

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

Harold D. Ward, Cabinet Secretary www.dep.wv.gov

Monday, October 3, 2022 PERMIT MODIFICATION APPROVAL Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION 1615 WYNKOOP STREET

DENVER, CO 80202

Re:

Permit Modification Approval for CRYSTAL UNIT 2H

47-095-02800-00-00

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.

Operator's Well Number: CRYSTAL UNIT 2H

Farm Name: ANTERO MIDSTREAM LLC

U.S. WELL NUMBER: 47-095-02800-00-00

Horizontal 6A New Drill

Date Modification Issued: 10/03/2022

Promoting a healthy environment.

API NO. 47- 095	02800	
OPERATOR WEL	L NO.	Crystal Unit 2H MOD
Well Pad Name	: Beech	Run Pad

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

1) Well Operator: Antero Resource	es Corpora	494507062	095-Tyler	Ellsworth Porter Falls 7.5'			
-, F		Operator ID	County	District Quadrangle			
2) Operator's Well Number: Crystal	Unit 2H MC	DD Well Pac	Name: Beed	ch Run Pad			
3) Farm Name/Surface Owner: Anter	o Midstream	LLC Public Roa	d Access: Be	ech Run Rd.			
4) Elevation, current ground: 1223	As-built El	evation, proposed	post-construct	tion:			
5) Well Type (a) Gas X Oil Underground Storage							
Other							
(b)If Gas Shallow		Deep					
Horizont	al X						
6) Existing Pad: Yes or No Yes			_				
 Proposed Target Formation(s), Dep Marcellus Shale: 7500' TVD, Anticip 		•					
8) Proposed Total Vertical Depth: 7	500' TVD						
9) Formation at Total Vertical Depth:		3					
10) Proposed Total Measured Depth:	20200' M	D					
11) Proposed Horizontal Leg Length:	10619.2'	*					
12) Approximate Fresh Water Strata	Depths:	880'					
13) Method to Determine Fresh Water	r Depths: 2	47095308530000					
14) Approximate Saltwater Depths:	2289'						
15) Approximate Coal Seam Depths:	431'						
16) Approximate Depth to Possible V	oid (coal m	ine, karst, other):	None Anticip	ated			
17) Does Proposed well location cont directly overlying or adjacent to an ad			N	o <u>X</u>			
(a) If Yes, provide Mine Info: Nar	ne:						
Dep	oth:		0	RECEIVED ffice of Oil and Gas			
Sea	m:			OCT 3 2022			
Ow	ner:			WV Department of			

Page **1** of **3**

9-30-22

OPERATOR WELL NO. Crystal Unit 2H MOD

Well Pad Name: Beech Run Pad

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	<u>Grade</u>	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	20"	New	X-60	78.67#	100	100	CTS, 96 Cu. Ft.
Fresh Water	13-3/8"	New	J/K-55	54.5#	930	930	CTS, 969 Cu. Ft.
Coal	9-5/8"	New	J/K-55	36#	3000	3000	CTS, 1221 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110CY	20#	20200	20200	4162Cu. 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	~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"	14,360	2500	Class G/H	~1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

			RECEIVED
Kind:	NI/A		office of Oil and Gas
	N/A		OCT 3 2022
Sizes:	NI/A		001 3 2022
	N/A	_ \	VV Department of
Depths Set:	NI/A	Envi	ronmental Protection
	N/A		

Page 2 of 3 Stew Myby 9-30-27

OPERATOR WELL NO. Crystal Unit 2H MOD

Well Pad Name: Beech Run Pad

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): 24.47 acres
- 22) Area to be disturbed for well pad only, less access road (acres): 12.89 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

WV Department of 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.

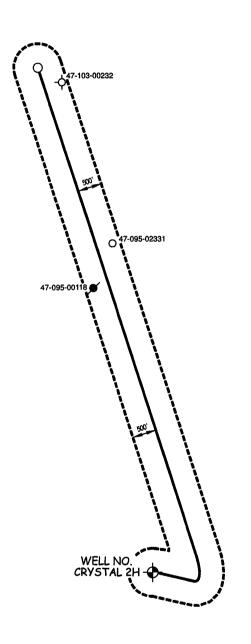
Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

*Note: Attach additional sheets as needed.

Steve Moloy
9-20-22

4709502800

BEECH RUN PAD ANTERO RESOURCES CORPORATION



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	SURVEYING, PLLC			SCALE : 1-IN	CH = 2000-FEE	Τ
P.O. BOX 17, PENNSBORO, WV 26415 (304) 659-1717		JOB #: 22-005WA	0'	2000'	4000'	6000'
DATE: 05/26/22	DRAWN BY: D.L.P.	FILE: CRYSTAL2HAOR.DWG				

UWI (APINum)	Well Name	Well Number	Operator	Historical Operator	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Producible Formation(s) not perf'd
47095001180000	O L RICE	1	SMITH C B	SMITH C B	2,067		Keener, Big Injun, Squaw	Berea, Weir, Alexander
47095023310000	BIRCH YELLOW	1 V-1	ALLIANCE PETR CORP	ALLIANCE PETR CORP				
47103002320000	J W DAWSON	1	UNKNOWN	UNKNOWN	2,100			

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OCT 03 2022

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PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS ROSALIE B. HENRY; DEANNA R. COCHRAN; DANNY RAY BOOHER ET UX; DANNY M. MOORE 60 AC±; 67 AC±; 51.5 AC±; 1.67 AC±; BRC APPALACHIAN MINERALS ILLC; KAREN SUE CLARK; KAREN SUE CLARK; CLAIR P. DAWSON 96.38 AC±; 7.21 AC±; 48.75 AC±; 120.5 AC±; _ CONVERT DRILL DEEPER X PROPOSED WORK: DRILL REDRILL FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION _X OTHER PHYSICAL CHANGE IN WELL (SPECIFY) ______ PLUG & ABANDON CLEAN OUT & REP CLEAN OUT & REPLUG TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,500' TVD 20,200' MD

ADDRESS

DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM

5400 D BIG TYLER ROAD

CHARLESTON, WV 25313

WELL OPERATOR _

ADDRESS .

FORM WW-6

ANTERO RESOURCES CORP.

1615 WYNKOOP ST.

DENVER, CO 80202

ADDRESS.

5400 D BIG TYLER ROAD

CHARLESTON, WV 25313

ADDRESS

FORM WW-6

1615 WYNKOOP ST.

DENVER, CO 80202

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
R: Elaine L. Oiler Lease			
Elaine L. Oiler	Petroedge Energy LLC	1/8	0399/0725
Petroedge Energy LLC	Statoil USA Onshore Properties	Assignment	0406/0147
Statoil USA Onshore Properties	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
/ Q: Elsie M. Snively Lease			
Elsie M. Snively	Statoil USA Onshore Properties Inc	1/8+	0463/0680
Statoil USA Onshore Properties Inc	EQT Production Company	Assignment	0539/0239
EQT Production Company	Antero Resources Corporation	Assignment	0663/0001
P: Rosalie B. Henry Lease		- 10	
Rosalie B. Henry	Antero Resources Corporation	1/8+	0559/0190
O: Deanna R. Cochran Lease			
Deanna R. Cochran	Antero Resources Corporation	1/8+	270A/0789
M: Danny Ray Booher, et ux Lease		OfficeRECE	
Danny Ray Booher, et ux	Stone Energy Corporation	1/8 OF OH ED	127A/0449
Stone Energy Corporation	EQT Production Company	Assignment ()	183A/0305
EQT Production Company	Antero Resources Corporation	Assignment 2 2022 Assignment 1/8 Assignment 1/8 Assignment 1/8+	230A/0883
1: Danny M. Moore Lease		Mondarine	
Danny M. Moore	Antero Resources Corporation	1/8+ Projection	0148/0211
/ I: BRC Appalachian Minerals I LLC Lease			
BRC Appalachian Minerals I LLC	BRC Working Interest Company LLC	1/8+	369/300
BRC Working Interest Company LLC	Chesapeake Appalachian LLC	Assignment	369/784
Chesapeake Appalachian LLC Statoil USA Onshore Properties Inc	Statoil USA Onshore Properties Inc	Assignment	378/764
SWN Exchange Titleholders LLC	SWN Exchange Titleholders LLC SWN Production Company LLC	Assignment Merger	470/668 9/404
SWN Production Company LLC	Antero Exchange Properties	Assignment	544/242
Antero Exchange Properties	Antero Resources Corporation	Merger	525/315
G: Karen Sue Clark Lease Karen Sue Clark	Antero Resources Corporation	1/8+	124/348
E: Karen Sue Clark Lease		- / • ·	22.,0.0
Karen Sue Clark	Antero Resources Corporation	1/8+	99/442

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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 Br Claire P Dawson Lease

Claire P Dawson

Antero Resources Corporation

1/8+

Environmental Protection

179A/819

*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.

Office of Oil and Gas

SEP 9 0

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 Company

Senior VP of Land



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

Modification Horizontal H6A Well Work Permit (47-095-02800, 47-095-02801, 47-095-02802)

1 message

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

Tue, Oct 4, 2022 at 8:03 AM

To: Mallory Stanton <mstanton@anteroresources.com>, Diane Blair <dblair@anteroresources.com>, Dani DeVito <ddevito@shalepro.com>, ljackson@wvassessor.com, Stephen E McCoy <stephen.e.mccoy@wv.gov>, "Blevins, Cragin" <cragin.blevins@wv.gov>

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

47-095-02800 - CRYSTAL UNIT 2H 47-095-02801 - EMMONS UNIT 1H 47-095-02802 - EMMONS UNIT 2H

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

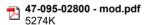
(304) 926-0499 ext. 41115

(304) 926-0452 fax

Wade.A.Stansberry@wv.gov

3 attachments

47-095-02802 - mod.pdf 5182K



47-095-02801 - mod.pdf 5411K