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www.eqt.com

TEL: (412) 395-3699

R. Alex Bosiljevac
Environmental
Coordinator

August 25, 2016

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

RE: G70-B General Permit Registration Resubmittal Application
Resubmittal of Existing G70-B Application to Update Compressor Engine
EQT Production Company
OXF-122 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-B General Permit Registration Resubmittal Application for the OXF-122 natural gas production site. The OXF-122 natural gas production site is currently permitted under registration G70-A146.

On May 31, 2016 EQT received a completeness letter from William T. Rothwell, P.E. of WVDAQ for a permit application filed to receive the authority to operate additional units at the OXF-122 site. Since this submittal, it has been determined that a larger compressor engine will required to meet the specifications of the Site. In order to receive the authority to construct the larger compressor engine, EQT submits this resubmittal application to amend the information presented in the G70-B application that WVDAQ currently has under review.

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

EQT Production Company

G70-B General Permit Registration Resubmittal Application

OXF 122 Natural Gas Production Site

Permit No. G70-A146

Harrisville, West Virginia

Prepared By:

ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.
Hurricane, West Virginia

August 2016

INTRODUCTION

EQT Production Company (EQT) submits this G70-B General Permit Registration to the WVDEP's Department of Air Quality to receive the authority to operate new units at the OXF-122 facility, currently permitted under G70-A146. This application addresses the operational activities associated with the production of natural gas and condensates at the OXF-122 pad.

FACILITY DESCRIPTION

The EQT OXF-122 natural gas production site will operate in Ritchie County, WV and consist of eight (8) natural gas wells. Natural gas and liquids (including water and condensates) will be extracted from underground deposits. The natural gas will be transported from the wells to a gas line for compression and additional processing, as necessary. The produced liquids will be stored in storage vessels. At the time of this submittal, there is no equipment installed at the OXF-122 facility.

The applicant is currently authorized to operate the following equipment under permit G70-A146:

- Five (5) natural gas wells;
- Five (5) line heaters each rated at 1.0 MMBtu/hr heat input;
- One (1) 140 bbl sand trap blowdown tank for storage of condensate and water;
- Six (6) 400 barrel (bbl) tanks for storage of condensate and water;
- Two (2) thermoelectric generator (TEG) each rated at 0.013 MMBtu/hr heat input; and
- One (1) enclosed combustion device with a capacity of 11.66 MMBtu/hr heat input.

The applicant seeks to authorize the operation of:

- Three (3) additional natural gas wells;
- One (1) 425 HP stationary natural gas compressor engine;
- Three (3) additional line heaters each rated at 1.54 MMBtu/hr heat input;
- One (1) additional line heater rated at 1.15 MMBtu/hr heat input;
- Five (5) line heaters with an increased heat input rating from 1.0 MMBtu/hr to 1.54 MMBtu/hr;
- One (1) additional enclosed combustion device with a capacity of 20.00 MMBtu/hr heat input; and
- Two (2) additional 400 bbl tanks for storage of condensate and water.

A process flow diagram is included in this application in Attachment D.

STATEMENT OF AGGREGATION

The OXF-122 pad is located in Ritchie County, WV and operated by EQT Production Company. Stationary sources of air pollutants may require aggregation of total emission levels if these sources share the same industrial grouping, are operating under common control, and are classified as contiguous or adjacent properties. EQT will operate the OXF-122 with the same industrial grouping as nearby facilities, and some of these facilities are under common control. EQT, however, is not subject to the aggregation of stationary emission sources because these sites do not meet the definition of contiguous or adjacent facilities.

The OXF-122 pad will operate under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding wells and compressor stations operated by EQT that share the same two-digit major SIC code of 13 for Crude Petroleum and Natural Gas Extraction. Therefore, the OXF-122 pad does share the same SIC codes as the surrounding wells and compressor stations.

EQT Production Company is the sole operator of the OXF-122 pad. EQT is also the sole operator of other production sites and compressor stations in the area. Therefore, EQT does qualify as having nearby operations under common control.

EQT's OXF-122 Natural Gas Production site is within 0.55 miles of the OXF-121 pad and 0.77 miles of the OXF-163 pad. These facilities do not meet the definition of contiguous or adjacent properties since they are not in contact and do not share a common boundary. Operations conducted at the OXF-122 site do not rely on or interact with other sites. Furthermore, operations separated by this distance do not meet the common sense notion of a "plant."

On June 3, 2016 the EPA Administrator published the *Source Determination for Certain Emission Units in the Oil and Natural Gas Sector*. This notice clarifies how properties in the oil and natural gas sector are determined to be adjacent in order to assist permitting authorities and permit applicants in making consistent source determinations. The following regulatory text defines "adjacent" for the oil and gas sector in terms of proximity.

> *Pollutant emitting activities shall be considered adjacent if they are located on the same surface site, or on surface sites that are located within ¼ mile of one another.*

The OXF-121 and OXF-163 pads are located on surface sites located greater than EPA's ¼ mile proposed ruling. Although the applicant notes that the EPA's Source Determination Rule does not mandate adoption by the State, it is the

only guidance available on a finite distance impacting the adjacency determination, and has been noted due to lack of WVDAQ guidance. Based upon the proximity of nearby facilities, EQT does not believe aggregation based upon adjacency is required.

Based on the above reasoning, EQT is not subject to the aggregation of stationary emission sources since the stationary sources are not considered contiguous or adjacent facilities.

REGULATORY DISCUSSION

This section outlines the State air quality regulations that could be reasonably expected to apply to the OXF-122 pad and makes an applicability determination for each regulation based on activities conducted at the site and the emissions of regulated air pollutants. This review is presented to supplement and/or add clarification to the information provided in the WVDEP G70-B permit application forms.

The West Virginia State Regulations address federal regulations, including Prevention of Significant Deterioration permitting, Title V permitting, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants. The regulatory requirements in reference to OXF-163 are described in detail in the below section.

WEST VIRGINIA STATE AIR REGULATIONS

45 CSR 02 – To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

The line heaters are indirect heat exchangers that combust natural gas but are exempt since the heat input capacities are less than 10 MMBtu/hr.

45 CSR 04 – To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor

Operations conducted at the OXF-122 wellpad are subject to this requirement. Based on the nature of the process at the wellpad, the presence of objectionable odors is unlikely.

45 CSR 06 – Control of Air Pollution from the Combustion of Refuse

The enclosed combustion devices located on the OXF-122 natural gas production site are subject to this regulation. Per 45 CSR 6-4.3, opacity of emissions from the enclosed combustion devices shall not exceed 20 percent, except as provided by

4.4. Particulate matter emissions from this unit will not exceed the levels calculated in accordance with 6-4.1.

§45-6-4.1 Determination for Maximum Allowable Particulate Emissions

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)

Enclosed Combustion Device with 20.00 MMBtu/hr heat input:

Incinerator Capacity = 0.26 tons per hour or 525 lbs/hr

ρNG = 0.042 lb/scf – Density of NG from EPA AP42 – Sections 1.4 and 3.2 (NG combustion)

$$\frac{300{,}000\ scf}{day} \times \frac{1\ day}{24\ hrs} \times \frac{0.042\ lb}{scf} = \frac{525\ lb}{hr} = \frac{0.26\ ton}{hr}$$

If the Incinerator Capacity is less than 15,000 lbs/hr, then F = 5.43

F = 5.43 * (0.26 tons per hour)

F = 1.41 lbs/hour

Enclosed Combustion Device with 11.66 MMBtu/hr heat input:

Incinerator Capacity = 0.12 tons per hour or 245 lbs/hr

ρNG = 0.042 lb/scf – Density of NG from EPA AP42 – Sections 1.4 and 3.2 (NG combustion)

$$\frac{140{,}000\ scf}{day} * \frac{1\ day}{24\ hours} * \frac{0.042\ lb}{scf} = \frac{245\ lb}{hr} = \frac{1{,}073\ tons}{year}$$

If the Incinerator Capacity is less than 15,000 lbs/hr, then F = 5.43

F = 5.43 * (0.12 tons per hour)

F = 0.67 lbs/hour

The enclosed combustion devices utilize AP-42 Section 1.4 PM emission factors to determine emissions from the combustion of refuse natural gas. Based upon the type of fuel combusted and the emission factors utilized, the PM emissions from the enclosed combustion devices will be well below the maximum allowable particulate emissions mandated by 45 CSR 06.

45 CSR 10 – To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

The line heaters are indirect heat exchangers that combust natural gas but are exempt since the heat input capacities are less than 10 MMBtu/hr.

45 CSR 13 – Permits for Construction, Modification, Relocation, and Operation of Stationary Sources of Air Pollutants

This G70-B permit application is being submitted for the operational activities associated with EQT's production of natural gas.

45 CSR 14 – Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration (PSD). The G70-B applicability criterion excludes facilities that meet the definition of a major source as defined in 45 CSR 19 for being eligible for the general permit.

Operation of equipment at the OXF-122 pad will not exceed emission thresholds established by this permitting program. EQT will monitor future construction and modification activities at the site closely and will compare future increase in emissions with the PSD thresholds to ensure these activities will not trigger this program.

45 CSR 16 - Standards of Performance for New Stationary Sources (NSPS)

45CSR 16 applies to registrants that are subject to NSPS requirements described in more detail in the Federal Regulations section. Applicable requirements of NSPS, Subpart JJJJ and OOOO are included in the G70-B general permit.

This facility is expected to contain gas well affected facilities under Subpart OOOO. This facility will contain a spark ignition internal combustion engine subject to Subpart JJJJ. No additional NSPS are applicable for this facility. Additional discussion is provided in the Federal Regulation Discussion of this permit application.

45 CS R19 – Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contributed to Non-attainment

Federal construction permitting programs regulate new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NNSR). The G70-B applicability criterion excludes facilities that meet the definition of a major source as defined in 45 CSR 19 for being eligible for the general permit.

Operation of equipment at the OXF-122 pad will not exceed emission thresholds established by either of these permitting programs. EQT will monitor future construction and modification activities at the site closely and will compare future increase in emissions with the NSR thresholds to ensure these activities will not trigger this program.

45 CSR 25 – Control of Air Pollution from Hazardous Waste Treatment, Storage, and Disposal Facilities

No hazardous waste will be burnt at this well site; therefore, it is not subject to this hazardous waste rule.

45 CSR 30 – Requirements for Operating Permits

45 CSR 30 applies to the requirements of the federal Title V operating permit program (40 CFR 70). 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 combination of HAPs, and 100 tpy of other regulated pollutants.

The potential emissions of 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.

45 CSR 34 – National Emission Standards for Hazardous Air Pollutants (NESHAP)

45 CSR 34 applies to registrants that are subject to the NESHAP requirements. Excluded from G70-B general permit eligibility are sources that are subject to NESHAP Subpart HHH.

The following NESHAP included in the G70-B permit are not subject to the OXF-122 facility:

- 40CFR63 Subpart HH (National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities).

FEDERAL REGULATIONS

40 CFR 60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines).

Subpart JJJJ sets forth nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compound (VOC) emission limits, fuel requirements, installation requirements, and monitoring requirements based on the year of installation of the subject internal combustion engine.

The CAT G3408C is a 425 bhp 4 stroke rich burn (4SRB) spark ignition (SI) engine manufactured in 2016. Per 40CFR60.4230(a)(4)(iii), an engine manufactured on or after July 1, 2008 with a maximum engine power less than 500 HP must comply with the provisions of 40 CFR 60 Subpart JJJJ.

The CAT 3408C compressor engine is subject to the emission standards contained in 40 CFR 60 Subpart JJJJ Table 1 - NOx, CO, VOC Emissions Standards for Stationary Non-Emergency SI Engines greater than 100 HP. In order to demonstrate compliance with these standards, EQT is subject to the requirements of 40 CFR §60.4243(b)(2)(ii), which mandates that a maintenance plan and maintenance records are kept, the engine is maintained and operated in a manner consistent with good air pollution control practices, and an initial performance test is conducted with one (1) year of engine startup.

40 CFR 60 Subpart OOOO (Standards of Performance for Crude oil and Natural Gas Production, Transmission and Distribution)

EPA published the NSPS for the oil and gas sector on August 16, 2012. EPA published final amendments to the subpart on September 23, 2013.

Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The applicable provisions and requirements of Subpart OOOO are included under the G70-B permit.

The only affected facilities expected to be subject to Subpart OOOO located at the OXF-122 production pad are listed below:

- Each gas well affected facility, which is a single natural gas well.

There are several equipment types that will be installed at OXF-122 that do not meet the affected facility definitions as specified by EPA. These include pneumatic controllers and storage vessels.

> Pneumatic Controllers: Pneumatic controller installed at this facility will be intermittent bleed rate devices. Therefore, the facility will not qualify as a pneumatic controller affected facility.
>
> Storage vessels: Based on PTE calculations included within this permit, each storage vessel will be manifolded and routed to an enclosed combustion device such that emissions from each of these tanks are expected to be below 6 tons per year (tpy) of VOC. Therefore, these tanks will not be considered group 2 storage vessel affected facilities as specified in §60.5365(e).

No additional NSPS are expected to be applicable to this facility.

40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAPs) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This Subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

The CAT G3408C is a 425 bhp 4 stroke rich burn (4SRB) spark ignition (SI) engine manufactured in 2016. The engine meets the requirements of 40 CFR 60 Subpart JJJJ. Per 40CFR63.6590(c)(1), no further requirements apply for a new stationary RICE located at an area source subject to regulation under 40 CFR 60 Subpart JJJJ.

No additional NESHAP are expected to be applicable to this facility.

General Permit G70-B will establish an emission cap on the following regulated and hazardous air pollutants:

Pollutant	Maximum Annual Emission Limit (tons/year)	OXF-122 Site Emission Levels (tons/year)
Nitrogen Oxides	50	23.90
Carbon Monoxide	80	22.29
Volatile Organic Compounds	80	15.02
Particulate Matter – 10/2.5	20	0.47
Sulfur Dioxide	20	0.10
Any Single Hazardous Air Pollutant	8	1.31 (as HCHO)
Total Hazardous Air Pollutants	20	2.13

The fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source for the purposes of 45CSR30-2.26.b or for eligibility of this General Permit.

west virginia department of environmental protection

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

G70-B GENERAL PERMIT REGISTRATION APPLICATION

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

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

SECTION 1. GENERAL INFORMATION

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

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

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

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

Facility Name: **OXF-122**

Operating Site Physical Address: **None**
If none available, list road, city or town and zip of facility.

City: **Harrisville, WV** | Zip Code: **26456** | County: **Ritchie**

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: **39.13226**
Longitude: **-80.83105**

SIC Code: **1311**

NAICS Code: **211111**

DAQ Facility ID No. (For existing facilities)
085-00048

CERTIFICATION OF INFORMATION

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

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

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

Responsible Official Signature: KDKirk
Name and Title: **Kenneth Kirk - Executive Vice President** Phone: **(412) 553-5700** Fax:
Email: **kkirk@eqt.com** Date: 8/25/16

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

If applicable:
Environmental Contact **Alex Bosiljevac**
Name and Title: **Environmental Coordinator** Phone: **(412) 395-3699** Fax:
Email: **abosiljevac@eqt.com** Date:

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: **EQT proposes the addition of one (1) low pressure separator to regulate flashing emissions from produced fluids originating from the eight (8) high pressure phase separators. The low pressure separator will be installed between the phase separators and produced fluid tanks. The fluid stream will pass through a line heater prior to entering the low pressure separator. A natural gas compressor engine will be installed to compress the natural gas realized at the low pressure tower and directed to the sales pipeline. The applicant also seeks to increase the heat input of five (5) line heaters from 1.0 MMBtu/hr to 1.54 MMBtu/hr and add four (4) additional 1.54 MMBtu/hr line heaters to the registration.**	
Directions to the facility: **From US-50, travel South on Sunnyside, CR-50/30 to Oxford Rd, CR-21. Go Southwest on Oxford Rd/S.Fork Hughes River 5.4 mi to Taylor Drain Rd, Cr-19. Go South on Taylor Drain Rd I Cr-19 for 4.2 miles (past EQT Pierce). Go West on Sugar Run Rd for 1.9 miles. At fork, go South, across bridge, on Summers Rd Brushy Fork for 1.5 miles. At top of hill, access road will be on the Left. Take access road 0.9 miles back to pads, going left at fork.**	
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): **Alex Bosiljevac - abosiljevac@eqt.com** ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO [1] ☐$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed in its entirety)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-B Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck Loading Data Sheet (if applicable) – Attachment O	
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☒ Pneumatic Controllers Data Sheet – Attachment Q	
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment R	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment S	
☒ Facility-wide Emission Summary Sheet(s) – Attachment T	
☒ Class I Legal Advertisement – Attachment U	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

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

Table of Contents

Attachment A

SINGLE SOURCE DETERMINATION FORM

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

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

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

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

See Introduction for additional source aggregation analysis.

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

Are the facilities owned by the same parent company or a subsidiary of the parent company? Provide the owners identity and the percentage of ownership of each facility.	Yes ☒ No ☐
Does an entity such as a corporation have decision making authority over the operation of a second entity through a contractual agreement or voting interest? Please explain.	Yes ☐ No ☒
Is there a contract for service relationship between the two (2) companies or, a support/dependency relationship that exists between the two (2) companies? Please explain.	Yes ☐ No ☒
Do the facilities share common workforces, plant managers, security forces, corporate executive officers or board executives?	Yes ☒ No ☐
Will managers or other workers frequently shuttle back and forth to be involved actively at both facilities?	Yes ☒ No ☐
Do the facilities share common payroll activities, employee benefits, health plans, retirement funds, insurance coverage, or other administrative functions? Please explain.	Yes ☒ No ☐
Does one (1) facility operation support the operation of the other facility?	Yes ☐ No ☒
Is one (1) facility dependent on the other? If one (1) facility shuts down, what are the limitations on the other to pursue outside business? Please explain.	Yes ☐ No ☒
Are there any financial arrangements between the two (2) entities?	Yes ☐ No ☒
Are there any legal or lease agreements between the two (2) facilities?	Yes ☐ No ☒
Do the facilities share products, byproducts, equipment, or other manufacturing or air pollution control device equipment? Please explain.	Yes ☐ No ☒
Do all the pollutant-emitting activities at the facilities belong to the same SIC Code? Please provide the SIC Codes. **1311**	Yes ☒ No ☐
Was the location of the new facility chosen primarily because of its proximity to the existing facility to integrate the operation of the two (2) facilities? Please explain.	Yes ☐ No ☒
Will materials be routinely transferred between the two (2) facilities? Please explain the amount of transfer and how often the transfers take place and what percentages go to the various entities.	Yes ☐ No ☒
Does the facility influence production levels or compliance with environmental regulations at other facilities? Who accepts the responsibility for compliance with air quality requirements? Please explain.	Yes ☐ No ☒

Attachment B

CITING CRITERIA WAIVER – (NOT APPLICABLE)

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

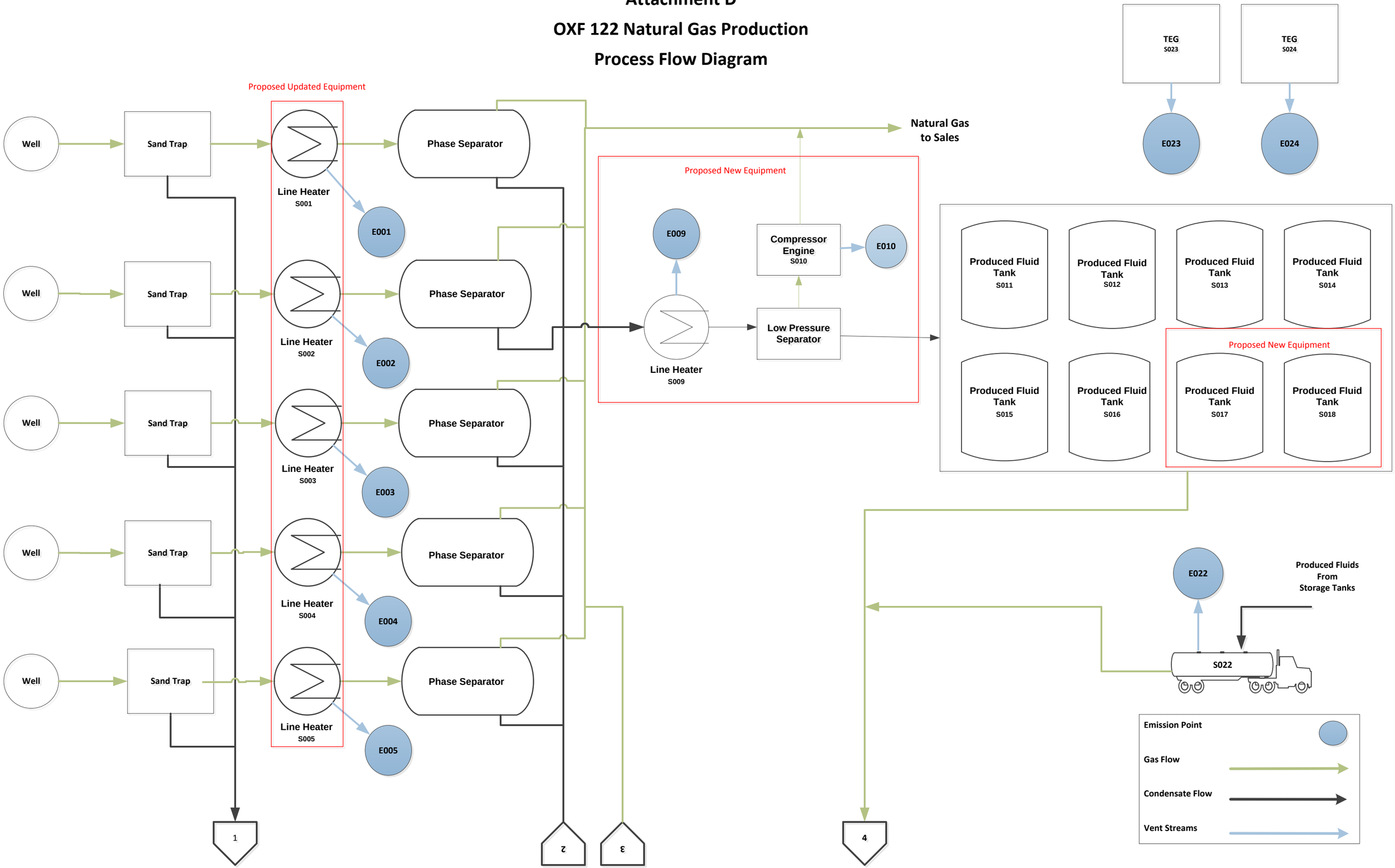
Attachment D

PROCESS FLOW DIAGRAM

Attachment D

OXF 122 Natural Gas Production

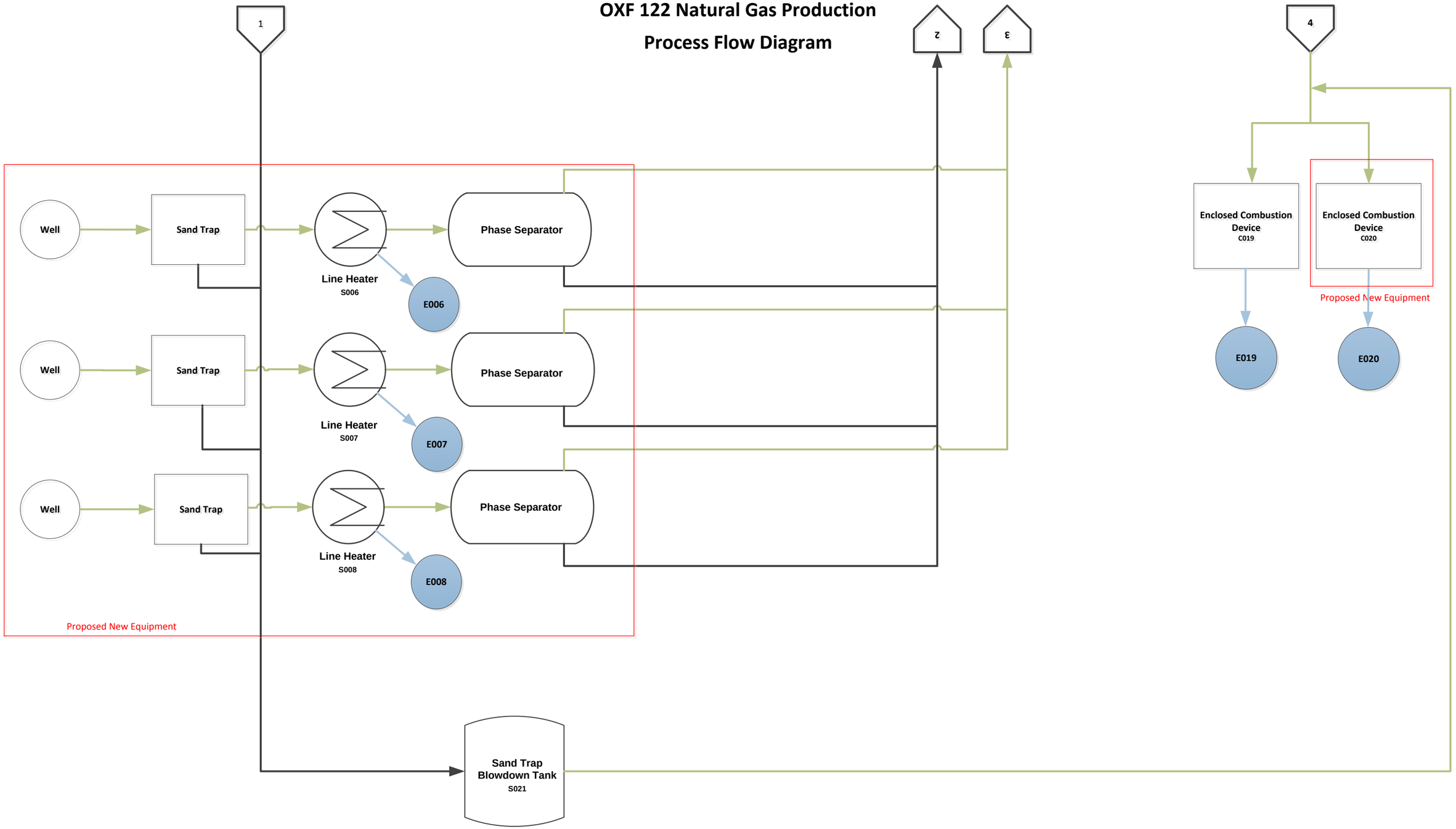
Process Flow Diagram



Attachment D

OXF 122 Natural Gas Production

Process Flow Diagram



Attachment E

PROCESS DESCRIPTION

Attachment E
Process Description

This permit application is being filed for EQT Production Company and addresses operational activities associated with the OXF-122 natural gas production site. Incoming raw natural gas from the eight (8) wells enters the site through a pipeline. The raw gas is first routed through the sand traps to remove sediment. Fluids from these sand traps are manually blowdown to the sand trap blowdown tank (S021), as needed. From the sand traps, raw gas is routed through line heaters (S001-S008) to assist with the phase separation process in the downstream phase separators. In the high pressure phase separators, produced fluids are removed from the raw gas before being dumped to a second stage of fluid separation. The produced fluids pass through a line heater (S009) to further assist in the separation process. At this low pressure separator, produced fluid pressure is reduced from approximately 390 psig to 30 psig. Vapors realized at the low pressure separator are directed to a 425 bhp compressor engine (S010) and routed to the sales pipeline. Produced fluid from the low pressure separator is sent to the produced fluids storage tanks (S011-S018). Emissions from the produced fluids tanks and sand trap blowdown tank are directed to one of the two enclosed combustion units (C019, C020) and burnt. Produced fluids are pumped into a tank truck (S022) on an as-needed basis and are disposed of off-site. Vapors during truck loading will be controlled by either of the two enclosed combustion units.

Two thermoelectric generation units (S023, S024) are operated and provide power to the OXF-122 natural gas production site.

A process flow diagram is included as Attachment D.

Attachment F

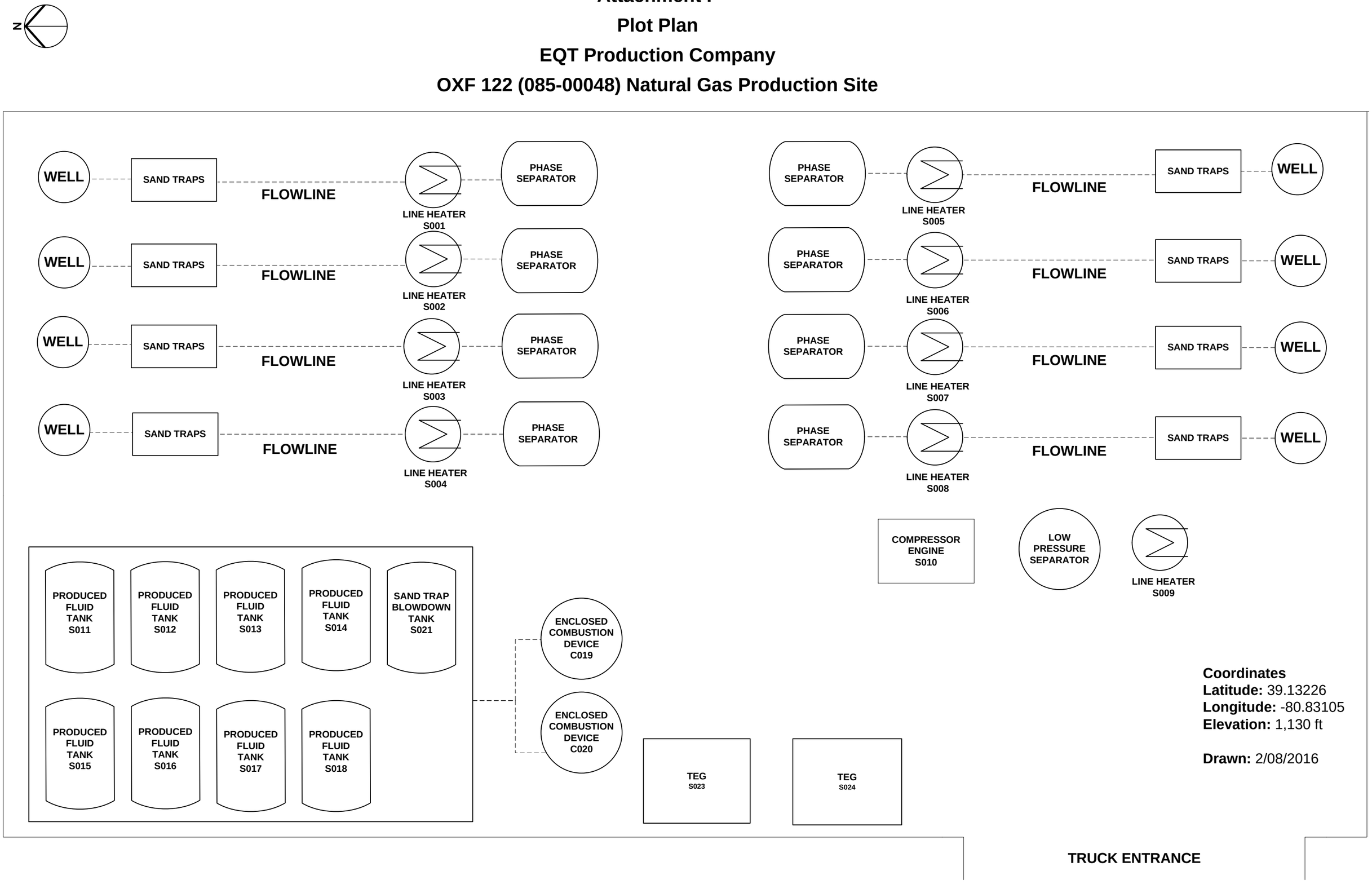
PLOT PLAN

Attachment F

Plot Plan

EQT Production Company

OXF 122 (085-00048) Natural Gas Production Site

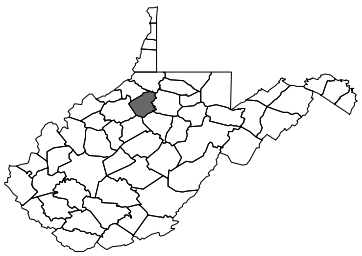


Coordinates
Latitude: 39.13226
Longitude: -80.83105
Elevation: 1,130 ft

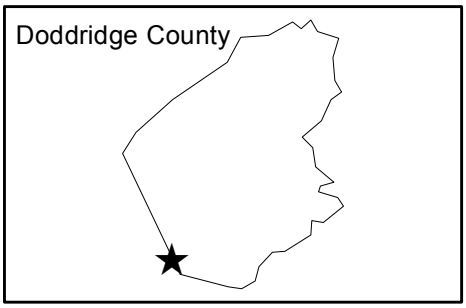
Drawn: 2/08/2016

Attachment G

AREA MAP



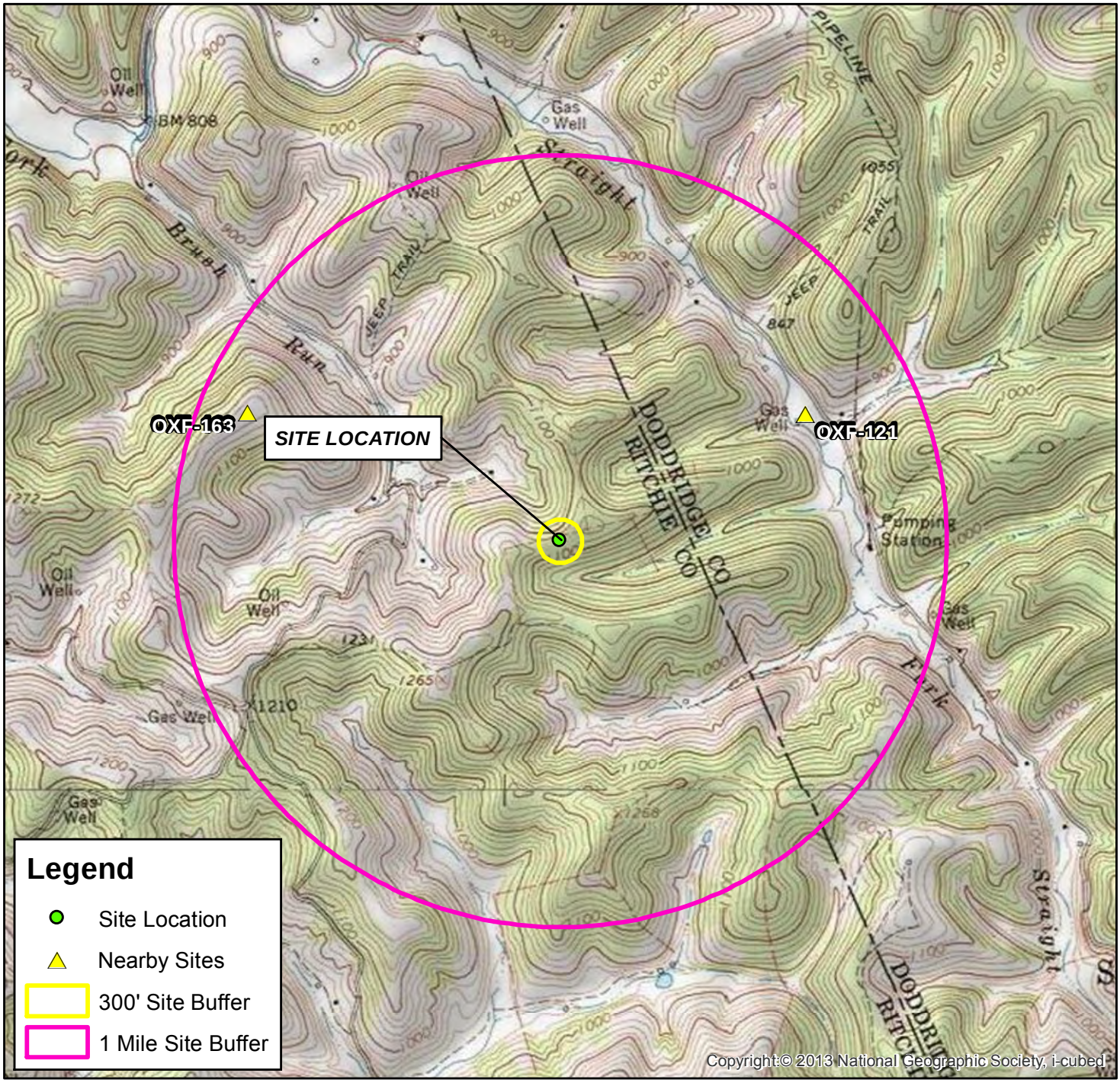
West Virginia



0 1,000 2,000 4,000 Feet

N

LAT. 39.13226 LON. -80.83105
DODDRIDGE COUNTY
WEST VIRGINIA



USGS 1:24K 7.5' Quadrangle:
Oxford, WV

SITE LOCATION MAP

ERM	**EQT PRODUCTION COMPANY** OXF-122 Well Pad Harrisville, West Virginia	GIS Review: GM CHK'D: GM 0250395
Drawn By: SRV-2/10/16	**Environmental Resources Management**	ATTACHMENT G

J:\GIS\Projects\EQT_MXD\OXF122_Site_Location_Map.mxd - 2/11/2016|SRV

Attachment H

APPLICABILITY FORM

ATTACHMENT H – G70-B SECTION APPLICABILITY FORM

General Permit G70-B Registration
Section Applicability Form

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

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

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

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

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

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

Attachment I

EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) 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	E001	Line Heater	2016	2016	1.54 MMBtu/hr	Modification *July 2016	NA	NA
S002	E002	Line Heater	2016	2016	1.54 MMBtu/hr	Modification *July 2016	NA	NA
S003	E003	Line Heater	2016	2016	1.54 MMBtu/hr	Modification *July 2016	NA	NA
S004	E004	Line Heater	2016	2016	1.54 MMBtu/hr	Modification *July 2016	NA	NA
S005	E005	Line Heater	2016	2016	1.54 MMBtu/hr	Modification *July 2016	NA	NA
S006	E006	Line Heater	2016	2016	1.54 MMBtu/hr	New *July 2016	NA	NA
S007	E007	Line Heater	2016	2016	1.54 MMBtu/hr	New *July 2016	NA	NA
S008	E008	Line Heater	2016	2016	1.54 MMBtu/hr	New *July 2016	NA	NA
S009	E009	Line Heater	2016	2016	1.15 MMBtu/hr	New *July 2016	NA	NA
S010	E010	Natural Gas Compressor Engine	2016	2016	425 bhp	New *July 2016	NA	NA
S011	E019 E020	Produced Fluid Tank	2016	2015	400 bbl	Modification *July 2016	C019 C020	NA
S012	E019 E020	Produced Fluid Tank	2016	2015	400 bbl	Modification *July 2016	C019 C020	NA
S013	E019 E020	Produced Fluid Tank	2016	2015	400 bbl	Modification *July 2016	C019 C020	NA
S014	E019 E020	Produced Fluid Tank	2016	2015	400 bbl	Modification *July 2016	C019 C020	NA
S015	E019 E020	Produced Fluid Tank	2016	2015	400 bbl	Modification *July 2016	C019 C020	NA
S016	E019 E020	Produced Fluid Tank	2016	2015	400 bbl	Modification *July 2016	C019 C020	NA
S017	E019 E020	Produced Fluid Tank	2016	2015	400 bbl	Modification *July 2016	C019 C020	NA

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]
S018	E019 E020	Produced Fluid Tank	2016	2015	400 bbl	Modification *July 2016	C019 C020	NA
C019	E019	Enclosed Combustion Device	2016	2015	11.66 MMBtu/hr	Modification *July 2016	NA	NA
C020	E020	Enclosed Combustion Device	2016	2015	20.00 MMBtu/hr	New *July 2016	NA	NA
S021	E019 E020	Sand Trap Blowdown Tank	2016	2015	100 bbl	Existing	C019 C020	NA
S022	E019 E020 E022	Tank Truck Loading Rack	2016	2015	79,660 gal/day	Modification *July 2016	NA	NA
S023	E023	Thermal Electric Generator	2016	2015	0.013 MMBtu/hr	Existing	NA	NA
S024	E024	Thermal Electric Generator	2016	2015	0.013 MMBtu/hr	Existing	NA	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.

*OXF-122 is currently permitted to operate under G70-A151. This facility has not commenced operations at the time of this submittal. To provide clarity to Attachment I, units are noted as “New” if they were not included in G70-A151, “Existing” if there was no change from the permitted conditions, or “Modification” if there is a difference between the G70-A151 issued registration and the requested updates in this G70-B application. Since operations have not commenced at the time of this application submittal, all installation dates are listed as 2016.

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: **Facility Wide**

Leak Detection Method Used	☐ Audible, visual, and olfactory (AVO) inspections	☐ Infrared (FLIR) cameras	☒ Other (please describe) **Permittee will follow section 4.1.4 in issued permit.**	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO_2e)
Pumps	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Valves	☐ Yes ☒ No	**306**	**EPA, 40 CFR 98 Subpart W**	☒ Gas ☐ Liquid ☐ Both	**0.69**	**0.38**	**29.34**
Safety Relief Valves	☐ Yes ☒ No	**9**	**EPA, 40 CFR 98 Subpart W**	☒ Gas ☐ Liquid ☐ Both	**0.03**	**0.02**	**1.28**
Open Ended Lines	☐ Yes ☒ No	**22**	**EPA, 40 CFR 98 Subpart W**	☒ Gas ☐ Liquid ☐ Both	**0.11**	**0.06**	**4.77**
Sampling Connections	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Connections (Not sampling)	☐ Yes ☒ No	**1,342**	**EPA, 40 CFR 98 Subpart W**	☒ Gas ☐ Liquid ☐ Both	**0.34**	**0.19**	**14.30**
Compressors	☐ Yes ☒ No	**1**	**EPA, 40 CFR 98 Subpart W Table W-1B: Default average component counts are used for major equipment. Compressor components (12 valves and 57 connections) are included in valve and connection counts.**	☒ Gas ☐ Liquid ☐ Both			
Flanges	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Other[1]	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			

[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.):
Fugitive emissions occur from sealed surfaces associated with production equipment, including equipment leaks.

Please indicate if there are any closed vent bypasses (include component): **NA**

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

Attachment K

GAS WELL AFFECTED FACILITY 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
47-085-10086	05/2016	05/2016	Green Completion
47-085-10087	05/2016	05/2016	Green Completion
47-085-10085	05/2016	05/2016	Green Completion
TBD			Green Completion
TBD			Green Completion
TBD			Green Completion
TBD			Green Completion
TBD			Green Completion

*Anticipated

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

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name **OXF-122 Storage Tank Area**	2. Tank Name **Produced Fluid Tanks (S011-S018)**
3. Emission Unit ID number **S011 – S018**	4. Emission Point ID number **E019 or E020**
5. Date Installed , Modified or Relocated *(for existing tanks)* **Anticipated 6/2016** Was the tank manufactured after August 23, 2011? ☒ Yes ☐ No	6. Type of change: ☐ New construction ☐ New stored material ☒ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* **Addition of upstream low pressure separator**.	
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. **16,800 gallons**	
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". **16,800 gallons**	
13A. Maximum annual throughput (gal/yr) **28,769,597**	13B. Maximum daily throughput (gal/day) **78,821**
14. Number of tank turnovers per year **1,713**	15. Maximum tank fill rate (gal/min) **54.74**
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 **14.0 oz** Pressure Setting

☒ Emergency Relief Valve (psig)

-0.5 oz Vacuum Setting **14.4 oz** Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☒ **No - A lock down screw hatch will be installed instead of Thief Hatch.**

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
Produced Fluid (Pre-Control)	**136.38**	**597.34**	**0.02**	**0.07**	**0.10**	**0.43**	**136.49**	**597.84**	**O - ProMax**

[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: **Green**	21B. Roof Color: **Green**	21C. Year Last Painted: **NA**

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):

24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft): 0.06

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

25A. Year Internal Floaters Installed:

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

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

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

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

25F. Describe deck fittings:

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

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

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

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

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

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

SITE INFORMATION

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

30. Daily Avg. Ambient Temperature (°F): **70.0**	31. Annual Avg. Maximum Temperature (°F): **65.5**
32. Annual Avg. Minimum Temperature (°F): **44.0**	33. Avg. Wind Speed (mph): **18 mph**
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): **1,123**	35. Atmospheric Pressure (psia): **14.7 (Atmosphere)**

LIQUID INFORMATION

36. Avg. daily temperature range of bulk liquid (°F): **82.9**	36A. Minimum (°F): **82.9**	36B. Maximum (°F): **82.9**
37. Avg. operating pressure range of tank (psig): **0 psig**	37A. Minimum (psig): **0 psig**	37B. Maximum (psig): **0 psig**

38A. Minimum liquid surface temperature (°F): **82.9**		38B. Corresponding vapor pressure (psia): **0.43**	
39A. Avg. liquid surface temperature (°F): **82.9**		39B. Corresponding vapor pressure (psia): **0.43**	
40A. Maximum liquid surface temperature (°F): **82.9**		40B. Corresponding vapor pressure (psia): **0.43**	
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:	**Produced Fluid**		
41B. CAS number:			
41C. Liquid density (lb/gal):	**7.9**		
41D. Liquid molecular weight (lb/lb-mole):	**19.68**		
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: **January** To: **December**		
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.	**30 psig** **110 F**		

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]
NA	**NA**	**NA**	**NA**

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

ATTACHMENT L – STORAGE VESSEL DATA SHEET

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name **OXF-122 Storage Tank Area**	2. Tank Name **Sand Trap Blowdown Tank**
3. Emission Unit ID number **S021**	4. Emission Point ID number **E019 or E020**
5. Date Installed , Modified or Relocated *(for existing tanks)* **Anticipated 06/2016** Was the tank manufactured after August 23, 2011? ☒ Yes ☐ No	6. Type of change: ☐ New construction ☐ New stored material ☒ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* **Addition of low pressure separator.**	
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. **5,880 gallons**	
9A. Tank Internal Diameter (ft.) **10**	9B. Tank Internal Height (ft.) **10**
10A. Maximum Liquid Height (ft.) **8**	10B. Average Liquid Height (ft.) **5**
11A. Maximum Vapor Space Height (ft.) **8**	11B. Average Vapor Space Height (ft.) **5**
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". **5,880 gallons**	
13A. Maximum annual throughput (gal/yr) **306,600**	13B. Maximum daily throughput (gal/day) **840**
14. Number of tank turnovers per year **52**	15. Maximum tank fill rate (gal/min) **4.1**
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]

Vacuum Setting Pressure Setting

☒ Emergency Relief Valve (psig)

-0.5 oz Vacuum Setting **14.4 oz** Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☒ **No - Two (2) emergency hatches set at 16 oz**

[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	
Produced Fluid (Pre control)	**5.49**	**1.00**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**5.50**	**1.00**	**EPA - ProMax**

[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: **Green**	21B. Roof Color: **Green**	21C. Year Last Painted: **NA**

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):

24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft): **5 ft.**	24B. If yes, for cone roof, provide slop (ft/ft): **NA**

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

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

30. Daily Avg. Ambient Temperature (°F): **70 °F**		31. Annual Avg. Maximum Temperature (°F): **65.5 °F**	
32. Annual Avg. Minimum Temperature (°F): **44 °F**		33. Avg. Wind Speed (mph): **18 mph**	
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): **1,123**		35. Atmospheric Pressure (psia): **14.70**	
LIQUID INFORMATION			
36. Avg. daily temperature range of bulk liquid (°F): **79.6**	36A. Minimum (°F): **79.6**	36B. Maximum (°F): **79.6**	
37. Avg. operating pressure range of tank (psig): **0.0 (atmospheric)**	37A. Minimum (psig): **0.0 (atmospheric)**	37B. Maximum (psig): **0.0 (atmospheric)**	
38A. Minimum liquid surface temperature (°F): **79.6**		38B. Corresponding vapor pressure (psia): **0.59**	
39A. Avg. liquid surface temperature (°F): **79.6**		39B. Corresponding vapor pressure (psia): **0.59**	
40A. Maximum liquid surface temperature (°F): **79.6**		40B. Corresponding vapor pressure (psia): **0.59**	
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:	**Produced Fluid**		
41B. CAS number:			
41C. Liquid density (lb/gal):	**6.83**		
41D. Liquid molecular weight (lb/lb-mole):	**21.72**		
41E. Vapor molecular weight (lb/lb-mole):	**37.33**		
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year.	**From: January To: December**		
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.	**85.0 F 393 psig**		

Attachment M

HEATER AND REBOILERS NOT SUBJECT TO 40CFR60 SUBPART Dc

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]
S001	E001	Line Heater	2015	Modification	1.54	1,262
S002	E002	Line Heater	2015	Modification	1.54	1,262
S003	E003	Line Heater	2015	Modification	1.54	1,262
S004	E004	Line Heater	2015	Modification	1.54	1,262
S005	E005	Line Heater	2015	Modification	1.54	1,262
S006	E006	Line Heater	2015	New	1.54	1,262
S007	E007	Line Heater	2015	New	1.54	1,262
S008	E008	Line Heater	2015	New	1.54	1,262
S009	E009	Line Heater	2015	New	1.15	1,262
S021	E021	TEG	2015	Existing	0.013	1,262
S022	E022	TEG	2015	Existing	0.013	1,262

*OXF-122 is currently permitted to operate under G70-A151. This facility has not commenced operations at the time of this submittal. To provide clarity to Attachment M, units are noted as "New" if they were not included in G70-A151, "Existing" if there was no change from the permitted conditions, or "Modification" if there is a difference between the G70-A151 issued registration and the requested updates in this G70-B application. Since operations have not commenced at the time of this application submittal, all installation dates are listed as 2016.

[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

INTERNAL COMBUSTION ENGINE 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]	**S010**		
Engine Manufacturer/Model	**CAT / 3408C**		
Manufacturers Rated bhp/rpm	**425 / 1800**		
Source Status[2]	**NS**		
Date Installed/ Modified/Removed/Relocated[3]	**07/2016**		
Engine Manufactured /Reconstruction Date[4]	**2016**		
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**		
APCD Type[7]	**NSCR**		
Fuel Type[8]	**PQ**		
H_2S (gr/100 scf)	**0.25**		
Operating bhp/rpm	**425 / 1800**		
BSFC (BTU/bhp-hr)	**9,578**		
Hourly Fuel Throughput	**3,226** ft^3/hr gal/hr	ft^3/hr gal/hr	ft^3/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	**28.26** $MMft^3$/yr gal/yr	$MMft^3$/yr gal/yr	$MMft^3$/yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes ☒ No ☐	Yes ☐ No ☐	Yes ☐ No ☐

Calculation Methodology[9]	Pollutant[10]	Hourly PTE (lb/hr)[11]	Annual PTE (tons/year)[11]	Hourly PTE (lb/hr)[11]	Annual PTE (tons/year)[11]	Hourly PTE (lb/hr)[11]	Annual PTE (tons/year)[11]
MD	NO_x	**1.87**	**8.21**				
MD	CO	**2.08**	**9.11**				
MD	VOC	**0.56**	**2.46**				
AP	SO_2	**<0.01**	**0.01**				
AP	PM (Filterable)	**0.04**	**0.17**				
AP	PM (Condensable)	**0.04**	**0.18**				
MD	Formaldehyde	**0.30**	**1.31**				
MD & AP	Total HAPs	**0.31**	**1.36**				
AP	GHG (CO_2e)	**466.34**	**2,043**				

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

2 Enter the Source Status using the following codes:

NS Construction of New Source (installation) ES Existing Source

MS	Modification of Existing Source	RS	Relocated Source
REM	Removal of Source		

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

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

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

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

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

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

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

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

8 Enter the Fuel Type using the following codes:

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

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

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

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

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

Engine Air Pollution Control Device
(Emission Unit ID# E019, use extra pages as necessary)

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

☒ NSCR ☐ SCR ☐ Oxidation Catalyst

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

Manufacturer: **TBD**	Model #: TBD
Design Operating Temperature: **854 °F**	Design gas volume: **2468** scfm
Service life of catalyst:	Provide manufacturer data? ☐Yes ☐ No
Volume of gas handled: **2468** cfm at **864** °F	Operating temperature range for NSCR/Ox Cat: From °F to °F
Reducing agent used, if any:	Ammonia slip (ppm):

Pressure drop against catalyst bed (delta P): 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

G3408C

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Production 3408 Non-Current Model

CATERPILLAR®

ENGINE SPEED (rpm):	1800	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	8.5	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	LPG IMPCO
AFTERCOOLER WATER INLET (°F):	130		WITH AIR FUEL RATIO CONTROL
JACKET WATER OUTLET (°F):	210	**SITE CONDITIONS:**	
ASPIRATION:	TA	FUEL:	Saturn
COOLING SYSTEM:	JW+OC, AC	FUEL PRESSURE RANGE(psig):	1.5-5.0
CONTROL SYSTEM:	EIS	FUEL METHANE NUMBER:	59.6
EXHAUST MANIFOLD:	WC	FUEL LHV (Btu/scf):	1110
COMBUSTION:	LOW EMISSION	ALTITUDE(ft):	500
NOx EMISSION LEVEL (g/bhp-hr NOx):	2.0	MAXIMUM INLET AIR TEMPERATURE(°F):	77
SET POINT TIMING:	34	STANDARD RATED POWER:	425 bhp@1800rpm

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	425	425	319	213
INLET AIR TEMPERATURE			°F	77	77	77	77
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(2)	Btu/bhp-hr	7939	7939	8127	8680
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	8760	8760	8967	9578
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(3)(4)	ft3/min	935	935	706	499
AIR FLOW	(WET)	(3)(4)	lb/hr	4144	4144	3129	2214
FUEL FLOW (60ºF, 14.7 psia)			scfm	51	51	39	28
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	64.5	64.5	49.9	35.9
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	854	854	809	798
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft3/min	2468	2468	1802	1264
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	4305	4305	3253	2301
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(8)(9)	g/bhp-hr	2.00	2.00	2.00	2.00
CO		(8)(9)	g/bhp-hr	1.89	1.89	1.99	2.22
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	2.86	2.86	3.18	3.59
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	1.07	1.07	1.19	1.35
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	0.48	0.48	0.53	0.60
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.28	0.28	0.29	0.32
CO2		(8)(9)	g/bhp-hr	523	523	528	564
EXHAUST OXYGEN		(8)(11)	% DRY	7.9	7.9	7.8	7.7
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	15217	15217	12925	10258
HEAT REJ. TO ATMOSPHERE		(12)	Btu/min	2250	2250	1727	1230
HEAT REJ. TO LUBE OIL (OC)		(12)	Btu/min	2406	2406	2044	1622
HEAT REJ. TO AFTERCOOLER (AC)		(12)(13)	Btu/min	2796	2796	1825	828

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC)	(13)	Btu/min	19626
TOTAL AFTERCOOLER CIRCUIT (AC)	(13)(14)	Btu/min	2936
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

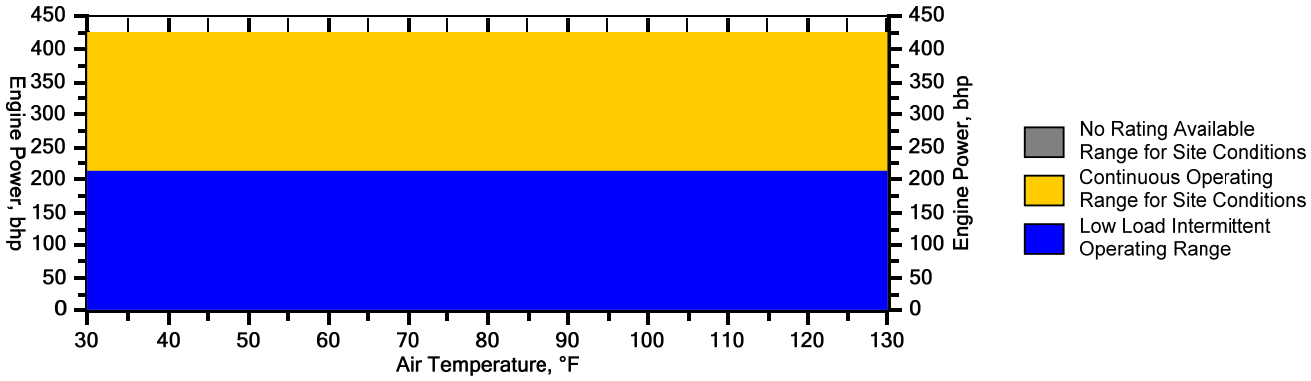
CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

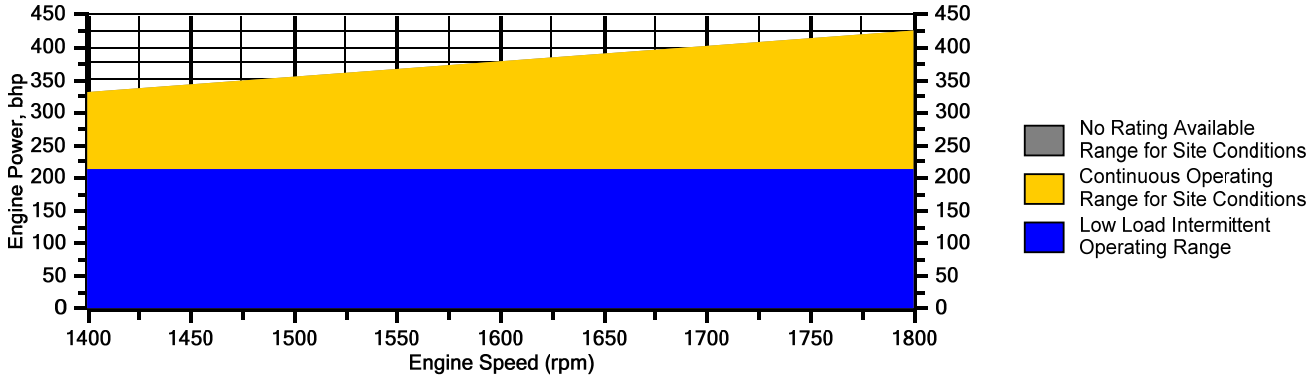
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 500 ft and 1800 rpm



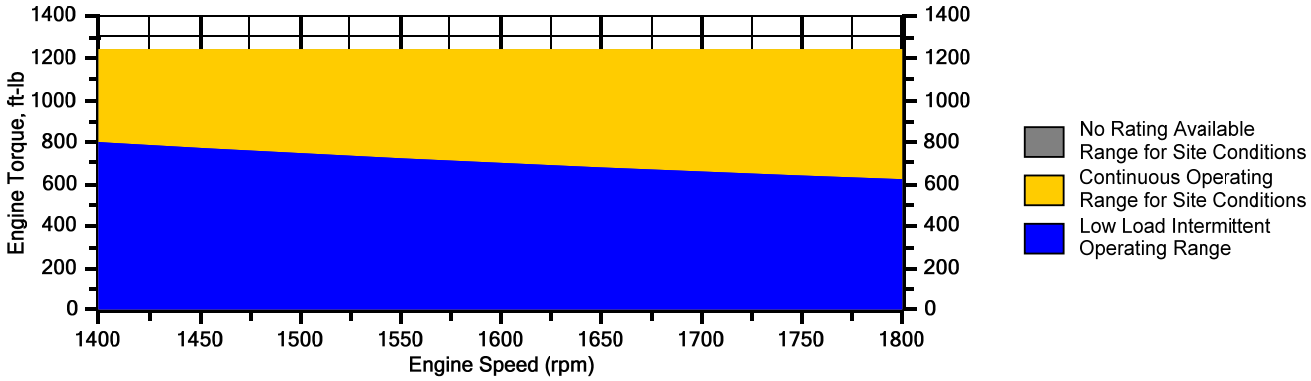
Engine Power vs. Engine Speed

Data represents speed sweep at 500 ft and 77 ºF



Engine Torque vs. Engine Speed

Data represents speed sweep at 500 ft and 77 ºF



Note: At site conditions of 500 ft and 77°F inlet air temp., constant torque can be maintained down to 1400 rpm. The minimum speed for loading at these conditions is 1400 rpm.

NOTES

1. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.

2. Fuel consumption tolerance is ± 3.0% of full load data.

3. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

4. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.

5. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

6. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

7. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

8. Emissions data is at engine exhaust flange prior to any after treatment.

9. Emission values are based on engine operating at steady state conditions. Fuel methane number cannot vary more than ± 3. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.

10. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

11. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.

12. Heat rejection values are nominal. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for radiation, ± 20% for lube oil circuit, and ± 5% for aftercooler circuit.

13. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.

14. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	79.9200	79.9200
Ethane	C2H6	13.4190	13.4190
Propane	C3H8	3.9090	3.9090
Isobutane	iso-C4H1O	0.4860	0.4860
Norbutane	nor-C4H1O	0.9240	0.9240
Isopentane	iso-C5H12	0.2330	0.2330
Norpentane	nor-C5H12	0.2170	0.2170
Hexane	C6H14	0.1660	0.1660
Heptane	C7H16	0.0660	0.0660
Nitrogen	N2	0.4500	0.4500
Carbon Dioxide	CO2	0.1800	0.1800
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0300	0.0300
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		100.0000	100.0000

Fuel Makeup:	Saturn
Unit of Measure:	English

Calculated Fuel Properties

Caterpillar Methane Number:	59.6
Lower Heating Value (Btu/scf):	1110
Higher Heating Value (Btu/scf):	1224
WOBBE Index (Btu/scf):	1330
THC: Free Inert Ratio:	157.73
Total % Inerts (% N2, CO2, He):	0.63%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.997
Stoich A/F Ratio (Vol/Vol):	11.52
Stoich A/F Ratio (Mass/Mass):	16.54
Specific Gravity (Relative to Air):	0.697
Specific Heat Constant (K):	1.285

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

Attachment O

TANKER TRUCK LOADING DATA SHEET

ATTACHMENT O – TANKER TRUCK LOADING DATA SHEET

Emission Unit ID#: **S022**	Emission Point ID#: **E019/E020**	Year Installed/Modified: **2015**
Emission Unit Description: **Tank Truck Loading Rack**		
Loading Area Data		
Number of Pumps: **1**	Number of Liquids Loaded: **1**	Max number of trucks loading at one (1) time: **1**
Are tanker trucks pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ Not Required If Yes, Please describe:		
Provide description of closed vent system and any bypasses. **Emissions collected and controlled by enclosed combustion device. Bypass is not available.**		
Are any of the following truck loadout systems utilized? ☐ Closed System to tanker truck passing a MACT level annual leak test? ☐ Closed System to tanker truck passing a NSPS level annual leak test? ☒ Closed System to tanker truck not passing an annual leak test and has vapor return?		

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

Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	**As needed**	**As needed**	**As needed**	**As needed**
Days/week	**As needed**	**As needed**	**As needed**	**As needed**

Bulk Liquid Data (use extra pages as necessary)

Liquid Name		**Produced Fluids**		
Max. Daily Throughput (1000 gal/day)		**79.67**		
Max. Annual Throughput (1000 gal/yr)		**29,081.01**		
Loading Method[1]		**BF**		
Max. Fill Rate (gal/min)		**42**		
Average Fill Time (min/loading)		**100 min**		
Max. Bulk Liquid Temperature (°F)		**70 °F**		
True Vapor Pressure[2]		**NA**		
Cargo Vessel Condition[3]		**U**		
Control Equipment or Method[4]		**Enclosed Combustion Device (C019 or C020)**		
Max. Collection Efficiency (%)		**70 %**		
Max. Control Efficiency (%)		**98 %**		
Max.VOC Emission Rate	Loading (lb/hr)	**0.07**		
	Annual (ton/yr)	**0.31**		
Max.HAP Emission Rate	Loading (lb/hr)	**<0.01**		
	Annual (ton/yr)	**<0.01**		
Estimation Method[5]		**EPA AP-42, 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 DEHYDRATION UNIT DATA SHEET
(NOT INCLUDED)

Attachment Q

PNEUMATIC CONTROLLERS 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? ☐ Yes ☒ No Please list approximate number.
Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after August 23, 2011? ☐ Yes ☒ No Please list approximate number.

Attachment R

AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE (ERD) SHEET

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

VAPOR COMBUSTION (Including Enclosed Combustors)

General Information

Control Device ID#: **C019**	Installation Date: **2016** ☐ New ☒ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity **~7,800** scfh **188,000** scfd	Maximum Design Heat Input (from mfg. spec sheet) **11.66** MMBTU/hr	Design Heat Content **1,262** 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# **S011-S018, S021, S022**)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
S011-S018	**Produced Fluid Tanks**		
S021	**Sand Trap Blowdown Tank**		
S022	**Tank Truck Loading Rack**		

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 Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate **82.20 (lb/hr)**	Heat Value of Waste Gas Stream **Variable** BTU/ft^3	Exit Velocity of the Emissions Stream (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	**~30** scfh	**0.03** 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 manufacture specification sheet.**

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#: **C020**	Installation Date: **2016** ☐ New ☒ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity **12,500** scfh **300,000** scfd	Maximum Design Heat Input (from mfg. spec sheet) **20.00** MMBTU/ hr	Design Heat Content **1,262** 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# **S011-S018, S021, S022**)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
S011-S018	**Produced Fluid Tanks**		
S021	**Sand Trap Blowdown Tank**		
S022	**Tank Truck Loading Rack**		

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	**30** feet	**5** feet	☐ Yes ☐ No Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate **82.20 (lb/hr)**	Heat Value of Waste Gas Stream **Variable** BTU/ft^3	Exit Velocity of the Emissions Stream (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	**~30** scfh	**0.03** 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 manufacture specification sheet.**

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.

§ 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

		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		

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

EQUIPMENT SPECIFICATION

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

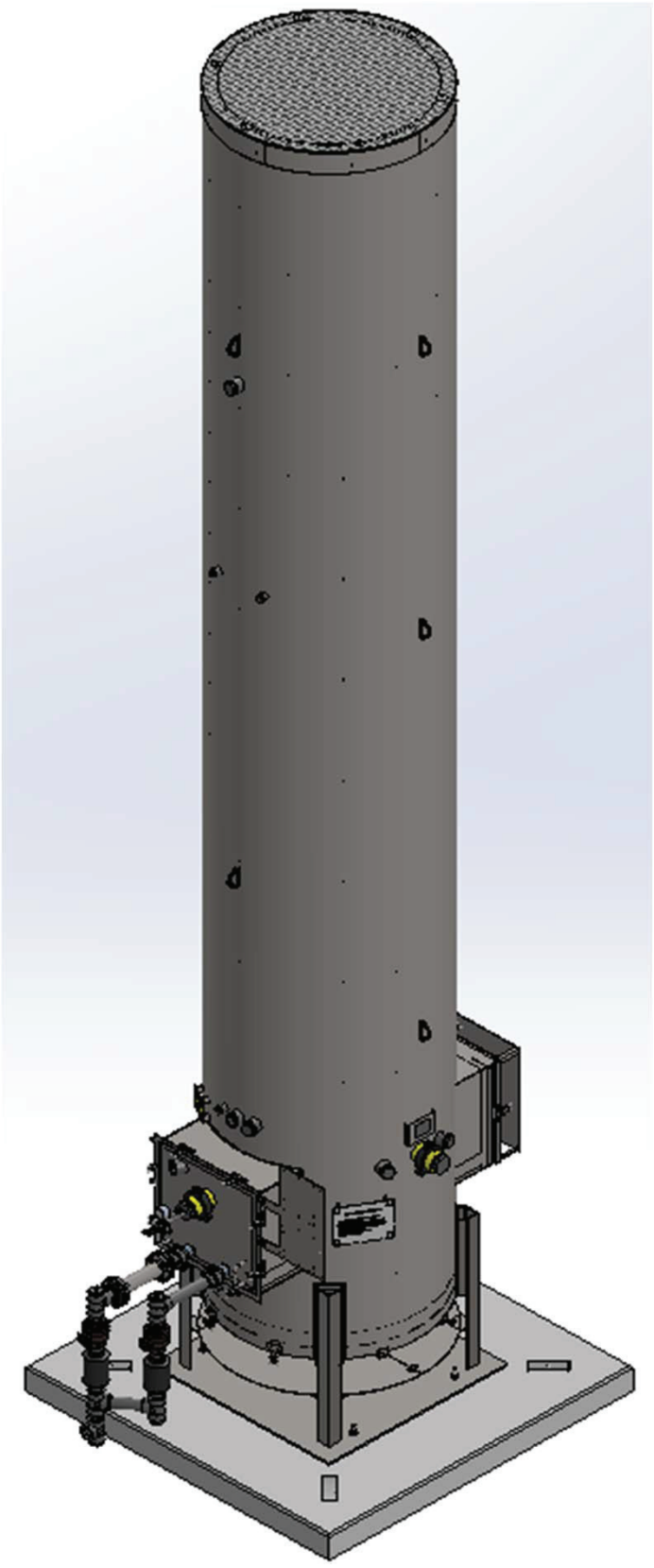
FABRICATION AND INSPECTION

76	**Special requirements**	☐ Skid Mounted ☑ Concrete Pad	**Equipment Info**	
77		☐ Other	**Component**	**Weight / Dimensions**
78			**Burner**	
79	**Inspection**	☑ Vendor Standard	Burner Assembly	
80		☐ Other. Specify:	**Stack**	
81	**Material Certification**	☑ Vendor Standard	Stack Assembly	48 " OD x 25 ' H
82		☐ MTR	Pilot Tip	
83		☐ Certificate of Compliance	Pilot Line(s)	
84		☐ Other (Specify):	Stack Assembly	
85	**NDE**	☑ Vendor Standard	**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:	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 Data Sheet		P.O. No.:	-	Checked:	SG		
		RFQ No.:	-	Approved:	MS		
Client:		Ref. P&ID:	-				
Site:				Supplier:	LEED FABRICATION		
Unit/Lease:		Remarks:	-	Model No.:	L30-0028-00		

GENERAL ARRANGEMENT

Attachment S

EMISSION CALCULATIONS

Line Heaters S001 - S008

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Boiler Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	0.03
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	<0.01
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	<0.01
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	<0.01
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	<0.01
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	<0.01
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	0.10	0.45
NOx	100	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	0.12	0.53
$PM_{Filterable}$	1.9	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	0.01
$PM_{Condensable}$	5.7	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	0.03
PM_{Total}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	0.04
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,262	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	1.54	1,262	8,760	180.14	789.03
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	1.54	1,262	8,760	<0.01	0.01
N_2O	0.0001	kg CO_2 / MMBtu	40 CFR Subpart C	1.54	1,262	8,760	<0.01	<0.01
Total HAPs							<0.01	0.01
Total CO_2e							180.33	789.85

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for all 9 line heaters are diplayed in the Total Site Emissions Table.

-Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.

-AP-42, Chapter 1.4 references are from the July 1998 revision.

˙Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/10^6 scf)** ÷ Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating (**MMBtu/hr)**

Line Heaters S009

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Boiler Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	0.02
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	<0.01
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	<0.01
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	<0.01
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	<0.01
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	<0.01
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	0.08	0.34
NOx	100	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	0.09	0.40
$PM_{Filterable}$	1.9	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	<0.01
$PM_{Condensable}$	5.7	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	0.02
PM_{Total}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	0.03
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	1.15	1,262	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	1.15	1,262	8,760	134.52	589.21
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	1.15	1,262	8,760	<0.01	0.01
N_2O	0.0001	kg CO_2 / MMBtu	40 CFR Subpart C	1.15	1,262	8,760	<0.01	<0.01
Total HAPs							<0.01	<0.01
Total CO_2e							134.66	589.82

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for all 9 line heaters are diplayed in the Total Site Emissions Table.

-Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.

-AP-42, Chapter 1.4 references are from the July 1998 revision.

˙Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/10^6 scf)** ÷ Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating (**MMBtu/hr)**

Thermoelectric Generators S023 - S024

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Boiler Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
NOx	100	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
$PM_{Filterable}$	1.9	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
$PM_{Condensable}$	5.7	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
PM_{Total}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,262	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	0.013	1,262	8,760	1.52	6.66
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	0.013	1,262	8,760	<0.01	<0.01
N_2O	0.0001	kg CO_2 / MMBtu	40 CFR Subpart C	0.013	1,262	8,760	<0.01	<0.01
Total HAPs							<0.01	<0.01
Total CO_2e							1.52	6.67

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one TEG. Cumulative emission rates for both TEGs are diplayed in the Total Site Emissions Table.

-Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.

- AP-42, Chapter 1.4 references are from the July 1998 revision.

-Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/10^6 scf)** ÷ Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating (**MMBtu/hr)**

Compressor Engine S010

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Maximum Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC's	0.60	g/bhp-hr	Vendor Guarantee[1]	425.0	9,578	1,262	8,760	0.56	2.46
Formaldehyde	3.20E-01	g/bhp-hr	Vendor Guarantee [1]	425.0	9,578	1,262	8,760	0.30	1.31
Benzene	1.58E-03	lb/MMBtu	AP-42 Chapter 3.2	425.0	9,578	1,262	8,760	<0.01	0.03
Toluene	5.58E-04	lb/MMBtu	AP-42 Chapter 3.2	425.0	9,578	1,262	8,760	<0.01	<0.01
Ethylbenze	2.48E-05	lb/MMBtu	AP-42 Chapter 3.2	425.0	9,578	1,262	8,760	<0.01	<0.01
Xylene	1.95E-04	lb/MMBtu	AP-42 Chapter 3.2	425.0	9,578	1,262	8,760	<0.01	<0.01
CO	2.22	g/bhp-hr	Vendor Guarantee [1]	425.0	9,578	1,262	8,760	2.08	9.11
NOx	2.00	g/bhp-hr	Vendor Guarantee [1]	425.0	9,578	1,262	8,760	1.87	8.21
$PM_{Filterable}$	9.50E-03	lb/MMBtu	AP-42 Chapter 3.2	425.0	9,578	1,262	8,760	0.04	0.17
$PM_{Condensable}$	9.91E-03	lb/MMBtu	AP-42 Chapter 3.2	425.0	9,578	1,262	8,760	0.04	0.18
SO_2	5.88E-04	lb/MMBtu	AP-42 Chapter 3.2	425.0	9,578	1,262	8,760	<0.01	0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	425.0	9,578	1,262	8,760	465.85	2,040
CH_4	0.001	kg CH_4 / MMBtu	40 CFR Subpart C	425.0	9,578	1,262	8,760	<0.01	0.04
N_2O	0.0001	kg N_2O / MMBtu	40 CFR Subpart C	425.0	9,578	1,262	8,760	<0.01	<0.01
Total HAPs								0.31	1.36
Total CO_2e								466.34	2,043

Notes:

[1] - Vendor Guarantees utilize the most conservative emisison factor, based upon the varying emission factors presented by the manufacturer based upon the load of the engine. Since the OXF-122 Compressor Engine will operate at or near peak load at startup and engine load will expect to decrease as production declines, EQT utilizes the 50% load emission factors to provide a conservative estimation of PTEs.

- Emission rates displayed above represent the max. hourly and max. annual emissions for one NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-2 - Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298
- Vendor Guarantee Emissions are converted from g/kW-hr to g/bhp-hr. 1 kW = 1.34 bhp

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/10^6 scf)** ÷ Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating (**MMBtu/hr)**

Produced Fluid Tanks S011 - S018

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Annual Emissions using ProMax (tons/yr)
VOCs	136.49	597.84
Total HAPs	7.76	33.97
Hexane	6.97	30.51
Benzene	0.19	0.83
Toluene	0.42	1.84
Ethylbenzene	0.02	0.08
Xylene	0.16	0.72
CO_2	0.17	0.76
CH_4	2.37	10.37
Total CO_2e	59.34	259.89

Notes:

-Emission rates for Produced Fluid Tanks S011 - S018 were calculated using ProMax software. ProMax output sheets for the OXF-122 Pad are attached.

-The emission rates displayed above are pre-control device emissions.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

-For emission calculation purposes, the total throughput for tanks S011 - S018 is modeled as being received through a single tank. The throughput value represents the total throughput for all eight (8) 400-barrel tanks. Therefore, emission rates represent a total from all produced fluids tanks located on the well pad. Actual throughput for each tank will vary based on operations.

Sand Trap Blow Tank S021

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Annual Emissions using ProMax (tons/yr)
VOCs	5.50	1.00
Total HAPs	0.27	0.05
Hexane	0.25	0.04
Benzene	0.01	0.001
Toluene	0.01	0.003
Ethylbenzene	0.001	0.000
Xylene	0.005	0.001
CO_2	0.02	0.003
CH_4	0.8765	0.16
Total CO_2e	21.93	4.00

Notes:

-Blowdown operations are conducted on the OXF-122 pad daily to allow for the removal of fluids from the sand traps. Based on available operational information, blowdowns are assummed to occur for one hour per day.

-Emissions from the Sand Trap Blow Tank are routed to an enclosed ground flare. The values displayed above a pre-control emission rates.

-Emission rates for the Sand Trap Blow Tank were calculated using ProMax software. ProMax output sheets for the OXF-122 Pad are attached.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1. GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Tank Unloading Operations S022

Total Emissions from Tank Unloading Operations

Pollutant	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)	Loading Rack Collection Efficiency	Enclosed Combustion Device Combusion Efficiency	Post-Control Max. Hourly Emissions (lb/hr)	Post-Control Max. Yearly Emissions (tons/yr)	Max. Hourly Emissions Not Collected by Loading Rack (lb/hr)	Max. Yearly Emissions Not Collected by Loading Rack (tons/yr)
VOCs	0.24	1.03	70%	98%	<0.01	0.01	0.07	0.31
HAPs	<0.01	<0.01	70%	98%	<0.01	<0.01	<0.01	<0.01
CO_2	<0.01	<0.01	70%	98%	0.79	3.48	<0.01	<0.01
CH_4	<0.01	0.01	70%	98%	<0.01	<0.01	<0.01	<0.01
Total CO_2e	0.08	0.33	--	--	0.79	3.48	0.02	0.10

Notes:
-Emission rates for liquid unloading operations were calculated using ProMax software. ProMax summary sheets are attached.

Enclosed Combustion Device S019 - 11.66 MMBtu/hr

Emissions from Tanks

Input to Enclosed Combustion Device	Pollutant	Amount of Gas Sent to Enclosed Combustion Device (lbs/hr)	Amount of Gas Sent to Enclosed Combustion Device (tons/year)	Enclosed Combustion Device Combustion Efficiency	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
Produced Fluid Tanks S011 - S018	VOCs	68.25	298.92	98%	1.36	5.98
	HAPs	3.88	16.98	98%	0.08	0.34
	Hexane	3.48	15.25	98%	0.07	0.31
	Benzene	0.09	0.41	98%	<0.01	<0.01
	Toluene	0.21	0.92	98%	<0.01	0.02
	Ethylbenzene	0.01	0.04	98%	<0.01	<0.01
	Xylene	0.08	0.36	98%	<0.01	<0.01
	CO_2	0.09	0.38	98%	180.53	790.70
	CH_4	1.18	5.18	98%	0.02	0.10
Sand Trap Blowdown Tank - S021	VOCs	2.75	0.50	98%	0.05	0.01
	HAPs	0.14	0.02	98%	<0.01	<0.01
	Hexane	0.12	0.02	98%	<0.01	<0.01
	Benzene	0.00	<0.001	98%	<0.01	<0.01
	Toluene	0.01	0.00	98%	<0.01	<0.01
	Ethylbenzene	<0.001	<0.001	98%	<0.01	<0.01
	Xylene	0.00	<0.001	98%	<0.01	<0.01
	CO_2	0.01	0.00	98%	11.27	49.36
	CH_4	0.44	0.08	98%	<0.01	<0.01
Truck Loading - S022	VOCs	0.12	0.51	98%	<0.01	<0.01
	HAPs	<0.001	0.002	98%	<0.01	<0.01
	CO_2	<0.001	0.003	98%	0.40	1.74
	CH_4	0.001	0.01	98%	<0.01	<0.01
Totals	VOCs	71.11	299.94	--	1.42	6.00
	HAPs	4.01	17.01	--	0.08	0.34
	Hexane	3.61	15.28	--	0.07	0.31
	Benzene	0.10	0.42	--	<0.01	<0.01
	Toluene	0.22	0.92	--	<0.01	0.02
	Ethylbenzene	0.01	0.04	--	<0.01	<0.01
	Xylene	0.08	0.36	--	<0.01	<0.01
	CO_2	0.10	0.39	--	192.19	841.80
	CH_4	1.62	5.27	--	0.03	0.11
	CO2e	40.67	132.11	--	193.00	844.44

Gas Composition of Vent Gas

Gas Stream	Mole Fraction
Methane	0.05
Ethane	0.14
Propane	0.23
Butane	0.25
Pentanes	0.11
Carbon Dioxide	0.001

Vent Gas Properties

Vent Gas Properties	Mass Flow Rate (lb/hr)	Density (lb/ft^3)
Condensate Tank	78.28	0.13
Blowdown Tank	3.92	0.10

Emissions from Pilot Operations

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factors (kg X/MMBtu)	Heat Value of Natural Gas (Btu/scf)	Enclosed Ground Flare Pilot Rating (Btu/hr)	Enclosed Ground Flare Burner Rating (Btu/hr)	Pilot Max. Hourly Emissions (lb/hr)	Pilot Max. Annual Emissions (tons/yr)	Burner Max. Hourly Emissions (lb/hr)	Burner Max. Annual Emissions (tons/yr)	Max. Hourly Emissions (lb/hr)	Max. Annual Emissions (tons/yr)
VOCs	5.5	--	1,262	30,000	11,660,000	<0.01	<0.01	--	--	<0.01	<0.01
Hexane	1.8	--	1,262	30,000	11,660,000	<0.01	<0.01	--	--	<0.01	<0.01
Formaldehyde	0.075	--	1,262	30,000	11,660,000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CO	84	--	1,262	30,000	11,660,000	<0.01	<0.01	0.78	3.40	0.78	3.41
NO_x	100	--	1,262	30,000	11,660,000	<0.01	0.01	0.92	4.05	0.93	4.06
$PM_{Condensable}$	5.70	--	1,262	30,000	11,660,000	<0.01	<0.01	0.05	0.23	0.05	0.23
$PM_{Filterable}$	1.90	--	1,262	30,000	11,660,000	<0.01	<0.01	0.02	0.08	0.02	0.08
PM_{Total}	7.6	--	1,262	30,000	11,660,000	<0.01	<0.01	0.07	0.31	0.07	0.31
SO_2	0.6	--	1,262	30,000	11,660,000	<0.01	<0.01	<0.01	0.02	<0.01	0.02
CO_2	--	52	1,262	30,000	11,660,000	3.44	15.08	1226.46	5371.89	1229.90	5386.98
CH_4	--	0.0	1,262	30,000	11,660,000	<0.01	<0.01	0.02	0.10	0.02	0.10
N_2O	--	<0.001	1,262	30,000	11,660,000	<0.01	<0.01	<0.01	0.01	<0.01	0.01
Total HAPs						<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CO_2e						3.45	15.10	1227.75	5377.55	1231.20	5392.65

Total Enclosed Combustion Device Emissions

Pollutant	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
VOCs	1.42	6.00
HAPs	0.08	0.34
Hexane	0.07	0.31
Formaldehyde	<0.01	<0.01
CO	0.78	3.41
NOx	0.93	4.06
$PM_{Condensable}$	0.05	0.23
$PM_{Filterable}$	0.02	0.08
PM_{Total}	0.07	0.31
SO_2	<0.01	0.02
CO_2	1422.10	6228.78
CH_4	0.06	0.21
N_2O	<0.01	0.01
CO_2e	1,424.20	6,237.08

Notes:
-Emissions from Enclosed Combustion Device Operations from AP-42, Chapter 1.4 references are from the July 1998 revision.
-Greenhouse Gas Emissions from the Enclosed Combustion Device Pilot and Burner calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
-Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Calculations:
Emissions from Tanks VOCs (lb/hr) = Amount of Gas sent to Enclosed Combustion Device (lb/hr) x 0.02 = Max. Hourly Emissions (lb/hr)
Emissions from Enclosed Combustion Device Operations (lb/hr) = Emission factor (lb/106 Btu) x Heat Value of Natural Gas (Btu/scf) ÷ 1,000,000 x Enclosed Combustion Device Pilot Gas Usage (mcfd) x 1,000 ÷ 24
Emissions from Enclosed Combustion Device Vapor Destruction CO2 Methodologies shown below sample equation

Emissions from Enclosed Combustion Device Operations CO2 (tons/yr) = ((Enclosed Combustion Device Pilot Gas Usage (mcfd) x 1,000 x 365 x Fraction of Gas Combusted by Enclosed Combustion Device x Mole Fraction of Methane x Number of Carbon Atoms in Methane) + … + (Enclosed Combustion Device Pilot Gas Usage (mcfd) x 1,000 x 365 x Fraction of Gas Combusted by Enclosed Combustion Device x Mole Fraction of Pentanes-plus x Number of Carbon Atoms in Pentanes-plus)) x .0526 (kg/ft3) CO2 x .001 x 1.102 tons/tonnes

$$E_{a,CH4}(un-combusted) = V_a * (1-\eta) * X_{CH4} \qquad \text{(Eq. W-19)}$$

$$E_{a,CO2}(un-combusted) = V_a * X_{CO2} \qquad \text{(Eq. W-20)}$$

$$E_{a,CO2}(combusted) = \sum_{J=1}^{5} (\eta * V_a * Y_j * R_j) \qquad \text{(Eq. W-21)}$$

Where:
Ea,CH4(un-combusted) = Contribution of annual un-combusted CH4 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Ea,CO2(un-combusted) = Contribution of annual un-combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Ea,CO2(combusted) = Contribution of annual combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Va = Volume of gas sent to Enclosed Combustion Device in cubic feet, during the year.
η = Fraction of gas combusted by a burning Enclosed Combustion Device (default is 0.98). For gas sent to an unlit Enclosed Combustion Device, η is zero.
XCH4 = Mole fraction of CH4 in gas to the Enclosed Combustion Device.
XCO2 = Mole fraction of CO2 in gas to the Enclosed Combustion Device.
Y_j = Mole fraction of gas hydrocarbon constituents j (such as methane, ethane, propane, butane, and pentanes-plus).
R_j = Number of carbon atoms in the gas hydrocarbon constituent j: 1 for methane, 2 for ethane, 3 for propane, 4 for butane, and 5 for pentanes plus).

Enclosed Combustion Device S020 - 20.00 MMBtu/hr

Emissions from Tanks

Input to Enclosed Combustion Device	Pollutant	Amount of Gas Sent to Enclosed Combustion Device (lbs/hr)	Amount of Gas Sent to Enclosed Combustion Device (tons/year)	Enclosed Combustion Device Combustion Efficiency	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
Produced Fluid Tanks S011 - S018	VOCs	68.25	298.92	98%	1.36	5.98
	HAPs	3.88	16.98	98%	0.08	0.34
	Hexane	3.48	15.25	98%	0.07	0.31
	Benzene	0.09	0.41	98%	<0.01	<0.01
	Toluene	0.21	0.92	98%	<0.01	0.02
	Ethylbenzene	0.01	0.04	98%	<0.01	<0.01
	Xylene	0.08	0.36	98%	<0.01	<0.01
	CO2	0.09	0.38	98%	180.53	790.70
	CH4	1.18	5.18	98%	0.02	0.10
Sand Trap Blowdown Tank - S021	VOCs	2.75	0.50	98%	0.05	0.01
	HAPs	0.14	0.02	98%	<0.01	<0.01
	Hexane	0.12	0.02	98%	<0.01	<0.01
	Benzene	0.00	<0.001	98%	<0.01	<0.01
	Toluene	0.01	0.00	98%	<0.01	<0.01
	Ethylbenzene	<0.001	<0.001	98%	<0.01	<0.01
	Xylene	0.00	<0.001	98%	<0.01	<0.01
	CO2	0.01	0.00	98%	11.27	49.36
	CH4	0.44	0.08	98%	<0.01	<0.01
Truck Loading - S022	VOCs	0.12	0.51	98%	<0.01	<0.01
	HAPs	<0.001	0.002	98%	<0.01	<0.01
	CO2	<0.001	0.003	98%	0.40	1.74
	CH4	0.001	0.01	98%	<0.01	<0.01
Totals	VOCs	71.11	299.94	--	1.42	6.00
	HAPs	4.01	17.01	--	0.08	0.34
	Hexane	3.61	15.28	--	0.07	0.31
	Benzene	0.10	0.42	--	<0.01	<0.01
	Toluene	0.22	0.92	--	<0.01	0.02
	Ethylbenzene	0.01	0.04	--	<0.01	<0.01
	Xylene	0.08	0.36	--	<0.01	<0.01
	CO2	0.10	0.39	--	192.19	841.80
	CH4	1.62	5.27	--	0.03	0.11
	CO2e	40.67	132.11	--	193.00	844.44

Gas Composition of Vent Gas

Gas Stream	Mole Fraction
Methane	0.05
Ethane	0.14
Propane	0.23
Butane	0.25
Pentanes	0.11
Carbon Dioxide	0.001

Vent Gas Properties

Vent Gas Properties	Mass Flow Rate (lb/hr)	Density (lb/ft3)
Condensate Tank	78.28	0.13
Blowdown Tank	3.92	0.10

Emissions from Pilot Operations

Pollutant	Emission Factor (lb/106 scf)	Emission Factors (kg X/MMBtu)	Heat Value of Natural Gas (Btu/scf)	Enclosed Ground Flare Pilot Rating (Btu/hr)	Enclosed Ground Flare Burner Rating (Btu/hr)	Pilot Max. Hourly Emissions (lb/hr)	Pilot Max. Annual Emissions (tons/yr)	Burner Max. Hourly Emissions (lb/hr)	Burner Max. Annual Emissions (tons/yr)	Max. Hourly Emissions (lb/hr)	Max. Annual Emissions (tons/yr)
VOCs	5.5	--	1,262	30,000	20,000,000	<0.01	<0.01	--	--	<0.01	<0.01
Hexane	1.8	--	1,262	30,000	20,000,000	<0.01	<0.01	--	--	<0.01	<0.01
Formaldehyde	0.075	--	1,262	30,000	20,000,000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CO	84	--	1,262	30,000	20,000,000	<0.01	<0.01	1.33	5.83	1.33	5.84
NOx	100	--	1,262	30,000	20,000,000	<0.01	0.01	1.58	6.94	1.59	6.95
PMCondensable	5.70	--	1,262	30,000	20,000,000	<0.01	<0.01	0.09	0.40	0.09	0.40
PMFilterable	1.90	--	1,262	30,000	20,000,000	<0.01	<0.01	0.03	0.13	0.03	0.13
PMTotal	7.6	--	1,262	30,000	20,000,000	<0.01	<0.01	0.12	0.53	0.12	0.53
SO2	0.6	--	1,262	30,000	20,000,000	<0.01	<0.01	<0.01	0.04	<0.01	0.04
CO2	--	52	1,262	30,000	20,000,000	3.44	15.08	2103.71	9214.23	2107.15	9229.31
CH4	--	0.0	1,262	30,000	20,000,000	<0.01	<0.01	0.04	0.18	0.04	0.18
N2O	--	<0.001	1,262	30,000	20,000,000	<0.01	<0.01	<0.01	0.02	<0.01	0.02
Total HAPs						<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CO2e						3.45	15.10	2105.92	9223.93	2109.37	9239.02

Total Enclosed Combustion Device Emissions

Pollutant	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
VOCs	1.42	6.00
HAPs	0.08	0.35
Hexane	0.07	0.31
Formaldehyde	<0.01	<0.01
CO	1.33	5.84
NOx	1.59	6.95
PMCondensable	0.09	0.40
PMFilterable	0.03	0.13
PMTotal	0.12	0.53
SO2	<0.01	0.04
CO2	2299.34	10071.11
CH4	0.07	0.28
N2O	<0.01	0.02
CO2e	2,302.37	10,083.46

Notes:
-Emissions from Enclosed Combustion Device Operations from AP-42, Chapter 1.4 references are from the July 1998 revision.
-Greenhouse Gas Emissions from the Enclosed Combustion Device Pilot and Burner calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
-Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
-CO2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO2=1, GWP CH4=25, GWP N2O=298

Example Calculations:
Emissions from Tanks VOCs (lb/hr) = Amount of Gas sent to Enclosed Combustion Device (lb/hr) x 0.02 = Max. Hourly Emissions (lb/hr)
Emissions from Enclosed Combustion Device Operations (lb/hr) = Emission factor (lb/106 Btu) x Heat Value of Natural Gas (Btu/scf) ÷ 1,000,000 x Enclosed Combustion Device Pilot Gas Usage (mcfd) x 1,000 ÷ 24
Emissions from Enclosed Combustion Device Vapor Destruction CO2 Methodologies shown below sample equation

Emissions from Enclosed Combustion Device Operations CO2 (tons/yr) = ((Enclosed Combustion Device Pilot Gas Usage (mcfd) x 1,000 x 365 x Fraction of Gas Combusted by Enclosed Combustion Device x Mole Fraction of Methane x Number of Carbon Atoms in Methane) + … + (Enclosed Combustion Device Pilot Gas Usage (mcfd) x 1,000 x 365 x Fraction of Gas Combusted by Enclosed Combustion Device x Mole Fraction of Pentanes-plus x Number of Carbon Atoms in Pentanes-plus)) x .0526 (kg/ft3) CO2 x .001 x 1.102 tons/tonnes

$$E_{a,CH4}(un-combusted) = V_a * (1-\eta) * X_{CH4} \qquad \text{(Eq. W-19)}$$

$$E_{a,CO2}(un-combusted) = V_a * X_{CO2} \qquad \text{(Eq. W-20)}$$

$$E_{a,CO2}(combusted) = \sum_{j=1}^{x} (\eta * V_a * Y_j * R_j) \qquad \text{(Eq. W-21)}$$

Where:
Ea,CH4(un-combusted) = Contribution of annual un-combusted CH4 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Ea,CO2(un-combusted) = Contribution of annual un-combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Ea,CO2(combusted) = Contribution of annual combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Va = Volume of gas sent to Enclosed Combustion Device in cubic feet, during the year.
η = Fraction of gas combusted by a burning Enclosed Combustion Device (default is 0.98). For gas sent to an unlit Enclosed Combustion Device, η is zero.
XCH4 = Mole fraction of CH4 in gas to the Enclosed Combustion Device.
XCO2 = Mole fraction of CO2 in gas to the Enclosed Combustion Device.
Yj = Mole fraction of gas hydrocarbon constituents j (such as methane, ethane, propane, butane, and pentanes-plus).
Rj = Number of carbon atoms in the gas hydrocarbon constituent j: 1 for methane, 2 for ethane, 3 for propane, 4 for butane, and 5 for pentanes plus).

Fugitive Emissions from Unpaved Haul Roads

Constant	Industrial Roads		
	PM	PM-10	PM-2.5
k (lb/VMT)	4.9	1.5	0.15
a	0.7	0.9	0.9
b	0.45	0.45	0.45

where

k		Patricle size multiplier[1]
s	4.8	Silt content of road surface material (%)
p	150	Number of days per year with precipitation

Item Number	Description	Number of Wheels	W Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)	PM Emissions (lbs/hr)	PM Emissions (tons/yr)	PM-10 Emissions (lbs/hr)	PM-10 Emissions (tons/yr)	PM-2.5 Emissions (lbs/hr)	PM-2.5 Emissions (tons/yr)
1	Liquids Hauling	14	30	10	0.72	1	6,923	NA	NA	3.10	10.73	0.79	2.73	0.08	0.27
2	Employee Vehicles	4	3	10	0.72	1	200	NA	NA	1.10	0.11	0.28	0.03	0.03	0.003
									Totals:	**4.20**	**10.84**	**1.07**	**2.76**	**0.11**	**0.28**

Notes:

[1] - Particle Size Multiplier used from AP-42 13.2.2 - Final Version 11/2006

[2] - Silt Content of Road Surface uses Sand and Gravel Processing Plant Road from AP-42 13.2.2 - Final Version 11/2006

[3] - Number of days per year with precipitation >0.01 in3 found using AP-42 13.2.2 Figure 13.2.2-1 - Final Version 11/2006

Example Calculations:

Emissions (lb/Vehicle Mile Traveled) - $E = k \times (s/12)^a \times (W/3)^b$ Equation 1a from AP-42 13.2.2 - Final Version 11/2006

Size Specific Emissions (lb/VMT) - $E_{ext} = E[(365-p)/365]$ Equation 2 from AP-42 13.2.2 - Final Version 11/2006

Fugitive Leaks

Default Average Component Counts for Major Onshore Natural Gas Production Equipment[1]				
Facility Equipment Type	Valves	Connectors	Open-ended Lines	Pressure Relief Valves
Wellheads	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 40CFR98 Subpart W

Well Specific Equipment Counts	
Facility Equipment Type	Count on Site
Wellheads	8
Separators	8
Meters/Piping	9
Compressors	1
In-line Heaters	9
Dehydrators	0

Gas Composition						
Emissions from Flaring Operations	Propane	Butane	Pentanes	Hexanes +	CO_2	CH_4
Mole %	4.00	1.78	0.64	0.58	0.15	78.13
MW	44	58	72	86.00	44.00	16.00

Fugitive Emissions													
Facility Equipment Type	Total Count	Emission Rate (scf/hr/component)[2]	Hours of Operation	VOCs (lbs/hr)	VOCs (tons/yr)	HAPs (lbs/hr)	HAPs (tons/yr)	CO_2 (lbs/hr)	CO_2 (tons/yr)	CH_4 (lbs/hr)	CH_4 (tons/yr)	Total CO_2e (lbs/hr)	Total CO_2e (tons/yr)
Valves	306	0.027	8760	0.16	0.69	0.09	0.38	<0.01	<0.01	0.27	1.17	6.70	29.34
Connectors	1342	0.003	8760	0.08	0.34	0.04	0.19	<0.01	<0.01	0.13	0.57	3.26	14.30
Open-ended Lines	22	0.061	8760	0.03	0.11	0.01	0.06	<0.01	<0.01	0.04	0.19	1.09	4.77
Pressure Relief Valves	9	0.040	8760	<0.01	0.03	<0.01	0.02	<0.01	<0.01	0.01	0.05	0.29	1.28
			Total Emissions:	**0.27**	**1.17**	**0.15**	**0.65**	**<0.01**	**0.01**	**0.45**	**1.99**	**11.34**	**49.69**

[2]- Table W-1A to 40CFR98 Subpart W

Notes:
-A gas sample from the OXF-122 Site is not available. A sample from a representative well is provided with this submittal.

Example Equations:
Fugitive Emissions (lb/hr) = Count x Emission Rate x Hours of Operation ÷ 385.5 scf/lbmol x mol VOC's

Total OXF-122 Site Emission Levels

	VOCs		HAPs		CO		NO_x		PM (Total)		PM (Filterable)		PM (Condensable)		SO_2		CO_2		CH_4		N_2O		CO_2e	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Line Heater (S001)	<0.01	0.03	<0.01	0.01	0.10	0.45	0.12	0.53	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (S002)	<0.01	0.03	<0.01	0.01	0.10	0.45	0.12	0.53	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (S003)	<0.01	0.03	<0.01	0.01	0.10	0.45	0.12	0.53	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (S004)	<0.01	0.03	<0.01	0.01	0.10	0.45	0.12	0.53	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (S005)	<0.01	0.03	<0.01	0.01	0.10	0.45	0.12	0.53	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (S006)	<0.01	0.03	<0.01	0.01	0.10	0.45	0.12	0.53	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (S007)	<0.01	0.03	<0.01	0.01	0.10	0.45	0.12	0.53	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (S008)	<0.01	0.03	<0.01	0.01	0.10	0.45	0.12	0.53	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (S009)	<0.01	0.02	<0.01	<0.01	0.08	0.34	0.09	0.40	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	134.52	589.21	<0.01	0.01	<0.01	<0.01	134.66	589.82
Compressor Engine (S010)	0.56	2.46	0.31	1.36	2.08	9.11	1.87	8.21	0.04	0.18	0.04	0.17	0.04	0.18	<0.01	0.01	465.85	2040.44	<0.01	0.04	<0.01	<0.01	466.34	2042.55
Tank Truck Loading Activities (E022)	0.07	0.31	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	<0.01	<0.01	<0.01	--	--	0.02	0.10
Enclosed Combustion Unit (C019)	1.42	6.00	0.08	0.34	0.78	3.41	0.93	4.06	0.07	0.31	0.02	0.08	0.05	0.23	<0.01	0.02	1422.10	6228.78	0.06	0.21	<0.01	0.01	1424.20	6237.08
Enclosed Combustion Unit (C020)	1.42	6.00	0.08	0.35	1.33	5.84	1.59	6.95	0.12	0.53	0.03	0.13	0.09	0.40	<0.01	0.04	2299.34	10071.11	0.07	0.28	<0.01	0.02	2302.37	10083.46
TEG (S023)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.52	6.66	<0.01	<0.01	<0.01	<0.01	1.52	6.67
TEG (S024)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.52	6.66	<0.01	<0.01	<0.01	<0.01	1.52	6.67
Haul Roads	--	--	--	--	--	--	--	--	4.20	10.84	4.20	10.84	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	0.27	1.17	0.15	0.65	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	0.01	0.45	1.99	--	--	11.34	49.69
Totals	**3.80**	**16.19**	**0.64**	**2.78**	**5.09**	**22.29**	**5.46**	**23.90**	**4.55**	**12.38**	**4.31**	**11.31**	**0.24**	**1.07**	**0.02**	**0.10**	**5,766.02**	**25,255.15**	**0.62**	**2.65**	**0.01**	**0.04**	**5,784.63**	**25,334.83**

-Two enclosed combustion devices are being included in this application. Emissions from the produced fluid tanks, sand trap blowdown tanks, and tank truck loading are routed to either C019 or C020. For the permitting of these sources, it is assumed that vapors are being evenly distributed between the two enclosed combustion devices. For this reason, the emissions from the combustion of vent gases between C019 and C020 are additive.

Total OXF-122 Site Emission Levels - HAP Speciation

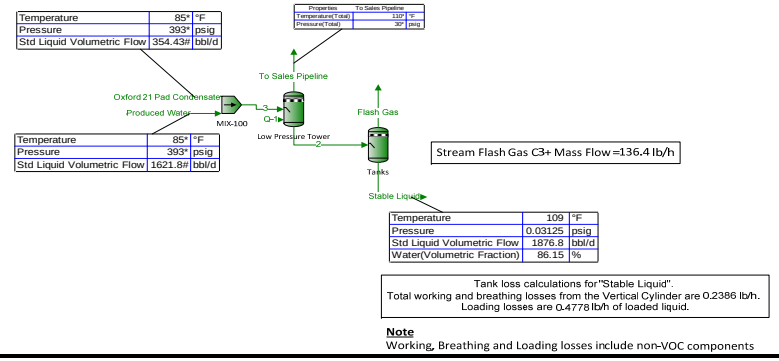
	Total HAPs		Formaldehyde		Hexane		Benzene		Toluene		Ethylbenzene		Xylene	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Line Heater (S001)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (S002)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (S003)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (S004)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (S005)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (S006)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (S007)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (S008)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (S009)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Compressor Engine (S010)	0.31	1.36	0.30	1.31	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tank Truck Loading Activities (E022)	<0.01	<0.01	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Enclosed Combustion Unit (C019)	0.08	0.34	<0.01	<0.01	0.07	0.31	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
Enclosed Combustion Unit (C020)	0.08	0.35	<0.01	<0.01	0.07	0.31	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
TEG (S023)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TEG (S024)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Haul Roads	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	0.15	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Totals	**0.64**	**2.78**	**0.30**	**1.31**	**0.14**	**0.61**	**<0.01**	**<0.01**	**<0.01**	**0.04**	**<0.01**	**<0.01**	**<0.01**	**<0.01**

-Two enclosed combustion devices are being included in this application. Emissions from the produced fluids tanks, sand trap blowdown tanks, and truck loading are routed to either C019 and C020. For the permitting of these sources, it is assumed that vapors are being evenly distributed between the two enclosed combustion devices. For this reason, the emissions from the combustion of vent gases between C019 and C020 are additive.

Flowsheet1
Plant Schematic

Client Name:	EQT	Job:
Location:	OXF 122 400% Case	
Flowsheet:	Flowsheet1	

EQT OFX 122 Well Pad
400% Contingency



Note
Working, Breathing and Loading losses include non-VOC components

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	OXF 122 400% Case		
Flowsheet:	Flowsheet1		

Connections

	Flash Gas	Oxford 21 Pad Condensate	Produced Water	Stable Liquid	To Sales Pipeline
From Block	Tanks	--	--	Tanks	Low Pressure Tower
To Block	--	MIX-100	MIX-100	--	--

Stream Composition

Mole Fraction	Flash Gas %	Oxford 21 Pad Condensate %	Produced Water %	Stable Liquid %	To Sales Pipeline %
Nitrogen	0	0 *	0 *	0	0
Methane	4.81913	12.131 *	0 *	0.000509035	32.9729
Carbon Dioxide	0.128967	0.087 *	0 *	7.21449E-05	0.211068
Ethane	14.1579	10.145 *	0 *	0.00675435	24.9405
Propane	23.259	9.322 *	0 *	0.0341817	18.3248
i-Butane	6.65361	2.446 *	0 *	0.0228118	3.4594
n-Butane	17.9775	6.995 *	0 *	0.0849668	8.34552
i-Pentane	6.96858	3.988 *	0 *	0.0794234	2.66116
n-Pentane	7.41033	5.018 *	0 *	0.109925	2.73385
Isohexane	3.36426	4.263 *	0 *	0.113134	1.1576
n-Hexane	2.6419	4.311 *	0 *	0.119199	0.898046
2,2,4-Trimethylpentane	0.00632265	0.025 *	0 *	0.000746385	0.00212165
Benzene	0.0792278	0.136 *	0 *	0.00378418	0.0270466
Heptane	2.8074	11.691 *	0 *	0.349925	0.943589
Toluene	0.148737	0.717 *	0 *	0.021605	0.0497693
Octane	0.846779	9.741 *	0 *	0.300574	0.28594
Ethylbenzene	0.00547894	0.074 *	0 *	0.00228918	0.00184977
o-Xylene	0.0504191	0.878 *	0 *	0.027249	0.0170584
Nonane	0.151113	4.769 *	0 *	0.148752	0.0512013
Decane	0.152015	13.263 *	0 *	0.41531	0.0527042
Water	8.37132	0 *	100 *	98.1588	2.86393

Mass Fraction	Flash Gas %	Oxford 21 Pad Condensate %	Produced Water %	Stable Liquid %	To Sales Pipeline %
Nitrogen	0	0 *	0 *	0	0
Methane	1.51076	2.49009 *	0 *	0.000415983	14.8981
Carbon Dioxide	0.110913	0.0489906 *	0 *	0.000161737	0.26162
Ethane	8.31905	3.90318 *	0 *	0.0103457	21.1216
Propane	20.042	5.25959 *	0 *	0.0767796	22.7581
i-Butane	7.55709	1.81906 *	0 *	0.0675397	5.66297
n-Butane	20.4187	5.20208 *	0 *	0.251564	13.6615
i-Pentane	9.8249	3.68156 *	0 *	0.291901	5.40756
n-Pentane	10.4477	4.63241 *	0 *	0.404	5.55527
Isohexane	5.66537	4.70052 *	0 *	0.49663	2.80959
n-Hexane	4.44893	4.75345 *	0 *	0.523253	2.17963
2,2,4-Trimethylpentane	0.0141133	0.0365395 *	0 *	0.00434305	0.00682576
Benzene	0.120934	0.135926 *	0 *	0.0150573	0.059502
Heptane	5.49713	14.9891 *	0 *	1.78611	2.66294
Toluene	0.267803	0.845293 *	0 *	0.101403	0.129153
Octane	1.89017	14.2372 *	0 *	1.74898	0.919923
Ethylbenzene	0.0113667	0.100522 *	0 *	0.01238	0.00553098
o-Xylene	0.1046	1.19268 *	0 *	0.147363	0.0510059
Nonane	0.378732	7.82617 *	0 *	0.971841	0.184951
Decane	0.422659	24.1456 *	0 *	3.01009	0.211201
Water	2.94707	0 *	100 *	90.0798	1.45313

Mass Flow	Flash Gas lb/h	Oxford 21 Pad Condensate lb/h	Produced Water lb/h	Stable Liquid lb/h	To Sales Pipeline lb/h
Nitrogen	0	0 *	0 *	0	0

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	OXF 122 400% Case		
Flowsheet:	Flowsheet1		

Mass Flow	Flash Gas lb/h	Oxford 21 Pad Condensate lb/h	Produced Water lb/h	Stable Liquid lb/h	To Sales Pipeline lb/h
Methane	2.36518	81.686 *	0 *	0.109216	79.2116
Carbon Dioxide	0.17364	1.60711 *	0 *	0.0424641	1.39101
Ethane	13.0239	128.042 *	0 *	2.71627	112.302
Propane	31.3769	172.538 *	0 *	20.1585	121.003
i-Butane	11.831	59.6731 *	0 *	17.7326	30.1095
n-Butane	31.9665	170.651 *	0 *	66.0482	72.6367
i-Pentane	15.3814	120.771 *	0 *	76.6385	28.7515
n-Pentane	16.3565	151.964 *	0 *	106.07	29.5369
Isohexane	8.86944	154.198 *	0 *	130.39	14.9383
n-Hexane	6.96504	155.934 *	0 *	137.38	11.5889
2,2,4-Trimethylpentane	0.0220952	1.19866 *	0 *	1.14027	0.036292
Benzene	0.189329	4.45899 *	0 *	3.95329	0.316367
Heptane	8.60605	491.709 *	0 *	468.944	14.1586
Toluene	0.41926	27.7294 *	0 *	26.6234	0.686694
Octane	2.95916	467.045 *	0 *	459.194	4.89115
Ethylbenzene	0.0177951	3.29756 *	0 *	3.25036	0.0294077
o-Xylene	0.163757	39.1252 *	0 *	38.6902	0.271194
Nonane	0.592926	256.733 *	0 *	255.157	0.983369
Decane	0.661696	792.084 *	0 *	790.299	1.12294
Water	4.61379	0 *	23662.8 *	23650.5	7.72618

Stream Properties

Property	Units	Flash Gas	Oxford 21 Pad Condensate	Produced Water	Stable Liquid	To Sales Pipeline
Temperature	°F	108.974	85 *	85 *	108.974	110 *
Pressure	psia	14.7272 *	407.696 *	407.696 *	14.7272	44.6959 *
Mole Fraction Vapor	%	100	2.45359	0	0	100
Mole Fraction Light Liquid	%	0	97.5464	100	1.84119	0
Mole Fraction Heavy Liquid	%	0	0	0	98.1588	0
Molecular Weight	lb/lbmol	51.1734	78.1542	18.0153	19.631	35.5057
Mass Density	lb/ft^3	0.125814	34.8738	62.1455	59.1312	0.266912
Molar Flow	lbmol/h	3.05931	41.974	1313.49	1337.43	14.9748
Mass Flow	lb/h	156.555	3280.45	23662.8	26255	531.691
Vapor Volumetric Flow	ft^3/h	1244.34	94.0662	380.765	444.013	1992.01
Liquid Volumetric Flow	gpm	155.138	11.7277	47.4719	55.3575	248.354
Std Vapor Volumetric Flow	MMSCFD	0.027863	0.382283	11.9627	12.1808	0.136385
Std Liquid Volumetric Flow	sgpm	0.561191	10.3376 *	47.3037 *	54.741	2.33912
Compressibility		0.981589	0.156312	0.0202195	0.000801201	0.972546
Specific Gravity		1.76688		0.996417	0.948086	1.22592
API Gravity				9.96415	16.0845	
Enthalpy	Btu/h	-171230	-3.25278E+06	-1.61206E+08	-1.6296E+08	-649297
Mass Enthalpy	Btu/lb	-1093.74	-991.568	-6812.63	-6206.8	-1221.19
Mass Cp	Btu/(lb*°F)	0.423816	0.531146	0.981529	0.936564	0.44693
Ideal Gas CpCv Ratio		1.10156	1.06777	1.32512	1.29305	1.14561
Dynamic Viscosity	cP	0.00850803		0.833816	0.600194	0.00970043
Kinematic Viscosity	cSt	4.22161		0.837605	0.629803	2.26883
Thermal Conductivity	Btu/(h*ft*°F)	0.01092		0.353848	0.322723	0.0142024
Surface Tension	lbf/ft			0.00492858	0.00426467 ?	
Net Ideal Gas Heating Value	Btu/ft^3	2574.42	3993.4	0	98.7367	1849.1
Net Liquid Heating Value	Btu/lb	18908.4	19235.7	-1059.76	938.286	19616.5
Gross Ideal Gas Heating Value	Btu/ft^3	2795.4	4313.43	50.31	155.802	2017.2
Gross Liquid Heating Value	Btu/lb	20547.1	20789.6	0	2041.41	21413.1

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	OXF 122 400% Case		
Flowsheet:	Flowsheet1		

Connections

	2	3			
From Block	Low Pressure Tower	MIX-100			
To Block	Tanks	Low Pressure Tower			

Stream Composition

Mole Fraction	2 %	3 %			
Nitrogen	0	0			
Methane	0.0115063	0.375656			
Carbon Dioxide	0.000366314	0.00269409			
Ethane	0.0390506	0.314156			
Propane	0.0871862	0.288671			
i-Butane	0.0379449	0.0757443			
n-Butane	0.125802	0.216611			
i-Pentane	0.0951461	0.123495			
n-Pentane	0.126586	0.15539			
Isohexane	0.120554	0.132011			
n-Hexane	0.124956	0.133497			
2,2,4-Trimethylpentane	0.000759112	0.000774165			
Benzene	0.00395636	0.00421146			
Heptane	0.355534	0.36203			
Toluene	0.0218951	0.022203			
Octane	0.301821	0.301646			
Ethylbenzene	0.00229646	0.00229153			
o-Xylene	0.0273018	0.0271887			
Nonane	0.148757	0.14768			
Decane	0.414709	0.41071			
Water	97.9539	96.9033			

Mass Fraction	2 %	3 %			
Nitrogen	0	0			
Methane	0.00936859	0.303178			
Carbon Dioxide	0.000818216	0.0059648			
Ethane	0.0595958	0.475228			
Propane	0.195124	0.640375			
i-Butane	0.111934	0.221477			
n-Butane	0.371105	0.633373			
i-Pentane	0.348408	0.448244			
n-Pentane	0.463535	0.564014			
Isohexane	0.527267	0.572306			
n-Hexane	0.546523	0.57875			
2,2,4-Trimethylpentane	0.00440097	0.00444882			
Benzene	0.0156849	0.0165495			
Heptane	1.80811	1.82498			
Toluene	0.10239	0.102918			
Octane	1.74981	1.73344			
Ethylbenzene	0.012374	0.0122389			
o-Xylene	0.14711	0.145213			
Nonane	0.968325	0.952866			
Decane	2.99475	2.93982			
Water	89.5634	87.8246			

Mass Flow	2 lb/h	3 lb/h			
Nitrogen	0	0			
Methane	2.47439	81.686			
Carbon Dioxide	0.216104	1.60711			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	OXF 122 400% Case		
Flowsheet:	Flowsheet1		

Mass Flow	2 lb/h	3 lb/h			
Ethane	15.7402	128.042			
Propane	51.5354	172.538			
i-Butane	29.5636	59.6731			
n-Butane	98.0147	170.651			
i-Pentane	92.02	120.771			
n-Pentane	122.427	151.964			
Isohexane	139.26	154.198			
n-Hexane	144.345	155.934			
2,2,4-Trimethylpentane	1.16236	1.19866			
Benzene	4.14262	4.45899			
Heptane	477.55	491.709			
Toluene	27.0427	27.7294			
Octane	462.153	467.045			
Ethylbenzene	3.26816	3.29756			
o-Xylene	38.854	39.1252			
Nonane	255.75	256.733			
Decane	790.961	792.084			
Water	23655.1	23662.8			

Stream Properties

Property	Units	2	3			
Temperature	°F	110	85.0995			
Pressure	psia	44.6959	407.696			
Mole Fraction Vapor	%	0	0.0194966			
Mole Fraction Light Liquid	%	2.04233	3.02197			
Mole Fraction Heavy Liquid	%	97.9577	96.9585			
Molecular Weight	lb/lbmol	19.703	19.8776			
Mass Density	lb/ft^3	58.8868	57.8849			
Molar Flow	lbmol/h	1340.49	1355.46			
Mass Flow	lb/h	26411.6	26943.3			
Vapor Volumetric Flow	ft^3/h	448.514	465.463			
Liquid Volumetric Flow	gpm	55.9186	58.0317			
Std Vapor Volumetric Flow	MMSCFD	12.2086	12.345			
Std Liquid Volumetric Flow	sgpm	55.3022	57.6413			
Compressibility		0.00244622	0.0239474			
Specific Gravity		0.944168				
API Gravity		16.6147				
Enthalpy	Btu/h	-1.63131E+08	-1.64459E+08			
Mass Enthalpy	Btu/lb	-6176.49	-6103.89			
Mass Cp	Btu/(lb*°F)	0.93464	0.927362			
Ideal Gas CpCv Ratio		1.2917	1.2909			
Dynamic Viscosity	cP	0.587641				
Kinematic Viscosity	cSt	0.617324				
Thermal Conductivity	Btu/(h*ft*°F)	0.320409				
Surface Tension	lbf/ft	0.00422098 ?				
Net Ideal Gas Heating Value	Btu/ft^3	104.387	123.662			
Net Liquid Heating Value	Btu/lb	1044.8	1411.29			
Gross Ideal Gas Heating Value	Btu/ft^3	161.826	182.324			
Gross Liquid Heating Value	Btu/lb	2151.11	2531.22			

Remarks

Energy Stream Report

Client Name:	EQT	Job:
Location:	OXF 122 400% Case	
Flowsheet:	Flowsheet1	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-1	678583 Btu/h	266.693 hp	--	Low Pressure Tower

Remarks

Blocks
Low Pressure Tower
Separator Report

Client Name:	EQT	Job:	
Location:	OXF 122 400% Case	Modified:	9:57 AM, 2/8/2016
Flowsheet:	Flowsheet1	Status:	Solved 10:01 AM, 2/8/2016

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
3	Inlet	MIX-100	To Sales Pipeline	Vapor Outlet	
2	Light Liquid Outlet	Tanks	Q-1	Energy	

Block Parameters

Pressure Drop	363	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	1.10478	%	Heat Duty	678583	Btu/h
Mole Fraction Light Liquid	2.01977	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	96.8755	%	Heat Release Curve Increments	5	

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	EQT	Job:	
Location:	OXF 122 400% Case	Modified: 2:14 PM, 7/24/2014	
Flowsheet:	Flowsheet1	Status: Solved 10:01 AM, 2/8/2016	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Water	Inlet		Oxford 21 Pad Condensate	Inlet	
3	Outlet	Low Pressure Tower			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 3	100 %

Remarks

Blocks
Tanks
Separator Report

Client Name:	EQT	Job:	
Location:	OXF 122 400% Case	Modified: 9:58 AM, 2/8/2016	
Flowsheet:	Flowsheet1	Status: Solved 10:01 AM, 2/8/2016	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
2	Inlet	Low Pressure Tower	Flash Gas	Vapor Outlet	
Stable Liquid	Light Liquid Outlet				

Block Parameters

Pressure Drop	29.9688	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	0.228224	%	Heat Duty	0	Btu/h
Mole Fraction Light Liquid	1.83699	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	97.9348	%	Heat Release Curve Increments	5	

Remarks

Flowsheet Environment
Environment1

Client Name:	EQT	Job:	
Location:	OXF 122 400% Case		
Flowsheet:	Flowsheet1		

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	1 %

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	2,2,4-Trimethylpentane	False	False
Methane	False	False	Benzene	False	False
Carbon Dioxide	False	False	Heptane	False	False
Ethane	False	False	Toluene	False	False
Propane	False	False	Octane	False	False
i-Butane	False	False	Ethylbenzene	False	False
n-Butane	False	False	o-Xylene	False	False
i-Pentane	False	False	Nonane	False	False
n-Pentane	False	False	Decane	False	False
Isohexane	False	False	Water	False	True
n-Hexane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Calculator Report

Client Name:	EQT	Job:
Location:	OXF 122 400% Case	

Simple Solver 1

Source Code

Residual Error (for CV1) = TP / 1876.7 - 1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Oxford 21 Pad Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	354.431
Unit	bbl/d

Measured Variable [TP]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Stable Liquid!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	1876.83
Unit	bbl/d

Solver Properties

Status: Solved

Error	7.09057E-05		Iterations	10
Calculated Value	10.3376	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 CV1) = LF / 86.373 - 1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	1621.84
Unit	bbl/d

Measured Variable [LF]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Stable Liquid!Phases!Total!Composition!Std. Liquid Volumetric Fraction!Water
Value	86.3686
Unit	%

Solver Properties

Status: Solved

Error	-5.044E-05		Iterations	10
Calculated Value	47.3037	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	Job:
Location:	OXF 122 400% Case	

Cn+ Flow/Frac.

User Value [CnPlusSum]

* Parameter	136.379	lb/h	Upper Bound	
Lower Bound		lb/h	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={E867C485-3D3C-49CB-BC24-EA16096DB2B1}

Tank Losses

User Value [ShellLength]

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

User Value [ShellDiam]

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

User Value [BreatherVP]

* Parameter	0.03	psig	Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value [BreatherVacP]

* Parameter	-0.03	psig	Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value [DomeRadius]

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

User Value [OpPress]

* Parameter	0.03125	psig	Upper Bound	
Lower Bound			* 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	1874.26	bbl/day	Upper Bound	
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

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

User Value [AtmPressure]

* Parameter	14.1085	psia	Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value Sets Report

Client Name:	EQT	Job:
Location:	OXF 122 400% Case	

User Value [TVP]

* Parameter	0.353847 psia	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

* Parameter	57.7675 °F	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	66.3119 °F	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	0.238624 lb/h	Upper Bound	
Lower Bound	lb/h	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.150644 ton/yr	Upper Bound	
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.0235518 ton/yr	Upper Bound	
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

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

User Value [WithdrawalLoss]

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

User Value [LoadingLosses]

* Parameter	0.477812 lb/h	Upper Bound	
Lower Bound	lb/h	* Enforce Bounds	False

User Value [DeckFittingLosses]

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

User Value [DeckSeamLosses]

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

User Value [FlashingLosses]

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

User Value [GasMoleWeight]

* Parameter	0.0284946 kg/mol	Upper Bound	
Lower Bound		* Enforce Bounds	False

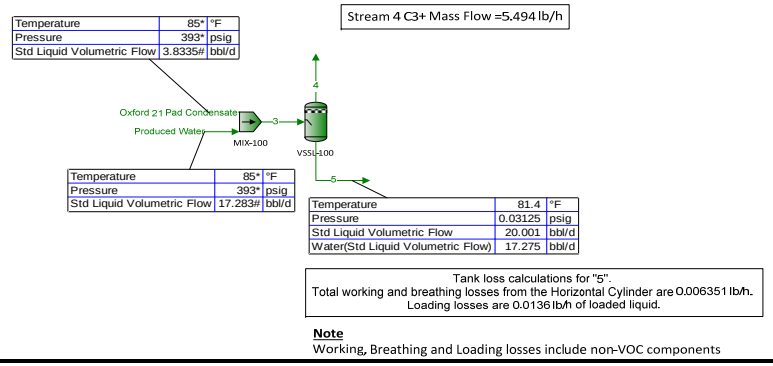
Remarks

This User Value Set was programmatically generated. GUID={B57AFC7E-AAE8-4873-921B-7B4031991004}

Flowsheet1
Plant Schematic

Client Name:	EQT	Job:
Location:	OXF 122 Blowdown Tank	
Flowsheet:	Flowsheet1	

EQT OFX 122 Well Pad
Blowdown Tank



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	OXF 122 Blowdown Tank		
Flowsheet:	Flowsheet1		

Connections

	Oxford 21 Pad Condensate	Produced Water	3	4	5
From Block	--	--	MIX-100	VSSL-100	VSSL-100
To Block	MIX-100	MIX-100	VSSL-100	--	--

Stream Composition

Mole Fraction	Oxford 21 Pad Condensate %	Produced Water %	3 %	4 %	5 %
Nitrogen	0 *	0 *	0	0	0
Methane	12.131 *	0 *	0.381096	27.3797	0.00317
Carbon Dioxide	0.087 *	0 *	0.00273311	0.188522	0.000132449
Ethane	10.145 *	0 *	0.318706	22.1556	0.0130338
Propane	9.322 *	0 *	0.292851	18.5613	0.0371307
i-Butane	2.446 *	0 *	0.0768412	4.10233	0.0204926
n-Butane	6.995 *	0 *	0.219748	10.571	0.0748511
i-Pentane	3.988 *	0 *	0.125283	3.92754	0.0720594
n-Pentane	5.018 *	0 *	0.157641	4.14733	0.101793
Isohexane	4.263 *	0 *	0.133922	1.84848	0.109922
n-Hexane	4.311 *	0 *	0.13543	1.4277	0.117341
2,2,4-Trimethylpentane	0.025 *	0 *	0.000785376	0.00328405	0.0007504
Benzene	0.136 *	0 *	0.00427245	0.043334	0.00372566
Heptane	11.691 *	0 *	0.367273	1.42241	0.352503
Toluene	0.717 *	0 *	0.0225246	0.075928	0.021777
Octane	9.741 *	0 *	0.306014	0.394172	0.30478
Ethylbenzene	0.074 *	0 *	0.00232471	0.00255805	0.00232145
o-Xylene	0.878 *	0 *	0.0275824	0.0230132	0.0276464
Nonane	4.769 *	0 *	0.149818	0.0644626	0.151013
Decane	13.263 *	0 *	0.416658	0.0593386	0.421659
Water	0 *	100 *	96.8585	3.60198	98.1639

Mass Fraction	Oxford 21 Pad Condensate %	Produced Water %	3 %	4 %	5 %
Nitrogen	0 *	0 *	0	0	0
Methane	2.49009 *	0 *	0.307152	11.1692	0.0025903
Carbon Dioxide	0.0489906 *	0 *	0.00604298	0.210974	0.000296904
Ethane	3.90318 *	0 *	0.481456	16.9404	0.0199622
Propane	5.25959 *	0 *	0.648769	20.8125	0.0833966
i-Butane	1.81906 *	0 *	0.22438	6.06308	0.0606678
n-Butane	5.20208 *	0 *	0.641675	15.6236	0.221595
i-Pentane	3.68156 *	0 *	0.454119	7.2056	0.264813
n-Pentane	4.63241 *	0 *	0.571406	7.60885	0.374083
Isohexane	4.70052 *	0 *	0.579807	4.05059	0.48249
n-Hexane	4.75345 *	0 *	0.586336	3.12854	0.515055
2,2,4-Trimethylpentane	0.0365395 *	0 *	0.00450713	0.00953904	0.00436604
Benzene	0.135926 *	0 *	0.0167664	0.0860729	0.0148232
Heptane	14.9891 *	0 *	1.8489	3.62428	1.79912
Toluene	0.845293 *	0 *	0.104267	0.177895	0.102202
Octane	14.2372 *	0 *	1.75616	1.14494	1.7733
Ethylbenzene	0.100522 *	0 *	0.0123993	0.00690575	0.0125534
o-Xylene	1.19268 *	0 *	0.147116	0.0621267	0.149499
Nonane	7.82617 *	0 *	0.965355	0.210234	0.986528
Decane	24.1456 *	0 *	2.97835	0.214688	3.05584
Water	0 *	100 *	87.665	1.65008	90.0768

Mass Flow	Oxford 21 Pad Condensate lb/h	Produced Water lb/h	3 lb/h	4 lb/h	5 lb/h
Nitrogen	0 *	0 *	0	0	0
Methane	0.88352 *	0 *	0.88352	0.876272	0.00724777

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	OXF 122 Blowdown Tank		
Flowsheet:	Flowsheet1		

Mass Flow	Oxford 21 Pad Condensate lb/h	Produced Water lb/h	3 lb/h	4 lb/h	5 lb/h
Carbon Dioxide	0.0173826 *	0 *	0.0173826	0.0165518	0.000830748
Ethane	1.38491 *	0 *	1.38491	1.32905	0.0558551
Propane	1.86618 *	0 *	1.86618	1.63283	0.233347
i-Butane	0.645427 *	0 *	0.645427	0.475676	0.169751
n-Butane	1.84577 *	0 *	1.84577	1.22574	0.620033
i-Pentane	1.30627 *	0 *	1.30627	0.565312	0.740958
n-Pentane	1.64365 *	0 *	1.64365	0.596948	1.0467
Isohexane	1.66781 *	0 *	1.66781	0.317787	1.35003
n-Hexane	1.68659 *	0 *	1.68659	0.245448	1.44114
2,2,4-Trimethylpentane	0.0129647 *	0 *	0.0129647	0.000748381	0.0122163
Benzene	0.0482286 *	0 *	0.0482286	0.00675281	0.0414758
Heptane	5.31834 *	0 *	5.31834	0.284341	5.034
Toluene	0.299922 *	0 *	0.299922	0.0139567	0.285966
Octane	5.05157 *	0 *	5.05157	0.0898254	4.96175
Ethylbenzene	0.0356666 *	0 *	0.0356666	0.000541787	0.0351248
o-Xylene	0.423179 *	0 *	0.423179	0.00487412	0.418305
Nonane	2.77684 *	0 *	2.77684	0.0164938	2.76034
Decane	8.56721 *	0 *	8.56721	0.0168432	8.55037
Water	0 *	252.168 *	252.168	0.129456	252.038

Stream Properties

Property	Units	Oxford 21 Pad Condensate	Produced Water	3	4	5
Temperature	°F	85 *	85 *	85.0992	81.3833	81.3833
Pressure	psia	407.696 *	407.696 *	407.696	14.7272 *	14.7272
Mole Fraction Vapor	%	2.45359	0	0.0206344	100	0
Mole Fraction Light Liquid	%	97.5464	100	3.06572	0	1.83443
Mole Fraction Heavy Liquid	%	0	0	96.9136	0	98.1656
Molecular Weight	lb/lbmol	78.1542	18.0153	19.9045	39.3259	19.6327
Mass Density	lb/ft^3	34.8738	62.1455	57.8153	0.101023	59.5744
Molar Flow	lbmol/h	0.453992	13.9974	14.4514	0.199498	14.2519
Mass Flow	lb/h	35.4814	252.168	287.649	7.84545	279.804
Vapor Volumetric Flow	ft^3/h	1.01742	4.0577	4.97531	77.6601	4.69671
Liquid Volumetric Flow	gpm	0.126848	0.505895	0.620299	9.68229	0.585564
Std Vapor Volumetric Flow	MMSCFD	0.00413479	0.127484	0.131618	0.00181695	0.129801
Std Liquid Volumetric Flow	sgpm	0.111812 *	0.504102 *	0.615914	0.0325554	0.583358
Compressibility		0.156312	0.0202195	0.0240087	0.987359	0.000835865
Specific Gravity			0.996417		1.35782	0.955193
API Gravity			9.96415			15.9923
Enthalpy	Btu/h	-35182.2	-1.71793E+06	-1.75311E+06	-9270.75	-1.74384E+06
Mass Enthalpy	Btu/lb	-991.568	-6812.63	-6094.6	-1181.67	-6232.36
Mass Cp	Btu/(lb*°F)	0.531146	0.981529	0.926643	0.42149	0.935133
Ideal Gas CpCv Ratio		1.06777	1.32512	1.29046	1.13709	1.29546
Dynamic Viscosity	cP		0.833816		0.0088937	0.807227
Kinematic Viscosity	cSt		0.837605		5.49593	0.837078
Thermal Conductivity	Btu/(h*ft*°F)		0.353848		0.0122927	0.313852
Surface Tension	lbf/ft		0.00492858			0.00446461 ?
Net Ideal Gas Heating Value	Btu/ft^3	3993.4	0	125.453	2031.99	98.7652
Net Liquid Heating Value	Btu/lb	19235.7	-1059.76	1443.68	19453.4	938.705
Gross Ideal Gas Heating Value	Btu/ft^3	4313.43	50.31	184.236	2213.33	155.833
Gross Liquid Heating Value	Btu/lb	20789.6	0	2564.39	21203.2	2041.78

Remarks

* User Specified Values
? Extrapolated or Approximate Values

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	EQT	Job:	
Location:	OXF 122 Blowdown Tank	Modified: 2:14 PM, 7/24/2014	
Flowsheet:	Flowsheet1	Status: Solved 3:40 PM, 12/22/2014	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Water	Inlet		Oxford 21 Pad Condensate	Inlet	
3	Outlet	VSSL-100			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 3	100 %

Remarks

Blocks
VSSL-100
Separator Report

Client Name:	EQT	Job:	
Location:	OXF 122 Blowdown Tank	Modified:	1:11 PM, 7/17/2014
Flowsheet:	Flowsheet1	Status:	Solved 3:40 PM, 12/22/2014

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
3	Inlet	MIX-100	4	Vapor Outlet	
5	Light Liquid Outlet				

Block Parameters

Pressure Drop	392.969	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	1.38047	%	Heat Duty	0	Btu/h
Mole Fraction Light Liquid	1.80911	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	96.8104	%	Heat Release Curve Increments	5	

Remarks

Flowsheet Environment
Environment1

Client Name:	EQT	Job:	
Location:	OXF 122 Blowdown Tank		
Flowsheet:	Flowsheet1		

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	1 %

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	2,2,4-Trimethylpentane	False	False
Methane	False	False	Benzene	False	False
Carbon Dioxide	False	False	Heptane	False	False
Ethane	False	False	Toluene	False	False
Propane	False	False	Octane	False	False
i-Butane	False	False	Ethylbenzene	False	False
n-Butane	False	False	o-Xylene	False	False
i-Pentane	False	False	Nonane	False	False
n-Pentane	False	False	Decane	False	False
Isohexane	False	False	Water	False	True
n-Hexane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Environments Report

Client Name:	EQT	Job:	
Location:	OXF 122 Blowdown Tank		

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	IG Ref Pressure	14.6959 psia
IG Ref Temperature	60 °F	IG Ref Volume	379.485 ft^3/lbmol
Liq Ref Temperature	60 °F		

Environment [Environment1]

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	1 %

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	2,2,4-Trimethylpentane	False	False
Methane	False	False	Benzene	False	False
Carbon Dioxide	False	False	Heptane	False	False
Ethane	False	False	Toluene	False	False
Propane	False	False	Octane	False	False
i-Butane	False	False	Ethylbenzene	False	False
n-Butane	False	False	o-Xylene	False	False
i-Pentane	False	False	Nonane	False	False
n-Pentane	False	False	Decane	False	False
Isohexane	False	False	Water	False	True
n-Hexane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Calculator Report

Client Name:	EQT	Job:
Location:	OXF 122 Blowdown Tank	

Simple Solver 1

Source Code

Residual Error (for CV1) = TP / 20 - 1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Oxford 21 Pad Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	3.83354
Unit	bbl/d

Measured Variable [TP]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!5!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	20.0009
Unit	bbl/d

Solver Properties

Status: Solved

Error	4.26454E-05		Iterations	2
Calculated Value	0.111812	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 CV1) = LF / 86.373 - 1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	17.2835
Unit	bbl/d

Measured Variable [LF]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!5!Phases!Total!Composition!Std. Liquid Volumetric Fraction!Water
Value	86.3694
Unit	%

Solver Properties

Status: Solved

Error	-4.1435E-05		Iterations	2
Calculated Value	0.504102	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	Job:
Location:	OXF 122 Blowdown Tank	

Cn+ Flow/Frac.

User Value [CnPlusSum]

* Parameter	5.49412	lb/h	Upper Bound	
Lower Bound		lb/h	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={E867C485-3D3C-49CB-BC24-EA16096DB2B1}

Tank Losses

User Value [ShellLength]

* Parameter	10	ft	Upper Bound	
* Lower Bound	0	ft	* Enforce Bounds	False

User Value [ShellDiam]

* Parameter	10	ft	Upper Bound	
* Lower Bound	0	ft	* Enforce Bounds	False

User Value [BreatherVP]

* Parameter	0.03	psig	Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value [BreatherVacP]

* Parameter	-0.03	psig	Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value [DomeRadius]

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

User Value [OpPress]

* Parameter	0.03125	psig	Upper Bound	
Lower Bound			* 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	19.9719	bbl/day	Upper Bound	
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

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

User Value [AtmPressure]

* Parameter	14.1085	psia	Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value Sets Report

Client Name:	EQT	Job:
Location:	OXF 122 Blowdown Tank	

User Value [TVP]

* Parameter	0.400748 psia	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

* Parameter	57.7675 °F	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	66.3119 °F	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	0.00635149 lb/h	Upper Bound	
Lower Bound	lb/h	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.0278195 ton/yr	Upper Bound	
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

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

User Value [RimSealLosses]

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

User Value [WithdrawalLoss]

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

User Value [LoadingLosses]

* Parameter	0.0136009 lb/h	Upper Bound	
Lower Bound	lb/h	* Enforce Bounds	False

User Value [DeckFittingLosses]

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

User Value [DeckSeamLosses]

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

User Value [FlashingLosses]

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

User Value [GasMoleWeight]

* Parameter	0.0278107 kg/mol	Upper Bound	
Lower Bound		* Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={B57AFC7E-AAE8-4873-921B-7B4031991004}

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

Certificate of Analysis : 13060035-001A

Company:	Gas Analytical Services	**For:**	Gas Analytical Services
Well:	Oxford 21 Pad		Alan Ball
Field:	EQT Midstream		PO Box 1028
Sample of:	Condensate-Spot		
Conditions:	393 @ N.G.		Bridgeport, WV, 26330
Sampled by:	RM-GAS		
Sample date:	5/28/2013	**Report Date:**	6/27/2013
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	12.131	16.043	2.159	0.3000	4.855
Carbon Dioxide	0.087	44.010	0.042	0.8180	0.035
Ethane	10.145	30.070	3.384	0.3562	6.403
Propane	9.322	44.097	4.560	0.5070	6.061
Iso-butane	2.446	58.123	1.577	0.5629	1.889
N-butane	6.995	58.123	4.510	0.5840	5.207
Iso-pentane	3.988	72.150	3.191	0.6244	3.446
N-pentane	5.018	72.150	4.016	0.6311	4.291
i-Hexanes	4.263	86.177	4.026	0.6795	4.092
n-Hexane	4.311	85.713	4.125	0.6640	4.172
2,2,4 trimethylpentane	0.025	114.231	0.032	0.6967	0.031
Benzene	0.136	78.114	0.102	0.8846	0.090
Heptanes	11.691	97.742	12.715	0.7030	12.206
Toluene	0.717	92.141	0.630	0.8719	0.569
Octanes	9.741	106.996	11.781	0.7535	10.540
E-benzene	0.074	106.167	0.040	0.8718	0.068
M-,O-,P-xylene	0.878	106.167	1.032	0.8731	0.803
Nonanes	4.769	122.539	6.704	0.7576	6.051
Decanes Plus	13.263	240.460	35.374	0.8174	29.191
	100.000		100.000		100.000

Calculated Values	**Total Sample**	**Decanes Plus**
Specific Gravity at 60 °F	0.6744	0.8174
Api Gravity at 60 °F	78.317	41.616
Molecular Weight	90.157	240.460
Pounds per Gallon (in Vacuum)	5.623	6.815
Pounds per Gallon (in Air)	5.617	6.807
Cu. Ft. Vapor per Gallon @ 14.73 psia	23.722	10.730

Brian Gaspard

Southern Petroleum Laboratories, Inc.

GAS ANALYTICAL SERVICES

C6+ Gas Analysis Report

Gas Analytical

Report Date: Sep 14, 2015 9:23a

Client:	Equitable Production	Date Sampled:	Sep 8, 2015 11:00a
Site:	514394	Analysis Date:	Sep 11, 2015 2:17p
Field No:	9998	Collected By:	J. Brown
Meter:	514394	Date Effective:	Sep 8, 2015 12:00a
Source Laboratory	Clarksburg (Bridgeport), WV	Sample Pressure (PSI):	70.0
Lab File No:	**X_CH1-6024.CHR**	Sample Temp (°F):	
Sample Type:	Spot	Field H2O:	No Test
Reviewed By:		Field H2S:	No Test

Component	Mol %	Gal/MSCF
Methane	78.1311	
Ethane	14.2559	3.79
Propane	4.0036	1.10
I-Butane	0.5947	0.19
N-Butane	1.1890	0.37
I-Pentane	0.3163	0.12
N-Pentane	0.3248	0.12
Nitrogen	0.4544	
Oxygen	<MDL	
Carbon Dioxide	0.1535	
Hexanes+	0.5767	0.24
TOTAL	100.0000	5.93

Analytical Results at Base Conditions (Real)		
BTU/SCF (Dry):	1,262.4954	BTU/ft³
BTU/SCF (Saturated):	1,241.4002	BTU/ft³
PSIA:	14.730	PSI
Temperature (°F):	60.00	°F
Z Factor (Dry):	0.99644	
Z Factor (Saturated):	0.99604	

Analytical Results at Contract Conditions (Real)		
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BTU/SCF (Saturated):	1,241.4002	BTU/ft³
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Temperature (°F):	60.00	°F
Z Factor (Dry):	0.99644	
Z Factor (Saturated):	0.99604	

Calculated Specific Gravities			
Ideal Gravity:	0.7188	Real Gravity:	0.7211
Molecular Wt:	20.8177	lb/lbmol	

Gross Heating Values are Based on:
GPA 2145-09, 2186
Compressibility is Calculated using AGA-8.

Source	Date	Notes
Gas Analytical	Sep 11, 2015	results to Bob Gum

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

Attachment T

FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Line Heater (E001)	0.12	0.53	0.10	0.45	<0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	180.33	789.85
Line Heater (E002)	0.12	0.53	0.10	0.45	<0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	180.33	789.85
Line Heater (E003)	0.12	0.53	0.10	0.45	<0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	180.33	789.85
Line Heater (E004)	0.12	0.53	0.10	0.45	<0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	180.33	789.85
Line Heater (E005)	0.12	0.53	0.10	0.45	<0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	180.33	789.85
Line Heater (E006)	0.12	0.53	0.10	0.45	<0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	180.33	789.85
Line Heater (E007)	0.12	0.53	0.10	0.45	<0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	180.33	789.85
Line Heater (E008)	0.12	0.53	0.10	0.45	<0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	180.33	789.85
Line Heater (E009)	0.09	0.40	0.08	0.34	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	134.66	589.82
Compressor Engine (E010)	1.87	8.21	2.08	9.11	0.56	2.46	<0.01	0.01	0.04	0.17	0.04	0.17	466.34	2,042.55
Enclosed Combustion Unit (E019)	0.93	4.06	0.78	3.41	1.42	6.00	<0.01	0.02	0.02	0.08	0.02	0.08	1,424.20	6,237.08
Enclosed Combustion Unit (E020)	1.59	6.95	1.33	5.84	1.42	6.00	<0.01	0.04	0.03	0.13	0.03	0.13	2302.37	10083.46
Tank Truck Loading Activities (E022)	--	--	--	--	0.07	0.31	--	--	--	--	--	--	0.02	0.10

Emission Point ID#	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TEG (S023)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.52	6.67
TEG (S024)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.52	6.67
TOTAL	**5.46**	**23.90**	**5.09**	**22.29**	**3.53**	**15.02**	**0.02**	**0.10**	**0.11**	**0.47**	**0.11**	**0.47**	**5784.63**	**25334.83**

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

ATTACHMENT T – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Line Heater (S001)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Line Heater (S002)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Line Heater (S003)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Line Heater (S004)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Line Heater (S005)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Line Heater (S006)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Line Heater (S007)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Line Heater (S008)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Line Heater (S009)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Compressor Engine (S010)	0.30	1.31	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.31	1.36
Enclosed Combustion Unit (E019)	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.07	0.31	0.08	0.34
Enclosed Combustion Unit (E020)	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.07	0.31	0.08	0.35
Tank Truck Loading Activities (E022)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TEG (S023)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TEG (S024)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TOTAL	**0.30**	**1.31**	**<0.01**	**<0.01**	**<0.01**	**0.04**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.14**	**0.61**	**0.49**	**2.13**

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

Attachment U

CLASS I LEGAL ADVERTISEMENT

Attachment U

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 General Permit for a natural gas production operation located in Harrisville, West Virginia. The latitude and longitude coordinates are: 39.13226 and -80.83105. Startup of operation is scheduled to begin the 1st day of December 2016.

The applicant estimates the maximum potential to discharge the following regulated air pollutants on a facility-wide basis will be:

Particulate Matter (PM) = 12.38 tpy
Sulfur Dioxide (SO_2) = 0.10 tpy
Volatile Organic Compounds (VOC) = 16.19 tpy
Carbon Monoxide (CO) = 22.29 tpy
Nitrogen Oxides (NO_x) = 23.90 tpy
Total Hazardous Air Pollutants (HAPs) = 2.78 tpy
Formaldehyde (HCHO) = 1.31 tpy
Hexane (C_6H_{14}) = 0.61 tpy
Carbon Dioxide Equivalents (CO_2e) = 25,334.83 tpy

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

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the 20th day of July, 2016.

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