



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

Thursday June 27, 2024
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for Otterslide 1H
47-085-10519-00-00

Extended lateral length

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.

A blue ink signature of James A. Martin, written in a cursive style.

James A. Martin
Chief

Operator's Well Number: Otterslide 1H
Farm Name: Nelson Mark Heyhurst
U.S. WELL NUMBER: 47-085-10519-00-00
Horizontal 6A New Drill
Date Modification Issued: 6/27/2024

Promoting a healthy environment.

06/28/2024

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

1) Well Operator: Antero Resources Corporation 494507062 085 - Ritchie Clay Ellenboro 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Otterside 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: 29500' MD

11) Proposed Horizontal Leg Length: 20606' *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

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(a) If Yes, provide Mine Info: Name: _____

Depth: _____ **JUN 14 2024**

Seam: _____ WY Department of

Owner: _____ Environmental Protection

WW-6B
(04/15)

API NO. 47-085 - 10519
 OPERATOR WELL NO. Otterside Unit 1H MOD
 Well Pad Name: Olympus Pad

18)

CASING AND TUBING PROGRAM

TYPE	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
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#	29500'	29500'	CTS, 6506 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

TYPE	<u>Size (in)</u>	<u>Wellbore Diameter (in)</u>	<u>Wall Thickness (in)</u>	<u>Burst Pressure (psi)</u>	<u>Anticipated Max. Internal Pressure (psi)</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
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							

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PACKERS

JUN 14 2024

Kind:	N/A				
Sizes:	N/A				WV Department of Environmental Protection
Depths Set:	N/A				

Quincy Neal
6-12-24 Page 2 of 3

06/28/2024

WW-6B
(10/14)

API NO. 47-085 - 10519
OPERATOR WELL NO. Otterlake Unit 1H MOD
Well Pad Name: Olympus 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): 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.

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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.

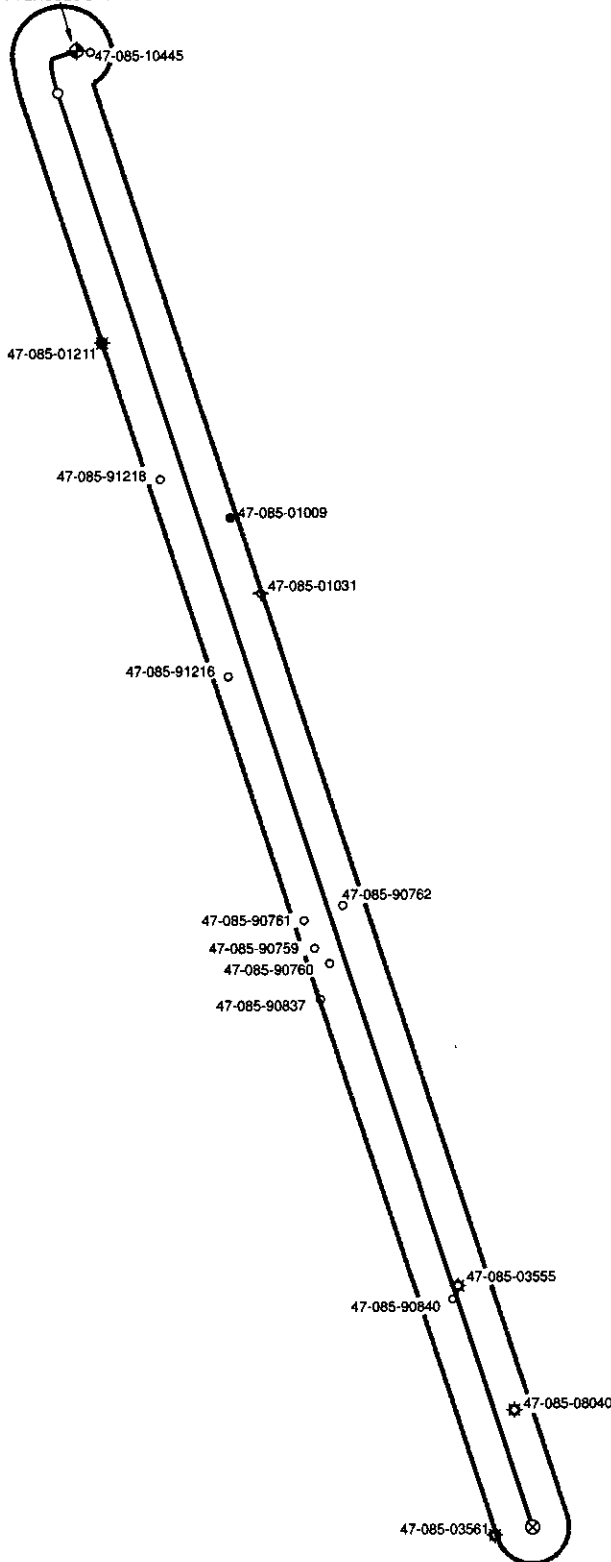
*Note: Attach additional sheets as needed.


Page 3 of 3
6-12-24

06/28/2024

OLYMPUS PAD ANTERO RESOURCES CORPORATION

WELL NO.
OTTERSLIDE 1H



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

JOB #: 23-030WA

DATE: 06/04/24

DRAWN BY: D.L.P.

FILE: OTTERSLIDE1HAOR.DWG

SCALE : 1-INCH = 2000-FEET

0' 2000' 4000' 6000'



06/28/2024

UWI (API Num)	Well Name	Well Number	Operator	Historical Operator	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Producible Formation(s) not perf'd
47085104450000	OLYMPUS UNIT	5V	ANTERO RESOURCES CORP					
47085012110000	L L LAMBERT	4	LAMBERT L L	LAMBERT L L	2,020		Big Injun	Weir, Benson, Alexander, Gordon
47085912180000								
47085010090000	A J RAMSEY ETAL	1	HARTMAN E C OIL & GAS	HARTMAN E C OIL & GAS	2,155		Squaw	Weir, Benson, Alexander, Gordon
47085010310000	A J RAMSEY	1	HARTMAN E C OIL & GAS	HARTMAN E C OIL & GAS	2,075			Weir, Benson, Alexander, Gordon
47085912160000								
47085907620000								
47085907610000								
47085907590000								
47085907600000								
47085908370000								
47085035550000	EARL WILSON	2	LUCAS WELL SERVICE INC	BLAUSER WELL SERVICE	1,798			Weir, Benson, Alexander, Gordon
47085908400000								
47085080400000	MABEL STAGGERS	5204	GREYLOCK OPCO LLC	EASTERN AMERICAN ENE	5,122	4267 - 4913	Riley, Alexander	Weir, Benson, Gordon
47085035610000	EARL WILSON	5	LUCAS WELL SERVICE INC	BLAUSER WELL SERVICE	2,026	1876 - 1984	Big Injun	Weir, Benson, Alexander, Gordon

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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>AC: Evelyn Hayhurst Lease</u>			
Evelyn Hayhurst Antero Resources Appalachian Corporation	Antero Resources Appalachian Corporation Antero Resources Corporation	1/8+ Name Change	0260/0279 0015/0705
<u>B: Antero Minerals, LLC. Lease</u>			
Antero Minerals, LLC.	Antero Resources Corporation	1/8+	0340/0661
<u>C: West Virginia Division of Multimodal Transportation Facilities Lease</u>			
West Virginia Division of Multimodal Transportation	Antero Resources Corporation	1/8+	0336/0335
<u>B: Antero Minerals, LLC. Lease</u>			
Antero Minerals, LLC.	Antero Resources Corporation	1/8+	0340/0661
<u>D: Mildred May Lambert Lease</u>			
Mildred May Lambert Alan Gable Oil Development Co. GasSearch Corporation Linn Energy Holdings, LLC XTO Energy, Inc.	Alan Gable Oil Development Co. GasSearch Corporation Linn Energy Holdings, LLC XTO Energy, Inc. Antero Resources Corporation	1/8+ Assignment Assignment Assignment Assignment	0157/0769 0207/0628 0239/0118 0246/0814 0295/0836
<u>E: The Carl G. Nielson Family Trust Lease</u>			
The Carl G. Nielson Family Trust	Antero Resources Corporation	1/8+	0332/0224
<u>F: Lowell E. Goff and Janet S. Goff Lease</u>			
Lowell E. Goff and Janet S. Goff SEP Exploration, LLC	SEP Exploration, LLC Antero Resources Corporation	1/8+ Agreement	0344/0693 0345/0526
<u>G: Laura M. Ulam Lease</u>			
Laura M. Ulam	Antero Resources Corporation	1/8+	0344/0667
<u>I: Gerald V. Wilson Lease</u>			
Gerald V. Wilson	Antero Resources Corporation	1/8+	0339/0007
<u>J: Waymond L. Mahaney and Mary E. Mahaney Lease</u>			
Waymond L. Mahaney and Mary E. Mahaney J.F. Deem J.F. Deem Oil & Gas, LLC CHK Louisiana, LLC Chesapeake Exploration, LLC SWN Production Company, LLC	J.F. Deem J.F. Deem Oil & Gas, LLC CHK Louisiana, LLC Chesapeake Exploration, LLC SWN Production Company, LLC Antero Resources Corporation	1/8 Assignment Assignment Merger Assignment Assignment	0213/0105 0228/0230 0247/0891 OKSOS 0280/0707 Pooled Tract
<u>K: Haught Family Trust Lease</u>			
Haught Family Trust	Antero Resources Corporation	1/8+	0339/0004
<u>M: Chad W. Johnson Lease</u>			
Chad William Johnson	Antero Resources Corporation	1/8+	0346/0120

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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
N: Ridgetop Appalachia, LLC. Lease Ridgetop Appalachia, LLC.	Antero Resources Corporation	1/8+	0339/0126
O: Bobby J. Bunner Lease Bobby J. Bunner	Antero Resources Corporation	1/8+	0338/0990
P: David L. Riddle Lease David L. Riddle	Antero Resources Corporation	1/8+	0341/0225
R: ET Blue Grass, LLC. Lease ET Blue Grass, LLC.	Antero Resources Corporation	1/8+	0343/0564
S: Antero Minerals, LLC. Lease Antero Minerals, LLC.	Antero Resources Corporation	1/8+	0337/0054
U: Judith A. Beary Lease Judith A. Beary	Antero Resources Corporation	1/8+	0340/0260
T: Greenbrier Royalty Fund II, LLC. Lease Greenbrier Royalty Fund II, LLC. SEP Exploration, LLC	SEP Exploration, LLC Antero Resources Corporation	1/8+ Agreement	0344/0437 0345/0526
Y: Sandra Kay Reed Lease Sandra Kay Reed	Antero Resources Corporation	1/8+	0339/0021
Z: Chad William Johnson Lease Chad William Johnson	Antero Resources Corporation	1/8+	0346/0132
AA: Pathfinder Resources IV, LLC. Lease Pathfinder Resources IV, LLC. SEP Exploration, LLC	SEP Exploration, LLC Antero Resources Corporation	1/8+ Agreement	0344/0739 0345/0526

*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.

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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
AB: Burl Dodd, Et Al Lease				
	Burl Dodd, Et Al	Dennis D. Blauser	1/8	0118/0318
	Dennis D. Blauser	Thomas H. Burrows	Assignment	0118/0792
	Thomas H. Burrows	Cedar Petroleum	Assignment	0118/0790
	Cedar Petroleum	Donald V. Belatini	Affidavit	0265/0645
	Donald V. Belatini	Blauser Energy Corporation	Assignment	0169/0352
	Blauser Energy Corporation	Antero Resources Corporation	Assignment	0265/0648

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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

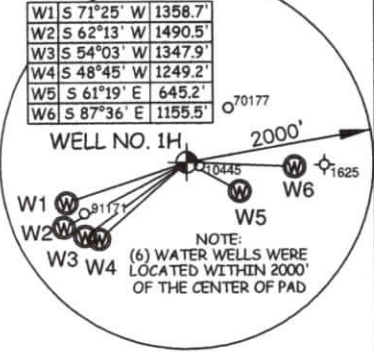
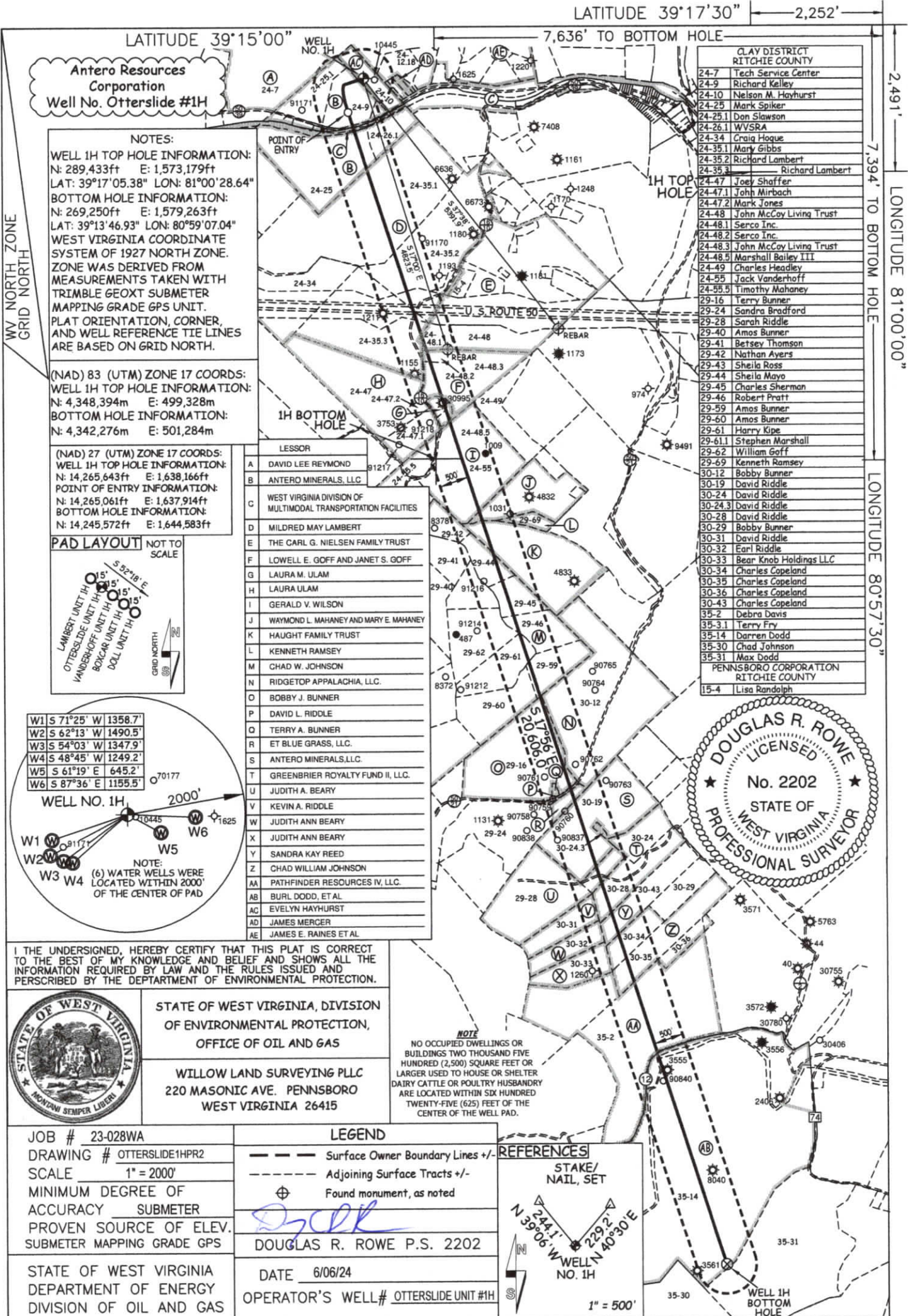
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Environmental Protection

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: Tim Rady
 Its: Senior Vice President of Land



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

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.

JOB # 23-028WA
DRAWING # OTTERSIDE1HPR2
SCALE 1" = 2000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

LEGEND
--- Surface Owner Boundary Lines +/-
- - - - - Adjoining Surface Tracts +/-
⊕ Found monument, as noted

REFERENCES
STAKE/ NAIL, SET
N 244.1' W 229.2' E
WELL NO. 1H
1" = 500'

STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

DATE 6/06/24
OPERATOR'S WELL# OTTERSIDE UNIT #1H

WELL TYPE: OIL ___ GAS LIQUID INJECTION ___ WASTE DISPOSAL ___ 47 - 085 - 10519
(IF "GAS") PRODUCTION STORAGE ___ DEEP ___ SHALLOW STATE COUNTY PERMIT

LOCATION: ELEVATION AS BUILT - 1,025' WATERSHED NORTH FORK HUGHES RIVER
QUADRANGLE ELLENBORO 7.5' DISTRICT CLAY COUNTY RITCHIE

SURFACE OWNER NELSON MARK HAYHURST ACREAGE 9.65 ACRES +/-
OIL & GAS ROYALTY OWNER EVELYN HAYHURST LEASE ACREAGE 9.65 ACRES±

PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER REDRILL ___ FRACTURE OR STIMULATE
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL ___
(SPECIFY) MOD-BHL PLUG & ABANDON CLEAN OUT & REPLUG

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,700' TVD 29,500' MD
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT KEVIN ELLIS
ADDRESS 1615 WYNKOOP ST. ADDRESS 535 WHITE OAKS BLVD

FORM WW-6 DENVER, CO 80202 BRIDGEPORT, WV 26330

06/28/2024

COUNTY NAME PERMIT