



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

Jim Justice, Governor
Austin Caperton, Cabinet Secretary
www.dep.wv.gov

PERMIT MODIFICATION APPROVAL
Horizontal 6A / Horizontal 6A Well - 1

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for MANOS UNIT 1H
47-085-10180-00-00

Extending the horizontal lateral length and point of entry.

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: MANOS UNIT 1H
Farm Name: JACKSON, STEPHEN C. ET AL
U.S. WELL NUMBER: 47-085-10180-00-00
Horizontal 6A / Horizontal 6A Well - 1
Date Issued: 6/8/2017

Promoting a healthy environment.

06/09/2017

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

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

2) Operator's Well Number: Manos Unit 1H Well Pad Name: Existing Buck Run Pad

3) Farm Name/Surface Owner: Stephen C. Jackson et al Public Road Access: Buck Run Rd

4) Elevation, current ground: 1127' Elevation, proposed post-construction: 1127'

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: 6403' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2800#

8) Proposed Total Vertical Depth: 6403' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 16235' MD

11) Proposed Horizontal Leg Length: 9237'

12) Approximate Fresh Water Strata Depths: 115', 244', 462'

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

14) Approximate Saltwater Depths: 532', 1149', 1794'

15) Approximate Coal Seam Depths: 420', 557', 757'

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

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

Depth: _____

Seam: _____

Owner: _____

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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 | H-40 | 94# | 40' | 40' | CTS, 38 Cu. Ft. |
| Fresh Water | 13-3/8" | New | J-55 | 54.5# | 515' *see #19 | 515' *see #19 | CTS, 715 Cu. Ft. |
| Coal | 9-5/8" | New | J-55 | 36# | 2450' | 2450' | CTS, 998 Cu. Ft. |
| Intermediate | | | | | | | |
| Production | 5-1/2" | New | P-110 | 20# | 16235' | 16235' | 4072 Cu. Ft. |
| Tubing | 2-3/8" | New | N-80 | 4.7# | | 7100' | |
| 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" | 0.438" | 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-H/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 | | | |

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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.
*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): 28.54 acres

22) Area to be disturbed for well pad only, less access road (acres): 10.27 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.

*Note: Attach additional sheets as needed.



MANOS UNIT 1H (BUCK RUN PAD) - AREA OF REVIEW 35-8-5.11 PAGE 1

4708510180 Mod

47085101800000

47085068860000



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Manos Unit 1H

47085073370000



06/09/2017⁹⁵⁰

FEET

MANOS UNIT 1H (BUCK RUN PAD) - AREA OF REVIEW 35-8-5.11 PAGE 2

4708510180 MOD

| UWI (APINum) | Well Name | Well Number | Operator | Hist Oper | ELEV_GR | TD | TD(SSTVD) |
|----------------|-------------------------|-------------|---------------------|---------------------------------------|------------------------------------|------|-----------|
| 47085073370000 | SPENCER RUTH & HARLEY E | WK-342 | ALLIANCE PETR CORP | KEPCO INCORPORATED | 855 | 5835 | -4980 |
| 47085068860000 | UTT JAMES W | JK-905 | ALLIANCE PETR CORP | J & J ENTERPRISES | 996 | 5995 | -4999 |
| UWI (APINum) | Well Name | Distance | Gross Perf Interval | Producing Formations | Producing Formations not Producing | | |
| 47085073370000 | SPENCER RUTH & HARLEY E | 210' | 4377'-5714' | Riley, Benson, Alexander, Rhinestreet | Warren | | |
| 47085068860000 | UTT JAMES W | 190' | 3371'-5776' | Warren, Benson, Rhinestreet | Riley, Alexander | | |

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06/09/2017

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>Harvey Weigle Heirs Lease</u> | | | |
| Harley Weigle Heirs | J & J Enterprises, Inc. | 1/8 | 0178/0571 |
| J & J Enterprises | Eastern American Energy Company | Assignment | 0231/0732 |
| Eastern American Energy Corporation | Energy Corporation of America | Merger | DB 0306/0836 |
| Energy Corporation of America | Antero Resources Appalachian Corporation | Assignment | 0257/0377 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |
| <u>Constance K. Griffith Lease</u> | | | |
| Constance K. Griffith | EQT Production Company | 1/8 | 256/738 |
| EQT Production Company | Antero Resources Corporation | Assignment | 282/175 |
| <u>Steve Jackson Lease</u> | | | |
| Steve Jackson | Antero Resources Appalachian Corporation | 1/8+ | 0257/0716 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |
| <u>Mary Maxine Welch Lease</u> | | | |
| Mary Maxine Welch | Kepco, Inc. | 1/8 | 0163/0131 |
| Kepco, Inc. | Eastern Pennsylvania Exploration Company | Assignment | 0176/0095 |
| Eastern Pennsylvania Exploration Company | Eastern American Energy Corporation | Assignment | 0218/0187 |
| Eastern American Energy Corporation | Seneca-Upshur Petroleum, Inc. d/b/a Keyspan Production & Development | Assignment | 0243/0839 |
| Seneca-Upshur Petroleum, Inc. | Seneca-Upshur Petroleum, LLC | Merger | 0311/0863 |
| Seneca-Upshur Petroleum, LLC | Antero Resources Appalachian Corporation | Assignment | 0258/0987 |
| Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |
| <u>Cliff Wilson et ux Lease</u> | | | |
| Cliff Wilson and Opal T. Wilson (HW) as joint owners | Carl D. Perkins | 1/8 | 0114/0272 |
| Carl D. Perkins & Dorothy Louise Perkins, his wife | Perkins Oil & Gas, Inc. | Assignment | 0131/0680 |
| Perkins Production Company, LLC and Perkins Oil & Gas, Inc. | Antero Resources Corporation | Assignment | 0264/1045 |

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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. ****CONTINUED ON NEXT PAGE****

WW-6A1
(5/13)

Operator's Well No. Manos Unit 1H

**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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- (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:

| Lease Name or Number | Grantor, Lessor, etc. | Grantee, Lessee, etc. | Royalty | Book/Page |
|---------------------------|--|--|-------------|-----------|
| <u>James W. Utt Lease</u> | | | | |
| | James W. Utt | J & J Enterprises, Inc. | 1/8 | 0165/0548 |
| | J & J Enterprises, Inc. | Eastern American Energy Corporation | Assignment | 0231/0732 |
| | Eastern American Energy Corp. | Enervest East Limited Partnership | Assignment | 0233/0311 |
| | Enervest East Limited Partnership | The Houston Exploration Co. | Assignment | 0234/0890 |
| | The Houston Exploration Co. | Seneca-Upshur Petroleum LLC | Assignment | 0236/0650 |
| | Seneca-Upshur Petroleum LLC | Antero Resources Appalachian Corporation | Assignment | 0259/0392 |
| | Antero Resources Appalachian Corporation | Antero Resources Corporation | Name Change | Exhibit 1 |

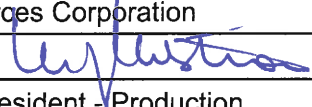
*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

**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: Kevin Kilstrom 
 Its: Senior Vice President - Production

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LATITUDE 39°20'00"

8,688'

1,731' TO BOTTOM HOLE

LATITUDE 39°22'30"

LONGITUDE 80°57'30" 13,328' TO BOTTOM HOLE

6,346'

LONGITUDE 80°55'00"

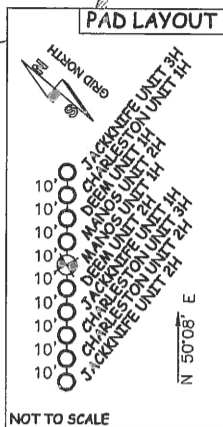
(NAD) 27 (UTM) ZONE 17 COORDS:
 WELL 1H TOP HOLE INFORMATION:
 N: 14,276,964ft E: 1,655,301ft
 POINT OF ENTRY INFORMATION:
 N: 14,276,606ft E: 1,653,933ft
 BOTTOM HOLE INFORMATION:
 N: 14,285,152ft E: 1,650,467ft

NOTES:
 WELL 1H TOP HOLE INFORMATION:
 N: 300,470ft E: 1,590,507ft
 LAT: 39°18'57.28" LON: 80°56'50.55"
 BOTTOM HOLE INFORMATION:
 N: 308,741ft E: 1,585,810ft
 LAT: 39°20'18.27" LON: 80°57'52.03"
 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: 4,351,845m E: 504,551m
 BOTTOM HOLE INFORMATION:
 N: 4,354,341m E: 503,078m

A - JEFFREY A. HURST ET AL. D.B. 305 PG. 1081 T.M. 14 PAR. 10.3 1.7 AC.±
 B - REGINA A. WANSTREET D.B. 265 PAR. 207 T.M. 14 PAR. 10.2 0.526 AC.±
 C - JEFFREY A. HURST ET AL. W.B. 39 PAR. 917 T.M. 14 PAR. 10.1 2.38 AC.±
 D - JAMES F. WILLIAMSON ET AL. D.B. 262 PAR. 312 T.M. 14 PAR. 11.3 1 AC.±
 E - JAMES F. WILLIAMSON ET AL. D.B. 262 PAR. 310 T.M. 14 PAR. 11.2 0.825 AC.±
 F - JAMES F. WILLIAMSON ET AL. D.B. 262 PAR. 316 T.M. 14 PAR. 11.4 0.91 AC.±
 G - PERL L. FREELAND ET AL. D.B. 179 PG. 726 T.M. 14 PAR. 11.5 0.76 AC.±
 H - KENNETH L. CUNNINGHAM ET AL. D.B. 216 PAR. 363 T.M. 14 PAR. 11.1 0.89 AC.±
 I - FLOYD T. BUTCHER III D.B. 234 PAR. 1 T.M. 14 PAR. 11.8 0.44 AC.±
 J - FLOYD T. BUTCHER III D.B. 234 PAR. 1 T.M. 14 PAR. 11.7 1.16 AC.±
 K - FAY JONES D.B. 223 PG. 369 T.M. 14 PAR. 11.4 1.24 AC.±

- NOTE:
 1. 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.
 2. TOP HOLE DATA SHOWN HEREON WAS PROVIDED BY ALLEGHENY SURVEYS, INC.
 3. AS DRILLED DATA WAS PROVIDED BY ANTERO RESOURCES CORPORATION.
 4. WLS IS NOT CERTIFYING THE DATA AND INFORMATION PROVIDED LISTED IN NOTES 2 AND 3, ONLY THE RELATIONSHIP TO THE DATA AND INFORMATION PROVIDED TO THE LEASE BOUNDARIES.
 5. WLS IS BY NO MEANS RESPONSIBLE FOR ANY ERRORS OR INACCURACIES WITH THE DATA AND INFORMATION THAT HAS BEEN PROVIDED.



Antero Resources Corporation
Well No. Manos Unit 1H
A.P.I. 47-085-10180

CLIFF WILSON
 ET UX LEASE

FRANK TUMAS
 D.B. 270 PG. 565
 T.M. 13 PAR. 04.2
 20.87 AC.±

FRANK TUMAS
 D.B. 270 PG. 565
 T.M. 13 PAR. 04.2
 65 AC.±

TORIE L. KNIGHT
 ET AL.
 D.B. 305 PG. 380
 T.M. 14 PAR. 01
 84.39 AC.±

CURTIS H.
 ROWIE ET AL.
 D.B. 290 PG. 819
 T.M. 13 PAR. 10.9
 0.782 AC.±

FRANCIS L.
 FRANTY ET AL.
 D.B. 190 PG. 357
 T.M. 13 PAR. 10.2
 0.538 AC.±

ROBERT E. BOLIN ET AL.
 D.B. 302 PG. 98
 T.M. 13 PAR. 10
 6.925 AC.±

STEPHEN D.
 JACKSON
 D.B. 307 PG. 390
 T.M. 14 PAR. 09
 93.911 AC.±

LEWIS P. DAVIS
 ET AL.
 D.B. 275 PG. 27
 T.M. 14 PAR. 10
 12.49 AC.±

MICHAEL H. YUDT
 ET AL.
 D.B. 295 PG. 169
 T.M. 14 PAR. 11.2
 23.9 AC.±

LEWIS P.
 DAVIS ET AL.
 D.B. 275 PG. 27
 T.M. 14 PAR. 03
 72.337 AC.±

JAMES F.
 WILLIAMSON ET AL.
 D.B. 262 PAR. 312
 T.M. 14 PAR. 01.2
 4.91 AC.±

IRON PIPE FOUND
 FLOYD T.
 BUTCHER III
 D.B. 234 PG. 1
 T.M. 14 PAR. 11.0
 15 AC.±

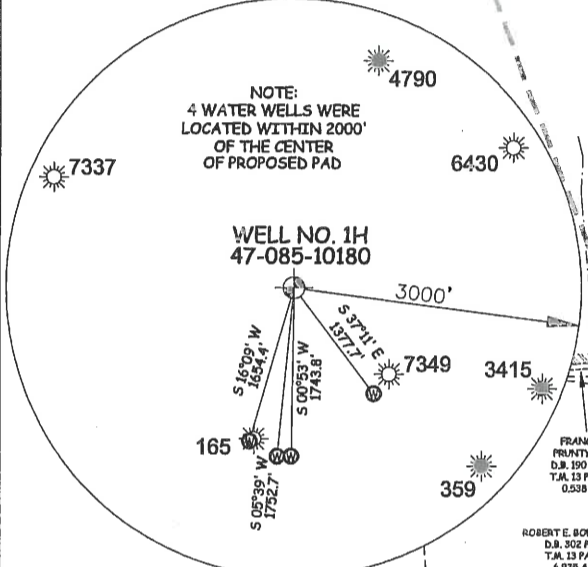
JEFFREY A.
 HURST ET AL.
 D.B. 305 PG. 1081
 T.M. 14 PAR. 11
 16.97 AC.±

BELL COOPER
 HEIRS
 D.B. 190 PG. 324
 T.M. 14 PAR. 16
 117 AC.±

STEVE
 JACKSON
 LEASE

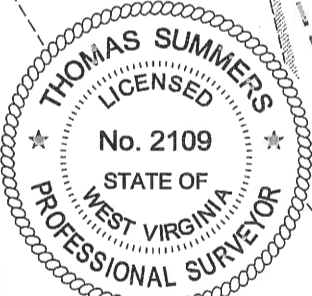
STEPHEN C.
 JACKSON ET AL.
 D.B. 236 PG. 742
 T.M. 14 PAR. 22
 40.835 AC.±

R. JONES ET AL.
 D.B. 216 PG. 669
 T.M. 14 PAR. 21
 31 AC.±



LEGEND

- Surface Owner Boundary Lines +/-
 - Interior Surface Tracts +/-
 - Found monument, as noted
 - 500' Wellbore Offset
 - As Drilled Well Path
- THOMAS SUMMERS P.S. 2109
 DATE 05/31/17
 OPERATOR'S WELL# MANOS UNIT #1H



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

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.

JOB # 14-009WA
 DRAWING # MANOS1HAD
 SCALE 1" = 1000'
 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

WELL TYPE: OIL ___ GAS LIQUID INJECTION ___ WASTE DISPOSAL ___
 (IF "GAS") PRODUCTION STORAGE ___ DEEP ___ SHALLOW
 LOCATION: ELEVATION 1,127' AS BUILT WATERSHED NORTH FORK HUGHES RIVER

QUADRANGLE PENNSBORO 7.5' DISTRICT CLAY COUNTY RITCHIE
 SURFACE OWNER STEPHEN C. JACKSON ET AL ACREAGE 40.835 ACRES +/-

OIL & GAS ROYALTY OWNER HARVEY WEIGLE HEIRS; STEVE JACKSON; LEASE ACREAGE 51 ACRES±; 117 ACRES±;
 CONSTANCE K. GRIFFITH; MARY MAXINE WELCH; CLIFF WILSON ET UX; JAMES W. UTT 31 ACRES±; 163 ACRES±; 413 ACRES±; 82 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 - POE

PLUG & ABANDON ___ CLEAN OUT & REPLUG ___ ESTIMATED DEPTH 6,403' TVD 16,235' MD
 TARGET FORMATION MARCELLUS

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
 DENVER, CO 80202 CHARLESTON, WV 25313

API WELL # 47 - 085 - 10180
 STATE COUNTY PERMIT

06/09/2017



June 6, 2017

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. Wade Stansberry
601 57th Street
Charleston, WV 25304

Mr. Stansberry:

Antero Resources Corporation (Antero) would like to submit the following permit modification for one approved well on the Buck Run Pad. We are requesting to extend the horizontal lateral length and point of entry for the Manos Unit 1H (API#: 47-085-10180)

Attached you will find the following documents:

- REVISED Form WW-6B, which shows the revised lateral length, Total Vertical Depth, Measured Depth and Production Casing/Cement program
- REVISED Form WW-6A1, which shows the new lease we will be drilling in to
- REVISED Mylar Plats, which shows the new extended lateral length
- Area of Review showing 500' around the well bore

If you have any questions please feel free to contact me at (303) 357-7223.

Thank you in advance for your consideration.

Sincerely,

A handwritten signature in blue ink, appearing to read "Shelby Johnson", with a long horizontal flourish extending to the right.

Shelby Johnson
Permitting Agent
Antero Resources Corporation

Enclosures

RECEIVED
Office of Oil and Gas

JUN 7 2017

WV Department of
Environmental Protection

06/09/2017

WW-6A1
(5/13)

Operator's Well No. Manos Unit 1H

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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 |
|------------------------------------|-----------------------|------------------------------|---------|-----------|
| Constance K. Griffith Lease | Constance K. Griffith | Antero Resources Corporation | 1/8+ | L8286/411 |

*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.

**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: Kevin Kilstrom
 Its: Senior Vice President of Production



LATITUDE 39°20'00"

8,688'

1,731' TO BOTTOM HOLE

LATITUDE 39°22'30"

LONGITUDE 80°57'30"

6,346'

13,328' TO BOTTOM HOLE

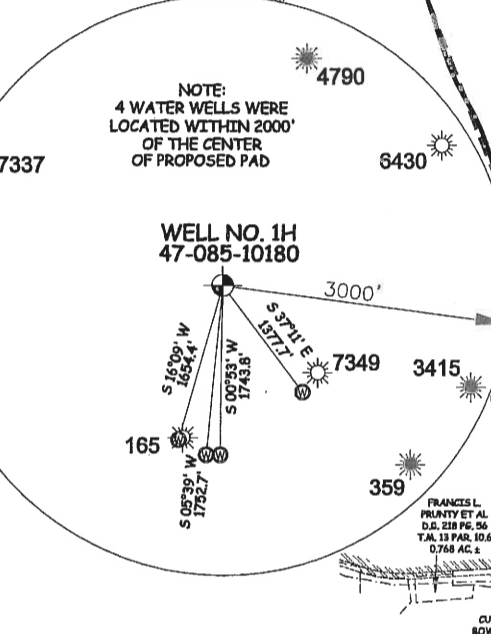
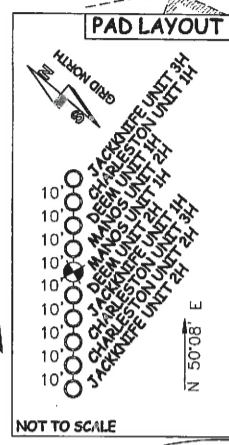
LONGITUDE 80°55'00"

Antero Resources Corporation
Well No. Manos Unit 1H
A.P.T. 47-085-10180

AS DRILLED DATA:
WELL 1H TOP HOLE INFORMATION:
N: 300,470ft E: 1,590,507ft
LAT: 39°18'57.28" LON: 80°56'50.55"
BOTTOM HOLE INFORMATION:
N: 308,741ft E: 1,585,810ft
LAT: 39°20'18.27" LON: 80°57'52.03"
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: 4,351,845m E: 504,551m
BOTTOM HOLE INFORMATION:
N: 4,354,341m E: 503,078m

- NOTE**
1. 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.
 2. TOP HOLE DATA SHOWN HEREON WAS PROVIDED BY ALLEGHENY SURVEYS, INC.
 3. AS DRILLED DATA WAS PROVIDED BY ANTERO RESOURCES CORPORATION.
 4. WLS IS NOT CERTIFYING THE DATA AND INFORMATION PROVIDED LISTED IN NOTES 2 AND 3, ONLY THE RELATIONSHIP TO THE DATA AND INFORMATION PROVIDED TO THE LEASE BOUNDARIES.
 5. WLS IS BY NO MEANS RESPONSIBLE FOR ANY ERRORS OR INACCURACIES WITH THE DATA AND INFORMATION THAT HAS BEEN PROVIDED.



LEGEND

- Surface Owner Boundary Lines +/-
- Interior Surface Tracts +/-
- Found monument, as noted
- Proposed Well Path
- As Drilled Well Path

DATE 02/09/17

OPERATOR'S WELL# MANOS UNIT #1H

JOB # 14-009WA
DRAWING # MANOS1HAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

API WELL # 47 - 085 - 10180
STATE COUNTY PERMIT



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WILLOW LAND SURVEYING PLLC
P.O. BOX 17 PENNSBORO WEST VIRGINIA 26415

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

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
(IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
LOCATION: ELEVATION 1,163' ORIGINAL - 1,127' AS BUILT WATERSHED NORTH FORK HUGHES RIVER
QUADRANGLE PENNSBORO 7.5' DISTRICT CLAY COUNTY RITCHIE

SURFACE OWNER STEPHEN C. JACKSON ET AL ACREAGE 40.835 ACRES +/-
OIL & GAS ROYALTY OWNER HARVEY WEIGLE HEIRS; STEVE JACKSON; LEASE ACREAGE 51 ACRES +/-; 117 ACRES +/-
CONSTANCE K. GRIFFITH; MARY MAXINE WELCH; CLIFF WILSON ET UX; JAMES W. UTT 31 ACRES +/-; 163 ACRES +/-; 413 ACRES +/-; 820 ACRES +/-

PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION
OTHER PHYSICAL CHANGE IN WELL (SPECIFY) (X) AS DRILLED

PLUG & ABANDON CLEAN OUT & REPLUG ESTIMATED DEPTH 6,403' TVD 16,235' MD
TARGET FORMATION MARCELLUS

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
DENVER, CO 80202 CHARLESTON, WV 25313



85-10180



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

March 17, 2017

West Virginia Department of Environmental Protection
Office of Oil and Gas
Attn: John Kearney
601 57th Street
Charleston, WV 25304

Mr. Kearney:

Please find enclosed an updated WW-6A1 for the Manos Unit 1H (API # 47-085-10180). When drilling, our wellbore slightly drilled into the Constance K. Griffith Lease. For your reference we have updated the WW-6A1 to reflect this.

If you have any questions please feel free to contact me at (303) 357-7223 or Mallory Stanton at (303) 357-7182.

Sincerely,

A handwritten signature in blue ink, appearing to read "S. Johnson", with a long horizontal flourish extending to the right.

Shelby Johnson
Permitting Agent
Antero Resources Corporation

Enclosures

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WV Department of
Environmental Protection

06/09/2017



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

April 18, 2017

West Virginia Department of Environmental Protection
Office of Oil and Gas
Attn: Wade Stansberry
601 57th Street
Charleston, WV 25304

Mr. Stansberry:

Please find enclosed an updated WW-6A1 for the Manos Unit 1H (API # 47-085-10180). When drilling, our wellbore slightly drilled into the Constance K. Griffith Lease, which was not originally included on our WW-6A1 application. We are requesting a modification for this well.

If you have any questions please feel free to contact me at (303) 357-7223 or Mallory Stanton at (303) 357-7182.

Sincerely,

A handwritten signature in blue ink, appearing to read "Shelby Johnson", with a long horizontal flourish extending to the right.

Shelby Johnson
Permitting Agent
Antero Resources Corporation

Enclosures

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Office of Oil and Gas

APR 20 2017

WV Department of
Environmental Protection

06/09/2017