

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

API 47 - 095 - 02249 County Tyler District Meade
Quad Pennsboro 7.5' Pad Name Hartley East Pad Field/Pool Name -----
Farm name David M. Hartley Well Number Woodworth 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 4357329m Easting 500600m
Landing Point of Curve Northing 4357503.975m Easting 500848.445m
Bottom Hole Northing 4359239m Easting 500152m

Elevation (ft) 1021' 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 05/15/2015 Date drilling commenced 05/17/2015 Date drilling ceased 01/06/2016
Date completion activities began 10/15/2016 Date completion activities ceased 03/06/2017
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 76', 135', 162' Open mine(s) (Y/N) depths No
Salt water depth(s) ft 846' Void(s) encountered (Y/N) depths No
Coal depth(s) ft 196', 1136', 1716' Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

Reviewed by:

API 47-095 - 02249 Farm name David M. Hartley Well number Woodworth 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	106#, K-55	N/A	Y
Surface	17-1/2"	13-3/8"	363'	New	48#, H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2523'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	13028'	New	20#, P-110	N/A	Y
Tubing		2-3/8"	6570'		4#, 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	162 sx	15.6	1.20	194	0'	8 Hrs.
Surface	Class A	435 sx	15.6	1.18	513	0'	8 Hrs.
Coal							
Intermediate 1	Class A	988 sx	15.6	1.18	1166	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	850 sx (Lead) 1053 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.44 (Lead), 1.83 (Tail)	3151	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 13028' MD, 6253' TVD (BHL), 6283' (Deepest Point Drilled) Loggers TD (ft) 12979' MD
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 6057'

** This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Freeland Unit 2H API #47-095-02127). Please reference the wireline logs submitted with Form WR-35 for Freeland Unit 2H. A Cement Bond Log has been included with this submittal.

Check all wireline logs run caliper density deviated/directional induction temperature neutron resistivity gamma ray 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- 095 - 02249 Farm name David M. Hartley Well number Woodworth Unit 2H

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>		
<u>Marcellus</u>	<u>6243' (TOP)</u>	<u>TVD</u>	<u>6580' (TOP) MD</u>
_____	_____	_____	_____
_____	_____	_____	_____

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 10997 mcfpd Oil 204 bpd NGL --- bpd Water 691 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
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***PLEASE SEE ATTACHED EXHIBIT 3**

Please insert additional pages as applicable.

Drilling Contractor Precision Drilling Company, LP
Address 2640 Reach Road City Williamsport State PA Zip 17701

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

Cementing Company Allied Oil & Gas Services, LLC
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  Title Permitting Agent Date 10/11/2017

API 47-095-02249 Farm Name David M. Hartley Well Number Woodworth Unit 2H

EXHIBIT 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	10/15/2016	12746.0	12913.0	60	Marcellus
2	1/1/2017	12548.0	12715.0	60	Marcellus
3	1/1/2017	12349.0	12516.0	60	Marcellus
4	1/1/2017	12151.0	12318.0	60	Marcellus
5	1/2/2017	11953.0	12120.0	60	Marcellus
6	1/2/2017	11755.0	11922.0	60	Marcellus
7	1/2/2017	11556.0	11723.0	60	Marcellus
8	1/2/2017	11358.0	11525.0	60	Marcellus
9	1/3/2017	11160.0	11327.0	60	Marcellus
10	1/3/2017	10962.0	11129.0	60	Marcellus
11	1/3/2017	10763.0	10930.0	60	Marcellus
12	1/3/2017	10565.0	10732.0	60	Marcellus
13	1/3/2017	10367.0	10534.0	60	Marcellus
14	1/3/2017	10169.0	10336.0	60	Marcellus
15	1/4/2017	9970.0	10137.0	60	Marcellus
16	1/4/2017	9772.0	9939.0	60	Marcellus
17	1/4/2017	9574.0	9741.0	60	Marcellus
18	1/4/2017	9376.0	9543.0	60	Marcellus
19	1/4/2017	9177.0	9344.0	60	Marcellus
20	1/5/2017	8979.0	9146.0	60	Marcellus
21	1/5/2017	8781.0	8948.0	60	Marcellus
22	1/5/2017	8583.0	8750.0	60	Marcellus
23	1/5/2017	8384.0	8551.0	60	Marcellus
24	1/5/2017	8186.0	8353.0	60	Marcellus
25	1/6/2017	7988.0	8155.0	60	Marcellus
26	1/6/2017	7790.0	7957.0	60	Marcellus
27	1/6/2017	7591.0	7758.0	60	Marcellus
28	1/6/2017	7393.0	7560.0	60	Marcellus
29	1/6/2017	7195.0	7362.0	60	Marcellus
30	1/7/2017	6997.0	7164.0	60	Marcellus
31	1/7/2017	6798.0	6965.0	60	Marcellus
32	1/7/2017	6600.0	6767.0	60	Marcellus

API 47-095-02249 Farm Name David M. Hartley Well Number Woodworth 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	1/1/2017	70.3	7505	0	4685	303810	8016.0	N/A
2	1/1/2017	69.3	6920	6849	4792	305190	6945.0	N/A
3	1/1/2017	70.7	6725	5261	3719	305660	7032.0	N/A
4	1/1/2017	72.4	7071	6166	4170	306650	8252.0	N/A
5	1/2/2017	74.7	7039	5922	4199	305100	7053.0	N/A
6	1/2/2017	69.7	6579	5844	3912	305470	6968.0	N/A
7	1/2/2017	69.5	6822	5740	3777	303630	6986.0	N/A
8	1/2/2017	72.1	6915	5286	4435	305150	7840.0	N/A
9	1/3/2017	74.7	6856	5136	4349	305270	6807.0	N/A
10	1/3/2017	72.3	6810	5443	3548	306050	6791.0	N/A
11	1/3/2017	69.6	6468	5300	4231	308400	6869.0	N/A
12	1/3/2017	69.6	6574	5615	3948	303840	6807.0	N/A
13	1/3/2017	72.5	6612	5078	4259	305550	7319.0	N/A
14	1/3/2017	74.7	6694	5085	3941	305280	6788.0	N/A
15	1/4/2017	72.8	6802	5289	3773	306400	6736.0	N/A
16	1/4/2017	70.3	6752	5368	4735	306250	7680.0	N/A
17	1/4/2017	69.1	6574	5189	4245	307950	7994.0	N/A
18	1/4/2017	69.8	6336	5758	3684	305160	6759.0	N/A
19	1/4/2017	72.6	6733	6051	4592	304400	6778.0	N/A
20	1/5/2017	72.8	6401	5443	4281	305120	6684.0	N/A
21	1/5/2017	69.0	6381	5811	4771	304360	6751.0	N/A
22	1/5/2017	69.6	6214	5854	4596	306250	6771.0	N/A
23	1/5/2017	69.6	6340	5765	4402	304750	6688.0	N/A
24	1/5/2017	72.8	6598	5822	4545	305520	6663.0	N/A
25	1/6/2017	69.7	6261	5454	4374	305500	6660.0	N/A
26	1/6/2017	69.8	6247	5586	4699	304000	6687.0	N/A
27	1/6/2017	70.2	6128	5096	4088	303850	6713.0	N/A
28	1/6/2017	72.8	6714	5704	4452	305850	8327.0	N/A
29	1/6/2017	70.1	6006	5314	4052	305750	6659.0	N/A
30	1/7/2017	69.6	6090	5629	4810	305150	6655.0	N/A
31	1/7/2017	70.4	5985	5955	4578	303770	6655.0	N/A
32	1/7/2017	70.1	5772	5618	3930	303900	6620.0	N/A
	AVG=	71.0	6,560	5,420	4,268	9,768,980	224,953	TOTAL

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	76'	N/A	76'	N/A
Fresh Water	135'	N/A	135'	N/A
Fresh Water	162'	N/A	162'	N/A
Shale/ Sandstone	est. -11	196	est. -11	196
Shale/ Trace Coal	est. 196	236	est. 196	236
Sandstone	est. 236	456	est. 236	456
Shale/ Limestone	est. 456	556	est. 456	556
Sandstone	est. 556	616	est. 556	616
Shale/ Trace Limestone	est. 616	776	est. 616	776
Siltstone	est. 776	801	est. 776	801
Shale/ Limestone	est. 801	956	est. 801	956
Sandstone	est. 956	1036	est. 956	1036
Shale/ Limestone	est. 1036	1136	est. 1036	1136
Shale/ Trace Coal	est. 1136	1176	est. 1136	1176
Sandstone/ Trace Coal	est. 1176	1236	est. 1176	1236
Shale/ Trace Limestone	est. 1236	1316	est. 1236	1316
Sandstone/ Shale	est. 1316	1416	est. 1316	1416
Sanstone/ Coal	est. 1416	1556	est. 1416	1556
Shale/ Trace Coal	est. 1556	1716	est. 1556	1716
Siltstone/ Trace Coal	est. 1716	1957	est. 1716	1959
Big Lime	1957	2819	1959	2820
Fifth Sandstone	2819	3404	2820	3406
Bayard	3404	3944	3406	3947
Speechley	3944	4234	3947	4244
Baltown	4234	4653	4244	4698
Bradford	4653	4982	4698	5067
Benson	4982	5175	5067	5285
Alexander	5175	5411	5285	5551
Elk	5411	5724	5551	5895
Rhinestreet	5724	6038	5895	6255
Sycamore	6038	6133	6255	6380
Middlesex	6133	6222	6380	6531
Burkett	6222	6235	6531	6561
Tully	6235	6243	6561	6580
Marcellus	6243	NA	6580	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.



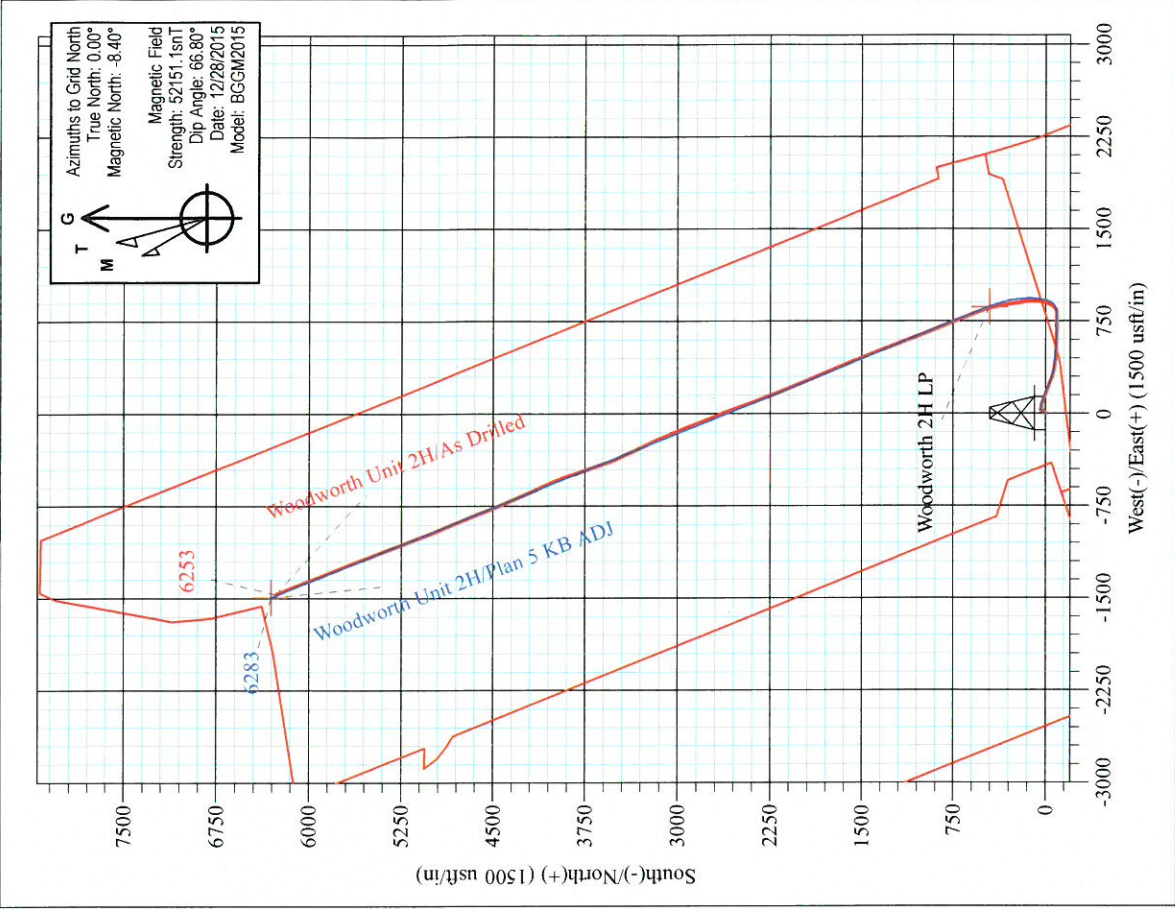
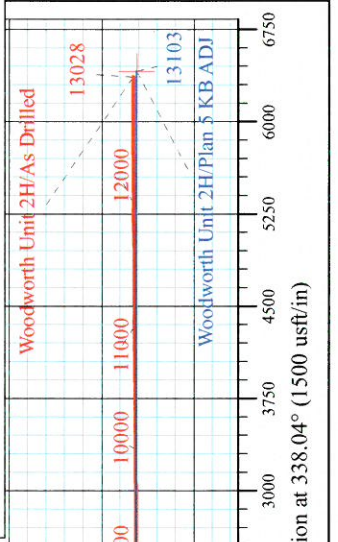
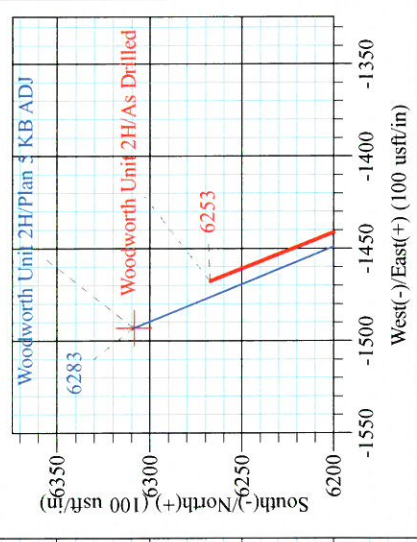
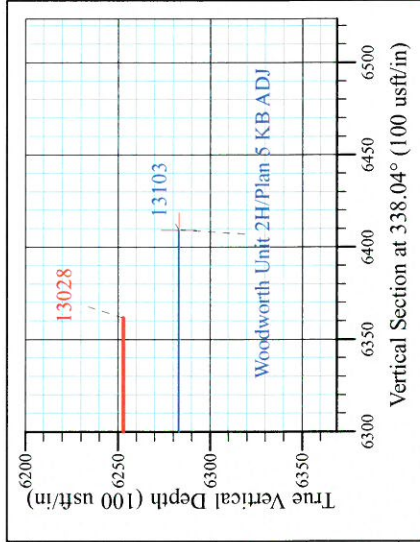
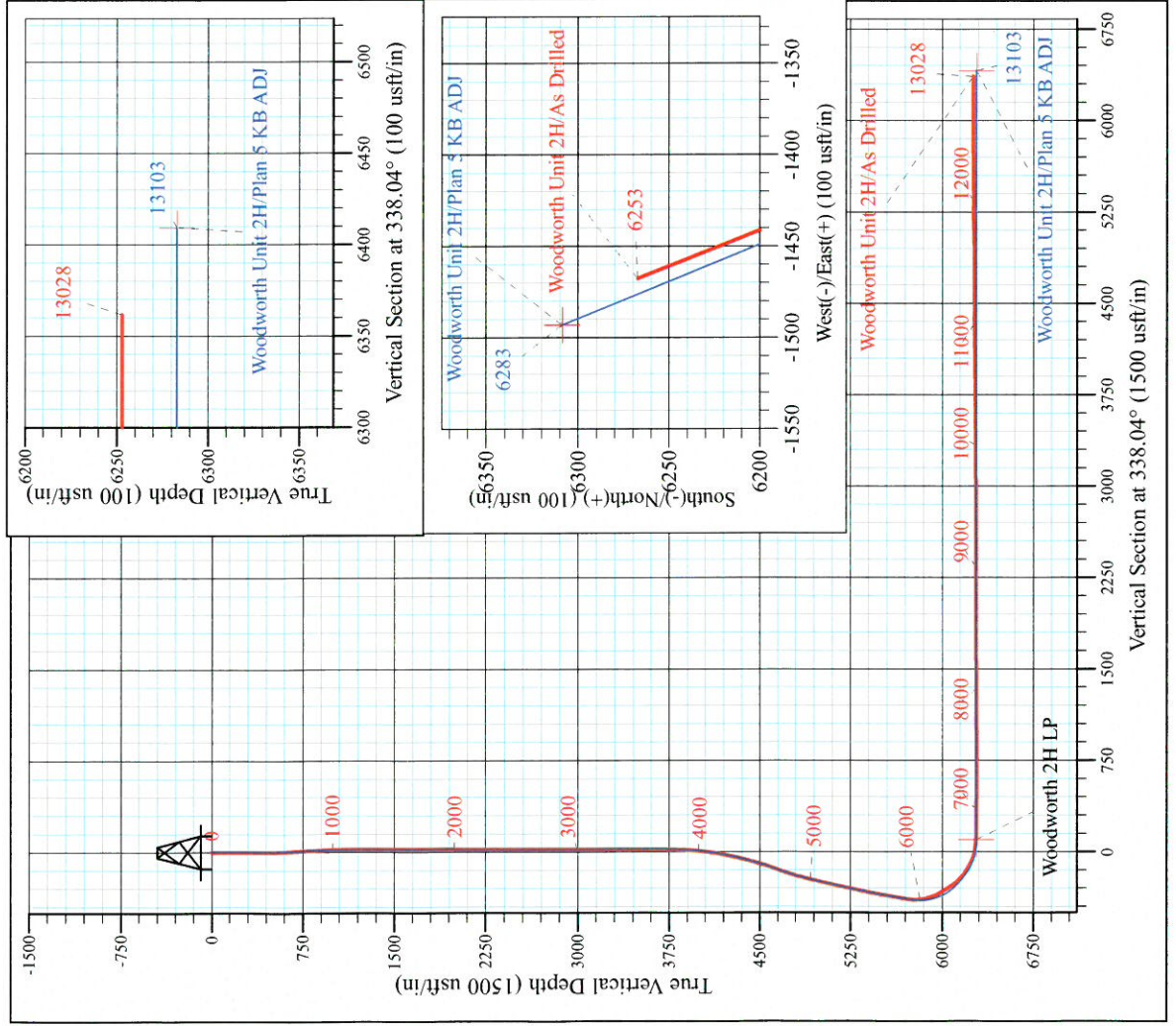
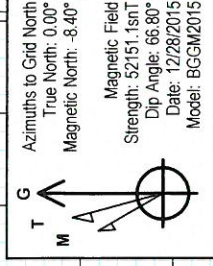
Hartley East Pad: Freeland/Plum Run/Woodworth
 Woodworth Unit 2H
 Plan 5 KB ADJ
 Precision 522: GL 1021' + KB 18' @ 1039.0usft
 Tyler County WV

PROJECT DETAILS:
 Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone: Zone 17N (84 W to 78 W)
 System Datum: Mean Sea Level



WELL DETAILS: Woodworth Unit 2H SHL

+N/-S	+E/-W	Northing	Latitude	Longitude
0.0	0.0	14294955.27	39° 21' 55.217 N	80° 59' 35.515 W



Woodworth Unit 2H
 Approx. BHL
 39° 22' 57.187 N 80° 59' 54.210 W

Shane Rhodes
 13:06, January 08 2016
 Scientific Drilling International
 124 Vista Drive
 Charleroi, PA 15022



Company:	Antero Resources	Local Co-ordinate Reference:	Well Woodworth Unit 2H
Project:	Tyler County WV	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Project	Tyler County WV, Tyler Co West Virginia		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	Hartley East Pad:Freeland/Plum Run/Woodworth				
Site Position:		Northing:	14,294,927.15 usft	Latitude:	39° 21' 54.939 N
From:	Map	Easting:	1,642,331.42 usft	Longitude:	80° 59' 35.611 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.00 °

Well	Woodworth Unit 2H, Marcellus					
Well Position	+N/-S	0.0 usft	Northing:	14,294,955.27 usft	Latitude:	39° 21' 55.217 N
	+E/-W	0.0 usft	Easting:	1,642,338.94 usft	Longitude:	80° 59' 35.515 W
Position Uncertainty		2.0 usft	Wellhead Elevation:	1,039.0 usft	Ground Level:	1,021.0 usft

Wellbore	Original Wellpath				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	5/13/2015	-8.36	66.88	52,206
	BGGM2015	12/28/2015	-8.40	66.80	52,151

Design	As Drilled				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0		338.04

Survey Program	Date 1/8/2016				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
30.0	5,705.0	Survey #6 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
5,718.0	13,028.0	Survey #7 - SDI MWD (Original Wellpath)	SDI MWD	Scientific Drilling Intl. MWD - Standard ver 1.0.1	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
30.0	0.06	155.34	30.0	0.0	0.0	0.0	0.20	0.20	0.00	
First SDI Gyro @ 30										
55.0	0.12	155.34	55.0	0.0	0.0	-0.1	0.24	0.24	0.00	
80.0	0.18	155.34	80.0	-0.1	0.1	-0.1	0.24	0.24	0.00	
105.0	0.23	155.34	105.0	-0.2	0.1	-0.2	0.20	0.20	0.00	
130.0	0.12	207.21	130.0	-0.3	0.1	-0.3	0.73	-0.44	207.48	
155.0	0.06	99.91	155.0	-0.3	0.1	-0.3	0.60	-0.24	-429.20	



Company:	Antero Resources	Local Co-ordinate Reference:	Well Woodworth Unit 2H
Project:	Tyler County WV	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
180.0	0.04	160.26	180.0	-0.3	0.1	-0.3	0.21	-0.08	241.40	
205.0	0.26	240.88	205.0	-0.3	0.1	-0.3	1.03	0.88	322.48	
230.0	0.11	132.22	230.0	-0.4	0.0	-0.4	1.25	-0.60	-434.64	
255.0	0.16	239.32	255.0	-0.4	0.0	-0.4	0.88	0.20	428.40	
280.0	0.14	178.97	280.0	-0.5	0.0	-0.4	0.61	-0.08	-241.40	
305.0	0.22	175.30	305.0	-0.5	0.0	-0.5	0.32	0.32	-14.68	
330.0	0.08	120.87	330.0	-0.6	0.0	-0.6	0.74	-0.56	-217.72	
355.0	0.09	142.80	355.0	-0.6	0.0	-0.6	0.14	0.04	87.72	
380.0	0.34	65.99	380.0	-0.6	0.1	-0.6	1.33	1.00	-307.24	
405.0	0.76	53.72	405.0	-0.5	0.3	-0.6	1.74	1.68	-49.08	
430.0	1.19	51.43	430.0	-0.2	0.7	-0.4	1.73	1.72	-9.16	
455.0	1.71	46.00	455.0	0.2	1.1	-0.2	2.15	2.08	-21.72	
480.0	2.25	39.58	480.0	0.8	1.7	0.1	2.33	2.16	-25.68	
505.0	2.66	38.38	504.9	1.7	2.4	0.7	1.65	1.64	-4.80	
530.0	2.99	37.32	529.9	2.7	3.1	1.3	1.34	1.32	-4.24	
555.0	3.51	39.13	554.9	3.8	4.0	2.0	2.12	2.08	7.24	
580.0	4.25	36.85	579.8	5.1	5.1	2.8	3.02	2.96	-9.12	
605.0	4.50	37.09	604.7	6.6	6.2	3.8	1.00	1.00	0.96	
630.0	4.77	37.62	629.7	8.2	7.4	4.9	1.09	1.08	2.12	
655.0	5.06	37.90	654.6	9.9	8.7	5.9	1.16	1.16	1.12	
680.0	5.06	38.45	679.5	11.7	10.1	7.0	0.19	0.00	2.20	
705.0	5.15	38.15	704.4	13.4	11.5	8.1	0.38	0.36	-1.20	
730.0	5.18	38.05	729.3	15.2	12.9	9.3	0.13	0.12	-0.40	
755.0	5.22	38.74	754.2	16.9	14.3	10.4	0.30	0.16	2.76	
780.0	5.29	38.28	779.1	18.7	15.7	11.5	0.33	0.28	-1.84	
805.0	5.27	38.31	804.0	20.5	17.1	12.6	0.08	-0.08	0.12	
830.0	4.95	38.22	828.9	22.3	18.5	13.8	1.28	-1.28	-0.36	
855.0	4.88	38.66	853.8	24.0	19.8	14.8	0.32	-0.28	1.76	
880.0	4.64	38.27	878.7	25.6	21.1	15.8	0.97	-0.96	-1.56	
905.0	4.26	38.39	903.6	27.1	22.3	16.8	1.52	-1.52	0.48	
930.0	3.89	39.21	928.5	28.5	23.4	17.7	1.50	-1.48	3.28	
955.0	3.66	38.25	953.5	29.8	24.5	18.5	0.95	-0.92	-3.84	
980.0	3.40	37.99	978.4	31.0	25.4	19.2	1.04	-1.04	-1.04	
1,005.0	3.04	38.09	1,003.4	32.1	26.3	19.9	1.44	-1.44	0.40	
1,030.0	2.69	39.44	1,028.4	33.1	27.1	20.6	1.43	-1.40	5.40	
1,055.0	2.35	40.06	1,053.3	33.9	27.8	21.1	1.36	-1.36	2.48	
1,080.0	2.23	36.34	1,078.3	34.7	28.4	21.6	0.76	-0.48	-14.88	
1,105.0	1.93	37.77	1,103.3	35.4	28.9	22.0	1.22	-1.20	5.72	
1,130.0	1.91	38.81	1,128.3	36.1	29.5	22.5	0.16	-0.08	4.16	
1,155.0	1.63	40.15	1,153.3	36.7	30.0	22.8	1.13	-1.12	5.36	



Company:	Antero Resources	Local Co-ordinate Reference:	Well Woodworth Unit 2H
Project:	Tyler County WW	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,180.0	1.38	40.84	1,178.3	37.2	30.4	23.1	1.00	-1.00	2.76
1,205.0	0.99	44.43	1,203.3	37.6	30.7	23.3	1.59	-1.56	14.36
1,230.0	1.12	44.30	1,228.3	37.9	31.0	23.5	0.52	0.52	-0.52
1,255.0	0.94	44.43	1,253.3	38.2	31.4	23.7	0.72	-0.72	0.52
1,280.0	0.80	44.40	1,278.3	38.5	31.6	23.9	0.56	-0.56	-0.12
1,305.0	0.84	45.02	1,303.3	38.7	31.9	24.0	0.16	0.16	2.48
1,330.0	0.54	51.00	1,328.3	38.9	32.1	24.1	1.23	-1.20	23.92
1,355.0	0.67	45.07	1,353.3	39.1	32.3	24.2	0.58	0.52	-23.72
1,380.0	0.57	46.77	1,378.3	39.3	32.5	24.3	0.41	-0.40	6.80
1,405.0	0.52	45.70	1,403.3	39.5	32.7	24.4	0.20	-0.20	-4.28
1,430.0	0.54	52.05	1,428.3	39.6	32.8	24.5	0.25	0.08	25.40
1,455.0	0.50	47.60	1,453.2	39.8	33.0	24.5	0.23	-0.16	-17.80
1,480.0	0.45	53.59	1,478.2	39.9	33.2	24.6	0.28	-0.20	23.96
1,505.0	0.46	49.98	1,503.2	40.0	33.3	24.7	0.12	0.04	-14.44
1,530.0	0.43	65.23	1,528.2	40.1	33.5	24.7	0.49	-0.12	61.00
1,555.0	0.40	53.48	1,553.2	40.2	33.6	24.7	0.36	-0.12	-47.00
1,580.0	0.32	75.77	1,578.2	40.3	33.8	24.7	0.64	-0.32	89.16
1,605.0	0.32	68.36	1,603.2	40.3	33.9	24.7	0.17	0.00	-29.64
1,630.0	0.31	74.32	1,628.2	40.4	34.0	24.7	0.14	-0.04	23.84
1,655.0	0.35	72.56	1,653.2	40.4	34.2	24.7	0.17	0.16	-7.04
1,680.0	0.25	95.19	1,678.2	40.4	34.3	24.7	0.61	-0.40	90.52
1,705.0	0.32	110.39	1,703.2	40.4	34.4	24.6	0.41	0.28	60.80
1,730.0	0.38	142.73	1,728.2	40.3	34.5	24.5	0.81	0.24	129.36
1,755.0	0.50	151.19	1,753.2	40.2	34.6	24.3	0.54	0.48	33.84
1,780.0	0.49	155.82	1,778.2	40.0	34.7	24.1	0.16	-0.04	18.52
1,805.0	0.56	154.19	1,803.2	39.8	34.8	23.8	0.29	0.28	-6.52
1,830.0	0.48	155.07	1,828.2	39.6	34.9	23.6	0.32	-0.32	3.52
1,855.0	0.58	155.57	1,853.2	39.3	35.0	23.4	0.40	0.40	2.00
1,880.0	0.53	142.20	1,878.2	39.1	35.2	23.1	0.55	-0.20	-53.48
1,905.0	0.53	154.67	1,903.2	38.9	35.3	22.9	0.46	0.00	49.88
1,930.0	0.49	147.03	1,928.2	38.7	35.4	22.7	0.32	-0.16	-30.56
1,955.0	0.40	153.01	1,953.2	38.6	35.5	22.5	0.40	-0.36	23.92
1,980.0	0.49	148.74	1,978.2	38.4	35.6	22.3	0.38	0.36	-17.08
2,005.0	0.37	148.85	2,003.2	38.2	35.7	22.1	0.48	-0.48	0.44
2,030.0	0.43	149.28	2,028.2	38.1	35.8	22.0	0.24	0.24	1.72
2,055.0	0.40	152.25	2,053.2	37.9	35.9	21.8	0.15	-0.12	11.88
2,080.0	0.43	152.79	2,078.2	37.8	35.9	21.6	0.12	0.12	2.16
2,105.0	0.39	138.35	2,103.2	37.6	36.0	21.4	0.44	-0.16	-57.76
2,130.0	0.45	151.88	2,128.2	37.5	36.1	21.2	0.46	0.24	54.12
2,155.0	0.40	150.61	2,153.2	37.3	36.2	21.1	0.20	-0.20	-5.08



Company:	Antero Resources	Local Co-ordinate Reference:	Well Woodworth Unit 2H
Project:	Tyler County WW	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,180.0	0.37	144.71	2,178.2	37.2	36.3	20.9	0.20	-0.12	-23.60
2,205.0	0.24	145.33	2,203.2	37.1	36.4	20.8	0.52	-0.52	2.48
2,230.0	0.16	122.32	2,228.2	37.0	36.5	20.7	0.45	-0.32	-92.04
2,255.0	0.18	145.79	2,253.2	37.0	36.5	20.6	0.29	0.08	93.88
2,280.0	0.25	145.97	2,278.2	36.9	36.6	20.5	0.28	0.28	0.72
2,305.0	0.13	142.07	2,303.2	36.8	36.6	20.4	0.48	-0.48	-15.60
2,330.0	0.22	130.56	2,328.2	36.8	36.7	20.4	0.38	0.36	-46.04
2,355.0	0.42	142.36	2,353.2	36.7	36.8	20.2	0.84	0.80	47.20
2,380.0	0.04	102.74	2,378.2	36.6	36.8	20.2	1.56	-1.52	-158.48
2,405.0	0.27	137.74	2,403.2	36.5	36.9	20.1	0.95	0.92	140.00
2,430.0	0.20	133.01	2,428.2	36.5	36.9	20.0	0.29	-0.28	-18.92
2,455.0	0.28	145.42	2,453.2	36.4	37.0	19.9	0.38	0.32	49.64
2,480.0	0.32	148.97	2,478.2	36.3	37.1	19.8	0.18	0.16	14.20
2,505.0	0.07	58.69	2,503.2	36.2	37.1	19.7	1.31	-1.00	-361.12
2,530.0	0.09	52.16	2,528.2	36.2	37.1	19.7	0.09	0.08	-26.12
2,555.0	0.10	72.58	2,553.2	36.3	37.2	19.7	0.14	0.04	81.68
2,580.0	0.13	90.06	2,578.2	36.3	37.2	19.7	0.18	0.12	69.92
2,605.0	0.12	86.83	2,603.2	36.3	37.3	19.7	0.05	-0.04	-12.92
2,630.0	0.05	40.49	2,628.2	36.3	37.3	19.7	0.37	-0.28	-185.36
2,655.0	0.04	36.92	2,653.2	36.3	37.3	19.7	0.04	-0.04	-14.28
2,680.0	0.04	349.36	2,678.2	36.3	37.3	19.7	0.13	0.00	-190.24
2,705.0	0.03	348.52	2,703.2	36.3	37.3	19.7	0.04	-0.04	-3.36
2,730.0	0.05	49.89	2,728.2	36.3	37.3	19.7	0.18	0.08	245.48
2,755.0	0.03	0.69	2,753.2	36.3	37.4	19.7	0.15	-0.08	-196.80
2,780.0	0.02	27.13	2,778.2	36.4	37.4	19.7	0.06	-0.04	105.76
2,805.0	0.09	60.05	2,803.2	36.4	37.4	19.8	0.30	0.28	131.68
2,830.0	0.06	19.56	2,828.2	36.4	37.4	19.8	0.24	-0.12	-161.96
2,855.0	0.07	329.50	2,853.2	36.4	37.4	19.8	0.22	0.04	-200.24
2,880.0	0.04	32.83	2,878.2	36.4	37.4	19.8	0.25	-0.12	253.32
2,905.0	0.06	18.40	2,903.2	36.5	37.4	19.8	0.09	0.08	-57.72
2,930.0	0.07	359.16	2,928.2	36.5	37.4	19.9	0.10	0.04	-76.96
2,955.0	0.02	8.17	2,953.2	36.5	37.4	19.9	0.20	-0.20	36.04
2,980.0	0.02	356.30	2,978.2	36.5	37.4	19.9	0.02	0.00	-47.48
3,005.0	0.02	356.25	3,003.2	36.5	37.4	19.9	0.00	0.00	-0.20
3,030.0	0.07	334.46	3,028.2	36.5	37.4	19.9	0.21	0.20	-87.16
3,055.0	0.06	336.83	3,053.2	36.6	37.4	19.9	0.04	-0.04	9.48
3,080.0	0.07	2.23	3,078.2	36.6	37.4	20.0	0.12	0.04	101.60
3,105.0	0.04	47.78	3,103.2	36.6	37.4	20.0	0.20	-0.12	182.20
3,130.0	0.05	25.32	3,128.2	36.6	37.4	20.0	0.08	0.04	-89.84
3,155.0	0.01	5.79	3,153.2	36.6	37.4	20.0	0.16	-0.16	-78.12



Company:	Antero Resources	Local Co-ordinate Reference:	Well Woodworth Unit 2H
Project:	Tyler County WV	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,180.0	0.05	353.69	3,178.2	36.7	37.4	20.0	0.16	0.16	-48.40
3,205.0	0.04	350.91	3,203.2	36.7	37.4	20.0	0.04	-0.04	-11.12
3,230.0	0.07	61.40	3,228.2	36.7	37.4	20.0	0.27	0.12	281.96
3,255.0	0.05	44.65	3,253.2	36.7	37.4	20.0	0.11	-0.08	-67.00
3,280.0	0.03	29.40	3,278.2	36.7	37.4	20.1	0.09	-0.08	-61.00
3,305.0	0.09	331.99	3,303.2	36.7	37.4	20.1	0.31	0.24	-229.64
3,330.0	0.06	0.02	3,328.2	36.8	37.4	20.1	0.19	-0.12	112.12
3,355.0	0.04	34.81	3,353.2	36.8	37.4	20.1	0.14	-0.08	139.16
3,380.0	0.03	29.35	3,378.2	36.8	37.4	20.1	0.04	-0.04	-21.84
3,405.0	0.05	328.23	3,403.2	36.8	37.4	20.1	0.18	0.08	-244.48
3,430.0	0.11	332.79	3,428.2	36.9	37.4	20.2	0.24	0.24	18.24
3,455.0	0.14	64.38	3,453.2	36.9	37.4	20.2	0.72	0.12	366.36
3,480.0	0.03	3.84	3,478.2	36.9	37.5	20.2	0.51	-0.44	-242.16
3,505.0	0.07	301.40	3,503.2	36.9	37.5	20.2	0.25	0.16	-249.76
3,530.0	0.04	350.13	3,528.2	36.9	37.4	20.3	0.21	-0.12	194.92
3,555.0	0.09	336.43	3,553.2	37.0	37.4	20.3	0.21	0.20	-54.80
3,580.0	0.10	50.84	3,578.2	37.0	37.4	20.3	0.46	0.04	297.64
3,605.0	0.08	315.29	3,603.2	37.0	37.4	20.3	0.54	-0.08	-382.20
3,630.0	0.27	121.95	3,628.2	37.0	37.5	20.3	1.39	0.76	666.64
3,655.0	0.87	113.81	3,653.2	36.9	37.7	20.1	2.42	2.40	-32.56
3,680.0	1.29	114.70	3,678.2	36.7	38.1	19.8	1.68	1.68	3.56
3,705.0	1.95	111.29	3,703.2	36.4	38.8	19.3	2.67	2.64	-13.64
3,730.0	2.55	110.54	3,728.2	36.1	39.7	18.6	2.40	2.40	-3.00
3,755.0	3.02	105.45	3,753.2	35.7	40.9	17.8	2.12	1.88	-20.36
3,780.0	3.91	97.25	3,778.1	35.4	42.3	17.0	4.07	3.56	-32.80
3,805.0	4.91	92.12	3,803.0	35.3	44.3	16.2	4.30	4.00	-20.52
3,830.0	5.42	89.72	3,827.9	35.2	46.5	15.3	2.22	2.04	-9.60
3,855.0	6.02	89.22	3,852.8	35.3	49.0	14.4	2.41	2.40	-2.00
3,880.0	6.62	87.86	3,877.7	35.3	51.7	13.4	2.47	2.40	-5.44
3,905.0	7.12	89.55	3,902.5	35.4	54.7	12.4	2.16	2.00	6.76
3,930.0	7.74	92.48	3,927.3	35.3	58.0	11.1	2.91	2.48	11.72
3,955.0	8.32	95.74	3,952.0	35.1	61.4	9.6	2.95	2.32	13.04
3,980.0	9.11	98.16	3,976.7	34.6	65.2	7.7	3.48	3.16	9.68
4,005.0	9.91	99.87	4,001.4	34.0	69.3	5.6	3.39	3.20	6.84
4,030.0	10.70	101.99	4,026.0	33.1	73.7	3.2	3.50	3.16	8.48
4,055.0	11.65	103.71	4,050.5	32.0	78.4	0.4	4.03	3.80	6.88
4,080.0	11.96	105.33	4,075.0	30.8	83.3	-2.6	1.82	1.24	6.48
4,105.0	12.81	106.27	4,099.4	29.3	88.5	-5.9	3.49	3.40	3.76
4,130.0	13.39	107.68	4,123.8	27.6	93.9	-9.5	2.65	2.32	5.64
4,155.0	13.83	108.76	4,148.1	25.8	99.5	-13.3	2.03	1.76	4.32



Company:	Antero Resources	Local Co-ordinate Reference:	Well Woodworth Unit 2H
Project:	Tyler County WV	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,180.0	14.61	110.31	4,172.3	23.8	105.3	-17.3	3.47	3.12	6.20
4,205.0	15.41	111.42	4,196.4	21.4	111.3	-21.7	3.40	3.20	4.44
4,230.0	15.87	112.16	4,220.5	18.9	117.6	-26.4	2.01	1.84	2.96
4,255.0	16.75	112.13	4,244.5	16.3	124.1	-31.3	3.52	3.52	-0.12
4,280.0	17.25	112.10	4,268.4	13.5	130.9	-36.4	2.00	2.00	-0.12
4,305.0	18.21	111.95	4,292.2	10.7	137.9	-41.7	3.84	3.84	-0.60
4,330.0	18.68	111.50	4,315.9	7.8	145.3	-47.1	1.96	1.88	-1.80
4,355.0	19.69	110.94	4,339.6	4.8	152.9	-52.8	4.11	4.04	-2.24
4,380.0	20.62	110.37	4,363.0	1.8	161.0	-58.6	3.80	3.72	-2.28
4,405.0	21.03	110.17	4,386.4	-1.3	169.3	-64.6	1.66	1.64	-0.80
4,430.0	21.83	110.59	4,409.7	-4.5	177.9	-70.7	3.26	3.20	1.68
4,455.0	22.20	111.78	4,432.8	-7.9	186.6	-77.1	2.32	1.48	4.76
4,480.0	22.42	111.87	4,456.0	-11.4	195.5	-83.7	0.89	0.88	0.36
4,505.0	23.09	112.41	4,479.0	-15.1	204.4	-90.4	2.81	2.68	2.16
4,530.0	24.16	112.43	4,501.9	-18.9	213.7	-97.4	4.28	4.28	0.08
4,555.0	24.92	112.24	4,524.7	-22.8	223.3	-104.7	3.06	3.04	-0.76
4,580.0	25.38	112.00	4,547.3	-26.8	233.1	-112.1	1.88	1.84	-0.96
4,605.0	26.26	111.58	4,569.8	-30.9	243.2	-119.6	3.60	3.52	-1.68
4,630.0	26.59	111.44	4,592.2	-35.0	253.6	-127.2	1.34	1.32	-0.56
4,655.0	27.09	111.30	4,614.5	-39.1	264.1	-135.0	2.02	2.00	-0.56
4,680.0	27.56	111.11	4,636.7	-43.2	274.8	-142.8	1.91	1.88	-0.76
4,705.0	27.61	110.52	4,658.9	-47.3	285.6	-150.7	1.11	0.20	-2.36
4,730.0	27.41	108.62	4,681.0	-51.2	296.5	-158.4	3.60	-0.80	-7.60
4,755.0	27.40	107.18	4,703.2	-54.7	307.4	-165.7	2.65	-0.04	-5.76
4,780.0	27.11	106.12	4,725.5	-58.0	318.4	-172.9	2.26	-1.16	-4.24
4,805.0	26.94	104.73	4,747.7	-61.0	329.4	-179.8	2.62	-0.68	-5.56
4,830.0	26.87	103.18	4,770.0	-63.8	340.3	-186.4	2.82	-0.28	-6.20
4,855.0	26.65	101.02	4,792.3	-66.1	351.3	-192.7	3.99	-0.88	-8.64
4,880.0	26.50	100.00	4,814.7	-68.2	362.3	-198.7	1.92	-0.60	-4.08
4,905.0	25.91	99.14	4,837.1	-70.0	373.2	-204.5	2.81	-2.36	-3.44
4,930.0	25.98	98.73	4,859.6	-71.7	384.0	-210.1	0.77	0.28	-1.64
4,955.0	26.05	98.60	4,882.1	-73.4	394.9	-215.7	0.36	0.28	-0.52
4,980.0	26.37	97.91	4,904.5	-74.9	405.8	-221.3	1.77	1.28	-2.76
5,005.0	26.50	97.19	4,926.9	-76.4	416.8	-226.7	1.38	0.52	-2.88
5,030.0	27.06	96.13	4,949.2	-77.7	428.0	-232.1	2.94	2.24	-4.24
5,055.0	27.64	95.51	4,971.4	-78.9	439.4	-237.5	2.58	2.32	-2.48
5,080.0	28.00	95.47	4,993.5	-80.0	451.1	-242.9	1.44	1.44	-0.16
5,105.0	27.99	95.22	5,015.6	-81.1	462.7	-248.2	0.47	-0.04	-1.00
5,130.0	28.11	95.03	5,037.7	-82.1	474.4	-253.6	0.60	0.48	-0.76
5,155.0	27.62	94.73	5,059.8	-83.1	486.1	-258.9	2.04	-1.96	-1.20



Company:	Antero Resources	Local Co-ordinate Reference:	Well Woodworth Unit 2H
Project:	Tyler County WV	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,180.0	27.77	94.32	5,081.9	-84.0	497.7	-264.1	0.97	0.60	-1.64
5,205.0	27.74	93.56	5,104.0	-84.8	509.3	-269.1	1.42	-0.12	-3.04
5,230.0	27.36	93.12	5,126.2	-85.5	520.8	-274.1	1.72	-1.52	-1.76
5,255.0	27.25	92.67	5,148.4	-86.1	532.3	-278.9	0.94	-0.44	-1.80
5,280.0	27.25	92.19	5,170.6	-86.6	543.7	-283.6	0.88	0.00	-1.92
5,305.0	27.45	91.80	5,192.8	-87.0	555.2	-288.3	1.07	0.80	-1.56
5,330.0	27.32	91.11	5,215.0	-87.3	566.7	-292.9	1.37	-0.52	-2.76
5,355.0	27.77	91.33	5,237.2	-87.5	578.2	-297.4	1.85	1.80	0.88
5,380.0	27.58	91.41	5,259.3	-87.8	589.9	-302.0	0.77	-0.76	0.32
5,405.0	27.48	91.51	5,281.5	-88.1	601.4	-306.6	0.44	-0.40	0.40
5,430.0	27.56	91.60	5,303.7	-88.4	613.0	-311.2	0.36	0.32	0.36
5,455.0	27.76	91.42	5,325.8	-88.7	624.6	-315.8	0.87	0.80	-0.72
5,480.0	27.50	91.47	5,348.0	-89.0	636.1	-320.4	1.04	-1.04	0.20
5,505.0	27.33	91.38	5,370.2	-89.3	647.7	-325.0	0.70	-0.68	-0.36
5,530.0	26.85	91.41	5,392.4	-89.6	659.0	-329.5	1.92	-1.92	0.12
5,555.0	26.55	91.30	5,414.8	-89.8	670.3	-334.0	1.22	-1.20	-0.44
5,580.0	26.15	91.14	5,437.2	-90.1	681.4	-338.3	1.63	-1.60	-0.64
5,605.0	25.74	90.71	5,459.6	-90.2	692.3	-342.6	1.80	-1.64	-1.72
5,630.0	25.77	91.38	5,482.2	-90.4	703.2	-346.8	1.17	0.12	2.68
5,655.0	25.36	91.36	5,504.7	-90.7	713.9	-351.1	1.64	-1.64	-0.08
5,680.0	24.67	90.76	5,527.4	-90.9	724.5	-355.2	2.94	-2.76	-2.40
5,705.0	24.29	90.52	5,550.1	-91.0	734.9	-359.2	1.57	-1.52	-0.96
Last SDI Gyro @ 5705									
5,718.0	24.34	90.98	5,562.0	-91.1	740.2	-361.3	1.51	0.38	3.54
First SDI MWD @ 5718									
5,779.0	24.22	91.01	5,617.6	-91.5	765.3	-371.1	0.20	-0.20	0.05
5,810.0	23.65	90.70	5,645.9	-91.7	777.9	-375.9	1.88	-1.84	-1.00
5,841.0	23.37	90.26	5,674.3	-91.8	790.2	-380.7	1.07	-0.90	-1.42
5,872.0	24.12	89.79	5,702.7	-91.8	802.7	-385.3	2.50	2.42	-1.52
5,903.0	24.61	89.12	5,730.9	-91.7	815.5	-390.0	1.81	1.58	-2.16
5,934.0	24.30	80.23	5,759.2	-90.5	828.3	-393.7	11.90	-1.00	-28.68
5,965.0	24.04	68.16	5,787.5	-87.1	840.4	-395.0	15.94	-0.84	-38.94
5,996.0	24.09	56.53	5,815.8	-81.2	851.6	-393.8	15.28	0.16	-37.52
6,026.0	24.54	43.81	5,843.2	-73.4	861.0	-390.0	17.49	1.50	-42.40
6,057.0	26.29	36.87	5,871.2	-63.2	869.6	-383.8	11.13	5.65	-22.39
6,088.0	28.25	33.02	5,898.7	-51.6	877.7	-376.0	8.50	6.32	-12.42
6,119.0	30.45	28.68	5,925.7	-38.5	885.5	-366.9	9.87	7.10	-14.00
6,150.0	32.52	24.58	5,952.2	-24.1	892.7	-356.1	9.60	6.68	-13.23
6,181.0	34.76	21.00	5,978.0	-8.2	899.3	-343.9	9.65	7.23	-11.55
6,212.0	36.09	17.29	6,003.2	8.7	905.2	-330.4	8.15	4.29	-11.97



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Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,242.0	36.58	12.55	6,027.4	25.9	909.8	-316.2	9.50	1.63	-15.80
6,273.0	37.94	8.93	6,052.1	44.3	913.3	-300.4	8.32	4.39	-11.68
6,304.0	39.31	4.81	6,076.3	63.6	915.6	-283.4	9.40	4.42	-13.29
6,335.0	40.75	1.73	6,100.1	83.5	916.7	-265.4	7.90	4.65	-9.94
6,366.0	42.79	357.73	6,123.2	104.1	916.6	-246.2	10.82	6.58	-12.90
6,380.0	44.23	356.29	6,133.3	113.7	916.1	-237.1	12.48	10.28	-10.28
Middlesex @ 6380									
6,397.0	46.00	354.64	6,145.3	125.7	915.1	-225.6	12.48	10.42	-9.71
6,428.0	49.63	352.69	6,166.1	148.5	912.6	-203.5	12.60	11.71	-6.29
6,458.0	53.81	350.63	6,184.7	171.8	909.2	-180.6	14.94	13.93	-6.87
6,489.0	58.84	349.95	6,201.9	197.3	904.8	-155.4	16.33	16.23	-2.19
6,520.0	62.25	349.93	6,217.1	223.8	900.1	-129.0	11.00	11.00	-0.06
6,531.0	63.22	350.59	6,222.2	233.5	898.4	-119.4	10.30	8.81	5.99
Burket @ 6531									
6,551.0	64.99	351.76	6,230.9	251.2	895.7	-101.9	10.30	8.85	5.85
6,561.0	65.87	352.03	6,235.1	260.3	894.4	-93.1	9.18	8.83	2.75
Tully @ 6561									
6,580.0	67.55	352.55	6,242.6	277.5	892.0	-76.2	9.18	8.84	2.69
Marcellus @ 6580									
6,582.0	67.73	352.60	6,243.4	279.4	891.8	-74.4	9.18	8.85	2.66
6,613.0	72.12	352.05	6,254.0	308.2	887.9	-46.2	14.26	14.16	-1.77
6,643.0	75.58	351.31	6,262.3	336.7	883.7	-18.2	11.77	11.53	-2.47
6,674.0	79.78	349.20	6,268.9	366.6	878.6	11.4	15.09	13.55	-6.81
6,705.0	82.83	347.00	6,273.6	396.6	872.3	41.6	12.08	9.84	-7.10
6,736.0	85.63	345.52	6,276.8	426.5	865.0	72.1	10.20	9.03	-4.77
6,767.0	86.91	343.96	6,278.8	456.4	856.8	102.8	6.50	4.13	-5.03
6,798.0	87.58	342.03	6,280.3	486.0	847.8	133.7	6.58	2.16	-6.23
6,833.0	88.86	339.21	6,281.3	519.0	836.2	168.6	8.84	3.66	-8.06
6,864.0	89.73	338.20	6,281.7	547.8	824.9	199.6	4.30	2.81	-3.26
6,894.0	90.27	338.28	6,281.7	575.7	813.8	229.6	1.82	1.80	0.27
6,956.0	89.66	338.24	6,281.8	633.3	790.8	291.6	0.99	-0.98	-0.06
7,049.0	89.46	338.57	6,282.5	719.8	756.6	384.6	0.41	-0.22	0.35
7,141.0	89.83	337.94	6,283.0	805.2	722.5	476.6	0.79	0.40	-0.68
7,234.0	90.00	338.41	6,283.2	891.5	687.9	569.6	0.54	0.18	0.51
7,326.0	90.00	338.77	6,283.2	977.2	654.4	661.6	0.39	0.00	0.39
7,419.0	90.23	339.10	6,283.0	1,064.0	620.9	754.6	0.43	0.25	0.35
7,511.0	90.27	339.44	6,282.6	1,150.0	588.4	846.6	0.37	0.04	0.37
7,604.0	89.83	339.58	6,282.5	1,237.1	555.8	939.5	0.50	-0.47	0.15
7,696.0	90.37	339.47	6,282.4	1,323.3	523.6	1,031.5	0.60	0.59	-0.12
7,789.0	90.20	337.40	6,281.9	1,409.8	489.4	1,124.5	2.23	-0.18	-2.23
7,882.0	89.90	337.90	6,281.8	1,495.8	454.1	1,217.5	0.63	-0.32	0.54



Scientific Drilling International

Survey Report



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Project:	Tyler County WV	TVD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Site:	Hartley East Pad:Freeland/Plum Run/Woodworth	MD Reference:	Precision 522: GL 1021' + KB 18' @ 1039.0usft
Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,974.0	90.67	339.23	6,281.4	1,581.5	420.5	1,309.5	1.67	0.84	1.45
8,067.0	89.77	336.88	6,281.0	1,667.7	385.7	1,402.5	2.71	-0.97	-2.53
8,159.0	89.50	336.04	6,281.6	1,752.1	349.0	1,494.4	0.96	-0.29	-0.91
8,252.0	90.54	337.03	6,281.6	1,837.4	311.9	1,587.4	1.54	1.12	1.06
8,345.0	90.64	338.81	6,280.6	1,923.5	277.0	1,680.4	1.92	0.11	1.91
8,437.0	89.80	338.10	6,280.2	2,009.1	243.2	1,772.4	1.20	-0.91	-0.77
8,530.0	89.43	337.28	6,280.9	2,095.1	207.9	1,865.4	0.97	-0.40	-0.88
8,622.0	90.37	338.46	6,281.0	2,180.4	173.2	1,957.4	1.64	1.02	1.28
8,715.0	90.81	338.92	6,280.1	2,267.0	139.4	2,050.4	0.68	0.47	0.49
8,807.0	90.40	338.95	6,279.1	2,352.8	106.4	2,142.3	0.45	-0.45	0.03
8,900.0	90.04	339.61	6,278.7	2,439.8	73.5	2,235.3	0.81	-0.39	0.71
8,992.0	90.07	339.87	6,278.7	2,526.1	41.6	2,327.3	0.28	0.03	0.28
9,085.0	89.73	339.37	6,278.8	2,613.3	9.2	2,420.2	0.65	-0.37	-0.54
9,178.0	89.56	338.26	6,279.4	2,700.0	-24.4	2,513.2	1.21	-0.18	-1.19
9,270.0	90.24	338.19	6,279.6	2,785.5	-58.5	2,605.2	0.74	0.74	-0.08
9,363.0	90.40	338.60	6,279.0	2,871.9	-92.7	2,698.2	0.47	0.17	0.44
9,455.0	89.66	337.47	6,279.0	2,957.2	-127.2	2,790.2	1.47	-0.80	-1.23
9,548.0	90.00	337.50	6,279.3	3,043.2	-162.8	2,883.2	0.37	0.37	0.03
9,641.0	89.53	335.77	6,279.6	3,128.5	-199.6	2,976.2	1.93	-0.51	-1.86
9,733.0	90.74	334.75	6,279.4	3,212.1	-238.2	3,068.1	1.72	1.32	-1.11
9,826.0	91.18	334.54	6,277.9	3,296.1	-278.0	3,160.9	0.52	0.47	-0.23
9,918.0	90.27	335.61	6,276.7	3,379.5	-316.7	3,252.8	1.53	-0.99	1.16
10,011.0	89.84	337.64	6,276.6	3,464.9	-353.6	3,345.7	2.23	-0.46	2.18
10,103.0	90.68	337.67	6,276.2	3,550.0	-388.6	3,437.7	0.91	0.91	0.03
10,196.0	90.81	340.15	6,275.0	3,636.7	-422.1	3,530.7	2.67	0.14	2.67
10,288.0	91.02	341.14	6,273.5	3,723.5	-452.6	3,622.6	1.10	0.23	1.08
10,381.0	90.17	340.56	6,272.6	3,811.4	-483.1	3,715.5	1.11	-0.91	-0.62
10,473.0	91.02	341.47	6,271.6	3,898.4	-513.0	3,807.4	1.35	0.92	0.99
10,566.0	90.85	338.08	6,270.1	3,985.6	-545.1	3,900.3	3.65	-0.18	-3.65
10,658.0	90.18	335.50	6,269.2	4,070.1	-581.4	3,992.2	2.90	-0.73	-2.80
10,751.0	89.87	335.78	6,269.2	4,154.9	-619.7	4,085.2	0.45	-0.33	0.30
10,844.0	91.08	336.36	6,268.4	4,239.9	-657.5	4,178.1	1.44	1.30	0.62
10,936.0	90.64	337.17	6,267.1	4,324.4	-693.8	4,270.1	1.00	-0.48	0.88
11,029.0	89.84	335.90	6,266.7	4,409.7	-730.8	4,363.0	1.61	-0.86	-1.37
11,121.0	89.23	337.49	6,267.4	4,494.2	-767.2	4,455.0	1.85	-0.66	1.73
11,214.0	92.09	339.90	6,266.3	4,580.8	-801.0	4,548.0	4.02	3.08	2.59
11,307.0	91.08	338.19	6,263.8	4,667.6	-834.2	4,640.9	2.13	-1.09	-1.84
11,399.0	88.80	336.51	6,263.9	4,752.5	-869.6	4,732.9	3.08	-2.48	-1.83
11,492.0	88.80	337.73	6,265.8	4,838.2	-905.8	4,825.9	1.31	0.00	1.31
11,584.0	92.62	339.78	6,264.7	4,923.9	-939.1	4,917.8	4.71	4.15	2.23



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Well:	Woodworth Unit 2H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
11,677.0	91.48	337.97	6,261.3	5,010.6	-972.6	5,010.8	2.30	-1.23	-1.95	
11,769.0	90.81	339.34	6,259.5	5,096.3	-1,006.1	5,102.7	1.66	-0.73	1.49	
11,862.0	90.51	338.58	6,258.4	5,183.1	-1,039.5	5,195.7	0.88	-0.32	-0.82	
11,955.0	89.77	338.31	6,258.2	5,269.5	-1,073.6	5,288.7	0.85	-0.80	-0.29	
12,047.0	90.07	338.66	6,258.3	5,355.1	-1,107.4	5,380.7	0.50	0.33	0.38	
12,140.0	90.47	338.91	6,257.9	5,441.8	-1,141.0	5,473.7	0.51	0.43	0.27	
12,232.0	91.15	338.78	6,256.6	5,527.6	-1,174.2	5,565.7	0.75	0.74	-0.14	
12,325.0	90.78	338.78	6,255.0	5,614.3	-1,207.9	5,658.7	0.40	-0.40	0.00	
12,418.0	90.04	338.80	6,254.4	5,701.0	-1,241.5	5,751.6	0.80	-0.80	0.02	
12,510.0	90.21	338.16	6,254.2	5,786.6	-1,275.3	5,843.6	0.72	0.18	-0.70	
12,603.0	90.57	337.89	6,253.5	5,872.8	-1,310.1	5,936.6	0.48	0.39	-0.29	
12,695.0	90.41	337.82	6,252.7	5,958.0	-1,344.8	6,028.6	0.19	-0.17	-0.08	
12,788.0	89.90	338.36	6,252.5	6,044.3	-1,379.5	6,121.6	0.80	-0.55	0.58	
12,880.0	89.80	338.21	6,252.7	6,129.8	-1,413.5	6,213.6	0.20	-0.11	-0.16	
12,963.0	89.97	338.58	6,252.9	6,207.0	-1,444.1	6,296.6	0.49	0.20	0.45	
Last SDI MWD @ 12963										
13,028.0	89.97	338.58	6,252.9	6,267.5	-1,467.8	6,361.6	0.00	0.00	0.00	
Projection To Bit @ 13028 MD / 6252 TVD										

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
6,380.0	6,133.3	Middlesex @ 6380		0.00	
6,531.0	6,222.2	Burket @ 6531		0.00	
6,561.0	6,235.1	Tully @ 6561		0.00	
6,580.0	6,242.6	Marcellus @ 6580		0.00	

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
30.0	30.0	0.0	0.0	First SDI Gyro @ 30
5,705.0	5,550.1	-91.0	734.9	Last SDI Gyro @ 5705
5,718.0	5,562.0	-91.1	740.2	First SDI MWD @ 5718
12,963.0	6,252.9	6,207.0	-1,444.1	Last SDI MWD @ 12963
13,028.0	6,252.9	6,267.5	-1,467.8	Projection To Bit @ 13028 MD / 6252 TVD

Checked By: _____ Approved By: _____ Date: _____

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	1/1/2017
Job End Date:	1/7/2017
State:	West Virginia
County:	Tyler
API Number:	47-095-02249-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Woodworth 2H
Latitude:	39.36541900
Longitude:	-80.99303600
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,283
Total Base Water Volume (gal):	9,723,198
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	88.99092	
Sand	J.S. Well Services, LLC	Proppant	Crystalline Silica, quartz	14808-60-7	100.00000	10.72062	
HCL Acid (12.6%-17.5%)	J.S. Well Services, LLC	Bulk Acid	Water	7732-18-5	87.40000	0.15583	
LGC-15	J.S. Well Services, LLC	Gelling Agents	Hydrogen Chloride	7647-01-0	17.50000	0.03623	
			Guar Gum	9000-30-0	50.00000	0.02403	
			Petroleum Distillates	64742-47-8	60.00000	0.02275	
			Suspending agent (solid)	14808-60-7	3.00000	0.00367	
			Surfactant	68439-51-0	3.00000	0.00144	
WFRA-405	J.S. Well Services, LLC	Friction Reducer					
			2-Propenoic acid, polymer with 2-propenamide	29003-06-9	30.00000	0.01506	
			Hydrated light distillate (petroleum)	64742-47-8	30.00000	0.01213	

SI-1100	J.S. Well Services, LLC	Scale Inhibitor							
			Ethylene Glycol	107-21-1			40.00000		0.00731
			Copolymer of Maleic and Acrylic acid	52255-49-9			10.00000		0.00151
			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
Bioclear 2000	J.S. Well Services, LLC	Anti-Bacterial Agent							
			2,2-dibromo-3-nitropropionamide	10222-01-2			20.00000		0.00436
			Deionized Water	7732-18-5			28.00000		0.00249
AI-303	J.S. Well Services, LLC	Acid Corrosion Inhibitors							
			Ethylene glycol	107-21-1			40.00000		0.00006
			Cinnamaldehyde	104-55-2			20.00000		0.00002
			Formic acid	64-18-6			20.00000		0.00002
			Butyl cellosolve	111-76-2			20.00000		0.00002
			Polyether	Proprietary			10.00000		0.00001
			Acetophenone, thiourea, formaldehyde polymer	68527-49-1			5.00000		0.00001

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°22'30"

9,858'

11,323' TO BOTTOM HOLE

LATITUDE 39°25'00"

LONGITUDE 80°57'30"

3,519'

LONGITUDE 80°57'30"

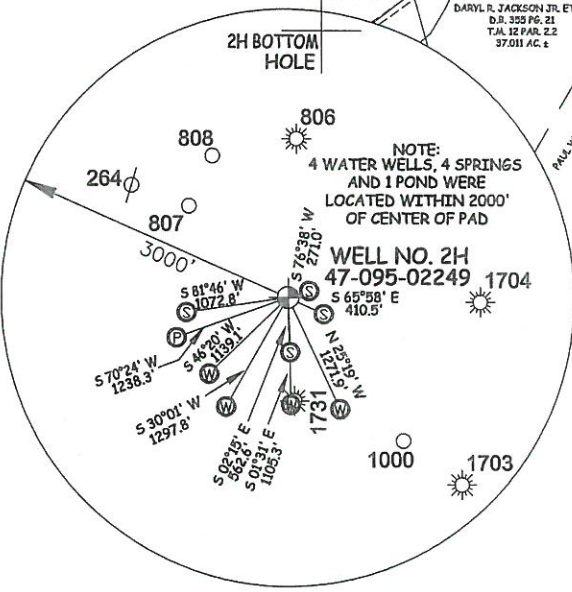
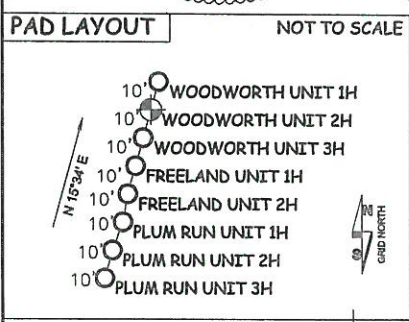
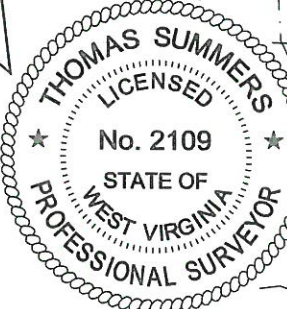
12,425' TO BOTTOM HOLE

Antero Resources Corporation
Well No. Woodworth Unit 2H
47-095-02249 AS DRILLED

AS DRILLED DATA:
WELL 2H TOP HOLE INFORMATION:
N: 318,682ft E: 1,577,843ft
LAT: 39°21'55.22" LON: 80°59'35.52"
BOTTOM HOLE INFORMATION:
N: 324,976ft E: 1,576,479ft
LAT: 39°22'57.19" LON: 80°59'54.21"
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: 4,357,329m E: 500,600m
BOTTOM HOLE INFORMATION:
N: 4,359,239m E: 500,152m

- 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 # 13-081WA	I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAN 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	LEGEND	
DRAWING # WOODWORTH2HADRR				— — — — — Surface Owner Boundary Lines +/-	— — — — — Interior Surface Tracts +/-
SCALE 1" = 1000'				X Existing Fence	Found monument, as noted
MINIMUM DEGREE OF ACCURACY SUBMETER		STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS	WILLOW LAND SURVEYING PLLC 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415	○ Proposed Well Path	○ As Drilled Well Path
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS				DATE 07/26/17	OPERATOR'S WELL# WOODWORTH UNIT #2H
STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS	WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL	LOCATION: ELEVATION 1,021' AS-DRILLED	WATERSHED OUTLET MIDDLE ISLAND CREEK	QUADRANGLE PENNSBORO 7.5 (TOP HOLE) MIDDLEBOURNE 7.5 (BOTTOM HOLE) DISTRICT MEADE COUNTY TYLER	STATE COUNTY PERMIT
SURFACE OWNER DAVID M. HARTLEY	OIL & GAS ROYALTY OWNER S.A. SMITH ET AL; WALTER JACKSON; DAVID HARTLEY; JAY-BEE PRODUCTION; ANDREW WILLIAMSON; THOMAS M. JONES; DALE PROCTOR; LOREN E. BAGLEY; RIDGEWOOD DEVELOPMENT; ROBERT LEE STEVENS ET UX	ACREAGE 28 ACRES +/-	LEASE ACREAGE 28 AC±; 24.0125 AC±; 46 AC±; 43.463 AC±; 31.713 AC±; 3.58 AC±; 18.313 AC±; 40 AC±; 50 AC±; 25 AC±	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
TARGET FORMATION MARCELLUS	ESTIMATED DEPTH 6,362' TVD 13,028' MD	WELL OPERATOR ANTERO RESOURCES CORP.	DESIGNATED AGENT DIANNA STAMPER	ADDRESS 1615 WYNKOOP STREET	ADDRESS 5400 D BIG TYLER ROAD
FORM WW-6	DENVER, CO 80202			CHARLESTON, WV 25313	

COUNTY NAME PERMIT