



**west virginia** department of environmental protection

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

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
www.dep.wv.gov

December 16, 2014

**WELL WORK PERMIT**

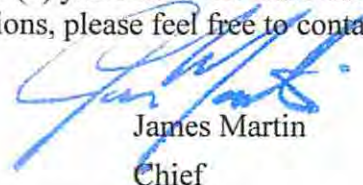
**Horizontal 6A Well**

This permit, API Well Number: 47-1706633, issued to ANTERO RESOURCES CORPORATION, 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 all 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 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.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-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) 926-0499 ext. 1654.



James Martin  
Chief

Operator's Well No: SULFUR UNIT 1H  
Farm Name: FORD, JEFFREY J.  
**API Well Number: 47-1706633**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 12/16/2014

Promoting a healthy environment.

12/19/2014

## 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.

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### CONDITIONS

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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 fifty (50) 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. 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.
8. 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.
9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to [DEPOOGNotify@wv.gov](mailto:DEPOOGNotify@wv.gov) within 30 days of commencement of drilling.

1706633

10/6

No 471706633

WW-6B  
(9/13)

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

1) Well Operator: Antero Resources Corporation 494488557 017 -Doddridge Greenbrier Big Isaac  
Operator ID County District Quadrangle

2) Operator's Well Number: Sulfur Unit 1H Well Pad Name: Existing Heflin North Pad

3) Farm Name/Surface Owner: Ford, Jeffrey J. Public Road Access: CR 48

4) Elevation, current ground: 1208' ✓ Elevation, proposed post-construction: 1208' ✓

5) Well Type (a) Gas  Oil  Underground Storage   
Other \_\_\_\_\_  
(b) If Gas Shallow  Deep   
Horizontal

*Done  
10-14-2014*

6) Existing Pad: Yes or No Yes ✓

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Marcellus Shale: 7400' TVD, Anticipated Thickness- 50 feet, Associated Pressure- 3200#

8) Proposed Total Vertical Depth: 7400' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 13,700' MD

11) Proposed Horizontal Leg Length: 5813'

12) Approximate Fresh Water Strata Depths: 105', 301'

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

14) Approximate Saltwater Depths: 666', 682'

15) Approximate Coal Seam Depths: 286', 393', 641', 905'

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  
(9/13)

18)

**CASING AND TUBING PROGRAM**

<u>TYPE</u>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill-up (Cu. Ft.)</u>
Conductor	20"	New	H-40	94#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	360'	360'	CTS, 500 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2450'	2450'	CTS, 998 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	13,700'	13,700'	3375 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7,100'	
Liners							

*DCW  
10-14-2014*

<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	20"	24"	0.438"	1530	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730/1730	Class A	1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	Class A	1.18
Intermediate						
Production	5-1/2"	8-3/4" & 8-1/2"	0.361"	12630	Lead-H/POZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200		
Liners						

**PACKERS**

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

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(9/13)

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.

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."

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 3.79 existing acres

22) Area to be disturbed for well pad only, less access road (acres): 3.79 existing 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 H/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 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

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\*Note: Attach additional sheets as needed.

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***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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№ 4 7 1 7 0 6 6 3 3

WW-9  
(9/13)

API Number 47 - 017 - \_\_\_\_\_  
Operator's Well No. Sulfur Unit 1H \_\_\_\_\_

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 494488557

Watershed (HUC 10) Big Isaac Creek Quadrangle Big Isaac

Elevation 1208' County Doddridge District Greenbrier

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 \_\_\_\_\_ )
- 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 \_\_\_\_\_)

*Done  
10-17-2014*

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/Freshwater, Intermediate - Dust/Soft 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)

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 *Cole Kilstrom*

Company Official (Typed Name) Cole Kilstrom

Company Official Title Environmental Representative



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Subscribed and sworn before me this 30th day of September, 20 14 Office of Oil and Gas

Natalie Komp

Notary Public

OCT 16 2014

My commission expires July 16, 2018

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Form WW-9

Operator's Well No. Sulfur Unit 1H

Antero Resources Corporation

Proposed Revegetation Treatment: Acres Disturbed 3.79 existing 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

\*Please note that this location is sharing the Access Roads "A" & "B" (8.40), Centralized Impoundment (3.57) and Excess/Topsoil Materials Stockpiles (1.87) with the Heflin North Centralized Impoundment. The Heflin North Pad will consist of 3.79 total acres of disturbance which is referenced as "Staging Area" (3.79) on the Heflin North Centralized Impoundment design.

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Annual Ryegrass	40	Crownvetch	10-15
*See attached Table 3 for additional seed type (Heflin North Pad Design Page 15)		*See attached Table 4a for additional seed type (Heflin North Pad Design Page 15)	
*or type of grass seed requested by surface owner		*or type of grass seed requested by surface owner	

NOTE: No Fescue or Timothy Grass shall be used

Attach:

Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Douglas Newlin

Comments: Maintain ETS to WV Dep regulations

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Title: Oil & Gas Inspector

Date: 10-14-2014 WV Department of

Field Reviewed?  Yes  No

Environmental Protection

12/19/2014



## Well Site Safety Plan Antero Resources

**Well Name:** Artie Unit 1H, Artie Unit 2H, Artie Unit 3H,  
Sulfur Unit 1H, Sulfur Unit 2H, Lead Unit 1H,  
Lead Unit 2H and Hoover Unit 1H

**Pad Location:** HEFLIN NORTH PAD  
Doddridge County/ Greenbrier District

**GPS Coordinates:** Lat 39°12'12.96"/Long -80°33'6.14" (NAD83)

### Driving Directions:

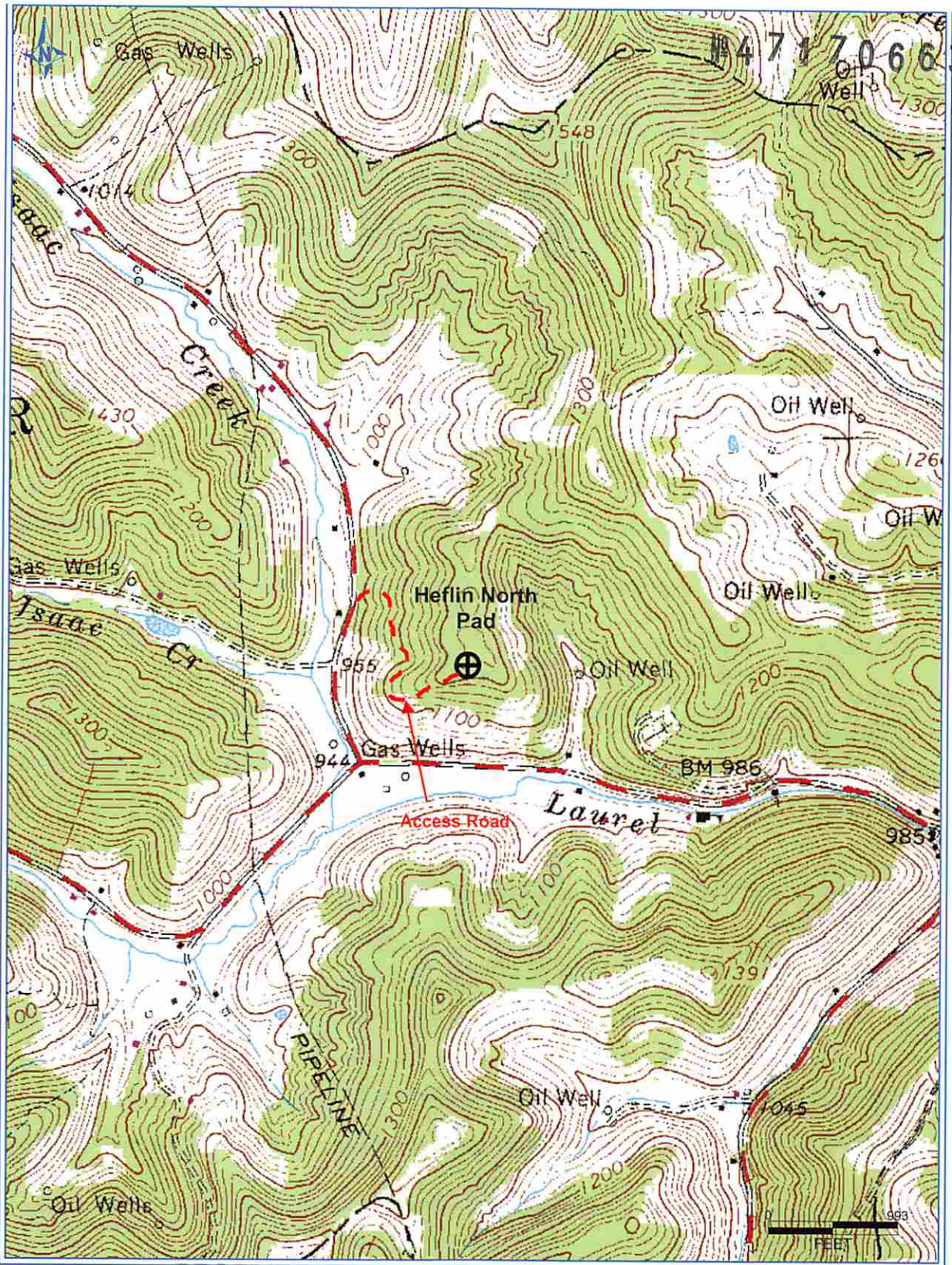
**From Clarksburg, WV**

Head west on US 50 W for 8.4 miles. Turn left onto Co RTE 31/Jarvisville-Makin road and continue for 4.8 miles. Turn right onto CO RTE 31/Jarvisville road and continue for 2.6 miles. Make a slight left onto Jarvisville-Makin road and continue for 0.5 miles. Continue onto Co RTE 25/Meathouse Fork for 1.8 miles. Keep right for Co RTE 48 and continue for 0.2 miles. Access Road will be on the right.

*DC N  
2-26-2014*

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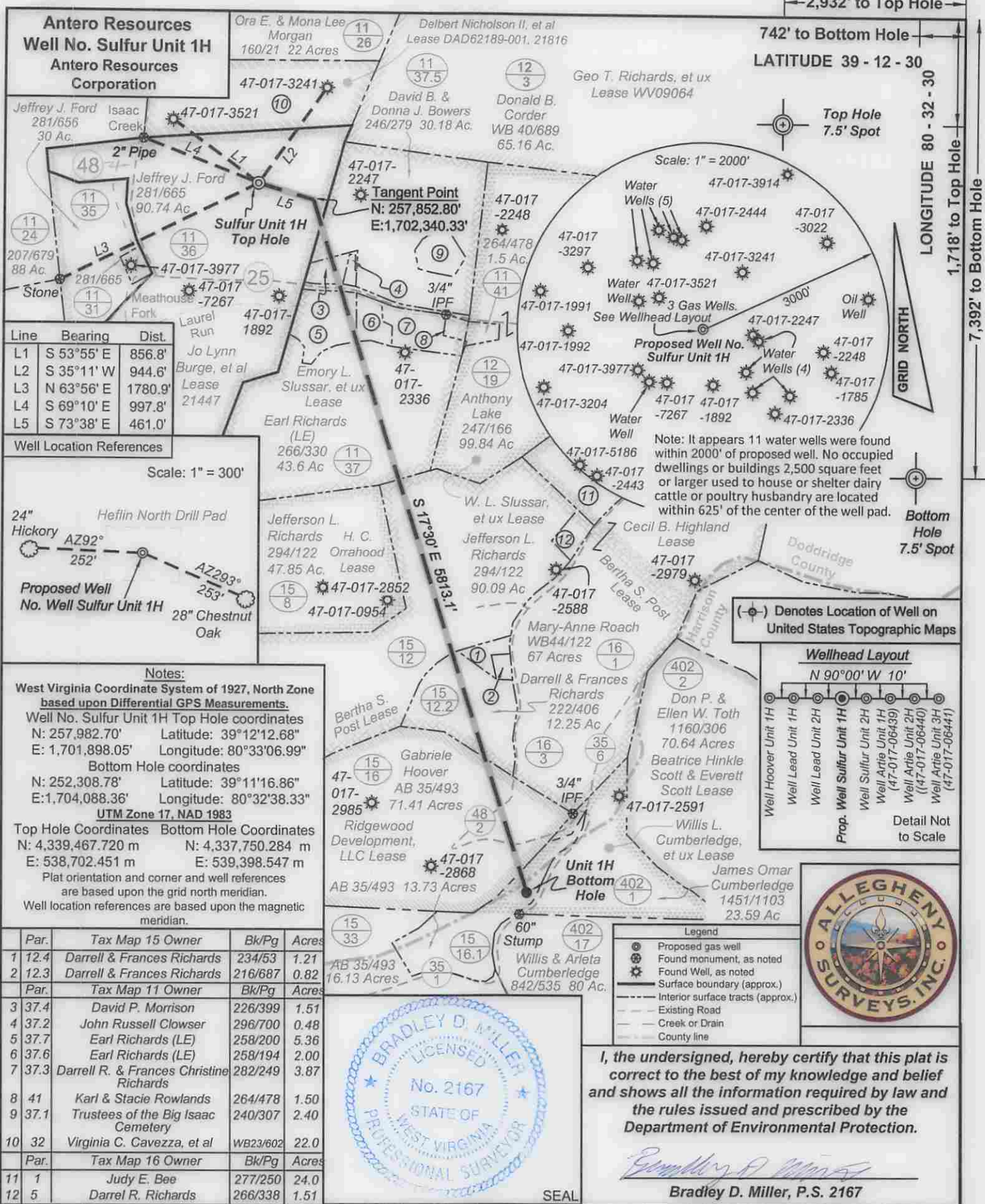
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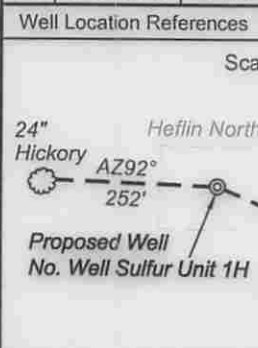
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**Antero Resources Corporation**  
 Appalachian Basin  
 Sulfur Unit 1H & 2H  
 Doddridge County  
 Quadrangle: Big Isaac  
 Watershed: Meathouse Fork  
 District: Greenbrier  
 Date: 12-06-2013

12/19/2014



Line	Bearing	Dist.
L1	S 53°55' E	856.8'
L2	S 35°11' W	944.6'
L3	N 63°56' E	1780.9'
L4	S 69°10' E	997.8'
L5	S 73°38' E	461.0'



**Notes:**  
 West Virginia Coordinate System of 1927, North Zone based upon Differential GPS Measurements.  
 Well No. Sulfur Unit 1H Top Hole coordinates  
 N: 257,982.70' Latitude: 39°12'12.68"  
 E: 1,701,898.05' Longitude: 80°33'06.99"  
 Bottom Hole coordinates  
 N: 252,308.78' Latitude: 39°11'16.86"  
 E: 1,704,088.36' Longitude: 80°32'38.33"  
 UTM Zone 17, NAD 1983  
 Top Hole Coordinates Bottom Hole Coordinates  
 N: 4,339,467.720 m N: 4,337,750.284 m  
 E: 538,702.451 m E: 539,398.547 m  
 Plat orientation and corner and well references are based upon the grid north meridian.  
 Well location references are based upon the magnetic meridian.

Par.	Tax Map 15 Owner	Bk/Pg	Acres
1	Darrell & Frances Richards	234/53	1.21
2	Darrell & Frances Richards	216/687	0.82
Par.	Tax Map 11 Owner	Bk/Pg	Acres
3	David P. Morrison	226/399	1.51
4	John Russell Clowser	296/700	0.48
5	Earl Richards (LE)	258/200	5.36
6	Earl Richards (LE)	258/194	2.00
7	Darrell R. & Frances Christine Richards	282/249	3.87
8	Karl & Stacie Rowlands	264/478	1.50
9	Trustees of the Big Isaac Cemetery	240/307	2.40
10	Virginia C. Cavezza, et al	WB23/602	22.0
Par.	Tax Map 16 Owner	Bk/Pg	Acres
11	Judy E. Bee	277/250	24.0
12	Darrel R. Richards	266/338	15.01



I, the undersigned, hereby certify that this plat is correct to the best of my knowledge and belief and shows all the information required by law and the rules issued and prescribed by the Department of Environmental Protection.

*Bradley D. Miller*  
 Bradley D. Miller, P.S. 2167

FILE NO: 349-30-G-12  
 DRAWING NO: 349-12 Sulfur 1H  
 SCALE: 1" = 1000'  
 MINIMUM DEGREE OF ACCURACY: Submeter  
 PROVEN SOURCE OF ELEVATION: WVDOT, Bridgeport, WV

STATE OF WEST VIRGINIA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 OIL AND GAS DIVISION

DATE: September 19, 2014  
 OPERATOR'S WELL NO. Sulfur Unit 1H  
 API WELL NO. 47-017-06633 H6A  
 STATE COUNTY PERMIT

WELL TYPE:  OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  
 (IF GAS) PRODUCTION:  STORAGE  DEEP  SHALLOW  
 LOCATION: ELEVATION: 1207.5' WATERSHED: Big Isaac Creek QUADRANGLE: Big Isaac  
 DISTRICT: Greenbrier COUNTY: Doddridge  
 SURFACE OWNER: Jeffrey J. Ford WILLIS L. Cumberledge, et ux RIGWOOD DEVELOPMENT, LLC ACREAGE: 90.219/2014  
 ROYALTY OWNER: Jo Lynn Burge, et al; Emory L. Slussar, et ux; Bertha S. Post LEASE NO: 21447 ACREAGE: 130; 91.21; 72; 150  
 PROPOSED WORK:  DRILL  CONVERT  DRILL DEEPER  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  
 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY) \_\_\_\_\_ 7,400' TVD  
 PLUG AND ABANDON  CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 13,700' MD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System  
 ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road  
 Denver, CO 80202 Charleston, WV 25313

# HEFLIN WELL PAD AS-BUILT AND EROSION & SEDIMENT CONTROL IMPROVEMENT PLAN

GREENBRIER DISTRICT, DODDRIDGE COUNTY, WEST VIRGINIA  
MEATHOUSE FORK WATERSHED  
USGS 7.5 BIG ISAAC QUAD MAP

API# 1706436  
API# 1706440  
API# 1706441  
API# 1706633  
API# 1706635



### LOCATION COORDINATES

ACCESS ROAD ENTRANCE  
LATITUDE 39.204741 LONGITUDE -80.555008 (NAD 83)  
N 4339411.50 E 535417.10 (UTM ZONE 17 METERS)  
CENTER OF WELL PAD  
LATITUDE 39.205901 LONGITUDE -80.551707 (NAD 83)  
N 4339468.51 E 535197.00 (UTM ZONE 17 METERS)

### GENERAL DESCRIPTION

THE WELL PAD HAS BEEN CONSTRUCTED TO AID IN THE DEVELOPMENT OF INDIVIDUAL MARCELLUS SHALE GAS WELLS.

### FLOODPLAIN NOTE

THE SITE IS LOCATED IN FLOODZONE "X" PER FEMA FLOOD MAP #4017C0080C.

### GEOTECHNICAL NOTE

A SUBSURFACE INVESTIGATION OF THE PROPOSED SITE WAS PERFORMED BY G.A. COVEY ENGINEERING, PLLC ON FEBRUARY 19-20, 2013. THIS REPORT PREPARED BY G.A. COVEY ENGINEERING, PLLC, DATED MARCH 5, 2013 REFLECTS THE RESULTS OF THE SUBSURFACE INVESTIGATION. THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS REPORT WAS USED IN THE PREPARATION OF THESE PLANS. PLEASE REFER TO THE SUBSURFACE INVESTIGATION REPORT BY G.A. COVEY ENGINEERING, PLLC FOR ADDITIONAL INFORMATION, AS NEEDED.

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.

### ENVIRONMENTAL NOTES

WETLAND DELINEATIONS WERE PERFORMED OCTOBER 26-28, 2012, AND JANUARY 15, 2013 BY ALLSTAR ECOLOGY, LLC. TO REVIEW THIS 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 JANUARY 15, 2013 STREAM AND WETLAND DELINEATION DESIGNER'S INDEX MAP WAS PREPARED BY ALLSTAR ECOLOGY, LLC AND SUMMARIZES THE RESULTS OF THE FIELD DELINEATION. THE EXHIBIT 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.

### PROJECT CONTACTS

**OPERATOR:**  
ANTERO RESOURCES CORPORATION  
235 WHITE OAK BLVD.  
BRIDGEPORT, WV 26330  
PHONE (304) 642-4100  
FAX (304) 642-4112

ELI WAGNER - ENVIRONMENTAL ENGINEER  
OFFICE (304) 642-4093 CELL (304) 476-9770

JOHN KAWCAK - OPERATIONS SUPERINTENDENT  
CELL (917) 369-1503

AARON KUNZLER - CONSTRUCTION SUPERVISOR  
CELL (406) 227-8344

ANTHONY SMITH - FIELD ENGINEER  
OFFICE (304) 642-4208 CELL (304) 673-6196

MARK JOHNSON - SURVEYING COORDINATOR  
OFFICE (304) 642-4152 CELL (304) 719-6505

BURT SIMCOX - LAND AGENT  
CELL (304) 292-9372

**ENGINEER/SURVEYOR:**  
NAVITUS ENGINEERING, INC.  
CHRIS S. KUMP, P.E. - PROJECT  
MANAGER/ENGINEER  
OFFICE (800) 662-4185 CELL (540) 696-8747

**ENVIRONMENTAL:**  
ALLSTAR ECOLOGY, LLC  
RYAN L. WARD - ENVIRONMENTAL SCIENTIST  
OFFICE (800) 213-2656 CELL (304) 600-7477

**GEOTECHNICAL:**  
G.A. COVEY ENGINEERING  
GARY A. COVEY - PROJECT ENGINEER  
OFFICE (304) 750-2203



2000 0 2000  
SCALE: 1" = 2000'

Electronic version of these plans may be viewed at Q:\OIL GAS\ISAY FILES\REVIEWS



5000 0 5000  
SCALE: 1" = 5000'

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!!

### RESTRICTIONS NOTES:

- THERE ARE NO PERENNIAL STREAMS, WETLANDS, LAKES, PONDS, OR RESERVOIRS WITHIN 100 FEET OF THE WELL PAD AND LOD.
- THERE IS NO NATURALLY PRODUCING FROTH STREAMS WITHIN 300 FEET OF THE WELL PAD AND LOD.
- THERE ARE NO GROUNDWATER INTAKE OR PUBLIC WATER SUPPLY FACILITIES WITHIN 1000 FEET OF THE WELL PAD AND LOD.
- THERE ARE NO EXISTING WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF THE WELL PAD.
- THERE ARE NO OCCUPIED DWELLING STRUCTURES WITHIN 825 FEET OF THE CENTER OF THE WELL PAD.
- THERE ARE NO AGRICULTURAL BUILDINGS LARGER THAN 2,500 SQUARE FEET WITHIN 825 FEET OF THE CENTER OF THE WELL PAD.

### 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 CSE 26-8.

WEST VIRGINIA STATE COORDINATE SYSTEM  
ELEVATION BASED ON MEANS  
NORTH ZONE, ALMOST  
CORRECT CURVE OFF & OFF  
POINT-PROJECTIONS

### SHEET INDEX

- COVER SHEET
- OVERALL PLAN SHEET INDEX
- ACCESS ROAD AS-BUILT PLAN
- WELL PAD & CENTRALIZED FRESHWATER IMPOUNDMENT AS-BUILT PLAN
- ACCESS ROAD AS-BUILT PROFILES
- WELL PAD AS-BUILT SECTIONS

HEFLIN NORTH LIMITS OF DISTURBANCE AREA (AC)	
Total Dist.	
Impacts to Safety 2 Foot T&E 1:30	
Well Pad	3.70
Total Affected Area	3.79
Total Wooded Acres Disturbed	3.70

Proposed Well Name	WW North	WW North	UTM (METERS)	Zone 17	RAD 83 Lat & Long
Arlo	N 257982.70	N 258019.87	E 1670657.80	E 533847.82	LAT 39-12-13.0311 LONG 80-53-55.8281
Arlo 1H	E 1701808.05	E 1670657.80	E 533847.82	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 2H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 3H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 4H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 5H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 6H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 7H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 8H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 9H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Arlo 10H	N 257982.70	N 258019.87	E 1670657.80	E 533714.64	LAT 39-12-13.0306 LONG 80-53-55.8281
Well Pad Elev. Min.	1,207.3				

### NOTES:

- ALL BMP'S MUST REMAIN IN PLACE AND FUNCTIONAL UNTIL ALL AREAS WITHIN THE LIMIT OF DISTURBANCE ARE COMPLETE AND PERMANENTLY STABILIZED. MAINTENANCE MUST INCLUDE INSPECTION OF ALL EROSION AND SEDIMENT CONTROLS AFTER EACH RAINFALL EVENT IN EXCESS OF 0.5" AND ON A WEEKLY BASIS.
- THE CONSTRUCTION SITE SHOULD BE STABILIZED AS SOON AS POSSIBLE AFTER COMPLETION. ESTABLISHMENT OF FINAL STABILIZATION MUST BE INITIATED NO LATER THAN 7 DAYS AFTER REACHING FINAL GRADE. FINAL STABILIZATION MEANS THAT ALL SOIL-DISTURBING ACTIVITIES ARE COMPLETED AND THAT EITHER A PERMANENT VEGETATIVE COVER WITH A DENSITY OF 70% OR GREATER HAS BEEN ESTABLISHED OR THAT THE SURFACE HAS BEEN COVERED WITH SAND COVER SUCH AS PAVEMENT OR BUILDINGS. IT SHOULD BE NOTED THAT THE 70% REQUIREMENT RELATES TO THE TOTAL AREA VEGETATED AND NOT JUST A PERCENT OF THE SITE.
- ALL PERMANENT SEDIMENT CONTROL MEASURES CAN BE REMOVED AFTER THE SITE IS PERMANENTLY STABILIZED AND APPROVAL IS RECEIVED FROM THE WVDEP.
- ANY AREAS DISTURBED BY REMOVAL OF CONTROLS SHALL BE REPAIRED, STABILIZED, AND PERMANENTLY SEEDS.

THE AS-BUILT INFORMATION SHOWN HEREON REFLECTS FIELD DATA COLLECTED RELATING TO THE FINAL GRADING OF THE DISTURBED AREA AS OF JUNE 27, 2014. NAVITUS ENGINEERING IS NOT RESPONSIBLE FOR ANY CHANGES MADE TO THE SITE AFTER THE ABOVE MENTIONED DATE.

**NAVITUS ENERGY ENGINEERING**  
Telephone: (800) 662-4185 | www.NavitusEng.com

DATE: 10/01/2014  
SCALE: AS SHOWN  
SHEET 1 OF 6

COVER SHEET  
**HEFLIN WELL PAD**  
GREENBRIER DISTRICT  
DODDRIDGE COUNTY, WEST VIRGINIA

APPROVED  
WVDEP OOG  
12/12/2014

THIS DOCUMENT WAS PREPARED FOR ANTERO RESOURCES CORPORATION

DESIGNER: CHRIS S. KUMP, P.E.  
CHECKED: GARY A. COVEY, P.E.  
DATE: 10/01/2014

