PROJECT REPORT

EQT Production
OXF-121 Pad

R13 Permit Application

Where energy meets innovation.

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August 2017

Trinity Consultants

Environmental solutions delivered uncommonly well

TABLE OF CONTENTS

EQT Production Company (EQT) is submitting this modification permit application (R-13) to the West Virginia Department of Environmental Protection (WVDEP) for the construction and operation of new equipment at an existing natural gas production well pad, OXF-121, located in Doddridge County, West Virginia. The wellpad is currently permitted under R13-3047. This R13 application seeks to replace the fifteen (15) existing 210 barrel (bbl) storage tanks with six (6) new 400 bbl storage vessels, which will be controlled by the existing combustor.

1.1. FACILITY AND PROJECT DESCRIPTION

The OXF-121 wellpad is an existing natural gas production facility. Natural gas and liquids (including water and condensate) are extracted from deposits underneath the surface. Natural gas is transported from the wells to a gas line for additional processing and compression, as necessary. The liquids produced are stored in storage vessels.

The OXF 121 wellpad currently consists of the following equipment

- Fifteen (15) 210 barrel (bbl) storage tanks for condensate/water (produced fluids) controlled by one(1) combustor , rated at 11.66 MMbtu/hr;
- One(1) line heater each rated at 1.15 MMBtu/hr ;
- Two (2) thermoelectric generators (TEGs), each rated at 0.013 MMbtu/hr heat input;
- Produced fluid truck loading; and
- Associated piping and components

As part of this application, EQT seeks to:

- Install six (6) 400 barrel (bbl) storage tanks for condensate/water(produced fluids), each controlled by the aforementioned combustor. The storage tanks will replace the existing fifteen (15) 210 barrel storage tanks at the site.
- Increase the current liquid permit throughputs at the wellpad

A process flow diagram is included as Attachment F.

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 OXF-121 Pad for air permitting purposes if, and only if, all three elements of the "stationary source" definition above are fulfilled.

WVDEP determined that the OXF-121 pad is a separate stationary source when the current permit was issued. There are no Marcellus facilities within a quarter-mile radius of the OXF-121 Pad. Therefore, the OXF-121 pad should continue to 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. R-13 APPLICATION ORGANIZATION

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

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

2. SAMPLE EMISSION SOURCE CALCULATIONS

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

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

- **Line Heaters, Enclosed Combustors and TEGs:** Potential emissions of criteria pollutants and hazardous air pollutants (HAPs) are calculated using U.S. EPA's AP-42 factors for natural gas external combustion.[1] These calculations assume a site-specific heat content of natural gas. Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.[2]

- **Fugitive Equipment Leaks:** Emissions of VOC and HAPs from leaking equipment components have been estimated using facility estimated component counts and types along with emission factors from the *Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995.* Emission factors used are based on average measured TOC from component types indicated. Greenhouse gas emissions from component leaks are calculated according to the procedures in 40 CFR 98 Subpart W.[3] Pneumatic devices at the wellpad are intermittent bleed and are assumed to be in operation 1/3 of the year.

- **Storage Tanks:** Working, breathing and flashing emissions of VOC and HAPs from the storage tanks at the facility are calculated using Bryan Research & Engineering ProMax® Software. Controlled calculations assume an overall control efficiency (capture and destruction) of 98%. The throughput for the produced fluids tanks are based on the maximum annualized monthly condensate and produced water at the OXF-121 well pad (i.e., the maximum monthly throughput for the pad times 12), and includes a safety factor of 1.80. The composition for the analysis was from a sample taken at OXF-121. The produced fluids throughput is calculated as follows:

$$Throughput\ \left(\frac{bbl}{day}\right) = \left(Condensate\ Throughput\ \left(\frac{bbl}{month}\right) + \left(Produced\ Water\ Throughput\ \left(\frac{bbl}{month}\right)\right)\right) * \frac{12\left(\frac{months}{year}\right)}{365\left(\frac{days}{year}\right)} \text{ x } 1.80$$

- **Tank Truck Loading:** Uncontrolled emissions of VOC and HAPs from the loading of organic liquids from storage tanks to tank truck are calculated using Bryan Research Engineering ProMax® Software. Truck loading is controlled by the enclosed combustors. U.S. EPA's AP-42 Chapter 5 Section 2 factors were used for capture efficiency.[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, *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.

3. R-13 APPLICATION FORMS

The WVDEP permit application forms contained in this application include all applicable R-13 application forms including the required attachments.

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

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

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

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

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

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

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

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

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

Section I. General

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

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

3. Name of facility *(if different from above):*
OXF-121 Wellpad

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

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

5B. Facility's present physical address:
New Milton, Doddridge County, West Virginia

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

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

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

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

- If **YES,** please explain: Applicant owns the site.
- If **NO,** you are not eligible for a permit for this source.

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

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

11A. DAQ Plant ID No. (for existing facilities only):
017-00049

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-3047

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

12A.

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

From New Milton, WV Head northwest on Meathouse Fork toward Co Rte 25/2 for 1.2 miles. Turn left onto WV-18 S and continue 9.8 miles. Turn right onto Grove Summers Rd and continue for 5.9 miles. Turn left onto Sugar Run and continue straight onto Summers Rd Brushy Fork for 0.7 miles. Turn left onto Co Rd 22/3 for 0.4 miles. Continue onto Elklick Run for 1.1 miles and arrive at the wellpad.

12.B. New site address (if applicable):	12C. Nearest city or town: New Milton	12D. County: Doddridge
12.E. UTM Northing (KM): 4,331.892	12F. UTM Easting (KM): 515.388	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
EQT is proposing with this R13 application to replace the fifteen (15) existing 210 barrel (bbl) storage tanks with six (6) new 400 bbl storage vessels.

14A. Provide the date of anticipated installation or change: 2016 (Upon permit issuance) – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen:	14B. Date of anticipated Start-Up if a permit is granted: 2017

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

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

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

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

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

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

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**
– For chemical processes, provide a MSDS for each compound emitted to the air.

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

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

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

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

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

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

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

☐ Absorption Systems	☐ Baghouse	☐ Flare
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☒ Other Collectors, specify Enclosed Combustors

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

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

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

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

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

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

☐ **YES** ☒ **NO**

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

Section III. Certification of Information

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

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

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

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

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

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE _____ *(Please use blue ink)* DATE: 4/9/17 *(Please use blue ink)*

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

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

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

ATTACHMENT A

Current Business Certificate

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

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

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

This certificate is issued on: 08/4/2010

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

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

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

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

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

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

atL006 v.3
L0553297664

ATTACHMENT B

Area Map

ATTACHMENT B

Figure 1 - Map of OXF-121 Location

Note – Ring represents 300 ft radius around wellpad equipment.

UTM Northing (KM)	4,331.892
UTM Easting (KM)	515.388
Elevation (m)	261

ATTACHMENT C

Installation and Start Up Schedule

ATTACHMENT C

Schedule of Planned Installation and Start-Up

Proposed Unit(s)	Date of Installation
Six (6) 400 barrel (bbl) storage tanks for condensate/water (produced fluids) - S020 – S025	**2017**

ATTACHMENT D

Regulatory Discussion

ATTACHMENT D – REGULATORY APPLICABILITY

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

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

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 well pad. 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 well pad. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

Prevention of Significant Deterioration (PSD) Source Classification

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

Title V Operating Permit Program

Title 40 of the Code of Federal Regulations Part 70 (40 CFR 70) establishes the federal Title V operating permit program. West Virginia has incorporated the provisions of this federal program in its Title V operating permit program in West Virginia Code of State Regulations (CSR) 45-30. The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP, and 100 tpy of all other regulated pollutants.[1]. 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.

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 well pad. The following NSPS could potentially apply to the well pad:

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

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

NSPS Subparts D, Da, Db, and Dc - Steam Generating Units

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

NSPS Subpart K, Ka, and Kb - Storage Vessels for Petroleum Liquids/Volatile Organic Liquids

These subparts apply to storage tanks of certain sizes constructed, reconstructed, or modified during various time periods. Subpart K applies to storage tanks constructed, reconstructed, or modified prior to 1978, and Subpart Ka applies to those constructed, reconstructed, or modified prior to 1984. Both Subparts K and Ka apply to storage tanks with a capacity greater than 40,000 gallons. Subpart Kb applies to volatile organic liquid (VOL) storage tanks constructed, reconstructed, or modified after July 23, 1984 with a capacity equal to or greater than 75 m^3 (~19,813 gallons). The proposed tanks at the wellpad will each have a capacity of 16,800 gallons. As such, Subparts K, Ka, and Kb do not apply to the storage tank at the wellpad.

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 (see clarification below regarding dates). This NSPS was published in the Federal Register on August 16, 2012, and subsequently amended. The proposed project does not include any source categories under NSPS Subpart OOOO or change any prior determinations related to NSPS Subpart OOOO. Therefore, this subpart is not applicable to the proposed project.

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

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

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

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

The proposed project will include six (6) produced fluid storage vessels at the well pad. These tanks will each have potential VOC emissions less than 6 tpy based on the permit application materials and enforceable limits to be included in the R-13 permit. As such, per §60.5365a(e), the tanks will not be storage vessel affected facilities under the rule.

Note that the proposed changes to the well pad do not meet the definition of modification under §60.5365a(i)(3)(i). Therefore, EQT will be not be subject to the leak detection and repair program under OOOOa.

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

Non-Applicability of All Other NSPS

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas processing plants (Subpart OOOO) and the applicability of a particular NSPS to the well pad can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

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 well pad 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 well pad:

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

NESHAP Subpart HH — Oil and Natural Gas Production Facilities

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

NESHAP Subpart JJJJJJ - Industrial, Commercial, and Institutional Boilers

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

West Virginia SIP Regulations

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

45 CSR 2: 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 heater 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.

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

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

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

45 CSR 16: Standards of Performance for New Stationary Sources

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

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

According to 45 CSR 17-3.1:

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

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

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

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

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 well pad, EQT will be complying with 45 CSR 34. Note that there are no applicable requirements under 40 CFR Parts 61 and 63 for the well pad.

Non-Applicability of Other SIP Rules

A thorough examination of the West Virginia SIP rules with respect to applicability at the well pad 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 well pad.

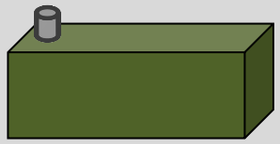
ATTACHMENT E

Plot Plan

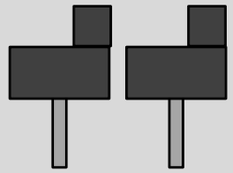
NOTE: This diagram is not to scale. Locations and distances between surface equipment are not known at this time.

Entrance to OXF-121 pad

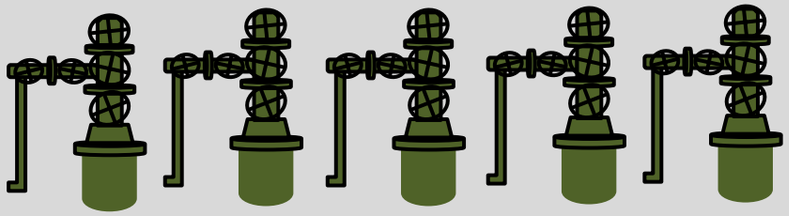
Production Units w/ In-Line Heaters (1) S016



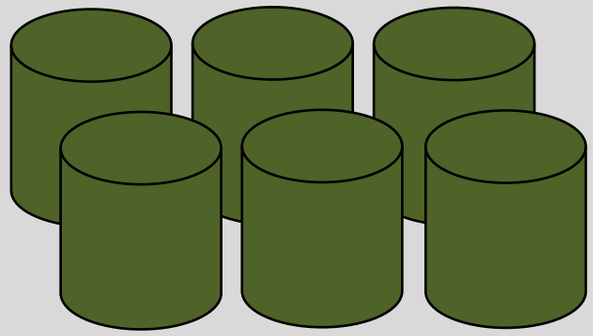
Thermoelectric Generators (2) S017-S018



Wellheads (5)



Combustor 11.66 MMBTU/hr C001



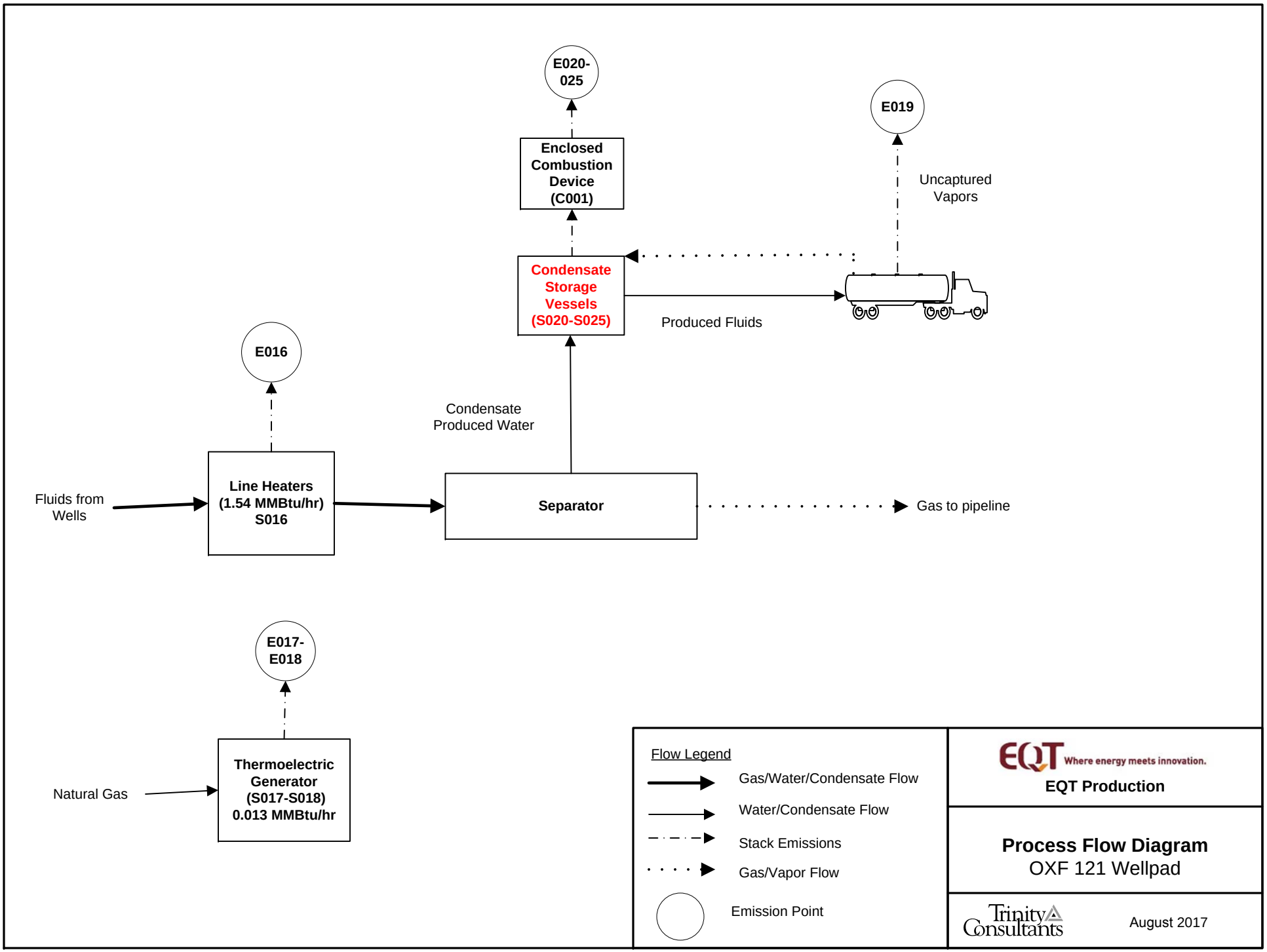
Produced Fluid Tanks 400 bbl (6) S020-S025

Attachment F

OXF-121 Well Pad Plot Plan

ATTACHMENT F

Detailed Process Flow Diagram


E020-025
E019
Enclosed Combustion Device (C001)
Uncaptured Vapors
Condensate Storage Vessels (S020-S025)
Produced Fluids
E016
Condensate Produced Water
Fluids from Wells
Line Heaters (1.54 MMBtu/hr) S016
Separator
Gas to pipeline
E017-E018
Natural Gas
Thermoelectric Generator (S017-S018) 0.013 MMBtu/hr
Flow Legend
Gas/Water/Condensate Flow
Water/Condensate Flow
Stack Emissions
Gas/Vapor Flow
Emission Point
EQT Where energy meets innovation.
EQT Production
Process Flow Diagram
OXF 121 Wellpad
Trinity Consultants
August 2017

ATTACHMENT G

Process Description

ATTACHMENT G: PROCESS DESCRIPTION

EQT is submitting this application to permit the installation of six (6) 400 bbl condensate tanks to replace the existing fifteen (15) 210 bbl storage tanks at the wellpad. The OXF 121 wellpad is currently authorized to operate under R13-3047.

The OXF-121 wellpad consists of five (5) wells, each with the basic operation. The incoming gas/liquid stream from the underground well will pass through a line heater (S016) to raise/maintain temperature of the stream and prevent hydrate formation. The stream will then pass through a high pressure separator, which will separate gas (natural gas from the separator is sent to the sales line) from liquids (condensate and produced water). The liquids are then transferred to the produced fluids tank (S001-S015)

Emissions from the storage vessels are controlled by a single enclosed combustor (C001). Once the tanks are filled, the contents are loaded into trucks for transport (S019). EQT utilizes vapor balancing in the truck loading operations, which means the vapors displaced by the filling of tanker trucks are routed back into the battery of tanks and ultimately to the combustor. Facility electricity is provided a pair of thermoelectric generators (S017-S018), respectively.

A process flow diagram is included as Attachment F.

ATTACHMENT I

Emission Units Table

Attachment I

Emission Units Table

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
S001	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S002	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S003	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S004	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S005	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S006	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S007	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S008	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S009	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S010	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S011	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S012	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S013	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S014	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S015	C001	Condensate Storage Tank	2010	210 bbl	Existing – To be removed	C001
S016	E016	Line Heater	2010	1.15 MMBtu/hr	Existing; No change	Existing; No change
S017	E017	Thermoelectric Generator	2010	0.013 MMBtu/hr	Existing; No change	None
S018	E018	Thermoelectric Generator	2010	0.013 MMBtu/hr	Existing; No change	None

S019	E019 (Uncaptured) C001 (Controlled, Captured)	Uncaptured Liquid Loading	2010/2017	2,111,540	Modified; Increased Throughput	C001
S020	C001	Produced fluid tank	TBD	400 bbl	New	C001
S021	C001	Produced fluid tank	TBD	400 bbl	New	C001
S022	C001	Produced fluid tank	TBD	400 bbl	New	C001
S023	C001	Produced fluid tank	TBD	400 bbl	New	C001
S024	C001	Produced fluid tank	TBD	400 bbl	New	C001
S025	C001	Produced fluid tank	TBD	400 bbl	New	C001
C001	C001	Combustor	2010	11.66 MMBtu/hr	Existing; No change	N/A

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

ATTACHMENT J

Emission Points Data Summary Sheet

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
C001	Upward Vert Stack	S020-S025, S019	Produced water/ condensate tanks, liquid loading	C001	Enclosed Combustor			NO_X CO VOC SO_2 PM_{10} $PM_{2.5}$ CO_2e HAP Toluene n-hexane	1.15 0.96 77.52 0.01 0.09 0.09 1,375.24 4.34 0.18 3.14	5.03 4.22 339.56 0.03 0.38 0.38 6,023.5 19.00 0.78 13.749	1.15 0.96 1.77 0.01 0.09 0.09 1,375.24 0.10 <0.01 0.07	5.03 4.22 6.85 0.03 0.38 0.38 6,023.5 0.38 0.02 0.28	Gas	BRE ProMax	
E016	Upward Vert Stack	S016	Line Heater	N/A	N/A			NO_X CO VOC SO_2 PM_{10} $PM_{2.5}$ CO_2e HAP	0.11 0.09 0.01 <0.01 0.01 0.01 135 <0.01	0.48 0.40 0.03 <0.01 0.04 0.04 592 0.01	0.11 0.09 0.01 <0.01 0.01 0.01 135 <0.01	0.48 0.40 0.03 <0.01 0.04 0.04 592 0.01	Gas	AP-42	
E017-E018 (each)	Upward Vert Stack	S017-S018	TEG	N/A	N/A			NO_X CO_2e	<0.01 1.52	<0.01 6.64	<0.01 1.52	<0.01 6.64	Gas	AP-42	
E019	Fugitive	S019	Uncaptured liquid loading	N/A	N/A			VOC HAP n-Hexane	4.79 0.24 0.18	1.25 0.06 0.05	4.79 0.24 0.18	1.25 0.06 0.05	Gas	BRE ProMax	

*Note – Only pollutants with controlled emissions > 0.01 tpy are presented in this table.

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

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

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

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

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

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

minute batch).

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

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

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

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

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

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

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

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	NA	---	---	---	---	---
Unpaved Haul Roads	PM PM_{10} $PM_{2.5}$	---	1.17 0.30 0.03	---	1.17 0.30 0.03	C
Storage Pile Emissions	NA	---	---	---	---	---
Loading/Unloading Operations (Uncaptured Emissions)	VOC HAP Benzene Toluene Xylene n-hexane	4.79 0.24 <0.01 0.01 <0.01 0.18	1.25 0.06 <0.01 <0.01 <0.01 0.05	0.22 0.01 <0.01 <0.01 <0.01 0.01	0.06 <0.01 <0.01 <0.01 <0.01 <0.01	B
Wastewater Treatment Evaporation & Operations	NA	---	---	---	---	---
Equipment Leaks	VOC HAP CO_2e Benzene Toluene Xylene n-hexane	N/A	12.36 0.39 213.07 0.01 0.01 0.01 0.20	N/A	12.36 0.39 213.07 0.01 0.01 0.01 0.20	A
General Clean-up VOC Emissions	NA	---	---	---	---	---
Other	NA	---	---	---	---	---

A –*Protocol for Equipment Leak Emission Estimates*, EPA 453/R-95-017, Table 2-1, November 1995. 40 CFR 98 Subpart W.
B- Bryan Research Engineering ProMax Software
C – AP-42 Chapter 13

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

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

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

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

ATTACHMENT L

Emissions Unit Data Sheet

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

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

Identification Number (as assigned on *Equipment List Form*): E019

1. Loading Area Name: S019 – Produced Liquids (Condensate and Produced Water)

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):

☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ Tank Trucks

3. Loading Rack or Transfer Point Data:

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

4. Does ballasting of marine vessels occur at this loading area?

☐ Yes ☐ No ☒ Does not apply

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

6. Are cargo vessels pressure tested for leaks at this or any other location?

☐ Yes ☒ No

If YES, describe:

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

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.

hours/day	Varies	Varies	Varies	Varies
days/week	7	7	7	7
weeks/quarter	13	13	13	13

8. Bulk Liquid Data *(add pages as necessary):*		
Pump ID No.		N/A
Liquid Name		Produced Liquids (Condensate and Produced Water)
Max. daily throughput (1000 gal/day)		See Attached emission calculations for all values
Max. annual throughput (1000 gal/yr)		See Attached emission calculations for all values
Loading Method [1]		SP
Max. Fill Rate (gal/min)		Varies
Average Fill Time (min/loading)		Varies
Max. Bulk Liquid Temperature (°F)		See ProMax Results
True Vapor Pressure [2]		See ProMax Results
Cargo Vessel Condition [3]		Unknown
Control Equipment or Method [4]		VB, ECD (Captured Loading Losses)
Minimum control efficiency (%)		70% Capture/ 98% control efficiency
Maximum Emission Rate	Loading (lb/hr)	See Attached Emissions Calculations for Breakdown
	Annual (lb/yr)	See Attached Emissions Calculations for Breakdown
Estimation Method [5]		Bryan Research Engineering ProMax Software
[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill		
[2] At maximum bulk liquid temperature		
[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)		
[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets*):CA = Carbon Adsorption LOA = Lean Oil AdsorptionCO =		

Condensation SC = Scrubber (Absorption)CRA = Compressor-Refrigeration-Absorption TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system) O = other (descibe)
[5] EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance TM = Test Measurement based upon test data submittal O = other (describe)

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Throughput of loaded liquids at site (gal/yr) on a monthly and rolling twelve month total.	Throughput of loaded liquids at site (gal/yr) on a monthly and rolling twelve month total.
REPORTING None	TESTING None

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

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

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

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS

EQUIPMENT/AIR POLLUTION CONTROL DEVICE.
10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

ATTACHMENT L – FUGITIVE EMISSIONS SUMMARY SHEET

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

Source/Equipment: Fugitive Emissions

Leak Detection Method Used	☐ Audible, visual, and olfactory (AVO) inspections	☐ Infrared (FLIR) cameras	☐ Other (please describe)	☒ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO_2e)
Pumps	☐ Yes ☒ No	9	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	☐ Gas ☒ Liquid ☐ Both	1.73	0.05	0.33
Valves	☐ Yes ☒ No	179	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	☒ Gas ☐ Liquid ☐ Both	1.71	0.05	17.64
Safety Relief Valves	☐ Yes ☒ No	14	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	☒ Gas ☐ Liquid ☐ Both	2.25	0.07	1.98
Open Ended Lines	☐ Yes ☒ No	8	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	☐ Gas ☐ Liquid ☒ Both	0.02	6.4E-04	1.67
Sampling Connections	☐ Yes ☐ No	---	N/A	☐ Gas ☐ Liquid ☐ Both	--	--	--
Connections (Not sampling)	☐ Yes ☒ No	765	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	☐ Gas ☐ Liquid ☒ Both	2.24	0.07	8.40
Compressors	☐ Yes ☐ No	---	N/A	☐ Gas ☐ Liquid ☐ Both	--	--	--
Flanges	☐ Yes ☐ No	---	(included in connections)	☐ Gas ☐ Liquid ☐ Both	--	--	--
Other[1]	☐ Yes ☒ No	25	40 CFR 98 Subpart W	☒ Gas ☐ Liquid ☐ Both	4.41	0.14	183.05

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

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

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

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

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

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

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name OXF-121 Wellpad	2. Tank Name Produced Fluids Tank (water and condensate)
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) S020-S025	4. Emission Point Identification No. (as assigned on *Equipment List Form*) C001
5. Date of Commencement of Construction (for existing tanks) N/A (new tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) N/A	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). Not applicable	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 bbl (each)	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 20	10B. Average Liquid Height (ft) 10
11A. Maximum Vapor Space Height (ft) 10	11B. Average Vapor Space Height (ft) 10
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 400 bbl (each)	

13A. Maximum annual throughput (gal/yr) **See attached emission calculations for all throughput values**	13B. Maximum daily throughput (gal/day) **See attached emission calculations for all throughput values**

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)
See attached emission calculations for all throughput values

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

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

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

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

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

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

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

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

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

22A. Is the tank heated? ☐ YES ☒ NO

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

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

23. Operating Pressure Range (psig):

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

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

24B. For cone roof, provide slope (ft/ft) 0.06

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

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

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

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

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

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

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

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

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

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

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

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

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☒ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets) – **Not Applicable: Tank calculations performed using ProMax software**

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

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets) **Not Applicable: Tank calculations performed using ProMax software**

34. Average daily temperature range of bulk liquid: Ambient			
34A. Minimum (°F)		34B. Maximum (°F)	
35. Average operating pressure range of tank:			
35A. Minimum (psig)		35B. Maximum (psig)	
36A. Minimum Liquid Surface Temperature (°F)		36B. Corresponding Vapor Pressure (psia)	
37A. Average Liquid Surface Temperature (°F)		37B. Corresponding Vapor Pressure (psia)	
38A. Maximum Liquid Surface Temperature (°F)		38B. Corresponding Vapor Pressure (psia)	
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			

39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			
Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☒ Conservation Vent (psig)
  - Vacuum Setting 0.5 oz Pressure Setting 12.5 oz
- ☒ Emergency Relief Valve (psig) 14.oz Pressure Setting
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☒ Vent to Incinerator[1]
- ☐ Other[1] (describe):

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
See attached emission calculations for all values					

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

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

ATTACHMENT M

Air Pollution Control Devices

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): C001

Equipment Information

1. Manufacturer: LEED Fabrication

   Model No. Enclosed Combustor 48”

2. Method:
   - ☐ Elevated flare
   - ☐ Ground flare
   - ☒ Other

   Describe Enclosed Combustion Device

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

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

5. Maximum capacity of flare:
   ~ 130 scf/min
   ~ 7,850 scf/hr

6. Dimensions of stack:
   Diameter 4 ft.
   Height 25 ft.

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

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

9. Number of burners:
   Rating: 11.66 MMBTU/hr

10. Will preheat be used? ☐ Yes ☐ No

11. Describe method of controlling flame:

12. Flare height: 25 ft

13. Flare tip inside diameter: 4 ft

14. Natural gas flow rate to flare pilot flame per pilot light:
    scf/min
    ~50 scf/hr

15. Number of pilot lights: One (1)
    Total 0.05 MMBTU/hr

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

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

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

19. Hours of unit operation per year: 8760

Steam Injection

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

Characteristics of the Waste Gas Stream to be Burned

29.

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

30. Estimate total combustible to flare: 405 LB/hr
(Maximum mass flow rate of waste gas) 130 scfm

31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:
VOC ~ 405

32. Give composition of carrier gases:

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

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

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

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

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

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

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

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

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 %	Process Conditions: Variable	Value	Units
4	Methane		Flow Rate	Up to 140	Mscfd
5	Ethane		Pressure	Up to 12	oz/in2
6	Propane		Temperature		°F
7	I-Butane		Molecular Weight		
8	n-Butane		Process/Waste Stream	☑ Gas	☐ Liquid
9	I-Pentane		Detailed Process Description / Process Notes:		
10	n-Pentane		1. Turndown 10:1. Based on an expected normal operating rate indicated above.		
11	n-Hexane		2. DRE: 98 % operating at design conditions		
12	CO2		3. Burner Pressure Drop: Min. 0.10 oz/in2		
13	N2				
14	Helium				
15	H_2O				
16	C7				
17	C8				
18	C9				
19	C10				
20	C11+				
21	TOTAL				

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

DESIGN DATA

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

EQUIPMENT SPECIFICATION

35	Type:	☐ Elevated ☑ Enclosed	Equipment Design:	
36		☐ Above Ground	Component	Material / Size / Rating / Other
37		☑ Stack ☐ Multiple Stack	Burner	
38		☐ Portable / Trailer	Burner Tip / Assist Gas Burner	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	

Environmental Control Equipment
Data Sheet

Item/Tag No.:		**Page**	2	of	3
Project No.:		**Revision:**	B		
Project:		**Date:**	27 February 2014		
		By:	JS		
P.O. No.:	-	**Checked:**	SG		
RFQ No.:	-	**Approved:**	MS		
Client:		**Ref. P&ID:**	-		
Site:		**Supplier:**	LEED FABRICATION		
Unit/Lease:		**Remarks:**	-	**Model No.:**	L30-0011-00

EQUIPMENT SPECIFICATION

Flame Detection: ☐ Thermocouple ☑ Ionization Rod ☐ UV Scanner

General Configuration:

Auxiliary Equipment	
Valves	NA
Blowers	NA
Dampers	NA
Inlet KO / Liquid Seal	NA
Flame / Detonation Arrestor	Yes
Instrumentation & Controls	
Solenoids / Shut-Off Valves	Check with Sales for available config.
Flow Meters	NA
Calorimeter	NA
Pressure Switches/Transmitters	NA
Thermocouples	Check with Sales for available config.
Temperature Switches/Transmitters	NA
BMS	Check with Sales for available config.
CEMS	NA
Other	NA

FABRICATION AND INSPECTION

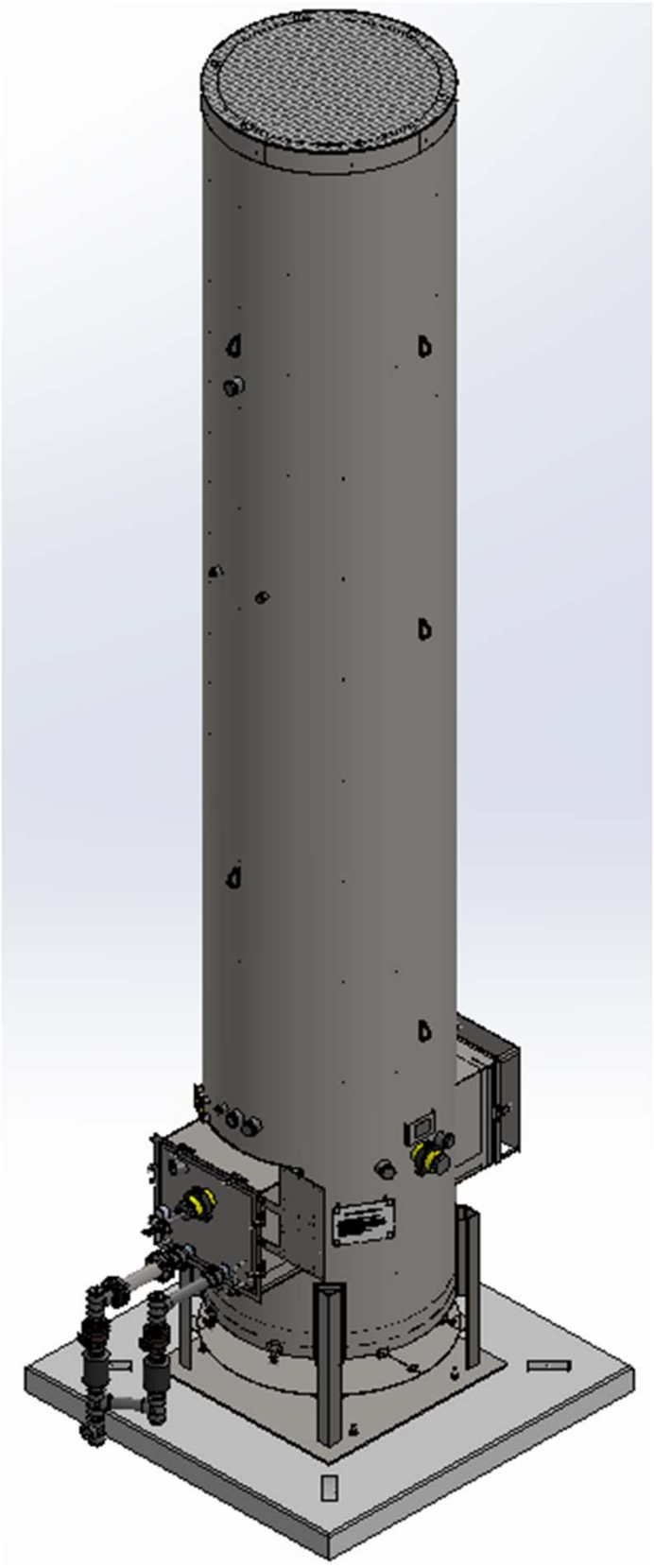
Special requirements	☐ Skid Mounted ☑ Concrete Pad ☐ Other
Inspection	☑ Vendor Standard ☐ Other. Specify:
Material Certification	☑ Vendor Standard ☐ MTR ☐ Certificate of Compliance ☐ Other (Specify):
NDE	☑ Vendor Standard ☐ Radiography. Specify: ☐ Ultrasonic. Specify: ☐ Liquid Penetrant. ☐ Magnetic Particles. ☐ PMI. Specify: ☐ Other. Specify:
Surface Preparation	☑ Vendor Standard ☐ Other. Specify:
Paint System	☑ Vendor Standard ☐ Other. Specify:
Finished Color	☑ Vendor Standard ☐ Other. Specify:

Equipment Info	
Component	**Weight / Dimensions**
Burner	
Burner Assembly	
Stack	
Stack Assembly	48 " OD x 25 ' H
Pilot Tip	
Pilot Line(s)	
Stack Assembly	
Auxiliary Equipment	
Blowers	
Inlet KO / Liquid Seal	
Flame / Detonation Arrestor	
Skid	
Instrumentation & Controls	
BMS	
Control Panel	

Additional Notes:

		Item/Tag No.:		Page	3	of	3
		Project No.:		Revision:	B		
		Project:		Date:	27 February 2014		
				By:	JS		
Environmental Control Equipment Data Sheet		P.O. No.:	-	Checked:	SG		
		RFQ No.:	-	Approved:	MS		
Client:		Ref. P&ID:	-				
Site:				Supplier:	LEED FABRICATION		
Unit/Lease:		Remarks:	-	Model No.:	L30-0011-00		

GENERAL ARRANGEMENT



Enclosed (Passive Swirl) Flare Flow Rates

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

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

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

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

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

ATTACHMENT N

Supporting Emission Calculations

Company Name: **EQT Production, LLC**
Facility Name: **OXF 121 Pad**
Project Description: **R13 Application**

Facility-Wide Emission Summary - Controlled

Wells	5	per pad
Storage Tanks	6	per pad
Sand Separator Tank	0	per pad
Line Heaters	1	per pad
TEGs	2	per pad
Dehy Reboiler	0	per pad
Glycol Dehy	0	per pad
Dehy Drip Tank	0	per pad
Dehy Combustor	0	per pad
Compressor	0	per pad
High Pressure Separator	5	per pad
Low Pressure Separator	0	per pad
Vapor Recovery Unit	0	per pad
Tank Combustor	1	per pad
Length of lease road	2,405	feet

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

CO_2	1
CH_4	25
N_2O	298

Emission Point ID #	Emission Source ID#s	Emission Source Description	NO_X		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		CH_4		CO_2e	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001	S020-S025	Storage Vessels	---	---	---	---	1.55	6.79	---	---	---	---	---	---	0.165	0.724	4.13	18.10
C001	S019	Captured Liquid Loading	---	---	---	---	0.22	0.06	---	---	---	---	---	---	---	---	---	---
C001	C001	Tank Combustor	1.15	5.03	0.96	4.22	2.8E-04	1.2E-03	0.01	0.03	0.09	0.38	0.09	0.38	1.2E-04	5.1E-04	1,371.10	6,005.43
C001	**S020-S025**	**---**	**1.15**	**5.03**	**0.96**	**4.22**	**1.77**	**6.85**	**0.01**	**0.03**	**0.09**	**0.38**	**0.09**	**0.38**	**0.17**	**0.72**	**1,375.24**	**6,023.53**
E016	S016	Line Heater	0.11	0.48	0.09	0.40	0.01	0.03	6.6E-04	2.9E-03	0.01	0.04	0.01	0.04	2.5E-03	0.01	135.14	591.90
E017	S017	TEG	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	2.9E-05	1.3E-04	1.52	6.64
E018	S018	TEG	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	2.9E-05	1.3E-04	1.52	6.64
E019	S019	Uncaptured Liquid Loading	---	---	---	---	4.79	1.25	---	---	---	---	---	---	---	---	---	---
---	---	Fugitives	---	---	---	---	---	12.36	---	---	---	---	---	---	---	8.52	---	213.07
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	0.30	---	0.03	---	---	---	---
Facility Total			1.26	5.52	1.06	4.64	6.57	20.48	0.01	0.03	0.10	0.72	0.10	0.45	0.17	9.26	1,513.41	6,841.79
Facility Total (excluding fugitive emissions)			1.26	5.52	1.06	4.64	6.57	8.12	0.01	0.03	0.10	0.42	0.10	0.42	0.17	0.74	1,513.41	6,628.72

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

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Facility-Wide Emission Summary - Controlled

Emission Point ID #	Emission Source ID#s	Emission Source Description	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		n-Hexane		BTEX		Total HAP	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001	S020-S025	Storage Vessels	---	---	1.6E-03	7.1E-03	3.5E-03	1.6E-02	9.7E-05	4.3E-04	1.5E-03	6.6E-03	0.06	0.27	0.01	0.03	0.09	0.38
C001	S019	Captured Liquid Loading	---	---	1.3E-04	3.5E-05	2.8E-04	7.2E-05	8.5E-06	2.2E-06	1.7E-04	4.4E-05	0.01	2.2E-03	5.9E-04	1.5E-04	0.01	2.9E-03
C001	C001	Tank Combustor	---	---	---	---	---	---	---	---	---	---			---	---	---	---
C001	**S020-S025**		---	---	**1.8E-03**	**7.2E-03**	**3.8E-03**	**1.6E-02**	**1.1E-04**	**4.3E-04**	**1.7E-03**	**6.6E-03**	**0.07**	**0.28**	**0.01**	**0.03**	**0.10**	**0.38**
E016	S016	Line Heater	8.2E-05	3.6E-04	2.3E-06	1.0E-05	3.7E-06	1.6E-05	---	---	---	---	2.0E-03	0.01	6.0E-06	2.6E-05	2.1E-03	0.01
E017	S017	TEG	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	6.8E-08	3.0E-07	2.3E-05	1.0E-04
E018	S018	TEG	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	6.8E-08	3.0E-07	2.3E-05	1.0E-04
E019	S019	Uncaptured Liquid Loading	---	---	2.9E-03	7.4E-04	0.01	1.5E-03	1.8E-04	4.8E-05	3.6E-03	9.5E-04	0.18	0.05	0.01	3.3E-03	0.24	0.06
---	---	Fugitives	---	---	---	0.01	---	0.01	---	<0.01	---	0.01	---	0.20	<0.01	0.02	---	0.39
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	---	---	---	<0.01	<0.01	---	---
Facility Total			8.4E-05	3.7E-04	4.6E-03	0.01	0.01	0.03	2.9E-04	4.7E-04	0.01	0.01	0.25	0.53	0.02	0.06	0.34	0.84
Facility Total (excluding fugitive emissions)			8.4E-05	3.7E-04	4.6E-03	0.01	9.7E-03	1.7E-02	2.9E-04	4.7E-04	5.3E-03	7.6E-03	0.25	0.33	0.02	0.03	0.34	0.45

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

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Produced Fluids Storage Vessels

Potential Throughput

Operational Hours	8,760	hrs/yr
Maximum Condensate Throughput[1]	40	bbl/day
Maximum Produced Water Throughput[1]	98	bbl/day

[1] Based on the highest monthly throughput recorded at the site (August 2013). Includes a 80 percent compliance margin

Overall Control Efficiency of Combustor 98%

Storage Tanks - Uncontrolled

	Breathing		Working		Flashing		Total Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Methane	<0.001	<0.001	<0.001	<0.001	8.265	36.201	8.265	36.201
Ethane	<0.001	<0.001	<0.001	<0.001	12.558	55.006	12.558	55.006
Propane	0.336	1.472	0.594	2.603	23.082	101.100	24.013	105.175
Isobutane	0.090	0.393	0.159	0.694	6.788	29.730	7.036	30.817
n-Butane	0.219	0.959	0.387	1.696	16.703	73.160	17.309	75.815
Isopentane	0.090	0.395	0.159	0.698	7.253	31.770	7.503	32.863
n-Pentane	0.088	0.386	0.156	0.683	7.454	32.650	7.699	33.720
n-Hexane	0.036	0.159	0.064	0.281	3.039	13.310	3.139	13.749
Cyclohexane	0.003	0.013	0.005	0.022	0.324	1.420	0.332	1.455
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	0.037	0.161	0.065	0.284	3.368	14.750	3.469	15.195
n-Octane	0.008	0.034	0.014	0.060	0.742	3.249	0.763	3.342
n-Nonane	0.002	0.007	0.003	0.013	0.167	0.734	0.172	0.754
n-Decane	0.002	0.007	0.003	0.012	0.163	0.713	0.167	0.732
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	0.053	0.234	0.094	0.414	4.575	20.040	4.723	20.688
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	0.001	0.003	0.001	0.004	0.080	0.349	0.081	0.356
Toluene	0.001	0.005	0.002	0.009	0.174	0.762	0.177	0.776
Ethylbenzene	3.7E-05	1.6E-04	6.6E-05	2.9E-04	0.005	0.021	0.005	0.021
m-Xylene	0.001	0.003	0.001	0.006	0.073	0.320	0.075	0.329
Isooctane	0.009	0.041	0.016	0.072	0.835	3.657	0.861	3.770
Total VOC Emissions:	0.97	4.27	1.72	7.55	74.83	327.73	77.52	339.56
Total HAP Emissions:	4.8E-02	0.21	0.08	0.37	4.21	18.42	4.34	19.00

[1] Uncontrolled emissions calculation using Promax (sum of produced water and condensate). Non-methane emissions are taken from the tank emissions stencil. Methane emissions are taken from the flash stream composition.
[2] Emission calculations based on OXF -121 condensate sample

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Produced Fluids Storage Vessels

Storage Tanks - Controlled

	Breathing		Working		Flashing		Total Emissions	
	lb/hr	tpy			lb/hr	tpy	lb/hr	tpy
Methane	<0.001	<0.001	<0.001	<0.001	0.165	0.724	0.165	0.724
Ethane	<0.001	<0.001	<0.001	<0.001	0.251	1.100	0.251	1.100
Propane	0.007	0.029	0.012	0.052	0.462	2.022	0.480	2.104
Isobutane	0.002	0.008	0.003	0.014	0.136	0.595	0.141	0.616
n-Butane	0.004	0.019	0.008	0.034	0.334	1.463	0.346	1.516
Isopentane	0.002	0.008	0.003	0.014	0.145	0.635	0.150	0.657
n-Pentane	0.002	0.008	0.003	0.014	0.149	0.653	0.154	0.674
n-Hexane	0.001	0.003	0.001	0.006	0.061	0.266	0.063	0.275
Cyclohexane	5.7E-05	2.5E-04	1.0E-04	4.4E-04	0.006	0.028	0.007	0.029
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	0.001	0.003	0.001	0.006	0.067	0.295	0.069	0.304
n-Octane	1.5E-04	0.001	2.7E-04	0.001	0.015	0.065	0.015	0.067
n-Nonane	3.3E-05	1.5E-04	5.9E-05	2.6E-04	0.003	0.015	0.003	0.015
n-Decane	3.0E-05	1.3E-04	5.3E-05	2.3E-04	0.003	0.014	0.003	0.015
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	0.001	0.005	0.002	0.008	0.092	0.401	0.094	0.414
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	1.2E-05	5.1E-05	2.1E-05	9.0E-05	0.002	0.007	0.002	0.007
Toluene	2.4E-05	1.1E-04	4.3E-05	1.9E-04	0.003	0.015	0.004	0.016
Ethylbenzene	7.4E-07	3.3E-06	1.3E-06	5.8E-06	9.5E-05	4.2E-04	9.7E-05	4.3E-04
m-Xylene	1.5E-05	6.5E-05	2.6E-05	1.1E-04	0.001	0.006	0.002	0.007
Isooctane	1.9E-04	0.001	3.3E-04	0.001	0.017	0.073	0.017	0.075
Total VOC Emissions:	1.9E-02	0.09	0.03	0.15	1.50	6.55	1.55	6.79
Total HAP Emissions:	9.6E-04	4.2E-03	1.7E-03	7.4E-03	8.4E-02	0.37	0.09	0.38

Company Name:	**EQT Production, LLC**
Facility Name:	**OXF 121 Pad**
Project Description:	**R13 Application**

Tank Combustor

Source Designation:	**C001**
Pilot Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Pilot Rating (MMBtu/hr)	0.05
Combustor Rating (MMBtu/hr) [1]	11.66
Combustor Rating (Mscfd) [1]	188.38
Combustor Rating (scf/hr)	7849.17
Pilot Fuel Consumption (scf/hr):	50.00
Potential Annual Hours of Operation (hr/yr):	8,760

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

Enclosed Combustor Emissions

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

[2] Emission factors from AP-42 Ch. 1.4 for natural gas combustion were used as they were determined to be most representative of the process. Ch. 5.3 (Natural Gas Processing) was consulted, however, factors contained there are appropriate for amine gas sweetening processes, which is not the case at the wellpad. Also, Ch. 13.5 (Industrial Flares) was consulted, but since the control device in this case is an enclosed combustor vs. an elevated flare, these factors were also determined to be inappropriate.

Combustor Maximum Loading:

$$\frac{7849.17\ \text{scf}}{\text{hr}} \left| \frac{\text{lb-mol}}{379.5\ \text{scf}} \right| \frac{20.44\ \text{lb}}{\text{lb-mol}} = 422.66\ \text{lb/hr}$$

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Line Heaters

Source Designation:	**S016**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr)	1.15
Fuel Consumption (MMscf/hr):	1.10E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

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

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Line Heaters

Hazardous Air Pollutant (HAP) Potential Emissions:

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

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

Company Name:	**EQT Production, LLC**
Facility Name:	**OXF 121 Pad**
Project Description:	**R13 Application**

Thermoelectric Generators

Source Designation:	**S017-S018**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr) [1]	0.013
Fuel Consumption (MMscf/hr):	1.23E-05
Potential Annual Hours of Operation (hr/yr):	8,760

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

Criteria and Manufacturer Specific Pollutant Emission Rates:

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

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Thermoelectric Generators

Hazardous Air Pollutant (HAP) Potential Emissions:

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

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

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

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

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

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Liquid Loading

Throughput 2,115,540 gal/yr
Capture Efficiency 70% non-tested tanker trucks
Control Efficiency 98% Combustor destruction efficiency

Liquid Loading Emissions

	Uncontrolled Emissions		Uncaptured Emissions		Controlled Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Propane	5.508	1.432	1.652	0.430	0.077	0.020
Isobutane	1.469	0.382	0.441	0.115	0.021	0.005
n-Butane	3.588	0.933	1.076	0.280	0.050	0.013
Isopentane	1.477	0.384	0.443	0.115	0.021	0.005
n-Pentane	1.445	0.376	0.434	0.113	0.020	0.005
n-Hexane	0.593	0.154	0.178	0.046	0.008	0.002
Cyclohexane	0.047	0.012	0.014	0.004	0.001	1.7E-04
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	0.601	0.156	0.180	0.047	0.008	0.002
n-Octane	0.126	0.033	0.038	0.010	0.002	4.6E-04
n-Nonane	0.027	0.007	0.008	0.002	3.8E-04	9.9E-05
n-Decane	0.025	0.006	0.007	0.002	3.4E-04	9.0E-05
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	0.875	0.228	0.263	0.068	0.012	0.003
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	0.010	0.002	0.003	0.001	1.3E-04	3.5E-05
Toluene	0.020	0.005	0.006	0.002	2.8E-04	7.2E-05
Ethylbenzene	0.001	1.6E-04	1.8E-04	4.8E-05	8.5E-06	2.2E-06
m-Xylene	0.012	0.003	0.004	0.001	1.7E-04	4.4E-05
Isooctane	0.152	0.040	0.046	0.012	0.002	0.001
Total VOC Emissions:	15.975	4.153	4.792	1.246	0.224	0.058
Total HAP Emissions:	0.787	0.205	0.236	0.061	0.011	0.003

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

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Fugitive Emissions

Fugitive Emissions from Component Leaks

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

[1] Table W-1B to Subpart W of Part 98 —Default Average Component Counts for Major Onshore Natural Gas Production

Fugitive VOC/Total Emissions from Component Leaks

Equipment Type	Service	Emission Factors[1] (kg/hr/source)	Facility Equipment Count[2] (units)	TOC Annual Fugitive Emissions (tpy)	Weight Fraction VOC	Weight Fraction HAP	VOC Emissions[3] (tpy)	HAP Emissions[3] (tpy)
Pumps	Light Liquid	0.01990	9	1.73	1.00	0.03	1.73	0.05
Compressor	Gas	0.22800	0	---	0.17	0.01	---	---
Valves	Gas	0.00597	179	10.29	0.17	0.01	1.71	0.05
Pressure Relief Valves	Gas	0.10400	14	13.56	0.17	0.01	2.25	0.07
Open-Ended Lines	All	0.00170	8	0.12	0.17	0.01	0.02	6.4E-04
Connectors	All	0.00183	765	13.52	0.17	0.01	2.24	0.07
Intermittent Pneumatic Devices[4]	Gas	13.5	25	---	---	---	4.41	0.14
			Emission Totals:	**39.22**	**---**	**---**	**12.36**	**0.39**

[1] U.S. EPA. Office of Air Quality Planning and Standards. *Protocol for Equipment Leak Emission Estimates.* Table 2-1. (Research Triangle Park, NC: U.S. EPA EPA-453/R-95-017, 1995). SOCMI factors were used as it was representative of natural gas liquids extraction. The pneumatic controller value is from 40 CFR 98 Subpart W, Table W-1A. Pneumatic assumes operation 1/3 of the year.

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

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

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

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Fugitive Emissions

Fugitive Specific HAP Emissions from Component Leaks

Equipment Type	Service	Emission Factors[1] (kg/hr/source)	Facility Equipment Count[2] (units)	TOC Annual Fugitive Emissions (tpy)	Benzene Emissions[3] (tpy)	Toluene Emissions[3] (tpy)	Ethylbenzene Emissions[3] (tpy)	Xylene Emissions[3] (tpy)	n-Hexane Emissions[4] (tpy)
Pumps	Light Liquid	0.01990	9	1.73	1.3E-04	3.1E-04	<0.01	1.8E-04	0.01
Compressor	Gas	0.22800	0	---	---	---	<0.01	---	---
Valves	Gas	0.00597	179	10.29	7.9E-04	1.9E-03	<0.01	1.1E-03	0.03
Pressure Relief Valves	Gas	0.10400	14	13.56	1.0E-03	2.4E-03	<0.01	1.4E-03	0.04
Open-Ended Lines	All	0.00170	8	0.12	9.4E-06	2.2E-05	<0.01	1.3E-05	3.8E-04
Connectors	All	0.00183	765	13.52	1.0E-03	2.4E-03	<0.01	1.4E-03	0.04
Intermittent Pneumatic Devices[4]	Gas	13.5	25	---	2.0E-03	4.8E-03	<0.01	2.8E-03	0.08
			Emission Totals:	**39.22**	**0.01**	**0.01**	**<0.01**	**0.01**	**0.20**

[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. The pneumatic controller value is from 40 CFR 98 Subpart W, Table W-1A. Pneumatic assumes operation 1/3 of the year.

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

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

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

GHG Fugitive Emissions from Component Leaks

Component	Component Count	GHG Emission Factor[1] scf/hr/component	CH_4 Emissions[2,3] (tpy)	CO_2 Emissions[2,3] (tpy)	CO_2e Emissions[4] (tpy)
Pumps	9	0.01	0.01	8.9E-05	0.33
Compressor	0	4.17	---	---	---
Valves	179	0.027	0.71	4.8E-03	17.64
Pressure Relief Devices	14	0.04	0.08	5.3E-04	1.98
Open-Ended Lines	8	0.061	0.07	4.5E-04	1.67
Connectors	765	0.003	0.34	2.3E-03	8.40
Intermittent Pneumatic Devices	25	6	7.32	0.05	183.05
Total			**8.52**	**0.06**	**213.07**

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

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

[3] Potential emissions VOC/HAP (tpy) = Gas volume vented (scf/yr) * Molar weight of natural gas (lb/lb-mol) * Weight % VOC/HAP ÷ 100 ÷ 379 (scf/lb-mol) ÷ 2,000 (lb/ton)
Mole fractions of CH_4 and CO_2 based on gas analysis:
CH_4: 79% CO_2: 0.20%

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

Company Name: EQT Production, LLC
Facility Name: OXF 121 Pad
Project Description: R13 Application

Haul Roads

Estimated Potential Road Fugitive Emissions

Unpaved Road Emissions

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

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

Description	Weight of Empty Truck (tons)	Weight of Truck w/ Max Load (tons)	Mean Vehicle Weight (tons)	Length of Unpaved Road Traveled (mile)	Trips Per Year	Mileage Per Year	Control (%)	Emissions (tpy) PM	PM_{10}	$PM_{2.5}$
Liquids Hauling	20	40	30	0.46	529	482	0	1.03	0.26	0.03
Employee Vehicles	3	3	3	0.46	200	182	0	0.14	0.04	0.00
Total Potential Emissions								**1.17**	**0.30**	**0.03**

Company Name: **EQT Production, LLC**
Facility Name: **OXF 121 Pad**
Project Description: **R13 Application**

Gas Analysis

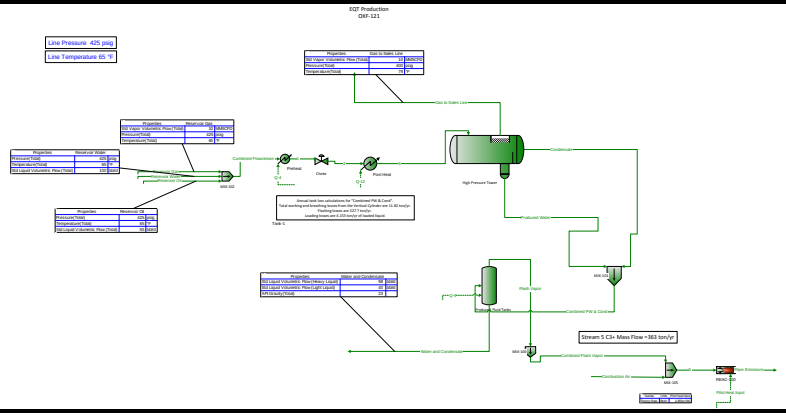
Sample Location: OXF 121 Gas Analysis
Sample Date: 5/29/2013
HHV (Btu/scf): 1,240 Note: A conservatively low BTU content of 1,050 was used for calculations.

Constituent	Natural Gas Stream Speciation (Mole %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.195	44.01	0.09	0.00	0.420
Nitrogen	0.532	28.01	0.15	0.01	0.729
Methane	78.965	16.04	12.67	0.62	61.981
Ethane	13.780	30.07	4.14	0.20	20.277
Propane	4.195	44.10	1.85	0.09	9.053
Isobutane	0.507	58.12	0.29	0.01	1.442
n-Butane	1.013	58.12	0.59	0.03	2.881
Isopentane	0.249	72.15	0.18	0.01	0.879
n-Pentane	0.240	72.15	0.17	0.01	0.847
Cyclopentane	<0.001	70.1	0.0	0.0	0.000
n-Hexane	0.073	86.18	0.06	0.00	0.308
Cyclohexane	0.011	84.16	0.01	0.00	0.045
Other Hexanes	0.113	86.18	0.10	0.00	0.477
Heptanes	0.079	100.21	0.08	0.00	0.387
Methylcyclohexane	<0.001	98.19	0.00	0.00	0.000
2,2,4-Trimethylpentane	0.031	114.23	0.04	0.00	0.173
Benzene*	0.002	78.11	0.00	0.00	0.008
Toluene*	0.004	92.14	0.00	0.00	0.018
Ethylbenzene*	<0.001	106.17	0.00	0.00	0.000
Xylenes*	0.002	106.16	0.00	0.00	0.010
C8 + Heavies	0.010	130.80	0.01	0.00	0.064
Totals	100.00		20.44	1.00	100

TOC (Total)	99.27	98.85
VOC (Total)	6.53	16.59
HAP (Total)	0.11	0.52

OXF-121
Plant Schematic

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	

Connections

	Combined Flash Vapor	Combined Flowstream	Combined PW & Cond	Gas to Sales Line	Reservoir Gas
From Block	MIX-100	MIX-102	MIX-101	High Pressure Tower	--
To Block	MIX-105	Preheat	Produced Fluid Tanks	--	MIX-102

Stream Composition

Mass Flow	Combined Flash Vapor lb/h	Combined Flowstream lb/h	Combined PW & Cond lb/h	Gas to Sales Line lb/h	Reservoir Gas lb/h
Nitrogen	0.0503402	163.634	0.0504575	163.583	163.634 *
Methane	12.1835	13921.8	12.2718	13909.6	13909.2 *
CO2	0.260237	94.4766	0.267879	94.2087	94.2272 *
Ethane	18.4773	4569.37	19.2096	4550.16	4549.5 *
Propane	23.5824	2057.83	26.9038	2030.93	2031.06 *
Isobutane	7.14688	332.811	9.62373	323.188	323.553 *
n-Butane	17.9139	672.945	26.8261	646.119	646.468 *
Isopentane	8.25025	215.991	18.6482	197.343	197.253 *
n-Pentane	8.6423	212.909	22.5942	190.315	189.331 *
n-Hexane	3.82349	93.2657	25.0099	68.2558	69.0719 *
Methylcyclopentane	0	0	0	0	0 *
Benzene	0.0995755	2.40714	0.651463	1.75568	1.71531 *
Cyclohexane	0.408377	10.1646	3.05469	7.10993	10.1646 *
n-Heptane	4.46426	163.206	80.8312	82.3752	86.9158 *
n-Octane	1.02394	76.2265	55.8151	20.4115	3.76263 *
n-Nonane	0.240104	45.4661	40.319	5.1471	5.63287 *
n-Decane	0.240545	127.582	121.617	5.96441	4.68668 *
n-Undecane	0	0	0	0	0 *
Dodecane	0	0	0	0	0 *
Water	2.11307	1459.01	1432.93	26.0764	0 *
Triethylene Glycol	0	0	0	0	0 *
Oxygen	0	0	0	0	0 *
Argon	0	0	0	0	0 *
Carbon Monoxide	0	0	0	0	0 *
Cyclopentane	0	0	0	0	0 *
Isohexane	5.6128	130.844	27.5065	103.337	106.919 *
3-Methylpentane	0	0	0	0	0 *
Neohexane	0	0	0	0	0 *
2,3-Dimethylbutane	0	0	0	0	0 *
Methylcyclohexane	0	0	0	0	0 *
Isooctane	1.09689	39.0665	18.6966	20.3699	38.8805 *
Decane, 2-Methyl-	0	0	0	0	0 *
Toluene	0.229521	8.34898	4.29615	4.05283	4.04665 *
m-Xylene	0.100515	8.40178	6.45257	1.94921	2.33135 *
Ethylbenzene	0.0065356	0.511631	0.385681	0.12595	0 *

Volumetric Flow	Combined Flash Vapor ft^3/h	Combined Flowstream ft^3/h	Combined PW & Cond gpm	Gas to Sales Line ft^3/h	Reservoir Gas ft^3/h
Nitrogen	0.720426	78.2438	0.000195114	84.7382	78.3241
Methane	302.964	10575.1	0.0833275	11604.5	10578.6
CO2	2.34988	23.8905	0.000428801	26.6101	23.9166
Ethane	242.776	1487.63	0.0858216	1692.66	1487.75
Propane	209.575	366.742	0.1035	435.726	367.258
Isobutane	47.8612	36.3425	0.0342472	45.291	36.441
n-Butane	119.763	66.7099	0.0925141	85.1096	66.938
Isopentane	44.1375	12.593	0.0600365	17.2129	12.4154
n-Pentane	46.1667	11.3992	0.0721615	15.8561	11.1004
n-Hexane	16.9469	2.48552	0.075494	3.38477	1.91374
Methylcyclopentane	0	0	0	0	0

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	

Volumetric Flow	Combined Flash Vapor ft^3/h	Combined Flowstream ft^3/h	Combined PW & Cond gpm	Gas to Sales Line ft^3/h	Reservoir Gas ft^3/h
Benzene	0.490262	0.0848824	0.00144108	0.122642	0.078427
Cyclohexane	1.85991	0.288926	0.00772492	0.401256	0.344784
n-Heptane	16.8772	2.8584	0.234912	2.1105	0.739678
n-Octane	3.36669	1.341	0.15624	0.188272	0.00664644
n-Nonane	0.696274	0.86626	0.109675	-0.0303132	0.0244008
n-Decane	0.623464	2.53567	0.324565	-0.103238	0.0489429
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	46.6917	33.2229	2.87143	18.7088	0
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	0	0	0	0	0
Isohexane	24.9276	4.03026	0.0839521	5.66109	3.54749
3-Methylpentane	0	0	0	0	0
Neohexane	0	0	0	0	0
2,3-Dimethylbutane	0	0	0	0	0
Methylcyclohexane	0	0	0	0	0
Isooctane	3.6322	0.646374	0.0530749	0.453872	0.292204
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.949529	0.15194	0.00956599	0.159275	0.0757382
m-Xylene	0.357723	0.130775	0.0143715	0.0390928	0.0176282
Ethylbenzene	0.0232794	0.00796894	0.000856286	0.00270534	0

Mole Fraction	Combined Flash Vapor	Combined Flowstream	Combined PW & Cond	Gas to Sales Line	Reservoir Gas
Nitrogen	0.000622907	0.00492733	2.09067E-05	0.00531185	0.00532 *
Methane	0.263254	0.732033	0.008879	0.788706	0.78965 *
CO2	0.00204973	0.00181085	7.0651E-05	0.00194723	0.00195 *
Ethane	0.213006	0.128186	0.00741522	0.137651	0.1378 *
Propane	0.185381	0.0393658	0.0070818	0.0418959	0.04195 *
Isobutane	0.0426234	0.00483016	0.00192189	0.00505808	0.00507 *
n-Butane	0.106837	0.00976658	0.00535724	0.0101121	0.01013 *
Isopentane	0.039638	0.00252529	0.00300009	0.00248809	0.00249 *
n-Pentane	0.0415216	0.00248926	0.00363491	0.00239947	0.00239 *
n-Hexane	0.0153798	0.000912944	0.00336864	0.000720492	0.00073 *
Methylcyclopentane	0	0	0	0	0 *
Benzene	0.000441885	2.5995E-05	9.68053E-05	2.04456E-05	2E-05 *
Cyclohexane	0.00168202	0.000101881	0.000421299	7.68484E-05	0.00011 *
n-Heptane	0.0154435	0.00137393	0.0093633	0.000747813	0.00079 *
n-Octane	0.00310723	0.000562907	0.00567157	0.000162544	3E-05 *
n-Nonane	0.000648932	0.000299032	0.0036489	3.65057E-05	4E-05 *
n-Decane	0.000586031	0.000756388	0.00992139	3.81321E-05	3E-05 *
n-Undecane	0	0	0	0	0 *
Dodecane	0	0	0	0	0 *
Water	0.0406581	0.068316	0.923233	0.00131668	0 *
Triethylene Glycol	0	0	0	0	0 *
Oxygen	0	0	0	0	0 *
Argon	0	0	0	0	0 *
Carbon Monoxide	0	0	0	0	0 *
Cyclopentane	0	0	0	0	0 *
Isohexane	0.0225772	0.00128078	0.00370492	0.0010908	0.00113 *
3-Methylpentane	0	0	0	0	0 *
Neohexane	0	0	0	0	0 *
2,3-Dimethylbutane	0	0	0	0	0 *
Methylcyclohexane	0	0	0	0	0 *
Isooctane	0.00332862	0.000288492	0.00189982	0.000162213	0.00031 *
Decane, 2-Methyl-	0	0	0	0	0 *

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	

Mole Fraction	Combined Flash Vapor	Combined Flowstream	Combined PW & Cond	Gas to Sales Line	Reservoir Gas
Toluene	0.000863488	7.6436E-05	0.000541209	4.0012E-05	4E-05 *
m-Xylene	0.000328189	6.67567E-05	0.000705468	1.67013E-05	2E-05 *
Ethylbenzene	2.13392E-05	4.06519E-06	4.2167E-05	1.07917E-06	0 *

Stream Properties

Property	Units	Combined Flash Vapor	Combined Flowstream	Combined PW & Cond	Gas to Sales Line	Reservoir Gas
Temperature	°F	85	65.1402	79.172	79.172	65 *
Pressure	psig	0	425	400	400	425 *
Mole Fraction Vapor		1	0.923976	0	1	0.999145
Mole Fraction Light Liquid		0	0.00838238	0.0762105	0	0.000855191
Mole Fraction Heavy Liquid		0	0.0676411	0.92379	0	0
Molecular Weight	lb/lbmol	40.1982	20.5877	22.68	20.4237	20.436
Mass Density	lb/ft^3	0.102285	1.92065	54.4317	1.59931	1.771
Molar Flow	lbmol/h	2.88487	1185.48	86.1537	1099.33	1097.98
Mass Flow	lb/h	115.967	24406.3	1953.97	22452.3	22438.3
Vapor Volumetric Flow	ft^3/h	1133.76	12707.3	35.8975	14038.8	12669.9
Liquid Volumetric Flow	gpm	141.351	1584.29	4.47554	1750.29	1579.62
Std Vapor Volumetric Flow	MMSCFD	0.0262743	10.7969	0.784655	10.0123	10 *
Std Liquid Volumetric Flow	sgpm	0.474227	136.989	4.50084	132.489	132.469
Specific Gravity		1.38794		0.872737	0.705174	
API Gravity				29.5835		
Net Ideal Gas Heating Value	Btu/ft^3	2068.96	1057.01	308.821	1115.64	1117.56
Net Liquid Heating Value	Btu/lb	19374.5	19364.2	4349	20671	20695.2

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	

Connections

	Reservoir Oil	Reservoir Water	Water and Condensate		
From Block	--	--	Produced Fluid Tanks		
To Block	MIX-102	MIX-102	--		

Stream Composition

Mass Flow	Reservoir Oil lb/h	Reservoir Water lb/h	Water and Condensate lb/h		
Nitrogen	0 *	0 *	0.000117358		
Methane	12.6739 *	0 *	0.0883403		
CO2	0.24935 *	0 *	0.0076422		
Ethane	19.8662 *	0 *	0.732294		
Propane	26.77 *	0 *	3.32137		
Isobutane	9.25853 *	0 *	2.47685		
n-Butane	26.4773 *	0 *	8.9122		
Isopentane	18.7382 *	0 *	10.398		
n-Pentane	23.5778 *	0 *	13.9519		
n-Hexane	24.1938 *	0 *	21.1864		
Methylcyclopentane	0 *	0 *	0		
Benzene	0.69183 *	0 *	0.551888		
Cyclohexane	0 *	0 *	2.64631		
n-Heptane	76.2907 *	0 *	76.367		
n-Octane	72.4639 *	0 *	54.7911		
n-Nonane	39.8332 *	0 *	40.0789		
n-Decane	122.895 *	0 *	121.377		
n-Undecane	0 *	0 *	0		
Dodecane	0 *	0 *	0		
Water	0 *	1459.01 *	1430.82		
Triethylene Glycol	0 *	0 *	0		
Oxygen	0 *	0 *	0		
Argon	0 *	0 *	0		
Carbon Monoxide	0 *	0 *	0		
Cyclopentane	0 *	0 *	0		
Isohexane	23.9245 *	0 *	21.8937		
3-Methylpentane	0 *	0 *	0		
Neohexane	0 *	0 *	0		
2,3-Dimethylbutane	0 *	0 *	0		
Methylcyclohexane	0 *	0 *	0		
Isooctane	0.185977 *	0 *	17.5997		
Decane, 2-Methyl-	0 *	0 *	0		
Toluene	4.30233 *	0 *	4.06663		
m-Xylene	6.07043 *	0 *	6.35205		
Ethylbenzene	0.511631 *	0 *	0.379145		

Volumetric Flow	Reservoir Oil gpm	Reservoir Water gpm	Water and Condensate gpm		
Nitrogen	0	0	3.73675E-07		
Methane	0.0848204	0	0.00051348		
CO2	0.000391807	0	1.03412E-05		
Ethane	0.0871941	0	0.00300209		
Propane	0.1013	0	0.0122587		
Isobutane	0.0324539	0	0.00867974		
n-Butane	0.0900095	0	0.0302911		
Isopentane	0.0595405	0	0.0335393		
n-Pentane	0.074348	0	0.0446317		
n-Hexane	0.0721912	0	0.0647014		
Methylcyclopentane	0	0	0		
Benzene	0.00152021	0	0.0012345		

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	

Volumetric Flow	Reservoir Oil gpm	Reservoir Water gpm	Water and Condensate gpm		
Cyclohexane	0	0	0.00683422		
n-Heptane	0.219364	0	0.226152		
n-Octane	0.200827	0	0.157018		
n-Nonane	0.107333	0	0.11199		
n-Decane	0.325007	0	0.333583		
n-Undecane	0	0	0		
Dodecane	0	0	0		
Water	0	2.91744	2.8711		
Triethylene Glycol	0	0	0		
Oxygen	0	0	0		
Argon	0	0	0		
Carbon Monoxide	0	0	0		
Cyclopentane	0	0	0		
Isohexane	0.0721533	0	0.0676121		
3-Methylpentane	0	0	0		
Neohexane	0	0	0		
2,3-Dimethylbutane	0	0	0		
Methylcyclohexane	0	0	0		
Isooctane	0.000522242	0	0.0512414		
Decane, 2-Methyl-	0	0	0		
Toluene	0.00951281	0	0.00927189		
m-Xylene	0.0134273	0	0.014579		
Ethylbenzene	0.00112815	0	0.000868941		

Mole Fraction	Reservoir Oil	Reservoir Water	Water and Condensate		
Nitrogen	0 *	0 *	5.03112E-08		
Methane	0.12131 *	0 *	6.61311E-05		
CO2	0.00087 *	0 *	2.0854E-06		
Ethane	0.10145 *	0 *	0.000292472		
Propane	0.09322 *	0 *	0.000904564		
Isobutane	0.02446 *	0 *	0.00051177		
n-Butane	0.06995 *	0 *	0.00184145		
Isopentane	0.03988 *	0 *	0.00173076		
n-Pentane	0.05018 *	0 *	0.00232232		
n-Hexane	0.04311 *	0 *	0.00295251		
Methylcyclopentane	0 *	0 *	0		
Benzene	0.00136 *	0 *	8.48499E-05		
Cyclohexane	0 *	0 *	0.000377621		
n-Heptane	0.11691 *	0 *	0.00915265		
n-Octane	0.09741 *	0 *	0.00576041		
n-Nonane	0.04769 *	0 *	0.00375283		
n-Decane	0.13263 *	0 *	0.0102448		
n-Undecane	0 *	0 *	0		
Dodecane	0 *	0 *	0		
Water	0 *	1 *	0.95381		
Triethylene Glycol	0 *	0 *	0		
Oxygen	0 *	0 *	0		
Argon	0 *	0 *	0		
Carbon Monoxide	0 *	0 *	0		
Cyclopentane	0 *	0 *	0		
Isohexane	0.04263 *	0 *	0.00305109		
3-Methylpentane	0 *	0 *	0		
Neohexane	0 *	0 *	0		
2,3-Dimethylbutane	0 *	0 *	0		
Methylcyclohexane	0 *	0 *	0		
Isooctane	0.00025 *	0 *	0.00185032		
Decane, 2-Methyl-	0 *	0 *	0		
Toluene	0.00717 *	0 *	0.000530044		

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	

Mole Fraction	Reservoir Oil	Reservoir Water	Water and Condensate		
m-Xylene	0.00878 *	0 *	0.000718539		
Ethylbenzene	0.00074 *	0 *	4.28886E-05		

Stream Properties

Property	Units	Reservoir Oil	Reservoir Water	Water and Condensate		
Temperature	°F	65 *	65 *	85 *		
Pressure	psig	425 *	425 *	0		
Mole Fraction Vapor		0	0	0		
Mole Fraction Light Liquid		1	1	0.0461951		
Mole Fraction Heavy Liquid		0	0	0.953805		
Molecular Weight	lb/lbmol	78.1542	18.0153	22.0731		
Mass Density	lb/ft^3	40.8595	62.35	56.5934		
Molar Flow	lbmol/h	6.51244	80.9874	83.2688		
Mass Flow	lb/h	508.975	1459.01	1838		
Vapor Volumetric Flow	ft^3/h	12.4567	23.4003	32.4773		
Liquid Volumetric Flow	gpm	1.55304	2.91744	4.04912		
Std Vapor Volumetric Flow	MMSCFD	0.0593128	0.737602	0.75838		
Std Liquid Volumetric Flow	sgpm	1.60417 *	2.91667 *	4.02661		
Specific Gravity		0.655124	0.999695	0.907395		
API Gravity		83.5662	9.94738	23.3801		
Net Ideal Gas Heating Value	Btu/ft^3	3993.39	0	247.84		
Net Liquid Heating Value	Btu/lb	19235.7	-1059.76	3400.98		

Remarks

Energy Stream Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Pilot Heat Input	2.26501E+06 * Btu/h	890.184 * hp	--	REAC-100

Remarks

Flowsheet Environment
SRK Environment

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	
Flowsheet:	OXF-121	

Environment Settings

Number of Poynting Intervals	0	Phase Tolerance	0.01
Gibbs Excess Model Evaluation Temperature	77 °F	Emulsion Enabled	False
Freeze Out Temperature Threshold Difference	10 °F	Emulsion Enabled	False

Components

Component Name	Henry's Law Component	Phase Initiator	Component Name	Henry's Law Component	Phase Initiator
Nitrogen	False	False	Dodecane	False	False
Methane	False	False	Water	False	True
CO2	False	False	Triethylene Glycol	False	True
Ethane	False	False	Oxygen	False	False
Propane	False	False	Argon	False	False
Isobutane	False	False	Carbon Monoxide	False	False
n-Butane	False	False	Cyclopentane	False	False
Isopentane	False	False	Isohexane	False	False
n-Pentane	False	False	3-Methylpentane	False	False
n-Hexane	False	False	Neohexane	False	False
Methylcyclopentane	False	False	2,3-Dimethylbutane	False	False
Benzene	False	False	Methylcyclohexane	False	False
Cyclohexane	False	False	Isooctane	False	False
n-Heptane	False	False	Decane, 2-Methyl-	False	False
n-Octane	False	False	Toluene	False	False
n-Nonane	False	False	m-Xylene	False	False
n-Decane	False	False	Ethylbenzene	False	False
n-Undecane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	SRK
Stability Calculation	SRK	Vapor Package	SRK
Light Liquid Package	SRK	Heavy Liquid Package	SRK

Remarks

Environments Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	Ideal Gas Reference Pressure	14.6959 psia
Ideal Gas Reference Temperature	60 °F	Ideal Gas Reference Volume	379.484 ft^3/lbmol
Liquid Reference Temperature	60 °F		

Environment [SRK Environment]

Environment Settings

Number of Poynting Intervals	0	Phase Tolerance	0.01
Gibbs Excess Model Evaluation Temperature	77 °F	Emulsion Enabled	False
Freeze Out Temperature Threshold Difference	10 °F	Emulsion Enabled	False

Components

Component Name	Henry's Law Component	Phase Initiator	Component Name	Henry's Law Component	Phase Initiator
Nitrogen	False	False	Dodecane	False	False
Methane	False	False	Water	False	True
CO2	False	False	Triethylene Glycol	False	True
Ethane	False	False	Oxygen	False	False
Propane	False	False	Argon	False	False
Isobutane	False	False	Carbon Monoxide	False	False
n-Butane	False	False	Cyclopentane	False	False
Isopentane	False	False	Isohexane	False	False
n-Pentane	False	False	3-Methylpentane	False	False
n-Hexane	False	False	Neohexane	False	False
Methylcyclopentane	False	False	2,3-Dimethylbutane	False	False
Benzene	False	False	Methylcyclohexane	False	False
Cyclohexane	False	False	Isooctane	False	False
n-Heptane	False	False	Decane, 2-Methyl-	False	False
n-Octane	False	False	Toluene	False	False
n-Nonane	False	False	m-Xylene	False	False
n-Decane	False	False	Ethylbenzene	False	False
n-Undecane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	SRK
Stability Calculation	SRK	Vapor Package	SRK
Light Liquid Package	SRK	Heavy Liquid Package	SRK

Remarks

Calculator Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	

Simple Specifier 1

Source Code

CV1 = O2Reqd * 3.0 / O2Frac

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Combustion Air!Phases!Total!Properties!Molar Flow
Value	185.044
Unit	

Measured Variable [O2Reqd]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Combined Flash Vapor!Analyses!Combustion Analysis 1!Properties!Required Combustion Oxygen
Value	12.9204
Unit	

Measured Variable [O2Frac]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Combustion Air!Phases!Total!Composition!Mole Fraction!Oxygen
Value	0.20947
Unit	

Remarks

Simple Specifier 2

Source Code

CV1 = FV*HV

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!QStreams!Pilot Heat Input!Energy Rate
Value	2.26501E+06
Unit	

Measured Variable [FV]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Flash Vapor!Phases!Total!Properties!Std Vapor Volumetric Flow
Value	1094.76
Unit	

Measured Variable [HV]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Flash Vapor!Phases!Total!Properties!Net Ideal Gas Heating Value
Value	2068.96
Unit	

Remarks

Simple Specifier 3

Source Code

CV1 = Pin

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Reservoir Gas!Phases!Total!Properties!Pressure
Value	425
Unit	

Calculator Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	

Measured Variable [Pin]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Parameters!Line Pressure!Properties!Parameter
Value	425
Unit	

Remarks

Simple Specifier 4

Source Code

CV1 = Tin

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Reservoir Gas!Phases!Total!Properties!Temperature
Value	65
Unit	

Measured Variable [Tin]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Parameters!Line Temperature!Properties!Parameter
Value	65
Unit	

Remarks

Simple Specifier 5

Source Code

CV1 = Tin

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Reservoir Oil!Phases!Total!Properties!Temperature
Value	65
Unit	

Measured Variable [Tin]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Parameters!Line Temperature!Properties!Parameter
Value	65
Unit	

Remarks

Simple Specifier 6

Source Code

CV1 = Pin

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Reservoir Oil!Phases!Total!Properties!Pressure
Value	425

Calculator Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	

Unit

Measured Variable [Pin]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Parameters!Line Pressure!Properties!Parameter
Value	425
Unit	

Remarks

Simple Specifier 7

Source Code

CV1 = Tin

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Reservoir Water!Phases!Total!Properties!Temperature
Value	65
Unit	

Measured Variable [Tin]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Parameters!Line Temperature!Properties!Parameter
Value	65
Unit	

Remarks

Simple Specifier 8

Source Code

CV1 = Pin

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-121!PStreams!Reservoir Water!Phases!Total!Properties!Pressure
Value	425
Unit	

Measured Variable [Pin]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Parameters!Line Pressure!Properties!Parameter
Value	425
Unit	

Remarks

User Value Sets Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	

Cn+ Flow/Frac.55

User Value [CnPlusSum]

* Parameter	363.024	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={6F8309F1-C05A-4942-A867-311E1532159F}

Tank-1

User Value [BlockReady]

* Parameter	1		Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value [ShellLength]

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

User Value [ShellDiam]

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

User Value [BreatherVP]

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

User Value [BreatherVacP]

* Parameter	-0.03125	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [DomeRadius]

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

User Value [OpPress]

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

User Value [AvgPercentLiq]

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

User Value [MaxPercentLiq]

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

User Value [AnnNetTP]

* Parameter	138.881	bbl/day	Upper Bound	bbl/day
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

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

User Value Sets Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	

User Value [MaxAvgT]

* Parameter	65.5	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [MinAvgT]

* Parameter	44	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [BulkLiqT]

* Parameter	59.09	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [AvgP]

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

User Value [Therml]

* Parameter	1123	Btu/ft^2/day	Upper Bound	Btu/ft^2/day
Lower Bound		Btu/ft^2/day	* Enforce Bounds	False

User Value [AvgWindSpeed]

* Parameter	6.3	mi/h	Upper Bound	mi/h
Lower Bound		mi/h	* Enforce Bounds	False

User Value [MaxHourlyLoadingRate]

* Parameter	5.7867	bbl/hr	Upper Bound	bbl/hr
* Lower Bound	0	bbl/hr	* Enforce Bounds	False

User Value [EntrainedOilFrac]

* Parameter	1	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [TurnoverRate]

* Parameter	23.2987		Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value [LLossSatFactor]

* Parameter	0.5		Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value [AtmPressure]

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

User Value [TVP]

* Parameter	5.74452	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

* Parameter	65.0762	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	75.9425	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value Sets Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	

User Value [TotalLosses]

* Parameter	11.8221	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	1.25867	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.711687	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

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

User Value [WithdrawalLoss]

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

User Value [LoadingLosses]

* Parameter	4.15299	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [MaxHourlyLoadingLoss]

* Parameter	0.948171	lb/hr	Upper Bound	lb/hr
Lower Bound		lb/hr	* Enforce Bounds	False

User Value [DeckFittingLosses]

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

User Value [DeckSeamLosses]

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

User Value [FlashingLosses]

* Parameter	327.739	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0572024	kg/mol	Upper Bound	kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={0511AF0C-026D-4690-8095-2CBDEB1C7684}

Parameters

User Value [Line Temperature]

* Parameter	65	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value Sets Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 121 Wellpad	

User Value [Line Pressure]

* Parameter	425	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

Remarks

LAFAYETTE LABORATORY
500 AMBASSADOR CAFFERY PKWY.
SCOTT, LOUISIANA 70583-1790
PHONE (337) 237-4775
FAX (337) 237-8005

Certificate of Analysis Number: 2011080059-001A

FOR: Gas Analytical Services
Chuck Honaker
PO Box 1028

Bridgeport, WV 26330

CUSTOMER: Gas Analytical Services
FIELD : EQT Production
LOCATION : 512432
SAMPLE POINT: Wellhead
REPORT DATE: 8/13/2011
SAMPLE DATE: 07/30/2011 08:00
SAMPLED BY: SA - GAS
MEMO:

TYPE: Gas
REPORT: C10+ (GPA Method 2286)
CYLINDER: GAS
PRESSURE: 340
TEMPERATURE: N.G.

COMPONENT	MOL %	WEIGHT %	GPM's @ 14.73
N2	0.500	0.678	
METHANE	78.009	60.646	
CO2	0.212	0.451	
ETHANE	14.476	21.095	3.870
PROPANE	4.405	9.411	1.213
I-BUTANE	0.525	1.478	0.172
N-BUTANE	1.069	3.009	0.337
I-PENTANE	0.225	0.785	0.082
N-PENTANE	0.240	0.838	0.087
I-HEXANES	0.099	0.413	0.040
N-HEXANE	0.083	0.291	0.029
BENZENE	0.002	0.009	0.001
CYCLOHEXANE	0.011	0.044	0.004
I-HEPTANES	0.049	0.241	0.022
N-HEPTANE	0.023	0.111	0.010
TOLUENE	0.005	0.022	0.002
I-OCTANES	0.033	0.192	0.017
N-OCTANE	0.006	0.036	0.003
*E-BENZENE	NIL	0.002	NIL
*m,o,&p-XYLENE	0.002	0.016	0.001
I-NONANES	0.004	0.049	0.004
N-NONANE	0.002	0.011	0.001
I-DECANES	NIL	0.015	0.001
N-DECANE	0.001	0.005	NIL
I-UNDECANES +	0.019	0.152	0.013
TOTALS	100.000	100.000	5.909

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

ATTACHMENT O: MONITORING, RECORDING, REPORTING, AND TESTING PLANS

Plan Type	Emission unit	Pollutant	Requirements	Frequency	Method of Measurement	Regulatory Reference
Monitoring, Recordkeeping	All	PM, Opacity, Odor	Monthly inspection of the facility to ensure no visible emissions, dust emissions, or objectionable odors are observed	Monthly	Method 22 and Olfactory Observation	Best Practice - No monitoring required under WV
Monitoring, Recordkeeping	Produced Fluids Storage Tanks (S020-S025)	VOC, HAP	Monitoring throughput of tanks	Monthly		

ATTACHMENT P

Class I Legal Notice

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that EQT Production Company has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a R13 permit modification for the natural gas production facility OXF-121 located off Straight Fork Road in Doddridge County, West Virginia. The latitude and longitude coordinates are: 39°8'8.34''N, -80°49'14.36''W. The project includes the installation of six (6) 400 bbl storage tanks which will replace the existing storage tanks at the site.

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

Pollutant	Emissions in tpy (tons per year)
NOx	5.52
CO	4.64
VOC	8.12
SO_2	0.03
PM	0.42
Formaldehyde	3.7E-04
BTEX	0.06
n-Hexane	0.53
Total HAPs	0.84
Carbon Dioxide Equivalents (CO_2e)	6,628.72

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

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.
Dated this the **(Day)** day of **(Month)**, 2017.

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