



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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Friday, August 31, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for SPOCK UNIT 1H
47-095-02478-00-00

Bottom hole adjustment

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: SPOCK UNIT 1H
Farm Name: TYRONE L BEEM ET AL
U.S. WELL NUMBER: 47-095-02478-00-00
Horizontal 6A New Drill
Date Modification Issued: August 31, 2018

A handwritten signature in blue ink, appearing to read "James A. Martin", is written over the typed name and title.

Promoting a healthy environment.

WW-6B
(04/15)

API NO. 47-095 - 02478
 OPERATOR WELL NO. Spock Unit 1H
 Well Pad Name: Pyle Run Pad

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

1) Well Operator: Antero Resources Corpora 494507062 095 - Tyler Centerville Middlebourne 7.5'
 Operator ID County District Quadrangle

2) Operator's Well Number: Spock Unit 1H Well Pad Name: Pyle Run Pad

3) Farm Name/Surface Owner: Tyrone L Beem et al Public Road Access: Bearsville-Mole Hole

4) Elevation, current ground: 1115' 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: 6800' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2800#

*DmH
7-25-18
GEB
7/25/2018*

8) Proposed Total Vertical Depth: 6800' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 16400' MD ✓

11) Proposed Horizontal Leg Length: 9691' ✓ *w/plate*

12) Approximate Fresh Water Strata Depths: 301', 332' ✓

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

14) Approximate Saltwater Depths: 674', 1584' ✓

15) Approximate Coal Seam Depths: 811' ✓

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: _____

Received

JUL 26 2018

WW-6B
(04/15)

Permit Modification API# 47-095-02478
 API NO. 47- 095 - 02478
 OPERATOR WELL NO. Spock Unit 1H
 Well Pad Name: Pyle Run Pad

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#	80'	80' ✓	CTS, 218 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	385' *see #19	385' *see #19 ✓	CTS, 348 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500'	2500' ✓	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	16400'	16400' ✓	3760 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

*gcb
7/25/2018
D317
7-25-18*

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"/0.33"	2730/1730	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"	0.361"	12,630	2500	Leak-Off/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			

Received

JUL 26 2018

WW-6B
(10/14)

API NO. 47- 095 - 02478
OPERATOR WELL NO. Speck Well 1H
Well Pad Name: Pyle Run Pad

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 freshwater 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

Dmb 7-25-18 JES 7/25/2018

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 29.70 acres

22) Area to be disturbed for well pad only, less access road (acres): 10.67 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.



Permit Modification API # 47-095-02478



Antero Resources Corporation

Spock Unit 1H - AOR



WELL SYMBOLS
Gas Well

RECEIVED
Office of Oil and Gas

JUL 17 2018

WV Department of
Environmental Protection

UWI (API Num)	Well Name	Well Number	Operator	Hist Oper	TD	Perforated Interval (shallowest, deepest)	Perforated Formation(s)	Producible Formation(s) not perf'd
4709500769000C	BEEH E G	H-838	SANCHO OIL & GAS	HAUGHT G L & SONS	5350	No perf data	No perf data	No perf data

RECEIVED
Office of Oil and Gas

JUL 17 2018

WV Department of
Environmental Protection

LATITUDE 39°25'00"

8,183'

4,338' TO BOTTOM HOLE
LATITUDE 39°25'00"

LONGITUDE 80°52'30"

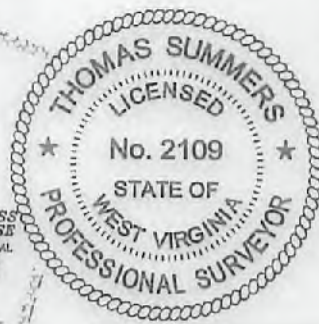
5,998'

LONGITUDE 80°52'30"

15,093' TO BOTTOM HOLE

COUNTY NAME PERMIT

Antero Resources Corporation
Well No. Spock Unit 1H
47-095-02478

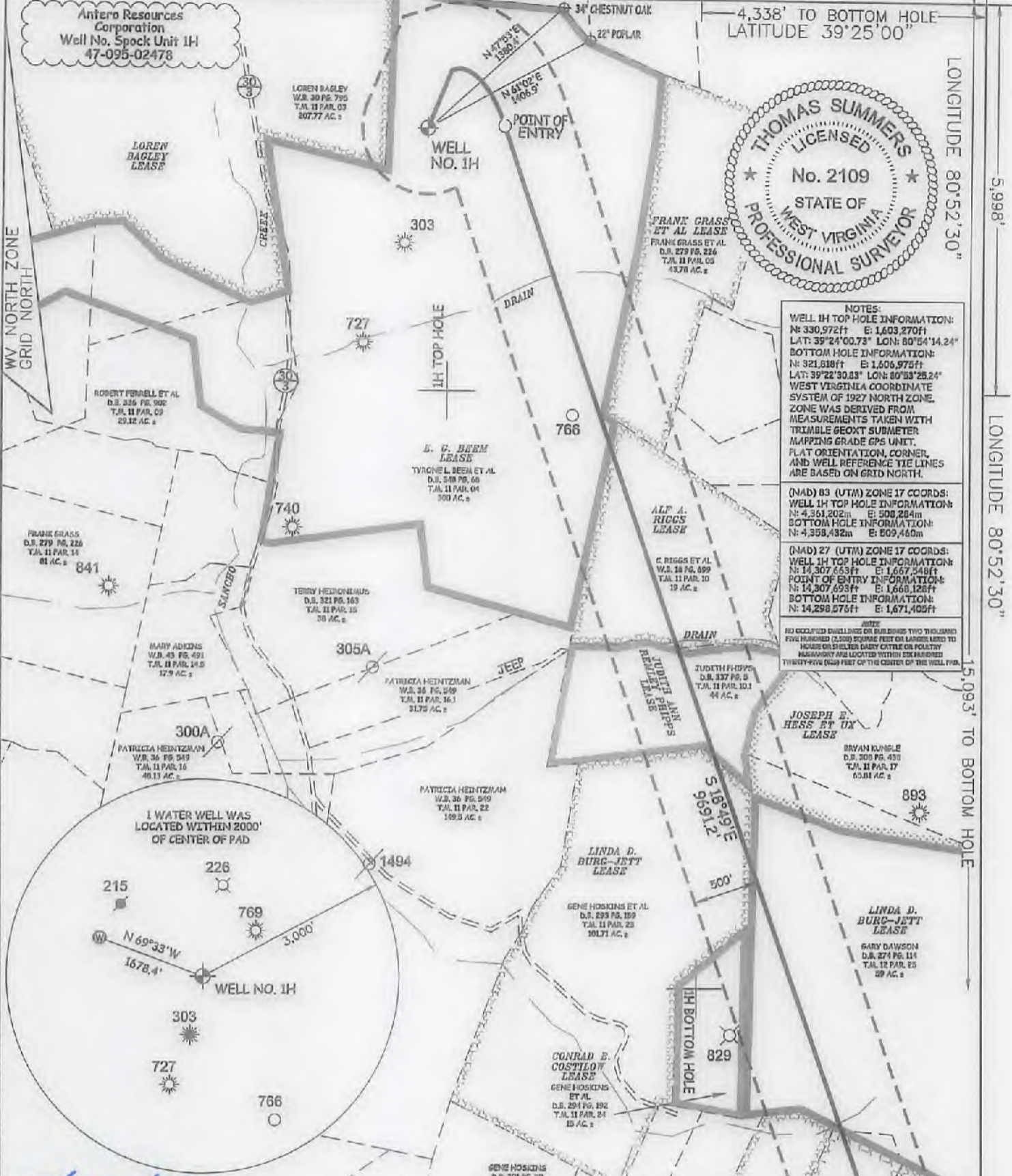


NOTES:
WELL 1H TOP HOLE INFORMATION:
N: 330,972ft E: 1,603,270ft
LAT: 39°24'00.73" LON: 80°54'14.24"
BOTTOM HOLE INFORMATION:
N: 321,618ft E: 1,606,975ft
LAT: 39°22'30.83" LON: 80°53'25.24"
WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. FLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS:
WELL 1H TOP HOLE INFORMATION:
N: 4,361,202m E: 500,284m
BOTTOM HOLE INFORMATION:
N: 4,358,432m E: 509,460m

(NAD) 27 (UTM) ZONE 17 COORDS:
WELL 1H TOP HOLE INFORMATION:
N: 14,307,653ft E: 1,667,548ft
POINT OF ENTRY INFORMATION:
N: 14,307,695ft E: 1,668,128ft
BOTTOM HOLE INFORMATION:
N: 14,298,076ft E: 1,671,405ft

NOTE:
NO OCCUPIED DWELLINGS OR BUSINESS TWO THOUSAND FIVE HUNDRED (2500) SQUARE FEET OR LARGER LISTED TO HOUSE OR SHEDS, DAIRY, CATTLE OR POULTRY HARBORING ARE LOCATED WITHIN ONE HUNDRED THIRTY-FIVE (135) FEET OF THE CENTER OF THE WELL PAD.



1 WATER WELL WAS LOCATED WITHIN 2000' OF CENTER OF PAD



THOMAS SUMMERS P.S. 2109
DATE 07/19/18
OPERATOR'S WELL # SPOCK UNIT 1H

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

PAD LAYOUT NOT TO SCALE



JOB # 18-047WA
DRAWING # SPOCK1HRA
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SURMETER
SUBMETER MAPPING GRADE GPS
WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL
(IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
LOCATION: ELEVATION 1,119'-AS BUILT WATERSHED OUTLET MIDDLE ISLAND CREEK
QUADRANGLE MIDDLEBOURNE 7.5TH PENNSBORO 7.5TH DISTRICT CENTERTVILLE COUNTY TYLER
SURFACE OWNER TYRONEL BEEM ET AL ACREAGE 300 AC +/-
OIL & GAS ROYALTY OWNER E. G. BEEM; ALF A. RIGGS; JUDITH ANN REMLEY PHIPPS; LINDA D. BURG-JETT;
LINDA D. BURG-JETT; CARL W. ASH; HASSLEY LAND & TIMBER, LLC

STATE COUNTY PERMIT

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

LEASE ACREAGE 317 AC±; 19.4 AC±; 44 AC±; 101.7 AC±; 178 AC±; 10 AC±; 20.75 AC±

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,800' TVD, 16,400' MD
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CI CORPORATION/SYSTEM
ADDRESS 1615 WYNNCOOP STREET ADDRESS 5400 D BIG TYLER ROAD
FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

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

LATITUDE 39°25'00"

8,183'

4,338' TO BOTTOM HOLE
LATITUDE 39°25'00"

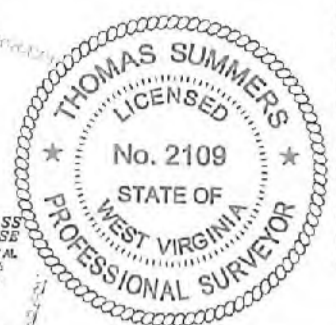
LONGITUDE 80°52'30"

5,998'

LONGITUDE 80°52'30"

15,093' TO BOTTOM HOLE

COUNTY NAME PERMIT

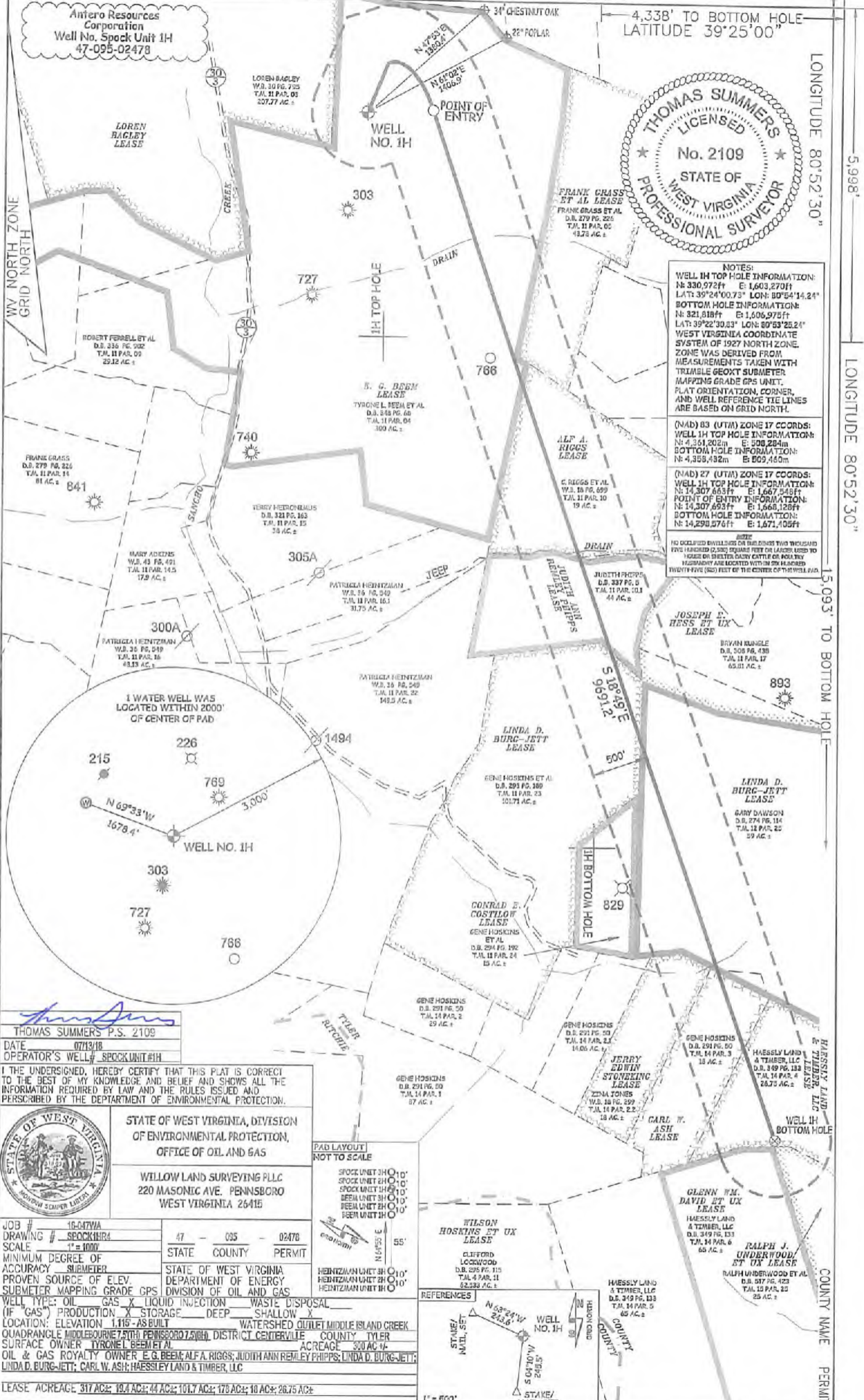


NOTES:
 WELL 1H TOP HOLE INFORMATION:
 N: 330,972ft E: 1,603,270ft
 LAT: 39°24'00.73" LON: 80°54'14.24"
 BOTTOM HOLE INFORMATION:
 N: 321,818ft E: 1,606,975ft
 LAT: 39°22'30.83" LON: 80°53'25.24"
 WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIANGLE GEOXY 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: 4,361,202m E: 508,284m
 BOTTOM HOLE INFORMATION:
 N: 4,358,432m E: 509,450m

(NAD) 27 (UTM) ZONE 17 COORDS:
 WELL 1H TOP HOLE INFORMATION:
 N: 14,307,663ft E: 1,667,549ft
 POINT OF ENTRY INFORMATION:
 N: 14,307,693ft E: 1,666,128ft
 BOTTOM HOLE INFORMATION:
 N: 14,298,576ft E: 1,671,405ft

NOTE:
 NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHEDE, CATTLE OR POLYTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY FIVE (625) FEET OF THE CENTER OF THE WELL PAD.



THOMAS SUMMERS P.S. 2109
 DATE 07/13/18
 OPERATOR'S WELL # SPOCK UNIT # 1H

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

PAD LAYOUT NOT TO SCALE

SPOCK UNIT 1H	10'
SPOCK UNIT 2H	10'
SPOCK UNIT 1H	10'
BEEM UNIT 3H	10'
BEEM UNIT 2H	10'
BEEM UNIT 1H	10'
HEINZMAN UNIT 3H	10'
HEINZMAN UNIT 2H	10'
HEINZMAN UNIT 1H	10'

JOB # 18-047WA
 DRAWING # SPOCK1H184
 SCALE 1" = 1000'
 MINIMUM DEGREE OF ACCURACY SUBMETER
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS
 WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X
 LOCATION: ELEVATION 1,116 AS BUILT WATERSHED OUTLET MIDDLE ISLAND CREEK
 QUADRANGLE MIDDLEBOURNE 7.5(N)H PENNSBORO 7.5(N)H DISTRICT CENTERVILLE COUNTY TYLER
 SURFACE OWNER TYRONEL BEEM ET AL ACREAGE 300 AC ±
 OIL & GAS ROYALTY OWNER E. G. BEEM; ALF A. RIGGS; JUDITH ANN REMLEY PHIPPS; LINDA D. BURG-JETT; LINDA D. BURG-JETT; CARL W. ASH; HAESSLEY LAND & TIMBER, LLC

STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS
 LEASE ACREAGE 317 AC ±; 19.4 AC ±; 44 AC ±; 101.7 AC ±; 175 AC ±; 10 AC ±; 26.75 AC ±



TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,000 TO 16,400 MD PROPOSED WORK: DRILL CONVERT DRILL DEEPER X REDRILL
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM FRACTURE OR STIMULATE X PERFORATE NEW FORMATION X PLUG OFF
 ADDRESS 1615 WYKOCOP STREET ADDRESS 5400 D BIG TYLER ROAD OTHER FORMATION PLUG & ABANDON CLEAN OUT & REPLUG
 FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313 OTHER PHYSICAL CHANGE IN WELL (SPECIFY) MOD-BHL

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>E.G. Beem Lease</u>			
E.G. Beem	Warren R. Haught	1/8	0213/0662
Warren R. Haught	Sancho Oil & Gas Corporation	Assignment	0369/0506
Sancho Oil & Gas Corporation	Antero Resources Corporation	Assignment	0436/0177
<u>Alf A. Riggs Lease</u>			
Alf A. Riggs	Antero Resources Appalachian Corporation	1/8+	0408/0615
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Judith Ann Remley Phipps Lease</u>			
Judith Ann Remley Phipps	Antero Resources Corporation	1/8+	0470/0375
<u>Linda D. Burg-Jett Lease (TM 11 PCL 23)</u>			
Linda D. Burg-Jett	Antero Resources Corporation	1/8+	0401/0640
<u>Linda D. Berg-Jett Lease (TM 12 PCL 25)</u>			
Linda D. Berg-Jett	Antero Resources Appalachian Corporation	1/8+	0400/0324
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Carl W. Ash Lease</u>			
Carl W. Ash	Antero Resources Corporation	1/8+	0507/0821

RECEIVED
Office of Oil and Gas

JUL 17 2018

WV Department of
Environmental Protection

*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.

WW-6A1
(5/13)

Operator's Well No. Spock 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)**

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:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
Haessly Land & Timber, LLC Lease	Haessly Land & Timber, LLC	Antero Resources Corporation	1/8+	0567/0323

*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.

RECEIVED
Office of Oil and Gas

JUL 17 2018

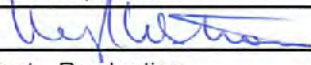
WV Department of
Environmental Protection

**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: SR Vice President - Production

WW-6B
(04/15)

API NO. 47-095 - 02478
OPERATOR WELL NO. Spock Unit 1H
Well Pad Name: Pyle Run Pad

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

1) Well Operator: Antero Resources Corporation 494507062 095 - Tyler Centerville Middlebourne 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Spock Unit 1H Well Pad Name: Pyle Run Pad

3) Farm Name/Surface Owner: Tyrone L Beem et al Public Road Access: Bearsville-Mole Hole

4) Elevation, current ground: 1115' 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: 6800' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2800#

8) Proposed Total Vertical Depth: 6800' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 16400' MD

11) Proposed Horizontal Leg Length: 9691'

12) Approximate Fresh Water Strata Depths: 301', 332'

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

14) Approximate Saltwater Depths: 674', 1584'

15) Approximate Coal Seam Depths: 811'

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: _____
Scam: _____
Owner: _____

RECEIVED
Office of Oil and Gas

JUL 17 2018

WW-6B
(04/15)

API NO. 47- 095 - 02478
OPERATOR WELL NO. Spock Unit 1H
Well Pad Name: Pyle Run 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	H-40	94#	80'	80'	CTS, 218 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	385' *see #19	385' *see #19	CTS, 348 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500'	2500'	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	16400'	16400'	3760 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
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"/0.33"	2730/1730	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"	0.361"	12,630	2500	Lead-NPOZ & 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			

RECEIVED
Office of Oil and Gas

JUL 17 2018

WW-6B
(10/14)

API NO. 47- 095 - 02478

OPERATOR WELL NO. Spock Unit 1H

Well Pad Name: Pyle Run Pad

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 freshwater 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): 29.70 acres

22) Area to be disturbed for well pad only, less access road (acres): 10.67 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.

RECEIVED
Office of Oil and Gas

JUL 17 2018

Page 3 of 3

