

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

API 47-017-06791 County Doddridge District West Union
 Quad West Union 7.5' Pad Name Alexander Pad Field/Pool Name -----
 Farm name Antero Resources Corporation Well Number Northrop 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 4354056m Easting 519373m
 Landing Point of Curve Northing 4353313m Easting 519329m
 Bottom Hole Northing 4351500m Easting 520091m

Elevation (ft) 1181' 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 2/9/2017 Date drilling commenced 1/18/2018 Date drilling ceased 4/19/2018
 Date completion activities began 9/26/2018 Date completion activities ceased 1/9/2019
 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 None Identified Open mine(s) (Y/N) depths No
 Salt water depth(s) ft None Identified Void(s) encountered (Y/N) depths No
 Coal depth(s) ft None Identified Cavern(s) encountered (Y/N) depths No
 Is coal being mined in area (Y/N) No

Reviewed by: _____

WR-35
Rev. 8/23/13

API 47-017 - 06791 Farm name Antero Resources Corporation Well number Northrop 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"	105'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	577.6'	New	54#, J-55	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2572'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	15813'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	7109'		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 ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	Class A	204 sx	15.6	1.18	241	0'	8 Hrs.
Surface	Class A	530 sx	15.6	1.21	641	0'	8 Hrs.
Coal							
Intermediate 1	Class A	880 sx	15.6	1.21	1065	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	785sx (Lead) 1340 sx (Tail)	14 (Lead), 15.2 (Tail)	1.45 (Lead), 1.94(Tail)	3738	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 15875' MD, 6901' TVD (BHL), 6928' (Deepest Point Drilled) Loggers TD (ft) 15875' MD

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

Plug back procedure N/A

Kick off depth (ft) 6392'

** This is a subsequent Well. Antero only runs wireline logs on one well on a multi-well pad (Scorpio Unit 2H API#47-017-06861). Please reference the wireline logs submitted with Form WR-35 for Scorpio Unit 2H. 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

WR-35
Rev. 8/23/13

API 47- 017 - 06791 Farm name Antero Resources Corporation Well number Northrop Unit 1H

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
Marcellus	6803' (TOP) TVD	7191' (TOP) MD

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 3600 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW Gas 12404 mcfpd Oil 90 bpd NGL --- bpd Water 517 bpd GAS MEASURED BY Estimated Orifice Pilot

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

***PLEASE SEE ATTACHED EXHIBIT 3**

Please insert additional pages as applicable.


Drilling Contractor Patterson - UTI Drilling Company LLC
Address 207 Carlton Drive City Eighty Four State PA Zip 15330

Logging Company Allied Horizontal Wireline Services
Address 381 Colonial Manor Rd City North Huntington State PA Zip 15642

Cementing Company Halliburton
Address 121 Champion Way City Canonsburg State PA Zip 15317

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

Please insert additional pages as applicable.

Completed by Karin Cox Telephone 303-357-6820
Signature  Title Permitting Agent Date 4/30/2019

API 47-017-06791 Farm Name Matthew W. Alexander & Linda Marie Muhly Well Number Northrop Unit 1H					
EXHIBIT 1					
Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	9/26/2018	15604.9	15709.3	60	Marcellus
2	9/27/2018	15405.646	15573.691	60	Marcellus
3	9/27/2018	15206.392	15374.437	60	Marcellus
4	9/27/2018	15007.138	15175.183	60	Marcellus
5	9/28/2018	14807.884	14975.929	60	Marcellus
6	9/28/2018	14608.63	14776.675	60	Marcellus
7	9/29/2018	14409.376	14577.421	60	Marcellus
8	9/30/2018	14210.122	14378.167	60	Marcellus
9	9/30/2018	14010.868	14178.913	60	Marcellus
10	10/1/2018	13811.614	13979.659	60	Marcellus
11	10/1/2018	13612.36	13780.405	60	Marcellus
12	10/2/2018	13413.106	13581.151	60	Marcellus
13	10/2/2018	13213.852	13381.897	60	Marcellus
14	10/2/2018	13014.598	13182.643	60	Marcellus
15	10/3/2018	12815.344	12983.389	60	Marcellus
16	10/4/2018	12616.09	12784.135	60	Marcellus
17	10/4/2018	12416.836	12584.881	60	Marcellus
18	10/4/2018	12217.582	12385.627	60	Marcellus
19	10/5/2018	12018.328	12186.373	60	Marcellus
20	10/5/2018	11819.074	11987.119	60	Marcellus
21	10/6/2018	11619.82	11787.865	60	Marcellus
22	10/6/2018	11420.566	11588.611	60	Marcellus
23	10/7/2018	11221.312	11389.357	60	Marcellus
24	10/7/2018	11022.058	11190.103	60	Marcellus
25	10/8/2018	10822.804	10990.849	60	Marcellus
26	10/8/2018	10623.55	10791.595	60	Marcellus
27	10/10/2018	10424.296	10592.341	60	Marcellus
28	10/11/2018	10225.042	10393.087	60	Marcellus
29	10/12/2018	10025.788	10193.833	60	Marcellus
30	10/12/2018	9826.534	9994.579	60	Marcellus
31	10/12/2018	9627.28	9795.325	60	Marcellus
32	10/13/2018	9428.026	9596.071	60	Marcellus
33	10/13/2018	9228.772	9396.817	60	Marcellus
34	10/14/2018	9029.518	9197.563	60	Marcellus
35	10/14/2018	8830.264	8998.309	60	Marcellus
36	10/15/2018	8631.01	8799.055	60	Marcellus
37	10/15/2018	8431.756	8599.801	60	Marcellus
38	10/16/2018	8232.502	8400.547	60	Marcellus
39	10/16/2018	8033.248	8201.293	60	Marcellus
40	10/17/2018	7833.994	8002.039	60	Marcellus
41	10/19/2018	7634.74	7802.785	60	Marcellus
42	10/19/2018	7435.486	7603.531	60	Marcellus
43	10/19/2018	7236.232	7404.277	60	Marcellus

API 47-017-06791 Farm Name Matthew W. Alexander & Linda Marie Muhly Well Number Northrop Unit 1H

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	9/26/2018	77.4	7014	5170	4428	278660	7239	N/A
2	9/27/2018	77.7	7551	6351	3403	397400	8338	N/A
3	9/27/2018	69.6	7310	6081	3547	397940	8094	N/A
4	9/27/2018	71.8	7732	5890	3562	419730	8754	N/A
5	9/28/2018	74.3	7740	5696	3629	419240	8190	N/A
6	9/28/2018	75.49	7775	5337	4003	419070	8470	N/A
7	9/29/2018	63.3	7970	5929	3991	400080	10160	N/A
8	9/30/2018	73.01	7824	5583	3660	399760	9908	N/A
9	9/30/2018	74.91	7539	5859	3936	401000	8487	N/A
10	10/1/2018	71.09	7608	5453	3997	400240	8275	N/A
11	10/1/2018	75.42	8118	5298	3855	400500	10211	N/A
12	10/2/2018	79.6	7912	5475	4932	399440	8746	N/A
13	10/2/2018	66.49	7959	5917	4216	399320	9587	N/A
14	10/2/2018	73.7	8032	5603	3839	400940	10196	N/A
15	10/3/2018	77.83	8055	5505	3792	398900	8631	N/A
16	10/4/2018	76.17	7669	5635	4176	399680	8203	N/A
17	10/4/2018	79.09	7527	5458	3713	397340	7862	N/A
18	10/4/2018	70.15	7303	6046	3697	401160	10522	N/A
19	10/5/2018	79.73	7660	5551	3824	401940	7910	N/A
20	10/5/2018	77.64	7417	5769	3902	397880	7907	N/A
21	10/6/2018	79.58	7170	5931	3703	403500	7914	N/A
22	10/6/2018	79.48	7314	5464	4494	394520	7867	N/A
23	10/7/2018	78.41	7282	6176	5176	391900	9122	N/A
24	10/7/2018	78.43	7286	5516	4042	396180	7860	N/A
25	10/8/2018	75.89	6981	6060	4987	399840	7951	N/A
26	10/8/2018	79.53	7014	5779	3807	400600	7814	N/A
27	10/10/2018	71.5	6893	5993	3599	402360	8039	N/A
28	10/11/2018	80.06	6984	5628	3786	397580	8136	N/A
29	10/12/2018	79.04	6893	6215	3743	400660	7981	N/A
30	10/12/2018	79.7	7278	5372	4953	399280	7922	N/A
31	10/12/2018	75.68	6764	5696	3743	399400	7939	N/A
32	10/13/2018	80	7073	5498	4310	398480	8186	N/A
33	10/13/2018	76.22	6764	5414	4298	403660	8176	N/A
34	10/14/2018	80.52	7014	5531	5100	397520	7952	N/A
35	10/14/2018	79.52	6816	5748	3984	402720	8170	N/A
36	10/15/2018	78.75	7215	5332	4829	400420	8524	N/A
37	10/15/2018	79.1	6994	5553	4504	403920	8210	N/A
38	10/16/2018	72.79	7167	5347	4093	397480	9334	N/A
39	10/16/2018	77.07	6852	5680	3702	397680	8134	N/A
40	10/17/2018	78.71	6792	5442	3657	405780	8088	N/A
41	10/19/2018	76.89	6710	5578	3948	403740	7811	N/A
42	10/19/2018	77.36	6875	5392	3896	400200	7872	N/A
43	10/19/2018	78.5	6961	5939	3881	396840	7664	N/A
	AVG=	76	7,321	5,672	4,054	17,124,480	362,356	TOTAL

API 47-017-06791 Farm Name Matthew W. Alexander & Linda Marie Muhly Well Number Northrop Unit 1H

EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD) From Surface	BOTTOM DEPTH (TVD) From Surface	TOP DEPTH (MD) From Surface	BOTTOM DEPTH (MD) From Surface
Shaly Sandstone	0	155	0	155
Sandy Shale	est 155	215	est 155	215
Shaly Sandstone	est 215	255	est 215	255
Sandstone	est 255	395	est 255	395
Shaly Sandstone	est 395	505	est 395	505
Sandstone	est 505	575	est 505	575
Carbonaceous shale	est 575	615	est 575	615
Sandstone	est 615	765	est 615	765
Shaly sandstone tr coal	est 765	1,025	est 765	1,025
Shaly Siltstone	est 1025	1,305	est 1025	1,305
Sandstone	est 1305	1,455	est 1305	1,455
Sandy siltstone	est 1455	1,855	est 1455	1,855
Sandstone	est 1855	2,087	est 1855	2,088
Big Lime	2,087	2,658	2,088	2,659
Fifty Foot Sandstone	2,658	2,872	2,659	2,873
Gordon	2,872	3,081	2,873	3,083
Fifth Sandstone	3,081	3,138	3,083	3,140
Bayard	3,138	3,916	3,140	3,933
Speechley	3,916	4,224	3,933	4,255
Balltown	4,224	4,702	4,255	4,755
Bradford	4,702	5,159	4,755	5,243
Benson	5,159	5,425	5,243	5,513
Alexander	5,425	6,426	5,513	6,574
Sycamore	6,426	6,591	6,574	6,785
Middlesex	6,591	6,725	6,785	7,005
Burkett	6,725	6,754	7,005	7,065
Tully	6,754	6,803	7,065	7,191
Marcellus	6,803	NA	7,191	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:	9/26/2018
Job End Date:	10/19/2018
State:	West Virginia
County:	Doddridge
API Number:	47-017-06791-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Northrop 1H
Latitude:	39.33563056
Longitude:	-80.77538056
Datum:	NAD27
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,928
Total Base Water Volume (gal):	15,581,179
Total Base Non Water Volume:	0



Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Fresh Water	Operator	Base Fluid					
			Water	7732-18-5	100.00000	88.11136	Density = 8.330
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.21826	

SP BREAKER	Halliburton	Breaker			Listed Below				
					Listed Below				
HYDROCHLORIC ACID	Halliburton	Solvent			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	11.62698		
			Hydrochloric acid		7647-01-0	15.00000	0.02500		
			Hydrotreated light petroleum distillate		64742-47-8	30.00000	0.01679		
			Inorganic salt		Proprietary	30.00000	0.01679		
			Acrylamide acrylate polymer		Proprietary	30.00000	0.01679		Denise Tuck, Halliburton, 3000 N. Sam Houston Pkwy E., Houston, TX 77032, 281-871-6226
			Guar gum		9000-30-0	100.00000	0.01282		
			Ethylene glycol		107-21-1	60.00000	0.00868		
			Glutaraldehyde		111-30-8	30.00000	0.00337		
			Telmer		Proprietary	10.00000	0.00145		
			Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides		68424-85-1	5.00000	0.00056		
			Sodium persulfate		7775-27-1	100.00000	0.00039		
			Sodium polyacrylate		9003-04-7	1.00000	0.00014		
			Methanol		67-56-1	100.00000	0.00014		
			Ethanol		64-17-5	1.00000	0.00011		
			Modified thiourea polymer		Proprietary	30.00000	0.00004		
			Phosphoric acid		7664-38-2	0.10000	0.00001		

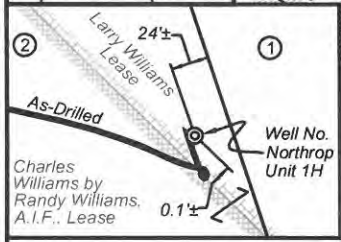
			Propargyl alcohol	107-19-7	5.00000	0.00001
			Ethoxylated alcohols	Proprietary	5.00000	0.00001
			Acrylic acid	79-10-7	0.01000	0.00000
			Sodium sulfate	7757-82-6	0.10000	0.00000

* 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)

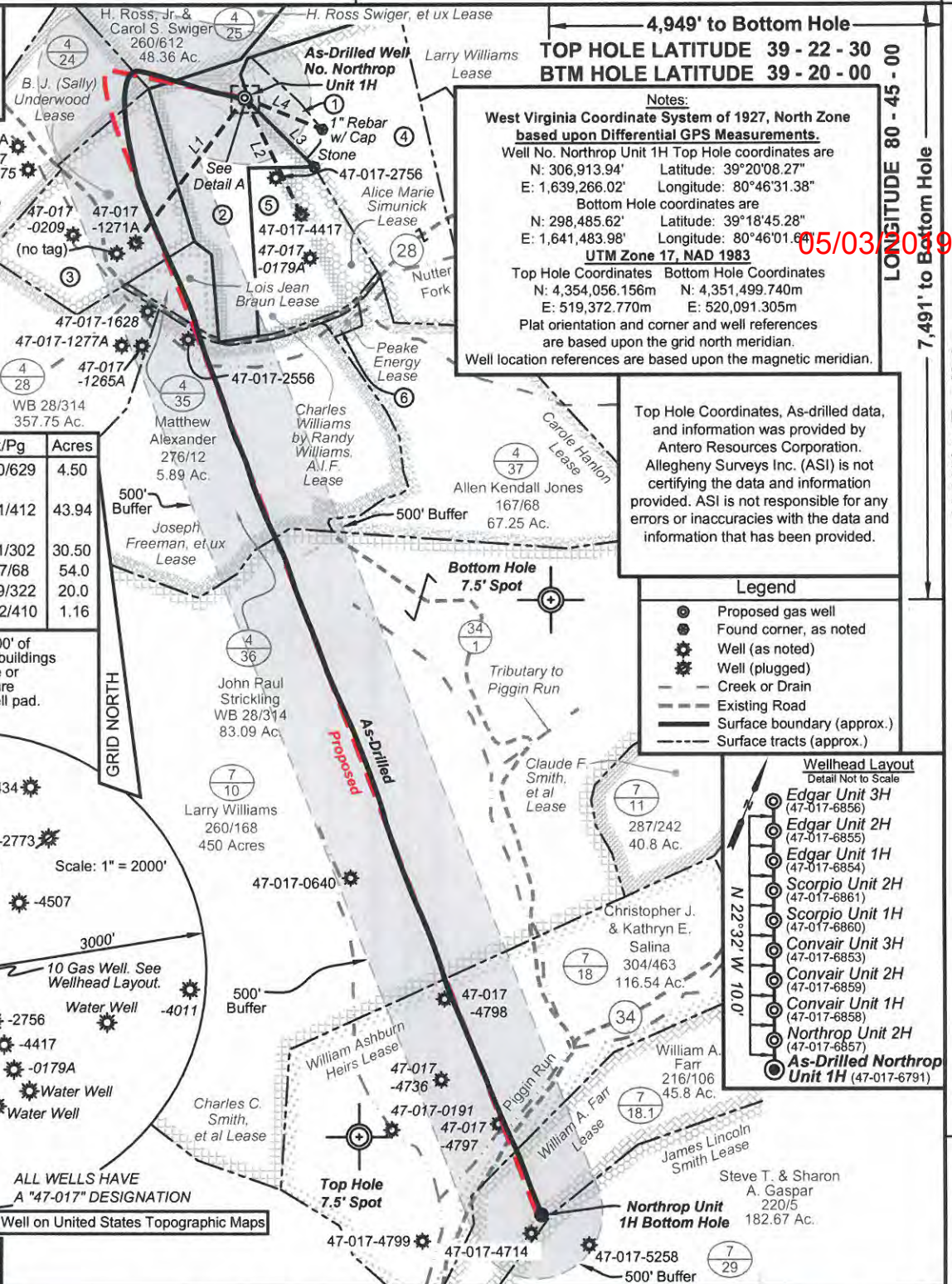
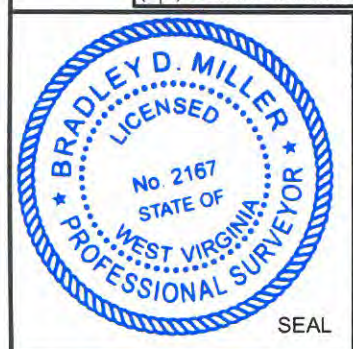
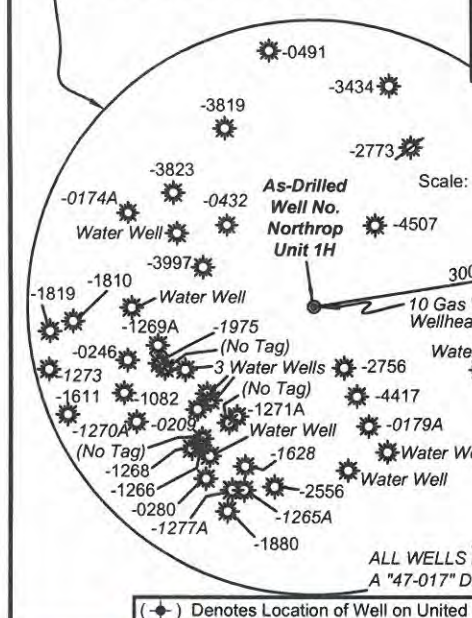
Antero Resources
Well No. Northrop Unit 1H
As-Drilled Plat
Antero Resources Corporation

	Bearing	Dist.	
L1	N 37°00' E	1,369.6'	47-017-1269A
L2	N 25°48' W	979.8'	47-017-1975
L3	N 45°21' W	739.7'	
L4	N 67°55' W	633.7'	



No.	Par	Tax Map 4 Owner	Bk/Pg	Acres
1	34.4	Matthew W. Alexander & Linda M. Muhly	320/629	4.50
2	32	Matthew W. Alexander & Linda Marie Muhly	241/412	43.94
3	30	Kathryn J. Sisler, et al	211/302	30.50
4	34.3	Allen Kendall Jones	167/68	54.0
5	32.1	Andy H. & Carrie Kurtz	349/322	20.0
6	37.4	Larry Williams	302/410	1.16

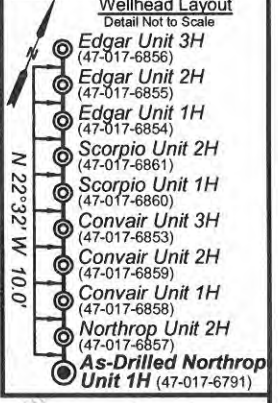
Note: 9 water wells were found within 2000' of proposed well. No occupied dwellings or buildings 2,500 square feet or larger used to house or shelter dairy cattle or poultry husbandry are located within 625' of the center of the well pad.



Notes:
West Virginia Coordinate System of 1927, North Zone based upon Differential GPS Measurements.
 Well No. Northrop Unit 1H Top Hole coordinates are
 N: 306,913.94' Latitude: 39°20'08.27"
 E: 1,639,266.02' Longitude: 80°46'31.38"
 Bottom Hole coordinates are
 N: 298,485.62' Latitude: 39°18'45.28"
 E: 1,641,483.98' Longitude: 80°46'01.64"
UTM Zone 17, NAD 1983
 Top Hole Coordinates Bottom Hole Coordinates
 N: 4,354,056.156m N: 4,351,499.740m
 E: 519,372.770m E: 520,091.305m
 Plat orientation and corner and well references are based upon the grid north meridian.
 Well location references are based upon the magnetic meridian.

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.

- Legend**
- ⊙ Proposed gas well
 - ⊙ Found corner, as noted
 - ⊙ Well (as noted)
 - ⊙ Well (plugged)
 - - - Creek or Drain
 - - - Existing Road
 - Surface boundary (approx.)
 - - - Surface tracts (approx.)



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



FILE NO: 48-30-WU-14
 DRAWING NO: Northrop 1H Well Plat
 SCALE: 1" = 1200'
 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: October 8 20 18
 Operator's Well No. Northrop Unit 1H
 API WELL NO
 47 - 017 - 06791
 STATE COUNTY PERMIT

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

LOCATION: ELEVATION: As-Drilled Grade - 1181' WATERSHED: Headwaters Middle Island Creek QUADRANGLE: West Union
 DISTRICT: West Union COUNTY: Doddridge
 SURFACE OWNER: Matthew W. Alexander & Linda Marie Muhly Freeman P. Smith, et ux; H. Ross Swiger, et ux B. J. (Sally) Underwood; Lois Jean Braun; Larry Williams Charles C. Smith, et al; William Ashburn Heirs ACREAGE: 43.94 48.36; 6.25 45.8; 120; 31
 ROYALTY OWNER: William A. Farr; Charles Williams by Randy Williams, A.I.F.; Joseph Freeman, et ux LEASE NO: ACREAGE: 36; 450; 67; 600

PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) As-Drilled 6,901' TVD
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 15,875' 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