

State of West Virginia
Department of Environmental Protection - Office of Oil and Gas
Well Operator's Report of Well Work

API 47-033-05619-RB County Harrison District Tenmile
Quad Wolf Summit Pad Name Southern Pad Field/Pool Name _____
Farm name Southern, Edgar Well Number Cottrill Unit 1H
Operator (as registered with the OOG) Antero Resources Corporation
Address 1615 Wynkoop Street City Denver State CO Zip 80202

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4,346,399.932m Easting 544,928.576m
Landing Point of Curve Northing 4,346,154.95m Easting 544,798.46m
Bottom Hole Northing 4,344,913.600m Easting 545,195.232m

Elevation (ft) 1,175' GL Type of Well New Existing Type of Report Interim Final
Permit Type Deviated Horizontal Horizontal 6A Vertical Depth Type Deep Shallow
Type of Operation Convert Deepen Drill Plug Back Redrilling Rework Stimulate
Well Type Brine Disposal CBM Gas Oil Secondary Recovery Solution Mining Storage Other _____
Type of Completion Single Multiple Fluids Produced Brine Gas NGL Oil Other _____
Drilled with Cable Rotary

Drilling Media Surface hole Air Mud Fresh Water Intermediate hole Air Mud Fresh Water Brine
Production hole Air Mud Fresh Water Brine
Mud Type(s) and Additive(s)
Air- Foam & 4% KCL
Mud- Polymer

Date permit issued 05/24/2012 Date drilling commenced 10/25/2012 Date drilling ceased 03/04/2013
Date completion activities began 03/12/2013 Date completion activities ceased 03/29/2013
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

Freshwater depth(s) ft 202' Open mine(s) (Y/N) depths Y
Salt water depth(s) ft None Available Void(s) encountered (Y/N) depths Y, 229'-234'
Coal depth(s) ft 687' Cavern(s) encountered (Y/N) depths None
Is coal being mined in area (Y/N) Yes - Sycamore Creek Mine

Reviewed by:

API 47-033 - 05619-RB Farm name Southern, Edgar Well number Cottrill Unit 1H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	30"	26"	71'	New	136#; J-55	N/A	Yes
Surface	24"	18 5/8"	192'	New	87.5#; J-55	N/A	Yes
Surface	17 1/2"	13 3/8"	295'	New	48#; J-55	N/A	Yes
Intermediate 1	12 1/4"	9 5/8"	2,593'	New	36#; J-55	N/A	Yes
Intermediate 2							
Intermediate 3							
Production	8 3/4" & 8 1/2"	5 1/2"	11,970'	New	20#; P-110	N/A	Yes
Tubing		2 3/8"	7,099'		4.7#; N-80	N/A	
Packer type and depth set		N/A					

Comment Details *Antero drilled a replacement borehole due to void encountered while drilling offset Cottrill Unit 3H well. 13-3/8" cement - 289 sx Class A - no returns to surface.
Perf 8 holes @ 245', Cement Squeeze #1 - 835 sx Class A - no returns, Cement Squeeze #2 - 835 sx Class A - no returns. Notified Inspector Tristan Jenkins and ran Bond Log. 120 sx Grout from 180' to surface.
Set Cement Retainer @ 200' and Cement Squeeze #3 - 66 sx Class A. Pressure test 1000#PSI held 30 min on 11/10/212.

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	Class A	145 sx	15.6	1.18	68	0'	8 Hrs.
Surface	Class A	404 sx	15.6	1.18	133	0'	8 Hrs.
Surface	Class A	*See Comments	15.6	1.18	205	*See Comments	8 Hrs. +
Intermediate 1	Class A	962 sx	15.6	1.18	812	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	949 sx (Lead); 830 sx (Tail)	14.2 (Lead); 15.2 (Tail)	1.44 (Lead); 1.8 (Tail)	2,263	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 11,970' MD, 6,918' TVD (BHL); 7,027' TVD (Deepest Point Drilled) Loggers TD (ft) 7080' (CBL)
Deepest formation penetrated Marcellus Plug back to (ft) N/A
Plug back procedure N/A

Kick off depth (ft) 6,347'

**This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Cottrill Unit 3H, API #47-033-05602). Please reference the wireline logs submitted with Form WR-35 for the Cottrill Unit 3H. A Cement Bond Log has been included with this submittal.

Check all wireline logs run **
 caliper density deviated/directional induction
 neutron resistivity gamma ray temperature sonic

Well cored Yes No Conventional Sidewall Were cuttings collected Yes No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING Conductor- 0
 Surface- 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface
 Surface- 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface
 Intermediate- 1 above float joint, 1 above float collar, 1 every 4th joint to surface
 Production- 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS _____

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED RA; Chemical

API 47- 033 - 05619-RB Farm name Southern, Edgar Well number Cottrill Unit 1H

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
* PLEASE SEE ATTACHED EXHIBIT 1					

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbbls)	Amount of Nitrogen/other (units)
* PLEASE SEE ATTACHED EXHIBIT 2								

Please insert additional pages as applicable.

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<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>		
<u>Marcellus</u>	<u>6983' (TOP)</u>	<u>TVD</u>	<u>7,441' (TOP)</u> <u>MD</u>
_____	_____	_____	_____
_____	_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 3,600 psi Bottom Hole 3,600 psi DURATION OF TEST _____ hrs

OPEN FLOW Gas 4,331 mcfpd Oil _____ bpd NGL _____ bpd Water 622 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	0		0		

*** PLEASE SEE ATTACHED EXHIBIT 3**

Please insert additional pages as applicable.

Drilling Contractor Frontier Drilling, LLC
Address 562 Spring Run Road City Pennsboro State WV Zip 26415

Logging Company Rush Wellsite Services
Address 600 Alpha Drive City Canonsburg State PA Zip 15317

Cementing Company Allied Oil & Gas Services, LLC
Address 1036 East Main Street City Bridgeport State WV Zip 26330

Stimulating Company Baker Hughes
Address 837 Phillippi Pike City Clarksburg State WV Zip 26301

Please insert additional pages as applicable.

Completed by Ashlie Steele Telephone 303-357-7310
Signature *Ashlie Steele* Title Permitting Supervisor Date 04/06/2015

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EXHIBIT 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	12-Mar-13	11,616	11,915	60	Marcellus
2	17-Mar-13	11,203	11,502	60	Marcellus
3	18-Mar-13	10,790	11,089	60	Marcellus
4	18-Mar-13	10,377	10,675	60	Marcellus
5	19-Mar-13	9,963	10,262	60	Marcellus
6	19-Mar-13	9,550	9,849	60	Marcellus
7	19-Mar-13	9,137	9,436	60	Marcellus
8	20-Mar-13	8,724	9,022	60	Marcellus
9	20-Mar-13	8,310	8,609	60	Marcellus
10	20-Mar-13	7,897	8,196	60	Marcellus
11	20-Mar-13	7,484	7,783	60	Marcellus

EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	17-Mar-13	69.0	7,560	6,270	5,364	388,767	10,466	N/A
2	18-Mar-13	69.0	7,503	6,465	5,052	460,115	11,805	N/A
3	18-Mar-13	72.0	7,192	5,680	4,737	460,002	10,857	N/A
4	18-Mar-13	74.0	7,285	5,945	4,833	458,547	11,009	N/A
5	19-Mar-13	72.0	7,010	5,859	4,530	458,981	10,557	N/A
6	19-Mar-13	72.0	6,713	5,460	4,671	461,030	10,478	N/A
7	20-Mar-13	68.0	7,500	5,747	5,598	459,899	11,879	N/A
8	20-Mar-13	72.0	7,146	5,852	4,764	462,458	10,839	N/A
9	20-Mar-13	71.0	6,797	5,707	4,090	460,087	10,177	N/A
10	20-Mar-13	72.0	6,799	5,471	4,212	464,579	9,884	N/A
11	21-Mar-13	73.0	6,324	4,538	4,266	490,364	11,089	N/A
	AVG=	71	7,075	5,727	4,738	5,024,829	119,040	TOTAL

EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD)	BOTTOM DEPTH (TVD)	TOP DEPTH (MD)	BOTTOM DEPTH (MD)
	From Surface	From Surface	From Surface	From Surface
Fresh Water	202	N/A	202	N/A
Siltstone	est 0	17	est 0	17
Siltstone w/Trace Coal	est 17	267	est 17	267
Sand/Siltstone	est 267	687	est 267	687
Coal	est 687	747	est 687	747
Siltstone w/Trace Coal	est 747	867	est 747	867
Sandstone	est 867	927	est 867	927
Shale	est 927	1,207	est 927	1,207
Shale/ Siltstone	est 1207	1,417	est 1207	1,417
Shale	est 1417	1,523	est 1417	1,523
Big Lime	est 1523	1,604	est 1523	1,604
Big Injun	est 1604	2,037	est 1604	2,037
Gantz Sand	est 2037	2,145	est 2037	2,145
Fifty Foot Sandstone	est 2145	2,253	est 2145	2,253
Gordon	est 2253	2,557	est 2253	2,557
Fifth Sandstone	est 2557	2,603	est 2557	2,603
Bayard	est 2603	2,979	est 2603	2,979
Warren	est 2979	3,248	est 2979	3,249
Speechley	est 3248	3,799	est 3248	3,799
Baltown	est 3799	4,131	est 3799	4,131
Bradford	est 4131	4,620	est 4131	4,621
Benson	4,620	4,916	4,621	4,917
Alexander	4,916	5,116	4,917	5,117
Elk	5,116	5,791	5,117	5,792
Rhinestreet	5,791	6,320	5,792	6,322
Sycamore	6,320	6,532	6,322	6,546
Middlesex	6,532	6,762	6,546	6,854
Burkett	6,762	6,788	6,854	6,898
Tully	6,788	6,983	6,898	7,441
Marcellus	6,983	NA	7,441	NA

*Please note Antero determines formation tops based on mud and wireline logs that are only run on one well on a multi-well pad (Please reference Cottrill Unit 3H API# 47-033-05602). The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	3/9/2013
Job End Date:	3/20/2013
State:	West Virginia
County:	Harrison
API Number:	47-033-05619-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Cottrell Unit 1HRE
Longitude:	-80.47938610
Latitude:	39.26572200
Datum:	NAD27
Federal/Tribal Well:	NO
Total Base Water Volume (gal):	4,467,708
Total Base Non Water Volume:	243,256

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water	7732-18-5	100.00000	87.75764	
Sand, White, 40/70	Baker Hughes	Proppant	Crystalline Silica (Quartz)	14808-60-7	100.00000	6.25328	
Sand, White, 20/40	Baker Hughes	Proppant	Crystalline Silica (Quartz)	14808-60-7	100.00000	3.93035	
Sand, White, 100 mesh	Baker Hughes	Proppant	Crystalline Silica (Quartz)	14808-60-7	100.00000	1.66870	
HCl, 10.1 - 15%	Baker Hughes	Acidizing	Water	7732-18-5	85.00000	0.11615	
			Hydrochloric Acid	7647-01-0	15.00000	0.02050	
GW-3LDF	Baker Hughes	Gelling Agent	Guar Gum	9000-30-0	60.00000	0.05280	SmartCare Product
			Petroleum Distillates	84742-47-8	30.00000	0.02640	SmartCare Product
			Paraffinic Petroleum Distillate	84742-55-8	30.00000	0.02640	SmartCare Product
			Crystalline Silica, Quartz (SiO2)	14808-60-7	5.00000	0.00440	SmartCare Product
			sotridecanol, ethoxylated	9043-30-5	5.00000	0.00440	SmartCare Product
			1-Butoxy-2-Propanol	5131-66-8	5.00000	0.00440	SmartCare Product
ERW-18	Baker Hughes	Friction Reducer	Petroleum Distillates	84742-47-8	30.00000	0.01761	SmartCare Product



Enzyme G-NE	Baker Hughes	Breaker	Water	7/32-18-5	95.00000	0.01603	
			Hemicellulase Enzyme Concentrate	9025-56-3	5.00000	0.00084	
Alpha 1427	Baker Hughes	Bicide	Glutaraldehyde	111-30-8	30.00000	0.00729	SmartCare Product
			Didecyl Dimethyl Ammonium Chloride	7173-51-5	10.00000	0.00243	SmartCare Product
			Quaternary Ammonium Compound	68424-85-1	5.00000	0.00122	SmartCare Product
			Ethanol	84-17-5	5.00000	0.00122	SmartCare Product
Scaletrol 720	Baker Hughes	Scale Inhibitor	Ethylene Glycol	107-21-1	30.00000	0.00517	
			Calcium Chloride	10043-52-4	5.00000	0.00086	
Ferrotrol 300L	Baker Hughes	Iron Control	Citric Acid	77-92-9	60.00000	0.00053	SmartCare Product
Cl-14	Baker Hughes	Corrosion Inhibitor	Polyoxyalkylenes	Trade Secret	30.00000	0.00007	
			Fatty Acids	Trade Secret	10.00000	0.00002	
			Propargyl Alcohol	107-19-7	5.00000	0.00001	
			Olefin	Trade Secret	5.00000	0.00001	
Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS							
		Other Chemicals	Water	7732-18-5		0.05291	
			Poly (acrylamide-co-acrylic acid)	Trade Secret		0.01761	
			Polyacrylate	Trade Secret		0.00345	
			Sorbitan Monooleate	Trade Secret		0.00294	
			Salt	Trade Secret		0.00294	
			Ethoxylated Alcohol	Trade Secret		0.00117	
			Methanol	37-56-1		0.00024	
			2-Butoxy-1-Propanol	15821-83-7		0.00007	
			Modified Thioera Polymer	68527-49-1		0.00002	
			Potassium Chloride	7447-40-7		0.00001	
			Sodium Chloride	7647-14-5		0.00001	
			Formaldehyde	50-00-0		0.00000	
			Hydrochloric Acid	7647-01-0		0.00000	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided. Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers. Material Safety Data Sheets (MSDS)