

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

API 47-095-02687 County Tyler District Ellsworth  
Quad Shirley & Porter Falls Pad Name Blizzard Field/Pool Name ----  
Farm name Roger D Blizzard & Ruth E Spencer Well Number Loraina 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 4372163m Easting 512860m  
Landing Point of Curve Northing 4372303.63m Easting 512594.53m  
Bottom Hole Northing 4376814m Easting 511045m

Elevation (ft) 1004' 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

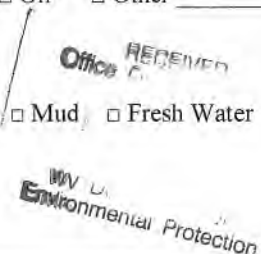
Date permit issued 3/20/2020 Date drilling commenced 6/4/2020 Date drilling ceased 6/26/2020  
Date completion activities began 8/30/2020 Date completion activities ceased 11/13/2020  
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

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

Freshwater depth(s) ft 16' Open mine(s) (Y/N) depths No  
Salt water depth(s) ft 1430', 1813' 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

**APPROVED**

Reviewed by: Smiley  
3/1/23  
**07/21/2023**



API 47-095 - 02687 Farm name Roger D Blizzard & Ruth E Spencer Well number Loraina 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	24"	20"	80'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	509'	New	54.5#, J-55	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2600'	New	36#, K-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	22660'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	6744'		4.7#, P-110		
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>2</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	Class A	204 sx	15.6	1.18	241	0'	8 Hrs.
Surface	Class A	565 sx	15.6	1.20	635	0'	8 Hrs.
Coal							
Intermediate 1	Class A	880 sx	15.6	1.19	1082	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	792 sx (Lead) 3536 sx (Tail)	13.5 (Lead), 15.2(Tail)	1.4 (Lead), 1.6 (Tail)	3003	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 22705' MD, 6403' TVD (BHL), 6502' (Deepest Point Drilled) Loggers TD (ft) 22705' MD  
 Deepest formation penetrated Marcellus Plug back to (ft) N/A  
 Plug back procedure N/A

Kick off depth (ft) 5813'

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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JMK  
3/19/23





API 47- 095 - 02687 Farm name Roger D Blizzard & Ruth E Spencer Well number Loraina 2H

PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6452' (TOP)	TVD	6800' (TOP) MD

Please insert additional pages as applicable.

GAS TEST  Build up  Drawdown  Open Flow OIL TEST  Flow  Pump

SHUT-IN PRESSURE Surface 1307 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW Gas 16611 mcfd Oil 680 bpd NGL --- bpd Water 1324 bpd GAS MEASURED BY  Estimated  Orifice  Pilot

LITHOLOGY/ FORMATION	TOP		BOTTOM		DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H <sub>2</sub> 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 H & P Drilling  
Address 912 N Eagle Valley Rd City Howard State PA Zip 16841

Logging Company KLX Energy  
Address 1415 Louisiana St, Suite 2900 City Houston State TX Zip 77002

Cementing Company Schlumberger Oilfield Services  
Address 300 Schlumberger Dr City Sugarland State TX Zip 77478

Stimulating Company Halliburton  
Address 3000 W. Sam Houston Pkwy City Houston State TX Zip 76114

Please insert additional pages as applicable.

Completed by Carly Marvel Telephone 303-357-7373  
Signature *Carly Marvel* Title Permitting Agent Date 2/6/2023

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

07/21/2023 *JM*

**Exhibit 1**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	8/30/2020	22588.3	22545.2	60	Marcellus
2	8/31/2020	22506.0303	22338.1818	60	Marcellus
3	8/31/2020	22302.21212	22134.3636	60	Marcellus
4	9/1/2020	22098.39394	21930.5455	60	Marcellus
5	9/1/2020	21894.57576	21726.7273	60	Marcellus
6	9/2/2020	21690.75758	21522.9091	60	Marcellus
7	9/2/2020	21486.93939	21319.0909	60	Marcellus
8	9/3/2020	21283.12121	21115.2727	60	Marcellus
9	9/3/2020	21079.30303	20911.4545	60	Marcellus
10	9/4/2020	20875.48485	20707.6364	60	Marcellus
11	9/4/2020	20671.66667	20503.8182	60	Marcellus
12	9/5/2020	20467.84848	20300	60	Marcellus
13	9/5/2020	20264.0303	20096.1818	60	Marcellus
14	9/5/2020	20060.21212	19892.3636	60	Marcellus
15	9/6/2020	19856.39394	19688.5455	60	Marcellus
16	9/6/2020	19652.57576	19484.7273	60	Marcellus
17	9/7/2020	19448.75758	19280.9091	60	Marcellus
18	9/7/2020	19244.93939	19077.0909	60	Marcellus
19	9/8/2020	19041.12121	18873.2727	60	Marcellus
20	9/8/2020	18837.30303	18669.4545	60	Marcellus
21	9/8/2020	18633.48485	18465.6364	60	Marcellus
22	9/9/2020	18429.66667	18261.8182	60	Marcellus
23	9/9/2020	18225.84848	18058	60	Marcellus
24	9/10/2020	18022.0303	17854.1818	60	Marcellus
25	9/10/2020	17818.21212	17650.3636	60	Marcellus
26	9/10/2020	17614.39394	17446.5455	60	Marcellus
27	9/11/2020	17410.57576	17242.7273	60	Marcellus
28	9/12/2020	17206.75758	17038.9091	60	Marcellus
29	9/12/2020	17002.93939	16835.0909	60	Marcellus
30	9/12/2020	16799.12121	16631.2727	60	Marcellus
31	9/13/2020	16595.30303	16427.4545	60	Marcellus
32	9/13/2020	16391.48485	16223.6364	60	Marcellus
33	9/14/2020	16187.66667	16019.8182	60	Marcellus
34	9/14/2020	15983.84848	15816	60	Marcellus
35	9/14/2020	15780.0303	15612.1818	60	Marcellus
36	9/15/2020	15576.21212	15408.3636	60	Marcellus
37	9/15/2020	15372.39394	15204.5455	60	Marcellus
38	9/16/2020	15168.57576	15000.7273	60	Marcellus
39	9/16/2020	14964.75758	14796.9091	60	Marcellus
40	9/17/2020	14760.93939	14593.0909	60	Marcellus
41	9/17/2020	14557.12121	14389.2727	60	Marcellus
42	9/17/2020	14353.30303	14185.4545	60	Marcellus
43	9/17/2020	14149.48485	13981.6364	60	Marcellus
44	9/17/2020	13945.66667	13777.8182	60	Marcellus
45	9/18/2020	13741.84848	13574	60	Marcellus
46	9/18/2020	13538.0303	13370.1818	60	Marcellus
47	9/18/2020	13334.21212	13166.3636	60	Marcellus
48	9/18/2020	13130.39394	12962.5455	60	Marcellus
49	9/19/2020	12926.57576	12758.7273	60	Marcellus
50	9/19/2020	12722.75758	12554.9091	60	Marcellus
51	9/19/2020	12518.93939	12351.0909	60	Marcellus
52	9/19/2020	12315.12121	12147.2727	60	Marcellus
53	9/20/2020	12111.30303	11943.4545	60	Marcellus
54	9/20/2020	11907.48485	11739.6364	60	Marcellus
55	9/20/2020	11703.66667	11535.8182	60	Marcellus
56	9/20/2020	11499.84848	11332	60	Marcellus
57	9/20/2020	11296.0303	11128.1818	60	Marcellus
58	9/20/2020	11092.21212	10924.3636	60	Marcellus
59	9/21/2020	10888.39394	10720.5455	60	Marcellus
60	9/21/2020	10684.57576	10516.7273	60	Marcellus
61	9/21/2020	10480.75758	10312.9091	60	Marcellus
62	9/21/2020	10276.93939	10109.0909	60	Marcellus
63	9/21/2020	10073.12121	9905.27273	60	Marcellus
64	9/22/2020	9869.30303	9701.45455	60	Marcellus
65	9/22/2020	9665.484848	9497.63636	60	Marcellus
66	9/22/2020	9461.66667	9293.81818	60	Marcellus
67	9/22/2020	9257.848485	9090	60	Marcellus
68	9/22/2020	9054.030303	8886.18182	60	Marcellus
69	9/23/2020	8850.212121	8682.36364	60	Marcellus
70	9/23/2020	8646.393939	8478.54545	60	Marcellus
71	9/23/2020	8442.575758	8274.72727	60	Marcellus
72	9/23/2020	8238.757576	8070.90909	60	Marcellus
73	9/23/2020	8034.939394	7867.09091	60	Marcellus
74	9/23/2020	7831.121212	7663.27273	60	Marcellus
75	9/24/2020	7627.30303	7459.45455	60	Marcellus
76	9/24/2020	7423.484848	7255.63636	60	Marcellus
77	9/24/2020	7219.66667	7051.81818	60	Marcellus
78	9/24/2020	7015.848485	6848	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	8/30/2020	63.76	9284	9378	3464	180320	236817	N/A
2	8/31/2020	87.78	10076	5999	4201	405270	306741	N/A
3	8/31/2020	87.03	9994	5524	4148	402910	302927	N/A
4	9/1/2020	63.88	8425	5748	4082	403240	401509	N/A
5	9/1/2020	89.27	9872	4658	4084	400700	310074	N/A
6	9/2/2020	90.36	10058	5445	4292	402970	303830	N/A
7	9/2/2020	93.93	9417	5442	4611	401630	324085	N/A
8	9/3/2020	90.33	10042	5725	4373	409140	300709	N/A
9	9/3/2020	91.59	9880	5730	4296	406150	296525	N/A
10	9/4/2020	93.39	9799	5493	4391	407680	302963	N/A
11	9/4/2020	86.1	9283	4429	4072	401910	306494	N/A
12	9/5/2020	91.39	9770	5574	4101	403370	299594	N/A
13	9/5/2020	87.52	10091	5237	4212	405440	295641	N/A
14	9/5/2020	92.74	9955	5418	3745	402520	298076	N/A
15	9/6/2020	91.72	10083	5630	4190	401760	297966	N/A
16	9/6/2020	91.04	9912	5128	4245	405750	299134	N/A
17	9/7/2020	92.26	10011	5864	4152	402940	298693	N/A
18	9/7/2020	85.86	9470	5790	3873	404460	293805	N/A
19	9/8/2020	90.83	9962	5744	4083	407030	293601	N/A
20	9/8/2020	89.99	9683	5046	3984	407600	297721	N/A
21	9/8/2020	93.25	9964	5983	3935	403990	291998	N/A
22	9/9/2020	93.02	10117	5519	4096	410650	303303	N/A
23	9/9/2020	93.91	9783	5464	3876	404360	294586	N/A
24	9/10/2020	92.94	9773	4688	3938	403490	291602	N/A
25	9/10/2020	92.78	9307	5596	4052	402130	295974	N/A
26	9/10/2020	96.7	9815	5596	3923	402870	308908	N/A
27	9/11/2020	93.7	9862	4721	3882	404330	293743	N/A
28	9/12/2020	93	9925	5548	3966	408080	289626	N/A
29	9/12/2020	94.65	9821	4725	4192	408130	290265	N/A
30	9/12/2020	90.61	9725	4686	4049	404790	293925	N/A
31	9/13/2020	96.41	9717	5522	4209	404430	291408	N/A
32	9/13/2020	94.18	9697	4447	4189	402280	288213	N/A
33	9/14/2020	96.38	9896	5651	4299	406920	285688	N/A
34	9/14/2020	95.67	9846	5725	4067	404300	287428	N/A
35	9/14/2020	96.71	9727	5983	3930	403970	281413	N/A
36	9/15/2020	97.34	9681	5917	3874	403820	288079	N/A
37	9/15/2020	93.97	8692	5692	4417	404170	287694	N/A
38	9/16/2020	96.84	9006	4145	4322	404600	278645	N/A
39	9/16/2020	93.03	9074	5505	3937	401510	286335	N/A
40	9/17/2020	93.38	8968	4092	3973	405580	294025	N/A
41	9/17/2020	95.93	9102	5240	3911	409590	291713	N/A
42	9/17/2020	94.51	9010	5680	4177	406490	281138	N/A
43	9/17/2020	94.96	8678	4760	3971	402090	281491	N/A
44	9/17/2020	95.46	8810	4363	3688	404670	285994	N/A
45	9/18/2020	95.51	8674	4835	3898	402500	286658	N/A
46	9/18/2020	97.28	8923	4480	4106	400430	281909	N/A
47	9/18/2020	94.85	8860	5170	3932	402050	284109	N/A
48	9/18/2020	94.49	8846	6061	4038	402480	285965	N/A
49	9/19/2020	95.66	8820	5914	4053	401980	290274	N/A
50	9/19/2020	95.54	8633	6062	4229	400920	277834	N/A
51	9/19/2020	96.74	8537	5801	4370	403750	280498	N/A
52	9/19/2020	96.79	8483	5726	3830	402000	284882	N/A
53	9/20/2020	97.36	8713	4053	3970	402070	281982	N/A
54	9/20/2020	96.71	8506	4707	3697	401670	282777	N/A
55	9/20/2020	95.39	8477	5939	4075	401710	279195	N/A
56	9/20/2020	96.46	8364	5595	3946	402930	278463	N/A
57	9/20/2020	95.49	8263	5550	4058	401560	279694	N/A
58	9/20/2020	95.95	8208	5565	4154	403040	281561	N/A
59	9/21/2020	96.07	8167	5703	4026	401590	280045	N/A
60	9/21/2020	96.21	8386	5708	4294	402550	275886	N/A
61	9/21/2020	95.22	8440	5202	3981	401690	274272	N/A
62	9/21/2020	96.22	8453	6335	3750	406350	282790	N/A
63	9/21/2020	98.24	8632	4489	3947	404350	282117	N/A
64	9/22/2020	97.63	8482	5385	3834	408860	281856	N/A
65	9/22/2020	97.33	8114	5592	3977	406680	282831	N/A
66	9/22/2020	98.41	8638	5934	4098	405920	284145	N/A
67	9/22/2020	98.16	8126	5677	3960	402580	283959	N/A
68	9/22/2020	96.57	8001	5763	3997	400320	307831	N/A
69	9/23/2020	98.32	8088	4868	3689	409070	285642	N/A
70	9/23/2020	98	7894	5351	3992	405790	284654	N/A
71	9/23/2020	97.74	8011	5975	3910	403420	283968	N/A
72	9/23/2020	97.5	8422	5972	3649	401180	275239	N/A
73	9/23/2020	98.54	8255	5811	4705	402630	275970	N/A
74	9/23/2020	98.07	8124	6579	3912	402190	279311	N/A
75	9/24/2020	98.19	7724	5566	3667	401140	279320	N/A
76	9/24/2020	98.54	7715	5688	4064	404270	279070	N/A
77	9/24/2020	97.83	7755	5501	4161	402860	280317	N/A
78	9/24/2020	97.41	7877	6075	3917	402860	280081	N/A
	AVG=	94	9,060	5,473	4,043	401,890	22,625,204	TOTAL

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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
Shaley Sandstone	74	214	74	214
Sandy Shale	214	364	214	364
Shaley Sandstone	364	514	364	514
Limestone, Tr Shale	514	544	514	544
Sandstone	544	664	544	664
Limestone, Tr Coal	664	694	664	694
Shaley Sandstone, Tr Coal	694	784	694	784
Shale, Tr Sandstone	784	1,204	784	1,204
Sandy Shale, Limestone, Tr Coal	1,204	1,354	1,204	1,354
Sandy Shale	1,354	1,504	1,354	1,504
Sandstone, Tr Shale, Tr Coal	1,504	1,624	1,504	1,624
Sandy Shale	1,624	1,834	1,624	1,834
Shaly Sandstone, Tr coal	1,834	1,852	1,834	1,852
Big Lime	1,878	2,612	1,878	2,612
Fifty Foot Sandstone	2,612	2,693	2,612	2,693
Gordon	2,693	2,997	2,693	2,997
Fifth Sandstone	2,997	3,058	2,997	3,058
Bayard	3,058	3,863	3,058	3,869
Speechley	3,863	4,172	3,869	4,181
Balltown	4,172	4,531	4,181	4,544
Bradford	4,531	4,945	4,544	4,963
Benson	4,945	5,170	4,963	5,191
Alexander	5,170	6,308	5,191	6,407
Sycamore	6,171	6,282	6,231	6,381
Middlesex	6,282	6,377	6,381	6,556
Burkett	6,377	6,400	6,556	6,615
Tully	6,400	6,452	6,615	6,800
Marcellus	6,452	NA	6,800	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.

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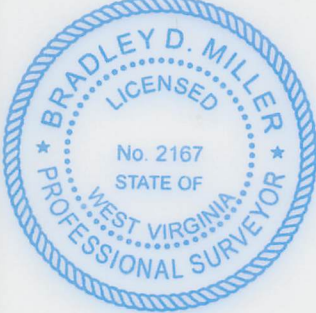
**Antero Resources**  
**Well No. Loraina 2H**  
 As-Drilled  
 Antero Resources Corporation



Loraina Unit 2H  
 POE Coordinates  
 West Virginia  
 Coordinate System  
 of 1927, North Zone  
 N: 367,192.66'  
 E: 1,618,071.39'  
 Latitude: 39°30'00.94"  
 Longitude: 80°51'12.66"  
 UTM Zone 17, NAD 1983  
 N: 4,372,312.363m  
 E: 512,609.310m

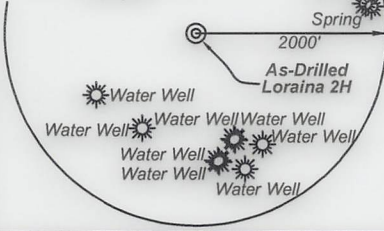
I, the undersigned, hereby certify that this  
 plat is correct to the best of my  
 knowledge and belief and shows all the  
 information required by law and the rules  
 issued and prescribed by the  
 Department of Environmental Protection.

*Bradley D. Miller*  
 Bradley D. Miller, P.S. 2167



SEAL

Note: 8 water wells and 2 springs  
 were found within 2000' of  
 proposed well. No occupied  
 dwellings or buildings 2,500  
 square feet or larger used to  
 house or shelter dairy cattle or  
 poultry husbandry are located  
 within 625' of the center of the  
 well pad.



Legend	
	As-Drilled gas well
	Monument, as noted
	Existing Well, as noted
	Creek or Drain
	Road
	Surface boundary (approx.)
	Interior surface tracts (approx.)
	District Line

10,804' to Bottom Hole

4,872' to Top Hole

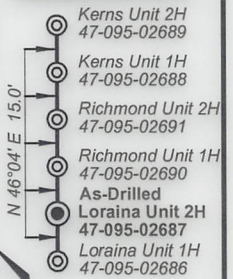
TOP HOLE LATITUDE 39 - 30 - 00  
 BTM HOLE LATITUDE 39 - 32 - 30

**Notes**  
 West Virginia Coordinate System  
 of 1927, North Zone  
 based upon Differential GPS Measurements.  
 Well No. Loraina Unit 2H Top Hole coordinates are  
 N: 366,690.25' Latitude: 39°29'56.09"  
 E: 1,618,886.88' Longitude: 80°51'02.15"  
 Bottom Hole coordinates are  
 N: 382,051.27' Latitude: 39°32'27.05"  
 E: 1,613,182.62' Longitude: 80°52'17.91"  
 UTM Zone 17, NAD 1983  
 Top Hole Coordinates Bottom Hole Coordinates  
 N: 4,372,163.455m N: 4,376,814.237m  
 E: 512,860.306m E: 511,044.502m  
 Plat orientation and corner and well references  
 are based upon the grid north meridian.  
 Well location references are based upon the magnetic  
 meridian.

LONGITUDE 80 - 50 - 00  
 396' to Top Hole  
 299' to Bottom Hole

Top Hole Coordinates,  
 As-drilled data, and  
 information was provided by  
 Antero Resources  
 Corporation. Allegheny  
 Surveys Inc. (ASI) is not  
 certifying the data and  
 information provided. ASI is  
 not responsible for any  
 errors or inaccuracies with  
 the data and information that  
 has been provided.

**Wellhead Layout (NTS)**



	Bearing	Dist.
L1	S 34°41' E	907.6'
L2	N 28°41' W	1,678.3'
L3	N 41°16' E	1,376.3'
L4	N 68°00' E	1,156.1'

FILE NO: 43-54-E-19  
 DRAWING NO: Loraina 2H As-Drilled  
 SCALE: 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY:  
 Submeter  
 PROVEN SOURCE OF ELEVATION:  
 WVDOT, Harrisville, WV

**STATE OF WEST VIRGINIA**  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
**OIL AND GAS DIVISION**

DATE: December 28 2020  
 OPERATOR'S WELL NO. Loraina 2H  
 API WELL NO  
 47 - 095 - 02687  
 STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  
 (IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW  
 LOCATION: ELEVATION: As-Built 1,004' WATERSHED: Outlet Middle Island Creek QUADRANGLE: Porter Falls  
 DISTRICT: Ellsworth Patrica Ann Heintzman; Rockford Energy, LLC; Mary Carol Chamberlain;  
 Roger D. Blizzard; Ridgewood Development, LLC; Donald Lee Sharps; Nina & Philip Whitefield;  
 SURFACE OWNER: & Ruth E. Spencer Patsy J. Oliverio; A. Dewayne Matthews; Kevin S. Goff, et ux;  
 BRC Appalachian Minerals I, LLC; Sandra E. Merrigan;  
 ROYALTY OWNER: Heritage Resources Marcellus Minerals, LLC; B. Fred Hill Jr.; Reita Jane Hall; LEASE NO: ACREAGE: 102.62 131.94; 50.13542;  
 34.102; 30.7625; 100;  
 PROPOSED WORK:  DRILL  CONVERT  DRILL DEEPER  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  
 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY) As-Drilled  
 PLUG AND ABANDON  CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 6,403' TVD  
 22,705' MD

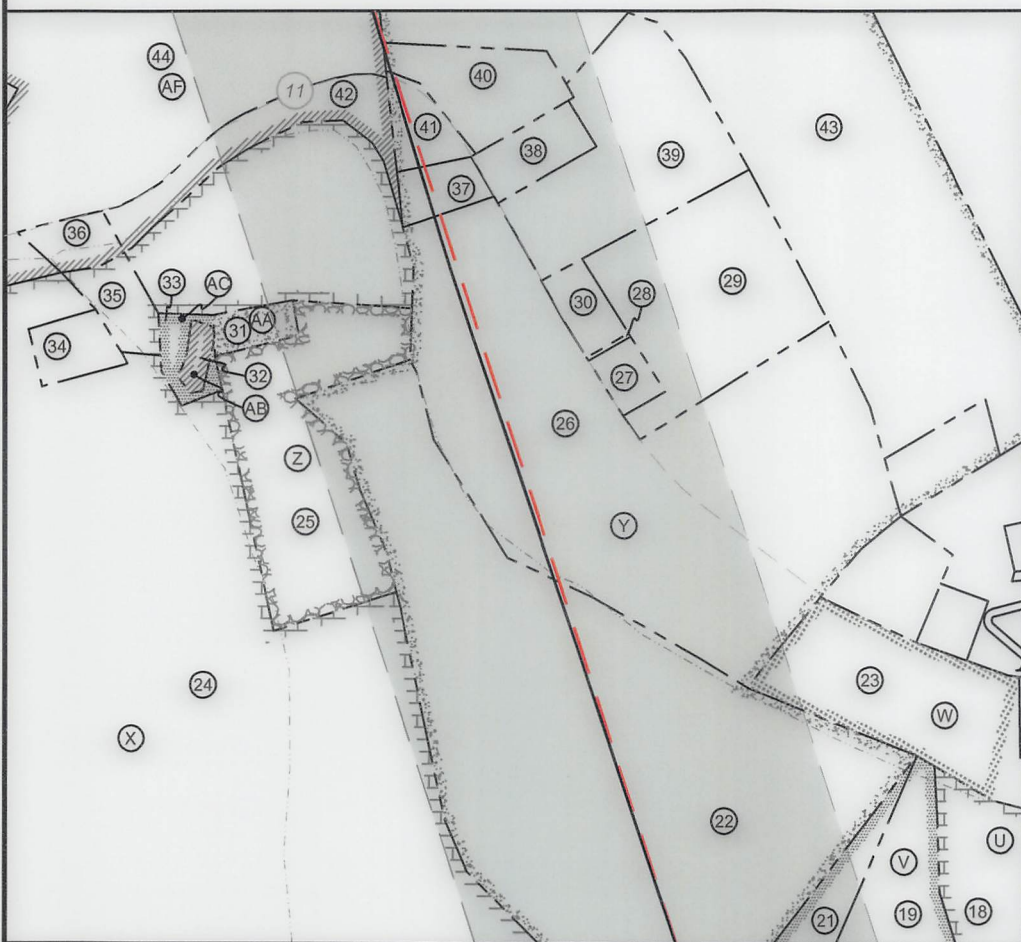
WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System  
 ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road  
 Denver, CO 80202 Charleston, WV 25313





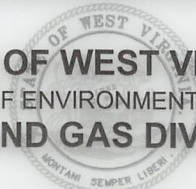
ID	TM/Par	Owner	Bk/Pg	Acres
1	15-33	Roger D. Blizzard, et al	340/170	102.62
2	15-34.1	Randy & Pamela L. Lancaster	370/776	11.417
3	15-34	Michael & Bente H. Biddle	294/537	82.34
4	15-30	Thomas C. Grinage, et ux	458/73	124.078
5	15-31	Roger D. Blizzard, et al	342/782	25
6	15-27	Ronald & Martha J. Greathouse	217/571	26
7	15-28	Charles Loy Jr., et al	379/140	9
8	15-29	Ronald & Martha J. Greathouse	214/124	15.75
9	15-12	Roger Matthes	319/22	61
10	15-15	David Mendenhall, et al	284/4	50
11	15-15.1	Robert M. Feldmeier, et ux	575/690	30
12	15-14	John W. & Leah D. Starkey	345/93	50.75
13	15-5	Earl H., Jr. & Bernadette Warriner	306/141	48.5
14	15-6	James F. & Connie L. Billiter, et al	288/325	59.5
15	15-2	John W. Eddy, Estate	71/13	49
16	10-59	Goldie A. Mathews	115/485	10.08
17	10-60	J.S. & Goldie A. Matthews	129/58	101.14
18	10-43	Kevin S. & Melinda S. Goff	431/799	100
19	10-42	Kevin S. & Melinda S. Goff	431/799	25.5
20	10-65	Daniel R. Deetz, et al	321/713	131.94
21	10-41	Kevin S. & Melinda S. Goff	431/799	2.66
22	10-36	Randy Lee & Mary Lou Michael	230/499	24.65
23	10-37.4	Kevin S. & Melinda S. Goff	425/830	7.5
24	10-35	Michael E. Neff	299/601	105.56
25	10-35.1	James H. & Mildred G. Bassett	220/370	8.12
26	10-15	Kevin S. Goff & Melinda S. Goff	423/695	18.50
27	10-16	Ruby M. Watson	256/45	0.488

ID	TM/Par	Owner	Bk/Pg	Acres
28	10-15.5	Ruby M. Watson	289/359	0.0292
29	10-15.7	Frank W., Jr. & Ruby M. Watson	317/383	5.226
30	10-15.4	Frank W., Jr. & Ruby M. Watson	343/309	0.65
31	10-35.2	Robert R. Bassett	269/703	0.48
32	10-35.6	Joseph C., Jr. & Vicky G. Snyder	317/551	0.24
33	10-35.3	James H. & Mildred G. Bassett	273/538	0.39
34	10-35.4	Mary Jane Woofler	319/73	0.75
35	10-35.5	Michael E. Neff	281/543	0.76
36	10-20	James & Mildred Bassett	311/637	0.72
37	10-15.3	Robert L. & Teresa Eddy	284/496	0.64
38	10-17	Sandra K. Metz	342/153	0.89
39	10-15.8	Frank & Ruby Watson	427/47	5.229
40	10-18	Wendy S. Gustavich	331/365	1.9
41	10-15.2	Sandra Metz	246/320	0.95
42	10-19.1	Sandra K. Metz	380/98	2.76
43	10-15.6	Wayne H. & Violet Mercer	317/378	35.82
44	10-19	James Bassett & Mildred Bassett	264/548	29.52
45	10-22	Michael V. and Debra K. Smith	335/619	59.42
46	10-21	Patricia Ann Heintzman	W13/384	3
47	10-3	Kevin S. & Melinda S. Goff	597/808	53.75
48	10-2	Patricia Ann Heintzman	W13/384	73.26
49	10-1	Patricia Ann Heintzman	150/15	48.50
50	10-64	John E Roberts	W30/108	100
51	6-36	Dennis & Clista Heintzman	297/640	417.6



Leases	
A	Heritage Resources Marcellus Minerals, LLC
B	Cliff & Virginia Perkins Irrevocable Trust
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D	B. Fred Hill Jr.
E	Karen F. Quinn
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K	Sandra E. Merrigan
L	John W. Kerns Heir Trust
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V	Kevin S. Goff, et ux
W	Kevin S. Goff, et ux
X	Michael E. Neff
Y	Ridgewood Development LLC
Z	James H. Bassett, et ux
AA	Richard Basset
AB	Melvin L. Nichols, et ux
AC	James H. Basset, et ux
AE	Paul A., Jr. & Phyllis V. Marks
AF	Donald Lee Sharps
AG	Nina & Phillip Whitefield
AH	Patricia Ann Heintzman
AI	Patricia Ann Heintzman
AJ	John E. Roberts
AK	Norma Smith

FILE NO: 43-54-E-19  
 DRAWING NO: Loraina 2H As-Drilled  
 SCALE: 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY:  
 Submeter  
 PROVEN SOURCE OF ELEVATION:  
 WVDOT, Harrisville, WV

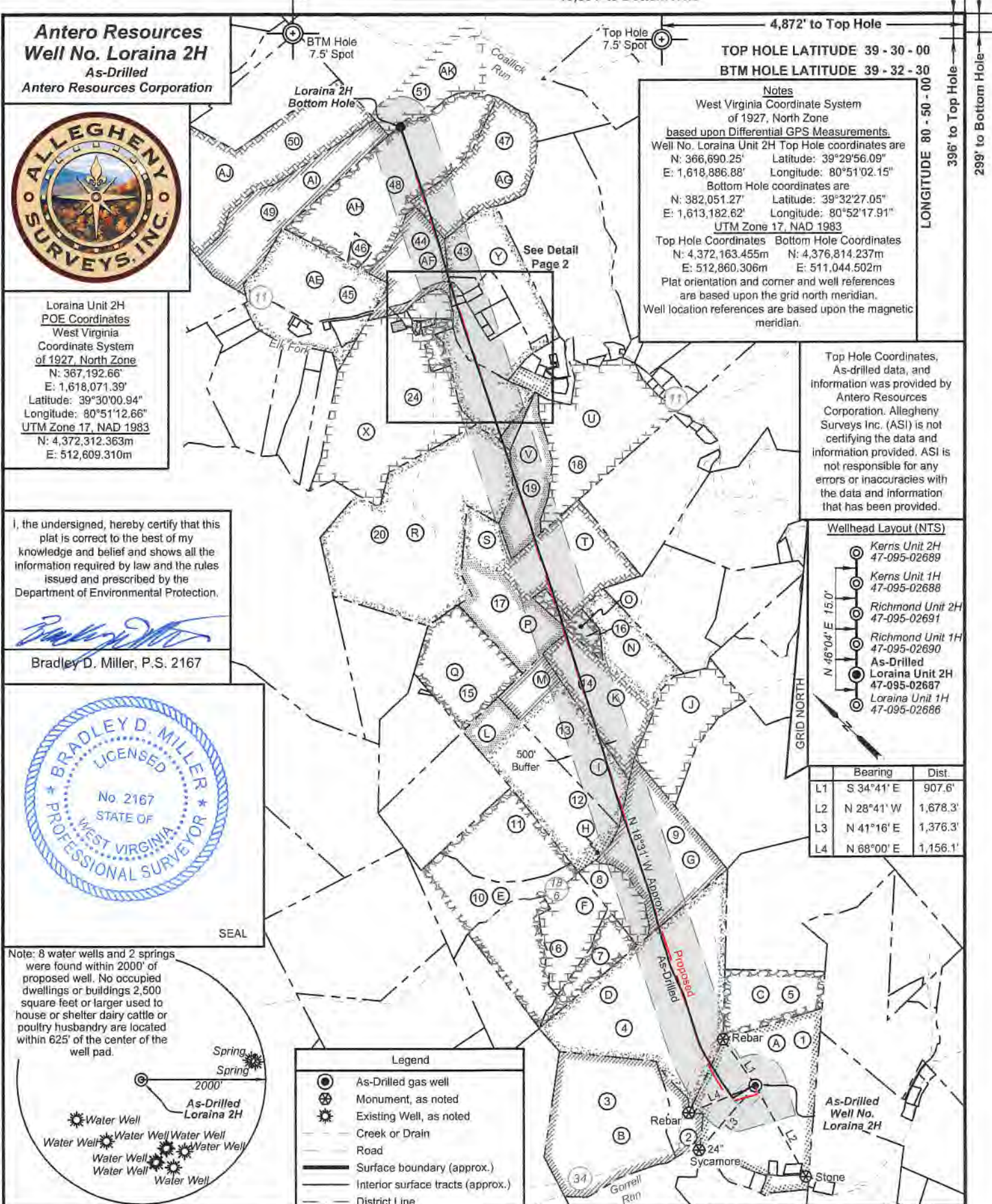
  
**STATE OF WEST VIRGINIA**  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
**OIL AND GAS DIVISION**

DATE: December 28 2020  
 OPERATOR'S WELL NO. Loraina 2H  
 API WELL NO  
 47 - 095 - 02687  
 STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  
 (IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW  
 LOCATION: ELEVATION: As-Built 1,004' WATERSHED: Outlet Middle Island Creek QUADRANGLE: Porter Falls  
 DISTRICT: Ellsworth  
 SURFACE OWNER: Roger D. Blizzard; Patricia Ann Heintzman; Rockford Energy, LLC; Mary Carol Chamberlain; Ridgewood Development, LLC; Donald Lee Sharps; Nina & Philip Whitefield;  
 & Ruth E. Spencer; Patsy J. Oliverio; A. Dewayne Matthews; Kevin S. Goff, et ux;  
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 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY) As-Drilled  
 PLUG AND ABANDON  CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 6,403' TVD  
 22,705' MD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System  
 ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road  
 Denver, CO 80202 Charleston, WV 25313





**Antero Resources**  
**Well No. Loraina 2H**  
 As-Drilled  
 Antero Resources Corporation

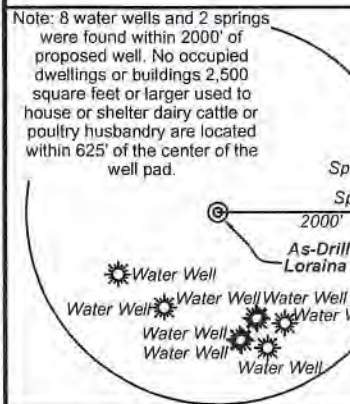


Loraina Unit 2H  
 POE Coordinates  
 West Virginia  
 Coordinate System  
 of 1927, North Zone  
 N: 367,192.66'  
 E: 1,618,071.39'  
 Latitude: 39°30'00.94"  
 Longitude: 80°51'12.66"  
 UTM Zone 17, NAD 1983  
 N: 4,372,312.363m  
 E: 512,609.310m

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 prescribed by the  
 Department of Environmental Protection.

*Bradley D. Miller*

Bradley D. Miller, P.S. 2167



10,804' to Bottom Hole

4,872' to Top Hole

TOP HOLE LATITUDE 39 - 30 - 00  
 BTM HOLE LATITUDE 39 - 32 - 30

Notes  
 West Virginia Coordinate System  
 of 1927, North Zone  
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 Well No. Loraina Unit 2H Top Hole coordinates are  
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 Top Hole Coordinates Bottom Hole Coordinates  
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Wellhead Layout (NTS)

Bearing	Dist.
L1 S 34°41' E	907.6'
L2 N 28°41' W	1,678.3'
L3 N 41°16' E	1,376.3'
L4 N 68°00' E	1,156.1'

Legend

- As-Drilled gas well
- ⊗ Monument, as noted
- ⊙ Existing Well, as noted
- Creek or Drain
- Road
- Surface boundary (approx.)
- Interior surface tracts (approx.)
- District Line

FILE NO: 43-54-E-19  
 DRAWING NO: Loraina 2H As-Drilled  
 SCALE: 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY:  
 Submeter  
 PROVEN SOURCE OF ELEVATION:  
 WVDOT, Harrisville, WV

**STATE OF WEST VIRGINIA**  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
**OIL AND GAS DIVISION**

DATE: December 28 2020  
 OPERATOR'S WELL NO. Loraina 2H  
 API WELL NO  
 47 - 095 - 02687  
 STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  
 (IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW

LOCATION: ELEVATION: As-Built 1,004' WATERSHED: Outlet Middle Island Creek QUADRANGLE: Porter Falls  
 DISTRICT: Ellsworth Patrica Ann Heintzman; Rockford Energy, LLC; Mary Carol Chamberlain;  
 SURFACE OWNER: Roger D. Blizzard Ridgewood Development, LLC; Donald Lee Sharps; Nina & Philip Whitefield;  
 & Ruth E. Spencer Patsy J. Oliverio; A. Dewayne Matthews; Kevin S. Goff, et ux; ACREAGE: 102.62  
 ROYALTY OWNER: Heritage Resources Marcellus Minerals, LLC; B. Fred Hill Jr.; Reita Jane Hall; LEASE NO: \_\_\_\_\_ ACREAGE: 32.28; 53.75; 76.25

PROPOSED WORK:  DRILL  CONVERT  DRILL DEEPER  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  
 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY) As-Drilled  
 PLUG AND ABANDON  CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 22,705' MD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System  
 ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road  
Denver, CO 80202 Charleston, WV 25313





ID	TM/Par	Owner	Bk/Pg	Acres
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7	15-28	Charles Loy Jr., et al	379/140	9
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14	15-6	James F. & Connie L. Billiter, et al	288/325	59.5
15	15-2	John W. Eddy, Estate	71/13	49
16	10-59	Goldie A. Mathews	115/485	10.08
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19	10-42	Kevin S. & Melinda S. Goff	431/799	25.5
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23	10-37.4	Kevin S. & Melinda S. Goff	425/830	7.5
24	10-35	Michael E. Neff	299/601	105.56
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26	10-15	Kevin S. Goff & Melinda S. Goff	423/695	18.50
27	10-16	Ruby M. Watson	256/45	0.488

ID	TM/Par	Owner	Bk/Pg	Acres
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36	10-20	James & Mildred Bassett	311/637	0.72
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38	10-17	Sandra K. Metz	342/153	0.89
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51	6-36	Dennis & Clista Heintzman	297/640	417.6



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D	B. Fred Hill Jr.
E	Karen F. Quinn
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H	John W. Starkey, et ux
I	BRC Appalachian Mineral I LLC
J	Dale E. Pipes
K	Sandra E. Merrigan
L	John W. Kerns Heir Trust
M	Allan Smith
N	David E. Bowyer
O	Rockford Energy, LLC
P	Mary Carol Chamberlain
Q	Bob Christen
R	Patsy J. Oliverio
S	Michael Allen Eddy
T	A. DeWayne Matthews
U	Susan Ertel
V	Kevin S. Goff, et ux
W	Kevin S. Goff, et ux
X	Michael E. Neff
Y	Ridgewood Development LLC
Z	James H. Bassett, et ux
AA	Richard Bassett
AB	Melvin L. Nichols, et ux
AC	James H. Bassett, et ux
AE	Paul A., Jr. & Phyllis V. Marks
AF	Donald Lee Sharps
AG	Nina & Phillip Whitefield
AH	Patricia Ann Heintzman
AI	Patricia Ann Heintzman
AJ	John E. Roberts
AK	Norma Smith

FILE NO: 43-54-E-19  
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 SCALE: 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY:  
 Submeter  
 PROVEN SOURCE OF ELEVATION:  
 WVDOT, Harrisville, WV

**STATE OF WEST VIRGINIA**  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
**OIL AND GAS DIVISION**

DATE: December 28, 2020  
 OPERATOR'S WELL NO. Loraina 2H  
 API WELL NO  
 47 - 095 - 02687  
 STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  
 (IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW

LOCATION: ELEVATION: As-Built 1,004' WATERSHED: Outlet Middle Island Creek QUADRANGLE: Porter Falls

DISTRICT: Ellsworth  
Patricia Ann Heintzman; Rockford Energy, LLC; Mary Carol Chamberlain;  
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SURFACE OWNER: & Ruth E. Spencer  
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ROYALTY OWNER: Heritage Resources Marcellus Minerals, LLC; B. Fred Hill Jr.; Reita Jane Hall;

LEASE NO: \_\_\_\_\_ ACREAGE: 32.28; 53.75; 76.25

PROPOSED WORK:  DRILL  CONVERT  DRILL DEEPER  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  
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PLUG AND ABANDON  CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 6,403' TVD 22,705' MD

WELL OPERATOR: Antero Resources Corporation  
 ADDRESS: 1615 Wynkoop Street  
 Denver, CO 80202

DESIGNATED AGENT: Dianna Stamper - CT Corporation System  
 ADDRESS: 5400 D Big Tyler Road  
 Charleston, WV 25313

COUNTY: Tyler  
 ACREAGE: 102.62  
131.94; 50.13542;  
 86.0; 48.33; 10.08;  
 34.102; 30.7625; 100;

*Handwritten signature/initials in blue ink.*



## Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	8/30/2020
Job End Date:	9/24/2020
State:	West Virginia
County:	Tyler
API Number:	47-095-02687-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	LORAINA 2H
Latitude:	39.49891400
Longitude:	-80.85060000
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,501
Total Base Water Volume (gal):	23,692,512
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
Produced Water	Halliburton	Base Fluid					
			Water	7732-18-5	100.00000	86.38392	Density = 8.50
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.16124	

SM



Sand-Common White-100 Mesh, SSA-2	Halliburton	Proppant					
				Listed Below			
HYDROCHLORI C ACID, 22 BAUME	Halliburton	Solvent					
				Listed Below			
OPTIFLO-II DELAYED RELEASE BREAKER	Halliburton	Breaker					
				Listed Below			
Excelerate LX-15	Halliburton	Friction Reducer					
				Listed Below			
WG-36 GELLING AGENT	Halliburton	Gelling Agent					
				Listed Below			
Sand-Premium White-40/70	Halliburton	Proppant					
				Listed Below			
MC B-8614	Halliburton	Biocide					
				Listed Below			
FLUID Enviro- Syn HCR-7000- WL	Fluid Energy Group	Acid Replacement					
				Listed Below			

HAI-501	Halliburton	Acid Corrosion Inhibitor					
				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	13.41977	
			Hydrochloric acid	7647-01-0	30.00000	0.03547	
			Complex Amine Compound	Proprietary	60.00000	0.03467	
			Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.01734	
			Guar gum	9000-30-0	100.00000	0.00475	
			Surfactant	Proprietary	5.00000	0.00289	
			Sobitan, mono-9-octadecenoate, (Z)	1338-43-8	5.00000	0.00289	
			Glutaraldehyde	111-30-8	30.00000	0.00250	
			Proprietary	Proprietary	20.00000	0.00138	
			Proprietary	Proprietary	10.00000	0.00069	
			Ethoxylated alcohols	Proprietary	5.00000	0.00059	
			Organic chloride compound	Proprietary	1.00000	0.00058	
			Alkoxyated polyhydric alcohol	Proprietary	1.00000	0.00058	
			Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1	5.00000	0.00042	
			Methanol	67-56-1	100.00000	0.00031	
			Ammonium persulfate	7727-54-0	100.00000	0.00010	
			Ethanol	64-17-5	1.00000	0.00008	
			Modified thiourea polymer	Proprietary	30.00000	0.00007	
			Mixture of dimer and trimer fatty acids of indefinite composition derived from tall oil	61790-12-3	30.00000	0.00007	
			Oxylated phenolic resin	Proprietary	30.00000	0.00003	



			Hexadecene	629-73-2	5.00000	0.00001	
			Propargyl alcohol	107-19-7	5.00000	0.00001	
			Phosphoric acid	7664-38-2	0.10000	0.00001	
			Organic salt #2	Proprietary	0.01000	0.00001	
			Sodium glycolate	2836-32-0	0.01000	0.00001	
			Nitrated acetate salt	Proprietary	0.01000	0.00001	
			Sodium hydroxide	1310-73-2	0.01000	0.00001	
			Formaldehyde	50-00-0	0.01000	0.00001	
			Organic salt #1	Proprietary	0.01000	0.00001	
			Acrylamide	79-06-1	0.01000	0.00001	
			C.I. pigment Orange 5	3468-63-1	1.00000	0.00000	

\* Total Water Volume sources may include various types of water including fresh water, produced water, and recycled water

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

\*\*\* If you are calculating a percentage of total ingredients do not add the water volume below the green line to the water volume above the green line

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)