



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

Monday, April 29, 2024
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for COKELEY UNIT 1H
47-085-10511-00-00

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.

A handwritten signature in blue ink, appearing to read "James A. Martin".

James A. Martin
Chief

Operator's Well Number: COKELEY UNIT 1H
Farm Name: MICHAEL UNDERWOOD ET AL
U.S. WELL NUMBER: 47-085-10511-00-00
Horizontal 6A New Drill
Date Modification Issued: 04/29/2024

Promoting a healthy environment.

05/03/2024

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: Cokeley 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 X Oil _____ Underground Storage _____
Other _____
(b) If Gas Shallow X Deep _____
Horizontal X _____
- 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: 25200' MD
- 11) Proposed Horizontal Leg Length: 16303' *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 X

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CK# 4030600
\$ 7500.00
Received 4/18/2024

James P. [Signature]

05/03/2024

18)

CASING AND TUBING PROGRAM

| 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# | 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# | 25200' | 25200' ✓ | CTS, 5422 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

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| | | | | |
|-------------|-----|--|--|---|
| Kind: | N/A | | | APR 26 2024 |
| Sizes: | N/A | | | WV Department of Environmental Protection |
| Depths Set: | N/A | | | |

James P. ...

4-23-2024

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:

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

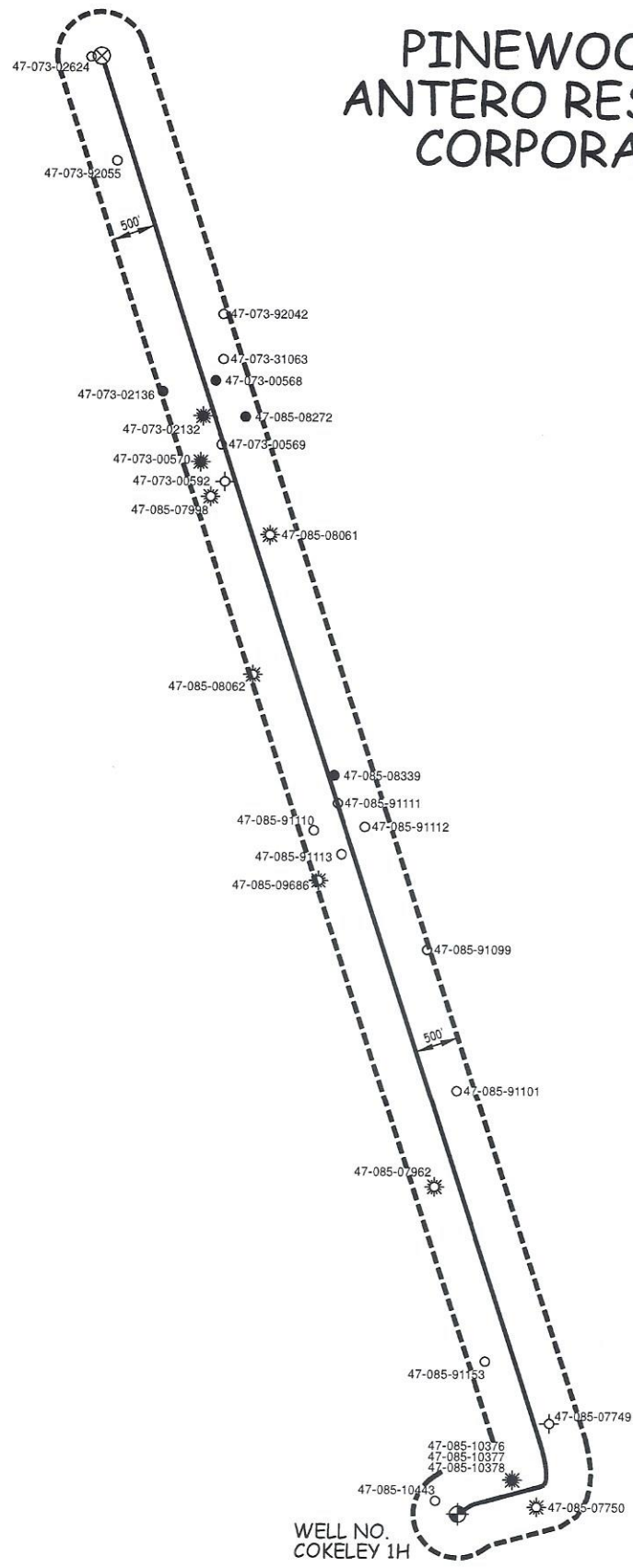
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25) Proposed borehole conditioning procedures:

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.

PINEWOOD PAD ANTERO RESOURCES CORPORATION



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

JOB #: 23-025WA

DATE: 11/29/23

DRAWN BY: D.R.R.

FILE: COKELEY1HAOR.DWG

SCALE : 1-INCH = 2000-FEET



05/03/2024

| 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 | | | | |
| 47085103780000 | EVERLY UNIT | 1H | ANTERO RESOURCES CORP | ANTERO RESOURCES CORP | 14,453 | 6640 - 14330 | Marcellus | |
| 47085103770000 | HAYHURST UNIT | 2H | ANTERO RESOURCES CORP | ANTERO RESOURCES CORP | 16,519 | 6512 - 16398 | Marcellus | |
| 47085103760000 | HAYHURST UNIT | 1H | ANTERO RESOURCES CORP | ANTERO RESOURCES CORP | 15,544 | 6693 - 15373 | Marcellus | |
| 47085911530000 | | | | | | | | |
| 47085079620000 | NICHOLS MICHAEL | 3 | HARPER CROSBY HOLDINGS LLC | RARE EARTH ENERGY | 2,933 | 1917 - 2867 | Keener, Big Injun, Weir, Thirty Foot | Gordon, Benson, Alexander |
| 47085098660000 | COOL JOHN | 3 | KEY OIL CO | KEY OIL CO | 4,838 | 4701 - 4704 | Benson | Weir, Gordon, Benson, Alexander |
| 47085911110000 | | | | | | | | |
| 47085089620000 | T BUTCHER | 2 | ALLIANCE PETROLEUM CO LLC | PARDEE GAS | 5,050 | 4906 - 4912 | Benson | Weir, Gordon, Benson, Alexander |
| 47085079980000 | SMITH JOHN A | 4 | PARDEE GAS | PARDEE GAS | | | | |
| 47073005920000 | JOHN FREELAND | 10 | WV WELLS LTD | HANLON OIL & GAS CO | 2,072 | 1821 - 1830 | | |
| 47073005700000 | JOHN FREELAND | 9 | WV WELLS LTD | HANLON OIL & GAS CO | 1,975 | | | |
| 47073021320000 | ELOY WAGNER | 3 | WV WELLS LTD | BIG KNOT OIL CO | 1,875 | | | |
| 47073021360000 | ELOY WAGNER HRS | 7 | WV WELLS LTD | BIG KNOT OIL CO | 1,873 | | | |
| 47073028240000 | | | | | | | | |
| 47073920420000 | | | | | | | | |
| 47073310630000 | JACOB MORRISON | 2 | HANLON OIL & GAS CO | HANLON OIL & GAS CO | | | | |
| 47073005680000 | FLOYD WAGNER | 12 | BEECHLICK OIL INC | HANLON OIL & GAS CO | 2,040 | | Salt Sands, Big Injun | Weir, Gordon, Benson, Alexander |
| 47085087200000 | ELOY WAGNER | 1 | WV WELLS LTD | BIG KNOT OIL CO | 1,931 | | Big Injun | Weir, Gordon, Benson, Alexander |
| 47073005690000 | JOHN FREELAND | 1 | ALEXANDER PRODUCTION CO | HANLON OIL & GAS CO | | | | |
| 47085080610000 | T BUTCHER | 1 | ALLIANCE PETROLEUM CO LLC | PARDEE GAS | 5,022 | | Benson | Weir, Gordon, Alexander |
| 47085083900000 | REBECCA WEEKLEY | 1 | KENNETH EVERETT MOSSOR | MOSSOR KENNETH | 1,829 | | Keener | Weir, Gordon, Benson, Alexander |
| 47085911110000 | | | | | | | | |
| 47085910990000 | | | | | | | | |
| 47085911010000 | | | | | | | | |
| 47085077490000 | MICHAEL D NICHOLS | 8 | HARPER CROSBY HOLDINGS LLC | RARE EARTH MINERALS | 3,030 | 1908 - 2918 | Big Lime, Weir, Gordon | Weir, Gordon, Benson, Alexander |
| 47085077500000 | UNDERWOOD RONNEL & GAIL | 2 | HARPER CROSBY HOLDINGS LLC | RARE EARTH ENERGY | 3,035 | 1790 - 2921 | Salt Sands, Big Injun, Weir, Gordon | Weir, Gordon, Benson, Alexander |

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 |
|---|---|---|--|
| Q: Ronnel L. Underwood Et Al Lease Ronnel L. Underwood Et Al Walter C. Alkire The Walter C. Alkire, Jr. Family Trust | Walter C. Alkire The Walter C. Alkire, Jr. Family Trust Antero Resources Corporation | 1/8 Agreement Assignment | 0233/0273 0313/0400 0271/0834 |
| S: The Big Chief Drilling and Production Company, Inc. Lease The Big Chief Drilling | Antero Resources Corporation | 1/8+ | 0314/0145 |
| O: Ridgetop Capitol VI, LP. Lease Ridgetop Capitol VI, LP. | Antero Resources Corporation | 1/8+ | 0336/0893 |
| M: Ridgetop Capitol VI, LP. Lease Ridgetop Capitol VI, LP. | Antero Resources Corporation | 1/8+ | 0336/0887 |
| N: Ridgetop Capitol VI, LP. Lease Ridgetop Capitol VI, LP. | Antero Resources Corporation | 1/8+ | 0336/0890 |
| L: Ridgetop Capitol VI, LP. Lease Ridgetop Capitol VI, LP. | Antero Resources Corporation | 1/8+ | 0336/0884 |
| J: Robert W. Ward, Jr. Lease Robert W. Ward, Jr. | Antero Resources Corporation | 1/8+ | 0341/0374 |
| I: Ella Louise LaFave Lease Ella Louise LaFave | Antero Resources Corporation | 1/8+ | 0335/0485 |
| H: Heritage Resources Lease Heritage Resources | Antero Resources Corporation | 1/8+ | 0340/0664 |
| G: W.C. Butcher Et Al Lease W.C. Butcher Et Al J.H. Wagner William Earle Snyder Eva J. Israel J.D. Israel, Et Al Kenneth E. Mossor and Lorena D. Mossor Pardee Gas Company Pardee Exploration Company Pardee Resource Group Pardee Minerals, LLC | J.H. Wagner William Earle Snyder Eva J. Israel J.D. Israel, Et Al Kenneth E. Mossor and Lorena D. Mossor Pardee Gas Company Pardee Exploration Company Pardee Resource Group Pardee Minerals, LLC Antero Resources Corporation | 1/8 Assignment Will Will Assignment Assignment Merge Merge Assignment Assignment | 0056/0384 0091/0103 0045/0721 0045/0751 0189/0121 0267/0587 0217/0610 0005/0830 0006/0726 0028/0001 |
| F: Theodore Butcher Lease Theodore Butcher | Antero Resources Corporation | 1/8+ | 0344/0135 |
| E: Donna Mossor Lease Donna Mossor | Antero Resources Corporation | 1/8+ | 0359/0540 |
| C: The Heflin Mineral Rights Partnership Lease The Heflin Mineral Rights Partnership | Antero Resources Corporation | 1/8+ | 0356/0412 |

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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>A: The Heflin Mineral Rights Partnership Lease</u> | The Heflin Mineral Rights Partnership | Antero Resources Corporation | 1/8+ | 0356/0412 |

*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 the 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.

**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