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west virginia department of environmental protection

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

Harold D. Ward, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Tuesday, March 15, 2022  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION  
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for TOROWEAP UNIT 3H  
47-095-02767-00-00

**Lateral Extension**

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.

A blue ink signature of James A. Martin, written in a cursive style.

James A. Martin  
Chief

Operator's Well Number: TOROWEAP UNIT 3H  
Farm Name: KENNETH TOMBLIN ET AL  
U.S. WELL NUMBER: 47-095-02767-00-00  
Horizontal 6A New Drill  
Date Modification Issued: 3/15/2022

Promoting a healthy environment.

03/18/2022

WW-6B  
(04/15)

API NO. 47-095 - 02767 MOD  
OPERATOR WELL NO. Toroweap Unit 3H  
Well Pad Name: Grand 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 Porter Falls 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: Toroweap Unit 3H Well Pad Name: Grand Pad

3) Farm Name/Surface Owner: Kenneth Tomblin et ux Public Road Access: Gorrells Run Road

4) Elevation, current ground: 1268' Elevation, proposed post-construction: -1243'

5) Well Type (a) Gas  Oil  Underground Storage   
Other

(b) If Gas Shallow  Deep   
Horizontal  SPW  
3/10/2022

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus Shale: 7400' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 9300#

8) Proposed Total Vertical Depth: 7,400'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 22,200'

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11) Proposed Horizontal Leg Length: 12,120'

12) Approximate Fresh Water Strata Depths: 25'

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13) Method to Determine Fresh Water Depths: 47-095-02267

14) Approximate Saltwater Depths: 2305'

15) Approximate Coal Seam Depths: 431'

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: \_\_\_\_\_

CK # 4005375  
Amt \$ 5000  
Date 2/24/22

WW-6B  
(04/15)

API NO. 47- 095 - 02767 MOD  
 OPERATOR WELL NO. Torowasp Unit 3H  
 Well Pad Name: Grand 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, 218 Cu. Ft.
Fresh Water	13-3/8"	New	J/K-55	54.5#	300	300	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J/K-55	36#	2500	2500	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	PY-110	23#	22200	22200	4666 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

*SDW*  
3/10/2022

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	Class H-POZ & T-11	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

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**PACKERS**

WV Department of  
Environmental Protection

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

WW-6B  
(10/14)

API NO. 47- 095 - 02767 MOD  
OPERATOR WELL NO. Torowear Unit 3H  
Well Pad Name: Grand 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

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): Existing 41.0 acres

22) Area to be disturbed for well pad only, less access road (acres): Existing 13.72 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.

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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

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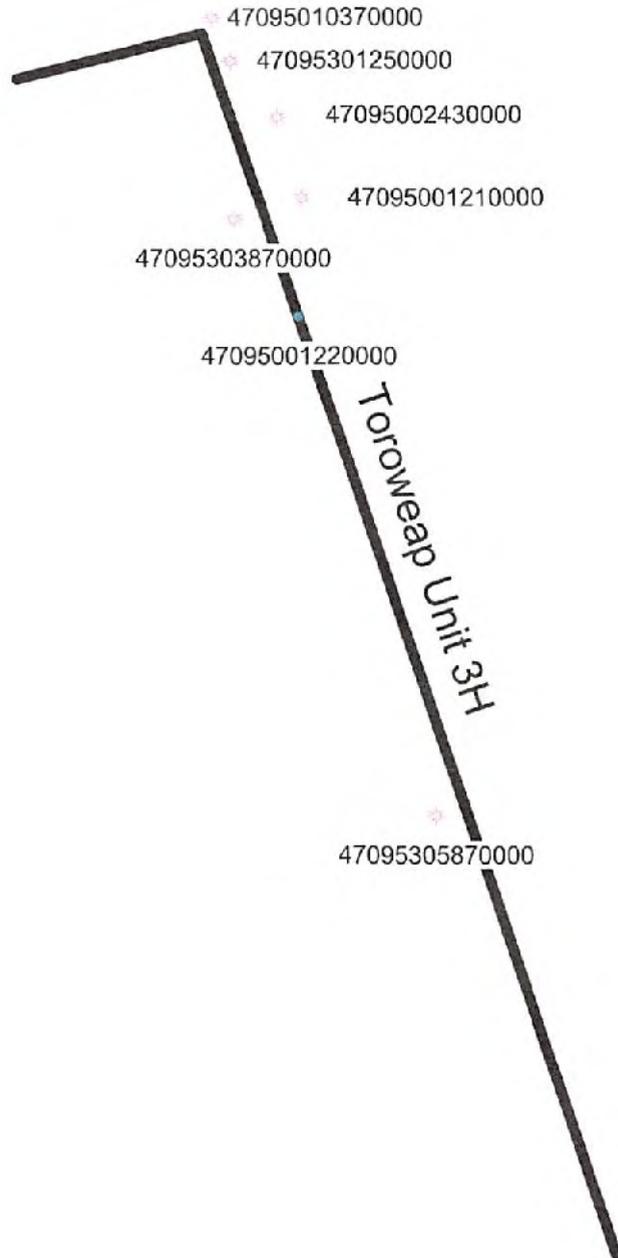
25) Proposed borehole conditioning procedures:

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.



4709502767



Antero Resources Corporation

Torowep Unit 3H - AOR



- WELL SYMBOLS
-  Plugged Gas Well
  -  Plugged Oil Well

October 20, 2021

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Energy

03/18/2022

UWI (API Num)	Well Name	Well Number	Operator	TD	Perforated Interval	Perforated Formation(s)	Producible Formation(s) not perf'd
47095303870000	K S BOREMAN 2	2025	MANUFACT LIGHT & HEAT	2,171		Big Injun	Alexander, Weir, Berea
47095001220000	JOHN EASTHAM	3	UNKNOWN	2,076		Big Injun	Alexander, Weir, Berea
47095305870000	A & L WEEKLEY 1	1612	MANUFACT LIGHT & HEAT	2,878		Big Injun, Gordon	Alexander, Weir, Berea
47095010370000							
47095301250000	JOHN F EASTMAN	1	EDGAR C W				
47095002430000	FERRELL NANCY H HEIRS	2	BOWYER DAVID	1,972	1938 - 1938	Keener	Alexander, Weir, Berea
47095001210000	AMANDA SOLES	2	BOWYER DAVID	2,210		Big Injun	Alexander, Weir, Berea

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LATITUDE 39°32'30"

5,427'

LATITUDE 39°30'00"

Antero Resources Corporation Well No. Toroweap 3H

NOTES: WELL 3H TOP HOLE INFORMATION: N: 369,725ft E: 1,630,135ft LAT: 39°30'27.73" LON: 80°48'39.24" BOTTOM HOLE INFORMATION: N: 358,514ft E: 1,635,591ft LAT: 39°28'37.72" LON: 80°47'27.58" WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS: WELL 3H TOP HOLE INFORMATION: N: 4,373,145m E: 516,272m BOTTOM HOLE INFORMATION: N: 4,369,758m E: 517,991m

WV NORTH ZONE GRID NORTH

8,325' TO BOTTOM HOLE

12,401'

LONGITUDE 80°45'00"

LONGITUDE 80°47'30"

Table with 2 columns: Parcel ID, Owner Name. Lists various land parcels and their owners in Ellsworth District - Tyler County.

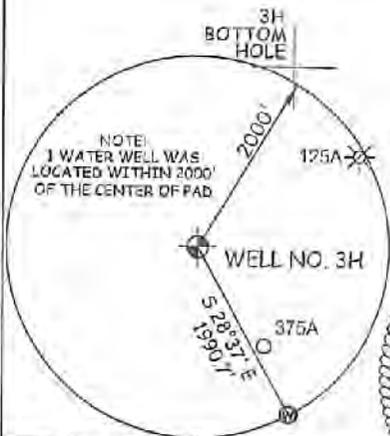
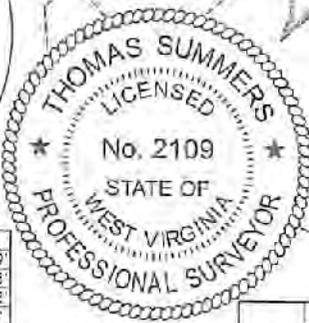


Table with 4 columns: LINE, BEARING, DIST., and another set of LINE, BEARING, DIST. for boundary lines.

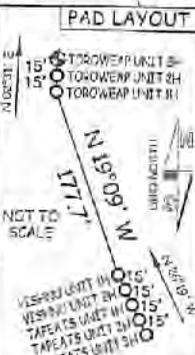


I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

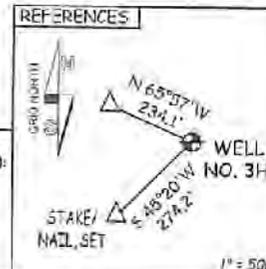
WILLOW LAND SURVEYING PLLC 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415



JOB # 21-011WA DRAWING # TOROWEAP3HR SCALE 1" = 2000' MINIMUM DEGREE OF ACCURACY SUBMETER PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

LEGEND: Surface Owner Boundary Lines +/-, Adjoining Surface Tracts +/-, Found monument, as noted. THOMAS SUMMERS P.S. 2109 DATE 01/26/22 OPERATOR'S WELL# TOROWEAP UNIT #3H

(NAD) 27 (UTM) ZONE 17 COORDS: WELL 3H TOP HOLE INFORMATION: N: 14,346,846ft E: 1,693,754ft POINT OF ENTRY INFORMATION: N: 14,347,195ft E: 1,695,470ft BOTTOM HOLE INFORMATION: N: 14,335,732ft E: 1,699,394ft



WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL API WELL # (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X STATE COUNTY PERMIT LOCATION: ELEVATION AS BUILT - 1,243.5' WATERSHED OUTLET MIDDLE ISLAND CREEK QUADRANGLE PORTER FALLS 7.5' DISTRICT ELLSWORTH COUNTY TYLER SURFACE OWNER KENNETH TOMBLIN ET AL ACREAGE 290.32 ACRES +/- OIL & GAS ROYALTY OWNER S. A. SMITH AND C. B. MORRIS HEIRS TRUST, MICHAEL LEE TOMBLIN, LEASE ACREAGE 290.32 AC +/- 55 AC +/- GREENBRIER ROYALTY FUND II, L.L.C. BETTY MOREHEAD ET VIR: BETTY MOREHEAD: 40 AC +/- 58 AC +/- 16.5 AC +/- BETTY MOREHEAD ET VIR: JAY A. WRIGHT ET UX: MORRIS MOUNTAINEER OIL & GAS L.L.C.: 15 AC +/- 40.81 AC +/- 45.98 AC +/- BETTY MOREHEAD ET VIR: DALE H. PARR ET UX: JOSEPHINE CALVIN; BRC APPALACHIAN MINERALS I LLC; MICHAEL SHERWOOD: 48.81 +/- 70 AC +/- 21 AC +/- 107 AC +/- 156.25 AC +/- PROPOSED WORK: DRILL CONVERT DRILL DEEPER X REDRILL FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL (SPECIFY) MOD-BHL PLUG & ABANDON CLEAN OUT & REPLUG TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,400' TVD 22,200' MD WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM ADDRESS 1615 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

03/18/2022

COUNTY NAME PERMIT

LATITUDE 39°32'30"

5,427'

LATITUDE 39°30'00"

11,572' TO BOTTOM HOLE

Antero Resources Corporation Well No. Toroweap 3H

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WV NORTH ZONE GRID NORTH

Table listing landowners and lease numbers in Ellsworth and McInroy Districts, Tyler County.

8,325' TO BOTTOM HOLE

12,401'

LONGITUDE 80°45'00"

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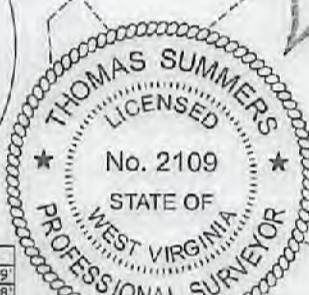
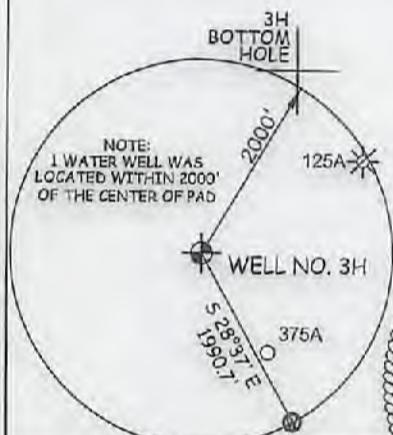
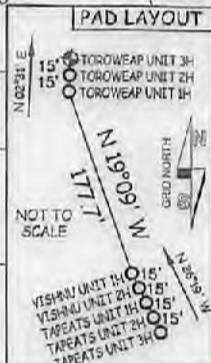


Table with 4 columns: LINE, BEARING, DIST., BEARING, DIST. listing boundary lines L1 through L6.

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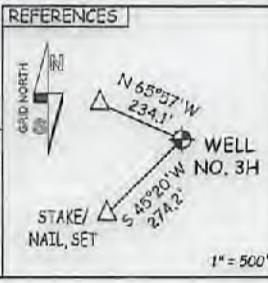
STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS. WILLLOW LAND SURVEYING PLLC, 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415



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03/18/2022

WW-6A1

Operator's Well Number Toroweap Unit 3H MOD

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>S.A. Smith and C. B Morris Heirs Trust</u> <u>Lease</u> S.A. Smith and C. Burke Morris Heirs Trust	Antero Resources Corporation	1/8+	0022/0268
<u>Michael Lee Tomblin Lease</u> Michael Lee Tomblin, a married man Antero Resources Appalachian Corporation	Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Assignment	0420/0497 0598/0358
<u>Greenbrier Royalty Fund II, LLC Lease</u> Greenbrier Royalty Fund II, LLC	Antero Resources Corporation	1/8+	0112/0047
<u>S.A. Smith and C. B Morris Heirs Trust</u> <u>Lease</u> S.A. Smith and C. Burke Morris Heirs Trust	Antero Resources Corporation	1/8+	0022/0268
<u>Betty Morehead, et vir Lease</u> Betty Morehead, et vir Petroedge Energy, LLC Statoil USA Onshore Properties Inc EQT Production Company	Petroedge Energy, LLC Statoil USA Onshore Properties Inc EQT Production Company Antero Resources Corporation	1/8 Assignment Assignment Assignment	0389/0539 0406/0147 0539/0239 0134/0172
<u>Betty Morehead Lease</u> Betty Morehead	Antero Resources Corporation	1/8+	0563/0571
<u>Betty Morehead, et vir Lease</u> Betty Morehead, et vir Petroedge Energy, LLC Statoil USA Onshore Properties Inc EQT Production Company	Petroedge Energy, LLC Statoil USA Onshore Properties Inc EQT Production Company Antero Resources Corporation	1/8+ Assignment Assignment Assignment	0390/0018 0406/0147 0539/0239 0134/0172
<u>Jay A Wright et ux Lease</u> Jay A Wright et ux	Antero Resources Corporation	1/8+	489/26
<u>Morris Mountaineer Oil &amp; Gas LLC Lease</u> Morris Mountaineer Oil & Gas LLC	Antero Resources Corporation	1/8+	84/428
<u>Betty Morehead, et vir Lease</u> Betty Morehead, et vir Petroedge Energy, LLC Statoil USA Onshore Properties Inc EQT Production Company	Petroedge Energy, LLC Statoil USA Onshore Properties Inc EQT Production Company Antero Resources Corporation	1/8+ Assignment Assignment Assignment	0390/0018 0406/0147 0539/0239 0134/0172
<u>Margaret Lemasters Lease</u> Margret Lemasters	Antero Resources Corporation	1/8+	85/279

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WV Department of  
Environmental Protection

03/18/2022

WW-6A1

Operator's Well Number Toroweap Unit 3H MOD

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Chapter 22, Article 6A, Section 5(a)(5)  
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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<b><u>Dale H Parr et ux Lease</u></b>			
Dale H Parr et ux	Petroedge Energy LLC	1/8+	385/701
Petroedge Energy LLC	Statoil USA Onshore Properties Inc	Assignment	406/147
Statoil USA Onshore Properties Inc	EQT Production Company	Assignment	539/239
EQT Production Company	Antero Resources Corporation	Assignment	663/1
<b><u>Josephine Calvin Lease</u></b>			
Josephine Calvin	JB Exploration I LLC	1/8+	418/556
JB Exploration I LLC	Antero Resources Corporation	Assignment	134/700
<b><u>BRC Appalachian Minerals I LLC Lease</u></b>			
BRC Appalachian Minerals I LLC	BRC Working Interest Company LLC	1/8	369/300
BRC Working Interest Company LLC	Chesapeake Appalachia LLC	Assignment	369/784
Chesapeake Appalachia LLC	Statoil USA Onshore Properties Inc	Assignment	378/764
Statoil USA Onshore Properties Inc	EQT Production Company	Assignment	539/239
EQT Production Company	Antero Resources Corporation	Assignment	663/1

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Office of Oil & Gas

MAR 14 2022

WV Department of  
Environmental Protection

03/18/2022

WW-6A1  
(5/13)

Operator's Well No. Toroweap Unit 3H MOD

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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
Michael Sherwood Lease	Michael Sherwood JB Exploration I LLC	JB Exploration I LLC Antero Resources Corporation	1/8+ Assignment	398/342 134/700

\*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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Office of Oil & Gas  
MAR 14 2022  
WV Department of  
Environmental Protection

**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



Stansberry, Wade A &lt;wade.a.stansberry@wv.gov&gt;

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**Modification Horizontal H6A Well Work Permit API: 47-095-02766 & 47-095-02767)**

1 message

**Stansberry, Wade A** <wade.a.stansberry@wv.gov>

Tue, Mar 15, 2022 at 11:10 AM

To: Mallory Stanton &lt;mstanton@anteroresources.com&gt;, Diane Blair &lt;dblair@anteroresources.com&gt;, Dani DeVito &lt;ddevito@shalepro.com&gt;, Douglas Newlon &lt;douglas.c.newlon@wv.gov&gt;, ljackson@wvassessor.com

I have attached a copy of the newly issued well [permit](#) number. This will serve as your copy.

**47-095-02766- CLUTTER UNIT 1H**  
**47-095-02767- GREENWOOD UNIT 1H**

If you have any questions, then [please](#) contact us here at the Office of Oil and Gas.

Thank you,

**Wade A. Stansberry**  
**Environmental Resource Specialist 3**  
**West Virginia Department of Environmental Protection**  
**Office of Oil & Gas**  
601 57th St. SE  
Charleston, WV 25304  
(304) 926-0499 ext. 41115  
(304) 926-0452 fax  
[Wade.A.Stansberry@wv.gov](mailto:Wade.A.Stansberry@wv.gov)

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**2 attachments**

 **47-095-02766 - mod.pdf**  
977K

 **47-095-02767 - mod.pdf**  
942K

**03/18/2022**