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R. Alex Bosiljevac
Environmental
Coordinator

July 15, 2016

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

RE: G70-C General Permit Registration Application
EQT Production Company
PEN-54 Natural Gas Production Site

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) complete PDFs included on CD-ROM of a G70-C General Permit Registration Application for the PEN-54 natural gas production 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.

Sincerely,

R. Alex Bosiljevac
EQT Corporation

Enclosures

PROJECT REPORT

EQT Production
PEN-54 Pad

G70-C Permit Application

Where energy meets innovation.

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

July 2016

Environmental solutions delivered uncommonly well

TABLE OF CONTENTS

EQT Production Company (EQT) is submitting this Class II General Permit (G70-C) application to the West Virginia Department of Environmental Protection (WVDEP) for the construction and operation of new equipment at a new natural gas production well pad, PEN-54, located in Ritchie County, West Virginia.

1.1. FACILITY AND PROJECT DESCRIPTION

The PEN-54 pad is a natural gas production facility that will consists of eleven (11) 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.

This application seeks to the permit the following equipment:

- Twelve (12) 400 barrel (bbl) storage tanks for condensate/water (produced fluids) controlled by two (2) combustors, one rated at 19.22 MMBtu/hr and one rated at 11.66 MMbtu/hr;
- Two (2) 140 bbl storage tanks for sand and produced fluids from the sand separator (vapors from this tank may be controlled by combustors but are not represented as controlled in this application);
- Eleven (11) line heaters rated at 1.54 MMBtu/hr each (heat input);
- Two (2) thermoelectric generators (TEGs), each rated at 0.013 MMBtu/hr (heat input);
- Two (2) low pressure separators and associated 1.15 MMbtu/hr line heaters;
- Two (2) vapor recovery units (VRUs) each powered by a natural gas fired 400 horsepower (hp) engine;
- Produced fluid truck loading; and
- Associated piping and components.

A process flow diagram is included as Attachment D. A comparison of the potential emissions of the wellpad with G70-C 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-C permit, fugitive emissions are not considered in determining eligibility of the permit.

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

Pollutant	Wellpad Potential Annual Emissions (tpy)	G70-C Maximum Annual Emission Limits (tpy)
Nitrogen Oxides	29.07	50
Carbon Monoxide	33.38	80
Volatile Organic Compounds	11.49	80
Particulate Matter – 10/2.5	2.13	20
Sulfur Dioxide	0.14	20
Individual HAP (n-hexane)[1]	1.20	8
Total HAP[1]	3.83	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 PEN-54 Pad for air permitting purposes if, and only if, all three elements of the "stationary source" definition above are fulfilled.

There are no Marcellus facilities within a quarter-mile radius of the PEN-54 Pad. The nearest wellpad, PEN-16, is located approximately 0.75 miles southwest of PEN-54. Therefore, the PEN-54 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-C APPLICATION ORGANIZATION

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

- Section 2: Sample Emission Source Calculations;
- Section 3: Regulatory Discussion;
- Section 4: G70-C 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: 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;
- Attachment O: Truck Loading Data Sheet;
- Attachment P: Glycol Dehydrator Data Sheet **(Not Applicable)**;
- Attachment Q: Pneumatic Controller Data Sheet **(Not Applicable)**;
- Attachment R: Air Pollution Control Device Data Sheet;
- Attachment S: Emission Calculations;
- Attachment T: Emission Summary Sheet;
- Attachment U: Class I Legal Advertisement; and
- Attachment V: General Permit Registration Application Fee.

2. SAMPLE EMISSION SOURCE CALCULATIONS

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

Emissions from this project will result from natural gas combustion in the engines, line heaters, enclosed combustors and TEGs, as well as storage of organic liquids in storage tanks and loading of organic liquids into tank trucks. In addition, fugitive emissions will result from component leaks from the operation of the station. The methods by which emissions from each of these source types are calculated are summarized below.

- **Line Heaters, Enclosed Combustors and TEGs:** 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.[1] These calculations assume a site-specific heat content of natural gas. Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.[2]

- **VRU Engines:** Potential emissions of oxides of nitrogen (NO_X), carbon monoxide (CO), and volatile organic compounds (VOC) are calculated using 40 CFR 60 Subpart JJJJ emissions factor standards. Remaining criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 factors for natural gas fired engines.[3] These calculations assume a specific heat content of natural gas from the closest wellpad. Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.

- **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 used 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.[4] 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. Controlled calculations assume an overall control efficiency (capture and destruction) of 98%. The throughput for the produced fluids tanks are based on the maximum annualized monthly condensate and produced water at the PEN-16 well pad (i.e., the maximum monthly throughput for the pad times 12) scaled up to eleven wells, and includes a safety factor of 1.60. The composition for the analysis was from a sample taken at PEN-54. Emissions of VOC and HAPs from the sand separator tanks are calculated using E&P TANK v2.0. The produced fluids throughput is calculated as follows:

$$Throughput\ \left(\frac{bbl}{day}\right) = \left(Condensate\ Throughput\ \left(\frac{bbl}{month}\right) + \left(Produced\ Water\ Throughput\ \left(\frac{bbl}{month}\right)\right)\right) * \frac{12\left(\frac{months}{year}\right)}{365\left(\frac{days}{year}\right)} \text{ x } 1.6 \text{ x } \left(\frac{11}{7}\right)$$

- **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

[1] U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 1.4, Natural Gas Combustion, Supplement D, July 1998.
[2] 40 CFR 98 Subpart C, *General Stationary Fuel combustion Sources*, Tables C-1 and C-2.
[3] U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 3.2, Natural Gas-fired Reciprocating Engines, Supplement D, August 2000.
[4] 40 CFR 98 Subpart W, *Petroleum and Natural Gas Systems*, Section 98.233(r), *Population Count and Emission Factors.*

loading is controlled by the enclosed combustors. U.S. EPA's AP-42 Chapter 5 Section 2 factors were used for capture efficiency.[5]

- **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.[6]

[5] U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 5.2, Transportation And Marketing Of Petroleum Liquids, June 2008.
[6] U.S. EPA, AP 42, Fifth Edition, Volume I, Section 13.2.2, Unpaved Roads, November 2006.

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-C 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 construction 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.[7] 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.

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

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 JJJJ – Stationary Spark Ignition Internal Combustion Engines
- 40 CFR Part 60 Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution
- 40 CFR Part 60 Subpart OOOOa – 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^3 (~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 JJJJ – Stationary Spark Ignition Internal Combustion Engines

New Source Performance Standards 40 CFR Part 60 Subpart JJJJ (NSPS JJJJ) affects owners and operators of stationary spark ignition internal combustion engines (SI ICE) that commence construction, reconstruction or modification after June 12, 2006. Applicability dates are based on the date the engine was ordered by the operator. The proposed engines (VRU engines) at the well pad are a 4-stroke rich burn, spark ignition engine manufactured after January 1, 2011, and are subject to this subpart. EQT will operate the engine according to the manufacturer's recommended practices and demonstrate compliance with the requirements specified in 40 CFR §60.4244 (testing methods) and 40 CFR§60.4243 (maintenance plan/records and performance testing frequency) for noncertified affected SI ICE at the facility, which includes an initial performance test within 1 year of engine startup to demonstrate compliance with the regulation.

3.3.4. NSPS Subpart OOOO - Crude Oil and Natural Gas Production, Transmission, and Distribution

Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011 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 included any construction, reconstruction or modification prior determination dates related to NSPS Subpart OOOO. Therefore, this subpart is not applicable to the proposed project. Note that EPA recently finalized 40 CFR 60 Subpart OOOOa; applicability of Subpart OOOOa is discussed in the following section.

3.3.5. NSPS Subpart OOOOa—Crude Oil and Natural Gas Facilities

Subpart OOOOa, Standards of 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.

Based on the rule, the following paragraphs describe the applicability of the facilities to be located at the proposed facility.

40 CFR 60.5385 requires owners and operators of affected reciprocating compressors to change the rod packing prior to operating 26,000 hours or prior to 36 months since start up or the last packing replacement. However, according to §60.5365a, compressors located at well sites are not affected facilities under Subpart OOOOa.

There are eleven (11) produced fluid storage vessels and two (2) sand separator storage vessels at the wellpad. The storage vessels at the facility 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-C permit. As such, per 60.5365a(e), the tanks will not be storage vessel affected facilities under the rule.

The proposed well pad is an affected facility under 60.5365a(i). Therefore, EQT will be required to monitor all fugitive emission components (ex. connectors, flanges, etc.) with an optical gas imaging (OGI) device, and repair all sources of fugitive emissions in accordance with the rule. EQT must also develop a corporate-wide monitoring plan and a site specific monitoring plan (or one plan that incorporates all required elements), and conduct surveys on a semi-annual basis. EQT is also subject to the applicable recordkeeping and reporting requirements of the rule.

The new pneumatic controllers will potentially be subject to NSPS OOOOa. Per 60.5365a(d)(1), a pneumatic controller affected facility is a single continuous bleed natural gas driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh. No pneumatic controllers installed will meet the definition of a pneumatic controller affected facility. Therefore, these units are not subject to the requirements of Subpart OOOOa.

3.3.6. Non-Applicability of All Other NSPS

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas processing plants (Subparts OOOO) 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 ZZZZ – Stationary Reciprocating Internal Combustion Engines
- 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 ZZZZ – Stationary Reciprocating Internal Engines

This rule affects reciprocating internal combustion engines (RICE) located at a major and area sources of HAP. 40 CFR §63.6590(c) states that a new or reconstructed stationary RICE located at an area HAP source must meet the requirements of NESHAP Subpart ZZZZ by meeting the requirements of NSPS Subpart JJJJ. No further requirements apply for such engines under NESHAP Subpart ZZZZ. The PEN-54 well pad is a minor (area) source of hazardous air pollutants and the VRU engine is considered a new stationary RICE. Therefore, the requirements contained in §63.6590(c) are applicable. EQT will be in compliance with applicable requirements of 40 CFR 63 Subpart ZZZZ by meeting the applicable requirements of 40 CFR 60 Subpart JJJJ.

3.4.3. 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 proposed line heaters will be 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 TEGs and 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 combustors are incinerators and therefore must comply with this regulation. Per 45 CSR 6-4.3, opacity of emissions from this unit shall not exceed 20 percent, except as provided by 4.4. PM emissions from this unit will not exceed the levels calculated in accordance with 6-4.1.

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 CPR 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 proposed for 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 CPR 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-C APPLICATION FORMS

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

West Virginia Department of Environmental Protection

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

G70-B GENERAL PERMIT REGISTRATION APPLICATION

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

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

SECTION 1. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): 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: PEN-54 Wellpad

Operating Site Physical Address:
If none available, list road, city or town and zip of facility. Pennsboro, Ritchie County

City: Pennsboro | Zip Code: 26415 | County: Ritchie

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.257421 N
Longitude: -80.927339 W

SIC Code: 1311
NAICS Code: 211111

DAQ Facility ID No. (For existing facilities)

CERTIFICATION OF INFORMATION

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

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

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

Responsible Official Signature: [signature] 412-5535700
Name and Title: Kenneth Kirk, Executive Vice President Phone: Fax:
Email: KKirk@eqt.com Date: 7/15/16

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:

OPERATING SITE INFORMATION
Briefly describe the proposed new operation and/or any change(s) to the facility: General permit application for a new natural gas production well pad.
Directions to the facility: From Pennsboro, WV take WV-74 S/Pullman Drive. Continue on WV-74S for 1.8 miles. Turn left onto Lynn Camp Rd and continue for 1.4 miles. Turn slight left onto Co Rd 10. And continue for 1.8 miles. Access road will be on the left.

ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☐ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☒ I wish to pay by credit card. Contact for payment (incl. name and email address): R. Alex Bosiljevac, abosiljevac@eqt.com ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO [1] ☐$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed in its entirety)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-C Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck Loading Data Sheet (if applicable) – Attachment O	
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☐ Pneumatic Controllers Data Sheet – Attachment Q	
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment R	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment S	
☒ Facility-wide Emission Summary Sheet(s) – Attachment T	
☒ Class I Legal Advertisement – Attachment U	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

All attachments must be identified by name, divided into sections, and submitted in order.

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).

Is there a facility owned by or associated with the natural gas industry located within one (1) mile of the proposed facility? Yes ☒ No ☐

If Yes, please complete the questionnaire on the following page (Attachment A).

Please provide a source aggregation analysis for the proposed facility below:

Please see discussion in the Application Report.

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

Are the facilities owned by the same parent company or a subsidiary of the parent company? Provide the owners identity and the percentage of ownership of each facility. PEN16 is owned by EQT Production Company	Yes ☒ No ☐
Does an entity such as a corporation have decision making authority over the operation of a second entity through a contractual agreement or voting interest? Please explain.	Yes ☐ No ☐ N/A
Is there a contract for service relationship between the two (2) companies or, a support/dependency relationship that exists between the two (2) companies? Please explain.	Yes ☐ No ☐ N/A
Do the facilities share common workforces, plant managers, security forces, corporate executive officers or board executives?	Yes ☒ No ☐
Will managers or other workers frequently shuttle back and forth to be involved actively at both facilities?	Yes ☒ No ☐
Do the facilities share common payroll activities, employee benefits, health plans, retirement funds, insurance coverage, or other administrative functions? Please explain.	Yes ☒ No ☐
Does one (1) facility operation support the operation of the other facility?	Yes ☐ No ☒
Is one (1) facility dependent on the other? If one (1) facility shuts down, what are the limitations on the other to pursue outside business? Please explain.	Yes ☐ No ☒
Are there any financial arrangements between the two (2) entities?	Yes ☐ No ☐ N/A
Are there any legal or lease agreements between the two (2) facilities?	Yes ☐ No ☒
Do the facilities share products, byproducts, equipment, or other manufacturing or air pollution control device equipment? Please explain.	Yes ☐ No ☒
Do all the pollutant-emitting activities at the facilities belong to the same SIC Code? Please provide the SIC Codes. 1	Yes ☒ No ☐
Was the location of the new facility chosen primarily because of its proximity to the existing facility to integrate the operation of the two (2) facilities? Please explain.	Yes ☐ No ☒
Will materials be routinely transferred between the two (2) facilities? Please explain the amount of transfer and how often the transfers take place and what percentages go to the various entities.	Yes ☐ No ☒
Does the facility influence production levels or compliance with environmental regulations at other facilities? Who accepts the responsibility for compliance with air quality requirements? Please explain.	Yes ☐ No ☒

ATTACHMENT A: SINGLE SOURCE DETERMINATION MAP

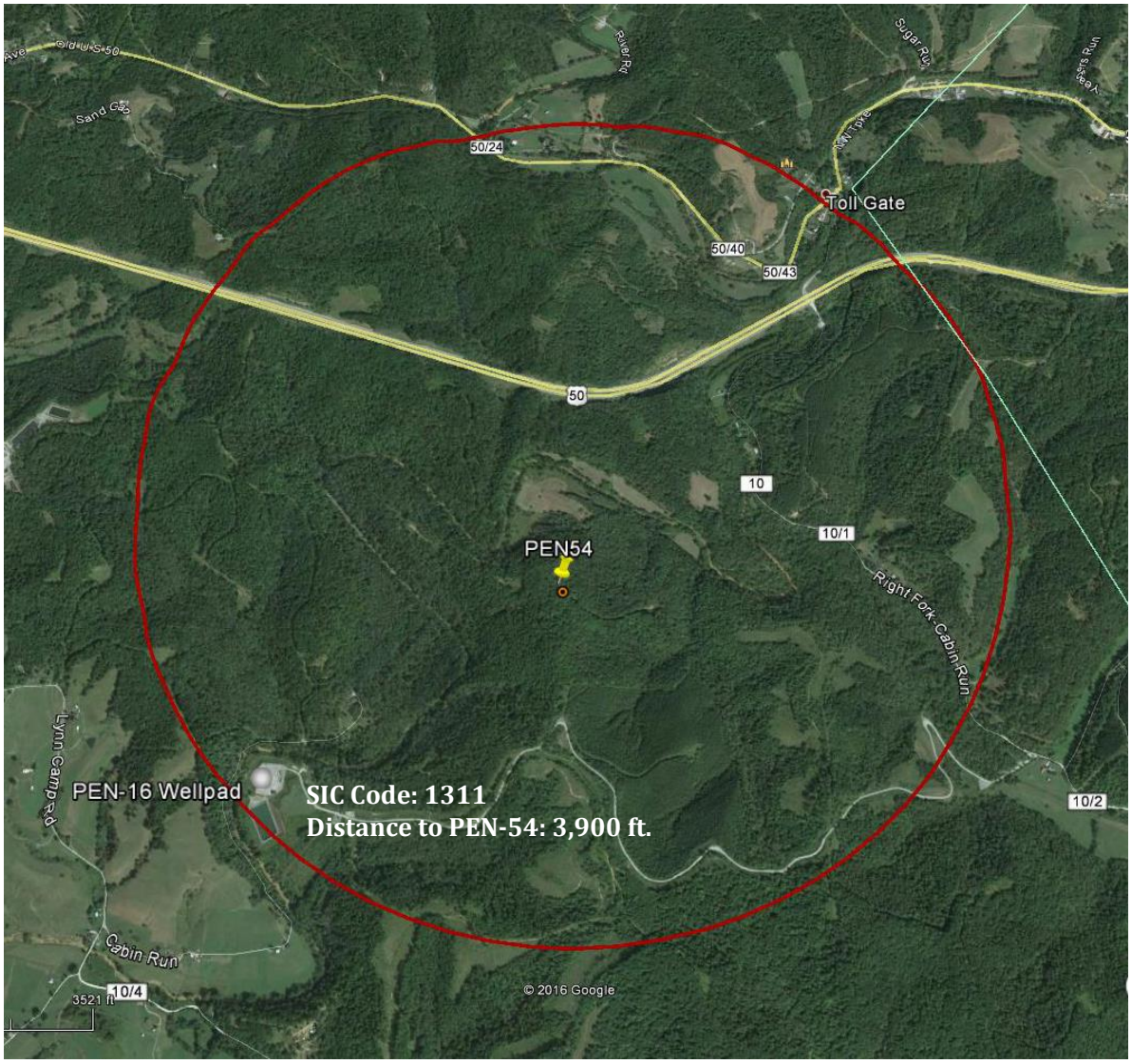


Figure 1 - Map of PEN-54 Location with 1 Mile Radius Circle

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-C 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.

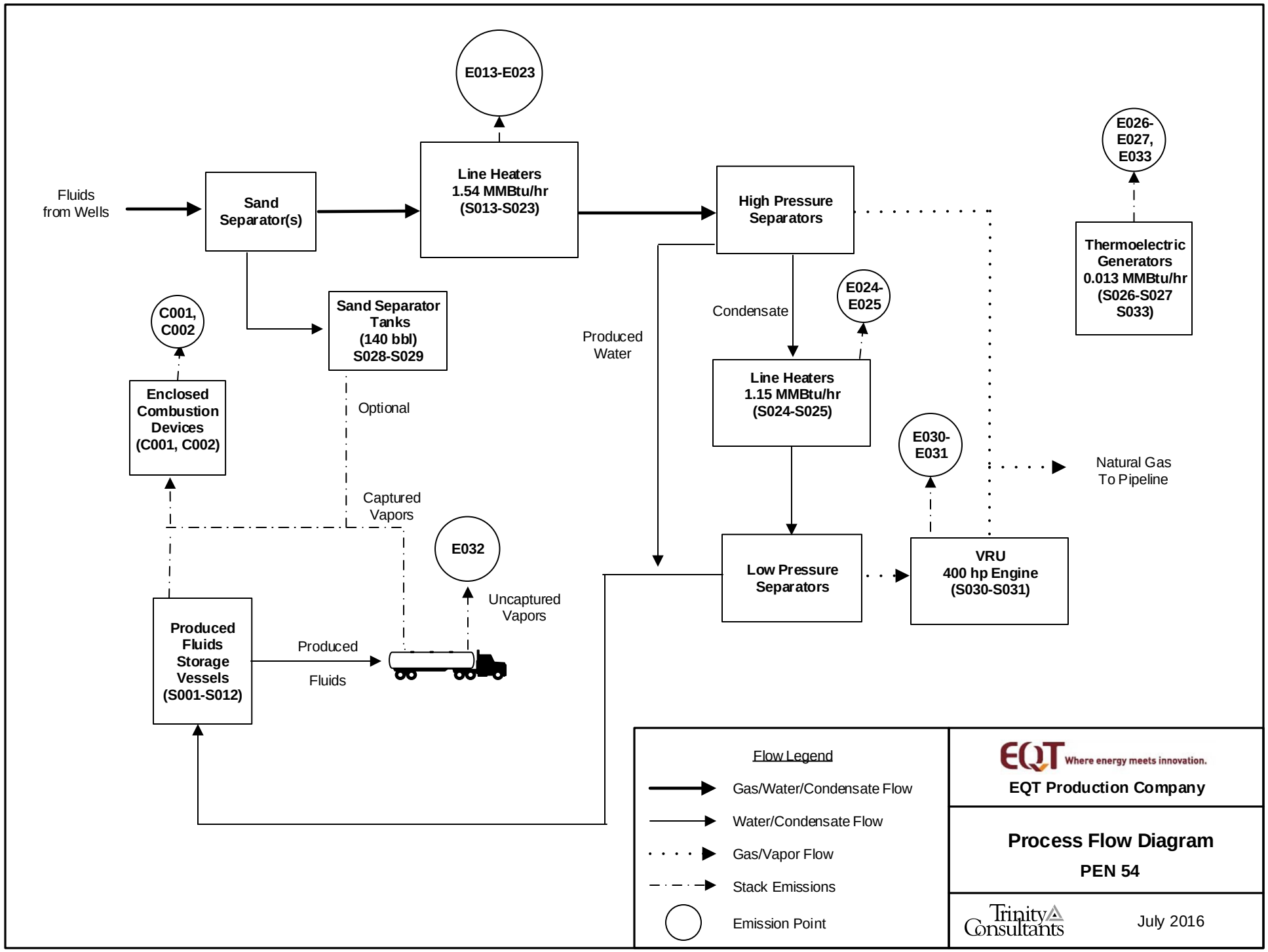
Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

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.

atL006 v.3
L0553297664

ATTACHMENT D

Process Flow Diagram


E013-E023
Fluids from Wells
Sand Separator(s)
Line Heaters 1.54 MMBtu/hr (S013-S023)
High Pressure Separators
E026-E027, E033
Thermoelectric Generators 0.013 MMBtu/hr (S026-S027 S033)
C001, C002
Sand Separator Tanks (140 bbl) S028-S029
Condensate
E024-E025
Produced Water
Enclosed Combustion Devices (C001, C002)
Optional
Line Heaters 1.15 MMBtu/hr (S024-S025)
E030-E031
Natural Gas To Pipeline
Captured Vapors
E032
Low Pressure Separators
VRU 400 hp Engine (S030-S031)
Uncaptured Vapors
Produced Fluids Storage Vessels (S001-S012)
Produced Fluids
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
PEN 54
Trinity Consultants
July 2016

ATTACHMENT E

Process Description

ATTACHMENT E: PROCESS DESCRIPTION

This G70-C Permit Application involves the construction of a new natural gas production wellpad (PEN-54). The wellpad will consist of eleven (11) wells, each with the same basic operation. The following equipment will be installed at the facility: twelve (12) storage tanks, two (2) low pressure separators with associated heaters and vapor recovery units (VRU), eleven (11) line heaters, three (3) thermoelectric generators (TEGs) and two (2) sand separator tanks.

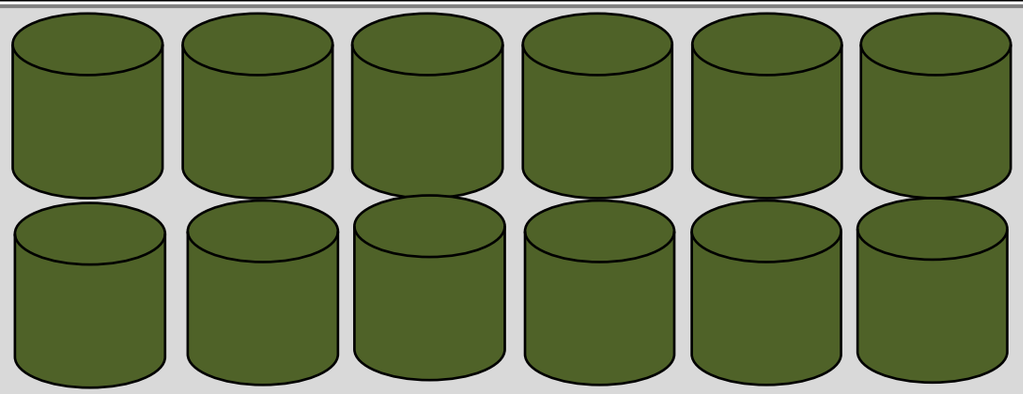
The incoming gas/liquid stream from the underground wells will pass through a sand separator, where sand, water, and residual solids are displaced and transferred to the sand separator tanks (S028-S029). The gas stream will then pass through the line heaters (S0013-S023) to raise/maintain temperature. 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 (condensate and produced water). The produced water will be sent to the produced fluids tanks (S001-S006) and the condensate stream will then pass through the low pressure separators, where it is heated (S024-S025) to volatilize (flash off) lighter hydrocarbons and separate condensate in the liquid stream. The flash gas from the condensate stream is recovered by the Vapor Recovery Units (S030-S031), which utilizes a natural gas-fired engine driven compressor to raise the pressure of the flash gas and route it back into the natural gas pipeline. The condensate is then transferred to the produced fluid storage vessels (S006-S012).

Emissions from the storage vessels are controlled by two enclosed combustors (C001, C002). 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 (S032) are routed back into the battery of tanks and ultimately to the combustors. Facility electricity is provided by thermoelectric generators (S026-S027, S033).

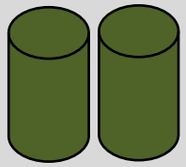
A process flow diagram is included as Attachment D.

ATTACHMENT F

Plot Plan



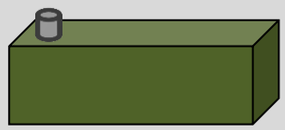
Tanks
400 bbl
(12)
S001-S012



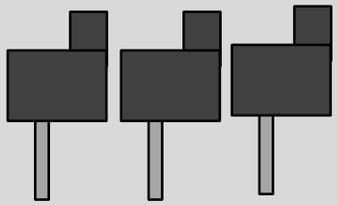
Sand Separator
Tanks
140 bbl
S028-S029

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

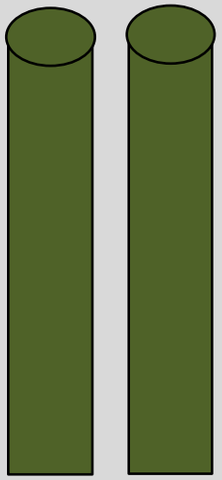
Entrance to PEN-54 Pad



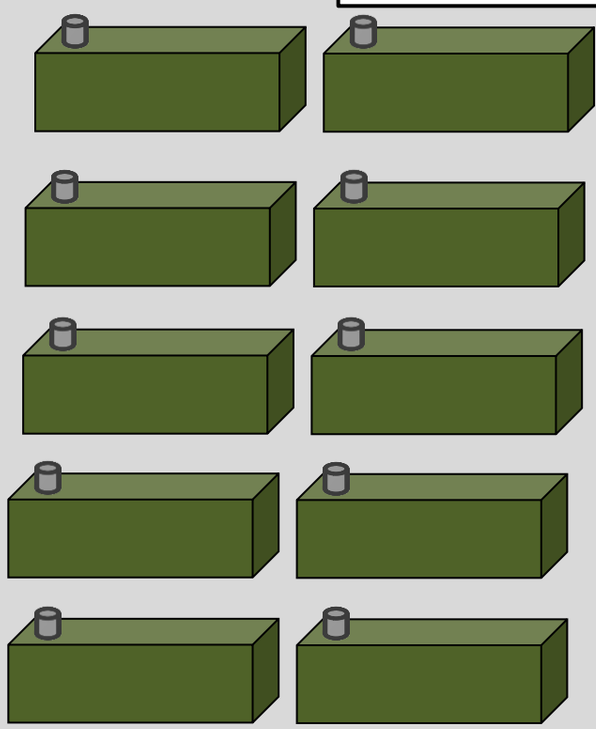
Line Heaters
1.54 MMBtu/hr
(11)



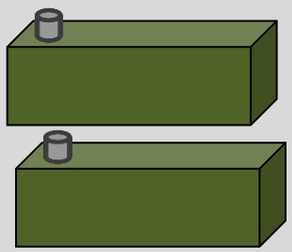
Thermoelectric Generators
(3)
S026-S027, S033



Two (2) Combustors
1 @ 19.22 MMBTU/hr
1 @ 11.66 MMBTU/hr
C001-C002

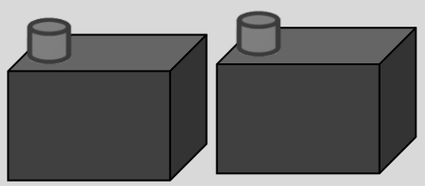


Wellheads
(11)



Line Heaters
(2)
1.15 MMBtu/hr
S024-S025

VRU Engines
400 hp
S030-S031



Attachment F

PEN-54 Well Pad Plot Plan

ATTACHMENT G

Area Map

ATTACHMENT G: AREA MAP

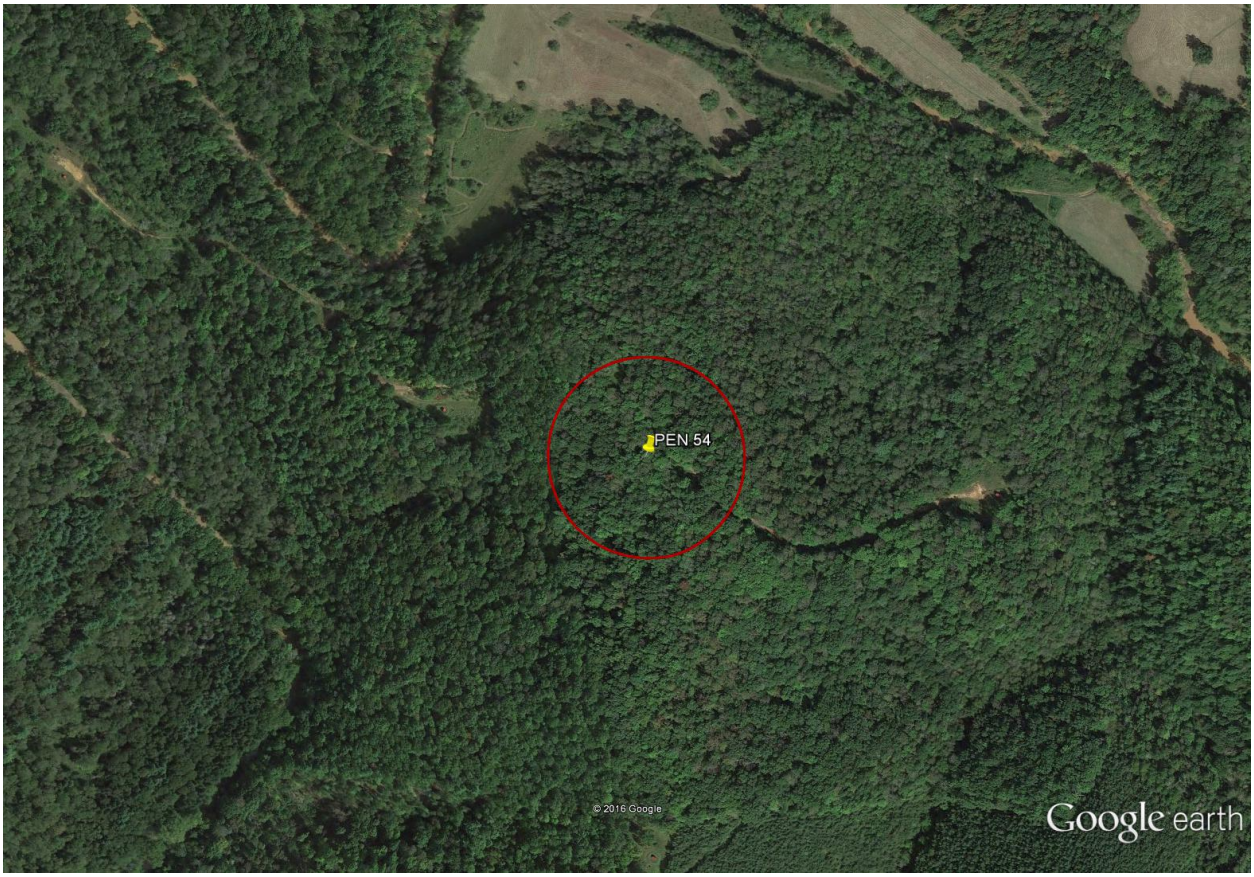


Figure 1 - Map of PEN-54 Location

UTM Northing (KM):	4,345.346
UTM Easting (KM):	506.269
Elevation:	~1,016 ft

ATTACHMENT H

Applicability Form

ATTACHMENT H – G70-C SECTION APPLICABILITY FORM

General Permit G70-C Registration
Section Applicability Form

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

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

GENERAL PERMIT G70-C APPLICABLE SECTIONS	
☒ Section 5.0	Gas Well Affected Facility (NSPS, Subpart OOOO)
☒ Section 6.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐ Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO)
☒ Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO and/or NESHAP Subpart HH
☒ Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐ Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)
☐ Section 11.0	Centrifugal Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☐ Section 12.0	Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☒ Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines, Microturbines
☒ Section 14.0	Tanker Truck Loading[3]
☐ Section 15.0	Glycol Dehydration Units[4]

1 *Applicants that are subject to Section 6 may also be subject to Section 7 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 8.*

2 *Applicants that are subject to Section 11 and 12 may also be subject to the applicable RICE requirements of Section 13.*

3 *Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 8.*

4 *Applicants that are subject to Section 15 may also be subject to the requirements of Section 9 (reboilers). Applicants that are subject to Section 15 may also be subject to control device and emission reduction device requirements of Section 8.*

ATTACHMENT I

Emission Units 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[1]	Emission Point ID[2]	Emission Unit Description	Year Installed	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD(s)[6]
S001	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S002	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S003	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S004	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S005	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S006	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S007	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S008	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S009	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S010	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S011	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S012	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S013	E013	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S014	E014	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S015	E015	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S016	E016	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S017	E017	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S018	E018	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S019	E019	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S020	E020	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S021	E021	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S022	E024	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S023	E023	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S024	E024	Line Heater	TBD	TBD	1.15 MMBtu/hr	New	None	---
S025	E025	Line Heater	TBD	TBD	1.15 MMBtu/hr	New	None	---
S026	E026	Thermoelectric Generator	TBD	TBD	0.013 MMBtu/hr	New	None	---
S027	E027	Thermoelectric Generator	TBD	TBD	0.013 MMBtu/hr	New	None	---
S033	E033	Thermoelectric Generator	TBD	TBD	0.013 MMBtu/hr	New	None	---

S028	E028	Sand Separator Storage Tank	TBD	TBD	140 bbl	New	C001-C002 (Optional)	---
S029	E029	Sand Separator Storage Tank	TBD	TBD	140 bbl	New	C001-C002 (Optional)	---
S032	E032 (Uncaptured) C001-C002 (Controlled, Captured)	Liquid Loading	TBD	TBD	16,648,380 gal/yr	New	C001-C002	---
S030	E030	VRU Engine	TBD	TBD	400 hp	New	None	---
S031	E031	VRU Engine	TBD	TBD	400 hp	New	None	---
C001	C001	Tank Combustor	TBD	TBD	19.22 MMBtu/hr	New	NA	---
C002	C002	Tank Combustor	TBD	TBD	11.66 MMBtu/hr	New	NA	---

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] When required by rule
[4] New, modification, removal, existing
[5] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.
[6] For ERDs use the following numbering system: 1D, 2D, 3D,... or other appropriate designation.

ATTACHMENT J

Fugitive Emissions Summary Sheet

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

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

Source/Equipment: Fugitive Emissions

Leak Detection Method Used	☐ Audible, visual, and olfactory (AVO) inspections	☐ Infrared (FLIR) cameras	☒ Other (please describe) Will satisfy condition 4.1.4. of the G70-C	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO_2e)
Pumps	☐ Yes ☒ No	21	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).	☐ Gas ☒ Liquid ☐ Both	4.04	0.26	0.78
Valves	☐ Yes ☒ No	659	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).	☒ Gas ☐ Liquid ☐ Both	6.34	0.41	66.42
Safety Relief Valves	☐ Yes ☒ No	48	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).	☒ Gas ☐ Liquid ☐ Both	7.97	0.51	7.10
Open Ended Lines	☐ Yes ☒ No	48	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).	☐ Gas ☐ Liquid ☒ Both	0.13	0.01	10.94
Sampling Connections	☐ Yes ☐ No	0	N/A	☐ Gas ☐ Liquid ☐ Both	---	---	---
Connections (Not sampling)	☐ Yes ☒ No	2,925	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).	☐ Gas ☐ Liquid ☒ Both	8.63	0.55	32.78
Compressors	☐ Yes ☒ No	2	(included in other component counts)	☒ Gas ☐ Liquid ☐ Both	0.74	0.05	31.15
Flanges	☐ Yes ☐ No	---	(included in connections)	☐ Gas ☐ Liquid ☐ Both	---	---	---
Other[1]	☐ Yes ☒ No	55	40 CFR 98 Subpart W	☒ Gas ☐ Liquid ☐ Both	9.73	0.62	410.91

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

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

ATTACHMENT K

Gas Well Data Sheet

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

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

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device
047-085-10222	January 2017	January 2017	Green
047-085-10227	January 2017	January 2017	Green
047-085-10226	January 2017	January 2017	Green
047-085-10225	January 2017	January 2017	Green
047-085-10228	January 2017	January 2017	Green
047-085-10229	January 2017	January 2017	Green
047-085-10230	January 2017	January 2017	Green
047-085-10231	January 2017	January 2017	Green
047-085-10232	January 2017	January 2017	Green
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD

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

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

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

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

Where,

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

ATTACHMENT L

Storage Vessel Data Sheet

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

☒ Composition of the representative sample used for the simulation
☒ For each stream that contributes to flashing emissions:
- ☒ Temperature and pressure (inlet and outlet from separator(s))
- ☒ Simulation-predicted composition
- ☒ Molecular weight
- ☒ Flow rate

☒ Resulting flash emission factor or flashing emissions from simulation
☒ Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name PEN 54 Wellpad	2. Tank Name Produced Fluid Tanks (water and condensate)
3. Emission Unit ID number S001-S012	4. Emission Point ID number C001-C002
5. Date Installed , Modified or Relocated *(for existing tanks)* Was the tank manufactured after August 23, 2011? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other (Low Pressure Tower) ☐ Relocation
7A. Description of Tank Modification *(if applicable)* N/A	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☐ Yes ☒ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height.
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 *(specify barrels or gallons).* This is also known as "working volume". 400 bbls

13A. Maximum annual throughput (gal/yr) **See attached emissions calculations for all throughput values**	13B. Maximum daily throughput (gal/day) **See attached emissions calculations for all throughput values**
14. Number of tank turnovers per year **See attached emissions calculations for all throughput values**	15. Maximum tank fill rate (gal/min) **See attached emissions calculations for all throughput values**

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

17. Is the tank system a variable vapor space system? ☐ Yes ☒ No
If yes, (A) What is the volume expansion capacity of the system (gal)?
(B) What are the number of transfers into the system per year?

18. Type of tank (check all that apply):
☒ Fixed Roof ☒ vertical ☐ horizontal ☐ flat roof ☒ cone roof ☐ dome roof ☐ other (describe)

☐ External Floating Roof ☐ pontoon roof ☐ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting
☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm
☐ Pressurized ☐ spherical ☐ cylindrical
☐ Other (describe)

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:
☐ Does Not Apply ☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____ ☐ Carbon Adsorption[1]
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers, enclosed combustors)
☒ Conservation Vent (psig) ☐ Condenser[1]
0.5 oz Vacuum Setting 12.5 oz Pressure Setting
☒ Emergency Relief Valve (psig)
Vacuum Setting 14.4 oz Pressure Setting
☐ Thief Hatch Weighted ☐ Yes ☒ No – Cashco Lockdown Hatch
[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method[1]**
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	
See attached Emissions Calculation for all values									

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

Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

TANK CONSTRUCTION AND OPERATION INFORMATION			
21. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) Welded or riveted			
21A. Shell Color: Green	21B. Roof Color: Green	21C. Year Last Painted: New	
22. Shell Condition (if metal and unlined): ☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable			
22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?	
23. Operating Pressure Range (psig): **Must be listed for tanks using VRUs with closed vent system.**			
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft): 0.06	
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☒ No			
28. Closed Vent System with Enclosed Combustor? ☒ Yes ☐ No			
SITE INFORMATION - Not Applicable: Tank calculations performed using ProMax software			
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^2-day):	35. Atmospheric Pressure (psia):		
LIQUID INFORMATION - Not Applicable: Tank calculations performed using ProMax software			
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.			

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name PEN-54	2. Tank Name Sand Separator Tank
3. Emission Unit ID number S028-S029	4. Emission Point ID number E028-E029
5. Date Installed , Modified or Relocated *(for existing tanks)* Was the tank manufactured after August 23, 2011? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other (Low Pressure Tower) ☐ Relocation
7A. Description of Tank Modification *(if applicable)* N/A	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☐ Yes ☒ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 140 bbls	
9A. Tank Internal Diameter (ft.) 10	9B. Tank Internal Height (ft.) 10
10A. Maximum Liquid Height (ft.) 10	10B. Average Liquid Height (ft.) 5
11A. Maximum Vapor Space Height (ft.) 10	11B. Average Vapor Space Height (ft.) 5
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". 140 bbls	
13A. Maximum annual throughput (gal/yr) **See attached emissions calculations for all throughput values**	13B. Maximum daily throughput (gal/day) **See attached emissions calculations for all throughput values**
14. Number of tank turnovers per year **See attached emissions calculations for all throughput values**	15. Maximum tank fill rate (gal/min) **See attached emissions calculations for all throughput values**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof ☐ vertical ☒ horizontal ☐ flat roof ☐ cone roof ☐ dome roof ☐ other (describe) ☐ External Floating Roof ☐ pontoon roof ☐ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting ☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm ☐ Pressurized ☐ spherical ☐ cylindrical	

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☒ Does Not Apply ☐ Rupture Disc (psig)

☐ Inert Gas Blanket of _____ ☐ Carbon Adsorption[1]

☐ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers, enclosed combustors)

☐ Conservation Vent (psig) ☐ Condenser[1]

Vacuum Setting Pressure Setting

☐ Emergency Relief Valve (psig)

-0.03 Vacuum Setting 0.90 Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☐ No

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
See attached Emissions Calculation for all values									

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)
Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

TANK CONSTRUCTION AND OPERATION INFORMATION

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

21A. Shell Color: Gray	21B. Roof Color: Gray	21C. Year Last Painted: New

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

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

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

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

25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒

25A. Year Internal Floaters Installed:

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

25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No

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

25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No

25F. Describe deck fittings:

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

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

26C. Deck seam. Continuous sheet construction:
☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)

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

27. Closed Vent System with VRU? ☐ Yes ☒ No

28. Closed Vent System with Enclosed Combustor? ☐ Yes ☒ No

SITE INFORMATION - Not Applicable: Tank calculations performed using E&P Tank software

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^2-day):	35. Atmospheric Pressure (psia):

LIQUID INFORMATION - Not Applicable: Tank calculations performed using E&P Tank software

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.			

STORAGE TANK DATA TABLE

List all deminimis storage tanks (i.e. lube oil, glycol, diesel etc.)

Source ID #[1]	Status[2]	Content[3]	Volume[4]
Not Applicable			

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the compressor station. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:
   - EXIST Existing Equipment
   - NEW Installation of New Equipment
   - REM Equipment Removed
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, diesel, mercaptan etc.
4. Enter the maximum design storage tank volume in gallons.

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#[1]	Emission Point ID#[2]	Emission Unit Description (manufacturer, model #)	Year Installed/ Modified	Type[3] and Date of Change	Maximum Design Heat Input (MMBTU/hr)[4]	Fuel Heating Value (BTU/scf)[5]
S013	E013	Line Heater	TBD	New	1.54	~1,237
S014	E014	Line Heater	TBD	New	1.54	~1,237
S015	E015	Line Heater	TBD	New	1.54	~1,237
S016	E016	Line Heater	TBD	New	1.54	~1,237
S017	E017	Line Heater	TBD	New	1.54	~1,237
S018	E018	Line Heater	TBD	New	1.54	~1,237
S019	E019	Line Heater	TBD	New	1.54	~1,237
S020	E020	Line Heater	TBD	New	1.54	~1,237
S021	E021	Line Heater	TBD	New	1.54	~1,237
S022	E022	Line Heater	TBD	New	1.54	~1,237
S023	E023	Line Heater	TBD	New	1.54	~1,237
S024	E024	Line Heater	TBD	New	1.15	~1,237
S025	E025	Line Heater	TBD	New	1.15	~1,237
S026	E026	Thermoelectric Generator	TBD	New	0.013	~1,237
S027	E027	Thermoelectric Generator	TBD	New	0.013	~1,237
S033	E033	Thermoelectric Generator	TBD	New	0.013	~1,237

1 Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

2 Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.

3 New, modification, removal

4 Enter design heat input capacity in MMBtu/hr.

5 Enter the fuel heating value in BTU/standard cubic foot.

ATTACHMENT N

Engines Data Sheet

ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

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

Emission Unit ID#[1]		S030		S031			
Engine Manufacturer/Model		Caterpillar/G3408		Caterpillar/G3408			
Manufacturers Rated bhp/rpm		400		400			
Source Status[2]		NS		NS			
Date Installed/ Modified/Removed/Relocated[3]		2016		2016			
Engine Manufactured /Reconstruction Date[4]		> January 2011		> January 2011			
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]		☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources		☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources		☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	
Engine Type[6]		4SRB		4SRB			
APCD Type[7]		NSCR		NSCR			
Fuel Type[8]		PQNG		PQNG			
H_2S (gr/100 scf)		0		0			
Operating bhp/rpm		400		400			
BSFC (BTU/bhp-hr)		7,539		7,539			
Hourly Fuel Throughput		2900 ft^3/hr NA gal/hr		2900 ft^3/hr NA gal/hr		ft^3/hr gal/hr	
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)		25.2 $MMft^3$/yr NA gal/yr		25.5 $MMft^3$/yr NA gal/yr		$MMft^3$/yr gal/yr	
Fuel Usage or Hours of Operation Metered		Yes ☒ No ☐		Yes ☒ No ☐		Yes ☐ No ☐	
Calculation Methodology[9]	**Pollutant[10]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
40 CFR 60 Subpart JJJJJ	NO_x	0.88	3.86	0.88	3.86		
40 CFR 60 Subpart JJJJJ	CO	1.76	7.73	1.76	7.73		
40 CFR 60 Subpart JJJJJ	VOC	0.68	2.97	0.68	2.97		
AP-42	SO_2	<0.01	<0.01	<0.01	<0.01		
AP-42	PM_{10}	0.06	0.26	0.06	0.26		
AP-42	Formaldehyde	0.06	0.27	0.06	0.27		
AP-42	Total HAPs	0.10	0.43	0.10	0.43		
40 CFR Part 98 Subpart C	GHG (CO_2e)	1,716	7,517	1,716	7,517		

1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor 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# S030-S031, use extra pages as necessary)

Air Pollution Control Device Manufacturer's Data Sheet included?
Yes ☒ No ☐
See attached certification

☒ NSCR ☐ SCR ☐ Oxidation Catalyst

Provide details of process control used for proper mixing/control of reducing agent with gas stream: Sequential multi-part fuel injection

Manufacturer: Caterpillar	Model #: G3408
Design Operating Temperature: 1,600 ºF	Design gas volume: scfm
Service life of catalyst: 5,000 hours	Provide manufacturer data? ☐Yes ☒ No
Volume of gas handled: 444.9 acfm at 1,600 ºF	Operating temperature range for NSCR/Ox Cat: From ºF to ºF
Reducing agent used, if any:	Ammonia slip (ppm):

Pressure drop against catalyst bed (delta P): 6 inches of H_2O

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)?
5,000 hours

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 LOADING DATA SHEET

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

Truck Loadout Collection Efficiencies

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

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

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

Emission Unit ID#: S032	Emission Point ID#: C001-C002, E032	Year Installed/Modified: N/A
Emission Unit Description: Uncaptured losses from loading of produced fluids into tanker trucks		
Loading Area Data		
Number of Pumps: 1	Number of Liquids Loaded: 1	Max number of trucks loading at one (1) time: 1
Are tanker trucks pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ 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 loadout systems utilized? ☐ Closed System to tanker truck passing a MACT level annual leak test? ☐ Closed System to tanker truck passing a NSPS level annual leak test? ☒ Closed System to tanker truck not passing an annual leak test and has vapor return?		

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

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

Bulk Liquid Data (use extra pages as necessary)

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[1]	SP		
Max. Fill Rate (gal/min)	Varies		
Average Fill Time (min/loading)	Varies		
Max. Bulk Liquid Temperature (°F)	See ProMax results		
True Vapor Pressure[2]	See ProMax results		
Cargo Vessel Condition[3]	U		
Control Equipment or Method[4]	VB, ECD (captured loading losses)		

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[5]		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)*

ATTACHMENT P – GLYCOL DEHYDRATION UNIT DATA SHEET – NOT APPLICABLE

Complete this data sheet for each Glycol Dehydration Unit, Reboiler, Flash Tank and/or Regenerator at the facility. Include gas sample analysis and GRI- GLYCalc™ input and aggregate report. Use extra pages if necessary.

Manufacturer:	Model:
Max. Dry Gas Flow Rate:	Reboiler Design Heat Input
Design Type: ☐ TEG ☐ DEG ☐ EG	Source Status[1]:
Date Installed/Modified/Removed[2]:	Regenerator Still Vent APCD/ERD[3]:
Control Device/ERD ID#[3]:	Fuel HV (BTU/scf):
H_2S Content (gr/100 scf):	Operation (hours/year):
Pump Rate (gpm):	
Water Content (wt %) in: Wet Gas: Dry Gas:	

Is the glycol dehydration unit exempt from 40CFR63 Section 764(d)? ☐ Yes ☐ No: If Yes, answer the following:

The actual annual average flowrate of natural gas to the glycol dehydration unit is less than 85 thousand standard cubic meters per day, as determined by the procedures specified in §63.772(b)(1) of this subpart. ☐ Yes ☐ No

The actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram per year (1 ton per year), as determined by the procedures specified in §63.772(b)(2) of this subpart. ☐ Yes ☐ No

Is the glycol dehydration unit located within an Urbanized Area (UA) or Urban Cluster (UC)? ☐ Yes ☐ No

Is a lean glycol pump optimization plan being utilized? ☐ Yes ☐ No

Recycling the glycol dehydration unit back to the flame zone of the reboiler.
☐ Yes ☐ No

Recycling the glycol dehydration unit back to the flame zone of the reboiler and mixed with fuel.
☐ Yes ☐ No

What happens when temperature controller shuts off fuel to the reboiler?
☐ Still vent emissions to the atmosphere.
☐ Still vent emissions stopped with valve.
☐ Still vent emissions to glow plug.
☐ None of the above: Still vent emissions are controlled by an enclosed combustor

Please indicate if the following equipment is present.
☐ Flash Tank
☐ Burner management system that continuously burns condenser or flash tank vapors

Control Device Technical Data

Pollutants Controlled	Manufacturer's Guaranteed Control Efficiency (%)

Emissions Data

Emission Unit ID / Emission Point ID[4]	Description	Calculation Methodology[5]	PTE[6]	Controlled Maximum Hourly Emissions (lb/hr)	Controlled Maximum Annual Emissions (tpy)

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 compressor station 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 *(Not Applicable)*

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? ☐ 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? ☐ Yes ☒ No Please list approximate number.

ATTACHMENT R

Air Pollution Control Device Data Sheet

ATTACHMENT R – 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: **Not Applicable**	Make/Model:
Primary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No
Secondary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **C001**	Installation Date: C001 ☒ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity ~12,812.5 scfh 307,500 scfd	Maximum Design Heat Input (from mfg. spec sheet) 19.22 MMBTU/hr	Design Heat Content 1,500 BTU/scf

Control Device Information

Type of Vapor Combustion Control?

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

Manufacturer: LEED Fabrication Model: Enclosed Combustor 60”	Hours of operation per year? 8,760

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# S001-S012, S032)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
S001-S012	Produced Fluid Tanks		
S032	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?
☐ Steam ☐ Air ☐ Pressure ☒ Non	~25 feet	5 feet	☐ Yes ☐ No ☒ N/A Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate 130 (scfm)	Heat Value of Waste Gas Stream Varies BTU/ft^3	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 ~50 scfh	Heat Input per Pilot 0.05 MMBTU/hr	Will automatic re-ignition be used? ☐ Yes ☒ 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? ☒ Yes ☐ No	If Yes, what type? ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

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

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **C002**	Installation Date: C002 ☒ New ☐ Modified ☐ Relocated
Maximum Rated Total Flow Capacity ~7,771 scfh 186,500 scfd	Maximum Design Heat Input (from mfg. spec sheet) 11.66 MMBTU/hr Design Heat Content 1,500 BTU/scf

Control Device Information

Type of Vapor Combustion Control?

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

Manufacturer: LEED Fabrication Model: Enclosed Combustor 48”	Hours of operation per year? 8,760

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# S001-S012, S032)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
S001-S012	Produced Fluid Tanks		
S032	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?
☐ Steam ☐ Air ☐ Pressure ☒ Non	~25 feet	4 feet	☐ Yes ☐ No ☒ N/A Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate 130 (scfm)	Heat Value of Waste Gas Stream Varies BTU/ft^3	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 ~50 scfh	Heat Input per Pilot 0.05 MMBTU/hr	Will automatic re-ignition be used? ☐ Yes ☒ 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? ☒ Yes ☐ No	If Yes, what type? ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).* 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: ☐ New ☐ Modified ☐ 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? ☐ Yes ☐ No Please attach copies of manufacturer's data sheets.		
Is condenser routed to a secondary APCD or ERD? ☐ Yes ☐ No		

ADSORPTION SYSTEM – Not Applicable		
General Information		
Control Device ID#:	Installation Date: ☐ New ☐ Modified ☐ 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^2	
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

General Information

Emission Unit ID#: S030-S031	Installation Date: TBD ☒ New ☐ Modified ☐ Relocated

Device Information

Manufacturer: Caterpillar
Model: G3408

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
NA	Low Pressure Separator		
NA	Low Pressure Separator		

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.

		Item/Tag No.:		Page	1	of	3
		Project No.:		Revision:	A		
		Project:		Date:	10 November 2014		
	Enviromental Control Equipment Data Sheet			By:	JS		
		P.O. No.:	-	Checked:	SG		
		RFQ No.:	-	Approved:	MS		
	Client:	Ref. P&ID:	-				
	Site:			Supplier:	LEED FABRICATION		
	Unit/Lease:	Remarks:	-	Model No.:	L30-0028-00		

GENERAL

1	Design Code:		NDE:	LEED Fabrication Standards
2	Service:		Customer Specs:	☐ Yes
3	Description:	Standard Dual Stage 60 High Efficiency Combustor		☑ No

PROCESS DATA

	Gas Composition:	mol %	Process Conditions: Variable	Value	Units
4	Methane		Flow Rate	Up to 300	Mscfd
5	Ethane		Pressure	Up to 12	oz/in2
6	Propane		Temperature		°F
7	I-Butane		Molecular Weight		
8	n-Butane		Process/Waste Stream	☑ Gas	☐ Liquid
9	I-Pentane		Detailed Process Description / Process Notes:		
10	n-Pentane		1. Turndown 10:1. Based on an expected normal operating rate indicated above.		
11	n-Hexane		2. DRE: 98 % operating at design conditions		
12	CO2		3. Burner Pressure Drop: Min. 0.12 oz/in2		
13	N2		4. Gas mixture heating value estimated to be 1500 BTU/SCF unless specified by customer		
14	Helium				
15	H_2O				
16	C7				
17	C8				
18	C9				
19	C10				
20	C11+				
21	TOTAL				

	Other Components:	PPMV	Available Utilities:	
22	H2S		Fuel / Pilot Gas	Min. 30psig Natural Gas /Propane 40-50 SCFH
23	Benzene		Instrument Air	NA
24	Toluene		Power	120 V / 60 Hz or Solar Power
25	E-Benzene		Steam	NA
26	Xylene		Purge Gas	

DESIGN DATA

27	Ambient Temperatures:		Noise Performance Requirements:	Under 85 dBA
28	Low, °F	-20	Structural Design Code:	
29	High, °F	120	Wind Design Code:	ASCE
30	Design Conditions: Pressure/Temperature			
31	Max. Relative Humidity, %	90	Pressure/Speed	100 mph
32	Elevation (ASL), ft		Category	
33	Area Classification:	Class I Div 2	Seismic Design Code:	
34	Electrical Design Code:	NEC	Location	

EQUIPMENT SPECIFICATION

35	Type:	☐ Elevated	☑ Enclosed		Equipment Design:		
36		☐ Above Ground			Component	Material / Size / Rating / Other	
37		☑ Stack	☐ Multiple Stack		Burner		
38		☐ Portable / Trailer			Burner Tip / Assist Gas Burner	Stainless Steel	
39					Burner Body	Carbon Steel	
40	Smokeless By:	☐ Steam	☐ Assist Air		Pilot		
41		☐ Gas Assist	☑ Staging		Pilot Tip	Stainless Steel	
42					Pilot Line(s)	Carbon Steel	
43	Stack:	☑ Self Supporting			Firebox / Stack		
44	Flare Burner:	☐ Non-Smokeless	☑ Smokeless	☐ Gas Assist	Shell	Carbon Steel	
45	Pilot:	☑ Intermittent	☐ Continuous		Piping	Carbon Steel	
46	Pilot Air Inspirator:	☑ Local	☐ Remote		Nozzles	Carbon Steel	
47	Pilot Flame Control:	☐ No	☑ Yes (Thermocouple)		Flanges	Carbon Steel	
48					Insulation	Blanket	
49	Pilot Ignition:	☐ Flamefront Generator	☑ Inspirating Ignitor		Insulation Pins	Stainless Steel	
50		☐ Electronic	☑ Automatic	☐ Manual	Refractory	NA	
51		☐ With Pilot Flame Control			Refractory Anchors	NA	
52		☐ With Auto Pilot Re-Ignition			Ladders and Platforms	NA	
53					Stack Sample Connections	Per EPA requirements	
54	Pilot Ignition Backup:	☐ Manual	Specify: i.e Piezo-Electric		Sight Glass	2	
55		☐ Battery Pack			Other		

		Item/Tag No.:		Page	2	of	3
		Project No.:		Revision:	A		
		Project:		Date:	10 November 2014		
				By:	JS		
	Environmental Control Equipment	P.O. No.:	-	Checked:	SG		
	Data Sheet	RFQ No.:	-	Approved:	MS		
	Client:	Ref. P&ID:	-				
	Site:			Supplier:	LEED FABRICATION		
	Unit/Lease:	Remarks:	-	Model No.:	L30-0028-00		

EQUIPMENT SPECIFICATION

56	**Flame Detection:**	☐ Thermocouple ☑ Ionization Rod	**Auxiliary Equipment**		
57		☐ UV Scanner	Valves	NA	
58	**General Configuration:**		Blowers	NA	
59			Dampers	NA	
60			Inlet KO / Liquid Seal	NA	
61			Flame / Detonation Arrestor	Yes	
62			**Instrumentation & Controls**		
63			Solenoids / Shut-Off Valves	Check with Sales for available config.	
64			Flow Meters	Check with Sales for available config.	
65			Calorimeter	NA	
66			Pressure Switches/Transmitters	Check with Sales for available config.	
67			Thermocouples	Check with Sales for available config.	
68			Temperature Switches/Transmitters	Check with Sales for available config.	
69			BMS	Check with Sales for available config.	
70			CEMS	NA	
71			Other	NA	
72					
73					
74					
75					

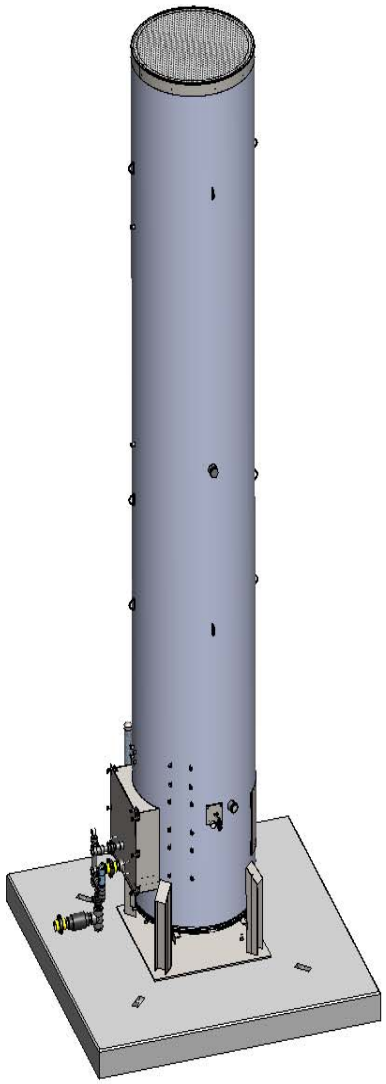
FABRICATION AND INSPECTION

76	**Special requirements**	☐ Skid Mounted ☑ Concrete Pad	**Equipment Info**	
77		☐ Other	**Component**	**Weight / Dimensions**
78			**Burner**	
79	**Inspection**	☑ Vendor Standard	Burner Assembly	
80		☐ Other. Specify:	**Stack**	
81	**Material Certification**	☑ Vendor Standard	Stack Assembly	60 " OD x 30 ' H. 7,000 Lbs
82		☐ MTR	Pilot Tip	
83		☐ Certificate of Compliance	Pilot Line(s)	
84		☐ Other (Specify):	Concrete Pad	12'x12' 12". 21,600 Lbs
85	**NDE**	☑ Vendor Standard	**Auxiliary Equipment**	
86		☐ Radiography. Specify:	Blowers	
87		☐ Ultrasonic. Specify:	Inlet KO / Liquid Seal	
88		☐ Liquid Penetrant.	Flame / Detonation Arrestor	
89		☐ Magnetic Particles.	Skid	
90		☐ PMI. Specify:	**Instrumentation & Controls**	
91		☐ Other. Specify:	BMS	
92	**Surface Preparation**	☑ Vendor Standard	Control Panel	
93		☐ Other. Specify:		
94	**Paint System**	☑ Vendor Standard		
95		☐ Other. Specify:		
96	**Finished Color**	☑ Vendor Standard		
97		☐ Other. Specify:		
98				
99				

Additional Notes:

		Item/Tag No.:		Page	3	of	3
		Project No.:		Revision:	A		
		Project:		Date:	10 November 2014		
				By:	JS		
Environmental Control Equipment		P.O. No.:	-	Checked:	SG		
Data Sheet		RFQ No.:	-	Approved:	MS		
Client:		Ref. P&ID:	-				
Site:				Supplier:	LEED FABRICATION		
Unit/Lease:		Remarks:	-	Model No.:	L30-0028-00		

GENERAL ARRANGEMENT



Flare Size (in)	# of Orifices (N)	Pressure (oz/in^2)	Flow Rate (m^3/s)	Flow Rate (mSCFD)	Heat Release (MMBTU/hr)
60	30	1	0.0304	92.72	5.79
60	30	2	0.0430	131.12	8.19
60	30	3	0.0526	160.59	10.04
60	30	4	0.0608	185.43	11.59
60	30	5	0.0679	207.32	12.96
60	30	6	0.0744	227.11	14.19
60	30	7	0.0804	245.30	15.33
60	30	8	0.0859	262.24	16.39
60	30	9	0.0912	278.15	17.38
60	30	10	0.0961	293.19	18.32
60	30	11	0.1008	307.50	19.22

Enclosed (Passive Swirl) Flare Flow Rates

$$Q = \left[C_d \mathrm{A} \cdot \sqrt{\frac{2\left(\frac{P}{16}\right)R}{\rho}} \right] \mathrm{N}$$

$$Convert\ to\ mSCFD$$
$$(Q \cdot M \cdot 24) / 1000$$

3/8" Orifice: Dia =	0.00635	m		
Area =	3.16692E-05	m^2	6894.757	Conversion from PSI to Pa (R)
Cd =	1		127132.8	m^3/s to ft^3/hr (M)
Density =	0.8	kg/m^3		

Flare Size	# of Orifices (N)	Pressure (OZ/in^2)	m^3/s	mSCFD	99% Combustion Efficiency
18	2	1	0.00207892	6.34316015	6.28
18	2	2	0.00294003	8.97058312	8.88
18	2	3	0.00360079	10.98667566	10.88
18	2	4	0.00415783	12.68632031	12.56
18	2	5	0.00464860	14.18373729	14.04
18	2	6	0.00509228	15.53750573	15.38
18	2	7	0.00550029	16.78242429	16.61
18	2	8	0.00588006	17.94116623	17.76
18	2	9	0.00623675	19.02948046	18.84
18	2	10	0.00657411	20.05883365	19.86
18	2	11	0.00689498	21.03788221	20.83
18	2	12	0.00720157	21.97335133	21.75
18	2	13	0.00749564	22.87058918	22.64
18	2	14	0.00777859	23.73393204	23.50
18	2	15	0.00805160	24.56695363	24.32
18	2	16	0.00831566	25.37264061	25.12
18	2	17	0.00857159	26.15351931	25.89
18	2	18	0.00882009	26.91174935	26.64
24	4	1	0.00415783	12.68632031	12.56
24	4	2	0.00588006	17.94116623	17.76
24	4	3	0.00720157	21.97335133	21.75
24	4	4	0.00831566	25.37264061	25.12
24	4	5	0.00929719	28.36747459	28.08
24	4	6	0.01018456	31.07501146	30.76
24	4	7	0.01100059	33.56484858	33.23
24	4	8	0.01176012	35.88233246	35.52
24	4	9	0.01247349	38.05896092	37.68
24	4	10	0.01314822	40.11766729	39.72
24	4	11	0.01378996	42.07576442	41.66
24	4	12	0.01440315	43.94670266	43.51
24	4	13	0.01499127	45.74117836	45.28
24	4	14	0.01555718	47.46786408	46.99
24	4	15	0.01610321	49.13390727	48.64
24	4	16	0.01663132	50.74528122	50.24
24	4	17	0.01714318	52.30703862	51.78
24	4	18	0.01764018	53.82349870	53.29
36	10	1	0.01039458	31.71580076	31.40
36	10	2	0.01470015	44.85291558	44.40
36	10	3	0.01800394	54.93337832	54.38
36	10	4	0.02078915	63.43160153	62.80
36	10	5	0.02324298	70.91868647	70.21
36	10	6	0.02546141	77.68752865	76.91
36	10	7	0.02750147	83.91212145	83.07

36	10	8	0.02940030	89.70583116	88.81
36	10	9	0.03118373	95.14740229	94.20
36	10	10	0.03287054	100.29416823	99.29
36	10	11	0.03447491	105.18941106	104.14
36	10	12	0.03600787	109.86675665	108.77
36	10	13	0.03747818	114.35294589	113.21
36	10	14	0.03889295	118.66966020	117.48
36	10	15	0.04025802	122.83476817	121.61
36	10	16	0.04157831	126.86320305	125.59
36	10	17	0.04285794	130.76759655	129.46
36	10	18	0.04410046	134.55874674	133.21
48	14	1	0.01455241	44.40212107	43.96
48	14	2	0.02058021	62.79408181	62.17
48	14	3	0.02520551	76.90672965	76.14
48	14	4	0.02910482	88.80424214	87.92
48	14	5	0.03254017	99.28616105	98.29
48	14	6	0.03564597	108.76254012	107.67
48	14	7	0.03850205	117.47697003	116.30
48	14	8	0.04116043	125.58816363	124.33
48	14	9	0.04365722	133.20636321	131.87
48	14	10	0.04601875	140.41183552	139.01
48	14	11	0.04826488	147.26517548	145.79
48	14	12	0.05041102	153.81345931	152.28
48	14	13	0.05246945	160.09412425	158.49
48	14	14	0.05445012	166.13752428	164.48
48	14	15	0.05636123	171.96867543	170.25
48	14	16	0.05820963	177.60848427	175.83
48	14	17	0.06000112	183.07463517	181.24
48	14	18	0.06174064	188.38224544	186.50

ATTACHMENT S

Emission Calculations

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Facility-Wide Emission Summary - Controlled

Wells	11	per pad
Storage Tanks	12	per pad
Sand Separator Tank	2	per pad
Line Heaters	13	per pad
TEGs	3	per pad
Dehy Reboiler	0	per pad
Glycol Dehy	0	per pad
Dehy Drip Tank	0	per pad
Dehy Combustor	0	per pad
Compressor	2	per pad
High Pressure Separator	11	per pad
Low Pressure Separator	2	per pad
Vapor Recovery Unit	2	per pad
Tank Combustor	2	per pad
Length of lease road	1,523	feet

Carbon equivalent emissions (CO_2e) are based on the following Global Warming Potentials (GWP) from 40 CFR Part 98, Table A-1:

CO_2	1
CH_4	25
N_2O	298

Emission Point ID #	Emission Source ID#s	Emission Source Description	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		CO_2e	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001-C002	S001-S012	Storage Vessels	---	---	---	---	0.36	1.58	---	---	---	---	---	---	3.22	14.09
C001-C002	S032	Captured Liquid Loading	---	---	---	---	2.33	0.61	---	---	---	---	---	---	---	---
C001	C001	Tank Combustor	1.89	8.28	1.59	6.95	2.8E-04	1.2E-03	0.01	0.05	0.14	0.63	0.14	0.63	2,256.10	9,881.72
C002	C002	Tank Combustor	1.15	5.03	0.96	4.22	2.8E-04	1.2E-03	0.01	0.03	0.09	0.38	0.09	0.38	1,371.10	6,005.43
C001	**S001-S012, S032, C001**	**---**	**1.89**	**8.28**	**1.59**	**6.95**	**1.34**	**1.09**	**0.01**	**0.05**	**0.14**	**0.63**	**0.14**	**0.63**	**2,257.71**	**9,888.76**
C002	**S001-S012, S032, C002**	**---**	**1.15**	**5.03**	**0.96**	**4.22**	**1.34**	**1.09**	**0.01**	**0.03**	**0.09**	**0.38**	**0.09**	**0.38**	**1,372.71**	**6,012.48**
E013	S013	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E014	S014	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E015	S015	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E016	S016	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E017	S017	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E018	S018	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E019	S019	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E020	S020	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E021	S021	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E022	S022	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E023	S023	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E024	S024	Line Heater	0.11	0.48	0.09	0.40	0.01	0.03	6.6E-04	2.9E-03	0.01	0.04	0.01	0.04	135.14	591.90
E025	S025	Line Heater	0.11	0.48	0.09	0.40	0.01	0.03	6.6E-04	2.9E-03	0.01	0.04	0.01	0.04	135.14	591.90
E026	S026	TEG	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	1.52	6.64
E027	S027	TEG	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	1.52	6.64
E033	S033	TEG	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	1.52	6.64
E028	S028	Sand Separator Tank	---	---	---	---	0.33	1.46	---	---	---	---	---	---	4.88	21.35
E029	S029	Sand Separator Tank	---	---	---	---	0.33	1.46	---	---	---	---	---	---	4.88	21.35
E030	S030	VRU Engine	0.88	3.86	1.76	7.73	0.68	2.97	1.8E-03	0.01	0.06	0.26	0.06	0.26	1,716.24	7,517.13
E031	S031	VRU Engine	0.88	3.86	1.76	7.73	0.68	2.97	1.8E-03	0.01	0.06	0.26	0.06	0.26	1,716.24	7,517.13
E032	S032	Uncaptured Liquid Loading	---	---	---	---	49.91	12.98	---	---	---	---	---	---	---	---
---	---	Fugitives	---	---	---	---	---	37.57	---	---	---	---	---	---	---	560.07
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	1.33	---	0.13	---	---
Facility Total			6.64	29.07	7.62	33.38	54.72	62.04	0.03	0.14	0.49	3.47	0.49	2.27	9,329.47	41,423.16
Facility Total (excluding fugitive emissions)			6.64	29.07	7.62	33.38	4.81	11.49	0.03	0.14	0.49	2.13	0.49	2.13	9,329.47	40,863.09

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, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Facility-Wide Emission Summary - Controlled

Emission Point ID #	Emission Source ID#s	Emission Source Description	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		n-Hexane		Total HAP	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001-C002	S001-S012	Storage Vessels	---	---	3.3E-04	1.4E-03	5.5E-04	2.4E-03	3.3E-05	1.4E-04	3.2E-04	1.4E-03	0.01	0.03	0.01	0.04
C001-C002	S032	Captured Liquid Loading	---	---	1.4E-03	3.7E-04	1.7E-03	4.5E-04	1.0E-04	2.7E-05	9.8E-04	2.6E-04	0.04	0.01	0.06	0.01
C001	C001	Tank Combustor	---	---	---	---	---	---	---	---	---	---	---	---	---	---
C002	C002	Tank Combustor	---	---	---	---	---	---	---	---	---	---	---	---	---	---
C001	**S001-S012, S032, C001**	**---**	---	---	**8.8E-04**	**9.0E-04**	**1.1E-03**	**1.4E-03**	**6.8E-05**	**8.5E-05**	**6.5E-04**	**8.3E-04**	**0.02**	**0.02**	**0.03**	**0.03**
C002	**S001-S012, S032, C002**	**---**	---	---	**8.8E-04**	**9.0E-04**	**1.1E-03**	**1.4E-03**	**6.8E-05**	**8.5E-05**	**6.5E-04**	**8.3E-04**	**0.02**	**0.02**	**0.03**	**0.03**
E013	S013	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E014	S014	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E015	S015	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E016	S016	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E017	S017	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E018	S018	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E019	S019	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E020	S020	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E021	S021	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E022	S022	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E023	S023	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E024	S024	Line Heater	8.2E-05	3.6E-04	2.3E-06	1.0E-05	3.7E-06	1.6E-05	---	---	---	---	2.0E-03	0.01	2.1E-03	0.01
E025	S025	Line Heater	8.2E-05	3.6E-04	2.3E-06	1.0E-05	3.7E-06	1.6E-05	---	---	---	---	2.0E-03	0.01	2.1E-03	0.01
E026	S026	TEG	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	2.3E-05	1.0E-04
E027	S027	TEG	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	2.3E-05	1.0E-04
E033	S033	TEG	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	2.3E-05	1.0E-04
E028	S028	Sand Separator Tank	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0E-03	<0.01	2.0E-03	1.0E-02
E029	S029	Sand Separator Tank	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0E-03	<0.01	2.0E-03	1.0E-02
E030	S030	VRU Engine	0.06	0.27	4.8E-03	2.1E-02	1.7E-03	7.4E-03	7.5E-05	3.3E-04	5.9E-04	2.6E-03	---	---	0.10	0.43
E031	S031	VRU Engine	0.06	0.27	4.8E-03	2.1E-02	1.7E-03	7.4E-03	7.5E-05	3.3E-04	5.9E-04	2.6E-03	---	---	0.10	0.43
E032	S032	Uncaptured Liquid Loading	---	---	0.03	0.01	0.04	0.01	2.2E-03	5.7E-04	2.1E-02	5.5E-03	0.81	0.21	1.24	0.32
---	---	Fugitives	---	---	---	0.03	---	0.07	---	<0.01	---	0.10	---	0.81	---	2.42
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Total			0.13	0.55	0.04	0.08	0.04	0.10	2.5E-03	1.4E-03	0.02	0.11	0.89	1.20	1.54	3.83
Facility Total (excluding fugitive emissions)			0.13	0.55	1.1E-02	0.04	5.7E-03	1.8E-02	2.9E-04	8.3E-04	2.5E-03	6.8E-03	0.08	0.18	0.30	1.09

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, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Produced Fluids Storage Vessels

Potential Throughput

Operational Hours	8,760	hrs/yr
Maximum Condensate Throughput[1]	208	bbl/day
Maximum Produced Water Throughput[1]	878	bbl/day

[1] Based on the highest monthly throughput recorded at the PEN 16 (January 2014) that was scaled up to eleven wells and Includes a safety factor of 60%.

Overall Control Efficiency of Combustor 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	6.434	28.182	6.434	28.182
Ethane	<0.001	<0.001	<0.001	<0.001	6.240	27.331	6.240	27.331
Propane	0.148	0.646	1.217	5.332	5.784	25.333	7.149	31.311
Isobutane	0.043	0.190	0.337	1.475	1.711	7.496	2.092	9.161
n-Butane	0.081	0.356	0.634	2.775	3.297	14.440	4.012	17.571
Isopentane	0.035	0.153	0.270	1.183	1.411	6.182	1.716	7.518
n-Pentane	0.028	0.122	0.216	0.946	1.144	5.012	1.388	6.080
n-Hexane	0.006	0.027	0.047	0.207	0.254	1.112	0.307	1.346
Cyclohexane	3.9E-04	0.002	0.003	0.013	0.022	0.095	0.025	0.110
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	0.007	0.029	0.051	0.224	0.294	1.287	0.352	1.540
n-Octane	0.002	0.009	0.016	0.070	0.094	0.410	0.111	0.488
n-Nonane	0.001	0.003	0.005	0.020	0.028	0.123	0.033	0.146
n-Decane	3.0E-04	0.001	0.002	0.010	0.015	0.065	0.017	0.077
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	0.012	0.052	0.092	0.402	0.487	2.131	0.590	2.584
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	1.4E-04	0.001	0.002	0.009	0.014	0.062	0.016	0.071
Toluene	2.4E-04	0.001	0.002	0.010	0.025	0.109	0.027	0.120
Ethylbenzene	1.6E-05	6.9E-05	1.3E-04	0.001	0.001	0.007	0.002	0.007
m-Xylene	1.5E-04	0.001	0.001	0.005	0.015	0.064	0.016	0.070
Isooctane	0.002	0.011	0.019	0.084	0.109	0.476	0.130	0.571
Total VOC Emissions:	0.37	1.60	2.91	12.76	14.70	64.40	17.98	78.77
Total HAP Emissions:	9.1E-03	0.04	0.07	0.32	0.42	1.83	0.50	2.18

[1] 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.
[2] Composition of condensate from PEN-16 sample from 12/23/2013

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Produced Fluids Storage Vessels

Storage Tanks - Controlled

	Breathing		Working		Flashing		Total Emissions	
	lb/hr	tpy			lb/hr	tpy	lb/hr	tpy
Methane	<0.001	<0.001	<0.001	<0.001	0.129	0.564	0.129	0.564
Ethane	<0.001	<0.001	<0.001	<0.001	0.125	0.547	0.125	0.547
Propane	0.003	0.013	0.024	0.107	0.116	0.507	0.143	0.626
Isobutane	0.001	0.004	0.007	0.030	0.034	0.150	0.042	0.183
n-Butane	0.002	0.007	0.013	0.055	0.066	0.289	0.080	0.351
Isopentane	0.001	0.003	0.005	0.024	0.028	0.124	0.034	0.150
n-Pentane	0.001	0.002	0.004	0.019	0.023	0.100	0.028	0.122
n-Hexane	1.2E-04	0.001	0.001	0.004	0.005	0.022	0.006	0.027
Cyclohexane	7.8E-06	3.4E-05	6.1E-05	2.7E-04	4.3E-04	0.002	0.001	0.002
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	1.3E-04	0.001	0.001	0.004	0.006	0.026	0.007	0.031
n-Octane	4.1E-05	1.8E-04	3.2E-04	0.001	0.002	0.008	0.002	0.010
n-Nonane	1.2E-05	5.2E-05	9.1E-05	4.0E-04	0.001	0.002	0.001	0.003
n-Decane	5.9E-06	2.6E-05	4.6E-05	2.0E-04	3.0E-04	0.001	3.5E-04	0.002
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	2.4E-04	0.001	0.002	0.008	0.010	0.043	0.012	0.052
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	2.7E-06	1.2E-05	4.0E-05	1.7E-04	2.8E-04	0.001	3.3E-04	0.001
Toluene	4.8E-06	2.1E-05	4.5E-05	2.0E-04	5.0E-04	0.002	0.001	0.002
Ethylbenzene	3.2E-07	1.4E-06	2.6E-06	1.1E-05	3.0E-05	1.3E-04	3.3E-05	1.4E-04
m-Xylene	3.0E-06	1.3E-05	2.5E-05	1.1E-04	2.9E-04	0.001	3.2E-04	0.001
Isooctane	4.9E-05	2.2E-04	3.8E-04	0.002	0.002	0.010	0.003	0.011
Total VOC Emissions:	7.3E-03	0.03	0.06	0.26	0.29	1.29	0.36	1.58
Total HAP Emissions:	1.8E-04	8.0E-04	1.4E-03	6.3E-03	8.4E-03	0.04	0.01	0.04

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

VRU Engine

Engine Information:

Manufacturer:	Caterpilllar
Model No.:	G3408
Engine ID	S030
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Rated Horsepower (bhp):	400

Engine Fuel Information:

Fuel Type:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Specific Fuel Consumption (Btu/bhp-hr):	7,539
Maximum Fuel Consumption at 100% Load (scf/hr):	2,872
Heat Input (MMBtu/hr):	3.02
Potential Fuel Consumption (MMBtu/yr):	26,417
Max. Fuel Consumption at 100%(MMscf/hr):	0.0029
Max. Fuel Consumption (MMscf/yr):	25.2
Max. Annual Hours of Operation (hr/yr):	8,760

Engine Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	1.00	g/bhp-hr	0.88	3.86	40 CFR 60, Subpart JJJJ, Table 1
VOC (excludes HCHO)	0.70	g/bhp-hr	0.62	2.70	40 CFR 60, Subpart JJJJ, Table 1
VOC (includes HCHO)	---	---	0.68	2.97	VOC + HCHO
CO	2.00	g/bhp-hr	1.76	7.73	40 CFR 60, Subpart JJJJ, Table 1
SO_X	0.001	lb/MMBtu	<0.01	<0.01	AP-42, Table 3.2-3 (Aug-2000)
PM_{10}	0.02	lb/MMBtu	0.06	0.26	AP-42, Table 3.2-3 (Aug-2000)
$PM_{2.5}$	0.02	lb/MMBtu	0.06	0.26	AP-42, Table 3.2-3 (Aug-2000)
Formaldehyde (HCHO)	0.02	lb/MMBtu	0.06	0.27	AP-42, Table 3.2-3 (Aug-2000)
GHG (CO_2e)	See Table Below		1,716	7,517	40 CFR 98, Tables C-1 & C-2
Other (Total HAP)	See Table Below		0.10	0.43	AP-42, Table 3.2-3 (Aug-2000)

Notes:

1. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
2. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
3. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this source type.

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

VRU Engine

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

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
GHGs:					
CO_2	569.00	lb/MMBtu	1715.88	7515.54	40 CFR 98, Table C-1
CH_4	0.001	kg/MMBtu	6.6E-03	2.9E-02	40 CFR 98, Table C-2
N_2O	0.0001	kg/MMBtu	6.6E-04	2.9E-03	40 CFR 98, Table C-2
GHG (CO_2e)			**1,716**	**7,517**	
Organic HAPs:					
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	7.6E-05	3.3E-04	AP-42, Table 3.2-3 (Aug-2000)
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	4.6E-05	2.0E-04	AP-42, Table 3.2-3 (Aug-2000)
1,3-Butadiene	6.63E-04	lb/MMBtu	2.0E-03	8.8E-03	AP-42, Table 3.2-3 (Aug-2000)
1,3-Dichloropropene	1.27E-05	lb/MMBtu	3.8E-05	1.7E-04	AP-42, Table 3.2-3 (Aug-2000)
Acetaldehyde	2.79E-03	lb/MMBtu	8.4E-03	3.7E-02	AP-42, Table 3.2-3 (Aug-2000)
Acrolein	2.63E-03	lb/MMBtu	7.9E-03	3.5E-02	AP-42, Table 3.2-3 (Aug-2000)
Benzene	1.58E-03	lb/MMBtu	4.8E-03	2.1E-02	AP-42, Table 3.2-3 (Aug-2000)
Carbon Tetrachloride	1.77E-05	lb/MMBtu	5.3E-05	2.3E-04	AP-42, Table 3.2-3 (Aug-2000)
Chlorobenzene	1.29E-05	lb/MMBtu	3.9E-05	1.7E-04	AP-42, Table 3.2-3 (Aug-2000)
Chloroform	1.37E-05	lb/MMBtu	4.1E-05	1.8E-04	AP-42, Table 3.2-3 (Aug-2000)
Ethylbenzene	2.48E-05	lb/MMBtu	7.5E-05	3.3E-04	AP-42, Table 3.2-3 (Aug-2000)
Ethylene Dibromide	2.13E-05	lb/MMBtu	6.4E-05	2.8E-04	AP-42, Table 3.2-3 (Aug-2000)
Methanol	3.06E-03	lb/MMBtu	9.2E-03	4.0E-02	AP-42, Table 3.2-3 (Aug-2000)
Methylene Chloride	4.12E-05	lb/MMBtu	1.2E-04	5.4E-04	AP-42, Table 3.2-3 (Aug-2000)
Naphthalene	9.71E-05	lb/MMBtu	2.9E-04	1.3E-03	AP-42, Table 3.2-3 (Aug-2000)
PAH	1.41E-04	lb/MMBtu	4.3E-04	1.9E-03	AP-42, Table 3.2-3 (Aug-2000)
Styrene	1.19E-05	lb/MMBtu	3.6E-05	1.6E-04	AP-42, Table 3.2-3 (Aug-2000)
Toluene	5.58E-04	lb/MMBtu	1.7E-03	7.4E-03	AP-42, Table 3.2-3 (Aug-2000)
Vinyl Chloride	7.18E-06	lb/MMBtu	2.2E-05	9.5E-05	AP-42, Table 3.2-3 (Aug-2000)
Xylene	1.95E-04	lb/MMBtu	5.9E-04	2.6E-03	AP-42, Table 3.2-3 (Aug-2000)
Total HAP			**0.10**	**0.43**	

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Sand Separator Tank

Throughput Parameter	Value	Units
Tank Capacity	5,880	gallons
Operational Hours	8,760	hrs/yr
Throughput	280	bbl/month
Percent Produced Water	50%	
Total Produced Water Throughput	140	bbl/month

[1] Conservatively assumes 2 turnovers/month of sand and produced water.

Description	Potential Throughput (gal/yr)
Produced Water and Sand	141,120

Sand Separator Tank (140 bbl) - Uncontrolled *(Per tank)* [2, 3]

Constituent	Total Emissions [1] lb/hr	tpy
Methane	0.195	0.854
Ethane	0.065	0.284
Propane	0.116	0.508
Isobutane	0.068	0.296
n-Butane	0.085	0.372
Isopentane	0.034	0.151
n-Pentane	0.023	0.102
Hexanes	0.002	0.008
Heptanes	0.002	0.008
Octane	0.001	0.003
Nonane	<0.001	0.001
Decane	<0.001	<0.001
Benzene	<0.001	<0.001
Toluene	<0.001	<0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
n-Hexane	0.001	0.006
2,2,4-Trimethylpentane	<0.001	<0.001
Total HC Emissions:	0.592	2.594
Total VOC Emissions:	0.333	1.457
Total HAP Emissions:	0.002	0.010

[2] E&P TANK 2.0 calculates working, breathing and flashing losses and reports the sum as one total.
[3] E&P TANK v2.0 emission calculations are based on PEN-16 sample from 12/23/2013.

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Sand Separator Tank

Sand Separator Tank (140 bbl) - Controlled *(Per tank)*

Constituent	Total Emissions lb/hr	tpy
Methane	0.195	0.854
Ethane	0.065	0.284
Propane	0.116	0.508
Isobutane	0.068	0.296
n-Butane	0.085	0.372
Isopentane	0.034	0.151
n-Pentane	0.023	0.102
Hexanes	0.002	0.008
Heptanes	0.002	0.008
Octane	0.001	0.003
Nonane	<0.001	0.001
Decane	<0.001	<0.001
Benzene	<0.001	<0.001
Toluene	<0.001	<0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
n-Hexane	0.001	0.006
2,2,4-Trimethylpentane	<0.001	<0.001
Total Emissions:	0.608	2.662
Total VOC Emissions:	0.333	1.457
Total HAP Emissions:	0.002	0.010

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Tank Combustor

Source Designation:	**C001**
Pilot Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Pilot Rating (MMBtu/hr)	0.05
Combustor Rating (MMBtu/hr) [1]	19.22
Combustor Rating (Mscfd) [1]	307.5
Combustor Rating (scf/hr)	12812.50
Pilot Fuel Consumption (scf/hr):	50.00
Potential Annual Hours of Operation (hr/yr):	8,760

[1] Maximum heat input for 60" model from Leed Enclosed Combustor Operations Manual

Enclosed Combustor Emissions

Pollutant	Emission Factors [2] (lb/MMBtu)	Combustor (lb/hr)	Combustor (tpy)	Pilot (lb/hr)	Pilot (tpy)	Total (lb/hr)	Total (tpy)
NO_x	0.10	1.88	8.25	5.1E-03	0.02	1.89	8.28
CO	0.08	1.58	6.93	4.3E-03	0.02	1.59	6.95
VOC	5.4E-03	---	---	2.8E-04	1.2E-03	0.00	0.00
SO_2	5.9E-04	0.01	0.05	3.1E-05	1.4E-04	0.01	0.05
PM/PM_{10}	0.01	0.14	0.63	3.9E-04	1.7E-03	0.14	0.63
CO_2	117.00	2248.688	9849.254	6.14	26.90	2254.83	9876.16
CH_4	2.2E-03	---	---	1.2E-04	5.1E-04	0.00	0.00
N_2O	2.2E-04	4.2E-03	0.02	1.2E-05	5.1E-05	4.2E-03	0.02

[2] 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 wellpad. 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.

Combustor Maximum Loading:

$$\frac{12812.5\ \text{scf}}{\text{hr}} \left| \frac{\text{lb-mol}}{379.5\ \text{scf}} \right| \frac{20.37\ \text{lb}}{\text{lb-mol}} = 687.56\ \text{lb/hr}$$

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Tank Combustor

Source Designation:	**C002**
Pilot Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Pilot Rating (MMBtu/hr)	0.05
Combustor Rating (MMBtu/hr) [1]	11.66
Combustor Rating (Mscfd) [1]	186.5
Combustor Rating (scf/hr)	7770.83
Pilot Fuel Consumption (scf/hr):	50.00
Potential Annual Hours of Operation (hr/yr):	8,760

[1] Maximum heat input for 48" model from Leed Enclosed Combustor Operations Manual

Enclosed Combustor Emissions

Pollutant	Emission Factors [2] (lb/MMBtu)	Combustor (lb/hr)	Combustor (tpy)	Pilot (lb/hr)	Pilot (tpy)	Total (lb/hr)	Total (tpy)
NO_x	0.10	1.14	5.01	5.1E-03	0.02	1.15	5.03
CO	0.08	0.96	4.21	4.3E-03	0.02	0.96	4.22
VOC	5.4E-03	---	---	2.8E-04	1.2E-03	0.00	0.00
SO_2	5.9E-04	0.01	0.03	3.1E-05	1.4E-04	0.01	0.03
PM/PM_{10}	0.01	0.09	0.38	3.9E-04	1.7E-03	0.09	0.38
CO_2	117.00	1364.189	5975.146	6.14	26.90	1370.33	6002.05
CH_4	2.2E-03	---	---	1.2E-04	5.1E-04	0.00	0.00
N_2O	2.2E-04	2.6E-03	0.01	1.2E-05	5.1E-05	2.6E-03	0.01

[2] 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 wellpad. 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.

Combustor Maximum Loading:

$$\frac{7770.83\ \text{scf}}{\text{hr}} \left| \frac{\text{lb-mol}}{379.5\ \text{scf}} \right| \frac{20.37\ \text{lb}}{\text{lb-mol}} = 417.01\ \text{lb/hr}$$

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Line Heaters

Source Designation:	**S013-S023**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr)	1.54
Fuel Consumption (MMscf/hr):	1.47E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	**Emission Factor (lb/MMscf)[1, 4]**	**Potential Emissions**	
		(lb/hr)[2]	**(tons/yr)[3]**
NO_x	100	0.15	0.64
CO	84	0.12	0.54
VOC	5.5	0.01	0.04
SO_2	0.6	8.8E-04	3.9E-03
PM Total	7.6	0.01	0.05
PM Condensable	5.7	0.01	0.04
PM_{10} (Filterable)	1.9	2.8E-03	0.01
$PM_{2.5}$ (Filterable)	1.9	2.8E-03	0.01
Lead	5.00E-04	7.3E-07	3.2E-06
CO_2	117.0	180.00	788.38
CH_4	2.21E-03	3.4E-03	1.5E-02
N_2O	2.21E-04	3.4E-04	1.5E-03

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Line Heaters

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
2-Methylnaphthalene	2.4E-05	3.5E-08	1.5E-07
3-Methylchloranthrene	1.8E-06	2.6E-09	1.2E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	2.3E-08	1.0E-07
Acenaphthene	1.8E-06	2.6E-09	1.2E-08
Acenaphthylene	1.8E-06	2.6E-09	1.2E-08
Anthracene	2.4E-06	3.5E-09	1.5E-08
Benz(a)anthracene	1.8E-06	2.6E-09	1.2E-08
Benzene	2.1E-03	3.1E-06	1.3E-05
Benzo(a)pyrene	1.2E-06	1.8E-09	7.7E-09
Benzo(b)fluoranthene	1.8E-06	2.6E-09	1.2E-08
Benzo(g,h,i)perylene	1.2E-06	1.8E-09	7.7E-09
Benzo(k)fluoranthene	1.8E-06	2.6E-09	1.2E-08
Chrysene	1.8E-06	2.6E-09	1.2E-08
Dibenzo(a,h) anthracene	1.2E-06	1.8E-09	7.7E-09
Dichlorobenzene	1.2E-03	1.8E-06	7.7E-06
Fluoranthene	3.0E-06	4.4E-09	1.9E-08
Fluorene	2.8E-06	4.1E-09	1.8E-08
Formaldehyde	7.5E-02	1.1E-04	4.8E-04
Hexane	1.8E+00	2.6E-03	1.2E-02
Indo(1,2,3-cd)pyrene	1.8E-06	2.6E-09	1.2E-08
Naphthalene	6.1E-04	8.9E-07	3.9E-06
Phenanthrene	1.7E-05	2.5E-08	1.1E-07
Pyrene	5.0E-06	7.3E-09	3.2E-08
Toluene	3.4E-03	5.0E-06	2.2E-05
Arsenic	2.0E-04	2.9E-07	1.3E-06
Beryllium	1.2E-05	1.8E-08	7.7E-08
Cadmium	1.1E-03	1.6E-06	7.1E-06
Chromium	1.4E-03	2.1E-06	9.0E-06
Cobalt	8.4E-05	1.2E-07	5.4E-07
Manganese	3.8E-04	5.6E-07	2.4E-06
Mercury	2.6E-04	3.8E-07	1.7E-06
Nickel	2.1E-03	3.1E-06	1.3E-05
Selenium	2.4E-05	3.5E-08	1.5E-07
Total HAP		**2.8E-03**	**1.2E-02**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3
[2] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).
[3] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).
[4] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Line Heater

Source Designation:	**S024-S025**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr)	1.15
Fuel Consumption (MMscf/hr):	1.10E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[1, 4]	Potential Emissions	
		(lb/hr)[2]	(tons/yr)[3]
NO_x	100	0.11	0.48
CO	84	0.09	0.40
VOC	5.5	0.01	0.03
SO_2	0.6	6.6E-04	2.9E-03
PM Total	7.6	0.01	0.04
PM Condensable	5.7	0.01	0.03
PM_{10} (Filterable)	1.9	2.1E-03	0.01
$PM_{2.5}$ (Filterable)	1.9	2.1E-03	0.01
Lead	5.00E-04	5.5E-07	2.4E-06
CO_2	117.0	135.00	591.29
CH_4	2.21E-03	2.5E-03	1.1E-02
N_2O	2.21E-04	2.5E-04	1.1E-03

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Line Heater

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
2-Methylnaphthalene	2.4E-05	2.6E-08	1.2E-07
3-Methylchloranthrene	1.8E-06	2.0E-09	8.7E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.8E-08	7.7E-08
Acenaphthene	1.8E-06	2.0E-09	8.7E-09
Acenaphthylene	1.8E-06	2.0E-09	8.7E-09
Anthracene	2.4E-06	2.6E-09	1.2E-08
Benz(a)anthracene	1.8E-06	2.0E-09	8.7E-09
Benzene	2.1E-03	2.3E-06	1.0E-05
Benzo(a)pyrene	1.2E-06	1.3E-09	5.8E-09
Benzo(b)fluoranthene	1.8E-06	2.0E-09	8.7E-09
Benzo(g,h,i)perylene	1.2E-06	1.3E-09	5.8E-09
Benzo(k)fluoranthene	1.8E-06	2.0E-09	8.7E-09
Chrysene	1.8E-06	2.0E-09	8.7E-09
Dibenzo(a,h) anthracene	1.2E-06	1.3E-09	5.8E-09
Dichlorobenzene	1.2E-03	1.3E-06	5.8E-06
Fluoranthene	3.0E-06	3.3E-09	1.4E-08
Fluorene	2.8E-06	3.1E-09	1.3E-08
Formaldehyde	7.5E-02	8.2E-05	3.6E-04
Hexane	1.8E+00	2.0E-03	8.7E-03
Indo(1,2,3-cd)pyrene	1.8E-06	2.0E-09	8.7E-09
Naphthalene	6.1E-04	6.7E-07	2.9E-06
Phenanthrene	1.7E-05	1.9E-08	8.2E-08
Pyrene	5.0E-06	5.5E-09	2.4E-08
Toluene	3.4E-03	3.7E-06	1.6E-05
Arsenic	2.0E-04	2.2E-07	9.6E-07
Beryllium	1.2E-05	1.3E-08	5.8E-08
Cadmium	1.1E-03	1.2E-06	5.3E-06
Chromium	1.4E-03	1.5E-06	6.7E-06
Cobalt	8.4E-05	9.2E-08	4.0E-07
Manganese	3.8E-04	4.2E-07	1.8E-06
Mercury	2.6E-04	2.9E-07	1.3E-06
Nickel	2.1E-03	2.3E-06	1.0E-05
Selenium	2.4E-05	2.6E-08	1.2E-07
Total HAP		**2.1E-03**	**9.1E-03**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3
[2] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).
[3] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).
[4] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Thermoelectric Generators

Source Designation:	**S026-S027,S033**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr) [1]	0.013
Fuel Consumption (MMscf/hr):	1.23E-05
Potential Annual Hours of Operation (hr/yr):	8,760

[1] Global Themorelectric specification sheet states 311 ft^3/day at 1000 BTU/ft^3.

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[2, 5]	Potential Emissions (lb/hr)[3]	Potential Emissions (tons/yr)[4]
NO_x	100	1.2E-03	0.01
CO	84	1.0E-03	4.5E-03
VOC	5.5	6.8E-05	3.0E-04
SO_2	0.6	7.4E-06	3.2E-05
PM Total	7.6	9.4E-05	4.1E-04
PM Condensable	5.7	7.0E-05	3.1E-04
PM_{10} (Filterable)	1.9	2.3E-05	1.0E-04
$PM_{2.5}$ (Filterable)	1.9	2.3E-05	1.0E-04
Lead	5.00E-04	6.2E-09	2.7E-08
CO_2	116.9	1.51	6.64
CH_4	2.21E-03	2.9E-05	1.3E-04
N_2O	2.21E-04	2.9E-06	1.3E-05

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Thermoelectric Generators

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[2]	Potential Emissions (lb/hr)[3]	Potential Emissions (tons/yr)[4]
HAPs:			
2-Methylnaphthalene	2.4E-05	3.0E-10	1.3E-09
3-Methylchloranthrene	1.8E-06	2.2E-11	9.7E-11
7,12-Dimethylbenz(a)anthracene	1.6E-05	2.0E-10	8.6E-10
Acenaphthene	1.8E-06	2.2E-11	9.7E-11
Acenaphthylene	1.8E-06	2.2E-11	9.7E-11
Anthracene	2.4E-06	3.0E-11	1.3E-10
Benz(a)anthracene	1.8E-06	2.2E-11	9.7E-11
Benzene	2.1E-03	2.6E-08	1.1E-07
Benzo(a)pyrene	1.2E-06	1.5E-11	6.5E-11
Benzo(b)fluoranthene	1.8E-06	2.2E-11	9.7E-11
Benzo(g,h,i)perylene	1.2E-06	1.5E-11	6.5E-11
Benzo(k)fluoranthene	1.8E-06	2.2E-11	9.7E-11
Chrysene	1.8E-06	2.2E-11	9.7E-11
Dibenzo(a,h) anthracene	1.2E-06	1.5E-11	6.5E-11
Dichlorobenzene	1.2E-03	1.5E-08	6.5E-08
Fluoranthene	3.0E-06	3.7E-11	1.6E-10
Fluorene	2.8E-06	3.5E-11	1.5E-10
Formaldehyde	7.5E-02	9.3E-07	4.1E-06
Hexane	1.8E+00	2.2E-05	9.7E-05
Indo(1,2,3-cd)pyrene	1.8E-06	2.2E-11	9.7E-11
Naphthalene	6.1E-04	7.5E-09	3.3E-08
Phenanthrene	1.7E-05	2.1E-10	9.2E-10
Pyrene	5.0E-06	6.2E-11	2.7E-10
Toluene	3.4E-03	4.2E-08	1.8E-07
Arsenic	2.0E-04	2.5E-09	1.1E-08
Beryllium	1.2E-05	1.5E-10	6.5E-10
Cadmium	1.1E-03	1.4E-08	5.9E-08
Chromium	1.4E-03	1.7E-08	7.6E-08
Cobalt	8.4E-05	1.0E-09	4.5E-09
Manganese	3.8E-04	4.7E-09	2.1E-08
Mercury	2.6E-04	3.2E-09	1.4E-08
Nickel	2.1E-03	2.6E-08	1.1E-07
Selenium	2.4E-05	3.0E-10	1.3E-09
Total HAP		**2.3E-05**	**1.0E-04**

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

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

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

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

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Liquid Loading

Throughput 16,648,380 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	68.962	17.930	20.688	5.379	0.965	0.251
Isobutane	19.336	5.027	5.801	1.508	0.271	0.070
n-Butane	36.340	9.448	10.902	2.835	0.509	0.132
Isopentane	15.515	4.034	4.654	1.210	0.217	0.056
n-Pentane	12.406	3.226	3.722	0.968	0.174	0.045
n-Hexane	2.715	0.706	0.815	0.212	0.038	0.010
Cyclohexane	0.174	0.045	0.052	0.014	0.002	0.001
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	2.933	0.763	0.880	0.229	0.041	0.011
n-Octane	0.912	0.237	0.274	0.071	0.013	0.003
n-Nonane	0.262	0.068	0.079	0.020	0.004	0.001
n-Decane	0.132	0.034	0.040	0.010	0.002	4.8E-04
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	5.266	1.369	1.580	0.411	0.074	0.019
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	0.102	0.026	0.031	0.008	0.001	3.7E-04
Toluene	0.123	0.032	0.037	0.010	0.002	4.5E-04
Ethylbenzene	0.007	0.002	0.002	0.001	1.0E-04	2.7E-05
m-Xylene	0.070	0.018	0.021	0.005	0.001	2.6E-04
Isooctane	1.100	0.286	0.330	0.086	0.015	0.004
Total VOC Emissions:	166.355	43.252	49.907	12.976	2.329	0.606
Total HAP Emissions:	4.118	1.071	1.235	0.321	0.058	0.015

[1] Uncontrolled emissions calculation using Promax (sum of produced water and condensate).
[2] Hourly emissions assume two hours of loading per day, five days per week.

Company Name: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Fugitive Emissions

Fugitive Emissions from Component Leaks

Facility Equipment Type[1]	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

[1] 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[1] (kg/hr/source)	Facility Equipment Count[2] (units)	TOC Annual Fugitive Emissions (tpy)	Weight Fraction VOC	Weight Fraction HAP	VOC Emissions[3] (tpy)	HAP Emissions[3] (tpy)
Pumps	Light Liquid	0.01990	21	4.04	1.00	0.06	4.04	0.26
Compressor	Gas	0.22800	2	4.40	0.17	0.01	0.74	0.05
Valves	Gas	0.00597	659	37.96	0.17	0.01	6.34	0.41
Pressure Relief Valves	Gas	0.10400	48	47.70	0.17	0.01	7.97	0.51
Open-Ended Lines	All	0.00170	48	0.79	0.17	0.01	0.13	0.01
Connectors	All	0.00183	2,925	51.69	0.17	0.01	8.63	0.56
Intermittent Pneumatic Devices[4]	Gas	13.5	55	---	---	---	9.73	0.63
			Emission Totals:	**146.58**	**---**	**---**	**37.57**	**2.42**

[1] 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). SOCMI factors were used as it was representative of natural gas liquids extraction. The pneumatic controller value is from 40 CFR 98 Subpart W, Table W-1A. Pneumatic assumes operation 1/3 of the year.

[2] 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.

[3] 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)

[4] 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: EQT Production, LLC
Facility Name: PEN-54 Pad
Project Description: G70-C Application

Fugitive Emissions

Fugitive Specific HAP Emissions from Component Leaks

Equipment Type	Service	Emission Factors[1] (kg/hr/source)	Facility Equipment Count[2] (units)	TOC Annual Fugitive Emissions (tpy)	Benzene Emissions[3] (tpy)	Toluene Emissions[3] (tpy)	Ethylbenzene Emissions[3] (tpy)	Xylene Emissions[3] (tpy)	n-Hexane Emissions[4] (tpy)
Pumps	Light Liquid	0.01990	21	4.04	6.2E-04	1.5E-03	0.0E+00	1.9E-03	0.02
Compressor	Gas	0.22800	2	4.40	6.8E-04	1.6E-03	0.0E+00	2.1E-03	0.02
Valves	Gas	0.00597	659	37.96	0.01	0.01	0.0E+00	0.02	0.15
Pressure Relief Valves	Gas	0.10400	48	47.70	0.01	0.02	0.0E+00	0.02	0.19
Open-Ended Lines	All	0.00170	48	0.79	1.2E-04	2.9E-04	0.0E+00	3.7E-04	3.1E-03
Connectors	All	0.00183	2,925	51.69	0.01	0.02	0.0E+00	0.02	0.20
Intermittent Pneumatic Devices[4]	Gas	13.5	55	---	0.01	0.02	0.0E+00	0.03	0.23
			Emission Totals:	**146.58**	**0.03**	**0.07**	**0.0E+00**	**0.10**	**0.81**

[1] 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). SOCMI factors were used as it was representative of natural gas liquids extraction. The pneumatic controller value is from 40 CFR 98 Subpart W, Table W-1A. Pneumatic assumes operation 1/3 of the year.

[2] 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.

[3] 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)

[4] 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[1] (scf/hr/component)	CH_4 Emissions[2,3] (tpy)	CO_2 Emissions[2,3] (tpy)	CO_2e Emissions[4] (tpy)
Pumps	21	0.01	0.03	2.2E-04	0.78
Compressor	2	4.17	1.25	0.01	31.15
Valves	659	0.027	2.66	0.02	66.42
Pressure Relief Devices	48	0.04	0.28	2.0E-03	7.10
Open-Ended Lines	48	0.061	0.44	3.1E-03	10.94
Connectors	2,925	0.003	1.31	0.01	32.78
Intermittent Pneumatic Devices	55	6	16.43	0.12	410.91
Total			**22.40**	**0.16**	**560.07**

[1] 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.

[2] 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.

[3] 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_4 and CO_2 based on gas analysis:
CH_4: 81% CO_2: 0.21%

[4] Carbon equivalent emissions (CO_2e) are based on the following Global Warming Potentials (GWP) from 40 CFR Part 98, Table A-1:
Carbon Dioxide (CO_2): 1
Methane (CH_4): 25

Company Name: **EQT Production, LLC**
Facility Name: **PEN-54 Pad**
Project Description: **G70-C Application**

Haul Roads

Estimated Potential Road Fugitive Emissions

Unpaved Road Emissions

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

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

Description	Weight of Empty Truck (tons)	Weight of Truck w/ Max Load (tons)	Mean Vehicle Weight (tons)	Length of Unpaved Road Traveled (mile)	Trips Per Year	Mileage Per Year	Control (%)	Emissions (tpy) PM	PM_{10}	$PM_{2.5}$
Liquids Hauling	20	40	30	0.29	4,162	2,401	0	5.14	1.31	0.13
Employee Vehicles	3	3	3	0.29	200	115	0	0.09	0.02	0.00
Total Potential Emissions								**5.23**	**1.33**	**0.13**

Company Name: **EQT Production, LLC**
Facility Name: **PEN-54 Pad**
Project Description: **G70-C Application**

Gas Analysis

Sample Location: CPT 11 Gas Analysis
Sample Date: 11/13/2014
HHV (Btu/scf): 1,237 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	0.208	44.01	0.09	0.00	0.449
Nitrogen	0.387	28.01	0.11	0.01	0.532
Methane	80.572	16.04	12.92	0.63	63.460
Ethane	12.770	30.07	3.84	0.19	18.856
Propane	3.536	44.10	1.56	0.08	7.657
Isobutane	0.490	58.12	0.28	0.01	1.398
n-Butane	0.936	58.12	0.54	0.03	2.671
Isopentane	0.220	72.15	0.16	0.01	0.779
n-Pentane	0.173	72.15	0.12	0.01	0.613
Cyclopentane	<0.001	70.1	0.0	0.0	0.000
n-Hexane	0.093	86.18	0.08	0.00	0.394
Cyclohexane	0.013	84.16	0.01	0.00	0.054
Other Hexanes	0.174	86.18	0.15	0.01	0.736
Heptanes	0.152	100.21	0.15	0.01	0.748
Methylcyclohexane	<0.001	98.19	0.00	0.00	0.000
2,2,4-Trimethylpentane	0.104	114.23	0.12	0.01	0.583
Benzene*	0.004	78.11	0.00	0.00	0.015
Toluene*	0.008	92.14	0.01	0.00	0.036
Ethylbenzene*	<0.001	106.17	0.00	0.00	0.000
Xylenes*	0.009	106.16	0.01	0.00	0.047
C8 + Heavies	0.151	130.80	0.20	0.01	0.970
Totals	100.000		20.37	1.00	100

TOC (Total)	99.41	99.02
VOC (Total)	6.06	16.70
HAP (Total)	0.22	1.08

****
* Project Setup Information *
****
Project File : Z:\Client\EQT Corporation\West Virginia\WV Wells\163901.0058 WV Wells 2016\PEN 54\02 Draft\2016-0316 PEN 54 Draft Application\Att S Emission Calcs\01 E&P TANK\20160316_EQT_PEN 16 _Sand Separator Tank.ept
Flowsheet Selection : Oil Tank with Separator
Calculation Method : RVP Distillation
Control Efficiency : 0.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

Filed Name : PEN 54 Wellpad
Well Name : PEN 54 Wellpad
Well ID : PEN 16 Wellpad Condensate Analysis 12/23/2013 :
Date 2016.07.12

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

Separator Pressure : 342.00[psig]
Separator Temperature : 60.00[F]
Ambient Pressure : 14.70[psia]
Ambient Temperature : 55.00[F]
C10+ SG : 0.7908
C10+ MW : 152.673

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

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	1.1420
4	N2	0.0000
5	C1	39.0360
6	C2	6.9320
7	C3	8.4930
8	i-C4	4.4260
9	n-C4	7.0670
10	i-C5	5.7350
11	n-C5	5.4720
12	C6	1.1910
13	C7	3.8930
14	C8	5.2640
15	C9	3.7820
16	C10+	5.4530
17	Benzene	0.0350
18	Toluene	0.2830
19	E-Benzene	0.0480
20	Xylenes	0.6270
21	n-C6	1.1130

22 224Trimethylp 0.0080

-- Sales Oil ----------
Production Rate : 0.1[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 59.11
Reid Vapor Pressure : 10.60[psia]

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

-- Emission Summary ----------
Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
Page 1---------- E&P TANK				
Total HAPs	0.010	0.002	0.010	0.002
Total HC	2.594	0.592	2.594	0.592
VOCs, C2+	1.741	0.397	1.741	0.397
VOCs, C3+	1.457	0.333	1.457	0.333

Uncontrolled Recovery Info.
Vapor 189.0700 x1E-3 [MSCFD]
HC Vapor 185.8300 x1E-3 [MSCFD]
GOR 1890.70 [SCF/bbl]

-- Emission Composition ----------
No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
1	H2S	0.000	0.000	0.000	0.000
2	O2	0.000	0.000	0.000	0.000
3	CO2	0.069	0.016	0.069	0.016
4	N2	0.000	0.000	0.000	0.000
5	C1	0.854	0.195	0.854	0.195
6	C2	0.284	0.065	0.284	0.065
7	C3	0.508	0.116	0.508	0.116
8	i-C4	0.296	0.068	0.296	0.068
9	n-C4	0.372	0.085	0.372	0.085
10	i-C5	0.151	0.034	0.151	0.034
11	n-C5	0.102	0.023	0.102	0.023
12	C6	0.008	0.002	0.008	0.002
13	C7	0.008	0.002	0.008	0.002
14	C8	0.003	0.001	0.003	0.001
15	C9	0.001	0.000	0.001	0.000
16	C10+	0.000	0.000	0.000	0.000
17	Benzene	0.000	0.000	0.000	0.000
18	Toluene	0.000	0.000	0.000	0.000
19	E-Benzene	0.000	0.000	0.000	0.000
20	Xylenes	0.000	0.000	0.000	0.000
21	n-C6	0.006	0.001	0.006	0.001
22	224Trimethylp	0.000	0.000	0.000	0.000
	Total	2.662	0.608	2.662	0.608

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

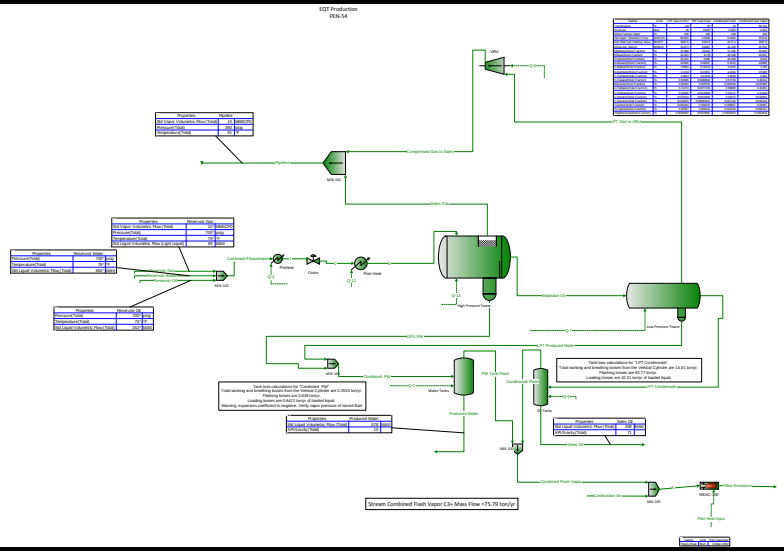
No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
			mol %	mol %	mol %	mol %	mol %	mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	1.1420	0.0549	0.0000	1.8366	0.3707	1.7099
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	C1	16.04	39.0360	0.5151	0.0000	63.6496	3.4789	58.4483
6	C2	30.07	6.9320	0.8172	0.0002	10.8392	5.5174	10.3792
7	C3	44.10	8.4930	4.2640	0.1035	11.1952	28.1995	12.6651
8	i-C4	58.12	4.4260	5.0143	2.0717	4.0501	21.9428	5.5968
9	n-C4	58.12	7.0670	10.1205	7.1584	5.1159	27.1615	7.0216
10	i-C5	72.15	5.7350	11.8352	12.6384	1.8372	7.2141	2.3020
11	n-C5	72.15	5.4720	12.0977	13.3471	1.2384	4.9094	1.5557
12	C6	86.16	1.1910	2.9262	3.3725	0.0823	0.3586	0.1061
13	C7	100.20	3.8930	9.8786	11.5322	0.0684	0.3655	0.0941
14	C8	114.23	5.2640	13.4686	15.7845	0.0215	0.1457	0.0322
15	C9	128.28	3.7820	9.6947	11.3736	0.0040	0.0362	0.0067
16	C10+	152.67	5.4530	13.9860	16.4156	0.0007	0.0090	0.0014
17	Benzene	78.11	0.0350	0.0872	0.1011	0.0016	0.0075	0.0021
18	Toluene	92.13	0.2830	0.7217	0.8444	0.0027	0.0158	0.0038
19	E-Benzene	106.17	0.0480	0.1229	0.1442	0.0001	0.0008	0.0002
20	Xylenes	106.17	0.6270	1.6064	1.8840	0.0012	0.0093	0.0019
21	n-C6	86.18	1.1130	2.7684	3.2050	0.0553	0.2566	0.0727
22	224Trimethylp	114.24	0.0080	0.0203	0.0238	0.0001	0.0006	0.0002

MW	52.95	93.59	100.60	26.98	53.23	29.25
Stream Mole Ratio	1.0000	0.3899	0.3321	0.6101	0.0577	0.6679
Heating Value [BTU/SCF]				1550.91	2989.35	1675.26
Gas Gravity [Gas/Air]				0.93	1.84	1.01
Bubble Pt. @ 100F [psia]	1457.94	41.76	11.06			

RVP @ 100F [psia]	364.28	25.40	10.61
Spec. Gravity @ 100F	0.549	0.672	0.683

PEN-16
Plant Schematic

Client Name:	EQT	Job:
Location:	PEN-54	
Flowsheet:	PEN-16	



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	PEN-54		
Flowsheet:	PEN-16		

Connections

	Combined PW	Combined Flash Vapor	Pipeline	Produced Water	Reservoir Gas
From Block	MIX-104	MIX-100	MIX-101	Water Tanks	--
To Block	Water Tanks	MIX-105	--	--	MIX-102

Stream Composition

Mole Fraction	Combined PW	Combined Flash Vapor	Pipeline	Produced Water	Reservoir Gas
Nitrogen	1.13859E-06	0.000905453	0.00374969	2.63176E-08	0.00387 *
Methane	0.000450537	0.426178	0.799105	2.06618E-05	0.80572 *
CO2	2.51086E-05	0.0108304	0.00254408	1.2534E-05	0.00208 *
Ethane	6.81809E-05	0.220514	0.126704	3.63683E-06	0.1277 *
Propane	1.77676E-05	0.1564	0.0376191	1.07328E-06	0.03536 *
Isobutane	1.01958E-06	0.0366684	0.00646005	2.29864E-08	0.0049 *
n-Butane	4.14752E-06	0.0713504	0.0113544	2.14263E-07	0.00936 *
Isopentane	7.58139E-07	0.0254383	0.00383639	2.55084E-08	0.0022 *
n-Pentane	6.21271E-07	0.02083	0.00315758	2.04207E-08	0.00173 *
n-Hexane	4.88832E-08	0.00402243	0.000671415	6.81891E-10	0.00093 *
Methylcyclopentane	0	0	0	0	0 *
Benzene	8.89761E-07	0.000235857	2.50379E-05	7.8239E-07	4E-05 *
Cyclohexane	5.37305E-08	0.000341886	5.13501E-05	9.16965E-09	0.00013 *
n-Heptane	4.30343E-08	0.00413815	0.000820864	6.96449E-10	0.00152 *
n-Octane	1.09195E-08	0.00119434	0.000283618	1.13607E-10	0.00021 *
n-Nonane	9.23882E-09	0.000328542	9.1378E-05	3.04249E-10	0.00044 *
n-Decane	3.5367E-09	0.000162158	5.58003E-05	8.81811E-11	0.00086 *
n-Undecane	0	0	0	0	0 *
Dodecane	0	0	0	0	0 *
Water	0.999428	0.0109371	0.00190803	0.999959	0 *
Triethylene Glycol	0	0	0	0	0 *
Oxygen	0	0	0	0	0 *
Argon	0	0	0	0	0 *
Carbon Monoxide	0	0	0	0	0 *
Cyclopentane	0	0	0	0	0 *
Isohexane	1.01822E-07	0.0076228	0.00122412	1.5448E-09	0.00174 *
3-Methylpentane	0	0	0	0	0 *
Neohexane	0	0	0	0	0 *
2,3-Dimethylbutane	0	0	0	0	0 *
Methylcyclohexane	0	0	0	0	0 *
Isooctane	2.30208E-09	0.00133221	0.000260698	3.99557E-12	0.00104 *
Decane, 2-Methyl-	0	0	0	0	0 *
Toluene	1.17838E-06	0.000358705	4.50342E-05	1.0151E-06	8E-05 *
m-Xylene	6.35082E-07	0.000191308	2.94166E-05	5.47516E-07	8E-05 *
Ethylbenzene	5.96908E-08	1.94111E-05	2.92859E-06	5.10141E-08	1E-05 *

Mass Flow	Combined PW lb/h	Combined Flash Vapor lb/h	Pipeline lb/h	Produced Water lb/h	Reservoir Gas lb/h
Nitrogen	0.0227017	0.0238705	119.01	0.000524443	119.034 *
Methane	5.14428	6.43416	14524.3	0.23579	14192.2 *
CO2	0.786489	0.448561	126.853	0.392393	100.509 *
Ethane	1.45917	6.24002	4316.49	0.077791	4216.04 *
Propane	0.55763	6.49028	1879.43	0.0336663	1711.99 *
Isobutane	0.0421781	2.00569	425.402	0.000950385	312.704 *
n-Butane	0.171575	3.90273	747.698	0.00885883	597.328 *
Isopentane	0.0389315	1.72722	313.598	0.00130918	174.28 *
n-Pentane	0.0319031	1.41432	258.11	0.00104806	137.047 *
n-Hexane	0.00299824	0.326214	65.5534	4.18008E-05	87.9956 *
Methylcyclopentane	0	0	0	0	0 *
Benzene	0.0494667	0.0173379	2.21583	0.0434737	3.43061 *
Cyclohexane	0.00321845	0.0270779	4.89627	0.000548962	12.0127 *

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	PEN-54		
Flowsheet:	PEN-16		

Mass Flow	Combined PW lb/h	Combined Flash Vapor lb/h	Pipeline lb/h	Produced Water lb/h	Reservoir Gas lb/h
n-Heptane	0.00306912	0.390223	93.1899	4.96423E-05	167.23 *
n-Octane	0.000887772	0.128391	36.7053	9.23135E-06	26.3383 *
n-Nonane	0.000843362	0.0396548	13.2782	2.77581E-05	61.9615 *
n-Decane	0.000358154	0.0217129	8.99513	8.92505E-06	134.351 *
n-Undecane	0	0	0	0	0 *
Dodecane	0	0	0	0	0 *
Water	12814.9	0.185427	38.9446	12814.7	0 *
Triethylene Glycol	0	0	0	0	0 *
Oxygen	0	0	0	0	0 *
Argon	0	0	0	0	0 *
Carbon Monoxide	0	0	0	0	0 *
Cyclopentane	0	0	0	0	0 *
Isohexane	0.00624521	0.618199	119.516	9.46981E-05	164.637 *
3-Methylpentane	0	0	0	0	0 *
Neohexane	0	0	0	0	0 *
2,3-Dimethylbutane	0	0	0	0	0 *
Methylcyclohexane	0	0	0	0	0 *
Isooctane	0.000187162	0.143211	33.7391	3.24668E-07	130.438 *
Decane, 2-Methyl-	0	0	0	0	0 *
Toluene	0.0772769	0.0311034	4.70116	0.0665325	8.0933 *
m-Xylene	0.0479882	0.0191137	3.53831	0.041349	9.32537 *
Ethylbenzene	0.00451037	0.00193937	0.352259	0.00385263	1.16567 *

Volumetric Flow	Combined PW gpm	Combined Flash Vapor ft^3/h	Pipeline ft^3/h	Produced Water gpm	Reservoir Gas ft^3/h
Nitrogen	6.16724E-05	0.317578	64.3167	1.4007E-06	36.817
Methane	0.0255209	148.812	12736.5	0.0011524	6599.26
CO2	0.00124698	3.76879	37.9599	0.000613786	14.6482
Ethane	0.00493534	76.3215	1721.36	0.000260038	720.885
Propane	0.00161136	53.736	441.317	9.62906E-05	129.85
Isobutane	0.000111374	12.5237	67.1344	2.4857E-06	11.4019
n-Butane	0.000447269	24.3282	111.152	2.28793E-05	15.9076
Isopentane	9.44437E-05	8.62125	31.8239	3.14799E-06	0.942541
n-Pentane	7.75366E-05	7.05067	25.3548	2.52501E-06	0.453565
n-Hexane	6.92345E-06	1.35055	4.15204	9.57221E-08	-0.365635
Methylcyclopentane	0	0	0	0	0
Benzene	9.29443E-05	0.0796916	0.182403	8.10756E-05	-0.000636337
Cyclohexane	6.55208E-06	0.115162	0.34142	1.10907E-06	-0.0159242
n-Heptane	6.85488E-06	1.3794	3.5402	1.09982E-07	-0.163504
n-Octane	1.92E-06	0.395074	0.768227	1.98072E-08	0.2105
n-Nonane	1.78058E-06	0.107747	0.0817078	5.81498E-08	0.881655
n-Decane	7.44137E-07	0.0527758	-0.0297887	1.84007E-08	2.32855
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	25.7324	3.81207	29.1529	25.6548	0
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	0	0	0	0	0
Isohexane	1.44433E-05	2.56351	8.0929	2.17165E-07	-0.583498
3-Methylpentane	0	0	0	0	0
Neohexane	0	0	0	0	0
2,3-Dimethylbutane	0	0	0	0	0
Methylcyclohexane	0	0	0	0	0
Isooctane	4.00686E-07	0.443578	1.12332	6.89455E-10	-0.0314327
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.000143697	0.120208	0.242116	0.000122827	0.00581235
m-Xylene	8.85007E-05	0.0636193	0.109143	7.5717E-05	0.075142

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	PEN-54		
Flowsheet:	PEN-16		

Volumetric Flow	Combined PW gpm	Combined Flash Vapor ft^3/h	Pipeline ft^3/h	Produced Water gpm	Reservoir Gas ft^3/h
Ethylbenzene	8.27366E-06	0.00646199	0.0115597	7.01732E-06	0.00842467

Stream Properties

Property	Units	Combined PW	Combined Flash Vapor	Pipeline	Produced Water	Reservoir Gas
Temperature	°F	90	69.7924	90.7854	70	75 *
Pressure	psig	390	0.625	390	0.625	700 *
Mole Fraction Vapor		0	1	0.999949	0	0.989805
Mole Fraction Light Liquid		1	0	5.06831E-05	1	0.0101946
Mole Fraction Heavy Liquid		0	0	0	0	0
Molecular Weight	lb/lbmol	18.0168	32.5543	20.421	18.0158	20.3721
Mass Density	lb/ft^3	62.0469	0.0885526	1.5137	62.2746	2.96954
Mass Flow	lb/h	12823.4	30.6365	23136.6	12815.6	22368.1
Vapor Volumetric Flow	ft^3/h	206.672	345.969	15284.7	205.792	7532.52
Liquid Volumetric Flow	gpm	25.7669	43.1338	1905.63	25.6572	939.119
Std Vapor Volumetric Flow	MMSCFD	6.48229	0.00857108	10.3187	6.47876	10 *
Std Liquid Volumetric Flow	sgpm	25.666	0.140665	136.16	25.6211	132.024
Compressibility		0.0199215	0.991274	0.924227	0.000779757	0.85451
Specific Gravity		0.994835	1.12401		0.998487	
API Gravity		10.0575			10.0151	
Net Ideal Gas Heating Value	Btu/ft^3	0.594834	1697.9	1115.72	0.0382164	1116
Net Liquid Heating Value	Btu/lb	-1046.57	19664.3	20675.7	-1058.89	20733.3

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	PEN-54		
Flowsheet:	PEN-16		

Connections

	Reservoir Oil	Sales Oil			
From Block	--	Oil Tanks			
To Block	MIX-102	--			

Stream Composition

Mole Fraction	Reservoir Oil		Sales Oil			
Nitrogen	0	*	1.6991E-07			
Methane	0.39036	*	0.000934113			
CO2	0.01142	*	3.43045E-05			
Ethane	0.06932	*	0.00997093			
Propane	0.08493	*	0.032131			
Isobutane	0.04426	*	0.0207894			
n-Butane	0.07067	*	0.0575933			
Isopentane	0.05735	*	0.0565232			
n-Pentane	0.05472	*	0.06217			
n-Hexane	0.01113	*	0.0422152			
Methylcyclopentane	0	*	0			
Benzene	0.00035	*	0.00165681			
Cyclohexane	0	*	0.00413787			
n-Heptane	0.03893	*	0.139668			
n-Octane	0.05264	*	0.135518			
n-Nonane	0.03782	*	0.11924			
n-Decane	0.05453	*	0.188333			
n-Undecane	0	*	0			
Dodecane	0	*	0			
Water	0	*	3.10104E-05			
Triethylene Glycol	0	*	0			
Oxygen	0	*	0			
Argon	0	*	0			
Carbon Monoxide	0	*	0			
Cyclopentane	0	*	0			
Isohexane	0.01191	*	0.0570518			
3-Methylpentane	0	*	0			
Neohexane	0	*	0			
2,3-Dimethylbutane	0	*	0			
Methylcyclohexane	0	*	0			
Isooctane	8E-05	*	0.0417377			
Decane, 2-Methyl-	0	*	0			
Toluene	0.00283	*	0.00928481			
m-Xylene	0.00627	*	0.0193291			
Ethylbenzene	0.00048	*	0.00165059			

Mass Flow	Reservoir Oil lb/h		Sales Oil lb/h			
Nitrogen	0	*	9.68898E-05			
Methane	339.108	*	0.305045			
CO2	27.2154	*	0.030732			
Ethane	112.87	*	6.10307			
Propane	202.796	*	28.8411			
Isobutane	139.301	*	24.5967			
n-Butane	222.423	*	68.1408			
Isopentane	224.06	*	83.0135			
n-Pentane	213.785	*	91.3067			
n-Hexane	51.9374	*	74.0533			
Methylcyclopentane	0	*	0			
Benzene	1.48043	*	2.6344			
Cyclohexane	0	*	7.08881			
n-Heptane	211.234	*	284.883			
n-Octane	325.606	*	315.111			
n-Nonane	262.663	*	311.306			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	PEN-54		
Flowsheet:	PEN-16		

Mass Flow	Reservoir Oil lb/h		Sales Oil lb/h				
n-Decane	420.133	*	545.467				
n-Undecane	0	*	0				
Dodecane	0	*	0				
Water	0	*	0.0113721				
Triethylene Glycol	0	*	0				
Oxygen	0	*	0				
Argon	0	*	0				
Carbon Monoxide	0	*	0				
Cyclopentane	0	*	0				
Isohexane	55.5773	*	100.08				
3-Methylpentane	0	*	0				
Neohexane	0	*	0				
2,3-Dimethylbutane	0	*	0				
Methylcyclohexane	0	*	0				
Isooctane	0.494842	*	97.0501				
Decane, 2-Methyl-	0	*	0				
Toluene	14.1198	*	17.4143				
m-Xylene	36.0455	*	41.7721				
Ethylbenzene	2.75946	*	3.56709				

Volumetric Flow	Reservoir Oil ft^3/h	Sales Oil gpm			
Nitrogen	0	3.08664E-07			
Methane	105.891	0.00176279			
CO2	1.9122	3.64582E-05			
Ethane	8.50634	0.0247431			
Propane	7.50287	0.105122			
Isobutane	4.06279	0.0850995			
n-Butane	6.14059	0.228778			
Isopentane	5.60236	0.264571			
n-Pentane	5.30635	0.28868			
n-Hexane	1.21715	0.223665			
Methylcyclopentane	0	0			
Benzene	0.0252142	0.00585449			
Cyclohexane	0	0.0181295			
n-Heptane	4.76693	0.834762			
n-Octane	7.08225	0.893872			
n-Nonane	5.55006	0.861322			
n-Decane	8.70476	1.48476			
n-Undecane	0	0			
Dodecane	0	0			
Water	0	-1.61771E-05			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	0	0			
Isohexane	1.31579	0.305576			
3-Methylpentane	0	0			
Neohexane	0	0			
2,3-Dimethylbutane	0	0			
Methylcyclohexane	0	0			
Isooctane	0.0108868	0.279476			
Decane, 2-Methyl-	0	0			
Toluene	0.241383	0.0393901			
m-Xylene	0.616541	0.0950808			
Ethylbenzene	0.0469925	0.00810733			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	PEN-54		
Flowsheet:	PEN-16		

Stream Properties

Property	Units	Reservoir Oil	Sales Oil			
Temperature	°F	75 *	70 *			
Pressure	psig	700 *	0.625			
Mole Fraction Vapor		0.28578	0			
Mole Fraction Light Liquid		0.71422	1			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	52.8825	103.3			
Mass Density	lb/ft^3	16.4101	43.3418			
Mass Flow	lb/h	2863.61	2102.78			
Vapor Volumetric Flow	ft^3/h	174.503	48.5162			
Liquid Volumetric Flow	gpm	21.7562	6.04877			
Std Vapor Volumetric Flow	MMSCFD	0.493182	0.185395			
Std Liquid Volumetric Flow	sgpm	10.2667 *	6.06446			
Compressibility		0.401395	0.00642406			
Specific Gravity			0.694925			
API Gravity			70.7153			
Net Ideal Gas Heating Value	Btu/ft^3	2714.31	5237.6			
Net Liquid Heating Value	Btu/lb	19339.1	19083.3			

Remarks

Energy Stream Report

Client Name:	EQT	Job:
Location:	PEN-54	
Flowsheet:	PEN-16	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Pilot Heat Input	606367 * Btu/h	238.311 * hp	--	REAC-100

Remarks

20160318_EQT_PEN 54_v1.1.pmx
Project Warnings Report

Client Name:	EQT	Job:
Location:	PEN-54	

ProMax:ProMax!Project!Flowsheets!PEN-16!Blocks!VRU
Warning: The change in entropy is negative.

User Value Sets Report

Client Name:	EQT	Job:
Location:	PEN-54	

Tank Losses.53

User Value [ShellLength]

* Parameter	20	ft	Upper Bound	ft
* Lower Bound	0	ft	* Enforce Bounds	False

User Value [ShellDiam]

* Parameter	12	ft	Upper Bound	ft
* Lower Bound	0	ft	* Enforce Bounds	False

User Value [BreatherVP]

* Parameter	0.875	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [BreatherVacP]

* Parameter	-0.0375	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [DomeRadius]

Parameter		ft	Upper Bound	ft
Lower Bound		ft	* Enforce Bounds	False

User Value [OpPress]

* Parameter	0	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [AvgPercentLiq]

* Parameter	50	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [MaxPercentLiq]

* Parameter	90	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [AnnNetTP]

* Parameter	216.414	bbl/day	Upper Bound	bbl/day
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

* Parameter	0	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [AtmPressure]

* Parameter	14.2535	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value Sets Report

Client Name:	EQT	Job:
Location:	PEN-54	

User Value [MaxLiqSurfaceT]

* Parameter	61.4758	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	14.0109	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	2.06825	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.266902	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WithdrawalLoss]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [LoadingLosses]

* Parameter	42.3144	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [DeckFittingLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	60.7705	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0546688	kg/mol	Upper Bound	kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={5524AB8C-40B1-4354-9DD7-EED65770BF87}

Tank Losses.331

User Value [ShellLength]

* Parameter	20	ft	Upper Bound	ft
* Lower Bound	0	ft	* Enforce Bounds	False

User Value Sets Report

Client Name:	EQT	Job:	
Location:	PEN-54		

User Value [ShellDiam]

*	Parameter	12 ft		Upper Bound	ft
*	Lower Bound	0 ft	*	Enforce Bounds	False

User Value [BreatherVP]

*	Parameter	0.875 psig		Upper Bound	psig
	Lower Bound	psig	*	Enforce Bounds	False

User Value [BreatherVacP]

*	Parameter	-0.0375 psig		Upper Bound	psig
	Lower Bound	psig	*	Enforce Bounds	False

User Value [DomeRadius]

	Parameter	ft		Upper Bound	ft
	Lower Bound	ft	*	Enforce Bounds	False

User Value [OpPress]

*	Parameter	0 psig		Upper Bound	psig
	Lower Bound	psig	*	Enforce Bounds	False

User Value [AvgPercentLiq]

*	Parameter	50 %		Upper Bound	%
	Lower Bound	%	*	Enforce Bounds	False

User Value [MaxPercentLiq]

*	Parameter	90 %		Upper Bound	%
	Lower Bound	%	*	Enforce Bounds	False

User Value [AnnNetTP]

*	Parameter	883.436 bbl/day		Upper Bound	bbl/day
*	Lower Bound	0 bbl/day	*	Enforce Bounds	False

User Value [OREff]

*	Parameter	0 %		Upper Bound	%
	Lower Bound	%	*	Enforce Bounds	False

User Value [AtmPressure]

*	Parameter	14.2535 psia		Upper Bound	psia
	Lower Bound	psia	*	Enforce Bounds	False

User Value [MaxLiqSurfaceT]

*	Parameter	61.4758 °F		Upper Bound	°F
	Lower Bound	°F	*	Enforce Bounds	False

User Value [TotalLosses]

*	Parameter	0.35526 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [WorkingLosses]

*	Parameter	0.05921 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [StandingLosses]

*	Parameter	0 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value Sets Report

Client Name:	EQT	Job:	
Location:	PEN-54		

User Value [RimSealLosses]

*	Parameter	0 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [WithdrawalLoss]

*	Parameter	0 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [LoadingLosses]

*	Parameter	0.9413 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [DeckFittingLosses]

*	Parameter	0 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [DeckSeamLosses]

*	Parameter	0 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [FlashingLosses]

*	Parameter	3.63907 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [GasMoleWeight]

*	Parameter	0.0452458 kg/mol		Upper Bound	kg/mol
	Lower Bound	kg/mol	*	Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={23417019-6BCF-4B6A-8C2C-C51E3F9510A8}

ATTACHMENT T

Emission Summary Sheet

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID# (Emission Source ID)	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001 (S001-S012, S032, C001)	1.89	8.28	1.59	6.95	1.34	1.09	0.01	0.05	0.14	0.63	0.14	0.63	2,257.71	9,888.76
C002 (S001-S012, S032, C002)	1.15	5.03	0.96	4.22	1.34	1.09	0.01	0.03	0.09	0.38	0.09	0.38	1,372.71	6,012.48
E013 (S013)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E014 (S014)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E015 (S015)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E016 (S016)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E017 (S017)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E018 (S018)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E019 (S019)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E020 (S020)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E021 (S021)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E022 (S022)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E023 (S023)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E024 (S024)	0.11	0.48	0.09	0.40	0.01	0.03	6.6E-04	2.9E-03	0.01	0.04	0.01	0.04	135.14	591.90
E025 (S025)	0.11	0.48	0.09	0.40	0.01	0.03	6.6E-04	2.9E-03	0.01	0.04	0.01	0.04	135.14	591.90
E026 (S026)	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	1.52	6.64
E027 (S027)	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	1.52	6.64
E033 (S033)	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	1.52	6.64
E028 (S028)	---	---	---	---	0.33	1.46	---	---	---	---	---	---	4.88	21.35

E029 (S029)	---	---	---	---	0.33	1.46	---	---	---	---	---	---	4.88	21.35
E030 (S030)	0.88	3.86	1.76	7.73	0.68	2.97	1.8E-03	0.01	0.06	0.26	0.06	0.26	1,716.24	7,517.13
E031 (S031)	0.88	3.86	1.76	7.73	0.68	2.97	1.8E-03	0.01	0.06	0.26	0.06	0.26	1,716.24	7,517.13
E032 (S032)	---	---	---	---	49.91	12.98	---	---	---	---	---	---	---	---
Fugitives	---	---	---	---	---	37.56	---	---	---	---	---	---	---	560.07
Haul Roads	---	---	---	---	---	---	---	---	---	1.33	---	0.13	---	---
Facility Total	6.64	29.07	7.62	33.38	54.72	62.04	0.03	0.14	0.49	3.47	0.49	2.27	9,329.47	41,423.16
Facility Total (excl. fugitives)	6.64	29.07	7.62	33.38	4.81	11.48	0.03	0.14	0.49	2.13	0.49	2.13	9,329.47	40,863.09

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 T – 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
C001 (S001-S012, S032, C001)	---	---	8.8E-04	9.0E-04	1.1E-03	1.4E-03	6.8E-05	8.5E-05	6.5E-04	8.3E-04	0.02	0.02	0.03	0.03
C002 (S001-S012, S032, C002)	---	---	8.8E-04	9.0E-04	1.1E-03	1.4E-03	6.8E-05	8.5E-05	6.5E-04	8.3E-04	0.02	0.02	0.03	0.03
E013 (S013)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E014 (S014)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E015 (S015)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E016 (S016)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E017 (S017)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E018 (S018)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E019 (S019)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E020 (S020)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E021 (S021)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E022 (S022)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E023 (S023)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E024 (S024)	8.2E-05	3.6E-04	2.3E-06	1.0E-05	3.7E-06	1.6E-05	---	---	---	---	2.0E-03	0.01	2.1E-03	0.01
E025 (S025)	8.2E-05	3.6E-04	2.3E-06	1.0E-05	3.7E-06	1.6E-05	---	---	---	---	2.0E-03	0.01	2.1E-03	0.01
E026 (S026)	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	2.3E-05	1.0E-04
E027 (S027)	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	2.3E-05	1.0E-04
E033 (S033)	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	2.3E-05	1.0E-04

E028 (S028)	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0E-03	<0.01	2.0E-03	1.0E-02
E029 (S029)	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0E-03	<0.01	2.0E-03	1.0E-02
E030 (S030)	0.06	0.27	4.8E0-3	2.1E-02	1.7E-03	7.4E-03	7.5E-05	3.3E-04	5.9E-04	2.6E-03	---	---	0.10	0.43
E031 (S031)	0.06	0.27	4.8E0-3	2.1E-02	1.7E-03	7.4E-03	7.5E-05	3.3E-04	5.9E-04	2.6E-03	---	---	0.10	0.43
E032 (S032)	---	---	0.03	0.01	0.04	0.01	2.2E-03	5.7E-04	2.1E-02	5.5E-03	0.81	0.21	1.24	0.32
Fugitives	---	---	---	0.03	---	0.07	---	<0.01	---	0.09	---	0.81	---	2.41
Haul Roads	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Total	0.13	0.55	0.04	0.08	0.04	0.10	2.5E-03	1.4E-03	0.02	0.11	0.89	1.20	1.54	3.83
Facility Total (excl. fugitives)	0.13	0.55	1.1E-02	0.04	5.7E-03	1.8E-02	2.9E-04	8.3E-04	2.5E-03	6.8E-03	0.08	0.18	0.30	1.09

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

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-C General Permit Registration for the construction of a new natural gas production facility PEN 54 located off C/R 10 road, near Pennsboro, in Ritchie County, West Virginia. The latitude and longitude coordinates are: 39.25742 N, -80.92734 W.

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

Pollutant	Emissions in tpy (tons per year)
NOx	29.07
CO	33.38
VOC	11.49
SO_2	0.14
PM	2.13
Total HAPs	3.83
Carbon Dioxide Equivalents (CO_2e)	40,863.09

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

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

By: EQT Production Company
Kenneth Kirk, Executive Vice President
625 Liberty Ave Suite 1700
Pittsburgh, PA 15222

ATTACHMENT V

General Permit Registration Application Fee