



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

Friday, May 31, 2024
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for DOLL UNIT 1H
47-085-10516-00-00

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

A handwritten signature in blue ink, appearing to read 'James A. Martin', is positioned to the right of the printed name and title.

Operator's Well Number: DOLL UNIT 1H
Farm Name: NELSON MARK HAYHURST
U.S. WELL NUMBER: 47-085-10516-00-00
Horizontal 6A New Drill
Date Modification Issued: 05/31/2024

Promoting a healthy environment.

05/31/2024

WW-6B
 (04/15)

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

- 1) Well Operator: Antero Resources Corporation Operator ID 494507062 County 085 - Ritchie District Clay Quadrangle Ellenboro 7.5'
- 2) Operator's Well Number: Doll Unit 1H MOD Well Pad Name: Olympus Pad
- 3) Farm Name/Surface Owner: Nelson Mark Hayhurst Public Road Access: Lamberton Rd
- 4) Elevation, current ground: 1025' - AS BUILT Elevation, proposed post-construction: _____
- 5) Well Type (a) Gas Oil _____ Underground Storage _____
 Other _____
 (b) If Gas Shallow Deep _____
 Horizontal _____
- 6) Existing Pad: Yes or No Yes
- 7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 6700' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#
- 8) Proposed Total Vertical Depth: 6700' TVD
- 9) Formation at Total Vertical Depth: Marcellus
- 10) Proposed Total Measured Depth: 28200' MD
- 11) Proposed Horizontal Leg Length: 17004' *Open to modification at a later date
- 12) Approximate Fresh Water Strata Depths: 173', 230'
- 13) Method to Determine Fresh Water Depths: 47085011840000, 47085066360000 Offset well records. Depths have been adjusted according to surface elevations.
- 14) Approximate Saltwater Depths: 430'
- 15) Approximate Coal Seam Depths: N/A
- 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

(a) If Yes, provide Mine Info: Name: _____ RECEIVED
 Office of Oil and Gas
 Depth: _____ MAY 24 2024
 Seam: _____
 Owner: _____ WV Department of
 Environmental Protection

CK #4031427
 # 7500
 5/2/2024

[Handwritten Signature]

5-21-24

WW-6B
 (04/15)

CASING AND TUBING PROGRAM

18)

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	J-55	94#	100'	100' ✓	CTS, 96 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	300'	300' ✓	CTS, 313 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	3000'	3000' ✓	CTS, 1221 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P110-ICY	23#	28200'	28200' ✓	CTS, 6178 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				RECEIVED Office of Oil and Gas
Depths Set:	N/A				MAY 24 2024

WV Department of
 Environmental Protection

James H. [Signature]

5-21-24

WW-6B
(10/14)

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): 18.11 acres
22) Area to be disturbed for well pad only, less access road (acres): 10.00 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

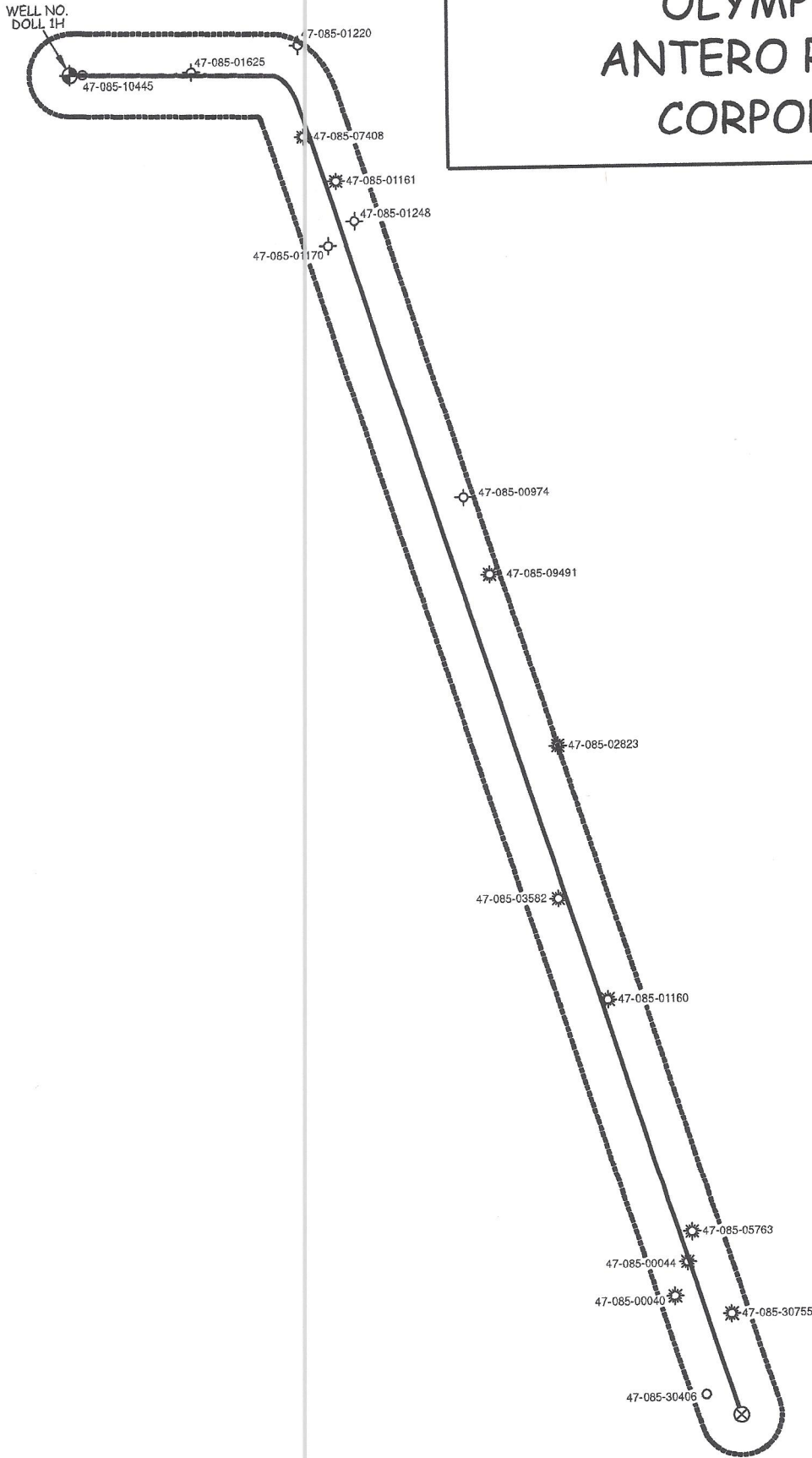
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25) Proposed borehole conditioning procedures:
Conductor: blowhole clean with air, run casing, 10 bbls fresh water.
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe 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.

James M. L.
5-21-24

OLYMPUS PAD ANTERO RESOURCES CORPORATION

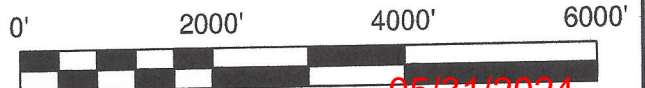


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WILLOW LAND SURVEYING, PLLC
P.O. BOX 17, PENNSBORO, WV 26415
(304) 659-1717

JOB #: 23-020WA

SCALE : 1-INCH = 2000-FEET



DATE: 05/13/24

DRAWN BY: D.L.P.

FILE: DOLL1HAOR.DWG

05/31/2024

DOLL

UWI (API Num)	Well Name	Well Number	Operator	Historical Operator	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Producible Formation(s) not perf'd
4708510450000	OLYMPIUS UNIT	5V	ANTERO RESOURCES CORP	ANTERO RESOURCES CORP				
47085016250000	MARY LOFTUS	1	MYERS HOMER W	MYERS HOMER W	2,092			
47085074080000	GENEVA	1	HARPER CROSBY HOLDINGS LLC	RARE EARTH ENERGY	5,990	3480 - 5880	Udev, Lower Huron, Java, Rhinestreet	Weir, Benson, Alexander, Gordon
47085011700000	A WILSON	1	WILSON JOSEPH E	WILSON JOSEPH E	2,098			Weir, Benson, Alexander, Gordon
4708503820000	W E DOLL HRS	2	DEEM J F OIL & GAS LLC	BLAUSER WELL SERVICE	2,186	1940 - 2118	Blue Monday, Big Injun	Weir, Benson, Alexander, Gordon
47085000440000	C BARNARD	1	MCCALL DRILLING	MCCALL DRILLING	1,845		Maxton	Weir, Benson, Alexander, Gordon
47085000400000	HOOVER WILSON	2	MCCALL DRILLING	MCCALL DRILLING	1,937		Maxton, Undetermined	Weir, Benson, Alexander, Gordon
47085304060000	HOOVER WILSON HEIRS	1	MCCALL DRILLING	MCCALL DRILLING				
47085012200000	MARY LOFTUS	1	DEEM F S	DEEM F S	2,128			
47085011610000	B A CAWLEY	1	UNKNOWN	UNKNOWN	2,079		Big Injun	Weir, Benson, Alexander, Gordon
47085012480000	ANNA K WILSON	2	WILSON JOSEPH E	WILSON JOSEPH E	2,139			
47085009740000	G CLARK ETAL	1	PITTSBURGH&W VA GAS	PITTSBURGH&W VA GAS	1,969			
47085094910000	SHAFFER	3	DEEM J F OIL & GAS LLC	DEEM J FRANK	5,100	3723 - 4664	Riley, Benson	Weir, Alexander, Gordon
47085030220000	JOHN P THOMAS	4	UNKNOWN	UNKNOWN	1,844		Big Injun, Gordon	Weir, Benson, Alexander
47085011600000	C A WILSON	1	MCCULLOUGH A & MILL	MCCULLOUGH A & MILL	1,879		Squaw	Weir, Benson, Alexander, Gordon
47085057630000	BARNARD JOHN HEIRS	1	ZICKFOOSE W F & R L	B & L OIL CO INC	5,995	4503 - 4863	Lower Huron	Weir, Benson, Alexander, Gordon
47085307550000	H B DAVIS 1	15	MCCALL DRILLING	MCCALL DRILLING	2,024		Big Injun, Berea	Weir, Benson, Alexander, Gordon

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LATITUDE 39°17'30" 2,216'

LATITUDE 39°15'00"

2,518' LONGITUDE 81°00'00"

3,821' TO BOTTOM HOLE LONGITUDE 80°57'30"

Antero Resources Corporation Well No. Doll #1H

NOTES: WELL 1H TOP HOLE INFORMATION: N: 289,405ft E: 1,573,215ft LAT: 39°17'05.12" LON: 81°00'28.18" BOTTOM HOLE INFORMATION: N: 272,790ft E: 1,581,282ft LAT: 39°14'22.24" LON: 80°58'42.11" WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS: WELL 1H TOP HOLE INFORMATION: N: 4,348,386m E: 499,339m BOTTOM HOLE INFORMATION: N: 4,343,365m E: 501,882m

(NAD) 27 (UTM) ZONE 17 COORDS: WELL 1H TOP HOLE INFORMATION: N: 14,265,616ft E: 1,638,202ft POINT OF ENTRY INFORMATION: N: 14,265,222ft E: 1,641,028ft BOTTOM HOLE INFORMATION: N: 14,249,143ft E: 1,646,543ft

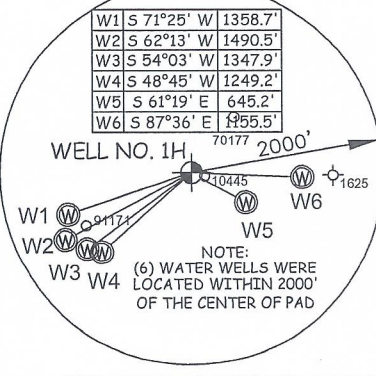
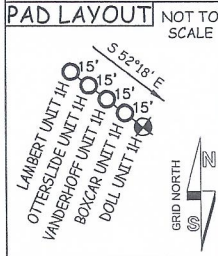
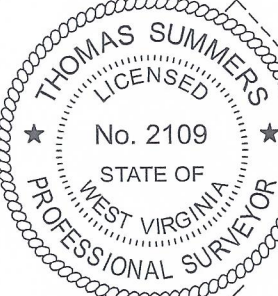


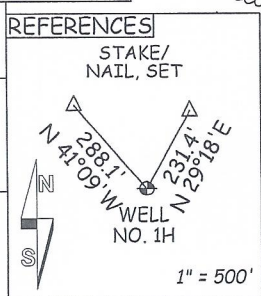
Table with columns LESSOR and well identifiers (A-AE) listing various landowners and entities such as WEST VIRGINIA DIVISION OF MULTIMODAL TRANSPORTATION FACILITIES, THE JAMES W. ANDERSON REVOCABLE LIVING TRUST, CHARLES W. ANDERSON, BRENDA K. EDMISTEN, JPE HARDWOOD LUMBER INC., PENNSBORO INDUSTRIAL PARK DEVELOPMENT AUTHORITY, INC., THE CARL G. NIELSEN FAMILY TRUST, ELEANOR MAPLE, ELEANOR D. MAPLE, ELEANOR DOTSON MAPLE, HARRY E. SHAFFER, ALICE D. ZEGREA, JOHN P. THOMAS ET AL, RIDGETOP APPALACHIA, LLC, SW2 MINERALS, LLC, DORIS SUE KERNS, JUDITH A. BEARY, GREENBRIER ROYALTY FUND II, LLC, CHAD W. JOHNSON, EIGG LAND LIMITED, HAUGHT FAMILY TRUST, ORVILLE R. BONNELL ET AL, ELKHORN MINERALS III, LLC, WILSON-JOHNSON FAMILY, LLC, SCOTT GREGORY LAMBERT, ERNEST DOLL, EVELYN HAYHURST, JAMES MERCER, REX FREELAND ET AL, JAMES E. RAINES ET AL, GALE F. TINGLER ET UX.



I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS. WILLOW LAND SURVEYING PLLC 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415



JOB # 23-020WA DRAWING # DOLL1HP SCALE 1" = 2000' MINIMUM DEGREE OF ACCURACY SUBMETER PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

LEGEND: Surface Owner Boundary Lines +/-, Adjoining Surface Tracts +/-, Found monument, as noted. THOMAS SUMMERS P.S. 2109 DATE 04/16/24 OPERATOR'S WELL# DOLL UNIT #H

Table listing landowners and acreage: PENNSBORO CORPORATION RITCHIE COUNTY, JPE Hardwood Lumber Inc., Tracey Tallman, Brenda Edmisten, Louwilda Satterfield, JPE Hardwood Lumber Inc., Simonton Building Products Inc., Pennsboro Industrial Park Dev. Authority, Pennsboro Industrial Park, Simonton Building Products Inc., Simonton Building Products Inc., Simonton Building Products Inc., Simonton Building Products Inc., Simply Blessed Designs & Rentals LLC, Charles Richards.

NOTE: NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHELTER DAIRY CATTLE OR POULTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY-FIVE (625) FEET OF THE CENTER OF THE WELL PAD.

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___ 47 - 085 - 10516 COUNTY NAME PERMIT (IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X STATE COUNTY PERMIT LOCATION: ELEVATION AS BUILT - 1,025' WATERSHED NORTH FORK HUGHES RIVER DISTRICT CLAY COUNTY RITCHIE QUADRANGLE ELLENBORO 7.5' ACREAGE 9.65 ACRES +/- SURFACE OWNER NELSON MARK HAYHURST LEASE ACREAGE 9.65 ACRES+ OIL & GAS ROYALTY OWNER EVELYN HAYHURST PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER X REDRILL ___ FRACTURE OR STIMULATE PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL X (SPECIFY) MOD-BHL PLUG & ABANDON CLEAN OUT & REPLUG TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,700' TVD 28,200' MD WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT KEVIN ELLIS ADDRESS 1615 WYNKOOP ST. ADDRESS 535 WHITE OAKS BLVD BRIDGEPORT, WV 26330

05/31/2024

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
<u>H: The Carl G. Nielson Family Trust Lease</u> The Carl G. Nielson Family Trust	Antero Resources Corporation	1/8+	0332/0224
<u>I: Eleanor Maple Lease</u> Eleanor Maple	Antero Resources Corporation	1/8+	0338/0927
<u>J2: Eleanor Dotson Maple Lease</u> Eleanor Dotson Maple	Antero Resources Corporation	1/8+	0317/0749
<u>J1: Eleanor D. Maple Lease</u> Eleanor D. Maple	Antero Resources Corporation	1/8+	0339/0331
<u>K: Harry E. Shaffer Lease</u> Harry E. Shaffer	Antero Resources Corporation	1/8+	0339/0455
<u>N: Ridgetop Appalachia, LLC. Lease</u> Ridgetop Appalachia, LLC.	Antero Resources Corporation	1/8+	0336/0879
<u>O: SW2 Minerals, LLC. Lease</u> SW2 Minerals, LLC.	Antero Resources Corporation	1/8+	0333/0034
<u>Q: Judith A. Beary Lease</u> Judith A. Beary	Antero Resources Corporation	1/8+	0337/0312
<u>R: Greenbrier Royalty Fund II, LLC. Lease</u> Greenbrier Royalty Fund II, LLC. SEP Exploration, LLC	SEP Exploration, LLC Antero Resources Corporation	1/8+ Agreement	0344/0437 0345/0540
<u>S: Chad W. Johnson Lease</u> Chad W. Johnson	Antero Resources Corporation	1/8+	0332/0557
<u>T: EIGG Land Limited Lease</u> EIGG Land Limited	Antero Resources Corporation	1/8+	0338/0203
<u>V: Orville R. Bonnell Et Al Lease</u> Orville R. Bonnell Et Al Dennis D. Blauser Blauser Energy Corporation	Dennis Blauser Blauser Energy Corporation Antero Resources Corporation	1/8 Assignment Assignment	0018/0426 0204/0795 0265/0648
<u>T: EIGG Land Limited Lease</u> EIGG Land Limited	Antero Resources Corporation	1/8+	0338/0203

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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 – Antero is utilizing the Co-tenancy Modernization and Majority Protection Act to proceed with development of certain royalty owners' interests in this tract.

**Pooling/Unitization – Antero has filed a horizontal well unitization application with the West Virginia Oil and Gas Conservation Commission that seeks to pool certain owners in this tract.

05/31/2024

**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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(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
<u>W: Elkhorn Minerals III, LLC. Lease</u>	Elkhorn Minerals III, LLC.	Antero Resources Corporation	1/8+	0338/0754

*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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**Pooling/Unitization – Antero has filed a horizontal well unitization application with the West Virginia Oil and Gas Conservation Commission that seeks to pool certain owners in this tract.

**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

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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