

**APPROVAL**  
NAME: *Michael Jeff*  
DATE: *1/27/16*

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

API 47-085-10163 County Ritchie District Clay  
Quad Pennsboro 7.5' Pad Name Walnut West Pad Field/Pool Name ----  
Farm name Walnut Investments Co. Well Number Musgrave Unit 1H  
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 4351527m Easting 500174m  
Landing Point of Curve Northing 4351191.60m Easting 499744.31m  
Bottom Hole Northing 4348428m Easting 500866m

Elevation (ft) 1121' GL Type of Well  New  Existing Type of Report  Interim  Final  
Permit Type  Deviated  Horizontal  Horizontal 6A  Vertical Depth Type  Deep  Shallow  
Type of Operation  Convert  Deepen  Drill  Plug Back  Redrilling  Rework  Stimulate  
Well Type  Brine Disposal  CBM  Gas  Oil  Secondary Recovery  Solution Mining  Storage  Other \_\_\_\_\_  
Type of Completion  Single  Multiple Fluids Produced  Brine  Gas  NGL  Oil  Other \_\_\_\_\_  
Drilled with  Cable  Rotary

Drilling Media Surface hole  Air  Mud  Fresh Water Intermediate hole  Air  Mud  Fresh Water  Brine  
Production hole  Air  Mud  Fresh Water  Brine  
Mud Type(s) and Additive(s)  
Air - Foam & 4% KCL  
Mud - Polymer

Date permit issued 11/25/2014 Date drilling commenced 2/7/2015 Date drilling ceased 5/19/2015  
Date completion activities began 6/24/2015 Date completion activities ceased 10/5/2015  
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

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

Freshwater depth(s) ft 130', 310' Open mine(s) (Y/N) depths N  
Salt water depth(s) ft None Void(s) encountered (Y/N) depths N  
Coal depth(s) ft 1571' Cavern(s) encountered (Y/N) depths N  
Is coal being mined in area (Y/N) N

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WS 02/05/16 Axd  
**02/05/2016**

API 47-085 - 10163 Farm name Walnut Investments Co. Well number Musgrave Unit 1H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade w/ft	Basket Depth(s)	Did cement circulate (Y/N) * Provide details below*
Conductor	30"	20"	53'	New	94#/J-55	N/A	Y
Surface	17-1/2"	13-3/8"	565'	New	48#/H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2526'	New	36#/J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	16,755'	New	23#/P-110	N/A	Y
Tubing		2-3/8"	6749'		4.7#/N-80		
Packer type and depth set		N/A					

Comment Details \_\_\_\_\_

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft <sup>3</sup> /sks)	Volume (ft <sup>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	Class A	100 sx	15.6	1.88	51 Cu. Ft.	0'	8 Hrs.
Surface	Class A	672 sx	15.6	1.18	392 Cu. Ft.	0'	8 Hrs.
Coal							
Intermediate 1	Class A	973 sx	15.6	1.18	791 Cu. Ft.	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	745 sx (Lead), 1796 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.44 (Lead), 1.80 (Tail)	3374 Cu. Ft.	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 16,755' MD, 6391' TVD Loggers TD (ft) 16,755' MD

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

Plug back procedure N/A

Kick off depth (ft) 6186'

\*\* This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Schmidle Unit 1H API# 47-085-10042). Please reference the wireline logs submitted with Form WR-35 for the Schmidle Unit 1H. A Cement Bond Log has been included with this submittal.

Check all wireline logs run  caliper  density  deviated/directional  induction  neutron  resistivity  gamma ray  temperature

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 Received

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WAS WELL COMPLETED OPEN HOLE?  Yes  No DETAILS JAN 13 2016

WERE TRACERS USED  Yes  No TYPE OF TRACER(S) USED N/A



API 47- 085 - 10163 Farm name Walnut Investments Co. Well number Musgrave Unit 1H

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
<u>Marcellus</u>	<u>6268' (Top)</u> TVD	<u>6741' (Top)</u> 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 11,778 mcfpd Oil 176 bpd NGL --- bpd Water 1 bpd GAS MEASURED BY  Estimated  Orifice  Pilot

LITHOLOGY/ FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H <sub>2</sub> S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
	<u>0</u>		<u>0</u>		
			<b>SEE ATTACHED EXHIBIT 3</b>		

Please insert additional pages as applicable.

Drilling Contractor Patterson - UTI Drilling Company LLC  
Address 207 Carlton Drive City Eighty-Four State PA Zip 15330

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

Cementing Company Allied Oil & Gas Services, LLC  
Address 1036 East Main Street City Bridgeport State WV Zip 26330

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

Please insert additional pages as applicable.

Completed by Natalie Komp Telephone 303-357-6820  
Signature \_\_\_\_\_ Title Permitting Agent Date 1/11/2015

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

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API 47-085-10163 Farm Name Walnut Investments Co. Well Number Musgrave Unit 1H

**EXHIBIT 1**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	24-Jun-15	16,496	16,663	60	Marcellus
2	20-Aug-15	16,298	16,465	60	Marcellus
3	21-Aug-15	16,094	16,241	60	Marcellus
4	21-Aug-15	15,902	16,069	60	Marcellus
5	21-Aug-15	15,704	15,871	60	Marcellus
6	21-Aug-15	15,505	15,673	60	Marcellus
7	21-Aug-15	15,307	15,474	60	Marcellus
8	22-Aug-15	15,109	15,276	60	Marcellus
9	24-Aug-15	14,911	15,078	60	Marcellus
10	24-Aug-15	14,713	14,880	60	Marcellus
11	24-Aug-15	14,515	14,682	60	Marcellus
12	25-Aug-15	14,316	14,483	60	Marcellus
13	25-Aug-15	14,118	14,285	60	Marcellus
14	25-Aug-15	13,920	14,087	60	Marcellus
15	25-Aug-15	13,722	13,889	60	Marcellus
16	26-Aug-15	13,524	13,691	60	Marcellus
17	26-Aug-15	13,325	13,493	60	Marcellus
18	26-Aug-15	13,127	13,294	60	Marcellus
19	27-Aug-15	12,929	13,096	60	Marcellus
20	27-Aug-15	12,731	12,898	60	Marcellus
21	27-Aug-15	12,533	12,700	60	Marcellus
22	27-Aug-15	12,335	12,502	60	Marcellus
23	28-Aug-15	12,136	12,304	60	Marcellus
24	28-Aug-15	11,938	12,105	60	Marcellus
25	28-Aug-15	11,740	11,907	60	Marcellus
26	28-Aug-15	11,542	11,709	60	Marcellus
27	28-Aug-15	11,344	11,511	60	Marcellus
28	29-Aug-15	11,146	11,313	60	Marcellus
29	29-Aug-15	10,947	11,115	60	Marcellus
30	29-Aug-15	10,749	10,916	60	Marcellus
31	29-Aug-15	10,551	10,718	60	Marcellus
32	29-Aug-15	10,353	10,520	60	Marcellus
33	29-Aug-15	10,155	10,322	60	Marcellus
34	30-Aug-15	9,957	10,124	60	Marcellus
35	1-Sep-15	9,634	9,785	60	Marcellus
36	2-Sep-15	9,470	9,608	60	Marcellus
37	2-Sep-15	9,302	9,444	60	Marcellus
38	2-Sep-15	9,134	9,276	60	Marcellus
39	2-Sep-15	8,966	9,108	60	Marcellus
40	3-Sep-15	8,768	8,935	60	Marcellus
41	3-Sep-15	8,570	8,737	60	Marcellus
42	3-Sep-15	8,371	8,539	60	Marcellus
43	3-Sep-15	8,173	8,340	60	Marcellus
44	3-Sep-15	7,975	8,142	60	Marcellus
45	4-Sep-15	7,777	7,944	60	Marcellus
46	4-Sep-15	7,579	7,746	60	Marcellus
47	4-Sep-15	7,381	7,548	60	Marcellus
48	4-Sep-15	7,182	7,350	60	Marcellus
49	4-Sep-15	6,984	7,151	60	Marcellus
50	5-Sep-15	6,786	6,953	60	Marcellus

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API 47-085-10163 Farm Name Walnut Investments Co. Well Number Musgrave Unit 1H

**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	19-Aug-15	39.8	7,421	N/A	4,581	5,214	3,602	N/A
2	20-Aug-15	66.4	7,197	6,218	3,689	183,390	6,963	N/A
3	21-Aug-15	60.0	6,928	6,194	3,730	209,210	6,367	N/A
4	21-Aug-15	63.4	6,908	6,166	4,646	232,850	6,504	N/A
5	21-Aug-15	60.7	7,357	5,862	4,935	143,730	6,878	N/A
6	21-Aug-15	60.3	7,164	5,821	4,224	166,885	6,617	N/A
7	21-Aug-15	62.7	6,958	5,587	4,121	227,245	6,433	N/A
8	22-Aug-15	57.1	7,145	5,980	5,096	203,470	6,634	N/A
9	24-Aug-15	23.4	7,972	8,615	6,756	0	6,000	N/A
10	24-Aug-15	40.1	8,078	5,514	4,314	7,860	5,732	N/A
11	24-Aug-15	64.3	6,753	5,338	3,797	226,115	6,820	N/A
12	25-Aug-15	63.8	6,920	5,428	4,969	206,400	6,155	N/A
13	25-Aug-15	65.0	6,626	5,292	5,797	173,200	6,983	N/A
14	25-Aug-15	33.9	8,775	6,751	6,613	5,900	5,566	N/A
15	25-Aug-15	58.3	6,534	6,378	4,610	220,030	6,294	N/A
16	26-Aug-15	61.8	6,399	6,041	4,066	232,715	5,867	N/A
17	26-Aug-15	64.6	6,519	5,890	4,399	233,400	5,930	N/A
18	26-Aug-15	50.7	5,505	6,037	5,028	204,600	5,213	N/A
19	27-Aug-15	58.0	6,756	5,847	4,670	212,005	5,658	N/A
20	27-Aug-15	59.9	6,742	5,722	4,982	235,630	5,880	N/A
21	27-Aug-15	60.5	6,383	5,386	4,703	233,700	5,835	N/A
22	27-Aug-15	62.8	6,537	5,751	4,749	235,020	5,861	N/A
23	28-Aug-15	63.2	6,542	5,733	5,329	236,450	5,846	N/A
24	28-Aug-15	61.8	6,671	5,951	4,678	185,000	5,988	N/A
25	28-Aug-15	61.5	6,408	6,562	4,925	237,550	5,755	N/A
26	28-Aug-15	62.4	6,264	5,271	4,728	235,060	5,775	N/A
27	28-Aug-15	62.5	6,693	5,972	5,071	237,350	5,794	N/A
28	29-Aug-15	63.7	6,764	5,511	5,121	219,190	6,295	N/A
29	29-Aug-15	62.1	6,255	6,133	4,499	221,700	5,548	N/A
30	29-Aug-15	62.5	6,554	6,942	4,073	226,150	5,591	N/A
31	29-Aug-15	63.3	6,422	7,110	4,585	212,400	5,893	N/A
32	29-Aug-15	62.7	6,438	6,301	5,314	230,160	5,730	N/A
33	29-Aug-15	61.2	6,549	6,952	5,318	233,960	5,918	N/A
34	30-Aug-15	64.2	6,492	5,897	4,596	235,600	5,875	N/A
35	1-Sep-15	10.2	7,841	5,264	5,277	9,800	4,579	N/A
36	2-Sep-15	59.4	6,335	5,998	5,010	235,670	5,946	N/A
37	2-Sep-15	61.0	6,421	5,955	5,125	214,600	5,513	N/A
38	2-Sep-15	61.2	6,034	5,962	5,060	235,000	5,703	N/A
39	2-Sep-15	62.4	6,043	6,112	4,395	225,220	5,612	N/A
40	3-Sep-15	60.4	6,105	6,180	4,785	235,500	5,933	N/A
41	3-Sep-15	59.6	6,194	5,223	4,799	235,200	5,986	N/A
42	3-Sep-15	58.9	6,030	6,180	4,641	234,050	5,819	N/A
43	3-Sep-15	62.3	6,141	6,012	4,509	216,900	6,216	N/A
44	3-Sep-15	59.4	5,967	5,412	4,678	194,900	5,611	N/A
45	4-Sep-15	60.3	5,934	6,030	4,303	234,560	5,647	N/A
46	4-Sep-15	62.1	6,007	7,242	4,650	235,450	5,677	N/A
47	4-Sep-15	61.2	5,973	7,087	5,814	230,250	5,588	N/A
48	4-Sep-15	59.6	5,885	7,093	4,398	235,500	5,698	N/A
49	4-Sep-15	60.2	5,877	6,562	4,489	237,800	5,669	N/A
50	5-Sep-15	61.2	5,540	5,687	4,205	232,000	5,483	N/A
AVG=		68.2	6,599	6,081	4,777	9,951,539	294,480	TOTAL

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## EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD)	BOTTOM DEPTH (TVD)	TOP DEPTH (MD)	BOTTOM DEPTH (MD)
	From Surface	From Surface	From Surface	From Surface
Fresh Water	130	N/A	130	N/A
Fresh Water	310	N/A	310	N/A
Sandstone	0	422	0	422
Shale	est 422	638	est 422	638
Siltstone	est 638	736	est 638	736
Shale	est 736	756	est 736	756
Limestone	est 756	780	est 756	780
Shale	est 780	798	est 780	798
Sandstone	est 798	818	est 798	818
Shale	est 818	838	est 818	838
Sandstone	est 838	858	est 838	858
Shale	est 858	1,047	est 858	1,047
Sandstone	est 1047	1,218	est 1047	1,218
Trace Coal/Sandstone	est 1218	1,238	est 1218	1,238
Shale	est 1238	1,318	est 1238	1,318
Sandstone	est 1318	1,458	est 1318	1,458
Shale/Trace Coal	est 1458	1,478	est 1458	1,478
Shale	est 1478	1,514	est 1478	1,514
Sandstone	est 1514	1,558	est 1514	1,558
Coal	est 1558	1,578	est 1558	1,578
Sandstone	est 1578	1,658	est 1578	1,658
Shale/Trace Coal	est 1658	1,678	est 1658	1,678
Silty Shale	est 1678	1,738	est 1678	1,738
Sandstone	est 1738	1,858	est 1738	1,858
Shale	est 1858	1,901	est 1858	1,901
Limestone	est 1901	1,919	est 1901	1,919
Shale	est 1919	1,972	est 1919	1,975
Big Lime	1,972	2,149	1,975	2,151
Big Injun	2,149	2,520	2,151	2,522
Gantz Sand	2,520	2,842	2,522	2,846
Fifty Foot Sandstone	2,842	2,963	2,846	2,968
Gordon	2,963	3,403	2,968	3,433
Fifth Sandstone	3,403	3,484	3,433	3,523
Bayard	3,484	3,947	3,523	4,041
Speechley	3,947	4,177	4,041	4,294
Baltown	4,177	4,619	4,294	4,784
Bradford	4,619	4,965	4,784	5,177
Benson	4,965	5,194	5,177	5,440
Alexander	5,194	5,489	5,440	5,767
Elk	5,489	5,712	5,767	6,008
Rhinestreet	5,712	6,056	6,008	6,403
Sycamore	6,056	6,146	6,403	6,523
Middlesex	6,146	6,244	6,523	6,685
Burkett	6,244	6,263	6,685	6,728
Tully	6,263	6,268	6,728	6,741
Marcellus	6,268	NA	6,741	NA

\*Please note Antero determines shallow 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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# Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	8/19/2015
Job End Date:	9/5/2015
State:	West Virginia
County:	Ritchie
API Number:	47-085-10163-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Musgrave 1H
Longitude:	-80.99815000
Latitude:	39.28513900
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,391
Total Base Water Volume (gal):	12,903,226
Total Base Non Water Volume:	558,432



## 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	90.89153	
Sand	U.S. Well Services, LLC	Proppant	Crystalline Silica, quartz	14808-60-7	100.00000	8.40522	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid	Water	7732-18-5	87.50000	0.31126	
			Hydrogen Chloride	7647-01-0	18.00000	0.07435	
LGC-15	U.S. Well Services	Gelling Agents	Guar Gum	9000-30-0	50.00000	0.08790	
			Petroleum Distillates	64742-47-8	60.00000	0.08325	
			Suspending agent (solid)	14808-60-7	3.00000	0.01344	
			Surfactant	68439-51-0	3.00000	0.00527	
WFRA-405	U.S. Well Services	Friction Reducer	Water	7732-18-5	40.00000	0.02769	
			Anionic Polyacrylamide	Proprietary	40.00000	0.02769	
			Sodium Chloride	7647-14-5	20.00000	0.01385	
			Petroleum Distillates	64742-47-8	20.00000	0.01115	
			Ethoxylated alcohol blend	Proprietary	5.00000	0.00346	

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JAN 13 2016



SI-1100	U.S. Well Services	Scale Inhibitor				
			Water	7732-18-5	80.00000	0.00962
			Ethylene Glycol	107-21-1	25.00000	0.00340
			Copolymer of Maleic and Acrylic acid	52255-49-9	10.00000	0.00142
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	7.50000	0.00122
			Phosphino carboxylic acid polymer	71050-62-9	5.00000	0.00078
			Hexamethylene triamine penta (methylene phosphonic acid)	34690-00-1	5.00000	0.00078
			Hexamethylene diamine penta (methylene phosphonic acid)	23605-74-5	2.00000	0.00031
HCL Acid (3% to 7.5%)	U.S. Well Services, LLC	Bulk Acid				
			Water	7732-18-5	97.00000	0.01365
			Hydrogen Chloride	7647-01-0	7.50000	0.00123
K-BAC 1020	U.S. Well Services	Anti-Bacterial Agent				
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00423
			Deionized Water	7732-18-5	28.00000	0.00242
HCL Acid (28%)	U.S. Well Services, LLC	Bulk Acid				
			Water	7732-18-5	72.00000	0.00152
			Hydrogen Chloride	7647-01-0	28.00000	0.00069
AP One	U.S. Well Services	Gel Breakers				
			Ammonium Persulfate	7727-54-0	100.00000	0.00203
AI-301	U.S. Well Services	Acid Corrosion Inhibitors				
			Diethylene Glycol	111-46-6	30.00000	0.00025
			Methenamine	100-97-0	20.00000	0.00020
			Hydrogen Chloride	7647-01-0	10.00000	0.00009
			Polyethylene polyamine	68603-67-8	10.00000	0.00007
			Coco amine	61791-14-8	5.00000	0.00003

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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JAN 13 2016

LATITUDE 39°20'00"

11,266'

LATITUDE 39°17'30"

LONGITUDE 80°57'30"

7,383'

LONGITUDE 80°57'30"

Antero Resources Corporation  
Well No. Musgrave Unit 1H  
47-085-10163 (AS DRILLED)

AS DRILLED DATA:  
WELL 1H TOP HOLE INFORMATION:  
N: 299,669ft E: 1,576,126ft  
LAT: 39°18'47.03" LON: 80°59'53.34"  
BOTTOM HOLE INFORMATION:  
N: 289,461ft E: 1,578,228ft  
LAT: 39°17'06.50" LON: 80°59'24.43"  
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 1H TOP HOLE INFORMATION:  
N: 4,351,527m E: 500,174m  
BOTTOM HOLE INFORMATION:  
N: 4,348,428m E: 500,866m

- NOTES**
1. NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHELTER DAIRY CATTLE OR POULTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY-FIVE (625) FEET OF THE CENTER OF THE WELL PAD.
  2. TOP HOLE DATA SHOWN HEREON WAS PROVIDED BY ALLEGHENY SURVEYS, INC.
  3. AS DRILLED DATA WAS PROVIDED BY ANTERO RESOURCES CORPORATION.
  4. WLS IS NOT CERTIFYING THE DATA AND INFORMATION LISTED IN NOTES 2 AND 3, ONLY THE RELATIONSHIP TO THE DATA AND INFORMATION PROVIDED TO THE LEASE BOUNDARIES.
  5. WLS IS BY NO MEANS RESPONSIBLE FOR ANY ERRORS OR INACCURACIES WITH THE DATA AND INFORMATION THAT HAS BEEN PROVIDED.

**LEGEND**

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

DATE 07/16/15

OPERATOR'S WELL# MUSGRAVE UNIT #1H

API WELL #  
47 - 085 - 10163

STATE COUNTY PERMIT

JOB # 13-007WA

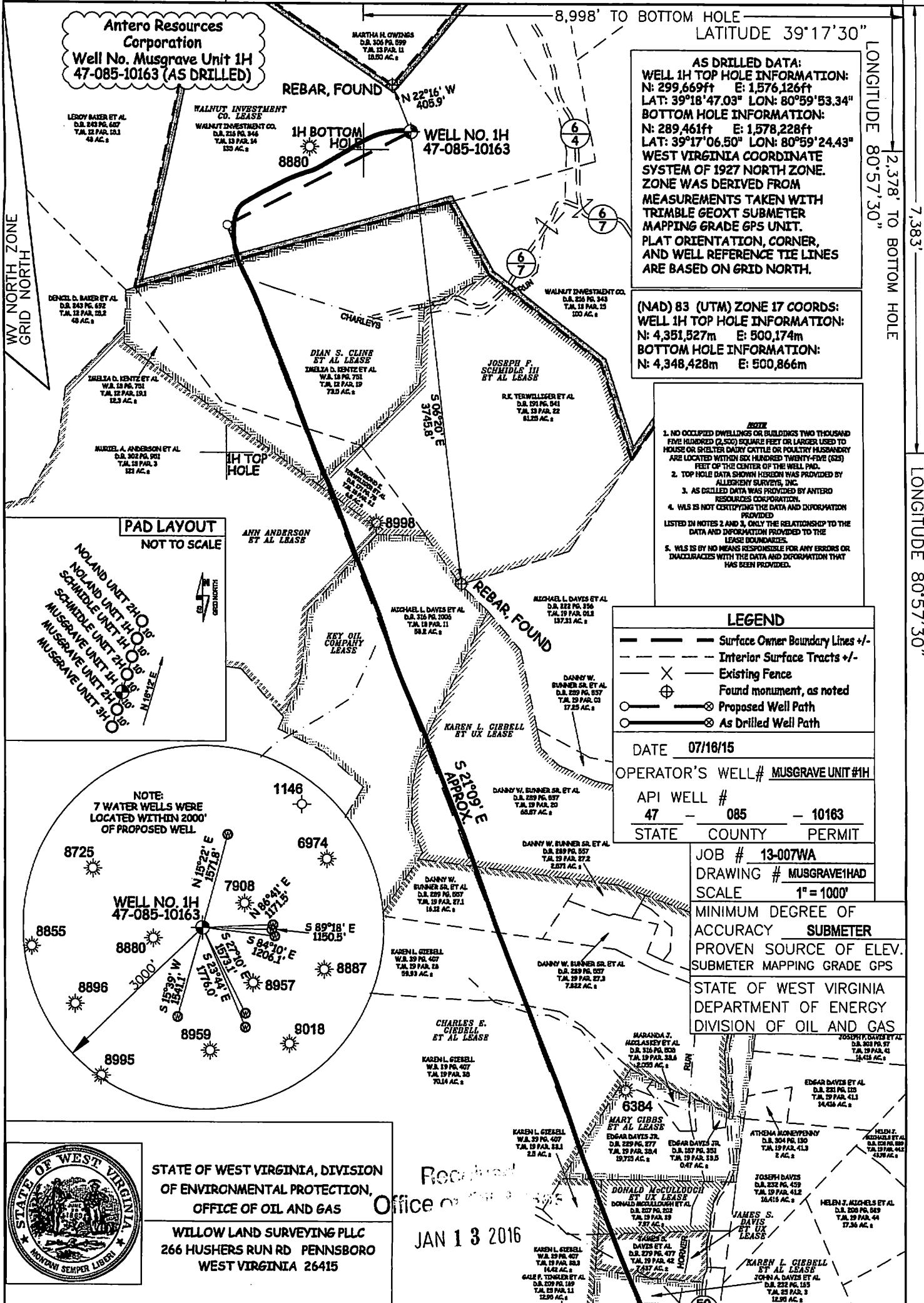
DRAWING # MUSGRAVE1HAD

SCALE 1" = 1000'

MINIMUM DEGREE OF ACCURACY SUBMETER

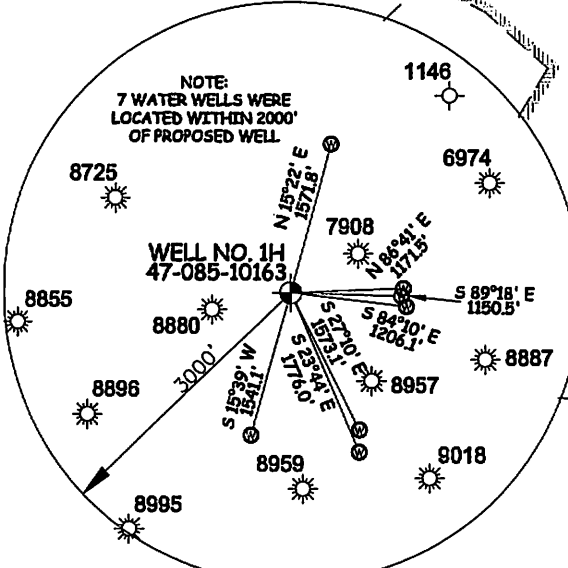
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

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

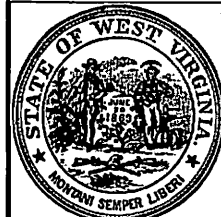


PAD LAYOUT  
NOT TO SCALE

NOLAND UNIT 2HO 30'  
NOLAND UNIT 1HO 30'  
SCHMIDLE UNIT 1HO 30'  
MUSGRAVE UNIT 1H 30'  
MUSGRAVE UNIT 2HO 30'  
MUSGRAVE UNIT 3HO



NOTE:  
7 WATER WELLS WERE  
LOCATED WITHIN 2000'  
OF PROPOSED WELL



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

WILLOW LAND SURVEYING PLLC  
266 HUSHERS RUN RD PENNSBORO  
WEST VIRGINIA 26415

Received  
Office of Oil and Gas  
JAN 13 2016

WELL TYPE: OIL GAS  LIQUID INJECTION WASTE DISPOSAL  
(IF "GAS") PRODUCTION  STORAGE DEEP SHALLOW   
LOCATION: ELEVATION 1,142' ORIGINAL - 1,121' AS DRILLED WATERSHED NORTH FORK HUGHES RIVER  
QUADRANGLE PENNSBORO 7.5' DISTRICT CLAY COUNTY RITCHIE

SURFACE OWNER WALNUT INVESTMENTS CO. ACREAGE 138 ACRES +/-  
OIL & GAS ROYALTY OWNER WALNUT INVESTMENT CO.; DIAN S. CLINE ET AL.; JOSEPH F. SCHMIDLE III ET AL.; ANN ANDERSON ET AL.; LEASE ACREAGE 238 AC +/- 73.5 AC +/- 76.8 AC +/- 180 AC +/-

KEY OIL COMPANY: KAREN L. GIBRELL ET UX; CHARLES E. GIBRELL ET AL.; MARY CIBBS ET AL.; DONALD MCCULLOUGH ET UX; JAMES S. DAVIS ET UX; KAREN L. GIBRELL ET AL.; PINNEY HOLDINGS, INC. 62.6 AC +/- 69.87 AC +/- 201 AC +/- 35.03 AC +/- 9.25 AC +/- 7.87 AC +/- 5.53 AC +/- 7 AC +/-

PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE  
PLUG OFF OLD FORMATION PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL  
(SPECIFY)  AS DRILLED PLUG & ABANDON CLEAN OUT & REPLUG

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,391' TVD 16,755' MD

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

02/05/2016

LATITUDE 39°20'00"

11,266'

8,998' TO BOTTOM HOLE

LATITUDE 39°17'30"

LONGITUDE 80°57'30"

7,383'

LONGITUDE 80°57'30"

Antero Resources Corporation  
Well No. Musgrave Unit 1H  
47-085-10163 (AS DRILLED)

AS DRILLED DATA:  
WELL 1H TOP HOLE INFORMATION:  
N: 299,669ft E: 1,576,126ft  
LAT: 39°18'47.03" LON: 80°59'53.34"  
BOTTOM HOLE INFORMATION:  
N: 289,461ft E: 1,578,228ft  
LAT: 39°17'06.50" LON: 80°59'24.43"  
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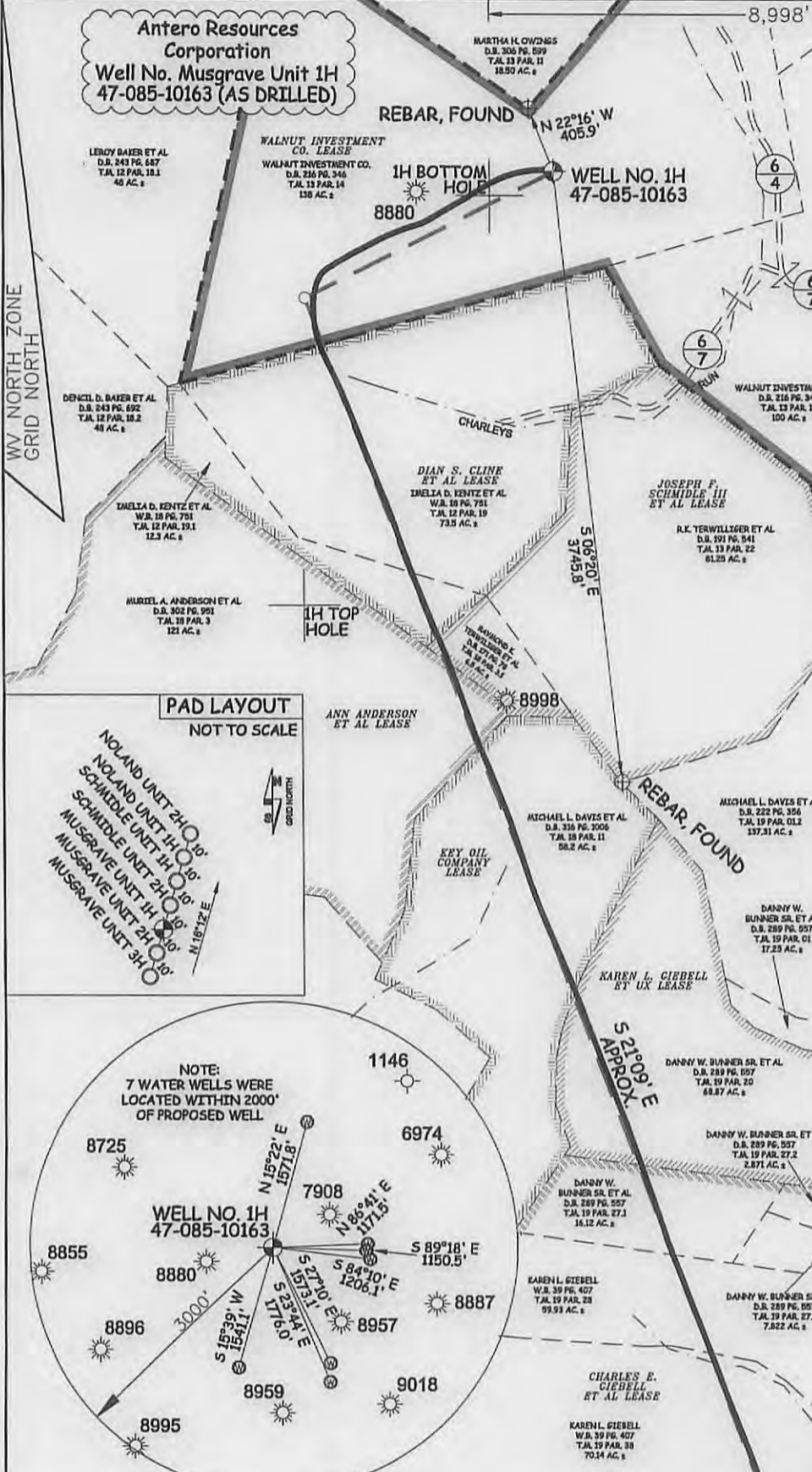
(NAD) 83 (UTM) ZONE 17 COORDS:  
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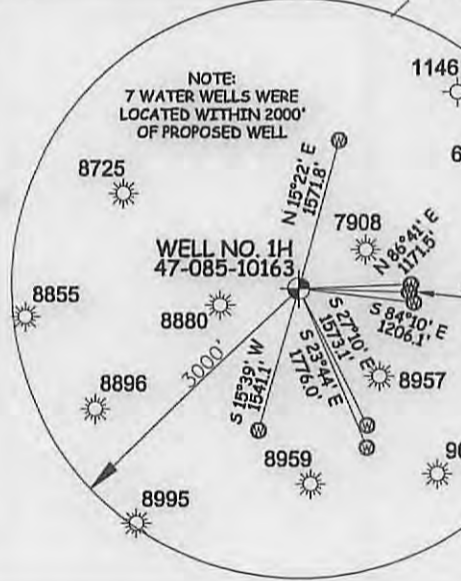
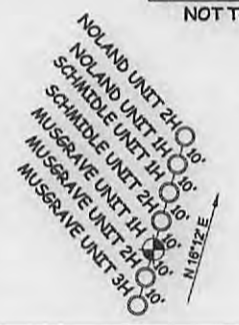
LEGEND  
--- Surface Owner Boundary Lines +/-  
--- Interior Surface Tracts +/-  
--- Existing Fence  
⊕ Found monument, as noted  
○ Proposed Well Path  
⊗ As Drilled Well Path

DATE 07/16/15  
OPERATOR'S WELL# MUSGRAVE UNIT #1H  
API WELL # 47 - 085 - 10163  
STATE COUNTY PERMIT

JOB # 13-007WA  
DRAWING # MUSGRAVE1HAD  
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



PAD LAYOUT NOT TO SCALE



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
WILLOW LAND SURVEYING PLLC  
266 HUSHERS RUN RD PENNSBORO WEST VIRGINIA 26415

WELL TYPE: OIL \_\_\_ GAS X LIQUID INJECTION \_\_\_ WASTE DISPOSAL \_\_\_  
(IF "GAS") PRODUCTION X STORAGE \_\_\_ DEEP \_\_\_ SHALLOW X  
LOCATION: ELEVATION 1,142' ORIGINAL - 1,121' AS DRILLED WATERSHED NORTH FORK HUGHES RIVER  
QUADRANGLE PENNSBORO 7.5' DISTRICT CLAY COUNTY RITCHIE  
SURFACE OWNER WALNUT INVESTMENTS CO. ACREAGE 138 ACRES +/-  
OIL & GAS ROYALTY OWNER WALNUT INVESTMENT CO.; DIAN S. CLINE ET AL.; JOSEPH F. SCHMIDLE III ET AL.; ANN ANDERSON ET AL.; LEASE ACREAGE 238 AC +/- 73.5 AC +/- 76.8 AC +/- 160 AC +/-  
KEY OIL COMPANY: KAREN L. GIEBEL ET UX; CHARLES E. GIEBEL ET AL.; MARY GIBBS ET AL.; DONALD MCCULLOUGH ET UX; JAMES S. DAVIS ET UX; KAREN L. GIEBEL ET AL.; PINEY HOLDINGS, INC. 62.6 AC +/- 68.8 AC +/- 201 AC +/- 25.03 AC +/- 9.25 AC +/- 7.437 AC +/- 5.531 AC +/- 7 AC +/-  
PROPOSED WORK: DRILL \_\_\_ CONVERT \_\_\_ DRILL DEEPER \_\_\_ REDRILL \_\_\_ FRACTURE OR STIMULATE \_\_\_  
PLUG OFF OLD FORMATION \_\_\_ PERFORATE NEW FORMATION \_\_\_ OTHER PHYSICAL CHANGE IN WELL \_\_\_  
(SPECIFY) (X) AS DRILLED PLUG & ABANDON CLEAN OUT & REPLUG  
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,391' TVD 16,755' MD  
WELL OPERATOR ANTERO RESOURCES CORPORATION DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM  
ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD  
FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

02/05/2016

COUNTY NAME

PERMIT



Antero Resources  
1615 Wynkoop Street  
Denver, CO 80202  
Office 303.357.7310  
Fax 303.357.7315

January 12, 2016

West Virginia Department of Environmental Protection  
Office of Oil and Gas  
Attn: John Kearney  
601 57<sup>th</sup> Street  
Charleston, WV 25304

Mr. Kearney:

Please find enclosed the data collected as part of Antero's Ritchie County Addendums. Please include this information as a supplement to the previously submitted Final Well Operator's Report of Well Work, Form WR-35 for the following wells:

- Musgrave Unit 1H (API# 47-085-10163) – Walnut West Pad
- Musgrave Unit 2H (API# 47-085-10191) – Walnut West Pad
- Noland Unit 1H (API# 47-085-10164) – Walnut West Pad
- Schmidle Unit 1H (API# 47-085-10042) – Walnut West Pad

If you have any questions please feel free to contact me at (303) 357-6820.

Sincerely,

A handwritten signature in blue ink that reads "Natalie Komp". The signature is fluid and cursive, with a long, sweeping tail on the letter "p".

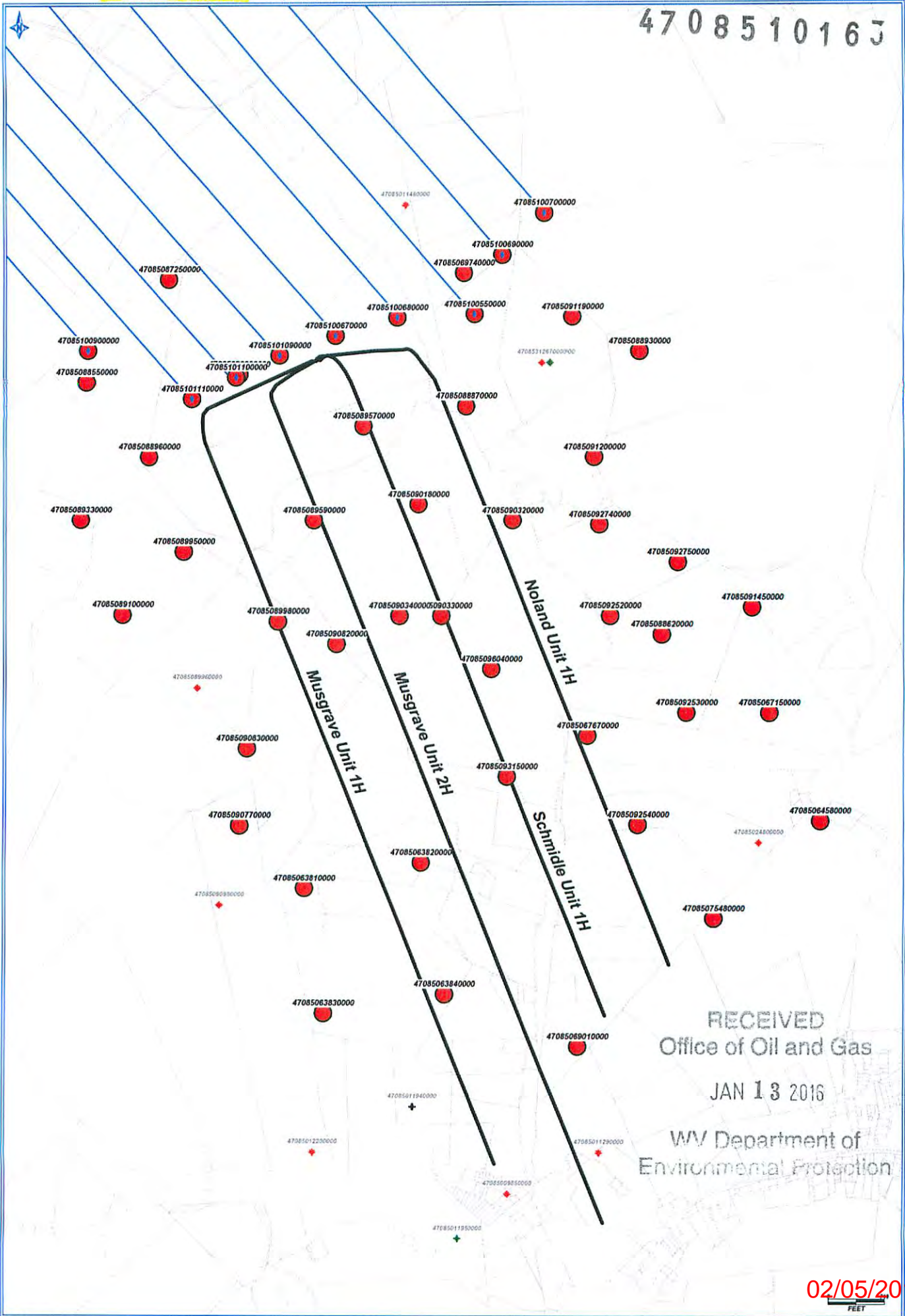
Natalie Komp  
Permitting Agent  
Antero Resources Corporation

RECEIVED  
Office of Oil and Gas  
JAN 13 2016  
WV Department of  
Environmental Protection

Enclosures

02/05/2016

4708510163



02/05/2016

FEET

MUSGRAVE UNIT 1H & 2H (WALNUT WEST PAD) - DATA COLLECTED ON OFFSET WELLS PER ADDENDUM

UWI (API Num)	Well Name	Well Number	Operator	Historical Operator	TD	ELEV_GR	TD (SSTVD)	Perfs (shallowest, deepest)
47085100550000	KIESSLING TERRY & H	PEN2CHS	NOBLE ENERGY INC	NOBLE ENERGY INC	16598	1084	-15314	MRCL Horizontal well
47085100670000	KIESSLING TERRY & H	PEN2AHS	NOBLE ENERGY INC	NOBLE ENERGY INC	16397	1081	-15316	MRCL Horizontal well
47085100690000	KIESSLING TERRY & H	PEN2DHS	NOBLE ENERGY INC	NOBLE ENERGY INC	16273	1084	-15189	MRCL Horizontal well
47085100680000	KIESSLING TERRY & H	PEN2BHS	NOBLE ENERGY INC	NOBLE ENERGY INC	16010	1084	-14926	MRCL Horizontal well
47085100700000	KIESSLING TERRY & H	PEN2EHS	NOBLE ENERGY INC	NOBLE ENERGY INC	15953	1084	-14869	MRCL Horizontal well
47085101090000	COKELEY LAWRENCE &	PEN 20 BHS	NOBLE ENERGY INC	NOBLE ENERGY INC	15247	1081	-14166	MRCL Horizontal well
47085101100000	COKELEY LAWRENCE &	PEN 20 CHS	NOBLE ENERGY INC	NOBLE ENERGY INC	14921	1081	-13840	MRCL Horizontal well
47085101110000	COKELEY LAWRENCE &	PEN 20 DHS	NOBLE ENERGY INC	NOBLE ENERGY INC	14852	1081	-13771	MRCL Horizontal well
47085100900000	COKELEY LAWRENCE &	PEN 20 MHS	NOBLE ENERGY INC	NOBLE ENERGY INC	13237	1081	-12156	MRCL Horizontal well
47085067670000	WEDEKMAN MARY V	WK-303	ROSS & WHARTON	KEPCO INCORPORATED	5979	1085	-4894	4936'-4938' (Benson), 5796'-5889' (Rhinstreet)
47085069740000	HUFFORD DWIGHT	JK-967	PETROLEUM DEV CORP	J & J ENTERPRISES	5995	1118	-4877	4935'-4937' (Benson), 5784'-5874' (Rhinstreet)
47085064580000	HAZELBAKER BRENDEN	1	MAY GAS CO	RARE EARTH ENERGY	5887	1144	-4843	4995'-5284' (Java/Angola), 5352'-5810' (Rhinstreet)
47085064590000	HAZELBAKER BRENDEN	2	RARE EARTH MINERALS	RARE EARTH ENERGY	5900	1086	-4814	no perfs recorded
47085075480000	HAZELBAKER BRENDEN	2	MAY GAS CO	RARE EARTH ENERGY	5430	1086	-4364	2062'-2440' (Big Injun/Weir), 5216'-5220' (Alexander)
47085069010000	HAYHURST ELLA D	1	MAY GAS CO	RARE EARTH ENERGY	5290	964	-4326	3381'-3440' (Berea/L Huron), 4496'-4846' (Java)
47085091190000	WILSON LORI	1	KEY OIL COMPANY	KEY OIL COMPANY	5438	1154	-4284	4988'-4991' (Benson)
47085067150000	GIEBELL C E & MARY	1	LIPPIZAN PETRO INCOR	STALNAKER GENE INC	5363	1105	-4258	3507'-3686' (Berea/L Huron), 4843'-5245' (Angola)
47085087250000	BAKER	1	KEY OIL COMPANY	KEY OIL COMPANY	5332	1077	-4255	4883'-4901' (Benson)
47085090770000	RAINES	1	ZICKEFOOSE W F & R L	BOWIE INC	5276	1028	-4248	1976'-2002' (Big Injun), 4856'-4860' (Benson)
47085063830000	GIEBELL C E & MARY	3	LIPPIZAN PETRO INCOR	STALNAKER GENE INC	5211	987	-4224	3412'-3813' (Berea/L Huron), 4503'-5158' (Angola)
47085063840000	GIEBELL C E & MARY	4	LIPPIZAN PETRO INCOR	STALNAKER GENE INC	5215	1001	-4214	3393'-4207' (Berea/L Huron), 4207'-5136' (Angola)
47085090830000	GIEBELL	5	KEY OIL COMPANY	KEY OIL COMPANY	5130	1030	-4100	4861'-4875' (Benson)
47085089950000	ANDERSON M A	3	GASSEARCH CORPORATN	GASSEARCH CORPORATN	5204	1121	-4083	1776'-1825' (Maxton), 4608'-4953' (Riley/Benson)
47085089100000	ANDERSON M A	1	GASSEARCH CORPORATN	GASSEARCH CORPORATN	5108	1059	-4049	1984'-2065' (Big Injun), 4561'-4888' (Riley/Benson)
47085089980000	ANDERSON M A	2	GASSEARCH CORPORATN	GASSEARCH CORPORATN	5170	1127	-4043	2461'-2960' (Weir/Gordon), 4639'-4970' (Riley/Benson)
47085096040000	GIEBELL	7	KEY OIL COMPANY	KEY OIL	5060	1031	-4029	4874'-4877' (Benson)
47085092530000	NOLAND	2	KEY OIL COMPANY	KEY OIL COMPANY	5097	1076	-4021	4946'-4949' (Benson)
47085091450000	MAPLE	1	KEY OIL COMPANY	KEY OIL COMPANY	5153	1134	-4019	4991'-4994' (Benson)
47085092740000	NOLAND	6	KEY OIL COMPANY	KEY OIL COMPANY	5129	1118	-4011	1973' (Big Injun), 4972'-4975' (Benson)
47085093150000	GIEBELL	6	KEY OIL COMPANY	KEY OIL COMPANY	5003	992	-4011	4848'-4851' (Benson)
47085092750000	NOLAND	7	KEY OIL COMPANY	KEY OIL COMPANY	5132	1130	-4002	4967'-4975' (Benson)
47085063810000	GIEBELL C E & MARY	1	LIPPIZAN PETRO INCOR	STALNAKER GENE INC	5109	1108	-4001	3516'-3668' (Berea/L Huron), 4566'-4948' (Benson)
47085088800000	SMITH	2	KEY OIL COMPANY	KEY OIL COMPANY	5057	1060	-3997	4543'-4558' (Riley), 4886'-4888' (Benson)
47085089590000	MUSGRAVE	1	KEY OIL COMPANY	KEY OIL COMPANY	5059	1063	-3994	4910'-4913' (Benson)
47085088870000	SMITH	3	KEY OIL COMPANY	KEY OIL COMPANY	4899	907	-3992	4398'-4408' (Riley), 4747'-4408' (Benson)
47085088930000	PENNSBORO	1	KEY OIL COMPANY	KEY OIL COMPANY	5150	1159	-3991	5018'-5021' (Benson)
47085090180000	SCHMIDLE	1	KEY OIL COMPANY	KEY OIL COMPANY	5031	1041	-3990	4529'-4547' (Riley), 4876'-4878' (Benson)
47085092520000	NOLAND	1	KEY OIL COMPANY	KEY OIL COMPANY	5010	1021	-3989	4869'-4877' (Benson)
47085090330000	GIEBELL	2	KEY OIL COMPANY	KEY OIL COMPANY	5096	1110	-3986	5000'-5003' (Benson)
47085090320000	GIEBELL	1	KEY OIL COMPANY	KEY OIL COMPANY	5065	1081	-3984	4576'-4594' (Riley), 4926'-4929' (Benson)
47085088620000	SMITH	1	KEY OIL COMPANY	KEY OIL COMPANY	5017	1034	-3983	4847'-4850' (Benson)
47085089570000	SMITH	5	KEY OIL COMPANY	KEY OIL COMPANY	4967	988	-3979	4806'-4821' (Benson)
47085090340000	GIEBELL	3	KEY OIL COMPANY	KEY OIL COMPANY	5000	1021	-3979	4879'-4882' (Benson)
47085091200000	WILSON LORI	2	KEY OIL COMPANY	KEY OIL COMPANY	5153	1180	-3973	5016'-5019' (Benson)
47085092540000	NOLAND	3	KEY OIL COMPANY	KEY OIL COMPANY	4904	933	-3971	3306'-3363' (Warren), 4776'-4779' (Benson)
47085090820000	GIEBELL	4	KEY OIL COMPANY	KEY OIL COMPANY	5106	1138	-3968	2032' (Big Lime), 4973'-4976' (Benson)
47085088960000	SMITH	4	KEY OIL COMPANY	KEY OIL COMPANY	5062	1101	-3961	4923'-4926' (Benson)
47085089330000	BAKER	4	KEY OIL COMPANY	KEY OIL COMPANY	5066	1106	-3960	4582'-4597' (Riley), 4920'-4953' (Benson)
47085088530000	BAKER	2	KEY OIL COMPANY	KEY OIL COMPANY	5177	1219	-3958	5034'-5037' (Benson)
47085063810000	GIEBELL C E & MARY	2	LIPPIZAN PETRO INCOR	STALNAKER GENE INC	4905	1000	-3905	3248'-3437' (Berea/L Huron), 4116'-4877' (Java)
47085095350000	GIEBELL	7	KEY OIL COMPANY	KEY OIL COMPANY	4230	1031	-3199	
47085089960000	ANDERSON M A	4	GASSEARCH CORPORATN	GASSEARCH CORPORATN	5230	1133	-2097	
47085090950000	RAINES	1	ZICKEFOOSE W F & R L	BOWIE INC	3050	1064	-1986	
47085024800000	CHARLES W HORNER	1	TERM ENERGY	LEMONT PHILIP	2240	1108	-1132	
47085012200000	MARY LORENS	1	DEEM F S	DEEM F S	2128	998	-1130	
47085011290000	H C SCHULTE	3	KOHL T H	KOHL T H	2205	1085	-1120	
47085011950000	W H & EARRIE STEWAR	1	MCCALL DRILLING	MCCALL DRILLING	2007	915	-1092	
47085012670000	W BARNARD	1	RANGER PETROLEUM INC	RANGER PETROLEUM INC	1963	874	-1089	
47085312670000	GEORGE C BARTZ	1	MOSES J R	MOSES J R	2125	1061	-1064	
47085011450000	S F MCDONNELL	1	BEASON GAS COMPANY	BEASON GAS COMPANY	1975	912	-1063	
47085011950000	NOBLE LAMBERT	1	UNKNOWN	UNKNOWN	1996	1002	-994	
47085005850000	HENRY C SCHULTE	2	YOUNG CHARLES E	YOUNG CHARLES E	2025	1078	-947	

4708510163