



August 5, 2016

Reference No. 082715

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

Dear Ms. Beverly McKeone:

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

GHD Services Inc. (GHD) 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 Hughes Well Pad.

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

1. Increase in condensate production
2. Change in storage tanks service
3. Addition of 3 Cimarron enclosed combustors
4. Addition of 12 line heaters

Please refer to Table 13 in Attachment S - 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-C General Permit Modification Application.
- Two CD copies of the G70-C General Permit Modification Application.
- The application fee with check no. 451865 in the amount of \$500.00.

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

Sincerely,

GHD Services Inc.

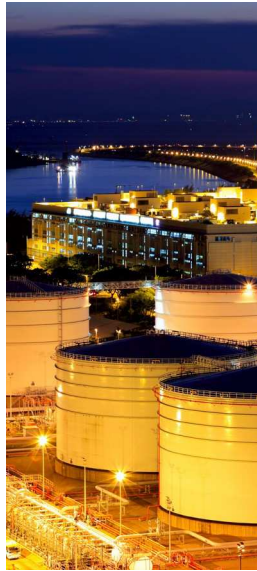
A handwritten signature in black ink, appearing to read 'Manuel Bautista', written in a cursive style.

Manuel Bautista

MB/ma/266

Encl.

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



General Permit G70-C Modification Application

Increase in condensate production, change in storage tanks service, and the addition of 3 Cimarron enclosed combustors and 12 line heaters.

Hughes Well Pad

Antero Resources Corporation

GHD
6320 Rothway Suite 100 Houston Texas 77040
082715 | Report No 266 | August 2016

Table of Contents

G70-C General Permit Modification

Attachment A	Single Source Determination Form
Attachment B	Siting Criteria Waiver – Not Applicable
Attachment C	Current Business Certificate
Attachment D	Process Flow Diagram
Attachment E	Process Description
Attachment F	Plot Plan
Attachment G	Area Map
Attachment H	G70-C Section Applicability Form
Attachment I	Emission Units/ERD Table
Attachment J	Fugitive Emissions Summary Sheet
Attachment K	Gas Well Affected Facility Data Sheet
Attachment L	Storage Vessels Data Sheet
Attachment M	Natural Gas Fired Fuel Burning Units Data Sheet
Attachment N	Internal Combustion Engine Data Sheet – Not Applicable
Attachment O	Tanker Truck Loading Data Sheet
Attachment P	Glycol Dehydration Unit Sheet– Not Applicable
Attachment Q	Pneumatic Controllers Data Sheet – Not Applicable
Attachment R	Air Pollution Control Device/ Emissions Reduction Devices Sheets
Attachment S	Emission Calculations
Attachment T	Facility-wide Emissions Summary Sheets
Attachment U	Class I Legal Advertisement



west virginia department of environmental protection

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

G70-C GENERAL PERMIT REGISTRATION APPLICATION

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

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

SECTION 1. GENERAL INFORMATION

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

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

Applicant's Mailing Address: 1615 Wynkoop Street

City: Denver State: CO ZIP Code: 80202

Facility Name: Hughes Well Pad

Operating Site Physical Address: 2604 Hunters Fork Rd.

City: Salem Zip Code: 26426 County: Doddridge

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

Latitude: 39.21939
Longitude: -80.62052

SIC Code: 1311 DAQ Facility ID No. (For existing facilities)
NAICS Code: 211111 017-00090

CERTIFICATION OF INFORMATION

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

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

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

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

If applicable:
Authorized Representative Signature: Barry Schatz
Name and Title: Barry Schatz/ Senior Environmental & Regulatory Manager Phone: 303-357-7276 Fax: 303-357-7315
Email: bschatz@anteroresources.com Date: 8/5/2016

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

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: Increase in condensate production, change in storage tanks service, and the addition of 3 Cimarron enclosed combustors and 12 line heaters.	
Directions to the facility: From Salem head southwest on Co Rte 29 (Salem Country Club Rd) for 1.9 miles, turn left onto Co Rte 15 (Sherwood-Greenbrier Rd) for 2.9 miles then turn left onto Co Rte 46/2 for 0.5 mile. Turn right onto Standing Stone Rd for 1.2 miles. Make a right onto Hunters Fork for 0.2 mile. Facility is on the right.	
ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22).	
<input checked="" type="checkbox"/> Check attached to front of application. <input type="checkbox"/> I wish to pay by electronic transfer. Contact for payment (incl. name and email address): <input type="checkbox"/> I wish to pay by credit card. Contact for payment (incl. name and email address):	
<input checked="" type="checkbox"/> \$500 (Construction, Modification, and Relocation) <input type="checkbox"/> \$300 (Class II Administrative Update) <input type="checkbox"/> \$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO ¹ <input type="checkbox"/> \$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH ²	
¹ Only one NSPS fee will apply. ² Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. <i>NSPS and NESHAP fees apply to new construction or if the source is being modified.</i>	
<input checked="" type="checkbox"/> Responsible Official or Authorized Representative Signature (if applicable)	
<input checked="" type="checkbox"/> Single Source Determination Form (must be completed in its entirety) – Attachment A	
<input type="checkbox"/> Siting Criteria Waiver (if applicable) – Attachment B	<input checked="" type="checkbox"/> Current Business Certificate – Attachment C
<input checked="" type="checkbox"/> Process Flow Diagram – Attachment D	<input checked="" type="checkbox"/> Process Description – Attachment E
<input checked="" type="checkbox"/> Plot Plan – Attachment F	<input checked="" type="checkbox"/> Area Map – Attachment G
<input checked="" type="checkbox"/> G70-C Section Applicability Form – Attachment H	<input checked="" type="checkbox"/> Emission Units/ERD Table – Attachment I
<input checked="" type="checkbox"/> Fugitive Emissions Summary Sheet – Attachment J	
<input checked="" type="checkbox"/> Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
<input checked="" type="checkbox"/> Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
<input checked="" type="checkbox"/> Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
<input type="checkbox"/> Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
<input checked="" type="checkbox"/> Tanker Truck Loading Data Sheet (if applicable) – Attachment O	
<input type="checkbox"/> Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
<input type="checkbox"/> Pneumatic Controllers Data Sheet – Attachment Q	
<input checked="" type="checkbox"/> Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment R	
<input checked="" type="checkbox"/> Emission Calculations (please be specific and include all calculation methodologies used) – Attachment S	
<input checked="" type="checkbox"/> Facility-wide Emission Summary Sheet(s) – Attachment T	
<input checked="" type="checkbox"/> Class I Legal Advertisement – Attachment U	
<input checked="" type="checkbox"/> One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

GHD SERVICES INC.

▼ PLEASE DETACH AND RETAIN FOR YOUR RECORDS ▼

INVOICE NUMBER	DATE	VOUCHER NO.	AMOUNT
Account Number: CR71216	7/12/2016	40WVDEPAQ 401013503	451865 500.00

TOTAL: 500.00

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

GHD SERVICES INC.

2055 NIAGARA FALLS BLVD, SUITE 3
NIAGARA FALLS, NY 14304

M&T BANK

MANUFACTURERS AND TRADERS TRUST COMPANY
Commercial Banking
Main Office, Ithaca, NY 14850
50-7063-2213

7/12/2016

NO. 451865

PAY

*****500

DOLLARS AND

CENTS

*****00

\$ *****500.00

TO THE
ORDER
OF

**West Virginia Dept of Environmental
Protection - Division Air Quality
601 57th Street SE
Charleston, WV 25304 US**

GHD SERVICES INC.

AUTHORIZED SIGNATURES

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

⑈ 451865⑈ ⑆ 2213706321⑆ 1000000 118910⑈

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

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

DATE: January 23, 2015

ATTN.: Director

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

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

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

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

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

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



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

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

Secretary

Name of Corporation or business entity

Attachment A

Single Source Determination Form

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

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

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

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

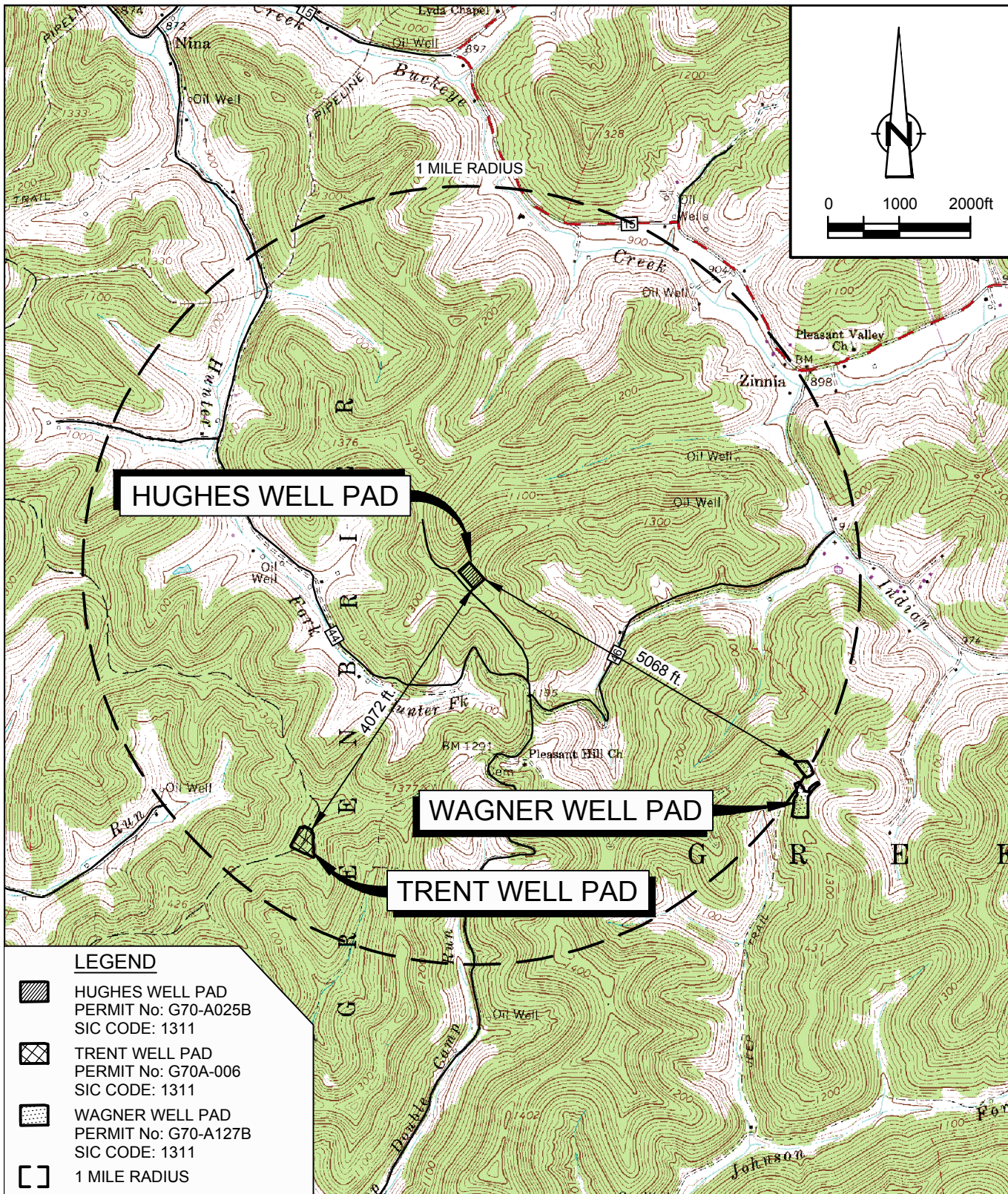
The Hughes Well Pad calculation of potential to emit included all the emissions sources that belong to the same industrial grouping, are located on contiguous or adjacent properties, and are under the control of the same person. The nearest emission source that belongs to the same industrial grouping and under the control of the same person but not located on contiguous or adjacent property is the Trent Well Pad. This well pad operates independently and is approximately 0.81 mile southwest of the facility. There is one other nearby source, Wagner Well Pad that belongs to the same industrial grouping and is under the same control but not located on contiguous or adjacent property. This well pad is located approximately 0.96 mile southeast of Hughes Well Pad and operates completely independent.

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

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



SOURCE: USGS QUADRANGLE MAP;
NEW MILTON AND BIG ISAAC, WEST VIRGINIA

SITE COORDINATES: LAT. 39.21939, LONG. -80.62052

Attachment A

SINGLE SOURCE DETERMINATION
HUGHES WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia



Attachment B

Siting Criteria Waiver

Attachment B

Siting Waiver

Hughes Well Pad

Antero Resources Corporation

Doddridge County, West Virginia

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

Attachment C

Current Business Certificate

State of West Virginia



Certificate

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

ANTERO RESOURCES CORPORATION

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

Therefore, I issue this

CERTIFICATE OF AMENDMENT TO CERTIFICATE OF AUTHORITY



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

Natalie E. Tennant

Secretary of State

FILED

JUN 10 2013

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



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

Website: www.wvsos.com
E-mail: business@wvsos.com

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

**APPLICATION FOR
AMENDED CERTIFICATE
OF AUTHORITY**

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

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

- Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation
- Date Certificate of Authority was issued in West Virginia: 6/25/2008
- Corporate name has been changed to: Antero Resources Corporation
(Attach one **Certified Copy of Name Change** as filed in home State of Incorporation.)
- Name the corporation elects to use in WV: Antero Resources Corporation
(due to home state name not being available)
- Other amendments: _____
(attach additional pages if necessary)

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

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

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

Print Name of Signer: Alvyn A. Schopp Title/Capacity: Authorized Person

Signature: Date: June 10, 2013

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

Delaware

PAGE 1

The First State

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

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

4520810 8100

130754186



You may verify this certificate online
at corp.delaware.gov/authver.shtml


Jeffrey W. Bullock, Secretary of State
AUTHENTICATION: 0496546

DATE: 06-10-13

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

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

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

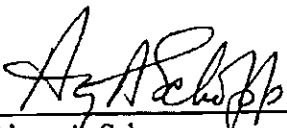
2. This Amendment to the Amended and Restated Certificate of Incorporation has been duly adopted and approved in accordance with Sections 242 of the General Corporation Law of the State of Delaware.

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

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

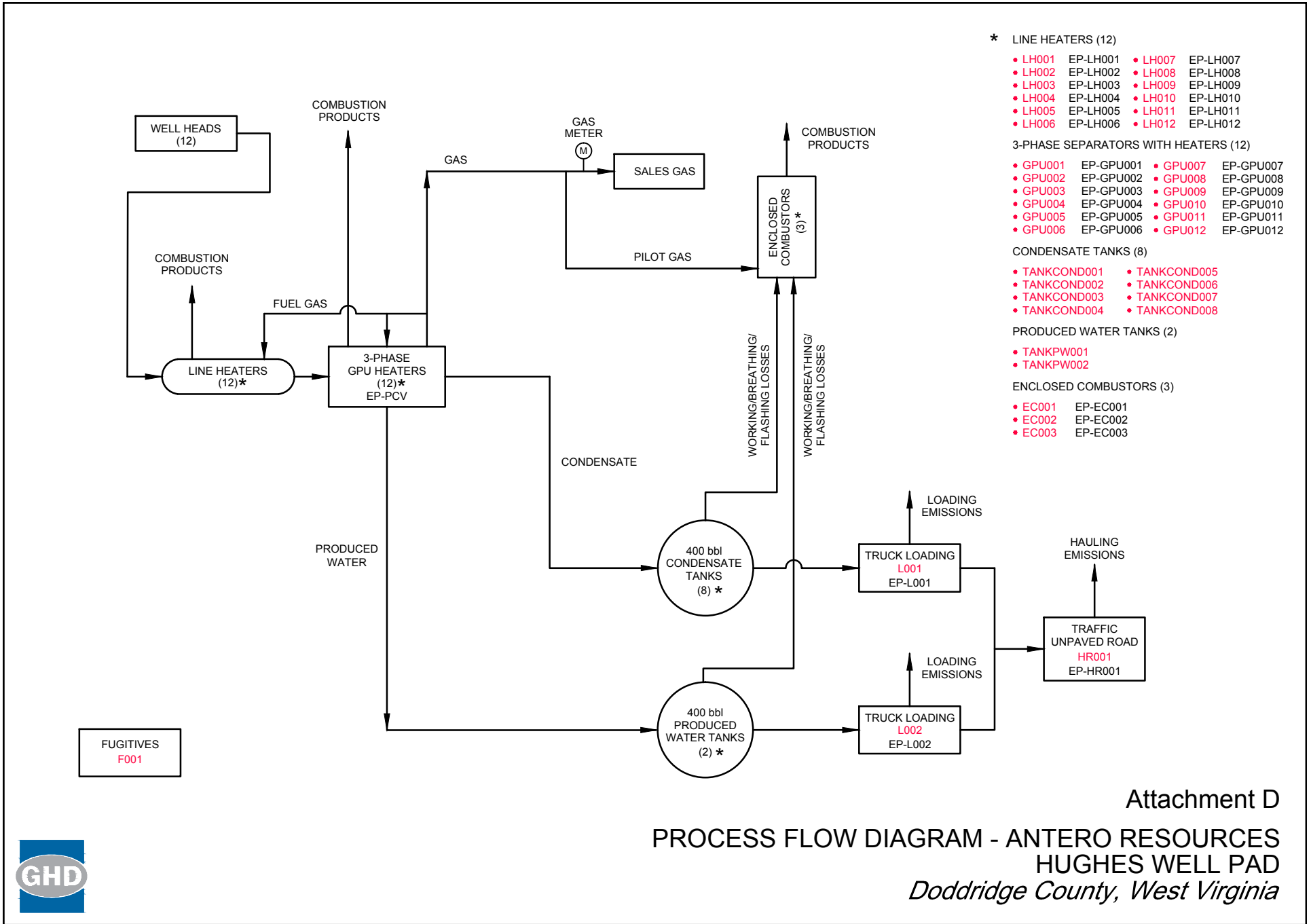
IN WITNESS WHEREOF, the Corporation has caused this Certificate of Amendment to be executed by its duly authorized officer on the 10th day of June, 2013.

ANTERO RESOURCES APPALACHIAN CORPORATION

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

Attachment D

Process Flow Diagram



Attachment E

Process Description

Attachment E

Process Description

Hughes Well Pad

Antero Resources Corporation

Doddridge County, West Virginia

A mixture of condensate, water, and entrained gas from the condensate and gas wells enters the facility through a series of line heaters (LH001-012) and gas production units (GPU001-GPU012) which are 3 phase separators where the gas, condensate, and produced water are separated. The line heaters and GPUs are fueled by a slip stream of the separated gas. The separated gas is then metered and sent to the sales gas pipeline. The separated condensate and water from the separators flow to their respective storage tanks (TANKCOND001-008 and TANKPW001-002).

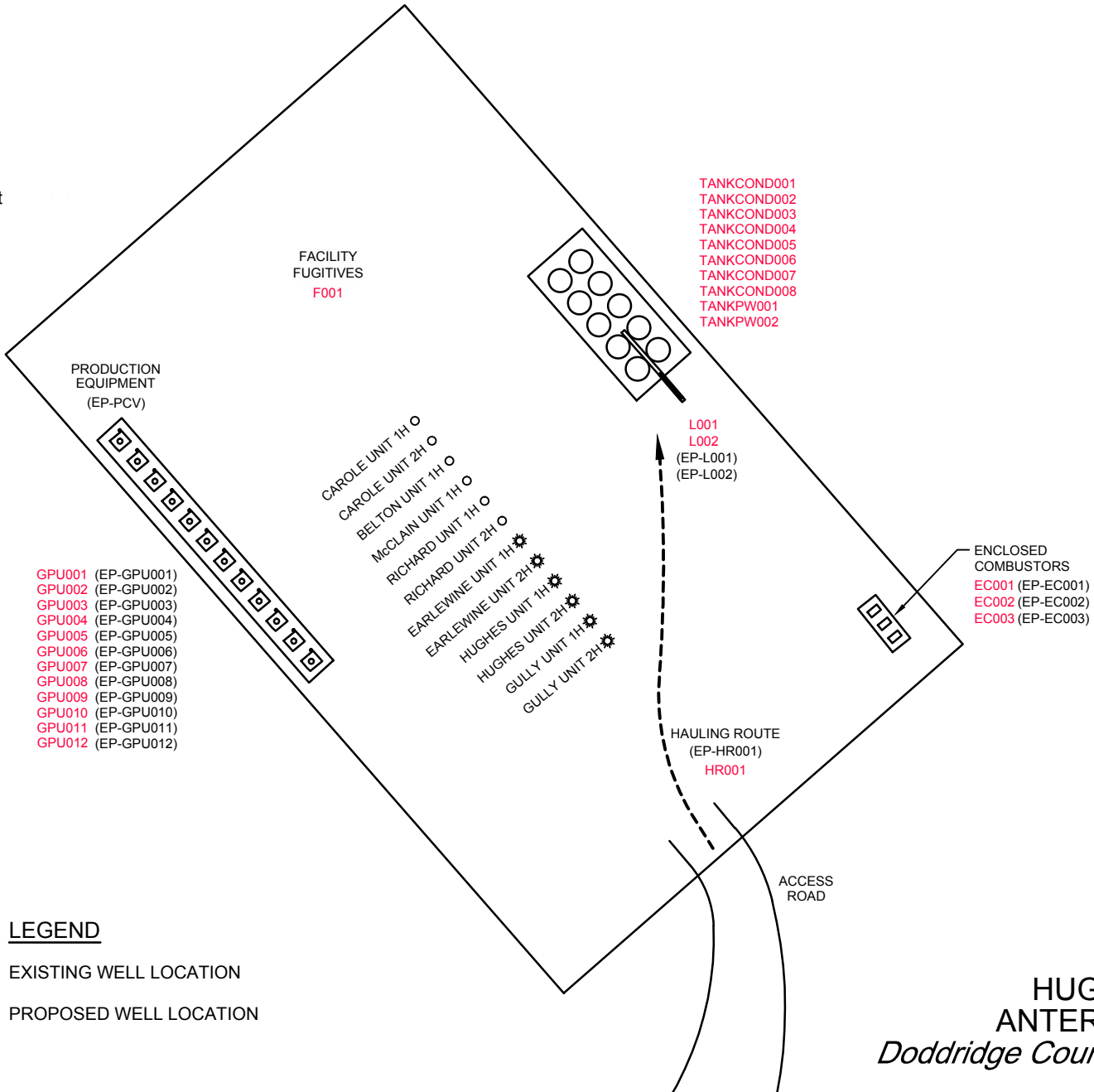
The facility has eight (8) tanks (TANKCOND001-008) on site to store condensate and two (2) tanks (TANKPW001-002) to store produced water prior to removal from the site. The flashing, working and breathing losses from the tanks are routed to three enclosed combustors (EC001-003) to control the emissions. The enclosed combustors that will be used to control emissions are designed to achieve a VOC destruction efficiency of 98 percent.

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

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

Attachment F

Plot Plan



LEGEND

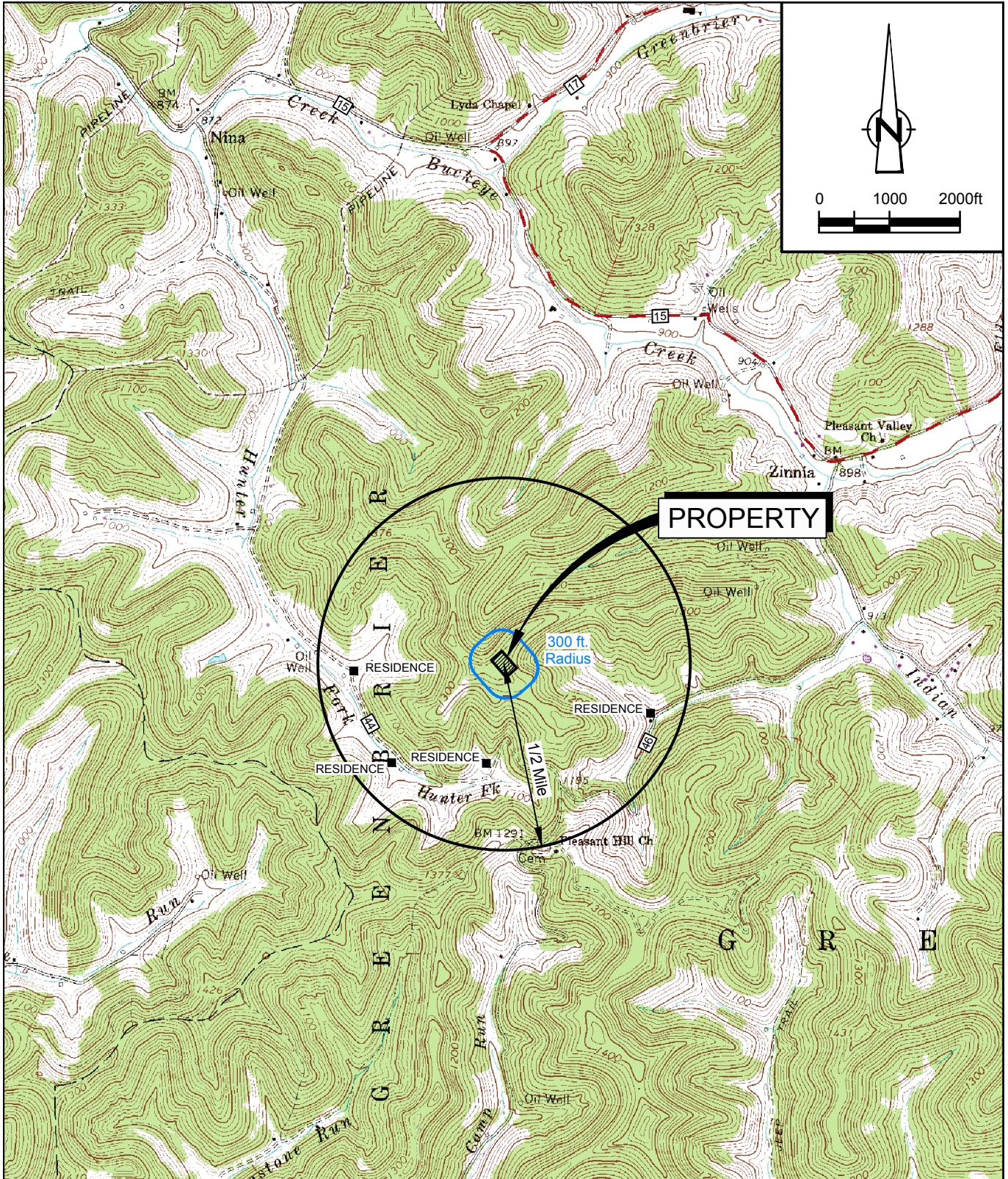
- EXISTING WELL LOCATION
- ✱ PROPOSED WELL LOCATION



Attachment F
 PLOT PLAN
 HUGHES WELL PAD
 ANTERO RESOURCES
 Doddridge County, West Virginia

Attachment G

Area Map



SOURCE: USGS QUADRANGLE MAP;
NEW MILTON AND BIG ISAAC, WEST VIRGINIA

SITE COORDINATES: LAT. 39.21939, LONG. -80.62052
SITE ELEVATION: 1330 ft AMSL



Attachment G
AREA MAP
HUGHES WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

Attachment H

G70-C Section Applicability Form

ATTACHMENT H – G70-C SECTION APPLICABILITY FORM

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

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

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

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

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

Attachment I

Emission Units/ ERD Table

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

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

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/Modified	Manufac. Date ³	Design Capacity	Type ⁴ and Date of Change	Control Device(s) ⁵	ERD (s) ⁶
GPU001 through GPU012	EP-GPU001 through EP-GPU012	Gas Production Unit Heater	2014		1 MMBtu/hr per GPU	Existing	N/A	
LH001 through LH012	EP-LH001 through EP-LH012	Line Heater	2016		2.0 MMBtu/hr per Line Heater	New	N/A	
F001	F001	Fugitives	2014		N/A	Existing	N/A	
TANK001 through TANK010	EP-TANK001-010	Condensate and Produced Water Tank F/W/B	2014		400 bbl each	Removal	TANK001-010	
TANKCOND001 through TANKCOND008	EP-EC001, EP-EC002, EP-EC003	Condensate Tank F/W/B	2014		400 bbl each	New	EC001, EC002, EC003	
TANKPW001 through TANKPW002	EP-EC001, EP-EC002, EP-EC003	PW Tank F/W/B	2014		400 bbl each	New	EC001, EC002, EC003	
L001	EP-L001	Loading (Condensate)	2014		10080 gal/hr 766500 gal/yr	Existing	N/A	
L002	EP-L002	Loading (Produced Water)	2014		10080 gal/hr 7665000 gal/yr	Existing	N/A	
HR001	EP-HR001	Haul Truck	2014		40 ton capacity	Existing	N/A	
EC001	EP-EC001	Enclosed Combustor	2016		12 MMBtu/hr	New	N/A	
EC002	EP-EC002	Enclosed Combustor	2016		12 MMBtu/hr	New	N/A	
EC003	EP-EC003	Enclosed Combustor	2016		12 MMBtu/hr	New	N/A	
PCV	EP-PCV	Pneumatic CV	2014		6.6 scf/day/PCV	Existing	N/A	

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S, ... or other appropriate designation.

² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

³ When required by rule.

⁴ New, modification, removal, existing.

⁵ For Control Devices use the following numbering system: 1C, 2C, 3C, ... or other appropriate designation.

⁶ For ERDs use the following numbering system: 1D, 2D, 3D, ... or other appropriate designation.

Attachment J

Fugitive Emissions Summary Sheet

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

Sources of fugitive emissions may include loading operations, equipment leaks, blowdown emissions , etc.

Use extra pages for each associated source or equipment if necessary.

Source/Equipment:

Leak Detection Method Used		<input type="checkbox"/> Audible, visual, and	<input checked="" type="checkbox"/> Infrared (FLIR) cameras	<input type="checkbox"/> Other (please describe)	<input type="checkbox"/> None required		
Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO2e)
Valves	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	600	EPA	gas	4.97	0.59	391.94
Valves	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	624	EPA	liquid	14.69	0.85	2.91
Connections (Not sampling)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	708	EPA	gas	0.26	3.10E-02	20.55
Flanges	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	156	EPA	gas	0.11	1.33E-02	8.83
Loading	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	2	EPA	gas	0.21	2.95E-03	0.49

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

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

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

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

Attachment K

Gas Well Affected Facility Data Sheet

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

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

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device
47017062780000	07/01/2014	05/01/2014	Green
47017062790000	06/17/2014	05/01/2014	Green
47017062800000	06/26/2017	05/01/2014	Green
47017063780000	05/01/2017	05/01/2017	Green
47017063790000	05/01/2017	05/01/2017	Green
47017063800000	05/01/2017	05/01/2017	Green
Six wells not permitted yet			

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

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

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

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

Where,

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

Attachment L

Storage Vessel Data Sheet

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

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

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name: Tanks	2. Tank Name: Condensate Tank 001-008
3. Emission Unit ID number: TANKCOND001-008	4. Emission Point ID number: EP-EC001, EP-EC002, EP-EC003

5. Date Installed, Modified or Relocated (for existing tanks) 2014	6. Type of change:
Was the tank manufactured after August 23, 2011? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> New construction <input type="checkbox"/> New stored material <input type="checkbox"/> Other <input type="checkbox"/> Relocation

7A. Description of Tank Modification (if applicable)
7B. Will more than one material be stored in this tank? If so, a separate form must be completed for each material. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

7C. Was USEPA Tanks simulation software utilized? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
--

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

TANK INFORMATION

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400bbbls

9A. Tank Internal Diameter (ft): 12	9B. Tank Internal Height (or Length) (ft): 20
10A. Maximum Liquid Height (ft): 18	10B. Average Liquid Height (ft): 10
11A. Maximum Vapor Space Height (ft): 18	11B. Average Vapor Space Height (ft): 10

12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.: 400bbbls

13A. Maximum annual throughput (gal/yr): 766500	13B. Maximum daily throughput (gal/day): 2100
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14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 6	15. Maximum tank fill rate (gal/min): 168
--	---

16. Tank fill method <input type="checkbox"/> Submerged <input checked="" type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading
--

17. Is the tank system a variable vapor space system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

If yes, (A) What is the volume expansion capacity of the system (gal)?
(B) What are the number of transfers into the system per year?

18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical <input type="checkbox"/> horizontal <input checked="" type="checkbox"/> flat roof <input type="checkbox"/> cone roof <input type="checkbox"/> dome roof <input type="checkbox"/> other (describe) <input type="checkbox"/> External Floating Roof <input type="checkbox"/> pontoon roof <input type="checkbox"/> double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof <input type="checkbox"/> vertical column support <input type="checkbox"/> self-supporting <input type="checkbox"/> Variable Vapor Space <input type="checkbox"/> lifter roof <input type="checkbox"/> diaphragm <input type="checkbox"/> Pressurized <input type="checkbox"/> spherical <input type="checkbox"/> cylindrical <input type="checkbox"/> other
--

ATTACHMENT L – STORAGE VESSEL DATA SHEET

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

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

Complete appropriate Air Pollution Control Device Sheet

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

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emission Loss		Estimation Method
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	

Please see Table 6 and Table 7

TANK CONSTRUCTION & OPERATION INFORMATION

21. Tank Shell Construction:

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

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

- No Rust Light Rust Dense Rust Not applicable

22A. Is the tank beated? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
---	-------------------------------------	--

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

Must be listed for tanks using VRUs with closed vent system

24. Is the tank a Vertical Fixed Roof Tank? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	24A. If yes, for dome roof provide radius (ft): NA	24B. If yes, for cone roof, provide slop (ft/ft): NA
--	--	--

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type:	<input type="checkbox"/> Metallic (mechanical) shoe seal	<input type="checkbox"/> Liquid mounted resilient seal
	<input type="checkbox"/> Vapor mounted resilient seal	<input type="checkbox"/> Other (describe):

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

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

- Shoe Rim Other (describe)

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

25F. Describe deck fittings

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

26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	26B. For bolted decks, provide deck construction
--	--

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

26D. Deck seam length (ft)	26E. Area of deck (ft ²)	26F. For column supported tanks: Number of columns:	26G. For column supported tanks, Diameter of each column:
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27. Closed Vent System with VRU Yes No

28. Closed Vent System with Enclosed Combustor? Yes No

ATTACHMENT L – STORAGE VESSEL DATA SHEET

SITE INFORMATION

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

LIQUID INFORMATION

36. Average daily temperature range of bulk liquid (F):	65.08	36A. Minimum (°F):	46.56	36B. Maximum (°F)	75.94
37. Average operating pressure range of tank (psig):	0	37A. Minimum (psig)	0	37B. Maximum (psig)	0
38A. Minimum Liquid Surface Temperature (°F)	46.56	38B. Corresponding Vapor Pressure (psia)	0.8145		
39A. Average Liquid Surface Temperature (°F)	65.08	39B. Corresponding Vapor Pressure (psia)	1.2499		
40A. Maximum Liquid Surface Temperature (°F)	75.94	40B. Corresponding Vapor Pressure (psia)	1.5850		

41. Provide the following for each liquid or gas to be stored in tank. Add additional pages if necessary.

41A. Material Name or Composition	Condensate		
41B. CAS Number	mix of HC		
41C. Liquid Density (lb/gal)	6.0500		
41D. Liquid Molecular Weight (lb/lb-mole)	113.20		
41E. Vapor Molecular Weight (lb/lb-mole)	42.5300		
Maximum Vapor Pressure	1.5850		
41F. True (psia)			
41G. Reid (psia)	2.51		
Months Storage per Year	year round		
41H. From - To			

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

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

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name Tanks	2. Tank Name: Produced Water Tank 001-002
3. Emission Unit ID number: TANKPW001-002	4. Emission Point ID number. EP-EC001, EP-EC002, EP-EC003
5. Date Installed , Modified or Relocated (for existing tanks) 2014 Was the tank manufactured after August 23, 2011? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	6. Type of change: <input checked="" type="checkbox"/> New construction <input type="checkbox"/> New stored material <input type="checkbox"/> Other <input type="checkbox"/> Relocation
7A. Description of Tank Modification (if applicable)	
7B. Will more than one material be stored in this tank? If so, a separate form must be completed for each material. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7C. Was USEPA Tanks simulation software utilized? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If Yes, please provide the appropriate documentation and items 8-42 below are not required.</i>	

TANK INFORMATION

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

ATTACHMENT L – STORAGE VESSEL DATA SHEET

SITE INFORMATION			
29. Provide the city and state on which the data in this section are based.: West Union, WV			
30. Daily Average Ambient Temperature (°F):	65.08	31. Annual Average Maximum Temperature (°F):	75.94
32. Annual Average Minimum Temperature (°F):	46.56	33. Average Wind Speed (miles/hr): 5.9mph	
34. Annual Average Solar Insulation Factor (BTU/(ft ² .day))	1030.236	35. Atmospheric Pressure (psia): 14.8 (based off local conditions, could not find annual)	
LIQUID INFORMATION			
36. Average daily temperature range of bulk liquid (F):	65.08	36A. Minimum (°F):	46.56
		36B. Maximum (°F)	75.94
37. Average operating pressure range of tank (psig):	0	37A. Minimum (psig)	0
		37B. Maximum (psig)	0
38A. Minimum Liquid Surface Temperature (°F)	46.56	38B. Corresponding Vapor Pressure (psia)	0.2243
39A. Average Liquid Surface Temperature (°F)	65.08	39B. Corresponding Vapor Pressure (psia)	0.3714
40A. Maximum Liquid Surface Temperature (°F)	75.94	40B. Corresponding Vapor Pressure (psia)	0.4914
41. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
41A. Material Name or Composition	Produced Water		
41B. CAS Number	mix of HC and water		
41C. Liquid Density (lb/gal)	8.3300		
41D. Liquid Molecular Weight (lb/lb-mole)	18.02		
41E. Vapor Molecular Weight (lb/lb-mole)	18.4232		
Maximum Vapor Pressure	0.4914		
41F. True (psia)			
41G. Reid (psia)	1.0215		
Months Storage per Year	year round		
41H. From - To			

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

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

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

Emission Unit ID#	Emission Point ID#	Emission Unit Description (Manufacturer, model#)	Year Installed/Modified	Type and Date of Change	Maximum Design Heat Input (MMBTU/hr)	Fuel Heating Value (BTU/scf)
GPU001	EP-GPU001	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU002	EP-GPU002	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU003	EP-GPU003	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU004	EP-GPU004	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU005	EP-GPU005	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU006	EP-GPU006	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU007	EP-GPU007	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU008	EP-GPU008	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU009	EP-GPU009	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU010	EP-GPU010	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU011	EP-GPU011	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU012	EP-GPU012	Gas Production Unit Heater	2014	New	1	1247.06
LH001	EP-LH001	Line Heater	2016	New	2	1247.06
LH002	EP-LH002	Line Heater	2016	New	2	1247.06
LH003	EP-LH003	Line Heater	2016	New	2	1247.06
LH004	EP-LH004	Line Heater	2016	New	2	1247.06
LH005	EP-LH005	Line Heater	2016	New	2	1247.06
LH006	EP-LH006	Line Heater	2016	New	2	1247.06
LH007	EP-LH007	Line Heater	2016	New	2	1247.06
LH008	EP-LH008	Line Heater	2016	New	2	1247.06
LH009	EP-LH009	Line Heater	2016	New	2	1247.06
LH010	EP-LH010	Line Heater	2016	New	2	1247.06
LH011	EP-LH011	Line Heater	2016	New	2	1247.06
LH012	EP-LH012	Line Heater	2016	New	2	1247.06

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

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

3. New, modification, removal.

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

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

Attachment O

Tanker Truck Loading Data Sheet

ATTACHMENT O – TANKER TRUCK LOADING DATA SHEET

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

Truck Loadout Collection Efficiencies

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

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

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

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

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

Loading Area Data

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

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

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

Provide description of closed vent system and any bypasses

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

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

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

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

Bulk Liquid Data (use extra pages as necessary)

Liquid Name	Condensate	Produced Water	
Max. Daily Throughput (1000 gal/day)	2.10	21.00	
Max. Annual Throughput (1000 gal/yr)	766.50	7665.00	
Loading Method	BF	BF	
Max. Fill Rate (gal/min)	168	168	
Average Fill Time (min/loading)	50	50	
Max. Bulk Liquid Temperature (F)	65.1	65.1	
True Vapor Pressure	1.2	0.4	
Cargo Vessel Condition	U	U	
Control Equipment or Method	None	None	
Max. Collection Efficiency (%)	0	0	
Max. Control Efficiency (%)	0	0	
Max VOC Emission Rate	Loading (lb/hr)	5.4170	0.0014
	Annual (ton/yr)	0.2060	0.0005
Max HAP Emission Rate	Loading (lb/hr)	0.0776	4.03E-07
	Annual (ton/yr)	0.0030	1.53E-07
Estimation Method	Promax	Promax	

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

Attachment R
Air Pollution Control Device – Emission
Reduction Device Sheets

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

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

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

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

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

VAPOR COMBUSTION (Including Enclosed Combustors)

General Information

Control Device ID#:	EC001-003	Installation Date: <input checked="" type="checkbox"/> New <input type="checkbox"/> Modified <input type="checkbox"/> Relocated	
Maximum Rated Total Flow Capacity 5458 scfh	131000 scfd	Maximum Design Heating Input (from mfg. spec sheet) 12.0 MMBTU/hr	Design Heat Content 2300 BTU/scf

Control Device Information

Type of Vapor Combustion Control?

- Enclosed Combustion Device
 Elevated Flare
 Ground Flare
 Thermal Oxidizer

Manufacturer: Cimarron	Hours of operation per year?	8760
Model: 48" HV ECD		

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# NA)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
TANKCOND001-008	Condensate Tanks		
TANKPW001-002	Produced Water Tanks		

If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.

Assist Type (Flares only) <input type="checkbox"/> Steam <input type="checkbox"/> Air <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Non	Flare height 25 feet	Tip Diameter 3.33 feet	Was the design per §60.18? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Provide determination
---	-----------------------------	-------------------------------	--

Waste Gas Information

Maximum Waste Gas Flow Rate 10.20 (scfm)	Heat Value of Waste Gas Stream 2,128.17 BTU/ft ³	Exit Velocity of the Emission Stream 0.0195 (ft/s)
---	--	---

Please see Attachment S, Tables 6 & 7 for VOC composition/ characteristics of the waste gas stream to be burned.

Pilot Gas Information

Number of Pilot Lights 3	Fuel Flow Rate to Pilot Flame per Pilot 12.6 scfh	Heat Input per Pilot 12800 BTU/hr	Will automatic re-ignition be used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
---------------------------------	--	--	--

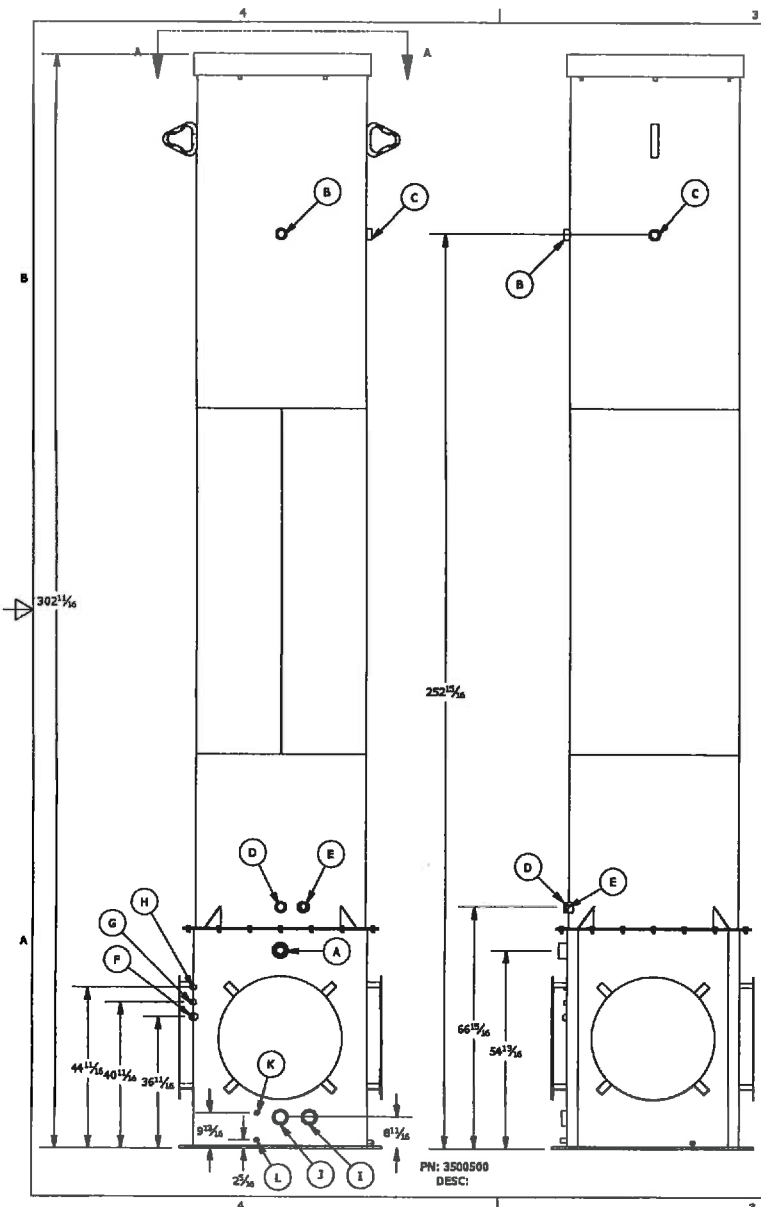
If automatic re-ignition is used, please describe the method. Flame Rectification, a thermocouple equivalent

Is pilot flame equipped with a monitor to detect the presence of the flame? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If Yes, What type? <input checked="" type="checkbox"/> Thermocouple <input type="checkbox"/> Infrared <input type="checkbox"/> Ultraviolet <input type="checkbox"/> Camera <input type="checkbox"/> Other:
--	--

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).*

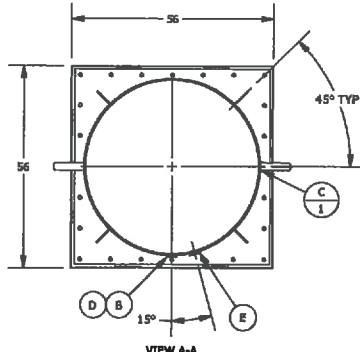
Additional information attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Manufacturer's specs sheet
--	----------------------------

Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11 (b) and performance testing.



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

- * >98% TVOC DRE, CERTIFIED USEPA 40 CFR 60, APPENDIX A, SOURCE EMISSIONS TEST METHODS REFERENCED. MEETS ALL EPA & CDPHE REGULATIONS.
- * DESTROYS OIL/CONDENSATE PRODUCTION TANK VAPORS W/ NO VISIBLE FLAME.
- * EXCELLENT OPACITY AND SMOKELESS OPERATION.
- * RELIABLE AND CUSTOMIZABLE IGNITION.
- * VERY LOW CAPITAL AND OPERATING COST.
- * EASY TO OPERATE AND MAINTAIN.
- * FIELD TESTED TO DESTROY UP TO 119.5 MDSCFD (131 MCFD) @ 10 oz/in²; 2300 BTU/CF WASTE GAS (SG 1.45)
- * STRUCTURE CERTIFIED FOR 90 MPH 3-SEC WIND GUST PER ASCE 7-05 & IBC 2006 STANDARDS. HIGHER WIND LOAD RATED STRUCTURES AVAILABLE.



PN: 3500500
DESC:

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

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

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

CIMARRON
Energy Inc.

TITLE:
48" HIGH VOLLUME BCD

DATE: _____ WO No.: _____ SHEET: 1 OF 1

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

Attachment S

Emissions Calculations

Table 1

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

Oil and Gas Site General Information

Administrative Information	
Company Name	Antero Resources Corporation
Facility/Well Name	Hughes Well Pad
Nearest City/Town	Salem
API Number/SIC Code	1311
Latitude/Longitude	39.21939, -80.62052
County	Doddridge County

Technical Information	
Max Condensate Site Throughput (bbl/day):	50
Max Produced Water Site Throughput (bbl/day):	500
Are there any sour gas streams at this site?	No
Is this site currently operational/producing?	Yes

Equipment/Processes at Site	
Equipment/Process Types	How many for this site?
Fugitives	12
Gas Production Unit Heaters	12
Line Heaters	12
Condensate Tanks	8
Produced Water Tanks	2
Loading Jobs	2
Enclosed Combustors	3

Table 2

Uncontrolled/Controlled Emissions Summary
 Hughes Well Pad
 Doddridge County, West Virginia
 Antero Resources Corporation

Emission Source	VOC		NO _x		CO _{2e}		CO		SO ₂		PM _{2.5}		PM ₁₀		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)		
UNCONTROLLED (Fugitives, Storage Tanks, Engine, Gas Production Unit Heaters, Line Heaters)																										
Fugitive Emissions (Component Count, PCV and Hauling) ¹	4.6767	20.4837			104.987	459.84								1.8646	0.4735			0.3515	1.5394	0.0015	0.0068	7.24E-02	3.17E-01			
Flashing, Working and Breathing (F/W/B) Losses ²	45.7038	200.1827			172.9063	757.3296												8.2586	36.1727	0.0009	0.0039	0.0215	0.0940			
Gas Production Unit Heater Emissions ³	0.0529	0.2318	0.9623	4.2147	1,154.72	5,057.66	0.8083	3.5404	0.0058	0.0253	0.0731	0.3203	0.0731	0.3203	4.81E-06	2.11E-05	0.018	0.079	2.02E-05	8.85E-05					0.0007	0.0032
Line Heater Emissions ³	0.1058	0.4636	1.9245	8.4294	2,309.43	10,115.31	1.6166	7.0807	0.0115	0.0506	0.1463	0.6406	0.1463	0.6406	9.62E-06	4.21E-05	0.036	0.159	4.04E-05	1.77E-04					0.0014	0.0063
TOTALS:	50.5392	221.3619	2.8868	12.6441	3742.0410	16390.1395	2.4249	10.6211	0.0173	0.0759	0.2194	0.9610	2.0840	1.4344	1.44E-05	6.32E-05	8.6644	37.9502	0.0025	0.0110	0.0939	0.4111	0.0022	0.0095		
TOTALS (Excluding Fugitives):	45.8626	200.8781	2.8868	12.6441	3637.0540	15930.2964	2.4249	10.6211	0.0173	0.0759	0.2194	0.9610	2.0840	1.4344	1.44E-05	6.32E-05	8.3130	36.4108	0.0010	0.0042	0.0215	0.0940	0.0022	0.0095		

UNCONTROLLED (Truck Loading Emissions)

Truck Loading Emissions ⁴	5.4184	0.2065			5.4280	0.4864												0.0776	2.95E-03	0.0000	2.66E-07	0.0007	2.83E-05		
--------------------------------------	--------	--------	--	--	--------	--------	--	--	--	--	--	--	--	--	--	--	--	--------	----------	--------	----------	--------	----------	--	--

CONTROLLED EMISSIONS

Enclosed Combustor Emissions (from F/W/B losses) ⁵	0.9143	4.0046	0.0650	0.2845	198.0880	867.6253	0.0546	0.2390	2.27E-05	0.0001	0.0037	0.0162	0.0049	0.0216	3.25E-07	1.42E-06	0.1652	0.7238	0.0000	0.0001	0.0004	0.0019	2.84E-06	1.24E-05		
Controlled Fugitive Emissions from Hauling													0.9323	0.2367												
TOTALS:	0.914	4.005	0.065	0.285	198.088	867.625	0.055	0.239	2.27E-05	9.93E-05	0.004	0.016	0.937	0.258	3.25E-07	1.42E-06	0.165	0.724	1.81E-05	7.92E-05	0.000	0.002	2.84E-06	1.24E-05		

POTENTIAL TO EMIT⁶	5.7497	25.3902	2.9517	12.9287	3767.2226	16500.9216	2.4795	10.8601	0.0173	0.0760	0.2231	0.9772	1.1567	1.2193	1.48E-05	6.46E-05	0.5710	2.5041	0.0016	0.0071	0.0728	0.3190	0.0022	0.0095		
POTENTIAL TO EMIT (Excluding Fugitives)	1.0731	4.7000	2.9517	12.9287	3662.2356	16040.5921	2.4795	10.8601	0.0173	0.0760	0.2231	0.9772	0.2243	0.9826	1.48E-05	6.46E-05	0.2196	0.9618	0.0001	0.0003	0.0004	0.0019	0.0022	0.0095		

Enter any notes here:

- 1 - See Tables 4 and 5 for fugitive emission calculations; Table 12 for PM emissions from hauling.
- 2 - See Tables 6 and 7 for tanks emission calculations
- 3 - See Table 9 for gas production unit heater and line heater emission calculations
- 4 - The maximum emission was calculated based on tank truck capacity of 200 barrels and actual fill rate of 50 minutes per tank truck. At a production rate of 50 barrels per day, VOC emissions would be 5.4184 pounds per hour when there are truck loading activities. Average hourly VOC emissions from truck loading is 0.0471 pound per hour.
- 5 - See Table 10 and 11 for enclosed combustion emission calculations.
- 6 - The hourly potential to emit is the sum of emissions from gas production unit heaters, line heaters, storage tanks, enclosed combustors, and fugitives. Does not include emissions from loading (see footnote 5). The total TPY PTE is the sum of all emissions. PM 10 TPY is the sum of uncontrolled hauling and other PM10 sources.

Table 3

**Permits Summary
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation**

Pollutant		Emissions		Threshold Exceeded?		
		Uncontrolled	Controlled	Threshold	Uncontrolled	Controlled
VOC	lbs/hr	50.5392	5.7497	6	Yes	
	tons/yr	221.5683	25.3902	10	Yes	Yes
NO _x	lbs/hr	2.8868	2.9517	6		
	tons/yr	12.6441	12.9287	10	Yes	Yes
CO	lbs/hr	2.4249	2.4795	6		
	tons/yr	10.6211	10.8601	10	Yes	Yes
SO ₂	lbs/hr	0.0173	0.0173	6		
	tons/yr	0.0759	0.0760	10		
PM _{2.5}	lbs/hr	0.2194	0.2231	6		
	tons/yr	0.9610	0.9772	10		
PM ₁₀	lbs/hr	2.0840	1.1567	6		
	tons/yr	1.4344	1.2193	10		
Lead	lbs/hr	1.44E-05	1.48E-05	6		
	tons/yr	6.32E-05	6.46E-05	10		
Total HAPs	lbs/hr	8.6644	0.5710	2	Yes	
	tons/yr	37.9531	2.5041	5	Yes	
Total TAPs	lbs/hr	0.0047	0.0038	1.14		
n-Hexane	lbs/hr	8.5065	0.4511			
	tons/yr	37.2613	1.9787			
Toluene	lbs/hr	0.0210	0.0143			
	tons/yr	0.0919	0.0627			
Ethylbenzene	lbs/hr	0.0384	0.0290			
	tons/yr	0.1681	0.1269			
Xylenes	lbs/hr	0.0939	0.0728			
	tons/yr	0.4111	0.3190			
Benzene	lbs/hr	0.0025	0.0016			
	tons/yr	0.0110	0.0071			

Enter any notes here:	<p>1. Emissions are based on 98% Enclosed Combustor DRE operating 100% of the time.</p> <p>2. Please see Attachment J - Fugitive Emissions Data Summary Sheet and Attachment T - Emission Points Summary Sheet for sitewide sources and breakdown of emission quantities.</p>
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Table 4

Fugitive Emissions
Hughes 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	0.191
	Benzene frac	0.000
	Toluene	0.000
	Ethylbenzene	0.000
	Xylenes	0.000
	n-Hexane	0.023
	HAPs	0.023
	Methane	0.603

Gas					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
600	Valves	Gas VOC	0.004500	0.52	9,936.91
		Non VOC	0.004500	2.18	42,097.49
		HAPs	0.004500	0.06	1,181.83
		CO2e	0.004500	40.67	783,875.34
708	Connectors	VOC	0.000200	0.03	521.14
		Non-VOC	0.000200	0.11	2,207.78
		HAPs	0.000200	0.00	61.98
		CO2e	0.000200	2.13	41,109.91
156	Flanges	VOC	0.000390	0.01	223.91
		Non-VOC	0.000390	0.05	948.60
		HAPs	0.000390	0.00	26.63
		CO2e	0.000390	0.916528	17663.324363
Total VOCs:				0.55	10681.96
Total THC:				2.90	55935.82

Light Liquid Weight Fraction From Analysis:	VOC frac	0.977
	Benzene frac	0.000
	Toluene	0.004
	Ethylbenzene	0.008
	Xylenes	0.021
	n-hexane	0.023
	HAPs	0.057
	Methane	0.008

Light Liquid					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
624	Valves	Light Liquid VOC	0.002500	1.52	29,382.89
		Light Liquid Non-VOC	0.002500	0.04	681.43
		Light Liquid HAPs	0.002500	0.09	1,701.04
		CO2e	0.002500	0.30	5823.58
Total VOC:				1.52	29,382.89
Total THC:				1.56	30,064.32

Fugitive Total Emissions			
	Annual Emissions (lb/yr)	Annual Emissions (lb/hr)	Annual Emissions (tpy)
VOC	40,064.85	4.57	20.03
Ethylbenzene		0.03	0.13
Toluene		0.01	0.06
Xylenes		0.07	0.32
n-Hexane		0.22	0.97
TAPs (Benzene)		0.00	0.01
HAPs		0.34	1.49
CO _{2e}	848,472.15	96.86	424.24

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

Table 5

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

Number of PCVs	36
Bleed Rate (scf/day/PCV)	6.6
Total Bleed Rate (scf/day)	237.6

Component	Mol%	Molecular Weight (lb/lb-mole)	Component Flow (scf/day)	Component Moles (lb-moles)	Component Emissions		
					(lbs/day)	(lbs/hr)	(tons/year)
H2S	0.00E+00	34.08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.4946	14.01	1.1751696	3.10E-03	0.04	1.81E-03	0.01
Carbon Dioxide	0.1467	44.01	0.3485592	9.19E-04	0.04	1.68E-03	7.38E-03
Methane	77.6927	16.04	184.5978552	0.49	7.80	0.33	1.42
Ethane	14.1987	30.07	33.7361112	0.09	2.67	0.11	0.49
Propane	4.4938	44.1	10.6772688	0.03	1.24	0.05	0.23
Isobutane	0.5666	58.12	1.3462416	3.55E-03	0.21	0.01	0.04
n-Butane	1.1838	58.12	2.8127088	7.41E-03	0.43	0.02	0.08
Isopentane	0.3749	72.15	0.8907624	2.35E-03	0.17	7.06E-03	0.03
n-Pentane	0.2914	72.15	0.6923664	1.82E-03	0.13	5.48E-03	0.02
2-Methylpentane	0.00E+00	86.18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3-Methylpentane	0.00E+00	86.18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.5451	86.18	1.2951576	3.41E-03	0.29	0.01	0.05
Methylcyclopentane	0.00E+00	84.16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	0.00E+00	78.11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylhexane	0.00E+00	100.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3-Methylhexane	0.00E+00	100.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heptane	0.00E+00	100.21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methylcyclohexane	0.00E+00	98.186	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	92.14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Octane	0.00E+00	114.23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	0.00E+00	106.17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m & p-Xylene	0.00E+00	106.16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	0.00E+00	106.16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nonane	0.00E+00	128.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C10+	0.00E+00	174.28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

	lb/hr	tpy
VOC Emissions	0.1030	0.4513
Benzene Emissions	0.00E+00	0.00E+00
Toluene Emissions	0.00E+00	0.00E+00
Ethylbenzene Emissions	0.00E+00	0.00E+00
Xylene Emissions	0.00E+00	0.00E+00
n-Hexane Emissions	0.0123	0.0537
HAPs Emissions	0.0123	0.0537
TAPs Emissions	0.00E+00	0.00E+00
CO _{2e} emissions	8.1294	35.6070

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

Table 6

**Uncontrolled Flashing Emissions
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation**

# Hours Operational	8760
---------------------	------

	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	0.0887	0.0506	0.2214	2.6436	0.0749	0.3281
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0348	0.0198	0.0868	0.3392	0.0096	0.0421
Carbon Dioxide	0.1638	0.0934	0.4090	2.6428	0.0749	0.3280
Methane	9.0342	5.1515	22.5636	57.8126	1.6382	7.1752
Ethane	17.3869	9.9144	43.4250	21.2534	0.6022	2.6378
Propane	22.5753	12.8729	56.3835	10.4802	0.2970	1.3007
Isobutane	6.3836	3.6401	15.9436	0.5929	0.0168	0.0736
n-Butane	15.5653	8.8757	38.8754	2.5654	0.0727	0.3184
Isopentane	7.6044	4.3362	18.9926	0.6658	0.0189	0.0826
n-Pentane	6.1818	3.5250	15.4396	0.5011	0.0142	0.0622
2-Methylpentane	0.0374	0.0213	0.0935	0.0013	0.0000	0.0002
3-Methylpentane	0.0264	0.0150	0.0659	0.0024	0.0001	0.0003
n-Hexane	14.3099	8.1598	35.7399	0.3860	0.0109	0.0479
Methylcyclopentane	0.0057	0.0033	0.0143	0.0015	0.0000	0.0002
Benzene	0.0015	0.0008	0.0036	0.0022	0.0001	0.0003
2-Methylhexane	0.0446	0.0254	0.1114	0.0013	0.0000	0.0002
3-Methylhexane	0.0371	0.0212	0.0927	0.0011	0.0000	0.0001
Heptane	0.0718	0.0409	0.1792	0.0023	0.0001	0.0003
Methylcyclohexane	0.0442	0.0252	0.1103	0.0074	0.0002	0.0009
Toluene	0.0110	0.0063	0.0275	0.0155	0.0004	0.0019
Octane	0.1697	0.0968	0.4238	0.0032	0.0001	0.0004
Ethylbenzene	0.0155	0.0088	0.0386	0.0214	0.0006	0.0027
m & p-Xylene	0.0119	0.0068	0.0297	0.0162	0.0005	0.0020
o-Xylene	0.0225	0.0129	0.0563	0.0318	0.0009	0.0039
Nonane	0.0935	0.0533	0.2336	0.0027	0.0001	0.0003
C10+	0.0785	0.0448	0.1961	0.0063	0.0002	0.0008
Total VOCs	73.292	41.79	183.1	15.308	0.4338	1.8999
Total CO _{2e}		128.88	564.5		41.03	179.7
Total TAPs (Benzene)		0.0008	0.0036		0.0001	0.0003
Toluene		0.0063	0.0275		0.0004	0.0019
Ethylbenzene		0.0088	0.0386		0.0006	0.0027
Xylenes		0.0196	0.0859		0.0014	0.0060
n-Hexane		8.160	35.740		0.0109	0.0479
Total HAPs		8.195	35.896		0.0134	0.0587
Total	100.00	57.02	249.8	100.00	2.834	12.41

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

Uncontrolled Working and Breathing Losses
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Condensate Tank Information	
Number of Tanks	8
Maximum Working Losses (lbs/hr)	0.9116
Maximum Breathing Losses (lbs/hr)	3.9891
# Hours Operational	8760

	Condensate Tank W/B Losses						
	Vapor Mass Fraction wt%	Working Losses		Breathing Losses		Max W/B Losses	
		lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
H2S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0019	1.72E-05	7.52E-05	0.0001	0.0003	0.0001	0.0004
Carbon Dioxide	0.2240	0.0020	0.0089	0.0089	0.0391	0.0110	0.0481
Methane	2.4064	0.0219	0.0961	0.0960	0.4205	0.1179	0.5165
Ethane	26.4080	0.2407	1.0544	1.0534	4.6141	1.2942	5.6685
Propane	28.6324	0.2610	1.1432	1.1422	5.0027	1.4032	6.1459
Isobutane	7.5588	0.0689	0.3018	0.3015	1.3207	0.3704	1.6225
n-Butane	18.3105	0.1669	0.7311	0.7304	3.1993	0.8973	3.9303
Isopentane	8.3070	0.0757	0.3317	0.3314	1.4514	0.4071	1.7831
n-Pentane	6.6392	0.0605	0.2651	0.2648	1.1600	0.3254	1.4251
2-Methylpentane	0.0387	0.0004	0.0015	0.0015	0.0068	0.0019	0.0083
3-Methylpentane	0.0272	0.0002	0.0011	0.0011	0.0048	0.0013	0.0058
n-Hexane	1.0021	0.0091	0.0400	0.0400	0.1751	0.0491	0.2151
Methylcyclopentane	0.0056	0.0001	0.0002	0.0002	0.0010	0.0003	0.0012
Benzene	0.0001	8.01E-07	0.0000	0.0000	0.0000	0.0000	0.0000
2-Methylhexane	0.0031	2.78E-05	0.0001	0.0001	0.0005	0.0001	0.0007
3-Methylhexane	0.0382	0.0003	0.0015	0.0015	0.0067	0.0019	0.0082
Heptane	0.0683	0.0006	0.0027	0.0027	0.0119	0.0033	0.0147
Methylcyclohexane	0.0419	0.0004	0.0017	0.0017	0.0073	0.0021	0.0090
Toluene	0.0015	1.33E-05	5.82E-05	0.0001	0.0003	0.0001	0.0003
Octane	0.1472	0.0013	0.0059	0.0059	0.0257	0.0072	0.0316
Ethylbenzene	0.0037	3.39E-05	1.48E-04	0.0001	0.0006	0.0002	0.0008
m & p-Xylene	0.0037	3.35E-05	1.47E-04	0.0001	0.0006	0.0002	0.0008
o-Xylene	0.0060	5.51E-05	0.0002	0.0002	0.0011	0.0003	0.0013
Nonane	0.0733	0.0007	0.0029	0.0029	0.0128	0.0036	0.0157
C10+	0.0511	4.66E-04	0.0020	0.0020	0.0089	0.0025	0.0110
Total VOCs	70.960	0.6469	2.833	2.8307	12.3983	3.4775	15.232
Total CO _{2e}		0.5505	2.4110	2.4088	10.5505	2.9592	12.961
Total TAPs (Benzene)		8.01E-07	3.51E-06	0.0000	0.0000	0.0000	0.0000
Toluene		1.33E-05	5.82E-05	0.0001	0.0003	0.0001	0.0003
Ethylbenzene		3.39E-05	1.48E-04	0.0001	0.0006	0.0002	0.0008
Xylenes		8.86E-05	0.0004	0.0004	0.0017	0.0005	0.0021
n-Hexane		0.0091	0.0400	0.0400	0.1751	0.0491	0.2151
Total HAPs		0.0093	0.0406	0.0406	0.1777	0.0498	0.2183
Total	100.00	0.9116	3.9927	3.9891	17.4723	4.9007	21.465

Table 7

Uncontrolled Working and Breathing Losses
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Produced Water Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.0358
Maximum Breathing Losses (lbs/hr)	0.0083

	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0067	2.41E-06	1.05E-05	5.57E-07	2.44E-06	2.97E-06	1.30E-05
Carbon Dioxide	3.5349	0.0013	0.0055	0.0003	0.0013	0.0016	0.0068
Methane	3.1893	0.0011	0.0050	0.0003	0.0012	0.0014	0.0062
Ethane	1.0819	0.0004	0.0017	0.0001	0.0004	0.0005	0.0021
Propane	0.1300	4.65E-05	0.0002	1.08E-05	4.71E-05	5.72E-05	0.0003
Isobutane	0.0009	3.29E-07	1.44E-06	7.62E-08	3.34E-07	4.05E-07	1.78E-06
n-Butane	0.0060	2.14E-06	9.39E-06	4.96E-07	2.17E-06	2.64E-06	1.16E-05
Isopentane	0.0004	1.39E-07	6.11E-07	3.23E-08	1.41E-07	1.72E-07	7.52E-07
n-Pentane	0.0002	7.65E-08	3.35E-07	1.77E-08	7.76E-08	9.43E-08	4.13E-07
2-Methylpentane	1.06E-07	3.77E-11	1.65E-10	8.73E-12	3.83E-11	4.65E-11	2.04E-10
3-Methylpentane	4.76E-07	1.70E-10	7.45E-10	3.94E-11	1.72E-10	2.10E-10	9.18E-10
n-Hexane	1.22E-06	4.36E-10	1.91E-09	1.01E-10	4.42E-10	5.37E-10	2.35E-09
Methylcyclopentane	6.31E-07	2.26E-10	9.89E-10	5.23E-11	2.29E-10	2.78E-10	1.22E-09
Benzene	2.91E-06	1.04E-09	4.56E-09	2.41E-10	1.05E-09	1.28E-09	5.61E-09
2-Methylhexane	1.76E-09	6.30E-13	2.76E-12	1.46E-13	6.39E-13	7.76E-13	3.40E-12
3-Methylhexane	2.29E-08	8.19E-12	3.59E-11	1.90E-12	8.30E-12	1.01E-11	4.42E-11
Heptane	3.41E-08	1.22E-11	5.33E-11	2.82E-12	1.23E-11	1.50E-11	6.57E-11
Methylcyclohexane	6.76E-07	2.42E-10	1.06E-09	5.59E-11	2.45E-10	2.98E-10	1.30E-09
Toluene	9.75E-06	3.49E-09	1.53E-08	8.07E-10	3.54E-09	4.29E-09	1.88E-08
Octane	9.24E-09	3.31E-12	1.45E-11	7.65E-13	3.35E-12	4.07E-12	1.78E-11
Ethylbenzene	7.56E-06	2.70E-09	1.18E-08	6.26E-10	2.74E-09	3.33E-09	1.46E-08
m & p-Xylene	6.41E-06	2.29E-09	1.00E-08	5.30E-10	2.32E-09	2.82E-09	1.24E-08
o-Xylene	1.31E-05	4.69E-09	2.05E-08	1.09E-09	4.75E-09	5.77E-09	2.53E-08
Nonane	3.67E-09	1.31E-12	5.74E-12	3.03E-13	1.33E-12	1.61E-12	7.07E-12
C10+	1.68E-09	6.01E-13	2.63E-12	1.39E-13	6.09E-13	7.40E-13	3.24E-12
Total VOCs	0.1376	4.92E-05	0.0002	1.14E-05	4.99E-05	6.06E-05	0.0003
Total CO _{2e}		0.0298	0.1304	0.0069	0.0302	0.0367	0.1606
Total TAPs (Benzene)		1.04E-09	4.56E-09	2.41E-10	1.05E-09	1.28E-09	5.61E-09
Toluene		3.49E-09	1.53E-08	8.07E-10	3.54E-09	4.29E-09	1.88E-08
Ethylbenzene		2.70E-09	1.18E-08	6.26E-10	2.74E-09	3.33E-09	1.46E-08
Xylenes		6.98E-09	3.06E-08	1.62E-09	7.08E-09	8.59E-09	3.76E-08
n-Hexane		4.36E-10	1.91E-09	1.01E-10	4.42E-10	5.37E-10	2.35E-09
Total HAPs		1.46E-08	6.41E-08	3.39E-09	1.48E-08	1.80E-08	7.90E-08
Total	100.00	0.0358	0.1566	0.0083	0.0362	0.0440	0.1928

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

Loading Emissions
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Annual Loading	Oil Truck Loading	Water Truck Loading
RVP	2.51	1.0215
Annual Average Temp (F)	65.076213	65.076213
S (saturation factor)	0.6	0.6
P (true vapor pressure)	1.25	0.37
M (MW of vapor)	42.53	18.42
Collection Efficiency (%)	0.00	0.00
Loading Loss (lb/10 ³ gal)*	0.76	0.10
Maximum Throughput (gallons/hr)**	10,080	10,080
Average Throughput (gallons/yr)	766,500	7,665,000
Loading Emissions (lbs/hr)	7.63	0.98
Loading Emissions (tpy)	0.29	0.37

	Condensate Tank Loading Losses			Produced Water Tank Loading Losses		
	Vapor Mass Fraction wt%	Loading Losses lbs/hr	Loading Losses tpy	Vapor Mass Fraction wt%	Loading Losses lbs/hr	Loading Losses tpy
H2S	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0019	1.44E-04	5.47E-06	0.0067	6.62E-05	2.52E-05
Carbon Dioxide	0.2240	0.0171	6.50E-04	3.5349	3.47E-02	1.32E-02
Methane	2.4064	0.1837	6.98E-03	3.1893	3.13E-02	1.19E-02
Ethane	26.4080	2.0160	0.0766	1.0819	1.06E-02	4.04E-03
Propane	28.6324	2.1858	8.31E-02	0.1300	1.28E-03	4.86E-04
Isobutane	7.5588	0.5770	2.19E-02	0.0009	9.05E-06	3.44E-06
n-Butane	18.3105	1.3978	5.31E-02	0.0060	5.89E-05	2.24E-05
Isopentane	8.3070	0.6342	2.41E-02	0.0004	3.83E-06	1.46E-06
n-Pentane	6.6392	0.5068	1.93E-02	0.0002	2.10E-06	8.00E-07
2-Methylpentane	0.0387	0.0030	1.12E-04	1.06E-07	1.04E-09	3.94E-10
3-Methylpentane	0.0272	0.0021	7.89E-05	4.76E-07	4.68E-09	1.78E-09
n-Hexane	1.0021	0.0765	2.91E-03	1.22E-06	1.20E-08	4.56E-09
Methylcyclopentane	0.0056	0.0004	1.62E-05	6.31E-07	6.21E-09	2.36E-09
Benzene	0.0001	0.0000	2.55E-07	0.0000	2.86E-08	1.09E-08
2-Methylhexane	0.0031	0.0002	8.85E-06	1.76E-09	1.73E-11	6.59E-12
3-Methylhexane	0.0382	0.0029	1.11E-04	2.29E-08	2.25E-10	8.56E-11
Heptane	0.0683	0.0052	1.98E-04	3.41E-08	3.35E-10	1.27E-10
Methylcyclohexane	0.0419	0.0032	1.22E-04	6.76E-07	6.64E-09	2.53E-09
Toluene	0.0015	0.0001	4.23E-06	0.0000	9.58E-08	3.64E-08
Octane	0.1472	0.0112	4.27E-04	9.24E-09	9.09E-11	3.45E-11
Ethylbenzene	0.0037	0.0003	1.08E-05	7.56E-06	7.43E-08	2.82E-08
m & p-Xylene	0.0037	0.0003	1.07E-05	6.41E-06	6.30E-08	2.39E-08
o-Xylene	0.0060	0.0005	1.75E-05	1.31E-05	1.29E-07	4.90E-08
Nonane	0.0733	0.0056	2.13E-04	3.67E-09	3.60E-11	1.37E-11
C10+	0.0511	0.0039	1.48E-04	1.68E-09	1.65E-11	6.28E-12
Total VOCs	70.9596	5.4170	0.2060	0.1376	1.35E-03	5.14E-04
Total CO _{2e}		4.6097	0.1753		0.8183	0.3111
Total TAPs (Benzene)		0.0000	2.55E-07		2.86E-08	1.09E-08
Toluene		0.0001	4.23E-06		9.58E-08	3.64E-08
Ethylbenzene		0.0003	1.08E-05		7.43E-08	2.82E-08
Xylenes		0.0007	2.82E-05		1.92E-07	7.29E-08
n-Hexane		0.0765	2.91E-03		1.20E-08	4.56E-09
Total HAPs		0.0776	2.95E-03		4.03E-07	1.53E-07
Total	100.0000	7.6340	0.2903	100.0000	0.9827	0.3736

Enter any notes here

Vapor mass fractions and loading losses from Promax output

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

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

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

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

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

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

Loading emissions are vented to the atmosphere.

Table 9

**Gas Production Unit Heater and Line Heater Emissions
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation**

Gas Production Unit Heater Emissions

Number of Units	12
GPU Heater Rating (MMBtu/hr)	1.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,247

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	0.962	4.215
CO	84	0.808	3.540
CO ₂	120,000	1154.716	5057.656
Lead	0.0005	4.81E-06	2.11E-05
N ₂ O	2.2	0.021	0.093
PM (Total)	7.6	0.073	0.320
SO ₂	0.6	0.006	0.025
TOC	11	0.106	0.464
Methane	2.3	0.022	0.097
VOC	5.5	0.053	0.232
HAPS			
2-Methylnaphthalene	2.40E-05	2.31E-07	1.01E-06
Benzene	2.10E-03	2.02E-05	8.85E-05
Dichlorobenzene	1.20E-03	1.15E-05	5.06E-05
Fluoranthene	3.00E-06	2.89E-08	1.26E-07
Fluorene	2.80E-06	2.69E-08	1.18E-07
Formaldehyde	7.50E-02	7.22E-04	3.16E-03
Hexane	1.80E+00	1.73E-02	7.59E-02
Naphthalene	6.10E-04	5.87E-06	2.57E-05
Phenanathrene	1.70E-05	1.64E-07	7.17E-07
Toluene	3.40E-03	3.27E-05	1.43E-04

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.159	0.695
TOTAL Uncontrolled HAPS	0.054	0.238
TOTAL Uncontrolled TAPs (Benzene)	6.06E-05	2.66E-04
TOTAL Uncontrolled Toluene	9.82E-05	4.30E-04
TOTAL Uncontrolled Hexane	5.20E-02	2.28E-01
TOTAL Uncontrolled TAPs (Formaldehyde)	2.17E-03	9.48E-03
TOTAL CO _{2e} Emissions	3,484.73	15,263.13

Enter any notes here:

All Emission Factors based off AP-42 Sec 1.4 Natural Gas Combustion

Line Heater Emissions

Number of Units	12
Line Heater Rating (MMBtu/hr)	2.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,247

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	1.925	8.429
CO	84	1.617	7.081
CO ₂	120,000	2309.432	10115.311
Lead	0.0005	9.62E-06	4.21E-05
N ₂ O	2.2	0.042	0.185
PM (Total)	7.6	0.146	0.641
SO ₂	0.6	0.012	0.051
TOC	11	0.212	0.927
Methane	2.3	0.044	0.194
VOC	5.5	0.106	0.464
HAPS			
2-Methylnaphthalene	2.40E-05	4.62E-07	2.02E-06
Benzene	2.10E-03	4.04E-05	1.77E-04
Dichlorobenzene	1.20E-03	2.31E-05	1.01E-04
Fluoranthene	3.00E-06	5.77E-08	2.53E-07
Fluorene	2.80E-06	5.39E-08	2.36E-07
Formaldehyde	7.50E-02	1.44E-03	6.32E-03
Hexane	1.80E+00	3.46E-02	1.52E-01
Naphthalene	6.10E-04	1.17E-05	5.14E-05
Phenanathrene	1.70E-05	3.27E-07	1.43E-06
Toluene	3.40E-03	6.54E-05	2.87E-04

Table 10

**Enclosed Combustor Emissions
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation**

General Information	
Unit Name:	EC001, EC002, EC003

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

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

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
H ₂ S percent destruction efficiency (%)	98

Enclosed Combustor operating hours	8760
No. of Enclosed Combustors	3

Stream Information							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed/Vapor Combustor (Enter Name of Each Stream Here)	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
Maximum Expected Hourly Volumetric Flow Rate of Stream (scf/hr)	37.8	--	508.79	58.37	43.73	0.91	649.59
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	331,128.00	--	4,457,003.74	511,294.40	383,051.27	7,944.06	5,690,421.47
Heating Content (Btu/ft3)	1,247		2,371.95	1,190.34	2,425.35	97.53	2,128.17

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
H2S	-	-	0.000	0.000	0.000	0.000	0.000
Total VOC	-	-	41.792	0.434	3.478	0.000	45.70
Benzene	-	-	0.001	0.000	0.000	0.000	0.001
Toluene	-	-	0.006	0.000	0.000	0.000	0.007
Ethylbenzene	-	-	0.009	0.001	0.000	0.000	0.010
Xylenes	-	-	0.020	0.001	0.000	0.000	0.021
n-Hexane	-	-	8.160	0.011	0.049	0.000	8.220
HAPs	-	-	8.195	0.013	0.050	0.000	8.259
Total Mass Flow	-	-	57.022	2.834	4.901	0.044	64.800
Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)							
H2S	-	-	0.000	0.000	0.000	0.000	0.000
Total VOC	-	-	183.051	1.900	15.232	0.000	200.183
Benzene	-	-	0.004	0.000	0.000	0.000	0.004
Toluene	-	-	0.028	0.002	0.000	0.000	0.030
Ethylbenzene	-	-	0.039	0.003	0.001	0.000	0.042
Xylenes	-	-	0.086	0.006	0.002	0.000	0.094
n-Hexane	-	-	35.740	0.048	0.215	0.000	36.003
HAP	-	-	35.896	0.059	0.218	0.000	36.173
Total Mass Flow	-	-	249.757	12.411	21.465	0.193	283.826

Table 10

**Enclosed Combustor Emissions
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation**

Controlled Emissions							
Hourly (lb/hr)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
NOx	0.004	-	0.051	0.006	0.004	0.000	0.06
CO	0.003	-	0.043	0.005	0.004	0.000	0.05
PM2.5	0.000	-	0.003	0.000	0.000	0.000	0.00
PM10	0.000	-	0.004	0.000	0.000	0.000	0.00
H2S	0.000	-	0.000	0.000	0.000	0.000	0.00
SO ₂	0.000	-	0.000	0.000	0.000	0.000	0.00
CO ₂	4.536	-	-	-	-	-	4.54
Total VOC	0.000	-	0.836	0.009	0.070	0.000	0.91
Benzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.000	0.000	0.000	0.000	0.00
Ethylbenzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.000	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.163	0.000	0.001	0.000	0.16
HAP	0.000	-	0.164	0.000	0.001	0.000	0.17
N ₂ O	0.000	-	0.001	0.000	0.000	0.000	0.00
Lead	0.000	-	0.000	0.000	0.000	0.000	0.00
Formaldehyde	0.000	-	-	-	-	-	0.00
Annual (tpy)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
NOx	0.017	-	0.223	0.026	0.019	0.000	0.28
CO	0.014	-	0.187	0.021	0.016	0.000	0.24
PM2.5	0.001	-	0.013	0.001	0.001	0.000	0.02
PM10	0.001	-	0.017	0.002	0.001	0.000	0.02
H ₂ S	0.000	-	0.000	0.000	0.000	0.000	0.00
SO ₂	0.000	-	0.000	0.000	0.000	0.000	0.00
CO ₂	19.868	-	-	-	-	-	19.87
Total VOC	0.001	-	3.661	0.038	0.305	0.000	4.00
Benzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.001	0.000	0.000	0.000	0.00
Ethylbenzene	0.000	-	0.001	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.002	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.715	0.001	0.004	0.000	0.72
HAP	0.000	-	0.718	0.001	0.004	0.000	0.72
N ₂ O	0.000	-	0.005	0.001	0.000	0.000	0.01
Lead	0.000	-	0.000	0.000	0.000	0.000	0.00
Formaldehyde	0.000	-	-	-	-	-	0.00

Enclosed Combustor/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total VOC	0.91	4.00
NOx	0.065	0.285
CO	0.055	0.239
PM2.5	0.004	0.016
PM10	0.005	0.022
H ₂ S	1.21E-05	5.28E-05
SO ₂	2.27E-05	9.93E-05
Benzene (TAPs)	1.81E-05	7.92E-05
Toluene	1.36E-04	0.001
Ethylbenzene	1.92E-04	0.001
Xylenes	0.000	0.002
Hexanes	0.164	0.720
Formaldehyde (TAPs)	2.84E-06	1.24E-05
HAPs	0.17	0.72
CO ₂ e	198.09	867.63
N ₂ O	0.001	0.006
Lead	3.25E-07	1.42E-06

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

Table 11

**Enclosed Combustor GHG Emissions
Hughes Well Pad
Doddridge County, West Virginia
Antero Resources Corporation**

Enclosed Combustor CO₂ and CH₄ Emissions

Components	Mole fraction of oil flash gas constituents ^a	Volume of oil flash gas sent to Enclosed Combustor scf/year	Mole fraction of water flash gas constituents ^a	Volume of water flash gas sent to Enclosed Combustor scf/year	Mole fraction of oil tank vapors constituents ^a	Volume of oil tank vapor sent to Enclosed Combustor scf/year	Mole fraction of water tank vapors constituents ^a	Volume of water tank vapors sent to Enclosed Combustor scf/year	Component volume of gas sent to Enclosed Combustor scf/year	Number of carbon atoms	Combustion Efficiency	Combusted CO ₂ Volume ^b scf/year	Uncombusted CO ₂ and CH ₄ Volume ^b scf/year	Volume GHGs Emitted scf/year
CO ₂	0.002	4,457,004	0.0124	511,294	0.0022	383,051	0.015	7,944	14,165	1	0	--	14,165	14,006,905
Methane	0.234	4,457,004	0.7423	511,294	0.0638	383,051	0.037	7,944	1,447,875	1	0.98	1,418,917	28,957	28,957
Ethane	0.240	4,457,004	0.1456	511,294	0.3735	383,051	0.007	7,944	1,288,942	2	0.98	2,526,326	--	
Propane	0.213	4,457,004	0.0489	511,294	0.2762	383,051	0.001	7,944	1,079,351	3	0.98	3,173,292	--	
i-Butane	0.046	4,457,004	0.0021	511,294	0.0553	383,051	0.000	7,944	225,779	4	0.98	885,054	--	
n-Butane	0.111	4,457,004	0.0091	511,294	0.1340	383,051	0.000	7,944	552,210	4	0.98	2,164,665	--	
Pentane	0.079	4,457,004	0.0033	511,294	0.0881	383,051	0.000	7,944	389,506	5	0.98	1,908,580	--	
Hexane	0.069	4,457,004	0.0009	511,294	0.0053	383,051	0.000	7,944	311,541	6	0.98	1,831,860	--	
Benzene	0.000	4,457,004	0.0000	511,294	0.0000	383,051	0.000	7,944	38	6	0.98	222	--	
Heptanes	0.001	4,457,004	0.0000	511,294	0.0005	383,051	0.000	7,944	3,160	7	0.98	21,676	--	
Toluene	0.000	4,457,004	0.0000	511,294	0.0000	383,051	0.000	7,944	242	7	0.98	1,660	--	
Octane	0.001	4,457,004	0.0000	511,294	0.0007	383,051	0.000	7,944	3,877	8	0.98	30,393	--	
Ethyl benzene	0.000	4,457,004	0.0000	511,294	0.0000	383,051	0.000	7,944	297	8	0.98	2,328	--	
Xylenes	0.000	4,457,004	0.0001	511,294	0.0000	383,051	0.000	7,944	663	8	0.98	5,199	--	
Nonane	0.000	4,457,004	0.0000	511,294	0.0002	383,051	0.000	7,944	1,447	9	0.98	12,764	--	
Decane plus	0.000	4,457,004	0.0000	511,294	0.0001	383,051	0.000	7,944	1,000	10	0.98	9,804	--	
Subtotal												13,992,740	--	

Pollutant	Volume Emitted scf/year	Density of GHG ^c lb/scf	Conversion Factor lb/ton	GWF	Emissions ^c	
					lbs/hr	(tons/yr)
CO ₂	14,006,905	0.12	2000	1	185.42	812.14
CH ₄	28,957	0.09	2000	25	0.31	1.35
CO₂e Emissions					193.1	845.82

GHG Emissions Summary

Notes

a Flashing/Working/Breathing Losses from ProMax output reports

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

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

Table 12

**Haul Road Emissions
Hughes 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 ¹ (%)	50	50

Tanker Truck Trip Calculation	
Condensate Production (bbl/day)	50
PW Production (bbl/day)	500
Truck Capacity (bbl)	200

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

	# of Wheels	Mean Vehicle Weight (W) (tons)	Mean Vehicle Speed (S) (mph)	Miles Per Trip (miles)	Maximum Trips per Hour	Maximum Trips per Year	Vehicle Miles Travelled		PM (lbs/VMT)	PM10 (lbs/VMT)
							(miles/hr)	(miles/year)		
Tanker Trucks Condensate	10	40	10	0.5300	1	92	0.5300	48.7600	3.8175	1.7179
Tanker Trucks PW	10	40	10	0.5300	1	913	0.5300	483.8900	3.8175	1.7179
Pick Up Truck	4	3	10	0.2800	1	730	0.2800	204.4000	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	2.0233	186.1427	0.0931	0.9105	83.7642	0.0419	1.0116	93.0714	0.0465	0.4552	41.8821	0.0209
Tanker Trucks PW	2.0233	1847.2643	0.9236	0.9105	831.2689	0.4156	1.0116	923.6321	0.4618	0.4552	415.6345	0.2078
Pick Up Truck	0.0971	70.8613	0.0354	0.0437	31.8876	0.0159	0.0485	35.4307	0.0177	0.0218	15.9438	0.0080
Total Emissions	4.1437	2,104.2684	1.0521	1.8646	946.9208	0.4735	2.0718	1,052.1342	0.5261	0.9323	473.4604	0.2367

Enter any notes here:	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 13

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

Pollutant	Potential Emissions		Previous Permit Application Emissions		Change in Emissions	
	Hourly PTE	Yearly PTE	Hourly PTE	Yearly PTE	Hourly PTE	Yearly PTE
PM	2.2962	1.5086	1.0602	0.0900	1.24E+00	1.4186
PM10	1.1567	1.2193	0.5502	0.3608	0.6065	0.8585
VOC (uncontrolled)	50.5392	221.5683	6.4146	28.1529	44.1246	193.4154
CO	2.4795	10.8601	0.8083	3.5404	1.6712	7.3197
NOx	2.9517	12.9287	0.9623	4.2147	1.9894	8.7140
SO2	0.0173	0.0760	0.0058	0.0253	1.16E-02	5.06E-02
Pb	1.48E-05	6.46E-05	0.0000	0.0000	9.89E-06	4.33E-05
HAPs	0.5710	2.5041	0.4041	1.7699	0.1669	0.7342
TAPs	0.0038	0.0166	0.0031	0.0137	6.89E-04	0.0029

Notes:

1. Change in emissions due to change in storage tanks service, increase in condensate production, and addition of 3 Cimarron enclosed combustors and 12 line heaters.
2. Change in permit from G70A to G70C.



Bryan Research & Engineering, Inc.

ProMax[®] 3.2

with
TSWEET[®] & PROSIM[®]

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Simulation Report

Client Name:	Antero Resources Corporation
Location:	West Virginia
Job:	Hughes Well Pad
Project Name:	PROMAX SCENARIO 3
File Name:	ProMax@C:\Users\ychen1\Documents\Drafts\082715- ANTERO\ProMax Report\1 HP\PROMAX SCENARIO 3.pmx
ProMax Version:	
Report Created:	7/18/2016 13:50

Names	Units	Oil	Water
Std Liquid Volumetric Flow	bb/d	45.412#	509.77#

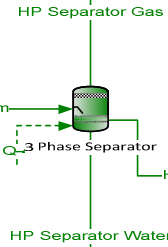
Names	Units	Gas
Std Vapor Volumetric Flow	MMSCFD	39.948#

Properties	HP Separator Gas
Pressure(Total)	198" psig
Temperature(Total)	70" °F

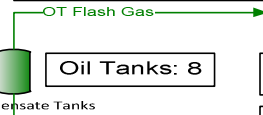
Properties	Total gas to sale
Pressure(Total)	198" psig
Temperature(Total)	°F
Std Vapor Volumetric Flow(Total)	40 MMSCFD

Stream Total gas to sale C3+ Mass Flow =7.546E+04 ton/yr

Names	Units	Sales Oil	Produced Water
Std Liquid Volumetric Flow	bb/d	50.001	500
Reid Vapor Pressure	psi	10.76	1.0215



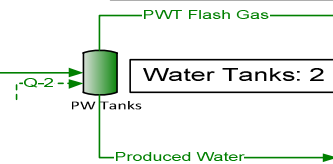
"OT Flash Gas" C3+ Mass Flow =183.1 ton/yr



Oil Tank WB
Tank loss calculations for "Sales Oil".
Total working and breathing losses from the
Vertical Cylinder are 21.47 ton/yr.

Stream Oil W/B C3+ Mass Flow =15.23 ton/yr

Stream PWT Flash Gas C3+ Mass Flow =1.9 ton/yr



Water Tank WB
Tank loss calculations for "Produced Water".
Total working and breathing losses from the Vertical
Cylinder are 0.1928 ton/yr.

Stream Water W/B C3+ Mass Flow =0.0002653 ton/yr

Process Streams	Status	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale				
Phase: Total	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water	0.181018	99.9641	0.0493572	0.204686	0.00415840	0	100	0	99.9970	3.02986	0.000119893	94.13370037	8.59525	0.181018					
H2S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen	0.493977	8.76446E-05	0.0116981	0.0516204	8.11848E-05	0.494658	0	0.013	2.92915E-06	0.250032	0.002859432	0.004429617	0.451718	0.493977					
Carbon Dioxide	0.146387	0.00102105	0.0371191	0.154790	0.00287809	0.146717	0	0.014	0.000601149	1.23990	0.016453775	1.47978156	0.133990	0.146387					
Methane	77.5919	0.0270013	5.36562	23.4243	0.110733	77.7018	0	5.372	0.00179095	74.4074	6.379595958	3.662565624	70.9596	77.5919					
Ethane	14.1776	0.00535394	5.99934	22.0520	0.746221	14.2004	0	5.517	0.000409313	14.5940	37.35186282	0.662847536	12.9722	14.1776					
Propane	4.48341	0.00181469	6.71244	21.2954	2.46895	4.49433	0	4.82	0.000152051	4.90727	27.61581153	0.054319734	4.10831	4.48341					
Isobutane	0.564384	7.36280E-05	2.09099	4.56851	1.37006	0.566666	0	1.445	2.27033E-06	0.210607	5.531036833	0.000291887	0.518731	0.564384					
n-Butane	1.17677	0.000330404	6.27036	11.1394	4.85352	1.18394	0	3.282	2.16337E-05	0.911324	13.39839566	0.00190081	1.08402	1.17677					
Isopentane	0.369879	6.76601E-05	4.74275	4.84710	0.374944	0	2.1	3.09928E-06	0.190546	4.8967636	9.95959E-05	0.344230	0.369879						
n-Pentane	0.286320	5.09021E-05	4.87669	3.56399	5.25867	0.291434	0	2.123	2.31033E-06	0.143417	3.313656252	5.46699E-05	0.267992	0.286320					
2-Methylpentane	0.00134434	1.07425E-07	0.0536125	0.0186997	0.0639551	0	1.478	2.37769E-09	0.000310040	0.0001908028	0.019089028	2.25628E-08	0.00129717	0.00134434					
3-Methylpentane	0.000941181	2.07369E-07	0.0418527	0.0127324	0.0503264	0	1.041	1.19980E-08	0.000576629	0.00013423299	0.013423299	1.01741E-07	0.000913634	0.000941181					
n-Hexane	0.058695	3.19037E-05	27.9095	6.90718	34.0210	0.545164	0	2.91	5.64050E-07	0.0924963	0.494587238	2.60691E-07	0.0500381	0.058695					
Methylcyclopentane	0.000205009	1.46180E-07	0.0120546	0.00282324	0.0147408	0	0.231	2.2752E-08	0.000364295	0.002816477	1.38227E-07	0.000202737	0.000205009						
Benzene	5.66392E-05	2.03234E-06	0.00332251	0.000777279	0.00406314	0	0.064	1.8332E-06	0.00058620	4.78476E-05	6.86425E-07	5.61696E-05	5.66392E-05						
2-Methylhexane	0.00138181	9.38844E-08	0.177660	0.0185237	0.223967	0	1.696	1.76339E-09	0.000271887	0.001294711	3.24056E-10	0.00148850	0.00138181						
3-Methylhexane	0.00114821	8.14718E-08	0.155053	0.0154003	0.195690	0	1.42	1.59813E-09	0.000235740	0.016221017	4.21115E-09	0.00124626	0.00114821						
Heptane	0.00225327	1.65018E-07	0.377996	0.0479321	0.479321	0	2.893	3.25466E-09	0.000477431	0.029010094	6.26189E-09	0.00253904	0.00225327						
Methylcyclohexane	0.00138195	5.95114E-07	0.232284	0.0187149	0.294430	0	1.775	6.47069E-08	0.00156551	0.018157873	1.26856E-07	0.00155783	0.00138195						
Toluene	0.000367350	1.01251E-05	0.0771403	0.00947656	0.0981392	0	0.495	8.95030E-06	0.00347635	0.000672669	1.95016E-06	0.000343437	0.000367350						
Octane	0.00485360	2.00309E-07	2.39000	0.0617896	3.06748	0	8.505	2.62438E-09	0.000583448	0.054823024	1.49099E-09	0.00746442	0.00485360						
Ethylbenzene	0.000465312	1.10862E-05	0.271802	0.00606173	0.349129	0	0.878	9.68288E-06	0.00415783	0.001487962	1.3118E-06	0.000770577	0.000465312						
m-Xylene	0.000358916	8.67937E-06	0.248987	0.000465219	0.320086	0	0.734	7.61216E-06	0.00315739	0.001471067	1.11209E-06	0.000644196	0.000358916						
o-Xylene	0.000681340	2.22265E-05	0.529547	0.00082934	0.681070	0	1.476	2.01397E-05	0.00617906	0.002420732	2.27548E-06	0.00129541	0.000681340						
Nonane	0.00245045	1.51474E-07	3.56542	0.00303233	4.59409	0	7.697	3.13156E-09	0.002437820	0.02431066	5.26771E-10	0.00675528	0.00245045						
C10+	0.00183998	2.91041E-07	27.7974	0.0204350	35.8802	0	42.021	1.60703E-08	0.000811562	0.013610554	1.9378E-10	0.0388798	0.00183998						
Mass Fraction	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water	0.156267	99.9577	0.00931582	0.0886503	0.000674182	0	100	0	99.9955	2.64362	5.07853E-05	92.04963085	7.47230	0.156267					
H2S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen	0.663096	0.000136277	0.00343330	0.0347648	2.04668E-05	0.663391	0	0.00320553	4.55471E-06	0.339232	0.001883432	0.00673547	0.610644	0.663096					
Carbon Dioxide	0.308711	0.00249417	0.0017148	0.163773	0.00113988	0.309119	0	0.00542333	0.00146852	2.64283	3.534922907	3.53627E-05	0.284560	0.308711					
Methane	59.6474	0.0240429	9.901821	9.03422	0.0159866	59.6762	0	7.58575	0.00159480	57.8126	3.189277294	54.9335	59.6474						
Ethane	20.4281	0.00893562	1.88996	17.3869	0.201928	20.4417	0	1.46021	0.00083169	21.2534	26.40804448	1.081855134	18.8229	20.4281					
Propane	9.47344	0.0044150	3.10103	22.5753	0.979755	9.48766	0	1.87083	0.00037167	10.4802	28.63239504	0.130013662	9.47344						
Isobutane	1.57189	0.000237529	1.27328	6.38496	1.57677	1.57189	0	0.739267	7.32499E-06	0.592858	7.588802695	0.00092086	1.45492	1.57189					
n-Butane	3.27747	0.00106590	3.81825	15.5653	2.53868	3.29435	0	1.67908	6.97953E-05	2.56337	18.31046009	0.005996761	3.04042	3.27747					
Isopentane	1.27877	0.000270952	3.58500	7.60442	3.14717	1.29507	0	1.33364	1.24142E-05	0.665832	8.306968124	0.000390038	1.19849	1.27877					
n-Pentane	0.998984	0.000203843	3.68624	6.18184	3.41440	1.00663	0	1.34825	9.25121E-06	0.501146	6.639205074	0.000214098	0.93052	0.998984					
2-Methylpentane	0.0055132	5.13833E-07	0.0490337	0.0034357	0.0495984	0	1.12111	1.13734E-08	0.00129401	0.003878652	1.05539E-07	0.00039429	0.0055132						
3-Methylpentane	0.00388652	9.91877E-07	0.0377864	0.0263782	0.0390291	0	0.789633	5.73911E-08	0.00240666	0.027198615	4.75899E-07	0.00379936	0.00388652						
n-Hexane	2.10009	0.000152600	25.1979	14.3099	26.3839	2.24910	0	2.20733	2.69807E-06	0.386050	1.002144682	2.1939E-06	2.10009						
Methylcyclopentane	0.00026760	6.82844E-07	0.0106288	0.00571219	0.0111644	0	0.17122	1.06306E-07	0.00148488	0.005573316	6.3144E-07	0.000823363	0.00026760						
Benzene	0.000212001	8.81140E-06	0.00271902	0.00145964	0.00285620	0	0.0440036	7.94980E-06	0.00226883	8.78783E-05	2.91038E-06	0.000211726	0.000212001						
2-Methylhexane	0.00663479	5.22157E-07	0.186507	0.0462267	0.201862	0	1.49587	9.80793E-09	0.00131947	0.003050376	1.76251E-09	0.00719745	0.00663479						
3-Methylhexane	0.00551315	4.53121E-07	0.162774	0.0370985	0.176464	0	1.25244	8.88873E-09	0.00114405	0.038217179	2.29041E-08	0.00602617	0.00551315						

Heptane	0.0108192	9.17781E-07	0.396819	0.0717606	0.432227	0	0	2.55162	1.81023E-08	0.00231698	0.068348608	3.40579E-08	0.0122773	0.0108192	
Methylcyclohexane	0.00650197	3.24326E-06	0.238945	0.0441763	0.260160	0	0	1.53405	3.52657E-07	0.00744459	0.041919802	6.76078E-07	0.00738116	0.00650197	
Toluene	0.00162190	5.17813E-05	0.0744649	0.0110236	0.0813753	0	0	0.401455	4.57753E-05	0.0155131	0.001457292	9.75321E-06	0.00193162	0.00162190	
Octane	0.00265670	1.27001E-06	2.86023	0.169684	3.15331	0	0	8.55146	1.66400E-08	0.00322784	0.147245472	9.24454E-09	0.0411458	0.00265670	
Ethylbenzene	0.00236717	6.53389E-05	0.302317	0.0154714	0.333663	0	0	0.802478	5.70597E-05	0.0213788	0.003714307	7.55935E-06	0.00394778	0.00236717	
m-Xylene	0.00182590	5.11447E-05	0.276941	0.0118738	0.305814	0	0	0.685912	4.48582E-05	0.0162347	0.003672131	6.40851E-06	0.00300330	0.00182590	
o-Xylene	0.00346617	0.000130974	0.589000	0.0225352	0.650703	0	0	1.37930	0.000118683	0.0137716	0.006042719	1.31127E-05	0.0063658	0.00346617	
Nonane	0.0150600	1.07831E-06	4.79087	0.0935261	5.30253	0	0	8.68935	2.22940E-08	0.00271961	0.073312124	3.66718E-09	0.0418093	0.0150600	
C10+	0.0140895	2.58144E-06	46.5383	0.0785061	51.5990	0	0	59.1064	1.42546E-07	0.00628108	0.05113956	1.68082E-09	0.284394	0.0140895	
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Water	743.232	7294.38	0.0540796	0.0505503	0.00352928	0	7437.66	0	7294.30	0.0749099	2.46883E-06	0.040525982	7437.66	143.232	
H2S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Nitrogen	607.783	0.00994476	0.0199308	0.0198236	0.000107142	607.798	0	0.0153521	0.000332249	0.00961251	9.23012E-05	2.96537E-06	607.813	607.783	
Carbon Dioxide	282.959	0.182011	0.0993539	0.0933867	0.00596718	283.215	0	0.0259736	0.107123	0.0748875	0.010976736	0.001566293	283.241	282.959	
Methane	54671.8	1.75452	5.23519	5.15150	0.0836883	54675.2	0	3.63300	0.116335	1.63818	0.117930396	0.001404119	54678.8	54671.8	
Ethane	18724.1	0.652073	10.9715	9.91439	1.05707	18728.7	0	6.99328	0.0493346	0.602239	1.294176311	0.0004763	18735.7	18724.1	
Propane	8683.21	0.324117	18.0019	12.8729	5.12893	8692.57	0	8.99885	0.0271482	0.296969	1.403184829	5.72401E-05	8701.53	8683.21	
Isobutane	1440.77	0.0173336	7.39155	3.64009	1.44463	1444.63	0	3.54053	0.000534301	0.0167993	0.37043464	4.0542E-05	1448.17	1440.77	
n-Butane	3004.08	0.0777839	22.1654	8.87565	3.12898	3018.28	0	8.04154	0.00509131	0.0726926	0.897338828	2.64015E-06	3026.32	3004.08	
Isopentane	1172.10	0.0197726	20.8114	4.33620	16.4752	1186.54	0	6.38714	0.00090568	0.0188671	0.40709873	1.71719E-07	1192.93	1172.10	
n-Pentane	907.312	0.0148754	21.3991	3.52501	17.8741	922.269	0	6.45710	0.000674842	0.0142005	0.325368838	9.42593E-08	928.726	907.312	
2-Methylpentane	5.08825	3.74967E-05	0.280990	0.0213466	0.259643	0	5.36928	8.29648E-07	3.66671E-05	0.001895521	4.64648E-11	5.36928	5.08825		
3-Methylpentane	3.56232	7.23819E-05	0.219355	0.0150414	0.204314	0	3.78175	4.18647E-06	6.81954E-05	0.00133292	2.0952E-10	3.78175	3.56232		
n-Hexane	1924.91	0.0111360	146.277	8.19590	138.117	2060.62	0	10.5714	0.000196814	0.0109391	0.049112001	5.3683E-10	2071.19	1924.91	
Methylcyclopentane	0.757795	4.98303E-05	0.0617016	0.00325721	0.0584444	0	0.819546	7.75459E-06	4.20757E-05	0.000273131	2.77999E-10	0.819546	0.757795		
Benzene	0.194317	0.000643008	0.0157843	0.000632318	0.0149520	0	0.210744	0.000579909	6.30998E-05	0.000643008	1.28132E-09	0.210744	0.194317		
2-Methylhexane	6.08135	3.81042E-05	1.08270	0.0254448	1.05725	0	7.16408	7.15452E-07	3.73887E-05	0.000149489	7.75967E-13	7.16408	6.08135		
3-Methylhexane	5.05327	3.30664E-05	0.944926	0.0211544	0.932771	0	5.99823	6.48400E-07	3.24180E-05	0.001872905	1.00838E-11	5.99823	5.05327		
Heptane	9.91668	6.69747E-05	2.30359	0.0409194	2.26267	0	12.2203	1.32050E-06	6.56542E-05	0.003349553	1.69944E-11	12.2203	9.91668		
Methylcyclohexane	5.99600	0.000236676	1.38711	0.0251903	1.36192	0	7.34694	2.57250E-05	0.000210951	0.002054359	2.97652E-10	7.34694	5.99600		
Toluene	1.48661	0.00377872	0.432278	0.00628588	0.425993	0	1.92267	0.00333914	0.000439582	7.14174E-05	0.00727E-09	1.92267	1.48661		
Octane	24.3509	9.26783E-05	16.6040	0.0957576	16.5073	0	40.9550	1.21383E-06	9.14644E-05	0.007216044	4.07002E-12	40.9550	24.3509		
Ethylbenzene	2.16971	0.00478609	1.75499	0.00882213	1.74617	0	3.92947	0.00416229	0.000605792	0.000182027	3.3281E-09	3.92947	2.16971		
m-Xylene	1.67359	0.00373227	1.60768	0.00677071	1.60091	0	3.28500	0.00327224	0.000460029	0.00017996	2.82142E-09	3.28500	1.67359		
o-Xylene	3.17703	0.00955774	3.41922	0.0128501	3.40637	0	6.60581	0.00865746	0.000900283	0.000296135	5.77301E-09	6.60581	3.17703		
Nonane	13.8038	7.86893E-05	27.8116	0.0533305	27.7583	0	41.6154	1.62626E-06	7.70630E-05	0.0035928	1.61452E-12	41.6154	13.8038		
C10+	12.9142	0.000188379	270.161	0.0447658	270.116	0	283.075	1.03928E-05	0.000177981	0.002506191	7.40001E-13	283.075	12.9142		

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale
Phase: Total	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units														
Temperature	°F	70.0	70.0	70.0	75.9	75.9	85.0	85.0	85.0	75.9	75.9	75.942503	75.942503	84.7825	
Pressure	psig	198	198	198	0	0	1000	1000	1000	0	0	12.56104394	-14.22488711	1000	198
Mole Fraction Vapor	%	100	0	0	100	0	100	0	0	100	100	100	100	91.0854	100
Mole Fraction Light Liquid	%	0	100	100	0	0	100	100	100	0	0	0	0	0.378718	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0	0	0	0	0	0	8.53983	0
Molecular Weight	lb/lbmol	20.9	18.0	95.4	41.6	111.1	20.9	18.0	113.6	18.0	20.6	42.5300199	18.42315895	20.7226	20.8687
Mass Density	lb/ft³	0.8	62.3	43.6	0.1	44.7	4.7	62.2	45.8	62.2	0.1	0.207675487	0.001510505	5.03621	0.826681
Molar Flow	lbmol/h	4392.1	405.0	6.1	1.4	4.7	4386.2	412.9	4.2	404.9	2.8	0.115228953	0.002389722	4803.27	4392.14
Mass Flow	lb/h	91658.4	7297.5	580.5	57.0	523.5	91619.8	7437.7	478.9	7294.6	0.1	4.90068968	0.04402623	99536.4	91658.4
Vapor Volumetric Flow	MCFH	110.9	0.1	0.0	0.5	0.0	19.6	0.1	0.0	0.1	0.1	23.5978244	29.14669711	19.7641	110.875
Liquid Volumetric Flow	Mbbld	473.9	0.5	0.1	84.0	0.5	0.5	0.5	0.5	0.2	0.2	2.942066419	3.633873925	84.4835	473.945
Std Vapor Volumetric Flow	MMSCFD	40.0	3.7	0.1	0.0	0.0	39.9	3.8	0.0	3.7	0.0	0.001049462	2.17647E-05	43.7464	40.0020
Std Liquid Volumetric Flow	Mbbld	18.3	0.5	0.1	0.0	0.1	18.3	0.5	0.0	0.5	0.0	0.020542341	9.70992E-05	18.8784	18.3198
Compressibility		0.945	0.011	0.082	0.985	0.006	0.777	0.050	0.431	0.001	0.996	0.971121435	0.99955103	0.714584	
Specific Gravity		0.721	0.998	0.698	1.436	0.717	0.721	0.997	0.734	0.998	0.713	1.4684462	0.636101695		0.720541
API Gravity		10.0	69.6		63.8		9.9	58.4		10.0					
Enthalpy	MMBtu/h	-151.5	-49.8	-0.5	-0.1	-0.4	-153.3	-50.7	-0.4	-49.8	0.0	-5195.68253	-243.3228505	-204.385	-151.472
Mass Enthalpy	Btu/lb	-1652.6	-6825.9	-898.7	-1088.4	-868.5	-1673.6	-6810.9	-818.4	-6822.4	-1816.8	-1060.19415	-5628.770098	-2053.37	-1652.58
Mass Cp	Btu/(lb**F)	0.5	1.0	0.5	0.4	0.5	0.7	1.0	0.5	1.0	0.5	0.411718353	0.442418159	0.698911	0.505758
Ideal Gas Cp/Cv Ratio		1.249	1.326	1.058	1.131	1.049	1.245	1.325	1.048	1.326	1.254	1.129906596	1.32228385	1.24943	
Dynamic Viscosity	cP	0.8	1.0	0.4	0.0	0.5	0.0	0.8	0.6	0.9	0.0	0.008513671	0.010264454		0.0107495
Kinematic Viscosity	cSt	0.0	1.0	0.6	5.0	0.7	0.2	0.8	0.8	0.9	12.6	2.559238529	424.2216874		0.811766
Thermal Conductivity	Btu/(h*ft**F)	0.0	0.3	0.1	0.0	0.1	0.0	0.4	0.1	0.3	0.0	0.010905542	0.01224237		0.0177506
Surface Tension	lbf/ft		0.005	0.001		0.001		0.005	0.001	0.005					
Net I.G. Heating Value	Btu/ft³	1139.1	0.4	4826.5	2180.4	5596.5	1141.9	0.0	5700.5	1077.9	2230.336272	45.36844668	1047.75	1139.10	
Net Liquid Heating Value	Btu/lb	20651.2	-1051.0	19032.2	19747.3	18954.3	-1059.8	18758.8	-1059.1						

Carbon Dioxide	0.146387	0.146387	0.146387	0.154790	0.154790	0.146717			1.23990	1.23990	0.216453775	1.47978156	0.146365	0.146387					
Methane	77.5919	77.5919	77.5919	23.4243	23.4243	77.7018			74.4074	74.4074	6.379595958	3.662565624	77.7904	77.5919					
Ethane	14.1776	14.1776	14.1776	24.0520	24.0520	14.2004			14.5940	14.5940	37.35186282	0.662847536	14.1719	14.1776					
Propane	4.48341	4.48341	4.48341	21.2954	21.2954	4.49433			4.90727	4.90727	27.61581153	0.054319734	4.45897	4.48341					
Isobutane	0.564384	0.564384	0.564384	4.56851	4.56851	0.566666			0.210607	0.210607	5.531036833	0.000291887	0.557666	0.564384					
n-Butane	1.17677	1.17677	1.17677	11.1394	11.1394	1.18394			0.911324	0.911324	13.39839566	0.00190081	1.15812	1.17677					
Isopentane	0.369879	0.369879	0.369879	4.38415	4.38415	0.374944			0.190546	0.190546	4.8967636	9.95959E-05	0.360397	0.369879					
n-Pentane	0.286320	0.286320	0.286320	3.56399	3.56399	0.291434			0.143417	0.143417	3.913656252	5.46699E-05	0.277556	0.286320					
2-Methylpentane	0.00134434	0.00134434	0.00134434	0.0180697	0.0180697	0			0.000310040	0.000310040	0.019098028	2.25628E-08	0.00128122	0.00134434					
3-Methylpentane	0.000941181	0.000941181	0.000941181	0.0127324	0.0127324	0			0.000576629	0.000576629	0.013423299	1.01741E-07	0.000894538	0.000941181					
n-Hexane	0.508569	0.508569	0.508569	6.90718	6.90718	0.545164			0.0924963	0.0924963	0.494587238	2.60691E-07	0.482249	0.508569					
Methylcyclopentane	0.000205009	0.000205009	0.000205009	0.00282324	0.00282324	0			0.000364295	0.000364295	0.002816477	1.38227E-07	0.000193127	0.000205009					
Benzene	5.66392E-05	5.66392E-05	5.66392E-05	0.000777279	0.000777279	0			0.000588620	0.000588620	4.78476E-05	6.86425E-07	5.34742E-05	5.66392E-05					
2-Methylhexane	0.00138181	0.00138181	0.00138181	0.0185237	0.0185237	0			0.000271887	0.000271887	0.001294711	3.24056E-10	0.00131774	0.00138181					
3-Methylhexane	0.00114821	0.00114821	0.00114821	0.0154003	0.0154003	0			0.000235740	0.000235740	0.016221017	4.21115E-09	0.00109359	0.00114821					
Heptane	0.00225327	0.00225327	0.00225327	0.0297891	0.0297891	0			0.000477431	0.000477431	0.029010094	6.26189E-09	0.00216508	0.00225327					
Methylcyclohexane	0.00138195	0.00138195	0.00138195	0.0187149	0.0187149	0			0.00156551	0.00156551	0.018157873	1.28856E-07	0.00130626	0.00138195					
Toluene	0.000367350	0.000367350	0.000367350	0.00497656	0.00497656	0			0.00347635	0.00347635	0.000672669	1.95016E-06	0.000348426	0.000367350					
Octane	0.00485360	0.00485360	0.00485360	0.0617896	0.0617896	0			0.000583448	0.000583448	0.054823024	1.49099E-09	0.00514344	0.00485360					
Ethylbenzene	0.000465312	0.000465312	0.000465312	0.00606173	0.00606173	0			0.00415783	0.00415783	0.001487962	1.3118E-06	0.000488311	0.000465312					
m-Xylene	0.000358916	0.000358916	0.000358916	0.00465219	0.00465219	0			0.00315739	0.00315739	0.001471067	1.11209E-06	0.000388001	0.000358916					
o-Xylene	0.000681340	0.000681340	0.000681340	0.00882934	0.00882934	0			0.00617906	0.00617906	0.002420732	2.27548E-06	0.000747171	0.000681340					
Nonane	0.00245045	0.00245045	0.00245045	0.0303323	0.0303323	0			0.000437820	0.000437820	0.02431066	5.26771E-10	0.00323638	0.00245045					
C10+	0.00183998	0.00183998	0.00183998	0.0204350	0.0204350	0			0.000811562	0.000811562	0.013610554	1.9378E-07	0.00556278	0.00183998					
Molar Flow	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water	7.95056	0	0	0.00280597	0	0			0	0.00415813	1.38151E-07	0.002249534	3.34842	7.95056					
H2S	0	0	0	0	0	0			0	0	0	0	0	0					
Nitrogen	21.6962	0	0	0.000707647	0	21.6967			0	0.000343140	3.29489E-06	1.05856E-07	21.6826	21.6962					
Carbon Dioxide	6.42950	0	0	0.00212197	0	6.43531			0	0.00170162	0.000249417	3.53627E-05	6.40359	6.42950					
Methane	3407.95	0	0	0.321117	0	3408.15			0	0.102115	0.007351142	8.75251E-05	3403.39	3407.95					
Ethane	622.702	0	0	0.329721	0	622.856			0	0.0200285	0.043040161	1.58402E-05	620.032	622.702					
Propane	196.918	0	0	0.291932	0	197.130			0	0.00673466	0.031821411	1.29809E-06	195.084	196.918					
Isobutane	24.7886	0	0	0.0626282	0	24.8551			0	0.000289034	0.006373356	6.9753E-09	24.3983	24.7886					
n-Butane	51.6856	0	0	0.152707	0	51.9299			0	0.00125069	0.015438831	4.54241E-08	50.6688	51.6856					
Isopentane	16.2456	0	0	0.0601008	0	16.4458			0	0.000261502	0.005642489	2.38007E-09	15.7676	16.2456					
n-Pentane	12.5756	0	0	0.0488576	0	12.7829			0	0.000196823	0.004509665	1.30648E-09	12.1433	12.5756					
2-Methylpentane	0.0590453	0	0	0.000247712	0	0			0	4.25494E-07	2.19961E-05	5.39189E-13	0.0560542	0.0590453					
3-Methylpentane	0.0413380	0	0	0.000174544	0	0			0	7.91356E-07	1.54675E-05	2.43132E-12	0.0391367	0.0413380					
n-Hexane	22.3371	0	0	0.0946883	0	23.9120			0	0.000126940	0.000569908	6.22978E-12	21.0988	22.3371					
Methylcyclopentane	0.00900427	0	0	3.87029E-05	0	0			0	4.99952E-07	3.2454E-06	3.30324E-12	0.00844946	0.00900427					
Benzene	0.00248767	0	0	1.06555E-05	0	0			0	8.07813E-07	5.51343E-08	1.64036E-11	0.00233954	0.00248767					
2-Methylhexane	0.0060909	0	0	0.000253935	0	0			0	3.73134E-07	1.49188E-06	7.74403E-15	0.0576520	0.0060909					
3-Methylhexane	0.0504308	0	0	0.000211117	0	0			0	3.23526E-07	1.86913E-05	1.00635E-13	0.0478455	0.0504308					
Heptane	0.0989669	0	0	0.000408369	0	0			0	6.55219E-07	3.3428E-05	1.49642E-13	0.0947239	0.0989669					
Methylcyclohexane	0.00606970	0	0	0.000256557	0	0			0	2.14848E-06	2.09231E-05	3.03151E-12	0.0571500	0.00606970					
Toluene	0.0161345	0	0	6.82221E-05	0	0			0	4.77088E-06	7.75109E-07	4.66035E-11	0.0152439	0.0161345					
Octane	0.213177	0	0	0.000847053	0	0			0	8.00714E-07	6.3172E-05	3.56305E-14	0.225029	0.213177					
Ethylbenzene	0.0204372	0	0	8.30983E-05	0	0			0	5.70614E-06	1.71456E-06	3.13484E-11	0.0213640	0.0204372					
m-Xylene	0.0157641	0	0	6.37754E-05	0	0			0	4.33315E-06	1.69509E-06	2.65758E-11	0.0169754	0.0157641					
o-Xylene	0.0299254	0	0	0.000121039	0	0			0	8.48004E-06	2.78938E-06	5.43777E-11	0.0326893	0.0299254					
Nonane	0.107627	0	0	0.000415816	0	0			0	6.00857E-07	2.80129E-05	1.25884E-14	0.141594	0.107627					
C10+	0.0808146	0	0	0.000280137	0	0			0	1.11377E-06	1.56833E-05	4.63079E-15	0.243376	0.0808146					
Mass Fraction	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water	0.156267	0.156267	0.156267	0.0886503	0.0886503	0			2.64362	2.64362	5.07853E-05	92.04963085	0.0662044	0.156267					
H2S	0	0	0	0	0	0			0	0	0	0	0	0					
Nitrogen	0.663096	0.663096	0.663096	0.0347648	0.0347648	0.663391			0.339232	0.339232	0.001883432	0.00673547	0.666626	0.663096					
Carbon Dioxide	0.308711	0.308711	0.308711	0.163773	0.163773	0.309119			2.64283	2.64283	0.223983493	3.534922907	0.309297	0.308711					
Methane	59.6474	59.6474	59.6474	9.03422	9.03422	59.6762			57.8126	57.8126	2.40640407	3.189277294	59.9223	59.6474					
Ethane	20.4281	20.4281	20.4281	17.3869	17.3869	20.4417			21.2534	21.2534	26.40804448	1.081855134	20.4616	20.4281					
Propane	9.47344	9.47344	9.47344	22.5753	22.5753	9.48766			10.4802	10.4802	28.63239504	0.130013662	9.44109	9.47344					
Isobutane	1.57189	1.57189	1.57189	6.38364	6.38364	1.57677			0.592858	0.592858	7.558802695	0.0002086	1.55635	1.57189					
n-Butane	3.27747	3.27747	3.27747	15.5653	15.5653	3.29435			2.56537	2.56537	18.31046009	0.005996761	3.23213	3.27747					

Isopentane	1.27877	1.27877	1.27877	7.60442	7.60442	1.29507	0.665832	0.665832	8.306968124	0.000390038	1.24854	1.27877					
n-Pentane	0.989884	0.989884	0.989884	6.18164	6.18164	1.00663	0.501146	0.501146	6.639205074	0.000214098	0.961547	0.989884					
2-Methylpentane	0.00555132	0.00555132	0.00555132	0.0374357	0.0374357	0	0.00129401	0.00129401	0.038678652	1.05539E-07	0.00630148	0.00555132					
3-Methylpentane	0.00388652	0.00388652	0.00388652	0.0263782	0.0263782	0	0.00240666	0.00240666	0.027198615	4.75899E-07	0.00370147	0.00388652					
n-Hexane	2.10009	2.10009	2.10009	14.3099	14.3099	2.24910	0.386050	0.386050	1.002144682	1.21939E-06	1.99547	2.10009					
Methylcyclopentane	0.000826760	0.000826760	0.000826760	0.00571219	0.00571219	0	0.00148488	0.00148488	0.005573316	6.3144E-07	0.000780437	0.000826760					
Benzene	0.000212001	0.000212001	0.000212001	0.00145964	0.00145964	0	0.00222683	0.00222683	8.78783E-05	2.91035E-06	0.000200564	0.000212001					
2-Methylhexane	0.00663479	0.00663479	0.00663479	0.0446227	0.0446227	0	0.00131947	0.00131947	0.003050376	1.76251E-09	0.00634011	0.00663479					
3-Methylhexane	0.00551315	0.00551315	0.00551315	0.0370985	0.0370985	0	0.00114405	0.00114405	0.038217179	2.29041E-08	0.00526166	0.00551315					
Heptane	0.0108192	0.0108192	0.0108192	0.0717606	0.0717606	0	0.00231698	0.00231698	0.068348608	3.40579E-08	0.0104170	0.0108192					
Methylcyclohexane	0.00650197	0.00650197	0.00650197	0.0441763	0.0441763	0	0.00744459	0.00744459	0.041919802	6.76078E-07	0.00615846	0.00650197					
Toluene	0.00162190	0.00162190	0.00162190	0.0110236	0.0110236	0	0.0155131	0.0155131	0.001457292	9.75321E-06	0.00154150	0.00162190					
Octane	0.0265670	0.0265670	0.0265670	0.169684	0.169684	0	0.00322784	0.00322784	0.147245472	9.24454E-09	0.0282111	0.0265670					
Ethylbenzene	0.00236717	0.00236717	0.00236717	0.0154714	0.0154714	0	0.0213788	0.0213788	0.003714307	7.55936E-06	0.00248926	0.00236717					
m-Xylene	0.00182590	0.00182590	0.00182590	0.0118738	0.0118738	0	0.0162347	0.0162347	0.003672131	6.40851E-06	0.00197791	0.00182590					
o-Xylene	0.00346617	0.00346617	0.00346617	0.0225352	0.0225352	0	0.0317716	0.0317716	0.006042719	1.31127E-05	0.00380884	0.00346617					
Nonane	0.0150600	0.0150600	0.0150600	0.0935261	0.0935261	0	0.00271961	0.00271961	0.073312124	3.66718E-09	0.0199308	0.0150600					
C10+	0.0140895	0.0140895	0.0140895	0.0785061	0.0785061	0	0.00628108	0.00628108	0.05113956	1.68082E-09	0.0426836	0.0140895					
Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h

Water	143.232	0	0	0.0505503	0	0	0	0.0749099	2.48883E-06	0.040525982	60.3227	143.232				
H2S	0	0	0	0	0	0	0	0	0	0	0	0				
Nitrogen	607.783	0	0	0.0198236	0	607.798	0	0.00961251	9.23012E-05	2.96537E-06	607.402	607.783				
Carbon Dioxide	282.959	0	0	0.0933867	0	283.215	0	0.0748875	0.010976736	0.001566293	281.819	282.959				
Methane	54671.8	0	0	5.15150	0	54675.2	0	1.63818	0.117930396	0.001404119	54598.8	54671.8				
Ethane	18724.1	0	0	9.91439	0	18728.7	0	0.602239	1.294176311	0.0004763	18643.8	18724.1				
Propane	8683.21	0	0	12.8729	0	8692.57	0	0.296969	1.403184829	5.72401E-05	8602.33	8683.21				
Isobutane	1440.77	0	0	3.64009	0	1444.63	0	0.0167993	0.370433464	4.0542E-07	1418.08	1440.77				
n-Butane	3004.08	0	0	8.87565	0	3018.28	0	0.0726926	0.897338828	2.64015E-06	2944.98	3004.08				
Isopentane	1172.10	0	0	4.33620	0	1186.54	0	0.0188671	0.40709873	1.71719E-07	1137.62	1172.10				
n-Pentane	907.312	0	0	3.52501	0	922.269	0	0.0142005	0.325366838	9.42593E-08	876.122	907.312				
2-Methylpentane	5.08825	0	0	0.0213466	0	5.08825	0	3.66671E-05	0.001895521	4.64648E-11	4.83049	5.08825				
3-Methylpentane	3.56232	0	0	0.0150414	0	3.56232	0	6.81954E-05	0.00133292	2.0952E-10	3.37262	3.56232				
n-Hexane	1924.91	0	0	8.15980	0	2060.62	0	0.0109391	0.049112001	5.36853E-10	1818.19	1924.91				
Methylcyclopentane	0.757795	0	0	0.00325721	0	0.757795	0	4.20757E-05	0.000273131	2.77999E-10	0.711102	0.757795				
Benzene	0.194317	0	0	0.000832318	0	0.194317	0	6.30998E-05	4.30664E-06	1.28132E-09	0.182746	0.194317				
2-Methylhexane	6.08135	0	0	0.0254448	0	6.08135	0	3.73887E-05	0.000149489	7.75967E-13	5.77684	6.08135				
3-Methylhexane	5.05327	0	0	0.0211544	0	5.05327	0	3.24180E-05	0.001872905	1.00838E-11	4.79421	5.05327				
Heptane	9.91668	0	0	0.0409194	0	9.91668	0	6.56542E-05	0.003349553	1.49944E-11	9.49152	9.91668				
Methylcyclohexane	5.95960	0	0	0.0251903	0	5.95960	0	0.000210951	0.002054359	2.97652E-10	5.61134	5.95960				
Toluene	1.48661	0	0	0.00628588	0	1.48661	0	0.000439582	7.14174E-05	4.29397E-09	1.40455	1.48661				
Octane	24.3509	0	0	0.0967576	0	24.3509	0	9.14644E-05	0.007216044	4.07002E-12	25.7048	24.3509				
Ethylbenzene	2.16971	0	0	0.00882213	0	2.16971	0	0.000605792	0.000182027	3.3281E-09	2.26811	2.16971				
m-Xylene	1.67359	0	0	0.00677071	0	1.67359	0	0.000460029	0.00017996	2.82142E-09	1.80219	1.67359				
o-Xylene	3.17703	0	0	0.0128501	0	3.17703	0	0.000900283	0.000296135	5.77301E-09	3.47046	3.17703				
Nonane	13.8038	0	0	0.0533305	0	13.8038	0	7.70630E-05	0.0035928	1.61452E-12	18.1602	13.8038				
C10+	12.9142	0	0	0.0447658	0	12.9142	0	0.000177981	0.002506191	7.40001E-13	38.8915	12.9142				

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale		
Phase: Vapor	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	
Property	Units																
Temperature	°F	70.0	70.0	70.0	75.9	75.9	85.0			75.9	75.9	75.942503	75.942503	64.7825	70		
Pressure	psig	198	198	198	0	0	1000			0	0	12.56104394	-14.22488711	1000	198		
Mole Fraction Vapor	%	100	100	100	100	100	100			100	100	100	100	100	100		
Mole Fraction Light Liquid	%	0	0	0	0	0	0			0	0	0	0	0	0		
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0			0	0	0	0	0	0		
Molecular Weight	lb/lbmol	20.9	20.9	20.9	41.6	41.6	20.9			20.6	20.6	42.5300199	18.42315895	20.8261	20.8687		
Mass Density	lb/ft³	0.8	0.8	0.8	0.1	0.1	4.7			0.1	0.1	0.207675487	0.001510505	4.64488	0.826681		
Molar Flow	lbmol/h	4392.1	0.0	0.0	1.4	0.0	4386.2			0.0	0.1	0.115228953	0.002389722	4375.08	4392.14		
Mass Flow	lb/h	91658.4	0.0	0.0	57.0	0.0	91619.8			0.0	2.8	4.90068968	0.04402623	91115.9	91658.4		
Vapor Volumetric Flow	MCFH	110.9	0.0	0.0	0.5	0.0	19.6			0.0	0.1	23.5978244	29.14669711	19.6164	110.875		
Liquid Volumetric Flow	Mbb/d	473.9	0.0	0.0	2.3	0.0	84.0			0.0	0.2	2.942066419	3.633873925	83.8520	473.945		
Std Vapor Volumetric Flow	MMSCFD	40.0	0.0	0.0	0.0	0.0	39.9			0.0	0.0	0.001049462	2.17647E-05	39.8466	40.0020		

Std Liquid Volumetric Flow	Mbb/d	18.3	0.0	0.0	0.0	0.0	18.3			0.0	0.0	0.020542341	9.70992E-05	18.2457	18.3198			
Compressibility		0.945	0.945	0.945	0.985	0.985	0.777			0.996	0.996	0.971121435	0.99955103	0.778656	0.944600			
Specific Gravity		0.721	0.721	0.721	1.436	1.436	0.721			0.713	0.713	1.4684462	0.636101695	0.719069	0.720541			
API Gravity																		
Enthalpy	MMBtu/h	-151.5	0.0	0.0	-0.1	0.0	-153.3			0.0	0.0	-5195.68253	-243.3228505	-153.013	-151.472			
Mass Enthalpy	Btu/lb	-1652.6	-1652.6	-1652.6	-1088.4	-1088.4	-1673.6			-1816.8	-1816.8	-1060.19415	-526.770098	-1679.32	-1652.58			
Mass Cp	Btu/(lb**F)	0.5	0.5	0.5	0.4	0.4	0.7			0.5	0.5	0.411718353	0.442418159	0.677425	0.505758			
Ideal Gas Cp/Cv Ratio		1.249	1.249	1.249	1.131	1.131	1.245			1.254	1.254	1.129906596	1.32228385	1.24575	1.24925			
Dynamic Viscosity	cP	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.008513671	0.010264454	0.0132369	0.0107495			
Kinematic Viscosity	cSt	0.8	0.8	0.8	5.0	5.0	0.2			12.6	12.6	2.559238529	424.2216874	0.177906	0.811764			
Thermal Conductivity	Btu/(h*ft**F)	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.010905542	0.01222437	0.0223976	0.0177506			
Surface Tension	lb/ft																	
Net I.G. Heating Value	Btu/ft^3	1139.1	1139.1	1139.1	2180.4	2180.4	1141.9			1077.9	1077.9	2230.336272	45.36844668	1138.00	1139.10			
Net Liquid Heating Value	Btu/lb	20651.2	20651.2	20651.2	19747.3	19747.3	20684.2			19724.3	19724.3	19747.38198	45.47876275	20674.8	20651.2			
Gross I.G. Heating Value	Btu/ft^3	1255.9	1255.9	1255.9	2371.9	2371.9	1258.8			1190.3	1190.3	2425.347008	97.52579755	1254.67	1255.87			
Gross Liquid Heating Value	Btu/lb	22774.5	22774.5	22774.5	21495.1	21495.1	22808.7			21791.2	21791.2	21487.40009	1028.870481	22800.6	22774.5			

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale			
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved			
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0.0493572	99.9641	0.0493572	0.00415840	0.00415840		100	0	99.9970	99.9970			0.0576293	0.0493572			
H2S		0	0	0	0	0		0	0	0	0			0	0			
Nitrogen		0.0116981	8.76446E-05	0.0116981	8.11848E-05	8.11848E-05		0.013	2.92915E-06	2.92915E-06				0.0715008	0.0116981			
Carbon Dioxide		0.0371191	0.00102105	0.0371191	0.00287809	0.00287809		0.014	0.000601149	0.000601149				0.107413	0.0371191			
Methane		5.36562	0.0270013	5.36562	0.110733	0.110733		5.372	0.00179095	0.00179095				25.1364	5.36562			
Ethane		5.99934	0.00535394	5.99934	0.746221	0.746221		0	0.000409313	0.000409313				16.4932	5.99934			
Propane		6.71244	0.00181469	6.71244	2.46895	2.46895		0	0.000152051	0.000152051				12.2956	6.71244			
Isobutane		2.09099	7.36280E-05	2.09099	1.37006	1.37006		0	1.445	2.27033E-06	2.27033E-06			2.84356	2.09099			
n-Butane		6.27036	0.000330404	6.27036	4.85352	4.85352		0	3.282	2.16337E-05	2.16337E-05			7.68259	6.27036			
Isopentane		4.74275	6.76601E-05	4.74275	4.84710	4.84710		0	2.1	3.09982E-06	3.09982E-06			4.21313	4.74275			
n-Pentane		4.87669	5.90921E-05	4.87669	5.25867	5.25867		0	2.123	2.31003E-06	2.31003E-06			4.00690	4.87669			
2-Methylpentane		0.0536125	1.07425E-07	0.0536125	0.0639551	0.0639551		0	1.478	2.37769E-09	2.37769E-09			0.0343684	0.0536125			
3-Methylpentane		0.0418527	2.07369E-07	0.0418527	0.0503264	0.0503264		0	1.041	1.19980E-08	1.19980E-08			0.0260949	0.0418527			
n-Hexane		27.9095	3.19037E-05	27.9095	34.0210	34.0210		0	2.91	5.64050E-07	5.64050E-07			16.1387	27.9095			
Methylcyclopentane		0.0120546	1.46180E-07	0.0120546	0.0147408	0.0147408		0	0.231	2.27562E-08	2.27562E-08			0.00708114	0.0120546			
Benzene		0.00332251	2.03234E-06	0.00332251	0.00406314	0.00406314		0	0.064	1.83352E-06	1.83352E-06			0.00193255	0.00332251			
2-Methylhexane		0.177660	9.38844E-08	0.177660	0.223967	0.223967		0	1.696	1.76339E-09	1.76339E-09			0.0761053	0.177660			
3-Methylhexane		0.155053	8.14718E-08	0.155053	0.195690	0.195690		0	1.42	1.59813E-09	1.59813E-09			0.0660537	0.155053			
Heptane		0.377996	1.65018E-07	0.377996	0.479321	0.479321		0	2.893	3.25466E-09	3.25466E-09			0.149706	0.377996			
Methylcyclohexane		0.232284	5.95114E-07	0.232284	0.294430	0.294430		0	1.775	6.47069E-08	6.47069E-08			0.0971655	0.232284			
Toluene		0.0771403	1.01251E-05	0.0771403	0.0981392	0.0981392		0	0.495	8.95030E-06	8.95030E-06			0.0307685	0.0771403			
Octane		2.39000	2.00309E-07	2.39000	3.06748	3.06748		0	8.505	2.62438E-09	2.62438E-09			0.733920	2.39000			
Ethylbenzene		0.271802	1.10882E-05	0.271802	0.349129	0.349129		0	0.878	9.68268E-06	9.68268E-06			0.0859077	0.271802			
m-Xylene		0.248987	8.67937E-06	0.248987	0.320086	0.320086		0	0.734	7.61216E-06	7.61216E-06			0.0766865	0.248987			
o-Xylene		0.529547	2.22265E-05	0.529547	0.681070	0.681070		0	1.476	2.01397E-05	2.01397E-05			0.162101	0.529547			
Nonane		3.56542	1.51474E-07	3.56542	4.59409	4.59409		0	7.697	3.13156E-09	3.13156E-09			1.00534	3.56542			
C10+		27.7974	2.91041E-07	27.7974	35.8802	35.8802		0	42.021	1.60703E-08	1.60703E-08			8.40014	27.7974			
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water		0	404.899	0.00300187	0	0.000195905		412.853	0	404.895	0			0.0104833	0			
H2S		0	0	0	0	0		0	0	0	0			0	0			
Nitrogen		0	0.000355000	0.000711472	0	3.82466E-06		0	0.000548027	1.18604E-05	0			0.0130066	0			
Carbon Dioxide		0	0.00413572	0.00225796	0	0.000135588		0	0.000590183	0.00243410	0			0.0195394	0			
Methane		0	0.109367	0.326333	0	0.00521668		0	0.226462	0.00725168	0			4.57252	0			
Ethane		0	0.0216859	0.364876	0	0.0351549		0	0.232574	0.00165734	0			3.00026	0			
Propane		0	0.00735032	0.408246	0	0.116314		0	0.203191	0.000615667	0			2.23668	0			
Isobutane		0	0.000296226	0.127173	0	0.0645443		0	0.0609153	9.19273E-06	0			0.517267	0			
n-Butane		0	0.00133828	0.381359	0	0.228652		0	0.138356	8.75966E-05	0			1.39753	0			
Isopentane		0	0.000274054	0.288451	0	0.228350		0	0.0885274	1.25514E-05	0			0.766405	0			
n-Pentane		0	0.000206176	0.296597	0	0.247739		0	0.0894970	9.35347E-06	0			0.728889	0			
2-Methylpentane		0	4.35121E-07	0.00326067	0	0.00301296		0	0.0623064	9.62744E-09	0			0.00625191	0			
3-Methylpentane		0	8.39937E-07	0.00254545	0	0.00237091		0	0.0438843	4.85808E-08	0			0.00474688	0			
n-Hexane		0	0.000129224	1.69744	0	1.60275		0	1.12674	2.28388E-06	0			2.93577	0			

Methylcyclopentane	0	5.92094E-07	0.000733151	0	0.000694448	0	0.00973801	9.21417E-08	0	0.00128812	0
Benzene	0	8.23189E-06	0.000202073	0	0.000191417	0	0.00269798	7.42408E-06	0	0.000351546	0
2-Methylhexane	0	3.80274E-07	0.0108051	0	0.0105512	0	0.0714964	7.14010E-09	0	0.0138442	0
3-Methylhexane	0	3.29997E-07	0.00943022	0	0.00921910	0	0.0598614	6.47093E-09	0	0.0120157	0
Heptane	0	6.68397E-07	0.0229895	0	0.0225811	0	0.121957	1.31784E-08	0	0.0272328	0
Methylcyclohexane	0	2.41048E-06	0.0141273	0	0.0138708	0	0.0748267	2.62003E-07	0	0.0176752	0
Toluene	0	4.10113E-05	0.00469162	0	0.00462340	0	0.0208672	3.62404E-05	0	0.00559706	0
Octane	0	8.11341E-07	0.145358	0	0.144511	0	0.358536	1.06263E-08	0	0.133506	0
Ethylbenzene	0	4.49120E-05	0.0165308	0	0.0164477	0	0.0370129	3.92059E-05	0	0.0156274	0
m-Xylene	0	3.51553E-05	0.0151432	0	0.0150794	0	0.0309424	3.08222E-05	0	0.0139499	0
o-Xylene	0	9.00273E-05	0.0322067	0	0.0320856	0	0.0622221	8.15472E-05	0	0.0294875	0
Nonane	0	6.13537E-07	0.216846	0	0.216430	0	0.324474	1.26799E-08	0	0.182880	0
C10+	0	1.17884E-06	1.69062	0	1.69034	0	1.77143	6.50699E-08	0	1.52806	0

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale		
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved		
Property	Units																
Temperature	*F	70.0	70.0	70.0	75.9	75.9		85.0	85.0	75.9	75.9			84.7825	70		
Pressure	psig	198	198	198	0	0		1000	1000	0	0			1000	198		
Mole Fraction Vapor	%	0	0	0	0	0		0	0	0	0			0	0		
Mole Fraction Light Liquid	%	100	100	100	100	100		100	100	100	100			100	100		
Mole Fraction Heavy Liquid	%	0	0	0	0	0		0	0	0	0			0	0		
Molecular Weight	lb/lbmol	95.4	18.0	95.4	111.1	111.1		18.0	113.6	18.0	18.0			56.8193	95.4489		
Mass Density	lb/ft^3	43.6	62.3	43.6	44.7	44.7		62.2	45.8	62.2	62.2			35.9412	43.5600		
Molar Flow	lbmol/h	0.0	405.0	6.1	0.0	4.7		412.9	4.2	404.9	0.0			18.1909	0		
Mass Flow	lb/h	0.0	7297.5	580.5	0.0	523.5		7437.7	478.9	7294.6	0.0			1033.59	0		
Vapor Volumetric Flow	MCFH	0.0	0.1	0.0	0.0	0.0		0.1	0.0	0.1	0.0			0.0287579	0		
Liquid Volumetric Flow	Mbb/d	0.0	0.5	0.1	0.0	0.1		0.5	0.0	0.5	0.0			0.122928	0		
Std Vapor Volumetric Flow	MMSCFD	0.0	3.7	0.1	0.0	0.0		3.8	0.0	3.7	0.0			0.165676	0		
Std Liquid Volumetric Flow	Mbb/d	0.0	0.5	0.1	0.0	0.1		0.5	0.0	0.5	0.0			0.125072	0		
Compressibility		0.082	0.011	0.082	0.006	0.006		0.050	0.431	0.001	0.001			0.274546	0.0819923		
Specific Gravity		0.698	0.998	0.698	0.717	0.717		0.997	0.734	0.998	0.998			0.576267	0.698423		
API Gravity		69.6	10.0	69.6	63.8	63.8		9.9	58.4	10.0	10.0			106.894	69.6119		
Enthalpy	MMBtu/h	0.0	-49.8	-0.5	0.0	-0.4		-50.7	-0.4	-49.8	0.0			-1.10521	0		
Mass Enthalpy	Btu/lb	-898.7	-6825.9	-898.7	-858.5	-858.5		-6811.9	-818.4	-6822.4	-6822.4			-1069.29	-898.665		
Mass Cp	Btu/(lb**F)	0.5	1.0	0.5	0.5	0.5		1.0	0.5	1.0	1.0			0.574192	0.496039		
Ideal Gas CpCv Ratio		1.058	1.326	1.058	1.049	1.049		1.325	1.048	1.326	1.326			1.09444	1.05807		
Dynamic Viscosity	cP	0.4	1.0	0.4	0.5	0.5		0.8	0.6	0.9	0.9			0.159307	0.393449		
Kinematic Viscosity	cSt	0.6	1.0	0.6	0.7	0.7		0.8	0.8	0.9	0.9			0.276707	0.563872		
Thermal Conductivity	Btu/(h**ft**F)	0.1	0.3	0.1	0.1	0.1		0.4	0.1	0.3	0.3			0.0616238	0.0670530		
Surface Tension	lb/ft	0.001	0.005	0.001	0.001	0.001		0.005	0.001	0.005	0.005			0.000424271	0.00129650		
Net I.G. Heating Value	Btu/ft^3	4826.5	0.4	4826.5	5596.5	5596.5		0.0	5700.5	0.0	0.0			2927.89	4826.51		
Net Liquid Heating Value	Btu/lb	19032.2	-1051.0	19032.2	18954.3	18954.3		-1059.8	18875.8	-1059.1	-1059.1			19407.5	19032.2		
Gross I.G. Heating Value	Btu/ft^3	5189.7	50.3	5189.7	6009.6	6009.6		50.3	6113.7	50.3	50.3			3167.60	5189.68		
Gross Liquid Heating Value	Btu/lb	20476.0	9.1	20476.0	20364.9	20364.9		0.0	20255.1	0.7	0.7			21008.4	20476.0		

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale		
Phase: Heavy Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved		
Mole Fraction	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		99.9641		99.9641										99.8769	99.9641		
H2S		0		0										0	0		
Nitrogen		8.76446E-05		8.76446E-05										0.000403555	8.76446E-05		
Carbon Dioxide		0.00102105		0.00102105										0.00311350	0.00102105		
Methane		0.0270013		0.0270013										0.101956	0.0270013		
Ethane		0.00535394		0.00535394										0.0137254	0.00535394		
Propane		0.00181469		0.00181469										0.00317278	0.00181469		
Isobutane		7.36280E-05		7.36280E-05										0.000104050	7.36280E-05		
n-Butane		0.000330404		0.000330404										0.000458411	0.000330404		
Isopentane		6.76601E-05		6.76601E-05										6.5552E-05	6.76601E-05		
n-Pentane		5.09021E-05		5.09021E-05										5.18144E-05	5.09021E-05		
2-Methylpentane		1.07425E-07		1.07425E-07										8.99529E-08	1.07425E-07		
3-Methylpentane		2.07369E-07		2.07369E-07										1.65404E-07	2.07369E-07		

n-Hexane	3.19037E-05			3.19037E-05										2.44549E-05	3.19037E-05				
Methylcyclopentane	1.46180E-07			1.46180E-07										1.06165E-07	1.46180E-07				
Benzene	2.03234E-06			2.03234E-06										1.68136E-06	2.03234E-06				
2-Methylhexane	9.38844E-08			9.38844E-08										4.86844E-08	9.38844E-08				
3-Methylhexane	8.14718E-08			8.14718E-08										4.27534E-08	8.14718E-08				
Heptane	1.65018E-07			1.65018E-07										7.27055E-08	1.65018E-07				
Methylcyclohexane	5.95114E-07			5.95114E-07										3.56480E-07	5.95114E-07				
Toluene	1.01251E-05			1.01251E-05										6.39413E-06	1.01251E-05				
Octane	2.00309E-07			2.00309E-07										9.31985E-08	2.00309E-07				
Ethylbenzene	1.10882E-05			1.10882E-05										5.25355E-06	1.10882E-05				
m-Xylene	8.67937E-06			8.67937E-06										4.17939E-06	8.67937E-06				
o-Xylene	2.22265E-05			2.22265E-05										1.10573E-05	2.22265E-05				
Nonane	1.51474E-07			1.51474E-07										6.19004E-08	1.51474E-07				
C10+	2.91041E-07			2.91041E-07										1.52492E-07	2.91041E-07				
Mass Fraction	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water	99.9577			99.9577										99.9577	99.9577				
H2S	0			0										0	0				
Nitrogen	0.000136277			0.000136277										0.000627462	0.000136277				
Carbon Dioxide	0.00249417			0.00249417										0.00760526	0.00249417				
Methane	0.0240429			0.0240429										0.0907829	0.0240429				
Ethane	0.00893562			0.00893562										0.0229067	0.00893562				
Propane	0.00444150			0.00444150										0.00776523	0.00444150				
Isobutane	0.000237529			0.000237529										0.000335662	0.000237529				
n-Butane	0.00106590			0.00106590										0.00147882	0.00106590				
Isopentane	0.000270952			0.000270952										0.000262516	0.000270952				
n-Pentane	0.000203843			0.000203843										0.000207491	0.000203843				
2-Methylpentane	5.13833E-07			5.13833E-07										4.30247E-07	5.13833E-07				
3-Methylpentane	9.91877E-07			9.91877E-07										7.91131E-07	9.91877E-07				
n-Hexane	0.000152600			0.000152600										0.000116969	0.000152600				
Methylcyclopentane	6.82844E-07			6.82844E-07										4.95910E-07	6.82844E-07				
Benzene	8.81140E-06			8.81140E-06										7.28950E-06	8.81140E-06				
2-Methylhexane	5.22157E-07			5.22157E-07										2.69635E-07	5.22157E-07				
3-Methylhexane	4.53121E-07			4.53121E-07										2.37775E-07	4.53121E-07				
Heptane	9.17781E-07			9.17781E-07										4.04355E-07	9.17781E-07				
Methylcyclohexane	3.24326E-06			3.24326E-06										1.94269E-06	3.24326E-06				
Toluene	5.17813E-05			5.17813E-05										3.26995E-05	5.17813E-05				
Octane	1.27001E-06			1.27001E-06										5.90884E-07	1.27001E-06				
Ethylbenzene	6.53389E-05			6.53389E-05										3.09666E-05	6.53389E-05				
m-Xylene	5.11447E-05			5.11447E-05										2.46271E-05	5.11447E-05				
o-Xylene	0.000130974			0.000130974										6.51556E-05	0.000130974				
Nonane	1.07831E-06			1.07831E-06										4.40643E-07	1.07831E-06				
C10+	2.58144E-06			2.58144E-06										1.35252E-06	2.58144E-06				
Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Water	0			0										7377.15	0				
H2S	0			0										0	0				
Nitrogen	0			0										0.0463501	0				
Carbon Dioxide	0			0										0.561795	0				
Methane	0			0										6.70606	0				
Ethane	0			0										1.69210	0				
Propane	0			0										0.573612	0				
Isobutane	0			0										0.0247951	0				
n-Butane	0			0										0.109240	0				
Isopentane	0			0										0.0193918	0				
n-Pentane	0			0										0.0153272	0				
2-Methylpentane	0			0										3.17820E-05	0				
3-Methylpentane	0			0										5.84402E-05	0				
n-Hexane	0			0										0.00864037	0				
Methylcyclopentane	0			0										3.66325E-05	0				
Benzene	0			0										0.000538469	0				
2-Methylhexane	0			0										1.99104E-05	0				
3-Methylhexane	0			0										1.75642E-05	0				
Heptane	0			0										2.98694E-05	0				

Methylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000143505	0
Toluene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00241549	0
Octane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.36482E-05	0
Ethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00228674	0
m-Xylene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00181919	0
o-Xylene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00481299	0
Nonane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.25500E-05	0
C10+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.99095E-05	0

Process Streams		HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	Well Stream	Total gas to sale				
Phase: Heavy Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved			
Property	Units																		
Temperature	°F	70.0		70.0										64.7825	70				
Pressure	psig	198		198										1000	198				
Mole Fraction Vapor	%	0		0										0	0				
Mole Fraction Light Liquid	%	0		0										0	0				
Mole Fraction Heavy Liquid	%	100		100										100	100				
Molecular Weight	lb/lbmol	18.0		18.0										18.0169	18.0164				
Mass Density	lb/ft³	62.3		62.3										62.0885	62.2605				
Molar Flow	lbmol/h	0.0		0.0										409.999	0				
Mass Flow	lb/h	0.0		0.0										7386.92	0				
Vapor Volumetric Flow	MCFH	0.0		0.0										0.118974	0				
Liquid Volumetric Flow	Mbb/d	0.0		0.0										0.508564	0				
Std Vapor Volumetric Flow	MMSCFD	0.0		0.0										3.73412	0				
Std Liquid Volumetric Flow	Mbb/d	0.0		0.0										0.507636	0				
Compressibility		0.011		0.011										0.0503943	0.0108279				
Specific Gravity		0.998		0.998										0.995503	0.998260				
API Gravity		10.0		10.0										10.0983	10.0472				
Enthalpy	MMBtu/h	0.0		0.0										-50.2670	0				
Mass Enthalpy	Btu/lb	-6825.9		-6825.9										-6804.87	-6825.86				
Mass Cp	Btu/(lb*°F)	1.0		1.0										0.981382	0.983052				
Ideal Gas Cp/Cv Ratio		1.326		1.326										1.32505	1.32581				
Dynamic Viscosity	cP	1.0		1.0										0.834207	0.995517				
Kinematic Viscosity	cSt	1.0		1.0										0.838767	0.998195				
Thermal Conductivity	Btu/(h*ft*°F)	0.3		0.3										0.351929	0.346524				
Surface Tension	lb/ft	0.005		0.005										0.00491936	0.00503986				
Net I.G. Heating Value	Btu/ft³	0.4		0.4										1.24861	0.394892				
Net Liquid Heating Value	Btu/lb	-1051.0		-1051.0										-1032.16	-1051.02				
Gross I.G. Heating Value	Btu/ft³	50.7		50.7										51.6262	50.7273				
Gross Liquid Heating Value	Btu/lb	9.1		9.1										29.0	9.1				

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

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

Sample: Yoke No. 1H (Maxwell Horizontal Pad)
 Separator Hydrocarbon Liquid
 Sampled @ 200 psig & 69 °F

Date Sampled: 09/25/13

Job Number: 35843.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.013	0.003	0.003
Carbon Dioxide	0.014	0.005	0.006
Methane	5.372	1.842	0.761
Ethane	5.517	2.986	1.465
Propane	4.820	2.687	1.877
Isobutane	1.445	0.957	0.742
n-Butane	3.282	2.094	1.685
2,2 Dimethylpropane	0.111	0.086	0.071
Isopentane	2.100	1.554	1.338
n-Pentane	2.012	1.476	1.282
2,2 Dimethylbutane	0.190	0.160	0.144
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.281	0.233	0.214
2 Methylpentane	1.478	1.241	1.125
3 Methylpentane	1.041	0.860	0.792
n-Hexane	1.974	1.643	1.502
Heptanes Plus	<u>70.350</u>	<u>82.174</u>	<u>86.993</u>
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----- 0.7687 (Water=1)
 °API Gravity ----- 52.59 @ 60°F
 Molecular Weight ----- 140.0
 Vapor Volume ----- 17.42 CF/Gal
 Weight ----- 6.40 Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----- 0.7261 (Water=1)
 °API Gravity ----- 63.39 @ 60°F
 Molecular Weight ----- 113.2
 Vapor Volume ----- 20.35 CF/Gal
 Weight ----- 6.05 Lbs/Gal

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
 Processor: JCdjv
 Cylinder ID: T-943

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.014	0.005	0.006
Nitrogen	0.013	0.003	0.003
Methane	5.372	1.842	0.761
Ethane	5.517	2.986	1.465
Propane	4.820	2.687	1.877
Isobutane	1.445	0.957	0.742
n-Butane	3.393	2.180	1.756
Isopentane	2.100	1.554	1.338
n-Pentane	2.012	1.476	1.282
Other C-6's	2.989	2.494	2.275
Heptanes	6.705	6.069	5.827
Octanes	10.280	9.819	9.895
Nonanes	7.698	8.452	8.624
Decanes Plus	42.021	55.063	59.304
Benzene	0.064	0.036	0.044
Toluene	0.495	0.336	0.403
E-Benzene	0.878	0.686	0.823
Xylenes	2.210	1.712	2.072
n-Hexane	1.974	1.643	1.502
2,2,4 Trimethylpentane	<u>0.000</u>	<u>0.000</u>	<u>0.000</u>
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity -----	0.7261	(Water=1)
°API Gravity -----	63.39	@ 60°F
Molecular Weight-----	113.2	
Vapor Volume -----	20.35	CF/Gal
Weight -----	6.05	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity -----	0.7820	(Water=1)
Molecular Weight-----	159.8	

Characteristics of Atmospheric Sample:

°API Gravity -----	56.94	@ 60°F
Reid Vapor Pressure (ASTM D-5191)-----	2.51	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	-----	T-943*	T-966
Pressure, PSIG	200	198	209
Temperature, °F	69	70	70

* Sample used for analysis

TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.013	0.003	0.003
Carbon Dioxide	0.014	0.005	0.006
Methane	5.372	1.842	0.761
Ethane	5.517	2.986	1.465
Propane	4.820	2.687	1.877
Isobutane	1.445	0.957	0.742
n-Butane	3.282	2.094	1.685
2,2 Dimethylpropane	0.111	0.086	0.071
Isopentane	2.100	1.554	1.338
n-Pentane	2.012	1.476	1.282
2,2 Dimethylbutane	0.190	0.160	0.144
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.281	0.233	0.214
2 Methylpentane	1.478	1.241	1.125
3 Methylpentane	1.041	0.860	0.792
n-Hexane	1.974	1.643	1.502
Methylcyclopentane	0.231	0.166	0.172
Benzene	0.064	0.036	0.044
Cyclohexane	0.465	0.321	0.346
2-Methylhexane	1.696	1.596	1.501
3-Methylhexane	1.420	1.319	1.256
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.906	0.814	0.794
n-Heptane	1.987	1.855	1.758
Methylcyclohexane	1.775	1.444	1.539
Toluene	0.495	0.336	0.403
Other C-8's	6.320	6.110	6.152
n-Octane	2.185	2.265	2.204
E-Benzene	0.878	0.686	0.823
M & P Xylenes	0.734	0.576	0.688
O-Xylene	1.476	1.136	1.384
Other C-9's	5.324	5.750	5.936
n-Nonane	2.373	2.702	2.688
Other C-10's	8.709	10.336	10.867
n-decane	2.435	3.024	3.060
Undecanes(11)	11.327	13.792	14.705
Dodecanes(12)	8.408	11.059	11.955
Tridecanes(13)	5.532	7.802	8.550
Tetradecanes(14)	2.884	4.357	4.840
Pentadecanes(15)	1.477	2.391	2.688
Hexadecanes(16)	0.586	1.013	1.148
Heptadecanes(17)	0.267	0.487	0.558
Octadecanes(18)	0.187	0.359	0.414
Nonadecanes(19)	0.095	0.190	0.220
Eicosanes(20)	0.047	0.098	0.114
Heneicosanes(21)	0.025	0.055	0.065
Docosanes(22)	0.019	0.043	0.051
Tricosanes(23)	0.008	0.020	0.024
Tetracosanes(24)	0.005	0.013	0.015
Pentacosanes(25)	0.003	0.008	0.010
Hexacosanes(26)	0.002	0.005	0.005
Heptacosanes(27)	0.001	0.003	0.004
Octacosanes(28)	0.001	0.002	0.003
Nonacosanes(29)	0.001	0.002	0.002
Triacontanes(30)	0.000	0.001	0.001
Hentriacontanes Plus(31+)	<u>0.001</u>	<u>0.003</u>	<u>0.004</u>
Total	100.000	100.000	100.000



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

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

Date Sampled: 09/25/2013

Date Analyzed: 10/02/2013

Sample: Yoke No. 1H (Maxwell Horizontal Pad)

Job Number: J35843

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	Stock Tank
Pressure, psig	200	0
Temperature, °F	69	70
Gas Oil Ratio (1)	-----	142
Gas Specific Gravity (2)	-----	1.144
Separator Volume Factor (3)	1.0761	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.9293
Oil API Gravity at 60 °F	56.94
Reid Vapor Pressure, psi (5)	2.51

Quality Control Check			
	Sampling Conditions	Test Samples	
Cylinder No.	-----	T-943*	T-966
Pressure, psig	200	198	209
Temperature, °F	69	70	70

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

(2) - Air = 1.000

(3) - Separator volume / Stock tank volume

(4) - Fraction of first stage separator liquid

(5) - Absolute pressure at 100 deg F

Analyst: _____ O. A.

* Sample used for flash study

Base Conditions: 14.73 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: Yoke No. 1H (Maxwell Horizontal Pad)
 Gas Evolved from Hydrocarbon Liquid Flashed
 From 200 psig & 69 °F to 0 psig & 70 °F

Date Sampled: 09/25/13

Job Number: 35843.001

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.250	
Carbon Dioxide	0.123	
Methane	35.935	
Ethane	30.932	8.225
Propane	18.489	5.065
Isobutane	3.361	1.094
n-Butane	5.774	1.810
2-2 Dimethylpropane	0.073	0.028
Isopentane	1.682	0.612
n-Pentane	1.243	0.448
Hexanes	1.135	0.466
Heptanes Plus	<u>1.003</u>	<u>0.440</u>
Totals	100.000	18.186

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity ----- 3.585 (Air=1)
 Molecular Weight ----- 102.82
 Gross Heating Value ----- 5398 BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity ----- 1.144 (Air=1)
 Compressibility (Z) ----- 0.9902
 Molecular Weight ----- 32.81
 Gross Heating Value
 Dry Basis ----- 1914 BTU/CF
 Saturated Basis ----- 1882 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: ANB
 Cylinder ID: ST-20

 David Dannhaus 361-661-7015

**CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT**

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.250		0.213
Carbon Dioxide	0.123		0.165
Methane	35.935		17.569
Ethane	30.932	8.225	28.350
Propane	18.489	5.065	24.850
Isobutane	3.361	1.094	5.954
n-Butane	5.774	1.810	10.229
2,2 Dimethylpropane	0.073	0.028	0.161
Isopentane	1.682	0.612	3.699
n-Pentane	1.243	0.448	2.734
2,2 Dimethylbutane	0.070	0.029	0.184
Cyclopentane	0.102	0.042	0.218
2,3 Dimethylbutane	0.371	0.151	0.975
2 Methylpentane	0.231	0.095	0.607
3 Methylpentane	0.000	0.000	0.000
n-Hexane	0.361	0.148	0.948
Methylcyclopentane	0.035	0.012	0.090
Benzene	0.019	0.005	0.045
Cyclohexane	0.053	0.018	0.136
2-Methylhexane	0.106	0.049	0.324
3-Methylhexane	0.105	0.048	0.321
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.117	0.051	0.354
n-Heptane	0.114	0.052	0.348
Methylcyclohexane	0.101	0.040	0.302
Toluene	0.038	0.013	0.107
Other C8's	0.159	0.074	0.534
n-Octane	0.039	0.020	0.136
Ethylbenzene	0.002	0.001	0.006
M & P Xylenes	0.018	0.007	0.058
O-Xylene	0.002	0.001	0.006
Other C9's	0.062	0.031	0.239
n-Nonane	0.012	0.007	0.047
Other C10's	0.018	0.010	0.078
n-Decane	0.003	0.002	0.013
Undecanes (11)	<u>0.000</u>	<u>0.000</u>	<u>0.000</u>
Totals	100.000	18.186	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity -----	1.144	(Air=1)
Compressibility (Z) -----	0.9902	
Molecular Weight -----	32.81	
Gross Heating Value		
Dry Basis -----	1914	BTU/CF
Saturated Basis -----	1882	BTU/CF

Antero Resources
Yoke Unit 1H - Maxwell Horizontal Pad

Tag Name	Value	Units	Timestamp
Accumulated Gas Flow	1096710	MCF	10/22/2013 15:07:41
Casing Pressure	230.75	PSIA	10/22/2013 15:07:40
Current Day Gas Flow	884.15	MCF	10/22/2013 15:07:41
Differential Pressure	8.09	inH2O	10/22/2013 15:07:41
Flow Rate	3450.06	MCF Per Day	10/22/2013 15:07:41
Pressure	170	PSIA	10/22/2013 15:07:41
Previous Day Energy	4288.41	MBTU	10/22/2013 15:07:41
Previous Day Gas Flow	3438.81	MCF	10/22/2013 15:07:41
Temperature	65.59	F	10/22/2013 15:07:41
Tubing Pressure	372.66	PSIA	10/22/2013 15:07:40
Daily AP	8.05	PSIA	10/22/2013 09:00:00
Daily DP	169.51	inH2O	10/22/2013 09:00:00
Daily Energy	4288.41	MBTU	10/22/2013 09:00:00
Daily Flow	3438.81	MCF	10/22/2013 09:00:00
Daily Tf	65.05	F	10/22/2013 09:00:00
Hourly AP	169.39	PSIA	10/22/2013 10:00:00
Hourly DP	8	Inches	10/22/2013 10:00:00
Hourly Energy	178.4	MBTU	10/22/2013 10:00:00
Hourly Flow Time	3600	Seconds	10/22/2013 10:00:00
Hourly Tf	63.5	F	10/22/2013 10:00:00
Hourly Volume	143	MCF	10/22/2013 10:00:00
Argon	0	%	10/22/2013 15:07:44
BTU	1247.06	BTU	10/22/2013 15:07:41
CO2	0.1467	%	10/22/2013 15:07:44
Carbon Monoxide	0	%	10/22/2013 15:07:44
Decane	0	%	10/22/2013 15:07:44
Ethane	14.1987	%	10/22/2013 15:07:44
Helium	0	%	10/22/2013 15:07:44
Heptane	0	%	10/22/2013 15:07:44
Hexane	0.5451	%	10/22/2013 15:07:44
Hydrogen	0	%	10/22/2013 15:07:44
Hydrogen Sulfide	0	%	10/22/2013 15:07:44
Iso-Butane	0.5666	%	10/22/2013 15:07:44
Iso-Pentane	0.3749	%	10/22/2013 15:07:44
Methane	77.6927	%	10/22/2013 15:07:44
N2	0.4946	%	10/22/2013 15:07:44
N-Butane	1.1838	%	10/22/2013 15:07:44
Nonane	0	%	10/22/2013 15:07:44
N-Pentane	0.2914	%	10/22/2013 15:07:44
Octane	0	%	10/22/2013 15:07:44
Oxygen	0.0117	%	10/22/2013 15:07:44
Plate Size	3.75	Inches	10/22/2013 15:07:43
Propane	4.4938	%	10/22/2013 15:07:44
SPG	0.7248		10/22/2013 15:07:41
Water	0	%	10/22/2013 15:07:44

Attachment T

Facility-wide Emissions Summary Sheet(s)

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	NOx		CO		VOC		SO2		PM10		PM2.5		GHG (CO2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-HR001									0.9323	0.2367				
EP-PCV					0.1030	0.4513							8.1294	35.6070
F001					4.5736	20.0324							96.8576	424.2361
EP-L001					5.4170	0.2060							4.6097	0.1753
EP-L002					1.35E-03	5.14E-04							0.8183	0.3111
EP-GPU001 through EP-GPU012 (emission per EPN)	0.0802	0.3512	0.0674	0.2950	0.0044	0.0193	0.0005	0.0021	0.0061	0.0267	0.0061	0.0267	96.2263	421.4713
EP-LH001 through EP-LH012 (emission per EPN)	0.1604	0.7025	0.1347	0.5901	0.0088	0.0386	0.0010	0.0042	0.0122	0.0534	0.0122	0.0534	192.4526	842.9426
EP-EC001 through EP-EC003 (emission per EPN)	0.0217	0.0948	0.0182	0.0797	0.3048	1.3349	0.0000	0.0000	0.0016	0.0072	0.0012	0.0054	66.0293	289.2084
TOTAL	2.9517	12.9287	2.4795	10.8601	1.0731	4.7000	0.0173	0.0760	0.2243	0.9826	0.2231	0.9772	3662.2356	16040.5921

Annual emissions shall be based on 8760 hours per year of operation for all emission units except emergency generators. According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-HR001														
EP-PCV			0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0123	0.0537	0.0123	0.0537
F001			0.0015	0.0068	0.0141	0.0616	0.0288	0.1260	0.0724	0.3171	0.2224	0.9742	0.3392	1.4857
EP-L001			6.71E-06	2.55E-07	1.11E-04	4.23E-06	2.84E-04	1.08E-05	0.001	2.82E-05	0.077	0.003	0.078	0.003
EP-L002			2.86E-08	1.09E-08	9.58E-08	3.64E-08	7.43E-08	2.82E-08	1.92E-07	7.29E-08	1.20E-08	4.56E-09	4.03E-07	1.53E-07
EP-GPU001 through EP-GPU012 (emission per EPN)	0.0001	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0063	0.0015	0.0066
EP-LH001 through EP-LH012 (emission per EPN)	0.0001	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0029	0.0126	0.0030	0.0132
EP-EC001 through EP-EC003 (emission per EPN)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0001	0.0003	0.0001	0.0006	0.0548	0.2401	0.0551	0.2413
TOTAL	0.0022	0.0095	0.0001	0.0003	0.0002	0.0010	0.0002	0.0008	0.0004	0.0019	0.2164	0.9480	0.2196	0.9618

Annual emissions shall be based on 8760 hours per year of operation for all emission units except emergency generators. According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above

Attachment U

Class I Legal Advertisement

Attachment U

**Air Quality Permit Notice
Notice of Application
Hughes 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 G70-C General Permit Modification for an Oil and Natural Gas Production facility located at 2604 Hunters Fork Rd. Salem, WV 26426, near Salem in Doddridge County, West Virginia.

The latitude and longitude coordinates are: 39.21939 and -80.62052

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

Pollutants	TOTALS (tpy):
NO _x	12.9287
CO	10.8601
PM _{2.5}	0.9772
PM ₁₀	0.9826
VOC	4.7000
SO ₂	0.0760
Formaldehyde	0.0095
Benzene	0.0003
Toluene	0.0010
Ethylbenzene	0.0008
Xylenes	0.0019
Hexane	0.9480
Total HAPs	0.9618

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

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

Dated this the __ day of _____, 2016

By: Antero Resources Corporation
Barry Schatz
Senior Environmental & Regulatory Manager
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