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 1706174 , Well #: RIGHT HAND UNIT 2H
Changed bottom hole

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

17-06174 MOD

ANTERO RESOURCES

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

September 10, 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 modification for one approved well on the Richard Garry Pad. We are requesting to move the horizontal lateral which will change the bottom hole location of the Right Hand Unit 2H (API# 47-017-06174). Please note that no new leases will be drilled through, so a revised Form WW-6A1 is not included.

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the revised MD and Production Casing/Cement program
- 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
SEP 20 2013
Office of Oil and Gas
WV Dept. of Environmental Protection

WW - 6B
(3/13)

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	New Milton	New Milton 7.5'
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: Right Hand Unit 2H Well Pad Name: Existing Richard Garry Pad

3 Elevation, current ground: 1156' Elevation, proposed post-construction: 1156'

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: 7,100' TVD, Anticipated Thickness- 60' feet, Associated Pressure- 3,250#

7) Proposed Total Vertical Depth: 7,100' TVD

8) Formation at Total Vertical Depth: Marcellus Shale

9) Proposed Total Measured Depth: 13,500' MD

10) Approximate Fresh Water Strata Depths: 54', 306'

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

12) Approximate Saltwater Depths: 1372', 1780'

13) Approximate Coal Seam Depths: 879', 1210'

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."

Received
SEP 20 2013
Office of Oil and Gas
WV Dept. of Environmental Protection

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 25.30 acres (existing)

19) Area to be disturbed for well pad only, less access road (acres): 6.04 acres (existing)

WW - 6B
(3/13)

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#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/ 48#	361'	361'	CTS, 502 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2470'	2470'	CTS, 1006 Cu Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	13500'	13500'	3319 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			

Received
SEP 20 2013
Office of Oil and Gas
WV Dept. of Environmental Protection

WW - 6B
(3/13)

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.

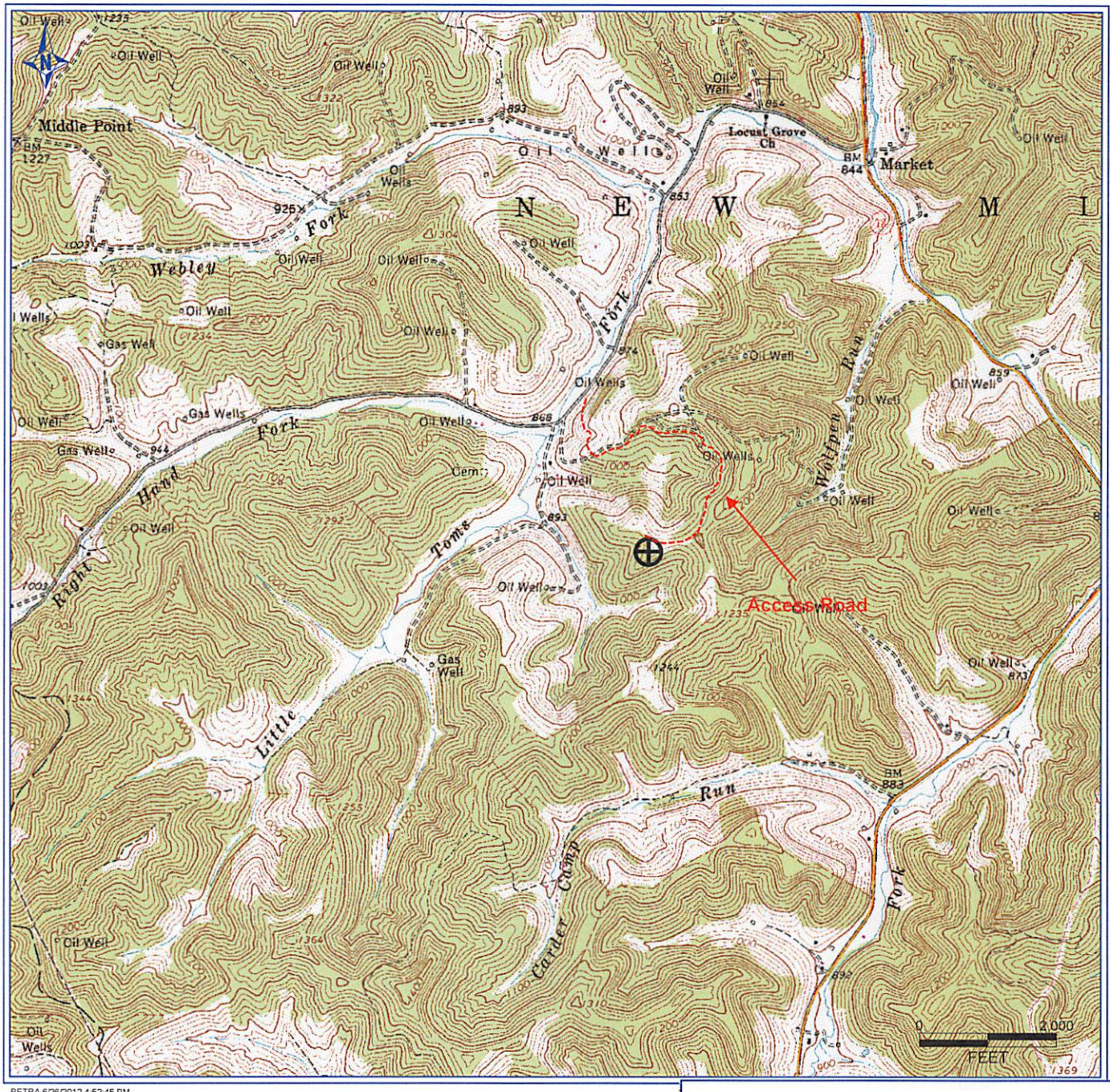
Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.

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.

Received
FEB 20
Office of Oil and Gas
WV Dept. of Environmental Protection

17-0617Y



PETRA 6/26/2012 4:52:45 PM

Antero Resources Corporation

APPALACHIAN BASIN

Right Hand Unit 2H

Doddridge County

0 2,000 4,000

FEET

REMARKS

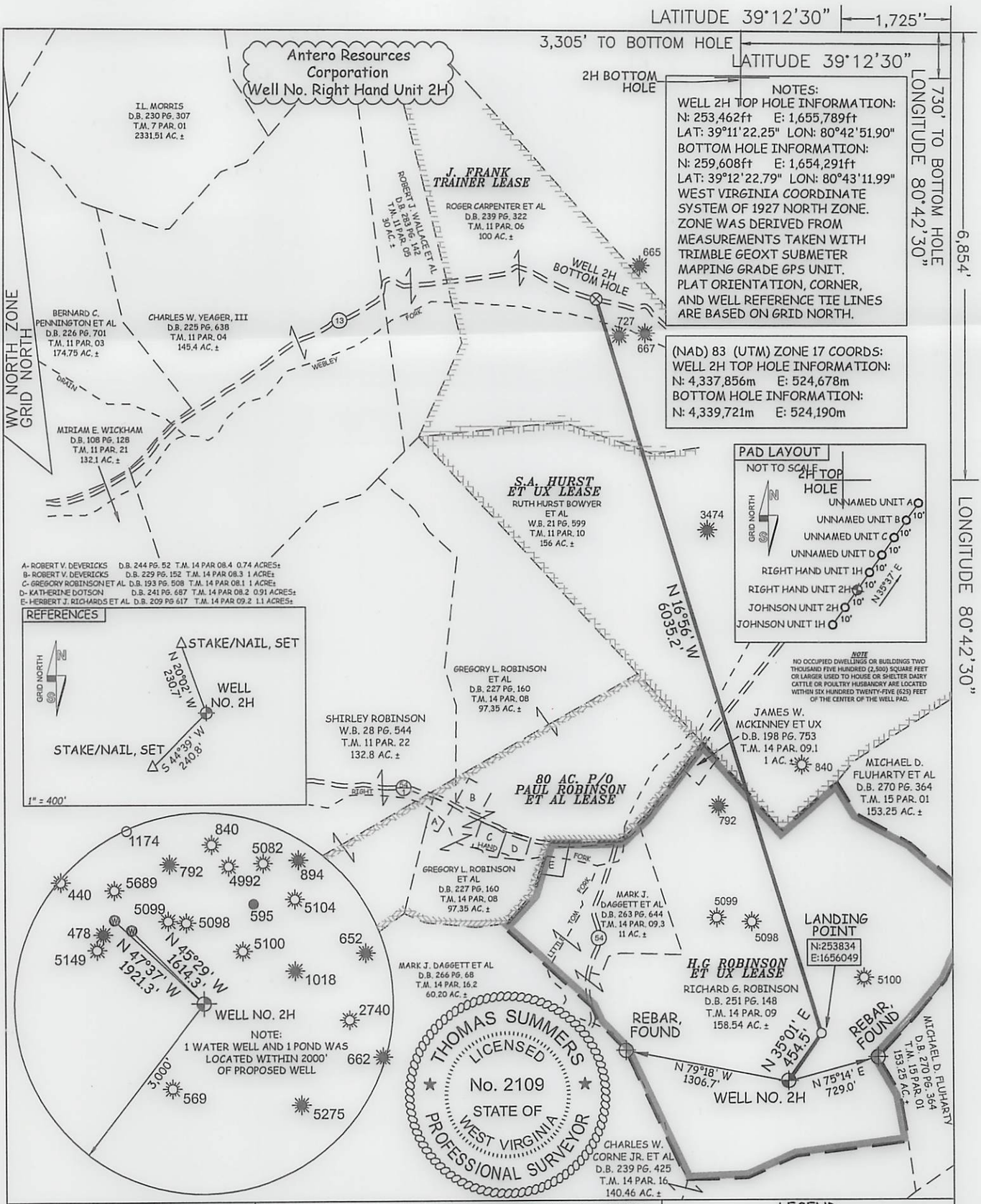
QUADRANGLE: NEW MILTON

WATERSHED: TRIB. OF LITTLE TOMS FORK

DISTRICT: NEW MILTON

Date: 11/6/2012

RECEIVED
Office of Oil & Gas
NOV 15 2012
WV Department of
Environmental Protection



JOB # 12-087WA
DRAWING # RIGHTHAND2HR5
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 DEPTARTMENT 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 09/04/13
OPERATOR'S WELL# RIGHT HAND UNIT #2H
API WELL # 47 — 017 — MOD2 06174HGA
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 1,156' WATERSHED TRIBUTARY OF LITTLE TOMS FORK
QUADRANGLE NEW MILTON 7.5' DISTRICT NEW MILTON COUNTY DODDRIDGE
SURFACE OWNER RICHARD G. ROBINSON ACREAGE 158.54 ACRES +/-
OIL & GAS ROYALTY OWNER H.G. ROBINSON ET UX; S.A. HURST ET UX; J. FRANK TRAINER LEASE ACREAGE 169.8 ACRES±; 156 ACRES±; 90 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 Modification - BHL Change PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,100' TVD 13,500' MD

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1625 17TH STREET ADDRESS CT CORPORATION SYSTEM
DENVER, CO 80202 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

COUNTY NAME PERMIT

FORM WW-6