



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Friday, March 20, 2020
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for DEVILLE UNIT 2H
47-095-02680-00-00

ANTERO RESOURCES CORPORATION

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.

If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

Operator's Well Number: DEVILLE UNIT 2H
Farm Name: ELDON J. & RUTH A. HELMAN
U.S. WELL NUMBER: 47-095-02680-00-00
Horizontal 6A New Drill
Date Modification Issued: 3/18/2020

Promoting a healthy environment.

WW-6B
(04/15)

API NO. 47-095 - 02680

OPERATOR WELL NO. Deville Unit 2H

Well Pad Name: Eldon Pad

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

1) Well Operator: Antero Resources Corporation 494507062 Tyler Ellsworth Middlebourne 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Deville Unit 2H Well Pad Name: Eldon Pad

3) Farm Name/Surface Owner: Eldon J. & Ruth A. Helman Public Road Access: CR 10/1

4) Elevation, current ground: 882' Elevation, proposed post-construction: ~880'

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 Expected Pressure(s):
Marcellus Shale: 6600' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#

JEB
3/12/2020

8) Proposed Total Vertical Depth: 6600' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 24100' MD

11) Proposed Horizontal Leg Length: 16374'

12) Approximate Fresh Water Strata Depths: 156'

13) Method to Determine Fresh Water Depths: 47-095-00912

14) Approximate Saltwater Depths: 1676'

15) Approximate Coal Seam Depths: None Identified

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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WW-6B
(04/15)

API NO. 47- 095 - 02680

OPERATOR WELL NO. Deville Unit 2H

Well Pad Name: Eldon Pad

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	20"	New	H-40	94#	80	80	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	300	300	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500	2500	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	23#	24100	24100	CTS, 6219 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

JEB
3/12/2020

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.438"	1530	50	Class A	~1.18
Fresh Water	13-3/8"	17-1/2"	0.38"	2730	1000	Class A	~1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	1500	Class A	~1.18
Intermediate							
Production	5-1/2"	8-3/4" & 8-1/2"	0.415"	12,630	2500	Lead-HPOZ & Tail - H	H/POZ~1.44 & H~1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

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Environmental Protection

WW-6B
(10/14)

API NO. 47- 095 - 02680

OPERATOR WELL NO. Deville Unit 2H

Well Pad Name: Eldon Pad

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."

Anticipated Max Pressure - 9300 lbs
Anticipated Max Rate - 80 bpm

JOB
3/12/2020

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 35.04 acres

22) Area to be disturbed for well pad only, less access road (acres): 12.65 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 and 1/4 lb of flake
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.

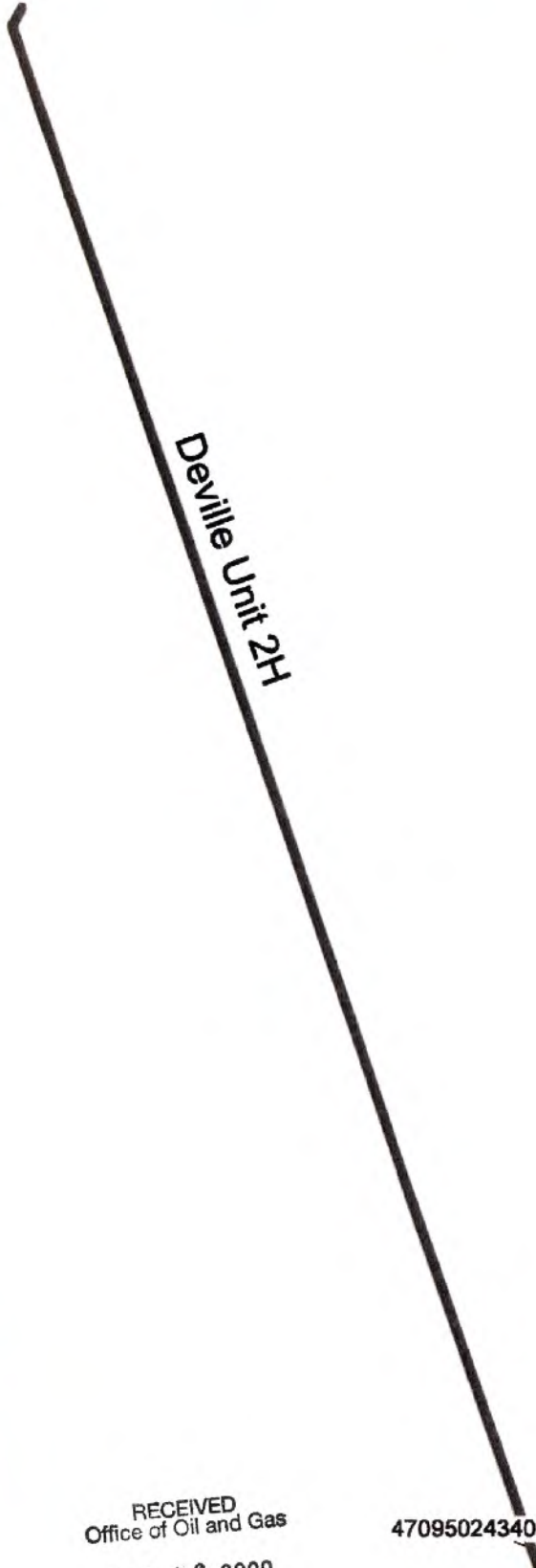
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Environmental Protection

DEVILLE UNIT 2H (ELDON PAD)- AREA OF REVIEW 35-8-5.11

PERMIT MODIFICATION API # 47-095-02680



Antero Resources Corporation

Deville Unit 2H - AOR



WELL SYMBOLS
Gas Well

December 16, 2019

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47095024340000

47095024330000

QCB
3/16/2020

LWI (API Num)	Well Name	Well Number	Operator	Hist Oper	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Productible Formation(s) not perf'd
47095024940000	PHEASANT UNIT	1H	ANTERO RESOURCES CORPORATION		19,257	6661 - 19157	Marcellus	N/A
47095024930000	PARACHUTE UNIT	3H	ANTERO RESOURCES CORPORATION		19,107	6688 - 19002	Marcellus	N/A

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Operator's Well Number Deville Unit 2H

INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<u>Eldon J. & Ruth A. Helman Lease</u> Eldon J. & Ruth A. Helman	Antero Resources Corporation	1/8+	0427/0610
<u>Carol J. Cox Lease</u> Carol J. Cox	Antero Resources Corporation	1/8+	0559/0691
<u>Lora Keller Thomas Lease</u> Lora Keller Thomas	Antero Resources Corporation	1/8+	0626/0599
<u>Carol J. Cox Lease</u> Carol J. Cox	Antero Resources Corporation	1/8+	0559/0691
<u>Nancy J. & Jerry A. Haught Lease</u> Nancy J. & Jerry A. Haught	Antero Resources Corporation	1/8+	0593/0530
<u>Randee Cox Lease</u> Randee Cox	Antero Resources Corporation	1/8+	0482/0804
<u>Raymond Cox Lease</u> Raymond Cox	Antero Resources Corporation	1/8+	0483/0727
<u>Roy D. Hadley Lease</u> Roy D. Hadley Chesapeake Appalachia LLC SWN Production Company	Chesapeake Appalachia LLC SWN Production Company Antero Resources Corporation	1/8 Assignment Assignment	0371/0373 0465/0463 0544/0242
<u>Patricia Doty Thomas Lease</u> Patricia Doty Thomas	Antero Resources Corporation	1/8+	0626/0593
<u>James A. Long et ux Lease</u> James A. Long et ux EQT Production Company	EQT Production Company Antero Resources Corporation	1/8 Assignment	0622/0795 0015/0209
<u>Stoneyknob Holdings LLC Lease</u> Stoneyknob Holdings LLC	Antero Resources Corporation	1/8+	0444/0209
<u>Donald R. Fletcher & Shirley Fletcher Lease</u> Donald R. Fletcher & Shirley Fletcher Chesapeake Appalachia LLC Statoil USA Onshore Properties LLC Antero Exchange Properties	Chesapeake Appalachia LLC Statoil USA Onshore Properties LLC Antero Exchange Properties Antero Resources Corporation	1/8 Assignment Assignment Merger	0371/0415 0375/0371 0544/0291 0522/0315

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<u>Sarah Lawson Wilson Lease</u> Sarah Lawson Wilson	Antero Resources Corporation	1/8+	0661/0736
<u>Anthony Byron Hill Lease</u> Anthony Byron Hill	Antero Resources Corporation	1/8+	0671/0611

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WW-6A1
(5/13)

Operator's Well No. Deville Unit 2H

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

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- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Sarah L. Hahn Lease</u>	Sarah L. Hahn	Antero Resources Corporation	1/8+	0535/0353

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

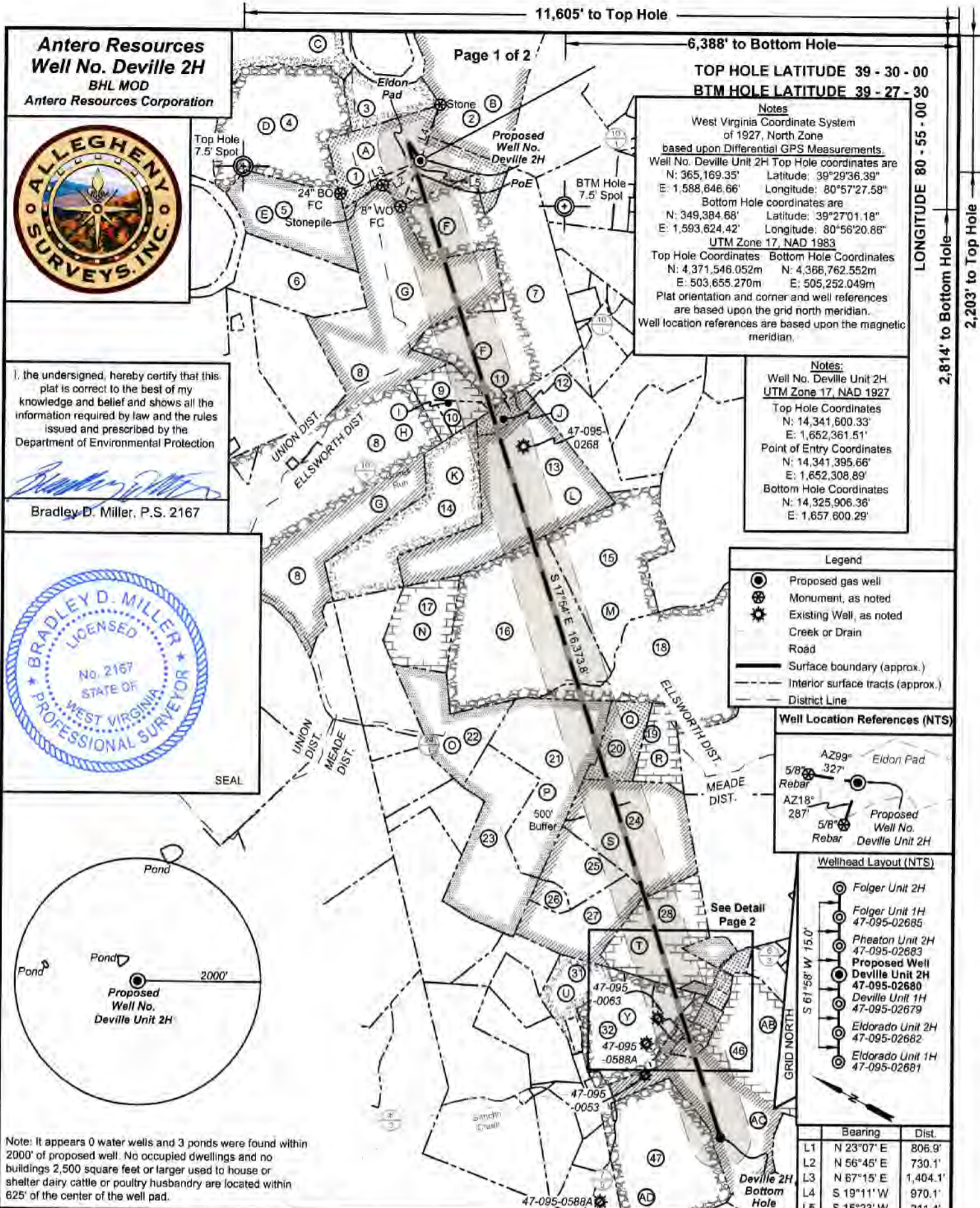
The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Antero Resources Corporation
 By: Tim Rady 
 Its: VP of Land

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MAR 16 2020

WV Department of
Environmental Protection



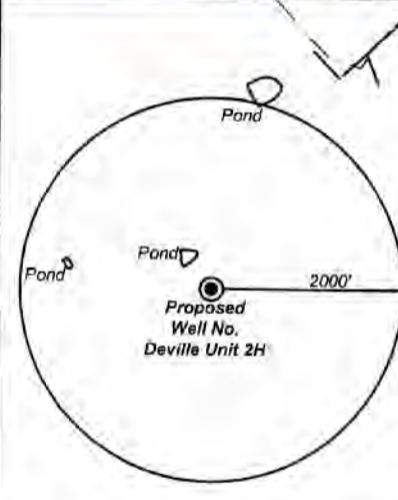
Antero Resources
Well No. Deville 2H
 BHL MOD
 Antero Resources Corporation



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



Note: It appears 0 water wells and 3 ponds were found within 2000' of proposed well. No occupied dwellings and no 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.

11,605' to Top Hole
 6,388' to Bottom Hole

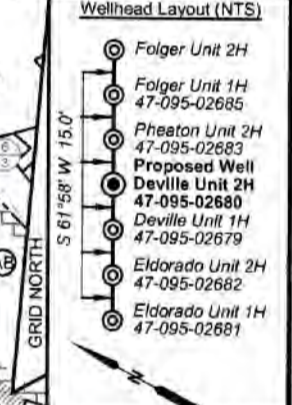
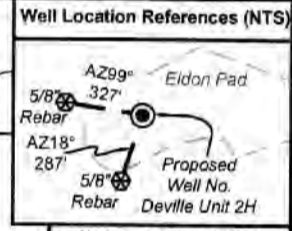
Page 1 of 2

TOP HOLE LATITUDE 39 - 30 - 00
BTM HOLE LATITUDE 39 - 27 - 30

Notes
 West Virginia Coordinate System of 1927, North Zone based upon Differential GPS Measurements.
 Well No. Deville Unit 2H Top Hole coordinates are
 N: 365,169.35' Latitude: 39°29'36.39"
 E: 1,588,646.66' Longitude: 80°57'27.58"
 Bottom Hole coordinates are
 N: 349,384.68' Latitude: 39°27'01.18"
 E: 1,593,624.42' Longitude: 80°56'20.88"
UTM Zone 17, NAD 1983
 Top Hole Coordinates Bottom Hole Coordinates
 N: 4,371,546.052m N: 4,366,762.552m
 E: 503,655.270m E: 505,252.049m
 Plat orientation and corner and well references are based upon the grid north meridian.
 Well location references are based upon the magnetic meridian.

Notes:
 Well No. Deville Unit 2H
UTM Zone 17, NAD 1927
 Top Hole Coordinates
 N: 14,341,600.33'
 E: 1,652,361.51'
 Point of Entry Coordinates
 N: 14,341,395.66'
 E: 1,652,308.89'
 Bottom Hole Coordinates
 N: 14,325,906.36'
 E: 1,657,600.29'

- Legend**
- Proposed gas well
 - ⊙ Monument, as noted
 - ⊛ Existing Well, as noted
 - Creek or Drain
 - Road
 - Surface boundary (approx.)
 - - - Interior surface tracts (approx.)
 - - - District Line



	Bearing	Dist.
L1	N 23°07' E	806.9'
L2	N 56°45' E	730.1'
L3	N 67°15' E	1,404.1'
L4	S 19°11' W	970.1'
L5	S 15°23' W	211.4'

FILE NO: 117-54-M-18
 DRAWING NO: Deville 2H Well Plat
 SCALE: 1" = 2000'
 MINIMUM DEGREE OF ACCURACY: Submeter
 PROVEN SOURCE OF ELEVATION: WVDOT, Harrisville, WV

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

DATE: February 25 20 20
 OPERATOR'S WELL NO. Deville Unit 2H
 API WELL NO
 47 - 095 - 02680
 STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
 Proposed Elev. 880'
 LOCATION: ELEVATION: Existing Elev. 882' WATERSHED: Outlet Middle Island Creek QUADRANGLE: Middlebourne 186.008;
 DISTRICT: Ellsworth/Meade Sarah Lawson Wilson; COUNTY: Tyler 5.384; 291.5; 20;
 SURFACE OWNER: Eldon J. & Ruth A. Helman Donald R. Fletcher, et ux; Anthony Bryon Hill; Sarah L. Hahn; 140; 132.08;
 RUTH A. HELMAN Patricia Doty Thomas; Stoneycnob Holdings, LLC; Lora Keller Thomas; ACREAGE: 61.83 54.238; 56.25725;
 ROYALTY OWNER: Eldon J. & Ruth A. Helman; Carol J. Cox; Nancy J. & Jerry A. Haught; Rande Cox; Raymond Cox; Roy D. Hadley; James A. Long, et ux 100; 0.54; 50.6;
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION ACREAGE: 61.83; 142; 21;
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) BHL MOD
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 24,100' MD 6,600' TVD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System
 ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road
 Denver, CO 80202 Charleston, WV 25313



ID	TM/Par	Owner	Bk/Pg	Acres
1	19-1	Eldon J. & Ruth A. Helman	383/761	61.83
2	13-10	Eldon J. & Ruth A. Helman	383/761	96.82
3	6-1.1	Eldon J. & Ruth A. Helman	383/761	21.0
4	6-2	Eldon J. & Ruth A. Helman	383/761	83.13
5	10-1	Lora K. Thomas	175/19	53.0
6	10-2	Mary Elizabeth Potts, et al	126/444	50.0
7	19-42	Carol J. Cox	334/298	142.0
8	10-10	Lora K. Thomas	201/359	307.06
9	19-45	Ronald K. Taylor, et al	492/20	13.3
10	19-45.1	Keith Taylor, et al	323/708	6.7
11	19-44.2	Ronald H. & Joyce A. Eddy	352/17	5.384
12	19-44.1	Annette DiMattina	360/747	1.73
13	19-44	Randee Jack Cox	288/401	92.886
14	19-46	Judy Rine, et al	W29/643	60.0
15	19-51	Larry & Betsy Moore, et al	312/108	72
16	19-50	Larry & Betsy Moore, et al	312/108	116.04
17	19-49	W. Clint Maxwell Estate	W4/270	35.14
18	25-1	Deborah S. Reed	328/804	100.45
19	2-15.1	James A., Jr. & Angela K. Long	333/188	11.0
20	2-15.2	James A., Jr. & Angela K. Long	333/188	20.0
21	2-4	Jon J. Cox & Patricia D. Thomas	311/352	78.0
22	2-2.1	Patricia Doty Thomas	192/409	39.25
23	2-4.1	Patricia Doty Thomas	316/222	62.0
24	2-5	Charles H. & Paula J. Foster	338/186	69.5

ID	TM/Par	Owner	Bk/Pg	Acres
25	2-14.1	Robert L. & Nancy C. Donaghy	289/121	26.36
26	2-13	Robert L. & Nancy C. Donaghy	317/477	4.79
27	2-14	Robert L. & Nancy C. Donaghy	339/9	31.43
28	2-5.1	Donald R. & Shirley D. Fletcher	204/309	54.24
29	2-5.3	Timothy B. & Lisa D. Bowen	345/52	5.76
30	2-20.4	Robert B. & Sally M. Ludington	299/152	1.134
31	2-33	Cathy Post	302/368	20.13
32	2-20	James R. & Violet M. Smith	267/226	39.656
33	2-20.3	Alan Jay Hill	337/94A	7.58
34	2-5.2	Timothy Brian & Lisa Dawn Bowen	343/789	1.51
35	2-19.1	Bruce A. & Sondra Stewart	330/436	1.83
36	2-20.1	Alan J. & Debra Hill	254/11	2.088
37	2-19	Flora Woodburn	344/290	4.1
38	2-20.9	Alan Jay Hill	337/94A	1.2
39	2-21	Alan Jay Hill	254/11	0.54
40	2-20.10	Christina D. (Hartman) Mercer	319/166	2.054
41	2-22	Thomas E. & Devin R. Weekley	385/621	0.42
42	2-23	Jason A. Reed	323/271	1.0
43	2-18.2	Roy David Haught	347/801	1.09
44	2-18.3	Roy David Haught	347/801	1.562
45	2-20.5	Thomas J. Glover	267/96	1.0
46	2-18.1	David & Debra Haught	294/442	102.03
47	2-24	David H. Hadley, et al	374/632	74

Detail (NTS)



Leases	
A	Eldon J. & Ruth A. Helman
B	Ruth H. Wells
C	Norma R Spencer, Trustee of the Allan P. Spencer Living Trust
D	Gary C. & Maryjane Richards
E	Lora Keller Thomas
F	Carol J. Cox
G	Lora Keller Thomas
H	Charlotte A. Weise
I	Nancy J. & Jerry A. Haught
J	Randee Cox
K	Nancy Jo & Jerry Allen Haught
L	Raymond Cox
M	Roy D. Hadley
N	Lisa Norman, et vir
P	Patricia Doty Thomas
Q	James A. Long, et ux
R	James A. Long, et ux
S	Stoneyknob Holdings, LLC
T	Donald R. Fletcher, et ux
U	Penelope M. Burch
V	OPEN
W	Kathy Ann Seago
X	Sarah Lawson Wilson
Y	Sarah Lawson Wilson
Z	Anthony Bryon Hill
AA	Alma A. Barnard
AB	Virgil R. & Janice R. McMullen
AC	Sarah L. Hahn
AD	Denton Eugene Hadley

FILE NO: 117-54-M-18
 DRAWING NO: Deville 2H Well Plat
 SCALE: 1" = 2000'
 MINIMUM DEGREE OF ACCURACY:
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 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 6,600' TVD
 24,100' MD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System
 ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road
 Denver, CO 80202 Charleston, WV 25313