



July 8, 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
Hartley East 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 Hartley East Well Pad.

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

1. Decrease in production.
2. Addition of 4 Ford engines.
3. Removal of 1 Kubota engine.
4. Removal of 1 Cimarron enclosed combustor.
5. Removal of 4 line heaters.
6. Removal of 4 GPUs.
7. Addition of 3 vapor recovery towers.

Please refer to Table 14 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. 449974 in the amount of \$1,500.00.

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

Sincerely,

GHD Services Inc.

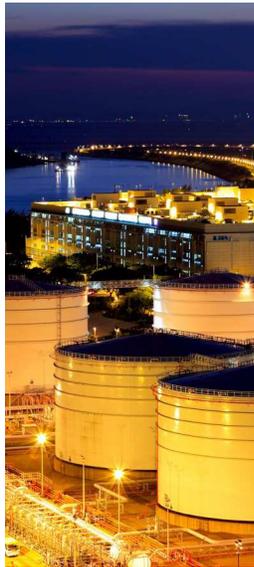
A handwritten signature in black ink, appearing to read 'Manuel Bautista', written in a cursive style.

Manuel Bautista

MB/ma/254

Encl.

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



General Permit G70-C Modification Application

Decrease in condensate production, addition of four Ford engines and three vapor recovery towers, removal of four GPUs, four line heaters, one Cimarron enclosed combustors and one Kubota engine.

Hartley East Well Pad

Antero Resources Corporation

GHD Services Inc.
6320 Rothway Suite 100 Houston Texas 77040
082715 | Report No 254 | July 2016

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west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25 4
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: Hartley East Well Pad

Operating Site Physical Address: 395 Rickey Run Rd.

City: Middlebourne

Zip Code: 26149

County: Tyler

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

Latitude: 39.36524

Longitude: -80.99324

SIC Code: 1311

DAQ Facility ID No. (For existing facilities)

NAICS Code: 211111

095-00043

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: 7/8/2016

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: Decrease in condensate production, removal of 4 GPUs, 4 line heaters 1 Cimarron enclosed combustors and 1 Kubota engine. Addition of 4 Ford engines and 3 vapor recovery towers.	
Directions to the facility: From the intersection of Main Street and US 50 near Ellenboro, head NORTH 0.2 miles toward Richie County School Rd. Take 2 nd right onto Co Rd. 50/39/old US 50W/ Washington St. for 1.4 miles. Turn LEFT on Co Rd. 1/ Hitchcock Run and follow for ~5.7 miles. Continue on CO Route 5/ Freeland-Hebron Rd, follow for ~1.1 miles. Turn RIGHT onto Co Route 3/2 and follow ~0.4 miles. Continue on Co Rd. 32/ Plum Run Rd. for ~0.3 miles. Turn RIGHT onto Brush Run Rd/Co Rd 6/5/Plum Run Rd and follow for ~0.4 miles. Slight LEFT onto Ricky Run and follow for ~0.4 miles. Access road will be on left.	
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 checked="" 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 checked="" 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:
CR61716

6/17/2016

40WVDEPAQ

401010376

449974

1,500.00

TOTAL : 1,500.00

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

GHD SERVICES INC.

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

M&T BANK

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

6/17/2016

NO. 449974

PAY

*****1,500

DOLLARS AND

*****00

CENTS

\$*****1,500.00

TO THE
ORDER
OF

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

GHD SERVICES INC.

AUTHORIZED SIGNATURES

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

⑈ 449974 ⑈ ⑆ 221370632⑆ 61000000118910 ⑈

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 Hartley East 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 Walnut Well Pad. This well pad operates independently and is approximately 3.66 mile southwest of the facility.

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. **NOT APPLICABLE – No facility within one mile**

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.	Yes <input 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 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 type="checkbox"/>
Do the facilities share common workforces, plant managers, security forces, corporate executive officers or board executives?	Yes <input 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 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 type="checkbox"/>
Does one (1) facility operation support the operation of the other facility?	Yes <input type="checkbox"/>	No <input 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.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Are there any financial arrangements between the two (2) entities?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Are there any legal or lease agreements between the two (2) facilities?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Do the facilities share products, byproducts, equipment, or other manufacturing or air pollution control device equipment? Please explain.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Do all the pollutant-emitting activities at the facilities belong to the same SIC Code? Please provide the SIC Codes.	Yes <input 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.	Yes <input type="checkbox"/>	No <input 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 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.	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Attachment B

Siting Criteria Waiver

Attachment B

Siting Waiver

Hartley East Well Pad

Antero Resources Corporation

Tyler County, West Virginia

A Siting Waiver form is not required because there are no occupied dwelling structures within 300 feet of Hartley East 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)
- 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
- Signature information (See below *Important Legal Notice Regarding Signature):
Print Name of Signer: Alvyn A. Schopp Title/Capacity: Authorized Person
Signature: *Alvyn A. Schopp* Date: June 10, 2013

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

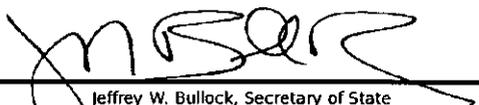
A FILED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS.

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.

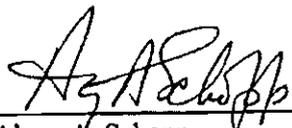
2. This Amendment to the Amended and Restated Certificate of Incorporation has been duly adopted and approved in accordance with Sections 242 of the General Corporation Law of the State of Delaware.

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.

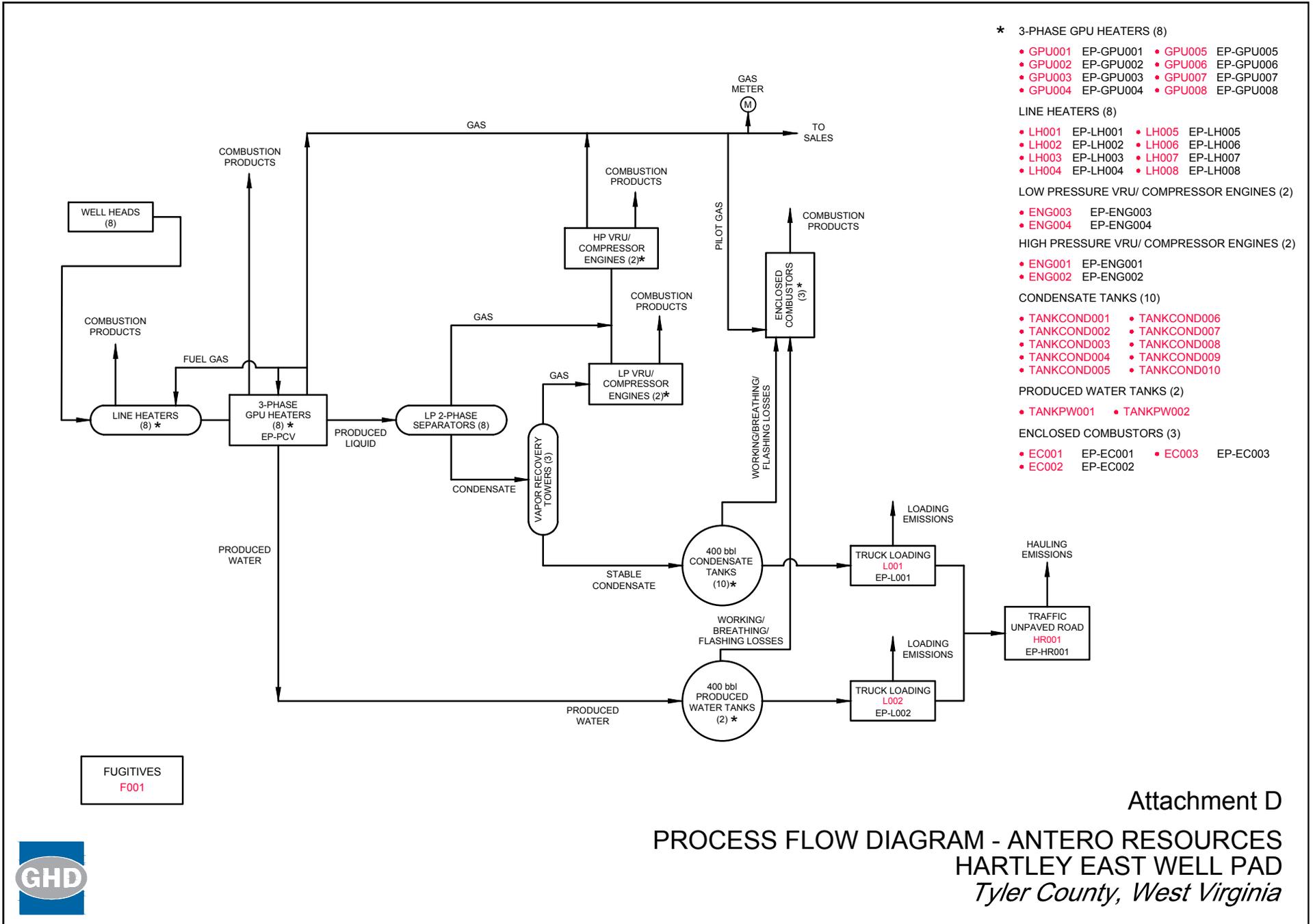
IN WITNESS WHEREOF, the Corporation has caused this Certificate of Amendment to be executed by its duly authorized officer on the 10th day of June, 2013.

ANTERO RESOURCES APPALACHIAN CORPORATION

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

Attachment D

Process Flow Diagram



- * 3-PHASE GPU HEATERS (8)
 - GPU001 EP-GPU001 • GPU005 EP-GPU005
 - GPU002 EP-GPU002 • GPU006 EP-GPU006
 - GPU003 EP-GPU003 • GPU007 EP-GPU007
 - GPU004 EP-GPU004 • GPU008 EP-GPU008
- LINE HEATERS (8)
 - LH001 EP-LH001 • LH005 EP-LH005
 - LH002 EP-LH002 • LH006 EP-LH006
 - LH003 EP-LH003 • LH007 EP-LH007
 - LH004 EP-LH004 • LH008 EP-LH008
- LOW PRESSURE VRU/ COMPRESSOR ENGINES (2)
 - ENG003 EP-ENG003
 - ENG004 EP-ENG004
- HIGH PRESSURE VRU/ COMPRESSOR ENGINES (2)
 - ENG001 EP-ENG001
 - ENG002 EP-ENG002
- CONDENSATE TANKS (10)
 - TANKCOND001 • TANKCOND006
 - TANKCOND002 • TANKCOND007
 - TANKCOND003 • TANKCOND008
 - TANKCOND004 • TANKCOND009
 - TANKCOND005 • TANKCOND010
- PRODUCED WATER TANKS (2)
 - TANKPW001 • TANKPW002
- ENCLOSED COMBUSTORS (3)
 - EC001 EP-EC001 • EC003 EP-EC003
 - EC002 EP-EC002

Attachment D
**PROCESS FLOW DIAGRAM - ANTERO RESOURCES
 HARTLEY EAST WELL PAD
 Tyler County, West Virginia**



Attachment E

Process Description

Attachment E

Process Description Hartley East Well Pad Antero Resources Corporation Tyler 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 (LH001-008) and gas production units (GPU001-GPU008) 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 gas from the three phase separators is metered and sent to the sales gas pipeline. The water flow to the produced water storage tanks (TANKPW001-002). The condensate is then sent to two phase low pressure separators where gas is further separated. The gas is routed to the high pressure VRU driven by gas fueled engines (ENG001-002), compressed, metered and sent to the sales gas line. The condensate from the two phase separators then flows to the vapor recovery towers (VRT001-003) where gas is further separated. Gas from the VRTs is recovered via the low pressure VRU driven by gas fueled engines (ENG003-004), compressed, metered and sent to the sales gas line through the high pressure compressors. The condensate from the VRTs flows to the condensate storage tanks (TANKSCOND001-010). The line heaters are only used during the first several months from start of production and will be removed once production has normalized.

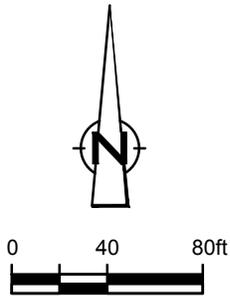
The facility has ten (10) tanks (TANKCOND001-010) on site to store condensate and two (2) tanks (TANKPW001-002) to store produced water prior to removal from the site. The flashing, working and breathing losses from the tanks are routed to three enclosed combustors (EC001-003) to control the emissions. The enclosed combustor(s) 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 site specific extended analysis of condensate and gas from Freeland Unit 2H, one of the wells from the Hartley East Well Pad.

Attachment F

Plot Plan



TANKCOND001
 TANKCOND002
 TANKCOND003
 TANKCOND004
 TANKCOND005
 TANKCOND006
 TANKCOND007
 TANKCOND008
 TANKCOND009
 TANKCOND010
 TANKPW001
 TANKPW002

VRTs
 VRT001
 VRT002
 VRT003

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

FREELAND UNIT 2H ○
 FREELAND UNIT 1H ○
 WOODWORTH UNIT 1H ○
 WOODWORTH UNIT 2H ○
 WOODWORTH UNIT 3H ○
 PLUM RUN UNIT 1H ○
 PLUM RUN UNIT 2H ○
 PLUM RUN UNIT 3H ○

PRODUCTION
 EQUIPMENT
 (EP-PCV)

HAULING ROUTE
 (EP-HR001)
 HR001

L001
 L002
 (EP-L001,
 EP-L002)

FACILITY
 FUGITIVES
 F001

GPU001 (EP-GPU001)
 GPU002 (EP-GPU002)
 GPU003 (EP-GPU003)
 GPU004 (EP-GPU004)
 GPU005 (EP-GPU005)
 GPU006 (EP-GPU006)
 GPU007 (EP-GPU007)
 GPU008 (EP-GPU008)

LOW PRESSURE
 VRU/COMPRESSOR
 ENGINES

ENG003 (EP-ENG003)
 ENG004 (EP-ENG004)

HIGH PRESSURE
 VRU/COMPRESSOR
 ENGINES

ENG001 (EP-ENG001)
 ENG002 (EP-ENG002)

ACCESS ROAD

LEGEND

○ EXISTING WELL LOCATION

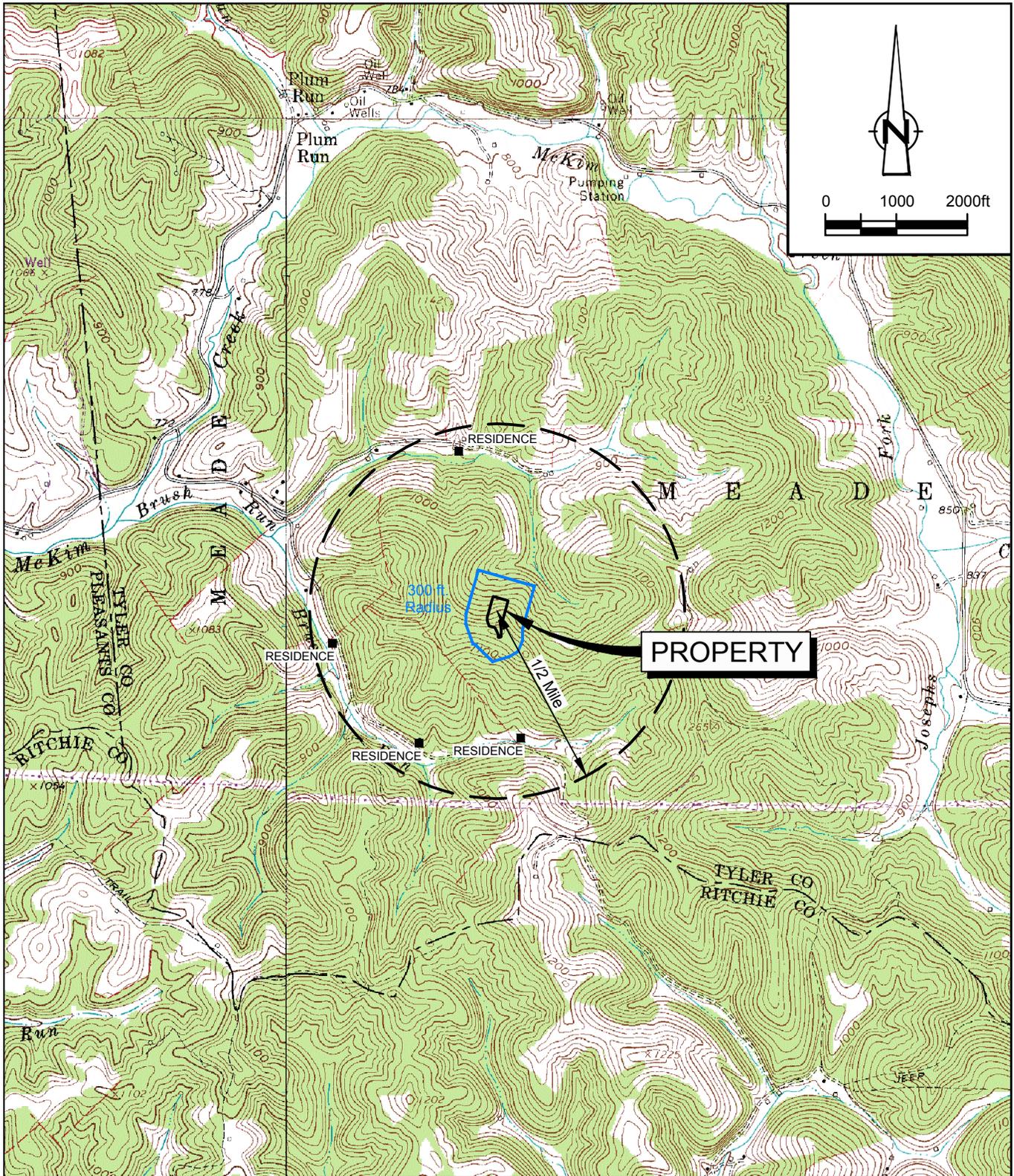


Attachment F

PLOT PLAN
 HARTLEY EAST PAD
 ANTERO RESOURCES
 Tyler County, West Virginia

Attachment G

Area Map



SOURCE: USGS QUADRANGLE MAP;
 BENS RUN, WEST VIRGINIA
 ELLENBORO, WEST VIRGINIA
 MIDDLEBOURNE, WEST VIRGINIA
 PENNSBORO, WEST VIRGINIA
 SITE COORDINATES: LAT. 39.365245, LONG. -80.993244



Attachment G
 AREA MAP
 HARTLEY EAST WELL PAD
 ANTERO RESOURCES
 Tyler 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 checked="" 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	Emission Point ID	Emission Unit Description	Year Installed/ Modified	Manufac. Date	Design Capacity	Type and Date of Change	Control Device(s)	ERD (s)
GPU001, GPU002, GPU003, GPU004, GPU005, GPU006, GPU007, GPU008	EP-GPU001, EP-GPU002, EP-GPU003, EP-GPU004, EP-GPU005, EP-GPU006, EP-GPU007, EP-GPU008	Gas Production Unit Heater	(6)-2015, (2)-2014		1.5 MMBtu/hr	Existing	N/A	
GPU009, GPU010, GPU011, GPU012	EP-GPU009, EP-GPU010, EP-GPU011, EP-GPU012	Gas Production Unit Heater	(4)-2015		1.5 MMBtu/hr	Removal	N/A	
LH001, LH002, LH003, LH004, LH005, LH006, LH007, LH008	EP-LH001, EP-LH002, EP-LH003, EP-LH004, EP-LH005, EP-LH006, EP-LH007, EP-LH008	Line Heater	2015		2.0 MMBtu/hr	Existing	N/A	
LH009, LH010, LH011, LH012	EP-LH009, EP-LH010, EP-LH011, EP-LH012	Line Heater	2015		2.0 MMBtu/hr	Removal		
F001	F001	Fugitives	2014-2015		N/A	Existing	N/A	
TANKCOND001-010	EP-EC001, EP-EC002, EP-EC003	Condensate Tank F/W/B	(6)-2014, (4)-2015		400 bbl each	Existing	EC001, EC002, EC003	
TANKPW001-002	EP-EC001, EP-EC002, EP-EC003	PW Tank F/W/B	2014		400 bbl each	Existing	EC001, EC002, EC003	
L001	EP-L001	Loading (Condensate)	2014		200 bbl capacity (each)	Existing	N/A	
L002	EP-L002	Loading (Produced Water)	2014		200 bbl capacity (each)	Existing	N/A	
HR001	EP-HR001	Haul Truck	2014		40 ton capacity	Existing	N/A	
EC001, EC002, EC003	EP-EC001, EP-EC002, EP-EC003	Enclosed Combustor	2015		90 scf/min	Existing	N/A	
EC004	EP-EC004	Enclosed Combustor	2014		90 scf/min	Removal	N/A	
PCV	EP-PCV	Pneumatic CV	2014-2015		6.6 scf/day/PCV	Existing	N/A	
ENG001	EP-ENG001	Compressor Engine	2014	2013	24 HP	Removal	N/A	
ENG001, ENG002	EP-ENG001, EP-ENG002	High Pressure VRU Compressor Engine	2016	2015	68 HP	New	Non-Selective Catalytic Reduction	
ENG003, ENG004	EP-ENG003, EP-ENG004	Low Pressure VRU Compressor Engine	2016	2016	99 HP	New	Non-Selective Catalytic Reduction	

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

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

3 When required by rule.

4 New, modification, removal, existing.

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

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

Attachment J

Fugitive Emissions Summary Sheet

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

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

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

Source/Equipment:

Leak Detection Method Used		<input type="checkbox"/> Audible, visual, and	<input checked="" type="checkbox"/> Infrared (FLIR) cameras	<input type="checkbox"/> Other (please describe)	<input type="checkbox"/> None required		
Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO ₂ e)
Valves	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	400	EPA	gas	2.79	0.46	271.66
Valves	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	416	EPA	liquid	9.57	1.05	3.73
Connections (Not sampling)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	472	EPA	gas	0.15	2.43E-02	14.25
Flanges	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	104	EPA	gas	0.06	1.04E-02	6.12
Loading	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	2	EPA	gas	15.40	1.57E-01	1.22

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

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

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

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

Attachment K

Gas Well Affected Facility Data Sheet

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

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

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device
470-950-21850	3/1/2017	10/1/2016	Green
470-950-21270	9/6/2014	8/1/2014	Green
470-950-22460	3/1/2017	10/1/2016	Green
470-950-22470	3/1/2017	10/1/2016	Green
470-950-22480	3/1/2017	10/1/2016	Green
470-950-22220	3/1/2017	10/1/2016	Green
470-950-22490	3/1/2017	10/1/2016	Green
470-950-22500	3/1/2017	10/1/2016	Green

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

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

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

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

Where,

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

Attachment L

Storage Vessel Data Sheet

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

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

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name: Tanks	2. Tank Name: Condensate Tank 001-010
3. Emission Unit ID number: TANKCOND001-010	4. Emission Point ID number: EP-EC001, EP-EC002, EP-EC003

5. Date Installed, Modified or Relocated (for existing tanks) (6)-2014, (4)-2015 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
--

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): 12509280	13B. Maximum daily throughput (gal/day): 34272
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 75	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 (6)-2014, (4)-2015

22. Shell Condition (if metal and unlined):

- No Rust Light Rust Dense Rust Not applicable

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

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

Must be listed for tanks using VRUs with closed vent system

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

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

25A. Year Internal Floaters Installed: _____

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

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

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

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

25F. Describe deck fittings _____

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

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

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

26D. Deck seam length (ft) _____ 26E. Area of deck (ft²) _____ 26F. For column supported tanks: Number of columns: _____ 26G. For column supported tanks, Diameter of each column: _____

27. Closed Vent System with VRU Yes No

28. Closed Vent System with Enclosed Combustor? Yes No

ATTACHMENT L – STORAGE VESSEL DATA SHEET

SITE INFORMATION

29. Provide the city and state on which the data in this section are based.: Charleston, 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) 3.75	
39A. Average Liquid Surface Temperature (°F) 65.08	39B. Corresponding Vapor Pressure (psia) 5.26	
40A. Maximum Liquid Surface Temperature (°F) 75.94	40B. Corresponding Vapor Pressure (psia) 6.35	

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)	5.4900		
41D. Liquid Molecular Weight (lb/lb-mole)	82.20		
41E. Vapor Molecular Weight (lb/lb-mole)	44.7384		
Maximum Vapor Pressure	6.3454		
41F. True (psia)			
41G. Reid (psia)	7.2800		
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): 7435050	13B. Maximum daily throughput (gal/day): 20370
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 222	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.: Charleston, 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)	0.22
39A. Average Liquid Surface Temperature (°F)	65.08	39B. Corresponding Vapor Pressure (psia)	0.37
40A. Maximum Liquid Surface Temperature (°F)	75.94	40B. Corresponding Vapor Pressure (psia)	0.49
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)	18.4702		
Maximum Vapor Pressure	0.4921		
41F. True (psia)			
41G. Reid (psia)	1.0226		
Months Storage per Year	year round		
41H. From - To			

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

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

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

Emission Unit ID#	Emission Point ID#	Emission Unit Description (Manufacturer, model#)	Year Installed/ Modified	Type and Date of Change	Maximum Design Heat Input (MMBTU/hr)	Fuel Heating Value (BTU/scf)
GPU001	EP-GPU001	Gas Production Unit Heater	2014	Existing	1.5	1245.9985
GPU002	EP-GPU002	Gas Production Unit Heater	2014	Existing	1.5	1245.9985
GPU003	EP-GPU003	Gas Production Unit Heater	2015	Existing	1.5	1245.9985
GPU004	EP-GPU004	Gas Production Unit Heater	2015	Existing	1.5	1245.9985
GPU005	EP-GPU005	Gas Production Unit Heater	2015	Existing	1.5	1245.9985
GPU006	EP-GPU006	Gas Production Unit Heater	2015	Existing	1.5	1245.9985
GPU007	EP-GPU007	Gas Production Unit Heater	2015	Existing	1.5	1245.9985
GPU008	EP-GPU008	Gas Production Unit Heater	2015	Existing	1.5	1245.9985
GPU009	EP-GPU009	Gas Production Unit Heater	2015	Removal	1.5	1245.9985
GPU010	EP-GPU010	Gas Production Unit Heater	2015	Removal	1.5	1245.9985
GPU011	EP-GPU011	Gas Production Unit Heater	2015	Removal	1.5	1245.9985
GPU012	EP-GPU012	Gas Production Unit Heater	2015	Removal	1.5	1245.9985
LH001	EP-LH001	Line Heater	2015	Existing	2.0	1245.9985
LH002	EP-LH002	Line Heater	2015	Existing	2.0	1245.9985
LH003	EP-LH003	Line Heater	2015	Existing	2.0	1245.9985
LH004	EP-LH004	Line Heater	2015	Existing	2.0	1245.9985
LH005	EP-LH005	Line Heater	2015	Existing	2.0	1245.9985
LH006	EP-LH006	Line Heater	2015	Existing	2.0	1245.9985
LH007	EP-LH007	Line Heater	2015	Existing	2.0	1245.9985
LH008	EP-LH008	Line Heater	2015	Existing	2.0	1245.9985
LH009	EP-LH009	Line Heater	2015	Removal	2.0	1245.9985
LH010	EP-LH010	Line Heater	2015	Removal	2.0	1245.9985
LH011	EP-LH011	Line Heater	2016	Removal	2.0	1245.9985
LH012	EP-LH012	Line Heater	2016	Removal	2.0	1245.9985

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 N

Internal Combustion Engine Data Sheet

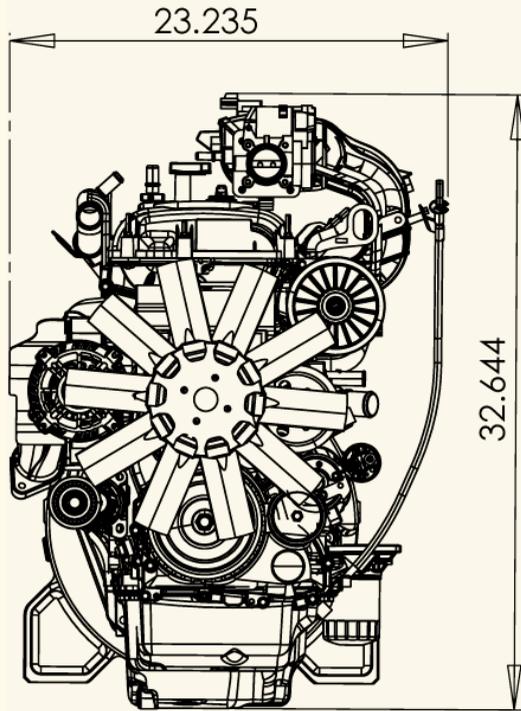
ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. *Generator(s) and microturbine generator(s) shall also use this form.*

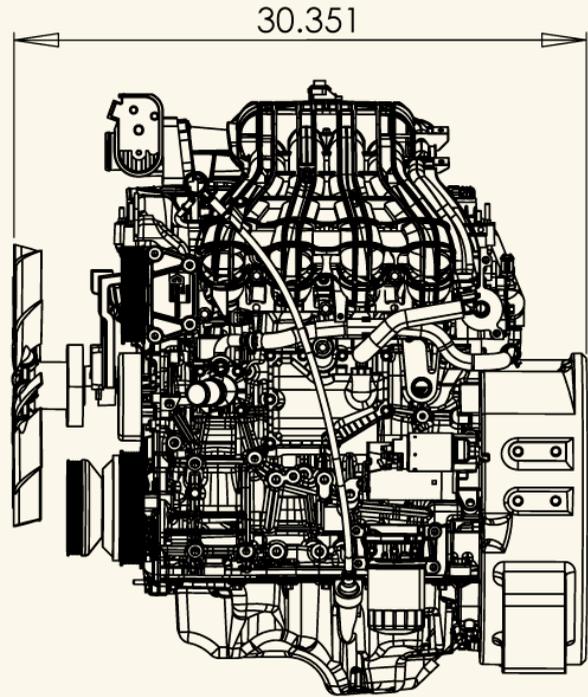
Emission Unit ID#		ENG001, ENG002		ENG003, ENG004		ENG001	
Engine Manufacturer/Model		Engine (MSG-425 2.5L Engine)		Engine (CSG-637 3.7L Engine)		Engine (Kubota DG972-E2)	
Manufacturers Rated bhp/rpm		68 HP @ 3200 rpm		99 HP @ 3200 rpm		24 HP @ 3600 rpm	
Source Status		NS		NS		REM	
Date Installed/ Modified/ Removed/ Relocated		2016		2016		2014	
Engine Manufacturer/ Reconstruction Date		2015		2016		2013	
Check all applicable Federal Rules for the engine (include EPA Certification of Conformity if applicable)		<input checked="" type="checkbox"/> 40CFR60 Subpart JJJJ <input checked="" type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input checked="" type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources		<input checked="" type="checkbox"/> 40CFR60 Subpart JJJJ <input checked="" type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input checked="" type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources		<input checked="" type="checkbox"/> 40CFR60 Subpart JJJJ <input checked="" type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input checked="" type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources	
Engine Type		4SRB		4SRB		4SRB	
APCD Type		NSCR		NSCR		NSCR	
Fuel Type		RG		RG		RG	
H2S (gr/ 100 scf)		0		0		0	
Operating bhp/rpm		50 HP @ 2200 rpm		68 HP @ 2200 rpm		16.5 HP @ 2400 rpm	
BSFC (BTU/bhp-hr)		8597		7974		9773	
Hourly Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)		345.00 ft ³ /hr gal/hr		435.20 ft ³ /hr gal/hr		193 ft ³ /hr gal/hr	
Fuel Usage or Hours of Operation Metered		3.022 MMft ³ /yr gal/yr		3.812352 MMft ³ /yr gal/yr		1.69068 MMft ³ /yr gal/yr	
Calculation Methodology	Pollutant	Hourly PTE (lb/hr)	Annual PTE (tons/year)	Hourly PTE (lb/hr)	Annual PTE (tons/year)	Hourly PTE (lb/hr)	Annual PTE (tons/year)
MD	NOx	0.1119	0.4900	0.1303	0.5707	0.3158	1.3831
MD	CO	0.7384	3.2341	1.0750	4.7085	5.6445	24.7228
AP	VOC	0.0346	0.1516	0.0467	0.2047	0.0071	0.0311
AP	SO2	0.0007	0.0030	0.0009	0.0041	0.0001	0.0006
AP	PM10	0.0111	0.0487	0.0150	0.0657	0.0023	0.0100
AP	Formaldehyde	0.0240	0.1050	0.0324	0.1418	0.0049	0.0215
AP	Total HAPs	0.0268	0.1176	0.0362	0.1587	0.0055	0.0241
OT	GHG (CO2e)	128.6169	563.3422	173.6822	760.7281	27.7765	121.6612

Installation Drawings

Front End View

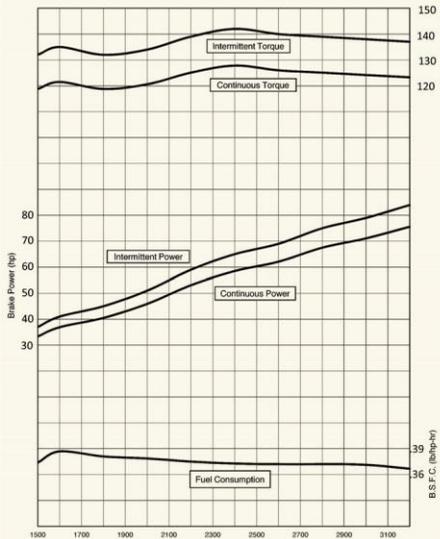


Left Side View



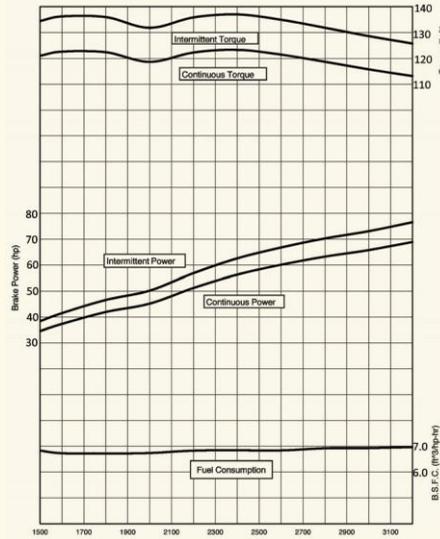
Power Curves (corrected per SAE J1349)

Gasoline



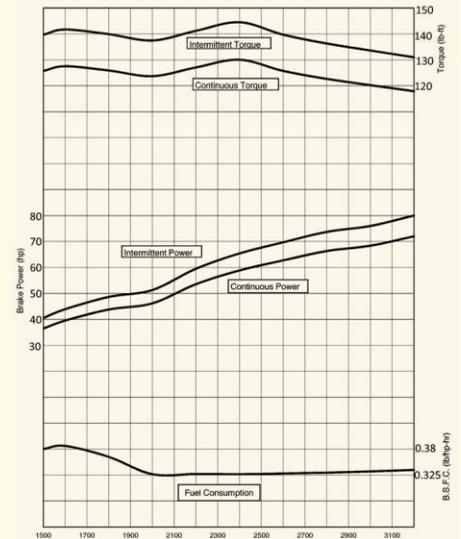
Engine Speed (RPM)

Natural Gas



Engine Speed (RPM)

Liquefied Petroleum Gas



Engine Speed (RPM)



Powertrain Assemblies
& Components
Provided By Ford
Component Sales



MSG-425 EFI

2.5 Liter 4-Cylinder



Options

Engine Cooling Fans

- 15" (381mm) diameter suction
- 15" (381mm) diameter pusher

Flywheels

- 10" (254mm) SAE over-center clutch
- flat face flywheel

Flywheel Housings

- SAE #4

Exhaust Manifold

- rear dump down

Power Steering Pump

Wiring Harnesses

Discrete Speed Switch

Variable Speed Hand Throttle

Variable Speed Foot Pedal

Engine Mounts

- Automotive with insulators
- Open power unit

Electronic Instrument Panel, Gauges

Three Way Catalyst / Muffler Standard

Transmissions

6R80 electronic shift

C6 Mechanical

Emissions Information

California Air Resources Board (CARB)

Environmental Protection Agency (EPA)

Emission Certified Packages Available.

Warranty

Contact Engine Distributors, Inc
for warranty details.



Powertrain Assemblies
& Components
Provided By Ford
Component Sales

Specifications

Engine Type	I-4
Bore and Stroke	3.5"x3.93" (89mm x 100mm)
Displacement	2.5L Liter (152.5 CID)
Compression Ratio	9.7:1
Oil Capacity	7 qts. including filter
Net Weight	351 Lbs. with accessories (159 Kgs.)
Dimensions	L 30.3" x W 23.3" x H 32.6" (769 mm x 589 mm x 828 mm)

GASOLINE (corrected per SAE J1349)

Unleaded 87 or 89 octane		
Intermittent Power	84 [HP] @ 3200rpm	(62 [kW] @ 3200rpm)
Continuous power	75 [HP] @ 3200rpm	(56 [kW] @ 3200rpm)
Intermittent Torque	137 [ft-lbs] @ 3200rpm	(185 [N-m] @ 3200rpm)
Continuous Torque	123 [ft-lbs] @ 3200rpm	(166 [N-m] @ 3200rpm)

NATURAL GAS (corrected per SAE J1349)

Fuel Specification	1050 BTU/FT ³	
Intermittent Power	76 [HP] @ 3200rpm	(56 [kW] @ 3200rpm)
Continuous power	68 [HP] @ 3200rpm	(50 [kW] @ 3200rpm)
Intermittent Torque	125 [ft-lbs] @ 3200rpm	(169 [N-m] @ 3200rpm)
Continuous Torque	113 [ft-lbs] @ 3200rpm	(153 [N-m] @ 3200rpm)

LIQUEFIED PETROLEUM GAS (corrected per SAE J1349)

Fuel Specification	HD-5	
Intermittent Power	80 [HP] @ 3200rpm	(59 [kW] @ 3200rpm)
Continuous power	72 [HP] @ 3200rpm	(53 [kW] @ 3200rpm)
Intermittent Torque	131 [ft-lbs] @ 3200rpm	(177 [N-m] @ 3200rpm)
Continuous Torque	118 [ft-lbs] @ 3200rpm	(160 [N-m] @ 3200rpm)

Standard Features / Benefits

Set-for-life valvetrain

Deep skirted, ribbed cylinder block casting for rigidity

Aluminum AA319 cylinder block cast with the Cosworth process,
including cast-in-place iron cylinder liners.

Chain driven dual camshafts with automatic tensioning system

Structural front cover and oil pan

Alternate fuel ready valvetrain components

Individual coil on plug electronic ignition

Cast aluminum camshaft cover to ensure warp-free sealing

Sintered metal connecting rods

Nodular iron crankshaft, featuring five main bearings,
eight counterweights

Broadband knock sensor, calibrated for individual cylinder use

Gasoline Sequential Port Fuel Injection

Closed loop fuel control for all fuels

Electronic engine management system with built-in engine
protection against detonation, high coolant temperature, low oil
pressure, over speed shutdown and starter lockout

Next generation governing - discrete speeds, variable speeds,
drive by wire - using the highest quality components.

Pursuant to the authority vested in the Air Resources Board by the Health and Safety Code, Division 26, Part 5, Chapters 1 and 2; and

Pursuant to the authority vested in the undersigned by Health and Safety Code Sections 39515 and 39516 and Executive Order G-14-012;

IT IS ORDERED AND RESOLVED: That the following new large spark-ignition engines and emission control systems produced by the manufacturer are certified for use in off-road equipment as described below. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY NAME	ENGINE DISPLACEMENT (liters)	FUEL TYPE
2015	FEDIB02.5MSG	2.5	Gasoline, LPG, CNG, Gasoline-LPG Dual Fuel
DURABILITY HOURS	SPECIAL FEATURES & EMISSION CONTROL SYSTEMS		TYPICAL EQUIPMENT USAGE
5000	Three-Way Catalytic Converter, Heated Oxygen Sensor, Sequential Multiport Fuel Injection (Gas), Gaseous Fuel Mixer (LPG, CNG)		Forklift, Aerial Lift, Generator, Compressor, Pump, Other Industrial Equipment
ENGINE MODELS (rated power in kilowatt, kW)		MSG425-DF (64.3 kW), MSG425-GAS (64.3 kW), MSG425-LPG (59.8 kW), MSG425-LP VAPOR (59.8 kW), MSG425-NG (57.3 kW)	

The following are the hydrocarbon plus oxides of nitrogen (HC+NOx) and carbon monoxide (CO) exhaust certification emission standards (Title 13, California Code of Regulations, (13 CCR) Section 2433(b)(1)) and certification emission levels for this engine family in grams per kilowatt-hour (g/kW-hr). Engines within this engine family shall have closed crankcases in conformance with 13 CCR Section 2433(b)(3).

(g/kW-hr)	HC+NOx	CO
Exhaust Standards	0.8	20.6
Certification Levels	0.5	3.3

The following is the evaporative hydrocarbon emission standard (13 CCR Section 2433(b)(4)) and certification emission level for this engine family in grams per gallon of fuel tank capacity (g/gallon).

Evaporative Certification Method	HC Certification Level (g/gallon)	HC Certification Standard (g/gallon)
Design Based	N/A	0.2

BE IT FURTHER RESOLVED: That for the listed engines for the aforementioned model-year, the manufacturer has submitted, and the Executive Officer hereby approves, the information and materials to demonstrate certification compliance with 13 CCR Section 2433(c) (certification and test procedures), 13 CCR Section 2434 (emission control labels), and 13 CCR Sections 2435 and 2436 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 14th day of November 2014.

FOR Annette Hebert, Chief
 Emissions Compliance, Automotive Regulations and Science Division



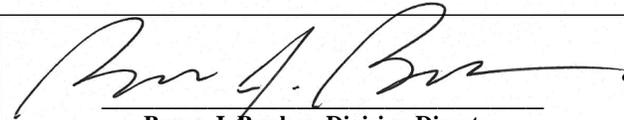
**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2015 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT**

**OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105**

Certificate Issued To: Engine Distributors, Inc.
(U.S. Manufacturer or Importer)
Certificate Number: FEDIB02.5MSG-002

Effective Date:
12/09/2014

Expiration Date:
12/31/2015


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
12/09/2014
Revision Date:
N/A

Manufacturer: Engine Distributors, Inc.
Engine Family: FEDIB02.5MSG
Certification Type: Mobile and Stationary
Fuel : LPG/Propane
Gasoline (up to and including 10% Ethanol)
Natural Gas (CNG/LNG)
Emission Standards : NMHC + NOx (g/kW-hr) : 0.8
HC + NOx (g/kW-hr) : 0.8
CO (g/kW-hr) : 20.6
NMHC + NOx (g/kW-hr) : 0.8
HC + NOx (g/kW-hr) : 0.8
CO (g/kW-hr) : 20.6
Emergency Use Only : N

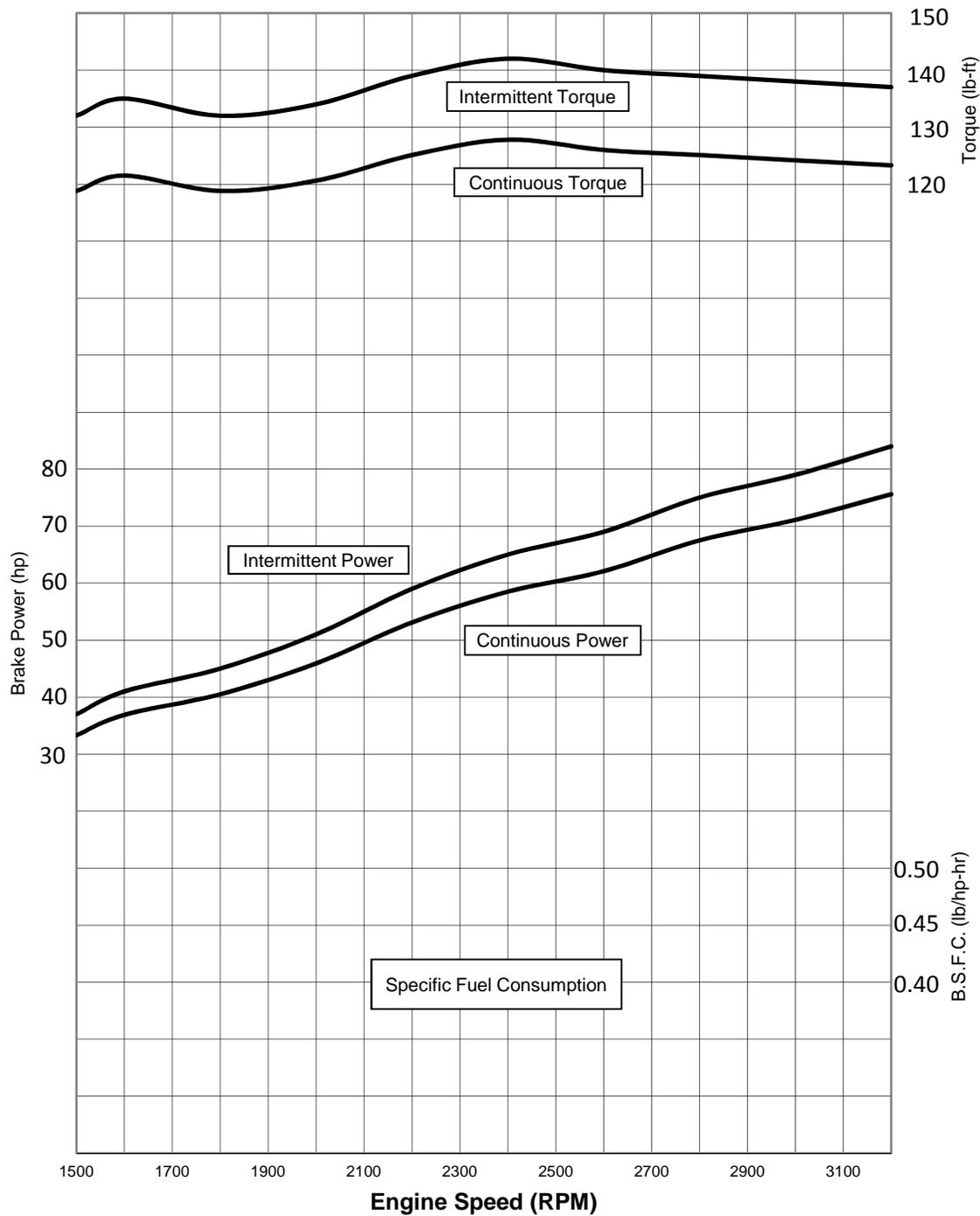
Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 1048. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

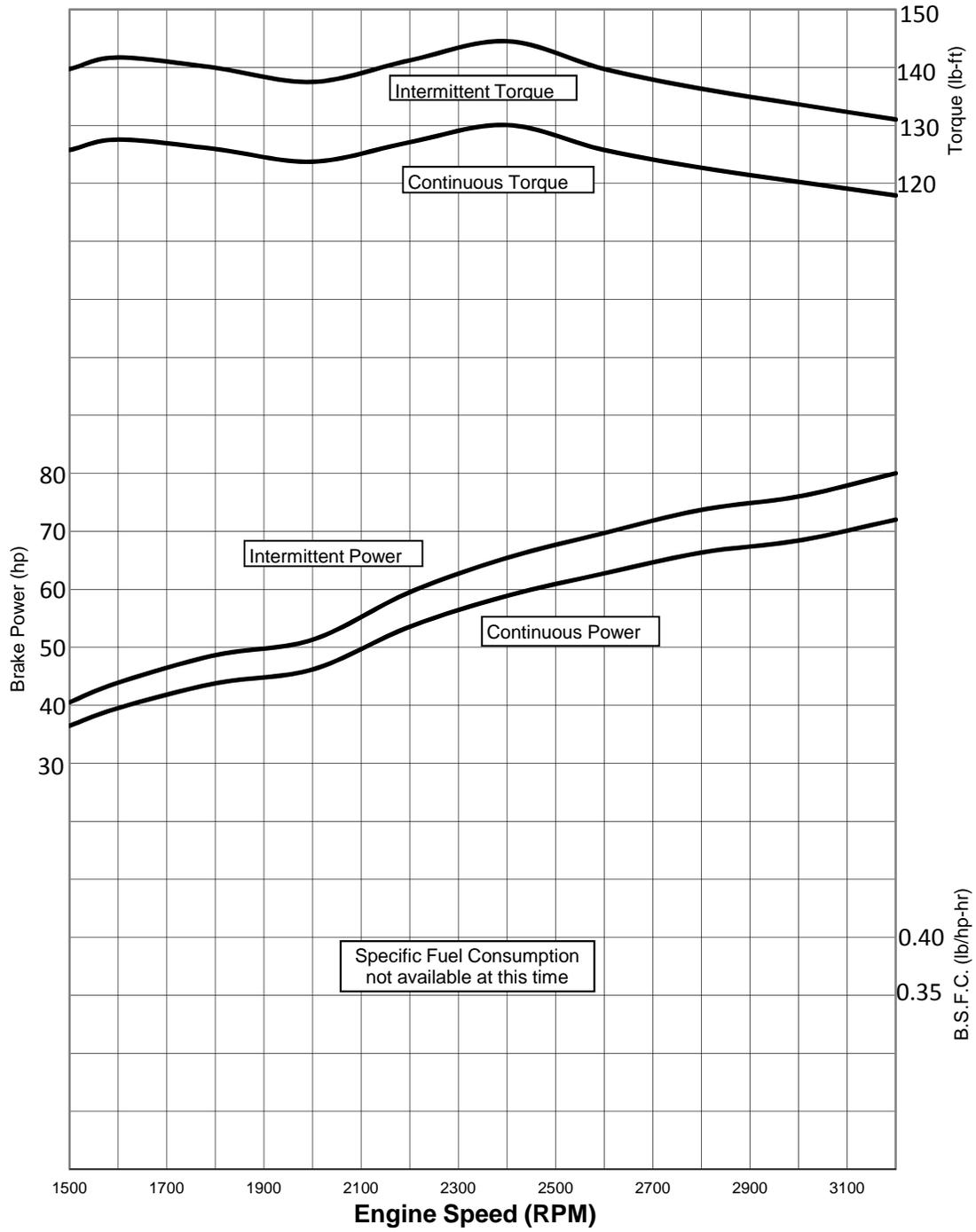
It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60, 40 CFR Part 1048. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60, 40 CFR Part 1048.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

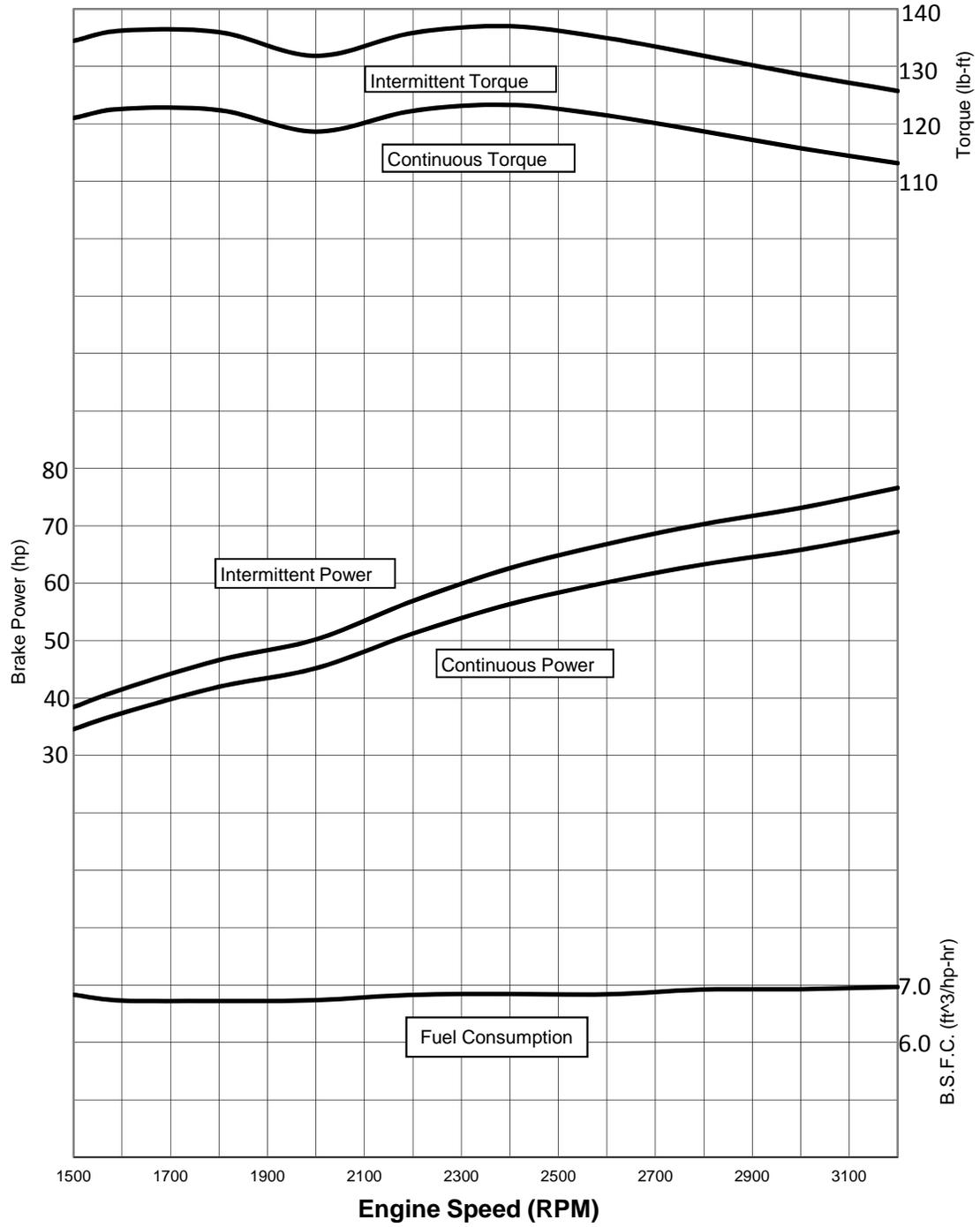
Gasoline



LP

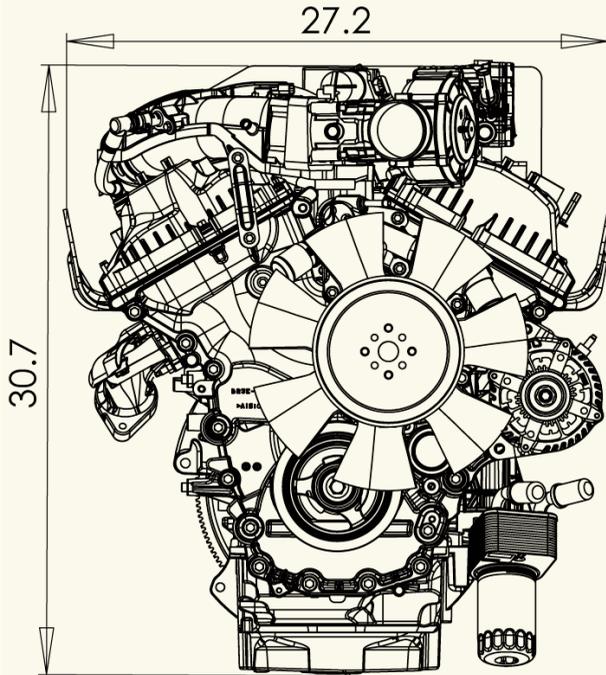


NG

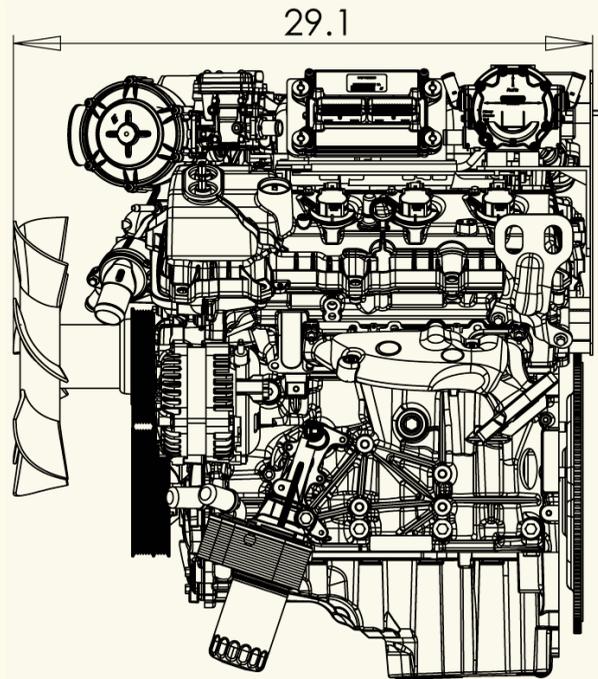


Installation Drawings

Front End View

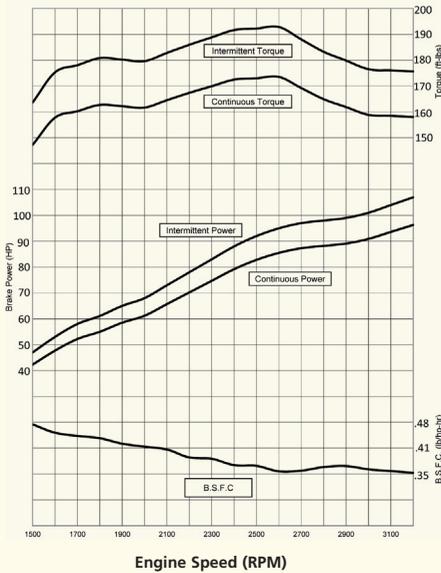


Left Side View

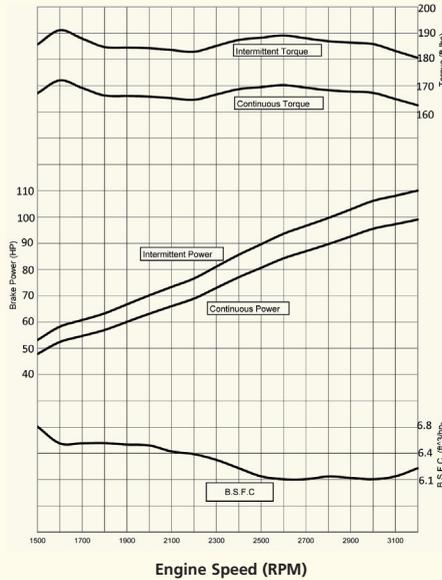


Power Curves (corrected per SAE J1349)

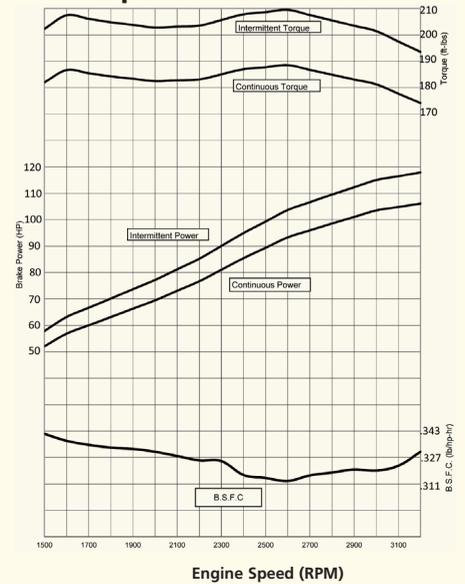
Gasoline



Natural Gas



Liquefied Petroleum Gas



Powertrain Assemblies
& Components
Provided By Ford
Component Sales

For additional information Contact:

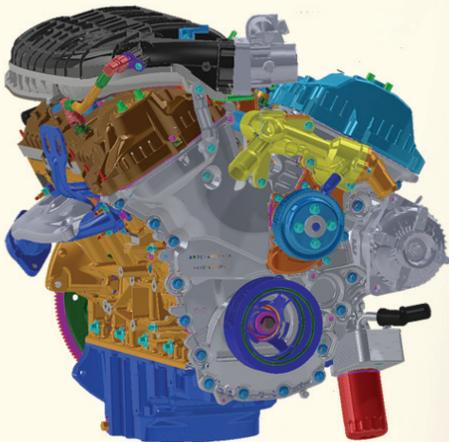
**ENGINE
DISTRIBUTORS
INC.**



400 University Ct • Blackwood NJ 08012
856/228-7298 • Fax:856/228-5531
www.edi-dist.com

CSG-637 ^{EFI}

3.7 Liter 6-Cylinder



Options

Engine Cooling Fans

- 14" (355mm) diameter suction
- 14" (355mm) diameter pusher

Flywheels

- 11.5" (292mm) SAE over-center clutch
- flat face flywheel

Flywheel Housings

- SAE #3

Exhaust Manifold

- rear dump down

Power Steering Pump

Air Conditioning

Wiring Harnesses

Discrete Speed Switch

Variable Speed Hand Throttle

Variable Speed Foot Pedal

Engine Mounts

- Automotive with insulators
- Open power unit

Electronic Instrument Panel, Gauges

Three Way Catalyst / Muffler Standard

Transmissions

6R80 electronic shift

Emissions Information

California Air Resources Board (CARB)
Environmental Protection Agency (EPA)
Emission Certified Packages

Warranty

Contact Engine Distributors, Inc
for warranty details.



Powertrain Assemblies
& Components
Provided By Ford
Component Sales

Specifications

Engine Type	V-6
Bore and Stroke	3.7" x 3.4" (94mm x 86mm)
Displacement	3.7L Liter (225.7 CID)
Compression Ratio	10.5:1
Oil Capacity.....	6 qts. including filter
Net Weight	355 Lbs. with accessories (161 Kgs.)
Dimensions	L 25.4" x W 29.5" x H 29.4" (646 mm x 751 mm x 748 mm)

Gasoline (corrected per SAE J1349)

Unleaded 87 or 89 octane		
Intermittent Power	107 [HP] @ 3200rpm	(80 [kW] @ 3200rpm)
Continuous Power	96 [HP] @ 3200rpm	(72 [kW] @ 3200rpm)
Intermittent Torque	193 [ft-lbs] @ 2600rpm	(261 [N-m] @ 2600rpm)
Continuous Torque	173 [ft-lbs] @ 2600rpm	(235 [N-m] @ 3200rpm)

Natural Gas (corrected per SAE J1349)

Fuel Specification	1050 BTU/FT3	
Intermittent Power	110 [HP] @ 3200rpm	(82 [kW] @ 3200rpm)
Continuous Power	99 [HP] @ 3200rpm	(74 [kW] @ 3200rpm)
Intermittent Torque	191 [ft-lbs] @ 1600rpm	(259 [N-m] @ 1600rpm)
Continuous Torque	172 [ft-lbs] @ 1600rpm	(233 [N-m] @ 1600rpm)

Liquefied Petroleum Gas (corrected per SAE J1349)

Fuel Specification	HD-5	
Intermittent Power	118 [HP] @ 3200rpm	(88 [kW] @ 3200rpm)
Continuous Power	106 [HP] @ 3200rpm	(79 [kW] @ 3200rpm)
Intermittent Torque	209 [ft-lbs] @ 2600rpm	(284 [N-m] @ 2600rpm)
Continuous Torque	188 [ft-lbs] @ 2600rpm	(255 [N-m] @ 2600rpm)

Standard Features / Benefits

Set-for-life valvetrain

Deep skirted, ribbed cylinder block casting for rigidity

150 AMP Alternator

Aluminum cylinder block and heads.

Chain driven dual camshafts with automatic tensioning system

Structural front cover and deep sump oil pan

Alternate fuel ready valvetrain components

Individual coil on plug electronic ignition

Four main bolts with side bolts through block for strength
and durability

Gasoline Sequential Port Fuel Injection

Closed loop fuel control for all fuels

Electronic engine management system with built-in engine
protection against detonation, high coolant temperature, low oil
pressure, over speed shutdown and starter lockout

Next generation governing – discrete speeds, variable speeds,
drive by wire – using the highest quality components.

Variable CAM Timing for intake camshafts - advances or retards
timing to maximize engine power and fuel efficiency

Forged steel crankshaft

Pursuant to the authority vested in the Air Resources Board by the Health and Safety Code, Division 26, Part 5, Chapters 1 and 2; and

Pursuant to the authority vested in the undersigned by Health and Safety Code Sections 39515 and 39516 and Executive Order G-14-012;

IT IS ORDERED AND RESOLVED: That the following new large spark-ignition engines and emission control systems produced by the manufacturer are certified for use in off-road equipment as described below. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY NAME	ENGINE DISPLACEMENT (liters)	FUEL TYPE
2016	GEDIB03.7CSG	3.7	Gasoline, LPG, CNG, Gasoline-LPG Dual Fuel, Gasoline-NG Dual Fuel
DURABILITY HOURS	SPECIAL FEATURES & EMISSION CONTROL SYSTEMS		TYPICAL EQUIPMENT USAGE
5000	Three-Way Catalytic Converter, Heated Oxygen Sensor, Sequential Multiport Fuel Injection (Gas), Gaseous Fuel Mixer (LPG, CNG)		Forklift, Aerial Lift, Generator, Compressor, Pump, Other Industrial Equipment
ENGINE MODELS (rated power in kilowatt, kW)		CSG637-DF-LPG-Gas (88.0 kW), CSG637-GAS (80.0 kW), CSG637-LPG (88.0 kW), CSG637-LP VAPOR (88.0 kW), CSG637-NG (82.0 kW), CSG637-DF-NG-GAS (82.0 kW)	

The following are the hydrocarbon plus oxides of nitrogen (HC+NOx) and carbon monoxide (CO) exhaust certification emission standards (Title 13, California Code of Regulations, (13 CCR) Section 2433(b)(1)) and certification emission levels for this engine family in grams per kilowatt-hour (g/kW-hr). Engines within this engine family shall have closed crankcases in conformance with 13 CCR Section 2433(b)(3).

(g/kW-hr)	HC+NOx	CO
Exhaust Standards	0.8	20.6
Certification Levels	0.4	3.3

The following is the evaporative hydrocarbon emission standard (13 CCR Section 2433(b)(4)) and certification emission level for this engine family in grams per gallon of fuel tank capacity (g/gallon).

Evaporative Certification Method	HC Certification Level (g/gallon)	HC Certification Standard (g/gallon)
Design Based	N/A	0.2

BE IT FURTHER RESOLVED: That for the listed engines for the aforementioned model-year, the manufacturer has submitted, and the Executive Officer hereby approves, the information and materials to demonstrate certification compliance with 13 CCR Section 2433(c) (certification and test procedures), 13 CCR Section 2434 (emission control labels), and 13 CCR Sections 2435 and 2436 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 24 day of November 2015.



Annette Hebert, Chief
 Emissions Compliance, Automotive Regulations and Science Division

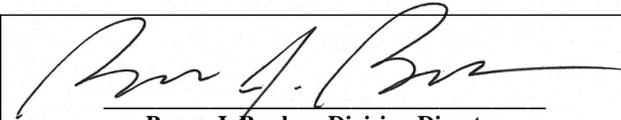


**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2016 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT**

**OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105**

Certificate Issued To: Engine Distributors, Inc.
(U.S. Manufacturer or Importer)
Certificate Number: GEDIB03.7CSG-002

Effective Date:
10/20/2015
Expiration Date:
12/31/2016


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
10/20/2015
Revision Date:
N/A

Manufacturer: Engine Distributors, Inc.
Engine Family: GEDIB03.7CSG
Mobile/Stationary Certification Type: Mobile and Stationary
Fuel : Gasoline (up to and including 10% Ethanol)
Natural Gas (CNG/LNG)
LPG/Propane
Emission Standards :
Part 60 Subpart JJJJ Table 1
CO (g/kW-hr) : 20.6
NOx (g/kW-hr) : 1.3
CO (g/kW-hr) : 2.7
VOC (g/kW-hr) : 0.9
HC + NOx (g/kW-hr) : 0.8
Mobile Part 1048
CO (g/kW-hr) : 20.6
HC + NOx (g/kW-hr) : 0.8
NMHC + NOx (g/kW-hr) : 0.8
Emergency Use Only : N

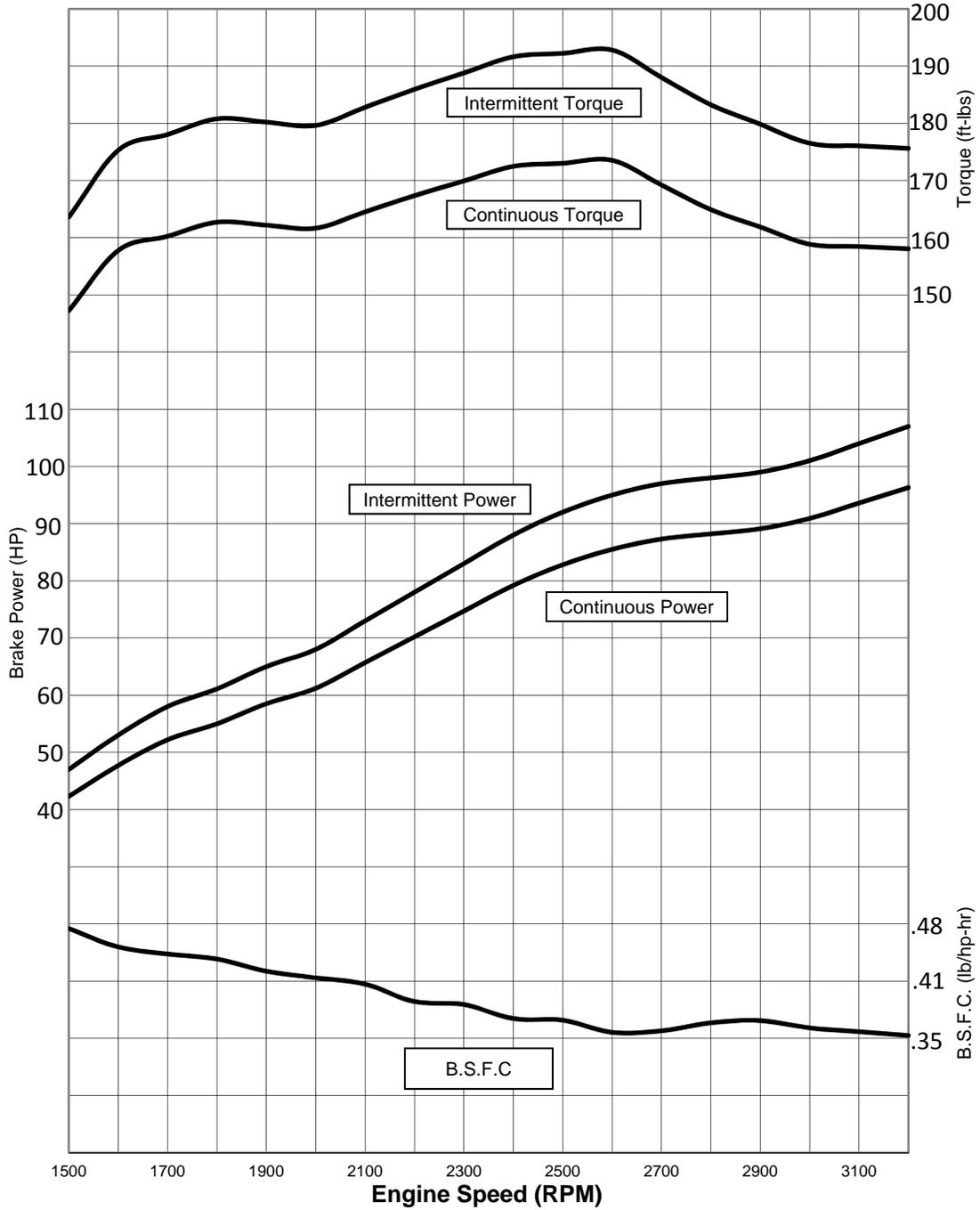
Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 1048. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

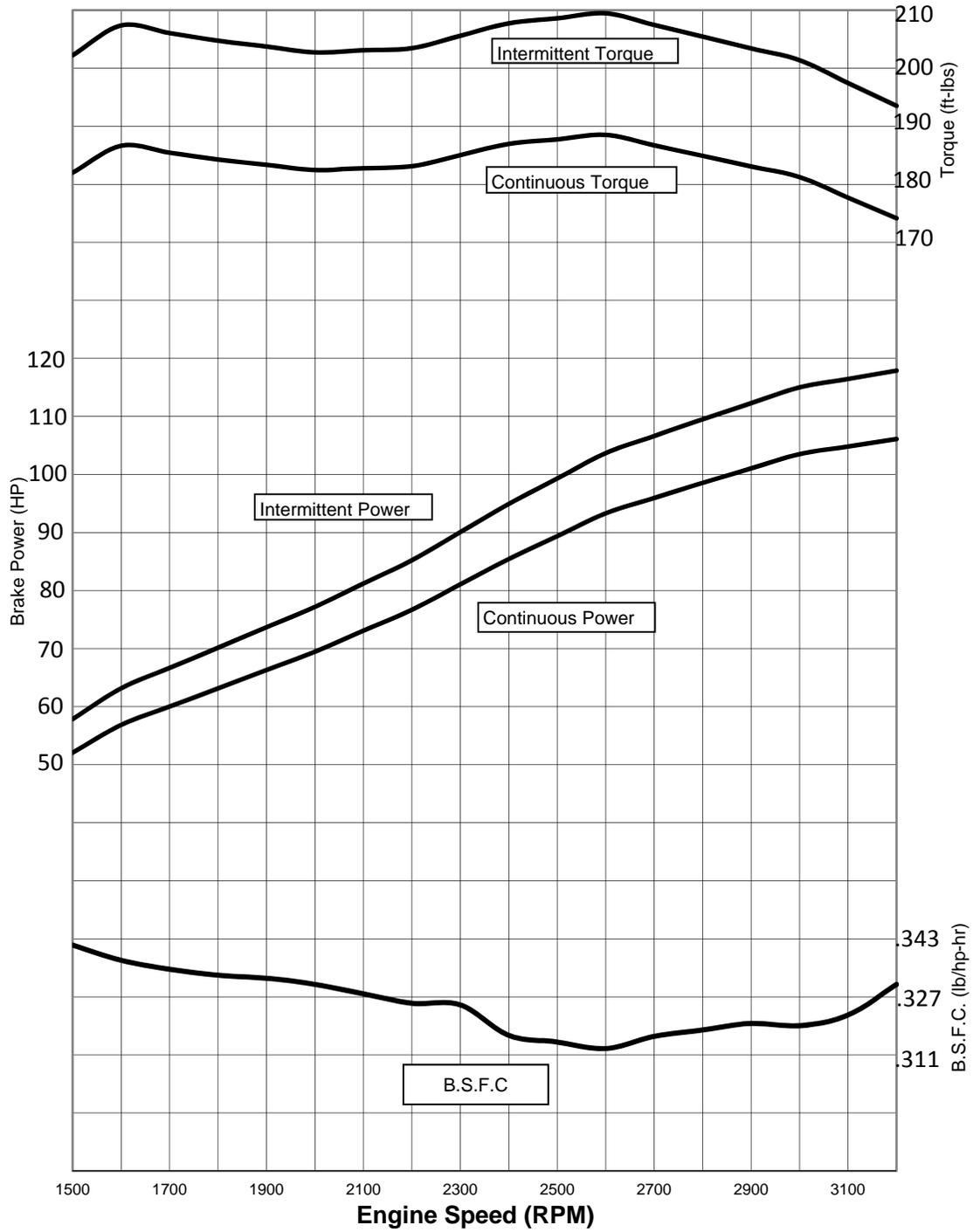
It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60, 40 CFR Part 1048. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60, 40 CFR Part 1048.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

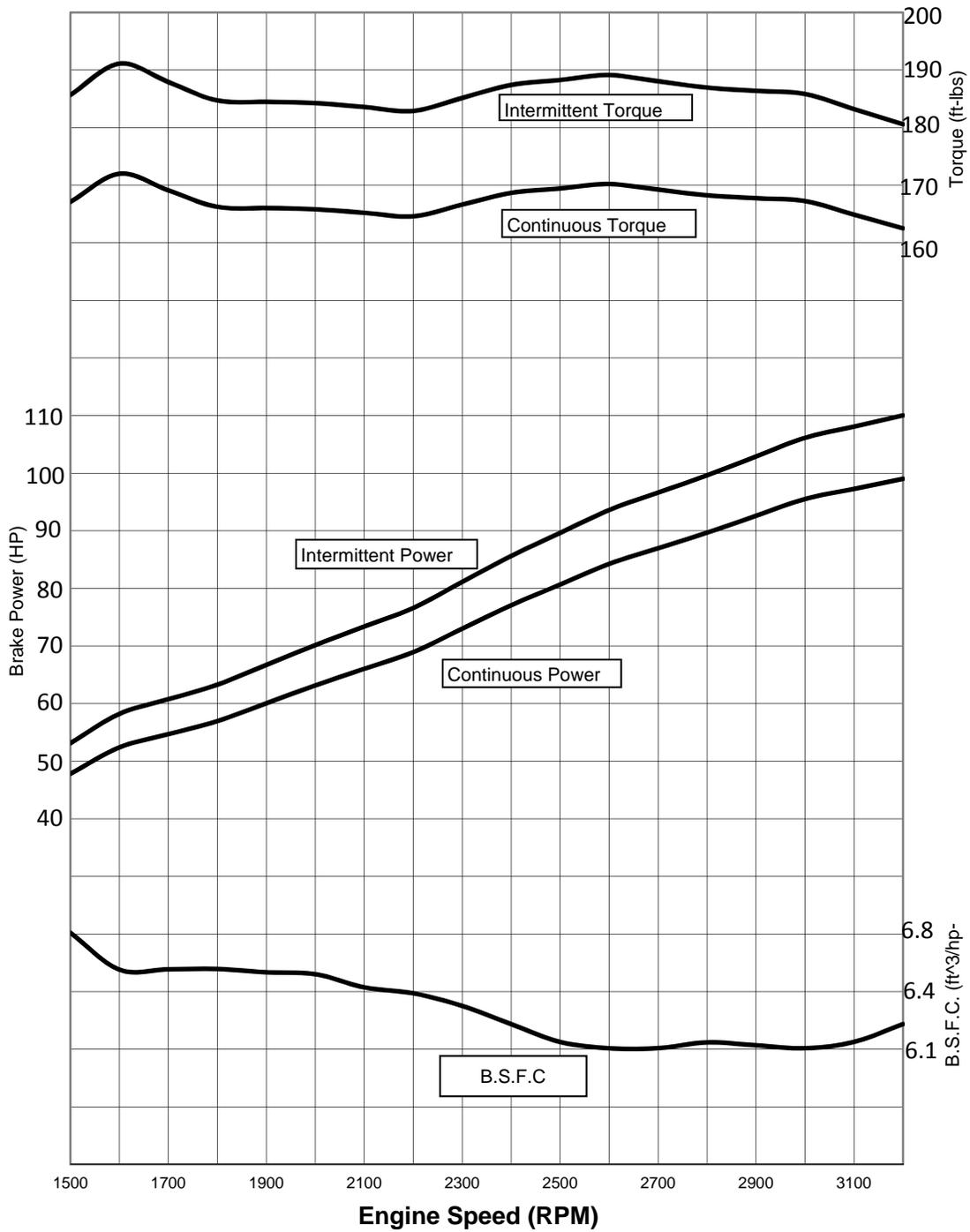
CSG637 Gasoline



CSG637 Propane



CSG637 Natural Gas



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	6	6	6	6
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)	34.27	20.37	
Max. Annual Throughput (1000 gal/yr)	12509.28	7435.05	
Loading Method	BF	BF	
Max. Fill Rate (gal/min)	168	168	
Average Fill Time (min/loading)	50	50	
Max. Bulk Liquid Temperature (F)	75.94	75.94	
True Vapor Pressure	6.35	0.49	
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)	24.8101	0.0015
	Annual (ton/yr)	15.3947	0.0006
Max HAP Emission Rate	Loading (lb/hr)	0.2535	1.30E-06
	Annual (ton/yr)	0.1573	4.78E-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
TANKCOND001-010	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 20.91 (scfm)	Heat Value of Waste Gas Stream 2,503.00 BTU/ft ³	Exit Velocity of the Emission Stream 0.0400 (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
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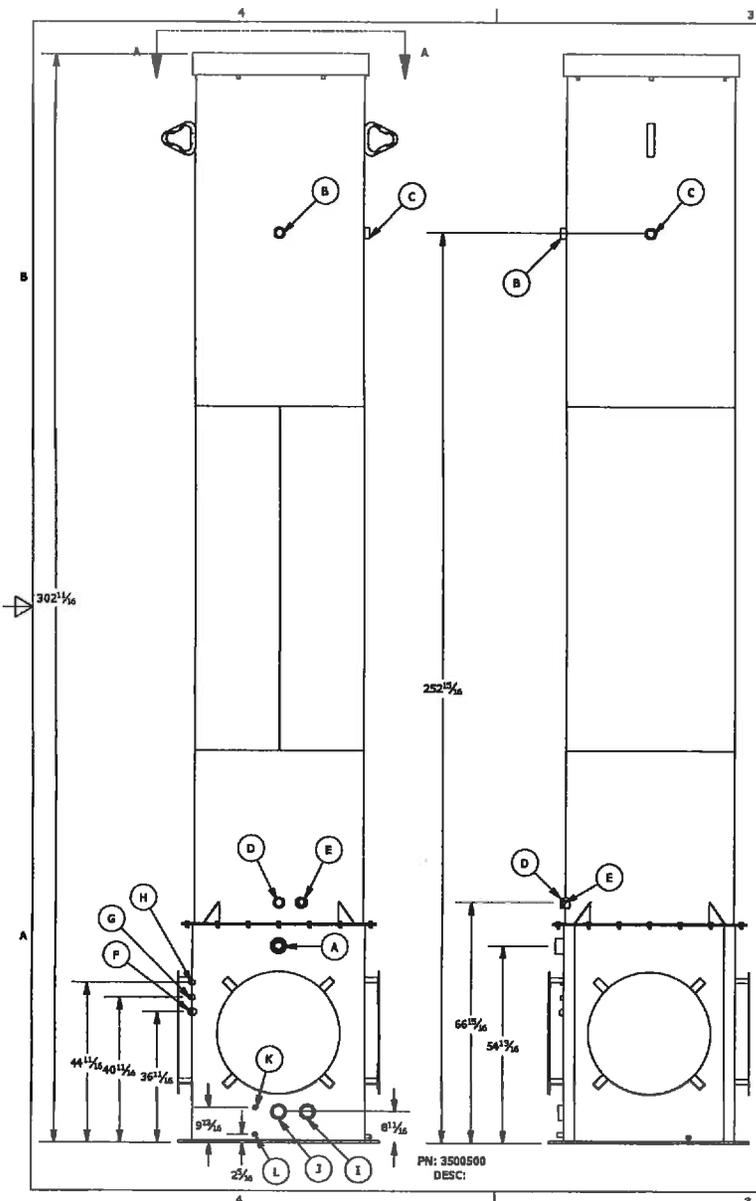
If automatic re-ignition is used, please describe the method. Flame Rectification, a thermocouple equivalent

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).*

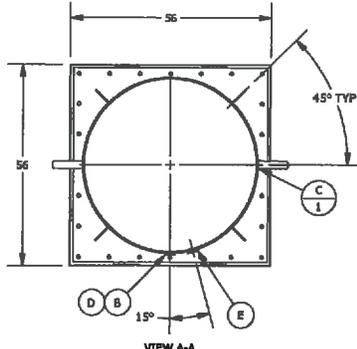
Additional information attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Manufacturer's specs sheet
--	----------------------------

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
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

Oil and Gas Site General Information

Administrative Information

Company Name	Antero Resources Corporation
Facility/Well Name	Hartley East Well Pad
Nearest City/Town	Middlebourne
API Number/SIC Code	1311
Latitude/Longitude	39.365245, -80.993244
County	Tyler County

Technical Information

Max Condensate Site Throughput (bbl/day):	816
Max Produced Water Site Throughput (bbl/day):	485
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	8
IC Engines	4
Gas Production Unit Heaters	8
Line Heaters	8
Condensate Tanks	10
Produced Water Tanks	2
Loading Jobs	2
Vapor Recovery Towers	3
Enclosed Combustors	3

Table 2
Uncontrolled/Controlled Emissions Summary
Hartley East Well Pad
Tyler 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, VRU engines, Gas Production Unit Heaters, Line Heaters)																									
Fugitive Emissions (Component Count, PCV and Hauling) ¹	2.9448	12.8982			74.890	328.02							1.7522	1.0330			0.3651	1.5989	0.0022	0.0094	4.53E-02	1.98E-01			
Flashing, Working and Breathing (F/W/B) Losses ²	108.8155	476.6118			81.8865	358.6627											12.6855	55.5626	0.0173	0.0756	0.0590	0.2583			
VRU Engine Emissions ³	0.0813	0.3563	0.2422	1.0608	318.10	1,393.28	1.8134	7.9427	0.0016	0.0071	0.0261	0.1144	0.0261	0.1144			0.0631	0.2763	0.0043	0.0190	5.36E-04	2.35E-03	0.0563	0.2468	
Gas Production Unit Heater Emissions ⁴	0.0530	0.2320	0.9631	4.2183	1,155.70	5,061.96	0.8090	3.5434	0.0058	0.0253	0.0732	0.3206	0.0732	0.3206	4.82E-06	2.11E-05	1.81E-02	7.94E-02	2.02E-05	8.86E-05			0.0007	0.0032	
Line Heater Emissions ⁵	0.0706	0.3093	1.2841	5.6244	1,540.93	6,749.29	1.0787	4.7245	0.0077	0.0337	0.0976	0.4275	0.0976	0.4275	6.42E-06	2.81E-05	2.42E-02	1.06E-01	2.70E-05	1.18E-04			0.0010	0.0042	
TOTALS:	111.9652	490.4076	2.4894	10.9035	3171.5096	13891.2123	3.7010	16.2105	0.0151	0.0661	0.1969	0.8624	1.9491	1.8954	1.12E-05	4.92E-05	13.1560	57.6231	0.0238	0.1043	0.1048	0.4590	0.0580	0.2541	
TOTALS (Excluding Fugitives):	109.0204	477.5094	2.4894	10.9035	3096.6201	13563.1960	3.7010	16.2105	0.0151	0.0661	0.1969	0.8624	0.1969	0.8624	1.12E-05	4.92E-05	12.7909	56.0241	0.0216	0.0948	0.0595	0.2607	0.0580	0.2541	
UNCONTROLLED (Truck Loading Emissions)																									
Truck Loading Emissions ⁶	24.8116	15.3952			2.3082	1.2236											0.2535	1.57E-01	0.0003	1.66E-04	0.0040	2.49E-03			
CONTROLLED EMISSIONS																									
Enclosed Combustor Emissions (from F/W/B losses) ⁷	2.1765	9.5331	0.1293	0.5662	452.6484	1982.6001	0.1086	0.4756	2.27E-05	0.0001	0.0074	0.0323	0.0098	0.0430	6.46E-07	2.83E-06	0.2538	1.1116	0.0003	0.0015	0.0012	0.0052	2.84E-06	1.24E-05	
Controlled Fugitive Emissions from Hauling													0.8761	0.5165											
TOTALS:	2.1765	9.5331	0.1293	0.5662	452.6484	1982.6001	0.1086	0.4756	2.27E-05	9.93E-05	0.0074	0.0323	0.8859	0.5595	6.46E-07	2.83E-06	0.2538	1.1116	3.45E-04	0.0015	0.0012	0.0052	2.84E-06	1.24E-05	
POTENTIAL TO EMIT⁷	5.3262	38.7242	2.6186	11.4696	3542.2716	15516.3734	3.8096	16.6861	0.0151	0.0662	0.2043	0.8947	1.0828	1.4219	1.19E-05	5.20E-05	0.7242	3.3294	0.0069	0.0303	0.0470	0.2083	0.0580	0.2542	
POTENTIAL TO EMIT (Excluding Fugitives)	2.3815	10.4308	2.6186	11.4696	3467.3821	15187.1335	3.8096	16.6861	0.0151	0.0662	0.2043	0.8947	0.2067	0.9054	1.19E-05	5.20E-05	0.3592	1.5731	0.0047	0.0207	0.0017	0.0075	0.0580	0.2542	

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 13 for VRU engine emissions
- 4 - See Table 9 for gas production unit heater and line heater emission calculations
- 5 - 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 816 barrels per day, VOC emissions would be 24.8116 pounds per hour when there are truck loading activities. Average hourly VOC emissions from truck loading is 3.5149 pound per hour.
- 6 - See Table 10 and 11 for enclosed combustion emission calculations.
- 7 - The hourly potential to emit is the sum of emissions from gas production unit heaters, line heaters, VRU engines, 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
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

Pollutant		Emissions		Threshold Exceeded?		
		Uncontrolled	Controlled	Threshold	Uncontrolled	Controlled
VOC	lbs/hr	111.9652	5.3262	6	Yes	
	tons/yr	505.8028	38.7242	10	Yes	Yes
NO _x	lbs/hr	2.4894	2.6186	6		
	tons/yr	10.9035	11.4696	10	Yes	Yes
CO	lbs/hr	3.7010	3.8096	6		
	tons/yr	16.2105	16.6861	10	Yes	Yes
SO ₂	lbs/hr	0.0151	0.0151	6		
	tons/yr	0.0661	0.0662	10		
PM _{2.5}	lbs/hr	0.1969	0.2043	6		
	tons/yr	0.8624	0.8947	10		
PM ₁₀	lbs/hr	1.9491	1.0828	6		
	tons/yr	1.8954	1.4219	10		
Lead	lbs/hr	1.12E-05	1.19E-05	6		
	tons/yr	4.92E-05	5.20E-05	10		
Total HAPs	lbs/hr	13.1560	0.7242	2	Yes	
	tons/yr	57.7804	3.3294	5	Yes	
Total TAPs	lbs/hr	0.0818	0.0649	1.14		
n-Hexane	lbs/hr	12.8499	0.5766			
	tons/yr	56.4348	2.6779			
Toluene	lbs/hr	0.0784	0.0190			
	tons/yr	0.3446	0.0845			
Ethylbenzene	lbs/hr	0.0408	0.0164			
	tons/yr	0.1796	0.0728			
Xylenes	lbs/hr	0.1048	0.0470			
	tons/yr	0.4615	0.2083			
Benzene	lbs/hr	0.0238	0.0069			
	tons/yr	0.1044	0.0303			

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>
------------------------------	---

Table 4

Fugitive Emissions
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation

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

Gas Weight Fraction From Analysis:	VOC frac	0.161
	Benzene frac	0.000
	Toluene	0.000
	Ethylbenzene	0.000
	Xylenes	0.000
	n-Hexane	0.027
	HAPs	0.027
	Methane	0.626

Gas					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
400	Valves	Gas VOC	0.004500	0.29	5,576.00
		Non VOC	0.004500	1.51	29,113.60
		HAPs	0.004500	0.05	926.95
		CO2e	0.004500	28.19	543,319.41
472	Connectors	VOC	0.000200	0.02	292.43
		Non-VOC	0.000200	0.08	1,526.85
		HAPs	0.000200	0.00	48.61
		CO2e	0.000200	1.48	28,494.08
104	Flanges	VOC	0.000390	0.01	125.65
		Non-VOC	0.000390	0.03	656.03
		HAPs	0.000390	0.00	20.89
		CO2e	0.000390	0.635263	12242.797411
Total VOCs:				0.31	5994.07
Total THC:				1.93	37290.55

Light Liquid Weight Fraction From Analysis:	VOC frac	0.955
	Benzene frac	0.001
	Toluene	0.007
	Ethylbenzene	0.007
	Xylenes	0.020
	n-hexane	0.070
	HAPs	0.104
	Methane	0.015

Light Liquid					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
416	Valves	Light Liquid VOC	0.002500	0.99	19,140.22
		Light Liquid Non-VOC	0.002500	0.05	902.66
		Light Liquid HAPs	0.002500	0.11	2,091.34
		CO2e	0.002500	0.39	7457.37
Total VOC:				0.99	19,140.22
Total THC:				1.04	20,042.88

Fugitive Total Emissions			
	Annual Emissions (lb/yr)	Annual Emissions (lb/hr)	Annual Emissions (tpy)
VOC	25,134.29	2.87	12.57
Ethylbenzene		1.58E-02	6.93E-02
Toluene		1.62E-02	7.09E-02
Xylenes		4.53E-02	1.98E-01
n-Hexane		2.73E-01	1.20E+00
TAPs (Benzene)		2.16E-03	9.44E-03
HAPs		3.52E-01	1.54E+00
CO _{2e}	591,513.67	67.52	295.76

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
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

Number of PCVs	32
Bleed Rate (scf/day/PCV)	6.6
Total Bleed Rate (scf/day)	211.2

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	0.4678	14.01	0.9879936	2.60E-03	0.04	1.52E-03	0.01
Carbon Dioxide	0.1488	44.01	0.3142656	8.28E-04	0.04	1.52E-03	6.65E-03
Methane	79.1872	16.04	167.2433664	0.44	7.07	0.29	1.29
Ethane	14.3455	30.07	30.297696	0.08	2.40	0.10	0.44
Propane	2.8917	44.1	6.1072704	0.02	0.71	0.03	0.13
Isobutane	0.5768	58.12	1.2182016	3.21E-03	0.19	0.01	0.03
n-Butane	1.1291	58.12	2.3846592	6.28E-03	0.37	0.02	0.07
Isopentane	0.3132	72.15	0.6614784	1.74E-03	0.13	5.24E-03	0.02
n-Pentane	0.3112	72.15	0.6572544	1.73E-03	0.12	5.21E-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	0.6287	86.18	1.3278144	3.50E-03	0.30	0.01	0.06
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	0.0756	0.3310
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	0.0126	0.0550
HAPs Emissions	0.0126	0.0550
TAPs Emissions	0.00E+00	0.00E+00
CO _{2e} emissions	7.3652	32.2594

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
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

# Hours Operational	8760
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	Condensate Tank Flashing Losses			Produced Water Tank Flashing Losses		
	Vapor Mass Fraction wt%	Flashing Losses		Vapor Mass Fraction wt%	Flashing Losses	
		lbs/hr	tpy		lbs/hr	tpy
Water	0.0409	0.0463	0.2028	2.4141	0.0830	0.3635
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0004	0.0005	0.0022	0.3193	0.0110	0.0481
Carbon Dioxide	0.0876	0.0992	0.4344	2.9199	0.1004	0.4397
Methane	1.0714	1.2130	5.3128	58.3807	2.0070	8.7908
Ethane	20.1851	22.8520	100.0916	20.8944	0.7183	3.1462
Propane	23.2207	26.2887	115.1445	6.5401	0.2248	0.9848
Isobutane	8.8553	10.0253	43.9109	4.5269	0.1556	0.6817
n-Butane	18.8662	21.3589	93.5519	2.3186	0.0797	0.3491
Isopentane	6.8221	7.7234	33.8285	0.5131	0.0176	0.0773
n-Pentane	7.0309	7.9598	34.8641	0.5083	0.0175	0.0765
2-Methylpentane	0.5035	0.5700	2.4966	0.0167	0.0006	0.0025
3-Methylpentane	0.3177	0.3597	1.5756	0.0281	0.0010	0.0042
n-Hexane	10.8848	12.3229	53.9744	0.2859	0.0098	0.0431
Methylcyclopentane	0.1160	0.1313	0.5750	0.0301	0.0010	0.0045
Benzene	0.0143	0.0162	0.0709	0.0249	0.0009	0.0037
2-Methylhexane	0.3064	0.3469	1.5194	0.0091	0.0003	0.0014
3-Methylhexane	0.2560	0.2898	1.2693	0.0079	0.0003	0.0012
Heptane	0.5199	0.5886	2.5780	0.0169	0.0006	0.0025
Methylcyclohexane	0.2289	0.2592	1.1352	0.0396	0.0014	0.0060
Toluene	0.0496	0.0562	0.2460	0.0825	0.0028	0.0124
Octane	0.4375	0.4953	2.1693	0.0086	0.0003	0.0013
Ethylbenzene	0.0199	0.0226	0.0989	0.0325	0.0011	0.0049
m & p-Xylene	0.0225	0.0254	0.1114	0.0359	0.0012	0.0054
o-Xylene	0.0245	0.0278	0.1217	0.0415	0.0014	0.0063
Nonane	0.0937	0.1061	0.4647	0.0029	0.0001	0.0004
C10+	0.0241	0.0273	0.1195	0.0017	0.0001	0.0003
Total VOCs	78.615	89.00	389.8	15.072	0.5181	2.2694
Total CO _{2e}		30.42	133.3		50.28	220.2
Total TAPs (Benzene)		0.0162	0.0709		0.0009	0.0037
Toluene		0.0562	0.2460		0.0028	0.0124
Ethylbenzene		0.0226	0.0989		0.0011	0.0049
Xylenes		0.0532	0.2330		0.0027	0.0117
n-Hexane		12.323	53.974		0.0098	0.0431
Total HAPs		12.471	54.623		0.0173	0.0758
Total	100.00	113.21	495.9	100.00	3.438	15.06

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

**Uncontrolled Working and Breathing Losses
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

Condensate Tank Information	
Number of Tanks	10
Maximum Working Losses (lbs/hr)	10.2005
Maximum Breathing Losses (lbs/hr)	16.0862
# 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	0.0000	8.78E-07	3.84E-06	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide	0.0778	0.0079	0.0347	0.0125	0.0548	0.0204	0.0895
Methane	0.1720	0.0175	0.0768	0.0277	0.1212	0.0452	0.1980
Ethane	26.3444	2.6873	11.7703	4.2378	18.5616	6.9251	30.3318
Propane	26.3891	2.6918	11.7902	4.2450	18.5931	6.9368	30.3833
Isobutane	9.5979	0.9790	4.2882	1.5439	6.7624	2.5230	11.0506
n-Butane	20.3992	2.0808	9.1140	3.2814	14.3727	5.3623	23.4868
Isopentane	6.9134	0.7052	3.0888	1.1121	4.8710	1.8173	7.9599
n-Pentane	7.0498	0.7191	3.1497	1.1340	4.9671	1.8532	8.1168
2-Methylpentane	0.4941	0.0504	0.2208	0.0795	0.3481	0.1299	0.5689
3-Methylpentane	0.3112	0.0317	0.1391	0.0501	0.2193	0.0818	0.3583
n-Hexane	0.7268	0.0741	0.3247	0.1169	0.5121	0.1910	0.8368
Methylcyclopentane	0.1059	0.0108	0.0473	0.0170	0.0746	0.0278	0.1219
Benzene	0.0008	8.06E-05	0.0004	0.0001	0.0006	0.0002	0.0009
2-Methylhexane	0.0199	2.03E-03	0.0089	0.0032	0.0140	0.0052	0.0229
3-Methylhexane	0.2499	0.0255	0.1117	0.0402	0.1761	0.0657	0.2878
Heptane	0.4696	0.0479	0.2098	0.0755	0.3308	0.1234	0.5406
Methylcyclohexane	0.2057	0.0210	0.0919	0.0331	0.1450	0.0541	0.2369
Toluene	0.0061	6.19E-04	2.71E-03	0.0010	0.0043	0.0016	0.0070
Octane	0.3628	0.0370	0.1621	0.0584	0.2556	0.0954	0.4177
Ethylbenzene	0.0046	4.66E-04	2.04E-03	0.0007	0.0032	0.0012	0.0053
m & p-Xylene	0.0056	5.69E-04	2.49E-03	0.0009	0.0039	0.0015	0.0064
o-Xylene	0.0063	6.40E-04	0.0028	0.0010	0.0044	0.0017	0.0072
Nonane	0.0717	0.0073	0.0320	0.0115	0.0505	0.0188	0.0825
C10+	0.0155	1.58E-03	0.0069	0.0025	0.0109	0.0041	0.0178
Total VOCs	73.406	7.4878	32.797	11.8082	51.7198	19.2960	84.516
Total CO _{2e}		0.4465	1.9557	0.7041	3.0841	1.1506	5.040
Total TAPs (Benzene)		8.06E-05	3.53E-04	0.0001	0.0006	0.0002	0.0009
Toluene		6.19E-04	2.71E-03	0.0010	0.0043	0.0016	0.0070
Ethylbenzene		4.66E-04	2.04E-03	0.0007	0.0032	0.0012	0.0053
Xylenes		1.21E-03	0.0053	0.0019	0.0084	0.0031	0.0136
n-Hexane		0.0741	0.3247	0.1169	0.5121	0.1910	0.8368
Total HAPs		0.0765	0.3351	0.1207	0.5285	0.1972	0.8636
Total	100.00	10.2005	44.6784	16.0862	70.4574	26.2867	115.136

Table 7

**Uncontrolled Working and Breathing Losses
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

Produced Water Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.0353
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	0.0063	2.22E-06	9.74E-06	5.24E-07	2.29E-06	2.75E-06	1.20E-05
Carbon Dioxide	3.9467	0.0014	0.0061	0.0003	0.0014	0.0017	0.0075
Methane	3.2016	0.0011	0.0049	0.0003	0.0012	0.0014	0.0061
Ethane	1.0667	0.0004	0.0016	0.0001	0.0004	0.0005	0.0020
Propane	0.0833	2.94E-05	0.0001	6.93E-06	3.03E-05	3.63E-05	0.0002
Isobutane	0.0624	2.20E-05	9.65E-05	5.19E-06	2.27E-05	2.72E-05	1.19E-04
n-Butane	0.0055	1.93E-06	8.47E-06	4.56E-07	2.00E-06	2.39E-06	1.05E-05
Isopentane	0.0003	1.09E-07	4.76E-07	2.56E-08	1.12E-07	1.34E-07	5.89E-07
n-Pentane	0.0002	7.77E-08	3.40E-07	1.83E-08	8.02E-08	9.60E-08	4.21E-07
2-Methylpentane	1.37E-06	4.85E-10	2.12E-09	1.14E-10	5.00E-10	5.99E-10	2.62E-09
3-Methylpentane	5.67E-06	2.00E-09	8.77E-09	4.72E-10	2.07E-09	2.47E-09	1.08E-08
n-Hexane	9.16E-07	3.23E-10	1.42E-09	7.61E-11	3.33E-10	3.99E-10	1.75E-09
Methylcyclopentane	1.35E-05	4.76E-09	2.09E-08	1.12E-09	4.91E-09	5.88E-09	2.58E-08
Benzene	3.39E-05	1.20E-08	5.24E-08	2.82E-09	1.23E-08	1.48E-08	6.48E-08
2-Methylhexane	1.29E-08	4.54E-12	1.99E-11	1.07E-12	4.68E-12	5.61E-12	2.46E-11
3-Methylhexane	1.68E-07	5.92E-11	2.59E-10	1.39E-11	6.11E-11	7.32E-11	3.20E-10
Heptane	2.69E-07	9.50E-11	4.16E-10	2.24E-11	9.80E-11	1.17E-10	5.14E-10
Methylcyclohexane	3.74E-06	1.32E-09	5.78E-09	3.11E-10	1.36E-09	1.63E-09	7.15E-09
Toluene	5.41E-05	1.91E-08	8.36E-08	4.50E-09	1.97E-08	2.36E-08	1.03E-07
Octane	2.52E-08	8.91E-12	3.90E-11	2.10E-12	9.19E-12	1.10E-11	4.82E-11
Ethylbenzene	1.22E-05	4.31E-09	1.89E-08	1.02E-09	4.45E-09	5.33E-09	2.33E-08
m & p-Xylene	1.22E-05	4.31E-09	1.89E-08	1.01E-09	4.44E-09	5.32E-09	2.33E-08
o-Xylene	1.81E-05	6.38E-09	2.79E-08	1.50E-09	6.58E-09	7.88E-09	3.45E-08
Nonane	4.03E-09	1.42E-12	6.22E-12	3.35E-13	1.47E-12	1.76E-12	7.69E-12
C10+	4.63E-10	1.63E-13	7.15E-13	3.85E-14	1.69E-13	2.02E-13	8.84E-13
Total VOCs	0.1519	5.36E-05	0.0002	1.26E-05	5.53E-05	6.62E-05	0.0003
Total CO _{2e}		0.0296	0.1298	0.0070	0.0306	0.0366	0.1604
Total TAPs (Benzene)		1.20E-08	5.24E-08	2.82E-09	1.23E-08	1.48E-08	6.48E-08
Toluene		1.91E-08	8.36E-08	4.50E-09	1.97E-08	2.36E-08	1.03E-07
Ethylbenzene		4.31E-09	1.89E-08	1.02E-09	4.45E-09	5.33E-09	2.33E-08
Xylenes		1.07E-08	4.68E-08	2.52E-09	1.10E-08	1.32E-08	5.78E-08
n-Hexane		3.23E-10	1.42E-09	7.61E-11	3.33E-10	3.99E-10	1.75E-09
Total HAPs		4.64E-08	2.03E-07	1.09E-08	4.78E-08	5.73E-08	2.51E-07
Total	100.00	0.0353	0.1546	0.0083	0.0364	0.0436	0.1910

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

**Loading Emissions
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

Annual Loading	Oil Truck Loading	Water Truck Loading
RVP	7.28	1.0226
Annual Average Temp (F)	65.08	65.08
S (saturation factor)	0.6	0.6
P (true vapor pressure)	5.26	0.37
M (MW of vapor)	44.74	18.47
Collection Efficiency (%)	0.00	0.00
Loading Loss (lb/10 ³ gal)*	3.35	0.10
Maximum Throughput (gallons/hr)**	10,080	10,080
Average Throughput (gallons/yr)	12,509,280	7,435,050
Loading Emissions (lbs/hr)	33.80	0.99
Loading Emissions (tpy)	20.97	0.36

	Condensate Tank Loading Losses			Produced Water Tank Loading Losses		
	Vapor Mass Fraction wt%	Loading Losses		Vapor Mass Fraction wt%	Loading Losses	
		lbs/hr	tpy		lbs/hr	tpy
H2S	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0000	2.91E-06	1.80E-06	0.0063	6.22E-05	2.29E-05
Carbon Dioxide	0.0778	0.0263	1.63E-02	3.9467	3.89E-02	1.44E-02
Methane	0.1720	0.0581	3.61E-02	3.2016	3.16E-02	1.17E-02
Ethane	26.3444	8.9040	5.5250	1.0667	1.05E-02	3.88E-03
Propane	26.3891	8.9192	5.53E+00	0.0833	8.22E-04	3.03E-04
Isobutane	9.5979	3.2440	2.01E+00	0.0624	6.16E-04	2.27E-04
n-Butane	20.3992	6.8946	4.28E+00	0.0055	5.41E-05	2.00E-05
Isopentane	6.9134	2.3366	1.45E+00	0.0003	3.04E-06	1.12E-06
n-Pentane	7.0498	2.3827	1.48E+00	0.0002	2.17E-06	8.02E-07
2-Methylpentane	0.4941	0.1670	1.04E-01	1.37E-06	1.36E-08	5.00E-09
3-Methylpentane	0.3112	0.1052	6.53E-02	5.67E-06	5.60E-08	2.06E-08
n-Hexane	0.7268	0.2456	1.52E-01	9.16E-07	9.03E-09	3.33E-09
Methylcyclopentane	0.1059	0.0358	2.22E-02	1.35E-05	1.33E-07	4.91E-08
Benzene	0.0008	0.0003	1.66E-04	0.0000	3.35E-07	1.23E-07
2-Methylhexane	0.0199	0.0067	4.17E-03	1.29E-08	1.27E-10	4.68E-11
3-Methylhexane	0.2499	0.0845	5.24E-02	1.68E-07	1.66E-09	6.11E-10
Heptane	0.4696	0.1587	9.85E-02	2.69E-07	2.66E-09	9.79E-10
Methylcyclohexane	0.2057	0.0695	4.31E-02	3.74E-06	3.69E-08	1.36E-08
Toluene	0.0061	0.0021	1.27E-03	0.0001	5.34E-07	1.97E-07
Octane	0.3628	0.1226	7.61E-02	2.52E-08	2.49E-10	9.19E-11
Ethylbenzene	0.0046	0.0015	9.57E-04	1.22E-05	1.21E-07	4.44E-08
m & p-Xylene	0.0056	0.0019	1.17E-03	1.22E-05	1.20E-07	4.44E-08
o-Xylene	0.0063	0.0021	1.32E-03	1.81E-05	1.78E-07	6.58E-08
Nonane	0.0717	0.0242	1.50E-02	4.03E-09	3.97E-11	1.46E-11
C10+	0.0155	0.0052	3.25E-03	4.63E-10	4.57E-12	1.68E-12
Total VOCs	73.4058	24.8101	15.3947	0.1519	1.50E-03	5.53E-04
Total CO _{2e}		1.4795	0.9180		0.8287	0.3056
Total TAPs (Benzene)		0.0003	1.66E-04		3.35E-07	1.23E-07
Toluene		0.0021	1.27E-03		5.34E-07	1.97E-07
Ethylbenzene		0.0015	9.57E-04		1.21E-07	4.44E-08
Xylenes		0.0040	2.49E-03		2.99E-07	1.10E-07
n-Hexane		0.2456	1.52E-01		9.03E-09	3.33E-09
Total HAPs		0.2535	1.57E-01		1.30E-06	4.78E-07
Total	100.0000	33.7986	20.9720	100.0000	0.9867	0.3639

Enter any notes here

Vapor mass fractions and loading losses from Promax output

*Using equation $L_i = 12.46 \cdot SPM/T$ 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
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

Gas Production Unit Heater Emissions

Number of Units	8
GPU Heater Rating (MMBtu/hr)	1.50
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,246

Line Heater Emissions

Number of Units	8
Line Heater Rating (MMBtu/hr)	2.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,246

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	0.963	4.218
CO	84	0.809	3.543
CO ₂	120,000	1155.700	5061.964
Lead	0.0005	4.82E-06	2.11E-05
N ₂ O	2.2	0.021	0.093
PM (Total)	7.6	0.073	0.321
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	8.86E-05
Dichlorobenzene	1.20E-03	1.16E-05	5.06E-05
Fluoranthene	3.00E-06	2.89E-08	1.27E-07
Fluorene	2.80E-06	2.70E-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

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	1.284	5.624
CO	84	1.079	4.725
CO ₂	120,000	1540.933	6749.286
Lead	0.0005	6.42E-06	2.81E-05
N ₂ O	2.2	0.028	0.124
PM (Total)	7.6	0.098	0.427
SO ₂	0.6	0.008	0.034
TOC	11	0.141	0.619
Methane	2.3	0.030	0.129
VOC	5.5	0.071	0.309
HAPS			
2-Methylnaphthalene	2.40E-05	3.08E-07	1.35E-06
Benzene	2.10E-03	2.70E-05	1.18E-04
Dichlorobenzene	1.20E-03	1.54E-05	6.75E-05
Fluoranthene	3.00E-06	3.85E-08	1.69E-07
Fluorene	2.80E-06	3.60E-08	1.57E-07
Formaldehyde	7.50E-02	9.63E-04	4.22E-03
Hexane	1.80E+00	2.31E-02	1.01E-01
Naphthalene	6.10E-04	7.83E-06	3.43E-05
Phenanathrene	1.70E-05	2.18E-07	9.56E-07
Toluene	3.40E-03	4.37E-05	1.91E-04

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.124	0.541
TOTAL Uncontrolled HAPS	0.042	0.185
TOTAL Uncontrolled TAPs (Benzene)	4.72E-05	2.07E-04
TOTAL Uncontrolled Toluene	7.64E-05	3.35E-04
TOTAL Uncontrolled Hexane	4.04E-02	1.77E-01
TOTAL Uncontrolled TAPs (Formaldehyde)	1.69E-03	7.38E-03
TOTAL CO _{2e} Emissions	2,712.66	11,881.44

Enter any notes here:

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

Table 10

**Enclosed Combustor Emissions
Hartley East Well Pad
Tyler 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	--	960.29	70.63	222.97	0.90	1,292.59
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	331,128.00	--	8,412,174.55	618,736.86	1,953,220.58	7,846.99	11,323,106.98
Heating Content (Btu/ft3)	1,246		2,691.69	1,189.83	2,540.33	97.66	2,503.00

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	-	-	89.001	0.518	19.296	0.000	108.82
Benzene	-	-	0.016	0.001	0.000	0.000	0.017
Toluene	-	-	0.056	0.003	0.002	0.000	0.061
Ethylbenzene	-	-	0.023	0.001	0.001	0.000	0.025
Xylenes	-	-	0.053	0.003	0.003	0.000	0.059
n-Hexane	-	-	12.323	0.010	0.191	0.000	12.524
HAPs	-	-	12.471	0.017	0.197	0.000	12.686
Total Mass Flow	-	-	113.212	3.438	26.287	0.044	142.980
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	-	-	389.826	2.269	84.516	0.000	476.612
Benzene	-	-	0.071	0.004	0.001	0.000	0.076
Toluene	-	-	0.246	0.012	0.007	0.000	0.265
Ethylbenzene	-	-	0.099	0.005	0.005	0.000	0.109
Xylenes	-	-	0.233	0.012	0.014	0.000	0.258
n-Hexane	-	-	53.974	0.043	0.837	0.000	54.854
HAP	-	-	54.623	0.076	0.864	0.000	55.563
Total Mass Flow	-	-	495.869	15.058	115.136	0.191	626.254

Table 10

**Enclosed Combustor Emissions
Hartley East Well Pad
Tyler 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	-	0.096	0.007	0.022	0.000	0.13
CO	0.003	-	0.081	0.006	0.019	0.000	0.11
PM2.5	0.000	-	0.005	0.000	0.001	0.000	0.01
PM10	0.000	-	0.007	0.001	0.002	0.000	0.01
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	-	1.780	0.010	0.386	0.000	2.18
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	-	0.000	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.001	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.246	0.000	0.004	0.000	0.25
HAP	0.000	-	0.249	0.000	0.004	0.000	0.25
N ₂ O	0.000	-	0.002	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	-	0.421	0.031	0.098	0.000	0.57
CO	0.014	-	0.353	0.026	0.082	0.000	0.48
PM2.5	0.001	-	0.024	0.002	0.006	0.000	0.03
PM10	0.001	-	0.032	0.002	0.007	0.000	0.04
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	-	7.797	0.045	1.690	0.000	9.53
Benzene	0.000	-	0.001	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.005	0.000	0.000	0.000	0.01
Ethylbenzene	0.000	-	0.002	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.005	0.000	0.000	0.000	0.01
n-Hexane	0.000	-	1.079	0.001	0.017	0.000	1.10
HAP	0.000	-	1.092	0.002	0.017	0.000	1.11
N ₂ O	0.000	-	0.009	0.001	0.002	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	2.18	9.53
NOx	1.29E-01	5.66E-01
CO	1.09E-01	4.76E-01
PM2.5	7.37E-03	3.23E-02
PM10	9.82E-03	4.30E-02
H ₂ S	1.21E-05	5.28E-05
SO ₂	2.27E-05	9.93E-05
Benzene (TAPs)	3.45E-04	1.51E-03
Toluene	1.21E-03	5.31E-03
Ethylbenzene	4.98E-04	2.18E-03
Xylenes	1.18E-03	5.17E-03
Hexanes	2.51E-01	1.10E+00
Formaldehyde (TAPs)	2.84E-06	1.24E-05
HAPs	0.25	1.11
CO ₂ e	452.65	1982.60
N ₂ O	2.84E-03	1.25E-02
Lead	6.46E-07	2.83E-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
Hartley East Well Pad
Tyler 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	0.001	8,412,175	0.0137	618,737	0.0008	1,953,221	0.017	7,847	18,147	1	0	--	18,147	33,486,457
Methane	0.032	8,412,175	0.7512	618,737	0.0048	1,953,221	0.037	7,847	742,777	1	0.98	727,922	14,856	14,856
Ethane	0.321	8,412,175	0.1434	618,737	0.3930	1,953,221	0.007	7,847	3,552,706	2	0.98	6,963,304	--	
Propane	0.251	8,412,175	0.0306	618,737	0.2685	1,953,221	0.000	7,847	2,658,283	3	0.98	7,815,351	--	
i-Butane	0.073	8,412,175	0.0161	618,737	0.0741	1,953,221	0.000	7,847	766,633	4	0.98	3,005,201	--	
n-Butane	0.155	8,412,175	0.0082	618,737	0.1574	1,953,221	0.000	7,847	1,616,467	4	0.98	6,336,549	--	
Pentane	0.092	8,412,175	0.0029	618,737	0.0868	1,953,221	0.000	7,847	942,596	5	0.98	4,618,722	--	
Hexane	0.065	8,412,175	0.0008	618,737	0.0080	1,953,221	0.000	7,847	561,668	6	0.98	3,302,611	--	
Benzene	0.000	8,412,175	0.0001	618,737	0.0000	1,953,221	0.000	7,847	785	6	0.98	4,617	--	
Heptanes	0.006	8,412,175	0.0001	618,737	0.0039	1,953,221	0.000	7,847	56,574	7	0.98	388,099	--	
Toluene	0.000	8,412,175	0.0002	618,737	0.0000	1,953,221	0.000	7,847	2,334	7	0.98	16,014	--	
Octane	0.003	8,412,175	0.0001	618,737	0.0024	1,953,221	0.000	7,847	29,429	8	0.98	230,722	--	
Ethyl benzene	0.000	8,412,175	0.0001	618,737	0.0000	1,953,221	0.000	7,847	831	8	0.98	6,515	--	
Xylenes	0.000	8,412,175	0.0002	618,737	0.0001	1,953,221	0.000	7,847	1,969	8	0.98	15,438	--	
Nonane	0.000	8,412,175	0.0000	618,737	0.0003	1,953,221	0.000	7,847	3,429	9	0.98	30,243	--	
Decane plus	0.000	8,412,175	0.0000	618,737	0.0000	1,953,221	0.000	7,847	715	10	0.98	7,004	--	
Subtotal												33,468,310	--	

Pollutant	Volume Emitted scf/year	Density of GHG ^c lb/scf	Conversion Factor lb/ton	GWF	Emissions ^c	
					lbs/hr	(tons/yr)
CO ₂	33,486,457	0.12	2000	1	443.29	1,941.60
CH ₄	14,856	0.09	2000	25	0.16	0.69
CO₂e Emissions					447.2	1958.87

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
Hartley East Well Pad
Tyler 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)	816
PW Production (bbl/day)	485
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	0.5000	1	1490	0.5000	745.0000	3.8175	1.7179
Tanker Trucks PW	10	40	10	0.5000	1	886	0.5000	443.0000	3.8175	1.7179
Pick Up Truck	4	3	10	0.2200	1	730	0.2200	160.6000	0.3467	0.1560

	Uncontrolled Emissions						Controlled Emissions					
	PM			PM10			PM			PM10		
	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)
Tanker Trucks Condensate	1.9088	2844.0594	1.4220	0.8589	1279.8267	0.6399	0.9544	1422.0297	0.7110	0.4295	639.9134	0.3200
Tanker Trucks PW	1.9088	1691.1655	0.8456	0.8589	761.0245	0.3805	0.9544	845.5828	0.4228	0.4295	380.5122	0.1903
Pick Up Truck	0.0763	55.6768	0.0278	0.0343	25.0545	0.0125	0.0381	27.8384	0.0139	0.0172	12.5273	0.0063
Total Emissions	3.8938	4,590.9017	2.2955	1.7522	2,065.9058	1.0330	1.9469	2,295.4508	1.1477	0.8761	1,032.9529	0.5165

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

Vapor Recovery Unit Emissions
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation

Ford MSG-425 2.5L Engine

Power (hp) ¹	68
Fuel consumption (lbs/BHP-hr) ¹	0.3864
Heat Content of Fuel (Btu/scf)	1245.9985
Density of NG (lb/scf)	0.056
Operating Hours/year	8760
No. of Engines	2

Ford CSG-637 3.7L Engine

Power (hp) ¹	99
Fuel consumption (lbs/BHP-hr) ¹	0.3584
Heat Content of Fuel (Btu/scf)	1245.9985
Density of NG (lb/scf)	0.056
Operating Hours/year	8760
No. of Engines	2

Pollutant	Emission Factors		lb/hr	tpy
	(g/hp-hr)	(lb/MMBtu)		
NOx ²	0.3731		0.1119	0.4900
CO ²	2.4627		0.7384	3.2341
CO ₂		110.000	128.6169	563.34
PM _{2.5}		9.500E-03	0.0111	0.0487
PM ₁₀		9.500E-03	0.0111	0.0487
PM (Total)		9.910E-03	0.0116	0.0508
SO ₂		5.880E-04	0.0007	0.0030
TOC		0.358	0.4186	1.8334
Methane		0.230	0.2689	1.1779
VOC ³		0.0296	0.0346	0.1516
HAPS				
Benzene		1.58E-03	1.85E-03	8.09E-03
Ethylbenzene		2.48E-05	2.90E-05	1.27E-04
Formaldehyde		2.05E-02	2.40E-02	1.05E-01
Naphthalene		9.71E-05	1.14E-04	4.97E-04
Toluene		5.58E-04	6.52E-04	2.86E-03
Xylene		1.95E-04	2.28E-04	9.99E-04

Pollutant	Emission Factors		lb/hr	tpy
	(g/hp-hr)	(lb/MMBtu)		
NOx ²	0.2985		0.1303	0.5707
CO ²	2.4627		1.0750	4.7085
CO ₂		110.000	173.6822	760.73
PM _{2.5}		9.500E-03	0.0150	0.0657
PM ₁₀		9.500E-03	0.0150	0.0657
PM (Total)		9.910E-03	0.0156	0.0685
SO ₂		5.880E-04	0.0009	0.0041
TOC		0.358	0.5653	2.4758
Methane		0.230	0.3632	1.5906
VOC ³		0.0296	0.0467	0.2047
HAPS				
Benzene		1.58E-03	2.49E-03	1.09E-02
Ethylbenzene		2.48E-05	3.92E-05	1.72E-04
Formaldehyde		2.05E-02	3.24E-02	1.42E-01
Naphthalene		9.71E-05	1.53E-04	6.72E-04
Toluene		5.58E-04	8.81E-04	3.86E-03
Xylene		1.95E-04	3.08E-04	1.35E-03

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.0813	0.3563
TOTAL Uncontrolled NOx	0.2422	1.0608
TOTAL Uncontrolled HAPS	0.0631	0.2763
TOTAL Uncontrolled TAPs (Benzene)	0.0043	0.0190
TOTAL Uncontrolled Toluene	0.0015	0.0067
TOTAL Uncontrolled Ethylbenzene	0.0001	0.0003
TOTAL Uncontrolled Xylene	0.0005	0.0023
TOTAL Uncontrolled TAPs (Formaldehyde)	0.0563	0.2468
TOTAL CO _{2e} Emissions	318.1012	1393.2831

Enter Any Notes Here:

- Engines were manufactured in 2015 for MSG-425 and 2016 for CSG-637. Both engine ratings were taken from manufacturer engine specifications. Please see copies of manufacturer engine specifications in Appendix N.
- Emission factors used for the 68 HP engine NOx and CO emissions are certification levels indicated on MSG-425 CARB document. See MSG-425 CARB document in Appendix N. Emission factors used for the 99 HP engine NOx and CO emissions are certification levels indicated on CSG-637 CARB document in Appendix N.
- Emission factors for all other contaminants including VOCs were obtained from AP-42, Section 3.2 "Natural Gas-fired Reciprocating Engines", Table 3.2-3.
- Hours of operation was calculated based on the 100% operation of the VRU.

Table 14

**Change in Regulated Air Pollutants Emissions
Hartley East Well Pad
Tyler County, West Virginia
Antero Resources Corporation**

Pollutant	Potential Emissions		Initial Permit Application Emissions		Change in Emissions	
	Hourly PTE	Yearly PTE	Hourly PTE	Yearly PTE	Hourly PTE	Yearly PTE
PM	2.1275	1.9388	1.3385	3.5924	7.89E-01	-1.6536
PM10	1.0828	1.4219	0.7688	2.2387	0.3140	-0.8168
VOC (uncontrolled)	111.9652	505.8028	419.9783	1848.0999	-308.0130	-1342.2971
CO	3.8096	16.6861	8.9643	39.2638	-5.1547	-22.5777
NOx	2.6186	11.4696	4.2680	18.6939	-1.6494	-7.2242
SO2	0.0151	0.0662	0.0204	0.0893	-5.26E-03	-2.31E-02
Pb	1.19E-05	5.20E-05	1.98E-05	8.66E-05	-7.88E-06	-3.45E-05
HAPs	0.7242	3.3294	0.6825	3.0071	0.0417	0.3222
TAPs	0.0649	0.2845	0.0159	0.0700	4.90E-02	0.2145

Notes:

1. Change in emissions due to the decrease in production, removal of a Cimarron enclosed combustor, removal of a Kubota compressor engine, removal of 4 GPUs, removal of 4 line heaters and the addition of 2 high pressure VRU compressor engines, 2 low pressure VRU compressor engines, and 3 VRTs.
2. Change in permit from G70A to G70C.



Bryan Research & Engineering, Inc.

ProMax[®] 3.2

with

TSWEET[®] & PROSIM[®]

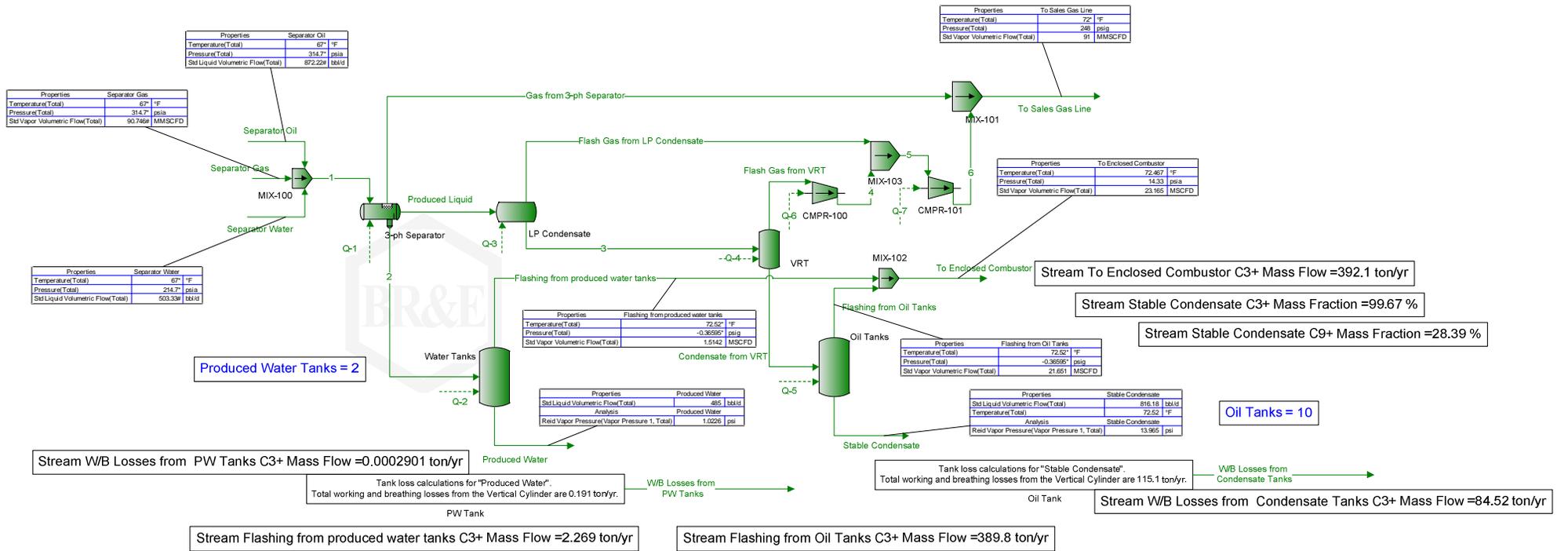
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Simulation Report

Client Name:	Antero Resources
Location:	Tyler County, WV
Job:	Hartley East Pad

Project Name:	Antero Promax Model- VRT
File Name:	\\Det-s1\shared\AirQuality\ANTERO RESOURCES\ProMax\Antero WV_VRT\ProMax Model\Antero Promax Model- VRT.pmx
ProMax Version:	

Report Created:	6/20/2016 16:29
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3-Methylhexane	0	0	231.398	231.398	89.5299	141.868	0.00027345	4.62919E-06	141.436	14.431821	180.3204	141.078	0.000272716	0.289802	0.290075	0.358628	140.788	0.358628	0.790450	0.790450	7.31627E-11	0.0657013
n-Heptane	0	0	550.078	550.078	185.653	364.425	0.00090785	1.01695E-05	363.545	36.89090	197.2060	362.818	0.00090815	0.288977	0.289158	0.372703	362.229	0.372703	1.60711	1.60711	1.17354E-10	0.123432
Methylcyclohexane	0	0	235.191	235.191	79.4625	159.727	0.00150160	0.00138771	156.341	3.386208	81.4996	156.019	0.00150160	0.250179	0.250362	0.321114	155.760	0.321114	0.207122	0.207122	0.163175E-09	0.5640029
Toluene	0	0	58.7936	58.7936	17.2011	41.5717	0.0208903	0.0105502	41.4789	0.083792	17.3542	41.4185	0.0208903	0.0561548	0.0568689	0.0694117	41.3623	0.0694117	0.153191	0.153191	2.35566E-08	0.00159624
n-Octane	0	0	1117.87	1117.87	369.529	949.529	0.00292286	3.23029E-06	948.784	74.5044	169.681	948.187	0.00292406	0.0495704	0.0495770	0.0596714	947.692	0.0596714	1.34175	1.34175	1.10074E-11	0.0063277
Ethylbenzene	0	0	57.5287	57.5287	7.44195	50.0789	0.00766970	0.00653060	50.0452	0.033455	7.50303	50.0180	0.00766970	0.0225716	0.0226877	0.0272305	49.954	0.0272305	0.0167671	0.0167671	5.32534E-09	0.00119882
p-Xylene	0	0	72.6904	72.6904	8.45391	64.2384	0.00810776	0.00672229	64.1903	0.0381222	8.52527	64.1597	0.00810776	0.0254233	0.0256888	0.0303541	64.1333	0.0303541	0.0686673	0.0686673	5.31945E-09	0.00146614
o-Xylene	0	0	91.8308	91.8308	9.26887	82.5489	0.0130552	0.01016280	82.5072	0.0142731	9.34384	82.4739	0.0130552	0.0277807	0.0280206	0.0332906	82.4461	0.0332906	0.0749690	0.0749690	7.87990E-09	0.00150160
n-Nonane	0	0	871.216	871.216	263.667	637.549	0.00100213	1.73990E-06	632.509	30.159664	38.8038	632.375	0.00100213	0.106104	0.106202	0.124428	632.279	0.124428	0.284902	0.284902	1.75521E-12	0.0168406
C10+	0	0	1711.41	1711.41	111.507	1699.92	6.23509E-05	2.48909E-06	1699.77	0.0419098	11.8553	1699.74	6.23509E-05	0.027805	0.0279304	0.0305165	1699.72	0.0305165	0.074263	0.074263	3.01095E-13	0.00407056

Process Streams	Separator Gas	Separator Water	Separator Oil	1	as from 3-ph Separator	Produced Liquid	2	Produced Water	3	Gas from LP Condenser	To Sales Gas Line	Condensate from VRT	from produced water	washing from Oil Tank	Enclosed Combust	Flash Gas from VRT	Stable Condensate	4	5	6	Losses from PW Tases	Losses from Condensate T	
Phase: Total	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units																						
Temperature	°F	87.0	87.0	87.0	58.8	70.0	70.0	72.5	70.0	70.0	72	72.52	72.52	72.52	72.4665	65	72.52	82.1757	70	70	653.335	75.9425	75.9425
Pressure	psig	300	300	300	248	248	248	4.365949	4.0	4.0	4.0	4.365949	4.365949	4.365949	5	4.0	4.365949	40	40	248	114.2230	114.2230	
Mole Fraction Vapor	%	100	0	0	95.1160	100	100	0	100	100	100	100	100	100	100	100	100	96.3801	99.5552	100	0	0	
Mole Fraction Light Liquid	%	0	0	0	1.10630	100	100	100	100	100	100	100	100	100	100	100	100	3.61994	0.444789	0	0	0	
Mole Fraction Heavy Liquid	%	0	0	0	3.77772	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Molecular Weight	lb/lbmol	20.5	18.0	82.5	21.0	18.0	83.3	18.0	18.0	91.5	28.7	20.4336	94.4732	20.6778	47.6236	45.8623	40.0603	95.7718	40.0603	31.7239	18.4702	44.7384	
Mass Density	lb/ft³	12.0	82.3	42.0	0.9	2.0	41.8	82.3	82.3	42.0	92.7	0.03262687	0.121813	0.117154	0.117154	0.142937	0.410322	43.0402	0.117154	0.117154	0.702553	0.00151748	
Dynamic Viscosity	lbm/ft-h	0.620	0.011	0.109	0.088	0.088	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Mass Flow	lb/h	203867.6	7343.6	8359.8	21957.0	203569.7	8821.0	7079.2	7075.8	8828.1	402.9	204165	8326.98	343782	113.212	116.650	201.119	8213.76	201.119	604.043	604.043	0.0435994	28.2867
Vapor Volumetric Flow	MCFH	164.6	0.1	0.2	243.7	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.190840	0.095702	1.407104	1.407104	1.90404	0.0859783	
Liquid Volumetric Flow	Mbb/d	703.8	0.5	0.9	1041.9	862.2	0.9	0.5	0.9	0.5	0.9	867.715	0.829442	2.82228	3.92726	4.25621	0.61452	0.815759	2.09518	2.09518	1.4054	3.67522	
Std Vapor Volumetric Flow	MMSCFD	90.7	3.7	0.9	95.4	90.8	1.0	3.6	3.6	1.0	3.6	0.90998	0.00216509	0.00216509	0.00216509	0.00216509	0.00216509	0.00216509	0.00216509	0.00216509	0.00216509	0.00216509	
Std Liquid Volumetric Flow	Mbb/d	41.3	0.5	0.9	42.6	41.3	0.9	0.5	0.9	0.5	0.9	41.3228	0.00367143	0.00367143	0.00367143	0.00367143	0.00367143	0.00367143	0.00367143	0.00367143	0.00367143	0.00367143	
Compressibility	z	0.920	0.011	0.109	0.895	0.895	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Specific Gravity		0.706	0.999	0.674	0.705	0.671	0.998	0.998	0.685	0.685	0.992	0.685	0.992	0.685	0.992	0.685	0.992	0.685	0.992	0.992	0.992	0.992	0.992
API Gravity		10.0	77.4	10.0	77.4	10.0	77.4	10.0	77.4	10.0	77.4	10.0	77.4	10.0	77.4	10.0	77.4	10.0	77.4	10.0	10.0	10.0	10.0
Enthalpy	MMBtu/h	-338.9	-50.2	-7.8	-39.9	-48.3	-339.2	-48.3	-48.3	-339.2	-48.3	-339.2	-48.3	-339.2	-48.3	-339.2	-48.3	-339.2	-48.3	-339.2	-339.2	-339.2	-339.2
Mass Enthalpy	Btu/lb*(°F)	-1662.5	-4820.9	-6829.4	-1662.5	-1662.5	-4820.9	-4820.9	-4820.9	-4820.9	-4820.9	-1662.5	-4820.9	-4820.9	-4820.9	-4820.9	-4820.9	-4820.9	-4820.9	-4820.9	-4820.9	-4820.9	-4820.9
Mass Cp	Btu/lb*(°F)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ideal Gas Cp/Cv Ratio		1.254	1.326	1.068	1.252	1.066	1.326	1.326	1.066	1.066	1.189	1.2540	1.0689	1.2566	1.1206	1.1657	1.1657	1.1657	1.1657	1.1657	1.1657	1.1657	1.1657
Dynamic Viscosity	cP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kinematic Viscosity	cSt	0.0	1.0	0.5	1.0	0.5	1.0	1.0	0.5	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0	1.0	0.5	1.0	0.5
Thermal Conductivity	Btu/(h*ft*°F)	0.0	0.3	0.1	0.0	0.1	0.3	0.3	0.1	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.3	0.1	0.3	0.1
Surface Tension	lbf/ft	0.005	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
Net I.G. Heating Value	Btu/h*3	1120.6	0.0	4162.1	1106.7	1116.7	4236.0	0.0	4642.3	0.0	4642.3	1117.75	4786.89	1078.13	2481.64	2389.90	2103.52	1685.93	4850.79	2103.52	1685.93	455.840	2340.49
Net Liquid Heating Value	Btu/h	20726.6	-1059.8	19306.0	19305.9	20701.4	19122.2	-1048.8	-1058.9	1907.27	20717.0	20699.4	19055.7	19702.5	19615.1	19717.7	19715.8	19048.0	20309.2	20309.2	20309.2	19653.7	19653.7
Gross I.G. Heating Value	Btu/h*3	1258.8	50.3	4615.4	1221.8	4650.0	5114.0	50.3	4650.0	50.3	4650.0	1221.8	4650.0	50.3	4650.0	50.3	4650.0	50.3	4650.0	50.3	4650.0	50.3	4650.0
Gross Liquid Heating Value	Btu/h	22863.1	0.0	20585.4	22011.7	22837.9	22819.6	0.0	22819.6	0.0	22819.6	22075.7	22831.1	21252.4	21288.6	21302.3	21516.9	20516.9	21516.9	21516.9	21516.9	21516.9	21516.9

Process Streams	Separator Gas	Separator Water	Separator Oil	1	as from 3-ph Separator	Produced Liquid	2	Produced Water	3	Gas from LP Condenser	To Sales Gas Line	Condensate from VRT	from produced water	washing from Oil Tank	Enclosed Combust	Flash Gas from VRT	Stable Condensate	4	5	6	Losses from PW Tases	Losses from Condensate T	
Phase: Vapor	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water	0	0	0.121747	0.148783	0.148783	0.148783	2.77086	0.228326	0.228326	0.148916	0.191360	2.77086	0.108113	0.282165	0.191360	0.108113	0.191817	0.219502	0.218579	93.9408	3.74185E-05		
H2S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Nitrogen	0.4678	0.468083	0.467532	0.467532	0.467532	0.235680	0.0991129	0.0991129	0.466786	0.0103501	0.235680	0.000760888	0.0161165	0.0103501	0.000760888	0.0103501	0.00760888	0.0107363	0.0760452	0.0752000			



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

For: Antero Resources Appalachian Corp.
 1615 Wynkoop Street
 Denver, Colorado 80202

Date Sampled: 09/12/14

Date Analyzed: 9/25/14

Sample: Freeland No. 2H

Job Number: J45343

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	Stock Tank
Pressure, psig	290	0
Temperature, °F	80	70
Gas Oil Ratio (1)	-----	362
Gas Specific Gravity (2)	-----	1.417
Separator Volume Factor (3)	1.2415	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.8055
Oil API Gravity at 60 °F	67.88
Reid Vapor Pressure, psi (5)	7.28

Quality Control Check			
	Sampling Conditions	Test Samples	
Cylinder No.	-----	T-535*	W-1330
Pressure, psig	290	248	172
Temperature, °F	80	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: _____ T. G.

* Sample used for flash study

Base Conditions: 14.85 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

 David Dannhaus 361-661-7015

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

For: Antero Resources Appalachian Corp.
 1615 Wynkoop Street
 Denver, Colorado 80202

Sample: Freeland No. 2H
 Gas Evolved From Hydrocarbon Liquid Flashed
 From 290 psig & 80°F to 0 psig & 70°F

Date Sampled: 09/12/2014

Job Number: 45343.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.086	
Carbon Dioxide	0.076	
Methane	24.289	
Ethane	25.052	6.753
Propane	22.476	6.241
Isobutane	4.471	1.475
n-Butane	11.412	3.626
2-2 Dimethylpropane	0.113	0.043
Isopentane	3.310	1.220
n-Pentane	3.746	1.369
Hexanes	2.990	1.242
Heptanes Plus	<u>1.979</u>	<u>0.877</u>
Totals	100.000	22.845

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity ----- 3.558 (Air=1)
 Molecular Weight ----- 101.44
 Gross Heating Value ----- 5423 BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity ----- 1.417 (Air=1)
 Compressibility (Z) ----- 0.9843
 Molecular Weight ----- 40.39
 Gross Heating Value
 Dry Basis ----- 2369 BTU/CF
 Saturated Basis ----- 2328 BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stain Tube Method (GPA 2377)
 Results: 0.063 Gr/100 CF, 1.0 PPMV or 0.0001 Mol %

Base Conditions: 14.850 PSI & 60 Deg F

Analyst: MR
 Processor: NG
 Cylinder ID: FL-5S

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

**CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT**

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.086		0.060
Carbon Dioxide	0.076		0.083
Methane	24.289		9.645
Ethane	25.052	6.753	18.652
Propane	22.476	6.241	24.541
Isobutane	4.471	1.475	6.435
n-Butane	11.412	3.626	16.424
2,2 Dimethylpropane	0.113	0.043	0.202
Isopentane	3.310	1.220	5.913
n-Pentane	3.746	1.369	6.692
2,2 Dimethylbutane	0.102	0.043	0.218
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.167	0.069	0.356
2 Methylpentane	0.910	0.381	1.942
3 Methylpentane	0.547	0.225	1.167
n-Hexane	1.264	0.524	2.697
Methylcyclopentane	0.095	0.033	0.198
Benzene	0.025	0.007	0.048
Cyclohexane	0.131	0.045	0.273
2-Methylhexane	0.228	0.107	0.566
3-Methylhexane	0.226	0.104	0.561
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.216	0.095	0.531
n-Heptane	0.330	0.153	0.819
Methylcyclohexane	0.185	0.075	0.450
Toluene	0.048	0.016	0.110
Other C8's	0.262	0.123	0.715
n-Octane	0.078	0.040	0.221
Ethylbenzene	0.003	0.001	0.008
M & P Xylenes	0.025	0.010	0.066
O-Xylene	0.003	0.001	0.008
Other C9's	0.080	0.041	0.250
n-Nonane	0.016	0.009	0.051
Other C10's	0.024	0.014	0.084
n-Decane	0.002	0.001	0.007
Undecanes (11)	<u>0.002</u>	<u>0.001</u>	<u>0.007</u>
Totals	100.000	22.845	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity -----	1.417	(Air=1)
Compressibility (Z) -----	0.9843	
Molecular Weight -----	40.39	
Gross Heating Value		
Dry Basis -----	2369	BTU/CF
Saturated Basis -----	2328	BTU/CF

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

For: Antero Resources Appalachian Corp.
 1615 Wynkoop Street
 Denver, Colorado 80202

Sample: Freeland No. 2H
 Separator Hydrocarbon Liquid
 Sampled @ 290 psig & 80 °F

Date Sampled: 09/12/14

Job Number: 45343.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.029	0.008	0.010
Carbon Dioxide	0.021	0.009	0.011
Methane	7.616	3.264	1.486
Ethane	8.231	5.568	3.011
Propane	9.071	6.321	4.866
Isobutane	2.544	2.106	1.799
n-Butane	7.923	6.318	5.602
2,2 Dimethylpropane	0.128	0.124	0.112
Isopentane	4.569	4.226	4.010
n-Pentane	6.870	6.299	6.030
2,2 Dimethylbutane	0.204	0.215	0.214
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.333	0.345	0.349
2 Methylpentane	2.794	2.933	2.929
3 Methylpentane	1.829	1.889	1.918
n-Hexane	5.268	5.479	5.522
Heptanes Plus	<u>42.569</u>	<u>54.897</u>	<u>62.132</u>
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity ----- 0.7457 (Water=1)
 °API Gravity ----- 58.26 @ 60°F
 Molecular Weight ----- 120.0
 Vapor Volume ----- 19.73 CF/Gal
 Weight ----- 6.21 Lbs/Gal

Characteristics of Total Sample:

Specific Gravity ----- 0.6589 (Water=1)
 °API Gravity ----- 83.27 @ 60°F
 Molecular Weight ----- 82.2
 Vapor Volume ----- 25.44 CF/Gal
 Weight ----- 5.49 Lbs/Gal

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
 Processor: XGdjv
 Cylinder ID: T-535

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.021	0.009	0.011
Nitrogen	0.029	0.008	0.010
Methane	7.616	3.264	1.486
Ethane	8.231	5.568	3.011
Propane	9.071	6.321	4.866
Isobutane	2.544	2.106	1.799
n-Butane	8.051	6.442	5.714
Isopentane	4.569	4.226	4.010
n-Pentane	6.870	6.299	6.030
Other C-6's	5.160	5.382	5.409
Heptanes	11.929	13.431	14.220
Octanes	12.037	14.358	15.927
Nonanes	5.167	7.103	7.973
Decanes Plus	10.643	17.394	20.544
Benzene	0.099	0.070	0.094
Toluene	0.630	0.534	0.707
E-Benzene	0.535	0.522	0.691
Xylenes	1.530	1.485	1.976
n-Hexane	5.268	5.479	5.522
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 -----	0.6589	(Water=1)
°API Gravity -----	83.27	@ 60°F
Molecular Weight-----	82.2	
Vapor Volume -----	25.44	CF/Gal
Weight -----	5.49	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity -----	0.7782	(Water=1)
Molecular Weight-----	158.7	

Characteristics of Atmospheric Sample:

°API Gravity -----	67.88	@ 60°F
Reid Vapor Pressure (ASTM D-5191)-----	7.28	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	-----	T-535*	W-1330
Pressure, PSIG	290	248	172
Temperature, °F	80	70	70

* Sample used for analysis

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.029	0.008	0.010
Carbon Dioxide	0.021	0.009	0.011
Methane	7.616	3.264	1.486
Ethane	8.231	5.568	3.011
Propane	9.071	6.321	4.866
Isobutane	2.544	2.106	1.799
n-Butane	7.923	6.318	5.602
2,2 Dimethylpropane	0.128	0.124	0.112
Isopentane	4.569	4.226	4.010
n-Pentane	6.870	6.299	6.030
2,2 Dimethylbutane	0.204	0.215	0.214
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.333	0.345	0.349
2 Methylpentane	2.794	2.933	2.929
3 Methylpentane	1.829	1.889	1.918
n-Hexane	5.268	5.479	5.522
Methylcyclopentane	0.751	0.672	0.769
Benzene	0.099	0.070	0.094
Cyclohexane	0.826	0.711	0.846
2-Methylhexane	2.651	3.118	3.232
3-Methylhexane	2.280	2.648	2.779
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	1.023	1.152	1.235
n-Heptane	4.397	5.131	5.360
Methylcyclohexane	2.375	2.415	2.837
Toluene	0.630	0.534	0.707
Other C-8's	6.854	8.305	9.189
n-Octane	2.808	3.638	3.901
E-Benzene	0.535	0.522	0.691
M & P Xylenes	0.676	0.664	0.873
O-Xylene	0.854	0.821	1.102
Other C-9's	3.581	4.846	5.499
n-Nonane	1.586	2.257	2.474
Other C-10's	3.263	4.853	5.607
n-decane	0.834	1.294	1.443
Undecanes(11)	2.580	3.937	4.613
Dodecanes(12)	1.603	2.643	3.140
Tridecanes(13)	0.963	1.701	2.049
Tetradecanes(14)	0.580	1.098	1.340
Pentadecanes(15)	0.334	0.677	0.836
Hexadecanes(16)	0.188	0.407	0.507
Heptadecanes(17)	0.117	0.269	0.338
Octadecanes(18)	0.065	0.157	0.199
Nonadecanes(19)	0.035	0.087	0.111
Eicosanes(20)	0.011	0.028	0.036
Heneicosanes(21)	0.005	0.012	0.016
Docosanes(22)	0.003	0.010	0.013
Tricosanes(23)	0.003	0.008	0.010
Tetracosanes(24)	0.009	0.028	0.037
Pentacosanes(25)	0.008	0.024	0.032
Hexacosanes(26)	0.010	0.032	0.042
Heptacosanes(27)	0.008	0.027	0.036
Octacosanes(28)	0.006	0.021	0.028
Nonacosanes(29)	0.007	0.024	0.032
Triacotanes(30)	0.006	0.021	0.029
Hentriacotanes Plus(31+)	<u>0.009</u>	<u>0.037</u>	<u>0.051</u>
Total	100.000	100.000	100.000

Gas Analytical

Report Date: Feb 19, 2016 8:59a

Client:	Antero Resources	Date Sampled:	Feb 2, 2016 1:20p
Site:	Freeland Unit 2H	Analysis Date:	Feb 18, 2016 1:23p
Field No:	9998	Collected By:	Jonathan Griffin
Meter:	40708	Date Effective:	Feb 2, 2016 12:00a
Source Laboratory	Clarksburg (Bridgeport), WV	Sample Pressure (PSI):	121.0
Lab File No:	X_CH1-9672.CHR	Sample Temp (°F):	56
Sample Type:	Spot	Field H2O:	No Test
Reviewed By:		Field H2S:	No Test

Component	Mol %	Gal/MSCF
Methane	79.1872	
Ethane	14.3455	3.81
Propane	2.8917	0.79
I-Butane	0.5768	0.19
N-Butane	1.1291	0.36
I-Pentane	0.3132	0.11
N-Pentane	0.3112	0.11
Nitrogen	0.4678	
Oxygen	<MDL	
Carbon Dioxide	0.1488	
Hexanes+	0.6287	0.26
TOTAL	100.0000	5.64

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1,245.9985 BTU/ft ³
BTU/SCF (Saturated):	1,225.1904 BTU/ft ³
PSIA:	14.730 PSI
Temperature (°F):	60.00 °F
Z Factor (Dry):	0.99656
Z Factor (Saturated):	0.99615

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1,245.9985 BTU/ft ³
BTU/SCF (Saturated):	1,225.1904 BTU/ft ³
PSIA:	14.730 PSI
Temperature (°F):	60.00 °F
Z Factor (Dry):	0.99656
Z Factor (Saturated):	0.99615

Calculated Specific Gravities		
Ideal Gravity:	0.7084	Real Gravity: 0.7105
Molecular Wt:	20.5167 lb/lbmol	

Gross Heating Values are Based on:
 GPA 2145-09, 2186
 Compressibility is Calculated using AGA-8.

Source	Date	Notes

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									0.8761	0.5165				
EP-PCV					0.0756	0.3310							7.3652	32.2594
F001					2.8692	12.5671							67.5244	295.7568
EP-ENG001, EP-ENG002, EP-ENG003, EP-ENG004	0.2422	1.0608	1.8134	7.9427	0.0813	0.3563	0.0016	0.0071	0.0261	0.1144	0.0261	0.1144	318.1012	1393.2831
EP-GPU001, EP-GPU002, EP-GPU003, EP-GPU004, EP-GPU005, EP-GPU006, EP-GPU007, EP-GPU008	0.9631	4.2183	0.8090	3.5434	0.0530	0.2320	0.0058	0.0253	0.0732	0.3206	0.0732	0.3206	1155.6996	5061.9644
EP-LH001, EP-LH002, EP-LH003, EP-LH004, EP-LH005, EP-LH006, EP-LH007, EP-LH008	1.2841	5.6244	1.0787	4.7245	0.0706	0.3093	0.0077	0.0337	0.0976	0.4275	0.0976	0.4275	1540.9328	6749.2858
EP-L001					24.8101	15.3947							1.4795	0.9180
EP-L002					0.0015	5.53E-04							0.8287	0.3056
EP-EC001, EP-EC002, EP-EC003	0.1293	0.5662	0.1086	0.4756	2.1765	9.5331	2.27E-05	9.93E-05	0.0098	0.0430	0.0074	0.0323	452.6484	1982.6001
TOTAL	2.6186	11.4696	3.8096	16.6861	2.3815	10.4308	0.0151	0.0662	0.2067	0.9054	0.2043	0.8947	3467.3821	15187.1335

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												
EP-HR001														
EP-PCV			0.00E+00	0.0126	0.0550	0.0126	0.0550							
F001			0.0022	0.0094	0.0162	0.0709	0.0158	0.0693	0.0453	0.1983	0.2730	1.1959	0.3525	1.5439
EP-ENG001, EP-ENG002, EP-ENG003, EP-ENG004	0.0563	0.2468	0.0043	0.0190	0.0015	0.0067	0.0001	0.0003	0.0005	0.0023	0.0000	0.0000	0.0631	0.2763
EP-GPU001, EP-GPU002, EP-GPU003, EP-GPU004, EP-GPU005, EP-GPU006, EP-GPU007, EP-GPU008	7.22E-04	0.0032	2.02E-05	8.86E-05	3.27E-05	1.43E-04					0.0173	0.0759	0.0181	0.0794
EP-LH001, EP-LH002, EP-LH003, EP-LH004, EP-LH005, EP-LH006, EP-LH007, EP-LH008	9.63E-04	0.0042	2.70E-05	1.18E-04	4.37E-05	1.91E-04					0.0231	0.1012	0.0242	0.1059
EP-L001			2.67E-04	1.66E-04	0.0021	0.0013	0.0015	9.57E-04	0.0040	0.0025	0.2456	0.1524	0.2535	0.1573
EP-L002			3.35E-07	1.23E-07	5.34E-07	1.97E-07	1.21E-07	4.44E-08	2.99E-07	1.10E-07	9.03E-09	3.33E-09	1.30E-06	4.78E-07
EP-EC001, EP-EC002, EP-EC003	2.84E-06	1.24E-05	0.0003	0.0015	0.0012	0.0053	4.98E-04	0.0022	0.0012	0.0052	0.2505	1.0974	0.2538	1.1116
TOTAL	0.0580	0.2542	0.0047	0.0207	0.0028	0.0124	0.0006	0.0025	0.0017	0.0075	0.2910	1.2746	0.3592	1.5731

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
Hartley East Well Pad
Antero Resources Corporation
Tyler 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 395 Rickey Run Rd. Middlebourne, WV 26149, near Middlebourne in Tyler County, West Virginia.

The latitude and longitude coordinates are: 39.365245 and -80.993244

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

Pollutants	TOTALS (tpy):
NO _x	11.4696
CO	16.6861
PM _{2.5}	0.8947
PM ₁₀	0.9054
VOC	10.4308
SO ₂	0.0662
Formaldehyde	0.2542
Benzene	0.0207
Toluene	0.0124
Ethylbenzene	0.0025
Xylenes	0.0075
Hexane	1.2746
Total HAPs	1.5731

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

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

Dated this the __ day of _____, 2016

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

www.ghd.com

