



August 16, 2016

Reference No. 082715

Ms. Beverly McKeone  
Division of Air Quality  
WV Department of Environmental Protection  
601 57th Street, SE  
Charleston, West Virginia 25304

Dear Ms. Beverly McKeone:

**Re: General Permit Registration G70-C Application  
Hubert Well Pad  
Antero Resources Corporation**

GHD Services Inc. (GHD) would like to submit this General Permit application that we prepared on behalf of Antero Resources Corporation for an oil and gas facility identified as Hubert Well Pad. This was previously submitted for permit determination and was assigned a Facility ID No. 033-00246 and PD14-098.

Enclosed are the following documents:

- Original copy of the G70-C General Permit Application.
- Two CD copies of the G70-C General Permit Application.
- The application fee with check no. 453964 in the amount of \$1500.00.

Please let us know if you have any questions or require additional information.

Sincerely,

GHD Services Inc.

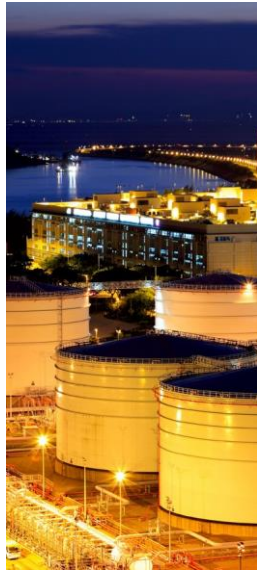
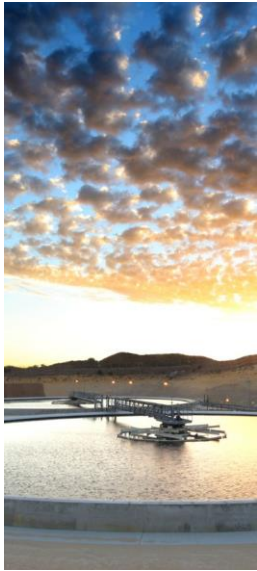
A handwritten signature in black ink, appearing to read "Manuel Bautista", written in a cursive style.

Manuel Bautista

MB/ma/264

Encl.

cc: Barry Schatz, Antero Resources Corporation  
Elizabeth McLaughlin, Antero Resources Corporation



# General Permit G70-C Registration Application

Hubert Well Pad

Antero Resources Corporation

GHD  
6320 Rothway Suite 100 Houston Texas 77040  
082715 | Report No 264 | August 2016

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west virginia department of environmental protection

Division of Air Quality  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304  
Phone (304) 926-0475  
Fax (304) 926-0479  
www.dep.wv.gov

### G70-C GENERAL PERMIT REGISTRATION APPLICATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS PRODUCTION FACILITIES LOCATED AT THE WELL SITE

- CONSTRUCTION
- MODIFICATION
- RELOCATION
- CLASS I ADMINISTRATIVE UPDATE
- CLASS II ADMINISTRATIVE UPDATE

#### SECTION 1. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): Antero Resources Corporation

Federal Employer ID No. (FEIN): 80-0162034

Applicant's Mailing Address: 1615 Wynkoop Street

City: Denver State: CO ZIP Code: 80202

Facility Name: Hubert Well Pad

Operating Site Physical Address: 3528 Raccoon Run Road

City: Salem Zip Code: 26426 County: Harrison

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):

Latitude: 39.25342  
Longitude: -80.56037

SIC Code: 1311

DAQ Facility ID No. (For existing facilities)  
033-00246

NAICS Code: 211111

#### CERTIFICATION OF INFORMATION

This G70-C General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of the Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. **Any administratively incomplete or improperly signed or unsigned G70-C Registration Application will be returned to the applicant. Furthermore, if the G70-C forms are not utilized, the application will be returned to the applicant. No substitution of forms is allowed.**

I hereby certify that Barry Schatz is an Authorized Representative and in that capacity shall represent the interest of the business (e.g., Corporation, Partnership, Limited Liability Company, Association Joint Venture or Sole Proprietorship) and may obligate and legally bind the business. If the business changes its Authorized Representative, a Responsible Official shall notify the Director of the Division of Air Quality immediately.

I hereby certify that all information contained in this G70-C General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible.

Responsible Official Signature: \_\_\_\_\_  
Name and Title: Phone: Fax:  
Email: Date:

If applicable:  
Authorized Representative Signature: Barry Schatz  
Name and Title: Barry Schatz/ Senior Environmental & Regulatory Manager Phone: 303-357-7276 Fax: 303-357-7315  
Email: bschatz@anteroresources.com Date: 8/16/2016

If applicable:  
Environmental Contact  
Name and Title: Phone: Fax:  
Email: Date:



<b>OPERATING SITE INFORMATION</b>	
Briefly describe the proposed new operation and/or any change(s) to the facility: Registration application for an oil and natural gas facility due to increase in condensate production, and addition of 3 Cimarron enclosed combustors and 7 line heaters.	
Directions to the facility: From Salem, Head south on Water St for 43 ft toward W Main St, turn left on Water St towards E Main St and go 0.2 mi, turn right onto Mechanic St and go 246 ft, turn right onto South St and go 0.4 mi, continue onto Patterson Fork Rd for 0.2 mi, continue onto Salem Country Club Rd 0.4 mi, turn slightly right on Patterson Fork Rd and go 0.9 mi, turn left onto Co Rte 29/2 and go 0.3 mi. The destination will be towards right.	
<b>ATTACHMENTS AND SUPPORTING DOCUMENTS</b>	
<b>I have enclosed the following required documents:</b>	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22).	
<input checked="" type="checkbox"/> Check attached to front of application. <input type="checkbox"/> I wish to pay by electronic transfer. Contact for payment (incl. name and email address): <input type="checkbox"/> I wish to pay by credit card. Contact for payment (incl. name and email address):	
<input checked="" type="checkbox"/> \$500 (Construction, Modification, and Relocation) <input type="checkbox"/> \$300 (Class II Administrative Update) <input checked="" type="checkbox"/> \$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO <sup>1</sup> <input type="checkbox"/> \$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH <sup>2</sup>	
<sup>1</sup> Only one NSPS fee will apply. <sup>2</sup> Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. <i>NSPS and NESHAP fees apply to new construction or if the source is being modified.</i>	
<input checked="" type="checkbox"/> Responsible Official or Authorized Representative Signature (if applicable)	
<input checked="" type="checkbox"/> Single Source Determination Form ( <b>must be completed in its entirety</b> ) – Attachment A	
<input type="checkbox"/> Siting Criteria Waiver (if applicable) – Attachment B	<input checked="" type="checkbox"/> Current Business Certificate – Attachment C
<input checked="" type="checkbox"/> Process Flow Diagram – Attachment D	<input checked="" type="checkbox"/> Process Description – Attachment E
<input checked="" type="checkbox"/> Plot Plan – Attachment F	<input checked="" type="checkbox"/> Area Map – Attachment G
<input checked="" type="checkbox"/> G70-C Section Applicability Form – Attachment H	<input checked="" type="checkbox"/> Emission Units/ERD Table – Attachment I
<input checked="" type="checkbox"/> Fugitive Emissions Summary Sheet – Attachment J	
<input checked="" type="checkbox"/> Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
<input checked="" type="checkbox"/> Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
<input checked="" type="checkbox"/> Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPU's, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
<input type="checkbox"/> Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
<input checked="" type="checkbox"/> Tanker Truck Loading Data Sheet (if applicable) – Attachment O	
<input type="checkbox"/> Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
<input type="checkbox"/> Pneumatic Controllers Data Sheet – Attachment Q	
<input checked="" type="checkbox"/> Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment R	
<input checked="" type="checkbox"/> Emission Calculations (please be specific and include all calculation methodologies used) – Attachment S	
<input checked="" type="checkbox"/> Facility-wide Emission Summary Sheet(s) – Attachment T	
<input checked="" type="checkbox"/> Class I Legal Advertisement – Attachment U	
<input checked="" type="checkbox"/> One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

GHD SERVICES INC.

▼ PLEASE DETACH AND RETAIN FOR YOUR RECORDS ▼

INVOICE NUMBER	DATE	VOUCHER NO.	AMOUNT
Account Number: CR80516	8/5/2016	40WVDEPAQ 401017370	453964 1,500.00

**TOTAL: 1,500.00**

THIS DOCUMENT IS PROTECTED BY A MICRO-PRINT SIGNATURE LINE, FLUORESCENT PAPER FIBERS, A WATERMARKED BACKER, AND IS REACTIVE TO CHEMICAL ALTERATION

**GHD SERVICES INC.**  
 2055 NIAGARA FALLS BLVD, SUITE 3  
 NIAGARA FALLS, NY 14304

**M&T BANK**  
 MANUFACTURERS AND TRADERS TRUST COMPANY  
 Commercial Banking  
 Main Office, Ithaca, NY 14850  
 50-7063-2213

8/5/2016

NO. 453964

PAY

\*\*\*\*\*1,500

DOLLARS AND

CENTS

\*\*\*\*\*00

\$\*\*\*\*\*1,500.00

TO THE  
ORDER  
OF

**WEST VIRGINIA DEPT OF ENVIRONMENTAL  
 PROTECTION - DIVISION AIR QUALITY**  
 601 57th Street SE  
 Charleston, WV 25304 US

GHD SERVICES INC.

AUTHORIZED SIGNATURES

WARNING: THIS DOCUMENT IS VOID IF ACCOUNT NUMBER DOES NOT APPEAR ON THE REVERSE SIDE IN RED

⑈453964⑈ ⑆221370632⑆ 1000000 118910⑈

**Attachment R  
AUTHORITY OF CORPORATION  
OR OTHER BUSINESS ENTITY (DOMESTIC OR FOREIGN)**

TO: The West Virginia Department of Environmental Protection,  
Division of Air Quality

DATE: January 23, 2015

ATTN.: Director

Corporation's / other business entity's Federal Employer I.D. Number 80-0162034

The undersigned hereby files with the West Virginia Department of Environmental Protection, Division of Air Quality, a permit application and hereby certifies that the said name is a trade name which is used in the conduct of an incorporated business or other business entity.

Further, the corporation or the business entity certifies as follows:

(1) Barry Schatz (is/are) the authorized representative(s) and in that capacity may represent the interest of the corporation or the business entity and may obligate and legally bind the corporation or the business entity.

(2) The corporation or the business entity is authorized to do business in the State of West Virginia.

(3) If the corporation or the business entity changes its authorized representative(s), the corporation or the business entity shall notify the Director of the West Virginia Department of Environmental Protection, Division of Air Quality, immediately upon such change.



\_\_\_\_\_  
President or Other Authorized Officer  
(Vice President, Secretary, Treasurer or other  
official in charge of a principal business function of  
the corporation or the business entity)

(If not the President, then the corporation or the business entity must submit certified minutes or bylaws stating legal authority of other authorized officer to bind the corporation or the business entity).

\_\_\_\_\_  
Secretary

\_\_\_\_\_  
Name of Corporation or business entity

# **Attachment A**

## **Single Source Determination Form**



## ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

Classifying multiple facilities as one “stationary source” under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of Building, structure, facility, or installation as given in §45-14-2.13 and §45-19-2.12. The definition states:

*“Building, Structure, Facility, or Installation” means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same “Major Group” (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).*

Is there a facility owned by or associated with the natural gas industry located within one (1) mile of the proposed facility? Yes  No

*If Yes, please complete the questionnaire on the following page (Attachment A).*

Please provide a source aggregation analysis for the proposed facility below:

The Hubert Well Pad calculation of potential to emit included all the emissions sources that belong to the same industrial grouping, are located on contiguous or adjacent properties, and are under the control of the same person. The nearest emission source that belongs to the same industrial grouping and under the control of the same person but not located on contiguous or adjacent property is the Varner West Well Pad. This well pad operates independently and is approximately 0.63 mile east of the facility. There is one other nearby source, Clarence Well Pad that belongs to the same industrial grouping and is under the same control but not located on contiguous or adjacent property. This well pad is located approximately 0.68 mile southwest of Hubert Well Pad and operates completely independent.

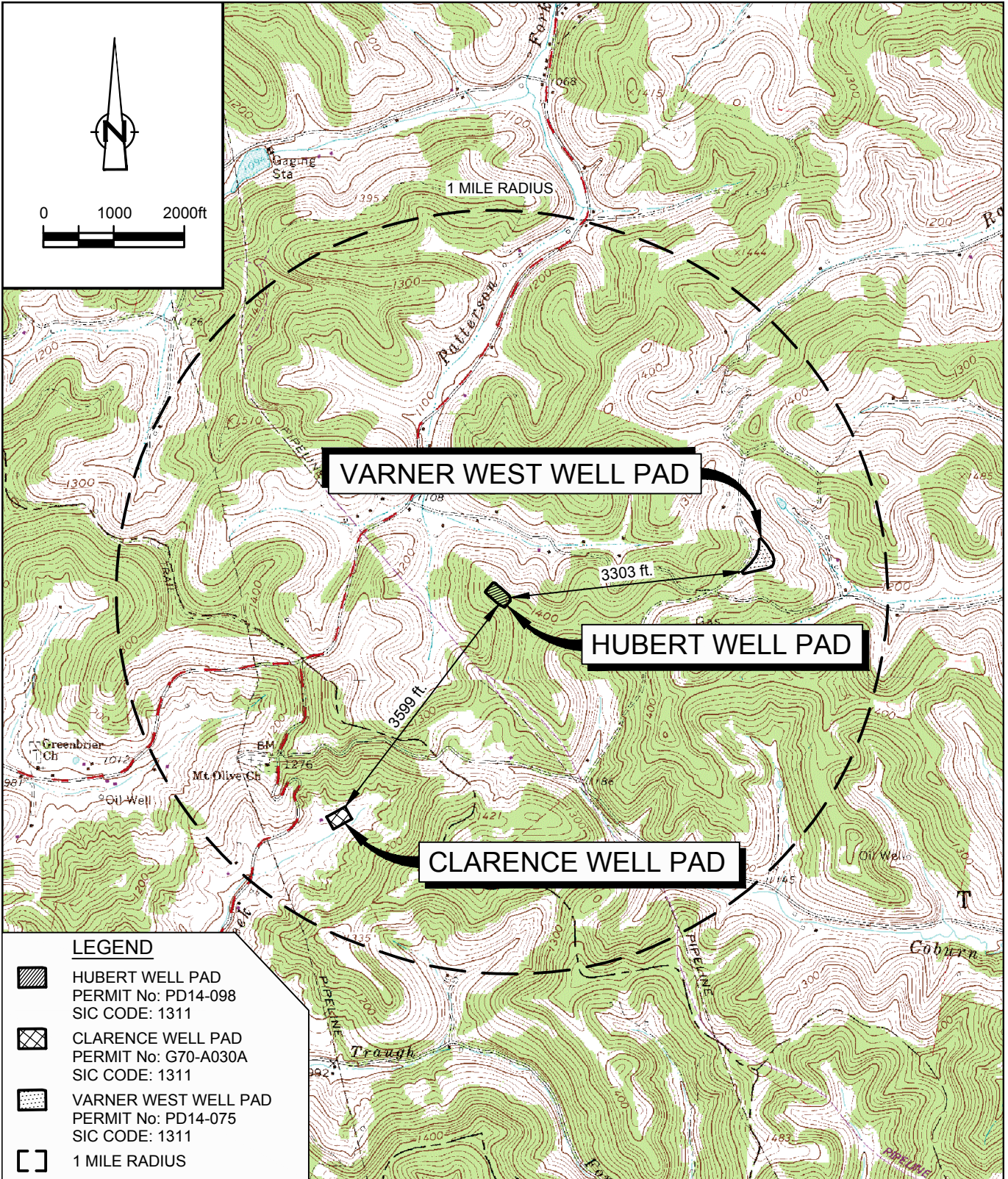
## ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

Answer each question with a detailed explanation to determine contiguous or adjacent properties which are under a common control and any support facilities. This section must be completed in its entirety.





Provide a map of contiguous or adjacent facilities (production facilities, compressor stations, dehydration facilities, etc.) which are under common control and those facilities that are not under common control but are support facilities. Please indicate the SIC code, permit number (if applicable), and the distance between facilities in question on the map.

Are the facilities owned by the same parent company or a subsidiary of the parent company? Provide the owners identity and the percentage of ownership of each facility. <b>Antero Resources has 100% ownership of each facility.</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Does an entity such as a corporation have decision making authority over the operation of a second entity through a contractual agreement or voting interest? Please explain.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is there a contract for service relationship between the two (2) companies or, a support/dependency relationship that exists between the two (2) companies? Please explain.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Do the facilities share common workforces, plant managers, security forces, corporate executive officers or board executives?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Will managers or other workers frequently shuttle back and forth to be involved actively at both facilities?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Do the facilities share common payroll activities, employee benefits, health plans, retirement funds, insurance coverage, or other administrative functions? Please explain.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Does one (1) facility operation support the operation of the other facility?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is one (1) facility dependent on the other? If one (1) facility shuts down, what are the limitations on the other to pursue outside business? Please explain. <b>No, these facilities operate completely independently.</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are there any financial arrangements between the two (2) entities?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Are there any legal or lease agreements between the two (2) facilities?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Do the facilities share products, byproducts, equipment, or other manufacturing or air pollution control device equipment? Please explain. <b>No, these facilities operate completely independently.</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Do all the pollutant-emitting activities at the facilities belong to the same SIC Code? Please provide the SIC Codes. <b>1311</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Was the location of the new facility chosen primarily because of its proximity to the existing facility to integrate the operation of the two (2) facilities? Please explain. <b>No, these facilities operate completely independently.</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Will materials be routinely transferred between the two (2) facilities? Please explain the amount of transfer and how often the transfers take place and what percentages go to the various entities.	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Does the facility influence production levels or compliance with environmental regulations at other facilities? Who accepts the responsibility for compliance with air quality requirements? Please explain. <b>No, these facilities operate completely independently.</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>





**LEGEND**

-  HUBERT WELL PAD  
PERMIT No: PD14-098  
SIC CODE: 1311
-  CLARENCE WELL PAD  
PERMIT No: G70-A030A  
SIC CODE: 1311
-  VARNER WEST WELL PAD  
PERMIT No: PD14-075  
SIC CODE: 1311
-  1 MILE RADIUS

SOURCE: USGS QUADRANGLE MAPS;  
BIG ISAAC AND SALEM, WEST VIRGINIA

SITE COORDINATES: LAT: 39.253426, LONG: -80.560375



Attachment A  
SINGLE SOURCE DETERMINATION  
HUBERT WELL PAD  
ANTERO RESOURCES  
*Harrison County, West Virginia*

# **Attachment B**

## **Siting Criteria Waiver**



**Attachment B**

**Siting Waiver**

**Hubert Well Pad**

**Antero Resources Corporation**

**Harrison County, West Virginia**

A Siting Waiver form is not required because there are no occupied dwelling structures within 300 feet of Hubert Well Pad.

# **Attachment C**

## **Current Business Certificate**

# State of West Virginia



## Certificate

*I, Natalie E. Tennant, Secretary of State of the State of West Virginia, hereby certify that*

### ANTERO RESOURCES CORPORATION

a corporation formed under the laws of Delaware, which is authorized to transact business in West Virginia by a Certificate of Authority has filed in my office as required by the provisions of the West Virginia Code, a copy of an amendment to its Articles of Incorporation authenticated by the proper office of the state or country of its incorporation and was found to conform to law.

Therefore, I issue this

### CERTIFICATE OF AMENDMENT TO CERTIFICATE OF AUTHORITY



*Given under my hand and the  
Great Seal of the State of  
West Virginia on this day of  
June 10, 2013*

*Natalie E. Tennant*

Secretary of State

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  
IN THE OFFICE OF Corporations Division  
SECRETARY OF STATE Tel: (304)558-8000  
Fax: (304)558-8381

Website: [www.wvsos.com](http://www.wvsos.com)  
E-mail: [business@wvsos.com](mailto:business@wvsos.com)

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

**APPLICATION FOR  
AMENDED CERTIFICATE  
OF AUTHORITY**

**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: 6/25/2008
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
7. Signature Information (See below **\*Important Legal Notice Regarding Signature**):  
Print Name of Signer: Alvyn A. Schopp Title/Capacity: Authorized Person  
Signature:  Date: June 10, 2013

**\*Important Legal Notice Regarding Signature:** Per 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.



# Delaware

PAGE 1

*The First State*

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF AMENDMENT OF "ANTERO RESOURCES APPALACHIAN CORPORATION", CHANGING ITS NAME FROM "ANTERO RESOURCES APPALACHIAN CORPORATION" TO "ANTERO RESOURCES CORPORATION", FILED IN THIS OFFICE ON THE TENTH DAY OF JUNE, A.D. 2013, AT 9:37 O'CLOCK A.M.

A FILED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS.

4520810 8100

130754186



  
Jeffrey W. Bullock, Secretary of State  
AUTHENTICATION: 0496546

DATE: 06-10-13

AMENDMENT TO THE  
AMENDED AND RESTATED  
CERTIFICATE OF INCORPORATION  
OF  
ANTERO RESOURCES APPALACHIAN CORPORATION

Antero Resources Appalachian Corporation (the "Corporation"), a corporation organized and existing under the laws of the State of Delaware, hereby certifies as follows:

1. The original Certificate of Incorporation of the Corporation was filed under the name Antero Resources Barnett Corporation with the filing of the original Certificate of Incorporation of the Corporation with the Secretary of State of the State of Delaware on March 18, 2008.

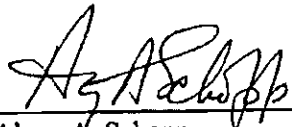
2. This Amendment to the Amended and Restated Certificate of Incorporation has been duly adopted and approved in accordance with Sections 242 of the General Corporation Law of the State of Delaware.

3. Article FIRST of the Amended and Restated Certificate of Incorporation is hereby amended to read in its entirety as follows:

FIRST. The name of the Corporation is Antero Resources Corporation.

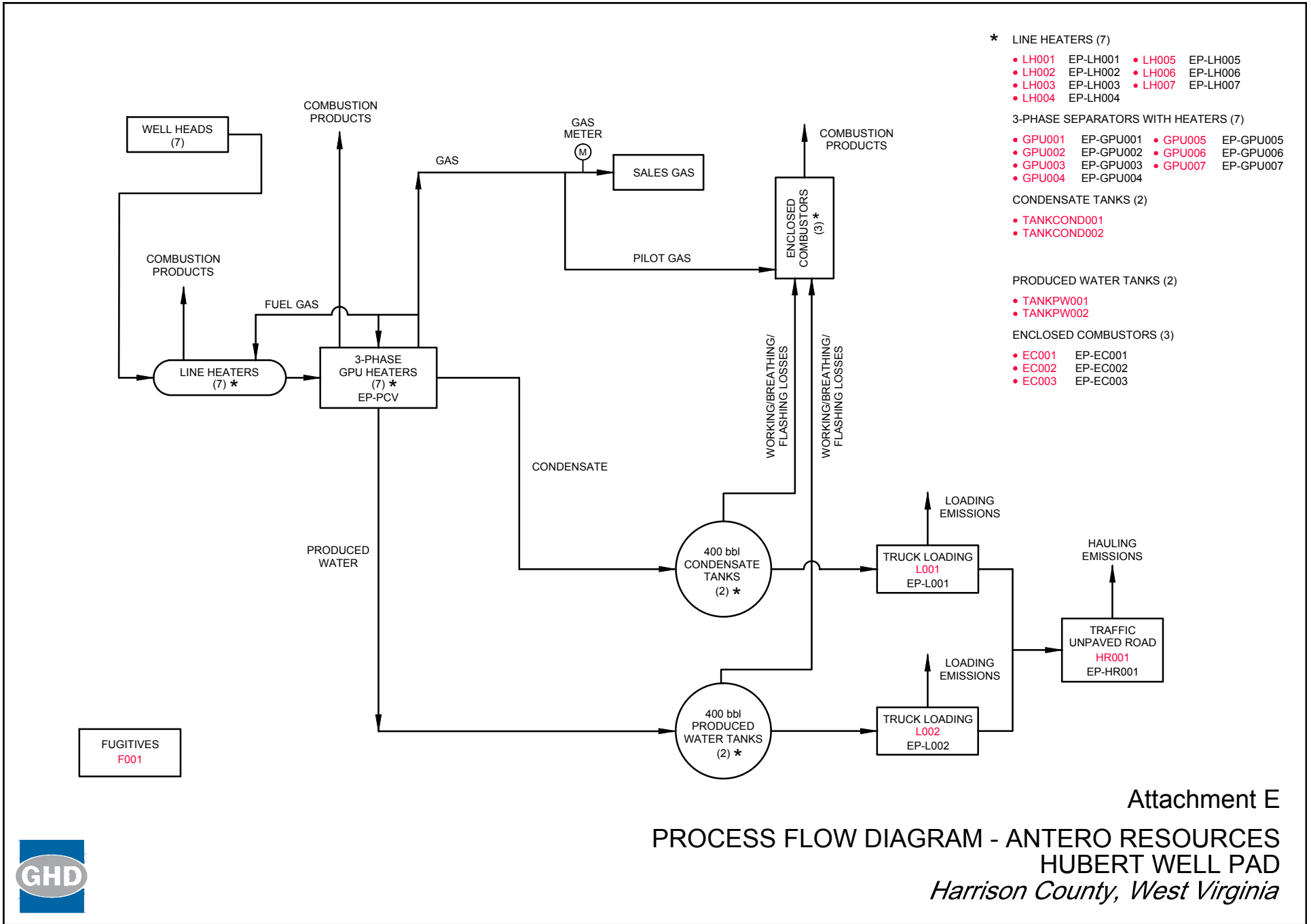
IN WITNESS WHEREOF, the Corporation has caused this Certificate of Amendment to be executed by its duly authorized officer on the 10th day of June, 2013.

ANTERO RESOURCES APPALACHIAN CORPORATION

By:   
Name: Alwyn A. Schopp  
Title: Vice President of Accounting &  
Administration / Treasurer

# **Attachment D**

## **Process Flow Diagram**



Attachment E  
**PROCESS FLOW DIAGRAM - ANTERO RESOURCES  
 HUBERT WELL PAD**  
*Harrison County, West Virginia*





# **Attachment E**

## **Process Description**

## **Attachment E**

### **Process Description**

#### **Hubert Well Pad**

#### **Antero Resources Corporation**

#### **Harrison County, West Virginia**

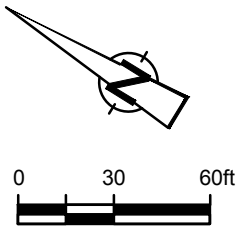
A mixture of condensate, water, and entrained gas from the condensate and gas wells enters the facility through a series of line heaters (LH001-007) and gas production units (GPU001-GPU007) which are 3 phase separators where the gas, condensate, and produced water are separated. The line heaters and GPUs are fueled by a slip stream of the separated gas. The separated gas is then metered and sent to the sales gas pipeline. The separated condensate and water from the separators flow to their respective storage tanks (TANKCOND001-002 and TANKPW001-002).

The facility has two (2) tanks (TANKCOND001-002) on site to store condensate and two (2) tanks (TANKPW001-002) to store produced water prior to removal from the site. The flashing, working and breathing losses from the tanks are routed to three enclosed combustors (EC001-003) to control the emissions. The enclosed combustors that will be used to control emissions are designed to achieve a VOC destruction efficiency of 98 percent.

Condensate and produced water are transported off site on an as needed basis via tanker truck. Truck loading connections are in place to pump condensate (L001) and produced water (L002) from the storage tanks into tanker trucks. Emissions from the loading operations are vented to the atmosphere.

Emissions from the facility's emission sources were calculated using the extended analysis of the condensate and gas from Moore Unit 1H, one of the wells in the Moore Well Pad. These extended analyses are considered representative of the materials from Hubert Well Pad, being in the same Marcellus rock formation.

# **Attachment F Plot Plan**



TANK COND001 TANK PW001  
 TANK COND002 TANK PW002

L001 (EP-L001)  
 L002 (EP-L002)

HAULING ROUTE  
 (EP-HR001)  
 HR001

ACCESS ROAD

FACILITY  
 FUGITIVES  
 F001

FORD UNIT 1H  
 FORD UNIT 2H  
 NELLE UNIT 1H  
 NELLE UNIT 2H  
 NORRIS UNIT 1H  
 NORRIS UNIT 2H  
 RUTH UNIT 2H

PRODUCTION  
 EQUIPMENT  
 (EP-PCV)

ENCLOSED  
 COMBUSTORS  
 EC001 (EP-EC001)  
 EC002 (EP-EC002)  
 EC003 (EP-EC003)

GPU001 (EP-GPU001) GPU006 (EP-GPU006)  
 GPU002 (EP-GPU002) GPU007 (EP-GPU007)  
 GPU003 (EP-GPU003)  
 GPU004 (EP-GPU004)  
 GPU005 (EP-GPU005)

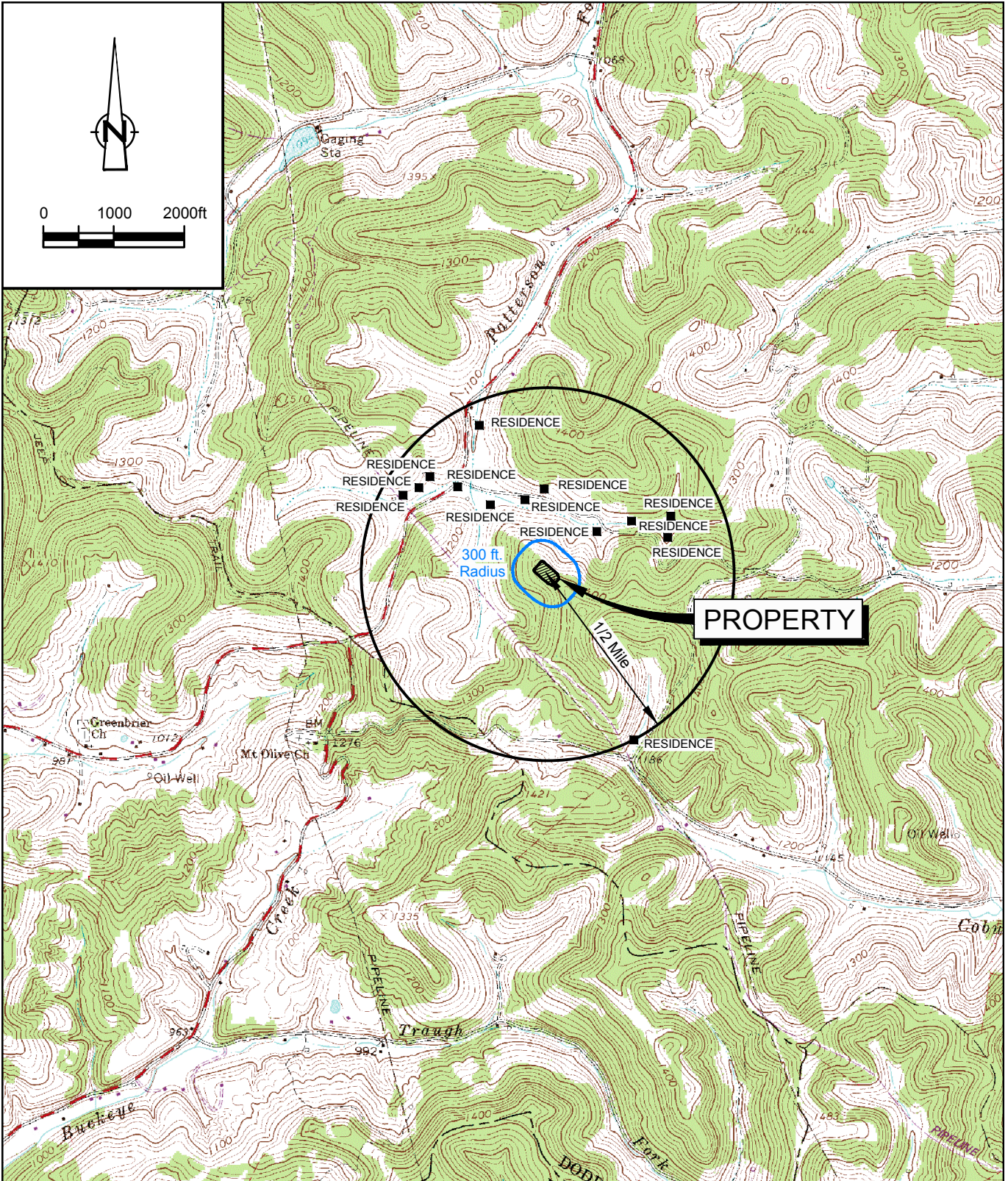


Attachment F  
 PLOT PLAN  
 HUBERT WELL PAD  
 ANTERO RESOURCES  
 Harrison County, West Virginia

# **Attachment G**

## **Area Map**





SOURCE: USGS QUADRANGLE MAPS;  
BIG ISAAC AND SALEM, WEST VIRGINIA

SITE COORDINATES: LAT: 39.253426, LONG: -80.560375  
SITE ELEVATION: 1147 ft AMSL



**Attachment G**  
**AREA MAP**  
**HUBERT WELL PAD**  
**ANTERO RESOURCES**  
*Harrison County, West Virginia*



# **Attachment H**

## **G70-C Section Applicability Form**

**ATTACHMENT H – G70-C SECTION APPLICABILITY FORM**

**General Permit G70-C Registration  
Section Applicability Form**

General Permit G70-C was developed to allow qualified applicants to seek registration for a variety of sources. These sources include gas well affected facilities, storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, centrifugal compressors, reciprocating compressors, reciprocating internal combustion engines (RICEs), tank truck loading, fugitive emissions, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G70-C allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

<b>GENERAL PERMIT G70-C APPLICABLE SECTIONS</b>	
<input checked="" type="checkbox"/> Section 5.0	Gas Well Affected Facility (NSPS, Subpart OOOO)
<input checked="" type="checkbox"/> Section 6.0	Storage Vessels Containing Condensate and/or Produced Water <sup>1</sup>
<input type="checkbox"/> Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO)
<input checked="" type="checkbox"/> Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO and/or NESHAP Subpart HH
<input checked="" type="checkbox"/> Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
<input type="checkbox"/> Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)
<input type="checkbox"/> Section 11.0	Centrifugal Compressor Affected Facility (NSPS, Subpart OOOO) <sup>2</sup>
<input type="checkbox"/> Section 12.0	Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO) <sup>2</sup>
<input type="checkbox"/> Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines, Microturbines
<input checked="" type="checkbox"/> Section 14.0	Tanker Truck Loading <sup>3</sup>
<input type="checkbox"/> Section 15.0	Glycol Dehydration Units <sup>4</sup>

- 1 Applicants that are subject to Section 6 may also be subject to Section 7 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 8.
- 2 Applicants that are subject to Section 11 and 12 may also be subject to the applicable RICE requirements of Section 13.
- 3 Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 8.
- 4 Applicants that are subject to Section 15 may also be subject to the requirements of Section 9 (reboilers). Applicants that are subject to Section 15 may also be subject to control device and emission reduction device requirements of Section 8.



# **Attachment I**

## **Emission Units/ ERD Table**

**ATTACHMENT I – EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) TABLE**

Include ALL emission units and air pollution control devices /ERDs that will be part of this permit application review. This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

Emission Unit ID <sup>1</sup>	Emission Point ID <sup>2</sup>	Emission Unit Description	Year Installed/Modified	Manufac. Date <sup>3</sup>	Design Capacity	Type <sup>4</sup> and Date of Change	Control Device(s) <sup>5</sup>	ERD (s) <sup>6</sup>
GPU001 through GPU007	EP-GPU001 through EP-GPU007	Gas Production Unit Heater	2014		1.0 MMBtu/hr per GPU	Existing	N/A	
LH001 through LH007	EP-LH001 through EP-LH007	Line Heater	2016		2.0 MMBtu/hr per Line Heater	New	N/A	
F001	F001	Fugitives	2014		N/A	Existing	N/A	
TANK001 through TANK002	EP-EC001, EP-EC002, EP-EC003	Condensate Tank F/W/B	2014		400 bbl each	Existing	EC001, EC002, EC003	
TANKPW001 through TANKPW002	EP-EC001, EP-EC002, EP-EC003	PW Tank F/W/B	2014		400 bbl each	New	EC001, EC002, EC003	
L001	EP-L001	Loading (Condensate)	2014		10080 gal/hr 153300 gal/yr	Existing	N/A	
L002	EP-L002	Loading (Produced Water)	2014		10080 gal/hr 7665000 gal/yr	Existing	N/A	
HR001	EP-HR001	Haul Truck	2014		40 ton capacity	Existing	N/A	
EC001	EP-EC001	Enclosed Combustor	2016		12 MMBtu/hr	New	N/A	
EC002	EP-EC002	Enclosed Combustor	2016		12 MMBtu/hr	New	N/A	
EC003	EP-EC003	Enclosed Combustor	2016		12 MMBtu/hr	New	N/A	
PCV	EP-PCV	Pneumatic CV	2014		6.6 scf/day/PCV	Existing	N/A	

1 For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S, ... or other appropriate designation.  
 2 For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.  
 3 When required by rule.  
 4 New, modification, removal, existing.  
 5 For Control Devices use the following numbering system: 1C, 2C, 3C, ... or other appropriate designation.  
 6 For ERDs use the following numbering system: 1D, 2D, 3D, ... or other appropriate designation.

# **Attachment J**

## **Fugitive Emissions Summary Sheet**

**ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET**

Sources of fugitive emissions may include loading operations, equipment leaks, blowdown emissions , etc.  
Use extra pages for each associated source or equipment if necessary.

Source/Equipment:

Leak Detection Method Used		<input type="checkbox"/> Audible, visual, and	<input checked="" type="checkbox"/> Infrared (FLIR) cameras	<input type="checkbox"/> Other (please describe)	<input type="checkbox"/> None required		
Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO <sub>2</sub> e)
Valves	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	350	EPA	gas	2.90	0.34	228.63
Valves	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	364	EPA	liquid	8.56	0.52	1.75
Connections (Not sampling)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	413	EPA	gas	0.15	1.81E-02	11.99
Flanges	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	91	EPA	gas	0.07	7.77E-03	5.15
Loading	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	2	EPA	gas	0.09	6.87E-02	0.25

1 Other equipment types may include compressor seals, relief valves, diaphragms, drains, meters, etc.

Please provide an explanation of the sources of fugitive emissions (e. g. pigging operations, equipment blowdowns, pneumatic controllers, etc.)

Please indicate if there are any closed vent bypasses (include component)

Specify all equipment used in the closed vent system (e. g. VRU, ERD, thief hatches, tanker truck loading, etc.)

# **Attachment K**

## **Gas Well Affected Facility Data Sheet**

**ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET**

Complete this data sheet if you are the owner or operator of a gas well affected facility for which construction, modification or reconstruction commenced after August 23, 2011. This form must be completed for natural gas well affected facilities regardless of when flowback operations occur (or have occurred).

<b>API Number</b>	<b>Date of Flowback</b>	<b>Date of Well Completion</b>	<b>Green Completion and/or Combustion Device</b>
470-330-57020	5/1/2017	3/1/2017	Green
470-330-56940	5/1/2017	3/1/2017	Green
470-330-56860	1/25/2014	11/1/2013	Green
470-330-56870	5/1/2017	3/1/2017	Green
470-330-56990	1/12/2014	10/1/2013	Green
470-330-57010	1/17/2014	10/1/2013	Green
470-330-56980	12/31/2013	10/1/2013	Green

*Note: If future wells are planned and no API number is available please list as PLANNED. If there are existing wells that commenced construction prior to August 23, 2011, please acknowledge as existing.*

*This is the same API (American Petroleum Institute) well number(s) provided in the well completion notification and as provided to the WVDEP, Office of Oil and Gas for the well permit. The API number may be provided on the application without the state code (047).*

*Every oil and gas well permitted in West Virginia since 1929 has been issued an API number. This API is used by agencies to identify and track oil and gas wells.*

*The API number has the following format: 047-001-00001*

*Where,*  
 047 = *State code. The state code for WV is 047.*  
 001 = *County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).*  
 00001 = *Well number. Each well will have a unique well number.*

# **Attachment L**

## **Storage Vessel Data Sheet**

**ATTACHMENT L – STORAGE VESSEL DATA SHEET**

Complete this data sheet if you are the owner or operator of a storage vessel that contains condensate and/or produced water. This form must be completed for each new or modified bulk liquid storage vessel(s) that contains condensate and/or produced water. (If you have more than one (1) identical tank (i.e. 4-400 bbl condensate tanks), then you can list all on one (1) data sheet). **Include gas sample analysis, flashing emissions, working and breathing losses, USEPA Tanks, simulation software (ProMax, E&P Tanks, HYSYS, etc.), and any other supporting documents where applicable.**

**The following information is REQUIRED:**

- Composition of the representative sample used for the simulation
- For each stream that contributes to flashing emissions:
  - Temperature and pressure (inlet and outlet from separator(s))
  - Simulation-predicted composition
  - Molecular weight
  - Flow rate
- Resulting flash emission factor or flashing emissions from simulation
- Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions

Additional information may be requested if necessary.

**GENERAL INFORMATION (REQUIRED)**

1. Bulk Storage Area Name	Tanks	2. Tank Name: Condensate Tank 001-002
3. Emission Unit ID number:	Existing: TANKCOND001-002	4. Emission Point ID number. EP-EC001, EP-EC002, EP-EC003
5. Date Installed, Modified or Relocated (for existing tanks)	2014	6. Type of change:
Was the tank manufactured after August 23, 2011?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> New construction <input type="checkbox"/> New stored material <input type="checkbox"/> Other <input type="checkbox"/> Relocation
7A. Description of Tank Modification (if applicable)		
7B. Will more than one material be stored in this tank? If so, a separate form must be completed for each material. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
7C. Was USEPA Tanks simulation software utilized? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If Yes, please provide the appropriate documentation and items 8-42 below are not required.</i>		

**TANK INFORMATION**

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400bbbls			
9A. Tank Internal Diameter (ft): 12	9B. Tank Internal Height (or Length) (ft):	20	
10A. Maximum Liquid Height (ft): 18	10B. Average Liquid Height (ft):	10	
11A. Maximum Vapor Space Height (ft): 18	11B. Average Vapor Space Height (ft):	10	
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.: 400bbbls			
13A. Maximum annual throughput (gal/yr):	153300	13B. Maximum daily throughput (gal/day):	420
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume):	5	15. Maximum tank fill rate (gal/min)	168
16. Tank fill method <input type="checkbox"/> Submerged <input checked="" type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading			
17. Is the tank system a variable vapor space system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?			
18. Type of tank (check all that apply):			
<input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical <input type="checkbox"/> horizontal <input checked="" type="checkbox"/> flat roof <input type="checkbox"/> cone roof <input type="checkbox"/> dome roof <input type="checkbox"/> other (describe)			
<input type="checkbox"/> External Floating Roof <input type="checkbox"/> pontoon roof <input type="checkbox"/> double deck roof			
<input type="checkbox"/> Domed External (or Covered) Floating Roof			
<input type="checkbox"/> Internal Floating Roof <input type="checkbox"/> vertical column support <input type="checkbox"/> self-supporting			
<input type="checkbox"/> Variable Vapor Space <input type="checkbox"/> lifter roof <input type="checkbox"/> diaphragm			
<input type="checkbox"/> Pressurized <input type="checkbox"/> spherical <input type="checkbox"/> cylindrical			
<input type="checkbox"/> other			



**ATTACHMENT L – STORAGE VESSEL DATA SHEET**

**PRESSURE/VACUUM CONTROL DATA**

19. Check as many as apply:

- Does Not Apply
- Inert Gas Blanket of
- Vent to Vapor Combustion Device (vapor combustors, flares, thermal oxidizers, enclosed combustors)
- Conservation Vent (psig)
- Emergency relief Valve (psig)
- Thief Hatch Weighted  Yes  No

Complete appropriate Air Pollution Control Device Sheet

20. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emission Loss		Estimation Method
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
<i>Please see Table 6 and Table 7</i>									

**TANK CONSTRUCTION & OPERATION INFORMATION**

21. Tank Shell Construction:

- Riveted  Gunite lined  Epoxy-coated  Other (describe): Steel

21A. Shell Color: Green      21B. Roof Color: Green      21C. Year Last Painted      2014

22. Shell Condition (if metal and unlined):

- No Rust  Light Rust  Dense Rust  Not applicable

22A. Is the tank heated?  Yes  No      22B. If yes, operating temperature:      22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig): 0 psig, atmospheric

**Must be listed for tanks using VRUs with closed vent system**

24. Is the tank a Vertical Fixed Roof Tank?  Yes  No      24A. If yes, for dome roof provide radius (ft): NA      24B. If yes, for cone roof, provide slop (ft/ft): NA

25. Complete the following section for **Floating Roof Tanks**      Does Not Apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type:  Metallic (mechanical) shoe seal  Liquid mounted resilient seal  
 Vapor mounted resilient seal  Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal?  Yes  No

25D. If YES, how is the secondary seal mounted? (check one)  
 Shoe  Rim  Other (describe)

25E. Is the Floating Roof equipped with a weather shield?  Yes  No

25F. Describe deck fittings

26. Complete the following section for Internal Floating Roof Tanks  Does not apply

26A. Deck Type:  Bolted  Welded      26B. For bolted decks, provide deck construction

26C. Deck seam:  
 5 ft. wide  6 ft. wide  7 ft. wide  5 x 7.5 ft wide  5 x 12 ft wide  Other (describe)

26D. Deck seam length (ft)      26E. Area of deck (ft<sup>2</sup>)      26F. For column supported tanks: Number of columns:      26G. For column supported tanks, Diameter of each column:

27. Closed Vent System with VRU  Yes  No

28. Closed Vent System with Enclosed Combustor?  Yes  No

**ATTACHMENT L – STORAGE VESSEL DATA SHEET**

**SITE INFORMATION**

29. Provide the city and state on which the data in this section are based.: West Union, WV			
30. Daily Average Ambient Temperature (°F):	65.08	31. Annual Average Maximum Temperature (°F):	75.94
32. Annual Average Minimum Temperature (°F):	46.56	33. Average Wind Speed (miles/hr): 18.5mph	
34. Annual Average Solar Insulation Factor (BTU/(ft <sup>2</sup> -day))	1030.236	35. Atmospheric Pressure (psia): 14.8 (based off local conditions, could not find annual)	

**LIQUID INFORMATION**

36. Average daily temperature range of bulk liquid (F):	65.08	36A. Minimum (°F):	46.56	36B. Maximum (°F)	75.94
37. Average operating pressure range of tank (psig):	0	37A. Minimum (psig)	0	37B. Maximum (psig)	0
38A. Minimum Liquid Surface Temperature (°F)	46.56	38B. Corresponding Vapor Pressure (psia)	0.4462		
39A. Average Liquid Surface Temperature (°F)	65.08	39B. Corresponding Vapor Pressure (psia)	0.7095		
40A. Maximum Liquid Surface Temperature (°F)	75.94	40B. Corresponding Vapor Pressure (psia)	0.9177		
41. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.					
41A. Material Name or Composition	Condensate				
41B. CAS Number	mix of HC				
41C. Liquid Density (lb/gal)	5.9800				
41D. Liquid Molecular Weight (lb/lb-mole)	111.40				
41E. Vapor Molecular Weight (lb/lb-mole)	0.0000				
Maximum Vapor Pressure	0.9177				
41F. True (psia)					
41G. Reid (psia)	1.65				
Months Storage per Year	year round				
41H. From - To					

**ATTACHMENT L – STORAGE VESSEL DATA SHEET**

Complete this data sheet if you are the owner or operator of a storage vessel that contains condensate and/or produced water. This form must be completed for each new or modified bulk liquid storage vessel(s) that contains condensate and/or produced water. (If you have more than one (1) identical tank (i.e. 4-400 bbl condensate tanks), then you can list all on one (1) data sheet). **Include gas sample analysis, flashing emissions, working and breathing losses, USEPA Tanks, simulation software (ProMax, E&P Tanks, HYSYS, etc.), and any other supporting documents where applicable.**

**The following information is REQUIRED:**

- Composition of the representative sample used for the simulation
- For each stream that contributes to flashing emissions:
  - Temperature and pressure (inlet and outlet from separator(s))
  - Simulation-predicted composition
  - Molecular weight
  - Flow rate
- Resulting flash emission factor or flashing emissions from simulation
- Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions

Additional information may be requested if necessary.

**GENERAL INFORMATION (REQUIRED)**

1. Bulk Storage Area Name Tanks	2. Tank Name: Produced Water Tank 001-002
3. Emission Unit ID number: TANKPW001-002	4. Emission Point ID number. EP-EC001, EP-EC002, EP-EC003
5. Date Installed , Modified or Relocated (for existing tanks) 2014	6. Type of change: <input checked="" type="checkbox"/> New construction <input type="checkbox"/> New stored material <input type="checkbox"/> Other  <input type="checkbox"/> Relocation
Was the tank manufactured after August 23, 2011? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
7A. Description of Tank Modification (if applicable)	
7B. Will more than one material be stored in this tank? If so, a separate form must be completed for each material. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7C. Was USEPA Tanks simulation software utilized? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

*If Yes, please provide the appropriate documentation and items 8-42 below are not required.*

**TANK INFORMATION**

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400bbbls	
9A. Tank Internal Diameter (ft): 12	9B. Tank Internal Height (or Length) (ft): 20
10A. Maximum Liquid Height (ft): 18	10B. Average Liquid Height (ft): 10
11A. Maximum Vapor Space Height (ft): 18	11B. Average Vapor Space Height (ft): 10
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.: 400bbbls	
13A. Maximum annual throughput (gal/yr): 7665000	13B. Maximum daily throughput (gal/day): 21000
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 229	15. Maximum tank fill rate (gal/min) 168
16. Tank fill method <input type="checkbox"/> Submerged <input checked="" type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Is the tank system a variable vapor space system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply):  <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical <input type="checkbox"/> horizontal <input checked="" type="checkbox"/> flat roof <input type="checkbox"/> cone roof <input type="checkbox"/> dome roof <input type="checkbox"/> other (describe) <input type="checkbox"/> External Floating Roof <input type="checkbox"/> pontoon roof <input type="checkbox"/> double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof <input type="checkbox"/> vertical column support <input type="checkbox"/> self-supporting <input type="checkbox"/> Variable Vapor Space <input type="checkbox"/> lifter roof <input type="checkbox"/> diaphragm <input type="checkbox"/> Pressurized <input type="checkbox"/> spherical <input type="checkbox"/> cylindrical	

**ATTACHMENT L – STORAGE VESSEL DATA SHEET**

**PRESSURE/VACUUM CONTROL DATA**

19. Check as many as apply:

- Does not apply     Rupture Disc (psig)  
 Inert Gas Blanket     Carbon Adsorption  
 Vent to Vapor Combustion Device (vapor combustors, flares, thermal oxidizers, enclosed combustors)  
 Conservation Vent (psig)    Vacuum    Pressure  
 Emergency relief Valve (psig)    Vacuum    Pressure  
 Thief Hatch Weighted     Yes     No

Complete appropriate Air Pollution Control Device Sheet

20. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emission Loss		1 Estimation Method
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
<i>Please see Table 6 and Table 7</i>									

**TANK CONSTRUCTION & OPERATION INFORMATION**

21. Tank Shell Construction:

- Riveted     Gunite lined     Epoxy-coated     Other(describe): Steel

21A. Shell Color: Green	21B. Roof Color: Green	21C. Year Last Painted    2014
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22. Shell Condition (if metal and unlined):

- No Rust     Light Rust     Dense Rust     Not applicable

22A. Is the tank heated? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
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23. Operating Pressure Range (psig): 0 psig, atmospheric  
**Must be listed for tanks using VRUs with closed vent system**

24. Is the tank a Vertical Fixed Roof Tank? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	24A. If yes, for dome roof provide radius (ft): NA	24B. If yes, for cone roof, provide slop (ft/ft): NA
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25. Complete the following section for **Floating Roof Tanks**    Does Not Apply

25A. Year Internal Floaters Installed:	
25B. Primary Seal Type:	<input type="checkbox"/> Metallic (mechanical) shoe seal <input type="checkbox"/> Liquid mounted resilient <input type="checkbox"/> Vapor mounted resilient seal <input type="checkbox"/> Other (describe):
25C. Is the Floating Roof equipped with a Secondary Seal?	<input type="checkbox"/> Yes <input type="checkbox"/> No
25D. If YES, how is the secondary seal mounted? (check one)	<input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other(describe):
25E. Is the Floating Roof equipped with a weather shield?	<input type="checkbox"/> Yes <input type="checkbox"/> No

26. Complete the following section for Internal Floating Roof Tanks     Does not apply

26A. Deck Type:	26B. For bolted decks, provide deck construction		
<input type="checkbox"/> Bolted <input type="checkbox"/> Welded			
26C. Deck seam:			
<input type="checkbox"/> 5 ft. wide <input type="checkbox"/> 6 ft. wide <input type="checkbox"/> 7 ft. wide <input type="checkbox"/> 5 x 7.5 ft. wide <input type="checkbox"/> 5 x 12 ft. wide <input type="checkbox"/> Other (describe)			
26D. Deck seam length (ft)	26E. Area of deck (ft <sup>2</sup> )	26F. For column supported tanks: Number of columns:	26G. For column supported tanks, Diameter of each column:

27. Closed Vent System with VRU	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
28. Closed Vent System with Enclosed Combustor?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

**ATTACHMENT L – STORAGE VESSEL DATA SHEET**

<b>SITE INFORMATION</b>			
29. Provide the city and state on which the data in this section are based.: West Union, WV			
30. Daily Average Ambient Temperature (°F):	65.08	31. Annual Average Maximum Temperature (°F):	75.94
32. Annual Average Minimum Temperature (°F):	46.56	33. Average Wind Speed (miles/hr): 5.9mph	
34. Annual Average Solar Insulation Factor (BTU/(ft <sup>2</sup> ·day))	1030.236	35. Atmospheric Pressure (psia): 14.8 (based off local conditions, could not find annual)	
<b>LIQUID INFORMATION</b>			
36. Average daily temperature range of bulk liquid (F):	65.08	36A. Minimum (°F):	46.56
		36B. Maximum (°F)	75.94
37. Average operating pressure range of tank (psig):	0	37A. Minimum (psig)	0
		37B. Maximum (psig)	0
38A. Minimum Liquid Surface Temperature (°F)	46.56	38B. Corresponding Vapor Pressure (psia)	0.2246
39A. Average Liquid Surface Temperature (°F)	65.08	39B. Corresponding Vapor Pressure (psia)	0.3720
40A. Maximum Liquid Surface Temperature (°F)	75.94	40B. Corresponding Vapor Pressure (psia)	0.4921
41. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
41A. Material Name or Composition	Produced Water		
41B. CAS Number	mix of HC and water		
41C. Liquid Density (lb/gal)	8.3300		
41D. Liquid Molecular Weight (lb/lb-mole)	18.02		
41E. Vapor Molecular Weight (lb/lb-mole)	18.8518		
Maximum Vapor Pressure	0.4921		
41F. True (psia)			
41G. Reid (psia)	1.0226		
Months Storage per Year	year round		
41H. From - To			

**Attachment M**  
**Natural Gas Fired Fuel Burning Unit(s)**  
**Data Sheet**

**ATTACHMENT M – SMALL HEATERS AND REBOILERS NOT SUBJECT TO  
40CFR60 SUBPART DC  
DATA SHEET**

Complete this data sheet for each small heater and reboiler not subject to 40CFR60 Subpart Dc at the facility. *The Maximum Design Heat Input (MDHI) must be less than 10 MMBTU/hr.*

Emission Unit ID#	Emission Point ID#	Emission Unit Description (Manufacturer, model#)	Year Installed/Modified	Type and Date of Change	Maximum Design Heat Input (MMBTU/hr)	Fuel Heating Value (BTU/scf)
GPU001	EP-GPU001	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU002	EP-GPU002	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU003	EP-GPU003	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU004	EP-GPU004	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU005	EP-GPU005	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU006	EP-GPU006	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU007	EP-GPU007	Gas Production Unit Heater	2014	Existing	1	1247.06
LH001	EP-LH001	Line Heater	2016	New	2	1247.06
LH002	EP-LH002	Line Heater	2016	New	2	1247.06
LH003	EP-LH003	Line Heater	2016	New	2	1247.06
LH004	EP-LH004	Line Heater	2016	New	2	1247.06
LH005	EP-LH005	Line Heater	2016	New	2	1247.06
LH006	EP-LH006	Line Heater	2016	New	2	1247.06
LH007	EP-LH007	Line Heater	2016	New	2	1247.06

1. Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S...or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

2. Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E...or other appropriate designation.

3. New, modification, removal.

4. Enter design heat input capacity in MMBtu/hr.

5. Enter the fuel heating value in BTU/standard cubic foot.

# **Attachment O**

## **Tanker Truck Loading Data Sheet**



**ATTACHMENT O – TANKER TRUCK LOADING DATA SHEET**

Complete this data sheet for each new or modified bulk liquid transfer area or loading rack at the facility. This is to be used for bulk liquid transfer operations to tanker trucks. Use extra pages if necessary.

**Truck Loadout Collection Efficiencies**

The following applicable capture efficiencies of a truck loadout are allowed:

- For tanker trucks passing the MACT level annual leak test – 99.2%
- For tanker trucks passing the NSPS level annual leak test – 98.7%
- For tanker trucks not passing one of the annual leak tests listed above – 70%

Compliance with this requirement shall be demonstrated by keeping records of the applicable MACT or NSPS Annual Leak Test certification for **every** truck and railcar loaded/unloaded. This requirement can be satisfied if the trucking company provided certification that its entire fleet was compliant. This certification must be submitted in writing to the Director of the DAQ. These additional requirements must be noted in the Registration Application.

Emission Unit ID#: L001, L002	Emission Point ID#: EP-L001, EP-L002	Year Installed/Modified: 2014
-------------------------------	--------------------------------------	-------------------------------

Emission Unit Description: **Condensate Loading, Produced Water Loading**

**Loading Area Data**

Number of Pumps: 2	Number of Liquids Loaded: 2	Max number of trucks loading at one time: 2
--------------------	-----------------------------	---

Are Tanker trucks pressure tested for leaks at this any other location?  Yes  No  Not Required

If Yes, Please Describe: Tank trucks are pressure tested for leaks at the location of the leak testing company. Trucks are tested using EPA Method 27-internal vapor valve test and issued certification that DOT requirements are met.

Provide description of closed vent system and any bypasses

Are any of the following truck loadout systems utilized? **No**

- Closed System to Tanker Truck passing a MACT level annual leak test?
- Closed System to Tanker Truck passing a NSPS level annual leak test?
- Closed System to Tanker Truck not passing an annual leak test and has vapor return?

**Projected Maximum Operating Schedule (for rack or transfer point as a whole)**

Time	Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec
Hours/day	2	2	2	2
Days/week	3	3	3	3

**Bulk Liquid Data (use extra pages as necessary)**

Liquid Name	Condensate	Produced Water	
Max. Daily Throughput (1000 gal/day)	0.42	21.00	
Max. Annual Throughput (1000 gal/yr)	153.30	7665.00	
Loading Method	BF	BF	
Max. Fill Rate (gal/min)	168	168	
Average Fill Time (min/loading)	50	50	
Max. Bulk Liquid Temperature (F)	65.1	65.1	
True Vapor Pressure	0.7	0.4	
Cargo Vessel Condition	U	U	
Control Equipment or Method	None	None	
Max. Collection Efficiency (%)	0	0	
Max. Control Efficiency (%)	0	0	
Max VOC Emission Rate	Loading (lb/hr)	3.0460	0.1803
	Annual (ton/yr)	0.0232	0.0686
Max HAP Emission Rate	Loading (lb/hr)	0.0216	1.80E-01
	Annual (ton/yr)	0.0002	6.86E-02
Estimation Method	Promax	Promax	

- 1 BF Bottom Fill      SP Splash Fill      SUB Submerged Fill
- 2 At maximum bulk liquid temperature
- 3 B Ballasted Vessel      C Cleaned      U Uncleaned (dedicated servi      O Other (describe)
- 4 List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets)
- CA Carbon Adsorption      VB Dedicated Vapor Balance (closed system)
- ECD Enclosed Combustion Device      F Flare
- TO Thermal Oxidization or Incineration
- 5 EPA EPA Emission Factor in AP-42      MB Material Balance
- TM Test Measurement based upon test data submittal      O Other (describe)

**Attachment R**  
**Air Pollution Control Device – Emission**  
**Reduction Device Sheets**

## ATTACHMENT R – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS

Complete the applicable air pollution control device sheet s for each flare, vapor combustor, thermal oxidizer, condenser, adsorption system, vapor recovery unit , BTEX Eliminator, Reboiler with and without Glow Plug, etc. at the facility. Use extra pages if necessary.

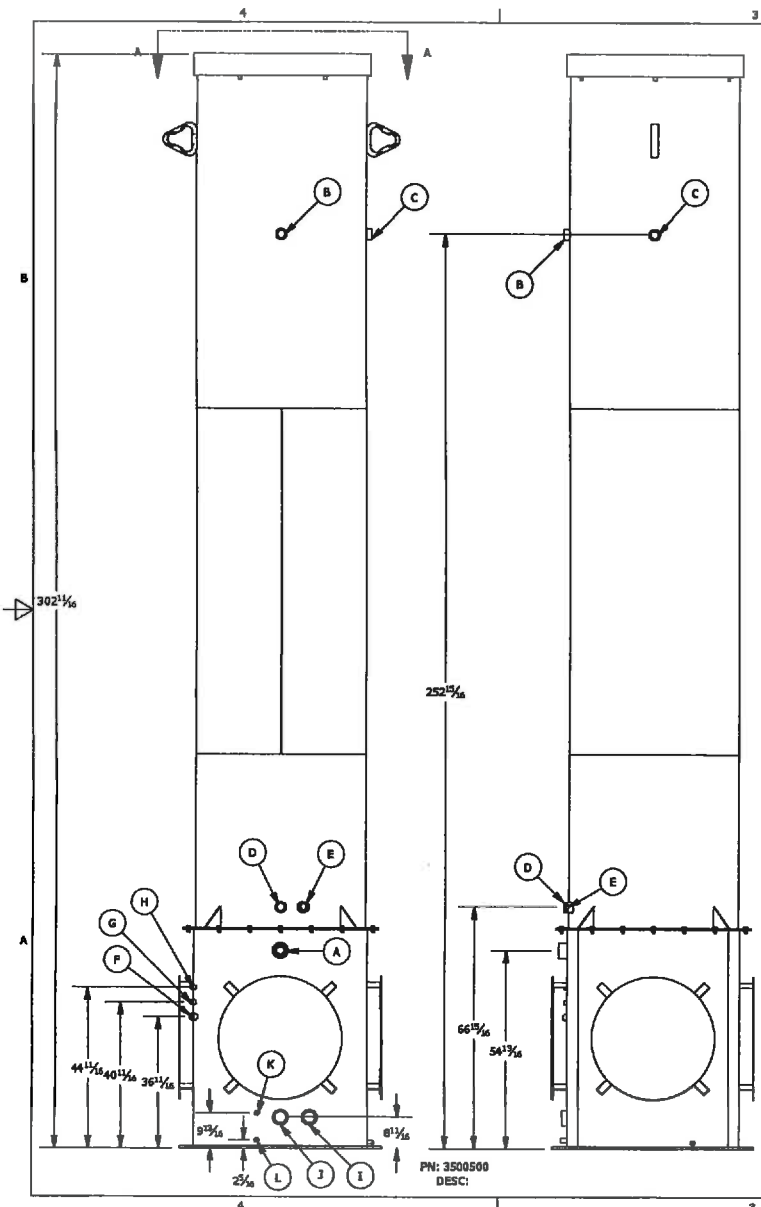
Emissions calculations must be performed using the most conservative control device efficiency.

*The following five (5) rows are only to be completed if registering an alternative air pollution control device.*

Emission Unit ID:	NA	Make/Model:	NA
Primary Control Device ID:	NA	Make/Model	NA
Control Efficiency (%):	NA	APCD/ERD Data Sheet Completed	<input type="checkbox"/> Yes <input type="checkbox"/> No
Secondary Control Device ID:	NA	Make/Model	NA
Control Efficiency (%):	NA	APCD/ERD Data Sheet Completed	<input type="checkbox"/> Yes <input type="checkbox"/> No

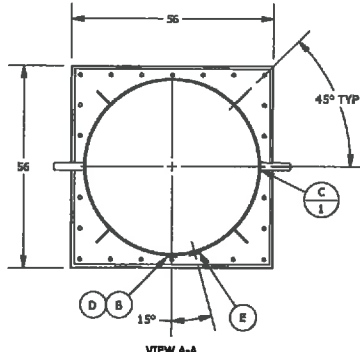
### VAPOR COMBUSTION (Including Enclosed Combustors)

General Information			
Control Device ID#:	EC001-003	Installation Date: <input checked="" type="checkbox"/> New <input type="checkbox"/> Modified <input type="checkbox"/> Relocated	
Maximum Rated Total Flow Capacity  5458 scfh	131000 scfd	Maximum Design Heating Input (from mfg. spec sheet)  12.0 MMBTU/hr	Design Heat Content  2300 BTU/scf
Control Device Information			
Type of Vapor Combustion Control?			
<input checked="" type="checkbox"/> Enclosed Combustion Device <input type="checkbox"/> Elevated Flare <input type="checkbox"/> Ground Flare <input type="checkbox"/> Thermal Oxidizer			
Manufacturer:	Cimarron	Hours of operation per year?	8760
Model:	48" HV ECD		
List the emission units whose emissions are controlled by this vapor control device (Emission Point ID#			NA
Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
TANKCOND001-002	Condensate Tanks		
TANKPW001-002	Produced Water Tanks		
<i>If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.</i>			
Assist Type (Flares only) <input type="checkbox"/> Steam <input type="checkbox"/> Air <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Non	Flare height  25 feet	Tip Diameter  3.33 feet	Was the design per §60.18? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Provide determination
Waste Gas Information			
Maximum Waste Gas Flow Rate  2.36 (scfm)	Heat Value of Waste Gas Stream  1,412.49 BTU/ft <sup>3</sup>	Exit Velocity of the Emission Stream  0.0045 (ft/s)	
Please see Attachment S, Tables 6 & 7 for VOC composition/ characteristics of the waste gas stream to be burned.			
Pilot Gas Information			
Number of Pilot Lights  3	Fuel Flow Rate to Pilot Flame per Pilot  12.6 scfh	Heat Input per Pilot  12800 BTU/hr	Will automatic re-ignition be used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If automatic re-ignition is used, please describe the method.		Flame Rectification, a thermocouple equivalent	
Is pilot flame equipped with a monitor to detect the presence of the flame? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		If Yes, What type? <input checked="" type="checkbox"/> Thermocouple <input type="checkbox"/> Infrared <input type="checkbox"/> Ultraviolet <input type="checkbox"/> Camera <input type="checkbox"/> Other:	
Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. <i>(If unavailable, please indicate).</i>			
Additional information attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Manufacturer's specs sheet	
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11 (b) and performance testing.			



**48" DIA x 302 5/8" HEIGHT, 88 ORIFICES  
EMISSION CONTROL DEVICE**

- \* >98% TVOC DRE, CERTIFIED USEPA 40 CFR 60, APPENDIX A, SOURCE EMISSIONS TEST METHODS REFERENCED. MEETS ALL EPA & CDPHE REGULATIONS.
- \* DESTROYS OIL/CONDENSATE PRODUCTION TANK VAPORS W/ NO VISIBLE FLAME.
- \* EXCELLENT OPACITY AND SMOKELESS OPERATION.
- \* RELIABLE AND CUSTOMIZABLE IGNITION.
- \* VERY LOW CAPITAL AND OPERATING COST.
- \* EASY TO OPERATE AND MAINTAIN.
- \* FIELD TESTED TO DESTROY UP TO 119.5 MDSCFD (131 MCFD) @ 10 oz/in<sup>2</sup>; 2300 BTU/CF WASTE GAS (SG 1.45)
- \* STRUCTURE CERTIFIED FOR 90 MPH 3-SEC WIND GUST PER ASCE 7-05 & IBC 2006 STANDARDS. HIGHER WIND LOAD RATED STRUCTURES AVAILABLE.



PN: 3500500  
DESC:

SCHEDULE OF NOZZLES			
MARK	QTY	DESCRIPTION	SERVICE
A	1	3" HALF COUPLING	2000# BURNER WASTE GAS IN
B	1	2" FULL COUPLING	3000# FLOW TEST/AUTOMATION
C	1	2" FULL COUPLING	3000# FLOW TEST/AUTOMATION
D	1	2" FULL COUPLING	3000# SIGHT GLASS
E	1	2" FULL COUPLING	3000# MANUAL LIGHTING
F	1	1" FULL COUPLING	3000# PILOT GAS IN
G	1	1/2" FULL COUPLING	3000# IGNITOR CABLE
H	1	1/2" FULL COUPLING	3000# AUTOMATION
I	1	3" HALF COUPLING	3000# DRIP TANK WASTE GAS IN
J	1	3" HALF COUPLING	3000# DRIP TANK WASTE GAS OUT
K	1	1/2" FULL COUPLING	3000# AUTOMATION
L	1	1/2" FULL COUPLING	3000# LIQUID DRAIN

- UNLESS OTHERWISE SPECIFIED
1. REMOVE ALL BURRS AND SHARP CORNERS.
  2. COR. RAD .03
  3. DO NOT SCALE DRAWING.
  4. ALL DIMENSIONS ARE IN INCHES.
  5. MACHINE FIN.
  6. FABRICATION AND SHARP CORNERS.
    - .X = ± 0.25
    - .XX = ± 0.125
    - .XXX = ± 0.06
    - ANGLES ± 3°
  7. MACHINE
    - .X = ± 0.030
    - .XX = ± 0.015
    - .XXX = ± 0.005
    - ANGLES ± 1/2°
    - CONTRICTY WITHIN 0.010 TIR

APPROVED FOR A.S.M.E CODE, SECTION VIII DIV 1  
ED, ADDENDA BY, DATE

**CIMARRON**  
Energy Inc.

TITLE:  
48" HIGH VOLLUME BCD

DATE: \_\_\_\_\_ WO No.: \_\_\_\_\_ SHEET: 1 OF 1

DRAWN BY: TDS | REV. | DRAW NO.: 3500500

# **Attachment S**

## **Emissions Calculations**

**Table 1**

**Facility Information  
Hubert Wellpad  
Harrison County, West Virginia  
Antero Resources Corporation**

**Oil and Gas Site General Information**

<b>Administrative Information</b>	
Company Name	Antero Resources Corporation
Facility/Well Name	Hubert Wellpad
Nearest City/Town	Salem
API Number/SIC Code	1311
Latitude/Longitude	39.253426, -80.560375
County	Harrison County

<b>Technical Information</b>	
Max Condensate Site Throughput (bbl/day):	10
Max Produced Water Site Throughput (bbl/day):	500
Are there any sour gas streams at this site?	No
Is this site currently operational/producing?	Yes

<b>Equipment/Processes at Site</b>	
<b>Equipment/Process Types</b>	<b>How many for this site?</b>
Fugitives	7
Gas Production Unit Heaters	7
Line Heaters	7
Condensate Tanks	2
Produced Water Tanks	2
Loading Jobs	2
Enclosed Combustors	3

Table 2

Uncontrolled/Controlled Emissions Summary  
 Hubert Wellpad  
 Harrison County, West Virginia  
 Antero Resources Corporation

Emission Source	VOC		NO <sub>x</sub>		CO <sub>2e</sub>		CO		SO <sub>2</sub>		PM <sub>10</sub>		PM <sub>2.5</sub>		Lead		Total HAPs		Benzene		Xylenes		Formaldehyde			
	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)		
<b>UNCONTROLLED (Fugitives, Storage Tanks, Engine, Gas Production Unit Heaters, Line Heaters)</b>																										
Fugitive Emissions (Component Count, PCV and Hauling) <sup>1</sup>	2.7262	11.9408			61.254	268.29							1.4399	0.3396			0.2101	0.9204	0.0009	0.0040	0.0489	0.2142				
Flashing, Working and Breathing (F/W/B) Losses <sup>2</sup>	6.6285	29.0329			63.4402	277.8679											0.4271	1.8709	0.0019	0.0084	0.0113	0.0497				
Gas Production Unit Heater Emissions <sup>3</sup>	0.0309	0.1352	0.5613	2.4586	673.58	2,950.30	0.4715	2.0652	0.0034	0.0148	0.0427	0.1869	0.0427	0.1869	2.81E-06	1.23E-05	0.011	0.046	1.18E-05	5.16E-05				0.0004	0.0018	
Line Heater Emissions <sup>3</sup>	0.0617	0.2704	1.1226	4.9172	1,347.17	5,900.60	0.9430	4.1304	0.0067	0.0295	0.0853	0.3737	0.0853	0.3737	5.61E-06	2.46E-05	0.021	0.093	2.36E-05	1.03E-04				0.0008	0.0037	
<b>TOTALS:</b>	<b>9.4474</b>	<b>41.3794</b>	<b>1.6840</b>	<b>7.3757</b>	<b>2145.4466</b>	<b>9397.0562</b>	<b>1.4145</b>	<b>6.1956</b>	<b>0.0101</b>	<b>0.0443</b>	<b>0.1280</b>	<b>0.5606</b>	<b>1.5679</b>	<b>0.9002</b>	<b>8.42E-06</b>	<b>3.69E-05</b>	<b>0.6690</b>	<b>2.9301</b>	<b>0.0029</b>	<b>0.0125</b>	<b>0.0602</b>	<b>0.2638</b>	<b>0.0013</b>	<b>0.0055</b>		
<b>TOTALS (Excluding Fugitives):</b>	<b>6.7211</b>	<b>29.4386</b>	<b>1.6840</b>	<b>7.3757</b>	<b>2084.1930</b>	<b>9128.7652</b>	<b>1.4145</b>	<b>6.1956</b>	<b>0.0101</b>	<b>0.0443</b>	<b>0.1280</b>	<b>0.5606</b>	<b>1.5679</b>	<b>0.9002</b>	<b>8.42E-06</b>	<b>3.69E-05</b>	<b>0.4588</b>	<b>2.0097</b>	<b>0.0020</b>	<b>0.0086</b>	<b>0.0113</b>	<b>0.0497</b>	<b>0.0013</b>	<b>0.0055</b>		
<b>UNCONTROLLED (Truck Loading Emissions)</b>																										
Truck Loading Emissions <sup>4</sup>	3.2263	0.0917			33.1739	0.2528											0.2019	6.87E-02	0.0120	9.13E-05	0.1888	6.86E-02				
<b>CONTROLLED EMISSIONS</b>																										
Enclosed Combustor Emissions (from F/W/B losses) <sup>5</sup>	0.1328	0.5816	0.0180	0.0786	22.0167	96.4332	0.0151	0.0660	2.27E-05	0.0001	0.0010	0.0045	0.0014	0.0060	8.98E-08	3.93E-07	0.0086	0.0377	0.0000	0.0002	0.0002	0.0010	2.84E-06	1.24E-05		
Controlled Fugitive Emissions from Hauling													0.7199	0.1698												
<b>TOTALS:</b>	<b>0.133</b>	<b>0.582</b>	<b>0.018</b>	<b>0.079</b>	<b>22.017</b>	<b>96.433</b>	<b>0.015</b>	<b>0.066</b>	<b>2.27E-05</b>	<b>9.93E-05</b>	<b>0.001</b>	<b>0.004</b>	<b>0.721</b>	<b>0.176</b>	<b>8.98E-08</b>	<b>3.93E-07</b>	<b>0.009</b>	<b>0.038</b>	<b>3.85E-05</b>	<b>1.69E-04</b>	<b>0.000</b>	<b>0.001</b>	<b>2.84E-06</b>	<b>1.24E-05</b>		
<b>POTENTIAL TO EMIT<sup>6</sup></b>	<b>2.9516</b>	<b>13.0198</b>	<b>1.7019</b>	<b>7.4544</b>	<b>2104.0232</b>	<b>9215.8742</b>	<b>1.4296</b>	<b>6.2617</b>	<b>0.0101</b>	<b>0.0444</b>	<b>0.1290</b>	<b>0.5650</b>	<b>0.8493</b>	<b>0.7363</b>	<b>8.51E-06</b>	<b>3.73E-05</b>	<b>0.2504</b>	<b>1.1657</b>	<b>0.0010</b>	<b>0.0044</b>	<b>0.0491</b>	<b>0.2838</b>	<b>0.0013</b>	<b>0.0055</b>		
<b>POTENTIAL TO EMIT (Excluding Fugitives)</b>	<b>0.2254</b>	<b>0.9872</b>	<b>1.7019</b>	<b>7.4544</b>	<b>2042.7695</b>	<b>8947.3305</b>	<b>1.4296</b>	<b>6.2617</b>	<b>0.0101</b>	<b>0.0444</b>	<b>0.1290</b>	<b>0.5650</b>	<b>0.1293</b>	<b>0.5665</b>	<b>8.51E-06</b>	<b>3.73E-05</b>	<b>0.0403</b>	<b>0.1766</b>	<b>0.0001</b>	<b>0.0003</b>	<b>0.0002</b>	<b>0.0010</b>	<b>0.0013</b>	<b>0.0055</b>		

**Enter any notes here:**

1 - See Tables 4 and 5 for fugitive emission calculations; Table 12 for PM emissions from hauling.  
 2 - See Tables 6 and 7 for tanks emission calculations  
 3 - See Table 9 for gas production unit heater and line heater emission calculations  
 4 - The maximum emission was calculated based on tank truck capacity of 200 barrels and actual fill rate of 50 minutes per tank truck. At a production rate of 10 barrels per day, VOC emissions would be 3.2263 pounds per hour when there are truck loading activities. Average hourly VOC emissions from truck loading is 0.0209 pound per hour.  
 5 - See Table 10 and 11 for enclosed combustion emission calculations.  
 6 - The hourly potential to emit is the sum of emissions from gas production unit heaters, line heaters, storage tanks, enclosed combustors, and fugitives. Does not include emissions from loading (see footnote 5). The total TPY PTE is the sum of all emissions.  
 PM 10 TPY is the sum of uncontrolled hauling and other PM10 sources.

**Table 3**

**Permits Summary  
Hubert Wellpad  
Harrison County, West Virginia  
Antero Resources Corporation**

Pollutant		Emissions		Threshold Exceeded?		
		Uncontrolled	Controlled	Threshold	Uncontrolled	Controlled
VOC	lbs/hr	9.4474	2.9516	6	<b>Yes</b>	
	tons/yr	41.4711	13.0198	10	<b>Yes</b>	<b>Yes</b>
NO <sub>x</sub>	lbs/hr	1.6840	1.7019	6		
	tons/yr	7.3757	7.4544	10		
CO	lbs/hr	1.4145	1.4296	6		
	tons/yr	6.1956	6.2617	10		
SO <sub>2</sub>	lbs/hr	0.0101	0.0101	6		
	tons/yr	0.0443	0.0444	10		
PM <sub>2.5</sub>	lbs/hr	0.1280	0.1290	6		
	tons/yr	0.5606	0.5650	10		
PM <sub>10</sub>	lbs/hr	1.5679	0.8493	6		
	tons/yr	0.9002	0.7363	10		
Lead	lbs/hr	8.42E-06	8.51E-06	6		
	tons/yr	3.69E-05	3.73E-05	10		
Total HAPs	lbs/hr	0.6690	0.2504	2		
	tons/yr	2.9989	1.1657	5		
Total TAPs	lbs/hr	0.0041	0.0022	1.14		
n-Hexane	lbs/hr	0.5629	0.1701			
	tons/yr	2.4655	0.7452			
Toluene	lbs/hr	0.0167	0.0095			
	tons/yr	0.0731	0.0415			
Ethylbenzene	lbs/hr	0.0250	0.0194			
	tons/yr	0.1095	0.0851			
Xylenes	lbs/hr	0.0602	0.0491			
	tons/yr	0.3325	0.2838			
Benzene	lbs/hr	0.0029	0.0010			
	tons/yr	0.0126	0.0044			

<b>Enter any notes here:</b>	<p>1. Emissions are based on 98% Enclosed Combustor DRE operating 100% of the time.</p> <p>2. Please see Attachment J - Fugitive Emissions Data Summary Sheet and Attachment T - Emission Points Summary Sheet for sitewide sources and breakdown of emission quantities.</p>
------------------------------	---



Table 4

Fugitive Emissions  
Hubert Wellpad  
Harrison County, West Virginia  
Antero Resources Corporation

VOC Type:	Condensate VOC
Emission Type:	Steady State (continuous)

Gas Weight Fraction From Analysis:	VOC frac	0.191
	Benzene frac	0.000
	Toluene	0.000
	Ethylbenzene	0.000
	Xylenes	0.000
	n-Hexane	0.023
	HAPs	0.023
	Methane	0.603

Gas					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
350	Valves	Gas VOC	0.004500	0.30	5,796.53
		Non VOC	0.004500	1.27	24,556.87
		HAPs	0.004500	0.04	689.40
		CO2e	0.004500	23.73	457,260.62
413	Connectors	VOC	0.000200	0.02	304.00
		Non-VOC	0.000200	0.07	1,287.87
		HAPs	0.000200	0.00	36.16
		CO2e	0.000200	1.24	23,980.78
91	Flanges	VOC	0.000390	0.01	130.62
		Non-VOC	0.000390	0.03	553.35
		HAPs	0.000390	0.00	15.53
		CO2e	0.000390	0.534641	10303.605878
<b>Total VOCs:</b>				0.32	6231.14
<b>Total THC:</b>				1.69	32629.23

Light Liquid Weight Fraction From Analysis:	VOC frac	0.976
	Benzene frac	0.000
	Toluene	0.005
	Ethylbenzene	0.010
	Xylenes	0.024
	n-hexane	0.020
	HAPs	0.059
	Methane	0.008

Light Liquid					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
364	Valves	Light Liquid VOC	0.002500	0.89	17,123.95
		Light Liquid Non-VOC	0.002500	0.02	413.57
		Light Liquid HAPs	0.002500	0.05	1,037.10
		CO2e	0.002500	0.18	3495.46
<b>Total VOC:</b>				0.89	17,123.95
<b>Total THC:</b>				0.91	17,537.52

Fugitive Total Emissions			
	Annual Emissions (lb/yr)	Annual Emissions (lb/hr)	Annual Emissions (tpy)
VOC	23,355.09	2.67	11.68
Ethylbenzene		0.02	0.08
Toluene		0.01	0.04
Xylenes		0.05	0.21
n-Hexane		0.12	0.55
TAPs (Benzene)		0.00	0.00
HAPs		0.20	0.89
CO <sub>2e</sub>	495,040.46	56.51	247.52

<b>Enter Notes Here:</b>	Fugitive emissions based on an estimated component count
	Global Warming Potentials from EPA site Reference to Emission factors used: 1. Emission factors are for oil and gas production facilities (not refineries) come from the EPA's "Protocol for Equipment Leak Emission Estimates" November 1995, EPA 4531, R-95-017, Table 2-4. 2. Percent of speciated VOCs used in fugitive calculations are based on the total hydrocarbons, not of the total sample.

Table 5

**Pneumatic Control Valve Emissions  
Hubert Wellpad  
Harrison County, West Virginia  
Antero Resources Corporation**

Number of PCVs	21
Bleed Rate (scf/day/PCV)	6.6
Total Bleed Rate (scf/day)	138.6

Component	Mol%	Molecular Weight (lb/lb-mole)	Component Flow (scf/day)	Component Moles (lb-moles)	Component Emissions		
					(lbs/day)	(lbs/hr)	(tons/year)
H2S	0.0000	34.08	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.4946	14.01	0.6855	0.0018	0.0253	0.0011	0.0046
Carbon Dioxide	0.1467	44.01	0.2033	5.36E-04	0.02	9.83E-04	4.30E-03
Methane	77.6927	16.04	107.6821	0.2838	4.5515	0.1896	0.8307
Ethane	14.1987	30.07	19.6794	0.0519	1.5594	0.0650	0.2846
Propane	4.4938	44.1	6.2284	0.0164	0.7238	0.0302	0.1321
Isobutane	0.5666	58.12	0.7853	0.0021	0.1203	0.0050	0.0220
n-Butane	1.1838	58.12	1.6407	0.0043	0.2513	0.0105	0.0459
Isopentane	0.3749	72.15	0.5196	0.0014	0.0988	0.0041	0.0180
n-Pentane	0.2914	72.15	0.4039	0.0011	0.0768	0.0032	0.0140
2-Methylpentane	0.0000	86.18	0.0000	0.0000	0.0000	0.0000	0.0000
3-Methylpentane	0.0000	86.18	0.0000	0.0000	0.0000	0.0000	0.0000
n-Hexane	0.5451	86.18	0.7555	0.0020	0.1716	0.0071	0.0313
Methylcyclopentane	0.0000	84.16	0.0000	0.0000	0.0000	0.0000	0.0000
Benzene	0.0000	78.11	0.0000	0.0000	0.0000	0.0000	0.0000
2-Methylhexane	0.0000	100.2	0.0000	0.0000	0.0000	0.0000	0.0000
3-Methylhexane	0.0000	100.2	0.0000	0.0000	0.0000	0.0000	0.0000
Heptane	0.0000	100.21	0.0000	0.0000	0.0000	0.0000	0.0000
Methylcyclohexane	0.0000	98.186	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0000	92.14	0.0000	0.0000	0.0000	0.0000	0.0000
Octane	0.0000	114.23	0.0000	0.0000	0.0000	0.0000	0.0000
Ethylbenzene	0.0000	106.17	0.0000	0.0000	0.0000	0.0000	0.0000
m & p-Xylene	0.0000	106.16	0.0000	0.0000	0.0000	0.0000	0.0000
o-Xylene	0.0000	106.16	0.0000	0.0000	0.0000	0.0000	0.0000
Nonane	0.0000	128.2	0.0000	0.0000	0.0000	0.0000	0.0000
C10+	0.0000	174.28	0.0000	0.0000	0.0000	0.0000	0.0000

	lb/hr	tpy
VOC Emissions	0.0601	0.2633
Benzene Emissions	0.0000	0.0000
Toluene Emissions	0.0000	0.0000
Ethylbenzene Emissions	0.0000	0.0000
Xylene Emissions	0.0000	0.0000
n-Hexane Emissions	0.0071	0.0313
HAPs Emissions	0.0071	0.0313
TAPs Emissions	0.0000	0.0000
CO <sub>2e</sub> emissions	4.7422	20.7707

<b>Enter any notes here:</b>	1. PCV bleed rate obtained from the user manual for PCV <a href="http://issuu.com/rmcprocesscontrols/docs/mizer-pilot-operation--parts---installation-manual">http://issuu.com/rmcprocesscontrols/docs/mizer-pilot-operation--parts---installation-manual</a>
	2. Emissions per hour= Mol % x no. of PCV x bleed rate x MW / 379.48 / 24

Table 6

**Uncontrolled Flashing Emissions**  
**Hubert Wellpad**  
**Harrison County, West Virginia**  
**Antero Resources Corporation**

# Hours Operational	8760
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	Condensate Tank Flashing Losses			Produced Water Tank Flashing Losses		
	Vapor Mass Fraction wt%	Flashing Losses lbs/hr	Flashing Losses tpy	Vapor Mass Fraction wt%	Flashing Losses lbs/hr	Flashing Losses tpy
Water	0.1203	0.0096	0.0422	2.6591	0.0730	0.3196
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0426	0.0034	0.0149	0.3436	0.0094	0.0413
Carbon Dioxide	0.1824	0.0146	0.0640	2.3094	0.0634	0.2776
Methane	11.2036	0.8971	3.9295	58.4062	1.6028	7.0201
Ethane	20.7921	1.6649	7.2924	21.4800	0.5894	2.5818
Propane	25.9059	2.0744	9.0860	10.3784	0.2848	1.2474
Isobutane	6.7340	0.5392	2.3618	0.5655	0.0155	0.0680
n-Butane	15.2935	1.2246	5.3639	2.3220	0.0637	0.2791
Isopentane	6.2037	0.4968	2.1759	0.5170	0.0142	0.0621
n-Pentane	4.7922	0.3837	1.6808	0.3722	0.0102	0.0447
2-Methylpentane	0.6198	0.0496	0.2174	0.0209	0.0006	0.0025
3-Methylpentane	0.4203	0.0337	0.1474	0.0375	0.0010	0.0045
n-Hexane	4.9138	0.3935	1.7234	0.1300	0.0036	0.0156
Methylcyclopentane	0.2022	0.0162	0.0709	0.0512	0.0014	0.0062
Benzene	0.0160	0.0013	0.0056	0.0231	0.0006	0.0028
2-Methylhexane	0.3816	0.0306	0.1339	0.0111	0.0003	0.0013
3-Methylhexane	0.3021	0.0242	0.1060	0.0092	0.0003	0.0011
Heptane	0.4528	0.0363	0.1588	0.0144	0.0004	0.0017
Methylcyclohexane	0.3376	0.0270	0.1184	0.0558	0.0015	0.0067
Toluene	0.0621	0.0050	0.0218	0.0836	0.0023	0.0100
Octane	0.5928	0.0475	0.2079	0.0111	0.0003	0.0013
Ethylbenzene	0.0477	0.0038	0.0167	0.0633	0.0017	0.0076
m & p-Xylene	0.0341	0.0027	0.0120	0.0448	0.0012	0.0054
o-Xylene	0.0604	0.0048	0.0212	0.0817	0.0022	0.0098
Nonane	0.2028	0.0162	0.0711	0.0059	0.0002	0.0007
C10+	0.0834	0.0067	0.0292	0.0030	0.0001	0.0004
Total VOCs	67.659	5.42	23.7	14.802	0.4062	1.7791
Total CO <sub>2e</sub>		22.44	98.3		40.13	175.8
Total TAPs (Benzene)		0.0013	0.0056		0.0006	0.0028
Toluene		0.0050	0.0218		0.0023	0.0100
Ethylbenzene		0.0038	0.0167		0.0017	0.0076
Xylenes		0.0076	0.0332		0.0035	0.0152
n-Hexane		0.393	1.723		0.0036	0.0156
Total HAPs		0.411	1.801		0.0117	0.0513
Total	100.00	8.01	35.1	100.00	2.744	12.02

<b>Enter any notes here:</b>	Vapor mass fractions and Flashing losses from Promax output
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Table 7

**Uncontrolled Working and Breathing Losses**  
**Hubert Wellpad**  
**Harrison County, West Virginia**  
**Antero Resources Corporation**

Condensate Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.1800
Maximum Breathing Losses (lbs/hr)	0.9966
# Hours Operational	8760

	Condensate Tank W/B Losses						
	Vapor Mass Fraction wt%	Working Losses		Breathing Losses		Max W/B Losses	
		lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Water	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2S	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0022	3.90E-06	1.71E-05	0.0000	0.0001	0.0000	0.0001
Carbon Dioxide	0.2373	0.0004	0.0019	0.0024	0.0104	0.0028	0.0122
Methane	2.8061	0.0051	0.0221	0.0280	0.1225	0.0330	0.1446
Ethane	28.5875	0.0515	0.2254	0.2849	1.2479	0.3364	1.4733
Propane	30.2932	0.0545	0.2389	0.3019	1.3224	0.3564	1.5612
Isobutane	7.3316	0.0132	0.0578	0.0731	0.3200	0.0863	0.3778
n-Butane	16.4080	0.0295	0.1294	0.1635	0.7162	0.1931	0.8456
Isopentane	6.3007	0.0113	0.0497	0.0628	0.2750	0.0741	0.3247
n-Pentane	4.7968	0.0086	0.0378	0.0478	0.2094	0.0564	0.2472
2-Methylpentane	0.6017	0.0011	0.0047	0.0060	0.0263	0.0071	0.0310
3-Methylpentane	0.4069	0.0007	0.0032	0.0041	0.0178	0.0048	0.0210
n-Hexane	0.3233	0.0006	0.0025	0.0032	0.0141	0.0038	0.0167
Methylcyclopentane	0.1830	0.0003	0.0014	0.0018	0.0080	0.0022	0.0094
Benzene	0.0009	1.63E-06	0.0000	0.0000	0.0000	0.0000	0.0000
2-Methylhexane	0.0238	4.29E-05	0.0002	0.0002	0.0010	0.0003	0.0012
3-Methylhexane	0.2844	0.0005	0.0022	0.0028	0.0124	0.0033	0.0147
Heptane	0.3930	0.0007	0.0031	0.0039	0.0172	0.0046	0.0203
Methylcyclohexane	0.2943	0.0005	0.0023	0.0029	0.0128	0.0035	0.0152
Toluene	0.0075	1.35E-05	5.93E-05	0.0001	0.0003	0.0001	0.0004
Octane	0.4825	0.0009	0.0038	0.0048	0.0211	0.0057	0.0249
Ethylbenzene	0.0107	1.92E-05	8.42E-05	0.0001	0.0005	0.0001	0.0006
m & p-Xylene	0.0098	1.77E-05	7.76E-05	0.0001	0.0004	0.0001	0.0005
o-Xylene	0.0151	2.72E-05	0.0001	0.0002	0.0007	0.0002	0.0008
Nonane	0.1487	0.0003	0.0012	0.0015	0.0065	0.0017	0.0077
C10+	0.0509	9.17E-05	0.0004	0.0005	0.0022	0.0006	0.0026
Total VOCs	68.367	0.1231	0.539	0.6814	2.9843	0.8044	3.523
Total CO <sub>2e</sub>		0.1267	0.5550	0.7015	3.0727	0.8283	3.628
Total TAPs (Benzene)		1.63E-06	7.12E-06	0.0000	0.0000	0.0000	0.0000
Toluene		1.35E-05	5.93E-05	0.0001	0.0003	0.0001	0.0004
Ethylbenzene		1.92E-05	8.42E-05	0.0001	0.0005	0.0001	0.0006
Xylenes		4.49E-05	0.0002	0.0002	0.0011	0.0003	0.0013
n-Hexane		0.0006	0.0025	0.0032	0.0141	0.0038	0.0167
Total HAPs		0.0007	0.0029	0.0037	0.0160	0.0043	0.0189
Total	100.00	0.1800	0.7885	0.9966	4.3652	1.1766	5.154

Table 7

**Uncontrolled Working and Breathing Losses**  
**Hubert Wellpad**  
**Harrison County, West Virginia**  
**Antero Resources Corporation**

Produced Water Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.0356
Maximum Breathing Losses (lbs/hr)	0.0082

	Produced Water Tank W/B Losses						
	Vapor Mass Fraction wt%	Working Losses		Breathing Losses		Max W/B Losses	
		lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Water	92.4631	0.0329	0.1441	0.0076	0.0334	0.0405	0.1775
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0068	2.42E-06	1.06E-05	5.61E-07	2.46E-06	2.99E-06	1.31E-05
Carbon Dioxide	3.0848	0.0011	0.0048	0.0003	0.0011	0.0014	0.0059
Methane	3.2177	0.0011	0.0050	0.0003	0.0012	0.0014	0.0062
Ethane	1.0920	0.0004	0.0017	0.0001	0.0004	0.0005	0.0021
Propane	0.1286	4.58E-05	0.0002	1.06E-05	4.64E-05	5.64E-05	0.0002
Isobutane	0.0009	3.12E-07	1.37E-06	7.23E-08	3.17E-07	3.85E-07	1.68E-06
n-Butane	0.0054	1.93E-06	8.45E-06	4.47E-07	1.96E-06	2.38E-06	1.04E-05
Isopentane	0.0003	1.08E-07	4.72E-07	2.49E-08	1.09E-07	1.33E-07	5.81E-07
n-Pentane	0.0002	5.65E-08	2.48E-07	1.31E-08	5.73E-08	6.96E-08	3.05E-07
2-Methylpentane	0.0000	6.07E-10	2.66E-09	1.41E-10	6.15E-10	7.47E-10	3.27E-09
3-Methylpentane	0.0000	2.63E-09	1.15E-08	6.10E-10	2.67E-09	3.24E-09	1.42E-08
n-Hexane	0.0000	1.46E-10	6.40E-10	3.38E-11	1.48E-10	1.80E-10	7.88E-10
Methylcyclopentane	0.0000	7.74E-09	3.39E-08	1.79E-09	7.85E-09	9.53E-09	4.17E-08
Benzene	0.0000	1.07E-08	4.71E-08	2.49E-09	1.09E-08	1.32E-08	5.79E-08
2-Methylhexane	0.0000	5.27E-12	2.31E-11	1.22E-12	5.35E-12	6.50E-12	2.85E-11
3-Methylhexane	0.0000	6.53E-11	2.86E-10	1.51E-11	6.62E-11	8.04E-11	3.52E-10
Heptane	0.0000	7.52E-11	3.29E-10	1.74E-11	7.62E-11	9.26E-11	4.06E-10
Methylcyclohexane	0.0000	1.80E-09	7.89E-09	4.17E-10	1.83E-09	2.22E-09	9.71E-09
Toluene	0.0001	1.87E-08	8.18E-08	4.32E-09	1.89E-08	2.30E-08	1.01E-07
Octane	0.0000	1.13E-11	4.97E-11	2.62E-12	1.15E-11	1.40E-11	6.11E-11
Ethylbenzene	0.0000	7.95E-09	3.48E-08	1.84E-09	8.06E-09	9.79E-09	4.29E-08
m & p-Xylene	0.0000	6.29E-09	2.75E-08	1.46E-09	6.38E-09	7.74E-09	3.39E-08
o-Xylene	0.0000	1.20E-08	5.25E-08	2.77E-09	1.22E-08	1.48E-08	6.46E-08
Nonane	0.0000	2.81E-12	1.23E-11	6.49E-13	2.84E-12	3.46E-12	1.51E-11
C10+	0.0000	1.16E-13	5.09E-13	2.69E-14	1.18E-13	1.43E-13	6.26E-13
Total VOCs	0.1355	4.82E-05	0.0002	1.12E-05	4.89E-05	5.94E-05	0.0003
Total CO <sub>2e</sub>		0.0297	0.1302	0.0069	0.0301	0.0366	0.1604
Total TAPs (Benzene)		1.07E-08	4.71E-08	2.49E-09	1.09E-08	1.32E-08	5.79E-08
Toluene		1.87E-08	8.18E-08	4.32E-09	1.89E-08	2.30E-08	1.01E-07
Ethylbenzene		7.95E-09	3.48E-08	1.84E-09	8.06E-09	9.79E-09	4.29E-08
Xylenes		1.83E-08	8.00E-08	4.23E-09	1.85E-08	2.25E-08	9.86E-08
n-Hexane		1.46E-10	6.40E-10	3.38E-11	1.48E-10	1.80E-10	7.88E-10
Total HAPs		5.58E-08	2.44E-07	1.29E-08	5.66E-08	6.87E-08	3.01E-07
Total	100.00	0.0356	0.1559	0.0082	0.0361	0.0438	0.1920

<b>Enter any notes here:</b>	Vapor mass fractions, working losses and breathing losses from Promax output
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Table 8

**Loading Emissions**  
**Hubert Wellpad**  
**Harrison County, West Virginia**  
**Antero Resources Corporation**

Annual Loading	Oil Truck Loading	Water Truck Loading
RVP	1.65	1.0226
Annual Average Temp (F)	65.076213	65.076213
S (saturation factor)	0.6	0.6
P (true vapor pressure)	0.71	0.37
M (MW of vapor)	41.42	18.37
Collection Efficiency (%)	0.00	0.00
Loading Loss (lb/10 <sup>3</sup> gal)*	0.42	0.10
Maximum Throughput (gallons/hr)**	10,080	10,080
Average Throughput (gallons/yr)	153,300	7,665,000
Loading Emissions (lbs/hr)	4.22	0.98
Loading Emissions (tpy)	0.03	0.37

	Condensate Tank Loading Losses			Produced Water Tank Loading Losses		
	Vapor Mass Fraction wt%	Loading Losses		Vapor Mass Fraction wt%	Loading Losses	
		lbs/hr	tpy		lbs/hr	tpy
Water	0.0022	9.14E-05	6.95E-07	3.2177	3.16E-02	1.20E-02
H2S	0.2373	0.0100	0.0001	1.0920	0.0107	0.0041
Nitrogen	2.8061	1.18E-01	9.01E-04	0.1286	0.0013	0.0005
Carbon Dioxide	28.5875	1.2066	9.18E-03	0.0009	0.0000	0.0000
Methane	30.2932	1.2786	9.72E-03	0.0054	5.32E-05	2.02E-05
Ethane	7.3316	0.3095	0.0024	0.0003	2.97E-06	1.13E-06
Propane	16.4080	0.6926	0.0053	0.0002	1.56E-06	5.93E-07
Isobutane	6.3007	0.2659	0.0020	0.0000	1.67E-08	6.36E-09
n-Butane	4.7968	0.2025	0.0015	0.0000	7.26E-08	2.76E-08
Isopentane	0.6017	0.0254	0.0002	0.0000	4.03E-09	1.53E-09
n-Pentane	0.4069	0.0172	0.0001	0.0000	2.13E-07	8.11E-08
2-Methylpentane	0.3233	0.0136	1.04E-04	3.02E-05	2.96E-07	1.13E-07
3-Methylpentane	0.1830	0.0077	5.87E-05	1.48E-08	1.45E-10	5.53E-11
n-Hexane	0.0009	0.0000	2.90E-07	1.83E-07	1.80E-09	6.84E-10
Methylcyclopentane	0.0238	0.0010	7.65E-06	2.11E-07	2.07E-09	7.88E-10
Benzene	0.2844	0.0120	9.13E-05	0.0000	4.97E-08	1.89E-08
2-Methylhexane	0.3930	0.0166	1.26E-04	5.25E-05	5.15E-07	1.96E-07
3-Methylhexane	0.2943	0.0124	9.45E-05	3.19E-08	3.13E-10	1.19E-10
Heptane	0.0075	0.0003	2.41E-06	2.23E-05	2.19E-07	8.34E-08
Methylcyclohexane	0.4825	0.0204	1.55E-04	1.77E-05	1.73E-07	6.59E-08
Toluene	0.0107	0.0005	3.43E-06	0.0000	3.30E-07	1.26E-07
Octane	0.0098	0.0004	3.16E-06	7.88E-09	7.74E-11	2.94E-11
Ethylbenzene	0.0151	0.0006	4.84E-06	3.26E-10	3.20E-12	1.22E-12
m & p-Xylene	0.1487	0.0063	4.77E-05	0.00E+00	0.00E+00	0.00E+00
o-Xylene	0.0509	0.0021	1.63E-05	1.84E+01	1.80E-01	6.86E-02
Nonane	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
C10+	41.4230	1.7484	1.33E-02	0.0000	0.0000	0.0000
Total VOCs	72.1651	3.0460	0.0232	18.3734	0.1803	0.0686
Total CO <sub>2e</sub>		33.1725	0.2522		0.0013	0.0005
Total TAPs (Benzene)		0.0120	9.13E-05		4.97E-08	1.89E-08
Toluene		0.0005	3.43E-06		3.30E-07	1.26E-07
Ethylbenzene		0.0006	4.84E-06		3.20E-12	1.22E-12
Xylenes		0.0084	6.41E-05		1.80E-01	6.86E-02
n-Hexane		0.0000	2.90E-07		1.80E-09	6.84E-10
Total HAPs		0.0216	1.64E-04		1.80E-01	6.86E-02
Total	141.4229	5.9693	0.0454	22.8183	0.2240	0.0852

**Enter any notes here**

Vapor mass fractions and loading losses from Promax output

\*Using equation  $L_v = 12.46 * SPM/T$  from AP-42, Chapter 5, Section 5.2-4

MW was obtained by Promax; RVP was taken from laboratory reports

Annual Average Temp (F) obtained from Charleston, WV (preset in Promax)

S (saturation factor) is based on submerged loading, dedicated service as it was most representative

True vapor pressure (TVP) equation from AP-42, Chapter 7, Figure 7.1-13b

\*\* Maximum throughput in gallons per hour obtained from actual transfer rate of 200 barrels in 50 minutes. (10,080 gal/hr = 200 bbl / 50 min x 42 gal/bbl x 60 min/hr)

Loading emissions are vented to the atmosphere.

Table 9

**Gas Production Unit Heater and Line Heater Emissions  
Hubert Wellpad  
Harrison County, West Virginia  
Antero Resources Corporation**

**Gas Production Unit Heater Emissions**

Number of Units	7
GPU Heater Rating (MMBtu/hr)	1.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,247

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	0.561	2.459
CO	84	0.472	2.065
CO <sub>2</sub>	120,000	673.584	2950.299
Lead	0.0005	2.81E-06	1.23E-05
N <sub>2</sub> O	2.2	0.012	0.054
PM (Total)	7.6	0.043	0.187
SO <sub>2</sub>	0.6	0.003	0.015
TOC	11	0.062	0.270
Methane	2.3	0.013	0.057
VOC	5.5	0.031	0.135
<b>HAPS</b>			
2-Methylnaphthalene	2.40E-05	1.35E-07	5.90E-07
Benzene	0.0021	1.18E-05	5.16E-05
Dichlorobenzene	0.0012	6.74E-06	2.95E-05
Fluoranthene	3.00E-06	1.68E-08	7.38E-08
Fluorene	2.80E-06	1.57E-08	6.88E-08
Formaldehyde	7.50E-02	4.21E-04	0.0018
Hexane	1.80E+00	0.0101	0.0443
Naphthalene	6.10E-04	3.42E-06	1.50E-05
Phenanathrene	1.70E-05	9.54E-08	4.18E-07
Toluene	0.0034	1.91E-05	8.36E-05

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.093	0.406
TOTAL Uncontrolled HAPS	0.032	0.139
TOTAL Uncontrolled TAPs (Benzene)	3.54E-05	1.55E-04
TOTAL Uncontrolled Toluene	5.73E-05	2.51E-04
TOTAL Uncontrolled Hexane	0.0303	0.1328
TOTAL Uncontrolled TAPs (Formaldehyde)	0.0013	0.0055
TOTAL CO <sub>2e</sub> Emissions	2,032.76	8,903.49

**Enter any notes here:**  
All Emission Factors based off AP-42 Sec 1.4 Natural Gas Combustion

**Line Heater Emissions**

Number of Units	7
Line Heater Rating (MMBtu/hr)	2.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,247

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	1.123	4.917
CO	84	0.943	4.130
CO <sub>2</sub>	120,000	1347.169	5900.598
Lead	0.0005	5.61E-06	2.46E-05
N <sub>2</sub> O	2.2	0.025	0.108
PM (Total)	7.6	0.085	0.374
SO <sub>2</sub>	0.6	0.007	0.030
TOC	11	0.123	0.541
Methane	2.3	0.026	0.113
VOC	5.5	0.062	0.270
<b>HAPS</b>			
2-Methylnaphthalene	2.40E-05	2.69E-07	1.18E-06
Benzene	0.0021	2.36E-05	1.03E-04
Dichlorobenzene	0.0012	1.35E-05	5.90E-05
Fluoranthene	3.00E-06	3.37E-08	1.48E-07
Fluorene	2.80E-06	3.14E-08	1.38E-07
Formaldehyde	0.0750	8.42E-04	0.0037
Hexane	1.8000	0.0202	0.0885
Naphthalene	6.10E-04	6.85E-06	3.00E-05
Phenanathrene	1.70E-05	1.91E-07	8.36E-07
Toluene	0.0034	3.82E-05	1.67E-04

Table 10

**Enclosed Combustor Emissions  
Hubert Wellpad  
Harrison County, West Virginia  
Antero Resources Corporation**

General Information	
Unit Name:	EC001, EC002, EC003

Pollutant	Emission Factor (lb/MMscf)
NOx	100
CO	84
PM10	7.6
PM2.5	5.7
SO <sub>2</sub>	0.6
CO <sub>2</sub>	120,000
VOC	5.5
benzene	2.10E-03
Hexane	1.80E+00
Toluene	3.40E-03
Formaldehyde	7.50E-02
N <sub>2</sub> O	2.20
Lead	5.00E-04

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H <sub>2</sub> S molecular weight	34.08
SO <sub>2</sub> molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
H <sub>2</sub> S percent destruction efficiency (%)	98

Enclosed Combustor operating hours	8760
No. of Enclosed Combustors	3

Stream Information							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed/Vapor Combustor (Enter Name of Each Stream Here)	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
Maximum Expected Hourly Volumetric Flow Rate of Stream (scf/hr)	37.8	--	73.36	56.68	10.78	0.91	179.52
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	331,128.00	--	642,621.21	496,501.80	94,427.83	7,930.27	1,572,609.11
Heating Content (Btu/ft <sup>3</sup> )	1,247		2,190.17	1,187.65	2,365.87	97.89	1,412.49

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
H <sub>2</sub> S	-	-	0.000	0.000	0.000	0.000	0.000
Total VOC	-	-	5.418	0.406	0.804	0.000	6.63
Benzene	-	-	0.001	0.001	0.000	0.000	0.002
Toluene	-	-	0.005	0.002	0.000	0.000	0.007
Ethylbenzene	-	-	0.004	0.002	0.000	0.000	0.006
Xylenes	-	-	0.008	0.003	0.000	0.000	0.011
n-Hexane	-	-	0.393	0.004	0.004	0.000	0.401
HAPs	-	-	0.411	0.012	0.004	0.000	0.427
Total Mass Flow	-	-	8.008	2.744	1.177	0.044	11.972

Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)							
H <sub>2</sub> S	-	-	0.000	0.000	0.000	0.000	0.000
Total VOC	-	-	23.730	1.779	3.523	0.000	29.033
Benzene	-	-	0.006	0.003	0.000	0.000	0.008
Toluene	-	-	0.022	0.010	0.000	0.000	0.032
Ethylbenzene	-	-	0.017	0.008	0.001	0.000	0.025
Xylenes	-	-	0.033	0.015	0.001	0.000	0.050
n-Hexane	-	-	1.723	0.016	0.017	0.000	1.756
HAP	-	-	1.801	0.051	0.019	0.000	1.871
Total Mass Flow	-	-	35.073	12.019	5.154	0.192	52.438



Table 10

**Enclosed Combustor Emissions**  
**Hubert Wellpad**  
**Harrison County, West Virginia**  
**Antero Resources Corporation**

Controlled Emissions							
Hourly (lb/hr)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
NOx	0.004	-	0.007	0.006	0.001	0.000	0.02
CO	0.003	-	0.006	0.005	0.001	0.000	0.02
PM2.5	0.000	-	0.000	0.000	0.000	0.000	0.00
PM10	0.000	-	0.001	0.000	0.000	0.000	0.00
H2S	0.000	-	0.000	0.000	0.000	0.000	0.00
SO <sub>2</sub>	0.000	-	0.000	0.000	0.000	0.000	0.00
CO <sub>2</sub>	4.536	-	-	-	-	-	4.54
Total VOC	0.000	-	0.108	0.008	0.016	0.000	0.13
Benzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.000	0.000	0.000	0.000	0.00
Ethylbenzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.000	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.008	0.000	0.000	0.000	0.01
HAP	0.000	-	0.008	0.000	0.000	0.000	0.01
N <sub>2</sub> O	0.000	-	0.000	0.000	0.000	0.000	0.00
Lead	0.000	-	0.000	0.000	0.000	0.000	0.00
Formaldehyde	0.000	-	-	-	-	-	0.00
Annual (tpy)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
NOx	0.017	-	0.032	0.025	0.005	0.000	0.08
CO	0.014	-	0.027	0.021	0.004	0.000	0.07
PM2.5	0.001	-	0.002	0.001	0.000	0.000	0.00
PM10	0.001	-	0.002	0.002	0.000	0.000	0.01
H <sub>2</sub> S	0.000	-	0.000	0.000	0.000	0.000	0.00
SO <sub>2</sub>	0.000	-	0.000	0.000	0.000	0.000	0.00
CO <sub>2</sub>	19.868	-	-	-	-	-	19.87
Total VOC	0.001	-	0.475	0.036	0.070	0.000	0.58
Benzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.000	0.000	0.000	0.000	0.00
Ethylbenzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.001	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.034	0.000	0.000	0.000	0.04
HAP	0.000	-	0.036	0.001	0.000	0.000	0.04
N <sub>2</sub> O	0.000	-	0.001	0.001	0.000	0.000	0.00
Lead	0.000	-	0.000	0.000	0.000	0.000	0.00
Formaldehyde	0.000	-	-	-	-	-	0.00

Enclosed Combustor/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total VOC	0.13	0.58
NOx	0.018	0.079
CO	0.015	0.066
PM2.5	0.001	0.004
PM10	0.001	0.006
H <sub>2</sub> S	1.21E-05	5.28E-05
SO <sub>2</sub>	2.27E-05	9.93E-05
Benzene (TAPs)	3.85E-05	1.69E-04
Toluene	1.47E-04	0.001
Ethylbenzene	1.14E-04	0.000
Xylenes	0.000	0.001
Hexanes	0.008	0.035
Formaldehyde (TAPs)	2.84E-06	1.24E-05
HAPs	0.01	0.04
CO <sub>2</sub> e	22.02	96.43
N <sub>2</sub> O	0.000	0.002
Lead	8.98E-08	3.93E-07

Enter any notes here as needed  
 1. Emission Factors from AP-42 Tables 1.4-1, 1.4-2, and 1.4.3

**Table 11**  
**Enclosed Combustor GHG Emissions**  
**Hubert Wellpad**  
**Harrison County, West Virginia**  
**Antero Resources Corporation**

**Enclosed Combustor CO<sub>2</sub> and CH<sub>4</sub> Emissions**

Components	Mole fraction of oil flash gas constituents <sup>a</sup>	Volume of oil flash gas sent to Enclosed Combustor scf/year	Mole fraction of water flash gas constituents <sup>a</sup>	Volume of water flash gas sent to Enclosed Combustor scf/year	Mole fraction of oil tank vapors constituents <sup>a</sup>	Volume of oil tank vapor sent to Enclosed Combustor scf/year	Mole fraction of water tank vapors constituents <sup>a</sup>	Volume of water tank vapors sent to Enclosed Combustor scf/year	Component volume of gas sent to Enclosed Combustor scf/year	Number of carbon atoms	Combustion Efficiency	Combusted CO <sub>2</sub> Volume <sup>b</sup> scf/year	Uncombusted CO <sub>2</sub> and CH <sub>4</sub> Volume <sup>b</sup> scf/year	Volume GHGs Emitted scf/year
CO <sub>2</sub>	0.033	642,621	0.0107	496,502	0.0415	94,428	0.000	7,930	30,523	1	0	--	30,523	1,099,967
Methane	0.206	642,621	0.7455	496,502	0.2546	94,428	0.001	7,930	526,746	1	0.98	516,211	10,535	10,535
Ethane	0.045	642,621	0.1462	496,502	0.0522	94,428	0.000	7,930	106,220	2	0.98	208,192	--	
Propane	0.024	642,621	0.0482	496,502	0.0271	94,428	0.000	7,930	41,587	3	0.98	122,265	--	
i-Butane	0.002	642,621	0.0020	496,502	0.0026	94,428	0.000	7,930	2,715	4	0.98	10,643	--	
n-Butane	0.002	642,621	0.0082	496,502	0.0017	94,428	0.000	7,930	5,231	4	0.98	20,506	--	
Pentane	0.015	642,621	0.0025	496,502	0.0017	94,428	0.000	7,930	11,276	5	0.98	55,252	--	
Hexane	0.002	642,621	0.0004	496,502	0.0009	94,428	0.000	7,930	1,435	6	0.98	8,440	--	
Benzene	0.001	642,621	0.0001	496,502	0.0009	94,428	0.000	7,930	720	6	0.98	4,231	--	
Heptanes	0.003	642,621	0.0002	496,502	0.0024	94,428	0.000	7,930	2,047	7	0.98	14,043	--	
Toluene	0.000	642,621	0.0002	496,502	0.0000	94,428	0.000	7,930	187	7	0.98	1,284	--	
Octane	0.000	642,621	0.0001	496,502	0.0003	94,428	0.000	7,930	396	8	0.98	3,103	--	
Ethyl benzene	0.000	642,621	0.0001	496,502	0.0001	94,428	0.000	7,930	181	8	0.98	1,419	--	
Xylenes	0.000	642,621	0.0002	496,502	0.0971	94,428	0.445	7,930	12,821	8	0.98	100,513	--	
Nonane	0.001	642,621	0.0000	496,502	0.0000	94,428	0.000	7,930	377	9	0.98	3,322	--	
Decane plus	0.000	642,621	0.0000	496,502	0.0000	94,428	0.000	7,930	2	10	0.98	20	--	
<b>Subtotal</b>												<b>1,069,445</b>	--	

Pollutant	Volume Emitted scf/year	Density of GHG <sup>c</sup> lb/scf	Conversion Factor lb/ton	GWF	Emissions <sup>c</sup>	
					lbs/hr	(tons/yr)
CO <sub>2</sub>	1,099,967	0.12	2000	1	14.56	63.78
CH <sub>4</sub>	10,535	0.09	2000	25	0.11	0.49
<b>CO<sub>2</sub>e Emissions</b>					<b>17.4</b>	<b>76.03</b>

**GHG Emissions Summary**

Notes

a Flashing/Working/Breathing Losses from ProMax output reports

b 40 CFR 98.233 (n)(4): Eqns: W-19, W-20 and W-21

c 40 CFR 98.233(v) Eqn W-36 - density at 60F and 14.7 psia

**Table 12**

**Haul Road Emissions  
Hubert Wellpad  
Harrison County, West Virginia  
Antero Resources Corporation**

	PM	PM10
Particle Size Multiplier (k)	0.8	0.36
Silt Content of Road Surface Material (s) (%)	5.1	5.1
Days per Year with Precipitation > 0.01 in (p)	150	150
Control Efficiency for Watering <sup>1</sup> (%)	50	50

Tanker Truck Trip Calculation	
Condensate Production (bbl/day)	10
PW Production (bbl/day)	500
Truck Capacity (bbl)	200

Pick Up Truck Trip Calculation	
No of Trips Per day	2
Trips Per Year	730

	# of Wheels	Mean Vehicle Weight (W) (tons)	Mean Vehicle Speed (S) (mph)	Miles Per Trip (miles)	Maximum Trips per Hour	Maximum Trips per Year	Vehicle Miles Travelled		PM (lbs/VMT)	PM10 (lbs/VMT)
							(miles/hr)	(miles/year)		
Tanker Trucks Condensate	10	40	10	0.4100	1	19	0.4100	7.7900	3.8175	1.7179
Tanker Trucks PW	10	40	10	0.4100	1	913	0.4100	374.3300	3.8175	1.7179
Pick Up Truck	4	3	10	0.2000	1	730	0.2000	146.0000	0.3467	0.1560

	Uncontrolled Emissions						Controlled Emissions					
	PM			PM10			PM			PM10		
	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)
Tanker Trucks Condensate	1.5652	29.7386	0.0149	0.7043	13.3823	0.0067	0.7826	14.8693	0.0074	0.3522	6.6912	0.0033
Tanker Trucks PW	1.5652	1429.0158	0.7145	0.7043	643.0571	0.3215	0.7826	714.5079	0.3573	0.3522	321.5285	0.1608
Pick Up Truck	0.0693	50.6152	0.0253	0.0312	22.7769	0.0114	0.0347	25.3076	0.0127	0.0156	11.3884	0.0057
<b>Total Emissions</b>	<b>3.1997</b>	<b>1,509.3696</b>	<b>0.7547</b>	<b>1.4399</b>	<b>679.2163</b>	<b>0.3396</b>	<b>1.5999</b>	<b>754.6848</b>	<b>0.3773</b>	<b>0.7199</b>	<b>339.6082</b>	<b>0.1698</b>

<b>Enter any notes here:</b>	1 EPA, AP-42, Volume I, Section 13.2.2 Unpaved Roads (11/06); assume 2:1 moisture ratio Section 13.2.2 Unpaved Roads (11/06) Source: Attachment L, Fugitive Emissions from Unpaved Haul Roads, Rev 03/2007, West Virginia Department of Environmental Protection
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Bryan Research & Engineering, Inc.

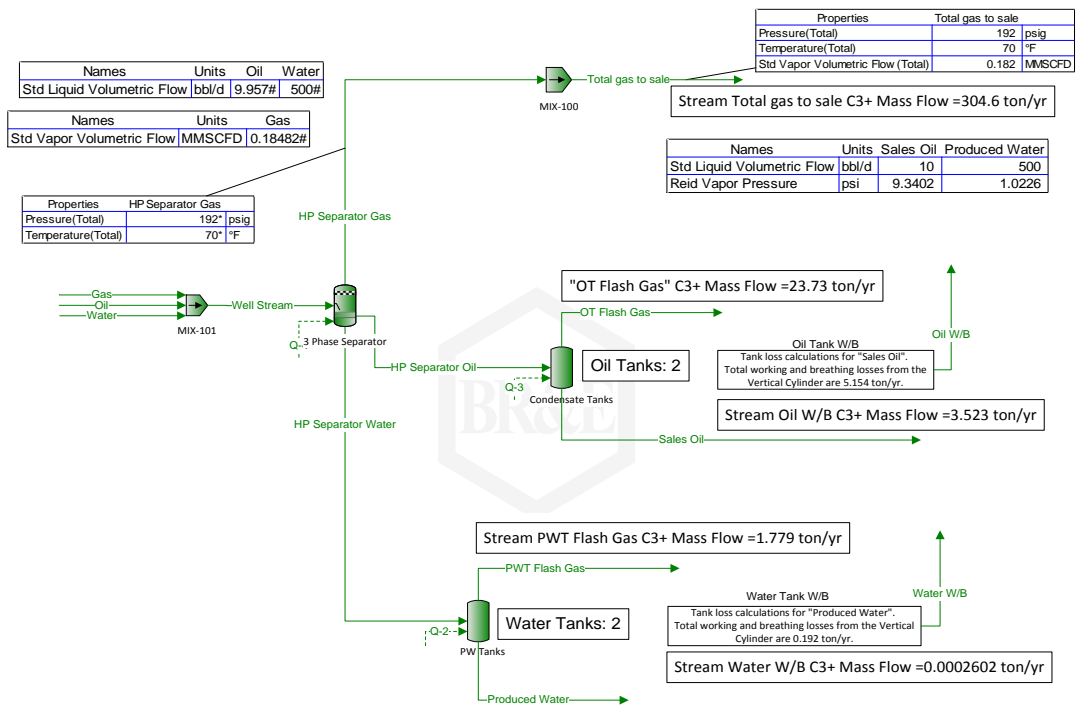
**ProMax<sup>®</sup> 3.2**

with  
**TSWEET<sup>®</sup> & PROSIM<sup>®</sup>**

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### Simulation Report

Client Name:	Antero Resources Corporation
Location:	West Virginia
Job:	Hubert Wellpad
Project Name:	PROMAX SCENARIO 3
File Name:	\\Det-s1\shared\AirQuality\ANTERO RESOURCES\ProMax\Antero WV_1 HP\PRON
ProMax Version:	
Report Created:	8/4/2016 6:38







Net I.G. Heating Value	Btu/ft <sup>3</sup>	1122.4	0.4	5268.7	2010.9	6038.8	1141.9	0.0	5638.0	0.0	1075.4	2174.94	45.6218	66.6484	1122.38
Net Liquid Heating Value	Btu/lb	20687.1	-1051.1	18950.8	19826.5	18885.1	20684.2	-1059.8	18900.7	-1059.0	19794.8	19771.6	-41.7561	384.006	20687.1
Gross I.G. Heating Value	Btu/ft <sup>3</sup>	1237.9	50.7	5658.6	2190.2	6478.5	1258.8	50.3	6049.6	50.3	1187.7	2365.87	97.8899	120.918	1237.93
Gross Liquid Heating Value	Btu/lb	22823.1	9.0	20364.7	21606.1	20271.5	22808.7	0.0	20292.0	0.8	21870.3	21520.6	1037.8	1505.9	22823.1

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale
Phase: Vapor	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0.186009	0.186009	0.186009	0.255208	0.255208	0			3.02986	3.02986	0.000157918	94.2995	0.0785796	0.186009
H2S		0	0	0	0	0	0			0	0	0	0	0	0
Nitrogen		0.499642	0.499642	0.499642	0.0581273	0.0581273	0.494658			0.251745	0.251745	0.00320299	0.00446789	0.520991	0.499642
Carbon Dioxide		0.129169	0.129169	0.129169	0.158356	0.158356	0.146717			1.07715	1.07715	0.223323	1.28785	0.103094	0.129169
Methane		78.1909	78.1909	78.1909	26.6875	26.6875	77.7018			74.7329	74.7329	7.24569	3.68519	79.7627	78.1909
Ethane		14.2384	14.2384	14.2384	26.4239	26.4239	14.2004			14.6635	14.6635	39.3820	0.667227	13.7461	14.2384
Propane		4.39809	4.39809	4.39809	22.4504	22.4504	4.49433			4.83125	4.83125	28.4571	0.0535781	3.88265	4.39809
Isobutane		0.531031	0.531031	0.531031	4.42741	4.42741	0.566666			0.199733	0.199733	5.22512	0.000277344	0.432866	0.531031
n-Butane		1.05099	1.05099	1.05099	10.0551	10.0551	1.18394			0.820063	0.820063	11.6938	0.00171372	0.824024	1.05099
Isopentane		0.282366	0.282366	0.282366	3.28583	3.28583	0.374944			0.147099	0.147099	3.61744	7.70353E-05	0.216772	0.282366
n-Pentane		0.208992	0.208992	0.208992	2.53818	2.53818	0.291434			0.105889	0.105889	2.75398	4.04430E-05	0.158189	0.208992
2-Methylpentane		0.0213065	0.0213065	0.0213065	0.274856	0.274856	0			0.00498645	0.00498645	0.289233	3.63603E-07	0.0170400	0.0213065
3-Methylpentane		0.0143699	0.0143699	0.0143699	0.186391	0.186391	0			0.00892564	0.00892564	0.195611	1.57796E-06	0.01143699	0.0143699
n-Hexane		0.167680	0.167680	0.167680	2.17899	2.17899	0.545164			0.0309753	0.0309753	0.155423	8.74741E-08	0.140986	0.167680
Methylcyclopentane		0.00695319	0.00695319	0.00695319	0.0917916	0.0917916	0			0.0124839	0.0124839	0.0900829	4.74615E-06	0.00558334	0.00695319
Benzene		0.000591040	0.000591040	0.000591040	0.00780571	0.00780571	0			0.00607646	0.00607646	0.000478956	7.09972E-06	0.000485205	0.000591040
2-Methylhexane		0.0113545	0.0113545	0.0113545	0.145547	0.145547	0			0.00227543	0.00227543	0.00985888	2.71751E-09	0.0117898	0.0113545
3-Methylhexane		0.000898284	0.000898284	0.000898284	0.115223	0.115223	0			0.00187806	0.00187806	0.117553	3.36163E-08	0.00932187	0.000898284
Heptane		0.0136506	0.0136506	0.0136506	0.172694	0.172694	0			0.00294767	0.00294767	0.162483	3.87393E-08	0.0151647	0.0136506
Methylcyclohexane		0.0101428	0.0101428	0.0101428	0.131398	0.131398	0			0.0116595	0.0116595	0.124162	9.46677E-07	0.0104067	0.0101428
Toluene		0.00198037	0.00198037	0.00198037	0.0257465	0.0257465	0			0.0186156	0.0186156	0.00337871	1.04635E-05	0.00207955	0.00198037
Octane		0.0162740	0.0162740	0.0162740	0.198322	0.198322	0			0.00200070	0.00200070	0.174959	5.12331E-09	0.0248474	0.0162740
Ethylbenzene		0.00137312	0.00137312	0.00137312	0.0171618	0.0171618	0			0.0122320	0.0122320	0.00416476	3.86688E-06	0.00196135	0.00137312
m-Xylene		0.000987664	0.000987664	0.000987664	0.0122875	0.0122875	0			0.00866496	0.00866496	0.00384137	3.05805E-06	0.00148342	0.000987664
o-Xylene		0.00174764	0.00174764	0.00174764	0.0217500	0.0217500	0			0.0157923	0.0157923	0.00588850	5.82724E-06	0.00265985	0.00174764
Nonane		0.00510787	0.00510787	0.00510787	0.0604323	0.0604323	0			0.000936594	0.000936594	0.0480132	1.12925E-09	0.0106139	0.00510787
C10+		0.00185205	0.00185205	0.00185205	0.0196649	0.0196649	0			0.000386400	0.000386400	0.0130229	3.69994E-11	0.00805846	0.00185205
<b>Molar Flow</b>		<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>	<b>lbmol/h</b>
Water		0.0372394	0	0	0.000534782	0	0			0	0.00405049	4.48576E-08	0.00224958	0.0147010	0.0372394
H2S		0	0	0	0	0	0			0	0	0	0	0	0
Nitrogen		0.100029	0	0	0.000121804	0	0.000380			0	0.000336546	9.09830E-07	1.06585E-07	0.0974692	0.100029
Carbon Dioxide		0.0258600	0	0	0.000331832	0	0.0297730			0	0.00144000	6.34363E-05	3.07227E-05	0.0192872	0.0258600
Methane		15.6540	0	0	0.0559229	0	15.7679			0	0.0999069	0.00205818	8.79128E-05	14.9223	15.6540
Ethane		2.85056	0	0	0.0553706	0	2.88165			0	0.0196030	0.0111867	1.59172E-05	2.57168	2.85056
Propane		0.890508	0	0	0.0470441	0	0.912024			0	0.00645867	0.00808344	1.27815E-06	0.726382	0.890508
Isobutane		0.106314	0	0	0.00927751	0	0.114992			0	0.000267014	0.00148423	6.61624E-09	0.0089825	0.106314
n-Butane		0.210410	0	0	0.0210701	0	0.240254			0	0.00109630	0.00332169	4.08821E-08	0.154162	0.210410
Isopentane		0.0565303	0	0	0.00688536	0	0.0760866			0	0.000196649	0.00102756	1.83773E-09	0.0405547	0.0565303
n-Pentane		0.0418407	0	0	0.00531868	0	0.0591401			0	0.000141558	0.000782287	9.64798E-10	0.0295947	0.0418407
2-Methylpentane		0.00426562	0	0	0.000575954	0	0			0	6.66615E-06	8.21585E-05	8.67400E-12	0.00318792	0.00426562
3-Methylpentane		0.00287688	0	0	0.000390578	0	0			0	1.19323E-05	5.55645E-05	3.76434E-11	0.00216437	0.00287688
n-Hexane		0.0335699	0	0	0.00456602	0	0.110629			0	4.14095E-05	4.41490E-05	2.08676E-12	0.0263764	0.0335699
Methylcyclopentane		0.00139205	0	0	0.000192347	0	0			0	1.66891E-05	2.55886E-05	1.13223E-10	0.00104455	0.00139205
Benzene		0.000118328	0	0	1.63666E-05	0	0			0	8.12334E-06	1.36050E-07	1.69369E-10	9.07742E-05	0.000118328
2-Methylhexane		0.00227321	0	0	0.000304991	0	0			0	3.04192E-06	2.80048E-06	6.48281E-14	0.00220569	0.00227321
3-Methylhexane		0.00179839	0	0	0.000241446	0	0			0	2.51069E-06	3.33916E-05	8.01942E-13	0.00174398	0.00179839
Heptane		0.00273287	0	0	0.000361876	0	0			0	3.94061E-06	4.61545E-05	9.24154E-13	0.00283707	0.00273287





Methylcyclohexane	0.199377	0	0	0.0270347	0	0	0	0	0.00153044	0.00346293	2.21740E-09	0.191161	0.199377
Toluene	0.0365305	0	0	0.00497098	0	0	0	0	0.00229299	8.84294E-05	2.29991E-08	0.0358466	0.0365305
Octane	0.372166	0	0	0.0474708	0	0	0	0	0.000305521	0.00567695	1.39610E-11	0.530998	0.372166
Ethylbenzene	0.0291848	0	0	0.00381791	0	0	0	0	0.00173605	0.000125596	9.79344E-09	0.0389560	0.0291848
m-Xylene	0.0209923	0	0	0.00273355	0	0	0	0	0.00122979	0.000115844	7.74495E-09	0.0294634	0.0209923
o-Xylene	0.0371452	0	0	0.00483863	0	0	0	0	0.00224136	0.000177579	1.47583E-08	0.0528293	0.0371452
Nonane	0.131155	0	0	0.0162415	0	0	0	0	0.000160587	0.00174920	3.45507E-12	0.254676	0.131155
C10+	0.0600672	0	0	0.00667559	0	0	0	0	8.36827E-05	0.000599276	1.42989E-13	0.244233	0.0600672

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale
Phase: Vapor	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units														
Temperature	°F	70.0	70.0	70.0	75.9	75.9	85.0			75.9	75.9	75.9425	75.9425	85.5887	70
Pressure	psig	192	192	192	0	0	1000			0	0	6.64146	-14.2257	1000	192
Mole Fraction Vapor	%	100	100	100	100	100	100			100	100	100	100	100	100
Mole Fraction Light Liquid	%	0	0	0	0	0	0			0	0	0	0	0	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0			0	0	0	0	0	0
Molecular Weight	lb/mol	20.5	20.5	20.5	38.2	38.2	20.9			20.5	20.5	41.4230	18.3731	20.1091	20.5287
Mass Density	lb/ft^3	0.8	0.8	0.8	0.1	0.1	4.7			0.1	0.1	0.157136	0.00150375	4.37184	0.787529
Molar Flow	lbmol/h	20.0	0.0	0.0	0.2	0.0	20.3			0.0	0.1	0.0284056	0.00238557	18.7084	20.0202
Mass Flow	lb/h	411.0	0.0	0.0	8.0	0.0	423.9			0.0	2.7	1.17665	0.0438303	376.209	410.989
Vapor Volumetric Flow	MCFH	0.5	0.0	0.0	0.1	0.0	0.1			0.0	0.1	0.00748807	0.0291474	0.0860528	0.521872
Liquid Volumetric Flow	Mbb/d	2.2	0.0	0.0	0.3	0.0	0.4			0.0	0.2	0.0320084	0.124593	0.367840	2.23079
Std Vapor Volumetric Flow	MMSCFD	0.2	0.0	0.0	0.0	0.0	0.2			0.0	0.0	0.000258708	2.17269E-05	0.170389	0.162337
Std Liquid Volumetric Flow	Mbb/d	0.1	0.0	0.0	0.0	0.0	0.1			0.0	0.0	0.000171826	3.31376E-06	0.0769053	0.0830008
Compressibility		0.948	0.948	0.948	0.988	0.988	0.777			0.996	0.996	0.978570	0.999551	0.797621	0.947890
Specific Gravity		0.709	0.709	0.709	1.319	1.319	0.721			0.709	0.709	1.43022	0.634373	0.694312	0.708801
API Gravity															
Enthalpy	MMBtu/h	-0.7	0.0	0.0	0.0	0.0	-0.7			0.0	0.0	-0.00125910	-0.000242557	-0.644691	-0.685868
Mass Enthalpy	Btu/lb	-1668.8	-1668.8	-1668.8	-1130.3	-1130.3	-1673.6			-1812.3	-1812.3	-1070.08	-5534.00	-1713.65	-1668.82
Mass Cp	Btu/(lb**F)	0.5	0.5	0.5	0.4	0.4	0.7			0.5	0.5	0.410790	0.443553	0.666921	0.506472
Ideal Gas Cp/Cv Ratio		1.253	1.253	1.253	1.143	1.143	1.245			1.256	1.256	1.13368	1.32235	1.25337	1.25309
Dynamic Viscosity	cP	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.00856942	0.0102462	0.0131408	0.0107687
Kinematic Viscosity	cSt	0.9	0.9	0.9	5.6	5.6	0.2			12.7	12.7	3.40450	425.370	0.187645	0.853644
Thermal Conductivity	Btu/(h**ft**F)	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0110290	0.0122361	0.0225028	0.0178135
Surface Tension	lbf/ft														
Net I.G. Heating Value	Btu/ft^3	1122.4	1122.4	1122.4	2010.9	2010.9	1141.9			1075.4	1075.4	2174.94	45.6218	1102.72	1122.38
Net Liquid Heating Value	Btu/lb	20687.1	20687.1	20687.1	19826.5	19826.5	20684.2			19794.8	19794.8	19771.6	-41.7561	20754.0	20687.1
Gross I.G. Heating Value	Btu/ft^3	1237.9	1237.9	1237.9	2190.2	2190.2	1258.8			1187.7	1187.7	2365.87	97.8899	1216.84	1237.93
Gross Liquid Heating Value	Btu/lb	22823.1	22823.1	22823.1	21606.1	21606.1	22808.7			21870.3	21870.3	21520.6	1037.8	22907.6	22823.1

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0.0532580	99.9649	0.0532580	0.00551820	0.00551820		100	0	99.9969	99.9969	4.68246E-06	100.0000	0.0692759	0.0532580
H2S		0	0	0	0	0		0	0	0	0	0	0	0	0
Nitrogen		0.0111860	8.60379E-05	0.0111860	8.94031E-05	8.94031E-05		0	0.013	2.94927E-06	2.94927E-06	7.37143E-06	1.67480E-09	0.0664112	0.0111860
Carbon Dioxide		0.0326984	0.000877607	0.0326984	0.00299360	0.00299360		0	0	0.000522259	0.000522259	0.00603725	2.00864E-05	0.0808032	0.0326984
Methane		5.20416	0.0264642	5.20416	0.125629	0.125629		5.429	0.00179884	0.00179884	0.0507443	2.84700E-06	23.4613	5.20416	
Ethane		5.69522	0.00525093	5.69522	0.795072	0.795072		5.67	0.000411293	0.000411293	1.72043	6.04112E-07	15.1812	5.69522	
Propane		6.37443	0.00174424	6.37443	2.57418	2.57418		4.895	0.000149712	0.000149712	4.73461	5.38481E-08	10.8223	6.37443	
Isobutane		1.90605	6.80757E-05	1.90605	1.31001	1.31001		1.346	2.15341E-06	2.15341E-06	2.20906	9.73838E-11	2.27462	1.90605	
n-Butane		5.39051	0.000290130	5.39051	4.28784	4.28784		3.278	1.94701E-05	1.94701E-05	7.13085	1.32603E-09	5.67329	5.39051	
Isopentane		3.56002	5.09433E-05	3.56002	3.62484	3.62484		2.12	2.39342E-06	2.39342E-06	5.71000	4.10527E-11	2.71193	3.56002	
n-Pentane		3.51512	3.66546E-05	3.51512	3.74606	3.74606		2.304	1.70588E-06	1.70588E-06	5.80348	2.13381E-11	2.50308	3.51512	
2-Methylpentane		0.845992	1.68404E-06	0.845992	0.981005	0.981005		1.46	3.82493E-08	3.82493E-08	1.47499	9.16578E-14	0.510111	0.845992	

3-Methylpentane	0.636127	3.13165E-06	0.636127	0.742442	0.742442	0	1.063	1.85757E-07	1.85757E-07	1.11181	1.07927E-12	0.378853	0.636127
n-Hexane	9.17044	1.04124E-05	9.17044	10.8232	10.8232	0	2.532	1.88933E-07	1.88933E-07	1.10104	1.75544E-14	5.30802	9.17044
Methylcyclopentane	0.403594	4.90009E-06	0.403594	0.477302	0.477302	0	0.629	7.79981E-07	7.79981E-07	0.662422	9.73361E-12	0.235432	0.403594
Benzene	0.0347948	2.09302E-05	0.0347948	0.0411749	0.0411749	0	0.063	1.89309E-05	1.89309E-05	0.00352993	7.24755E-10	0.0211036	0.0347948
2-Methylhexane	1.42426	7.65775E-07	1.42426	1.72654	1.72654	0	1.928	1.47616E-08	1.47616E-08	0.163383	5.82270E-16	0.772636	1.42426
3-Methylhexane	1.18323	6.32593E-07	1.18323	1.43570	1.43570	0	1.592	1.27349E-08	1.27349E-08	2.04442	7.52713E-15	0.641795	1.18323
Heptane	2.23123	9.92988E-07	2.23123	2.71786	2.71786	0	2.931	2.00996E-08	2.00996E-08	3.56662	8.73353E-15	1.20005	2.23123
Methylcyclohexane	1.67362	4.33017E-06	1.67362	2.03820	2.03820	0	2.198	4.82033E-07	4.82033E-07	2.69718	1.29031E-12	0.908304	1.67362
Toluene	0.408546	5.40663E-05	0.408546	0.499037	0.499037	0	0.549	4.79380E-05	4.79380E-05	0.0916225	8.87183E-10	0.223590	0.408546
Octane	8.05357	6.69341E-07	8.05357	9.91051	9.91051	0	9.866	9.00199E-09	9.00199E-09	12.2163	7.65669E-16	4.28127	8.05357
Ethylbenzene	0.803426	3.25199E-05	0.803426	0.989294	0.989294	0	0.993	2.84921E-05	2.84921E-05	0.334389	2.98121E-10	0.431290	0.803426
m-Xylene	0.686741	2.37483E-05	0.686741	0.846178	0.846178	0	0.843	2.08953E-05	2.08953E-05	0.368128	2.44239E-10	0.368224	0.686741
o-Xylene	1.36070	5.66800E-05	1.36070	1.67722	1.67722	0	1.67	5.14847E-05	5.14847E-05	0.630829	6.29066E-10	0.730341	1.36070
Nonane	7.44085	3.15827E-07	7.44085	9.18553	9.18553	0	8.901	6.70138E-09	6.70138E-09	10.2545	2.69799E-16	3.97138	7.44085
C10+	31.9002	1.31008E-07	31.9002	39.4366	39.4366	0	37.727	3.47550E-09	3.47550E-09	35.9237	1.12167E-17	17.1734	31.9002

Molar Flow	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water	0	404.897	0.000583697	0	4.89151E-05	404.935	0	404.893	0	0	0	0	0.00140575	0
H2S	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen	0	0.000348488	0.000122597	0	7.92498E-07	0	0.000120600	1.19418E-05	0	0	0	0	0.00134762	0
Carbon Dioxide	0	0.000355466	0.000358368	0	2.65362E-05	0	0	0.00211466	0	0	0	0	0.00163966	0
Methane	0	0.107190	0.0570365	0	0.00111362	0	0.0503645	0.00728361	0	0	0	0	0.476077	0
Ethane	0	0.0212683	0.0624184	0	0.00704777	0	0.0526003	0.00166535	0	0	0	0	0.308058	0
Propane	0	0.00706486	0.0698625	0	0.0228183	0	0.0454106	0.000606191	0	0	0	0	0.219606	0
Isobutane	0	0.000275733	0.0208899	0	0.0116124	0	0.0124868	8.71929E-06	0	0	0	0	0.0461567	0
n-Butane	0	0.00117514	0.0590789	0	0.0380088	0	0.0304098	7.88356E-05	0	0	0	0	0.115123	0
Isopentane	0	0.000206340	0.0390171	0	0.0321317	0	0.0196671	9.69111E-06	0	0	0	0	0.0550305	0
n-Pentane	0	0.000148466	0.0385250	0	0.0332063	0	0.0213741	6.90720E-06	0	0	0	0	0.0507925	0
2-Methylpentane	0	6.82102E-06	0.00927190	0	0.00869594	0	0.0135443	1.54874E-07	0	0	0	0	0.0103512	0
3-Methylpentane	0	1.26844E-05	0.00697183	0	0.00658125	0	0.00986139	7.52140E-07	0	0	0	0	0.00768770	0
n-Hexane	0	4.21745E-05	0.100506	0	0.0959401	0	0.0234892	7.65000E-07	0	0	0	0	0.107711	0
Methylcyclopentane	0	1.98473E-05	0.00442330	0	0.00423096	0	0.00583520	3.15819E-06	0	0	0	0	0.00477740	0
Benzene	0	8.47755E-05	0.000381344	0	0.000364988	0	0.000584447	7.66522E-05	0	0	0	0	0.000428234	0
2-Methylhexane	0	3.10169E-06	0.0156096	0	0.0153046	0	0.0178859	5.97708E-08	0	0	0	0	0.0156784	0
3-Methylhexane	0	2.56225E-06	0.0129679	0	0.0127265	0	0.0147689	5.15644E-08	0	0	0	0	0.0130233	0
Heptane	0	4.02199E-06	0.0244538	0	0.0240919	0	0.0271907	8.13843E-08	0	0	0	0	0.0243514	0
Methylcyclohexane	0	1.75389E-05	0.0183426	0	0.0180672	0	0.0203907	1.95178E-06	0	0	0	0	0.0184313	0
Toluene	0	0.000218990	0.00447758	0	0.00442363	0	0.00509304	0.000194104	0	0	0	0	0.00453710	0
Octane	0	2.71109E-06	0.0882655	0	0.0878499	0	0.0915263	3.64496E-08	0	0	0	0	0.0868757	0
Ethylbenzene	0	0.000131719	0.00880538	0	0.00876942	0	0.00921200	0.000115366	0	0	0	0	0.00875175	0
m-Xylene	0	9.61900E-05	0.00752654	0	0.00750079	0	0.00782046	8.46062E-05	0	0	0	0	0.00742202	0
o-Xylene	0	0.000229576	0.0149130	0	0.0148675	0	0.0154925	0.000208464	0	0	0	0	0.0148201	0
Nonane	0	1.27922E-06	0.0815502	0	0.0814235	0	0.0825741	2.71343E-08	0	0	0	0	0.0805874	0
C10+	0	5.30632E-07	0.349620	0	0.349579	0	0.349991	1.40725E-08	0	0	0	0	0.348483	0

Process Streams	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units													
Temperature	°F	70.0	70.0	70.0	75.9	75.9	85.0	85.0	75.9	75.9	75.9425	75.9425	85.5887	70
Pressure	psig	192	192	192	0	0	1000	1000	0	0	6.64146	-14.2257	1000	192
Mole Fraction Vapor	%	0	0	0	0	0	0	0	0	0	0	0	0	0
Mole Fraction Light Liquid	%	100	100	100	100	100	100	100	100	100	100	100	100	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol	104.6	18.0	104.6	120.3	120.3	18.0	112.2	18.0	18.0	115.316	18.0153	70.2510	104.594
Mass Density	lb/ft³	44.6	62.3	44.6	45.5	45.5	62.2	45.4	62.2	62.2	44.9391	62.2179	39.6332	44.5983
Molar Flow	lbmol/h	0.0	405.0	1.1	0.0	0.9	404.9	0.9	404.9	0.0	0	0	2.02920	0
Mass Flow	lb/h	0.0	7297.4	114.6	0.0	106.6	7295.0	104.1	7294.6	0.0	0	0	142.554	0

Vapor Volumetric Flow	MCFH	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0	0	0.00359683	0
Liquid Volumetric Flow	Mbbl/d	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0	0	0.0153749	0
Std Vapor Volumetric Flow	MMSCFD	0.0	3.7	0.0	0.0	0.0	3.7	0.0	3.7	0.0	0	0	0.0184812	0
Std Liquid Volumetric Flow	Mbbl/d	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0	0	0.01586652	0
Compressibility		0.085	0.011	0.085	0.007	0.007	0.050	0.429	0.001	0.001	0.00952563	2.36878E-05	0.0037371	0.0852804
Specific Gravity		0.715	0.998	0.715	0.729	0.729	0.997	0.727	0.998	0.998	0.720536	0.997577	0.635462	0.715071
API Gravity		65.0	10.0	65.0	60.5	60.5	9.9	60.0	10.0	10.0	62.8502	10.0135	85.7620	65.0183
Enthalpy	MMBtu/h	0.0	-49.8	-0.1	0.0	-0.1	-49.7	-0.1	-49.8	0.0	0	0	-0.137820	0
Mass Enthalpy	Btu/lb	-863.9	-6825.9	-863.9	-829.8	-829.8	-6810.9	-828.9	-6822.4	-6822.4	-858.728	-6822.67	-966.797	-863.873
Mass Cp	Btu/(lb**F)	0.5	1.0	0.5	0.5	0.5	1.0	0.5	1.0	1.0	0.489145	0.982746	0.536274	0.489626
Ideal Gas CpCv Ratio		1.053	1.326	1.053	1.046	1.046	1.325	1.048	1.326	1.326	1.04741	1.32556	1.07669	1.05303
Dynamic Viscosity	cP	0.5	1.0	0.5	0.6	0.6	0.8	0.5	0.9	0.9	0.554158	0.924435	0.227714	0.477311
Kinematic Viscosity	cSt	0.7	1.0	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.769817	0.927556	0.358683	0.668133
Thermal Conductivity	Btu/(h*ft**F)	0.1	0.3	0.1	0.1	0.1	0.4	0.1	0.3	0.3	0.0681893	0.349835	0.0635170	0.0678616
Surface Tension	lbf/ft	0.001	0.005	0.001	0.002	0.002	0.005	0.001	0.005	0.005	0.00151190	0.00499737	0.000603054	0.00138428
Net I.G. Heating Value	Btu/ft*3	5268.7	0.4	5268.7	6038.8	6038.8	0.0	5638.0	0.0	0.0	5805.39	3.70855E-05	3581.03	5268.69
Net Liquid Heating Value	Btu/lb	18950.8	-1051.1	18950.8	18885.1	18885.1	-1059.8	18900.7	-1059.0	-1059.0	18941.0	-1059.76	19188.2	18950.8
Gross I.G. Heating Value	Btu/ft*3	5658.6	50.7	5658.6	6478.5	6478.5	50.3	6049.6	50.3	50.3	6233.83	50.3100	3860.54	5658.59
Gross Liquid Heating Value	Btu/lb	20364.7	9.0	20364.7	20271.5	20271.5	0.0	20292.0	0.8	0.8	20350.3	0.000824722	20697.4	20364.7

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale
Phase: Heavy Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water	99.9649		99.9649											99.8769	99.9649
H2S	0		0											0	0
Nitrogen	8.60379E-05		8.60379E-05											0.000415309	8.60379E-05
Carbon Dioxide	0.000877607		0.000877607											0.00218199	0.000877607
Methane	0.0264642		0.0264642											0.103549	0.0264642
Ethane	0.00525093		0.00525093											0.0134466	0.00525093
Propane	0.00174424		0.00174424											0.00282347	0.00174424
Isobutane	6.80757E-05		6.80757E-05											8.38635E-05	6.80757E-05
n-Butane	0.000290130		0.000290130											0.000340285	0.000290130
Isopentane	5.09433E-05		5.09433E-05											4.15652E-05	5.09433E-05
n-Pentane	3.66546E-05		3.66546E-05											3.13032E-05	3.66546E-05
2-Methylpentane	1.68404E-06		1.68404E-06											1.28801E-06	1.68404E-06
3-Methylpentane	3.13165E-06		3.13165E-06											2.29893E-06	3.13165E-06
n-Hexane	1.04124E-05		1.04124E-05											7.72189E-06	1.04124E-05
Methylcyclopentane	4.90009E-06		4.90009E-06											3.26655E-06	4.90009E-06
Benzene	2.09302E-05		2.09302E-05											1.61411E-05	2.09302E-05
2-Methylhexane	7.65775E-07		7.65775E-07											4.69974E-07	7.65775E-07
3-Methylhexane	6.32593E-07		6.32593E-07											3.95013E-07	6.32593E-07
Heptane	9.92988E-07		9.92988E-07											5.50569E-07	9.92988E-07
Methylcyclohexane	4.33017E-06		4.33017E-06											3.07660E-06	4.33017E-06
Toluene	5.40663E-05		5.40663E-05											4.11643E-05	5.40663E-05
Octane	6.69341E-07		6.69341E-07											5.00594E-07	6.69341E-07
Ethylbenzene	3.25199E-05		3.25199E-05											2.30176E-05	3.25199E-05
m-Xylene	2.37483E-05		2.37483E-05											1.74927E-05	2.37483E-05
o-Xylene	5.66800E-05		5.66800E-05											4.31112E-05	5.66800E-05
Nonane	3.15827E-07		3.15827E-07											2.29495E-07	3.15827E-07
C10+	1.31008E-07		1.31008E-07											1.08579E-07	1.31008E-07
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water	99.9584		99.9584											99.8699	99.9584
H2S	0		0											0	0
Nitrogen	0.000133779		0.000133779											0.000645752	0.000133779
Carbon Dioxide	0.00214377		0.00214377											0.00533001	0.00214377
Methane	0.0235646		0.0235646											0.0922031	0.0235646

Ethane		0.00876368		0.00876368									0.0224420	0.00876368	
Propane		0.00426907		0.00426907									0.00691047	0.00426907	
Isobutane		0.000219616		0.000219616									0.000270547	0.000219616	
n-Butane		0.000935977		0.000935977									0.00109778	0.000935977	
Isopentane		0.000204008		0.000204008									0.000166452	0.000204008	
n-Pentane		0.000146787		0.000146787									0.000125356	0.000146787	
2-Methylpentane		8.05501E-06		8.05501E-06									6.16072E-06	8.05501E-06	
3-Methylpentane		1.49792E-05		1.49792E-05									1.09961E-05	1.49792E-05	
n-Hexane		4.98042E-05		4.98042E-05									3.69348E-05	4.98042E-05	
Methylcyclopentane		2.28896E-05		2.28896E-05									1.52588E-05	2.28896E-05	
Benzene		9.07446E-05		9.07446E-05									6.99807E-05	9.07446E-05	
2-Methylhexane		4.25901E-06		4.25901E-06									2.61384E-06	4.25901E-06	
3-Methylhexane		3.51829E-06		3.51829E-06									2.19693E-06	3.51829E-06	
Heptane		5.52269E-06		5.52269E-06									3.06208E-06	5.52269E-06	
Methylcyclohexane		2.35985E-05		2.35985E-05									1.67668E-05	2.35985E-05	
Toluene		0.000276502		0.000276502									0.000210519	0.000276502	
Octane		4.24378E-06		4.24378E-06									3.17387E-06	4.24378E-06	
Ethylbenzene		0.000191629		0.000191629									0.000135635	0.000191629	
m-Xylene		0.000139941		0.000139941									0.000103078	0.000139941	
o-Xylene		0.000333997		0.000333997									0.000254039	0.000333997	
Nonane		2.24830E-06		2.24830E-06									1.63371E-06	2.24830E-06	
C10+		1.17799E-06		1.17799E-06									9.76316E-07	1.17799E-06	
<b>Mass Flow</b>		<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>	
Water		0		0									7294.73	0	
H2S		0		0									0	0	
Nitrogen		0		0									0.0471672	0	
Carbon Dioxide		0		0									0.389316	0	
Methane		0		0									6.73473	0	
Ethane		0		0									1.63922	0	
Propane		0		0									0.504757	0	
Isobutane		0		0									0.0197614	0	
n-Butane		0		0									0.0801840	0	
Isopentane		0		0									0.0121580	0	
n-Pentane		0		0									0.00915631	0	
2-Methylpentane		0		0									0.000449993	0	
3-Methylpentane		0		0									0.000803179	0	
n-Hexane		0		0									0.00269780	0	
Methylcyclopentane		0		0									0.00111454	0	
Benzene		0		0									0.00511155	0	
2-Methylhexane		0		0									0.000190921	0	
3-Methylhexane		0		0									0.000160469	0	
Heptane		0		0									0.000223661	0	
Methylcyclohexane		0		0									0.00122468	0	
Toluene		0		0									0.0153768	0	
Octane		0		0									0.000231827	0	
Ethylbenzene		0		0									0.00990707	0	
m-Xylene		0		0									0.00752906	0	
o-Xylene		0		0									0.0185556	0	
Nonane		0		0									0.000119330	0	
C10+		0		0									7.13124E-05	0	
<b>Process Streams</b>		<b>HP Separator Gas</b>	<b>HP Separator Water</b>	<b>HP Separator Oil</b>	<b>OT Flash Gas</b>	<b>Sales Oil</b>	<b>Gas</b>	<b>Water</b>	<b>Oil</b>	<b>Produced Water</b>	<b>PWT Flash Gas</b>	<b>Oil W/B</b>	<b>Water W/B</b>	<b>Well Stream</b>	<b>Total gas to sale</b>
<b>Phase: Heavy Liquid</b>	<b>Status</b>	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
<b>Property</b>	<b>Units</b>														
Temperature	°F	70.0		70.0										85.5887	70
Pressure	psig	192		192										1000	192



**FESCO, Ltd.**  
**1100 FESCO Avenue - Alice, Texas 78332**

**For:** Antero Resources Appalachian Corp.  
 1625 17th Street  
 Denver, Colorado 80202

**Sample:** Moore No. 1H (Moore Well Pad)  
 Separator Hydrocarbon Liquid  
 Sampled @ 200 psig & 71 °F

Date Sampled: 09/25/13

Job Number: 35844.002

**CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M**

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.013	0.003	0.003
Carbon Dioxide	0.000	0.000	0.000
Methane	5.429	1.872	0.782
Ethane	5.670	3.086	1.531
Propane	4.895	2.744	1.938
Isobutane	1.346	0.896	0.702
n-Butane	3.278	2.103	1.711
2,2 Dimethylpropane	0.112	0.087	0.072
Isopentane	2.120	1.578	1.374
n-Pentane	2.192	1.617	1.420
2,2 Dimethylbutane	0.171	0.146	0.133
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.285	0.238	0.221
2 Methylpentane	1.460	1.234	1.130
3 Methylpentane	1.063	0.883	0.822
n-Hexane	2.076	1.737	1.606
Heptanes Plus	<u>69.889</u>	<u>81.775</u>	<u>86.555</u>
Totals:	100.000	100.000	100.000

**Characteristics of Heptanes Plus:**

Specific Gravity ----- 0.7602 (Water=1)  
 °API Gravity ----- 54.63 @ 60°F  
 Molecular Weight ----- 137.9  
 Vapor Volume ----- 17.49 CF/Gal  
 Weight ----- 6.33 Lbs/Gal

**Characteristics of Total Sample:**

Specific Gravity ----- 0.7182 (Water=1)  
 °API Gravity ----- 65.51 @ 60°F  
 Molecular Weight ----- 111.4  
 Vapor Volume ----- 20.47 CF/Gal  
 Weight ----- 5.98 Lbs/Gal

Base Conditions: 14.850 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG  
 Processor: JCdjv  
 Cylinder ID: W-1570

\_\_\_\_\_  
 David Dannhaus 361-661-7015

**TANKS DATA INPUT REPORT**

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.013	0.003	0.003
Methane	5.429	1.872	0.782
Ethane	5.670	3.086	1.531
Propane	4.895	2.744	1.938
Isobutane	1.346	0.896	0.702
n-Butane	3.390	2.190	1.783
Isopentane	2.120	1.578	1.374
n-Pentane	2.192	1.617	1.420
Other C-6's	2.980	2.501	2.306
Heptanes	7.576	6.844	6.648
Octanes	12.065	11.665	11.797
Nonanes	8.901	9.909	10.137
Decanes Plus	37.229	50.209	54.133
Benzene	0.063	0.036	0.045
Toluene	0.549	0.374	0.454
E-Benzene	0.993	0.780	0.947
Xylenes	2.513	1.958	2.395
n-Hexane	2.076	1.737	1.606
2,2,4 Trimethylpentane	<u>0.000</u>	<u>0.000</u>	<u>0.000</u>
Totals:	100.000	100.000	100.000

**Characteristics of Total Sample:**

Specific Gravity -----	0.7182 (Water=1)
°API Gravity -----	65.51 @ 60°F
Molecular Weight-----	111.4
Vapor Volume -----	20.47 CF/Gal
Weight -----	5.98 Lbs/Gal

**Characteristics of Decanes (C10) Plus:**

Specific Gravity -----	0.7744 (Water=1)
Molecular Weight-----	162.0

**Characteristics of Atmospheric Sample:**

°API Gravity -----	58.66 @ 60°F
Reid Vapor Pressure (ASTM D-5191)-----	1.65 psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	-----	W-1570*	----
Pressure, PSIG	200	192	----
Temperature, °F	71	70	----

\* Sample used for analysis



## TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.013	0.003	0.003
Carbon Dioxide	0.000	0.000	0.000
Methane	5.429	1.872	0.782
Ethane	5.670	3.086	1.531
Propane	4.895	2.744	1.938
Isobutane	1.346	0.896	0.702
n-Butane	3.278	2.103	1.711
2,2 Dimethylpropane	0.112	0.087	0.072
Isopentane	2.120	1.578	1.374
n-Pentane	2.192	1.617	1.420
2,2 Dimethylbutane	0.171	0.146	0.133
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.285	0.238	0.221
2 Methylpentane	1.460	1.234	1.130
3 Methylpentane	1.063	0.883	0.822
n-Hexane	2.076	1.737	1.606
Methylcyclopentane	0.629	0.453	0.475
Benzene	0.063	0.036	0.045
Cyclohexane	0.496	0.344	0.375
2-Methylhexane	1.928	1.824	1.735
3-Methylhexane	1.592	1.487	1.432
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.623	0.570	0.555
n-Heptane	2.308	2.167	2.076
Methylcyclohexane	2.198	1.798	1.938
Toluene	0.549	0.374	0.454
Other C-8's	7.225	7.113	7.150
n-Octane	2.641	2.754	2.709
E-Benzene	0.993	0.780	0.947
M & P Xylenes	0.843	0.666	0.804
O-Xylene	1.670	1.292	1.591
Other C-9's	6.223	6.843	7.054
n-Nonane	2.678	3.066	3.083
Other C-10's	8.998	10.873	11.414
n-decane	2.504	3.128	3.199
Undecanes(11)	9.521	11.804	12.566
Dodecanes(12)	6.162	8.252	8.907
Tridecanes(13)	3.969	5.699	6.237
Tetradecanes(14)	2.330	3.584	3.976
Pentadecanes(15)	1.359	2.238	2.513
Hexadecanes(16)	0.796	1.402	1.587
Heptadecanes(17)	0.538	1.001	1.144
Octadecanes(18)	0.366	0.717	0.825
Nonadecanes(19)	0.238	0.486	0.562
Eicosanes(20)	0.164	0.348	0.405
Heneicosanes(21)	0.099	0.222	0.259
Docosanes(22)	0.065	0.150	0.177
Tricosanes(23)	0.049	0.118	0.139
Tetracosanes(24)	0.031	0.078	0.093
Pentacosanes(25)	0.013	0.033	0.040
Hexacosanes(26)	0.009	0.023	0.027
Heptacosanes(27)	0.006	0.015	0.019
Octacosanes(28)	0.005	0.015	0.018
Nonacosanes(29)	0.003	0.010	0.012
Triacotanes(30)	0.001	0.003	0.004
Hentriacotanes Plus(31+)	<u>0.002</u>	<u>0.008</u>	<u>0.010</u>
Total	100.000	100.000	100.000



**FESCO, Ltd.**  
**1100 Fesco Avenue - Alice, Texas 78332**

**For:** Antero Resources Appalachian Corp.  
 1625 17th Street  
 Denver, Colorado 80202

**Date Sampled:** 09/25/13

**Date Analyzed:** 10/02/13

**Sample:** Moore No. 1H

**Job Number:** J35844

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	Stock Tank
Pressure, psig	200	0
Temperature, °F	71	70
Gas Oil Ratio (1)	-----	139
Gas Specific Gravity (2)	-----	1.149
Separator Volume Factor (3)	1.0837	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.9228
Oil API Gravity at 60 °F	58.66
Reid Vapor Pressure, psi (5)	1.65

Quality Control Check			
	Sampling Conditions	Test Samples	
Cylinder No.	-----	W-1570*	----
Pressure, psig	200	192	----
Temperature, °F	71	70	----

(1) - Scf of flashed vapor per barrel of stock tank oil

(2) - Air = 1.000

(3) - Separator volume / Stock tank volume

(4) - Fraction of first stage separator liquid

(5) - Absolute pressure at 100 deg F

Analyst: \_\_\_\_\_ M. G.

\* Sample used for flash study

**Base Conditions: 14.85 PSI & 60 °F**

Certified: FESCO, Ltd.     -     Alice, Texas

\_\_\_\_\_  
 David Dannhaus    361-661-7015

**FESCO, Ltd.**  
**1100 Fesco Ave. - Alice, Texas 78332**

**For:** Antero Resources Appalachian Corp.  
 1625 17th Street  
 Denver, Colorado 80202

**Sample:** Moore No. 1H (Moore Well Pad)  
 Gas Evolved from Hydrocarbon Liquid Flashed  
 From 200 psig & 71 °F to 0 psig & 70 °F

Date Sampled: 09/25/13

Job Number: 35844.001

**CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT**

<b>COMPONENT</b>	<b>MOL%</b>	<b>GPM</b>
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.054	
Carbon Dioxide	0.117	
Methane	35.770	
Ethane	31.071	8.375
Propane	18.617	5.169
Isobutane	3.229	1.065
n-Butane	5.838	1.855
2-2 Dimethylpropane	0.101	0.039
Isopentane	1.708	0.630
n-Pentane	1.353	0.494
Hexanes	1.101	0.457
Heptanes Plus	<u>1.041</u>	<u>0.471</u>
Totals	100.000	18.556

**Computed Real Characteristics Of Heptanes Plus:**

Specific Gravity ----- 3.643 (Air=1)  
 Molecular Weight ----- 104.45  
 Gross Heating Value ----- 5573 BTU/CF

**Computed Real Characteristics Of Total Sample:**

Specific Gravity ----- 1.149 (Air=1)  
 Compressibility (Z) ----- 0.9899  
 Molecular Weight ----- 32.94  
 Gross Heating Value  
   Dry Basis ----- 1951 BTU/CF  
   Saturated Basis ----- 1918 BTU/CF

\*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)

Results: 0.063 Gr/100 CF, 1.0 PPMV or 0.0001 Mol %

Base Conditions: 14.850 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR  
 Processor: ANB  
 Cylinder ID: FL# 15 S

David Dannhaus 361-661-7015

**CHROMATOGRAPH EXTENDED ANALYSIS  
TOTAL REPORT**

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.054		0.046
Carbon Dioxide	0.117		0.156
Methane	35.770		17.417
Ethane	31.071	8.375	28.359
Propane	18.617	5.169	24.919
Isobutane	3.229	1.065	5.697
n-Butane	5.838	1.855	10.300
2,2 Dimethylpropane	0.101	0.039	0.221
Isopentane	1.708	0.630	3.741
n-Pentane	1.353	0.494	2.963
2,2 Dimethylbutane	0.063	0.027	0.165
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.081	0.033	0.212
2 Methylpentane	0.363	0.152	0.950
3 Methylpentane	0.229	0.094	0.599
n-Hexane	0.365	0.151	0.955
Methylcyclopentane	0.034	0.012	0.087
Benzene	0.010	0.003	0.024
Cyclohexane	0.050	0.017	0.128
2-Methylhexane	0.110	0.052	0.335
3-Methylhexane	0.110	0.050	0.335
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.119	0.052	0.358
n-Heptane	0.120	0.056	0.365
Methylcyclohexane	0.101	0.041	0.301
Toluene	0.023	0.008	0.064
Other C8's	0.177	0.083	0.592
n-Octane	0.039	0.020	0.135
Ethylbenzene	0.002	0.001	0.006
M & P Xylenes	0.014	0.005	0.045
O-Xylene	0.002	0.001	0.006
Other C9's	0.074	0.038	0.284
n-Nonane	0.015	0.009	0.058
Other C10's	0.031	0.018	0.133
n-Decane	0.004	0.002	0.017
Undecanes (11)	<u>0.006</u>	<u>0.004</u>	<u>0.027</u>
Totals	100.000	18.556	100.000

**Computed Real Characteristics Of Total Sample:**

Specific Gravity -----	1.149	(Air=1)
Compressibility (Z) -----	0.9899	
Molecular Weight -----	32.94	
Gross Heating Value		
Dry Basis -----	1951	BTU/CF
Saturated Basis -----	1918	BTU/CF

**Antero Resources**  
**Moore Unit 1H - Moore Pad**

Tag Name	Value	Units	Timestamp
Accumulated Gas Flow	1154650	MCF	12/3/2013 10:05
Casing Pressure	287.85	PSIA	12/3/2013 10:05
Current Day Gas Flow	422.39	MCF	12/3/2013 10:05
Differential Pressure	13.27	inH2O	12/3/2013 10:05
Flow Rate	4797.37	MCF Per Day	12/3/2013 10:05
Pressure	203.88	PSIA	12/3/2013 10:05
Previous Day Energy	5930.91	MBTU	12/3/2013 10:05
Previous Day Gas Flow	4755.91	MCF	12/3/2013 10:05
Temperature	69.77	F	12/3/2013 10:05
Tubing Pressure	287.85	PSIA	12/3/2013 10:05
Daily AP	12.9	PSIA	12/3/2013 9:00
Daily DP	206.96	inH2O	12/3/2013 9:00
Daily Energy	5930.91	MBTU	12/3/2013 9:00
Daily Flow	4755.91	MCF	12/3/2013 9:00
Daily Tf	68.31	F	12/3/2013 9:00
Hourly AP	197.13	PSIA	12/3/2013 11:00
Hourly DP	13.86	Inches	12/3/2013 11:00
Hourly Energy	250.4	MBTU	12/3/2013 11:00
Hourly Flow Time	3600	Seconds	12/3/2013 11:00
Hourly Tf	69.4	F	12/3/2013 11:00
Hourly Volume	200.8	MCF	12/3/2013 11:00
Audited Accumulated Gas Volume		MCF	
Audited Casing Pressure	293	PSI	11/30/2013 9:00
Audited Gas Volume	4772.87	MCF	11/30/2013 9:00
Audited Oil Volume	0	Barrels	11/30/2013 9:00
Audited Tubing Pressure	293	PSI	11/30/2013 9:00
Audited Water Volume	0	Barrels	11/30/2013 9:00
Argon	0	%	12/3/2013 10:05
BTU	1247.06	BTU	12/3/2013 10:05
CO2	0.1467	%	12/3/2013 10:05
Carbon Monoxide	0	%	12/3/2013 10:05
Decane	0	%	12/3/2013 10:05
Ethane	14.1987	%	12/3/2013 10:05
Helium	0	%	12/3/2013 10:05
Heptane	0	%	12/3/2013 10:05
Hexane	0.5451	%	12/3/2013 10:05
Hydrogen	0	%	12/3/2013 10:05
Hydrogen Sulfide	0	%	12/3/2013 10:05
Iso-Butane	0.5666	%	12/3/2013 10:05
Iso-Pentane	0.3749	%	12/3/2013 10:05
Methane	77.6927	%	12/3/2013 10:05
N2	0.4946	%	12/3/2013 10:05
N-Butane	1.1838	%	12/3/2013 10:05
Nonane	0	%	12/3/2013 10:05
N-Pentane	0.2914	%	12/3/2013 10:05
Octane	0	%	12/3/2013 10:05
Oxygen	0.0117	%	12/3/2013 10:05
Plate Size	3.75	Inches	12/3/2013 10:05
Propane	4.4938	%	12/3/2013 10:05
SPG	0.7248		12/3/2013 10:05
Water	0	%	12/3/2013 10:05

# **Attachment T**

## **Facility-wide Emissions Summary Sheet(s)**

**ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET**

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	NOx		CO		VOC		SO2		PM10		PM2.5		GHG (CO2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-HR001									0.7199	0.1698				
EP-PCV					0.0601	0.2633							4.7422	20.7707
F001					2.6661	11.6775							56.5115	247.5202
EP-L001					3.0460	0.0232							33.1725	0.2522
EP-L002					1.80E-01	6.86E-02							0.0013	0.0005
EP-GPU001 through EP-GPU007 (emission per EPN)	0.0802	0.3512	0.0674	0.2950	0.0044	0.0193	0.0005	0.0021	0.0061	0.0267	0.0061	0.0267	96.2263	421.4713
EP-LH001 through EP-LH007 (emission per EPN)	0.1604	0.7025	0.1347	0.5901	0.0088	0.0386	0.0010	0.0042	0.0122	0.0534	0.0122	0.0534	192.4526	842.9426
EP-EC001 through EP-EC003 (emission per EPN)	0.0060	0.0262	0.0050	0.0220	0.0443	0.1939	0.0000	0.0000	0.0005	0.0020	0.0003	0.0015	7.3389	32.1444
<b>TOTAL</b>	<b>1.7019</b>	<b>7.4544</b>	<b>1.4296</b>	<b>6.2617</b>	<b>0.2254</b>	<b>0.9872</b>	<b>0.0101</b>	<b>0.0444</b>	<b>0.1293</b>	<b>0.5665</b>	<b>0.1290</b>	<b>0.5650</b>	<b>2042.7695</b>	<b>8947.3305</b>

Annual emissions shall be based on 8760 hours per year of operation for all emission units except emergency generators.

According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above

**ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET**

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-HR001														
EP-PCV			0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0071	0.0313	0.0071	0.0313
F001			0.0009	0.0040	0.0093	0.0406	0.0193	0.0846	0.0489	0.2142	0.1246	0.5457	0.2030	0.8891
EP-L001			1.20E-02	9.13E-05	4.51E-04	3.43E-06	6.37E-04	4.84E-06	0.008	6.41E-05	0.000	0.000	0.022	0.000
EP-L002			4.97E-08	1.89E-08	3.30E-07	1.26E-07	3.20E-12	1.22E-12	1.80E-01	6.86E-02	1.80E-09	6.84E-10	1.80E-01	6.86E-02
EP-GPU001 through EP-GPU007 (emission per EPN)	0.0001	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0063	0.0015	0.0066
EP-LH001 through EP-LH007 (emission per EPN)	0.0001	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0029	0.0126	0.0030	0.0132
EP-EC001 through EP-EC003 (emission per EPN)	0.0000	0.0000	0.0000	0.0001	0.0000	0.0002	0.0000	0.0002	0.0001	0.0003	0.0027	0.0118	0.0029	0.0126
<b>TOTAL</b>	<b>0.0013</b>	<b>0.0055</b>	<b>0.0001</b>	<b>0.0003</b>	<b>0.0002</b>	<b>0.0009</b>	<b>0.0001</b>	<b>0.0005</b>	<b>0.0002</b>	<b>0.0010</b>	<b>0.0384</b>	<b>0.1682</b>	<b>0.0403</b>	<b>0.1766</b>

Annual emissions shall be based on 8760 hours per year of operation for all emission units except emergency generators.

According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above



# **Attachment U**

## **Class I Legal Advertisement**

**Attachment U**

**Air Quality Permit Notice  
Notice of Application  
Hubert Wellpad  
Antero Resources Corporation  
Harrison County, West Virginia**

Notice is given that Antero Resources Corporation has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-C General Permit Registration for an Oil and Natural Gas Production facility located at 3528 Raccoon Run Road, Salem, WV 26426, near Salem in Harrison County, West Virginia.

The latitude and longitude coordinates are: 39.253426 and -80.560375

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

Pollutants	TOTALS (tpy):
NO <sub>x</sub>	7.4544
CO	6.2617
PM <sub>2.5</sub>	0.5650
PM <sub>10</sub>	0.5665
VOC	0.9872
SO <sub>2</sub>	0.0444
Formaldehyde	0.0055
Benzene	0.0003
Toluene	0.0009
Ethylbenzene	0.0005
Xylenes	0.0010
Hexane	0.1682
Total HAPs	0.1766

Proposed new equipment will be installed on or about January 1, 2017. Startup of operation using new equipment is planned to begin on or about May 01, 2017. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the \_\_ day of \_\_\_\_\_, 2016

By: Antero Resources Corporation  
Barry Schatz  
Senior Environmental & Regulatory Manager  
1615 Wynkoop Street  
Denver, CO 80202

[www.ghd.com](http://www.ghd.com)

