August 2, 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
James Webb 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 James Webb Well Pad.

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

1. Increase in production.
2. Addition of a Cimarron enclosed combustor.
3. Removal of a Kubota compressor engine.
4. Addition of 5 Ford high pressure vapor recovery unit compressor engines.
5. Addition of 2 Ford low pressure vapor recovery unit compressor engines.
6. Addition of 4 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. 451646 in the amount of $1,500.00.

GHD Services Inc.
6320 Rothway Suite 100 Houston Texas 77040 USA
T 713 734 3090 **F** 713 734 3391 **W** www.ghd.com

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

Sincerely,

GHD Services Inc.

Manuel Bautista

MB/ma/260

Encl.

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

General Permit G70-C Modification Application

Increase in production, addition of 1 Cimarron enclosed combustor, removal of a Kubota compressor engine, and the addition of 5 Ford high pressure VRU compressor engines, 2 Ford low pressure VRU compressor engines, and 4 VRTs.

James Webb Well Pad

Antero Resources Corporation

GHD
6320 Rothway Suite 100 Houston Texas 77040
082715 | Report No 260 | July 2016

Table of Contents

west virginia department of environmental protection

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

G70-C GENERAL PERMIT REGISTRATION APPLICATION

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

☐CONSTRUCTION
☒MODIFICATION
☐RELOCATION
☐CLASS I ADMINISTRATIVE UPDATE
☐CLASS II ADMINISTRATIVE UPDATE

SECTION 1. GENERAL INFORMATION

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

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

Applicant's Mailing Address: 1615 Wynkoop Street

City: Denver	State: CO	ZIP Code: 80202

Facility Name: James Webb Well Pad

Operating Site Physical Address: 416 Cabin Run Rd West Union

City: West Union	Zip Code: 26456	County: Doddridge

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.23871
Longitude: -80.87306

SIC Code: 1311 NAICS Code: 211111	DAQ Facility ID No. (For existing facilities) 017-00144

CERTIFICATION OF INFORMATION

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

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

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

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

If applicable:
Authorized Representative Signature: Barry Schatz
Name and Title: Barry Schatz/ Senior Environmental & Regulatory Manager Phone: 303-357-7276 Fax: 303-357-7315
Email: bschatz@anteroresources.com Date: 8/2/2016

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

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: Increase in production, addition of 1 Cimarron enclosed combustor, removal of a Kubota compressor engine, and the addition of 5 Ford high pressure VRU compressor engines, 2 Ford low pressure VRU compressor engines, and 4 VRTs.	
Directions to the facility: Travel on US-50 W for 28.4 miles. Turn left onto Old U.S 50 E/Sunnyside Rd. Go 1.9 miles. Turn left onto Oxford Rd, go 2.0 miles. Turn right onto Co Rte 21/1, go 0.5 mile. The facility is on the 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). ☒ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☐ I wish to pay by credit card. Contact for payment (incl. name and email address): ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO [1] ☐$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. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed in its entirety)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-C Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ 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	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck Loading Data Sheet (if applicable) – Attachment O	
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☐ Pneumatic Controllers Data Sheet – Attachment Q	
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment R	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment S	
☒ Facility-wide Emission Summary Sheet(s) – Attachment T	
☒ Class I Legal Advertisement – Attachment U	
☒ 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:		40WVDEPAQ	451646	
CR70816	7/8/2016	401013280		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

7/8/2016 NO. 451646

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

⑈451646⑈ ⑆221370632⑆6100000018910⑈

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:

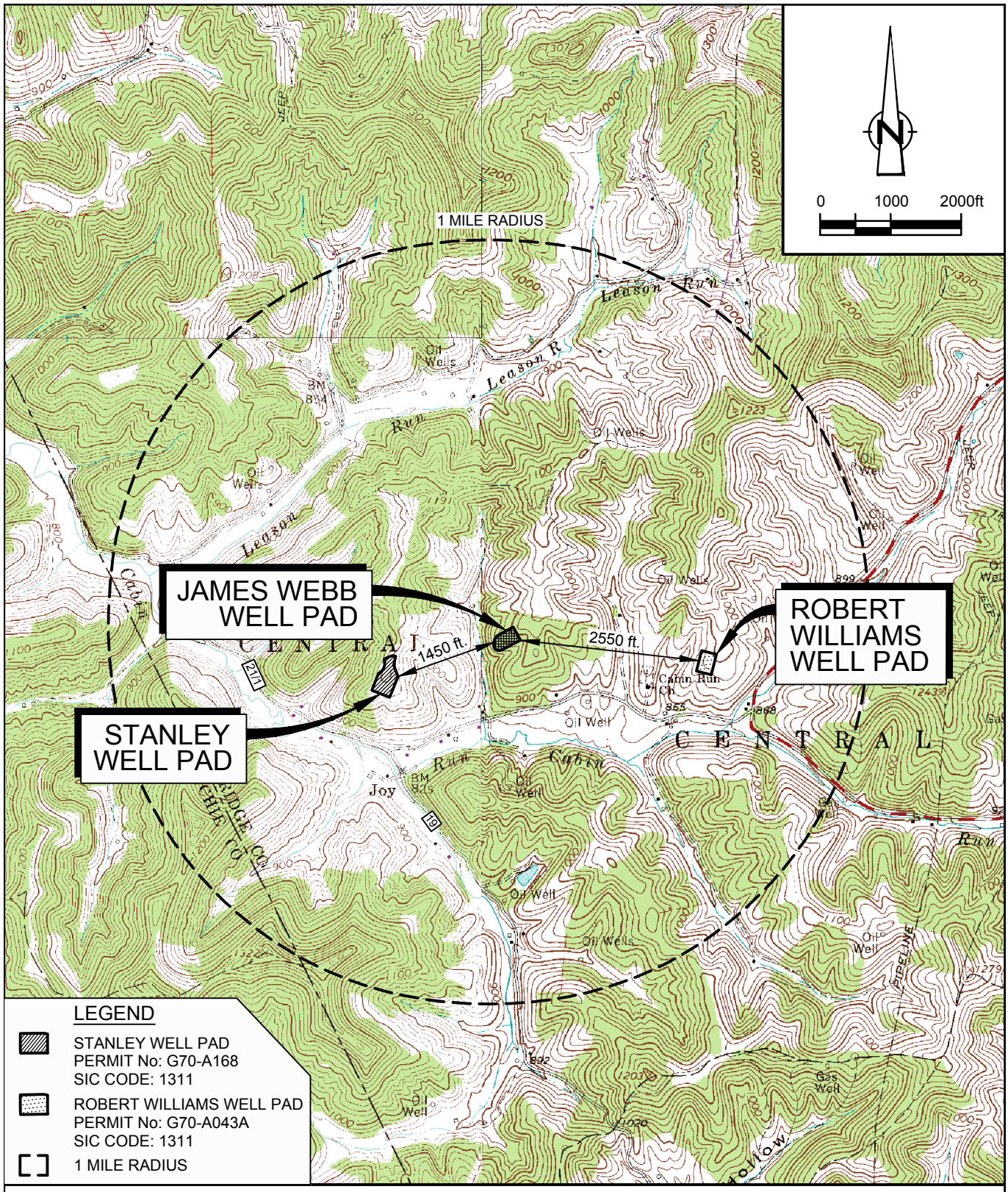
The James Webb Well Pad calculation of potential to emit included all the emissions sources that belong to the same industrial grouping, are located on contiguous or adjacent properties, and are under the control of the same person. The nearest emission source that belongs to the same industrial grouping and under the control of the same person but not located on contiguous or adjacent property is the Stanley Well Pad. This well pad operates independently and is approximately 0.27 mile southwest of the facility. There is one other nearby source, Robert Williams Well Pad that belongs to the same industrial grouping and is under the same control but not located on contiguous or adjacent property. This well pad is located approximately 0.48 mile east of James Webb Well Pad and operates completely independent.

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

Are the facilities owned by the same parent company or a subsidiary of the parent company? Provide the owners identity and the percentage of ownership of each facility. **Antero Resources has 100% ownership of each facility.**	Yes ☒ No ☐
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 ☐ No ☒
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 ☐ No ☒
Do the facilities share common workforces, plant managers, security forces, corporate executive officers or board executives?	Yes ☒ No ☐
Will managers or other workers frequently shuttle back and forth to be involved actively at both facilities?	Yes ☐ No ☒
Do the facilities share common payroll activities, employee benefits, health plans, retirement funds, insurance coverage, or other administrative functions? Please explain.	Yes ☐ No ☒
Does one (1) facility operation support the operation of the other facility?	Yes ☐ No ☒
Is one (1) facility dependent on the other? If one (1) facility shuts down, what are the limitations on the other to pursue outside business? Please explain. **No, these facilities operate completely independently.**	Yes ☐ No ☒
Are there any financial arrangements between the two (2) entities?	Yes ☐ No ☒
Are there any legal or lease agreements between the two (2) facilities?	Yes ☐ No ☒
Do the facilities share products, byproducts, equipment, or other manufacturing or air pollution control device equipment? Please explain. **No, these facilities operate completely independently.**	Yes ☐ No ☒
Do all the pollutant-emitting activities at the facilities belong to the same SIC Code? Please provide the SIC Codes. **1311**	Yes ☒ No ☐
Was the location of the new facility chosen primarily because of its proximity to the existing facility to integrate the operation of the two (2) facilities? Please explain. **No, these facilities operate completely independently.**	Yes ☐ No ☒
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 ☐ No ☒
Does the facility influence production levels or compliance with environmental regulations at other facilities? Who accepts the responsibility for compliance with air quality requirements? Please explain. **No, these facilities operate completely independently.**	Yes ☐ No ☒



SOURCE: USGS QUADRANGLE MAP;
OXFORD, PENNSBORO, PULLMAN, AND WEST UNION, WEST VIRGINIA

SITE COORDINATES: LAT. 39.238719, LONG. -80.873061
SITE ELEVATION: 1003 ft AMSL

GHD

Attachment A

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

82715-00(260)GN-WA004 JUN 24, 2016

Attachment B
Siting Criteria Waiver

Attachment B

Siting Waiver
James Webb Well Pad
Antero Resources Corporation
Doddridge County, West Virginia

A Siting Waiver form is not required because there are no occupied dwelling structures within 300 feet of James Webb 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

IN THE OFFICE OF SECRETARY OF STATE

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

Penney Barker, Manager
Corporations Division
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

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

APPLICATION FOR AMENDED CERTIFICATE OF AUTHORITY

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

1. Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation

2. Date Certificate of Authority was issued in West Virginia: 6/25/2008

3. Corporate name has been changed to: Antero Resources Corporation
(Attach one Certified Copy of Name Change as filed in home State of incorporation.)

4. Name the corporation elects to use in WV: Antero Resources Corporation
(due to home state name not being available)

5. Other amendments:
(attach additional pages if necessary)

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

Alvyn A. Schopp — Contact Name
(303) 357-7310 — Phone Number

7. **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

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.

Jeffrey W. Bullock, Secretary of State

4520810 8100

130754186

AUTHENTICATION: 0496546

DATE: 06-10-13

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

State of Delaware
Secretary of State
Division of Corporations
Delivered 09:37 AM 06/10/2013
FILED 09:37 AM 06/10/2013
SRV 130754186 - 4520810 FILE

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:

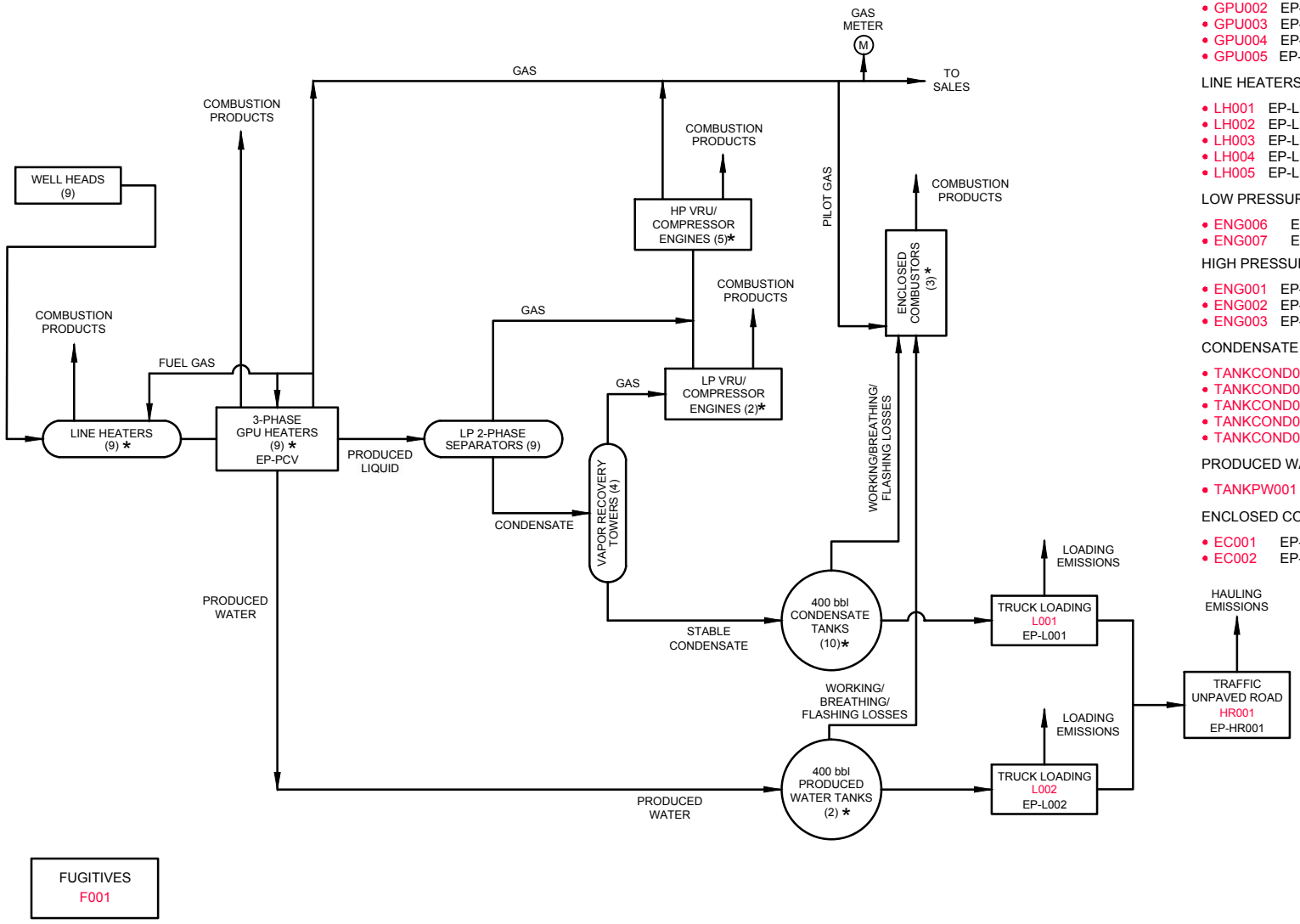
FIRST. The name of the Corporation is Antero Resources Corporation.

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: Alvyn A. Schopp
Title: Vice President of Accounting & Administration / Treasurer

Attachment D
Process Flow Diagram



* 3-PHASE GPU HEATERS (8)

- GPU001 EP-GPU001
- GPU002 EP-GPU002
- GPU003 EP-GPU003
- GPU004 EP-GPU004
- GPU005 EP-GPU005
- GPU006 EP-GPU006
- GPU007 EP-GPU007
- GPU008 EP-GPU008
- GPU009 EP-GPU009

LINE HEATERS (8)

- LH001 EP-LH001
- LH002 EP-LH002
- LH003 EP-LH003
- LH004 EP-LH004
- LH005 EP-LH005
- LH006 EP-LH006
- LH007 EP-LH007
- LH008 EP-LH008
- LH009 EP-LH009

LOW PRESSURE VRU/ COMPRESSOR ENGINES (2)

- ENG006 EP-ENG006
- ENG007 EP-ENG007

HIGH PRESSURE VRU/ COMPRESSOR ENGINES (5)

- ENG001 EP-ENG001
- ENG002 EP-ENG002
- ENG003 EP-ENG003
- ENG004 EP-ENG004
- ENG005 EP-ENG005

CONDENSATE TANKS (10)

- TANKCOND001
- TANKCOND002
- TANKCOND003
- TANKCOND004
- TANKCOND005
- TANKCOND006
- TANKCOND007
- TANKCOND008
- TANKCOND009
- TANKCOND010

PRODUCED WATER TANKS (2)

- TANKPW001
- TANKPW002

ENCLOSED COMBUSTORS (3)

- EC001 EP-EC001
- EC002 EP-EC002
- EC003 EP-EC003

Attachment D

PROCESS FLOW DIAGRAM - ANTERO RESOURCES JAMES WEBB WELL PAD

Doddridge County, West Virginia

82715-00(260)GN-WA002 JUN 24, 2016

Attachment E
Process Description

Attachment E

Process Description
James Webb Well Pad
Antero Resources Corporation
Doddridge County, West Virginia

A mixture of condensate, water, and entrained gas from the condensate and gas wells enters the facility through a series of line heaters (LH001-009) and gas production units (GPU001-GPU009) 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.

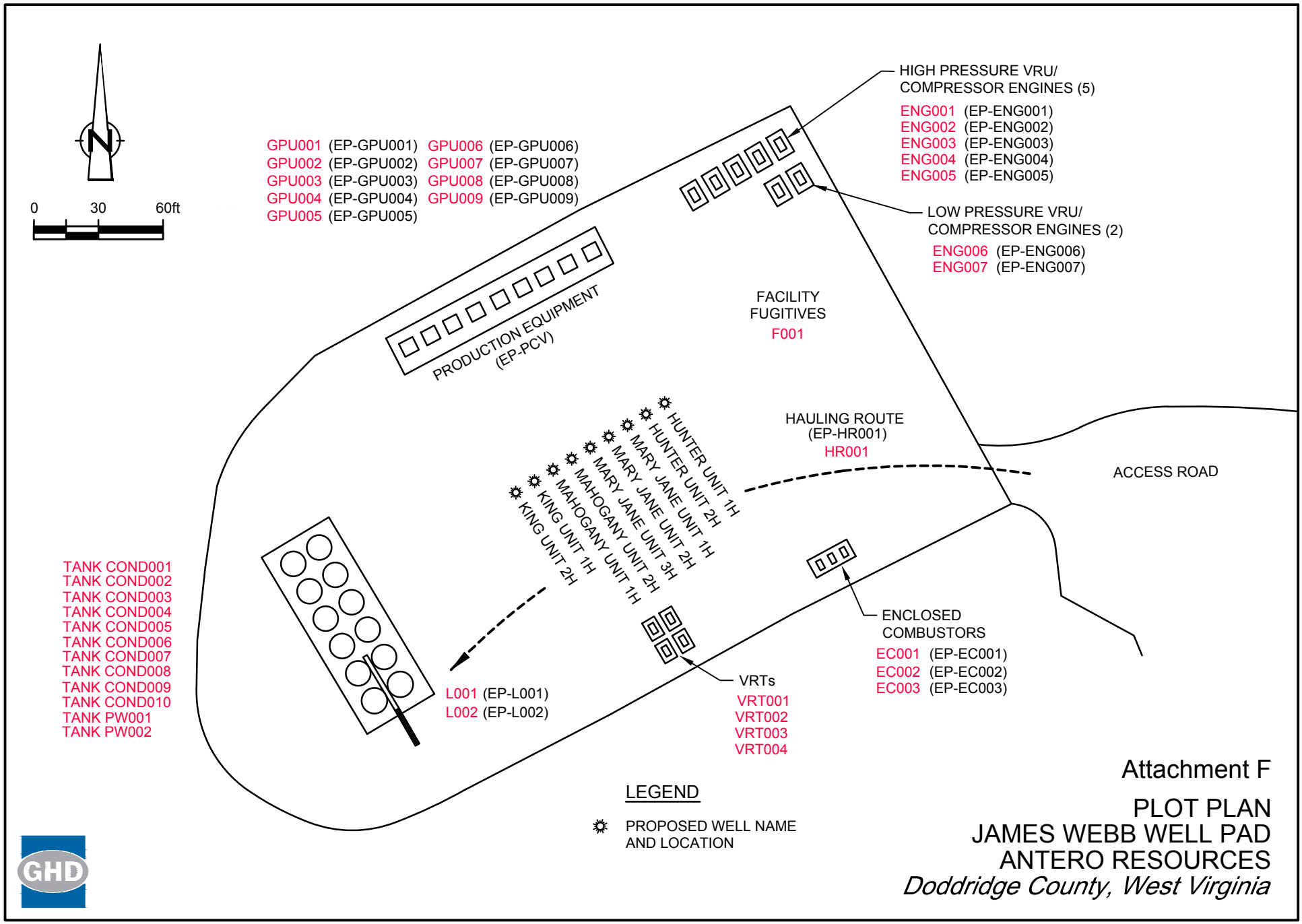
The gas from the three phase separators is metered and sent to the sales gas pipeline. The water flow to the produced water storage tanks (TANKPW001-002). The condensate is then sent to two phase low pressure separators where gas is further separated. The gas is routed to the high pressure VRU driven by gas fueled engines (ENG001-005), compressed, metered and sent to the sales gas line. The condensate from the two phase separators then flows to the vapor recovery towers (VRT001-004) where gas is further separated. Gas from the VRTs is recovered via the low pressure VRU driven by gas fueled engines (ENG006-007), 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 combustors that will be used to control emissions are designed to achieve a VOC destruction efficiency of 98 percent.

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

Emissions from the facility's emission sources were calculated using the extended analysis of condensate from Seaborne Unit 1H one of the wells from the Vogt Well Pad and gas analysis from Pike Unit 2H of Robert Williams Well Pad. These extended analyses are considered representative of the materials from James Webb Well Pad, being in the same Marcellus rock formation.

Attachment F
Plot Plan

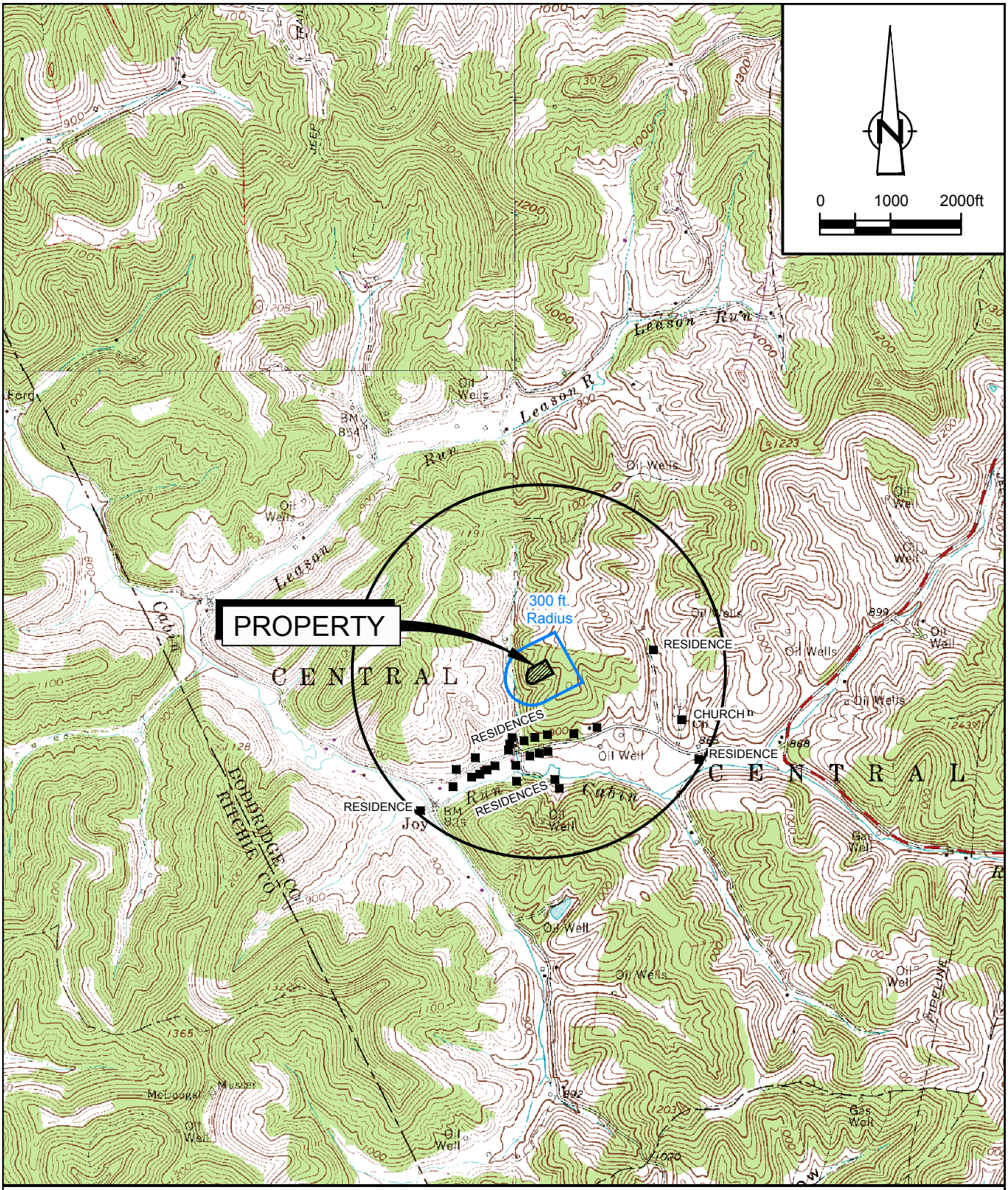


Attachment F

PLOT PLAN
JAMES WEBB WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

82715-00(260)GN-WA003 JUL 4/2016

Attachment G
Area Map



SOURCE: USGS QUADRANGLE MAP;
OXFORD, PENNSBORO, PULLMAN, AND WEST UNION, WEST VIRGINIA

SITE COORDINATES: LAT. 39.238719, LONG. -80.873061
SITE ELEVATION: 1003 ft AMSL

GHD

Attachment G

AREA MAP
JAMES WEBB WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

82715-00(260)GN-WA001 JUN 24, 2016

Attachment H
G70-B 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	
☒Section 5.0	Gas Well Affected Facility (NSPS, Subpart OOOO)
☒Section 6.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO)
☒Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO and/or NESHAP Subpart HH
☒Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)
☐Section 11.0	Centrifugal Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☐Section 12.0	Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☒Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines, Microturbines
☒Section 14.0	Tanker Truck Loading[3]
☐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, GPU009	EP-GPU001, EP-GPU002, EP-GPU003, EP-GPU004, EP-GPU005, EP-GPU006, EP-GPU007, EP-GPU008, EP-GPU009	Gas Production Unit Heater	2015		1.5 MMBtu/hr	Existing	N/A	
LH001, LH002, LH003, LH004, LH005, LH006, LH007, LH008, LH009	EP-LH001, EP-LH002, EP-LH003, EP-LH004, EP-LH005, EP-LH006, EP-LH007, EP-LH008, EP-LH009	Line Heater	2015		2.0 MMBtu/hr	Existing	N/A	
F001	F001	Fugitives	2015		N/A	Existing	N/A	
TANKCOND001-010	EP-EC001, EP-EC002, EP-EC003	Condensate Tank F/W/B	2015		400 bbl each	Existing	EC001, EC002, EC003	
TANKPW001-002	EP-EC001, EP-EC002, EP-EC003	PW Tank F/W/B	2015		400 bbl each	Existing	EC001, EC002, EC003	
L001	EP-L001	Loading (Condensate)	2015		200 bbl capacity (each)	Existing	N/A	
L002	EP-L002	Loading (Produced Water)	2015		200 bbl capacity (each)	Existing	N/A	
HR001	EP-HR001	Haul Truck	2015		40 ton capacity	Existing	N/A	
EC001	EP-EC001	Enclosed Combustor	2015		90 scf/min	Existing	N/A	
EC002	EP-EC002	Enclosed Combustor	2016		90 scf/min	Existing	N/A	
EC003	EP-EC003	Enclosed Combustor	2016		90 scf/min	New	N/A	
PCV	EP-PCV	Pneumatic CV	2015		6.6 scf/day/PCV	Existing	N/A	
ENG001	EP-ENG001	Compressor Engine	2016	2013	24 HP	Removal	Non-Selective Catalytic Reduction	
ENG001, ENG002, ENG003,ENG004, ENG005	EP-ENG001, EP-ENG002, EP-ENG003,EP-ENG004,EP- ENG006	High Pressure VRU Compressor Engine	2016	2015	68 HP	New	Non-Selective Catalytic Reduction	
ENG006, ENG007	EP-ENG006,EP- ENG008	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	☐ Audible, visual, and	☑ Infrared (FLIR) cameras	☐ Other (please describe)	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO2e)
Valves	☐ Yes ☑ No	450	EPA	gas	2.89	0.53	316.66
Valves	☐ Yes ☑ No	468	EPA	liquid	10.81	1.22	4.00
Connections (Not sampling)	☐ Yes ☑ No	531	EPA	gas	0.15	2.79E-02	16.61
Flanges	☐ Yes ☑ No	117	EPA	gas	0.07	1.20E-02	7.14
Loading	☐ Yes ☑ No	2	EPA	gas	26.38	2.36E-01	2.14

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
47017067030000	09/01/2017	02/01/2017	Green
47017067040000	09/01/2017	02/01/2017	Green
47017067080000	09/01/2017	02/01/2017	Green
47017067490000	09/01/2017	02/01/2017	Green
47017067050000	09/01/2017	02/01/2017	Green
47017067020000	09/01/2017	02/01/2017	Green
47017066990000	09/01/2017	02/01/2017	Green
47017067000000	09/01/2017	02/01/2017	Green
47017067010000	09/01/2017	02/01/2017	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. Type of change:
2015 Was the tank manufactured after August 23, 2011? ☑ Yes ☐ No	☑ New construction ☐ New stored material ☐ Other ☐ 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.
☐ Yes ☑ No

7C.Was USEPA Tanks simulation software utilized?

☐ Yes ☑ 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. 400bbls

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.: 400bbls

13A. Maximum annual throughput (gal/yr): 42893340	13B. Maximum daily throughput (gal/day): 117516
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 256	15. Maximum tank fill rate (gal/min) 168

16. Tank fill method ☐ Submerged ☑ Splash ☐ Bottom Loading

17. Is the tank system a variable vapor space system? ☐ Yes ☑ 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):

☑ Fixed Roof ☑ vertical ☐ horizontal ☑ flat roof ☐ cone roof ☐ dome roof ☐ other (describe)
☐ External Floating Roof ☐ pontoon roof ☐ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting
☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm
☐ Pressurized ☐ spherical ☐ cylindrical
☐ 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		[1]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 ☐ Gunite lined ☐ Epoxy-coated ☑ Other (describe): Steel

21A. Shell Color: Green	21B. Roof Color: Green	21C. Year Last Painted 2015

22. Shell Condition (if metal and unlined):

☑ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

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

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

Must be listed for tanks using VRUs with closed vent system

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

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

25A. Year Internal Floaters Installed:

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

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

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

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

25F. Describe deck fittings

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

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

26C. Deck seam:

☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft wide ☐ 5 x 12 ft wide ☐ Other (describe)

26D. Deck seam length (ft)	26E. Area of deck (ft^2)	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/(ft2·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)	1.85
39A. Average Liquid Surface Temperature (°F)	65.08	39B. Corresponding Vapor Pressure (psia)	2.71
40A. Maximum Liquid Surface Temperature (°F)	75.94	40B. Corresponding Vapor Pressure (psia)	3.34

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

41A. Material Name or Composition	Condensate		
41B. CAS Number	mix of HC		
41C. Liquid Density (lb/gal)	5.6800		
41D. Liquid Molecular Weight (lb/lb-mole)	87.90		
41E. Vapor Molecular Weight (lb/lb-mole)	44.1305		
Maximum Vapor Pressure 41F. True (psia)	3.3419		
41G. Reid (psia)	4.4500		
Months Storage per Year 41H. From - To	year round		

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) 2015 Was the tank manufactured after August 23, 2011? ☑ Yes ☐ No	6. Type of change: ☑ New construction ☐ New stored material ☐ Other ☐ 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.
☐ Yes ☑ No

7C.Was USEPA Tanks simulation software utilized?
☐ Yes ☑ 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. 400bbls

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.: 400bbls

13A. Maximum annual throughput (gal/yr): 7205100	13B. Maximum daily throughput (gal/day): 19740
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 215	15. Maximum tank fill rate (gal/min) 168

16. Tank fill method ☐ Submerged ☑ Splash ☐ Bottom Loading

17. Is the tank system a variable vapor space system? ☐ Yes ☑ 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):

☑ Fixed Roof ☑ vertical ☐ horizontal ☑ flat roof ☐ cone roof ☐ dome roof ☐ other (describe)
☐ External Floating Roof ☐ pontoon roof ☐ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting
☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm
☐ Pressurized ☐ spherical ☐ cylindrical

ATTACHMENT L – STORAGE VESSEL DATA SHEET

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☐ Does not apply ☐ Rupture Disc (psig)

☐ Inert Gas Blanket ☐ Carbon Adsorption

☑ Vent to Vapor Combustion Device (vapor combustors, flares, thermal oxidizers, enclosed combustors)

☐ Conservation Vent (psig)
Vacuum Pressure

☐ Emergency relief Valve (psig)
Vacuum Pressure

☐ Thief Hatch Weighted ☐ Yes ☐ No

Complete appropriate Air Pollution Control Device Sheet

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

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

TANK CONSTRUCTION & OPERATION INFORMATION

21. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy- ☑ Other(describe): Steel

21A. Shell Color: Green	21B. Roof Color: Green	21C. Year Last Painted 2015

22. Shell Condition (if metal and unlined):
☑ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

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

23. Operating Pressure Range (psig): 0 psig, atmospheric
Must be listed for tanks using VRUs with closed vent system

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

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted ☐ 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

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

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): 5.9mph
34. Annual Average Solar Insulation Factor (BTU/(ft2·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)	0.23
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)	18.5619		
Maximum Vapor Pressure 41F. True (psia)	0.4928		
41G. Reid (psia)	1.0238		
Months Storage per Year 41H. From - To	year round		

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	2015	Existing	1.5	1227.4562
GPU002	EP-GPU002	Gas Production Unit Heater	2015	Existing	1.5	1227.4562
GPU003	EP-GPU003	Gas Production Unit Heater	2015	Existing	1.5	1227.4562
GPU004	EP-GPU004	Gas Production Unit Heater	2015	Existing	1.5	1227.4562
GPU005	EP-GPU005	Gas Production Unit Heater	2015	Existing	1.5	1227.4562
GPU006	EP-GPU006	Gas Production Unit Heater	2015	Existing	1.5	1227.4562
GPU007	EP-GPU007	Gas Production Unit Heater	2015	Existing	1.5	1227.4562
GPU008	EP-GPU008	Gas Production Unit Heater	2015	Existing	1.5	1227.4562
GPU009	EP-GPU009	Gas Production Unit Heater	2015	Existing	1.5	1227.4562
LH001	EP-LH001	Line Heater	2015	Existing	2.0	1227.4562
LH002	EP-LH002	Line Heater	2015	Existing	2.0	1227.4562
LH003	EP-LH003	Line Heater	2015	Existing	2.0	1227.4562
LH004	EP-LH004	Line Heater	2015	Existing	2.0	1227.4562
LH005	EP-LH005	Line Heater	2015	Existing	2.0	1227.4562
LH006	EP-LH006	Line Heater	2015	Existing	2.0	1227.4562
LH007	EP-LH007	Line Heater	2015	Existing	2.0	1227.4562
LH008	EP-LH008	Line Heater	2015	Existing	2.0	1227.4562
LH009	EP-LH009	Line Heater	2016	Existing	2.0	1227.4562

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

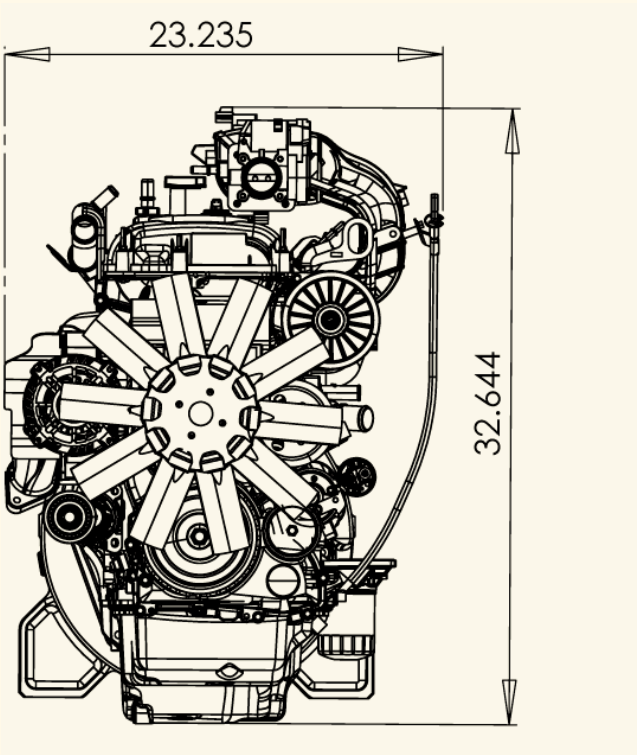
ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

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.*

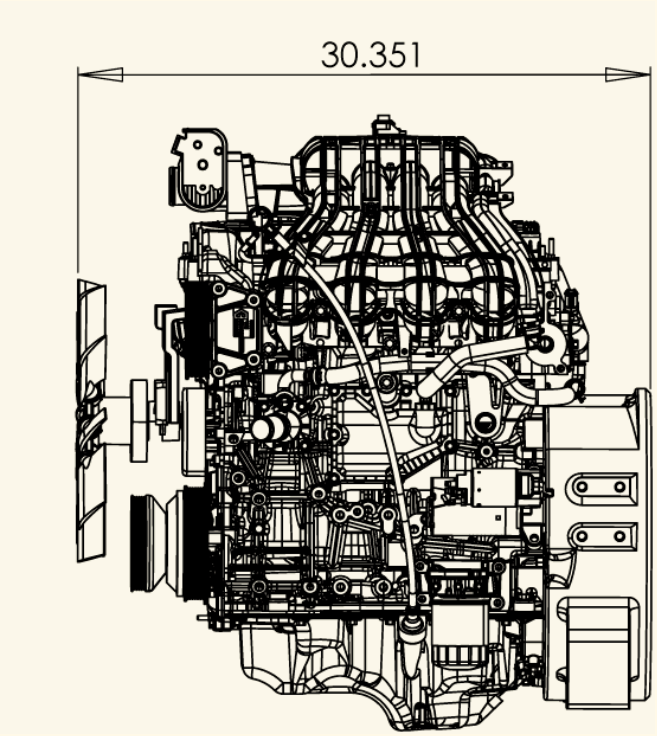
Emission Unit ID#		ENG001, ENG002, ENG003,ENG004, ENG005		ENG006, ENG007		ENG001	
Engine Manufacturer/Model		Engine (MSG-425 2.5L Engine)		Engine (CSG-637 3.7L Engine)		Engine (Kubota DG972-E2)	
Manufacturers Rated bhp/rpm		68 HP @ 3200 rpm		99 HP @ 3200 rpm		24 HP @ 3600 rpm	
Source Status		NS		NS		REM	
Date Installed/ Modified/ Removed/ Relocated		2016		2016		2016	
Engine Manufacturer/ Reconstruction Date		2015		2015		2013	
Check all applicable Federal Rules for the engine (include EPA Certification of Conformity if applicable)		☑ 40CFR60 Subpart JJJJ ☑ JJJJ Certified? ☐ 40CFR60 Subpart IIII ☐ IIII Certified? ☑ 40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources		☑ 40CFR60 Subpart JJJJ ☑ JJJJ Certified? ☐ 40CFR60 Subpart IIII ☐ IIII Certified? ☑ 40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources		☑ 40CFR60 Subpart JJJJ ☑ JJJJ Certified? ☐ 40CFR60 Subpart IIII ☐ IIII Certified? ☑ 40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/NSPS JJJJ Window ☐ 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)		8469		7856		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	0.2797	1.2251	0.1303	0.5707	0.3158	1.3831
MD	CO	1.8460	8.0853	1.0750	4.7085	5.6445	24.7228
AP	VOC	0.0852	0.3733	0.0460	0.2017	0.0071	0.0311
AP	SO2	0.0017	0.0074	0.0009	0.0040	0.0001	0.0006
AP	PM10	0.0274	0.1198	0.0148	0.0647	0.0023	0.0100
AP	Formaldehyde	0.0590	0.2586	0.0319	0.1397	0.0049	0.0215
AP	Total HAPs	0.0661	0.2895	0.0357	0.1564	0.0055	0.0241
OT	GHG (CO2e)	316.7573	1387.3972	171.0976	749.4074	27.7765	121.6612

Installation Drawings

Front End View

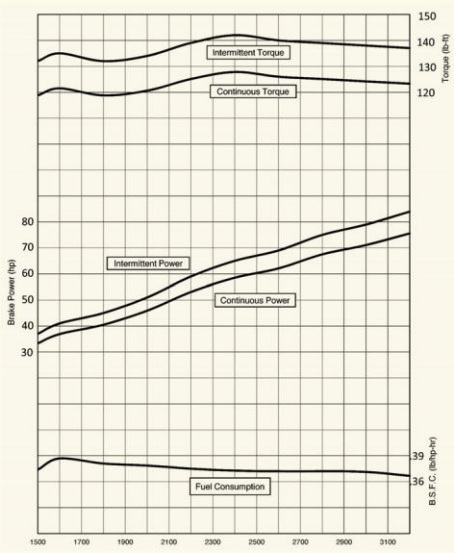


Left Side View

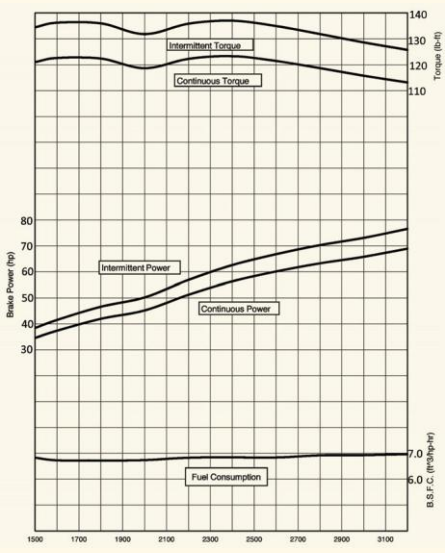


Power Curves (corrected per SAE J1349)

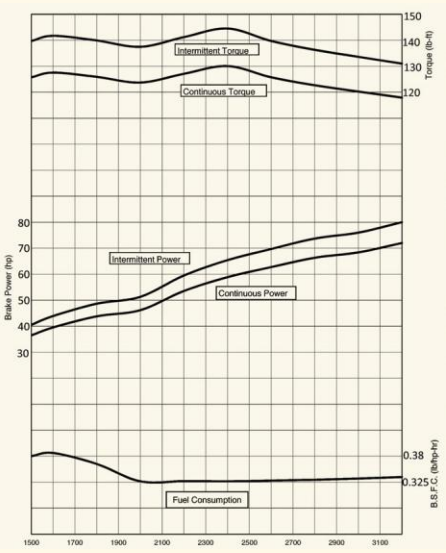
Gasoline



Natural Gas



Liquefied Petroleum Gas



Ford Power Products

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.

Ford Power Products

Powertrain Assemblies & Components Provided By Ford Component Sales

Specifications

Engine Type	I-4
Bore and Stroke	3.5"x 3.93" (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/FT3	
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.

California Environmental Protection Agency **Air Resources Board**	**ENGINE DISTRIBUTORS, INC.**	**EXECUTIVE ORDER U-L-034-0028** New Off-Road Large Spark-Ignition Engines Above 19 Kilowatts

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) : 20.6NMHC + NOx (g/kW-hr) : 0.8
HC + NOx (g/kW-hr) : 0.8
CO (g/kW-hr) : 20.6
Emergency Use Only : N

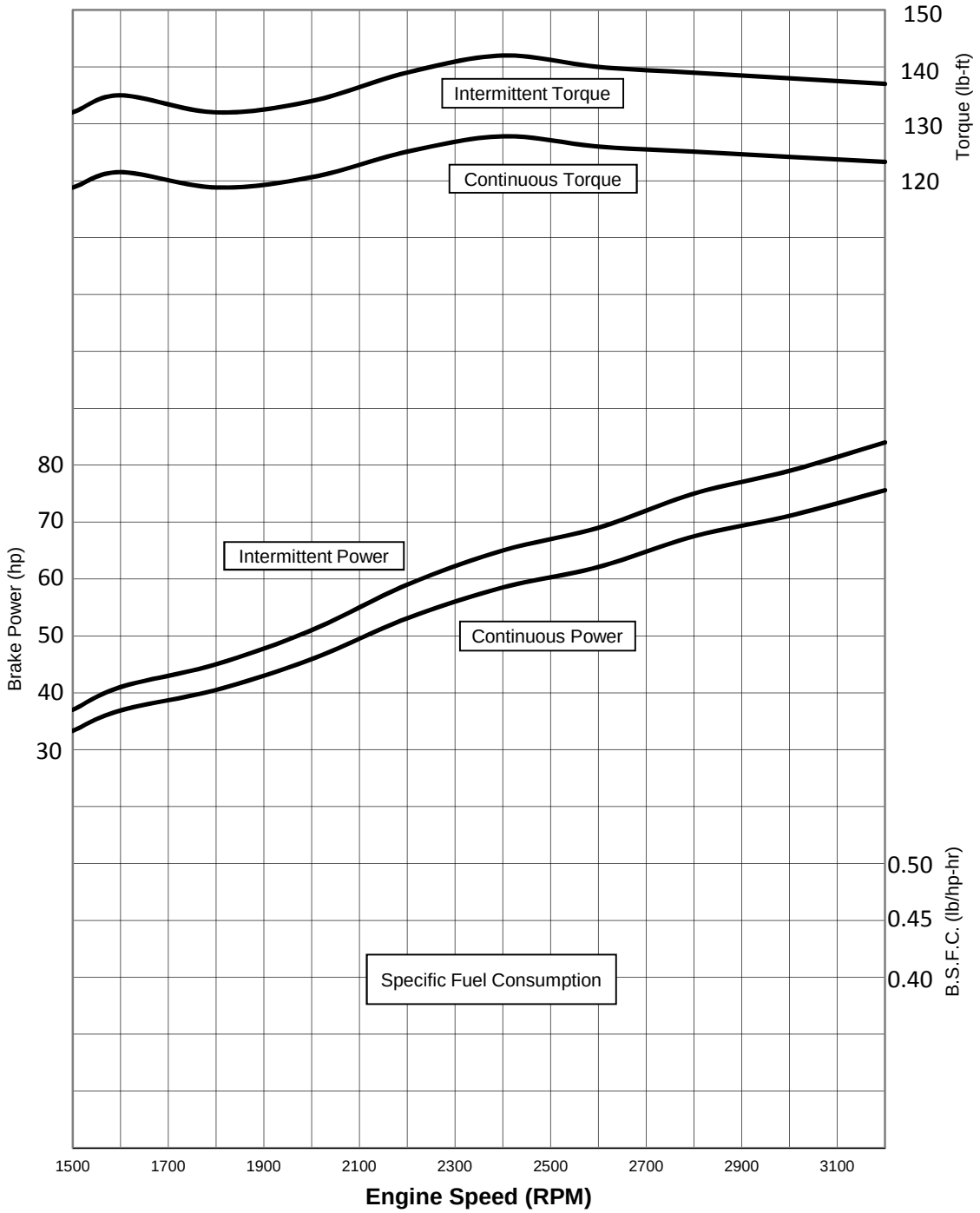
Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with 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.

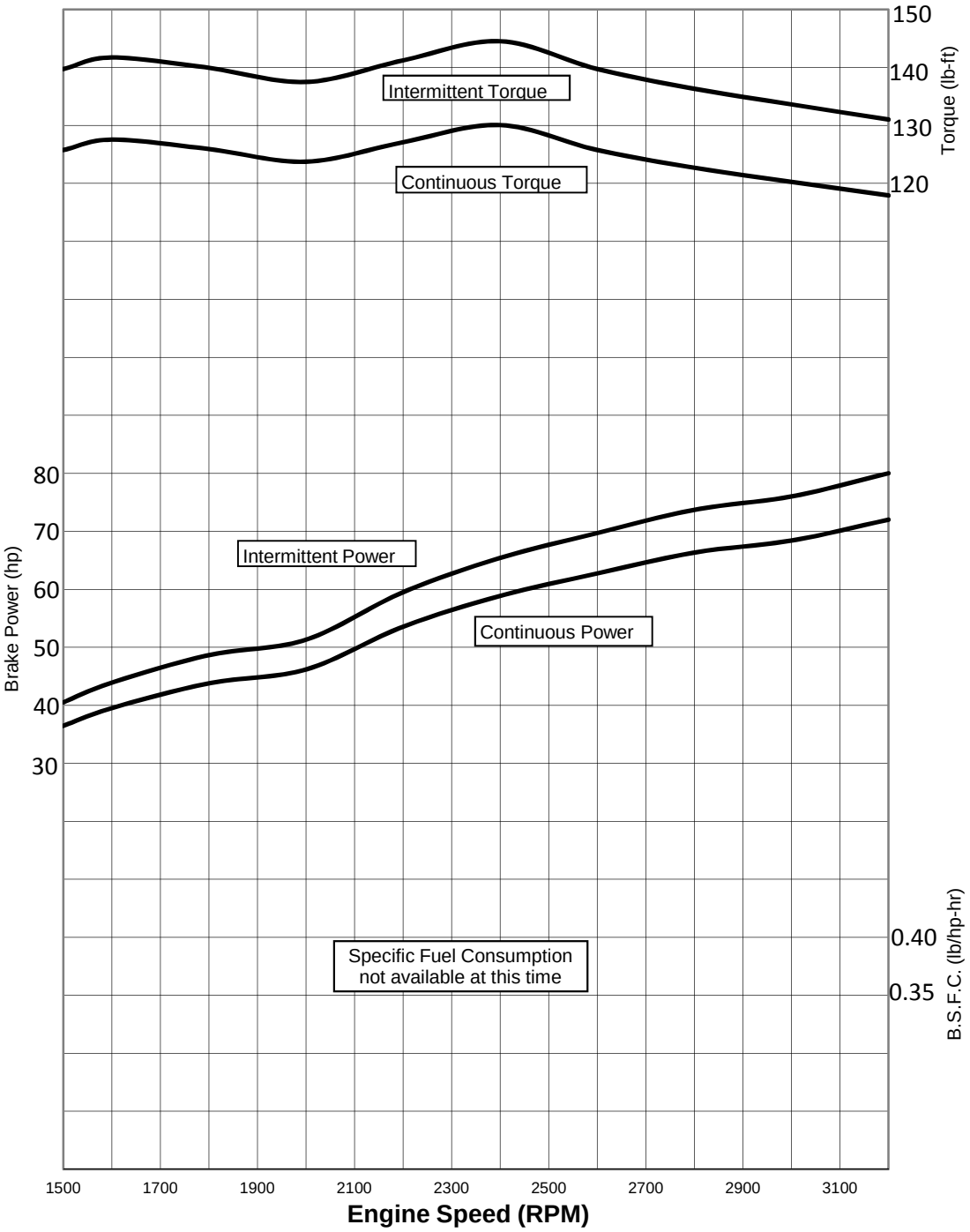
It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons 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.

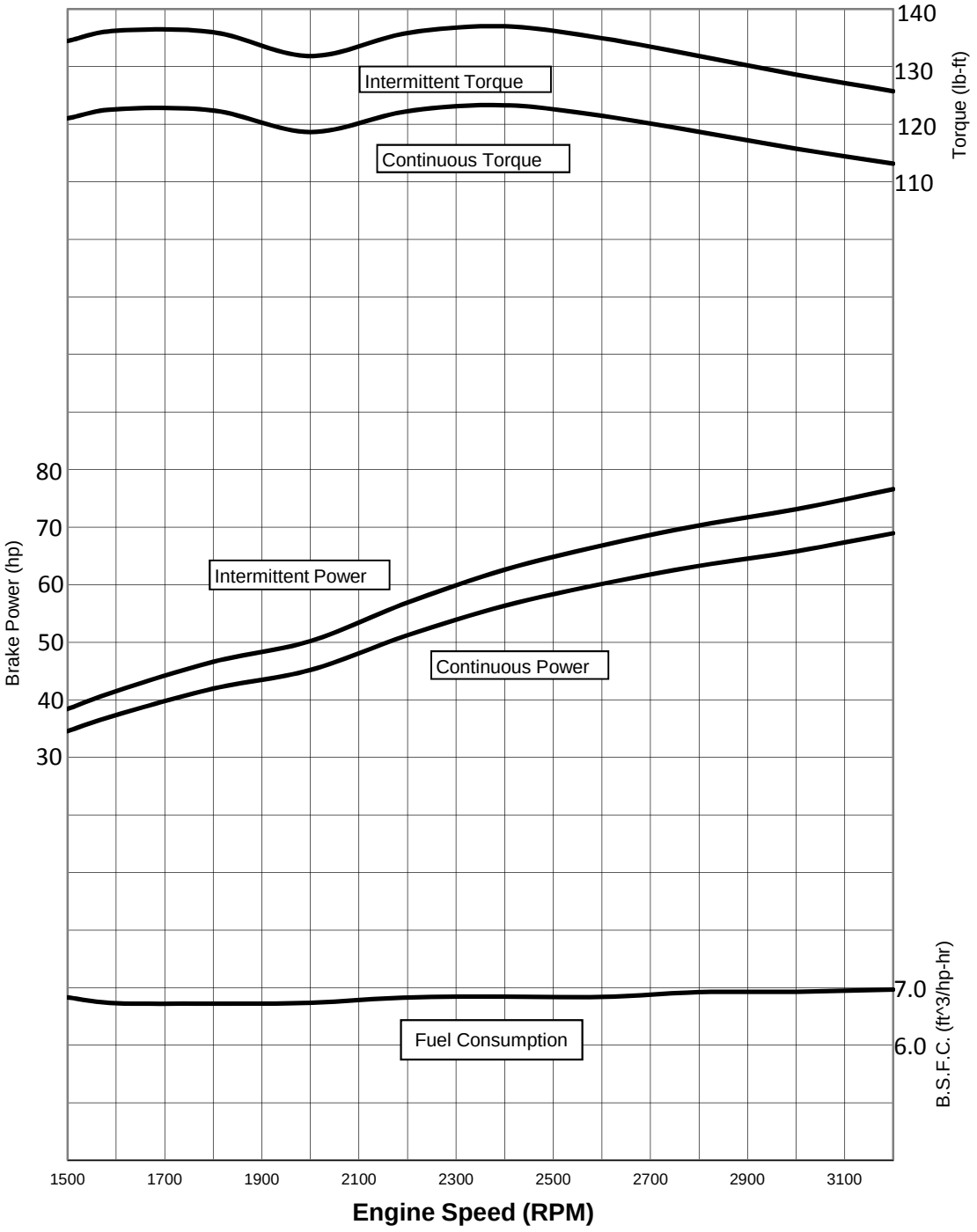
Gasoline


Intermittent Torque
Continuous Torque
Intermittent Power
Continuous Power
Specific Fuel Consumption
Brake Power (hp)
80
70
60
50
40
30
Torque (lb-ft)
150
140
130
120
B.S.F.C. (lb/hp-hr)
0.50
0.45
0.40
1500
1700
1900
2100
2300
2500
2700
2900
3100
Engine Speed (RPM)

LP

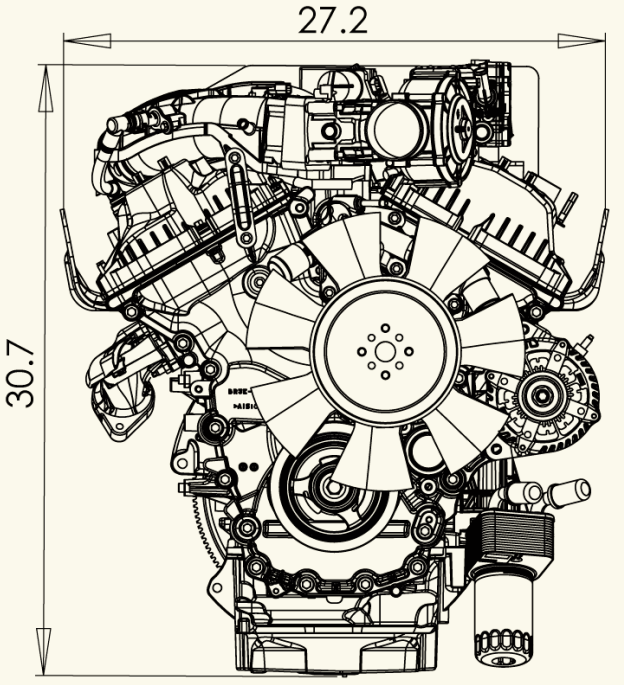

150
140
130
120
Torque (lb-ft)
Intermittent Torque
Continuous Torque
80
70
60
50
40
30
Brake Power (hp)
Intermittent Power
Continuous Power
Specific Fuel Consumption
not available at this time
0.40
0.35
B.S.F.C. (lb/hp-hr)
1500
1700
1900
2100
2300
2500
2700
2900
3100
Engine Speed (RPM)

NG

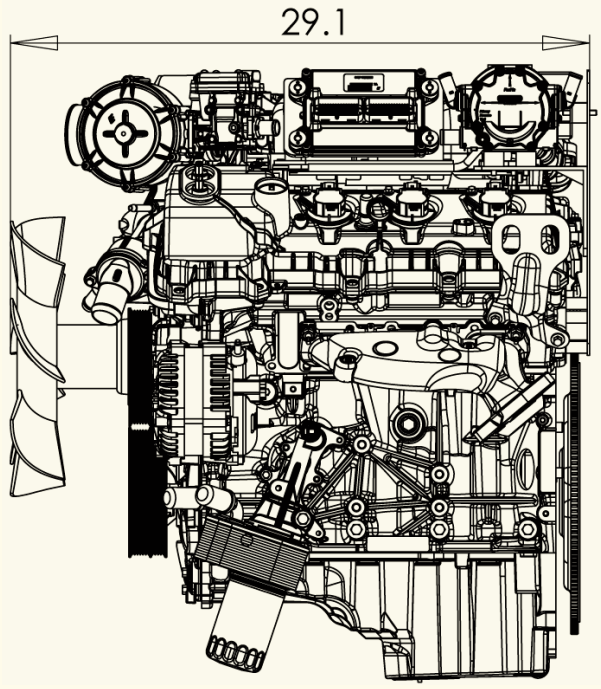

140
130
120
110
Torque (lb-ft)
Intermittent Torque
Continuous Torque
80
70
60
50
40
30
Brake Power (hp)
Intermittent Power
Continuous Power
7.0
6.0
B.S.F.C. (ft^3/hp-hr)
Fuel Consumption
1500
1700
1900
2100
2300
2500
2700
2900
3100
Engine Speed (RPM)

Installation Drawings

Front End View

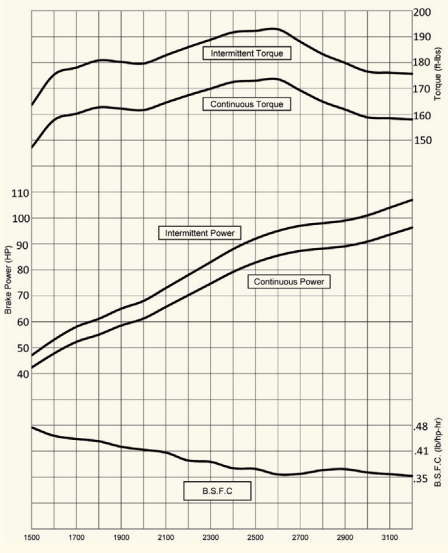


Left Side View

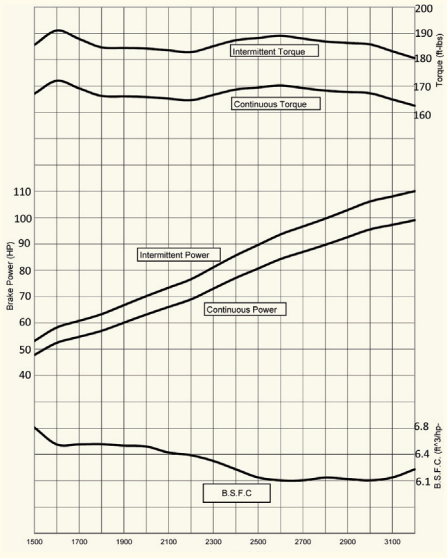


Power Curves (corrected per SAE J1349)

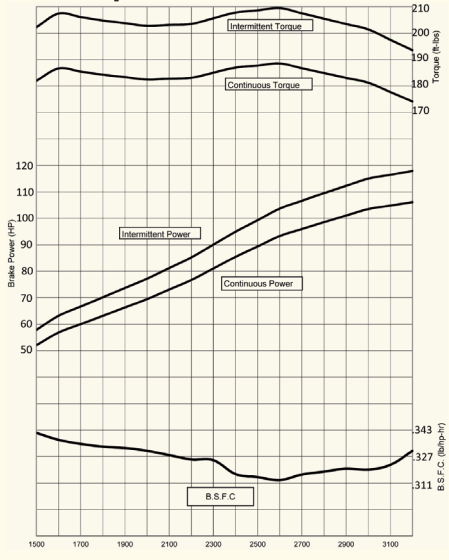
Gasoline



Natural Gas



Liquefied Petroleum Gas



Ford Power Products

Powertrain Assemblies & Components Provided By Ford Component Sales

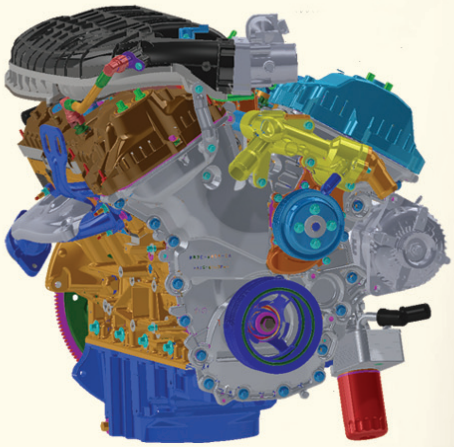
For additional information Contact:

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.

Power Products

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

California Environmental Protection Agency **Air Resources Board**	**ENGINE DISTRIBUTORS, INC.**	**EXECUTIVE ORDER U-L-034-0031** New Off-Road Large Spark-Ignition Engines Above 19 Kilowatts

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 JJJ 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

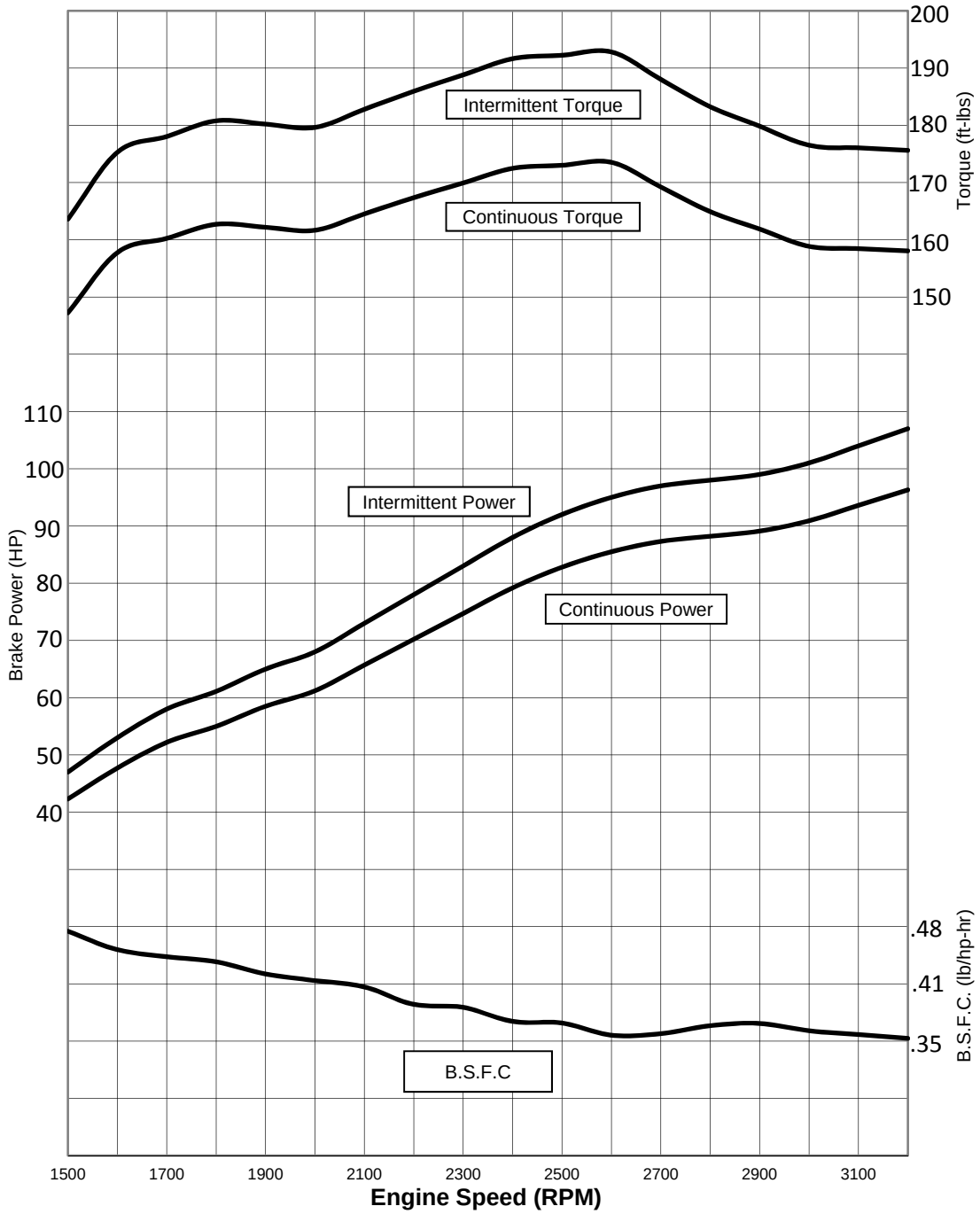
Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with 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.

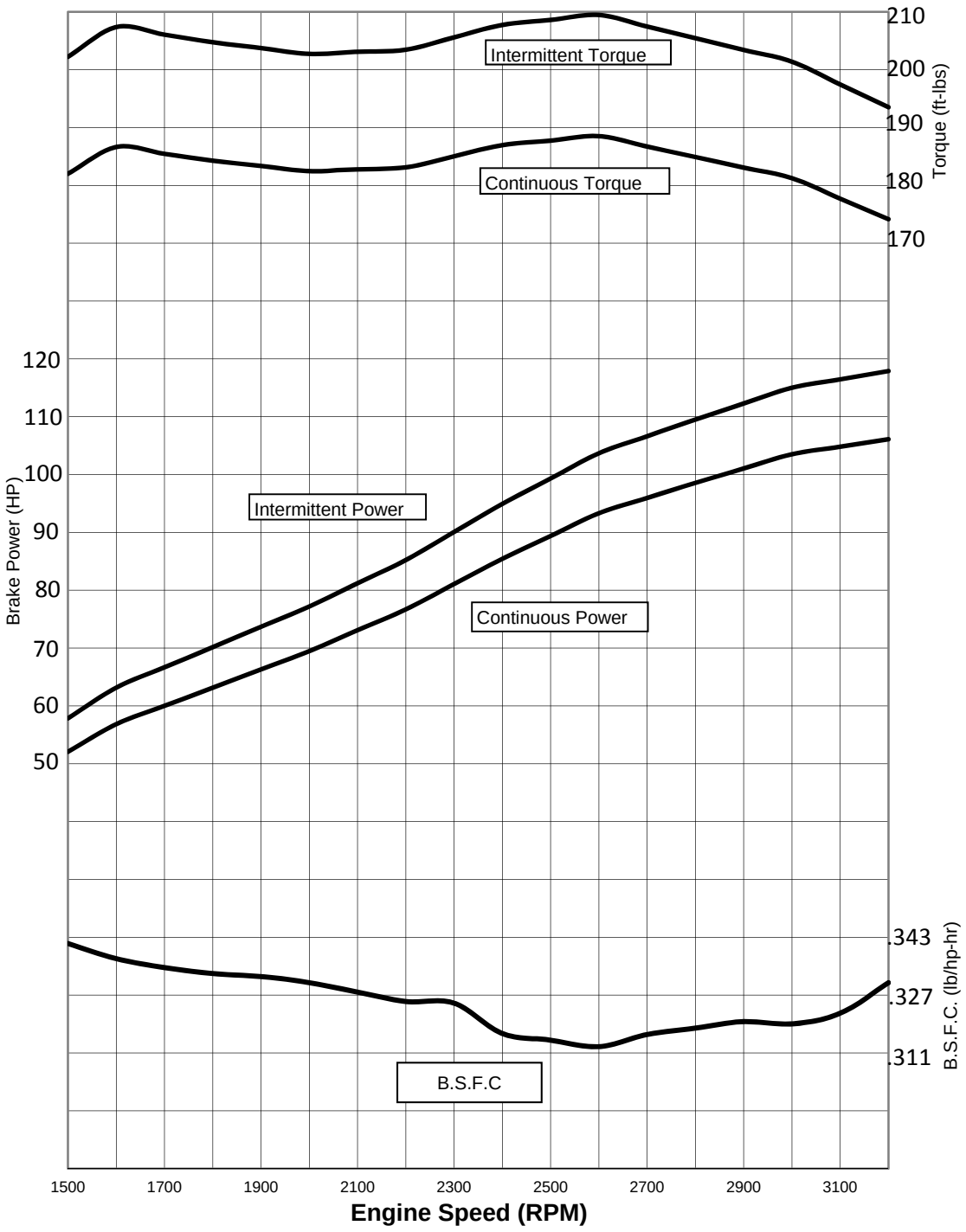
This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and which are produced during the model year 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.

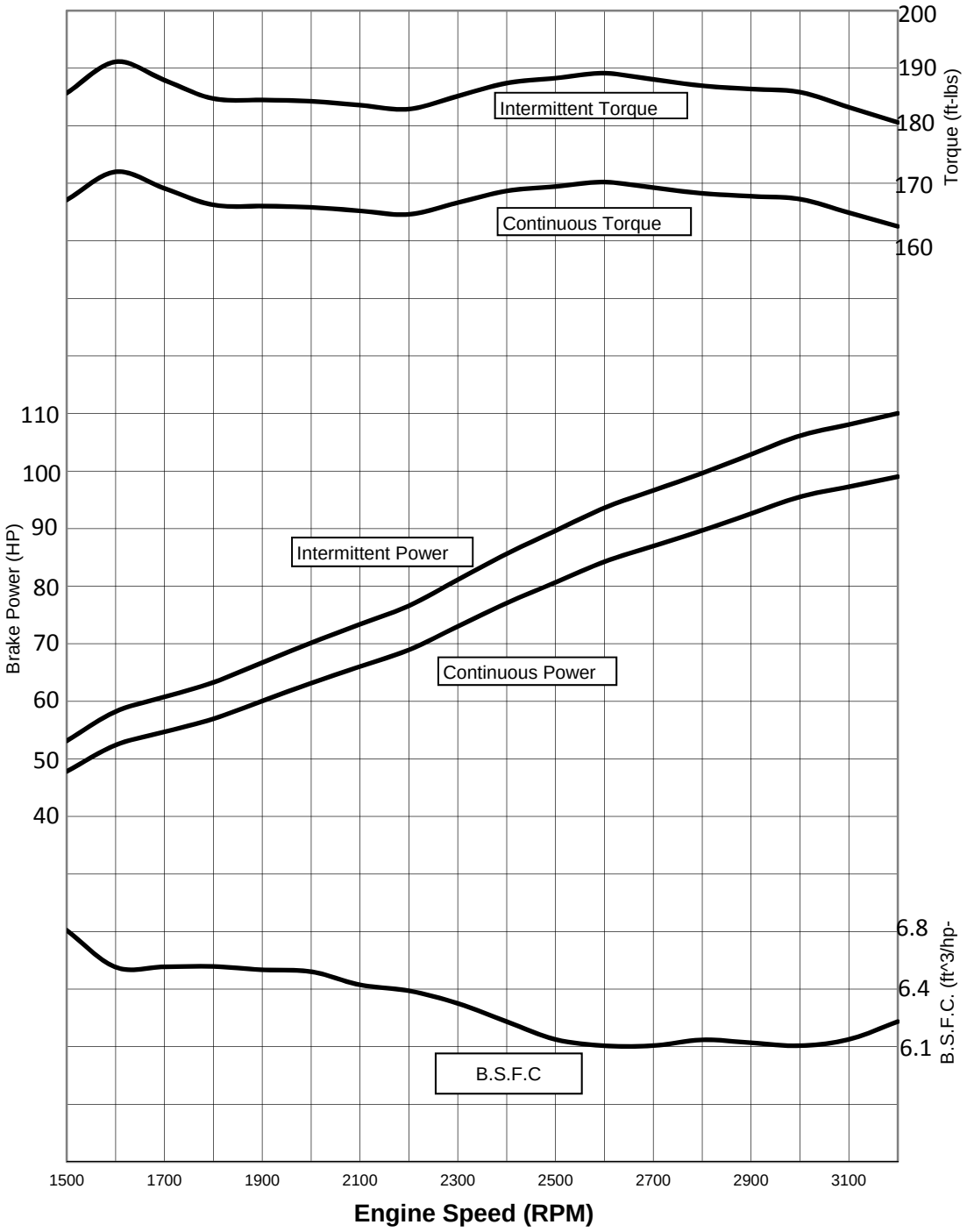
This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

CSG637 Gasoline




CSG637 Propane
Intermittent Torque
Continuous Torque
Intermittent Power
Continuous Power
B.S.F.C
Torque (ft-lbs)
210
200
190
180
170
Brake Power (HP)
120
110
100
90
80
70
60
50
B.S.F.C. (lb/hp-hr)
.343
.327
.311
1500
1700
1900
2100
2300
2500
2700
2900
3100
Engine Speed (RPM)

CSG637 Natural Gas



Attachment O
Tanker Truck Loading Data Sheet

ATTACHMENT O – TANKER TRUCK LOADING DATA S HEET

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: 2015

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	7	7	7	7
Days/week	7	7	7	7

Bulk Liquid Data (use extra pages as necessary)

Liquid Name		Condensate	Produced Water	
Max. Daily Throughput (1000 gal/day)		117.52	19.74	
Max. Annual Throughput (1000 gal/yr)		42893.34	7205.10	
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		3.34	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)	12.3997	0.0013	
	Annual (ton/yr)	26.3822	0.0005	
Max HAP Emission Rate	Loading (lb/hr)	0.1109	2.46E-06	
	Annual (ton/yr)	0.2360	8.80E-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	☐ Yes ☐ No
Secondary Control Device ID:	NA	Make/Model	NA
Control Efficiency (%):	NA	APCD/ERD Data Sheet Completed	☐ Yes ☐ No

VAPOR COMBUSTION (Including Enclosed Combustors)

General Information

Control Device ID#:	EC001, EC002, EC003	Installation Date: ☑ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity		Maximum Design Heating Input (from mfg. spec sheet)	Design Heat Content
5458 sdfh	131000 scfd	12.0 MMBTU/hr	2300 BTU/scf

Control Device Information

Type of Vapor Combustion Control?

☑ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare
☐ Thermal Oxidizer

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

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)	Flare height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☑ Non	25 feet	3.33 feet	☑ Yes ☐ No Provide determination

Waste Gas Information

Maximum Waste Gas Flow Rate	Heat Value of Waste Gas Stream	Exit Velocity of the Emission Stream
54.80 (scfm)	2,556.42 BTU/ft^3	0.1049 (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	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
3	12.6 scfh	12800 BTU/hr	☑ Yes ☐ No

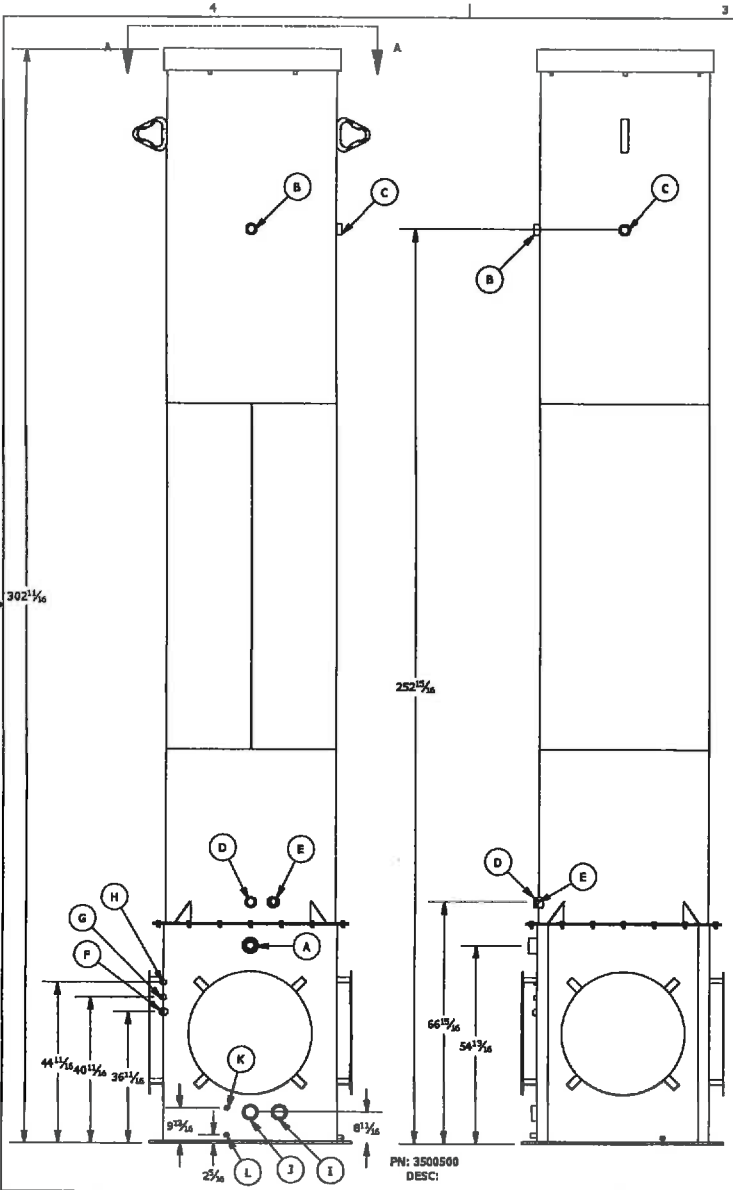
If automatic re-ignition is used, please describe the method. Flame Rectification, a thermocouple equivalent

Is pilot flame equipped with a monitor to detect the presence of the flame? ☑ Yes ☐ No	If Yes, What type? ☑ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

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

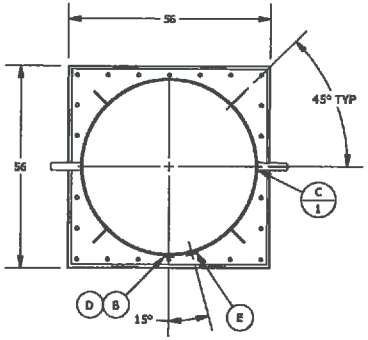
Additional information attached? ☑ Yes ☐ No Manufacturer's specs sheet

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 EMMISIONS TEST METHODS REFERENCED. MEETS ALL EPA & CDPHE REGULATIONS.
* DESTROYS OIL/CONDENSATE PRODUCTION TANK VAPORS W/ NO VISIBLE FLAME.
* EXCELLENT OPACITY AND SMOKELESS OPERATION.
* RELIABLE AND CUSTOMIZABLE IGNITION.
* VERY LOW CAPITAL AND OPERATING COST.
* EASY TO OPERATE AND MAINTAIN.
* FIELD TESTED TO DESTROY UP TO 119.5 MDSCFD (131 MCFD) @ 10 oz/in^2; 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.



VIEW A-A

PN: 3500500
DESC:

SCHEDULE OF NOZZLES				
MARK	QTY	DESCRIPTION	SERIES	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
   .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°
   CONTRICITY 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 VOLUME ECD

DATE:	WO No.:	SHEET: 1 OF 1

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

Attachment S
Emissions Calculations

Table 1

Facility Information
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Oil and Gas Site General Information

Administrative Information	
Company Name	Antero Resources Corporation
Facility/Well Name	James Webb Well Pad
Nearest City/Town	West Union
API Number/SIC Code	1311
Latitude/Longitude	39.238719, -80.873061
County	Doddridge County

Technical Information	
Max Condensate Site Throughput (bbl/day):	2,798
Max Produced Water Site Throughput (bbl/day):	470
Are there any sour gas streams at this site?	No
Is this site currently operational/producing?	No

Equipment/Processes at Site	
Equipment/Process Types	**How many for this site?**
Fugitives	9
IC Engines	7
Gas Production Unit Heaters	9
Line Heaters	9
Condensate Tanks	10
Produced Water Tanks	2
Loading Jobs	2
Vapor Recovery Towers	4
Enclosed Combustors	3

Table 2

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

Emission Source	VOC		NO_x		CO_{2e}		CO		SO_2		$PM_{2.5}$		PM_{10}		Lead		Total HAPs		Benzene		Xylenes		Formaldehyde	
	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)
UNCONTROLLED (Fugitives, Storage Tanks, VRU engines, Gas Production Unit Heaters, Line Heaters)																								
Fugitive Emissions (Component Count, PCV and Hauling)[1]	3.2524	14.2453			87.071	381.37							2.5744	3.8031			0.4221	1.8489	0.0072	0.0314	0.0591	0.2590		
Flashing, Working and Breathing (F/W/B) Losses[2]	286.5475	1255.0779			165.7343	725.9162											32.4508	142.1347	0.2055	0.8999	0.1970	0.8627		
VRU Engine Emissions[3]	0.1313	0.5750	0.4100	1.7958	513.36	2,248.50	2.9210	12.7939	0.0026	0.0114	0.0421	0.1845	0.0421	0.1845			0.1018	0.4459	0.0070	0.0307	0.0009	0.0038	0.0909	0.3982
Gas Production Unit Heater Emissions[4]	0.0605	0.2650	1.0998	4.8173	1,319.80	5,780.74	0.9239	4.0465	0.0066	0.0289	0.0836	0.3661	0.0836	0.3661	5.50E-06	2.41E-05	0.0207	0.0907	2.31E-05	0.0001			0.0008	0.0036
Line Heater Emissions[4]	0.0807	0.3533	1.4664	6.4230	1,759.74	7,707.65	1.2318	5.3954	0.0088	0.0385	0.1115	0.4882	0.1115	0.4882	7.33E-06	3.21E-05	0.0276	0.1209	3.08E-05	0.0001			0.0011	0.0048
TOTALS:	**290.0722**	**1270.5164**	**2.9763**	**13.0361**	**3845.7016**	**16844.1731**	**5.0767**	**22.2357**	**0.0180**	**0.0789**	**0.2372**	**1.0388**	**2.8116**	**4.8419**	**1.28E-05**	**5.62E-05**	**33.0231**	**144.6412**	**0.2197**	**0.9622**	**0.2570**	**1.1255**	**0.0928**	**0.4067**
TOTALS (Excluding Fugitives):	**286.8199**	**1256.2711**	**2.9763**	**13.0361**	**3758.6304**	**16462.8009**	**5.0767**	**22.2357**	**0.0180**	**0.0789**	**0.2372**	**1.0388**	**0.2372**	**1.0388**	**1.28E-05**	**5.62E-05**	**32.6010**	**142.7922**	**0.2125**	**0.9309**	**0.1978**	**0.8665**	**0.0928**	**0.4067**
UNCONTROLLED (Truck Loading Emissions)																								
Truck Loading Emissions[5]	12.4010	26.3826			1.7160	2.1412											0.1109	0.2360	0.0006	0.0012	0.0024	0.0052		
CONTROLLED EMISSIONS																								
Enclosed Combustor Emissions (from F/W/B losses)[6]	5.7312	25.1025	0.3326	1.4567	1180.8881	5172.2898	0.2794	1.2236	2.27E-05	0.0001	0.0190	0.0830	0.0253	0.1107	1.66E-06	7.28E-06	0.6491	2.8430	0.0041	0.0180	0.0039	0.0173	2.84E-06	1.24E-05
Controlled Fugitive Emissions from Hauling													1.2872	1.9016										
TOTALS:	**5.7312**	**25.1025**	**0.3326**	**1.4567**	**1180.8881**	**5172.2898**	**0.2794**	**1.2236**	**2.27E-05**	**9.93E-05**	**0.0190**	**0.0830**	**1.3125**	**2.0123**	**1.66E-06**	**7.28E-06**	**0.6491**	**2.8430**	**0.0041**	**0.0180**	**0.0039**	**0.0173**	**2.84E-06**	**1.24E-05**
POTENTIAL TO EMIT[7]	**9.2559**	**66.9237**	**3.3089**	**14.4928**	**4860.8554**	**21292.6879**	**5.3560**	**23.4594**	**0.0180**	**0.0790**	**0.2561**	**1.1218**	**1.5497**	**3.0511**	**1.45E-05**	**6.35E-05**	**1.2213**	**5.5854**	**0.0183**	**0.0815**	**0.0639**	**0.2852**	**0.0928**	**0.4067**
POTENTIAL TO EMIT (Excluding Fugitives)	**6.0036**	**26.2957**	**3.3089**	**14.4928**	**4773.7841**	**20909.1745**	**5.3560**	**23.4594**	**0.0180**	**0.0790**	**0.2561**	**1.1218**	**0.2624**	**1.1495**	**1.45E-05**	**6.35E-05**	**0.7992**	**3.5005**	**0.0112**	**0.0489**	**0.0048**	**0.0210**	**0.0928**	**0.4067**

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 2798 barrels per day, VOC emissions would be 12.401 pounds per hour when there are truck loading activities. Average hourly VOC emissions from truck loading is 6.0234 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
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Pollutant		Emissions		Threshold Exceeded?		
		Uncontrolled	Controlled	Threshold	Uncontrolled	Controlled
VOC	lbs/hr	290.0722	9.2559	6	**Yes**	
	tons/yr	1296.8991	66.9237	10	**Yes**	**Yes**
NO_X	lbs/hr	2.9763	3.3089	6		
	tons/yr	13.0361	14.4928	10	**Yes**	**Yes**
CO	lbs/hr	5.0767	5.3560	6		
	tons/yr	22.2357	23.4594	10	**Yes**	**Yes**
SO_2	lbs/hr	0.0180	0.0180	6		
	tons/yr	0.0789	0.0790	10		
$PM_{2.5}$	lbs/hr	0.2372	0.2561	6		
	tons/yr	1.0388	1.1218	10		
PM_{10}	lbs/hr	2.8116	1.5497	6		
	tons/yr	4.8419	3.0511	10		
Lead	lbs/hr	1.28E-05	1.45E-05	6		
	tons/yr	5.62E-05	6.35E-05	10		
Total HAPs	lbs/hr	33.0231	1.2213	2	**Yes**	
	tons/yr	144.8771	5.5854	5	**Yes**	**Yes**
Total TAPs	lbs/hr	0.3125	0.1112	1.14		
n-Hexane	lbs/hr	32.0821	0.9937			
	tons/yr	140.7440	4.5767			
Toluene	lbs/hr	0.2665	0.0297			
	tons/yr	1.1704	0.1331			
Ethylbenzene	lbs/hr	0.1045	0.0224			
	tons/yr	0.4599	0.1002			
Xylenes	lbs/hr	0.2570	0.0639			
	tons/yr	1.1307	0.2852			
Benzene	lbs/hr	0.2197	0.0183			
	tons/yr	0.9634	0.0815			

Enter any notes here:	1. Emissions are based on 98% Enclosed Combustor DRE operating 100% of the time. 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.

Table 4

Fugitive Emissions
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

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

Gas Weight Fraction From Analysis:	VOC frac	0.148
	Benzene frac	0.000
	Toluene	0.000
	Ethylbenzene	0.000
	Xylenes	0.000
	n-Hexane	0.027
	HAPs	0.027
	Methane	0.649

Gas					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
450	Valves	Gas VOC	0.004500	0.30	5,772.23
		Non VOC	0.004500	1.73	33,253.57
		HAPs	0.004500	0.06	1,063.03
		CO2e	0.004500	32.86	633,317.60
531	Connectors	VOC	0.000200	0.02	302.72
		Non-VOC	0.000200	0.09	1,743.96
		HAPs	0.000200	0.00	55.75
		CO2e	0.000200	1.72	33,213.99
117	Flanges	VOC	0.000390	0.01	130.07
		Non-VOC	0.000390	0.04	749.31
		HAPs	0.000390	0.00	23.95
		CO2e	0.000390	0.740492	14270.756621
			Total VOCs:	0.32	6205.02
			Total THC:	2.18	41951.87

Light Liquid Weight Fraction From Analysis:	VOC frac	0.958
	Benzene frac	0.003
	Toluene	0.009
	Ethylbenzene	0.008
	Xylenes	0.023
	n-hexane	0.065
	HAPs	0.108
	Methane	0.014

Light Liquid					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
468	Valves	Light Liquid VOC	0.002500	1.12	21,611.82
		Light Liquid Non-VOC	0.002500	0.05	936.42
		Light Liquid HAPs	0.002500	0.13	2,431.07
		CO2e	0.002500	0.42	7999.41
			Total VOC:	1.12	21,611.82
			Total THC:	1.17	22,548.24

Fugitive Total Emissions			
	Annual Emissions (lb/yr)	Annual Emissions (lb/hr)	Annual Emissions (tpy)
VOC	27,816.84	3.18	13.91
Ethylbenzene		0.02	0.09
Toluene		0.02	0.10
Xylenes		0.06	0.26
n-Hexane		0.30	1.31
TAPs (Benzene)		0.01	0.03
HAPs		0.41	1.79
CO_{2e}	688,801.76	78.63	344.40

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

Table 5

Pneumatic Control Valve Emissions
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

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

Component	Mol%	Molecular Weight (lb/lb-mole)	Component Flow (scf/day)	Component Moles (lb-moles)	Component Emissions (lbs/day)	(lbs/hr)	(tons/year)
H2S	0.00E+00	34.08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.4154	14.01	0.9869904	0.00	0.04	0.00	0.01
Carbon Dioxide	0.1709	44.01	0.4060584	0.00	0.05	0.00	0.01
Methane	80.6676	16.04	191.6662176	0.51	8.10	0.34	1.48
Ethane	13.4543	30.07	31.9674168	0.08	2.53	0.11	0.46
Propane	2.6759	44.1	6.3579384	0.02	0.74	0.03	0.13
Isobutane	0.5461	58.12	1.2975336	0.00	0.20	0.01	0.04
n-Butane	0.9324	58.12	2.2153824	0.01	0.34	0.01	0.06
Isopentane	0.2731	72.15	0.6488856	0.00	0.12	0.01	0.02
n-Pentane	0.2342	72.15	0.5564592	0.00	0.11	0.00	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	0.6301	86.18	1.4971176	0.00	0.34	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	0.0769	0.3369
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	0.0142	0.0620
HAPs Emissions	0.0142	0.0620
TAPs Emissions	0.00E+00	0.00E+00
CO_{2e} emissions	8.4409	36.9713

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
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

# Hours Operational	8760

	Condensate Tank Flashing Losses			Produced Water Tank Flashing Losses		
	Vapor Mass Fraction	Flashing Losses		Vapor Mass Fraction	Flashing Losses	
	wt%	lbs/hr	tpy	wt%	lbs/hr	tpy
Water	0.0465	0.1578	0.6910	2.4575	0.0967	0.4234
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0004	0.0015	0.0065	0.2916	0.0115	0.0502
Carbon Dioxide	0.1205	0.4091	1.7917	3.6890	0.1451	0.6356
Methane	1.2228	4.1500	18.1772	60.7138	2.3882	10.4605
Ethane	21.4715	72.8738	319.1874	19.5819	0.7703	3.3738
Propane	24.9924	84.8237	371.5279	5.9333	0.2334	1.0223
Isobutane	9.4768	32.1642	140.8791	4.1026	0.1614	0.7068
n-Butane	17.6699	59.9713	262.6743	1.7895	0.0704	0.3083
Isopentane	6.2909	21.3510	93.5176	0.3857	0.0152	0.0664
n-Pentane	5.5854	18.9568	83.0306	0.3297	0.0130	0.0568
2-Methylpentane	0.6821	2.3150	10.1397	0.0183	0.0007	0.0032
3-Methylpentane	0.4617	1.5669	6.8629	0.0334	0.0013	0.0058
n-Hexane	9.2838	31.5091	138.0099	0.1981	0.0078	0.0341
Methylcyclopentane	0.2108	0.7153	3.1331	0.0455	0.0018	0.0078
Benzene	0.0591	0.2005	0.8781	0.0983	0.0039	0.0169
2-Methylhexane	0.3950	1.3405	5.8714	0.0095	0.0004	0.0016
3-Methylhexane	0.3145	1.0675	4.6755	0.0079	0.0003	0.0014
Heptane	0.5603	1.9017	8.3294	0.0148	0.0006	0.0025
Methylcyclohexane	0.3640	1.2353	5.4106	0.0521	0.0020	0.0090
Toluene	0.0691	0.2345	1.0271	0.1097	0.0043	0.0189
Octane	0.5175	1.7565	7.6935	0.0082	0.0003	0.0014
Ethylbenzene	0.0237	0.0805	0.3527	0.0368	0.0014	0.0063
m & p-Xylene	0.0281	0.0953	0.4176	0.0427	0.0017	0.0074
o-Xylene	0.0275	0.0934	0.4092	0.0447	0.0018	0.0077
Nonane	0.1084	0.3681	1.6121	0.0027	0.0001	0.0005
C10+	0.0174	0.0590	0.2586	0.0028	0.0001	0.0005
Total VOCs	77.138	261.81	1,146.7	13.266	0.5218	2.2857
Total CO_{2e}		104.16	456.2		59.85	262.1
Total TAPs (Benzene)		0.2005	0.8781		0.0039	0.0169
Toluene		0.2345	1.0271		0.0043	0.0189
Ethylbenzene		0.0805	0.3527		0.0014	0.0063
Xylenes		0.1888	0.8268		0.0034	0.0151
n-Hexane		31.509	138.010		0.0078	0.0341
Total HAPs		32.213	141.095		0.0209	0.0914
Total	100.00	339.40	1,486.6	100.00	3.934	17.23

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

Table 7

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

Condensate Tank Information	
Number of Tanks	10
Maximum Working Losses (lbs/hr)	17.6905
Maximum Breathing Losses (lbs/hr)	15.8206
# Hours Operational	8760

	Condensate Tank W/B Losses						
	Vapor Mass Fraction	Working Losses		Breathing Losses		Max W/B Losses	
	wt%	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	1.51E-06	6.64E-06	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide	0.1093	0.0193	0.0847	0.0173	0.0757	0.0366	0.1604
Methane	0.1969	0.0348	0.1525	0.0311	0.1364	0.0660	0.2889
Ethane	27.4212	4.8510	21.2472	4.3382	19.0013	9.1891	40.2485
Propane	27.9224	4.9396	21.6356	4.4175	19.3486	9.3571	40.9842
Isobutane	10.1439	1.7945	7.8600	1.6048	7.0291	3.3993	14.8891
n-Butane	18.7558	3.3180	14.5328	2.9673	12.9967	6.2853	27.5295
Isopentane	6.2916	1.1130	4.8751	0.9954	4.3597	2.1084	9.2348
n-Pentane	5.5370	0.9795	4.2903	0.8760	3.8368	1.8555	8.1271
2-Methylpentane	0.6629	0.1173	0.5136	0.1049	0.4593	0.2221	0.9729
3-Methylpentane	0.4486	0.0794	0.3476	0.0710	0.3108	0.1503	0.6584
n-Hexane	0.6149	0.1088	0.4764	0.0973	0.4261	0.2060	0.9025
Methylcyclopentane	0.1923	0.0340	0.1490	0.0304	0.1332	0.0644	0.2822
Benzene	0.0033	5.85E-04	0.0026	0.0005	0.0023	0.0011	0.0049
2-Methylhexane	0.0253	4.47E-03	0.0196	0.0040	0.0175	0.0085	0.0371
3-Methylhexane	0.3032	0.0536	0.2349	0.0480	0.2101	0.1016	0.4450
Heptane	0.4989	0.0883	0.3866	0.0789	0.3457	0.1672	0.7323
Methylcyclohexane	0.3263	0.0577	0.2529	0.0516	0.2261	0.1094	0.4790
Toluene	0.0085	1.51E-03	6.60E-03	0.0013	0.0059	0.0029	0.0125
Octane	0.4254	0.0753	0.3296	0.0673	0.2948	0.1426	0.6244
Ethylbenzene	0.0055	9.72E-04	4.26E-03	0.0009	0.0038	0.0018	0.0081
m & p-Xylene	0.0070	1.25E-03	5.46E-03	0.0011	0.0049	0.0024	0.0103
o-Xylene	0.0071	1.26E-03	0.0055	0.0011	0.0050	0.0024	0.0105
Nonane	0.0820	0.0145	0.0636	0.0130	0.0569	0.0275	0.1204
C10+	0.0107	1.90E-03	0.0083	0.0017	0.0074	0.0036	0.0158
Total VOCs	72.273	12.7854	56.000	11.4340	50.0808	24.2194	106.081
Total CO_{2e}		0.8899	3.8979	0.7959	3.4859	1.6858	7.384
Total TAPs (Benzene)		5.85E-04	2.56E-03	0.0005	0.0023	0.0011	0.0049
Toluene		1.51E-03	6.60E-03	0.0013	0.0059	0.0029	0.0125
Ethylbenzene		9.72E-04	4.26E-03	0.0009	0.0038	0.0018	0.0081
Xylenes		2.51E-03	0.0110	0.0022	0.0098	0.0048	0.0208
n-Hexane		0.1088	0.4764	0.0973	0.4261	0.2060	0.9025
Total HAPs		0.1143	0.5008	0.1023	0.4479	0.2166	0.9487
Total	100.00	17.6905	77.4846	15.8206	69.2943	33.5112	146.779

Table 7

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

Produced Water Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.0350
Maximum Breathing Losses (lbs/hr)	0.0084

	Produced Water Tank W/B Losses						
	Vapor Mass Fraction	Working Losses		Breathing Losses		Max W/B Losses	
	wt%	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	0.0056	1.96E-06	8.58E-06	4.70E-07	2.06E-06	2.43E-06	1.06E-05
Carbon Dioxide	4.8540	0.0017	0.0074	0.0004	0.0018	0.0021	0.0092
Methane	3.2411	0.0011	0.0050	0.0003	0.0012	0.0014	0.0062
Ethane	0.9733	0.0003	0.0015	0.0001	0.0004	0.0004	0.0018
Propane	0.0736	2.57E-05	0.0001	6.17E-06	2.70E-05	3.19E-05	0.0001
Isobutane	0.0551	1.93E-05	8.44E-05	4.62E-06	2.02E-05	2.39E-05	1.05E-04
n-Butane	0.0041	1.44E-06	6.31E-06	3.46E-07	1.51E-06	1.79E-06	7.83E-06
Isopentane	0.0002	7.89E-08	3.46E-07	1.89E-08	8.29E-08	9.78E-08	4.29E-07
n-Pentane	0.0001	4.87E-08	2.13E-07	1.17E-08	5.11E-08	6.03E-08	2.64E-07
2-Methylpentane	1.47E-06	5.15E-10	2.26E-09	1.24E-10	5.41E-10	6.39E-10	2.80E-09
3-Methylpentane	6.56E-06	2.30E-09	1.01E-08	5.50E-10	2.41E-09	2.85E-09	1.25E-08
n-Hexane	6.18E-07	2.16E-10	9.47E-10	5.18E-11	2.27E-10	2.68E-10	1.17E-09
Methylcyclopentane	1.99E-05	6.95E-09	3.04E-08	1.67E-09	7.30E-09	8.62E-09	3.77E-08
Benzene	1.31E-04	4.57E-08	2.00E-07	1.10E-08	4.80E-08	5.66E-08	2.48E-07
2-Methylhexane	1.31E-08	4.59E-12	2.01E-11	1.10E-12	4.82E-12	5.69E-12	2.49E-11
3-Methylhexane	1.63E-07	5.71E-11	2.50E-10	1.37E-11	5.99E-11	7.08E-11	3.10E-10
Heptane	2.30E-07	8.03E-11	3.52E-10	1.92E-11	8.43E-11	9.95E-11	4.36E-10
Methylcyclohexane	4.79E-06	1.67E-09	7.34E-09	4.02E-10	1.76E-09	2.08E-09	9.10E-09
Toluene	7.01E-05	2.45E-08	1.07E-07	5.88E-09	2.57E-08	3.04E-08	1.33E-07
Octane	2.36E-08	8.27E-12	3.62E-11	1.98E-12	8.68E-12	1.03E-11	4.49E-11
Ethylbenzene	1.35E-05	4.71E-09	2.06E-08	1.13E-09	4.95E-09	5.84E-09	2.56E-08
m & p-Xylene	1.41E-05	4.94E-09	2.16E-08	1.18E-09	5.19E-09	6.12E-09	2.68E-08
o-Xylene	1.89E-05	6.63E-09	2.90E-08	1.59E-09	6.96E-09	8.22E-09	3.60E-08
Nonane	3.69E-09	1.29E-12	5.65E-12	3.09E-13	1.35E-12	1.60E-12	7.00E-12
C10+	1.22E-09	4.27E-13	1.87E-12	1.02E-13	4.48E-13	5.29E-13	2.32E-12
Total VOCs	0.1334	4.67E-05	0.0002	1.12E-05	4.90E-05	5.79E-05	0.0003
Total CO_{2e}		0.0300	0.1316	0.0072	0.0315	0.0372	0.1631
Total TAPs (Benzene)		4.57E-08	2.00E-07	1.10E-08	4.80E-08	5.66E-08	2.48E-07
Toluene		2.45E-08	1.07E-07	5.88E-09	2.57E-08	3.04E-08	1.33E-07
Ethylbenzene		4.71E-09	2.06E-08	1.13E-09	4.95E-09	5.84E-09	2.56E-08
Xylenes		1.16E-08	5.07E-08	2.77E-09	1.21E-08	1.43E-08	6.28E-08
n-Hexane		2.16E-10	9.47E-10	5.18E-11	2.27E-10	2.68E-10	1.17E-09
Total HAPs		8.67E-08	3.80E-07	2.08E-08	9.10E-08	1.07E-07	4.71E-07
Total	100.00	0.0350	0.1532	0.0084	0.0367	0.0434	0.1899

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

Table 8

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

Annual Loading	Oil Truck Loading	Water Truck Loading
RVP	4.45	1.0238
Annual Average Temp (F)	65.08	65.08
S (saturation factor)	0.6	0.6
P (true vapor pressure)	2.71	0.37
M (MW of vapor)	44.13	18.56
Collection Efficiency (%)	0.00	0.00
Loading Loss (lb/10^3 gal)*	1.70	0.10
Maximum Throughput (gallons/hr)**	10,080	10,080
Average Throughput (gallons/yr)	42,893,340	7,205,100
Loading Emissions (lbs/hr)	17.16	0.99
Loading Emissions (tpy)	36.50	0.35

	Condensate Tank Loading Losses			Produced Water Tank Loading Losses		
	Vapor Mass Fraction	Loading Losses		Vapor Mass Fraction	Loading Losses	
	wt%	lbs/hr	tpy	wt%	lbs/hr	tpy
H2S	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0000	1.47E-06	3.13E-06	0.0056	5.56E-05	1.99E-05
Carbon Dioxide	0.1093	0.0187	0.0399	4.8540	0.0482	0.0172
Methane	0.1969	0.0338	0.0719	3.2411	0.0322	0.0115
Ethane	27.4212	4.7046	10.0097	0.9733	0.0097	0.0035
Propane	27.9224	4.7906	10.1927	0.0736	7.31E-04	2.61E-04
Isobutane	10.1439	1.7404	3.7029	0.0551	5.47E-04	1.95E-04
n-Butane	18.7558	3.2179	6.8465	0.0041	4.09E-05	1.46E-05
Isopentane	6.2916	1.0794	2.2967	0.0002	2.24E-06	8.01E-07
n-Pentane	5.5370	0.9500	2.0212	0.0001	1.38E-06	4.94E-07
2-Methylpentane	0.6629	0.1137	0.2420	1.47E-06	1.46E-08	5.23E-09
3-Methylpentane	0.4486	0.0770	0.1638	6.56E-06	6.52E-08	2.33E-08
n-Hexane	0.6149	0.1055	0.2244	6.18E-07	6.14E-09	2.19E-09
Methylcyclopentane	0.1923	0.0330	0.0702	1.99E-05	1.97E-07	7.05E-08
Benzene	0.0033	0.0006	0.0012	0.0001	1.30E-06	4.64E-07
2-Methylhexane	0.0253	0.0043	0.0092	1.31E-08	1.30E-10	4.66E-11
3-Methylhexane	0.3032	0.0520	0.1107	1.63E-07	1.62E-09	5.79E-10
Heptane	0.4989	0.0856	0.1821	2.30E-07	2.28E-09	8.15E-10
Methylcyclohexane	0.3263	0.0560	0.1191	4.79E-06	4.76E-08	1.70E-08
Toluene	0.0085	0.0015	0.0031	0.0001	6.96E-07	2.49E-07
Octane	0.4254	0.0730	0.1553	2.36E-08	2.35E-10	8.39E-11
Ethylbenzene	0.0055	0.0009	0.0020	1.35E-05	1.34E-07	4.78E-08
m & p-Xylene	0.0070	0.0012	0.0026	1.41E-05	1.40E-07	5.01E-08
o-Xylene	0.0071	0.0012	0.0026	1.89E-05	1.88E-07	6.73E-08
Nonane	0.0820	0.0141	0.0299	3.69E-09	3.66E-11	1.31E-11
C10+	0.0107	0.0018	0.0039	1.22E-09	1.21E-11	4.33E-12
Total VOCs	72.2727	12.3997	26.3822	0.1334	0.0013	0.0005
Total CO_{2e}		0.8631	1.8363		0.8529	0.3048
Total TAPs (Benzene)		0.0006	0.0012		1.30E-06	4.64E-07
Toluene		0.0015	0.0031		6.96E-07	2.49E-07
Ethylbenzene		0.0009	0.0020		1.34E-07	4.78E-08
Xylenes		0.0024	0.0052		3.28E-07	1.17E-07
n-Hexane		0.1055	0.2244		6.14E-09	2.19E-09
Total HAPs		0.1109	0.2360		2.46E-06	8.80E-07
Total	100.0000	17.1568	36.5037	100.0000	0.9932	0.3549

Enter any notes here

Vapor mass fractions and loading losses from Promax output

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

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

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

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

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

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

Loading emissions are vented to the atmosphere.

Table 9

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

Gas Production Unit Heater Emissions

Number of Units	9
GPU Heater Rating (MMBtu/hr)	1.50
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,227

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	1.100	4.817
CO	84	0.924	4.047
CO_2	120,000	1319.803	5780.736
Lead	0.0005	5.50E-06	2.41E-05
N_2O	2.2	0.024	0.106
PM (Total)	7.6	0.084	0.366
SO_2	0.6	0.007	0.029
TOC	11	0.121	0.530
Methane	2.3	0.025	0.111
VOC	5.5	0.060	0.265
HAPS			
2-Methylnaphthalene	2.40E-05	2.64E-07	1.16E-06
Benzene	0.0021	2.31E-05	1.01E-04
Dichlorobenzene	0.0012	1.32E-05	5.78E-05
Fluoranthene	3.00E-06	3.30E-08	1.45E-07
Fluorene	2.80E-06	3.08E-08	1.35E-07
Formaldehyde	0.0750	8.25E-04	0.0036
Hexane	1.8000	0.0198	0.0867
Naphthalene	6.10E-04	6.71E-06	2.94E-05
Phenanathrene	1.70E-05	1.87E-07	8.19E-07
Toluene	0.0034	3.74E-05	1.64E-04

Line Heater Emissions

Number of Units	9
Line Heater Rating (MMBtu/hr)	2.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,227

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	1.466	6.423
CO	84	1.232	5.395
CO_2	120,000	1759.737	7707.648
Lead	0.0005	7.33E-06	3.21E-05
N_2O	2.2	0.032	0.141
PM (Total)	7.6	0.111	0.488
SO_2	0.6	0.009	0.039
TOC	11	0.161	0.707
Methane	2.3	0.034	0.148
VOC	5.5	0.081	0.353
HAPS			
2-Methylnaphthalene	2.40E-05	3.52E-07	1.54E-06
Benzene	0.0021	3.08E-05	1.35E-04
Dichlorobenzene	0.0012	1.76E-05	7.71E-05
Fluoranthene	3.00E-06	4.40E-08	1.93E-07
Fluorene	2.80E-06	4.11E-08	1.80E-07
Formaldehyde	0.0750	0.0011	0.0048
Hexane	1.8000	0.0264	1.16E-01
Naphthalene	6.10E-04	8.95E-06	3.92E-05
Phenanathrene	1.70E-05	2.49E-07	1.09E-06
Toluene	3.40E-03	4.99E-05	2.18E-04

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.141	0.618
TOTAL Uncontrolled HAPs	0.048	0.212
TOTAL Uncontrolled TAPs (Benzene)	5.39E-05	2.36E-04
TOTAL Uncontrolled Toluene	8.73E-05	3.82E-04
TOTAL Uncontrolled Hexane	0.0462	0.2023
TOTAL Uncontrolled TAPs (Formaldehyde)	0.0019	0.0084
TOTAL CO_{2e} Emissions	3,097.84	13,568.54

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

Table 10

Enclosed Combustor Emissions
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

General Information	
Unit Name:	EC001, EC002, EC003

Pollutant	Emission Factor (lb/MMscf)
NOx	100
CO	84
PM10	7.6
PM2.5	5.7
SO_2	0.6
CO_2	120,000
VOC	5.5
benzene	2.10E-03
Hexane	1.80E+00
Toluene	3.40E-03
Formaldehyde	7.50E-02
N_2O	2.20
Lead	5.00E-04

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S 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_2S 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	--	2,918.52	80.42	288.17	0.89	3,325.79
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	331,128.00	--	25,566,210.40	704,473.56	2,524,329.45	7,765.84	29,133,907.25
Heating Content (Btu/ft3)	1,227		2,633.60	1,162.32	2,506.75	96.96	2,556.42

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	-	-	261.806	0.522	24.219	0.000	286.55
Benzene	-	-	0.200	0.004	0.001	0.000	0.205
Toluene	-	-	0.234	0.004	0.003	0.000	0.242
Ethylbenzene	-	-	0.081	0.001	0.002	0.000	0.084
Xylenes	-	-	0.189	0.003	0.005	0.000	0.197
n-Hexane	-	-	31.509	0.008	0.206	0.000	31.723
HAPs	-	-	32.213	0.021	0.217	0.000	32.451
Total Mass Flow	-	-	339.398	3.934	33.511	0.043	376.886
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	-	-	1146.711	2.286	106.081	0.000	1255.078
Benzene	-	-	0.878	0.017	0.005	0.000	0.900
Toluene	-	-	1.027	0.019	0.012	0.000	1.058
Ethylbenzene	-	-	0.353	0.006	0.008	0.000	0.367
Xylenes	-	-	0.827	0.015	0.021	0.000	0.863
n-Hexane	-	-	138.010	0.034	0.902	0.000	138.946
HAP	-	-	141.095	0.091	0.949	0.000	142.135
Total Mass Flow	-	-	1486.565	17.229	146.779	0.190	1650.763

Table 10

Enclosed Combustor Emissions
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Controlled Emissions							
Hourly (lb/hr)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
NOx	0.004	-	0.292	0.008	0.029	0.000	0.33
CO	0.003	-	0.245	0.007	0.024	0.000	0.28
PM2.5	0.000	-	0.017	0.000	0.002	0.000	0.02
PM10	0.000	-	0.022	0.001	0.002	0.000	0.03
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	-	5.236	0.010	0.484	0.000	5.73
Benzene	0.000	-	0.004	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.005	0.000	0.000	0.000	0.00
Ethylbenzene	0.000	-	0.002	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.004	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.630	0.000	0.004	0.000	0.63
HAP	0.000	-	0.644	0.000	0.004	0.000	0.65
N_2O	0.000	-	0.006	0.000	0.001	0.000	0.01
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	-	1.278	0.035	0.126	0.000	1.46
CO	0.014	-	1.074	0.030	0.106	0.000	1.22
PM2.5	0.001	-	0.073	0.002	0.007	0.000	0.08
PM10	0.001	-	0.097	0.003	0.010	0.000	0.11
H_2S	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	-	22.934	0.046	2.122	0.000	25.10
Benzene	0.000	-	0.018	0.000	0.000	0.000	0.02
Toluene	0.000	-	0.021	0.000	0.000	0.000	0.02
Ethylbenzene	0.000	-	0.007	0.000	0.000	0.000	0.01
Xylenes	0.000	-	0.017	0.000	0.000	0.000	0.02
n-Hexane	0.000	-	2.760	0.001	0.018	0.000	2.78
HAP	0.000	-	2.822	0.002	0.019	0.000	2.84
N_2O	0.000	-	0.028	0.001	0.003	0.000	0.03
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	5.73	25.10
NOx	0.33	1.46
CO	0.28	1.22
PM2.5	0.02	0.08
PM10	0.03	0.11
H_2S	1.21E-05	5.28E-05
SO_2	2.27E-05	9.93E-05
Benzene (TAPs)	0.00	0.02
Toluene	0.00	0.02
Ethylbenzene	0.00	0.01
Xylenes	0.00	0.02
Hexanes	0.63	2.78
Formaldehyde (TAPs)	2.84E-06	1.24E-05
HAPs	0.65	2.84
CO_2e	1180.89	5172.29
N_2O	0.01	0.03
Lead	1.66E-06	7.28E-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
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Enclosed Combustor CO_2 and CH_4 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	25,566,210	0.0170	704,474	0.0011	2,524,329	0.020	7,766	47,599	1	0	--	47,599	88,104,278
Methane	0.036	25,566,210	0.7676	704,474	0.0054	2,524,329	0.037	7,766	1,464,771	1	0.98	1,435,476	29,295	29,295
Ethane	0.333	25,566,210	0.1321	704,474	0.4036	2,524,329	0.006	7,766	9,635,790	2	0.98	18,886,149	--	
Propane	0.265	25,566,210	0.0273	704,474	0.2802	2,524,329	0.000	7,766	7,491,863	3	0.98	22,026,076	--	
i-Butane	0.076	25,566,210	0.0143	704,474	0.0772	2,524,329	0.000	7,766	2,151,543	4	0.98	8,434,050	--	
n-Butane	0.142	25,566,210	0.0062	704,474	0.1428	2,524,329	0.000	7,766	3,994,191	4	0.98	15,657,229	--	
Pentane	0.077	25,566,210	0.0020	704,474	0.0726	2,524,329	0.000	7,766	2,149,546	5	0.98	10,532,775	--	
Hexane	0.056	25,566,210	0.0006	704,474	0.0089	2,524,329	0.000	7,766	1,467,207	6	0.98	8,627,178	--	
Benzene	0.000	25,566,210	0.0003	704,474	0.0000	2,524,329	0.000	7,766	9,255	6	0.98	54,419	--	
Heptanes	0.007	25,566,210	0.0002	704,474	0.0047	2,524,329	0.000	7,766	193,066	7	0.98	1,324,436	--	
Toluene	0.000	25,566,210	0.0002	704,474	0.0000	2,524,329	0.000	7,766	9,225	7	0.98	63,282	--	
Octane	0.004	25,566,210	0.0001	704,474	0.0031	2,524,329	0.000	7,766	106,296	8	0.98	833,361	--	
Ethyl benzene	0.000	25,566,210	0.0001	704,474	0.0000	2,524,329	0.000	7,766	2,775	8	0.98	21,756	--	
Xylenes	0.000	25,566,210	0.0002	704,474	0.0001	2,524,329	0.000	7,766	6,521	8	0.98	51,127	--	
Nonane	0.000	25,566,210	0.0000	704,474	0.0003	2,524,329	0.000	7,766	10,816	9	0.98	95,396	--	
Decane plus	0.000	25,566,210	0.0000	704,474	0.0000	2,524,329	0.000	7,766	1,425	10	0.98	13,968	--	
											Subtotal	**88,056,679**	--	

Pollutant	Volume Emitted *scf/year*	Density of GHG[c] *lb/scf*	Conversion Factor *lb/ton*	GWF	Emissions[c] *lbs/hr*	Emissions[c] *(tons/yr)*
CO_2	88,104,278	0.12	2000	1	1166.306	5108.419
CH_4	29,295	0.09	2000	25	0.311	1.363
				CO_2e Emissions	**1174.084**	**5142.487**

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
James Webb Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

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

Tanker Truck Trip Calculation	
Condensate Production (bbl/day)	2,798
PW Production (bbl/day)	470
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 (miles/hr)	Vehicle Miles Travelled (miles/year)	PM (lbs/VMT)	PM10 (lbs/VMT)
Tanker Trucks Condensate	10	40	10	0.7400	1	5107	0.7400	3779.1800	3.8175	1.7179
Tanker Trucks PW	10	40	10	0.7400	1	858	0.7400	634.9200	3.8175	1.7179
Pick Up Truck	4	3	10	0.2049	1	730	0.2049	149.5770	0.3467	0.1560

	Uncontrolled Emissions						Controlled Emissions					
	PM			PM10			PM			PM10		
	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)
Tanker Trucks Condensate	2.8250	14427.1307	7.2136	1.2712	6492.2088	3.2461	1.4125	7213.5654	3.6068	0.6356	3246.1044	1.6231
Tanker Trucks PW	2.8250	2423.8258	1.2119	1.2712	1090.7216	0.5454	1.4125	1211.9129	0.6060	0.6356	545.3608	0.2727
Pick Up Truck	0.0710	51.8553	0.0259	0.0320	23.3349	0.0117	0.0355	25.9277	0.0130	0.0160	11.6674	0.0058
Total Emissions	5.7210	16,902.8118	8.4514	2.5744	7,606.2653	3.8031	2.8605	8,451.4059	4.2257	1.2872	3,803.1327	1.9016

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

Table 13

Vapor Recovery Unit Emissions
James Webb Well Pad
Doddridge 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)	1227.4562
Density of NG (lb/scf)	0.056
Operating Hours/year	8760
No. of Engines	5

Pollutant	Emission Factors (g/hp-hr)	Emission Factors (lb/MMBtu)	lb/hr	tpy
NOx^2	0.3731		0.2797	1.2251
CO^2	2.4627		1.8460	8.0853
CO_2		110.000	316.7573	1,387.40
$PM_{2.5}$		9.500E-03	0.0274	0.1198
PM_{10}		9.500E-03	0.0274	0.1198
PM (Total)		9.910E-03	0.0285	0.1250
SO_2		5.880E-04	0.0017	0.0074
TOC		0.358	1.0309	4.5153
Methane		0.230	0.6623	2.9009
VOC^3		0.0296	0.0852	0.3733
HAPS				
Benzene		0.0016	0.0045	0.0199
Ethylbenzene		2.48E-05	7.14E-05	3.13E-04
Formaldehyde		0.0205	0.0590	0.2586
Naphthalene		9.71E-05	2.80E-04	0.0012
Toluene		5.58E-04	0.0016	0.0070
Xylene		1.95E-04	5.62E-04	0.0025

Ford CSG-637 3.7L Engine

Power (hp) [1]	99
Fuel consumption (lbs/BHP-hr) [1]	0.3584
Heat Content of Fuel (Btu/scf)	1227.4562
Density of NG (lb/scf)	0.056
Operating Hours/year	8760
No. of Engines	2

Pollutant	Emission Factors (g/hp-hr)	Emission Factors (lb/MMBtu)	lb/hr	tpy
NOx^2	0.2985		0.1303	0.5707
CO^2	2.4627		1.0750	4.7085
CO_2		110.000	171.0976	749.41
$PM_{2.5}$		9.500E-03	0.0148	0.0647
PM_{10}		9.500E-03	0.0148	0.0647
PM (Total)		9.910E-03	0.0154	0.0675
SO_2		5.880E-04	0.0009	0.0040
TOC		0.358	0.5568	2.4390
Methane		0.230	0.3577	1.5669
VOC^3		0.0296	0.0460	0.2017
HAPS				
Benzene		0.0016	0.0025	0.0108
Ethylbenzene		2.48E-05	3.86E-05	1.69E-04
Formaldehyde		0.0205	0.0319	0.1397
Naphthalene		9.71E-05	1.51E-04	6.62E-04
Toluene		5.58E-04	8.68E-04	0.0038
Xylene		1.95E-04	3.03E-04	0.0013

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.1313	0.5750
TOTAL Uncontrolled NOx	0.4100	1.7958
TOTAL Uncontrolled HAPs	0.1018	0.4459
TOTAL Uncontrolled TAPs (Benzene)	0.0070	0.0307
TOTAL Uncontrolled Toluene	0.0025	0.0108
TOTAL Uncontrolled Ethylbenzene	0.0001	0.0005
TOTAL Uncontrolled Xylene	0.0009	0.0038
TOTAL Uncontrolled TAPs (Formaldehyde)	0.0909	0.3982
TOTAL CO_{2e} Emissions	513.3564	2248.5012

Enter Any Notes Here:

1. 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.

2. 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. See CSG-637 CARB document in Appendix N.

3. 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.

4. Hours of operation was calculated based on the 100% operation of the VRU.

Table 14

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

	Potential Emissions		Previous Permit Application Emissions		Change in Emissions	
Pollutant	**Hourly PTE**	**Yearly PTE**	**Hourly PTE**	**Yearly PTE**	**Hourly PTE**	**Yearly PTE**
PM	3.0808	5.1907	2.3593	3.1942	7.21E-01	1.9964
PM10	1.5497	3.0511	1.1922	2.0088	0.3575	1.0423
VOC (uncontrolled)	290.0722	1296.8991	241.3615	1062.9456	48.7108	233.9535
CO	5.3560	23.4594	8.2406	36.0940	-2.8846	-12.6346
NOx	3.3089	14.4928	3.4064	14.9202	-0.0976	-0.4274
SO2	0.0180	0.0790	0.0153	0.0671	2.72E-03	1.19E-02
Pb	1.45E-05	6.35E-05	0.0000	0.0001	-9.59E-07	-4.20E-06
HAPs	1.2213	5.5854	0.7531	3.3152	0.4682	2.2702
TAPs	0.1112	0.4882	0.0271	0.1190	8.41E-02	0.3692

Notes:
1. Change in emissions due to the increase in production, addition of 1 Cimarron enclosed combustor, removal of a Kubota compressor engine, and the addition of 5 Ford high pressure VRU compressor engines, 2 Ford low pressure VRU compressor engines, and 4 VRTs.
2. Change in permit from G70A to G70C.

Bryan Research & Engineering, Inc.

ProMax® 3.2

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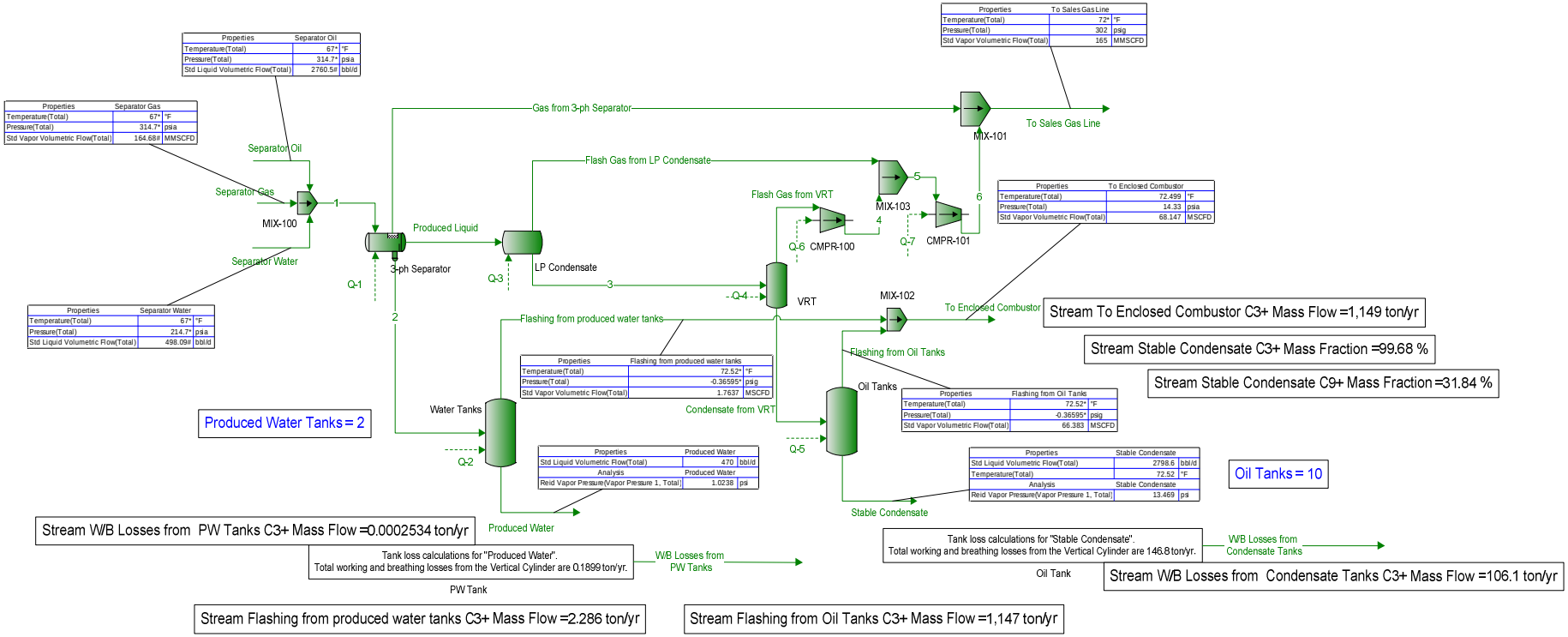
TSWEET® & PROSIM®

Simulation Report	
Client Name:	Antero Resources
Location:	Ritchie County, WV
Job:	James Webb

Project Name:	Antero Promax Model- VRT
File Name:	ProMax@C:\Users\ychen1\Documents\Drafts\082715- ANTERO\ProMax Report\VRT\Antero Promax Model- VRT.pmx
ProMax Version:	

Report Created:	6/27/2016 11:11


Properties | Separator Oil
Temperature(Total) 67* °F
Pressure(Total) 314.7* psia
Std Liquid Volumetric Flow(Total) 2760.5# bbl/d
Properties | Separator Gas
Temperature(Total) 67* °F
Pressure(Total) 314.7* psia
Std Vapor Volumetric Flow(Total) 164.68# MMSCFD
Properties | Separator Water
Temperature(Total) 67* °F
Pressure(Total) 214.7* psia
Std Liquid Volumetric Flow(Total) 498.09# bbl/d
Properties | To Sales Gas Line
Temperature(Total) 72* °F
Pressure(Total) 302 psig
Std Vapor Volumetric Flow(Total) 165 MMSCFD
Properties | To Enclosed Combustor
Temperature(Total) 72.499 °F
Pressure(Total) 14.33 psia
Std Vapor Volumetric Flow(Total) 68.147 MSCFD
Properties | Flashing from produced water tanks
Temperature(Total) 72.52* °F
Pressure(Total) -0.36595* psig
Std Vapor Volumetric Flow(Total) 1.7637 MSCFD
Properties | Flashing from Oil Tanks
Temperature(Total) 72.52* °F
Pressure(Total) -0.36595* psig
Std Vapor Volumetric Flow(Total) 66.383 MSCFD
Properties | Produced Water
Std Liquid Volumetric Flow(Total) 470 bbl/d
Analysis | Produced Water
Reid Vapor Pressure(Vapor Pressure 1, Total) 1.0238 psi
Properties | Stable Condensate
Std Liquid Volumetric Flow(Total) 2798.6 bbl/d
Temperature(Total) 72.52 °F
Analysis | Stable Condensate
Reid Vapor Pressure(Vapor Pressure 1, Total) 13.469 psi
Gas from 3-ph Separator
Separator Oil
Separator Gas
Separator Water
MIX-100
1
3-ph Separator
Produced Liquid
Flash Gas from LP Condensate
LP Condensate
Q-1
Q-3
2
3
MIX-101
To Sales Gas Line
MIX-103
5
6
4
Flash Gas from VRT
Q-6 CMPR-100
Q-7 CMPR-101
Q-4
VRT
MIX-102
To Enclosed Combustor
Flashing from produced water tanks
Condensate from VRT
Flashing from Oil Tanks
Oil Tanks
Water Tanks
Q-2
Q-5
Produced Water
Stable Condensate
Stream To Enclosed Combustor C3+ Mass Flow =1,149 ton/yr
Stream Stable Condensate C3+ Mass Fraction =99.68 %
Stream Stable Condensate C9+ Mass Fraction =31.84 %
Produced Water Tanks = 2
Oil Tanks = 10
Stream W/B Losses from PW Tanks C3+ Mass Flow =0.0002534 ton/yr
Tank loss calculations for "Produced Water".
Total working and breathing losses from the Vertical Cylinder are 0.1899 ton/yr.
W/B Losses from PW Tanks
PW Tank
Tank loss calculations for "Stable Condensate".
Total working and breathing losses from the Vertical Cylinder are 146.8 ton/yr.
W/B Losses from Condensate Tanks
Oil Tank
Stream W/B Losses from Condensate Tanks C3+ Mass Flow =106.1 ton/yr
Stream Flashing from produced water tanks C3+ Mass Flow =2.286 ton/yr
Stream Flashing from Oil Tanks C3+ Mass Flow =1,147 ton/yr

Process Streams		Separator Gas	Separator Water	Separator Oil	1	as from 3-ph Separato	Produced Liquid	2	Produced Water	3	h Gas from LP Conden	To Sales Gas Line	Condensate from VRT	g from produced wate	lashing from Oil Tank	o Enclosed Combusto	Flash Gas from VRT	Stable Condensate
Phase: Total	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0	100	0	2.14643	0.125370	0.0454751	99.9470	99.9965	0.0174082	0.213043	0.125704	0.00511189	2.77097	0.120138	0.188742	0.192658	0.00220798
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.4154	0	0.026	0.400098	0.416451	0.0141104	0.000110007	2.46978E-06	0.000633857	0.0945692	0.415042	1.90254E-05	0.211472	0.000730428	0.00618445	0.00939659	1.06552E-06
CO2		0.1709	0	0.022	0.164790	0.170491	0.0545661	0.00170234	0.000836893	0.0192168	0.265611	0.170826	0.00514556	1.70273	0.127520	0.168287	0.219763	0.00205613
Methane		80.6676	0	7.703	77.7395	80.8028	8.29586	0.0409384	0.00184524	1.10942	51.2010	80.6412	0.103852	76.8777	3.54917	5.44692	15.4410	0.0168722
Ethane		13.4543	0	7.916	13.0747	13.4530	8.07217	0.00710028	0.000373331	4.33002	30.4139	13.5328	1.84944	13.2288	33.2505	32.7323	39.6838	1.05670
Propane		2.6759	0	7.595	2.69914	2.70001	5.43416	0.00147715	8.72643E-05	4.80215	9.20747	2.73977	3.68294	2.73327	26.3917	25.7794	20.7534	3.10964
Isobutene		0.5461	0	2.047	0.558993	0.521914	2.94261	0.000921436	0.000166189	3.10498	1.97319	0.531675	2.94891	1.48534	7.86514	7.70003	5.32935	2.82479
n-Butane		0.9324	0	5.957	0.994790	0.908358	6.23551	0.000333103	1.50726E-05	6.70400	3.43849	0.925538	6.51268	0.625416	14.1562	13.8060	9.43077	6.31971
Isopentane		0.2731	0	3.263	0.316272	0.247745	3.98511	5.70336E-05	1.81818E-06	4.50012	0.910391	0.252348	4.63551	0.108582	4.06009	3.95783	2.57042	4.65004
n-Pentane		0.2342	0	4.557	0.300067	0.217318	4.64606	4.87203E-05	1.52190E-06	5.29069	0.797438	0.221351	5.50382	0.0928163	3.60480	3.51391	2.25319	5.55176
2-Methylpentane		0	0	2.662	0.0436568	0.0226530	1.11332	2.23294E-06	3.36544E-08	1.28644	0.0797262	0.0230509	1.36099	0.00432488	0.368564	0.359137	0.223939	1.38604
3-Methylpentane		0	0	1.907	0.0312748	0.0153476	0.840511	4.16951E-06	1.67747E-07	0.972269	0.0538797	0.0156161	1.02988	0.00786956	0.249458	0.243205	0.151149	1.04958
n-Hexane		0.6301	0	6.607	0.714596	0.313338	21.0265	2.40383E-05	2.89795E-07	24.3672	1.08188	0.318688	25.8652	0.0467013	5.01647	4.88786	3.01678	26.3915
Methylcyclopentane		0	0	1.031	0.0169084	0.00712149	0.511784	6.31134E-06	7.26141E-07	0.593301	0.0251020	0.00724654	0.630000	0.0109839	0.116610	0.113876	0.0702644	0.642961
Benzene		0	0	0.31	0.00508400	0.00213926	0.153884	9.63681E-05	8.34128E-05	0.178384	0.00761527	0.00217723	0.189407	0.0255597	0.0352140	0.0349642	0.0212731	0.193300
2-Methylhexane		0	0	2.934	0.0481176	0.0123046	1.84486	9.94850E-07	1.33080E-08	2.14722	0.0397391	0.0124942	2.29032	0.00193020	0.183543	0.178842	0.107619	2.34351
3-Methylhexane		0	0	2.426	0.0397864	0.00979401	1.54399	8.28107E-07	1.15458E-08	1.79730	0.0316530	0.00994515	1.91738	0.00160576	0.146158	0.142417	0.0857908	1.96210
n-Heptane		0	0	5.216	0.0855424	0.0178917	3.47408	1.54653E-06	2.22397E-08	4.04649	0.0566404	0.0181596	4.31971	0.00299751	0.260380	0.253719	0.152561	4.42219
Methylcyclohexane		0	0	3.402	0.0557928	0.0114609	2.27605	5.94309E-06	4.64671E-07	2.65102	0.0373652	0.0116399	2.82991	0.0107737	0.172612	0.168424	0.101446	2.89699
Toluene		0	0	0.818	0.0134152	0.00231420	0.568731	7.74833E-05	6.52206E-05	0.662723	0.00757496	0.00235043	0.707786	0.0241796	0.0349173	0.0346394	0.0204716	0.724773
n-Octane		0	0	11.443	0.187665	0.0158965	8.76095	7.50399E-07	6.80530E-09	10.2206	0.0463380	0.0161056	10.9293	0.00146227	0.210971	0.205549	0.120567	11.1999
Ethylbenzene		0	0	0.657	0.0107748	0.000756162	0.510625	2.10642E-05	1.74960E-05	0.595772	0.00227699	0.000766576	0.637156	0.00703427	0.0104065	0.0103192	0.00595494	0.652978
p-Xylene		0	0	0.877	0.0143828	0.000904819	0.686716	2.33972E-05	1.92520E-05	0.801287	0.00269693	0.000917080	0.857016	0.00817066	0.0123213	0.0122139	0.00702213	0.878341
o-Xylene		0	0	1.007	0.0165148	0.000890322	0.795753	3.38358E-05	2.95035E-05	0.928596	0.00264492	0.000902307	0.993269	0.00854891	0.0120737	0.0119825	0.00686270	1.01804
n-Nonane		0	0	6.279	0.102976	0.00322607	5.07547	2.20033E-07	3.19189E-09	5.92414	0.00867519	0.00326345	6.33826	0.000426417	0.0393730	0.0383651	0.0219076	6.49728
C10+		0	0	13.338	0.218743	0.000505022	11.0911	1.95350E-07	1.76443E-08	12.9487	0.00112658	0.000509244	13.8570	0.000349473	0.00495120	0.00483210	0.00259999	14.2067
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water		0	403.387	0	403.387	22.6202	0.168180	380.599	380.593	0.0551441	0.113036	22.7733	0.0151313	0.00536586	0.00875657	0.0141224	0.0400128	0.00637473
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		75.1119	0	0.0801351	75.1920	75.1394	0.0521843	0.000418907	9.40014E-06	0.00200788	0.0501764	75.1915	5.63156E-05	0.000409507	5.32393E-05	0.000462746	0.00195156	3.07630E-06
CO2		30.9018	0	0.0678066	30.9696	30.7613	0.201801	0.00648254	0.00318527	0.0608732	0.140928	30.9479	0.0152310	0.00329726	0.00929466	0.0125919	0.0456423	0.00593632
Methane		14586.2	0	23.7416	14609.9	14579.1	30.6805	0.155894	0.00702312	3.51432	27.1662	14609.4	0.307403	0.148870	0.258691	0.407561	3.20692	0.0487123
Ethane		2432.78	0	24.3981	2457.18	2427.30	29.8532	0.0270379	0.00142092	13.7162	16.1370	2451.68	5.47439	0.0256170	2.42355	2.44917	8.24186	3.05084
Propane		483.851	0	23.4087	507.260	487.157	20.0971	0.00562500	0.000332134	15.2118	4.88530	496.353	10.9016	0.00529286	1.92363	1.92892	4.31023	8.97795
Isobutene		98.7448	0	6.30910	105.054	94.1678	10.8826	0.00350883	0.000632528	9.83567	1.04694	96.3216	8.72883	0.00287630	0.573272	0.576148	1.10684	8.15556
n-Butane		168.595	0	18.3602	186.955	163.893	23.0607	0.00126846	5.73676E-05	21.2363	1.82439	167.676	19.2777	0.00121109	1.03181	1.03303	1.95866	18.2459
Isopentane		49.3814	0	10.0570	59.4384	44.7001	14.7381	0.000217184	6.92013E-06	14.2551	0.483035	45.7170	13.7212	0.000210264	0.295931	0.296141	0.533845	13.4253
n-Pentane		42.3476	0	14.0452	56.3928	39.2102	17.1825	0.000185527	5.79246E-06	16.7594	0.423104	40.1012	16.2914	0.000179735	0.262745	0.262925	0.467961	16.0287
2-Methylpentane		0	0	8.20460	8.20460	4.08723	4.11737	8.50304E-06	1.28091E-07	4.07507	0.0423011	4.17604	4.02856	8.37495E-06	0.0268638	0.0268722	0.0465095	4.00169
3-Methylpentane		0	0	5.87760	5.87760	2.76913	3.10845	1.58775E-05	6.38456E-07	3.07987	0.0285875	2.82911	3.04847	1.52391E-05	0.0181824	0.0181976	0.0313918	3.03029
n-Hexane		113.934	0	20.3636	134.297	56.5349	77.7621	9.15381E-05	1.10298E-06	77.1881	0.574023	57.7354	76.5616	9.04351E-05	0.365639	0.365730	0.626549	76.1959
Methylcyclopentane		0	0	3.17767	3.17767	1.28492	1.89273	2.40336E-05	2.76374E-06	1.87941	0.0133186	1.31283	1.86481	2.12699E-05	0.00849944	0.00852071	0.0145931	1.85631
Benzene		0	0	0.955457	0.955457	0.385981	0.569109	0.000366970	0.000317475	0.565068	0.00404050	0.394440	0.560650	4.94953E-05	0.00256667	0.00261617	0.00441818	0.558083
2-Methylhexane		0	0	9.04294	9.04294	2.22009	6.82284	3.78840E-06	5.06514E-08	6.80176	0.0210847	2.26353	6.77941	3.73774E-06	0.0133780	0.0133817	0.0223513	6.76603
3-Methylhexane		0	0	7.47722	7.47722	1.76711	5.71011	3.15344E-06	4.39441E-08	5.69331	0.0167944	1.80172	5.67549	3.10949E-06	0.0106531	0.0106562	0.0178177	5.66484
n-Heptane		0	0	16.0763	16.0763	3.22817	12.8482	5.88919E-06	8.46457E-08	12.8181	0.0300522	3.28990	12.7864	5.80454E-06	0.0189785	0.0189843	0.0316851	12.7674
Methylcyclohexane		0	0	10.4854	10.4854	2.06786	8.41749	2.26313E-05	1.76857E-06	8.39766	0.0198252	2.10876	8.37659	2.08628E-05	0.0125813	0.0126022	0.0210691	8.36401
Toluene		0	0	2.52117	2.52117	0.417547	2.10333	0.000295057	0.000248234	2.09931	0.00401912	0.425817	2.09506	4.68227E-05	0.00254504	0.00259187	0.00425171	2.09252
n-Octane		0	0	35.2687	35.2687	2.86817	32.4005	2.85753E-06	2.59015E-08	32.3759	0.0245860	2.91780	32.3509	2.83162E-06	0.0153772	0.0153800	0.0250402	32.3355
Ethylbenzene		0	0	2.02495	2.02495	0.136433	1.88844	8.02125E-05	6.65909E-05	1.88723	0.00120813	0.138878	1.88599	1.36216E-05	0.000758507	0.000772128	0.00123677	1.88524
p-Xylene		0	0	2.70302	2.70302	0.163255	2.53968	8.90966E-05	7.32745E-05	2.53824	0.00143093	0.166144	2.53679	1.58221E-05	0.000898071	0.000913893	0.00145841	2.53589
o-Xylene		0	0	3.10369	3.10369	0.160639	2.94293	0.000128847	0.000112292	2.94152	0.00140334	0.163467	2.94010	1.65546E-05	0.000880023	0.000896578	0.00142530	2.93922
n-Nonane		0	0	19.3526	19.3526	0.582073	18.7706	8.37888E-07	1.21486E-08	18.7660	0.00460287	0.591226	18.7614	8.25739E-07	0.00286981	0.00287064	0.00454996	18.7585
C10+		0	0	41.1093	41.1093	0.0911200	41.0182	7.43896E-07	6.71553E-08	41.0176	0.000597742	0.0922577	41.0170	6.76741E-07	0.000360881	0.000361558	0.000539988	41.0167
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0	100	0	1.82495	0.113161	0.00969972	99.9379	99.9938	0.00333482	0.140798	0.113216	0.000940840	2.45747	0.0464799	0.0741031	0.0883114	0.000401068
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.578497	0	0.00824763	0.528963	0.584513	0.00468003	0.000171043	3.84035E-06	0.000188814	0.0971858	0.581267	5.44494E-06	0.291632	0.000439428	0.00377567	0.00669769	3.00962E-07
CO2		0.373902	0	0.0109638	0.342271	0.375935	0.0284324	0.00415828	0.00204439	0.00899302	0.428825	0.375853	0.00231352	3.68900	0.120523	0.161408	0.246088	0.000912388
Methane		64.3338	0	1.39933	58.8581	64.9474	1.57571	0.0364520	0.00164313	0.189254	30.1326	64.6763	0.0170207	60.7138	1.22276	1.90436	6.30283	0.00272914
Ethane		20.1117	0	2.69535	18.5543	20.2677	2.87378	0.0118499	0.000623104	1.38448	33.5489	20.3434	0.568138	19.5819	21.4715	21.4498	30.3614	0.320372
Propane		5.86589	0	3.79239	5.61712	5.96521	2.83708	0.00361526	0.000213589	2.25169	14.8944	6.03986	1.65914	5.93327	24.9924	24.7740	23.2848	1.38257
Isobutene		1.52319	0	1.30053	1.48017	1.46715	1.95474	0.00286943	0.000517562	1.85246	4.06134	1.49134	1.69031	4.10256	9.47683	9.41525	7.60808	1.59802
n-Butane		2.69410	0	3.92067	2.72877	2.64523	4.29100	0.00107458	4.86272E-05	4.14337	7.33156	2.68939	3.86719	1.78948	17.6699	17.4879	13.9469	3.70358
Isopentane		0.979534	0	2.66585	1.07692	0.895567	3.40419	0.000228391	7.28138E-06	3.45248	2.40960	0.910221	3.41680	0.385658	6.29085	6.22319	4.71869	3.38274
n-Pentane		0.840011	0	3.72304	1.02174	0.785576	3.96879	0.000195101	6.09485E-06	4.05900	2.11063	0.798413	4.05683	0.329662	5.58540	5.52519	4.13633	4.03871
2-Methylpentane		0	0	2.59765	0.177553	0.0978076	1.13592	1.06802E-05	1.60980E-07	1.17883	0.252041	0.0993089	1.19820	0.0183474	0.682088	0.674484	0.491023	1.20432
3-Methylpentane		0	0	1.86090	0.127195	0.0662655	0.857572	1.99429E-05	8.02388E-07	0.890938	0.170332	0.0672781	0.906701	0.0333849	0.461662	0.456756	0.331418	0.911976
n-Hexane		2.69936	0	6.44730	2.90628	1.35288	21.4533	0.000114976	1.38619E-06	22.3288	3.42018	1.37299	22.7715	0.198120	9.28381	9.17971	6.61478	22.9314
Methylcyclopentane		0	0	0.982544	0.0671581	0.0300288	0.509957	2.94811E-05	3.39212E-06	0.530953	0.0774994	0.0304896	0.541673	0.0455068	0.210758	0.208865	0.150462	0.545595
Benzene		0	0	0.274201	0.0187420	0.00837229	0.142316	0.000417801	0.000361657	0.148167	0.0218217	0.00850234	0.151150	0.0982854	0.0590714	0.0595207	0.0422802	0.152241
2-Methylhexane		0	0	3.32910	0.227548	0.0617743	2.18869	5.53290E-06	7.40181E-08	2.28786	0.146077	0.0625897	2.34459	0.00952125	0.394964	0.390548	0.274382	2.36770
3-Methylhexane		0	0	2.75269	0.188150	0.0491701	1.83174	4.60556E-06	6.42166E-08	1.91502	0.116353	0.0498202	1.96281	0.00792089	0.314517	0.311004	0.218729	1.98235
n-Heptane		0	0	5.91840	0.404530	0.0898241	4.12155	8.60108E-06	1.23695E-07	4.31154	0.208204	0.0909704	4.42205	0.0147861	0.560309	0.554059	0.388964	4.46782
Methylcyclohexane		0	0	3.78246	0.258536	0.0563809	2.64591	3.23878E-05	2.53246E-06	2.76784	0.134587	0.0571369	2.83867	0.0520751	0.363970	0.360396	0.253439	2.86801
Toluene		0	0	0.853462	0.0583352	0.0106833	0.620429	0.000396249	0.000333559	0.649308	0.0256040	0.0108269	0.666248	0.109675	0.0690917	0.0695567	0.0479934	0.673326
n-Octane		0	0	14.8015	1.01170	0.0909788	11.8487	4.75758E-06	4.31489E-08	12.4145	0.194178	0.0919751	12.7544	0.00822277	0.517537	0.511702	0.350421	12.8994

Ethylbenzene		0	0	0.789836	0.0539863	0.00402217	0.641841	0.000124121	0.000103102	0.672573	0.00886810	0.00406869	0.691067	0.0367635	0.0237264	0.0238757	0.0160860	0.698977
p-Xylene		0	0	1.05432	0.0720639	0.00481291	0.863183	0.000137868	0.000113450	0.904581	0.0105036	0.00486751	0.929531	0.0427026	0.0280920	0.0282594	0.0189688	0.940215
o-Xylene		0	0	1.21060	0.0827462	0.00473579	1.00024	0.000199378	0.000173861	1.04830	0.0103010	0.00478909	1.07731	0.0446795	0.0275274	0.0277240	0.0185381	1.08976
n-Nonane		0	0	9.11917	0.623307	0.0207307	7.70717	1.56633E-06	2.27232E-08	8.07938	0.0408170	0.0209252	8.30498	0.00269231	0.108447	0.107236	0.0714923	8.40213
C10+		0	0	24.7095	1.68893	0.00413960	21.4834	1.77385E-06	1.60227E-07	22.5261	0.00676136	0.00416511	23.1604	0.00281458	0.0173955	0.0172285	0.0108229	23.4347
Mass Flow		**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**
Water		0	7267.13	0	7267.13	407.510	3.02981	6856.59	6856.50	0.993436	2.03638	410.267	0.272595	0.0966675	0.157752	0.254420	0.720841	0.114842
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		2104.14	0	2.24486	2106.38	2104.91	1.46186	0.0117350	0.000263330	0.0562474	1.40561	2106.37	0.00157759	0.0114717	0.00149141	0.0129631	0.0546698	8.61777E-05
CO2		1359.97	0	2.98414	1362.96	1353.79	8.88117	0.285293	0.140182	2.67900	6.20216	1362.00	0.670308	0.145111	0.409053	0.554164	2.00869	0.261254
Methane		233998	0	380.873	234379	233884	492.191	2.50092	0.112668	56.3783	435.812	234371	4.93150	2.38825	4.15004	6.53828	51.4468	0.781465
Ethane		73151.4	0	733.626	73885.0	72986.6	897.658	0.813004	0.0427258	412.434	485.223	73719.6	164.610	0.770278	72.8738	73.6441	247.825	91.7358
Propane		21335.7	0	1032.22	22367.9	21481.5	886.195	0.248038	0.0146457	670.774	215.420	21887.0	480.712	0.233392	84.8237	85.0571	190.062	395.888
Isobutene		5540.21	0	353.980	5894.19	5283.41	610.583	0.196868	0.0354888	551.844	58.7397	5404.25	489.743	0.161379	32.1642	32.3256	62.1009	457.578
n-Butane		9799.10	0	1067.13	10866.2	9525.82	1340.34	0.0737256	0.00333433	1234.30	106.038	9745.70	1120.46	0.0703913	59.9713	60.0417	113.842	1060.49
Isopentane		3562.81	0	725.597	4288.41	3225.06	1063.34	0.0156696	0.000499279	1028.49	34.8504	3298.42	989.969	0.0151703	21.3510	21.3662	38.5163	968.618
n-Pentane		3055.33	0	1013.35	4068.67	2828.97	1239.70	0.0133856	0.000417919	1209.17	30.5264	2893.25	1175.41	0.0129677	18.9568	18.9697	33.7628	1156.45
2-Methylpentane		0	0	707.035	707.035	352.218	354.816	0.000732753	1.10383E-05	351.170	3.64531	359.871	347.162	0.000721714	2.31500	2.31572	4.00797	344.847
3-Methylpentane		0	0	506.504	506.504	238.631	267.872	0.00136825	5.50192E-05	265.409	2.46354	243.800	262.703	0.00131323	1.56687	1.56819	2.70520	261.136
n-Hexane		9818.26	0	1754.84	11573.1	4871.91	6701.18	0.00788832	9.50498E-05	6651.71	49.4666	4975.37	6597.72	0.00779327	31.5091	31.5169	53.9931	6566.21
Methylcyclopentane		0	0	267.431	267.431	108.138	159.291	0.00202266	0.000232595	158.170	1.12089	110.487	156.942	0.00179006	0.715309	0.717099	1.22815	156.226
Benzene		0	0	74.6325	74.6325	30.1497	44.4541	0.0286647	0.0247986	44.1385	0.315611	30.8104	43.7934	0.00386617	0.200487	0.204353	0.345112	43.5929
2-Methylhexane		0	0	906.120	906.120	222.457	683.662	0.000379605	5.07536E-06	681.549	2.11273	226.810	679.310	0.000374529	1.34050	1.34088	2.23964	677.969
3-Methylhexane		0	0	749.232	749.232	177.068	572.164	0.000315981	4.40329E-06	570.481	1.68284	180.536	568.696	0.000311577	1.06746	1.06778	1.78537	567.628
n-Heptane		0	0	1610.88	1610.88	323.469	1287.41	0.000590108	8.48166E-06	1284.40	3.01129	329.655	1281.22	0.000581626	1.90168	1.90226	3.17491	1279.32
Methylcyclohexane		0	0	1029.52	1029.52	203.035	826.480	0.00222208	0.000173649	824.533	1.94656	207.050	822.464	0.00204843	1.23531	1.23736	2.06869	821.229
Toluene		0	0	232.297	232.297	38.4721	193.798	0.0271861	0.0228719	193.427	0.370315	39.2342	193.036	0.00431417	0.234496	0.238810	0.391746	192.801
n-Octane		0	0	4028.69	4028.69	327.627	3701.06	0.000326411	2.95868E-06	3698.25	2.80842	333.296	3695.39	0.000323452	1.75651	1.75684	2.86031	3693.64
Ethylbenzene		0	0	214.979	214.979	14.4844	200.486	0.00851576	0.00706962	200.358	0.128261	14.7439	200.227	0.00144613	0.0805269	0.0819730	0.131302	200.146
p-Xylene		0	0	286.966	286.966	17.3319	269.625	0.00945895	0.00777919	269.473	0.151915	17.6387	269.318	0.00167976	0.0953437	0.0970234	0.154832	269.223
o-Xylene		0	0	329.504	329.504	17.0542	312.436	0.0136790	0.0119215	312.287	0.148986	17.3545	312.135	0.00175752	0.0934277	0.0951852	0.151317	312.042
n-Nonane		0	0	2482.07	2482.07	74.6539	2407.42	0.000107463	1.55811E-06	2406.83	0.590342	75.8278	2406.25	0.000105905	0.368068	0.368174	0.583555	2405.88
C10+		0	0	6725.48	6725.48	14.9072	6710.58	0.000121701	1.09866E-05	6710.48	0.0977906	15.0934	6710.39	0.000110715	0.0590402	0.0591509	0.0883420	6710.33

Process Streams		**Separator Gas**	**Separator Water**	**Separator Oil**	**1**	**as from 3-ph Separato**	**Produced Liquid**	**2**	**Produced Water**	**3**	**n Gas from LP Conden**	**To Sales Gas Line**	**Condensate from VRT**	**g from produced wate**	**lashing from Oil Tanks**	**o Enclosed Combusto**	**Flash Gas from VRT**	**Stable Condensate**
Phase: Total	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	**Units**																	
Temperature	°F	67.0	67.0	67.0	59.4	70.0	70.0	70.0	72.5	70.0	70.0	72	65	72.52	72.52	72.4989	65	72.52
Pressure	psig	300	200	300	200	302	302	302	-0.365949	50	50	302	5	-0.365949	-0.365949	-0.365949	5	-0.365949
Mole Fraction Vapor	%	100	0	0	96.1646	100	0	0	0	0	100	100	0	100	100	100	100	0
Mole Fraction Light Liquid	%	0	100	100	1.80831	0	100	100	100	100	0	0	100	0	0	0	0	100
Mole Fraction Heavy Liquid	%	0	0	0	2.02704	0	0	0	0	0	0	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol	20.1	18.0	88.3	21.2	20.0	84.5	18.0	18.0	94.0	27.3	20.0024	97.8828	20.3135	46.5645	45.8852	39.3017	99.1784
Mass Density	lb/ft^3	1.2	62.3	43.2	0.9	1.2	42.4	62.3	62.3	43.4	0.3	1.19926	43.8884	0.0511434	0.119007	0.117211	0.140129	43.7787
Molar Flow	lbmol/h	18081.8	403.4	308.2	18793.4	18042.8	369.8	380.8	380.6	316.8	53.1	18116.6	296.002	0.193646	7.28877	7.48242	20.7688	288.713
Mass Flow	lb/h	363725.0	7267.1	27218.2	398210.3	360113.3	31236.1	6860.9	6856.9	29789.8	1446.3	362376	28973.5	3.93361	339.398	343.332	816.249	28634.1
Vapor Volumetric Flow	MCFH	299.7	0.1	0.6	444.0	299.6	0.7	0.1	0.1	0.7	4.5	302.166	0.660164	0.0769135	2.85192	2.92917	5.82500	0.654065
Liquid Volumetric Flow	Mbbl/d	1281.2	0.5	2.7	1898.1	1280.7	3.2	0.5	0.5	2.9	19.3	1291.63	2.82193	0.328773	12.1908	12.5210	24.8994	2.79586
Std Vapor Volumetric Flow	MMSCFD	164.7	3.7	2.8	171.2	164.3	3.4	3.5	3.5	2.9	0.5	164.999	2.69588	0.00176365	0.0663834	0.0681471	0.189155	2.62949
Std Liquid Volumetric Flow	Mbbl/d	74.3	0.5	2.8	77.5	73.8	3.2	0.5	0.5	3.0	0.3	74.1947	2.84465	0.000777679	0.0461013	0.0468790	0.121380	2.79855
Compressibility		0.923	0.011	0.114	0.911	0.925	0.111	0.016	0.001	0.025	0.970	0.925773	0.00780160	0.996575	0.981744	0.982279	0.981095	0.00568420
Specific Gravity		0.695	0.999	0.693		0.689	0.679	0.998	0.998	0.695	0.941	0.690629	0.703689	0.701368	1.60775	1.58429	1.35698	0.701931
API Gravity			10.0	71.6			75.2	10.1	10.0	70.5			68.8752					68.3221
Enthalpy	MMBtu/h	-613.3	-49.6	-24.4	-687.3	-611.4	-28.7	-46.8	-46.8	-26.5	-1.9	-613.821	-25.6162	-0.00718495	-0.317893	-0.325078	-0.851530	-25.1375
Mass Enthalpy	Btu/lb	-1686.1	-6830.9	-897.0	-1726.1	-1697.7	-917.2	-6824.6	-6825.7	-890.3	-1341.5	-1693.88	-884.124	-1826.55	-936.638	-946.834	-1043.22	-877.886
Mass Cp	Btu/(lb*°F)	0.5	1.0	0.5	0.5	0.5	0.5	1.0	1.0	0.5	0.4	0.527387	0.489307	0.474656	0.401909	0.402705	0.407420	0.493082
Ideal Gas CpCv Ratio		1.258	1.326	1.064	1.249	1.259	1.066	1.326	1.326	1.059	1.199	1.25806	1.05748	1.26052	1.11975	1.12145	1.14314	1.05601
Dynamic Viscosity	cP	0.0	1.0	0.4		0.0	0.3	1.0	1.0	0.4	0.0	0.0110499	0.424759	0.0107641	0.00822210	0.00827033	0.00861738	0.415695
Kinematic Viscosity	cSt	0.6	1.0	0.5		0.6	0.5	1.0	1.0	0.6	1.9	0.575204	0.604188	13.1391	4.31310	4.40486	3.83908	0.592777
Thermal Conductivity	Btu/(h*ft**F)	0.0	0.3	0.1		0.0	0.1	0.3	0.3	0.1	0.0	0.0185605	0.0695114	0.0172177	0.0102144	0.0103574	0.0112409	0.0690146
Surface Tension	lbf/ft		0.005	0.001			0.001	0.005	0.005	0.001			0.00142141					0.00141038
Net I.G. Heating Value	Btu/ft^3	1103.6	0.0	4465.7	1135.0	1094.5	4282.7	0.6	0.0	4755.2	1461.6	1096.65	4943.98	1052.52	2427.69	2392.10	2064.43	5007.50
Net Liquid Heating Value	Btu/lb	20765.6	-1059.8	19010.6	20247.3	20755.1	19070.5	-1047.0	-1058.9	19013.8	20237.0	20750.9	18992.1	19582.9	19624.9	19624.4	19783.4	18984.6
Gross I.G. Heating Value	Btu/ft^3	1217.6	50.3	4805.3	1251.4	1207.8	4612.2	50.9	50.4	5116.6	1600.6	1210.16	5318.05	1162.32	2633.60	2595.52	2245.28	5385.82
Gross Liquid Heating Value	Btu/lb	22916.2	0.0	20468.1	22330.7	22910.3	20549.7	13.3	0.9	20470.9	22172.5	22904.3	20441.0	21634.0	21302.8	21306.6	21529.4	20430.8

Process Streams		**Separator Gas**	**Separator Water**	**Separator Oil**	**1**	**as from 3-ph Separato**	**Produced Liquid**	**2**	**Produced Water**	**3**	**n Gas from LP Conden**	**To Sales Gas Line**	**Condensate from VRT**	**g from produced wate**	**lashing from Oil Tanks**	**o Enclosed Combusto**	**Flash Gas from VRT**	**Stable Condensate**
Phase: Vapor	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0			0.124352	0.125370	0.125370	0.125370	2.77097	0.213043	0.213043	0.125704	0.192658	2.77097	0.120138	0.188742	0.192658	0.120138
H2S		0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.4154			0.415876	0.416451	0.416451	0.416451	0.211472	0.0945692	0.0945692	0.415042	0.00939659	0.211472	0.000730428	0.00618445	0.00939659	0.000730428
CO2		0.1709			0.170547	0.170491	0.170491	0.170491	1.70273	0.265611	0.265611	0.170826	0.219763	1.70273	0.127520	0.168287	0.219763	0.127520
Methane		80.6676			80.7289	80.8028	80.8028	80.8028	76.8777	51.2010	51.2010	80.6412	15.4410	76.8777	3.54917	5.44692	15.4410	3.54917
Ethane		13.4543			13.4760	13.4530	13.4530	13.4530	13.2288	30.4139	30.4139	13.5328	39.6838	13.2288	33.2505	32.7323	39.6838	33.2505
Propane		2.6759			2.71896	2.70001	2.70001	2.70001	2.73327	9.20747	9.20747	2.73977	20.7534	2.73327	26.3917	25.7794	20.7534	26.3917
Isobutene		0.5461			0.530037	0.521914	0.521914	0.521914	1.48534	1.97319	1.97319	0.531675	5.32935	1.48534	7.86514	7.70003	5.32935	7.86514
n-Butane		0.9324			0.924231	0.908358	0.908358	0.908358	0.625416	3.43849	3.43849	0.925538	9.43077	0.625416	14.1562	13.8060	9.43077	14.1562
Isopentane		0.2731			0.253624	0.247745	0.247745	0.247745	0.108582	0.910391	0.910391	0.252348	2.57042	0.108582	4.06009	3.95783	2.57042	4.06009

n-Pentane		0.2342			0.222709	0.217318	0.217318	0.217318	0.0928163	0.797438	0.797438	0.221351	2.25319	0.0928163	3.60480	3.51391	2.25319	3.60480
2-Methylpentane		0			0.0230542	0.0226530	0.0226530	0.0226530	0.00432488	0.0797262	0.0797262	0.0230509	0.223939	0.00432488	0.368564	0.359137	0.223939	0.368564
3-Methylpentane		0			0.0155949	0.0153476	0.0153476	0.0153476	0.00786956	0.0538797	0.0538797	0.0156161	0.151149	0.00786956	0.249458	0.243205	0.151149	0.249458
n-Hexane		0.6301			0.315876	0.313338	0.313338	0.313338	0.0467013	1.08188	1.08188	0.318688	3.01678	0.0467013	5.01647	4.88786	3.01678	5.01647
Methylcyclopentane		0			0.00721791	0.00712149	0.00712149	0.00712149	0.0109839	0.0251020	0.0251020	0.00724654	0.0702644	0.0109839	0.116610	0.113876	0.0702644	0.116610
Benzene		0			0.00217112	0.00213926	0.00213926	0.00213926	0.0255597	0.00761527	0.00761527	0.00217723	0.0212731	0.0255597	0.0352140	0.0349642	0.0212731	0.0352140
2-Methylhexane		0			0.0118365	0.0123046	0.0123046	0.0123046	0.00193020	0.0397391	0.0397391	0.0124942	0.107619	0.00193020	0.183543	0.178842	0.107619	0.183543
3-Methylhexane		0			0.00942764	0.00979401	0.00979401	0.00979401	0.00160576	0.0316530	0.0316530	0.00994515	0.0857908	0.00160576	0.146158	0.142417	0.0857908	0.146158
n-Heptane		0			0.0170210	0.0178917	0.0178917	0.0178917	0.00299751	0.0566404	0.0566404	0.0181596	0.152561	0.00299751	0.260380	0.253719	0.152561	0.260380
Methylcyclohexane		0			0.0110444	0.0114609	0.0114609	0.0114609	0.0107737	0.0373652	0.0373652	0.0116399	0.101446	0.0107737	0.172612	0.168424	0.101446	0.172612
Toluene		0			0.00221609	0.00231420	0.00231420	0.00231420	0.0241796	0.00757496	0.00757496	0.00235043	0.0204716	0.0241796	0.0349173	0.0346394	0.0204716	0.0349173
n-Octane		0			0.0140588	0.0158965	0.0158965	0.0158965	0.00146227	0.0463380	0.0463380	0.0161056	0.120567	0.00146227	0.210971	0.205549	0.120567	0.210971
Ethylbenzene		0			0.000674307	0.000756162	0.000756162	0.000756162	0.00703427	0.00227699	0.00227699	0.000766576	0.00595494	0.00703427	0.0104065	0.0103192	0.00595494	0.0104065
p-Xylene		0			0.000799089	0.000904819	0.000904819	0.000904819	0.00817066	0.00269693	0.00269693	0.000917080	0.00702213	0.00817066	0.0123213	0.0122139	0.00702213	0.0123213
o-Xylene		0			0.000780296	0.000890322	0.000890322	0.000890322	0.00854891	0.00264492	0.00264492	0.000902307	0.00686270	0.00854891	0.0120737	0.0119825	0.00686270	0.0120737
n-Nonane		0			0.00265456	0.00322607	0.00322607	0.00322607	0.000426417	0.00867519	0.00867519	0.00326345	0.0219076	0.000426417	0.0393730	0.0383651	0.0219076	0.0393730
C10+		0			0.000347533	0.000505022	0.000505022	0.000505022	0.000349473	0.00112658	0.00112658	0.000509244	0.00259999	0.000349473	0.00495120	0.00483210	0.00259999	0.00495120
Molar Flow		**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**
Water		0			22.4737	22.6202	0	0	0	0	0.113036	22.7733	0	0.00536586	0.00875657	0.0141224	0.0400128	0
H2S		0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		75.1119			75.1596	75.1394	0	0	0	0	0.0501764	75.1915	0	0.000409507	5.32393E-05	0.000462746	0.00195156	0
CO2		30.9018			30.8223	30.7613	0	0	0	0	0.140928	30.9479	0	0.00329726	0.00929466	0.0125919	0.0456423	0
Methane		14586.2			14589.8	14579.1	0	0	0	0	27.1662	14609.4	0	0.148870	0.258691	0.407561	3.20692	0
Ethane		2432.78			2435.47	2427.30	0	0	0	0	16.1370	2451.68	0	0.0256170	2.42355	2.44917	8.24186	0
Propane		483.851			491.387	487.157	0	0	0	0	4.88530	496.353	0	0.00529286	1.92363	1.92892	4.31023	0
Isobutene		98.7448			95.7915	94.1678	0	0	0	0	1.04694	96.3216	0	0.00287630	0.573272	0.576148	1.10684	0
n-Butane		168.595			167.033	163.893	0	0	0	0	1.82439	167.676	0	0.00121109	1.03181	1.03303	1.95866	0
Isopentane		49.3814			45.8365	44.7001	0	0	0	0	0.483035	45.7170	0	0.000210264	0.295931	0.296141	0.533845	0
n-Pentane		42.3476			40.2493	39.2102	0	0	0	0	0.423104	40.1012	0	0.000179735	0.262745	0.262925	0.467961	0
2-Methylpentane		0			4.16650	4.08723	0	0	0	0	0.0423011	4.17604	0	8.37495E-06	0.0268638	0.0268722	0.0465095	0
3-Methylpentane		0			2.81841	2.76913	0	0	0	0	0.0285875	2.82911	0	1.52391E-05	0.0181824	0.0181976	0.0313918	0
n-Hexane		113.934			57.0871	56.5349	0	0	0	0	0.574023	57.7354	0	9.04351E-05	0.365639	0.365730	0.626549	0
Methylcyclopentane		0			1.30447	1.28492	0	0	0	0	0.0133186	1.31283	0	2.12699E-05	0.00849944	0.00852071	0.0145931	0
Benzene		0			0.392379	0.385981	0	0	0	0	0.00404050	0.394440	0	4.94953E-05	0.00256667	0.00261617	0.00441818	0
2-Methylhexane		0			2.13916	2.22009	0	0	0	0	0.0210847	2.26353	0	3.73774E-06	0.0133780	0.0133817	0.0223513	0
3-Methylhexane		0			1.70382	1.76711	0	0	0	0	0.0167944	1.80172	0	3.10949E-06	0.0106531	0.0106562	0.0178177	0
n-Heptane		0			3.07614	3.22817	0	0	0	0	0.0300522	3.28990	0	5.80454E-06	0.0189785	0.0189843	0.0316851	0
Methylcyclohexane		0			1.99602	2.06786	0	0	0	0	0.0198252	2.10876	0	2.08628E-05	0.0125813	0.0126022	0.0210691	0
Toluene		0			0.400506	0.417547	0	0	0	0	0.00401912	0.425817	0	4.68227E-05	0.00254504	0.00259187	0.00425171	0
n-Octane		0			2.54079	2.86817	0	0	0	0	0.0245860	2.91780	0	2.83162E-06	0.0153772	0.0153800	0.0250402	0
Ethylbenzene		0			0.121865	0.136433	0	0	0	0	0.00120813	0.138878	0	1.36216E-05	0.000758507	0.000772128	0.00123677	0
p-Xylene		0			0.144416	0.163255	0	0	0	0	0.00143093	0.166144	0	1.58221E-05	0.000898071	0.000913893	0.00145841	0
o-Xylene		0			0.141020	0.160639	0	0	0	0	0.00140334	0.163467	0	1.65546E-05	0.000880023	0.000896578	0.00142530	0
n-Nonane		0			0.479749	0.582073	0	0	0	0	0.00460287	0.591226	0	8.25739E-07	0.00286981	0.00287064	0.00454996	0
C10+		0			0.0628084	0.0911200	0	0	0	0	0.000597742	0.0922577	0	6.76741E-07	0.000360881	0.000361558	0.000539988	0
Mass Fraction		**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Water		0			0.112118	0.113161	0.113161	0.113161	2.45747	0.140798	0.140798	0.113216	0.0883114	2.45747	0.0464799	0.0741031	0.0883114	0.0464799
H2S		0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.578497			0.583055	0.584513	0.584513	0.584513	0.291632	0.0971858	0.0971858	0.581267	0.00669769	0.291632	0.000439428	0.00377567	0.00669769	0.000439428
CO2		0.373902			0.375639	0.375935	0.375935	0.375935	3.68900	0.428825	0.428825	0.375853	0.246088	3.68900	0.120523	0.161408	0.246088	0.120523
Methane		64.3338			64.8157	64.9474	64.9474	64.9474	60.7138	30.1326	30.1326	64.6763	6.30283	60.7138	1.22276	1.90436	6.30283	1.22276
Ethane		20.1117			20.2797	20.2677	20.2677	20.2677	19.5819	33.5489	33.5489	20.3434	30.3614	19.5819	21.4715	21.4498	30.3614	21.4715
Propane		5.86589			6.00038	5.96521	5.96521	5.96521	5.93327	14.8944	14.8944	6.03986	23.2848	5.93327	24.9924	24.7740	23.2848	24.9924
Isobutene		1.52319			1.48833	1.46715	1.46715	1.46715	4.10256	4.06134	4.06134	1.49134	7.60808	4.10256	9.47683	9.41525	7.60808	9.47683
n-Butane		2.69410			2.68846	2.64523	2.64523	2.64523	1.78948	7.33156	7.33156	2.68939	13.9469	1.78948	17.6699	17.4879	13.9469	17.6699
Isopentane		0.979534			0.915799	0.895567	0.895567	0.895567	0.385658	2.40960	2.40960	0.910221	4.71869	0.385658	6.29085	6.22319	4.71869	6.29085
n-Pentane		0.840011			0.804168	0.785576	0.785576	0.785576	0.329662	2.11063	2.11063	0.798413	4.13633	0.329662	5.58540	5.52519	4.13633	5.58540
2-Methylpentane		0			0.0994293	0.0978076	0.0978076	0.0978076	0.0183474	0.252041	0.252041	0.0993089	0.491023	0.0183474	0.682088	0.674484	0.491023	0.682088
3-Methylpentane		0			0.0672583	0.0662655	0.0662655	0.0662655	0.0333849	0.170332	0.170332	0.0672781	0.331418	0.0333849	0.461662	0.456756	0.331418	0.461662
n-Hexane		2.69936			1.36233	1.35288	1.35288	1.35288	0.198120	3.42018	3.42018	1.37299	6.61478	0.198120	9.28381	9.17971	6.61478	9.28381
Methylcyclopentane		0			0.0304015	0.0300288	0.0300288	0.0300288	0.0455068	0.0774994	0.0774994	0.0304896	0.150462	0.0455068	0.210758	0.208865	0.150462	0.210758
Benzene		0			0.00848753	0.00837229	0.00837229	0.00837229	0.0982854	0.0218217	0.0218217	0.00850234	0.0422802	0.0982854	0.0590714	0.0595207	0.0422802	0.0590714
2-Methylhexane		0			0.0593579	0.0617743	0.0617743	0.0617743	0.00952125	0.146077	0.146077	0.0625897	0.274382	0.00952125	0.394964	0.390548	0.274382	0.394964
3-Methylhexane		0			0.0472781	0.0491701	0.0491701	0.0491701	0.00792089	0.116353	0.116353	0.0498202	0.218729	0.00792089	0.314517	0.311004	0.218729	0.314517
n-Heptane		0			0.0853575	0.0898241	0.0898241	0.0898241	0.0147861	0.208204	0.208204	0.0909704	0.388964	0.0147861	0.560309	0.554059	0.388964	0.560309

Methylcyclohexane		0			0.0542718	0.0563809	0.0563809	0.0563809	0.0520751	0.134587	0.134587	0.0571369	0.253439	0.0520751	0.363970	0.360396	0.253439	0.363970
Toluene		0			0.0102190	0.0106833	0.0106833	0.0106833	0.109675	0.0256040	0.0256040	0.0108269	0.0479934	0.109675	0.0690917	0.0695567	0.0479934	0.0690917
n-Octane		0			0.0803716	0.0909788	0.0909788	0.0909788	0.00822277	0.194178	0.194178	0.0919751	0.350421	0.00822277	0.517537	0.511702	0.350421	0.517537
Ethylbenzene		0			0.00358277	0.00402217	0.00402217	0.00402217	0.0367635	0.00886810	0.00886810	0.00406869	0.0160860	0.0367635	0.0237264	0.0238757	0.0160860	0.0237264
p-Xylene		0			0.00424577	0.00481291	0.00481291	0.00481291	0.0427026	0.0105036	0.0105036	0.00486751	0.0189688	0.0427026	0.0280920	0.0282594	0.0189688	0.0280920
o-Xylene		0			0.00414593	0.00473579	0.00473579	0.00473579	0.0446795	0.0103010	0.0103010	0.00478909	0.0185381	0.0446795	0.0275274	0.0277240	0.0185381	0.0275274
n-Nonane		0			0.0170392	0.0207307	0.0207307	0.0207307	0.00269231	0.0408170	0.0408170	0.0209252	0.0714923	0.00269231	0.108447	0.107236	0.0714923	0.108447
C10+		0			0.00284551	0.00413960	0.00413960	0.00413960	0.00281458	0.00676136	0.00676136	0.00416511	0.0108229	0.00281458	0.0173955	0.0172285	0.0108229	0.0173955
Mass Flow		**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**
Water		0			404.870	407.510	0	0	0	0	2.03638	410.267	0	0.0966675	0.157752	0.254420	0.720841	0
H2S		0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		2104.14			2105.48	2104.91	0	0	0	0	1.40561	2106.37	0	0.0114717	0.00149141	0.0129631	0.0546698	0
CO2		1359.97			1356.47	1353.79	0	0	0	0	6.20216	1362.00	0	0.145111	0.409053	0.554164	2.00869	0
Methane		233998			234057	233884	0	0	0	0	435.812	234371	0	2.38825	4.15004	6.53828	51.4468	0
Ethane		73151.4			73232.3	72986.6	0	0	0	0	485.223	73719.6	0	0.770278	72.8738	73.6441	247.825	0
Propane		21335.7			21668.0	21481.5	0	0	0	0	215.420	21887.0	0	0.233392	84.8237	85.0571	190.062	0
Isobutene		5540.21			5374.51	5283.41	0	0	0	0	58.7397	5404.25	0	0.161379	32.1642	32.3256	62.1009	0
n-Butane		9799.10			9708.31	9525.82	0	0	0	0	106.038	9745.70	0	0.0703913	59.9713	60.0417	113.842	0
Isopentane		3562.81			3307.05	3225.06	0	0	0	0	34.8504	3298.42	0	0.0151703	21.3510	21.3662	38.5163	0
n-Pentane		3055.33			2903.94	2828.97	0	0	0	0	30.5264	2893.25	0	0.0129677	18.9568	18.9697	33.7628	0
2-Methylpentane		0			359.050	352.218	0	0	0	0	3.64531	359.871	0	0.000721714	2.31500	2.31572	4.00797	0
3-Methylpentane		0			242.877	238.631	0	0	0	0	2.46354	243.800	0	0.00131323	1.56687	1.56819	2.70520	0
n-Hexane		9818.26			4919.51	4871.91	0	0	0	0	49.4666	4975.37	0	0.00779327	31.5091	31.5169	53.9931	0
Methylcyclopentane		0			109.783	108.138	0	0	0	0	1.12089	110.487	0	0.00179006	0.715309	0.717099	1.22815	0
Benzene		0			30.6494	30.1497	0	0	0	0	0.315611	30.8104	0	0.00386617	0.200487	0.204353	0.345112	0
2-Methylhexane		0			214.348	222.457	0	0	0	0	2.11273	226.810	0	0.000374529	1.34050	1.34088	2.23964	0
3-Methylhexane		0			170.726	177.068	0	0	0	0	1.68284	180.536	0	0.000311577	1.06746	1.06778	1.78537	0
n-Heptane		0			308.235	323.469	0	0	0	0	3.01129	329.655	0	0.000581626	1.90168	1.90226	3.17491	0
Methylcyclohexane		0			195.981	203.035	0	0	0	0	1.94656	207.050	0	0.00204843	1.23531	1.23736	2.06869	0
Toluene		0			36.9020	38.4721	0	0	0	0	0.370315	39.2342	0	0.00431417	0.234496	0.238810	0.391746	0
n-Octane		0			290.231	327.627	0	0	0	0	2.80842	333.296	0	0.000323452	1.75651	1.75684	2.86031	0
Ethylbenzene		0			12.9378	14.4844	0	0	0	0	0.128261	14.7439	0	0.00144613	0.0805269	0.0819730	0.131302	0
p-Xylene		0			15.3320	17.3319	0	0	0	0	0.151915	17.6387	0	0.00167976	0.0953437	0.0970234	0.154832	0
o-Xylene		0			14.9714	17.0542	0	0	0	0	0.148986	17.3545	0	0.00175752	0.0934277	0.0951852	0.151317	0
n-Nonane		0			61.5303	74.6539	0	0	0	0	0.590342	75.8278	0	0.000105905	0.368068	0.368174	0.583555	0
C10+		0			10.2755	14.9072	0	0	0	0	0.0977906	15.0934	0	0.000110715	0.0590402	0.0591509	0.0883420	0

Process Streams		**Separator Gas**	**Separator Water**	**Separator Oil**	**1**	**as from 3-ph Separato**	**Produced Liquid**	**2**	**Produced Water**	**3**	**h Gas from LP Conden**	**To Sales Gas Line**	**Condensate from VRT**	**g from produced wate**	**lashing from Oil Tanks**	**o Enclosed Combusto**	**Flash Gas from VRT**	**Stable Condensate**
Phase: Vapor	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	**Units**																	
Temperature	°F	67.0			59.4	70.0	70.0	70.0	72.5	70.0	70.0	72	65	72.52	72.52	72.4989	65	72.52
Pressure	psig	300			200	302	302	302	-0.365949	50	50	302	5	-0.365949	-0.365949	-0.365949	5	-0.365949
Mole Fraction Vapor	%	100			100	100	100	100	100	100	100	100	100	100	100	100	100	100
Mole Fraction Light Liquid	%	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mole Fraction Heavy Liquid	%	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol	20.1			20.0	20.0	20.0	20.0	20.3	27.3	27.3	20.0024	39.3017	20.3135	46.5645	45.8852	39.3017	46.5645
Mass Density	lb/ft^3	1.2			0.8	1.2	1.2	1.2	0.1	0.3	0.3	1.19926	0.140129	0.0511434	0.119007	0.117211	0.140129	0.119007
Molar Flow	lbmol/h	18081.8			18072.6	18042.8	0.0	0.0	0.0	0.0	53.1	18116.6	0	0.193646	7.28877	7.48242	20.7688	0
Mass Flow	lb/h	363725.0			361110.9	360113.3	0.0	0.0	0.0	0.0	1446.3	362376	0	3.93361	339.398	343.332	816.249	0
Vapor Volumetric Flow	MCFH	299.7			443.2	299.6	0.0	0.0	0.0	0.0	4.5	302.166	0	0.0769135	2.85192	2.92917	5.82500	0
Liquid Volumetric Flow	Mbbl/d	1281.2			1894.6	1280.7	0.0	0.0	0.0	0.0	19.3	1291.63	0	0.328773	12.1908	12.5210	24.8994	0
Std Vapor Volumetric Flow	MMSCFD	164.7			164.6	164.3	0.0	0.0	0.0	0.0	0.5	164.999	0	0.00176365	0.0663834	0.0681471	0.189155	0
Std Liquid Volumetric Flow	Mbbl/d	74.3			74.0	73.8	0.0	0.0	0.0	0.0	0.3	74.1947	0	0.000777679	0.0461013	0.0468790	0.121380	0
Compressibility		0.923			0.945	0.925	0.925	0.925	0.997	0.970	0.970	0.925773	0.981095	0.996575	0.981744	0.982279	0.981095	0.981744
Specific Gravity		0.695			0.690	0.689	0.689	0.689	0.701	0.941	0.941	0.690629	1.35698	0.701368	1.60775	1.58429	1.35698	1.60775
API Gravity																		
Enthalpy	MMBtu/h	-613.3			-612.9	-611.4	0.0	0.0	0.0	0.0	-1.9	-613.821	0	-0.00718495	-0.317893	-0.325078	-0.851530	0
Mass Enthalpy	Btu/lb	-1686.1			-1697.3	-1697.7	-1697.7	-1697.7	-1826.6	-1341.5	-1341.5	-1693.88	-1043.22	-1826.55	-936.638	-946.834	-1043.22	-936.638
Mass Cp	Btu/(lb*°F)	0.5			0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.527387	0.407420	0.474656	0.401909	0.402705	0.407420	0.401909
Ideal Gas CpCv Ratio		1.258			1.262	1.259	1.259	1.259	1.261	1.199	1.199	1.25806	1.14314	1.26052	1.11975	1.12145	1.14314	1.11975
Dynamic Viscosity	cP	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0110499	0.00861738	0.0107641	0.00822210	0.00827033	0.00861738	0.00822210
Kinematic Viscosity	cSt	0.6			0.8	0.6	0.6	0.6	13.1	1.9	1.9	0.575204	3.83908	13.1391	4.31310	4.40486	3.83908	4.31310
Thermal Conductivity	Btu/(h*ft*°F)	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0185605	0.0112409	0.0172177	0.0102144	0.0103574	0.0112409	0.0102144
Surface Tension	lbf/ft																	
Net I.G. Heating Value	Btu/ft^3	1103.6			1095.6	1094.5	1094.5	1094.5	1052.5	1461.6	1461.6	1096.65	2064.43	1052.52	2427.69	2392.10	2064.43	2427.69

Net Liquid Heating Value	Btu/lb	20765.6			20753.2	20755.1	20755.1	20755.1	19582.9	20237.0	20237.0	20750.9	19783.4	19582.9	19624.9	19624.4	19783.4	19624.9
Gross I.G. Heating Value	Btu/ft^3	1217.6			1209.0	1207.8	1207.8	1207.8	1162.3	1600.6	1600.6	1210.16	2245.28	1162.32	2633.60	2595.52	2245.28	2633.60
Gross Liquid Heating Value	Btu/lb	22916.2			22907.5	22910.3	22910.3	22910.3	21634.0	22172.5	22172.5	22904.3	21529.4	21634.0	21302.8	21306.6	21529.4	21302.8

Process Streams		Separator Gas	Separator Water	Separator Oil	1	as from 3-ph Separato	Produced Liquid	2	Produced Water	3	n Gas from LP Conden	To Sales Gas Line	Condensate from VRT	g from produced wate	lashing from Oil Tank	o Enclosed Combusto	Flash Gas from VRT	Stable Condensate
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water			100	0	0.0346227	0.0454751	0.0454751	99.9470	99.9965	0.0174082	0.0174082		0.00511189	99.9965	0.00220798		0.00511189	0.00220798
H2S			0	0	0	0	0	0	0	0	0		0	0	0		0	0
Nitrogen			0	0.026	0.00943968	0.0141104	0.0141104	0.000110007	2.46978E-06	0.000633857	0.000633857		1.90254E-05	2.46978E-06	1.06552E-06		1.90254E-05	1.06552E-06
CO2			0	0.022	0.0418306	0.0545661	0.0545661	0.00170234	0.000836893	0.0192168	0.0192168		0.00514556	0.000836893	0.00205613		0.00514556	0.00205613
Methane			0	7.703	5.87684	8.29586	8.29586	0.0409384	0.00184524	1.10942	1.10942		0.103852	0.00184524	0.0168722		0.103852	0.0168722
Ethane			0	7.916	6.38091	8.07217	8.07217	0.00710028	0.000373331	4.33002	4.33002		1.84944	0.000373331	1.05670		1.84944	1.05670
Propane			0	7.595	4.66912	5.43416	5.43416	0.00147715	8.72643E-05	4.80215	4.80215		3.68294	8.72643E-05	3.10964		3.68294	3.10964
Isobutene			0	2.047	2.72450	2.94261	2.94261	0.000921436	0.000166189	3.10498	3.10498		2.94891	0.000166189	2.82479		2.94891	2.82479
n-Butane			0	5.957	5.86187	6.23551	6.23551	0.000333103	1.50726E-05	6.70400	6.70400		6.51268	1.50726E-05	6.31971		6.51268	6.31971
Isopentane			0	3.263	4.00233	3.98511	3.98511	5.70336E-05	1.81818E-06	4.50012	4.50012		4.63551	1.81818E-06	4.65004		4.63551	4.65004
n-Pentane			0	4.557	4.75023	4.64606	4.64606	4.87203E-05	1.52190E-06	5.29069	5.29069		5.50382	1.52190E-06	5.55176		5.50382	5.55176
2-Methylpentane			0	2.662	1.18822	1.11332	1.11332	2.23294E-06	3.36544E-08	1.28644	1.28644		1.36099	3.36544E-08	1.38604		1.36099	1.38604
3-Methylpentane			0	1.907	0.900174	0.840511	0.840511	4.16951E-06	1.67747E-07	0.972269	0.972269		1.02988	1.67747E-07	1.04958		1.02988	1.04958
n-Hexane			0	6.607	22.7193	21.0265	21.0265	2.40383E-05	2.89795E-07	24.3672	24.3672		25.8652	2.89795E-07	26.3915		25.8652	26.3915
Methylcyclopentane			0	1.031	0.551188	0.511784	0.511784	6.31134E-06	7.26141E-07	0.593301	0.593301		0.630000	7.26141E-07	0.642961		0.630000	0.642961
Benzene			0	0.31	0.165577	0.153884	0.153884	9.63681E-05	8.34128E-05	0.178384	0.178384		0.189407	8.34128E-05	0.193300		0.189407	0.193300
2-Methylhexane			0	2.934	2.03146	1.84486	1.84486	9.94850E-07	1.33080E-08	2.14722	2.14722		2.29032	1.33080E-08	2.34351		2.29032	2.34351
3-Methylhexane			0	2.426	1.69884	1.54399	1.54399	8.28107E-07	1.15458E-08	1.79730	1.79730		1.91738	1.15458E-08	1.96210		1.91738	1.96210
n-Heptane			0	5.216	3.82535	3.47408	3.47408	1.54653E-06	2.22397E-08	4.04649	4.04649		4.31971	2.22397E-08	4.42219		4.31971	4.42219
Methylcyclohexane			0	3.402	2.49801	2.27605	2.27605	5.94309E-06	4.64671E-07	2.65102	2.65102		2.82991	4.64671E-07	2.89699		2.82991	2.89699
Toluene			0	0.818	0.623927	0.568731	0.568731	7.74833E-05	6.52206E-05	0.662723	0.662723		0.707786	6.52206E-05	0.724773		0.707786	0.724773
n-Octane			0	11.443	9.63029	8.76095	8.76095	7.50399E-07	6.80530E-09	10.2206	10.2206		10.9293	6.80530E-09	11.1999		10.9293	11.1999
Ethylbenzene			0	0.657	0.559966	0.510625	0.510625	2.10642E-05	1.74960E-05	0.595772	0.595772		0.637156	1.74960E-05	0.652978		0.637156	0.652978
p-Xylene			0	0.877	0.752851	0.686716	0.686716	2.33972E-05	1.92520E-05	0.801287	0.801287		0.857016	1.92520E-05	0.878341		0.857016	0.878341
o-Xylene			0	1.007	0.871739	0.795753	0.795753	3.38358E-05	2.95035E-05	0.928596	0.928596		0.993269	2.95035E-05	1.01804		0.993269	1.01804
n-Nonane			0	6.279	5.55341	5.07547	5.07547	2.20033E-07	3.19189E-09	5.92414	5.92414		6.33826	3.19189E-09	6.49728		6.33826	6.49728
C10+			0	13.338	12.0781	11.0911	11.0911	1.95350E-07	1.76443E-08	12.9487	12.9487		13.8570	1.76443E-08	14.2067		13.8570	14.2067
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water			403.387	0	0.117663	0	0.168180	380.599	380.593	0.0551441	0		0.0151313	0	0		0	0.00637473
H2S			0	0	0	0	0	0	0	0	0		0	0	0		0	0
Nitrogen			0	0.0801351	0.0320801	0	0.0521843	0.000418907	9.40014E-06	0.00200788	0		5.63156E-05	0	0		0	3.07630E-06
CO2			0	0.0678066	0.142158	0	0.201801	0.00648254	0.00318527	0.0608732	0		0.0152310	0	0		0	0.00593632
Methane			0	23.7416	19.9720	0	30.6805	0.155894	0.00702312	3.51432	0		0.307403	0	0		0	0.0487123
Ethane			0	24.3981	21.6851	0	29.8532	0.0270379	0.00142092	13.7162	0		5.47439	0	0		0	3.05084
Propane			0	23.4087	15.8677	0	20.0971	0.00562500	0.000332134	15.2118	0		10.9016	0	0		0	8.97795
Isobutene			0	6.30910	9.25904	0	10.8826	0.00350883	0.000632528	9.83567	0		8.72883	0	0		0	8.15556
n-Butane			0	18.3602	19.9212	0	23.0607	0.00126846	5.73676E-05	21.2363	0		19.2777	0	0		0	18.2459
Isopentane			0	10.0570	13.6016	0	14.7381	0.000217184	6.92013E-06	14.2551	0		13.7212	0	0		0	13.4253
n-Pentane			0	14.0452	16.1433	0	17.1825	0.000185527	5.79246E-06	16.7594	0		16.2914	0	0		0	16.0287
2-Methylpentane			0	8.20460	4.03809	0	4.11737	8.50304E-06	1.28091E-07	4.07507	0		4.02856	0	0		0	4.00169
3-Methylpentane			0	5.87760	3.05918	0	3.10845	1.58775E-05	6.38456E-07	3.07987	0		3.04847	0	0		0	3.03029
n-Hexane			0	20.3636	77.2098	0	77.7621	9.15381E-05	1.10298E-06	77.1881	0		76.5616	0	0		0	76.1959
Methylcyclopentane			0	3.17767	1.87317	0	1.89273	2.40336E-05	2.76374E-06	1.87941	0		1.86481	0	0		0	1.85631
Benzene			0	0.955457	0.562704	0	0.569109	0.000366970	0.000317475	0.565068	0		0.560650	0	0		0	0.558083
2-Methylhexane			0	9.04294	6.90378	0	6.82284	3.78840E-06	5.06514E-08	6.80176	0		6.77941	0	0		0	6.76603
3-Methylhexane			0	7.47722	5.77340	0	5.71011	3.15344E-06	4.39441E-08	5.69331	0		5.67549	0	0		0	5.66484
n-Heptane			0	16.0763	13.0002	0	12.8482	5.88919E-06	8.46457E-08	12.8181	0		12.7864	0	0		0	12.7674
Methylcyclohexane			0	10.4854	8.48933	0	8.41749	2.26313E-05	1.76857E-06	8.39766	0		8.37659	0	0		0	8.36401
Toluene			0	2.52117	2.12037	0	2.10333	0.000295057	0.000248234	2.09931	0		2.09506	0	0		0	2.09252
n-Octane			0	35.2687	32.7279	0	32.4005	2.85753E-06	2.59015E-08	32.3759	0		32.3509	0	0		0	32.3355
Ethylbenzene			0	2.02495	1.90301	0	1.88844	8.02125E-05	6.65909E-05	1.88723	0		1.88599	0	0		0	1.88524
p-Xylene			0	2.70302	2.55851	0	2.53968	8.90966E-05	7.32745E-05	2.53824	0		2.53679	0	0		0	2.53589
o-Xylene			0	3.10369	2.96255	0	2.94293	0.000128847	0.000112292	2.94152	0		2.94010	0	0		0	2.93922
n-Nonane			0	19.3526	18.8729	0	18.7706	8.37888E-07	1.21486E-08	18.7660	0		18.7614	0	0		0	18.7585
C10+			0	41.1093	41.0465	0	41.0182	7.43896E-07	6.71553E-08	41.0176	0		41.0170	0	0		0	41.0167

Process Streams		Separator Gas	Separator Water	Separator Oil	1	as from 3-ph Separato	Produced Liquid	2	Produced Water	3	n Gas from LP Conden	To Sales Gas Line	Condensate from VRT	g from produced wate	lashing from Oil Tank	o Enclosed Combusto	Flash Gas from VRT	Stable Condensate
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved

Property	Units																	
Temperature	°F		67.0	67.0	59.4	70.0	70.0	70.0	72.5	70.0	70.0		65	72.52	72.52		65	72.52
Pressure	psig		200	300	200	302	302	302	-0.365949	50	50		5	-0.365949	-0.365949		5	-0.365949
Mole Fraction Vapor	%		0	0	0	0	0	0	0	0	0		0	0	0		0	0
Mole Fraction Light Liquid	%		100	100	100	100	100	100	100	100	100		100	100	100		100	100
Mole Fraction Heavy Liquid	%		0	0	0	0	0	0	0	0	0		0	0	0		0	0
Molecular Weight	lb/lbmol		18.0	88.3	89.0	84.5	84.5	18.0	18.0	94.0	94.0		97.8828	18.0158	99.1784		97.8828	99.1784
Mass Density	lb/ft^3		62.3	43.2	43.2	42.4	42.4	62.3	62.3	43.4	43.4		43.8884	62.2507	43.7787		43.8884	43.7787
Molar Flow	lbmol/h		403.4	308.2	339.8	0.0	369.8	380.8	380.6	316.8	0.0		296.002	0	0		0	288.713
Mass Flow	lb/h		7267.1	27218.2	30235.8	0.0	31236.1	6860.9	6856.9	29789.8	0.0		28973.5	0	0		0	28634.1
Vapor Volumetric Flow	MCFH		0.1	0.6	0.7	0.0	0.7	0.1	0.1	0.7	0.0		0.660164	0	0		0	0.654065
Liquid Volumetric Flow	Mbbl/d		0.5	2.7	3.0	0.0	3.2	0.5	0.5	2.9	0.0		2.82193	0	0		0	2.79586
Std Vapor Volumetric Flow	MMSCFD		3.7	2.8	3.1	0.0	3.4	3.5	3.5	2.9	0.0		2.69588	0	0		0	2.62949
Std Liquid Volumetric Flow	Mbbl/d		0.5	2.8	3.1	0.0	3.2	0.5	0.5	3.0	0.0		2.84465	0	0		0	2.79855
Compressibility			0.011	0.114	0.079	0.111	0.111	0.016	0.001	0.025	0.025		0.00780160	0.000726146	0.00568420		0.00780160	0.00568420
Specific Gravity			0.999	0.693	0.693	0.679	0.679	0.998	0.998	0.695	0.695		0.703689	0.998102	0.701931		0.703689	0.701931
API Gravity			10.0	71.6	72.7	75.2	75.2	10.1	10.0	70.5	70.5		68.8752	10.0153	68.3221		68.8752	68.3221
Enthalpy	MMBtu/h		-49.6	-24.4	-27.5	0.0	-28.7	-46.8	-46.8	-26.5	0.0		-25.6162	0	0		0	-25.1375
Mass Enthalpy	Btu/lb		-6830.9	-897.0	-910.0	-917.2	-917.2	-6824.6	-6825.7	-890.3	-890.3		-884.124	-6825.70	-877.886		-884.124	-877.886
Mass Cp	Btu/(lb*°F)		1.0	0.5	0.5	0.5	0.5	1.0	1.0	0.5	0.5		0.489307	0.982959	0.493082		0.489307	0.493082
Ideal Gas CpCv Ratio			1.326	1.064	1.064	1.066	1.066	1.326	1.326	1.059	1.059		1.05748	1.32572	1.05601		1.05748	1.05601
Dynamic Viscosity	cP		1.0	0.4	0.4	0.3	0.3	1.0	1.0	0.4	0.4		0.424759	0.964474	0.415695		0.424759	0.415695
Kinematic Viscosity	cSt		1.0	0.5	0.5	0.5	0.5	1.0	1.0	0.6	0.6		0.604188	0.967221	0.592777		0.604188	0.592777
Thermal Conductivity	Btu/(h*ft*°F)		0.3	0.1	0.1	0.1	0.1	0.3	0.3	0.1	0.1		0.0695114	0.348213	0.0690146		0.0695114	0.0690146
Surface Tension	lbf/ft		0.005	0.001	0.001	0.001	0.001	0.005	0.005	0.001	0.001		0.00142141	0.00502317	0.00141038		0.00142141	0.00141038
Net I.G. Heating Value	Btu/ft^3		0.0	4465.7	4504.5	4282.7	4282.7	0.6	0.0	4755.2	4755.2		4943.98	0.0393239	5007.50		4943.98	5007.50
Net Liquid Heating Value	Btu/lb		-1059.8	19010.6	19040.0	19070.5	19070.5	-1047.0	-1058.9	19013.8	19013.8		18992.1	-1058.87	18984.6		18992.1	18984.6
Gross I.G. Heating Value	Btu/ft^3		50.3	4805.3	4849.0	4612.2	4612.2	50.9	50.4	5116.6	5116.6		5318.05	50.3509	5385.82		5318.05	5385.82
Gross Liquid Heating Value	Btu/lb		0.0	20468.1	20507.9	20549.7	20549.7	13.3	0.9	20470.9	20470.9		20441.0	0.894331	20430.8		20441.0	20430.8

Process Streams		Separator Gas	Separator Water	Separator Oil	1	as from 3-ph Separato	Produced Liquid	2	Produced Water	3	n Gas from LP Conder	To Sales Gas Line	Condensate from VRT	g from produced wate	lashing from Oil Tank	o Enclosed Combusto	Flash Gas from VRT	Stable Condensate
Phase: Heavy Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water					99.9595	99.9470	99.9470											
H2S					0	0	0											
Nitrogen					8.02034E-05	0.000110007	0.000110007											
CO2					0.00135981	0.00170234	0.00170234											
Methane					0.0304889	0.0409384	0.0409384											
Ethane					0.00567981	0.00710028	0.00710028											
Propane					0.00132591	0.00147715	0.00147715											
Isobutene					0.000881055	0.000921436	0.000921436											
n-Butane					0.000297309	0.000333103	0.000333103											
Isopentane					5.54652E-05	5.70336E-05	5.70336E-05											
n-Pentane					4.56931E-05	4.87203E-05	4.87203E-05											
2-Methylpentane					2.10464E-06	2.23294E-06	2.23294E-06											
3-Methylpentane					4.04801E-06	4.16951E-06	4.16951E-06											
n-Hexane					2.28411E-05	2.40383E-05	2.40383E-05											
Methylcyclopentane					6.74341E-06	6.31134E-06	6.31134E-06											
Benzene					9.84033E-05	9.63681E-05	9.63681E-05											
2-Methylhexane					1.07014E-06	9.94850E-07	9.94850E-07											
3-Methylhexane					8.83177E-07	8.28107E-07	8.28107E-07											
n-Heptane					1.78897E-06	1.54653E-06	1.54653E-06											
Methylcyclohexane					5.94264E-06	5.94309E-06	5.94309E-06											
Toluene					7.70949E-05	7.74833E-05	7.74833E-05											
n-Octane					7.04457E-07	7.50399E-07	7.50399E-07											
Ethylbenzene					2.15506E-05	2.10642E-05	2.10642E-05											
p-Xylene					2.32992E-05	2.33972E-05	2.33972E-05											
o-Xylene					3.31660E-05	3.38358E-05	3.38358E-05											
n-Nonane					2.06558E-07	2.20033E-07	2.20033E-07											
C10+					1.80317E-07	1.95350E-07	1.95350E-07											
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water					99.9511	99.9379	99.9379											
H2S					0	0	0											
Nitrogen					0.000124704	0.000171043	0.000171043											
CO2					0.00332159	0.00415828	0.00415828											

Methane					0.0271478	0.0364520	0.0364520											
Ethane					0.00947930	0.0118499	0.0118499											
Propane					0.00324512	0.00361526	0.00361526											
Isobutene					0.00274370	0.00286943	0.00286943											
n-Butane					0.000959120	0.00107458	0.00107458											
Isopentane					0.000222112	0.000228391	0.000228391											
n-Pentane					0.000182979	0.000195101	0.000195101											
2-Methylpentane					1.00666E-05	1.06802E-05	1.06802E-05											
3-Methylpentane					1.93619E-05	1.99429E-05	1.99429E-05											
n-Hexane					0.000109250	0.000114976	0.000114976											
Methylcyclopentane					3.14996E-05	2.94811E-05	2.94811E-05											
Benzene					0.000426628	0.000417801	0.000417801											
2-Methylhexane					5.95170E-06	5.53290E-06	5.53290E-06											
3-Methylhexane					4.91186E-06	4.60556E-06	4.60556E-06											
n-Heptane					9.94951E-06	8.60108E-06	8.60108E-06											
Methylcyclohexane					3.23856E-05	3.23878E-05	3.23878E-05											
Toluene					0.000394265	0.000396249	0.000396249											
n-Octane					4.46633E-06	4.75758E-06	4.75758E-06											
Ethylbenzene					0.000126988	0.000124121	0.000124121											
p-Xylene					0.000137292	0.000137868	0.000137868											
o-Xylene					0.000195432	0.000199378	0.000199378											
n-Nonane					1.47041E-06	1.56633E-06	1.56633E-06											
C10+					1.63736E-06	1.77385E-06	1.77385E-06											
Mass Flow		**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**
Water					6860.14	0	0											
H2S					0	0	0											
Nitrogen					0.00855908	0	0											
CO2					0.227978	0	0											
Methane					1.86329	0	0											
Ethane					0.650612	0	0											
Propane					0.222729	0	0											
Isobutene					0.188314	0	0											
n-Butane					0.0658292	0	0											
Isopentane					0.0152447	0	0											
n-Pentane					0.0125588	0	0											
2-Methylpentane					0.000690921	0	0											
3-Methylpentane					0.00132890	0	0											
n-Hexane					0.00749839	0	0											
Methylcyclopentane					0.00216198	0	0											
Benzene					0.0292816	0	0											
2-Methylhexane					0.000408495	0	0											
3-Methylhexane					0.000337126	0	0											
n-Heptane					0.000682885	0	0											
Methylcyclohexane					0.00222279	0	0											
Toluene					0.0270604	0	0											
n-Octane					0.000306547	0	0											
Ethylbenzene					0.00871583	0	0											
p-Xylene					0.00942303	0	0											
o-Xylene					0.0134135	0	0											
n-Nonane					0.000100922	0	0											
C10+					0.000112380	0	0											

Process Streams		**Separator Gas**	**Separator Water**	**Separator Oil**	**1**	**as from 3-ph Separato**	**Produced Liquid**	**2**	**Produced Water**	**3**	**n Gas from LP Conden**	**To Sales Gas Line**	**Condensate from VRT**	**g from produced wate**	**lashing from Oil Tank**	**o Enclosed Combusto**	**Flash Gas from VRT**	**Stable Condensate**
Phase: Heavy Liquid	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	**Units**																	
Temperature	°F				59.4	70.0	70.0											
Pressure	psig				200	302	302											
Mole Fraction Vapor	%				0	0	0											
Mole Fraction Light Liquid	%				0	0	0											
Mole Fraction Heavy Liquid	%				100	100	100											
Molecular Weight	lb/lbmol				18.0	18.0	18.0											
Mass Density	lb/ft^3				62.4	62.3	62.3											
Molar Flow	lbmol/h				381.0	0.0	0.0											
Mass Flow	lb/h				6863.5	0.0	0.0											
Vapor Volumetric Flow	MCFH				0.1	0.0	0.0											

Liquid Volumetric Flow	Mbbl/d				0.5	0.0	0.0											
Std Vapor Volumetric Flow	MMSCFD				3.5	0.0	0.0											
Std Liquid Volumetric Flow	Mbbl/d				0.5	0.0	0.0											
Compressibility					0.011	0.016	0.016											
Specific Gravity					1.000	0.998	0.998											
API Gravity					10.1	10.1	10.1											
Enthalpy	MMBtu/h				-46.9	0.0	0.0											
Mass Enthalpy	Btu/lb				-6835.9	-6824.6	-6824.6											
Mass Cp	Btu/(lb*°F)				1.0	1.0	1.0											
Ideal Gas CpCv Ratio					1.326	1.326	1.326											
Dynamic Viscosity	cP				1.1	1.0	1.0											
Kinematic Viscosity	cSt				1.1	1.0	1.0											
Thermal Conductivity	Btu/(h*ft*°F)				0.3	0.3	0.3											
Surface Tension	lbf/ft				0.005	0.005	0.005											
Net I.G. Heating Value	Btu/ft^3				0.5	0.6	0.6											
Net Liquid Heating Value	Btu/lb				-1049.8	-1047.0	-1047.0											
Gross I.G. Heating Value	Btu/ft^3				50.8	50.9	50.9											
Gross Liquid Heating Value	Btu/lb				10.4	13.3	13.3											

October 7, 2013

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

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

Sample: Seaborne No. 1H (Vogt Pad well sample)
Separator Hydrocarbon Liquid
Sampled @ 320 psig & 72 °F

Date Sampled: 09/20/13 Job Number: 35820.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.026	0.007	0.008
Carbon Dioxide	0.022	0.009	0.011
Methane	7.703	3.192	1.406
Ethane	7.916	5.177	2.708
Propane	7.595	5.117	3.810
Isobutane	2.047	1.638	1.353
n-Butane	5.957	4.593	3.939
2,2 Dimethylpropane	0.080	0.075	0.066
Isopentane	3.263	2.918	2.678
n-Pentane	4.477	3.969	3.675
2,2 Dimethylbutane	0.231	0.236	0.226
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.514	0.515	0.504
2 Methylpentane	2.662	2.702	2.610
3 Methylpentane	1.907	1.904	1.870
n-Hexane	4.853	4.880	4.758
Heptanes Plus	50.748	63.069	70.379
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.7601	(Water=1)
°API Gravity	54.66	@ 60°F
Molecular Weight	121.9	
Vapor Volume	19.79	CF/Gal
Weight	6.33	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.6812	(Water=1)
°API Gravity	76.24	@ 60°F
Molecular Weight	87.9	
Vapor Volume	24.60	CF/Gal
Weight	5.68	Lbs/Gal

Base Conditions: 14.850 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
Processor: JCdjv
Cylinder ID: W-1016

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.022	0.009	0.011
Nitrogen	0.026	0.007	0.008
Methane	7.703	3.192	1.406
Ethane	7.916	5.177	2.708
Propane	7.595	5.117	3.810
Isobutane	2.047	1.638	1.353
n-Butane	6.037	4.668	4.005
Isopentane	3.263	2.918	2.678
n-Pentane	4.477	3.969	3.675
Other C-6's	5.314	5.356	5.209
Heptanes	12.616	13.622	14.000
Octanes	14.845	16.794	18.294
Nonanes	6.279	8.213	9.061
Decanes Plus	13.338	21.169	24.822
Benzene	0.310	0.212	0.276
Toluene	0.818	0.670	0.858
E-Benzene	0.657	0.620	0.794
Xylenes	1.883	1.768	2.275
n-Hexane	4.853	4.880	4.758
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity	0.6812	(Water=1)
°API Gravity	76.24	@ 60°F
Molecular Weight	87.9	
Vapor Volume	24.60	CF/Gal
Weight	5.68	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity	0.7987	(Water=1)
Molecular Weight	163.6	

Characteristics of Atmospheric Sample:

°API Gravity	63.19	@ 60°F
Reid Vapor Pressure (ASTM D-5191)	4.45	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	W-1016*	T-3025
Pressure, PSIG	320	302	301
Temperature, °F	72	70	70

* Sample used for analysis

TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.026	0.007	0.008
Carbon Dioxide	0.022	0.009	0.011
Methane	7.703	3.192	1.406
Ethane	7.916	5.177	2.708
Propane	7.595	5.117	3.810
Isobutane	2.047	1.638	1.353
n-Butane	5.957	4.593	3.939
2,2 Dimethylpropane	0.080	0.075	0.066
Isopentane	3.263	2.918	2.678
n-Pentane	4.477	3.969	3.675
2,2 Dimethylbutane	0.231	0.236	0.226
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.514	0.515	0.504
2 Methylpentane	2.662	2.702	2.610
3 Methylpentane	1.907	1.904	1.870
n-Hexane	4.853	4.880	4.758
Methylcyclopentane	1.031	0.892	0.987
Benzene	0.310	0.212	0.276
Cyclohexane	1.009	0.840	0.966
2-Methylhexane	2.934	3.336	3.345
3-Methylhexane	2.426	2.723	2.765
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.828	0.881	0.935
n-Heptane	4.388	4.950	5.002
Methylcyclohexane	3.402	3.344	3.800
Toluene	0.818	0.670	0.858
Other C-8's	8.240	9.437	10.332
n-Octane	3.203	4.013	4.162
E-Benzene	0.657	0.620	0.794
M & P Xylenes	0.877	0.832	1.059
O-Xylene	1.007	0.936	1.216
Other C-9's	4.414	5.647	6.340
n-Nonane	1.865	2.566	2.721
Other C-10's	3.956	5.561	6.358
n-decane	1.123	1.685	1.817
Undecanes(11)	3.018	4.353	5.047
Dodecanes(12)	1.740	2.710	3.186
Tridecanes(13)	1.212	2.024	2.412
Tetradecanes(14)	0.714	1.277	1.543
Pentadecanes(15)	0.441	0.846	1.034
Hexadecanes(16)	0.286	0.585	0.722
Heptadecanes(17)	0.207	0.449	0.559
Octadecanes(18)	0.165	0.377	0.471
Nonadecanes(19)	0.114	0.271	0.342
Eicosanes(20)	0.081	0.201	0.255
Heneicosanes(21)	0.065	0.168	0.214
Docosanes(22)	0.051	0.137	0.175
Tricosanes(23)	0.036	0.102	0.131
Tetracosanes(24)	0.030	0.088	0.114
Pentacosanes(25)	0.022	0.066	0.086
Hexacosanes(26)	0.020	0.064	0.083
Heptacosanes(27)	0.017	0.055	0.072
Octacosanes(28)	0.012	0.039	0.051
Nonacosanes(29)	0.010	0.033	0.044
Triacontanes(30)	0.006	0.020	0.027
Hentriacontanes Plus(31+)	0.014	0.059	0.080
Total	100.000	100.000	100.000

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

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

Date Sampled: 09/20/13

Date Analyzed: 10/02/13

Sample: Seaborne No. 1H (Vogt Pad well sample)

Job Number: J35820

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	**Stock Tank**
Pressure, psig	320	0
Temperature, °F	72	70
Gas Oil Ratio (1)	------	327
Gas Specific Gravity (2)	------	1.303
Separator Volume Factor (3)	1.1969	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.8355
Oil API Gravity at 60 °F	63.19
Reid Vapor Pressure, psi (5)	4.45

Quality Control Check			
	Sampling Conditions	**Test Samples**	
Cylinder No.	------	W-1016*	T-3025
Pressure, psig	320	302	301
Temperature, °F	72	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: M. G.
* Sample used for flash study
Base Conditions: 14.85 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

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

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

Sample: Seaborne No. 1H (Vogt Pad well sample)
Gas Evolved from Hydrocarbon Liquid Flashed
From 320 psig & 72 °F to 0 psig & 70 °F

Date Sampled: 09/20/13 Job Number: 35820.001

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.084	
Carbon Dioxide	0.109	
Methane	28.979	
Ethane	27.515	7.417
Propane	21.197	5.886
Isobutane	3.988	1.315
n-Butane	9.085	2.887
2-2 Dimethylpropane	0.097	0.037
Isopentane	2.547	0.939
n-Pentane	2.631	0.961
Hexanes	2.134	0.886
Heptanes Plus	1.634	0.724
Totals	100.000	21.052

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.558	(Air=1)
Molecular Weight	101.68	
Gross Heating Value	5428	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.303	(Air=1)
Compressibility (Z)	0.9868	
Molecular Weight	37.25	
Gross Heating Value		
Dry Basis	2191	BTU/CF
Saturated Basis	2153	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.850 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: ANB
Cylinder ID: FL# 9 S

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.084		0.063
Carbon Dioxide	0.109		0.129
Methane	28.979		12.483
Ethane	27.515	7.417	22.213
Propane	21.197	5.886	25.095
Isobutane	3.988	1.315	6.223
n-Butane	9.085	2.887	14.177
2,2 Dimethylpropane	0.097	0.037	0.188
Isopentane	2.547	0.939	4.934
n-Pentane	2.631	0.961	5.097
2,2 Dimethylbutane	0.081	0.034	0.187
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.128	0.053	0.296
2 Methylpentane	0.661	0.277	1.529
3 Methylpentane	0.408	0.168	0.944
n-Hexane	0.856	0.355	1.981
Methylcyclopentane	0.072	0.025	0.163
Benzene	0.024	0.007	0.050
Cyclohexane	0.109	0.037	0.246
2-Methylhexane	0.178	0.083	0.479
3-Methylhexane	0.178	0.082	0.479
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.179	0.079	0.477
n-Heptane	0.248	0.115	0.667
Methylcyclohexane	0.177	0.072	0.467
Toluene	0.039	0.013	0.096
Other C8's	0.232	0.109	0.687
n-Octane	0.065	0.034	0.199
Ethylbenzene	0.002	0.001	0.006
M & P Xylenes	0.018	0.007	0.051
O-Xylene	0.002	0.001	0.006
Other C9's	0.070	0.036	0.237
n-Nonane	0.014	0.008	0.048
Other C10's	0.021	0.012	0.080
n-Decane	0.004	0.002	0.015
Undecanes (11)	0.002	0.001	0.008
Totals	100.000	21.052	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.303	(Air=1)
Compressibility (Z)	0.9868	
Molecular Weight	37.25	

Gross Heating Value

Dry Basis	2191	BTU/CF
Saturated Basis	2153	BTU/CF

GAS ANALYTICAL SERVICES

C6+ Gas Analysis Report

Gas Analytical

Report Date: Feb 26, 2016 7:27a

Client:	Antero Resources	Date Sampled:	Feb 18, 2016 9:40a
Site:	Pike Unit 2H	Analysis Date:	Feb 25, 2016 11:54a
Field No:	9998	Collected By:	M. Hileman
Meter:	40551	Date Effective:	Feb 18, 2016 12:00a
Source Laboratory	Clarksburg (Bridgeport), WV	Sample Pressure (PSI):	219.0
Lab File No:	**X_CH1-9841.CHR**	Sample Temp (°F):	61
Sample Type:	Spot	Field H2O:	No Test
Reviewed By:		Field H2S:	No Test

Component	Mol %	Gal/MSCF
Methane	80.6676	
Ethane	13.4543	3.58
Propane	2.6759	0.74
I-Butane	0.5461	0.18
N-Butane	0.9324	0.29
I-Pentane	0.2731	0.10
N-Pentane	0.2342	0.08
Nitrogen	0.4154	
Oxygen	<MDL	
Carbon Dioxide	0.1709	
Hexanes+	0.6301	0.26
TOTAL	100.0000	5.23

Analytical Results at Base Conditions (Real)		
BTU/SCF (Dry):	1,227.4562	BTU/ft³
BTU/SCF (Saturated):	1,206.9708	BTU/ft³
PSIA:	14.730	PSI
Temperature (°F):	60.00	°F
Z Factor (Dry):	0.99669	
Z Factor (Saturated):	0.99629	

Analytical Results at Contract Conditions (Real)		
BTU/SCF (Dry):	1,227.4562	BTU/ft³
BTU/SCF (Saturated):	1,206.9708	BTU/ft³
PSIA:	14.730	PSI
Temperature (°F):	60.00	°F
Z Factor (Dry):	0.99669	
Z Factor (Saturated):	0.99629	

Calculated Specific Gravities			
Ideal Gravity:	0.6964	Real Gravity:	0.6985
Molecular Wt:	20.1707	lb/lbmol	

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

Source	Date	Notes

<MDL = Less than Method Detection Limits, NG = Not Given, NT = Not Tested

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									1.2872	1.9016				
EP-PCV					0.0769	0.3369							8.4409	36.9713
F001					3.1754	13.9084							78.6303	344.4009
EP-ENG001 through EP-ENG005 (emission per EPN)	0.0559	0.2450	0.3692	1.6171	0.0170	0.0747	0.0003	0.0015	0.0055	0.0240	0.0055	0.0240	66.6630	291.9840
EP-ENG006 & EP-ENG007 (emission per EPN)	0.0652	0.2854	0.5375	2.3543	0.0230	0.1008	0.0005	0.0020	0.0074	0.0324	0.0074	0.0324	90.0207	394.2905
EP-L001					12.3997	26.3822							0.8631	1.8363
EP-L002					0.0013	0.0005							0.8529	0.3048
EP-GPU001 through EP-GPU009 (emission per EPN)	0.1222	0.5353	0.1027	0.4496	0.0067	0.0294	0.0007	0.0032	0.0093	0.0407	0.0093	0.0407	146.6447	642.3040
EP-LH001 through EP-LH009 (emission per EPN)	0.1629	0.7137	0.1369	0.5995	0.0090	0.0393	0.0010	0.0043	0.0124	0.0542	0.0124	0.0542	195.5263	856.4053
EP-EC001 through EP-EC003 (emission per EPN)	0.1109	0.4856	0.0931	0.4079	1.9104	8.3675	0.0000	0.0000	0.0084	0.0369	0.0063	0.0277	393.6294	1724.0966
TOTAL	3.3089	14.4928	5.3560	23.4594	6.0036	26.2957	0.0180	0.0790	0.2624	1.1495	0.2561	1.1218	4773.7841	20909.1745

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

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

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-HR001														
EP-PCV			0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0142	0.0620	0.0142	0.0620
F001			0.0072	0.0314	0.0223	0.0976	0.0206	0.0903	0.0591	0.2590	0.2988	1.3086	0.4080	1.7869
EP-ENG001 through EP-ENG005 (emission per EPN)	0.0118	0.0517	0.0009	0.0040	0.0003	0.0014	0.0000	0.0001	0.0001	0.0005	0.0000	0.0000	0.0132	0.0579
EP-ENG006 & EP-ENG007 (emission per EPN)	0.0159	0.0698	0.0012	0.0054	0.0004	0.0019	0.0000	0.0001	0.0002	0.0007	0.0000	0.0000	0.0179	0.0782
EP-L001			0.0006	0.0012	0.0015	0.0031	0.0009	0.0020	0.0024	0.0052	0.1055	0.2244	0.1109	0.2360
EP-L002			1.30E-06	4.64E-07	6.96E-07	2.49E-07	1.34E-07	4.78E-08	3.28E-07	1.17E-07	6.14E-09	2.19E-09	2.46E-06	8.80E-07
EP-GPU001 through EP-GPU009 (emission per EPN)	0.0001	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0096	0.0023	0.0101
EP-LH001 through EP-LH009 (emission per EPN)	0.0001	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0029	0.0128	0.0031	0.0134
EP-EC001 through EP-EC003 (emission per EPN)	0.0000	0.0000	0.0014	0.0060	0.0016	0.0071	0.0006	0.0024	0.0013	0.0058	0.2115	0.9264	0.2164	0.9477
TOTAL	0.0928	0.4067	0.0112	0.0489	0.0074	0.0324	0.0018	0.0078	0.0048	0.0210	0.6807	2.9816	0.7992	3.5005

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
James Webb Well Pad
Antero Resources Corporation
Doddridge County, West Virginia

Notice is given that Antero Resources Corporation has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-C General Permit Modification for an Oil and Natural Gas Production facility located at 416 Cabin Run Rd West Union, WV 26456 , near West Union in Doddridge County, West Virginia.

The latitude and longitude coordinates are: 39.238719 and -80.873061

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

Pollutants	TOTALS (tpy):
NO_X	14.4928
CO	23.4594
$PM_{2.5}$	1.1218
PM_{10}	1.1495
VOC	26.2957
SO_2	0.0790
Formaldehyde	0.4067
Benzene	0.0489
Toluene	0.0324
Ethylbenzene	0.0078
Xylenes	0.0210
Hexane	2.9816
Total HAPs	3.5005

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

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.
Dated this the __ day of _____, 2016

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

www.ghd.com