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 25, 2014

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

Re: Permit Modification Approval for API Number 1706349 , Well #: DOUGLAS UNIT 1H
Changed Orientation of 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,

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

02/28/2014

ANTERO RESOURCES

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

December 11, 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 two approved wells on the John North Pad. We are requesting to change the orientation of the horizontal laterals which will change the bottom hole locations of the Douglas Unit 1H (API# 47-017-06349) and Bernice Unit 2H (API#47-017-06297).

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

Ashlie Mihalcin
Permit Representative
Antero Resources Corporation

Enclosures

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: Douglas Unit 1H Well Pad Name: John North Pad

3) Farm Name/Surface Owner: John K. Davis Public Road Access: CR 48

4) Elevation, current ground: ~1239' Elevation, proposed post-construction: 1246'

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

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus Shale: 7,500' TVD, Anticipated Thickness- 50 Feet, Associated Pressure- 3200#

8) Proposed Total Vertical Depth: 7,500' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 17,300' MD

11) Proposed Horizontal Leg Length: 9335'

12) Approximate Fresh Water Strata Depths: 175', 331'

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

14) Approximate Saltwater Depths: 541', 1581', 1903'

15) Approximate Coal Seam Depths: 238', 841', 1337'

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: _____

02/28/2014

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#	385'	385'	CTS, 535 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2450'	2450'	CTS, 998 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	17300'	17300'	4365 Cu Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
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			

02/28/2014

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): 19.95 acres

22) Area to be disturbed for well pad only, less access road (acres): 6.08 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 2-3% 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:

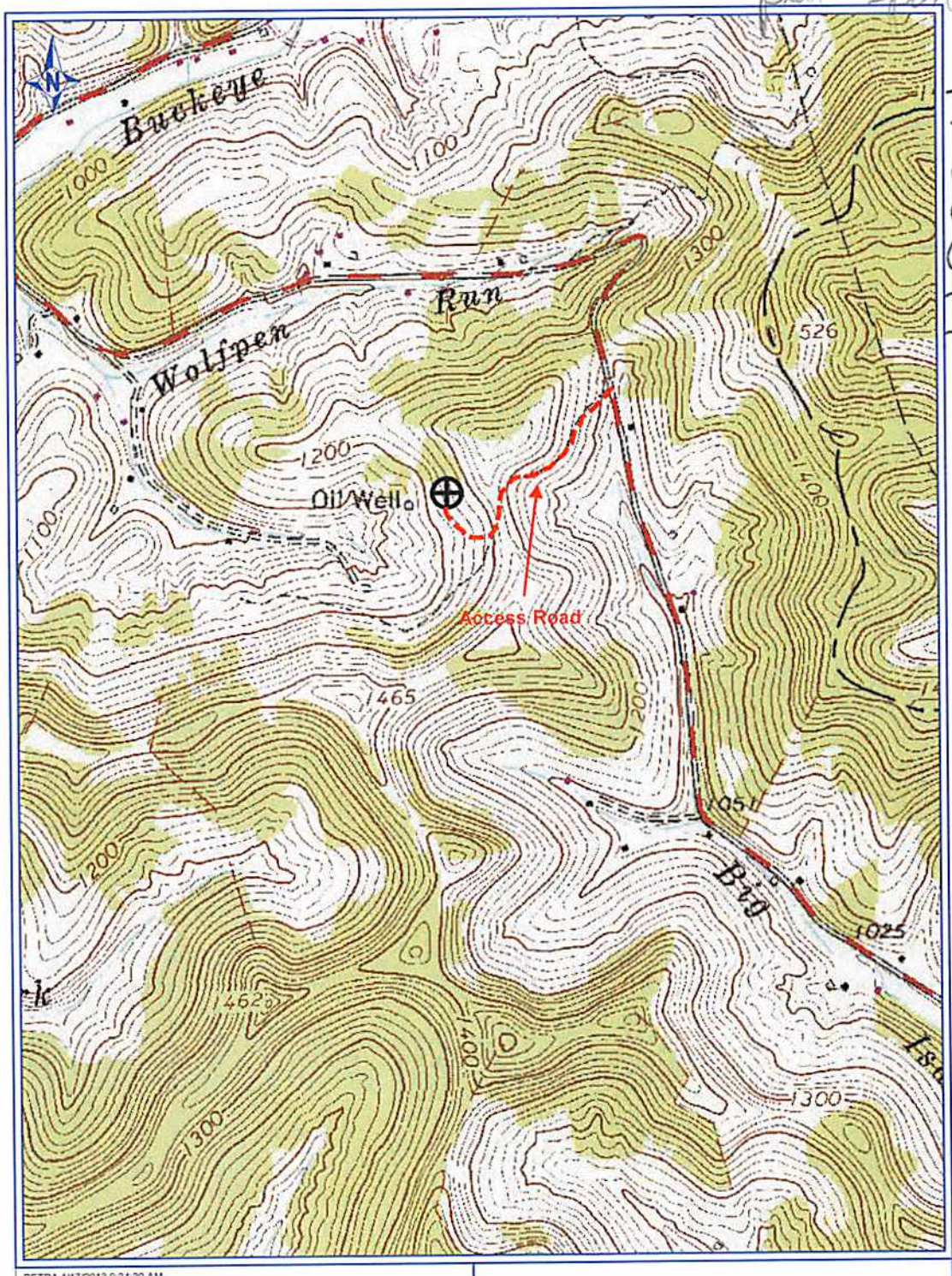
Conductor: blowhole clean with air, run casing, 10 bbls fresh water.
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.
Intermediate: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

*Note: Attach additional sheets as needed.

02/28/2014

Plat Spotted

17-06349



PETRA 4/17/2013 9:34:30 AM

DCN
8-21-2013

Antero Resources Corp

APPALACHIAN BASIN

Douglas Unit 1H

Doddridge County

REMARKS
QUADRANGLE: BIG ISAAC
WATERSHED: WOLFPEN RUN OF BUCKEYE CREEK
DISTRICT: GREENBRIER

By: ECM

0 2,500
FEET

Received
AUG 23 2013
Office of Oil and Gas
WV Dept. of Environmental Protection

17-06349 H6A DOUGLAS UNIT 1H
ANTERO RESOURCES

PAD NAME: JOHN NORTH

02/28/2014

Antero Resources
Well No. Douglas Unit 1H
Antero Resources Corporation

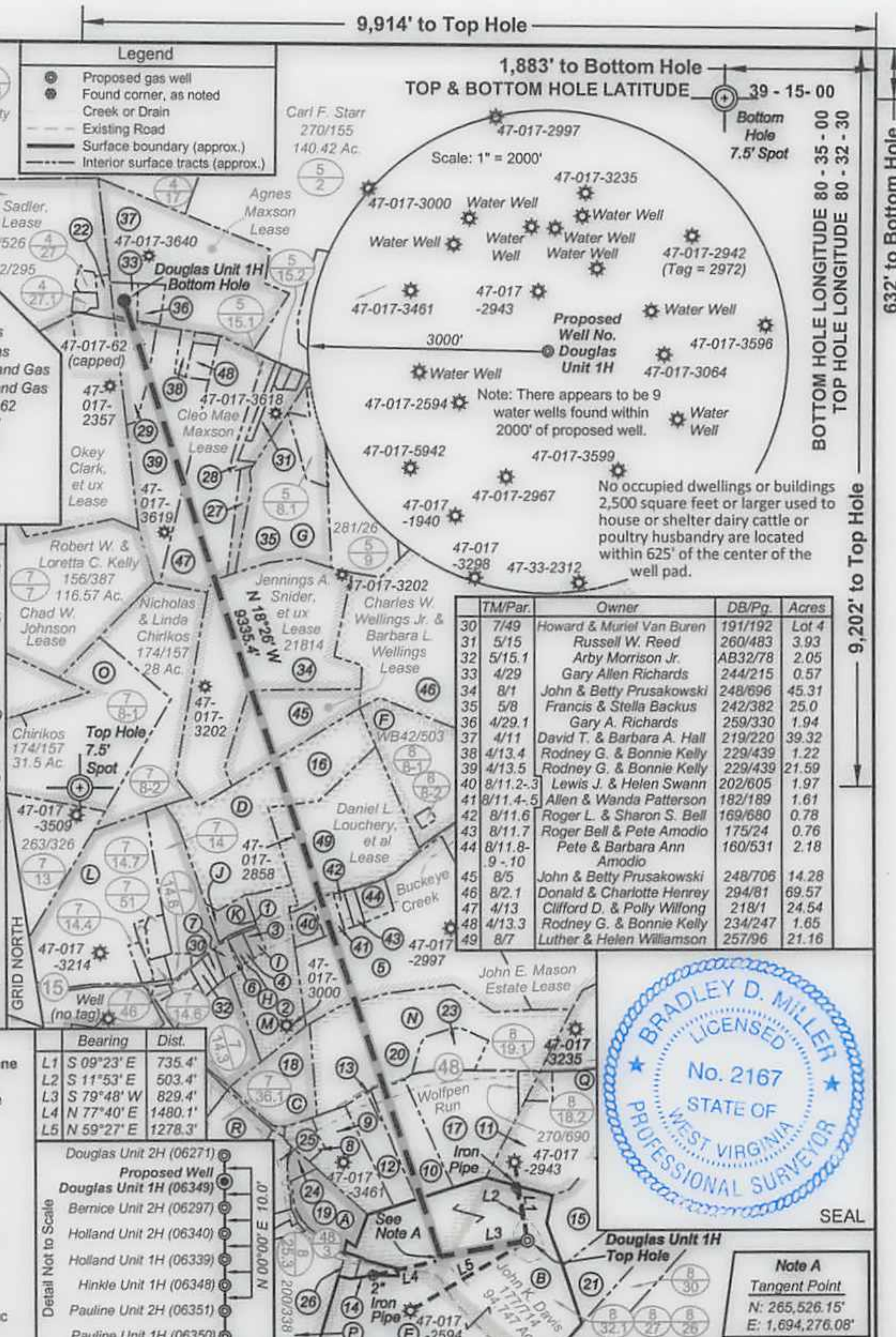
(-◆-) Denotes Location of Well on United States Topographic Maps

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

Lease Table

A	Thomas E. Hickman Lease
B	Joseph E. Richards Lease
C	Jason T. Powell Lease TML #1419
D	Charles W. Wellings Jr., et ux Lease 21312
E	Gladys & Raymond Yerkey Lease 21675
F	Clarence W. Evans, et ux Lease DAD36728
G	Gerald Maxson, et ux Lease
H	Gregory M. Pigg, et ux, Memorandum of Oil and Gas
I	Robert E. Currey, et ux, Memorandum of Oil and Gas
J	Charles W. Wellings Jr., et ux, Memorandum of Oil and Gas
K	Charles W. Wellings Jr., et ux, Memorandum of Oil and Gas
L	Isaac Eddy, et ux Lease L012454, James Romine DV011162
M	Richard William Bond II, et ux Lease DAD36472/001
N	Franklin Maxwell Heirs, et ux Lease DAD41038/001
O	Ora Virginia White Lease DAD61820/002
P	Darrell Ford, et ux, et al Lease
Q	Argil Freeman, et ux Lease DAD40725
R	Homer L. Ford Lease DVO19229

	TM/Par.	Owner	DB/Pg.	Acres
1	8/6.1	August & Rhonie Jordan	240/680	2.29
2	8/7.1	Rebecca S. Choco	254/537	15.78
3	8/35	Robert & Dian Currey	174/703	0.83
4	8/34	Gregory & Tessa Pigg	281/276	0.80
5	8/11.1	Isaac & Sheila Hileman	224/672	43.35
6	8/34.1	D. Duane & Leah Perkins	273/298	0.14
7	8/33	D. Duane & Leah Perkins	227/200	1.10
8	8/18.8	Kevin & Lisa Swan	276/364	2.01
9	8/18.3	Kevin Swann	197/262	10.64
10	8/18.4	Debra K. Underwood	225/54	8.87
11	8/19.2	Penny Freeman Jones	WB37/177	33.39
12	8/18.7	Kevin & Lisa Swan	268/673	5.82
13	8/18.5	Debra K. Swan	233/214	0.21
14	8/32	Jimmy D. Clevenger	262/152	1.01
15	8/28	John K. Davis	177/722	67.69
16	8/6	Jason C. Ridenour	244/613	55.67
17	8/18	David M. Swann	AB33/449	82.6
18	8/17	Jason T. Powell	285/347	10.24
19	8/25.4	Tom & Mary Jo Hickman	282/83	7.00
20	8/18.6	Vanessa Richter	249/635	82.6
21	8/29	John K. Davis	177/722	9.25
22	4/28	Shelia Davis	222/221	1.31
23	8/18.1	T. Nelson & Kimberly McClain	233/554	4.94
24	8/25.1	Tom & Mary Jo Hickman	282/83	1.00
25	8/25.2	Timothy & Julie Goldsmith	273/129	4.61
26	8/32.2	Jimmy D. Clevenger	262/152	0.75
27	5/19	Arby Morrison Jr.	260/403	2.22
28	5/18	Arby Morrison Jr.	260/405	0.36
29	4/13.2	Stephen & Remonda Trent	211/459	5.56
30	7/49	Howard & Muriel Van Buren	191/192	Lot 4
31	5/15	Russell W. Reed	260/483	3.93
32	5/15.1	Arby Morrison Jr.	AB32/78	2.05
33	4/29	Gary Allen Richards	244/215	0.57
34	8/1	John & Betty Prusakowski	248/696	45.31
35	5/8	Francis & Stella Backus	242/382	25.0
36	4/29.1	Gary A. Richards	259/330	1.94
37	4/11	David T. & Barbara A. Hall	219/220	39.32
38	4/13.4	Rodney G. & Bonnie Kelly	229/439	1.22
39	4/13.5	Rodney G. & Bonnie Kelly	229/439	21.59
40	8/11.2-.3	Lewis J. & Helen Swann	202/605	1.97
41	8/11.4-.5	Allen & Wanda Patterson	182/189	1.61
42	8/11.6	Roger L. & Sharon S. Bell	169/680	0.78
43	8/11.7	Roger Bell & Pete Amodio	175/24	0.76
44	8/11.8-.9 -.10	Pete & Barbara Ann Amodio	160/531	2.18
45	8/5	John & Betty Prusakowski	248/706	14.28
46	8/2.1	Donald & Charlotte Henrey	294/81	69.57
47	4/13	Clifford D. & Polly Wilfong	218/1	24.54
48	4/13.3	Rodney G. & Bonnie Kelly	234/247	1.65
49	8/7	Luther & Helen Williamson	257/96	21.16



Notes:
West Virginia Coordinate System of 1927, North Zone
based upon Differential GPS Measurements.
Well No. Douglas Unit 1H Top Hole coordinates are
N: 265,672.97' Latitude: 39°13'27.89"
E: 1,695,092.40' Longitude: 80°34'34.61"
Bottom Hole coordinates are
N: 274,382.55' Latitude: 39°14'53.52"
E: 1,691,324.22' Longitude: 80°35'23.83"
UTM Zone 17, NAD 1983
Top Hole Coordinates N: 4,341,775.984m E: 536,590.021m
Bottom Hole Coordinates N: 4,344,410.215m E: 535,397.783m
Plat orientation and corner and well references are based upon the grid north meridian.
Well location references are based upon the magnetic meridian.

	Bearing	Dist.
L1	S 09°23' E	735.4'
L2	S 11°53' E	503.4'
L3	S 79°48' W	829.4'
L4	N 77°40' E	1480.1'
L5	N 59°27' E	1278.3'

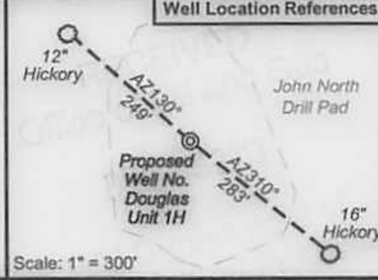
Detail Not to Scale (N 00°00' E 10.0')
Douglas Unit 2H (06271)
Proposed Well Douglas Unit 1H (06349)
Bernice Unit 2H (06297)
Holland Unit 2H (06340)
Holland Unit 1H (06339)
Hinkle Unit 1H (06348)
Pauline Unit 2H (06351)
Pauline Unit 1H (06350)

ALLEGHENY SURVEYS, INC.

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.

Bradley D. Miller, P.S. 2167

Well Location References



FILE NO: 228-30-G-12
DRAWING NO: 228-12 Douglas 1H Well Plat
SCALE: 1" = 1500'
MINIMUM DEGREE OF ACCURACY: Submeter
PROVEN SOURCE OF ELEVATION: WVDOT, Bridgeport, WV

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

DATE: November 15 2013
OPERATOR'S WELL NO. Douglas Unit 1H
API WELL NO MOD
47 - 017 - 06349
STATE COUNTY PERMIT
H6A

WELL TYPE: ☐ OIL ☒ GAS ☐ LIQUID INJECTION ☐ WASTE DISPOSAL
(IF GAS) PRODUCTION : ☐ STORAGE ☐ DEEP ☒ SHALLOW
LOCATION: ELEVATION: 1246' WATERSHED: Wolfpen Run of Buckeye Creek QUADRANGLE: Big Isaac
DISTRICT: Greenbrier COUNTY: Doddridge 02/28/2014
SURFACE OWNER: John K. Davis; Agnes Maxson; Jennings A. Snider, et ux; Cleo Mae Maxson; Charles W. Wellings Jr. & Barbara L. Wellings; Joseph E. Richards; Charles W. Wellings Jr., et ux ACREAGE: 94.747; 39.51; 14.27; 47; 65
ROYALTY OWNER: Franklin Maxwell Heirs, et ux; John E. Mason Estate; Daniel L. Louchery, et al LEASE NO: DAD41038/001; 21312; 21814 ACREAGE: 125; 95; 89; 22; 36.6
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: 7,500' TVD 17,300' MD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System
ADDRESS: 1625 17th Street, Denver, CO 80202 ADDRESS: 5400 D Big Tyler Road, Charleston, WV 25313