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west virginia department of environmental protection

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Office of Oil and Gas  
601 57<sup>th</sup> Street, S.E.  
Charleston, WV 25304  
(304) 926-0450  
fax: (304) 926-0452

Jim Justice , Governor  
Austin Caperton , Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

Tuesday, September 26, 2017  
WELL WORK PERMIT  
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION  
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit approval for BILL UNIT 4H  
47-085-10327-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless 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: BILL UNIT 4H  
Farm Name: DONALD L. COSTILOW  
U.S. WELL NUMBER: 47-085-10327-00-00  
Horizontal 6A / New Drill  
Date Issued: 9/26/2017

Promoting a healthy environment.

09/29/2017

# PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

## CONDITIONS

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1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than one hundred (100) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. 24 hours prior to the initiation of the completion process the operator shall notify the Chief or his designee.
8. During the completion process the operator shall monitor annular pressures and report any anomaly noticed to the chief or his designee immediately.
9. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
10. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

## PERMIT CONDITIONS

11. The operator shall provide to the Office of Oil and Gas the dates of each of the following within 30 days of their occurrence: completion of construction of the well pad, commencement of drilling, cessation of drilling, completion of any other permitted well work, and completion of the well. Such notice shall be provided by sending an email to [DEPOOGNotify@wv.gov](mailto:DEPOOGNotify@wv.gov).

4

WW-6B  
(04/15)

API NO. 47-085 - 10327  
OPERATOR WELL NO. Bill Unit 4H  
Well Pad Name: Existing Bison 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 085 - Ritchie Clay Pennsboro 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: Bill Unit 4H Well Pad Name: Existing Bison Pad

3) Farm Name/Surface Owner: Donald L. Costilow Public Road Access: CR 50/26

4) Elevation, current ground: 1221' Elevation, proposed post-construction: 1221'

5) Well Type (a) Gas X Oil \_\_\_\_\_ Underground Storage \_\_\_\_\_  
Other \_\_\_\_\_

(b) If Gas Shallow X Deep \_\_\_\_\_  
Horizontal X \_\_\_\_\_

*Michael Gaff*  
*8-22-2017*

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Burket Shale: 6900' TVD, Anticipated Thickness- 55 feet, Associated Pressure- 2800#

8) Proposed Total Vertical Depth: 6900' TVD

9) Formation at Total Vertical Depth: Burket

10) Proposed Total Measured Depth: 13900' MD

11) Proposed Horizontal Leg Length: 4920'

12) Approximate Fresh Water Strata Depths: 119', 300', 446'

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

14) Approximate Saltwater Depths: 833', 1192', 1695', 1715'

15) Approximate Coal Seam Depths: 826'

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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WW-6B  
(04/15)

API NO. 47-085 - 10327  
 OPERATOR WELL NO. B21 Unit 4H  
 Well Pad Name: Existing Bison 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#	500' *See #19	500' *See #19	CTS, 451 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500'	2500'	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	23#	13900'	13900'	CTS, 3130 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

MAC  
8-22-2017

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 & Tub - 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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WW-6B  
(10/14)

API NO. 47-085 - 10327  
OPERATOR WELL NO. Bill Unit 4H  
Well Pad Name: Existing Bison Pad

MAG  
8-22-2017

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 Burket 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 Burket 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): 19.91 existing acres

22) Area to be disturbed for well pad only, less access road (acres): 6.00 existing 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

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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.



47085080980000



47085070940000



47085080880000



47085089560000



47085071090000



**Bill 4H**

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09/29/2017





WW-9  
(4/16)

API Number 47 - 085 - 10327  
Operator's Well No. Bill Unit 4H

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Antero Resources Corporation OP Code 494507062

Watershed (HUC 10) North Fork Hughes River Quadrangle Pennsboro 7.5'

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes  No

Will a pit be used? Yes  No

If so, please describe anticipated pit waste: No pit will be used at this site (Drilling and Flowback Fluids will be stored in tanks. Cuttings will be tanked and hauled off site.)

Will a synthetic liner be used in the pit? Yes  No  If so, what ml.? N/A

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number \*UIC Permit # will be provided on Form WR-34 )
- Reuse (at API Number Future permitted well locations when applicable. API# will be provided on Form WR-34 )
- Off Site Disposal (Supply form WW-9 for disposal location) (Meadowfill Landfill Permit #SWF-1032-98)
- Other (Explain Northwestern Landfill Permit #SWF-1025/ WV0109410)

MDC  
8-22-2017

Will closed loop system be used? If so, describe: Yes, fluids stored in tanks, cuttings removed offsite and taken to landfill.

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc.  
Surface - Air/Freshwater, Intermediate - Dust/Stiff Foam, Production - Water Based Mud or Synthetic Based Mud

-If oil based, what type? Synthetic, petroleum, etc. Synthetic

Additives to be used in drilling medium? Please See Attachment

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Drill cuttings stored in tanks, removed offsite and taken to landfill.

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Meadowfill Landfill (Permit #SWF-1032-98), Northwestern Landfill (Permit # SWF-1025/WV0109410)

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

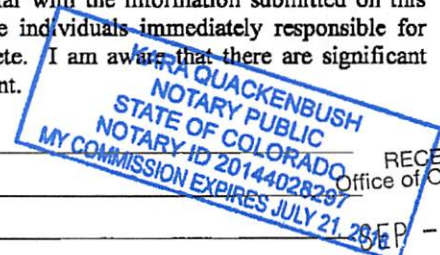
I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature [Signature]

Company Official (Typed Name) Shawn Donovan

Company Official Title Environmental Specialist III



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Subscribed and sworn before me this 15 day of August, 20 17

[Signature]

Notary Public

My commission expires JULY 21, 2018

WV Department of Environmental Protection

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## *Form WW-9 Additives Attachment*

### **SURFACE INTERVAL**

1. Fresh Water
2. Soap –Foamer AC
3. Air

### **INTERMEDIATE INTERVAL**

#### *STIFF FOAM RECIPE:*

- 1) 1 ppb Soda Ash / Sodium Carbonate-Alkalinity Control Agent
- 2) 1 ppb Conqor 404 ( 11.76 ppg) / Corrosion Inhibitor
- 3) 4 ppb KLA-Gard ( 9.17 ppg) / Amine Acid Complex-Shale Stabilizer
- 4) 1ppb Mil Pac R / Sodium Carboxymethylcellulose-Filtration Control Agent
- 5) 12 ppb KCL / Potassium Chloride-inorganic Salt
- 6) Fresh Water 80 bbls
- 7) Air

### **PRODUCTION INTERVAL**

1. Alpha 1655  
Salt Inhibitor
2. Mil-Carb  
Calcium Carbonate
3. Cottonseed Hulls  
Cellulose-Cottonseed Pellets – LCM
4. Mil-Seal  
Vegetable, Cotton & Cellulose-Based Fiber Blend – LCM
5. Clay-Trol  
Amine Acid Complex – Shale Stabilizer
6. Xan-Plex  
Viscosifier For Water Based Muds
7. Mil-Pac (All Grades)  
Sodium Carboxymethylcellulose – Filtration Control Agent
8. New Drill  
Anionic Polyacrylamide Copolymer Emulsion – Shale Stabilizer
9. Caustic Soda  
Sodium Hydroxide – Alkalinity Control
10. Mil-Lime  
Calcium Hydroxide – Lime
11. LD-9  
Polyether Polyol – Drilling Fluid Defoamer
12. Mil Mica  
Hydro-Biotite Mica – LCM

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13. Escaid 110  
Drilling Fluid Solvent – Aliphatic Hydrocarbon
14. Ligco  
Highly Oxidized Leonardite – Filtration Control Agent
15. Super Sweep  
Polypropylene – Hole Cleaning Agent
16. Sulfatrol K  
Drilling Fluid Additive – Sulfonated Asphalt Residuum
17. Sodium Chloride, Anhydrous  
Inorganic Salt
18. D-D  
Drilling Detergent – Surfactant
19. Terra-Rate  
Organic Surfactant Blend
20. W.O. Defoam  
Alcohol-Based Defoamer
21. Perma-Lose HT  
Fluid Loss Reducer For Water-Based Muds
22. Xan-Plex D  
Polysaccharide Polymer – Drilling Fluid Viscosifier
23. Walnut Shells  
Ground Cellulosic Material – Ground Walnut Shells – LCM
24. Mil-Graphite  
Natural Graphite – LCM
25. Mil Bar  
Barite – Weighting Agent
26. X-Cide 102  
Biocide
27. Soda Ash  
Sodium Carbonate – Alkalinity Control Agent
28. Clay Trol  
Amine Acid complex – Shale Stabilizer
29. Sulfatrol  
Sulfonated Asphalt – Shale Control Additive
30. Xanvis  
Viscosifier For Water-Based Muds
31. Milstarch  
Starch – Fluid Loss Reducer For Water Based Muds
32. Mil-Lube  
Drilling Fluid Lubricant

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Form WW-9

Operator's Well No. Bill Unit 4H

**Antero Resources Corporation**

Proposed Revegetation Treatment: Acres Disturbed 19.91 existing acres Prevegetation pH \_\_\_\_\_

Lime 2-4 Tons/acre or to correct to pH 6.5

Fertilizer type Hay or straw or Wood Fiber (will be used where needed)

Fertilizer amount 500 lbs/acre

Mulch 2-3 Tons/acre

Access Road "A" (5.41 acres) + Access Road "B" (0.23) + Access Road "C" (2.26 acres) + Access Road "D" (0.68 acres) + Well Pad (6.00 acres) + Water Containment Pad (1.43 acres) + Excess/Topsoil Material Stockpiles (3.74 acres) = 19.91 Acres

**Temporary**

**Permanent**

Seed Type	lbs/acre
<b>Annual Ryegrass</b>	<b>40</b>
<u>See Table IV-3 for additional seed type (Bison Pad Design Page 24)</u>	

Seed Type	lbs/acre
<b>Crownvetch</b>	<b>10-15</b>
<b>Tall Fescue</b>	<b>30</b>
<u>See Table IV-4 for additional seed type (Bison Pad Design Page 24)</u>	

\*or type of grass seed requested by surface owner

\*or type of grass seed requested by surface owner

**Attach:**

Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, include dimensions (L x W x D) of the pit, and dimensions (L x W), and area in acreage, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Michael Goff

Comments: Preseed & mulch any disturbed per WVDEP regulations. Maintain & upgrade E-n-s as necessary.

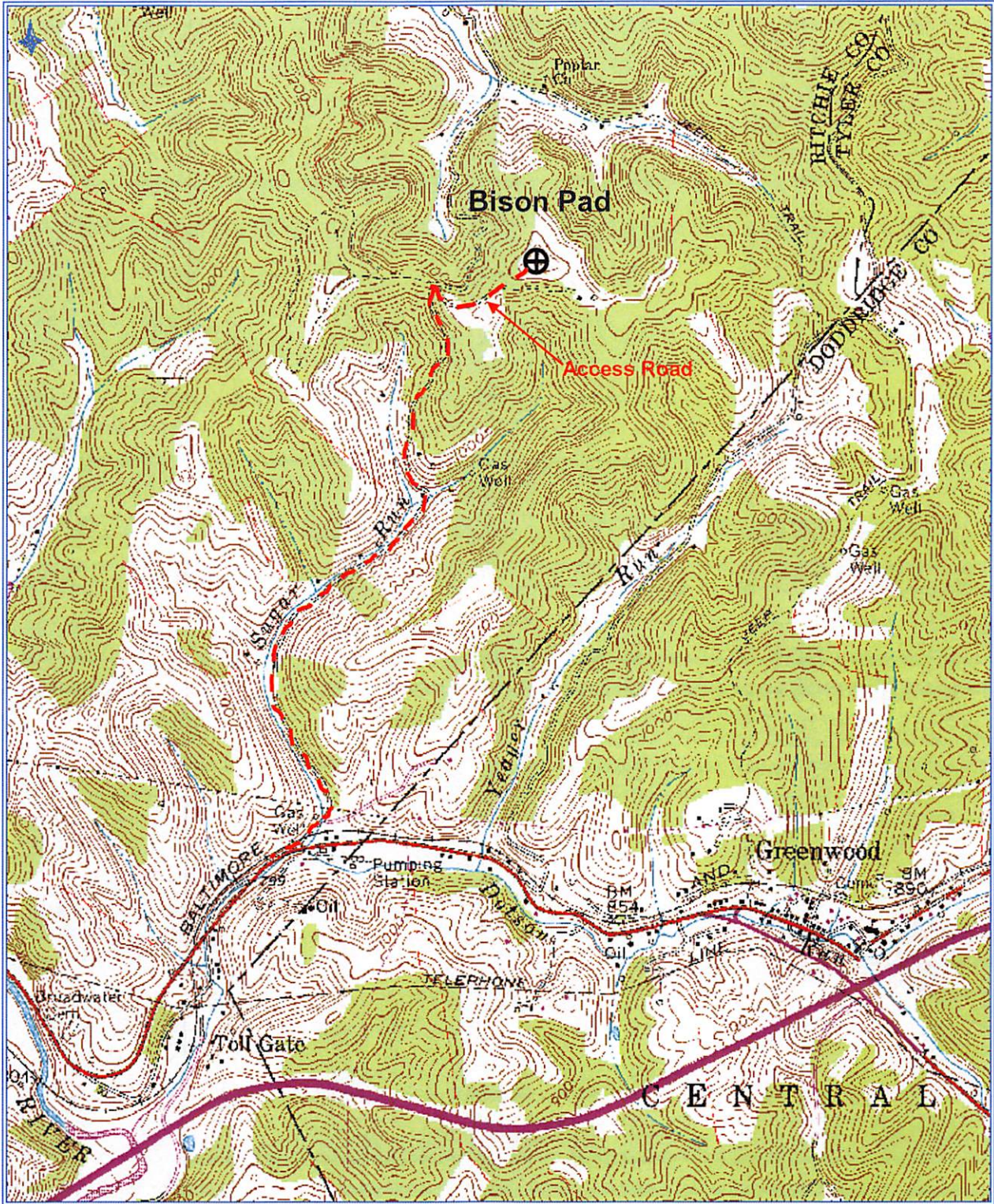
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Title: Oil & Gas Inspector Date: 8-22-2017

Field Reviewed?  Yes  No



**Antero Resources Corporation**  
Appalachian Basin  
Bill Unit 4H  
Ritchie County

Quadrangle: Pennsboro  
Watershed: Hughes River  
District: Clay  
Date: 7-20-2015

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**911 Address**  
**1462 Sugar Run Rd.**  
**Pennsboro, WV 26415**

## Well Site Safety Plan

### Antero Resources

**Well Name:** Bill Unit 1H-4H, Buffalo Unit 1H & 2H, Mogar Unit 1H & 2H, Waldo Unit 1H & 2H, Waco Unit 1H-3H

**Pad Location:** BISON PAD  
 Ritchie County/Clay District

#### GPS Coordinates:

**Entrance** - Lat 39°18'51.21"/Long -80°54'44.88" (NAD83)

**Pad Center** - Lat 39°17'40.52"/Long -80°54'19.58" (NAD83)

*Michael Doff*  
 8-22-2017

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#### Driving Directions:

From the intersection of I-79 and Hwy 50 near Clarksburg WV. Head west on Hwy 50 for ~ 35.6 miles. Turn RIGHT on Old U.S 50 E (Northwest Turnpike), and follow for ~1.3 miles. Turn RIGHT on Sugar Run Rd and follow that for ~1.5 miles. Rig access road will be on the right.

#### Alternate Route:

From the Town of Pennsboro. Take Main St. south out of town. Turn left onto E. Myles/ Old US 50W (3 miles). Continue onto Northwest Turnpike (0.8 miles). Turn left onto Sugar Run Rd. (1.6 miles). Pad access road will be on your right.

**EMERGENCY (24 HOUR) CONTACT 1-800-878-1373**

09/29/2017

LATITUDE 39°20'00"

7,530'

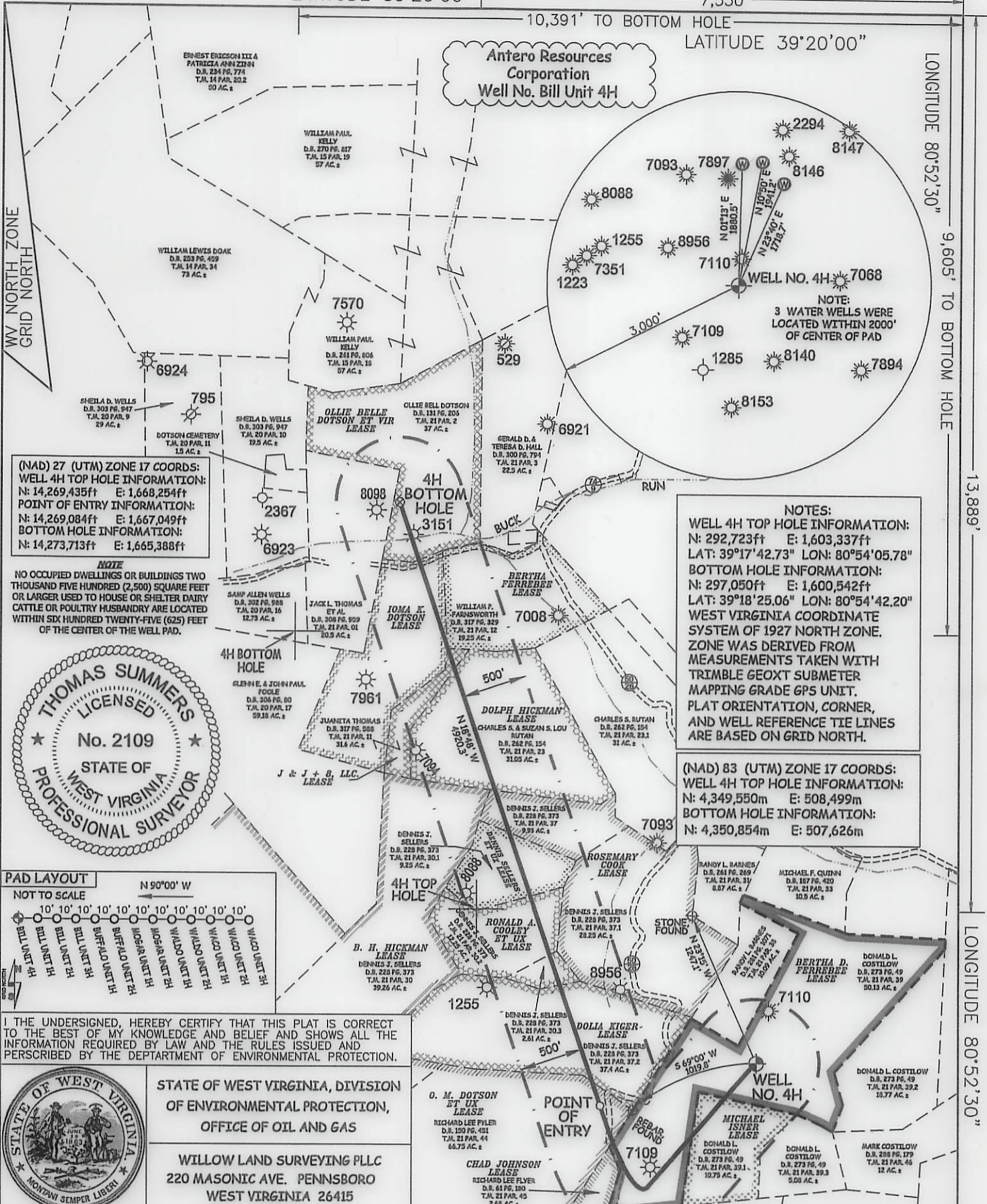
10,391' TO BOTTOM HOLE

LATITUDE 39°20'00"

LONGITUDE 80°52'30"

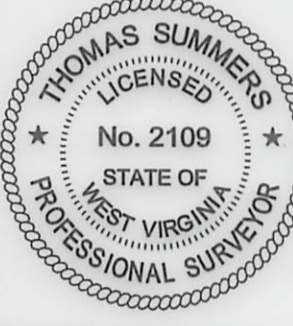
9,605' TO BOTTOM HOLE

LONGITUDE 80°52'30"



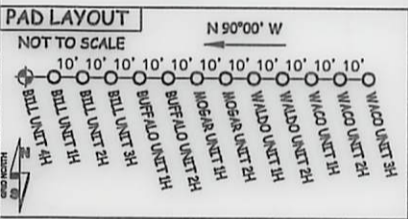
(NAD) 27 (UTM) ZONE 17 COORDS:  
 WELL 4H TOP HOLE INFORMATION:  
 N: 14,269,435ft E: 1,668,254ft  
 POINT OF ENTRY INFORMATION:  
 N: 14,269,084ft E: 1,667,049ft  
 BOTTOM HOLE INFORMATION:  
 N: 14,273,713ft E: 1,665,388ft

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.



NOTES:  
 WELL 4H TOP HOLE INFORMATION:  
 N: 292,723ft E: 1,603,337ft  
 LAT: 39°17'42.73" LON: 80°54'05.78"  
 BOTTOM HOLE INFORMATION:  
 N: 297,050ft E: 1,600,542ft  
 LAT: 39°18'25.06" LON: 80°54'42.20"  
 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 4H TOP HOLE INFORMATION:  
 N: 4,349,550m E: 508,499m  
 BOTTOM HOLE INFORMATION:  
 N: 4,350,854m E: 507,626m



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 # 15-029WA  
 DRAWING # BILL4H  
 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

LEGEND  
 - - - - - Surface Owner Boundary Lines +/-  
 - - - - - Interior Surface Tracts +/-  
 x x x x Existing Fence  
 ⊕ Found monument, as noted  
 THOMAS SUMMERS P.S. 2109  
 DATE 08/02/17  
 OPERATOR'S WELL# BILLUNIT#4H



WELL TYPE: OIL	<input checked="" type="checkbox"/> GAS	<input checked="" type="checkbox"/> LIQUID INJECTION	<input type="checkbox"/> WASTE DISPOSAL	47	085	10321H6A
(IF "GAS") PRODUCTION	<input checked="" type="checkbox"/> STORAGE	<input type="checkbox"/> DEEP	<input checked="" type="checkbox"/> SHALLOW	STATE	COUNTY	PERMIT
LOCATION: ELEVATION 1,238' - ORIGINAL 1,221' - PROPOSED	WATERSHED NORTH FORK HUGHES RIVER		QUADRANGLE PENNSBORO 7.5	DISTRICT CLAY	COUNTY RITCHIE	09/29/2017
SURFACE OWNER DONALD L. COSTILOW	ACREAGE 50.13 ACRES +/-		LEASE ACREAGE 67 AC.±; 10.75 AC.±; 70 AC.±; 40 AC.±; 13.99 AC.±; 9.25 AC.±; 9.25 AC.±; 26.52 AC.±; 4.58 AC.±; 20 AC.±; 27 AC.±; 37 AC.±;			
OIL & GAS ROYALTY OWNER BERTHA D. FERREBEE; MICHAEL ISNER; O.M. DOTSON ET UX;	DOLIA KIGER; RONALD A. COOLEY ET UX; DENNIS SELLERS ET UX; ROSEMARY COOK; DOLPH HICKMAN;		J & J + 8 LLC; BERTHA FERREBEE; IOMA K. DOTSON; OLLIE BELLE DOTSON ET VIR;			
PROPOSED WORK: DRILL <input checked="" type="checkbox"/> CONVERT	<input type="checkbox"/> DRILL DEEPER	<input type="checkbox"/> REDRILL	<input type="checkbox"/> FRACTURE OR STIMULATE	<input checked="" type="checkbox"/> PLUG & ABANDON	<input type="checkbox"/> CLEAN OUT & REPLUG	
PLUG OFF OLD FORMATION	<input type="checkbox"/> PERFORATE NEW FORMATION	<input checked="" type="checkbox"/> OTHER PHYSICAL CHANGE IN WELL (SPECIFY)				
TARGET FORMATION BURKETT	ESTIMATED DEPTH 6,900' TVD 13,900' MD					
WELL OPERATOR ANTERO RESOURCES CORP.	DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM					
ADDRESS 1615 WYNKOOP ST. DENVER, CO 80202	ADDRESS 5400 D BIG TYLER ROAD CHARLESTON, WV 25313					

**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
<b><u>Bertha D. Ferrebee Lease</u></b>			
Bertha D. Ferrebee	J & J Enterprises, Inc.	1/8	0170/0080
J & J Enterprises, Inc.	Eastern American Energy Corporation	Confirmatory Deed & Assignment of Leases	DB 0231/0732
Eastern American Energy Corporation	Energy Corporation of America	Certificate of Merger	COI 0006/0450
Energy Corporation of America	Antero Resources Appalachian Corporation	Memorandum of Agreement	0257/0397
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Michael Isner Lease</u></b>			
Michael Isner	Antero Resources Appalachian Corporation	1/8+	0264/0944
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Chad Johnson Lease</u></b>			
Chad Johnson	Tenmile Land, LLC	1/8+	0284/0600
Tenmile Land, LLC	Antero Resources Corporation	Assignment	0286/0162
<b><u>O.M. Dotson, et ux Lease</u></b>			
O.M. Dotson and M.A. Dotson	M.G. Zinn	1/8	0031/0195
M.G. Zinn	J.L. Newman	Assignment	0126/0415
J.L. Newman	The Philadelphia Company of West Virginia	Assignment	0091/0265
The Philadelphia Company of West Virginia	Pittsburgh and West Virginia Gas Company	Assignment	0055/0362
Pittsburgh and West Virginia Gas Company	Equitable Gas Company	Assignment	DB 0126/0473
Equitable Gas Company	Equitrans, Inc.	Assignment	0201/0253
Equitrans, Inc.	Equitable Production – Eastern States, Inc.	Assignment	0234/0830
Equitable Production – Eastern States, Inc.	Equitable Production Company	Merger	Exhibit 2
Equitable Production Company	EQT Production Company	Name Change	CR 0006/0443
EQT Production Company	Antero Resources Corporation	Partial Assignment	0277/0836
<b><u>Dolia Kiger- Lease</u></b>			
Dolia Kiger	J & J Enterprises, Inc.	1/8	0177/0404
J & J Enterprises, Inc.	Eastern American Energy Corporation	Confirmatory Deed & Assignment of Leases	DB 0231/0732
Eastern American Energy Corporation	Energy Corporation of America	Certificate of Merger	CR 0006/0450
Energy Corporation of America	Antero Resources Appalachian Corporation	Memorandum of Agreement	0257/0397
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Ronald A. Cooley, et ux Lease</u></b>			
Ronald A. Cooley, et ux	Antero Resources Appalachian Corporation	1/8+	0262/0324
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

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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.



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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- (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
<b><u>Dennis Sellers, et ux Lease</u></b>			
Dennis Sellers, et ux Key Oil Company	Key Oil Company Antero Resources Appalachian Corporation	1/8 Partial Assignment of Oil & Gas Leases	0211/0141 0258/0509
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Rosemary Cook Lease</u></b>			
Rosemary Cook Key Oil Company	Key Oil Company Antero Resources Appalachian Corporation	1/8 Partial Assignment of Oil & Gas Leases	0233/0949 0253/0747
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>B.H. Hickman Lease</u></b>			
B.H. Hickman M.G. Zinn J.L. Newman The Philadelphia Company of West Virginia The Pittsburgh and West Virginia Gas Company Equitable Gas Company P.D. Farr, II Antero Resources Appalachian Corporation	M.G. Zinn J.L. Newman The Philadelphia Company of West Virginia The Pittsburgh and West Virginia Gas Company Equitable Gas Company P.D. Farr, II Antero Resources Appalachian Corporation Antero Resources Corporation	1/8 Assignment Assignment Assignment Dissolution Assignment Assignment Name Change	0029/0447 0126/0415 0091/0265 0055/0359 DB 0126/0473 0192/0804 0257/0249 Exhibit 1
<b><u>Dolph Hickman Lease</u></b>			
Dolph Hickman, et al J & J Enterprises, Inc.	J & J Enterprises, Inc. Eastern American Energy Corporation	1/8 Confirmatory Deed & Assignment of Leases	0167/0299 DB 0231/0732
Eastern American Energy Corporation Energy Corporation of America	Energy Corporation of America Antero Resources Appalachian Corporation	Certificate of Merger Memorandum of Agreement	CR 0006/0450 0257/0397
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>J &amp; J + 8, LLC Lease</u></b>			
J & J + 8, LLC	Antero Resources Corporation	1/8+	0285/0016
<b><u>Ioma K. Dotson Lease</u></b>			
Ioma K. Dotson aka Ioma Clark	Antero Resources Corporation	1/8+	0277/0992
<b><u>Bertha Ferrebee Lease</u></b>			
Bertha D. Ferrebee J & J Enterprises, Inc.	J & J Enterprises, Inc. Eastern American Energy Corporation	1/8 Confirmatory Deed & Assignment of Leases	0169/0298 DB 0231/0732
Eastern American Energy Corporation Energy Corporation of America	Energy Corporation of America Antero Resources Appalachian Corporation	Certificate of Merger Memorandum of Agreement	COI 0006/0450 0257/0397
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

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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.

**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
<b>Ollie Belle Dotson, et vir Lease</b>				
	Ollie Belle Dotson, et vir	Carl Perkins	1/8	0108/0497
	Carl Perkins	Perkins Oil & Gas, Inc.	Assignment	0131/0680
	Perkins Oil & Gas, Inc.	Antero Resources Corporation	*Partial Assign.	0264/1045

\*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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WV Department of  
Environmental Protection

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

# State of West Virginia



## Certificate

*I, Joe Manchin III, Secretary of State of the  
State of West Virginia, hereby certify that*

by the provisions of Chapter 31 of the West Virginia Code, Articles of Merger were received and filed  
MERGING **EQUITABLE PRODUCTION - EASTERN STATES, INC.**, A QUALIFIED DE ORGANIZATION, WITH AND INTO  
**EQUITABLE PRODUCTION COMPANY**, A QUALIFIED ORGANIZATION.

Therefore, I hereby issue this

### CERTIFICATE OF MERGER

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Office of Oil and Gas  
AUG 16 2017  
WV Department of  
Environmental Protection



*Given under my hand and the  
Great Seal of the State of  
West Virginia on this day of  
June 28, 2001*



Secretary of State

09/29/2017

85-10327



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

August 10, 2017

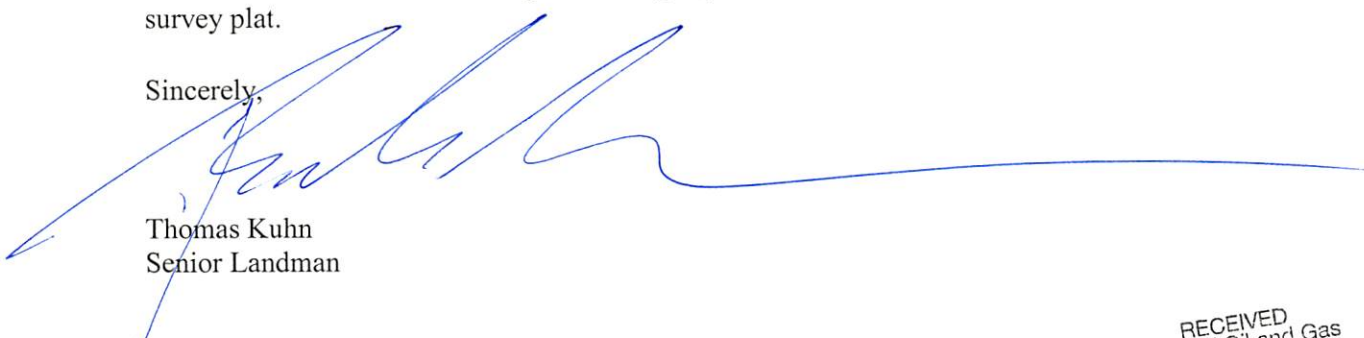
West Virginia Department of Environmental Protection  
Chief, Office of Oil and Gas  
Attn: Mr. James Martin  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304

RE: Bill Unit 4H  
Quadrangle: Pennsboro 7.5'  
Ritchie County/Clay District, West Virginia

Mr. Martin:

Antero Resources Corporation (Antero) is submitting the following application for a new well work permit for the Bill Unit 4H horizontal shallow well. As an authorized representative, I certify that Antero has the right to extract, produce or market the oil or gas from all leases through which the Bill Unit 4H horizontal lateral will drill through including any and all roads crossed under as identified on the attached survey plat.

Sincerely,



Thomas Kuhn  
Senior Landman

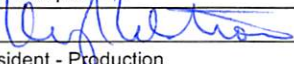
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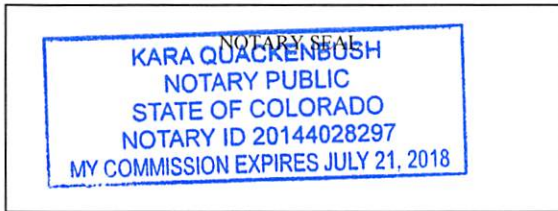
09/29/2017

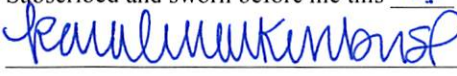


**Certification of Notice is hereby given:**

THEREFORE, I Kevin Kilstrom, have read and understand the notice requirements within West Virginia Code § 22-6A. I certify that as required under West Virginia Code § 22-6A, I have served the attached copies of the Notice Forms, identified above, to the required parties through personal service, by registered mail or by any method of delivery that requires a receipt or signature confirmation. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Notice Certification and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator:	<u>Antero Resources Corporation</u>	Address:	<u>1615 Wynkoop Street</u>
By:	<u>Kevin Kilstrom</u> 		<u>Denver, CO 80202</u>
Its:	<u>Senior Vice President - Production</u>	Facsimile:	<u>303-357-7315</u>
Telephone:	<u>303-357-7310</u>	Email:	<u>kquackenbush@anteroresources.com</u>



Subscribed and sworn before me this 14 day of August 2017  
  
 \_\_\_\_\_ Notary Public  
 My Commission Expires July 21, 2018

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [deprivacyofficer@wv.gov](mailto:deprivacyofficer@wv.gov).

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 Office of Oil and Gas  
 AUG 16 2017  
 WV Department of  
 Environmental Protection  
 09/29/2017

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
NOTICE OF APPLICATION

Notice Time Requirement: notice shall be provided no later than the filing date of permit application.

Date of Notice: 8/15/2017 Date Permit Application Filed: 8/15/2017

Notice of:

- PERMIT FOR ANY WELL WORK       CERTIFICATE OF APPROVAL FOR THE CONSTRUCTION OF AN IMPOUNDMENT OR PIT

Delivery method pursuant to West Virginia Code § 22-6A-10(b)

- PERSONAL SERVICE       REGISTERED MAIL       METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to W. Va. Code § 22-6A-10(b) no later than the filing date of the application, the applicant for a permit for any well work or for a certificate of approval for the construction of an impoundment or pit as required by this article shall deliver, by personal service or by registered mail or by any method of delivery that requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of this article, and the well plat to each of the following persons: (1) The owners of record of the surface of the tract on which the well is or is proposed to be located; (2) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for roads or other land disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The coal owner, operator or lessee, in the event the tract of land on which the well proposed to be drilled is located [sic] is known to be underlain by one or more coal seams; (4) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for the placement, construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this article; (5) Any surface owner or water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five hundred feet of the center of the well pad which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field within which the proposed well work activity is to take place. (c)(1) If more than three tenants in common or other co-owners of interests described in subsection (b) of this section hold interests in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be maintained pursuant to section eight, article one, chapter eleven-a of this code. (2) Notwithstanding any provision of this article to the contrary, notice to a lien holder is not notice to a landowner, unless the lien holder is the landowner. W. Va. Code R. § 35-8-5.7.a requires, in part, that the operator shall also provide the Well Site Safety Plan ("WSSP") to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Application Notice    WSSP Notice    E&S Plan Notice    Well Plat Notice is hereby provided to:

SURFACE OWNER(s)  
Name: PLEASE SEE ATTACHMENT  
Address: \_\_\_\_\_

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

SURFACE OWNER(s) (Road and/or Other Disturbance)  
Name: PLEASE SEE ATTACHMENT  
Address: \_\_\_\_\_

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

SURFACE OWNER(s) (Impoundments or Pits)  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_

COAL OWNER OR LESSEE  
Name: NO DECLARATIONS ON RECORD WITH COUNTY  
Address: \_\_\_\_\_

COAL OPERATOR  
Name: NO DECLARATIONS ON RECORD WITH COUNTY  
Address: \_\_\_\_\_

WATER PURVEYOR(s)/OWNER(s) OF WATER WELL, SPRING OR OTHER WATER SUPPLY SOURCE  
Name: NONE IDENTIFIED WITHIN 1500'  
Address: \_\_\_\_\_

\*NOTE: 3 water wells were identified but are located greater than 1500' from subject pad location

OPERATOR OF ANY NATURAL GAS STORAGE FIELD  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_

\*Please attach additional forms if necessary

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WV Department of  
Environmental Protection

09/29/2017

AUG 16 2017

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-10(b), notice is hereby given that the undersigned well operator has applied for a permit for well work or for a certificate of approval for the construction of an impoundment or pit.

**This Notice Shall Include:**

Pursuant to W. Va. Code § 22-6A-10(b), this notice shall include: (1) copies of the application; (2) the erosion and sediment control plan required by section seven of this article; and (3) the well plat.

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments; (2) who may file written comments; (3) the name and address of the secretary for the purpose of filing the comments and obtaining additional information; and (4) a statement that the persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Pursuant to W. Va. Code R. § 35-8-5.7.a, the operator shall provide the Well Site Safety Plan to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Pursuant to W. Va. Code R. § 35-8-15.2.c, this notice shall: (1) contain a statement of the surface owner's and water purveyor's right to request sampling and analysis; (2) advise the surface owner and water purveyor of the rebuttable presumption for contamination or deprivation of a fresh water source or supply; advise the surface owner and water purveyor that refusal to allow the operator to conduct a pre-drilling water well test constitutes a method to rebut the presumption of liability; (3) advise the surface owner and water purveyor of his or her independent right to sample and analyze any water supply at his or her own expense; advise the surface owner and water purveyor whether or not the operator will utilize an independent laboratory to analyze any sample; and (4) advise the surface owner and or water purveyor that he or she can obtain from the Chief a list of water testing laboratories in the subject area capable of and qualified to test water supplies in accordance with standard acceptable methods.

Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

**Well Location Restrictions**

Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any existing water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within six hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary. (c) Notwithstanding the foregoing provisions of this section, nothing contained in this section prevents an operator from conducting the activities permitted or authorized by a Clean Water Act Section 404 permit or other approval from the United States Army Corps of Engineers within any waters of the state or within the restricted areas referenced in this section. (d) The well location restrictions set forth in this section shall not apply to any well on a multiple well pad if at least one of the wells was permitted prior to the effective date of this article. (e) The secretary shall, by December 31, 2012, report to the Legislature on the noise, light, dust and volatile organic compounds generated by the drilling of horizontal wells as they relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding, if any, by the secretary that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

09/29/2017



examined in the study required by this subsection, the secretary shall have the authority to propose for promulgation legislative rules establishing guidelines and procedures regarding reasonable levels of noise, light, dust and volatile organic compounds relating to drilling horizontal wells, including reasonable means of mitigating such factors, if necessary.

**Water Well Testing:**

Pursuant to West Virginia Code § 22-6A-10(d), notification shall be made, with respect to surface landowners identified in subsection (b) or water purveyors identified in subdivision (5), subsection (b) of this section, of the opportunity for testing their water well. The operator shall provide an analysis to such surface landowner or water purveyor at their request.

**Water Testing Laboratories:**

Pursuant to West Virginia Code § 22-6A-10(i), persons entitled to notice pursuant to subsection (b) of this section may contact the department to ascertain the names and locations of water testing laboratories in the subject area capable and qualified to test water supplies in accordance with standard accepted methods. In compiling that list of names the department shall consult with the state Bureau for Public Health and local health departments. A surface owner and water purveyor has an independent right to sample and analyze any water supply at his or her own expense. The laboratory utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section.

**Rebuttable Presumption for Contamination or Deprivation of a Fresh Water Source or Supply:**

W. Va. Code § 22-6A-18 requires that (b) unless rebutted by one of the defenses established in subsection (c) of this section, in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply. (c) In order to rebut the presumption of liability established in subsection (b) of this section, the operator must prove by a preponderance of the evidence one of the following defenses: (1) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration water well test. (2) The landowner or water purveyor refused to allow the operator access to the property to conduct a predrilling or prealteration water well test. (3) The water supply is not within one thousand five hundred feet of the well. (4) The pollution occurred more than six months after completion of drilling or alteration activities. (5) The pollution occurred as the result of some cause other than the drilling or alteration activity. (d) Any operator electing to preserve its defenses under subdivision (1), subsection (c) of this section shall retain the services of an independent certified laboratory to conduct the predrilling or prealteration water well test. A copy of the results of the test shall be submitted to the department and the surface owner or water purveyor in a manner prescribed by the secretary. (e) Any operator shall replace the water supply of an owner of interest in real property who obtains all or part of that owner's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source with a comparable water supply where the secretary determines that the water supply has been affected by contamination, diminution or interruption proximately caused by the oil or gas operation, unless waived in writing by that owner. (f) The secretary may order the operator conducting the oil or gas operation to: (1) Provide an emergency drinking water supply within twenty-four hours; (2) Provide temporary water supply within seventy-two hours; (3) Within thirty days begin activities to establish a permanent water supply or submit a proposal to the secretary outlining the measures and timetables to be used in establishing a permanent supply. The total time in providing a permanent water supply may not exceed two years. If the operator demonstrates that providing a permanent replacement water supply cannot be completed within two years, the secretary may extend the time frame on case-by-case basis; and (4) Pay all reasonable costs incurred by the real property owner in securing a water supply. (g) A person as described in subsection (b) of this section aggrieved under the provisions of subsections (b), (e) or (f) of this section may seek relief in court... (i) Notwithstanding the denial of the operator of responsibility for the damage to the real property owner's water supply or the status of any appeal on determination of liability for the damage to the real property owner's water supply, the operator may not discontinue providing the required water service until authorized to do so by the secretary or a court of competent jurisdiction.

**Written Comment:**

Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary. All persons described in West Virginia Code § 22-6A-10(b) may file written comments as to the location or construction of the applicant's proposed well work to the Secretary at:

Chief, Office of Oil and Gas  
Department of Environmental Protection  
601 57<sup>th</sup> St. SE  
Charleston, WV 25304  
(304) 926-0450

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Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water. **NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.**

**Time Limits and Methods for Filing Comments.**

The law requires these materials to be served on or before the date the operator files its Application. You have **THIRTY (30) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Pursuant to West Virginia Code § 22-6A-11(c)(2), Any objections of the affected coal operators and coal seam owners and lessees shall be addressed through the processes and procedures that exist under sections fifteen, seventeen and forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article. The written comments filed by the parties entitled to notice under subdivisions (1), (2), (4), (5) and (6), subsection (b), section ten of this article shall be considered by the secretary in the permit issuance process, but the parties are not entitled to participate in the processes and proceedings that exist under sections fifteen, seventeen or forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article.

**Comment Requirements**

Your comments must be in writing and include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

Disclaimer: All comments received will be placed on our web site <http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/Pages/default.aspx> and the applicant will automatically be forwarded an email notice that such comments have been submitted. The applicant will be expected to provide a response to comments submitted by any surface owner, water purveyor or natural gas storage operator noticed within the application.

**Permit Denial or Condition**

The Chief has the power to deny or condition a well work permit. Pursuant to West Virginia Code § 22-6A-8(d), the permit may not be issued or be conditioned, including conditions with respect to the location of the well and access roads prior to issuance if the director determines that:

- (1) The proposed well work will constitute a hazard to the safety of persons;
- (2) The plan for soil erosion and sediment control is not adequate or effective;
- (3) Damage would occur to publicly owned lands or resources; or
- (4) The proposed well work fails to protect fresh water sources or supplies.

A permit may also be denied under West Virginia Code § 22-6A-7(k), the secretary shall deny the issuance of a permit if the secretary determines that the applicant has committed a substantial violation of a previously issued permit for a horizontal well, including the applicable erosion and sediment control plan associated with the previously issued permit, or a substantial violation of one or more of the rules promulgated under this article, and in each instance has failed to abate or seek review of the violation within the time prescribed by the secretary pursuant to the provisions of subdivisions (1) and (2), subsection (a), section five of this article and the rules promulgated hereunder, which time may not be unreasonable.

Pursuant to West Virginia Code § 22-6A-10(g), any person entitled to submit written comments to the secretary pursuant to subsection (a), section eleven of this article, shall also be entitled to receive from the secretary a copy of the permit as issued or a copy of the order modifying or denying the permit if the person requests receipt of them as a part of the written comments submitted concerning the permit application. Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

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WW-6A  
(8-13)

API NO. 47-85 - 10329  
OPERATOR WELL NO. Bill Unit 4H  
Well Pad Name: Existing Bison Pad

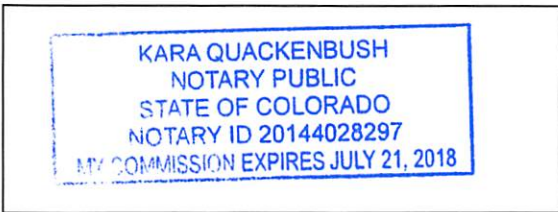
**Notice is hereby given by:**

Well Operator: Antero Resources Corporation  
Telephone: (303) 357-7310  
Email: kquackenbush@anteroresources.com

Address: 1615 Wynkoop Street  
Denver, CO 80202  
Facsimile: 303-357-7315

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [deprivacyofficer@wv.gov](mailto:deprivacyofficer@wv.gov).



Subscribed and sworn before me this 15 day of August 2017.

Kara Quackenbush Notary Public

My Commission Expires July 21, 2018

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**WW-6A Notice of Application Attachment (BISON PAD):****List of Surface Owner(s) with Proposed Disturbance associated with Bison Well Pad:**

**WELL PAD – Both owners were notified of all well work permit applications, and have executed signed Surface Use Agreements with Antero Resources Corporation.**

**TM 21 PCL 39 and 39.1**

**Owner:** Donald L. & Patricia L. Costilow  
**Address:** 608 Carson Road  
 Ashtabula, OH 44004

**TM 21 PCL 38**

**Owner:** Randy L. Barnes  
**Address:** 48 Cloverdale Rd.  
 Pennsboro, WV 26415

**ROAD AND/OR OTHER DISTURBANCE – Both owners have executed signed Surface Use and/or Road Agreements with Antero Resources Corporation. However, they were only notified if their tracts were overlying the oil and gas leasehold being developed by the proposed well work.**

**TM 21 PCL 37.2 and 37.3**

**Owner:** Dennis J. & Delsa R. Sellers  
**Address:** 531 Park Drive  
 Pennsboro, WV 26415

**TM 21 PCL 44**

**Owner:** Richard L. Fyler  
**Address:** 1010 York Road  
 Dillsburg, PA 17019

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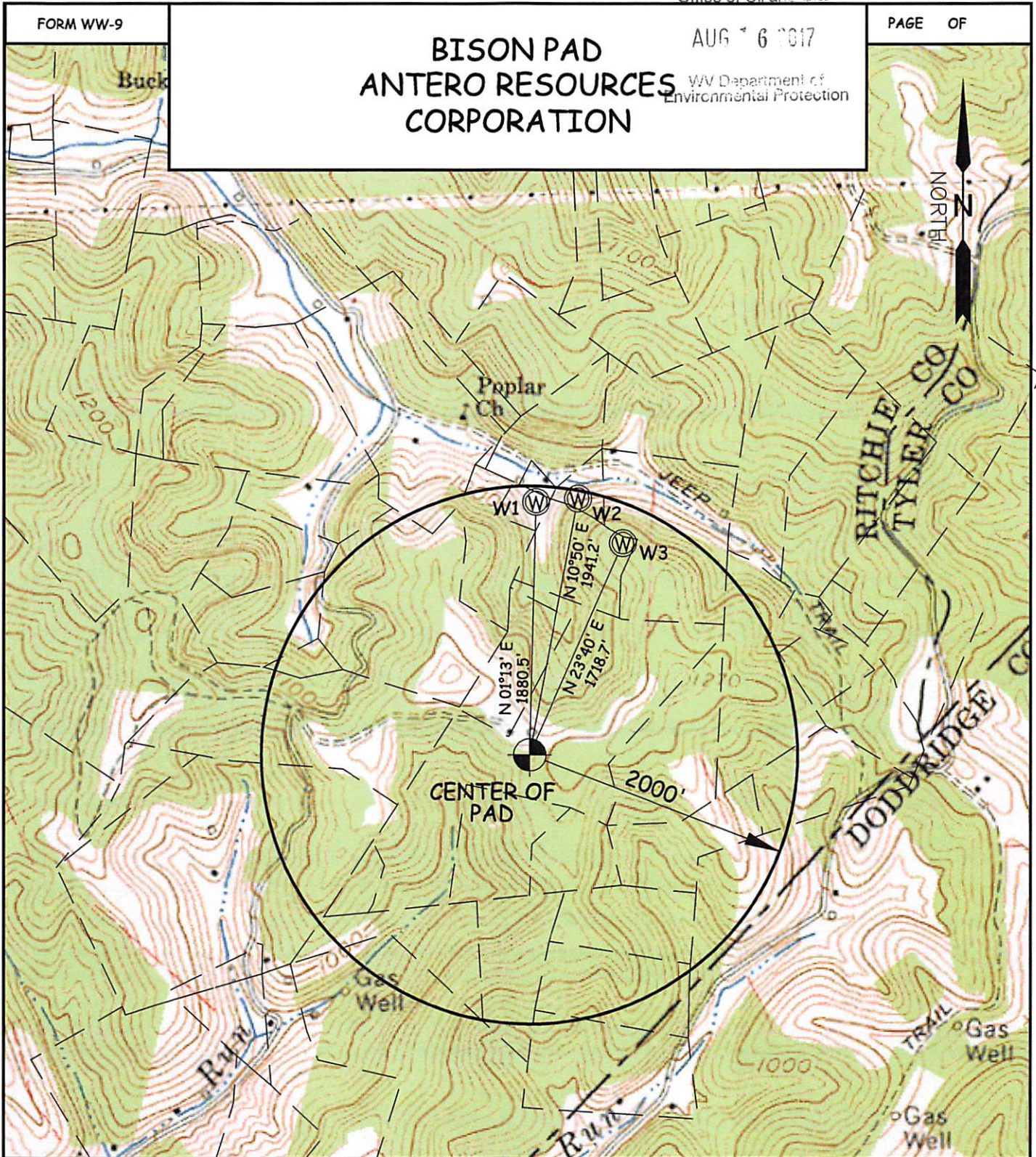
FORM WW-9

AUG 6 2017

PAGE OF

**BISON PAD  
ANTERO RESOURCES  
CORPORATION**

WV Department of  
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WELL	SURFACE OWNER	ADDRESS	DISTRICT-TAX MAP-PARCEL	WELL LATITUDE	WELL LONGITUDE
W1	JO ANN ROBINSON	RT 1 BOX 1015 GREENWOOD, WV 26415	3-21-31.1	39° 18' 01.32"	80° 54' 05.20"
W2	CHRISTIAN CHURCH	P.O. BOX 31 PENNSBORO, WV 26415	3-21-32	39° 18' 01.63"	80° 54' 01.21"
W3	MICHAEL F. QUINN	2122 LORRAINE AVE BALTIMORE, MD 21207	3-21-33	39° 17' 58.40"	80° 53' 56.88"

WILLOW LAND SURVEYING PLLC P.O. BOX 17, PENNSBORO, WV 26415 (304) 659-1717	TOPO SECTION OF :  PENNSBORO 7.5' QUAD.	SCALE : 1-INCH = 1000-FEET 0'      1000'      2000'      3000' 
	DATE: 08/08/17      DRAWN BY: G.B.K.	

**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**NOTICE OF INTENT TO DRILL**

Pursuant to W. Va. Code § 22-6A-16(b), the Notice of Intent to Drill is only required if the notice requirements of W. Va. Code § 22-6A-10(a) have NOT been met or if the Notice of Intent to Drill requirement has NOT been waived in writing by the surface owner.

**Notice Time Requirement:** Notice shall be provided at least **TEN (10)** days prior to filing a permit application.

**Date of Notice:** 07/31/2017      **Date Permit Application Filed:** 08/10/2017

**Delivery method pursuant to West Virginia Code § 22-6A-16(b)**

- HAND DELIVERY       CERTIFIED MAIL RETURN RECEIPT REQUESTED

Pursuant to W. Va. Code § 22-6A-16(b), at least ten days prior to filing a permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner notice of its intent to enter upon the surface owner's land for the purpose of drilling a horizontal well: *Provided*, That notice given pursuant to subsection (a), section ten of this article satisfies the requirements of this subsection as of the date the notice was provided to the surface owner: *Provided, however*, That the notice requirements of this subsection may be waived in writing by the surface owner. The notice, if required, shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative.

**Notice is hereby provided to the SURFACE OWNER(s):**

Name: Donald L. & Patricia L. Costilow  
Address: 608 Carson Rd.  
Ashtabula, OH 44004

Name: Randy L. Barnes  
Address: 48 Cloverdale Rd.  
Pennsboro, WV 26415

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-16(b), notice is hereby given that the undersigned well operator has an intent to enter upon the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State: West Virginia      UTM NAD 83      Easting: 508524.63m (Approximate Pad Center)  
County: Ritchie      Northing: 4349558.08m (Approximate Pad Center)  
District: Clay      Public Road Access: CR 50/26  
Quadrangle: Pennsboro 7.5'      Generally used farm name: Costilow, Donald  
Watershed: North Fork Hughes River

**This Notice Shall Include:**

Pursuant to West Virginia Code § 22-6A-16(b), this notice shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

**Notice is hereby given by:**

Well Operator: Antero Resources Corporation  
Address: 1615 Wynkoop St.  
Denver, CO 80202  
Telephone: 303-357-7323  
Email: kquackenbush@anteroresources.com  
Facsimile: 303-357-7315

Authorized Representative: Kara Quackenbush  
Address: 1615 Wynkoop St.  
Denver, CO 80202  
Telephone: 303-357-7323  
Email: kquackenbush@anteroresources.com  
Facsimile: 303-357-7315

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. We will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).

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**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**NOTICE OF PLANNED OPERATION**

**Notice Time Requirement:** notice shall be provided no later than the **filing date of permit application.**

**Date of Notice:** 08/15/2017      **Date Permit Application Filed:** 08/15/2017

**Delivery method pursuant to West Virginia Code § 22-6A-16(c)**

- CERTIFIED MAIL                                       HAND  
RETURN RECEIPT REQUESTED                                      DELIVERY

Pursuant to W. Va. Code § 22-6A-16(c), no later than the date for filing the permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner whose land will be used for the drilling of a horizontal well notice of the planned operation. The notice required by this subsection shall include: (1) A copy of this code section; (2) The information required to be provided by subsection (b), section ten of this article to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. (d) The notices required by this section shall be given to the surface owner at the address listed in the records of the sheriff at the time of notice.

**Notice is hereby provided to the SURFACE OWNER(s)**

(at the address listed in the records of the sheriff at the time of notice):

Name: Donald L. & Patricia L. Costilow  
Address: 608 Carson Rd.  
Ashtabula, OH 44004

Name: Randy L. Barnes  
Address: 48 Cloverdale Rd.  
Pennsboro, WV 26415

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-16(c), notice is hereby given that the undersigned well operator has developed a planned operation on the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>508499m</u>
County:	<u>Ritchie</u>		Northing:	<u>4349550m</u>
District:	<u>Clay</u>	Public Road Access:		<u>CR 50/26</u>
Quadrangle:	<u>Pennsboro 7.5'</u>	Generally used farm name:		<u>Donald L. Costilow</u>
Watershed:	<u>North Fork Hughes River</u>			

**This Notice Shall Include:**

Pursuant to West Virginia Code § 22-6A-16(c), this notice shall include: (1) A copy of this code section; (2) The information required to be provided by **W. Va. Code § 22-6A-10(b)** to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57<sup>th</sup> Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

Well Operator: Antero Resources Corporation  
Telephone: (303) 357-7310  
Email: kquackenbush@anteroresources.com

Address: 1615 Wynkoop Street  
Denver, CO 80202  
Facsimile: 303-357-7315

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use of your personal information, please contact DEP's Chief Privacy Officer at [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION  
**Division of Highways**

1900 Kanawha Boulevard East • Building Five • Room 110  
 Charleston, West Virginia 25305-0430 • (304) 558-3505

Jim Justice  
 Governor

Thomas J. Smith, P. E.  
 Secretary of Transportation/  
 Commissioner of Highways

July 28, 2017

James A. Martin, Chief  
 Office of Oil and Gas  
 Department of Environmental Protection  
 601 57<sup>th</sup> Street, SE  
 Charleston, WV 25304

Subject: DOH Permit for the Bison Pad, Ritchie County  
 Bill Unit 4H Well site

47-085-10327 ✓

Dear Mr. Martin,

This well site will be accessed from a DOH permit #03-2014-0425 which has been issued to Antero Resources Corporation for access to the State Road for a well site located off of Ritchie County Route 50/26 SLS.

The operator has signed a STATEWIDE OIL AND GAS ROAD MAINTENANCE BONDING AGREEMENT and provided the required Bond. This operator is currently in compliance with the DOH OIL AND GAS POLICY dated January 3, 2012.

Very Truly Yours,

Gary K. Clayton, P.E.  
 Regional Maintenance Engineer  
 Central Office O&G Coordinator

Cc: Kara Quackenbush  
 Antero Resources Corporation  
 CH, OM, D-3  
 File

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# List of Anticipated Additives Used for Fracturing or Stimulating Well

4708510327

Additives	Chemical Abstract Service Number (CAS #)
Fresh Water	7732-18-5
2 Phosphobutane 1,2,4 tricarboxylic acid	37971-36-1
Ammonium Persulfate	7727-54-0
Anionic copolymer	Proprietary
Anionic polymer	Proprietary
BTEX Free Hydrotreated Heavy Naphtha	64742-48-9
Cellulase enzyme	Proprietary
Demulsifier Base	Proprietary
Ethoxylated alcohol blend	Mixture
Ethoxylated Nonylphenol	68412-54-4
Ethoxylated oleylamine	26635-93-8
Ethylene Glycol	107-21-1
Glycol Ethers	111-76-2
Guar gum	9000-30-0
Hydrogen Chloride	7647-01-0
Hydrotreated light distillates, non-aromatic, BTEX free	64742-47-8
Isopropyl alcohol	67-63-0
liquid, 2,2-dibromo-3-nitrilopropionamide	10222-01-2
Microparticle	Proprietary
Petroleum Distillates (BTEX Below Detect)	64742-47-8
Polyacrylamide	57-55-6
Propargyl Alcohol	107-19-7
Propylene Glycol	57-55-6
Quartz	14808-60-7
Sillica, crystalline quartz	7631-86-9
Sodium Chloride	7647-14-5
Sodium Hydroxide	1310-73-2
Sugar	57-50-1
Surfactant	68439-51-0
Suspending agent (solid)	14808-60-7
Tar bases, quinoline derivs, benzyl chloride-quaternized	72480-70-7
Solvent Naphtha, petroleum, heavy aliph	64742-96-7
Soybean Oil, Me ester	67784-80-9
Copolymer of Maleic and Acrylic Acid	52255-49-9
DETA phosphonate	15827-60-8
Hexamethylene Triamine Penta	34690-00-1
Phosphino Carboxylic acid polymer	71050-62-9
Hexamethylene Diamine Tetra	23605-75-5
2-Propenoic acid, polymer with 2 propenamide	9003-06-9
Hexamethylene diamine penta (methylene phosphonic acid)	23605-74-5
Diethylene Glycol	111-46-6
Methenamine	100-97-0
Polyethylene polyamine	68603-67-8
Coco amine	61791-14-8
2-Propyn-1-olcompound with methyloxirane	38172-91-7

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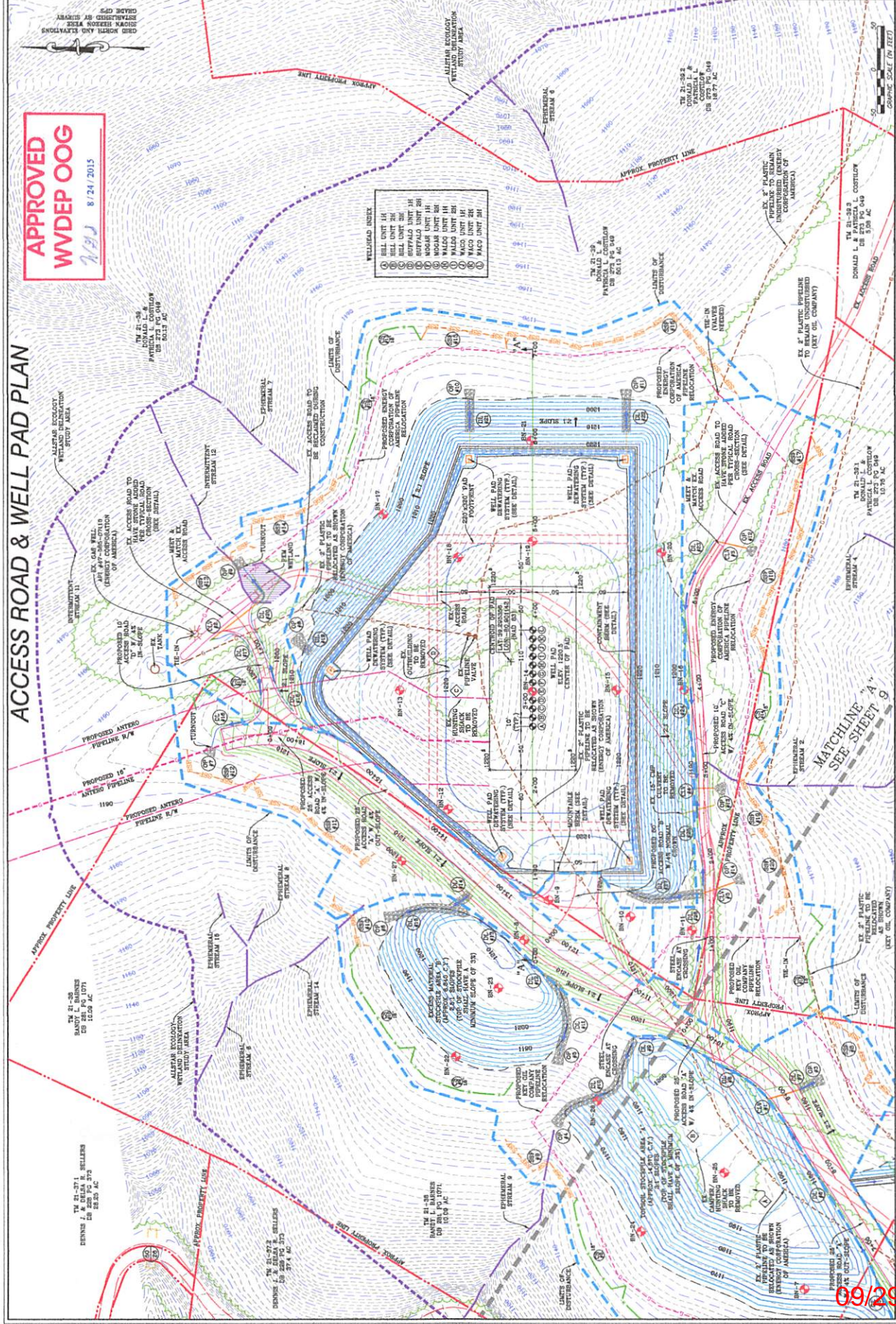


**APPROVED**  
**WVDEP 00G**  
8/24/2015

REVISION	DATE



DATE: 08/26/2015  
SCALE: 1" = 50'  
SHEET 10 OF 26



09/29/2017

**LOCATION COORDINATES:**

ACCESS ROAD ENTRANCE  
LATITUDE: 39.294589 LONGITUDE: -80.905438 (NAD 83)  
N 4349472.52 E 508154.24 (UTM ZONE 17 METERS)

CENTER OF TANK  
LATITUDE: 39.293936 LONGITUDE: -80.903464 (NAD 83)  
N 4349390.12 E 508323.02 (UTM ZONE 17 METERS)

CENTROID OF PAD  
LATITUDE: 39.295359 LONGITUDE: -80.901136 (NAD 83)  
N 4349558.40 E 508525.14 (UTM ZONE 17 METERS)

**GENERAL DESCRIPTION:**

THE ACCESS ROAD(S), WATER CONTAINMENT PAD, AND WELL PAD HAVE BEEN CONSTRUCTED TO AID IN THE DEVELOPMENT OF INDIVIDUAL MARCELLUS SHALE GAS WELLS.

**FLOODPLAIN NOTES:**

THE PROPOSED SITE IS LOCATED WITHIN FEMA FLOOD ZONE "X" PER FEMA FLOOD MAP #54085C0125C.

**MISS UTILITY STATEMENT:**

ANTERO RESOURCES CORPORATION HAS NOTIFIED MISS UTILITY OF WEST VIRGINIA FOR THE LOCATING OF UTILITIES PRIOR TO THIS PROJECT DESIGN; TICKET #1330482890.

**ENTRANCE PERMIT:**

ANTERO RESOURCES CORPORATION HAS OBTAINED AN ENCROACHMENT PERMIT (FORM MM-109) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

**ENVIRONMENTAL NOTES:**

STREAM AND WETLAND DELINEATIONS WERE PERFORMED IN JULY 2014, JANUARY 2015, AND FEBRUARY 2015 BY ALLSTAR ECOLOGY TO REVIEW THE SITE FOR WATERS AND WETLANDS THAT ARE MOST LIKELY WITHIN THE REGULATORY PURVIEW OF THE U.S. ARMY CORPS OF ENGINEERS (USACE) AND/OR THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (WVDEP). THE APRIL 3, 2015 STREAM AND WETLAND DELINEATION MAP WAS PREPARED BY ALLSTAR ECOLOGY AND SUMMARIZES THE RESULTS OF THE FIELD DELINEATION. THE MAP DOES NOT, IN ANY WAY, REPRESENT A JURISDICTIONAL DETERMINATION OF THE LANDWARD LIMITS OF WATERS AND WETLANDS WHICH MAY BE REGULATED BY THE USACE OR THE WVDEP. IT IS STRONGLY RECOMMENDED THAT THE AFOREMENTIONED AGENCIES BE CONSULTED IN AN EFFORT TO GAIN WRITTEN CONFIRMATION OF THE DELINEATION SHOWN ON THIS EXHIBIT PRIOR TO ENGAGING CONSTRUCTION ON THE PROPERTY DESCRIBED HEREIN. THE DEVELOPER SHALL OBTAIN THE APPROPRIATE PERMITS FROM THE FEDERAL AND/OR STATE REGULATORY AGENCIES PRIOR TO ANY PROPOSED IMPACTS TO WATERS OF THE U.S., INCLUDING WETLAND FILLS AND STREAM CROSSINGS.

**GEOTECHNICAL NOTES:**

A SUBSURFACE INVESTIGATION OF THE PROPOSED SITE WAS PERFORMED BY PENNSYLVANIA SOIL & ROCK, INC. ON MAY 09, 12, 13, 2014 & JANUARY 16, 2015. THE REPORT PREPARED BY PENNSYLVANIA SOIL & ROCK, INC. DATED JUNE 02, 2014, REVISED APRIL 13, 2016, REFLECTS THE RESULTS OF THE SUBSURFACE INVESTIGATION. THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS REPORT WERE USED IN THE PREPARATION OF THESE PLANS. PLEASE REFER TO THE SUBSURFACE INVESTIGATION REPORT BY PENNSYLVANIA SOIL & ROCK, INC. FOR ADDITIONAL INFORMATION, AS NEEDED.

**PROJECT CONTACTS:**

CHARLES E. COMPTON, III - SURVEYING COORDINATOR  
CELL: (304) 719-6449

DAVID PATSY - LAND AGENT  
CELL: (304) 476-6090

**OPERATOR:**

ANTERO RESOURCES CORPORATION  
535 WHITE OAKS BLVD  
BRIDGEPORT, WV 26330  
PHONE: (304) 842-4100  
FAX: (304) 842-4102

ELI WAGONER - ENVIRONMENTAL ENGINEER  
OFFICE: (304) 842-4088 CELL: (304) 476-9770

JON McEVERS - OPERATIONS SUPERINTENDENT  
OFFICE: (303) 357-6799 CELL: (303) 808-2423

AARON KUNZLER - CONSTRUCTION SUPERVISOR  
CELL: (405) 227-8344

ROBERT B. WIRKS - FIELD ENGINEER  
OFFICE: (304) 842-4100 CELL: (304) 627-7405

**ENGINEER/SURVEYOR:**

NAVITUS ENGINEERING, INC.  
CYRUS S. KUMP, PE - PROJECT MANAGER/ENGINEER  
OFFICE: (888) 662-4185 CELL: (540) 686-6747

**ENVIRONMENTAL:**

ALLSTAR ECOLOGY, LLC  
RYAN L. WARD - ENVIRONMENTAL SCIENTIST  
OFFICE: (866) 213-2666 CELL: (304) 692-7477

**GEOTECHNICAL:**

PENNSYLVANIA SOIL & ROCK, INC.  
CHRISTOPHER W. SAMIOS - PROJECT ENGINEER  
OFFICE: (412) 372-4000 CELL: (412) 589-0662

**RESTRICTIONS NOTES:**

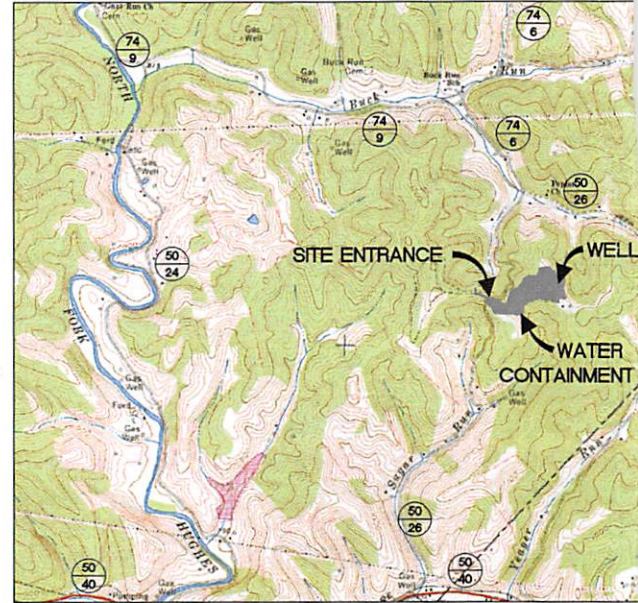
1. THERE ARE NO PERENNIAL STREAMS, LAKES, PONDS, OR RESERVOIRS WITHIN 100 FEET OF THE WELL PAD AND LOD. THERE IS A WETLAND IMPACT THAT HAS BEEN PERMITTED BY THE APPROPRIATE AGENCIES.
2. THERE ARE NO NATURALLY PRODUCING TROUT STREAMS WITHIN 300 FEET OF THE WELL PAD AND LOD.
3. THERE ARE NO GROUNDWATER INTAKE OR PUBLIC WATER SUPPLY FACILITIES WITHIN 1000 FEET OF THE WELL PAD AND LOD.
4. THERE ARE NO APPARENT EXISTING WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF THE WELL(S) BEING DRILLED.
5. THERE ARE NO OCCUPIED DWELLING STRUCTURES WITHIN 625 FEET OF THE CENTER OF THE WELL PAD.
6. THERE ARE NO AGRICULTURAL BUILDINGS LARGER THAN 2,500 SQUARE FEET WITHIN 625 FEET OF THE CENTER OF THE WELL PAD.

**NOTES:**

1. ALL BMP'S MUST REMAIN IN PLACE AND FUNCTIONAL UNTIL ALL AREAS WITHIN THE LIMIT OF DISTURBANCE ARE COMPLETE AND PERMANENTLY STABILIZED. MAINTENANCE MUST INCLUDE INSPECTION OF ALL EROSION AND SEDIMENT CONTROLS AFTER EACH RUNOFF EVENT IN EXCESS OF 0.5" AND ON A BIWEEKLY BASIS.
2. THE CONSTRUCTION SITE SHOULD BE STABILIZED AS SOON AS POSSIBLE AFTER COMPLETION. ESTABLISHMENT OF FINAL STABILIZATION MUST BE INITIATED NO LATER THAN 7 DAYS AFTER REACHING FINAL GRADE. FINAL STABILIZATION MEANS THAT ALL SOIL-DISTURBING ACTIVITIES ARE COMPLETED, AND THAT EITHER A PERMANENT VEGETATIVE COVER WITH A DENSITY OF 70% OR GREATER HAS BEEN ESTABLISHED OR THAT THE SURFACE HAS BEEN STABILIZED BY HARD COVER SUCH AS PAVEMENT OR BUILDINGS. IT SHOULD BE NOTED THAT THE 70% REQUIREMENT REFERS TO THE TOTAL AREA VEGETATED AND NOT JUST A PERCENT OF THE SITE.
3. ALL PERMANENT SEDIMENT CONTROL MEASURES CAN BE REMOVED AFTER THE SITE IS PERMANENTLY STABILIZED AND APPROVAL IS RECEIVED FROM THE WVDEP.
4. ANY AREAS DISTURBED BY REMOVAL OF CONTROLS SHALL BE REPAIRED, STABILIZED, AND PERMANENTLY SEEDED.
5. THE AS-BUILT INFORMATION SHOWN HEREON REFLECTS FIELD DATA COLLECTED RELATING TO THE FINAL GRADING OF THE DISTURBED AREA AS OF NOVEMBER 21, 2016. NAVITUS ENGINEERING IS NOT RESPONSIBLE FOR ANY CHANGES MADE TO THE SITE AFTER THE ABOVE MENTIONED DATES.
6. THE EXISTING CONTAINMENT BERM AROUND THE WELL PAD SHALL BE REPAIRED AS NECESSARY TO ENSURE 100% CONTAINMENT OF ALL FLUIDS PRIOR TO DRILLING OPERATIONS
7. THE EXISTING EGREGESSES TO THE WELL PAD SHALL HAVE THE MOUNTABLE BERMS REPAIRED AS NECESSARY TO ENSURE 100% CONTAINMENT OF ALL FLUIDS PRIOR TO DRILLING OPERATIONS.

# BISON WELL PAD & WATER AS-BUILT AND EROSION CONTROL IMPROVEMENTS

CLAY DISTRICT, RITCHIE COUNTY  
CABIN RUN-NORTH FORK HUGO  
USGS 7.5 PENNSBORO & WEST



WEST VIRGINIA COUNTY MAP



(NOT TO SCALE)

**DESIGN CERTIFICATION:**

THE DRAWINGS, CONSTRUCTION NOTES, AND REFERENCE DIAGRAMS ATTACHED HERETO HAVE BEEN PREPARED IN ACCORDANCE WITH THE WEST VIRGINIA CODE OF STATE RULES, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS CRS 35-8.

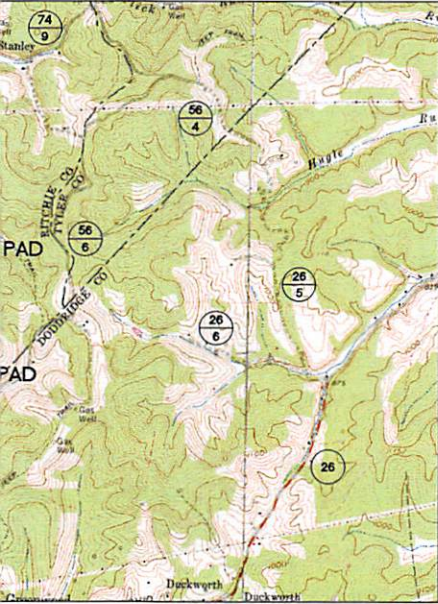
MISS Utility of West Virginia  
1-800-245-4848  
West Virginia State Law  
(Section XIV: Chapter 24-C)  
Requires that you call two  
business days before you dig in  
the state of West Virginia.  
IT'S THE LAW!!

<b>BISON W</b>
Wetland and Impact Ca
Wetland 1 (Access Road
Stream and Impact Ca
Stream 12 (Access Road
Stream and Impact Ca
Stream 2 (Access Road
Stream 9 (Stockpile Area
Stream 10 (Access Road
& Stockpile Area "A"
Stream 14 (Access Road
& Stockpile Area "B"

09/29/2017

# WATER CONTAINMENT PAD PLAN & SEDIMENT CONTROL PLAN

CLAY DISTRICT, WEST VIRGINIA  
RITCHIE COUNTY WATERSHED  
UNION QUAD MAPS



WEST VIRGINIA STATE PLANE COORDINATE SYSTEM  
NORTH ZONE, NAD83  
ELEVATION BASED ON NAVD88  
ESTABLISHED BY SURVEY GRADE GPS & OPUS  
POST-PROCESSING

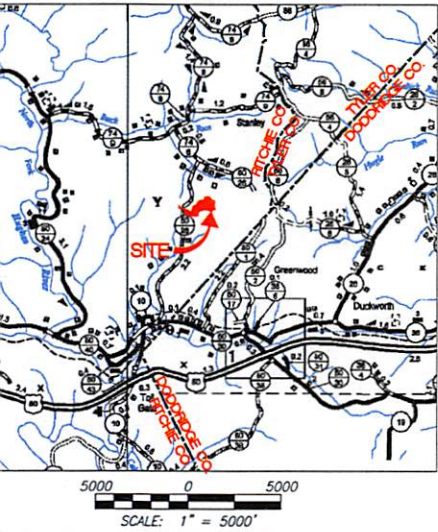
**REPRODUCTION NOTE**  
THESE PLANS WERE CREATED TO BE PLOTTED ON 22"x34" (ANSI D) PAPER. HALF SCALE DRAWINGS ARE ON 11"x17" (ANSI B) PAPER.  
THESE PLANS WERE CREATED FOR COLOR PLOTTING AND ANY REPRODUCTIONS IN GRAY SCALE OR COLOR MAY RESULT IN A LOSS OF INFORMATION AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

**SHEET INDEX:**

- 1 - COVER SHEET
- 2 - LEGEND
- 3 - OVERALL PLAN SHEET INDEX
- 4 - ACCESS ROAD & WATER CONTAINMENT PAD AS-BUILT PLAN
- 5 - ACCESS ROAD & WELL PAD AS-BUILT PLAN
- 6 - ACCESS ROAD AS-BUILT PROFILES
- 7 - ACCESS ROAD AS-BUILT PROFILES
- 8 - WELL PAD & WATER CONTAINMENT PAD AS-BUILT SECTIONS

Proposed Well Name	WV North NAD 27	WV North NAD 83	UTM (METERS) Zone 17	NAD 83 Lat & Long
Bill	N 292723.24	N 292757.65	N 4349550.00	LAT 39-17-43.0215
Unit 4H	E 1603337.26	E 1571896.17	E 508499.24	LONG -80-54-05.1699
Bill	N 292723.23	N 292757.65	N 4349550.05	LAT 39-17-43.0231
Unit 1H	E 1603347.25	E 1571906.17	E 508502.28	LONG -80-54-05.0427
Bill	N 292723.23	N 292757.65	N 4349550.10	LAT 39-17-43.0246
Unit 2H	E 1603357.26	E 1571916.17	E 508505.33	LONG -80-54-04.9155
Bill	N 292723.23	N 292757.65	N 4349550.15	LAT 39-17-43.0262
Unit 3H	E 1603367.25	E 1571926.17	E 508508.37	LONG -80-54-04.7883
Buffalo	N 292723.23	N 292757.65	N 4349550.20	LAT 39-17-43.0277
Unit 1H	E 1603377.26	E 1571936.17	E 508511.42	LONG -80-54-04.6512
Buffalo	N 292723.23	N 292757.65	N 4349550.26	LAT 39-17-43.0292
Unit 2H	E 1603387.26	E 1571946.17	E 508514.47	LONG -80-54-04.5340
Mogar	N 292723.23	N 292757.65	N 4349550.31	LAT 39-17-43.0308
Unit 1H	E 1603397.26	E 1571956.17	E 508517.51	LONG -80-54-04.4068
Mogar	N 292723.23	N 292757.65	N 4349550.36	LAT 39-17-43.0323
Unit 2H	E 1603407.26	E 1571966.17	E 508520.56	LONG -80-54-04.2796
Waldo	N 292723.23	N 292757.65	N 4349550.41	LAT 39-17-43.0339
Unit 1H	E 1603417.26	E 1571976.17	E 508523.61	LONG -80-54-04.1524
Waldo	N 292723.23	N 292757.65	N 4349550.46	LAT 39-17-43.0354
Unit 2H	E 1603427.26	E 1571986.17	E 508526.65	LONG -80-54-04.0252
Waco	N 292723.23	N 292757.65	N 4349550.51	LAT 39-17-43.0370
Unit 1H	E 1603437.26	E 1571996.17	E 508529.70	LONG -80-54-03.8980
Waco	N 292723.23	N 292757.65	N 4349550.56	LAT 39-17-43.0385
Unit 2H	E 1603447.26	E 1572006.17	E 508532.75	LONG -80-54-03.7708
Waco	N 292723.23	N 292757.65	N 4349550.61	LAT 39-17-43.0400
Unit 3H	E 1603457.26	E 1572016.17	E 508535.79	LONG -80-54-03.6436
Well Pad Elevation	1,220.5			

WVDOH COUNTY ROAD MAP



**WETLAND IMPACT (SQUARE FEET)**

Use	Fill (SF)	Total Impact (SF)	Total Impact (AC)
"D"	1,788	1,788	0.04

**BISON INTERMITTENT STREAM IMPACT (LINEAR FEET)**

Use	Permanent Impacts		Temp. Impacts		Temp. Disturb.	Total Disturbance (LF)
	Culvert / Fill (LF)	Inlets/Outlets Structures (LF)	Cofferdam/ E&S Controls (LF)	Distance to L.O.D. (LF)		
"D"	0	0	0	30		30

**BISON EPHEMERAL STREAM IMPACT (LINEAR FEET)**

Use	Permanent Impacts		Temp. Impacts		Temp. Disturb.	Total Disturbance (LF)
	Culvert / Fill (LF)	Inlets/Outlets Structures (LF)	Cofferdam/ E&S Controls (LF)	Distance to L.O.D. (LF)		
"C"	7	0	0	53		60
"A"	0	0	0	65		65
"A"	0	0	0	59		59
"A"	0	0	0	42		42

**BISON LIMITS OF DISTURBANCE AREA (AC)**

Total Site	Permitted	Modification	Total
Access Road "A" (1,679')	5.41	0.08	5.49
Access Road "B" (79')	0.23	0.00	0.23
Access Road "C" (567')	2.26	0.00	2.26
Access Road "D" (145')	0.68	0.08	0.76
Well Pad	6.00	0.00	6.00
Water Containment Pad	1.43	0.00	1.43
Excess/Topsoil Material Stockpiles	3.74	0.00	3.74
<b>Total Affected Area</b>	<b>19.75</b>	<b>0.16</b>	<b>19.91</b>
Total Wooded Acres Disturbed	16.24	0.05	16.29

**Impacts to Dennis J. & Delsa R. Sellers TM 21-37.2**

Total Site	Permitted	Modification	Total
Access Road "A" (0')	0.09	0.00	0.09
<b>Total Affected Area</b>	<b>0.09</b>	<b>0.00</b>	<b>0.09</b>
Total Wooded Acres Disturbed	0.06	0.00	0.06

**Impacts to Chad W. Johnson TM 21-44**

Total Site	Permitted	Modification	Total
Access Road "A" (221')	1.31	0.00	1.31
<b>Total Affected Area</b>	<b>1.31</b>	<b>0.00</b>	<b>1.31</b>
Total Wooded Acres Disturbed	0.83	0.00	0.83

**Impacts to Dennis J. & Delsa R. Sellers TM 21-37.3**

Total Site	Permitted	Modification	Total
Access Road "A" (42')	0.31	0.00	0.31
<b>Total Affected Area</b>	<b>0.31</b>	<b>0.00</b>	<b>0.31</b>
Total Wooded Acres Disturbed	0.25	0.00	0.25

**Impacts to Donald L. & Patricia L. Costlow TM 21-39**

Total Site	Permitted	Modification	Total
Access Road "A" (548')	1.87	0.08	1.95
Access Road "B" (48')	0.16	0.00	0.16
Access Road "C" (442')	1.31	0.00	1.31
Access Road "D" (121')	0.64	0.08	0.72
Well Pad	5.99	0.00	5.99
Water Containment Pad	1.18	0.00	1.18
Excess/Topsoil Material Stockpiles	0.19	0.00	0.19
<b>Total Affected Area</b>	<b>11.34</b>	<b>0.16</b>	<b>11.50</b>
Total Wooded Acres Disturbed	9.09	0.05	9.14

**Impacts to Randy L. Barnes TM 21-38**

Total Site	Permitted	Modification	Total
Access Road "A" (868')	1.82	0.00	1.82
Access Road "B" (31')	0.07	0.00	0.07
Access Road "C" (34')	0.10	0.00	0.10
Access Road "D" (24')	0.04	0.00	0.04
Well Pad	0.01	0.00	0.01
Water Containment Pad	0.25	0.00	0.25
Excess/Topsoil Material Stockpiles	3.55	0.00	3.55
<b>Total Affected Area</b>	<b>5.84</b>	<b>0.00</b>	<b>5.84</b>
Total Wooded Acres Disturbed	5.20	0.00	5.20

**Impacts to Donald L. & Patricia L. Costlow TM 21-39.1**

Total Site	Permitted	Modification	Total
Access Road "A" (0')	0.01	0.00	0.01
Access Road "C" (91')	0.85	0.00	0.85
<b>Total Affected Area</b>	<b>0.86</b>	<b>0.00</b>	<b>0.86</b>
Total Wooded Acres Disturbed	0.81	0.00	0.81

**NAVITUS**  
ENERGY ENGINEERING  
Telephone: (888) 662-4185 | www.NavitusEng.com

DATE	REVISION	REVISED SURFACE CONFIGURATION
07/24/2017		

**Antero Resources**  
THIS DOCUMENT WAS PREPARED FOR ANTERO RESOURCES CORPORATION

RECEIVED  
Office of Oil and Gas  
SEP - 5 2017  
WV Department of Environmental Protection

**BISON**  
WELL PAD & WATER CONTAINMENT PAD  
CLAY DISTRICT  
RITCHIE COUNTY, WEST VIRGINIA

COVER SHEET  
REGISTERED PROFESSIONAL ENGINEER  
STATE OF WEST VIRGINIA  
07/24/2017

DATE: 11/29/2016  
SCALE: AS SHOWN  
SHEET 01 OF 8

Michael Staff  
8-28-2017

09/29/2017