



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

February 14, 2014

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

Re: Permit Modification Approval for API Number 1706181 , Well #: WELLING UNIT 1H
Lateral Extended

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



November 7, 2013

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

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

Ms. Laura Cooper:

Antero Resources Corporation (Antero) would like to submit the following permit modifications for two approved wells on the existing Marsden Pad. We are requesting to extend the horizontal laterals which will change the bottom hole locations of the Welling Unit 1H (API# 47-017-06181) and Welling Unit 2H (API# 47-017-06183).

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

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Environmental Protection

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 Greenbrier Big Isaac
Operator ID County District Quadrangle

2) Operator's Well Number: Welling Unit 1H Well Pad Name: Marsden Pad

3) Farm Name/Surface Owner: Richard E. & Wilma J. Marsden Public Road Access: CR 17

4) Elevation, current ground: 971' Elevation, proposed post-construction: 971'

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: 7,300' TVD, Anticipated Thickness- 50' feet, Associated Pressure- 3,200#

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

9) Formation at Total Vertical Depth: Marcellus Shale

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

11) Proposed Horizontal Leg Length: 9,209'

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

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

14) Approximate Saltwater Depths: 427', 1131'

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

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

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(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

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#	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#	2440'	2440'	CTS, 993 Cu Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	17400'	17400'	4404 Cu Ft.
Tubing	2-3/8"	New	N-80	4.7#		7200'	
Liners							

AL for DN

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.

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): 9.31 acres

22) Area to be disturbed for well pad only, less access road (acres): 3.71 acres

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

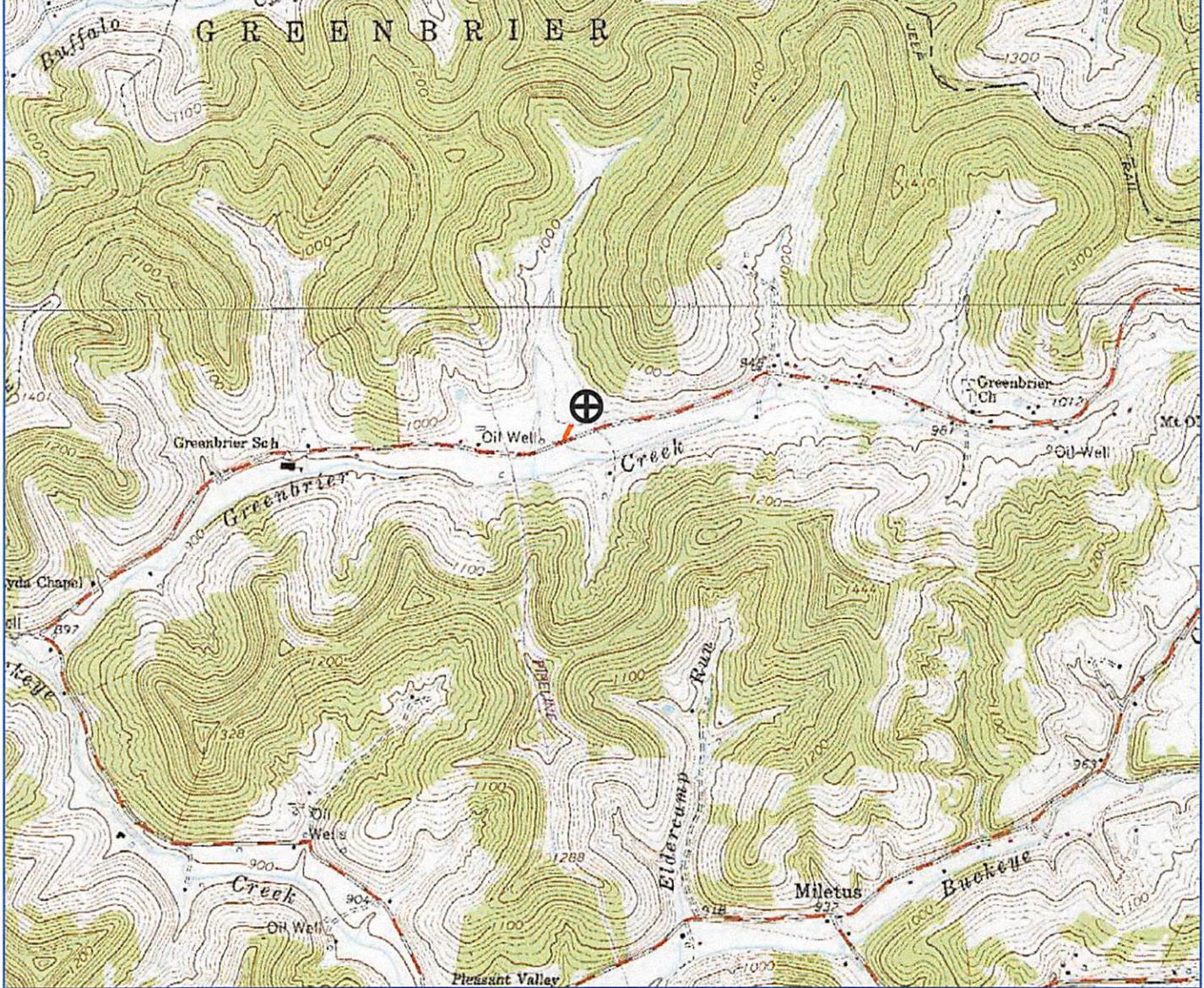
25) Proposed borehole conditioning procedures:

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.

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 WV Department of
 Environmental Protection

*Note: Attach additional sheets as needed.

EXHIBIT 2, TOPOGRAPHICAL MAP OF WELL SITE LOCATION (MARSDEN PAD)



PETRA 7/24/2012 1:53:29 PM

Antero Resources Corporation

APPALACHIAN BASIN

Marsden Pad

Doddridge County

REMARKS

QUADRANGLE: BIG ISAAC
 WATERSHED: UPPER MIDDLE ISL. CR.
 DISTRICT: GREENBRIER



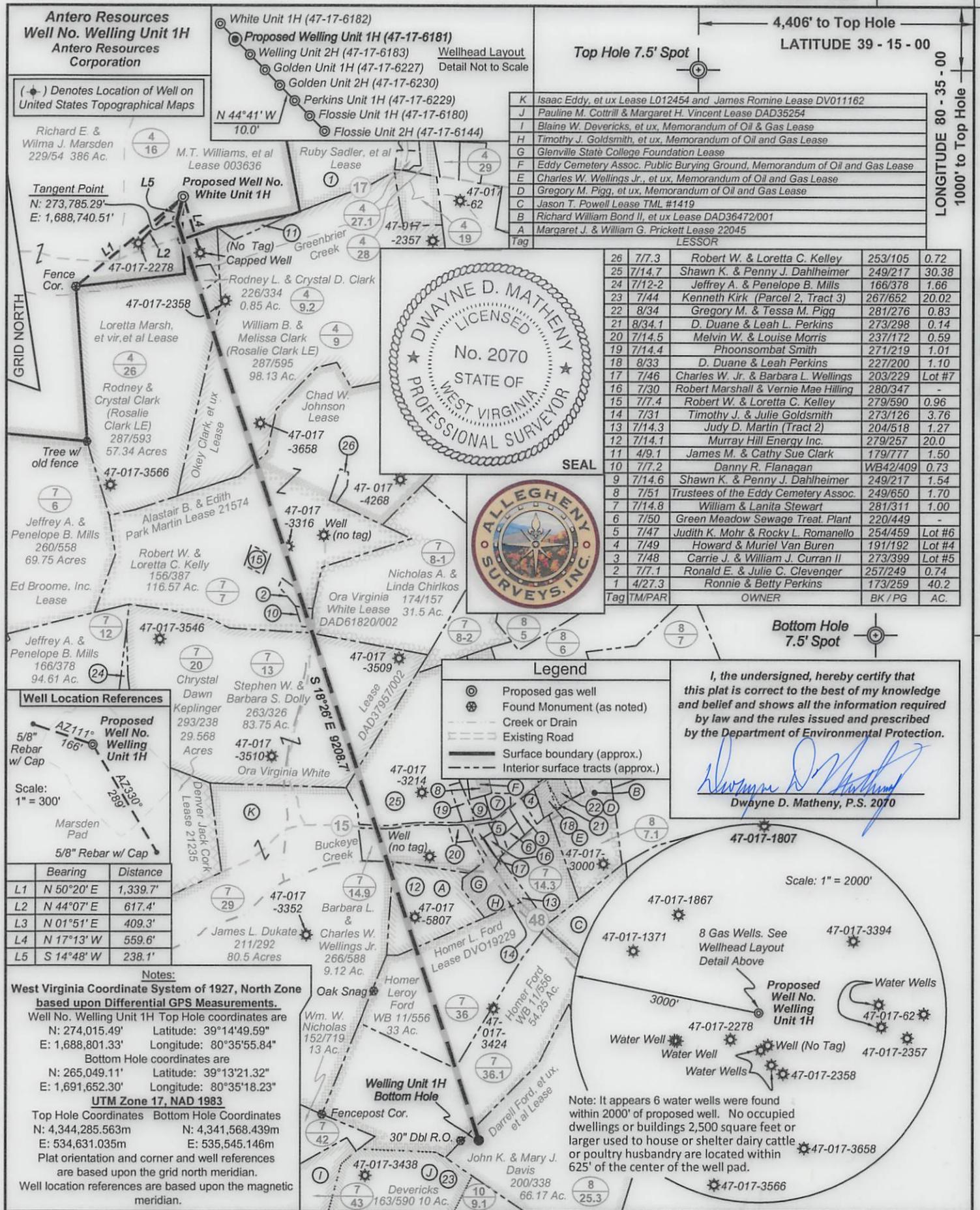
July 24, 2012

1,555' to Bottom Hole

4,406' to Top Hole
LATITUDE 39 - 15 - 00

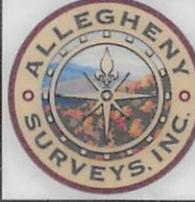
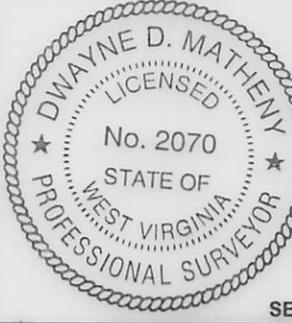
LONGITUDE 80 - 35 - 00
1000' to Top Hole

9,966' to Bottom Hole



K	Isaac Eddy, et ux Lease L012454 and James Romine Lease DV011162
J	Pauline M. Cottrill & Margaret H. Vincent Lease DAD35254
I	Blaine W. Devericks, et ux, Memorandum of Oil & Gas Lease
H	Timothy J. Goldsmith, et ux, Memorandum of Oil and Gas Lease
G	Glennville State College Foundation Lease
F	Eddy Cemetery Assoc. Public Burying Ground, Memorandum of Oil and Gas Lease
E	Charles W. Wellings Jr., et ux, Memorandum of Oil and Gas Lease
D	Gregory M. Pigg, et ux, Memorandum of Oil and Gas Lease
C	Jason T. Powell Lease TML #1419
B	Richard William Bond II, et ux Lease DAD36472/001
A	Margaret J. & William G. Prickett Lease 22045
Tag	

LESSOR			
26	7/7.3	Robert W. & Loretta C. Kelley	253/105 0.72
25	7/14.7	Shawn K. & Penny J. Dahlheimer	249/217 30.38
24	7/12-2	Jeffrey A. & Penelope B. Mills	166/378 1.66
23	7/14.4	Kenneth Kirk (Parcel 2, Tract 3)	267/652 20.02
22	8/34	Gregory M. & Tessa M. Pigg	281/276 0.83
21	8/34.1	D. Duane & Leah L. Perkins	273/298 0.14
20	7/14.5	Melvin W. & Louise Morris	237/172 0.59
19	7/14.4	Phoonsombat Smith	271/219 1.01
18	8/33	D. Duane & Leah Perkins	227/200 1.10
17	7/46	Charles W. Jr. & Barbara L. Wellings	203/229 Lot #7
16	7/30	Robert Marshall & Vernie Mae Hilling	280/347 -
15	7/7.4	Robert W. & Loretta C. Kelley	279/590 0.96
14	7/31	Timothy J. & Julie Goldsmith	273/126 3.76
13	7/14.3	Judy D. Martin (Tract 2)	204/518 1.27
12	7/14.1	Murray Hill Energy Inc.	279/257 20.0
11	4/9.1	James M. & Cathy Sue Clark	179/777 1.50
10	7/7.2	Danny R. Flanagan	WB42/409 0.73
9	7/14.6	Shawn K. & Penny J. Dahlheimer	249/217 1.54
8	7/51	Trustees of the Eddy Cemetery Assoc.	249/650 1.70
7	7/14.8	William & Lanita Stewart	281/311 1.00
6	7/50	Green Meadow Sewage Treat. Plant	220/449 -
5	7/47	Judith K. Mohr & Rocky L. Romanello	254/459 Lot #6
4	7/49	Howard & Muriel Van Buren	191/192 Lot #4
3	7/48	Carrie J. & William J. Curran II	273/399 Lot #5
2	7/7.1	Ronald E. & Julie C. Clevenger	257/249 0.74
1	4/27.3	Ronnie & Betty Perkins	173/259 40.2
Tag	TM/PAR	OWNER	BK / PG AC.



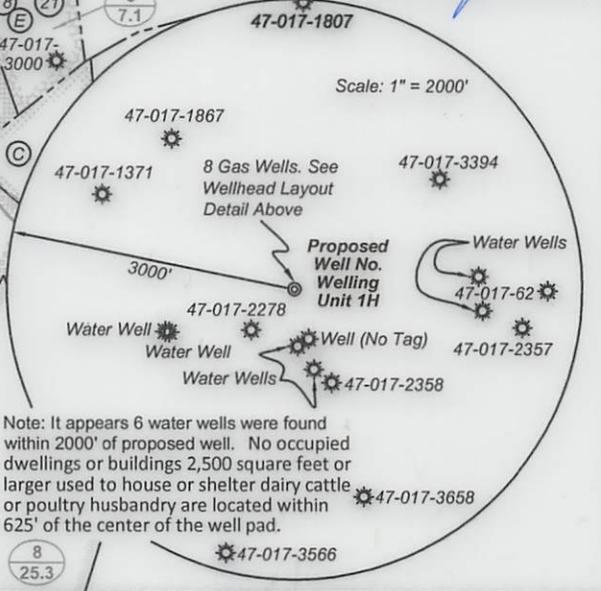
Legend	
⊙	Proposed gas well
⊗	Found Monument (as noted)
---	Creek or Drain
---	Existing Road
---	Surface boundary (approx.)
---	Interior surface tracts (approx.)

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 rules issued and prescribed by the Department of Environmental Protection.

Dwayne D. Matheny
Dwayne D. Matheny, P.S. 2070

Well Location References	
5/8" Rebar w/ Cap	AZ 111° 166'
Scale: 1" = 300'	2330° 289'
Marsden Pad	
5/8" Rebar w/ Cap	
Bearing	Distance
L1 N 50°20'E	1,339.7'
L2 N 44°07'E	617.4'
L3 N 01°51'E	409.3'
L4 N 17°13'W	559.6'
L5 S 14°48'W	238.1'

Notes:
West Virginia Coordinate System of 1927, North Zone based upon Differential GPS Measurements.
Well No. Welling Unit 1H Top Hole coordinates are
N: 274,015.49' Longitude: 80°35'55.84"
Bottom Hole coordinates are
N: 265,049.11' Latitude: 39°13'21.32"
E: 1,691,652.30' Longitude: 80°35'18.23"
UTM Zone 17, NAD 1983
Top Hole Coordinates Bottom Hole Coordinates
N: 4,344,285.563m N: 4,341,568.439m
E: 534,631.035m E: 535,545.146m
Plat orientation and corner and well references are based upon the grid north meridian.
Well location references are based upon the magnetic meridian.



FILE NO: 235-30-G-12
DRAWING NO: 235-12 Welling 1H Well
SCALE: 1" = 1200'
MINIMUM DEGREE OF ACCURACY: Submeter
PROVEN SOURCE OF ELEVATION: WV DOT, Bridgeport, WV

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

DATE: October 17 2013
OPERATOR'S WELL NO. Welling Unit 1H
API WELL NO MOD
47 - 017 - 06181
STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
(IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
LOCATION: ELEVATION: 971' WATERSHED: Greenbrier Creek QUADRANGLE: Big Isaac
DISTRICT: Greenbrier Richard E. & Isaac Eddy, et ux & James Romine; Loretta Marsh, et vir, et al
SURFACE OWNER: Wilma J. Marsden Ora Virginia White; Ora Virginia White
ROYALTY OWNER: M.T. Williams, et al; Okey Clark, et ux; Margaret J. & William G. Prickett DAD61820/002; 22045 COUNTY: Doddridge 70
PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) Modification - BHL ACREAGE: 386 50; 12.18
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 17,400' MD 92; 67; 85
7,300' TVD

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