

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

API 47-095-02320 County Tyler District Meade  
Quad Pennsboro 7.5' Pad Name Ritchie Petroleum Pad Field/Pool Name -----  
Farm name David M. Hartley Well Number Tamarind 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 4356660m Easting 502141m  
Landing Point of Curve Northing 4356563.70m Easting 502822.68m  
Bottom Hole Northing 4354762m Easting 503562m

Elevation (ft) 1176' 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 11/18/2015 Date drilling commenced 3/5/2017 Date drilling ceased 10/17/2017  
Date completion activities began 3/27/2018 Date completion activities ceased 8/3/2018  
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 N/A Open mine(s) (Y/N) depths No  
Salt water depth(s) ft N/A 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:

API 47-095 - 02320 Farm name David M. Hartley Well number Tamarind 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"	112'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	369'	New	48#, H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2592'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	16055'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	6532'		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 <sup>3</sup> /sks)	Volume (ft <sup>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	Class A	202 sx	15.6	1.21	244	0'	8 Hrs.
Surface	Class A	332 sx	15.6	1.21	402	0'	8 Hrs.
Coal							
Intermediate 1	Class A	923 sx	15.6	1.19	1098	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	770 sx (Lead) 1090 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.39 (Lead), 1.60 (Tail)	2814	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 14242' MD, 6472' TVD (BHL), 6472' (Deepest Point Drilled) Loggers TD (ft) 14242' MD  
 Deepest formation penetrated Marcellus Plug back to (ft) N/A  
 Plug back procedure N/A

Kick off depth (ft) 5804'

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 - 02320 Farm name David M. Hartley Well number Tamarind Unit 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.

API 47- 095 - 02320 Farm name David M. Hartley Well number Tamarind Unit 2H

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>		
<u>Marcellus</u>	<u>6429'</u> (TOP) TVD	<u>7084'</u> (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 5901 mcfpd Oil 68 bpd NGL --- bpd Water 712 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 <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 Frontier Drilling LLC  
Address 562 Spring Run Road City Pennsboro State WV Zip 26415

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

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

Stimulating Company Halliburton  
Address 121 Champion Way, Suite 200 City Canonsburg State PA Zip 15317

Please insert additional pages as applicable.

Completed by Megan Griffith Telephone 303-357-7223  
Signature \_\_\_\_\_ Title Permitting Agent Date \_\_\_\_\_

API 47-095-02320 Farm Name David M. Hartley Well Number Tamarind Unit 2H

**EXHIBIT 1**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	3/26/2018	14043		60	Marcellus
2	3/28/2018	13839	14011	60	Marcellus
3	3/28/2018	13635	13807	60	Marcellus
4	3/29/2018	13431	13603	60	Marcellus
5	3/30/2018	13227	13399	60	Marcellus
6	3/31/2018	13023	13195	60	Marcellus
7	3/31/2018	12819	12991	60	Marcellus
8	3/31/2018	12615	12787	60	Marcellus
9	4/1/2018	12411	12583	60	Marcellus
10	4/1/2018	12207	12379	60	Marcellus
11	4/1/2018	12003	12175	60	Marcellus
12	4/1/2018	11799	11971	60	Marcellus
13	4/2/2018	11595	11767	60	Marcellus
14	4/2/2018	11391	11563	60	Marcellus
15	4/2/2018	11187	11359	60	Marcellus
16	4/3/2018	10983	11155	60	Marcellus
17	4/3/2018	10779	10951	60	Marcellus
18	4/4/2018	10574	10747	60	Marcellus
19	4/4/2018	10370	10542	60	Marcellus
20	4/4/2018	10166	10338	60	Marcellus
21	4/4/2018	9962	10134	60	Marcellus
22	4/5/2018	9758	9930	60	Marcellus
23	4/5/2018	9554	9726	60	Marcellus
24	4/5/2018	9350	9522	60	Marcellus
25	4/6/2018	9146	9318	60	Marcellus
26	4/6/2018	8942	9114	60	Marcellus
27	4/6/2018	8738	8910	60	Marcellus
28	4/6/2018	8534	8706	60	Marcellus
29	4/7/2018	8330	8502	60	Marcellus
30	4/7/2018	8126	8298	60	Marcellus
31	4/7/2018	7922	8094	60	Marcellus
32	4/8/2018	7718	7890	60	Marcellus
33	4/8/2018	7514	7686	60	Marcellus
34	4/8/2018	7310	7482	60	Marcellus
35	4/9/2018	7106	7278	60	Marcellus

API 47-095-02320 Farm Name David M. Hartley Well Number Tamarind 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	3/26/2018	59.7	8023	5499	4221	164860	10487	N/A
2	3/28/2018	74.8	6884	5493	3298	367290	9256	N/A
3	3/28/2018	77.4	6811	3941	5311	367550	9048	N/A
4	3/29/2018	74.9	6657	5394	3696	358750	8691	N/A
5	3/30/2018	74.5	7280	5601	3548	368370	8254	N/A
6	3/31/2018	75.1	7198	5429	3412	364360	8005	N/A
7	3/31/2018	73.7	7248	5332	3452	364590	8153	N/A
8	3/31/2018	76.6	7194	5461	3691	361100	9944	N/A
9	4/1/2018	78.5	6980	5410	3528	362800	8055	N/A
10	4/1/2018	75.5	7197	5493	3874	364710	8094	N/A
11	4/1/2018	77	6946	5352	3924	362560	8826	N/A
12	4/1/2018	78.8	7302	5290	3856	363990	7799	N/A
13	4/2/2018	75.5	6879	5313	3637	362810	8421	N/A
14	4/2/2018	75.7	6893	5549	3975	364070	8026	N/A
15	4/2/2018	77.1	7213	5464	3671	362910	7977	N/A
16	4/3/2018	77.8	6662	5195	3571	363730	8635	N/A
17	4/3/2018	78.4	6402	5474	3941	365250	8327	N/A
18	4/4/2018	77.9	6580	5285	3908	356150	8136	N/A
19	4/4/2018	75.2	6501	5546	3768	358550	8251	N/A
20	4/4/2018	79.2	6432	5226	3802	362430	8445	N/A
21	4/4/2018	79.1	6831	5295	4053	363860	8246	N/A
22	4/5/2018	77.8	6792	4575	3556	367230	8355	N/A
23	4/5/2018	78	6469	5103	3828	363060	8457	N/A
24	4/5/2018	78	6664	5614	3761	364220	8201	N/A
25	4/6/2018	78.6	6600	5431	3477	365480	8072	N/A
26	4/6/2018	74.3	6615	5318	3407	361330	8849	N/A
27	4/6/2018	74.2	6279	5224	3274	361820	8199	N/A
28	4/6/2018	77.6	6614	5396	3906	364950	8444	N/A
29	4/7/2018	75.9	6667	5235	3326	366510	8607	N/A
30	4/7/2018	77.9	6272	5195	4046	347490	8342	N/A
31	4/7/2018	75.8	6581	5434	3887	360050	7919	N/A
32	4/8/2018	70.3	7033	5087	5019	361890	10618	N/A
33	4/8/2018	79.5	6489	5200	4010	361950	8093	N/A
34	4/8/2018	80.1	6645	5529	3901	356650	8039	N/A
35	4/9/2018	79.7	5909	5028	3992	364100	8533	N/A
	<b>AVG=</b>	<b>76.3</b>	<b>6,793</b>	<b>5,297</b>	<b>3,815</b>	<b>12,497,420</b>	<b>297,804</b>	<b>TOTAL</b>

## 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 w/intbd Sandstone and	-32	0	-32	228
Sandy shale and coal	228	260	228	528
Sandy shale	528	560	528	708
Calcareous shale	708	740	708	848
Limy shale with coal	848	880	848	1,048
Sandy shale	1,048	1,080	1,048	1,208
Sandy shale with coal	1,208	1,240	1,208	1,348
sandstone	1,348	1,380	1,348	1,488
Sandy shale	1,488	1,520	1,488	1,568
Shaly sandstone	1,568	1,600	1,568	1,648
Silty shale	1,648	1,680	1,648	1,708
Sandy shale	1,708	1,740	1,708	1,808
Sandy shale/coal	1,808	1,840	1,808	2,042
Big Lime	2,066	2,066	2,074	2,180
Big Injun	2,168	2,168	2,180	2,640
Gantz Sand	2,611	2,611	2,640	2,977
Fifty Foot Sandstone	2,933	2,933	2,977	3,110
Gordon	3,056	3,056	3,110	3,405
Fifth Sandstone	3,321	3,321	3,405	3,561
Bayard	3,461	3,461	3,561	3,806
Warren	3,682	3,682	3,806	4,172
Speechley	4,014	4,014	4,172	4,707
Balltown	4,330	4,330	4,523	5,160
Bradford	4,490	4,490	4,707	5,160
Benson	4,887	4,887	5,160	5,627
Alexander	5,301	5,301	5,627	6,251
Rhinestreet	5,832	5,864	6,219	6,628
Sycamore	6,167	6,199	6,628	6,779
Middlesex	6,271	6,303	6,779	6,958
Burkett	6,366	6,398	6,958	7,027
Tully	6,390	6,422	7,027	7,052
Marcellus	6,397	6,429	7,052	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.

LATITUDE 39°22'30"

4,801'

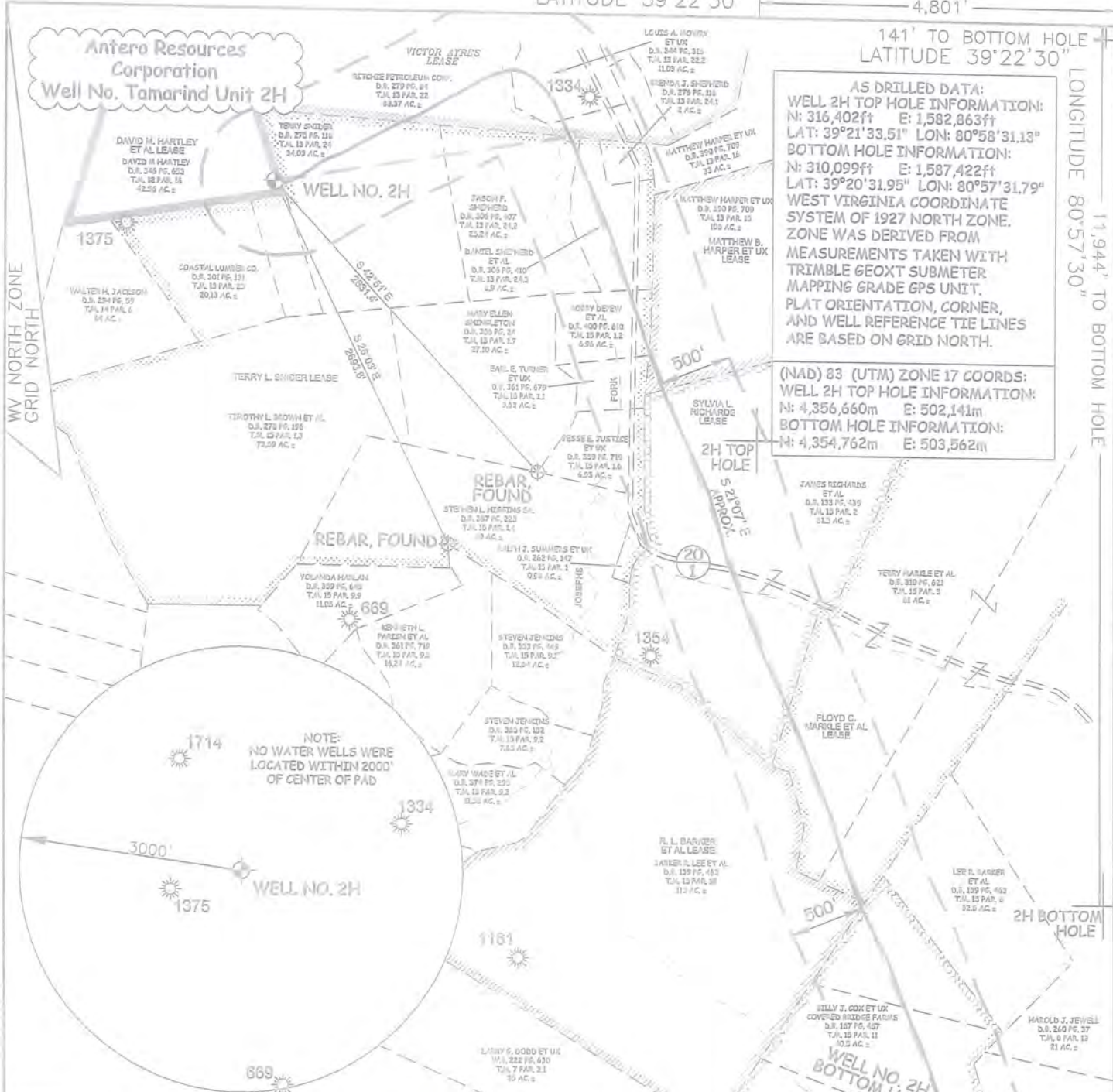
141' TO BOTTOM HOLE  
LATITUDE 39°22'30"

LONGITUDE 80°57'30"

5,716'

LONGITUDE 80°57'30"

Antero Resources Corporation  
Well No. Tamarind Unit 2H

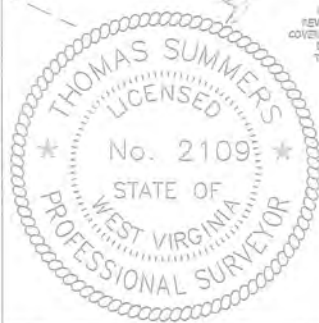


**AS DRILLED DATA:**  
**WELL 2H TOP HOLE INFORMATION:**  
 N: 316,402ft E: 1,582,863ft  
 LAT: 39°21'33.51" LON: 80°58'31.13"  
**BOTTOM HOLE INFORMATION:**  
 N: 310,099ft E: 1,587,422ft  
 LAT: 39°20'31.95" LON: 80°57'31.79"  
**WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE.**  
**ZONE WAS DERIVED 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: 4,356,660m E: 502,141m  
**BOTTOM HOLE INFORMATION:**  
 N: 4,354,762m E: 503,562m



**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.



JOB # 15-042WA  
 DRAWING # TAMARIND2HAD  
 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

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.

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

WILLOW LAND SURVEYING PLLC  
 220 MASONIC AVENUE PENNSBORO WEST VIRGINIA 26415



**LEGEND**  
 - - - Surface Owner Boundary Lines +/-  
 - - - Interior Surface Tracts +/-  
 - - - Proposed Well Path  
 - - - As Drilled Well Path

THOMAS SUMMERS P.S. 2109  
 DATE 11/07/18  
 OPERATOR'S WELL # TAMARIND 2H

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL   
 (IF "GAS") PRODUCTION  STORAGE  DEEP  SHALLOW   
 LOCATION: ELEVATION 1,176' AS BUILT WATERSHED OUTLET MIDDLE ISLAND CREEK  
 QUADRANGLE PENNSBORO 7.5' DISTRICT MEADE COUNTY TYLER  
 SURFACE OWNER DAVID M. HARTLEY ACREAGE 42.56 ACRES +/-  
 OIL & GAS ROYALTY OWNER DAVID M. HARTLEY ET AL; TERRY L. SNIDER; VICTOR AYRES; LEASE ACREAGE 42.56 AC±; 221.24 AC±; 97 AC±;  
 MATTHEW B. HARPER ET UX; SYLVIA L. RICHARDS; FLOYD C. MARKLE ET AL; R.L. BARKER ET AL; ALLIANCE PETROLEUM CORPORATION 108 AC±; 81.5 AC±; 81 AC±; 115 AC±; 50.5 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 6,472' TVD 14,242' MD

WELL OPERATOR ANTERO RESOURCES CORPORATION DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM  
 ADDRESS 1815 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD  
 DENVER, CO 80202 CHARLESTON, WV 25313