

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

RECEIVED
Office of Oil and Gas
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OCT 12 2017

WV Department of
Environmental Protection

API 47 - 095 - 02270 County Tyler District Centerville
Quad Shirley 7.5' Pad Name Dale Pad Field/Pool Name ---
Farm name Raymond Underwood Well Number Rymer Unit 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 4364736m Easting 511836m
Landing Point of Curve Northing 4364911.777m Easting 512025.514m
Bottom Hole Northing 4367160m Easting 511214m

Elevation (ft) 1017' 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 07/14/2015 Date drilling commenced 03/02/2016 Date drilling ceased 06/26/2016
Date completion activities began 01/20/2017 Date completion activities ceased 07/02/2017
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 55' 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 1166', 1331' Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

APPROVED

NAME: Sen n
DATE: 10-25-17

Reviewed by: _____

11/10/2017

API 47-095 - 02270 Farm name Raymond Underwood Well number Rymer Unit 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"	40'	New	133#, J-55	N/A	Y
Surface	17- 1/2"	13- 3/8"	500'	New	48#, H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2613'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"	5-1/2"	15056'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	6772'		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 ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	Class A	102 sx	15.6	1.18	120	0	8 Hrs.
Surface	Class A	610 sx	15.3	1.2	732	0	8 Hrs.
Coal							
Intermediate 1	Class A	954 sx	15.6	1.18	1126	0	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	803 sx (Lead) 1358 sx (Tail)	14.32 (Lead), 15.26 (Tail)	1.27 (Lead), 1.84 (Tail)	3519	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 15056' MD, 6473' TVD (BHL) & 6517' TVD (Deepest Point Drilled) Loggers TD (ft) 15043' MD
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 6524'

** There were no wireline logs run on this pad. Please reference the wireline logs submitted with Rymer Unit 4HD (API#47-095-02273). A Cement Bond Log has been included with this submittal.

Check all wireline logs run caliper density deviated/directional induction
 neutron resistivity gamma ray temperature sonic

Well cored Yes No Conventional Sidewall Were cuttings collected Yes No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING _____
 Conductor - 0
 Surface - 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface
 Intermediate - 1 above float joint, 1 above float collar, 1 every 4th joint to surface
 Production - 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS _____

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED N/A

API 47-095-02270 Farm Name Raymond Underwood Well Number Rymer Unit 2H

EXHIBIT 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	1/20/2017	14790	14958	60	Marcellus
2	4/13/2017	14590	14759	60	Marcellus
3	4/13/2017	14391	14559	60	Marcellus
4	4/13/2017	14191	14360	60	Marcellus
5	4/14/2017	13992	14160	60	Marcellus
6	4/14/2017	13792	13960	60	Marcellus
7	4/15/2017	13592	13761	60	Marcellus
8	4/15/2017	13393	13561	60	Marcellus
9	4/15/2017	13193	13362	60	Marcellus
10	4/16/2017	12994	13162	60	Marcellus
11	4/16/2017	12794	12962	60	Marcellus
12	4/17/2017	12594	12763	60	Marcellus
13	4/17/2017	12395	12563	60	Marcellus
14	4/18/2017	12195	12364	60	Marcellus
15	4/19/2017	11996	12164	60	Marcellus
16	4/20/2017	11796	11964	60	Marcellus
17	4/20/2017	11597	11765	60	Marcellus
18	4/21/2017	11397	11565	60	Marcellus
19	4/21/2017	11197	11366	60	Marcellus
20	4/22/2017	10998	11166	60	Marcellus
21	4/22/2017	10798	10967	60	Marcellus
22	4/22/2017	10599	10767	60	Marcellus
23	4/23/2017	10399	10567	60	Marcellus
24	4/23/2017	10199	10368	60	Marcellus
25	4/24/2017	10000	10168	60	Marcellus
26	4/24/2017	9800	9969	60	Marcellus
27	4/25/2017	9601	9769	60	Marcellus
28	4/25/2017	9401	9569	60	Marcellus
29	4/25/2017	9201	9370	60	Marcellus
30	4/27/2017	9002	9170	60	Marcellus
31	4/27/2017	8802	8971	60	Marcellus
32	4/28/2017	8603	8771	60	Marcellus
33	4/28/2017	8403	8571	60	Marcellus
34	4/29/2017	8204	8372	60	Marcellus
35	4/29/2017	8004	8172	60	Marcellus
36	4/30/2017	7804	7973	60	Marcellus
37	4/30/2017	7605	7773	60	Marcellus
38	5/1/2017	7405	7573	60	Marcellus
39	5/1/2017	7206	7374	60	Marcellus
40	5/2/2017	7006	7174	60	Marcellus

EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	4/12/2017	76.5	7109	4833	4337	359420	7897	N/A
2	4/13/2017	74.2	7279	5423	3635	352650	7760	N/A
3	4/13/2017	75.8	7215	5594	3976	363750	7940	N/A
4	4/13/2017	77.5	7186	6308	3540	357560	7854	N/A
5	4/14/2017	75.8	7130	5683	3743	346950	7539	N/A
6	4/14/2017	75.9	7386	4735	3975	344450	7670	N/A
7	4/15/2017	78.3	7118	6055	3564	362840	7761	N/A
8	4/15/2017	75.1	7362	5245	4176	355600	9040	N/A
9	4/15/2017	78.7	7391	5748	4941	361460	9444	N/A
10	4/16/2017	77.5	7405	5035	4634	349460	9247	N/A
11	4/16/2017	78.8	7266	5548	4257	367720	9468	N/A
12	4/17/2017	77.1	6918	5255	3928	355521	7906	N/A
13	4/17/2017	78.8	6923	5118	3479	353960	7519	N/A
14	4/18/2017	79.1	6791	6071	3398	353600	7449	N/A
15	4/19/2017	72.6	7567	5984	4614	352130	9750	N/A
16	4/20/2017	76.1	7204	5142	4041	351590	9132	N/A
17	4/20/2017	72.4	6851	5280	3748	354010	7652	N/A
18	4/21/2017	78.4	6807	5180	3489	352530	7497	N/A
19	4/21/2017	78.7	6727	5121	3852	358750	7558	N/A
20	4/22/2017	76.5	6747	5103	3302	353290	7525	N/A
21	4/22/2017	78.6	6796	5162	3489	355970	7441	N/A
22	4/22/2017	48.5	7078	5235	4110	353640	10652	N/A
23	4/23/2017	78.9	6736	5184	3462	355740	7612	N/A
24	4/23/2017	78.5	6417	5006	3868	355840	7575	N/A
25	4/24/2017	78.8	6608	5203	3681	361990	7461	N/A
26	4/24/2017	77.8	7299	5256	5919	355140	10501	N/A
27	4/25/2017	76.5	6653	5196	3442	348490	7776	N/A
28	4/25/2017	75.1	7513	5141	3571	350930	9315	N/A
29	4/25/2017	67.0	7461	4976	3854	355770	11610	N/A
30	4/27/2017	79.2	6731	5190	4168	356960	7465	N/A
31	4/27/2017	77.1	6406	5883	3687	354180	7679	N/A
32	4/28/2017	7662.0	6791	5595	4836	357230	8290	N/A
33	4/28/2017	75.8	6541	5160	3945	357580	8591	N/A
34	4/29/2017	78.9	6426	5421	5240	357190	7506	N/A
35	4/29/2017	76.7	6399	5254	4077	356610	8744	N/A
36	4/30/2017	79.0	6604	5519	4817	358760	7513	N/A
37	4/30/2017	76.6	6466	5381	4083	341100	7261	N/A
38	5/1/2017	79.4	6402	5620	3844	358600	7367	N/A
39	5/1/2017	74.8	6532	5247	3760	356760	9617	N/A
40	5/2/2017	74.0	6140	5286	3359	356700	7399	N/A
	AVG=	265.7	6,910	5,359	3,996	14,212,421	330,983	TOTAL

EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD) From Surface	BOTTOM DEPTH (TVD) From Surface	TOP DEPTH (MD) From Surface	BOTTOM DEPTH (MD) From Surface
Fresh Water	55'	N/A	55'	N/A
Shale	est. -19	341	est. -19	341
Sandstone	est. 341	521	est. 341	521
Siltstone	est. 521	701	est. 521	701
Limestone	est. 701	751	est. 701	751
Shale	est. 751	1166	est. 751	1166
Trace Coal	est. 1166	1171	est. 1166	1171
Shale	est. 1171	1331	est. 1171	1331
Trace Coal	est. 1331	1336	est. 1331	1336
Sandstone	est. 1336	1631	est. 1336	1631
Shale	est. 1631	1924	est. 1631	1926
Big Lime	1924	2032	1926	2034
Big Injun	2032	2523	2034	2525
Gantz Sand	2523	2652	2525	2654
Fifty Foot Sandstone	2652	2742	2654	2744
Gordon	2742	3099	2744	3101
Fifth Sandstone	3099	3153	3101	3155
Bayard	3153	3500	3155	3502
Warren	3500	3870	3502	3872
Speechley	3870	4600	3872	4200
Bradford	4600	5017	4200	4604
Benson	5017	5252	4604	5027
Alexander	5252	5429	5027	5459
Elk	5429	5825	5459	5901
Rhinestreet	5825	6142	5901	6288
Sycamore	6142	6317	6288	6538
Middlesex	6317	6415	6538	6718
Burkett	6415	6476	6718	6807
Tully	6476	6484	6807	6967
Marcellus	6484	NA	6967	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: 4/12/2017
Job End Date: 5/2/2017
State: West Virginia
County: Tyler
API Number: 47-095-02270-00-00
Operator Name: Antero Resources Corporation
Well Name and Number: Rymur 2H
Latitude: 39.43197500
Longitude: -80.86270278
Datum: NAD27
Federal Well: NO
Indian Well: NO
True Vertical Depth: 6,474
Total Base Water Volume (gal): 14,393,680
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	90.23485	Density = 8.330
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.23361	

Product Name	Halliburton	Solvent							
HYDROCHLORIC ACID						Listed Below			
SAND-PREMIUM WHITE-40/70, BULK	Halliburton	Proppant							
SP BREAKER	Halliburton	Breaker				Listed Below			
MC S-2510T	Halliburton	Scale Inhibitor				Listed Below			
WG-36 GELLING AGENT	Halliburton	Gelling Agent				Listed Below			
SAND-COMMON WHITE-100 MESH, SSA-2, BULK (100003676)	Halliburton	Proppant				Listed Below			
FR-76	Halliburton	Friction Reducer				Listed Below			
MC B-8614	Halliburton	Biocide				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	9.47256	
	Hydrochloric acid	7647-01-0	15.00000	0.02605	
	Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.02205	
	Inorganic salt	Proprietary	30.00000	0.02205	
	Acrylamide acrylate copolymer	Proprietary	30.00000	0.02205	Denise Tuck, Halliburton, 3000 N. Sam Houston Pkwy E., Houston, TX 77032, 281-871-6226
	Guar gum	9000-30-0	100.00000	0.02198	
	Ethylene Glycol	107-21-1	60.00000	0.00848	
	Glutaraldehyde	111-30-8	30.00000	0.00266	
	Neutralized Polyacrylic Emulsion	Proprietary	10.00000	0.00141	
	Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1	5.00000	0.00044	
	Sodium persulfate	7775-27-1	100.00000	0.00044	
	Ethanol	64-17-5	1.00000	0.00009	
	Methanol	67-56-1	0.14000	0.00001	
	Phosphoric acid	7664-38-2	0.10000	0.00001	
	Sodium sulfate	7757-82-6	0.10000	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)

LATITUDE 39°27'30"

8,278'

10,307' TO BOTTOM HOLE

LATITUDE 39°27'30"

LONGITUDE 80°50'00"

1,632' TO BOTTOM HOLE

9,598'

LONGITUDE 80°50'00"

Antero Resources Corporation
Well No. Rymer Unit 2H
47-095-02270

STATE OF WV DNR
D.B. 215 PG. 520
T.M. 27 PAR. 02
405.81 AC. ±

STATE OF WV DNR
D.B. 307 PG. 217
T.M. 27 PAR. 25
100 AC. ±

DAVID L. MAPLE
LEASE
STATE OF WV DNR
D.B. 227 PG. 141
T.M. 27 PAR. 28
88.75 AC. ±

JOSEPH
SAYRE
LEASE

MARK D. FLETCHER
D.B. 230 PG. 627
T.M. 27 PAR. 27
34.94 AC. ±

MARK DOUGLAS
FLETCHER LEASE
MARK D. FLETCHER
D.B. 230 PG. 627
T.M. 27 PAR. 29
52 AC. ±

JOHN ROBERT
SPENCE
ET UX LEASE
JOHN R. SPENCE ET AL
D.B. 373 PG. 720
T.M. 27 PAR. 26
21.71 AC. ±

STATE OF WV DNR
D.B. 256 PG. 17
T.M. 04 PAR. 01
222.85 AC. ±

STATE OF WV DNR
D.B. 255 PG. 248
T.M. 04 PAR. 01.2
10 AC. ±

STATE OF WV DNR
D.B. 255 PG. 254
T.M. 04 PAR. 01.3
10.4 AC. ±

STATE OF WV DNR
D.B. 255 PG. 245
T.M. 04 PAR. 01.4
10 AC. ±

SCOTT C.
BLAIR LEASE
SCOTT C. BLAIR ET AL
D.B. 296 PG. 589
T.M. 04 PAR. 08.4
64.17 AC. ±

STAR FURNITURE CO.
D.B. 248 PG. 486
T.M. 04 PAR. 08.2
2.79 AC. ±

CATHY JO ASH
ET AL LEASE

STONE
FOUND

ROBERT L.
RIPLEY ET AL
D.B. 327 PG. 77
T.M. 04 PAR. 06.1
9.25 AC. ±

ROBERT L. BROWN
ET UX LEASE
WILLIE R. LESTER
D.B. 326 PG. 402
T.M. 04 PAR. 07
97.75 AC. ±

REGINA H.
BERTOZZI ET AL
D.B. 334 PG. 420
T.M. 04 PAR. 08.3
41.86 AC. ±

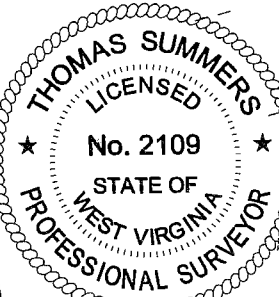
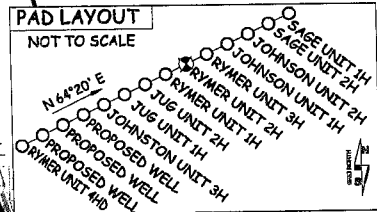
RAYMOND
UNDERWOOD
W.B. 28 PG. 70
T.M. 04 PAR. 12.2
16 AC. ±

ROBERT L.
RIPLEY ET AL
D.B. 327 PG. 77
T.M. 04 PAR. 06.2
18.75 AC. ±

RAYMOND
UNDERWOOD
W.B. 28 PG. 70
T.M. 04 PAR. 12
76.5 AC. ±

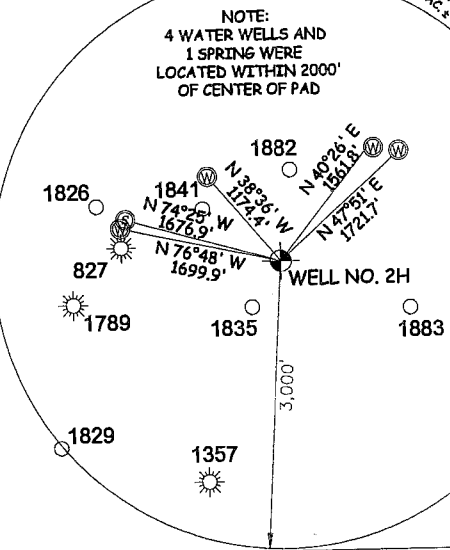
AS DRILLED DATA:
WELL 2H TOP HOLE INFORMATION:
N: 342,372ft E: 1,615,120ft
LAT: 39°25'55.20" LON: 80°51'45.50"
BOTTOM HOLE INFORMATION:
N: 350,361ft E: 1,613,209ft
LAT: 39°27'13.87" LON: 80°52'11.41"
WEST VIRGINIA COORDINATE
SYSTEM OF 1927 NORTH ZONE.
ZONE WAS DERIVED FROM
MEASUREMENTS TAKEN WITH
TRIMBLE GEOXT 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 2H TOP HOLE INFORMATION:
N: 4,364,736m E: 511,836m
BOTTOM HOLE INFORMATION:
N: 4,367,160m E: 511,214m



- 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 ALLEGHENY SURVEYS, INC.
- 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.

NOTE:
4 WATER WELLS AND
1 SPRING WERE
LOCATED WITHIN 2000'
OF CENTER OF PAD



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 # 13-104WA
DRAWING # RYMER2HAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

LEGEND
--- Surface Owner Boundary Lines +/-
- - - Interior Surface Tracts +/-
○ Proposed Well Path
⊗ As Drilled Well Path
THOMAS SUMMERS P.S. 2109

11/10/2017