

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

4709502420

API 47-085-02420 County Tyler District Meade
Quad Middlebourne 7.5' (TH), Pennsboro 7.5' (BH) Pad Name McKim Pad Field/Pool Name -----
Farm name Jarret W. Shepherd et al Well Number McKim 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 4359553m Easting 504206m
Landing Point of Curve Northing 4359710m Easting 504974m
Bottom Hole Northing 4355913m Easting 506454m

Elevation (ft) 1172' 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 4/4/2017 Date drilling commenced 6/29/2017 Date drilling ceased 1/31/2018
Date completion activities began 10/8/2018 Date completion activities ceased 12/8/2018
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:

WR-35
Rev. 8/23/13

API 47-085 - 02420 Farm name Jarret W. Shepherd et al Well number McKim 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"	95'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	554'	New	54.5#, J-55	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2661'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	21016'	New	23#, HCP-110	N/A	Y
Tubing		2-3/8"	7274'		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	284 sx	15.6	1.21	344	0'	8 Hrs.
Surface	Class A	490 sx	15.6	1.21	593	0'	8 Hrs.
Coal							
Intermediate 1	Class A	889 sx	15.6	1.22	1085	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	800 sx (Lead) 2004 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.45 (Lead), 1.94 (Tail)	5048	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 21016' MD, 6524' TVD (BHL), 6527' (Deepest Point Drilled) Loggers TD (ft) 21016' MD

Deepest formation penetrated Marcellus Plug back to (ft) N/A

Plug back procedure N/A

Kick off depth (ft) 6156'

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

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PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6452' (TOP)	TVD	7334' (TOP) 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 11185 mcfpd Oil 223 bpd NGL --- bpd Water 0 bpd GAS MEASURED BY Estimated Orifice Pilot

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

***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 Allied Horizontal
Address 381 Colonial Manor Rd City North Huntington State PA Zip 15642

Cementing Company C&J Energy Services
Address 1650 Hackers Creek City Jane Lew State WV Zip 26378

Stimulating Company Halliburton
Address 121 Champion Way Suite 200 City Canonsburg State PA Zip 15317

Please insert additional pages as applicable.

Completed by Karin Cox Telephone 303-357-7310
Signature  Title Permitting Agent Date 4/17/2019

API 47-095-02420 Farm Name Jarret W. Shepherd et al Well Number McKim Unit 3H					
EXHIBIT 1					
Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	10/8/2018	20817	20915	60	Marcellus
2	10/8/2018	20616.54	20785.59	60	Marcellus
3	10/9/2018	20416.08	20585.13	60	Marcellus
4	10/9/2018	20215.62	20384.67	60	Marcellus
5	10/10/2018	20015.16	20184.21	60	Marcellus
6	10/10/2018	19814.7	19983.75	60	Marcellus
7	10/11/2018	19614.24	19783.29	60	Marcellus
8	10/11/2018	19413.78	19582.83	60	Marcellus
9	10/12/2018	19213.32	19382.37	60	Marcellus
10	10/12/2018	19012.86	19181.91	60	Marcellus
11	10/12/2018	18812.4	18981.45	60	Marcellus
12	10/13/2018	18611.94	18780.99	60	Marcellus
13	10/13/2018	18411.48	18580.53	60	Marcellus
14	10/14/2018	18211.02	18380.07	60	Marcellus
15	10/15/2018	18010.56	18179.61	60	Marcellus
16	10/15/2018	17810.1	17979.15	60	Marcellus
17	10/15/2018	17609.64	17778.69	60	Marcellus
18	10/16/2018	17409.18	17578.23	60	Marcellus
19	10/16/2018	17208.72	17377.77	60	Marcellus
20	10/17/2018	17008.26	17177.31	60	Marcellus
21	10/17/2018	16807.8	16976.85	60	Marcellus
22	10/18/2018	16607.34	16776.39	60	Marcellus
23	10/18/2018	16406.88	16575.93	60	Marcellus
24	10/18/2018	16206.42	16375.47	60	Marcellus
25	10/19/2018	16005.96	16175.01	60	Marcellus
26	10/19/2018	15805.5	15974.55	60	Marcellus
27	10/20/2018	15605.04	15774.09	60	Marcellus
28	10/20/2018	15404.58	15573.63	60	Marcellus
29	10/20/2018	15204.12	15373.17	60	Marcellus
30	10/21/2018	15003.66	15172.71	60	Marcellus
31	10/21/2018	14803.2	14972.25	60	Marcellus
32	10/22/2018	14602.74	14771.79	60	Marcellus
33	10/22/2018	14402.28	14571.33	60	Marcellus
34	10/22/2018	14201.82	14370.87	60	Marcellus
35	10/23/2018	14001.36	14170.41	60	Marcellus
36	10/23/2018	13800.9	13969.95	60	Marcellus
37	10/24/2018	13600.44	13769.49	60	Marcellus
38	10/24/2018	13399.98	13569.03	60	Marcellus
39	10/24/2018	13199.52	13368.57	60	Marcellus
40	10/25/2018	12999.06	13168.11	60	Marcellus
41	10/25/2018	12798.6	12967.65	60	Marcellus
42	10/25/2018	12598.14	12767.19	60	Marcellus
43	10/26/2018	12397.68	12566.73	60	Marcellus
44	10/26/2018	12197.22	12366.27	60	Marcellus
45	10/27/2018	11996.76	12165.81	60	Marcellus
46	10/27/2018	11796.3	11965.35	60	Marcellus
47	10/27/2018	11595.84	11764.89	60	Marcellus
48	10/28/2018	11395.38	11564.43	60	Marcellus
49	10/28/2018	11194.92	11363.97	60	Marcellus
50	10/28/2018	10994.46	11163.51	60	Marcellus
51	10/28/2018	10794	10963.05	60	Marcellus
52	10/28/2018	10593.54	10762.59	60	Marcellus
53	10/29/2018	10393.08	10562.13	60	Marcellus
54	10/29/2018	10192.62	10361.67	60	Marcellus
55	10/29/2018	9992.16	10161.21	60	Marcellus
56	10/30/2018	9791.7	9960.75	60	Marcellus
57	10/30/2018	9591.24	9760.29	60	Marcellus
58	10/30/2018	9390.78	9559.83	60	Marcellus
59	10/31/2018	9190.32	9359.37	60	Marcellus
60	10/31/2018	8989.86	9158.91	60	Marcellus
61	10/31/2018	8789.4	8958.45	60	Marcellus
62	10/31/2018	8588.94	8757.99	60	Marcellus
63	11/1/2019	8388.48	8557.53	60	Marcellus
64	11/1/2018	8188.02	8357.07	60	Marcellus
65	11/1/2018	7987.56	8156.61	60	Marcellus
66	11/1/2018	7787.1	7956.15	60	Marcellus
67	11/1/2018	7586.64	7755.69	60	Marcellus
68	11/2/2018	7386.18	7555.23	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	10/8/2018	65.12	8398	6845	3547	236260	7472.7143	N/A
2	10/8/2018	70.33	8148	6139	3199	365280	8020.7857	N/A
3	10/9/2018	72.4	8224	5846	3304	361980	7929.2381	N/A
4	10/9/2018	71.1	8115	6260	3477	365890	7896.3095	N/A
5	10/10/2018	70.3	8334	6152	3936	361980	7500.9048	N/A
6	10/10/2018	72.02	8112	5773	3447	320100	7862.2619	N/A
7	10/11/2018	70.66	8127	5652	3758	357000	7848.1905	N/A
8	10/11/2018	67.75	8004	5779	3624	359120	7829.7143	N/A
9	10/12/2018	68.13	8163	6095	3824	362620	7970.3571	N/A
10	10/12/2018	68.68	8116	6249	4485	363020	7863.2619	N/A
11	10/12/2018	72.1	8315	5768	3751	351360	8176.2143	N/A
12	10/13/2018	69.49	8034	6193	3879	361960	7843.5952	N/A
13	10/13/2018	71.7	8075	5827	3173	354980	8199.5476	N/A
14	10/14/2018	71.67	8023	6014	3339	365660	9533	N/A
15	10/15/2018	73	8072	5782	3701	359100	7986.0476	N/A
16	10/15/2018	71.61	7845	5616	3590	363320	7719.4048	N/A
17	10/15/2018	69.7	8033	5612	4346	359620	10798.738	N/A
18	10/16/2018	69.15	8054	6062	3464	358100	8141.8095	N/A
19	10/16/2018	71.97	7799	5056	3704	346320	8081.381	N/A
20	10/17/2018	70.34	7850	5844	4093	352120	8393.5	N/A
21	10/17/2018	73.05	8090	6627	3527	351880	7772.9524	N/A
22	10/18/2018	71.96	7986	6291	3735	358620	7598.4286	N/A
23	10/18/2018	72.33	7909	5254	3805	364420	7795.2381	N/A
24	10/18/2018	74.28	8069	5966	3854	355120	8425.619	N/A
25	10/19/2018	70.94	7839	6375	3761	355060	7674.2381	N/A
26	10/19/2018	74.5	7787	6221	3814	351200	7410.7381	N/A
27	10/20/2018	72	7696	6251	3812	353240	7426.0238	N/A
28	10/20/2018	72.53	7692	6328	3651	358480	7608.2857	N/A
29	10/20/2018	74.48	7775	6051	3630	355360	8252.1667	N/A
30	10/21/2018	70.22	7490	6018	3722	355740	7515.1905	N/A
31	10/21/2018	71.65	7950	5852	3622	352700	7425.1905	N/A
32	10/22/2018	73.8	7833	6514	3753	358900	7257.2381	N/A
33	10/22/2018	74.4	7707	6433	3612	353820	7484.4762	N/A
34	10/22/2018	74.6	7884	6464	3499	354660	7938.5952	N/A
35	10/23/2018	68	7459	5784	3711	362280	7616.1905	N/A
36	10/23/2018	69.7	7526	4183	3593	355100	8552.7619	N/A
37	10/24/2018	74.6	7759	5991	3459	347420	7189.0238	N/A
38	10/24/2018	74.11	7799	5661	3672	369100	8000.9524	N/A
39	10/24/2018	73.9	7837	5995	3891	359820	7350.3333	N/A
40	10/25/2018	73.89	7850	6287	3816	357780	7418.1667	N/A
41	10/25/2018	74.5	7736	6180	3914	356260	7229.2381	N/A
42	10/25/2018	77.1	7583	5428	3760	350960	7245.7857	N/A
43	10/26/2018	75.41	7615	5663	3598	360700	7518.5714	N/A
44	10/26/2018	76.8	7660	6067	3946	356300	7349.3333	N/A
45	10/27/2018	75.35	7793	5510	3546	359720	7413.0952	N/A
46	10/27/2018	77.13	7827	6394	3877	359580	7211.8571	N/A
47	10/27/2018	76.76	7770	6855	3931	355500	7332.3095	N/A
48	10/28/2018	78.74	7846	7027	3874	358100	7151.6905	N/A
49	10/28/2018	73.71	7491	6536	3938	359460	8926.0476	N/A
50	10/28/2018	72.23	7524	5706	3595	361500	8779.2619	N/A
51	10/28/2018	79.76	7774	6209	4549	366500	7420.4048	N/A
52	10/28/2018	77.45	7476	5967	3874	364920	7296.8571	N/A
53	10/29/2018	78.09	7428	6218	4372	361340	7372.4048	N/A
54	10/29/2018	77.91	7723	6136	3512	358040	7416.0238	N/A
55	10/29/2018	80.15	7666	6530	3977	353760	7008.4286	N/A
56	10/30/2018	78.95	7518	6104	3825	361700	7275.7857	N/A
57	10/30/2018	73.8	7262	5581	4983	359740	7347.1905	N/A
58	10/30/2018	79.02	7510	6252	4234	358560	7536.8571	N/A
59	10/31/2018	65.96	7229	5906	3596	359560	7227.0952	N/A
60	10/31/2018	78.59	7501	6098	3843	358260	7124.2619	N/A
61	10/31/2018	77.76	7366	5408	3562	350620	6966.7619	N/A
62	10/31/2018	78.32	7327	6247	4080	353820	6944.2381	N/A
63	11/1/2019	78.6	7493	6157	3757	356200	7003	N/A
64	11/1/2018	77.91	7185	6534	4038	353980	7058.5476	N/A
65	11/1/2018	75	6950	6279	3967	360080	7064.0238	N/A
66	11/1/2018	78.29	7398	6227	3092	361200	7078	N/A
67	11/1/2018	79.33	7301	6365	3799	352960	7021.0476	N/A
68	11/2/2018	80.31	7266	6678	3831	354300	7196.3571	N/A
	AVG=	74	7,765	6,050	3,771	24,180,110	522,293	TOTAL

API 47-095-02420 Farm Name Jarret W. Shepherd et al Well Number McKim Unit 3H

EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD)	BOTTOM DEPTH (TVD)	TOP DEPTH (MD)	BOTTOM DEPTH (MD)
	From Surface	From Surface	From Surface	From Surface
Silty Sandstone	0	227	0	227
Sandy siltstone	est 227	667	est 227	667
Sandstone	est 667	887	est 667	887
Silty Sandstone	est 887	997	est 887	997
limy siltstone	est 997	1,147	est 997	1,147
silty sandstone, tr. coal	est 1147	1,287	est 1147	1,287
silty sandstone	est 1287	1,367	est 1287	1,367
silty shale	est 1367	1,587	est 1367	1,587
sandstone, tr coal	est 1587	1,647	est 1587	1,647
silty sandstone	est 1647	1,667	est 1647	1,667
sandstone	est 1667	1,807	est 1667	1,807
sandy shale	est 1807	1,887	est 1807	1,887
shaly sand	est 1887	2,058	est 1887	2,100
Big Lime	2,058	2,294	2,100	2,350
Big Injun	2,294	2,634	2,350	2,706
Gantz Sand	2,634	2,812	2,706	2,897
Fifty Foot Sandstone	2,812	2,968	2,897	3,072
Gordon	2,968	3,077	3,072	3,201
Fifth Sandstone	3,077	3,448	3,201	3,623
Bayard	3,448	3,616	3,623	3,813
Warren	3,616	3,990	3,813	4,253
Speechley	3,990	4,146	4,253	4,435
Balltown	4,146	4,752	4,435	5,142
Bradford	4,752	5,089	5,142	5,531
Benson	5,089	5,323	5,531	5,744
Alexander	5,323	5,863	5,744	6,432
Rhinestreet	5,863	6,222	6,432	6,455
Sycamore	6,222	6,322	6,455	7,020
Middlesex	6,322	6,414	7,020	7,216
Burkett	6,414	6,438	7,216	7,287
Tully	6,438	6,452	7,287	7,334
Marcellus	6,452	NA	7,334	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:	10/8/2018
Job End Date:	11/2/2018
State:	West Virginia
County:	Tyler
API Number:	47-095-02420-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	McKim 3H
Latitude:	39.38537500
Longitude:	-80.95133300
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,527
Total Base Water Volume (gal):	23,113,607
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
Fresh Water	Operator	Base Fluid					
			Water	7732-18-5	100.00000	88.68482	Density = 8.330
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.12081	

EXCELERATE PS-2	Halliburton	Friction Reducer								
					Listed Below					
MC B-8614	Halliburton	Biocide								
					Listed Below					
SAND-COMMON WHITE-100 MESH, SSA-2, BULK (100003676)	Halliburton	Proppant								
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		11.13772		
			Guar gum	9000-30-0		100.00000		0.02644		
			Inorganic salt	Proprietary		30.00000		0.01653		
			Acrylamide acrylate polymer	Proprietary		30.00000		0.01653		Denise Tuck, Halliburton, 3000 N. Sam Houston Pkwy E., Houston, TX 77032, 281-871-6226
			Hydrotreated light petroleum distillate	64742-47-8		30.00000		0.01653		
			Hydrochloric acid	7647-01-0		15.00000		0.01088		
			Ethylene glycol	107-21-1		60.00000		0.00825		
			Glutaraldehyde	111-30-8		30.00000		0.00253		
			Telmer	Proprietary		10.00000		0.00137		
			Sodium persulfate	7775-27-1		100.00000		0.00092		
			Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1		5.00000		0.00042		
			Hdrotreated light petroleum distillates	Proprietary		100.00000		0.00020		

