

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

API 47-085-10179 County Ritchie District Clay  
Quad Pennsboro 7.5' Pad Name Buck Run Pad Field/Pool Name -----  
Farm name Stephen C. Jackson, et al Well Number Jackknife Unit 2H  
Operator (as registered with the OOG) Antero Resources  
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 4351835m Easting 504540m  
Landing Point of Curve Northing 4352026.61m Easting 504677.00m  
Bottom Hole Northing 4354704m Easting 503585m

Elevation (ft) 1127' 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 02/26/2015 Date drilling commenced 11/12/2015 Date drilling ceased 04/17/2016  
Date completion activities began 06/26/2016 Date completion activities ceased 09/26/2016  
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by Office of Oil and Gas N/A

RECEIVED  
Office of Oil and Gas

MAR 20 2017

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

WV Department of  
Environmental Protection

Freshwater depth(s) ft 55', 227', 439' Open mine(s) (Y/N) depths No  
Salt water depth(s) ft 1921' 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**

NAME: Michael Hoff  
DATE: 5/10/17

Reviewed by: \_\_\_\_\_  
05/26/2017

API 47-085 - 10179 Farm name Stephen C. Jackson, et al Well number Jackknife 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# K-55	N/A	Yes
Surface	17- 1/2"	13- 3/8"	576'	New	48# H-40	N/A	Yes
Coal							
Intermediate 1	12-1/4"	9-5/8"	2520'	New	36# J-55	N/A	Yes
Intermediate 2							
Intermediate 3							
Production	8-3/4"/ 8-1/2"	5-1/2"	16484'	New	23# P-110	N/A	Yes
Tubing		2-3/8"	6618'		5.95# N-80	N/A	Yes
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	100 sx	15.6	1.18	38	0'	8 Hrs.
Surface	Class A	664 sx	15.6	1.18	400	0'	8 Hrs.
Coal							
Intermediate 1	Class A	967 sx	15.6	1.18	789	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	856 sx (Lead) 1550 sx (Tail)	13.5 Lead 15.2 Tail	1.44 Lead 1.83 Tail	3314	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 16484' MD, 6422' TVD (BHL); 6442' TVD (Deepest Point Drilled) Loggers TD (ft) 16484' MD  
 Deepest formation penetrated Marcellus Plug back to (ft) N/A  
 Plug back procedure N/A

Kick off depth (ft) 6045'

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 \_\_\_\_\_



API 47- 085 - 10268 Farm name Stephen C. Jackson, et al Well number Charleston Unit 2H

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
Marcellus	6383' (TOP) TVD	6829' (TOP) MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST  Build up  Drawdown  Open Flow OIL TEST  Flow  Pump

SHUT-IN PRESSURE Surface 3000 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW Gas 13239 mcfpd Oil 224 bpd NGL --- bpd Water 324 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 Patterson - UTI Drilling Company, LLC  
Address 207 Carlton Dr. City Eighty Four State PA Zip 15330

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

Cementing Company BJ Services  
Address 1036 East Main Street City Bridgeport State WV Zip 26330

Stimulating Company US Well Services  
Address 533 Industrial Park Dr. City Jane Lew State WV Zip 26378

Please insert additional pages as applicable.

Completed by Samantha Klaas Telephone 303-357-6759  
Signature *Samantha Klaas* Title Permitting Agent Date 3/17/2017

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

**EXHIBIT 1**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	26-Jun-16	16,211	16,381	60	Marcellus
2	3-Sep-16	16,009	16,179	60	Marcellus
3	3-Sep-16	15,807	15,977	60	Marcellus
4	4-Sep-16	15,605	15,775	60	Marcellus
5	4-Sep-16	15,403	15,573	60	Marcellus
6	4-Sep-16	15,201	15,372	60	Marcellus
7	4-Sep-16	14,999	15,170	60	Marcellus
8	5-Sep-16	14,797	14,968	60	Marcellus
9	5-Sep-16	14,596	14,766	60	Marcellus
10	5-Sep-16	14,394	14,564	60	Marcellus
11	5-Sep-16	14,192	14,362	60	Marcellus
12	6-Sep-16	13,990	14,160	60	Marcellus
13	6-Sep-16	13,788	13,958	60	Marcellus
14	6-Sep-16	13,586	13,756	60	Marcellus
15	6-Sep-16	13,384	13,554	60	Marcellus
16	6-Sep-16	13,182	13,353	60	Marcellus
17	7-Sep-16	12,980	13,151	60	Marcellus
18	7-Sep-16	12,778	12,949	60	Marcellus
19	7-Sep-16	12,577	12,747	60	Marcellus
20	7-Sep-16	12,375	12,545	60	Marcellus
21	8-Sep-16	12,173	12,343	60	Marcellus
22	8-Sep-16	11,971	12,141	60	Marcellus
23	8-Sep-16	11,769	11,939	60	Marcellus
24	8-Sep-16	11,567	11,737	60	Marcellus
25	9-Sep-16	11,365	11,535	60	Marcellus
26	9-Sep-16	11,163	11,334	60	Marcellus
27	9-Sep-16	10,961	11,132	60	Marcellus
28	9-Sep-16	10,759	10,930	60	Marcellus
29	9-Sep-16	10,558	10,728	60	Marcellus
30	10-Sep-16	10,356	10,526	60	Marcellus
31	10-Sep-16	10,154	10,324	60	Marcellus
32	10-Sep-16	9,952	10,122	60	Marcellus
33	11-Sep-16	9,750	9,920	60	Marcellus
34	11-Sep-16	9,548	9,718	60	Marcellus
35	11-Sep-16	9,346	9,516	60	Marcellus
36	11-Sep-16	9,144	9,315	60	Marcellus
37	11-Sep-16	8,942	9,113	60	Marcellus
38	11-Sep-16	8,740	8,911	60	Marcellus
39	12-Sep-16	8,539	8,709	60	Marcellus
40	12-Sep-16	8,337	8,507	60	Marcellus
41	12-Sep-16	8,135	8,305	60	Marcellus
42	12-Sep-16	7,933	8,103	60	Marcellus
43	12-Sep-16	7,731	7,901	60	Marcellus
44	12-Sep-16	7,529	7,699	60	Marcellus
45	13-Sep-16	7,327	7,497	60	Marcellus
46	13-Sep-16	7,125	7,296	60	Marcellus
47	13-Sep-16	6,923	7,094	60	Marcellus
48	13-Sep-16	6,721	6,892	60	Marcellus

05/26/2017

## 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	26-Jun-16	66.0	7,950	6,131	8,447	305,500	8,021	N/A
2	3-Sep-16	70.4	7,285	0	4,987	306,300	8,383	N/A
3	3-Sep-16	74.1	7,324	6,071	4,833	306,740	8,362	N/A
4	4-Sep-16	76.9	7,462	5,987	5,051	305,665	8,352	N/A
5	4-Sep-16	71.1	7,065	6,040	4,510	306,800	9,229	N/A
6	4-Sep-16	74.6	7,209	6,173	4,809	304,765	8,332	N/A
7	4-Sep-16	77.6	7,199	5,847	4,681	305,440	8,317	N/A
8	5-Sep-16	76.7	7,201	5,618	4,624	305,930	8,306	N/A
9	5-Sep-16	76.2	7,234	5,561	4,513	307,500	9,221	N/A
10	5-Sep-16	76.4	7,276	5,786	4,209	307,400	9,002	N/A
11	5-Sep-16	77.3	7,257	5,609	4,728	306,210	8,282	N/A
12	6-Sep-16	75.2	7,389	5,726	4,714	308,260	8,274	N/A
13	6-Sep-16	76.3	7,219	5,511	4,896	307,400	8,282	N/A
14	6-Sep-16	72.1	7,063	5,402	4,834	308,000	7,392	N/A
15	6-Sep-16	72.8	7,436	5,300	5,027	306,350	6,479	N/A
16	6-Sep-16	76.6	7,454	5,311	4,917	259,910	6,532	N/A
17	7-Sep-16	76.9	7,375	5,112	4,785	304,945	6,459	N/A
18	7-Sep-16	73.1	7,561	5,261	4,292	306,150	8,013	N/A
19	7-Sep-16	72.7	7,467	5,389	4,331	300,600	6,350	N/A
20	7-Sep-16	75.9	7,427	5,208	4,567	304,385	6,435	N/A
21	8-Sep-16	76.6	7,422	5,326	4,653	307,415	6,434	N/A
22	8-Sep-16	74.1	7,251	5,182	4,363	311,600	7,670	N/A
23	8-Sep-16	73.3	7,179	5,225	3,705	308,300	6,450	N/A
24	8-Sep-16	78.1	7,416	5,815	4,166	307,690	6,506	N/A
25	9-Sep-16	76.8	7,486	5,461	4,437	295,075	6,321	N/A
26	9-Sep-16	74.0	7,352	5,282	4,252	304,700	6,425	N/A
27	9-Sep-16	78.8	7,329	5,286	4,109	309,400	7,226	N/A
28	9-Sep-16	77.5	7,379	5,721	4,528	306,700	6,378	N/A
29	9-Sep-16	76.2	7,380	5,472	4,574	306,515	6,355	N/A
30	10-Sep-16	77.1	7,247	5,539	4,624	306,710	6,351	N/A
31	10-Sep-16	75.7	7,349	5,823	4,327	303,100	7,356	N/A
32	10-Sep-16	76.7	7,090	5,379	4,677	287,950	7,401	N/A
33	11-Sep-16	77.1	6,996	5,741	4,378	305,845	6,321	N/A
34	11-Sep-16	73.0	6,938	6,137	4,713	308,810	6,341	N/A
35	11-Sep-16	75.4	7,194	6,018	3,561	302,400	6,321	N/A
36	11-Sep-16	74.2	7,522	6,414	4,703	259,700	7,329	N/A
37	11-Sep-16	78.9	6,891	6,412	4,762	307,395	6,287	N/A
38	11-Sep-16	78.0	6,731	5,602	4,453	306,005	6,279	N/A
39	12-Sep-16	78.0	6,899	5,964	4,594	305,965	6,831	N/A
40	12-Sep-16	78.3	6,829	6,187	4,003	307,400	6,318	N/A
41	12-Sep-16	72.6	6,593	5,823	4,334	305,050	6,302	N/A
42	12-Sep-16	76.2	6,715	5,123	4,752	306,100	6,292	N/A
43	12-Sep-16	76.1	6,487	5,739	4,002	306,400	6,235	N/A
44	12-Sep-16	77.2	6,561	5,736	3,883	306,400	6,227	N/A
45	13-Sep-16	77.4	6,491	6,083	4,878	306,060	6,220	N/A
46	13-Sep-16	77.9	6,434	5,515	3,855	306,440	6,213	N/A
47	13-Sep-16	78.2	6,940	5,248	4,098	305,995	7,023	N/A
48	13-Sep-16	76.8	6,523	5,456	3,609	308,740	6,302	N/A

## 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	55'	N/A	55'	N/A
Fresh Water	227'	N/A	227'	N/A
Fresh Water	439'	N/A	439'	N/A
Siltstone	0	567	0	567
Shale	567	627	567	627
Sandstone	627	647	627	647
Siltstone	647	867	647	867
Shale	867	987	867	987
Sandstone	987	1,067	987	1,067
Shale	1,067	1,247	1,067	1,247
Sandstone	1,247	1,387	1,247	1,387
Coaly Sandstone	1,387	1,647	1,387	1,647
Shale	1,647	1,867	1,647	1,867
Sandstone	1,867	1,907	1,867	1,907
Shale	1,907	1,995	1,907	1,996
Big Lime	1,995	2,133	1,996	2,134
Big Injun	2,133	2502	2,134	2503
Gantz Sand	2,502	2881	2,503	2882
Fifty Foot Sandstone	2,881	2982	2,882	2983
Gordon	2,982	3348	2,983	3349
Fifth Sandstone	3,348	3412	3,349	3413
Bayard	3412	3556	3413	3557
Warren	3556	3949	3557	3950
Speechley	3949	4221	3950	4222
Baltown	4221	4613	4222	4614
Bradford	4613	5000	4614	5011
Benson	5000	5236	5011	5259
Alexander	5236	5548	5259	5598
Elk	5548	5826	5598	5904
Rhinestreet	5826	6132	5904	6259
Sycamore	6132	6226	6259	6384
Middlesex	6226	6331	6384	6559
Burkett	6331	6357	6559	6620
Tully	6357	6379	6620	6679
Marcellus	6379	NA	6679	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:	6/26/2016
Job End Date:	9/13/2016
State:	West Virginia
County:	Ritchie
API Number:	47-085-10179-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Jackknife 2H
Latitude:	39.31582500
Longitude:	-80.94751111
Datum:	NAD27
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,442
Total Base Water Volume (gal):	14,903,406
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
Water	Antero Resources	Carrier/Base Fluid	Water	7732-18-5	100.00000	89.14932	
Sand	U.S. Well Services, LLC	Proppant	Crystalline Silica, quartz	14808-60-7	100.00000	10.46035	
HCL Acid (12.6%-17.5%)	U.S. Well Services, LLC	Bulk Acid	Water	7732-18-5	87.40000	0.14885	
			Hydrogen Chloride	7647-01-0	17.50000	0.03461	
LGC-15	U.S. Well Services, LLC	Gelling Agents	Guar Gum	9000-30-0	50.00000	0.07125	
			Petroleum Distillates	64742-47-8	60.00000	0.06747	
			Suspending agent (solid)	14808-60-7	3.00000	0.01090	
			Surfactant	68439-51-0	3.00000	0.00427	
WFRA-405	U.S. Well Services, LLC	Friction Reducer	2-Propenoic acid, polymer with 2-propanamide	9003-06-9	30.00000	0.02261	
			Hydrated light distillate (petroleum)	64742-47-8	30.00000	0.01820	



Bioclear 2000	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00419	
			Deionized Water	7732-18-5	28.00000	0.00239	
SI-1100s	U.S. Well Services, LLC	Scale Inhibitor					
			Copolymer of Maleic and Acrylic acid	52255-49-9	10.00000	0.00152	
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	3.00000	0.00052	
			Phosphino carboxylic acid polymer	71050-62-9	3.00000	0.00050	
			Hexamethylene tramine penta (methylene phosphonic acid)	34690-00-1	3.00000	0.00050	
AP One	U.S. Well Services, LLC	Gel Breakers					
			Ammonium Persulfate	7727-54-0	100.00000	0.00216	
AI-302	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Water	7732-18-5	95.00000	0.00032	
			2-Propyn-1-olcompound with methyloxirane	38172-91-7	15.00000	0.00005	

Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.

\* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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

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°20'00"

8,727'

66' TO BOTTOM HOLE  
LATITUDE 39°22'30"

LONGITUDE 80°57'30" TO BOTTOM HOLE

6,378'

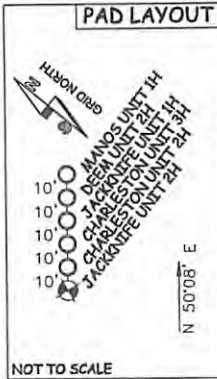
LONGITUDE 80°55'00"

2H BOTTOM HOLE

COUNTY NAME PERMIT

**Antero Resources Corporation**  
**Well No. Jackknife Unit 2H**  
**A.P.I. 47-085-10179**

A - JEFFREY A. HURST ET AL. D.B. 309 PG. 1081 T.J.L. 14 PAR. 10.3 1.7 AC.±  
B - REGINA A. WAINSTREET D.B. 305 PAR. 207 T.J.L. 14 PAR. 10.2 0.526 AC.±  
C - JEFFREY A. HURST ET AL. W.A. 59 PAR. 917 T.J.L. 14 PAR. 10.1 2.38 AC.±  
D - JAMES F. WILLIAMSON ET AL. D.B. 262 PAR. 312 T.J.L. 14 PAR. 11.3 1 AC.±  
E - JAMES F. WILLIAMSON ET AL. D.B. 262 PAR. 310 T.J.L. 14 PAR. 11.2 0.823 AC.±  
F - JAMES F. WILLIAMSON ET AL. D.B. 265 PAR. 316 T.J.L. 14 PAR. 11.4 0.91 AC.±  
G - FRED L. FREELAND ET AL. D.B. 179 PG. 726 T.J.L. 14 PAR. 11.5 0.76 AC.±  
H - KENNETH L. CUNNINGHAM ET AL. D.B. 216 PAR. 353 T.J.L. 14 PAR. 11.1 0.89 AC.±  
I - FLOYD T. BUTCHER III D.B. 234 PAR. 1 T.J.L. 14 PAR. 11.2 0.44 AC.±  
J - FLOYD T. BUTCHER III D.B. 234 PAR. 1 T.J.L. 14 PAR. 11.7 1.16 AC.±  
K - FAY JONES D.B. 223 PG. 369 T.J.L. 14 PAR. 11.6 1.24 AC.±  
L - DANIEL A. SHUMAN ET AL. D.B. 296 PG. 331 T.J.L. 14 PAR. 11.9 1.77 AC.±  
M - CHRISTOPHER B. SHAFER ET AL. D.B. 312 PG. 817 T.J.L. 14 PAR. 11.1 1.60 AC.±



**NOTES:**  
**WELL 2H TOP HOLE INFORMATION:**  
N: 300,439ft E: 1,590,468ft  
LAT: 39°18'56.97" LON: 80°56'51.04"  
**BOTTOM HOLE INFORMATION:**  
N: 309,907ft E: 1,587,493ft  
LAT: 39°20'30.06" LON: 80°57'30.84"  
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: 4,351,835m E: 504,540m  
**BOTTOM HOLE INFORMATION:**  
N: 4,354,704m E: 503,585m

- 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.

**LEGEND**

- Surface Owner Boundary Lines +/-
- - - Interior Surface Tracts +/-
- ⊕ Found monument, as noted
- Proposed Well Path
- ⊗ As Drilled Well Path

DATE 12/22/16

OPERATOR'S WELL# JACKKNIFE UNIT #2H

JOB # 14-008WA

DRAWING # JACKKNIFE2HAD

SCALE 1" = 1000'

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

WELL TYPE: OIL \_\_\_ GAS  LIQUID INJECTION \_\_\_ WASTE DISPOSAL \_\_\_

(IF "GAS") PRODUCTION  STORAGE \_\_\_ DEEP \_\_\_ SHALLOW

LOCATION: ELEVATION 1,127' AS BUILT WATERSHED NORTH FORK HUGHES RIVER

QUADRANGLE PENNSBORO 7.5' DISTRICT CLAY COUNTY RITCHE

SURFACE OWNER STEPHEN C. JACKSON ET AL ACREAGE 40.835 ACRES +/-

OIL & GAS ROYALTY OWNER HARVEY WEIGLE HEIRS; STEVE JACKSON; LEASE ACREAGE 51 ACRES±; 117 ACRES±;

W.J. COLLINS ET UX; CLIFF WILSON ET UX; MARY MAXINE WELCH; HAROLD JEWELL; WILLIAM DAVIS HEWITT 575 ACRES±; 413 ACRES±; 76.43 ACRES±; 26.5 ACRES±; 20 ACRES±;

PROPOSED WORK: DRILL \_\_\_ CONVERT \_\_\_ DRILL DEEPER \_\_\_ REDRILL \_\_\_ FRACTURE OR

STIMULATE \_\_\_ PLUG OFF OLD FORMATION \_\_\_ PERFORATE NEW FORMATION \_\_\_

OTHER PHYSICAL CHANGE IN WELL (SPECIFY) (X) AS DRILLED

PLUG & ABANDON \_\_\_ CLEAN OUT & REPLUG \_\_\_ ESTIMATED DEPTH 6,423' TVD 16,484' MD

TARGET FORMATION MARCELLUS

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER

ADDRESS 1615 WYNKOOP STREET ADDRESS CT CORPORATION SYSTEM

DENVER, CO 80202 CHARLESTON, WV 25313

FORM WW-6



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
WILLOW LAND SURVEYING PLLC  
P.O. BOX 17 PENNSBORO WEST VIRGINIA 26415

API WELL # 47 - 085 - 10179  
STATE COUNTY PERMIT

05/20/2017

LATITUDE 39°20'00"

8,727'

66' TO BOTTOM HOLE  
LATITUDE 39°22'30"

LONGITUDE 80°57'30" 12.135' TO BOTTOM HOLE

LONGITUDE 80°55'00"

**Antero Resources Corporation**  
**Well No. Jackknife Unit 2H**  
**A.P.I. 47-085-10179**

- A - JEFFREY A. HURST ET AL. D.B. 200 PG. 1081 T.J. 14 PAR. 10.3 17 AC.±
- B - REGINA A. WAINSTREET D.B. 245 PAR. 207 T.J. 14 PAR. 10.2 0.526 AC.±
- C - JEFFREY A. HURST ET AL. W.B. 39 PAR. 317 T.J. 14 PAR. 10.1 2.38 AC.±
- D - JAMES F. WILLIAMSON ET AL. D.B. 262 PAR. 312 T.J. 14 PAR. 11.3 1 AC.±
- E - JAMES F. WILLIAMSON ET AL. D.B. 282 PAR. 310 T.J. 14 PAR. 11.2 0.823 AC.±
- F - JAMES F. WILLIAMSON ET AL. D.B. 252 PAR. 316 T.J. 14 PAR. 11.4 0.91 AC.±
- G - RON L. FRIELAND ET AL. D.B. 179 PG. 726 T.J. 14 PAR. 11.5 0.76 AC.±
- H - KENNETH L. CUNNINGHAM ET AL. D.B. 216 PAR. 363 T.J. 14 PAR. 11.1 0.89 AC.±
- I - FLOYD T. BUTCHER III D.B. 234 PAR. 1 T.J. 14 PAR. 11.8 0.44 AC.±
- J - FLOYD T. BUTCHER III D.B. 234 PAR. 1 T.J. 14 PAR. 11.7 1.16 AC.±
- K - RAY JONES D.B. 223 PG. 369 T.J. 14 PAR. 11.6 1.24 AC.±
- L - DANIEL A. SHUMAN ET AL. D.B. 296 PG. 331 T.J. 14 PAR. 11.9 1.77 AC.±
- M - CHRISTOPHER B. SHAFFER ET AL. D.B. 312 PG. 817 T.J. 14 PAR. 11.1 1.60 AC.±



**NOTES:**  
WELL 2H TOP HOLE INFORMATION:  
N: 300,439ft E: 1,590,468ft  
LAT: 39°18'56.97" LON: 80°56'51.04"  
BOTTOM HOLE INFORMATION:  
N: 309,907ft E: 1,587,493ft  
LAT: 39°20'30.06" LON: 80°57'30.84"  
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: 4,351,835m E: 504,540m  
BOTTOM HOLE INFORMATION:  
N: 4,354,704m E: 503,585m

- 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.

WV NORTH ZONE  
GRID NORTH



**LEGEND**

- Surface Owner Boundary Lines +/-
- - - Interior Surface Tracts +/-
- ⊕ Found monument, as noted
- Proposed Well Path
- ⊗ As Drilled Well Path

DATE 12/22/16

OPERATOR'S WELL# JACKKNIFE UNIT #2H

JOB # 14-008WA  
DRAWING # JACKKNIFE2HAD  
SCALE 1" = 1000'  
MINIMUM DEGREE OF ACCURACY SUBMETER  
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

API WELL # 47 - 085 - 10179  
STATE COUNTY PERMIT



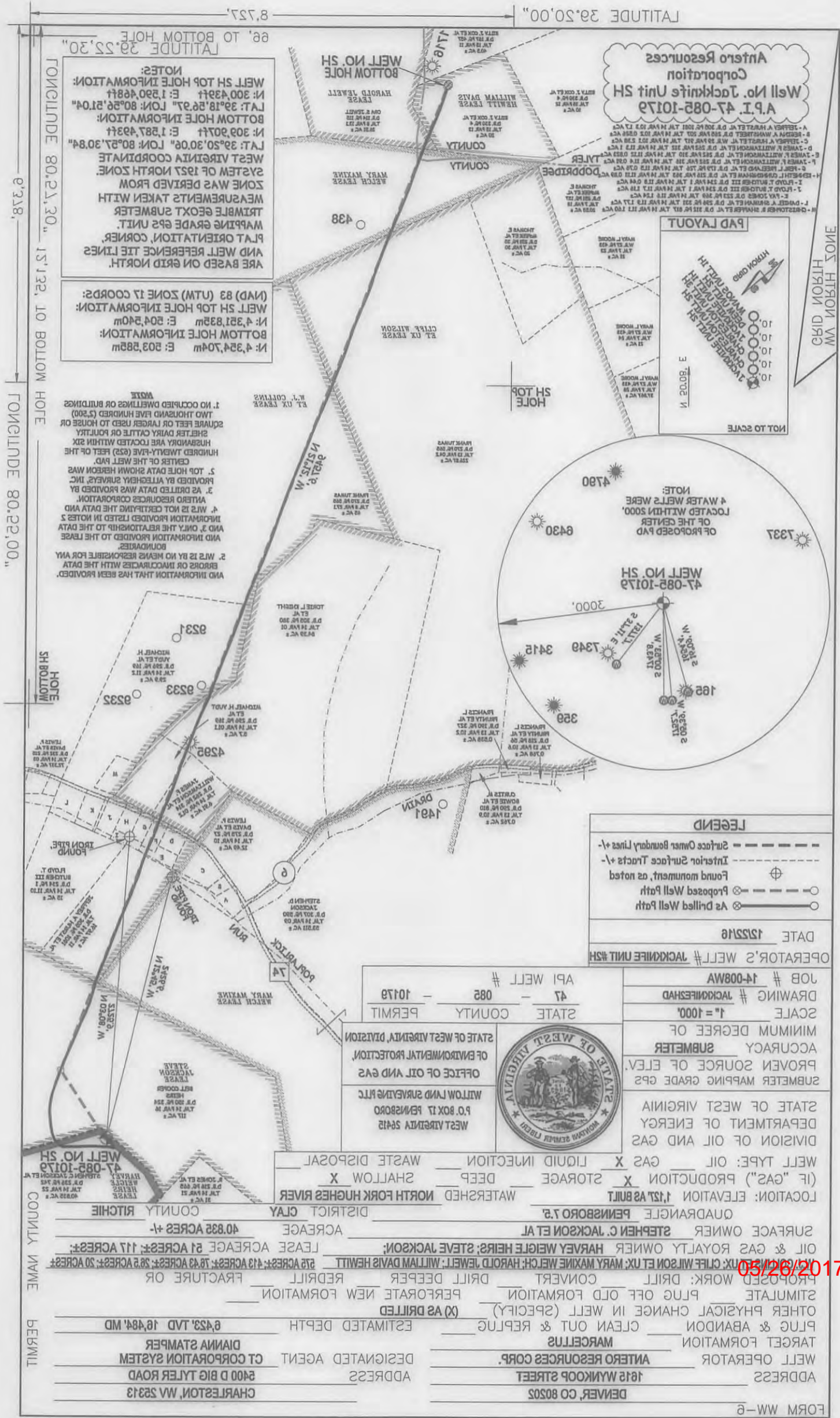
STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
WILLOW LAND SURVEYING PLLC  
P.O. BOX 17 PENNSBORO WEST VIRGINIA 26415

STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS

WELL TYPE: OIL GAS  LIQUID INJECTION WASTE DISPOSAL  
(IF "GAS") PRODUCTION  STORAGE DEEP SHALLOW   
LOCATION: ELEVATION 1,127' AS BUILT WATERSHED NORTH FORK HUGHES RIVER

QUADRANGLE PENNSBORO 7.5' DISTRICT CLAY COUNTY RITCHIE  
SURFACE OWNER STEPHEN C. JACKSON ET AL ACREAGE 40.835 ACRES +/-  
OIL & GAS ROYALTY OWNER HARVEY WEIGLE HEIRS; STEVE JACKSON; LEASE ACREAGE 51 ACRES±; 117 ACRES±;  
W.J. COLLINS ET UX; CLIFF WILSON ET UX; MARY MAXINE WELCH; HAROLD JEWELL; WILLIAM DAVIS HEWITT 575 ACRES±; 413 ACRES±; 76.43 ACRES±; 26.5 ACRES±; 20 ACRES±;  
PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION  
OTHER PHYSICAL CHANGE IN WELL (SPECIFY) (X) AS DRILLED  
PLUG & ABANDON CLEAN OUT & REPLUG ESTIMATED DEPTH 6,423' TVD 16,484' MD  
TARGET FORMATION MARCELLUS DIANNA STAMPER  
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT CT CORPORATION SYSTEM  
ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD  
DENVER, CO 80202 CHARLESTON, WV 25313

05/26/2017

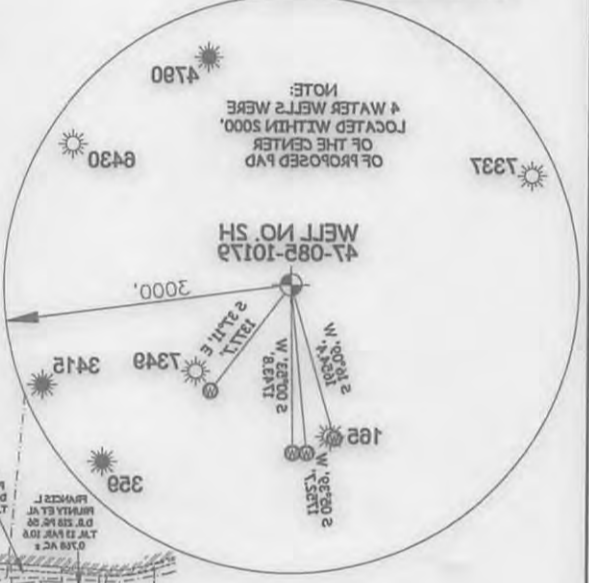
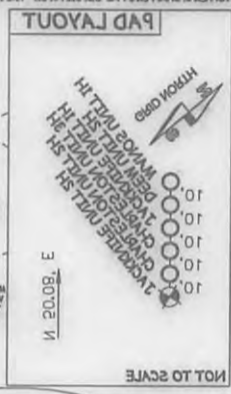


NOTES:  
WELL 5H TOP HOLE INFORMATION:  
N: 300437ft E: 1290487ft  
LAT: 39°18'58.97" LON: 80°56'51.04"  
BOTTOM HOLE INFORMATION:  
N: 309307ft E: 1287493ft  
LAT: 39°20'30.06" LON: 80°57'30.84"  
WEST VIRGINIA COORDINATE  
SYSTEM OF 1927 NORTH ZONE  
ZONE WAS DERIVED FROM  
MEASUREMENTS TAKEN WITH  
TRIANGLE GEODT SUBMETER  
MAPPING GRADE EPS UNIT.  
PLA ORIENTATION, CORNER  
AND WELL REFERENCE TIE LINES  
ARE BASED ON GRID NORTH.

(MAD) 83 (UTM) ZONE 17 COORDS:  
WELL 5H TOP HOLE INFORMATION:  
N: 4381835m E: 5047540m  
BOTTOM HOLE INFORMATION:  
N: 4354704m E: 503885m

NOTE:  
1. NO OCCUPIED DWELLINGS OR BUILDINGS  
TWO THOUSAND FIVE HUNDRED (2,500)  
SQUARE FEET OR LARGER USED TO HOUSE OR  
SHEPHERD DAILY 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. THIS IS NOT CERTIFYING THE DATA AND  
INFORMATION PROVIDED LISTED IN NOTES 2  
AND 3 ONLY THE RELATIONSHIP TO THE DATA  
BOUNDARIES.  
5. THIS IS BY NO MEANS RESPONSIBLE FOR ANY  
ERRORS OR INACCURACIES WITH THE DATA  
AND INFORMATION THAT HAS BEEN PROVIDED.

Antero Resources  
Corporation  
Well No. 47-088-10129  
A.P.I. 47-088-10129



LEGEND

- Surface Owner Boundary Lines +/-
- - - Interior Surface Tracts +/-
- ⊕ Found monument, as noted
- Proposed Well Path
- ⊗ As Drilled Well Path

DATE 12/22/16

OPERATOR'S WELL # JACKKNIFE UNIT #5H

FORM WW-8

ADDRESS 1615 WYNKOOP STREET  
DENVER, CO 80202

WELL OPERATOR ANTERO RESOURCES CORP.  
DESIGNATED AGENT DIANNA STAMPER

ADDRESS 5400 D BIG TYLER ROAD  
CHARLESTON, WV 25313

PERMIT

WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL  
(IF "GAS") PRODUCTION X STORAGE DEEP SHALLOW X  
LOCATION: ELEVATION 1127 AS BUILT  
DIVISION OF OIL AND GAS  
DEPARTMENT OF ENERGY  
STATE OF WEST VIRGINIA  
SUBMETER MAPPING GRADE EPS  
PROVEN SOURCE OF ELEV.  
ACCURACY SUBMETER  
MINIMUM DEGREE OF  
SCALE 1" = 1000'  
DRAWING # JACKKNIFE SHAD  
JOB # 14-008WA  
APRIL WELL # 47 - 088 - 10129  
STATE COUNTY PERMIT

WEST VIRGINIA 52412  
P.O. BOX 17 PENNSBORO  
WEST VIRGINIA 26154  
WILLOW LAND SURVEYS, PLLC  
OFFICE OF OIL AND GAS  
OF ENVIRONMENTAL PROTECTION  
STATE OF WEST VIRGINIA, DIVISION

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENERGY  
DIVISION OF OIL AND GAS

WELL OPERATOR ANTERO RESOURCES CORP.  
DESIGNATED AGENT DIANNA STAMPER

ADDRESS 5400 D BIG TYLER ROAD  
CHARLESTON, WV 25313

PERMIT

05/26/2017