

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

API 47-085-10331 County Ritchie District Clay
Quad Pennsboro 7.5' Pad Name Hichman Pad Field/Pool Name -----
Farm name Radall Bond et al Well Number Griff Unit 3H
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 4354352m Easting 509969m
Landing Point of Curve Northing 4354555m Easting 510480m
Bottom Hole Northing 4358115m Easting 509339m

Elevation (ft) 1250' 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 1/12/2018 Date drilling commenced 1/31/2018 Date drilling ceased 8/8/2018
Date completion activities began 1/4/2019 Date completion activities ceased 4/5/2019
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 None Identified Open mine(s) (Y/N) depths No
Salt water depth(s) ft None Identified Void(s) encountered (Y/N) depths No
Coal depth(s) ft None Identified Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

Reviewed by:

API 47-085 - 10331 Farm name Radall Bond et al Well number Griff Unit 3H

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	24"	20"	80'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	449.1'	New	54.5#, J-55	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2607.8'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	19679'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	7146.2'		4.7#, L-80		
Packer type and depth set		N/A					

Comment Details _____

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	204 sx	15.6	1.18	241	0'	8 Hrs.
Surface	Class A	400 sx	15.6	1.20	480	0'	8 Hrs.
Coal							
Intermediate 1	Class A	883 sx	15.6	1.20	1060	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	830 sx (Lead) 2035 sx (Tail)	14 (Lead), 15.2 (Tail)	1.45 (Lead), 1.83(Tail)	4928	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 19699' MD, 6661' TVD (BHL), 6661' (Deepest Point Drilled) Loggers TD (ft) 19699' MD
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 6200'

** This is a subsequent Well. Antero only runs wireline logs on one well on a multi-well pad (Centerville Unit 2H API#47-085-10338). 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

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

EXHIBIT 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	1/4/2019	19523.8	19579.1	60	Marcellus
2	1/5/2019	19322.962	19492.327	60	Marcellus
3	1/6/2019	19122.124	19291.489	60	Marcellus
4	1/6/2019	18921.286	19090.651	60	Marcellus
5	1/6/2019	18720.448	18889.813	60	Marcellus
6	1/7/2019	18519.61	18688.975	60	Marcellus
7	1/7/2019	18318.772	18488.137	60	Marcellus
8	1/8/2019	18117.934	18287.299	60	Marcellus
9	1/8/2019	17917.096	18086.461	60	Marcellus
10	1/8/2019	17716.258	17885.623	60	Marcellus
11	1/9/2019	17515.42	17684.785	60	Marcellus
12	1/9/2019	17314.582	17483.947	60	Marcellus
13	1/10/2019	17113.744	17283.109	60	Marcellus
14	1/10/2019	16912.906	17082.271	60	Marcellus
15	1/11/2019	16712.068	16881.433	60	Marcellus
16	1/11/2019	16511.23	16680.595	60	Marcellus
17	1/12/2019	16310.392	16479.757	60	Marcellus
18	1/12/2019	16109.554	16278.919	60	Marcellus
19	1/12/2019	15908.716	16078.081	60	Marcellus
20	1/13/2019	15707.878	15877.243	60	Marcellus
21	1/14/2019	15507.04	15676.405	60	Marcellus
22	1/14/2019	15306.202	15475.567	60	Marcellus
23	1/14/2019	15105.364	15274.729	60	Marcellus
24	1/15/2019	14904.526	15073.891	60	Marcellus
25	1/15/2019	14703.688	14873.053	60	Marcellus
26	1/16/2019	14502.85	14672.215	60	Marcellus
27	1/16/2019	14302.012	14471.377	60	Marcellus
28	1/17/2019	14101.174	14270.539	60	Marcellus
29	1/17/2019	13900.336	14069.701	60	Marcellus
30	1/18/2019	13699.498	13868.863	60	Marcellus
31	1/18/2019	13498.66	13668.025	60	Marcellus
32	1/18/2019	13297.822	13467.187	60	Marcellus
33	1/19/2019	13096.984	13266.349	60	Marcellus
34	1/19/2019	12896.146	13065.511	60	Marcellus
35	1/20/2019	12695.308	12864.673	60	Marcellus
36	1/21/2019	12494.47	12663.835	60	Marcellus
37	1/21/2019	12293.632	12462.997	60	Marcellus
38	1/22/2019	12092.794	12262.159	60	Marcellus
39	1/22/2019	11891.956	12061.321	60	Marcellus
40	1/23/2019	11691.118	11860.483	60	Marcellus
41	1/23/2019	11490.28	11659.645	60	Marcellus
42	1/24/2019	11289.442	11458.807	60	Marcellus
43	1/24/2019	11088.604	11257.969	60	Marcellus
44	1/25/2019	10887.766	11057.131	60	Marcellus
45	1/25/2019	10686.928	10856.293	60	Marcellus
46	1/26/2019	10486.09	10655.455	60	Marcellus
47	1/26/2019	10285.252	10454.617	60	Marcellus
48	1/27/2019	10084.414	10253.779	60	Marcellus
49	1/27/2019	9883.576	10052.941	60	Marcellus
50	1/28/2019	9682.738	9852.103	60	Marcellus
51	1/28/2019	9481.9	9651.265	60	Marcellus
52	2/27/2019	9281.062	9450.427	60	Marcellus
53	2/27/2019	9080.224	9249.589	60	Marcellus
54	2/27/2019	8879.386	9048.751	60	Marcellus
55	2/27/2019	8678.548	8847.913	60	Marcellus
56	2/27/2019	8477.71	8647.075	60	Marcellus
57	2/27/2019	8276.872	8446.237	60	Marcellus
58	2/28/2019	8076.034	8245.399	60	Marcellus
59	2/28/2019	7875.196	8044.561	60	Marcellus
60	2/28/2019	7674.358	7843.723	60	Marcellus
61	2/28/2019	7473.52	7642.885	60	Marcellus
62	2/28/2019	7272.682	7442.047	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	1/4/2019	69.5	7957	7987	3433	150350	4618	N/A
2	1/5/2019	70.8	7679	5810	4191	404400	9626	N/A
3	1/6/2019	70.4	7967	6167	4077	400650	8410.15	N/A
4	1/6/2019	75.1	8206	5614	4357	401650	8371	N/A
5	1/6/2019	73.5	8133	5524	4559	403700	8341.23	N/A
6	1/7/2019	74.2	8351	6158	4434	401800	8264	N/A
7	1/7/2019	70	8191	6035	4091	403100	7887.15	N/A
8	1/8/2019	73.6	8217	6372	3825	400650	8204	N/A
9	1/8/2019	69.8	8119	6682	3773	401800	8275.9	N/A
10	1/8/2019	67.7	8240	6925	4280	402400	8245.43	N/A
11	1/9/2019	61.1	8102	6102	3834	401900	8193	N/A
12	1/9/2019	71.1	8205	5853	4518	401500	8045	N/A
13	1/10/2019	69.4	8505	7822	4465	402450	8643	N/A
14	1/10/2019	72	8220	6370	4828	401500	8241	N/A
15	1/11/2019	69.7	8355	6174	4017	401750	8376	N/A
16	1/11/2019	68.8	8141	6228	3598	400250	8282	N/A
17	1/12/2019	73.6	8569	6227	3879	401350	8289	N/A
18	1/12/2019	73.2	8422	5867	3377	401500	8249	N/A
19	1/12/2019	72.6	7966	5673	3865	401460	8224.44	N/A
20	1/13/2019	72.7	8235	5991	4252	401500	8177	N/A
21	1/14/2019	72.4	7966	6051	4788	401250	8273.07	N/A
22	1/14/2019	78.5	8198	6026	4479	404450	8140.7	N/A
23	1/14/2019	72.5	8200	6408	4680	400500	9683.3	N/A
24	1/15/2019	75	8122	6091	3786	402000	9196.8	N/A
25	1/15/2019	70.7	8181	6477	3874	401300	8468.25	N/A
26	1/16/2019	73.1	7756	6288	3957	403200	8041.2	N/A
27	1/16/2019	74.8	8185	6533	3834	401500	8137	N/A
28	1/17/2019	68.4	7906	5983	4731	399200	9786	N/A
29	1/17/2019	73.9	7969	6147	3619	401500	7944	N/A
30	1/18/2019	79.9	7880	5578	3980	403150	8177	N/A
31	1/18/2019	83	7820	6031	4413	402000	8150	N/A
32	1/18/2019	77	8073	6891	3613	402100	8188	N/A
33	1/19/2019	68.3	7920	6982	3732	401200	9819	N/A
34	1/19/2019	77.8	8267	6640	3961	402700	8450	N/A
35	1/20/2019	76	8017	6165	3633	401800	7984	N/A
36	1/21/2019	74.2	7898	6250	4474	402600	8363	N/A
37	1/21/2019	78.7	7838	5930	4070	401700	8027	N/A
38	1/22/2019	79.9	8040	6249	3502	402400	8441	N/A
39	1/22/2019	77	7844	6289	3462	401450	8355	N/A
40	1/23/2019	83.4	7805	6632	3515	402750	8129	N/A
41	1/23/2019	79.5	7894	7016	3727	401650	8193	N/A
42	1/24/2019	80	8047	6916	3933	402450	7829.53	N/A
43	1/24/2019	76	7916	7024	3583	403900	8104	N/A
44	1/25/2019	79.1	7576	6311	4013	405600	8007	N/A
45	1/25/2019	78.6	7616	7096	4267	402300	8175	N/A
46	1/26/2019	79.1	8091	5947	3800	401200	7914.18	N/A
47	1/26/2019	78.5	8210	6908	4086	401850	8100	N/A
48	1/27/2019	80.3	7987	6183	4333	400800	7928.61	N/A
49	1/27/2019	76.1	7832	6027	4060	401450	8395	N/A
50	1/28/2019	77.3	7760	6004	3655	400900	7841.3	N/A
51	1/28/2019	80.5	7718	6636	3502	402300	7931	N/A
52	2/27/2019	78.30433	7834.946	6479	4482	399750	7936.82	N/A
53	2/27/2019	78.92863	7986.288	7094	3920	401100	7928.3	N/A
54	2/27/2019	83.26904	7920.454	6776	3772	401300	7899.19	N/A
55	2/27/2019	80.9602	7641.858	6999	3474	401450	7954.25	N/A
56	2/27/2019	84.45996	7314.949	7257	4012	406284.9839	7963.77	N/A
57	2/27/2019	83.39784	7043.029	6172	4622	400300	7897.31	N/A
58	2/28/2019	84.58932	7293.165	4748	4744	401350	7955.22	N/A
59	2/28/2019	87.60664	7177.186	6487	3944	400316	8046.51	N/A
60	2/28/2019	86.62201	7425.963	6381	3965	400100	8090.49	N/A
61	2/28/2019	81.90372	6721.932	6270	3575	401850	7946.51	N/A
62	2/28/2019	82.01629	6571.896	5503	4514	404880	8076.96	N/A
	AVG=	76	7,923	6,346	4,028	24,667,491	508,830	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
No Data collected	0	445	0	445
Silty Shale	est 445	505	est 445	505
Shaly Siltstone	est 505	685	est 505	685
Sandy Siltstone	est 685	765	est 685	765
Silty Sandstone	est 765	845	est 765	845
Sandy Siltstone	est 845	905	est 845	905
Shaly Sandstone	est 905	945	est 905	945
Sandy Shale	est 945	1,085	est 945	1,085
Shaly sandstone tr coal	est 1,085	1,145	est 1,085	1,145
Shaly Sandstone	est 1,145	1,265	est 1,145	1,265
Silty Shale with intermittend SS	est 1,265	1,625	est 1,265	1,625
Sandstone	est 1,625	1,785	est 1,625	1,785
Sandy Shale	est 1,785	2,096	est 1,785	2,157
Big Lime	2,096	2,956	2,157	3,064
Fifty Foot Sandstone	2,956	3,062	3,064	3,176
Gordon	3,062	3,226	3,176	3,348
Fifth Sandstone	3,226	3,435	3,348	3,568
Bayard	3,435	3,960	3,568	4,123
Speechley	3,960	4,202	4,123	4,379
Balltown	4,202	4,765	4,379	4,974
Bradford	4,765	5,107	4,974	5,335
Benson	5,107	5,361	5,335	5,604
Alexander	5,361	6,313	5,604	6,650
Sycamore	6,313	6,429	6,650	6,806
Middlesex	6,429	6,546	6,806	7,015
Burkett	6,546	6,577	7,015	7,100
Tully	6,577	6,610	7,100	7,229
Marcellus	6,610	NA	7,229	NA

*Please note Antero determines 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.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	1/4/2019
Job End Date:	2/28/2019
State:	West Virginia
County:	Ritchie
API Number:	47-085-10331-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Griff Unit 3H
Latitude:	39.33918000
Longitude:	-80.88434000
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,658
Total Base Water Volume (gal):	22,157,764
Total Base Non Water Volume:	0



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	Supplied by Operator	Base Fluid					
			Water	7732-18-5	100.00000	87.89812	
DWP-641	CWS	Friction Reducer					
				Listed Below			

				Listed Below			
Items above are Trade Names with the exception of Base Water . Items below are the individual ingredients.							
				Crystalline silica (Quartz)	14808-60-7	100.00000	11.72721
				Calcite	471-34-1	1.00000	0.08152
				Hydrochloric acid	7647-01-0	37.00000	0.05521
				Distillates (petroleum), hydrotreated middle	64742-46-7	60.00000	0.04318
				Guar gum	9000-30-0	60.00000	0.04318
				Illite	12173-60-3	1.00000	0.03572
				Polymer	26100-47-0	45.00000	0.02858
				Distillates (petroleum), hydrotreated light	64742-47-8	30.00000	0.01905
				Biotite	1302-27-8	0.10000	0.01172
				Goethite	1310-14-1	0.10000	0.01172
				Apatite	64476-38-6	0.10000	0.01172
				Ammonium chloride	12125-02-9	11.00000	0.00699
				Polyethylene glycol mixture	25322-68-3	54.50000	0.00585
				Quaternary ammonium compounds, bis (hydrogenated tallow alkyl)dimethyl, salts with bentonite	68953-58-2	5.00000	0.00360
				Ilmenite	98072-94-7	0.10000	0.00357
				Sorbitan monooleate	1338-43-8	4.00000	0.00254
				2,2-Dibromo-3-Nitriopropionamide	10222-01-2	20.00000	0.00215
				Polyethylene glycol monooleate	9004-96-0	3.00000	0.00191
				Ammonium Persulfate	7727-54-0	100.00000	0.00150
				Sorbitol tetraoleate	61723-83-9	2.00000	0.00127
				Oxirane, 2-methyl-, polymer with oxirane, monodecyl ether	37251-67-5	1.50000	0.00108
				Amines, tallow alkyl, ethoxylated	61791-26-2	1.00000	0.00064

