



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

Re: Permit Modification Approval for API Number 1706297 , Well #: BERNICE UNIT 2H
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



December 11, 2013

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

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 Mihalein
Permit Representative
Antero Resources Corporation

Enclosures

Received
DEC 13 2013
Office of Oil and Gas
WV Dept. of Environmental Protection

02/28/2014

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 Greenbrier Big Isaac
Operator ID County District Quadrangle

2) Operator's Well Number: Bernice Unit 2H 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: 15,200' MD

11) Proposed Horizontal Leg Length: 7126'

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: _____

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West Virginia Department of
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WW-6B
(9/13)

18) CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill-up (Cu. Ft.)</u>
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#	395'	395'	CTS, 549 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#	15200'	15200'	3769 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
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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The Department of
Environmental Protection
Page 2 of 3
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.

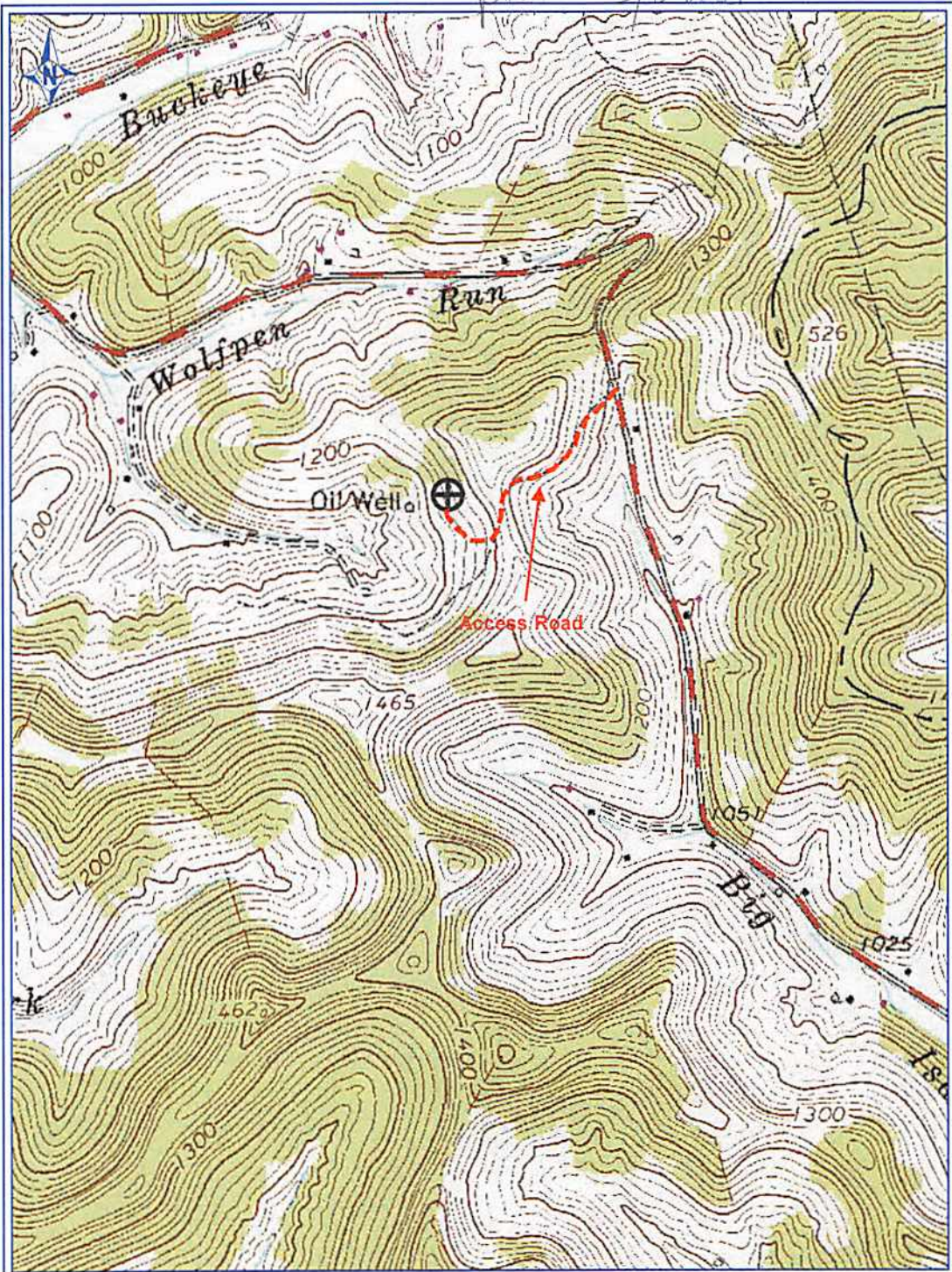
Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.

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.

plat spotted

1706297



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

Received
Office of Oil & Gas

JUN 5 2013

Antero Resources Corp

APPALACHIAN BASIN

Bernice Unit 2H

Doddridge County

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

By: ECM



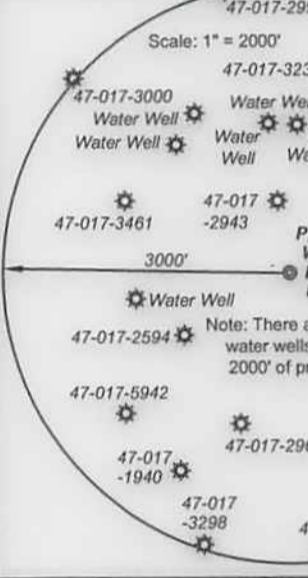
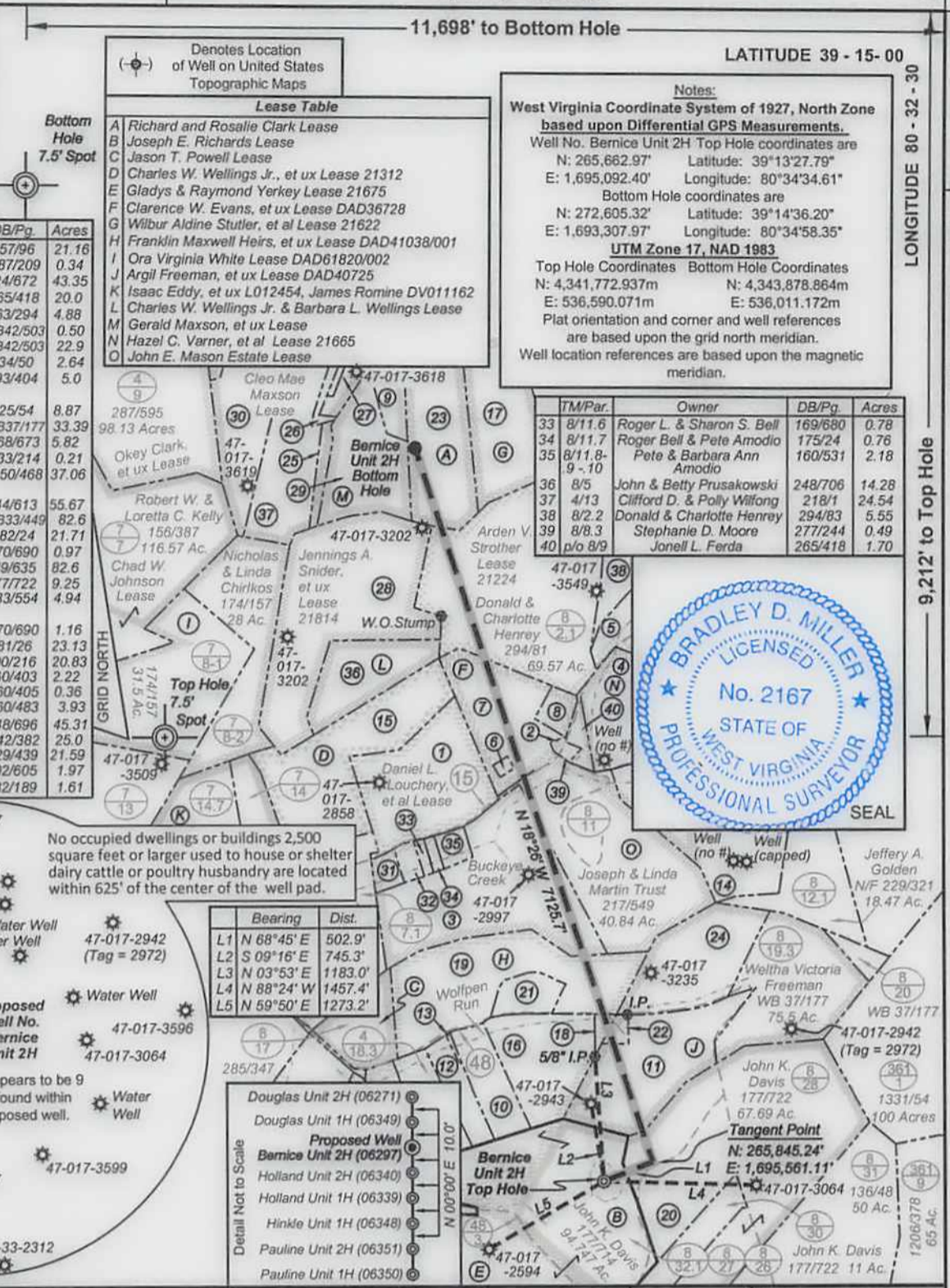
02/28/2014

Antero Resources
Well No. Bernice Unit 2H
Antero Resources Corporation

Legend

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

TM/Par.	Owner	DB/Pg.	Acres
1 8/7	Luther & Helen Williamson	257/96	21.16
2 8/8.2	Zak S. Henry	287/209	0.34
3 8/11.1	Isaac & Sheila Hileman	224/672	43.35
4 p/o 8/9	Jonell L. Ferda	265/418	20.0
5 8/2	Mikasa T. Ash	263/294	4.88
6 p/o 8/8	Barbara E. Hart	WB42/503	0.50
7 8/8/8	Barbara E. Hart	WB42/503	22.9
8 8/8.4	Rick L. Hart	234/50	2.64
9 5/8.1	Pamela Jean & Phillip M. Speece, Jr./Dusty E. Gray	293/404	5.0
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 8/10.2	The Butterfly Evolution Trust	250/468	37.06
15 8/6	Jason C. Ridenour	244/613	55.67
16 8/18	David M. Swann	AB33/449	82.6
17 5/10	Larry Blain/Mary Jo Carder	282/24	21.71
18 8/18.2	Jennifer J. Henline	270/690	0.97
19 8/18.6	Vanessa Richter	249/635	82.6
20 8/29	John K. Davis	177/722	9.25
21 8/18.1	T. Nelson & Kimberly McClain	233/554	4.94
22 8/19.1	Jennifer J. Henline	270/690	1.16
23 5/9	Robert Clark	281/26	23.13
24 8/19	John & Sara Pumphrey	200/216	20.83
25 5/19	Arby Morrison Jr.	260/403	2.22
26 5/18	Arby Morrison Jr.	260/405	0.36
27 5/15	Russell W. Reed	260/483	3.93
28 8/1	John & Betty Prusakowski	248/696	45.31
29 5/8	Francis & Stella Backus	242/382	25.0
30 4/13.5	Rodney G. & Bonnie Kelly	229/739	21.59
31 8/11.2-3	Lewis J. & Helen Swann	202/605	1.97
32 8/11.4-5	Allen & Wanda Patterson	182/189	1.61



No occupied dwellings or buildings 2,500 square feet or larger used to house or shelter dairy cattle or poultry husbandry are located within 625' of the center of the well pad.

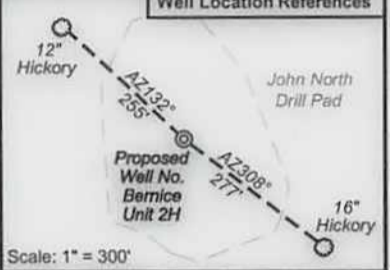


TM/Par.	Owner	DB/Pg.	Acres
33 8/11.6	Roger L. & Sharon S. Bell	169/680	0.78
34 8/11.7	Roger Bell & Pete Amodio	175/24	0.76
35 8/11.8-9-10	Pete & Barbara Ann Amodio	160/531	2.18
36 8/5	John & Betty Prusakowski	248/706	14.28
37 4/13	Clifford D. & Polly Wilfong	218/1	24.54
38 8/2.2	Donald & Charlotte Henrey	294/83	5.55
39 8/8.3	Stephanie D. Moore	277/244	0.49
40 p/o 8/9	Jonell L. Ferda	265/418	1.70



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
Bradley D. Miller, P.S. 2167



FILE NO: 234-30-G-12
 DRAWING NO: 234-12 Bernice 2H 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: December 10 2013
 OPERATOR'S WELL NO. Bernice Unit 2H
 API WELL NO MOD
 47 - 017 - 06297
 STATE COUNTY PERMIT

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: Boone
 SURFACE OWNER: John K. Davis SURFACE OWNER: Argil Freeman, et ux Arden V. Strother; Clarence W. Evans, et ux Richard and Rosalie Clark; Joseph E. Richards LEASE NO: DAD40725 DAD36728 DAD41038/001; 21224 ACREAGE: 94.747 23; 76; 127
 ROYALTY OWNER: Franklin Maxwell Heirs, et ux; John E. Mason Estate LEASE NO: DAD41038/001; 21224 ACREAGE: 125; 95; 89; 24
 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 15,200' 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