May 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-B Modification Application
Hamilton 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 Hamilton Well Pad.

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

1. Increase in production.
2. Addition of 7 2-phase separators.
3. Addition of 7 line heaters.
4. Addition of 2 Cimarron enclosed combustors.

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-B General Permit Modification Application.
- Two CD copies of the G70-B General Permit Modification Application.
- The application fee with check no. 445475 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/245

Encl.

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

General Permit G70-B Modification Application

Increase in production, and addition of 7 line heaters and 2 Cimarron enclosed combustors.

Hamilton Well Pad

Antero Resources Corporation

GHD Services Inc.
6320 Rothway Suite 100 Houston Texas 77040
082715 | Report No 245 | May 2016

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G70-B General Permit Modification

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-B 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: Hamilton Well Pad

Operating Site Physical Address: 0.2 miles west from the intersection of Camp Mistake Rd. and Little Flint Rd. Then go 0.61 miles north on an unnamed road. The entrance will be towards the right.

City: Shirley	Zip Code: 26434	County: Doddridge

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.36775
Longitude: -80.74368

SIC Code: 1311 NAICS Code: 211111	DAQ Facility ID No. (For existing facilities) 017 - 00078

CERTIFICATION OF INFORMATION

This G70-B 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-B Registration Application will be returned to the applicant. Furthermore, if the G70-B 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-B 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: 5-2-2016

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, and addition of 7 line heaters and 2 Cimarron enclosed combustors.	
Directions to the facility: From the intersection Little Flint road and Camp Mistake road, go 0.2 mi West. Then go 0.61 mi north on unnamed road. The entrance will be towards right.	
ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☒ 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-B 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	445475	
CR42616	4/26/2016	401003088		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

NO. 445475

4/26/2016

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

⑈445475⑈ ⑆221370632⑆610000001189 10⑈

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:

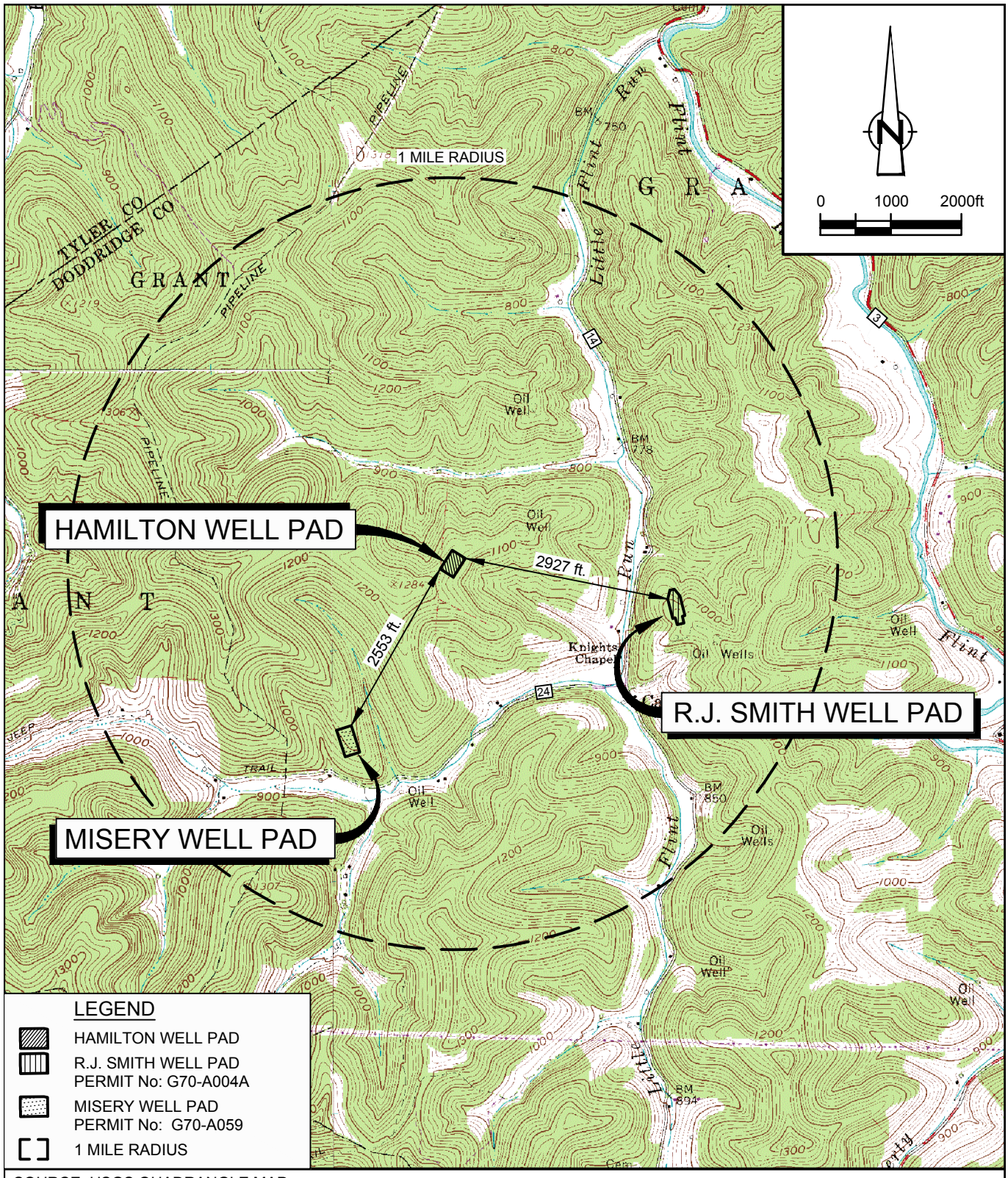
The Hamilton Well Pad calculation potential to emit included all the emissions sources that belong to the same industrial grouping, are located on contiguous or adjacent properties, and are under the control of the same person. The nearest emission source that belongs to the same industrial grouping and under the control of the same person but not located on contiguous or adjacent property is the Misery Well Pad. This operates independently and is approximately 0.55 mile southwest of the facility. There is another nearby source, RJ Smith Well Pad that belongs to the same industrial grouping and under the same control but not located on contiguous or adjacent property. This is located 0.61 mile southeast of Hamilton and also operates completely independently.

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;
WEST UNION, OXFORD, SMITHBURG, AND CENTER POINT, WEST VIRGINIA

SITE COORDINATES: UTM ZONE 17N 522079.1, 4357618.8 NAD 83

Attachment A

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

GHD

82715-00(245)GN-WA004 APR 26, 2016

Attachment B
Siting Criteria Waiver

Attachment B

Siting Waiver
Hamilton 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 Hamilton 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:

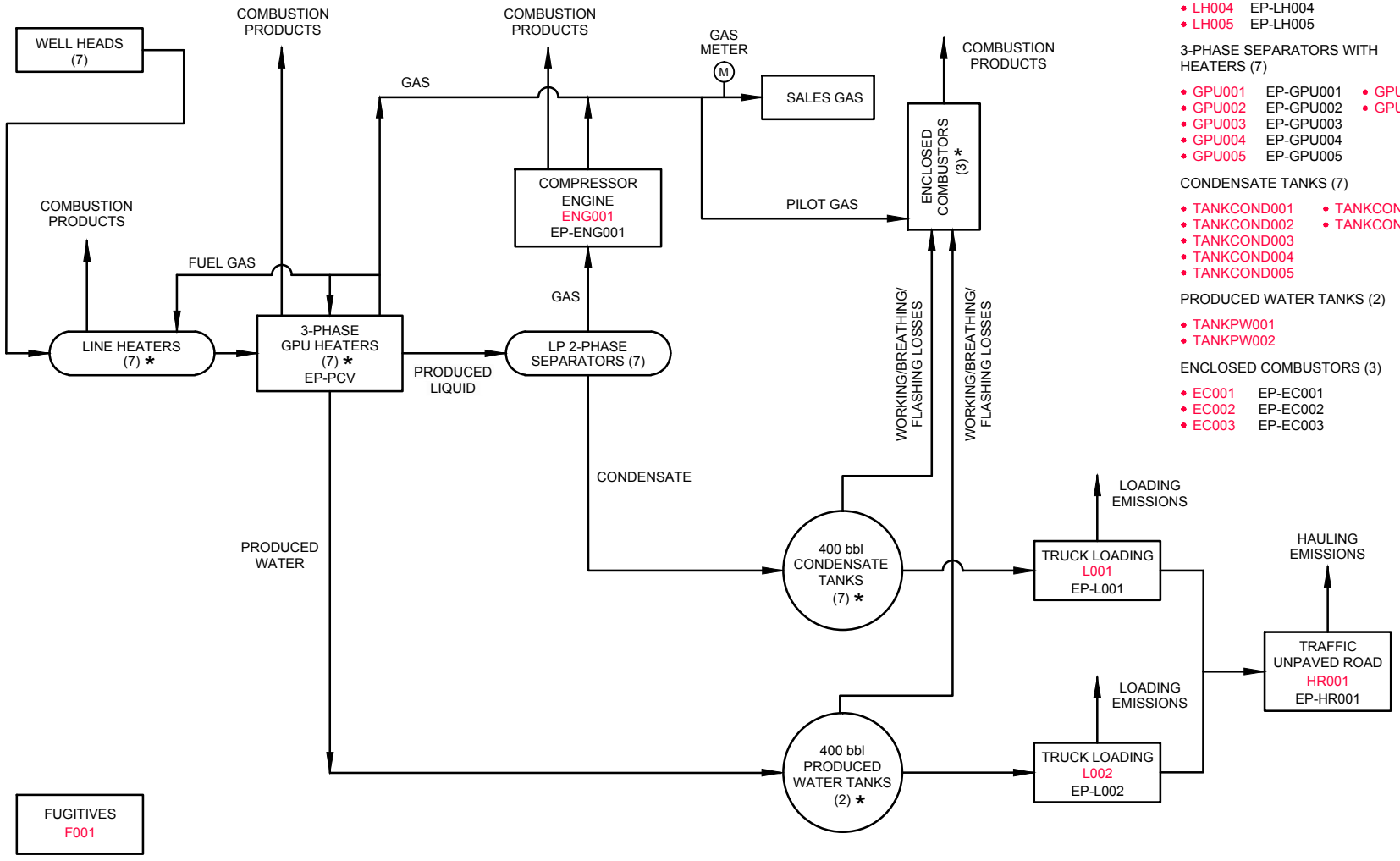
FIRST. The name of the Corporation is Antero Resources Corporation.

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



* LINE HEATERS (7)

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

3-PHASE SEPARATORS WITH HEATERS (7)

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

CONDENSATE TANKS (7)

- TANKCOND001
- TANKCOND002
- TANKCOND003
- TANKCOND004
- TANKCOND005
- TANKCOND006
- TANKCOND007

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 HAMILTON WELL PAD

Doddridge County, West Virginia

82715-00(245)GN-WA001 APR 26, 2016

Attachment E
Process Description

Attachment E

Process Description
Hamilton 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 (LH001-007) and gas production units (GPU001-GPU007) which are 3-phase separators where the gas, condensate, and produced water are separated. The line heaters and GPUs are fueled by a slip stream of the separated gas.

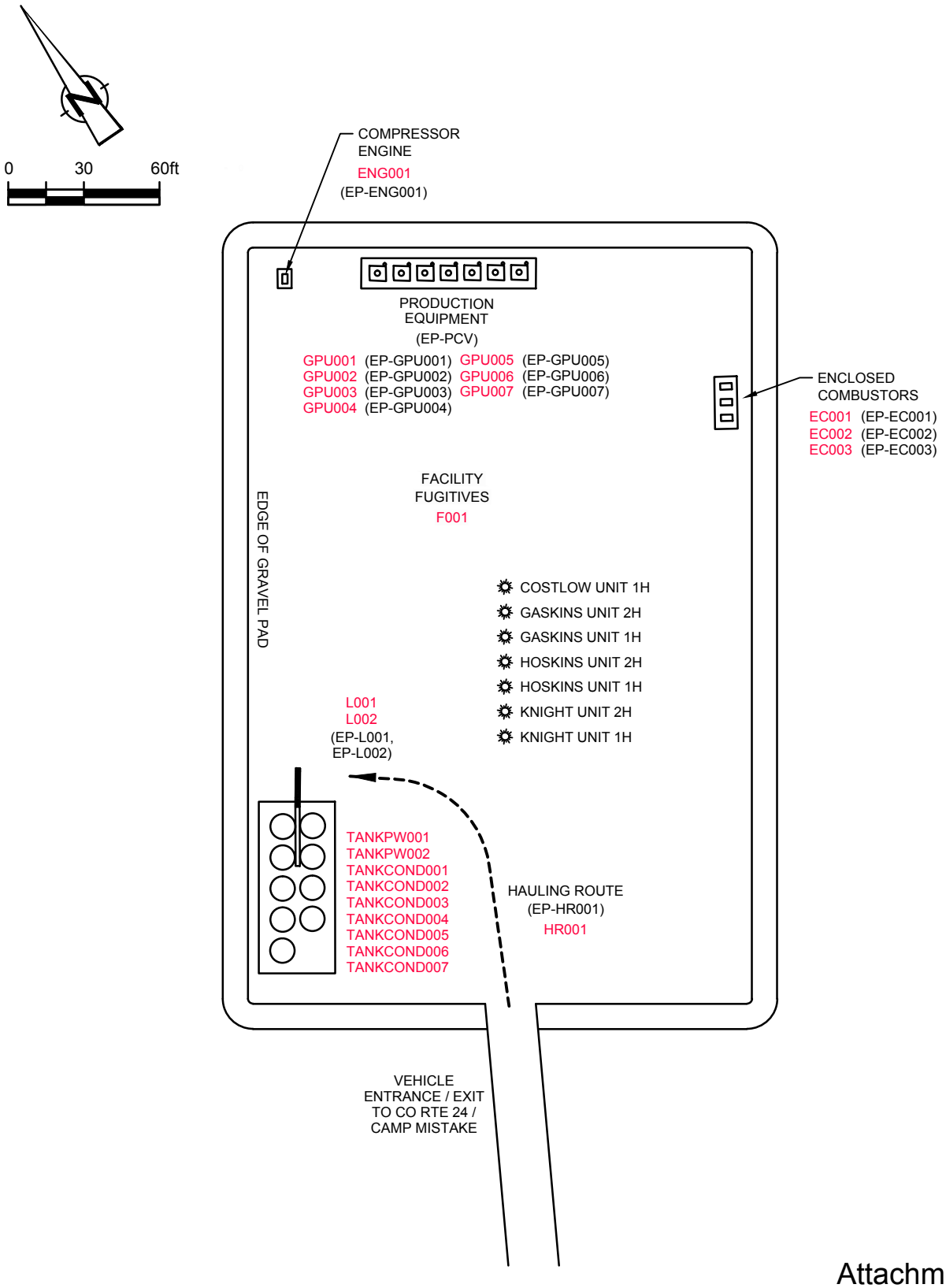
The gas from the three phase separators is metered and sent to the sales gas pipeline. The water flow to the produced water storage tanks (TANKPW001-002). The condensate is then sent to two phase low pressure separators where gas is further separated. The gas is routed to the gas fueled compressor engine (ENG001), compressed, metered and sent to the sales gas line. The condensate from the two phase separators flows to the condensate storage tanks (TANKSCOND001-007). 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 seven (7) tanks (TANKCOND001-007) on site to store condensate and two (2) tanks (TANKPW001-002) to store produced water prior to removal from the site. The flashing, working and breathing losses from the tanks are routed to three enclosed combustors (EC001-003) to control the emissions. The enclosed combustor(s) that will be used to control emissions are designed to achieve a VOC destruction efficiency of 98 percent.

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

Emissions from the facility's emission sources were calculated using the extended analysis of the condensate and gas is from Sweeny No. 2H, one of the wells in the Forest Well Pad. These extended analyses are considered representative of the materials from Hamilton Pad, being in the same Marcellus rock formation.

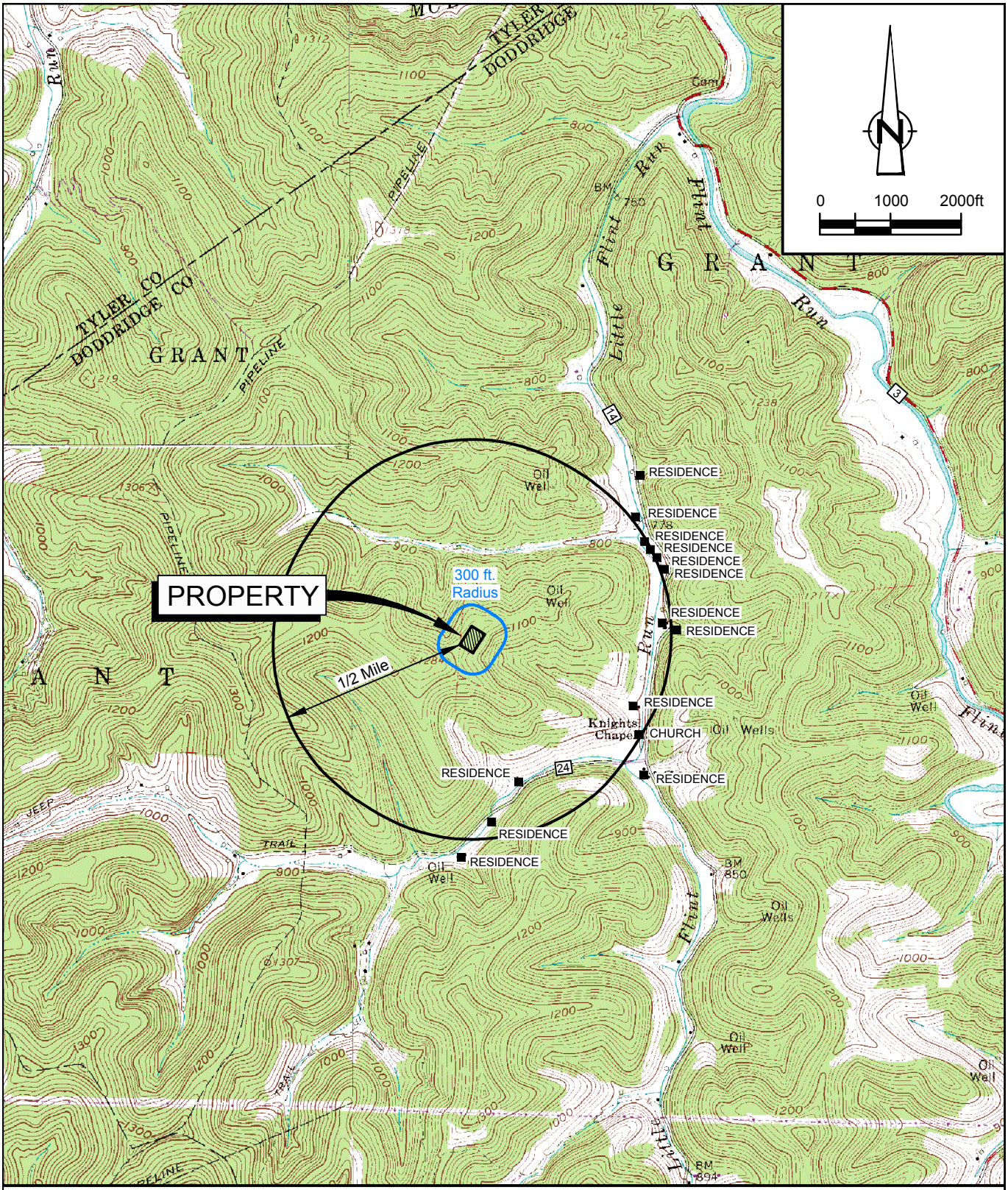
Attachment F
Plot Plan



Attachment F

PLOT PLAN
HAMILTON WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

Attachment G
Area Map



SOURCE: USGS QUADRANGLE MAP;
WEST UNION, OXFORD, SMITHBURG, AND CENTER POINT, WEST VIRGINIA

SITE COORDINATES: UTM ZONE 17N 522079.1, 4357618.8 NAD 83
SITE ELEVATION: 1157 ft AMSL

GHD

Attachment G

AREA MAP
HAMILTON WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

82715-00(245)GN-WA003 APR 27, 2016

Attachment H
G70-B Section Applicability Form

ATTACHMENT H – G70-B SECTION APPLICABILITY FORM

General Permit G70-B Registration
Section Applicability Form

General Permit G70-B 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-B 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-B 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[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD (s)[6]
GPU001, GPU002, GPU003, GPU004, GPU005, GPU006, GPU007	EP-GPU001, EP-GPU002, EP-GPU003, EP-GPU004, EP-GPU005, EP-GPU006, EP-GPU007	Gas Production Unit Heater	2014		1.5 MMBtu/hr	Existing	N/A	
LH001, LH002, LH003, LH004, LH005, LH006, LH007	EP-LH001, EP-LH002, EP-LH003, EP-LH004, EP-LH005, EP-LH006, EP-LH007	Line Heater	2016		2.0 MMBtu/hr	New	N/A	
F001	F001	Fugitives	2014		N/A	Existing	N/A	
TANKCOND001-007	EP-EC001, EP-EC002, EP-EC003	Condensate Tank F/W/B	2014		400 bbl each	Existing	EC001, EC002, EC003	
TANKPW001-002	EP-EC001, EP-EC002, EP-EC003	PW Tank F/W/B	2014		400 bbl each	Existing	EC001, EC002, EC003	
L001	EP-L001	Loading (Condensate)	2014		200 bbl capacity (each)	Existing	N/A	
L002	EP-L002	Loading (Produced Water)	2014		200 bbl capacity (each)	Existing	N/A	
HR001	EP-HR001	Haul Truck	2014		40 ton capacity	Existing	N/A	
EC001	EP-EC001	Enclosed Combustor	2014		90 scf/min	Existing	N/A	
EC002	EP-EC002	Enclosed Combustor	2016		90 scf/min	New	N/A	
EC003	EP-EC003	Enclosed Combustor	2016		90 scf/min	New	N/A	
PCV	EP-PCV	Pneumatic CV	2014		6.6 scf/day/PCV	Existing	N/A	
ENG001	EP-ENG001	Compressor Engine	2015	2013	24 HP	Existing	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	Monitor Frequency	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
						VOC	HAP	GHG (CO2e)
Valves	☐ Yes ☑ No	350	Quarterly monitoring	EPA	gas	2.90	0.34	228.63
Valves	☐ Yes ☑ No	364	Quarterly monitoring	EPA	liquid	8.50	0.63	2.38
Connections (Not sampling)	☐ Yes ☑ No	413	Quarterly monitoring	EPA	gas	0.15	1.81E-02	11.99
Flanges	☐ Yes ☐ No	91	Quarterly monitoring	EPA	gas	0.07	7.77E-03	5.15
Loading	☐ Yes ☑ No	2	Quarterly monitoring	EPA	gas	2.39	4.92E-03	1.60

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**
47017061940000	12/8/2013	October 2013	Green
47017062600000	12/28/2013	October 2013	Green
47017062050000	12/18/2013	October 2013	Green
47017064160000	7/4/2016	April 2016	Green
47017063040000	6/25/2016	April 2016	Green
47017064010000	7/24/2016	April 2016	Green
47017064170000	7/14/2016	April 2016	Green

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

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

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

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

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

Attachment L
Storage Vessel Data Sheet

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

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

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name: Tanks	2. Tank Name: Condensate Tank 001-007
3. Emission Unit ID number: TANKCOND001-007	4. Emission Point ID number. EP-EC001, EP-EC002, EP-EC003
5. Date Installed , Modified or Relocated (for existing tanks)	6. Type of change:
2016 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): 7665000	13B. Maximum daily throughput (gal/day): 21000
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 66	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 2014

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

22A. Is the tank heated?
☐ Yes ☑ No

22B. If yes, operating temperature:

22C. If yes, how is heat provided to tank?

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

24. Is the tank a Vertical Fixed Roof Tank?
☑ Yes ☐ No

24A. If yes, for dome roof provide radius (ft): NA

24B. If yes, for cone roof, provide slop (ft/ft): NA

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

25A. Year Internal Floaters Installed:

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

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

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

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

25F. Describe deck fittings

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

26A. Deck Type: ☐ Bolted ☐ Welded

26B. For bolted decks, provide deck construction

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

26D. Deck seam length (ft)

26E. Area of deck (ft^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.: West Union, WV	
30. Daily Average Ambient Temperature (°F): 51.7	31. Annual Average Maximum Temperature (°F): 63.8
32. Annual Average Minimum Temperature (°F): 39.5	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):	51.7	36A. Minimum (°F):	39.5	36B. Maximum (°F)	63.8
37. Average operating pressure range of tank (psig):	0	37A. Minimum (psig)	0	37B. Maximum (psig)	0

38A. Minimum Liquid Surface Temperature (°F)	39.5	38B. Corresponding Vapor Pressure (psia)	0.7429
39A. Average Liquid Surface Temperature (°F)	51.7	39B. Corresponding Vapor Pressure (psia)	0.9934
40A. Maximum Liquid Surface Temperature (°F)	63.8	40B. Corresponding Vapor Pressure (psia)	1.3075

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)	5.7700		
41D. Liquid Molecular Weight (lb/lb-mole)	97.40		
41E. Vapor Molecular Weight (lb/lb-mole)	41.9152		
Maximum Vapor Pressure 41F. True (psia)	1.5672		
41G. Reid (psia)	2.6500		
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) 2016 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): 15330000	13B. Maximum daily throughput (gal/day): 42000
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 457	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-coated ☑ Other(describe): Steel

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

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

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

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

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

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted ☐ 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.: West Union, WV	
30. Daily Average Ambient Temperature (°F): 51.7	31. Annual Average Maximum Temperature (°F): 63.8
32. Annual Average Minimum Temperature (°F): 39.5	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):	51.7	36A. Minimum (°F):	39.5	36B. Maximum (°F)	63.8
37. Average operating pressure range of tank (psig):	0	37A. Minimum (psig)	0	37B. Maximum (psig)	0

38A. Minimum Liquid Surface Temperature (°F)	39.5	38B. Corresponding Vapor Pressure (psia)	0.1836
39A. Average Liquid Surface Temperature (°F)	51.7	39B. Corresponding Vapor Pressure (psia)	0.2594
40A. Maximum Liquid Surface Temperature (°F)	63.8	40B. Corresponding Vapor Pressure (psia)	0.3598

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)	97.40		
41E. Vapor Molecular Weight (lb/lb-mole)	18.1526		
Maximum Vapor Pressure 41F. True (psia)	0.4464		
41G. Reid (psia)	1.0227		
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	2014	Existing	1.5	1247.06
GPU002	EP-GPU002	Gas Production Unit Heater	2014	Existing	1.5	1247.06
GPU003	EP-GPU003	Gas Production Unit Heater	2014	Existing	1.5	1247.06
GPU004	EP-GPU004	Gas Production Unit Heater	2014	Existing	1.5	1247.06
GPU005	EP-GPU005	Gas Production Unit Heater	2014	Existing	1.5	1247.06
GPU006	EP-GPU006	Gas Production Unit Heater	2014	Existing	1.5	1247.06
GPU007	EP-GPU007	Gas Production Unit Heater	2014	Existing	1.5	1247.06
LH001	EP-LH001	Line Heater	2016	New	2	1247.06
LH002	EP-LH002	Line Heater	2016	New	2	1247.06
LH003	EP-LH003	Line Heater	2016	New	2	1247.06
LH004	EP-LH004	Line Heater	2016	New	2	1247.06
LH005	EP-LH005	Line Heater	2016	New	2	1247.06
LH006	EP-LH006	Line Heater	2016	New	2	1247.06
LH007	EP-LH007	Line Heater	2016	New	2	1247.06

1. Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.
2. Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.
3. New, modification, removal.
4. Enter design heat input capacity in MMBtu/hr.
5. Enter the fuel heating value in BTU/standard cubic foot.

Attachment 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		
Engine Manufacturer/Model	Engine (Kubota DG972-E2)		
Manufacturers Rated bhp/rpm	24 HP @ 3600 rpm		
Source Status	ES		
Date Installed/ Modified/ Removed/ Relocated	2015		
Engine Manufacturer/ Reconstruction Date	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		
APCD Type	NSCR		
Fuel Type	RG		
H2S (gr/ 100 scf)	0		
Operating bhp/rpm	16.5 HP @ 2400 rpm		
BSFC (BTU/bhp-hr)	9773		
Hourly Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	193 ft^3/hr gal/hr		ft^3/hr gal/hr
Fuel Usage or Hours of Operation Metered	1.6907 $MMft^3/yr$ gal/yr		$MMft^3/yr$ 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	0.3158	1.3831				
MD	CO	5.6445	24.7228				
AP	VOC	0.0071	0.0311				
AP	SO2	0.0001	0.0006				
AP	PM10	0.0023	0.0100				
AP	Formaldehyde	0.0049	0.0215				
AP	Total HAPs	0.0055	0.0241				
OT	GHG (CO2e)	27.7765	121.6612				

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2013 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT OF 1990

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Kubota Corporation**
(U.S. Manufacturer or Importer)

Certificate Number: DKBXS.9622HP-002

Effective Date: 11/20/2012

Expiration Date: 12/31/2013

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/20/2012

Revision Date: N/A

Manufacturer: Kubota Corporation
Engine Family: DKBXS.9622HP
Certificate Number: DKBXS.9622HP-002
Useful Life : 1000 Hours / 5 Years
Engine Class : Nonhandheld-Class II
Fuel : Natural Gas (CNG/LNG)
Emission Standards : NMHC + NOx (g/kW-hr) : 8
CO (g/kW-hr) : 610

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547), 40 CFR Part 1054, 40 CFR Part 1068 and 40 CFR Part 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 for the following small nonroad engine family, more fully described in the documentation required by 40 CFR Part 1054 and produced in the stated model year.

This certificate of conformity covers only those new small nonroad 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 1054 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 1054. This certificate of conformity does not cover small 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 1068, Subpart E 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 1054. 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 1054, 40 CFR Part 1068.

This certificate does not cover small 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.

TECHNICAL INFORMATION

DG972-SAEH-S1

NATURAL GAS FUEL ENGINE

July, 2006

KUBOTA Corporation

CONTENTS

Specifications and dimensions are subject to change without prior notice.

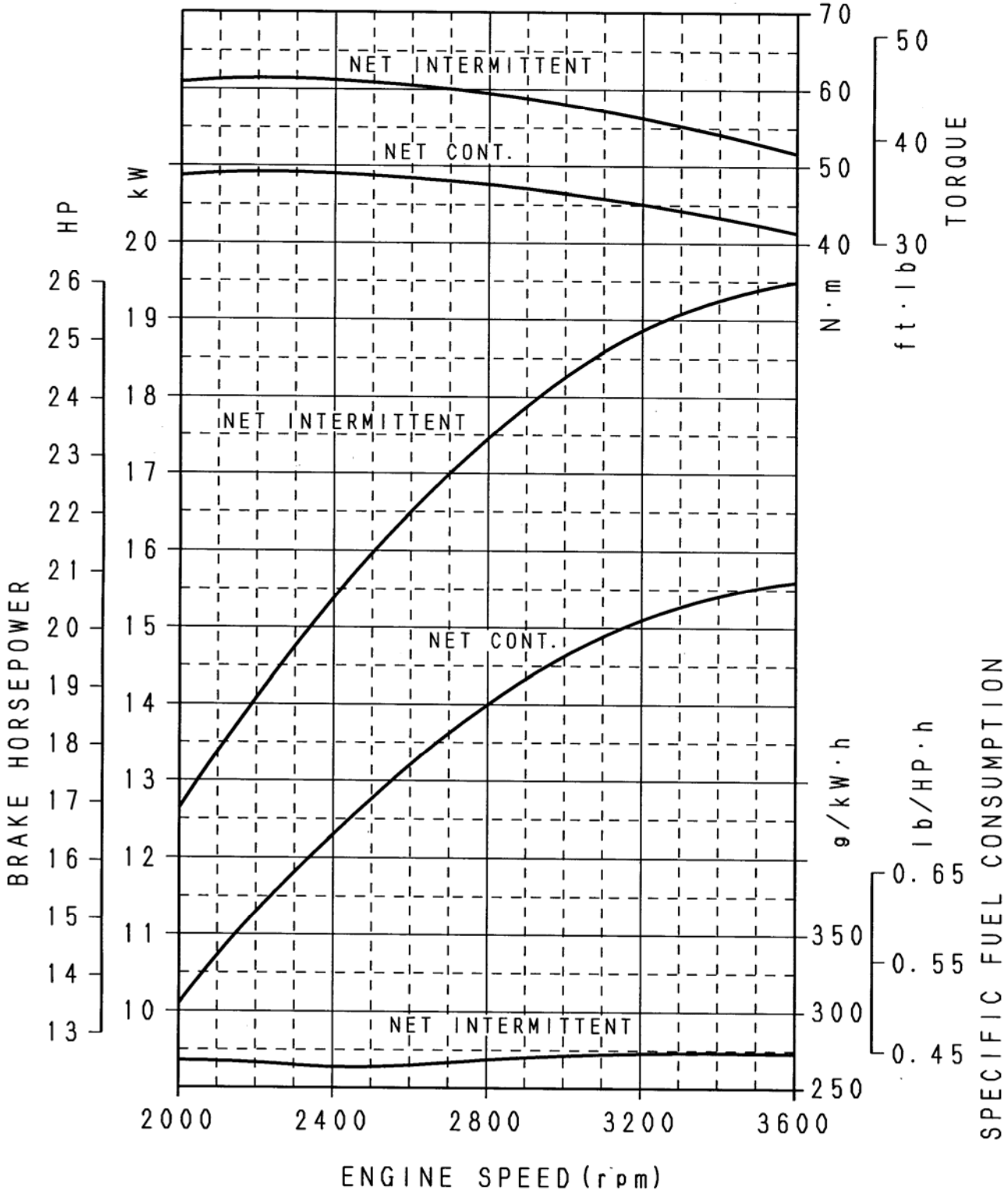
1. GENERAL SPECIFICATIONS

ITEM	UNIT	SPECIFICATIONS
Engine model		DG972-SAEH-S1
Type		Vertical, In line, 4cycle Natural Gas engine
Cooling system		Water cooling with water pump
Number of cylinders		3
Cylinder bore	mm(in)	74.5 (2.93)
Stroke	mm(in)	73.6 (2.90)
Total displacement	L(cu. in)	0.962 (58.7)
High idle	rpm	3850
Low idle	rpm	1500
Horsepower	kW(HP)	19.5(26.1)
Max. torque (SAE J1349)	Nm(ft-lb) /rpm	61.2 (45.2)/2400
Compression ratio		9.2
Firing order		1-2-3
Ignition timing		B.T.D.C.15˚/1000rpm B.T.D.C.28˚/3600rpm
Ignition system		Distributor-less Solid State type
Fuel		Natural Gas only
Direction of rotation		Counter-clockwise from flywheel side
Starting system		Electric starting with cell starter
Starter output	V-kW	12-1.0
Alternator output	V-W	12-480 (Standard)
Lubricating system		Forced lubricating by trochoid pump
Lubricating oil		Quality better than SH class
Lube. oil capacity	L(US gal)	3.4 (0.90)
Coolant capacity	L(US gal)	1.22 (0.32)
Governor type		Centrifugal flyweight mechanical type governor
Dimensions (LxBxH)	mm(in)	526x415x503 (20.7x16.3x19.8)
Dry weight	kg(lb)	Approx. 95.4(210)
Application		Stationary only

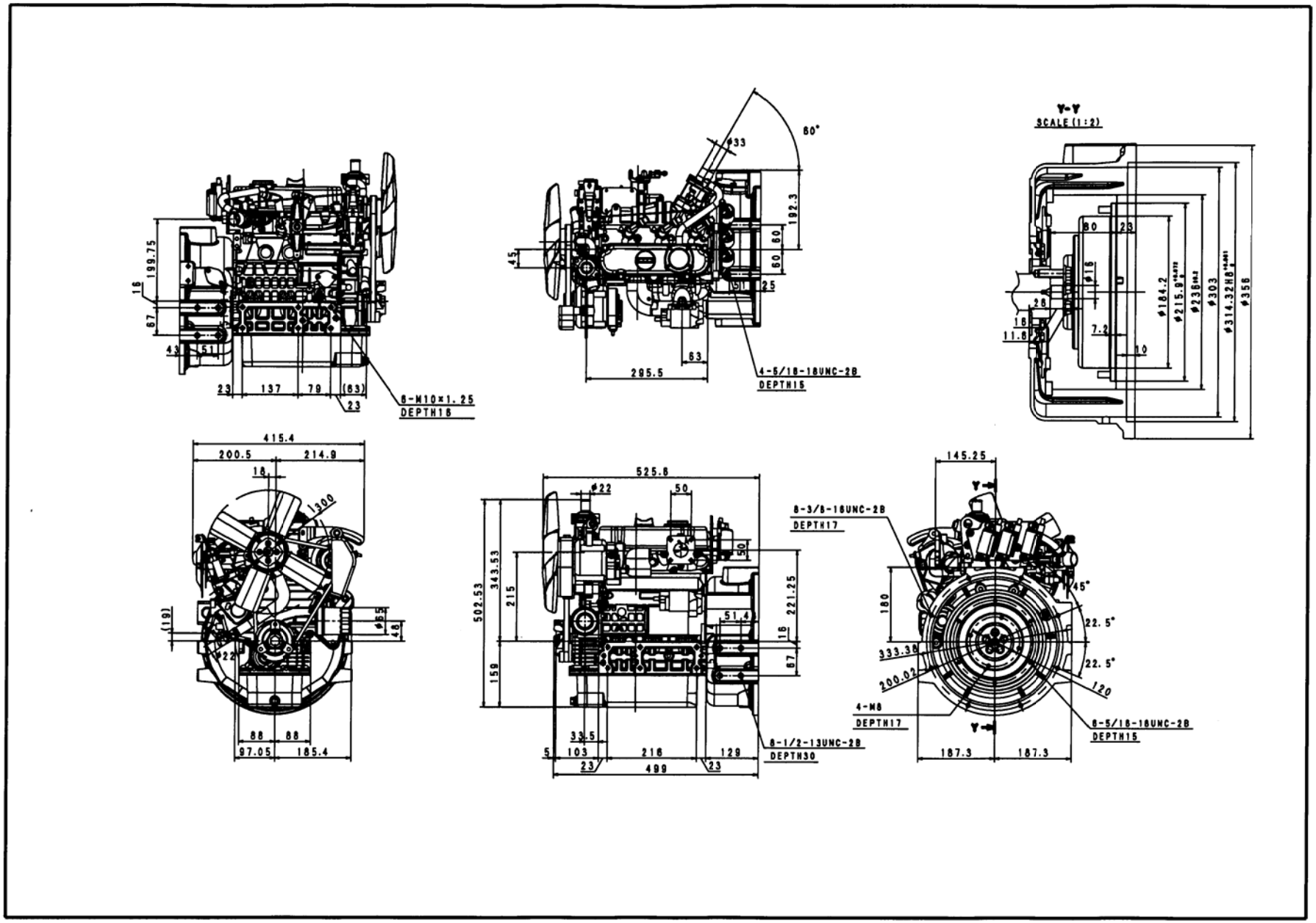
2. PERFORMANCE CURVES

DG972 PERFORMANCE CURVES

Higher calorific value : 11000kcal/m^3 (1236BTU/ft^3)



3. DIMENSIONS



4. TECHNICAL DATA

ITEM		SPECIFICATIONS
Engine model		DG972-SAEH-S1
Brake horse power		See attached sheet 4-1)
Top Clearance		1.35 to 1.65mm (0.05315 to 0.06496in)
Compression pressure		1.32MPa (192psi)
Fuel consumption		See attached sheet 4-2)
Lube. oil consumption		Max.0.67g/kWh (0.5g/HPh) at rated load
Lube. oil pressure		at idling speed: more than 69kPa (more than 9.95psi)
		at rated speed: 196 to 441kPa (28.44 to 63.99psi)
Noise level		See attached sheet 4-3)
Combustion air requirements		See attached sheet (Refer to 25deg.C and 1000hPa) 4-4)
Cooling air requirements		
Combustion and cooling air requirements		
Exhaust gas volume		See attached sheet (Refer to 25deg.C and 1000hPa) 4-5)
Cold starting limits		-15deg.C (5deg.F)
Heat rejection		See attached sheet 4-6)
Angles of tilt	Front or Rear down	30° (Less than 10min. continuous operation)
		20° (Continuous operation)
	Left or Right side down	30° (Less than 10min. continuous operation)
		20° (Continuous operation)
Valve timing		[Inlet valve] Open: TDC –20° Close: BDT +45°
		[Exhaust valve] Open: BDC –50° Close: TDC +15°
Cooling fan data		See attached sheet 4-7)
Center of gravity		See attached sheet 4-8)
Unbalanced forces of engines		See attached sheet 4-9)
Mass elastic system		See attached sheet 4-10)
Thermostat specifications		Opening temperature: 71±1.5deg.C (159.8±2.7deg.F)
		Fully opened temperature: 85deg.C (185deg.F) [at Thermostat lift:8mm (0.31in)]

4-1) BRAKE HORSE POWER

SAE J1349

Engine speed	rpm	2000	2400	2800	3200	3600
Net intermittent	kW	12.6	15.4	17.4	18.9	19.5
	HP	16.9	20.6	23.3	25.3	26.1
	PS	17.1	20.9	23.7	25.7	26.5
Net continuous	kW	10.1	12.3	13.9	15.1	15.6
	HP	13.5	16.5	18.7	20.3	20.9
	PS	13.7	16.8	18.9	20.6	21.2

Note

1. Conversion rates 1kW=1.35962PS=1.34048HP
   1PS=0.7355kW=0.985925HP
   1HP=0.7457kW=1.01428PS
2. Fuel detail Japanese standard gas
   higher calorific value : 11000kcal/m^3 (1236BTU/ft^3)
   supply pressure : 0.98 – 2.45kPa (7.35 – 18.38mmHg)

4-2) FUEL CONSUMPTION

Specific at net intermittent (SAE J1349)

Engine speed	rpm	2000	2400	2800	3200	3600
Brake horse power	kW	12.6	15.4	17.4	18.9	19.5
	HP	16.9	20.6	23.3	25.3	26.1
	PS	17.1	20.9	23.7	25.7	26.5
Fuel consumption	g/kWh	269	264	269	273	273
	g/HPh	200	197	200	204	204
	g/PSh	198	194	198	201	201
	lb/HPh	0.442	0.434	0.442	0.449	0.449

Note

1. Conversion rates 1kW=1.35962PS=1.34048HP 1kg=2.20462lb (1g=0.00220462lb)
   1PS=0.7355kW=0.985925HP 1lb=0.45359kg
   1HP=0.7457kW=1.01428PS
2. Fuel detail Japanese standard gas
   higher calorific value : 11000kcal/m^3 (1236BTU/ft^3)
   supply pressure : 0.98 – 2.45kPa (7.35 – 18.38mmHg)

4-3) NOISE LEVEL

Load × rpm	Unit	Sound pressure at 1m(3.3ft)
0/4 × 3850	dB(A)	90.0
4/4 × 3850 15.6kW (20.9HP)	dB(A)	92.0
0/4 × 1500	dB(A)	72.0

These data show the average noise level at four points.

Note

1. Measurement conditions : With radiator, cooling fan, air cleaner and muffler.

4-4) AIR REQUIREMENTS

1. Combustion air requirements (Refer to 25deg.C and 1000hPa)

rpm	2000	2400	2800	3200	3600
L/sec	12.35	14.81	17.28	19.75	22.22
m^3/h	44.44	53.33	62.22	71.11	80.00
in^3/sec	753	904	1055	1205	1356
ft^3/min	26.13	31.35	36.58	41.80	47.03

Combustion air requirements calculating formula

$Q_1=Vh \bullet N \bullet C \bullet \eta \bullet 10^{-3}$

Q_1: Amount of intake air (m^3/min)
Vh: Total displacement (L)
N: Engine speed (rpm)
C: Coefficient=0.5
η: Intake efficiency
Natural Gas: 0.77

2. Cooling air requirements (Refer to 25deg.C and 1000hPa)

rpm	2000	2400	2800	3200	3600
L/sec	571.2	737.2	824.7	833.9	764.7
m^3/h	2056	2654	2969	3002	2753
in^3/sec	34859	44984	50327	50888	46667
ft^3/min	1210.2	1561.8	1747.3	1766.7	1620.2

Above data is decided by following conditions.

1. Using the standard radiator.
2. Engine is run as open unit.

3. Combustion and cooling air requirements (Refer to 25deg.C and 1000hPa)

rpm	2000	2400	2800	3200	3600
L/sec	583.5	752.0	842.0	853.7	786.9
m^3/h	2100.4	2707.3	3031.2	3073.1	2833.0
in^3/sec	35612	45888	51382	52093	48023
ft^3/min	1236.3	1593.2	1783.9	1808.5	1667.2

Note

1. Cooling fan and fan pulley specifications(Cooling fan Part No. 15881-74112)

Item	
Fan diameter	300mm (11.81in)
No. of blade and type of shape	4, S type
Diameter of fan driving pulley	100mm (3.94in)
Diameter of fan pulley	84mm (3.31in)

2. Conversion rates

$1L=61.0237in^3=0.035315ft^3$
$1ft^3=28.3168L$
$1L/sec=3.6m^3/h=2.1189ft^3/min$

4-5) EXHAUST GAS VOLUME

Refer to 25deg.C and 1000hPa

rpm	2000	2400	2800	3200	3600
L/sec	35.46	42.55	49.65	56.74	63.83
m^3/h	127.67	153.19	178.73	204.26	229.80
in^3/sec	2164	2597	3030	3462	3895
ft^3/min	75.05	90.06	105.07	120.08	135.09

Note

1. Conversion rates $1L=61.0237in^3=0.035315ft^3$
   $1ft^3=28.3168L$
   $1L/sec=3.6m^3/h=127.133ft^3/hr$

4-6) HEAT REJECTION TO COOLING WATER

1. Specific at net intermittent (SAE J1349)

Engine speed	rpm	2000	2400	2800	3200	3600
Brake horse power	kW	12.6	15.4	17.4	18.9	19.5
	HP	16.9	20.6	23.3	25.3	26.1
	PS	17.1	20.9	23.7	25.7	26.5
Fuel consumption	g/kWh	269	264	269	273	273
	g/HPh	200	197	200	204	204
	g/PSh	198	194	198	201	201
	lb/HPh	0.442	0.434	0.442	0.449	0.449
Heat rejection to cooling water	MJ/h	29.05	31.52	38.79	45.13	51.82
	kcal/h	6940	7529	9267	10781	12379
	BTU/h	12491	13551	16679	19404	22281

Note

Heat rejection to cooling water calculating formula

Ho=Hu•Ne•be•i

Ho: Heat rejection to cooling water

Hu: Fuel low calorific value

Japanese standard gas; 49.4MJ/kg, 11800kcal/h, 212391BTU/lb

Ne: Brake horse power

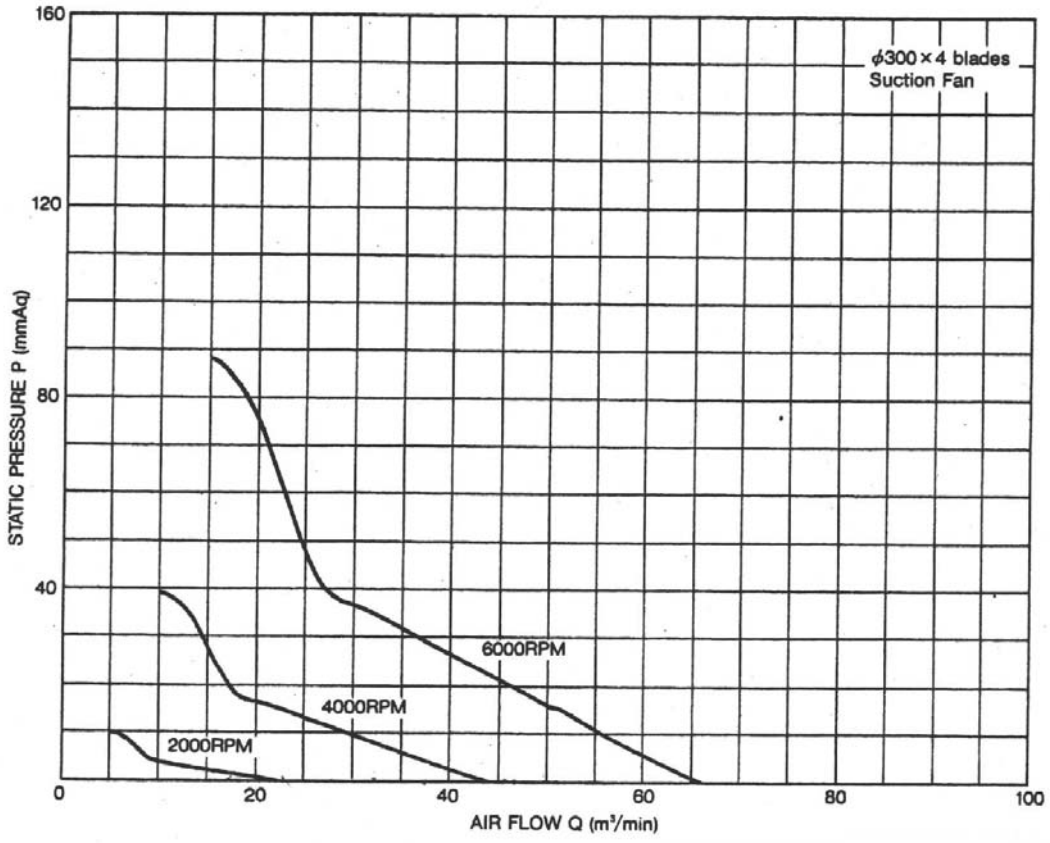
Be: Specific fuel consumption

i: Dispersion ratio to cooling water

4-7) COOLING FAN DATA

1. Performance curves <P-Q>

- Part No. 15881-74110 (Applicable for DG972)



4-8) CENTER OF GRAVITY

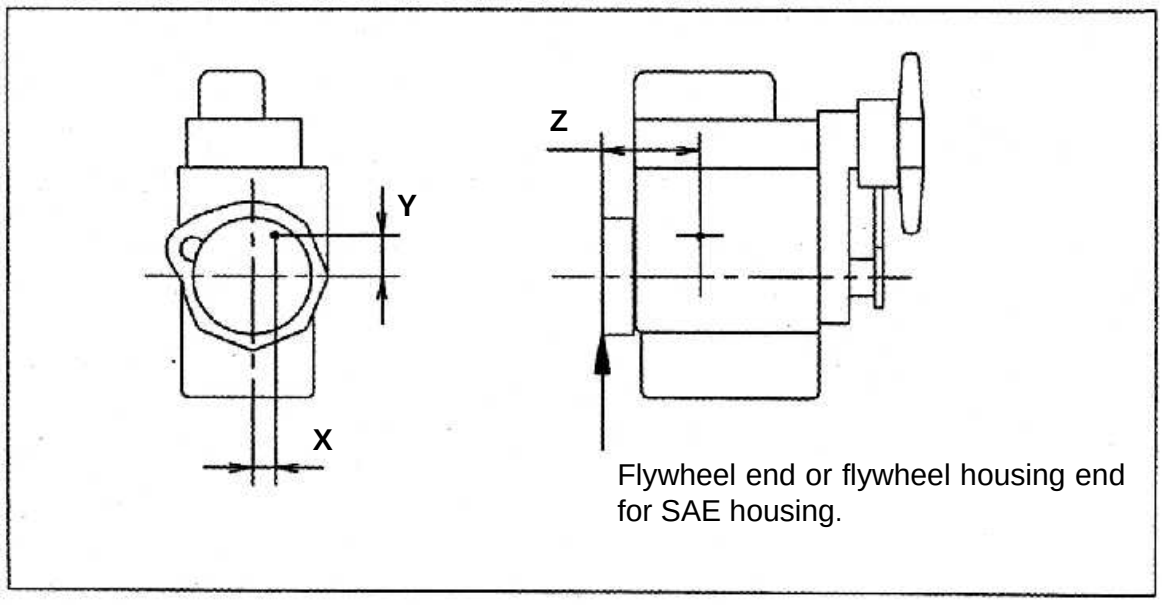
1. With standard flywheel and rear-end plate

Model	Dry weight kg (lb)	Center of gravity		
		X mm (in)	Y mm (in)	Z mm (in)
WG/DF972	72.0 (159)	-25.5 (-1.00)	73.3 (2.89)	179.5 (7.07)

2. With SAE flywheel and flywheel housing

Model	Dry weight kg (lb)	Center of gravity		
		X mm (in)	Y mm (in)	Z mm (in)
DG972 -SAEH-S1	95.4 (210)	-10.0 (0.39)	28.0 (1.10)	207.0 (8.15)

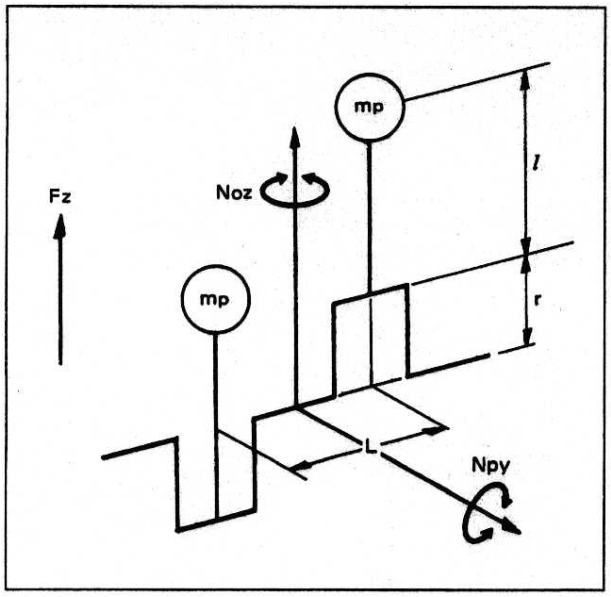
Note
Cooling water and lubricating oil weight is not included in above engine weight.



Flywheel end or flywheel housing end for SAE housing.

4-9) UNBALANCED FORCES OF ENGINES

1. Base data



FZ: Unbalanced inertia force
Npy, Noz: Unbalanced inertia couple
mp: Reciprocating mass
r: Crank radius
l: Center distance of connecting rod
L: Cylinder distance
ω: Angular velocity

ω=2πn/60	n: Engine speed(rpm)

l=0.098m r=0.0368m L=0.080m	Cylinder bore (mm)	mp (kg)
	74.5	0.37/9.80665

2. Unbalanced inertia force and couple

($x\omega^2$)

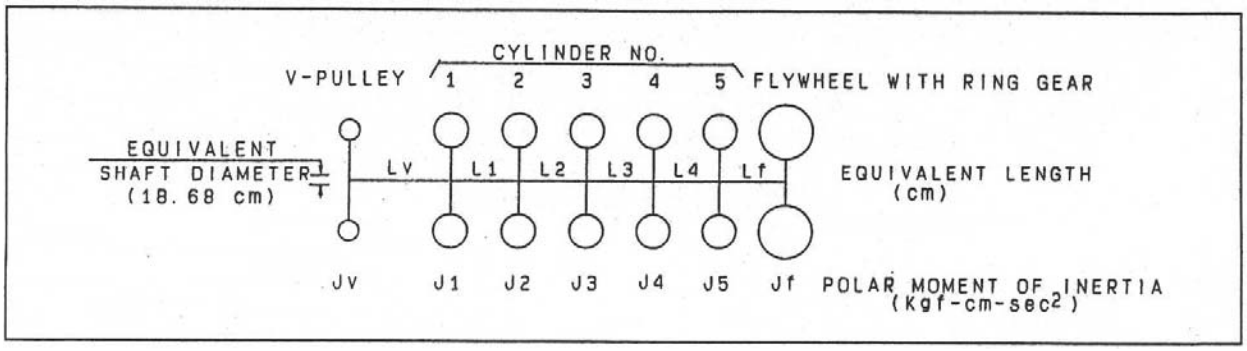
Model	No. of Cylinder	Cylinder Bore	Order	Fz	Npy	Noz
WG/DF/DG 972	3	74.5mm	1	0	0.000096	0.000096
			2	0	0.000072	0

▼An example of calculation

Calculation condition	ω^2	Fz, Npy, Noz		
			Order	Calculation
Engine model DG972 Engine speed 3600(rpm)	$[2 \times \pi \times 3600/60]^2$ =142122	Fz	1	0
			2	0
		Npy	1	0.000096 × 142122=13.6kg
			2	0.000072 × 142122=10.2kg
		Noz	1	0.000096 × 142122=13.6kg
			2	0

4-10) MASS ELASTIC SYSTEM

Equivalent torsional vibration data



MODEL	EQUIVALENT LENGTH (cm)				POLAR MOMENT OF INERTIA (kgfcm-sec^2)				
	LV	L1	L2	Lf	JV	J1	J2	J3	Jf
DG972 -SAEH-S1	35082	4528	4528	2824	0.013	0.026	0.026	0.026	1.281

Note: Flywheel E8052-25110, V-Pulley 16861-74280

5. FUEL SYSTEM AND FUEL DIAGRAM

- **All fuel connections added to this engine must be installed by qualified personnel utilizing recognized procedures and standards.**
- **These non-KUBOTA installed parts, such as hoses, shutoff solenoid valve should be approved for Natural gas use.**
- **An approved, listed fuel filter and shutoff solenoid valve must be installed between the gas tank and Kubota regulator.**
- **Two fuel cut solenoids must be installed in series before the regulator on the fuel supply line for safety (backup) purpose.**

1. Tightening torque and leak check

1) The joint must be installed to the gas entrance of the regulator by screw with O-ring. Screw is tightened to the specified torque using a driver, and leak check must be performed as shown in the below table.
2) The connector on the gas mixer may be mounted on any position since it is not sealed. The lock nut may be loosened using a wrench. The connector may be changed to any specified angle. The lock nut should be tightened to the specified torque using a wrench as shown in the below table.

[TIGHTENING TORQUE AND LEAK CHECK]

			Tightening torque			Leak check pressure
	Qty.	Size	Nm	kgfm	ft-lb	
SCREW	2	M4	1.9 to 2.9	0.2 to 0.3	1.5 to 2.2	Soap solution or its equivalent
LOCK NUT	1	M16 × 1	19.6 to 39.2	2.0 to 4.0	14.5 to 28.9	

2. Setting of the regulator

1) Install the regulator in **UPRIGHT** position, it must be installed within 4G vibration level. If not, it may not supply necessary fuel to the engine.
2) **DO NOT** connect any extension hose to the air vent pipe of the regulator. This may cause an improper supply of fuel to the engine.

3. Caution for FUEL SYSTEM

The standard engine is equipped with ϕ6.6 jet for the fuel calorific gas value of 11000kcal/m^3 (1236BTU/ft^3).
When the engine is operated with the different calorific gas, it is necessary to select the correct jet of the mixer.
In that case, refer to the manual **[Adjustment for Natural Gas Engine DG972]**.

Japanese standard gas higher calorific value : 11000kcal/m^3 (1236BTU/ft^3)
supply pressure : 0.98 – 2.45kPa (7.35 – 18.38mmHg)

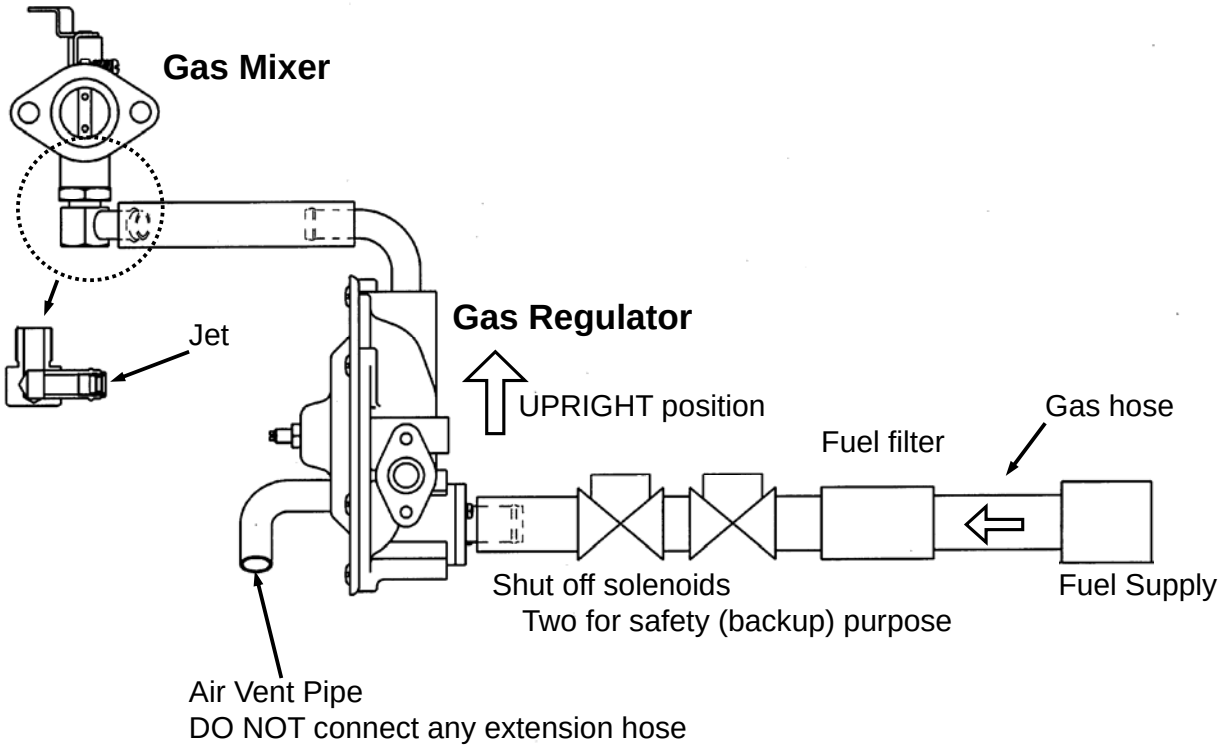
Equipments Vacuum Meter : Not KUBOTA supplied
Adjustable Jet : Service Tool

4. Application Check Item

The items as shown below must be managed for all engines, and these items must be informed to KUBOTA with Application Check results.
Refer to the attached sheet **[Application Check Sheet for DG972]**.

1) The diameter of the jet (with the intake vacuum curve)
2) The calorific value of the gas
3) The supply pressure of gas
4) The serial number of the engine

5. Fuel diagram



NATURAL GAS ENGINE

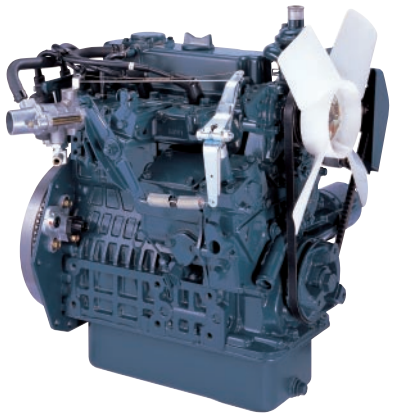
KUBOTA DG SERIES (3-cylinder)

DG972-E2

2 EPA Tier

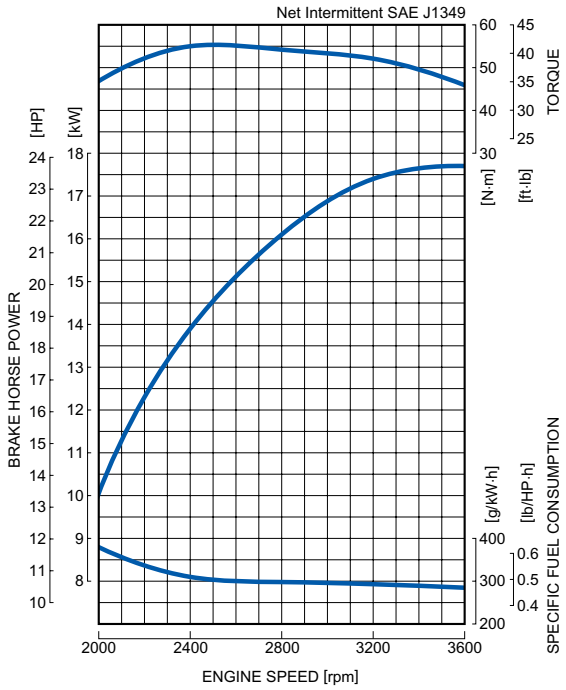
RATED POWER

17.6kW@3600rpm



Photograph may show non-standard equipment.

PERFORMANCE CURVE



FEATURES and BENEFITS

New Engine Series

- The Kubota DG Series offers a new solution to the increasing needs for natural gas engine. The diesel engine based Kubota DG Series gives users the same foot-print, reliability and durability of D902, WG972, and DF972 acknowledged as the world's top quality small industrial engines.
- Kubota offers SAE Flywheel Housing and Rear End Plate specifications for the DG972 engine. These options offer users flexible Power Take Off (PTO) choices.
- The Kubota DG Series is designed to endure use outdoors under severe environment. This series is equipped with a bypass breather tube to avoid freezing below zero.

Emission

- Kubota DG Series complies with EPA Tier 2 Emissions Regulations. EPA regulation is one of the most stringent emissions regulations in the world.

Best Fuel System

- Specialized for Natural Gas use, the DG972 engine eliminated the carburetor, regulator and a fuel filter parts, which are only necessary for Gasoline or LPG use. Also, Kubota adopts the best jet set and the ignition timing that provides the best engine performance in severe conditions.

Ease maintenance cost and time

- Mechanical governor system will contribute to lower maintenance cost and prevents users from having to deal with complicated electric maintenance. Moreover, water resistant spark plug caps are adopted for outdoor use.

DG972-E2

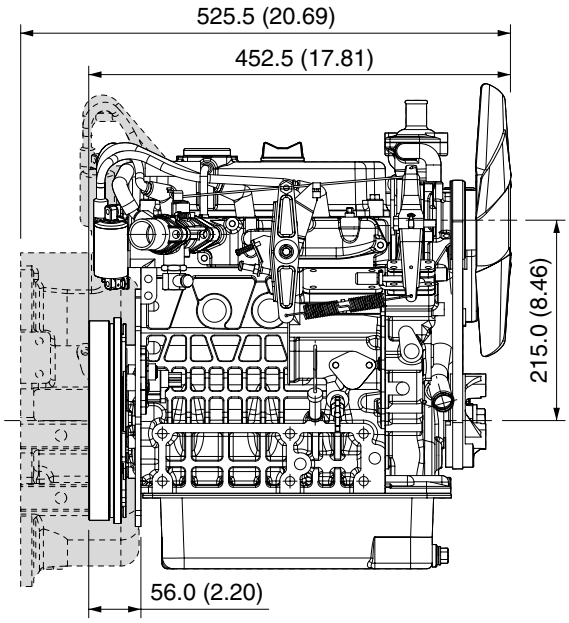
KUBOTA DG SERIES

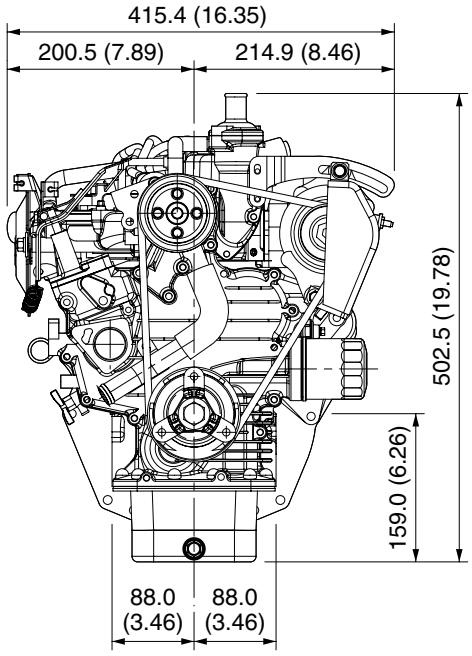
GENERAL SPECIFICATION

Model		DG972-E2
Emission Regulation		Tier 2
Type		Vertical 4-cycle Liquid Cooled Natural Gas
Number of Cylinders		3
Bore	mm (in)	74.5 (2.93)
Stroke	mm (in)	73.6 (2.9)
Displacement	L (cu.in)	0.962 (58.70)
Fuel		Natural Gas
Intake System		Naturally Aspirated
Maximum Speed	rpm	3600
Output: Net Intermittent	kW	17.6
	hp	23.6
	ps	23.9
Direction of Rotation		Counterclockwise Viewed on Flywheel
Oil Pan Capacity	L (gal)	3.7 (0.98)
Starter Capacity	V-kW	12-1.0
Alternator Capacity	V-A	12-40
Length	mm (in)	525.5 (20.69)*1 / 452.5 (17.81)*2
Width	mm (in)	415.4 (16.35)
Height (1)	mm (in)	502.5 (19.78)
Height (2)	mm (in)	159.0 (6.26)
Dry Weight	kg (lb)	72.0 (158.7)*1 / 95.4 (210.3)*2

*Specification is subject to change without notice.
*Output: Net Intermittent SAE J1349
*Dry weight is according to Kubota's standard specification.
When specification varies, the weight will vary accordingly.
*1 with SAE Flywheel and Housing
*2 with Rear End Plate

DIMENSIONS





Kubota

Your Driving Force
KUBOTA ENGINE

KUBOTA Corporation
2-47, Shikitsuhigashi 1-chome, Naniwa-ku, Osaka, 556-8601 Japan
Fax: 06-6648-3521
http://www.engine.kubota.co.jp

1334-01-COM '08.09. .STD

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:	2014

Emission Unit Description: Condensate Loading, Produced Water Loading

Loading Area Data

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

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

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

Provide description of closed vent system and any bypasses

Are any of the following truck loadout systems utilized? Yes

☐ Closed System to Tanker Truck passing a MACT level annual leak test?

☑ Closed System to Tanker Truck passing a NSPS level annual leak test?

☑ Closed System to Tanker Truck not passing an annual leak test and has vapor return?

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

Time	Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec
Hours/day	6	6	6	6
Days/week	7	7	7	7

Bulk Liquid Data (use extra pages as necessary)

Liquid Name		Condensate	Produced Water	
Max. Daily Throughput (1000 gal/day)		21.00	42.00	
Max. Annual Throughput (1000 gal/yr)		7665.00	15330.00	
Loading Method		BF	BF	
Max. Fill Rate (gal/min)		168	168	
Average Fill Time (min/loading)		50	50	
Max. Bulk Liquid Temperature (F)		63.8	63.8	
True Vapor Pressure		1.57	0.45	
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)	6.2770	0.0013	
	Annual (ton/yr)	2.3866	0.0010	
Max HAP Emission Rate	Loading (lb/hr)	0.0129	3.02E-06	
	Annual (ton/yr)	0.0049	2.29E-06	
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#:	EC001-03	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
TANKCOND001-007	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
28.06 (scfm)	2,043.75 BTU/ft^3	0.0537 (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

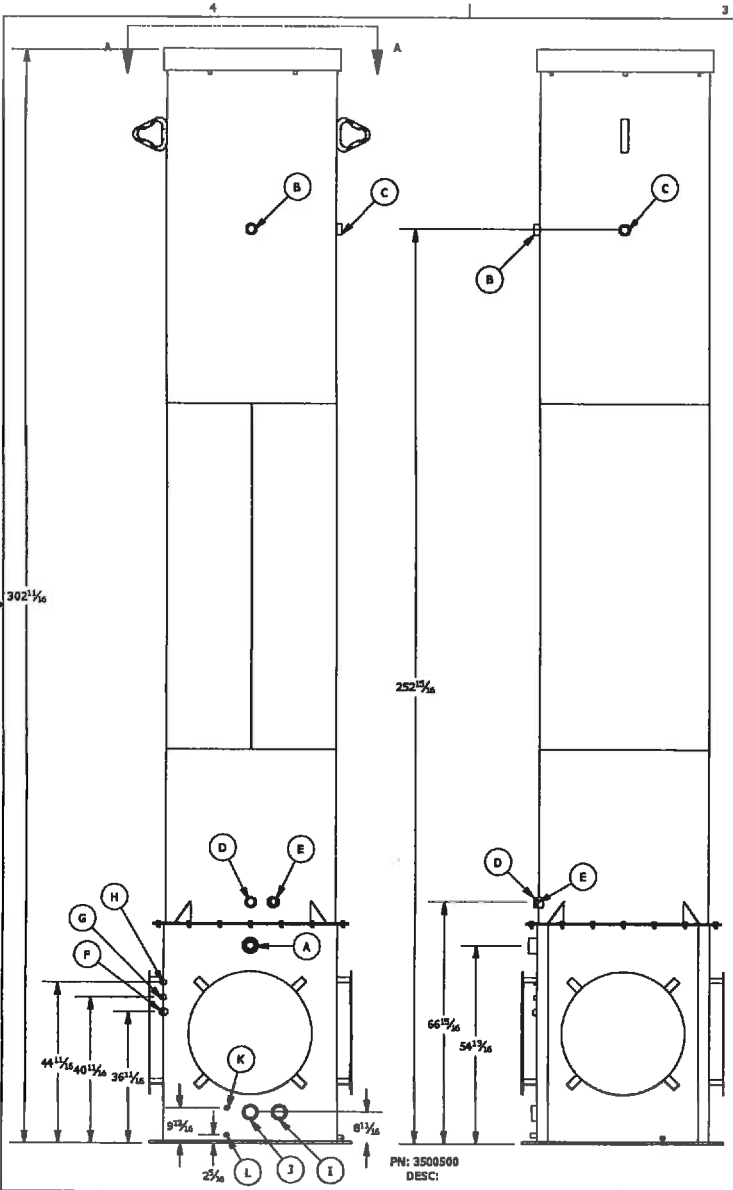
If automatic re-ignition is used, please describe the method. Flame Rectification, a thermocouple equivalent

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

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

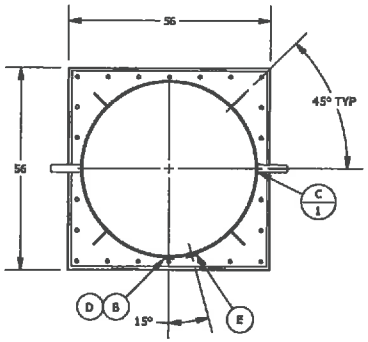
Additional information attached? ☑ Yes ☐ No Manufacturer's specs sheet

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
Hamilton 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	Hamilton Well Pad
Nearest City/Town	Shirley
API Number/SIC Code	1311
Latitude/Longitude	39.36775, -80.743689
County	Doddridge County

Technical Information	
Max Condensate Site Throughput (bbl/day):	500
Max Produced Water Site Throughput (bbl/day):	1,000
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	7
IC Engines	1
Gas Production Unit Heaters	7
Line Heaters	7
Condensate Tanks	7
Produced Water Tanks	2
Loading Jobs	2
Enclosed Combustors	3

Table 2

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

Emission Source	VOC		NO_x		CO_{2e}		CO		SO_2		$PM_{2.5}$		PM_{10}		Lead		Total HAPs		Benzene		Xylenes		Formaldehyde	
	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)
UNCONTROLLED (Fugitives, Storage Tanks, Engine, Gas Production Unit Heaters, Line Heaters)																								
Fugitive Emissions (Component Count, PCV and Hauling)[1]	2.7310	11.9619			62.978	275.84							0.3997	0.2557			0.2369	1.0374	0.0016	0.0072	5.13E-02	2.25E-01		
Flashing, Working and Breathing (F/W/B) Losses[2]	120.5787	528.1349			277.2011	1214.1407											2.8925	12.6692	0.0723	0.3168	0.1657	0.7259		
Engine Emissions[3]	7.10E-03	3.11E-02	3.16E-01	1.38E+00	2.78E+01	1.22E+02	5.64E+00	2.47E+01	1.41E-04	6.18E-04	2.38E-03	1.04E-02	2.28E-03	9.99E-03			5.51E-03	2.41E-02	3.79E-04	1.66E-03	4.68E-05	2.05E-04	4.92E-03	2.15E-02
Gas Production Unit Heater Emissions[4]	0.0463	0.2028	0.8420	3.6879	1,010.38	4,425.45	0.7073	3.0978	0.0051	0.0221	0.0640	0.2803	0.0640	0.2803	4.21E-06	1.84E-05	1.58E-02	6.94E-02	1.77E-05	7.74E-05			0.0006	0.0028
Line Heater Emissions[4]	0.0617	0.2704	1.1226	4.9172	1,347.17	5,900.60	0.9430	4.1304	0.0067	0.0295	0.0853	0.3737	0.0853	0.3737	5.61E-06	2.46E-05	2.11E-02	9.26E-02	2.36E-05	1.03E-04			0.0008	0.0037
TOTALS:	**123.4249**	**540.6012**	**2.2804**	**9.9881**	**2725.5005**	**11937.6922**	**7.2948**	**31.9510**	**0.0119**	**0.0522**	**0.1517**	**0.6644**	**0.5513**	**0.9196**	**9.82E-06**	**4.30E-05**	**3.1719**	**13.8927**	**0.0744**	**0.3258**	**0.2171**	**0.9507**	**0.0064**	**0.0280**
TOTALS (Excluding Fugitives):	**120.6939**	**528.6393**	**2.2804**	**9.9881**	**2662.5225**	**11661.8487**	**7.2948**	**31.9510**	**0.0119**	**0.0522**	**0.1517**	**0.6644**	**0.1516**	**0.6640**	**9.82E-06**	**4.30E-05**	**2.9350**	**12.8553**	**0.0727**	**0.3186**	**0.1658**	**0.7261**	**0.0064**	**0.0280**
UNCONTROLLED (Truck Loading Emissions)																								
Truck Loading Emissions[5]	6.2783	2.3875			3.2333	1.6037											0.0129	4.92E-03	0.0002	7.91E-05	0.0022	8.27E-04		
CONTROLLED EMISSIONS																								
Enclosed Combustor Emissions (from F/W/B losses)[6]	2.4118	10.5636	0.1722	0.7541	533.0871	2334.9215	0.1446	0.6334	2.27E-05	0.0001	0.0098	0.0430	0.0131	0.0573	8.61E-07	3.77E-06	0.0579	0.2537	0.0014	0.0063	0.0033	0.0145	2.84E-06	1.24E-05
Controlled Fugitive Emissions from Hauling													0.1999	0.1278										
TOTALS:	**2.41E+00**	**1.06E+01**	**1.72E-01**	**7.54E-01**	**5.33E+02**	**2.33E+03**	**1.45E-01**	**6.33E-01**	**2.27E-05**	**9.93E-05**	**9.81E-03**	**4.30E-02**	**2.13E-01**	**1.85E-01**	**8.61E-07**	**3.77E-06**	**5.79E-02**	**2.54E-01**	**1.45E-03**	**6.34E-03**	**3.31E-03**	**1.45E-02**	**2.84E-06**	**1.24E-05**
POTENTIAL TO EMIT[7]	**5.2580**	**25.4174**	**2.4526**	**10.7422**	**2981.3865**	**13060.0767**	**7.4394**	**32.5844**	**0.0120**	**0.0523**	**0.1615**	**0.7074**	**0.3645**	**0.8491**	**1.07E-05**	**4.68E-05**	**0.3373**	**1.4821**	**0.0035**	**0.0155**	**0.0546**	**0.2402**	**0.0064**	**0.0280**
POTENTIAL TO EMIT (Excluding Fugitives)	**2.5269**	**11.0680**	**2.4526**	**10.7422**	**2918.4086**	**12782.6295**	**7.4394**	**32.5844**	**0.0120**	**0.0523**	**0.1615**	**0.7074**	**0.1647**	**0.7213**	**1.07E-05**	**4.68E-05**	**0.1004**	**0.4398**	**0.0019**	**0.0082**	**0.0034**	**0.0147**	**0.0064**	**0.0280**

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 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 500 barrels per day, VOC emissions would be 6.2783 pounds per hour when there are truck loading activities. Average hourly VOC emissions from truck loading is 0.5451 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, engine, 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

Hamilton Well Pad

Doddridge County, West Virginia

Antero Resources Corporation

Pollutant		Emissions		Threshold Exceeded?		
		Uncontrolled	Controlled	Threshold	Uncontrolled	Controlled
VOC	lbs/hr	123.4249	5.2580	6	**Yes**	
	tons/yr	542.9887	25.4174	10	**Yes**	**Yes**
NO_X	lbs/hr	2.2804	2.4526	6		
	tons/yr	9.9881	10.7422	10		**Yes**
CO	lbs/hr	7.2948	7.4394	6	**Yes**	**Yes**
	tons/yr	31.9510	32.5844	10	**Yes**	**Yes**
SO_2	lbs/hr	0.0119	0.0120	6		
	tons/yr	0.0522	0.0523	10		
$PM_{2.5}$	lbs/hr	0.1517	0.1615	6		
	tons/yr	0.6644	0.7074	10		
PM_{10}	lbs/hr	0.5513	0.3645	6		
	tons/yr	0.9196	0.8491	10		
Lead	lbs/hr	9.82E-06	1.07E-05	6		
	tons/yr	4.30E-05	4.68E-05	10		
Total HAPs	lbs/hr	3.1719	0.3373	2	**Yes**	
	tons/yr	13.8976	1.4821	5	**Yes**	
Total TAPs	lbs/hr	0.0808	0.0099	1.14		
n-Hexane	lbs/hr	2.5911	0.2328			
	tons/yr	11.3523	1.0229			
Toluene	lbs/hr	0.1690	0.0159			
	tons/yr	0.7405	0.0701			
Ethylbenzene	lbs/hr	0.1139	0.0240			
	tons/yr	0.4992	0.1053			
Xylenes	lbs/hr	0.2171	0.0546			
	tons/yr	0.9515	0.2402			
Benzene	lbs/hr	0.0744	0.0035			
	tons/yr	0.3259	0.0155			

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
Hamilton Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

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

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

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

Light Liquid Weight Fraction From Analysis:	VOC frac	0.969
	Benzene frac	0.001
	Toluene	0.006
	Ethylbenzene	0.011
	Xylenes	0.026
	n-hexane	0.028
	HAPs	0.071
	Methane	0.011

Light Liquid					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
364	Valves	Light Liquid VOC	0.002500	0.88	16,990.62
		Light Liquid Non-VOC	0.002500	0.03	546.90
		Light Liquid HAPs	0.002500	0.06	1,250.30
		CO2e	0.002500	0.25	4753.33
			Total VOC:	0.88	16,990.62
			Total THC:	0.91	17,537.52

Fugitive Total Emissions			
	Annual Emissions (lb/yr)	Annual Emissions (lb/hr)	Annual Emissions (tpy)
VOC	23,221.76	2.65	11.61
Ethylbenzene		0.02	0.10
Toluene		0.01	0.06
Xylenes		0.05	0.22
n-Hexane		0.14	0.61
TAPs (Benzene)		0.00	0.01
HAPs		0.23	1.00
CO_{2e}	496,298.33	56.66	248.15

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
Hamilton Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Number of PCVs	28
Bleed Rate (scf/day/PCV)	6.6
Total Bleed Rate (scf/day)	184.8

Component	Mol%	Molecular Weight (lb/lb-mole)	Component Flow (scf/day)	Component Moles (lb-moles)	Component Emissions (lbs/day)	(lbs/hr)	(tons/year)
H2S	0.00E+00	34.08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.4946	14.01	0.9140208	2.41E-03	0.03	1.41E-03	0.01
Carbon Dioxide	0.1467	44.01	0.2711016	7.14E-04	0.03	1.31E-03	5.74E-03
Methane	77.6927	16.04	143.5761096	0.38	6.07	0.25	1.11
Ethane	14.1987	30.07	26.2391976	0.07	2.08	0.09	0.38
Propane	4.4938	44.1	8.3045424	0.02	0.97	0.04	0.18
Isobutane	0.5666	58.12	1.0470768	2.76E-03	0.16	0.01	0.03
n-Butane	1.1838	58.12	2.1876624	5.76E-03	0.34	0.01	0.06
Isopentane	0.3749	72.15	0.6928152	1.83E-03	0.13	5.49E-03	0.02
n-Pentane	0.2914	72.15	0.5385072	1.42E-03	0.10	4.27E-03	0.02
2-Methylpentane	0.00E+00	86.18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3-Methylpentane	0.00E+00	86.18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.5451	86.18	1.0073448	2.65E-03	0.23	0.01	0.04
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	0.0801	0.3510
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	0.0095	0.0418
HAPs Emissions	0.0095	0.0418
TAPs Emissions	0.00E+00	0.00E+00
CO_{2e} emissions	6.3229	27.6943

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
Hamilton 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	0.1002	0.1568	0.6867	2.7455	0.1729	0.7573
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0063	0.0099	0.0434	0.4032	0.0254	0.1112
Carbon Dioxide	0.0536	0.0840	0.3678	0.8615	0.0543	0.2376
Methane	4.4842	7.0198	30.7466	62.2169	3.9180	17.1609
Ethane	25.1780	39.4144	172.6351	21.5125	1.3547	5.9337
Propane	30.7140	48.0806	210.5930	8.5527	0.5386	2.3590
Isobutane	7.4544	11.6693	51.1116	0.4755	0.0299	0.1312
n-Butane	13.9397	21.8216	95.5787	1.6995	0.1070	0.4688
Isopentane	5.1470	8.0572	35.2906	0.3782	0.0238	0.1043
n-Pentane	4.1391	6.4795	28.3802	0.2898	0.0183	0.0799
2-Methylpentane	1.8244	2.8560	12.5091	0.0578	0.0036	0.0159
3-Methylpentane	0.8857	1.3865	6.0729	0.0747	0.0047	0.0206
n-Hexane	1.5271	2.3905	10.4704	0.0382	0.0024	0.0105
Methylcyclopentane	0.3101	0.4854	2.1262	0.0761	0.0048	0.0210
Benzene	0.0432	0.0677	0.2963	0.0689	0.0043	0.0190
2-Methylhexane	0.6713	1.0508	4.6026	0.0187	0.0012	0.0052
3-Methylhexane	0.5230	0.8187	3.5859	0.0152	0.0010	0.0042
Heptane	0.9984	1.5630	6.8458	0.0304	0.0019	0.0084
Methylcyclohexane	0.5789	0.9062	3.9691	0.0933	0.0059	0.0257
Toluene	0.0932	0.1459	0.6390	0.1398	0.0088	0.0386
Octane	0.8876	1.3894	6.0857	0.0161	0.0010	0.0044
Ethylbenzene	0.0543	0.0851	0.3726	0.0804	0.0051	0.0222
m & p-Xylene	0.0325	0.0508	0.2227	0.0476	0.0030	0.0131
o-Xylene	0.0653	0.1022	0.4476	0.0991	0.0062	0.0273
Nonane	0.2260	0.3538	1.5496	0.0063	0.0004	0.0017
C10+	0.0625	0.0978	0.4284	0.0020	0.0001	0.0005
Total VOCs	70.178	109.86	481.2	12.260	0.7721	3.3817
Total CO_{2e}		175.58	769.0		98.00	429.3
Total TAPs (Benzene)		0.0677	0.2963		0.0043	0.0190
Toluene		0.1459	0.6390		0.0088	0.0386
Ethylbenzene		0.0851	0.3726		0.0051	0.0222
Xylenes		0.1530	0.6703		0.0092	0.0405
n-Hexane		2.391	10.470		0.0024	0.0105
Total HAPs		2.842	12.449		0.0299	0.1308
Total	100.00	156.54	685.7	100.00	6.297	27.58

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

Table 7

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

Condensate Tank Information	
Number of Tanks	7
Maximum Working Losses (lbs/hr)	6.3021
Maximum Breathing Losses (lbs/hr)	8.4521
# 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	0.0002	1.47E-05	6.45E-05	0.0000	0.0001	0.0000	0.0002
Carbon Dioxide	0.0567	0.0036	0.0157	0.0048	0.0210	0.0084	0.0367
Methane	0.9639	0.0607	0.2661	0.0815	0.3568	0.1422	0.6229
Ethane	31.5502	1.9883	8.7088	2.6667	11.6799	4.6550	20.3888
Propane	32.6691	2.0588	9.0177	2.7612	12.0942	4.8201	21.1119
Isobutane	7.3627	0.4640	2.0323	0.6223	2.7257	1.0863	4.7580
n-Butane	13.5360	0.8530	3.7364	1.1441	5.0111	1.9971	8.7474
Isopentane	4.7359	0.2985	1.3073	0.4003	1.7532	0.6987	3.0605
n-Pentane	3.7631	0.2372	1.0387	0.3181	1.3931	0.5552	2.4319
2-Methylpentane	1.6241	0.1023	0.4483	0.1373	0.6012	0.2396	1.0495
3-Methylpentane	0.7863	0.0496	0.2171	0.0665	0.2911	0.1160	0.5082
n-Hexane	0.0922	0.0058	0.0254	0.0078	0.0341	0.0136	0.0596
Methylcyclopentane	0.2550	0.0161	0.0704	0.0216	0.0944	0.0376	0.1648
Benzene	0.0022	1.39E-04	0.0006	0.0002	0.0008	0.0003	0.0014
2-Methylhexane	0.0378	2.38E-03	0.0104	0.0032	0.0140	0.0056	0.0245
3-Methylhexane	0.4441	0.0280	0.1226	0.0375	0.1644	0.0655	0.2870
Heptane	0.7807	0.0492	0.2155	0.0660	0.2890	0.1152	0.5045
Methylcyclohexane	0.4570	0.0288	0.1261	0.0386	0.1692	0.0674	0.2953
Toluene	0.0101	6.35E-04	2.78E-03	0.0009	0.0037	0.0015	0.0065
Octane	0.6529	0.0411	0.1802	0.0552	0.2417	0.0963	0.4219
Ethylbenzene	0.0111	6.97E-04	3.05E-03	0.0009	0.0041	0.0016	0.0071
m & p-Xylene	0.0085	5.37E-04	2.35E-03	0.0007	0.0032	0.0013	0.0055
o-Xylene	0.0148	9.34E-04	0.0041	0.0013	0.0055	0.0022	0.0096
Nonane	0.1504	0.0095	0.0415	0.0127	0.0557	0.0222	0.0972
C10+	0.0349	2.20E-03	0.0096	0.0029	0.0129	0.0051	0.0225
Total VOCs	67.429	4.2494	18.612	5.6992	24.9623	9.9486	43.575
Total CO_{2e}		1.5222	6.6673	2.0415	8.9419	3.5637	15.609
Total TAPs (Benzene)		1.39E-04	6.11E-04	0.0002	0.0008	0.0003	0.0014
Toluene		6.35E-04	2.78E-03	0.0009	0.0037	0.0015	0.0065
Ethylbenzene		6.97E-04	3.05E-03	0.0009	0.0041	0.0016	0.0071
Xylenes		1.47E-03	0.0064	0.0020	0.0086	0.0034	0.0151
n-Hexane		0.0058	0.0254	0.0078	0.0341	0.0136	0.0596
Total HAPs		0.0088	0.0383	0.0117	0.0514	0.0205	0.0898
Total	100.00	6.3021	27.6031	8.4521	37.0202	14.7542	64.623

Table 7

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

Produced Water Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.0553
Maximum Breathing Losses (lbs/hr)	0.0081

	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	0.0079	4.36E-06	1.91E-05	6.38E-07	2.80E-06	5.00E-06	2.19E-05
Carbon Dioxide	1.1365	0.0006	0.0028	0.0001	0.0004	0.0007	0.0032
Methane	3.3849	0.0019	0.0082	0.0003	0.0012	0.0021	0.0094
Ethane	1.0801	0.0006	0.0026	0.0001	0.0004	0.0007	0.0030
Propane	0.1047	5.78E-05	0.0003	8.46E-06	3.71E-05	6.63E-05	0.0003
Isobutane	0.0007	4.03E-07	1.76E-06	5.89E-08	2.58E-07	4.62E-07	2.02E-06
n-Butane	0.0039	2.17E-06	9.49E-06	3.17E-07	1.39E-06	2.48E-06	1.09E-05
Isopentane	0.0002	1.21E-07	5.29E-07	1.77E-08	7.74E-08	1.38E-07	6.07E-07
n-Pentane	0.0001	6.75E-08	2.96E-07	9.88E-09	4.33E-08	7.74E-08	3.39E-07
2-Methylpentane	4.65E-06	2.57E-09	1.13E-08	3.76E-10	1.65E-09	2.95E-09	1.29E-08
3-Methylpentane	1.46E-05	8.06E-09	3.53E-08	1.18E-09	5.16E-09	9.24E-09	4.05E-08
n-Hexane	1.19E-07	6.58E-11	2.88E-10	9.63E-12	4.22E-11	7.54E-11	3.30E-10
Methylcyclopentane	3.19E-05	1.76E-08	7.73E-08	2.58E-09	1.13E-08	2.02E-08	8.86E-08
Benzene	8.89E-05	4.91E-08	2.15E-07	7.18E-09	3.15E-08	5.63E-08	2.47E-07
2-Methylhexane	2.46E-08	1.36E-11	5.97E-11	1.99E-12	8.73E-12	1.56E-11	6.84E-11
3-Methylhexane	3.00E-07	1.66E-10	7.27E-10	2.43E-11	1.06E-10	1.90E-10	8.33E-10
Heptane	4.41E-07	2.44E-10	1.07E-09	3.57E-11	1.56E-10	2.79E-10	1.22E-09
Methylcyclohexane	8.37E-06	4.62E-09	2.03E-08	6.76E-10	2.96E-09	5.30E-09	2.32E-08
Toluene	8.68E-05	4.79E-08	2.10E-07	7.01E-09	3.07E-08	5.50E-08	2.41E-07
Octane	4.54E-08	2.51E-11	1.10E-10	3.67E-12	1.61E-11	2.88E-11	1.26E-10
Ethylbenzene	2.81E-05	1.55E-08	6.80E-08	2.27E-09	9.94E-09	1.78E-08	7.79E-08
m & p-Xylene	1.86E-05	1.03E-08	4.49E-08	1.50E-09	6.57E-09	1.18E-08	5.15E-08
o-Xylene	4.04E-05	2.23E-08	9.77E-08	3.26E-09	1.43E-08	2.56E-08	1.12E-07
Nonane	8.41E-09	4.65E-12	2.04E-11	6.80E-13	2.98E-12	5.33E-12	2.33E-11
C10+	2.39E-10	1.32E-13	5.78E-13	1.93E-14	8.46E-14	1.51E-13	6.63E-13
Total VOCs	0.1100	6.08E-05	0.0003	8.89E-06	3.89E-05	6.97E-05	0.0003
Total CO_{2e}		0.0474	0.2076	0.0069	0.0304	0.0543	0.2379
Total TAPs (Benzene)		4.91E-08	2.15E-07	7.18E-09	3.15E-08	5.63E-08	2.47E-07
Toluene		4.79E-08	2.10E-07	7.01E-09	3.07E-08	5.50E-08	2.41E-07
Ethylbenzene		1.55E-08	6.80E-08	2.27E-09	9.94E-09	1.78E-08	7.79E-08
Xylenes		3.26E-08	1.43E-07	4.76E-09	2.09E-08	3.73E-08	1.64E-07
n-Hexane		6.58E-11	2.88E-10	9.63E-12	4.22E-11	7.54E-11	3.30E-10
Total HAPs		1.45E-07	6.36E-07	2.12E-08	9.30E-08	1.66E-07	7.29E-07
Total	100.00	0.0553	0.2420	0.0081	0.0354	0.0633	0.2774

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

Table 8

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

Annual Loading	Oil Truck Loading	Water Truck Loading
RVP	2.65	1.0227
Annual Average Temp (F)	72.1	72.1
S (saturation factor)	0.6	0.6
P (true vapor pressure)	1.57	0.45
M (MW of vapor)	41.92	18.15
Collection Efficiency (%)	0.00	0.00
Loading Loss (lb/10^3 gal)*	0.92	0.11
Maximum Throughput (gallons/hr)**	10,080	10,080
Average Throughput (gallons/yr)	7,665,000	15,330,000
Loading Emissions (lbs/hr)	9.31	1.15
Loading Emissions (tpy)	3.54	0.87

	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	0.0002	2.18E-05	8.27E-06	0.0079	9.07E-05	6.89E-05
Carbon Dioxide	0.0567	0.0053	2.01E-03	1.1365	1.30E-02	9.92E-03
Methane	0.9639	0.0897	3.41E-02	3.3849	3.89E-02	2.96E-02
Ethane	31.5502	2.9370	1.1167	1.0801	1.24E-02	9.43E-03
Propane	32.6691	3.0412	1.16E+00	0.1047	1.20E-03	9.14E-04
Isobutane	7.3627	0.6854	2.61E-01	0.0007	8.37E-06	6.36E-06
n-Butane	13.5360	1.2601	4.79E-01	0.0039	4.50E-05	3.42E-05
Isopentane	4.7359	0.4409	1.68E-01	0.0002	2.51E-06	1.91E-06
n-Pentane	3.7631	0.3503	1.33E-01	0.0001	1.40E-06	1.07E-06
2-Methylpentane	1.6241	0.1512	5.75E-02	4.65E-06	5.34E-08	4.06E-08
3-Methylpentane	0.7863	0.0732	2.78E-02	1.46E-05	1.67E-07	1.27E-07
n-Hexane	0.0922	0.0086	3.26E-03	1.19E-07	1.37E-09	1.04E-09
Methylcyclopentane	0.2550	0.0237	9.02E-03	3.19E-05	3.67E-07	2.79E-07
Benzene	0.0022	0.0002	7.83E-05	0.0001	1.02E-06	7.76E-07
2-Methylhexane	0.0378	0.0035	1.34E-03	2.46E-08	2.83E-10	2.15E-10
3-Methylhexane	0.4441	0.0413	1.57E-02	3.00E-07	3.45E-09	2.62E-09
Heptane	0.7807	0.0727	2.76E-02	4.41E-07	5.06E-09	3.85E-09
Methylcyclohexane	0.4570	0.0425	1.62E-02	8.37E-06	9.61E-08	7.31E-08
Toluene	0.0101	0.0009	3.57E-04	0.0001	9.96E-07	7.58E-07
Octane	0.6529	0.0608	2.31E-02	4.54E-08	5.21E-10	3.96E-10
Ethylbenzene	0.0111	0.0010	3.92E-04	2.81E-05	3.22E-07	2.45E-07
m & p-Xylene	0.0085	0.0008	3.01E-04	1.86E-05	2.13E-07	1.62E-07
o-Xylene	0.0148	0.0014	5.25E-04	4.04E-05	4.64E-07	3.53E-07
Nonane	0.1504	0.0140	5.32E-03	8.41E-09	9.66E-11	7.34E-11
C10+	0.0349	0.0032	1.23E-03	2.39E-10	2.74E-12	2.09E-12
Total VOCs	67.4289	6.2770	2.3866	0.1100	1.26E-03	9.60E-04
Total CO_{2e}		2.2485	0.8549		0.9848	0.7488
Total TAPs (Benzene)		0.0002	7.83E-05		1.02E-06	7.76E-07
Toluene		0.0009	3.57E-04		9.96E-07	7.58E-07
Ethylbenzene		0.0010	3.92E-04		3.22E-07	2.45E-07
Xylenes		0.0022	8.26E-04		6.77E-07	5.15E-07
n-Hexane		0.0086	3.26E-03		1.37E-09	1.04E-09
Total HAPs		0.0129	4.92E-03		3.02E-06	2.29E-06
Total	100.0000	9.3091	3.5394	100.0000	1.1483	0.8732

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
Hamilton Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Gas Production Unit Heater Emissions

Number of Units	7
GPU Heater Rating (MMBtu/hr)	1.50
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,247

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	0.842	3.688
CO	84	0.707	3.098
CO_2	120,000	1010.376	4425.449
Lead	0.0005	4.21E-06	1.84E-05
N_2O	2.2	0.019	0.081
PM (Total)	7.6	0.064	0.280
SO_2	0.6	0.005	0.022
TOC	11	0.093	0.406
Methane	2.3	0.019	0.085
VOC	5.5	0.046	0.203
HAPS			
2-Methylnaphthalene	2.40E-05	2.02E-07	8.85E-07
Benzene	2.10E-03	1.77E-05	7.74E-05
Dichlorobenzene	1.20E-03	1.01E-05	4.43E-05
Fluoranthene	3.00E-06	2.53E-08	1.11E-07
Fluorene	2.80E-06	2.36E-08	1.03E-07
Formaldehyde	7.50E-02	6.31E-04	2.77E-03
Hexane	1.80E+00	1.52E-02	6.64E-02
Naphthalene	6.10E-04	5.14E-06	2.25E-05
Phenanathrene	1.70E-05	1.43E-07	6.27E-07
Toluene	3.40E-03	2.86E-05	1.25E-04

Line Heater Emissions

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

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	1.123	4.917
CO	84	0.943	4.130
CO_2	120,000	1347.169	5900.598
Lead	0.0005	5.61E-06	2.46E-05
N_2O	2.2	0.025	0.108
PM (Total)	7.6	0.085	0.374
SO_2	0.6	0.007	0.030
TOC	11	0.123	0.541
Methane	2.3	0.026	0.113
VOC	5.5	0.062	0.270
HAPS			
2-Methylnaphthalene	2.40E-05	2.69E-07	1.18E-06
Benzene	2.10E-03	2.36E-05	1.03E-04
Dichlorobenzene	1.20E-03	1.35E-05	5.90E-05
Fluoranthene	3.00E-06	3.37E-08	1.48E-07
Fluorene	2.80E-06	3.14E-08	1.38E-07
Formaldehyde	7.50E-02	8.42E-04	3.69E-03
Hexane	1.80E+00	2.02E-02	8.85E-02
Naphthalene	6.10E-04	6.85E-06	3.00E-05
Phenanathrene	1.70E-05	1.91E-07	8.36E-07
Toluene	3.40E-03	3.82E-05	1.67E-04

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.108	0.473
TOTAL Uncontrolled HAPs	0.037	0.162
TOTAL Uncontrolled TAPs (Benzene)	4.13E-05	1.81E-04
TOTAL Uncontrolled Toluene	6.68E-05	2.93E-04
TOTAL Uncontrolled Hexane	3.54E-02	1.55E-01
TOTAL Uncontrolled TAPs (Formaldehyde)	1.47E-03	6.45E-03
TOTAL CO_{2e} Emissions	2,371.55	10,387.41

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

Table 10

Enclosed Combustor Emissions
Hamilton 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	--	1,417.27	131.65	133.58	1.32	1,721.62
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	331,128.00	--	12,415,295.46	1,153,227.86	1,170,143.77	11,600.24	15,081,395.33
Heating Content (Btu/ft3)	1,247		2,178.06	1,058.26	2,178.06	1,058.26	2,043.75

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	-	-	109.858	0.772	9.949	0.000	120.58
Benzene	-	-	0.068	0.004	0.000	0.000	0.072
Toluene	-	-	0.146	0.009	0.001	0.000	0.156
Ethylbenzene	-	-	0.085	0.005	0.002	0.000	0.092
Xylenes	-	-	0.153	0.009	0.003	0.000	0.166
n-Hexane	-	-	2.391	0.002	0.014	0.000	2.407
HAPs	-	-	2.842	0.030	0.020	0.000	2.893
Total Mass Flow	-	-	156.543	6.297	14.754	0.063	177.658
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	-	-	481.178	3.382	43.575	0.000	528.135
Benzene	-	-	0.296	0.019	0.001	0.000	0.317
Toluene	-	-	0.639	0.039	0.007	0.000	0.684
Ethylbenzene	-	-	0.373	0.022	0.007	0.000	0.402
Xylenes	-	-	0.670	0.040	0.015	0.000	0.726
n-Hexane	-	-	10.470	0.011	0.060	0.000	10.541
HAP	-	-	12.449	0.131	0.090	0.000	12.669
Total Mass Flow	-	-	685.658	27.582	64.623	0.277	778.141

Table 10

Enclosed Combustor Emissions
Hamilton 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	-	0.142	0.013	0.013	0.000	0.17
CO	0.003	-	0.119	0.011	0.011	0.000	0.14
PM2.5	0.000	-	0.008	0.001	0.001	0.000	0.01
PM10	0.000	-	0.011	0.001	0.001	0.000	0.01
H2S	0.000	-	0.000	0.000	0.000	0.000	0.00
SO_2	0.000	-	0.000	0.000	0.000	0.000	0.00
CO_2	4.536	-	-	-	-	-	4.54
Total VOC	0.000	-	2.197	0.015	0.199	0.000	2.41
Benzene	0.000	-	0.001	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.003	0.000	0.000	0.000	0.00
Ethylbenzene	0.000	-	0.002	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.003	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.048	0.000	0.000	0.000	0.05
HAP	0.000	-	0.057	0.001	0.000	0.000	0.06
N_2O	0.000	-	0.003	0.000	0.000	0.000	0.00
Lead	0.000	-	0.000	0.000	0.000	0.000	0.00
Formaldehyde	0.000	-	-	-	-	-	0.00
Annual (tpy)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
NOx	0.017	-	0.621	0.058	0.059	0.001	0.75
CO	0.014	-	0.521	0.048	0.049	0.000	0.63
PM2.5	0.001	-	0.035	0.003	0.003	0.000	0.04
PM10	0.001	-	0.047	0.004	0.004	0.000	0.06
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	-	9.624	0.068	0.871	0.000	10.56
Benzene	0.000	-	0.006	0.000	0.000	0.000	0.01
Toluene	0.000	-	0.013	0.001	0.000	0.000	0.01
Ethylbenzene	0.000	-	0.007	0.000	0.000	0.000	0.01
Xylenes	0.000	-	0.013	0.001	0.000	0.000	0.01
n-Hexane	0.000	-	0.209	0.000	0.001	0.000	0.21
HAP	0.000	-	0.249	0.003	0.002	0.000	0.25
N_2O	0.000	-	0.014	0.001	0.001	0.000	0.02
Lead	0.000	-	0.000	0.000	0.000	0.000	0.00
Formaldehyde	0.000	-	-	-	-	-	0.00

Enclosed Combustor/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total VOC	2.41	10.56
NOx	1.72E-01	7.54E-01
CO	1.45E-01	6.33E-01
PM2.5	9.81E-03	4.30E-02
PM10	1.31E-02	5.73E-02
H_2S	1.21E-05	5.28E-05
SO_2	2.27E-05	9.93E-05
Benzene (TAPs)	1.45E-03	6.34E-03
Toluene	3.12E-03	1.37E-02
Ethylbenzene	1.84E-03	8.04E-03
Xylenes	3.31E-03	1.45E-02
Hexanes	4.82E-02	2.11E-01
Formaldehyde (TAPs)	2.84E-06	1.24E-05
HAPs	0.06	0.25
CO_2e	533.09	2334.92
N_2O	3.79E-03	1.66E-02
Lead	8.61E-07	3.77E-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
Hamilton 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	12,415,295	0.0039	1,153,228	0.0005	1,170,144	0.005	11,600	11,437	1	0	--	11,437	38,893,565
Methane	0.116	12,415,295	0.7689	1,153,228	0.0252	1,170,144	0.038	11,600	2,356,255	1	0.98	2,309,130	47,125	47,125
Ethane	0.347	12,415,295	0.1418	1,153,228	0.4398	1,170,144	0.007	11,600	4,990,028	2	0.98	9,780,455	--	
Propane	0.289	12,415,295	0.0384	1,153,228	0.3105	1,170,144	0.000	11,600	3,994,190	3	0.98	11,742,919	--	
i-Butane	0.053	12,415,295	0.0016	1,153,228	0.0531	1,170,144	0.000	11,600	724,477	4	0.98	2,839,949	--	
n-Butane	0.099	12,415,295	0.0058	1,153,228	0.0976	1,170,144	0.000	11,600	1,355,999	4	0.98	5,315,515	--	
Pentane	0.053	12,415,295	0.0018	1,153,228	0.0494	1,170,144	0.000	11,600	722,669	5	0.98	3,541,080	--	
Hexane	0.020	12,415,295	0.0004	1,153,228	0.0122	1,170,144	0.000	11,600	267,881	6	0.98	1,575,142	--	
Benzene	0.000	12,415,295	0.0002	1,153,228	0.0000	1,170,144	0.000	11,600	3,065	6	0.98	18,021	--	
Heptanes	0.011	12,415,295	0.0003	1,153,228	0.0066	1,170,144	0.000	11,600	139,677	7	0.98	958,181	--	
Toluene	0.000	12,415,295	0.0003	1,153,228	0.0000	1,170,144	0.000	11,600	5,609	7	0.98	38,479	--	
Octane	0.006	12,415,295	0.0002	1,153,228	0.0043	1,170,144	0.000	11,600	75,708	8	0.98	593,551	--	
Ethyl benzene	0.000	12,415,295	0.0002	1,153,228	0.0000	1,170,144	0.000	11,600	2,860	8	0.98	22,420	--	
Xylenes	0.000	12,415,295	0.0003	1,153,228	0.0001	1,170,144	0.000	11,600	5,166	8	0.98	40,501	--	
Nonane	0.001	12,415,295	0.0000	1,153,228	0.0005	1,170,144	0.000	11,600	9,665	9	0.98	85,243	--	
Decane plus	0.000	12,415,295	0.0000	1,153,228	0.0001	1,170,144	0.000	11,600	2,198	10	0.98	21,540	--	
											Subtotal	**38,882,128**	--	

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	38,893,565	0.12	2000	1	514.86	2,255.11
CH_4	47,125	0.09	2000	25	0.50	2.19
				CO_2e Emissions	**527.4**	**2309.91**

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
Hamilton 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)	500
PW Production (bbl/day)	1,000
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	0.1000	1	913	0.1000	91.3000	3.8175	1.7179
Tanker Trucks PW	10	40	10	0.1000	1	1825	0.1000	182.5000	3.8175	1.7179
Pick Up Truck	4	3	10	0.3600	1	730	0.3600	262.8000	0.3467	0.1560

	Uncontrolled Emissions						Controlled Emissions					
	PM			PM10			PM			PM10		
	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)
Tanker Trucks Condensate	0.3818	348.5404	0.1743	0.1718	156.8432	0.0784	0.1909	174.2702	0.0871	0.0859	78.4216	0.0392
Tanker Trucks PW	0.3818	696.6991	0.3483	0.1718	313.5146	0.1568	0.1909	348.3496	0.1742	0.0859	156.7573	0.0784
Pick Up Truck	0.1248	91.1074	0.0456	0.0562	40.9983	0.0205	0.0624	45.5537	0.0228	0.0281	20.4992	0.0102
Total Emissions	0.8883	1,136.3470	0.5682	0.3997	511.3561	0.2557	0.4442	568.1735	0.2841	0.1999	255.6781	0.1278

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

Engine Emissions
Hamilton Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Kubota DG972-E2

Power (hp)	24
Fuel consumption (lbs/BHP-hr)	0.449
Heat Content of Fuel (Btu/scf)	1247.06
Density of NG (lb/scf)	0.056
Operating Hours/year	8760
No. of Engines	1

Pollutant	Emission Factors (g/hp-hr)	Emission Factors (lb/MMBtu)	lb/hr	tpy
NOx[1]	5.97		0.3158	1.3831
CO[2]	106.7		5.6445	24.7228
CO_2		110.000	26.3967	115.62
$PM_{2.5}$		9.910E-03	0.0024	0.0104
PM_{10}		9.500E-03	0.0023	0.0100
PM (Total)		9.910E-03	0.0024	0.0104
SO_2		5.880E-04	0.0001	0.0006
TOC		0.358	0.0859	0.3763
Methane		0.230	0.0552	0.2417
VOC[3]		0.0296	0.0071	0.0311
HAPS				
Benzene		1.58E-03	3.79E-04	1.66E-03
Ethylbenzene		2.48E-05	5.95E-06	2.61E-05
Formaldehyde		2.05E-02	4.92E-03	2.15E-02
Naphthalene		9.71E-05	2.33E-05	1.02E-04
Toluene		5.58E-04	1.34E-04	5.86E-04
Xylene		1.95E-04	4.68E-05	2.05E-04

	lb/hr	tpy
TOTAL Uncontrolled VOC	7.10E-03	3.11E-02
TOTAL Uncontrolled NOx	3.16E-01	1.38E+00
TOTAL Uncontrolled HAPs	5.51E-03	2.41E-02
TOTAL Uncontrolled TAPs (Benzene)	3.79E-04	1.66E-03
TOTAL Uncontrolled Toluene	1.34E-04	5.86E-04
TOTAL Uncontrolled Ethylbenzene	5.95E-06	2.61E-05
TOTAL Uncontrolled Xylenes	4.68E-05	2.05E-04
TOTAL Uncontrolled TAPs (Formaldehyde)	4.92E-03	2.15E-02
TOTAL CO_{2e} Emissions	2.78E+01	1.22E+02

Enter Any Notes Here:

1. Emission factor used for the 24 HP engine's NOx is the 40 CFR 1054 standard indicated on the EPA's Certificate of Conformity. See Appendix N.
2. Emission factor for CO was the Certification CO level taken from EPA's Non-Road Small SI 2013 Certification issued by Office of Transportation and Air Quality, March 2014.
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.

Table 14

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

	Potential Emissions		Initial Permit Application Emissions		Change in Emissions	
Pollutant	**Hourly PTE**	**Yearly PTE**	**Hourly PTE**	**Yearly PTE**	**Hourly PTE**	**Yearly PTE**
PM	0.6088	1.0054	0.5254	0.6955	8.35E-02	0.3099
PM10	0.3645	0.8491	0.2810	0.5082	0.0836	0.3410
VOC (uncontrolled)	123.4249	542.9887	132.7862	582.2862	-9.3612	-39.2974
CO	7.4394	32.5844	6.5157	28.5388	0.9237	4.0457
NOx	2.4526	10.7422	1.3530	5.9259	1.0996	4.8163
SO2	0.0120	0.0523	0.0052	0.0228	6.75E-03	2.96E-02
Pb	1.07E-05	4.68E-05	5.19E-06	2.27E-05	5.50E-06	2.41E-05
HAPs	0.3373	1.4821	0.4723	2.0740	-0.1351	-0.5918
TAPs	0.0099	0.0435	0.0078	0.0343	2.08E-03	0.0092

Notes:
1. Change in emissions due to the increase in production, addition of 7 line heaters and 2 Cimarron enclosed combustors.
2. Change in permit from G70A to G70B.

Bryan Research & Engineering, Inc.

ProMax® 3.2

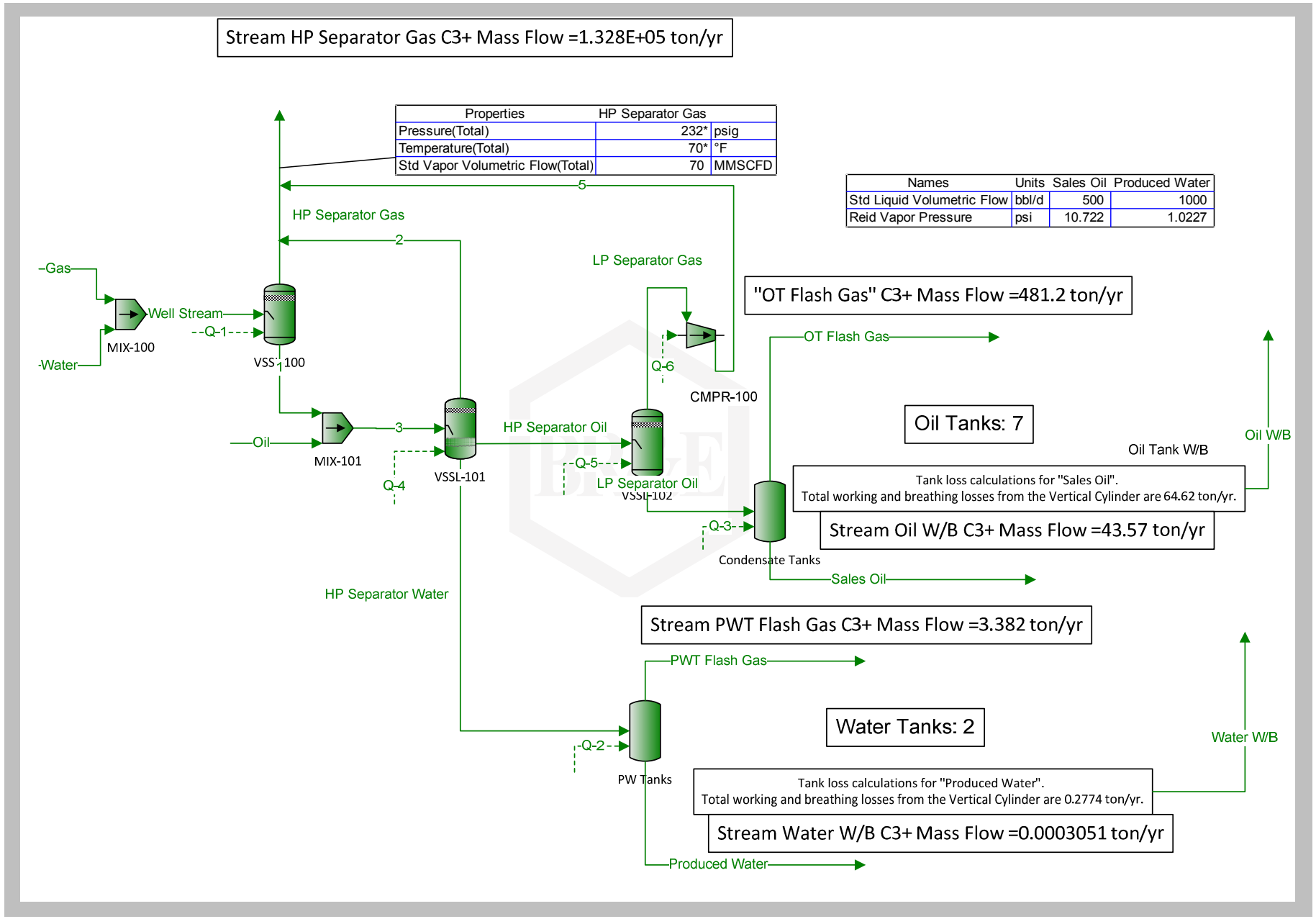
with

TSWEET® & PROSIM®

Simulation Report	
Client Name:	Antero Resources Corporation
Location:	West Virginia
Job:	Hamilton Well Pad

Project Name:	PROMAX SCENARIO 3
File Name:	ProMax@V:\AirQuality\ANTERO RESOURCES\ProMax\Antero WV_Updated 2Ph Separator\PROMAX SCENARIO 3.PMX
ProMax Version:	3.2.13330.0

Report Created:	4/26/2016 14:32


Stream HP Separator Gas C3+ Mass Flow =1.328E+05 ton/yr
Properties | HP Separator Gas
Pressure(Total) | 232* | psig
Temperature(Total) | 70* | °F
Std Vapor Volumetric Flow(Total) | 70 | MMSCFD
Names | Units | Sales Oil | Produced Water
Std Liquid Volumetric Flow | bbl/d | 500 | 1000
Reid Vapor Pressure | psi | 10.722 | 1.0227
5
HP Separator Gas
2
LP Separator Gas
"OT Flash Gas" C3+ Mass Flow =481.2 ton/yr
Gas
Well Stream
Q-1
MIX-100
Water
VSS 100
Q-6
CMPR-100
OT Flash Gas
Oil Tanks: 7
Oil W/B
Oil Tank W/B
3
HP Separator Oil
Oil
MIX-101
Q-5
Q-4
VSSL-101
LP Separator Oil
VSSL-102
Tank loss calculations for "Sales Oil".
Total working and breathing losses from the Vertical Cylinder are 64.62 ton/yr.
Q-3
Stream Oil W/B C3+ Mass Flow =43.57 ton/yr
Condensate Tanks
Sales Oil
HP Separator Water
Stream PWT Flash Gas C3+ Mass Flow =3.382 ton/yr
PWT Flash Gas
Water Tanks: 2
Water W/B
Q-2
PW Tanks
Tank loss calculations for "Produced Water".
Total working and breathing losses from the Vertical Cylinder are 0.2774 ton/yr.
Stream Water W/B C3+ Mass Flow =0.0003051 ton/yr
Produced Water

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Total	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		9.67439	0.157552	99.9592	0.0502132	0.230619	0.00465508	0	100	0	99.9972	3.02982	0.000110580	94.9993	99.9589	93.4026	0.0215339
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.446803	0.493889	0.000115233	0.0145445	0.00937629	1.39712E-05	0.494658	0	0.016	3.35198E-06	0.286151	0.000349784	0.00511564	0.000101787	0.00114455	0.000713309
Carbon Dioxide		0.132523	0.146369	0.000340783	0.0117216	0.0505555	0.000875697	0.146717	0	0	0.000188693	0.389176	0.0540218	0.468755	0.0016900	0.00109232	0.00458663
Methane		70.1846	77.5795	0.0320019	6.36957	11.5949	0.0553799	77.7018	0	6.555	0.00185582	77.1039	2.51842	3.83013	0.0310987	0.459000	0.917347
Ethane		12.8266	14.1780	0.00596009	6.54215	34.7336	1.06099	14.2004	0	6.561	0.000398983	14.2236	43.9798	0.652058	0.00607365	0.436010	3.57623
Propane		4.05953	4.48723	0.00162714	5.95800	28.8927	3.32610	4.49433	0	5.95	0.000119514	3.85606	31.0537	0.0430883	0.00203456	0.392160	5.23585
Isobutane		0.511845	0.565789	6.53520E-05	1.82739	5.32007	1.57295	0.566666	0	1.825	1.75418E-06	0.162661	5.30968	0.000227602	8.17795E-05	0.119778	1.85285
n-Butane		1.06940	1.18209	0.000241093	4.45379	9.94854	4.22760	1.18394	0	4.446	1.38059E-05	0.581327	9.76156	0.00122418	0.000367033	0.291955	4.65493
Isopentane		0.338670	0.374361	4.24446E-05	2.96014	2.95917	3.25441	0.374944	0	2.955	1.69632E-06	0.104220	2.75135	5.50033E-05	7.47436E-05	0.193888	3.23235
n-Pentane		0.263240	0.290982	3.25121E-05	3.11439	2.37972	3.50998	0.291434	0	3.109	1.28708E-06	0.0798630	2.18622	3.07405E-05	5.64715E-05	0.203971	3.42555
2-Methylpentane		0	0	5.31281E-06	2.68547	0.878183	3.16186	0	0	2.681	1.02275E-07	0.0133267	0.789936	9.79452E-07	0	0.175846	2.99128
3-Methylpentane		0	0	7.09816E-06	1.45036	0.426337	1.71311	0	0	1.448	3.58905E-07	0.0172368	0.382467	3.07142E-06	0	0.0949740	1.61699
n-Hexane		0.492422	0.544325	3.49952E-06	3.10277	0.735058	3.68501	0.545164	0	3.097	5.37819E-08	0.00881294	0.0448421	2.50852E-08	3.68246E-05	0.203166	3.46465
Methylcyclopentane		0	0	8.15253E-06	0.668025	0.152839	0.793996	0	0	0.667	1.12380E-06	0.0179779	0.126986	6.88900E-06	0	0.0437484	0.746103
Benzene		0	0	6.14929E-05	0.101297	0.0229512	0.120421	0	0	0.102	5.46575E-05	0.0175371	0.00118701	2.06505E-05	0	0.00669016	0.113141
2-Methylhexane		0	0	1.47419E-06	2.71968	0.277889	3.27145	0	0	2.715	2.40752E-08	0.00370885	0.0158305	4.46494E-09	0	0.178076	3.04784
3-Methylhexane		0	0	1.19947E-06	2.22483	0.216499	2.67742	0	0	2.221	2.04598E-08	0.00301547	0.185777	5.44082E-08	0	0.145675	2.49359
Heptane		0	0	2.39943E-06	5.34622	0.413322	6.44577	0	0	5.337	4.11530E-08	0.00603161	0.326563	7.99054E-08	0	0.350053	5.99517
Methylcyclohexane		0	0	8.17188E-06	3.13431	0.244559	3.77871	0	0	3.129	7.81869E-07	0.0189016	0.195072	1.54692E-06	0	0.205230	3.51472
Toluene		0	0	8.95101E-05	0.661872	0.0419577	0.799038	0	0	0.662	7.77429E-05	0.0301737	0.00458455	1.70950E-05	0	0.0434204	0.742486
Octane		0	0	1.10513E-06	13.2170	0.322311	16.0140	0	0	13.194	1.25819E-08	0.00279433	0.239583	7.21384E-09	0	0.865392	14.8419
Ethylbenzene		0	0	4.09849E-05	1.01017	0.0212301	1.22433	0	0	1.009	3.51090E-05	0.0150635	0.00436799	4.80026E-06	0	0.0661801	1.13447
m-Xylene		0	0	2.49980E-05	0.720899	0.0126916	0.874008	0	0	0.72	2.15195E-05	0.00891827	0.00336247	3.17277E-06	0	0.0472247	0.809670
o-Xylene		0	0	6.77881E-05	1.62186	0.0255061	1.96666	0	0	1.62	6.05539E-05	0.0185628	0.00585142	6.90457E-06	0	0.106255	1.82166
Nonane		0	0	3.89874E-07	9.14493	0.0730966	11.0971	0	0	9.129	7.01240E-09	0.000979220	0.0491567	1.19043E-09	0	0.598769	10.2736
C10+		0	0	9.80943E-08	20.8884	0.0162797	25.3642	0	0	20.852	1.96464E-09	0.000245865	0.00918059	2.72514E-11	0	1.36768	23.4708
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
Water		821.939	12.1092	809.801	0.0285057	0.00870323	0.00217617	0	821.939	0	809.792	0.00959704	3.89242E-07	0.00331506	809.830	809.830	0.0108794
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		37.9605	37.9597	0.000933535	0.00825682	0.000353848	6.53131E-06	37.9605	0	0.00909894	2.71448E-05	0.000906390	1.23124E-06	1.78514E-07	0.000824637	0.00992358	0.000360379
Carbon Dioxide		11.2592	11.2497	0.00276079	0.00665426	0.00190789	0.000409373	11.2592	0	0	0.00152806	0.00123273	0.000190157	1.63575E-05	0.00947080	0.00947080	0.00231727
Methane		5962.90	5962.65	0.259257	3.61596	0.437574	0.0258892	5962.90	0	3.72772	0.0150287	0.244228	0.00886488	0.000133655	0.251950	3.97967	0.463464
Ethane		1089.75	1089.70	0.0482845	3.71393	1.31080	0.495995	1089.75	0	3.73114	0.00323102	0.0450535	0.154809	2.27540E-05	0.0492065	3.78034	1.80679
Propane		344.899	344.882	0.0131820	3.38231	1.09037	1.55489	344.899	0	3.38367	0.000967839	0.0122142	0.109309	1.50360E-06	0.0164833	3.40015	2.64527
Isobutane		43.4865	43.4858	0.000529437	1.03740	0.200772	0.735328	43.4865	0	1.03785	1.42056E-05	0.000515231	0.0186901	7.94231E-09	0.000662547	1.03851	0.936100
n-Butane		90.8565	90.8535	0.00195317	2.52838	0.375444	1.97633	90.8565	0	2.52837	0.000111802	0.00184137	0.0343608	4.27186E-08	0.00297356	2.53134	2.35177
Isopentane		28.7735	28.7729	0.000343857	1.68045	0.111675	1.52138	28.7735	0	1.68046	1.37371E-05	0.000330120	0.00968479	1.91938E-09	0.000605545	1.68107	1.63305
n-Pentane		22.3649	22.3645	0.000263391	1.76802	0.0898074	1.64086	22.3649	0	1.76804	1.04229E-05	0.000252968	0.00769551	1.07271E-09	0.000457511	1.76850	1.73066
2-Methylpentane		0	0	4.30408E-05	1.52452	0.0331414	1.47812	0	0	1.52464	8.28239E-07	4.22125E-05	0.00278058	3.41787E-11	0	1.52464	1.51126
3-Methylpentane		0	0	5.75044E-05	0.823359	0.0160893	0.800851	0	0	0.823454	2.90646E-06	5.45980E-05	0.00134629	1.07179E-10	0	0.823454	0.816941
n-Hexane		41.8364	41.8361	2.83507E-05	1.76142	0.0277400	1.72268	41.8364	0	1.76121	4.35534E-07	2.79152E-05	0.000157845	8.75366E-13	0.000298339	1.76151	1.75042
Methylcyclopentane		0	0	6.60462E-05	0.379233	0.00576792	0.371180	0	0	0.379312	9.10069E-06	5.69455E-05	0.000446990	2.40396E-10	0	0.379312	0.376948
Benzene		0	0	0.000498174	0.0575056	0.000866147	0.0562949	0	0	0.0580058	0.000442625	5.55491E-05	4.17827E-06	7.20613E-10	0	0.0580058	0.0571610
2-Methylhexane		0	0	1.19428E-05	1.54394	0.0104871	1.52935	0	0	1.54398	1.94965E-07	1.17479E-05	5.57237E-05	1.55807E-13	0	1.54398	1.53984
3-Methylhexane		0	0	9.71727E-06	1.26302	0.00817038	1.25165	0	0	1.26305	1.65686E-07	9.55158E-06	0.000653936	1.89861E-12	0	1.26305	1.25982
Heptane		0	0	1.94385E-05	3.03501	0.0155982	3.01329	0	0	3.03507	3.33263E-07	1.91053E-05	0.00114951	2.78835E-12	0	3.03507	3.02889
Methylcyclohexane		0	0	6.62030E-05	1.77932	0.00922932	1.76648	0	0	1.77941	6.33169E-06	5.98713E-05	0.000686656	5.39810E-11	0	1.77941	1.77571
Toluene		0	0	0.000725150	0.375740	0.00158342	0.373537	0	0	0.376469	0.000629574	9.55760E-05	1.61377E-05	5.96541E-10	0	0.376469	0.375120
Octane		0	0	8.95298E-06	7.50318	0.0121636	7.48627	0	0	7.50322	1.01890E-07	8.85109E-06	0.000843336	2.51732E-13	0	7.50322	7.49844
Ethylbenzene		0	0	0.000332033	0.573468	0.000801193	0.572356	0	0	0.573802	0.000284318	4.77140E-05	1.53754E-05	1.67508E-10	0	0.573802	0.573157
m-Xylene		0	0	0.000202517	0.409249	0.000478962	0.408584	0	0	0.409452	0.000174268	2.82488E-05	1.18359E-05	1.10716E-10	0	0.409452	0.409063
o-Xylene		0	0	0.000549172	0.920716	0.000962562	0.919381	0	0	0.921268	0.000490374	5.87981E-05	2.05971E-05	2.40940E-10	0	0.921268	0.920344
Nonane		0	0	3.15849E-06	5.19151	0.00275856	5.18769	0	0	5.19152	5.67874E-08	3.10170E-06	0.000173032	4.15407E-14	0	5.19152	5.19044
C10+		0	0	7.94693E-07	11.8582	0.000614372	11.8573	0	0	11.8582	1.59099E-08	7.78783E-07	3.23158E-05	9.50957E-16	0	11.8582	11.8580
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		8.45632	0.135912	99.9536	0.00921314	0.100159	0.000746952	0	100	0	99.9955	2.74549	4.75275E-05	94.2807	99.9520	72.3240	0.00362611
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.607293	0.662504	0.000179174	0.00414968	0.00633212	3.48597E-06	0.663391	0	0.00457137	5.21218E-06	0.403202	0.000233773	0.00789454	0.000158265	0.00137810	0.000186776
Carbon Dioxide		0.282979	0.308453	0.000832451	0.00525390	0.0536373	0.000343261	0.309119	0	0	0.000460950	0.861498	0.0567210	1.13646	0.00285555	0.00206624	0.00188676
Methane		54.6298	59.5951	0.0284958	1.04071	4.48425	0.00791311	59.6762	0	1.07252	0.00165257	62.2169	0.963892	3.38490	0.0276912	0.316494	0.137556
Ethane		18.7131	20.4139	0.00994733	2.00350	25.1780	0.284155	20.4417	0	2.01210	0.000665925	21.5125	31.5502	1.08011	0.0101367	0.563506	1.00513
Propane		8.68535	9.47472	0.00398250	2.67575	30.7140	1.30634	9.48766	0	2.67592	0.000292526	8.55265	32.6691	0.104669	0.00497961	0.743262	2.15804
Isobutane		1.44343	1.57467	0.000210831	1.08174	7.45439	0.814294	1.57677	0	1.08185	5.65937E-06	0.475539	7.36274	0.000728750	0.000263825	0.299227	1.00660
n-Butane		3.01577	3.28991	0.000777787	2.63646	13.9397	2.18857	3.29435	0	2.63556	4.45408E-05	1.69951	13.5360	0.00391966	0.00118407	0.729358	2.52890
Isopentane		1.18556	1.29334	0.000169975	2.17515	5.14697	2.09134	1.29507	0	2.17444	6.79344E-06	0.378219	4.73592	0.000218614	0.000299318	0.601259	2.17984
n-Pentane		0.921503	1.00528	0.000130199	2.28850	4.13912	2.25558	1.00663	0	2.28776	5.15449E-06	0.289825	3.76315	0.000122180	0.000226145	0.632530	2.31013
2-Methylpentane		0	0	2.54122E-05	2.35696	1.82440	2.42689	0	0	2.35636	4.89221E-07	0.0577652	1.62407	4.64973E-06	0	0.651326	2.40944
3-Methylpentane		0	0	3.39518E-05	1.27294	0.885703	1.31490	0	0	1.27266	1.71678E-06	0.0747139	0.786331	1.45809E-05	0	0.351779	1.30247
n-Hexane		2.05891	2.24613	1.67389E-05	2.72321	1.52706	2.82843	2.24910	0	2.72198	2.57259E-07	0.0382002	0.0921929	1.19086E-07	0.000176137	0.752518	2.79074
Methylcyclopentane		0	0	3.80829E-05	0.572591	0.310091	0.595176	0	0	0.572519	5.24981E-06	0.0761034	0.254968	3.19389E-05	0	0.158251	0.586919
Benzene		0	0	0.000266610	0.0805865	0.0432191	0.0837807	0	0	0.0812602	0.000236984	0.0689025	0.00221207	8.88604E-05	0	0.0224613	0.0826060
2-Methylhexane		0	0	8.19903E-06	2.77551	0.671274	2.91972	0	0	2.77464	1.33905E-07	0.0186929	0.0378443	2.46464E-08	0	0.766946	2.85460
3-Methylhexane		0	0	6.67113E-06	2.27050	0.522980	2.38955	0	0	2.26979	1.13796E-07	0.0151982	0.444115	3.00332E-07	0	0.627398	2.33549
Heptane		0	0	1.33450E-05	5.45597	0.998429	5.75275	0	0	5.45424	2.28892E-07	0.0303998	0.780678	4.41076E-07	0	1.50762	5.61505
Methylcyclohexane		0	0	4.45355E-05	3.13430	0.578877	3.30459	0	0	3.13340	4.26124E-06	0.0933491	0.456956	8.36720E-06	0	0.866112	3.22565

Toluene		0	0	0.000457770	0.621103	0.0931976	0.655741	0	0	0.622099	0.000397607	0.139840	0.0100778	8.67702E-05	0	0.171956	0.639449
Octane		0	0	7.00682E-06	15.3764	0.887570	16.2929	0	0	15.3713	7.97758E-08	0.0160551	0.652919	4.53944E-08	0	4.24883	15.8467
Ethylbenzene		0	0	0.000241513	1.09226	0.0543357	1.15773	0	0	1.09253	0.000206896	0.0804394	0.0110635	2.80742E-05	0	0.301989	1.12577
m-Xylene		0	0	0.000147306	0.779479	0.0324825	0.826459	0	0	0.779605	0.000126813	0.0476238	0.00851664	1.85559E-05	0	0.215493	0.803464
o-Xylene		0	0	0.000399456	1.75365	0.0652795	1.85967	0	0	1.75411	0.000356841	0.0991256	0.0148208	4.03812E-05	0	0.484859	1.80770
Nonane		0	0	2.77545E-06	11.9455	0.226008	12.6767	0	0	11.9415	4.99221E-08	0.00631708	0.150413	8.41082E-09	0	3.30078	12.3161
C10+		0	0	8.66805E-07	33.8686	0.0624800	35.9657	0	0	33.8572	1.73611E-08	0.00196880	0.0348692	2.38998E-10	0	9.35857	34.9259
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**
Water		14807.5	218.151	14588.8	0.513537	0.156791	0.0392044	0	14807.5	0	14588.6	0.172893	7.01230E-06	0.0597218	14589.3	14589.3	0.195996
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		1063.40	1063.38	0.0261515	0.231302	0.00991248	0.000182964	1063.40	0	0.254892	0.000760419	0.0253911	3.44913E-05	5.00077E-06	0.0231009	0.277993	0.0100954
Carbon Dioxide		495.512	495.095	0.121501	0.292851	0.0839654	0.0180163	495.512	0	0	0.0672493	0.0542516	0.00836873	0.000719886	0.416805	0.416805	0.101982
Methane		95659.7	95655.6	4.15912	58.0088	7.01977	0.415326	95659.7	0	59.8019	0.241098	3.91802	0.142214	0.00214415	4.04190	63.8438	7.43509
Ethane		32767.7	32766.2	1.45187	111.674	39.4144	14.9141	32767.7	0	112.192	0.0971536	1.35472	4.65497	0.000684191	1.47959	113.671	54.3285
Propane		15208.5	15207.8	0.581269	149.145	48.0806	68.5640	15208.5	0	149.205	0.0426774	0.538591	4.82006	6.63020E-05	0.726840	149.932	116.645
Isobutane		2527.53	2527.49	0.0307720	60.2957	11.6693	42.7389	2527.53	0	60.3220	0.000825661	0.0299464	1.08631	4.61625E-07	0.0385087	60.3605	54.4082
n-Butane		5280.78	5280.61	0.113522	146.955	21.8216	114.869	5280.78	0	146.954	0.00649817	0.107024	1.99713	2.48290E-06	0.172830	147.127	136.690
Isopentane		2075.97	2075.93	0.0248089	121.242	8.05721	109.766	2075.97	0	121.243	0.000991113	0.0238178	0.698746	1.38481E-07	0.0436893	121.287	117.823
n-Pentane		1613.60	1613.57	0.0190033	127.560	6.47950	118.386	1613.60	0	127.562	0.000752003	0.0182513	0.555222	7.73946E-08	0.0330089	127.595	124.865
2-Methylpentane		0	0	0.00370905	131.376	2.85597	127.377	0	0	131.387	7.13738E-05	0.00363768	0.239618	2.94536E-09	0	131.387	130.233
3-Methylpentane		0	0	0.00495547	70.9532	1.38650	69.0137	0	0	70.9615	0.000250466	0.00470500	0.116017	9.23623E-09	0	70.9615	70.4002
n-Hexane		3605.26	3605.24	0.00244313	151.791	2.39051	148.452	3605.26	0	151.773	3.75323E-05	0.00240560	0.0136023	7.54349E-11	0.0257095	151.799	150.843
Methylcyclopentane		0	0	0.00555841	31.9160	0.485425	31.2383	0	0	31.9227	0.000765909	0.00479250	0.0376185	2.02316E-08	0	31.9227	31.7237
Benzene		0	0	0.0389133	4.49187	0.0676563	4.39730	0	0	4.53094	0.0345742	0.00433904	0.000326373	5.62884E-08	0	4.53094	4.46495
2-Methylhexane		0	0	0.00119670	154.706	1.05083	153.244	0	0	154.709	1.95358E-05	0.00117716	0.00558362	1.56122E-11	0	154.709	154.294
3-Methylhexane		0	0	0.000973689	126.557	0.818688	125.418	0	0	126.560	1.66021E-05	0.000957087	0.0655256	1.90245E-10	0	126.560	126.236
Heptane		0	0	0.00194778	304.114	1.56297	301.937	0	0	304.120	3.33936E-05	0.00191438	0.115183	2.79399E-10	0	304.120	303.500
Methylcyclohexane		0	0	0.00650021	174.705	0.906190	173.444	0	0	174.713	0.000621684	0.00587853	0.0674201	5.30018E-09	0	174.713	174.350
Toluene		0	0	0.0668141	34.6201	0.145894	34.4171	0	0	34.6872	0.0580079	0.00880622	0.00148690	5.49643E-08	0	34.6872	34.5630
Octane		0	0	0.00102269	857.077	1.38943	855.146	0	0	857.081	1.16387E-05	0.00101105	0.0963330	2.87550E-11	0	857.081	856.535
Ethylbenzene		0	0	0.0352501	60.8822	0.0850586	60.7641	0	0	60.9177	0.0301846	0.00506556	0.00163233	1.77835E-08	0	60.9177	60.8492
m-Xylene		0	0	0.0215002	43.4479	0.0508490	43.3773	0	0	43.4695	0.0185012	0.00299904	0.00125656	1.17541E-08	0	43.4695	43.4282
o-Xylene		0	0	0.0583029	97.7479	0.102190	97.6061	0	0	97.8064	0.0520606	0.00624230	0.00218669	2.55793E-08	0	97.8064	97.7083
Nonane		0	0	0.000405093	665.837	0.353800	665.347	0	0	665.838	7.28327E-06	0.000397809	0.0221923	5.32781E-12	0	665.838	665.701
C10+		0	0	0.000126515	1887.82	0.0978080	1887.69	0	0	1887.83	2.53286E-06	0.000123982	0.00514467	1.51392E-13	0	1887.83	1887.79

Process Streams		**Well Stream**	**HP Separator Gas**	**HP Separator Water**	**HP Separator Oil**	**OT Flash Gas**	**Sales Oil**	**Gas**	**Water**	**Oil**	**Produced Water**	**PWT Flash Gas**	**Oil W/B**	**Water W/B**	**1**	**3**	**LP Separator Oil**
Phase: Total	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	**Units**																
Temperature	°F	161.9	70.0	70.0	70.0	75.9	75.9	200.0	200.0	200.0	75.9	75.94	75.9425	75.9425	70	92.9550	70
Pressure	psig	200	232	232	232	0	0	300	200	300	0	0	7.85245	-14.2292	232	232	40
Mole Fraction Vapor	%	92.5573	100	0	0	100	0	100	0	3.88063	0	100	100	100	0	0.0957784	0
Mole Fraction Light Liquid	%	7.44265	0	100	100	0	100	0	100	96.1194	100	0	0	0	100	6.47502	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93.4292	0
Molecular Weight	lb/lbmol	20.6	20.9	18.0	98.2	41.5	112.3	20.9	18.0	98.0	18.0	19.8810	41.9152	18.1526	18.0165	23.2658	106.985
Mass Density	lb/ft^3	0.7	1.0	62.3	43.9	0.1	44.8	1.0	60.2	30.2	62.2	0.0510034	0.168359	0.00147475	62.2584	52.7166	44.5646
Molar Flow	lbmol/h	8496.0	7685.9	810.1	56.8	3.8	46.7	7674.1	821.9	56.9	809.8	0.316752	0.352001	0.00348957	810.163	867.031	50.5222
Mass Flow	lb/h	175105.4	160509.1	14595.6	5574.0	156.5	5248.6	160297.9	14807.5	5575.8	14589.3	6.29736	14.7542	0.0633447	14596.3	20172.2	5405.12
Vapor Volumetric Flow	MCFH	236.8	165.7	0.2	0.1	1.5	0.1	166.4	0.2	0.2	0.2	0.123469	0.0876355	0.0429527	0.234447	0.382653	0.121287
Liquid Volumetric Flow	Mbbl/d	1012.0	708.3	1.0	0.5	6.2	0.5	711.2	1.1	0.8	1.0	0.527780	0.374605	0.183605	1.00216	1.63568	0.518453
Std Vapor Volumetric Flow	MMSCFD	77.4	70.0	7.4	0.5	0.0	0.4	69.9	7.5	0.5	7.4	0.00288486	0.00320589	3.17817E-05	7.37866	7.89660	0.460137
Std Liquid Volumetric Flow	Mbbl/d	33.1	32.1	1.0	0.6	0.0	0.5	32.1	1.0	0.6	1.0	0.00127306	0.00216209	4.78517E-06	1.00133	1.55461	0.522633
Compressibility		0.897	0.936	0.013	0.097	0.985	0.006	0.964	0.009	0.144	0.001	0.996607	0.976646	0.999552	0.0125593	0.0183585	0.0231004
Specific Gravity			0.721	0.998	0.704	1.432	0.718	0.721	0.964		0.998	0.686437	1.44722	0.626760	0.998227		0.714531
API Gravity				10.1	68.1		63.6		10.0		10.0				10.0519		65.2024
Enthalpy	MMBtu/h	-352.5	-265.3	-99.6	-4.9	-0.2	-4.5	-253.3	-99.2	-4.5	-99.5	-0.0114049	-0.0155507	-0.000352636	-99.6270	-104.162	-4.67743
Mass Enthalpy	Btu/lb	-2012.9	-1652.6	-6825.5	-884.7	-1070.1	-851.7	-1579.9	-6699.9	-813.3	-6822.4	-1811.07	-1053.98	-5566.94	-6825.49	-5163.66	-865.371
Mass Cp	Btu/(lb*°F)	0.6	0.5	1.0	0.5	0.4	0.5	0.6	1.0	0.6	1.0	0.484663	0.409188	0.448528	0.983032	0.850896	0.488525
Ideal Gas CpCv Ratio		1.232	1.249	1.326	1.056	1.133	1.049	1.215	1.320	1.046	1.326	1.26074	1.13261	1.32274	1.32581	1.24497	1.05188
Dynamic Viscosity	cP		0.0	1.0	0.4	0.0	0.5	0.0	0.3		0.9	0.0107515	0.00851744	0.0101690	0.995522		0.496819
Kinematic Viscosity	cSt		0.7	1.0	0.6	5.0	0.7	0.8	0.3		0.9	13.1597	3.15830	430.467	0.998232		0.695966
Thermal Conductivity	Btu/(h*ft*°F)		0.0	0.3	0.1	0.0	0.1	0.0	0.4		0.3	0.0174406	0.0107811	0.0122940	0.346442		0.0689791
Surface Tension	lbf/ft			0.005	0.001		0.001		0.004		0.005				0.00503944		0.00145930
Net I.G. Heating Value	Btu/ft^3	1031.4	1140.1	0.5	4956.6	2178.1	5648.9	1141.9	0.0	4950.5	0.0	1058.26	2203.84	46.4351	0.448229	325.121	5389.62
Net Liquid Heating Value	Btu/lb	18845.5	20654.7	-1049.8	18981.9	19770.3	18915.7	20684.2	-1059.8	18985.5	-1058.9	20118.0	19795.8	-31.0530	-1049.84	4488.19	18940.5
Gross I.G. Heating Value	Btu/ft^3	1141.9	1256.9	50.8	5329.6	2369.1	6067.8	1258.8	50.3	5323.1	50.3	1169.49	2396.82	99.1557	50.7837	396.592	5791.49
Gross Liquid Heating Value	Btu/lb	20879.9	22777.7	10.5	20421.9	21518.1	20329.9	22808.7	0.0	20425.9	0.9	22241.1	21542.8	1071.1	10.4	5653.5	20364.3

Process Streams		**Well Stream**	**HP Separator Gas**	**HP Separator Water**	**HP Separator Oil**	**OT Flash Gas**	**Sales Oil**	**Gas**	**Water**	**Oil**	**Produced Water**	**PWT Flash Gas**	**Oil W/B**	**Water W/B**	**1**	**3**	**LP Separator Oil**
Phase: Vapor	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Water		2.41304	0.157552	0.157679	0.157679	0.230619	0.230619	0		0	3.02982	3.02982	0.000110580	94.9993	0.157552	0.330178	0.282153
H2S		0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
Nitrogen		0.482726	0.493889	0.561082	0.561082	0.00937629	0.00937629	0.494658		0.224489	0.286151	0.286151	0.000349784	0.00511564	0.493889	0.411959	0.126403
Carbon Dioxide		0.143141	0.146369	0.0426637	0.0426637	0.0505555	0.0505555	0.146717		0	0.389176	0.389176	0.0540218	0.468755	0.146369	0.0497444	0.0694246
Methane		75.8268	77.5795	79.9358	79.9358	11.5949	11.5949	77.7018		58.3535	77.1039	77.1039	2.51842	3.83013	77.5795	75.5147	50.4636
Ethane		13.8577	14.1780	13.8710	13.8710	34.7336	34.7336	14.2004		22.3546	14.2236	14.2236	43.9798	0.652058	14.1780	16.2900	30.5286
Propane		4.38590	4.48723	3.56509	3.56509	28.8927	28.8927	4.49433		9.25482	3.85606	3.85606	31.0537	0.0430883	4.48723	4.64593	11.7983

Isobutane		0.553000	0.565789	0.447831	0.447831	5.32007	5.32007	0.566666		1.57691	0.162661	0.162661	5.30968	0.000227602	0.565789	0.620130	1.62150
n-Butane		1.15538	1.18209	0.768594	0.768594	9.94854	9.94854	1.18394		3.07001	0.581327	0.581327	9.76156	0.00122418	1.18209	1.09199	2.82710
Isopentane		0.365901	0.374361	0.209922	0.209922	2.95917	2.95917	0.374944		1.11534	0.104220	0.104220	2.75135	5.50033E-05	0.374361	0.315460	0.758655
n-Pentane		0.284405	0.290982	0.165262	0.165262	2.37972	2.37972	0.291434		0.981701	0.0798630	0.0798630	2.18622	3.07405E-05	0.290982	0.254252	0.597917
2-Methylpentane		0	0	0.0604136	0.0604136	0.878183	0.878183	0		0.472998	0.0133267	0.0133267	0.789936	9.79452E-07	0	0.0982120	0.212285
3-Methylpentane		0	0	0.0292771	0.0292771	0.426337	0.426337	0		0.236740	0.0172368	0.0172368	0.382467	3.07142E-06	0	0.0479003	0.102734
n-Hexane		0.532017	0.544325	0.0508158	0.0508158	0.735058	0.735058	0.545164		0.447750	0.00881294	0.00881294	0.0448421	2.50852E-08	0.544325	0.0846560	0.176080
Methylcyclopentane		0	0	0.0103669	0.0103669	0.152839	0.152839	0		0.0898031	0.0179779	0.0179779	0.126986	6.88900E-06	0	0.0171925	0.0365789
Benzene		0	0	0.00155030	0.00155030	0.0229512	0.0229512	0		0.0134706	0.0175371	0.0175371	0.00118701	2.06505E-05	0	0.00256548	0.00551498
2-Methylhexane		0	0	0.0199088	0.0199088	0.277889	0.277889	0		0.238108	0.00370885	0.00370885	0.0158305	4.46494E-09	0	0.0354315	0.0656946
3-Methylhexane		0	0	0.0155052	0.0155052	0.216499	0.216499	0		0.184720	0.00301547	0.00301547	0.185777	5.44082E-08	0	0.0275256	0.0512107
Heptane		0	0	0.0301362	0.0301362	0.413322	0.413322	0		0.376547	0.00603161	0.00603161	0.326563	7.99054E-08	0	0.0538567	0.0979605
Methylcyclohexane		0	0	0.0173571	0.0173571	0.244559	0.244559	0		0.208174	0.0189016	0.0189016	0.195072	1.54692E-06	0	0.0307593	0.0578209
Toluene		0	0	0.00296259	0.00296259	0.0419577	0.0419577	0		0.0378441	0.0301737	0.0301737	0.00458455	1.70950E-05	0	0.00530566	0.00991759
Octane		0	0	0.0248340	0.0248340	0.322311	0.322311	0		0.446831	0.00279433	0.00279433	0.239583	7.21384E-09	0	0.0477855	0.0758303
Ethylbenzene		0	0	0.00158627	0.00158627	0.0212301	0.0212301	0		0.0286106	0.0150635	0.0150635	0.00436799	4.80026E-06	0	0.00304746	0.00498178
m-Xylene		0	0	0.000954609	0.000954609	0.0126916	0.0126916	0		0.0185371	0.00891827	0.00891827	0.00336247	3.17277E-06	0	0.00186318	0.00297118
o-Xylene		0	0	0.00191828	0.00191828	0.0255061	0.0255061	0		0.0380905	0.0185628	0.0185628	0.00585142	6.90457E-06	0	0.00375877	0.00596769
Nonane		0	0	0.00590598	0.00590598	0.0730966	0.0730966	0		0.151645	0.000979220	0.000979220	0.0491567	1.19043E-09	0	0.0122130	0.0169807
C10+		0	0	0.00148341	0.00148341	0.0162797	0.0162797	0		0.0787916	0.000245865	0.000245865	0.00918059	2.72514E-11	0	0.00355530	0.00376520
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**
Water		189.754	12.1092	0	0	0.00870323	0	0		0	0	0.00959704	3.89242E-07	0.00331506	0	0.00274189	0
H2S		0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
Nitrogen		37.9601	37.9597	0	0	0.000353848	0	37.9605		0.00495414	0	0.000906390	1.23124E-06	1.78514E-07	0	0.00342103	0
Carbon Dioxide		11.2562	11.2497	0	0	0.00190789	0	11.2592		0	0	0.00123273	0.000190157	1.63575E-05	0	0.000413092	0
Methane		5962.79	5962.65	0	0	0.437574	0	5962.90		1.28777	0	0.244228	0.00886488	0.000133655	0	0.627096	0
Ethane		1089.73	1089.70	0	0	1.31080	0	1089.75		0.493333	0	0.0450535	0.154809	2.27540E-05	0	0.135277	0
Propane		344.894	344.882	0	0	1.09037	0	344.899		0.204240	0	0.0122142	0.109309	1.50360E-06	0	0.0385811	0
Isobutane		43.4863	43.4858	0	0	0.200772	0	43.4865		0.0348000	0	0.000515231	0.0186901	7.94231E-09	0	0.00514974	0
n-Butane		90.8554	90.8535	0	0	0.375444	0	90.8565		0.0677506	0	0.00184137	0.0343608	4.27186E-08	0	0.00906819	0
Isopentane		28.7733	28.7729	0	0	0.111675	0	28.7735		0.0246139	0	0.000330120	0.00968479	1.91938E-09	0	0.00261967	0
n-Pentane		22.3647	22.3645	0	0	0.0898074	0	22.3649		0.0216647	0	0.000252968	0.00769551	1.07271E-09	0	0.00211138	0
2-Methylpentane		0	0	0	0	0.0331414	0	0		0.0104384	0	4.22125E-05	0.00278058	3.41787E-11	0	0.000815581	0
3-Methylpentane		0	0	0	0	0.0160893	0	0		0.00522450	0	5.45980E-05	0.00134629	1.07179E-10	0	0.000397777	0
n-Hexane		41.8362	41.8361	0	0	0.0277400	0	41.8364		0.00988118	0	2.79152E-05	0.000157845	8.75366E-13	0	0.000703008	0
Methylcyclopentane		0	0	0	0	0.00576792	0	0		0.00198182	0	5.69455E-05	0.000446990	2.40396E-10	0	0.000142772	0
Benzene		0	0	0	0	0.000866147	0	0		0.000297275	0	5.55491E-05	4.17827E-06	7.20613E-10	0	2.13045E-05	0
2-Methylhexane		0	0	0	0	0.0104871	0	0		0.00525470	0	1.17479E-05	5.57237E-05	1.55807E-13	0	0.000294233	0
3-Methylhexane		0	0	0	0	0.00817038	0	0		0.00407650	0	9.55158E-06	0.000653936	1.89861E-12	0	0.000228581	0
Heptane		0	0	0	0	0.0155982	0	0		0.00830983	0	1.91053E-05	0.00114951	2.78835E-12	0	0.000447241	0
Methylcyclohexane		0	0	0	0	0.00922932	0	0		0.00459410	0	5.98713E-05	0.000686656	5.39810E-11	0	0.000255434	0
Toluene		0	0	0	0	0.00158342	0	0		0.000835164	0	9.55760E-05	1.61377E-05	5.96541E-10	0	4.40598E-05	0
Octane		0	0	0	0	0.0121636	0	0		0.00986090	0	8.85109E-06	0.000843336	2.51732E-13	0	0.000396824	0
Ethylbenzene		0	0	0	0	0.000801193	0	0		0.000631393	0	4.77140E-05	1.53754E-05	1.67508E-10	0	2.53070E-05	0
m-Xylene		0	0	0	0	0.000478962	0	0		0.000409086	0	2.82488E-05	1.18359E-05	1.10716E-10	0	1.54724E-05	0
o-Xylene		0	0	0	0	0.000962562	0	0		0.000840601	0	5.87981E-05	2.05971E-05	2.40940E-10	0	3.12139E-05	0
Nonane		0	0	0	0	0.00275856	0	0		0.00334659	0	3.10170E-06	0.000173032	4.15407E-14	0	0.000101420	0
C10+		0	0	0	0	0.000614372	0	0		0.00173881	0	7.78783E-07	3.23158E-05	9.50957E-16	0	2.95242E-05	0
Mass Fraction		**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Water		2.08809	0.135912	0.141973	0.141973	0.100159	0.100159	0		0	2.74549	2.74549	4.75275E-05	94.2807	0.135912	0.281682	0.188069
H2S		0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
Nitrogen		0.649544	0.662504	0.785570	0.785570	0.00633212	0.00633212	0.663391		0.228800	0.403202	0.403202	0.000233773	0.00789454	0.662504	0.546501	0.131013
Carbon Dioxide		0.302590	0.308453	0.0938420	0.0938420	0.0536373	0.0536373	0.309119		0	0.861498	0.861498	0.0567210	1.13646	0.308453	0.103672	0.113045
Methane		58.4300	59.5951	64.0921	64.0921	4.48425	4.48425	59.6762		34.0591	62.2169	62.2169	0.963892	3.38490	59.5951	57.3685	29.9531
Ethane		20.0149	20.4139	20.8459	20.8459	25.1780	25.1780	20.4417		24.4558	21.5125	21.5125	31.5502	1.08011	20.4139	23.1960	33.9639
Propane		9.28960	9.47472	7.85703	7.85703	30.7140	30.7140	9.48766		14.8477	8.55265	8.55265	32.6691	0.104669	9.47472	9.70150	19.2489
Isobutane		1.54387	1.57467	1.30091	1.30091	7.45439	7.45439	1.57677		3.33460	0.475539	0.475539	7.36274	0.000728750	1.57467	1.70685	3.48700
n-Butane		3.22558	3.28991	2.23271	2.23271	13.9397	13.9397	3.29435		6.49199	1.69951	1.69951	13.5360	0.00391966	3.28991	3.00560	6.07960
Isopentane		1.26805	1.29334	0.756972	0.756972	5.14697	5.14697	1.29507		2.92773	0.378219	0.378219	4.73592	0.000218614	1.29334	1.07781	2.02519
n-Pentane		0.985617	1.00528	0.595928	0.595928	4.13912	4.13912	1.00663		2.57694	0.289825	0.289825	3.76315	0.000122180	1.00528	0.868688	1.59611
2-Methylpentane		0	0	0.260202	0.260202	1.82440	1.82440	0		1.48299	0.0577652	0.0577652	1.62407	4.64973E-06	0	0.400791	0.676852
3-Methylpentane		0	0	0.126097	0.126097	0.885703	0.885703	0		0.742251	0.0747139	0.0747139	0.786331	1.45809E-05	0	0.195475	0.327559
n-Hexane		2.20217	2.24613	0.218864	0.218864	1.52706	1.52706	2.24910		1.40383	0.0382002	0.0382002	0.0921929	1.19086E-07	2.24613	0.345471	0.561415
Methylcyclopentane		0	0	0.0436059	0.0436059	0.310091	0.310091	0		0.274973	0.0761034	0.0761034	0.254968	3.19389E-05	0	0.0685194	0.113900

Benzene		0	0	0.00605234	0.00605234	0.0432191	0.0432191	0		0.0382823	0.0689025	0.0689025	0.00221207	8.88604E-05	0	0.00948980	0.0159387
2-Methylhexane		0	0	0.0997043	0.0997043	0.671274	0.671274	0		0.868053	0.0186929	0.0186929	0.0378443	2.46464E-08	0	0.168127	0.243555
3-Methylhexane		0	0	0.0776509	0.0776509	0.522980	0.522980	0		0.673419	0.0151982	0.0151982	0.444115	3.00332E-07	0	0.130612	0.189858
Heptane		0	0	0.150923	0.150923	0.998429	0.998429	0		1.37275	0.0303998	0.0303998	0.780678	4.41076E-07	0	0.255556	0.363177
Methylcyclohexane		0	0	0.0851763	0.0851763	0.578877	0.578877	0		0.743657	0.0933491	0.0933491	0.456956	8.36720E-06	0	0.143020	0.210052
Toluene		0	0	0.0136428	0.0136428	0.0931976	0.0931976	0		0.126863	0.139840	0.139840	0.0100778	8.67702E-05	0	0.0231500	0.0338095
Octane		0	0	0.141780	0.141780	0.887570	0.887570	0		1.85701	0.0160551	0.0160551	0.652919	4.53944E-08	0	0.258489	0.320486
Ethylbenzene		0	0	0.00841688	0.00841688	0.0543357	0.0543357	0		0.110511	0.0804394	0.0804394	0.0110635	2.80742E-05	0	0.0153211	0.0195685
m-Xylene		0	0	0.00506523	0.00506523	0.0324825	0.0324825	0		0.0716010	0.0476238	0.0476238	0.00851664	1.85559E-05	0	0.00936714	0.0116708
o-Xylene		0	0	0.0101786	0.0101786	0.0652795	0.0652795	0		0.147128	0.0991256	0.0991256	0.0148208	4.03812E-05	0	0.0188972	0.0234412
Nonane		0	0	0.0378581	0.0378581	0.226008	0.226008	0		0.707620	0.00631708	0.00631708	0.150413	8.41082E-09	0	0.0741766	0.0805792
C10+		0	0	0.0118031	0.0118031	0.0624800	0.0624800	0		0.456371	0.00196880	0.00196880	0.0348692	2.38998E-10	0	0.0268034	0.0221780
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**
Water		3418.48	218.151	0	0	0.156791	0	0		0	0	0.172893	7.01230E-06	0.0597218	0	0.0493959	0
H2S		0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
Nitrogen		1063.39	1063.38	0	0	0.00991248	0	1063.40		0.138782	0	0.0253911	3.44913E-05	5.00077E-06	0	0.0958346	0
Carbon Dioxide		495.380	495.095	0	0	0.0839654	0	495.512		0	0	0.0542516	0.00836873	0.00719886	0	0.0181800	0
Methane		95657.8	95655.6	0	0	7.01977	0	95659.7		20.6591	0	3.91802	0.142214	0.00214415	0	10.0602	0
Ethane		32767.1	32766.2	0	0	39.4144	0	32767.7		14.8340	0	1.35472	4.65497	0.000684191	0	4.06765	0
Propane		15208.3	15207.8	0	0	48.0806	0	15208.5		9.00610	0	0.538591	4.82006	6.63020E-05	0	1.70126	0
Isobutane		2527.52	2527.49	0	0	11.6693	0	2527.53		2.02265	0	0.0299464	1.08631	4.61625E-07	0	0.299314	0
n-Butane		5280.71	5280.61	0	0	21.8216	0	5280.78		3.93781	0	0.107024	1.99713	2.48290E-06	0	0.527063	0
Isopentane		2075.96	2075.93	0	0	8.05721	0	2075.97		1.77586	0	0.0238178	0.698746	1.38481E-07	0	0.189006	0
n-Pentane		1613.59	1613.57	0	0	6.47950	0	1613.60		1.56308	0	0.0182513	0.555222	7.73946E-08	0	0.152334	0
2-Methylpentane		0	0	0	0	2.85597	0	0		0.899529	0	0.00363768	0.239618	2.94536E-09	0	0.0702830	0
3-Methylpentane		0	0	0	0	1.38650	0	0		0.450223	0	0.00470500	0.116017	9.23623E-09	0	0.0342786	0
n-Hexane		3605.25	3605.24	0	0	2.39051	0	3605.26		0.851514	0	0.00240560	0.0136023	7.54349E-11	0	0.0605819	0
Methylcyclopentane		0	0	0	0	0.485425	0	0		0.166789	0	0.00479250	0.0376185	2.02316E-08	0	0.0120156	0
Benzene		0	0	0	0	0.0676563	0	0		0.0232207	0	0.00433904	0.000326373	5.62884E-08	0	0.00166413	0
2-Methylhexane		0	0	0	0	1.05083	0	0		0.526531	0	0.00117716	0.00558362	1.56122E-11	0	0.0294828	0
3-Methylhexane		0	0	0	0	0.818688	0	0		0.408473	0	0.000957087	0.0655256	1.90245E-10	0	0.0229042	0
Heptane		0	0	0	0	1.56297	0	0		0.832661	0	0.00191438	0.115183	2.79399E-10	0	0.0448144	0
Methylcyclohexane		0	0	0	0	0.906190	0	0		0.451076	0	0.00587853	0.0674201	5.30018E-09	0	0.0250800	0
Toluene		0	0	0	0	0.145894	0	0		0.0769507	0	0.00880622	0.00148690	5.49643E-08	0	0.00405960	0
Octane		0	0	0	0	1.38943	0	0		1.12640	0	0.00101105	0.0963330	2.87550E-11	0	0.0453286	0
Ethylbenzene		0	0	0	0	0.0850586	0	0		0.0670318	0	0.00506556	0.00163233	1.77835E-08	0	0.00268672	0
m-Xylene		0	0	0	0	0.0508490	0	0		0.0434307	0	0.00299904	0.00125656	1.17541E-08	0	0.00164262	0
o-Xylene		0	0	0	0	0.102190	0	0		0.0892424	0	0.00624230	0.00218669	2.55793E-08	0	0.00331382	0
Nonane		0	0	0	0	0.353800	0	0		0.429217	0	0.000397809	0.0221923	5.32781E-12	0	0.0130076	0
C10+		0	0	0	0	0.0978080	0	0		0.276819	0	0.000123982	0.00514467	1.51392E-13	0	0.00470026	0

Process Streams		**Well Stream**	**HP Separator Gas**	**HP Separator Water**	**HP Separator Oil**	**OT Flash Gas**	**Sales Oil**	**Gas**	**Water**	**Oil**	**Produced Water**	**PWT Flash Gas**	**Oil W/B**	**Water W/B**	**1**	**3**	**LP Separator Oil**
Phase: Vapor	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	**Units**																
Temperature	°F	161.9	70.0	70.0	70.0	75.9	75.9	200.0		200.0	75.9	75.94	75.9425	75.9425	70	92.9550	70
Pressure	psig	200	232	232	232	0	0	300		300	0	0	7.85245	-14.2292	232	232	40
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	20.8	20.9	20.0	20.0	41.5	41.5	20.9		27.5	19.9	19.8810	41.9152	18.1526	20.8837	21.1169	27.0277
Mass Density	lb/ft^3	0.7	1.0	0.9	0.9	0.1	0.1	1.0		1.3	0.1	0.0510034	0.168359	0.00147475	0.968640	0.931846	0.266633
Molar Flow	lbmol/h	7863.7	7685.9	0.0	0.0	3.8	0.0	7674.1		2.2	0.0	0.316752	0.352001	0.00348957	0	0.830429	0
Mass Flow	lb/h	163713.5	160509.1	0.0	0.0	156.5	0.0	160297.9		60.7	0.0	6.29736	14.7542	0.0633447	0	17.5360	0
Vapor Volumetric Flow	MCFH	236.6	165.7	0.0	0.0	1.5	0.0	166.4		0.0	0.0	0.123469	0.0876355	0.0429527	0	0.0188186	0
Liquid Volumetric Flow	Mbbl/d	1011.2	708.3	0.0	0.0	6.2	0.0	711.2		0.2	0.0	0.527780	0.374605	0.183605	0	0.0804417	0
Std Vapor Volumetric Flow	MMSCFD	71.6	70.0	0.0	0.0	0.0	0.0	69.9		0.0	0.0	0.00288486	0.00320589	3.17817E-05	0	0.00756324	0
Std Liquid Volumetric Flow	Mbbl/d	32.3	32.1	0.0	0.0	0.0	0.0	32.1		0.0	0.0	0.00127306	0.00216209	4.78517E-06	0	0.00349757	0
Compressibility		0.968	0.936	0.941	0.941	0.985	0.985	0.964		0.931	0.997	0.996607	0.976646	0.999552	0.935701	0.942655	0.975394
Specific Gravity		0.719	0.721	0.691	0.691	1.432	1.432	0.721		0.949	0.686	0.686437	1.44722	0.626760	0.721056	0.729108	0.933192
API Gravity																	
Enthalpy	MMBtu/h	-275.7	-265.3	0.0	0.0	-0.2	0.0	-253.3		-0.1	0.0	-0.0114049	-0.0155507	-0.000352636	0	-0.0285149	0
Mass Enthalpy	Btu/lb	-1684.2	-1652.6	-1693.3	-1693.3	-1070.1	-1070.1	-1579.9		-1305.5	-1811.1	-1811.07	-1053.98	-5566.94	-1652.62	-1626.07	-1373.03
Mass Cp	Btu/(lb**F)	0.5	0.5	0.5	0.5	0.4	0.4	0.6		0.5	0.5	0.484663	0.409188	0.448528	0.511045	0.515431	0.448703
Ideal Gas CpCv Ratio		1.226	1.249	1.259	1.259	1.133	1.133	1.215		1.165	1.261	1.26074	1.13261	1.32274	1.24907	1.24086	1.20021

Dynamic Viscosity	cP	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0107515	0.00851744	0.0101690	0.0108061	0.0111435	0.00979538
Kinematic Viscosity	cSt	1.1	0.7	0.7	0.7	5.0	5.0	0.8		0.6	13.2	13.1597	3.15830	430.467	0.696445	0.746543	2.29343
Thermal Conductivity	Btu/(h*ft*°F)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0174406	0.0107811	0.0122940	0.0178832	0.0186424	0.0147709
Surface Tension	lbf/ft																
Net I.G. Heating Value	Btu/ft^3	1114.3	1140.1	1097.7	1097.7	2178.1	2178.1	1141.9		1478.1	1058.3	1058.26	2203.84	46.4351	1140.10	1153.51	1454.31
Net Liquid Heating Value	Btu/lb	20230.2	20654.7	20762.7	20762.7	19770.3	19770.3	20684.2		20299.7	20118.0	20118.0	19795.8	-31.0530	20654.7	20660.9	20307.8
Gross I.G. Heating Value	Btu/ft^3	1229.7	1256.9	1211.4	1211.4	2369.1	2369.1	1258.8		1619.0	1169.5	1169.49	2396.82	99.1557	1256.93	1271.34	1593.66
Gross Liquid Heating Value	Btu/lb	22332.4	22777.7	22920.7	22920.7	21518.1	21518.1	22808.7		22243.9	22241.1	22241.1	21542.8	1071.1	22777.7	22778.3	22264.2

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Light Liquid	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		99.9771	99.9589	99.9592	0.0502132	0.00465508	0.00465508		100	0	99.9972	99.9972	3.11859E-06	100.0000	99.9589	0.0897395	0.0215339
H2S		0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Nitrogen		6.10633E-05	0.000101787	0.000115233	0.0145445	1.39712E-05	1.39712E-05		0	0.00758266	3.35198E-06	3.35198E-06	8.30439E-07	1.90347E-09	0.000101787	0.0105134	0.000713309
Carbon Dioxide		0.000473815	0.00116900	0.000340783	0.0117216	0.000875697	0.000875697		0	0	0.000188693	0.000188693	0.00139725	7.25721E-06	0.00116900	0.0116116	0.00458663
Methane		0.0182772	0.0310987	0.0320019	6.36957	0.0553799	0.0553799		0	4.46374	0.00185582	0.00185582	0.0189404	2.93717E-06	0.0310987	5.58995	0.917347
Ethane		0.00314314	0.00607365	0.00596009	6.54215	1.06099	1.06099		0	5.92336	0.000398983	0.000398983	2.08055	5.86028E-07	0.00607365	6.40865	3.57623
Propane		0.000680224	0.00203456	0.00162714	5.95800	3.32610	3.32610		0	5.81657	0.000119514	0.000119514	5.49576	4.29864E-08	0.00203456	5.96577	5.23585
Isobutane		3.47186E-05	8.17795E-05	6.53520E-05	1.82739	1.57295	1.57295		0	1.83502	1.75418E-06	1.75418E-06	2.38071	7.93290E-11	8.17795E-05	1.83968	1.85285
n-Butane		0.000179174	0.000367033	0.000241093	4.45379	4.22760	4.22760		0	4.50155	1.38059E-05	1.38059E-05	6.28450	9.40259E-10	0.000367033	4.48885	4.65493
Isopentane		2.91524E-05	7.47436E-05	4.24446E-05	2.96014	3.25441	3.25441		0	3.02927	1.69632E-06	1.69632E-06	4.56806	2.90957E-11	7.47436E-05	2.98905	3.23235
n-Pentane		2.79526E-05	5.64715E-05	3.25121E-05	3.11439	3.50998	3.50998		0	3.19489	1.28708E-06	1.28708E-06	4.85597	1.60995E-11	5.64715E-05	3.14580	3.42555
2-Methylpentane		0	0	5.31281E-06	2.68547	3.16186	3.16186		0	2.77014	1.02275E-07	1.02275E-07	4.27937	2.45084E-13	0	2.71421	2.99128
3-Methylpentane		0	0	7.09816E-06	1.45036	1.71311	1.71311		0	1.49690	3.58905E-07	3.58905E-07	2.30867	2.08529E-12	0	1.46594	1.61699
n-Hexane		1.99719E-05	3.68246E-05	3.49952E-06	3.10277	3.68501	3.68501		0	3.20396	5.37819E-08	5.37819E-08	0.337507	4.99705E-15	3.68246E-05	3.13637	3.46465
Methylcyclopentane		0	0	8.15253E-06	0.668025	0.793996	0.793996		0	0.690303	1.12380E-06	1.12380E-06	0.983898	1.40242E-11	0	0.675275	0.746103
Benzene		0	0	6.14929E-05	0.101297	0.120421	0.120421		0	0.105574	5.46575E-05	5.46575E-05	0.00910647	2.09252E-09	0	0.102327	0.113141
2-Methylhexane		0	0	1.47419E-06	2.71968	3.27145	3.27145		0	2.81500	2.40752E-08	2.40752E-08	0.276686	9.49640E-16	0	2.74966	3.04784
3-Methylhexane		0	0	1.19947E-06	2.22483	2.67742	2.67742		0	2.30321	2.04598E-08	2.04598E-08	3.40689	1.20930E-14	0	2.24937	2.49359
Heptane		0	0	2.39943E-06	5.34622	6.44577	6.44577		0	5.53727	4.11530E-08	4.11530E-08	7.52850	1.78815E-14	0	5.40538	5.99517
Methylcyclohexane		0	0	8.17188E-06	3.13431	3.77871	3.77871		0	3.24692	7.81869E-07	7.81869E-07	4.45381	2.09291E-12	0	3.16898	3.51472
Toluene		0	0	8.95101E-05	0.661872	0.799038	0.799038		0	0.687199	7.77429E-05	7.77429E-05	0.128522	1.43878E-09	0	0.668987	0.742486
Octane		0	0	1.10513E-06	13.2170	16.0140	16.0140		0	13.7086	1.25819E-08	1.25819E-08	17.4957	1.07016E-15	0	13.3644	14.8419
Ethylbenzene		0	0	4.09849E-05	1.01017	1.22433	1.22433		0	1.04858	3.51090E-05	3.51090E-05	0.368179	3.67355E-10	0	1.02137	1.13447
m-Xylene		0	0	2.49980E-05	0.720899	0.874008	0.874008		0	0.748320	2.15195E-05	2.15195E-05	0.338183	2.51535E-10	0	0.728881	0.809670
o-Xylene		0	0	6.77881E-05	1.62186	1.96666	1.96666		0	1.68387	6.05539E-05	6.05539E-05	0.657661	7.39879E-10	0	1.63976	1.82166
Nonane		0	0	3.89874E-07	9.14493	11.0971	11.0971		0	9.49144	7.01240E-09	7.01240E-09	11.0441	2.82321E-16	0	9.24719	10.2736
C10+		0	0	9.80943E-08	20.8884	25.3642	25.3642		0	21.6907	1.96464E-09	1.96464E-09	20.6973	7.27143E-18	0	21.1223	23.4708
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
Water		632.185	0	809.801	0.0285057	0	0.00217617		821.939	0	809.792	0	0	0	809.830	0.0503801	0.0108794
H2S		0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Nitrogen		0.000386121	0	0.000933535	0.00825682	0	6.53131E-06		0	0.00414480	2.71448E-05	0	0	0	0.000824637	0.00590228	0.000360379
Carbon Dioxide		0.00299607	0	0.00276079	0.00665426	0	0.000409373		0	0	0.00152806	0	0	0	0.00947080	0.00651880	0.00231727
Methane		0.115572	0	0.259257	3.61596	0	0.0258892		0	2.43995	0.0150287	0	0	0	0.251950	3.13822	0.463464
Ethane		0.0198750	0	0.0482845	3.71393	0	0.495995		0	3.23780	0.00323102	0	0	0	0.0492065	3.59784	1.80679
Propane		0.00430126	0	0.0131820	3.38231	0	1.55489		0	3.17943	0.000967839	0	0	0	0.0164833	3.34921	2.64527
Isobutane		0.000219536	0	0.000529437	1.03740	0	0.735328		0	1.00305	1.42056E-05	0	0	0	0.000662547	1.03280	0.936100
n-Butane		0.00113297	0	0.00195317	2.52838	0	1.97633		0	2.46062	0.000111802	0	0	0	0.00297356	2.52006	2.35177
Isopentane		0.000184339	0	0.000343857	1.68045	0	1.52138		0	1.65585	1.37371E-05	0	0	0	0.000605545	1.67807	1.63305
n-Pentane		0.000176753	0	0.000263391	1.76802	0	1.64086		0	1.74637	1.04229E-05	0	0	0	0.000457511	1.76606	1.73066
2-Methylpentane		0	0	4.30408E-05	1.52452	0	1.47812		0	1.51420	8.28239E-07	0	0	0	0	1.52377	1.51126
3-Methylpentane		0	0	5.75044E-05	0.823359	0	0.800851		0	0.818230	2.90646E-06	0	0	0	0	0.822985	0.816941
n-Hexane		0.000126289	0	2.83507E-05	1.76142	0	1.72268		0	1.75133	4.35534E-07	0	0	0	0.000298339	1.76077	1.75042
Methylcyclopentane		0	0	6.60462E-05	0.379233	0	0.371180		0	0.377330	9.10069E-06	0	0	0	0	0.379102	0.376948
Benzene		0	0	0.000498174	0.0575056	0	0.0562949		0	0.0577085	0.000442625	0	0	0	0	0.0574468	0.0571610
2-Methylhexane		0	0	1.19428E-05	1.54394	0	1.52935		0	1.53872	1.94965E-07	0	0	0	0	1.54367	1.53984
3-Methylhexane		0	0	9.71727E-06	1.26302	0	1.25165		0	1.25897	1.65686E-07	0	0	0	0	1.26281	1.25982
Heptane		0	0	1.94385E-05	3.03501	0	3.01329		0	3.02676	3.33263E-07	0	0	0	0	3.03460	3.02889
Methylcyclohexane		0	0	6.62030E-05	1.77932	0	1.76648		0	1.77482	6.33169E-06	0	0	0	0	1.77908	1.77571
Toluene		0	0	0.000725150	0.375740	0	0.373537		0	0.375634	0.000629574	0	0	0	0	0.375572	0.375120
Octane		0	0	8.95298E-06	7.50318	0	7.48627		0	7.49336	1.01890E-07	0	0	0	0	7.50281	7.49844
Ethylbenzene		0	0	0.000332032	0.573468	0	0.572356		0	0.573171	0.000284318	0	0	0	0	0.573404	0.573157
m-Xylene		0	0	0.000202517	0.409249	0	0.408584		0	0.409043	0.000174268	0	0	0	0	0.409197	0.409063

o-Xylene		0	0	0.000549172	0.920716	0	0.919381		0	0.920427	0.000490374	0	0	0	0	0.920571	0.920344
Nonane		0	0	3.15849E-06	5.19151	0	5.18769		0	5.18817	5.67874E-08	0	0	0	0	5.19141	5.19044
C10+		0	0	7.94693E-07	11.8582	0	11.8573		0	11.8565	1.59099E-08	0	0	0	0	11.8582	11.8580
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		99.9745	99.9520	99.9536	0.00921314	0.000746952	0.000746952		100	0	99.9955	99.9955	5.30192E-07	100.0000	99.9520	0.0163233	0.00362611
H2S		0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Nitrogen		9.49498E-05	0.000158265	0.000179174	0.00414968	3.48597E-06	3.48597E-06		0	0.00210528	5.21218E-06	5.21218E-06	2.19537E-07	2.95986E-09	0.000158265	0.00297367	0.000186776
Carbon Dioxide		0.00115745	0.00285555	0.000832451	0.00525390	0.000343261	0.000343261		0	0	0.000460950	0.000460950	0.000580301	1.77286E-05	0.00285555	0.00515967	0.00188676
Methane		0.0162753	0.0276912	0.0284958	1.04071	0.00791311	0.00791311		0	0.709728	0.00165257	0.00165257	0.00286744	2.61552E-06	0.0276912	0.905445	0.137556
Ethane		0.00524604	0.0101367	0.00994733	2.00350	0.284155	0.284155		0	1.76527	0.000665925	0.000665925	0.590381	9.78130E-07	0.0101367	1.94567	1.00513
Propane		0.00166493	0.00497961	0.00398250	2.67575	1.30634	1.30634		0	2.54205	0.000292526	0.000292526	2.28695	1.05217E-07	0.00497961	2.65610	2.15804
Isobutane		0.000112009	0.000263825	0.000210831	1.08174	0.814294	0.814294		0	1.05707	5.65937E-06	5.65937E-06	1.30582	2.55937E-10	0.000263825	1.07961	1.00660
n-Butane		0.000578048	0.00118407	0.000777787	2.63646	2.18857	2.18857		0	2.59314	4.45408E-05	4.45408E-05	3.44705	3.03353E-09	0.00118407	2.63427	2.52890
Isopentane		0.000116748	0.000299318	0.000169975	2.17515	2.09134	2.09134		0	2.16615	6.79344E-06	6.79344E-06	3.11025	1.16524E-10	0.000299318	2.17744	2.17984
n-Pentane		0.000111944	0.000226145	0.000130199	2.28850	2.25558	2.25558		0	2.28458	5.15449E-06	5.15449E-06	3.30628	6.44762E-11	0.000226145	2.29162	2.31013
2-Methylpentane		0	0	2.54122E-05	2.35696	2.42689	2.42689		0	2.36596	4.89221E-07	4.89221E-07	3.48014	1.17235E-12	0	2.36162	2.40944
3-Methylpentane		0	0	3.39518E-05	1.27294	1.31490	1.31490		0	1.27849	1.71678E-06	1.71678E-06	1.87750	9.97488E-12	0	1.27551	1.30247
n-Hexane		9.55326E-05	0.000176137	1.67389E-05	2.72321	2.82843	2.82843		0	2.73648	2.57259E-07	2.57259E-07	0.274474	2.39032E-14	0.000176137	2.72894	2.79074
Methylcyclopentane		0	0	3.80829E-05	0.572591	0.595176	0.595176		0	0.575791	5.24981E-06	5.24981E-06	0.781425	6.55149E-11	0	0.573808	0.586919
Benzene		0	0	0.000266610	0.0805865	0.0837807	0.0837807		0	0.0817329	0.000236984	0.000236984	0.00671276	9.07289E-09	0	0.0807031	0.0826060
2-Methylhexane		0	0	8.19903E-06	2.77551	2.91972	2.91972		0	2.79561	1.33905E-07	1.33905E-07	0.261636	5.28195E-15	0	2.78188	2.85460
3-Methylhexane		0	0	6.67113E-06	2.27050	2.38955	2.38955		0	2.28735	1.13796E-07	1.13796E-07	3.22158	6.72618E-14	0	2.27573	2.33549
Heptane		0	0	1.33450E-05	5.45597	5.75275	5.75275		0	5.49913	2.28892E-07	2.28892E-07	7.11900	9.94579E-14	0	5.46871	5.61505
Methylcyclohexane		0	0	4.45355E-05	3.13430	3.30459	3.30459		0	3.15969	4.26124E-06	4.26124E-06	4.12683	1.14067E-11	0	3.14161	3.22565
Toluene		0	0	0.000457770	0.621103	0.655741	0.655741		0	0.627546	0.000397607	0.000397607	0.111751	7.35858E-09	0	0.622360	0.639449
Octane		0	0	7.00682E-06	15.3764	16.2929	16.2929		0	15.5200	7.97758E-08	7.97758E-08	18.8599	6.78548E-15	0	15.4137	15.8467
Ethylbenzene		0	0	0.000241513	1.09226	1.15773	1.15773		0	1.10333	0.000206896	0.000206896	0.368871	2.16484E-09	0	1.09484	1.12577
m-Xylene		0	0	0.000147306	0.779479	0.826459	0.826459		0	0.787392	0.000126813	0.000126813	0.338818	1.48231E-09	0	0.781306	0.803464
o-Xylene		0	0	0.000399456	1.75365	1.85967	1.85967		0	1.77179	0.000356841	0.000356841	0.658898	4.36015E-09	0	1.75771	1.80770
Nonane		0	0	2.77545E-06	11.9455	12.6767	12.6767		0	12.0650	4.99221E-08	4.99221E-08	13.3671	2.00991E-15	0	11.9748	12.3161
C10+		0	0	8.66805E-07	33.8686	35.9657	35.9657		0	34.2246	1.73611E-08	1.73611E-08	31.0951	6.42572E-17	0	33.9522	34.9259
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
Water		11389.0	0	14588.8	0.513537	0	0.0392044		14807.5	0	14588.6	0	0	0	14589.3	0.907612	0.195996
H2S		0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Nitrogen		0.0108166	0	0.0261515	0.231302	0	0.000182964		0	0.116110	0.000760419	0	0	0	0.0231009	0.165343	0.0100954
Carbon Dioxide		0.131856	0	0.121501	0.292851	0	0.0180163		0	0	0.0672493	0	0	0	0.416805	0.286889	0.101982
Methane		1.85407	0	4.15912	58.0088	0	0.415326		0	39.1428	0.241098	0	0	0	4.04190	50.3448	7.43509
Ethane		0.597622	0	1.45187	111.674	0	14.9141		0	97.3576	0.0971536	0	0	0	1.47959	108.184	54.3285
Propane		0.189667	0	0.581269	149.145	0	68.5640		0	140.199	0.0426774	0	0	0	0.726840	147.685	116.645
Isobutane		0.0127599	0	0.0307720	60.2957	0	42.7389		0	58.2994	0.000825661	0	0	0	0.0385087	60.0287	54.4082
n-Butane		0.0658506	0	0.113522	146.955	0	114.869		0	143.017	0.00649817	0	0	0	0.172830	146.471	136.690
Isopentane		0.0132998	0	0.0248089	121.242	0	109.766		0	119.467	0.000991113	0	0	0	0.0436893	121.070	117.823
n-Pentane		0.0127525	0	0.0190033	127.560	0	118.386		0	125.999	0.000752003	0	0	0	0.0330089	127.419	124.865
2-Methylpentane		0	0	0.00370905	131.376	0	127.377		0	130.487	7.13738E-05	0	0	0	0	131.311	130.233
3-Methylpentane		0	0	0.00495547	70.9532	0	69.0137		0	70.5113	0.000250466	0	0	0	0	70.9210	70.4002
n-Hexane		0.0108830	0	0.00244313	151.791	0	148.452		0	150.922	3.75323E-05	0	0	0	0.0257095	151.735	150.843
Methylcyclopentane		0	0	0.00555841	31.9160	0	31.2383		0	31.7559	0.000765909	0	0	0	0	31.9050	31.7237
Benzene		0	0	0.0389133	4.49187	0	4.39730		0	4.50772	0.0345742	0	0	0	0	4.48727	4.46495
2-Methylhexane		0	0	0.00119670	154.706	0	153.244		0	154.183	1.95358E-05	0	0	0	0	154.679	154.294
3-Methylhexane		0	0	0.000973689	126.557	0	125.418		0	126.151	1.66021E-05	0	0	0	0	126.536	126.236
Heptane		0	0	0.00194778	304.114	0	301.937		0	303.287	3.33936E-05	0	0	0	0	304.073	303.500
Methylcyclohexane		0	0	0.00650021	174.705	0	173.444		0	174.262	0.000621684	0	0	0	0	174.681	174.350
Toluene		0	0	0.0668141	34.6201	0	34.4171		0	34.6103	0.0580079	0	0	0	0	34.6046	34.5630
Octane		0	0	0.00102269	857.077	0	855.146		0	855.955	1.16387E-05	0	0	0	0	857.035	856.535
Ethylbenzene		0	0	0.0352501	60.8822	0	60.7641		0	60.8507	0.0301846	0	0	0	0	60.8754	60.8492
m-Xylene		0	0	0.0215002	43.4479	0	43.3773		0	43.4261	0.0185012	0	0	0	0	43.4424	43.4282
o-Xylene		0	0	0.0583029	97.7479	0	97.6061		0	97.7172	0.0520606	0	0	0	0	97.7324	97.7083
Nonane		0	0	0.000405093	665.837	0	665.347		0	665.409	7.28327E-06	0	0	0	0	665.825	665.701
C10+		0	0	0.000126515	1887.82	0	1887.69		0	1887.55	2.53286E-06	0	0	0	0	1887.82	1887.79

Process Streams		**Well Stream**	**HP Separator Gas**	**HP Separator Water**	**HP Separator Oil**	**OT Flash Gas**	**Sales Oil**	**Gas**	**Water**	**Oil**	**Produced Water**	**PWT Flash Gas**	**Oil W/B**	**Water W/B**	**1**	**3**	**LP Separator Oil**
Phase: Light Liquid	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	**Units**																
Temperature	°F	161.9	70.0	70.0	70.0	75.9	75.9		200.0	200.0	75.9	75.94	75.9425	75.9425	70	92.9550	70

Pressure	psig	200	232	232	232	0	0		200	300	0	0	7.85245	-14.2292	232	232	40
Mole Fraction Vapor	%	0	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	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol	18.0	18.0	18.0	98.2	112.3	112.3		18.0	100.9	18.0	18.0156	105.966	18.0153	18.0165	99.0414	106.985
Mass Density	lb/ft^3	60.9	62.3	62.3	43.9	44.8	44.8		60.2	39.9	62.2	62.2169	43.9469	62.2179	62.2584	43.2664	44.5646
Molar Flow	lbmol/h	632.3	0.0	810.1	56.8	0.0	46.7		821.9	54.7	809.8	0	0	0	810.163	56.1404	50.5222
Mass Flow	lb/h	11391.9	0.0	14595.6	5574.0	0.0	5248.6		14807.5	5515.2	14589.3	0	0	0	14596.3	5560.23	5405.12
Vapor Volumetric Flow	MCFH	0.2	0.0	0.2	0.1	0.0	0.1		0.2	0.1	0.2	0	0	0	0.234447	0.128511	0.121287
Liquid Volumetric Flow	Mbbl/d	0.8	0.0	1.0	0.5	0.0	0.5		1.1	0.6	1.0	0	0	0	1.00216	0.549332	0.518453
Std Vapor Volumetric Flow	MMSCFD	5.8	0.0	7.4	0.5	0.0	0.4		7.5	0.5	7.4	0	0	0	7.37866	0.511306	0.460137
Std Liquid Volumetric Flow	Mbbl/d	0.8	0.0	1.0	0.6	0.0	0.5		1.0	0.5	1.0	0	0	0	1.00133	0.550040	0.522633
Compressibility		0.010	0.013	0.013	0.097	0.006	0.006		0.009	0.112	0.001	0.000740328	0.00945886	2.35132E-05	0.0125593	0.0952211	0.0231004
Specific Gravity		0.977	0.998	0.998	0.704	0.718	0.718		0.964	0.640	0.998	0.997562	0.704627	0.997577	0.998227	0.693717	0.714531
API Gravity		10.0	10.1	10.1	68.1	63.6	63.6		10.0	66.8	10.0	10.0156	67.1400	10.0135	10.0519	67.6712	65.2024
Enthalpy	MMBtu/h	-76.7	0.0	-99.6	-4.9	0.0	-4.5		-99.2	-4.5	-99.5	0	0	0	-99.6270	-4.84515	-4.67743
Mass Enthalpy	Btu/lb	-6736.3	-6825.5	-6825.5	-884.7	-851.7	-851.7		-6699.9	-807.9	-6822.4	-6822.39	-894.293	-6822.67	-6825.49	-871.394	-865.371
Mass Cp	Btu/(lb*°F)	1.0	1.0	1.0	0.5	0.5	0.5		1.0	0.6	1.0	0.982735	0.495508	0.982746	0.983032	0.508199	0.488525
Ideal Gas CpCv Ratio		1.322	1.326	1.326	1.056	1.049	1.049		1.320	1.045	1.326	1.32555	1.05147	1.32556	1.32581	1.05392	1.05188
Dynamic Viscosity	cP	0.4	1.0	1.0	0.4	0.5	0.5		0.3	0.2	0.9	0.924450	0.464783	0.924435	0.995522	0.375792	0.496819
Kinematic Viscosity	cSt	0.4	1.0	1.0	0.6	0.7	0.7		0.3	0.4	0.9	0.927586	0.660239	0.927556	0.998232	0.542219	0.695966
Thermal Conductivity	Btu/(h*ft*°F)	0.4	0.3	0.3	0.1	0.1	0.1		0.4	0.1	0.3	0.349786	0.0684796	0.349835	0.346442	0.0665862	0.0689791
Surface Tension	lbf/ft	0.004	0.005	0.005	0.001	0.001	0.001		0.004	0.001	0.005	0.00499717	0.00142205	0.00499737	0.00503944	0.00122155	0.00145930
Net I.G. Heating Value	Btu/ft^3	0.2	0.4	0.5	4956.6	5648.9	5648.9		0.0	5090.7	0.0	0.0378946	5353.58	3.74307E-05	0.448229	4998.32	5389.62
Net Liquid Heating Value	Btu/lb	-1054.4	-1049.8	-1049.8	18981.9	18915.7	18915.7		-1059.8	18971.1	-1058.9	-1058.92	19002.0	-1059.76	-1049.84	18976.1	18940.5
Gross I.G. Heating Value	Btu/ft^3	50.6	50.8	50.8	5329.6	6067.8	6067.8		50.3	5472.6	50.3	50.3498	5758.49	50.3100	50.7837	5374.10	5791.49
Gross Liquid Heating Value	Btu/lb	5.6	10.4	10.5	20421.9	20329.9	20329.9		0.0	20406.0	0.9	0.863395	20450.9	0.000856441	10.3851	20414.4	20364.3

Process Streams		**Well Stream**	**HP Separator Gas**	**HP Separator Water**	**HP Separator Oil**	**OT Flash Gas**	**Sales Oil**	**Gas**	**Water**	**Oil**	**Produced Water**	**PWT Flash Gas**	**Oil W/B**	**Water W/B**	**1**	**3**	**LP Separator Oil**
Phase: Heavy Liquid	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Water					99.9592											99.9650	
H2S					0											0	
Nitrogen					0.000115233											7.41029E-05	
Carbon Dioxide					0.000340783											0.000313422	
Methane					0.0320019											0.0264616	
Ethane					0.00596009											0.00582952	
Propane					0.00162714											0.00152634	
Isobutane					6.53520E-05											6.89775E-05	
n-Butane					0.000241093											0.000273243	
Isopentane					4.24446E-05											4.69876E-05	
n-Pentane					3.25121E-05											3.95157E-05	
2-Methylpentane					5.31281E-06											7.00006E-06	
3-Methylpentane					7.09816E-06											8.84016E-06	
n-Hexane					3.49952E-06											4.65030E-06	
Methylcyclopentane					8.15253E-06											8.31631E-06	
Benzene					6.14929E-05											6.63756E-05	
2-Methylhexane					1.47419E-06											1.59373E-06	
3-Methylhexane					1.19947E-06											1.31070E-06	
Heptane					2.39943E-06											2.23817E-06	
Methylcyclohexane					8.17188E-06											9.83384E-06	
Toluene					8.95101E-05											0.000105245	
Octane					1.10513E-06											1.54756E-06	
Ethylbenzene					4.09849E-05											4.60793E-05	
m-Xylene					2.49980E-05											2.96643E-05	
o-Xylene					6.77881E-05											8.21961E-05	
Nonane					3.89874E-07											5.49454E-07	
C10+					9.80943E-08											1.42006E-07	
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**
Water					0											809.777	
H2S					0											0	
Nitrogen					0											0.000600278	
Carbon Dioxide					0											0.00253891	
Methane					0											0.214355	

Ethane					0											0.0472227	
Propane					0											0.0123643	
Isobutane					0											0.000558759	
n-Butane					0											0.00221344	
Isopentane					0											0.000380628	
n-Pentane					0											0.000320101	
2-Methylpentane					0											5.67047E-05	
3-Methylpentane					0											7.16106E-05	
n-Hexane					0											3.76703E-05	
Methylcyclopentane					0											6.73671E-05	
Benzene					0											0.000537683	
2-Methylhexane					0											1.29102E-05	
3-Methylhexane					0											1.06175E-05	
Heptane					0											1.81305E-05	
Methylcyclohexane					0											7.96600E-05	
Toluene					0											0.000852546	
Octane					0											1.25361E-05	
Ethylbenzene					0											0.000373270	
m-Xylene					0											0.000240299	
o-Xylene					0											0.000665838	
Nonane					0											4.45091E-06	
C10+					0											1.15033E-06	
Mass Fraction		**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Water					99.9536											99.9587	
H2S					0											0	
Nitrogen					0.000179174											0.000115221	
Carbon Dioxide					0.000832451											0.000765609	
Methane					0.0284958											0.0235624	
Ethane					0.00994733											0.00972936	
Propane					0.00398250											0.00373575	
Isobutane					0.000210831											0.000222526	
n-Butane					0.000777787											0.000881501	
Isopentane					0.000169975											0.000188167	
n-Pentane					0.000130199											0.000158245	
2-Methylpentane					2.54122E-05											3.34824E-05	
3-Methylpentane					3.39518E-05											4.22838E-05	
n-Hexane					1.67389E-05											2.22431E-05	
Methylcyclopentane					3.80829E-05											3.88477E-05	
Benzene					0.000266610											0.000287778	
2-Methylhexane					8.19903E-06											8.86386E-06	
3-Methylhexane					6.67113E-06											7.28974E-06	
Heptane					1.33450E-05											1.24480E-05	
Methylcyclohexane					4.45355E-05											5.35925E-05	
Toluene					0.000457770											0.000538236	
Octane					7.00682E-06											9.81188E-06	
Ethylbenzene					0.000241513											0.000271531	
m-Xylene					0.000147306											0.000174802	
o-Xylene					0.000399456											0.000484355	
Nonane					2.77545E-06											3.91144E-06	
C10+					8.66805E-07											1.25482E-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**
Water					0											14588.4	
H2S					0											0	
Nitrogen					0											0.0168158	
Carbon Dioxide					0											0.111736	
Methane					0											3.43879	
Ethane					0											1.41994	
Propane					0											0.545210	
Isobutane					0											0.0324763	
n-Butane					0											0.128650	
Isopentane					0											0.0274619	
n-Pentane					0											0.0230949	
2-Methylpentane					0											0.00488655	
3-Methylpentane					0											0.00617107	

n-Hexane					0											0.00324625	
Methylcyclopentane					0											0.00566958	
Benzene					0											0.0419994	
2-Methylhexane					0											0.00129363	
3-Methylhexane					0											0.00106389	
Heptane					0											0.00181672	
Methylcyclohexane					0											0.00782150	
Toluene					0											0.0785522	
Octane					0											0.00143198	
Ethylbenzene					0											0.0396282	
m-Xylene					0											0.0255113	
o-Xylene					0											0.0706887	
Nonane					0											0.000570851	
C10+					0											0.000183133	

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Heavy Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units																
Temperature	°F				70.0											92.9550	
Pressure	psig				232											232	
Mole Fraction Vapor	%				0											0	
Mole Fraction Light Liquid	%				0											0	
Mole Fraction Heavy Liquid	%				100											100	
Molecular Weight	lb/lbmol				18.0											18.0164	
Mass Density	lb/ft^3				62.3											62.0186	
Molar Flow	lbmol/h				0.0											810.060	
Mass Flow	lb/h				0.0											14594.4	
Vapor Volumetric Flow	MCFH				0.0											0.235323	
Liquid Volumetric Flow	Mbbl/d				0.0											1.00591	
Std Vapor Volumetric Flow	MMSCFD				0.0											7.37773	
Std Liquid Volumetric Flow	Mbbl/d				0.0											1.00107	
Compressibility					0.013											0.0120841	
Specific Gravity					0.998											0.994381	
API Gravity					10.1											10.0427	
Enthalpy	MMBtu/h				0.0											-99.2885	
Mass Enthalpy	Btu/lb				-6825.5											-6803.19	
Mass Cp	Btu/(lb*°F)				1.0											0.981861	
Ideal Gas CpCv Ratio					1.326											1.32471	
Dynamic Viscosity	cP				1.0											0.757492	
Kinematic Viscosity	cSt				1.0											0.762492	
Thermal Conductivity	Btu/(h*ft*°F)				0.3											0.356626	
Surface Tension	lbf/ft				0.005											0.00486663	
Net I.G. Heating Value	Btu/ft^3				0.5											0.400701	
Net Liquid Heating Value	Btu/lb				-1049.8											-1050.91	
Gross I.G. Heating Value	Btu/ft^3				50.8											50.7336	
Gross Liquid Heating Value	Btu/lb				10.5											9.3	

October 7, 2013

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

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

Sample: Sweeny No. 2H (Forest Well Pad)
Separator Hydrocarbon Liquid
Sampled @ 265 psig & 72 °F

Date Sampled: 09/20/13 Job Number: 35822.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.016	0.004	0.005
Carbon Dioxide	0.000	0.000	0.000
Methane	6.555	2.493	1.079
Ethane	6.561	3.938	2.025
Propane	5.950	3.679	2.693
Isobutane	1.825	1.340	1.088
n-Butane	4.352	3.079	2.596
2,2 Dimethylpropane	0.094	0.081	0.070
Isopentane	2.955	2.425	2.188
n-Pentane	3.109	2.529	2.302
2,2 Dimethylbutane	0.233	0.218	0.206
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.371	0.341	0.328
2 Methylpentane	2.077	1.935	1.837
3 Methylpentane	1.448	1.327	1.281
n-Hexane	3.097	2.858	2.739
Heptanes Plus	61.357	73.752	79.565
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.7476	(Water=1)
°API Gravity	57.76	@ 60°F
Molecular Weight	126.4	
Vapor Volume	18.78	CF/Gal
Weight	6.23	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.6930	(Water=1)
°API Gravity	72.68	@ 60°F
Molecular Weight	97.4	
Vapor Volume	22.57	CF/Gal
Weight	5.77	Lbs/Gal

Base Conditions: 14.850 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

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

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.016	0.004	0.005
Methane	6.555	2.493	1.079
Ethane	6.561	3.938	2.025
Propane	5.950	3.679	2.693
Isobutane	1.825	1.340	1.088
n-Butane	4.446	3.160	2.665
Isopentane	2.955	2.425	2.188
n-Pentane	3.109	2.529	2.302
Other C-6's	4.129	3.821	3.652
Heptanes	10.940	10.981	11.026
Octanes	16.323	17.415	18.233
Nonanes	9.129	11.236	11.888
Decanes Plus	20.852	30.674	34.062
Benzene	0.102	0.064	0.082
Toluene	0.662	0.498	0.626
E-Benzene	1.009	0.874	1.099
Xylenes	2.340	2.009	2.549
n-Hexane	3.097	2.858	2.739
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity	0.6930	(Water=1)
°API Gravity	72.68	@ 60°F
Molecular Weight	97.4	
Vapor Volume	22.57	CF/Gal
Weight	5.77	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity	0.7696	(Water=1)
Molecular Weight	159.2	

Characteristics of Atmospheric Sample:

°API Gravity	61.33	@ 60°F
Reid Vapor Pressure (ASTM D-5191)	2.65	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	W-1002*	T-3030
Pressure, PSIG	265	232	231
Temperature, °F	72	70	70

* Sample used for analysis

TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.016	0.004	0.005
Carbon Dioxide	0.000	0.000	0.000
Methane	6.555	2.493	1.079
Ethane	6.561	3.938	2.025
Propane	5.950	3.679	2.693
Isobutane	1.825	1.340	1.088
n-Butane	4.352	3.079	2.596
2,2 Dimethylpropane	0.094	0.081	0.070
Isopentane	2.955	2.425	2.188
n-Pentane	3.109	2.529	2.302
2,2 Dimethylbutane	0.233	0.218	0.206
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.371	0.341	0.328
2 Methylpentane	2.077	1.935	1.837
3 Methylpentane	1.448	1.327	1.281
n-Hexane	3.097	2.858	2.739
Methylcyclopentane	0.667	0.530	0.576
Benzene	0.102	0.064	0.082
Cyclohexane	0.624	0.476	0.539
2-Methylhexane	2.715	2.833	2.792
3-Methylhexane	2.221	2.288	2.283
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	1.061	1.073	1.080
n-Heptane	3.652	3.781	3.755
Methylcyclohexane	3.129	2.823	3.153
Toluene	0.662	0.498	0.626
Other C-8's	9.393	10.222	10.624
n-Octane	3.801	4.370	4.455
E-Benzene	1.009	0.874	1.099
M & P Xylenes	0.720	0.627	0.784
O-Xylene	1.620	1.383	1.765
Other C-9's	6.182	7.514	8.009
n-Nonane	2.948	3.722	3.879
Other C-10's	6.082	8.124	8.817
n-decane	2.003	2.760	2.925
Undecanes(11)	5.075	6.955	7.656
Dodecanes(12)	2.899	4.291	4.789
Tridecanes(13)	1.869	2.966	3.356
Tetradecanes(14)	1.118	1.901	2.180
Pentadecanes(15)	0.652	1.188	1.379
Hexadecanes(16)	0.379	0.738	0.864
Heptadecanes(17)	0.250	0.514	0.607
Octadecanes(18)	0.184	0.399	0.475
Nonadecanes(19)	0.121	0.274	0.328
Eicosanes(20)	0.077	0.181	0.218
Heneicosanes(21)	0.047	0.115	0.140
Docosanes(22)	0.032	0.081	0.099
Tricosanes(23)	0.020	0.054	0.066
Tetracosanes(24)	0.015	0.040	0.050
Pentacosanes(25)	0.009	0.027	0.033
Hexacosanes(26)	0.006	0.017	0.021
Heptacosanes(27)	0.004	0.012	0.016
Octacosanes(28)	0.003	0.009	0.011
Nonacosanes(29)	0.002	0.008	0.010
Triacontanes(30)	0.002	0.005	0.007
Hentriacontanes Plus(31+)	0.003	0.012	0.016
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: Sweeny No. 2H (Forest Well Pad)

Job Number: J35822

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	**Stock Tank**
Pressure, psig	265	0
Temperature, °F	72	70
Gas Oil Ratio (1)	------	209
Gas Specific Gravity (2)	------	1.225
Separator Volume Factor (3)	1.1348	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.8812
Oil API Gravity at 60 °F	61.33
Reid Vapor Pressure, psi (5)	2.65

Quality Control Check			
	Sampling Conditions	**Test Samples**	
Cylinder No.	------	W-1002*	T-3030
Pressure, psig	265	232	231
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: Sweeny No. 2H (Forest Well Pad)
Gas Evolved from Hydrocarbon Liquid Flashed
From 265 psig & 72 °F to 0 psig & 70 °F

Date Sampled: 09/20/13 Job Number: 35822.001

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.042	
Carbon Dioxide	0.128	
Methane	33.021	
Ethane	28.999	7.817
Propane	19.505	5.416
Isobutane	3.942	1.300
n-Butane	7.039	2.237
2-2 Dimethylpropane	0.112	0.043
Isopentane	2.264	0.835
n-Pentane	1.810	0.661
Hexanes	1.577	0.655
Heptanes Plus	1.561	0.703
Totals	100.000	19.666

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.626	(Air=1)
Molecular Weight	103.80	
Gross Heating Value	5537	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.225	(Air=1)
Compressibility (Z)	0.9884	
Molecular Weight	35.07	
Gross Heating Value		
Dry Basis	2069	BTU/CF
Saturated Basis	2033	BTU/CF

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

Base Conditions: 14.850 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: ANB
Cylinder ID: FL# 4 S

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.042		0.034
Carbon Dioxide	0.128		0.161
Methane	33.021		15.106
Ethane	28.999	7.817	24.867
Propane	19.505	5.416	24.528
Isobutane	3.942	1.300	6.534
n-Butane	7.039	2.237	11.667
2,2 Dimethylpropane	0.112	0.043	0.230
Isopentane	2.264	0.835	4.658
n-Pentane	1.810	0.661	3.724
2,2 Dimethylbutane	0.086	0.036	0.211
Cyclopentane	0.015	0.006	0.030
2,3 Dimethylbutane	0.102	0.042	0.251
2 Methylpentane	0.510	0.213	1.253
3 Methylpentane	0.317	0.130	0.779
n-Hexane	0.547	0.227	1.344
Methylcyclopentane	0.054	0.019	0.130
Benzene	0.020	0.006	0.045
Cyclohexane	0.072	0.025	0.173
2-Methylhexane	0.160	0.075	0.457
3-Methylhexane	0.158	0.073	0.452
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.171	0.075	0.484
n-Heptane	0.197	0.092	0.563
Methylcyclohexane	0.165	0.067	0.462
Toluene	0.038	0.013	0.100
Other C8's	0.264	0.124	0.830
n-Octane	0.066	0.034	0.215
Ethylbenzene	0.003	0.001	0.009
M & P Xylenes	0.019	0.007	0.058
O-Xylene	0.003	0.001	0.009
Other C9's	0.106	0.054	0.382
n-Nonane	0.022	0.012	0.080
Other C10's	0.035	0.021	0.141
n-Decane	0.004	0.002	0.016
Undecanes (11)	0.004	0.002	0.017
Totals	100.000	19.666	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.225	(Air=1)
Compressibility (Z)	0.9884	
Molecular Weight	35.07	
Gross Heating Value		
Dry Basis	2069	BTU/CF
Saturated Basis	2033	BTU/CF

Antero Resources
Sweeney Unit 2H - Forest Pad

Tag Name	Value	Units	Timestamp
Accumulated Gas Flow	733909.8	MCF	12/6/2013 11:05:27
Casing Pressure	504.96	PSIA	12/6/2013 11:05:40
Current Day Gas Flow	488.7	MCF	12/6/2013 11:05:27
Differential Pressure	7.88	inH2O	12/6/2013 11:05:27
Flow Rate	3760.18	MCF Per Day	12/6/2013 11:05:27
Pressure	209.88	PSIA	12/6/2013 11:05:27
Previous Day Energy	3854.11	MBTU	12/6/2013 11:05:28
Previous Day Gas Flow	3090.55	MCF	12/6/2013 11:05:28
Temperature	68.16	F	12/6/2013 11:05:27
Tubing Pressure	504.05	PSIA	12/6/2013 11:05:40
Daily AP	3.63	PSIA	12/6/2013 09:00:00
Daily DP	310	inH2O	12/6/2013 09:00:00
Daily Energy	3854.1	MBTU	12/6/2013 09:00:00
Daily Flow	3090.55	MCF	12/6/2013 09:00:00
Daily Tf	70.89	F	12/6/2013 09:00:00
Hourly AP	280.83	PSIA	12/6/2013 09:00:00
Hourly DP	4.8	Inches	12/6/2013 09:00:00
Hourly Energy	175.9	MBTU	12/6/2013 09:00:00
Hourly Flow Time	3600	Seconds	12/6/2013 09:00:00
Hourly Tf	69.9	F	12/6/2013 09:00:00
Hourly Volume	141.1	MCF	12/6/2013 09:00:00
Audited Accumulated Gas Volume		MCF	
Audited Casing Pressure	526	PSI	12/4/2013 09:00:00
Audited Gas Volume	3849.42	MCF	12/4/2013 09:00:00
Audited Oil Volume	183.7	Barrels	12/4/2013 09:00:00
Audited Tubing Pressure	465	PSI	12/4/2013 09:00:00
Audited Water Volume	0	Barrels	12/4/2013 09:00:00
Argon	0	%	12/6/2013 11:05:33
BTU	1247.06	BTU	12/6/2013 11:05:27
C02	0.1467	%	12/6/2013 11:05:33
Carbon Monoxide	0	%	12/6/2013 11:05:33
Decane	0	%	12/6/2013 11:05:33
Ethane	14.1987	%	12/6/2013 11:05:33
Helium	0	%	12/6/2013 11:05:33
Heptane	0	%	12/6/2013 11:05:33
Hexane	0.5451	%	12/6/2013 11:05:33
Hydrogen	0	%	12/6/2013 11:05:33
Hydrogen Sulfide	0	%	12/6/2013 11:05:33
Iso-Butane	0.5666	%	12/6/2013 11:05:33
Iso-Pentane	0.3749	%	12/6/2013 11:05:33
Methane	77.6927	%	12/6/2013 11:05:33
N2	0.4946	%	12/6/2013 11:05:33
N-Butane	1.1838	%	12/6/2013 11:05:33
Nonane	0	%	12/6/2013 11:05:33
N-Pentane	0.2914	%	12/6/2013 11:05:33
Octane	0	%	12/6/2013 11:05:33
Oxygen	0.0117	%	12/6/2013 11:05:33
Plate Size	3.75	Inches	12/6/2013 11:05:38
Propane	4.4938	%	12/6/2013 11:05:33
SPG	0.7248		12/6/2013 11:05:27
Water	0	%	12/6/2013 11:05:33
Water	0	%	12/6/2013 11:06:26

Attachment T
Facility-wide Emissions Summary Sheet(s)

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	NOx		CO		VOC		SO2		PM10		PM2.5		GHG (CO2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-HR001									0.1999	0.1278				
EP-PCV					0.0801	0.3510							6.3229	27.6943
F001					2.6509	11.6109							56.6551	248.1492
EP-ENG001	3.16E-01	1.38E+00	5.64E+00	2.47E+01	7.10E-03	3.11E-02	1.41E-04	6.18E-04	2.28E-03	9.99E-03	2.38E-03	1.04E-02	27.78	121.66
EP-GPU001, EP-GPU002, EP-GPU003, EP-GPU004, EP-GPU005, EP-GPU006, EP-GPU007	0.8420	3.6879	0.7073	3.0978	0.0463	0.2028	0.0051	0.0221	0.0640	0.2803	0.0640	0.2803	1010.3764	4425.4487
EP-LH001, EP-LH002, EP-LH003, EP-LH004, EP-LH005, EP-LH006, EP-LH007	1.1226	4.9172	0.9430	4.1304	0.0617	0.2704	0.0067	0.0295	0.0853	0.3737	0.0853	0.3737	1347.1685	5900.5982
EP-L001					6.2770	2.3866							2.2485	0.8549
EP-L002					1.26E-03	9.60E-04							0.9848	0.7488
EP-EC001, EP-EC002, EP-EC003	0.1722	0.7541	0.1446	0.6334	2.4118	10.5636	2.27E-05	9.93E-05	0.0131	0.0573	0.0098	0.0430	533.0871	2334.9215
TOTAL	2.4526	10.7422	7.4394	32.5844	2.5269	11.0680	0.0120	0.0523	0.1647	0.7213	0.1615	0.7074	2918.4086	12782.6295

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	0.0095	0.0418	0.0095	0.0418
F001			0.0016	0.0072	0.0126	0.0552	0.0221	0.0969	0.0513	0.2246	0.1397	0.6119	0.2273	0.9957
EP-ENG001	4.92E-03	2.15E-02	3.79E-04	1.66E-03	1.34E-04	5.86E-04	5.95E-06	2.61E-05	4.68E-05	2.05E-04			5.51E-03	2.41E-02
EP-GPU001, EP-GPU002, EP-GPU003, EP-GPU004, EP-GPU005, EP-GPU006, EP-GPU007	0.0006	0.0028	1.77E-05	7.74E-05	2.86E-05	0.0001			0.00E+00	0.00E+00	0.0152	0.0664	0.0158	0.0694
EP-LH001, EP-LH002, EP-LH003, EP-LH004, EP-LH005, EP-LH006, EP-LH007	0.0008	0.0037	2.36E-05	0.0001	3.82E-05	1.67E-04			0.00E+00	0.00E+00	0.0202	0.0885	0.0211	0.0926
EP-L001			2.06E-04	7.83E-05	9.38E-04	3.57E-04	1.03E-03	3.92E-04	2.17E-03	8.26E-04	8.58E-03	3.26E-03	1.29E-02	4.92E-03
EP-L002			1.02E-06	7.76E-07	9.96E-07	7.58E-07	3.22E-07	2.45E-07	6.77E-07	5.15E-07	1.37E-09	1.04E-09	3.02E-06	2.29E-06
EP-EC001, EP-EC002, EP-EC003	2.84E-06	1.24E-05	0.0014	0.0063	0.0031	0.0137	0.0018	0.0080	0.0033	0.0145	0.0482	0.2111	0.0579	0.2537
TOTAL	0.0064	0.0280	0.0019	0.0082	0.0033	0.0146	0.0018	0.0081	0.0034	0.0147	0.0836	0.3660	0.1004	0.4398

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
Hamilton 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-B General Permit Modification for an Oil and Natural Gas Production facility located at 0.2 miles west from the intersection of Camp Mistake Rd. and Little Flint Rd., near Shirley in Doddridge County, West Virginia.

The latitude and longitude coordinates are: 39.36775 degrees N and -80.743689 degrees W

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

Pollutants	TOTALS (tpy):
NO_X	10.7422
CO	32.5844
$PM_{2.5}$	0.7074
PM_{10}	0.7213
VOC	11.0680
SO_2	0.0523
Formaldehyde	0.0280
Benzene	0.0082
Toluene	0.0146
Ethylbenzene	0.0081
Xylenes	0.0147
Hexane	0.3660
Total HAPs	0.4398

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

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

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

www.ghd.com