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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)

Monday, April 3, 2023  
PERMIT MODIFICATION APPROVAL  
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION  
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for JENKINS 2H  
47-017-06943-00-00

**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: JENKINS 2H  
Farm Name: ANTERO RESOURCES CORPORATION  
U.S. WELL NUMBER: 47-017-06943-00-00  
Horizontal 6A New Drill  
Date Modification Issued: 04/03/2023

Promoting a healthy environment.

04/07/2023

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

- 1) Well Operator: Antero Resources Corporation 494507062 ✓ 017 - Doddri ✓ Southwe ✓ Oxford 7.5' ✓  
Operator ID County District Quadrangle
- 2) Operator's Well Number: Jenkins Unit 2H MOD ✓ Well Pad Name: Locke Pad
- 3) Farm Name/Surface Owner: Antero Resources Corporation Public Road Access: Taylor Drain Road
- 4) Elevation, current ground: 1100.5' - As Built Elevation, proposed post-construction: \_\_\_\_\_
- 5) Well Type (a) Gas X Oil \_\_\_\_\_ Underground Storage \_\_\_\_\_  
Other \_\_\_\_\_  
(b) If Gas Shallow X Deep \_\_\_\_\_  
Horizontal X
- 6) Existing Pad: Yes or No Yes ✓
- 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: 19400' MD ✓
- 11) Proposed Horizontal Leg Length: 9629' \*Open to modification at a later date ✓
- 12) Approximate Fresh Water Strata Depths: 236', 260', 320', 326' ✓
- 13) Method to Determine Fresh Water Depths: 47017033900000, 47017000980000 Offset well records. Depths have been adjusted according to surface elevations.
- 14) Approximate Saltwater Depths: 1733', 1750'
- 15) Approximate Coal Seam Depths: None Anticipated
- 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: \_\_\_\_\_

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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	79#	100'	100' ✓	CTS, 96 Cu. Ft.
Fresh Water	13-3/8"	New	J/K-55	54.5#	376'	376' ✓	CTS, 392 Cu. Ft.
Coal	9-5/8"	New	J-/K55	36#	2500'	2500' ✓	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110CY	20#	19400'	19400' ✓	CTS, 3961 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

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"	0.375"	2250	50	Class A/L	~1.18
Fresh Water	13-3/8"	17-1/2"	0.38"	2730	1000	Class A/L	~1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	1500	Class A/L	~1.18
Intermediate							
Production	5-1/2"	8-3/4" & 8-1/2"	0.415"	14,360 ✓	2500	Class G/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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19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill a new horizontal shallow well into the 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

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 27.54 acres

22) Area to be disturbed for well pad only, less access road (acres): 13.31 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/L cement.

Surface: Class A/L cement with 2-3% calcium chloride and 1/4 lb of flake

Intermediate: Class A/L 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 G/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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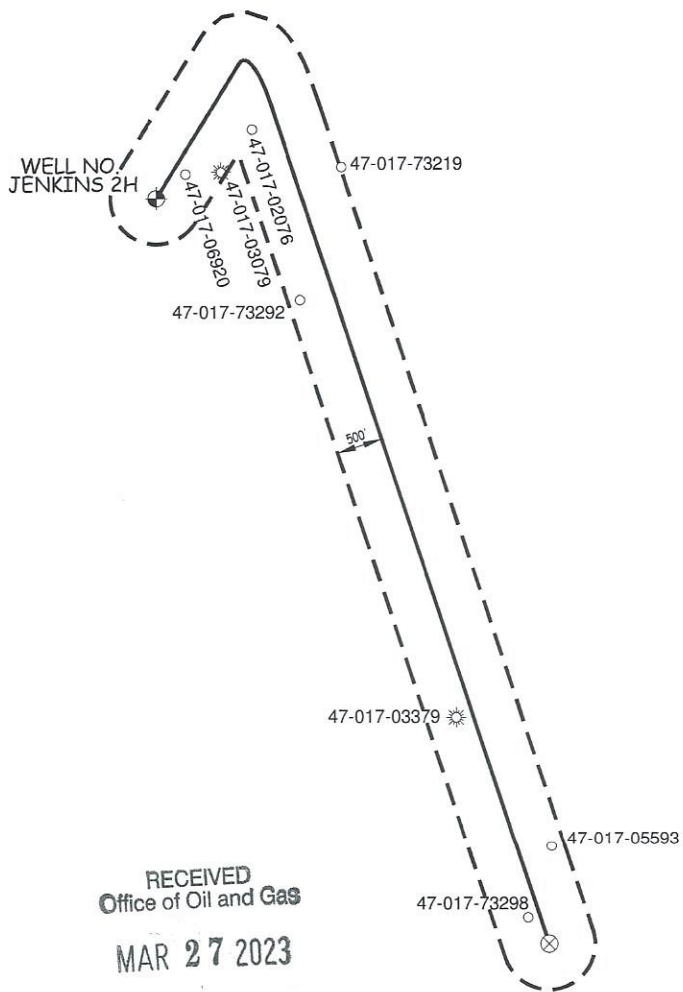
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LOCKE PAD  
ANTERO RESOURCES  
CORPORATION



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WILLOW LAND SURVEYING, PLLC  
P.O. BOX 17, PENNSBORO, WV 26415  
(304) 659-1717

JOB #: 22-005WA

DATE: 03/03/23

DRAWN BY: D.R.R.

FILE: JENKINS2HAOR.DWG

SCALE : 1-INCH = 2000-FEET



4701706943

UWI (API Num)	Well Name	Well Number	Operator	Historical Operator	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Productible Formation(s) not perf'd
47017030790000	DENNISON CHARLES	J-609	DENNISON CHARLES	GREYLOCK CONVENT LLC	5,350	4413 - 5135	Speechley, Balltown, Riley, Alexander	Weir, Berea
47017020760000	MAXWELL	4803	EQUITABLE GAS CO	EQUITABLE GAS CO				
47017732190000	FLORENCE STOUT	20	UNKNOWN	UNKNOWN				
47017732920000	JAMES S BRITTON		EQUITABLE RES EXPL	EQUITABLE RES EXPL				
47017033790000	HUSK RANDAL ET AL	JK-1092	GREYLOCK CONVENT LLC	J & J ENTERPRISES	5,995	4315 - 5048	Riley, Alexander	Weir, Berea
47017055930000	HICKMAN	2	RITCHIE PET CORP	JAY BEE PRODUCTION	5,617	3138 - 5017	Greenland, Balltown, Alexander	Weir, Berea
47017732980000	W J HICKMAN	1	UNKNOWN	UNKNOWN				Weir, Berea

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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
<b><u>E.W. Osbourne, et al Lease</u></b>			
E.W. Osbourne et al	Hope Natural Gas	1/8	57/132
Hope Natural Gas	Trio Oil and Gas Company	Assignment	72/496
Trio Oil and Gas Company	Charter D. Stinespring, Paul B. Davis and G.W. Hill	Assignment	131/687
Charter D. Stinespring, Paul B. Davis and G.W. Hill	J & J Enterprises, Inc	Assignment	131/762
J & J Enterprises, Inc	Eastern American Energy Corporation	Assignment	159/139
Eastern American Energy Corporation	Energy Corporation of America	Merger	6/450
Energy Corporation of America	Antero Resources Appalachian Corporation	Assignment	272/307
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	46/523
<b><u>Charles J. Dennison Lease</u></b>			
Chareles J. Dennison	Clarence Mutschelknaus et al	1/8	105/129
Clarence Mutschelknaus Et al	Antero Resources Appalachian Corporation	Assignment	262/74
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	46/523
<b><u>J. W. Nutter Heirs Lease</u></b>			
J.W. Nutter Heirs	Clarence Mutschelknaus	1/8	121/34
Clarence Mutschelknaus	Clarence Mutschelknaus Jr & Helen Suzanne Osborne	Assignment	Destroyed Document
Clarence Mutschelknaus Jr & Helen Suzanne Osborne	Blue Stone Energy Partners	Assignment	250/198
Blue Sotne Energy Partners	BEP Merger Sub LP	Merger	288/1
BEP Merger Sub LP	Antero Resources Bluestone LLC	Merger	288/1
Antero Resources Bluestone LLC	Antero Resources Appalachian	Merger	WV SOS
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	46/523
<b><u>Charles J. Dennison Lease</u></b>			
Chareles J. Dennison	Clarence Mutschelknaus et al	1/8	105/129
Clarence Mutschelknaus Et al	Antero Resources Appalachian Corporation	Assignment	262/74
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	46/523
<b><u>J.S. Britton et ux Lease</u></b>			
J.S. Britton et ux	U.G. Summers	1/8	22/438
U.G. Summers	The Fisher Oil Company	Assignment	22/443
The Fisher Oil Company	The Philadelphia Company of West Virginia	Assignment	24/64
The Philadelphia Company of West Virginia	Pittsburgh & WV Gas Company	Assignment	32/253
Pittsburgh & WV Gas Company	Equitable Gas Company	Assignment	121/257
Equitable Gas Company	Equitrans Inc.	Assignment	154/475
Equitrans Inc.	Equitrans LP	Deed	302/123
Equitrans LP	Equitable Production-Eastern States Inc.	Assignment	192/19
Equitable Production-Eastern States Inc.	Equitable Production Company	Merger	281/346
Equitable Production Company	EQT Production Company	Name Change	281/346
EQT Production Company	Antero Resources Corporation	Assignment	487/641

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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<b><u>E.W. Husk et al Lease</u></b>			
E.W. Husk et al	Black Bear Oil & Gas Corporation et al	1/8	95/105
Black Bear Oil & Gas Corporation et al	Global Petroleum Investment Inc.	Assignment	97/679
Global Petroleum Investment Inc.	Awyard A. Pursley	Assignment	97/679
Awyard A. Pursley	Parkway Development Corporation et al	Assignment	165/261
Parkway Development Corporation et al	Kiedaisch & Summers LLC	Assignment	210/560
Kiedaisch & Summers LLC	Antero Resources Appalachian Corporation	Assignment	303/505
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	46/523
<b><u>Randall Husk et ux Lease</u></b>			
Randall Husk et ux	Clarence Mutschelknaus et ux	1/8	128/763
Clarence Mutschelknaus et ux	Clarence Mutschelknaus, Jr.	Assignment	234/273
Clarence Mutschelknaus, Jr.	Clarence Mutschelknaus, Jr. & Helen Suzanne Osborne	Assignment	234/323
Clarence Mutschelknaus, Jr. & Helen Suzanne Osborne	Blue Stone Energy Partners	Assignment	245/542
Blue Stone Energy Partners	BEP Merger Sub LP	Merge	288/1
BEP Merger Sub LP	Antero Resources Bluestone LLC	Merge	288/1
Antero Resources Bluestone LLC	Antero Resources Appalachian Corporation	Merge	WV SOS
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	46/523
<b><u>Mabel Haught Lease</u></b>			
Mabel Haught	B&M Associates	1/8	161/526
B&M Associates	Eastern American Energy Corporation	Assignment	166/411
Eastern American Energy Corporation	Energy Corporation of America	Assignment	240/498
Energy Corporation of America	Antero Resources Appalachian Corporation	Assignment	272/307
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	46/523

\*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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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Martha H. Caldwell Lease</u>	Martha H. Caldwell Jay-Bee Production Company JBU LLC	Jay-Bee Production Company JBU LLC Antero Resources Corporation	1/8 Assignment Assignment	206/384 278/209 453/234

\*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.

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

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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: Senior Vice President of Land