

### 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

September 22, 2014

### WELL WORK PERMIT

#### Horizontal 6A Well

This permit, API Well Number: 47-8510140, 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: MIRACLE UNIT 3H

Farm Name: QUIMBY, FRANKLIN P.

API Well Number: 47-8510140

Permit Type: Horizontal 6A Well

Date Issued: 09/22/2014

### PERMIT CONDITIONS 4708510140

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 hydraulic fracture monitoring plan. Please be advised that this plan 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.

### 4708510140

### PERMIT CONDITIONS

- 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.
- 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.
- 10. 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 <u>DEPOOGNotify@wv.gov</u> within 30 days of commencement of drilling.



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

Miracle Unit 3H Edwin Pad Moats Unit 3H Edwin 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 <u>less than</u> 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
- \*Tracers demonstrate that we rarely reach offset wells at 660' offset
  - -Wili use tracers at each lateral

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WV Department of Environmental Protection

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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 Res	ources Corporation	494488557	085- Ritchie	Union	Pullman 7.5'
			Operator ID	County	District	Quadrangle
2) Operator's	Well Number: M	firacle Unit 3H	Well Pa	d Name: Edwin	Pad	
3) Farm Name	/Surface Owner:	Franklin P. Quin	Public Ro	ad Access: CR 1	10/4	
4) Elevation, c	surrent ground:	~1220' E	levation, proposed	post-construction	n: 1191'	
5) Well Type	(a) Gas	Oil _	Und	erground Storag	е	
	(b)If Gas Sh	nallow	Deep			
	He	orizontal =				
6) Existing Page	d: Yes or No Ye	es				
		s), Depth(s), Antic nticipated Thickness			ressure(s)	): 
8) Proposed To	otal Vertical Dep	oth: 6900' TVD				
9) Formation a	t Total Vertical	Depth: Marcellus	Shale			
10) Proposed T	Total Measured I	Depth: 17,900' MI				
11) Proposed F	lorizontal Leg L	ength: 10,217				
12) Approxima	ate Fresh Water	Strata Depths:	116', 128', 202'			
13) Method to	Determine Fresh	Water Depths:	Offset well records. De	pths have been adj	usted accord	ding to surface elevations.
14) Approxima	nte Saltwater Dep	pths: 1366', 2140	', 2254'			
15) Approxima	nte Coal Seam D	epths: 194'				
16) Approxima	ite Depth to Poss	sible Void (coal m	ine, karst, other):	None anticipated		
		on contain coal sear o an active mine?	ns Yes	No	V.	60
(a) If Yes, pro	ovide Mine Info:	Name:			COM	
		Depth:		00	30	o Dia
		Seam:		1.	NUG	. Gns cotection
		Owner:				Sut Dil and Cas protection
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WW-6B (9/13)

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### CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft. (Ib/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#	2465'	2465'	CTS, 1004 Cu. Ft.
Intermediate	7.7				2.77.227.		
Production	5-1/2"	New	P-110	20#	17,900'	17,900'	4252 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7,100	1.552.5611.6
Liners			1			1,100	

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 & Tall - 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	
Depths Set:	N/A	

Dan IN

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): 18.74 acres
22) Area to be disturbed for well pad only, less access road (acres): 5.32 acres
23) Describe centralizer placement for each casing string:
Conductor: no centralizers our factories and the float shoe, one on the insert float collar and one every 4th joint spaced up the hole
o surface.  ntermediate 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 ntermediate: 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: Tall 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:
onductor: blowhole clean with air, run casing, 10 bbls fresh water.  urface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls
resh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.  ntermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine
vater followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.
roduction: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosit weep, 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 Parite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.
*Note: Attach additional sheets as needed.

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

### FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Waterched (HIIC IO) Inbutar	CO-LI- D	
watershed (110°C 10)	y of Cabin Run	Quadrangle Pullman 7.5'
Elevation 1.191	County_Ritchie	District Clay
Do you anticipate using more t	than 5,000 bbls of water to complete th	
If so, please describe a	anticipated pit waste.	ste (Drilling and Flowback Hudds will be abred in tanks, Outlings will be tanked and havind off sits.
Will a synthetic liner l	be used in the pit? Yes No _	If so, what ml.? N/A
Proposed Disposal Me	ethod For Treated Pit Wastes:	
	d Application	
	lerground Injection (UIC Permit Num	cations when applicable. API# will be provided on Form WR-34
■ Off:		disposal location) (Meadowfill Landfill Permit #SWF-1032-98
Will closed loop system be used	d? If so, describe: Yes	
Orilling medium anticipated for	r this well (vertical and horizontal)? A	ir, freshwater, oil based, etc. Dust/Stiff Foam, Production. Water Based Mud
-If oil based, what typ	e? Synthetic, petroleum, etc. N/A	
	medium? Please See Attachment	
		c, ctc. Stored in tanks, removed offsite and taken to landfill.
	to solidify what medium will be used?	
The second secon	me/permit number? Meadowfill Landfill (Po	
-Landini of offsite nan	ne/permit number/	Unit #3441-1002-98)
Landification Lundonst	and and agent to the towns and sauditi	ons of the GENERAL WATER POLLUTION PERMIT to
on August 1, 2005, by the Office provisions of the permit are en aw or regulation can lead to en I certify under penalty application form and all attace obtaining the information, I be	forceable by law. Violations of any to forcement action. The sy of law that I have personally example the chiments thereto and that, based on re- telieve that the information is true, as	Department of Environmental Protection. I understand that term or condition of the general permit and/or other application and am familiar with the information submitted on my inquiry of those individuals immediately responsible occurate, and complete. I am aware that there are signiful fine or imprisonment.  SAMANTHA MARSH
on August 1, 2005, by the Office provisions of the permit are en aw or regulation can lead to en a certify under penalty application form and all attace obtaining the information, I be benalties for submitting false in Company Official Signature	ce of Oil and Gas of the West Virginia aforceable by law. Violations of any to aforcement action.  The second of t	Department of Environmental Protection. I understand that term or condition of the general permit and/or other application and am familiar with the information submitted on my inquiry of those individuals immediately responsible occurate, and complete. I am aware that there are significant fine or imprisonment.  SAMANTHA MARSH NOTARY PUBLIC
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47-8510140

Form WW-9

Operator's Well No. Miracle Unit 3H

Proposed Revegetation Treatment: Acres Disturb	18.74	Prevegetation pH	6.0
Proposed Revegetation Treatment: Acres Disturbe	CC	Prevegetation pri	6.0
Fertilizer type Hay or straw or Wood Fiber (		ded)	
Fertilizer amount 500	lbs/acre		
Mulch 2-3	Tons/acre		
Access Roads (8.48) + Drill & Water	Containment Pad (5.3) Seed Mixtu		Acres
Temporary		Permane	nt
Seed Type Ibs/acre		Seed Type	lbs/acre
Tall Fescue 45	Ta	all Fescue	45
Perennial Rye Grass 20	Pe	erennial Rye Grass	20
*or type of grass seed requested by surface	owner *or	type of grass seed request	ted by surface owr
Orawing(s) of road, location, pit and proposed are provided)		(unless engineered plans inclu	ding this info have b
Attach:  Drawing(s) of road, location, pit and proposed are provided)  Photocopied section of involved 7.5' topographic section Approved by:  Daniel Comments:		(unless engineered plans inclu	ding this info have b
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### Form WW-9 Additives Attachment

### **SURFACE INTERVAL**

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

### INTERMEDIATE INTERVAL

### STIFF FOAM RECIPE:

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

### **PRODUCTION INTERVAL**

1. Alpha 1655

Salt Inhibitor

2. Mil-Carb

Calcium Carbonate

3. Cottonseed Hulls

Cellulose-Cottonseed Pellets – LCM

4. Mil-Seal

Vegetable, Cotton & Cellulose-Based Fiber Blend - LCM

5. Clay-Trol

Amine Acid Complex – Shale Stabilizer

6. Xan-Plex

Viscosifier For Water Based Muds

7. Mil-Pac (All Grades)

Sodium Carboxymethylcellulose - Filtration Control Agent

8. New Drill

Anionic Polyacrylamide Copolymer Emulsion - Shale Stabilizer

9. Caustic Soda

Sodium Hydroxide - Alkalinity Control

10. Mil-Lime

Calcium Hydroxide - Lime

11. LD-9

Polyether Polyol – Drilling Fluid Defoamer

12. Mil Mica

Hydro-Biotite Mica - LCM

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13. Escaid 110

Drilling 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** 

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WV Department of Environmental Protection



# Well Site Safety Plan Antero Resources

Well Name: Hornet Unit 1H, Hornet Unit 2H, Myrtle Unit

1H, Myrtle Unit 2H, Miracle Unit 1H, Miracle Unit 2H, Kehrer Unit 1H, Kehrer Unit 2H, Moats

Unit 1H, Moats Unit 2H, Miracle Unit 3H

Pad Location: EDWIN PAD

Ritchie County/ Clay District

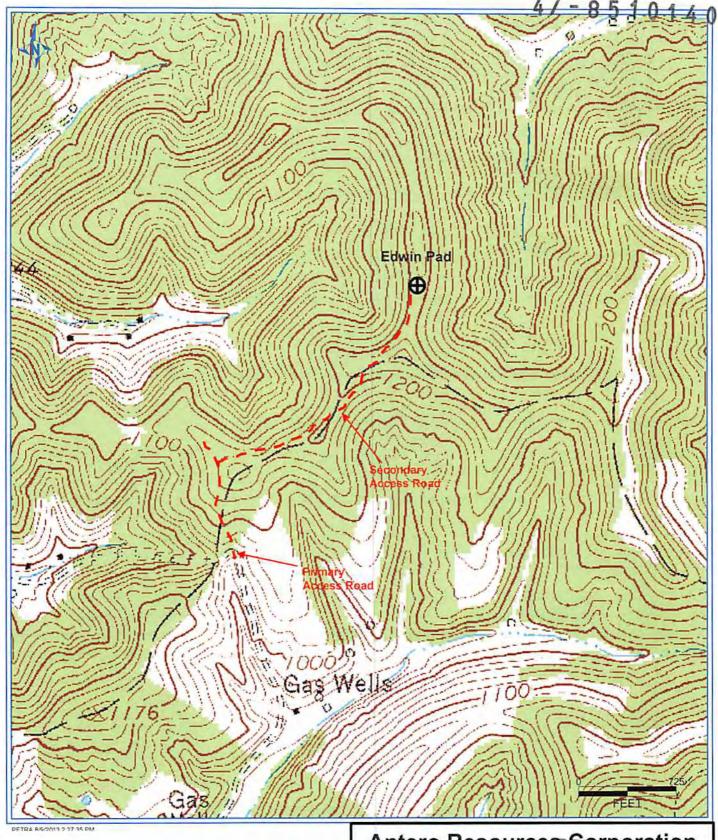
GPS Coordinates: Lat 39°13'49.56"/Long 80°54'10.19" (NAD83)

### **Driving Directions:**

Head south on WV 74 for 1.3 miles. Turn left onto Lynn Camp road. Stay on Lynn Camp road for 1.3 miles. Take slight right onto County Road 10/Cabin Run road. Continue onto County road 10/4 for 2.7 miles. Turn left to stay on County Road 10/4 and continue for .4 miles. Access road on left

Dan ula-

SSP Page 1 09/26/2014



Antero Resources Corporation
Appalachian Basinand Gas
Miracle Unit 3H Ritchie County 8 2014

WV Department of Quadrangle: Pullman

Quadrangle: Pulling Watershed: Little Kanawharonmental Protection District: Clay 09/26/201

