

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

API 47-085-10106 County Ritchie District Clay  
Quad Pennsboro 7.5' Pad Name Eddy Field/Pool Name ----  
Farm name Annie B. Haymond, et al Well Number Mulvay Unit 2H  
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 4,353,850m Easting 506,904m  
Landing Point of Curve Northing 4,353,965.99m Easting 507,469.21m  
Bottom Hole Northing 4,351,702m Easting 508,377m

Elevation (ft) 971' 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 6/25/2014 Date drilling commenced 10/17/2014 Date drilling ceased 12/20/2014  
Date completion activities began 1/13/2015 Date completion activities ceased 4/20/2015  
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 126', 307' Open mine(s) (Y/N) depths N  
Salt water depth(s) ft 653', 2099' Void(s) encountered (Y/N) depths N  
Coal depth(s) ft 1056' Cavern(s) encountered (Y/N) depths N  
Is coal being mined in area (Y/N) N

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[Signature]  
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API 47-085 - 10106 Farm name Annie B. Haymond, et al Well number Mulvay Unit 2H

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"	20"	40'	New	94#/J-55	N/A	Y
Surface	17-1/2"	13-3/8"	358'	New	48#/H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2654'	New	36#/J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	15,396'	New	23#/P-110	N/A	Y
Tubing		2-3/8"	6924'		4.7#/N-80		
Packer type and depth set		N/A					

Comment Details \_\_\_\_\_

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft <sup>3</sup> /sks)	Volume (ft <sup>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	Class A	150 sx	15.6	1.18	38 Cu. Ft.	0'	8 Hrs.
Surface	Class A	480 sx	15.6	1.18	249 Cu. Ft.	0'	8 Hrs.
Coal							
Intermediate 1	Class A	1037 sx	15.6	1.18	831 Cu. Ft.	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	935 sx (Lead), 1348 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.44 (Lead), 1.60 (Tail)	3034 Cu. Ft.	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 15,400' MD, 6330' TVD (BHL); 6334' TVD (Deepest Point Drilled) Loggers TD (ft) 15,351' MD  
 Deepest formation penetrated Marcellus Plug back to (ft) N/A  
 Plug back procedure N/A

Kick off depth (ft) 6523'

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

\*\* This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Anna Unit 2H API# 47-085-09963). Please reference the wireline logs submitted with Form WR-35 for the Anna Unit 2H. A Cement Bond Log has been included with this submittal.

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  
 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 N/A

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API 47- 085 - 10106 Farm name Annie B. Haymond, et al Well number Mulvay Unit 2H

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
<u>Marcellus</u>	<u>6283' (Top)</u> TVD	<u>6982' (Top)</u> MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST  Build up  Drawdown  Open Flow OIL TEST  Flow  Pump

SHUT-IN PRESSURE Surface 3000 psi Bottom Hole ---- psi DURATION OF TEST ---- hrs

OPEN FLOW Gas 11,828 mcfpd Oil 59 bpd NGL --- bpd Water 5 bpd GAS MEASURED BY  Estimated  Orifice  Pilot

<u>LITHOLOGY/ FORMATION</u>	<u>TOP</u>	<u>BOTTOM</u>	<u>TOP</u>	<u>BOTTOM</u>	<u>DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H<sub>2</sub>S, ETC)</u>
	<u>DEPTH IN FT NAME TVD</u>	<u>DEPTH IN FT TVD</u>	<u>DEPTH IN FT MD</u>	<u>DEPTH IN FT MD</u>	
	<u>0</u>		<u>0</u>		
			<b>SEE ATTACHED EXHIBIT 3</b>		

Please insert additional pages as applicable.

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

Logging Company STRC  
Address 1560 Good Hope Pike City Clarksburg State WV Zip 26301

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

Stimulating Company US Well Services  
Address 533 Industrial Park Drive City Jane Lew State WV Zip 26378

Please insert additional pages as applicable.

Completed by Natalie Komp Telephone 303-357-6820  
Signature  Title Permitting Agent Date 9/9/2015

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Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

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API 47-085-10106 Farm Name Annie B. Haymond, et al Well Number Mulvay Unit 2H

**EXHIBIT 1**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	13-Jan-15	15,137	15,304	60	Marcellus
2	3-Feb-15	14,939	15,106	60	Marcellus
3	3-Feb-15	14,741	14,908	60	Marcellus
4	4-Feb-15	14,544	14,710	60	Marcellus
5	4-Feb-15	14,346	14,513	60	Marcellus
6	4-Feb-15	14,148	14,315	60	Marcellus
7	5-Feb-15	13,950	14,117	60	Marcellus
8	5-Feb-15	13,752	13,919	60	Marcellus
9	5-Feb-15	13,554	13,721	60	Marcellus
10	6-Feb-15	13,357	13,524	60	Marcellus
11	6-Feb-15	13,159	13,326	60	Marcellus
12	7-Feb-15	12,961	13,128	60	Marcellus
13	7-Feb-15	12,763	12,930	60	Marcellus
14	7-Feb-15	12,565	12,732	60	Marcellus
15	7-Feb-15	12,368	12,534	60	Marcellus
16	8-Feb-15	12,170	12,337	60	Marcellus
17	8-Feb-15	11,972	12,139	60	Marcellus
18	8-Feb-15	11,774	11,941	60	Marcellus
19	9-Feb-15	11,576	11,743	60	Marcellus
20	9-Feb-15	11,378	11,545	60	Marcellus
21	9-Feb-15	11,181	11,348	60	Marcellus
22	9-Feb-15	10,983	11,150	60	Marcellus
23	10-Feb-15	10,785	10,952	60	Marcellus
24	10-Feb-15	10,587	10,754	60	Marcellus
25	10-Feb-15	10,389	10,556	60	Marcellus
26	10-Feb-15	10,192	10,358	60	Marcellus
27	11-Feb-15	9,994	10,161	60	Marcellus
28	11-Feb-15	9,796	9,963	60	Marcellus
29	11-Feb-15	9,598	9,765	60	Marcellus
30	12-Feb-15	9,400	9,567	60	Marcellus
31	12-Feb-15	9,202	9,369	60	Marcellus
32	12-Feb-15	9,005	9,171	60	Marcellus
33	12-Feb-15	8,807	8,974	60	Marcellus
34	13-Feb-15	8,609	8,776	60	Marcellus
35	13-Feb-15	8,411	8,578	60	Marcellus
36	13-Feb-15	8,213	8,380	60	Marcellus
37	13-Feb-15	8,016	8,182	60	Marcellus
37B	18-Mar-15	N/A	N/A	60	Marcellus
38	18-Mar-15	7,818	7,985	60	Marcellus
39	18-Mar-15	7,620	7,787	60	Marcellus
40	18-Mar-15	7,422	7,589	60	Marcellus
41	18-Mar-15	7,224	7,391	60	Marcellus
42	19-Mar-15	7,026	7,193	60	Marcellus

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**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	1-Feb-15	60.6	7,506	N/A	4,820	240,680	6,674	N/A
2	3-Feb-15	63.1	7,630	5,545	4,419	235,200	6,714	N/A
3	3-Feb-15	59.8	7,600	6,115	4,170	239,260	6,548	N/A
4	4-Feb-15	61.3	7,555	6,008	3,365	238,100	6,634	N/A
5	4-Feb-15	61.8	7,530	6,556	3,169	237,300	6,549	N/A
6	4-Feb-15	61.1	7,560	6,526	4,164	237,860	6,486	N/A
7	5-Feb-15	60.8	7,570	6,119	3,498	237,760	6,463	N/A
8	5-Feb-15	59.8	7,581	6,042	2,835	238,500	6,526	N/A
9	5-Feb-15	60.9	7,418	5,765	2,822	238,700	6,418	N/A
10	6-Feb-15	53.7	6,943	5,648	5,742	56,500	6,684	N/A
11	6-Feb-15	50.1	7,523	5,711	4,430	12,500	6,372	N/A
12	7-Feb-15	55.9	7,203	5,556	4,995	80,500	6,346	N/A
13	7-Feb-15	53.9	6,701	5,650	3,608	232,500	6,882	N/A
14	7-Feb-15	54.4	6,678	5,511	4,155	184,300	6,135	N/A
15	7-Feb-15	58.5	6,838	5,855	3,578	231,250	6,271	N/A
16	8-Feb-15	57.8	6,924	5,969	3,379	240,000	6,624	N/A
17	8-Feb-15	59.1	7,018	5,509	4,100	229,800	6,487	N/A
18	8-Feb-15	58.6	7,009	5,288	4,121	173,300	6,336	N/A
19	9-Feb-15	63.6	7,129	5,466	4,622	216,750	6,774	N/A
20	9-Feb-15	60.3	6,647	5,220	4,239	241,240	6,418	N/A
21	9-Feb-15	61.1	6,690	5,516	4,088	240,720	6,400	N/A
22	9-Feb-15	62.9	6,618	5,387	2,821	242,200	6,407	N/A
23	10-Feb-15	60.2	6,931	5,828	3,247	147,100	6,045	N/A
24	10-Feb-15	64.0	7,099	5,295	4,837	243,260	6,227	N/A
25	10-Feb-15	63.8	6,992	5,372	4,787	242,680	6,159	N/A
26	10-Feb-15	60.7	6,895	5,252	3,776	236,454	6,098	N/A
27	11-Feb-15	63.8	7,000	5,362	4,670	242,240	6,140	N/A
28	11-Feb-15	63.9	6,703	5,357	4,749	241,840	6,105	N/A
29	11-Feb-15	60.2	7,099	5,409	3,636	228,060	6,078	N/A
30	12-Feb-15	60.8	6,753	5,360	3,336	242,380	6,157	N/A
31	12-Feb-15	61.1	6,841	5,399	4,717	222,340	5,970	N/A
32	12-Feb-15	63.0	7,009	5,194	4,074	243,460	6,070	N/A
33	12-Feb-15	60.5	6,860	5,047	3,254	240,000	6,021	N/A
34	13-Feb-15	59.5	6,834	5,171	5,216	194,510	5,976	N/A
35	13-Feb-15	59.6	7,206	5,209	3,965	215,860	6,551	N/A
36	13-Feb-15	63.6	6,897	5,176	4,710	220,900	5,687	N/A
37	13-Feb-15	50.1	6,850	5,217	3,769	31,610	2,475	N/A
37B	18-Mar-15	65.8	6,871	N/A	4,600	229,800	6,129	N/A
38	18-Mar-15	64.4	6,863	5,257	4,781	215,400	6,344	N/A
39	18-Mar-15	65.0	6,771	5,669	3,803	239,200	5,970	N/A
40	18-Mar-15	66.0	6,578	5,287	4,047	239,700	5,932	N/A
41	18-Mar-15	64.2	6,863	5,172	3,753	212,800	6,282	N/A
42	19-Mar-15	64.5	6,561	5,364	3,284	210,300	6,435	N/A
	AVG=	60.6	7,027	5,545	4,050	9,064,814	67,985	0

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SEP 14 2015

10/16/2015



## 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	126	N/A	126	N/A
Fresh Water	307	N/A	307	N/A
Sandstone	0	256	0	256
Sandstone/Trace Coal	est. 256	316	est. 256	316
Sandstone/Siltstone	est. 316	596	est. 316	596
Limestone	est. 596	636	est. 596	636
Siltstone/Sandstone	est. 636	736	est. 636	736
Limestone/Siltstone	est. 736	796	est. 736	796
Siltstone	est. 796	896	est. 796	896
Limestone/Sandstone	est. 896	1,056	est. 896	1,056
Coal	est. 1056	1,076	est. 1056	1,076
Sandstone	est. 1076	1,136	est. 1076	1,136
Siltstone	est. 1136	1,196	est. 1136	1,196
Shale	est. 1196	1,256	est. 1196	1,256
Sandstone	est. 1256	1,316	est. 1256	1,316
Sandstone/Trace Coal	est. 1316	1,336	est. 1316	1,336
Sandstone	est. 1336	1,376	est. 1336	1,376
Siltstone	est. 1376	1,396	est. 1376	1,396
Sandstone/Trace Coal	est. 1396	1,696	est. 1396	1,696
Siltstone	est. 1696	1,837	est. 1696	1,839
Big Lime	1,837	1,995	1,839	1,997
Big Injun	1,995	2,376	1,997	2,378
Gantz Sand	2,376	2,755	2,378	2,757
Fifty Foot Sandstone	2,755	2,848	2,757	2,851
Gordon	2,848	3,190	2,851	3,197
Fifth Sandstone	3,190	3,261	3,197	3,269
Bayard	3,261	3,404	3,269	3,418
Warren	3,404	3,740	3,418	3,785
Speechley	3,740	3,982	3,785	4,074
Baltown	3,982	4,447	4,074	4,627
Bradford	4,447	4,826	4,627	5,068
Benson	4,826	5,046	5,068	5,332
Alexander	5,046	5,350	5,332	5,707
Elk	5,350	5,654	5,707	6,086
Rhinestreet	5,654	6,009	6,086	6,526
Sycamore	6,009	6,119	6,526	6,668
Middlesex	6,119	6,226	6,668	6,841
Burkett	6,226	6,256	6,841	6,908
Tully	6,256	6,283	6,908	6,982
Marcellus	6,283	NA	6,982	NA

\*Please note Antero determines shallow formation tops based on mud logs that are only run on one well on a multi-well pad. The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

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# Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	2/14/2015
Job End Date:	3/19/2015
State:	West Virginia
County:	Ritchie
API Number:	47-085-10106-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Mulvay Unit 2H
Longitude:	-80.91989200
Latitude:	39.33404400
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,334
Total Base Water Volume (gal):	11,251,758
Total Base Non Water Volume:	475,350



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## Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Antero Resources	Base Fluid					
			Water	7732-18-5	100.00000	90.77066	
Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	8.76835	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.17982	
			Hydrogen Chloride	7641-01-1	18.00000	0.04295	
LGC-15	U.S. Well Services, LLC	Gelling Agents					
			Guar Gum	9000-30-0	50.00000	0.05447	
			Petroleum Distillates	64742-47-8	60.00000	0.05159	
			Suspending agent (solid)	14808-60-7	3.00000	0.00833	
			Surfactant	68439-51-0	3.00000	0.00327	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			Anionic Polyacrylamide	Proprietary		0.02936	
			Water	7732-18-5	40.00000	0.02936	
			Petroleum Distillates	64742-47-8	22.00000	0.02364	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00367	

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			Crystalline Salt	12125-02-9	5.00000	0.00367
SI-1100	U.S. Well Services	Scale Inhibitor				
			Di Water	7732-18-5	80.00000	0.00785
			Ethylene Glycol	107-21-1	40.00000	0.00443
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00182
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00127
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00123
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00116
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00113
			Acrylic polymer	52255-49-9	5.00000	0.00049
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent				
			2,2-dibromo-3-nitropropionamide	10222-01-2	20.00000	0.00417
			Deionized Water	7732-18-5	28.00000	0.00238
SI-1000	U.S. Well Services, LLC	Scale Inhibitor				
			Anionic Copolymer	Proprietary		0.00123
			Ethylene Glycol	107-21-1	20.00000	0.00111
			Water	7732-18-5	30.00000	0.00093
AP One	U.S. Well Services, LLC	Gel Breakers				
			Ammonium Persulfate	7727-54-0	100.00000	0.00180
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors				
			Diethylene Glycol	111-46-6	30.00000	0.00014
			Methenamine	100-97-0	20.00000	0.00011
			Hydrogen Chloride	7647-01-0	10.00000	0.00005
			Polyethylene polyamine	68603-67-8	10.00000	0.00004
			Coco amine	61791-14-8	5.00000	0.00002

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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.

- \* 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)



