

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

API 47-085-10103 County Ritchie District Union
Quad Pullman 7.5' Pad Name John Richards Pad Field/Pool Name ----
Farm name Richards, John Wayne Well Number Duckworth Unit 3H
Operator (as registered with the OOG) Antero Resources Corporation
Address 1615 Wynkoop St. 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 4339570m Easting 506946m
Landing Point of Curve Northing 4339303.71m Easting 506858.64
Bottom Hole Northing 4337649m Easting 507157m

Elevation (ft) 1025' 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 6/25/2014 Date drilling commenced 9/30/2014 Date drilling ceased 11/14/2014
Date completion activities began 9/3/2015 Date completion activities ceased 11/13/2015
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A **Received**

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Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug **FEB 11 2016**

Freshwater depth(s) ft 42', 52', 172' Open mine(s) (Y/N) depths No
Salt water depth(s) ft None Identified Void(s) encountered (Y/N) depths No
Coal depth(s) ft None Identified Cavern(s) encountered (Y/N) depths No

Is coal being mined in area (Y/N) No

APPROVED

NAME: Michael Gaff
DATE: 6/13/16

Reviewed by:

AOR/16/RQ/16
RBDMS

APPROVED

NAME:
DATE:

09/16/2016

APPROVED
DATE

API 47-085 - 10103 Farm name Richards, John Wayne Well number Duckworth Unit 3H

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	30"	20"	40'	New	94# K-55	N/A	Y
Surface	17- 1/2"	13- 3/8"	408'	New	48# H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2535'	New	36# J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4" & 8-1/2"	5-1/2"	12676'	New	20# J-55	N/A	Y
Tubing		2-3/8"	6566'		4.7# N-80	N/A	
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	150 sx	15.6	1.18	38	0'	8 Hrs.
Surface	Class A	477 sx	15.6	1.18	283	0'	8 Hrs.
Coal							
Intermediate 1	Class A	983 sx	15.6	1.00	794	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	850 sx (Lead) 1100 sx (Tail)	14.5 Lead 15.2 Tail	1.30 Lead 1.86 Tail	2438	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 12676' MD, 6425 TVD (BHL) Loggers TD (ft) 12676'
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 5720'

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 _____

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API 47- 085 - 10103 Farm name Richards, John Wayne Well number Duckworth Unit 3H

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
Marcellus	6365' (TOP) TVD	6712' (TOP) MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

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

OPEN FLOW Gas 9217 mcfpd Oil 59 bpd NGL --- bpd Water --- bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
	0		0		

***PLEASE SEE ATTACHED EXHIBIT 3**

Please insert additional pages as applicable.

Drilling Contractor Frontier Drilling LLC
Address 562 Spring Run Rd. City Pennsboro State WV Zip 26415

Logging Company Rush Wellsite Services
Address 600 Alpha Drive City Canonsburg State PA Zip 15317

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 Dr. City Jane Lew State WV Zip 26378

Please insert additional pages as applicable.

Completed by Kara Quackenbush Telephone 303-357-7233
Signature  Title Permit Representative Date 1/26/2016

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

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EXHIBIT 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	3-Sep-15	12,414	12,585	60	Marcellus
2	25-Sep-15	12,212	12,383	60	Marcellus
3	25-Sep-15	12,010	12,181	60	Marcellus
4	25-Sep-15	11,808	11,978	60	Marcellus
5	26-Sep-15	11,606	11,776	60	Marcellus
6	26-Sep-15	11,404	11,574	60	Marcellus
7	26-Sep-15	11,202	11,372	60	Marcellus
8	26-Sep-15	11,000	11,170	60	Marcellus
9	27-Sep-15	10,797	10,968	60	Marcellus
10	27-Sep-15	10,595	10,766	60	Marcellus
11	27-Sep-15	10,393	10,564	60	Marcellus
12	27-Sep-15	10,191	10,362	60	Marcellus
13	28-Sep-15	9,989	10,159	60	Marcellus
14	28-Sep-15	9,787	9,957	60	Marcellus
15	28-Sep-15	9,585	9,755	60	Marcellus
16	30-Sep-15	9,383	9,553	60	Marcellus
17	2-Oct-15	9,181	9,351	60	Marcellus
18	2-Oct-15	8,979	9,149	60	Marcellus
19	2-Oct-15	8,776	8,947	60	Marcellus
20	2-Oct-15	8,574	8,745	60	Marcellus
21	3-Oct-15	8,372	8,543	60	Marcellus
22	3-Oct-15	8,170	8,340	60	Marcellus
23	3-Oct-15	7,968	8,138	60	Marcellus
24	3-Oct-15	7,766	7,936	60	Marcellus
25	3-Oct-15	7,564	7,734	60	Marcellus
26	4-Oct-15	7,362	7,532	60	Marcellus
27	4-Oct-15	7,160	7,330	60	Marcellus
28	4-Oct-15	6,957	7,128	60	Marcellus
29	4-Oct-15	6,755	6,926	60	Marcellus

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EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	24-Sep-15	65.5	6,758	N/A	4,720	145,060	6,732	N/A
2	25-Sep-15	54.6	7,268	5,733	4,896	60,430	6,578	N/A
3	25-Sep-15	64.8	6,673	5,364	4,521	182,006	6,878	N/A
4	25-Sep-15	63.7	6,177	5,477	3,320	253,816	6,704	N/A
5	26-Sep-15	64.9	6,575	5,474	5,146	201,480	6,556	N/A
6	26-Sep-15	63.1	6,489	5,516	4,062	154,360	6,822	N/A
7	26-Sep-15	66.5	7,003	5,515	4,734	142,528	6,956	N/A
8	26-Sep-15	64.5	6,771	5,528	4,522	159,817	7,111	N/A
9	27-Sep-15	66.9	6,433	5,302	5,309	257,110	6,532	N/A
10	27-Sep-15	66.3	6,408	5,342	4,914	248,670	6,330	N/A
11	27-Sep-15	66.1	6,438	5,750	4,180	243,538	6,333	N/A
12	27-Sep-15	62.9	6,647	5,163	4,897	225,589	6,944	N/A
13	28-Sep-15	67.0	6,451	5,634	3,843	257,180	6,411	N/A
14	28-Sep-15	67.0	6,589	5,565	3,290	233,720	6,969	N/A
15	28-Sep-15	49.4	7,196	5,658	5,150	23,120	6,923	N/A
16	30-Sep-15	66.0	6,892	5,838	4,884	199,340	5,109	N/A
17	2-Oct-15	66.0	6,533	5,732	4,644	245,300	6,278	N/A
18	2-Oct-15	65.0	6,591	5,425	4,912	238,380	6,168	N/A
19	2-Oct-15	67.2	6,707	5,481	5,176	248,860	6,417	N/A
20	2-Oct-15	67.7	6,659	5,807	5,257	240,540	6,859	N/A
21	3-Oct-15	64.0	6,501	5,464	4,467	225,040	6,318	N/A
22	3-Oct-15	61.0	6,881	5,786	3,778	164,060	6,846	N/A
23	3-Oct-15	65.8	6,421	5,923	3,833	256,700	6,252	N/A
24	3-Oct-15	67.0	6,412	5,849	4,671	238,520	6,815	N/A
25	3-Oct-15	67.0	6,250	5,908	5,403	256,840	6,507	N/A
26	4-Oct-15	66.0	6,057	6,255	4,838	215,300	6,746	N/A
27	4-Oct-15	60.0	6,212	6,087	4,325	144,750	6,332	N/A
28	4-Oct-15	67.0	6,682	5,883	4,918	216,300	6,748	N/A
29	4-Oct-15	67.5	6,128	6,367	4,862	254,260	6,553	N/A
AVG=		64.5	6,579	5,672	4,602	5,932,614	190,727	TOTAL

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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	42'	N/A	42'	N/A
Fresh Water	52'	N/A	52'	N/A
Fresh Water	172'	N/A	172'	N/A
Silt	0	37	0	37
Sandstone	est. 37	97	est. 37	97
Silty Shale	est. 97	417	est. 97	417
Silty Sandstone	est. 417	657	est. 417	657
Sandy siltstone	est. 657	737	est. 657	737
Limey Shale	est. 737	817	est. 737	817
Silty Shale	est. 817	1317	est. 817	1317
Sandstone	est. 1317	1357	est. 1317	1357
Sandy shale	est. 1357	1417	est. 1357	1417
Sandstone	est. 1417	1497	est. 1417	1497
Sandy shale	est. 1497	1577	est. 1497	1577
Shale / Coal	est. 1577	1637	est. 1577	1637
Sandstone (Tr Coal)	est. 1637	1817	est. 1637	1817
Shale	est. 1817	1897	est. 1817	1897
Limey Siltstone	est. 1897	1945	est. 1897	1968
Big Lime	1945	2032	1968	2032
Big Injun	2032	2286	2032	2286
Gantz Sand	2286	2449	2286	2449
Fifty Foot Sandstone	2449	2663	2449	2663
Gordon	2663	2947	2663	2947
Fifth Sandstone	2947	3051	2947	3051
Bayard	3051	3428	3051	3428
Warren	3428	3824	3428	3824
Speechley	3824	3952	3824	3952
Baltown	3952	4516	3952	4516
Bradford	4516	4880	4516	4880
Benson	4880	5120	4880	5121
Alexander	5120	5322	5121	5322
Elk	5322	5720	5322	5721
Rhinestreet	5720	6051	5721	6100
Sycamore	6051	6208	6100	6344
Middlesex	6208	6315	6344	6556
Burkett	6315	6344	6556	6637
Tully	6344	6365	6637	6712
Marcellus	6365	NA	6712	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.

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**Duckworth Unit 3H
Ritchie County WV
Northing: 14236693.67
Easting: 1663157.25
As Drilled**



To convert Magnetic North to Grid, Subtract 8.42°
To convert True North to Grid, Subtract 0.05°

Azimuths to Grid North
True North: -0.05°
Magnetic North: -8.42°

Magnetic Field
Strength: 52191.5snT
Dip Angle: 66.80°
Date: 10/15/2014
Model: BGGM2014

Frontier 23 GL 1025' KB 23' @ 1048.0usft
Gr: 1025.0

		WELL DETAILS Duckworth Unit 3H			
		Ground Level: 1025.0			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	14236693.67	1663157.25	39° 12' 19.044 N	80° 55' 11.004 W

Genie Lightfoot
13:46, July 13 2015
Scientific Drilling Inter
11220 NW 10th Street
Yukon, OK 73099

SITE DETAILS: John Richards Pad: Duckworth/Stalwa

Site Centre Northing: 14236693.67
Easting: 1663157.25

Positional Uncertainty: 0.0
Convergence: 0.05
Local North: Grid

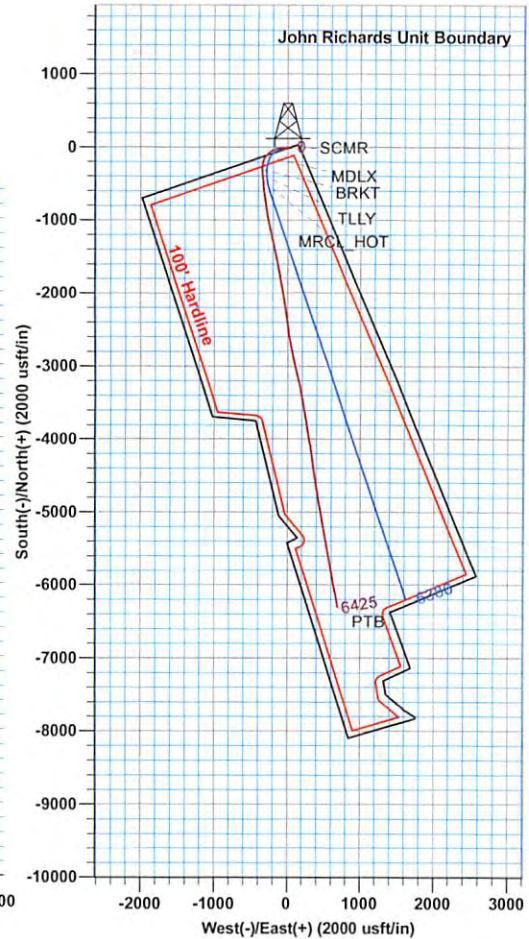
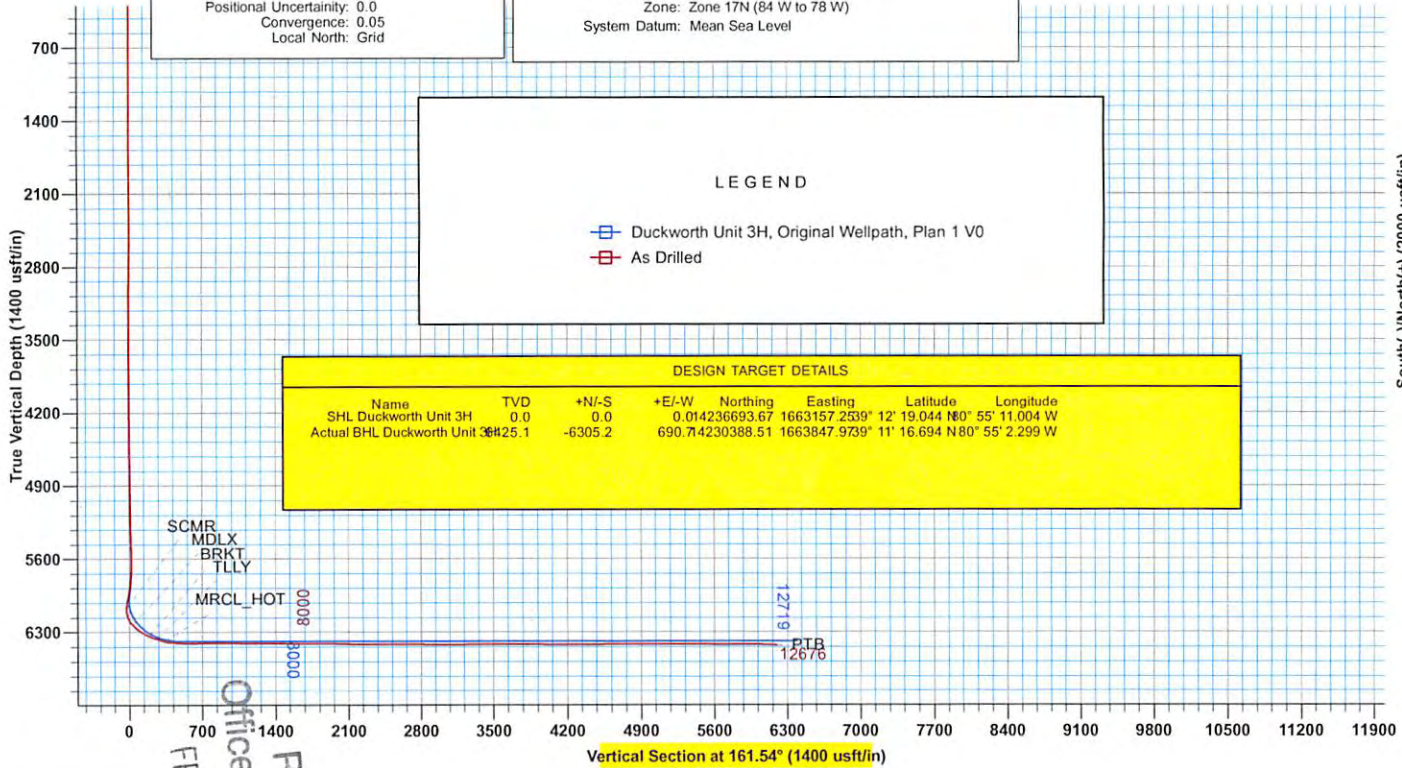
PROJECT DETAILS: Ritchie County WV

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

LEGEND

— Duckworth Unit 3H, Original Wellpath, Plan 1 V0
— As Drilled

DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL Duckworth Unit 3H	0.0	0.0	0.0	14236693.67	1663157.25	39° 12' 19.044 N	80° 55' 11.004 W
Actual BHL Duckworth Unit 3H	25.1	-6305.2	690.7	4230388.51	1663847.97	39° 11' 16.694 N	80° 55' 2.299 W



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Antero

Ritchie County WV
John Richards Pad: Duckworth/Stalnaker
Duckworth Unit 3H
Original Wellpath

Design: As Drilled

EOW Completion Report

13 July, 2015



Scientific Drilling

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EOW Completion Report



Company:	Antero	Local Co-ordinate Reference:	Well Duckworth Unit 3H
Project:	Ritchie County WV	TVD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Site:	John Richards Pad: Duckworth/Stalnaker	MD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Well:	Duckworth Unit 3H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Project	Ritchie County WV, Ritchie County WV, WV North		
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	John Richards Pad: Duckworth/Stalnaker
-------------	--

Site Position:		Northing:	14,236,693.67 usft	Latitude:	39° 12' 19.044 N
From:	Map	Easting:	1,663,157.25 usft	Longitude:	80° 55' 11.004 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.05 °

Well	Duckworth Unit 3H, Marcellus					
Well Position	+N/-S	0.0 usft	Northing:	14,236,693.67 usft	Latitude:	39° 12' 19.044 N
	+E/-W	0.0 usft	Easting:	1,663,157.25 usft	Longitude:	80° 55' 11.004 W
Position Uncertainty		2.0 usft	Wellhead Elevation:	1,048.0 usft	Ground Level:	1,025.0 usft

Wellbore	Original Wellpath
-----------------	-------------------

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	10/15/2014	-8.37	66.80	52,191

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	161.54

Survey Program	Date	7/13/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
25.0	5,525.0	Survey #1 Def Gyro Survey to KOP (Original Wellpath)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
5,560.0	12,676.0	Survey #3 Corrected (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
	25.0	0.03	283.44	25.0	0.0	0.0	0.0	0.12
	50.0	0.05	283.44	50.0	0.0	0.0	0.0	0.08
	75.0	0.08	283.44	75.0	0.0	-0.1	0.0	0.12
	100.0	0.10	283.44	100.0	0.0	-0.1	0.0	0.08
	125.0	0.07	333.93	125.0	0.0	-0.1	-0.1	0.31
	150.0	0.24	235.53	150.0	0.0	-0.2	-0.1	1.04
	175.0	0.19	253.66	175.0	0.0	-0.2	-0.1	0.34
	200.0	0.26	322.91	200.0	0.0	-0.3	-0.1	0.93
	225.0	0.19	262.84	225.0	0.1	-0.4	-0.2	0.93
	250.0	0.07	263.08	250.0	0.0	-0.5	-0.2	0.48

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Company:	Antero	Local Co-ordinate Reference:	Well Duckworth Unit 3H
Project:	Ritchie County WV	TVD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Site:	John Richards Pad: Duckworth/Stalnaker	MD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Well:	Duckworth Unit 3H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
275.0	0.08	247.14	275.0	0.0	-0.5	-0.2	0.09	
300.0	0.20	210.70	300.0	0.0	-0.5	-0.2	0.57	
325.0	0.21	214.95	325.0	-0.1	-0.6	-0.1	0.07	
350.0	0.03	356.95	350.0	-0.1	-0.6	-0.1	0.94	
375.0	0.18	219.30	375.0	-0.1	-0.6	-0.1	0.81	
400.0	0.22	246.11	400.0	-0.2	-0.7	0.0	0.40	
425.0	0.19	322.21	425.0	-0.2	-0.8	-0.1	1.02	
450.0	0.14	261.38	450.0	-0.1	-0.8	-0.1	0.69	
475.0	0.17	340.11	475.0	-0.1	-0.9	-0.2	0.79	
500.0	0.16	220.03	500.0	-0.1	-0.9	-0.2	1.14	
525.0	0.05	270.45	525.0	-0.1	-0.9	-0.2	0.54	
550.0	0.18	213.58	550.0	-0.2	-1.0	-0.2	0.63	
575.0	0.15	225.63	575.0	-0.2	-1.0	-0.1	0.18	
600.0	0.08	256.51	600.0	-0.2	-1.0	-0.1	0.36	
625.0	0.15	206.68	625.0	-0.3	-1.1	-0.1	0.46	
650.0	0.05	253.74	650.0	-0.3	-1.1	-0.1	0.49	
675.0	0.11	237.20	675.0	-0.3	-1.1	0.0	0.25	
700.0	0.23	228.47	700.0	-0.4	-1.2	0.0	0.49	
725.0	0.19	259.49	725.0	-0.4	-1.3	0.0	0.47	
750.0	0.20	218.50	750.0	-0.5	-1.3	0.0	0.55	
775.0	0.09	209.50	775.0	-0.5	-1.4	0.0	0.45	
800.0	0.15	198.94	800.0	-0.6	-1.4	0.1	0.25	
825.0	0.13	196.36	825.0	-0.6	-1.4	0.1	0.08	
850.0	0.18	188.82	850.0	-0.7	-1.4	0.2	0.22	
875.0	0.16	198.25	875.0	-0.8	-1.4	0.3	0.14	
900.0	0.27	188.09	900.0	-0.8	-1.5	0.3	0.46	
925.0	0.25	185.16	925.0	-1.0	-1.5	0.4	0.10	
950.0	0.24	180.92	950.0	-1.1	-1.5	0.5	0.08	
975.0	0.29	211.22	975.0	-1.2	-1.5	0.6	0.59	
1,000.0	0.21	192.51	1,000.0	-1.3	-1.6	0.7	0.45	
1,025.0	0.30	185.84	1,025.0	-1.4	-1.6	0.8	0.38	
1,050.0	0.22	184.28	1,050.0	-1.5	-1.6	0.9	0.32	
1,075.0	0.14	193.80	1,075.0	-1.6	-1.6	1.0	0.34	
1,100.0	0.25	196.72	1,100.0	-1.6	-1.6	1.1	0.44	
1,125.0	0.14	218.60	1,125.0	-1.7	-1.7	1.1	0.52	
1,150.0	0.10	208.70	1,150.0	-1.8	-1.7	1.1	0.18	
1,175.0	0.18	238.81	1,175.0	-1.8	-1.7	1.2	0.42	
1,200.0	0.12	227.00	1,200.0	-1.8	-1.8	1.2	0.27	
1,225.0	0.14	205.80	1,225.0	-1.9	-1.8	1.2	0.21	
1,250.0	0.11	194.15	1,250.0	-1.9	-1.8	1.3	0.16	
1,275.0	0.03	177.49	1,275.0	-2.0	-1.8	1.3	0.33	
1,300.0	0.07	175.63	1,300.0	-2.0	-1.8	1.3	0.16	
1,325.0	0.03	222.52	1,325.0	-2.0	-1.8	1.3	0.22	
1,350.0	0.14	168.21	1,350.0	-2.0	-1.8	1.4	0.50	



EOW Completion Report



Company:	Antero	Local Co-ordinate Reference:	Well Duckworth Unit 3H
Project:	Ritchie County WV	TVD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Site:	John Richards Pad: Duckworth/Stalnaker	MD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Well:	Duckworth Unit 3H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
1,375.0	0.04	137.49	1,375.0	-2.1	-1.8	1.4	0.43	
1,400.0	0.10	142.71	1,400.0	-2.1	-1.8	1.4	0.24	
1,425.0	0.07	60.73	1,425.0	-2.1	-1.8	1.4	0.46	
1,450.0	0.14	20.21	1,450.0	-2.1	-1.8	1.4	0.39	
1,475.0	0.08	270.31	1,475.0	-2.1	-1.8	1.4	0.73	
1,500.0	0.05	279.83	1,500.0	-2.1	-1.8	1.4	0.13	
1,525.0	0.14	327.17	1,525.0	-2.0	-1.8	1.3	0.45	
1,550.0	0.10	261.83	1,550.0	-2.0	-1.9	1.3	0.54	
1,575.0	0.19	274.77	1,575.0	-2.0	-1.9	1.3	0.38	
1,600.0	0.26	269.93	1,600.0	-2.0	-2.0	1.3	0.29	
1,625.0	0.22	278.50	1,625.0	-2.0	-2.1	1.2	0.21	
1,650.0	0.32	284.53	1,650.0	-2.0	-2.2	1.2	0.42	
1,675.0	0.29	288.83	1,675.0	-1.9	-2.4	1.1	0.15	
1,700.0	0.34	283.97	1,700.0	-1.9	-2.5	1.0	0.23	
1,725.0	0.31	269.65	1,725.0	-1.9	-2.6	0.9	0.35	
1,750.0	0.29	278.62	1,750.0	-1.9	-2.8	0.9	0.20	
1,775.0	0.28	269.79	1,775.0	-1.9	-2.9	0.8	0.18	
1,800.0	0.24	288.14	1,800.0	-1.8	-3.0	0.8	0.37	
1,825.0	0.33	276.08	1,825.0	-1.8	-3.1	0.7	0.43	
1,850.0	0.31	269.51	1,850.0	-1.8	-3.3	0.7	0.17	
1,875.0	0.24	284.63	1,875.0	-1.8	-3.4	0.6	0.40	
1,900.0	0.29	277.28	1,900.0	-1.8	-3.5	0.6	0.24	
1,925.0	0.28	277.20	1,925.0	-1.8	-3.6	0.5	0.04	
1,950.0	0.30	270.98	1,950.0	-1.7	-3.7	0.5	0.15	
1,975.0	0.17	263.15	1,975.0	-1.8	-3.8	0.4	0.53	
2,000.0	0.33	260.60	2,000.0	-1.8	-4.0	0.4	0.64	
2,025.0	0.26	265.02	2,025.0	-1.8	-4.1	0.4	0.29	
2,050.0	0.21	274.38	2,050.0	-1.8	-4.2	0.4	0.25	
2,075.0	0.20	274.64	2,075.0	-1.8	-4.3	0.3	0.04	
2,100.0	0.20	273.84	2,100.0	-1.8	-4.4	0.3	0.01	
2,125.0	0.21	256.54	2,125.0	-1.8	-4.4	0.3	0.25	
2,150.0	0.16	256.45	2,150.0	-1.8	-4.5	0.3	0.20	
2,175.0	0.17	262.55	2,175.0	-1.8	-4.6	0.3	0.08	
2,200.0	0.15	269.09	2,200.0	-1.8	-4.7	0.2	0.11	
2,225.0	0.22	284.69	2,225.0	-1.8	-4.7	0.2	0.34	
2,250.0	0.23	257.84	2,250.0	-1.8	-4.8	0.2	0.42	
2,275.0	0.16	292.20	2,275.0	-1.8	-4.9	0.2	0.53	
2,300.0	0.28	284.00	2,300.0	-1.8	-5.0	0.1	0.50	
2,325.0	0.11	251.11	2,325.0	-1.8	-5.1	0.1	0.79	
2,350.0	0.14	239.47	2,350.0	-1.8	-5.1	0.1	0.16	
2,375.0	0.27	237.82	2,375.0	-1.8	-5.2	0.1	0.52	
2,400.0	0.26	250.34	2,400.0	-1.9	-5.3	0.1	0.23	
2,425.0	0.27	247.91	2,425.0	-1.9	-5.4	0.1	0.06	
2,450.0	0.32	262.03	2,450.0	-2.0	-5.6	0.1	0.35	
2,475.0	0.30	252.30	2,475.0	-2.0	-5.7	0.1	0.22	

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EOW Completion Report



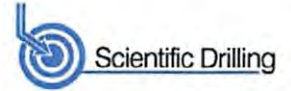
Company:	Antero	Local Co-ordinate Reference:	Well Duckworth Unit 3H
Project:	Ritchie County WV	TVD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Site:	John Richards Pad: Duckworth/Stalnaker	MD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Well:	Duckworth Unit 3H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
2,500.0	0.32	240.51	2,500.0	-2.0	-5.8	0.1	0.27	
2,525.0	0.38	262.49	2,525.0	-2.1	-6.0	0.1	0.58	
2,550.0	0.23	255.47	2,550.0	-2.1	-6.1	0.1	0.62	
2,575.0	0.29	264.34	2,575.0	-2.1	-6.2	0.1	0.29	
2,600.0	0.35	265.74	2,600.0	-2.1	-6.3	0.0	0.24	
2,625.0	0.31	268.54	2,625.0	-2.2	-6.5	0.0	0.17	
2,650.0	0.25	257.24	2,650.0	-2.2	-6.6	0.0	0.33	
2,675.0	0.31	263.43	2,675.0	-2.2	-6.7	-0.1	0.27	
2,700.0	0.43	265.68	2,700.0	-2.2	-6.9	-0.1	0.48	
2,725.0	0.51	270.66	2,725.0	-2.2	-7.1	-0.2	0.36	
2,750.0	0.43	266.94	2,750.0	-2.2	-7.3	-0.2	0.34	
2,775.0	0.54	266.72	2,775.0	-2.2	-7.5	-0.3	0.44	
2,800.0	0.51	262.70	2,800.0	-2.2	-7.7	-0.3	0.19	
2,825.0	0.47	264.28	2,825.0	-2.3	-7.9	-0.4	0.17	
2,850.0	0.55	265.62	2,850.0	-2.3	-8.2	-0.4	0.32	
2,875.0	0.48	269.58	2,875.0	-2.3	-8.4	-0.5	0.31	
2,900.0	0.63	265.58	2,900.0	-2.3	-8.6	-0.5	0.62	
2,925.0	0.58	263.04	2,925.0	-2.3	-8.9	-0.6	0.23	
2,950.0	0.54	266.97	2,950.0	-2.4	-9.1	-0.7	0.22	
2,975.0	0.44	262.55	2,975.0	-2.4	-9.3	-0.7	0.43	
3,000.0	0.57	255.06	3,000.0	-2.4	-9.6	-0.7	0.58	
3,025.0	0.62	260.98	3,025.0	-2.5	-9.8	-0.8	0.32	
3,050.0	0.45	258.02	3,050.0	-2.5	-10.0	-0.8	0.69	
3,075.0	0.52	267.39	3,075.0	-2.5	-10.3	-0.8	0.42	
3,100.0	0.50	270.05	3,100.0	-2.5	-10.5	-0.9	0.12	
3,125.0	0.50	252.84	3,125.0	-2.6	-10.7	-0.9	0.60	
3,150.0	0.48	267.43	3,150.0	-2.6	-10.9	-1.0	0.50	
3,175.0	0.37	261.53	3,175.0	-2.6	-11.1	-1.0	0.47	
3,200.0	0.47	273.46	3,200.0	-2.6	-11.3	-1.1	0.53	
3,225.0	0.40	267.61	3,225.0	-2.6	-11.5	-1.1	0.33	
3,250.0	0.46	270.15	3,250.0	-2.6	-11.6	-1.2	0.25	
3,275.0	0.23	262.29	3,275.0	-2.6	-11.8	-1.2	0.94	
3,300.0	0.22	246.34	3,300.0	-2.7	-11.9	-1.2	0.25	
3,325.0	0.31	234.07	3,325.0	-2.7	-12.0	-1.2	0.42	
3,350.0	0.30	242.91	3,350.0	-2.8	-12.1	-1.2	0.19	
3,375.0	0.26	229.75	3,375.0	-2.9	-12.2	-1.1	0.30	
3,400.0	0.29	237.04	3,400.0	-2.9	-12.3	-1.1	0.18	
3,425.0	0.41	247.82	3,425.0	-3.0	-12.4	-1.1	0.55	
3,450.0	0.40	251.97	3,450.0	-3.1	-12.6	-1.1	0.12	
3,475.0	0.42	256.14	3,475.0	-3.1	-12.8	-1.1	0.14	
3,500.0	0.46	258.83	3,500.0	-3.2	-13.0	-1.1	0.18	
3,525.0	0.46	251.46	3,525.0	-3.2	-13.2	-1.1	0.24	
3,550.0	0.50	251.92	3,550.0	-3.3	-13.4	-1.1	0.16	
3,575.0	0.53	254.81	3,575.0	-3.3	-13.6	-1.1	0.16	

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EOW Completion Report



Company:	Antero	Local Co-ordinate Reference:	Well Duckworth Unit 3H
Project:	Ritchie County WV	TVD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Site:	John Richards Pad: Duckworth/Stalnaker	MD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Well:	Duckworth Unit 3H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
3,600.0	0.29	251.56	3,600.0	-3.4	-13.7	-1.1	0.96
3,625.0	0.43	249.96	3,625.0	-3.4	-13.9	-1.1	0.56
3,650.0	0.31	257.75	3,650.0	-3.5	-14.0	-1.1	0.52
3,675.0	0.13	218.97	3,675.0	-3.5	-14.1	-1.1	0.90
3,700.0	0.16	178.23	3,700.0	-3.6	-14.1	-1.1	0.42
3,725.0	0.18	167.67	3,725.0	-3.6	-14.1	-1.0	0.15
3,750.0	0.15	163.49	3,750.0	-3.7	-14.1	-0.9	0.13
3,775.0	0.31	90.98	3,775.0	-3.8	-14.0	-0.9	1.20
3,800.0	0.16	113.60	3,800.0	-3.8	-13.9	-0.8	0.69
3,825.0	0.39	111.53	3,825.0	-3.8	-13.8	-0.8	0.92
3,850.0	0.33	118.60	3,850.0	-3.9	-13.7	-0.7	0.30
3,875.0	0.37	103.03	3,875.0	-3.9	-13.5	-0.6	0.41
3,900.0	0.33	97.50	3,900.0	-4.0	-13.4	-0.5	0.21
3,925.0	0.40	94.83	3,924.9	-4.0	-13.2	-0.4	0.29
3,950.0	0.43	97.25	3,949.9	-4.0	-13.1	-0.3	0.14
3,975.0	0.37	88.91	3,974.9	-4.0	-12.9	-0.3	0.33
4,000.0	0.51	85.58	3,999.9	-4.0	-12.7	-0.2	0.57
4,050.0	0.67	87.47	4,049.9	-4.0	-12.2	-0.1	0.32
4,100.0	0.63	74.75	4,099.9	-3.9	-11.6	0.0	0.30
4,150.0	0.64	74.80	4,149.9	-3.7	-11.1	0.0	0.02
4,200.0	0.78	86.52	4,199.9	-3.6	-10.5	0.1	0.40
4,250.0	0.80	86.37	4,249.9	-3.6	-9.8	0.3	0.04
4,300.0	0.88	89.31	4,299.9	-3.6	-9.1	0.5	0.18
4,350.0	0.95	88.42	4,349.9	-3.6	-8.3	0.8	0.14
4,400.0	1.03	89.16	4,399.9	-3.5	-7.4	1.0	0.16
4,450.0	0.98	95.80	4,449.9	-3.6	-6.5	1.3	0.25
4,500.0	0.95	101.25	4,499.9	-3.7	-5.7	1.7	0.19
4,550.0	0.91	97.94	4,549.9	-3.8	-4.9	2.1	0.13
4,600.0	0.92	102.28	4,599.9	-4.0	-4.1	2.5	0.14
4,650.0	0.94	107.71	4,649.9	-4.2	-3.3	2.9	0.18
4,700.0	1.11	102.08	4,699.9	-4.4	-2.5	3.4	0.39
4,750.0	1.16	104.20	4,749.9	-4.6	-1.5	3.9	0.13
4,800.0	1.07	107.35	4,799.8	-4.9	-0.6	4.5	0.22
4,850.0	1.31	114.59	4,849.8	-5.3	0.4	5.1	0.57
4,900.0	1.36	107.48	4,899.8	-5.7	1.5	5.9	0.35
4,950.0	1.35	112.87	4,949.8	-6.1	2.6	6.6	0.26
5,000.0	1.60	112.61	4,999.8	-6.6	3.8	7.5	0.50
5,050.0	1.71	110.55	5,049.8	-7.1	5.1	8.4	0.25
5,100.0	1.77	106.84	5,099.8	-7.6	6.6	9.3	0.26
5,150.0	1.95	113.16	5,149.7	-8.2	8.1	10.2	0.55
5,200.0	1.78	109.00	5,199.7	-8.8	9.6	11.3	0.43
5,250.0	1.90	110.81	5,249.7	-9.3	11.1	12.3	0.27
5,300.0	1.80	114.24	5,299.6	-9.9	12.6	13.4	0.30
5,350.0	1.90	109.44	5,349.6	-10.5	14.1	14.4	0.37

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Company:	Antero	Local Co-ordinate Reference:	Well Duckworth Unit 3H
Project:	Ritchie County WV	TVD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Site:	John Richards Pad: Duckworth/Stalnaker	MD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Well:	Duckworth Unit 3H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

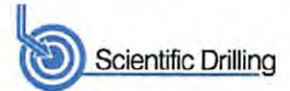
Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,400.0	1.91	109.99	5,399.6	-11.1	15.7	15.5	0.04
5,450.0	1.92	112.47	5,449.6	-11.7	17.2	16.5	0.17
5,500.0	1.88	113.84	5,499.5	-12.3	18.8	17.6	0.12
5,525.0	1.84	114.19	5,524.5	-12.7	19.5	18.2	0.17
5,560.0	1.77	127.44	5,559.5	-13.2	20.4	19.0	1.21
5,593.0	1.58	112.25	5,592.5	-13.7	21.3	19.7	1.46
5,625.0	1.01	225.34	5,624.5	-14.1	21.5	20.1	6.82
5,657.0	3.61	249.80	5,656.5	-14.6	20.3	20.3	8.51
5,689.0	6.10	261.99	5,688.4	-15.2	17.7	20.0	8.38
5,720.0	8.61	268.55	5,719.1	-15.5	13.7	19.0	8.53
5,752.0	11.47	268.93	5,750.6	-15.6	8.2	17.4	8.94
5,784.0	14.42	266.98	5,781.8	-15.9	1.0	15.4	9.32
5,817.0	18.17	266.47	5,813.5	-16.4	-8.2	13.0	11.37
5,849.0	20.76	265.65	5,843.6	-17.2	-18.9	10.3	8.14
5,881.0	23.04	266.46	5,873.3	-18.0	-30.8	7.3	7.19
5,912.0	25.77	269.40	5,901.5	-18.4	-43.6	3.7	9.64
5,944.0	28.85	271.62	5,930.0	-18.3	-58.3	-1.1	10.14
5,976.0	32.10	271.90	5,957.5	-17.8	-74.5	-6.7	10.17
6,009.0	34.97	271.36	5,985.1	-17.3	-92.7	-13.0	8.74
6,041.0	37.48	267.85	6,010.9	-17.4	-111.6	-18.8	10.17
6,071.0	39.41	263.08	6,034.4	-18.9	-130.2	-23.3	11.79
6,103.0	40.48	257.34	6,058.9	-22.4	-150.4	-26.4	11.99
6,123.0	41.57	252.74	6,074.0	-25.8	-163.1	-27.2	16.05
SCMR							
6,135.0	42.31	250.08	6,082.9	-28.3	-170.7	-27.2	16.05
6,167.0	44.53	245.83	6,106.2	-36.6	-191.0	-25.8	11.46
6,199.0	47.19	241.02	6,128.5	-46.9	-211.6	-22.5	13.61
6,231.0	49.03	234.85	6,149.8	-59.5	-231.7	-16.9	15.46
6,263.0	51.85	230.80	6,170.2	-74.5	-251.4	-9.0	13.15
6,295.0	53.46	225.16	6,189.6	-91.5	-270.2	1.2	14.88
6,328.0	54.84	219.07	6,209.0	-111.3	-288.1	14.4	15.53
6,359.0	55.79	214.32	6,226.6	-131.8	-303.4	28.9	12.97
6,367.0	55.76	212.71	6,231.1	-137.3	-307.0	33.0	16.64
MDLX							
6,391.0	55.81	207.89	6,244.6	-154.4	-317.0	46.1	16.61
6,422.0	55.83	200.97	6,262.1	-177.7	-327.6	64.8	13.46
6,454.0	57.39	196.47	6,279.7	-203.0	-336.2	86.1	12.71
6,486.0	59.44	191.22	6,296.4	-229.5	-342.7	109.2	15.37
6,518.0	62.75	187.70	6,311.9	-257.1	-347.3	133.9	14.19
6,550.0	65.43	183.53	6,325.9	-285.7	-350.1	160.2	14.40
6,579.0	66.39	179.79	6,337.7	-312.2	-350.8	185.0	12.23
BRKT							
6,582.0	66.49	179.41	6,338.9	-314.9	-350.8	187.6	12.08
6,614.0	67.92	177.33	6,351.3	-344.4	-350.0	215.9	7.47
6,646.0	70.46	175.81	6,362.7	-374.3	-348.2	244.8	9.09

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EOW Completion Report



Company:	Antero	Local Co-ordinate Reference:	Well Duckworth Unit 3H
Project:	Ritchie County WV	TVD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Site:	John Richards Pad: Duckworth/Stalnaker	MD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Well:	Duckworth Unit 3H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
6,660.0	71.25	175.68	6,367.3	-387.5	-347.2	257.6	5.71
TLLY							
6,678.0	72.26	175.52	6,372.9	-404.5	-345.9	274.2	5.67
6,710.0	74.44	174.91	6,382.1	-435.1	-343.3	304.0	7.05
6,735.0	76.89	174.82	6,388.3	-459.2	-341.2	327.5	9.81
MRCL_HOT							
6,742.0	77.57	174.80	6,389.8	-466.0	-340.6	334.2	9.72
6,773.0	80.78	175.01	6,395.7	-496.3	-337.9	363.8	10.38
6,805.0	82.92	174.45	6,400.2	-527.9	-334.9	394.6	6.91
6,816.2	84.11	174.17	6,401.5	-538.9	-333.8	405.5	10.92
6,861.0	88.90	173.07	6,404.2	-583.4	-328.9	449.2	10.97
6,883.0	89.25	172.46	6,404.5	-605.2	-326.1	470.8	3.20
6,974.0	88.99	172.02	6,405.9	-695.3	-313.8	560.2	0.56
7,065.0	89.16	170.44	6,407.4	-785.2	-299.9	649.9	1.75
7,156.0	91.54	172.11	6,406.9	-875.2	-286.1	739.5	3.19
7,246.0	90.57	168.77	6,405.2	-963.9	-271.2	828.4	3.86
7,337.0	90.04	168.15	6,404.7	-1,053.1	-253.0	918.8	0.90
7,428.0	88.99	167.01	6,405.5	-1,141.9	-233.4	1,009.3	1.70
7,519.0	88.81	167.27	6,407.2	-1,230.6	-213.2	1,099.8	0.35
7,609.0	89.60	167.19	6,408.5	-1,318.4	-193.3	1,189.4	0.88
7,700.0	90.13	167.10	6,408.7	-1,407.1	-173.0	1,279.9	0.59
7,790.0	89.60	168.77	6,408.9	-1,495.1	-154.2	1,369.4	1.95
7,881.0	89.78	169.12	6,409.4	-1,584.4	-136.8	1,459.6	0.43
7,972.0	89.96	169.47	6,409.6	-1,673.9	-119.9	1,549.8	0.43
8,068.0	89.87	169.47	6,409.7	-1,768.2	-102.3	1,644.9	0.09
8,165.0	89.87	170.24	6,410.0	-1,863.7	-85.2	1,740.8	0.79
8,261.0	90.04	169.47	6,410.0	-1,958.2	-68.3	1,835.8	0.82
8,357.0	88.55	171.14	6,411.2	-2,052.8	-52.2	1,930.7	2.33
8,453.0	87.58	170.17	6,414.5	-2,147.5	-36.6	2,025.4	1.43
8,549.0	88.55	170.79	6,417.7	-2,242.1	-20.7	2,120.2	1.20
8,646.0	89.96	172.02	6,419.0	-2,338.0	-6.2	2,215.8	1.93
8,742.0	90.31	174.13	6,418.7	-2,433.3	5.4	2,309.8	2.23
8,838.0	90.13	173.87	6,418.4	-2,528.8	15.4	2,403.5	0.33
8,934.0	89.69	169.82	6,418.5	-2,623.8	29.0	2,498.0	4.24
9,030.0	90.04	169.91	6,418.8	-2,718.3	45.9	2,593.0	0.38
9,126.0	89.96	169.65	6,418.8	-2,812.8	62.9	2,688.0	0.28
9,222.0	89.60	166.92	6,419.1	-2,906.8	82.4	2,783.3	2.87
9,319.0	89.08	165.96	6,420.2	-3,001.1	105.2	2,879.9	1.13
9,415.0	90.13	167.89	6,420.9	-3,094.6	126.9	2,975.5	2.29
9,511.0	90.04	166.57	6,420.8	-3,188.2	148.1	3,071.1	1.38
9,607.0	90.40	169.65	6,420.4	-3,282.1	167.9	3,166.4	2.33
9,703.0	90.48	169.29	6,419.7	-3,376.5	185.4	3,261.5	0.38
9,799.0	91.54	170.35	6,418.0	-3,471.0	202.4	3,356.4	1.56
9,896.0	88.81	167.36	6,417.7	-3,566.1	221.1	3,452.6	4.17
9,992.0	91.01	171.05	6,417.8	-3,660.4	239.1	3,547.8	4.47

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EOW Completion Report



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Site:	John Richards Pad: Duckworth/Stalnaker	MD Reference:	Frontier 23 GL 1025' KB 23' @ 1048.0usft
Well:	Duckworth Unit 3H	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Antero NE

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
10,088.0	89.78	170.88	6,417.2	-3,755.2	254.2	3,642.5	1.29
10,185.0	89.52	170.61	6,417.7	-3,850.9	269.8	3,738.2	0.39
10,280.0	91.19	171.40	6,417.2	-3,944.8	284.6	3,831.9	1.94
10,376.0	88.29	168.50	6,417.6	-4,039.3	301.4	3,926.9	4.27
10,473.0	89.25	170.35	6,419.7	-4,134.6	319.2	4,022.9	2.15
10,569.0	89.43	172.28	6,420.8	-4,229.5	333.7	4,117.5	2.02
10,665.0	89.25	172.72	6,421.9	-4,324.7	346.2	4,211.7	0.50
10,761.0	90.84	172.37	6,421.8	-4,419.8	358.6	4,306.0	1.70
10,857.0	90.66	172.28	6,420.6	-4,515.0	371.5	4,400.3	0.21
10,952.0	90.13	172.02	6,419.9	-4,609.1	384.4	4,493.6	0.62
11,048.0	90.84	170.35	6,419.1	-4,703.9	399.2	4,588.3	1.89
11,145.0	90.75	171.05	6,417.7	-4,799.7	414.8	4,684.0	0.73
11,241.0	90.48	169.47	6,416.7	-4,894.3	431.1	4,778.9	1.67
11,337.0	88.72	167.10	6,417.4	-4,988.2	450.6	4,874.2	3.07
11,434.0	89.69	168.86	6,418.7	-5,083.1	470.8	4,970.6	2.07
11,530.0	89.78	169.65	6,419.2	-5,177.4	488.7	5,065.7	0.83
11,627.0	90.13	170.44	6,419.2	-5,273.0	505.4	5,161.7	0.89
11,723.0	90.13	171.23	6,419.0	-5,367.7	520.7	5,256.4	0.82
11,819.0	90.31	171.76	6,418.7	-5,462.7	534.9	5,351.0	0.58
11,916.0	89.25	169.03	6,419.0	-5,558.3	551.1	5,446.8	3.02
12,012.0	89.43	168.24	6,420.1	-5,652.4	570.0	5,542.1	0.84
12,108.0	89.96	169.82	6,420.6	-5,746.7	588.3	5,637.2	1.74
12,205.0	90.22	170.09	6,420.5	-5,842.2	605.2	5,733.2	0.39
12,301.0	90.84	172.11	6,419.6	-5,937.0	620.0	5,827.8	2.20
12,397.0	88.90	167.89	6,419.8	-6,031.5	636.7	5,922.8	4.84
12,493.0	88.90	168.68	6,421.7	-6,125.5	656.2	6,018.1	0.82
12,589.0	88.81	169.29	6,423.6	-6,219.7	674.5	6,113.3	0.64
12,614.0	88.72	169.21	6,424.1	-6,244.3	679.2	6,138.0	0.48
12,676.0	89.40	169.37	6,425.1	-6,305.2	690.7	6,199.4	1.13

PTB

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
6,123.0	6,074.0	-25.8	-163.1	SCMR
6,367.0	6,231.1	-137.3	-307.0	MDLX
6,579.0	6,337.7	-312.2	-350.8	BRKT
6,660.0	6,367.3	-387.5	-347.2	TLLY
6,735.0	6,388.3	-459.2	-341.2	MRCL_HOT
12,676.0	6,425.1	-6,305.2	690.7	PTB

Received
Office of Oil & Gas
FEB 11 2016

Checked By: _____ Approved By: _____ Date: _____

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	9/24/2015
Job End Date:	10/4/2015
State:	West Virginia
County:	Ritchie
API Number:	47-085-10103-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Duckworth 3H
Longitude:	-80.91972200
Latitude:	39.20528600
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,425
Total Base Water Volume (gal):	8,419,632
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	Base Fluid	Water	7732-18-5	100.00000	91.72841	
Sand	U.S. Well Services, LLC	Proppant	Crystalline Silica, quartz	14808-60-7	100.00000	7.74981	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid	Water	7732-18-5	87.50000	0.17142	
			Hydrogen Chloride	7647-01-0	18.00000	0.04095	
LGC-15	U.S. Well Services	Gelling Agents	Guar Gum	9000-30-0	50.00000	0.08374	
			Petroleum Distillates	64742-47-8	60.00000	0.07931	
			Suspending agent (solid)	14808-60-7	3.00000	0.01281	
			Surfactant	68439-51-0	3.00000	0.00502	
WFRA-405	U.S. Well Services	Friction Reducer	Water	7732-18-5	40.00000	0.03347	
			Anionic Polyacrylamide	Proprietary	40.00000	0.03347	
			Sodium Chloride	7647-14-5	20.00000	0.01673	
			Petroleum Distillates	64742-47-8	20.00000	0.01347	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00418	

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SI-1100	U.S. Well Services	Scale Inhibitor				
			Water	7732-18-5	80.00000	0.01001
			Ethylene Glycol	107-21-1	25.00000	0.00353
			Copolymer of Maleic and Acrylic acid	52255-49-9	10.00000	0.00148
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	7.50000	0.00127
			Hexamethylene triamine penta (methylene phosphonic acid)	34690-00-1	5.00000	0.00081
			Phosphino carboxylic acid polymer	71050-62-9	5.00000	0.00081
			Hexamethylene diamine penta (methylene phosphonic acid)	23605-74-5	2.00000	0.00033
K-BAC 1020	U.S. Well Services	Anti-Bacterial Agent				
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00403
			Deionized Water	7732-18-5	28.00000	0.00230
AP One	U.S. Well Services	Gel Breakers				
			Ammonium Persulfate	7727-54-0	100.00000	0.00230
AI-301	U.S. Well Services	Acid Corrosion Inhibitors				
			Diethylene Glycol	111-46-6	30.00000	0.00013
			Methenamine	100-97-0	20.00000	0.00010
			Hydrogen Chloride	7647-01-0	10.00000	0.00005
			Polyethylene polyamine	68603-67-8	10.00000	0.00004
			Coco amine	61791-14-8	5.00000	0.00002

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)

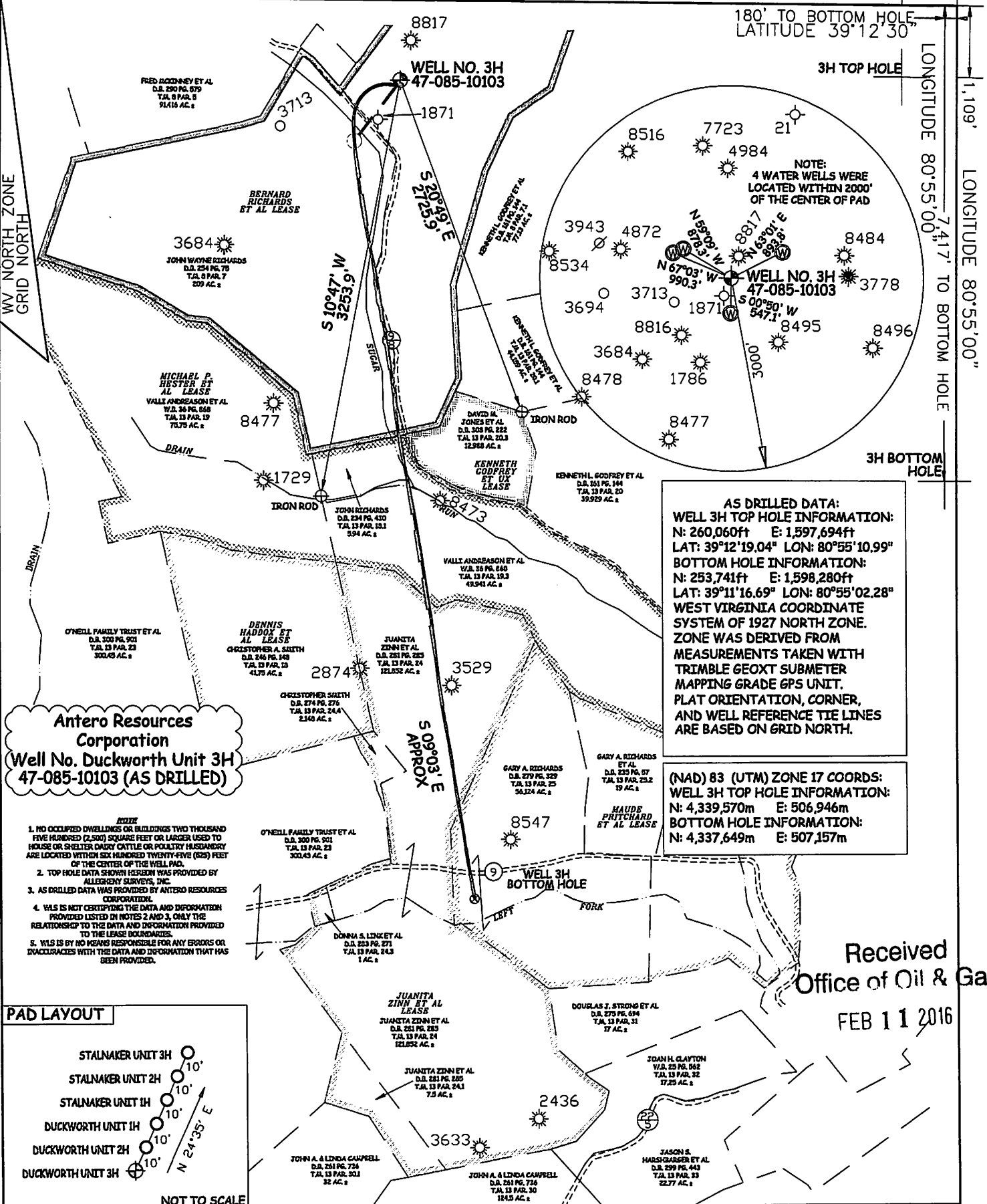
Prepared
 Office of Oil & Gas
 FEB 11 2016

LATITUDE 39°12'30" 865'

180' TO BOTTOM HOLE, LATITUDE 39°12'30"

LONGITUDE 80°55'00" 7417' TO BOTTOM HOLE

LONGITUDE 80°55'00" 1.109'

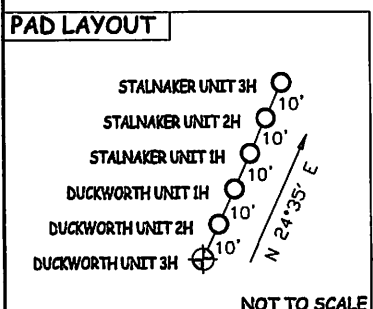


AS DRILLED DATA:
WELL 3H TOP HOLE INFORMATION:
 N: 260,060ft E: 1,597,694ft
 LAT: 39°12'19.04" LON: 80°55'10.99"
BOTTOM HOLE INFORMATION:
 N: 253,741ft E: 1,598,280ft
 LAT: 39°11'16.69" LON: 80°55'02.28"
 WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH 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 3H TOP HOLE INFORMATION:
 N: 4,339,570m E: 506,946m
BOTTOM HOLE INFORMATION:
 N: 4,337,649m E: 507,157m

Antero Resources Corporation
Well No. Duckworth Unit 3H
47-085-10103 (AS DRILLED)

- 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 HEREIN 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.



Received
 Office of Oil & Gas
 FEB 11 2016

JOB # 14-023 WA
 DRAWING # DUCKWORTH3HADR
 SCALE 1" = 1000'
 MINIMUM DEGREE OF ACCURACY SUBMETER
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS



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 +/-
 X Existing Fence
 ⊕ Found monument, as noted
 ⊙ Proposed Well Path
 ⊗ As Drilled Well Path

DATE 07/13/15
 OPERATOR'S WELL # DUCKWORTH UNIT #3H
 API WELL #

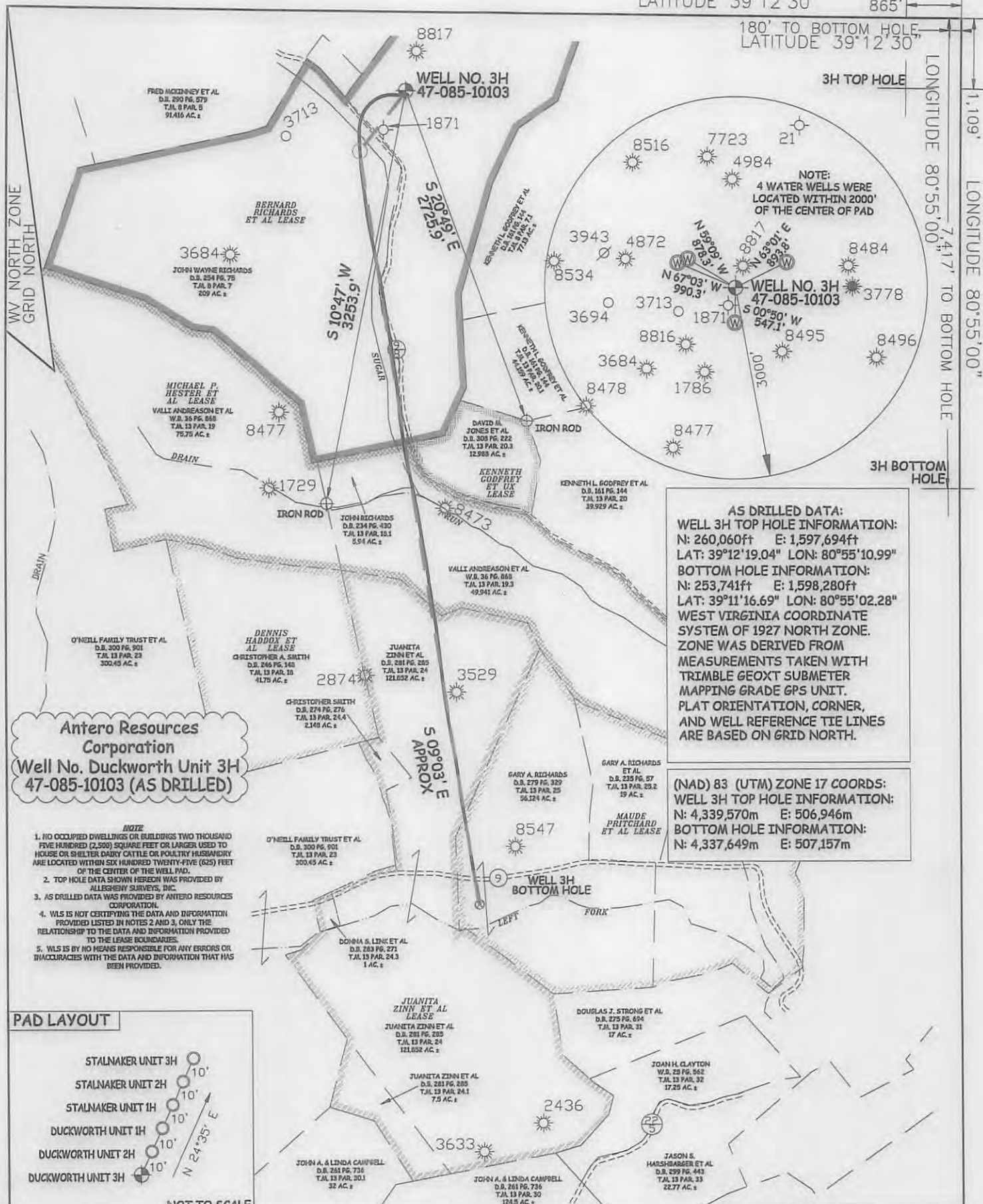
STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS
 WELL TYPE: OIL ___ GAS LIQUID INJECTION ___ WASTE DISPOSAL ___
 (IF "GAS") PRODUCTION STORAGE ___ DEEP ___ SHALLOW
 LOCATION: ELEVATION 1,035' ORIGINAL - 1,025' AS DRILLED WATERSHED SOUTH FORK HUGHES RIVER
 QUADRANGLE PULLMAN 7.5' DISTRICT UNION COUNTY PERMIT 80916/2016
 SURFACE OWNER JOHN WAYNE RICHARDS ACREAGE 209 ACRES +/-
 OIL & GAS ROYALTY OWNER BERNARD RICHARDS ET AL; LEASE ACREAGE 214 ACRES +/-
 MICHAEL P. HEASTER ET AL; JUANITA ZINN ET AL; MAUDE PRITCHARD ET AL 234.5 ACRES +/-; 132.5 ACRES +/-; 137 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 6,425' TVD 12,676' MD
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
 DENVER, CO 80202 CHARLESTON, WV 25313

LATITUDE 39°12'30" 865'

180' TO BOTTOM HOLE, LATITUDE 39°12'30"

LONGITUDE 80°55'00" 7,417' TO BOTTOM HOLE

LONGITUDE 80°55'00" 1,109'

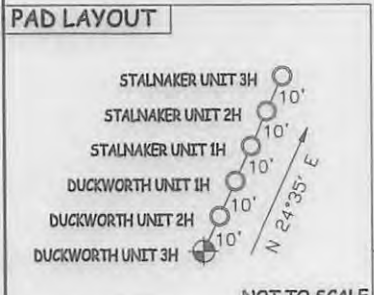


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JOB # 14-023 WA
 DRAWING # DUCKWORTH3HADR
 SCALE 1" = 1000'
 MINIMUM DEGREE OF ACCURACY SUBMETER
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS



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 +/-
- X Existing Fence
- ⊕ Found monument, as noted
- Proposed Well Path
- ⊙ As Drilled Well Path

DATE 07/13/15
 OPERATOR'S WELL# DUCKWORTH UNIT #3H
 API WELL # 47 - 085 - 10103

STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS
 WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
 LOCATION: ELEVATION 1,035' ORIGINAL - 1,025' AS DRILLED WATERSHED SOUTH FORK HUGHES RIVER
 QUADRANGLE PULLMAN 7.5' DISTRICT UNION COUNTY OHIO
 SURFACE OWNER JOHN WAYNE RICHARDS ACREAGE 209 ACRES +/-
 OIL & GAS ROYALTY OWNER BERNARD RICHARDS ET AL; LEASE ACREAGE 214 ACRES±;
 MICHAEL P. HEASTER ET AL; JUANITA ZINN ET AL; MAUDE PRITCHARD ET AL 234.5 ACRES±; 132.5 ACRES±; 137 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 6,425' TVD 12,676' MD
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
 DENVER, CO 80202 CHARLESTON, WV 25313

COUNTY NAME PERMIT