



**CONESTOGA-ROVERS  
& ASSOCIATES**

6320 Rothway, Suite 100, Houston, Texas 77040  
Telephone: (713) 734-3090 Fax: (713) 734-3391  
[www.CRAworld.com](http://www.CRAworld.com)

June 26, 2015

Reference No. 082715

Mr. Jay Fedczak  
Assistant Director for Permitting  
Division of Air Quality  
WV Department of Environmental Protection  
601 57<sup>th</sup> Street, SE  
Charleston, West Virginia 25304

Dear Mr. Jay Fedczak:

Re: General Permit Registration G70-A Modification Application  
Pennington South Wellpad  
Antero Resources Corporation

Conestoga-Rovers & Associates (CRA) would like to submit this General Permit Modification application that we prepared on behalf of Antero Resources Corporation for an oil and gas facility identified as Pennington South.

A General Permit Registration Modification is requested due to the following planned operational changes:

- 1) Replace the 6 existing 1.5 MMBtu/hr Gas Production Unit with 1.0 MMBtu/hr.
- 2) Remove the 48" Cimarron enclosed combustor.
- 3) Remove the 24 HP Kubota engine
- 4) Reduce condensate production

Please refer to Table 11 in Attachment I –Emissions Calculations for the summary of changes in emissions of regulated air pollutants that will result from the above operational changes.

Enclosed are the following documents:

- Original copy of the G70-A General Permit Modification Application
- Two CD copies of the G70-A General Permit Modification Application
- The application fee with check no. 407686 in the amount of \$1500.00.

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Equal  
Employment Opportunity  
Employer

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**CONESTOGA-ROVERS  
& ASSOCIATES**

June 26, 2015

- 2 -

Reference No. 082715

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

Sincerely,

CONESTOGA-ROVERS & ASSOCIATES

Manuel Bautista

Encl.

cc: Barry Schatz, Antero Resources Corporation



## **General Permit Application G70-A Modification**

Removal of 24 HP Kubota Engine and 48" Cimarron enclosed combustor, replacement of 6 Gas Processing Units from 1.5 to 1.0 MMBtu/hr, and reduced condensate production

Pennington South Well Pad

Prepared for: Antero Resources Corporation

**Conestoga-Rovers & Associates**

6320 Rothway, Suite 100  
Houston, Texas 77040

June 2015 • 082715 • Report No. 205

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**Table of Contents \***

## G70-A General Permit Modification

Attachment A	Current Business Certificate - No changes
Attachment B	Process Description
Attachment C	Description of Fugitive Emissions - No changes
Attachment D	Process Flow Diagram
Attachment E	Plot Plan
Attachment F	Area Map - No changes
Attachment G	Emission Unit Data Sheets/G70 – A Section Applicability Form
Attachment H	Air Pollution Control Device Data Sheet - Not Applicable
Attachment I	Emission Calculations
Attachment J	Class I Legal Advertisement
Attachment K	Electronic Submittal - Not Applicable
Attachment L	General Permit Modification Application Fee
Attachment M	Siting Criteria Waiver - Not Applicable
Attachment N	Material Safety Data Sheets - No changes
Attachment O	Emissions Summary Sheet
Attachment P	Other Supporting Documentation - Not Applicable

\* Note: Attachments which either have no changes from initial permit application or not applicable were not included in this submittal. The Attachment letter identifiers consistent with the G70-A application guidance and instructions were maintained for easier identification/reference.



WEST VIRGINIA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 DIVISION OF AIR QUALITY  
 601 57<sup>th</sup> Street, SE  
 Charleston, WV 25304  
 Phone: (304) 926-0475 • www.dep.wv.gov/daq

**APPLICATION FOR GENERAL PERMIT REGISTRATION**  
 CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE  
 A STATIONARY SOURCE OF AIR POLLUTANTS

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

**CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:**

- |   |   |
|---|---|
| <input type="checkbox"/> <b>G10-D</b> – Coal Preparation and Handling                                   | <input type="checkbox"/> <b>G40-C</b> – Nonmetallic Minerals Processing                             |
| <input type="checkbox"/> <b>G20-B</b> – Hot Mix Asphalt   | <input type="checkbox"/> <b>G50-B</b> – Concrete Batch  |
| <input type="checkbox"/> <b>G30-D</b> – Natural Gas Compressor Stations                                 | <input type="checkbox"/> <b>G60-C</b> – Class II Emergency Generator                                |
| <input type="checkbox"/> <b>G33-A</b> – Spark Ignition Internal Combustion Engines                      | <input type="checkbox"/> <b>G65-C</b> – Class I Emergency Generator                                 |
| <input type="checkbox"/> <b>G35-A</b> – Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit) | <input checked="" type="checkbox"/> <b>G70-A</b> – Class II Oil and Natural Gas Production Facility |

**SECTION I. GENERAL INFORMATION**

1. Name of applicant (as registered with the WV Secretary of State's Office): <b>Antero Resources Corporation</b>		2. Federal Employer ID No. (FEIN): 80-0162034	
3. Applicant's mailing address: 1615 Wynkoop St. _____ Denver, CO, 80202 _____		4. Applicant's physical address: <u>1800 Webley Fork Rd. West Union, WV 26456</u>	
5. If applicant is a subsidiary corporation, please provide the name of parent corporation:			
6. <b>WV BUSINESS REGISTRATION.</b> Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO – IF <b>YES</b> , provide a copy of the Certificate of <b>Incorporation/ Organization / Limited Partnership</b> (one page) including any name change amendments or other Business Registration Certificate as <b>Attachment A</b> . – IF <b>NO</b> , provide a copy of the <b>Certificate of Authority / Authority of LLC / Registration</b> (one page) including any name change amendments or other Business Certificate as <b>Attachment A</b> .			

**SECTION II. FACILITY INFORMATION**

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.): Natural Gas and Oil Production facility	8a. Standard Industrial Classification (SIC) code: 1311	AND	8b. North American Industry System (NAICS) code: 211111
9. DAQ Plant ID No. (for existing facilities only): <u>017-00113</u>	10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only): <u>G70-A069A</u>		

**A: PRIMARY OPERATING SITE INFORMATION**

11A. Facility name of primary operating site: <u>Pennington South Well Pad</u> _____ _____	12A. Address of primary operating site: Mailing: <u>N/A</u> Physical: <u>1800 Webley Fork Rd. West Union, WV 26456</u>	
13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <span style="float:right;"><input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</span> – IF YES, please explain: <u>Antero is leasing the mineral rights for this site</u> _____ _____ – IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.		
14A. – For <b>Modifications or Administrative Updates</b> at an existing facility, please provide directions to the present location of the facility from the nearest state road; From the intersection of Porto Rico Road and Maxwell Ridge Road, go West on Maxwell Ridge Road for 1.6 mi to find the destination on the right. – For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a <b>MAP</b> as <b>Attachment F</b> .		
15A. Nearest city or town: West Union	16A. County: Doddridge	17A. UTM Coordinates: Northing (KM): 4,339.2806 Easting (KM): 522.377 Zone: 17N
18A. Briefly describe the proposed new operation or change (s) to the facility: Removal of 24 HP Kubota Engine and 48" Cimarron enclosed combustor, replacement of 6 Gas Processing Units from 1.5 to 1.0 MMBtu/hr, and reduced condensate production.		19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: 39.202500 Longitude: -80.740833

**B: 1<sup>ST</sup> ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)**

11B. Name of 1 <sup>st</sup> alternate operating site: _____ _____ _____	12B. Address of 1 <sup>st</sup> alternate operating site: Mailing: _____ Physical: _____ _____ _____
13B. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <span style="float:right;"><input type="checkbox"/> YES <input type="checkbox"/> NO</span> – IF YES, please explain: _____ _____ – IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.	
14B. – For <b>Modifications or Administrative Updates</b> at an existing facility, please provide directions to the present location of the facility from the nearest state road; – For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a <b>MAP</b> as <b>Attachment F</b> . _____ _____ _____	

15B. Nearest city or town:	16B. County:	17B. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18B. Briefly describe the proposed new operation or change (s) to the facility:		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

**C: 2<sup>ND</sup> ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits):**

11C. Name of 2 <sup>nd</sup> alternate operating site: _____	12C. Address of 2 <sup>nd</sup> alternate operating site: Mailing: _____ Physical: _____
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13C. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site?  YES  NO

– IF YES, please explain: \_\_\_\_\_

– IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14C. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP as Attachment F.**

\_\_\_\_\_

\_\_\_\_\_

15C. Nearest city or town:	16C. County:	17C. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
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18C. Briefly describe the proposed new operation or change (s) to the facility:	19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____
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20. Provide the date of anticipated installation or change:  <u>Upon issuance of the permit</u>  – If this is an <b>After-The-Fact</b> permit application, provide the date upon which the proposed change did happen: :  ____/____/____	21. Date of anticipated Start-up if registration is granted:  <u>Upon issuance of the permit</u>
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22. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).

Hours per day \_\_\_\_\_ Days per week \_\_\_\_\_ Weeks per year \_\_\_\_\_ Percentage of operation \_\_\_\_\_

### SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

23. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

24. Include a **Table of Contents** as the first page of your application package.

All of the required forms and additional information can be found under the Permitting Section (General Permits) of DAQ's website, or requested by phone.

25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.

- ATTACHMENT A : CURRENT BUSINESS CERTIFICATE
- ATTACHMENT B: PROCESS DESCRIPTION
- ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- ATTACHMENT D: PROCESS FLOW DIAGRAM
- ATTACHMENT E: PLOT PLAN
- ATTACHMENT F: AREA MAP
- ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM
- ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS
- ATTACHMENT I: EMISSIONS CALCULATIONS
- ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT
- ATTACHMENT K: ELECTRONIC SUBMITTAL
- ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE
- ATTACHMENT M: SITING CRITERIA WAIVER
- ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS)
- ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please DO NOT fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.



SECTION IV. CERTIFICATION OF INFORMATION

This 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 a 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, Emission Inventory, Certified Emission Statement, 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 Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

I certify that I am the Owner and Proprietor

I hereby certify that (please print or type) \_\_\_\_\_ 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 Office of Air Quality immediately, and/or,

I hereby certify that all information contained in this 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

Signature \_\_\_\_\_  
(please use blue ink) Responsible Official Date

Name & Title Barry Schatz, Senior Environmental & Regulatory Manager  
(please print or type)

Signature Barry Schatz \_\_\_\_\_ Date 6-26-2015  
(please use blue ink) Authorized Representative (if applicable)

Applicant's Name Antero Resources Corporation

Phone & Fax \_\_\_\_\_  
Phone 303-357-7276 Fax 303-357-7315

Email bschatz@anteroresources.com

**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: 6/14/13: 14 JUN, 2013

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) DONALD C. GRAY (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.

Kevin J. Kustrom KEVIN J. KUSTROM - VICE PRESIDENT  
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 B**

## **Process Description**

## **Attachment B**

### **Process Description Pennington South Well Pad Antero Resources Corporation Doddridge County, West Virginia**

A mixture of condensate and entrained gas from the wells enters the Facility through a number of three phase low pressure separators where the gas phase is separated from the liquid phase. Gas Production Units (GPU) heaters (H001-H006) are used in conjunction with the separators to help separate the gas from the liquid phases. These heaters are fueled by a slip stream of the separated gas. The separated gas from the three phase low pressure separators is sent to a metered sales gas pipeline. The separated water flow to the produced water storage tanks (TANKPW001-002). The separated condensate is then sent to two phase low pressure separators where gas is further separated from the condensate. The condensate from the two phase separators flow to the condensate storage tanks (TANKCOND001-004).

The Facility has four (4) tanks (TANKCOND001-004) on site to store condensate and two (2) tanks (TANKPW001-002) to store produced water prior to removal from the site. Flashing, working, and breathing losses from the tanks are routed to the atmosphere.

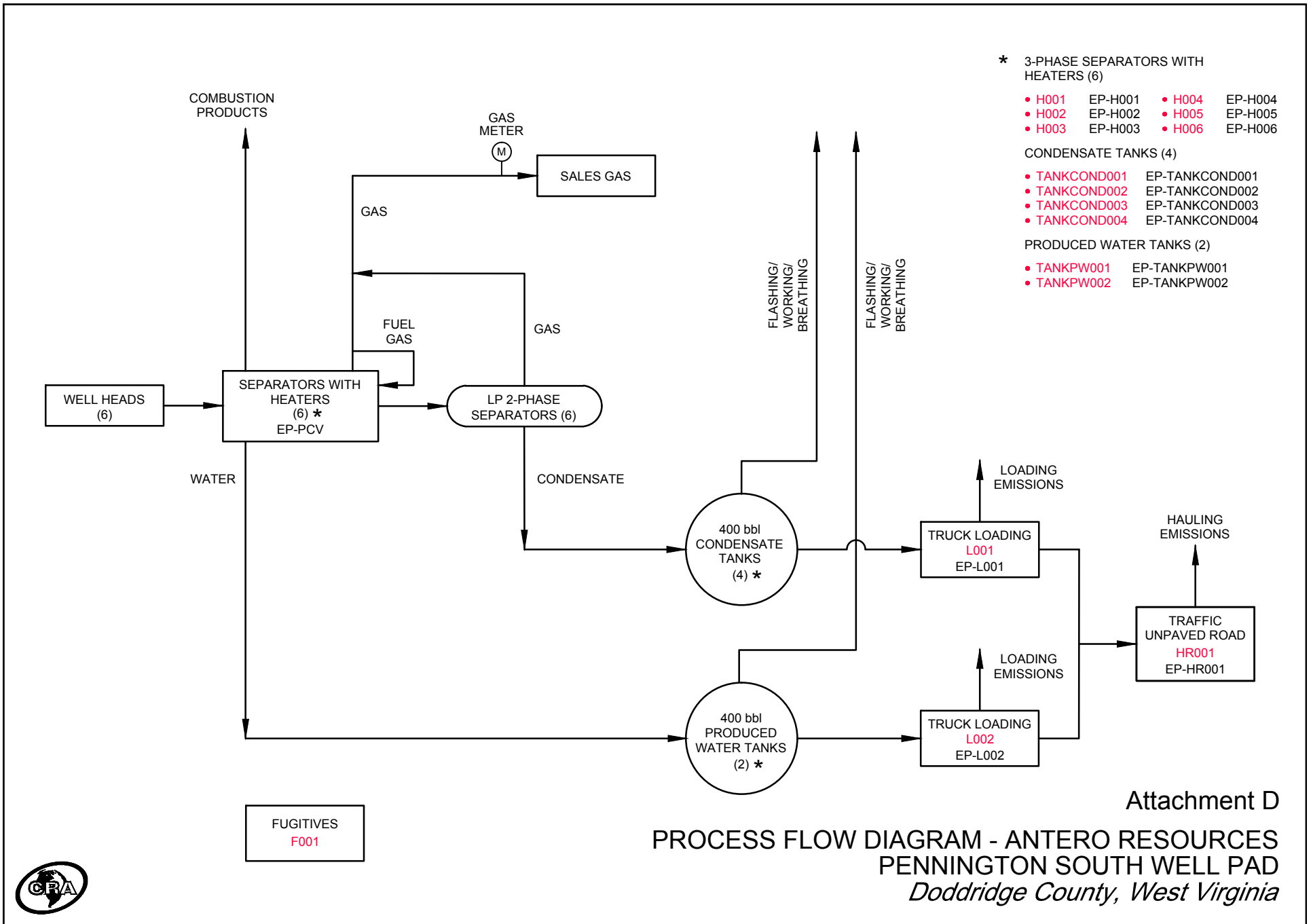
Condensate and produced water are transported off site on an as needed basis via tanker truck. Truck loading connections are in place to pump condensate (L001) and produced water (L002) from the storage tanks into tanker trucks. Emissions from the loading operations are vented to the atmosphere.

Emissions from the Facility's emission sources were calculated using the extended analysis of the condensate and gas analysis from Tom's Fork Unit 1, one of the wells in the Erwin Hilltop Pad. These extended analyses are considered representative of the materials from Pennington South Pad being in the same Marcellus rock formation.

Pennington South Pad calculation of potential to emit included all of the emission 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 Pennington North Pad. This operates independently and is approximately 2,983 feet north of the Facility.

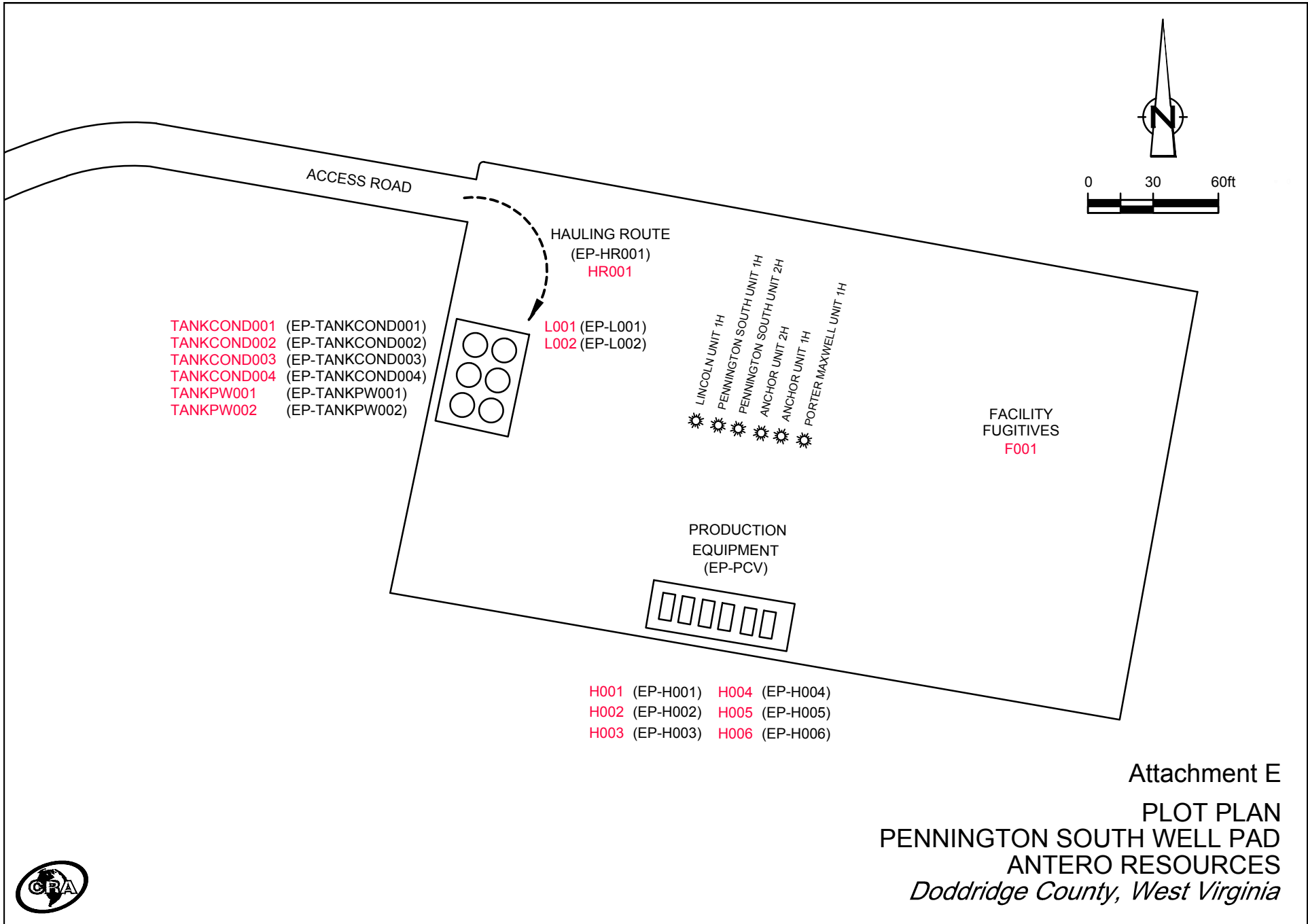
# Attachment D

## Process Flow Diagram



# Attachment E

## Plot Plan



Attachment E

PLOT PLAN  
 PENNINGTON SOUTH WELL PAD  
 ANTERO RESOURCES  
*Doddridge County, West Virginia*





## **Attachment G**

### **Emission Unit Data Sheets/G70-A Section Applicability Form**

### General Permit G70-A Registration Section Applicability Form

General Permit G70-A was developed to allow qualified applicants to seek registration for a variety of sources. These sources include natural gas well affected facilities, storage tanks, natural gas-fired compressor engines (RICE), natural gas producing units, natural gas-fired in-line heaters, pneumatic controllers, heater treaters, tank truck loading, glycol dehydration units, 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-A 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.

Section 5	Natural Gas Well Affected Facility	<input checked="" type="checkbox"/>
Section 6	Storage Vessels*	<input checked="" type="checkbox"/>
Section 7	Gas Producing Units, In-Line Heaters, Heater Treaters, and Glycol Dehydration Reboilers	<input checked="" type="checkbox"/>
Section 8	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)	<input type="checkbox"/>
Section 9	<i>Reserved</i>	<input type="checkbox"/>
Section 10	Natural gas-fired Compressor Engine(s) (RICE) **	<input type="checkbox"/>
Section 11	Tank Truck Loading Facility ***	<input checked="" type="checkbox"/>
Section 12	Standards of Performance for Storage Vessel Affected Facilities (NSPS, Subpart OOOO)	<input type="checkbox"/>
Section 13	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (NSPS, Subpart JJJJ)	<input type="checkbox"/>
Section 14	Control Devices not subject to NSPS, Subpart OOOO	<input type="checkbox"/>
Section 15	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (40CFR63, Subpart ZZZZ)	<input type="checkbox"/>
Section 16	Glycol Dehydration Units	<input type="checkbox"/>
Section 17	Dehydration Units With Exemption from NESHAP Standard, Subpart HH § 63.764(d) (40CFR63, Subpart HH)	<input type="checkbox"/>
Section 18	Dehydration Units Subject to NESHAP Standard, Subpart HH and Not Located Within an UA/UC (40CFR63, Subpart HH)	<input type="checkbox"/>
Section 19	Dehydration Units Subject to NESHAP Standard, Subpart HH and Located Within an UA/UC (40CFR63, Subpart HH)	<input type="checkbox"/>

\* Applicants that are subject to Section 6 may also be subject to Section 12 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 14.

\*\* Applicants that are subject to Section 10 may also be subject to the applicable RICE requirements of Section 13 and/or Section 15.

\*\*\* Applicants that are subject to Section 11 may also be subject to control device requirements of Section 14.

## NATURAL 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).*

Please provide the API number(s) for each NG well at this facility:	
47-017-06403-00	
47-017-06404-00	
47-017-06405-00	
3 wells unpermitted	

*Note: This is the same API 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 (American Petroleum Institute) 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 G: Emission Units Data Sheet

(includes all emission units and air pollution control devices  
that will be part of this permit application review, regardless of permitting status)

Emission Unit ID <sup>1</sup>	Emission Point ID <sup>2</sup>	Emission Unit Description	Year Installed/Modified	Design Capacity	Type <sup>3</sup> and Date of Change	Control Device <sup>4</sup>
H001, H002, H003, H004, H005, H006	EP-H001, EP-H002, EP-H003, EP-H004, EP-H005, EP-H006	Gas Production Unit Heater	2014	1.5 MMBtu/hr (each)	Removal	N/A
H001, H002, H003, H004, H005, H006	EP-H001, EP-H002, EP-H003, EP-H004, EP-H005, EP-H006	Gas Production Unit Heater	2015	1 MMBtu/hr (each)	New	N/A
F001	F001	Fugitives	2014		New	N/A
TANKCOND001-04	EP-TANKCOND001-04	Condensate Tank F/W/B	2014	400 bbl each	New	N/A
TANKPW001-002	EP-TANKPW001-002	PW Tank F/W/B	2014	400 bbl each	New	N/A
L001	EP-L001	Loading (Condensate)	2014	200BBL capacity (each)	New	N/A
L002	EP-L002	Loading (Water)	2014	200BBL capacity (each)	New	N/A
HR001	EP-HR001	Haul Truck	2014	40 ton capacity	New	N/A
FL001	EP-FL001	Flare	2014	90scf/min	Removal	N/A
PCV	EP-PCV	Pneumatic CV	2014	6.6 scf/day/PCV	New	N/A
ENG001	EP-ENG001	Compressor Engine	2014	24HP	Removal	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 New, modification, removal.

4 For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

## Attachment G: Storage Vessel Emission Unit Data Sheet (Condensate)

Provide the following information for each new or modified bulk liquid storage tank.

### I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name COND TANK	2. Tank Name TANKCOND001-04
3. Emission Unit ID number TANKCOND001-04	4. Emission Point ID number EP-TANKCOND001-04
5. Date Installed or Modified (for existing tanks) 2014	6. Type of change: N/A
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. No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.)	

### II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400bbls	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (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." 400bbls	
13A. Maximum annual throughput (gal/yr) 91,980	13B. Maximum daily throughput (gal/day) 252
14. Number of tank turnovers per year 2	15. Maximum tank fill rate (gal/min) 168
16. Tank fill method: Splash Fill	
17. Is the tank system a variable vapor space system? 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            horizontal <input checked="" type="checkbox"/> flat roof            cone roof            dome roof            other (describe) External Floating Roof            pontoon roof            double deck roof            Domed External (or Covered) Floating Roof Internal Floating Roof            vertical column support            self-supporting Variable Vapor Space            lifter roof diaphragm Pressurized            spherical            cylindrical Underground Other (describe)	

### III. TANK CONSTRUCTION AND OPERATION INFORMATION (check which one applies)

Refer to enclosed TANKS Summary Sheets  
 Refer to the responses to items 19 – 26 in section VII

### IV. SITE INFORMATION (check which one applies)

Refer to enclosed TANKS Summary Sheets  
 Refer to the responses to items 27 – 33 in section VII

### V. LIQUID INFORMATION (check which one applies)

Refer to enclosed TANKS Summary Sheets  
 Refer to the responses to items 34 – 39 in section VII

## Attachment G: Storage Vessel Emission Unit Data Sheet (Condensate)

Provide the following information for each new or modified bulk liquid storage tank.

### VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):	
Does Not Apply	Rupture Disc (psig)
Carbon Adsorption <sup>1</sup>	Inert Gas Blanket of _____
<input checked="" type="checkbox"/> Vent to Vapor Combustion Device <sup>1</sup> (vapor combustors, flares, thermal oxidizers) Condenser <sup>1</sup>	
Conservation Vent (psig)	
Other <sup>1</sup> (describe)	Vacuum Setting      Pressure Setting Emergency Relief Valve (psig)
<sup>1</sup> Complete appropriate Air Pollution Control Device Sheet	

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
<i>Please see Tables 6 and 7</i>								

<sup>1</sup> EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)  
Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

### SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION			
19. Tank Shell Construction: Steel			
20A. Shell Color: Green	20B. Roof Color: Green	20C. Year Last Painted: 2014	
21. Shell Condition (if metal and unlined): No Rust			
22A. Is the tank heated? No	22B. If yes, operating temperature:		22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): 0			
24. Is the tank a <b>Vertical Fixed Roof Tank</b> ? Yes	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):	
25. Complete item 25 for <b>Floating Roof Tanks</b> Does not apply			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type (check one):    Metallic (mechanical) shoe seal    Liquid mounted resilient seal			
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 <b>Internal Floating Roof Tanks</b> Does not apply			
26A. Deck Type:    Bolted    Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction:			
26D. Deck seam length (ft.):	26E. Area of deck (ft <sup>2</sup> ):	26F. For column supported	26G. For column supported

## Attachment G: Storage Vessel Emission Unit Data Sheet (Condensate)

Provide the following information for each new or modified bulk liquid storage tank.

<b>SITE INFORMATION:</b>			
27. Provide the city and state on which the data in this section are based: Charleston, WV			
28. Daily Avg. Ambient Temperature (°F): 55.3		29. Annual Avg. Maximum Temperature (°F): 75.94	
30. Annual Avg. Minimum Temperature (°F): 65.9		31. Avg. Wind Speed (mph): 5.9	
32. Annual Avg. Solar Insulation Factor (BTU/ft <sup>2</sup> -day): 1030.235999		33. Atmospheric Pressure (psia): 14.8	
<b>LIQUID INFORMATION:</b>			
34. Avg. daily temperature range of bulk liquid (°F): 51.7	34A. Minimum (°F): 39.5	34B. Maximum (°F): 63.8	
35. Avg. operating pressure range of tank (psig): 0	35A. Minimum (psig): 0	35B. Maximum (psig): 0	
36A. Minimum liquid surface temperature (°F): 39.5		36B. Corresponding vapor pressure (psia): 4.9281	
37A. Avg. liquid surface temperature (°F): 51.7		37B. Corresponding vapor pressure (psia): 6.1139	
38A. Maximum liquid surface temperature (°F): 63.8		38B. Corresponding vapor pressure (psia): 7.4968	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	Condensate		
39B. CAS number:	mix of HC		
39C. Liquid density (lb/gal):	5.9		
39D. Liquid molecular weight (lb/lb-mole):	103.8		
39E. Vapor molecular weight (lb/lb-mole):	40.33		
39F. Maximum true vapor pressure (psia):	8.5762		
39G. Max Reid vapor pressure (psi):	9.61302		
39H. Months Storage per year. From:	year round		
To:			

## Attachment G: Storage Vessel Emission Unit Data Sheet (Produced Water)

Provide the following information for each new or modified bulk liquid storage tank.

### I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name PWTANK	2. Tank Name TANKPW001-002
3. Emission Unit ID number TANKPW001-002	4. Emission Point ID number EP-TANKPW001-002
5. Date Installed or Modified (for existing tanks) 2014	6. Type of change: N/A
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. No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.)	

### II. TANK INFORMATION (required)

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 (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." 400bbbls	
13A. Maximum annual throughput (gal/yr) 551,880	13B. Maximum daily throughput (gal/day) 1,512
14. Number of tank turnovers per year 17	15. Maximum tank fill rate (gal/min) 168
16. Tank fill method Splash Fill	
17. Is the tank system a variable vapor space system? 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     horizontal <input checked="" type="checkbox"/> flat roof     cone roof     dome roof     other (describe) External Floating Roof     pontoon roof     double deck roof     Domed External (or Covered) Floating Roof Internal Floating Roof     vertical column support     self-supporting Variable Vapor Space     lifter roof diaphragm Pressurized     spherical     cylindrical Underground Other (describe)	

### III. TANK CONSTRUCTION AND OPERATION INFORMATION (check which one applies)

Refer to enclosed TANKS Summary Sheets

Refer to the responses to items 19 – 26 in section VII


### IV. SITE INFORMATION (check which one applies)

Refer to enclosed TANKS Summary Sheets

Refer to the responses to items 27 – 33 in section VII


### V. LIQUID INFORMATION (check which one applies)

Refer to enclosed TANKS Summary Sheets

Refer to the responses to items 34 – 39 in section VII




## Attachment G: Storage Vessel Emission Unit Data Sheet (Produced Water)

Provide the following information for each new or modified bulk liquid storage tank.

### VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):  
 Does Not Apply Rupture Disc (psig)  
 Carbon Adsorption<sup>1</sup> Inert Gas Blanket of \_\_\_\_\_  
 Vent to Vapor Combustion Device<sup>1</sup> (vapor combustors, flares, thermal oxidizers) Condenser<sup>1</sup>  
 Conservation Vent (psig)  
 Other<sup>1</sup> (describe) Vacuum Setting Pressure Setting Emergency Relief Valve (psig)  
<sup>1</sup> Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
<i>Please see Tables 6 and 7</i>								

1 EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)  
 Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

### SECTION VII (required if did not provide TANKS Summary Sheets)

<b>TANK CONSTRUCTION AND OPERATION INFORMATION</b>		
19. Tank Shell Construction: Steel		
20A. Shell Color: Green	20B. Roof Color: Green	20C. Year Last Painted: 2014
21. Shell Condition (if metal and unlined): No Rust		
22A. Is the tank heated? No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): 0		
24. Is the tank a <b>Vertical Fixed Roof Tank</b> ? Yes	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slope (ft/ft):
25. Complete item 25 for <b>Floating Roof Tanks</b> Does not apply		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type (check one): Metallic (mechanical) shoe seal    Liquid mounted resilient seal		
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 <b>Internal Floating Roof Tanks</b> Does not apply		
26A. Deck Type: Bolted    Welded		26B. For bolted decks, provide deck construction:
26C. Deck seam. Continuous sheet construction:		
26D. Deck seam length (ft.):	26E. Area of deck (ft <sup>2</sup> ):	26F. For column supported    26G. For column supported

## Attachment G: Storage Vessel Emission Unit Data Sheet (Produced Water)

Provide the following information for each new or modified bulk liquid storage tank.

<b>SITE INFORMATION:</b>			
27. Provide the city and state on which the data in this section are based: Charleston, WV			
28. Daily Avg. Ambient Temperature (°F): 55.3	29. Annual Avg. Maximum Temperature (°F): 75.94		
30. Annual Avg. Minimum Temperature (°F): 65.9	31. Avg. Wind Speed (mph): 5.9		
32. Annual Avg. Solar Insulation Factor (BTU/ft2-day): 1030.235999	33. Atmospheric Pressure (psia): 14.8		
<b>LIQUID INFORMATION:</b>			
34. Avg. daily temperature range of bulk liquid (°F): 51.7	34A. Minimum (°F): 39.5	34B. Maximum (°F): 63.8	
35. Avg. operating pressure range of tank (psig): 0	35A. Minimum (psig): 0	35B. Maximum (psig): 0	
36A. Minimum liquid surface temperature (°F): 39.5	36B. Corresponding vapor pressure (psia):	0.1839	
37A. Avg. liquid surface temperature (°F): 51.7	37B. Corresponding vapor pressure (psia):	0.2599	
38A. Maximum liquid surface temperature (°F): 63.8	38B. Corresponding vapor pressure (psia):	0.3604	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	Produced Water		
39B. CAS number:	mix of HC and water		
39C. Liquid density (lb/gal):	8.33		
39D. Liquid molecular weight (lb/lb-mole):	18.0157		
39E. Vapor molecular weight (lb/lb-mole):	18.4013		
39F. Maximum true vapor pressure (psia):	0.4472		
39G. Max Reid vapor pressure (psi):	1.02414		
39H. Months Storage per year. From:	year round		
To:			

## Attachment G: Natural Gas Fired Fuel Burning Units Emission Data Sheet

Complete the information on this data for each Gas Producing Unit(s), Heater Treater(s), and in-line heater(s) at the production pad. Reboiler information should be entered on the Glycol Dehydration Emission Unit Data Sheet.

Emission Unit ID # <sup>1</sup>	Emission Point ID# <sup>2</sup>	Emission Unit Description (Manufacturer / Model #)	Year Installed/Modified	Type <sup>3</sup> and Date of Change	Control Device <sup>4</sup>	Design Heat Input (mmBtu/hr) <sup>5</sup>	Fuel Heating Value (Btu/scf) <sup>6</sup>
H001	EP-H001	Gas Production Unit Heater	2014	Removal	--	1.50	1,208.97
H002	EP-H002	Gas Production Unit Heater	2014	Removal	--	1.50	1,208.97
H003	EP-H003	Gas Production Unit Heater	2014	Removal	--	1.50	1,208.97
H004	EP-H004	Gas Production Unit Heater	2014	Removal	--	1.50	1,208.97
H005	EP-H005	Gas Production Unit Heater	2014	Removal	--	1.50	1,208.97
H006	EP-H006	Gas Production Unit Heater	2014	Removal	--	1.50	1,208.97
H001	EP-H001	Gas Production Unit Heater	2015	New	--	1.00	1,208.97
H002	EP-H002	Gas Production Unit Heater	2015	New	--	1.00	1,208.97
H003	EP-H003	Gas Production Unit Heater	2015	New	--	1.00	1,208.97
H004	EP-H004	Gas Production Unit Heater	2015	New	--	1.00	1,208.97
H005	EP-H005	Gas Production Unit Heater	2015	New	--	1.00	1,208.97
H006	EP-H006	Gas Production Unit Heater	2015	New	--	1.00	1,208.97
ENG001	EP-ENG001	Engine (Kubota DG972-E2)	2014	Removal	--	--	1,208.97
FL001	FL001	Flare (Cimmaron 48", Model No. 700-TI-603-D-31C)	2014	Removal	--	--	1,208.97

<sup>1</sup> Enter the appropriate Emission Unit (or Sources) 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 sources, use 1S, 2S, 3S...or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

<sup>2</sup> 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.

<sup>3</sup> New, modification, removal.

<sup>4</sup> Complete appropriate air pollution control device sheet for any control device.

<sup>5</sup> Enter design heat input capacity in mmBtu/hr.

<sup>6</sup> Enter the fuel heating value in Btu/standard cubic foot.

## Attachment G: Tank Truck Loading

### Emissions Unit Data Sheet

*Furnish the following information for each new or modified bulk liquid transfer area or loading rack at the natural gas production pad. This form is to be used for bulk liquid transfer operations to tank trucks.*

1. Emission Unit ID: L001, L002	2. Emission Point ID: EP-L001, EP-L002	3. Year Installed/Modified: 2014		
4. Emission Unit Description: CONDENSATE AND PRODUCED WATER				
5. Loading Area Data				
5A. Number of pumps: 2	5B. Number of liquids loaded: 2	5C. Maximum number of tank trucks loading at one time: 1		
6. Describe cleaning location, compounds and procedure for tank trucks: For hire tank trucks are used and are cleaned at the operator's dispatch terminal. These trucks are in dedicated service and cleaned only prior to repair or leak tests. Cleaning materials include water, steam, detergent, and solvents which are applied using hand held pressurized spray nozzles.				
7. Are tank trucks pressure tested for leaks at this or any other location? X Yes      No If YES, 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.				
8. Projected Maximum Operating Schedule (for rack or transfer point as a whole):				
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	2	2	2	2
days/week	1	1	1	1
9. Bulk Liquid Data (add pages as necessary)				
Liquid Name	Condensate	Produced Water		
Max. daily throughput (1000 gal/day)	0.252	1.512		
Max. annual throughput (1000 gal/yr)	91.98	551.88		
Loading Method <sup>1</sup>	BF	BF		
Max. Fill Rate (gal/min)	168	168		
Average Fill Time (min/loading)	50	50		
Max. Bulk Liquid Temperature (°F)	72.1	72.1		
True Vapor Pressure <sup>2</sup>	8.58	0.45		
Cargo Vessel Condition <sup>3</sup>	U	U		
Control Equipment or Method <sup>4</sup>	None	None		
Minimum collection efficiency (%)	0	0		
Minimum control efficiency (%)	0	0		
Maximum Emission Rate	Loading (lb/hr)	49.01	1.17	
	Annual (ton/yr)	0.22	0.03	
Estimation Method <sup>5</sup>	Promax	Promax		
Notes:				
1 BF = Bottom    SP = Splash Fill    SUB = Submerged Fill				
2 At maximum bulk liquid temperature				
3 B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)				
4 List as many as apply (complete and submit appropriate <i>Air Pollution Control Device Sheets as Attachment "H"</i> ): CA = Carbon Adsorption VB = Dedicated Vapor Balance (closed system) ECD = Enclosed Combustion Device F = Flare TO = Thermal Oxidation or Incineration				
5 EPA = EPA Emission Factor as stated in AP-42				
<b>10. Proposed Monitoring, Recordkeeping, Reporting, and Testing</b>				
MONITORING		RECORDKEEPING		
1) Visual inspection to ensure that loading connections from storage tanks to trucks are leak-free.		1) Maintain records of condensate transferred from storage tanks.		
		2) Maintain records of produced water transferred from storage tanks.		
REPORTING		TESTING		
N/A		N/A		
11. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty: N/A				

# Attachment I

## Emission Calculations

**Table 1**

**Facility Information  
 Pennington South Well Pad  
 Doddridge County, West Virginia  
 Antero Resources Corporation**

<b>Oil and Gas Site General Information</b>
---

Administrative Information	
Company Name	Antero Resources Corporation
Facility/Well Name	Pennington South Well Pad
Nearest City/Town	West Union
API Number/SIC Code	1311
Latitude/Longitude	39.2025, -80.740833
County	Doddridge County

Technical Information	
Max Condensate Site Throughput (bbl/day):	6
Max Produced Water Site Throughput (bbl/day):	36
Are there any sour gas streams at this site?	No
Is this site currently operational/producing?	Yes

Equipment/Processes at Site	
Equipment/Process Types	How many for this site?
Fugitives	6
IC Engines	0
Turbines	0
Diesel Engines	0
Gas Processing Unit Heaters	6
Condensate Tanks	4
Produced Water Tanks	2
Miscellaneous Tanks	0
Loading Jobs	2
Glycol Units	0
Amine Units	0
Flares-Vapor Combustors	0

Table 2

**Uncontrolled/Controlled Emissions Summary  
Pennington South Well Pad  
Doddridge County, West Virginia  
Antero Resources Corporation**

Emission Source	VOC		NO <sub>x</sub>		CO <sub>2</sub>		CO		SO <sub>2</sub>		PM <sub>2.5</sub>		PM <sub>10</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, Gas Production Unit Heaters)</b>																								
Fugitive Emissions (Component Count, PCV and Hauling) <sup>1</sup>	2.2202	9.7243			55.823	244.51							0.4731	0.0301			0.1922	0.8419	0.0012	0.0054	5.64E-02	2.47E-01		
Flashing, Working and Breathing (F/W/B) Losses <sup>2</sup>	3.13	13.7			6.0	26.4											0.039	0.170	0.0007	0.0030	0.0032	0.0142		
Gas Production Unit Heaters <sup>3</sup>	0.0273	0.1196	0.4963	2.1737	599.09	2,623.99	0.4169	1.8259	0.0030	0.0130	0.0377	0.1652	0.0377	0.1652	2.48E-06	1.09E-05	9.34E-03	4.09E-02	1.04E-05	4.56E-05			0.0004	0.0016
<b>TOTALS:</b>	<b>5.3760</b>	<b>23.5471</b>	<b>0.4963</b>	<b>2.1737</b>	<b>660.9297</b>	<b>2894.8722</b>	<b>0.4169</b>	<b>1.8259</b>	<b>0.0030</b>	<b>0.0130</b>	<b>0.0377</b>	<b>0.1652</b>	<b>0.5109</b>	<b>0.1953</b>	<b>2.48E-06</b>	<b>1.09E-05</b>	<b>0.2403</b>	<b>1.0523</b>	<b>0.0019</b>	<b>0.0084</b>	<b>0.0596</b>	<b>0.2611</b>	<b>0.0004</b>	<b>0.0016</b>
<b>UNCONTROLLED (Truck Loading Emissions)</b>																								
Truck Loading Emissions <sup>4</sup>	30.434	0.139			20.235	0.115											0.0903	0.0004	1.01E-03	4.61E-06	0.0160	0.0001		
<b>CONTROLLED EMISSIONS</b>																								
Controlled Fugitive Emissions from Hauling													0.2366	0.0151										
<b>TOTALS:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.24</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>POTENTIAL TO EMIT<sup>5</sup></b>	<b>5.3760</b>	<b>23.6860</b>	<b>0.4963</b>	<b>2.1737</b>	<b>660.9297</b>	<b>2894.9870</b>	<b>0.4169</b>	<b>1.8259</b>	<b>0.0030</b>	<b>0.0130</b>	<b>0.0377</b>	<b>0.1652</b>	<b>0.5109</b>	<b>0.1953</b>	<b>2.48E-06</b>	<b>1.09E-05</b>	<b>0.2403</b>	<b>1.0527</b>	<b>0.0019</b>	<b>0.0084</b>	<b>0.0596</b>	<b>0.2612</b>	<b>0.0004</b>	<b>0.0016</b>
<b>Enter any notes here:</b>	<p>1 - See Tables 4 and 5 for fugitive emission calculations; Table 10 for PM emissions from hauling.                  2 - See Tables 6 and 7 for tanks emission calculations                  3 - See Table 9 for gas production unit 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 6 barrels per day, VOC emissions would be 30.4339 pounds per hour when there are truck loading activities. Average hourly VOC emissions from truck loading is 0.0317 pound per hour.                  5 - The hourly potential to emit is the sum of emissions from gas production unit heater, storage tanks, and fugitives. Does not include emissions from loading (see footnote 4). The total TPY PTE is the sum of all emissions.                  PM 10 TPY is the sum of uncontrolled hauling and other PM10 sources.</p>																							

**Table 3**

**Permit Summary  
 Pennington South Well Pad  
 Doddridge County, West Virginia  
 Antero Resources Corporation**

Pollutant		Emissions			Threshold Exceeded?	
		Uncontrolled	Controlled	Threshold	Uncontrolled	Controlled
VOC	lbs/hr	5.3760		6		
	tons/yr	23.6860		10	<b>Yes</b>	
NO <sub>x</sub>	lbs/hr	0.4963		6		
	tons/yr	2.1737		10		
CO	lbs/hr	0.4169		6		
	tons/yr	1.8259		10		
SO <sub>2</sub>	lbs/hr	0.0030		6		
	tons/yr	0.0130		10		
PM <sub>2.5</sub>	lbs/hr	3.77E-02	3.77E-02	6		
	tons/yr	1.65E-01	1.65E-01	10		
PM <sub>10</sub>	lbs/hr	0.5109	0.2743	6		
	tons/yr	0.1953	0.1803	10		
Lead	lbs/hr	2.48E-06		6		
	tons/yr	1.09E-05		10		
Total HAPs	lbs/hr	0.2403		2		
	tons/yr	1.0527		5		
Total TAPs	lbs/hr	0.0023		1.14		
n-Hexane	lbs/hr	0.1402				
	tons/yr	0.6141				
Toluene	lbs/hr	0.0143				
	tons/yr	0.0628				
Ethylbenzene	lbs/hr	0.0239				
	tons/yr	0.1045				
Xylenes	lbs/hr	0.0596				
	tons/yr	0.2612				
Benzene	lbs/hr	0.0019				
	tons/yr	0.0084				



Table 4

Fugitive Emissions  
 Pennington South Well Pad  
 Doddridge County, West Virginia  
 Antero Resources Corporation

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

Gas Weight Fraction From Analysis:	VOC frac	0.156
	Benzene frac	0.000
	Toluene	0.000
	Ethylbenzene	0.000
	Xylenes	0.000
	n-Hexane	0.012
	Methane	0.643

Gas					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
300	Valves	Gas VOC	0.004500	0.21	4,050.13
		Non VOC	0.004500	1.14	21,967.07
354	Connectors	VOC	0.000200	0.01	212.41
		Non-VOC	0.000200	0.06	1,152.05
78	Flanges	VOC	0.000390	0.00	91.26
		Non-VOC	0.000390	0.03	494.99
<b>Total VOCs:</b>				0.23	4,353.80
<b>Total THC:</b>				1.45	27,967.91

Light Liquid Weight Fraction From Analysis:	VOC frac	0.981
	Benzene frac	0.001
	Toluene	0.007
	Ethylbenzene	0.013
	Xylenes	0.033
	n-hexane	0.034
	Methane	0.007

Light Liquid					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
312	Valves	Light Liquid VOC	0.002500	0.76	14,739.27
		Light Liquid Non-VOC		0.02	292.89
<b>Total VOC:</b>				0.76	14,739.27
<b>Total THC:</b>				0.78	15,032.16

Fugitive Total Emissions			
	Annual Emissions (lb/yr)	Annual Emissions (lb/hr)	Annual Emissions (tpy)
VOC	19,093.07	2.18	9.55
Ethylbenzene		0.02	0.10
Toluene		0.01	0.05
Xylenes		0.06	0.25
n-Hexane		0.10	0.42
TAPs (Benzene)		0.00	0.01
HAPs		0.19	0.83
CO <sub>2e</sub>	452,282.28	51.63	226.14

<b>Enter Notes Here:</b>	Fugitive emissions based on an estimated component count Global Warming Potentials from EPA site Reference to Emission factors used:
	<ol style="list-style-type: none"> <li>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.</li> <li>Percent of speciated VOCs used in fugitive calculations are based on the total hydrocarbons, not of the total sample.</li> </ol>

Table 5

**Pneumatic Control Valve Emissions  
 Pennington South Well Pad  
 Doddridge County, West Virginia  
 Antero Resources Corporation**

Number of PCVs	18
Bleed Rate (scf/day/PCV)	6.6
Total Bleed Rate (scf/day)	118.8

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	34.08	0	0.00	0.00	0.00	0.00
Nitrogen	0.3959	14.01	0.4703292	0.00	0.02	0.00	0.00
Carbon Dioxide	0.1247	44.01	0.1481436	0.00	0.02	0.00	0.00
Methane	80.1487	16.04	95.2166556	0.25	4.02	0.17	0.73
Ethane	13.3575	30.07	15.86871	0.04	1.26	0.05	0.23
Propane	3.7444	44.1	4.4483472	0.01	0.52	0.02	0.09
Isobutane	0.5119	58.12	0.6081372	0.00	0.09	0.00	0.02
n-Butane	0.8243999	58.12	0.979387081	0.00	0.15	0.01	0.03
Isopentane	0.181	72.15	0.215028	0.00	0.04	0.00	0.01
n-Pentane	0.4327	72.15	0.5140476	0.00	0.10	0.00	0.02
2-Methylpentane	0	86.18	0	0.00	0.00	0.00	0.00
3-Methylpentane	0	86.18	0	0.00	0.00	0.00	0.00
n-Hexane	0.2788	86.18	0.3312144	0.00	0.08	0.00	0.01
Methylcyclopentane	0	84.16	0	0.00	0.00	0.00	0.00
Benzene	0	78.11	0	0.00	0.00	0.00	0.00
2-Methylhexane	0	100.2	0	0.00	0.00	0.00	0.00
3-Methylhexane	0	100.2	0	0.00	0.00	0.00	0.00
Heptane	0	100.21	0	0.00	0.00	0.00	0.00
Methylcyclohexane	0	98.186	0	0.00	0.00	0.00	0.00
Toluene	0	92.14	0	0.00	0.00	0.00	0.00
Octane	0	114.23	0	0.00	0.00	0.00	0.00
Ethylbenzene	0	106.17	0	0.00	0.00	0.00	0.00
m & p-Xylene	0	106.16	0	0.00	0.00	0.00	0.00
o-Xylene	0	106.16	0	0.00	0.00	0.00	0.00
Nonane	0	128.2	0	0.00	0.00	0.00	0.00
C10+	0	174.28	0	0.00	0.00	0.00	0.00

	lb/hr	tpy
VOC Emissions	0.0406	0.1777
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	0.0031	0.0137
HAPs Emissions	0.0031	0.0137
TAPs Emissions	0.0000	0.0000
CO <sub>2e</sub> emissions	4.1931	18.3656

<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  
Pennington South Well Pad  
Doddridge County, West Virginia  
Antero Resources Corporation**

# Hours Operational	8760
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Component	Condensate Tank Flashing Losses			Produced Water Tank Flashing Losses		
	Vapor Mass Fraction wt%	Flashing Losses		Vapor Mass Fraction wt%	Flashing Losses	
		lbs/hr	tpy		lbs/hr	tpy
Water	0.1893	0.0025	0.0109	2.6813	0.0000	0.0000
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0149	0.0002	0.0009	0.5488	0.0008	0.0037
Carbon Dioxide	0.2643	0.0035	0.0152	2.5623	0.0040	0.0173
Methane	6.9346	0.0908	0.3977	59.5579	0.0918	0.4022
Ethane	28.2828	0.3704	1.6221	21.0560	0.0325	0.1422
Propane	28.3487	0.3712	1.6259	9.0276	0.0139	0.0610
Isobutane	6.6125	0.0866	0.3793	0.5589	0.0009	0.0038
n-Butane	12.1423	0.1590	0.6964	1.9842	0.0031	0.0134
Isopentane	4.7466	0.0622	0.2722	0.4948	0.0008	0.0033
n-Pentane	3.7074	0.0485	0.2126	0.3694	0.0006	0.0025
2-Methylpentane	1.2404	0.0162	0.0711	0.0574	0.0001	0.0004
3-Methylpentane	0.8076	0.0106	0.0463	0.0980	0.0002	0.0007
n-Hexane	2.0225	0.0265	0.1160	0.0742	0.0001	0.0005
Methylcyclopentane	0.3963	0.0052	0.0227	0.1335	0.0002	0.0009
Benzene	0.0392	0.0005	0.0022	0.0627	0.0001	0.0004
2-Methylhexane	0.6645	0.0087	0.0381	0.0272	0.0000	0.0002
3-Methylhexane	0.5180	0.0068	0.0297	0.0221	0.0000	0.0001
Heptane	0.8284	0.0108	0.0475	0.0370	0.0001	0.0003
Methylcyclohexane	0.5948	0.0078	0.0341	0.1346	0.0002	0.0009
Toluene	0.1101	0.0014	0.0063	0.1675	0.0003	0.0011
Octane	0.9581	0.0125	0.0550	0.0255	0.0000	0.0002
Ethylbenzene	0.0672	0.0009	0.0039	0.1017	0.0002	0.0007
m & p-Xylene	0.0523	0.0007	0.0030	0.0782	0.0001	0.0005
o-Xylene	0.0803	0.0011	0.0046	0.1227	0.0002	0.0008
Nonane	0.2727	0.0036	0.0156	0.0113	0.0000	0.0001
C10+	0.1042	0.0014	0.0060	0.0051	0.0000	0.0000
Total VOCs	64.314	0.84	3.7	13.594	0.0210	0.0918
Total CO <sub>2e</sub>		2.27	10.0		2.30	10.1
Total TAPs (Benzene)		0.0005	0.0022		0.0001	0.0004
Toluene		0.0014	0.0063		0.0003	0.0011
Ethylbenzene		0.0009	0.0039		0.0002	0.0007
Xylenes		0.0017	0.0076		0.0003	0.0014
n-Hexane		0.026	0.116		0.0001	0.0005
Total HAPs		0.031	0.136		0.0009	0.0041
Total	100.00	1.31	5.7	100.00	0.150	0.66

<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**  
**Pennington South Well Pad**  
**Doddridge County, West Virginia**  
**Antero Resources Corporation**

Condensate Tank Information	
Number of Tanks	4
Maximum Working Losses (lbs/hr)	0.1197
Maximum Breathing Losses (lbs/hr)	3.5287

	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
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0006	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001
Carbon Dioxide	0.2879	0.0003	0.0015	0.0102	0.0445	0.0105	0.0460
Methane	1.5596	0.0019	0.0082	0.0550	0.2410	0.0569	0.2492
Ethane	36.0579	0.0432	0.1891	1.2724	5.5730	1.3155	5.7621
Propane	30.7044	0.0368	0.1610	1.0835	4.7456	1.1202	4.9066
Isobutane	6.6286	0.0079	0.0348	0.2339	1.0245	0.2418	1.0593
n-Butane	11.9625	0.0143	0.0627	0.4221	1.8489	0.4364	1.9116
Isopentane	4.4356	0.0053	0.0233	0.1565	0.6856	0.1618	0.7088
n-Pentane	3.4249	0.0041	0.0180	0.1209	0.5293	0.1250	0.5473
2-Methylpentane	1.1166	0.0013	0.0059	0.0394	0.1726	0.0407	0.1784
3-Methylpentane	0.7254	0.0009	0.0038	0.0256	0.1121	0.0265	0.1159
n-Hexane	0.1235	0.0001	0.0006	0.0044	0.0191	0.0045	0.0197
Methylcyclopentane	0.3312	0.0004	0.0017	0.0117	0.0512	0.0121	0.0529
Benzene	0.0021	0.0000	0.0000	0.0001	0.0003	0.0001	0.0003
2-Methylhexane	0.0380	0.0000	0.0002	0.0013	0.0059	0.0014	0.0061
3-Methylhexane	0.4463	0.0005	0.0023	0.0157	0.0690	0.0163	0.0713
Heptane	0.6575	0.0008	0.0034	0.0232	0.1016	0.0240	0.1051
Methylcyclohexane	0.4774	0.0006	0.0025	0.0168	0.0738	0.0174	0.0763
Toluene	0.0121	0.0000	0.0001	0.0004	0.0019	0.0004	0.0019
Octane	0.7164	0.0009	0.0038	0.0253	0.1107	0.0261	0.1145
Ethylbenzene	0.0139	0.0000	0.0001	0.0005	0.0022	0.0005	0.0022
m & p-Xylene	0.0140	0.0000	0.0001	0.0005	0.0022	0.0005	0.0022
o-Xylene	0.0186	0.0000	0.0001	0.0007	0.0029	0.0007	0.0030
Nonane	0.1842	0.0002	0.0010	0.0065	0.0285	0.0067	0.0294
C10+	0.0607	0.0001	0.0003	0.0021	0.0094	0.0022	0.0097
Total VOCs	62.094	0.0743	0.326	2.1911	9.5971	2.2655	9.923
Total CO <sub>2e</sub>		0.0470	0.2060	1.3860	6.0706	1.4330	6.277
Total TAPs (Benzene)		0.0000	0.0000	0.0001	0.0003	0.0001	0.0003
Toluene		0.0000	0.0001	0.0004	0.0019	0.0004	0.0019
Ethylbenzene		0.0000	0.0001	0.0005	0.0022	0.0005	0.0022
Xylenes		0.0000	0.0002	0.0011	0.0050	0.0012	0.0052
n-Hexane		0.0001	0.0006	0.0044	0.0191	0.0045	0.0197
Total HAPs		0.0002	0.0010	0.0065	0.0285	0.0067	0.0294
Total	100.00	0.1197	0.5244	3.5287	15.4557	3.6484	15.980

Table 7

**Uncontrolled Working and Breathing Losses**  
**Pennington South Well Pad**  
**Doddridge County, West Virginia**  
**Antero Resources Corporation**

Produced Water Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.0090
Maximum Breathing Losses (lbs/hr)	0.0083

Component	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
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0108	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide	3.3843	0.0003	0.0013	0.0003	0.0012	0.0006	0.0026
Methane	3.2444	0.0003	0.0013	0.0003	0.0012	0.0006	0.0025
Ethane	1.0585	0.0001	0.0004	0.0001	0.0004	0.0002	0.0008
Propane	0.1106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Isobutane	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Butane	0.0046	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Isopentane	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Pentane	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Methylpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Methylpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methylcyclopentane	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Benzene	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Methylhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Methylhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methylcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ethylbenzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
m & p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
o-Xylene	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C10+	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total VOCs	0.1169	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Total CO <sub>2e</sub>		0.0076	0.0333	0.0070	0.0306	0.0146	0.0639
Total TAPs (Benzene)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ethylbenzene		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Xylenes		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Hexane		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total HAPs		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	100.00	0.0090	0.0394	0.0083	0.0362	0.0173	0.0756

<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**  
**Pennington South Well Pad**  
**Doddridge County, West Virginia**  
**Antero Resources Corporation**

Annual Loading	Oil Truck Loading	Water Truck Loading
RVP	9.61	1.0241
Annual Average Temp (F)	72.1	72.1
S (saturation factor)	0.6	0.6
P (true vapor pressure)	8.58	0.45
M (MW of vapor)	40.33	18.40
Collection Efficiency (%)	0	0
Loading Loss (lb/10 <sup>3</sup> gal)*	4.86	0.12
Maximum Throughput (gallons/hr)	10,080	10,080
Average Throughput (gallons/yr)	91,980	551,880
Loading Emissions (lbs/hr)	49.01	1.17
Loading Emissions (tpy)	0.22	0.03

Component	Condensate Tank Loading Losses			Produced Water Tank Loading Losses		
	Vapor Mass Fraction	Loading Losses		Vapor Mass Fraction	Loading Losses	
		wt%	lbs/hr		tpy	wt%
H2S	0.0000	0.00	0.00	0.0000	0.00E+00	0.00E+00
Nitrogen	0.0006	0.00	0.00	0.0108	1.25E-04	3.44E-06
Carbon Dioxide	0.2879	0.14	0.00	3.3843	3.95E-02	1.08E-03
Methane	1.5596	0.76	0.00	3.2444	3.78E-02	1.04E-03
Ethane	36.0579	17.67	0.08	1.0585	1.23E-02	3.38E-04
Propane	30.7044	15.05	0.07	0.1106	1.29E-03	3.53E-05
Isobutane	6.6286	3.25	0.01	0.0009	1.00E-05	2.74E-07
n-Butane	11.9625	5.86	0.03	0.0046	5.34E-05	1.46E-06
Isopentane	4.4356	2.17	0.01	0.0003	3.34E-06	9.14E-08
n-Pentane	3.4249	1.68	0.01	0.0002	1.82E-06	4.98E-08
2-Methylpentane	1.1166	0.55	0.00	0.0000	5.39E-08	1.48E-09
3-Methylpentane	0.7254	0.36	0.00	0.0000	2.23E-07	6.11E-09
n-Hexane	0.1235	0.06	0.00	0.0000	2.70E-09	7.40E-11
Methylcyclopentane	0.3312	0.16	0.00	0.0001	6.54E-07	1.79E-08
Benzene	0.0021	0.00	0.00	0.0001	9.44E-07	2.58E-08
2-Methylhexane	0.0380	0.02	0.00	0.0000	4.19E-10	1.15E-11
3-Methylhexane	0.4463	0.22	0.00	0.0000	5.10E-09	1.40E-10
Heptane	0.6575	0.32	0.00	0.0000	6.27E-09	1.72E-10
Methylcyclohexane	0.4774	0.23	0.00	0.0000	1.41E-07	3.86E-09
Toluene	0.0121	0.01	0.00	0.0001	1.21E-06	3.32E-08
Octane	0.7164	0.35	0.00	0.0000	8.41E-10	2.30E-11
Ethylbenzene	0.0139	0.01	0.00	0.0000	4.14E-07	1.13E-08
m & p-Xylene	0.0140	0.01	0.00	0.0000	3.56E-07	9.74E-09
o-Xylene	0.0186	0.01	0.00	0.0001	5.84E-07	1.60E-08
Nonane	0.1842	0.09	0.00	0.0000	1.75E-10	4.79E-12
C10+	0.0607	0.03	0.00	0.0000	1.18E-11	3.22E-13
<b>Total VOCs</b>	<b>62.0940</b>	<b>30.433</b>	<b>0.139</b>	<b>0.1169</b>	<b>1.36E-03</b>	<b>3.73E-05</b>
<b>Total CO<sub>2e</sub></b>		<b>19.250</b>	<b>0.0878</b>		<b>0.9854</b>	<b>0.0270</b>
<b>Total TAPs (Benzene)</b>		<b>0.0010</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>
Toluene		0.0060	0.0000		0.0000	0.0000
Ethylbenzene		0.0068	0.0000		0.0000	0.0000
Xylenes		0.0160	0.0001		0.0000	0.0000
n-Hexane		0.0605	0.0003		0.0000	0.0000
<b>Total HAPs</b>		<b>0.0903</b>	<b>0.0004</b>		<b>0.0000</b>	<b>0.0000</b>
<b>Total</b>	<b>100.0000</b>	<b>49.0104</b>	<b>0.2236</b>	<b>100.0000</b>	<b>1.1662</b>	<b>0.0319</b>

**Enter any notes here**

Vapor mass fractions and loading losses from Promax output  
\*Using equation  $L_i = 12.46 * SPM/T$  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  
Loading emissions are vented to the atmosphere.

**Table 9**

**Gas Production Unit Heater Emissions  
Pennington South Well Pad  
Doddridge County, West Virginia  
Antero Resources Corporation**

Number of Units	6
GPU Heater Rating (MMBtu/hr)	1.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,209

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	0.496	2.174
CO	84	0.417	1.826
CO <sub>2</sub>	120,000	595.546	2608.493
Lead	0.0005	2.48E-06	1.09E-05
N <sub>2</sub> O	2.2	0.011	0.048
PM (Total)	7.6	0.038	0.165
SO <sub>2</sub>	0.6	0.003	0.013
TOC	11	0.055	0.239
Methane	2.3	0.011	0.050
VOC	5.5	0.027	0.120
<b>HAPS</b>			
2-Methylnaphthalene	2.40E-05	1.19E-07	5.22E-07
Benzene	2.10E-03	1.04E-05	4.56E-05
Dichlorobenzene	1.20E-03	5.96E-06	2.61E-05
Fluoranthene	3.00E-06	1.49E-08	6.52E-08
Fluorene	2.80E-06	1.39E-08	6.09E-08
Formaldehyde	7.50E-02	3.72E-04	1.63E-03
Hexane	1.80E+00	8.93E-03	3.91E-02
Naphthalene	6.10E-04	3.03E-06	1.33E-05
Phenanathrene	1.70E-05	8.44E-08	3.70E-07
Toluene	3.40E-03	1.69E-05	7.39E-05

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.027	0.120
TOTAL Uncontrolled HAPs	0.009	0.041
TOTAL Uncontrolled TAPs (Benzene)	0.000	0.000
TOTAL Uncontrolled TAPs (Formaldehyde)	0.000	0.002
TOTAL CO <sub>2e</sub> Emissions	599.09	2,623.99

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

Table 10

**Haul Road Emissions  
Pennington South Well Pad  
Doddridge 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)	6
PW Production (bbl/day)	36
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	0.1200	1	11	0.1200	1.3200	3.8175	1.7179
Tanker Trucks PW	10	40	10	0.1200	1	66	0.1200	7.9200	3.8175	1.7179
Pick Up Truck	4	3	10	0.3900	1	730	0.3900	284.7000	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	0.4581	5.0391	0.0025	0.2061	2.2676	0.0011	0.2291	2.5196	0.0013	0.1031	1.1338	0.0006
Tanker Trucks PW	0.4581	30.2348	0.0151	0.2061	13.6057	0.0068	0.2291	15.1174	0.0076	0.1031	6.8028	0.0034
Pick Up Truck	0.1352	98.6997	0.0493	0.0608	44.4149	0.0222	0.0676	49.3499	0.0247	0.0304	22.2074	0.0111
<b>Total Emissions</b>	<b>1.0514</b>	<b>133.9737</b>	<b>0.0670</b>	<b>0.4731</b>	<b>60.2882</b>	<b>0.0301</b>	<b>0.5257</b>	<b>66.9868</b>	<b>0.0335</b>	<b>0.2366</b>	<b>30.1441</b>	<b>0.0151</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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**Table 11**

**Change in Regulated Air Pollutants Emissions  
 Pennington South Well Pad  
 Doddridge County, West Virginia  
 Antero Resources Corporation**

Pollutant	Potential Emissions		Initial Permit Application Emissions		Change in Emissions	
	Hourly PTE	Yearly PTE	Hourly PTE	Yearly PTE	Hourly PTE	Yearly PTE
<b>PM</b>	1.0514	0.0670	0.0589	0.2579	0.9925	-0.1909
<b>PM10</b>	0.5109	0.1953	0.5319	0.4377	-0.0211	-0.2424
<b>VOC (Uncontrolled)</b>	5.3760	23.6860	47.8380	212.1597	-42.4620	-188.4737
<b>CO</b>	0.4169	1.8259	6.2698	27.4617	-5.8529	-25.6358
<b>NOx</b>	0.4963	2.1737	1.0602	4.6437	-0.5639	-2.4700
<b>SO2</b>	0.0030	0.0130	0.0046	0.0202	-0.0016	-0.0071
<b>Pb</b>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<b>HAPs</b>	0.2403	1.0527	5.4032	23.6885	-5.1629	-22.6358
<b>TAPs</b>	0.0023	0.0101	0.0096	0.0307	-0.0073	-0.0206

Notes: 1) Change in emissions due to removal of 24 HP Kubota Engine and 48" Cimarron enclosed combustor, the replacement of 6 Gas Processing Units from 1.5 to 1.0 MMBtu/hr, and reduced condensate production.



Bryan Research & Engineering, Inc.

# ProMax<sup>®</sup> 3.2

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

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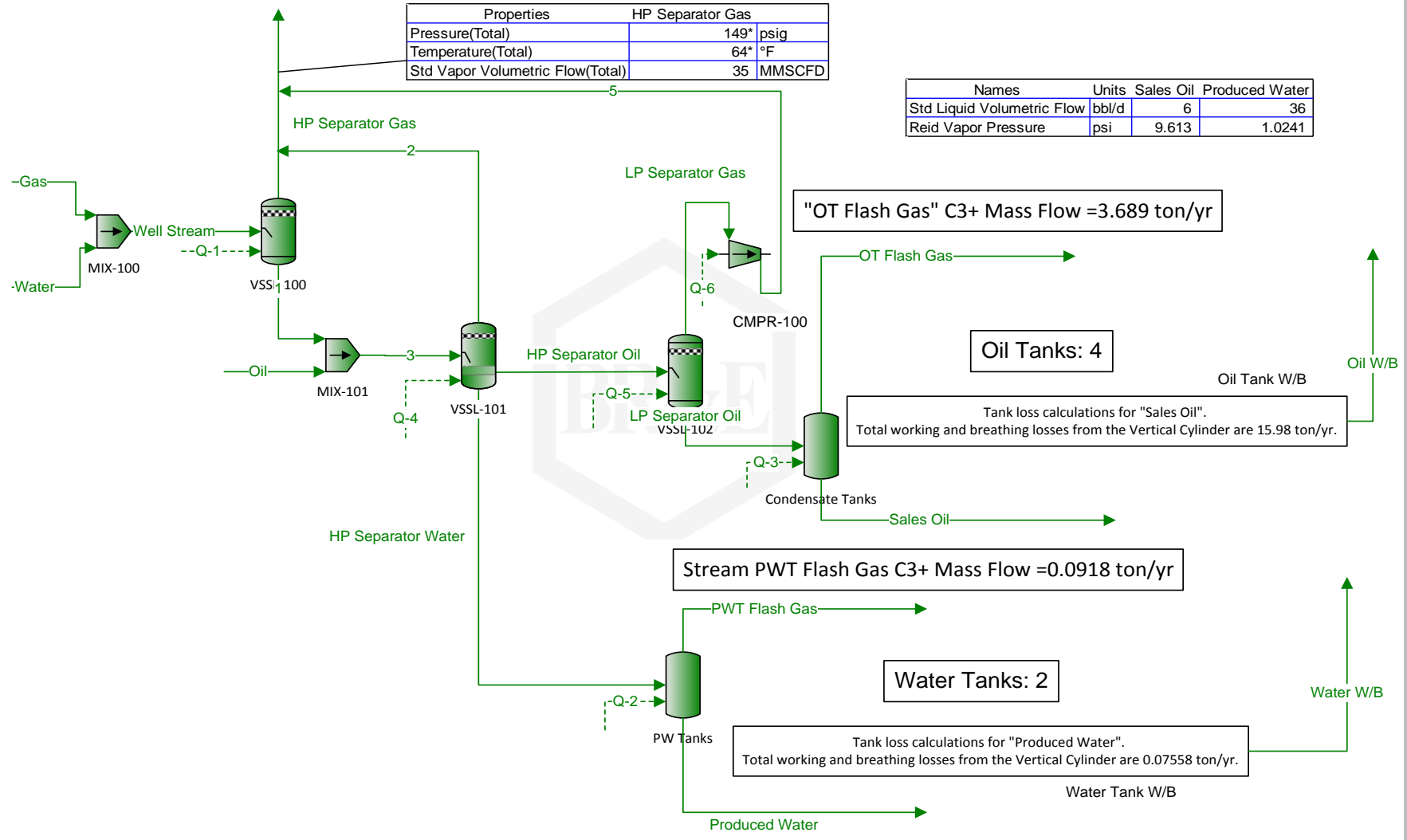
## Simulation Report

Client Name:	Antero Resources Corporation
Location:	West Virginia
Job:	Pennington South Well Pad
Project Name:	PROMAX SCENARIO 3
File Name:	ProMax@V:\AirQuality\ANTERO RESOURCES\ProMax\Antero WV_Updated 2Ph S
ProMax Version:	3.2.13330.0
Report Created:	6/18/2015 9:03

Stream HP Separator Gas C3+ Mass Flow = 5.226E+04 ton/yr

Properties	HP Separator Gas
Pressure(Total)	149* psig
Temperature(Total)	64* °F
Std Vapor Volumetric Flow(Total)	35 MMSCFD

Names	Units	Sales Oil	Produced Water
Std Liquid Volumetric Flow	bb/d	6	36
Reid Vapor Pressure	psi	9.613	1.0241



"OT Flash Gas" C3+ Mass Flow = 3.689 ton/yr

Oil Tanks: 4

Tank loss calculations for "Sales Oil".  
Total working and breathing losses from the Vertical Cylinder are 15.98 ton/yr.

Stream PWT Flash Gas C3+ Mass Flow = 0.0918 ton/yr

Water Tanks: 2

Tank loss calculations for "Produced Water".  
Total working and breathing losses from the Vertical Cylinder are 0.07558 ton/yr.

Oil Tank W/B

Water W/B

Process Stream	Status	Well Stream		HP Separator Gas		HP Separator Water		HP Separator Oil		OT Flash Gas		Sales Oil		Gas		Water		Oil		Produced Water		PWT Flash Gas		Oil WB		Water WB		1		3		LP Separator Oil	
		Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%	Solved	%
Water	0.940348	0.188881	0.995716	0.0519447	0.406628	0.00841087	0	100	0	99.997	3.02996	0.000296474	94.1605	99.9707	97.8668	0.0312072																	
H2S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																	
Nitrogen	0.392177	0.395153	0.000108266	0.0113346	0.0207075	3.04980E-05	0.395900	0	0.0170005	4.62761E-06	0.398848	0.000869150	0.00706819	5.60778E-05	0.000412681	0.00120532																	
Carbon Dioxide	0.123527	0.124459	0.000882381	0.0306754	0.234058	0.00407283	0.124700	0	0.0380011	0.000574683	1.18523	0.263761	1.41504	0.000729880	0.00151427	0.0171401																	
Methane	79.3950	79.9973	0.0214490	4.19976	16.8493	0.07999787	80.1487	0	4.27113	0.00181925	75.5778	3.92034	3.72151	0.0225284	0.111942	1.03278																	
Ethane	13.2319	13.3323	0.00410245	4.47178	36.6634	1.11722	13.3575	0	4.48413	0.000399898	14.2555	48.3579	0.647786	0.00423373	0.9985152	3.13688																	
Propane	3.70919	3.73733	0.00121165	4.44482	25.0991	2.89473	3.74440	0	4.44113	0.000129176	4.16775	28.0797	0.0461610	0.00135264	0.0947898	4.15407																	
Isobutane	0.507086	0.510934	5.29590E-05	1.47956	4.43458	1.31285	0.511900	0	1.47904	2.11125E-06	0.195770	4.59906	0.000271513	5.96996E-05	0.0318566	1.49022																	
n-Butane	0.816648	0.822843	0.000197014	3.64753	8.14306	3.46448	0.824400	0	3.64611	1.65051E-05	0.694989	8.29978	0.00145061	0.002004761	0.0789345	3.73031																	
Isopentane	0.179298	0.180658	3.85317E-05	2.69108	2.56440	2.82728	0.181000	0	2.69008	2.27222E-06	0.139604	2.47919	7.30264E-05	3.05865E-05	0.0566439	2.81235																	
n-Pentane	0.428631	0.431883	2.87482E-05	2.77350	2.00297	2.96332	0.432700	0	2.77008	1.67953E-06	0.104218	1.91430	3.97598E-05	6.96661E-05	0.0586568	2.90875																	
2-Methylpentane	0	0	3.62487E-06	1.83300	0.561055	2.01679	0	0	1.83205	1.04052E-07	0.0135556	0.522536	9.87420E-07	0.0038564	1.93408																		
3-Methylpentane	0	0	6.9483E-06	1.32955	0.365277	1.46604	0	0	1.32904	4.81999E-07	0.0231503	0.339434	4.0844E-06	0.0279702	1.40349																		
n-Hexane	0.276178	0.278274	4.66261E-06	4.13823	0.914823	4.57899	0.278800	0	4.13512	1.07029E-07	0.0175394	0.0577964	4.94803E-08	1.61151E-05	0.0870413	4.37165																	
Methylcyclopentane	0	0	1.04041E-05	0.864081	0.183549	0.956871	0	0	0.864026	2.01814E-06	0.0322885	0.158704	1.2622E-05	0	0.0181838	0.912932																	
Benzene	0	0	5.51457E-05	0.0934961	0.0195562	0.103569	0	0	0.0960029	5.09154E-05	0.0163379	0.00105860	1.90669E-05	0.00202042	0.0987658																		
2-Methylhexane	0	0	1.47107E-06	2.72976	0.258484	3.04721	0	0	2.72808	3.95654E-06	0.00525669	0.0152913	6.59284E-09	0	0.0571337	2.88876																	
3-Methylhexane	0	0	1.19649E-06	2.23545	0.201488	2.49618	0	0	2.23407	3.04570E-08	0.00448934	0.179613	8.02789E-08	0.0070169	2.36590																		
Heptane	0	0	2.00587E-06	4.50494	0.322264	5.03668	0	0	4.50214	5.13383E-08	0.00752514	0.264620	9.88021E-08	0.0497494	4.76882																		
Methylcyclohexane	0	0	8.40243E-06	3.27582	0.236134	3.66235	0	0	3.27410	1.15427E-06	0.0279071	0.196064	2.26356E-06	0.0689049	3.47668																		
Toluene	0	0	0.000104943	0.798659	0.0465843	0.893727	0	0	0.803024	9.53359E-08	0.0370139	0.00531763	2.07824E-05	0	0.0169000	0.845594																	
Octane	0	0	1.20026E-06	14.5328	0.326944	16.3020	0	0	14.5234	2.04501E-08	0.00454237	0.252917	1.16217E-08	0	0.305562	15.3943																	
Ethylbenzene	0	0	5.04826E-05	1.27652	0.0246721	1.43223	0	0	1.27804	4.54309E-05	0.0194950	0.00529875	6.15668E-06	0.0268969	1.35225																		
m-Xylene	0	0	4.00871E-05	1.18895	0.0192063	1.33200	0	0	1.18804	3.61994E-05	0.0150043	0.00531409	5.29003E-06	0.0250027	1.25741																		
o-Xylene	0	0	8.28459E-05	2.03954	0.0294466	2.28906	0	0	2.04206	7.67536E-05	0.0023524	0.00706268	8.67449E-06	0.0429761	2.16068																		
Nonane	0	0	4.76752E-07	11.2307	0.0828650	12.16106	0	0	11.2233	1.27899E-08	0.00178630	0.0579283	2.15209E-09	0.036200	11.8988																		
C10+	0	0	1.79106E-07	24.1265	0.61993E-07	27.1024	0	0	24.1107	5.61993E-09	0.000667940	0.0158776	1.20597E-10	0.027221	25.5640																		















3-Methylpentane					0											1.79995E-06	
n-Hexane					0											1.27062E-06	
Methylcyclopentane					0											3.04184E-06	
Benzene					0											1.58350E-05	
2-Methylhexane					0											4.24929E-07	
3-Methylhexane					0											3.44464E-07	
Heptane					0											6.02997E-07	
Methylcyclohexane					0											2.35127E-06	
Toluene					0											2.94699E-05	
Octane					0											3.23145E-07	
Ethylbenzene					0											1.43685E-05	
m-Xylene					0											1.12442E-05	
o-Xylene					0											2.30944E-05	
Nonane					0											1.28283E-07	
C10+					0											4.80786E-08	
<b>Mass Fraction</b>		<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
Water					99.9657											99.9649	
H2S					0											0	
Nitrogen					0.000168342											0.000184187	
Carbon Dioxide					0.00215544											0.00218193	
Methane					0.0190990											0.0198314	
Ethane					0.00684694											0.00689602	
Propane					0.00296556											0.00303163	
Isobutane					0.000170890											0.000169521	
n-Butane					0.000635584											0.000618381	
Isopentane					0.000154305											0.000151330	
n-Pentane					0.000115126											0.000110052	
2-Methylpentane					1.73384E-05											1.62340E-05	
3-Methylpentane					3.10659E-05											2.95241E-05	
n-Hexane					2.23021E-05											2.08416E-05	
Methylcyclopentane					4.86004E-05											4.87274E-05	
Benzene					0.000239090											0.000235433	
2-Methylhexane					8.18170E-06											8.10450E-06	
3-Methylhexane					6.65456E-06											6.56981E-06	
Heptane					1.11561E-05											1.15007E-05	
Methylcyclohexane					4.57919E-05											4.39426E-05	
Toluene					0.000536695											0.000516835	
Octane					7.60997E-06											7.02994E-06	
Ethylbenzene					0.000297479											0.000290353	
m-Xylene					0.000236222											0.000227218	
o-Xylene					0.000488186											0.000466682	
Nonane					3.39392E-06											3.13167E-06	
C10+					1.53220E-06											1.41044E-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>	<b>lb/h</b>	<b>lb/h</b>	<b>lb/h</b>
Water					0											525.187	
H2S					0											0	
Nitrogen					0											0.000967667	
Carbon Dioxide					0											0.0114632	
Methane					0											0.104189	
Ethane					0											0.0362297	
Propane					0											0.0159273	
Isobutane					0											0.000890617	
n-Butane					0											0.00324880	
Isopentane					0											0.000795047	
n-Pentane					0											0.000578182	
2-Methylpentane					0											8.52888E-05	
3-Methylpentane					0											0.000155111	
n-Hexane					0											0.000109496	
Methylcyclopentane					0											0.000256000	
Benzene					0											0.00123690	
2-Methylhexane					0											4.25787E-05	
3-Methylhexane					0											3.45160E-05	
Heptane					0											6.04215E-05	
Methylcyclohexane					0											0.000230862	
Toluene					0											0.00271531	





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

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

**Date Sampled:** 05/17/2013

**Date Analyzed:** 06/03/2013

**Job Number:** J33542

**Sample:** Tom's Fork No. 1H

FLASH LIBERATION OF SEPARATOR WATER		
	Separator	Stock Tank
Pressure, psig	149	0
Temperature, °F	64	70
Gas Water Ratio (1)	-----	1.44
Gas Specific Gravity (2)	-----	1.219
Separator Volume Factor (3)	1.000	1.000

(1) - Scf of water saturated vapor per barrel of stock tank water

(2) - Air = 1.000

(3) - Separator volume / Stock tank volume

Analyst:                   A. A.                  

Piston No. : WF-305\*

**Base Conditions: 14.65 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:** Tom's Fork No. 1H  
 Gas Liberated from Separator Water  
 From 149 psig & 64 °F to 0 psig & 70 °F

Date Sampled: 05/17/13

Job Number: 33542.001

**CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT**

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.000	
Carbon Dioxide	1.623	
Methane	50.762	
Ethane	15.569	4.140
Propane	9.072	2.485
Isobutane	2.466	0.802
n-Butane	5.548	1.739
2-2 Dimethylpropane	0.112	0.043
Isopentane	3.181	1.157
n-Pentane	2.995	1.079
Hexanes	4.199	1.721
Heptanes Plus	<u>4.473</u>	<u>1.964</u>
Totals	100.000	15.130

**Computed Real Characteristics Of Heptanes Plus:**

Specific Gravity ----- 3.554 (Air=1)  
 Molecular Weight ----- 101.71  
 Gross Heating Value ----- 5368 BTU/CF

**Computed Real Characteristics Of Total Sample:**

Specific Gravity ----- 1.219 (Air=1)  
 Compressibility (Z) ----- 0.9882  
 Molecular Weight ----- 34.89  
 Gross Heating Value  
 Dry Basis ----- 1987 BTU/CF  
 Saturated Basis ----- 1953 BTU/CF

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

Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR  
 Processor: AL  
 Cylinder ID: WF# 3 S

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

**CHROMATOGRAPH EXTENDED ANALYSIS  
TOTAL REPORT**

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.000		0.000
Carbon Dioxide	1.623		2.047
Methane	50.762		23.344
Ethane	15.569	4.140	13.418
Propane	9.072	2.485	11.466
Isobutane	2.466	0.802	4.108
n-Butane	5.548	1.739	9.243
2,2 Dimethylpropane	0.112	0.043	0.232
Isopentane	3.181	1.157	6.578
n-Pentane	2.995	1.079	6.194
2,2 Dimethylbutane	0.180	0.075	0.445
Cyclopentane	0.091	0.038	0.183
2,3 Dimethylbutane	0.196	0.080	0.484
2 Methylpentane	1.316	0.543	3.251
3 Methylpentane	0.846	0.343	2.090
n-Hexane	1.570	0.642	3.878
Methylcyclopentane	0.153	0.052	0.369
Benzene	0.043	0.012	0.096
Cyclohexane	0.222	0.075	0.535
2-Methylhexane	0.568	0.263	1.631
3-Methylhexane	0.552	0.250	1.585
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.574	0.248	1.632
n-Heptane	0.628	0.288	1.804
Methylcyclohexane	0.502	0.201	1.413
Toluene	0.086	0.029	0.227
Other C8's	0.759	0.351	2.398
n-Octane	0.129	0.066	0.422
Ethylbenzene	0.004	0.002	0.012
M & P Xylenes	0.023	0.009	0.070
O-Xylene	0.004	0.002	0.012
Other C9's	0.174	0.088	0.630
n-Nonane	0.020	0.011	0.074
Other C10's	0.028	0.016	0.113
n-Decane	0.003	0.002	0.012
Undecanes (11)	<u>0.001</u>	<u>0.001</u>	<u>0.004</u>
Totals	100.000	15.130	100.000

**Computed Real Characteristics Of Total Sample:**

Specific Gravity -----	1.219	(Air=1)
Compressibility (Z) -----	0.9882	
Molecular Weight -----	34.89	
Gross Heating Value		
Dry Basis -----	1987	BTU/CF
Saturated Basis -----	1953	BTU/CF

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

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

**Sample:** Tom's Fork No. 1H  
 Separator Hydrocarbon Liquid  
 Sampled @ 149 psig & 62 °F

Date Sampled: 05/17/13

Job Number: 33542.002

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

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.017	0.004	0.005
Carbon Dioxide	0.038	0.014	0.016
Methane	4.271	1.558	0.660
Ethane	4.484	2.582	1.299
Propane	4.441	2.634	1.887
Isobutane	1.479	1.042	0.828
n-Butane	3.646	2.475	2.042
2,2 Dimethylpropane	0.074	0.061	0.051
Isopentane	2.616	2.060	1.819
n-Pentane	2.770	2.162	1.926
2,2 Dimethylbutane	0.206	0.185	0.171
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.394	0.348	0.327
2 Methylpentane	1.832	1.637	1.521
3 Methylpentane	1.329	1.168	1.104
n-Hexane	2.879	2.549	2.391
Heptanes Plus	<u>69.523</u>	<u>79.521</u>	<u>83.953</u>
Totals:	100.000	100.000	100.000

**Characteristics of Heptanes Plus:**

Specific Gravity ----- 0.7475 (Water=1)  
 °API Gravity ----- 57.80 @ 60°F  
 Molecular Weight ----- 125.3  
 Vapor Volume ----- 18.93 CF/Gal  
 Weight ----- 6.23 Lbs/Gal

**Characteristics of Total Sample:**

Specific Gravity ----- 0.7080 (Water=1)  
 °API Gravity ----- 68.35 @ 60°F  
 Molecular Weight ----- 103.8  
 Vapor Volume ----- 21.65 CF/Gal  
 Weight ----- 5.90 Lbs/Gal

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: JCM  
 Processor: JCdjv  
 Cylinder ID: W-1002

David Dannhaus 361-661-7015



## TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.017	0.004	0.005
Carbon Dioxide	0.038	0.014	0.016
Methane	4.271	1.558	0.660
Ethane	4.484	2.582	1.299
Propane	4.441	2.634	1.887
Isobutane	1.479	1.042	0.828
n-Butane	3.646	2.475	2.042
2,2 Dimethylpropane	0.074	0.061	0.051
Isopentane	2.616	2.060	1.819
n-Pentane	2.770	2.162	1.926
2,2 Dimethylbutane	0.206	0.185	0.171
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.394	0.348	0.327
2 Methylpentane	1.832	1.637	1.521
3 Methylpentane	1.329	1.168	1.104
n-Hexane	2.879	2.549	2.391
Methylcyclopentane	0.864	0.659	0.701
Benzene	0.096	0.058	0.072
Cyclohexane	0.656	0.481	0.532
2-Methylhexane	2.728	2.730	2.633
3-Methylhexane	2.234	2.208	2.157
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.878	0.852	0.839
n-Heptane	3.624	3.600	3.499
Methylcyclohexane	3.274	2.833	3.097
Toluene	0.803	0.579	0.713
Other C-8's	10.455	10.921	11.103
n-Octane	4.068	4.487	4.477
E-Benzene	1.278	1.062	1.308
M & P Xylenes	1.188	0.992	1.215
O-Xylene	2.042	1.672	2.089
Other C-9's	7.928	9.249	9.644
n-Nonane	3.295	3.992	4.072
Other C-10's	8.288	10.626	11.282
n-decane	2.146	2.835	2.942
Undecanes(11)	6.306	8.294	8.931
Dodecanes(12)	3.312	4.706	5.138
Tridecanes(13)	1.921	2.927	3.239
Tetradecanes(14)	1.036	1.691	1.897
Pentadecanes(15)	0.536	0.937	1.064
Hexadecanes(16)	0.249	0.465	0.533
Heptadecanes(17)	0.137	0.270	0.312
Octadecanes(18)	0.081	0.169	0.196
Nonadecanes(19)	0.043	0.094	0.110
Eicosanes(20)	0.022	0.049	0.058
Heneicosanes(21)	0.012	0.029	0.034
Docosanes(22)	0.008	0.020	0.024
Tricosanes(23)	0.005	0.013	0.015
Tetracosanes(24)	0.002	0.006	0.008
Pentacosanes(25)	0.002	0.004	0.005
Hexacosanes(26)	0.001	0.003	0.003
Heptacosanes(27)	0.001	0.002	0.002
Octacosanes(28)	0.001	0.002	0.002
Nonacosanes(29)	0.000	0.001	0.001
Triacotanes(30)	0.000	0.001	0.001
Hentriacotanes Plus(31+)	<u>0.001</u>	<u>0.002</u>	<u>0.002</u>
Total	100.000	100.000	100.000

**Antero Resources**  
**Tom's Fork Unit 1H - Erwin Hilltop Pad**

Tag Name	Value	Units	Timestamp
Accumulated Gas Flow	1007191	MCF	12/12/2013 09:05:33
Casing Pressure	265.75	PSIA	12/12/2013 09:05:38
Current Day Gas Flow	141.06	MCF	12/12/2013 09:05:33
Differential Pressure	4.15	inH2O	12/12/2013 09:05:33
Flow Rate	2901.39	MCF Per Day	12/12/2013 09:05:33
Pressure	224.06	PSIA	12/12/2013 09:05:33
Previous Day Energy	3355.95	MBTU	12/12/2013 09:05:34
Previous Day Gas Flow	2775.87	MCF	12/12/2013 09:05:34
Temperature	60.24	F	12/12/2013 09:05:33
Tubing Pressure	454.39	PSIA	12/12/2013 09:05:38
Daily AP	3.49	PSIA	12/12/2013 09:00:00
Daily DP	245.52	inH2O	12/12/2013 09:00:00
Daily Energy	3355.95	MBTU	12/12/2013 09:00:00
Daily Flow	2775.87	MCF	12/12/2013 09:00:00
Daily Tf	60.68	F	12/12/2013 09:00:00
Hourly AP	225.27	PSIA	12/12/2013 10:00:00
Hourly DP	3.89	Inches	12/12/2013 10:00:00
Hourly Energy	141.7	MBTU	12/12/2013 10:00:00
Hourly Flow Time	3600	Seconds	12/12/2013 10:00:00
Hourly Tf	60.3	F	12/12/2013 10:00:00
Hourly Volume	117.2	MCF	12/12/2013 10:00:00
Argon	0	%	12/12/2013 09:05:37
BTU	1208.97	BTU	12/12/2013 09:05:33
C02	0.1247	%	12/12/2013 09:05:37
Carbon Monoxide	0	%	12/12/2013 09:05:37
Decane	0	%	12/12/2013 09:05:37
Ethane	13.3575	%	12/12/2013 09:05:37
Helium	0	%	12/12/2013 09:05:37
Heptane	0	%	12/12/2013 09:05:37
Hexane	0.2788	%	12/12/2013 09:05:37
Hydrogen	0	%	12/12/2013 09:05:37
Hydrogen Sulfide	0	%	12/12/2013 09:05:37
Iso-Butane	0.5119	%	12/12/2013 09:05:37
Iso-Pentane	0.181	%	12/12/2013 09:05:37
Methane	80.1487	%	12/12/2013 09:05:37
N2	0.3959	%	12/12/2013 09:05:37
N-Butane	0.8244	%	12/12/2013 09:05:37
Nonane	0	%	12/12/2013 09:05:37
N-Pentane	0.4327	%	12/12/2013 09:05:37
Octane	0	%	12/12/2013 09:05:37
Oxygen	0	%	12/12/2013 09:05:37
Plate Size	3.75	Inches	12/12/2013 09:05:35
Propane	3.7444	%	12/12/2013 09:05:37
SPG	0.6963		12/12/2013 09:05:33
Water	0	%	12/12/2013 09:05:37
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 J

## Class I Legal Advertisement

**Attachment J**

**Air Quality Permit Notice  
Notice of Application  
Pennington South Well Pad  
Antero Resources Corporation  
Doddridge 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 General Permit Registration Modification for an Oil and Natural Gas facility located 1800 Webley Fork Rd. West Union, WV 26456.

The latitude and longitude coordinates are: 39.2025 degrees N and -80.740833 degrees W

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

Pollutants	TOTALS (tpy):
VOC	23.6860
NO <sub>x</sub>	2.1737
CO <sub>2e</sub>	2895.0000
CO	1.8259
SO <sub>2</sub>	0.0130
PM <sub>2.5</sub>	0.1652
PM <sub>10</sub>	0.1953
Lead	1.09E-05
Total HAPs	1.0527
Benzene	0.0084
Formaldehyde	0.0016
Xylenes	0.2612

Change of operation is planned to begin upon permit issuance. 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 1227, during normal business hours.

Dated this the \_\_ day of \_\_\_\_\_, 2014

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

# Attachment L

## General Permit Registration Application Fee

Conestoga-Rovers & Associates, Inc.

PLEASE DETACH AND RETAIN FOR YOUR RECORDS

INVOICE NUMBER	DATE	VOUCHER NO.	AMOUNT
Account Number: CR60215	6/2/2015	40VVDEPAQ 400953360	407686 1,500.00
<b>TOTAL:</b>			<b>1,500.00</b>

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

**Conestoga-Rovers & Associates, 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

6/2/2015

NO. 407686

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

DOLLARS AND \*\*\*\*\*00 CENTS

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

TO THE  
ORDER  
OF

WV Dept. of Environmental Protection  
Division Air Quality  
601 57th Street SE  
Charleston, WV 25304 US

  
  
 AUTHORIZED SIGNATURES

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

⑈ 407686 ⑈ ⑆ 2213706321 ⑆ 1000000 ⑆ 18910 ⑈

# Attachment O

## Emissions Summary Sheet

**Attachment O: G70-A Emissions Summary Sheet**  
**Emission Points Data Summary Sheet**

Table 1: Emissions Data												
Emission Point ID No. <i>(Must match Emission Units Table &amp; Plot Plan)</i>	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point <i>(Must match Emission Units Table &amp; Plot Plan)</i>		Air Pollution Control Device <i>(Must match Emission Units Table &amp; Plot Plan)</i>		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> <i>(Speciate VOCs &amp; HAPS)</i>	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase <i>(At exit conditions, Solid, Liquid or Gas/Vapor)</i>	Est. Method Used <sup>6</sup>
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
EP-H001, EP-H002, EP-H003, EP-H004, EP-H005, EP-H006	Vertical Stack	H001, H002, H003, H004, H005, H006	Gas Production Unit Heater	N/A		CO (630080)	0.4169	1.8259	0.4169	1.8259	Gas/Vapor /Solid (for PM)	MB AP-42
						NOx (10102439)	0.4963	2.1737	0.4963	2.1737		
						Pb (7439-92-1)	2.48E-06	1.09E-05	2.48E-06	1.09E-05		
						CO2 Equivalent N2O (10024972), CO2 (124389), CH4 (74828)	599.0853	2623.9938	599.0853	2623.9938		
						SO2 (7446095)	2.98E-03	1.30E-02	2.98E-03	1.30E-02		
						PM, PM10, PM2.5	0.0377	0.1652	0.0377	0.1652		
						Benzene (71432)	1.04E-05	4.56E-05	1.04E-05	4.56E-05		
						Toluene (108883)	1.69E-05	7.39E-05	1.69E-05	7.39E-05		
						Hexane (110543)	8.93E-03	0.0391	8.93E-03	3.91E-02		
						Formaldehyde (50000)	3.72E-04	1.63E-03	3.72E-04	1.63E-03		
						2-Methylnaphthalene (91576)	1.19E-07	5.22E-07	1.19E-07	5.22E-07		
						Dichlorobenzene (95501)	5.96E-06	2.61E-05	5.96E-06	2.61E-05		
						Fluoranthene (206440)	1.49E-08	6.52E-08	1.49E-08	6.52E-08		
						Fluorene (86737)	1.39E-08	6.09E-08	1.39E-08	6.09E-08		
						Naphthalene (91203)	3.03E-06	1.33E-05	3.03E-06	1.33E-05		
Phenanathrene (85018)	8.44E-08	3.70E-07	8.44E-08	3.70E-07								
Total VOCs	0.0273	0.1196	0.0273	0.1196								
F001	n/a	F001	Fugitives	N/A		Benzene (71432)	0.0012	5.40E-03	1.23E-03	5.40E-03	Gas/Vapor	MB
						Toluene (108883)	0.0122	0.0533	0.0122	0.0533		
						Ethyl benzene (100414)	0.0223	0.0977	0.0223	0.0977		
						Hexane (110543)	0.0970	0.4248	0.0970	0.4248		
						o,m,p-xylenes (95476,108383,106423)	0.0564	0.2470	0.0564	0.2470		
						CO2 Equivalent CO2 (124389), CH4	51.6304	226.1411	51.6304	226.1411		
						VOCs	2.1796	9.5465	2.1796	9.5465		
EP-L001, EP-L002	n/a	L001, L002	Loading (Condensate), Loading (Water)	N/A		VOCs	30.4339	0.1389	30.4339	0.1389	Gas/Vapor	MB
						hexane (110543)	6.05E-02	2.76E-04	6.05E-02	2.76E-04		
						o,m,p-xylenes (95476,108383,106423)	1.60E-02	7.29E-05	1.60E-02	7.29E-05		
						CO2 Equivalent CO2 (124389), CH4	20.2354	0.1148	20.2354	0.1148		



**Attachment O: G70-A Emissions Summary Sheet**  
**Emission Points Data Summary Sheet**

Table 1: Emissions Data												
Emission Point ID No. <i>(Must match Emission Units Table &amp; Plot Plan)</i>	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point <i>(Must match Emission Units Table &amp; Plot Plan)</i>		Air Pollution Control Device <i>(Must match Emission Units Table &amp; Plot Plan)</i>		All Regulated Pollutants - Chemical Name/CAS <sub>3</sub> <i>(Speciate VOCs &amp; HAPS)</i>	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase <i>(At exit conditions, Solid, Liquid or Gas/Vapor)</i>	Est. Method Used <sup>6</sup>
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
EP-HR001	n/a	HR001	Haul Truck	N/A		PM, PM10, PM2.5	1.0514	0.0670	0.5257	0.0335	Solid	MB
TANKCOND001-04 and TANKPW001-002	n/a	EP-TANKCOND001-04, EP-TANKPW001-002	Condensate Tank F/W/B, PW Tank F/W/B	N/A	N/A	CO2 Equivalent N2O (10024972), CO2 (124389), CH4	6.0209	26.3717	0.0000	0.0000	Gas/Vapor/ Solid (for PM)	MB
						Benzene (71432)	0.0007	0.0030	0.00E+00	0.00E+00		
						Toluene (108883)	0.0021	0.0094	4.29E-05	1.88E-04		
						ethyl benzene (100414)	0.0015	0.0068	3.09E-05	1.35E-04		
						hexane (110543)	0.0311	0.1362	6.22E-04	2.72E-03		
						o,m,p-xylenes (95476,108383,106423)	0.0053	0.0134	1.05E-04	2.69E-04		
EP-PCV	valve	PCV	Pneumatic CV	N/A		hexane (110543)	3.13E-03	0.0137	3.13E-03	0.0137	Gas/Vapor	MB
						CO2 Equivalent CO2 (124389), CH4	4.1931	18.3656	4.1931	18.3656		
						VOCs	0.0406	0.1777	0.0406	0.1777		

**Attachment C/O: G70-A Emissions Summary Sheet  
Fugitive Emissions Data Summary Sheet**

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS <sup>1</sup>	Maximum Potential Uncontrolled Emissions <sup>2</sup>		Maximum Potential Controlled Emissions <sup>3</sup>		Est. Method Used <sup>4</sup>
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	n/a					
Unpaved Haul Roads	PM, PM10, PM2.5	1.0514	0.0670	0.5257	0.0335	MB
Loading/Unloading Operations	VOCs	30.4339	0.1389	30.4339	0.1389	MB
Equipment Leaks (Components)	hexane (110543)	0.0605	2.76E-04	0.0605	2.76E-04	MB
	o,m,p-xylenes (95476,108383,106423)	0.0160	7.29E-05	0.0160	7.29E-05	
	CO2 Equivalent CO2 (124389), CH4	20.2354	0.1148	20.2354	0.1148	
	Toluene (108883)	Does not apply	0.0533	Does not apply	0.0533	
	Ethyl benzene (100414)		0.0977		0.0977	
	Hexane (110543)		0.4248		0.4248	
	o,m,p-xylenes (95476,108383,106423)		0.2470		0.2470	
	CO2 Equivalent CO2 (124389), CH4		226.1411		226.1411	
	VOCs	9.5465	9.5465			
	Equipment Leaks (PCVs)	hexane (110543)	3.13E-03	0.0137	3.13E-03	
	CO2 Equivalent CO2 (124389), CH4	4.1931	18.3656	4.1931	18.3656	
	VOCs	0.0406	0.1777	0.0406	0.1777	

<sup>1</sup> List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS<sub>2</sub>, VOCs, H<sub>2</sub>S, Inorganics, Lead, Organics, O<sub>3</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, SO<sub>3</sub>, all applicable Greenhouse Gases (including CO<sub>2</sub> and methane), etc. DO NOT LIST H<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, and Noble Gases.

<sup>2</sup> Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

<sup>3</sup> Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

<sup>4</sup> Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).