



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

Tuesday, August 3, 2021
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET
DENVER, CO 80202

Re: Permit Modification Approval for RAPIDS UNIT 1H
47-095-02739-00-00

Extend Intermediate/Coal String to 3050'.

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: RAPIDS UNIT 1H
Farm Name: JOHN SHEPHERD
U.S. WELL NUMBER: 47-095-02739-00-00
Horizontal 6A New Drill
Date Modification Issued: 08/03/2021

Promoting a healthy environment.

08/06/2021

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

*CHK#
231960
\$2500⁰²*

1) Well Operator: Antero Resources Corporation

<u>494507062</u>	<u>095-Tyler</u>	<u>McElroy</u>	<u>Shirley 7.5'</u>
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Operator ID County District Quadrangle

2) Operator's Well Number: Rapids Unit 1H Well Pad Name: Shepherd Pad

3) Farm Name/Surface Owner: John Shepherd Public Road Access: Sandy Creek Rd.

4) Elevation, current ground: 935' Elevation, proposed post-construction: ~935'

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: 7100' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2850#

8) Proposed Total Vertical Depth: 7100' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 21000' MD

11) Proposed Horizontal Leg Length: 16672'

12) Approximate Fresh Water Strata Depths: 98'

13) Method to Determine Fresh Water Depths: 47-095-01482, 47-095-01434

14) Approximate Saltwater Depths: 1586'

15) Approximate Coal Seam Depths: None Identified

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: _____
Depth: _____
Seam: _____
Owner: _____

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JUL 29 2021
WV Department of
Environmental Protection

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	H-40	94#	80	80	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	300	300	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	3050	3050	CTS, 1242 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	23#	21000	21000	CTS, 5367 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"	0.438"	1530	50	Class A	~1.18
Fresh Water	13-3/8"	17-1/2"	0.38"	2730	1000	Class A	~1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	1500	Class A	~1.18
Intermediate							
Production	5-1/2"	8-3/4" & 8-1/2"	0.415"	12,630	2500	Lead-HI/POZ & Tail - H	H/POZ~1.44 & H~1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.

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): 26.43 acres

22) Area to be disturbed for well pad only, less access road (acres): 8.13 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 cement.
Surface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake
Intermediate: Class A 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 H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20

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.

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Office of Oil and Gas

*Note: Attach additional sheets as needed.

JUL 29 2021

LATITUDE 39°25'00" 3,201'

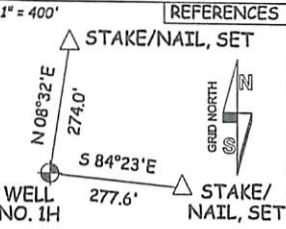
LATITUDE 39°27'30" 9,899'

8,457'

LONGITUDE 80°45'00"

LONGITUDE 80°45'00"

Antero Resources Corporation
Well No. Rapids Unit 1H



RECEIVED
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- 11-25 BEVERLY GUYNN
11-25.1 PHILLIP HEADLEY
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19-63.1 JACQUELINE WICHMAN TRUST
19A-62 ROY L. CLEVENSTINE

NOTES:
WELL 1H TOP HOLE INFORMATION:
N: 327,914ft E: 1,643,537ft
LAT: 39°23'36.41" LON: 80°45'40.78"
BOTTOM HOLE INFORMATION:
N: 341,935ft E: 1,637,033ft
LAT: 39°25'54.07" LON: 80°47'06.17"
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: 4,360,476m E: 520,567m
BOTTOM HOLE INFORMATION:
N: 4,364,714m E: 518,514m

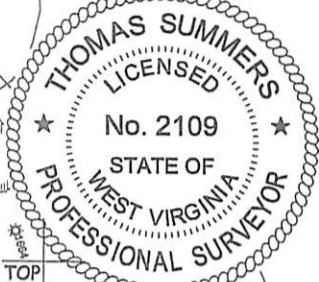


Table with 3 columns: LINE, BEARING, DIST. Lists well locations W1 through W21 with their respective bearings and distances from the well center.

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.

(NAD) 27 (UTM) ZONE 17 COORDS:
WELL 1H TOP HOLE INFORMATION:
N: 14,305,279ft E: 1,707,847ft
POINT OF ENTRY INFORMATION:
N: 14,303,379ft E: 1,706,399ft
BOTTOM HOLE INFORMATION:
N: 14,319,184ft E: 1,701,112ft

JOB # 18-003WA
DRAWING # RAPIDS1H
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

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

LEGEND
Surface Owner Boundary Lines +/-
Interior Surface Tracts +/-
Existing Fence
Found monument, as noted
THOMAS SUMMERS P.S. 2109
DATE 05/17/21
OPERATOR'S WELL# RAPIDS UNIT #1H

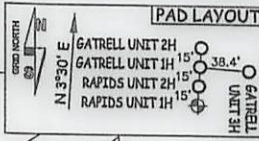
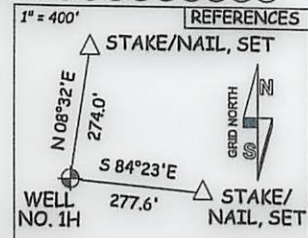
WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL
(IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
LOCATION: ELEVATION 935' - ASBUILT WATERSHED McELROY CREEK
QUADRANGLE SHIRLEY 7.5' DISTRICT McELROY COUNTY TYLER
SURFACE OWNER JOHN SHEPHERD ACREAGE 31.75 ACRES +/-
OIL & GAS ROYALTY OWNER LAMOYNE SWEENEY; EDGAR B. HARTLEY; BAYARD SWEENEY JR. ET AL; ERMA MABEL PITTS; JAMES JEFFERS ET UX; NOBLE ENERGY INC. ET AL; ROBERT SMITH; GLEN DUCKWORTH, JR.; SHANNON S. ADAMS; TOM WILLIAMS ET UX; JAMES MALLOY ET UX; REBECCA WILLIAMS; ROSEMARY HAUGHT; HENRY M. WALLACE ET UX; JIMMY J. GRIFFIN ET UX; BOUNTY MINERALS, LLC; BRC APPALACHIAN I, LLC; TROY SPENCER UNDERWOOD
PROPOSED WORK: DRILL X CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE X
PLUG OFF OLD FORMATION PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL
(TARGET) PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,100' TVD 21,000' MD
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM
ADDRESS 1615 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD
FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

COUNTY NAME PERMIT

LATITUDE 39°25'00" 3,201'

LATITUDE 39°27'30" 9,899'

Antero Resources Corporation Well No. Rapids Unit 1H



NOTES: WELL 1H TOP HOLE INFORMATION: N: 327,914ft E: 1,643,537ft LAT: 39°23'36.41" LON: 80°45'40.78" BOTTOM HOLE INFORMATION: N: 341,935ft E: 1,637,033ft LAT: 39°25'54.07" LON: 80°47'06.17" 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: 4,360,476m E: 520,567m BOTTOM HOLE INFORMATION: N: 4,364,714m E: 518,514m

WV NORTH ZONE GRID NORTH

8,457'

LONGITUDE 80°45'00"

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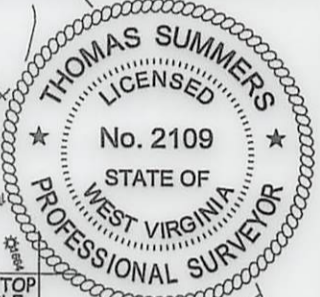
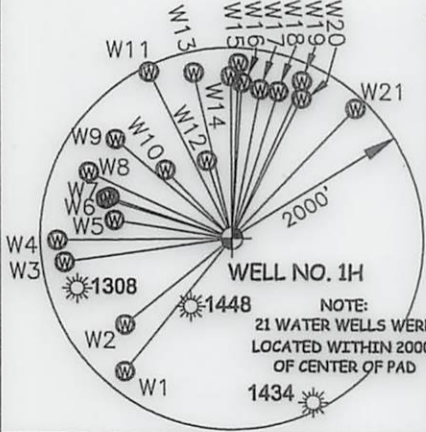


Table with columns: LINE, BEARING, DIST. Lists lines W1 through W21 with bearings and distances.

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JOB # 18-003WA
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SCALE 1" = 2000'
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LEGEND: Surface Owner Boundary Lines +/-, Interior Surface Tracts +/-, Existing Fence, Found monument, as noted. THOMAS SUMMERS P.S. 2109 DATE 05/17/21 OPERATOR'S WELL# RAPIDS UNIT #1H

WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL 47 095 02739 MOD
(IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
LOCATION: ELEVATION 935' ASBUILT WATERSHED McELROY CREEK STATE COUNTY PERMIT
QUADRANGLE SHIRLEY 7.5' DISTRICT McELROY COUNTY TYLER
SURFACE OWNER JOHN SHEPHERD ACREAGE 31.75 ACRES +/- LEASE ACREAGE 72.28 AC±; 16 AC±; 55AC±; 74 AC±; 83 AC±;
OIL & GAS ROYALTY OWNER LAMOYNE SWEENEY; EDGAR B. HARTLEY; BAYARD SWEENEY JR. ET AL; ERMA MABEL PITTS; JAMES JEFFERS ET UX;
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ADDRESS 1615 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD
FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313



July 28, 2021

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

West Virginia Department of Environmental Protection
Office of Oil and Gas
Attn: Mr. Taylor Brewer
601 57th Street
Charleston, WV 25304

Mr. Brewer:

Antero Resources Corporation (Antero) would like to submit the following permit modifications for approved well on the Shepherd Pad. We are requesting to extend the wellbore casing for the coal/intermediate string.

Attached you will find the following documents:

- REVISED Form WW-6B
- REVISED Mylar Plat

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

Thank you in advance for your consideration.

Sincerely,

Mallory Stanton
Permitting Supervisor
Antero Resources Corporation

Enclosures

RAPIOS UNIT 1H SHEPHERD PAD
231960 - 7/27/21 \$2,500

RAPIOS UNIT #2H SHEPHERD PAD
231961 - 7/27/21 \$2,500

GATRELL UNIT 1H SHEPHERD PAD
231962 - 7/27/21 \$2,500

GATRELL UNIT 2H SHEPHERD PAD
231963 7/27/21 \$2,500

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Office of Oil and Gas

JUL 29 2021

WV Department of
Environmental Protection

08/06/2021



Stansberry, Wade A <wade.a.stansberry@wv.gov>

Modification H6A Horizontal Well Work Permit (API: 47-095-02739)

1 message

Stansberry, Wade A <wade.a.stansberry@wv.gov>

Tue, Aug 3, 2021 at 10:05 AM

To: Mallory Stanton <mstanton@anteroresources.com>, Dani DeVito <ddevito@shalepro.com>

Cc: Derek Haught <derek.m.haught@wv.gov>, ljackson@wvassessor.com, jturner@wvassessor.com

I have attached a copy of the newly issued well [permit](#) number "RAPIDS UNIT 1H", API (47-095-02739). This will serve as your copy.

If you have any questions, then [please](#) contact us here at the Office of Oil and Gas.

Thank you,

Wade A. Stansberry

Environmental Resource Specialist 3

West Virginia Department of Environmental Protection

Office of Oil & Gas


601 57th St. SE

Charleston, WV 25304

(304) 926-0499 ext. 41115

(304) 926-0452 fax

Wade.A.Stansberry@wv.gov

 **47-095-02739 - mod.pdf**
2631K

08/06/2021