



---

**west virginia** department of environmental protection

---

Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304  
(304) 926-0450  
(304) 926-0452 fax

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

September 14, 2015

**WELL WORK PERMIT**

**Horizontal 6A Well**

This permit, API Well Number: 47-8510243, issued to ANTERO RESOURCES CORPORATION, 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 all 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 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.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-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) 926-0499 ext. 1654.

James Martin  
Chief

Operator's Well No: BUFFALO UNIT 2H  
Farm Name: COSTILOW, DONALD L.

**API Well Number: 47-8510243**

**Permit Type: Horizontal 6A Well**

Date Issued: 09/14/2015

**Promoting a healthy environment.**

**9/18/2015**

## 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

---

1. Operator shall take additional measures with this permitted activity to avoid communication with offset wells. Such additional measures are described in the attached addendum. This addendum is part of the terms of the well work permit, and includes a description of depth and completed formations of offset wells. Also included is a description of monitoring activities that will take place during fracturing operations of the permitted well work.
1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACOE). Through this permit, you are hereby being advised to consult with USACOE 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.

## PERMIT CONDITIONS

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. 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.
8. 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.
9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to [DEPOOGNotify@wv.gov](mailto:DEPOOGNotify@wv.gov) within 30 days of commencement of drilling.



WW-6B  
(04/15)

API NO. 47-085 - \_\_\_\_\_  
 OPERATOR WELL NO. Buffalo Unit 2H  
 Well Pad Name: Bison Pad

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

- 1) Well Operator: Antero Resources Corp. 494488557 085 - Ritchie Clay Pennsboro 7.5'  
 Operator ID County District Quadrangle
- 2) Operator's Well Number: Buffalo Unit 2H Well Pad Name: Bison Pad
- 3) Farm Name/Surface Owner: Costilow, Donald L. Public Road Access: CR 50/26
- 4) Elevation, current ground: 1238' Elevation, proposed post-construction: 1221'
- 5) Well Type (a) Gas  Oil \_\_\_\_\_ Underground Storage \_\_\_\_\_  
 Other \_\_\_\_\_  
 (b) If Gas Shallow  Deep \_\_\_\_\_  
 Horizontal
- 6) Existing Pad: Yes or No No
- 7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus Shale: 6900' TVD, Anticipated Thickness 75 feet, Associated Pressure 2800#
- 8) Proposed Total Vertical Depth: 6900'
- 9) Formation at Total Vertical Depth: Marcellus Shale
- 10) Proposed Total Measured Depth: 13900'
- 11) Proposed Horizontal Leg Length: 6495'
- 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
- (a) If Yes, provide Mine Info: Name: \_\_\_\_\_  
 Depth: \_\_\_\_\_  
 Seam: \_\_\_\_\_  
 Owner: \_\_\_\_\_

RECEIVED  
 Office of Oil and Gas  
*Daniel Williams*  
 8-26-15  
 AUG 28 2015  
 Page 1 of 3  
 WV Department of  
 Environmental Protection  
 9/18/2015

WW-6B  
(04/15)

API NO. 47-085 - \_\_\_\_\_  
 OPERATOR WELL NO. Buffalo Unit 2H  
 Well Pad Name: 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#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	500' *see #19	500'	CTS, 695 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2415'	2415'	CTS, 983 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	13900'	13900'	3441 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.438"	1530	50	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/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"	12630	2500	Lead H/POZ & Tail H/POZ	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200			
Liners							

**PACKERS**

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

RECEIVED  
 Office of Oil and Gas  
*David A. ...*  
 8-26-15  
 Page 2 of 3  
 AUG 28 2015  
 WV Department of Environmental Protection  
 9/18/2015



WW-6B  
(10/14)

API NO. 47-085 - \_\_\_\_\_  
OPERATOR WELL NO. Buffalo Unit 2H  
Well Pad Name: Bison 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."

Max Pressure - 9300 lbs  
Max Rate - 80 bpm

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 19.75 acres

22) Area to be disturbed for well pad only, less access road (acres): 6.00 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 + 0.5% C51.

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

Page 3 of 3  
AUG 28 2015

WV Department of  
Environmental Protection  
9/18/2015



***Addendum for Antero pads in Ritchie County, WV***

Bill Unit 1H	Bison Pad
Bill Unit 2H	Bison Pad
Bill Unit 3H	Bison Pad
Mogar Unit 1H	Bison Pad
Mogar Unit 2H	Bison Pad
Buffalo Unit 1H	Bison Pad
Buffalo Unit 2H	Bison Pad

The following outlines the process to be undertaken by Antero Resources prior to and during completion process of wells in Ritchie County.

- Investigate all wells within 1320' of new wells - for all identified Marcellus vertical wells and any existing well(s) with an interval that is less than 1500 feet from the deepest formation drilled (including, but not specific to the Alexander formation) to the top of Marcellus:
  - Contact operator of all wells
  - Confirm well status, producing horizon, well completion/stimulation information
  - Discuss plans to stimulate the horizontal Marcellus wells and the plans for monitoring potential impact on shallow wells
  - Make sure all vertical wells (with an interval that is less than 1500 feet from the deepest formation drilled to the top of Marcellus) have adequate wellhead equipment, including pressure gauges
  - Provide shallow well operator with frac dates and develop plan for monitoring during stimulation
  - If well waters out during frac, shut it in until after stimulation, and install adequate well control equipment prior to swabbing in the impacted shallow well
- Control fracturing parameters during job to limit fracture height growth
  - Limit rate and limit pressures for each segment of fracturing stages

RECEIVED  
Office of Oil and Gas

AUG 14 2015

WV Department of  
Environmental Protection

9/18/2015



WW-9  
(2/15)

API Number 47 - 085 - \_\_\_\_\_  
Operator's Well No. Buffalo Unit 2H

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 494488557

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 \_\_\_\_\_ )
- 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 \_\_\_\_\_)

Will closed loop system be used? If so, describe: Yes

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

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

Additives to be used in drilling medium? Please See Attachment

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. 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)

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.

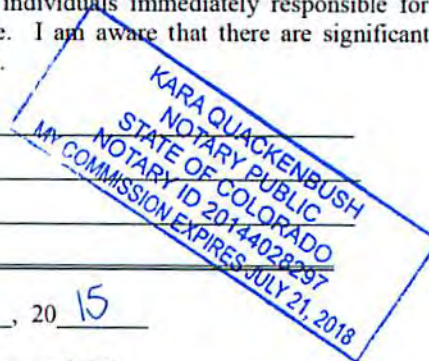
I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations 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) Cole Kilstrom

Company Official Title Environmental & Regulatory Manager



Subscribed and sworn before me this 23 day of July, 20 15

[Signature] Notary Public

My commission expires July 21, 2018



4708510243

Form WW-9

Operator's Well No. Buffalo Unit 2H

Antero Resources Corporation

Proposed Revegetation Treatment: Acres Disturbed 19.75 acres Prevegetation pH 6.0

Lime 2 - 3 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

Existing Access Road "A" (5.41) + Existing Access Road "B" (0.23) + Existing Access Road "C" (2.26) + Existing Access Road "D" (0.68) + Well Pad (6.20) + Water Containment Pad (1.43) + Excav/Topsoil Material Stockpile (3.74) = 19.75 Acres

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Annual Ryegrass	40	Crownvetch	10-15
		Tall Fescue	30

See attached Table IV-3 for additional seed type (Bison Pad Design Page 24)

\*or type of grass seed requested by surface owner

See attached Table IV-4 for additional seed type (Bison Pad Design Page 24)

\*or type of grass seed requested by surface owner

Attach:

Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Daniel W. Cam

Comments: propose to mulch all dirt area unless otherwise 2 ton per acre maintain all pits during operation

Title: oil & gas inspector Date: 8-26-15

Field Reviewed?  Yes  No

RECEIVED  
Office of Oil and Gas  
AUG 28 2015  
WV Department of  
Environmental Protection  
9/18/2015

**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

RECEIVED  
Office of Oil and Gas

WV L  
Enviro  
of 9/18/2015



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

RECEIVED  
Office of Oil and Gas

AUG 14 2015

WV Department of  
Environmental Protection

9/18/2015

4708510243



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

## **Well Site Safety Plan**

### **Antero Resources**

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

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

**GPS Coordinates:** Lat 39°17'43.28"/Long -80°54'4.11" (NAD83)

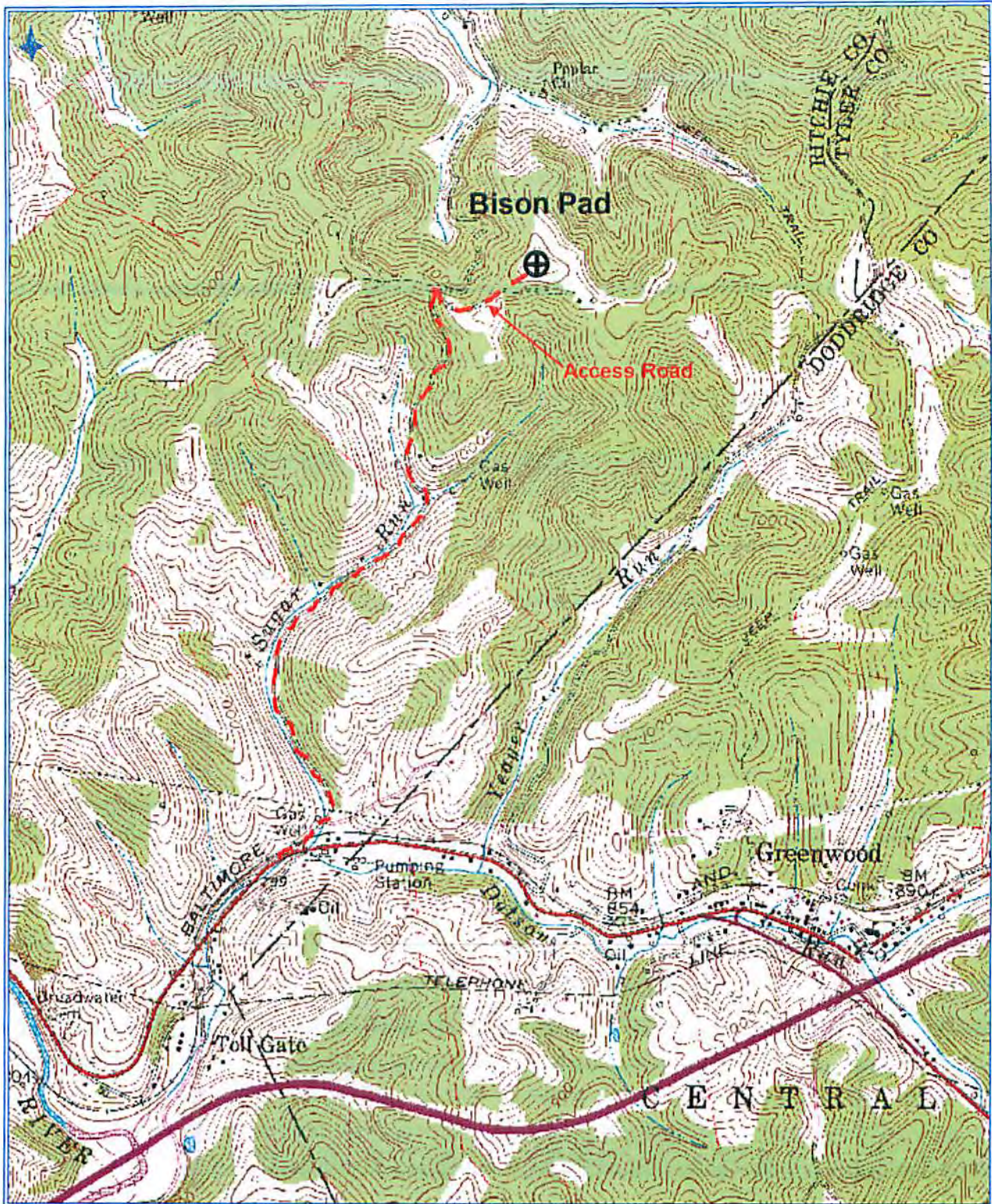
#### **Driving Directions:**

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 Tpke), 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.

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

RECEIVED  
Office of Oil and Gas  
*[Signature]*  
AUG 28 2015





**Antero Resources Corporation**  
 Appalachian Basin  
 Buffalo Unit 1H & 2H  
 Ritchie County

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

RECEIVED  
 Office of Oil and Gas  
 AUG 14 2015  
 WV Department of Environment and Natural Resources

9/18/2015



LATITUDE 39°20'00"

7,480'

8,755' TO BOTTOM HOLE

LATITUDE 39°20'00"

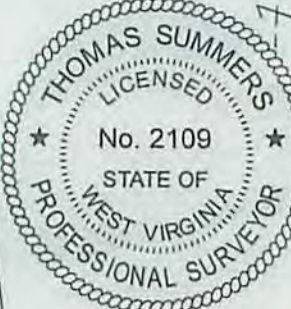
LONGITUDE 80°52'30"

7,321' TO BOTTOM HOLE

13,888'

LONGITUDE 80°52'30"

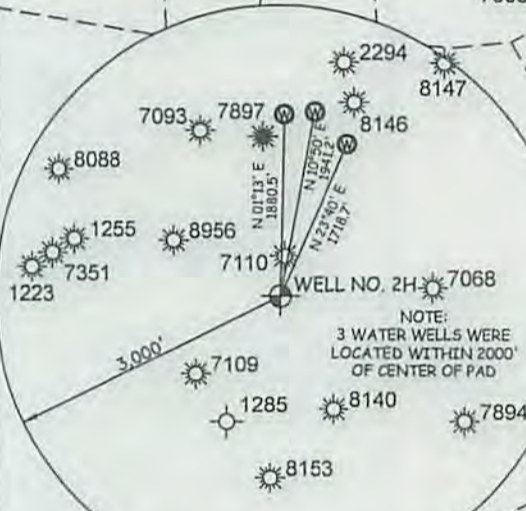
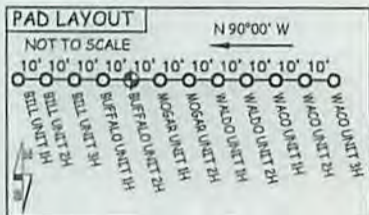
Antero Resources Corporation  
Well No. Buffalo Unit 2H



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 2H TOP HOLE INFORMATION:  
N: 292,723ft E: 1,603,387ft  
LAT: 39°17'42.74" LON: 80°54'05.15"  
BOTTOM HOLE INFORMATION:  
N: 299,309ft E: 1,602,213ft  
LAT: 39°18'47.65" LON: 80°54'21.39"  
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 2H TOP HOLE INFORMATION:  
N: 4,349,550m E: 508,514m  
BOTTOM HOLE INFORMATION:  
N: 4,351,551m E: 508,123m



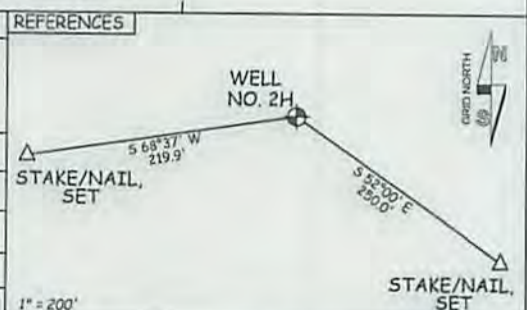
I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



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 # 15-030WA  
DRAWING # BUFFALO2HR1  
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 - Existing Fence  
⊕ Found monument, as noted  
THOMAS SUMMERS P.S. 2109  
DATE 07/15/15  
OPERATOR'S WELL# BUFFALO UNIT #2H



WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL 47 085 -10243  
(IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X STATE COUNTY  
LOCATION: ELEVATION 1,238' - ORIGINAL 1,221' - PROPOSED WATERSHED NORTH FORK HUGHES RIVER  
QUADRANGLE PENNSBORO 7.5 DISTRICT CLAY COUNTY RITCHIE  
SURFACE OWNER DONALD L. COSTILOW ACREAGE 50.13 ACRES +/-  
OIL & GAS ROYALTY OWNER BERTHA D. FERREBEE; DAVID W. DOTSON; MICHAEL F. QUINN; DELORES D. BUTCHER; DAVID W. DOTSON; LEASE ACREAGE 67 AC +/- 21,417 AC +/- 10.5 AC +/- 2.86 AC +/- 10.65 AC +/-  
KARL K. HICKMAN ET UX; EUGENE COSTILOW ET UX; F. M. FERREBEE ET AL; MAX D. JEWELL ET UX 14.52 AC +/- 54 AC +/- 56 AC +/- 36 AC +/-  
PROPOSED WORK: DRILL X CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE X  
PLUG OFF OLD FORMATION PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL  
(SPECIFY) PLUG & ABANDON CLEAN OUT & REPLUG  
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,900' TVD 13,900' MD  
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM  
ADDRESS 1615 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD  
DENVER, CO 80202 CHARLESTON, WV 25313

9/18/2015

COUNTY NAME

PERMIT



WW-6A1

Operator's Well Number Buffalo Unit 2H

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 American	Antero Resources Appalachian Corporation	Memorandum of Agreement	0257/0397
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>David W. Dotson Lease</u></b>			
David W. Dotson, a married person	Antero Resources Appalachian Corporation	1/8+	0265/0787
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Michael F. QuInn Lease</u></b>			
Michael F. QuInn	Antero Resources Corporation	1/8+	0281/0267
<b><u>Delores D. Butcher Lease</u></b>			
Delores D. Butcher	Antero Resources Appalachian Corporation	1/8+	0263/0999
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>David W. Dotson Lease</u></b>			
David W. Dotson	Antero Resources Appalachian Corporation	1/8+	0264/0065
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Karl K. Hickman, et ux Lease</u></b>			
Karl K. & Betty Hickman	Antero Resources Appalachian Corporation	1/8	0265/0597
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<b><u>Eugene Costilow, et ux Lease</u></b>			
Eugene Costilow, et ux	J & J Enterprises, Inc.	1/8	0167/0293
J & J Enterprises, Inc.	Equitable Resources Energy Company	Assignment	0208/0132
Equitable Resources Energy Company	Enervest East Limited Partnership	Assignment	0222/0273
Enervest East Limited Partnership	The Houston Exploration Company	Assignment	0234/0890
The Houston Exploration Company	Seneca-Upshur Petroleum, Inc.	Assignment	0236/0650
Seneca-Upshur Petroleum, Inc.	Eastern American Energy Corporation	Assignment	0243/0849
Eastern American Energy Corporation	Energy Corporation of America	Certificate of Merger	CR 0006/0450
Energy Corporation of America	Antero Resources Appalachian Corporation	Assignment	0257/0377
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

RECEIVED  
Office of Oil and Gas  
1/8  
Name Change

AUG 14 2015

WV Department of Environmental Protection  
Assignment  
Assignment  
Assignment  
Assignment  
Certificate of Merger  
Assignment  
Name Change

9/18/2015

WW-6A1

Operator's Well Number Buffalo Unit 2H

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>F.M. Ferrebee, et al Lease</u>			
F.M. Ferrebee, et al	Carnegie Natural Gas Company	1/8	0041/0188
Carnegie Natural Gas Company	Carnegie Production Company	Assignment	0228/0859
Carnegie Production Company	EQT Production Company	Certificate of Registration of Trade Name	Exhibit 2
EQT Production Company	Antero Resources Corporation	Assignment	0268/0465

**RECEIVED**  
Office of Oil and Gas  
AUG 14 2015  
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.

\*\*CONTINUED ON NEXT PAGE\*\*

9/18/2015



WW-6A1  
(5/13)

Operator's Well No. Buffalo Unit 2H

**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
<u>Max D. Jewell, et ux Lease</u>				
	Max D. Jewell & wife, Linda S. Jewell	J & J Enterprises, Inc.	1/8	0167/0291
	J & J Enterprises, Inc.	Eastern American Energy Corporation	Merger	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	0257/0377
	Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1


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

**Acknowledgement of Possible Permitting/Approval  
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Antero Resources Corporation  
 By: Ward McNeilly   
 Its: VP of Reserves, Planning & Midstream

RECEIVED  
Office of Oil and Gas  
AUG 14 2015

WV Department of  
Environmental Protection

**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:** Rural Route 1 Box 604  
 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

RECEIVED  
 Office of Oil and Gas

SEP 11 2015

WV Department of  
 Environmental Protection

9/18/2015



FORM WW-6A1  
EXHIBIT 1

FILED

JUN 10 2013

Natalie E. Tennant  
Secretary of State  
1900 Kanawha Blvd E  
Bldg 1, Suite 157-K  
Charleston, WV 25305



Penney Barker, Manager  
Corporations Division  
Tel: (304)558-8000  
Fax: (304)558-8381  
Website: [www.wvgsos.com](http://www.wvgsos.com)  
E-mail: [business@wvgsos.com](mailto:business@wvgsos.com)

APPLICATION FOR  
AMENDED CERTIFICATE  
OF AUTHORITY

Office Hours: Monday - Friday  
8:30 a.m. - 5:00 p.m. ET

FILE ONE ORIGINAL  
(Two if you want a filed  
stamped copy returned to you)  
FEE: \$25.00

\*\*\*\* In accordance with the provisions of the West Virginia Code, the undersigned corporation hereby \*\*\*\*  
applies for an Amended Certificate of Authority and submits the following statement:

- Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation
- Date Certificate of Authority was issued in West Virginia: 6/26/2008
- Corporate name has been changed to: Antero Resources Corporation  
(Attach one Certified Copy of Name Change as filed in home State of incorporation.)
- Name the corporation elects to use in WV: Antero Resources Corporation  
(due to home state name not being available)
- Other amendments:  
(attach additional pages if necessary)
- Name and phone number of contact person. (This is optional; however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)  
Alvyn A. Schopp (303) 367-7310  
Contact Name Phone Number
- Signature Information (See below \*Important Legal Notice Regarding Signature):  
Print Name of Signer: Alvyn A. Schopp Title/Capacity: Authorized Person  
Signature: [Handwritten Signature] Date: June 10, 2013

**\*Important Legal Notice Regarding Signature:** Per West Virginia Code §31D-1-129, Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.

Form CF-4

Issued by the Office of the Secretary of State

RECEIVED  
Office of Oil and Gas  
Revised 4/13

AUG 14 2015

# State of West Virginia



## Certificate

*I, Natalie E. Tennant, Secretary of State of the  
State of West Virginia, hereby certify that*

**EQT PRODUCTION COMPANY**

has filed a "Certificate of Registration of Trade Name" in my office according to the provisions of Chapter 47 of the West Virginia Code and was found to conform to law.

Therefore, I hereby issue this

### CERTIFICATE OF REGISTRATION OF TRADE NAME

authorizing it to transact business in West Virginia under the assumed name of

**CARNEGIE PRODUCTION COMPANY**



RECEIVED  
Office of Oil and Gas

*Given under my hand and the  
Great Seal of the State of  
West Virginia on this day of  
April 9, 2009*

AUG 14 2015

WV Department  
Environmental Protection

*Natalie E. Tennant*  
Secretary of State



4708510243



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

July 21, 2015

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: Buffalo Unit 2H  
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 Buffalo Unit 2H horizontal shallow well. As an authorized representative, I certify that Antero has the right to extract, produce or market the oil or gas for all leases through which the Buffalo Unit 2H horizontal lateral will drill through including any and all roads crossed under as identified on the attached survey plat.

Sincerely,

A handwritten signature in blue ink, appearing to read "Spencer Booth", is written over a faint, larger version of the same signature.

Spencer Booth  
Senior Landman

RECEIVED  
Office of Oil and Gas

AUG

WV Dept  
Environmental

9/18/2015

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

Date of Notice Certification: 08/10/2015

API No. 47- 085 - \_\_\_\_\_  
Operator's Well No. Buffalo Unit 2H  
Well Pad Name: Bison Pad

**Notice has been given:**

Pursuant to the provisions in West Virginia Code § 22-6A, the Operator has provided the required parties with the Notice Forms listed below for the tract of land as follows:

State: <u>West Virginia</u>	UTM NAD 83	Easting: <u>508514m</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>Costlow, Donald</u>	
Watershed: <u>North Fork Hughes River</u>		

Pursuant to West Virginia Code § 22-6A-7(b), every permit application filed under this section shall be on a form as may be prescribed by the secretary, shall be verified and shall contain the following information: (14) A certification from the operator that (i) it has provided the owners of the surface described in subdivisions (1), (2) and (4), subsection (b), section ten of this article, the information required by subsections (b) and (c), section sixteen of this article; (ii) that the requirement was deemed satisfied as a result of giving the surface owner notice of entry to survey pursuant to subsection (a), section ten of this article six-a; or (iii) the notice requirements of subsection (b), section sixteen of this article were waived in writing by the surface owner; and Pursuant to West Virginia Code § 22-6A-11(b), the applicant shall tender proof of and certify to the secretary that the notice requirements of section ten of this article have been completed by the applicant.

<p>Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:</p> <p>*PLEASE CHECK ALL THAT APPLY</p> <p><input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED</p> <p><input checked="" type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED</p> <p><input type="checkbox"/> 3. NOTICE OF INTENT TO DRILL or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or</p> <p style="padding-left: 100px;"><input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)</p> <p><input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION</p> <p><input checked="" type="checkbox"/> 5. PUBLIC NOTICE</p> <p><input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION</p>	<p><b>OOG OFFICE USE ONLY</b></p> <p><input checked="" type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input checked="" type="checkbox"/> RECEIVED</p> <p><input checked="" type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input checked="" type="checkbox"/> RECEIVED</p> <p><input checked="" type="checkbox"/> RECEIVED</p> <p><input checked="" type="checkbox"/> RECEIVED</p>
--	---

**Required Attachments:**

The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication date verification or the associated Affidavit of Publication. The attached Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of personal service, the return receipt card or other postal receipt for certified mailing.

RECEIVED  
Office of Oil and Gas

AUG 14 2015

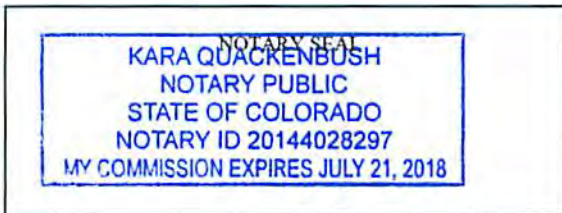
9/18/2015



**Certification of Notice is hereby given:**

THEREFORE, I Ward McNeilly, 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>Ward McNeilly</u> <i>W. McNeilly</i>		<u>Denver, CO 80202</u>
Its:	<u>VP, Reserves Planning &amp; Midstream</u>	Facsimile:	<u>303-357-7315</u>
Telephone:	<u>(303) 357-7310</u>	Email:	<u>asteele@anteroresources.com</u>



Subscribed and sworn before me this 10 day of August 2015  
*Kara Quackenbush*  
 \_\_\_\_\_ 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 [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).

RECEIVED  
Office of Oil and Gas

AUG 14 2015

WV Department of  
Environmental Protection

9/18/2015



WW-6A  
(9-13)

API NO. 47- 085  
OPERATOR WELL NO. Buffalo Unit 2H  
Well Pad Name: Bison Pad

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: 8/11/2015 Date Permit Application Filed: 8/11/2015

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: Donald L. & Patricia L. Costilow ✓

Address: 608 Carson Rd. ✓  
Ashtabula, OH 44004

Name: Randy L. Barnes ✓

Address: RR 1 Box 604  
Pennsboro, WV 26415

SURFACE OWNER(s) (Road and/or Other Disturbance)

\*PLEASE NOTE THE ADDITIONAL SURFACE TRACTS WITH DISTURBANCE SHOWN ON PAD DESIGN ARE NOT OVERLYING THE OIL & GAS LEASEHOLD BEING DEVELOPED BY THE PROPOSED WELL; THEREFORE, ARE NOT REQUIRED TO BE NOTIFIED PER WV CODE 22-6A-10. ANTERO HAS SECURED A SIGNED AGREEMENT WITH THE RELATED PARTIE(S)

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: \_\_\_\_\_

RECEIVED

Office of Oil and Gas

\*Please attach additional forms if necessary 8/11/2015



WW-6A  
(8-13)

API NO. 47-085 -  
OPERATOR WELL NO. Buffalo Unit 2H  
Well Pad Name: Bison Pad

**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



WW-6A  
(8-13)

API NO. 47-085 -  
OPERATOR WELL NO. Buffalo Unit 2H  
Well Pad Name: Bison Pad

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

RECEIVED  
Office of Oil and Gas

AUG 14 2015

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.**

WV Department of  
Environmental Protection  
9/18/2015



**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.

RECEIVED  
Office of Oil and Gas

AUG 14 2015

WV Department of  
Environmental Protection 9/18/2015


4708510243

WW-6A  
(8-13)

API NO. 47-085 -  
OPERATOR WELL NO. Buffalo Unit 2H  
Well Pad Name: Bison Pad

**Notice is hereby given by:**

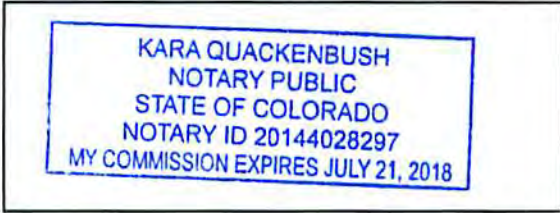
Well Operator: Antero Resources Corporation  
Telephone: (303) 357-7310  
Email: asteele@anteroresources.com



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 11 day of August 2015.

Kara Quackenbush Notary Public

My Commission Expires JULY 21, 2018

RECEIVED  
Office of Oil and Gas

AUG 14 2015

WV Department of  
Environmental Protection

9/18/2015



WW-6A3  
(1/12)

Operator Well No. Buffalo Unit 2H

Multiple Wells on the Bison Pad

**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**NOTICE OF ENTRY FOR PLAT SURVEY**

**Notice Time Requirement:** Notice shall be provided at least **SEVEN (7)** days but no more than **FORTY-FIVE (45)** days prior to entry

**Date of Notice:** 5/20/2014      **Date of Planned Entry:** 5/30/2014

**Delivery method pursuant to West Virginia Code § 22-6A-10a**

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

Pursuant to West Virginia Code § 22-6A-10(a), Prior to filing a permit application, the operator shall provide notice of planned entry on to the surface tract to conduct any plat surveys required pursuant to this article. Such notice shall be provided at least seven days but no more than forty-five days prior to such entry to: (1) The surface owner of such tract; (2) to any owner or lessee of coal seams beneath such tract that has filed a declaration pursuant to section thirty-six, article six, chapter twenty-two of this code; and (3) any owner of minerals underlying such tract in the county tax records. The notice shall include a statement that copies of the state Erosion and Sediment Control Manual and the statutes and rules related to oil and gas exploration and production may be obtained from the Secretary, which statement shall include contact information, including the address for a web page on the Secretary's web site, to enable the surface owner to obtain copies from the secretary.

**Notice is hereby provided to:**

SURFACE OWNER(s)

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

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

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

COAL OWNER OR LESSEE

Name: NO DECLARATION ON RECORD WITH COUNTY  
Address: \_\_\_\_\_

MINERAL OWNER(s)

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

\*please attach additional forms if necessary

**Notice is hereby given:**

Pursuant to West Virginia Code § 22-6A-10(a), notice is hereby given that the undersigned well operator is planning entry to conduct a plat survey on the tract of land as follows:

State: West Virginia  
County: Ritchie  
District: Clay  
Quadrangle: Pennsboro

Approx. Latitude & Longitude: 39.295258, -80.901300 (NAD 83)  
Public Road Access: CR 50/26  
Watershed: North Fork Hughes River  
Generally used farm name: Costilow, Donald L. & Patricia L.

Copies of the state Erosion and Sediment Control Manual and the statutes and rules related to oil and gas exploration and production 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). Copies of such documents or additional information related to horizontal drilling may be obtained from the Secretary by visiting [www.dep.wv.gov/oil-and-gas/pages/default.aspx](http://www.dep.wv.gov/oil-and-gas/pages/default.aspx).

RECEIVED  
Office of Oil and Gas

**Notice is hereby given by:**

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

Address: 1625 17th Street  
Denver, CO 80202  
Facsimile: (303) 357-7315

AUG 14 2015

WV Department of  
Environmental Protection

**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 [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).



**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:** 08/11/2015      **Date Permit Application Filed:** 08/11/2015

**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: RR 1 Box 604  
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>508514m</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>Costilow, Donald</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: asteele@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 [depprivacyofficer@wv.gov](mailto:depprivacyofficer@wv.gov).

RECEIVED  
Office of Oil and Gas

AUG 14 2015

WV Department of  
Environmental Protection **9/18/2015**





## WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

## Division of Highways

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

Earl Ray Tomblin  
Governor

Paul A. Mattox, Jr., P. E.  
Secretary of Transportation/  
Commissioner of Highways

July 15, 2015

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  
Buffalo Unit 2H Well site

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: Ashlie Steele  
Antero Resources Corporation  
CH, OM, D-3  
File

RECEIVED  
Office of Oil and Gas

AUG 14 2015

WV Department of  
Environmental Protection 9/18/2015

**List of Anticipated Additives Used for Fracturing or  
Stimulating Well**

<b>Additives</b>	<b>Chemical Abstract Service Number (CAS #)</b>
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

RECEIVED  
Office of Oil and Gas

AUG 14 2015

WV Department of  
Environmental Protection  
9/18/2015



# BISON WELL PAD & WATER CONTAINMENT PAD

## SITE DESIGN & CONSTRUCTION PLAN, EROSION & SEDIMENT CONTROL PLANS

CLAY DISTRICT, RITCHIE COUNTY, WEST VIRGINIA  
CABIN RUN-NORTH FORK HUGHES WATERSHED

USGS 7.5 PENNSBORO & WESTUNION QUAD MAP

API# 8510234  
API# 8510240  
API# 8510241  
API# 8510242  
API# 8510243  
API# 8510249

**NAVITUS**  
ENERGY ENGINEERING

**LOCATION COORDINATES:**  
ACCESS ROAD ENTRANCE  
LATITUDE: 39.294408 LONGITUDE: -80.905438 (NAD 83)  
N 4344475.52 E 508154.54 (UTM ZONE 17 METERS)  
CENTER OF TANK  
LATITUDE: 39.292843 LONGITUDE: -80.903462 (NAD 83)  
N 4344930.12 E 508323.02 (UTM ZONE 17 METERS)  
CENTROID OF PAD  
LATITUDE: 39.290358 LONGITUDE: -80.901142 (NAD 83)  
N 4344958.08 E 508024.83 (UTM ZONE 17 METERS)

**APPROVED**  
**WVDEP OOG**  
8/24/2015

**GENERAL DESCRIPTION:**  
THE ACCESS ROAD(S), WATER CONTAINMENT PAD, AND WELL PAD ARE BEING 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 #5408500125C. MISS UTILITY STATEMENT:  
ANTERO RESOURCES CORPORATION WILL NOTIFY MISS UTILITY OF WEST VIRGINIA FOR THE LOCATING OF UTILITIES PRIOR TO THIS PROJECT DESIGN TICKET #23046896. IN ADDITION, MISS UTILITY WILL BE CONTACTED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION FOR THIS PROJECT.

**ENTRANCE PERMIT:**  
ANTERO RESOURCES CORPORATION WILL OBTAIN AN ENCROACHMENT PERMIT (FORM WM-106) 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 JURISDICTION 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 SUMMARIZED 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 USE OF THE WVDEP. IT IS STRONGLY RECOMMENDED THAT THE APPROPRIATE AGENCIES BE CONSULTED IN AN EFFORT TO GAIN WRITTEN CONFIRMATION OF THE DELINEATION SHOWN ON THIS DESIGN PRIOR TO COMMENCING 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 FIELDS 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 JANUARY 20, 2015, 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**

**OPERATOR:**  
ANTERO RESOURCES CORPORATION  
530 WHITE GARD BLVD.  
INDIANGAP, WV 26030  
PHONE: (204) 842-4100  
FAX: (204) 842-4102

**ELI WALGONER - ENVIRONMENTAL ENGINEER**  
OFFICE: (204) 842-4068 CELL: (204) 476-9770

**JOHN KAWKAC - OPERATIONS SUPERINTENDENT**  
CELL: (817) 368-1553

**AARON KUNZLER - CONSTRUCTION SUPERVISOR**  
CELL: (405) 927-8344

**ANTHONY SMITH - FIELD ENGINEER**  
OFFICE: (204) 842-4008 CELL: (204) 873-6196

**MARK JOHNSON - SURVEYING COORDINATOR**  
(204) 842-4192 CELL: (204) 719-6448  
**DAVID PATSY - LAND AGENT**  
(204) 476-6090  
**ENGINEER/SURVEYOR:**  
NAVITUS ENGINEERING, INC.  
CYNTHIA S. KIMPO, PE - PROJECT MANAGER/ENGINEER  
OFFICE: (888) 662-4185 CELL: (240) 686-6747

**ENVIRONMENTAL:**  
ALLSTAR ECOLOGY, LLC  
STEVE S. WARD - ENVIRONMENTAL SCIENTIST  
(866) 213-2686 CELL: (204) 622-7477

**GEOTECHNICAL:**  
PENNSYLVANIA SOIL & ROCK, INC.  
CHRISTOPHER W. SAMOJS - PROJECT ENGINEER  
(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 LCO. THERE IS A WETLAND IMPACT THAT WILL NEED TO BE PERMITTED BY THE APPROPRIATE AGENCIES.
2. THERE ARE NO NATURALLY PRODUCING TROUT STREAMS WITHIN 300 FEET OF THE WELL PAD AND LCO.
3. THERE ARE NO GROUNDWATER INTAKE OR PUBLIC WATER SUPPLY FACILITIES WITHIN 1000 FEET OF THE WELL PAD AND LCO.
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.

**REPRODUCTION NOTE**

THESE PLANS WERE CREATED TO BE PLOTTED ON 24"x36" (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.

**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 CHS 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!!**

**BISON WETLAND IMPACT (SQUARE FEET)**

Wetland and Impact Cause	FB (SF)	Total Impact (SF)	Total Impact (AC)
Wetland 1 (Access Road 'D')	1,768	1,768	0.04



WEST VIRGINIA STATE PLANE COORDINATE SYSTEM  
NAD 83  
NAD 83  
UTM  
ZONE 17  
Easting  
Northing

**SHEET INDEX:**

- 1 - COVER SHEET
- 2 - CONSTRUCTION AND EAS CONTROL NOTES
- 3 - LEGEND
- 4 - MATERIAL QUANTITIES
- 5 - STORM DRAINAGE COMPUTATIONS
- 6 - EXISTING CONDITIONS
- 7 - EXISTING STRUCTURES & FEATURES
- 8 - OVERALL PLAN SHEET INDEX & VOLUMES
- 9 - ACCESS ROAD & WATER CONTAINMENT PAD PLAN
- 10 - WATER CONTAINMENT PAD PAD PLAN
- 11 - WELL PAD GRADING PLAN
- 12 - WATER CONTAINMENT PAD GRADING PLAN
- 13 - ACCESS ROAD PROFILES
- 14 - ACCESS ROAD PROFILES
- 15 - ACCESS ROAD SECTIONS
- 16 - ACCESS ROAD SECTIONS
- 17 - WELL PAD & WATER CONTAINMENT PAD SECTIONS
- 18 - WELL PAD SECTIONS
- 19-24 - CONSTRUCTION DETAILS
- 25 - ACCESS ROAD & WATER CONTAINMENT PAD DECLARATION PLAN
- 26 - ACCESS ROAD & WELL PAD RECLAMATION PLAN
- 27-28 - GEOTECHNICAL DETAILS

Proposed Well Name	WV Route	WV Route	UTM (Easting)	UTM (Northing)	NAD 83 Lat & Long
WV Route	NAD 27	NAD 83	Zone 17	Zone 17	
Well 1	N 26723.23	N 26727.65	N 434950.05	LAT 39.1743 2211	
Well 2	E 150347.23	E 151906.17	E 50802.28	LONG -80.9438 3427	
Well 3	N 26723.23	N 26727.65	N 434950.10	LAT 39.1743 2266	
Well 4	N 26723.23	N 26727.65	N 434950.28	LONG -80.9438 3185	
Well 5	N 26723.23	N 26727.65	N 434950.15	LAT 39.1743 2262	
Well 6	E 150337.23	E 151926.17	E 50806.37	LONG -80.9438 3383	
Well 7	N 26723.23	N 26727.65	N 434950.20	LAT 39.1743 2277	
Well 8	E 150337.23	E 151926.17	E 50811.42	LONG -80.9438 3672	
Well 9	N 26723.23	N 26727.65	N 434950.28	LAT 39.1743 2262	
Well 10	E 150337.23	E 151946.17	E 50814.47	LONG -80.9438 3340	
Well 11	N 26723.23	N 26727.65	N 434950.31	LAT 39.1743 2268	
Well 12	E 150337.23	E 151906.17	E 50817.51	LONG -80.9438 4068	
Well 13	N 26723.23	N 26727.65	N 434950.36	LAT 39.1743 2223	
Well 14	E 150347.23	E 151946.17	E 50820.38	LONG -80.9438 2708	
Well 15	N 26723.23	N 26727.65	N 434950.41	LAT 39.1743 2239	
Well 16	E 150347.23	E 151926.17	E 50823.81	LONG -80.9438 3328	
Well 17	N 26723.23	N 26727.65	N 434950.46	LAT 39.1743 2204	
Well 18	E 150347.23	E 151906.17	E 50826.85	LONG -80.9438 3382	
Well 19	N 26723.23	N 26727.65	N 434950.51	LAT 39.1743 2230	
Well 20	E 150347.23	E 151906.17	E 50829.89	LONG -80.9438 3690	
Well 21	N 26723.23	N 26727.65	N 434950.56	LAT 39.1743 2286	
Well 22	E 150347.23	E 152006.17	E 50832.75	LONG -80.9438 3758	
Well 23	N 26723.23	N 26727.65	N 434950.61	LAT 39.1743 2312	
Well 24	E 150347.23	E 152026.17	E 50835.79	LONG -80.9438 3491	
Well Pad Entrance	L70.5				

BISON LIMITS OF DISTURBANCE AREA (AC)		Impacts to Donald L. & Patricia L. Clinebon TM 21-31-28	
Total Area		Access Road "A" (551')	1.87
Access Road "A" (11 826')	5.41	Access Road "B" (487')	0.16
Access Road "B" (79')	0.23	Access Road "C" (442')	1.31
Access Road "C" (567')	2.26	Access Road "D" (121')	0.64
Access Road "D" (145')	0.68	Well Pad	5.99
Well Pad	6.00	Water Containment Pad	1.18
Water Containment Pad	1.43	Excess/Topsoil Material Stockpiles	0.19
Excess/Topsoil Material Stockpiles	3.74	<b>Total Affected Area</b>	<b>11.34</b>
<b>Total Affected Area</b>	<b>19.75</b>	<b>Total Wooded Acres Disturbed</b>	<b>9.09</b>
<b>Total Wooded Acres Disturbed</b>	<b>16.24</b>	Impacts to Dennis J. & Debra R. Bellows TM 21-31-22	
		Access Road "A" (859')	1.82
		Access Road "B" (311')	0.12
		Access Road "C" (343')	0.23
		Access Road "D" (243')	0.54
		Well Pad	0.01
		Water Containment Pad	0.25
		Excess/Topsoil Material Stockpiles	2.50
		<b>Total Affected Area</b>	<b>5.84</b>
		<b>Total Wooded Acres Disturbed</b>	<b>5.20</b>
		Impacts to Dennis J. & Debra R. Bellows TM 21-31-23	
		Access Road "A" (42')	0.01
		Access Road "C" (91')	0.85
		<b>Total Affected Area</b>	<b>0.86</b>
		<b>Total Wooded Acres Disturbed</b>	<b>0.86</b>

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

Stream and Impact Cause	Permanent Impacts		Temp. Impacts		Total Impact (LF)
	Culvert FB (LF)	Inlets/Outlets Structures (LF)	Distance to L.O.D. (LF)	Distance to L.O.D. (LF)	
Stream 2 (Access Road 'B')	7	0	56	63	63
Stream 9 (Stockpile Area 'A')	0	0	65	65	65
Stream 10 (Access Road 'A' & Stockpile Area 'A')	0	0	59	59	59
Stream 14 (Access Road 'A' & Stockpile Area 'B')	0	0	42	42	42

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

Stream and Impact Cause	Permanent Impacts		Temp. Impacts		Total Impact (LF)
	Culvert FB (LF)	Inlets/Outlets Structures (LF)	Distance to L.O.D. (LF)	Distance to L.O.D. (LF)	
Stream 12 (Access Road 'C')	0	0	21	21	21

REVISION


DATE



THIS DOCUMENT WAS PREPARED FOR ANTERO RESOURCES CORPORATION

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

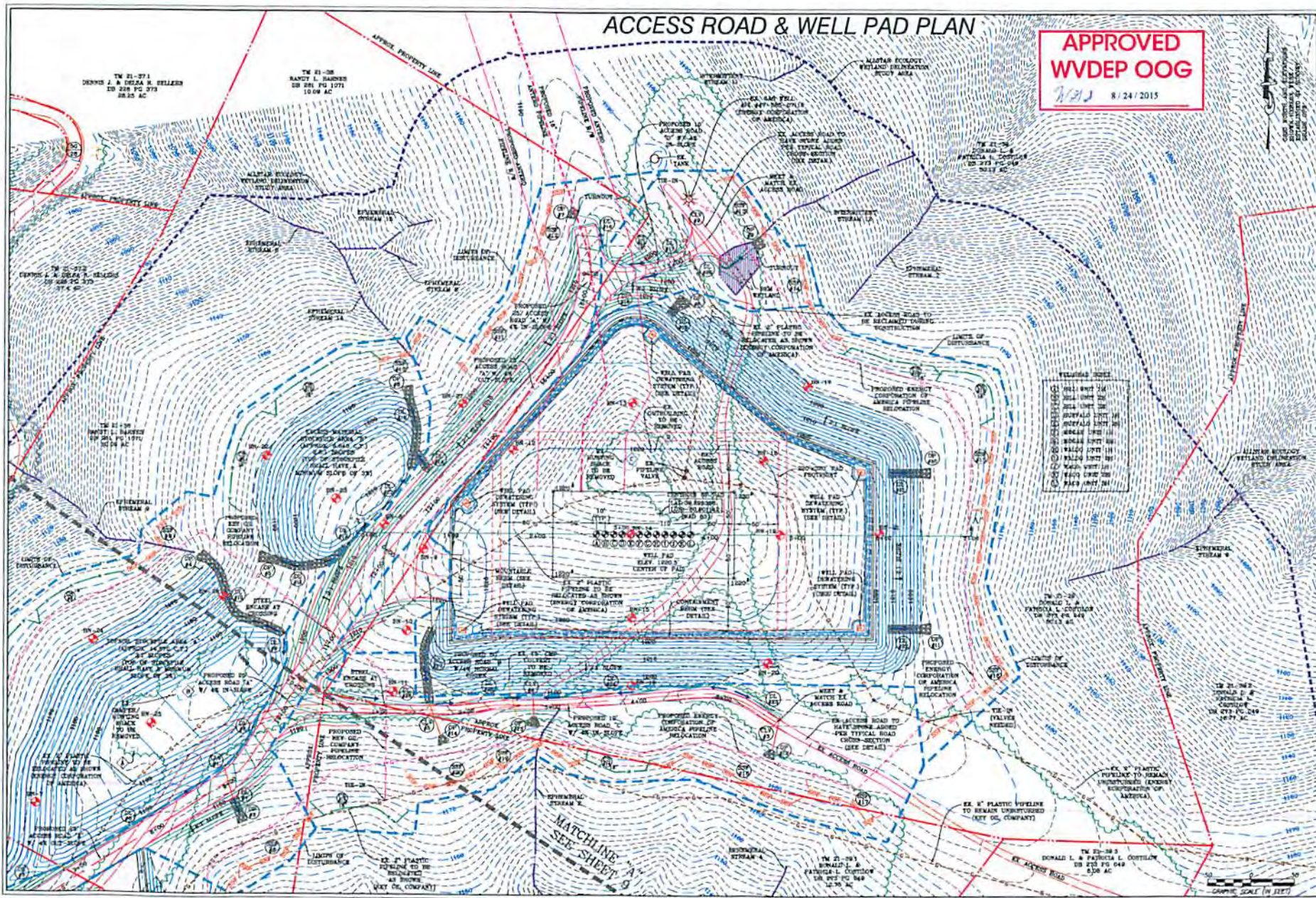


DATE: 06/26/2015  
SCALE: AS SHOWN  
SHEET 1 OF 26



# ACCESS ROAD & WELL PAD PLAN

**APPROVED WVDEP OOG**  
 10/1 8/24/2015



**REVISION**

NO.	DATE	DESCRIPTION
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		

**NAVITUS**  
 ENERGY ENGINEERING



THIS DOCUMENT WAS PREPARED FOR ANTERO RESOURCES CORPORATION

**BISON**  
 WELL PAD & WATER CONTAMINANT PAD  
 CLAY DISTRICT WEST VIRGINIA  
 BITCHE COUNTY, WEST VIRGINIA



DATE: 06/26/2015  
 SCALE: 1" = 50'  
 SHEET 10 OF 26



# BISON WELL PAD & WATER CONTAINMENT SITE DESIGN & CONSTRUCTION EROSION & SEDIMENT CONTROL

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

**LOCATION COORDINATES:**

**ACCESS ROAD ENTRANCE**  
LATITUDE: 39.294509 LONGITUDE: -80.905438 (NAD 83)  
N 4349472.52 E 508154.24 (UTM ZONE 17 METERS)

**CENTER OF TANK**  
LATITUDE: 39.293845 LONGITUDE: -80.903482 (NAD 83)  
N 4349390.12 E 508323.02 (UTM ZONE 17 METERS)

**CENTROID OF PAD**  
LATITUDE: 39.295366 LONGITUDE: -80.901142 (NAD 83)  
N 4349568.08 E 508524.63 (UTM ZONE 17 METERS)

**GENERAL DESCRIPTION:**

THE ACCESS ROAD(S), WATER CONTAINMENT PAD, AND WELL PAD ARE BEING 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 WILL NOTIFY MISS UTILITY OF WEST VIRGINIA FOR THE LOCATING OF UTILITIES PRIOR TO THIS PROJECT DESIGN; TICKET #1330462890. IN ADDITION, MISS UTILITY WILL BE CONTACTED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION FOR THIS PROJECT.

**ENTRANCE PERMIT:**

ANTERO RESOURCES CORPORATION WILL OBTAIN 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 JANUARY 28, 2015, 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:**

**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

**JOHN KAWCAK - OPERATIONS SUPERINTENDENT**  
CELL: (817) 368-1553

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

**ANTHONY SMITH - FIELD ENGINEER**  
OFFICE: (304) 842-4208 CELL: (304) 673-6196

**MARK JOHNSON - SURVEYING COORDINATOR**  
(304) 842-4162 CELL: (304) 719-6449

**DAVID PATSY - LAND AGENT**  
(304) 476-8090

**ENGINEER/SURVEYOR:**  
NAVITUS ENGINEERING, INC.  
CYRUS S. KUMP, PE - PROJECT  
MANAGER/ENGINEER  
OFFICE: (888) 662-4185 CELL: (540) 666-6747

**ENVIRONMENTAL:**  
ALLSTAR ECOLOGY, LLC  
RYAN L. WARD - ENVIRONMENTAL SCIENTIST  
(866) 213-2666 CELL: (304) 892-7477

**GEOTECHNICAL:**  
PENNSYLVANIA SOIL & ROCK, INC.  
CHRISTOPHER W. SAMOS - PROJECT ENGINEER  
(412) 372-4000 CELL: (412) 589-0862

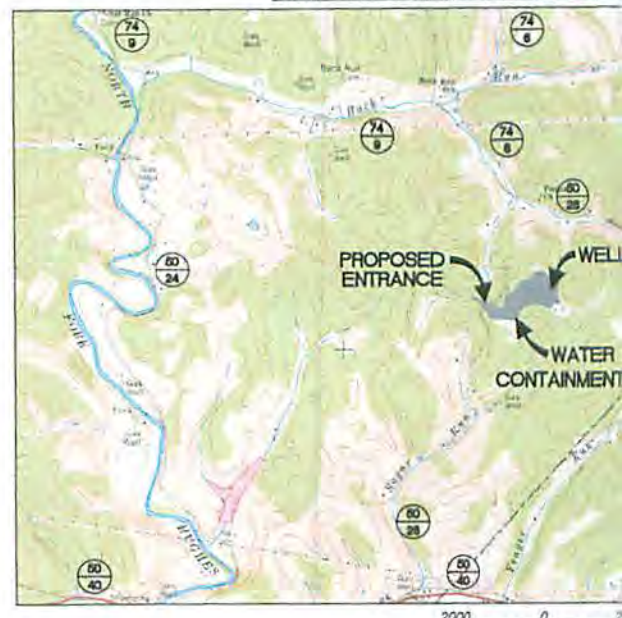
**RESTRICTIONS NOTES:**

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 WILL NEED TO BE 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.

**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.



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!!



# CONTAINMENT PAD

## CONSTRUCTION PLAN, CONTROL PLANS

WEST VIRGINIA  
WATERSHED  
QUAD MAP



WEST VIRGINIA STATE PLANE COORDINATE SYSTEM  
NAD 83 ELEVATION BASED ON NAVD83  
ESTABLISHED BY SURVEY GRADE GPS & OPUS  
POST-PROCESSING

4708510234

### SHEET INDEX:

- 1 - COVER SHEET
- 2 - CONSTRUCTION AND E&S CONTROL NOTES
- 3 - LEGEND
- 4 - MATERIAL QUANTITIES
- 5 - STORM DRAINAGE COMPUTATIONS
- 6 - EXISTING CONDITIONS
- 7 - EXISTING STRUCTURES & FEATURES
- 8 - OVERALL PLAN SHEET INDEX & VOLUMES
- 9 - ACCESS ROAD & WATER CONTAINMENT PAD PLAN
- 10 - ACCESS ROAD & WELL PAD PLAN
- 11 - WELL PAD GRADING PLAN
- 12 - WATER CONTAINMENT PAD GRADING PLAN
- 13 - ACCESS ROAD PROFILES
- 14 - ACCESS ROAD PROFILES
- 15 - ACCESS ROAD SECTIONS
- 16 - ACCESS ROAD SECTIONS
- 17 - WELL PAD & WATER CONTAINMENT PAD SECTIONS
- 18 - WELL PAD SECTIONS
- 19-24 - CONSTRUCTION DETAILS
- 25 - ACCESS ROAD & WATER CONTAINMENT PAD RECLAMATION PLAN
- 26 - ACCESS ROAD & WELL PAD RECLAMATION PLAN
- GE500-GE506 - GEOTECHNICAL DETAILS



Telephone: (888) 662-4185 | www.NavitusEng.com

### WVD0H COUNTY ROAD MAP



5000 0 5000  
SCALE: 1" = 5000'

Proposed Well Name	WW North NAD 27	WW North NAD 83	UTM (METERS) Zone 17	NAD 83 Lat & Long
Bill	N 292723 23	N 292757 65	N 4349550 05	LAT 39-17-43 0231
Unit 1H	E 1603347 25	E 1571908 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 28	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 25	E 1571936 17	E 508511 42	LONG -80-54-04 8612
Buffalo	N 292723 23	N 292757 65	N 4349550 25	LAT 39-17-43 0292
Unit 2H	E 1603387 28	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 25	E 1571956 17	E 508517 51	LONG -80-54-04 4068
Mogar	N 292723 23	N 292757 65	N 4349550 35	LAT 39-17-43 0323
Unit 2H	E 1603407 25	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 45	LAT 39-17-43 0354
Unit 2H	E 1603427 25	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 55	LAT 39-17-43 0385
Unit 2H	E 1603447 25	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 25	E 1572016 17	E 508535 79	LONG -80-54-03 6436
Well Pad Elevation	1,220.5			

BISON LIMITS OF DISTURBANCE AREA (AC)	
Total Site	
Access Road "A" (1,686')	5.41
Access Road "B" (79')	0.23
Access Road "C" (567')	2.26
Access Road "D" (145')	0.68
Well Pad	6.00
Water Containment Pad	1.43
Excess/Topsoil Material Stockpiles	3.74
<b>Total Affected Area</b>	<b>19.75</b>
Total Wooded Acres Disturbed 16.24	
Impacts to Dennis J. & Delsa R. Sellers TM 21-37.2	
Access Road "A" (0')	0.09
<b>Total Affected Area</b>	<b>0.09</b>
Total Wooded Acres Disturbed 0.05	
Impacts to Willard & Effie L. Dotson & Richard L. Fyler TM 21-44	
Access Road "A" (224')	1.31
<b>Total Affected Area</b>	<b>1.31</b>
Total Wooded Acres Disturbed 0.83	
Impacts to Dennis J. & Delsa R. Sellers TM 21-37.3	
Access Road "A" (42')	0.31
<b>Total Affected Area</b>	<b>0.31</b>
Total Wooded Acres Disturbed 0.25	

Impacts to Donald L. & Patricia L. Costlow TM 21-39	
Access Road "A" (551')	1.87
Access Road "B" (48')	0.16
Access Road "C" (442')	1.31
Access Road "D" (121')	0.64
Well Pad	5.99
Water Containment Pad	1.18
Excess/Topsoil Material Stockpiles	0.19
<b>Total Affected Area</b>	<b>11.34</b>
Total Wooded Acres Disturbed 9.09	
Impacts to Randy L. Barnes TM 21-38	
Access Road "A" (859')	1.82
Access Road "B" (31')	0.07
Access Road "C" (34')	0.10
Access Road "D" (24')	0.04
Well Pad	0.01
Water Containment Pad	0.25
Excess/Topsoil Material Stockpiles	3.55
<b>Total Affected Area</b>	<b>5.84</b>
Total Wooded Acres Disturbed 5.20	
Impacts to Donald L. & Patricia L. Costlow TM 21-39.1	
Access Road "A" (0')	0.01
Access Road "C" (91')	0.85
<b>Total Affected Area</b>	<b>0.86</b>
Total Wooded Acres Disturbed 0.81	

BISON EPHEMERAL STREAM IMPACT (LINEAR FEET)				
Stream and Impact Cause	Permanent Impacts		Temp. Impacts	Total Impact (LF)
	Culvert / Fill (LF)	Inlets/Outlets Structures (LF)	Distance to L.O.D. (LF)	
Stream 2 (Access Road "B")	7	0	56	63
Stream 9 (Stockpile Area "A")	0	0	65	65
Stream 10 (Access Road "A" & Stockpile Area "A")	0	0	59	59
Stream 14 (Access Road "A" & Stockpile Area "B")	0	0	42	42

BISON INTERMITTENT STREAM IMPACT (LINEAR FEET)				
Stream and Impact Cause	Permanent Impacts		Temp. Impacts	Total Impact (LF)
	Culvert / Fill (LF)	Inlets/Outlets Structures (LF)	Distance to L.O.D. (LF)	
Stream 12 (Access Road "D")	0	9	21	30

BISON WETLAND IMPACT (SQUARE FEET)			
Impact Cause	Fill (SF)	Total Impact (SF)	Total Impact (AC)
Access Road "D")	1,788	1,788	0.04

REVISION	DATE



THIS DOCUMENT WAS PREPARED FOR ANTERO RESOURCES CORPORATION

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



DATE: 06/26/2015  
SCALE: AS SHOWN  
SHEET 1 OF 26

*David A. Lamm*  
8-26-15

9/18/2015  
West Virginia Department of Environmental Protection