

#### 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

January 26, 2015

#### WELL WORK PERMIT

#### Horizontal 6A Well

This permit, API Well Number: 47-1706657, 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.

Chief

James Martin

Operator's Well No: SHEEP RUN UNIT 1H

Farm Name: HORTON, JUDY A.

API Well Number: 47-1706657

Permit Type: Horizontal 6A Well

Date Issued: 01/26/2015

## 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. <u>Failure to adhere to the specified permit conditions may result in enforcement action.</u>

#### **CONDITIONS**

- 1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
- 2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
- 3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
- 4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
- 5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled Water Well Regulations, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
- 6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
- 7. 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 within 30 days of commencement of drilling.

WW-6B (9/13)

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

WELL WORK I ERWIN	TATTLICATION	1	526
1) Well Operator: Antero Resources Corporation 494	488557 017 -D	oddridge Central	Oxford 7.5'
	erator ID Coun	ty District	Quadrangle
2) Operator's Well Number: Sheep Run Unit 1H	Well Pad Name	: Fritz Pad	
3) Farm Name/Surface Owner: Horton, Judy A.	_ Public Road Acce	ess: CR 11/3	
4) Elevation, current ground: 1053' Elevation	on, proposed post-co	onstruction: 1053'	
5) Well Type (a) Gas Oil Other	Undergroun	nd Storage	1
(b)If Gas Shallow Horizontal	Deep		Dev. 2014
6) Existing Pad: Yes or No Yes			10-7
7) Proposed Target Formation(s), Depth(s), Anticipated Marcellus Shale: 7,200' TVD, Anticipated Thickness- 60 fe			
8) Proposed Total Vertical Depth: 7,200' TVD			
9) Formation at Total Vertical Depth: Marcellus Shale			
10) Proposed Total Measured Depth: 17,000' MD			
11) Proposed Horizontal Leg Length: 8112'			
12) Approximate Fresh Water Strata Depths: 108'			
13) Method to Determine Fresh Water Depths: Washi	ngton Unit 2H (API# 4	7-017-06371) on san	ne pad.
14) Approximate Saltwater Depths: 451', 923', 1,952'			
15) Approximate Coal Seam Depths: 1067'			
16) Approximate Depth to Possible Void (coal mine, k	arst, other): None a	nticipated	
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:		Pa	ceived
Depth:		1 U = 1	COLACA
		00	7 2 4 2014
Owner:			

Office of Oil and Gas
WV Dept. of Environmental Protection

WW-6B (9/13)

18)

# CASING AND TUBING PROGRAM

ТҮРЕ	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
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#	300'	300'	CTS, 417 Cu. Ft
Coal	9-5/8"	New	J-55	36#	2455'	2455'	CTS, 1,000 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	17,000'	17,000'	4,281 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7,100'	
Liners							

TYPE	Size	Wellbore	Wall	Burst Pressure	Cement Type	Cement Yield
		<u>Diameter</u>	<u>Thickness</u>			(cu. ft./k)
Conductor	20"	24"	0.438"	1530	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730/1730	Class A	1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	Class A	1.18
Intermediate						
Production	5-1/2"	8-3/4" & 8-1/2"	0.361"	12630	Lead-H/POZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200		
Liners						

### **PACKERS**

Kind:	N/A	
Sizes:	N/A	Heceived
Depths Set:	N/A	OCT 2 4 2014

Office of Oil and Gas WV Dept. of Environmental Protection WW-6B (9/13)

\*Note: Attach additional sheets as needed.

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:
Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.
20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:
Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The fluid will be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."
21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 11.21 existing acres
22) Area to be disturbed for well pad only, less access road (acres):  3.72 existing acres
23) Describe centralizer placement for each casing string:
Conductor: no centralizers Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole to surface.
Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.  Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.  24) Describe all cement additives associated with each cement type:  OCT 2 4 2014
20 D . The Harmont addition are interest with each compant time.
24) Describe all cement additives associated with each cement type:  001 2 4 2014
Conductor: no additives, Class A cement. Surface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake
Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat
Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C <sub>15</sub> 1 Dept. of Environmental Protect
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.

WV Dept. of Environmental Protection

WW-9 (9/13)

API Number 47	7 -	017	.e	
Operate	or's	Well No	. Sheep Run Unit 1H	

# 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) Tributary of Cabin Run Quadrangle Oxford 7.5'
Elevation 1053' County Doddridge District Central
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:  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. Dutt/Stiff 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)
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  Company Official (Typed Name) Cole Kilstrom  Company Official (Typed Name) Cole Kilstrom
Company Official Signature  Company Official (Typed Name) Cole Kilstrom  Company Official Title Environmental Representative
Company Official (Typed Name) Cole Kilstrom  Company Official Title Environmental Representative
Subscribed and sworn before me this
Kura allackuch Notary Public OCT 2 4 2014
My commission expires UNIV 21, 2018

Form WW-9

Operator's Well No. Sheep Run Unit 1H

Antero Resources (	Jorporation		
Proposed Revegetation Treatme	ent: Acres Disturbed 11.21	(existing) Prevegetation nH	
Lime 2-4	Tons/acre or to correct to pH	6.5	
	traw or Wood Fiber (will be used w		
Fertilizer amount 500		s/acre	
Mulch 2-3	Tons/a		
		Road to Water Containment Pad (0.53) + Existing W	hter Containment Pad (3.41) +
LAISING ACCESS INSIG (1.17)		Spoil Pad 2 (1.42) = 11.21 Existing Acres	ner contaminent aut (5,417).
Temp	porary	Perman	ient
Seed Type	lbs/acre	Seed Type	lbs/acre
Tall Fescue	45	Tall Fescue	45
Perennial Rye Gras	s 20	Perennial Rye Grass	20
*or type of grass seed requ	ested by surface owner	*or type of grass seed reques	sted by surface owner
Plan Approved by:		bed greas mains	Taxis 6 HS
		osa gives prigin	dig Els
To wo Dep 1290.	1411017		
		landicom	Received
			OCT 2 4 2014
01 = 1 = 1	a de la trad		Office of Oil and Gas ept. of Environmental Protec
Title: 0,1 7 6-45		Date: 10-21-2014	
Field Reviewed?	Yes (	) No	

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

#### **PRODUCTION INTERVAL**

1. Alpha 1655

Salt Inhibitor

2. Mil-Carb

Calcium Carbonate

3. Cottonseed Hulls

Cellulose-Cottonseed Pellets - LCM

4. Mil-Seal

Vegetable, Cotton & Cellulose-Based Fiber Blend – LCM

5. Clay-Trol

Amine Acid Complex - Shale Stabilizer

6. Xan-Plex

Viscosifier For Water Based Muds

7. Mil-Pac (All Grades)

Sodium Carboxymethylcellulose - Filtration Control Agent

8. New Drill

Anionic Polyacrylamide Copolymer Emulsion - Shale Stabilizer

9. Caustic Soda

Sodium Hydroxide - Alkalinity Control

10. Mil-Lime

Calcium Hydroxide - Lime

11. LD-9

Polyether Polyol – Drilling Fluid Defoamer

12. Mil Mica

Hydro-Biotite Mica - LCM

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13. Escaid 110

Drilling Fluild Solvent – Aliphatic Hydrocarbon

14. Ligco

Highly Oxidized Leonardite - Filteration 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

OCT 2 4 2014

Office of Oil and Gas
WV Dept. of Environmental Protection



# Well Site Safety Plan Antero Resources

Well Name: Washington Unit 1H, Washington 2H,

Washington Unit 4H, Hayden Unit 1H, Hayden Unit 2H, Hileman Unit 1H, Hileman Unit 2H, Sheep Run Unit 2H

Pad Location: FRITZ PAD

Doddridge County/ Central District

GPS Coordinates: Lat 39°14′0.02″/ Long 80°50′23.89″ (NAD83)

## **Driving Directions:**

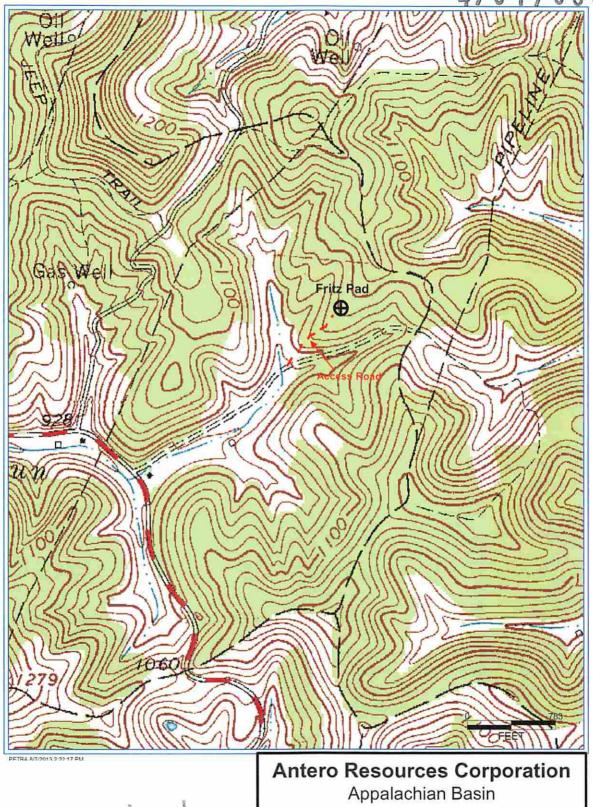
From Pullman, WV head northeast on Main St./Co Rd 9. Follow Co Rd. 9/ Harrisville-Pullman Odford for 5.4 miles. Continue on S Fork of Hughes River for ~1.7 mi. Continue on Route 21 for ~1.6 mi. Turn right onto Co. Route 11/3 and follow for ~0/4 mi. Access road will be on left.

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

DCW Received

OCT 2 4 2014

4701706657



Received

OCT 2 4 2014

Office of Oil and Gas WV Dept. of Environmental Protection Appalachian Basin Sheep Run Unit 1H Doddridge County

Quadrangle: Oxford 7.5'

Watershed: Tributary of Cabin Run

District: Central Date: 8-7-2013

