EQT Plaza
625 Liberty Avenue, Ste. 1700
Pittsburgh PA 15222
www.eqt.com

TEL: (412) 395-3699

R. Alex Bosiljevac
Environmental Coordinator

Via Certified Mail
Return Receipt Requested
No. 7015 0640 0000 9694 4090

August 25, 2014

Mr. William Durham
WVDEP – Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

Re: R13 Permit Application
EQT Gathering LLC – Janus Compressor Station
Doddridge County, WV

Dear Mr. Durham:

EQT Gathering LLC (EQT) is submitting this permit application to obtain an R13 Permit for a new compressor station located off in Doddridge County, West Virginia (Janus Compressor Station).

The main source of air emissions at the Janus Compressor Station will be four (4) natural gas-fired compressor engines (each rated at 5,350 HP). Each engine is a lean burn spark ignition unit that will compress natural gas from nearby wells and gathering systems for transmission via pipeline. The engines will be equipped with oxidation catalysts to reduce carbon monoxide (CO), formaldehyde, and volatile organic compound (VOC) emissions. The engines will be manufactured after July 1, 2007 and are subject to the emission standards, testing and record keeping requirements of New Source Performance Standards (NSPS) for Spark Ignition Engines (40 CFR 60, Subpart JJJJ). The construction of the facility will not trigger prevention of significant deterioration, but the facility will be a major source with respect to the Title V permit program. EQT will submit a Title V operating permit application within one year of start-up of the facility.

The compressed natural gas will be processed through one of two (2) triethylene glycol (TEG) dehydration units, rated at 125 million standard cubic feet per day (MMscfd) of gas throughput and equipped with a natural gas fired reboilers rated at 2.31 Million British Thermal Units per hour (MMBtu/hr heat input). Each TEG unit will be controlled via enclosed ground flare (rated at 7 MMBtu/hr). The dehydration unit will be subject to regulation as an area source under 40 CFR 63, Subpart HH - National Emission Standards for Hazardous Air Pollutants (NESHAP) From Oil and Natural Gas Production Facilities. However, as these units meet the exemption criteria specified in §63.764(e)(1)(ii), the only applicable requirements are to maintain records as specified by §63.774(d)(1).

The Janus Compressor Station will also be equipped with five (5) micro-turbine driven generators; each rated at 200 kilowatts of electricity (KWe), for power generation at the facility. These micro-turbines are not subject to NSPS Subpart KKKK, Standards of Performance for Stationary Combustion Turbines, since the maximum rated heat input of each turbine is less than 10 MMBtu/hr. The facility will also include two small natural gas-fired fuel heaters rated at 1.15 and 0.77 MMBtu/hr of heat input, each are also exempt from permitting.

EQT is proposing to install two (2) 8,820-gallon produced fluids tanks at the Janus Compressor Station. The produced fluid storage tanks will be subject to NSPS Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution as currently effective; however since VOC emissions are less than 6 tpy, the control standards do not apply. The tanks will be controlled by an enclosed ground flare (rated at 41 MMBtu/hr).

Finally, the application also includes information on 22 other small storage tanks with negligible emissions and estimates of fugitive emissions from the Station.

Enclosed are two electronic copies and one original hard copy of the R13 application. EQT appreciates your review of this application. If you have any questions or comments about the attached information or have additional information requirements, please, feel free to contact me at (412) 553-7848.

Sincerely,

RAB

R. Alex Bosiljevac
Environmental Coordinator

R13 PERMIT APPLICATION

EQT Gathering, LLC > Janus Compressor Station

Doddridge County, West Virginia

Prepared By:

TRINITY CONSULTANTS
4500 Brooktree Rd.
Suite 103
Wexford, PA 15090
(724) 935-2611

August 2015

Trinity Consultants

Environmental solutions delivered uncommonly well

TABLE OF CONTENTS

EQT Gathering, LLC (EQT) is submitting this Rule 13 (R-13) permit application to the West Virginia Department of Environmental Protection (WVDEP) for the proposed construction and operation of a natural gas compressor station located in Doddridge County, West Virginia (Janus Compressor Station).

1.1. FACILITY AND PROJECT DESCRIPTION

The Janus Compressor Station will be a natural gas gathering facility covered under Standard Industrial Classification (SIC) code 1311. The facility will have the potential to operate 24 hours per day, and 7 days per week. The station will consists of four (4) lean burn natural gas fired compressor engines (each rated at 5,350 horsepower [hp]) equipped with oxidation catalyst, two (2) triethylene glycol (TEG) dehydration units (each rated at 125 million standard cubic feet per day [MMscfd])), with associated reboilers (rated at 2.31 MMBtu/hr heat input) and controlled by enclosed flares (each rated at 7.0 MMbtu/hr), five (5) microturbine generator (each rated 200 kW), two (2) fuel gas heaters (rated at 1.15 MMbtu/hr and 0.77 MMbtu/hr), two (2) produced fluid tanks (210 bbl each) controlled by a tank enclosed flare (rated at 41 MMbtu/hr), as well as twenty (22) miscellaneous storage tanks.

A description of each source category is included below. A process flow diagram is included as Attachment F

1.1.1. Compressor Engines

EQT is proposing to install four (4) natural gas-fired reciprocating engines for the compression and transmission of natural gas. The engines will be 4-stroke, lean burn, spark ignition engines each rated at 5,350 hp and equipped with oxidation catalyst for control of carbon monoxide (CO), volatile organic compound (VOC), and formaldehyde (HCHO) emissions.

The function of these reciprocating compressors is to raise the discharge pressure of the gas to overcome the effect of frictional losses in the pipeline upstream of the station and maintain the required suction pressure to reduce gathering line pressures to allow wells to feed gas into the system

1.1.2. Dehydration Unit

The purpose of the dehydration unit is to remove water from the natural gas stream using TEG. In the absorber tower, the TEG absorbs water from the gas stream. The water rich glycol then passes through a flash tank where the pressure of the rich TEG is dropped. During this process, natural gas entrained in the glycol stream is flashed off. The water rich glycol is then heated in a reboiler where water and impurities are liberated from the glycol before it is recycled through the unit. Emissions from the dehydration regenerator vent and flash tank are controlled by the enclosed flares. Each dehydration unit has the potential to operate 8,760 hours per year, which is reflected in emission calculations.

1.1.3. Storage Tanks

The Janus Compressor Station will operate twenty four (24) storage tanks as described as below (nominal capacity listed):

- T-001 Produced Fluids Tank 8,820 gallons
- T-002 Produced Fluids Tank 8,820 gallons
- T-003 Engine Lube Oil Tank 2,000 gallons
- T-004 Compressor Oil Tank 2,000 gallons
- T-005 New MEG Tank 2,000 gallons
- T-006 Used MEG Tank 2,000 gallons

- T-007 Used Oil Tank 4,200 gallons
- T-008 Ice-chek Tank 4,000 gallons
- T-009 Engine Oil Tank 300 gallons
- T-010 Engine Oil Tank 300 gallons
- T-011 Engine Oil Tank 300 gallons
- T-012 Engine Oil Tank 300 gallons
- T-013 Compressor Oil Tank 300 gallons
- T-014 Compressor Oil Tank 300 gallons
- T-015 Compressor Oil Tank 300 gallons
- T-016 Compressor Oil Tank 300 gallons
- T-017 Ice-chek Tank 550 gallons
- T-018 Ice-chek Tank 550 gallons
- T-019 Ice-chek Tank 550 gallons
- T-020 Ice-chek Tank 550 gallons
- T-021 Ice-chek Tank 550 gallons
- T-022 Ice-chek Tank 550 gallons
- T-023 New TEG Tank 2,000 gallons
- T-024 Used TEG Tank 2,000 gallons

1.1.4. Fuel Gas Heater

EQT is proposing to add two (2) natural gas-fired fuel gas heaters rated at 1.15 MMBtu/hr and 0.77 MMBtu/hr of heat input at the Janus Compressor Station. The heaters will operate continuously (i.e., 8760 hours per year) and preheat natural gas to maintain temperature above dewpoint prior to combustion.

1.1.5. Microturbine Generators

There will be five (5) microturbine generator at the Janus Compressor Station. The microturbine generator is a Model C1000 low-NO_X generator (5 identical units of 200 kW each) manufactured by Capstone and will provide electrical power to the station.

1.2. R-13 APPLICATION ORGANIZATION

This R-13 permit application is organized as follows:

- Section 2: Sample Emission Source Calculations;
- Section 3: R-13 Application Forms;
- Attachment A: Business Certificate;
- Attachment B: Map;
- Attachment C: Installation and Start Up Schedule;
- Attachment D: Regulatory Discussion;
- Attachment E: Plot Plan;
- Attachment F: Detailed Process Flow Diagram;
- Attachment G: Process Description;
- Attachment I: Emission Units Table;
- Attachment J: Emission Points Data Summary Sheet;
- Attachment K: Fugitive Emissions Data Summary Sheet;
- Attachment L: Emissions Unit Data Sheets;
- Attachment M: Air Pollution Control Device Sheet;
- Attachment N: Supporting Emission Calculations;
- Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans;
- Attachment P: Public Notice;
- Attachment S: Title V Revision Information; and
- Application Fee

2. SAMPLE EMISSION SOURCE CALCULATIONS

The characteristics of air emissions from the Janus Compressor Station, along with the methodology used for calculating emissions from the proposed new sources, are described in narrative form below. Detailed supporting calculations are also provided in Attachment N.

Emissions from the Janus Compressor Station will result from the TEG dehydration unit, natural gas combustion in the compressor engines, fuel gas heaters, microturbine generators, reboilers, and flashing, working, and breathing losses from the storage tanks. In addition, fugitive emissions from component leaks will result from the operation of the station. The methodologies employed in calculating emissions from these sources have been summarized below, with specific citations included in Attachment N.

- **Compressor Engines:** Potential emissions of nitrogen oxides (NO_X), CO, VOC, formaldehyde are calculated using factors provided by the engine and catalyst manufacturer. Potential emissions of sulfur dioxide (SO_2), particulate matter ($PM/PM_{10}/PM_{2.5}$), and all other hazardous air pollutants (HAPs) are calculated using U.S. EPA's AP-42 factors for four stroke lean burn engines. Potential emissions of greenhouse gas pollutants (GHGs) are calculated using manufacturer's data as available (CO_2 and CH_4 in this case) and U.S. EPA's emission factors from 40 CFR Part 98, Subpart C for all others.

- **Reboiler and Fuel Gas Heater:** Potential emissions of all criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 factors for natural gas combustion equipment. These calculations assume a site-specific heat content. Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.

- **Microturbine Generator:** Potential emissions of NO_X, CO, VOC, methane, and CO_2 are calculated using manufacturer's emission data. Emissions of all other criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 factors for natural gas internal combustion engines. These calculations use a site specific heat content.

- **TEG Dehydration Units:** Potential emissions of HAPs, VOC, and methane from the dehydration units are calculated using GRI-GLYCalc. Emissions of other criteria pollutants are calculated for natural gas combustion in the flare using U.S. EPA's AP-42 factors for external combustion of natural gas. Greenhouse gas emissions from combustion in the flare are calculated according to the procedures in 40 CFR 98 Subpart C.

- **Storage Tanks:** Working, standing, and flash loss emissions of VOC and HAPs from the produced fluids storage tanks are calculated using E&P Tank v2.0. Liquid loading emissions are calculated using EPA AP-42 emission factors.

- **Fugitive Emissions:** Emissions from fugitive equipment leaks are calculated using published EPA emission factors and 40 CFR Part 98, Subpart W emission factors. Emissions from blowdown events are calculated using engineering estimates of the amount of gas vented during each event. Site specific gas analyses were used to speciate VOC, HAP, and GHG emissions.

3. R13 APPLICATION FORM

The WVDEP permit application forms contained in this application include all applicable R13 application forms including the required attachments.

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☒ **CONSTRUCTION** ☐ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
EQT Gathering, LLC

2. Federal Employer ID No. ***(FEIN):***
20-2752042

3. Name of facility *(if different from above):*
Janus Station

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
625 Liberty Avenue, Suite 1700
Pittsburgh, PA 15222

5B. Facility's present physical address:
Off Left Fork Run Road
Doddridge County, WV

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ **YES** ☐ **NO**

- If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**
- If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: EQT Corporation

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**

- If **YES,** please explain: Applicant owns site

- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Natural Gas Compressor Station

10. North American Industry Classification System **(NAICS)** code for the facility:
211111

11A. DAQ Plant ID No. (for existing facilities only):
–

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):

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

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

Turn south off of RT 50 at MM 50.5 onto Arnolds Creek Rd.(Rt 11). Bear left in 0.7 miles onto Left Fork Run Rd. (RT 11/4). Turn right in 0.9 miles onto station road and proceed 0.9 miles up the hill to the Janus Station.

12.B. New site address (if applicable):	12C. Nearest city or town: West Union	12D. County: Doddridge
12.E. UTM Northing (KM): 4,345.400	12F. UTM Easting (KM): 516.767	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
EQT is proposing to build a natural gas compressor station that will consists of the following equipment: Compressor engines, TEG dehydrators with reboilers and enclosed flares, microturbines, fuel gas heaters, tank enclosed flare and miscellaneous storage tanks.

14A. Provide the date of anticipated installation or change: / / – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: 3/1/2016

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17**. Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18**. Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

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

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

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) **.**
– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**
– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

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

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☒ Bulk Liquid Transfer Operations	☒ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☒ Storage Tanks
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ General Emission Unit, specify Compressor Engines, Dehydration unit, Fuel Gas Heater, Microturbines

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☐ Baghouse	☒ Flare – Tank Enclosed flare and Dehy Flares
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☒ Other Collectors, specify Oxidation Catalyst

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33**. Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ **YES** ☒ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's "***Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity	☐ Authority of Partnership
☐ Authority of Governmental Agency	☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

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

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE Diana M. Charletta *(Please use blue ink)* DATE: 8/25/15 *(Please use blue ink)*

35B. Printed name of signee: Diana Charletta		35C. Title: Sr. Vice President
35D. E-mail: dcharletta@eqt.com	36E. Phone:	36F. FAX:
36A. Printed name of contact person (if different from above): Alex Bosiljevac		36B. Title: Environmental Coordinator
36C. E-mail: abosiljevac@eqt.com	36D. Phone: 412-395-3699	36E. FAX: 412-395-7027

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- ☒ **Attachment A: Business Certificate**
- ☒ **Attachment B: Map(s)**
- ☒ **Attachment C: Installation and Start Up Schedule**
- ☒ **Attachment D: Regulatory Discussion**
- ☒ **Attachment E: Plot Plan**
- ☒ **Attachment F: Detailed Process Flow Diagram(s)**
- ☒ **Attachment G: Process Description**
- ☐ **Attachment H: Material Safety Data Sheets (MSDS)**
- ☒ **Attachment I: Emission Units Table**
- ☒ **Attachment J: Emission Points Data Summary Sheet**
- ☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
- ☒ **Attachment L: Emissions Unit Data Sheet(s)**
- ☒ **Attachment M: Air Pollution Control Device Sheet(s)**
- ☒ **Attachment N: Supporting Emissions Calculations**
- ☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
- ☒ **Attachment P: Public Notice**
- ☐ **Attachment Q: Business Confidential Claims**
- ☐ **Attachment R: Authority Forms**
- ☒ **Attachment S: Title V Permit Revision Information**
- ☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ ***Forward 1 copy of the application to the Title V Permitting Group and:***
- ☐ ***For Title V Administrative Amendments:***
  - ☐ ***NSR permit writer should notify Title V permit writer of draft permit,***
- ☐ ***For Title V Minor Modifications:***
  - ☐ ***Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,***
  - ☐ ***NSR permit writer should notify Title V permit writer of draft permit.***
- ☐ ***For Title V Significant Modifications processed in parallel with NSR Permit revision:***
  - ☐ ***NSR permit writer should notify a Title V permit writer of draft permit,***
  - ☐ ***Public notice should reference both 45CSR13 and Title V permits,***
  - ☐ ***EPA has 45 day review period of a draft permit.***

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

ATTACHMENT A

Current Business Certificate

WEST VIRGINIA
STATE TAX DEPARTMENT

BUSINESS REGISTRATION
CERTIFICATE

ISSUED TO:
EQT GATHERING, LLC
225 N SHORE DR
PITTSBURGH, PA 15212-5860

BUSINESS REGISTRATION ACCOUNT NUMBER: **1010-2674**

This certificate is issued on: **06/28/2011**

This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code

The person or organization identified on this certificate is registered to conduct business in the State of West Virginia at the location above.

This certificate is not transferrable and must be displayed at the location for which issued.

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

atL006 v.4
L2077129856

ATTACHMENT B

Map

Figure 1 - Map of Janus Station

UTM Northing (KM): 4,345.400
UTM Easting (KM): 516.767
Elevation: 900 ft

ATTACHMENT C

Startup and Installation Schedule

ATTACHMENT C

Schedule of Planned Installation and Start-Up

Unit	Installation Schedule	Startup Schedule
Four (4) CAT3616 Compressor Engines	March 2016	Upon issuance of permit
Two (2) 125 MMSCFD Dehydration Units with associated reboilers and enclosed flares	March 2016	Upon issuance of permit
Two (2) Fuel Gas Heaters (rated 1.15 & 0.77 MMBtu/hr)	March 2016	Upon issuance of permit
Two (2) 8,820 gallon Produced Fluids Storage Tanks with associated enclosed flare (rated 41 MMBtu/hr)	March 2016	Upon issuance of permit
Twenty (22) Storage Tanks	March 2016	Upon issuance of permit
Five (5) Capstone Microturbines (each rated 200kWe)	March 2016	Upon issuance of permit

ATTACHMENT D

Regulatory Discussion

ATTACHMENT D – REGULATORY APPLICABILITY

This section documents the applicability determinations made for Federal and State air quality regulations. The monitoring, recordkeeping, reporting, and testing plan is presented in Attachment O. In this section, applicability or non-applicability of the following regulatory programs is addressed:

- Prevention of Significant Deterioration (PSD) permitting;
- Title V of the 1990 Clean Air Act Amendments;
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAP); and
- West Virginia State Implementation Plan (SIP) regulations.

This review is presented to supplement and/or add clarification to the information provided in the WVDEP R13A permit application forms. In addition to providing a summary of applicable requirements, this section of the application also provides non-applicability determinations for certain regulations, allowing the WVDEP to confirm that identified regulations are not applicable to the Janus Compressor Station. Note that explanations of non-applicability are limited to those regulations for which there may be some question of applicability specific to the operations at the Janus Compressor Station. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

Prevention of Significant Deterioration (PSD) Source Classification

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration (PSD) and new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NNSR). PSD and NNSR regulations apply when a major source makes a change, such as installing new equipment or modifying existing equipment, and a significant increase in emissions results from the change. The Janus Compressor Station is not a major source with respect to these programs since its potential emissions are below all the NNSR/PSD thresholds. As such, NNSR/PSD permitting is not triggered by this construction activity. EQT will monitor future construction activities at the site closely and will compare any future increase in emissions with the NSR/PSD thresholds to ensure these activities will not trigger this program.

Title V Operating Permit Program

Title 40 of the Code of Federal Regulations Part 70 (40 CFR 70) establishes the federal Title V operating permit program. West Virginia has incorporated the provisions of this federal program in its Title V operating permit program in West Virginia Code of State Regulations (CSR) 45-30. The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP, and 100 tpy of all other regulated pollutants.[1] Potential emissions of NO_X exceed 100 tpy. Therefore, the Janus Compressor Station will be a major source with respect to the Title V permit program and as such is required to submit a Title V operating permit application. EQT will submit the Title V operating permit application within one year of start-up of the facility.

New Source Performance Standards

New Source Performance Standards (NSPS), located in 40 CFR 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable

[1] On June 23, 2014, the U.S Supreme Court decision in the case of *Utility Air Regulatory Group v. EPA* effectively changed the permitting procedures for GHGs under the PSD and Title V programs .

provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except where expressly noted. The following is a summary of applicability and non-applicability determinations for NSPS regulations of relevance to the Janus Compressor Station.

NSPS Subparts K, Ka, and Kb

These subparts apply to storage tanks of certain sizes constructed, reconstructed, or modified during various time periods. Subpart K applies to storage tanks constructed, reconstructed, or modified prior to 1978, and Subpart Ka applies to those constructed, reconstructed, or modified prior to 1984. Both Subparts K and Ka apply to storage tanks with a capacity greater than 40,000 gallons. Subpart Kb applies to volatile organic liquid (VOL) storage tanks constructed, reconstructed, or modified after July 23, 1984 with a capacity equal to or greater than 75 m3 (~19,813 gallons). All of the proposed storage tanks at the Janus Compressor Station have a capacity of 19,000 gallons or less. As such, Subparts K, Ka, and Kb do not apply to the storage tanks at the Janus Compressor Station.

NSPS Subparts IIII – Stationary Compression Ignition Internal Combustion Engines

This subpart applies to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines. The Janus Compressor Station will not have any compression ignition internal combustion engine, and therefore the requirements of this subpart do not apply.

NSPS Subparts JJJJ – Stationary Spark Ignition Internal Combustion Engines

NSPS Subpart JJJJ affects owners and operators of stationary spark ignition internal combustion engines (SI ICE) that commence construction, reconstruction or modification after June 12, 2006. Applicability dates are based on the manufacture date for new engines. The applicability dates for new engines range from July 1, 2007 to January 1, 2009, depending upon the engine horsepower (hp) and application.

40 CFR §60.4230(a)(4) states:

Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:

> *(i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500-hp (except lean burn engines with a maximum engine power greater than or equal to 500-hp and less than 1,350-hp);*
> *(ii) On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500-hp and less than 1,350-hp;*
> *(iii) On or after July 1, 2008, for engines with a maximum engine power less than 500-hp; or*
> *(iv) On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 kW (25-hp).*

The compressor engines proposed for installation at the Janus Compressor Station are four stroke lean burn engines (each rated at 5,350 HP) that were manufactured after July 1, 2007, and therefore NSPS JJJJ is applicable. Based on the engine manufacturer's specifications and the specifications for the associated catalyst, the engine complies with the emissions standards contain in 40 CFR §60.4233(e). EQT will operate the engine according to the manufacturer's recommended practices and demonstrate compliance with the requirements specified in 40 CFR §60.4244 (testing methods) and 40 CFR§60.4243(b)(2) (maintenance plan/records and performance testing frequency) for non-certified affected SI ICE at the facility. Initial notification of construction commencement will be submitted as required in 40 CFR §60.7(a)(1) and §60.4245(c), and performance testing results will be reported as required in 40 CFR §60.4245(d).

NSPS Subparts KKKK – Stationary Combustion Turbines

This subpart applies to owners, and operators of stationary combustion turbines. The Janus Compressor Station will have microturbines. These microturbines are not subject to NSPS Subpart KKKK since the maximum rated heat input

of each turbine is less than 10 MMBtu/hr, per 40 CFR 60.4305(a). It is important to note that the combined unit, called a C1000, is actually made of multiple units.

NSPS Subpart OOOO—Crude Oil and Natural Gas Production, Transmission, and Distribution

Subpart OOOO – *Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution*, applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011. This NSPS was published in the Federal Register on August 16, 2012, with an effective date of October 15, 2012. The list of potentially affected facilities includes:

- Gas wells
- Centrifugal compressors
- Reciprocating compressors
- Pneumatic controllers
- Storage vessels
- Equipment (as defined in §60.5430) located at onshore natural gas processing plants
- Sweetening units located onshore that process natural gas produced from either onshore or offshore wells

The Janus Compressor Station does not include gas wells or centrifugal compressors, therefore, the only potentially applicable requirements are those for reciprocating compressors, storage vessels, and pneumatic controllers. Rule applicability for each of these affected categories is discussed below.

Reciprocating Compressors- 40 CFR 60.5385 requires owners and operators of affected reciprocating compressors to change the rod packing prior to operating 26,000 hours or prior to 36 months since start up or the last packing replacement. EQT will comply with this requirement for the proposed compressors.

Storage Vessels – EQT is proposing to install two (2) produced fluids storage tanks at the Janus Compressor Station. Potential VOC emissions from each of the produced fluid storage tanks are less than 6 tpy. As such, these tanks will not be a storage vessel affected facilities under this rule.

Pneumatic Controllers – The pneumatic controllers were ordered and installed after August 23, 2011 and are therefore potentially subject to NSPS OOOO. Per 60.5365(d)(2), a pneumatic controller affected facility is a single continuous bleed natural gas driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh. No pneumatic controllers installed will meet the definition of a pneumatic controller affected facility. Therefore, these units are not subject to the requirements of Subpart OOOO.

Non-Applicability of All Other NSPS

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas operations (Subpart OOOO), internal combustion engines (Subparts IIII and JJJJ), and associated equipment (Subparts D-Dc, KKKK, and K-Kb), the applicability of a particular NSPS to the Janus Compressor Station can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to natural gas compressor stations.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

Part 63 NESHAP allowable emission limits are established on the basis of a maximum achievable control technology (MACT) determination for a particular major source. A HAP major source is defined as having potential emissions in excess of 25 tpy for total HAP and/or potential emissions in excess of 10 tpy for any individual HAP. The Janus Compressor Station will be an Area (minor) source of HAP since its potential emissions of HAP are less than the 10/25 major source thresholds. NESHAP apply to sources in specifically regulated industrial source categories (Clean Air Act

Section 112(d)) or on a case-by-case basis (Section 112(g)) for facilities not regulated as a specific industrial source type:

- 40 CFR Part 63 Subpart HH – Oil and Natural Gas Production Facilities
- 40 CFR Part 63 HHH – Natural Gas Transmission and Storage Facilities
- 40 CFR Part 63 YYYY – Stationary Combustion Turbines
- 40 CFR Part 63 Subpart ZZZZ- Stationary Reciprocating Internal Combustion Engines (RICE)
- 40 CFR Part 63 Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers

The applicability of these NESHAP Subparts is discussed in the following sections.

40 CFR 63 Subpart HH – Oil and Natural Gas Production Facilities

This subpart applies to affected emission points that are located at facilities that are major and area sources of HAP and either process, upgrade, or store hydrocarbon liquids prior to custody transfer or that process, upgrade, or store natural gas prior to entering the natural gas transmission and storage source category. For purposes of this subpart, natural gas enters the natural gas transmission and storage source category after the natural gas processing plant, if present.

The proposed Janus Compressor Station will be an area source of HAP emissions. The station will processes natural gas in its glycol dehydrator prior to the point of custody transfer; therefore, the provisions of NESHAP Subpart HH apply to the Janus Compressor Station. The benzene emissions from the glycol dehydrator vents are less than 0.90 megagrams per year (1 tpy), therefore, the Janus Compressor Station is exempt from the requirements of NESHAP Subpart HH pursuant to 40 CFR §63.764(e)(1)(ii), except for the requirement to keep records of the actual average natural gas flow rate or actual average benzene emissions from the dehydrator, per 40 CFR §63.774(d)(1).

40 CFR 63 Subpart HHH – Natural Gas Transmission and Storage Facilities

This standard applies to such units at natural gas transmission and storage facilities that are major sources of HAP emissions located downstream of the point of custody transfer (after processing and/or treatment in the production sector), but upstream of the distribution sector. The Janus Compressor Station is not a transmission facility; therefore, the provisions of NESHAP Subpart HHH do not apply to the Janus Compressor Station

40 CFR 63 Subpart YYYY – Stationary Combustion Turbines

Stationary combustion turbines located at facilities that are major sources of HAPs are potentially subject to Subpart YYYY, NESHAP for Stationary Combustion Turbines. Subpart YYYY establishes emissions and operating limitations for lean premix gas-fired, lean premix oil-fired, diffusion flame gas-fired and diffusion flame oil-fired stationary combustion turbines. The Janus Compressor Station is minor source of HAP and therefore is not subject to the requirements of this subpart.

40 CFR 63 Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines

40 CFR §63.6590(c) states that a new or reconstructed stationary RICE located at an area HAP source must meet the requirements of NESHAP Subpart ZZZZ by meeting the requirements of NSPS Subpart JJJJ. No further requirements apply for such engines under NESHAP Subpart ZZZZ. The Janus Compressor Station is a minor (area) source of hazardous air pollutants and the four (4) proposed compressor engines are considered a new stationary RICE. Therefore, the requirements contained in §63.6590(c) are applicable. EQT will be in compliance with applicable requirements of 40 CFR 63 Subpart ZZZZ by meeting the applicable requirements of 40 CFR 60 Subpart JJJJ.

40 CFR 63 Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers (Area Source Boiler MACT)

This MACT standard applies to industrial, commercial, and institutional boilers of various sizes and fuel types. The proposed fuel heaters at the Janus Compressor Station are natural gas-fired heaters and are specifically exempt from this subpart. Therefore, the requirements of this subpart will not apply.

West Virginia SIP Regulations

The Janus Compressor Station is potentially subject to regulations contained in the West Virginia Code of State Regulations, Chapter 45 (Code of State Regulations). The Code of State Regulations fall under two main categories, those regulations that are generally applicable (e.g., permitting requirements), and those that have specific applicability (e.g., PM standards for manufacturing equipment).

45 CSR 2: Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

45 CSR 2 applies to fuel burning units, defined as equipment burning fuel "for the primary purpose of producing heat or power by indirect heat transfer". The reboilers and fuel gas heaters are fuel burning units and therefore must comply with this regulation. Per 45 CSR 2-3, opacity of emissions from this unit shall not exceed 10 percent based on a six minute block average. Per 45 CSR 2-11, units less than 10 MMBtu/hr are exempt from the PM emission requirements in this rule.

45 CSR 4: To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor

According to 45 CSR 4-3:

No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.

The Janus Compressor Station is generally subject to this requirement. However, due to the nature of the process at the station, production of objectionable odor from the compressor station during normal operation is unlikely.

45 CSR 6: Control of Air Pollution from the Combustion of Refuse

45 CSR 6 applies to activities involving incineration of refuse, defined as "the destruction of combustible refuse by burning in a furnace designed for that purpose. For the purposes of this rule, the destruction of any combustible liquid or gaseous material by burning in a flare or flare stack, thermal oxidizer or thermal catalytic oxidizer stack shall be considered incineration." The proposed dehydrator enclosed flares, and Tank enclosed flare are incinerators and therefore must comply with this regulation. Per 45 CSR 6-4.3, opacity of emissions from this unit shall not exceed 20 percent, except as provided by 4.4. PM emissions from this unit will not exceed the levels calculated in accordance with 6-4.1

45 CSR 16: Standards of Performance for New Stationary Sources

45 CSR 16-1 incorporates the federal Clean Air Act (CAA) standards of performance for new stationary sources set forth in 40 CPR Part 60 by reference. As such, by complying with all applicable requirements of 40 CFR Part 60 at the Janus Compressor Station (discussed earlier in this attachment), EQT will be complying with 45 CSR 16.

45 CSR 17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter

According to 45 CSR 17-3.1:

No person shall cause, suffer, allow or permit fugitive particulate matter to be discharged beyond the boundary lines of the property lines of the property on which the discharge originates or at any public or residential location, which causes or contributes to statutory air pollution.

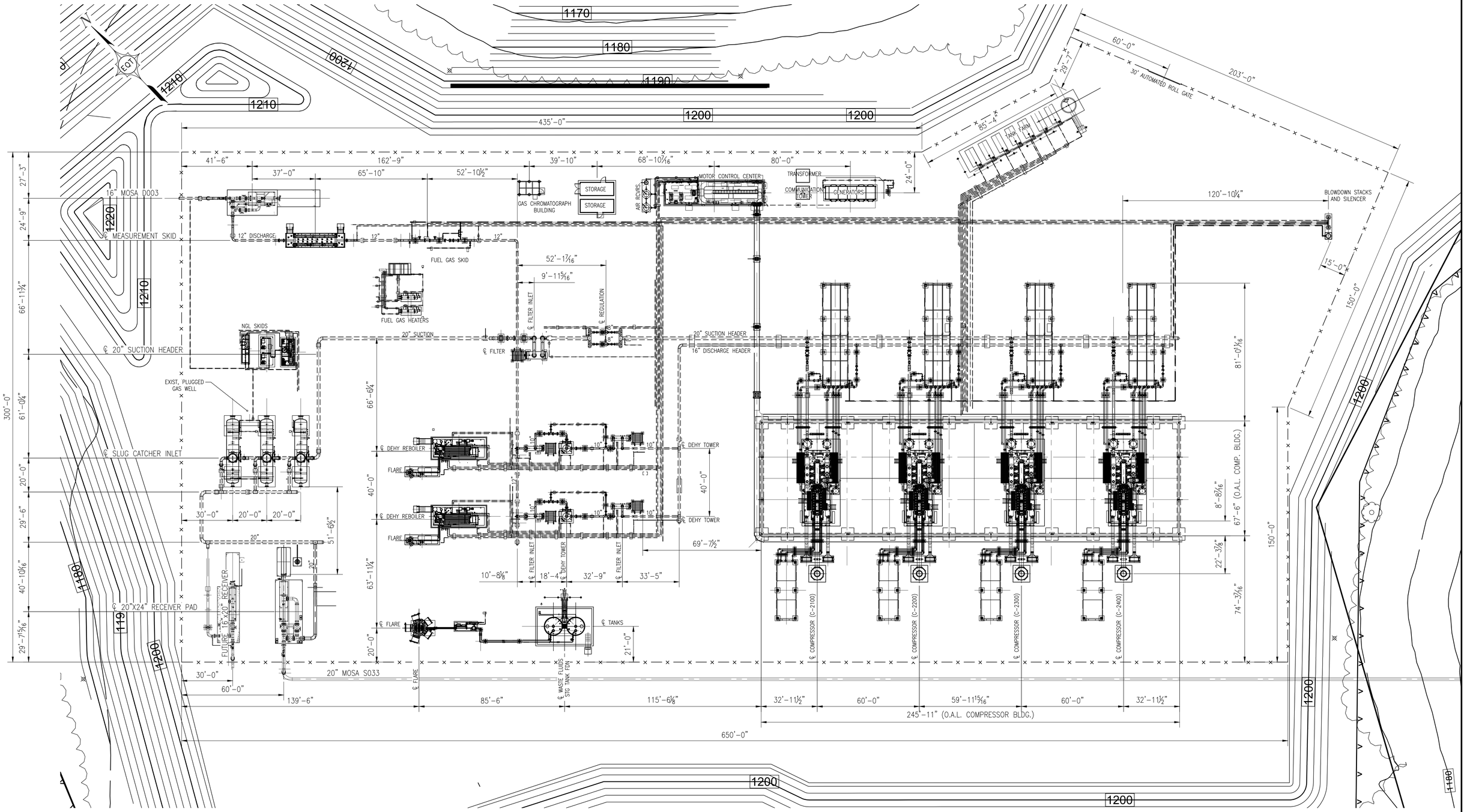
Due to the nature of the activities at the Janus Station it is unlikely that fugitive particulate matter emissions will be emitted under normal operating conditions. However, EQT will take measures to ensure any fugitive particulate matter emissions will not cross the property boundary should any such emissions occur.

45 CSR 21-28: Petroleum Liquid Storage in Fixed Roof Tanks

45 CSR 21-28 applies to any fixed roof petroleum liquid storage tank with a capacity greater than 40,000 gallons. The capacity of each storage tank proposed for the Janus Compressor Station is less than 40,000 gallons; therefore, 45 CSR 21-28 will not apply.

ATTACHMENT E

Plot Plan



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TO THE BEST OF MY KNOWLEDGE, ALL COMPONENTS OF THIS DRAWING ARE DESIGNED IN ACCORDANCE WITH APPLICABLE GUIDELINES AND SPECIFICATIONS

– MECHANICAL DESIGN ENGINEER — – DATE

– ELECTRICAL DESIGN ENGINEER — – DATE

NOTE: ANY CHANGES TO THE DESIGN SHOWN ON THIS DRAWING MUST BE APPROVED BY THE DESIGN ENGINEER.

EQT SM
DESIGN ENGINEERING
PROJECT ID
DRAWING SCALE: 1"=25'-0"

DRAWING TITLE:
JANUS COMPRESSOR STATION
2016 COMPRESSOR AND DEHY INSTALLATION
PIPING
PLOT PLAN

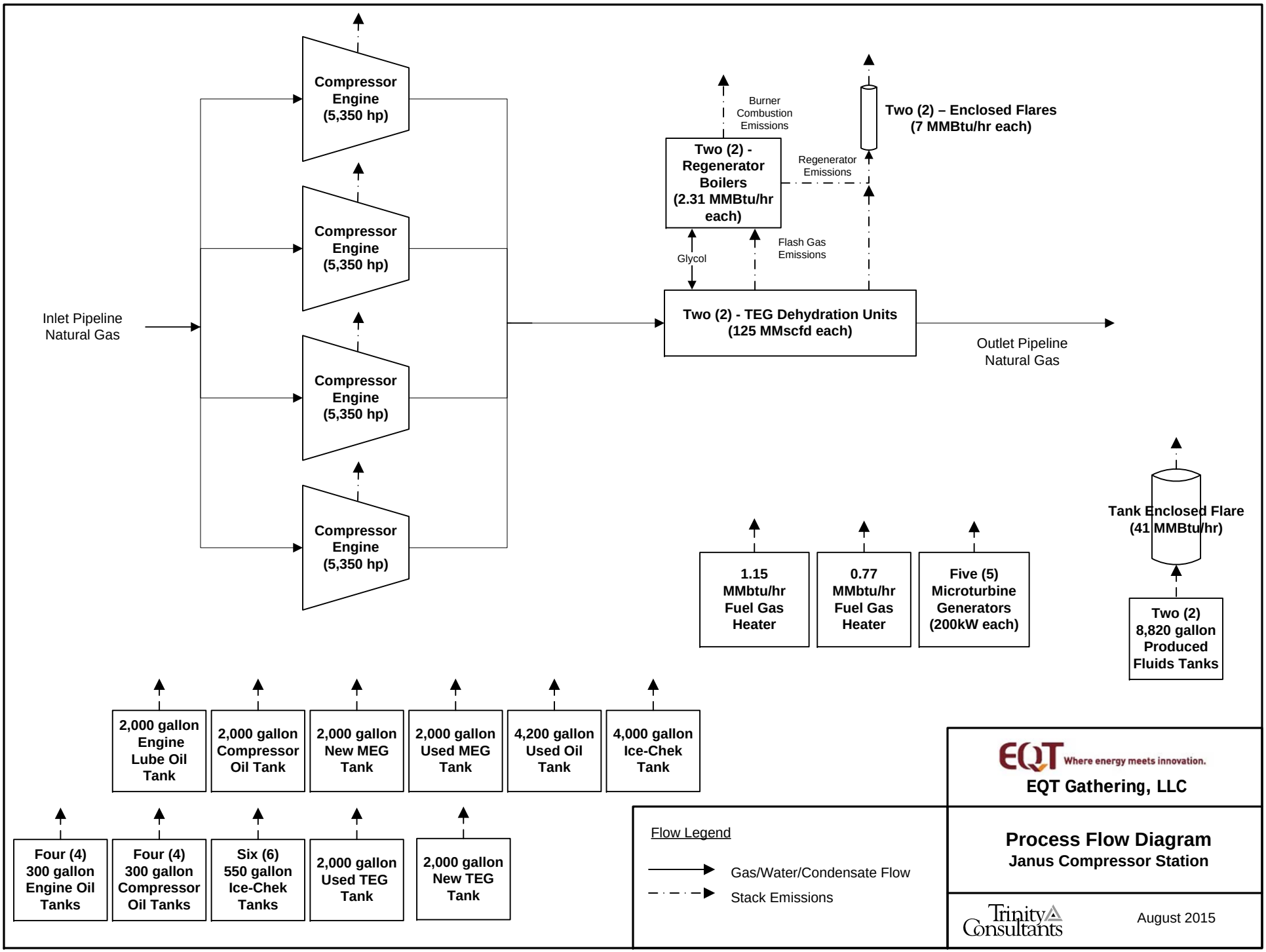
FACILITY	STATE	IDENTIFICATION	SERIES	SHEET	REVISION
C	W	JAN01	1100	02	P

Plotted by Gillespie, Steve on August 11, 2015 - 8:18 PM

File Path: C:\Vault Working\3D\Saturn\JAN01\Drawing Files\Design Files\Mechanical\JAN01-1100-02.dwg

ATTACHMENT F

Detailed Process Flow Diagram


Compressor Engine (5,350 hp)
Compressor Engine (5,350 hp)
Compressor Engine (5,350 hp)
Compressor Engine (5,350 hp)
Inlet Pipeline Natural Gas
Burner Combustion Emissions
Two (2) – Enclosed Flares (7 MMBtu/hr each)
Two (2) - Regenerator Boilers (2.31 MMBtu/hr each)
Regenerator Emissions
Glycol
Flash Gas Emissions
Two (2) - TEG Dehydration Units (125 MMscfd each)
Outlet Pipeline Natural Gas
1.15 MMbtu/hr Fuel Gas Heater
0.77 MMbtu/hr Fuel Gas Heater
Five (5) Microturbine Generators (200kW each)
Tank Enclosed Flare (41 MMBtu/hr)
Two (2) 8,820 gallon Produced Fluids Tanks
2,000 gallon Engine Lube Oil Tank
2,000 gallon Compressor Oil Tank
2,000 gallon New MEG Tank
2,000 gallon Used MEG Tank
4,200 gallon Used Oil Tank
4,000 gallon Ice-Chek Tank
Four (4) 300 gallon Engine Oil Tanks
Four (4) 300 gallon Compressor Oil Tanks
Six (6) 550 gallon Ice-Chek Tanks
2,000 gallon Used TEG Tank
2,000 gallon New TEG Tank
Flow Legend
Gas/Water/Condensate Flow
Stack Emissions
EQT Where energy meets innovation.
EQT Gathering, LLC
Process Flow Diagram
Janus Compressor Station
Trinity Consultants
August 2015

ATTACHMENT G

Process Description

ATTACHMENT G – PROCESS DESCRIPTION

Natural gas enters the station via the gathering pipeline system and is compressed using one of the four (4) natural gas-fired compressor engines (identified as ENG-1 to ENG-4, each rated at 5,350 hp). The compressed natural gas stream is then processed through the triethylene glycol (TEG) dehydration units (with associated reboilers). The dehydration units will introduce TEG to the gas stream in a contact tower to absorb water vapor from the gas to a level not exceeding 7 pounds per million standard cubic feet (lb/MMscf). The TEG is then sent to the natural gas-fired reboilers, each rated at 2.3 MMBtu/hr heat input. The water is evaporated from the TEG in the reboiler and discharged, and the glycol is then sent back to the contact tower for reuse. Each dehydration unit is equipped with an enclosed flare which will control emissions from the dehydration still vent and emissions from the flash tank. The natural gas stream from the contact tower flows into the pipeline to be transported further along the pipeline system. The station is also equipped with two (2) fuel gas heaters, two (2) produced fluids storage tanks, and twenty two (22) miscellaneous storage tanks. Once the tanks are filled, the contents are loaded into trucks for transport. Electricity at the station will be provided by the five (5) Capstone microturbine generators.

A process flow diagram is included as Attachment F.

ATTACHMENT I

Emission Units Table

Attachment I

Emission Units Table

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
ENG-001	ENG-001	Caterpillar G3616 Compressor Engine #1	2016	5,350 HP	New	Ox. Cat. (C1)
ENG-002	ENG-002	Caterpillar G3616 Compressor Engine #2	2016	5,350 HP	New	Ox. Cat. (C2)
ENG-003	ENG-003	Caterpillar G3616 Compressor Engine #3	2016	5,350 HP	New	Ox. Cat. (C3)
ENG-004	ENG-004	Caterpillar G3616 Compressor Engine #4	2016	5,350 HP	New	Ox. Cat. (C4)
DEHY-001	FLARE-001	Dehydration Unit #1	2016	125 MMscfd	New	Enclosed Flare (FLARE-001)
DEHY-002	FLARE-002	Dehydration Unit #2	2016	125 MMscfd	New	Enclosed Flare (FLARE-002)
RB-001	RB-001	Dehydration Unit Reboiler #1	2016	2.31 MMBtu/hr	New	N/A
RB-002	RB-002	Dehydration Unit Reboiler #2	2016	2.31 MMBtu/hr	New	N/A
EG-001	EG-001	Microturbine Generator	2016	200 KW	New	N/A
EG-002	EG-002	Microturbine Generator	2016	200 KW	New	N/A
EG-003	EG-003	Microturbine Generator	2016	200 KW	New	N/A
EG-004	EG-004	Microturbine Generator	2016	200 KW	New	N/A
EG-005	EG-005	Microturbine Generator	2016	200 KW	New	N/A
HTR-1	HTR-1	Fuel Gas Heater	2016	1.15 MMBtu/hr	New	N/A
HTR-2	HTR-2	Fuel Gas Heater	2016	0.77 MMBtu/hr	New	N/A
T-001	FLARE-003	Produced Fluids Tank	2016	8,820 gallons	New	Enclosed Flare (FLARE-003)
T-002	FLARE-003	Produced Fluids Tank	2016	8,820 gallons	New	Enclosed Flare (FLARE-003)
T-003	T-003	Engine Lube Oil Tank	2016	2,000 gallons	New	N/A
T-004	T-004	Compressor Oil Tank	2016	2,000 gallons	New	N/A
T-005	T-005	New MEG Tank	2016	2,000 gallons	New	N//A
T-006	T-006	Used MEG Tank	2016	2,000 gallons	New	N/A
T-007	T-007	Used Oil Tank	2016	4,200 gallons	New	N/A
T-008	T-008	Ice-chek Tank	2016	4,000 gallons	New	N/A
T-009	T-009	Engine Oil Tank	2016	300 gallons	New	N/A
T-010	T-010	Engine Oil Tank	2016	300 gallons	New	N/A
T-011	T-011	Engine Oil Tank	2016	300 gallons	New	N/A
T-012	T-012	Engine Oil Tank	2016	300 gallons	New	N/A

T-013	T-013	Compressor Oil Tank	2016	300 gallons	New	N/A
T-014	T-014	Compressor Oil Tank	2016	300 gallons	New	N/A
T-015	T-015	Compressor Oil Tank	2016	300 gallons	New	N/A
T-016	T-016	Compressor Oil Tank	2016	300 gallons	New	N/A
T-017	T-017	Ice-chek Tank	2016	550 gallons	New	N/A
T-018	T-018	Ice-chek Tank	2016	550 gallons	New	N/A
T-019	T-019	Ice-chek Tank	2016	550 gallons	New	N/A
T-020	T-020	Ice-chek Tank	2016	550 gallons	New	N/A
T-021	T-021	Ice-chek Tank	2016	550 gallons	New	N/A
T-022	T-022	Ice-chek Tank	2016	550 gallons	New	N/A
T-023	T-023	New TEG Tank	2016	2,000 gallons	New	N//A
T-024	T-024	Used TEG Tank	2016	2,000 gallons	New	N/A
FLARE-001	FLARE-001	Dehy Enclosed Flare #1	2016	7 MMBtu/hr	New	N/A
FLARE-002	FLARE-002	Dehy Enclosed Flare #2	2016	7 MMBtu/hr	New	N/A
FLARE-003	FLARE-003	Tank Enclosed Flare #3	2016	41 MMBtu/hr	New	N/A
L1	L1	Liquid Loading	2016	210,000 gal/yr	New	N/A

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT J

Emission Points Data Summary Sheet

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
ENG-001 to ENG-004 (Each unit)	Upward Vertical stack	ENG-001 to ENG-004	Compressor Engine (Each unit)	C-1	Oxidation Catalyst	NA	NA	NOx CO VOC SO2 PM/PM10/PM2.5 HAPs CO2e	5.90 29.13 8.85 0.02 0.003 3.12 5,741	25.83 127.60 38.75 0.10 0.01 13.67 25,144	5.90 2.04 3.93 0.02 0.003 1.00 5,741	25.83 8.93 17.23 0.10 0.01 4.38 25,144	Gas/Vapor	O[A] O[A] O[A] O[B] O[B] O[A,B] O[A,C]	
FLARE-001 & FLARE-002 (Each unit)	Upward Vertical Stack	DEHY-001 & DEHY-002	Dehydration Unit (Each Unit)	FLARE-001 to FLARE - 002	Enclosed Flares	NA	NA	VOC HAP Benzene	77.61 33.76 4.11	339.92 147.88 18.02	1.55 0.68 0.08	6.80 2.96 0.36	Gas/Vapor	O[D]	
RB-001 & RB-002 (Each unit)	Upward Vertical Stack	RB-001 & RB-002	Reboiler	NA	NA	NA	NA	NOx CO PM/PM10/PM2.5 SO2 VOC CO2e	0.19 0.16 0.01 <0.01 0.01 271	0.83 0.69 0.06 <0.01 0.05 1,185	0.19 0.16 0.01 <0.01 0.01 271	0.83 0.69 0.06 <0.01 0.05 1,185	Gas/Vapor	O[F] O[F] O[F] O[F] O[F] O[C]	
FLARE-001 & FLARE-002 (Each unit)	Upward Vertical Stack	FLARE-001 & FLARE-002	Dehy Enclosed Flares (Each unit)	NA	NA	NA	NA	NOx CO PM/PM10/PM2.5 SO2 CO2e	0.58 0.49 0.04 <0.01 830	2.53 2.13 0.19 0.02 3,637	0.58 0.49 0.04 <0.01 830	2.53 2.13 0.19 0.02 3,637	Gas/Vapor	O[F] O[F] O[F] O[F] O[C]	
FLARE-003	Upward Vertical Stack	T-001 & T-002 (Each unit)	Produced Fluids Storage Tank	NA	NA	NA	NA	VOC HAP	0.96 0.02	4.19 0.10	0.05 0.001	0.21 0.01	Gas/Vapor	O[E]	
FLARE-003	Upward Vertical Stack	FLARE-003	Tank Enclosed Flare	NA	NA	NA	NA	NOx CO PM/PM10 SO2 CO2e	3.35 2.82 0.25 0.02 4,816	14.69 12.34 1.12 0.09 21,095	3.35 2.82 0.25 0.02 4,816	14.69 12.34 1.12 0.09 21,095	Gas/Vapor	O[F] O[F] O[F] O[F] O[C]	
L1	Fugitive	L1	Liquid Loading	NA	NA	NA	NA	VOC	NA	0.09	NA	0.09	Gas/Vapor	O[H]	

HTR-1	Upward Vertical stack	HTR-1	Fuel Gas Heater	NA	NA	NA	NA	NOx CO VOC SO2 PM/PM10/PM2.5 CO2e	0.09 0.08 0.01 <0.01 0.01 135	0.41 0.35 0.02 <0.01 0.03 590	0.09 0.08 0.01 <0.01 0.01 135	0.41 0.35 0.02 <0.01 0.03 590	Gas/Vapor	O[F] O[F] O[F] O[F] O[F] O[C]	
HTR-2	Upward Vertical stack	HTR-2	Fuel Gas Heater	NA	NA	NA	NA	NOx CO VOC SO2 PM/PM10/PM2.5 CO2e	0.06 0.05 <0.01 <0.01 <0.01 90	0.28 0.23 <0.01 <0.01 <0.01 395	0.06 0.05 <0.01 <0.01 <0.01 90	0.28 0.23 <0.01 <0.01 <0.01 395	Gas/Vapor	O[F] O[F] O[F] O[F] O[F] O[C]	
EG-001 to EG-005 (Combined)	Upward Vertical stack	EG-001 to EG-005	Microturbine	NA	NA	NA	NA	NOx CO VOC SO2 PM/PM10/PM2.5 HAPs CO2e	0.40 1.10 0.10 0.04 0.08 0.01 1,331	1.75 4.82 0.44 0.17 0.33 0.05 5,831	0.40 1.10 0.10 0.04 0.08 0.01 1,331	1.75 4.82 0.44 0.17 0.33 0.05 5,831	Gas/Vapor	O[A] O[A] O[A] O[G] O[G] O[G] O[A,C]	

A- Manufacturer's specific pollutant emission Factor
B- AP-42 Section 3.2, Table 3.2-2 "Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines" Supplement F, August 2000, except for Formaldehyde which is manufacturer's spec.
C- 40 CFR 98, Subpart C for natural gas fired combustion.
D- GRI-GLYCalc
E- API E&PTanks
F- AP-42 Section 1.4 Tables 1.4-1, 1.4-2 and 1.4-3, July 1998.
G- AP-42 Section 3.1 Table 3.1-2a
H- AP-42 Section 5.2 Table 5.2-1

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (^{o}F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☒ Yes ☐ No ☐ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☒ No ☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☒ Yes ☐ No ☐ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☒ Yes ☐ No ☐ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	NA	--	--	--	--	--
Unpaved Haul Roads	PM PM_{10} $PM_{2.5}$	0.05 0.01 <0.01	0.20 0.05 0.01	0.05 0.01 <0.01	0.20 0.05 0.01	O[C]
Storage Pile Emissions	NA	---	---	---	---	---
Loading/Unloading Operations	VOC	N/A	0.09	N/A	0.09	O[B]
Wastewater Treatment Evaporation & Operations	NA	---	---	---	---	---
Equipment Leaks (includes blowdowns and maintenance)	VOC HAP	N/A	12.01 0.51	N/A	12.01 0.51	O[A]
General Clean-up VOC Emissions	NA	---	---	---	---	---
Other	NA	---	---	---	---	---

A – Oil *and Gas Production Operations Average Emission Factors*, Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, Table 2-4, November 1995, 40 CFR 98 Subpart W, and mass balance.

B- AP 42 Section 5.2.1

C – AP 42 Section 13.2.2.

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

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

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

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

ATTACHMENT L

Emission Unit Data Sheet

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): ENG-001 to ENG-004

1. Name or type and model of proposed affected source:

   Compressor Engine #1 – #4: Four (4) Caterpillar 3616 natural gas fired compressor engines equipped with oxidation catalyst.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   NA

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   Does not produce any materials. Compresses natural gas to maintain pipeline pressure.

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   Internal combustion of natural gas.

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas – 32,160 scf/hr (each engine), 281.7 MMscf/yr (each engine)

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas with negligible H_2S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

22.9 scf/hr @ 60 °F and 14.7 psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

39.43 MMBtu/hr spark ignition reciprocating internal combustion engine.

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 39.43 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ 812 °F and 14.7 psia

a.	NO_X	5.90	lb/hr	grains/ACF
b.	SO_2	0.02	lb/hr	grains/ACF
c.	CO	29.13	lb/hr	grains/ACF
d.	PM_{10}	0.39	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs	8.85	lb/hr	grains/ACF
g.	Pb	NA	lb/hr	grains/ACF
h.	Specify other(s)			
	Benzene	0.02	lb/hr	grains/ACF
	Toluene	0.02	lb/hr	grains/ACF
	Xylene	0.01	lb/hr	grains/ACF
	Formaldehyde	2.36	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Replace the reciprocating compressor rod packing before 26,000 hours or 36 months from the date of the most recent rod packing element Monitor the number of hours of operation for each reciprocating compressor	Maintain records of maintenance conducted on the engine Maintain documentation that the engine meets the emission standards of 40 CFR 60.4233(e) Maintain records of all notification submitted Maintain records of the date and time of each reciprocating compressor rod packing element Maintain records of the deviations in cases where the compressor was not operated in compliance with 60.5383
REPORTING	**TESTING**
Submission of an initial notification as required in 40 CFR 60.7(a)(1) Submit a copy of each performance test Submit an annual NSPS OOOO report one year from the initial annual report	Initial performance test and subsequent performance testing every 8760 hours or every three years, whichever comes first.

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
See attached manufacturer specification sheet

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): EG-001 to EG-005

1. Name or type and model of proposed affected source:

   Natural Gas-fired combustion Capstone Microturbines (each rated at 200kW) – Consist of 5 identical units

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   NA

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   Does not produce any materials. Electrical generation from natural gas.

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   External combustion of natural gas

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas – 9,297 scf/hr (total)

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas with negligible H_2S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

Unknown @ °F and psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

Five (5) 2.28 MMBtu/hr stationary gas turbines

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 2.28 (each) × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ Unknown °F and psia

a.	NO_X	0.40 (total)	lb/hr	grains/ACF
b.	SO_2	0.04 (total)	lb/hr	grains/ACF
c.	CO	1.10 (total)	lb/hr	grains/ACF
d.	PM_{10}	0.08 (total)	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs	0.10 (total)	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
	HAP	0.01 (total)	lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None	None
REPORTING	TESTING
None	None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
None.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): DEHY-001 to DEHY-002

1. Name or type and model of proposed affected source: 125 MMSCFD dehydration unit with 2.31 MMBtu/hr heat input rated reboiler (each)
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: 125 million standard cubic feet per day of natural gas, each
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce a material – removes water from wet natural gas
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: External combustion of natural gas in reboiler

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Reboiler - Natural gas – 1,884 scfh

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas with negligible H_2S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

Unknown @ °F and psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

natural gas fired external combustion heater – 2.31 MMbtu/hr input rating

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 2.31 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ Unknown °F and psia

a.	NO_X	0.19	lb/hr	grains/ACF
b.	SO_2	<0.01	lb/hr	grains/ACF
c.	CO	0.16	lb/hr	grains/ACF
d.	PM_{10}	0.01	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs	77.61	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
	HAPs	33.76	lb/hr	grains/ACF
	Benzene	4.11	lb/hr	grains/ACF
	Toluene	11.02	lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Throughput of wet natural gas. Operating parameters of dehydration unit for GLYCalc (temperature, pressure, glycol flow rate) Conduct visual inspections one per month confirming the pilot is lit	Annual benzene emissions calculated with GLYCalc. Maintain records of the times and duration of all periods which the pilot flame was absent
REPORTING	**TESTING**
None.	

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): HTR-1

1. Name or type and model of proposed affected source:

   Heater - Natural gas fired fuel gas heater

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   NA

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   Does not produce any materials. Thermal generation from natural gas.

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   External combustion of natural gas

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas – 938 scfh

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas with negligible H_2S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

Unknown @ °F and psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

1.15 MMBtu/hr, natural gas fired external combustion heater

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 1.15 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ Unknown °F and psia

a.	NO_X	0.09	lb/hr	grains/ACF
b.	SO_2	<0.01	lb/hr	grains/ACF
c.	CO	0.08	lb/hr	grains/ACF
d.	PM_{10}	0.01	lb/hr	grains/ACF
e.	Hydrocarbons	0.01	lb/hr	grains/ACF
f.	VOCs	0.01	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
	HAPs	<0.01	lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None	None
REPORTING	TESTING
None	None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
None.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): HTR-2

1. Name or type and model of proposed affected source:

   Heater - Natural gas fired fuel gas heater

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   NA

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   Does not produce any materials. Thermal generation from natural gas.

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   External combustion of natural gas

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas – 628 scfh

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas with negligible H_2S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

Unknown @ °F and psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

0.77 MMBtu/hr, natural gas fired external combustion heater

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 0.77 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ Unknown °F and psia

a.	NO_X	0.06	lb/hr	grains/ACF
b.	SO_2	<0.01	lb/hr	grains/ACF
c.	CO	0.05	lb/hr	grains/ACF
d.	PM_{10}	0.01	lb/hr	grains/ACF
e.	Hydrocarbons	0.01	lb/hr	grains/ACF
f.	VOCs	0.01	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
	HAPs	<0.01	lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None	None
REPORTING	TESTING
None	None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
None.

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Janus Compressor Station	2. Tank Name Produced Fluids Storage Tanks
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) T-001 & T-002	4. Emission Point Identification No. (as assigned on *Equipment List Form*) FLARE-003
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) Not Applicable	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. T-001 & T-002: 210 bbl (each)	
9A. Tank Internal Diameter (ft) ~10	9B. Tank Internal Height (or Length) (ft) ~15
10A. Maximum Liquid Height (ft) ~15	10B. Average Liquid Height (ft) ~ 10
11A. Maximum Vapor Space Height (ft) ~15	11B. Average Vapor Space Height (ft) ~5
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 210 bbl (each)	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
210,000 (Total)	575 (Total)

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)
24 (Total)

15. Maximum tank fill rate (gal/min) TBD

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

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☐ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
TBD	TBD

18. Type of tank (check all that apply):
- ☒ Fixed Roof _x_ vertical ___ horizontal ___ flat roof _x_ cone roof ___ dome roof
  ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) Welded

20A. Shell Color Gray	20B. Roof Color Gray	20C. Year Last Painted

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

22A. Is the tank heated? ☐ YES ☒ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): -0.30 to 0.75 psig

24. Complete the following section for **Vertical Fixed Roof Tanks** ☒ Does Not Apply

24A. For dome roof, provide roof radius (ft)

24B. For cone roof, provide slope (ft/ft) 0.0625

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ 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; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

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: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. Huntington, WV
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F) 65.3
30. Annual Average Minimum Temperature (°F) 45
31. Average Wind Speed (miles/hr) 6.6
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day)) 1,176
33. Atmospheric Pressure (psia) 14.33

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: 56.74	
34A. Minimum (°F)	34B. Maximum (°F) 61.79
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F) 56.74	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F) 61.79	38B. Corresponding Vapor Pressure (psia)

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

39A.	Material Name or Composition	Produced Fluids		
39B.	CAS Number	TBD		
39C.	Liquid Density (lb/gal)	TBD		
39D.	Liquid Molecular Weight (lb/lb-mole)	TBD		
39E.	Vapor Molecular Weight (lb/lb-mole)	36.25		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)	TBD TBD		
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☒ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☒ Conservation Vent (psig) – Enardo Valve
  - Vacuum Setting 0.30 Pressure Setting 0.75
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☐ Other[1] (describe):

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method[1]
		Amount	Units		
See attached Emissions Calculation					

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on *Equipment List Form*):

1. Loading Area Name: Liquid Loading

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):
☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ Tank Trucks

3. Loading Rack or Transfer Point Data:

Number of pumps	1
Number of liquids loaded	1
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	1

4. Does ballasting of marine vessels occur at this loading area?
☐ Yes ☐ No ☒ Does not apply

5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:

6. Are cargo vessels pressure tested for leaks at this or any other location?
☐ Yes ☒ No
If YES, describe:

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

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7

weeks/quarter	13	13	13	13

8. Bulk Liquid Data *(add pages as necessary):*							
Pump ID No.		NA					
Liquid Name		Produced Fluids					
Max. daily throughput (1000 gal/day)		0.58					
Max. annual throughput (1000 gal/yr)		210					
Loading Method [1]		Splash Fill					
Max. Fill Rate (gal/min)		TBD					
Average Fill Time (min/loading)		TBD					
Max. Bulk Liquid Temperature (^{o}F)		~70					
True Vapor Pressure [2]		0.21 psia					
Cargo Vessel Condition [3]		Unknown					
Control Equipment or Method [4]		NA					
Minimum control efficiency (%)		0					
Maximum Emission Rate	Loading (lb/hr)	~0.02 lb/hr VOC					
	Annual (lb/yr)	~174 lb/yr VOC					
Estimation Method [5]		AP-42					

[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 service), O = other (describe)

[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets*):CA = Carbon Adsorption LOA = Lean Oil AdsorptionCO = Condensation SC = Scrubber (Absorption)CRA = Compressor-Refrigeration-Absorption TO = Thermal Oxidation or Incineration
CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system)
O = other (descibe)

[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance

TM = Test Measurement based upon test data submittal
O = other (describe)

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None	Throughput of liquid loaded at site (gal/yr)
REPORTING	TESTING
None	None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

G3616

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Janus

ENGINE SPEED (rpm):	1000	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	7.6	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	GAV
AFTERCOOLER - STAGE 1 INLET (°F):	174		WITH AIR FUEL RATIO CONTROL
JACKET WATER OUTLET (°F):	190	**SITE CONDITIONS:**	
ASPIRATION:	TA	FUEL:	Gas Analysis
COOLING SYSTEM:	JW+1AC, OC+2AC	FUEL PRESSURE RANGE(psig):	58.0-70.3
CONTROL SYSTEM:	ADEM4	FUEL METHANE NUMBER:	58.5
EXHAUST MANIFOLD:	DRY	FUEL LHV (Btu/scf):	1106
COMBUSTION:	LOW EMISSION	ALTITUDE(ft):	1205
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5	MAXIMUM INLET AIR TEMPERATURE(°F):	100
SET POINT TIMING:	17	STANDARD RATED POWER:	5350 bhp@1000rpm

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	5350	5004	3753	2502
INLET AIR TEMPERATURE			°F	61	100	100	100
AFTERCOOLER - STAGE 2 INLET (°F):		(2)	°F	90	129	129	129
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(3)	Btu/bhp-hr	6649	6688	6875	7346
FUEL CONSUMPTION (HHV)		(3)	Btu/bhp-hr	7338	7382	7588	8107
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(4)(5)	ft3/min	12300	12572	9479	6485
AIR FLOW	(WET)	(4)(5)	lb/hr	56238	53453	40303	27575
FUEL FLOW (60ºF, 14.7 psia)			scfm	536	504	389	277
INLET MANIFOLD PRESSURE		(6)	in Hg(abs)	104.7	101.4	76.1	53.5
EXHAUST TEMPERATURE - ENGINE OUTLET		(7)	°F	812	831	890	957
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(8)(5)	ft3/min	31980	30834	24342	17517
EXHAUST GAS MASS FLOW	(WET)	(8)(5)	lb/hr	57938	55053	41536	28454
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(9)(10)	g/bhp-hr	0.50	0.50	0.50	0.50
CO		(9)(10)	g/bhp-hr	2.47	2.47	2.47	2.47
THC (mol. wt. of 15.84)		(9)(10)	g/bhp-hr	3.33	3.55	3.86	4.04
NMHC (mol. wt. of 15.84)		(9)(10)	g/bhp-hr	1.23	1.31	1.42	1.49
NMNEHC (VOCs) (mol. wt. of 15.84)		(9)(10)(11)	g/bhp-hr	0.55	0.59	0.64	0.67
HCHO (Formaldehyde)		(9)(10)	g/bhp-hr	0.20	0.20	0.22	0.24
CO2		(9)(10)	g/bhp-hr	434	436	449	478
EXHAUST OXYGEN		(9)(12)	% DRY	10.7	11.0	10.7	10.3
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(13)	Btu/min	53513	53105	42942	36257
HEAT REJ. TO ATMOSPHERE		(13)	Btu/min	17853	17700	16186	14721
HEAT REJ. TO LUBE OIL (OC)		(13)	Btu/min	32563	30635	27055	23552
HEAT REJ. TO A/C - STAGE 1 (1AC)		(13)(14)	Btu/min	46341	50313	25135	6019
HEAT REJ. TO A/C - STAGE 2 (2AC)		(13)(14)	Btu/min	19487	11640	7974	4850
COOLING SYSTEM SIZING CRITERIA							
TOTAL JACKET WATER CIRCUIT (JW+1AC)		(14)(15)	Btu/min	111244			
TOTAL STAGE 2 AFTERCOOLER CIRCUIT (OC+2AC)		(14)(15)	Btu/min	59536			

A cooling system safety factor of 0% has been added to the cooling system sizing criteria.

CONDITIONS AND DEFINITIONS

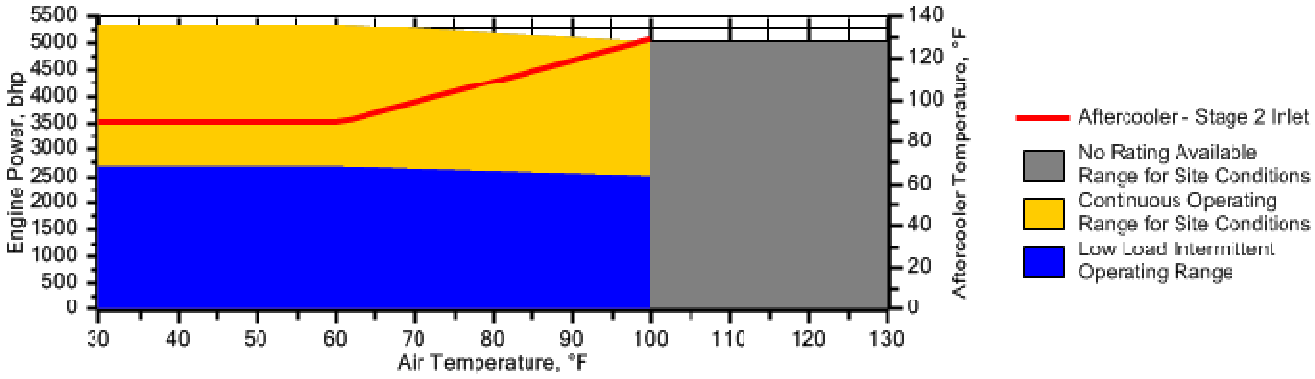
Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

PREPARED BY: Ryan Hoffman, eqt
Data generated by Gas Engine Rating Pro Version 5.03.00
Ref. Data Set EM0457-03-001, Printed 16Jun2015

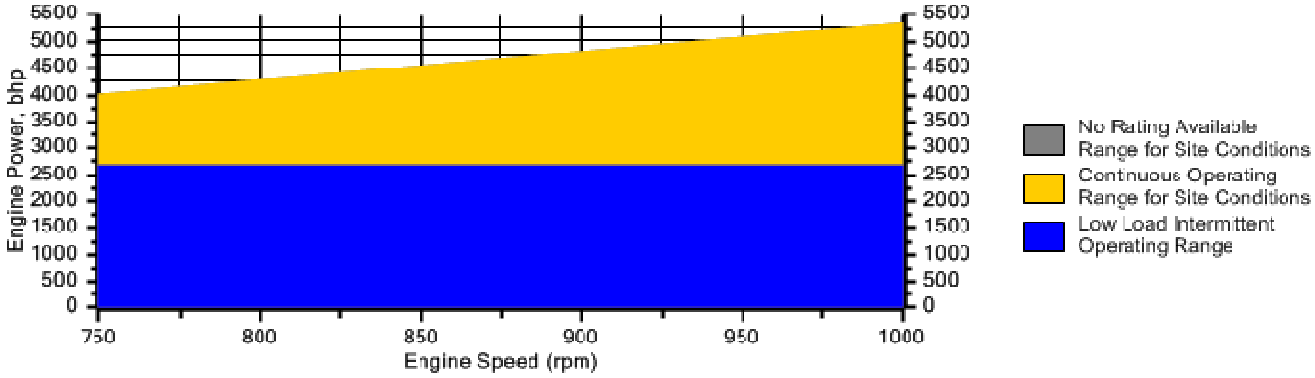
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1205 ft and 1000 rpm



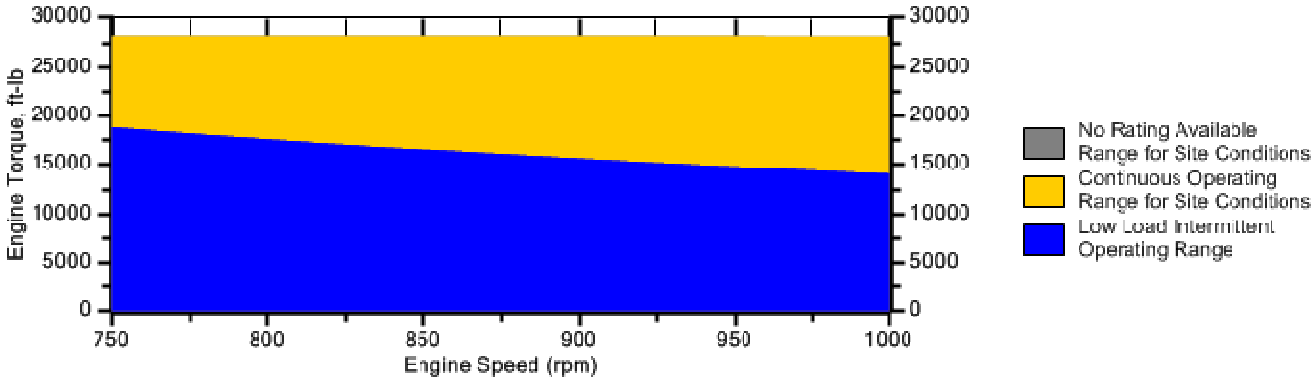
Engine Power vs. Engine Speed

Data represents speed sweep at 1205 ft and 100 °F



Engine Torque vs. Engine Speed

Data represents speed sweep at 1205 ft and 100 °F



Note: At site conditions of 1205 ft and 100°F inlet air temp., constant torque can be maintained down to 750 rpm. The minimum speed for loading at these conditions is 750 rpm.

NOTES

1. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.

2. Aftercooler temperature is based on site specified cooling system ambient capability. Refer to the table below.

Site Ambient Capability	
AC Temp.	Ambient Cap.
90°F	60°F
110°F	80°F
130°F	100°F

3. Fuel consumption tolerance is ± 2.5% of full load data.

4. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

5. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.

6. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

7. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

8. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

9. Emissions data is at engine exhaust flange prior to any after treatment.

10. Emission values are based on engine operating at steady state conditions. Fuel methane number cannot vary more than ± 3. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.

11. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

12. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.

13. Heat rejection values are nominal. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for radiation, ± 20% for lube oil circuit, and ± 5% for aftercooler circuit.

14. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.

15. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	80.6440	80.6440
Ethane	C2H6	12.8910	12.8910
Propane	C3H8	3.5750	3.5750
Isobutane	iso-C4H1O	0.4550	0.4550
Norbutane	nor-C4H1O	0.8340	0.8340
Isopentane	iso-C5H12	0.2300	0.2300
Norpentane	nor-C5H12	0.2140	0.2140
Hexane	C6H14	0.5010	0.5010
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.4660	0.4660
Carbon Dioxide	CO2	0.1900	0.1900
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		100.0000	100.0000

Fuel Makeup:	Gas Analysis
Unit of Measure:	English

Calculated Fuel Properties

Caterpillar Methane Number:	58.5
Lower Heating Value (Btu/scf):	1106
Higher Heating Value (Btu/scf):	1220
WOBBE Index (Btu/scf):	1327
THC: Free Inert Ratio:	151.44
Total % Inerts (% N2, CO2, He):	0.66%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.997
Stoich A/F Ratio (Vol/Vol):	11.48
Stoich A/F Ratio (Mass/Mass):	16.54
Specific Gravity (Relative to Air):	0.694
Specific Heat Constant (K):	1.286

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

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Technical Reference

Capstone MicroTurbine™ Systems Emissions

Summary

Capstone MicroTurbine™ systems are inherently clean and can meet some of the strictest emissions standards in the world. This technical reference is to provide customers with information that may be requested by local air permitting organizations or to compare air quality impacts of different technologies for a specific project. The preferred units of measure are "output based"; meaning that the quantity of a particular exhaust emission is reported relative to the useable output of the microturbine – typically in pounds per megawatt hour for electrical generating equipment. This technical reference also provides volumetric measurements in parts per million and milligrams per normal cubic meter. A conversion between several common units is also provided.

Maximum Exhaust Emissions at ISO Conditions

Table 1 below summarizes the exhaust emissions at full power and ISO conditions for different Capstone microturbine models. Note that the fuel can have a significant impact on certain emissions. For example landfill and digester gas can be made up of a wide variety of fuel elements and impurities, and typically contains some percentage of carbon dioxide (CO_2). This CO_2 dilutes the fuel, makes complete combustion more difficult, and results in higher carbon monoxide emissions (CO) than for pipeline-quality natural gas.

Table 1. Emission for Different Capstone Microturbine Models in [lb/MWhe]

Model	Fuel	NOx	CO	VOC (5)
C30 NG	Natural Gas (1)	0.64	1.8	0.23
CR30 MBTU	Landfill Gas (2)	0.64	22.0	1.00
CR30 MBTU	Digester Gas (3)	0.64	11.0	1.00
C30 Liquid	Diesel #2 (4)	2.60	0.41	0.23
C65 NG Standard	Natural Gas (1)	0.46	1.25	0.10
C65 NG Low NOx	Natural Gas (1)	0.17	1.30	0.10
C65 NG CARB	Natural Gas (1)	0.17	0.24	0.05
CR65 Landfill	Landfill Gas (2)	0.46	4.0	0.10
CR65 Digester	Digester Gas (3)	0.46	4.0	0.10
C200 NG	Natural Gas (1)	0.40	1.10	0.10
C200 NG CARB	Natural Gas (1)	0.14	0.20	0.04
CR200 Digester	Digester Gas (3)	0.40	3.6	0.10

Notes:

(1) Emissions for standard natural gas at 1,000 BTU/scf (HHV) or 39.4 MJ/m3 (HHV)
(2) Emissions for surrogate gas containing 42% natural gas, 39% CO2, and 19% Nitrogen
(3) Emissions for surrogate gas containing 63% natural gas and 37% CO2
(4) Emissions for Diesel #2 according to ASTM D975-07b
(5) Expressed as Methane

Table 2 provides the same output-based information shown in Table 1, but expressed in grams per horsepower hour (g/hp-hr).

Table 2. Emission for Different Capstone Microturbine Models in [g/hp-hr]

Model	Fuel	NOx	CO	VOC [5]
C30 NG	Natural Gas [1]	0.22	0.60	0.078
CR30 MBTU	Landfill Gas [2]	0.22	7.4	0.340
CR30 MBTU	Digester Gas [3]	0.22	3.7	0.340
C30 Liquid	Diesel #2 [4]	0.90	0.14	0.078
C65 NG Standard	Natural Gas [1]	0.16	0.42	0.034
C65 NG Low NOx	Natural Gas [1]	0.06	0.44	0.034
C65 NG CARB	Natural Gas [1]	0.06	0.08	0.017
CR65 Landfill	Landfill Gas [2]	0.16	1.4	0.034
CR65 Digester	Digester Gas [3]	0.16	1.4	0.034
C200 NG	Natural Gas [1]	0.14	0.37	0.034
C200 NG CARB	Natural Gas [1]	0.05	0.07	0.014
CR200 Digester	Digester Gas [3]	0.14	1.3	0.034

Notes: - same as for Table 1

Emissions may also be reported on a volumetric basis, with the most common unit of measurement being parts per million. This is typically a measurement that is corrected to specific oxygen content in the exhaust and without considering moisture content. The abbreviation for this unit of measurement is “ppmvd” (parts per million by volume, dry) and is corrected to 15% oxygen for electrical generating equipment such as microturbines. The relationship between an output based measurement like pounds per MWh and a volumetric measurement like ppmvd depends on the characteristics of the generating equipment and the molecular weight of the criteria pollutant being measured. Table 3 expresses the emissions in ppmvd at 15% oxygen for the Capstone microturbine models shown in Table 1. Note that raw measurements expressed in ppmv will typically be lower than the corrected values shown in Table 3 because the microturbine exhaust has greater than 15% oxygen.

Another volumetric unit of measurement expresses the mass of a specific criteria pollutant per standard unit of volume. Table 4 expresses the emissions in milligrams per normal cubic meter at 15% oxygen. Normal conditions for this purpose are expresses as one atmosphere of pressure and zero degrees Celsius. Note that both the ppmvd and mg/m3 measurements are for specific oxygen content. A conversion can be made to adjust either unit of measurement to other reference oxygen contents, if required. Use the equation below to convert from one reference oxygen content to another:

$$\text{Emissions at New } O_2 = \frac{(20.9 - \text{New } O_2 \text{ Percent})}{(20.9 - \text{Current } O_2 \text{ Percent})} \text{ X Emissions at Current } O_2$$

For example, to express 9 ppmvd of NOx at 15% oxygen to ppmvd at 3% oxygen:

$$\text{Emissions at 3\% } O_2 = \frac{(20.9 - 3.0)}{(20.9 - 15.0)} \text{ X } 9 = 27 \text{ ppmvd}$$

Table 3. Emission for Different Capstone Microturbine Models in [ppmvd] at 15% O_2

Model	Fuel	NOx	CO	VOC
C30 NG	Natural Gas (1)	9	40	9
CR30 MBTU	Landfill Gas (2)	9	500	40
CR30 MBTU	Digester Gas (3)	9	250	40
C30 Liquid	Diesel #2 (4)	35	9	9
C65 NG Standard	Natural Gas (1)	9	40	7
C65 NG Low NOx	Natural Gas (1)	4	40	7
C65 NG CARB	Natural Gas (1)	4	8	3
CR65 Landfill	Landfill Gas (2)	9	130	7
CR65 Digester	Digester Gas (3)	9	130	7
C200 NG	Natural Gas (1)	9	40	7
C200 NG CARB	Natural Gas (1)	4	8	3
CR200 Digester	Digester Gas (3)	9	130	7

Notes: same as Table 1

Table 4. Emission for Different Capstone Microturbine Models in [mg/m3] at 15% O_2

Model	Fuel	NOx	CO	VOC (5)
C30 NG	Natural Gas (1)	18	50	6
CR30 MBTU	Landfill Gas (2)	18	620	30
CR30 MBTU	Digester Gas (3)	18	310	30
C30 Liquid	Diesel #2 (4)	72	11	6
C65 NG Standard	Natural Gas (1)	19	50	5
C65 NG Low NOx	Natural Gas (1)	8	50	5
C65 NG CARB	Natural Gas (1)	8	9	2
CR65 Landfill	Landfill Gas (2)	18	160	5
CR65 Digester	Digester Gas (3)	18	160	5
C200 NG	Natural Gas (1)	18	50	5
C200 NG CARB	Natural Gas (1)	8	9	2
CR200 Digester	Digester Gas (3)	18	160	5

Notes: same as Table 1

The emissions stated in Tables 1, 2, 3 and 4 are guaranteed by Capstone for new microturbines during the standard warranty period. They are also the expected emissions for a properly maintained microturbine according to manufacturer's published maintenance schedule for the useful life of the equipment.

Emissions at Full Power but Not at ISO Conditions

The maximum emissions in Tables 1, 2, 3 and 4 are at full power under ISO conditions. These levels are also the expected values at full power operation over the published allowable ambient temperature and elevation ranges.

Emissions at Part Power

Capstone microturbines are designed to maintain combustion stability and low emissions over a wide operating range. Capstone microturbines utilize multiple fuel injectors, which are switched on or off depending on the power output of the turbine. All injectors are typically on when maximum power is demanded, regardless of the ambient temperature or elevation. As the load requirements of the microturbine are decreased, injectors will be switched off to maintain stability and low emissions. However, the emissions relative to the lower power output may increase. This effect differs for each microturbine model.

Emissions Calculations for Permitting

Air Permitting agencies are normally concerned with the maximum amount of a given pollutant being emitted per unit of time (for example pounds per day of NOx). The simplest way to make this calculation is to use the maximum microturbine full electrical power output (expressed in MW) multiplied by the emissions rate in pounds per MWhe times the number of hours per day. For example, the C65 CARB microturbine operating on natural gas would have a NOx emissions rate of:

NOx = .17 X (65/1000) X 24 = .27 pounds per day

This would be representative of operating the equipment full time, 24 hours per day, at full power output of 65 kWe.

As a general rule, if local permitting is required, use the published agency levels as the stated emissions for the permit and make sure that this permitted level is above the calculated values in this technical reference.

Consideration of Useful Thermal Output

Capstone microturbines are often deployed where their clean exhaust can be used to provide heating or cooling, either directly or using hot water or other heat transfer fluids. In this case, the local permitting or standards agencies will usually consider the emissions from traditional heating sources as being displaced by the useful thermal output of the microturbine exhaust energy. This increases the useful output of the microturbine, and decreases the relative emissions of the combined heat and power system. For example, the CARB version C65 ICHP system with integral heat recovery can achieve a total system efficiency of 70% or more, depending on inlet water temperatures and other installation-specific characteristics. The electric efficiency of the CARB version C65 microturbine is 28% at ISO conditions. This means that the total NOx output based emissions, including the captured thermal value, is the electric-only emissions times the ratio of electric efficiency divided by total system efficiency:

NOx = .17 X 28/70 = .068 pounds per MWh (based on total system output)

This is typically much less than the emissions that would result from providing electric power using traditional central power plants, plus the emissions from a local hot water heater or boiler. In fact microturbine emissions are so low compared with traditional hot water heaters that installing a Capstone microturbine with heat recovery can actually decrease the local emissions of NOx and other criteria pollutants, without even considering the elimination of emissions from a remote power plant.

Greenhouse Gas Emissions

Many gasses are considered "greenhouse gasses", and agencies have ranked them based on their global warming potential (GWP) in the atmosphere compared with carbon dioxide (CO_2), as well as their ability to maintain this effect over time. For example, methane is a greenhouse gas with a GWP of 21. Criteria pollutants like NOx and organic compounds like methane are monitored by local air permitting authorities, and are subject to strong emissions controls. Even though some of these criteria pollutants can be more troublesome for global warming than CO_2, they are released in small quantities – especially from Capstone microturbines. So the major contributor of concern is carbon dioxide, or CO_2. Emission of CO_2 depends on two things:

1. Carbon content in the fuel
2. Efficiency of converting fuel to useful energy

It is for these reasons that many local authorities are focused on using clean fuels (for example natural gas compared with diesel fuel), achieving high efficiency using combined heat and power systems, and displacing emissions from traditional power plants using renewable fuels like waste landfill and digester gasses.

Table 5 shows the typical CO_2 emissions due to combustion for different Capstone microturbine models at full power and ISO conditions. The values do not include CO_2 that may already exist in the fuel itself, which is typical for renewable fuels like landfill and digester gas. These values are expressed on an output basis, as is done for criteria pollutants in Table 1. The table shows the pounds per megawatt hour based on electric power output only, as well as considering total useful output in a CHP system with total 70% efficiency (LHV). As for criteria pollutants, the relative quantity of CO_2 released is substantially less when useful thermal output is also considered in the measurement.

Table 5. CO_2 Emission for Capstone Microturbine Models in [lb/MWh]

Model	Fuel	CO_2	
		Electric Only	70% Total CHP
C30 NG	Natural Gas (1)	1,690	625
CR30 MBTU	Landfill Gas (1)	1,690	625
CR30 MBTU	Digester Gas (1)	1,690	625
C30 Liquid	Diesel #2 (2)	2,400	855
C65 NG Standard	Natural Gas (1)	1,520	625
C65 NG Low NOx	Natural Gas (1)	1,570	625
C65 NG CARB	Natural Gas (1)	1,570	625
CR65 Landfill	Landfill Gas (1)	1,520	625
CR65 Digester	Digester Gas (1)	1,520	625
C200 NG	Natural Gas (1)	1,330	625
C200 NG CARB	Natural Gas (1)	1,330	625
CR200 Digester	Digester Gas (1)	1,330	625

Notes:

(1) Emissions due to combustion, assuming natural gas with CO_2 content of 117 lb/MMBTU (HHV)

(2) Emissions due to combustion, assuming diesel fuel with CO_2 content of 160 lb/MMBTU (HHV)

Useful Conversions

The conversions shown in Table 6 can be used to obtain other units of emissions outputs. These are approximate conversions.

Table 6. Useful Unit Conversions

From	Multiply By	To Get
lb/MWh	0.338	g/bhp-hr
g/bhp-hr	2.96	lb/MWh
lb	0.454	kg
kg	2.20	lb
kg	1,000	g
hp (electric)	.746	kW
kW	1.34	hp (electric)
MW	1,000	kW
kW	0.001	MW

Definitions

- ISO conditions are defined as: 15 °C (59 °F), 60% relative humidity, and sea level pressure of 101.3 kPa (14.696 psia).
- HHV: Higher Heating Value
- LHV: Lower Heating Value
- kW_{th}: Kilowatt (thermal)
- kW_e : Kilowatt (electric)
- MWh: Megawatt-hour
- hp-hr: horsepower-hour (sometimes referred to as “electric horsepower-hour”)
- Scf: Standard cubic foot (standard references ISO temperature and pressure)
- m3: Normal cubic meter (normal references 0 °C and one atmosphere pressure)

Capstone Contact Information

If questions arise regarding this technical reference, please contact Capstone Turbine Corporation for assistance and information:

Capstone Applications

Toll Free Telephone: (866) 4-CAPSTONE or (866) 422-7786

Fax: (818) 734-5385

E-mail: applications@capstoneturbine.com

ATTACHMENT M

Air Pollution Control Device Sheet

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): C1-C4

Equipment Information

1. Manufacturer: EMIT Technologies (or similar) Model No. EBX-9000-3036F-8C4E-48C (or similar)	2. Control Device Name: C1-C4 (Oxidation Catalysts) Type: Catalytic Oxidation Catalyst
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: CO – 93% (Estimated), VOC (NMNEHC+HCHO) – 56% (Estimated) Formaldehyde – 90% (Estimated) NMNEHC – 43% (Estimated)	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 31,980 SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse of disposal.	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☒ No
Are particulates present?	☒ Yes	☐ No
Are metals present?	☐ Yes	☒ No

15. Inlet Emission stream parameters:	Maximum	Typical
Pressure (mmHg):		
Heat Content (BTU/scf):		
Oxygen Content (%):		
Moisture Content (%):		
Relative Humidity (%):		

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor
☐ Particulate (type): ☒ Other

17. Inlet gas velocity: ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
31,980 ACF @ 812 °F and PSIA

20. Gas stream temperature:
Inlet: 812 °F
Outlet: varies °F

21. Gas flow rate:
Design Maximum: ACFM
Average Expected: 31,980 ACFM

22. Particulate Grain Loading in grains/scf:
Inlet:
Outlet:

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A CO	29.13		100	2.04		93
B VOC (NMNEHC+HCHO)	8.85		100	3.93		56
C Formaldehyde	2.36		100	0.24		90
D						
E						

24. Dimensions of stack: Height ft. Diameter ft.

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

Particulate Distribution

26. Complete the table: Particulate Size Range (microns)	Particle Size Distribution at Inlet to Collector: Weight % for Size Range	Fraction Efficiency of Collector: Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system:

29. Have you included ***Other Collectores Control Device*** in the Emissions Points Data Summary Sheet?

30. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING: Operate and maintain catalyst element according to the recommendations of the manufacturer	RECORDKEEPING: Keep records of all catalytic reduction device maintenance
REPORTING: None	TESTING: None

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
CO – 93% (Estimated),
VOC (NMNEHC+HCHO) – 56% (Estimated)
Formaldehyde – 90% (Estimated)

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
CO – 93% (Estimated),
VOC (NMNEHC+HCHO) – 56% (Estimated)
Formaldehyde – 90% (Estimated)

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
See attached manufacturer's specification sheet

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): FLARE-001 to FLARE-002

Equipment Information

1. Manufacturer: Envirotherm (or similar)
Model No. ETI-DVC-36-20 (or similar)

2. Method:
☐ Elevated flare
☐ Ground flare
☒ Other
Describe Enclosed Flare

3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.

4. Method of system used:
☐ Steam-assisted ☐ Air-assisted ☐ Pressure-assisted ☒ Non-assisted

5. Maximum capacity of flare:
scf/min
scf/hr

6. Dimensions of stack:
Diameter 3 ft.
Height 20 ft.

7. Estimated combustion efficiency:
(Waste gas destruction efficiency)
Estimated: > 98 %
Minimum guaranteed: > 98 %

8. Fuel used in burners:
☒ Natural Gas
☐ Fuel Oil, Number
☐ Other, Specify:

9. Number of burners: One (1)
Rating: 7 MMBTU/hr

10. Will preheat be used? ☐ Yes ☐ No

11. Describe method of controlling flame:

12. Flare height: 20 ft

13. Flare tip inside diameter: 28 inches ft

14. Natural gas flow rate to flare pilot flame per pilot light:
scf/min
74 scf/hr

15. Number of pilot lights: One (1)
Total 0.09 MMBTU/hr

16. Will automatic re-ignition be used?
☒ Yes ☐ No

17. If automatic re-ignition will be used, describe the method:

18. Is pilot flame equipped with a monitor? ☒ Yes ☐ No
If yes, what type? ☒ Thermocouple ☐ Infra-Red
☐ Ultra Violet ☐ Camera with monitoring control room
☐ Other, Describe:

19. Hours of unit operation per year: 8760

Steam Injection

20. Will steam injection be used? ☐ Yes ☒ No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29.

Name	Quantity Grains of H_2S/100 ft^3	Quantity (LB/hr, ft^3/hr, etc)	Source of Material
See attached emissions calculations			

30. Estimate total combustible to flare: 270 (from GLYcalc) LB/hr (Maximum mass flow rate of waste gas) scfm	
31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:	
32. Give composition of carrier gases:	
33. Temperature of emission stream: >100 °F Heating value of emission stream: 116-1,651 BTU/ft^3 Mean molecular weight of emission stream: MW = lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: 1450-1600 °F	36. Flare gas flow rate: 121 scf/min
37. Flare gas heat content: 116-1,651 BTU/ft^3	38. Flare gas exit velocity: 22.81 ft/sec
39. Maximum rate during emergency for one major piece of equipment or process unit: scf/min	
40. Maximum rate during emergency for one major piece of equipment or process unit: BTU/min	
41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
42. Describe the collection material disposal system:	
43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet?	

44. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
Presence of pilot (temperature)	Maintain records of the times and duration of all periods where the pilot flame was absent Maintain records of visible emission opacity tests
REPORTING:	TESTING:
None	Conduct a Method 22 opacity test as required

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
VOC – 100%
HAP – 100%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
VOC – 98%
HAP – 98%

47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): FLARE-003

Equipment Information

1. Manufacturer: Envirotherm (or similar)
Model No. EF-96-30 (or similar)

2. Method:
- ☐ Elevated flare
- ☐ Ground flare
- ☒ Other
  Describe Tank Enclosed Flare

3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.

4. Method of system used:
☐ Steam-assisted ☐ Air-assisted ☐ Pressure-assisted ☒ Non-assisted

5. Maximum capacity of flare:
scf/min
scf/hr

6. Dimensions of stack:
Diameter 8 ft.
Height 30 ft.

7. Estimated combustion efficiency:
(Waste gas destruction efficiency)
Estimated: > 95 %
Minimum guaranteed: > 95 %

8. Fuel used in burners:
- ☒ Natural Gas
- ☐ Fuel Oil, Number
- ☐ Other, Specify:

9. Number of burners: One (1)
Rating: 41 MMBTU/hr

10. Will preheat be used? ☐ Yes ☐ No

11. Describe method of controlling flame:

12. Flare height: 30 ft

13. Flare tip inside diameter: 8 ft

14. Natural gas flow rate to flare pilot flame per pilot light:
scf/min
100 scf/hr

15. Number of pilot lights: One (1)
Total 0.12 MMBTU/hr

16. Will automatic re-ignition be used?
☒ Yes ☐ No

17. If automatic re-ignition will be used, describe the method:

The pilot flare will re-ignite upon pilot failure

18. Is pilot flame equipped with a monitor? ☒ Yes ☐ No
If yes, what type?
- ☒ Thermocouple
- ☐ Infra-Red
- ☐ Ultra Violet
- ☐ Camera with monitoring control room
- ☐ Other, Describe:

19. Hours of unit operation per year: 8760

Steam Injection

20. Will steam injection be used? ☐ Yes ☒ No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29.

Name	Quantity Grains of H_2S/100 ft^3	Quantity (LB/hr, ft^3/hr, etc)	Source of Material
See attached emissions calculations			

30. Estimate total combustible to flare:		LB/hr
(Maximum mass flow rate of waste gas)	338	scfm (20,280 scfh)
31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:		
32. Give composition of carrier gases:		

33. Temperature of emission stream: >70 °F Heating value of emission stream: 1,951 BTU/ft^3 Mean molecular weight of emission stream: MW = lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: 1800 °F	36. Flare gas flow rate: 625 scf/min (37,500 scfh)
37. Flare gas heat content: 1,951 BTU/ft^3	38. Flare gas exit velocity: 125 ft/sec
39. Maximum rate during emergency for one major piece of equipment or process unit:	scf/min
40. Maximum rate during emergency for one major piece of equipment or process unit:	BTU/min
41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
42. Describe the collection material disposal system:	
43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet?	

44. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
Presence of pilot (temperature)	Maintain records of the times and duration of all periods where the pilot flame was absent Maintain records of visible emission opacity tests
REPORTING:	TESTING:
None	Conduct a Method 22 opacity test as required

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
VOC – 100%
HAP – 100%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
VOC – 95%
HAP – 95%

47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

10497 Town & Country Way, Ste. 940
Houston, TX 77024
Office: 307.673.0883 | Direct: 307.675.5073
cparisi@emittechnologies.com

Prepared For:
Matthew Peterson
EQT MIDSTREAM

QUOTE: QUO-16388-Q3X4

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G3616
Horsepower:	5350
RPM:	1000
Compression Ratio:	9.2
Exhaust Flow Rate:	31980 CFM
Exhaust Temperature:	812 °F
Reference:	DM8608-04-002
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

	g/bhp-hr	Lb/Hr	Tons/Year
NOx:	0.50	5.90	25.83
CO:	2.47	29.13	127.60
THC:	3.33	39.28	172.03
NMHC	1.23	14.51	63.54
NMNEHC:	0.55	6.49	28.41
HCHO:	0.20	2.36	10.33
O2:	10.70 %		

POST CATALYST EMISSIONS

	% Reduction	Lb/Hr
NOx:	Unaffected by Oxidation Catalyst	
CO:	>93 %	<2.04
VOC:	>43 %	<3.70
HCHO:	>90 %	<0.23

CONTROL EQUIPMENT

Catalyst Housing

Model:	EBX-9000-3036F-8C4E-48C
Manufacturer:	EMIT Technologies, Inc
Element Size:	Rectangle 48" x 15" x 3.5"
Housing Type:	8 Element Capacity
Catalyst Installation:	Ground Level Accessible Housing
Construction:	3/16" Carbon Steel
Sample Ports:	9 (0.5" NPT)
Inlet Connections:	30" Flat Face Flange
Outlet Connections:	36" Flat Face Flange
Configuration:	Side In / End Out
Silencer:	Integrated
Silencer Grade:	Hospital Enhanced
Insertion Loss:	35-50 dBA

Catalyst Element

Model:	RT-4815-H
Catalyst Type:	Oxidation, Premium Precious Group Metals
Substrate Type:	BRAZED
Manufacturer:	EMIT Technologies, Inc
Element Quantity:	6
Element Size:	Rectangle 48" x 15" x 3.5"

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WARRANTY

EMIT Technologies, Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of two (2) years from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance using an EMIT Air/Fuel ratio controller is dependent upon properly defined set-points, variable with engine and fuel gas composition. Air/fuel ratio controller performance is guaranteed, but not limited, to fuel gas with a HHV content of 1400 BTU/SCF.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures. In most cases, excluding thermal deactivation, catalyst performance is redeemable by means of proper washing (refer to EMIT Catalyst/Silencer Housing Manual for element wash information, or contact a local EMIT Sales representative).

The exhaust temperature operating range at the converter inlet is a minimum of 600°F for oxidation catalyst and 750 ˚F for NSCR catalyst, and a maximum of 1250°F.

If a properly functioning, high temperature shut down switch is not installed, thermal deactivation of catalyst at sustained temperatures above 1250˚F is not covered. If excessive exposure to over oxygenation of NSCR catalyst occurs due to improperly functioning or non-existent Air/Fuel ratio control, then deactivation of catalyst is not warranted.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent. Standard Oxidation Catalyst conversion efficiencies (% reduction) will be guaranteed for fuel gas containing less than 1.5% mole fraction of non-methane, non-ethane hydrocarbons. Applications where fuel gas exceeds this level will require a Premium Oxidation Catalyst to maintain guaranteed VOC conversion efficiencies.

Engine lubrication oil shall contain less than 0.5 wt% Sulfated Ash with a maximum allowable specific oil consumption of 0.7 g/bhp-hr. The catalyst shall be limited to a maximum ash loading of 0.022 lb/ft3. Phosphorous and zinc additives are limited to 0.03 wt%. New or Reconstructed engines must operate for a minimum of 50 hours prior to catalyst installation, otherwise the warranty is void.

The catalyst must not be exposed to the following know poisoning agents, including: antimony, arsenic, chromium, copper, iron, lead, lithium, magnesium, mercury, nickel, phosphorous, potassium, silicon, sodium, sulfur, tin, and zinc. Total poison concentrations in the fuel gas must be limited to 0.25 ppm or less for catalyst to function properly.

Shipment - Promised shipping dates are approximate lead times from the point of manufacture and are not guaranteed. EMIT Technologies, Inc. will not be liable for any loss, damage or delay in manufacture or delivery resulting from any cause beyond its control including, but not limited to a period equal to the time lost by reason of that delay. All products will be crated as per best practice to prevent any damage during shipment. Unless otherwise specified, Buyer will pay for any special packing and shipping requirements. Acceptance of goods by common carrier constitutes delivery to Buyer. EMIT Technologies, Inc. shall not be responsible for goods damaged or lost in transit.

Terms: Credit is extended to purchaser for net 30 time period. If payment is not received in the net 30 timeframe, interest on the unpaid balance will accrue at a rate of 1.5% per month from the invoice date.

Order Cancellation Terms: Upon cancellation of an order once submittal of a Purchase Order has occurred, the customer will pay a 25% restocking fee for Catalyst Housings, Catalyst Elements, and Air/Fuel Ratio Controllers; 50% restocking fee for Cooler Top Solutions Exhaust System Accessories, and other Custom Built Products; 100% of all associated shipping costs incurred by EMIT; 100% of all project expenses incurred by EMIT for Field Services.

Flare Stacks – Thermal Oxidizers – Burners & Controls

EQT
EF-96-30
TECHNICAL SUMMARY

Customer:	EQT	
Attn:	Matthew Peterson	
Prepared By:	Mike Riddell	Francisco Cuevas
	(817)233-9169	(817)925-8388
	mriddell@irsvc.com	fcuevas@irsvc.com
Date Prepared:		

Technical Summary

Design Condition

Process inlet stream:

Bullet Tank Flash GasStream #1

Pipe Size:	4” Sch 40
Inlet Pressure:	0-90 PSIG
Volume Max:	20,280 SCFH
BTU Value	1,951 Btu/Scf
Total Heat input MAX	39.6 MMBTU/HR
Total BTU Load Max	41 MMBTU/hr
Combustion Chamber Temp: High Limit	1800 °F
Residence Time:	≥ 1.0 Sec.
Exit Velocity:	29.64 FT/sec.
Destruction Efficiency:	≥ 95%
Turn Down	10 : 1

Utility Flare Sizing:

Pipe Size:	6” Sch 40
Inlet Pressure:	8-12 osi
Volume	37,500 SCFH
BTU Value	1600 Btu/Scf
Total Heat input	60.0 MMBTU/HR
Exit Velocity:	125 FT/sec.
Destruction Efficiency:	≥ 95%
Δ P tip	.15 PSIG
Design Radiation	497 BTU/hr-sq.ft.

Site Conditions:

Wind Speed	90 MPH
Seismic Zone	1
Elevation	1000 ft.
Humidity	High

Utilities:

Gas Service Required for Pilot	100 SCFH – Natural Gas @ 20 PSIG Min. / 150 PSIG Max
Gas Service Required for Assist Fuel	8,000 SCFH – Natural Gas @ 20 PSIG Min. (Intermittent Usage)
Electrical Service Required	480 VAC, 3ph, 60Hz, 20 amp
Compressed Gas for Valves	80 PSIG – Intermittent

Flare Stacks – Thermal Oxidizers – Burners & Controls

EQT
36 - DVC
TECHNICAL SUMMARY

Customer:	EQT	
Attn:	Matthew Peterson	
Prepared By:	Mike Riddell	Francisco Cuevas
	(817)233-9169	(817)925-8388
	mriddell@irsvc.com	fcuevas@irsvc.com
Date Prepared:	July 9, 2015	

Technical Summary
Process Inlet Stream: Based on GRI-Gly Calc Output

OVERHEAD STILL INLET	
Inlet Temperature:	212 °F
Inlet Pressure:	14.7 PSIG
Flow Rate:	6,220 SCFH
Heating Value:	115.87 BTU/FT^3
FLASH GAS INLET	
Inlet Temperature:	120 °F
Inlet Pressure:	20-50 PSIG
Flow Rate:	939 SCFH
Heating Value:	1,651 BTU/FT^3
STACK PROPERTIES	
Exit Inner Diameter:	28 IN
Exit Outer Diameter:	36 IN
Stack Height:	20 FT
Mass Flow at 1450°F:	350,975 ACFH
Exit Velocity:	22.81 FT/SEC
Maximum BTU Load on Unit:	7 MMBTU/HR
Maximum BTU Load of Stream:	3.0 MMBTU/HR
Combustion Chamber Temp:	1450°F – 1600°F
Destruction Efficiency:	≥98.0%
Residence Time:	≥0.85 Sec.

SITE CONDITIONS	
Wind Speed:	90 MPH
Seismic Zone:	1
Elevation:	1,000 FT
Humidity:	High

UTILITIES	
Gas Service Required for Burner:	400 SCFH – Natural Gas intermittent use, only on when temperature < 1450 °F
Electrical Service Required:	24 VDC, 5 Amps
Gas Consumption at Start-up:	400,000 Btu/hr
Gas Consumption under load:	≤ 400 SCFH, Dependant on BTU value of waste stream

ATTACHMENT N

Supporting Emission Calculations

EQT Gathering - Janus Station
Facility-Wide Emissions Summary

	Janus Station													Janus Station TOTAL	
	CAT G3616 Compressor Engines	Capstone Microturbine	Fuel Gas Heaters		Dehydrator Enclosed Flares	Dehydration Units	Reboilers	Tank Enclosed Flare	Haul Roads	Miscellaneous Storage Tanks	Produced Fluids Storage Tanks	Liquid Loading Operations	Station Fugitives - Blowdowns & Component Leaks		
Emission Unit ID	ENG-001 to ENG-004	EG-001 to EG-005	HTR-1	HTR-2	DEHY-001 to DEHY-002	DEHY-001 to DEHY-002	RB-001 to RB-002	FLARE-003	NA	T003 to T024	T-001 to T002	L1	NA		
Emission Point ID	ENG-001 to ENG-004	EG-001 to EG-005	HTR-1	HTR-2	FLARE-001 to FLARE-002	FLARE-001 to FLARE-002	RB-001 to RB-002	FLARE-003	NA	NA	FLARE-003	L1	NA		
Equipment Count	4	5	1	1	2	2	2	1	NA	22	2	NA	NA		
Equipment Status	New	New	New	New	New	New	New	New	New	New	New	New	New		
Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	---	Natural Gas	Natural Gas	NA	NA	NA	NA	NA		
Capacity	5,350	1.0	1.15	0.77	7	125	2.31	41		4,200 or less	210				
Unit	bhp	MW	MMBtu/hr	MMBtu/hr	MMBtu/hr	MMSCFD	MMBtu/hr	MMBtu/hr		gallon	bbl				
Hours per Year	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760		
Pollutant	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	lb/hr	tpy
PM_{10}	6.90	0.33	0.03	0.02	0.38	---	0.13	1.12	0.20	---	---	---	---	**2.1**	**9.1**
$PM_{2.5}$	6.90	0.33	0.03	0.02	0.38	---	0.13	1.12	0.01	---	---	---	---	**2.0**	**8.9**
SO_X	0.41	0.17	<0.01	<0.01	0.03	---	0.01	0.09	---	---	---	---	---	**0.2**	**0.7**
CO	35.73	4.82	0.35	0.23	4.25	---	1.39	12.34	---	---	---	---	---	**13.5**	**59.1**
NO_X	103.32	1.75	0.41	0.28	5.07	---	1.65	14.69	---	---	---	---	---	**29.0**	**127.2**
VOC (incl. HCHO)	68.91	0.44	0.02	0.02	---	13.60	0.09	---	---	0.00	0.42	0.09	12.01	**21.8**	**95.6**
CO_2	89,682	5,825	589	395	7,267	7,295	2,368	21073	---	---	--	---	0.22	**30,706**	**134,494**
CH_4	433.94	0.11	0.01	0.01	0.14	6.32	0.04	0.40	---	---	---	---	33.37	**108.3**	**474**
N_2O	0.15	0.01	<0.01	<0.01	0.01	---	0.00	0.04	---	---	---	---	---	**0.1**	**0.2**
CO_2e	100,576	5,831	590	395	7,274	7,453	2,370	21095	---	---	---	---	834	**33,429**	**146,419**
Formaldehyde	4.13	0.04	<0.01	<0.01	---	---	<0.01	---	---	---	---	---	---	**1.0**	**4.2**
Total HAPs (including HCHO)	17.53	0.05	0.01	0.01	---	5.92	0.03	---	---	---	0.01	---	0.51	**5.5**	**24.1**

1. VOC and HAP emissions are included in the storage tank emissions.

Compressor Engines (Per Engine)

Source Designation:	
Manufacturer:	Caterpillar
Model No.:	3616
Stroke Cycle:	4-stroke
Type of Burn:	Lean Burn
Year Installed/Date Manufactured	TBD
Fuel Used:	Natural Gas
Fuel High Heating Value (HHV) (Btu/scf):	1,226
Rated Horsepower (bhp):	5,350
Specific Fuel Consumption (Btu/bhp-hr)	7,338
Maximum Fuel Consumption at 100% Load (scf/hr):	32,160
Heat Input (MMBtu/hr)	39.43
Control Device:	Oxidation Catalyst
Operational Details:	
Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	281.7

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	**Emission Factors[a]**	**Units**	**Estimation Basis / Emission Factor Source**
NOx	0.50	g/bhp-hr	CAT GERP Vendor Spec Sheet
CO	0.17	g/bhp-hr	Catalyst Vendor Spec Sheet
SO_2	5.88E-04	lb/MMBtu	AP-42, Table 3.2-2 (Jul-2000)
PM_{10} (Filterable)	7.71E-05	lb/MMBtu	AP-42, Table 3.2-2 (Jul-2000)
$PM_{2.5}$ (Filterable)	7.71E-05	lb/MMBtu	AP-42, Table 3.2-2 (Jul-2000)
PM Condensable	9.91E-03	lb/MMBtu	AP-42, Table 3.2-2 (Jul-2000)
PM Total	9.99E-03	lb/MMBtu	AP-42, Table 3.2-2 (Jul-2000)
NMNEHC	0.31	g/bhp-hr	Catalyst Vendor Spec Sheet
VOC (Includes HCHO)	0.33	g/bhp-hr	Catalyst Vendor Spec Sheet
Formaldehyde (HCHO)	0.02	g/bhp-hr	Catalyst Vendor Spec Sheet
CO_2	434.0	g/bhp-hr	CAT GERP Vendor Spec Sheet
CH_4	2.10	g/bhp-hr	Vendor Spec Sheet (=THC-NMHC)
N_2O	1.00E-04	kg/MMBtu	40 CFR 98, Table C-2

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	**Potential Emissions**	
	(lb/hr)[b]	**(tons/yr)[c]**
NO_x	5.90	25.83
CO	2.04	8.93
SO_2	0.02	0.10
PM_{10} (Filterable)	0.003	0.01
$PM_{2.5}$ (Filterable)	0.003	0.01
PM Condensable	0.39	1.71
PM Total	0.39	1.73
NMNEHC	3.70	16.20
VOC (incl HCHO)	3.93	17.23
Formaldehyde (HCHO)	0.24	1.03
CO_2	5,119	22,420
CH_4	24.77	108.49
N_2O	0.01	0.04

Compressor Engines (Per Engine)

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
Acenaphthene	1.25E-06	4.93E-05	2.16E-04
Acenaphthylene	5.53E-06	2.18E-04	9.55E-04
Acetaldehyde	8.36E-03	3.30E-01	1.44E+00
Acrolein	5.14E-03	2.03E-01	8.88E-01
Benzene	4.40E-04	1.74E-02	7.60E-02
Benzo(b)fluoranthene	1.66E-07	6.55E-06	2.87E-05
Benzo(e)pyrene	4.15E-07	1.64E-05	7.17E-05
Benzo(g,h,i)perlyene	4.14E-07	1.63E-05	7.15E-05
Biphenyl	2.12E-04	8.36E-03	3.66E-02
1,3-Butadiene	2.67E-04	1.05E-02	4.61E-02
Carbon Tetrachloride	3.67E-05	1.45E-03	6.34E-03
Chlorobenzene	3.04E-05	1.20E-03	5.25E-03
Chloroform	2.85E-05	1.12E-03	4.92E-03
Chrysene	6.93E-07	2.73E-05	1.20E-04
1,3-Dichloropropene	2.64E-05	1.04E-03	4.56E-03
Ethylbenzene	3.97E-05	1.57E-03	6.86E-03
Ethylene Dibromide	4.43E-05	1.75E-03	7.65E-03
Fluoranthene	1.11E-06	4.38E-05	1.92E-04
Fluorene	5.67E-06	2.24E-04	9.79E-04
Methanol	2.50E-03	9.86E-02	4.32E-01
Methylene Chloride	2.00E-05	7.89E-04	3.45E-03
n-Hexane	1.11E-03	4.38E-02	1.92E-01
Phenanthrene	1.04E-05	4.10E-04	1.80E-03
Phenol	2.40E-05	9.46E-04	4.15E-03
Pyrene	1.36E-06	5.36E-05	2.35E-04
Styrene	2.36E-05	9.31E-04	4.08E-03
Toluene	4.08E-04	1.61E-02	7.05E-02
1,1,2,2-Tetrachloroethane	4.00E-05	1.58E-03	6.91E-03
Tetrachloroethane	2.48E-06	9.78E-05	4.28E-04
1,1,2-Trichloroethane	3.18E-05	1.25E-03	5.49E-03
2,2,4-Trimethylpentane	2.50E-04	9.86E-03	4.32E-02
Vinyl Chloride	1.49E-05	5.88E-04	2.57E-03
Xylene	1.84E-04	7.26E-03	3.18E-02
Polycyclic Organic Matter:			
Naphthalene	7.44E-05	2.93E-03	1.29E-02
2-Methylnaphthalene	3.32E-05	1.31E-03	5.73E-03
PAH	2.69E-05	1.06E-03	4.65E-03
Total HAP		**1.00**	**4.38**

Notes:

1. SO_2, PM, and HAP emission factors from AP-42 Section 3.2, Table 3.2-2 "Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines," Supplement F, August 2000. NO_X, VOC, CO, CO_2, and CH_4 (=THC-NMHC) and formaldehyde emission factors are based on manufacturer's data. Greenhouse gas emission factors (N_2O) are based on 40 CFR Part 98, Subpart C, Table C-2 for natural gas combustion.

2. Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or gr/bhp-hr).

3. Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

Microturbines

Microturbine Unit Information:

Manufacturer:	Capstone
Model No.:	C200
Projected Startup Date:	Upon Approval
Number of Units:	5

Notes:
1. The unit is comprised of 5 identical C200 units.

Microturbine Fuel Information:

	Per C1000 Unit
Fuel Type:	Natural Gas
Higher Heating Value (Btu/Scf)	1,226
Rated Electrical Power Output (kW):	1,000
Rated Electrical Power Output (MW):	1.000
Rated Horsepower (bhp):	1,341
Heat Input (MMBtu/hr)	11.40
Potential Fuel Consumption (scf/hr):	9,297
Potential Fuel Consumption (MMBtu/yr):	99,864
Max. Annual Hours of Operation (hr/yr):	8,760

Microturbine Emissions Data:

Pollutant	**Emission Factors**	**Units**	**Maximum Potential Emissions**		**Estimation Basis / Emission Factor Source**
			lbs/hr	**tpy**	
NO_X	0.40	lb/MWhe	0.40	1.75	Manufacturer's Specifications
VOC	0.10	lb/MWhe	0.10	0.44	Manufacturer's Specifications
CO	1.10	lb/MWhe	1.10	4.82	Manufacturer's Specifications
SO_X	0.0034	lb/MMBtu	0.04	0.17	AP-42, Table 3.1-2a (Apr-2000)
PM_{10}	0.0066	lb/MMBtu	0.08	0.33	AP-42, Table 3.1-2a (Apr-2000)
$PM_{2.5}$	0.0066	lb/MMBtu	0.08	0.33	AP-42, Table 3.1-2a (Apr-2000)
GHG (CO_2e)	See Table Below		1,331	5,831	Manuf. Specs / 40 CFR 98, Table C-2
Other (Total HAP)	See Table Below		0.01	0.05	AP-42, Table 3.1-3 (Apr-2000)

Notes:
1. NMNEHC is non-methane, non-ethane hydrocarbon excluding formaldehyde (HCHO).
2. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
3. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
4. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this engine type, including HCHO.

Greenhouse Gas (GHG) & Hazardous Air Pollutant (HAP) Emissions Calculations:

Pollutant	**Emission Factor**	**Units**	**Maximum Potential Emissions**		**Estimation Basis / Emission Factor Source**
			lbs/hr	**tpy**	
GHGs:					
CO_2	1,330	lb/MWhe	1,330	5,825	Manufacturer's Specifications
CH_4	0.001	kg/MMBtu	0.03	0.11	40 CFR 98, Table C-2
N_2O	0.0001	kg/MMBtu	0.00	0.01	40 CFR 98, Table C-2
GHG (CO_2e)			**1,331**	**5,831**	
HAPs:					
1,3-Butadiene	4.3E-07	lb/MMBtu	4.90E-06	2.15E-05	AP-42, Table 3.1-3 (Apr-2000)
Acetaldehyde	4.0E-05	lb/MMBtu	4.56E-04	2.00E-03	AP-42, Table 3.1-3 (Apr-2000)
Acrolein	6.4E-06	lb/MMBtu	7.30E-05	3.20E-04	AP-42, Table 3.1-3 (Apr-2000)
Benzene	1.2E-05	lb/MMBtu	1.37E-04	5.99E-04	AP-42, Table 3.1-3 (Apr-2000)
Ethylbenzene	3.2E-05	lb/MMBtu	3.65E-04	1.60E-03	AP-42, Table 3.1-3 (Apr-2000)
Formaldehyde	7.1E-04	lb/MMBtu	8.09E-03	3.55E-02	AP-42, Table 3.1-3 (Apr-2000)
Naphthalene	1.3E-06	lb/MMBtu	1.48E-05	6.49E-05	AP-42, Table 3.1-3 (Apr-2000)
PAH	2.2E-06	lb/MMBtu	2.51E-05	1.10E-04	AP-42, Table 3.1-3 (Apr-2000)
Propylene oxide	2.9E-05	lb/MMBtu	3.31E-04	1.45E-03	AP-42, Table 3.1-3 (Apr-2000)
Toluene	1.3E-04	lb/MMBtu	1.48E-03	6.49E-03	AP-42, Table 3.1-3 (Apr-2000)
Xylene	6.4E-05	lb/MMBtu	7.30E-04	3.20E-03	AP-42, Table 3.1-3 (Apr-2000)
Total HAP			**0.012**	**0.051**	

Dehydration Unit & Combustor Emissions

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY
Controlled Regenerator Emissions

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon dioxide	0.91	21.8	3.99
Methane	0.0234	0.563	0.103
Ethane	0.0623	1.495	0.273
Propane	0.0620	1.488	0.272
Isobutane	0.0178	0.427	0.078
n-Butane	0.0511	1.227	0.224
Isopentane	0.0168	0.403	0.074
n-Pentane	0.0232	0.558	0.102
n-Hexane*	0.0222	0.534	0.097
Cyclohexane	0.0288	0.692	0.126
Other Hexanes	0.0221	0.530	0.097
Heptanes	0.0689	1.655	0.302
2,2,4-Trimethylpentane*	0.0145	0.349	0.064
Benzene*	0.0799	1.918	0.350
Toluene*	0.2164	5.193	0.948
Ethylbenzene*	0.0387	0.929	0.170
Xylenes*	0.2660	6.385	1.165
C8+ Heavier Hydrocarbons	0.0664	1.594	0.291
Total Emissions	1.0808	25.938	4.734
Total Hydrocarbon Emissions	1.0808	25.938	4.734
Total VOC Emissions	0.9951	23.881	4.358
Total HAP Emissions	0.6378	15.308	2.794

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY
Flash Gas Emissions

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon dioxide	2	57	10
Methane	0.6821	16.371	2.988
Ethane	0.5151	12.362	2.256
Propane	0.2467	5.921	1.081
Isobutane	0.0471	1.131	0.206
n-Butane	0.1040	2.496	0.456
Isopentane	0.0299	0.718	0.131
n-Pentane	0.0334	0.800	0.146
n-Hexane*	0.0177	0.426	0.078
Cyclohexane	0.0057	0.136	0.025
Other Hexanes	0.0232	0.556	0.101
Heptanes	0.0268	0.644	0.118
2,2,4-Trimethylpentane*	0.0112	0.268	0.049
Benzene*	0.0023	0.056	0.010
Toluene*	0.0041	0.098	0.018
Ethylbenzene*	0.0004	0.010	0.002
Xylenes*	0.0020	0.049	0.009
C8+ Heavier Hydrocarbons	0.0025	0.060	0.011
Total Emissions	1.7543	42.103	7.684
Total Hydrocarbon Emissions	1.7543	42.103	7.684
Total VOC Emissions	0.5571	13.370	2.440
Total HAP Emissions	0.0378	0.907	0.166

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY [1]
Combined Regenerator and Flash Gas Emissions [2]

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon dioxide	3.2800	78.7200	14.3664
Methane	0.7055	16.934	3.0904
Ethane	0.5774	13.857	2.5288
Propane	0.3087	7.409	1.3521
Isobutane	0.0649	1.558	0.2843
n-Butane	0.1551	3.723	0.6795
Isopentane	0.0467	1.121	0.2045
n-Pentane	0.0566	1.358	0.2479
n-Hexane*	0.0399	0.960	0.1751
Cyclohexane	0.0345	0.828	0.1511
Other Hexanes	0.0453	1.086	0.1981
Heptanes	0.0957	2.299	0.4196
2,2,4-Trimethylpentane*	0.0257	0.617	0.1126
Benzene*	0.0822	1.974	0.3604
Toluene*	0.2205	5.291	0.9656
Ethylbenzene*	0.0391	0.939	0.1714
Xylenes*	0.2680	6.434	1.1743
C8+ Heavier Hydrocarbons	0.0689	1.654	0.3019
Total Emissions	2.8351	68.041	12.4175
Total Hydrocarbon Emissions	2.8351	68.041	12.4175
Total VOC Emissions	1.5522	37.251	6.7983
Total HAP Emissions	0.6756	16.215	2.9593

*HAPs

Enclosed Flare (FLARE-1 & FLARE-2) Emissions Calculations:

Combustor Rating	7.0	MMbtu/hr
Pilot Rating	0.09	MMbtu/hr
Higher Heating Value (HHV)	1,226	btu/scf

Pollutant	Emission Factors [a] (lb/MMBtu)	Combustor Potential Emissions (lb/hr)	Combustor Potential Emissions (tpy)	Pilot Potential Emissions (lb/hr)	Pilot Potential Emissions (tpy)
NO_x	0.082	0.571	2.500	0.007	0.032
CO	0.069	0.480	2.100	0.006	0.027
PM/PM_{10}	0.006	0.043	0.190	0.0006	0.002
SO_2	0.000	0.003	0.015	4.40E-05	1.93E-04
CO_2 [b] (Natural Gas Firing)	116.997	818.981	3,587.137	10.530	46.120
CH_4 [b] (Natural Gas Firing)	0.002	0.015	0.068	1.98E-04	8.69E-04
N_2O [b] (Natural Gas Firing)	0.000	0.002	0.007	1.98E-05	8.69E-05

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.
[b] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

[1] Based on GRI GLYCalc 4.0 run at dry gas flowrate of 125 MMSCFD and T and P of 75°F and 1200 psig, respectively. Still emissions are controlled by the enclosed flare at a destruction efficiency of 98%. Flash tank emissions will be routed to the reboiler for use as fuel, with the flare as backup for excess. This is expected to achieve 98% destruction efficiency.

Reboilers (Per Unit)

Source Designation:	
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,226
Heat Input (MMBtu/hr)	2.31
Fuel Consumption (MMscf/hr):	1.88E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	1.88E-01	8.25E-01
CO	84	1.58E-01	6.93E-01
SO_2	0.6	1.13E-03	4.95E-03
PM Total	7.6	1.43E-02	6.27E-02
PM Condensable	5.7	1.07E-02	4.70E-02
PM_{10} (Filterable)	1.9	3.58E-03	1.57E-02
$PM_{2.5}$ (Filterable)	1.9	3.58E-03	1.57E-02
VOC	5.5	1.04E-02	4.54E-02
CO_2 [d] (Natural Gas Firing)	143,462	270.26	1183.76
CH_4 [d] (Natural Gas Firing)	2.7	5.09E-03	2.23E-02
N_2O [d] (Natural Gas Firing)	0.27	5.09E-04	2.23E-03

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
3-Methylchloranthrene	1.8E-06	3.39E-09	1.49E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	3.01E-08	1.32E-07
Acenaphthene	1.8E-06	3.39E-09	1.49E-08
Acenaphthylene	1.8E-06	3.39E-09	1.49E-08
Anthracene	2.4E-06	4.52E-09	1.98E-08
Benz(a)anthracene	1.8E-06	3.39E-09	1.49E-08
Benzene	2.1E-03	3.96E-06	1.73E-05
Benzo(a)pyrene	1.2E-06	2.26E-09	9.90E-09
Benzo(b)fluoranthene	1.8E-06	3.39E-09	1.49E-08
Benzo(g,h,i)perylene	1.2E-06	2.26E-09	9.90E-09
Benzo(k)fluoranthene	1.8E-06	3.39E-09	1.49E-08
Chrysene	1.8E-06	3.39E-09	1.49E-08
Dibenzo(a,h) anthracene	1.2E-06	2.26E-09	9.90E-09
Dichlorobenzene	1.2E-03	2.26E-06	9.90E-06
Fluoranthene	3.0E-06	5.65E-09	2.48E-08
Fluorene	2.8E-06	5.27E-09	2.31E-08
Formaldehyde	7.5E-02	1.41E-04	6.19E-04
Hexane	1.8E+00	3.39E-03	1.49E-02
Indo(1,2,3-cd)pyrene	1.8E-06	3.39E-09	1.49E-08
Phenanthrene	1.7E-05	3.20E-08	1.40E-07
Pyrene	5.0E-06	9.42E-09	4.13E-08
Toluene	3.4E-03	6.41E-06	2.81E-05
Arsenic	2.0E-04	3.77E-07	1.65E-06
Beryllium	1.2E-05	2.26E-08	9.90E-08
Cadmium	1.1E-03	2.07E-06	9.08E-06
Chromium	1.4E-03	2.64E-06	1.16E-05
Cobalt	8.4E-05	1.58E-07	6.93E-07
Lead	5.0E-04	9.42E-07	4.13E-06
Manganese	3.8E-04	7.16E-07	3.14E-06
Mercury	2.6E-04	4.90E-07	2.15E-06
Nickel	2.1E-03	3.96E-06	1.73E-05
Selenium	2.4E-05	4.52E-08	1.98E-07
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.4E-05	4.52E-08	1.98E-07
Naphthalene	6.1E-04	1.15E-06	5.03E-06
Total HAP		**3.56E-03**	**1.56E-02**

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.

[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[c] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

[d] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Fuel Gas Heater 1

Source Designation:	
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,226
Heat Input (MMBtu/hr)	1.15
Fuel Consumption (MMscf/hr):	9.38E-04
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	0.09	0.41
CO	84	0.08	0.35
SO_2	0.6	5.63E-04	2.46E-03
PM Total	7.6	0.01	0.03
PM Condensable	5.7	0.01	0.02
PM_{10} (Filterable)	1.9	1.78E-03	7.80E-03
$PM_{2.5}$ (Filterable)	1.9	1.78E-03	7.80E-03
VOC	5.5	0.01	0.02
CO_2 [d] (Natural Gas Firing)	143,462	134.55	589.32
CH_4 [d] (Natural Gas Firing)	2.7	2.54E-03	1.11E-02
N_2O [d] (Natural Gas Firing)	0.27	2.54E-04	1.11E-03

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
3-Methylchloranthrene	1.8E-06	1.69E-09	7.39E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.50E-08	6.57E-08
Acenaphthene	1.8E-06	1.69E-09	7.39E-09
Acenaphthylene	1.8E-06	1.69E-09	7.39E-09
Anthracene	2.4E-06	2.25E-09	9.86E-09
Benz(a)anthracene	1.8E-06	1.69E-09	7.39E-09
Benzene	2.1E-03	1.97E-06	8.63E-06
Benzo(a)pyrene	1.2E-06	1.13E-09	4.93E-09
Benzo(b)fluoranthene	1.8E-06	1.69E-09	7.39E-09
Benzo(g,h,i)perylene	1.2E-06	1.13E-09	4.93E-09
Benzo(k)fluoranthene	1.8E-06	1.69E-09	7.39E-09
Chrysene	1.8E-06	1.69E-09	7.39E-09
Dibenzo(a,h) anthracene	1.2E-06	1.13E-09	4.93E-09
Dichlorobenzene	1.2E-03	1.13E-06	4.93E-06
Fluoranthene	3.0E-06	2.81E-09	1.23E-08
Fluorene	2.8E-06	2.63E-09	1.15E-08
Formaldehyde	7.5E-02	7.03E-05	3.08E-04
Hexane	1.8E+00	1.69E-03	7.39E-03
Indo(1,2,3-cd)pyrene	1.8E-06	1.69E-09	7.39E-09
Phenanthrene	1.7E-05	1.59E-08	6.98E-08
Pyrene	5.0E-06	4.69E-09	2.05E-08
Toluene	3.4E-03	3.19E-06	1.40E-05
Arsenic	2.0E-04	1.88E-07	8.22E-07
Beryllium	1.2E-05	1.13E-08	4.93E-08
Cadmium	1.1E-03	1.03E-06	4.52E-06
Chromium	1.4E-03	1.31E-06	5.75E-06
Cobalt	8.4E-05	7.88E-08	3.45E-07
Lead	5.0E-04	4.69E-07	2.05E-06
Manganese	3.8E-04	3.56E-07	1.56E-06
Mercury	2.6E-04	2.44E-07	1.07E-06
Nickel	2.1E-03	1.97E-06	8.63E-06
Selenium	2.4E-05	2.25E-08	9.86E-08
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.4E-05	2.25E-08	9.86E-08
Naphthalene	6.1E-04	5.72E-07	2.51E-06
Total HAP		**1.77E-03**	**7.76E-03**

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.

[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[c] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

[d] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Fuel Gas Heater 2

Source Designation:	
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,226
Heat Input (MMBtu/hr)	0.77
Fuel Consumption (MMscf/hr):	6.28E-04
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	0.06	0.28
CO	84	0.05	0.23
SO_2	0.6	3.77E-04	1.65E-03
PM Total	7.6	4.77E-03	2.09E-02
PM Condensable	5.7	3.58E-03	1.57E-02
PM_{10} (Filterable)	1.9	1.19E-03	5.23E-03
$PM_{2.5}$ (Filterable)	1.9	1.19E-03	5.23E-03
VOC	5.5	3.45E-03	1.51E-02
CO_2 [d] (Natural Gas Firing)	143,462	90.09	394.59
CH_4 [d] (Natural Gas Firing)	2.7	1.70E-03	7.44E-03
N_2O [d] (Natural Gas Firing)	0.27	1.70E-04	7.44E-04

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
3-Methylchloranthrene	1.8E-06	1.13E-09	4.95E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.00E-08	4.40E-08
Acenaphthene	1.8E-06	1.13E-09	4.95E-09
Acenaphthylene	1.8E-06	1.13E-09	4.95E-09
Anthracene	2.4E-06	1.51E-09	6.60E-09
Benz(a)anthracene	1.8E-06	1.13E-09	4.95E-09
Benzene	2.1E-03	1.32E-06	5.78E-06
Benzo(a)pyrene	1.2E-06	7.54E-10	3.30E-09
Benzo(b)fluoranthene	1.8E-06	1.13E-09	4.95E-09
Benzo(g,h,i)perylene	1.2E-06	7.54E-10	3.30E-09
Benzo(k)fluoranthene	1.8E-06	1.13E-09	4.95E-09
Chrysene	1.8E-06	1.13E-09	4.95E-09
Dibenzo(a,h) anthracene	1.2E-06	7.54E-10	3.30E-09
Dichlorobenzene	1.2E-03	7.54E-07	3.30E-06
Fluoranthene	3.0E-06	1.88E-09	8.25E-09
Fluorene	2.8E-06	1.76E-09	7.70E-09
Formaldehyde	7.5E-02	4.71E-05	2.06E-04
Hexane	1.8E+00	1.13E-03	4.95E-03
Indo(1,2,3-cd)pyrene	1.8E-06	1.13E-09	4.95E-09
Phenanthrene	1.7E-05	1.07E-08	4.68E-08
Pyrene	5.0E-06	3.14E-09	1.38E-08
Toluene	3.4E-03	2.14E-06	9.35E-06
Arsenic	2.0E-04	1.26E-07	5.50E-07
Beryllium	1.2E-05	7.54E-09	3.30E-08
Cadmium	1.1E-03	6.91E-07	3.03E-06
Chromium	1.4E-03	8.79E-07	3.85E-06
Cobalt	8.4E-05	5.27E-08	2.31E-07
Lead	5.0E-04	3.14E-07	1.38E-06
Manganese	3.8E-04	2.39E-07	1.05E-06
Mercury	2.6E-04	1.63E-07	7.15E-07
Nickel	2.1E-03	1.32E-06	5.78E-06
Selenium	2.4E-05	1.51E-08	6.60E-08
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.4E-05	1.51E-08	6.60E-08
Naphthalene	6.1E-04	3.83E-07	1.68E-06
Total HAP		**1.19E-03**	**5.19E-03**

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.

[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[c] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

[d] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Storage Tank Emissions

Tank Description	Tank Contents	Tank ID Number	Number of Tanks	Tank Capacity (gal)	Tank Diameter (ft)	Tank Length (ft)	Turnovers Per Year	Annual Throughput (gal)	VOC Emissions Per Tank (lb/yr)	Total VOC Emissions (tpy)	HAP Emissions Per Tank (lb/yr)	Total HAP Emissions (tpy)
Produced Fluids Tank	Produced Water	T-001	1	8,820	10	15.0	12	105,000	418.73	0.209	10.074	0.01
Produced Fluids Tank	Produced Water	T-002	1	8,820	10	15.0	12	105,000	418.73	0.209	10.074	0.01
Engine Lube Oil Tank	Engine Lube Oil	T-003	1	2,000	5.33	12.0	2	4,200	0.65	0.000	<0.01	<0.01
Compressor Lube Oil Tank	Compressor Oil	T-004	1	2,000	5.33	12.0	4	7,266	0.70	3.50E-04	<0.01	<0.01
New MEG Tank	New MEG	T-005	1	2,000	5.33	12.0	1	1,050	0.04	2.00E-05	<0.01	<0.01
Used MEG Tank	Used MEG	T-006	1	2,000	5.33	12.0	1	1,050	0.04	2.00E-05	<0.01	<0.01
Used Oil Tank	Used Oil	T-007	1	4,200	5.33	25.1	1	4,200	1.27	6.35E-04	<0.01	<0.01
Ice-chek Tank	Ice-chek	T-008	1	3,998	5.33	23.9	5	21,000	0.11	5.50E-05	<0.01	<0.01
Engine Lube Oil Tank	Engine Oil	T-009	1	302	3.2	5.1	3	1,050	0.11	5.50E-05	<0.01	<0.01
Engine Lube Oil Tank	Engine Oil	T-010	1	302	3.2	5.1	3	1,050	0.11	5.50E-05	<0.01	<0.01
Engine Lube Oil Tank	Engine Oil	T-011	1	302	3.2	5.1	3	1,050	0.11	5.50E-05	<0.01	<0.01
Engine Lube Oil Tank	Engine Oil	T-012	1	302	3.2	5.1	3	1,050	0.11	5.50E-05	<0.01	<0.01
Compressor Lube Oil Tank	Compressor Oil	T-013	1	302	3.2	5.1	6	1,806	0.11	5.50E-05	<0.01	<0.01
Compressor Lube Oil Tank	Compressor Oil	T-014	1	302	3.2	5.1	6	1,806	0.11	5.50E-05	<0.01	<0.01
Compressor Lube Oil Tank	Compressor Oil	T-015	1	302	3.2	5.1	6	1,806	0.11	5.50E-05	<0.01	<0.01
Compressor Lube Oil Tank	Compressor Oil	T-016	1	302	3.2	5.1	6	1,806	0.11	5.50E-05	<0.01	<0.01
Ice-chek Tank	Ice-chek	T-017	1	550	4.2	5.4	6	3,486	0.02	1.00E-05	<0.01	<0.01
Ice-chek Tank	Ice-chek	T-018	1	550	4.2	5.4	6	3,486	0.02	1.00E-05	<0.01	<0.01
Ice-chek Tank	Ice-chek	T-019	1	550	4.2	5.4	6	3,486	0.20	1.0E-04	<0.01	<0.01
Ice-chek Tank	Ice-chek	T-020	1	550	4.2	5.4	6	3,486	0.06	3.0E-05	<0.01	<0.01
Ice-chek Tank	Ice-chek	T-021	1	550	4.2	5.4	6	3,486	0.06	3.0E-05	<0.01	<0.01
Ice-chek Tank	Ice-chek	T-022	1	550	4.2	5.4	6	3,486	0.06	3.0E-05	<0.01	<0.01
New TEG Tank	New TEG	T-023	1	2,000	5.3	12.0	2	4,200	0.05	2.5E-05	<0.01	<0.01
Used TEG Tank	Used TEG	T-024	1	2,000	5.3	12.0	2	4,200	0.05	2.5E-05	<0.01	<0.01
Total Potential Emissions (excluding pipeline fluids tanks)									**4.21**	**0.00**	**0.000**	**0.00**

1. Ice-Chek contains ethylene glycol

Produced Fluids Tank (210 bbl) - T001 & T002

Operational Hours	8,760 hrs/yr
Control Efficiency	95%
Annual Fluid Throughput (per tank)	105,000 gal/yr

Description	Potential Throughput [1] (gal/yr)
Produced Water	105,000

[1] Based on engineering estimate of produced water for the station. Produced water comprises of 90% water and 10% condensate

Storage Tank (210 bbl, each) - Emissions (Each Tank)

Constituent	Uncontrolled Total Emissions [1] lb/hr	Uncontrolled Total Emissions [1] tpy	Controlled Total Emissions [1] lb/hr	Controlled Total Emissions [1] tpy
Carbon Dioxide	0.002	0.007	0.002	0.007
Methane	0.158	0.692	0.008	0.035
Ethane	0.149	0.651	0.007	0.033
Propane	0.273	1.194	0.014	0.060
Isobutane	0.192	0.841	0.010	0.042
n-Butane	0.181	0.791	0.009	0.040
Isopentane	0.149	0.653	0.007	0.033
n-Pentane	0.063	0.276	0.003	0.014
n-Hexane	0.019	0.085	0.001	0.004
Other Hexanes	0.047	0.204	0.002	0.010
Heptanes	0.022	0.095	0.001	0.005
Benzene	0.001	0.005	0.000	0.000
Toluene	0.001	0.005	0.000	0.000
Ethylbenzene	<0.001	<0.001	<0.001	<0.001
Xylenes	0.000	0.002	0.000	0.000
2,2,4-Trimethylpentane	<0.001	<0.001	<0.001	<0.001
C8+ Heavies	0.008	0.036	0.000	0.002
Total Emissions:	1.262	5.529	0.063	0.276
Total VOC Emissions:	0.956	4.186	0.048	0.209
Total HAP Emissions:	0.023	0.100	0.001	0.005

[1] E&P TANK v2.0 calculates working, breathing and flashing losses and reports the sum as one total. The proposed control system includes an enclosed flare which will achieve 95% control of HAP and VOC.

Tank Enclosed Flare

Enclosed Ground Flare Calculations:

Combustor Rating	41.0	MMbtu/hr
Hours Of Operation	8760	hrs
Pilot Rating	0.12	MMbtu/hr
Higher Heating Value (HHV)	1,226	btu/scf

Pollutant	Emission Factors [a] (lb/MMBtu)	Combustor Potential Emissions (lb/hr)	Combustor Potential Emissions (tpy)	Pilot Potential Emissions (lb/hr)	Pilot Potential Emissions (tpy)
NO_x	0.082	3.34	14.65	0.01	0.04
CO	0.069	2.81	12.30	0.01	0.04
PM/PM_{10}	0.006	0.25	1.11	7.60E-04	3.33E-03
SO_2	0.000	0.02	0.09	6.00E-05	2.63E-04
CO_2 [b] (Natural Gas Firing)	116.997	4796.89	21010.38	14.35	62.84
CH_4 [b] (Natural Gas Firing)	0.002	0.09	0.40	2.70E-04	1.18E-03
N_2O [b] (Natural Gas Firing)	0.000	0.01	0.04	2.70E-05	1.18E-04

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.

[b] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Haul Roads

Estimated Potential Road Fugitive Emissions

Unpaved Road Emissions

Unpaved Roads: $E\ (lb/VMT) = k(s/12)^a(W/3)^b)*[(365-p)/365]$

	PM	PM_{10}	$PM_{2.5}$	
k Factor (lb/VMT)	4.9	1.5	0.15	AP-42 Table 13.2.2-2 (Final, 11/06)
Silt content, s	4.8 %			AP-42 Table 13.2.2-1 (11/06), for Sand and Gravel Processing
Number of Rain Days, p	150			AP-42 Figure 13.2.1-2
a	0.7	0.9	0.9	AP-42 Table 13.2.2-2 (Final, 11/06)
b	0.45	0.45	0.45	AP-42 Table 13.2.2-2 (Final, 11/06)

Description	Weight of Empty Truck (tons)	Weight of Truck w/ Max Load (tons)	Mean Vehicle Weight (tons)	Length of Unpaved Road Traveled (mile/trip)	Trips Per Year	Mileage Per Year	Control (%)	Emissions (tpy) PM	PM_{10}	$PM_{2.5}$
Liquids Hauling	20	40	30	0.75	53	39	0	0.08	0.02	0.002
Employee Vehicles	3	3	3	0.75	200	150	0	0.11	0.03	0.003
Total Potential Emissions								**0.20**	**0.05**	**0.01**

Fugitive Emissions

Fugitive Component Information:

Component Type	Estimated Component Count	Gas Leak Emission Factor (lb/hr/component)	Gas Leak Emission Factor Source	Average Gas Leak Rate (lb/hr)	Max Gas Leak Rate (tpy)	Potential VOC Emissions (tpy)	Potential HAP Emissions (tpy)
Connectors	650	0.0004	EPA Protocol, Table 2-4	0.29	1.51	0.23	0.01
Flanges	250	0.001	EPA Protocol, Table 2-4	0.21	1.13	0.17	0.01
Open-Ended Lines	12	0.004	EPA Protocol, Table 2-4	0.05	0.28	0.04	0.00
Valves	700	0.010	EPA Protocol, Table 2-4	6.94	36.50	5.65	0.31
Total				**7.50**	**39.41**	**6.10**	**0.33**

Notes:

1. The component type "Other" includes any equipment type other than connectors, flanges, open-ended lines, pumps and valves that have fugitive emissions.
2. The component count is a preliminary estimate based on the proposed design of the station
3. *Table 2-4 :Oil & Gas Production Operations Average Emission Factors* , Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995.
4. Assumes maximum leak rate 20% greater than measured average leak rate.

GHG Fugitive Emissions from Component Leaks:

Component Type	Estimated Component Count	GHG Emission Factor (scf/hr/component)	GHG Emission Factor Source	CH_4 Emissions (tpy)	CO_2 Emissions (tpy)	CO_2e Emissions (tpy)
Connectors	650	0.003	40 CFR 98, Table W-1A	0.29	1.9E-03	7.29
Flanges	250	0.003	40 CFR 98, Table W-1A	0.11	7.2E-04	2.80
Open-Ended Lines	12	0.061	40 CFR 98, Table W-1A	0.11	7.1E-04	2.74
Valves	700	0.027	40 CFR 98, Table W-1A	2.83	1.8E-02	70.66
Total				**3.34**	**0.02**	**83.49**

Notes:

1. The component count is a preliminary estimate based on the proposed design of the station
2. *Table W-1 of Subpart W - Default Whole Gas Emission Factors for Onshore Production* , 40 CFR 98, Subpart W.
3. Calculated in accordance with Equations W-32a, W-35, and W-36 in Subpart W of 40 CFR 98.
4. GHG (CO2e) is carbon dioxide equivalent, which is the summation of CO2 (GWP = 1) + CH4 (GWP = 25) + N2O (GWP = 298).

VOC/GHG Fugitive Emissions from Blowdowns:

Blowdown Type	Number of Events	Gas Volume (scf/event)	VOC Emissions (tpy)	HAP Emissions (tpy)	CH_4 Emissions (tpy)	CO_2 Emissions (tpy)	CO_2e Emissions (tpy)
Station ESD	1	358,000	1.20	0.04	6.11	0.04	152.79
Pigging Operations	3	100,000	1.01	0.03	5.12	0.03	128.04
Filter Maintenance	2	22,800	0.15	<0.01	0.78	0.01	19.46
Compressor	24	44,000	3.55	0.11	18.02	0.12	450.70
Total			**5.91**	**0.18**	**30.03**	**0.19**	**750.99**

Notes:

1. CH_4 and CO_2 emissions are based on fractions of these pollutants in the site-specific gas analysis.
2. Emissions are calculated in accordance with Equations W-35 and W-36 in Subpart W of 40 CFR 98.
3. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).

Fugitive Component Emissions Data:

Pollutant	Atmospheric Emissions lbs/hr	Atmospheric Emissions tpy	Emissions Estimation Method
VOC	2.74	12.01	EPA Protocol, Table 2-4 and Site-Specific Gas Analysis
HAPs	0.12	0.51	EPA Protocol, Table 2-4 and Site-Specific Gas Analysis
GHG (CO_2e)	191	834	40 CFR 98, Table W-1A and Site-Specific Gas Analysis

Liquid Loading

Liquid Loading Emissions

Loading Losses: L_L (lb/10^3 gal) = 12.46 (SPM)/T

S	1.45	saturation factor for splash loading (AP-42 Table 5.2-1)
P	0.21	true vapor pressure of liquid loaded (Psia) - assume octane
M	116.02	molecular weight of vapors (lb/lb-mol) - E&P Tank Data
T	530.0	temperature of liquids loaded (deg R)

Description	Loading Losses (lb/10^3 gal)	Maximum Throughput (gal)	VOC Emissions (tpy)
Produced Water	0.8	210,000	0.09

1. No HAPs present in the liquid stream

Gas Analysis

Higher Heating Value 1,226 btu/scf

Constituent	Concentration (Vol %)	Molecular Weight	Molar Weight	Average Weight Fraction	Stream Speciation (Wt. %)
Carbon Dioxide	0.190%	44.01	0.08	0.00	0.42
Nitrogen	0.466%	28.014	0.13	0.01	0.65
Methane	80.644%	16.04	12.94	0.64	64.22
Ethane	12.891%	30.07	3.88	0.19	19.25
Propane	3.575%	44.10	1.58	0.08	7.83
Isobutane	0.455%	58.12	0.26	0.01	1.31
n-Butane	0.834%	58.12	0.48	0.02	2.41
Isopentane	0.230%	72.15	0.17	0.01	0.82
n-Pentane	0.214%	72.15	0.15	0.01	0.77
n-Hexane*	0.088%	86.18	0.08	0.00	0.38
Cyclohexane	0.016%	84.16	0.01	0.00	0.07
Other Hexanes	0.128%	86.18	0.11	0.01	0.55
Heptanes	0.112%	100.20	0.11	0.01	0.56
2,2,4-Trimethylpentane*	0.069%	114.23	0.08	0.00	0.39
Benzene*	0.004%	78.11	0.00	0.00	0.02
Toluene*	0.007%	92.14	0.01	0.00	0.03
Ethylbenzene*	0.001%	106.17	0.00	0.00	0.01
Xylenes*	0.005%	106.16	0.01	0.00	0.03
C8+ Heavies	0.055%	114.23	0.06	0.00	0.31
Totals	99.98%		20.14	1.00	100.00

*HAPs

TOC (Total)	99.33%		98.94
VOC (Total)	5.79%		15.47
HAP (Total)	0.17%		0.85

CERTIFICATE OF ANALYSIS

Number : 2012100194-001A

LAFAYETTE AREA LABORATORY
4790 N.E. EVANGELINE THRUWAY
CARENCRO, LA 70520
PHONE (337) 896-3055
FAX (337) 896-3077

Gas Analytical Services
Chuck Honaker
PO Box 1028

Bridgeport, WV 26330

Field:	EQT Midstream	**Report Date:**	10/23/12
Station:	Main Suction after Recycle	**Sample Of:**	Gas
Station No.:		**Sample Date:**	10/10/2012
Sample Point:		**Sample Conditions:**	236 psi ,N.G.° F
Cylinder # :	GAS	**PO / Ref. No.:**	

Comments:

ANALYTICAL DATA

Components	Mol %	Wt%	GPM at 14.730 psia	Method	Lab Tech.	Date Analyzed
				GPA-2286	CC	10/23/12
Nitrogen	0.466	0.649	0.051	(MC10)		
Methane	80.644	64.134	13.668			
Carbon Dioxide	0.190	0.416	0.032			
Ethane	12.891	19.215	3.447			
Propane	3.575	7.813	0.985			
iso Butane	0.455	1.309	0.149			
n-Butane	0.834	2.404	0.263			
iso Pentane	0.230	0.823	0.084			
n-Pentane	0.214	0.763	0.078			
i-Hexanes	0.128	0.543	0.052			
n-Hexane	0.088	0.373	0.036			
Benzene	0.004	0.014	0.001			
Cyclohexane	0.016	0.068	0.006			
I-Heptanes	0.072	0.358	0.032			
n-Heptane	0.040	0.200	0.018			
Toluene	0.007	0.031	0.002			
i-Octanes	0.069	0.360	0.031			
n-Octane	0.016	0.089	0.008			
*e-Benzene	0.001	0.003	NIL			
*m,o,&p-Xylene	0.005	0.026	0.002			
i-Nonanes	0.017	0.102	0.008			
n-Nonane	0.005	0.032	0.003			
i-Decanes	0.004	0.039	0.003			
n-Decane Plus	0.002	0.015	0.001			
i-Undecanes	0.027	0.221	0.019			
Totals	100.000	100.000	18.980			

Calculated Values	TOTAL	C10+
Molecular Weight	20.172	159.200
Real Dry BTU @ 14.73 psia, 60 °F	1226.2	8681.3
Real Wet BTU @ 14.73 psia, 60 °F	1205.7	8531.1
Relative Density	0.6982	5.5140
	TOTAL	
GPM's at 14.73 psia, 60 °F	18.980	
Compressibility Factor	0.9967	

Brian Haspad
Data Reviewer

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: EQT - Janus Compressor Station Dehys 1 & 2
File Name: Z:\Client\EQT Corporation\West Virginia\Janus\153901.0106 R13 Application\04 Draft\2015-0708 Janus R13 Application\Attach N - Emission Calculations\GRI-GLYCalc\2015-0710_EQT_Janus_R13_Dehys1&2.ddf
Date: July 10, 2015

DESCRIPTION:

Description: Potential-to-emit for R13 application

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0234	0.563	0.1027
Ethane	0.0623	1.495	0.2728
Propane	0.0620	1.488	0.2716
Isobutane	0.0178	0.427	0.0779
n-Butane	0.0511	1.227	0.2239
Isopentane	0.0168	0.403	0.0735
n-Pentane	0.0232	0.558	0.1018
n-Hexane	0.0222	0.534	0.0974
Cyclohexane	0.0288	0.692	0.1263
Other Hexanes	0.0221	0.530	0.0967
Heptanes	0.0689	1.655	0.3020
2,2,4-Trimethylpentane	0.0145	0.349	0.0637
Benzene	0.0799	1.918	0.3501
Toluene	0.2164	5.193	0.9477
Ethylbenzene	0.0387	0.929	0.1695
Xylenes	0.2660	6.385	1.1653
C8+ Heavies	0.0664	1.594	0.2909
Total Emissions	1.0808	25.938	4.7337
Total Hydrocarbon Emissions	1.0808	25.938	4.7337
Total VOC Emissions	0.9951	23.881	4.3583
Total HAP Emissions	0.6378	15.308	2.7937
Total BTEX Emissions	0.6010	14.425	2.6325

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.1719	28.126	5.1329
Ethane	3.1137	74.728	13.6379
Propane	3.1008	74.420	13.5817
Isobutane	0.8896	21.349	3.8962
n-Butane	2.5556	61.333	11.1933
Isopentane	0.8392	20.142	3.6758
n-Pentane	1.1622	27.892	5.0904
n-Hexane	1.1123	26.696	4.8719
Cyclohexane	1.4420	34.608	6.3160
Other Hexanes	1.1042	26.502	4.8365

Heptanes	3.4473	82.736	15.0993
2,2,4-Trimethylpentane	0.7273	17.456	3.1856
Benzene	3.9966	95.919	17.5052
Toluene	10.8182	259.637	47.3838
Ethylbenzene	1.9347	46.433	8.4740
Xylenes	13.3021	319.249	58.2630
C8+ Heavies	3.3204	79.688	14.5431
Total Emissions	54.0381	1296.914	236.6868
Total Hydrocarbon Emissions	54.0381	1296.914	236.6868
Total VOC Emissions	49.7525	1194.060	217.9160
Total HAP Emissions	31.8912	765.389	139.6835
Total BTEX Emissions	30.0516	721.238	131.6259

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.6821	16.371	2.9877
Ethane	0.5151	12.362	2.2560
Propane	0.2467	5.921	1.0805
Isobutane	0.0471	1.131	0.2064
n-Butane	0.1040	2.496	0.4556
Isopentane	0.0299	0.718	0.1310
n-Pentane	0.0334	0.800	0.1461
n-Hexane	0.0177	0.426	0.0777
Cyclohexane	0.0057	0.136	0.0248
Other Hexanes	0.0232	0.556	0.1014
Heptanes	0.0268	0.644	0.1176
2,2,4-Trimethylpentane	0.0112	0.268	0.0489
Benzene	0.0023	0.056	0.0103
Toluene	0.0041	0.098	0.0179
Ethylbenzene	0.0004	0.010	0.0019
Xylenes	0.0020	0.049	0.0090
C8+ Heavies	0.0025	0.060	0.0110
Total Emissions	1.7543	42.103	7.6838
Total Hydrocarbon Emissions	1.7543	42.103	7.6838
Total VOC Emissions	0.5571	13.370	2.4400
Total HAP Emissions	0.0378	0.907	0.1656
Total BTEX Emissions	0.0089	0.214	0.0390

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	34.1066	818.557	149.3867
Ethane	25.7535	618.084	112.8003
Propane	12.3347	296.032	54.0258
Isobutane	2.3560	56.543	10.3191
n-Butane	5.2007	124.816	22.7790
Isopentane	1.4959	35.902	6.5521
n-Pentane	1.6675	40.021	7.3038
n-Hexane	0.8869	21.285	3.8844
Cyclohexane	0.2829	6.790	1.2392
Other Hexanes	1.1579	27.790	5.0717
Heptanes	1.3424	32.219	5.8799

2,2,4-Trimethylpentane	0.5581	13.394	2.4444
Benzene	0.1173	2.815	0.5138
Toluene	0.2048	4.915	0.8970
Ethylbenzene	0.0212	0.508	0.0928
Xylenes	0.1022	2.453	0.4476
C8+ Heavies	0.1259	3.022	0.5516
Total Emissions	87.7144	2105.146	384.1891
Total Hydrocarbon Emissions	87.7144	2105.146	384.1891
Total VOC Emissions	27.8544	668.504	122.0021
Total HAP Emissions	1.8904	45.370	8.2800
Total BTEX Emissions	0.4455	10.691	1.9511

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature: 70.00 deg. F
Excess Oxygen: 10.00 %
Combustion Efficiency: 98.00 %
Supplemental Fuel Requirement: 2.66e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
n-Hexane	2.00%	98.00%
Cyclohexane	2.00%	98.00%
Other Hexanes	2.00%	98.00%
Heptanes	2.00%	98.00%
2,2,4-Trimethylpentane	2.00%	98.00%
Benzene	2.00%	98.00%
Toluene	2.00%	98.00%
Ethylbenzene	2.00%	98.00%
Xylenes	2.00%	98.00%
C8+ Heavies	2.00%	98.00%

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages: 1.25
Calculated Dry Gas Dew Point: 1.00 lbs. H2O/MMSCF

Temperature: 75.0 deg. F
Pressure: 1200.0 psig
Dry Gas Flow Rate: 125.0000 MMSCF/day

Glycol Losses with Dry Gas: 2.2907 lb/hr
Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 24.78 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio: 9.10 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	4.04%	95.96%
Carbon Dioxide	99.71%	0.29%
Nitrogen	99.97%	0.03%
Methane	99.98%	0.02%
Ethane	99.95%	0.05%
Propane	99.93%	0.07%
Isobutane	99.91%	0.09%
n-Butane	99.88%	0.12%
Isopentane	99.90%	0.10%
n-Pentane	99.87%	0.13%
n-Hexane	99.81%	0.19%
Cyclohexane	99.07%	0.93%
Other Hexanes	99.85%	0.15%
Heptanes	99.69%	0.31%
2,2,4-Trimethylpentane	99.88%	0.12%
Benzene	90.41%	9.59%
Toluene	87.55%	12.45%
Ethylbenzene	86.58%	13.42%
Xylenes	81.61%	18.39%
C8+ Heavies	99.73%	0.27%

FLASH TANK

Flash Control: Combustion device
Flash Control Efficiency: 98.00 %
Flash Temperature: 135.0 deg. F
Flash Pressure: 35.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.93%	0.07%
Carbon Dioxide	27.75%	72.25%
Nitrogen	3.25%	96.75%
Methane	3.32%	96.68%
Ethane	10.79%	89.21%
Propane	20.09%	79.91%
Isobutane	27.41%	72.59%
n-Butane	32.95%	67.05%
Isopentane	36.26%	63.74%
n-Pentane	41.37%	58.63%
n-Hexane	55.86%	44.14%
Cyclohexane	84.12%	15.88%
Other Hexanes	49.33%	50.67%
Heptanes	72.11%	27.89%
2,2,4-Trimethylpentane	57.23%	42.77%
Benzene	97.29%	2.71%
Toluene	98.29%	1.71%
Ethylbenzene	99.03%	0.97%
Xylenes	99.34%	0.66%
C8+ Heavies	96.78%	3.22%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	56.19%	43.81%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	1.38%	98.62%
n-Pentane	1.21%	98.79%
n-Hexane	0.89%	99.11%
Cyclohexane	3.80%	96.20%
Other Hexanes	2.03%	97.97%
Heptanes	0.69%	99.31%
2,2,4-Trimethylpentane	2.62%	97.38%
Benzene	5.14%	94.86%
Toluene	8.04%	91.96%
Ethylbenzene	10.51%	89.49%
Xylenes	13.01%	86.99%
C8+ Heavies	12.41%	87.59%

STREAM REPORTS:

WET GAS STREAM

Temperature: 75.00 deg. F
Pressure: 1214.70 psia
Flow Rate: 5.21e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.22e-002	1.29e+002
Carbon Dioxide	1.90e-001	1.15e+003
Nitrogen	4.66e-001	1.79e+003
Methane	8.06e+001	1.78e+005
Ethane	1.29e+001	5.32e+004
Propane	3.57e+000	2.17e+004
Isobutane	4.55e-001	3.63e+003
n-Butane	8.34e-001	6.66e+003
Isopentane	2.30e-001	2.28e+003
n-Pentane	2.14e-001	2.12e+003
n-Hexane	8.80e-002	1.04e+003
Cyclohexane	1.60e-002	1.85e+002
Other Hexanes	1.28e-001	1.51e+003
Heptanes	1.12e-001	1.54e+003
2,2,4-Trimethylpentane	6.90e-002	1.08e+003
Benzene	4.00e-003	4.29e+001
Toluene	7.00e-003	8.86e+001

Ethylbenzene	1.00e-003	1.46e+001
Xylenes	5.00e-003	7.29e+001
C8+ Heavies	5.50e-002	1.29e+003
Total Components	100.00	2.77e+005

DRY GAS STREAM

Temperature: 75.00 deg. F
Pressure: 1214.70 psia
Flow Rate: 5.21e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.11e-003	5.22e+000
Carbon Dioxide	1.90e-001	1.15e+003
Nitrogen	4.66e-001	1.79e+003
Methane	8.07e+001	1.78e+005
Ethane	1.29e+001	5.32e+004
Propane	3.57e+000	2.16e+004
Isobutane	4.55e-001	3.63e+003
n-Butane	8.33e-001	6.65e+003
Isopentane	2.30e-001	2.28e+003
n-Pentane	2.14e-001	2.12e+003
n-Hexane	8.79e-002	1.04e+003
Cyclohexane	1.59e-002	1.83e+002
Other Hexanes	1.28e-001	1.51e+003
Heptanes	1.12e-001	1.54e+003
2,2,4-Trimethylpentane	6.89e-002	1.08e+003
Benzene	3.62e-003	3.88e+001
Toluene	6.13e-003	7.76e+001
Ethylbenzene	8.66e-004	1.26e+001
Xylenes	4.08e-003	5.95e+001
C8+ Heavies	5.49e-002	1.28e+003
Total Components	100.00	2.77e+005

LEAN GLYCOL STREAM

Temperature: 75.00 deg. F
Flow Rate: 1.88e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	1.04e+004
Water	1.50e+000	1.59e+002
Carbon Dioxide	3.10e-012	3.28e-010
Nitrogen	4.27e-013	4.51e-011
Methane	1.12e-017	1.19e-015
Ethane	1.29e-007	1.36e-005
Propane	5.94e-009	6.28e-007
Isobutane	9.20e-010	9.74e-008
n-Butane	1.82e-009	1.92e-007
Isopentane	1.11e-004	1.17e-002
n-Pentane	1.34e-004	1.42e-002
n-Hexane	9.50e-005	1.00e-002
Cyclohexane	5.39e-004	5.70e-002
Other Hexanes	2.16e-004	2.28e-002
Heptanes	2.28e-004	2.41e-002

2,2,4-Trimethylpentane	1.85e-004	1.96e-002
Benzene	2.05e-003	2.17e-001
Toluene	8.94e-003	9.46e-001
Ethylbenzene	2.15e-003	2.27e-001
Xylenes	1.88e-002	1.99e+000
C8+ Heavies	4.45e-003	4.70e-001
Total Components	100.00	1.06e+004

RICH GLYCOL STREAM

Temperature: 75.00 deg. F
Pressure: 1214.70 psia
Flow Rate: 1.94e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.60e+001	1.04e+004
Water	2.61e+000	2.83e+002
Carbon Dioxide	3.02e-002	3.28e+000
Nitrogen	4.17e-003	4.52e-001
Methane	3.25e-001	3.53e+001
Ethane	2.66e-001	2.89e+001
Propane	1.42e-001	1.54e+001
Isobutane	2.99e-002	3.25e+000
n-Butane	7.15e-002	7.76e+000
Isopentane	2.16e-002	2.35e+000
n-Pentane	2.62e-002	2.84e+000
n-Hexane	1.85e-002	2.01e+000
Cyclohexane	1.64e-002	1.78e+000
Other Hexanes	2.11e-002	2.28e+000
Heptanes	4.44e-002	4.81e+000
2,2,4-Trimethylpentane	1.20e-002	1.30e+000
Benzene	3.99e-002	4.33e+000
Toluene	1.10e-001	1.20e+001
Ethylbenzene	2.01e-002	2.18e+000
Xylenes	1.42e-001	1.54e+001
C8+ Heavies	3.61e-002	3.92e+000
Total Components	100.00	1.08e+004

FLASH TANK OFF GAS STREAM

Temperature: 135.00 deg. F
Pressure: 49.70 psia
Flow Rate: 1.35e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.23e-001	2.07e-001
Carbon Dioxide	1.51e+000	2.37e+000
Nitrogen	4.37e-001	4.37e-001
Methane	5.96e+001	3.41e+001
Ethane	2.40e+001	2.58e+001
Propane	7.84e+000	1.23e+001
Isobutane	1.14e+000	2.36e+000

n-Butane	2.51e+000	5.20e+000
Isopentane	5.81e-001	1.50e+000
n-Pentane	6.48e-001	1.67e+000
n-Hexane	2.88e-001	8.87e-001
Cyclohexane	9.42e-002	2.83e-001
Other Hexanes	3.77e-001	1.16e+000
Heptanes	3.75e-001	1.34e+000
2,2,4-Trimethylpentane	1.37e-001	5.58e-001
Benzene	4.21e-002	1.17e-001
Toluene	6.23e-002	2.05e-001
Ethylbenzene	5.59e-003	2.12e-002
Xylenes	2.70e-002	1.02e-001
C8+ Heavies	2.07e-002	1.26e-001
Total Components	100.00	9.07e+001

FLASH TANK GLYCOL STREAM

Temperature: 135.00 deg. F
Flow Rate: 1.92e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.68e+001	1.04e+004
Water	2.63e+000	2.82e+002
Carbon Dioxide	8.46e-003	9.10e-001
Nitrogen	1.36e-004	1.47e-002
Methane	1.09e-002	1.17e+000
Ethane	2.89e-002	3.11e+000
Propane	2.88e-002	3.10e+000
Isobutane	8.27e-003	8.90e-001
n-Butane	2.38e-002	2.56e+000
Isopentane	7.91e-003	8.51e-001
n-Pentane	1.09e-002	1.18e+000
n-Hexane	1.04e-002	1.12e+000
Cyclohexane	1.39e-002	1.50e+000
Other Hexanes	1.05e-002	1.13e+000
Heptanes	3.23e-002	3.47e+000
2,2,4-Trimethylpentane	6.94e-003	7.47e-001
Benzene	3.92e-002	4.21e+000
Toluene	1.09e-001	1.18e+001
Ethylbenzene	2.01e-002	2.16e+000
Xylenes	1.42e-001	1.53e+001
C8+ Heavies	3.52e-002	3.79e+000
Total Components	100.00	1.08e+004

FLASH GAS EMISSIONS

Flow Rate: 5.63e+003 scfh
Control Method: Combustion Device
Control Efficiency: 98.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.10e+001	1.63e+002
Carbon Dioxide	3.84e+001	2.51e+002
Nitrogen	1.05e-001	4.37e-001

Methane	2.87e-001	6.82e-001
Ethane	1.16e-001	5.15e-001
Propane	3.77e-002	2.47e-001
Isobutane	5.47e-003	4.71e-002
n-Butane	1.21e-002	1.04e-001
Isopentane	2.80e-003	2.99e-002
n-Pentane	3.12e-003	3.34e-002
n-Hexane	1.39e-003	1.77e-002
Cyclohexane	4.53e-004	5.66e-003
Other Hexanes	1.81e-003	2.32e-002
Heptanes	1.81e-003	2.68e-002
2,2,4-Trimethylpentane	6.59e-004	1.12e-002
Benzene	2.03e-004	2.35e-003
Toluene	3.00e-004	4.10e-003
Ethylbenzene	2.69e-005	4.24e-004
Xylenes	1.30e-004	2.04e-003
C8+ Heavies	9.97e-005	2.52e-003
Total Components	100.00	4.16e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.90e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.99e+001	1.24e+002
Carbon Dioxide	2.71e-001	9.10e-001
Nitrogen	6.86e-003	1.47e-002
Methane	9.56e-001	1.17e+000
Ethane	1.36e+000	3.11e+000
Propane	9.20e-001	3.10e+000
Isobutane	2.00e-001	8.90e-001
n-Butane	5.76e-001	2.56e+000
Isopentane	1.52e-001	8.39e-001
n-Pentane	2.11e-001	1.16e+000
n-Hexane	1.69e-001	1.11e+000
Cyclohexane	2.24e-001	1.44e+000
Other Hexanes	1.68e-001	1.10e+000
Heptanes	4.50e-001	3.45e+000
2,2,4-Trimethylpentane	8.33e-002	7.27e-001
Benzene	6.70e-001	4.00e+000
Toluene	1.54e+000	1.08e+001
Ethylbenzene	2.39e-001	1.93e+000
Xylenes	1.64e+000	1.33e+001
C8+ Heavies	2.55e-001	3.32e+000
Total Components	100.00	1.79e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 5.69e+000 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Methane	9.75e+000	2.34e-002
Ethane	1.38e+001	6.23e-002
Propane	9.39e+000	6.20e-002
Isobutane	2.04e+000	1.78e-002
n-Butane	5.87e+000	5.11e-002
Isopentane	1.55e+000	1.68e-002
n-Pentane	2.15e+000	2.32e-002
n-Hexane	1.72e+000	2.22e-002
Cyclohexane	2.29e+000	2.88e-002
Other Hexanes	1.71e+000	2.21e-002
Heptanes	4.59e+000	6.89e-002
2,2,4-Trimethylpentane	8.50e-001	1.45e-002
Benzene	6.83e+000	7.99e-002
Toluene	1.57e+001	2.16e-001
Ethylbenzene	2.43e+000	3.87e-002
Xylenes	1.67e+001	2.66e-001
C8+ Heavies	2.60e+000	6.64e-002
Total Components	100.00	1.08e+000

****
* Project Setup Information *
****

Project File : Z:\Client\EQT Corporation\West Virginia\Janus\153901.0106 R13 Application\04 Draft\2015-0708 Janus R13 Application\Attach N - Emission Calculations\E&P Tank\20150715_EQT_Janus_PWT.ept
Flowsheet Selection : Oil Tank with Separator
Calculation Method : RVP Distillation
Control Efficiency : 95.0%
Known Separator Stream : Geographical Region
Geographical Region : All Regions in US
Entering Air Composition : No

Filed Name : Janus Produced Water Tank
Well Name : 210 bbl PWT
Date : 2015.07.15

****
* Data Input *
****

Separator Pressure : 300.00[psig]
Separator Temperature : 80.00[F]
Ambient Pressure : 14.70[psia]
Ambient Temperature : 80.00[F]
C10+ SG : 0.8820
C10+ MW : 296.00

-- Low Pressure Oil ----------

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0300
4	N2	0.0900
5	C1	8.4300
6	C2	4.2300
7	C3	5.9100
8	i-C4	5.1700
9	n-C4	6.2200
10	i-C5	8.9100
11	n-C5	4.9700
12	C6	9.1100
13	C7	11.3400
14	C8	10.3900
15	C9	5.9600
16	C10+	11.7500
17	Benzene	0.3700
18	Toluene	0.9800
19	E-Benzene	0.1500
20	Xylenes	1.1900
21	n-C6	4.8000
22	224Trimethylp	0.0000

-- Sales Oil ----------
Production Rate : 1[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 58.0
Reid Vapor Pressure : 10.60[psia]

****
* Calculation Results *
****

-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
Page 1----------				E&P TANK
Total HAPs	0.100	0.023	0.005	0.001
Total HC	5.529	1.262	0.276	0.063
VOCs, C2+	4.836	1.104	0.242	0.055
VOCs, C3+	4.186	0.956	0.209	0.048

Uncontrolled Recovery Info.
Vapor 287.1100 x1E-3 [MSCFD]
HC Vapor 285.8300 x1E-3 [MSCFD]
GOR 287.11 [SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
1	H2S	0.000	0.000	0.000	0.000
2	O2	0.000	0.000	0.000	0.000
3	CO2	0.007	0.002	0.007	0.002
4	N2	0.013	0.003	0.013	0.003
5	C1	0.692	0.158	0.035	0.008
6	C2	0.651	0.149	0.033	0.007
7	C3	1.194	0.273	0.060	0.014
8	i-C4	0.841	0.192	0.042	0.010
9	n-C4	0.791	0.181	0.040	0.009
10	i-C5	0.653	0.149	0.033	0.007
11	n-C5	0.276	0.063	0.014	0.003
12	C6	0.204	0.047	0.010	0.002
13	C7	0.095	0.022	0.005	0.001
14	C8	0.030	0.007	0.002	0.000
15	C9	0.006	0.001	0.000	0.000
16	C10+	0.000	0.000	0.000	0.000
17	Benzene	0.005	0.001	0.000	0.000
18	Toluene	0.005	0.001	0.000	0.000
19	E-Benzene	0.000	0.000	0.000	0.000
20	Xylenes	0.002	0.000	0.000	0.000
21	n-C6	0.085	0.019	0.004	0.001
22	224Trimethylp	0.000	0.000	0.000	0.000
	Total	5.550	1.267	0.277	0.063

-- Stream Data ----------

No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
			mol %	mol %	mol %	mol %	mol %	mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0300	0.0021	0.0000	0.1194	0.0496	0.1111
4	N2	28.01	0.0900	0.0006	0.0000	0.3763	0.0145	0.3332
5	C1	16.04	8.4300	0.2054	0.0000	34.7691	4.8646	31.2062
6	C2	30.07	4.2300	0.5879	0.0039	15.8939	13.8313	15.6481
7	C3	44.10	5.9100	2.4063	0.8494	17.1306	37.7108	19.5826
8	i-C4	58.12	5.1700	3.7204	3.2119	9.8124	15.2521	10.4605
9	n-C4	58.12	6.2200	5.2238	4.8805	9.4102	13.0089	9.8389
10	i-C5	72.15	8.9100	9.7007	9.7854	6.3777	7.7795	6.5447
11	n-C5	72.15	4.9700	5.6802	5.7866	2.6955	3.2686	2.7638
12	C6	86.16	9.1100	11.4207	11.8324	1.7100	2.0852	1.7547
13	C7	100.20	11.3400	14.6665	15.2753	0.6869	0.8605	0.7075
14	C8	114.23	10.3900	13.5756	14.1635	0.1882	0.2442	0.1949
15	C9	128.28	5.9600	7.8101	8.1523	0.0352	0.0503	0.0370
16	C10+	175.93	11.7500	15.4190	16.0990	0.0000	0.0000	0.0000
17	Benzene	78.11	0.3700	0.4701	0.4881	0.0496	0.0610	0.0509
18	Toluene	92.13	0.9800	1.2750	1.3293	0.0351	0.0448	0.0363
19	E-Benzene	106.17	0.1500	0.1963	0.2049	0.0017	0.0022	0.0017
20	Xylenes	106.17	1.1900	1.5580	1.6260	0.0114	0.0152	0.0119
21	n-C6	86.18	4.8000	6.0812	6.3116	0.6969	0.8566	0.7160
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	MW		100.95	120.35	123.46	38.83	49.76	40.13
	Stream Mole Ratio		1.0000	0.7620	0.7299	0.2380	0.0322	0.2701
	Heating Value	[BTU/SCF]			2218.43	2811.04	2289.04	
	Gas Gravity	[Gas/Air]			1.34	1.72	1.39	
	Bubble Pt. @ 100F	[psia]	322.24	24.57	11.47			

RVP @ 100F	[psia]	79.39	15.92	10.57
Spec. Gravity @ 100F		0.672	0.695	0.698

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	TEG Tank
City:	
State:	West Virginia
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	2,000 Gallon Tank

Tank Dimensions

Shell Length (ft):	12.00
Diameter (ft):	5.30
Volume (gallons):	2,000.00
Turnovers:	0.00
Net Throughput(gal/yr):	4,200.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TEG Tank - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Propylene glycol	All	55.41	46.54	64.27	51.30	0.0007	0.0004	0.0012	76.1100			76.11	Option 2: A=8.2082, B=2085.9, C=203.54

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TEG Tank - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0398
Vapor Space Volume (cu ft):	168.6255
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0645
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	168.6255
Tank Diameter (ft):	5.3000
Effective Diameter (ft):	9.0011
Vapor Space Outage (ft):	2.6500
Tank Shell Length (ft):	12.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0645
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0008
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0012
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0007
Vapor Space Outage (ft):	2.6500
Working Losses (lb):	0.0055
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Annual Net Throughput (gal/yr.):	4,200.0000
Annual Turnovers:	0.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	5.3000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0453

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TEG Tank - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Propylene glycol	0.01	0.04	0.05

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T007
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	Used MEG Tank - 4,200 gallon

Tank Dimensions

Shell Length (ft):	25.10
Diameter (ft):	5.30
Volume (gallons):	4,200.00
Turnovers:	1.00
Net Throughput(gal/yr):	4,200.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T007 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	55.41	46.54	64.27	51.30	0.0061	0.0040	0.0081	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0074

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T007 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	1.1891
Vapor Space Volume (cu ft):	352.7083
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0648
Vented Vapor Saturation Factor:	0.9991
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	352.7083
Tank Diameter (ft):	5.3000
Effective Diameter (ft):	13.0179
Vapor Space Outage (ft):	2.6500
Tank Shell Length (ft):	25.1000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0648
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0041
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0040
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0081
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9991
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0061
Vapor Space Outage (ft):	2.6500
Working Losses (lb):	0.0789
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Annual Net Throughput (gal/yr.):	4,200.0000
Annual Turnovers:	1.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	5.3000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1.2680

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T007 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.08	1.19	1.27

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T006
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	Used MEG Tank - 2,000 gallon

Tank Dimensions

Shell Length (ft):	12.00
Diameter (ft):	5.30
Volume (gallons):	2,000.00
Turnovers:	0.53
Net Throughput(gal/yr):	1,050.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T006 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Propylene glycol	All	55.41	46.54	64.27	51.30	0.0007	0.0004	0.0012	76.1100			76.11	Option 2: A=8.2082, B=2085.9, C=203.54

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T006 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0398
Vapor Space Volume (cu ft):	168.6255
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0645
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	168.6255
Tank Diameter (ft):	5.3000
Effective Diameter (ft):	9.0011
Vapor Space Outage (ft):	2.6500
Tank Shell Length (ft):	12.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0645
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0008
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0012
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0007
Vapor Space Outage (ft):	2.6500
Working Losses (lb):	0.0014
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Annual Net Throughput (gal/yr.):	1,050.0000
Annual Turnovers:	0.5250
Turnover Factor:	1.0000
Tank Diameter (ft):	5.3000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0412

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T006 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Propylene glycol	0.00	0.04	0.04

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T005
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	New MEG Tank - 2,000 gallon

Tank Dimensions

Shell Length (ft):	12.00
Diameter (ft):	5.30
Volume (gallons):	2,000.00
Turnovers:	0.53
Net Throughput(gal/yr):	1,050.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T005 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Propylene glycol	All	55.41	46.54	64.27	51.30	0.0007	0.0004	0.0012	76.1100			76.11	Option 2: A=8.2082, B=2085.9, C=203.54

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T005 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0398
Vapor Space Volume (cu ft):	168.6255
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0645
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	168.6255
Tank Diameter (ft):	5.3000
Effective Diameter (ft):	9.0011
Vapor Space Outage (ft):	2.6500
Tank Shell Length (ft):	12.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0645
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0008
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0012
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0007
Vapor Space Outage (ft):	2.6500
Working Losses (lb):	0.0014
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Annual Net Throughput (gal/yr.):	1,050.0000
Annual Turnovers:	0.5250
Turnover Factor:	1.0000
Tank Diameter (ft):	5.3000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0412

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T005 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Propylene glycol	0.00	0.04	0.04

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T009-T012
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	Engine Lube Oil Tank

Tank Dimensions

Shell Length (ft):	5.10
Diameter (ft):	3.20
Volume (gallons):	302.00
Turnovers:	3.48
Net Throughput(gal/yr):	1,050.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T009-T012 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	55.41	46.54	64.27	51.30	0.0061	0.0040	0.0081	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0074

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T009-T012 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0881
Vapor Space Volume (cu ft):	26.1252
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0648
Vented Vapor Saturation Factor:	0.9995
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	26.1252
Tank Diameter (ft):	3.2000
Effective Diameter (ft):	4.5596
Vapor Space Outage (ft):	1.6000
Tank Shell Length (ft):	5.1000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0648
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0041
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0040
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0081
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9995
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0061
Vapor Space Outage (ft):	1.6000
Working Losses (lb):	0.0197
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Annual Net Throughput (gal/yr.):	1,050.0000
Annual Turnovers:	3.4768
Turnover Factor:	1.0000
Tank Diameter (ft):	3.2000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.1078

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T009-T012 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.02	0.09	0.11

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T003
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	Engine Lube Oil - 4,200 gallon

Tank Dimensions

Shell Length (ft):	12.00
Diameter (ft):	5.30
Volume (gallons):	2,000.00
Turnovers:	2.10
Net Throughput(gal/yr):	4,200.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T003 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	55.41	46.54	64.27	51.30	0.0061	0.0040	0.0081	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0074

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T003 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.5685
Vapor Space Volume (cu ft):	168.6255
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0648
Vented Vapor Saturation Factor:	0.9991
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	168.6255
Tank Diameter (ft):	5.3000
Effective Diameter (ft):	9.0011
Vapor Space Outage (ft):	2.6500
Tank Shell Length (ft):	12.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0648
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0041
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0040
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0081
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9991
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0061
Vapor Space Outage (ft):	2.6500
Working Losses (lb):	0.0789
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Annual Net Throughput (gal/yr.):	4,200.0000
Annual Turnovers:	2.1000
Turnover Factor:	1.0000
Tank Diameter (ft):	5.3000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.6474

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T003 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.08	0.57	0.65

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T004
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	Compressor Oil - 4,200 gallon

Tank Dimensions

Shell Length (ft):	12.00
Diameter (ft):	5.30
Volume (gallons):	2,000.00
Turnovers:	3.63
Net Throughput(gal/yr):	7,266.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T004 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	55.41	46.54	64.27	51.30	0.0061	0.0040	0.0081	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0074

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T004 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.5685
Vapor Space Volume (cu ft):	168.6255
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0648
Vented Vapor Saturation Factor:	0.9991
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	168.6255
Tank Diameter (ft):	5.3000
Effective Diameter (ft):	9.0011
Vapor Space Outage (ft):	2.6500
Tank Shell Length (ft):	12.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0648
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0041
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0040
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0081
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9991
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0061
Vapor Space Outage (ft):	2.6500
Working Losses (lb):	0.1365
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Annual Net Throughput (gal/yr.):	7,266.0000
Annual Turnovers:	3.6330
Turnover Factor:	1.0000
Tank Diameter (ft):	5.3000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.7049

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T004 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.14	0.57	0.70

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T013-T016
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	Compressor Oil Tank

Tank Dimensions

Shell Length (ft):	5.10
Diameter (ft):	3.20
Volume (gallons):	302.00
Turnovers:	3.48
Net Throughput(gal/yr):	1,050.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T013-T016 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	55.41	46.54	64.27	51.30	0.0061	0.0040	0.0081	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0074

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T013-T016 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0881
Vapor Space Volume (cu ft):	26.1252
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0648
Vented Vapor Saturation Factor:	0.9995
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	26.1252
Tank Diameter (ft):	3.2000
Effective Diameter (ft):	4.5596
Vapor Space Outage (ft):	1.6000
Tank Shell Length (ft):	5.1000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0648
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0041
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0040
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0081
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9995
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0061
Vapor Space Outage (ft):	1.6000
Working Losses (lb):	0.0197
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0061
Annual Net Throughput (gal/yr.):	1,050.0000
Annual Turnovers:	3.4768
Turnover Factor:	1.0000
Tank Diameter (ft):	3.2000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.1078

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T013-T016 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.02	0.09	0.11

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T017-T018
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	Ice Chek Tank

Tank Dimensions

Shell Length (ft):	5.40
Diameter (ft):	4.20
Volume (gallons):	550.00
Turnovers:	6.34
Net Throughput(gal/yr):	3,486.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T017-T018 - Horizontal Tank

		Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp	Vapor Pressure (psia)			Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight.	Fract.	Fract.	Weight	Calculations
Propylene glycol	All	55.41	46.54	64.27	51.30	0.0007	0.0004	0.0012	76.1100			76.11	Option 2: A=8.2082, B=2085.9, C=203.54

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T017-T018 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0112
Vapor Space Volume (cu ft):	47.6522
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0645
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	47.6522
Tank Diameter (ft):	4.2000
Effective Diameter (ft):	5.3751
Vapor Space Outage (ft):	2.1000
Tank Shell Length (ft):	5.4000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0645
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0008
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0012
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0007
Vapor Space Outage (ft):	2.1000
Working Losses (lb):	0.0046
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Annual Net Throughput (gal/yr.):	3,486.0000
Annual Turnovers:	6.3382
Turnover Factor:	1.0000
Tank Diameter (ft):	4.2000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0158

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T017-T018 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Propylene glycol	0.00	0.01	0.02

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T008
City:	
State:	West Virgina
Company:	EQT Gathering
Type of Tank:	Horizontal Tank
Description:	Ice chek Tank - 4,000 gallon

Tank Dimensions

Shell Length (ft):	23.90
Diameter (ft):	5.30
Volume (gallons):	4,000.00
Turnovers:	5.25
Net Throughput(gal/yr):	21,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T008 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Propylene glycol	All	55.41	46.54	64.27	51.30	0.0007	0.0004	0.0012	76.1100			76.11	Option 2: A=8.2082, B=2085.9, C=203.54

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T008 - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0792
Vapor Space Volume (cu ft):	335.8458
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0645
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	335.8458
Tank Diameter (ft):	5.3000
Effective Diameter (ft):	12.7029
Vapor Space Outage (ft):	2.6500
Tank Shell Length (ft):	23.9000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Daily Avg. Liquid Surface Temp. (deg. R):	515.0759
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.9683
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0645
Daily Vapor Temperature Range (deg. R):	35.4636
Daily Vapor Pressure Range (psia):	0.0008
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0012
Daily Avg. Liquid Surface Temp. (deg R):	515.0759
Daily Min. Liquid Surface Temp. (deg R):	506.2100
Daily Max. Liquid Surface Temp. (deg R):	523.9417
Daily Ambient Temp. Range (deg. R):	24.1833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0007
Vapor Space Outage (ft):	2.6500
Working Losses (lb):	0.0277
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0007
Annual Net Throughput (gal/yr.):	21,000.0000
Annual Turnovers:	5.2500
Turnover Factor:	1.0000
Tank Diameter (ft):	5.3000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.1069

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T008 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Propylene glycol	0.03	0.08	0.11

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

ATTACHMENT O - MONITORING, RECORDING, REPORTING, AND TESTING PLANS

Plan Type	Emission unit	Pollutant	Requirements	Frequency	Method of Measurement	Regulatory Reference
Monitoring, Recordkeeping	Compressor Engines	NO_X, CO, VOC	Performance test	Initial and every three years or 8,760 hours of operation	EPA Test Methods	NSPS JJJJ
Monitoring, Recordkeeping	Compressor Engines		Maintenance records	Each occurrence	N/A	NSPS JJJJ
Monitoring, Recordkeeping	Compressor	VOC	Change rod packing	Every 36 months or 26,000 hours of operation	N/A	NSPS OOOO
Monitoring, Recordkeeping	Liquid Loading	VOC	Monitor throughput of loading	Monthly	Records	
Recordkeeping	Dehydration Unit	HAP	Maintain benzene emissions below 0.9 megagrams/yr	Annual	GRI-GLYCalc with actual operating parameters	40 CFR 63 Subpart HH

See Attachment D for additional information.

ATTACHMENT P

Public Notice

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that EGT Gathering, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a construction permit (R-13) to construct a new natural gas compressor station (the Janus Station) located off Left Fork Run Road in Doddridge County, West Virginia. The site latitude and longitude coordinates are: 39.25777 N, -80.80566 W.

The applicant estimates the potential increase in the following Regulated Air Pollutants associated with the project after the installation of the proposed equipment:

Particulate Matter (PM) = 9.1 tpy
Sulfur Dioxide (SO2) = 0.7 tpy
Volatile Organic Compounds (VOC) = 95.6 tpy
Carbon Monoxide (CO) = 59.1 tpy
Nitrogen Oxides (NOx) = 127.2 tpy
Hazardous Air Pollutants (HAPs) = 24.1 tpy
Carbon Dioxide Equivalents (CO_2e) = 146,419 tpy

Startup of operation will begin on or about March of 2016. 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 on August 24, 2015.

By: EQT Gathering, LLC
Diana Charletta, Senior Vice President – Midstream Operations
625 Liberty Avenue Suite 1700
Pittsburgh, PA 15222