

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 <u>www.dep.wv.gov</u>

Monday, April 24, 2023 PERMIT MODIFICATION APPROVAL Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION 1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Mo

Permit Modification Approval for LOKI UNIT 1H

47-095-02849-00-00

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.

James A. Martin

Chief

Operator's Well Number: LOKI UNIT 1H

Farm Name: ANTERO RESOURCES CORPORATION

U.S. WELL NUMBER: 47-095-02849-00-00

Horizontal 6A New Drill

Date Modification Issued: 4/24/2023

Promoting a healthy environment.

WW-6B (04/15)

CK \$ 4018525 \$ 2500 \$ 4/4/23

API NO. 47- 095	02849	
OPERATOR WE	L NO	Loki Unit 1H MOD
Well Pad Name		

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

1) Well Operator: Antero Re	esources Corpor	4945070)62	095 - Tyler	Union	Middlebourne 7.5'
		Operato	r ID	County	District	Quadrangle
2) Operator's Well Number: L	oki Unit 1H MOD		Well Pac	Name: Rom	a Lou Pad	
3) Farm Name/Surface Owner	Antero Resources	Corp. Pul	olic Roa	d Access: Se	llers Road	
4) Elevation, current ground:	As-built 883' Ele	evation, pr	oposed	oost-construct	ion:	9
5) Well Type (a) Gas X	Oil	500.000	Unde	rground Stora	ge	
Other			_			
(b)If Gas Sh	nallow X	D	еер			
	orizontal X					
6) Existing Pad: Yes or No Yes						
7) Proposed Target Formation(Marcellus Shale: 6500' TVD,	s), Depth(s), Anticip Anticipated Thicknes	pated Thic ss- 55 feet,	kness ar	nd Expected P	ressure(s): 2850#	
8) Proposed Total Vertical Dep						
9) Formation at Total Vertical I						
10) Proposed Total Measured D)				
11) Proposed Horizontal Leg Le	ength: 16049' *	Open to n	nodificat	tion at a later	date	
12) Approximate Fresh Water S		168'				
13) Method to Determine Fresh	Water Depths: 47	095001110000	Offset well r	ecords, Depths have	been adjusted an	cording to surface elevations.
14) Approximate Saltwater Dep	ths: 1678'			•		
15) Approximate Coal Seam De	pths: None Antici	pated	The state of the s			
16) Approximate Depth to Possi	ible Void (coal mine	e, karst, ot	her): N	one Anticipat	ed	
17) Does Proposed well location directly overlying or adjacent to	contain coal seams	S		No		
(a) If Yes, provide Mine Info:	Name:					
	Depth:				~	RECEIVED
	Seam:					ffice of Oil and Gas
	Owner:				,	APR 24 2023
					V Envi	W Department of ronmental Protection

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July 4/21/20

API NO. 47- 095

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

18)

CASING AND TUBING PROGRAM

TYPE		Mon					
	Size	New	Consider	Weight per ft.	FOOTAGE: For	INTERVALS:	CEMENT:
	(in)	or Used	Grade	(lb/ft)	Drilling (ft)	Left in Well	Fill-up
C1 /						<u>(ft)</u>	(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-/K55	36#	2990'	2990'	
Intermediate					2000	2990	CTS, 1217 Cu. Ft.
Production	5-1/2"	New	P-110CY	20#	24600'	24600'	070 5074 0 5
Tubing	2-3/8"	New	N-80	4.7#	24000	24000	CTS, 5271 Cu. Ft.
Liners				11111			

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield
Conductor	20"	24"	0.375"	2250	50	Class A/I	(cu. ft./k) ~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	
Intermediate					1000	Olass AL	~1.18
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	2000	0,000 0/11	- 1.0
Liners				- 1,200			

PACKERS

N/A	
N/A	
N/A	RECEIVED Office of Oil and Ga
	N/A

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WV Department of Environmental Protection

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4/21/23

OPERATOR WELL NO. Loki 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

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25) Proposed borehole conditioning procedures:

Conductor: blowhole clean with air, run casing, 10 bbls fresh water.

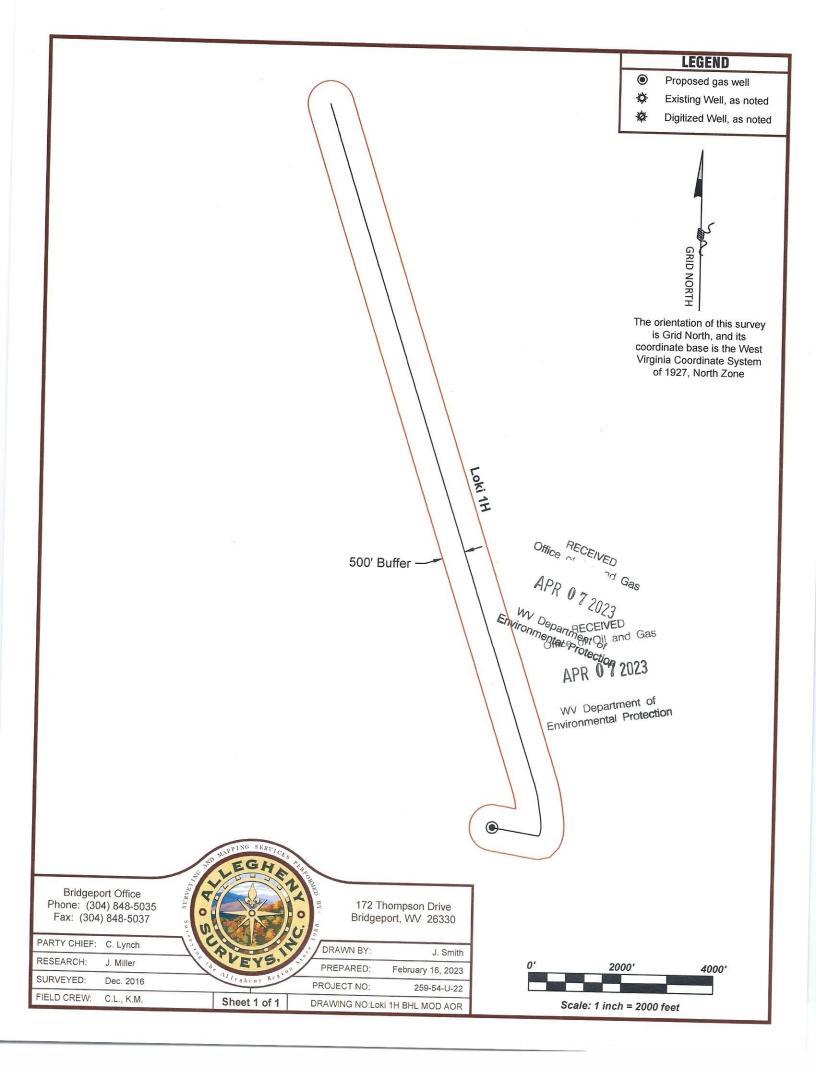
WV Department of Environmental Protection Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.

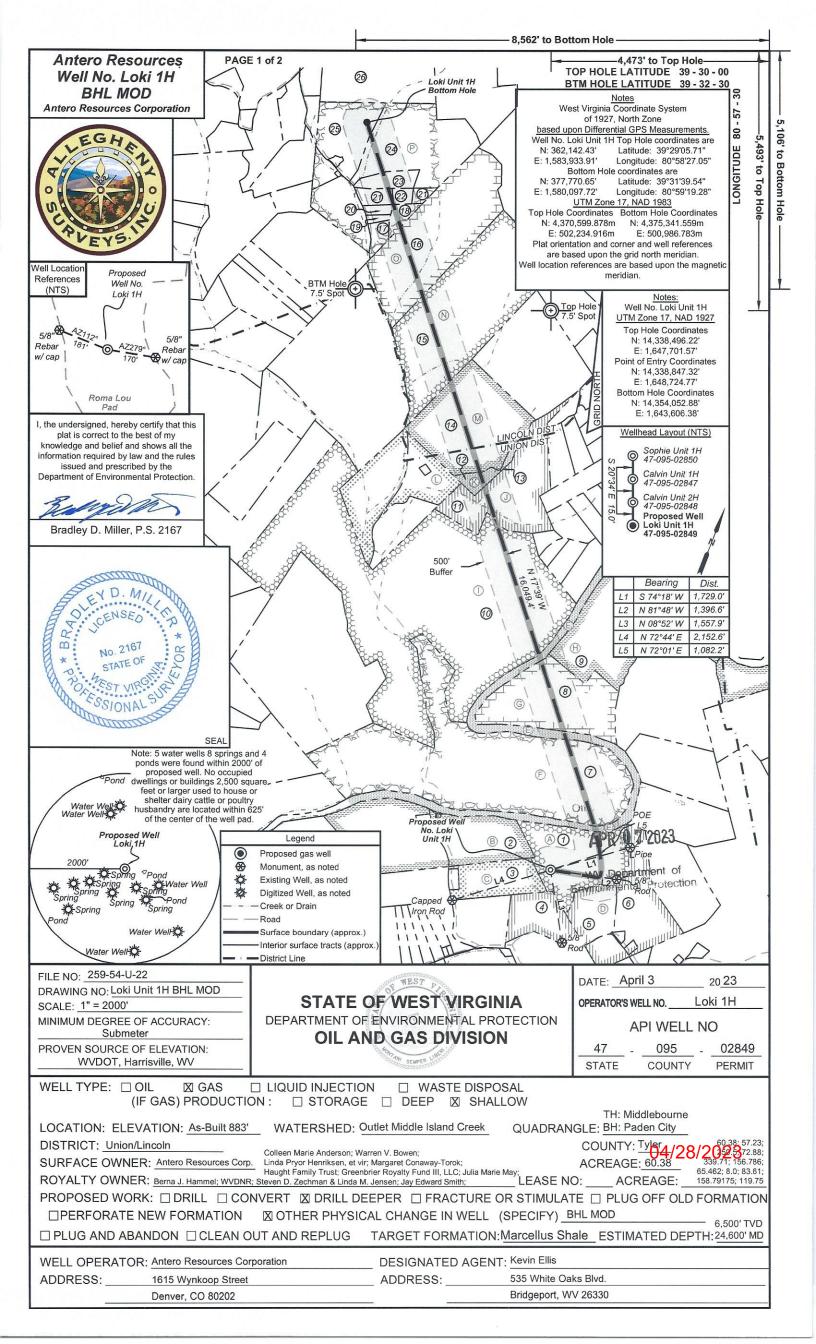
Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water. Production: circulate with 14 lb/gal NaCl mud, trip to 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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Antero Resources Well No. Loki 1H **BHL MOD**

Antero Resources Corporation



ID	TM-Par	Owner	Bk/Pg	Acres
1	10-4.1	Antero Resources Corporation	OR12/739	60.38
2	9-9.1	Jennifer K. & Diane M. Thomas	AR46/754	40.00
3	10-4	Kevin L. & Tammy J. Thomas	OR7/290	32.22
4	10-5.3	Richard Daniel Bowen	344/814	25.92
5	10-5.5	Bowen Family Irrevocable Trust	372/303	22.89
6	10-5	Timothy Brian Bowen, et al	652/440	48.36
7	9-4	Steven D. Zechman & Linda M. Jensen	348/422	250.00
8	6-3	Eldon J. & Ruth A. Helman	383/761	72.80
9	6-1	Eldon J. & Ruth A. Helman	383/761	169.00
10	5-16	Charity Gas Inc.	358/516	393.00
11	6-4	Darren E. Thacker	616/762	67.00
12	6-5.2	Julia Fetty Carolus	323/585	5.50
13	6-5.3	Julia Fetty Carolus	323/587	2.50
14	5-26	Paul R. Fetty	288/126	82.22
15	14-1	Edward E. & Connie Howell	361/829	158.74
16	11-11	Thomas E. Bowen	374/636	119.75
17	11-14	Calvin Lee & Irene M. Stewart	251/635	4.99
18	11-15	Thomas E. Bowen	374/636	6.00
19	11-14.2	Gerald Eugene & Sonya Stewart	374/843	1.75
20	11-14.1	Gerald Eugene Stewart	279/572	3.00
21	11-16	John Mark Campbell	326/365	8.85
22	11-16.1	John Lincoln & Autumn Rose Campbell	OR 43/11	3.09
23	11-17	Thomas E. Neff	341/213	10.00
24	11-18	William L. & Lynn A. Hinkle	366/387	72.50
25	11-19.1	Sheila & Rex Ervin	409/542	34.55
26	11-24	Ryan Chambers & Nancy Marie Chaplin	348/763	77.00

PAGE 2 of 2

	Leases
Α	Berna J. Hammel
В	Mary Faye Grove
С	Sally & Mitchell Dunn
D	J&N Management Enterprises, LLC
Ε	WVDNR
F	Steven D. Zechman &
г	Linda M. Jensen
G	Jay Edward Smith
Н	Norma R. Spencer
1	Haught Family Trust
J	Greenbrier Royalty Fund III, LLC
K	Julia Marie May
L	Warren T Stewart
М	Linda Pryor Henriksen, et vir
N	Margaret Conaway-Torok
0	Warren V. Bowen
P	Colleen Marie Anderson

OB DECEMEN 77 Gas APR 0 7 2023 WV Department of Environmental Protection

FILE NO: 259-54-U-22 DRAWING NO: Loki Unit 1H BHL MOD SCALE: 1" = 2000'	
MINIMUM DEGREE OF ACCURACY: Submeter	DEF
PROVEN SOURCE OF ELEVATION: WVDOT, Harrisville, WV	
WELL TYPE: □ OIL □ 区GAS	□ LIQ

WEST D STATE OF WEST VIRGINIA PARTMENT OF ENVIRONMENTAL PROTECTION

DATE: April 3 20_23 OPERATOR'S WELL NO. Loki 1H API WELL NO

Submeter	OIL AND GAS DIVISION	AFTWELLING			
PROVEN SOURCE OF ELEVATION: WVDOT, Harrisville, WV	OIL AND GAS DIVISION	47 STATE	- 095 COUNTY	- <u>02849</u> PERMIT	
WELL TYPE: ☐ OIL ☒ GAS (IF GAS) PRODUCTION			liddlebourne		
LOCATION: ELEVATION: As-Built 883'	WATERSHED: Outlet Middle Island Creek QUADRAN	NGLE: BH: P	aden City		
DISTRICT: Union/Lincoln SURFACE OWNER: Antero Resources Corp.	Colleen Marie Anderson; Warren V. Bowen; Linda Pryor Henriksen, et vir; Margaret Conaway-Torok; Haught Family Trust; Greenbrier Royalty Fund III, LLC; Julia Marie May; Steven D. Zechman & Linda M. Jensen; Jay Edward Smith; LEASE N		7: Tyler 04/28 E: 60.38 CREAGE:	60.38; 57.23; 2303 ; 72.88; 56.786 ; 65.462; 8.0; 83.61; 158.79175; 119.75	
PROPOSED WORK: ☐ DRILL ☐ CO	NVERT ☒ DRILL DEEPER ☐ FRACTURE OR STIMULA	TE 🗆 PLU	G OFF OLD	FORMATION	
□PERFORATE NEW FORMATION	☑ OTHER PHYSICAL CHANGE IN WELL (SPECIFY) _ OUT AND REPLUG TARGET FORMATION: Marcellus Sh	BHL MOD		6,500' TVD	
WELL OPERATOR: Antero Resources Co	rporation DESIGNATED AGENT: Kevin Ellis				
ADDRESS: 1615 Wynkoop Street	505 144 11 0	aks Blvd.			
Denver CO 80202	Bridgeport, V	VV 26330			

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, etc.	Royalty	Book/Page
A: Berna J. Hammel Lease Berna J. Hammel	Antero Resources Corporation	1/8+	0587/0076
E: WVDNR Lease WVDNR	Antero Resources Corporation	1/8+	0121/0242
F: Steven D. Zechman & Linda M. Jensen Lease Steven D. Zechman & Linda M. Jensen	Antero Resources Corporation	1/8+	0105/0308
E: WVDNR Lease WVDNR	Antero Resources Corporation	1/8+	0121/0242
G: Jay Edward Smith Lease Jay Edward Smith Montani Energy LLC Antero Resources Appalachian Corporation	Montani Energy LLC Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Assignment Name Change	0404/0001 0404/0754 0557/0430
E: WVDNR Lease WVDNR	Antero Resources Corporation	1/8+	0121/0242
I: Haught Family Trust Lease Haught Family Trust Antero Resources Appalachian Corporation	Antero Resources Appalachian Corporation Antero Resources Corporation	175CEIVED	0404/0244 0557/0430
J: Greenbrier Royalty Fund III, LLC Lease Greenbrier Royalty Fund III, LLC	Antero Resources Corporation	APP. 7 2023	0108/0295
K: Julia Marie May Lease Julia Marie May	Antero Resources Corporation	WV Department of Environmental Protection	0233/0464
M: Linda Pryor Henriksen, et vir Lease Linda Pryor Henriksen, et vir	Antero Resources Corporation	1/8+	0671/0593
N: Margaret Conaway-Torok Lease Margaret Conaway-Torok	Antero Resources Corporation	1/8+	0595/0622
O: Warren V. Bowen Lease Warren V. Bowen Triad Energy Corporation Triad Hunter LLC Blue Ridge Mountain Resources Inc. Eclipse Resources I LP SWN Production LLC	Triad Energy Corporation Triad Hunter LLC Blue Ridge Mountain Resources Inc. Eclipse Resources I LP SWN Production LLC Antero Resources Corporation	1/8 Assignment Merger Merger Name Change Assignment	0349/0650 0371/0605 0104/0354 0104/0357 WV SOS 0235/0291

^{*}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)

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:

Lease Name or Number Colleen Marie Anderson Lease	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
	Colleen Marie Anderson	Antero Resources Corporation	1/8+	0201/0597

*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 C APR 07 2023

The permit applicant for the proposed well work addressed in this application herebyene knowledges 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: Senior Vice President of Land

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April 6, 2023

West Virginia Department of Environmental Protection CEIVED Office of Oil and Gas
Attn: Mr. Taylor Brewer

601 57th Street

Charleston, WV 25304

Mr. Brewer:

Antero Resources 1615 Wynkoop Street Denver, CO 80202 Office 303.357.7310 Fax 303.357.7315

WV Department of Environmental Protection

APR 07 2023

Antero Resources Corporation (Antero) would like to submit the following permit modifications for approved well on the existing Roma Lou Pad: Loki Unit 1H (47-095-02849), and on the existing Ingold Pad: Chiselfinger Unit 1H (47-103-03556), Chiselfinger Unit 2H (47-103-03557), Skinner Hollow Unit 1H (47-103-03558), and Skinner Hollow Unit 2H (47-103-03559) Expedited.

Attached you will find the following:

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

If you have any questions please feel free to contact me at (303) 357-7182.

Thank you in advance for your consideration.

Sincerely,

Stefan Gaspar Permitting Agent Antero Resources Corporation

Enclosures