

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

API 47 - 095 - 02659 County Tyler District McElroy  
Quad Shirley 7.5' Pad Name Colorado West Field/Pool Name ---  
Farm name Antero Resources Corporation Well Number Rockies 2H  
Operator (as registered with the OOG) Antero Resources Corporation  
Address 1615 Wynkoop St 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 4361453m Easting 518119m  
Landing Point of Curve Northing 517922.76m Easting 4361557.55m  
Bottom Hole Northing 4365183m Easting 516768m

Elevation (ft) 749' 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 11/7/2019 Date drilling commenced 1/11/2020 Date drilling ceased 3/26/2020  
Date completion activities began 2/18/2021 Date completion activities ceased 4/10/2021  
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 298 Open mine(s) (Y/N) depths N  
Salt water depth(s) ft 916 Void(s) encountered (Y/N) depths N  
Coal depth(s) ft None Identified Cavern(s) encountered (Y/N) depths N  
Is coal being mined in area (Y/N) N

**APPROVED**

Reviewed by: [Signature]  
3/16/23  
**06/09/2023**

WR-35  
Rev. 8/23/13

API 47-095 - 02659 Farm name Antero Resources Corporation Well number Rockies 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"	105'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	441'	New	54.5#, J-55	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	3060'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"	5-1/2"	19441'	New	20#, P-110	N/A	Y
Tubing		2-3/8"	6673'		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>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	Class A	204 sx	15.6	1.20	43	0	8 Hrs
Surface	Class A	354 sx	15.6	1.20	71	0	8 Hrs
Coal							
Intermediate 1	Class A	1063 sx	15.6	1.20	225	0	8 Hrs
Intermediate 2							
Intermediate 3							
Production	Class H	792 sx (Lead) 3076 sx (Tail)	13.5 (Lead), 15.2(Tail)	1.4 (Lead), 1.26 (Tail)	690	-500' into Intermediate Casing	8 Hrs
Tubing							

Drillers TD (ft) 19462' MD, 6418' TVD (BHL), 6429' (Deepest Point Drilled) Loggers TD (ft) 19462' MD  
 Deepest formation penetrated Marcellus Plug back to (ft) N/A  
 Plug back procedure N/A

Kick off depth (ft) 5650'

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 over 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 on 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 \_\_\_\_\_

06/09/2023

5/21/23

API 47- 095 - 02659 Farm name Antero Resources Corporation Well number Rockies 2H

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.

06/09/2023

3/16/23

WR-35  
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PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6354' (TOP)	TVD	6702' (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 6229 mcfpd Oil 90 bpd NGL --- bpd Water 1562 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)
	0		0		

**\*PLEASE SEE ATTACHED EXHIBIT 3**

Please insert additional pages as applicable.

Drilling Contractor Patterson Drilling Company  
Address 10713 West Sam Houston Parkway North City Houston State TX Zip 77064

Logging Company Nine Energy Services  
Address 6500 West Fwy City Fort Worth State TX Zip 76116

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 2/7/2023

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

06/09/2023

*Handwritten signature and date: 3/16/23*

LATITUDE 39°25'00"

11,226'

3,858' TO BOTTOM HOLE

LATITUDE 39°27'30"

Antero Resources Corporation Well No. Rockies Unit 2H

AS DRILLED DATA: WELL 2H TOP HOLE INFORMATION: N: 331,255ft E: 1,635,558ft ... BOTTOM HOLE INFORMATION: N: 343,569ft E: 1,631,328ft ... WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE.

(NAD) 83 (UTM) ZONE 17 COORDS: WELL 2H TOP HOLE INFORMATION: N: 4,361,453m E: 518,119m ... BOTTOM HOLE INFORMATION: N: 4,365,183m E: 516,768m

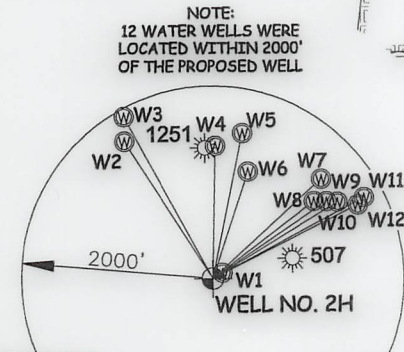
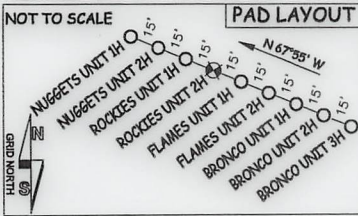
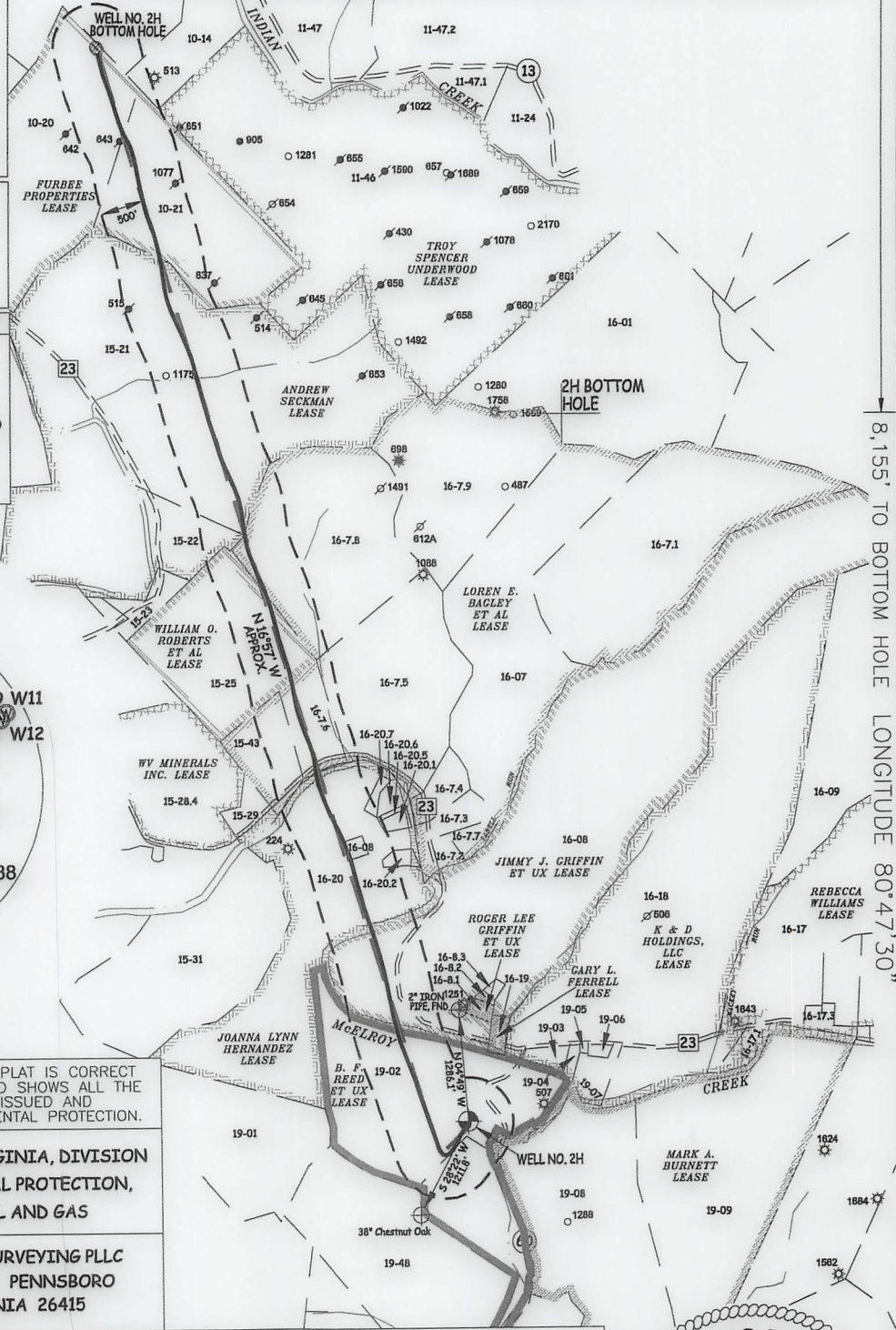


Table with 2 columns: Well ID (W1-W12) and coordinates (N, E, Dist). W1: N 58°50' E 116.6', W2: N 32°31' W 1698.8', etc.

Table with 6 columns: TM-Par, Surface Owner, and well numbers (15-29, 16-08, 16-20.5). Lists owners like Mitchell Herrick, Roger Weese, June Griffin, Susan Spencer, etc.



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.

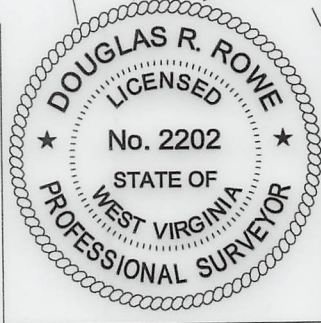


STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS. WILLOW LAND SURVEYING PLLC 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415

JOB # 19-004WA DRAWING # ROCKIES2HAD 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

LEGEND: Surface Owner Boundary Lines +/- Interior Surface Tracts +/- Proposed Well Path As Drilled Well Path. DOUGLAS R. ROWE P.S. 2202 DATE 06/09/21 OPERATOR'S WELL# ROCKIES UNIT #2H

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 ANTERO RESOURCES CORPORATION. 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. 5. WLS IS BY NO MEANS RESPONSIBLE FOR ANY ERRORS OR INACCURACIES WITH THE DATA AND INFORMATION THAT HAS BEEN PROVIDED.



WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL 47 - 095 - 02659 (IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X STATE COUNTY PERMIT LOCATION: ELEVATION 749' - AS BUILT WATERSHED McELROY CREEK QUADRANGLE SHIRLEY 7.5' DISTRICT McELROY COUNTY TIER COUNTY NAME SURFACE OWNER ANTERO RESOURCES CORPORATION ACREAGE 127.86 ACRES +/- OIL & GAS ROYALTY OWNER B.F. REED ET UX; JIMMY J. GRIFFIN ET UX; JOANNA LYNN HERNANDEZ LEASE ACREAGE 130 AC.±; 236 AC.±; 99.5 AC.±; LOREN E. BAGLEY ET AL; WILLIAM O. ROBERTS ET AL; ANDREW SECKMAN; FURBEE PROPERTIES 502.8 AC.±; 66.25 AC.±; 300 AC.±; 316 AC.± 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 6,418' TVD 19,462' MD WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM ADDRESS 1615 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD DENVER, CO 80202 CHARLESTON, WV 25313

WV NORTH ZONE GRID NORTH

5,230' LONGITUDE 80°45'00"

8,155' TO BOTTOM HOLE LONGITUDE 80°47'30"

LATITUDE 39°25'00"

11,226'

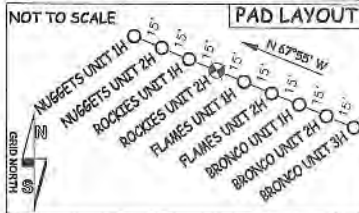
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NOTE: 12 WATER WELLS WERE LOCATED WITHIN 2000' OF THE PROPOSED WELL

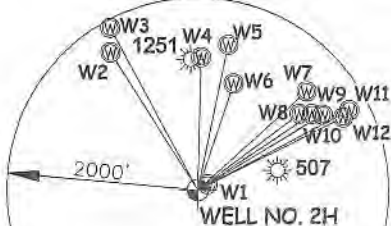
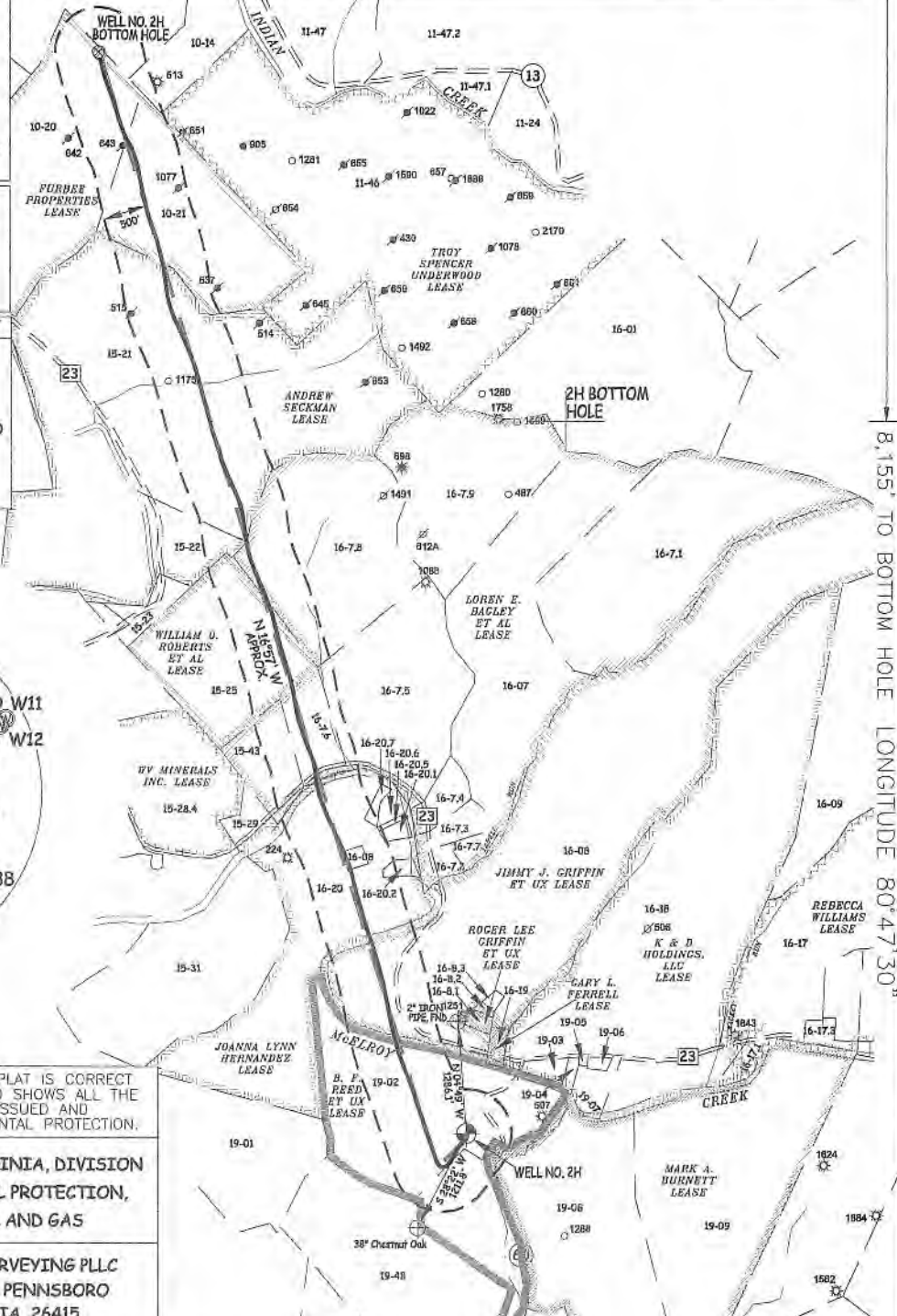


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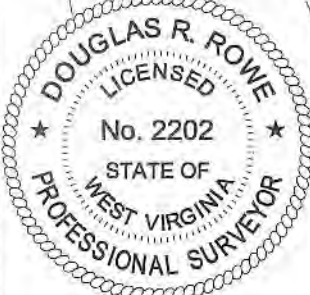
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WILLOW LAND SURVEYING PLLC 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415

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5,230' LONGITUDE 80°45'00"

8,155' TO BOTTOM HOLE LONGITUDE 80°47'30"

COUNTY NAME PERMIT

06/09/2023

API 47-095-02659 Farm Name Antero Resources Corporation Well Number Rockies Unit 2H

Exhibit 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	2/18/2021	19344.4	19300.9	36	Marcellus
2	2/18/2021	19261.04314	19047.902	36	Marcellus
3	2/19/2021	19010.04514	18796.904	36	Marcellus
4	2/19/2021	18759.04714	18545.906	36	Marcellus
5	2/19/2021	18508.04914	18294.908	36	Marcellus
6	2/19/2021	18257.05114	18043.91	36	Marcellus
7	2/20/2021	18006.05314	17792.912	36	Marcellus
8	2/20/2021	17755.05514	17541.914	36	Marcellus
9	2/20/2021	17504.05714	17290.916	36	Marcellus
10	2/20/2021	17253.05914	17039.918	36	Marcellus
11	2/21/2021	17002.06114	16788.92	36	Marcellus
12	2/21/2021	16751.06314	16537.922	36	Marcellus
13	2/21/2021	16500.06514	16286.924	36	Marcellus
14	2/21/2021	16249.06714	16035.926	36	Marcellus
15	2/22/2021	15998.06914	15784.928	36	Marcellus
16	2/22/2021	15747.07114	15533.93	36	Marcellus
17	2/22/2021	15496.07314	15282.932	36	Marcellus
18	2/22/2021	15245.07514	15031.934	36	Marcellus
19	2/23/2021	14994.07714	14780.936	36	Marcellus
20	2/23/2021	14743.07914	14529.938	36	Marcellus
21	2/23/2021	14492.08114	14278.94	36	Marcellus
22	2/23/2021	14241.08314	14027.942	36	Marcellus
23	2/24/2021	13990.08514	13776.944	36	Marcellus
24	2/24/2021	13739.08714	13525.946	36	Marcellus
25	2/24/2021	13488.08914	13274.948	36	Marcellus
26	2/25/2021	13237.09114	13023.95	36	Marcellus
27	2/25/2021	12986.09314	12772.952	36	Marcellus
28	2/25/2021	12735.09514	12521.954	36	Marcellus
29	2/25/2021	12484.09714	12270.956	36	Marcellus
30	2/26/2021	12233.09914	12019.958	36	Marcellus
31	2/26/2021	11982.10114	11768.96	36	Marcellus
32	2/26/2021	11731.10314	11517.962	36	Marcellus
33	2/26/2021	11480.10514	11266.964	36	Marcellus
34	2/27/2021	11229.10714	11015.966	36	Marcellus
35	2/27/2021	10978.10914	10764.968	36	Marcellus
36	2/28/2021	10727.11114	10513.97	36	Marcellus
37	2/28/2021	10476.11314	10262.972	36	Marcellus
38	3/1/2021	10225.11514	10011.974	36	Marcellus
39	3/2/2021	9974.117143	9760.976	36	Marcellus
40	3/2/2021	9723.119143	9509.978	36	Marcellus
41	3/3/2021	9472.121143	9258.98	36	Marcellus
42	3/4/2021	9221.123143	9007.982	36	Marcellus
43	3/4/2021	8970.125143	8756.984	36	Marcellus
44	3/5/2021	8719.127143	8505.986	36	Marcellus
45	3/5/2021	8468.129143	8254.988	36	Marcellus
46	3/6/2021	8217.131143	8003.99	36	Marcellus
47	3/6/2021	7966.133143	7752.992	36	Marcellus
48	3/6/2021	7715.135143	7501.994	36	Marcellus
49	3/7/2021	7464.137143	7250.996	36	Marcellus
50	3/7/2021	7213.139143	6999.998	36	Marcellus
51	3/8/2021	6962.141143	6749	36	Marcellus

06/09/2023

API 47-095-02659 Farm Name Antero Resources Corporation Well Number Rockies Unit 2H

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	2/18/2021	64.94	8189.43	8370.61	4252.5	182530	219432	N/A
2	2/18/2021	86.86	8574	6327	4787.04	507040	386305	N/A
3	2/19/2021	90.38	8408	6048	4535.45	497080	385736	N/A
4	2/19/2021	85.6	8055.96	4021.75	4428.05	509080	385372	N/A
5	2/19/2021	81.08	8104.3	5955.48	4008.39	505550	389323	N/A
6	2/19/2021	88.5	8478	5956	4643.05	502170	383039	N/A
7	2/20/2021	91.62	8484	7800	4298.45	509810	369087	N/A
8	2/20/2021	88.78	8397.55	0	4330.17	507440	468650	N/A
9	2/20/2021	87.56	8526.95	2867.55	4034.03	498915	370019	N/A
10	2/20/2021	84.12	8604	6413	4002.7	503200	363135	N/A
11	2/21/2021	76.87	8414.91	8375.61	4517.02	502950	429328	N/A
12	2/21/2021	78.6	8309.63	2821.76	4260.92	503630	381237	N/A
13	2/21/2021	89.39	8203.54	2971.33	4229.08	506230	377289	N/A
14	2/21/2021	93.15	8406	6568	4335.81	505385	365381	N/A
15	2/22/2021	92.54	8185	8049	4352.63	506955	434441	N/A
16	2/22/2021	94.23	8229.87	2967.15	4614.08	504650	368097	N/A
17	2/22/2021	93.07	8320.75	2861.29	4262.23	504150	366975	N/A
18	2/22/2021	94.36	8539	6772	4217.33	512270	364514	N/A
19	2/23/2021	82.46	8316	8281	4017.56	503530	370921	N/A
20	2/23/2021	67.77	8400	7311	3993	514560	455465	N/A
21	2/23/2021	88.06	8420	8067	4035	509380	356503	N/A
22	2/23/2021	94.87	8488.18	7327.69	4390.28	506200	362453	N/A
23	2/24/2021	91.67	8407	7040	4104.46	512700	360485	N/A
24	2/24/2021	94.73	8405	6385	4106	510370	360522	N/A
25	2/24/2021	95.34	8211	6386	4379	504190	361466	N/A
26	2/25/2021	78.76	7523	7648	4454.69	506290	444737	N/A
27	2/25/2021	94.56	8276	6502	4342	506000	357951	N/A
28	2/25/2021	93.85	8240	6088	4279	505600	366160	N/A
29	2/25/2021	82.22	8413	7700	3966.6	507790	363902	N/A
30	2/26/2021	91.31	8368	7725	4240.87	506470	358812	N/A
31	2/26/2021	95.41	8063	6272	4305	515790	362969	N/A
32	2/26/2021	96.06	8259	5721	4120	514940	364608	N/A
33	2/26/2021	95.36	8128	6270	4346.27	514740	362164	N/A
34	2/27/2021	94	8058	7194	4251.72	508930	355346	N/A
35	2/27/2021	96.4	7915.38	6077.1	4589.08	508100	361638	N/A
36	2/28/2021	95.37	8119	6629	4444.93	513450	357466	N/A
37	2/28/2021	96.17	8019	6272	4362	506890	360885	N/A
38	3/1/2021	95.57	7699	6206	4215	507290	356521	N/A
39	3/2/2021	92.21	8408	7415	4457.03	503880	355903	N/A
40	3/2/2021	86.44	8233.05	2397.19	4054.25	505840	365580	N/A
41	3/3/2021	88.7	8357	8284	3943	512280	360023	N/A
42	3/4/2021	85.89	8356.56	2416.52	3766.91	514090	370082	N/A
43	3/4/2021	80.82	8327.22	8121.97	3879.27	509300	362713	N/A
44	3/5/2021	94.22	7962.48	6025.97	4303.14	513790	372259	N/A
45	3/5/2021	89.22	8599	6999	4153	513530	360549	N/A
46	3/6/2021	95.75	7801.13	2362.47	4347.65	517630	372420	N/A
47	3/6/2021	93.3	7771	7646	4150	505460	353919	N/A
48	3/6/2021	93.44	7503.59	2908.75	4624.16	509870	362941	N/A
49	3/7/2021	97.31	7590	6912	4456	516870	354790	N/A
50	3/7/2021	95.95	7486.59	7191.77	4573.36	510960	355744	N/A
51	3/8/2021	95.03	7263.32	2776.31	4808.56	512860	364297	N/A
	AVG=	90	8,192	5,955	4,286	25,598,605	18,919,554	TOTAL

06/09/2023 



## EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD)	BOTTOM DEPTH (TVD)	TOP DEPTH (MD)	BOTTOM DEPTH (MD)
	From Surface	From Surface	From Surface	From Surface
Shale	0	310	0	310
Silty sandstone	310	460	310	460
Shale	460	700	460	700
Silty Shale	700	820	700	820
Shale with interbedded limestone	820	850	820	850
Shale	850	880	850	880
Shale w/ trace coal	880	910	880	910
Shaley Sandstone	910	1,180	910	1,180
Shale	1,180	1,240	1,180	1,240
Sandstone w/ interbedded coals	1,240	1,330	1,240	1,330
Sandstone w/ trace coal	1,330	1,480	1,330	1,480
Sandstone	1,480	1,510	1,480	1,510
Shale	1,510	1,640	1,510	N/A
Big Lime	1,640	2,362	1,642	2,364
Fifty Foot Sandstone	2,362	2,443	2,364	2,445
Gordon	2,443	2,752	2,445	2,754
Fifth Sandstone	2,752	2,783	2,754	2,785
Bayard	2,783	3,591	2,785	3,595
Speechley	3,591	3,812	3,595	3,818
Balltown	3,812	4,288	3,818	4,300
Bradford	4,288	4,765	4,300	4,786
Benson	4,765	5,021	4,786	5,048
Alexander	5,021	6,169	5,048	6,272
Sycamore	5,989	6,144	6,075	6,247
Middlesex	6,144	6,281	6,272	6,484
Burkett	6,281	6,310	6,509	6,560
Tully	6,310	6,354	6,585	6,702
Marcellus	6,354	NA	6,702	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:	2/18/2021
Job End Date:	3/8/2021
State:	West Virginia
County:	Tyler
API Number:	47-095-02659-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	ROCKIES UNIT 2H
Latitude:	39.40231000
Longitude:	-80.78973000
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,429
Total Base Water Volume (gal):	19,689,077
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	86.60337	Density = 8.50
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.06694	

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HYDROCHLORIC ACID, 22 BAUME	Halliburton	Solvent					
				Listed Below			
HAI-501	Halliburton	Acid Corrosion Inhibitor					
				Listed Below			
FLUID Enviro-Syn HCR-7000-WL	Fluid Energy Group	Acid Replacement					
				Listed Below			
MC B-8614	Halliburton	Biocide					
				Listed Below			
WG-36 GELLING AGENT	Halliburton	Gelling Agent					
				Listed Below			
OPTIFLO-II DELAYED RELEASE BREAKER	Halliburton	Breaker					
				Listed Below			
Sand-Common White-100 Mesh, SSA-2	Halliburton	Proppant					
				Listed Below			
Excelerate LX-15	Halliburton	Friction Reducer					
				Listed Below			

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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	13.24668	
			Complex Amine Compound	Proprietary	60.00000	0.03689	
			Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.01844	
			Proprietary	Proprietary	20.00000	0.01044	
			Hydrochloric acid	7647-01-0	30.00000	0.00654	
			Guar gum	9000-30-0	100.00000	0.00608	
			Proprietary	Proprietary	10.00000	0.00522	
			Sorbitan, mono-9-octadecenoate, (Z)	1338-43-8	5.00000	0.00307	
			Surfactant	Proprietary	5.00000	0.00307	
			Glutaraldehyde	111-30-8	30.00000	0.00248	
			Ethoxylated alcohols	Proprietary	5.00000	0.00062	
			Organic chloride compound	Proprietary	1.00000	0.00061	
			Alkoxyated polyhydric alcohol	Proprietary	1.00000	0.00061	
			Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1	5.00000	0.00041	
			Methanol	67-56-1	100.00000	0.00012	
			Ammonium persulfate	7727-54-0	100.00000	0.00011	
			Ethanol	64-17-5	1.00000	0.00008	
			Oxylated phenolic resin	Proprietary	30.00000	0.00003	
			Modified thiourea polymer	Proprietary	30.00000	0.00001	
			Mixture of dimer and trimer fatty acids of indefinite composition derived from tall oil	61790-12-3	30.00000	0.00001	
			Phosphoric acid	7664-38-2	0.10000	0.00001	
			Sodium glycolate	2836-32-0	0.01000	0.00001	
			Organic salt #1	Proprietary	0.01000	0.00001	
			Sodium hydroxide	1310-73-2	0.01000	0.00001	

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			Organic salt #2	Proprietary	0.01000	0.00001	
			Formaldehyde	50-00-0	0.01000	0.00001	
			Acrylamide	79-06-1	0.01000	0.00001	
			Nitrated acetate salt	Proprietary	0.01000	0.00001	
			Propargyl alcohol	107-19-7	5.00000	0.00000	
			Hexadecene	629-73-2	5.00000	0.00000	
			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)

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