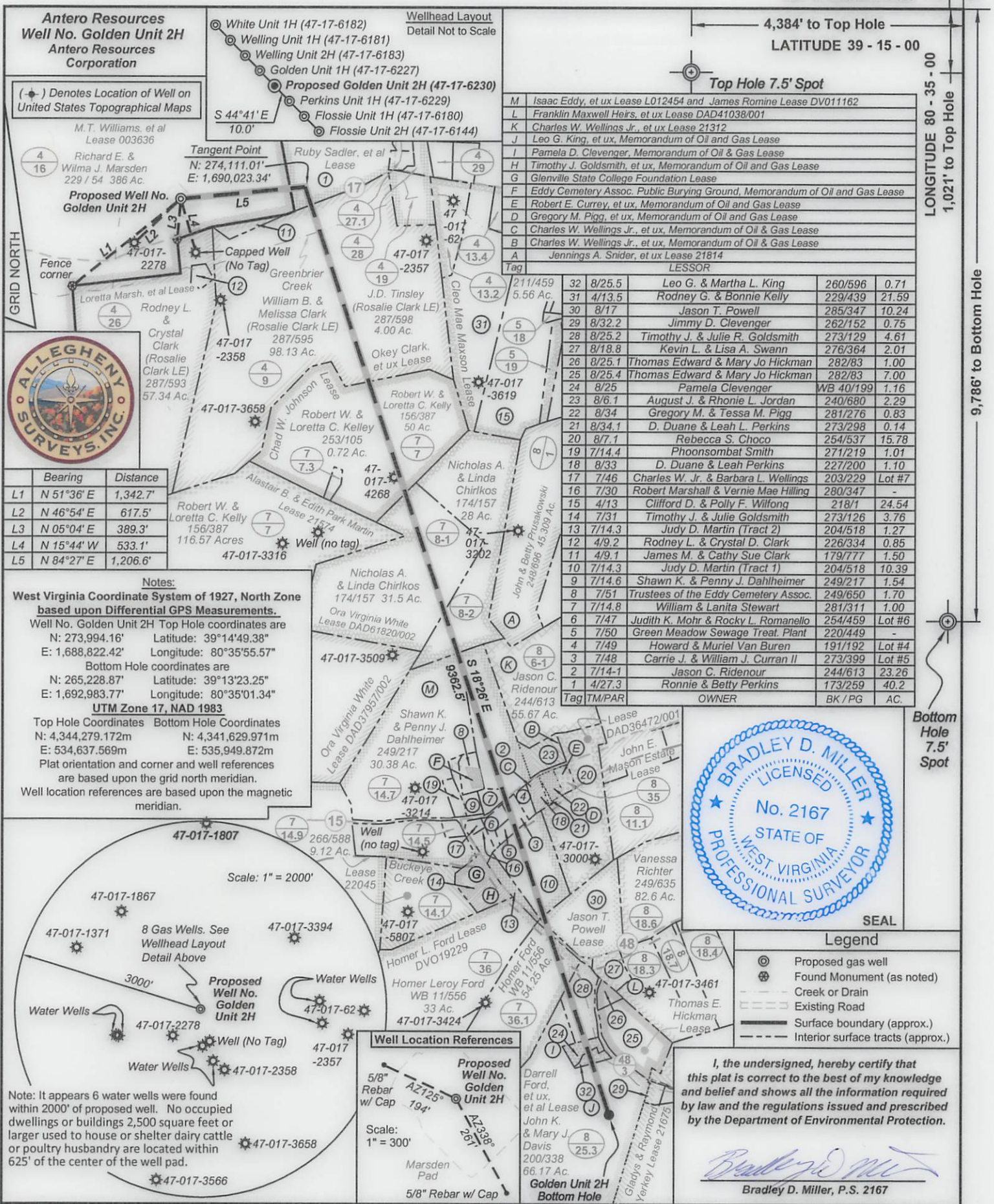
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.

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
Well No. Golden Unit 2H
 Antero Resources Corporation

(+) Denotes Location of Well on United States Topographical Maps

M.T. Williams, et al
 Lease 003636

Richard E. & Wilma J. Marsden
 229 / 54 386 Ac.

Proposed Well No. Golden Unit 2H

White Unit 1H (47-17-6182)
 Welling Unit 1H (47-17-6181)
 Welling Unit 2H (47-17-6183)
 Golden Unit 1H (47-17-6227)
Proposed Golden Unit 2H (47-17-6230)
 Perkins Unit 1H (47-17-6229)
 Flossie Unit 1H (47-17-6180)
 Flossie Unit 2H (47-17-6144)

S 44°41'E
 10.0'

Tangent Point
 N: 274,111.01'
 E: 1,690,023.34'

Ruby Sadler, et al
 Lease

Greenbrier Creek
 William B. & Melissa Clark
 (Rosalie Clark LE)
 287/595
 98.13 Ac.

Okey Clark, et ux
 Lease

Robert W. & Loretta C. Kelley
 156/387
 50 Ac.

Chad W. Johnson
 Lease

Robert W. & Loretta C. Kelley
 253/105
 0.72 Ac.

Alastair B. & Edith Park Martin
 Lease 21574

Robert W. & Loretta C. Kelley
 116.57 Acres

47-017-3316

Nicholas A. & Linda Chirkos
 174/157 31.5 Ac.

Ora Virginia White
 Lease DAD61820/002

47-017-3509

Shawn K. & Penny J. Dahlheimer
 249/217
 30.38 Ac.

John E. Mason
 Lease DAD36472/001

John E. Mason
 Lease

Vanessa Richter
 249/635
 82.6 Ac.

Jason T. Powell
 Lease

47-017-3461

Thomas E. Hickman
 Lease

47-017-3424

Homer Leroy Ford
 WB 11/556
 33 Ac.

47-017-3424

Homer Ford
 et ux, et al Lease
 John K. & Mary J. Davis
 200/338
 66.17 Ac.

Golden Unit 2H Bottom Hole

5/8" Rebar w/ Cap

Marsden Pad

5/8" Rebar w/ Cap

Scale: 1" = 300'

AZ125° 19.4'

AZ338° 26.1'

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

Well Location References

Scale: 1" = 300'

5/8" Rebar w/ Cap

AZ125° 19.4'

AZ338° 26.1'

Marsden Pad

5/8" Rebar w/ Cap

BRADLEY D. MILLER
 LICENSED
 No. 2167
 STATE OF WEST VIRGINIA
 PROFESSIONAL SURVEYOR

Legend

- Proposed gas well
- Found Monument (as noted)
- Creek or Drain
- Existing Road
- Surface boundary (approx.)
- Interior surface tracts (approx.)

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 regulations issued and prescribed by the Department of Environmental Protection.

Bradley D. Miller
 Bradley D. Miller, P.S. 2167

DATE: October 4 2013

OPERATOR'S WELL NO. Golden Unit 2H

API WELL NO **MOD**

47 - 017 - 06230 **H6A**

STATE COUNTY PERMIT

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

LOCATION: ELEVATION: 971'

DISTRICT: Greenbrier Richard E. & Wilma J. Marsden

SURFACE OWNER: Wilma J. Marsden

ROYALTY OWNER: M.T. Williams, et al; Ruby Sadler, et al; Chad W. Johnson; Okey Clark, et ux

LEASE NO: DAD61820/002; 003636 ACREAGE: 386 0.71; 70; 50 10; 92; 1.161

PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) Modification - BHL

PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 7,300' TVD 17,400' MD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System

ADDRESS: 1625 17th Street ADDRESS: 5400 D Big Tyler Road
Denver, CO 80202 Charleston, WV 25313

FILE NO: 229-30-G-12
 DRAWING NO: 229-12 Golden 2H Well
 SCALE: 1" = 1200'
 MINIMUM DEGREE OF ACCURACY: Submeter
 PROVEN SOURCE OF ELEVATION: WVDOT, Bridgeport, WV