



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

Wednesday, January 8, 2020
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for HARPUA UNIT 2H
47-095-02641-00-00

Modified Point of Entry and Lateral Length with additional Leases

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: HARPUA UNIT 2H
Farm Name: BARBARA KAY TURNER
U.S. WELL NUMBER: 47-095-02641-00-00
Horizontal 6A New Drill
Date Modification Issued: January 8, 2020

Promoting a healthy environment.

WW-6B
(04/15)

API NO. 47-095 - 02641 MOD
OPERATOR WELL NO. Harpua Unit 2H
Well Pad Name: Gamehenge East 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 095 - Tyler Ellsworth Paden City 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Harpua Unit 2H Well Pad Name: Gamehenge East Pad

3) Farm Name/Surface Owner: Barbara Kay Turner Public Road Access: State Ridge Road

4) Elevation, current ground: 1072' Elevation, proposed post-construction: ~1061'

5) Well Type (a) Gas X Oil _____ Underground Storage _____

Other _____

(b) If Gas Shallow X Deep _____

Horizontal X

JEB
11/18/2019

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 7000' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#

8) Proposed Total Vertical Depth: 7000' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 23700' MD

11) Proposed Horizontal Leg Length: 15763'

12) Approximate Fresh Water Strata Depths: 363'

13) Method to Determine Fresh Water Depths: 47-095-00335

14) Approximate Saltwater Depths: 1093'

15) Approximate Coal Seam Depths: 550'

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 X

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

RECEIVED
Office of Oil and Gas

NOV 22 2019

WW-6B
(04/15)

PERMIT MODIFICATION API # 47-095-02641 *mon*
 API NO. 47- 095 - 02641
 OPERATOR WELL NO. Harpua Unit 2H
 Well Pad Name: Gamehenge East 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#	413 *see # 19	413 *see # 19	CTS, 574 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#	23700	23700	6109 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

JCB
11/10/2019

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-H/POZ & 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			

RECEIVED
Office of Oil and Gas

NOV 22 2019

WW-6B
(10/14)

API NO. 47-095 - 02641
OPERATOR WELL NO. Harpua Unit 2H
Well Pad Name: Gamehenge East 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.

*Antero will be air drilling the fresh water string which makes it difficult to determine when fresh water is encountered. Therefore, we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

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

JCB
11/10/2019

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 7.45 acres

22) Area to be disturbed for well pad only, less access road (acres): 7.45 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.

NOV 22 2019
WV Department of
Environmental Protection

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.

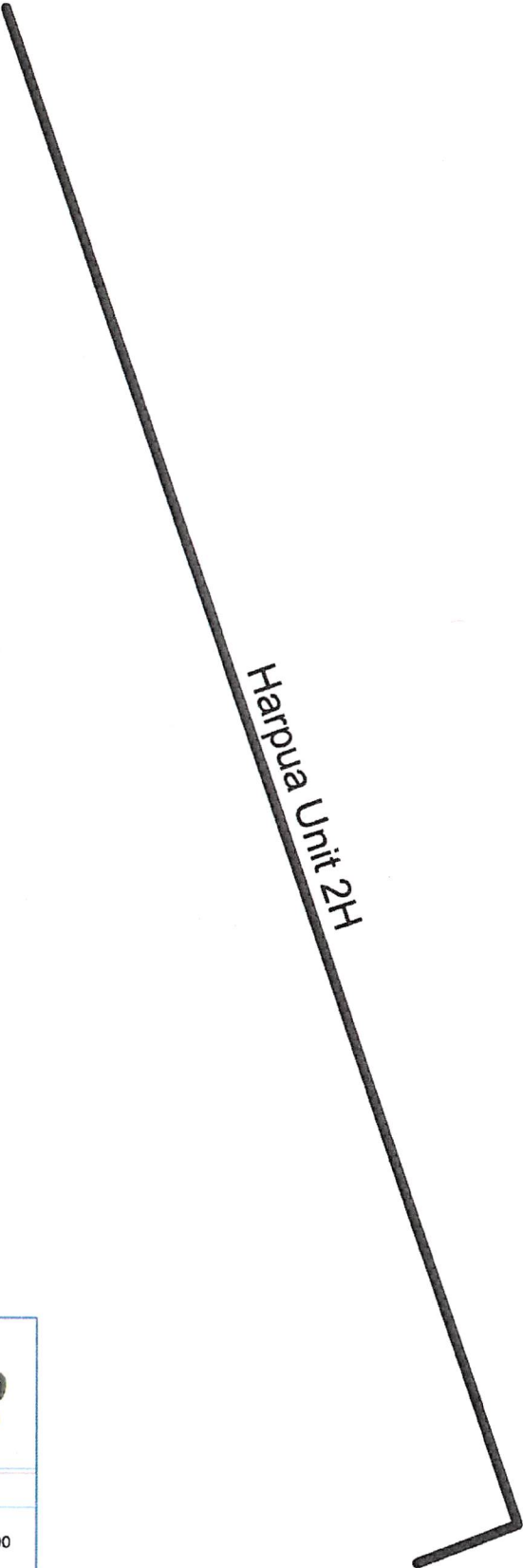
*Note: Attach additional sheets as needed.

RECEIVED
Office of Oil and Gas





HARPUA UNIT 2H (GAMEHENGE EAST PAD) - AREA OF REVIEW
35-8-5.11 PAGE 1

PERMIT MODIFICATION API # 47-095-02641 *mo10*



RECEIVED
Office of Oil and Gas
NOV 22 2019
WV Department of
Environmental Protection

 Antero Resources Corporation
Harpua Unit 2H
 FEET
REMARKS No Wells of Interest
December 17, 2018

JEB
11/18/2019

WW-6A1

Operator's Well Number Harpua 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>Linda L. Newbrough Lease (TM 14 PCL 26)</u>			
Linda L. Newbrough	Chesapeake Appalachia, LLC	1/8	0373/0234
Chesapeake Appalachia, LLC	Statoil USA Onshore Properties, Inc	Assignment	0376/0733
Statoil USA Onshore Properties, Inc	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<u>Jack Russell Folger, et ux Lease</u>			
Jack Russell Folger, et ux	Antero Resources Corporation	1/8+	0495/0097
<u>Naomi V. Beagle Lease</u>			
Naomi V. Beagle	Antero Resources Corporation	1/8+	0535/0464
<u>Linda L. Newbrough Lease (TM 15 PCL 18)</u>			
Linda L. Newbrough	Chesapeake Appalachia, LLC	1/8	0373/0234
Chesapeake Appalachia, LLC	Statoil USA Onshore Properties, Inc	Assignment	0376/0733
Statoil USA Onshore Properties, Inc	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
<u>Stanley M. & Irene E. Koterba Lease</u>			
Stanley M. & Irene E. Koterba	Antero Resources Corporation	1/8+	0597/0497
<u>Sarah Valentour Nass Lease</u>			
Sarah Valentour Nass	Antero Resources Corporation	1/8+	0555/0116
<u>Kim M. & Larry M. Henthorn Lease</u>			
Kim M. & Larry M. Henthorn	Antero Resources Corporation	1/8+	0570/0426
<u>James F. Sr. & Phyllis M. Henthorn Lease (TM 9 PCL 60)</u>			
James F. Sr. & Phyllis M. Henthorn	Antero Resources Corporation	1/8+	0583/0545
<u>Sarah A. Midcap Lease</u>			
Sarah A. Midcap	Antero Resources Corporation	1/8+	0472/0582
<u>James F. Sr. & Phyllis M. Henthorn Lease (TM 9 PCL 59)</u>			
James F. Sr. & Phyllis M. Henthorn	Antero Resources Corporation	1/8+	0583/0545

RECEIVED
 Office of Oil and Gas
 NOV 22 2019
 WV Department of
 Environmental Protection

*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.

CONTINUED ON NEXT PAGE

DOB
11/18/2019

WW-6A1

Operator's Well Number Harpua 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>Robert D. & Jessica J. Masters Lease</u> Robert D. & Jessica J. Masters	Antero Resources Corporation	1/8+	0436/0611
<u>Larry R. Henthorn Lease</u> Larry R. Henthorn	Antero Resources Corporation	1/8+	0621/0042
<u>Michael P. & Sherri J. Tuttle Lease</u> Michael P. & Sherri J. Tuttle	Antero Resources Corporation	1/8+	0452/0258
<u>Bobby S. & Sue Marie Adams Lease</u> Bobby S. & Sue Marie Adams	Antero Resources Corporation	1/8+	0627/0643
<u>James W. Chapman Lease</u> James W. Chapman	Antero Resources Corporation	1/8+	0435/0665
<u>Waco Oil & Gas Inc. Lease</u> Waco Oil & Gas Inc.	Antero Resources Corporation	1/8+	0518/0587
<u>Marilyn S. Parkinson Lease</u> Marilyn S. Parkinson	Antero Resources Corporation	1/8+	0551/0257
<u>David E. Bowyer Lease</u> David E. Bowyer	Antero Resources Corporation	1/8+	0569/0503
<u>Charles M. Ferrell Lease</u> Charles M. Ferrell	Antero Resources Corporation	1/8+	0526/0064
<u>David E. Bowyer Lease</u> David E. Bowyer	Antero Resources Corporation	1/8+	0569/0503
<u>Kathryn L. Watkins Lease</u> Kathryn L. Watkins Triad Hunter LLC	Triad Hunter LLC Antero Resources Corporation	1/8 Assignment	0387/0657 0496/0776
<u>Diane W. Kestle Lease</u> Diane W. Kestle	Antero Resources Corporation	1/8+	0504/0232
<u>Ronald L. Perine et ux Lease</u> Ronald L. Perine et ux	Antero Resources Corporation	1/8+	0599/0105
<u>Sherry Sue Dietrich Lease</u> Sherry Sue Dietrich	Antero Resources Corporation	1/8+	0543/0029

WV Department of Environmental Protection

NOV 22 2019

Office of Oil and Gas
RECEIVED

JCB
11/18/2019

WW-6A1

Operator's Well Number Harpua 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>Jefferson Minerals LLC Lease</u> Jefferson Minerals LLC	Antero Resources Corporation	1/8+	0648/0046
<u>Nancy Templeton Lease</u> Nancy Templeton	Antero Resources Corporation	1/8+	0402/0665
<u>Michael D. Reynolds Lease</u> Michael D. Reynolds	Antero Resources Corporation	1/8+	0633/0549

RECEIVED
Office of Oil and Gas
NOV 22 2019
WV Department of
Environmental Protection

JEB
11/18/2019

MOD

WW-6A1
(5/13)

Operator's Well No. Harpua 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:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Bounty Minerals Lease</u>	Bounty Minerals	Antero Resources Corporation	1/8+	0623/0575

*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

RECEIVED
Office of Oil and Gas

NOV 22 2019

WV Department of
Environmental Protection

JCB
11/18/2019

Antero Resources
Well No. Harpua Unit 2H
 BHL MOD
 Antero Resources Corporation

8,907' to Bottom Hole

3,347' to Top Hole

TOP HOLE LATITUDE 39 - 32 - 30
 BTM HOLE LATITUDE 39 - 35 - 00

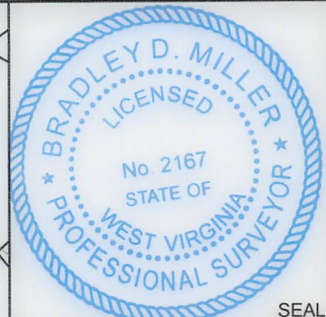
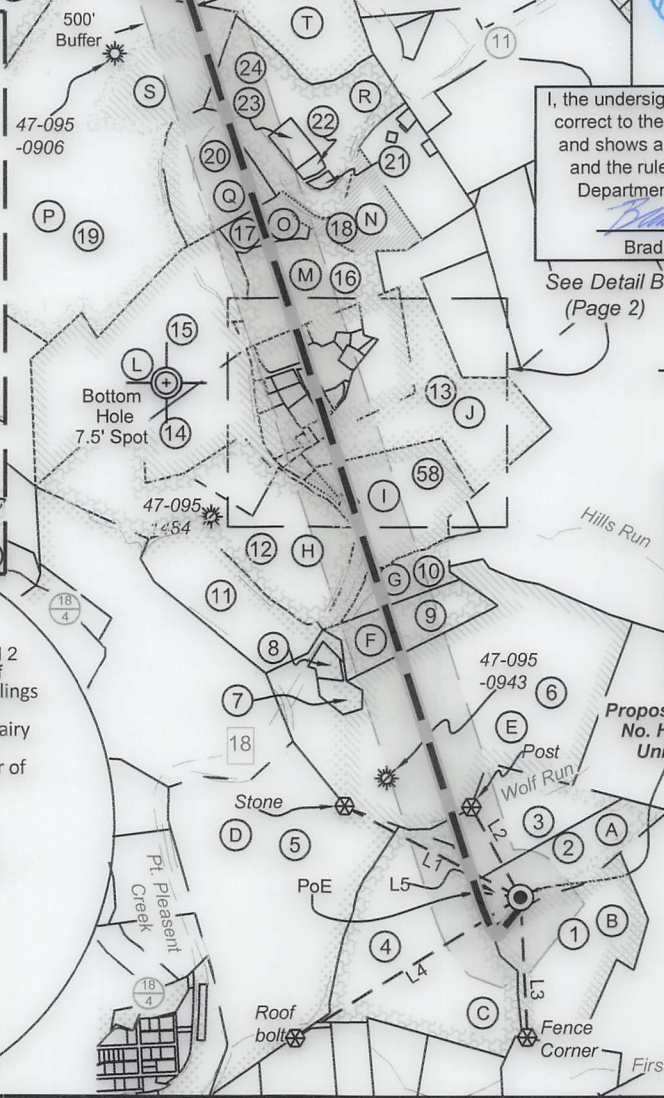
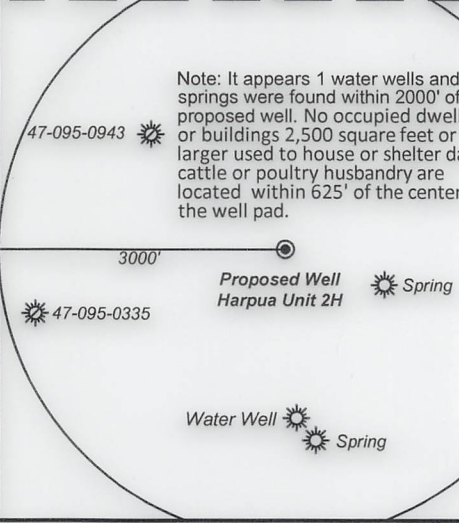
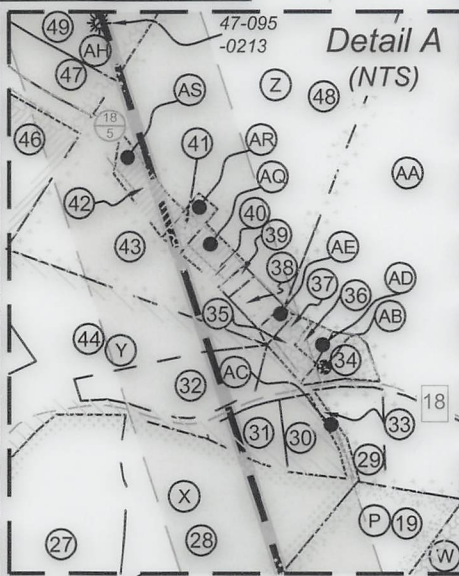


Wellhead Layout (NTS)

Maggie Unit 3H	47-095-02639
Maggie Unit 2H	47-095-02638
Maggie Unit 1H	47-095-02637
Proposed Well Harpua Unit 2H	47-095-02641
Harpua Unit 1H	47-095-02636
Possum Unit 2H	47-095-02642
Possum Unit 1H	47-095-02640

Notes:
 Well No. Harpua Unit 2H
 UTM Zone 17, NAD 1927
 Top Hole Coordinates
 N: 14,347,540.06'
 E: 1,672,504.91'
 Point of Entry Coordinates
 N: 14,347,587.49'
 E: 1,672,046.11'
 Bottom Hole Coordinates
 N: 14,362,490.67'
 E: 1,666,929.04'

Notes:
 West Virginia Coordinate System
 of 1927, North Zone
 based upon Differential GPS Measurements.
 Well No. Harpua Unit 2H Top Hole coordinates are
 N: 370,773.90' Latitude: 39°30'34.95"
 E: 1,608,893.34' Longitude: 80°53'10.44"
 Bottom Hole coordinates are
 N: 385,820.64' Latitude: 39°33'02.83"
 E: 1,603,566.01' Longitude: 80°54'21.41"
 UTM Zone 17, NAD 1983
 Top Hole Coordinates Bottom Hole Coordinates
 N: 4,373,356.657m N: 4,377,913.610m
 E: 509,795.006m E: 508,095.617m
 Plat orientation and corner and well references
 are based upon the grid north meridian.
 Well location references are based upon the magnetic
 meridian.

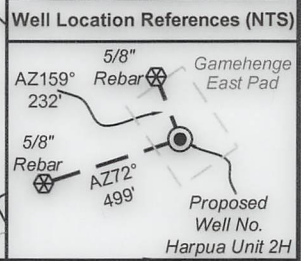


I, the undersigned, hereby certify that this plat is correct to the best of my knowledge and belief and shows all the information required by law and the rules issued and prescribed by the Department of Environmental Protection.
 Bradley D. Miller, P.S. 2167

Legend

- Proposed gas well Monument, as noted
- Existing Well, as noted
- Digitized Well, as noted
- Creek or Drain
- Surface boundary (approx.)
- Interior surface tracts (approx.)

	Bearing	Dist.
L1	S 62°47' E	2,070.7'
L2	S 28°56' E	1,071.5'
L3	N 02°54' W	1,454.6'
L4	N 58°02' E	2,773.0'
L5	N 83°09' W	461.4'



FILE NO: 34-54-E-16
 DRAWING NO: Harpua 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: November 1 20 19
 OPERATOR'S WELL NO. Harpua Unit 2H
 API WELL NO. MOD
 47 - 095 - 02641
 STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
 Proposed 1061'
 LOCATION: ELEVATION: Existing 1072' WATERSHED: Outlet Middle Island Creek QUADRANGLE: Paden City 3.27; 0.86088; 113.725; 64.18; 45; 62.84375; 0.37; 2.062; 0.761; 46.13; 36.47; 74.169; 24.52; 7.148; 10; 23.38688; 48.78; 217.30; 20; 12.5; 46.43; 109.48; 4.5; 285.00625; 21.5; 33.25; 74.47; 64
 DISTRICT: Ellsworth/Lincoln
 SURFACE OWNER: Barbara Kay Turner
 ROYALTY OWNER: Phyllis M. & James F. Henthorn Sr. (2); Larry R. Henthorn; Michael P. & Sherrin J. Tuttle; Linda L. Newbrough; Kenneth F. & Donna Blake; Michael E. & Lois J. Henthorn; Robert D. & Jessica J. Masters; Larry M. & Kim M. Henthorn; Sarah Valenour Nass; Naomi V. Beagle; Jack Russell Folger, et ux
 LEASE NO: _____ ACREAGE: _____
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) BHL MOD
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 7,000' TVD 23,700' MD

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



ID	TM/Par	Owner	Bk/Pg	Acres
1	15-19	David Mendenhall, et al	282/723	45.00
2	15-18	Barbara Kay Turner	398/670	26.18
3	14-26	Brenda K. Turner	398/670	26.34
4	14-27	Ridgetop Capital LP	372/299	64.96
5	14-24	Ridgetop Capital LP	372/299	124.76
6	14-25	Stanley M. Koterba, et al	331/32	126.05
7	14-25.2	Andrew B. & Angela M. Negie	489/577	3.00
8	14-25.1	Roy F. Gorrell	447/180	2.00
9	14-11	Larry R. Henthorn	270/363	21.50
10	9-61	Larry R. Henthorn	212/606	10.00
11	14-10	Sara A. Midcap	342/568	40.00
12	9-39	Board of Education of Tyler County	290/88	65.00
13	9-59	James F. & Phyllis Henthorn	190/311	46.13
14	9-40	Sara A. Midcap	168/3	16.83
15	9-31	Sara A. Midcap	168/3	74.00
16	9-25	Michael & Sherri Tuttle	319/341	24.52
17	9-24	Bob S. & Sue M. Adams	204/599	7.15
18	9-26	Mariyn Ankrom	WB 47/269	18.94
19	9-15	Heartwood Forestland Fund II LP	326/547	225.64
20	9-23	Raymond Chapman, et al	WB 45/271	22.31
21	9-15.1	Timothy & Marilyn S. Skinner	226/477	0.71
22	9-22	Shawn A. & Cathy A. Potts	291/219	0.98
23	9-15.2	Par Mar Realty Co.	534/407	3.091
24	9-15.3	Fred Midcap	351/7	44.00
25	9-16	Sara A. Midcap	181/278	96.78
26	9-14	Leroy Kent Morris	480/311	93.63
27	9-1	Linda L. Stemple	369/9	24.24
28	9-2	William & Margaret A. Garrett	284/41	22.19
29	9-5.1	John W. Starkey	255/571	2.55
30	9-3.1	Roger J. II & Stacey L. Morgan	340/764	2.34
31	9-3	Bridgette A. Morgan	341/289	2.16
32	9-44.1	Rodney L. & Brenda K. Morgan	297/137	5.30
33	9-64	Carol Morgan, et al	262/459	0.97
34	9-41	Roger J. Morgan II	327/31	1.40
35	9-41.1	Nancy M. Morgan	269/629	0.99
36	9-41.2	Rodney L. & Brenda K. Morgan	342/121	0.52
37	9-39	Nancy A. Morgan	157/512	0.42
38	9-37	William Bassett	WB 30/15	0.92
39	9-37.1	Dottie Marie Perine	WB 30/15	0.41
40	9-38	Charles O. Rice	157/293	1.31
41	9-33.1	Ronald L. & Dottie M. Perine	312/328	0.86
42	9-33.2	Leonard G. Cooper	328/885	3.27
43	9-33.3	David D. & Whitney C. Cooper	438/62	12.13
44	9-44	Diane Weaver Clark	WB 39/544	40.68
45	9-36	Diane Weaver Clark	WB 39/544	59.00
46	9-35	Mark E. Heintzman	246/532	19.75
47	9-32.1	Sandra M. Bassett	346/487	3.36
48	9-33	Jefferson Minerals, LLC	438/66	69.17
49	9-32	Tracy P. Carr	346/487	32.17
50	9-32.1	Sandra M. Bassett	WB 40/353	1.08
51	9-31.2	Ralph & Sylvia Harter	347/178	4.57
52	9-31.3	Ralph & Sylvia Harter	347/180	1.05
53	9-30	Ervin L. & Betty M. Bassett	309/391	19.57
54	9-31	Russell L. & Mary E. Myers	347/263	31.45
55	9-31.1	Russell L. & Mary E. Myers	340/654	38.04
56	9-21	Thomas K. Brotherton	23/310	64.00
57	9-19	Russell L. & Marry E. Myres	337/26	93.17
58	9-60	James F. & Phyllis Henthorn	190/311	36.47
59	9-57	Kenneth & Donna Blake	323/91	0.37
60	9-56	Jason Lee Henthorn	546/431	0.92
61	9-40.1	Board of Education of Tyler County	290/88	9.17
62	9-55	Michael E. & Lois Henthorn	319/327	1.02
63	9-56.1	Michael E. & Lois Henthorn	297/623	1.04
64	9-58	Beatrice Lee Henthorn	WB 31/242	0.37
65	9-54	Beatrice Lee Henthorn	WB 31/242	0.89
66	9-58.1	Robert D. & Jessica J. Masters	342/737	0.76
67	9-53	R&S Lumber Co.	318/200	5.49
68	9-52	Mark A. & Lisa D. Richmond	328/344	1.59
69	9-51	Robert L. & Toni R. Vancamp	444/541	0.68
70	9-48.1	Kirk Family Trust	511/167	0.70

ID	TM/Par	Owner	Bk/Pg	Acres
71	9-48.2	Kirk Family Trust	511/167	0.33
72	9-49	Claudia Jean Gray	WB 29/220	15.15
73	9-48.5	Kathleen Fluharty	291/212	0.93
74	9-48.4	Francis D. & Barbara A. Slider	290/347	3.64
75	9-47	Brian & Tricia Brinkmeier	328/887	1.01
76	9-50	Lloyd & Linda Waggoner	299/497	1.06
77	9-53.1	Jessie A. Thompson	346/698	1.67
78	9-45	Stanley Modesitt	332/70	0.35
79	9-46	Michael J. & Heather D. Mongold	510/509	0.86
80	9-41	Daniel J. & Sha M. Yoho	306/514	2.93
81	9-42	Michael D. & Martha K. Pierpoint	215/276	1.06
82	9-48.7	Kathleen Fluharty Baxter	332/216	0.55
83	9-43	Catherine L. Bennett	217/376	0.72
84	9-48.3	Larry R. Henthorn	290/166	0.32
85	9-48	Michael D. & Martha K. Pierpoint	332/514	2.82



Detail B
(NTS)

	Lessor
A	Linda L. Newbrough
B	Jack Russell Folger, et ux
C	Naomi V. Beagle
D	Scott Denomme, et ux
E	Stanley M. & Irene E. Koterba
F	Sarah Valentour Nass
G	Kim M. & Larry M. Henthorn
H	Sarah A. Midcap
I	James F. Sr. & Phyllis M. Henthorn
J	James F. Sr. & Phyllis M. Henthorn
K	Larry R. Henthorn
L	Sarah A. Midcap
M	Michael P. & Sherri J. Tuttle
N	Roger Ankrom
O	Bobby S. & Sue Marie Adams
P	David E. Bowyer
Q	James W. Chapman
R	Waco Oil & Gas Inc.
S	Marylin S. Parkinson
T	Nancy J. Squires
U	Sandra L. Baumgardner
V	Charles M. Ferrell
W	H3, LLC

	Lessor
X	Kathryn L. Watkins
Y	Diane W. Kestle
Z	Jefferson Minerals, LLC
AA	Pamela Oakley-Whiting
AB	Roger Morgan, et ux
AC	Cheryl Cumberledge
AD	Rodney Morgan, et ux
AE	Nancy Morgan
AF	Jean Cline
AG	Mark E. Heintzman
AH	Nancy Templeton
AI	Michael D. Reynolds
AJ	Timothy L. Vancamp
AK	Bounty Minerals, LLC
AL	Robert D. & Jessica J. Masters
AM	Beatrice Lee Henthorn
AN	Michael E. & Lois J. Henthorn
AO	Jason L. & Patty J. Henthorn
AP	Kenneth F. & Donna Blake
AQ	Sherry Sue Dietrich
AR	Ronald L. Perine, et ux
AS	Sherry Sue Dietrich

FILE NO: 34-54-E-16
 DRAWING NO: Harpua 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: November 1 20 19
 OPERATOR'S WELL NO. Harpua Unit 2H
 API WELL NO. mdd
 47 - 095 - 02641
 STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
 Proposed 1061'

LOCATION: ELEVATION: Existing 1072' WATERSHED: Outlet Middle Island Creek QUADRANGLE: Paden City
 DISTRICT: Ellsworth/Lincoln COUNTY: Tyler
 SURFACE OWNER: Barbara Kay Turner ACREAGE: 26.18
 ROYALTY OWNER: Phyllis M. & James F. Henthorn Sr. (2); Larry R. Henthorn; Michael P. & Sherri J. Tuttle; Linda L. Newbrough; Kenneth F. & Donna Blake; Michael E. & Lois J. Henthorn; Robert D. & Jessica J. Masters; Larry M. & Kim M. Henthorn; Sarah Valentour Nass; Naomi V. Beagle; Jack Russell Folger, et ux. LEASE NO: ACREAGE: 21.5, 33.25, 74.47, 64

PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) BHL MOD 7,000' TVD
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 23,700' 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