

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

Monday, June 25, 2018 PERMIT MODIFICATION APPROVAL Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION 1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for JACK UNIT 2H 47-095-02462-00-00

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

Mand.

Operator's Well Number
Farm Name:JACK UNIT 2H
ROGER R. WEESEU.S. WELL NUMBER:47-095-02462-00-00
Horizontal 6ADate Modification Issued:6/25/18

Promoting a healthy environment.

Permit Modification API# 47-095-02462 API NO. 47-095 - 02462 OPERATOR WELL NO. Jack Unit 2H

Well Pad Name: Neat Pad

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

1) Well Operator: Antero R	esources	Corpora	494507062	095 - Tyler	Meade	Middlebourne 7.5'
.,			Operator ID	County	District	Quadrangle
2) Operator's Well Number:	Jack Unit:	2H	Well Pa	ad Name: Neat	Pad	
3) Farm Name/Surface Owne	er: Weese,	Roger F	R. Public Ro	ad Access: CR	7	
4) Elevation, current ground:	~1032'	El	evation, proposed	l post-constructi	on: 1005	
5) Well Type (a) Gas X Other		_ Oil	Une	lerground Stora	ge	
	Shallow Horizontal	X X	Deep			-
6) Existing Pad: Yes or No	No			<u>.</u>		
7) Proposed Target Formation Marcellus Shale: 6600' TVE						
8) Proposed Total Vertical D	epth: 660	0' TVD				
9) Formation at Total Vertica	Carlo a State of	Marcellus	3			
10) Proposed Total Measured	l Depth:	18900' M	D			
11) Proposed Horizontal Leg	Length:	11573'				
12) Approximate Fresh Wate	r Strata De	pths:	100', 121', 166			
13) Method to Determine Fre	esh Water D	Depths:	Offset well records. D	epths have been ac	ljusted accor	ding to surface elevations.
14) Approximate Saltwater D	Pepths: No	one Identi	fied			Office of Oil and Gas
15) Approximate Coal Seam	Depths: 1	441'				MAY 0 4 2018
16) Approximate Depth to Po	ossible Voi	d (coal m	ine, karst, other):	None Anticipa	ited	
17) Does Proposed well locat directly overlying or adjacent			ms Yes	No	, <u>X</u>	WV Department of nvironmental Protection
(a) If Yes, provide Mine Int	fo: Name					
	Depth					
	Seam:					
	Owner	r:				

WW-6B (04/15)

Permit Modification API# 47-095-02462

OPERATOR WELL NO. Jack Unit 2H

API NO. 47- 095 - 02462

Well Pad Name: Neat Pad

WW-6B (04/15)

CASING AND TUBING PROGRAM

ТҮРЕ	<u>Size</u> (in)	<u>New</u> <u>or</u> <u>Used</u>	Grade	<u>Weight per ft.</u> (lb/ft)	<u>FOOTAGE: For</u> <u>Drilling (ft)</u>	INTERVALS: Left in Well (ft)	<u>CEMENT:</u> <u>Fill-up</u> (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#	18900'	18900'	4789 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	<u>Wall</u> <u>Thickness</u> (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	<u>Cement</u> <u>Type</u>	<u>Cement</u> <u>Yield</u> (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/PCZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

		PACKERS	MAY 0 4 2018
Kind:	N/A		Environmental Protection
Sizes:	N/A		
Depths Set:	N/A		

Office of Oil and Gas

18)

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

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 30.45 acres

22) Area to be disturbed for well pad only, less access road (acres): 8.93 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 Environmental Protection

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.

Operator's Well Number

Jack Unit 2H Permit Modification API# 47-095-02462

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:

ook/Page
35/0766
xhibit 1
16/0627
59/0219
36/0177
xhibit 1
56/0029
02/0254
36/0451
5

Office of Oil and Gas

MAY 0 4 2018

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. WW-6A1 (5/13)

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Lease Name or				
Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
Danny J. Nagle et ux Lease				
	Danny J. Nagle, et ux	Antero Resources Corporation	1/8+	0456/0451

*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, RECEIVED 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.

Antero Resources Corporation
Kevin Kilstrom
Senior VP - Production

MAY 0 4 2018

WV Department of Environmental Protection

FORM WW-6A1	
EXHIBIT 1	

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Naialio E. Tennant. Scoretary of State 1900 Kanawha Bivd E Bidg 1, Suite 157-K. Charleston, WV 25305

FILE ONE ORIGINAL (Two if you want a filed stamped copy returned to you) FEEI \$25.60

APPLICATION FOR AMENDED CERTIFICATE OF AUTHORITY

JUN 1 0 2013 Penney Barker, Manager IN THE OFFICE OF Corporations Division

CRETARY OF STATE Pace (304)558-8000 Webbilte: <u>www.wwss.com</u> E-mail: business@wysp.com

> Office Hours: Monday - Friday 8:30 a.m. - 5:00 p.m. BT

**** In accordance with the provisions of the West Virginia Code, the undersigned corporation hereby **** applies for an Amended Certificate of Authority and submits the following statement:

- Name under which the corporation was authorized to transact business in WV:
- Date Certificate of Authority was issued in West Virginia:
- Corporate name has been changed to: (Attach one <u>Certified Copy of Name Change</u> as filed in home State of incorporation.)
- Name the corporation elects to use in WV: (due to home state name not being available)
- Other amendments: (attach additional pages if necessary)

Antero Resources Appalachian Corporation

6/25/2008

Antero Resources Corporation

Antero Resources Corporation

6. Name and phone number of contact person. (This is optional, however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)

Alvyn A. Schopp (303) 357-7310 Phone Number Contact Name

Phone reunitoer

7. Signature information (See below *Junortant Legal Notice Reparding Signature):

Title/Capacity: Authorized Person Print Name of Signer: Akyn A. Schop: June 10, 2013 Signature: Date: ·

*Important Least Notice Repariting Standards: For West Virginia Code 5310-1-129. Penalty for signing false document. Any person vito signs a document he or she knows is thise in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdomeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jall not more than one year, or both.

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lined by the Office of the Secretary of Sinte

Revised 4/15

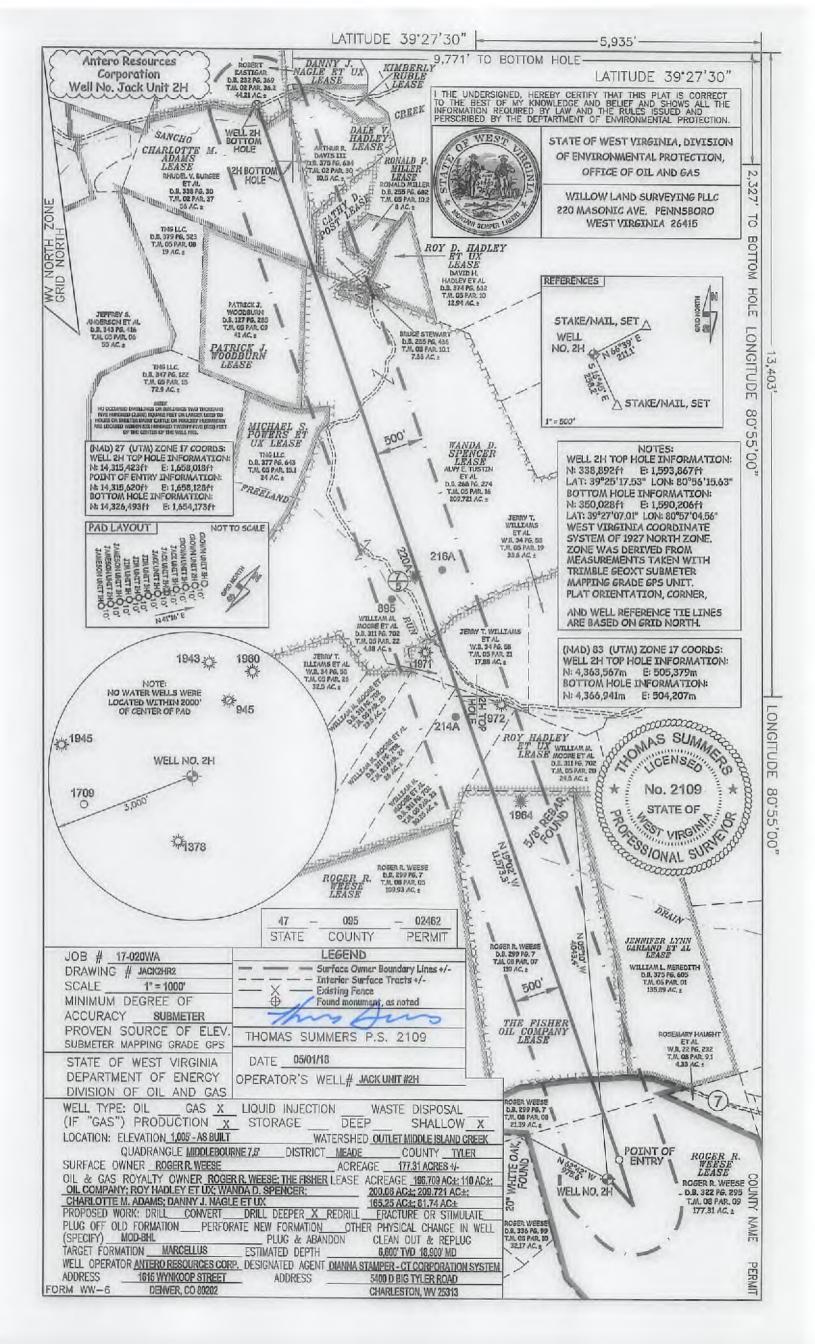
WV011 - 0416/2013 Waters Klawer Dallas

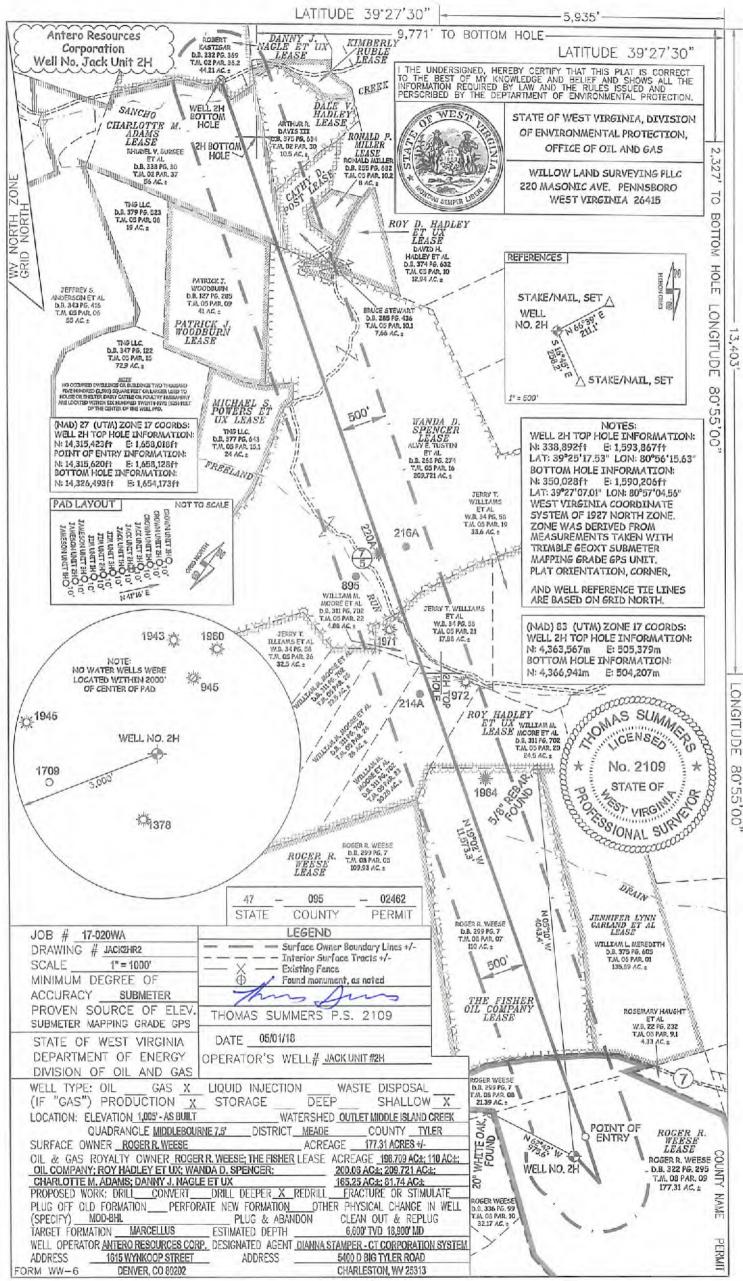
Office of Oil and Gas

D.P.

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WV Department of Environmental Protection





80°55'00"



JACK UNIT 2H (NEAT PAD) - AREA OF REVIEW 35-8-5.11 PAGE 2 Permit Modification API# 47-095-02462

UWI (APINum)	Well Name	Well Number	Operator	Historical Operator	TD
47095019720000	MOORE W M	2	SANCHO OIL & GAS	SANCHO OIL & GAS	5240
17095019540000	WEESE ROGER R	1	SANCHO OIL & GAS	SANCHO OIL & GAS	5360
47095019710000	MOORE W M	1	SANCHO OIL & GAS	SANCHO OIL & GAS	5166
ELEV_GR	TD (SSTVD)	Approx Distance to well (ft)	Perforated interval (shallowest, deepest)	Perforated Formation(s)	Producible Formation(s) not perf'd
ELEV_GR 820	TD (SSTVD) -4420	Approx Distance to well (ft) 342	Perforated Interval (shallowest, deepest) 4712-4942		Producible Formation(s) not perf'd Weir, Fifth, Warren, Alexander
				Benson, Elk	Producible Formation(s) not perf'd Weir, Fifth, Warren, Alexander Weir, Fifth, Warren, Elk