

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

Tuesday, May 30, 2023 PERMIT MODIFICATION APPROVAL Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION 1615 WYNKOOP STREET

DENVER, CO 80202

Re:

Permit Modification Approval for SOPHIE UNIT 1H

47-095-02850-00-00

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

mes A. Martin

Operator's Well Number: SOPHIE UNIT, 1H

Farm Name: ANTERO RESOURCES CORPORATION

U.S. WELL NUMBER: 47-095-02850-00-00

Horizontal 6A New Drill

Date Modification Issued: 05/30/2023

Promoting a healthy environment.

API NO. 47- 09:	5	02850		
OPERATO	R WEL	L NO.	Sophie Unit 1H MOD	/
Well Pad	Name	: Roma	Lou Pad	-

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

						_
1) Well Operator:	Antero Res	sources Corpora	494507062	095 - Tyler	Union	Middlebourne 7.5'
			Operator ID	County	District	Quadrangle
2) Operator's We	ll Number: So	phie Unit 1H M	OD Well Pa	d Name: Roma	Lou Pad	
3) Farm Name/Su	rface Owner:	Antero Resource	s Corp. Public Ros	nd Access: Sell	ers Road	1
4) Elevation, curr	ent ground:	As-built 883' E	Elevation, proposed	post-constructi	on:	
5) Well Type (a	a) Gas X		Und			
0	ther					
(t	o)If Gas Sha	allow X	Deep			
		rizontal X				
6) Existing Pad: Y				-		
7) Proposed Targe Marcellus Shale	et Formation(s e: 6500' TVD, A), Depth(s), Antionticipated Thickne	cipated Thickness a ess- 55 feet, Associa	nd Expected Prated Prated Pressure- 2	essure(s): 850#	
8) Proposed Total	Vertical Depti	h: 6500' TVD				
9) Formation at To	otal Vertical D	epth: Marcellu	s			
10) Proposed Tota	al Measured De	epth: 23600' N	1D			
11) Proposed Hori	izontal Leg Le	ngth: 14331'	*Open to modifica	ation at a later	date	
12) Approximate l	Fresh Water St	rata Depths:	168'			
13) Method to Det			470950 2730 Offset well	records. Depths have	been adjusted ac	cording to surface elevations.
14) Approximate S						ostang to surface cicvations.
15) Approximate (Coal Seam Dep	oths: None Anti	cipated			
16) Approximate I	Depth to Possil	ble Void (coal m	ine, karst, other):	None Anticipat	ed	
17) Does Proposed directly overlying	l well location or adjacent to	contain coal sear an active mine?	ms Yes	No	Х	
(a) If Yes, provid	le Mine Info:	Name:				
		Depth:				
		Seam:				
		Owner:	-			
			Office Of (EIVED Oil and Gas	-	-
				4 2023		
			WV Depart Environmenta	ment of	Р	age 1 of 3

OPERATOR WELL NO. Sophie Unit 1H MOD Well Pad Name: Roma Lou Pad

18)

CASING AND TUBING PROGRAM

TYPE	Cian	New		337 . 1		INTERVALS:	CEMENT:
	Size (in)	or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	Left in Well (ft)	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#	300'	300'	CTS, 313 Cu. Ft.
Coal	9-5/8"	New	J/K-55	36#	2990'	2990'	CTS, 1217 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110 ICY	23#	23600'	23600' -	CTS, 5019 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

ТҮРЕ	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				77-7	,,,,,	Oldob / VE	1.10
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			1.0
Liners				,			

PACKERS

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

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OPERATOR WELL NO. Sophie Unit 1H MOD
Well Pad Name: Roma Lou 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): 21.24 acres
- 22) Area to be disturbed for well pad only, less access road (acres): 12.19 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.

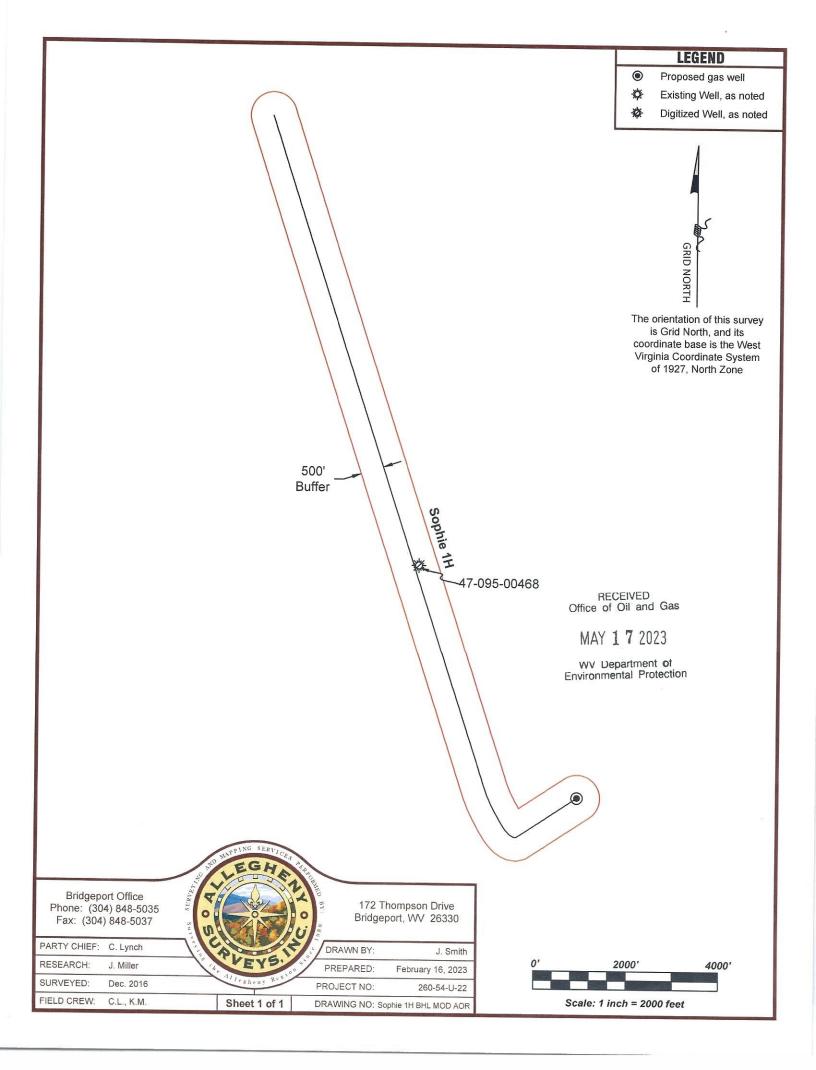
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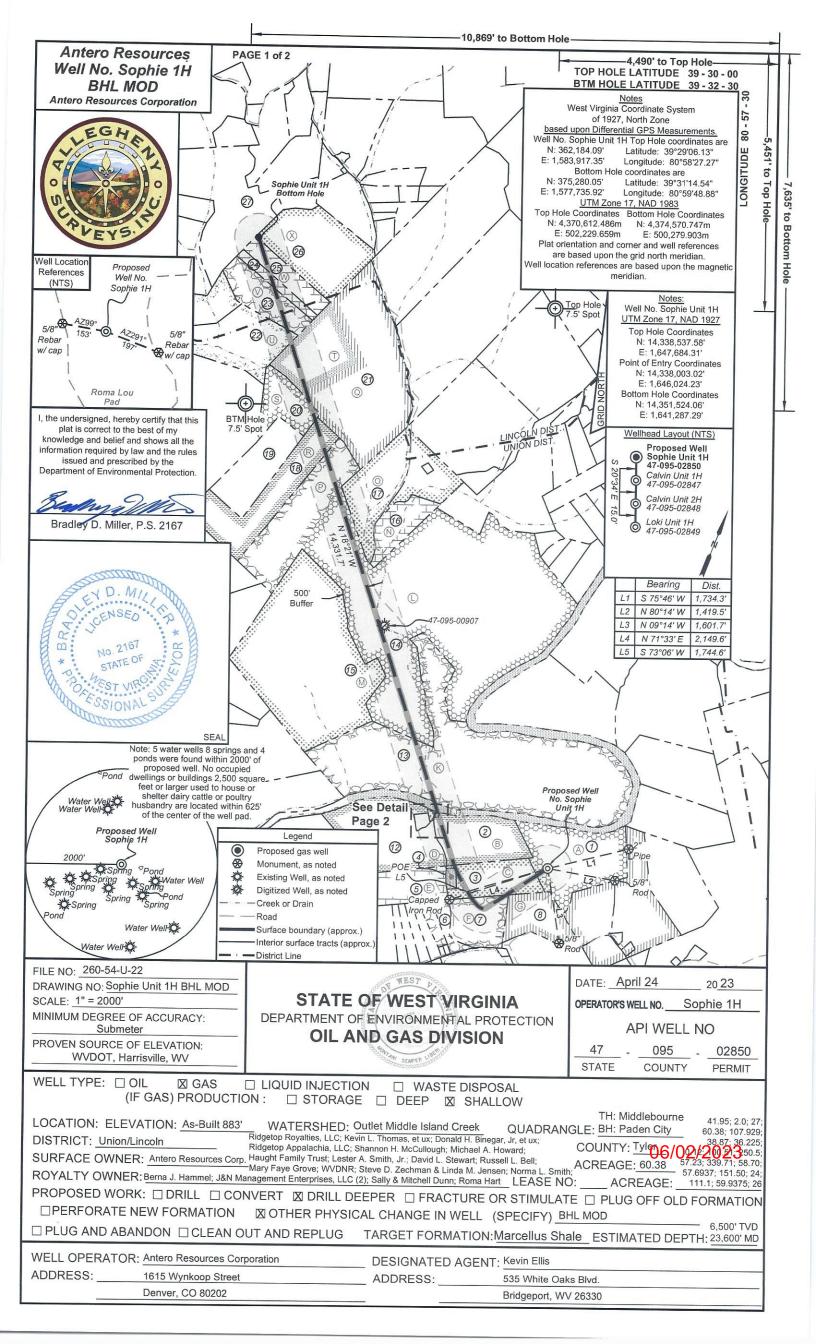
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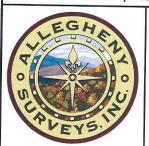


Producible Formation(s) not perf'd			
Perforated Formation(s)			
Perforated Interval (shallowest, deepest)			
Historical Operator TD UNKNOWN			
Well Number Operator 5496 UNKNOWN			
Well Name Name			
47095004680000			

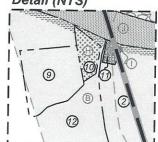


Antero Resources Well No. Sophie 1H BHL MOD

Antero Resources Corporation



Detail (NTS)



ID	TM-Par	Owner	Bk/Pg	Acres
1	10-4.1	Antero Resources Corporation	OR12/739	100000000000000000000000000000000000000
2	9-9.1	Jennifer K. & Diane M. Thomas	AR46/754	
3	10-4	Kevin L. & Tammy J. Thomas	OR7/290	32.22
4	9-13	Kevin L. & Tammy J. Thomas	OR7/290	2.00
5	9-12	Jimmy E. Patterson, et al	OR79/645	
6	9-15.3	Billy D. & Roma L. Hart	WB21/443	
7	9-16	Billy D. & Roma L. Hart	154/569	20.00
8	10-5.3	Richard Daniel Bowen	344/814	25.92
9	9-9.2	Samuel P. & Katina S. Smith	370/11	2.01
10	9-10	Jennifer K. & Diane M. Thomas	AR46/754	
11	9-11	Jennifer K. & Diane M. Thomas	AR46/754	
12	9-9	Patrick L. & Tammy M. Smith	341/695	58.50
13	9-4	Steven D. Zechman & Linda M. Jensen	348/422	250.00
14	5-16	Charity Gas Inc.	358/516	393.00
15	5-21	Lowell P. & Sharon D. Bee	348/149	180.60
16	5-15.3	David L. Stewart	WB39/431	
17	5-15.2	Warren T. Stewart	501/702	40.00
18	5-13.1	Donald A. Quinif	308/511	57.69
19	5-14	Jeff Howard & Debra Metz	295/619	41.00
20	5-9	David L. Stewart	WB39/431	
21	5-5	Antero Resources Corp.	598/600	173.00
22	5-3	Christopher D. & Betsy A. Metz		111.10
23	5-25	Clyde C. & Helen S. Dowler	168/90	27.00
24	5-6	Russell L. Bell	335/942	8.00
25	5-6.1	Russell L. Bell	335/940	18.00
26	11-12	Patrick & Kevin Hill, et al	584/619	59.95
27	11-47	John M. & Kara L. Garrett	656/399	82.39

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	Leases
Α	Berna J. Hammel
В	Mary Faye Grove
С	Sally & Mitchell Dunn
D	Kevin L. Thomas, et ux
Е	Linda Lou Dennis
F	Roma Hart
G	J&N Management Enterprises, LLC
Н	J&N Management Enterprises, LLC
1	J&N Management Enterprises, LLC
J	WVDNR
K	Steven D. Zechman & Linda M. Jensen
L	Haught Family Trust
М	Greenbrier Royalty Fund II, LLC
Ν	David L. Stewart
0	Warren T. Stewart
Р	Norma L. Smith
Q	Ridgetop Appalachia, LLC
R	Lester A. Smith, Jr.
S	David L. Stewart
Т	Donald H. Binegar, Jr, et ux
U	Michael A. Howard
٧	Ridgetop Royalties
W	Russell L. Bell
Х	Shannon H. McCullough

FILE NO: 260-54-U-22

DRAWING NO: Sophie Unit 1H BHL MOD

SCALE: 1" = 2000'

MINIMUM DEGREE OF ACCURACY:
Submeter

PROVEN SOURCE OF ELEVATION: WVDOT, Harrisville, WV

Denver, CO 80202

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS DIVISION

WEST D

DATE: _A	Apri	124		20_23
OPERATOR'S	TOR'S WELL NO			hie 1H
	A	PI WEL	LN	C
47	-	095		02850
CTATE		COLINIT		DEDLUT

Bridgeport, WV 26330

WVDOT, Harrisville, WV	THE SEMPER LIBERTY	STATE COUNTY PERMIT
WELL TYPE: □ OIL ☑ GAS (IF GAS) PRODUCTION	□ LIQUID INJECTION □ WASTE DISPOSAL DN: □ STORAGE □ DEEP ☒ SHALLOW	
ROYALTY OWNER: Berna J. Hammel; J&N Ma PROPOSED WORK: DRILL COI PERFORATE NEW FORMATION	WATERSHED: Outlet Middle Island Creek QUADRAN Ridgetop Royalties, LLC; Kevin L. Thomas, et ux; Donald H. Binegar, Jr, et ux; Ridgetop Appalachia, LLC; Shannon H. McCullough; Michael A. Howard; Haught Family Trust; Lester A. Smith, Jr.; David L. Stewart; Russell L. Bell; Mary Faye Grove; WVDNR; Steve D. Zechman & Linda M. Jensen; Norma L. Sminagement Enterprises, LLC (2); Sally & Mitchell Dunn; Roma Hart LEASE NOVERT DRILL DEEPER FRACTURE OR STIMULA OTHER PHYSICAL CHANGE IN WELL (SPECIFY) EUT AND REPLUG TARGET FORMATION: Marcellus Sh	NO: ACREAGE:111.1; 59.9375; 26 ATE □ PLUG OFF OLD FORMATION BHL MOD
WELL OPERATOR: Antero Resources Cor ADDRESS: 1615 Wynkoop Street		

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 –

- 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, et	c. Royalty	Book/Page
•	A: Berna J. Hammel Lease Berna J. Hammel	Antero Resources Corporation	1/8+	0587/0076
1	C: Sally & Mitchell Dunn Lease Sally & Mitchell Dunn	Antero Resources Corporation	1/8+	0602/0022
,	G: J&N Management Enterprises, LLC Lease J&N Management Enterprises, LLC	Antero Resources Corporation	1/8+	0591/0235
	F: Roma Hart Lease Roma Hart	Antero Resources Corporation	1/8+	0429/0537
•	✓ <u>C: Sally & Mitchell Dunn Lease</u> Sally & Mitchell Dunn	Antero Resources Corporation	1/8+	0602/0022
-	D: Kevin L. Thomas, et ux Lease Kevin L. Thomas, et ux	Antero Resources Corporation	1/8+	0251/0694
•	C: Sally & Mitchell Dunn Lease Sally & Mitchell Dunn	Antero Resources Corporation	1/8+	0602/0022
1	B: Mary Faye Grove Lease Mary Faye Grove	Antero Resources Corporation	1/8+	0573/0085
1	✓ <u>I: J&N Management Enterprises, LLC Lease</u> J&N Management Enterprises, LLC	Antero Resources Corporation	1/8+	0223/0540
	<u>J: WVDNR Lease</u> WVDNR	Antero Resources Corporation	1/8+	0121/0242
	<u>K: Steven D. Zechman & Linda M. Jensen Lease</u> Steven D. Zechman & Linda M. Jensen Steven D. Zechman & Linda M. Jen	Antero Resources Corporation	1/8+	0105/0308
•	L: Haught Family Trust Lease Haught Family Trust Antero Resources Appalachian Corporation	Antero Resources Appalachian Corpo Antero Resources Corporation	oration 1/8+ Name Change	0404/0244 0557/0430
1	P: Norma L. Smith <u>Lease</u> Norma L. Smith	Antero Resources Corporation	1/8+	0592/0214
1	R: Lester A. Smith, Jr. Lease Lester A. Smith, Jr.	Antero Resources Corporation	1/8+	0594/0728
1	S: David L. Stewart Lease David L. Stewart	Antero Resources Corporation	1/8+	0668/0105
1	Q: Ridgetop Appalachia, LLC Lease Ridgetop Appalachia, LLC	Antero Resources Corporation	1/8+	0205/0152
1	T: Donald H. Binegar, Jr, et ux Lease Donald H. Binegar, Jr, et ux	Antero Resources Corporation	Office Of Oil and Gags+ MAY 24 2023	0247/0232
		1	WV Department of	

WV Department of Environmental Protection Operator's Well Number

Sophie Unit 1H MOD

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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:

	Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
1	U: Michael A. Howard Lease Michael A. Howard Siltstone Resources II, LLC	Siltstone Resources II, LLC Antero Resources Corporation	1/8+ Assignment	0597/0368 0199/0404
1	V: Ridgetop Royalties Lease Ridgetop Royalties	Antero Resources Corporation	1/8+	0245/0798
1	W: Russell L. Bell Lease Russell L. Bell	Antero Resources Corporation	1/8+	0627/0399

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^{*}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.

^{*}Co-tenancy utilization – At least 7 mineral owners in tract. At least 75% of the royalty owners have executed a lease on the tract. The interests of the remaining co-tenants were acquired pursuant to the Co-tenancy Modernization and Majority Protection Act

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)

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- (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

Shannon H. McCullough Lease

Shannon H. McCullough Antero Resources Corporation 1/8+ 0008/0224

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcelius 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:

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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

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WV Department of Environmental Protection

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: Jared Hurst

Vice President of Land

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May 16, 2023

West Virginia Department of Environmental Protection Office of Oil and Gas Attn: Mr. Taylor Brewer 601 57th Street Charleston, WV 25304 Antero Resources 1615 Wynkoop Street Denver, CO 80202 Office 303.357.7310 Fax 303.357.7315

Mr. Brewer:

Antero Resources Corporation (Antero) would like to submit the following permit modifications for approved well on the existing Roma Lou Pad: Sophie Unit 1H (47-095-02850) Expedited.

Attached you will find the following:

- > AOR
- Revised Form WW-6B
- Revised Form WW-6A1
- Revised Mylar Plat

If you have any questions please feel free to contact me at (303) 357-6959.

Thank you in advance for your consideration.

Sincerely.

Stefan Gaspar Permitting Agent

Antero Resources Corporation

Enclosures

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