



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 HANELY UNIT 1H
47-085-10512-00-00

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: HANLEY UNIT 1H
Farm Name: MICHEAL UNDERWOOD ET AL
U.S. WELL NUMBER: 47-085-10512-00-00
Horizontal 6A New Drill
Date Modification Issued: 5/31/2024

Promoting a healthy environment.

03/14/2025

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: Hanely Unit 1H MOD Well Pad Name: Pinewood Pad

3) Farm Name/Surface Owner: Michael Underwood Et Al Public Road Access: Pinewood Lane

4) Elevation, current ground: 1066' - 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: 28100' MD

11) Proposed Horizontal Leg Length: 17458' *Open to modification at a later date

12) Approximate Fresh Water Strata Depths: 200', 378', 878'

13) Method to Determine Fresh Water Depths: 47085088860000, 47085077500000 Offset well records. Depths have been adjusted according to surface elevations.

14) Approximate Saltwater Depths: 1490'

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: _____

Seam: _____ **MAY 22 2024**

Owner: _____ WV Department of
Environmental Protection


5-21-24

18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<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#	928'	928'	CTS, 967 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#	28100'	28100'	CTS, 6153 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

<u>TYPE</u>	<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							

PACKERS

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

James Hill
5-21-24

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): 19.86 acres

22) Area to be disturbed for well pad only, less access road (acres): 8.21 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:

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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

WV Department of
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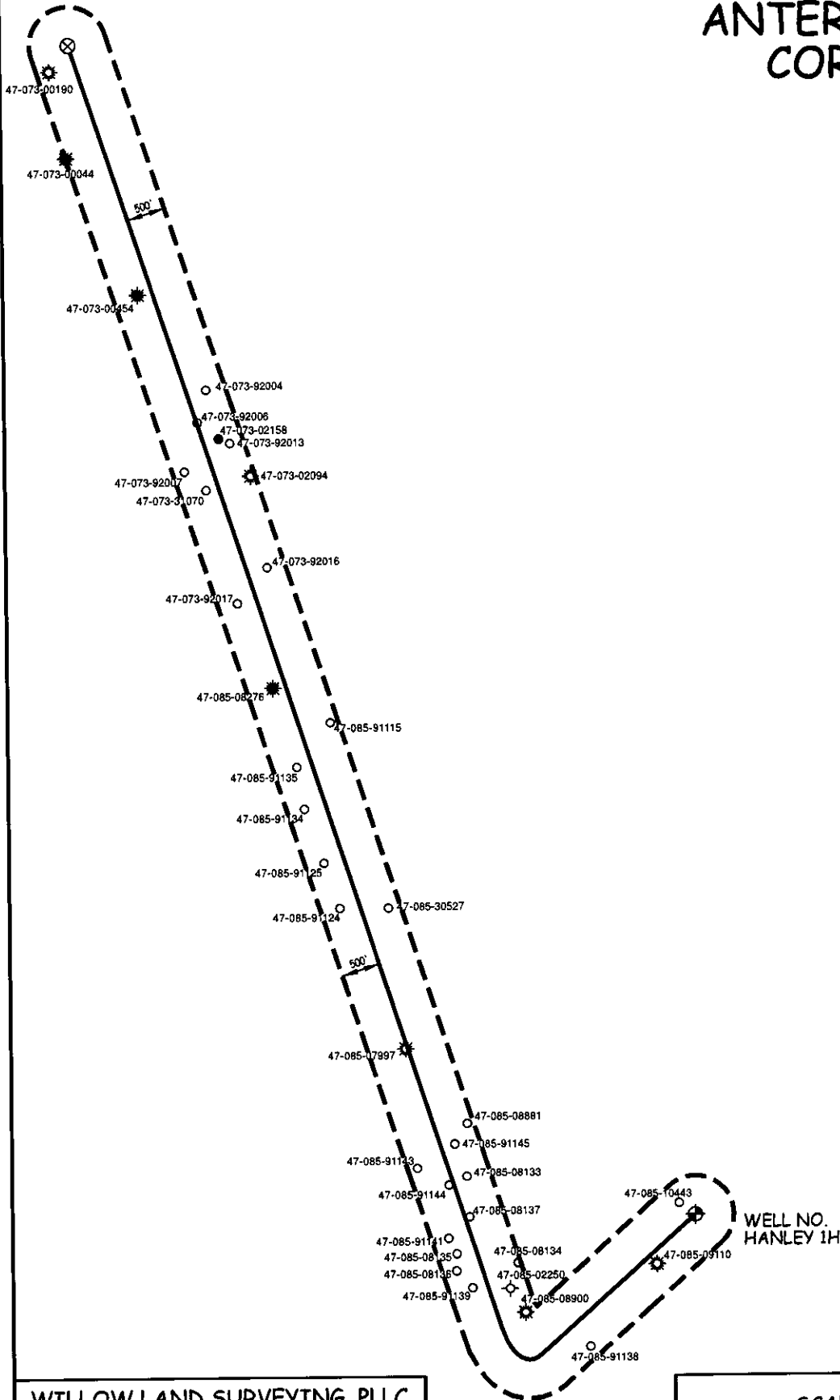
25) Proposed borehole conditioning procedures:

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 Paul
5-21-24

PINEWOOD PAD ANTERO RESOURCES CORPORATION



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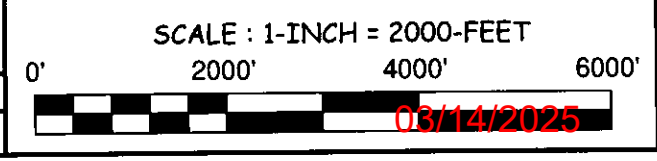
WILLOW LAND SURVEYING, PLLC
P.O. BOX 17, PENNSBORO, WV 26415
(304) 659-1717

JOB #: 23-027WA

DATE: 11/28/23

DRAWN BY: D.R.R.

FILE: HANLEY1HAOR.DWG



UWI (API Num)	Well Name	Well Number	Operator	Historical Operator	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Producing Formation(s) not perf'd
47085104430000	AR PINWOOD	5V	ANTERO RESOURCES CORP	ANTERO RESOURCES CORP				
47085091100000	UNDERWOOD R L	4	MACFARLAN OIL & GAS	MACFARLAN OIL & GAS	2,804	1801 - 2734	Big Injun, Fifth	Weir, Gordon, Benson, Alexander
47085911380000								
47085081360000	M E PACKMAN JR	4	MACFARLAN OIL & GAS	MACFARLAN OIL & GAS				
47085081350000	M E PACKMAN JR	3	MACFARLAN OIL & GAS	MACFARLAN OIL & GAS				
47085911410000								
47085911440000								
47085911430000								
47085079970000	ADAH VIRGINIA MOSSOR	1	ALLIANCE PETROLEUM CO LLC	PARDEE GAS	4,852	4679 - 4685	Benson	Weir, Gordon, Alexander
47085911240000								
47085911250000								
47085911340000								
47085911350000								
47085082760000	CALVIN BUTCHER	5	GLASS DEVELOPMENT CO	BIG KNOT OIL CO	1,986		Maxton, Keener	Weir, Gordon, Benson, Alexander
47073920170000								
47073310700000	J W GARRELL	2	HANLON OIL & GAS CO	HANLON OIL & GAS CO				
47073920070000								
47073004540000	J M & J S MORRISON	1	TUDESCO RALPH	TUDESCO RALPH	2,082		Big Lime, Gordon Stray, Fifth	Weir, Gordon, Benson, Alexander
47073000440000	J J SIMONTON	1	HEFLIN DORA	MAX OIL&GAS DRLG INC	1,750		Maxton	Weir, Gordon, Benson, Alexander
47073001900000	1ST NAT'L BANK	2	MAX OIL&GAS DRLG INC	MAX OIL&GAS DRLG INC	1,887		Big Injun	Weir, Gordon, Benson, Alexander
47073920040000								
47073920060000								
47073021580000	ROBERT JAY	1	ALEXANDER PRODUCTION CO	UNKNOWN			Big Lime	Weir, Gordon, Benson, Alexander
47073920130000								
47073020940000	GORRELL J W HEIRS	1	ALLIANCE PETROLEUM CO LLC	PARDEE GAS	5,077	4889 - 4893	1st Salt Sand, 3rd Salt Sand, Maxton, Keener	Weir, Gordon, Benson, Alexander
47073920160000								
47085911150000								
47085305270000	C P BROADWATER 2	6270	HOPE NATURAL GAS	HOPE NATURAL GAS	1,983		Big Injun	Weir, Gordon, Benson, Alexander
47085088810000	MOSSOR	1	MACFARLAN OIL & GAS	MACFARLAN OIL & GAS	5,200			Weir, Gordon, Benson, Alexander
47085911450000								
47085081330000	M E PACKMAN JR	1	MACFARLAN OIL & GAS	MACFARLAN OIL & GAS				
47085081370000	M E PACKMAN JR	5	MACFARLAN OIL & GAS	MACFARLAN OIL & GAS				
47085081340000	M E PACKMAN JR	2	MACFARLAN OIL & GAS	MACFARLAN OIL & GAS				
47085022500000	HARRY MIHLBAUER	9	HANLON OIL & GAS CO	HANLON OIL & GAS CO	1,955			Weir, Gordon, Benson, Alexander

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LATITUDE 39°20'00" 8,710'

LATITUDE 39°22'30" 5,106' TO BOTTOM HOLE

9,212' TO BOTTOM HOLE
9,030'
LONGITUDE 81°02'30"
LONGITUDE 81°00'00"

Antero Resources Corporation
Well No. Hanely #1H

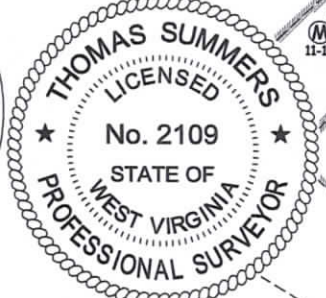
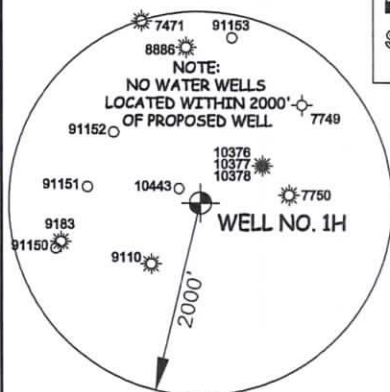
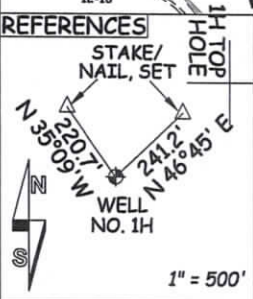
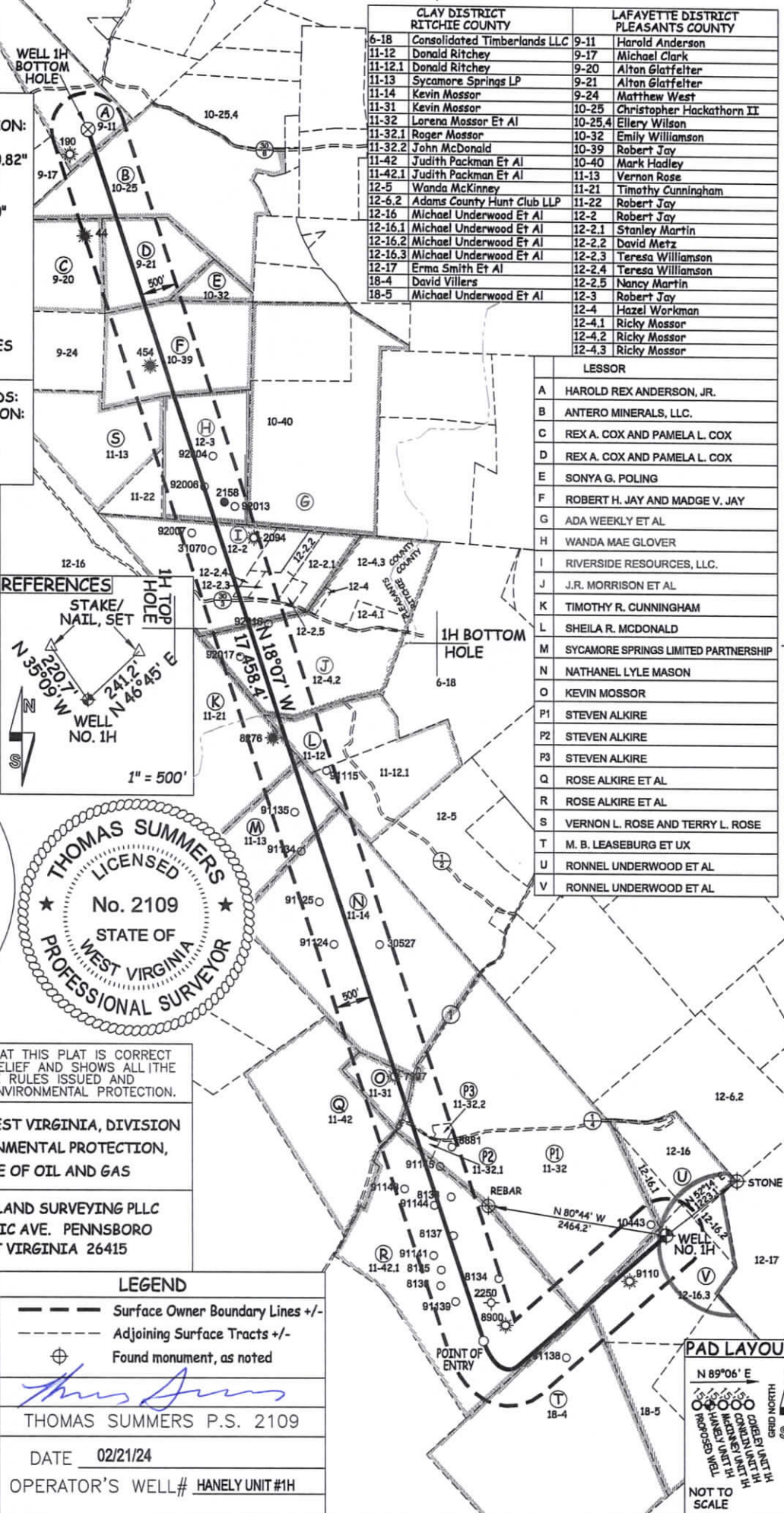
NOTES:
WELL 1H TOP HOLE INFORMATION:
N: 298,177ft E: 1,566,866ft
LAT: 39°18'30.75" LON: 81°01'50.82"
BOTTOM HOLE INFORMATION:
N: 313,310ft E: 1,558,939ft
LAT: 39°20'58.95" LON: 81°03'35.00"
WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE.
ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT 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: 4,351,026m E: 497,361m
BOTTOM HOLE INFORMATION:
N: 4,355,596m E: 494,869m

(NAD) 27 (UTM) ZONE 17 COORDS:
WELL 1H TOP HOLE INFORMATION:
N: 14,274,277ft E: 1,631,709ft
POINT OF ENTRY INFORMATION:
N: 14,272,775ft E: 1,629,235ft
BOTTOM HOLE INFORMATION:
N: 14,289,270ft E: 1,623,534ft

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.

WV NORTH ZONE
GRID NORTH



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 # 23-027WA
DRAWING # HANELY1HPR1
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 02/21/24
OPERATOR'S WELL# HANELY UNIT #1H

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___ 47 - 085 - 10512
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X STATE COUNTY PERMIT
LOCATION: ELEVATION 1,066' - AS BUILT WATERSHED NORTH FORK HUGHES RIVER
QUADRANGLE ELLENBORO 7.5' DISTRICT CLAY COUNTY RITCHIE
SURFACE OWNER MICHAEL UNDERWOOD ET AL ACREAGE 50 ACRES +/-
OIL & GAS ROYALTY OWNER RONNEL L. UNDERWOOD ET AL LEASE ACREAGE 266.83 ACRES ±

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 28,100' 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

03/14/2025

COUNTY NAME PERMIT

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>V: Ronnel Underwood Et Al Lease</u>			
Ronnel Underwood Et Al	Walter C. Alkire	1/8	0233/0273
Walter C. Alkire	The Walter C. Alkire, Jr. Family Trust	Agreement	0313/0400
The Walter C. Alkire, Jr. Family Trust	Antero Resources Corporation	Assignment	0271/0834
<u>U: Ronnel Underwood Et Al Lease</u>			
Ronnel Underwood Et Al	Walter C. Alkire	1/8	0199/0020
Walter C. Alkire	The Walter C. Alkire, Jr. Family Trust	Agreement	0313/0400
The Walter C. Alkire, Jr. Family Trust	Antero Resources Corporation	Assignment	0271/0834
<u>T: M.B. Leaseburg Et Ux Lease</u>			
M.B. Leaseburg Et Ux	A.C. Mercer	1/8	0080/0261
A.C. Mercer	Florizel Woodford	Assignment	0080/0267
Florizel Woodford	Rich Oil & Gas Company	Assignment	0081/0236
Rich Oil & Gas Company	W.H. Mossor	Assignment	0098/0256
W.H. Mossor	J&J Enterprises, Inc.	Assignment	0133/0004
J&J Enterprises, Inc.	Term Energy Corporation	Assignment	0172/0336
Term Energy Corporation	Antero Resources Corporation	Assignment	0283/0595
<u>P1: Steven Alkire Lease</u>			
Steven Alkire	Antero Resources Corporation	1/8+	0340/0291
<u>R: Rose Alkire Et Al Lease</u>			
Rose Alkire ET Al	Walter C. Alkire	1/8	0143/0521
Walter C. Alkire	The Walter C. Alkire, Jr. Family Trust	Agreement	0313/0400
The Walter C. Alkire, Jr. Family Trust	Antero Resources Corporation	Assignment	0289/0050
<u>P2: Steven Alkire Lease</u>			
Steven Alkire	Antero Resources Corporation	1/8+	0340/0291
<u>P1: Steven Alkire Lease</u>			
Steven Alkire	Antero Resources Corporation	1/8+	0340/0291
<u>O: Kevin Mossor Lease</u>			
Kevin Mossor	Antero Resources Corporation	1/8+	0337/0139
<u>N: Nathanel Lyle Mason Lease</u>			
Nathanel Lyle Mason	Antero Resources Corporation	1/8+	0346/0258
<u>M: Sycamore Springs Limited Partnership Lease</u>			
Sycamore Springs Limited Partnership	Antero Resources Corporation	1/8+	0319/0453
<u>K: Timothy R. Cunningham Lease</u>			
Timothy R. Cunningham	Antero Resources Corporation	1/8+	0327/0564
<u>L: Sheila R. McDonald Lease</u>			
Sheila R. McDonald	Antero Resources Corporation	1/8+	0331/0857

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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)

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Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
J: J.R. Morrison Et Al Lease			
J.R. Morrison Et Al	Shafer Gas & Oil Company	1/8	0152/0289
Shafer Gas & Oil Company	Earl Grissom	Agreement	0170/0017
Earl Grissom	Frank A. Browning	Agreement	0171/0119
Frank A. Browning	W.E.B. Well Trending Services	Assignment	0245/0256
W.E.B. Well Trending Services	Triad Energy Corporation	Assignment	0255/0669
Triad Energy Corporation	Triad Hunter, LLC	Assignment	0277/0482
Triad Hunter, LLC	Blue Ridge Mountain Resources, Inc.	Assignment	0344/0319
Blue Ridge Mountain Resources, Inc.	Eclipse Resources I, LP	Assignment	0344/0312
Eclipse Resources I, LP	Antero Resources Corporation	Assignment	Pooled Tract
I: Riverside Resources, LLC. Lease			
Riverside Resources, LLC.	Antero Resources Corporation	1/8+	0357/0019
H: Wanda Mae Glover Lease			
Wanda Mae Glover	Antero Resources Corporation	1/8+	0358/0021
F: Robert H. Jay and Madge V. Jay Lease			
Robert H. Jay and Madge V. Jay	Pardee Gas Company	1/8	0219/0454
Pardee Gas Company	Pardee Exploration Company	Assignment	0228/0648
Pardee Exploration Company	Pardee Resources Group	Merge	0007/0346
Pardee Resource Group	Pardee Minerals, LLC	Merge	WVSOS
Pardee Minerals, LLC	Irish Resources, Inc.	Assignment	0298/0435
Irish Resources, Inc.	Antero Resources Corporation	Assignment	0300/0449
D: Rex A. Cox and Pamela L. Cox Lease			
Rex A. Cox and Pamela L. Cox	Antero Resources Corporation	1/8+	0353/0394
B: Antero Minerals, LLC. Lease			
Antero Minerals, LLC.	Antero Resources Corporation	1/8+	0353/0003

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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.

**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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Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
A: Harold Rex Anderson, Jr. Lease				
	Harold Rex Anderson, Jr.	Antero Resources Corporation	1/8+	0347/0301

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**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
 Its: Senior Vice President of Land

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West Virginia Department of
Environmental Protection