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R. Alex Bosiljevac
Environmental
Coordinator

April 4, 2017

CERTIFIED MAIL # 7015 1520 0002 1412 2878

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

RE: G70-D General Permit Registration Application
EQT Production Company
OXF-155 Natural Gas Production Site

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) complete PDFs included on CD-ROM of a G70-D General Permit Registration Application for the OXF-155 natural gas production site. A legal advertisement will be published in the next few days and proof of publication will be forwarded as soon as it is received. Please contact me for payment of the application fee by credit card.

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

Sincerely,

RAB

R. Alex Bosiljevac
EQT Corporation

Enclosures

PROJECT REPORT

EQT Production
OXF-155 Pad

G70-D Permit Application

Where energy meets innovation.

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

March 2017

Trinity Consultants

Environmental solutions delivered uncommonly well

TABLE OF CONTENTS

EQT Production Company (EQT) is submitting this Class II General Permit (G70-D) application to the West Virginia Department of Environmental Protection (WVDEP) for the construction and operation of new equipment at a new natural gas production well pad, OXF-155, located in Doddridge County, West Virginia.

1.1. FACILITY AND PROJECT DESCRIPTION

The OXF-155 pad is a natural gas production facility that will consists of six (6) natural gas wells. Natural gas and liquids (including water and condensate) are extracted from deposits underneath the surface. Natural gas is transported from the well to a gas line for additional processing and compression, as necessary. The liquids produced are stored in storage vessels.

This application seeks to permit the following equipment:

- Six (6) 400 barrel (bbl) storage tanks for condensate/water (produced fluids) controlled by two (2) combustors, one rated at 19.22 MMBtu/hr and one rated at 11.66 MMbtu/hr;
- One (1) 100 bbl storage tanks for sand and produced fluids from the sand separator (vapors from this tank may be controlled by combustors but are not represented as controlled in this application);
- Six (6) line heaters, each rated at 1.54 MMBtu/hr (heat input);
  One (1) low pressure separator and associated 2.31 MMbtu/hr line heater (heat input);
- One (1) vapor recovery unit (VRU) powered by a natural gas fired 405 horsepower (hp) Caterpillar engine, with a backup natural gas fired 110 horsepower (hp) Engine Distributors Inc. (EDI) engine for when production declines. The smaller engine will replace the larger engine, but both engines are included in the potential emission calculations assuming continuous operation;
- Produced fluid truck loading; and
- Associated piping and components.

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

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

Pollutant	Wellpad Potential Annual Emissions (tpy)	G70-D Maximum Annual Emission Limits (tpy)
Nitrogen Oxides	28.57	50
Carbon Monoxide	27.12	80
Volatile Organic Compounds	14.54	80
Particulate Matter – 10/2.5	1.72	20
Sulfur Dioxide	0.12	20
Individual HAP (n-hexane)[1]	5.98	8
Total HAP[1]	6.79	20

1. Includes fugitive emissions

1.2. SOURCE STATUS

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

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

Other additional pollutant emitting facilities should be aggregated with the OXF-155 Pad for air permitting purposes if, and only if, all three elements of the "stationary source" definition above are fulfilled.

There are no Marcellus facilities within a quarter-mile radius of the OXF-155 Pad. The nearest wellpad, OXF-136, is located approximately 0.35 miles southeast of OXF-155. Therefore, the OXF-155 pad should be considered a separate stationary source with respect to permitting programs, including Title V and Prevention of Significant Deterioration (PSD). As discussed in this application, the facility is a minor source of air emissions with respect to New Source Review (NSR) and Title V permitting.

1.3. G70-D APPLICATION ORGANIZATION

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

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

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

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

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

- **VRU Engines:** Potential emissions of oxides of nitrogen (NO_X), carbon monoxide (CO), and volatile organic compounds (VOC) are calculated using vendor guarantees. For the Caterpillar VRU engine, formaldehyde, is calculated using manufacturer vendor guarantees. The remaining criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 factors for natural gas fired engines.[3] These calculations assume a specific heat content of natural gas of 1,050 Btu/scf (conservatively lower than the site-specific gas analysis). Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.

- **Fugitive Equipment Leaks:** Emissions of VOC and HAPs from leaking equipment components have been estimated using facility estimated component counts and types along with emission factors from the *Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995.* Emission factors are based on average measured TOC from component types indicated. Greenhouse gas emissions from component leaks are calculated according to the procedures in 40 CFR 98 Subpart W.[4] Pneumatic devices at the wellpad are intermittent bleed and are assumed to be in operation 1/3 of the year.

- **Storage Tanks:** Working, breathing and flashing emissions of VOC and HAPs from the storage tanks at the facility are calculated using Bryan Research & Engineering ProMax® Software. Controlled calculations assume an overall control efficiency (capture and destruction) of 95%. The throughput for the produced fluids tanks are based on engineering estimates of monthly condensate and produced water at the OXF-136 well pad (i.e., the maximum monthly throughput for the pad times 12). The composition for the analysis was from a sample taken at OXF-136. Emissions of VOC and HAPs from the sand separator tank are calculated using E&P TANK v2.0. The produced fluids throughput is calculated as follows:

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

- **Tank Truck Loading:** Uncontrolled emissions of VOC and HAPs from the loading of organic liquids from storage tanks to tank truck are calculated using Bryan Research Engineering ProMax® Software. Truck

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

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

- **Haul Roads:** Fugitive dust emitted from facility roadways has been estimated using projected vehicle miles traveled along with U.S. EPA's AP-42 factors for unpaved haul roads.[6]

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

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

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

This review is presented to supplement and/or add clarification to the information provided in the WVDEP G70-D permit application forms.

In addition to providing a summary of applicable requirements, this section of the application also provides non-applicability determinations for certain regulations, allowing the WVDEP to confirm that identified regulations are not applicable to the wellpad. Note that explanations of non-applicability are limited to those regulations for which there may be some question of applicability specific to the operations at the wellpad. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

3.1. PREVENTION OF SIGNIFICANT DETERIORATION SOURCE CLASSIFICATION

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

3.2. TITLE V OPERATING PERMIT PROGRAM

Title 40 of the Code of Federal Regulations Part 70 (40 CFR 70) establishes the federal Title V operating permit program. West Virginia has incorporated the provisions of this federal program in its Title V operating permit program in West Virginia CSR 45-30. The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP and 100 tpy of all other regulated pollutants. The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the wellpad is not a major source for Title V purposes.

3.3. NEW SOURCE PERFORMANCE STANDARDS

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

- 40 CFR Part 60 Subparts D/Da/Db/Dc – Steam Generating Units
- 40 CFR Part 60 Subpart K/Ka/Kb – Storage Vessels for Petroleum Liquids/Volatile Organic Liquids
- 40 CFR Part 60 Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines

- 40 CFR Part 60 Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution
- 40 CFR Part 60 Subpart OOOOa – Crude Oil and Natural Gas Facilities

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

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

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

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

3.3.3. NSPS Subparts JJJJ – Stationary Spark Ignition Internal Combustion Engines

New Source Performance Standards 40 CFR Part 60 Subpart JJJJ (NSPS JJJJ) affects owners and operators of stationary spark ignition internal combustion engines (SI ICE) that commence construction, reconstruction or modification after June 12, 2006. Applicability dates are based on the date the engine was ordered by the operator. The proposed 405 HP engine (VRU Caterpillar engine) at the well pad is a 4-stroke rich burn, spark ignition engine manufactured before June 12, 2006 (February of 2000). As such, this engine is not subject to the requirements of this rule. The proposed 110 HP EDI engine (VRU EDI engine) is an engine manufactured after January 1st, 2011 and subject to this subpart. The engine has been certified to meet the applicable emission limited in Table 1 of Subpart JJJJ. EQT will operate this engine according to the manufacturer's recommended practices and demonstrate compliance with the requirements specified in 40 CFR§60.4243 (maintenance plan/records) for certified affected SI ICE at the facility. No stack testing is required for certified engines.

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

Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011 and or before September 18, 2015. This NSPS was published in the Federal Register on August 16, 2012, and subsequently amended. The proposed project does not change applicability dates with respect to NSPS Subpart OOOO for existing equipment. Therefore, this subpart is not applicable to the proposed project.

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

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

- Hydraulically fractured wells;
- Centrifugal compressors located between the wellhead and the point of custody transfer to the natural gas distribution segment;
- Reciprocating compressors located between the wellhead and the point of custody transfer to the natural gas distribution segment;

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

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

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

There are six (6) produced fluid storage vessels at the wellpad. The storage vessels at the facility will each have potential VOC emissions less than 6 tpy based on the permit application materials and enforceable limits to be included in the G70-D permit. As such, per 60.5365a(e), the tanks will not be storage vessel affected facilities under the rule.

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

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

3.3.6. Non-Applicability of All Other NSPS

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

3.4. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

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

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

> 40 CFR Part 63 Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines
> 40 CFR Part 63 Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers

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

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

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

3.4.2. 40 CFR 63 Subpart ZZZZ – Stationary Reciprocating Internal Engines

This rule affects reciprocating internal combustion engines (RICE) located at a major and area sources of HAP. The proposed 405 hp Caterpillar engine is an existing non-emergency, non-black start 4 stroke rich burn engine located at an area source. Per §63.6603(a), the requirements for existing engines located at area sources are summarized in Table 2d and for non-emergency, non-black start 4SRB stationary RICE ≤500 hp include:

- Change oil and filter every 2,160 hours of operation or annually, whichever comes first,
- Inspect spark plugs every 2,160 hours of operation or annually, whichever comes first, and replace as necessary, and
- Inspect all hoses and belts every 2,160 hours of operation or annually, whichever comes first, and replace as necessary.

EQT will comply with the applicable work practice requirements of the rule and keep the associated records for the 405 HP engine.

40 CFR §63.6590(c) states that a new or reconstructed stationary RICE located at an area HAP source must meet the requirements of NESHAP Subpart ZZZZ by meeting the requirements of NSPS Subpart JJJJ. No further requirements apply for such engines under NESHAP Subpart ZZZZ. The 110 hp EDI engine is considered a new stationary RICE. Therefore, the requirements contained in §63.6590(c) are applicable. EQT will be in compliance with applicable requirements of 40 CFR 63 Subpart ZZZZ by meeting the applicable requirements of 40 CFR 60 Subpart JJJJ for the 110 hp engine.

3.4.3. 40 CFR 63 Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers

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

3.5. WEST VIRGINIA SIP REGULATIONS

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

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

45 CSR 2 applies to fuel burning units, defined as equipment burning fuel "for the primary purpose of producing heat or power by indirect heat transfer". The line heaters are fuel burning units and therefore must comply with this regulation. Per 45 CSR 2-3, opacity of emissions from units shall not exceed 10 percent.

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

According to 45 CSR 4-3:

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

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

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

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

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

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

3.5.5. 45 CSR 17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter

According to 45 CSR 17-3.1:

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

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

3.5.6. 45 CSR 21-28: Petroleum Liquid Storage in Fixed Roof Tanks

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

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

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

3.5.8. Non-Applicability of Other SIP Rules

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

4. G70-D APPLICATION FORMS

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

west virginia department of environmental protection

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

G70-D GENERAL PERMIT REGISTRATION APPLICATION

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

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

SECTION 1. GENERAL INFORMATION

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

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

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

City: Pittsburgh | State: PA | ZIP Code: 15222

Facility Name: OXF 155 Wellpad

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

City: Summers | Zip Code: 26421 | County: Doddridge

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.21338°
Longitude: -80.80996°

SIC Code: 1311
NAICS Code: 211111

DAQ Facility ID No. (For existing facilities)

CERTIFICATION OF INFORMATION

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

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

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

Responsible Official Signature: _____ 412-553-5700
Name and Title: Mike Gavin, Vice President Phone: Fax:
Email: gavinm@eqt.com Date: 4/14/17

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

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

OPERATING SITE INFORMATION
Briefly describe the proposed new operation and/or any change(s) to the facility: EQT Production Company (EQT) is submitting this Class II General Permit (G70-D) application to the West Virginia Department of Environmental Protection (WVDEP) for the construction and operation of new equipment at a new natural gas production well pad, OXF-155, located in Doddridge County, West Virginia.
Directions to the facility: From WV DEP, head west on Pleasant Valley Road toward Ruskin Drive. Turn right onto Kingmont road. Turn left to merge onto I-79S. Take exit 119 to merge onto US-50 W toward Clarksburg/Bridgeport. Turn left onto Old U.S 50E/Sunnyside road. Turn left onto Co Rte 21/Oxford Road. Turn left onto S Form of Hughes River. Finally, turn left onto CO Rte 23/2. OXF-155 would be on your left.

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

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

ATTACHMENT A

Single Source Determination

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

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

Is there equipment and activities in the same industrial grouping (defined by SIC code)?
Yes ☒ No ☐

Is there equipment and activities under the control of the same person/people?
Yes ☒ No ☐

Is there equipment and activities located on the same site or on sites that share equipment and are within ¼ mile of each other?
Yes ☐ No ☒

ATTACHMENT A: SINGLE SOURCE DETERMINATION MAP

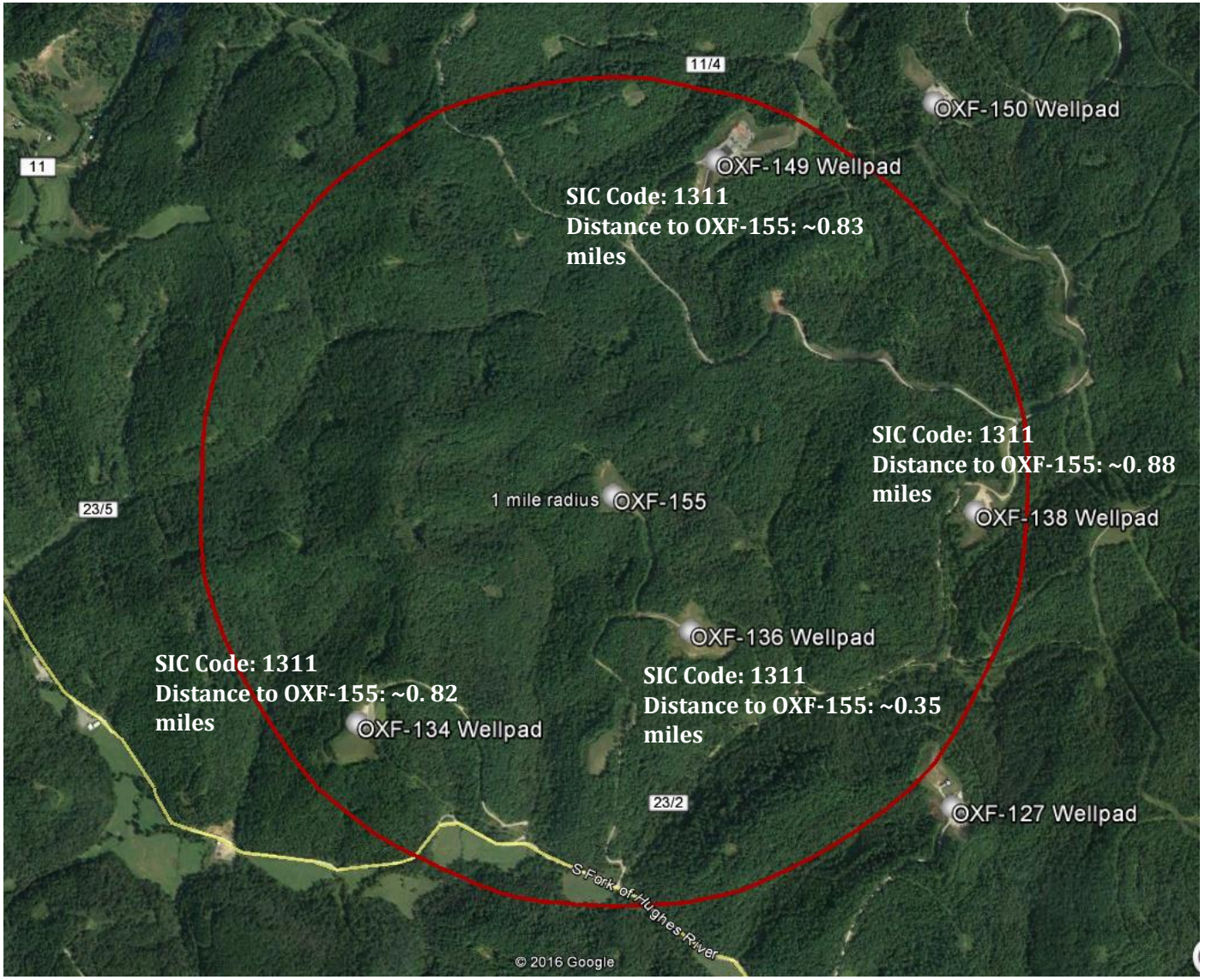


Figure 1 - Map of OXF-155 Location with 1 Mile Radius Circle

Coordinates:
Latitude: 39°12'34.28"N
Longitude: 80°48'20.73"W

ATTACHMENT B

Siting Criteria Waiver *(Not Applicable)*

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

G70-D General Permit
Siting Criteria Waiver

WV Division of Air Quality 300' Waiver

I _____ hereby
Print Name

acknowledge and agree that _____ will
General Permit Applicant's Name

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

.

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

Signed:

_____
Signature Date

_____
Signature Date

Taken, subscribed and sworn before me this _____ day of

_____, 20_____.

My commission expires: _____

SEAL_____
Notary Public

ATTACHMENT C

Business Certificate

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

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

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

This certificate is issued on: 08/4/2010

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

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

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

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

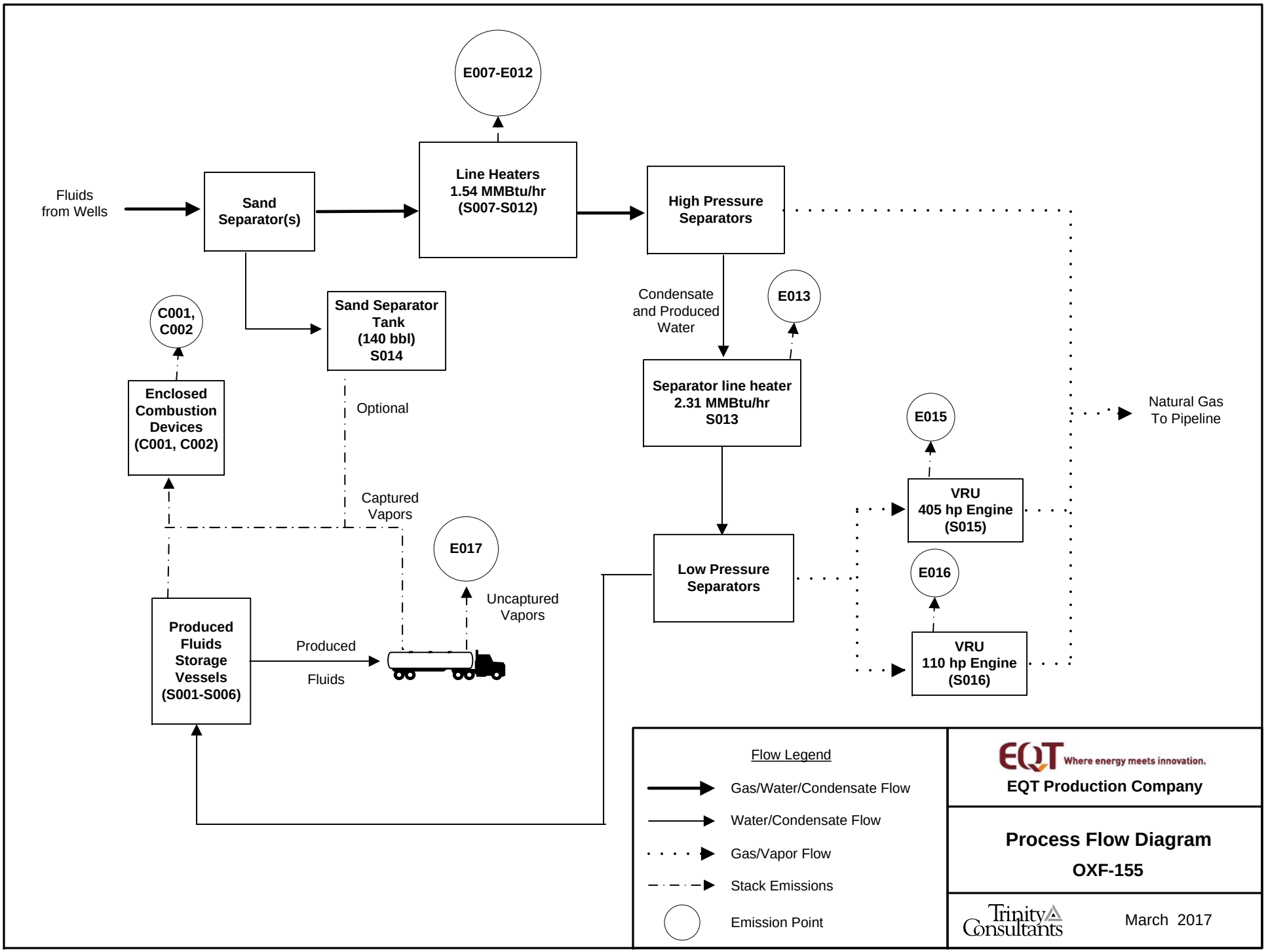
Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

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

atL006 v.3
L0553297664

ATTACHMENT D

Process Flow Diagram


E007-E012
Line Heaters
1.54 MMBtu/hr
(S007-S012)
Fluids
from Wells
Sand
Separator(s)
High Pressure
Separators
Condensate
and Produced
Water
E013
Separator line heater
2.31 MMBtu/hr
S013
Sand Separator
Tank
(140 bbl)
S014
C001,
C002
Enclosed
Combustion
Devices
(C001, C002)
Optional
Captured
Vapors
E017
Uncaptured
Vapors
Produced
Fluids
Storage
Vessels
(S001-S006)
Produced
Fluids
Low Pressure
Separators
E015
VRU
405 hp Engine
(S015)
E016
VRU
110 hp Engine
(S016)
Natural Gas
To Pipeline
Flow Legend
Gas/Water/Condensate Flow
Water/Condensate Flow
Gas/Vapor Flow
Stack Emissions
Emission Point
EQT Where energy meets innovation.
EQT Production Company
Process Flow Diagram
OXF-155
Trinity Consultants
March 2017

ATTACHMENT E

Process Description

ATTACHMENT E: PROCESS DESCRIPTION

This G70-D Permit Application involves the construction of a new natural gas production wellpad (OXF-155). The wellpad will consist of eleven (6) wells, each with the same basic operation. The following equipment will be installed at the facility: six (6) storage tanks, one (1) low pressure separator with associated heater and vapor recovery units (VRUs), six (6) line heaters, and one (1) sand separator tank.

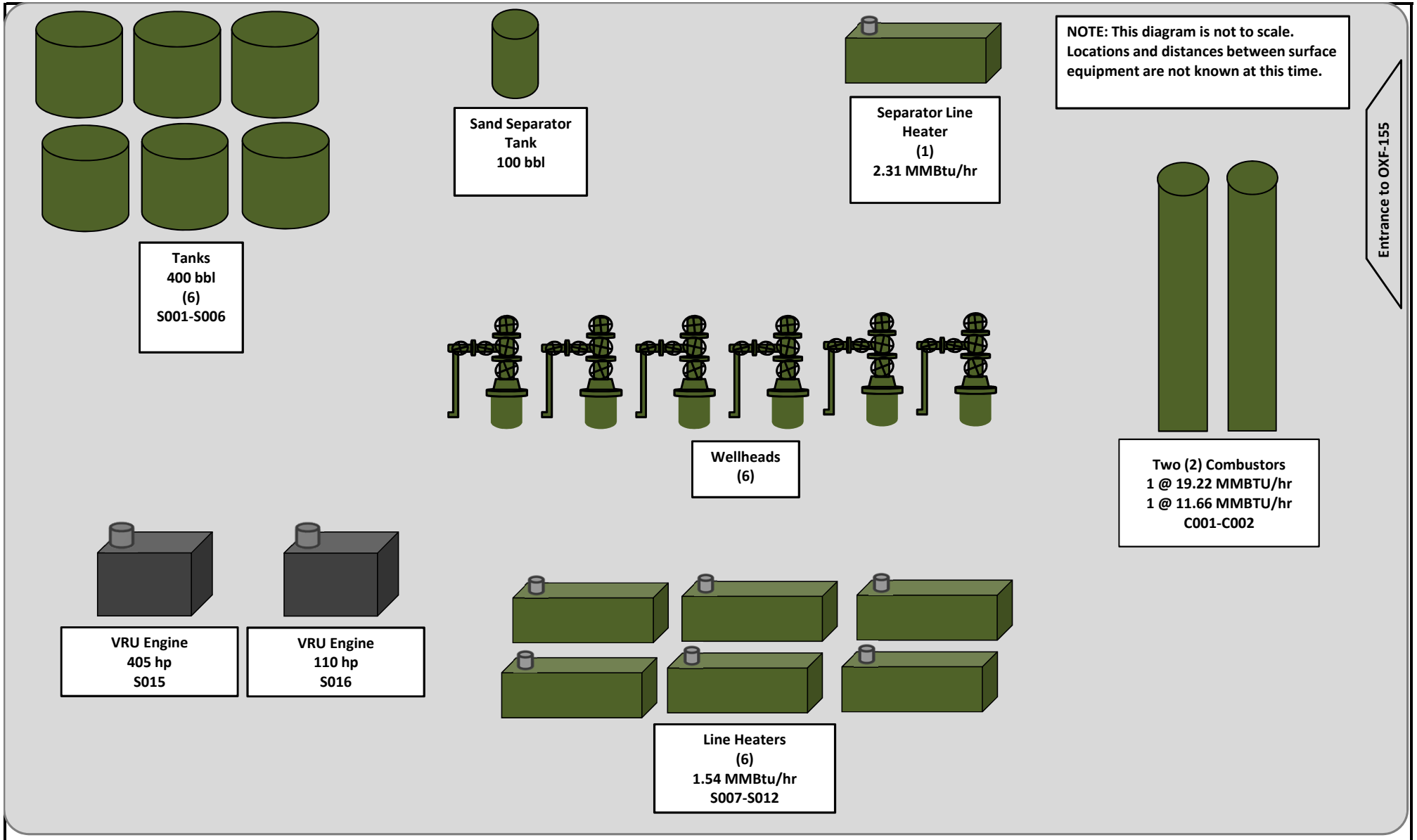
The incoming gas/liquid stream from the underground wells will pass through a sand separator, where sand, water, and residual solids are displaced and transferred to the sand separator tank (S014). The gas stream will then pass through the line heaters (S007-S012) to raise/maintain temperature. The stream will then pass through the high pressure (3 phase) separators, which will separate gas (natural gas from the separator is sent to the sales line) from liquids (condensate and produced water). The produced fluids stream will then pass through the low pressure separator, where it is heated (S013) to volatilize (flash off) lighter hydrocarbons and separate condensate and produced water in the liquid stream. The flash gas from the condensate stream is recovered by the Vapor Recovery Unit, which utilizes a natural gas-fired engine (S015 and S016) driven compressor to raise the pressure of the flash gas and route it back into the natural gas pipeline. The condensate is then transferred to the produced fluid storage vessels (S001-S006).

Emissions from the storage vessels are controlled by two enclosed combustors (C001, C002). Once the tanks are filled, the contents are loaded into trucks for transport. EQT utilizes vapor balancing in the condensate truck loading operations, which means the vapors displaced by the filling of tanker trucks (S017) are routed back into the battery of tanks and ultimately to the combustors.

A process flow diagram is included as Attachment D.

ATTACHMENT F

Plot Plan



Attachment F

OXF-155 Well Pad Plot Plan

ATTACHMENT G

Area Map

ATTACHMENT G: AREA MAP

Figure 1 - Map of OXF-155 Location

Zone: 17
UTM Northing (KM): 4340.46
UTM Easting (KM): 516.77
Elevation: ~1,210 ft

ATTACHMENT H

G70-D Section Applicability Form

ATTACHMENT H – G70-D SECTION APPLICABILITY FORM

General Permit G70-D Registration
Section Applicability Form

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

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

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

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

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

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

ATTACHMENT I

Emission Units Table

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

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD(s)[6]
S001	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S002	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S003	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S004	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S005	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S006	C001-C002	Produced Fluid Storage Tank	TBD	TBD	400 bbl	New	C001-C002	---
S007	E007	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S008	E008	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S009	E009	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S010	E010	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S011	E011	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S012	E012	Line Heater	TBD	TBD	1.54 MMBtu/hr	New	None	---
S013	E013	Separator Heater	TBD	TBD	2.31 MMBtu/hr	New	None	---
S014	E014	Sand Separator Storage Tank	TBD	TBD	140 bbl	New	C001-C002 (Optional)	---

S015	E015	VRU Caterpillar Engine	TBD	TBD	405 hp	New	None	---
S016	E016	VRU EDI Engine	TBD	TBD	110 hp	New	None	---
S017	E017 (Uncaptured) C001-C002 (Controlled, Captured)	Liquid Loading	TBD	TBD	15,925,997 gal/yr	New	C001-C002	---
C001	C001	Tank Combustor	TBD	TBD	11.66 MMBtu/hr	New	NA	---
C002	C002	Tank Combustor	TBD	TBD	19.22 MMBtu/hr	New	NA	---

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

ATTACHMENT J

Fugitive Emissions Summary Sheet

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

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

Source/Equipment: Fugitive Emissions

Leak Detection Method Used	☐ Audible, visual, and olfactory (AVO) inspections	☐ Infrared (FLIR) cameras	☒ Other (please describe) Will satisfy condition 12.1.1 of the G70-D	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (methane, CO_2e)
Pumps	☐ Yes ☒ No	11	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	2.02	0.24	0.37
Valves	☐ Yes ☒ No	374	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	☒ Gas ☐ Liquid ☐ Both	6.14	0.74	35.56
Safety Relief Valves	☐ Yes ☒ No	25	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	☒ Gas ☐ Liquid ☐ Both	7.02	0.84	3.46
Open Ended Lines	☐ Yes ☒ No	26	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	0.12	0.01	5.48
Sampling Connections	☐ Yes ☒ No	0	N/A	☐ Gas ☐ Liquid ☐ Both	---	---	---
Connections (Not sampling)	☐ Yes ☒ No	1,664	U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (EPA-453/R-95-017, 1995).	☐ Gas ☐ Liquid ☒ Both	8.39	1.01	17.60
Compressors	☐ Yes ☒ No	2	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	1.26	0.15	29.41
Flanges	☐ Yes ☐ No	---	(included in connections)	☐ Gas ☐ Liquid ☐ Both	---	---	---
Other[1]	☐ Yes ☒ No	30	40 CFR 98 Subpart W	☒ Gas ☐ Liquid ☐ Both	10.05	1.20	476.03

[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/rail car loading, etc.) N/A

ATTACHMENT K

Gas Well Data Sheet

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

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

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device	Subject to OOOO or OOOOa?
47-1706755	TBD	TBD	Green	Yes - OOOOa
47-1706756	TBD	TBD	Green	Yes - OOOOa
47-1706757	TBD	TBD	Green	Yes - OOOOa
47-1706758	TBD	TBD	Green	Yes - OOOOa
47-1706759	TBD	TBD	Green	Yes - OOOOa
47-1706768	TBD	TBD	Green	Yes - OOOOa

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

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

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

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

Where,

047 = State code. The state code for WV is 047.

001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).

00001= Well number. Each well will have a unique well number.

ATTACHMENT L

Storage Vessel Data Sheet

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

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

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

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name OXF-155	2. Tank Name Produced Fluids Tanks (water and condensate)
3. Emission Unit ID number S001-S006	4. Emission Point ID number C001-C002
5. Date Installed , Modified or Relocated *(for existing tanks)* Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☐ Yes ☒ No Was the tank manufactured after September 18, 2015? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* N/A	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☐ Yes ☒ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

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

13A. Maximum annual throughput (gal/yr) **See attached emissions calculations for all throughput values**	13B. Maximum daily throughput (gal/day) **See attached emissions calculations for all throughput values**
14. Number of tank turnovers per year **See attached emissions calculations for all throughput values**	15. Maximum tank fill rate (gal/min) **See attached emissions calculations for all throughput values**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof ☒ vertical ☐ horizontal ☐ flat roof ☒ cone roof ☐ dome roof ☐ other (describe) ☐ External Floating Roof ☐ pontoon roof ☐ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting ☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm ☐ Pressurized ☐ spherical ☐ cylindrical ☐ Other (describe)	

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☐ Does Not Apply ☐ Rupture Disc (psig)

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

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

☒ Conservation Vent (psig) ☐ Condenser[1]

0.5 oz Vacuum Setting 14.4 oz Pressure Setting

☐ Emergency Relief Valve (psig)

Vacuum Setting Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☒ No

[1] Complete appropriate Air Pollution Control Device Sheet

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

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

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION		
21. Tank Shell Construction: ☒ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)		
21A. Shell Color: Blue	21B. Roof Color: Blue	21C. Year Last Painted: N/A
22. Shell Condition (if metal and unlined): ☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable		

22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?	
23. Operating Pressure Range (psig): **Must be listed for tanks using VRUs with closed vent system.**			
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft): 0.17	
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☒ Yes ☐ No			
28. Closed Vent System with Enclosed Combustor? ☒ Yes ☐ No			
SITE INFORMATION - Not Applicable: Tank calculations performed using ProMax software			
29. Provide the city and state on which the data in this section are based:			
30. Daily Avg. Ambient Temperature (°F):	31. Annual Avg. Maximum Temperature (°F):		
32. Annual Avg. Minimum Temperature (°F):	33. Avg. Wind Speed (mph):		
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	35. Atmospheric Pressure (psia):		
LIQUID INFORMATION - Not Applicable: Tank calculations performed using ProMax software			
36. Avg. daily temperature range of bulk liquid (°F):	36A. Minimum (°F):	36B. Maximum (°F):	
37. Avg. operating pressure range of tank (psig):	37A. Minimum (psig):	37B. Maximum (psig):	
38A. Minimum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):		
39A. Avg. liquid surface temperature (°F):	39B. Corresponding vapor pressure (psia):		
40A. Maximum liquid surface temperature (°F):	40B. Corresponding vapor pressure (psia):		
41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
41A. Material name and composition:			
41B. CAS number:			
41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-mole):			
41E. Vapor molecular weight (lb/lb-mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name OXF-155	2. Tank Name Sand Separator Tank
3. Emission Unit ID number S014	4. Emission Point ID number E014
5. Date Installed , Modified or Relocated *(for existing tanks)* Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☐ Yes ☒ No Was the tank manufactured after September 18, 2015? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* N/A	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☐ Yes ☒ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

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

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☒ Does Not Apply ☐ Rupture Disc (psig)

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

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

☐ Conservation Vent (psig) ☐ Condenser[1]

Vacuum Setting Pressure Setting

☐ Emergency Relief Valve (psig)

Vacuum Setting Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☐ No

[1] Complete appropriate Air Pollution Control Device Sheet

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

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

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION

21. Tank Shell Construction:

☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) Welded

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

22. Shell Condition (if metal and unlined):

☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

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

23. Operating Pressure Range (psig):

Must be listed for tanks using VRUs with closed vent system.

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

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

25A. Year Internal Floaters Installed:

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

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

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

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

25F. Describe deck fittings:

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

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

26C. Deck seam. Continuous sheet construction:

☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)

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

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

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

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

29. Provide the city and state on which the data in this section are based:

30. Daily Avg. Ambient Temperature (°F):	31. Annual Avg. Maximum Temperature (°F):
32. Annual Avg. Minimum Temperature (°F):	33. Avg. Wind Speed (mph):

34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):		35. Atmospheric Pressure (psia):	
LIQUID INFORMATION - Not Applicable: Tank calculations performed using E&P Tank software			
36. Avg. daily temperature range of bulk liquid (°F):	36A. Minimum (°F):	36B. Maximum (°F):	
37. Avg. operating pressure range of tank (psig):	37A. Minimum (psig):	37B. Maximum (psig):	
38A. Minimum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39A. Avg. liquid surface temperature (°F):		39B. Corresponding vapor pressure (psia):	
40A. Maximum liquid surface temperature (°F):		40B. Corresponding vapor pressure (psia):	
41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
41A. Material name and composition:			
41B. CAS number:			
41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-mole):			
41E. Vapor molecular weight (lb/lb-mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

STORAGE TANK DATA TABLE

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

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

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

ATTACHMENT M

Heaters Data Sheet

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

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

Emission Unit ID#[1]	Emission Point ID#[2]	Emission Unit Description (manufacturer, model #)	Year Installed/ Modified	Type[3] and Date of Change	Maximum Design Heat Input (MMBTU/hr)[4]	Fuel Heating Value (BTU/scf)[5]
S007	E007	Line Heater	TBD	New	1.54	~1,360
S008	E008	Line Heater	TBD	New	1.54	~1,360
S009	E009	Line Heater	TBD	New	1.54	~1,360
S010	E010	Line Heater	TBD	New	1.54	~1,360
S011	E011	Line Heater	TBD	New	1.54	~1,360
S012	E012	Line Heater	TBD	New	1.54	~1,360
S013	E013	Separator Heater	TBD	New	2.31	~1,360

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

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

3 New, modification, removal

4 Enter design heat input capacity in MMBtu/hr.

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

ATTACHMENT N

Engines Data Sheet

ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

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

Emission Unit ID#[1]		S015		S016			
Engine Manufacturer/Model		Caterpillar/G3408		Engine Distributors Inc/CSG-637			
Manufacturers Rated bhp/rpm		405		110			
Source Status[2]		NS		NS			
Date Installed/ Modified/Removed/Relocated[3]		2017		2017			
Engine Manufactured /Reconstruction Date[4]		February 2000		August 2015			
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]		☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources		☒40CFR60 Subpart JJJJ ☒JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources		☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	
Engine Type[6]		4SRB		4SRB			
APCD Type[7]		NSCR		NSCR			
Fuel Type[8]		RG		RG			
H_2S (gr/100 scf)		0		0			
Operating bhp/rpm		405		110			
BSFC (BTU/bhp-hr)		8,260		6,510			
Hourly Fuel Throughput		3,186 ft^3/hr NA gal/hr		682 ft^3/hr NA gal/hr		ft^3/hr gal/hr	
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)		27.9 $MMft^3$/yr NA gal/yr		6.0 $MMft^3$/yr NA gal/yr		$MMft^3$/yr gal/yr	
Fuel Usage or Hours of Operation Metered		Yes ☒ No ☐		Yes ☒ No ☐		Yes ☐ No ☐	
	Pollutant[10]	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
Vendor Spec	NO_x	2.14	9.39	0.24	1.06		
Vendor Spec	CO	2.23	9.78	0.49	2.12		
Vendor Spec	VOC	0.17	0.74	0.18	0.81		
AP-42	SO_2	<0.01	<0.01	<0.01	<0.01		
AP-42	PM_{10}	0.06	0.28	0.01	0.06		
Vendor Spec/AP-42	Formaldehyde	0.07	0.31	0.01	0.06		
AP-42	Total HAPs	0.11	0.49	0.02	0.10		
40 CFR Part 98 Subpart C	GHG (CO_2e)	392	1,716	84	367		

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

2 Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Relocated Source

REM Removal of Source

3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation or removal.

4 Enter the date that the engine was manufactured, modified or reconstructed.

5 Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart IIII/JJJJ? If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance as appropriate.

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

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

2SLB	Two Stroke Lean Burn	4SRB	Four Stroke Rich Burn
4SLB	Four Stroke Lean Burn		

7 Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

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

8 Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas /Production Gas	D	Diesel

9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc™	OT	Other	(please list)

10 Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.

11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

Engine Air Pollution Control Device
(Emission Unit ID# S015 use extra pages as necessary)

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

☒ NSCR	☐ SCR	☐ Oxidation Catalyst

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

Manufacturer: Miratech (or equivalent)	Model #: IQ-18-08 (or equivalent)
Design Operating Temperature: 995 ºF	Design gas volume: 1587 scfm
Service life of catalyst:	Provide manufacturer data? ☒Yes ☐ No
Volume of gas handled: 1587 acfm at 1,600 oF	Operating temperature range for NSCR/Ox Cat: From 750 ºF to 1250 ºF
Reducing agent used, if any:	Ammonia slip (ppm):

Pressure drop against catalyst bed (delta P): 3 inches of H_2O

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

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

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

How often is performance test required?
☐ Initial
☐ Annual
☐ Every 8,760 hours of operation
☐ Field Testing Required
☒ No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT, Table 2d of 40 CFR 63 Subpart ZZZZ.

G3408

GAS ENGINE TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED (rpm):	1800	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	9.7	APPLICATION:	GAS COMPRESSION
AFTERCOOLER TYPE:	SCAC	RATING LEVEL:	CONTINUOUS
AFTERCOOLER WATER INLET (°F):	130	FUEL:	NAT GAS
JACKET WATER OUTLET (°F):	210	FUEL SYSTEM:	HPG IMPCO
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig):	20.0-25.0
COOLING SYSTEM:	JW+OC, AC	FUEL METHANE NUMBER:	80
CONTROL SYSTEM:	CDIS	FUEL LHV (Btu/scf):	905
EXHAUST MANIFOLD:	WC	ALTITUDE CAPABILITY AT 77°F INLET AIR TEMP. (ft):	5000
COMBUSTION:	STANDARD SETTING		
EXHAUST OXYGEN (% O2):	2.0		

RATING		NOTES	LOAD	100%	75%	50%
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	400	300	200
ENGINE EFFICIENCY	(ISO 3046/1)	(2)	%	33.8	32.5	29.1
ENGINE EFFICIENCY	(NOMINAL)	(2)	%	33.8	32.5	29.1
ENGINE DATA						
FUEL CONSUMPTION	(ISO 3046/1)	(3)	Btu/bhp-hr	7539	7822	8731
FUEL CONSUMPTION	(NOMINAL)	(3)	Btu/bhp-hr	7539	7822	8731
AIR FLOW (77°F, 14.7 psia)	(WET)	(4) (5)	ft3/min	600	480	356
AIR FLOW	(WET)	(4) (5)	lb/hr	2659	2128	1578
FUEL FLOW (60ºF, 14.7 psia)			scfm	55	43	32
COMPRESSOR OUT PRESSURE			in Hg(abs)	46.4	43.4	39.5
COMPRESSOR OUT TEMPERATURE			°F	187	173	152
AFTERCOOLER AIR OUT TEMPERATURE			°F	153	153	149
INLET MAN. PRESSURE		(6)	in Hg(abs)	43.6	35.8	28.0
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(7)	°F	153	153	149
TIMING		(8)	°BTDC	22	22	22
EXHAUST TEMPERATURE - ENGINE OUTLET		(9)	°F	966	914	846
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(10) (5)	ft3/min	1774	1364	962
EXHAUST GAS MASS FLOW	(WET)	(10) (5)	lb/hr	2810	2246	1666
EMISSIONS DATA - ENGINE OUT						
NOx (as NO2)		(11)(12)	g/bhp-hr	24.64	22.90	20.00
CO		(11)(13)	g/bhp-hr	1.60	1.60	1.60
THC (mol. wt. of 15.84)		(11)(13)	g/bhp-hr	2.60	2.20	2.30
NMHC (mol. wt. of 15.84)		(11)(13)	g/bhp-hr	0.39	0.33	0.35
NMNEHC (VOCs) (mol. wt. of 15.84)		(11)(13)(14)	g/bhp-hr	0.26	0.22	0.23
HCHO (Formaldehyde)		(11)(13)	g/bhp-hr	0.19	0.23	0.21
CO2		(11)(13)	g/bhp-hr	492	510	569
EXHAUST OXYGEN		(11)(15)	% DRY	2.0	2.3	2.5
LAMBDA		(11)(15)		1.10	1.13	1.12
ENERGY BALANCE DATA						
LHV INPUT		(16)	Btu/min	50211	39075	29106
HEAT REJECTION TO JACKET WATER (JW)		(17)(23)	Btu/min	16233	13528	11535
HEAT REJECTION TO ATMOSPHERE		(18)	Btu/min	2008	1563	1164
HEAT REJECTION TO LUBE OIL (OC)		(19)(23)	Btu/min	2567	2139	1824
HEAT REJECTION TO EXHAUST (LHV TO 77°F)		(20)(21)	Btu/min	12044	8942	6079
HEAT REJECTION TO EXHAUST (LHV TO 350°F)		(20)	Btu/min	8022	5836	3793
HEAT REJECTION TO AFTERCOOLER (AC)		(22)(24)	Btu/min	412	193	22

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1. (Standard reference conditions of 77°F, 29.60 in Hg barometric pressure.) No overload permitted at rating shown. Consult the altitude deration factor chart for applications that exceed the rated altitude or temperature.

Emission levels are at engine exhaust flange prior to any after treatment. Values are based on engine operating at steady state conditions. Tolerances specified are dependent upon fuel quality. Fuel methane number cannot vary more than ± 3. Part load data may require engine adjustment.

For notes information consult page three.

FUEL USAGE GUIDE

CAT METHANE NUMBER	30	35	40	45	50	55	60	65	70	75	80	100
SET POINT TIMING	-	-	-	-	-	-	-	-	20	21	22	22
DERATION FACTOR	0	0	0	0	0	0	0	0	1	1	1	1

ALTITUDE DERATION FACTORS AT RATED SPEED

INLET AIR TEMP °F	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1	1	1	0.98	0.95	0.91	0.88	0.84	0.81	0.78	0.75	0.72	0.69
120	1	1	1	1	0.96	0.93	0.89	0.86	0.82	0.79	0.76	0.73	0.70
110	1	1	1	1	0.98	0.94	0.91	0.87	0.84	0.80	0.77	0.74	0.71
100	1	1	1	1	1	0.96	0.92	0.89	0.85	0.82	0.79	0.75	0.72
90	1	1	1	1	1	0.98	0.94	0.90	0.87	0.83	0.80	0.77	0.74
80	1	1	1	1	1	0.99	0.96	0.92	0.88	0.85	0.81	0.78	0.75
70	1	1	1	1	1	1	0.97	0.94	0.90	0.86	0.83	0.80	0.76
60	1	1	1	1	1	1	0.99	0.95	0.92	0.88	0.85	0.81	0.78
50	1	1	1	1	1	1	1	0.97	0.94	0.90	0.86	0.83	0.79

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)

INLET AIR TEMP °F	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	2.69	2.98	3.27	3.57	3.87	4.18	4.18	4.18	4.18	4.18	4.18	4.18	4.18
120	2.35	2.63	2.92	3.21	3.51	3.81	3.81	3.81	3.81	3.81	3.81	3.81	3.81
110	2	2.28	2.56	2.85	3.14	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44
100	1.66	1.93	2.21	2.49	2.78	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07
90	1.32	1.58	1.86	2.13	2.42	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
80	1	1.24	1.50	1.77	2.05	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34
70	1	1	1.15	1.42	1.69	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.97
60	1	1	1	1.06	1.33	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
50	1	1	1	1	1	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23

ALTITUDE (FEET ABOVE SEA LEVEL)

MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM)

INLET AIR TEMP °F	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1300	1300	1360	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
120	1300	1300	1330	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
110	1300	1300	1300	1370	1400	1400	1400	1400	1400	1400	1400	1400	1400
100	1300	1300	1300	1330	1400	1400	1400	1400	1400	1400	1400	1400	1400
90	1300	1300	1300	1300	1370	1400	1400	1400	1400	1400	1400	1400	1400
80	1300	1300	1300	1300	1340	1400	1400	1400	1400	1400	1400	1400	1400
70	1300	1300	1300	1300	1300	1380	1400	1400	1400	1400	1400	1400	1400
60	1300	1300	1300	1300	1300	1340	1400	1400	1400	1400	1400	1400	1400
50	1300	1300	1300	1300	1300	1300	1380	1400	1400	1400	1400	1400	1400

ALTITUDE (FEET ABOVE SEA LEVEL)

FUEL USAGE GUIDE:

This table shows the derate factor and full load set point timing required for a given fuel. Note that deration and set point timing adjustment may be required as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar methane number calculation.

ALTITUDE DERATION FACTORS:

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site.

ACTUAL ENGINE RATING:

To determine the actual rating of the engine at site conditions, one must consider separately, limitations due to fuel characteristics and air system limitations. The Fuel Usage Guide deration establishes fuel limitations. The Altitude/Temperature deration factors and RPC (reference the Caterpillar Methane Program) establish air system limitations. RPC comes into play when the Altitude/Temperature deration is less than 1.0 (100%). Under this condition, add the two factors together. When the site conditions do not require an Altitude/ Temperature derate (factor is 1.0), it is assumed the turbocharger has sufficient capability to overcome the low fuel relative power, and RPC is ignored. To determine the actual power available, take the lowest rating between 1) and 2).

1) Fuel Usage Guide Deration
2) 1-((1-Altitude/Temperature Deration) + (1-RPC))

AFTERCOOLER HEAT REJECTION FACTORS(ACHRF):

To maintain a constant air inlet manifold temperature, as the inlet air temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor (ACHRF) to adjust for inlet air temp and altitude conditions. See note 24 for application of this factor in calculating the heat exchanger sizing criteria. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM):

This table shows the minimum allowable engine turndown speed where the engine will maintain the Rated Speed's Torque for the given ambient conditions.

NOTES:

1. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.
2. ISO 3046/1 engine efficiency tolerance is (+)0, (-)5% of full load % efficiency value. Nominal engine efficiency tolerance is ± 5.0% of full load % efficiency value.
3. ISO 3046/1 fuel consumption tolerance is (+)5, (-)0% of full load data. Nominal fuel consumption tolerance is ± 5.0% of full load data.
4. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.
5. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.
6. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.
7. Inlet manifold temperature is a nominal value with a tolerance of ± 9°F.
8. Timing indicated is for use with the minimum fuel methane number specified. Consult the appropriate fuel usage guide for timing at other methane numbers.
9. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
10. Exhaust flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 6 %.
11. Emissions data is at engine exhaust flange prior to any after treatment.
12. NOx values are "Not to Exceed".
13. CO, CO2, THC, NMHC, NMNEHC, and HCHO values are "Not to Exceed" levels. THC, NMHC, and NMNEHC do not include aldehydes.
14. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
15. Exhaust Oxygen tolerance is ± 0.5.
16. LHV rate tolerance is ± 5.0%.
17. Heat rejection to jacket water value displayed includes heat to jacket water alone. Value is based on treated water. Tolerance is ± 10% of full load data.
18. Heat rejection to atmosphere based on treated water. Tolerance is ± 50% of full load data.
19. Lube oil heat rate based on treated water. Tolerance is ± 20% of full load data.
20. Exhaust heat rate based on treated water. Tolerance is ± 10% of full load data.
21. Heat rejection to exhaust (LHV to 77°F) value shown includes unburned fuel and is not intended to be used for sizing or recovery calculations.
22. Heat rejection to aftercooler based on treated water. Tolerance is ±5% of full load data.
23. Total Jacket Water Circuit heat rejection is calculated as: (JW x 1.1) + (OC x 1.2). Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.
24. Total Aftercooler Circuit heat rejection is calculated as: AC x ACHRF x 1.05. Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.

ENGINE POWER (bhp):	400	COOLING SYSTEM:	JW+OC, AC
ENGINE SPEED (rpm):	1800	AFTERCOOLER WATER INLET (°F):	130
EXHAUST MANIFOLD:	WC	JACKET WATER OUTLET (°F):	210

Free Field Mechanical and Exhaust Noise

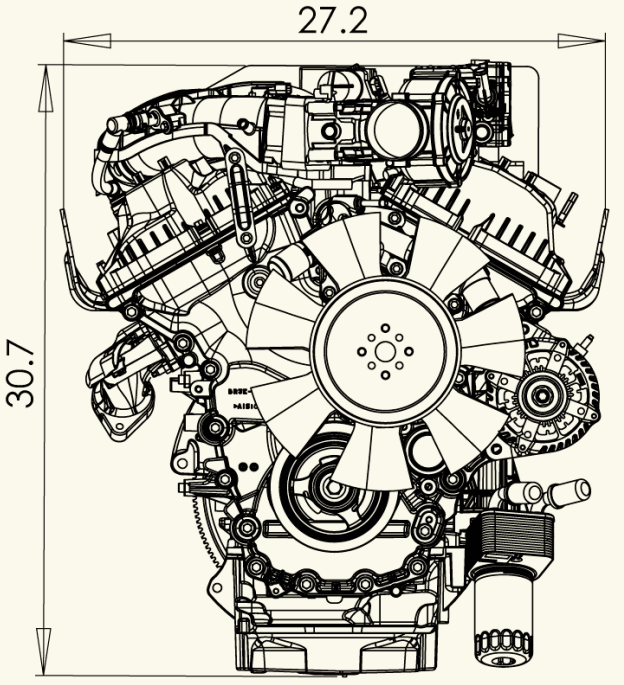
SOUND PRESSURE LEVEL (dB)										
Octave Band Center Frequency (OBCF)										
100% Load Data			dB(A)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Mechanical Sound	Distance from the Engine (ft)	3.3	94.5	82.4	85.4	84.4	87.4	91.4	87.4	82.4	83.4
		23.0	83.5	74.7	79.7	74.7	76.7	78.7	77.7	73.7	72.7
		49.2	77.5	69.4	74.4	68.4	70.4	73.4	71.4	67.4	64.4
Exhaust Sound	Distance from the Engine (ft)	4.9	109.9	107.1	109.5	108.8	105.8	101.3	101.8	102.8	101.1
		23.0	96.5	96	100.3	96	90.7	89.3	88.3	89.3	86
		49.2	89.9	89.3	93.6	89.3	84	82.6	81.6	82.6	79.4

SOUND PARAMETER DEFINITION:

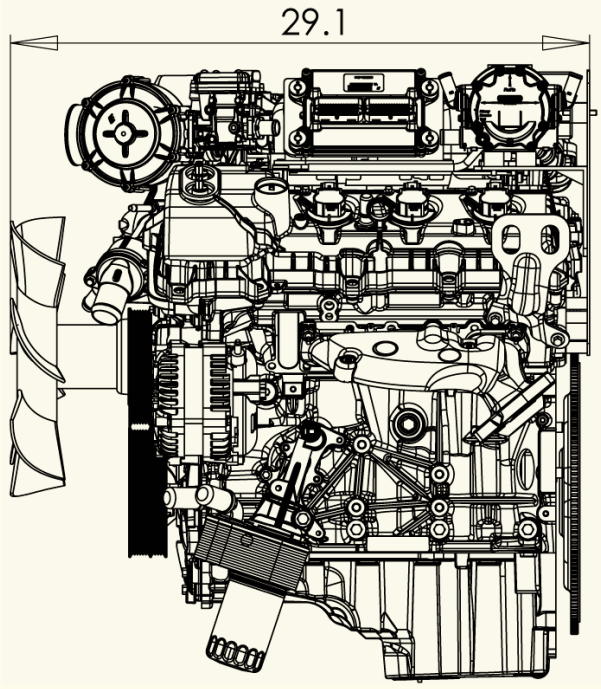
Data Variability Statement:
Sound data presented by Caterpillar has been measured in accordance with ISO 6798 in a Grade 3 test environment. Measurements made in accordance with ISO 6798 will result in some amount of uncertainty. The uncertainties depend not only on the accuracies with which sound pressurelevels and measurement surface areas are determined, but also on the 'near-field error' which increases for smaller measurement distances and lower frequencies. The uncertainty for a Grade 3 test environment, that has a source that produces sounds that are uniformly distributed in frequency over the frequency range of interest, is equal to 4 dB (A-weighted). This uncertainty is expressed as the largest value of the standard deviation.

Installation Drawings

Front End View

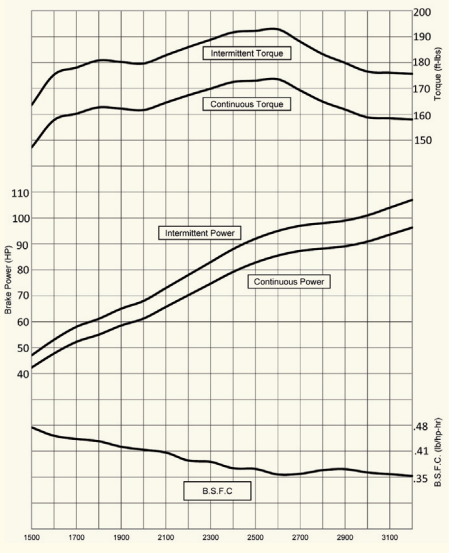


Left Side View

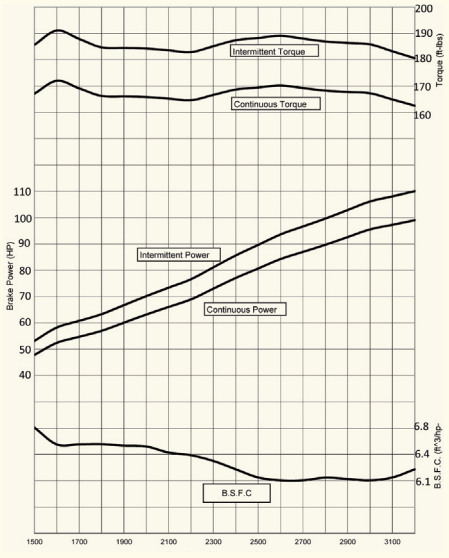


Power Curves (corrected per SAE J1349)

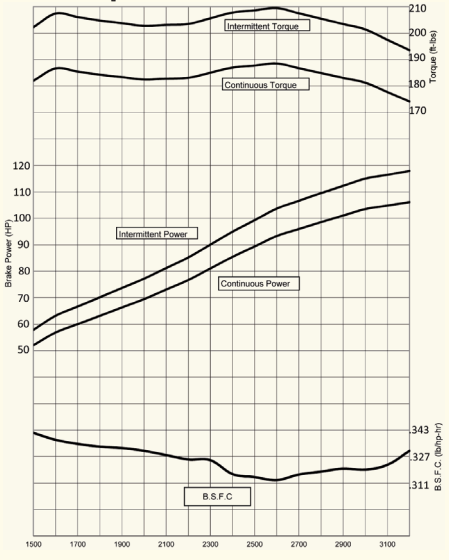
Gasoline



Natural Gas



Liquefied Petroleum Gas



Ford Power Products

Powertrain Assemblies & Components Provided By Ford Component Sales

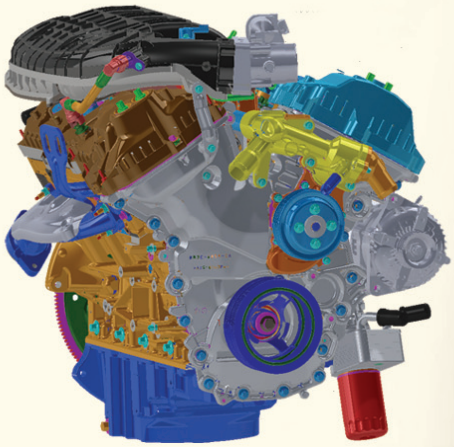
For additional information Contact:

ENGINE DISTRIBUTORS INC.

400 University Ct • Blackwood NJ 08012
856/228-7298 • Fax:856/228-5531
www.edi-dist.com

CSG-637 EFI

3.7 Liter
6-Cylinder



Options

Engine Cooling Fans
- 14" (355mm) diameter suction
- 14" (355mm) diameter pusher

Flywheels
- 11.5" (292mm) SAE over-center clutch
- flat face flywheel

Flywheel Housings
- SAE #3

Exhaust Manifold
- rear dump down

Power Steering Pump
Air Conditioning
Wiring Harnesses
Discrete Speed Switch
Variable Speed Hand Throttle
Variable Speed Foot Pedal
Engine Mounts
- Automotive with insulators
- Open power unit

Electronic Instrument Panel, Gauges
Three Way Catalyst / Muffler Standard

Transmissions

6R80 electronic shift

Emissions Information

California Air Resources Board (CARB)
Environmental Protection Agency (EPA)
Emission Certified Packages

Warranty

Contact Engine Distributors, Inc
for warranty details.

Power Products

Powertrain Assemblies
& Components
Provided By Ford
Component Sales

Specifications

Engine Type	V-6
Bore and Stroke	3.7"x 3.4" (94mm x 86mm)
Displacement	3.7L Liter (225.7 CID)
Compression Ratio	10.5:1
Oil Capacity	6 qts. including filter
Net Weight	355 Lbs. with accessories (161 Kgs.)
Dimensions	L 25.4" x W 29.5" x H 29.4" (646 mm x 751 mm x 748 mm)

Gasoline (corrected per SAE J1349)

Unleaded 87 or 89 octane

Intermittent Power	107 [HP] @ 3200rpm	(80 [kW] @ 3200rpm)
Continuous Power	96 [HP] @ 3200rpm	(72 [kW] @ 3200rpm)
Intermittent Torque	193 [ft-lbs] @ 2600rpm	(261 [N-m] @ 2600rpm)
Continuous Torque	173 [ft-lbs] @ 2600rpm	(235 [N-m] @ 3200rpm)

Natural Gas (corrected per SAE J1349)

Fuel Specification	1050 BTU/FT3	
Intermittent Power	110 [HP] @ 3200rpm	(82 [kW] @ 3200rpm)
Continuous Power	99 [HP] @ 3200rpm	(74 [kW] @ 3200rpm)
Intermittent Torque	191 [ft-lbs] @1600rpm	(259 [N-m] @ 1600rpm)
Continuous Torque	172 [ft-lbs] @1600rpm	(233 [N-m] @ 1600rpm)

Liquefied Petroleum Gas (corrected per SAE J1349)

Fuel Specification	HD-5	
Intermittent Power	118 [HP] @ 3200rpm	(88 [kW] @ 3200rpm)
Continuous Power	106 [HP] @ 3200rpm	(79 [kW] @ 3200rpm)
Intermittent Torque	209 [ft-lbs] @ 2600rpm	(284 [N-m] @ 2600rpm)
Continuous Torque	188 [ft-lbs] @ 2600rpm	(255 [N-m] @ 2600rpm)

Standard Features / Benefits

Set-for-life valvetrain

Deep skirted, ribbed cylinder block casting for rigidity

150 AMP Alternator

Aluminum cylinder block and heads.

Chain driven dual camshafts with automatic tensioning system

Structural front cover and deep sump oil pan

Alternate fuel ready valvetrain components

Individual coil on plug electronic ignition

Four main bolts with side bolts through block for strength and durability

Gasoline Sequential Port Fuel Injection

Closed loop fuel control for all fuels

Electronic engine management system with built-in engine protection against detonation, high coolant temperature, low oil pressure, over speed shutdown and starter lockout

Next generation governing – discrete speeds, variable speeds, drive by wire – using the highest quality components.

Variable CAM Timing for intake camshafts - advances or retards timing to maximize engine power and fuel efficiency

Forged steel crankshaft

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2015 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Engine Distributors, Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: FEDIB03.7CSG-006

Effective Date: 06/08/2015

Expiration Date: 12/31/2015

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 06/08/2015

Revision Date: N/A

Manufacturer: Engine Distributors, Inc.
Engine Family: FEDIB03.7CSG
Mobile/Stationary Certification Type: Mobile and Stationary
Fuel : LPG/Propane
Gasoline (up to and including 10% Ethanol)
Natural Gas (CNG/LNG)
Emission Standards :
Mobile Part 1048
HC + NOx (g/kW-hr) : 0.8
NMHC + NOx (g/kW-hr) : 0.8
CO (g/kW-hr) : 20.6
Part 60 Subpart JJJ Table 1
NOx (g/kW-hr) : 1.3
HC + NOx (g/kW-hr) : 0.8
CO (g/kW-hr) : 2.7
CO (g/kW-hr) : 20.6
VOC (g/kW-hr) : 0.9
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 1048. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60, 40 CFR Part 1048. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60, 40 CFR Part 1048.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

ATTACHMENT O

Truck Loading Data Sheet

ATTACHMENT O – TANKER TRUCK/RAIL CAR LOADING DATA SHEET

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

Truck/Rail Car Loadout Collection Efficiencies

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

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

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

Emission Unit ID#: S017	Emission Point ID#: C001-C002, E017	Year Installed/Modified: N/A
Emission Unit Description: Uncaptured losses from loading of produced fluids into tanker trucks		
Loading Area Data		
Number of Pumps: 1	Number of Liquids Loaded: 1	Max number of trucks/rail cars loading at one (1) time: 1
Are tanker trucks/rail cars pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ Not Required If Yes, Please describe:		
Provide description of closed vent system and any bypasses. Trucks utilize vapor recovery lines to route displaced vapors back into battery of tanks.		
Are any of the following truck/rail car loadout systems utilized? ☐ Closed System to tanker truck/rail car passing a MACT level annual leak test? ☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test? ☒ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return?		

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

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

Bulk Liquid Data (use extra pages as necessary)

Liquid Name	Produced Fluids		
Max. Daily Throughput (1000 gal/day)	See attached emissions calculations for all throughput values		
Max. Annual Throughput (1000 gal/yr)	See attached emissions calculations for all throughput values		
Loading Method[1]	SP		
Max. Fill Rate (gal/min)	Varies		
Average Fill Time (min/loading)	Varies		
Max. Bulk Liquid Temperature (°F)	See ProMax results		
True Vapor Pressure[2]	See ProMax results		
Cargo Vessel Condition[3]	U		
Control Equipment or Method[4]	VB, ECD (captured loading losses)		

Max. Collection Efficiency (%)		70		
Max. Control Efficiency (%)		98		
Max.VOC Emission Rate	Loading (lb/hr)	See attached emission calculations for breakdown		
	Annual (ton/yr)	See attached emission calculations for breakdown		
Max.HAP Emission Rate	Loading (lb/hr)	See attached emission calculations for breakdown		
	Annual (ton/yr)	See attached emission calculations for breakdown		
Estimation Method[5]		AP-42 Section 5.2 Methodology (via ProMax)		

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

3 B Ballasted Vessel C Cleaned U Uncleaned (dedicated service)
O Other (describe)

4 List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets)
CA Carbon Adsorption VB Dedicated Vapor Balance (closed system)
ECD Enclosed Combustion Device F Flare
TO Thermal Oxidization or Incineration

5 EPA EPA Emission Factor in AP-42 MB Material Balance
TM Test Measurement based upon test data submittal O Other (describe)

ATTACHMENT P

Glycol Dehydrator Data Sheet *(Not Applicable)*

ATTACHMENT P – GLYCOL DEHYDRATION UNIT DATA SHEET - NOT APPLICABLE

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

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

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

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

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

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

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

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

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

What happens when temperature controller shuts off fuel to the reboiler?
☐ Still vent emissions to the atmosphere.
☐ Still vent emissions stopped with valve.
☐ Still vent emissions to glow plug.

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

Control Device Technical Data

Pollutants Controlled	Manufacturer's Guaranteed Control Efficiency (%)

Emissions Data

Emission Unit ID / Emission Point ID[4]	Description	Calculation Methodology[5]	PTE[6]	Controlled Maximum Hourly Emissions (lb/hr)	Controlled Maximum Annual Emissions (tpy)
	Reboiler Vent		NO_x		
			CO		
			VOC		
			SO_2		
			PM_{10}		

			GHG (CO_2e)		
	Glycol Regenerator Still Vent	GRI-GlyCalc™	VOC		
		GRI-GlyCalc™	Benzene		
		GRI-GlyCalc™	Toluene		
		GRI-GlyCalc™	Ethylbenzene		
		GRI-GlyCalc™	Xylenes		
		GRI-GlyCalc™	n-Hexane		
	Glycol Flash Tank	GRI-GlyCalc™	VOC		
		GRI-GlyCalc™	Benzene		
		GRI-GlyCalc™	Toluene		
		GRI-GlyCalc™	Ethylbenzene		
		GRI-GlyCalc™	Xylenes		
		GRI-GlyCalc™	n-Hexane		

1 Enter the Source Status using the following codes:
NS Construction of New Source ES Existing Source
MS Modification of Existing Source

2 Enter the date (or anticipated date) of the glycol dehydration unit's installation (construction of source), modification or removal.

3 Enter the Air Pollution Control Device (APCD)/Emission Reduction Device (ERD) type designation using the following codes and the device ID number:
NA None CD Condenser FL Flare
CC Condenser/Combustion Combination TO Thermal Oxidizer O Other (please list)

4 Enter the appropriate Emission Unit ID Numbers and Emission Point ID Numbers for the glycol dehydration unit reboiler vent and glycol regenerator still vent. The glycol dehydration unit reboiler vent and glycol regenerator still vent should be designated RBV-1 and RSV-1, respectively. If the well site incorporates multiple glycol dehydration units, a Glycol Dehydration Emission Unit Data Sheet shall be completed for each, using Source Identification RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

5 Enter the Potential Emissions Data Reference designation using the following codes:
MD Manufacturer's Data AP AP-42
GR GRI-GLYCalc™ OT Other (please list)

6 Enter the Reboiler Vent and Glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The Glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). **Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc™ Aggregate Calculations Report (shall include emissions reports, equipment reports, and stream reports) to this Glycol Dehydration Emission Unit Data Sheet(s). Backup pumps do not have to be considered as operating for purposes of PTE.** This PTE data shall be incorporated in the Emissions Summary Sheet.

ATTACHMENT Q

Pneumatic Controller Data Sheet

ATTACHMENT Q – PNEUMATIC CONTROLLERS DATA SHEET

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

☐ Yes ☒ No

Please list approximate number.

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

☐ Yes ☒ No

Please list approximate number.

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

☐ Yes ☒ No

Please list approximate number.

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

☐ Yes ☒ No

Please list approximate number.

ATTACHMENT R

Pneumatic Pump Data Sheet *(Not Applicable)*

ATTACHMENT R – PNEUMATIC PUMP DATA SHEET

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

☐ Yes ☒ No

Please list.

Source ID #	Date	Pump Make/Model	Pump Size

ATTACHMENT S

Air Pollution Control Device Data Sheet

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

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

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

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

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

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **C001** **Capture Efficiency – 100%** **Control Efficiency – 98%**	Installation Date: ☒ New ☐ Modified ☐ Relocated
Maximum Rated Total Flow Capacity ~7,850 scfh 188,000 scfd	Maximum Design Heat Input (from mfg. spec sheet) 11.66 MMBTU/hr Design Heat Content 1,500 BTU/scf

Control Device Information

Type of Vapor Combustion Control?

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

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

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# S001-S006, S016)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
S001-S006	Produced Fluids Tank		
S017	Captured Liquid Loading		

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

Assist Type (Flares only)	Flare Height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☒ Non	~25 feet	4 feet	☐ Yes ☐ No ☒ N/A Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate 130 (scfm)	Heat Value of Waste Gas Stream Varies BTU/ft^3	Exit Velocity of the Emissions Stream Varies (ft/s)

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

Pilot Gas Information

Number of Pilot Lights 1	Fuel Flow Rate to Pilot Flame per Pilot ~50 scfh	Heat Input per Pilot 0.05 BTU/hr	Will automatic re-ignition be used? ☐ Yes ☒ No

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

Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	If Yes, what type? ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

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

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer’s data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **C002** **Capture Efficiency – 100%** **Control Efficiency – 98%**	Installation Date: ☒ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity ~12,812.5 scfh 307,500 scfd	Maximum Design Heat Input (from mfg. spec sheet) 19.22 MMBTU/hr	Design Heat Content 1,500 BTU/scf

Control Device Information

Type of Vapor Combustion Control?

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

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

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# S001-S006, S016)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
S001-S006	Produced Fluids Tank		
S017	Captured Liquid Loading		

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

Assist Type (Flares only)	Flare Height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☒ Non	~25 feet	4 feet	☐ Yes ☐ No ☒ N/A Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate 130 (scfm)	Heat Value of Waste Gas Stream Varies BTU/ft^3	Exit Velocity of the Emissions Stream Varies (ft/s)

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

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
1	~50 scfh	0.05 MMBTU/hr	☐ Yes ☒ No

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

Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	If Yes, what type? ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

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

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer’s data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

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

ADSORPTION SYSTEM – Not Applicable		
General Information		
Control Device ID#:	Installation Date: ☐ New ☐ Modified ☐ Relocated	
Manufacturer:	Model:	Control Device Name:
Design Inlet Volume: scfm	Adsorbent charge per adsorber vessel and number of adsorber vessels:	
Length of Mass Transfer Zone supplied by the manufacturer:	Adsorber diameter: ft Adsorber area: ft^2	
Adsorbent type and physical properties:	Overall Control Efficiency (%):	
Working Capacity of Adsorbent (%):		
Operating Parameters		
Inlet volume: scfm @ °F		
Adsorption time per adsorption bed (life expectancy):	Breakthrough Capacity (lbs of VOC/100 lbs of adsorbent):	
Temperature range of carbon bed adsorber. °F - °F		
Control Device Technical Data		
Pollutants Controlled	Manufacturer's Guaranteed Control Efficiency (%)	
Describe the warning and/or alarm system that protects against operation when unit is not meeting the design requirements:		
Has the control device been tested by the manufacturer and certified?		
Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty.		
Additional information attached? ☐ Yes ☐ No Please attach copies of manufacturer's data sheets, drawings, and performance testing.		

VAPOR RECOVERY UNIT

General Information

Emission Unit ID#: S015, S016	Installation Date: TBD ☒ New ☐ Modified ☐ Relocated

Device Information

Manufacturer: Caterpillar & Engine Distributors Inc
Model: G3408 & CSG-637

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

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
NA	Low Pressure Separator		

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

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, and performance testing.

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

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

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

		Item/Tag No.:		Page	1	of	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

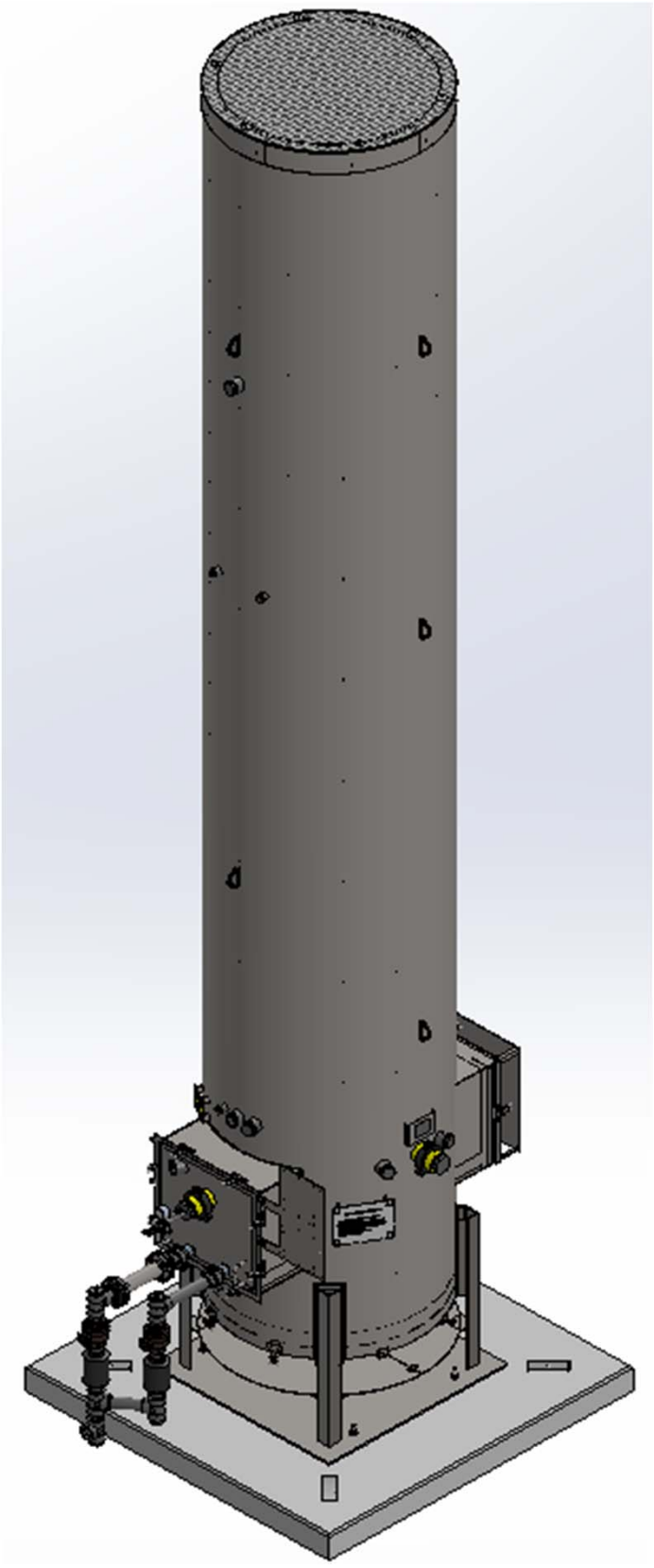
Special requirements	☐ Skid Mounted ☑ Concrete Pad ☐ Other
Inspection	☑ Vendor Standard ☐ Other. Specify:
Material Certification	☑ Vendor Standard ☐ MTR ☐ Certificate of Compliance ☐ Other (Specify):
NDE	☑ Vendor Standard ☐ Radiography. Specify: ☐ Ultrasonic. Specify: ☐ Liquid Penetrant. ☐ Magnetic Particles.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



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

GENERAL

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

PROCESS DATA

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

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

DESIGN DATA

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

EQUIPMENT SPECIFICATION

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

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

EQUIPMENT SPECIFICATION

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

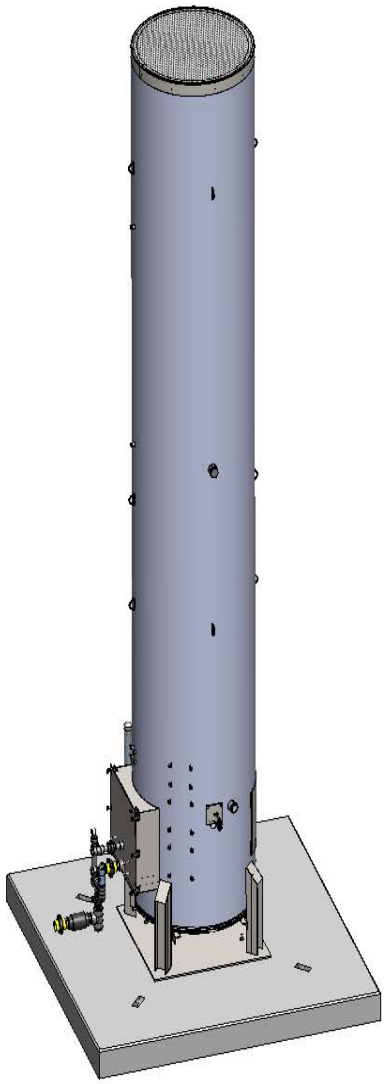
FABRICATION AND INSPECTION

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

Additional Notes:

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

GENERAL ARRANGEMENT



§ MMBTU/hr values are calculated based on 1500 BTU/scf gas

Flare Size	# of Orifices (N)	Pressure (OZ/in^2)	m^3/s	mSCFD	MMBTU/hr
18	2	1	0.0021	6.34	0.39
18	2	2	0.0029	8.97	0.56
18	2	3	0.0036	10.99	0.68
18	2	4	0.0042	12.69	0.78
18	2	5	0.0046	14.18	0.88
18	2	6	0.0051	15.54	0.96
18	2	7	0.0055	16.78	1.04
18	2	8	0.0059	17.94	1.11
18	2	9	0.0062	19.03	1.18
18	2	10	0.0066	20.06	1.24
18	2	11	0.0069	21.04	1.30
18	2	12	0.0072	21.97	1.36
18	2	13	0.0075	22.87	1.42
18	2	14	0.0078	23.73	1.47
18	2	15	0.0081	24.57	1.52
18	2	16	0.0083	25.37	1.57
18	2	17	0.0086	26.15	1.62
18	2	18	0.0088	26.91	1.67
24	4	1	0.0042	12.69	0.78
24	4	2	0.0059	17.94	1.11
24	4	3	0.0072	21.97	1.36
24	4	4	0.0083	25.37	1.57
24	4	5	0.0093	28.37	1.76
24	4	6	0.0102	31.08	1.92
24	4	7	0.0110	33.56	2.08
24	4	8	0.0118	35.88	2.22
24	4	9	0.0125	38.06	2.35
24	4	10	0.0131	40.12	2.48
24	4	11	0.0138	42.08	2.60
24	4	12	0.0144	43.95	2.72
24	4	13	0.0150	45.74	2.83
24	4	14	0.0156	47.47	2.94
24	4	15	0.0161	49.13	3.04
24	4	16	0.0166	50.75	3.14
24	4	17	0.0171	52.31	3.24
24	4	18	0.0176	53.82	3.33
36	10	1	0.0104	31.72	1.96
36	10	2	0.0147	44.85	2.78
36	10	3	0.0180	54.93	3.40

36	10	4	0.0208	63.43	3.92
36	10	5	0.0232	70.92	4.39
36	10	6	0.0255	77.69	4.81
36	10	7	0.0275	83.91	5.19
36	10	8	0.0294	89.71	5.55
36	10	9	0.0312	95.15	5.89
36	10	10	0.0329	100.29	6.21
36	10	11	0.0345	105.19	6.51
36	10	12	0.0360	109.87	6.80
36	10	13	0.0375	114.35	7.08
36	10	14	0.0389	118.67	7.34
36	10	15	0.0403	122.83	7.60
36	10	16	0.0416	126.86	7.85
36	10	17	0.0429	130.77	8.09
36	10	18	0.0441	134.56	8.33
48	14	1	0.0146	44.40	2.75
48	14	2	0.0206	62.79	3.89
48	14	3	0.0252	76.91	4.76
48	14	4	0.0291	88.80	5.49
48	14	5	0.0325	99.29	6.14
48	14	6	0.0356	108.76	6.73
48	14	7	0.0385	117.48	7.27
48	14	8	0.0412	125.59	7.77
48	14	9	0.0437	133.21	8.24
48	14	10	0.0460	140.41	8.69
48	14	11	0.0483	147.27	9.11
48	14	12	0.0504	153.81	9.52
48	14	13	0.0525	160.09	9.91
48	14	14	0.0545	166.14	10.28
48	14	15	0.0564	171.97	10.64
48	14	16	0.0582	177.61	10.99
48	14	17	0.0600	183.07	11.33
48	14	18	0.0617	188.38	11.66

ATTACHMENT T

Emission Calculations

Company Name: **EQT Production, LLC**
Facility Name: **OXF-155 Wellpad**
Project Description: **G70-D Application**

Facility-Wide Emission Summary - Controlled

Wells	6	per pad
Storage Tanks	6	per pad
Sand Separator Tank	1	per pad
Line Heaters	7	per pad
Compressor	2	per pad
High Pressure Separator	6	per pad
Low Pressure Separator	1	per pad
Vapor Recovery Unit	1	per pad
Tank Combustor	2	per pad
Length of lease road	2,100	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-C002	S001-S006	Storage Vessels	---	---	---	---	0.41	1.79	---	---	---	---	---	---	0.29	1.26	7.17	31.41
C001-C002	S017	Captured Liquid Loading	---	---	---	---	1.73	0.45	---	---	---	---	---	---	---	---	---	---
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	0.00	0.00	1,371.10	6,005.43
C002	C002	Tank Combustor	1.89	8.28	1.59	6.95	2.8E-04	1.2E-03	0.01	0.05	0.14	0.63	0.14	0.63	0.00	0.00	2,256.10	9,881.72
C001	**S001-S006, S017, C001**	**---**	**1.15**	**5.03**	**0.96**	**4.22**	**1.07**	**1.12**	**0.01**	**0.03**	**0.09**	**0.38**	**0.09**	**0.38**	**0.14**	**0.63**	**1374.69**	**6021.14**
C002	**S001-S006, S017, C002**	**---**	**1.89**	**8.28**	**1.59**	**6.95**	**1.07**	**1.12**	**0.01**	**0.05**	**0.14**	**0.63**	**0.14**	**0.63**	**0.14**	**0.63**	**2259.68**	**9897.42**
E007	S007	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E008	S008	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E009	S009	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E010	S010	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E011	S011	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E012	S012	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E013	S013	Separator Heater	0.22	0.96	0.18	0.81	0.01	0.05	1.3E-03	5.8E-03	0.02	0.07	0.02	0.07	0.01	0.02	270.27	1,183.79
E014	S014	Sand Separator Tank	---	---	---	---	0.19	0.83	---	---	---	---	---	---	0.02	0.09	0.50	2.18
E015	S015	Caterpillar VRU Engine	2.14	9.39	2.23	9.78	0.17	0.74	2.0E-03	0.01	0.06	0.28	0.06	0.28	0.01	0.03	391.72	1,715.75
E016	S016	EDI VRU Engine	0.24	1.06	0.49	2.12	0.18	0.81	4.2E-04	1.8E-03	0.01	0.06	0.01	0.06	0.00	0.01	83.85	367.28
E017	S017	Uncaptured Liquid Loading	---	---	---	---	37.13	9.65	---	---	---	---	---	---	---	---	---	---
---	---	Fugitives	---	---	---	---	---	36.30	---	---	---	---	---	---	---	44.12	---	1,103.11
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	1.76	---	0.18	---	---	---	---
Facility Total			6.52	28.57	6.19	27.12	39.88	50.84	0.03	0.12	0.39	3.48	0.39	1.90	0.34	45.61	5,462.89	25,030.58
Facility Total (excluding fugitive emissions)			6.52	28.57	6.19	27.12	39.88	14.54	0.03	0.12	0.39	1.72	0.39	1.72	0.34	1.50	5,462.89	23,927.47

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-155 Wellpad
Project Description: G70-D Application

Facility-Wide Emission Summary - Controlled

Emission Point ID #	Emission Source ID#s	Emission Source Description	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		n-Hexane		Total BTEX		Total HAP	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001-C002	S001-S006	Storage Vessels	---	---	1.8E-04	7.8E-04	3.6E-04	1.6E-03	2.4E-05	1.0E-04	2.2E-04	9.5E-04	0.05	0.21	7.7E-04	3.4E-03	0.05	0.21
C001-C002	S017	Captured Liquid Loading	---	---	1.0E-03	2.6E-04	1.2E-03	3.1E-04	6.2E-05	1.6E-05	5.3E-04	1.4E-04	0.17	0.04	2.8E-03	7.3E-04	0.17	0.04
C001	C001	Tank Combustor	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
C002	C002	Tank Combustor	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
C001	**S001-S006, S017, C001**	**---**	---	---	**5.9E-04**	**5.2E-04**	**7.7E-04**	**9.3E-04**	**4.3E-05**	**6.0E-05**	**3.7E-04**	**5.4E-04**	**1.1E-01**	**1.3E-01**	**1.8E-03**	**2.1E-03**	**1.1E-01**	**1.3E-01**
C002	**S001-S006, S017, C002**	**---**	---	---	**5.9E-04**	**5.2E-04**	**7.7E-04**	**9.3E-04**	**4.3E-05**	**6.0E-05**	**3.7E-04**	**5.4E-04**	**1.1E-01**	**1.3E-01**	**1.8E-03**	**2.1E-03**	**1.1E-01**	**1.3E-01**
E007	S007	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	8.1E-06	3.5E-05	2.8E-03	0.01
E008	S008	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	8.1E-06	3.5E-05	2.8E-03	0.01
E009	S009	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	8.1E-06	3.5E-05	2.8E-03	0.01
E010	S010	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	8.1E-06	3.5E-05	2.8E-03	0.01
E011	S011	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	8.1E-06	3.5E-05	2.8E-03	0.01
E012	S012	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	8.1E-06	3.5E-05	2.8E-03	0.01
E013	S013	Separator Heater	1.6E-04	7.2E-04	4.6E-06	2.0E-05	7.5E-06	3.3E-05	---	---	---	---	4.0E-03	0.02	1.2E-05	5.3E-05	4.1E-03	0.02
E014	S014	Sand Separator Tank	---	---	<0.01	1.0E-03	<0.01	1.0E-03	<0.01	<0.01	<0.01	<0.01	4.0E-03	<0.01	<0.01	2.0E-03	4.0E-03	1.9E-02
E015	S015	Caterpillar VRU Engine	0.07	0.31	5.3E-03	2.3E-02	1.9E-03	8.2E-03	8.3E-05	3.6E-04	6.5E-04	2.9E-03	---	---	0.01	0.03	0.11	0.49
E016	S016	EDI VRU Engine	0.01	0.06	1.1E-03	5.0E-03	4.0E-04	1.8E-03	1.8E-05	7.8E-05	1.4E-04	6.1E-04	---	---	1.7E-03	0.01	0.02	0.10
E017	S017	Uncaptured Liquid Loading	---	---	0.02	0.01	0.03	0.01	1.3E-03	3.4E-04	1.1E-02	3.0E-03	3.61	0.94	0.06	0.02	3.67	0.96
---	---	Fugitives	---	---	---	<0.01	---	<0.01	---	<0.01	---	<0.01	---	4.70	---	<0.01	<0.01	4.88
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Total			0.09	0.38	0.03	0.04	0.03	0.02	1.5E-03	9.0E-04	0.01	0.01	3.85	5.98	0.07	0.06	4.05	6.79
Facility Total (excluding fugitive emissions)			0.09	0.38	2.9E-02	0.04	2.9E-02	2.0E-02	1.5E-03	9.0E-04	1.3E-02	7.5E-03	3.85	1.28	0.07	0.06	4.05	1.91

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-155 Wellpad
Project Description: G70-D Application

Produced Fluids Storage Vessels

Potential Throughput

Operational Hours	8,760	hrs/yr
Maximum Condensate Throughput[1]	4,876	bbl/month
Maximum Produced Water Throughput[1]	26,723	bbl/month

Overall Control Efficiency of Combustors 95%

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	5.736	25.125	5.736	25.125
Ethane	<0.001	<0.001	<0.001	<0.001	3.881	16.999	3.881	16.999
Propane	0.031	0.134	0.920	4.028	2.062	9.033	3.013	13.195
Isobutane	0.008	0.035	0.157	0.689	0.582	2.549	0.747	3.273
n-Butane	0.018	0.081	0.392	1.716	1.389	6.086	1.800	7.882
Isopentane	0.007	0.033	0.135	0.591	0.599	2.623	0.741	3.247
n-Pentane	0.007	0.030	0.119	0.520	0.570	2.499	0.696	3.048
n-Hexane	0.010	0.042	0.166	0.728	0.775	3.394	0.951	4.164
Cyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	0.001	0.004	0.014	0.062	0.069	0.302	0.084	0.367
n-Octane	4.5E-04	0.002	0.008	0.034	0.038	0.167	0.046	0.203
n-Nonane	1.0E-04	4.6E-04	0.002	0.008	0.009	0.040	0.011	0.048
n-Decane	1.4E-04	0.001	0.002	0.011	0.013	0.055	0.015	0.067
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	0.002	0.010	0.043	0.045	0.199	0.056	0.245
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	1.3E-05	5.8E-05	0.002	0.007	0.002	0.008	0.004	0.016
Toluene	3.6E-05	1.6E-04	0.002	0.007	0.005	0.024	0.007	0.031
Ethylbenzene	2.9E-06	1.3E-05	7.0E-05	3.1E-04	4.0E-04	0.002	4.7E-04	0.002
m-Xylene	2.6E-05	1.1E-04	0.001	0.003	0.004	0.016	0.004	0.019
Isooctane	2.6E-06	1.1E-05	4.5E-05	2.0E-04	2.2E-04	0.001	2.6E-04	0.001
Total VOC Emissions:	0.08	0.36	1.93	8.45	6.16	27.00	8.18	35.81
Total HAP Emissions:	9.7E-03	0.04	0.17	0.75	0.79	3.45	0.97	4.23

[1] Uncontrolled emissions calculation using Promax (sum of produced water and condensate). Non-methane emissions are taken from the tank emissions stencil. Methane emissions are taken from the flash stream composition.
[2] Composition of condensate from OXF-136 sample from 3/10/2013.

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D 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	0.287	1.256	0.287	1.256
Ethane	<0.001	<0.001	<0.001	<0.001	0.194	0.850	0.194	0.850
Propane	0.002	0.007	0.046	0.201	0.103	0.452	0.151	0.660
Isobutane	3.9E-04	0.002	0.008	0.034	0.029	0.127	0.037	0.164
n-Butane	0.001	0.004	0.020	0.086	0.069	0.304	0.090	0.394
Isopentane	3.7E-04	0.002	0.007	0.030	0.030	0.131	0.037	0.162
n-Pentane	3.4E-04	0.001	0.006	0.026	0.029	0.125	0.035	0.152
n-Hexane	4.8E-04	0.002	0.008	0.036	0.039	0.170	0.048	0.208
Cyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	4.1E-05	1.8E-04	0.001	0.003	0.003	0.015	0.004	0.018
n-Octane	2.2E-05	9.8E-05	3.9E-04	0.002	0.002	0.008	0.002	0.010
n-Nonane	5.2E-06	2.3E-05	9.0E-05	4.0E-04	4.6E-04	0.002	0.001	0.002
n-Decane	7.1E-06	3.1E-05	1.2E-04	0.001	0.001	0.003	0.001	0.003
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	2.9E-05	1.2E-04	4.9E-04	0.002	0.002	0.010	0.003	0.012
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	6.6E-07	2.9E-06	8.0E-05	3.5E-04	9.7E-05	4.2E-04	1.8E-04	0.001
Toluene	1.8E-06	7.9E-06	8.1E-05	3.6E-04	2.7E-04	0.001	3.6E-04	0.002
Ethylbenzene	1.4E-07	6.3E-07	3.5E-06	1.5E-05	2.0E-05	8.7E-05	2.4E-05	1.0E-04
m-Xylene	1.3E-06	5.7E-06	2.9E-05	1.3E-04	1.9E-04	0.001	2.2E-04	0.001
Isooctane	1.3E-07	5.7E-07	2.2E-06	9.8E-06	1.1E-05	4.7E-05	1.3E-05	5.8E-05
Total VOC Emissions:	4.1E-03	0.02	0.10	0.42	0.31	1.35	0.41	1.79
Total HAP Emissions:	4.9E-04	2.1E-03	8.5E-03	3.7E-02	3.9E-02	0.17	0.05	0.21

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Sand Separator Tank

Throughput Parameter	Value	Units
Tank Capacity	4,200	gallons
Operational Hours	8,760	hrs/yr
Throughput	200	bbl/month
Percent Produced Water	50%	
Total Produced Water Throughput	100	bbl/month

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

Description	Potential Throughput (gal/yr)
Produced Water and Sand	100,800

Sand Separator Tank (100 bbl) - Uncontrolled [2, 3]

Constituent	Total Emissions [1] lb/hr	tpy
Methane	0.020	0.087
Ethane	0.035	0.152
Propane	0.050	0.218
Isobutane	0.020	0.089
n-Butane	0.051	0.222
Isopentane	0.029	0.127
n-Pentane	0.023	0.099
Hexanes	0.006	0.026
Heptanes	0.005	0.023
Octane	0.002	0.007
Nonane	<0.001	0.001
Decane	<0.001	<0.001
Benzene	<0.001	0.001
Toluene	<0.001	0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
n-Hexane	0.004	0.017
2,2,4-Trimethylpentane	<0.001	<0.001
Total HC Emissions:	0.245	1.071
Total VOC Emissions:	0.190	0.832
Total HAP Emissions:	0.004	0.019

[2] E&P TANK 2.0 calculates working, breathing and flashing losses and reports the sum as one total.
[3] E&P TANK v2.0 emission calculations are based on OXF-136 condensate sample from 03/10/2013

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Sand Separator Tank

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

Constituent	Total Emissions lb/hr	tpy
Methane	0.020	0.087
Ethane	0.035	0.152
Propane	0.050	0.218
Isobutane	0.020	0.089
n-Butane	0.051	0.222
Isopentane	0.029	0.127
n-Pentane	0.023	0.099
Hexanes	0.006	0.026
Heptanes	0.005	0.023
Octane	0.002	0.007
Nonane	<0.001	0.001
Decane	<0.001	<0.001
Benzene	<0.001	0.001
Toluene	<0.001	0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
n-Hexane	0.004	0.017
2,2,4-Trimethylpentane	<0.001	<0.001
Total Emissions:	0.245	1.072
Total VOC Emissions:	0.190	0.832
Total HAP Emissions:	0.004	0.019

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Compressor Engine

Engine Information:

Manufacturer:	Caterpilllar
Model No.:	G3408
Engine ID	S015
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Rated Horsepower (bhp):	405

Engine Fuel Information:

Fuel Type:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Specific Fuel Consumption (Btu/bhp-hr):	8,260
Maximum Fuel Consumption at 100% Load (scf/hr):	3,186
Heat Input (MMBtu/hr):	3.35
Potential Fuel Consumption (MMBtu/yr):	29,305
Max. Fuel Consumption at 100%(MMscf/hr):	0.0032
Max. Fuel Consumption (MMscf/yr):	27.9
Max. Annual Hours of Operation (hr/yr):	8,760

Engine Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	2.40	g/bhp-hr	2.14	9.39	Vendor Specifications
NMNEHC	0.11	g/bhp-hr	0.10	0.43	Vendor Specifications
VOC (includes HCHO)	---	---	0.17	0.74	VOC + HCHO
CO	2.50	g/bhp-hr	2.23	9.78	Vendor Specifications
SO_X	0.001	lb/MMBtu	<0.01	<0.01	AP-42, Table 3.2-3 (Aug-2000)
PM_{10}	0.02	lb/MMBtu	0.06	0.28	AP-42, Table 3.2-3 (Aug-2000)
$PM_{2.5}$	0.02	lb/MMBtu	0.06	0.28	AP-42, Table 3.2-3 (Aug-2000)
Formaldehyde (HCHO)	0.08	g/bhp-hr	0.07	0.31	Vendor Specifications
GHG (CO_2e)	See Table Below		392	1,716	40 CFR 98, Tables C-1 & C-2
Other (Total HAP)	See Table Below		0.11	0.49	AP-42, Table 3.2-3 (Aug-2000)

Notes:

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

Company Name: **EQT Production, LLC**
Facility Name: **OXF-155 Wellpad**
Project Description: **G70-D Application**

Compressor Engine

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

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
GHGs:					
CO_2	116.98	lb/MMBtu	391.32	1713.98	40 CFR 98, Table C-1
CH_4	0.002	lb/MMBtu	0.01	0.03	40 CFR 98, Table C-2
N_2O	0.0001	kg/MMBtu	7.4E-04	3.2E-03	40 CFR 98, Table C-2
GHG (CO_2e)			**392**	**1,716**	
Organic HAPs:					
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	8.46E-05	3.71E-04	AP-42, Table 3.2-3 (Aug-2000)
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	5.12E-05	2.24E-04	AP-42, Table 3.2-3 (Aug-2000)
1,3-Butadiene	6.63E-04	lb/MMBtu	2.22E-03	9.7E-03	AP-42, Table 3.2-3 (Aug-2000)
1,3-Dichloropropene	1.27E-05	lb/MMBtu	4.25E-05	1.86E-04	AP-42, Table 3.2-3 (Aug-2000)
Acetaldehyde	2.79E-03	lb/MMBtu	9.3E-03	4.1E-02	AP-42, Table 3.2-3 (Aug-2000)
Acrolein	2.63E-03	lb/MMBtu	8.8E-03	3.9E-02	AP-42, Table 3.2-3 (Aug-2000)
Benzene	1.58E-03	lb/MMBtu	5.3E-03	2.3E-02	AP-42, Table 3.2-3 (Aug-2000)
Carbon Tetrachloride	1.77E-05	lb/MMBtu	5.92E-05	2.59E-04	AP-42, Table 3.2-3 (Aug-2000)
Chlorobenzene	1.29E-05	lb/MMBtu	4.32E-05	1.89E-04	AP-42, Table 3.2-3 (Aug-2000)
Chloroform	1.37E-05	lb/MMBtu	4.58E-05	2.01E-04	AP-42, Table 3.2-3 (Aug-2000)
Ethylbenzene	2.48E-05	lb/MMBtu	8.30E-05	3.63E-04	AP-42, Table 3.2-3 (Aug-2000)
Ethylene Dibromide	2.13E-05	lb/MMBtu	7.13E-05	3.12E-04	AP-42, Table 3.2-3 (Aug-2000)
Methanol	3.06E-03	lb/MMBtu	1.0E-02	4.5E-02	AP-42, Table 3.2-3 (Aug-2000)
Methylene Chloride	4.12E-05	lb/MMBtu	1.38E-04	6.04E-04	AP-42, Table 3.2-3 (Aug-2000)
Naphthalene	9.71E-05	lb/MMBtu	3.25E-04	1.42E-03	AP-42, Table 3.2-3 (Aug-2000)
PAH	1.41E-04	lb/MMBtu	4.72E-04	2.07E-03	AP-42, Table 3.2-3 (Aug-2000)
Styrene	1.19E-05	lb/MMBtu	3.98E-05	1.74E-04	AP-42, Table 3.2-3 (Aug-2000)
Toluene	5.58E-04	lb/MMBtu	1.87E-03	8.2E-03	AP-42, Table 3.2-3 (Aug-2000)
Vinyl Chloride	7.18E-06	lb/MMBtu	2.40E-05	1.05E-04	AP-42, Table 3.2-3 (Aug-2000)
Xylene	1.95E-04	lb/MMBtu	6.52E-04	2.86E-03	AP-42, Table 3.2-3 (Aug-2000)
Total HAP			**0.11**	**0.49**	

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Compressor Engine

Engine Information:

Manufacturer:	Ford
Model No.:	CSG-637
Engine ID	S016
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Rated Horsepower (bhp):	110

Engine Fuel Information:

Fuel Type:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Specific Fuel Consumption (Btu/bhp-hr):	6,510
Maximum Fuel Consumption at 100% Load (scf/hr):	682
Heat Input (MMBtu/hr):	0.72
Potential Fuel Consumption (MMBtu/yr):	6,273
Max. Fuel Consumption at 100%(MMscf/hr):	0.0007
Max. Fuel Consumption (MMscf/yr):	6.0
Max. Annual Hours of Operation (hr/yr):	8,760

Engine Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	1.00	g/bhp-hr	0.24	1.06	Vendor Specifications
NMNEHC	0.70	g/bhp-hr	0.17	0.74	Vendor Specifications
VOC (includes HCHO)	---	---	0.18	0.81	VOC + HCHO
CO	2.00	g/bhp-hr	0.49	2.12	Vendor Specifications
SO_X	0.001	lb/MMBtu	<0.01	<0.01	AP-42, Table 3.2-3 (Aug-2000)
PM_{10}	0.02	lb/MMBtu	0.01	0.06	AP-42, Table 3.2-3 (Aug-2000)
$PM_{2.5}$	0.02	lb/MMBtu	0.01	0.06	AP-42, Table 3.2-3 (Aug-2000)
Formaldehyde (HCHO)	0.02	lb/MMBtu	0.01	0.06	AP-42, Table 3.2-3 (Aug-2000)
GHG (CO_2e)	See Table Below		84	367	40 CFR 98, Tables C-1 & C-2
Other (Total HAP)	See Table Below		0.02	0.10	AP-42, Table 3.2-3 (Aug-2000)

Notes:

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

Company Name: **EQT Production, LLC**
Facility Name: **OXF-155 Wellpad**
Project Description: **G70-D Application**

Compressor Engine

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

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
GHGs:					
CO_2	116.98	lb/MMBtu	83.77	366.90	40 CFR 98, Table C-1
CH_4	0.002	lb/MMBtu	0.00	0.01	40 CFR 98, Table C-2
N_2O	0.0001	kg/MMBtu	1.6E-04	6.9E-04	40 CFR 98, Table C-2
GHG (CO_2e)			**84**	**367**	
Organic HAPs:					
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	1.81E-05	7.94E-05	AP-42, Table 3.2-3 (Aug-2000)
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	1.10E-05	4.80E-05	AP-42, Table 3.2-3 (Aug-2000)
1,3-Butadiene	6.63E-04	lb/MMBtu	4.75E-04	2.08E-03	AP-42, Table 3.2-3 (Aug-2000)
1,3-Dichloropropene	1.27E-05	lb/MMBtu	9.09E-06	3.98E-05	AP-42, Table 3.2-3 (Aug-2000)
Acetaldehyde	2.79E-03	lb/MMBtu	2.00E-03	8.8E-03	AP-42, Table 3.2-3 (Aug-2000)
Acrolein	2.63E-03	lb/MMBtu	1.88E-03	8.2E-03	AP-42, Table 3.2-3 (Aug-2000)
Benzene	1.58E-03	lb/MMBtu	1.13E-03	4.96E-03	AP-42, Table 3.2-3 (Aug-2000)
Carbon Tetrachloride	1.77E-05	lb/MMBtu	1.27E-05	5.55E-05	AP-42, Table 3.2-3 (Aug-2000)
Chlorobenzene	1.29E-05	lb/MMBtu	9.24E-06	4.05E-05	AP-42, Table 3.2-3 (Aug-2000)
Chloroform	1.37E-05	lb/MMBtu	9.81E-06	4.30E-05	AP-42, Table 3.2-3 (Aug-2000)
Ethylbenzene	2.48E-05	lb/MMBtu	1.78E-05	7.78E-05	AP-42, Table 3.2-3 (Aug-2000)
Ethylene Dibromide	2.13E-05	lb/MMBtu	1.53E-05	6.68E-05	AP-42, Table 3.2-3 (Aug-2000)
Methanol	3.06E-03	lb/MMBtu	2.19E-03	9.6E-03	AP-42, Table 3.2-3 (Aug-2000)
Methylene Chloride	4.12E-05	lb/MMBtu	2.95E-05	1.29E-04	AP-42, Table 3.2-3 (Aug-2000)
Naphthalene	9.71E-05	lb/MMBtu	6.95E-05	3.05E-04	AP-42, Table 3.2-3 (Aug-2000)
PAH	1.41E-04	lb/MMBtu	1.01E-04	4.42E-04	AP-42, Table 3.2-3 (Aug-2000)
Styrene	1.19E-05	lb/MMBtu	8.52E-06	3.73E-05	AP-42, Table 3.2-3 (Aug-2000)
Toluene	5.58E-04	lb/MMBtu	4.00E-04	1.75E-03	AP-42, Table 3.2-3 (Aug-2000)
Vinyl Chloride	7.18E-06	lb/MMBtu	5.14E-06	2.25E-05	AP-42, Table 3.2-3 (Aug-2000)
Xylene	1.95E-04	lb/MMBtu	1.40E-04	6.12E-04	AP-42, Table 3.2-3 (Aug-2000)
Total HAP			**0.02**	**0.10**	

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D 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
[2] Combustor is used as back-up controlled device in case of VRU malfunction.

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:

$$\frac{7849.17\ \text{scf}}{\text{hr}} \left| \frac{\text{lb-mol}}{379.5\ \text{scf}} \right| \frac{22.58\ \text{lb}}{\text{lb-mol}} = 467\ \text{lb/hr}$$

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Tank Combustor

Source Designation:	**C002**
Pilot Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Pilot Rating (MMBtu/hr)	0.05
Combustor Rating (MMBtu/hr) [1]	19.22
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 60" model from Leed Enclosed Combustor Operations Manual
[2] Combustor is used as back-up controlled device in case of VRU malfunction.

Enclosed Combustor Emissions

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

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

Combustor Maximum Loading:

$$\frac{7849.17\ \text{scf}}{\text{hr}} \left| \frac{\text{lb-mol}}{379.5\ \text{scf}} \right| \frac{22.58\ \text{lb}}{\text{lb-mol}} = 467\ \text{lb/hr}$$

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Line Heater

Source Designation:	**S007-S012**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr)	1.54
Fuel Consumption (MMscf/hr):	1.47E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[1, 4]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
NO_x	100	0.15	0.64
CO	84	0.12	0.54
VOC	5.5	0.01	0.04
SO_2	0.6	8.8E-04	3.9E-03
PM Total	7.6	0.01	0.05
PM Condensable	5.7	0.01	0.04
PM_{10} (Filterable)	1.9	2.8E-03	0.01
$PM_{2.5}$ (Filterable)	1.9	2.8E-03	0.01
Lead	5.00E-04	7.3E-07	3.2E-06
CO_2	117.0	180.18	789.17
CH_4	2.21E-03	3.4E-03	1.5E-02
N_2O	2.21E-04	3.4E-04	1.5E-03

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Line Heater

Hazardous Air Pollutant (HAP) Potential Emissions:

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

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

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

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

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

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Separator Heater

Source Designation:	**S013**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr)	2.31
Fuel Consumption (MMscf/hr):	2.20E-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	0.22	0.96
CO	84	0.18	0.81
VOC	5.5	0.01	0.05
SO_2	0.6	1.3E-03	5.8E-03
PM Total	7.6	0.02	0.07
PM Condensable	5.7	0.01	0.05
PM_{10} (Filterable)	1.9	4.2E-03	0.02
$PM_{2.5}$ (Filterable)	1.9	4.2E-03	0.02
Lead	5.00E-04	1.1E-06	4.8E-06
CO_2	117.0	269.99	1182.57
CH_4	2.21E-03	5.1E-03	2.2E-02
N_2O	2.21E-04	5.1E-04	2.2E-03

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D Application

Separator Heater

Hazardous Air Pollutant (HAP) Potential Emissions:

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

[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-155 Wellpad**
Project Description: **G70-D Application**

Liquid Loading

Throughput 15,925,997 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	54.015	14.044	16.205	4.213	0.756	0.197
Isobutane	10.711	2.785	3.213	0.835	0.150	0.039
n-Butane	26.010	6.763	7.803	2.029	0.364	0.095
Isopentane	9.603	2.497	2.881	0.749	0.134	0.035
n-Pentane	8.570	2.228	2.571	0.668	0.120	0.031
n-Hexane	12.046	3.132	3.614	0.940	0.169	0.044
Cyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	1.021	0.266	0.306	0.080	0.014	0.004
n-Octane	0.560	0.146	0.168	0.044	0.008	0.002
n-Nonane	0.131	0.034	0.039	0.010	0.002	4.77E-04
n-Decane	0.177	0.046	0.053	0.014	0.002	0.001
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	0.715	0.186	0.215	0.056	0.010	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	0.072	0.019	0.021	0.006	0.001	2.61E-04
Toluene	0.085	0.022	0.026	0.007	0.001	3.10E-04
Ethylbenzene	0.004	0.001	0.001	3.43E-04	6.16E-05	1.60E-05
m-Xylene	0.038	0.010	0.011	0.003	0.001	1.39E-04
Isooctane	0.003	0.001	0.001	2.54E-04	4.56E-05	1.19E-05
Total VOC Emissions:	123.76	32.18	37.13	9.65	1.73	0.45
Total HAP Emissions:	12.25	3.18	3.67	0.96	0.17	0.04

[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-155 Wellpad
Project Description: G70-D 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	11	2.02	1.00	0.12	2.02	0.24
Compressor	Gas	0.22800	2	4.40	0.29	0.03	1.26	0.15
Valves	Gas	0.00597	374	21.53	0.29	0.03	6.14	0.74
Pressure Relief Valves	Gas	0.10400	25	24.60	0.29	0.03	7.02	0.84
Open-Ended Lines	All	0.00170	26	0.42	0.29	0.03	0.12	0.01
Connectors	All	0.00183	1,664	29.40	0.29	0.03	8.39	1.01
Intermittent Pneumatic Devices[4]	Gas	13.5	30	---	---	---	10.05	1.20
			Emission Totals:	**82.37**	**---**	**---**	**34.99**	**4.19**

[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 equipment values are from 40 CFR 98 Subpart W, Table W-1A (units of scf/hr/component). Pneumatic controller assumes operation 1/3 of the year.

[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-155 Wellpad
Project Description: G70-D 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	11	2.02	<0.01	<0.01	<0.01	<0.01	0.07
Compressor	Gas	0.22800	2	4.40	---	---	---	---	0.15
Valves	Gas	0.00597	374	21.53	<0.01	<0.01	<0.01	<0.01	0.74
Pressure Relief Valves	Gas	0.10400	25	24.60	<0.01	<0.01	<0.01	<0.01	0.84
Open-Ended Lines	All	0.00170	26	0.42	<0.01	<0.01	<0.01	<0.01	0.01
Connectors	All	0.00183	1,664	29.40	<0.01	<0.01	<0.01	<0.01	1.01
Intermittent Pneumatic Devices[4]	Gas	13.5	30	---	<0.01	<0.01	<0.01	<0.01	1.20
			Emission Totals:	**82.37**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**4.02**

[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 equipment values are from 40 CFR 98 Subpart W, Table W-1A (units of scf/hr/component). Pneumatic controller assumes operation 1/3 of the year.

[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	11	0.01	0.01	7.6E-05	0.37
Compressor	2	4.17	1.18	0.01	29.41
Valves	374	0.027	1.42	0.01	35.56
Pressure Relief Devices	25	0.04	0.14	7.1E-04	3.46
Open-Ended Lines	26	0.061	0.22	1.1E-03	5.48
Connectors	1,664	0.003	0.70	3.6E-03	17.60
Intermittent Pneumatic Devices	30	13.5	19.04	0.10	476.03
Total			**22.71**	**0.12**	**567.90**

[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: 76% CO_2: 0.14%

[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-155 Wellpad
Project Description: G70-D Application

Fugitive Emissions

Fugitive Emissions from Miscellaneous Venting

Source	# of Events (yr)	Vented Gas Volume (scf/event)	Volume (scf/yr)	VOC Emissions (tpy)	Benzene Emissions (tpy)	Toluene Emissions (tpy)	Ethylbenzene Emissions (tpy)	Xylene Emissions (tpy)	n-Hexane Emissions (tpy)	HAP Emissions (tpy)	CH_4 Emissions (tpy)	CO_2 Emissions (tpy)	CO_2e Emissions (tpy)
Compressor #1 Startup/ Shutdown	24	5,000	120,000	1.02	<0.01	<0.01	<0.01	<0.01	0.12	0.12	1.93	0.01	48.30
VRU Upsets	24	50,000	1,200,000	0.20	<0.01	<0.01	<0.01	<0.01	0.55	0.55	19.32	0.10	483.03
Rod Packing Venting	---	---	9,630	0.08	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.16	8.0E-04	3.88
Total				**1.31**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.68**	**0.68**	**21.40**	**0.11**	**535.21**

[1] VOC and HAP emissions are based on sum of the fractions of the pollutants in the site-specific gas analysis in those classifications, and are calculated in accordance with standard conversion methodology and factors.
[2] CH_4 and CO_2 emissions are based on fractions of these pollutants in the site-specific gas analysis, and are calculated in accordance with Equations W-35 and W-36 in Subpart W of 40 CFR 98.
[3] GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
[4] Total number of Compressor #1 maintenance activities and other shutdown/restarts is estimated to be 2 events per month
[5] 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)
[6] Potential emissions CH_4/CO_2 (tpy) = Gas volume vented (scf/yr) * Mole % CH_4/CO_2 ÷ 100 * Density CH_4/CO_2 (kg/scf) * 1,000 (g/kg) ÷ 453.6 (g/lb) ÷ 2,000 (lb/ton)
[7] Gas venting volumes are based on engineering estimates.
[8] Total number of VRU upset events is estimated to be 2 events per month. During periods of VRU downtime, all vapors will be sent to the flare for control. VRU upset emission calculations conservatively assumes 98% destruction efficiency

Company Name: EQT Production, LLC
Facility Name: OXF-155 Wellpad
Project Description: G70-D 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	0.40	3,981	3,167	0	6.78	1.73	0.17
Employee Vehicles	3	3	3	0.40	200	159	0	0.12	0.03	0.00
Total Potential Emissions								**6.90**	**1.76**	**0.18**

Company Name: **EQT Production, LLC**
Facility Name: **OXF-155 Wellpad**
Project Description: **G70-D Application**

Gas Analysis

Sample Location: OXF-134 Gas Analysis
Sample Date: 7/25/2016
HHV (Btu/scf): 1,360 Note: A conservatively low BTU content of 1,050 was used for calculations.

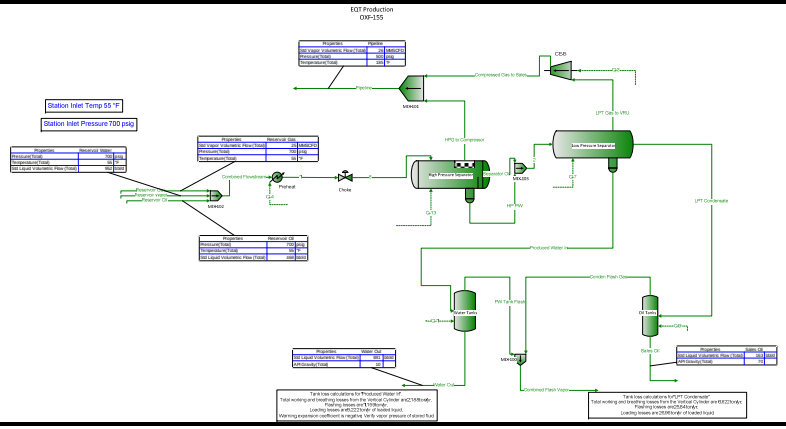
Constituent	Natural Gas Stream Speciation (Mole %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.143	44.01	0.06	0.00	0.278
Nitrogen	0.641	28.01	0.18	0.01	0.795
Methane	76.062	16.04	12.20	0.54	54.034
Ethane	12.286	30.07	3.69	0.16	16.362
Propane	4.336	44.10	1.91	0.08	8.468
Isobutane	0.870	58.12	0.51	0.02	2.240
n-Butane	2.100	58.12	1.22	0.05	5.406
Isopentane	0.861	72.15	0.62	0.03	2.750
n-Pentane	0.910	72.15	0.66	0.03	2.908
n-Hexane[1]	0.896	86.18	0.77	0.03	3.420
Cyclohexane[1]	0.896	84.16	0.75	0.03	3.340
Totals	100.000		22.58	1.00	100

1. Hexanes plus assumed to be split equally

TOC (Total)	99.22	98.93
VOC (Total)	10.87	28.53
HAP (Total)	0.90	3.42

OXF-155
Plant Schematic

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	



* 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 155 Wellpad	
Flowsheet:	OXF-155	

Connections

	Combined Flash Vapor	Combined Flowstream	Compressed Gas to Sales	Conden Flash Gas	HP PW
From Block	MIX-100	MIX-102	CE-5	Oil Tanks	High Pressure Separator
To Block	--	Preheat	MIX-101	MIX-100	MIX-103

Stream Composition

Mole Fraction	Combined Flash Vapor	Combined Flowstream	Compressed Gas to Sales	Conden Flash Gas	HP PW
Nitrogen	0.000534333	0.00493002	0.00201661	0.00046863	1.96529E-06
Methane	0.301646	0.586369	0.487209	0.285748	0.000395443
CO2	0.00234308	0.00110762	0.00222129	0.0022382	8.43043E-06
Ethane	0.26164	0.0957669	0.192475	0.264484	6.18818E-05
Propane	0.170513	0.0345902	0.109051	0.175206	1.28894E-05
Isobutane	0.0379897	0.00708168	0.0253243	0.0394814	1.11752E-06
n-Butane	0.0913238	0.0171335	0.0617018	0.0937187	5.50183E-06
Isopentane	0.0327393	0.00731387	0.0243335	0.0339057	1.11056E-06
n-Pentane	0.0316109	0.00769371	0.0244833	0.0329917	9.50419E-07
n-Hexane	0.0374128	0.0144021	0.0340537	0.0391424	9.24102E-07
Methylcyclopentane	0	0	0	0	0
Benzene	9.7852E-05	3.23691E-05	8.188E-05	9.71852E-05	5.05222E-07
Cyclohexane	0	0	0	0	0
n-Heptane	0.0029532	0.00186464	0.003095	0.00310467	5.49612E-08
n-Octane	0.00148756	0.00170487	0.00181442	0.0015753	2.21461E-08
n-Nonane	0.000327803	0.000767653	0.00046648	0.000347762	2.41802E-09
n-Decane	0.000423801	0.00224401	0.000695917	0.000451244	1.82075E-09
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	0.0243964	0.215993	0.0287273	0.0243921	0.999507
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	0.00215451	0.0006946	0.00183356	0.00224592	6.38636E-08
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	8.0768E-06	4.75143E-06	8.20416E-06	8.52007E-06	1.25426E-10
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.000238958	0.000133189	0.00022995	0.000235765	1.31343E-06
m-Xylene	0.000144243	0.000156203	0.00016087	0.00014061	7.46451E-07
Ethylbenzene	1.55975E-05	1.6333E-05	1.74989E-05	1.53768E-05	8.15286E-08

Mass Flow	Combined Flash Vapor lb/h	Combined Flowstream lb/h	Compressed Gas to Sales lb/h	Conden Flash Gas lb/h	HP PW lb/h
Nitrogen	0.00487133	492.9	0.268349	0.00400309	0.0397448
Methane	1.57484	33572.7	37.1278	1.39783	4.57975
CO2	0.0335585	173.973	0.46437	0.0300361	0.267845
Ethane	2.56031	10277.3	27.492	2.42504	1.34329
Propane	2.44693	5443.68	22.8422	2.35583	0.410313
Isobutane	0.718584	1469	6.99186	0.699735	0.0468905
n-Butane	1.72741	3554.13	17.0354	1.66099	0.230854
Isopentane	0.768719	1883.3	8.33962	0.745935	0.0578438
n-Pentane	0.742224	1981.11	8.39095	0.725826	0.049503
n-Hexane	1.04923	4429.49	13.9399	1.02856	0.0574897
Methylcyclopentane	0	0	0	0	0
Benzene	0.00248746	9.02386	0.0303814	0.00231482	0.0284896

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Mass Flow	Combined Flash Vapor lb/h	Combined Flowstream lb/h	Compressed Gas to Sales lb/h	Conden Flash Gas lb/h	HP PW lb/h
Cyclohexane	0	0	0	0	0
n-Heptane	0.0963028	666.831	1.47316	0.0948617	0.00397576
n-Octane	0.0552992	695.042	0.984523	0.0548704	0.00182625
n-Nonane	0.0136822	351.386	0.284198	0.0136005	0.000223883
n-Decane	0.0196237	1139.51	0.470348	0.0195776	0.000187019
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	0.143033	13887.5	2.45838	0.133995	12999.1
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	0.0604229	213.63	0.750571	0.0590169	0.00397305
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	0.00030025	1.93706	0.00445166	0.000296768	1.0343E-05
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.00716525	43.7978	0.100644	0.006624	0.0873642
m-Xylene	0.00498364	59.1856	0.0811278	0.00455193	0.0572097
Ethylbenzene	0.000538898	6.18861	0.00882478	0.00049779	0.00624854

Volumetric Flow	Combined Flash Vapor ft^3/h	Combined Flowstream ft^3/h	Compressed Gas to Sales ft^3/h	Conden Flash Gas ft^3/h	HP PW gpm
Nitrogen	0.0665982	147.174	0.184251	0.0547465	0.000118758
Methane	37.4088	14501.5	42.9326	33.2123	0.0247356
CO2	0.289465	21.9692	0.19109	0.259133	0.000458425
Ethane	32.1296	1406.12	15.854	30.4344	0.00486909
Propane	20.7667	275.335	8.53206	19.9921	0.00126158
Isobutane	4.59507	35.0515	1.8983	4.47362	0.000131311
n-Butane	11.0277	69.8472	4.55583	10.6013	0.000637438
Isopentane	3.92679	27.3065	1.71541	3.80907	0.000148301
n-Pentane	3.78583	29.4917	1.70954	3.70078	0.000127084
n-Hexane	4.43965	77.1083	2.22912	4.34973	0.000139973
Methylcyclopentane	0	0	0	0	0
Benzene	0.0116968	0.110369	0.00541506	0.0108807	5.61386E-05
Cyclohexane	0	0	0	0	0
n-Heptane	0.347566	12.6193	0.190253	0.342122	9.35186E-06
n-Octane	0.173565	13.6343	0.104603	0.172065	4.15636E-06
n-Nonane	0.0378707	6.92172	0.0249117	0.0376035	4.97169E-07
n-Decane	0.0485409	22.2705	0.034524	0.0483662	4.08588E-07
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	3.02038	228.432	2.45281	2.8306	26.775
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	0.256189	3.56547	0.121735	0.250097	9.69314E-06
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	0.000949242	0.0358335	0.000498982	0.000937523	2.33252E-08
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.0283076	0.610707	0.0141714	0.0261545	0.000170202

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production
Location:	OXF 155 Wellpad
Flowsheet:	OXF-155

Job: V1.0

Volumetric Flow	Combined Flash Vapor ft^3/h	Combined Flowstream ft^3/h	Compressed Gas to Sales ft^3/h	Conden Flash Gas ft^3/h	HP PW gpm
m-Xylene	0.0169375	0.895098	0.00928054	0.0154587	0.000110494
Ethylbenzene	0.00183308	0.092784	0.00101697	0.001692	1.20022E-05

Stream Properties

Property	Units	Combined Flash Vapor	Combined Flowstream	Compressed Gas to Sales	Conden Flash Gas	HP PW
Temperature	°F	69.9947	56.5703	413.789	70	184.305
Pressure	psig	0.25	700	500 *	0.25 *	500
Mole Fraction Vapor		0.999997	0.694601	1	1	0
Mole Fraction Light Liquid		3.17612E-06	0.0894322	0	0	1
Mole Fraction Heavy Liquid		0	0.215967	0	0	0
Molecular Weight	lb/lbmol	36.9671	22.5139	31.4805	37.5956	18.0165
Mass Density	lb/ft^3	0.0983046	4.76016	1.80687	0.100015	60.4884
Mass Flow	lb/h	12.0305	80351.7	149.539	11.464	13006.4
Vapor Volumetric Flow	ft^3/h	122.38	16880.1	82.7614	114.623	215.023
Liquid Volumetric Flow	gpm	15.2578	2104.53	10.3183	14.2907	26.808
Std Vapor Volumetric Flow	MMSCFD	0.00296397	32.5049	0.0432631	0.00277718	6.57494
Specific Gravity				1.08694	1.29807	0.969848
API Gravity						10.0213
Net Ideal Gas Heating Value	Btu/ft^3	1925.19	1005.33	1644.24	1956.91	0.533512
Net Liquid Heating Value	Btu/lb	19615.7	16699.4	19688.1	19604.3	-1047.96
Std Liquid Volumetric Flow	sgpm	0.0520685	384.267	0.688807	0.0492475	26.0285

Warnings

ProMax:ProMax!Project!Flowsheets!OXF-155!PStreams!Combined Flowstream
Warning: The temperature of 56.5703 °F is below hydrate formation.

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Connections

	HPG to Compressor	LPT Condensate	LPT Gas to VRU	Pipeline	Produced Water In
From Block	High Pressure Separator	Low Pressure Separator	Low Pressure Separator	MIX-101	Low Pressure Separator
To Block	MIX-101	Oil Tanks	CE-5	--	Water Tanks

Stream Composition

Mole Fraction	HPG to Compressor	LPT Condensate	LPT Gas to VRU	Pipeline	Produced Water In
Nitrogen	0.00622102	9.67324E-06	0.00201661	0.00621397	6.19934E-08
Methane	0.739465	0.0069513	0.487209	0.739041	2.90378E-05
CO2	0.00139373	7.53785E-05	0.00222129	0.00139512	2.17902E-06
Ethane	0.120507	0.0138356	0.192475	0.120628	1.47507E-05
Propane	0.0433401	0.0262256	0.109051	0.0434503	5.52862E-06
Isobutane	0.00882131	0.0136823	0.0253243	0.008849	7.71279E-07
n-Butane	0.021265	0.0466717	0.0617018	0.0213328	3.16677E-06
Isopentane	0.00895435	0.0424194	0.0243335	0.00898015	7.20985E-07
n-Pentane	0.00937465	0.0529196	0.0244833	0.0094	3.98236E-07
n-Hexane	0.0168098	0.233833	0.0340537	0.0168388	4.12976E-07
Methylcyclopentane	0	0	0	0	0
Benzene	3.75246E-05	0.000551135	8.188E-05	3.7599E-05	4.04107E-07
Cyclohexane	0	0	0	0	0
n-Heptane	0.00201405	0.0594985	0.003095	0.00201587	2.33309E-08
n-Octane	0.00158698	0.0999102	0.00181442	0.00158736	5.49097E-09
n-Nonane	0.00055583	0.0732868	0.00046648	0.00055568	9.38439E-10
n-Decane	0.00112357	0.303464	0.000695917	0.00112285	4.56803E-10
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	0.0174096	0.00110081	0.0287273	0.0174285	0.999941
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	0.00082219	0.00918315	0.00183356	0.000823886	2.94469E-08
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	5.13017E-06	0.000151872	8.20416E-06	5.13533E-06	5.20658E-11
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.000141428	0.00463879	0.00022995	0.000141577	8.96449E-07
m-Xylene	0.000137492	0.0105429	0.00016087	0.000137532	3.86656E-07
Ethylbenzene	1.46728E-05	0.0010491	1.74989E-05	1.46775E-05	5.11202E-08

Mass Flow	HPG to Compressor lb/h	LPT Condensate lb/h	LPT Gas to VRU lb/h	Pipeline lb/h	Produced Water In lb/h
Nitrogen	492.627	0.00431251	0.268349	492.895	0.00125308
Methane	33533.5	1.77472	37.1278	33570.6	0.336125
CO2	173.387	0.0527942	0.46437	173.851	0.0691949
Ethane	10242.9	6.62078	27.492	10270.4	0.320036
Propane	5402.26	18.404	22.8422	5425.1	0.175905
Isobutane	1449.32	12.6559	6.99186	1456.32	0.032346
n-Butane	3493.79	43.1706	17.0354	3510.83	0.132808
Isopentane	1826.22	48.7063	8.33962	1834.56	0.0375338
n-Pentane	1911.94	60.7628	8.39095	1920.33	0.0207318
n-Hexane	4094.84	320.686	13.9399	4108.78	0.0256788
Methylcyclopentane	0	0	0	0	0
Benzene	8.28558	0.68512	0.0303814	8.31596	0.0227762

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Mass Flow	HPG to Compressor lb/h	LPT Condensate lb/h	LPT Gas to VRU lb/h	Pipeline lb/h	Produced Water In lb/h
Cyclohexane	0	0	0	0	0
n-Heptane	570.476	94.8799	1.47316	571.949	0.00168684
n-Octane	512.432	181.625	0.984523	513.416	0.000452575
n-Nonane	201.515	149.587	0.284198	201.799	8.68456E-05
n-Decane	451.896	687.144	0.470348	452.367	4.6897E-05
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	886.581	0.315607	2.45838	889.04	12998.2
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	200.283	12.5941	0.750571	201.034	0.001831
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	1.65652	0.276086	0.00445166	1.66097	4.29135E-06
Decane, 2-Methyl-	0	0	0	0	0
Toluene	36.8355	6.80201	0.100644	36.9362	0.0595982
m-Xylene	41.262	17.8129	0.0811278	41.3431	0.0296192
Ethylbenzene	4.40335	1.77251	0.00882478	4.41218	0.00391599

Volumetric Flow	HPG to Compressor ft^3/h	LPT Condensate gpm	LPT Gas to VRU ft^3/h	Pipeline ft^3/h	Produced Water In gpm
Nitrogen	248.78	1.53757E-05	1.32579	249.123	3.47021E-06
Methane	27659.2	0.0112929	316.916	27716.5	0.00169625
CO2	49.2503	7.00616E-05	1.43286	49.4373	0.000111407
Ethane	3932.31	0.0286932	122.616	3947.95	0.0010974
Propane	1252.78	0.0706114	68.2634	1260.14	0.000514528
Isobutane	230.206	0.0457361	15.6267	231.766	8.63941E-05
n-Butane	531.173	0.151162	37.9187	534.881	0.000350108
Isopentane	197.641	0.161047	14.7392	199.049	9.20329E-05
n-Pentane	201.179	0.199149	14.7831	202.598	5.09228E-05
n-Hexane	298.609	0.999747	20.1641	300.668	5.99049E-05
Methylcyclopentane	0	0	0	0	0
Benzene	0.731681	0.00156393	0.0491659	0.7365	4.31906E-05
Cyclohexane	0	0	0	0	0
n-Heptane	28.3044	0.286058	1.79886	28.513	3.80521E-06
n-Octane	17.1559	0.528872	1.03513	17.3022	9.88402E-07
n-Nonane	3.89369	0.424063	0.260434	3.94181	1.85135E-07
n-Decane	3.83349	1.91371	0.380946	3.92964	9.83763E-08
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	620.761	-0.000521787	18.593	623.124	26.2142
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	15.3418	0.0397226	1.09051	15.449	4.27842E-06
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	0.0713073	0.000817629	0.00475584	0.0718414	9.27928E-09
Decane, 2-Methyl-	0	0	0	0	0
Toluene	2.19686	0.0157476	0.135362	2.21166	0.000111821

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Volumetric Flow	HPG to Compressor ft^3/h	LPT Condensate gpm	LPT Gas to VRU ft^3/h	Pipeline ft^3/h	Produced Water In gpm
m-Xylene	1.68451	0.0414032	0.0929297	1.69692	5.51097E-05
Ethylbenzene	0.184879	0.00411351	0.010128	0.186217	7.24702E-06

Stream Properties

Property	Units	HPG to Compressor	LPT Condensate	LPT Gas to VRU	Pipeline	Produced Water In
Temperature	°F	184.305	110 *	110	184.847	110
Pressure	psig	500 *	30 *	30	500	30
Mole Fraction Vapor		1	0	1	1	0
Mole Fraction Light Liquid		0	1	0	0	1
Mole Fraction Heavy Liquid		0	0	0	0	0
Molecular Weight	lb/lbmol	23.1842	104.706	31.4805	23.1981	18.016
Mass Density	lb/ft^3	1.8568	42.1993	0.234668	1.8561	61.8155
Mass Flow	lb/h	65536.4	1666.33	149.539	65685.9	12999.5
Vapor Volumetric Flow	ft^3/h	35295.3	39.4872	637.238	35389.3	210.294
Liquid Volumetric Flow	gpm	4400.45	4.92308	79.4478	4412.17	26.2185
Std Vapor Volumetric Flow	MMSCFD	25.7451	0.144943	0.0432631	25.7884	6.57161
Specific Gravity		0.800488	0.676607	1.08694	0.800968	0.991125
API Gravity			70.3744			10.004
Net Ideal Gas Heating Value	Btu/ft^3	1236.6	5314.68	1644.24	1237.28	0.0886407
Net Liquid Heating Value	Btu/lb	20153.7	19103.3	19688.1	20152.6	-1057.8
Std Liquid Volumetric Flow	sgpm	352.784	4.80342	0.688807	353.473	25.9903

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Connections

	PW Tank Flash	Reservoir Gas	Reservoir Oil	Reservoir Water	Sales Oil
From Block	Water Tanks	--	--	--	Oil Tanks
To Block	MIX-100	MIX-102	MIX-102	MIX-102	--

Stream Composition

Mole Fraction	PW Tank Flash	Reservoir Gas	Reservoir Oil	Reservoir Water	Sales Oil
Nitrogen	0.00151119	0.00641 *	0 *	0 *	7.07613E-07
Methane	0.538001	0.760618 *	0.0917647 *	0 *	0.00150506
CO2	0.00390243	0.001427 *	0.000677966 *	0 *	3.31283E-05
Ethane	0.219352	0.122859 *	0.0855633 *	0 *	0.00893921
Propane	0.10073	0.043357 *	0.0835095 *	0 *	0.0233153
Isobutane	0.0158114	0.008701 *	0.0261615 *	0 *	0.0131784
n-Butane	0.0557172	0.021003 *	0.0657926 *	0 *	0.0457526
Isopentane	0.0153973	0.008605 *	0.0467099 *	0 *	0.0425857
n-Pentane	0.0110815	0.009101 *	0.0466002 *	0 *	0.0533089
n-Hexane	0.0116963	0.017919 *	0.041655 *	0 *	0.237636
Methylcyclopentane	0	0 *	0 *	0 *	0
Benzene	0.000107766	0 *	0.00217348 *	0 *	0.000560003
Cyclohexane	0	0 *	0 *	0 *	0
n-Heptane	0.000701243	0 *	0.125204 *	0 *	0.0606001
n-Octane	0.000183017	0 *	0.114477 *	0 *	0.101831
n-Nonane	3.10512E-05	0 *	0.0515454 *	0 *	0.0747117
n-Decane	1.57849E-05	0 *	0.150678 *	0 *	0.309383
n-Undecane	0	0 *	0 *	0 *	0
Dodecane	0	0 *	0 *	0 *	0
Water	0.0244602	0 *	0 *	1 *	0.000645821
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	0.000795472	0 *	0.0466401 *	0 *	0.00931867
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	1.48635E-06	0 *	0.000319043 *	0 *	0.000154673
Decane, 2-Methyl-	0	0 *	0 *	0 *	0
Toluene	0.000286418	0 *	0.00894317 *	0 *	0.0047248
m-Xylene	0.000198268	0 *	0.0104885 *	0 *	0.0107461
Ethylbenzene	1.88795E-05	0 *	0.00109671 *	0 *	0.00106929

Mass Flow	PW Tank Flash lb/h	Reservoir Gas lb/h	Reservoir Oil lb/h	Reservoir Water lb/h	Sales Oil lb/h
Nitrogen	0.000868241	492.9 *	0 *	0 *	0.000309422
Methane	0.177015	33494.5 *	78.2468 *	0 *	0.376889
CO2	0.0035224	172.387 *	1.58589 *	0 *	0.0227581
Ethane	0.135275	10140.6 *	136.75 *	0 *	4.19574
Propane	0.0910983	5247.95 *	195.727 *	0 *	16.0482
Isobutane	0.0188481	1388.18 *	80.8211 *	0 *	11.9562
n-Butane	0.0664183	3350.88 *	203.254 *	0 *	41.5096
Isopentane	0.022784	1704.18 *	179.126 *	0 *	47.9604
n-Pentane	0.0163978	1802.41 *	178.705 *	0 *	60.0369
n-Hexane	0.0206723	4238.7 *	190.797 *	0 *	319.658
Methylcyclopentane	0	0 *	0 *	0 *	0
Benzene	0.000172645	0 *	9.02386 *	0 *	0.682806
Cyclohexane	0	0 *	0 *	0 *	0

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Mass Flow	PW Tank Flash lb/h	Reservoir Gas lb/h	Reservoir Oil lb/h	Reservoir Water lb/h	Sales Oil lb/h
n-Heptane	0.00144112	0 *	666.831 *	0 *	94.7851
n-Octane	0.000428769	0 *	695.042 *	0 *	181.571
n-Nonane	8.16789E-05	0 *	351.386 *	0 *	149.573
n-Decane	4.60625E-05	0 *	1139.51 *	0 *	687.125
n-Undecane	0	0 *	0 *	0 *	0
Dodecane	0	0 *	0 *	0 *	0
Water	0.00903768	0 *	0 *	13887.5 *	0.181611
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	0.00140593	0 *	213.63 *	0 *	12.5351
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	3.48219E-06	0 *	1.93706 *	0 *	0.27579
Decane, 2-Methyl-	0	0 *	0 *	0 *	0
Toluene	0.000541249	0 *	43.7978 *	0 *	6.79539
m-Xylene	0.000431707	0 *	59.1856 *	0 *	17.8083
Ethylbenzene	4.11082E-05	0 *	6.18861 *	0 *	1.77202

Volumetric Flow	PW Tank Flash ft^3/h	Reservoir Gas ft^3/h	Reservoir Oil gpm	Reservoir Water gpm	Sales Oil gpm
Nitrogen	0.0118229	147.786	0	0	9.71618E-07
Methane	4.19356	14531.5	0.484655	0	0.00215444
CO2	0.0303261	22.0938	0.00228169	0	2.63069E-05
Ethane	1.69733	1397.88	0.573246	0	0.016906
Propane	0.774722	262.817	0.719236	0	0.0583002
Isobutane	0.12101	29.8801	0.277522	0	0.0413022
n-Butane	0.425845	56.2056	0.678076	0	0.139147
Isopentane	0.1171	18.2148	0.561764	0	0.152763
n-Pentane	0.0841881	20.1156	0.556651	0	0.18968
n-Hexane	0.0882785	63.0267	0.564791	0	0.965222
Methylcyclopentane	0	0	0	0	0
Benzene	0.000817391	0	0.0198136	0	0.00151729
Cyclohexane	0	0	0	0	0
n-Heptane	0.00526052	0	1.90793	0	0.277757
n-Octane	0.00136477	0	1.92084	0	0.515185
n-Nonane	0.00022993	0	0.945633	0	0.413984
n-Decane	0.000116157	0	3.01291	0	1.87114
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	0.190374	0	0	27.7269	-3.13386E-05
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	0.006013	0	0.638626	0	0.0382674
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	1.11423E-05	0	0.00541465	0	0.000794704
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.00215819	0	0.0971081	0	0.0153788
m-Xylene	0.00148489	0	0.131532	0	0.0405645

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Volumetric Flow	PW Tank Flash ft^3/h	Reservoir Gas ft^3/h	Reservoir Oil gpm	Reservoir Water gpm	Sales Oil gpm
Ethylbenzene	0.000141482	0	0.0137136	0	0.00403118

Stream Properties

Property	Units	PW Tank Flash	Reservoir Gas	Reservoir Oil	Reservoir Water	Sales Oil
Temperature	°F	70 *	55 *	55 *	55 *	70 *
Pressure	psig	0.25 *	700 *	700 *	700 *	0.25
Mole Fraction Vapor		1	0.912979	0	0	0
Mole Fraction Light Liquid		0	0.0870206	1	1	0.999756
Mole Fraction Heavy Liquid		0	0	0	0	0.000244204
Molecular Weight	lb/lbmol	27.6228	22.5988	83.3749	18.0153	106.017
Mass Density	lb/ft^3	0.0730804	3.74831	42.1381	62.4461	43.4902
Mass Flow	lb/h	0.566531	62032.6	4431.54	13887.5	1654.87
Vapor Volumetric Flow	ft^3/h	7.75216	16549.5	105.167	222.392	38.0516
Liquid Volumetric Flow	gpm	0.966503	2063.31	13.1117	27.7269	4.74409
Std Vapor Volumetric Flow	MMSCFD	0.000186793	25 *	0.484088	7.02084	0.142166
Specific Gravity		0.95374		0.675626	1.00124	0.697304
API Gravity				78.7567	9.91415	70.048
Net Ideal Gas Heating Value	Btu/ft^3	1453.47	1224.81	4251.27	0	5380.28
Net Liquid Heating Value	Btu/lb	19846.6	20497	19194.1	-1059.76	19099.9
Std Liquid Volumetric Flow	sgpm	0.00282105	342.841	13.6633 *	27.7622 *	4.75417

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Connections

	Separator Oil	Water Out	1	2	8
From Block	High Pressure Separator	Water Tanks	Preheat	MIX-103	Choke
To Block	MIX-103	--	Choke	Low Pressure Separator	High Pressure Separator

Stream Composition

Mole Fraction	Separator Oil	Water Out	1	2	8
Nitrogen	0.000411803	1.90395E-08	0.00493002	1.31741E-05	0.00493002
Methane	0.106431	1.37459E-05	0.586369	0.00329544	0.586369
CO2	0.000356539	2.06815E-06	0.00110762	1.79509E-05	0.00110762
Ethane	0.054212	8.51601E-06	0.0957669	0.00154285	0.0957669
Propane	0.0458182	2.66552E-06	0.0345902	0.00126563	0.0345902
Isobutane	0.0166408	3.21861E-07	0.00708168	0.000456201	0.00708168
n-Butane	0.0509465	1.5831E-06	0.0171335	0.0013987	0.0171335
Isopentane	0.0389373	2.83335E-07	0.00731387	0.00106599	0.00731387
n-Pentane	0.0471987	8.32542E-08	0.00769371	0.00129177	0.00769371
n-Hexane	0.191276	8.05192E-08	0.0144021	0.00523215	0.0144021
Methylcyclopentane	0	0	0	0	0
Benzene	0.000447648	4.01056E-07	3.23691E-05	1.27342E-05	3.23691E-05
Cyclohexane	0	0	0	0	0
n-Heptane	0.04737	3.39867E-09	0.00186464	0.00129559	0.00186464
n-Octane	0.0787537	2.88843E-10	0.00170487	0.00215388	0.00170487
n-Nonane	0.0575661	5.58321E-11	0.000767653	0.00157439	0.000767653
n-Decane	0.238079	8.12826E-12	0.00224401	0.00651127	0.00224401
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	0.00501528	0.999969	0.215993	0.972308	0.215993
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	0.00762745	6.83635E-09	0.0006946	0.000208667	0.0006946
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	0.000120985	9.81769E-12	4.75143E-06	3.30898E-06	4.75143E-06
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.00367578	8.88333E-07	0.000133189	0.000101807	0.000133189
m-Xylene	0.00829048	3.81031E-07	0.000156203	0.000227465	0.000156203
Ethylbenzene	0.000825506	5.0585E-08	1.6333E-05	2.26563E-05	1.6333E-05

Mass Flow	Separator Oil lb/h	Water Out lb/h	1 lb/h	2 lb/h	8 lb/h
Nitrogen	0.23417	0.000384837	492.9	0.273915	492.9
Methane	34.6589	0.15911	33572.7	39.2386	33572.7
CO2	0.318515	0.0656725	173.973	0.58636	173.973
Ethane	33.0895	0.184761	10277.3	34.4328	10277.3
Propane	41.0118	0.0848072	5443.68	41.4221	5443.68
Isobutane	19.6333	0.0134979	1469	19.6801	1469
n-Butane	60.1079	0.0663902	3554.13	60.3388	3554.13
Isopentane	57.0256	0.0147497	1883.3	57.0835	1883.3
n-Pentane	69.1249	0.00433401	1981.11	69.1744	1981.11
n-Hexane	334.594	0.00500654	4429.49	334.652	4429.49
Methylcyclopentane	0	0	0	0	0
Benzene	0.709788	0.0226035	9.02386	0.738278	9.02386
Cyclohexane	0	0	0	0	0
n-Heptane	96.3508	0.00024572	666.831	96.3548	666.831

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Mass Flow	Separator Oil lb/h	Water Out lb/h	1 lb/h	2 lb/h	8 lb/h
n-Octane	182.609	2.38062E-05	695.042	182.61	695.042
n-Nonane	149.871	5.1667E-06	351.386	149.871	351.386
n-Decane	687.615	8.34453E-07	1139.51	687.615	1139.51
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	1.83405	12998.2	13887.5	13001	13887.5
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	13.3425	0.000425072	213.63	13.3465	213.63
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	0.280532	8.09168E-07	1.93706	0.280542	1.93706
Decane, 2-Methyl-	0	0	0	0	0
Toluene	6.87489	0.059057	43.7978	6.96226	43.7978
m-Xylene	17.8664	0.0291875	59.1856	17.9236	59.1856
Ethylbenzene	1.77901	0.00387488	6.18861	1.78525	6.18861

Volumetric Flow	Separator Oil gpm	Water Out gpm	1 ft^3/h	2 gpm	8 ft^3/h
Nitrogen	0.00120129	1.02778E-06	148.979	0.00132005	149.333
Methane	0.300218	0.000777593	14778.9	0.324954	14821.1
CO2	0.000642366	0.000102721	22.6475	0.00110079	22.7256
Ethane	0.175951	0.000617577	1470.81	0.18082	1477.07
Propane	0.181305	0.000242545	297.429	0.182567	299.191
Isobutane	0.0788858	3.53007E-05	37.9736	0.0790171	38.2367
n-Butane	0.232915	0.000171451	75.0527	0.233553	75.6016
Isopentane	0.203747	3.54638E-05	27.6623	0.203896	27.829
n-Pentane	0.244368	1.04408E-05	29.5425	0.244495	29.6987
n-Hexane	1.10533	1.14639E-05	75.7687	1.10547	75.9417
Methylcyclopentane	0	0	0	0	0
Benzene	0.00168734	4.21512E-05	0.109694	0.00174348	0.110067
Cyclohexane	0	0	0	0	0
n-Heptane	0.303837	5.44345E-07	12.4917	0.303846	12.5072
n-Octane	0.551011	5.10758E-08	13.6003	0.551015	13.6098
n-Nonane	0.437152	1.08227E-08	6.93279	0.437153	6.9359
n-Decane	1.9598	1.72025E-09	22.3456	1.9598	22.3536
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	-0.00221822	26.0197	229.923	26.7728	229.941
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	0.0446819	9.74716E-07	3.50305	0.0446916	3.51272
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	0.000863846	1.71819E-09	0.0354919	0.000863869	0.0355338
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.0162943	0.000109019	0.605625	0.0164645	0.606618
m-Xylene	0.0421002	5.34433E-05	0.893684	0.0422106	0.894494
Ethylbenzene	0.00417825	7.05732E-06	0.0926041	0.00419026	0.0926916

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

Stream Properties

Property	Units	Separator Oil	Water Out	1	2	8
Temperature	°F	184.305	70	61.5703	184.305	61.4852
Pressure	psig	500	0.25	698	500	696
Mole Fraction Vapor		0	0	0.699519	0	0.699597
Mole Fraction Light Liquid		1	1	0.0845817	0.0273492	0.0845039
Mole Fraction Heavy Liquid		0	0	0.215899	0.972651	0.215899
Molecular Weight	lb/lbmol	89.1141	18.0157	22.5139	19.9609	22.5139
Mass Density	lb/ft^3	38.3295	62.2798	4.65663	56.5002	4.64263
Mass Flow	lb/h	1808.93	12998.9	80351.7	14815.3	80351.7
Vapor Volumetric Flow	ft^3/h	47.1942	208.717	17255.3	262.217	17307.3
Liquid Volumetric Flow	gpm	5.88395	26.0219	2151.31	32.692	2157.8
Std Vapor Volumetric Flow	MMSCFD	0.184876	6.57142	32.5049	6.75982	32.5049
Specific Gravity		0.61456	0.99857		0.905902	
API Gravity		75.6806	10.0031		18.5819	
Net Ideal Gas Heating Value	Btu/ft^3	4535.67	0.0473282	1005.33	124.566	1005.33
Net Liquid Heating Value	Btu/lb	19158.3	-1058.71	16699.4	1419.19	16699.4
Std Liquid Volumetric Flow	sgpm	5.45401	25.9875	384.267	31.4825	384.267

Warnings

ProMax:ProMax!Project!Flowsheets!OXF-155!PStreams!1
Warning: The temperature of 61.5703 °F is within 10 °F of hydrate formation.
ProMax:ProMax!Project!Flowsheets!OXF-155!PStreams!8
Warning: The temperature of 61.4852 °F is within 10 °F of hydrate formation.

Remarks

Flowsheet Environment
SRK Environment

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	
Flowsheet:	OXF-155	

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 155 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 155 Wellpad	

Condensate Flow Rate

Source Code

Residual Error (for CV1) = 1-Cond/163

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-155!PStreams!Reservoir Oil!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	468.456
Unit	

Measured Variable [Cond]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-155!PStreams!Sales Oil!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	163
Unit	

Solver Properties

Status: Solved

Error	-7.8604E-07		Iterations	2
Calculated Value	13.6633	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		Skip Dependency Check	False

Remarks

Simple Solver 2

Source Code

Residual Error (for Water_Flow_Rate) = 1-Water/891

Calculated Variable [Water_Flow_Rate]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-155!PStreams!Reservoir Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	951.847
Unit	

Measured Variable [Water]

Source Moniker	ProMax:ProMax!Project!Flowsheets!OXF-155!PStreams!Water Out!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	891
Unit	

Solver Properties

Status: Solved

Error	5.22993E-09		Iterations	2
Calculated Value	27.7622	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		Skip Dependency Check	False

Remarks

User Value Sets Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	

Tank Losses.53

User Value [ShellLength]

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

User Value [ShellDiam]

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

User Value [BreatherVP]

* Parameter	0.3	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds	False	

User Value [BreatherVacP]

* Parameter	-0.7	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	168.791	bbl/day	Upper Bound		bbl/day
* Lower Bound	0	bbl/day	* Enforce Bounds	False	

User Value [OREff]

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

User Value [AtmPressure]

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

User Value [MaxLiqSurfaceT]

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

User Value [TotalLosses]

* Parameter	6.62229	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [WorkingLosses]

* Parameter	2.08637	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value Sets Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	

User Value [StandingLosses]

* Parameter	0.121058	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	26.9575	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [DeckFittingLosses]

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

User Value [DeckSeamLosses]

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

User Value [FlashingLosses]

* Parameter	25.84	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.056166	kg/mol	Upper Bound	kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False

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

Tank Losses.331

User Value [ShellLength]

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

User Value [ShellDiam]

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

User Value [BreatherVP]

* Parameter	0.3	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [BreatherVacP]

* Parameter	-0.7	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value Sets Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	

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	898.921 bbl/day		Upper Bound	bbl/day
*	Lower Bound	0 bbl/day	*	Enforce Bounds	False

User Value [OREff]

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

User Value [AtmPressure]

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

User Value [MaxLiqSurfaceT]

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

User Value [TotalLosses]

*	Parameter	2.1876 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [WorkingLosses]

*	Parameter	0.729201 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value [StandingLosses]

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

User Value [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	5.22187 ton/yr		Upper Bound	ton/yr
	Lower Bound	ton/yr	*	Enforce Bounds	False

User Value Sets Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF 155 Wellpad	

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	1.15878	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0466606	kg/mol	Upper Bound	kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False

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

GAS ANALYTICAL SERVICES

C6+ Gas Analysis Report

Gas Analytical

Report Date: Aug 3, 2016 6:24a

Client:	EQT PRODUCTION	Date Sampled:	Jul 25, 2016
Client Code:	0555	Analysis Date:	Aug 1, 2016 12:00a
Site:	OXF 134 PAD 512432	Collected By:	D HITT
Field No:	520	Date Effective:	Aug 1, 2016 12:00a
Meter:	512432	Sample Pressure (PSI):	40.0
Source Laboratory	Stonewood, WV	Sample Temp (°F):	75
Lab File No:	**516559116**	Field H2O (lb/MMSCFD):	<MDL
Cylinder No:	562	Field H2S (PPM):	<MDL
Sample Type:	Spot		
Reviewed By:	Ashley Free		
Analysis Status:	good		

Component	Mol %	Gal/MSCF
Methane	76.0618	0.0000
Ethane	12.2859	3.2994
Propane	4.3357	1.1994
I-Butane	0.8701	0.2859
N-Butane	2.1003	0.6649
I-Pentane	0.8605	0.3160
N-Pentane	0.9101	0.3313
Nitrogen	0.6410	0.0000
Oxygen	<MDL	
Carbon Dioxide	0.1427	0.0000
Hexanes+	1.7919	0.7808
TOTAL	100.0000	6.8777

Analytical Results at Base Conditions (Real)		
BTU/SCF (Dry):	1,360.3376	BTU/ft³
BTU/SCF (Saturated):	1,337.1866	BTU/ft³
PSIA:	14.696	PSI
Temperature (°F):	60.0	°F
Z Factor (Dry):	0.99562	
Z Factor (Saturated):	0.99525	

Analytical Results at Contract Conditions (Real)		
BTU/SCF (Dry):	1,363.4987	BTU/ft³
BTU/SCF (Saturated):	1,340.3488	BTU/ft³
PSIA:	14.730	PSI
Temperature (°F):	60.0	°F
Z Factor (Dry):	0.99572	
Z Factor (Saturated):	0.99525	

Calculated Specific Gravities			
Ideal Gravity:	0.7846	Real Gravity:	0.7877
Molecular Wt:	22.7245	lb/lbmol	

Gross Heating Values are Based on:
GPA 2145-09, 2172
Compressibility is Calculated using AGA-8.

Source	Date	Notes
AGAS	Aug 1, 2016	BOB GUM

<MDL = Less than Method Detection Limits, NG = Not Given, NT = Not Tested

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

Certificate of Analysis : 2013040067-002A

Company:	Gas Analytical Services	**For:**	Gas Analytical Services
Well:	Oxford 136 Pad		Chuck Honaker
Field:	EQT Production		PO Box 1028
Sample of:	Liquid		
Conditions:	333 @ N.G.		Bridgeport, WV, 26330
Sampled by:	GR - GAS		
Sample date:	03/10/2013 @ 11:00	**Report Date:**	4/26/2013
Remarks:	Cylinder No.: GAS		
Remarks:			

Analysis: (*GPA 2186M*)	**Mol. %**	**MW**	**Wt. %**	**Sp. Gravity**	**L.V. %**
Nitrogen	0.000	28.013	0.000	0.8094	0.000
Methane	9.204	16.043	1.609	0.3000	3.655
Carbon Dioxide	0.068	44.010	0.033	0.8180	0.027
Ethane	8.582	30.070	2.813	0.3562	5.374
Propane	8.376	44.097	4.026	0.5070	5.403
Iso-butane	2.624	58.123	1.662	0.5629	2.011
N-butane	6.599	58.123	4.180	0.5840	4.874
Iso-pentane	4.385	72.150	3.448	0.6244	3.759
N-pentane	4.674	72.150	3.676	0.6311	3.966
i-Hexanes	4.678	86.177	4.335	0.6795	4.446
n-Hexane	4.178	85.604	3.928	0.6640	4.007
2,2,4 trimethylpentane	0.032	114.231	0.040	0.6967	0.039
Benzene	0.218	78.114	0.149	0.8846	0.143
Heptanes	12.558	97.552	13.429	0.7046	12.978
Toluene	0.897	92.141	0.723	0.8719	0.707
Octanes	11.482	107.133	13.731	0.7528	12.367
E-benzene	0.110	106.167	0.058	0.8718	0.100
M-,O-,P-xylene	1.052	106.167	1.216	0.8731	0.957
Nonanes	5.170	121.642	7.121	0.7646	6.419
Decanes Plus	15.113	205.338	33.823	0.8007	28.768
	100.000		100.000		100.000

Calculated Values	**Total Sample**	**Decanes Plus**
Specific Gravity at 60 °F	0.6809	0.8007
Api Gravity at 60 °F	76.303	45.218
Molecular Weight	91.750	205.338
Pounds per Gallon (in Vacuum)	5.677	6.676
Pounds per Gallon (in Air)	5.671	6.668
Cu. Ft. Vapor per Gallon @ 14.73 psia	23.536	12.309

Brian Gaspard

Southern Petroleum Laboratories, Inc.

ATTACHMENT U

Emission Summary Sheet

ATTACHMENT U – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		CH_4		GHG (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 (S001-S006, S017)	1.15	5.03	0.96	4.22	1.07	1.12	0.01	0.03	0.09	0.38	0.09	0.38	0.14	0.63	1,374.69	6,021.14
C002 (S001-S006, S017)	1.89	8.28	1.59	6.95	1.07	1.12	0.01	0.05	0.14	0.63	0.14	0.63	0.14	0.63	2,259.68	9,897.42
E007 (S007)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E008 (S008)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E009 (S009)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E010 (S010)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E011 (S011)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E012 (S012)	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	0.00	0.01	180.36	789.99
E013 (S013)	0.22	0.96	0.18	0.81	0.01	0.05	1.3E-03	5.8E-03	0.02	0.07	0.02	0.07	0.01	0.02	270.27	1,183.79
E014 (S014)	---	---	---	---	0.19	0.83	---	---	---	---	---	---	0.02	0.09	0.50	2.18
E015 (S015)	2.14	9.39	2.23	9.78	0.17	0.74	0.00	0.01	0.06	0.28	0.06	0.28	0.01	0.03	391.72	1,715.75
E016 (S016)	0.24	1.06	0.49	2.12	0.18	0.81	0.00	0.00	0.01	0.06	0.01	0.06	0.00	0.01	83.85	367.28
E017 (S017)	---	---	---	---	37.13	9.65	---	---	---	---	---	---	---	---	---	---
Fugitives	---	---	---	---	---	36.30	---	---	---	---	---	---	---	44.12	---	1,103.11
Haul Roads	---	---	---	---	---	---	---	---	---	1.76	---	0.18	---	---	---	---
Facility Total	6.52	28.57	6.19	27.12	39.88	50.84	0.03	0.12	0.39	3.48	0.39	1.90	0.34	45.61	5,462.89	25,030.58
Facility Total (excl. fugitives)	6.52	28.57	6.19	27.12	39.88	14.54	0.03	0.12	0.39	1.72	0.39	1.72	0.34	1.50	5,462.89	23,927.47

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators.
According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

ATTACHMENT U – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001 (S001-S006, S017)	---	---	5.9E-04	5.2E-04	7.7E-04	9.3E-04	4.3E-05	6.0E-05	3.7E-04	5.4E-04	1.1E-01	1.3E-01	1.1E-01	1.3E-01
C002 (S001-S006, S017)	---	---	5.9E-04	5.2E-04	7.7E-04	9.3E-04	4.3E-05	6.0E-05	3.7E-04	5.4E-04	1.1E-01	1.3E-01	1.1E-01	1.3E-01
E007 (S007)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	0.00	0.00
E008 (S008)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	0.00	0.00
E009 (S009)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	0.00	0.00
E010 (S010)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	0.00	0.00
E011 (S011)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	0.00	0.00
E012 (S012)	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	0.00	0.00
E013 (S013)	1.6E-04	7.2E-04	4.6E-06	2.0E-05	7.5E-06	3.3E-05	---	---	---	---	4.0E-03	0.02	0.00	0.00
E014 (S014)	---	---	<0.01	1.0E-03	<0.01	1.0E-03	<0.01	<0.01	<0.01	<0.01	4.0E-03	<0.01	4.0E-03	0.02
E015 (S015)	0.07	0.31	5.3E-03	2.3E-02	1.9E-03	8.2E-03	8.3E-05	3.6E-04	6.5E-04	2.9E-03	---	---	0.11	0.49
E016 (S016)	0.01	0.06	1.1E-03	5.0E-03	4.0E-04	1.8E-03	1.8E-05	7.8E-05	1.4E-04	6.1E-04	---	---	0.02	0.10
E017 (S017)	---	---	0.02	0.01	0.03	0.01	1.3E-03	3.4E-04	1.1E-02	3.0E-03	3.61	0.94	0.06	0.02
Fugitives	---	---	---	<0.01	---	<0.01	---	<0.01	---	<0.01	---	4.70	---	4.88
Haul Roads	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Total	0.09	0.38	0.03	0.04	0.03	0.02	1.5E-03	9.0E-04	0.01	0.01	3.85	5.98	4.05	6.79
Facility Total (excl. fugitives)	0.09	0.38	2.9E-02	0.04	2.9E-02	2.0E-02	1.5E-03	9.0E-04	1.3E-02	7.5E-03	3.85	1.28	4.05	1.91

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators.
According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

ATTACHMENT V

Class I Legal Advertisement

RECOMMENDED PUBLIC NOTICE TEMPLATE

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that EQT Production Company has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-D General Permit Registration for a new natural gas production facility, OXF-155, located 4 miles north of Summers in Doddridge County, West Virginia. The latitude and longitude coordinates are: 39.20952N, -80.80576 W.

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

Pollutant	Emissions in tpy (tons per year)
NOx	28.57
CO	27.12
VOC	14.54
SO_2	0.12
PM	1.72
Formaldehyde	0.38
Benzene	0.04
Toluene	0.02
Ethylbenzene	9.0E-04
Xylene	0.01
n-Hexane	5.98
Total HAPs	6.79
Carbon Dioxide Equivalents (CO_2e)	25,030.58

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

ATTACHMENT W

General Permit Registration Application Fee