Roy
670-A139
017-00038

PROJECT REPORT

EQT Production
OXF-131 Pad

G70-A Permit Application

EQT

Where energy meets innovation.

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

December 2014

Trinity Consultants

Environmental solutions delivered uncommonly well

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EQT Production Company (EQT) is submitting this Class II General Permit application (G-70A) to the West Virginia Department of Environmental Protection (WVDEP) for the OXF-131 facility, a natural gas production well pad, located in Doddridge County, West Virginia.

1.1. FACILITY AND PROJECT DESCRIPTION

The OXF-131 Pad is an existing natural gas production facility consisting of five natural gas wells. OXF-131 is currently permitted and operating under West Virginia permit R13-3001. 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 authorize installation and operation of the following additional equipment at the OXF-131 Pad:

- One (1) 140 bbl sand separator tank for produced water and sand. Vapors from this tank may be controlled by one (1) existing combustor (rated at 11.66 MMBtu/hr). For emission calculation purposes, no control is assumed.
- One (1) thermoelectric generator (TEG), rated at 0.013 MMBtu/hr (heat input)

Additionally, this application also seeks to increase the current permit liquid throughput limits for the condensate tanks and liquid loading at the facility.

The following equipment is already permitted and installed at the OXF-131 Pad:

- Five (5) natural gas wells;
- Fifteen (15) 210 barrel (bbl) storage tanks for condensate/water controlled by one (1) existing combustor (rated at 11.66 MMBtu/hr);
- Five (5) line heaters, rated at 1.54, 1.15, and 0.77 MMBtu/hr respectively (heat input, each); and
- One (1) thermoelectric generators (TEG), rated at 0.013 MMBtu/hr (heat input).

A process flow diagram is included as Attachment D.

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 proposed OXF-131 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 OXF-131 Pad. Therefore, the OXF-131 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-A APPLICATION ORGANIZATION

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

- Section 2: Sample Emission Source Calculations;
- Section 3: Regulatory Discussion;
- Section 4: G70-A Application Forms;
- Attachment A: Current Business Certificate;
- Attachment B: Process Description;
- Attachment C: Description of Fugitive Emissions;
- Attachment D: Process Flow Diagram;
- Attachment E: Plot Plan;
- Attachment F: Area Map;
- Attachment G: Emission Unit Data Sheets and G70-A Section Applicability Form;
- Attachment H: Air Pollution Control Device Sheets;
- Attachment I: Emission Calculations;
- Attachment J: Class I Legal Advertisement;
- Attachment K: Electronic Submittal (*not applicable*);
- Attachment L: General Permit Registration Application Fee;
- Attachment N: Material Safety Data Sheet (*not applicable*); and
- Attachment O: Emissions Summary Sheet;

2. SAMPLE EMISSION SOURCE CALCULATIONS

The characteristics of air emissions from the proposed 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 I of this application.

Emissions from the proposed project will result from storage of organic liquids in the sand separator storage tank, combustion from the thermoelectric generator, and fugitive emissions from component leaks from the operation of the station. The methods by which emissions from each of this source type, as well as the existing source types, are calculated are summarized below.

- **Line Heaters and Thermoelectric Generators:** Potential emissions of all criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 factors for natural gas combustion equipment.[1] These calculations assume a site-specific heat content of natural gas. Greenhouse gas (GHG) emissions are calculated according to 40 CFR 98 Subpart C.[2] Please note that potential emissions of NO_X, CO, PM, SO_2 and GHGs from the combustor are also calculated according to the aforementioned methodologies.

- **Fugitive Equipment Leaks:** Emissions of VOC and HAPs from leaking equipment components have been estimated using facility estimated component counts and types along with *Table 2-4: Oil & Gas Production Operations Average Emission Factors, 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 in gas service at O&G Production Operations. Greenhouse gas emissions from component leaks are calculated according to the procedures in 40 CFR 98 Subpart W.[3]

- **Storage Tanks:** Working, breathing and flashing emissions of VOC and HAPs from the condensate/water stored in the tanks at the facility are calculated using API E&P TANK v2.0.

- **Tank Truck Loading:** Emissions of VOC and HAPs from the loading of organic liquids from storage tanks to tank truck are calculated using U.S. EPA's AP-42 Chapter 5 Section 2 factors.[4]

- **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.[5]

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[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] 40 CFR 98 Subpart W, *Petroleum and Natural Gas Systems*, Section 98.233(r), *Population Count and Emission Factors.*

[4] U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 5.2, Transportation And Marketing Of Petroleum Liquids, June 2008.

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

This review is presented to supplement and/or add clarification to the information provided in the WVDEP G70-A 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 (PSD) SOURCE CLASSIFICATION

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration (PSD). 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 Code of State Regulations (CSR) 45-30. The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP, 100,000 tpy of greenhouse gas pollutants (on a carbon dioxide equivalent [CO_2e] basis), and 100 tpy of all other regulated pollutants.[6] 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.

[6] 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.

3.3. NEW SOURCE PERFORMANCE STANDARDS

New Source Performance Standards (NSPS), located in 40 CFR 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except where expressly noted. The following is a summary of applicability and non-applicability determinations for NSPS regulations of relevance to the wellpad.

3.3.1. NSPS Subparts D, Da, Db, and Dc

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, therefore the requirements of these subparts do not apply.

3.3.2. NSPS Subparts K, Ka, and Kb

These subparts apply to storage tanks of certain sizes constructed, reconstructed, or modified during various time periods. Subpart K applies to storage tanks constructed, reconstructed, or modified prior to 1978, and Subpart Ka applies to those constructed, reconstructed, or modified prior to 1984. Both Subparts K and Ka apply to storage tanks with a capacity greater than 40,000 gallons. Subpart Kb applies to volatile organic liquid (VOL) storage tanks constructed, reconstructed, or modified after July 23, 1984 with a capacity equal to or greater than 75 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 OOOO—Crude Oil and Natural Gas Production, Transmission, and Distribution

Subpart OOOO – *Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution,* applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011. This NSPS was published in the Federal Register on August 16, 2012, and amended in the Federal Register on September 23, 2013[7]. The list of potentially affected facilities includes:

- Gas wellheads
- Centrifugal compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment
- Reciprocating compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment
- Continuous bleed natural gas-driven pneumatic controllers with a bleed rate of > 6 scfh located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment (excluding natural gas processing plants)
- Continuous bleed natural gas-driven pneumatic controllers located at natural gas processing plants
- Storage vessels in the production, processing, or transmission and storage segments
- Sweetening units located onshore that process natural gas produced from either onshore or offshore wells

There are fifteen (15) existing condensate storage vessels at the wellpad. As part of this project, EQT is proposing to install one (1) new sand separator storage vessel. The storage vessels are controlled by one (1) existing enclosed combustor with destruction efficiencies greater than 95 percent. The storage vessels at the facility will each have

[7] 78 FR 54816 (*http://www.gpo.gov/fdsys/pkg/FR-2013-09-23/pdf/2013-22010.pdf*)

potential VOC emissions less than 6 tpy based on the permit application materials and enforceable limits to be included in the G-70A permit. Potential VOC emissions from the sand separator tank (excluding controls) are less than 6 tpy. As such, per 60.5365(e), the tanks are not storage vessel affected facilities under the rule.

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

3.3.4. 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 (NESHAP)

Part 63 NESHAP allowable emission limits are established on the basis of a maximum achievable control technology (MACT) determination for a particular major source. A HAP major source is defined as having potential emissions in excess of 25 tpy for total HAP and/or potential emissions in excess of 10 tpy for any individual HAP. The wellpad is an Area (minor) source of HAP since its potential emissions of HAP are less than the 10/25 major source thresholds. NESHAP apply to sources in specifically regulated industrial source categories (Clean Air Act Section 112(d)) or on a case-by-case basis (Section 112(g)) for facilities not regulated as a specific industrial source type. Besides 40 CFR 63 Subpart A (NESHAP Subpart A), which is similar to 40 CFR 60 Subpart A (NSPS Subpart A), the following NESHAP could potentially apply to the wellpad:

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

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

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

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

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

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

3.5. WEST VIRGINIA SIP REGULATIONS

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

3.5.1. 45 CSR 2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

45 CSR 2 applies to fuel burning units, defined as equipment burning fuel "for the primary purpose of producing heat or power by indirect heat transfer". The 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. Per 45 CSR 2-4, PM emissions from units will not exceed a level of 0.09 multiplied by the heat design input in MMBtu/hr of the unit.

3.5.2. 45 CSR 4: To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor

According to 45 CSR 4-3:

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

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

3.5.3. 45 CSR 6: Control of Air Pollution from the Combustion of Refuse

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

3.5.4. 45 CSR 16: Standards of Performance for New Stationary Sources

45 CSR 16-1 incorporates the federal Clean Air Act (CAA) standards of performance for new stationary sources set forth in 40 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 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.

3.5.7. 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-A APPLICATION FORMS

The WVDEP permit application forms contained in this application include all applicable G70-A 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 • *www.dep.wv.gov/daq*

APPLICATION FOR GENERAL PERMIT REGISTRATION

CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE
A STATIONARY SOURCE OF AIR POLLUTANTS

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

CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:

☐ **G10-D** – Coal Preparation and Handling
☐ **G20-B** – Hot Mix Asphalt
☐ **G30-D** – Natural Gas Compressor Stations
☐ **G33-A** – Spark Ignition Internal Combustion Engines
☐ **G35-A** – Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit)
☐ **G40-C** – Nonmetallic Minerals Processing
☐ **G50-B** – Concrete Batch
☐ **G60-C** – Class II Emergency Generator
☐ **G65-C** – Class I Emergency Generator
☒ **G70-A** – Class II Oil and Natural Gas Production Facility

SECTION I. GENERAL INFORMATION

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

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

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

4. Applicant's physical address:

5. If applicant is a subsidiary corporation, please provide the name of parent corporation:

6. **WV BUSINESS REGISTRATION.** Is the applicant a resident of the State of West Virginia? ☒ **YES** ☐ **NO**

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

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.): Natural gas wellpad

8a. Standard Industrial Classification (SIC) code: 1311

AND

8b. North American Industry System (NAICS) code: 211111

9. DAQ Plant ID No. (for existing facilities only):
017 - 00038

10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only):
R13-3001

Date of Last Application Revision 10/18/2013

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site:	12A. Address of primary operating site:
OXF-131 Wellpad	Mailing: Physical:

13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☒ YES ☐ NO

- IF **YES**, please explain: Property is leased and held under production rights.
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14A. - For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

- For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

From West Union, take Old U.S. 50 W to US-50 W. Turn right onto US-50 W and proceed 0.8 miles. Then turn left onto Old U.S 50 E and go 1.9 miles. Continue on Co Rte 21 to Oak proceed 4.5 miles. Turn left onto S Fork of Hughes River and travel 3.5 miles. Then turn right onto Upper Run and go .5 miles.

15A. Nearest city or town:	16A. County:	17A. UTM Coordinates:
West Union	Doddridge	Northing (KM): 4337.207 Easting (KM): 517.752 Zone: 17

18A. Briefly describe the proposed new operation or change (s) to the facility:	19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
This project involves the construction and operation of one (1) sand separator tank, one (1) thermoelectric generator (TEG), and an increase in produced water/condensate throughput at an existing natural gas production wellpad operation.	Latitude: 39.18392 Longitude: -80.79446

B: 1ST ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits) - NA

11B. Name of 1st alternate operating site:	12B. Address of 1st alternate operating site:
NA	Mailing: Physical:

13B. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☐ YES ☐ NO

- IF **YES**, please explain:
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14B. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F.**

15B. Nearest city or town:	16B. County:	17B. UTM Coordinates: Northing (KM): Easting (KM): Zone:
18B. Briefly describe the proposed new operation or change (s) to the facility:		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: Longitude:

C: 2ND ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits): - NA

11C. Name of 2nd alternate operating site:	12C. Address of 2nd alternate operating site:
NA	Mailing: Physical:

13C. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☐ **YES** ☐ **NO**

– IF **YES**, please explain:

– IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14C. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F.**

15C. Nearest city or town:	16C. County:	17C. UTM Coordinates: Northing (KM): Easting (KM): Zone:
18C. Briefly describe the proposed new operation or change (s) to the facility:		19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: Longitude:

20. Provide the date of anticipated installation or change: _____/_____/_____ ☐ If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: : _____/_____/_____	21. Date of anticipated Start-up if registration is granted: _____/_____/_____

22. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).

Hours per day_____ Days per week _____ Weeks per year _____ Percentage of operation _____

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

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

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

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

25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.

- ☒ ATTACHMENT A : CURRENT BUSINESS CERTIFICATE
- ☒ ATTACHMENT B: PROCESS DESCRIPTION
- ☒ ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- ☒ ATTACHMENT D: PROCESS FLOW DIAGRAM
- ☒ ATTACHMENT E: PLOT PLAN
- ☒ ATTACHMENT F: AREA MAP
- ☒ ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM
- ☒ ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS
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- ☐ ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS) (*not applicable*)
- ☒ ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- ☒ OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please DO NOT fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.

SECTION IV. CERTIFICATION OF INFORMATION

This 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 a 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, Emission Inventory, Certified Emission Statement, 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 Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

☒ I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

☐ I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

☐ I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

☐ I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

☐ I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

☐ I certify that I am the Owner and Proprietor

G *I hereby certify that* (please print or type) *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 Office of Air Quality immediately, and/or,

I hereby certify that all information contained in this 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

Signature _____
(please use blue ink) Responsible Official Date

Name & Title Kenneth Kirk, Executive Vice President
(please print or type)

Signature _____ 12-22-2014
(please use blue ink) Authorized Representative (if applicable) Date

Applicant's Name Alex Bosiljevac, Environmental Coordinator

Phone & Fax 412-395-3699 412-395-7027
Phone Fax

Email abosiljevac@eqt.com

ATTACHMENT A

Current 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.

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ATTACHMENT B

Process Description

ATTACHMENT B: PROCESS DESCRIPTION

This project involves the construction and operation of one (1) sand separator tank, one (1) thermoelectric generator (TEG), and an increase in produced water/condensate throughput at an existing natural gas production wellpad operation.

The OXF-131 wellpad consists of five wells, each with the same basic operation. The incoming gas 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 tank. The gas then flows into a three phase separator which separates water and condensate from the gas stream. The liquid condensate in the separator will be transferred to a storage vessel. Emissions from the storage vessels (condensate tanks and sand separator tank) are controlled by a single enclosed combustor. Once the tanks are filled, the contents are loaded into trucks for transport. Heat and electricity is provided by line heaters and a thermoelectric generators, respectively.

A process flow diagram is included as Attachment D.

ATTACHMENT C

Description of Fugitive Emissions

G70-A FUGITIVE EMISSIONS SUMMARY SHEET

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants-Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	NA					
Unpaved Haul Roads	PM	13.45	58.91	13.45	58.91	O[A]
	PM_{10}	3.43	15.02	3.43	15.02	
	$PM_{2.5}$	0.34	1.50	0.34	1.50	
Loading/Unloading Operations	VOC	1.12	4.91	0.38	1.64	O[B]
	HAP	0.03	0.11	0.01	0.04	
Equipment Leaks	VOC	Does not apply	16.79	Does not apply	16.79	O[C]
	CO_2e		599		599	
	HAP		0.65		0.65	
Blowdown Emissions	NA					
Other	NA					

[A] AP-42 Section 13.2.2

[B] AP-42 Section 5.2

[C] Protocol for Equipment Leak Estimates (EPA-453/R-95-017), Table 2-1, Nov. 1995.

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

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

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

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

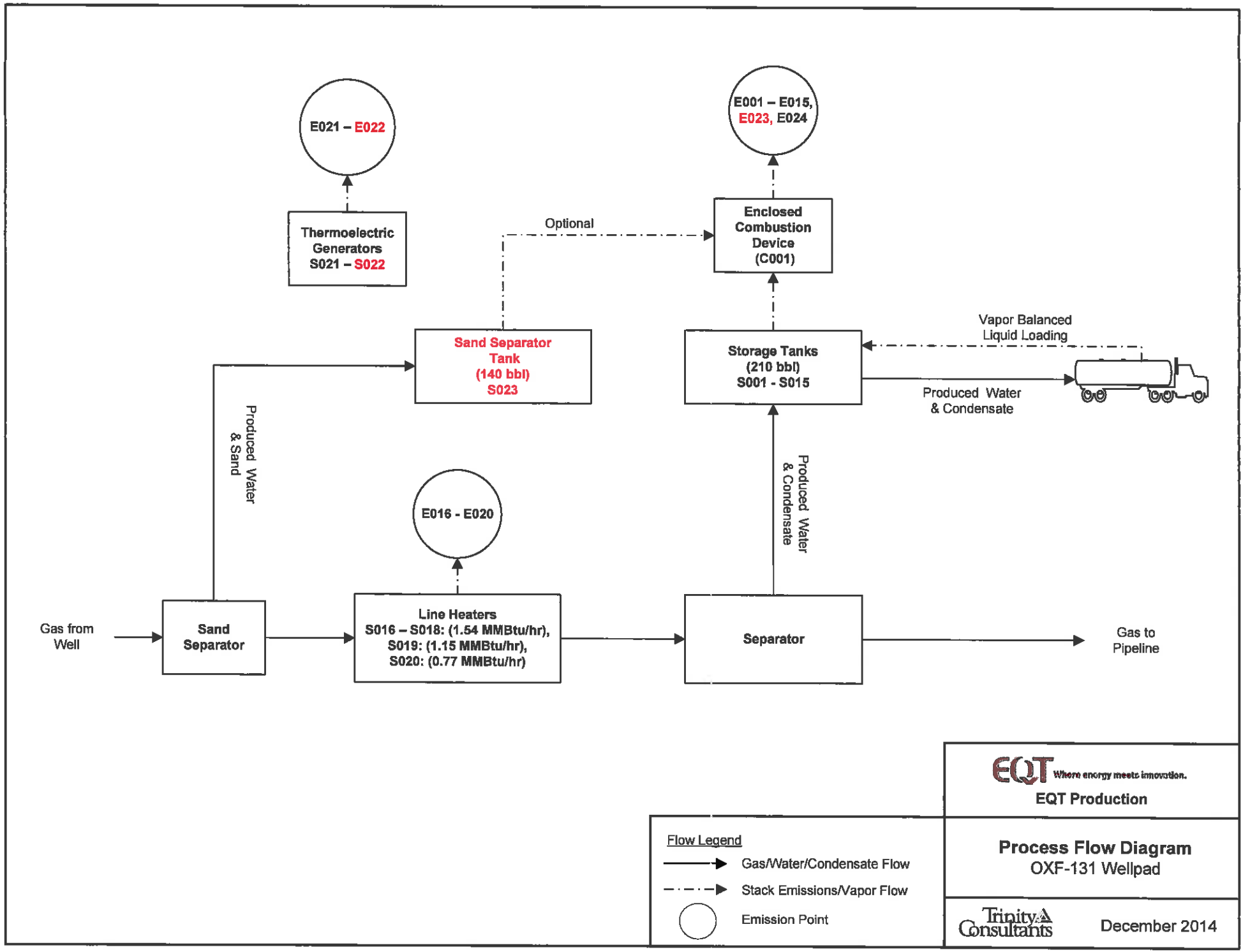
LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	light liquid VOC[6,7]	1	TBD	TBD	384
	heavy liquid VOC[8]	---	TBD	TBD	---
	Non-VOC[9]	---	TBD	TBD	---
Valves[10]	Gas VOC	367	TBD	TBD	8,486
	Light Liquid VOC	---	TBD	TBD	---
	Heavy Liquid VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---
Safety Relief Valves[11]	Gas VOC	35	TBD	TBD	14,059
	Non VOC	---	TBD	TBD	---
Open-ended Lines[12]	VOC	13	TBD	TBD	85
	Non-VOC	---	TBD	TBD	---
Sampling Connections[13]	VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---
Compressors	VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---
Flanges	VOC	1,496	TBD	TBD	10,574
	Non-VOC	---	TBD	TBD	---
Other	VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---

[1 - 13] See notes on the following page.

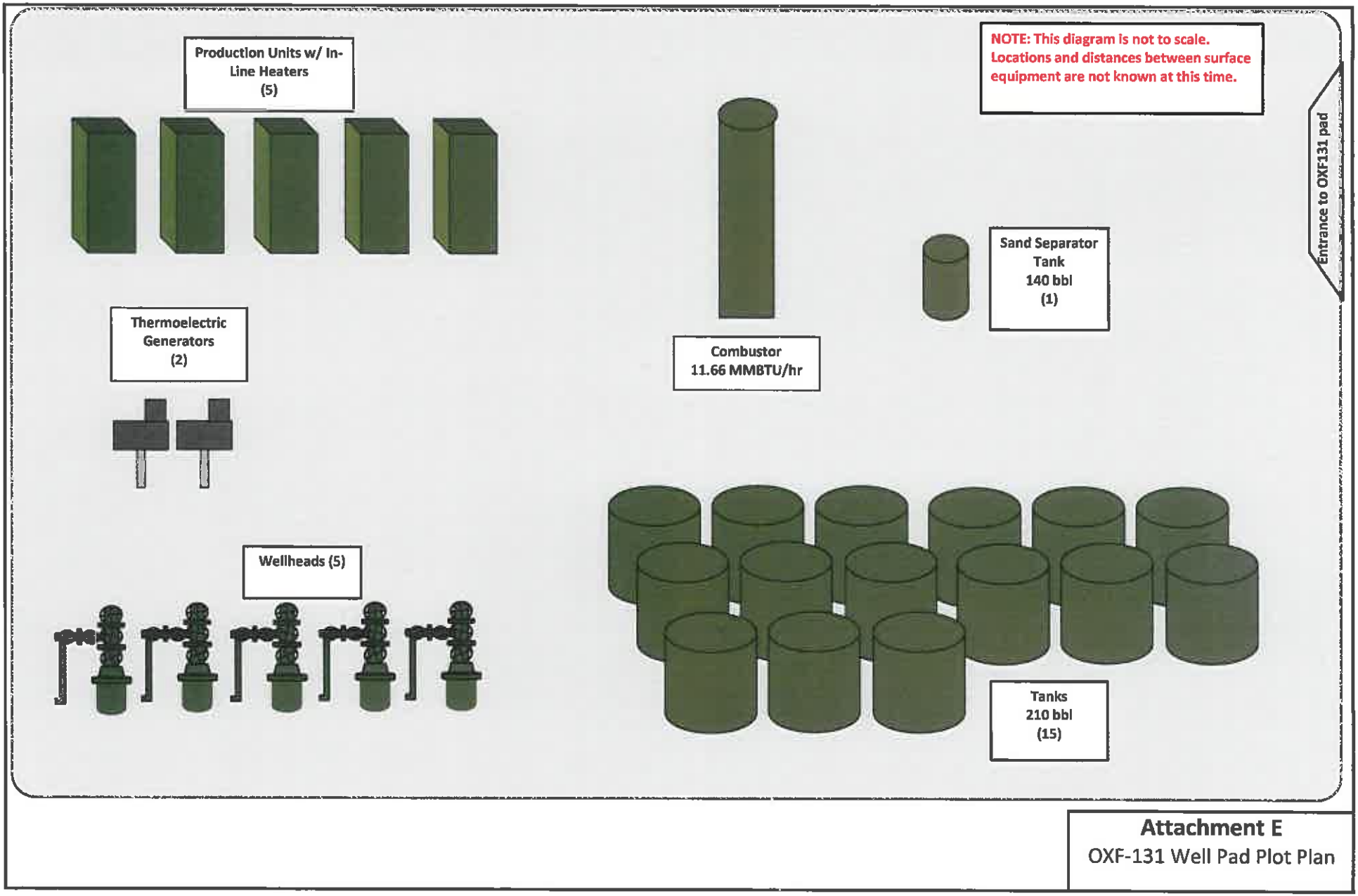
ATTACHMENT D

Process Flow Diagram


E021 – E022
E001 – E015, E023, E024
Thermoelectric Generators S021 – S022
Optional
Enclosed Combustion Device (C001)
Vapor Balanced Liquid Loading
Sand Separator Tank (140 bbl) S023
Storage Tanks (210 bbl) S001 - S015
Produced Water & Condensate
Produced Water & Sand
Produced Water & Condensate
E016 - E020
Gas from Well
Sand Separator
Line Heaters S016 – S018: (1.54 MMBtu/hr), S019: (1.15 MMBtu/hr), S020: (0.77 MMBtu/hr)
Separator
Gas to Pipeline
Flow Legend
Gas/Water/Condensate Flow
Stack Emissions/Vapor Flow
Emission Point
EQT Where energy meets innovation.
EQT Production
Process Flow Diagram
OXF-131 Wellpad
Trinity Consultants
December 2014

ATTACHMENT E

Plot Plan



Attachment E
OXF-131 Well Pad Plot Plan

ATTACHMENT F

Area Map

ATTACHMENT F: AREA MAP

Figure 1 - Map of OXF-131 Location

UTM Northing (KM):	4,337.207
UTM Easting (KM):	517.752
Elevation (m):	370

ATTACHMENT G

Emission Unit Data Sheets and G70-A Section Applicability Form

General Permit G70-A Registration
Section Applicability Form

General Permit G70-A was developed to allow qualified applicants to seek registration for a variety of sources. These sources include natural gas well affected facilities, storage tanks, natural gas-fired compressor engines (RICE), natural gas producing units, natural gas-fired in-line heaters, pneumatic controllers, heater treaters, tank truck loading, glycol dehydration units, 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-A 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.

Section 5	Natural Gas Well Affected Facility	☒
Section 6	Storage Vessels*	☒
Section 7	Gas Producing Units, In-Line Heaters, Heater Treaters, and Glycol Dehydration Reboilers	☒
Section 8	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)	☐
Section 9	*Reserved*	☐
Section 10	Natural gas-fired Compressor Engine(s) (RICE) **	☐
Section 11	Tank Truck Loading Facility ***	☒
Section 12	Standards of Performance for Storage Vessel Affected Facilities (NSPS, Subpart OOOO)	☐
Section 13	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (NSPS, Subpart JJJJ)	☐
Section 14	Control Devices not subject to NSPS, Subpart OOOO	☒
Section 15	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (40CFR63, Subpart ZZZZ)	☐
Section 16	Glycol Dehydration Units	☐
Section 17	Dehydration Units With Exemption from NESHAP Standard, Subpart HH § 63.764(d) (40CFR63, Subpart HH)	☐
Section 18	Dehydration Units Subject to NESHAP Standard, Subpart HH and Not Located Within an UA/UC (40CFR63, Subpart HH)	☐
Section 19	Dehydration Units Subject to NESHAP Standard, Subpart HH and Located Within an UA/UC (40CFR63, Subpart HH)	☐

* *Applicants that are subject to Section 6 may also be subject to Section 12 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 14.*

** *Applicants that are subject to Section 10 may also be subject to the applicable RICE requirements of Section 13 and/or Section 15.*

*** *Applicants that are subject to Section 11 may also be subject to control device requirements of Section 14.*

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
S001	E001	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S002	E002	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S003	E003	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S004	E004	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S005	E005	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S006	E006	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S007	E007	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S008	E008	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S009	E009	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S010	E010	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S011	E011	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S012	E012	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S013	E013	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S014	E014	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S015	E015	Storage Tank	2012	210 bbl	Existing	Enclosed Flare (C001)
S016	E016	Line Heater	2012	1.54 MMBtu/hr	Existing	None
S017	E017	Line Heater	2012	1.54 MMBtu/hr	Existing	None
S018	E018	Line Heater	2012	1.54 MMBtu/hr	Existing	None
S019	E019	Line Heater	2012	1.15 MMBtu/hr	Existing	None
S020	E020	Line Heater	2012	0.77 MMBtu/hr	Existing	None
S021	E021	Thermoelectric Generator	2012	0.013 MMBtu/hr	Existing	None
S022	E022	Thermoelectric Generator	TBD	0.013 MMBtu/hr	New	None
S023	E023	Sand Separator Tank	TBD	140 bbl	New	Enclosed Flare (C001) OPTIONAL
S024	E024	Liquid Loading	2012	N/A	Existing	Enclosed Flare (C001)

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

NATURAL 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).

Please provide the API number(s) for each NG well at this facility:	
4701705921	
4701705920	
4701705954	
4701705919	
4701705918	

Note: This is the same API 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 (American Petroleum Institute) 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.

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name OXF-131 Wellpad	2. Tank Name Produced Fluid Storage Tanks
3. Emission Unit ID number S001 through S015 (Existing)	4. Emission Point ID number E001 through E015 (Existing)
5. Date Installed or Modified *(for existing tanks)* 2012	6. Type of change: ☐ New construction ☐ New stored material ☒ Other (throughput increase)
7A. Description of Tank Modification *(if applicable)* Installation of four new tanks; No changes to existing tanks.	
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. Provide any limitations on source operation affecting emissions. (production variation, etc.) None	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 210 bbl	
9A. Tank Internal Diameter (ft.) ~12.25	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. 210 bbl	
13A. Maximum annual throughput (gal/yr) ~ 2,762,142 (each tank)	13B. Maximum daily throughput (gal/day) ~ 7,568 (each tank)
14. Number of tank turnovers per year ~314 (each tank)	15. Maximum tank fill rate (gal/min)
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 _X__ vertical ___ horizontal _ X _ 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 ☐ Underground ☐ Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply
☐ Carbon Adsorption[1]
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1]
☐ Other[1] (describe)
☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____
Vacuum Setting Pressure Setting
☒ Conservation Vent (psig) - Enardo Valve
☒ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss *(All tanks)*		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
See Attached Emission Calculations									

[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.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

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

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

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

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

23. Operating Pressure Range (psig): -0.03 to 0.70 psig

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): Flat

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:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Charleston, West Virginia			
28. Daily Avg. Ambient Temperature (°F): 54.98		29. Annual Avg. Maximum Temperature (°F): 65.75	
30. Annual Avg. Minimum Temperature (°F): 44.22		31. Avg. Wind Speed (mph): 6.05	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): 1,250.57		33. Atmospheric Pressure (psia): 14.25	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 57.22	34A. Minimum (°F):	34B. Maximum (°F):	
35. Avg. operating pressure range of tank (psig): 0.3128	35A. Minimum (psig): 0.2430	35B. Maximum (psig): 0.4000	
36A. Minimum liquid surface temperature (°F): 52.97		36B. Corresponding vapor pressure (psia): 0.2430	
37A. Avg. liquid surface temperature (°F): 61.57		37B. Corresponding vapor pressure (psia): 0.3128	
38A. Maximum liquid surface temperature (°F): 70.18		38B. Corresponding vapor pressure (psia): 0.4000	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	Produced Water/Condensate		
39B. CAS number:	NA		
39C. Liquid density (lb/gal):	NA		
39D. Liquid molecular weight (lb/lb-mole):	NA		
39E. Vapor molecular weight (lb/lb-mole):	24.49		
39F. Maximum true vapor pressure (psia):	NA		
39G. Maxim Reid vapor pressure (psia):	NA		
39H. Months Storage per year. From: To:	12 (All year)		

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name OXF-131 Wellpad	2. Tank Name Sand Separator Tank
3. Emission Unit ID number S023	4. Emission Point ID number E023
5. Date Installed or Modified *(for existing tanks)* TBD	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable)* Installation of one new tank	
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. Provide any limitations on source operation affecting emissions. (production variation, etc.) None	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 140 bbl	
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 bbl	
13A. Maximum annual throughput (gal/yr) ~141,120	13B. Maximum daily throughput (gal/day) ~387
14. Number of tank turnovers per year ~24	15. Maximum tank fill rate (gal/min)
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 _X__ 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 ☐ Underground ☐ Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply
☐ Carbon Adsorption[1]
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers) OPTIONAL
☐ Condenser[1]
☐ Other[1] (describe)
☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____
☐ Conservation Vent (psig
Vacuum Setting Pressure Setting
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss *(All tanks)*		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
See Attached Emission Calculations									

[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.

SECTION VII (required if did not provide TANKS Summary Sheets) *See enclosed TANKS summary sheet.*

TANK CONSTRUCTION AND OPERATION INFORMATION

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

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

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

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

23. Operating Pressure Range (psig): -0.3 to 0.70 psig

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:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Charleston, West Virginia			
28. Daily Avg. Ambient Temperature (°F): 54.98		29. Annual Avg. Maximum Temperature (°F): 65.75	
30. Annual Avg. Minimum Temperature (°F): 44.22		31. Avg. Wind Speed (mph): 6.05	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): 1,250.57		33. Atmospheric Pressure (psia): 14.25	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 57.22	34A. Minimum (°F):	34B. Maximum (°F):	
35. Avg. operating pressure range of tank (psig): 0.3128	35A. Minimum (psig): 0.2430	35B. Maximum (psig): 0.4000	
36A. Minimum liquid surface temperature (°F): 52.97		36B. Corresponding vapor pressure (psia): 0.2430	
37A. Avg. liquid surface temperature (°F): 61.57		37B. Corresponding vapor pressure (psia): 0.3128	
38A. Maximum liquid surface temperature (°F): 70.18		38B. Corresponding vapor pressure (psia): 0.4000	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	Sand/Produced Water		
39B. CAS number:	NA		
39C. Liquid density (lb/gal):	NA		
39D. Liquid molecular weight (lb/lb-mole):	NA		
39E. Vapor molecular weight (lb/lb-mole):	24.49		
39F. Maximum true vapor pressure (psia):	NA		
39G. Maxim Reid vapor pressure (psia):	NA		
39H. Months Storage per year. From: To:	12 (All year)		

NATURAL GAS FIRED FUEL BURNING UNITS
EMISSION DATA SHEET

Complete the information on this data for each Gas Producing Unit(s), Heater Treater(s), and in-line heater(s) at the production pad. Reboiler information should be entered on the Glycol Dehydration Emission Unit Data Sheet.

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
S016	E016	Line Heater	2012	Existing; No change	None	1.54 MMBtu/hr	1,050
S017	E017	Line Heater	2012	Existing; No change	None	1.54 MMBtu/hr	1,050
S018	E018	Line Heater	2012	Existing; No change	None	1.54 MMBtu/hr	1,050
S019	E019	Line Heater	2012	Existing; No change	None	1.15 MMBtu/hr	1,050
S020	E020	Line Heater	2012	Existing; No change	None	0.77 MMBtu/hr	1,050
S021	E021	Thermoelectric Generator	2012	Existing; No change	None	0.013 MMBtu/hr	1,050
S022	E022	Thermoelectric Generator	TBD	New	None	0.013 MMBtu/hr	1,050

1 Enter the appropriate Emission Unit (or Sources) 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 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 Complete appropriate air pollution control device sheet for any control device.

5 Enter design heat input capacity in mmBtu/hr.

6 Enter the fuel heating value in Btu/standard cubic foot.

TANK TRUCK LOADING
EMISSION UNIT DATA SHEET

Furnish the following information for each new or modified bulk liquid transfer area or loading rack at the natural gas production pad. This form is to be used for bulk liquid transfer operations to tank trucks.

1. Emission Unit ID: Liquid Loading	2. Emission Point ID: NA	3. Year Installed/ Modified: NA
4. Emission Unit Description: Loss of vapors from loading of trucks		
5. Loading Area Data:		
5A. Number of pumps: 1	5B. Number of liquids loaded: 1	5C. Maximum number of tank trucks loading at one time: 1
6. Describe cleaning location, compounds and procedure for tank trucks: NA		
7. Are tank trucks pressure tested for leaks at this or any other location? ☐ Yes ☒ No If YES, describe:		

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

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

9. Bulk Liquid Data *(add pages as necessary):*

Liquid Name	Condensate and Produced Water		
Max. daily throughput (1000 gal/day)	Variable		
Max. annual throughput (1000 gal/yr)	~ 41,573		
Loading Method [1]	Vapor Balanced		
Max. Fill Rate (gal/min)	TBD		
Average Fill Time (min/loading)	TBD		
Max. Bulk Liquid Temperature (°F)	Ambient		
True Vapor Pressure [2]	0.40 psia (estimate)		
Cargo Vessel Condition[3]	Unknown		
Control Equipment or Method [4]	VB, ECD		
Minimum collection efficiency (%)	70		
Minimum control efficiency (%)	95		

* *Continued on next page*

Maximum Emission Rate	Loading (lb/hr)	VOC	0.38		
		HAP	0.01		
	Annual (ton/yr)	VOC	1.64		
		HAP	0.04		
Estimation Method [5]					

Notes:

[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 as Attachment "H"*):
CA = Carbon Adsorption
VB = Dedicated Vapor Balance (closed system)
ECD = Enclosed Combustion Device
F = Flare
TO = Thermal Oxidation or Incineration

[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance
TM = Test Measurement based upon test data submittal
O = other (describe)

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

MONITORING *Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation/air pollution control device.* None	RECORDKEEPING *Please describe the proposed recordkeeping that will accompany the monitoring.* None
REPORTING *Please describe the proposed frequency of reporting of the recordkeeping.* None	TESTING *Please describe any proposed emissions testing for this process equipment/air pollution control device.* None

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

None

ATTACHMENT H

Air Pollution Control Device Data Sheets

AIR POLLUTION CONTROL DEVICE
Vapor Combustion Control Device Sheet

Complete this vapor combustion control device sheet for each enclosed combustion device, flare, thermal oxidizer, or completion combustion device that is located at the natural gas production pad for the purpose of thermally destructing waste gas to control emissions of regulated pollutants to the atmosphere.

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS FORM BEFORE COMPLETING.

General Information

1. Control Device ID#: C001	2. Installation Date: 2012 ☐ New	
3. Maximum Rated Total Flow Capacity: ~130 scf/min ~188,380 scfd	4. Maximum Design Heat Input: 11.66 MMBtu/hr	5. Design Heat Content: 1,050 BTU/scf

Control Device Information

6. Select the type of vapor combustion control device being used: ☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare ☐ Thermal Oxidizer ☐ Completion Combustion Device

7. Manufacturer: LEED Fabrication Model No.: Enclosed Combustor 48"	8. Hours of operation per year: 8760

9. List the emission units whose emissions are controlled by this vapor combustion control device: (Emission Point ID#: S001-S015, S023, S024)

10. Emission Unit ID#	Emission Source Description:	Emission Unit ID#	Emission Source Description:
E001 – E015	Existing Produced Water Storage Tanks		
E023	New Sand Separator Storage Tank (optional)		
E024	Liquid Loading		

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

11. Assist Type	12. Flare Height	13. Tip Diameter	14. Was the design per §60.18?
☐ Steam - ☐ Air - ☐ Pressure - ☒ Non -	~25 ft	~4 ft	☐Yes ☐No NA

Waste Gas Information

15. Maximum waste gas flow rate (scfm):	16. Heat value of waste gas stream (BTU/ft3)	17. Temperature of the emissions stream (°F)	18. Exit Velocity of the emissions stream (scf/min)
~130	Variable	~70	

19. Provide an attachment with the characteristics of the waste gas stream to be burned. ***See attached emission calculations.***

Pilot Information

20. Type/Grade of pilot fuel:	21. Number of pilot lights:	22. Fuel flow rate to pilot flame per pilot (scf/hr):	23. Heat input per pilot (BTU/hr):	24. Will automatic re-ignition be used?
Pipeline quality natural gas	1	25	26,335	☐ Yes ☒ No

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

26. Describe the method of controlling flame:
Three flame cells to stop the main flame front; One 2" flame arrestor on piping from drip pot to burner assembly.

27. Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	28. If yes, what type? ☒ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☐ Other, describe:

29. Pollutant(s) Controlled	30. % Capture Efficiency	31. Manufacturer's Guaranteed Control Efficiency (%)
HC	100	≥ 95
VOC	100	≥ 95
HAP	100	≥ 95

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

33. Describe all operating ranges and maintenance procedures required by the manufacturer to maintain warranty:
See attached specification sheet.

34. Additional Information Attached? ☒ **YES** ☐ **NO**

Please attach a copy of manufacturer's data sheet.
Please attach a copy of manufacturer's drawing.
Please attach a copy of the manufacturer's performance testing.

If any of the requested information is not available, please contact the manufacturer.

Enclosed Combustors Installation, Operation & Maintenance Manual

Contact - 303-659-6801
www.leedfab.com

WARNINGS

WARNING

CAREFULLY READ AND FAMILIARIZE YOURSELF WITH THE CONTENT OF THIS MANUAL AND OTHER EQUIPMENT DOCUMENTATION BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE ANY EQUIPMENT

CAUTION

INCORRECT INSTALLATION, OPERATION, ADJUSTMENT OR MAINTENANCE OF COMBUSTION EQUIPMENT CAN LEAD TO BODILY INJURY OR DEATH AND/OR SERIOUS DAMAGE TO PROPERTY. FOLLOW ALL SAFETY PRECAUTIONS AND MAINTENANCE RECOMMENDATIONS PRIOR TO, AND DURING USE OF ANY COMBUSTION EQUIPMENT

CAUTION

PILOT IGNITION SYSTEM GENERATES 20KV - 40KV HIGH VOLTAGE OUTPUT WHICH CAN CAUSE BURNS OR CARDIAC ARREST. DO NOT TOUCH OR PLACE ANY OBJECT NEAR THE IGNITION COIL'S HIGH VOLTAGE TERMINAL OR CONNECTED IGNITION WIRE WHILE THE PRODUCT IS OPERATING. EVEN WITHOUT MAKING PHYSICAL CONTACT WITH THE TERMINAL, IT IS POSSIBLE TO DRAW A SPARK FROM SEVERAL INCHES AWAY

CAUTION

FAILURE TO PROPERLY GROUND THE PILOT ASSEMBLY BACK TO IGNITOR GROUND SCREW MAY RESULT IN ACCIDENTAL ELECTROCUTION, PRODUCT DAMAGE, OR SIMPLY FAILURE TO IGNITE THE PILOT

OVERVIEW

Combustion of natural gas, vapors and other residual gases at oil well facilities, gas and liquid loading facilities, tank farms and process plants is necessary to maintain environmental quality, safety and for regulatory compliance.

Leed combustion systems are designed to operate at high efficiencies (>99%). Typical operating pressures for combustors range from 0 to 16 oz. /in2 and can combust gas volumes to over 160 mSCFD. Enclosed Combustors are not designed to handle pressures exceeding 16 oz. /in2 and the main combustor gas should not be supplied from a higher pressure source such as a separator or wellhead.

The Leed system is designed to be highly efficient and very simple to maintain. Only routine maintenance should be necessary to keep the combustor burning at peak performance.

INSTALLATION

Site Selection and Preparation

A location for the combustor should be chosen that is an appropriate distance from any gas emission source as defined in your company's design practices. In the absence of company specific design practices, it is recommended that the combustor location is 75 – 100 feet from any source of fugitive emissions.

Shipping and Receiving

- Inspect all equipment upon receipt and notify Leed Fabrication, no later than 10 days after receipt, of any shipping damage.
- When loading and off-loading the combustor and other ancillary equipment, make sure proper equipment and personnel is employed and adequate support and surface protection is provided to avoid both structural and superficial damage on the supplied equipment. **Special attention is required with handling stacks to avoid damage to paint and wind diverters.**

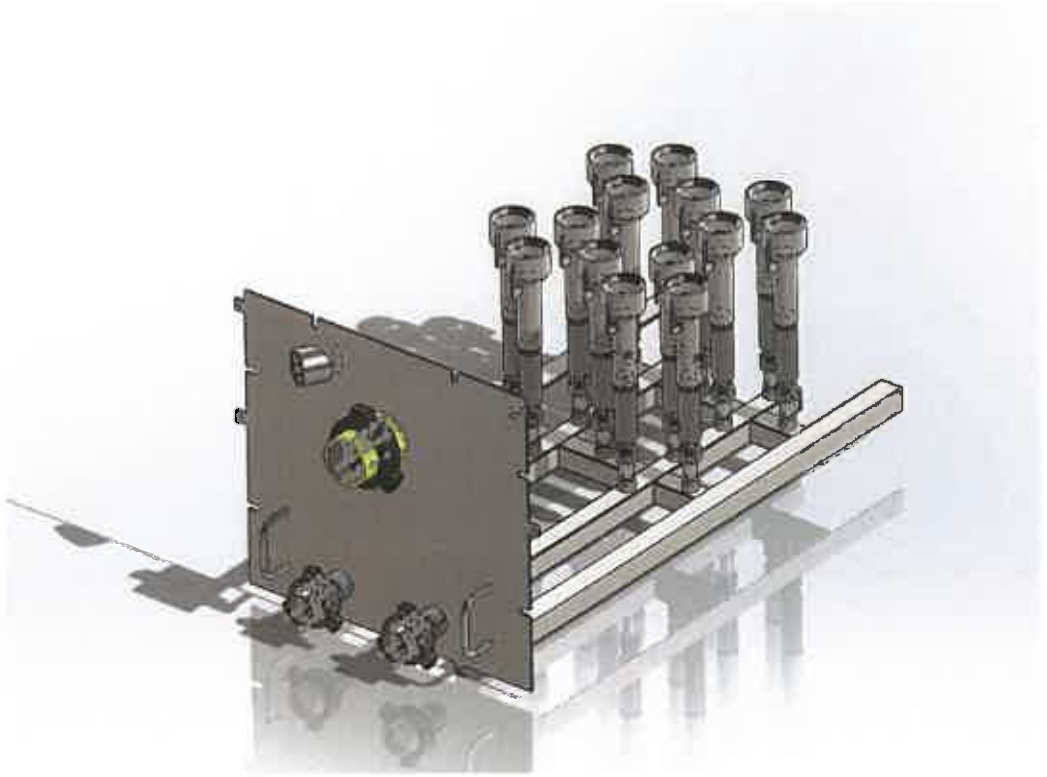
Installation Process

- Make sure all equipment drawings supplied with unit are available prior to starting the installation process.
- Flat, stable ground should be chosen for setting the combustor. Concrete foundation or optional concrete pad provided with the combustor shall be used to make sure adequate support is available for the equipment.
- The combustor should be set with appropriate heavy lifting equipment and qualified personnel. The combustor base assembly is designed with lifting eyes located on the stack. Additional lifting lugs have been provided for off-loading and stabilization when setting the combustor.
- Before setting the stack, the insulation on the interior of the stack should be inspected. Remove any protective covering over the bird screen and air intake cells prior to setting the stack and thoroughly inspect the insulation. Any insulation damaged during transportation or storage shall be repaired or replaced.

NOTE

IT IS RECOMMENDED THAT THE BURNER BRACKET ASSEMBLY AND THE PILOT ASSEMBLY ARE REMOVED PRIOR TO SETTING THE COMBUSTOR STACK. THIS ENSURES THAT NO DAMAGE OCCURS TO THE BURNER HEADS OR PILOT

- If the Burner Bracket Assembly is not already in place, align the outside angles on the burner bracket with the angles located inside the burner box. Slide the assembly until it is self-supported.



- The burner heads are installed on the couplings located on the Burner Bracket Assembly. The lower nozzle should be adjusted to locate ¼" below the inlet of the Venturi Mixer. To get more premix air, the nozzle can be adjusted to NO MORE THAN 3/8" from the entrance of the Venturi Mixer.

NOTE

IF THE NOZZLE IS SET MORE THAN 3/8" FROM THE VENTURI ENTRANCE, THERE IS A POSSIBILITY THAT THE STACK AIR VELOCITY MAY DRAW THE GAS OUT OF THE VENTURI THROAT AND IGNITE. OUTSIDE OF THE BURNER HEAD

- Pilot Assembly is normally located on the burner plate. There is an alternate location for the pilot assembly on the side of the combustor

stack. The assembly is easily accessible by sliding out the burner bracket or removing the plug in which the pilot assembly and igniter striker is mounted.

- Install ignition module and/or BMS system supplied with the unit. Please review attached manufacturer installation instructions before making any connections.
- If the inlet manifold is not already installed, proceed to install according to equipment drawings. Standard inlet manifold configuration shall include inline flame arrestor, block valve, gauges and other controls designed for the specific application.

Interface Connections

- Make sure all equipment interface drawings are available prior to starting the installation process.
- All piping should be designed and installed in accordance with regulations, recognized piping standards and company safety standards.
- The inlet piping to the combustor should be designed and installed to avoid liquid collection points, minimize pressure drop and freezing issues in field piping leading to the combustor. Installation of a Liquid Knock Out tank is strongly recommended.

NOTE

CONTACT A LEED FABRICATION REPRESENTATIVE FOR LIQUID KNOCK OUT RECOMMENDATIONS IF THE COMBUSTOR IS INSTALLED FOR USE WITH POTENTIALLY WET FEED GAS. CALL 303-659-6801

- A block valve is located in front of the pilot regulator. Stainless steel tubing and fittings should be run from the pilot source gas to this valve. Care should be taken to avoid piping that may cause freezing or trip hazards.
- Install Electric supply to the ignition module and/or BMS system.
- Install any other instrumentation associated with the system. Refer to equipment drawings before making any connections.

OPERATION

Pre Start-up Activities

Inspect all components of the combustor according to the following guidelines:

- Inspect all piping and fittings. Care should always be taken to make sure that all piping connections are tight and no leaks exist in the system.
- Check to confirm that all burner heads are installed according to this manual.
- Make sure the sight glass and test port plugs are properly installed.
- Removable air intake cells should be inspected prior to start-up. Make sure there is no obstructions or access ways adjacent to air intake cells
- Make sure that the deflector plates are properly installed after inspection or cleaning.
- Make sure the ignition system is installed to manufacturer recommendations.
- Confirm pilot gas supply and power supply availability.
- Confirm that all areas surrounding the equipment ignition source are tested and free of flammable gases or vapors.

Initial Settings

Make sure the following items are properly set before any testing or start-up activity is performed:

- Verify that block ball valve to the main gas supply is COMPLETELY CLOSED prior to starting the ignition sequence. If gas has leaked by the main supply ball valve, the operator must shut the valve and allow the combustor to vent for a minimum of 15 minutes prior to re-starting the ignition process.
- Check that pilot fuel gas is running to the combustor.
- Check that the pilot assembly is secured and the igniter is functioning properly.

- Open the block valve on the pilot assembly to flow gas through the pilot. Adjust the regulator to 6 – 8 psi. Close the ball valve to the pilot supply and allow the pilot gas to clear the stack for approximately 10 minutes.
- Use the ignition module and/or BMS system to ignite the pilot. If the pilot is not ignited after 10 seconds, shut the pilot gas and check the installation and function of the ignition system.
- Test Operation of automatic shut-off valve located on field piping leading to the combustor.
- Verify that any other operational safety shutdown systems, i.e. ESD, Thermocouples, PVRV, etc. are fully functional.
- System is now ready for initial operation

Initial Operation

Once all initial setting and testing activities have been performed, combustor is ready for operation:

- Ignite Pilot using ignition module and/or BMS system to ignite the pilot. Confirm flame presence visually and also via annunciator (light) on ignition module and/or BMS system.
- To Ignite the Main Burner, slowly open the block valve to the main supply gas. The burner heads should ignite and the combustor will be running smoothly and quietly. If the heads do not light after 15 seconds, shut off the main supply line and allow the gas in the combustion stack to vent for a minimum of 15 minutes.
- For systems with automated shut-off valves, ignition would not occur until control system / BMS allows valve to open based on specific logic defined for the system.

MAINTENANCE

Preventive Maintenance

Weekly Inspection:

- Inspect all connections and make sure that they are tight and no leaks exist in the system.
- Inspect air intake cells. High pressure air might be used to clean up the air intake cells prior to starting the unit.
- Confirm proper operation of the ignition system / BMS.

Quarterly Inspection:

- Confirm that thermocouples and all basic instrumentation (gauges, sight glasses, transmitters/switches, etc.) are in correct working order. Replace faulty items as required.
- Inspect and clean detonation/flame arrestors as required.
- Confirm set points on pilot fuel gas system and adjust as required.
- Confirm proper operation of the ignition system / BMS.

NOTE

CONTACT A LEED FABRICATION REPRESENTATIVE FOR INFORMATION ABOUT OUR PREVENTIVE MAINTENANCE PROGRAMS. CALL 303-659-6801

Troubleshooting

This section is designed to aid the operator to troubleshoot commons issues for other problems not included in this section please contact Leed Fabrication. The following is a list of issues with corresponding possible solutions:

1. Pilot does not ignite

a. Confirm power supply to ignition system / BMS. For systems with solar panels, confirm proper operation of the system, check battery and replace as required.
b. Confirm flow of fuel gas supply is available and all valves are correctly aligned.
c. If ignition system/BMS is energized (on), check internal fuse and replace as required.
d. Confirm pilot solenoid valves are energized during ignition sequence.
e. Confirm ignition system/BMS is properly programmed. See attached vendor documentation for additional detail
f. Check ignition wire is properly connected to ignition coils and to the ignition rod.
g. Check ignition rod gap inside pilot assembly. Gap should not be bigger than 1/2".
h. Check Pilot assembly is properly grounded.

2. Pilot has visible flame but cannot be detected

a. Adjust rod positioning and /or gas pilot gas pressure.
b. Check wiring inside ignition system / BMS.
c. Confirm grounding of pilot assembly.

3. Main Burner does not ignite

a. Confirm flow on gas/vapor line and that all valves are open and correctly aligned.
b. See item 5 for additional troubleshooting information.

4. Stack High Temperature

a. Verify flow rate and any possible process upset upstream of the combustor. Combustor might be operating outside design range (over fired).
b. Check stack and line thermocouples for thermocouple failure.

c. Confirm proper wiring termination of thermocouples inside ignition system / BMS

5. High Pressure on inlet line / Decreased capacity

a. Check for Process Line blockage. Verify that there are not liquid slugs or liquid carryover from process upsets.
b. Check that all block valves are operating correctly. Replace as required.
c. Check for inline flame/detonation arrestor blockage. Clean and/or replace as required.
d. Check for burner blockage. Look inside the stack through sight port and visually confirm that there are not solid objects or liquids on top of the burner. Pull out burner rack and clean and or replace burner heads as required.

6. Smoking

a. Check for Process Line blockage. Verify that there are not liquid slugs or liquid carryover from process upsets. See item 5 for additional troubleshooting information.
b. Confirm and air intake are clean and there is no inside or outside blockage. Blow out with pressure air as required.
e. Heavy hydrocarbons or water in the gas/vapor stream dropping out of vapor phase. Troubleshoot process upstream of the combustor to avoid liquid carryovers. Pull out burner rack and clean and or replace burner heads as required.
f. Check for burner blockage. Look inside the stack through sight port and visually confirm that there are not solid objects or liquids on top of the burner. Pull out burner rack and clean and or replace burner heads as required.

SPARE PARTS LIST

The following spare parts list is the minimum recommendation for the commissioning and operation of this type of unit. Customer specific details such as brand names, model numbers and quantities may apply. Additional spare parts requirements such as 2 year operation are not covered in this list:

1. Pilot Pressure Gauge
2. Main Line Pressure Gauge
3. Stack Thermocouple
4. Pilot Thermocouple or other applicable flame detection device
5. Spare Ignition Rod
6. Solenoid Valves Pilot
7. Shut-off Valve Assembly or Shut-off valve actuator

REFERENCE DRAWINGS

VENDOR LITERATURE

Ignition System / BMS

Enviromental Control Equipment
Data Sheet

Item/Tag No.:		Page	1	of	2
Project No.:		Revision:	B		
Project:		Date:	27 February 2014		
		By:	JS		
P.O. No.:	-	Checked:	SG		
RFQ No.:	-	Approved:	MS		
Ref. P&ID:	-				
Remarks:	-	Supplier:	LEED FABRICATION		
		Model No.:	L30-0011-00		

Client:		
Site:		
Unit/Lease:		

GENERAL

1	Design Code:	NDE:	LEED Fabrication Standards
2	Service:	Customer Specs:	☐ Yes
3	Description: Standard Dual Stage 48 High Efficiency Combustor		☑ No

PROCESS DATA

	Gas Composition:	mol %
4	Methane	
5	Ethane	
6	Propane	
7	I-Butane	
8	n-Butane	
9	I-Pentane	
10	n-Pentane	
11	n-Hexane	
12	CO2	
13	N2	
14	Helium	
15	H_2O	
16	C7	
17	C8	
18	C9	
19	C10	
20	C11+	
21	TOTAL	

Process Conditions:		
Variable	Value	Units
Flow Rate	Up to 140	Mscfd
Pressure	Up to 12	oz/in2
Temperature		°F
Molecular Weight		
Process/Waste Stream	☑ Gas	☐ Liquid

Detailed Process Description / Process Notes:

1. Turndown 10:1. Based on an expected normal operating rate indicated above.
2. DRE: 98 % operating at design conditions
3. Burner Pressure Drop: Min. 0.10 oz/in2

	Other Components:	PPMV
22	H2S	
23	Benzene	
24	Toluene	
25	E-Benzene	
26	Xylene	

Available Utilities:	
Fuel / Pilot Gas	Min. 30psig Natural Gas /Propane 40-50 SCFH
Instrument Air	NA
Power	120 V / 60 Hz or Solar Power
Steam	NA
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	304 SS
39				Burner Body	Carbon Steel
40	Smokeless By:	☐ Steam	☐ Assist Air	Pilot	
41		☐ Gas Assist	☑ Staging	Pilot Tip	304 SS
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	304 SS
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:	B		
		Project:		Date:	27 February 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.:	L30-0011-00		

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	NA	
65			Calorimeter	NA	
66			Pressure Switches/Transmitters	NA	
67			Thermocouples	Check with Sales for available config.	
68			Temperature Switches/Transmitters	NA	
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	48 " OD x 25 ' H	
82		☐ MTR	Pilot Tip		
83		☐ Certificate of Compliance	Pilot Line(s)		
84		☐ Other (Specify):	Stack Assembly		
85	**NDE**	☑ Vendor Standard	**Auxillary 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:	B		
		Project:		Date:	27 February 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.:	L30-0011-00		

GENERAL ARRANGEMENT

ATTACHMENT I

Emission Calculations

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Site Wide Summary

Emission Source	Value	Units	Emission Unit ID(s)	Emission Point ID(s)	Control Device
Well(s)	5	per pad	---	---	---
Produced Fluid Storage Tank(s)	15	per pad	S001 - S015	E001 - E015	C001
Sand Separator Tank	1	per pad	S023	E023	C001 (optional)
Line Heater(s) *(Existing 0.77 MMBtu/hr)*	1	per pad	S020	E020	None
Line Heater(s) *(Existing 1.15 MMBtu/hr)*	1	per pad	S019	E019	None
Line Heater(s) *(Existing 2.31 MMBtu/hr)*	3	per pad	S016 - S018	E016 - E018	None
Thermoelectric Generator(s) (TEGs)	2	per pad	S021 - S022	E021 - E022	None
Dehydrator(s)	0	per pad	---	---	---
Reboiler(s)	0	per pad	---	---	---
Tank Combustor(s)	1	per pad	C001	E001 - E015, E023	N/A
Dehy Combustor(s)	0	per pad	---	---	---
Length of lease road	6,940	feet	---	---	---

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Site Wide Summary

Constituent	Storage Tanks w/ Combustor (tpy)	Sand Separator Tank (tpy)	0.77 MMBtu/hr Line Heaters (tpy)	1.15 MMBtu/hr Line Heaters (tpy)	2.31 MMBtu/hr Line Heaters (tpy)	TEGs (tpy)	Fugitive Components (tpy)	Liquid Loading (tpy)	Haul Roads (tpy)	Total Emissions (tpy)
Criteria Pollutants										
NO_X	4.87	—	0.321	0.481	2.888	1.1E-02	—	—	—	**8.58**
CO	4.09	—	0.270	0.404	2.426	9.1E-03	—	—	—	**7.20**
PM Total	0.37	—	0.024	0.037	0.219	8.2E-04	—	—	58.91	**59.57**
PM_{10} Total	0.37	—	0.024	0.037	0.219	8.2E-04	—	—	15.02	**15.67**
$PM_{2.5}$ Total	0.37	—	0.024	0.037	0.219	8.2E-04	—	—	1.50	**2.15**
SO_2	0.03	—	0.002	0.003	0.017	6.5E-05	—	—	—	**0.05**
VOC	31.22	0.22	0.018	0.026	0.159	5.9E-04	16.79	1.64	—	**50.08**
Greenhouse Gases										
CO_2	5,988.64	—	394.19	591.29	3,547.72	13.28	0.18	—	—	**10,535**
CH_4	12.40	0.08	0.01	0.01	0.07	2.5E-04	23.94	—	—	**36.50**
N_2O	0.01	—	7.4E-04	1.1E-03	0.01	2.5E-05	—	—	—	**0.02**
CO_2e	6,301.95	2.10	394.60	591.90	3,551.38	13.29	598.58	—	—	**11,454**
Hazardous Air Pollutants										
Methylnaphthalene (2-)	—	—	7.7E-08	1.2E-07	6.9E-07	2.6E-09	—	—	—	8.9E-07
Methylchloranthrene (3-)	—	—	5.8E-09	8.7E-09	5.2E-08	1.9E-10	—	—	—	6.7E-08
Dimethybenz(a)anthracene (7,12-)	—	—	5.1E-08	7.7E-08	4.6E-07	1.7E-09	—	—	—	5.9E-07
Acenaphthene	—	—	5.8E-09	8.7E-09	5.2E-08	1.9E-10	—	—	—	6.7E-08
Acenaphthylene	—	—	5.8E-09	8.7E-09	5.2E-08	1.9E-10	—	—	—	6.7E-08
Anthracene	—	—	7.7E-09	1.2E-08	6.9E-08	2.6E-10	—	—	—	8.9E-08
Benz(a)anthracene	—	—	5.8E-09	8.7E-09	5.2E-08	1.9E-10	—	—	—	6.7E-08
Benzene	1.5E-02	<0.001	6.7E-06	1.0E-05	6.1E-05	2.3E-07	0.04	8.2E-04	—	5.9E-02
Benzo(a)pyrene	—	—	3.9E-09	5.8E-09	3.5E-08	1.3E-10	—	—	—	4.4E-08
Benzo(b)fluoranthene	—	—	5.8E-09	8.7E-09	5.2E-08	1.9E-10	—	—	—	6.7E-08
Benzo(g,h,i)perylene	—	—	3.9E-09	5.8E-09	3.5E-08	1.3E-10	—	—	—	4.4E-08
Benzo(k)fluoranthene	—	—	5.8E-09	8.7E-09	5.2E-08	1.9E-10	—	—	—	6.7E-08
Chrysene	—	—	5.8E-09	8.7E-09	5.2E-08	1.9E-10	—	—	—	6.7E-08
Dibenzo(a,h)anthracene	—	—	3.9E-09	5.8E-09	3.5E-08	1.3E-10	—	—	—	4.4E-08
Dichlorobenzene	—	—	3.9E-06	5.8E-06	3.5E-05	1.3E-07	—	—	—	4.4E-05
Fluoranthene	—	—	9.6E-09	1.4E-08	8.7E-08	3.2E-10	—	—	—	1.1E-07
Fluorene	—	—	9.0E-09	1.3E-08	8.1E-08	3.0E-10	—	—	—	1.0E-07
Formaldehyde	—	—	2.4E-04	3.6E-04	2.2E-03	8.1E-06	—	—	—	2.8E-03
Hexane, n-	3.3E-01	3.0E-03	5.8E-03	8.7E-03	5.2E-02	1.9E-04	0.30	0.03	—	7.4E-01
Indeno(1,2,3-cd)pyrene	—	—	5.8E-09	8.7E-09	5.2E-08	1.9E-10	—	—	—	6.7E-08
Naphthalene	—	—	2.0E-06	2.9E-06	1.8E-05	6.6E-08	—	—	—	2.3E-05
Phenanthrene	—	—	5.5E-08	8.2E-08	4.9E-07	1.8E-09	—	—	—	6.3E-07
Pyrene	—	—	1.6E-08	2.4E-08	1.4E-07	5.4E-10	—	—	—	1.9E-07
Toluene	3.0E-02	<0.001	1.1E-05	1.6E-05	9.8E-05	3.7E-07	0.02	1.6E-03	—	5.4E-02
Arsenic	—	—	6.4E-07	9.6E-07	5.8E-06	2.2E-08	—	—	—	7.4E-06
Beryllium	—	—	3.9E-08	5.8E-08	3.5E-07	1.3E-09	—	—	—	4.4E-07
Cadmium	—	—	3.5E-06	5.3E-06	3.2E-05	1.2E-07	—	—	—	4.1E-05
Chromium	—	—	4.5E-06	6.7E-06	4.0E-05	1.5E-07	—	—	—	5.2E-05
Cobalt	—	—	2.7E-07	4.0E-07	2.4E-06	9.1E-09	—	—	—	3.1E-06
Manganese	—	—	1.2E-06	1.8E-06	1.1E-05	4.1E-08	—	—	—	1.4E-05
Mercury	—	—	8.3E-07	1.3E-06	7.5E-06	2.8E-08	—	—	—	9.6E-06
Nickel	—	—	6.7E-06	1.0E-05	6.1E-05	2.3E-07	—	—	—	7.8E-05
Selenium	—	—	7.7E-08	1.2E-07	6.9E-07	2.6E-09	—	—	—	8.9E-07
Ethylbenzene	<0.001	<0.001	—	—	—	—	2.2E-03	8.7E-05	—	2.3E-03
Trimethylpentane (2,2,4-)	<0.001	<0.001	—	—	—	—	0.25	7.4E-05	—	2.5E-01
Xylene	1.5E-02	<0.001	—	—	—	—	0.02	1.2E-03	—	4.1E-02
Total HAP	0.38	3.0E-03	0.01	0.01	0.05	2.0E-04	0.65	0.04	—	**1.13**

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Produced Fluid Storage Tanks

Throughput Parameter	Value	Units
Operational Hours	8,760	hrs/yr
Total Condensate Throughput	8,142	bbl/month
Total Produced Water Throughput	74,065	bbl/month

Description	Potential Throughput [1] (gal/yr)
Produced Water and Condensate	41,432,126

(all wells)

[1] Based on maximum produced water and condensate throughput for the wellpad, and scaled based on total number of wells.

Storage Tanks (210 bbl, each) - Uncontrolled *(Per tank)*

Constituent	Total Emissions [1] lb/hr	tpy
Methane	3.739	16.377
Ethane	5.587	24.471
Propane	4.832	21.163
Isobutane	1.018	4.459
n-Butane	2.008	8.793
Isopentane	0.631	2.763
n-Pentane	0.520	2.279
n-Hexane	0.101	0.441
Cyclohexane	<0.001	<0.001
Other Hexanes	0.121	0.528
Heptanes	0.176	0.773
Benzene	0.003	0.013
Toluene	0.007	0.031
Ethylbenzene	<0.001	0.002
Xylenes	0.004	0.016
2,2,4-Trimethylpentane	<0.001	0.002
C8+ Heavies	0.084	0.368
Total Emissions:	18.917	82.858
Total VOC Emissions:	9.504	41.629
Total HAP Emissions:	0.114	0.500

[1] E&P TANK 2.0 calculates working, breathing and flashing losses and reports the sum as one total.

Control Efficiency of Combustor	95%	NSPS OOOO
Pilot Rating	0.03 MMBtu/hr	Max. pilot fuel usage for Leed Enclosed Combustor
Combustor Rating	11.66 MMBtu/hr	Max. input from Leed Enclosed Combustor Operations Manual

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Produced Fluid Storage Tanks

Storage Tanks (210 bbl, each) - Controlled *(Per tank)*

Constituent	Total Emissions lb/hr	Total Emissions tpy
Methane	0.187	0.819
Ethane	0.279	1.224
Propane	0.242	1.058
Isobutane	0.051	0.223
n-Butane	0.100	0.440
Isopentane	0.032	0.138
n-Pentane	0.026	0.114
n-Hexane	0.005	0.022
Cyclohexane	<0.001	<0.001
Other Hexanes	0.006	0.026
Heptanes	0.009	0.039
Benzene	<0.001	0.001
Toluene	<0.001	0.002
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	0.001
2,2,4-Trimethylpentane	<0.001	<0.001
C8+ Heavies	0.004	0.019
Total Emissions:	0.946	4.143
Total VOC Emissions:	0.475	2.081
Total HAP Emissions:	0.006	0.025

Enclosed Combustor Emissions *(each combustor)* [1]

Pollutant [2]	Emission Factor (lb/MMBtu)	Combustor Potential Emissions (lb/hr)	Combustor Potential Emissions (tpy)	Pilot Potential Emissions (lb/hr)	Pilot Potential Emissions (tpy)
NO_x	0.095	1.110	4.864	0.003	0.011
CO	0.080	0.933	4.086	0.002	0.009
PM/PM_{10}	0.007	0.084	0.370	1.9E-04	0.001
SO_2	0.001	0.007	0.029	1.5E-05	6.6E-05
CO_2 (Natural Gas Firing)	116.997	1364.189	5975.146	3.081	13.495
CH_4 (Natural Gas Firing)	0.002	0.026	0.113	5.8E-05	2.5E-04
N_2O (Natural Gas Firing)	2.2E-04	0.003	0.011	5.8E-06	2.5E-05

[1] 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 this facility. 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.

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

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Sand Separator Tank

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

1. Conservatively assumed 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)*

Constituent	Total Emissions [1]	
	lb/hr	tpy
Methane	0.019	0.084
Ethane	0.029	0.126
Propane	0.025	0.111
Isobutane	0.005	0.024
n-Butane	0.011	0.048
Isopentane	0.003	0.015
n-Pentane	0.003	0.013
n-Hexane	0.001	0.003
Cyclohexane	<0.001	<0.001
Other Hexanes	0.001	0.003
Heptanes	0.001	0.004
Benzene	<0.001	<0.001
Toluene	<0.001	<0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
2,2,4-Trimethylpentane	<0.001	<0.001
C8+ Heavies	<0.001	0.002
Total Emissions:	0.099	0.435
Total VOC Emissions:	0.051	0.224
Total HAP Emissions:	0.001	0.003

[1] E&P TANK 2.0 calculates working, breathing and flashing losses and reports the sum as one total.

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Sand Separator Tank

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

Constituent	Total Emissions lb/hr	Total Emissions tpy
Methane	0.019	0.084
Ethane	0.029	0.126
Propane	0.025	0.111
Isobutane	0.005	0.024
n-Butane	0.011	0.048
Isopentane	0.003	0.015
n-Pentane	0.003	0.013
n-Hexane	0.001	0.003
Cyclohexane	<0.001	<0.001
Other Hexanes	0.001	0.003
Heptanes	0.001	0.004
Benzene	<0.001	<0.001
Toluene	<0.001	<0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
2,2,4-Trimethylpentane	<0.001	<0.001
C8+ Heavies	<0.001	0.002
Total Emissions:	0.099	0.435
Total VOC Emissions:	0.051	0.224
Total HAP Emissions:	0.001	0.003

[1] All vapors will be routed to the same combustor controlling the other storage tanks on this pad at 95% control efficiency. However, no control is assumed

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Line Heaters (2.31 MMBtu/hr)

Parameter	Value	Units
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	1,050	BTU/scf
Heat Input	2.31	MMBtu/hr (each)
Fuel Consumption	2.20E-03	MMscf/hr (each)
Potential Annual Hours of Operation	8,760	hr/yr

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	0.220	0.963
CO	84	0.185	0.809
SO_2	0.6	0.001	0.006
PM Total	7.6	0.017	0.073
PM Condensable	5.7	0.013	0.055
PM_{10} (Filterable)	1.9	0.004	0.018
$PM_{2.5}$ (Filterable)	1.9	0.004	0.018
VOC	5.5	0.012	0.053
Lead	5.0E-04	1.1E-06	4.8E-06
CO_2[d] (Natural Gas Firing)	122,847	269.994	1182.573
CH_4[d] (Natural Gas Firing)	2.3	0.005	0.022
N_2O[d] (Natural Gas Firing)	0.23	0.001	0.002

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Line Heaters (2.31 MMBtu/hr)

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
Methylnaphthalene (2-)	2.4E-05	5.3E-08	2.3E-07
3-Methylchloranthrene	1.8E-06	4.0E-09	1.7E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	3.5E-08	1.5E-07
Acenaphthene	1.8E-06	4.0E-09	1.7E-08
Acenaphthylene	1.8E-06	4.0E-09	1.7E-08
Anthracene	2.4E-06	5.3E-09	2.3E-08
Benz(a)anthracene	1.8E-06	4.0E-09	1.7E-08
Benzene	2.1E-03	4.6E-06	2.0E-05
Benzo(a)pyrene	1.2E-06	2.6E-09	1.2E-08
Benzo(b)fluoranthene	1.8E-06	4.0E-09	1.7E-08
Benzo(g,h,i)perylene	1.2E-06	2.6E-09	1.2E-08
Benzo(k)fluoranthene	1.8E-06	4.0E-09	1.7E-08
Chrysene	1.8E-06	4.0E-09	1.7E-08
Dibenzo(a,h) anthracene	1.2E-06	2.6E-09	1.2E-08
Dichlorobenzene	1.2E-03	2.6E-06	1.2E-05
Fluoranthene	3.0E-06	6.6E-09	2.9E-08
Fluorene	2.8E-06	6.2E-09	2.7E-08
Formaldehyde	7.5E-02	1.6E-04	7.2E-04
Hexane	1.8E+00	4.0E-03	1.7E-02
Indo(1,2,3-cd)pyrene	1.8E-06	4.0E-09	1.7E-08
Naphthalene	6.1E-04	1.3E-06	5.9E-06
Phenanthrene	1.7E-05	3.7E-08	1.6E-07
Pyrene	5.0E-06	1.1E-08	4.8E-08
Toluene	3.4E-03	7.5E-06	3.3E-05
Arsenic	2.0E-04	4.4E-07	1.9E-06
Beryllium	1.2E-05	2.6E-08	1.2E-07
Cadmium	1.1E-03	2.4E-06	1.1E-05
Chromium	1.4E-03	3.1E-06	1.3E-05
Cobalt	8.4E-05	1.8E-07	8.1E-07
Manganese	3.8E-04	8.4E-07	3.7E-06
Mercury	2.6E-04	5.7E-07	2.5E-06
Nickel	2.1E-03	4.6E-06	2.0E-05
Selenium	2.4E-05	5.3E-08	2.3E-07
Total HAP		**4.1E-03**	**1.8E-02**

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

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

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

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

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Line Heater (1.15 MMBtu/hr)

Parameter	Value	Units
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	1,050	BTU/scf
Heat Input	1.15	MMBtu/hr (each)
Fuel Consumption	1.10E-03	MMscf/hr (each)
Potential Annual Hours of Operation	8,760	hr/yr

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	0.110	0.481
CO	84	0.092	0.404
SO_2	0.6	0.001	0.003
PM Total	7.6	0.008	0.037
PM Condensable	5.7	0.006	0.027
PM_{10} (Filterable)	1.9	0.002	0.009
$PM_{2.5}$ (Filterable)	1.9	0.002	0.009
VOC	5.5	0.006	0.026
Lead	5E-04	5E-07	2E-06
CO_2[d] (Natural Gas Firing)	122,847	134.997	591.286
CH_4[d] (Natural Gas Firing)	2.3	0.003	0.011
N_2O[d] (Natural Gas Firing)	0.23	2.5E-04	0.001

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Line Heater (1.15 MMBtu/hr)

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
Methylnaphthalene (2-)	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**

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

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Line Heater (0.77 MMBtu/hr)

Parameter	Value	Units
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	1,050	BTU/scf
Heat Input	0.77	MMBtu/hr (each)
Fuel Consumption	7.33E-04	MMscf/hr (each)
Potential Annual Hours of Operation	8,760	hr/yr

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	0.073	0.321
CO	84	0.062	0.270
SO_2	0.6	0.000	0.002
PM Total	7.6	0.006	0.024
PM Condensable	5.7	0.004	0.018
PM_{10} (Filterable)	1.9	0.001	0.006
$PM_{2.5}$ (Filterable)	1.9	0.001	0.006
VOC	5.5	0.004	0.018
Lead	5.0E-04	3.7E-07	1.6E-06
CO_2[d] (Natural Gas Firing)	122,847	89.998	394.191
CH_4[d] (Natural Gas Firing)	2.3	0.002	0.007
N_2O[d] (Natural Gas Firing)	0.23	1.7E-04	0.001

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Line Heater (0.77 MMBtu/hr)

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
Methylnaphthalene (2-)	2.4E-05	1.8E-08	7.7E-08
3-Methylchloranthrene	1.8E-06	1.3E-09	5.8E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.2E-08	5.1E-08
Acenaphthene	1.8E-06	1.3E-09	5.8E-09
Acenaphthylene	1.8E-06	1.3E-09	5.8E-09
Anthracene	2.4E-06	1.8E-09	7.7E-09
Benz(a)anthracene	1.8E-06	1.3E-09	5.8E-09
Benzene	2.1E-03	1.5E-06	6.7E-06
Benzo(a)pyrene	1.2E-06	8.8E-10	3.9E-09
Benzo(b)fluoranthene	1.8E-06	1.3E-09	5.8E-09
Benzo(g,h,i)perylene	1.2E-06	8.8E-10	3.9E-09
Benzo(k)fluoranthene	1.8E-06	1.3E-09	5.8E-09
Chrysene	1.8E-06	1.3E-09	5.8E-09
Dibenzo(a,h) anthracene	1.2E-06	8.8E-10	3.9E-09
Dichlorobenzene	1.2E-03	8.8E-07	3.9E-06
Fluoranthene	3.0E-06	2.2E-09	9.6E-09
Fluorene	2.8E-06	2.1E-09	9.0E-09
Formaldehyde	7.5E-02	5.5E-05	2.4E-04
Hexane	1.8E+00	1.3E-03	5.8E-03
Indo(1,2,3-cd)pyrene	1.8E-06	1.3E-09	5.8E-09
Naphthalene	6.1E-04	4.5E-07	2.0E-06
Phenanthrene	1.7E-05	1.2E-08	5.5E-08
Pyrene	5.0E-06	3.7E-09	1.6E-08
Toluene	3.4E-03	2.5E-06	1.1E-05
Arsenic	2.0E-04	1.5E-07	6.4E-07
Beryllium	1.2E-05	8.8E-09	3.9E-08
Cadmium	1.1E-03	8.1E-07	3.5E-06
Chromium	1.4E-03	1.0E-06	4.5E-06
Cobalt	8.4E-05	6.2E-08	2.7E-07
Manganese	3.8E-04	2.8E-07	1.2E-06
Mercury	2.6E-04	1.9E-07	8.3E-07
Nickel	2.1E-03	1.5E-06	6.7E-06
Selenium	2.4E-05	1.8E-08	7.7E-08
Total HAP		**1.4E-03**	**6.1E-03**

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

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Thermoelectric Generators (TEGs)

Parameter	Value	Units
Manufacturer	Global Thermoelectric	
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	1,050	BTU/scf
Heat Input	0.013	MMBtu/hr (each)
Fuel Consumption [1]	1.23E-05	MMscf/hr (each)
Potential Annual Hours of Operation	8,760	hr/yr

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

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	0.001	0.005
CO	84	0.001	0.005
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
VOC	5.5	6.8E-05	3.0E-04
Lead	5.0E-04	6.2E-09	2.7E-08
CO_2[d] (Natural Gas Firing)	122,847	1.516	6.640
CH_4[d] (Natural Gas Firing)	2.3	2.9E-05	1.3E-04
N_2O[d] (Natural Gas Firing)	0.23	2.9E-06	1.3E-05

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Thermoelectric Generators (TEGs)

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
Methylnaphthalene (2-)	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**

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

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

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

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

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Fugitive Components

Component Counts

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 Productior

Fugitive Emissions from Component Leaks

Equipment Type	Service	Emission Factors[1] (kg/hr/source)	Facility Equipment Count[2] (units)	TOC Total Fugitive Emissions (lb/hr)	TOC Annual Fugitive Emissions (tpy)
Valves	Gas	0.005970	368	4.84	21.21
Pump Seals	Light Liquid	0.019900	1	0.04	0.19
Pressure Relief Valves	Gas	0.104000	35	8.02	35.15
Connectors	All	0.001830	1496	6.04	26.44
Open-Ended Lines	All	0.001700	13	0.05	0.21
			Emission Totals:	**19.00**	**83.20**

[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.

[2] Assumes one pump for liquid loading, no compressors or dehydrators, and one meter per wellhead. Pressure relief valves count includes an Enardo valve and Emergency Pressure Relief valve for each Produced Water storage tank.

VOC and HAP Weight Fractions [1]

Service	Weight Fraction VOC	Weight Fraction Hexane	Weight Fraction Benzene	Weight Fraction Toluene	Weight Fraction Ethylbenzene	Weight Fraction 2,2,4-trimethylpentane	Weight Fraction Xylene
Gas	0.2000	0.004	0.001	2.6E-04	2.6E-05	0.003	3.0E-04
Light Liquid	1.0000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
All	0.2000	0.004	0.001	2.6E-04	2.6E-05	0.003	3.0E-04

[1] All weight fractions from the same representative gas analyses used for other emission calculation

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Fugitive Components

VOC and HAP Fugitive Emissions

Pollutant	Hourly Fugitive Emissions (lb/hr)	Annual Fugitive Emissions (tpy)
VOC	3.834	16.794
Hexane	0.069	0.301
Benzene	0.010	0.043
Toluene	0.005	0.022
Ethylbenzene	5.0E-04	0.002
2,2,4-trimethylpentane	0.058	0.253
Xylene	0.006	0.025
Total HAP	0.148	0.647

GHG Fugitive Emissions from Component Leaks

Component	Component Count[1]	GHG Emission Factor[2] (scf/hr/component)	CH_4 Emissions[3,4] (tpy)	CO_2 Emissions[3,4] (tpy)	CO_2e Emissions[5] (tpy)
Connectors	1,496	3.0E-03	6.4E-01	4.8E-03	1.6E+01
Open-Ended Lines	13	6.1E-02	1.1E-01	8.5E-04	2.8E+00
Pressure Relief Devices	35	4.0E-02	2.0E-01	1.5E-03	5.0E+00
Pneumatic Devices	25	6.0E+00	2.2E+01	1.6E-01	5.4E+02
Valves	368	2.7E-02	1.4E+00	1.1E-02	3.6E+01
Total			**23.9**	**0.178**	**599**

[1] The component count for pneumatics assumes 5 pneumatics per well
[2] 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, except for pneumatics, which are set at NSPS OOOO limits.
[3] Calculated in accordance with Equations W-31, W-35 and W-36 in Subpart W of 40 CFR 98.
[4] Mole fractions of CH_4 and CO_2 based on gas analysis:

CH_4:	77.49%	CO_2:	0.21%

[5] 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: OXF-131 Pad
Project Description: G-70A Permit Application

Liquid Loading

Liquid Loading Losses:

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

Controlled Loading Losses: L_L (lb/10^3 gal) = 12.46 (SPM)/T * (1 - collection efficiency * control efficiency)

Parameter	Value	Description
S	1.00	saturation factor for vapor balancing (AP-42 Table 5.2-1)
Collection Efficiency	70%	collection efficiency for non-NSPS/MACT annual leak tested trucks
Control Efficiency	95%	control efficiency of combustor
P	0.40	max true vapor pressure of liquid loaded (psia) - TANKS Data
M	24.48	molecular weight of vapors (lb/lb-mol) - TANKS Data
T	516.9	minimum temperature of liquids loaded (deg R) - TANKS Data

Description	Loading Losses (lb/10^3 gal)	Maximum Throughput[1] (gal)	VOC Emissions Uncontrolled (tpy)	VOC Emissions Controlled (tpy)
Liquids Hauling	0.2	41,573,246	4.91	1.64

[1] Sum of the annual throughput from each well at the pad including the sand separator tank.

Speciated HAP Emission Potential:

Constituent	mol%[1]	True Vapor Pressure of Organic Compounds in liquid (psia)[2]	Partial Vapor Pressure (psia)	Mole Fraction	Molecular Weight	VOC Vapor Weight	Speciated Weight Fraction	Speciated Liquid Loading Emissions (tpy)[3]
Methane	0.095	---	---	---	---	---	---	---
Ethane	0.602	---	---	---	---	---	---	---
Propane	1.646	127.310	2.096	0.320	44.097	14.132	0.196	0.322
Isobutane	0.867	46.110	0.400	0.061	58.123	3.554	0.049	0.081
n-Butane	2.986	32.045	0.957	0.146	58.123	8.506	0.118	0.194
Isopentane	3.103	12.530	0.389	0.059	72.150	4.290	0.059	0.098
n-Pentane	3.943	8.433	0.333	0.051	72.150	3.669	0.051	0.084
n-Hexane	4.692	2.436	0.114	0.017	85.671	1.498	0.021	0.034
Other Hexanes	4.939	2.436	0.120	0.018	86.177	1.586	0.022	0.036
Heptanes	14.686	0.735	0.108	0.017	97.881	1.616	0.022	0.037
Benzene	0.200	1.508	0.003	4.6E-04	78.114	0.036	5.0E-04	0.001
Toluene	1.138	0.425	0.005	0.001	92.141	0.068	0.001	0.002
Ethylbenzene	0.155	0.151	2.3E-04	3.6E-05	106.167	0.004	5.3E-05	8.7E-05
Xylenes	1.763	0.180	0.003	4.8E-04	106.167	0.051	0.001	0.001
2,2,4-Trimethylpentane	0.031	0.596	1.8E-04	2.8E-05	114.231	0.003	4.5E-05	7.4E-05
C8+ Heavies	59.154	3.4	2.011	0.308	107.726	33.135	0.459	0.755
	100.0		6.54			72.15	1.00	
Total Emissions:								1.64
Total HAP Emissions:								0.04

[1] An atmospheric analysis of a representative condensate sample (from wellpad OXF-131, Well #512441) is utilized to estimate the composition.

[2] Emission factors from AP-42 Section 7.1 "Liquid Storage Tanks" Tables 7.1-2, 7.1-3 and 7.1-5 (at 70 deg F or ~21 deg C) and Handbook of Chemistry and Physics: 84th Edition (at 295 K)

[3] Speciated emissions (tpy) = Speciated Weight Fraction x Calculated Controlled Liquid Loading Emissions (tpy). As methane and ethane will flash off prior to loading, the emissions from these constituents are not included in the speciation.

Company Name: EOT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit 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/trip)	Trips Per Year	Mileage Per Year	Control (%)	Emissions (tpy) PM	PM_{10}	$PM_{2.5}$
Liquids Hauling	20	40	30	2.63	10,393	27,322	0	58.51	14.91	1.49
Employee Vehicles	3	3	3	2.63	200	526	0	0.40	0.10	0.01
Total Potential Emissions								**58.91**	**15.02**	**1.50**

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Combustor Flow Rate Calculations

TANK GAS STREAM (FROM E&P TANKS 2.0)

Component	lb/hr	lb-mol/hr	mol%	MW lb/lb-mol	MW in Mixture
Carbon Dioxide	1.305	0.030	0.003	44.010	0.144
Nitrogen	<0.001	<0.001	<0.001	28.000	<0.001
Methane	56.104	3.498	0.386	16.040	6.193
Ethane	83.834	2.788	0.308	30.070	9.253
Propane	72.505	1.644	0.181	44.100	8.003
Isobutane	15.275	0.263	0.029	58.120	1.686
n-Butane	30.131	0.518	0.057	58.120	3.326
Isopentane	9.468	0.131	0.014	72.150	1.045
n-Pentane	7.803	0.108	0.012	72.150	0.861
n-Hexane	1.516	0.018	0.002	85.667	0.167
Cyclohexane	<0.001	<0.001	<0.001	84.160	<0.001
Other Hexanes	1.816	0.021	0.002	86.177	0.200
Heptanes	2.641	0.027	0.003	97.880	0.292
2,2,4-Trimethylpentane	<0.001	<0.001	<0.001	114.230	<0.001
Benzene	0.045	0.001	6.4E-05	78.110	0.005
Toluene	0.105	0.001	1.3E-04	92.140	0.012
Ethylbenzene	<0.001	<0.001	<0.001	106.170	<0.001
Xylenes	0.060	0.001	6.2E-05	106.170	0.007
C8 + Heavies	1.260	0.012	0.001	107.726	0.139
Total	283.87	9.06		31.33	lb/lbmole

1. Representative gas stream from the produced water storage tanks and sand separator storage tank are flowing to the combustor.

Combustor Rating	11.66 MMBtu/hr	Max. input from Leed Enclosed Combustor Operations Manual
Pilot Rating	0.03 MMBtu/hr	Max. pilot fuel usage for Leed Enclosed Combustor
Pilot Rating	26,335 btu/hr	
Pilot Fuel Usage	25 scf/hr	
Combustor Flow Capacity	188.38 MSCFD	Max. flowrate from LEED Combustor Operations Manual
	7,849 scf/hr	
	131 scf/min	

Enclosed Combustor Mass Flow Rate (C001)

$$\frac{7{,}849\ \text{scf}}{\text{hr}} * \frac{1\ \text{lbmole}}{379\ \text{scf}} * \frac{31.33\ \text{lb}}{\text{lbmole}} = \frac{649\ \text{lb}}{\text{hr}}$$

Mass flow rate (lb/hr) = Maximum Rated total flow capacity (scf/hr) * Vapor Molecular Weight (lb/lbmole)
Molar Gas Volume (scf/lbmole)

Company Name: EQT Production, LLC
Facility Name: OXF-131 Pad
Project Description: G-70A Permit Application

Gas Analysis

Sample Location: Average of OXF127, OXF134, OXF136, OXF138, OXF150, OXF153, WEU1, & WEU2

HHV (Btu/scf): 1,050

Constituent	Molecular Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	44.01	0.004	0.4425
Nitrogen	28.01	0.006	0.6148
Methane	16.04	0.595	59.5185
Ethane	30.07	0.208	20.8008
Propane	44.10	0.097	9.6721
Isobutane	58.12	0.016	1.6106
n-Butane	58.12	0.032	3.1996
Isopentane	72.15	0.009	0.9445
n-Pentane	72.15	0.010	0.9570
n-Hexane	86.18	0.004	0.3630
Cyclohexane	84.16	0.001	0.0608
Other Hexanes	86.18	0.005	0.5320
Heptanes	100.21	0.004	0.4288
2,2,4-Trimethylpentane	114.23	0.003	0.3053
Benzene*	78.11	0.001	0.0520
Toluene*	92.14	2.6E-04	0.0264
Ethylbenzene*	106.17	2.6E-05	0.0026
Xylenes*	106.16	3.0E-04	0.0299
C8 + Heavies	114.23	0.004	0.3701
Totals		1.00	100

[1] Per email from Regina Henry, EQT, to Tom Muscenti, Trinity, on 10/10/2012

TOC (Total)	98.87
VOC (Total)	18.55
HAP (Total)	0.78

****
* Project Setup Information *
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Project File : \\Pit-dc1\p\Client\EQT Corporation\West Virginia\WV Production Wells\143901.0023\OXF 131\02 Draft\20141027 G70\Attach I - Emission Calcs\E&P TANK\20141105 EQT OXF131 Condensate Tanks v1.0.ept
Flowsheet Selection : Oil Tank with Separator
Calculation Method : RVP Distillation
Control Efficiency : 95.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

Filed Name : EQT - OXF131 Condensate Tanks
Well Name : PTE for G70 Application
Date : 2014.11.05

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

Separator Pressure : 414.00[psig]
Separator Temperature : 60.00[F]
Ambient Pressure : 14.70[psia]
Ambient Temperature : 55.00[F]
C10+ SG : 0.8024
C10+ MW : 163.342

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

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0840
4	N2	0.0000
5	C1	9.9570
6	C2	8.1140
7	C3	6.8240
8	i-C4	1.8640
9	n-C4	4.8700
10	i-C5	2.9440
11	n-C5	3.3610
12	C6	2.2410
13	C7	9.7080
14	C8	11.4500
15	C9	8.4380
16	C10+	25.3730
17	Benzene	0.0910
18	Toluene	0.7580
19	E-Benzene	0.1130
20	Xylenes	1.3570
21	n-C6	2.4330
22	224Trimethylp	0.0200

-- Sales Oil ----------
Production Rate : 19.5[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]
Total HAPs	0.500	0.114	0.025	0.006
Page 1----------				E&P TANK
Total HC	82.477	18.830	4.124	0.942
VOCs, C2+	66.100	15.091	3.305	0.755
VOCs, C3+	41.629	9.504	2.081	0.475

Uncontrolled Recovery Info.
Vapor 5.4900 [MSCFD]
HC Vapor 5.4700 [MSCFD]
GOR 281.54 [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	0.379	0.087	0.379	0.087
4	N2	0.000	0.000	0.000	0.000
5	C1	16.377	3.739	0.819	0.187
6	C2	24.471	5.587	1.224	0.279
7	C3	21.163	4.832	1.058	0.242
8	i-C4	4.459	1.018	0.223	0.051
9	n-C4	8.793	2.008	0.440	0.100
10	i-C5	2.763	0.631	0.138	0.032
11	n-C5	2.279	0.520	0.114	0.026
12	C6	0.528	0.121	0.026	0.006
13	C7	0.773	0.176	0.039	0.009
14	C8	0.285	0.065	0.014	0.003
15	C9	0.070	0.016	0.004	0.001
16	C10+	0.013	0.003	0.001	0.000
17	Benzene	0.013	0.003	0.001	0.000
18	Toluene	0.031	0.007	0.002	0.000
19	E-Benzene	0.002	0.000	0.000	0.000
20	Xylenes	0.016	0.004	0.001	0.000
21	n-C6	0.441	0.101	0.022	0.005
22	224Trimethylp	0.002	0.000	0.000	0.000
	Total	82.858	18.917	4.143	0.946

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

No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
			mol %	mol %	mol %	mol %	mol %	mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0840	0.0069	0.0001	0.3251	0.3289	0.3254
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	C1	16.04	9.9570	0.2491	0.0001	40.3145	12.0792	38.6045
6	C2	30.07	8.1140	1.3061	0.2375	29.4027	52.0759	30.7759
7	C3	44.10	6.8240	3.2946	2.8877	17.8607	22.6275	18.1494
8	i-C4	58.12	1.8640	1.5368	1.5034	2.8873	3.1206	2.9014
9	n-C4	58.12	4.8700	4.6049	4.5743	5.6989	6.0623	5.7209
10	i-C5	72.15	2.9440	3.4237	3.4639	1.4439	1.5163	1.4483
11	n-C5	72.15	3.3610	4.0550	4.1140	1.1907	1.2521	1.1944
12	C6	86.16	2.2410	2.8819	2.9372	0.2370	0.2510	0.2378
13	C7	100.20	9.7080	12.7165	12.9774	0.3002	0.3211	0.3015
14	C8	114.23	11.4500	15.0807	15.3960	0.0965	0.1043	0.0969
15	C9	128.28	8.4380	11.1296	11.3633	0.0212	0.0250	0.0215
16	C10+	163.34	25.3730	33.4860	34.1908	0.0030	0.0034	0.0030
17	Benzene	78.11	0.0910	0.1181	0.1204	0.0064	0.0068	0.0064
18	Toluene	92.13	0.7580	0.9963	1.0170	0.0128	0.0138	0.0128
19	E-Benzene	106.17	0.1130	0.1490	0.1521	0.0005	0.0006	0.0005
20	Xylenes	106.17	1.3570	1.7892	1.8267	0.0056	0.0061	0.0056
21	n-C6	86.18	2.4330	3.1494	3.2114	0.1926	0.2046	0.1933
22	224Trimethylp	114.24	0.0200	0.0262	0.0268	0.0005	0.0005	0.0005
	MW		95.74	116.43	118.13	31.04	35.93	31.33
	Stream Mole Ratio		1.0000	0.7577	0.7421	0.2423	0.0156	0.2579
	Heating Value	[BTU/SCF]				1808.07	2072.28	1824.07
	Gas Gravity	[Gas/Air]				1.07	1.24	1.08
	Bubble Pt. @ 100F	[psia]	406.75	28.61	13.23			
	RVP @ 100F	[psia]	101.88	15.92	10.81			

Spec. Gravity @ 100F	0.685	0.715	0.717		

****
* Project Setup Information *
****
Project File : \\Pit-dc1\p\Client\EQT Corporation\West Virginia\WV Production Wells\143901.0023\OXF 131\02 Draft\20141027 G70\Attach I - Emission Calcs\E&P TANK\20141105 EQT OXF131 Condensate Tanks v1.0.ept
Flowsheet Selection : Oil Tank with Separator
Calculation Method : RVP Distillation
Control Efficiency : 95.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

Filed Name : EQT - OXF131 Sand Separator Tanks
Well Name : PTE for G70 Application
Date : 2014.11.05

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

Separator Pressure : 1000.00[psig]
Separator Temperature : 60.00[F]
Ambient Pressure : 14.70[psia]
Ambient Temperature : 55.00[F]
C10+ SG : 0.8024
C10+ MW : 163.342

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

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0840
4	N2	0.0000
5	C1	9.9570
6	C2	8.1140
7	C3	6.8240
8	i-C4	1.8640
9	n-C4	4.8700
10	i-C5	2.9440
11	n-C5	3.3610
12	C6	2.2410
13	C7	9.7080
14	C8	11.4500
15	C9	8.4380
16	C10+	25.3730
17	Benzene	0.0910
18	Toluene	0.7580
19	E-Benzene	0.1130
20	Xylenes	1.3570
21	n-C6	2.4330
22	224Trimethylp	0.0200

-- 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]
Total HAPs	0.000	0.000	0.000	0.000
Page 1----------				E&P TANK
Total HC	0.434	0.099	0.022	0.005
VOCs, C2+	0.350	0.080	0.018	0.004
VOCs, C3+	0.224	0.051	0.011	0.003

Uncontrolled Recovery Info.
Vapor 28.5500 x1E-3 [MSCFD]
HC Vapor 28.4600 x1E-3 [MSCFD]
GOR 285.50 [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	0.002	0.000	0.002	0.000
4	N2	0.000	0.000	0.000	0.000
5	C1	0.084	0.019	0.004	0.001
6	C2	0.126	0.029	0.006	0.001
7	C3	0.111	0.025	0.006	0.001
8	i-C4	0.024	0.005	0.001	0.000
9	n-C4	0.048	0.011	0.002	0.001
10	i-C5	0.015	0.003	0.001	0.000
11	n-C5	0.013	0.003	0.001	0.000
12	C6	0.003	0.001	0.000	0.000
13	C7	0.004	0.001	0.000	0.000
14	C8	0.002	0.000	0.000	0.000
15	C9	0.000	0.000	0.000	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	0.003	0.001	0.000	0.000
22	224Trimethylp	0.000	0.000	0.000	0.000
	Total	0.435	0.099	0.022	0.005

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

No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
			mol %	mol %	mol %	mol %	mol %	mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0840	0.0066	0.0001	0.3213	0.3162	0.3210
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	C1	16.04	9.9570	0.2418	0.0000	39.7491	11.7353	38.0842
6	C2	30.07	8.1140	1.2509	0.2033	29.1600	51.0457	30.4607
7	C3	44.10	6.8240	3.1681	2.7444	18.0351	23.3072	18.3484
8	i-C4	58.12	1.8640	1.4983	1.4616	2.9856	3.2407	3.0007
9	n-C4	58.12	4.8700	4.5164	4.4778	5.9543	6.3490	5.9778
10	i-C5	72.15	2.9440	3.4009	3.4384	1.5428	1.6209	1.5475
11	n-C5	72.15	3.3610	4.0391	4.0957	1.2817	1.3479	1.2856
12	C6	86.16	2.2410	2.8872	2.9421	0.2595	0.2747	0.2604
13	C7	100.20	9.7080	12.7650	13.0260	0.3336	0.3566	0.3350
14	C8	114.23	11.4500	15.1484	15.4646	0.1087	0.1175	0.1092
15	C9	128.28	8.4380	11.1817	11.4164	0.0242	0.0284	0.0245
16	C10+	163.34	25.3730	33.6460	34.3537	0.0035	0.0039	0.0035
17	Benzene	78.11	0.0910	0.1184	0.1207	0.0070	0.0075	0.0071
18	Toluene	92.13	0.7580	1.0005	1.0213	0.0143	0.0154	0.0143
19	E-Benzene	106.17	0.1130	0.1496	0.1528	0.0006	0.0007	0.0006
20	Xylenes	106.17	1.3570	1.7975	1.8351	0.0063	0.0069	0.0063
21	n-C6	86.18	2.4330	3.1573	3.2190	0.2119	0.2250	0.2126
22	224Trimethylp	114.24	0.0200	0.0263	0.0269	0.0006	0.0006	0.0006

MW	95.74	116.73	118.42	31.38	36.34	31.68
Stream Mole Ratio	1.0000	0.7541	0.7386	0.2459	0.0155	0.2614
Heating Value [BTU/SCF]				1826.39	2094.09	1842.30
Gas Gravity [Gas/Air]				1.08	1.25	1.09
Bubble Pt. @ 100F [psia]	406.75	27.71	12.65			
RVP @ 100F [psia]	101.88	15.44	10.40			

Spec. Gravity @ 100F	0.685	0.715	0.717

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

Certificate of Analysis : 13050161-002A

Company:	Gas Analytical Services	**For:**	Gas Analytical Services
Well:	OXF 131 Pad		Alan Ball
Field:	EQT Production		PO Box 1028
Sample of:	Condensate-Spot		
Conditions:	414 @ N.G.		Bridgeport, WV, 26330
Sampled by:	GR-GAS		
Sample date:	5/14/2013	**Report Date:**	5/29/2013
Remarks:	Cylinder No.: GAS		
Remarks:			

Analysis: (*GPA 2186M*)	**Mol. %**	**MW**	**Wt. %**	**Sp. Gravity**	**L.V. %**
Nitrogen	0.000	28.013	0.000	0.8094	0.000
Methane	9.957	16.043	1.664	0.3000	3.884
Carbon Dioxide	0.084	44.010	0.039	0.8180	0.033
Ethane	8.114	30.070	2.542	0.3562	4.991
Propane	6.824	44.097	3.135	0.5070	4.324
Iso-butane	1.864	58.123	1.129	0.5629	1.403
N-butane	4.870	58.123	2.948	0.5840	3.533
Iso-pentane	2.944	72.150	2.213	0.6244	2.479
N-pentane	3.361	72.150	2.526	0.6311	2.801
i-Hexanes	2.241	86.177	1.990	0.6795	2.104
n-Hexane	2.433	85.734	2.184	0.6640	2.288
2,2,4 trimethylpentane	0.020	114.231	0.024	0.6967	0.024
Benzene	0.091	78.114	0.065	0.8846	0.059
Heptanes	9.708	98.181	9.953	0.7010	9.943
Toluene	0.758	92.141	0.641	0.8719	0.588
Octanes	11.450	107.956	13.087	0.7510	12.206
E-benzene	0.113	106.167	0.053	0.8718	0.102
M-,O-,P-xylene	1.357	106.167	1.501	0.8731	1.214
Nonanes	8.438	122.962	11.137	0.7603	10.366
Decanes Plus	25.373	163.342	43.169	0.8024	37.658
	100.000		100.000		100.000

Calculated Values	**Total Sample**	**Decanes Plus**
Specific Gravity at 60 °F	0.6999	0.8024
Api Gravity at 60 °F	70.675	44.841
Molecular Weight	96.001	163.342
Pounds per Gallon (in Vacuum)	5.835	6.690
Pounds per Gallon (in Air)	5.829	6.683
Cu. Ft. Vapor per Gallon @ 14.73 psia	23.120	15.507

Brian Gaspard

Southern Petroleum Laboratories, Inc.

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

Certificate of Analysis : 13050161-002A

Company:	Gas Analytical Services	**For:**	Gas Analytical Services
Well:	OXF 131 Pad		Alan Ball
Field:	EQT Production		PO Box 1028
Sample of:	Condensate-Spot		
Conditions:	414 @ N.G.		Bridgeport, WV, 26330
Sampled by:	GR-GAS		
Sample date:	5/14/2013	**Report Date:**	5/29/2013
Remarks:	Cylinder No.: GAS		
Remarks:			

Analysis: (*GPA 2103*)	**Mol. %**	**MW**	**Wt. %**	**Sp. Gravity**	**L.V. %**
Nitrogen	0.000	28.013	0.000	0.8094	0.000
Methane	9.957	16.043	1.664	0.3000	3.884
Carbon Dioxide	0.084	44.010	0.039	0.8180	0.033
Ethane	8.114	30.070	2.542	0.3562	4.991
Propane	6.824	44.097	3.135	0.5070	4.324
Iso-butane	1.864	58.123	1.129	0.5629	1.403
N-butane	4.870	58.123	2.948	0.5840	3.533
Iso-pentane	2.944	72.150	2.213	0.6244	2.479
N-pentane	3.361	72.150	2.526	0.6311	2.801
Hexanes	4.674	85.734	4.174	0.6652	4.392
Heptanes Plus	57.308	98.181	79.630	0.7010	72.160
	100.000		100.000		100.000

Calculated Values	**Total Sample**	**Heptanes Plus**
Specific Gravity at 60 °F	0.6999	0.7741
Api Gravity at 60 °F	70.675	51.303
Molecular Weight	96.001	133.398
Pounds per Gallon (in Vacuum)	5.835	6.454
Pounds per Gallon (in Air)	5.829	6.447
Cu. Ft. Vapor per Gallon @ 14.73 psia	23.120	18.402
Standing-Katz Density (lb. / ft^3)		

Brian Hazzard

Southern Petroleum Laboratories, Inc.

Certificate of Analysis

Number: 2030-13050161-002A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

Alan Ball
Gas Analytical Services
PO Box 1028
Bridgeport, WV 26330

May 22, 2013

Station Name: OXF 131 Pad
Station Number: 512441
Station Location: EQT Production
Sample Point: Wellhead

Sampled By: GR-GAS
Sample Of: Condensate Spot
Sample Date: 05/14/2013 13:00
Sample Conditions: 414 psig
Cylinder No: GAS

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Color-Visual	Proprietary	L STRAW			AR	05/22/2013
API Gravity @ 60° F	ASTM D-5002	61.22	°		AR	05/22/2013
Specific Gravity @ 60/60° F	ASTM D-5002	0.7342			AR	05/22/2013
Density @ 60° F	ASTM D-5002	0.7335	g/ml		AR	05/22/2013
Shrinkage Factor	Proprietary	0.9043			AR	05/22/2013
Flash Factor	Proprietary	256.6792	Cu. Ft./S.T. Bbl		AR	05/22/2013

Patti L. Pecora

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

ATTACHMENT J

Class I Legal Advertisement

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that EQT Production has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Class II General Permit (G70-A) for the existing natural gas production wellpad OXF-131. The facility is located in Doddridge County, West Virginia, about 7.5 miles South of West Union, WV at 39.18392, -80.79446.

The applicant estimates the potential to discharge the following Regulated Air Pollutants associated with this facility:

Pollutant	Emissions (tons per year)
NO_X	8.58
CO	7.20
VOC	50.08
SO_2	0.05
PM	59.57
Total HAPs	1.13
Carbon Dioxide Equivalents (CO_2e)	11,454

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 1227, during normal business hours.

Dated this the 22 day of December, 2014.

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

ATTACHMENT K

Electronic Submittal (*not applicable*)

ATTACHMENT L

General Permit Registration Application Fee

ATTACHMENT M

Siting Criteria Waiver (*not applicable*)

ATTACHMENT N

Material Safety Data Sheet (*not applicable*)

ATTACHMENT O

Emission Summary Sheet

G70-A EMISSIONS SUMMARY SHEET

Emission Point ID No.	Emission Point Type[1]	Emission Unit Vented Through This Point		Air Pollution Control Device		All Regulated Pollutants - Chemical Name/CAS[2]	Maximum Potential Uncontrolled Emissions[3]		Maximum Potential Controlled Emissions[4]		Emission Form or Phase	Est. Method Used[5]
		ID No.	Source	ID No.	Device Type	*(Speciate VOCs & HAPS)*	lb/hr	ton/yr	lb/hr	ton/yr	*(At exit conditions, Solid, Liquid or Gas/Vapor)*	
E001 – E015 (Total-All Tanks)	Upward vertical stack	S001 – S015	Produced Fluid Storage Tanks	C001	Combustor	VOC	142.56	624.44	7.13	31.22	Gas/Vapor	E&P TANK v2.0
						HAPs	1.71	7.50	0.09	0.38		
E016 – E018 (Total-All 2.31 MMBtu Heaters)	Upward vertical stack	S016 – S018	Line Heaters	None	---	NOx	0.66	2.89	0.66	2.89	Gas/Vapor	AP-42
						CO	0.55	2.43	0.55	2.43		
						PM/PM10/PM2.5	0.05	0.22	0.05	0.22		
						SO2	<0.01	0.02	<0.01	0.02		
						VOC	0.04	0.16	0.04	0.16		
						CO2e	811	3,551	811	3,551		
E019 (Total-All 1.15 MMBtu Heaters)	Upward vertical stack	S019	Line Heater	None	---	NOx	0.11	0.48	0.11	0.48	Gas/Vapor	AP-42
						CO	0.09	0.40	0.09	0.40		
						PM/PM10/PM2.5	0.01	0.04	0.01	0.04		
						SO2	<0.01	<0.01	<0.01	<0.01		
						VOC	0.01	0.03	0.01	0.03		
						CO2e	135	592	135	592		
E020 (Total-All 0.77 MMBtu Heaters)	Upward vertical stack	S020	Line Heater	None	---	NOx	0.07	0.32	0.07	0.32	Gas/Vapor	AP-42
						CO	0.06	0.27	0.06	0.27		
						PM/PM10/PM2.5	0.01	0.02	0.01	0.02		
						SO2	<0.01	<0.01	<0.01	<0.01		
						VOC	<0.01	0.02	<0.01	0.02		
						CO2e	90	395	90	395		

E021 – E022 (Total-All TEG's)	Upward vertical stack	S021 – S022	TEG	None	---	NOx	<0.01	0.01	<0.01	0.01	Gas/Vapor	AP-42
						CO	<0.01	0.01	<0.01	0.01		
						PM/PM10/PM2.5	<0.01	<0.01	<0.01	<0.01		
						SO2	<0.01	<0.01	<0.01	<0.01		
						VOC	<0.01	<0.01	<0.01	<0.01		
						CO2e	3	13	3	13		
E023	Upward vertical stack	S023	Sand Separator Tank	C001 (opt)	Combustor	VOC	0.05	0.22	0.05	0.22	Gas/Vapor	E&P TANK v2.0
						HAPs	<0.01	<0.01	<0.01	<0.01		
E024	Upward vertical stack	S024	Liquid Loading	C001	Combustor	VOC	1.12	4.91	0.38	1.64	Gas/Vapor	AP-42
						HAPs	0.03	0.11	0.01	0.04		
C001	Upward vertical stack	C001	Combustor	None	---	NOx	1.11	4.87	1.11	4.87	Gas/Vapor	AP-42
						CO	0.93	4.09	0.93	4.09		
						PM/PM10/PM2.5	0.08	0.37	0.08	0.37		
						SO2	0.01	0.03	0.01	0.03		
						VOC	---	---	---	---		
						CO2e	1,439	6,302	1,439	6,302		