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R. Alex Bosiljevac  
Environmental Coordinator

October 10, 2017

**CERTIFIED MAIL**

Mr. William F. Durham, Director  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, West Virginia, 25304

**RE: G70D Permit Application  
EQT Production Company  
Permit No: G70-A176  
Goshorn Natural Gas Production Site**

Dear Mr. Durham,

Enclosed are two electronic copies and one original hard copy of a proposed G70-D General Air Permit for the Goshorn Natural Gas Production Well Site. A legal advertisement will be published in the next few days and proof of publication will be forwarded as soon as it is received. Please contact me for payment of the application fee by credit card.

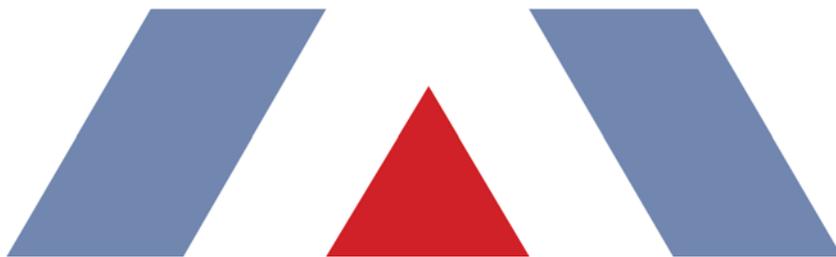
If you have any questions concerning this permit application, please contact me at (412) 395-3699 or by email at [abosiljevac@eqt.com](mailto:abosiljevac@eqt.com).

Sincerely,

A handwritten signature in blue ink, appearing to read 'RAB' followed by a large, stylized flourish.

R. Alex Bosiljevac  
EQT Corporation

Enclosures



## PROJECT REPORT

**EQT Production Company**  
**Goshorn Pad**

### G70-D Permit Application



**Where energy meets innovation.**

TRINITY CONSULTANTS  
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September 2017



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# 1. INTRODUCTION

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EQT Production Company (EQT) is submitting this Class II General Permit (G70-D) application to the West Virginia Department of Environmental Protection (WVDEP) to modify the permit for an existing natural gas production wellpad (Goshorn pad), located in Marshall County, West Virginia. The Goshorn wellpad is currently permitted under G70-A176. This G70D application seeks to install an additional combustor at the wellpad, revise the equipment list in the current permit and convert the G70-A permit to a G70-D.

## 1.1. FACILITY AND PROJECT DESCRIPTION

The Goshorn pad is a natural gas production facility that consist of four (4) natural gas wells. Natural gas and liquids (including water and condensate) are extracted from deposits underneath the surface. Natural gas is transported from the well to a gas line for additional processing and compression, as necessary. The liquids produced are stored in storage vessels.

The Goshorn wellpad is currently permitted for the following equipment:

- > Two (2) 400 barrel (bbl) produced water storage tanks for condensate/water (produced fluids);
- > Four (4) 210 bbl produced water storage tanks;
- > One (1) 100 bbl condensate storage tank;
- > Four (4) line heaters, each rated at 0.75 MMBtu/hr (heat input);
- > Produced fluid truck loading; and
- > Associated piping and components

As part of this application, EQT seeks to update the current permit to reflect the following equipment to be located at the wellpad:

- > Two (2) 400 barrel (bbl) produced water storage tanks for condensate/water (produced fluids);
- > Four (4) line heaters, each rated at 0.75 MMBtu/hr (heat input);
- > Produced fluid truck loading; and
- > Associated piping and components

Additionally, EQT is proposing to install an enclosed combustor, rated at 12.2 MMBtu/hr, at the Goshorn wellpad. The proposed combustor will control emissions from the produced fluid storage tanks (two (2) 400 bbl units) located at the wellpad.

A process flow diagram is included as Attachment D. A comparison of the potential emissions of the equipment at the wellpad in comparison with G70-D emission limits is provided in Table 1. Facility emissions are well below the permit limits. Note that in accordance with condition 1.1.1. of the G70-D permit, fugitive emissions are not considered in determining eligibility of the permit.

**Table 1 - Comparison of Wellpad Potential Emissions to G70-D Permit Emission Limits**

<b>Pollutant</b>	<b>Wellpad Potential Annual Emissions (tpy)</b>	<b>G70-D Maximum Annual Emission Limits (tpy)</b>
Nitrogen Oxides	6.50	50
Carbon Monoxide	5.46	80
Volatile Organic Compounds	0.44	80
Particulate Matter – 10/2.5	0.49	20
Sulfur Dioxide	0.04	20
Individual HAP (n-hexane) <sup>1</sup>	1.00	8
Total HAP <sup>1</sup>	1.07	20

1. Includes fugitive emissions

## **1.2. SOURCE STATUS**

WVDEP must make stationary source determinations on a case-by-case basis using the guidance under the Clean Air Act (CAA) and EPA’s and WVDEP’s implementing regulations. The definition of stationary source in 40 CFR 51.166(b) includes the following:

*“(6) Building, structure, facility, or installation means all of the pollutant emitting activities which belong to the same industrial grouping, are located on or more contiguous or adjacent properties, and are under control of the same person (or persons under common control).”*

Other additional pollutant emitting facilities should be aggregated with the Goahorn Pad for air permitting purposes if, and only if, all three elements of the “stationary source” definition above are fulfilled.

WVDEP had determined that the Goshorn pad is a separate stationary source when the current permit was issued. Since then, there have been no facilities installed within a quarter-mile radius of the Goshorn Pad. Therefore, the Goshorn pad should be considered a separate stationary source with respect to permitting programs, including Title V and Prevention of Significant Deterioration (PSD). As discussed in this application, the facility is a minor source of air emissions with respect to New Source Review (NSR) and Title V permitting.

### 1.3. G70-D APPLICATION ORGANIZATION

This West Virginia Code of State Regulations, Title 45 (CSR) Series 13 (45 CSR 13) G70-D permit application is organized as follows:

- > Section 2: Sample Emission Source Calculations;
- > Section 3: Regulatory Discussion;
- > Section 4: G70-D Application Form;
- > Attachment A: Single Source Determination;
- > Attachment B: Siting Criteria Waiver **(Not Applicable)**;
- > Attachment C: Business Certificate;
- > Attachment D: Process Flow Diagram;
- > Attachment E: Process Description;
- > Attachment F: Plot Plan;
- > Attachment G: Area Map;
- > Attachment H: G70-D Section Applicability Form;
- > Attachment I: Emission Units Table;
- > Attachment J: Fugitive Emissions Summary Sheet;
- > Attachment K: Gas Well Data Sheet;
- > Attachment L: Storage Vessel Data Sheet;
- > Attachment M: Heaters Data Sheet;
- > Attachment N: Engines Data Sheet **(Not Applicable)**;
- > Attachment O: Truck Loading Data Sheet;
- > Attachment P: Glycol Dehydrator Data Sheet **(Not Applicable)**;
- > Attachment Q: Pneumatic Controller Data Sheet
- > Attachment R: Pneumatic Pump Data Sheet;
- > Attachment S: Air Pollution Control Device Data Sheet;
- > Attachment T: Emission Calculations;
- > Attachment U: Emission Summary Sheet;
- > Attachment V: Class I Legal Advertisement; and
- > Attachment W: General Permit Registration Application Fee.

## 2. SAMPLE EMISSION SOURCE CALCULATIONS

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The characteristics of the air emissions from the natural gas production operations, along with the methodology for calculating these emissions, are briefly described in this section of the application. Detailed emission calculations are presented in Attachment T of this application.

Emissions from this facility result from natural gas combustion in the line heaters, enclosed combustor, as well as storage and loading of organic liquids in storage tanks and tank trucks. In addition, fugitive emissions result from component leaks from the operation of the station. The method by which emissions from each of these source types, as well as the existing source types, are calculated is summarized below.

- > **Line Heaters and Combustors:** Potential emissions of criteria pollutants and hazardous air pollutants (HAPs) are calculated using U.S. EPA's AP-42 factors for natural gas external combustion.<sup>1</sup> These calculations assume a conservatively low BTU content of 1,050 BTU per cubic feet of natural gas. Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.<sup>2</sup>
- > **Fugitive Equipment Leaks:** Emissions of VOC and HAPs from leaking equipment components have been estimated using facility estimated component counts and types along with emission factors from the *Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995*. Emission factors are based on average measured TOC from component types indicated. Greenhouse gas emissions from component leaks are calculated according to the procedures in 40 CFR 98 Subpart W.<sup>3</sup> Pneumatic devices at the wellpad are intermittent bleed and are assumed to be in operation 1/3 of the year.
- > **Storage Tanks:** Working, breathing and flashing emissions of VOC and HAPs from the storage tanks at the facility are calculated using Bryan Research & Engineering ProMax® Software. The throughput for the produced fluids tanks are based on engineering estimates of monthly condensate and produced water at the Goshorn well pad. The composition for the analysis was from a sample taken at the Goshorn wellpad.  
$$\text{Throughput } \left( \frac{\text{bbl}}{\text{day}} \right) = \left( \text{Condensate Composition (\%)} + \left( \text{Produced Water Throughput } \left( \frac{\text{bbl}}{\text{month}} \right) \right) \right) * \frac{12 \left( \frac{\text{months}}{\text{year}} \right)}{365 \left( \frac{\text{days}}{\text{year}} \right)}$$
- > **Tank Truck Loading:** Uncontrolled emissions of VOC and HAPs from the loading of organic liquids from storage tanks to tank truck are calculated using Bryan Research Engineering ProMax® Software. Truck loading is controlled by the enclosed combustors. U.S. EPA's AP-42 Chapter 5 Section 2 factors were used for capture efficiency
- > **Haul Roads:** Fugitive dust emitted from facility roadways has been estimated using projected vehicle miles traveled along with U.S. EPA's AP-42 factors for unpaved haul roads.<sup>4</sup>

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<sup>1</sup> U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 1.4, Natural Gas Combustion, Supplement D, July 1998.

<sup>2</sup> 40 CFR 98 Subpart C, *General Stationary Fuel combustion Sources*, Tables C-1 and C-2.

<sup>3</sup> 40 CFR 98 Subpart W, *Petroleum and Natural Gas Systems*, Section 98.233(r), *Population Count and Emission Factors*.

<sup>4</sup> U.S. EPA, AP 42, Fifth Edition, Volume I, Section 13.2.2, Unpaved Roads, November 2006.

## 3. REGULATORY DISCUSSION

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This section documents the applicability determinations made for Federal and State air quality regulations. In this section, applicability or non-applicability of the following regulatory programs is addressed:

- > Prevention of Significant Deterioration 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 G70-D 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 wellpad. 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 wellpad. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

### 3.1. PREVENTION OF SIGNIFICANT DETERIORATION SOURCE CLASSIFICATION

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration. PSD 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 wellpad is not a major source with respect to the PSD program since its potential emissions are below all the PSD thresholds. As such, PSD permitting is not triggered by this activity. EQT will monitor future construction activities at the site closely and will compare any future increase in emissions with the PSD thresholds to ensure these activities will not trigger this program.

### 3.2. 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 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. The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the wellpad is not a major source for Title V purposes.

### 3.3. NEW SOURCE PERFORMANCE STANDARDS

New Source Performance Standards, 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 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 wellpad. The following NSPS could potentially apply to the wellpad:

- > 40 CFR Part 60 Subparts D/Da/Db/Dc – Steam Generating Units
- > 40 CFR Part 60 Subpart K/Ka/Kb – Storage Vessels for Petroleum Liquids/Volatile Organic Liquids
- > 40 CFR Part 60 Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution

- > 40 CFR Part 60 Subpart 0000a – Crude Oil and Natural Gas Facilities

### 3.3.1. NSPS Subparts D, Da, Db, and Dc – Steam Generating Units

These subparts apply to steam generating units of various sizes, all greater than 10 MMBtu/hr. The proposed project does not include any steam generating units with a heat input greater than 10 MMBtu/hr, therefore the requirements of these subparts do not apply.

### 3.3.2. NSPS Subparts K, Ka, and Kb – Storage Vessels for Petroleum Liquids/Volatile Organic Liquids

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 m<sup>3</sup> (~19,813 gallons). All of the tanks at the wellpad have a capacity of 19,813 gallons or less. As such, Subparts K, Ka, and Kb do not apply to the storage tanks at the wellpad.

### 3.3.3. NSPS Subpart 0000 - Crude Oil and Natural Gas Production, Transmission, and Distribution

Subpart 0000, 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 and or before September 18, 2015. This NSPS was published in the Federal Register on August 16, 2012, and subsequently amended. The proposed project does not change applicability dates with respect to NSPS Subpart 0000 for existing equipment.

### 3.3.4. NSPS Subpart 0000a—Crude Oil and Natural Gas Facilities

Subpart 0000a, Standards of Performance for Crude Oil and Natural Gas Facilities, applies to affected facilities that commenced construction, reconstruction, or modification after September 18, 2015. The regulation was published final in the Federal Register on June 3, 2016. The rule includes provisions for the following facilities:

- > Hydraulically fractured wells;
- > Centrifugal compressors located between the wellhead and the point of custody transfer to the natural gas distribution segment;
- > Reciprocating compressors located between the wellhead and the point of custody transfer to the natural gas distribution segment;
- > Continuous bleed natural gas-driven pneumatic controllers with a bleed rate of > 6 scfh located in the production, gathering, processing, or transmission and storage segments (excluding natural gas processing plants);
- > Continuous bleed natural gas-driven pneumatic controllers located at natural gas processing plants;
- > Pneumatic pumps located in the production and processing segments;
- > Storage vessels located in the production, gathering, processing, or transmission and storage segments;
- > The collection of fugitive emissions components at a well site;
- > The collection of fugitive emissions components at a compressor station; and
- > Sweetening units located onshore that process natural gas produced from either onshore or offshore wells.

The proposed project does not include any source categories that is an affected source under NSPS Subpart 0000a, with the exception of the produced fluids tanks. There are two (2) produced fluids storage vessels proposed for the wellpad. The storage vessels will each have potential VOC emissions less than 6 tpy based on the permit application

materials and enforceable limits to be included in the G70-D permit. As such, per 60.5365a(e), the tanks will not be storage vessel affected facilities under the rule.

### 3.3.5. Non-Applicability of All Other NSPS

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas processing plants (Subparts 0000) and associated equipment (Subparts D-Dc and K-Kb), the applicability of a particular NSPS to the wellpad can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

## 3.4. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

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 wellpad is 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. Besides 40 CFR 63 Subpart A (NESHAP Subpart A), which is similar to 40 CFR 60 Subpart A (NSPS Subpart A), the following NESHAP could potentially apply to the wellpad:

- > 40 CFR Part 63 Subpart HH – Oil and Natural Gas Production Facilities
- > 40 CFR Part 63 Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers

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

### 3.4.1. 40 CFR 63 Subpart HH - Oil and Natural Gas Production Facilities

This standard contains requirements for both major and area sources of HAP. At area sources, the only affected source is a triethylene glycol dehydration unit (§63.760(b)(2)). The wellpad does not include a triethylene glycol dehydration unit; therefore the requirements of this subpart do not apply.

### 3.4.2. 40 CFR 63 Subpart JJJJJJ - Industrial, Commercial, and Institutional Boilers

This MACT standard applies to industrial, commercial, and institutional boilers of various sizes and fuel types at area sources. The line heaters are natural gas-fired and are specifically exempt from this subpart. Therefore, no sources at the wellpad are subject to any requirements under 40 CFR 63 Subpart JJJJJJ.

## 3.5. WEST VIRGINIA SIP REGULATIONS

The wellpad 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).

### 3.5.1. 45 CSR 2: To Prevent and Control 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 line heaters are fuel burning units and therefore must comply with this regulation. Per 45 CSR 2-3, opacity of emissions from units shall not exceed 10 percent.

### **3.5.2. 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 wellpad is generally subject to this requirement. However, due to the nature of the process at the wellpad, production of objectionable odor from the wellpad during normal operation is unlikely.

### **3.5.3. 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 enclosed combustor is an incinerator 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 these units will not exceed the levels calculated in accordance with 6-4.1:

### **3.5.4. 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 CFR Part 60 by reference. As such, by complying with all applicable requirements of 40 CFR Part 60 at the wellpad, EQT will be complying with 45 CSR 16.

### **3.5.5. 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 wellpad, 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.

### **3.5.6. 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 at the wellpad is less than 40,000 gallons; therefore, 45 CSR 21-28 will not apply to the petroleum liquid storage tanks at this wellpad.

### **3.5.7. 45 CSR 34: Emissions Standards for Hazardous Air Pollutants**

45 CSR 34-1 incorporates the federal Clean Air Act (CAA) national emissions standards for hazardous air pollutants (NESHAPs) as set forth in 40 CFR Parts 61 and 63 by reference. As such, by complying with all applicable requirements of 40 CFR Parts 61 and 63 at the wellpad, EQT will be complying with 45 CSR 34. Note that there are no applicable requirements under 40 CFR Parts 61 and 63 for the wellpad.

### **3.5.8. Non-Applicability of Other SIP Rules**

A thorough examination of the West Virginia SIP rules with respect to applicability at the wellpad reveals many SIP regulations that do not apply or impose additional requirements on operations. Such SIP rules include those specific to a particular type of industrial operation that is categorically not applicable to the wellpad.

## 4. G70-D APPLICATION FORMS

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The WVDEP permit application forms contained in this application include all applicable G70-D application forms including the required attachments.



west virginia department of environmental protection

Division of Air Quality  
601 57<sup>th</sup> Street SE  
Charleston, WV 25 4  
Phone (304) 926-0475  
Fax (304) 926-0479  
www.dep.wv.gov

### G70-D GENERAL PERMIT REGISTRATION APPLICATION

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

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

#### SECTION I. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): EQT Production Company

Federal Employer ID No. (FEIN): 25-0724685

Applicant's Mailing Address: 625 Liberty Avenue, Suite 1700

City: Pittsburgh

State: PA

ZIP Code: 15222

Facility Name: Goshorn Wellpad

Operating Site Physical Address: See lat/long  
If none available, list road, city or town and zip of facility.

City: Cameron

Zip Code: 26033

County: Marshall

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

Latitude: 39.81578°

Longitude: -80.61547°

SIC Code: 1311  
NAICS Code: 211111

DAQ Facility ID No. (For existing facilities)  
051-00214

#### CERTIFICATION OF INFORMATION

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

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

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

Responsible Official Signature: [Signature]  
Name and Title: Mike Gavin, Vice President Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
Email: gavinm@eqt.com Date: 10/9/17

If applicable:  
Authorized Representative Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
Email: \_\_\_\_\_ Date: \_\_\_\_\_

If applicable:  
Environmental Contact  
Name and Title: Alex Bosiljevac, Environmental Coordinator Phone: 412-395-3699 Fax: 412-395-7027  
Email: ABosiljevac@eqt.com Date: \_\_\_\_\_



ATTACHMENT A

**Single Source Determination**

## ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

The Source Determination Rule for the oil and gas industry was published in the Federal Register on June 3, 2016 and will become effective on August 2, 2016. EPA defined the term “adjacent” and stated that equipment and activities in the oil and gas sector that are under common control will be considered part of the same source if they are located on the same site or on sites that share equipment and are within ¼ mile of each other.

Is there equipment and activities in the same industrial grouping (defined by SIC code)?

Yes  No

Is there equipment and activities under the control of the same person/people?

Yes  No

Is there equipment and activities located on the same site or on sites that share equipment and are within ¼ mile of each other?

Yes  No

## ATTACHMENT A: SINGLE SOURCE DETERMINATION MAP

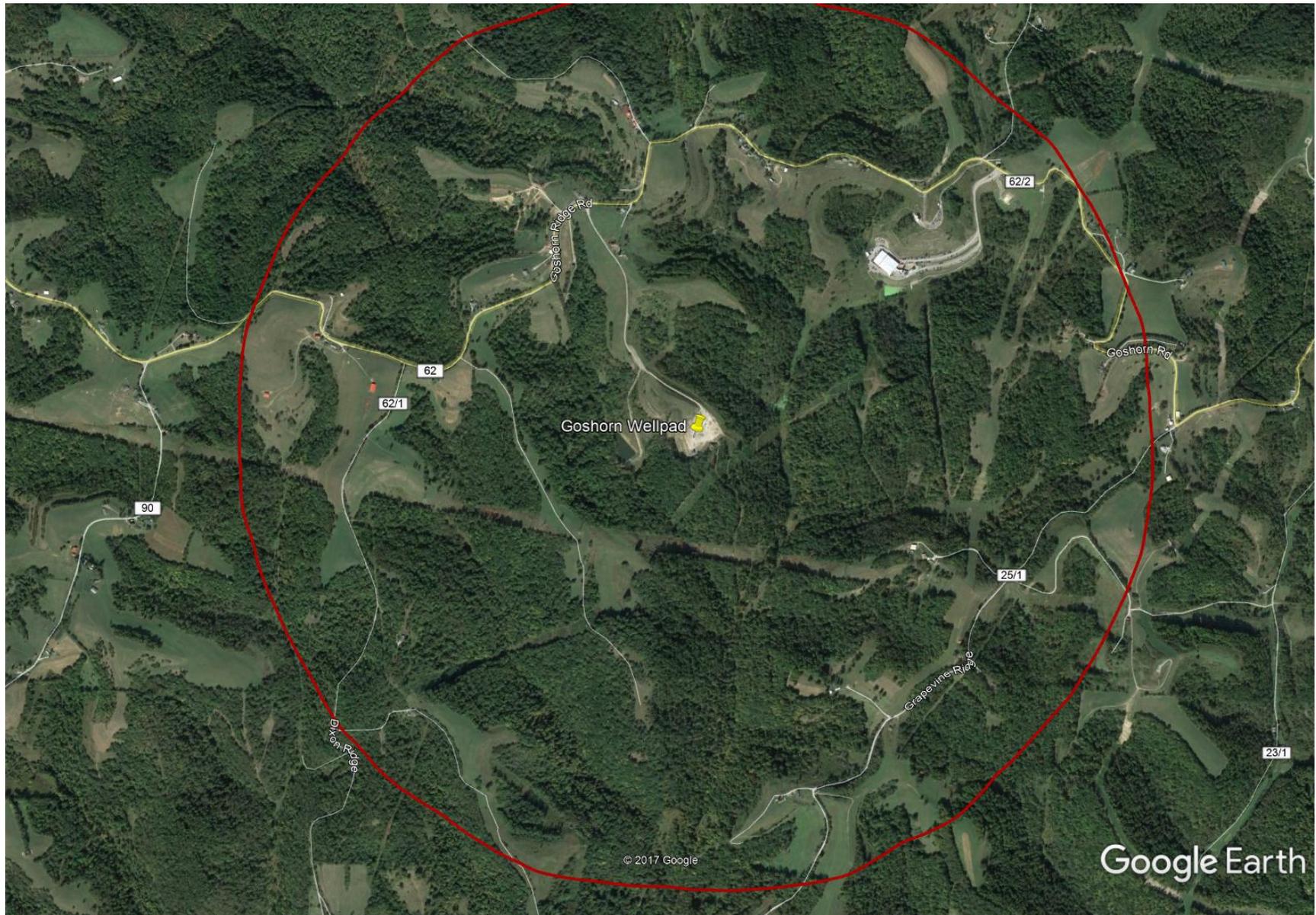


Figure 1 - Map of Goshorn Location with 1 Mile Radius Circle

Coordinates:

Latitude: 39.81578°

Longitude: -80.61547°

ATTACHMENT B

Siting Criteria Waiver *(Not Applicable)*

**ATTACHMENT B - SITING CRITERIA WAIVER – NOT APPLICABLE**  
If applicable, please complete this form and it must be notarized.

**G70-D General Permit  
Siting Criteria Waiver**

**WV Division of Air Quality 300' Waiver**

I \_\_\_\_\_ hereby  
Print Name  
acknowledge and agree that \_\_\_\_\_ will  
General Permit Applicant's Name

construct an emission unit(s) at a natural gas production facility  
that will be located within 300' of my dwelling and/or business.

I hereby offer this waiver of siting criteria to the West Virginia Department of Environmental Protection  
Division of Air Quality as permission to construct, install and operate in such location.

Signed:

\_\_\_\_\_  
Signature Date

\_\_\_\_\_  
Signature Date

**Taken, subscribed and sworn before me this \_\_\_\_ day of**  
\_\_\_\_\_, 20\_\_\_\_.

My commission expires: \_\_\_\_\_

SEAL \_\_\_\_\_  
Notary Public

ATTACHMENT C

**Business Certificate**

**WEST VIRGINIA  
STATE TAX DEPARTMENT  
BUSINESS REGISTRATION  
CERTIFICATE**

ISSUED TO:  
**EQT PRODUCTION COMPANY  
625 LIBERTY AVE 1700  
PITTSBURGH, PA 15222-3114**

**BUSINESS REGISTRATION ACCOUNT NUMBER: 1022-8081**

This certificate is issued on: 08/4/2010

*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.*

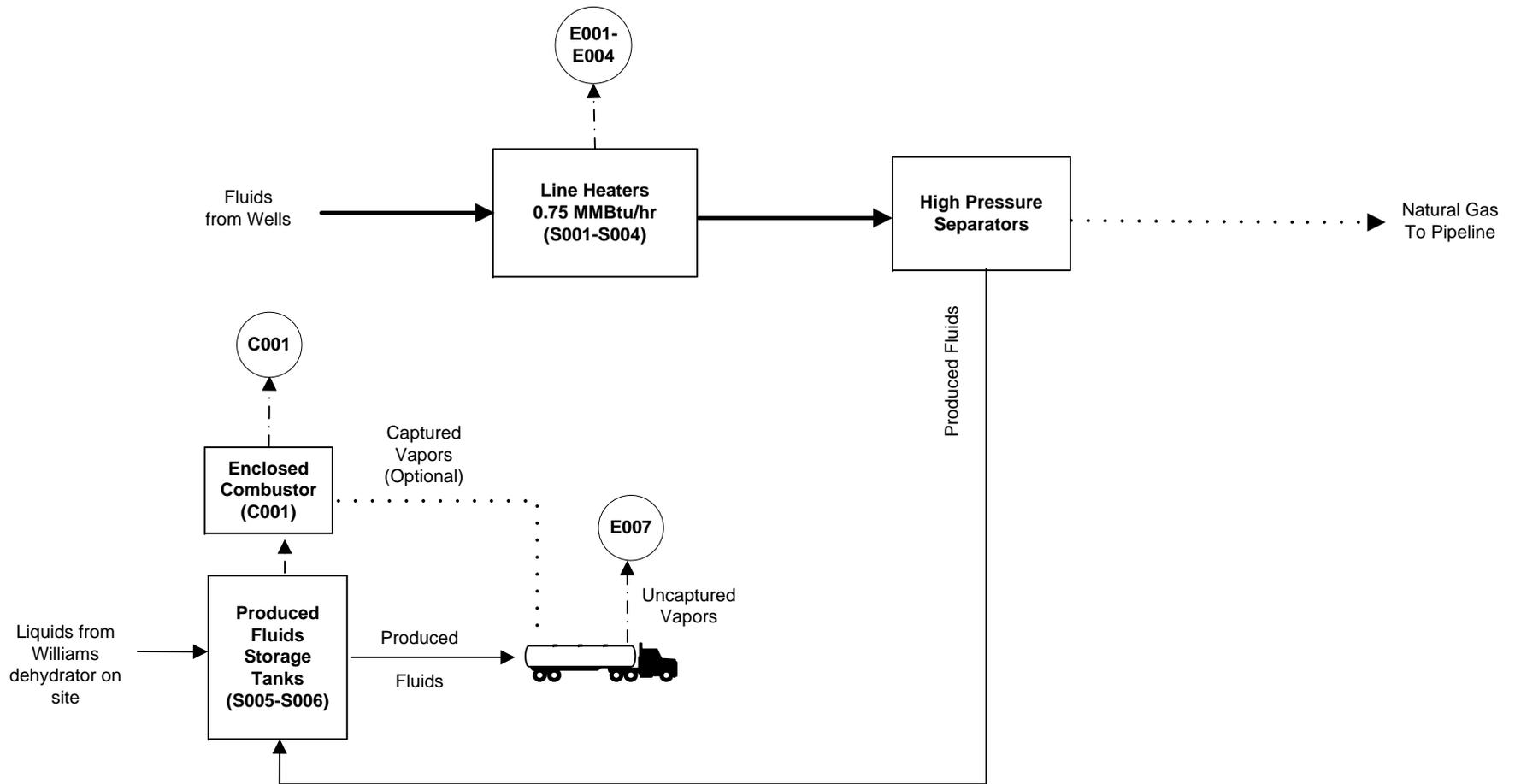
This certificate is not transferrable and must be displayed at the location for which issued.  
This certificate shall be permanent until cessation of the business for which the certificate of registration  
was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

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.

## ATTACHMENT D

### Process Flow Diagram



Flow Legend	
	Gas/Water/Condensate Flow
	Water/Condensate Flow
	Gas/Vapor Flow
	Stack Emissions
	Emission Point

**EQT** Where energy meets innovation.  
**EQT Production Company**

---

**Process Flow Diagram**  
**Goshorn Wellpad**

---

Trinity  
 Consultants

September 2017

## ATTACHMENT E

### Process Description

## ATTACHMENT E: PROCESS DESCRIPTION

EQT is submitting this G70D application to modify the permit for an existing natural gas production wellpad (Goshorn wellpad). Specifically, EQT is proposing to install an enclosed combustor to control emissions from the storage tanks and to update the permit to reflect the currently built in equipment at the Goshorn wellpad

The incoming gas/liquid stream from the underground wells will pass through the line heaters (S001-S004) to raise/maintain temperature. The stream will then pass through the high pressure (3 phase) separators, which will separate gas (natural gas from the separator is sent to the sales line) from liquids (produced water and condensate). The produced fluids stream is then transferred to the condensate/water storage vessels (S005-S006), which are controlled by an enclosed combustor (C001). In addition to liquids from the wells, produced fluids from the dehydrator located on site (operated by Williams) will also be sent to the storage vessels.

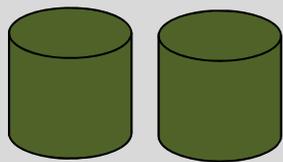
Once the tanks are filled, the contents are loaded into trucks for transport. EQT utilizes vapor balancing in the truck loading operations, which means the vapors displaced by the filling of tanker trucks (S007) are routed back into the battery of tanks.

A process flow diagram is included as Attachment D.

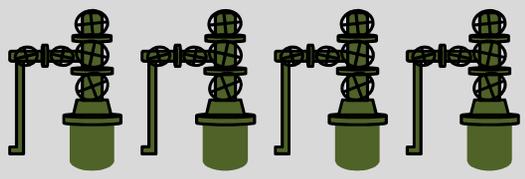
## ATTACHMENT F

### Plot Plan

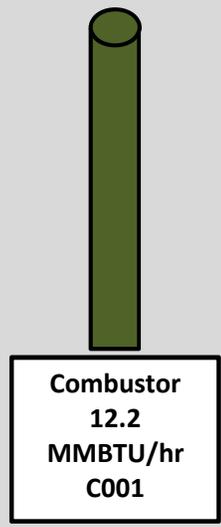
NOTE: This diagram is not to scale.  
Locations and distances between surface  
equipment are not known at this time.



Two (2) Produced Fluid  
Storage Tanks  
400 bbl (each)  
S005-S006

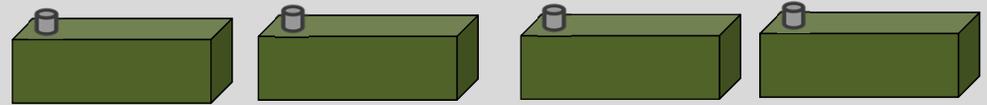


Four (4)  
Wellheads



Combustor  
12.2  
MMBTU/hr  
C001

Entrance to Goshorn Pad



Four (4) Line Heaters  
0.75 MMBtu/hr (each)  
S001-S004

## ATTACHMENT G

### Area Map

**ATTACHMENT G: AREA MAP**



**Figure 1 - Map of Goshorn Location**

Zone: 17  
UTM Northing (KM): 4,407.381  
UTM Easting (KM): 532.911  
Elevation: ~1,322 ft

ATTACHMENT H

**G70-D Section Applicability Form**

**ATTACHMENT H – G70-D SECTION APPLICABILITY FORM**

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

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

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

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

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

ATTACHMENT I

Emission Units Table

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

Include ALL emission units and air pollution control devices/ERDs that will be part of this permit application review. Do not include fugitive emission sources in this table. Deminimis storage tanks shall be listed in the Attachment L table. This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

Emission Unit ID <sup>1</sup>	Emission Point ID <sup>2</sup>	Emission Unit Description	Year Installed	Manufac. Date <sup>3</sup>	Design Capacity	Type <sup>4</sup> and Date of Change	Control Device(s) <sup>5</sup>	ERD(s) <sup>6</sup>
S005	C001	Produced Fluids Storage Tanks	2017	2017	400 bbl	New	C001	---
S006	C001	Produced Fluids Storage Tanks	2017	2017	400 bbl	New	C001	---
S001	E001	Line Heater	2012	2012	0.75 MMBtu/hr	Existing	None	---
S002	E002	Line Heater	2012	2012	0.75 MMBtu/hr	Existing	None	---
S003	E003	Line Heater	2012	2012	0.75 MMBtu/hr	Existing	None	---
S004	E004	Line Heater	2012	2012	0.75 MMBtu/hr	Existing	None	---
S007	C001	Liquid Loading	2012	2012	1,036, 308 gal/yr	Modified – Increased throughput	C001	---

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

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

When required by rule

<sup>4</sup> New, modification, removal, existing

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

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

ATTACHMENT J

**Fugitive Emissions Summary Sheet**

## ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

Sources of fugitive emissions may include loading operations, equipment leaks, blowdown emissions, etc.  
Use extra pages for each associated source or equipment if necessary.

Source/Equipment: Fugitive Emissions

Leak Detection Method Used		<input type="checkbox"/> Audible, visual, and olfactory (AVO) inspections	<input type="checkbox"/> Infrared (FLIR) cameras	<input checked="" type="checkbox"/> Other (please describe) Will satisfy condition 12.1.1 of the G70-D	<input type="checkbox"/> None required		
Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (methane, CO <sub>2e</sub> )
Pumps	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	3	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	<input type="checkbox"/> Gas <input checked="" type="checkbox"/> Liquid <input type="checkbox"/> Both	0.58	0.06	0.11
Valves	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	210	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	<input checked="" type="checkbox"/> Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Both	1.52	0.17	21.71
Safety Relief Valves	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	10	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	<input checked="" type="checkbox"/> Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Both	1.26	0.14	1.53
Open Ended Lines	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	15	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	<input type="checkbox"/> Gas <input type="checkbox"/> Liquid <input checked="" type="checkbox"/> Both	0.03	3.4E-03	3.50
Sampling Connections	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	---	N/A	<input type="checkbox"/> Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Both	---	---	---
Connections (Not sampling)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	924	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	<input type="checkbox"/> Gas <input type="checkbox"/> Liquid <input checked="" type="checkbox"/> Both	2.05	0.23	10.61
Compressors	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	---	N/A	<input checked="" type="checkbox"/> Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Both	---	---	---
Flanges	<input type="checkbox"/> Yes <input type="checkbox"/> No	---	N/A	<input type="checkbox"/> Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Both	---	---	---
Other <sup>1</sup>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	20	40 CFR 98 Subpart W	<input checked="" type="checkbox"/> Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Both	2.55	0.28	344.53

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

Please provide an explanation of the sources of fugitive emissions (e.g. pigging operations, equipment blowdowns, pneumatic controllers, etc.):  
Pneumatic Controller count is 'Other' category. An estimate of Miscellaneous Gas Venting emissions are included in the Emission Calculations and serve to include such sources as compressor venting, pigging, vessel blowdowns and other sources.

Please indicate if there are any closed vent bypasses (include component): N/A

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

ATTACHMENT K

**Gas Well Data Sheet**



ATTACHMENT L

**Storage Vessel Data Sheet**

## ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

**The following information is REQUIRED:**

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

*Additional information may be requested if necessary.*

### GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name Goshorn	2. Tank Name Produced Fluids Storage Tanks
3. Emission Unit ID number S005-S006	4. Emission Point ID number C001
5. Date Installed , Modified or Relocated <i>(for existing tanks)</i> Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Was the tank manufactured after September 18, 2015? <input type="checkbox"/> Yes <input type="checkbox"/> No	6. Type of change: <input checked="" type="checkbox"/> New construction <input type="checkbox"/> New stored material <input type="checkbox"/> Other <input type="checkbox"/> Relocation
7A. Description of Tank Modification <i>(if applicable)</i> N/A	
7B. Will more than one material be stored in this tank? <i>If so, a separate form must be completed for each material.</i> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7C. Was USEPA Tanks simulation software utilized? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b><i>If Yes, please provide the appropriate documentation and items 8-42 below are not required.</i></b>	

### TANK INFORMATION

8. Design Capacity <i>(specify barrels or gallons)</i> . Use the internal cross-sectional area multiplied by internal height. 400 bbls	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 20
10A. Maximum Liquid Height (ft.) 20	10B. Average Liquid Height (ft.) 10
11A. Maximum Vapor Space Height (ft.) 20	11B. Average Vapor Space Height (ft.) 10
12. Nominal Capacity <i>(specify barrels or gallons)</i> . This is also known as “working volume”. 400 bbls	



<input checked="" type="checkbox"/> No Rust <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input type="checkbox"/> Not applicable			
22A. Is the tank heated? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): <b>Must be listed for tanks using VRUs with closed vent system.</b>			
24. Is the tank a <b>Vertical Fixed Roof Tank</b> ? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft): 0.06
25. Complete item 25 for <b>Floating Roof Tanks</b> <input type="checkbox"/> Does not apply <input checked="" type="checkbox"/>			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type ( <i>check one</i> ): <input type="checkbox"/> Metallic (mechanical) shoe seal <input type="checkbox"/> Liquid mounted resilient seal <input type="checkbox"/> Vapor mounted resilient seal <input type="checkbox"/> Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? <input type="checkbox"/> Yes <input type="checkbox"/> No			
25D. If yes, how is the secondary seal mounted? ( <i>check one</i> ) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe):			
25E. Is the floating roof equipped with a weather shield? <input type="checkbox"/> Yes <input type="checkbox"/> No			
25F. Describe deck fittings:			
26. Complete the following section for <b>Internal Floating Roof Tanks</b> <input checked="" type="checkbox"/> Does not apply			
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: <input type="checkbox"/> 5 ft. wide <input type="checkbox"/> 6 ft. wide <input type="checkbox"/> 7 ft. wide <input type="checkbox"/> 5 x 7.5 ft. wide <input type="checkbox"/> 5 x 12 ft. wide <input type="checkbox"/> other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft <sup>2</sup> ):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
28. Closed Vent System with Enclosed Combustor? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
<b>SITE INFORMATION - Not Applicable: Tank calculations performed using ProMax software</b>			
29. Provide the city and state on which the data in this section are based:			
30. Daily Avg. Ambient Temperature (°F):		31. Annual Avg. Maximum Temperature (°F):	
32. Annual Avg. Minimum Temperature (°F):		33. Avg. Wind Speed (mph):	
34. Annual Avg. Solar Insulation Factor (BTU/ft <sup>2</sup> -day):		35. Atmospheric Pressure (psia):	
<b>LIQUID INFORMATION - Not Applicable: Tank calculations performed using ProMax software</b>			
36. Avg. daily temperature range of bulk liquid (°F):		36A. Minimum (°F):	36B. Maximum (°F):
37. Avg. operating pressure range of tank (psig):		37A. Minimum (psig):	37B. Maximum (psig):
38A. Minimum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39A. Avg. liquid surface temperature (°F):		39B. Corresponding vapor pressure (psia):	
40A. Maximum liquid surface temperature (°F):		40B. Corresponding vapor pressure (psia):	
41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
41A. Material name and composition:			
41B. CAS number:			
41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-mole):			
41E. Vapor molecular weight (lb/lb-mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From:                      To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			



ATTACHMENT M

**Heaters Data Sheet**

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

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

Emission Unit ID# <sup>1</sup>	Emission Point ID# <sup>2</sup>	Emission Unit Description (manufacturer, model #)	Year Installed/Modified	Type <sup>3</sup> and Date of Change	Maximum Design Heat Input (MMBTU/hr) <sup>4</sup>	Fuel Heating Value (BTU/scf) <sup>5</sup>
S001	E001	Line Heater	2012	Existing	0.75	~1,194
S002	E002	Line Heater	2012	Existing	0.75	~1,194
S003	E003	Line Heater	2012	Existing	0.75	~1,194
S004	E004	Line Heater	2012	Existing	0.75	~1,194

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

ATTACHMENT N

Engines Data Sheet *(Not Applicable)*

## ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET- **NOT APPLICABLE**

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

Emission Unit ID# <sup>1</sup>			
Engine Manufacturer/Model			
Manufacturers Rated bhp/rpm			
Source Status <sup>2</sup>			
Date Installed/ Modified/Removed/Relocated <sup>3</sup>			
Engine Manufactured /Reconstruction Date <sup>4</sup>			
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable) <sup>5</sup>	<input type="checkbox"/> 40CFR60 Subpart JJJJ <input type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources	<input type="checkbox"/> 40CFR60 Subpart JJJJ <input type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources	<input type="checkbox"/> 40CFR60 Subpart JJJJ <input type="checkbox"/> JJJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources
Engine Type <sup>6</sup>			
APCD Type <sup>7</sup>			
Fuel Type <sup>8</sup>			
H <sub>2</sub> S (gr/100 scf)			
Operating bhp/rpm			
BSFC (BTU/bhp-hr)			
Hourly Fuel Throughput	ft <sup>3</sup> /hr gal/hr	ft <sup>3</sup> /hr gal/hr	ft <sup>3</sup> /hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	MMft <sup>3</sup> /yr gal/yr	MMft <sup>3</sup> /yr gal/yr	MMft <sup>3</sup> /yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
	<b>Pollutant<sup>10</sup></b>	<b>Hourly PTE (lb/hr)<sup>11</sup></b>	<b>Annual PTE (tons/year)<sup>11</sup></b>

1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion engine/generator engine located at the well site. Multiple engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. Microturbine generator engines should be designated MT-1, MT-2, MT-3 etc. If more than three (3) engines exist, please use additional sheets.

2 Enter the Source Status using the following codes:

- |     |   |    |                  |
|-----|---|----|------------------|
| NS  | Construction of New Source (installation) | ES | Existing Source  |
| MS  | Modification of Existing Source           | RS | Relocated Source |
| REM | Removal of Source                         |    |                  |

- 3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation or removal.
- 4 Enter the date that the engine was manufactured, modified or reconstructed.
- 5 Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart IIII/JJJJ? If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance as appropriate.

**Provide a manufacturer's data sheet for all engines being registered.**

- 6 Enter the Engine Type designation(s) using the following codes:  

2SLB Two Stroke Lean Burn	4SRB Four Stroke Rich Burn
4SLB Four Stroke Lean Burn	
- 7 Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:  

A/F Air/Fuel Ratio	IR Ignition Retard
HEIS High Energy Ignition System	SIPC Screw-in Precombustion Chambers
PSC Prestratified Charge	LEC Low Emission Combustion
NSCR Rich Burn & Non-Selective Catalytic Reduction	OxCat Oxidation Catalyst
SCR Lean Burn & Selective Catalytic Reduction	
- 8 Enter the Fuel Type using the following codes:  

PQ Pipeline Quality Natural Gas	RG Raw Natural Gas /Production Gas	D Diesel
---------------------------------	------------------------------------	----------
- 9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.  

MD Manufacturer's Data	AP AP-42	
GR GRI-HAPCalc™	OT Other	(please list)
- 10 Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.
- 11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

**Engine Air Pollution Control Device  
(Emission Unit ID# use extra pages as necessary)**

Air Pollution Control Device Manufacturer's Data Sheet included?  
Yes  No

NSCR

SCR

Oxidation Catalyst

Provide details of process control used for proper mixing/control of reducing agent with gas stream:

Manufacturer:	Model #:
---------------	----------

Design Operating Temperature:	Design gas volume:
-------------------------------	--------------------

Service life of catalyst:	Provide manufacturer data? <input type="checkbox"/> Yes <input type="checkbox"/> No
---------------------------	---

Volume of gas handled:	Operating temperature range for NSCR/Ox Cat: From °F to °F
------------------------	---

Reducing agent used, if any:	Ammonia slip (ppm):
------------------------------	---------------------

Pressure drop against catalyst bed (delta P):

Provide description of warning/alarm system that protects unit when operation is not meeting design conditions:

Is temperature and pressure drop of catalyst required to be monitored per 40CFR63 Subpart ZZZZ?  
 Yes  No

How often is catalyst recommended or required to be replaced (hours of operation)?

How often is performance test required?  
 Initial  
 Annual  
 Every 8,760 hours of operation  
 Field Testing Required  
 No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT,

ATTACHMENT O

**Truck Loading Data Sheet**

## ATTACHMENT O – TANKER TRUCK/RAIL CAR LOADING DATA SHEET

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

### ***Truck/Rail Car Loadout Collection Efficiencies***

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

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

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

Emission Unit ID#: S007	Emission Point ID#: C001, E007	Year Installed/Modified: Installed - 2012 Modified - TBD		
Emission Unit Description: Uncaptured losses from loading of produced fluids into tanker trucks				
<b>Loading Area Data</b>				
Number of Pumps: 1	Number of Liquids Loaded: 1	Max number of trucks/rail cars loading at one (1) time: 1		
Are tanker trucks/rail cars pressure tested for leaks at this or any other location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not Required If Yes, Please describe:				
Provide description of closed vent system and any bypasses. Trucks utilize vapor recovery lines to route displaced vapors back into battery of tanks.				
Are any of the following truck/rail car loadout systems utilized? <input type="checkbox"/> Closed System to tanker truck/rail car passing a MACT level annual leak test? <input type="checkbox"/> Closed System to tanker truck/rail car passing a NSPS level annual leak test? <input checked="" type="checkbox"/> Closed System to tanker truck/rail car not passing an annual leak test and has vapor return?				
<b>Projected Maximum Operating Schedule (for rack or transfer point as a whole)</b>				
Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	Varies	Varies	Varies	Varies
Days/week	7	7	7	7
<b>Bulk Liquid Data (use extra pages as necessary)</b>				
Liquid Name	Produced Fluids			
Max. Daily Throughput (1000 gal/day)	See attached emissions calculations for all throughput values			
Max. Annual Throughput (1000 gal/yr)	See attached emissions calculations for all throughput values			
Loading Method <sup>1</sup>	SP			
Max. Fill Rate (gal/min)	Varies			
Average Fill Time (min/loading)	Varies			
Max. Bulk Liquid Temperature (°F)	See ProMax results			
True Vapor Pressure <sup>2</sup>	See ProMax results			

Cargo Vessel Condition <sup>3</sup>		U		
Control Equipment or Method <sup>4</sup>		VB, ECD		
Max. Collection Efficiency (%)		70		
Max. Control Efficiency (%)		98		
Max.VOC Emission Rate	Loading (lb/hr)	See attached emission calculations for breakdown		
	Annual (ton/yr)	See attached emission calculations for breakdown		
Max.HAP Emission Rate	Loading (lb/hr)	See attached emission calculations for breakdown		
	Annual (ton/yr)	See attached emission calculations for breakdown		
Estimation Method <sup>5</sup>		AP-42 Section 5.2 Methodology (via ProMax)		

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

ATTACHMENT P

Glycol Dehydrator Data Sheet *(Not Applicable)*



			SO <sub>2</sub>		
			PM <sub>10</sub>		
			GHG (CO <sub>2</sub> e)		
	Glycol Regenerator Still Vent	GRI-GlyCalc™	VOC		
		GRI-GlyCalc™	Benzene		
		GRI-GlyCalc™	Toluene		
		GRI-GlyCalc™	Ethylbenzene		
		GRI-GlyCalc™	Xylenes		
		GRI-GlyCalc™	n-Hexane		
	Glycol Flash Tank	GRI-GlyCalc™	VOC		
		GRI-GlyCalc™	Benzene		
		GRI-GlyCalc™	Toluene		
		GRI-GlyCalc™	Ethylbenzene		
		GRI-GlyCalc™	Xylenes		
		GRI-GlyCalc™	n-Hexane		

- 1 Enter the Source Status using the following codes:  
 NS Construction of New Source ES Existing Source  
 MS Modification of Existing Source
- 2 Enter the date (or anticipated date) of the glycol dehydration unit's installation (construction of source), modification or removal.
- 3 Enter the Air Pollution Control Device (APCD)/Emission Reduction Device (ERD) type designation using the following codes and the device ID number:  
 NA None CD Condenser FL Flare  
 CC Condenser/Combustion Combination TO Thermal Oxidizer O Other (please list)
- 4 Enter the appropriate Emission Unit ID Numbers and Emission Point ID Numbers for the glycol dehydration unit reboiler vent and glycol regenerator still vent. The glycol dehydration unit reboiler vent and glycol regenerator still vent should be designated RBV-1 and RSV-1, respectively. If the well site incorporates multiple glycol dehydration units, a Glycol Dehydration Emission Unit Data Sheet shall be completed for each, using Source Identification RBV-2 and RSV-2, RBV-3 and RSV-3, etc.
- 5 Enter the Potential Emissions Data Reference designation using the following codes:  
 MD Manufacturer's Data AP AP-42  
 GR GRI-GLYCalc™ OT Other (please list)
- 6 Enter the Reboiler Vent and Glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The Glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). **Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc™ Aggregate Calculations Report (shall include emissions reports, equipment reports, and stream reports) to this Glycol Dehydration Emission Unit Data Sheet(s). Backup pumps do not have to be considered as operating for purposes of PTE.** This PTE data shall be incorporated in the Emissions Summary Sheet.

ATTACHMENT Q

**Pneumatic Controller Data Sheet**

**ATTACHMENT Q – PNEUMATIC CONTROLLERS  
DATA SHEET**

**Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?**

Yes     No

Please list approximate number.

**Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after September 18, 2015?**

Yes     No

Please list approximate number.

**Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?**

Yes     No

Please list approximate number.

**Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after September 18, 2015?**

Yes     No

Please list approximate number.

ATTACHMENT R

**Pneumatic Pump Data Sheet**

**ATTACHMENT R – PNEUMATIC PUMP  
DATA SHEET**

**Are there any natural gas-driven diaphragm pumps located at a well site that commenced construction, modification or reconstruction after September 18, 2015?**

Yes     No

Please list.

Source ID #	Date	Pump Make/Model	Pump Size

ATTACHMENT S

**Air Pollution Control Device Data Sheet**

**ATTACHMENT S – AIR POLLUTION CONTROL DEVICE /  
EMISSION REDUCTION DEVICE SHEETS**

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

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

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

Emission Unit ID: <b>Not Applicable</b>	Make/Model:
Primary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: <input type="checkbox"/> Yes <input type="checkbox"/> No
Secondary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: <input type="checkbox"/> Yes <input type="checkbox"/> No

## VAPOR COMBUSTION (Including Enclosed Combustors)

### General Information

Control Device ID#: <b>C001</b> Control Efficiency - <b>98%</b> Capture Efficiency - <b>100%</b>	Installation Date: TBD <input checked="" type="checkbox"/> New <input type="checkbox"/> Modified <input type="checkbox"/> Relocated	
Maximum Rated Total Flow Capacity 5208 scfh                      125 Mscfd	Maximum Design Heat Input (from mfg. spec sheet) 12.2 MMBtu/hr	Design Heat Content 2333 Btu/scf

### Control Device Information

Type of Vapor Combustion Control?		
<input checked="" type="checkbox"/> Enclosed Combustion Device	<input type="checkbox"/> Elevated Flare	<input type="checkbox"/> Ground Flare
<input type="checkbox"/> Thermal Oxidizer		
Manufacturer: COMM Engineering Model: Model 4 Combustor	Hours of operation per year? 8760	

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID#) S005-S006, S007

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
S005-S006	Produced Fluids Storage Vessel		
S007	Liquid Loading		

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

Assist Type (Flares only)	Flare Height	Tip Diameter	Was the design per §60.18?
<input type="checkbox"/> Steam <input type="checkbox"/> Air <input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Non	feet 23	feet 4	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Provide determination.

### Waste Gas Information

Maximum Waste Gas Flow Rate 86 (scfm)	Heat Value of Waste Gas Stream Varies BTU/ft <sup>3</sup>	Exit Velocity of the Emissions Stream Varies (ft/s)
--	--	--

*Provide an attachment with the characteristics of the waste gas stream to be burned.*

### Pilot Gas Information

Number of Pilot Lights 1	Fuel Flow Rate to Pilot Flame per Pilot ~15 scfh	Heat Input per Pilot BTU/hr ~1,194	Will automatic re-ignition be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
-----------------------------	---	--	--

If automatic re-ignition is used, please describe the method.

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

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

Additional information attached?    Yes      No

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

## **CONDENSER – Not Applicable**

### **General Information**

Control Device ID#:	Installation Date: <input type="checkbox"/> New <input type="checkbox"/> Modified <input type="checkbox"/> Relocated	
Manufacturer:	Model:	Control Device Name:
Control Efficiency (%):		
Manufacturer's required temperature range for control efficiency.      °F		
Describe the warning and/or alarm system that protects against operation when unit is not meeting the design requirements:		
Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty.		
Additional information attached? <input type="checkbox"/> Yes <input type="checkbox"/> No Please attach copies of manufacturer's data sheets.		
Is condenser routed to a secondary APCD or ERD? <input type="checkbox"/> Yes <input type="checkbox"/> No		

## ADSORPTION SYSTEM – Not Applicable

### General Information

Control Device ID#:	Installation Date: <input type="checkbox"/> New <input type="checkbox"/> Modified <input type="checkbox"/> Relocated	
Manufacturer:	Model:	Control Device Name:
Design Inlet Volume:      scfm	Adsorbent charge per adsorber vessel and number of adsorber vessels:	
Length of Mass Transfer Zone supplied by the manufacturer:	Adsorber diameter:      ft	Adsorber area:      ft <sup>2</sup>
Adsorbent type and physical properties:	Overall Control Efficiency (%):	
Working Capacity of Adsorbent (%):		

### Operating Parameters

Inlet volume:      scfm @      °F	
Adsorption time per adsorption bed (life expectancy):	Breakthrough Capacity (lbs of VOC/100 lbs of adsorbent):
Temperature range of carbon bed adsorber. °F -      °F	

### Control Device Technical Data

Pollutants Controlled	Manufacturer's Guaranteed Control Efficiency (%)

Describe the warning and/or alarm system that protects against operation when unit is not meeting the design requirements:

Has the control device been tested by the manufacturer and certified?

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty.

Additional information attached?  Yes       No

Please attach copies of manufacturer's data sheets, drawings, and performance testing.

## VAPOR RECOVERY UNIT – Not Applicable

### General Information

Emission Unit ID#:

Installation Date:

New       Modified       Relocated

### Device Information

Manufacturer:

Model:

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

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description

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

Additional information attached?  Yes       No

Please attach copies of manufacturer's data sheets, drawings, and performance testing.

The registrant may claim a capture and control efficiency of 95 % (which accounts for 5% downtime) for the vapor recovery unit.

The registrant may claim a capture and control efficiency of 98% if the VRU has a backup flare that meet the requirements of Section 8.1.2 of this general permit.

The registrant may claim a capture and control efficiency of 98% if the VRU has a backup VRU.



Manufacturer's Performance Test Summary - NSPS 0000/0000a

Client: COMM Engineering  
Device: Model 4 Combustor  
Location: Lafayette, LA  
Date: October 2016  
Reference File Number: 16-323B

METCO Environmental conducted a NSPS Subpart 0000/0000a manufacturer performance test of COMM Engineering's Model 4 Combustor on September 30 – October 4, 2016 in Lafayette, LA to demonstrate the performance efficiency of the enclosed combustion device. The methods used were specified in 40 CFR 60 Subpart 0000/0000a and testing was performed as required at the following conditions:

Test Condition	Combustor Load Cycle (% of max flow rate)
1	Ramping up and down between 0-30%
2	Ramping up and down between 30-70%
3	Steady between 90-100%
4	Ramping up and down between 70-100%

The test results demonstrated the COMM Model 4 Combustor meets the minimum destruction efficiency of 95.0 percent for VOCs, operated with no visible smoke emissions, and had CO concentrations below 10 ppmv (corrected to 3% CO<sub>2</sub>). The actual destruction efficiency of the tested device throughout all four Test Conditions was 99.99%.

The maximum flow rate of propene burned during testing was 5208 scfh. This converts to a maximum heat load of 12.2 MMBTU/hr based on the higher heating value of propene at 2333 BTU/scf.

Third party Performance Testing conducted by METCO Environmental:

A handwritten signature in black ink, appearing to read "Mike Hutcherson".

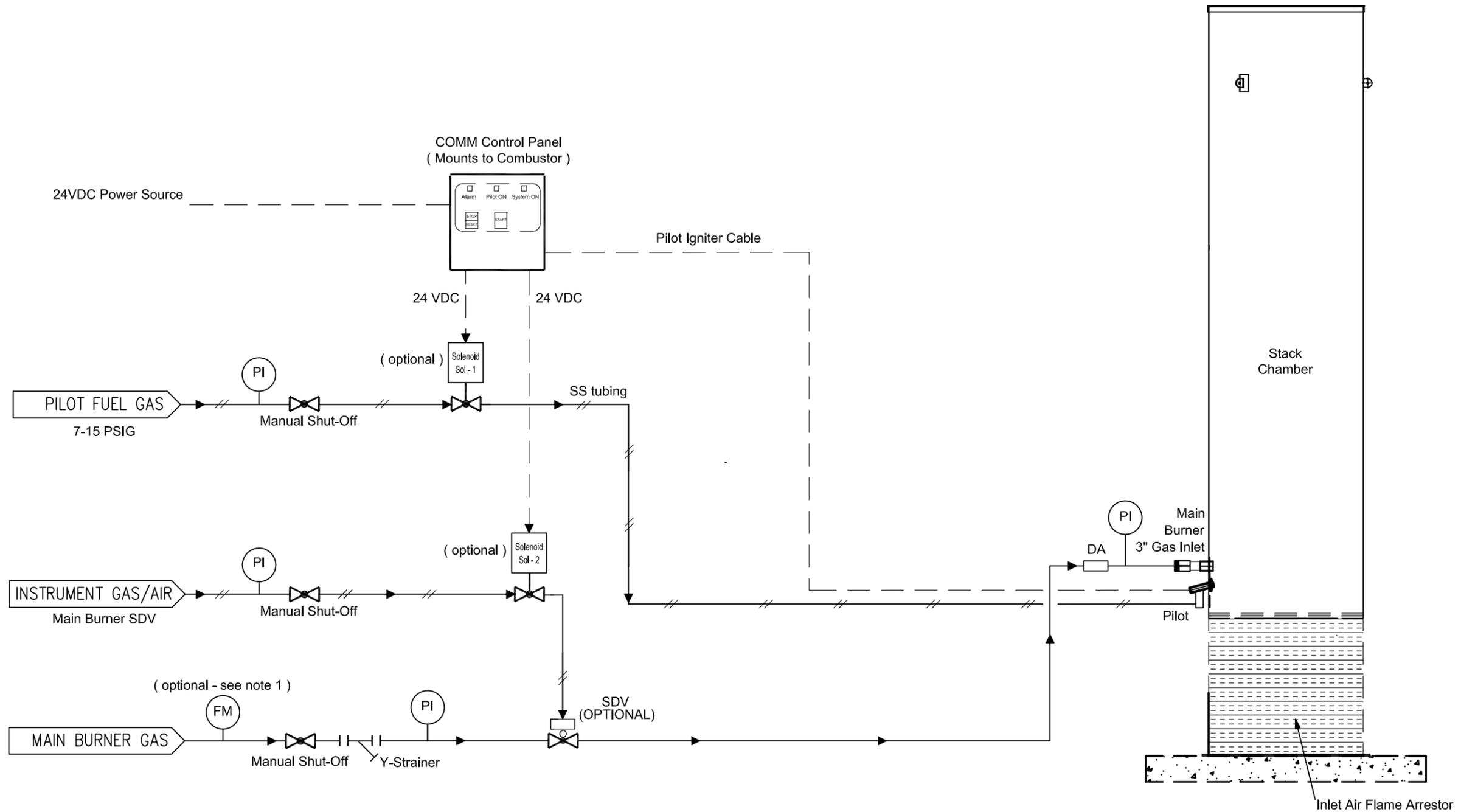
Mike Hutcherson  
Director of Field Operations

**NOTES:**

1. Flow Meter Requires:

- 10 diameters of straight pipe upstream
- 15 diameters of straight pipe downstream
- 24 VDC Power

LEGEND	
PI	- Pressure Guage
SDV	- Shut Down Valve
FM	- Flow Meter
DA	- Deflagration Arrestor



***ELEVATION VIEW***  
(FOR SINGLE UNIT)

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REVISIONS					REFERENCE DRAWINGS	
NO.	DATE	BY	CHK'D	DESCRIPTION	DWG NO.	DESCRIPTION



**COMM STANDARD**  
**P&ID COMBUSTOR MODEL 4 SINGLE STREAM 2017**

DWG. SCALE:	PLOT SCALE:	DWG. SIZE:
NTS	1:1	B
DES. BY: AD	DATE: 3/10/2017	REV. DATE:
DRAWN BY: JMS	DATE: 3/14/2017	DATE:
APPROVED BY:	DATE:	PROJECT NO.:
DRAWING NO.:	170000-F-101	REV.:
		A

ATTACHMENT T

Emission Calculations

Company Name: EOT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

**Facility-Wide Emission Summary - Controlled**

Wells 4 per pad Carbon equivalent emissions (CO<sub>2</sub>e) are based on the following Global Warming Potentials (GWP) from 40 CFR Part 98, Table A-1:  
 Storage Tanks 2 per pad CO<sub>2</sub> 1  
 Sand Separator Tank 0 per pad CH<sub>4</sub> 25  
 Line Heaters 4 per pad N<sub>2</sub>O 298  
 Compressor 0 per pad  
 High Pressure Separator 4 per pad  
 Low Pressure Separator 0 per pad  
 Vapor Recovery Unit 0 per pad  
 Tank Combustor 1 per pad  
 Length of Lease Road 2,652 feet

Emission Point ID #	Emission Source ID#s	Emission Source Description	NO <sub>x</sub>		CO		VOC		SO <sub>2</sub>		PM <sub>10</sub>		PM <sub>2.5</sub>		CH <sub>4</sub>		CO <sub>2</sub> e	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001	S005-S006	Produced Fluid Storage Vessels	---	---	---	---	0.08	0.35	---	---	---	---	---	---	0.02	0.11	0.62	2.70
C001	S007	Captured Liquid Loading	---	---	---	---	3.1E-03	8.0E-04	---	---	---	---	---	---	---	---	---	---
C001	C001	Enclosed Combustor	1.20	5.25	1.01	4.41	8.5E-05	3.7E-04	0.01	0.03	0.09	0.40	0.09	0.40	0.00	0.00	1,430.01	6,263.46
<b>C001</b>	<b>S005-S006,S007, C001</b>	<b>Enclosed Combustor</b>	<b>1.20</b>	<b>5.25</b>	<b>1.01</b>	<b>4.41</b>	<b>0.08</b>	<b>0.35</b>	<b>0.01</b>	<b>0.03</b>	<b>0.09</b>	<b>0.40</b>	<b>0.09</b>	<b>0.40</b>	<b>0.02</b>	<b>0.11</b>	<b>1,430.63</b>	<b>6,266.16</b>
E001	S001	Line Heater	0.07	0.31	0.06	0.26	3.9E-03	0.02	4.3E-04	1.9E-03	0.01	0.02	0.01	0.02	1.7E-03	0.01	87.84	384.73
E002	S002	Line Heater	0.07	0.31	0.06	0.26	3.9E-03	0.02	4.3E-04	1.9E-03	0.01	0.02	0.01	0.02	1.7E-03	0.01	87.84	384.73
E003	S003	Line Heater	0.07	0.31	0.06	0.26	3.9E-03	0.02	4.3E-04	1.9E-03	0.01	0.02	0.01	0.02	1.7E-03	0.01	87.84	384.73
E004	S004	Line Heater	0.07	0.31	0.06	0.26	3.9E-03	0.02	4.3E-04	1.9E-03	0.01	0.02	0.01	0.02	1.7E-03	0.01	87.84	384.73
E007	S007	Uncaptured Liquid Loading	---	---	---	---	0.07	0.02	---	---	---	---	---	---	---	---	---	---
---	---	Fugitives	---	---	---	---	---	8.64	---	---	---	---	---	---	---	---	---	---
---	---	Haul Roads	---	---	---	---	---	---	---	---	0.18	---	0.02	---	---	---	18.77	469.40
Facility Total			1.48	6.50	1.25	5.46	0.16	9.08	0.01	0.04	0.11	0.67	0.11	0.51	0.03	18.91	1,781.99	8,274.49
Facility Total (excluding fugitive emissions)			1.48	6.50	1.25	5.46	0.16	0.44	0.01	0.04	0.11	0.49	0.11	0.49	0.03	0.14	1,781.99	7,805.10

1. Emissions routed to combustors are divided evenly by the total number of combustors (i.e., Combustor Point Emissions = [storage tanks emissions + captured loading emissions] / [number of combustors] + combustor emissions). However, emissions can be routed to either combustor.

Company Name: EOT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

**Facility-Wide Emission Summary - Controlled**

Emission Point ID #	Emission Source ID#s	Emission Source Description	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		n-Hexane		Total BTEX		Total HAP	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001	S005-S006	Produced Fluid Storage Vessels	---	---	4.1E-05	1.8E-04	2.4E-04	1.0E-03	4.6E-04	2.0E-03	5.0E-04	2.2E-03	0.02	0.08	1.2E-03	0.01	0.02	0.08
C001	S007	Captured Liquid Loading	---	---	1.0E-06	2.7E-07	5.8E-06	1.5E-06	1.2E-05	3.2E-06	1.1E-05	2.9E-06	6.1E-04	1.6E-04	3.0E-05	7.9E-06	6.4E-04	1.7E-04
C001	C001	Enclosed Combustor	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
<b>C001</b>	<b>S005-S006,S007, C001</b>	<b>Enclosed Combustor</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>4.2E-05</b>	<b>1.8E-04</b>	<b>2.4E-04</b>	<b>1.0E-03</b>	<b>4.7E-04</b>	<b>2.0E-03</b>	<b>5.1E-04</b>	<b>2.2E-03</b>	<b>0.02</b>	<b>0.08</b>	<b>1.3E-03</b>	<b>0.01</b>	<b>0.02</b>	<b>0.08</b>
E001	S001	Line Heater	5.4E-05	2.3E-04	1.5E-06	6.6E-06	2.4E-06	1.1E-05	---	---	---	---	1.3E-03	0.01	3.9E-06	1.7E-05	1.3E-03	0.01
E002	S002	Line Heater	5.4E-05	2.3E-04	1.5E-06	6.6E-06	2.4E-06	1.1E-05	---	---	---	---	1.3E-03	0.01	3.9E-06	1.7E-05	1.3E-03	0.01
E003	S003	Line Heater	5.4E-05	2.3E-04	1.5E-06	6.6E-06	2.4E-06	1.1E-05	---	---	---	---	1.3E-03	0.01	3.9E-06	1.7E-05	1.3E-03	0.01
E004	S004	Line Heater	5.4E-05	2.3E-04	1.5E-06	6.6E-06	2.4E-06	1.1E-05	---	---	---	---	1.3E-03	0.01	3.9E-06	1.7E-05	1.3E-03	0.01
E007	S007	Uncaptured Liquid Loading	---	---	2.2E-05	5.7E-06	1.2E-04	3.2E-05	2.6E-04	6.8E-05	2.4E-04	6.3E-05	0.01	3.4E-03	6.5E-04	1.7E-04	0.01	3.6E-03
---	---	Fugitives	---	---	---	<0.01	---	<0.01	---	<0.01	---	<0.01	---	0.90	---	<0.01	---	0.96
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Total			2.1E-04	9.4E-04	6.9E-05	2.1E-04	3.8E-04	1.1E-03	7.3E-04	2.1E-03	7.5E-04	2.3E-03	0.04	1.00	1.9E-03	0.01	0.04	1.07
Facility Total (excluding fugitive emissions)			2.1E-04	9.4E-04	6.9E-05	2.1E-04	3.8E-04	1.1E-03	7.3E-04	2.1E-03	7.5E-04	2.3E-03	0.04	0.10	1.9E-03	0.01	0.04	0.11

1. Emissions routed to combustors are divided evenly by the total number of combustors (i.e., Combustor Point Emissions = [storage tanks emissions + captured loading emissions] / [number of combustors] + combustor emissions). However, emissions can be routed to either combustor.

Company Name: EQT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

**Produced Fluid Storage Vessels**

**Potential Throughput**

Operational Hours 8,760 hrs/yr  
 Maximum Condensate Throughput<sup>1</sup> 7.6 bbl/day  
 Maximum Produced Water Throughput<sup>1</sup> 60 bbl/day

Overall Control Efficiency of Combustors 98%

**Storage Tanks - Uncontrolled**

	Breathing		Working		Flashing		Total Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Methane	<0.001	<0.001	<0.001	<0.001	1.235	5.409	1.235	5.409
Ethane	<0.001	<0.001	<0.001	<0.001	0.353	1.544	0.353	1.544
Propane	0.004	0.017	0.003	0.013	1.076	4.711	1.083	4.742
Isobutane	0.001	0.005	0.001	0.004	0.332	1.456	0.334	1.464
n-Butane	0.002	0.009	0.001	0.007	0.610	2.670	0.613	2.685
Isopentane	0.001	0.004	0.001	0.003	0.279	1.220	0.280	1.226
n-Pentane	0.001	0.003	4.9E-04	0.002	0.220	0.962	0.221	0.967
Benzene	4.2E-06	1.8E-05	3.2E-06	1.4E-05	0.002	0.009	0.002	0.009
Ethylbenzene	5.0E-05	2.2E-04	3.8E-05	1.7E-04	0.023	0.100	0.023	0.100
Toluene	2.4E-05	1.0E-04	1.8E-05	7.9E-05	0.012	0.052	0.012	0.052
o-Xylene	4.6E-05	2.0E-04	3.5E-05	1.5E-04	0.025	0.109	0.025	0.109
C6	0.002	0.011	0.002	0.008	0.858	3.759	0.863	3.778
C7	0.001	0.003	0.001	0.002	0.270	1.181	0.271	1.187
C8	4.5E-04	0.002	3.4E-04	0.001	0.173	0.758	0.174	0.761
C9	1.7E-04	0.001	1.3E-04	0.001	0.068	0.300	0.069	0.301
C10	6.0E-05	2.6E-04	4.6E-05	2.0E-04	0.025	0.110	0.025	0.111
C11	1.7E-05	7.5E-05	1.3E-05	5.8E-05	0.008	0.033	0.008	0.033
C12	3.6E-06	1.6E-05	2.8E-06	1.2E-05	0.002	0.008	0.002	0.008
C13	6.4E-07	2.8E-06	4.9E-07	2.1E-06	3.2E-04	0.001	3.2E-04	0.001
<b>Total VOC Emissions:</b>	0.01	0.05	0.01	0.04	3.98	17.44	4.00	17.53
<b>Total HAP Emissions:</b>	2.6E-03	0.01	0.00	0.01	0.92	4.03	0.92	4.05

<sup>1</sup> Uncontrolled emissions calculation using Promax (sum of produced water and condensate). Non-methane emissions are taken from the tank emissions stencil. Methane emissions are taken from the flash stream composition.

<sup>2</sup> Composition of condensate from Goshorn from 02/27/2017.

Company Name: EQT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

**Produced Fluid Storage Vessels**

	Breathing		Working		Flashing		Total Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Methane	<0.001	<0.001	<0.001	<0.001	0.025	0.108	0.025	0.108
Ethane	<0.001	<0.001	<0.001	<0.001	0.007	0.031	0.007	0.031
Propane	7.9E-05	3.5E-04	6.1E-05	2.7E-04	0.022	0.094	0.022	0.095
Isobutane	2.1E-05	9.4E-05	1.6E-05	7.2E-05	0.007	0.029	0.007	0.029
n-Butane	3.9E-05	1.7E-04	3.0E-05	1.3E-04	0.012	0.053	0.012	0.054
Isopentane	1.7E-05	7.3E-05	1.3E-05	5.6E-05	0.006	0.024	0.006	0.025
n-Pentane	1.3E-05	5.6E-05	9.9E-06	4.3E-05	0.004	0.019	0.004	0.019
Benzene	8.3E-08	3.6E-07	6.4E-08	2.8E-07	4.0E-05	1.8E-04	4.1E-05	1.8E-04
Ethylbenzene	9.9E-07	4.3E-06	7.6E-07	3.3E-06	4.5E-04	0.002	4.6E-04	0.002
Toluene	4.7E-07	2.1E-06	3.6E-07	1.6E-06	2.4E-04	0.001	2.4E-04	0.001
o-Xylene	9.2E-07	4.0E-06	7.0E-07	3.1E-06	5.0E-04	0.002	5.0E-04	0.002
C6	5.0E-05	2.2E-04	3.8E-05	1.7E-04	0.017	0.075	0.017	0.076
C7	1.4E-05	6.2E-05	1.1E-05	4.8E-05	0.005	0.024	0.005	0.024
C8	8.9E-06	3.9E-05	6.8E-06	3.0E-05	0.003	0.015	0.003	0.015
C9	3.4E-06	1.5E-05	2.6E-06	1.1E-05	0.001	0.006	0.001	0.006
C10	1.2E-06	5.2E-06	9.2E-07	4.0E-06	0.001	0.002	0.001	0.002
C11	3.4E-07	1.5E-06	2.6E-07	1.2E-06	1.5E-04	0.001	1.5E-04	0.001
C12	7.3E-08	3.2E-07	5.6E-08	2.4E-07	3.4E-05	1.5E-04	3.4E-05	1.5E-04
C13	1.3E-08	5.6E-08	9.7E-09	4.3E-08	6.4E-06	2.8E-05	6.5E-06	2.8E-05
<b>Total VOC Emissions:</b>	2.5E-04	0.00	0.00	0.00	0.08	0.35	0.08	0.35
<b>Total HAP Emissions:</b>	5.2E-05	2.3E-04	4.0E-05	1.8E-04	1.8E-02	0.08	0.02	0.08

**Company Name:** EQT Production Company  
**Facility Name:** Goshorn Wellpad  
**Project Description:** G70-D Application

<b>Line Heater</b>
--------------------

<b>Source Designation:</b>	<b>S001-S004</b>
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr)	0.75
Fuel Consumption (MMscf/hr):	7.14E-04
Potential Annual Hours of Operation (hr/yr):	8,760

**Criteria and Manufacturer Specific Pollutant Emission Rates:**

Pollutant	Emission Factor (lb/MMscf) <sup>1,4</sup>	Potential Emissions	
		(lb/hr) <sup>2</sup>	(tons/yr) <sup>3</sup>
NO <sub>x</sub>	100	0.07	0.31
CO	84	0.06	0.26
VOC	5.5	3.9E-03	0.02
SO <sub>2</sub>	0.6	4.3E-04	1.9E-03
PM Total	7.6	0.01	0.02
PM Condensable	5.7	4.1E-03	0.02
PM <sub>10</sub> (Filterable)	1.9	1.4E-03	0.01
PM <sub>2.5</sub> (Filterable)	1.9	1.4E-03	0.01
Lead	5.00E-04	3.6E-07	1.6E-06
CO <sub>2</sub>	117.0	87.75	384.34
CH <sub>4</sub>	2.21E-03	1.7E-03	7.2E-03
N <sub>2</sub> O	2.21E-04	1.7E-04	7.2E-04

Company Name: EQT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

<b>Line Heater</b>
--------------------

**Hazardous Air Pollutant (HAP) Potential Emissions:**

Pollutant	Emission Factor (lb/MMscf) <sup>1</sup>	Potential Emissions	
		(lb/hr) <sup>2</sup>	(tons/yr) <sup>3</sup>
<b>HAPs:</b>			
2-Methylnaphthalene	2.4E-05	1.7E-08	7.5E-08
3-Methylchloranthrene	1.8E-06	1.3E-09	5.6E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.1E-08	5.0E-08
Acenaphthene	1.8E-06	1.3E-09	5.6E-09
Acenaphthylene	1.8E-06	1.3E-09	5.6E-09
Anthracene	2.4E-06	1.7E-09	7.5E-09
Benz(a)anthracene	1.8E-06	1.3E-09	5.6E-09
Benzene	2.1E-03	1.5E-06	6.6E-06
Benzo(a)pyrene	1.2E-06	8.6E-10	3.8E-09
Benzo(b)fluoranthene	1.8E-06	1.3E-09	5.6E-09
Benzo(g,h,i)perylene	1.2E-06	8.6E-10	3.8E-09
Benzo(k)fluoranthene	1.8E-06	1.3E-09	5.6E-09
Chrysene	1.8E-06	1.3E-09	5.6E-09
Dibenzo(a,h) anthracene	1.2E-06	8.6E-10	3.8E-09
Dichlorobenzene	1.2E-03	8.6E-07	3.8E-06
Fluoranthene	3.0E-06	2.1E-09	9.4E-09
Fluorene	2.8E-06	2.0E-09	8.8E-09
Formaldehyde	7.5E-02	5.4E-05	2.3E-04
Hexane	1.8E+00	1.3E-03	5.6E-03
Indo(1,2,3-cd)pyrene	1.8E-06	1.3E-09	5.6E-09
Naphthalene	6.1E-04	4.4E-07	1.9E-06
Phenanthrene	1.7E-05	1.2E-08	5.3E-08
Pyrene	5.0E-06	3.6E-09	1.6E-08
Toluene	3.4E-03	2.4E-06	1.1E-05
Arsenic	2.0E-04	1.4E-07	6.3E-07
Beryllium	1.2E-05	8.6E-09	3.8E-08
Cadmium	1.1E-03	7.9E-07	3.4E-06
Chromium	1.4E-03	1.0E-06	4.4E-06
Cobalt	8.4E-05	6.0E-08	2.6E-07
Manganese	3.8E-04	2.7E-07	1.2E-06
Mercury	2.6E-04	1.9E-07	8.1E-07
Nickel	2.1E-03	1.5E-06	6.6E-06
Selenium	2.4E-05	1.7E-08	7.5E-08
<b>Total HAP</b>		<b>1.3E-03</b>	<b>5.9E-03</b>

<sup>1</sup> Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3

<sup>2</sup> Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

<sup>3</sup> Annual Emissions (tons/yr)<sub>Potential</sub> = (lb/hr)<sub>Emissions</sub> × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

<sup>4</sup> GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: EQT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

**Enclosed Combustor**

<b>Source Designation:</b>	<b>C001</b>
Pilot Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Pilot Rating (MMBtu/hr)	0.02
Combustor Rating (MMBtu/hr) <sup>1</sup>	12.2
Pilot Fuel Consumption (scf/hr):	15.00
Potential Annual Hours of Operation (hr/yr):	8,760

<sup>1</sup> Maximum heat input for OOOO Combustor Model 4 Manual

**Enclosed Combustor Emissions**

Pollutant	Emission Factors <sup>1</sup> (lb/MMBtu)	Combustor		Pilot		Total	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
NO <sub>x</sub>	0.10	1.20	5.24	1.5E-03	0.01	1.20	5.25
CO	0.08	1.00	4.40	1.3E-03	0.01	1.01	4.41
VOC	5.4E-03	---	---	8.5E-05	3.7E-04	0.00	0.00
SO <sub>2</sub>	5.9E-04	0.01	0.03	9.3E-06	4.1E-05	0.01	0.03
PM/PM <sub>10</sub>	0.01	0.09	0.40	1.2E-04	5.1E-04	0.09	0.40
CO <sub>2</sub>	117.00	1427.367	6251.868	1.84	8.07	1429.21	6259.94
CH <sub>4</sub>	2.2E-03	---	---	3.5E-05	1.5E-04	0.00	0.00
N <sub>2</sub> O	2.2E-04	2.7E-03	0.01	3.5E-06	1.5E-05	2.7E-03	0.01

<sup>1</sup> Emission factors from AP-42 Ch. 1.4 for natural gas combustion were used as they were determined to be most representative of the process. Ch. 5.3 (Natural Gas Processing) was consulted, however, factors contained there are appropriate for amine gas sweetening processes, which is not the case at the PEN-15 Pad. Also, Ch. 13.5 (Industrial Flares) was consulted, but since the control device in this case is an enclosed combustor vs. an elevated flare, these factors were also determined to be inappropriate. Non-pilot VOC and methane emissions calculated using Promax.

Company Name: EQT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

<b>Liquid Loading</b>
-----------------------

Throughput 1,036,308 gal/yr  
 Capture Efficiency 70% non-tested tanker trucks  
 Control Efficiency 98% Combustor destruction efficiency

Liquid Loading Emissions

	Uncontrolled Emissions		Uncaptured Emissions		Controlled Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Propane	0.070	0.018	0.021	0.005	0.001	2.54E-04
Isobutane	0.019	0.005	0.006	0.001	2.63E-04	6.85E-05
n-Butane	0.034	0.009	0.010	0.003	4.80E-04	1.25E-04
Isopentane	0.015	0.004	0.004	0.001	2.06E-04	5.36E-05
n-Pentane	0.011	0.003	0.003	0.001	1.59E-04	4.12E-05
Benzene	7.30E-05	1.90E-05	2.19E-05	5.69E-06	1.02E-06	2.66E-07
Ethylbenzene	0.001	2.27E-04	2.62E-04	6.80E-05	1.22E-05	3.18E-06
Toluene	4.15E-04	1.08E-04	1.24E-04	3.23E-05	5.80E-06	1.51E-06
o-Xylene	0.001	2.10E-04	2.42E-04	6.29E-05	1.13E-05	2.94E-06
C6	0.044	0.011	0.013	0.003	0.001	1.59E-04
C7	0.013	0.003	0.004	0.001	1.75E-04	4.55E-05
C8	0.008	0.002	0.002	0.001	1.10E-04	2.85E-05
C9	0.003	0.001	0.001	2.34E-04	4.21E-05	1.09E-05
C10	0.001	2.73E-04	3.15E-04	8.19E-05	1.47E-05	3.82E-06
C11	3.02E-04	7.84E-05	9.05E-05	2.35E-05	4.22E-06	1.10E-06
C12	6.37E-05	1.66E-05	1.91E-05	4.97E-06	8.92E-07	2.32E-07
C13	1.12E-05	2.90E-06	3.35E-06	8.71E-07	1.56E-07	4.06E-08
<b>Total VOC Emissions:</b>	0.22	0.06	0.07	0.02	0.00	0.00
<b>Total HAP Emissions:</b>	0.05	0.01	0.01	0.00	0.00	0.00

<sup>1</sup> Uncontrolled emissions calculation using Promax (sum of produced water and condensate).

<sup>2</sup> Hourly emissions assume two hours of loading per day, five days per week.

Company Name: EQT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

**Haul Roads**

**Estimated Potential Road Fugitive Emissions**

**Unpaved Road Emissions**

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

	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	
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)	Trips Per Year	Mileage Per Year	Control (%)	Emissions (tpy)		
								PM	PM <sub>10</sub>	PM <sub>2.5</sub>
Liquids Hauling	20	40	30	0.50	259	260	0	0.56	0.14	0.01
Employee Vehicles	3	3	3	0.50	200	201	0	0.15	0.04	0.00
<b>Total Potential Emissions</b>								<b>0.71</b>	<b>0.18</b>	<b>0.02</b>

Company Name: EOT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

**Fugitive Emissions**

**Fugitive Emissions from Component Leaks**

Facility Equipment Type <sup>1</sup>	Valves	Connectors	Open-Ended Lines	Pressure Relief Devices
Wellhead	8	38	0.5	0
Separators	1	6	0	0
Meters/Piping	12	45	0	0
Compressors	12	57	0	0
In-line heaters	14	65	2	1
Dehydrators	24	90	2	2

<sup>1</sup> Table W-1B to Subpart W of Part 98 —Default Average Component Counts for Major Onshore Natural Gas Production

**Fugitive VOC/Total Emissions from Component Leaks**

Equipment Type	Service	Emission Factors <sup>1</sup> (kg/hr/source)	Facility Equipment Count <sup>2</sup> (units)	TOC Annual Fugitive Emissions (tpy)	Weight Fraction VOC	Weight Fraction HAP	VOC Emissions <sup>3</sup> (tpy)	HAP Emissions <sup>3</sup> (tpy)
Pumps	Light Liquid	0.01990	3	0.58	1.00	0.11	0.58	0.06
Compressor	Gas	0.22800	0	---	0.13	0.01	---	---
Valves	Gas	0.00597	210	12.11	0.13	0.01	1.52	0.17
Pressure Relief Valves	Gas	0.10400	10	10.04	0.13	0.01	1.26	0.14
Open-Ended Lines	All	0.00170	15	0.25	0.13	0.01	0.03	3.4E-03
Connectors	All	0.00183	924	16.33	0.13	0.01	2.05	0.23
Intermittent Pneumatic Devices <sup>4</sup>	Gas	13.5	20	---	---	---	2.55	0.28
<b>Emission Totals:</b>				<b>39.30</b>	<b>---</b>	<b>---</b>	<b>7.99</b>	<b>0.89</b>

<sup>1</sup> U.S. EPA. Office of Air Quality Planning and Standards. *Protocol for Equipment Leak Emission Estimates*. Table 2-1. (Research Triangle Park, NC: U.S. EPA EPA-453/R-95-017, 1995). SOCMF factors were used as it was representative of natural gas liquids extraction. The pneumatic equipment values are from 40 CFR 98 Subpart W, Table W-1A (units of scf/hr/component). Pneumatic controller assumes operation 1/3 of the year.

<sup>2</sup> Assumes one pump for each tank and one meter per wellhead. Pressure relief valves count includes one Emergency Pressure Relief valve and one lock-down hatch for each storage tank. Pneumatic devices assume 5 per well. A 50% compliance margin is added to the component counts based on Subpart W counts.

<sup>3</sup> Potential emissions VOC/HAP (tpy) = Emission factor (kg/hr/source) \* Number of Sources \* Weight % VOC/HAP x 2.2046 (lb/kg) x 8,760 (hr/yr) ÷ 2,000 (lb/ton)

<sup>4</sup> Potential emissions VOC/HAP (tpy) = Gas volume vented (scf/yr) \* Molar weight of natural gas (lb/lb-mol) \* Weight % VOC/HAP ÷ 100 ÷ 379 (scf/lb-mol) ÷ 2,000 (lb/ton)

Company Name: EOT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

### Fugitive Emissions

**Fugitive Specific HAP Emissions from Component Leaks**

Equipment Type	Service	Emission Factors <sup>1</sup> (kg/hr/source)	Facility Equipment Count <sup>2</sup> (units)	TOC Annual Fugitive Emissions (tpy)	Benzene Emissions <sup>3</sup> (tpy)	Toluene Emissions <sup>3</sup> (tpy)	Ethylbenzene Emissions <sup>3</sup> (tpy)	Xylene Emissions <sup>3</sup> (tpy)	n-Hexane Emissions <sup>4</sup> (tpy)
Pumps	Light Liquid	0.01990	3	0.58	<0.01	<0.01	<0.01	<0.01	0.01
Compressor	Gas	0.22800	0	---	---	---	---	---	---
Valves	Gas	0.00597	210	12.11	<0.01	<0.01	<0.01	<0.01	0.17
Pressure Relief Valves	Gas	0.10400	10	10.04	<0.01	<0.01	<0.01	<0.01	0.14
Open-Ended Lines	All	0.00170	15	0.25	<0.01	<0.01	<0.01	<0.01	3.4E-03
Connectors	All	0.00183	924	16.33	<0.01	<0.01	<0.01	<0.01	0.23
Intermittent Pneumatic Devices <sup>4</sup>	Gas	13.5	20	---	<0.01	<0.01	<0.01	<0.01	0.28
<b>Emission Totals:</b>				<b>39.30</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>0.83</b>

<sup>1</sup> U.S. EPA. Office of Air Quality Planning and Standards. *Protocol for Equipment Leak Emission Estimates*. Table 2-1. (Research Triangle Park, NC: U.S. EPA EPA-453/R-95-017, 1995). SOCM1 factors were used as it was representative of natural gas liquids extraction. The pneumatic equipment values are from 40 CFR 98 Subpart W, Table W-1A (units of scf/hr/component). Pneumatic controller assumes operation 1/3 of the year.

<sup>2</sup> Assumes one pump for each tank and one meter per wellhead. Pressure relief valves count includes one Emergency Pressure Relief valve and one lock-down hatch for each storage tank. Pneumatic devices assume 5 per well. A 50% compliance margin is added to the component counts based on Subpart W counts.

<sup>3</sup> Potential emissions HAP (tpy) = Emission factor (kg/hr/source) \* Number of Sources \* Weight % HAP x 2.2046 (lb/kg) x 8,760 (hr/yr) ÷ 2,000 (lb/ton)

<sup>4</sup> Potential emissions HAP (tpy) = Gas volume vented (scf/yr) \* Molar weight of natural gas (lb/lb-mol) \* Weight % HAP ÷ 100 ÷ 379 (scf/lb-mol) ÷ 2,000 (lb/ton)

**GHG Fugitive Emissions from Component Leaks**

Component	Component Count	GHG Emission Factor <sup>1</sup> (scf/hr/component)	CH <sub>4</sub> Emissions <sup>2,3</sup> (tpy)	CO <sub>2</sub> Emissions <sup>2,3</sup> (tpy)	CO <sub>2</sub> e Emissions <sup>4</sup> (tpy)
Pumps	3	0.01	4.6E-03	1.6E-05	0.11
Compressor	0	4.17	---	---	---
Valves	210	0.027	0.87	3.0E-03	21.71
Pressure Relief Devices	10	0.04	0.06	2.1E-04	1.53
Open-Ended Lines	15	0.061	0.14	4.9E-04	3.50
Connectors	924	0.003	0.42	1.5E-03	10.61
Intermittent Pneumatic Devices	20	13.5	13.78	0.05	344.53
<b>Total</b>			<b>15.28</b>	<b>0.05</b>	<b>382.00</b>

<sup>1</sup> Population emission factors for gas service in the Eastern U.S. from *Table W-1A of Subpart W - Default Whole Gas Emission Factors for Onshore Production*, 40 CFR 98, Subpart W (table W-6 for compressor). Pneumatic assumes operation 1/3 of the year.

<sup>2</sup> Calculated in accordance with Equations W-32a, W-35 and W-36 in Subpart W of 40 CFR 98. See footnote 4 above for sample calculation.

<sup>3</sup> Potential emissions VOC/HAP (tpy) = Gas volume vented (scf/yr) \* Molar weight of natural gas (lb/lb-mol) \* Weight % VOC/HAP ÷ 100 ÷ 379 (scf/lb-mol) ÷ 2,000 (lb/ton)

Mole fractions of CH<sub>4</sub> and CO<sub>2</sub> based on gas analysis:

CH<sub>4</sub>: 83%                      CO<sub>2</sub>: 0.11%

<sup>4</sup> Carbon equivalent emissions (CO<sub>2</sub>e) are based on the following Global Warming Potentials (GWP) from 40 CFR Part 98, Table A-1:

Carbon Dioxide (CO<sub>2</sub>): 1  
 Methane (CH<sub>4</sub>): 25

Company Name: EOT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

**Fugitive Emissions**

**Fugitive Emissions from Miscellaneous Venting**

Source	# of Events (yr)	Vented Gas Volume (scf/event)	Volume (scf/yr)	VOC Emissions (tpy)	Benzene Emissions (tpy)	Toluene Emissions (tpy)	Ethylbenzene Emissions (tpy)	Xylene Emissions (tpy)	n-Hexane Emissions (tpy)	HAP Emissions (tpy)	CH <sub>4</sub> Emissions (tpy)	CO <sub>2</sub> Emissions (tpy)	CO <sub>2</sub> e Emissions (tpy)
Pad Blowdowns	---	---	200,000	0.65	<0.01	<0.01	<0.01	<0.01	0.07	0.07	3.50	0.01	87.40
<b>Total</b>				<b>0.65</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>0.07</b>	<b>0.07</b>	<b>3.50</b>	<b>0.01</b>	<b>87.40</b>

<sup>1</sup> VOC and HAP emissions are based on sum of the fractions of the pollutants in the site-specific gas analysis in those classifications, and are calculated in accordance with standard conversion methodology and factors.

<sup>2</sup> CH<sub>4</sub> and CO<sub>2</sub> emissions are based on fractions of these pollutants in the site-specific gas analysis, and are calculated in accordance with Equations W-35 and W-36 in Subpart W of 40 CFR 98.

<sup>3</sup> GHG (CO<sub>2</sub>e) is carbon dioxide equivalent, which is the summation of CO<sub>2</sub> (GWP = 1) + CH<sub>4</sub> (GWP = 25) + N<sub>2</sub>O (GWP = 298).

<sup>4</sup> Total number of Compressor #1 maintenance activities and other shutdown/restarts is estimated to be 2 events per month

<sup>5</sup> Potential emissions VOC/HAP (tpy) = Gas volume vented (scf/yr) \* Molar weight of natural gas (lb/lb-mol) \* Weight % VOC/HAP + 100 + 379 (scf/lb-mol) + 2,000 (lb/ton)

<sup>6</sup> Potential emissions CH<sub>4</sub>/CO<sub>2</sub> (tpy) = Gas volume vented (scf/yr) \* Mole % CH<sub>4</sub>/CO<sub>2</sub> + 100 \* Density CH<sub>4</sub>/CO<sub>2</sub> (kg/scf) \* 1,000 (g/kg) + 453.6 (g/lb) + 2,000 (lb/ton)

<sup>7</sup> Gas venting volumes are based on engineering estimates.

Company Name: EQT Production Company  
 Facility Name: Goshorn Wellpad  
 Project Description: G70-D Application

<b>Gas Analysis</b>
---------------------

Sample Location: Goshorn Gas Analysis  
 Sample Date: 12/7/2016  
 HHV (Btu/scf): 1,194      Note: A conservatively low BTU content of 1,050 was used for calculations.

Constituent	Natural Gas Stream Speciation (Mole %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.105	44.01	0.05	0.00	0.237
Nitrogen	0.359	28.01	0.10	0.01	0.515
Methane	82.581	16.04	13.25	0.68	67.854
Ethane	12.223	30.07	3.68	0.19	18.828
Propane	3.032	44.10	1.34	0.07	6.849
Isobutane	0.427	58.12	0.25	0.01	1.270
n-Butane	0.652	58.12	0.38	0.02	1.941
Isopentane	0.175	72.15	0.13	0.01	0.647
n-Pentane	0.126	72.15	0.09	0.00	0.466
Cyclopentane	<0.001	70.1	0.0	0.0	0.000
n-Hexane <sup>1</sup>	0.315	86.18	0.27	0.01	1.392
Cyclohexane <sup>1</sup>	<0.001	84.16	0.00	0.00	0.000
Other Hexanes <sup>1</sup>	<0.001	86.18	0.00	0.00	0.000
<b>Totals</b>	<b>99.995</b>		<b>19.52</b>	<b>1.00</b>	<b>100</b>

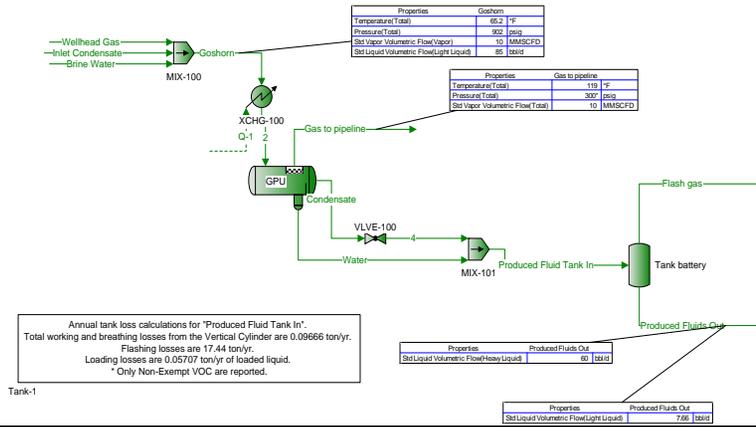
1. Hexanes plus is conservatively assumed to be n-hexanes

TOC (Total)	99.53	99.25
VOC (Total)	4.73	12.57
HAP (Total)	0.32	1.39

# Flowsheet1 Plant Schematic

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	
Flowsheet:	Flowsheet1	

## EQT Production Goshorn Wellpad Tank Emissions



\* User Specified Values  
 ? Extrapolated or Approximate Values

<b>Process Streams Report</b>	
<b>All Streams</b>	
Tabulated by Total Phase	

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	
Flowsheet:	Flowsheet1	

Connections					
-------------	--	--	--	--	--

	Brine Water	Condensate	Flash gas	Gas to pipeline	Goshorn
From Block	--	GPU	Tank battery	GPU	MIX-100
To Block	MIX-100	VLVE-100	--	--	XCHG-100

Stream Composition					
--------------------	--	--	--	--	--

	Brine Water	Condensate	Flash gas	Gas to pipeline	Goshorn
Mole Fraction	%	%	%	%	%
Methane	0 *	7.29516	35.5126	81.6974	78.2194
Ethane	0 *	5.02405	19.6691	12.1304	11.6169
Propane	0 *	3.68599	12.0132	3.04206	2.91497
Isobutane	0 *	1.10626	2.90542	0.434596	0.416852
n-Butane	0 *	2.3328	5.41754	0.673256	0.646211
Isopentane	0 *	1.40777	2.09737	0.189427	0.182352
n-Pentane	0 *	1.31949	1.68044	0.140494	0.135443
Nitrogen	0 *	0.0115334	0.0620707	0.354809	0.339688
Carbon Dioxide	0 *	0.0221857	0.222687	0.104363	0.0999561
Benzene	0 *	0.0295309	0.0151713	0.00103824	0.00101591
Ethylbenzene	0 *	2.06847	0.136414	0.00991816	0.0109742
Toluene	0 *	0.42914	0.0787748	0.00537337	0.00545357
o-Xylene	0 *	2.80394	0.149991	0.0109753	0.0125136
C6	0 *	10.9327	5.86062	0.415899	0.405955
C7	0 *	7.72594	1.65218	0.117394	0.117895
C8	0 *	12.4619	0.964623	0.0720162	0.0778292
C9	0 *	12.5937	0.351025	0.0281287	0.0359075
C10	0 *	11.7855	0.119863	0.0106109	0.0185606
C11	0 *	9.20935	0.0338961	0.0032171	0.00964558
C12	0 *	5.16507	0.00720328	0.000740793	0.00439157
C13	0 *	2.4426	0.00128769	0.000146076	0.00188127
Water	100 *	0.146904	11.0485	0.557743	4.72626

	Brine Water	Condensate	Flash gas	Gas to pipeline	Goshorn
Mass Fraction	%	%	%	%	%

Methane	0 *	1.10493	16.0652	65.9704	63.2137
Ethane	0 *	1.42627	16.6777	18.3597	17.5968
Propane	0 *	1.53454	14.9379	6.752	6.47523
Isobutane	0 *	0.607054	4.76193	1.27145	1.22053
n-Butane	0 *	1.28011	8.87926	1.96967	1.89209
Isopentane	0 *	0.958938	4.26714	0.687924	0.662774
n-Pentane	0 *	0.898806	3.41889	0.510218	0.492278
Nitrogen	0 *	0.00305038	0.0490326	0.5003	0.47937
Carbon Dioxide	0 *	0.00921825	0.276359	0.231186	0.221606
Benzene	0 *	0.0217782	0.0334173	0.00408211	0.00399757
Ethylbenzene	0 *	2.07329	0.408388	0.0530008	0.0586924
Toluene	0 *	0.373309	0.204673	0.0249205	0.0253132
o-Xylene	0 *	2.81047	0.449035	0.0586501	0.066925
C6	0 *	8.8949	14.2416	1.80402	1.76233
C7	0 *	7.30897	4.66837	0.592093	0.595109
C8	0 *	13.4397	3.10717	0.414071	0.447861
C9	0 *	15.2495	1.26954	0.181591	0.231998
C10	0 *	15.8316	0.480914	0.0759922	0.133035
C11	0 *	13.5906	0.149405	0.0253114	0.0759514
C12	0 *	8.30632	0.0345992	0.00635141	0.0376833
C13	0 *	4.25159	0.00669442	0.00135556	0.0174721
Water	100 *	0.0249863	5.61275	0.505761	4.28928

\* User Specified Values  
 ? Extrapolated or Approximate Values

**Process Streams Report**  
**All Streams**  
 Tabulated by Total Phase

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	
Flowsheet:	Flowsheet1	

	Brine Water	Condensate	Flash gas	Gas to pipeline	Goshorn
Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h
Methane	0 *	0.967492	1.18955	14549.2	14550.4
Ethane	0 *	1.24887	1.23491	4049.08	4050.41
Propane	0 *	1.34367	1.10608	1489.1	1490.46
Isobutane	0 *	0.531545	0.352599	280.407	280.94
n-Butane	0 *	1.12088	0.657468	434.393	435.519
Isopentane	0 *	0.839659	0.315962	151.716	152.556
n-Pentane	0 *	0.787007	0.253153	112.524	113.312
Nitrogen	0 *	0.00267095	0.00363064	110.337	110.341
Carbon Dioxide	0 *	0.00807163	0.0204631	50.9861	51.0089
Benzene	0 *	0.0190693	0.0024744	0.900275	0.920155
Ethylbenzene	0 *	1.8154	0.0302392	11.6889	13.5097
Toluene	0 *	0.326874	0.0151551	5.49601	5.82656
o-Xylene	0 *	2.46089	0.033249	12.9348	15.4047
C6	0 *	7.7885	1.05453	397.861	405.65
C7	0 *	6.39984	0.345671	130.581	136.981
C8	0 *	11.768	0.230071	91.3198	103.088
C9	0 *	13.3527	0.0940033	40.0483	53.401
C10	0 *	13.8624	0.0356094	16.7594	30.6218
C11	0 *	11.9002	0.0110627	5.58222	17.4824
C12	0 *	7.27313	0.00256191	1.40075	8.67388
C13	0 *	3.72275	0.000495691	0.298957	4.02171
Water	987.3 *	0.0218784	0.415598	111.541	987.3

**Stream Properties**

Property	Units	Brine Water	Condensate	Flash gas	Gas to pipeline	Goshorn
Temperature	°F	65 *	119.003	118.278	119.003	65.2177
Pressure	psia	916.696 *	314.696	14.6959 *	314.696 *	916.696
Mole Fraction Vapor	%	0	0	100	100	94.2617
Mole Fraction Light Liquid	%	100	100	0	0	1.04553
Mole Fraction Heavy Liquid	%	0	0	0	0	4.6928
Molecular Weight	lb/lbmol	18.0153	105.918	35.4623	19.8669	19.8506
Mass Density	lb/ft <sup>3</sup>	62.3757	42.6696	0.084769	1.06366	4.26045
Molar Flow	lbmol/h	54.8035	0.826688	0.2088	1110.1	1159.55
Mass Flow	lb/h	987.3	87.5614	7.40453	22054.2	23017.8
Vapor Volumetric Flow	ft <sup>3</sup> /h	15.8283	2.05208	87.3496	20734.1	5402.68
Liquid Volumetric Flow	gpm	1.9734	0.255843	10.8903	2585.04	673.581
Std Vapor Volumetric Flow	MMSCFD	0.499129	0.00752916	0.00190167	10.1103	10.5608
Std Liquid Volumetric Flow	sgpm	1.97368 *	0.25134	0.030833	131.61	133.615
Compressibility		0.047022	0.12579	0.991233	0.946499	0.758254
Specific Gravity		1.00011	0.684148	1.22442	0.68595	
API Gravity		9.88979	66.9036			
Enthalpy	Btu/h	-6.74371E+06	-77606.4	-10251.4	-3.75727E+07	-4.50378E+07
Mass Enthalpy	Btu/lb	-6830.46	-886.309	-1384.48	-1703.65	-1956.65
Mass Cp	Btu/(lb*°F)	0.981086	0.540043	0.44685	0.539741	0.671781
Ideal Gas CpCv Ratio		1.32608	1.04751	1.14418	1.24642	1.26204
Thermal Conductivity	Btu/(h*ft*°F)	0.344737	0.0690834	0.0144415	0.0205149	
Net Ideal Gas Heating Value	Btu/ft <sup>3</sup>	0	5357.72	1760.89	1088	1045.43
Net Liquid Heating Value	Btu/lb	-1059.76	19037.8	18660.6	20726.1	19890.8
Gross Ideal Gas Heating Value	Btu/ft <sup>3</sup>	50.3101	5771.22	1923.54	1201.2	1156.21
Gross Liquid Heating Value	Btu/lb	0	20519.3	20401.1	22888.4	22008.5

**Warnings**

ProMax!Project!Flowsheets!Flowsheet1!PStreams!Goshorn  
 Warning: The temperature of 65.2177 °F is within 10 °F of hydrate formation.

**Remarks**

		<b>Process Streams Report</b> <b>All Streams</b> Tabulated by Total Phase		
Client Name:	EQT Production Company	Job:		
Location:	Goshorn Wellpad			
Flowsheet:	Flowsheet1			

**Process Streams Report**  
**All Streams**  
 Tabulated by Total Phase

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	
Flowsheet:	Flowsheet1	

**Connections**

	Inlet Condensate	Produced Fluid Tank In	Produced Fluids Out	Water	Wellhead Gas
From Block	--	MIX-101	Tank battery	GPU	--
To Block	MIX-100	Tank battery	--	MIX-101	MIX-100

**Stream Composition**

Mole Fraction	Inlet Condensate %	Produced Fluid Tank In %	Produced Fluids Out %	Water %	Wellhead Gas %
Methane	3.30398 *	0.152636	0.0027164	0.0312153	82.5852 *
Ethane	7.28906 *	0.0894057	0.00639174	0.00551845	12.2234 *
Propane	7.52755 *	0.0624114	0.0117422	0.000811786	3.03204 *
Isobutane	2.20809 *	0.0185577	0.006318	6.71851E-05	0.42662 *
n-Butane	4.91977 *	0.0391575	0.0163542	0.000166382	0.65213 *
Isopentane	2.85108 *	0.0235544	0.0147619	2.32047E-05	0.175008 *
n-Pentane	2.73138 *	0.0220711	0.0150399	1.53291E-05	0.126206 *
Nitrogen	0.00309998 *	0.000263859	1.8098E-06	7.22798E-05	0.358717 *
Carbon Dioxide	0.0415998 *	0.00104699	0.000107278	0.000687636	0.105305 *
Benzene	0.174099 *	0.000514627	0.000452486	2.13609E-05	0 *
Ethylbenzene	1.88069 *	0.0346792	0.0342478	0.00010547	0 *
Toluene	0.934594 *	0.00725384	0.0069506	8.19288E-05	0 *
o-Xylene	2.14449 *	0.0470409	0.0466044	0.000174525	0 *
C6	18.3864 *	0.182768	0.158695	2.24903E-05	0.315415 *
C7	20.204 *	0.129147	0.12269	4.18241E-06	0 *
C8	13.3378 *	0.208308	0.205102	1.24285E-06	0 *
C9	6.15356 *	0.21051	0.209914	3.22649E-07	0 *
C10	3.18078 *	0.197	0.197327	4.28466E-08	0 *
C11	1.65299 *	0.153939	0.154448	4.70368E-09	0 *
C12	0.752595 *	0.0863366	0.0866722	2.33035E-09	0 *
C13	0.322398 *	0.0408293	0.0409969	8.90354E-10	0 *
Water	0 *	98.2926	98.6625	99.961	0 *

Mass Fraction	Inlet Condensate %	Produced Fluid Tank In %	Produced Fluids Out %	Water %	Wellhead Gas %
Methane	0.604349 *	0.125665	0.00224422	0.0277956	67.8582 *
Ethane	2.49902 *	0.137966	0.00989781	0.0092103	18.8252 *
Propane	3.78468 *	0.141237	0.0266653	0.00198689	6.84793 *
Isobutane	1.46332 *	0.0553547	0.0189114	0.000216747	1.27002 *
n-Butane	3.26037 *	0.116801	0.0489522	0.000536768	1.94136 *
Isopentane	2.34541 *	0.0872147	0.0548492	9.29269E-05	0.64672 *
n-Pentane	2.24694 *	0.0817223	0.0558824	6.1388E-05	0.466377 *
Nitrogen	0.000990158 *	0.000379337	2.61093E-06	0.000112388	0.514691 *
Carbon Dioxide	0.0208745 *	0.0023647	0.00024314	0.00167974	0.237369 *
Benzene	0.155057 *	0.00206299	0.00182022	9.26133E-05	0 *
Ethylbenzene	2.27655 *	0.188946	0.187247	0.000621507	0 *
Toluene	0.981847 *	0.0343002	0.032981	0.000419001	0 *
o-Xylene	2.59588 *	0.256298	0.254805	0.00102844	0 *
C6	18.0659 *	0.808299	0.704284	0.000107576	1.39217 *
C7	23.083 *	0.664123	0.633118	2.32616E-05	0 *
C8	17.3716 *	1.22115	1.20655	7.88008E-06	0 *
C9	8.99873 *	1.38559	1.38649	2.2969E-06	0 *
C10	5.16015 *	1.43848	1.44589	3.38378E-07	0 *
C11	2.94599 *	1.23486	1.24327	4.08091E-08	0 *
C12	1.46165 *	0.754722	0.760298	2.20324E-08	0 *
C13	0.677707 *	0.386305	0.389244	9.11108E-09	0 *
Water	0 *	90.8762	91.5364	99.956	0 *

**Process Streams Report**  
**All Streams**  
 Tabulated by Total Phase

Client Name: EQT Production Company

Job:

Location: Goshorn Wellpad

Flowsheet: Flowsheet1

Mass Flow	Inlet Condensate lb/h	Produced Fluid Tank In lb/h	Produced Fluids Out lb/h	Water lb/h	Wellhead Gas lb/h
Methane	3.58638 *	1.21101	0.021461	0.243523	14546.8 *
Ethane	14.8299 *	1.32956	0.0946506	0.0806935	4035.58 *
Propane	22.4594 *	1.36107	0.254995	0.0174076	1468 *
Isobutane	8.68373 *	0.533444	0.180845	0.00189896	272.256 *
n-Butane	19.348 *	1.12559	0.46812	0.00470274	416.171 *
Isopentane	13.9183 *	0.840473	0.524511	0.000814153	138.638 *
n-Pentane	13.334 *	0.787544	0.534391	0.000537834	99.9778 *
Nitrogen	0.00587588 *	0.00365561	2.49678E-05	0.000984656	110.335 *
Carbon Dioxide	0.123875 *	0.0227882	0.0023251	0.0147166	50.885 *
Benzene	0.920155 *	0.0198807	0.0174063	0.000811405	0 *
Ethylbenzene	13.5097 *	1.82084	1.7906	0.00544516	0 *
Toluene	5.82656 *	0.330545	0.31539	0.00367096	0 *
o-Xylene	15.4047 *	2.4699	2.43665	0.00901035	0 *
C6	107.208 *	7.78944	6.73492	0.000942496	298.442 *
C7	136.981 *	6.40004	6.05437	0.0002038	0 *
C8	103.088 *	11.768	11.538	6.90391E-05	0 *
C9	53.401 *	13.3527	13.2587	2.01237E-05	0 *
C10	30.6218 *	13.8624	13.8268	2.96461E-06	0 *
C11	17.4824 *	11.9002	11.8891	3.57538E-07	0 *
C12	8.67388 *	7.27313	7.27057	1.93031E-07	0 *
C13	4.02171 *	3.72275	3.72226	7.98242E-08	0 *
Water	0 *	875.758	875.343	875.736	0 *

**Stream Properties**

Property	Units	Inlet Condensate	Produced Fluid Tank In	Produced Fluids Out	Water	Wellhead Gas
Temperature	°F	65 *	118.289	118.278	119.003	65 *
Pressure	psia	916.696 *	14.8209	14.6959	314.696	916.696 *
Mole Fraction Vapor	%	0	0.420686	0	0	100
Mole Fraction Light Liquid	%	100	1.33291	1.33761	100	0
Mole Fraction Heavy Liquid	%	0	98.2464	98.6624	0	0
Molecular Weight	lb/lbmol	87.7042	19.4855	19.4178	18.0162	19.5241
Mass Density	lb/ft^3	42.7282	9.41651	59.6323	61.6767	3.98091
Molar Flow	lbmol/h	6.76625	49.4564	49.2476	48.6297	1097.98
Mass Flow	lb/h	593.429	963.683	956.279	876.122	21437.1
Vapor Volumetric Flow	ft^3/h	13.8884	102.34	16.0362	14.2051	5384.98
Liquid Volumetric Flow	gpm	1.73155	12.7592	1.99932	1.77102	671.374
Std Vapor Volumetric Flow	MMSCFD	0.0616244	0.45043	0.448528	0.442901	10 *
Std Liquid Volumetric Flow	sgpm	1.78504 *	2.00426	1.97342	1.75292	129.856
Compressibility		0.33418	0.00494467	0.000771548	0.0148025	0.798481
Specific Gravity		0.685088		0.956121	0.9889	0.674114
API Gravity		74.2905		14.574	10.028	
Enthalpy	Btu/h	-557595	-6.01513E+06	-6.00488E+06	-5.93753E+06	-3.77365E+07
Mass Enthalpy	Btu/lb	-939.616	-6241.82	-6279.43	-6777.06	-1760.33
Mass Cp	Btu/(lb*°F)	0.515948	0.93948	0.943285	0.981299	0.661297
Ideal Gas CpCv Ratio		1.06298	1.29492	1.29623	1.32349	1.26466
Thermal Conductivity	Btu/(h*ft*°F)	0.070596		0.332821	0.366587	0.0215622
Net Ideal Gas Heating Value	Btu/ft^3	4455.72	89.9699	82.8855	0.419925	1076.6
Net Liquid Heating Value	Btu/lb	19120.3	774.776	636.285	-1050.47	20877
Gross Ideal Gas Heating Value	Btu/ft^3	4804.39	146.374	138.839	50.7534	1188.93
Gross Liquid Heating Value	Btu/lb	20628.9	1873.25	1729.79	9.72836	23060.4

**Remarks**

**Process Streams Report**  
**All Streams**  
 Tabulated by Total Phase

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	
Flowsheet:	Flowsheet1	

**Connections**

	2	4		
From Block	XCHG-100	VLVE-100		
To Block	GPU	MIX-101		

**Stream Composition**

Mole Fraction	2 %	4 %		
Methane	78.2194	7.29516		
Ethane	11.6169	5.02405		
Propane	2.91497	3.68599		
Isobutane	0.416852	1.10626		
n-Butane	0.646211	2.3328		
Isopentane	0.182352	1.40777		
n-Pentane	0.135443	1.31949		
Nitrogen	0.339688	0.0115334		
Carbon Dioxide	0.0999561	0.0221857		
Benzene	0.00101591	0.0295309		
Ethylbenzene	0.0109742	2.06847		
Toluene	0.00545357	0.42914		
o-Xylene	0.0125136	2.80394		
C6	0.405955	10.9327		
C7	0.117895	7.72594		
C8	0.0778292	12.4619		
C9	0.0359075	12.5937		
C10	0.0185606	11.7855		
C11	0.00964558	9.20935		
C12	0.00439157	5.16507		
C13	0.00188127	2.4426		
Water	4.72626	0.146904		

Mass Fraction	2 %	4 %		
Methane	63.2137	1.10493		
Ethane	17.5968	1.42627		
Propane	6.47523	1.53454		
Isobutane	1.22053	0.607054		
n-Butane	1.89209	1.28011		
Isopentane	0.662774	0.958938		
n-Pentane	0.492278	0.898806		
Nitrogen	0.47937	0.00305038		
Carbon Dioxide	0.221606	0.00921825		
Benzene	0.00399757	0.0217782		
Ethylbenzene	0.0586924	2.07329		
Toluene	0.0253132	0.373309		
o-Xylene	0.066925	2.81047		
C6	1.76233	8.8949		
C7	0.595109	7.30897		
C8	0.447861	13.4397		
C9	0.231998	15.2495		
C10	0.133035	15.8316		
C11	0.0759514	13.5906		
C12	0.0376833	8.30632		
C13	0.0174721	4.25159		
Water	4.28928	0.0249863		

Mass Flow	2 lb/h	4 lb/h		
Methane	14550.4	0.967492		
Ethane	4050.41	1.24887		
Propane	1490.46	1.34367		

**Process Streams Report**  
**All Streams**  
 Tabulated by Total Phase

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	
Flowsheet:	Flowsheet1	

Mass Flow	2 lb/h	4 lb/h			
Isobutane	280.94	0.531545			
n-Butane	435.519	1.12088			
Isopentane	152.556	0.839659			
n-Pentane	113.312	0.787007			
Nitrogen	110.341	0.00267095			
Carbon Dioxide	51.0089	0.00807163			
Benzene	0.920155	0.0190693			
Ethylbenzene	13.5097	1.8154			
Toluene	5.82656	0.326874			
o-Xylene	15.4047	2.46089			
C6	405.65	7.7885			
C7	136.981	6.39984			
C8	103.088	11.768			
C9	53.401	13.3527			
C10	30.6218	13.8624			
C11	17.4824	11.9002			
C12	8.67388	7.27313			
C13	4.02171	3.72275			
Water	987.3	0.0218784			

**Stream Properties**

Property	Units	2	4			
Temperature	°F	119.003	104.419			
Pressure	psia	314.696 *	14.8209 *			
Mole Fraction Vapor	%	95.7349	17.9795			
Mole Fraction Light Liquid	%	0.0712937	82.0205			
Mole Fraction Heavy Liquid	%	4.19384	0			
Molecular Weight	lb/lbmol	19.8506	105.918			
Mass Density	lb/ft <sup>3</sup>	1.10927	1.41146			
Molar Flow	lbmol/h	1159.55	0.826688			
Mass Flow	lb/h	23017.8	87.5614			
Vapor Volumetric Flow	ft <sup>3</sup> /h	20750.4	62.0359			
Liquid Volumetric Flow	gpm	2587.06	7.73435			
Std Vapor Volumetric Flow	MMSCFD	10.5608	0.00752916			
Std Liquid Volumetric Flow	sgpm	133.615	0.25134			
Compressibility		0.90684	0.183724			
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	-4.35878E+07	-77606.4			
Mass Enthalpy	Btu/lb	-1893.65	-886.309			
Mass Cp	Btu/(lb*°F)	0.556549	0.518402			
Ideal Gas CpCv Ratio		1.24816	1.04856			
Thermal Conductivity	Btu/(h*ft*°F)					
Net Ideal Gas Heating Value	Btu/ft <sup>3</sup>	1045.43	5357.72			
Net Liquid Heating Value	Btu/lb	19890.8	19037.8			
Gross Ideal Gas Heating Value	Btu/ft <sup>3</sup>	1156.21	5771.22			
Gross Liquid Heating Value	Btu/lb	22008.5	20519.3			

**Remarks**

## Energy Stream Report

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	
Flowsheet:	Flowsheet1	

### Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-1	1.45E+06 * Btu/h	569.871 * hp	--	XCHG-100

Remarks

**Blocks  
GPU  
Separator Report**

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	Modified: 3:44 PM, 8/2/2017
Flowsheet:	Flowsheet1	Status: Solved 2:53 PM, 9/6/2017

**Connections**

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
2	Inlet	XCHG-100	Gas to pipeline	Vapor Outlet	
Condensate	Light Liquid Outlet	VLVE-100	Water	Heavy Liquid Outlet	MIX-101

**Block Parameters**

Pressure Drop	0 psi	* Main Liquid Phase	Light Liquid
Mole Fraction Vapor	95.7349 %	Heat Duty	0 Btu/h
Mole Fraction Light Liquid	0.0712937 %	Heat Release Curve Type	Plug Flow
Mole Fraction Heavy Liquid	4.19384 %	Heat Release Curve Increments	10

**Remarks**

**Blocks**  
**MIX-100**  
Mixer/Splitter Report

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	Modified: 12:02 PM, 8/2/2017
Flowsheet:	Flowsheet1	Status: Solved 2:53 PM, 9/6/2017

**Connections**

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Wellhead Gas	Inlet		Inlet Condensate	Inlet	
Brine Water	Inlet		Goshorn	Outlet	XCHG-100

**Block Parameters**

Pressure Drop	0 psi	Fraction to PStream	100 %
		Goshorn	

**Remarks**

**Blocks**  
**MIX-101**  
Mixer/Splitter Report

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	Modified: 12:50 PM, 9/6/2017
Flowsheet:	Flowsheet1	Status: Solved 2:53 PM, 9/6/2017

**Connections**

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
4	Inlet	VLVE-100	Water	Inlet	GPU
Produced Fluid Tank In	Outlet	Tank battery			

**Block Parameters**

Pressure Drop	0 psi	Fraction to PStream	100 %
		Produced Fluid Tank In	

**Remarks**

<b>Blocks Tank battery Separator Report</b>					
Client Name:	EQT Production Company			Job:	
Location:	Goshorn Wellpad			Modified:	12:50 PM, 9/6/2017
Flowsheet:	Flowsheet1			Status:	Solved 2:53 PM, 9/6/2017
<b>Connections</b>					
Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Fluid Tank In	Inlet	MIX-101	Flash gas	Vapor Outlet	
Produced Fluids Out	Light Liquid Outlet				
<b>Block Parameters</b>					
Pressure Drop	0.125	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	0.42219	%	Heat Duty	0	Btu/h
Mole Fraction Light Liquid	1.33197	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	98.2458	%	Heat Release Curve Increments	10	
<b>Remarks</b>					

	<b>Blocks</b> <b>VLVE-100</b> JT-Valve Report	
--	---	--

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	Modified: 4:07 PM, 8/2/2017
Flowsheet:	Flowsheet1	Status: Solved 2:53 PM, 9/6/2017

Connections					
Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Condensate	Inlet	GPU	4	Outlet	MIX-101

Block Parameters			
Pressure Drop	299.875	psi	Pressure Drop Method
Joule-Thomson Coefficient	0.0486346	°F/psi	User Set

**Remarks**

**Blocks**  
**XCHG-100**  
Heat Exchanger Report

Client Name:	EQT Production Company	Job:
Location:	Goshorn Wellpad	Modified: 3:44 PM, 8/2/2017
Flowsheet:	Flowsheet1	Status: Solved 2:53 PM, 9/6/2017

**Connections**

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Goshorn	Inlet	MIX-100	2	Outlet	GPU
Q-1	Energy				

**Block Parameters**

Pressure Drop	602 psi	Heat Release Curve Type	Plug Flow
Temperature Change	53.7856 °F	Heat Release Curve Increments	10
Heat Duty	1.45E+06 Btu/h		

**Remarks**

Flowsheet Environment Environment1					
Client Name:	EQT Production Company			Job:	
Location:	Goshorn Wellpad				
Flowsheet:	Flowsheet1				
Environment Settings					
Number of Poynting Intervals	0	Phase Tolerance	1 %		
Gibbs Excess Model	77 °F	Emulsion Enabled	False		
Evaluation Temperature					
Freeze Out Temperature	10 °F				
Threshold Difference					
Components					
Component Name	Henry's Law Component	Phase Initiator	Component Name	Henry's Law Component	Phase Initiator
Methane	False	False	Toluene	False	False
Ethane	False	False	o-Xylene	False	False
Propane	False	False	C6	False	False
Isobutane	False	False	C7	False	False
n-Butane	False	False	C8	False	False
Isopentane	False	False	C9	False	False
n-Pentane	False	False	C10	False	False
Nitrogen	False	False	C11	False	False
Carbon Dioxide	False	False	C12	False	False
Benzene	False	False	C13	False	False
Ethylbenzene	False	False	Water	False	True
Physical Property Method Sets					
Liquid Molar Volume	COSTALD		Overall Package	Peng-Robinson Polar	
Stability Calculation	Peng-Robinson Polar		Vapor Package	Peng-Robinson Polar	
Light Liquid Package	Peng-Robinson Polar		Heavy Liquid Package	Peng-Robinson Polar	
Remarks					

**Gas Analytical**  
 Stonewood, West Virginia  
 8444 Water Street  
 Stonewood, WV 26301-8006

Report Date: Dec 21, 2016 12:57p

Client:	EQT PRODUCTION	Date Sampled:	Dec 7, 2016
Client Code:	0555	Analysis Date:	Dec 20, 2016 12:00a
Site:	GOSHORN 518047	Collected By:	RV
Field:	940-WEST VIRGINIA	Date Effective:	Jan 1, 2017 12:00a
Meter:	518047	Sample Pressure (PSI):	0.0
Source Laboratory	Stonewood, WV	Sample Temp (°F):	60
<b>Lab File No:</b>	<b>516604708</b>	Field H2O (lb/MMSCFD):	
Cylinder No:	1159		
Analysis Status:	good		
Sample Type:	Spot		
Measurement Analyst:	<i>Ashley Free</i>		

Component	Mol %	GPM @Contract PSIA
H2S		
Methane	82.5814	0.0000
Ethane	12.2228	3.2782
Propane	3.0319	0.8377
I-Butane	0.4266	0.1400
N-Butane	0.6521	0.2062
I-Pentane	0.1750	0.0642
N-Pentane	0.1262	0.0459
Nitrogen	0.3587	0.0000
Oxygen	0.0046	0.0000
Carbon Dioxide	0.1053	0.0000
Helium	0.0000	
Hexanes+	0.3154	0.1373
TOTAL	100.0000	4.7095

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1,193.7483 BTU/ft <sup>3</sup>
BTU/SCF (Saturated):	1,173.3779 BTU/ft <sup>3</sup>
PSIA:	14.696 PSI
Temperature (°F):	60.0 °F
Z Factor (Dry):	0.99690
Z Factor (Saturated):	0.99652

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1,196.5187 BTU/ft <sup>3</sup>
BTU/SCF (Saturated):	1,176.1492 BTU/ft <sup>3</sup>
PSIA:	14.730 PSI
Temperature (°F):	60.0 °F
Z Factor (Dry):	0.99691
Z Factor (Saturated):	0.99652

Calculated Specific Gravities		
Ideal Gravity:	0.6749	Real Gravity: 0.6767
Molecular Wt:	19.5468	lb/lbmol

Methods, standards, and uncertainties based on GPA 2261-13.  
 Analytical Calculations performed in accordance with GPA 2172-09.

Source	Date	Notes

**Gas Analytical Services**

MOUNDS ,OK

918-861-9998

<b>Customer</b> : 5115 - EQT PRODUCTION	<b>Date Sampled</b> : 02/27/2017
<b>Station Id</b> : 518050	<b>Date Analyzed</b> : 03/09/2017
<b>Cylinder Id</b> : 1	<b>Effective Date</b> : 03/01/2017
<b>Producer</b> : EQT PRODUCTION	<b>Line Pressure</b> : 0.00000
<b>Lease</b> : TRANS ENERGY PAD	<b>Cyl Pressure</b> : 902.00000
<b>Area</b> :	<b>Temp</b> : 71.00000
<b>Sample By</b> :	<b>Cylinder Type</b> : Spot
<b>Property Cd</b> :	<b>Formation</b> :

COMPONENT		Mole Percent	WT. Percent	Liq Vol Percent
Methane	C1	3.3040	0.5807	1.3209
Ethane	C2	7.2891	2.4015	4.5989
Propane	C3	7.5276	3.6370	4.8924
Iso-Butane	IC4	2.2081	1.4062	1.7043
Normal-Butane	NC4	4.9198	3.1331	3.6590
Iso-Pentane	IC5	2.8511	2.2539	2.4599
Normal-Pentane	NC5	2.7314	2.1592	2.3359
Nitrogen	N2	0.0031	0.0009	0.0005
Carbon-Dioxide	CO2	0.0416	0.0200	0.0164
BENZENE	BENZENE	0.1741	0.1490	0.1143
ETHYLBENZENE	E-BENZENE	1.8807	2.1877	1.7112
TOLUENE	TOLUENE	0.9346	0.9436	0.7378
O-XYLENE	O-XYLENE	2.1445	2.4947	1.9228
C6's	C6's	18.3865	17.3291	17.6321
C7's	C7's	20.2041	27.4466	26.0416
C8's	C8's	13.3379	16.4775	15.7185
C9's	C9's	6.1536	8.5638	7.5809
C10's	C10's	3.1808	4.4418	3.8608
C11's	C11's	1.6530	2.4633	1.9970
C12's	C12's	0.7526	1.2592	1.1111
C13's	C13's	0.3224	0.6512	0.5836
TOTAL		100.0006	100.0000	100.0000

**Totals**

SPECIFIC GRAVITY @ 60 DEG. F. (WATER = 1)	0.6819
MOLECULAR WEIGHT	91.2706
POUNDS/GALLON (ABSOLUTE DENSITY)	5.6855
CALC. VAPOR PRESSURE @ 14.65 PSIA, 100 Deg. F.	244.4865

**Comments:**

CUFT. VAPOR / GALLON @ 14.65 PSIA, 60 Deg. G.	23.7876
BTU / CUFT. DRY GAS @ 14.65 PSIA, 60 Deg. F.	4,704.1602
BTU / GALLON LIQUID	116,948.5893
BTU / POUND	20,478.7396

**Comments:**

ATTACHMENT U

**Emission Summary Sheet**

## ATTACHMENT U – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	NO <sub>x</sub>		CO		VOC		SO <sub>2</sub>		PM <sub>10</sub>		PM <sub>2.5</sub>		CH <sub>4</sub>		GHG (CO <sub>2</sub> e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
<b>C001 (S005-S006,S007)</b>	1.20	5.25	1.01	4.41	0.08	0.35	0.01	0.03	0.09	0.40	0.09	0.40	0.02	0.11	1,430.63	6,266.16
<b>E001 (S001)</b>	0.07	0.31	0.06	0.26	3.9E-03	0.02	4.3E-04	1.9E-03	0.01	0.02	0.01	0.02	1.7E-03	0.01	87.84	384.73
<b>E002 (S002)</b>	0.07	0.31	0.06	0.26	3.9E-03	0.02	4.3E-04	1.9E-03	0.01	0.02	0.01	0.02	1.7E-03	0.01	87.84	384.73
<b>E003 (S003)</b>	0.07	0.31	0.06	0.26	3.9E-03	0.02	4.3E-04	1.9E-03	0.01	0.02	0.01	0.02	1.7E-03	0.01	87.84	384.73
<b>E004 (S004)</b>	0.07	0.31	0.06	0.26	3.9E-03	0.02	4.3E-04	1.9E-03	0.01	0.02	0.01	0.02	1.7E-03	0.01	87.84	384.73
<b>E007 (S007)</b>	---	---	---	---	0.07	0.02	---	---	---	---	---	---	---	---	---	---
<b>Fugitives</b>	---	---	---	---	---	8.64	---	---	---	---	---	---	---	18.77	---	469.40
<b>Haul Roads</b>	---	---	---	---	---	---	---	---	---	0.18	---	0.02	---	---	---	---
<b>Facility Total</b>	1.48	6.50	1.25	5.46	0.16	9.08	0.01	0.04	0.11	0.67	0.11	0.51	0.03	18.91	1,781.99	8,274.49
<b>Facility Total (excl. fugitives)</b>	1.48	6.50	1.25	5.46	0.16	0.44	0.01	0.04	0.11	0.49	0.11	0.49	0.03	0.14	1,781.99	7,805.10

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators.

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

## ATTACHMENT U – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
<b>C001 (S005-S006,S007)</b>	---	---	4.2E-05	1.8E-04	2.4E-04	1.0E-03	4.7E-04	2.0E-03	5.1E-04	2.2E-03	0.02	0.08	0.02	0.08
<b>E001 (S001)</b>	5.4E-05	2.3E-04	1.5E-06	6.6E-06	2.4E-06	1.1E-05	---	---	---	---	1.3E-03	0.01	1.3E-03	0.01
<b>E002 (S002)</b>	5.4E-05	2.3E-04	1.5E-06	6.6E-06	2.4E-06	1.1E-05	---	---	---	---	1.3E-03	0.01	1.3E-03	0.01
<b>E003 (S003)</b>	5.4E-05	2.3E-04	1.5E-06	6.6E-06	2.4E-06	1.1E-05	---	---	---	---	1.3E-03	0.01	1.3E-03	0.01
<b>E004 (S004)</b>	5.4E-05	2.3E-04	1.5E-06	6.6E-06	2.4E-06	1.1E-05	---	---	---	---	1.3E-03	0.01	1.3E-03	0.01
<b>E007 (S007)</b>	---	---	2.5E-05	5.7E-06	1.2E-04	3.2E-05	2.6E-04	6.8E-05	2.4E-04	6.3E-05	0.01	3.4E-03	0.01	3.6E-03
<b>Fugitives</b>	---	---	---	<0.01	---	<0.01	---	<0.01	---	<0.01	---	0.90	---	0.96
<b>Haul Roads</b>	---	---	---	---	---	---	---	---	---	---	---	---	---	---
<b>Facility Total</b>	2.1E-04	9.4E-04	6.9E-05	2.1E-04	3.8E-04	1.1E-03	7.3E-04	2.1E-03	7.5E-04	2.3E-03	0.04	1.00	0.04	1.07
<b>Facility Total (excl. fugitives)</b>	2.1E-04	9.4E-04	6.9E-05	2.1E-04	3.8E-04	1.1E-03	7.3E-04	2.1E-03	7.5E-04	2.3E-03	0.04	0.10	0.04	0.11

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators.

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

ATTACHMENT V

**Class I Legal Advertisement**

# RECOMMENDED PUBLIC NOTICE TEMPLATE

## AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that EQT Production Company has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-D General Permit Registration for an existing natural gas production facility, Goshorn, located in Cameron, Marshall County, West Virginia. The latitude and longitude coordinates are: 39.81578 N, -80.61547 W.

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

Pollutant	Emissions in tpy (tons per year)
NOx	6.50
CO	5.46
VOC	0.44
SO <sub>2</sub>	0.04
PM	0.49
Formaldehyde	9.4E-04
Benzene	2.1E-04
Toluene	1.1E-03
Ethylbenzene	2.1E-03
Xylene	2.3E-03
n-Hexane	1.00
Total HAPs	1.07
Carbon Dioxide Equivalents (CO <sub>2</sub> e)	7,805.10

Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57<sup>th</sup> Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

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

Dated this the **(Day)** day of **(Month)**, 2017.

By: EQT Production Company  
Mike Gavin, Vice President  
625 Liberty Ave Suite 1700  
Pittsburgh, PA 15222

ATTACHMENT W

**General Permit Registration Application Fee**