

### 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

June 25, 2014

### WELL WORK PERMIT

#### Horizontal 6A Well

This permit, API Well Number: 47-8510103, 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: DUCKWORTH UNIT 3H

Farm Name: RICHARDS, JOHN WAYNE

API Well Number: 47-8510103

Permit Type: Horizontal 6A Well

Date Issued: 06/25/2014

Promoting a healthy environment.

### PERMIT CONDITIONS

4708510103

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. The Office of Oil and Gas has approved your permit application, which includes your addendum. Please be advised that the addendum is part of the terms of the well work permit, and will be enforced as such. The Office of Oil and Gas must receive a copy of all data collected, and submitted in a timely fashion, but no later than the WR35 submittal.
- 2. 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.
- 3. 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.
- 4. 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.
- 5. 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.
- 6. 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.
- 7. 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.

### **PERMIT CONDITIONS**

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- 8. 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.
- 9. 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.

4708510103

WW-6B (9/13)

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

1) Well Opera	tor: Antero I	Resources Cor	poration	494488557	085- Ritchie	Union	Pullman 7.5'
				Operator ID	County	District	Quadrangle
2) Operator's	Well Number	Duckworth U	Jnit 3H	Well Pa	ad Name: John	Richards F	Pad
3) Farm Name	Surface Own	ner: John Wa	yne Ric	hards Public Ro	oad Access: CR	9/8	
4) Elevation, c	current ground	i: ~1035'	Ele	evation, proposed	l post-constructi	on: 1,025	
5) Well Type	(a) Gas Other		Oil		lerground Stora	-	
	(b)If Gas	Shallow	in .	Deep			
		Horizontal					
6) Existing Page	d: Yes or No	No					
7) Proposed Ta Marcellus Sh	arget Formationale: 6600' TVD	on(s), Depth(s), Anticipated Th	), Antici	pated Thickness 50 feet, Associated	and Associated Pressure- 3000#	Pressure(s)	
8) Proposed To							
9) Formation a			rcellus S	hale			
10) Proposed T	otal Measure	ed Depth: 13	,400' MD				
11) Proposed H	Iorizontal Le	g Length: 62	11'				
12) Approxima	te Fresh Wat	er Strata Deptl	ıs:	85', 126', 298'			
13) Method to	Determine Fr	esh Water Dep	ths: Of	ffset well records. De	epths have been ad	justed accord	ing to surface elevations.
14) Approxima		The state of the s	, 1856', 1				0
15) Approxima	te Coal Seam	Depths: 445	', 580'				
16) Approxima	te Depth to P	ossible Void (	coal min	e, karst, other):	None anticipated		
17) Does Propo directly overlyi	sed well loca ng or adjacen	tion contain co t to an active r	oal seam	s Yes	No.	<b>V</b>	
(a) If Yes, pro	vide Mine In	fo: Name:					
		Depth:					
		Seam:			- 6	UE COL	
		Owner:					
						5.010	

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#	355'	355'	CTS, 493 Cu. Ft
Coal	9-5/8"	New	J-55	36#	2455'	2455'	CTS, 1000 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	13,400'	13,400'	3,291 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#	·	7,100	3,233 34.1
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (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 & Teil - 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		546 M (50)
Depths Set:	N/A	· Cii	

Dan 11/2m-5.2-14 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): 24.65 acres
22) Area to be disturbed for well pad only, less access road (acres): 5.50 acres
23) Describe centralizer placement for each casing string:
Conductor: no centralizers Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th Joint spaced up the hole to surface.
Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.  Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.
24) Describe all cement additives associated with each cement type:
Conductor: no additives, Class A cement. Surface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake
Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat  Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51
Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20
25) Proposed borehole conditioning procedures:
Conductor: blowhole clean with air, run casing, 10 bbls fresh water.  Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.
Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.
Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve; pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

WW-9 (9/13)

API Number 47 -	085		
Operator's	Well No.	Duckworth Unit 3H	

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

### FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Antero Re	sources Corporation	OP Code 49448855	57
Watershed (HUC 10) Suga	ar Run	Quadrangle Pullman 7.5'	
Elevation 1,025	County_Ritchie	District Union	
Will a pit be used? Yes_	re than 5,000 bbls of water to compl		No
		sed at this site (Drilling and Flowback Fluids will be store	d in tanks. Cuttings will be tanked and hauled off site.
Will a synthetic lin	ner be used in the pit? Yes	No If so, what ml.? N/A	
Proposed Disposal	Method For Treated Pit Wastes:		
		Number well locations when applicable. API# will be provided -9 for disposal location) (Meadowfill Land	
	ther (Explain		
Will closed loop system be	used? If so, describe: Yes		
Drilling medium anticipated	for this well (vertical and horizonta	1)? Air, freshwater, oil based, etc. Dust/Suffer	r/Freshwater, Intermediate - com, Production - Water Based Mud
-If oil based, what	type? Synthetic, petroleum, etc. N/A		
Additives to be used in drill	ing medium? Please See Attachment		
		offsite, etc. Stored in tanks, removed offsite a	nd taken to landfill.
	an to solidify what medium will be u		
	name/permit number? Meadowfill Land		
-Landini of offsite	name/permit number/	dill (Ferrit #SWF-1052-90)	
on August 1, 2005, by the O provisions of the permit are law or regulation can lead to I certify under per application form and all a obtaining the information,	ffice of Oil and Gas of the West Virgenforceable by law. Violations of enforcement action.  alty of law that I have personally tachments thereto and that, based I believe that the information is the information, including the possibility.	examined and am familiar with the in on my inquiry of those individuals it, accurate, and complete. I am awaity of fine or imprisonment.	tection. I understand that the ermit and/or other applicable formation submitted on this ammediately responsible for
Company Official (Typed N		(mile a cil	LD SIT-
	nvironmental Specialist		- 6 7 64 6
Company Official Title E	пиноппения орешены	Life Control of the C	#210t
Subscribed and sworn before	expe this D day of	April , 20 14	neutiness in
Samarth	objust "	Notary Public	SAMANTHA MARSH NOTARY PUBLIC STATE OF COLORATO
My commission expires	444Mber 20 2017		MY COMMISSION EXPIRES DECEMBER 20, 20

24.65		
Proposed Revegetation Treatment: Acres Disturbed 24.65	Prevegetation p	Н
Lime 2-4 Tons/acre or to correct to pl	<sub>H</sub> <u>6.5</u>	
Fertilizer type Hay or straw or Wood Fiber (will be used	where needed)	
Fertilizer amount 500	bs/acre	
2-3		
MulchTons IA (6.5) + Singing Area "A" (2.20)+ Well Pad/ Production Equipment Pad (5.50)+ Wait		Power The Life Communication
	ed Mixtures	excess/Lopsoil Material Stockpiles (7.90)=
Temporary	Perm	
Seed Type lbs/acre		
Annual Ryegrass 40	Seed Type  Crownvetch	lbs/acre
		10-15
*See attached Table 3 for additional seed type (John Richards Pad Design Page 25)	"See attached Table 4a for additional seed typ	e (John Richards Pad Design Page 25)
*or type of grass seed requested by surface owner	*Or type of grace good may	ested by surface owner
		ested by surface owner
*No Fescue or Timo  Attach:  Drawing(s) of road, location, pit and proposed area for land appropriate to the state of the	thy Grass shall be used	
*No Fescue or Timo  Attach:  Drawing(s) of road, location, pit and proposed area for land approvided)  Photocopied section of involved 7.5' topographic sheet.  Plan Approved by:  David when	plication (unless engineered plans in	cluding this info have been
*No Fescue or Timo  Attach:  Drawing(s) of road, location, pit and proposed area for land approvided)  Photocopied section of involved 7.5' topographic sheet.  Plan Approved by:  Daniel When Comments:  Dressed & mulch a	plication (unless engineered plans in	cluding this info have been

### 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

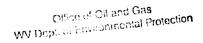
11. LD-9

Polyether Polyol – Drilling Fluid Defoamer

12. Mil Mica

Hydro-Biotite Mica – LCM

Received



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

WW Dept. of Environmental Protection



# Well Site Safety Plan Antero Resources

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

Unit 3H, Duckworth Unit 1H, Duckworth Unit

2H, Duckworth Unit 3H

Pad Location: JOHN RICHARDS PAD

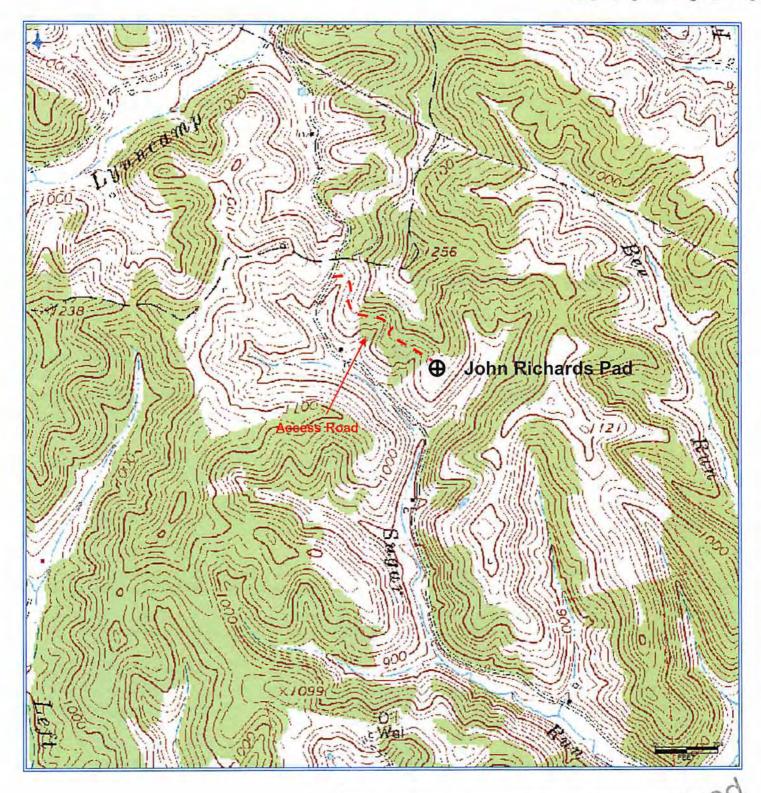
Ritchie County/ Union District

GPS Coordinates: Lat 39°12'19.61"/Long -80°55'10.23" (NAD83)

### **Driving Directions:**

From the intersection of I-79 and Hwy 50 near Bridgeport WV, head west on Hwy 50 for ~31.7 miles. Turn LEFT onto Co Route 50/30 (Old US 50 E), and follow for ~1.9 miles. Turn LEFT onto Co Route 21 (Oxford Rd), and follow for ~4.5 miles. Continue straight onto Co Route 19/11 (S Fork of Hughes River), and follow that for ~1.7 miles. Continue onto Co Rd 9 (Harrisville-Pullman-Oxford) and follow that for ~2.9 miles. Turn RIGHT onto Co Rd 9/9 (Right Fork-White Oak Creek) for ~0.2 miles. Continue onto Co Rd 9/8 (Sugar Run) for ~1.3 miles. Look for rig signs and location on the right. Drill site is right off the road.

5-2-14 warm



## Antero Resources Corporation

Appalachian Basin Duckworth Unit 3H Ritchie County

Quadrangle: Pullman 7.5' Watershed: Sugar Run

District: Union Date: 4-4-14 MV Dept. of Environmental Protect

1014

