

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

December 08, 2014

WELL WORK PERMIT Horizontal 6A Well

This permit, API Well Number: 47-1706623, 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) James Martin 926-0499 ext. 1654.

Operator's Well No: MCDONNELL UNIT 1H

Farm Name: STRICKLING, JOHN PAUL ET AL

API Well Number: 47-1706623

Permit Type: Horizontal 6A Well

Date Issued: 12/08/2014

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. 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

1) Well Operator: A	Intero Resourc	es Corporation	494488557	017 - Doddridge	West Union	West Union 7.5'
			Operator ID	County	District	Quadrangle
2) Operator's Well N	lumber: McDo	nnell Unit 1H	Well Pa	ad Name: Strick	ling Pad	
3) Farm Name/Surfa	ce Owner: Jo	hn Paul Stricklin	g, et al Public Ro	ad Access: CR	28	
4) Elevation, current	ground: ~1	,070' EI	evation, proposed	l post-construction	on: <u>~1,065</u>	5'
5) Well Type (a) C Othe	-	Oil	Und	derground Storag	ge	
(b)If	Gas Shallo	w 🔳	Deep			01,002
	Horizo	ontal =				DCN-4
6) Existing Pad: Yes	or No No					102
 Proposed Target F Marcellus Shale: 7, 	8. 50	70 N N				
8) Proposed Total Ve	ertical Depth:	7,500'				
9) Formation at Tota	l Vertical Dep	th: Marcellus	Shale			_
10) Proposed Total N	Measured Dept	h: 15,800'				
11) Proposed Horizo	ntal Leg Leng	th: 6,797'				
12) Approximate Fre	sh Water Stra	ta Depths:	60', 110', 258'			
13) Method to Detern 14) Approximate Sal			Offset well records. D	epths have been ad	justed accord	ing to surface elevations.
15) Approximate Co	al Seam Depth	is: 327', 341'				
16) Approximate De	pth to Possible	Void (coal mi	ine, karst, other):	None Anticipated		
17) Does Proposed w directly overlying or			rns Yes	No	V	
(a) If Yes, provide	Mine Info: N	lame:				
	Ι	Depth:				
	S	eam:				
	C	Owner:	Bo	ceived		ž
			8 4 4	UUIIUU		

OCT 2 4 2014

Page 1 of 3

WW-6B (9/13)

18)

CASING AND TUBING PROGRAM

TYPE	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#	310'	310'	CTS, 431 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2,450'	2,450'	CTS, 998 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	15,800'	15,800'	3,952 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7,100'	
Liners							

TYPE Wellbore Size Wall Burst Pressure Cement Type Cement Yield Diameter Thickness (cu. ft./k) Conductor 20" 24" 0.438" 1530 Class A 1.18 Fresh Water 0.38"/0.33" 13-3/8" 17-1/2" 2730/1730 Class A 1.18 Coal 9-5/8" 3520 12-1/4" 0.352" 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" 11200 0.19" Liners

PACKERS

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

Received

OCT 2 4 2014

Page 2 of 3

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): 19.64 Acres
22) Area to be disturbed for well pad only, less access road (acres): 4.41 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.

OCT 2 4 2014 Page 3 of 3

WW-9 (9/13)

API Number 47 -	017		
Operator's	Well	No. McDonnell Unit 1H	

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name A	ntero Resources Corporation	OP Code 4944885	57
Operator Traine			
Watershed (HUC 10	Nutter Fork of Middle Island Creek	Quadrangle West Union 7.5'	
Elevation 1,065'	County Doddridge	District West Un	ion
Will a pit be used?	sing more than 5,000 bbls of water to comp		
	e describe anticipated pit waste: No pit will be us	7	In tanks. Cuttings will be tanked and hauled off site.)
	hetic liner be used in the pit? Yes	No ✓ If so, what ml.? N/A	al 1 1 2011
Proposed L	Disposal Method For Treated Pit Wastes:		Jan 7
-	Land Application Underground Injection (UIC Permi	t Number	,/
_		ed well locations when applicable. API# will be provide	d on Form WR-34
_	Off Site Disposal (Supply form WW Other (Explain	V-9 for disposal location) (Meadowfill Lar	ndfill Permit #SWF-1032-98)
Will closed loop sys	tem be used? If so, describe: Yes		
Drilling medium ant	icipated for this well (vertical and horizont	ral)? Air, freshwater, oil based, etc. Durst/Suff	Air/Freshweter, Intermediate - Foarn, Production - Water Based Mud
-If oil bases	d, what type? Synthetic, petroleum, etcN/	/A	
Additives to be used	in drilling medium?_Please See Attachment		
	al method? Leave in pit, landfill, removed		and taken to landfill.
	it and plan to solidify what medium will be		
	offsite name/permit number? Meadowfill La		
on August 1, 2005, I provisions of the pe law or regulation can I certify ur application form ar obtaining the inforr penalties for submitt	at I understand and agree to the terms and one the Office of Oil and Gas of the West Virmit are enforceable by law. Violations on lead to enforcement action. Inder penalty of law that I have personally and all attachments thereto and that, base mation, I believe that the information is the ting false information including the possible ignature.	irginia Department of Environmental Professional profession of the general professional professi	otection. I understand that the permit and/or other applicable information submitted on this immediately responsible for eare that there are significant
Company Official (Typed Name) Evan Foster		LORAL!
Company Official T	itle_Environmental Representative	J' COMMISSION EXPIR	RE N. Art.
Subscribed and swor	- C. Daling	Septenber, 20 14 Notary Public	
7	00		OCT 2 4 2014

Form WW-9 Operator's Well No. McDonnell Unit 1H Antero Resources Corporation Proposed Revegetation Treatment: Acres Disturbed 19.64 Prevegetation pH Lime 2-4 __Tons/acre or to correct to pH 6.5 Fertilizer type Hay or straw or Wood Fiber (will be used where needed) Fertilizer amount 500 lbs/acre Mulch 2-3 Tons/acre Access Roads (8.39) + Staging Area (0.24) + Well Pad (4.41) + Water Containment Pad (3.37) + Excess/Topsoil Material Stockpiles (3.23) = 19.64 Acres Seed Mixtures Temporary Permanent Seed Type lbs/acre Seed Type lbs/acre Annual Ryegrass 40 Crownvetch 10 - 15*See Table IV-3 for additional seed type (Strickling Pad Design Page 21) *See Table IV-4A for additional seed type (Strickling Pad Design Page 21) *or type of grass seed requested by surface owner *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. Preseed o Mulch any distorted areas Field Reviewed?

OCT 2 4 2014

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

SEP 1 9 2014

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

SEP 1 9 2014

Office of Oil and Gas
WV Dept. of Environmental Protection



Well Site Safety Plan **Antero Resources**

Well Name: Jimmy Unit 1H, Jimmy Unit 2H, McDonnell Unit

1H, McDonnell Unit 2H, Taunus Unit 1H, Taunus

Unit 2H

Pad Location: STRICKLING PAD

Doddridge County/ West Union District

GPS Coordinates: Lat 39°19′56.13″/Long 80°47′1.02″ (NAD83)

Driving Directions:

From the intersection of I-79 and Hwy 50 near Clarksburg, head west on Hwy 50 for ~ 29.9 miles, then turn RIGHT at WV-18N (Town of West Union Ahead). In ~0.6 miles, turn left onto Davis St/Old U.S. 50 W and follow for ~0.4 miles. Take the second right onto WV-18N/Sistersville Pike and follow for ~5.1 miles. Turn right onto Nutter Fork and follow for ~2.1 miles. Look for rig signs and lease road on the RIGHT. Follow lease road to location.

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

PO 2 Receiv

Received

OCT 2 4 2014

SSP Page 1



