



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Jim Justice , Governor
Austin Caperton , Cabinet Secretary
www.dep.wv.gov

Wednesday, May 03, 2017
WELL WORK PERMIT
Horizontal 6A / New Drill

ANTERO RESOURCES CORPORATION (A)
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit approval for MASTER UNIT 2H
47-085-10322-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926- 0450.



James A. Martin
Chief

Operator's Well Number: MASTER UNIT 2H
Farm Name: DANIEL HAYMOND III ET AL
U.S. WELL NUMBER: 47-085-10322-00-00
Horizontal 6A / New Drill
Date Issued: 5/3/2017

Promoting a healthy environment.

05/05/2017

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than one hundred (100) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. 24 hours prior to the initiation of the completion process the operator shall notify the Chief or his designee.
8. During the completion process the operator shall monitor annular pressures and report any anomaly noticed to the chief or his designee immediately.
9. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
10. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

PERMIT CONDITIONS

11. The operator shall provide to the Office of Oil and Gas the dates of each of the following within 30 days of their occurrence: completion of construction of the well pad, commencement of drilling, cessation of drilling, completion of any other permitted well work, and completion of the well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov.

WW-6B
(04/15)

4708510022 2/6
API NO. 47-085 - 10322 - -
OPERATOR WELL NO. Master Unit 2H
Well Pad Name: Lettie Pad

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Antero Resources Corporation 494507062 085 - Ritchie Clay Pennsboro 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Master Unit 2H Well Pad Name: Lettie Pad

3) Farm Name/Surface Owner: Daniel M. Haymond, III, et al Public Road Access: Stull Hill Rd.

4) Elevation, current ground: ~974 Elevation, proposed post-construction: 970'

5) Well Type (a) Gas Oil Underground Storage

Other _____

(b) If Gas Shallow Deep

Horizontal

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus Shale: 6700' TVD, Anticipated Thickness- 75 feet, Associated Pressure- 2800#

8) Proposed Total Vertical Depth: 6700' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 17500' MD

11) Proposed Horizontal Leg Length: 10750'

12) Approximate Fresh Water Strata Depths: 85', 156', 408'

13) Method to Determine Fresh Water Depths: Offset well records. Depths have been adjusted according to surface elevations.

14) Approximate Saltwater Depths: 1158', 1760', 1840'

15) Approximate Coal Seam Depths: 320', 348', 390', 500'

16) Approximate Depth to Possible Void (coal mine, karst, other): None Anticipated

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes _____ No

(a) If Yes, provide Mine Info: Name: _____

Depth: _____

Seam: _____

Owner: _____

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WW-6B
(04/15)

API NO. 47-085 -
OPERATOR WELL NO. Master Unit 2H
Well Pad Name: Lettie Pad

18) CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	20"	New	H-40	94#	80'	80'	CTS, 77 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	460' *see #19	460' *see #19	CTS, 639 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2500'	2500'	CTS, 1018 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	23#	17500'	17500'	4405 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	24"	0.438"	1530	50	Class A	~1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730	1000	Class A	~1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	1500	Class A	~1.18
Intermediate							
Production	5-1/2"	8-3/4" & 8-1/2"	0.451"	14,530	2500	Lead-H/POZ & Tail - H	H/POZ~1.44 & H~1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

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APR 26 2017
WV Department of Environmental Protection

ACS
4/26/17

WW-6B
(10/14)

API NO. 47- 085 - _____
OPERATOR WELL NO. Master Unit 2H
Well Pad Name: Little Pad

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.
*Antero will be air drilling the fresh water string which makes it difficult to determine when fresh water is encountered. Therefore, we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The fluid will be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."

Anticipated Max Pressure - 9300 lbs
Anticipated Max Rate - 80 bpm

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 14.68 Acres

22) Area to be disturbed for well pad only, less access road (acres): 6.68 Acres

23) Describe centralizer placement for each casing string:

Conductor: no centralizers
Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole to surface.
Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.
Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.

24) Describe all cement additives associated with each cement type:

Conductor: no additives, Class A cement.
Surface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake
Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat
Production: Lead cement- 50/50 Class I²/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51
Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20

25) Proposed borehole conditioning procedures:

Conductor: blowhole clean with air, run casing, 10 bbls fresh water.
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.
Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.
Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 20 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

*Note: Attach additional sheets as needed.

MDC
3/24/2017

MAR 24 2017 Page 3 of 3

WV Department of
Environmental Protection

05/05/2017



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No wells exist within a 500' radius of the wellbore that are reasonably expected to penetrate a depth that could be within the range of fracture propagation; therefore no additional details (perforated formation, producing zones, etc.) are required as outlined in 35CSR8-5.11.



Master Unit 2H - AOR



REMARKS
No wells of interest within area of review.

January 30, 2017

Received
Office of Oil & Gas
FEB 06 2017

05/05/2017

4708510322

WW-9
(4/16)

API Number 47 - 085 - _____
Operator's Well No. Master Unit 2H

**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS**

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Antero Resources Corporation OP Code 494507062

Watershed (HUC 10) North Fork Hughes River Quadrangle Pennsboro 7.5'

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes No

Will a pit be used? Yes No

If so, please describe anticipated pit waste: No pit will be used at this site (Drilling and Flowback Fluids will be stored in tanks. Cuttings will be tanked and hauled off site.)

Will a synthetic liner be used in the pit? Yes No If so, what ml? N/A

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection (UIC Permit Number *UIC Permit # will be provided on Form WR-34)
- Reuse (at API Number Future permitted well locations when applicable. API# will be provided on Form WR-34)
- Off Site Disposal (Supply form WW-9 for disposal location) (Meadowfill Landfill Permit #SWF-1032-98)
- Other (Explain Northwestern Landfill Permit #SWF-1025/WV0109410)

Will closed loop system be used? If so, describe: Yes

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Surface - Air/Fresh water, Intermediate - Dual/3-W foam Production - Water Based Mud

-If oil based, what type? Synthetic, petroleum, etc. N/A

Additives to be used in drilling medium? Please See Attachment

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Stored in tanks, removed offsite and taken to landfill.

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Meadowfill Landfill (Permit #SWF-1032-98), Northwestern Landfill (Permit # SWF-1025/WV0109410)

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature [Signature]
Company Official (Typed Name) Cole Kilstrom
Company Official Title Environmental & Regulatory Manager

Subscribed and sworn before me this 3rd day of February, 20 17

[Signature] Notary Public

My commission expires July 21, 2018



WV Department of Environmental Protection

05/05/2017

MAG
3/21/2017

Antero Resources Corporation

Proposed Revegetation Treatment: Acres Disturbed 14.68 Acres Prevegetation pH _____

Lime 2-4 Tons/acre or to correct to pH 6.5

Fertilizer type Hay or straw or Wood Fiber (will be used where needed)

Fertilizer amount 500 lbs/acre

Mulch 2-3 Tons/acre

Access Road "A" (1.94 acres) + Access Road "B" (0.85 acres) + Staging Area (1.14 acres) + Well Pad (6.85 acres) + Water Containment Pad (1.47 acres) + Excess Topsoil Material Stockpiles (3.22 acres) = 14.68 Acres

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Annual Ryegrass	40	Crownvetch	10-15
Field Bromegrass	40	Tall Fescue	30
See attached table for additional seed type (Lettie Design Page 22)		See attached table for additional seed type (Lettie Design Page 22)	
*or type of grass seed requested by surface owner		*or type of grass seed requested by surface owner	

Attach:

Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, include dimensions (L x W x D) of the pit, and dimensions (L x W), and area in acreage, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Michael Goff

Comments: Preseed & mulch any disturbed areas per WVAEP regulations. Maintain & upgrade E-N-S as necessary

Title: Oil & Gas Inspector

Date: 3/21/2017

Field Reviewed? Yes No

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WV Department of Environmental Protection 05/05/2017

Form WW-9 Additives Attachment**SURFACE INTERVAL**

1. Fresh Water
2. Soap –Foamer AC
3. Air

INTERMEDIATE INTERVAL***STIFF FOAM RECIPE:***

- 1) 1 ppb Soda Ash / Sodium Carbonate-Alkalinity Control Agent
- 2) 1 ppb Conqor 404 (11.76 ppg) / Corrosion Inhibitor
- 3) 4 ppb KLA-Gard (9.17 ppg) / Amine Acid Complex-Shale Stabilizer
- 4) 1ppb Mil Pac R / Sodium Carboxymethylcellulose-Filtration Control Agent
- 5) 12 ppb KCL / Potassium Chloride-inorganic Salt
- 6) Fresh Water 80 bbls
- 7) Air

PRODUCTION INTERVAL

1. Alpha 1655
Salt Inhibitor
2. Mil-Carb
Calcium Carbonate
3. Cottonseed Hulls
Cellulose-Cottonseed Pellets – LCM
4. Mil-Seal
Vegetable, Cotton & Cellulose-Based Fiber Blend – LCM
5. Clay-Trol
Amine Acid Complex – Shale Stabilizer
6. Xan-Plex
Viscosifier For Water Based Muds
7. Mil-Pac (All Grades)
Sodium Carboxymethylcellulose – Filtration Control Agent
8. New Drill
Anionic Polyacrylamide Copolymer Emulsion – Shale Stabilizer
9. Caustic Soda
Sodium Hydroxide – Alkalinity Control
10. Mil-Lime
Calcium Hydroxide – Lime
11. LD-9
Polyether Polyol – Drilling Fluid Defoamer
12. Mil Mica
Hydro-Biotite Mica – LCM

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13. Escaid 110
Drilling Fluid Solvent – Aliphatic Hydrocarbon
14. Ligco
Highly Oxidized Leonardite – Filtration Control Agent
15. Super Sweep
Polypropylene – Hole Cleaning Agent
16. Sulfatrol K
Drilling Fluid Additive – Sulfonated Asphalt Residuum
17. Sodium Chloride, Anhydrous
Inorganic Salt
18. D-D
Drilling Detergent – Surfactant
19. Terra-Rate
Organic Surfactant Blend
20. W.O. Defoam
Alcohol-Based Defoamer
21. Perma-Lose HT
Fluid Loss Reducer For Water-Based Muds
22. Xan-Plex D
Polysaccharide Polymer – Drilling Fluid Viscosifier
23. Walnut Shells
Ground Cellulosic Material – Ground Walnut Shells – LCM
24. Mil-Graphite
Natural Graphite – LCM
25. Mil Bar
Barite – Weighting Agent
26. X-Cide 102
Biocide
27. Soda Ash
Sodium Carbonate – Alkalinity Control Agent
28. Clay Trol
Amine Acid complex – Shale Stabilizer
29. Sulfatrol
Sulfonated Asphalt – Shale Control Additive
30. Xanvis
Viscosifier For Water-Based Muds
31. Milstarch
Starch – Fluid Loss Reducer For Water Based Muds
32. Mil-Lube
Drilling Fluid Lubricant

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05/05/2017



911 Address
262 Stull Hill Rd.
Pennsboro, WV 26415

Well Site Safety Plan

Antero Resources

Well Name: Leeroy Unit 1H-3H, Master Unit 1H-3H,
 Christopher Unit 1H-3H, Hayes Unit 1H & 2H

Pad Location: Lettie PAD
 Ritchie County/Clay District

Michael Goff
 3/21/2017

GPS Coordinates:

Entrance - Lat 39°21'55.10"/Long -80°54'44.30" (NAD83)

Pad Center - Lat 39°21'53.77"/Long -80°54'37.26" (NAD83)

Driving Directions:

From the intersection of I79 and HWY 50: Travel west on US-50 for 28.7 miles. Turn right onto WV-18 N for 0.6 miles. Turn left onto Davis St/Old U.S. 50W for 0.4 miles. Turn right onto Wv-18N/Sistersville Pike for 12.2 miles. Turn left onto WV-74 S for 3.7 miles. Turn right onto Stull Hill Rd for 0.3 miles. The access road will be on the Right.

Alternate Route:

From the town of Pennsboro WV: Head north on WV-74 for 7.3 miles. Turn left onto Stull Hill Rd and continue for 0.3 miles. The access road will be on the Right.

EMERGENCY (24 HOUR) CONTACT 1-800-878-1373

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WV Department of
 Environmental Protection

05/05/2017

Antero Resources Corporation

Appalachian Basin

Master Unit 2H

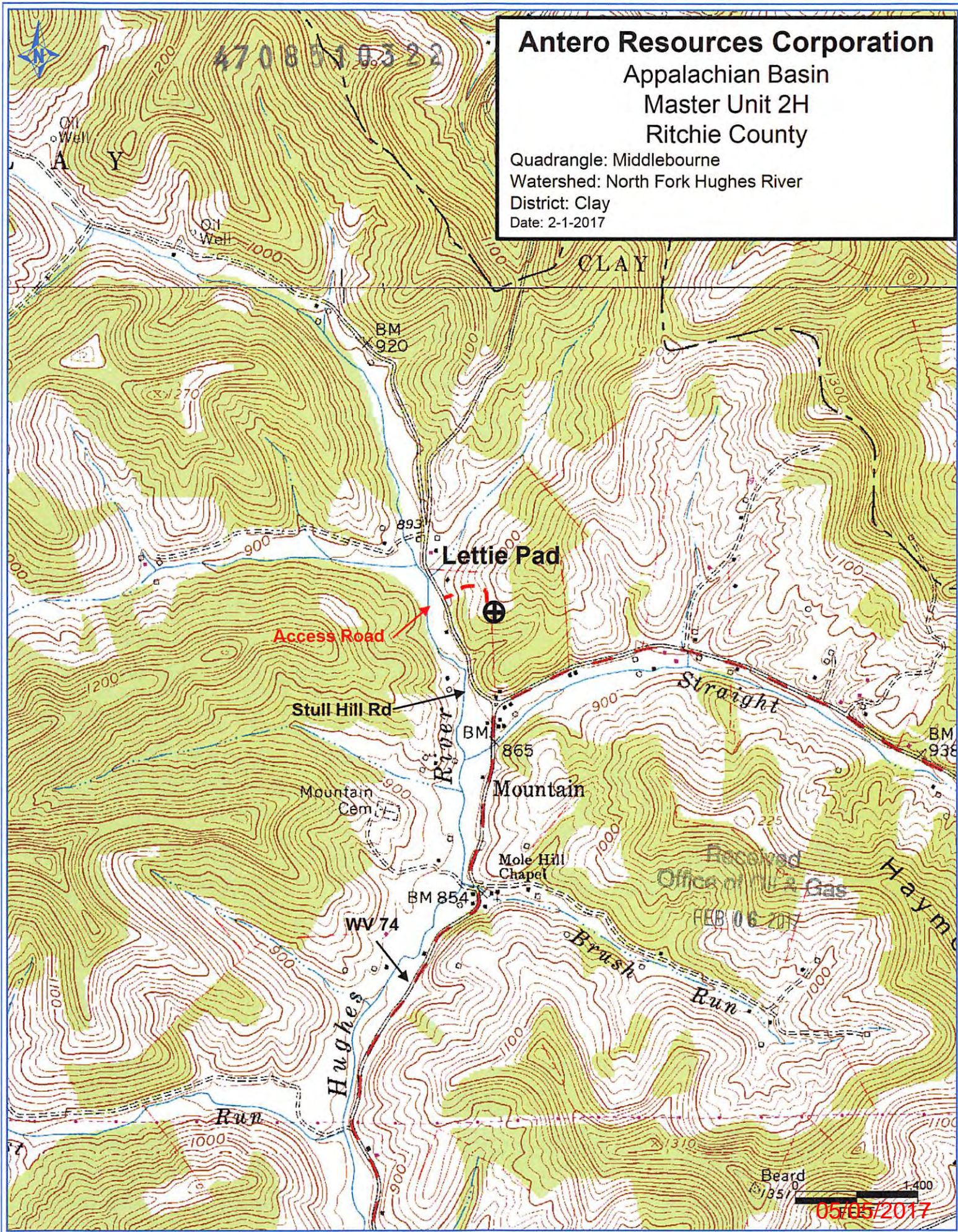
Ritchie County

Quadrangle: Middlebourne

Watershed: North Fork Hughes River

District: Clay

Date: 2-1-2017



LATITUDE 39°22'30"

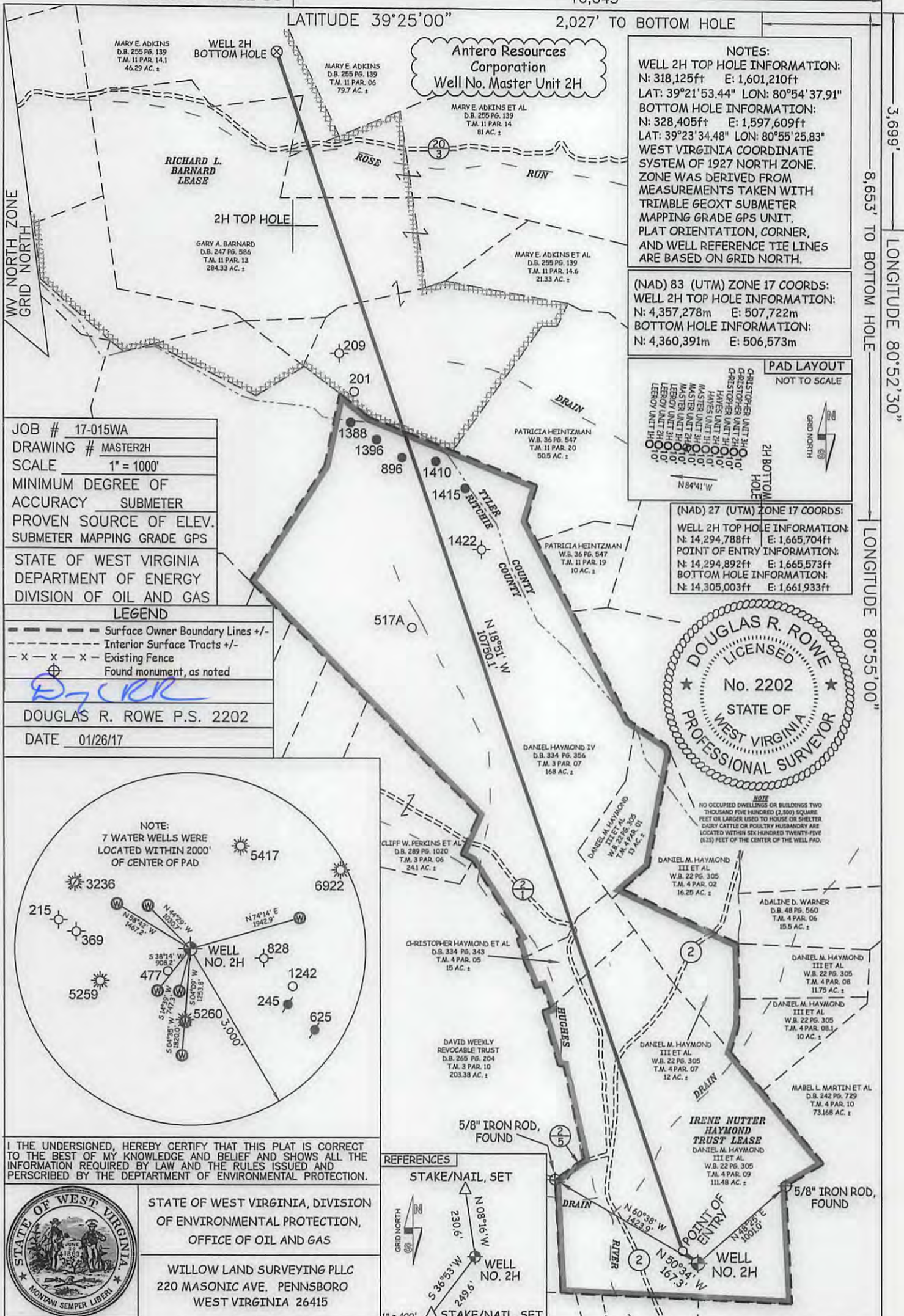
10,045'

LATITUDE 39°25'00"

2,027' TO BOTTOM HOLE

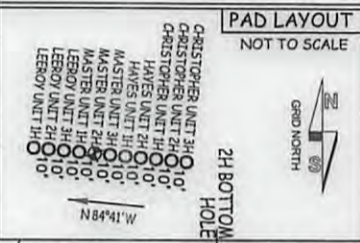
3,699' LONGITUDE 80°52'30"

8,653' TO BOTTOM HOLE LONGITUDE 80°55'00"

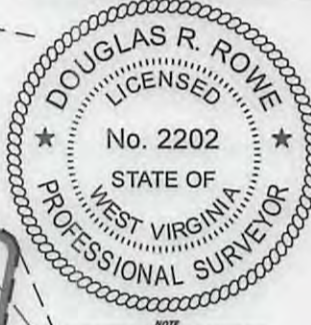


NOTES:
WELL 2H TOP HOLE INFORMATION:
 N: 318,125ft E: 1,601,210ft
 LAT: 39°21'53.44" LON: 80°54'37.91"
BOTTOM HOLE INFORMATION:
 N: 328,405ft E: 1,597,609ft
 LAT: 39°23'34.48" LON: 80°55'25.83"
 WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS:
WELL 2H TOP HOLE INFORMATION:
 N: 4,357,278m E: 507,722m
BOTTOM HOLE INFORMATION:
 N: 4,360,391m E: 506,573m



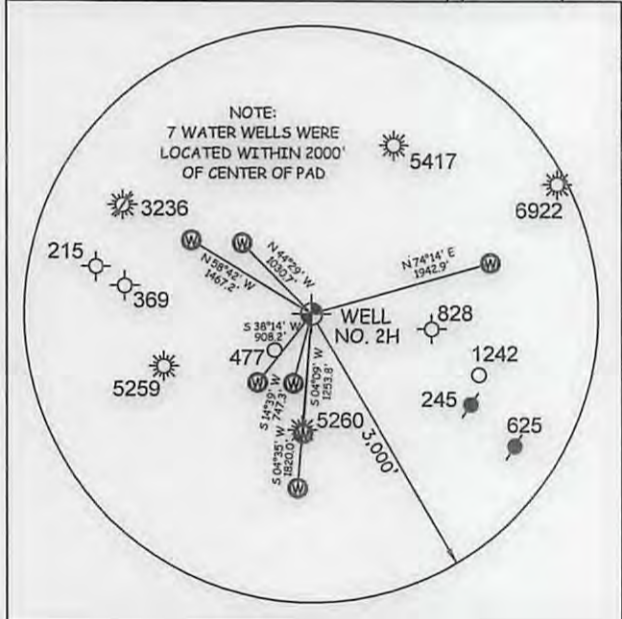
(NAD) 27 (UTM) ZONE 17 COORDS:
WELL 2H TOP HOLE INFORMATION:
 N: 14,294,788ft E: 1,665,704ft
POINT OF ENTRY INFORMATION:
 N: 14,294,892ft E: 1,665,573ft
BOTTOM HOLE INFORMATION:
 N: 14,305,003ft E: 1,661,933ft



JOB # 17-015WA
DRAWING # MASTER2H
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

LEGEND
 - - - Surface Owner Boundary Lines +/-
 - - - Interior Surface Tracts +/-
 - x - x - Existing Fence
 ⊕ Found monument, as noted

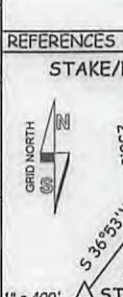
D. Rowe
DOUGLAS R. ROWE P.S. 2202
DATE 01/26/17



I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE RULES ISSUED AND PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
 WILLOW LAND SURVEYING PLLC
 220 MASONIC AVE. PENNSBORO WEST VIRGINIA 26415



WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
LOCATION: ELEVATION 974' - ORIGINAL 970' - PROPOSED _____ WATERSHED NORTH FORK HUGHES RIVER STATE COUNTY PERMIT _____
 QUADRANGLE PENNSBORO 7.5' (TH) - MIDDLEBOURNE 7.5' (BH) DISTRICT CLAY COUNTY RITCHIE
SURFACE OWNER DANIEL M. HAYMOND III ET AL ACREAGE 111.48 ACRES +/-
OIL & GAS ROYALTY OWNER IRENE NUTTER HAYMOND TRUST; RICHARD L. BARNARD LEASE ACREAGE 375 AC±; 284 AC±

PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL _____
 (SPECIFY) _____ PLUG & ABANDON _____ CLEAN OUT & REPLUG _____
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,700' TVD 17,500' MD
WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER - CT CORPORATION SYSTEM
ADDRESS 1615 WYNKOOP ST. ADDRESS 5400 D BIG TYLER ROAD
 DENVER, CO 80202 CHARLESTON, WV 25313

FORM WW-6

05/05/2017

WW-6A1
(5/13)

Operator's Well No. Master Unit 2H

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Richard L. Barnard Lease</u>	Richard L. Barnard	Antero Resources Corporation	1/8+	0442/0079

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

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The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Antero Resources Corporation
By: Kevin Kilstrom
Its: Senior VP of Production

WW-6A1

Operator's Well Number Master Unit 2H

INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<u>Irene Nutter Haymond Trust Lease</u>			
Irene Nutter Haymond	DC Petroleum, Inc.	1/8+	0257/0085
DC Petroleum, Inc.	Antero Resources Appalachian Corporation	Assignment	0257/0763
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

****CONTINUED ON NEXT PAGE****

05/05/2017

**FORM WW-6A1
EXHIBIT 1**

FILED

JUN 10 2013

Natalie E. Tennant
Secretary of State
1900 Kanawha Blvd E
Bldg 1, Suite 157-K
Charleston, WV 25305



Penney Barker, Manager
Corporations Division
Tel: (304)558-8000
Fax: (304)558-8381
Website: www.wvsos.com
E-mail: business@wvsos.com

**APPLICATION FOR
AMENDED CERTIFICATE
OF AUTHORITY**

Office Hours: Monday - Friday
8:30 a.m. - 5:00 p.m. ET

FILE ONE ORIGINAL
(Two if you want a filed
stamped copy returned to you)
FEE: \$25.00

**** In accordance with the provisions of the West Virginia Code, the undersigned corporation hereby ****
applies for an Amended Certificate of Authority and submits the following statement:

- 1. Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation
- 2. Date Certificate of Authority was issued in West Virginia: 6/26/2008
- 3. Corporate name has been changed to: Antero Resources Corporation
(Attach one **Certified Copy of Name Change** as filed in home State of incorporation.)
- 4. Name the corporation elects to use in WV: Antero Resources Corporation
(due to home state name not being available)
- 5. Other amendments: _____
(attach additional pages if necessary)

6. Name and phone number of contact person. (This is optional, however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)

Alvyn A. Schopp (303) 367-7310
Contact Name Phone Number

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7. Signature information (See below ***Important Legal Notice Regarding Signature***):

Print Name of Signer: Alvyn A. Schopp Title/Capacity: Authorized Person
Signature: *Alvyn A. Schopp* Date: June 10, 2013

***Important Legal Notice Regarding Signature:** For West Virginia Code §31D-1-129. Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.

4708510344



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

February 3, 2017


West Virginia Department of Environmental Protection
Chief, Office of Oil and Gas
Attn: Mr. James Martin
601 57th Street SE
Charleston, WV 25304

RE: Master Unit 2H
Quadrangle: Pennsboro 7.5'
Ritchie County/Clay District, West Virginia

Mr. Martin:

Antero Resources Corporation (Antero) is submitting the following application for a new well work permit for the Master Unit 2H horizontal shallow well. As an authorized representative, I certify that Antero has the right to extract, produce or market the oil or gas for all leases through which the Master Unit 2H horizontal lateral will drill through including any and all roads crossed under as identified on the attached survey plat.

Sincerely,


Thomas Kuhn
Senior Landman

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FEB 06 2017

05/05/2017

**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE CERTIFICATION**

Date of Notice Certification: 02/02/2017

API No. 47- 085 - _____
Operator's Well No. Master Unit 2H
Well Pad Name: Lettie Pad

Notice has been given:

Pursuant to the provisions in West Virginia Code § 22-6A, the Operator has provided the required parties with the Notice Forms listed below for the tract of land as follows:

State: <u>West Virginia</u>	UTM NAD 83	Easting: <u>507722m</u>
County: <u>Ritchie</u>		Northing: <u>4357278m</u>
District: <u>Clay</u>	Public Road Access: <u>Stull Hill Rd.</u>	
Quadrangle: <u>Pennsboro 7.5'</u>	Generally used farm name: <u>Daniel M. Haymond, III, et al</u>	
Watershed: <u>North Fork Hughes River</u>		

Pursuant to West Virginia Code § 22-6A-7(b), every permit application filed under this section shall be on a form as may be prescribed by the secretary, shall be verified and shall contain the following information: (14) A certification from the operator that (i) it has provided the owners of the surface described in subdivisions (1), (2) and (4), subsection (b), section ten of this article, the information required by subsections (b) and (c), section sixteen of this article; (ii) that the requirement was deemed satisfied as a result of giving the surface owner notice of entry to survey pursuant to subsection (a), section ten of this article six-a; or (iii) the notice requirements of subsection (b), section sixteen of this article were waived in writing by the surface owner; and Pursuant to West Virginia Code § 22-6A-11(b), the applicant shall tender proof of and certify to the secretary that the notice requirements of section ten of this article have been completed by the applicant.

<p>Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:</p> <p>*PLEASE CHECK ALL THAT APPLY</p> <p><input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED</p> <p><input type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input checked="" type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED</p> <p><input checked="" type="checkbox"/> 3. NOTICE OF INTENT TO DRILL or <input type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or</p> <p style="padding-left: 100px;"><input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)</p> <p><input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION</p> <p><input checked="" type="checkbox"/> 5. PUBLIC NOTICE</p> <p><input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION</p>	<p align="center">OOG OFFICE USE ONLY</p> <p><input checked="" type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input checked="" type="checkbox"/> RECEIVED</p> <p><input checked="" type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input checked="" type="checkbox"/> RECEIVED</p> <p><input checked="" type="checkbox"/> RECEIVED</p> <p><input checked="" type="checkbox"/> RECEIVED</p>
--	--

Required Attachments:

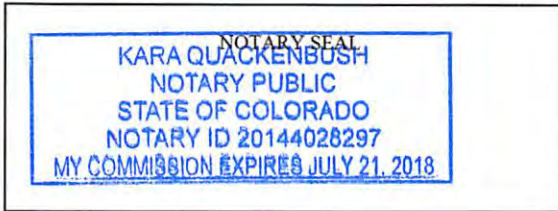
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication date verification or the associated Affidavit of Publication. The attached Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of personal service, the return receipt card or other postal receipt for certified mailing.

Certification of Notice is hereby given:

THEREFORE, I Kevin Kilstrom, have read and understand the notice requirements within West Virginia Code § 22-6A. I certify that as required under West Virginia Code § 22-6A, I have served the attached copies of the Notice Forms, identified above, to the required parties through personal service, by registered mail or by any method of delivery that requires a receipt or signature confirmation. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Notice Certification and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator: Antero Resources Corporation
By: Kevin Kilstrom
Its: Senior VP of Production
Telephone: 303-357-7310

Address: 1615 Wynkoop Street
Denver, CO 80202
Facsimile: 303-357-7315
Email: kquackenbush@anteroresources.com



Subscribed and sworn before me this 2 day of February 2017
Kara Quackenbush Notary Public
My Commission Expires July 21, 2018

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at deprivacyofficer@wv.gov.

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05/05/2017

**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF APPLICATION**

Notice Time Requirement: notice shall be provided no later than the **filing date of permit application.**

Date of Notice: 2/3/2017 **Date Permit Application Filed:** 2/3/2017

Notice of:

- PERMIT FOR ANY WELL WORK CERTIFICATE OF APPROVAL FOR THE CONSTRUCTION OF AN IMPOUNDMENT OR PIT

Delivery method pursuant to West Virginia Code § 22-6A-10(b)

- PERSONAL SERVICE REGISTERED MAIL METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to W. Va. Code § 22-6A-10(b) no later than the filing date of the application, the applicant for a permit for any well work or for a certificate of approval for the construction of an impoundment or pit as required by this article shall deliver, by personal service or by registered mail or by any method of delivery that requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of this article, and the well plat to each of the following persons: (1) The owners of record of the surface of the tract on which the well is or is proposed to be located; (2) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for roads or other land disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The coal owner, operator or lessee, in the event the tract of land on which the well proposed to be drilled is located [sic] is known to be underlain by one or more coal seams; (4) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for the placement, construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this article; (5) Any surface owner or water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five hundred feet of the center of the well pad which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field within which the proposed well work activity is to take place. (c)(1) If more than three tenants in common or other co-owners of interests described in subsection (b) of this section hold interests in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be maintained pursuant to section eight, article one, chapter eleven-a of this code. (2) Notwithstanding any provision of this article to the contrary, notice to a lien holder is not notice to a landowner, unless the lien holder is the landowner. W. Va. Code R. § 35-8-5.7.a requires, in part, that the operator shall also provide the Well Site Safety Plan ("WSSP") to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Application Notice WSSP Notice E&S Plan Notice Well Plat Notice is hereby provided to:

SURFACE OWNER(s)
Name: PLEASE SEE ATTACHMENT
Address: _____

Name: _____
Address: _____

SURFACE OWNER(s) (Road and/or Other Disturbance)
Name: PLEASE SEE ATTACHMENT
Address: _____

Name: _____
Address: _____

SURFACE OWNER(s) (Impoundments or Pits)
Name: _____
Address: _____

COAL OWNER OR LESSEE
Name: NO DECLARATIONS ON RECORD WITH COUNTY
Address: _____

COAL OPERATOR
Name: NO DECLARATIONS ON RECORD WITH COUNTY
Address: _____

WATER PURVEYOR(s)/OWNER(s) OF WATER WELL, SPRING OR OTHER WATER SUPPLY SOURCE
Name: PLEASE SEE ATTACHMENT
Address: _____

OPERATOR OF ANY NATURAL GAS STORAGE FIELD
Name: _____
Address: _____

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Office of Oil & Gas**

*Please attach additional forms if necessary

FEB 06 2017

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-10(b), notice is hereby given that the undersigned well operator has applied for a permit for well work or for a certificate of approval for the construction of an impoundment or pit.

This Notice Shall Include:

Pursuant to W. Va. Code § 22-6A-10(b), this notice shall include: (1) copies of the application; (2) the erosion and sediment control plan required by section seven of this article; and (3) the well plat.

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments; (2) who may file written comments; (3) the name and address of the secretary for the purpose of filing the comments and obtaining additional information; and (4) a statement that the persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Pursuant to W. Va. Code R. § 35-8-5.7.a, the operator shall provide the Well Site Safety Plan to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Pursuant to W. Va. Code R. § 35-8-15.2.c, this notice shall: (1) contain a statement of the surface owner's and water purveyor's right to request sampling and analysis; (2) advise the surface owner and water purveyor of the rebuttable presumption for contamination or deprivation of a fresh water source or supply; advise the surface owner and water purveyor that refusal to allow the operator to conduct a pre-drilling water well test constitutes a method to rebut the presumption of liability; (3) advise the surface owner and water purveyor of his or her independent right to sample and analyze any water supply at his or her own expense; advise the surface owner and water purveyor whether or not the operator will utilize an independent laboratory to analyze any sample; and (4) advise the surface owner and or water purveyor that he or she can obtain from the Chief a list of water testing laboratories in the subject area capable of and qualified to test water supplies in accordance with standard acceptable methods.

Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Well Location Restrictions

Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any existing water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within six hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary. (c) Notwithstanding the foregoing provisions of this section, nothing contained in this section prevents an operator from conducting the activities permitted or authorized by a Clean Water Act Section 404 permit or other approval from the United States Army Corps of Engineers within any waters of the state or within the restricted areas referenced in this section. (d) The well location restrictions set forth in this section shall not apply to any well on a multiple well pad if at least one of the wells was permitted prior to the effective date of this article. (e) The secretary shall, by December 31, 2012, report to the Legislature on the noise, light, dust and volatile organic compounds generated by the drilling of horizontal wells as they relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding, if any, by the secretary that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

examined in the study required by this subsection, the secretary shall have the authority to propose for promulgation legislative rules establishing guidelines and procedures regarding reasonable levels of noise, light, dust and volatile organic compounds relating to drilling horizontal wells, including reasonable means of mitigating such factors, if necessary.

Water Well Testing:

Pursuant to West Virginia Code § 22-6A-10(d), notification shall be made, with respect to surface landowners identified in subsection (b) or water purveyors identified in subdivision (5), subsection (b) of this section, of the opportunity for testing their water well. The operator shall provide an analysis to such surface landowner or water purveyor at their request.

Water Testing Laboratories:

Pursuant to West Virginia Code § 22-6A-10(i), persons entitled to notice pursuant to subsection (b) of this section may contact the department to ascertain the names and locations of water testing laboratories in the subject area capable and qualified to test water supplies in accordance with standard accepted methods. In compiling that list of names the department shall consult with the state Bureau for Public Health and local health departments. A surface owner and water purveyor has an independent right to sample and analyze any water supply at his or her own expense. The laboratory utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section.

Rebuttable Presumption for Contamination or Deprivation of a Fresh Water Source or Supply:

W. Va. Code § 22-6A-18 requires that (b) unless rebutted by one of the defenses established in subsection (c) of this section, in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply. (c) In order to rebut the presumption of liability established in subsection (b) of this section, the operator must prove by a preponderance of the evidence one of the following defenses: (1) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration water well test. (2) The landowner or water purveyor refused to allow the operator access to the property to conduct a predrilling or prealteration water well test. (3) The water supply is not within one thousand five hundred feet of the well. (4) The pollution occurred more than six months after completion of drilling or alteration activities. (5) The pollution occurred as the result of some cause other than the drilling or alteration activity. (d) Any operator electing to preserve its defenses under subdivision (1), subsection (c) of this section shall retain the services of an independent certified laboratory to conduct the predrilling or prealteration water well test. A copy of the results of the test shall be submitted to the department and the surface owner or water purveyor in a manner prescribed by the secretary. (e) Any operator shall replace the water supply of an owner of interest in real property who obtains all or part of that owner's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source with a comparable water supply where the secretary determines that the water supply has been affected by contamination, diminution or interruption proximately caused by the oil or gas operation, unless waived in writing by that owner. (f) The secretary may order the operator conducting the oil or gas operation to: (1) Provide an emergency drinking water supply within twenty-four hours; (2) Provide temporary water supply within seventy-two hours; (3) Within thirty days begin activities to establish a permanent water supply or submit a proposal to the secretary outlining the measures and timetables to be used in establishing a permanent supply. The total time in providing a permanent water supply may not exceed two years. If the operator demonstrates that providing a permanent replacement water supply cannot be completed within two years, the secretary may extend the time frame on case-by-case basis; and (4) Pay all reasonable costs incurred by the real property owner in securing a water supply. (g) A person as described in subsection (b) of this section aggrieved under the provisions of subsections (b), (e) or (f) of this section may seek relief in court... (i) Notwithstanding the denial of the operator of responsibility for the damage to the real property owner's water supply or the status of any appeal on determination of liability for the damage to the real property owner's water supply, the operator may not discontinue providing the required water service until authorized to do so by the secretary or a court of competent jurisdiction.

Written Comment:

Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary. All persons described in West Virginia Code § 22-6A-10(b) may file written comments as to the location or construction of the applicant's proposed well work to the Secretary at:

Chief, Office of Oil and Gas
Department of Environmental Protection
601 57th St. SE
Charleston, WV 25304
(304) 926-0450

Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water. **NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.**

Received
Office of Oil & Gas

FEB 06 2017

05/05/2017

Time Limits and Methods for Filing Comments.

The law requires these materials to be served on or before the date the operator files its Application. You have **THIRTY (30) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Pursuant to West Virginia Code § 22-6A-11(c)(2), Any objections of the affected coal operators and coal seam owners and lessees shall be addressed through the processes and procedures that exist under sections fifteen, seventeen and forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article. The written comments filed by the parties entitled to notice under subdivisions (1), (2), (4), (5) and (6), subsection (b), section ten of this article shall be considered by the secretary in the permit issuance process, but the parties are not entitled to participate in the processes and proceedings that exist under sections fifteen, seventeen or forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article.

Comment Requirements

Your comments must be in writing and include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

Disclaimer: All comments received will be placed on our web site <http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/Pages/default.aspx> and the applicant will automatically be forwarded an email notice that such comments have been submitted. The applicant will be expected to provide a response to comments submitted by any surface owner, water purveyor or natural gas storage operator noticed within the application.

Permit Denial or Condition

The Chief has the power to deny or condition a well work permit. Pursuant to West Virginia Code § 22-6A-8(d), the permit may not be issued or be conditioned, including conditions with respect to the location of the well and access roads prior to issuance if the director determines that:

- (1) The proposed well work will constitute a hazard to the safety of persons;
- (2) The plan for soil erosion and sediment control is not adequate or effective;
- (3) Damage would occur to publicly owned lands or resources; or
- (4) The proposed well work fails to protect fresh water sources or supplies.

A permit may also be denied under West Virginia Code § 22-6A-7(k), the secretary shall deny the issuance of a permit if the secretary determines that the applicant has committed a substantial violation of a previously issued permit for a horizontal well, including the applicable erosion and sediment control plan associated with the previously issued permit, or a substantial violation of one or more of the rules promulgated under this article, and in each instance has failed to abate or seek review of the violation within the time prescribed by the secretary pursuant to the provisions of subdivisions (1) and (2), subsection (a), section five of this article and the rules promulgated hereunder, which time may not be unreasonable.

Pursuant to West Virginia Code § 22-6A-10(g), any person entitled to submit written comments to the secretary pursuant to subsection (a), section eleven of this article, shall also be entitled to receive from the secretary a copy of the permit as issued or a copy of the order modifying or denying the permit if the person requests receipt of them as a part of the written comments submitted concerning the permit application. Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

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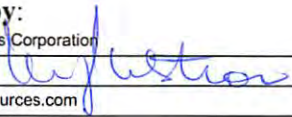
4708510322

WW-6A
(8-13)

API NO. 47-085 -
OPERATOR WELL NO. Master Unit 2H
Well Pad Name: Lettie Pad

Notice is hereby given by:

Well Operator: Antero Resources Corporation
Telephone: (303) 357-7310
Email: kquackenbush@anteroresources.com



Address: 1615 Wynkoop Street
Denver, CO 80202
Facsimile: 303-357-7315

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

KARA QUACKENBUSH
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 2014402829
MY COMMISSION EXPIRES JULY 21, 2018

Subscribed and sworn before me this 3 day of February 2017
Kara Quackenbush Notary Public
My Commission Expires July 21, 2018

KARA QUACKENBUSH
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20144028297
MY COMMISSION EXPIRES JULY 21, 2018

Received
Office of Oil & Gas
FEB 06 2017

05/05/2017

WW-6A Notice of Application Attachment (LETTIE PAD):

List of Surface Owner(s) with Proposed Disturbance associated with Lettie Well Pad:

WELL PAD – These owners were notified of all well work permit applications, and have executed signed Surface Use Agreements with Antero Resources Corporation.

TM 9 PCL 4

Owner: Christopher Haymond ✓
Address: PO Box 426
Pennsboro, WV 26415

Owner: Christopher Haymond ✓
(2nd Address)
Address: 382 Stull Hill Rd.
Pennsboro, WV 26415

Owner: Jessica M. Haymond ✓
Address: 3308 ½ Descanso Dr.
Los Angeles, CA 90026

Owner: Daniel M. Haymond IV ✓
Address: 2974 North Orange St.
Orange, CA 92865

Owner: Daniel M. Haymond IV ✓
(2nd Address)
Address: 1411 N. Batavia St. STE218
Orange, CA 92867

Owner: Zarick Irrevocable Trust ✓
c/o Daniel M. Haymond IV
Address: 1411 N. Batavia St. STE218
Orange, CA 92867

ROAD AND/OR OTHER DISTURBANCE - All owners have executed signed Surface Use and/or Road Agreements with Antero Resources Corporation. However, they were only notified if their tracts were overlying the oil and gas leasehold being developed by the proposed well work.

TM 9 PCL 4

Owner: Christopher Haymond ✓
Address: PO Box 426
Pennsboro, WV 26415

Owner: Christopher Haymond ✓
(2nd Address)
Address: 382 Stull Hill Rd.
Pennsboro, WV 26415

Owner: Jessica M. Haymond ✓
Address: 3308 ½ Descanso Dr.
Los Angeles, CA 90026.

Owner: Daniel M. Haymond IV ✓
Address: 2974 North Orange St.
Orange, CA 92865

Owner: Daniel M. Haymond IV ✓
(2nd Address)
Address: 1411 N. Batavia St. STE218
Orange, CA 92867

TM 9 PCL 4 (continued...)

Owner: Zarick Irrevocable Trust ✓
c/o Daniel M. Haymond IV
Address: 1411 N. Batavia St. STE218
Orange, CA 92867

TM 9 PCL 13*

Owner: Antero Resources Corporation
Address: 1615 Wynkoop St.
Denver, CO 80202

*Please note Antero recently purchased this property from Michael Devon Hammett.

Received
Office of Oil & Gas
FEB 06 2017

WW-6A Notice of Application Attachment (LETTIE PAD):**WATER SOURCE OWNERS – Within 1500'**

*NOTE: On attached water well map 2 other water sources are identified, but they are located greater than 1500' from the subject well pad location.

1 Water Source: W2 – 1254'

Owner: Mary Lou Dawson
Address: 208 E. Myles Ave.
Pennsboro, WV 26415

1 Water Source: W4 – 747'

Owner: Rocky A. McClain, et al
Address: 66 Stull Hill Rd.
Pennsboro, WV 26415



1 Water Source: W5 – 908'

Owner: Norma C. Greene
Address: 88 Stull Hill Rd.
Pennsboro, WV 26415

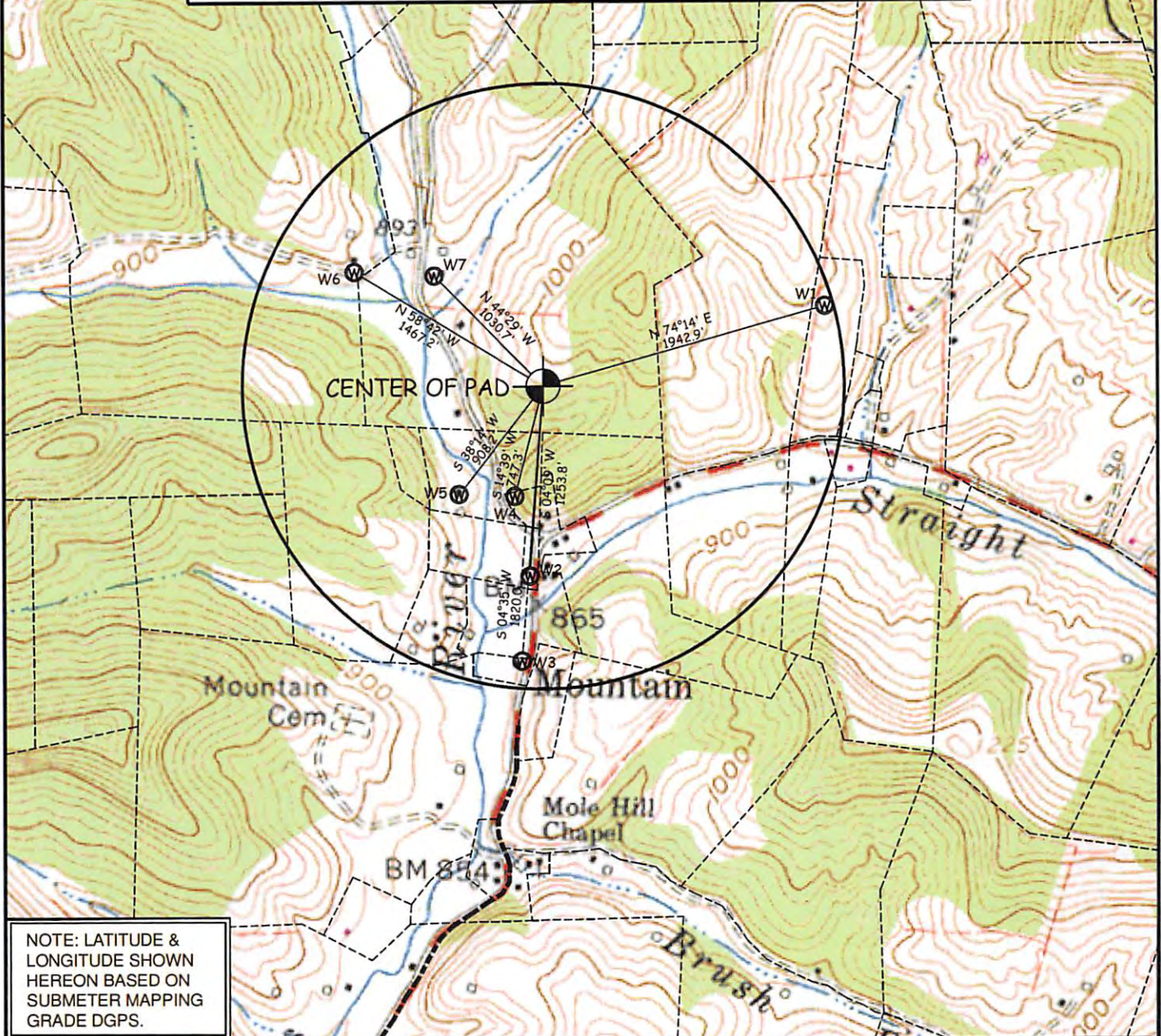
2 Water Sources: W6 – 1467', W7 – 1031'

Owner: Daniel M. Haymond, et al
Address: 2974 North Orange Ave.
Orange, CA 92865

Received
Office of Oil & Gas
FEB 06 2017

05/05/2017

LETTIE PAD ANTERO RESOURCES CORPORATION



NOTE: LATITUDE & LONGITUDE SHOWN HEREON BASED ON SUBMETER MAPPING GRADE DGPS.

WELL	SURFACE OWNER	ADDRESS	DISTRICT-TAX MAP-PARCEL	WELL LATITUDE	WELL LONGITUDE
W1	HENRY HILGER	7762 MOUNTAIN DR. PENNSBORO, WV 26415	3-4-11.8	39°21'58.94"	80°54'14.08"
W2	MARY LOU DAWSON	208 E. MYLES AVE., PENNSBORO, WV 26415	3-4-23	39°21'41.06"	80°54'38.68"
W3	MYRON PERKINS ET AL	1 CORE LOGIC DR, WESTLAKE, TX 76262	3-4-31	39°21'35.48"	80°54'39.27"
W4	ROCKY A. MCCLAIN ET AL	66 STULL HILL RD, PENNSBORO, WV 26415	3-4-14.3	39°21'46.26"	80°54'40.04"
W5	NORMA C. GREENE	88 STULL HILL RD, PENNSBORO, WV 26415	3-4-14	39°21'46.30"	80°54'44.79"
W6	DANIEL M. HAYMOND ET AL	2974 NORTH ORANGE AVE. ORANGE, CA 92865	3-4-5	39°22'00.72"	80°54'53.90"
W7	DANIEL M. HAYMOND ET AL	2974 NORTH ORANGE AVE. ORANGE, CA 92865	3-4-9	39°22'00.54"	80°54'47.12"

WILLOW LAND SURVEYING, PLLC
P.O. BOX 17, PENNSBORO, WV 26415
(304) 659-1717

TOPO SECTION(S) OF :
PENNSBORO 7.5'

JOB #: 17-015WA

FILE: LETTIEPADWATERMAP

SCALE : 1-INCH = 1000-FEET



DATE: 01/31/17

DRAWN BY: D.L.P.

**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF INTENT TO DRILL**

Pursuant to W. Va. Code § 22-6A-16(b), the Notice of Intent to Drill is only required if the notice requirements of W. Va. Code § 22-6A-10(a) have NOT been met or if the Notice of Intent to Drill requirement has NOT been waived in writing by the surface owner.

Notice Time Requirement: Notice shall be provided at least **TEN (10)** days prior to filing a permit application.
Date of Notice: 01/16/2017 **Date Permit Application Filed:** 02/03/2017

Delivery method pursuant to West Virginia Code § 22-6A-16(b)

HAND DELIVERY CERTIFIED MAIL RETURN RECEIPT REQUESTED

Pursuant to W. Va. Code § 22-6A-16(b), at least ten days prior to filing a permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner notice of its intent to enter upon the surface owner's land for the purpose of drilling a horizontal well: *Provided*, That notice given pursuant to subsection (a), section ten of this article satisfies the requirements of this subsection as of the date the notice was provided to the surface owner: *Provided, however*, That the notice requirements of this subsection may be waived in writing by the surface owner. The notice, if required, shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative.

Notice is hereby provided to the SURFACE OWNER(s):

Name: PLEASE SEE ATTACHED Name: _____
Address: _____ Address: _____

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-16(b), notice is hereby given that the undersigned well operator has an intent to enter upon the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>507723m</u>
County:	<u>Ritchie</u>		Northing:	<u>4357279m</u>
District:	<u>Clay</u>	Public Road Access:	<u>Stull Hill Rd (Stella Hill Rd)</u>	
Quadrangle:	<u>Pennsboro 7.5'</u>	Generally used farm name:	<u>Daniel M. Haymond III, et al</u>	
Watershed:	<u>North Fork Hughes River</u>			

This Notice Shall Include:

Pursuant to West Virginia Code § 22-6A-16(b), this notice shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Notice is hereby given by:

Well Operator:	<u>Antero Resources Corporation</u>	Authorized Representative:	<u>Shelby Johnson</u>
Address:	<u>1615 Wynkoop St.</u>	Address:	<u>1615 Wynkoop St.</u>
	<u>Denver, CO 80202</u>		<u>Denver, CO 80202</u>
Telephone:	<u>303-357-7223</u>	Telephone:	<u>303-357-7223</u>
Email:	<u>shjohnson@anteroresources.com</u>	Email:	<u>shjohnson@anteroresources.com</u>
Facsimile:	<u>303-357-7315</u>	Facsimile:	<u>303-357-7315</u>

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

WW-6A4 Notice of Intent to Drill Attachment:

4708510322

Surface Owners:

Owner: Christopher Keith Haymond
Address: 382 Stull Hill Road
Pennsboro, WV 26415

Owner: Christopher Haymond
Address: (2nd Address)
P.O. Box 426
Pennsboro, WV 26415

Owner: Daniel M IV Haymond
Address: 1411 N. Batavia St STE 218
Orange, CA 92867

Owner: Jessica M. Haymond
Address: 3308 ½ Descanso Dr
Los Angeles, CA 90026

Owner: Zarick Irrevocable
Address: c/o Daniel Haymond IV Trust
1411 N. Batavia St STE 218
Orange, CA 92867

Owner: Daniel M. Haymond, IV
Address: (Second Address)
2974 N. Orange Ave
Orange, CA 92865

WW-6A5 Notice of Planned Operations Attachment (LETTIE PAD):

Owner: Christopher Haymond
Address: PO Box 426
Pennsboro, WV 26415

Owner: Christopher Haymond
(2nd Address)
Address: 382 Stull Hill Rd.
Pennsboro, WV 26415

Owner: Jessica M. Haymond
Address: 3308 ½ Descanso Dr.
Los Angeles, CA 90026

Owner: Daniel M. Haymond IV
Address: 2974 North Orange Ave.
Orange, CA 92865

Owner: Daniel M. Haymond IV
(2nd Address)
Address: 1411 N. Batavia St. STE218
Orange, CA 92867

Owner: Zarick Irrevocable Trust
c/o Daniel M. Haymond IV
Address: 1411 N. Batavia St. STE218
Orange, CA 92867





WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0430 • (304) 558-3505Jim Justice
GovernorThomas J. Smith, P. E.
Secretary of Transportation/
Commissioner of Highways

January 31, 2017

James A. Martin, Chief
Office of Oil and Gas
Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304Subject: DOH Permit for the Lettie Pad, Ritchie County
Master Unit 2H Well Site 47-085-10322

Dear Mr. Martin,

This well site will be accessed from a DOH permit #06-2016-0108 which has been issued to Antero Resources Corporation for access to the State Road for a well site located off of SLS 2 in Ritchie County.

The operator has signed a STATEWIDE OIL AND GAS ROAD MAINTENANCE BONDING AGREEMENT and provided the required Bond. This operator is currently in compliance with the DOH OIL AND GAS POLICY dated January 3, 2012.

Very Truly Yours,

A handwritten signature in blue ink that reads "Gary K. Clayton".

Gary K. Clayton, P.E.
Regional Maintenance Engineer
Central Office O&G CoordinatorCc: Kara Quackenbush
Antero Resources Corporation
CH, OM, D-3
File

List of Anticipated Additives Used for Fracturing or Stimulating Well

4708510322

Additives	Chemical Abstract Service Number (CAS #)
Fresh Water	7732-18-5
2 Phosphobutane 1,2,4 tricarboxylic acid	37971-36-1
Ammonium Persulfate	7727-54-0
Anionic copolymer	Proprietary
Anionic polymer	Proprietary
BTEX Free Hydrotreated Heavy Naphtha	64742-48-9
Cellulase enzyme	Proprietary
Demulsifier Base	Proprietary
Ethoxylated alcohol blend	Mixture
Ethoxylated Nonylphenol	68412-54-4
Ethoxylated oleylamine	26635-93-8
Ethylene Glycol	107-21-1
Glycol Ethers	111-76-2
Guar gum	9000-30-0
Hydrogen Chloride	7647-01-0
Hydrotreated light distillates, non-aromatic, BTEX free	64742-47-8
Isopropyl alcohol	67-63-0
liquid, 2,2-dibromo-3-nitrilopropionamide	10222-01-2
Microparticle	Proprietary
Petroleum Distillates (BTEX Below Detect)	64742-47-8
Polyacrylamide	57-55-6
Propargyl Alcohol	107-19-7
Propylene Glycol	57-55-6
Quartz	14808-60-7
Sillica, crystalline quartz	7631-86-9
Sodium Chloride	7647-14-5
Sodium Hydroxide	1310-73-2
Sugar	57-50-1
Surfactant	68439-51-0
Suspending agent (solid)	14808-60-7
Tar bases, quinoline derivs, benzyl chloride-quaternized	72480-70-7
Solvent Naphtha, petroleum, heavy aliph	64742-96-7
Soybean Oil, Me ester	67784-80-9
Copolymer of Maleic and Acrylic Acid	52255-49-9
DETA phosphonate	15827-60-8
Hexamethylene Triamine Penta	34690-00-1
Phosphino Carboxylic acid polymer	71050-62-9
Hexamethylene Diamine Tetra	23605-75-5
2-Propenoic acid, polymer with 2 propenamide	9003-06-9
Hexamethylene diamine penta (methylene phosphonic acid)	23605-74-5
Diethylene Glycol	111-46-6
Methenamine	100-97-0
Polyethylene polyamine	68603-67-8
Coco amine	61791-14-8
2-Propyn-1-olcompound with methyloxirane	38172-91-7

05/05/2017

LETTIE WELL PAD & WATER CONTAINMENT PAD SITE DESIGN & CONSTRUCTION PLAN, EROSION & SEDIMENT CONTROL PLANS

**APPROVED
WVDEP OOG**

4/24/2017

CLAY DISTRICT, RITCHIE COUNTY, WEST VIRGINIA
CABIN RUN-NORTH FORK HUGHES RIVER WATERSHED
USGS 7.5 PENNSBORO QUAD MAP

LOCATION COORDINATES:
ACCESS ROAD ENTRANCE
LATITUDE: 39.965306 LONGITUDE: -80.912305 (NAD 83)
N 4357319.87 E 507554.43 (UTM ZONE 17 METERS)

CENTER OF TANK
LATITUDE: 39.965734 LONGITUDE: -80.912124 (NAD 83)
N 4357347.42 E 507549.08 (UTM ZONE 17 METERS)

CENTROID OF PAD
LATITUDE: 39.964936 LONGITUDE: -80.910350 (NAD 83)
N 4357278.99 E 507722.90 (UTM ZONE 17 METERS)

GENERAL DESCRIPTION:
THE ACCESS ROAD(S), WATER CONTAINMENT PAD, AND WELL PAD ARE BEING CONSTRUCTED TO AID IN THE DEVELOPMENT OF INDIVIDUAL MARCELLUS SHALE GAS WELLS.

FLOODPLAIN NOTES:
THE PROPOSED SITE IS LOCATED WITHIN FEMA FLOOD ZONE "X" PER FEMA FLOOD MAP #54085C0125C.

MISS UTILITY STATEMENT:
ANTERO RESOURCES CORPORATION WILL NOTIFY MISS UTILITY OF WEST VIRGINIA FOR THE LOCATING OF UTILITIES PRIOR TO THIS PROJECT DESIGN, TICKET #1419246636. IN ADDITION, MISS UTILITY WILL BE CONTACTED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION FOR THIS PROJECT.

ENTRANCE PERMIT:
ANTERO RESOURCES CORPORATION WILL OBTAIN AN ENCROACHMENT PERMIT (FORM MM-106) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

ENVIRONMENTAL NOTES:
STREAM AND WETLAND DELINEATIONS WERE PERFORMED IN MAY 2014, JULY 2014, & OCTOBER 2016 BY K.C. HARVEY ENVIRONMENTAL, LLC TO REVIEW THE SITE FOR WATERS AND WETLANDS THAT ARE MOST LIKELY WITHIN THE REGULATORY JURISDICTION OF THE U.S. ARMY CORPS OF ENGINEERS (USACE) AND/OR THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (WVDEP). THE OCTOBER 21, 2016 DESIGN OVERVIEW MAP WAS PREPARED BY K.C. HARVEY ENVIRONMENTAL, LLC AND SUMMARIZES THE RESULTS OF THE FIELD DELINEATION. THE MAP DOES NOT, IN ANY WAY, REPRESENT A JURISDICTIONAL DETERMINATION OF THE LANDWARD LIMITS OF WATERS AND WETLANDS WHICH MAY BE REGULATED BY THE USACE OR THE WVDEP.

GEOTECHNICAL NOTES:
THE PROPOSED ACCESS ROAD CUT SLOPE (1:1) SHALL BE FIELD VERIFIED BY A CERTIFIED GEOTECHNICAL ENGINEER TO ENSURE THE PROPOSED SLOPES ARE ADEQUATE PRIOR TO CONSTRUCTION. ACCESS ROAD CONSTRUCTION SHALL BE MONITORED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER OR PROJECT DESIGN ENGINEER DURING CONSTRUCTION.

A SUBSURFACE INVESTIGATION OF THE PROPOSED SITE WAS PERFORMED BY PENNSYLVANIA SOIL & ROCK, INC. BETWEEN FEBRUARY 11, 2015 & FEBRUARY 25, 2015. THE REPORT PREPARED BY PENNSYLVANIA SOIL & ROCK, INC. DATED MARCH 27, 2016 REVISED JANUARY 31, 2017, REFLECTS THE RESULTS OF THE SUBSURFACE INVESTIGATION. THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS REPORT WERE USED IN THE PREPARATION OF THESE PLANS. PLEASE REFER TO THE SUBSURFACE INVESTIGATION REPORT BY PENNSYLVANIA SOIL & ROCK, INC. FOR ADDITIONAL INFORMATION, AS NEEDED.

PROJECT CONTACTS:
CHARLES E. COMPTON, III - SURVEYING COORDINATOR
CELL: (304) 719-6449

OPERATOR:
ANTERO RESOURCES CORPORATION
530 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE: (304) 842-4100
FAX: (304) 842-4102

ENGINEER/SURVEYOR:
NAVITUS ENGINEERING, INC.
CYRUS S. KUMP, PE - PROJECT MANAGER/ENGINEER
OFFICE: (606) 602-4185 CELL: (640) 606-6747

ENVIRONMENTAL:
K.C. HARVEY ENVIRONMENTAL, LLC
SHANNON THOMPSON - STAFF SCIENTIST
OFFICE: (740) 373-1970 CELL: (970) 398-8250

GEOTECHNICAL:
PENNSYLVANIA SOIL & ROCK, INC.
CHRISTOPHER W. SAMOIS - PROJECT ENGINEER
OFFICE: (412) 372-4000 CELL: (412) 599-0962

ELI WAGNER - ENVIRONMENTAL ENGINEER
OFFICE: (304) 842-4068 CELL: (304) 476-9770

JON MCEVERS - OPERATIONS SUPERINTENDENT
OFFICE: (303) 357-8799 CELL: (303) 808-2423

AARON KUNTZER - CONSTRUCTION SUPERVISOR
CELL: (405) 227-8344

ROBERT B. WIRKS - FIELD ENGINEER
OFFICE: (304) 642-4100 CELL: (304) 627-7405

RESTRICTIONS NOTES:
1. THERE ARE NO LAKES, PONDS, OR RESERVOIRS WITHIN 100 FEET OF THE WELL PAD AND LOD. THERE ARE WETLANDS & PERENNIAL STREAMS ADJACENT TO THE STAGING AREA & WATER CONTAINMENT PAD THAT WILL REMAIN UNDISTURBED.

2. THERE ARE NO NATURALLY PRODUCING TROUT STREAMS WITHIN 300 FEET OF THE WELL PAD AND LOD.

3. THERE ARE NO GROUNDWATER INTAKE OR PUBLIC WATER SUPPLY FACILITIES WITHIN 1000 FEET OF THE WELL PAD AND LOD.

4. THERE ARE NO APPARENT EXISTING WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF THE WELL(S) BEING DRILLED.

5. THERE ARE NO OCCUPIED DWELLING STRUCTURES WITHIN 625 FEET OF THE CENTER OF THE WELL PAD.

6. THERE ARE NO AGRICULTURAL BUILDINGS LARGER THAN 2,500 SQUARE FEET WITHIN 625 FEET OF THE CENTER OF THE WELL PAD.

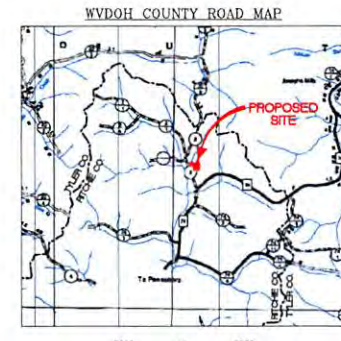
REPRODUCTION NOTE

THESE PLANS WERE CREATED TO BE PLOTTED ON 22"x34" (ANSI D) PAPER. HALF SCALE DRAWINGS ARE ON 11"x17" (ANSI B) PAPER.

THESE PLANS WERE CREATED FOR COLOR PLOTTING AND ANY REPRODUCTIONS IN GRAY SCALE OR COLOR MAY RESULT IN A LOSS OF INFORMATION AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

DESIGN CERTIFICATION:
THE DRAWINGS, CONSTRUCTION NOTES, AND REFERENCE DIAGRAMS ATTACHED HERETO HAVE BEEN PREPARED IN ACCORDANCE WITH THE WEST VIRGINIA CODE OF STATE RULES, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS CRS 35-8.

MISS Utility of West Virginia
1-800-245-4848
West Virginia State Law
(Section XIV: Chapter 24-C)
Requires that you call two business days before you dig in the state of West Virginia.
IT'S THE LAW!



WEST VIRGINIA STATE PLANE COORDINATE SYSTEM
NORTH ZONE, NAVD83
ELEVATION BASED ON NAVD83
SURVEY GRADE GPS & DPMS
FUSIS PROCESSING

SHEET INDEX:

- 1 - COVER SHEET
 - 2 - CONSTRUCTION AND E&S CONTROL NOTES
 - 3 - LEGEND
 - 4 - MATERIAL QUANTITIES
 - 5 - STORM DRAINAGE COMPUTATIONS
 - 6 - EXISTING CONDITIONS
 - 7 - EXISTING STRUCTURES & FEATURES
 - 8 - OVERALL PLAN SHEET INDEX & VOLUMES
 - 9 - ACCESS ROAD, WELL PAD, & WATER CONTAINMENT PAD PLAN
 - 10 - WELL PAD GRADING PLAN
 - 11 - WATER CONTAINMENT PAD GRADING PLAN
 - 12 - ACCESS ROAD PROFILES & SECTIONS
 - 13 - WELL PAD, WATER CONTAINMENT PAD & STOCKPILE SECTIONS
 - 14 - WELL PAD SECTIONS
 - 15-22 - CONSTRUCTION DETAILS
 - 23 - ACCESS ROAD WATER CONTAINMENT PAD & WELL PAD RECLAMATION PLAN
- GES00-GE504 - GEOTECHNICAL DETAILS

LETTIE LIMITS OF DISTURBANCE AREA (AC)	
Total Site	
Access Road 'A' (254')	1.94
Access Road 'B' (37')	0.05
Staging Area	1.14
Well Pad	6.86
Water Containment Pad	1.47
Excess/Topsoil Material Stockpiles	3.22
Total Affected Area	14.68
Total Wooded Acres Disturbed	12.34
Impacts to Christopher K. Haymond TM 4-09	
Access Road 'A' (487')	1.70
Access Road 'B' (24')	0.02
Staging Area	1.14
Well Pad	6.86
Water Containment Pad	0.76
Excess/Topsoil Material Stockpiles	3.22
Total Affected Area	13.70
Total Wooded Acres Disturbed	12.25
Impacts to Michael D. Hammett TM 4-13	
Access Road 'A' (67')	0.24
Access Road 'B' (13')	0.03
Water Containment Pad	0.71
Total Affected Area	0.98
Total Wooded Acres Disturbed	0.09

Proposed Well Name	WW North NAD 27	WW North NAD 83	UTM (METERS) Zone 17	NAD 83 Lat & Long
Leary	N 318306.36	N 318157.77	E 4357778.06	LAT 39-21-45.7903
Unit 1H	E 1921170.88	E 1922728.51	E 5077209.87	LONG 80-54-37.6009
Leary	N 318274.42	N 318111.68	E 4357278.44	LAT 39-21-53.7510
Unit 2H	E 192180.55	E 1928728.47	E 5077183.21	LONG 80-54-37.6140
Leary	N 318208.96	N 318155.96	E 4357278.22	LAT 39-21-53.7437
Unit 3H	E 192102.81	E 1928742.43	E 5077186.26	LONG 80-54-37.5470
Mastie	N 318255.67	N 318105.08	E 4357278.02	LAT 39-21-53.7204
Unit 1H	E 1921500.47	E 1928719.36	E 5077189.29	LONG 80-54-37.4000
Mastie	N 318154.77	N 318155.79	E 4357277.76	LAT 39-21-53.7291
Unit 2H	E 1921010.43	E 1928719.36	E 5077213.13	LONG 80-54-37.2800
Mastie	N 318253.88	N 318119.29	E 4357277.66	LAT 39-21-53.7218
Unit 3H	E 1921220.38	E 1928778.31	E 5077251.17	LONG 80-54-37.1600
Hayes	N 318152.96	N 318151.40	E 4357277.33	LAT 39-21-53.7145
Unit 1H	E 1921230.26	E 1928719.27	E 5077229.21	LONG 80-54-37.0900
Hayes	N 318152.96	N 318155.36	E 4357277.11	LAT 39-21-53.7072
Unit 2H	E 1921242.51	E 1928719.23	E 5077213.24	LONG 80-54-36.9172
Christopher	N 318121.18	N 318155.61	E 4357278.86	LAT 39-21-53.6966
Unit 1H	C 1921520.27	C 1928808.19	E 507734.26	LONG 80-54-35.7851
Christopher	N 318155.29	N 318154.71	E 4357278.07	LAT 39-21-53.6909
Unit 2H	E 1921025.23	E 1928719.15	E 507737.32	LONG 80-54-36.8581
Christopher	N 318119.40	N 318113.42	E 4357276.44	LAT 39-21-53.6612
Unit 3H	E 1921012.18	E 1928825.11	E 507742.30	LONG 80-54-36.8311
Well Pad Elevation	970.9			

NAVITUS
ENERGY ENGINEERING

REVISION	DATE	BY	DESCRIPTION
1	02/07/2016	REVISED SURFACE CONFIGURATION	
2	02/20/2017	REVISED WELL PAD	
3	02/23/2017	REVISED PAD CONTAINMENT BEHM DETAIL	

Antero
THIS DOCUMENT WAS PREPARED FOR ANTERO RESOURCES CORPORATION

COVER SHEET
LETTIE
WELL PAD & WATER CONTAINMENT PAD
CLAY DISTRICT
RITCHIE COUNTY, WEST VIRGINIA



DATE: 02/11/2016
SCALE: AS SHOWN
SHEET 1 OF 23

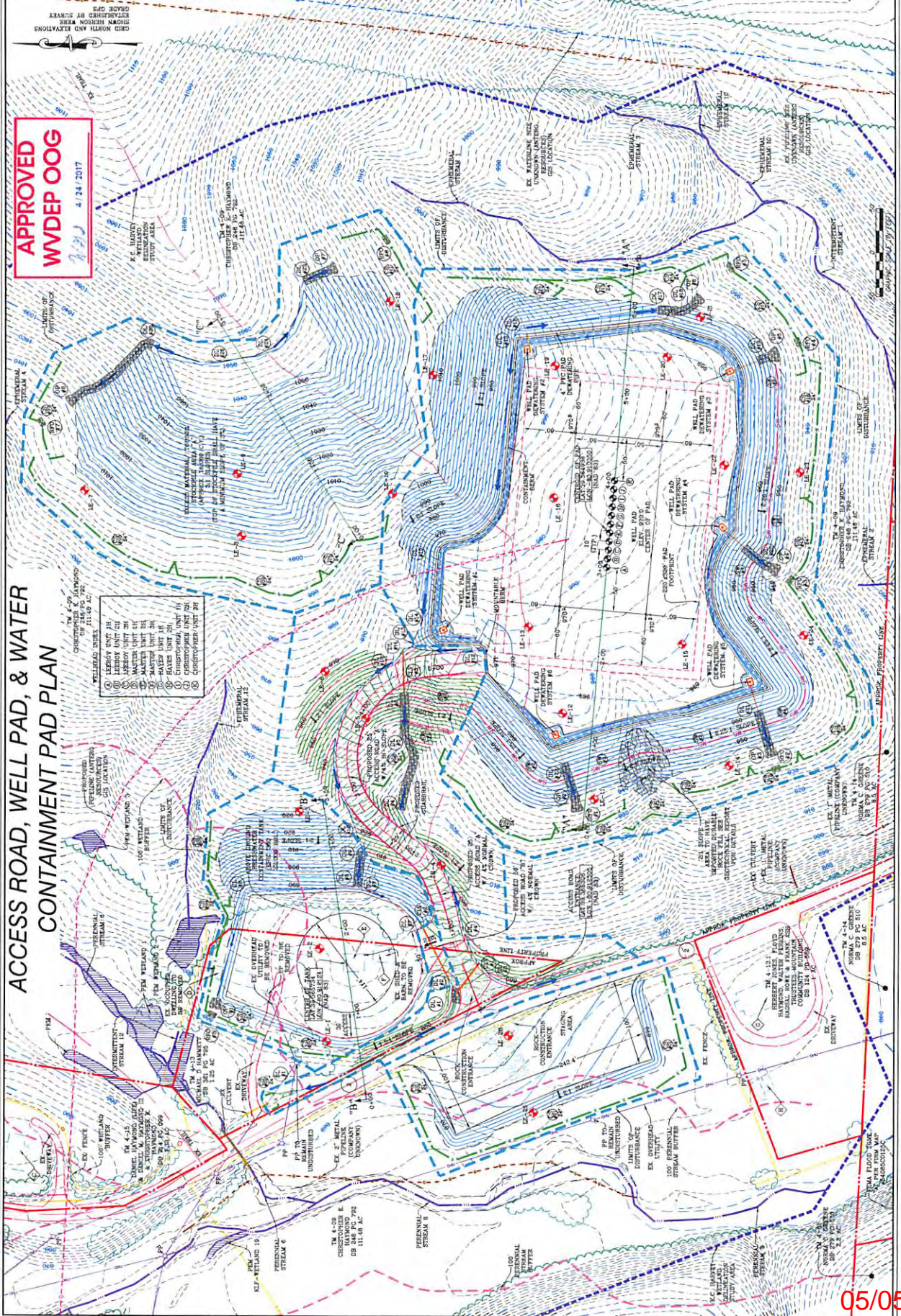
DATE	REVISION
02/23/2017	REVERSED PAD CONTAINMENT BEAM DETAIL
02/01/2017	REVERSED WELL PAD
04/07/2016	REVERSED SURFACE CONFIGURATION



THIS DOCUMENT IS PREPARED FOR ANTERO ENERGY CORPORATION
WELL PAD & WATER CONTAINMENT PAD
LETTIE
CLAY DISTRICT
RITCHIE COUNTY, WEST VIRGINIA



DATE: 02/11/2016
SCALE: 1" = 50'
SHEET 0 OF 23



05/05/2017

LETTIE WELL PAD & WATER SITE DESIGN & CONSTRUCTION EROSION & SEDIMENT CONTROL

CLAY DISTRICT, RITCHIE COUNTY
CABIN RUN-NORTH FORK HUGHES

USGS 7.5 PENNSBORO QUAD

LOCATION COORDINATES:

ACCESS ROAD ENTRANCE
LATITUDE: 39.365306 LONGITUDE: -80.912305 (NAD 83)
N 4357319.87 E 507554.43 (UTM ZONE 17 METERS)

CENTER OF TANK
LATITUDE: 39.365734 LONGITUDE: -80.912124 (NAD 83)
N 4357367.42 E 507589.98 (UTM ZONE 17 METERS)

CENTROID OF PAD
LATITUDE: 39.364936 LONGITUDE: -80.910350 (NAD 83)
N 4357278.99 E 507722.90 (UTM ZONE 17 METERS)

GENERAL DESCRIPTION:

THE ACCESS ROAD(S), WATER CONTAINMENT PAD, AND WELL PAD ARE BEING CONSTRUCTED TO AID IN THE DEVELOPMENT OF INDIVIDUAL MARCELLUS SHALE GAS WELLS.

FLOODPLAIN NOTES:

THE PROPOSED SITE IS LOCATED WITHIN FEMA FLOOD ZONE "X" PER FEMA FLOOD MAP #54085C0125C.

MISS UTILITY STATEMENT:

ANTERO RESOURCES CORPORATION WILL NOTIFY MISS UTILITY OF WEST VIRGINIA FOR THE LOCATING OF UTILITIES PRIOR TO THIS PROJECT DESIGN; TICKET #1419246636. IN ADDITION, MISS UTILITY WILL BE CONTACTED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION FOR THIS PROJECT.

ENTRANCE PERMIT:

ANTERO RESOURCES CORPORATION WILL OBTAIN AN ENCROACHMENT PERMIT (FORM MM-109) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

ENVIRONMENTAL NOTES:

STREAM AND WETLAND DELINEATIONS WERE PERFORMED IN MAY 2014, JULY 2014, & OCTOBER 2016 BY K.C. HARVEY ENVIRONMENTAL, LLC TO REVIEW THE SITE FOR WATERS AND WETLANDS THAT ARE MOST LIKELY WITHIN THE REGULATORY PURVIEW OF THE U.S. ARMY CORPS OF ENGINEERS (USACE) AND/OR THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (WVDEP). THE OCTOBER 21, 2016 DESIGN OVERVIEW MAP WAS PREPARED BY K.C. HARVEY ENVIRONMENTAL, LLC AND SUMMARIZES THE RESULTS OF THE FIELD DELINEATION. THE MAP DOES NOT, IN ANY WAY, REPRESENT A JURISDICTIONAL DETERMINATION OF THE LANDWARD LIMITS OF WATERS AND WETLANDS WHICH MAY BE REGULATED BY THE USACE OR THE WVDEP.

GEOTECHNICAL NOTES:

THE PROPOSED ACCESS ROAD CUT SLOPE (1.5:1) SHALL BE FIELD VERIFIED BY A CERTIFIED GEOTECHNICAL ENGINEER TO ENSURE THE PROPOSED SLOPES ARE ADEQUATE PRIOR TO CONSTRUCTION. ACCESS ROAD CONSTRUCTION SHALL BE MONITORED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER OR PROJECT DESIGN ENGINEER DURING CONSTRUCTION.

A SUBSURFACE INVESTIGATION OF THE PROPOSED SITE WAS PERFORMED BY PENNSYLVANIA SOIL & ROCK, INC. BETWEEN FEBRUARY 11, 2015 & FEBRUARY 25, 2015. THE REPORT PREPARED BY PENNSYLVANIA SOIL & ROCK, INC. DATED MARCH 27, 2015 REVISED JANUARY 31, 2017, REFLECTS THE RESULTS OF THE SUBSURFACE INVESTIGATION. THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS REPORT WERE USED IN THE PREPARATION OF THESE PLANS. PLEASE REFER TO THE SUBSURFACE INVESTIGATION REPORT BY PENNSYLVANIA SOIL & ROCK, INC. FOR ADDITIONAL INFORMATION, AS NEEDED.

PROJECT CONTACTS:

CHARLES E. COMPTON, III - SURVEYING COORDINATOR
CELL: (304) 719-6449

RICHARD LYLES - LAND AGENT
CELL: (770) 378-6833

ENGINEER/SURVEYOR:

NAVITUS ENGINEERING, INC.
CYRUS S. KUMP, PE - PROJECT MANAGER/ENGINEER
OFFICE: (888) 662-4185 CELL: (540) 886-6747

ENVIRONMENTAL:

KC HARVEY ENVIRONMENTAL, LLC
SHANNON THOMPSON - STAFF SCIENTIST
OFFICE: (740) 373-1970 CELL: (970) 396-8250

GEOTECHNICAL:

PENNSYLVANIA SOIL & ROCK, INC.
CHRISTOPHER W. SAMIOS-PROJECT ENGINEER
OFFICE: (412) 372-4000 CELL: (412) 589-0662

OPERATOR:
ANTERO RESOURCES CORPORATION
535 WHITE OAKS BLVD.
BRIDGEPORT, WV 28330
PHONE: (304) 842-4100
FAX: (304) 842-4102

ELI WAGONER - ENVIRONMENTAL ENGINEER
OFFICE: (304) 842-4068 CELL: (304) 476-9770

JON MCEVERS - OPERATIONS SUPERINTENDENT
OFFICE: (303) 357-6799 CELL: (303) 808-2423

AARON KUNZLER - CONSTRUCTION SUPERVISOR
CELL: (405) 227-8344

ROBERT B. WIRKS - FIELD ENGINEER
OFFICE: (304) 842-4100 CELL: (304) 627-7405

RESTRICTIONS NOTES:

1. THERE ARE NO LAKES, PONDS, OR RESERVOIRS WITHIN 100 FEET OF THE WELL PAD AND LOD. THERE ARE WETLANDS & PERENNIAL STREAMS ADJACENT TO THE STAGING AREA & WATER CONTAINMENT PAD THAT WILL REMAIN UNDISTURBED.
2. THERE ARE NO NATURALLY PRODUCING TROUT STREAMS WITHIN 300 FEET OF THE WELL PAD AND LOD.
3. THERE ARE NO GROUNDWATER INTAKE OR PUBLIC WATER SUPPLY FACILITIES WITHIN 1000 FEET OF THE WELL PAD AND LOD.
4. THERE ARE NO APPARENT EXISTING WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF THE WELL(S) BEING DRILLED.
5. THERE ARE NO OCCUPIED DWELLING STRUCTURES WITHIN 625 FEET OF THE CENTER OF THE WELL PAD.
6. THERE ARE NO AGRICULTURAL BUILDINGS LARGER THAN 2,500 SQUARE FEET WITHIN 625 FEET OF THE CENTER OF THE WELL PAD.

REPRODUCTION NOTE

THESE PLANS WERE CREATED TO BE PLOTTED ON 22"X34" (ANSI D)
PAPER. HALF SCALE DRAWINGS ARE ON 11"X17" (ANSI B) PAPER.

THESE PLANS WERE CREATED FOR COLOR PLOTTING AND ANY
REPRODUCTIONS IN GRAY SCALE OR COLOR MAY RESULT IN A LOSS OF
INFORMATION AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.



WEST VIRGINIA COUNTY MAP



(NOT TO SCALE)

DESIGN CERTIFICATION:

THE DRAWINGS, CONSTRUCTION NOTES, AND REFERENCE DIAGRAMS ATTACHED HERETO HAVE BEEN PREPARED IN ACCORDANCE WITH THE WEST VIRGINIA CODE OF STATE RULES, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS CRS 35-8.

05/05/2017

CONTAINMENT PAD CONSTRUCTION PLAN, CONTROL PLANS

WEST VIRGINIA
OVER WATERSHED
MAP



WEST VIRGINIA STATE PLANE COORDINATE SYSTEM
NORTH ZONE, NAD83
ELEVATION BASED ON NAVD83
ESTABLISHED BY SURVEY GRADE GPS & OPUS
POST-PROCESSING

SHEET INDEX:

- 1 - COVER SHEET
 - 2 - CONSTRUCTION AND E&S CONTROL NOTES
 - 3 - LEGEND
 - 4 - MATERIAL QUANTITIES
 - 5 - STORM DRAINAGE COMPUTATIONS
 - 6 - EXISTING CONDITIONS
 - 7 - EXISTING STRUCTURES & FEATURES
 - 8 - OVERALL PLAN SHEET INDEX & VOLUMES
 - 9 - ACCESS ROAD, WELL PAD, & WATER CONTAINMENT PAD PLAN
 - 10 - WELL PAD GRADING PLAN
 - 11 - WATER CONTAINMENT PAD GRADING PLAN
 - 12 - ACCESS ROAD PROFILES & SECTIONS
 - 13 - WELL PAD, WATER CONTAINMENT PAD & STOCKPILE SECTIONS
 - 14 - WELL PAD SECTIONS
 - 15-22 - CONSTRUCTION DETAILS
 - 23 - ACCESS ROAD, WATER CONTAINMENT PAD & WELL PAD RECLAMATION PLAN
- GE500-GE504 - GEOTECHNICAL DETAILS



DATE	REVISION
04/07/2016 <td>REVISED SURFACE CONFIGURATION</td>	REVISED SURFACE CONFIGURATION
02/01/2017 <td>REVISED WELL PAD</td>	REVISED WELL PAD

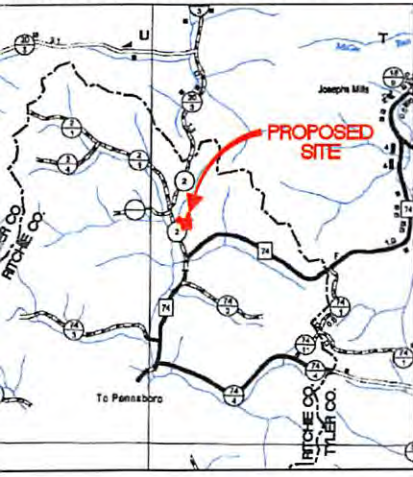


COVER SHEET
LETTIE
WELL PAD & WATER CONTAINMENT PAD
CLAY DISTRICT
RITCHIE COUNTY, WEST VIRGINIA



DATE: 02/11/2016
SCALE: AS SHOWN
SHEET 1 OF 23

WVDOH COUNTY ROAD MAP



LETTIE LIMITS OF DISTURBANCE AREA (AC)	
Total Site	
Access Road "A" (55')	1.94
Access Road "B" (37')	0.05
Staging Area	1.14
Well Pad	6.86
Water Containment Pad	1.47
Excess/Topsoil Material Stockpiles	3.22
Total Affected Area	14.68
Total Wooded Acres Disturbed	12.34
Impacts to Christopher K. Haymond TM 4-09	
Access Road "A" (487')	1.70
Access Road "B" (24')	0.02
Staging Area	1.14
Well Pad	6.86
Water Containment Pad	0.76
Excess/Topsoil Material Stockpiles	3.22
Total Affected Area	13.70
Total Wooded Acres Disturbed	12.25
Impacts to Michael D Hammett TM 4-13	
Access Road "A" (67')	0.24
Access Road "B" (13')	0.03
Water Containment Pad	0.71
Total Affected Area	0.98
Total Wooded Acres Disturbed	0.09

Proposed Well Name	WV North NAD 27	WV North NAD 83	UTM (METERS) Zone 17	NAD 83 Lat & Long
Leeroy Unit 1H	N 318128.36 E 1601170.59	N 318162.77 E 1569729.51	N 4357278.66 E 537709.97	LAT 39-21-53.7583 LONG -80-54-37.8009
Leeroy Unit 2H	N 318127.46 E 1601180.55	N 318161.86 E 1569739.47	N 4357278.44 E 507713.01	LAT 39-21-53.7510 LONG -80-54-37.6740
Leeroy Unit 3H	N 318126.56 E 1601190.51	N 318160.98 E 1569749.43	N 4357278.22 E 507716.05	LAT 39-21-53.7437 LONG -80-54-37.5470
Master Unit 1H	N 318125.57 E 1601200.47	N 318160.08 E 1569759.39	N 4357278.00 E 507719.09	LAT 39-21-53.7364 LONG -80-54-37.4200
Master Unit 2H	N 318124.77 E 1601210.43	N 318159.19 E 1569769.35	N 4357277.78 E 507722.13	LAT 39-21-53.7291 LONG -80-54-37.2930
Master Unit 3H	N 318123.98 E 1601220.39	N 318158.29 E 1569779.31	N 4357277.55 E 507725.17	LAT 39-21-53.7218 LONG -80-54-37.1660
Hayes Unit 1H	N 318122.98 E 1601230.35	N 318157.40 E 1569789.27	N 4357277.33 E 507728.21	LAT 39-21-53.7145 LONG -80-54-37.0390
Hayes Unit 2H	N 318122.39 E 1601240.31	N 318156.50 E 1569799.23	N 4357277.11 E 507731.24	LAT 39-21-53.7072 LONG -80-54-36.9121
Christopher Unit 1H	N 318121.19 E 1601250.27	N 318155.61 E 1569809.19	N 4357276.89 E 507734.28	LAT 39-21-53.6999 LONG -80-54-36.7851
Christopher Unit 2H	N 318120.29 E 1601260.23	N 318154.71 E 1569819.15	N 4357276.67 E 507737.32	LAT 39-21-53.6926 LONG -80-54-36.6581
Christopher Unit 3H	N 318119.40 E 1601270.19	N 318153.82 E 1569829.11	N 4357276.44 E 507740.36	LAT 39-21-53.6852 LONG -80-54-36.5311
Well Pad Elevation	970.0			

MISS Utility of West Virginia
1-800-245-4848
West Virginia State Law
(Section XIV: Chapter 24-C)
Requires that you call two
business days before you dig in
the state of West Virginia.
IT'S THE LAW!!

Michael D. Jeff
3/21/2017
Environmental Pro

05/05/2017