

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

API 47-095-02293 County Tyler District Centerville  
Quad Middlebourne 7.5' Pad Name Estlack Pad Field/Pool Name ---  
Farm name Edna Monroe Well Number Hare 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 4362780m Easting 510494m  
Landing Point of Curve Northing 4362761.998m Easting 510853.353m  
Bottom Hole Northing 4359822m Easting 511901m

Elevation (ft) 1142' 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 08/26/2015 Date drilling commenced 10/07/2015 Date drilling ceased 01/19/2016  
Date completion activities began 06/25/2016 Date completion activities ceased 12/07/2016  
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

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

Freshwater depth(s) ft 46', 98' Open mine(s) (Y/N) depths No  
Salt water depth(s) ft 748', 1222' Void(s) encountered (Y/N) depths No  
Coal depth(s) ft 228', 1128', 1628' Cavern(s) encountered (Y/N) depths No  
Is coal being mined in area (Y/N) No

**APPROVED**

NAME: Sen n Ha  
DATE: 9-19-17

Reviewed by:

DmH

02/16/2018

API 47-095 - 02293 Farm name Edna Monroe Well number Hare 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	94#, J-55	N/A	Y
Surface	17- 1/2"	13- 3/8"	400'	New	48#, H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2573'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"	5-1/2"	17522'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	6836'		4.7#, N-80		
Packer type and depth set		N/A					

Comment Details \*Please note this well was drilled to 17532, however casing was only ran to 17522\*

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	123 sx	15.6	1.18	145	0	8 Hrs.
Surface	Class A	451 sx	15.6	1.19	537	0	8 Hrs.
Coal							
Intermediate 1	Class A	1000 sx	15.6	1.18	1180	0	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	1070 sx (Lead), 1667 sx (Tail)	14.5 (Lead), 15.2 (Tail)	1.23 (Lead), 1.83 (Tail)	4367	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 17532' MD, 6679' TVD (BHL & Deepest point drilled) Loggers TD (ft) 17484' MD

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

Plug back procedure N/A

Kick off depth (ft) 6352

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

\*\* This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Lucy Unit 1H API# 47-095-02276). Please reference the wireline logs submitted with Form WR-35 for the Lucy Unit 1H. A Cement Bond Log has been included with this submittal.

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API 47-095-Q2293 Farm Name Edna Monroe Well Number Hare Unit 2H

**EXHIBIT 1**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	6/25/2016	17257	17399	60	Marcellus
2	8/4/2016	17057	17225	60	Marcellus
3	8/4/2016	16856	17025	60	Marcellus
4	8/5/2016	16656	16825	60	Marcellus
5	8/5/2016	16456	16625	60	Marcellus
6	8/6/2016	16256	16425	60	Marcellus
7	8/6/2016	16056	16225	60	Marcellus
8	8/6/2016	15856	16025	60	Marcellus
9	8/7/2016	15656	15825	60	Marcellus
10	8/7/2016	15456	15624	60	Marcellus
11	8/8/2016	15256	15424	60	Marcellus
12	8/8/2016	15055	15224	60	Marcellus
13	8/10/2016	14855	15024	60	Marcellus
14	8/10/2016	14655	14824	60	Marcellus
15	8/11/2016	14455	14624	60	Marcellus
16	8/11/2016	14255	14424	60	Marcellus
17	8/12/2016	14055	14224	60	Marcellus
18	8/14/2016	13855	14023	60	Marcellus
19	8/14/2016	13655	13823	60	Marcellus
20	8/14/2016	13455	13623	60	Marcellus
21	8/15/2016	13254	13423	60	Marcellus
22	8/15/2016	13054	13223	60	Marcellus
23	8/16/2016	12854	13023	60	Marcellus
24	8/17/2016	12654	12823	60	Marcellus
25	8/17/2016	12454	12623	60	Marcellus
26	8/18/2016	12254	12423	60	Marcellus
27	8/18/2016	12054	12222	60	Marcellus
28	8/19/2016	11854	12022	60	Marcellus
29	8/19/2016	11654	11822	60	Marcellus
30	8/19/2016	11453	11622	60	Marcellus
31	8/20/2016	11253	11422	60	Marcellus
32	8/20/2016	11053	11222	60	Marcellus
33	8/21/2016	10853	11022	60	Marcellus
34	8/21/2016	10653	10822	60	Marcellus
35	8/21/2016	10453	10622	60	Marcellus
36	8/22/2016	10253	10421	60	Marcellus
37	8/22/2016	10053	10221	60	Marcellus
38	8/23/2016	9852	10021	60	Marcellus
39	8/23/2016	9652	9821	60	Marcellus
40	8/23/2016	9452	9621	60	Marcellus
41	8/24/2016	9252	9421	60	Marcellus
42	8/24/2016	9052	9221	60	Marcellus
43	8/25/2016	8852	9021	60	Marcellus
44	8/25/2016	8652	8821	60	Marcellus
45	8/25/2016	8452	8620	60	Marcellus
46	8/26/2016	8252	8420	60	Marcellus
47	8/26/2016	8051	8220	60	Marcellus
48	8/27/2016	7851	8020	60	Marcellus
49	8/28/2016	7651	7820	60	Marcellus
50	8/28/2016	7451	7620	60	Marcellus
51	8/29/2016	7251	7420	60	Marcellus
52	8/29/2016	7051	7220	60	Marcellus

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## EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbbls)	Amount of Nitrogen/ other (units)
1	8/3/2016	68.7	7285	5007	4584	305701	7931.1	N/A
2	8/4/2016	70.2	7492	5539	3244	304430	7826.7	N/A
3	8/4/2016	71.6	7519	5427	3082	307889	7940.9	N/A
4	8/5/2016	72.5	7408	5908	3128	303167	7829.5	N/A
5	8/5/2016	72.2	7309	5554	3359	306098	7772.9	N/A
6	8/6/2016	74.1	7272	5483	3320	305436	7771.7	N/A
7	8/6/2016	76.0	7349	5405	3452	306851	7874.9	N/A
8	8/6/2016	71.3	7204	5380	3439	305260	7878.5	N/A
9	8/7/2016	72.0	7104	5275	3248	305582	7764.9	N/A
10	8/7/2016	74.4	7003	5578	3550	305437	7824.0	N/A
11	8/8/2016	72.8	6984	5646	3382	307330	7887.9	N/A
12	8/8/2016	72.6	7173	5550	3459	305356	8100.4	N/A
13	8/10/2016	76.9	7196	5385	3007	305747	7665.9	N/A
14	8/10/2016	76.6	6995	5340	3393	306364	7662.0	N/A
15	8/11/2016	74.4	7133	5413	3103	306501	7758.9	N/A
16	8/11/2016	74.8	7219	5411	3246	305749	7766.6	N/A
17	8/12/2016	77.5	7136	5280	3162	307191	7812.1	N/A
18	8/14/2016	76.4	7262	6069	4507	306044	8962.8	N/A
19	8/14/2016	71.7	7035	5407	4255	302563	7835.8	N/A
20	8/14/2016	76.1	7090	5213	3312	305890	7794.7	N/A
21	8/15/2016	71.8	7070	5432	3483	306133	7936.1	N/A
22	8/15/2016	72.9	6911	5601	2954	303940	7784.2	N/A
23	8/16/2016	74.4	6825	5521	3237	303476	7759.6	N/A
24	8/17/2016	71.6	6737	5915	3417	304997	7681.6	N/A
25	8/17/2016	72.2	6892	5588	3108	303339	7888.5	N/A
26	8/18/2016	71.8	6741	5451	3415	306183	7812.7	N/A
27	8/18/2016	71.0	6937	5523	3453	304870	8608.9	N/A
28	8/19/2016	70.9	6571	5663	3343	305556	7609.0	N/A
29	8/19/2016	76.3	6882	5697	3382	304954	7614.1	N/A
30	8/19/2016	70.9	6809	5372	2980	308569	7669.0	N/A
31	8/20/2016	76.5	7122	5461	4461	304288	10288.4	N/A
32	8/20/2016	70.9	6996	5384	3859	305892	8156.1	N/A
33	8/21/2016	73.3	6612	5242	3361	305028	7530.0	N/A
34	8/21/2016	76.1	7055	5931	3630	305144	7616.1	N/A
35	8/21/2016	72.6	6514	5342	3209	305799	7526.2	N/A
36	8/22/2016	74.3	6494	5856	3509	304684	7551.7	N/A
37	8/22/2016	72.7	6396	6151	3342	303642	7421.8	N/A
38	8/23/2016	73.2	6387	5212	3391	305328	7512.4	N/A
39	8/23/2016	77.6	6859	5765	3752	306444	7697.0	N/A
40	8/23/2016	72.5	6480	5962	3233	306132	7566.4	N/A
41	8/24/2016	75.9	6394	5786	3361	306563	7588.5	N/A
42	8/24/2016	78.3	6509	5250	3417	303821	7557.0	N/A
43	8/25/2016	76.9	6511	5290	3157	304572	7437.6	N/A
44	8/25/2016	77.0	6622	5854	3573	306740	7594.5	N/A
45	8/25/2016	76.0	6296	5479	3299	305911	7582.0	N/A
46	8/26/2016	76.2	6565	5685	3355	307603	7639.5	N/A
47	8/26/2016	76.7	6483	5721	3199	306459	7720.6	N/A
48	8/27/2016	76.4	6497	5720	3334	305910	7645.2	N/A
49	8/28/2016	78.5	6455	5852	3279	304786	7652.1	N/A
50	8/28/2016	76.7	6521	5703	3301	304129	7555.6	N/A
51	8/29/2016	76.6	6267	5602	3059	305319	7409.6	N/A
52	8/29/2016	83.4	6228	5305	2961	304198	6085.2	N/A
	AVG=	74.3	6,862	5,550	3,405	15,884,995	404,359	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
Fresh Water	46'	N/A	46'	N/A
Fresh Water	98'	N/A	98'	N/A
Siltstone	0	228	0	228
Coal	est. 228	248	est. 228	248
Sandstone/Siltstone	est. 248	908	est. 248	908
Shale/Siltstone	est. 908	1128	est. 908	1128
Coal	est. 1128	1148	est. 1128	1148
Shale	est. 1148	1348	est. 1148	1348
Coal	est. 1348	1368	est. 1348	1368
Shale	est. 1368	1448	est. 1368	1448
Sandstone/Siltstone	est. 1448	1628	est. 1448	1628
Coal	est. 1628	1648	est. 1628	1648
Sandstone/Siltstone	est. 1648	2038	est. 1648	2041
Big Lime	2038	2153	2041	2156
Big Injun	2153	2710	2156	2713
Gantz Sand	2710	2797	2713	2800
Fifty Foot Sandstone	2797	2902	2800	2905
Gordon	2902	3205	2905	3208
Fifth Sandstone	3205	3280	3208	3283
Bayard	3280	3605	3283	3608
Warren	3605	4016	3608	4019
Speechley	4016	4740	4019	4746
Bradford	4740	5107	4746	5129
Benson	5107	5375	5129	5420
Alexander	5375	5549	5420	5612
Elk	5549	5923	5612	6025
Rhinestreet	5923	6230	6025	6366
Sycamore	6230	6401	6366	6597
Middlesex	6401	6507	6597	6819
Burkett	6507	6538	6819	6901
Tully	6538	6569	6901	6999
Marcellus	6569	NA	6999	NA

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\*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:	8/29/2016
Job End Date:	8/29/2016
State:	West Virginia
County:	Tyler
API Number:	47-095-02293-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Hare 2H
Latitude:	39.41440000
Longitude:	-80.87826389
Datum:	NAD27
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,688
Total Base Water Volume (gal):	17,629,453
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	89.99865	Density = 8.340
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.23397	

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FDP-M1075-12	Halliburton	Scale Inhibitor					
				Listed Below			
SAND-PREMIUM WHITE-40/70, BULK	Halliburton	Proppant					
				Listed Below			
HYDROCHLORIC ACID	Halliburton	Solvent					
				Listed Below			
SP BREAKER	Halliburton	Breaker					
				Listed Below			
FR-76	Halliburton	Friction Reducer					
				Listed Below			
HAI-OS ACID INHIBITOR	Halliburton	Corrosion Inhibitor					
				Listed Below			
MC B-8614	Halliburton	Biocide					
				Listed Below			
WG-36 GELLING AGENT	Halliburton	Gelling Agent					
				Listed Below			

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SAND-COMMON WHITE-100 MESH, SSA-2, BULK (100003676)	Halliburton	Proppant					
				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	9.71938	
			Hydrochloric acid	7647-01-0	15.00000	0.02664	
			Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.02026	
			Inorganic salt	Proprietary	30.00000	0.02026	
			Acrylamide acrylate copolymer	Proprietary	30.00000	0.02026	Denise Tuck, Halliburton, 3000 N. Sam Houston Pkwy E., Houston, TX 77032, 281-871-6226
			Guar gum	9000-30-0	100.00000	0.01352	
			Ethylene Glycol	107-21-1	60.00000	0.00857	
			Glutaraldehyde	111-30-8	30.00000	0.00264	
			Telomer	Proprietary	10.00000	0.00143	
			Quaternary ammonium compounds, benzyl-C12- 16-alkyldimethyl chlorides	68424-85-1	5.00000	0.00044	
			Sodium polyacrylate	9003-04-7	1.00000	0.00014	
			Sodium persulfate	7775-27-1	100.00000	0.00013	
			Methanol	67-56-1	60.00000	0.00009	
			Ethanol	64-17-5	1.00000	0.00009	
			Fatty acids, tall oil	Proprietary	30.00000	0.00004	
			Reaction product of acetophenone, formaldehyde, thiourea and oleic acid in dimethyl formamide	68527-49-1	30.00000	0.00004	
			Ethoxylated alcohols	Proprietary	30.00000	0.00004	
			Olefins	Proprietary	5.00000	0.00002	

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			Propargyl alcohol	107-19-7	10.00000	0.00001	
			Phosphoric acid	7664-38-2	0.10000	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(l) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

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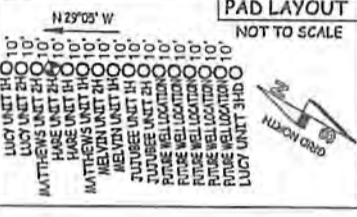
LATITUDE 39°25'00" -922'

LONGITUDE 80°52'30"

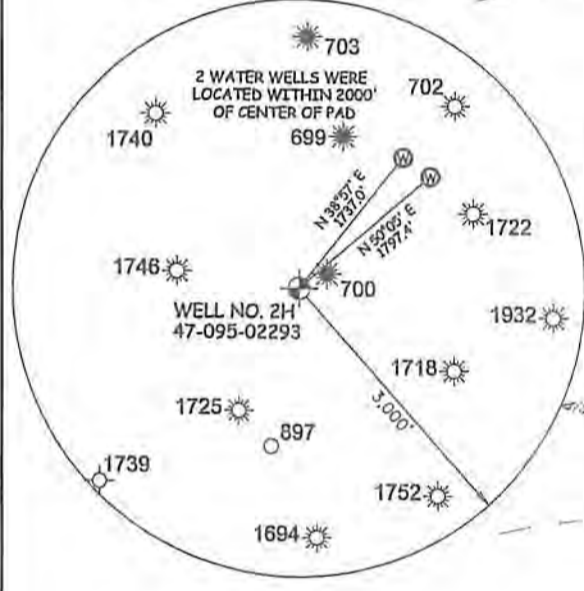
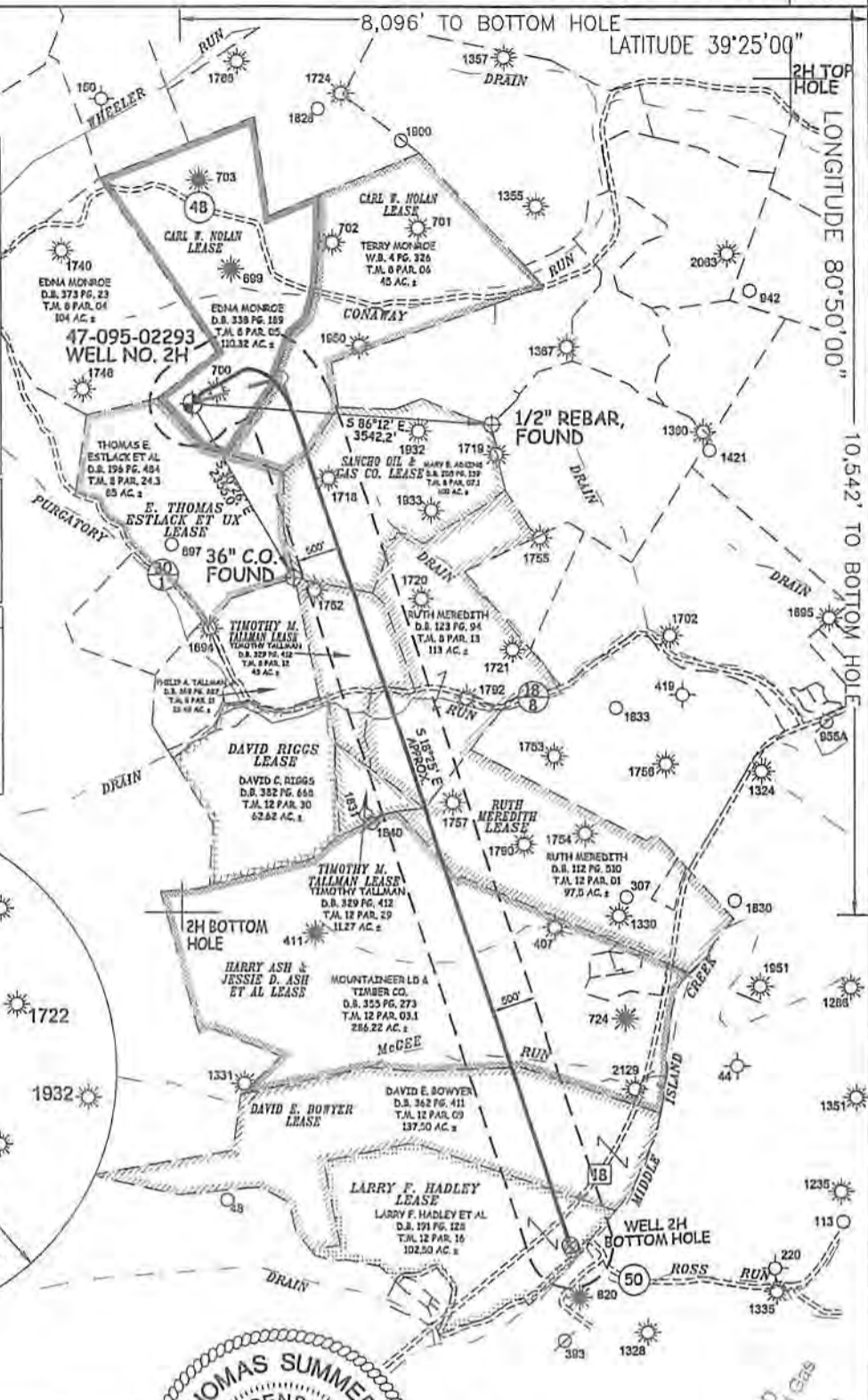
**Antero Resources Corporation**  
**Well No. Hare Unit 2H**  
**47-095-02293 (AS DRILLED)**

**AS DRILLED DATA:**  
**WELL 2H TOP HOLE INFORMATION:**  
 N: 336,030ft E: 1,610,609ft  
 LAT: 39°24'51.84" LON: 80°52'41.75"  
**BOTTOM HOLE INFORMATION:**  
 N: 326,245ft E: 1,615,063ft  
 LAT: 39°23'15.81" LON: 80°51'43.11"  
 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: 4,362,780m E: 510,494m  
**BOTTOM HOLE INFORMATION:**  
 N: 4,359,822m E: 511,901m



GRID NORTH



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

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



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JOB # 15-009WA  
 DRAWING # HARE2HADR  
 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 +/-
- Found monument, as noted
- Proposed Well Path
- As Drilled Well Path

THOMAS SUMMERS P.S. 2109  
 DATE 06/29/17  
 OPERATOR'S WELL# HARE UNIT #1H

**NOTE**

- 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.
- TOP HOLE DATA SHOWN HEREON WAS PROVIDED BY ALLEGHENY SURVEYS, INC.
- AS DRILLED DATA WAS PROVIDED BY ANTERO RESOURCES CORPORATION.
- 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.
- WLS IS BY NO MEANS RESPONSIBLE FOR ANY ERRORS OR DISCREPANCIES WITH THE DATA AND INFORMATION THAT HAS BEEN PROVIDED.

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  47 - 095 - 02293

(IF "GAS") PRODUCTION  STORAGE  DEEP  SHALLOW  STATE COUNTY PERMIT

LOCATION: ELEVATION 1,142' -AS-DRILLED WATERSHED HEADWATERS MIDDLE ISLAND CREEK 02/16/2018

QUADRANGLE MIDDLEBOURNE 7.5' (TH) SHIRLEY 7.5' (BH) DISTRICT CENTERVILLE COUNTY TYLER

SURFACE OWNER EDNA MONROE ACREAGE 110.32 ACRES +/-

OIL & GAS ROYALTY OWNER CARL W. NOLAN; CARL W. NOLAN; SANCHO OIL & GAS CO.; TIMOTHY M. TALLMAN; LEASE ACREAGE 116 AC +/- 120 AC +/- 100 AC +/- 43 AC +/-

RUTH MEREDITH; TIMOTHY M. TALLMAN; HARRY ASH & JESSIE D. ASH ET AL; DAVID E. BOWYER; LARRY F. HADLEY 291 AC +/- 210 AC +/- 11 AC +/- 138 AC +/- 102.5 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 6,679' TVD 17,532' 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



