

PM

RECEIVED of \_\_\_\_\_  
Office of Oil and Gas

MAY 18 2015

WV Department of  
Environmental Protection

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

API 47-017-06267 County Doddridge District Grant  
Quad Smithburg 7.5' Pad Name Revival Pad Field/Pool Name \_\_\_\_\_  
Farm name Williams, Larry et al Well Number Koch 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 4,352,812m Easting 526,709m  
Landing Point of Curve Northing 4,352,879.76m Easting 526,426.44m  
Bottom Hole Northing 4,354,443m Easting 525,907m

Elevation (ft) 1,376' 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 06/26/2013 Date drilling commenced 09/26/2013 Date drilling ceased 03/12/2014  
Date completion activities began 04/19/2014 Date completion activities ceased 07/06/2014  
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 437' Open mine(s) (Y/N) depths No  
Salt water depth(s) ft 1,677' Void(s) encountered (Y/N) depths None  
Coal depth(s) ft None Identified Cavern(s) encountered (Y/N) depths None  
Is coal being mined in area (Y/N) No

Reviewed by:  
A.L. 5/26/15  
W.S. 06/05/2015

WR-35  
Rev. 8/23/13

MAY 18 2015

API 47-017 - 06267

Farm name Williams, Larry et al

Well number Koch Unit 2H

WV Department of  
Environmental Protection

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Depth(s)	Did cement circulate (Y/N) * Provide details below*
Conductor	24"	20"	59'	New	51#; J-55	N/A	Yes
Surface	17 1/2"	13 3/8"	493'	New	48#; H-40	N/A	Yes*
Coal							
Intermediate 1	12 1/4"	9 5/8"	2,651'	New	36#; J-55	N/A	Yes
Intermediate 2							
Intermediate 3							
Production	8 3/4" & 8 1/2"	5 1/2"	13,350'	New	20#; P-110	N/A	No
Tubing		2 3/8"	7,289'	New	4.7#; N-80	N/A	
Packer type and depth set		N/A					

Comment Details \*Surface cement fell out 40', grouted back to surface with 100 sacks.

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	225 sx	15.6	1.18	57	0'	8 Hrs.
Surface	Class A	679 sx*	15.6	1.18	342	0'	8 Hrs.
Coal							
Intermediate 1	Class A	1,027 sx	15.6	1.18	830	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	1,154 sx (Lead); 925 sx (Tail)	14.5 (Lead); 15.2 (Tail)	1.3 (Lead); 1.86 (Tail)	2,567	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 13,350' MD, 7,275' TVD (BHL & Deepest Point Drilled) Loggers TD (ft) 13,301'

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

Plug back procedure N/A

Kick off depth (ft) 8,608'

\*\*This is a subsequent well. Antaro only runs wireline logs on one well on a multi-well pad (Mt. Salem Revival Unit 1H, API #47-017-06289). Please reference the wireline logs submitted with Form WR-35 for the Mt. Salem Revival 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    sonic

Well cored  Yes  No   Conventional   Sidewall   Were cuttings collected  Yes  No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING \_\_\_\_\_

Conductor- 0  
 Surface- 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface  
 Intermediate- 1 above float joint, 1 above float collar, 1 every 4th joint to surface  
 Production- 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

WAS WELL COMPLETED AS SHOT HOLE  Yes  No   DETAILS \_\_\_\_\_

WAS WELL COMPLETED OPEN HOLE?  Yes  No   DETAILS \_\_\_\_\_

WERE TRACERS USED  Yes  No   TYPE OF TRACER(S) USED \_\_\_\_\_







**API 47-017-06267 Farm Name Williams, Larry et al Well Number Koch Unit 2H**

**EXHIBIT 1**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	19-Apr-14	13,131	13,266	60	Marcellus
2	14-May-14	12,929	13,100	60	Marcellus
3	14-May-14	12,727	12,898	60	Marcellus
4	14-May-14	12,525	12,696	60	Marcellus
5	15-May-14	12,323	12,493	60	Marcellus
6	15-May-14	12,121	12,291	60	Marcellus
7	15-May-14	11,919	12,089	60	Marcellus
8	15-May-14	11,717	11,887	60	Marcellus
9	15-May-14	11,515	11,685	60	Marcellus
10	16-May-14	11,313	11,483	60	Marcellus
11	16-May-14	11,111	11,281	60	Marcellus
12	17-May-14	10,909	11,079	60	Marcellus
13	17-May-14	10,706	10,877	60	Marcellus
14	18-May-14	10,504	10,675	60	Marcellus
15	18-May-14	10,302	10,473	60	Marcellus
16	18-May-14	10,100	10,271	60	Marcellus
17	18-May-14	9,898	10,069	60	Marcellus
18	19-May-14	9,696	9,866	60	Marcellus
19	19-May-14	9,494	9,664	60	Marcellus
20	19-May-14	9,292	9,462	60	Marcellus
21	19-May-14	9,090	9,260	60	Marcellus
22	20-May-14	8,888	9,058	60	Marcellus
23	20-May-14	8,686	8,856	60	Marcellus
24	20-May-14	8,484	8,654	60	Marcellus
25	20-May-14	8,281	8,452	60	Marcellus
26	20-May-14	8,079	8,250	60	Marcellus
27	21-May-14	7,877	8,048	60	Marcellus
28	21-May-14	7,675	7,846	60	Marcellus

RECEIVED  
Office of Oil and Gas

MAY 18 2015

WV Department of  
Environmental Protection

06/05/2015

## 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	12-May-14	75.0	7,787	NA	4,178	259,280	6,578	N/A
2	13-May-14	73.0	7,743	5,755	5,205	233,180	7,796	N/A
3	14-May-14	67.3	8,156	6,029	5,168	230,911	6,549	N/A
4	14-May-14	70.3	7,864	5,658	5,348	157,091	6,346	N/A
5	15-May-14	73.9	8,093	5,396	4,278	259,880	7,297	N/A
6	15-May-14	71.8	8,340	5,848	5,166	179,230	6,128	N/A
7	15-May-14	76.5	8,207	5,635	4,666	258,132	6,413	N/A
8	15-May-14	78.1	7,720	5,404	5,433	255,434	6,419	N/A
9	15-May-14	77.0	7,529	5,334	5,279	259,930	6,581	N/A
10	16-May-14	57.3	8,371	5,477	5,327	254,180	5,930	N/A
11	16-May-14	78.5	7,850	5,349	4,910	254,808	6,411	N/A
12	17-May-14	76.5	7,566	5,377	4,358	260,370	6,423	N/A
13	17-May-14	77.9	7,734	5,407	5,462	259,649	6,361	N/A
14	18-May-14	72.0	8,143	5,615	5,444	256,770	6,441	N/A
15	18-May-14	78.8	7,877	5,584	4,329	259,110	6,417	N/A
16	18-May-14	82.1	7,980	5,699	5,363	260,620	6,308	N/A
17	18-May-14	79.3	7,154	5,353	4,944	260,996	6,793	N/A
18	19-May-14	78.2	7,962	5,607	3,931	199,200	5,401	N/A
19	19-May-14	81.5	7,606	5,527	4,227	237,190	5,963	N/A
20	19-May-14	80.4	7,890	5,322	5,223	260,398	6,521	N/A
21	19-May-14	81.3	7,935	5,482	5,350	260,930	6,314	N/A
22	20-May-14	86.0	8,201	5,682	4,978	262,440	6,227	N/A
23	20-May-14	81.2	7,726	5,775	4,054	259,710	6,378	N/A
24	20-May-14	77.0	7,845	5,601	4,860	227,480	6,643	N/A
25	20-May-14	81.0	7,473	5,566	5,574	254,710	6,371	N/A
26	20-May-14	81.1	7,851	5,310	4,439	259,590	6,365	N/A
27	21-May-14	82.4	7,355	5,796	5,070	261,330	6,330	N/A
28	21-May-14	66.8	8,060	6,022	4,410	260,000	6,272	N/A
	AVG=	76.5	7,858	5,578	4,892	6,902,549	179,975	TOTAL

RECEIVED  
Office of Oil and Gas

MAY 18 2015

WV Department of  
Environmental Protection

**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	437'	N/A	437'	N/A
Shale	0	337	0	337
Siltstone/ Sandstone	Est. 337	597	Est. 337	597
Shale	Est. 597	707	Est. 597	707
Sandstone	Est. 707	837	Est. 707	837
Siltstone/ Shale	Est. 837	917	Est. 837	917
Shale	Est. 917	1,727	Est. 917	1,727
Sandstone	Est. 1727	1,787	Est. 1727	1,787
Shale	Est. 1787	1,907	Est. 1787	1,907
Sandstone/ Trace Coal	Est. 1907	1,987	Est. 1907	1,987
Sandstone	Est. 1987	2,127	Est. 1987	2,127
Sandstone/ Trace Coal	Est. 2127	2,147	Est. 2127	2,147
Shale/ Sandstone	Est. 2147	2,181	Est. 2147	2,181
Big Lime	2,181	2,283	2,181	2,283
Big Injun	2,283	2,747	2,283	2,747
Gantz Sand	2,747	2,902	2,747	2,902
Fifty Foot Sandstone	2,902	2,977	2,902	2,977
Gordon	2,977	3,297	2,977	3,297
Fifth Sandstone	3,297	3,301	3,297	3,301
Bayard	3,301	3,683	3,301	3,683
Warren	3,683	4,053	3,683	4,053
Speechley	4,053	4,303	4,053	4,303
Baltown	4,303	4,795	4,303	4,795
Bradford	4,795	5,325	4,795	5,325
Benson	5,325	5,597	5,325	5,597
Alexander	5,597	5,763	5,597	5,763
Elk	5,763	6,351	5,763	6,351
Rhinestreet	6,351	6,702	6,351	6,708
Sycamore	6,702	6,930	6,708	6,998
Middlesex	6,930	7,077	6,998	7,310
Burkett	7,077	7,105	7,310	7,382
Tully	7,105	7,184	7,382	7,636
Marcellus	7,184	NA	7,636	NA

\*Please note Antero determines shallow formation tops based on mud and/or wireline logs that are only run on one well on a multi-well pad (Please reference Wireline Logs submitted for the Mt. Salem Revival Unit 1H API# 47-017-06269). The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

RECEIVED  
Office of Oil and Gas

MAY 18 2015

WV Department of  
Environmental Protection

06/05/2015

# Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	5/13/2014
Job End Date:	5/21/2014
State:	West Virginia
County:	Doddridge
API Number:	47-017-06267-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Koch Unit 2H
Longitude:	-80.69013300
Latitude:	39.32431700
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	7,275
Total Base Water Volume (gal):	7,850,493
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
Fresh Water	Operator	Base Fluid	Fresh Water	7732-18-5	100.00000	90.16675	Density = 8.330
40/70 - COMMON BROWN	Halliburton	Proppant	Crystalline silica, quartz	14808-60-7	100.00000	5.67104	
20/40 - COMMON WHITE	Halliburton	Proppant	Crystalline silica, quartz	14808-60-7	100.00000	3.15351	
100 MESH - COMMON WHITE	Halliburton	Proppant	Crystalline silica, quartz	14808-60-7	100.00000	0.61305	
HCl > 10%	Halliburton	Solvent	Hydrochloric Acid	7647-01-0	30.00000	0.22188	
WG-36 GELLING AGENT	Halliburton	Gelling Agent	Guar gum	9000-30-0	100.00000	0.06523	
PemVIs VFR-10	Halliburton	Friction Reducer	Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.02137	
			Ammonium chloride	12125-02-9	10.00000	0.00712	
			Alcohols, C12-16, ethoxylated	88551-12-2	10.00000	0.00712	



RECEIVED  
Office of Oil and Gas

MAY 18 2015

WV Department of  
Environmental Protection

06/05/2015



SP BREAKER	Halliburton	Breaker	9-Octadecanamide, n,n-bis-2 (hydroxy-ethyl)-, (Z)	93-83-4	5.00000	0.00356		
P-65	Halliburton	Scale Inhibitor	Sodium persulfate	7775-27-1	100.00000	0.00319		
DpitKleen-WF(TM)	Halliburton	Concentrate	Ammonium chloride	12125-02-9	10.00000	0.00199		
BE-9	Halliburton	Biocide	Sodium perborate tetrahydrate	10486-00-7	100.00000	0.00166		
HALOS ACID INHIBITOR	Halliburton	Corrosion Inhibitor	Tributyl tetradecyl phosphonium chloride	81741-28-8	10.00000	0.00124		
			Methanol	67-56-1	60.00000	0.00006		
			Propargyl alcohol	107-19-7	10.00000	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.								
		Other Ingredient(s)	Polyacrylate	Confidential		0.04631		
		Other Ingredient(s)	Water	7732-18-5		0.02439		
		Other Ingredient(s)	Water	7732-18-5		0.02137		
		Other Ingredient(s)	Organic phosphonate	Confidential		0.01196		
		Other Ingredient(s)	Bentonite, benzyl(hydrogenated tallow alkyl) dimethylammonium stearate complex	121886-68-4		0.00326		
		Other Ingredient(s)	Silica gel	112926-00-8		0.00065		
		Other Ingredient(s)	Surfactant mixture	Confidential		0.00065		
		Other Ingredient(s)	Surfactant mixture	Confidential		0.00065		
		Other Ingredient(s)	Formaldehyde	50-00-0		0.00020		
		Other Ingredient(s)	Crystalline Silica, Quartz	14808-60-7		0.00007		
		Other Ingredient(s)	Reaction product of acetophenone, formaldehyde, thiourea and oleic acid in dimethyl formamide	68527-49-1		0.00003		

RECEIVED  
Office of Oil and Gas  
MAY 18 2015

			Fatty acids, tall oil	Confidential		0.00003	Denise Tuck, Halliburton 8000 N. Sam Houston Pkwy E., Houston, TX 77032 281-871-6226
		Other Ingredient(s)	Alcohols, C14-C15, ethoxylated	88951-67-7		0.00003	
		Other Ingredient(s)	Olefins	Confidential		0.00000	
		Other Ingredient(s)	Olefins	Confidential		0.00000	
		Other Ingredient(s)	Sodium sulfate	7757-82-6		0.00000	
		Other Ingredient(s)	Olefins	Confidential		0.00000	
		Other Ingredient(s)	Olefins	Confidential		0.00000	
		Other Ingredient(s)	Olefins	Confidential		0.00000	

\* 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)

RECEIVED  
 Office of Oil and Gas  
 MAY 18 2015  
 WV Department of  
 Environmental Protection



LATITUDE 39°20'00"

6,689'

LATITUDE 39°22'30"

LONGITUDE 80°40'00"

LONGITUDE 80°40'00"

LONGITUDE 80°40'00"

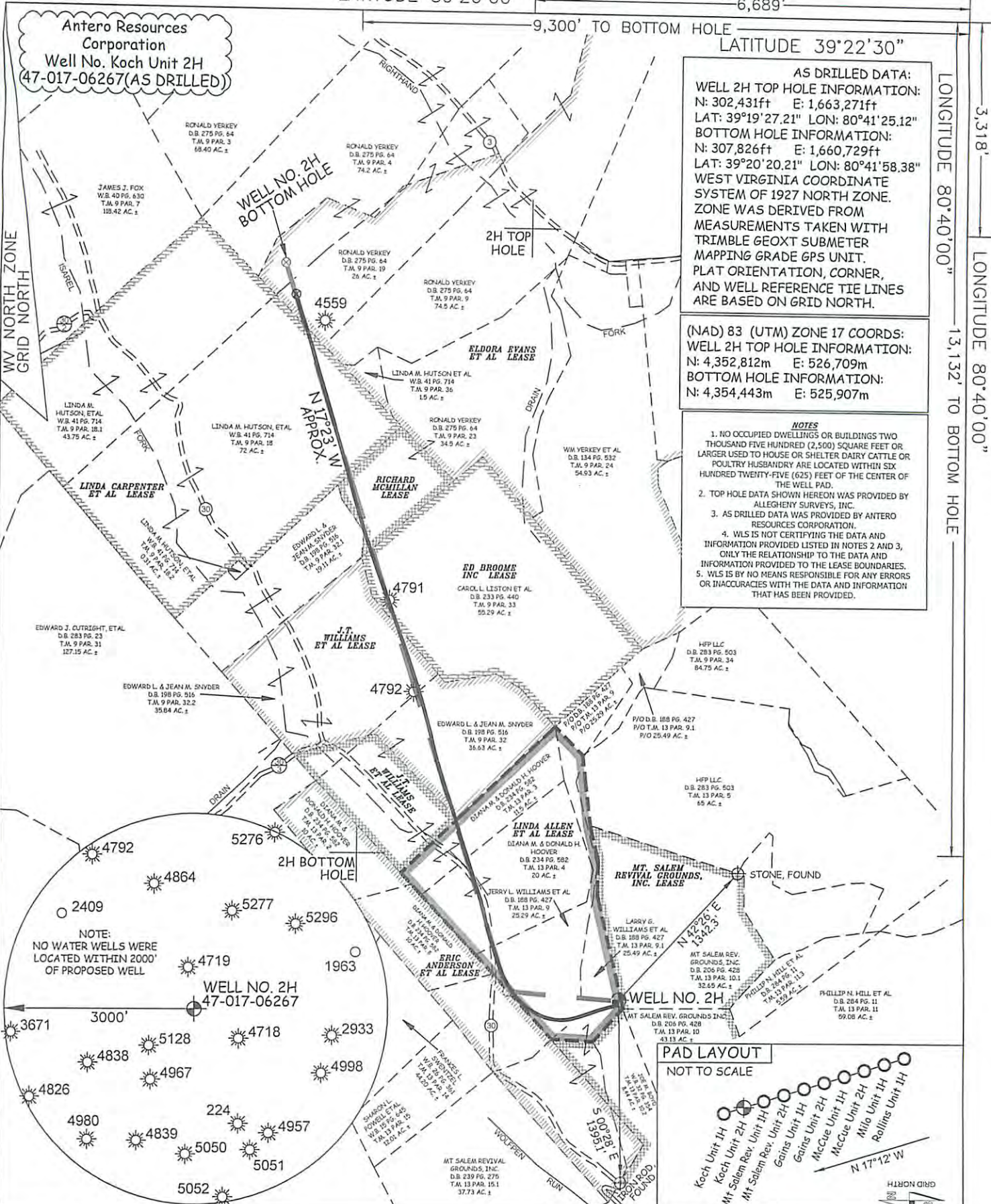
LONGITUDE 80°40'00"

LONGITUDE 80°40'00"

LONGITUDE 80°40'00"

LONGITUDE 80°40'00"

LONGITUDE 80°40'00"



AS DRILLED DATA:  
 WELL 2H TOP HOLE INFORMATION:  
 N: 302,431ft E: 1,663,271ft  
 LAT: 39°19'27.21" LON: 80°41'25.12"  
 BOTTOM HOLE INFORMATION:  
 N: 307,826ft E: 1,660,729ft  
 LAT: 39°20'20.21" LON: 80°41'58.38"  
 WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS:  
 WELL 2H TOP HOLE INFORMATION:  
 N: 4,352,812m E: 526,709m  
 BOTTOM HOLE INFORMATION:  
 N: 4,354,443m E: 525,907m

- 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 PROVIDED LISTED IN NOTES 2 AND 3, ONLY THE RELATIONSHIP TO THE DATA AND INFORMATION PROVIDED TO THE LEASE BOUNDARIES.
  5. WLS IS BY NO MEANS RESPONSIBLE FOR ANY ERRORS OR INACCURACIES WITH THE DATA AND INFORMATION THAT HAS BEEN PROVIDED.

JOB # 12-132WA  
 DRAWING # KOCH2HAD  
 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 +/-
  - Existing Fence
  - Found monument, as noted
  - Proposed Well Path
  - As Drilled Well Path

DATE 04/20/15  
 OPERATOR'S WELL# KOCH UNIT #2H

API WELL # 47 - 017 - 06267  
 STATE COUNTY PERMIT  
 MIDDLE ISLAND CREEK

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 1,402' ORIGINAL - 1,376' AS-DRILLED WATERSHED HEADWATERS  
 QUADRANGLE SMITHBURG 7.5' DISTRICT GRANT COUNTY DODDRIDGE  
 SURFACE OWNER LARRY WILLIAMS ET AL ACREAGE 25.49 ACRES +/-  
 OIL & GAS ROYALTY OWNER LINDA ALLEN ET AL; ERIC ANDERSON ET AL; J.T. WILLIAMS ET AL; J.T. WILLIAMS ET AL; ED BROOME INC.; RICHARD MCMILLAN; LINDA CARPENTER ET AL; ELDORA EVANS ET AL  
 LEASE ACREAGE 35.11 ACRES +/-; 40 ACRES +/-; 214 ACRES +/-; 59 ACRES +/-; 55.29 ACRES +/-; 10.87 ACRES +/-; 214 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 7,274' TVD 13,350' 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

RECEIVED  
 WV Department of Environmental Protection  
 PERMIT