WR-35
Rev. 8/23/13

APPROVED
NAME: [illegible]
DATE 1/3/18

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

API 47 - 017 - 06380 County Doddridge District Greenbrier
Quad Big Isaac 7.5' Pad Name Hughes Pad Field/Pool Name -----
Farm name Eric E. Nelson, et al Well Number Richard 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 4341190m	Easting 532760m
Landing Point of Curve	Northing 4341189.300m	Easting 533321.011m
Bottom Hole	Northing 4339105m	Easting 533989m

Elevation (ft) 1332' 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 10/28/2013 Date drilling commenced 10/08/2014 Date drilling ceased 1/12/2015
Date completion activities began 07/07/2017 Date completion activities ceased 09/03/2017
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 36', 109', 112' Open mine(s) (Y/N) depths No
Salt water depth(s) ft 1091', 1150' Void(s) encountered (Y/N) depths No
Coal depth(s) ft 390', 964', 1648', 1948' Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

Reviewed by:

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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"	53'	New	106.5#, J-55	N/A	Y
Surface	17-1/2"	13-3/8"	604'	New	48#, H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2522'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	15305'	New	23#, P-110	N/A	Y
Tubing		2-3/8"	7799'		4.7#, P-110		
Packer type and depth set		N/A					

Comment Details _____

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft^3/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor	Class A	152 sx	15.6	1.18	179	0'	8 Hrs.
Surface	Class A	718 sx	15.6	1.18	847	0'	8 Hrs.
Coal							
Intermediate 1	Class A	969 sx	15.6	1.18	1143	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	1253 sx (Lead) 1173 sx (Tail)	14.5 (Lead), 15.2 (Tail)	1.3 (Lead), 1.86 (Tail)	3811	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 15309' MD, 7335' TVD (BHL) & 7365' TVD (Deepest Point Drilled) Loggers TD (ft) 15254' MD

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

Plug back procedure N/A

** This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (McClain Unit 1H API #47-017-06378). Please reference the wireline logs submitted with Form WR-35 for McClain Unit 1H. A Cement Bond Log has been included with this submittal.

Kick off depth (ft) 7437'

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

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)

***PLEASE SEE ATTACHED EXHIBIT 1**

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)

***PLEASE SEE ATTACHED EXHIBIT 2**

Please insert additional pages as applicable.

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PRODUCING FORMATION(S)	DEPTHS			
Marcellus	7315' (TOP)	TVD	7811' (TOP)	MD

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ■ Open Flow OIL TEST ■ Flow ☐ Pump

SHUT-IN PRESSURE Surface 3950 psi Bottom Hole --- psi DURATION OF TEST --- hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	13819 mcfpd	7 bpd	--- bpd	547 bpd	☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION NAME	TOP DEPTH IN FT 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_2S, ETC)

*PLEASE SEE ATTACHED EXHIBIT 3

Please insert additional pages as applicable.

Drilling Contractor Precision Drilling Company, LP
Address 562 Spring Run Rd City Pennsboro State WV Zip 26415

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

Cementing Company Nabors Completion & Production Services, Co.
Address 1650 Hackers Creek City Jane Lew State WV Zip 26378

Stimulating Company US Well Services
Address 533 Industrial Park Drive 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 12/14/2017

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

API 47-017-06380 Farm Name Eric E. Nelson, et al Well Number Richard Unit 2H

EXHIBIT 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	7/7/2017	15011	15178	60	Marcellus
2	8/6/2017	14812	14980	60	Marcellus
3	8/6/2017	14613	14781	60	Marcellus
4	8/6/2017	14414	14582	60	Marcellus
5	8/7/2017	14215	14383	60	Marcellus
6	8/7/2017	14016	14184	60	Marcellus
7	8/7/2017	13817	13985	60	Marcellus
8	8/7/2017	13618	13786	60	Marcellus
9	8/8/2017	13419	13587	60	Marcellus
10	8/8/2017	13221	13388	60	Marcellus
11	8/8/2017	13022	13189	60	Marcellus
12	8/8/2017	12823	12991	60	Marcellus
13	8/9/2017	12624	12792	60	Marcellus
14	8/9/2017	12425	12593	60	Marcellus
15	8/9/2017	12226	12394	60	Marcellus
16	8/9/2017	12027	12195	60	Marcellus
17	8/9/2017	11828	11996	60	Marcellus
18	8/10/2017	11629	11797	60	Marcellus
19	8/10/2017	11430	11598	60	Marcellus
20	8/10/2017	11232	11399	60	Marcellus
21	8/10/2017	11033	11200	60	Marcellus
22	8/11/2017	10834	11002	60	Marcellus
23	8/11/2017	10635	10803	60	Marcellus
24	8/11/2017	10436	10604	60	Marcellus
25	8/11/2017	10237	10405	60	Marcellus
26	8/11/2017	10038	10206	60	Marcellus
27	8/12/2017	9839	10007	60	Marcellus
28	8/12/2017	9640	9808	60	Marcellus
29	8/12/2017	9441	9609	60	Marcellus
30	8/12/2017	9243	9410	60	Marcellus
31	8/13/2017	9044	9211	60	Marcellus
32	8/13/2017	8845	9013	60	Marcellus
33	8/13/2017	8646	8814	60	Marcellus
34	8/13/2017	8447	8615	60	Marcellus
35	8/13/2017	8248	8416	60	Marcellus
36	8/14/2017	8049	8217	60	Marcellus
37	8/14/2017	7850	8018	60	Marcellus

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API 47-017-06380 Farm Name Eric E. Nelson, et al Well Number Richard 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	8/5/2017	73.8	8536	6645	5003	202000	10957	N/A
2	8/6/2017	73.6	8255	6999	5500	200200	7939	N/A
3	8/6/2017	73.9	8158	7299	5969	202100	7857	N/A
4	8/6/2017	75.7	8219	6859	4939	202300	7822	N/A
5	8/7/2017	75.7	8217	6888	4989	202500	7879	N/A
6	8/7/2017	77.3	8179	6534	5286	203000	7767	N/A
7	8/7/2017	78.4	8869	6266	5082	202400	7725	N/A
8	8/7/2017	78.3	8531	6688	5511	203000	7731	N/A
9	8/8/2017	76.6	8549	6713	5372	203250	8700	N/A
10	8/8/2017	78.9	8316	6409	5840	203250	7976	N/A
11	8/8/2017	76.7	8135	6387	5868	202700	7684	N/A
12	8/8/2017	78.2	8174	6405	5779	203190	7715	N/A
13	8/9/2017	78.1	8070	6213	4663	203260	7659	N/A
14	8/9/2017	75.4	8576	6459	5887	203500	7676	N/A
15	8/9/2017	76.8	8496	6298	5000	203600	7678	N/A
16	8/9/2017	77.4	8268	6387	5010	203760	7665	N/A
17	8/9/2017	76.9	8388	6552	5625	203640	7635	N/A
18	8/10/2017	76.9	8617	6423	4549	203500	9975	N/A
19	8/10/2017	78.1	8566	6870	6040	203500	7681	N/A
20	8/10/2017	72.7	8452	6441	4724	203000	9682	N/A
21	8/10/2017	76.8	8298	6641	5786	203600	9668	N/A
22	8/11/2017	69.4	8357	6613	5343	203460	8689	N/A
23	8/11/2017	79.4	8014	6459	5089	203050	7639	N/A
24	8/11/2017	75.7	8283	6055	4939	203500	7614	N/A
25	8/11/2017	75.3	8076	6073	5389	203800	7684	N/A
26	8/11/2017	79.4	8222	6191	5332	203440	7564	N/A
27	8/12/2017	78.8	8229	6537	5715	203340	7550	N/A
28	8/12/2017	76.0	7709	5897	5214	203100	7656	N/A
29	8/12/2017	79.7	7852	6248	5175	203100	7493	N/A
30	8/12/2017	75.9	7666	6319	4914	203700	10420	N/A
31	8/13/2017	77.8	7590	6816	5057	203450	7470	N/A
32	8/13/2017	75.9	8029	6559	5211	202000	9204	N/A
33	8/13/2017	80.3	7979	6487	5711	201900	7725	N/A
34	8/13/2017	80.1	8016	6419	5583	202500	7574	N/A
35	8/13/2017	78.3	7788	6849	4925	202000	7476	N/A
36	8/14/2017	79.8	7538	6402	5128	202960	7484	N/A
37	8/14/2017	67.3	7950	7607	5990	196040	10165	N/A
AVG=		76.6	8194	6,538	5,328	7,502,590	302,478	TOTAL

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API 47-017-06380 Farm Name Eric E. Nelson, et al Well Number Richard Unit 2H

EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD) From Surface	BOTTOM DEPTH (TVD) From Surface	TOP DEPTH (MD) From Surface	BOTTOM DEPTH (MD) From Surface
Fresh Water	36'	N/A	36'	N/A
Fresh Water	109'	N/A	109'	N/A
Fresh Water	112'	N/A	112'	N/A
Shale	7	188	7	188
Sandy siltstone	188	390	188	390
Coal	390	408	390	408
Shale	408	488	408	488
Siltstone	488	828	488	828
Shale	828	908	828	908
Sandstone	908	943	908	943
Shale	943	964	943	964
Trace coal	964	986	964	986
Sandy siltstone	986	1348	986	1348
Shale	1348	1588	1348	1588
Sandy shale	1588	1648	1588	1648
Trace coal	1648	1668	1648	1668
Shale	1668	1708	1668	1708
Sandstone	1708	1808	1708	1808
Silty sandstone	1808	1948	1808	1948
Trace coal	1948	1988	1948	1988
Silty sandstone	1988	2248	1988	2248
Shale	2248	2350	2248	2351
Big Lime	2350	2498	2351	2499
Big Injun	2498	2947	2499	2948
Weir	2947	3047	2948	3048
Fifty Foot Sandstone	3047	3220	3048	3221
Gordon	3220	3728	3221	3733
Fifth Sandstone	3728	4034	3733	4047
Bayard	4034	4454	4047	4504
Speechley	4454	4710	4504	4792
Baltown	4710	5391	4792	5560
Bradford	5391	5661	5560	5863
Riley	5661	6102	5863	6353
Benson	6102	6853	6353	7189
Alexander	6853	7007	7189	7363
Sycamore	7007	7156	7363	7538
Middlesex	7156	7187	7538	7579
Burkett	7187	7276	7579	7719
Tully	7276	7315	7719	7811
Marcellus	7315	NA	7811	NA

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Richard Unit 2H
Doddridge County WV
Northing: 14242005.14
Easting: 1747848.84
As Drilled

Antero Resources

Scientific Drilling

To convert Magnetic North to Grid, Subtract 8.82°
To convert True North to Grid, Subtract 0.24°

Azimuths to Grid North
True North: -0.24°
Magnetic North: -8.82°

Magnetic Field
Strength: 52163.9snT
Dip Angle: 66.77°
Date: 10/3/2014
Model: BGGM2014

Precision 523: GL 1331' + KB 19' @ 1350.0usft
Gr: 1331.0

WELL DETAILS Richard Unit 2H
Ground Level: 1331.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	14242005.14	1747848.84	39° 13' 9.439 N	80° 37' 14.442 W

SITE DETAILS: Hughes Pad:Belton/Carole/Earlewine/Gully/Hughes

Carole/Belton/McClain/Richard/Earlewine/Hughes/Gul

Site Centre Northing: 14242041.55
Easting: 1747814.24

Positional Uncertainity: 2.0
Convergence: 0.24
Local North: Grid

PROJECT DETAILS: Doddridge County WV

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

DESIGN TARGET DETAILS

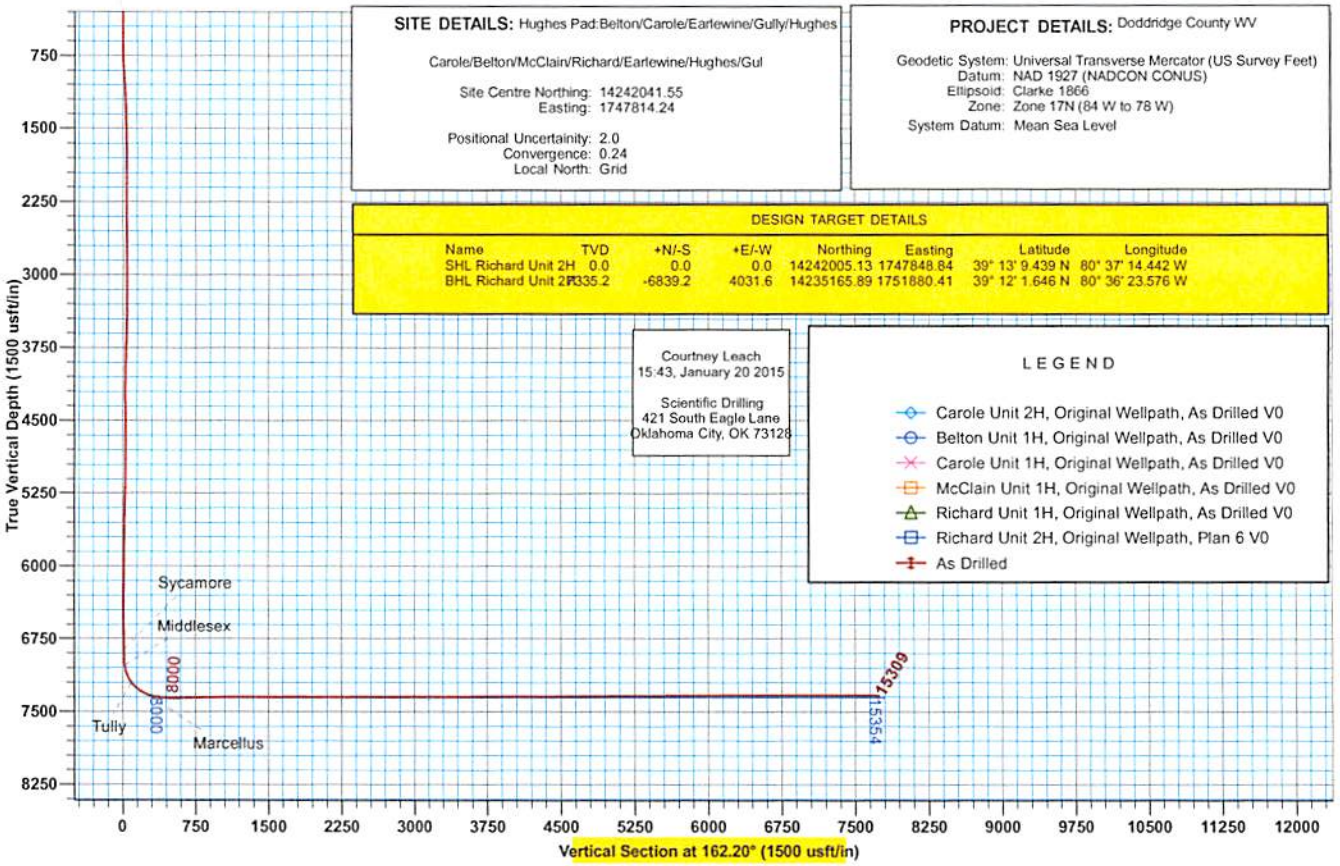
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL Richard Unit 2H	0.0	0.0	0.0	14242005.13	1747848.84	39° 13' 9.439 N	80° 37' 14.442 W
BHL Richard Unit 2H	7335.2	-6839.2	4031.6	14235165.89	1751880.41	39° 12' 1.646 N	80° 36' 23.576 W

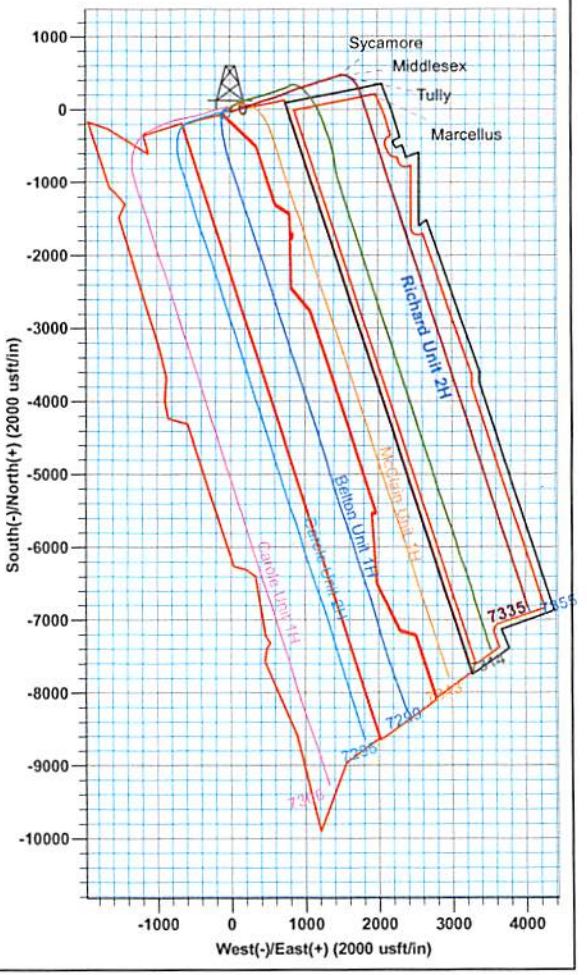
Courtney Leach
15:43, January 20 2015

Scientific Drilling
421 South Eagle Lane
Oklahoma City, OK 73128

LEGEND

- Carole Unit 2H, Original Wellpath, As Drilled V0
- Belton Unit 1H, Original Wellpath, As Drilled V0
- Carole Unit 1H, Original Wellpath, As Drilled V0
- McClain Unit 1H, Original Wellpath, As Drilled V0
- Richard Unit 1H, Original Wellpath, As Drilled V0
- Richard Unit 2H, Original Wellpath, Plan 6 V0
- As Drilled





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Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Project Doddridge County WV, McClellan District

Map System:	Universal Transverse Mercator (US Survey Fee	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site Hughes Pad:Belton/Carole/Earlewine/Gully/Hughes

Site Position:		**Northing:**	14,242,041.55 usft	**Latitude:**	39° 13' 9.801 N
From:	Map	**Easting:**	1,747,814.24 usft	**Longitude:**	80° 37' 14.880 W
Position Uncertainty:	2.0 usft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	0.24 °

Well Richard Unit 2H, Marcellus

Well Position	**+N/-S**	0.0 usft	**Northing:**	14,242,005.14 usft	**Latitude:**	39° 13' 9.439 N
	+E/-W	0.0 usft	**Easting:**	1,747,848.84 usft	**Longitude:**	80° 37' 14.442 W
Position Uncertainty		2.0 usft	**Wellhead Elevation:**	1,350.0 usft	**Ground Level:**	1,331.0 usft

Wellbore Original Wellpath

Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	BGGM2014	10/3/2014	-8.58	66.77	52,164

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	162.20

Survey Program **Date** 1/20/2015

From (usft)	**To (usft)**	**Survey (Wellbore)**	**Tool Name**	**Description**
31.0	6,306.0	Survey #4 Final Gyro (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
6,306.0	15,309.0	Survey #5 MWD (Original Wellpath)	MWD SDI	MWD - Standard ver 1.0.1

Survey

MD (usft)	**Inc (°)**	**Azi (azimuth) (°)**	**TVD (usft)**	**N/S (usft)**	**E/W (usft)**	**V. Sec (usft)**	**DLeg (°/100usft)**
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
31.0	0.10	62.72	31.0	0.0	0.0	0.0	0.32
56.0	0.21	62.72	56.0	0.0	0.1	0.0	0.44
81.0	0.31	62.72	81.0	0.1	0.2	0.0	0.40
106.0	0.41	62.72	106.0	0.2	0.3	-0.1	0.40
131.0	0.30	70.22	131.0	0.2	0.5	-0.1	0.48
156.0	0.17	60.58	156.0	0.3	0.6	-0.1	0.54
181.0	0.12	203.33	181.0	0.3	0.6	-0.1	1.10
206.0	0.01	86.76	206.0	0.2	0.6	-0.1	0.50
231.0	0.03	215.60	231.0	0.2	0.6	0.0	0.15
256.0	0.07	291.16	256.0	0.2	0.6	-0.1	0.28

Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
281.0	0.06	197.32	281.0	0.2	0.5	-0.1	0.38
306.0	0.03	180.01	306.0	0.2	0.5	0.0	0.13
331.0	0.09	231.20	331.0	0.2	0.5	0.0	0.30
356.0	0.08	100.74	356.0	0.2	0.5	0.0	0.62
381.0	0.13	58.57	381.0	0.2	0.6	0.0	0.36
406.0	0.16	207.86	406.0	0.2	0.6	0.0	1.12
431.0	0.12	171.04	431.0	0.1	0.6	0.1	0.38
456.0	0.11	112.86	456.0	0.1	0.6	0.1	0.45
481.0	0.12	175.63	481.0	0.0	0.6	0.1	0.48
506.0	0.16	158.23	506.0	0.0	0.6	0.2	0.23
531.0	0.12	169.00	531.0	-0.1	0.6	0.3	0.19
556.0	0.19	165.96	556.0	-0.1	0.7	0.3	0.28
581.0	0.14	209.11	581.0	-0.2	0.6	0.4	0.52
606.0	0.09	123.33	606.0	-0.2	0.7	0.4	0.64
631.0	0.10	113.54	631.0	-0.3	0.7	0.5	0.08
656.0	0.14	169.09	656.0	-0.3	0.7	0.5	0.47
681.0	0.44	155.36	681.0	-0.4	0.8	0.6	1.22
706.0	1.14	141.19	706.0	-0.7	1.0	1.0	2.89
731.0	2.23	137.06	731.0	-1.2	1.4	1.6	4.38
756.0	2.75	139.43	756.0	-2.1	2.2	2.6	2.12
781.0	3.27	141.56	780.9	-3.1	3.0	3.8	2.13
806.0	3.64	140.04	805.9	-4.2	3.9	5.2	1.52
831.0	4.40	139.33	830.8	-5.6	5.1	6.9	3.05
856.0	4.72	139.20	855.7	-7.1	6.4	8.7	1.28
881.0	4.77	139.30	880.7	-8.7	7.7	10.6	0.20
906.0	4.84	139.39	905.6	-10.2	9.1	12.5	0.28
931.0	4.85	138.74	930.5	-11.8	10.5	14.5	0.22
956.0	4.86	139.51	955.4	-13.4	11.9	16.4	0.26
981.0	4.87	139.60	980.3	-15.0	13.2	18.4	0.05
1,006.0	4.62	138.05	1,005.2	-16.6	14.6	20.3	1.12
1,031.0	4.19	138.17	1,030.1	-18.0	15.9	22.0	1.72
1,056.0	4.02	137.55	1,055.1	-19.4	17.1	23.7	0.70
1,081.0	3.68	138.17	1,080.0	-20.6	18.2	25.2	1.37
1,106.0	3.42	137.74	1,105.0	-21.8	19.2	26.6	1.05
1,131.0	3.18	137.84	1,129.9	-22.8	20.2	27.9	0.96
1,156.0	3.01	137.63	1,154.9	-23.8	21.1	29.1	0.68
1,181.0	2.98	139.37	1,179.9	-24.8	22.0	30.3	0.38
1,206.0	2.56	139.94	1,204.8	-25.7	22.8	31.4	1.68
1,231.0	2.32	139.71	1,229.8	-26.5	23.5	32.4	0.96
1,256.0	2.15	141.21	1,254.8	-27.3	24.1	33.3	0.72
1,281.0	1.85	140.45	1,279.8	-28.0	24.6	34.1	1.20
1,306.0	1.61	143.12	1,304.8	-28.6	25.1	34.9	1.01
1,331.0	1.56	147.29	1,329.7	-29.1	25.5	35.5	0.50
1,356.0	1.47	150.05	1,354.7	-29.7	25.8	36.2	0.46

Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,381.0	1.28	149.16	1,379.7	-30.2	26.1	36.7	0.76
1,406.0	1.29	150.23	1,404.7	-30.7	26.4	37.3	0.10
1,431.0	1.21	157.25	1,429.7	-31.2	26.7	37.8	0.69
1,456.0	1.02	159.66	1,454.7	-31.6	26.8	38.3	0.78
1,481.0	0.87	162.83	1,479.7	-32.0	27.0	38.7	0.64
1,506.0	0.67	176.43	1,504.7	-32.3	27.0	39.1	1.08
1,531.0	0.64	172.78	1,529.7	-32.6	27.1	39.3	0.21
1,556.0	0.53	169.00	1,554.7	-32.9	27.1	39.6	0.47
1,581.0	0.27	162.72	1,579.7	-33.0	27.1	39.8	1.05
1,606.0	0.26	152.22	1,604.7	-33.2	27.2	39.9	0.20
1,631.0	0.22	152.75	1,629.7	-33.2	27.2	40.0	0.16
1,656.0	0.21	146.00	1,654.7	-33.3	27.3	40.1	0.11
1,681.0	0.17	150.81	1,679.7	-33.4	27.3	40.2	0.17
1,706.0	0.25	142.32	1,704.7	-33.5	27.4	40.2	0.34
1,731.0	0.18	127.13	1,729.7	-33.5	27.4	40.3	0.36
1,756.0	0.30	150.96	1,754.7	-33.6	27.5	40.4	0.61
1,781.0	0.28	142.01	1,779.7	-33.7	27.6	40.5	0.20
1,806.0	0.21	171.31	1,804.7	-33.8	27.6	40.6	0.56
1,831.0	0.19	141.89	1,829.7	-33.9	27.7	40.7	0.41
1,856.0	0.28	139.97	1,854.7	-34.0	27.7	40.8	0.36
1,881.0	0.27	135.30	1,879.7	-34.1	27.8	40.9	0.10
1,906.0	0.19	159.53	1,904.7	-34.1	27.9	41.0	0.50
1,931.0	0.27	139.04	1,929.7	-34.2	27.9	41.1	0.45
1,956.0	0.18	131.01	1,954.7	-34.3	28.0	41.2	0.38
1,981.0	0.06	136.05	1,979.7	-34.3	28.0	41.3	0.48
2,006.0	0.07	44.14	2,004.7	-34.3	28.0	41.3	0.37
2,031.0	0.03	90.40	2,029.7	-34.3	28.1	41.3	0.22
2,056.0	0.10	125.76	2,054.7	-34.3	28.1	41.3	0.31
2,081.0	0.12	77.55	2,079.7	-34.3	28.1	41.3	0.37
2,106.0	0.16	107.69	2,104.7	-34.3	28.2	41.3	0.33
2,131.0	0.19	142.93	2,129.7	-34.4	28.2	41.4	0.44
2,156.0	0.18	161.12	2,154.7	-34.5	28.3	41.5	0.24
2,181.0	0.05	105.16	2,179.7	-34.5	28.3	41.5	0.63
2,206.0	0.13	127.89	2,204.7	-34.5	28.3	41.5	0.34
2,231.0	0.13	130.88	2,229.7	-34.6	28.4	41.6	0.03
2,256.0	0.03	126.07	2,254.7	-34.6	28.4	41.6	0.40
2,281.0	0.08	117.04	2,279.7	-34.6	28.4	41.6	0.20
2,306.0	0.07	104.75	2,304.7	-34.6	28.5	41.6	0.08
2,331.0	0.05	277.65	2,329.7	-34.6	28.5	41.6	0.48
2,356.0	0.10	38.89	2,354.7	-34.6	28.5	41.6	0.53
2,381.0	0.14	167.31	2,379.7	-34.6	28.5	41.7	0.87
2,406.0	0.15	213.31	2,404.7	-34.7	28.5	41.7	0.45
2,431.0	0.22	223.96	2,429.7	-34.7	28.4	41.7	0.31
2,456.0	0.19	188.85	2,454.7	-34.8	28.4	41.8	0.51
2,481.0	0.13	226.24	2,479.7	-34.9	28.3	41.9	0.47

Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
2,506.0	0.16	270.92	2,504.7	-34.9	28.3	41.9	0.45
2,531.0	0.19	273.95	2,529.7	-34.9	28.2	41.8	0.13
2,556.0	0.22	279.59	2,554.7	-34.9	28.1	41.8	0.14
2,581.0	0.22	281.47	2,579.7	-34.8	28.0	41.7	0.03
2,606.0	0.33	262.94	2,604.7	-34.8	27.9	41.7	0.56
2,631.0	0.24	273.55	2,629.7	-34.8	27.8	41.7	0.42
2,656.0	0.29	263.28	2,654.7	-34.9	27.7	41.6	0.28
2,681.0	0.27	266.48	2,679.7	-34.9	27.6	41.6	0.10
2,706.0	0.31	259.63	2,704.7	-34.9	27.4	41.6	0.21
2,731.0	0.24	251.69	2,729.7	-34.9	27.3	41.6	0.32
2,756.0	0.34	263.25	2,754.7	-34.9	27.2	41.6	0.46
2,781.0	0.28	263.11	2,779.7	-34.9	27.1	41.5	0.24
2,806.0	0.42	263.55	2,804.7	-35.0	26.9	41.5	0.56
2,831.0	0.29	269.61	2,829.7	-35.0	26.8	41.5	0.54
2,856.0	0.34	258.51	2,854.7	-35.0	26.6	41.5	0.31
2,881.0	0.30	263.51	2,879.7	-35.0	26.5	41.4	0.19
2,906.0	0.39	260.40	2,904.7	-35.0	26.3	41.4	0.37
2,931.0	0.45	257.38	2,929.7	-35.1	26.1	41.4	0.26
2,956.0	0.41	255.29	2,954.7	-35.1	26.0	41.4	0.17
2,981.0	0.38	255.69	2,979.7	-35.2	25.8	41.4	0.12
3,006.0	0.40	253.25	3,004.7	-35.2	25.6	41.4	0.10
3,031.0	0.44	256.67	3,029.7	-35.3	25.5	41.3	0.19
3,056.0	0.40	248.54	3,054.7	-35.3	25.3	41.3	0.29
3,081.0	0.45	250.47	3,079.7	-35.4	25.1	41.4	0.21
3,106.0	0.48	264.30	3,104.7	-35.4	24.9	41.3	0.46
3,131.0	0.40	252.06	3,129.7	-35.5	24.7	41.3	0.49
3,156.0	0.45	254.52	3,154.7	-35.5	24.5	41.3	0.21
3,181.0	0.46	256.73	3,179.7	-35.6	24.4	41.3	0.08
3,206.0	0.42	250.20	3,204.7	-35.6	24.2	41.3	0.26
3,231.0	0.44	256.09	3,229.7	-35.7	24.0	41.3	0.19
3,256.0	0.43	247.75	3,254.7	-35.7	23.8	41.3	0.26
3,281.0	0.49	259.60	3,279.7	-35.8	23.6	41.3	0.45
3,306.0	0.45	256.03	3,304.7	-35.8	23.4	41.3	0.20
3,331.0	0.48	255.95	3,329.7	-35.9	23.2	41.3	0.12
3,356.0	0.25	41.23	3,354.7	-35.9	23.2	41.2	2.80
3,381.0	1.32	57.22	3,379.7	-35.7	23.4	41.1	4.33
3,406.0	2.89	59.44	3,404.7	-35.2	24.2	40.9	6.29
3,431.0	4.22	61.83	3,429.6	-34.4	25.6	40.6	5.35
3,456.0	5.58	66.26	3,454.5	-33.5	27.5	40.3	5.64
3,481.0	6.39	72.77	3,479.4	-32.6	29.9	40.2	4.22
3,506.0	6.72	77.15	3,504.2	-31.9	32.7	40.3	2.40
3,531.0	6.91	76.95	3,529.0	-31.2	35.6	40.6	0.77
3,556.0	6.92	77.01	3,553.9	-30.5	38.5	40.8	0.05
3,581.0	7.36	72.80	3,578.7	-29.7	41.5	41.0	2.73

Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
3,606.0	8.14	67.58	3,603.4	-28.6	44.7	40.9	4.20
3,631.0	9.08	64.41	3,628.2	-27.0	48.1	40.4	4.21
3,656.0	9.84	64.31	3,652.8	-25.3	51.8	39.9	3.04
3,681.0	10.49	65.99	3,677.4	-23.4	55.8	39.3	2.86
3,706.0	11.27	64.53	3,702.0	-21.4	60.1	38.8	3.31
3,731.0	11.79	63.46	3,726.5	-19.2	64.6	38.1	2.25
3,756.0	11.82	64.03	3,750.9	-17.0	69.2	37.3	0.48
3,781.0	11.76	63.70	3,775.4	-14.7	73.8	36.6	0.36
3,806.0	11.91	64.53	3,799.9	-12.5	78.4	35.8	0.91
3,831.0	12.51	64.87	3,824.3	-10.2	83.1	35.2	2.42
3,856.0	13.03	64.45	3,848.7	-7.9	88.1	34.4	2.11
3,881.0	13.40	65.00	3,873.0	-5.4	93.3	33.7	1.56
3,906.0	13.57	66.42	3,897.4	-3.0	98.6	33.0	1.49
3,931.0	13.61	68.50	3,921.7	-0.8	104.0	32.5	1.96
3,956.0	14.13	69.34	3,945.9	1.4	109.6	32.2	2.23
3,981.0	14.61	69.47	3,970.1	3.6	115.4	31.9	1.92
4,006.0	15.48	70.02	3,994.3	5.8	121.5	31.6	3.53
4,031.0	16.47	69.09	4,018.3	8.2	128.0	31.3	4.09
4,056.0	17.24	68.86	4,042.2	10.8	134.7	30.9	3.09
4,081.0	18.00	68.91	4,066.1	13.5	141.8	30.5	3.04
4,106.0	18.62	69.09	4,089.8	16.4	149.1	30.0	2.49
4,131.0	19.29	69.82	4,113.4	19.2	156.7	29.6	2.84
4,156.0	20.11	70.22	4,137.0	22.1	164.7	29.3	3.32
4,181.0	20.74	70.33	4,160.4	25.0	172.9	29.0	2.52
4,206.0	21.28	70.94	4,183.8	28.0	181.3	28.8	2.33
4,231.0	21.77	71.82	4,207.0	30.9	190.0	28.6	2.35
4,256.0	22.33	72.69	4,230.2	33.8	199.0	28.6	2.59
4,281.0	22.84	73.06	4,253.3	36.6	208.1	28.8	2.12
4,306.0	23.35	73.76	4,276.3	39.4	217.5	29.0	2.32
4,331.0	24.38	74.37	4,299.1	42.2	227.3	29.3	4.24
4,356.0	25.00	74.62	4,321.8	45.0	237.3	29.7	2.51
4,381.0	25.69	74.73	4,344.4	47.8	247.6	30.2	2.77
4,406.0	26.34	74.58	4,366.9	50.7	258.2	30.6	2.61
4,431.0	26.47	74.02	4,389.3	53.7	268.9	31.1	1.12
4,456.0	26.63	73.35	4,411.7	56.9	279.6	31.3	1.36
4,481.0	26.97	73.54	4,434.0	60.1	290.5	31.6	1.40
4,506.0	26.92	73.29	4,456.3	63.3	301.3	31.8	0.50
4,531.0	26.45	72.63	4,478.6	66.6	312.0	32.0	2.22
4,556.0	26.73	72.22	4,500.9	70.0	322.7	32.0	1.34
4,581.0	27.21	72.02	4,523.2	73.5	333.5	32.0	1.95
4,606.0	27.52	71.97	4,545.4	77.0	344.4	32.0	1.24
4,631.0	27.41	71.21	4,567.6	80.7	355.4	31.8	1.47
4,656.0	27.68	71.01	4,589.8	84.4	366.3	31.6	1.14
4,681.0	27.83	70.92	4,611.9	88.2	377.3	31.4	0.62

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Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
4,706.0	27.85	70.84	4,634.0	92.0	388.3	31.1	0.17
4,731.0	27.60	70.78	4,656.1	95.8	399.3	30.8	1.01
4,756.0	27.91	71.43	4,678.3	99.6	410.3	30.6	1.73
4,781.0	28.10	72.13	4,700.3	103.3	421.5	30.5	1.52
4,806.0	28.27	72.32	4,722.4	106.9	432.7	30.5	0.77
4,831.0	28.18	72.43	4,744.4	110.5	444.0	30.6	0.42
4,856.0	28.37	72.90	4,766.4	114.0	455.3	30.7	1.17
4,881.0	28.50	73.56	4,788.4	117.4	466.7	30.9	1.36
4,906.0	28.64	74.13	4,810.4	120.8	478.2	31.2	1.23
4,931.0	29.12	74.61	4,832.2	124.0	489.8	31.7	2.13
4,956.0	29.30	74.83	4,854.1	127.2	501.6	32.2	0.84
4,981.0	29.16	74.71	4,875.9	130.4	513.4	32.8	0.61
5,006.0	29.04	74.21	4,897.7	133.7	525.1	33.2	1.08
5,031.0	28.75	73.62	4,919.6	137.0	536.7	33.6	1.63
5,056.0	28.41	72.99	4,941.6	140.5	548.1	33.8	1.82
5,081.0	27.99	72.37	4,963.6	144.0	559.4	33.9	2.05
5,106.0	27.52	71.82	4,985.7	147.6	570.5	33.9	2.14
5,131.0	27.09	71.37	5,007.9	151.2	581.4	33.8	1.91
5,156.0	27.20	71.14	5,030.2	154.8	592.2	33.6	0.61
5,181.0	27.66	71.17	5,052.4	158.6	603.1	33.4	1.84
5,206.0	27.66	71.43	5,074.5	162.3	614.1	33.2	0.48
5,231.0	27.00	70.81	5,096.7	166.0	624.9	33.0	2.88
5,256.0	27.15	70.33	5,119.0	169.8	635.7	32.7	1.06
5,281.0	27.01	69.96	5,141.2	173.7	646.4	32.3	0.88
5,306.0	26.65	69.50	5,163.6	177.6	657.0	31.8	1.66
5,331.0	25.97	68.55	5,186.0	181.5	667.3	31.2	3.20
5,356.0	26.07	68.37	5,208.4	185.6	677.5	30.4	0.51
5,381.0	25.88	67.92	5,230.9	189.6	687.7	29.7	1.10
5,406.0	25.92	67.64	5,253.4	193.8	697.8	28.8	0.51
5,431.0	26.42	67.70	5,275.8	197.9	708.0	28.0	2.00
5,456.0	26.67	67.88	5,298.2	202.2	718.3	27.1	1.05
5,481.0	27.02	68.12	5,320.5	206.4	728.8	26.3	1.47
5,506.0	26.80	67.54	5,342.8	210.7	739.3	25.4	1.37
5,531.0	26.78	66.95	5,365.1	215.0	749.7	24.4	1.07
5,556.0	27.39	67.31	5,387.4	219.5	760.1	23.4	2.53
5,581.0	27.47	69.29	5,409.6	223.7	770.8	22.6	3.66
5,606.0	27.47	69.62	5,431.7	227.8	781.6	22.1	0.61
5,631.0	27.35	69.33	5,453.9	231.8	792.4	21.5	0.72
5,656.0	27.37	69.15	5,476.1	235.9	803.2	21.0	0.34
5,681.0	27.45	69.16	5,498.3	240.0	813.9	20.3	0.32
5,706.0	27.39	68.81	5,520.5	244.1	824.7	19.7	0.69
5,731.0	27.12	69.84	5,542.7	248.1	835.4	19.1	2.17
5,756.0	27.04	70.50	5,565.0	252.0	846.1	18.7	1.24
5,781.0	26.65	70.37	5,587.3	255.8	856.7	18.4	1.58

Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,806.0	26.28	70.31	5,609.7	259.5	867.2	18.0	1.48
5,831.0	26.43	70.07	5,632.1	263.3	877.7	17.6	0.74
5,856.0	26.61	70.38	5,654.5	267.1	888.2	17.2	0.91
5,881.0	26.56	71.03	5,676.8	270.8	898.7	16.9	1.18
5,906.0	26.58	70.89	5,699.2	274.4	909.3	16.7	0.26
5,931.0	26.51	70.77	5,721.5	278.1	919.8	16.4	0.35
5,956.0	25.64	71.15	5,744.0	281.7	930.2	16.2	3.54
5,981.0	24.97	71.43	5,766.6	285.1	940.4	16.0	2.72
6,006.0	24.83	71.42	5,789.3	288.4	950.3	15.9	0.56
6,031.0	24.84	72.22	5,812.0	291.7	960.3	15.8	1.34
6,056.0	25.05	72.82	5,834.6	294.9	970.4	15.9	1.32
6,081.0	25.06	72.75	5,857.3	298.0	980.5	16.0	0.13
6,106.0	24.94	72.48	5,879.9	301.2	990.6	16.1	0.66
6,131.0	25.58	72.20	5,902.5	304.4	1,000.7	16.1	2.60
6,156.0	25.86	71.61	5,925.1	307.8	1,011.0	16.0	1.52
6,181.0	26.27	71.00	5,947.5	311.3	1,021.4	15.9	1.96
6,206.0	26.14	71.16	5,970.0	314.9	1,031.9	15.6	0.59
6,231.0	25.69	72.14	5,992.4	318.3	1,042.3	15.5	2.48
6,256.0	25.63	72.83	6,015.0	321.6	1,052.6	15.6	1.22
6,281.0	25.88	72.68	6,037.5	324.8	1,062.9	15.7	1.03
6,306.0	26.07	72.94	6,060.0	328.0	1,073.4	15.8	0.89
6,482.0	27.08	70.81	6,217.4	352.5	1,148.2	15.3	0.79
6,571.0	25.69	69.93	6,297.1	365.8	1,185.5	14.1	1.62
6,661.0	23.70	73.15	6,378.9	377.8	1,221.1	13.6	2.67
6,750.0	22.87	73.53	6,460.6	387.9	1,254.8	14.3	0.95
6,839.0	24.02	71.26	6,542.3	398.6	1,288.6	14.4	1.64
6,929.0	26.57	70.36	6,623.6	411.2	1,324.9	13.5	2.87
7,018.0	28.60	73.95	6,702.5	423.8	1,364.1	13.5	2.95
7,108.0	28.66	75.48	6,781.5	435.2	1,405.7	15.4	0.82
7,198.0	27.30	73.47	6,861.0	446.5	1,446.4	17.1	1.84
Sycamore							
7,287.0	25.59	73.79	6,940.7	457.6	1,484.4	18.0	1.93
7,317.0	25.99	73.40	6,967.7	461.3	1,496.9	18.4	1.45
7,347.0	26.97	78.28	6,994.6	464.6	1,509.9	19.2	7.95
7,377.0	28.19	84.61	7,021.1	466.6	1,523.6	21.5	10.58
7,382.0	28.34	85.70	7,025.6	466.8	1,526.0	22.0	10.74
Middlesex							
7,407.0	29.21	90.98	7,047.5	467.2	1,538.0	25.3	10.74
7,437.0	29.70	98.38	7,073.6	466.0	1,552.7	31.0	12.23
7,466.0	30.37	103.85	7,098.7	463.2	1,566.9	38.0	9.72
7,496.0	31.98	109.27	7,124.4	458.7	1,581.7	46.8	10.78
7,526.0	34.46	115.26	7,149.5	452.5	1,596.9	57.4	13.70
7,555.0	37.54	120.29	7,172.9	444.5	1,612.0	69.5	14.71
7,585.0	40.63	125.53	7,196.2	434.2	1,627.8	84.2	15.07

Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
7,598.0	42.22	127.40	7,206.0	429.1	1,634.7	91.2	15.49
Tully							
7,615.0	44.34	129.68	7,218.4	421.8	1,643.9	100.9	15.49
7,645.0	47.91	133.39	7,239.2	407.5	1,660.0	119.5	14.87
7,675.0	51.31	137.19	7,258.6	391.3	1,676.1	139.8	14.88
7,705.0	54.87	141.30	7,276.6	373.1	1,691.7	161.9	16.15
7,734.0	57.93	145.84	7,292.7	353.6	1,706.0	184.8	16.77
7,764.0	61.52	149.62	7,307.8	331.7	1,719.9	209.9	16.17
7,794.0	65.58	152.59	7,321.2	308.2	1,732.8	236.2	16.18
7,823.0	70.02	155.21	7,332.1	284.1	1,744.6	262.8	17.44
7,830.0	71.07	155.86	7,334.4	278.1	1,747.3	269.4	17.37
Marcellus							
7,853.0	74.53	157.95	7,341.2	257.9	1,756.0	291.2	17.37
7,883.0	78.30	161.48	7,348.3	230.6	1,766.1	320.4	16.99
7,913.0	80.76	164.07	7,353.7	202.4	1,774.8	349.8	11.80
7,943.0	82.26	163.81	7,358.2	173.9	1,783.0	379.5	5.07
7,973.0	84.52	162.83	7,361.6	145.3	1,791.6	409.3	8.20
8,037.0	89.70	161.03	7,364.9	84.6	1,811.4	473.2	8.57
8,129.0	91.41	161.76	7,364.0	-2.6	1,840.7	565.2	2.02
8,223.0	92.25	163.06	7,361.0	-92.2	1,869.1	659.1	1.65
8,317.0	90.71	162.17	7,358.5	-181.8	1,897.2	753.1	1.89
8,411.0	90.13	161.44	7,357.8	-271.1	1,926.5	847.1	0.99
8,505.0	91.04	161.24	7,356.9	-360.2	1,956.6	941.1	0.99
8,598.0	91.21	162.78	7,355.1	-448.6	1,985.3	1,034.0	1.67
8,692.0	90.54	162.71	7,353.6	-538.4	2,013.2	1,128.0	0.72
8,786.0	89.97	162.86	7,353.2	-628.2	2,041.0	1,222.0	0.63
8,880.0	89.97	161.73	7,353.3	-717.7	2,069.6	1,316.0	1.20
8,974.0	90.37	162.82	7,353.0	-807.2	2,098.2	1,410.0	1.24
9,068.0	90.57	160.95	7,352.2	-896.6	2,127.5	1,504.0	2.00
9,161.0	90.00	162.21	7,351.7	-984.8	2,156.8	1,597.0	1.49
9,256.0	90.47	162.51	7,351.4	-1,075.3	2,185.6	1,692.0	0.59
9,345.0	89.90	163.95	7,351.1	-1,160.5	2,211.3	1,781.0	1.74
9,435.0	89.63	162.82	7,351.4	-1,246.8	2,237.0	1,871.0	1.29
9,524.0	88.99	161.37	7,352.5	-1,331.5	2,264.4	1,959.9	1.78
9,614.0	89.73	163.08	7,353.5	-1,417.2	2,291.9	2,049.9	2.07
9,703.0	91.11	163.51	7,352.9	-1,502.4	2,317.5	2,138.9	1.62
9,793.0	91.31	163.21	7,351.0	-1,588.6	2,343.2	2,228.9	0.40
9,882.0	90.00	162.50	7,349.9	-1,673.7	2,369.5	2,317.9	1.67
9,972.0	90.07	161.79	7,349.9	-1,759.3	2,397.1	2,407.9	0.79
10,061.0	90.37	161.50	7,349.5	-1,843.8	2,425.1	2,496.9	0.47
10,151.0	90.13	160.20	7,349.2	-1,928.8	2,454.6	2,586.8	1.47
10,241.0	90.00	162.12	7,349.0	-2,014.0	2,483.7	2,676.8	2.14
10,330.0	90.84	160.99	7,348.4	-2,098.4	2,511.8	2,765.8	1.58
10,420.0	89.93	162.22	7,347.8	-2,183.8	2,540.2	2,855.8	1.70

Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 1350.0usft
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Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
10,509.0	89.66	163.64	7,348.1	-2,268.9	2,566.3	2,944.8	1.62
10,599.0	89.56	162.69	7,348.7	-2,355.0	2,592.4	3,034.8	1.06
10,688.0	89.70	161.84	7,349.3	-2,439.8	2,619.5	3,123.8	0.97
10,778.0	90.13	161.70	7,349.4	-2,525.3	2,647.7	3,213.8	0.50
10,867.0	89.77	162.93	7,349.5	-2,610.1	2,674.7	3,302.8	1.44
10,957.0	90.10	161.87	7,349.6	-2,695.8	2,701.9	3,392.8	1.23
11,046.0	90.54	162.14	7,349.1	-2,780.5	2,729.4	3,481.8	0.58
11,136.0	89.87	161.40	7,348.8	-2,866.0	2,757.6	3,571.7	1.11
11,226.0	90.13	161.43	7,348.8	-2,951.3	2,786.3	3,661.7	0.29
11,315.0	90.77	162.56	7,348.1	-3,035.9	2,813.8	3,750.7	1.46
11,404.0	90.24	162.22	7,347.3	-3,120.7	2,840.7	3,839.7	0.71
11,494.0	90.24	163.10	7,346.9	-3,206.6	2,867.5	3,929.7	0.98
11,583.0	90.44	162.59	7,346.4	-3,291.7	2,893.8	4,018.7	0.62
11,673.0	89.83	162.51	7,346.2	-3,377.5	2,920.8	4,108.7	0.68
11,763.0	90.57	161.95	7,345.9	-3,463.2	2,948.2	4,198.7	1.03
11,852.0	90.81	162.57	7,344.8	-3,548.0	2,975.3	4,287.7	0.75
11,942.0	91.08	162.90	7,343.3	-3,633.9	3,002.0	4,377.7	0.47
12,032.0	90.54	162.33	7,342.0	-3,719.8	3,028.9	4,467.7	0.87
12,121.0	89.77	160.82	7,341.8	-3,804.3	3,057.1	4,556.7	1.90
12,211.0	89.90	161.43	7,342.1	-3,889.4	3,086.2	4,646.7	0.69
12,300.0	90.23	160.98	7,342.0	-3,973.7	3,114.8	4,735.6	0.63
12,389.0	89.87	161.12	7,341.9	-4,057.8	3,143.7	4,824.6	0.43
12,479.0	90.64	162.44	7,341.5	-4,143.3	3,171.9	4,914.6	1.70
12,568.0	91.04	161.30	7,340.2	-4,227.9	3,199.6	5,003.6	1.36
12,657.0	91.01	163.37	7,338.6	-4,312.7	3,226.6	5,092.6	2.33
12,747.0	89.97	164.07	7,337.8	-4,399.1	3,251.8	5,182.5	1.39
12,836.0	90.37	163.45	7,337.6	-4,484.5	3,276.7	5,271.5	0.83
12,926.0	90.57	162.07	7,336.8	-4,570.5	3,303.4	5,361.5	1.55
13,015.0	91.24	161.55	7,335.4	-4,655.0	3,331.2	5,450.5	0.95
13,105.0	90.50	161.44	7,334.0	-4,740.3	3,359.7	5,540.5	0.83
13,194.0	89.76	162.87	7,333.8	-4,825.1	3,387.0	5,629.5	1.81
13,283.0	89.63	161.61	7,334.3	-4,909.8	3,414.1	5,718.5	1.42
13,373.0	90.67	162.44	7,334.1	-4,995.4	3,441.9	5,808.5	1.48
13,462.0	90.77	162.62	7,333.0	-5,080.3	3,468.6	5,897.5	0.23
13,552.0	91.28	162.04	7,331.4	-5,166.1	3,495.9	5,987.4	0.86
13,641.0	89.40	161.71	7,330.8	-5,250.6	3,523.6	6,076.4	2.14
13,731.0	89.87	161.96	7,331.4	-5,336.1	3,551.7	6,166.4	0.59
13,820.0	90.03	162.69	7,331.5	-5,420.9	3,578.7	6,255.4	0.84
13,910.0	89.53	161.48	7,331.8	-5,506.6	3,606.4	6,345.4	1.45
13,999.0	90.74	163.14	7,331.6	-5,591.4	3,633.4	6,434.4	2.31
14,089.0	89.83	161.79	7,331.2	-5,677.2	3,660.5	6,524.4	1.81
14,179.0	89.40	161.43	7,331.8	-5,762.6	3,688.9	6,614.4	0.62
14,269.0	89.30	162.29	7,332.8	-5,848.1	3,717.0	6,704.4	0.96
14,358.0	90.91	162.67	7,332.6	-5,933.0	3,743.7	6,793.4	1.86

Company:	Antero	**Local Co-ordinate Reference:**	Well Richard Unit 2H
Project:	Doddridge County WV	**TVD Reference:**	Precision 523: GL 1331' + KB 19' @ 13500usft
Site:	Hughes Pad:Belton/Carole/Earlewine/Gully/Hugh	**MD Reference:**	Precision 523: GL 1331' + KB 19' @ 13500usft
Well:	Richard Unit 2H	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

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MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
14,448.0	90.37	161.85	7,331.6	-6,018.7	3,771.2	6,883.4	1.09
14,538.0	90.60	163.54	7,330.9	-6,104.6	3,797.9	6,973.4	1.90
14,627.0	89.06	162.71	7,331.1	-6,189.8	3,823.8	7,062.4	1.97
14,717.0	89.16	162.13	7,332.5	-6,275.5	3,850.9	7,152.4	0.65
14,806.0	89.87	161.07	7,333.3	-6,360.0	3,879.0	7,241.3	1.43
14,896.0	90.47	162.96	7,333.0	-6,445.6	3,906.8	7,331.3	2.20
14,985.0	90.61	161.47	7,332.2	-6,530.3	3,934.0	7,420.3	1.68
15,075.0	90.40	162.91	7,331.4	-6,616.0	3,961.5	7,510.3	1.62
15,165.0	88.92	162.42	7,331.9	-6,701.9	3,988.3	7,600.3	1.73
15,245.0	88.59	162.57	7,333.6	-6,778.2	4,012.4	7,680.3	0.45
15,309.0	88.59	162.57	7,335.2	-6,839.2	4,031.6	7,744.3	0.00

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
7,198.0	6,861.0	446.5	1,446.4	Sycamore
7,382.0	7,025.6	466.8	1,526.0	Middlesex
7,598.0	7,206.0	429.1	1,634.7	Tully
7,830.0	7,334.4	278.1	1,747.3	Marcellus

Checked By: _____ Approved By: _____ Date: _____

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	8/5/2017
Job End Date:	8/14/2017
State:	West Virginia
County:	Doddridge
API Number:	47-017-06380-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Richard 2H
Latitude:	39.21928889
Longitude:	-80.62068056
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	7,365
Total Base Water Volume (gal):	13,066,494
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	87.43633	
Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	12.21587	
HCL Acid (12.6%-17.5%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.40000	0.19573	
			Hydrogen Chloride	7647-01-0	17.50000	0.04551	
LGC-15	U.S. Well Services, LLC	Gelling Agents					
			Guar Gum	9000-30-0	50.00000	0.03098	
			Petroleum Distillates	64742-47-8	60.00000	0.02934	
			Suspending agent (solid)	14808-60-7	3.00000	0.00474	
			Surfactant	68439-51-0	3.00000	0.00186	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			2-Propenoic acid, polymer with 2 propenamide	9003-06-9	30.00000	0.01748	
			Hydrated light distillate (petroleum)	64742-47-8	30.00000	0.01407	

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Bioclear 2000	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00426	
			Deionized Water	7732-18-5	28.00000	0.00244	
SI-1200s	U.S. Well Services, LLC	Scale Inhibitor					
			Alkyl Phosphonic Acid	Proprietary	5.00000	0.00063	
			Ammonia	7664-41-7	0.50000	0.00010	
AP One	U.S. Well Services, LLC	Gel Breakers					
			Ammonium Persulfate	7727-54-0	100.00000	0.00052	
AI-303	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Ethylene glycol	107-21-1	40.00000	0.00007	
			Cinnamaldehyde	104-55-2	20.00000	0.00003	
			Formic acid	64-18-6	20.00000	0.00002	
			Butyl cellosolve	111-76-2	20.00000	0.00002	
			Polyether	60828-78-6	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)

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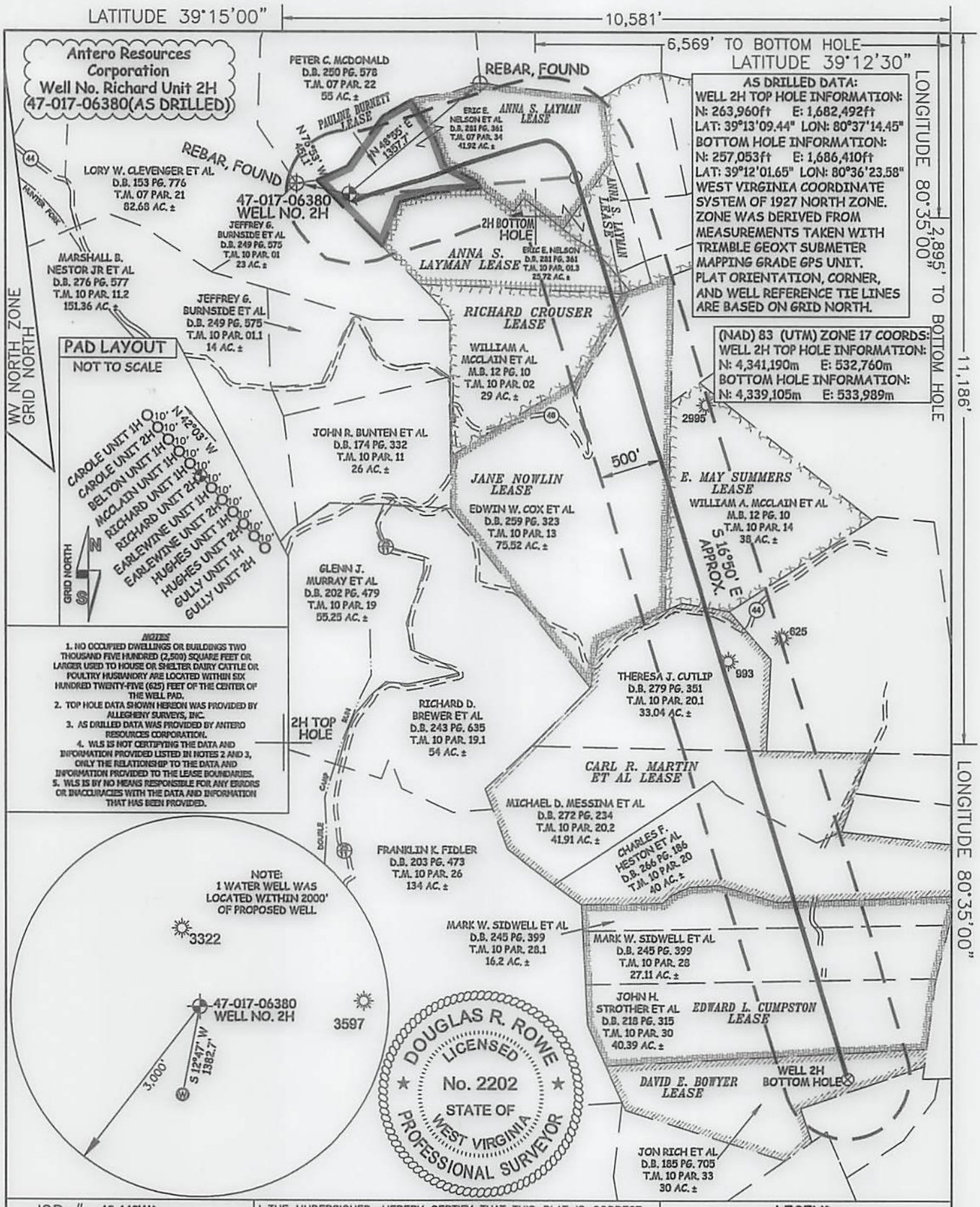
WV Department of
Environmental Protection



JOB # 12-148WA
DRAWING # RICHARD2HAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

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 PERSCRIBED BY THE DEPTARTMENT OF ENVIRONMENTAL PROTECTION.

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

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

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

DRR

DOUGLAS R. ROWE P.S. 2202

DATE 11/28/17
OPERATOR'S WELL# RICHARD UNIT #2H
API WELL # 47 – 017 – 06380
STATE COUNTY PERMIT

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

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X
LOCATION: ELEVATION 1,332' AS DRILLED WATERSHED HEADWATERS OF MIDDLE ISLAND CREEK
QUADRANGLE BIG ISSAC 7.5' DISTRICT GREENBRIER COUNTY DODDRIDGE
SURFACE OWNER ERIC E. NELSON, ET AL ACREAGE 41.92 ACRES +/-
OIL & GAS ROYALTY OWNER PAULINE BURNETT; ANNA S. LAYMAN; ANNA S. LAYMAN LEASE ACREAGE 14.29 ACRES±; 25.16 ACRES±; 23.9625 ACRES±; ANNA S. LAYMAN; RICHARD CROUSER; JANE NOWLIN; E. MAY SUMMERS; CARL R. MARTIN ET AL; EDWARD L. CUMPSTON; DAVID E. BOWYER 10.275 ACRES±; 29.93 ACRES±; 76 ACRES±; 38 ACRES±; 115 ACRES±; 86 ACRES±; 30 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
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,335' TVD 15,309' MD

COUNTY NAME
PERMIT

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS CT CORPORATION SYSTEM
DENVER, CO 80202 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

FORM WW-6

FORM WW-6

WELL OPERATOR	ANTERO RESOURCES CORP.	DESIGNATED AGENT	DIANNA STAMPER
ADDRESS	1615 WYNKOOP STREET	ADDRESS	CT CORPORATION SYSTEM
	DENVER, CO 80202		5400 D BIG TYLER ROAD
			CHARLESTON, WV 25313

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,335' TVD 15,309' MD

(SPECIFY) (X) AS DRILLED PLUG & ABANDON CLEAN OUT & REPLUG

PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE IN WELL

PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___

ANNA S. LAYMAN; RICHARD CROUSER; JANE NOWLIN; E. MAY SUMMERS; CARL R. MARTIN ET AL; EDWARD L. CUMPSTON; DAVID E. BOWYER 182.75 ACRES; 29.89 ACRES; 26 ACRES; 30 ACRES; 115 ACRES; 80 ACRES; 30 ACRES

OIL & GAS ROYALTY OWNER PAULINE BURNETT; ANNA S. LAYMAN; ANNA S. LAYMAN LEASE ACREAGE 14.29 ACRES; 25.16 ACRES; 23.0625 ACRES

SURFACE OWNER ERIC E. NELSON, ET AL ACREAGE 41.92 ACRES +/-

QUADRANGLE BIG ISSAC 7.5' DISTRICT GREENBRIER COUNTY DODDRIDGE

LOCATION: ELEVATION 1,332' AS DRILLED WATERSHED HEADWATERS OF MIDDLE ISLAND CREEK

(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___

API WELL # STATE 47 COUNTY 017 PERMIT 06380

OPERATOR'S WELL # RICHARD UNIT #2H

DATE 11/28/17

DOUGLAS R. ROWE P.S. 2202

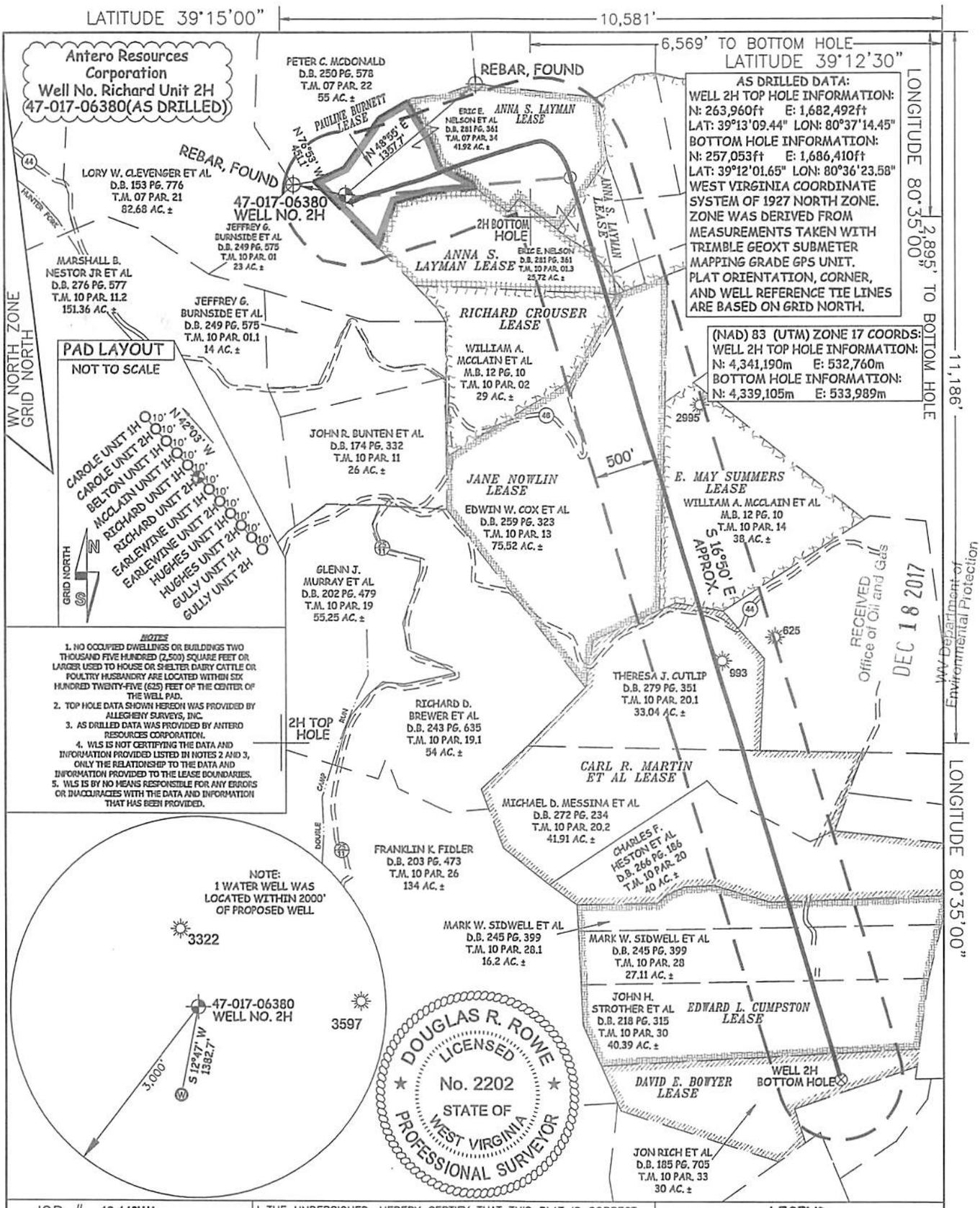
WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO
WEST VIRGINIA 26415

STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE 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.

JOB #	12-14BWA
DRAWING #	RICHARD2HAD
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



JOB # 12-148WA
DRAWING # RICHARD2HAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
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STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

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

LEGEND
- Surface Owner Boundary Lines +/-
- Interior Surface Tracts +/-
- Proposed Well Path
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DOUGLAS R. ROWE P.S. 2202

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

DATE 11/28/17
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TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,335' TVD 15,309' MD

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DENVER, CO 80202 CHARLESTON, WV 25313

FORM WW-6

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