

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

API 47 - 085 - 10369 County Ritchie District Union  
Quad Pullman 7.5' Pad Name Ireland North Pad Field/Pool Name -----  
Farm name Lynwood Ireland et al Well Number Hughes River 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 4335957m Easting 508716m  
Landing Point of Curve Northing 4335881.05m Easting 508773.60m  
Bottom Hole Northing 4332316m Easting 510011m

Elevation (ft) 945.5' 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 10/29/2018 Date drilling commenced 6/15/2017 Date drilling ceased 2/18/2019  
Date completion activities began 4/25/2019 Date completion activities ceased 8/10/2019  
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 92', 398', 429' Open mine(s) (Y/N) depths No  
Salt water depth(s) ft 1509', 1749' 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

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Reviewed by:  
DMH  
12-17-20

API 47- 085 - 10369 Farm name Lynwood Ireland et al Well number Hughes River 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	24"	20"	110'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	483'	New	48#, H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2574'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	19301'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	6370'		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	204 sx	15.6	1.18	120	0'	8 Hrs.
Surface	Class A	395 sx	15.6	1.18	826	0'	8 Hrs.
Coal							
Intermediate 1	Class A	890 sx	15.6	1.18	1181	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	169 sx (Lead) 2489 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.53 (Lead), 1.83 (Tail)		~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 19320' MD, 6354' TVD (BHL), 6399' (Deepest Point Drilled) Loggers TD (ft) 19320' MD  
 Deepest formation penetrated Marcellus Plug back to (ft) N/A  
 Plug back procedure N/A

Kick off depth (ft) 5900'

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



API 47-085-10369 Farm name Lynwood Ireland et al Well number Hughes River Unit 1H

**PERFORATION RECORD**

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

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 (bbls)	Amount of Nitrogen/other (units)
<b>*PLEASE SEE ATTACHED EXHIBIT 2</b>								

Please insert additional pages as applicable.

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API 47- 085 - 10369 Farm name Lynwood Ireland et al Well number Hughes River Unit 1H

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>		
Marcellus	6336' (TOP)	TVD	6658' (TOP) MD

Please insert additional pages as applicable.

GAS TEST  Build up  Drawdown  Open Flow OIL TEST  Flow  Pump

SHUT-IN PRESSURE Surface 2800 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW Gas 8718 mcfpd Oil 93 bpd NGL --- bpd Water 960 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 <sub>2</sub> S, ETC)
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**\*PLEASE SEE ATTACHED EXHIBIT 3**

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 <sub>2</sub> S, ETC)

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 Wireline Services  
Address 381 Colonial Manor Road 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 Baker Hughes  
Address 837 Phillippi Pike City Clarksburg State WV Zip 26301

Please insert additional pages as applicable.

Completed by Megan Griffith Telephone 303-357-7223  
Signature  Title Permitting Agent Date 2.18.20

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

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Office of Oil and Gas  
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West Virginia Department of Environmental Protection

**EXHIBIT 1**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	5/22/2019	19151	19206	60	Marcellus
2	5/22/2019	18950.33	19119.555	60	Marcellus
3	5/22/2019	18749.66	18918.885	60	Marcellus
4	5/23/2019	18548.99	18718.215	60	Marcellus
5	5/23/2019	18348.32	18517.545	60	Marcellus
6	5/24/2019	18147.65	18316.875	60	Marcellus
7	5/25/2019	17946.98	18116.205	60	Marcellus
8	5/25/2019	17746.31	17915.535	60	Marcellus
9	5/26/2019	17545.64	17714.865	60	Marcellus
10	5/27/2019	17344.97	17514.195	60	Marcellus
11	5/27/2019	17144.3	17313.525	60	Marcellus
12	5/27/2019	16943.63	17112.855	60	Marcellus
13	5/28/2019	16742.96	16912.185	60	Marcellus
14	5/29/2019	16542.29	16711.515	60	Marcellus
15	5/29/2019	16341.62	16510.845	60	Marcellus
16	5/30/2019	16140.95	16310.175	60	Marcellus
17	5/30/2019	15940.28	16109.505	60	Marcellus
18	5/31/2019	15739.61	15908.835	60	Marcellus
19	5/31/2019	15538.94	15708.165	60	Marcellus
20	6/1/2019	15338.27	15507.495	60	Marcellus
21	6/1/2019	15137.6	15306.825	60	Marcellus
22	6/3/2019	14936.93	15106.155	60	Marcellus
23	6/4/2019	14736.26	14905.485	60	Marcellus
24	6/5/2019	14535.59	14704.815	60	Marcellus
25	6/5/2019	14334.92	14504.145	60	Marcellus
26	6/6/2019	14134.25	14303.475	60	Marcellus
27	6/7/2019	13933.58	14102.805	60	Marcellus
28	6/15/2019	13732.91	13902.135	60	Marcellus
29	6/16/2019	13532.24	13701.465	60	Marcellus
30	6/17/2019	13331.57	13500.795	60	Marcellus
31	6/17/2019	13130.9	13300.125	60	Marcellus
32	6/17/2019	12930.23	13099.455	60	Marcellus
33	6/18/2019	12729.56	12898.785	60	Marcellus
34	6/18/2019	12528.89	12698.115	60	Marcellus
35	6/18/2019	12328.22	12497.445	60	Marcellus
36	6/19/2019	12127.55	12296.775	60	Marcellus
37	6/20/2019	11926.88	12096.105	60	Marcellus
38	6/20/2019	11726.21	11895.435	60	Marcellus
39	6/20/2019	11525.54	11694.765	60	Marcellus
40	6/21/2019	11324.87	11494.095	60	Marcellus
41	6/21/2019	11124.2	11293.425	60	Marcellus
42	6/21/2019	10923.53	11092.755	60	Marcellus
43	6/22/2019	10722.86	10892.085	60	Marcellus
44	6/22/2019	10522.19	10691.415	60	Marcellus
45	6/23/2019	10321.52	10490.745	60	Marcellus
46	6/23/2019	10120.85	10290.075	60	Marcellus
47	6/24/2019	9920.18	10089.405	60	Marcellus
48	6/24/2019	9719.51	9888.735	60	Marcellus
49	6/25/2019	9518.84	9688.065	60	Marcellus
50	6/25/2019	9318.17	9487.395	60	Marcellus
51	6/25/2019	9117.5	9286.725	60	Marcellus
52	6/26/2019	8916.83	9086.055	60	Marcellus
53	6/27/2019	8716.16	8885.385	60	Marcellus
54	6/27/2019	8515.49	8684.715	60	Marcellus
55	6/27/2019	8314.82	8484.045	60	Marcellus
56	6/28/2019	8114.15	8283.375	60	Marcellus
57	6/28/2019	7913.48	8082.705	60	Marcellus
58	6/28/2019	7712.81	7882.035	60	Marcellus
59	6/29/2019	7512.14	7681.365	60	Marcellus
60	6/29/2019	7311.47	7480.695	60	Marcellus
61	6/29/2019	7110.8	7280.025	60	Marcellus
62	6/29/2019	6910.13	7079.355	60	Marcellus
63	6/30/2019	6709.46	6878.685	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 (bbbls)	Amount of Nitrogen/ other (units)
1	5/22/2019	60.0373	7674.027	8085	2680	298270	5844	N/A
2	5/22/2019	75.2712	8110.083	6156	3126	446160	10269	N/A
3	5/22/2019	72.4352	8069.045	5947	3342	451600	8960	N/A
4	5/23/2019	70	7873	6583	2895	440780	12250	N/A
5	5/23/2019	75.5433	7999.46	6091	3149	444620	8907	N/A
6	5/24/2019	60.2462	7968.695	6128	2964	456380	12814	N/A
7	5/25/2019	74.1347	8086.374	6448	3010	456520	8870	N/A
8	5/25/2019	75.8081	7872.917	5612	3349	459900	8879	N/A
9	5/26/2019	70.5191	7923.44	6090	3386	452000	10501	N/A
10	5/27/2019	75.6973	8012.328	6078	3529	453880	8659	N/A
11	5/27/2019	61.908	7864.126	5539	2782	450900	11863	N/A
12	5/27/2019	78.0772	7887.532	5709	2876	460840	8851	N/A
13	5/28/2019	75.7813	7504.832	5947	2718	448760	8646	N/A
14	5/29/2019	72.5976	7351.816	6038	2492	457480	8720	N/A
15	5/29/2019	75.8503	7575.694	6168	2650	455740	8680	N/A
16	5/30/2019	75.0559	7099.741	6162	2866	457760	8668	N/A
17	5/30/2019	76.1575	7590.737	5493	2568	457700	8709	N/A
18	5/31/2019	77.2562	7387.509	3777	2570	458120	9273	N/A
19	5/31/2019	74.2332	7492.589	5903	2752	454560	8649	N/A
20	6/1/2019	47.4829	8231.77	5750	4334	351220	8089	N/A
21	6/1/2019	71.0692	7863.519	5774	2578	451040	8593	N/A
22	6/3/2019	64.102	7763.527	5643	5811	338020	13016	N/A
23	6/4/2019	67.0924	7435.623	5895	2572	448560	8752	N/A
24	6/5/2019	64.502	7333.154	6080	2834	453000	8606	N/A
25	6/5/2019	69.3772	7265.078	6216	3309	451140	10641	N/A
26	6/6/2019	66.1278	7329.117	6122	2501	453000	9756	N/A
27	6/7/2019	64.3069	7393.535	6899	4188	403180	7750	N/A
28	6/15/2019	68.9734	7434.63	5923	2910	458279	8831	N/A
29	6/16/2019	71.746	7144.882	6686	2787	457100	8874	N/A
30	6/17/2019	71.0597	7192.825	6068	3598	434155	8624	N/A
31	6/17/2019	65.3087	7144.9	6492	2894	443520	8963	N/A
32	6/17/2019	69.3341	7411.872	7136	3206	450231	8858	N/A
33	6/18/2019	74.4266	7128.76	4650	3223	454124	8766	N/A
34	6/18/2019	70.8252	7157.742	6361	3119	453240	8849	N/A
35	6/18/2019	70.5288	7303.63	5889	3077	466252	8720	N/A
36	6/19/2019	72.9409	7306.034	7142	3223	447560	8622	N/A
37	6/20/2019	68.8513	7409.272	7061	3525	448070	10674	N/A
38	6/20/2019	67.2465	7336.111	7330	3339	451340	8762	N/A
39	6/20/2019	67.9235	7506.553	6620	4387	448910	8757	N/A
40	6/21/2019	69.5809	7597.696	7248	3229	460980	8754	N/A
41	6/21/2019	71.5149	7327.679	7608	3314	452820	8780	N/A
42	6/21/2019	72.1693	7129.298	7079	3678	450270	8739	N/A
43	6/22/2019	71.8542	7044.209	6265	3375	450480	8690	N/A
44	6/22/2019	68.9317	6912.157	6274	4184	452640	8686	N/A
45	6/23/2019	73.5441	6783.107	5821	3854	445900	8625	N/A
46	6/23/2019	72.262	6969.991	6493	3633	450740	8695	N/A
47	6/24/2019	71.8858	7374.961	6919	5172	414900	9820	N/A
48	6/24/2019	73.7801	7131.035	6266	3621	450840	8775	N/A
49	6/25/2019	65.7898	6503.175	6746	4165	448040	8783	N/A
50	6/25/2019	68.417	7228.429	6460	3030	452700	8705	N/A
51	6/25/2019	68.6636	6626.556	4259	3988	447060	8564	N/A
52	6/26/2019	60.9704	7530.704	6500	4374	454370	9087	N/A
53	6/27/2019	64.5	7550	6339	4399	336850	8372	N/A
54	6/27/2019	72.1137	6838.345	6017	3235	449670	8663	N/A
55	6/27/2019	71.5111	7215.456	6823	3066	449580	8606	N/A
56	6/28/2019	72.1003	7038.608	7185	3097	445600	8614	N/A
57	6/28/2019	73.4873	6588.503	6286	4085	446020	8749	N/A
58	6/28/2019	73.6331	6889.738	5638	3221	457340	8621	N/A
59	6/29/2019	72.9978	6747.994	6911	3043	451200	8588	N/A
60	6/29/2019	74.9908	6524.959	7382	3321	442720	8466	N/A
61	6/29/2019	75.1128	6377.03	3655	3379	452540	8533	N/A
62	6/29/2019	72.181	6659.466	6566	3443	439600	8441	N/A
63	6/30/2019	74.7235	6463.246	6033	3280	450890	8888	N/A
<b>AVG.</b>		<b>70.2</b>	<b>7,516</b>	<b>6,222</b>	<b>3,217</b>	<b>19,937,001</b>	<b>412,789</b>	<b>TOTAL</b>

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Office of Oil and Gas

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**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	65	125	65	125
Sandstone	125	165	125	165
Silty sandstone tr coal	165	525	165	525
Shaly siltstone tr coal	525	685	525	685
Shaly siltstone	685	505	685	505
Silty Sandstone	505	985	505	985
Silty sandstone	985	825	985	825
Silty Sandstone	825	1,105	825	1,105
Siltstone	1,105	1,285	1,105	1,285
Siltstone tr coal	1,285	1,405	1,285	1,405
Sandstone tr coal	1,405	1,525	1,405	1,525
Shaly siltstone tr coal	1,525	1,705	1,525	1,705
Silty sandstone tr coal	1,705	1,889	1,705	1,905
Big Lime	1,904	2,417	1,875	2,417
Fifty Foot Sandstone	2,417	2,617	2,387	2,618
Gordon	2,617	2,906	2,588	2,907
Fifth Sandstone	2,906	2,990	2,877	2,991
Bayard	2,990	3,745	2,961	3,756
Speechley	3,745	3,917	3,726	3,932
Balltown	3,917	4,444	3,902	4,469
Bradford	4,444	4,831	4,439	4,863
Benson	4,831	5,073	4,833	5,110
Alexander	5,073	6,202	5,080	6,335
Sycamore	6,002	6,172	6,076	6,305
Middlesex	6,172	6,284	6,305	6,508
Burkett	6,284	6,317	6,508	6,595
Tully	6,317	6,336	6,595	6,658
Marcellus	6,336	NA	6,658	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.

# ANTERO RESOURCES CORPORATION

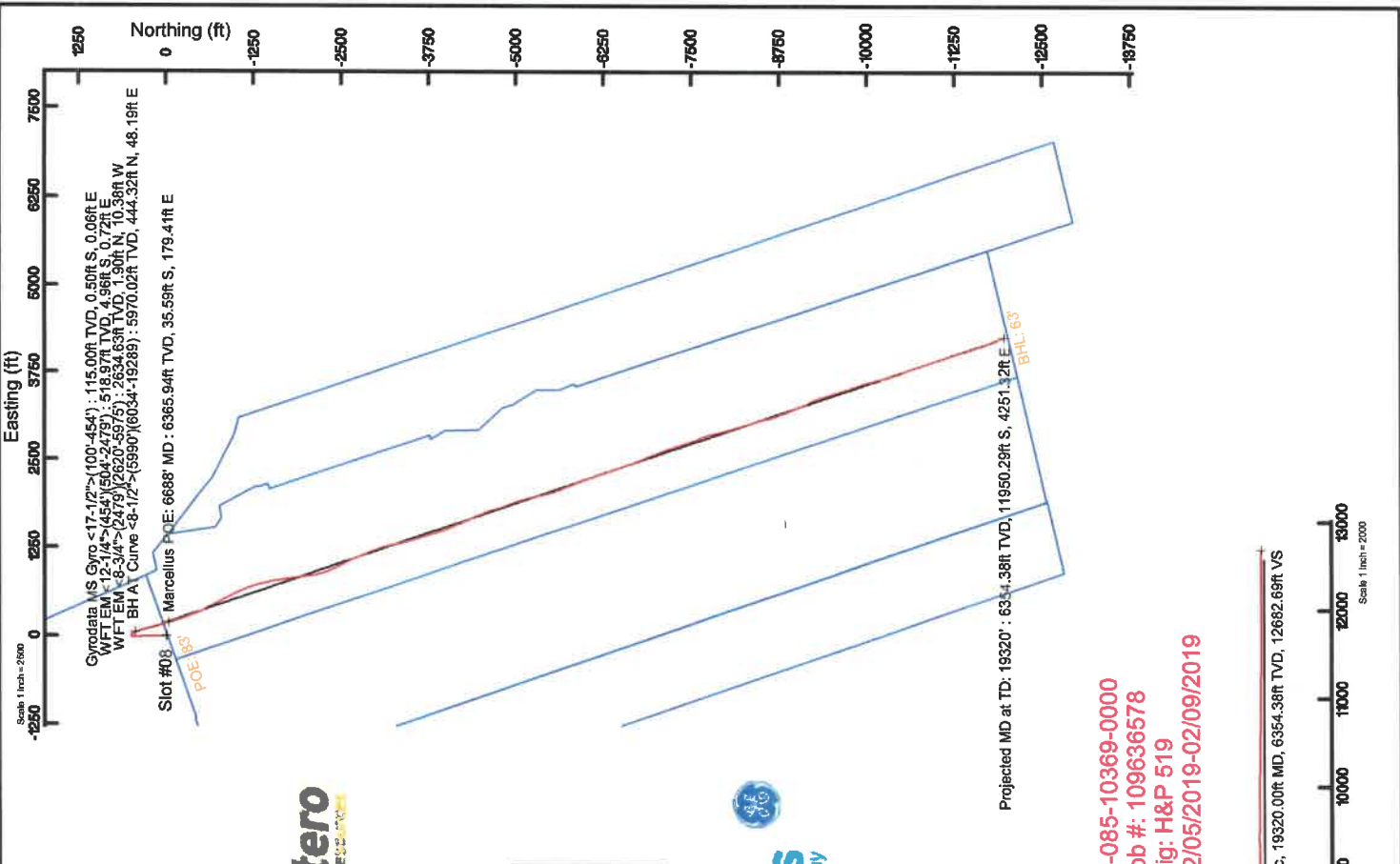
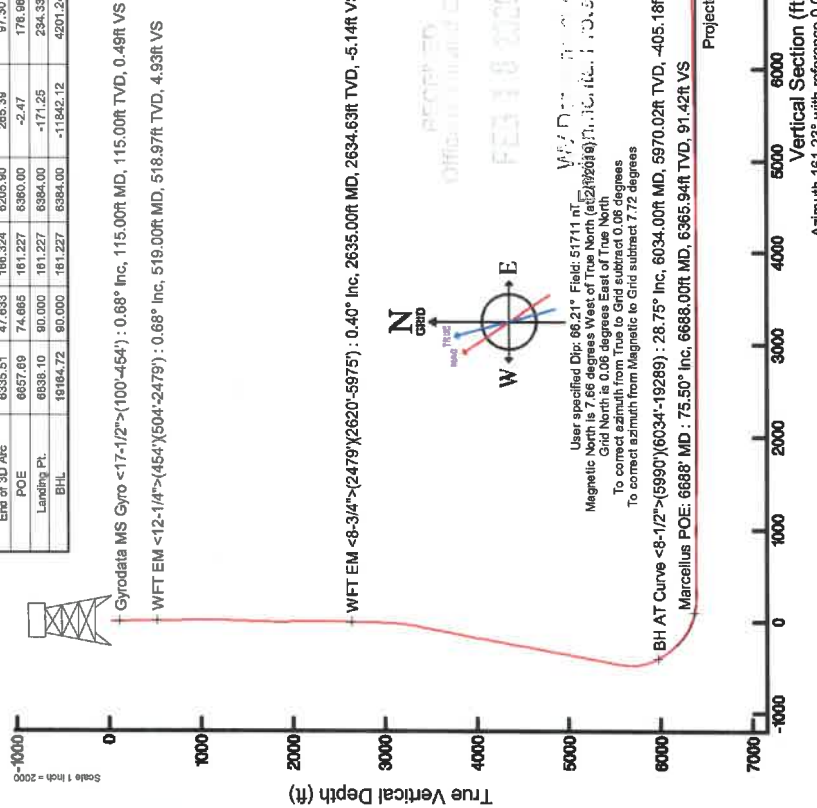
Location: Ritchie County, WV  
 Facility: Ritchie Ireland North Pad  
 Slot: Slot #08  
 Well: Hughes River Unit 1H  
 Wellbore: Hughes River Unit 1H PWB

Grid System: NAD27 / UTM Zone 17 North, US feet  
 North Reference: Grid North  
 Scale: True distance  
 Depths are in feet  
 H&P 510 (RKB) to Mean Sea Level: 975.5 feet  
 Mean Sea Level (At Slot #08): -945.5 feet  
 Coordinates are in feet referenced to Slot

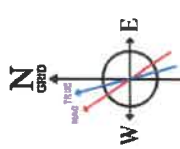
Location Information			
Facility Name	Grid East (US ft)	Grid North (US ft)	Longitude
Ireland North Pad	14224850.128	80°53'57.720"W	80°53'57.720"W
Slot	Local N (ft)	Local E (ft)	Longitude
Slot #08	-12.11	27.58	80°53'57.370"W
H&P 510 (RKB) to Ground level (At Slot #08)	30ft		
Mean Sea Level to Ground level (At Slot #08)	-945.5ft		
H&P 510 (RKB) to Mean Sea Level	975.5ft		

Well Data			
Slot	Well	Wellbore	Wellpath
Slot #08	Hughes River Unit 1H	Hughes River Unit 1H AWB	Hughes River Unit 1H AWP Proj: 19320'
Slot #08	Hughes River Unit 1H	Hughes River Unit 1H PWB	Hughes River Unit 1H PWP Rev-A.0

Well Profile Data								
Design Comment	MD (ft)	Inc (°)	Asz (°)	TVD (ft)	Local N (ft)	Local E (ft)	DLS (1/100ft)	VS (ft)
Tile On	5980.00	25.770	157.610	5930.61	463.24	41.30	11.39	-425.31
Proj. To Bottom	6082.00	30.550	162.910	5994.38	431.25	52.65	7.46	-391.38
End of 3D Arc	6335.51	47.633	186.324	6205.00	295.39	97.30	6.29	-219.97
POE	6657.69	74.665	181.227	6360.00	-2.47	176.98	8.50	59.27
Landing Pt.	6938.10	90.000	151.227	6394.00	-171.25	234.33	8.50	237.54
BHL	15164.72	80.000	181.227	6384.00	-11842.12	4201.24	0.00	12564.16



API: 47-085-10369-0000  
 BHI Job #: 109636578  
 Rig: H&P 519  
 Duration: 02/05/2019-02/09/2019



Scale 1 inch = 2000'



# Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	5/22/2019
Job End Date:	6/30/2019
State:	West Virginia
County:	Ritchie
API Number:	47-085-10369-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Hughes River 1H
Latitude:	39.17271110
Longitude:	-80.89926940
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,399
Total Base Water Volume (gal):	24,871,312
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	Antero Resources	Carrier/Base Fluid	Water	7732-18-5	100.00000	88.90759	
Sand	J.S. Well Services, LLC	Proppant	Crystalline Silica, quartz	14808-60-7	100.00000	10.68450	
HCl Acid (12.6%-17.5%)	J.S. Well Services, LLC	Bulk Acid	Water	7732-18-5	87.40000	0.18181	
			Hydrogen Chloride	7647-01-0	17.50000	0.04227	
GC-15	J.S. Well Services, LLC	Gelling Agents	Guar Gum	9000-30-0	50.00000	0.06055	
			Petroleum Distillates	64742-47-8	60.00000	0.05734	
			Suspending agent (solid)	14808-60-7	3.00000	0.00926	
			Surfactant	68439-51-0	3.00000	0.00363	
WFRA-405	J.S. Well Services, LLC	Friction Reducer	2-Propanoic acid, polymer with propenamide	29003-06-9	30.00000	0.01673	
			Hydrated light distillate (petroleum)	64742-47-8	30.00000	0.01347	

SI-1200s	U.S. Well Services, LLC	Scale Inhibitor						
			Water	7732-18-5		98.00000		0.01226
			Sodium Chloride	7647-14-5		10.00000		0.00125
			Sodium Salt of Diethylenetriaminepenta(methylenephosphonic acid)	68155-78-2		10.00000		0.00125
Bioclear 2000	U.S. Well Services, LLC	Anti-Bacterial Agent						
			2,2-dibromo-3-nitropropionamide	10222-01-2		20.00000		0.00409
			Deionized Water	7732-18-5		28.00000		0.00234
AP One	U.S. Well Services, LLC	Gel Breakers						
			Ammonium Persulfate	7727-54-0		100.00000		0.00153
AI-303	U.S. Well Services, LLC	Acid Corrosion Inhibitors						
			Ethylene glycol	107-21-1		40.00000		0.00006
			Cinnamaldehyde	104-55-2		20.00000		0.00002
			Formic acid	64-18-6		20.00000		0.00002
			Butyl cellosolve	111-76-2		20.00000		0.00002
			Polyether	50828-78-6		10.00000		0.00001
			Acetophenone, thiourea, formaldehyde polymer	68527-49-1		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.

\* 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)



LATITUDE 39°12'30"

6,881'

LATITUDE 39°10'00" 2,646' TO BOTTOM HOLE

LONGITUDE 80°52'30"

9,754' TO BOTTOM HOLE

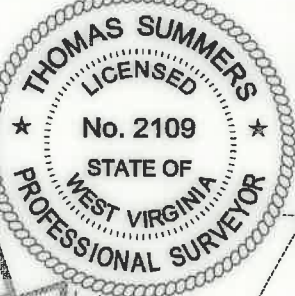
12,975'

LONGITUDE 80°52'30"

# Antero Resources Corporation Well No. Hughes River Unit 1H

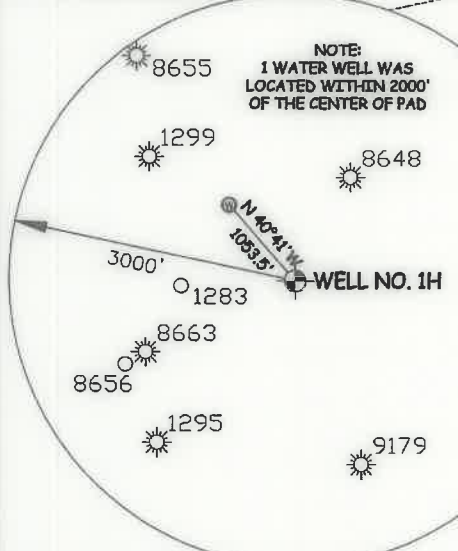
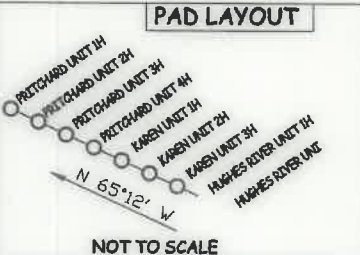
**AS DRILLED DATA:**  
**WELL 1H TOP HOLE INFORMATION:**  
 N: 248,105ft E: 1,603,304ft  
 LAT: 39°10'21.76" LON: 80°53'57.37"  
**BOTTOM HOLE INFORMATION:**  
 N: 236,085ft E: 1,607,355ft  
 LAT: 39°08'23.59" LON: 80°53'03.58"  
**WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE 6EOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.**

**(NAD) 83 (UTM) ZONE 17 COORDS:**  
**WELL 1H TOP HOLE INFORMATION:**  
 N: 4,335,957m E: 508,716m  
**BOTTOM HOLE INFORMATION:**  
 N: 4,332,316m E: 510,011m



WV NORTH ZONE GRID NORTH

- NOTE**
1. NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHELTER DAIRY CATTLE OR POULTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY-FIVE (625) FEET OF THE CENTER OF THE WELL PAD.
  2. TOP HOLE DATA SHOWN HEREON WAS PROVIDED BY
  3. AS DRILLED DATA WAS PROVIDED BY ANTERO RESOURCES CORPORATION.
  4. WLS IS NOT CERTIFYING THE DATA AND INFORMATION PROVIDED LISTED IN NOTES 2 AND 3, ONLY THE RELATIONSHIP TO THE DATA AND INFORMATION PROVIDED TO THE LEASE BOUNDARIES.
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JOB # **14-127WA**  
 DRAWING # **HUGHESRIVER1HAD**  
 SCALE **1" = 2000'**  
 MINIMUM DEGREE OF ACCURACY **SUBMETER**  
 PROVEN SOURCE OF ELEV. **SUBMETER MAPPING GRADE GPS**  
 STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



**STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**WILLOW LAND SURVEYING PLLC**  
 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415

**LEGEND**  
 - - - - - Surface Owner Boundary Lines +/-  
 - - - - - Interior Surface Tracts +/-  
 O - - - - - Proposed Well Path  
 O - - - - - As Drilled Well Path

*Thomas Summers*  
 THOMAS SUMMERS P.S. 2109  
 DATE **11/20/19**  
 OPERATOR'S WELL# **HUGHES RIVER UNIT #1H**

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL   
 (IF "GAS") PRODUCTION  STORAGE  DEEP  SHALLOW   
 LOCATION: ELEVATION **945.5' AS BUILT** WATERSHED **SOUTH FORK HUGHES RIVER**  
 QUADRANGLE **PULLMAN 7.5'** DISTRICT **UNION**  
 SURFACE OWNER **LYNWOOD IRELAND ET AL**  
 OIL & GAS ROYALTY OWNER **BELLE PRITCHARD; W. P. IRELAND ET UX;**  
**C. C. DAVIS ET AL; JOYCE E. WEBER; CHARLES CARSON; ELBERT SHEETS HEIRS;**  
**MICHAEL I. SPIKER ET AL; YVONNE JOYCE RIGGLEMAN; AI G. KELLEY; L. M. EHRET ET UX**  
 PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE   
 PLUG OFF OLD FORMATION  PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY) **AS DRILLED** PLUG & ABANDON  CLEAN OUT & REPLUG   
 TARGET FORMATION **MARCELLUS** ESTIMATED DEPTH **6,354' TVD 19,320' MD**  
 WELL OPERATOR **ANTERO RESOURCES CORP.** DESIGNATED AGENT **DIANNA STAMPER**  
 ADDRESS **1615 WYNKOOP STREET** ADDRESS **CT CORPORATION SYSTEM**  
**DENVER, CO 80202** **5400 D BIG TYLER ROAD**  
**CHARLESTON, WV 25313**

API WELL # **47 - 085 - 10369**  
 STATE COUNTY PERMIT  
 COUNTY **RITCHIE**  
 ACREAGE **144.276 ACRES +/-**  
 LEASE ACREAGE **415 AC±; 222 AC±; 130 AC±; 445.67 AC±; 71.95 AC±; 70.25 AC±; 84.14 AC±; 35.5 AC±; 100 AC±; 234 AC±**

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6,881'

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9,754' TO BOTTOM HOLE

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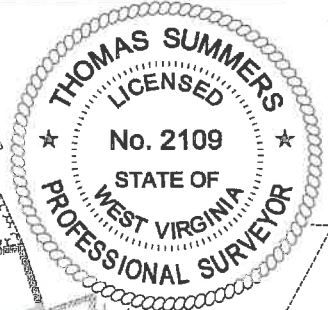
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# Antero Resources Corporation Well No. Hughes River Unit 1H

WELL NO. 1H

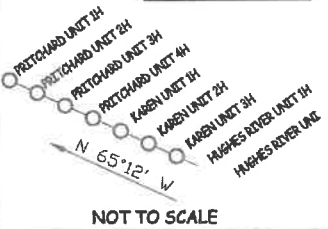
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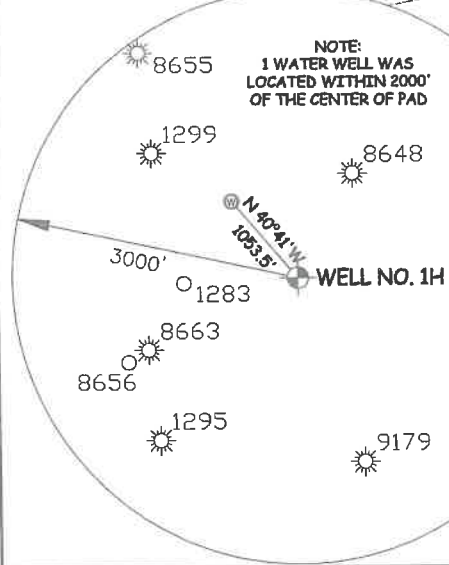


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### PAD LAYOUT



NOT TO SCALE



**NOTE:**  
 1 WATER WELL WAS LOCATED WITHIN 2000' OF THE CENTER OF PAD

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**FORM WW-6** **CHARLESTON, WV 25313**

COUNTY NAME PERMIT