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G70-A140
085-00018

FEB 03 2015

EQT Production Company

G70-A General Air Permit Application
OXF 122 Natural Gas Production Site

West Union, West Virginia

Prepared By:

ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.
Hurricane, West Virginia

January 2015

INTRODUCTION

EQT Production Company (EQT) is submitting this G70-A Class II General Permit application to the WVDEP's Department of Air Quality for the OXF-122 natural gas production site located in Ritchie County, West Virginia. 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 operates in Ritchie County, WV and consists of five (5) natural gas wells. Natural gas and liquids (including water and condensates) are 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 are stored in storage vessels.

The applicant seeks to authorize the operation of:

- Five (5) natural gas wells;
- Five (5) line heaters each rated at 1.00 MMBtu/hr heat input;
- Six (6) 400 barrel (bbl) tanks for storage of produced condensate and water;
- One (1) 140 bbl sand trap blowdown tank 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.

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

STATEMENT OF AGGREGATION

The OXF-122 pad will be 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.

There are no EQT owned or operated sites with a 1 mile radius of the OXF-122 pad. The nearest EQT owned and operated site is the OXF-44 pad, which is located 6,800 feet to the northeast. Nearby sites 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."

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-A 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-122 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 device located on the OXF-122 natural gas production site is subject to this regulation. Per 45 CSR 6-4.3, opacity of emissions from the enclosed combustion device 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 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-A 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 G70A-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 any 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 all registrants that are subject to any of the NSPS requirements described in more detail in the Federal Regulations section. Applicable requirements of NSPS, Subpart JJJJ and OOOO are included in the G70-A general permit.

This facility is expected to contain gas well affected facilities under Subpart OOOO. 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 G70A-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 any 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 any combination of HAP, and 100 tpy of all other regulated pollutants.

The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the wellpad is not a major source for Title V purposes.

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

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

The following NESHAP included in the G70-A 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).
- 40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

FEDERAL REGULATIONS

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-A 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: Any pneumatic controller installed at this facility will be intermittent bleed devices. Therefore, there will not be any pneumatic controller affected facilities located at this site.

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).

The following NSPS included in the G70-A permit are not applicable to the OXF-122 facility:

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

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

	WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DIVISION OF AIR QUALITY 601 57th Street, SE Charleston, WV 25304 Phone: (304) 926-0475 • *www.dep.wv.gov/daq*	**APPLICATION FOR GENERAL PERMIT REGISTRATION** *CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE* *A STATIONARY SOURCE OF AIR POLLUTANTS*

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

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

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

SECTION I. GENERAL INFORMATION

1. Name of applicant (as registered with the WV Secretary of State's Office): **EQT Production Company**	2. Federal Employer ID No. **(FEIN):** **25-0724685**
3. Applicant's mailing address: **625 Liberty Avenue, Suite 1700** **Pittsburgh, PA 15222**	4. Applicant's physical address:

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

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

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

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.): **Class II Oil and Natural Gas Production Facility**	8a. Standard Industrial Classification AND 8b. North American Industry Classification (SIC) code: **1311** System (NAICS) code: **211111**
9. DAQ Plant ID No. (for existing facilities only): **N/A**	10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only): **N/A**

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site:	12A. Address of primary operating site:
OXF-122 Natural Gas Production Facility	Mailing: **625 Liberty Avenue, Suite 1700** **Pittsburgh, PA 15222** Physical: **3434 Brushy Fork Road** **West Union, WV 26456**

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

- IF **YES**, please explain: **The applicant leases the proposed site.**
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

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

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

Directions from West Union, WV. Begin traveling South on Route 18 for 0.6 miles. Turn right onto US 50 W and travel for 3.0 miles. Turn left onto Old US 50 E and travel for 1.9 miles. Turn left onto County Route 21 / Oxford Road and travel for 4.5 miles. County Road 21 / Oxford Road turns slightly right and becomes S Fork of Hughes River. Travel for 0.9 miles on S Fork of Hughes Road. Turn left onto Taylor Drain Road and travel for 4.2 miles. Turn right onto Sugar Run Road and travel for 0.6 miles. Continue straight onto Summers Road Brushy Fork and travel for 1.3 miles. Turn left to stay on Summers Road Brushy Fork and travel for 1.1 miles. Travel approximately ¼ mile, the access road will be on your right.

15A. Nearest city or town:	16A. County:	17A. UTM Coordinates:
West Union, WV	**Ritchie**	Northing (KM): **514.60** Easting (KM): **4,331.47** Zone: **17**

18A. Briefly describe the proposed new operation or change (s) to the facility:	19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
The OXF-122 Natural Gas Production Facility will be a new production site expected to be in production in June 1, 2015.	Latitude: **39.13226** Longitude: **-80.83105**

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

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

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

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

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

- ☒ ATTACHMENT A : CURRENT BUSINESS CERTIFICATE
- ☒ ATTACHMENT B: PROCESS DESCRIPTION
- ☒ ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- ☒ ATTACHMENT D: PROCESS FLOW DIAGRAM
- ☒ ATTACHMENT E: PLOT PLAN
- ☒ ATTACHMENT F: AREA MAP
- ☒ ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM
- ☒ ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS
- ☒ ATTACHMENT I: EMISSIONS CALCULATIONS
- ☒ ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT
- ☐ ATTACHMENT K: ELECTRONIC SUBMITTAL **(NOT APPLICABLE)**
- ☒ ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE
- ☐ ATTACHMENT M: SITING CRITERIA WAIVER **(NOT APPLICABLE)**
- ☐ ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS) **(NOT APPLICABLE)**
- ☒ ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- ☐ OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

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

SECTION IV. CERTIFICATION OF INFORMATION

This General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of a Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, Emission Inventory, Certified Emission Statement, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative. the official agreement below shall be checked off and the appropriate names and signatures entered. Any administratively incomplete or improperly signed or unsigned Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

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

FOR A PARTNERSHIP

☐ I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

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

FOR AN ASSOCIATION

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

FOR A JOINT VENTURE

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

FOR A SOLE PROPRIETORSHIP

☐ I certify that I am the Owner and Proprietor

G *I hereby certify that* (please print or type) *Kenneth Kirk*

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

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

Signature _____
(please use blue ink) Responsible Official Date

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

Signature _____ 1/29/2015
(please use blue ink) Authorized Representative (if applicable) Date

Applicant's Name Alex Bosiljevac, Environmental Coordinator

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

Email abosiljevac@eqt.com

Attachment A

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

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

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

This certificate is issued on: 08/4/2010

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

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

This certificate is not transferrable and must be displayed at the location for which issued. This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

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

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

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L0553297664

Attachment B

Attachment B
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 five (5) wells enters the site through a pipeline. The raw gas is routed through the sand traps to remove any sediment. Fluids from these sand traps are manually blowdown to the sand trap blowdown tank (S016), as needed. From the sand traps, raw gas is routed through line heaters (S001-S005) to assist with the phase separation process in the downstream three-phase separators. In the separator, produced fluids are removed from the raw gas and transferred to the produced fluid storage tanks (S006-S011). Emissions from the produced fluid tanks and sand trap blowdown tank are directed to the enclosed combustion device (C012) and burnt. Produced fluids are pumped into a tank truck (S013) on an as-needed basis and are disposed of off-site. Vapors during truck loading will be controlled by the enclosed combustion device.

Two thermoelectric generation units (S014, S015) are operated with natural gas and provide power to the OXF-122 natural gas production site.

A process flow diagram is included as Attachment D.

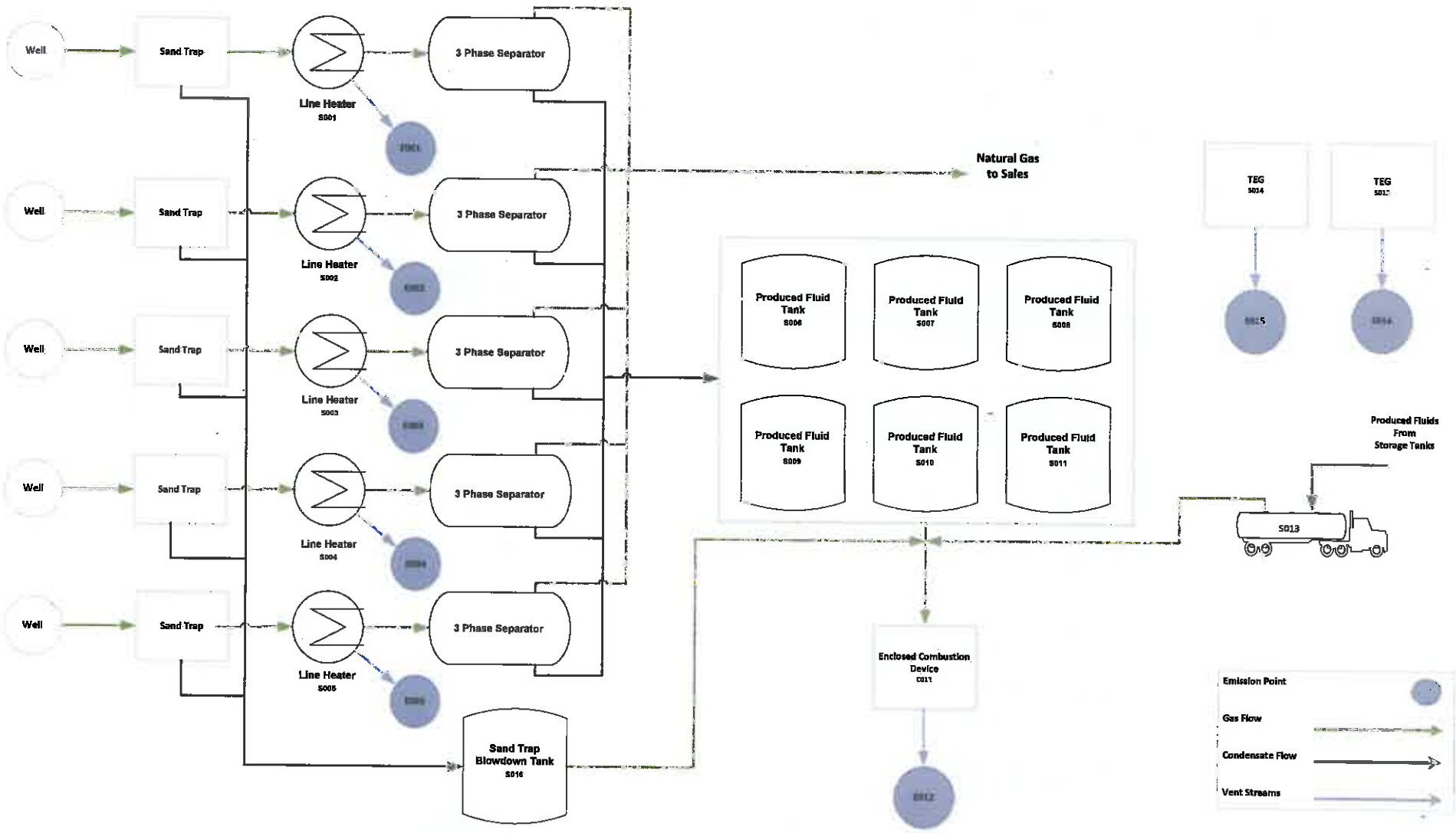
Attachment C

Attachment C
G70-A General Permit Description of Fugitive Emissions

This permit application is being filed for EQT Production Company and addresses operational activities associated with the OXF-122 natural gas production site. Fugitive emissions on the site are generated from a number of sources, including an unpaved haul road and equipment leaks. These fugitive emission sources cannot be controlled by air pollution control devices. Emission levels for fugitive emissions were calculated using AP-42 emission factors, results of a gas analysis, and 40 CFR 98 Subpart W factors and equipment counts. A summary of the fugitive emissions on the OXF-122 natural gas production site can be found in Attachment O – Emissions Summary Sheet.

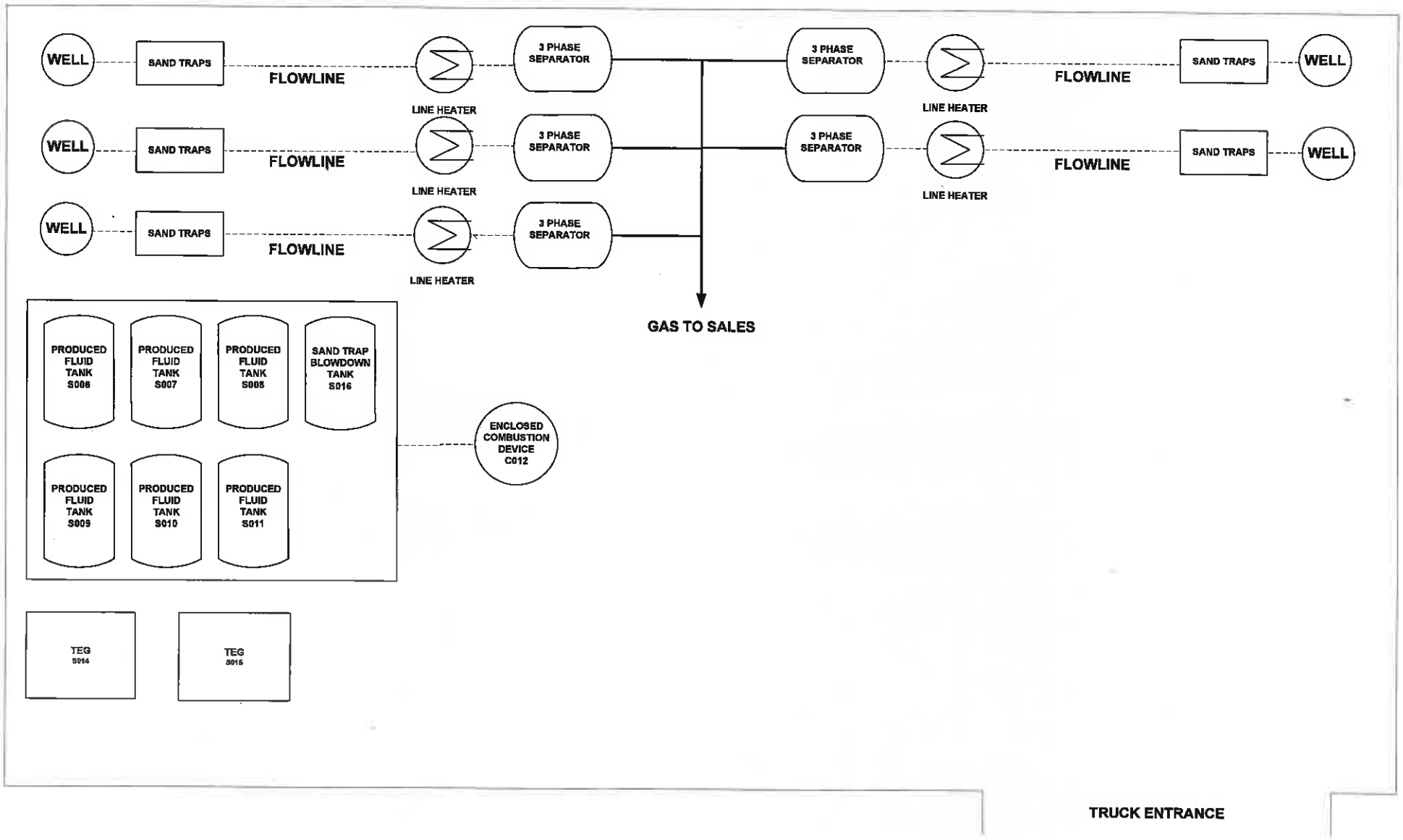
Attachment D

Attachment D
OXF 122 Natural Gas Production
Process Flow Diagram

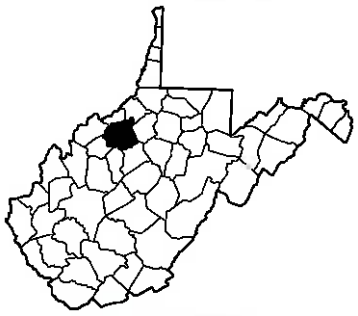


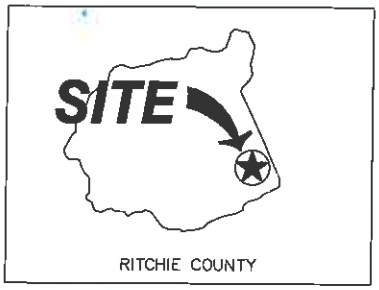
Attachment E

Attachment E
Plot Plan
EQT OXF 122 Natural Gas Production Site



Attachment F





LAT. 39.13226 LON. −80.83105
CITY OF WEST UNION
RITCHIE COUNTY
WEST VIRGINIA

0 2000
SCALE (IN FEET)

SITE LOCATION MAP

ADAPTED FROM USGS

REVISIONS ARE TO BE MADE ON THE CADD FILE ONLY

ERM	**EQT PRODUCTION COMPANY** OXF−122 WELL PAD WEST UNION, WEST VIRGINIA	CADD Review CHK'D GM 0250395
Drawn By MLB/9−19−14	Environmental Resources Management	ATTACHMENT F

G:\CAD\Drawings\EQT Production\0250395\C106.dwg

Attachment G

General Permit G70-A Registration
Section Applicability Form

General Permit G70-A was developed to allow qualified applicants to seek registration for a variety of sources. These sources include natural gas well affected facilities, storage tanks, natural gas-fired compressor engines (RICE), natural gas producing units, natural gas-fired in-line heaters, pneumatic controllers, heater treaters, tank truck loading, glycol dehydration units, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

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

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

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

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

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

Attachment G
Emission Source Data Sheets

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
S001	E001	Line Heater	2015	1.00 mmBtu/hr	New	NA
S002	E002	Line Heater	2015	1.00 mmBtu/hr	New	NA
S003	E003	Line Heater	2015	1.00 mmBtu/hr	New	NA
S004	E004	Line Heater	2015	1.00 mmBtu/hr	New	NA
S005	E005	Line Heater	2015	1.00 mmBtu/hr	New	NA
S006	E012	Produced Fluid Tank	2015	400 bbl	New	C012
S007	E012	Produced Fluid Tank	2015	400 bbl	New	C012
S008	E012	Produced Fluid Tank	2015	400 bbl	New	C012
S009	E012	Produced Fluid Tank	2015	400 bbl	New	C012
S010	E012	Produced Fluid Tank	2015	400 bbl	New	C012
S011	E012	Produced Fluid Tank	2015	400 bbl	New	C012
C012	E012	Enclosed Combustion Device	2015	11.66 mmBtu/hr	New	NA
S013	E012	Tank Truck Loading Rack	2015	10,620 gal/day	New	NA
S014	E014	Thermal Electric Generator	2015	0.013 mmBtu/hr	New	NA
S015	E015	Thermal Electric Generator	2015	0.013 mmBtu/hr	New	NA
S016	S016	Sand Trap Blowdown Tank	2015	140 bbl	New	C012

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

Attachment G
Emission Source Data Sheets
NATURAL GAS WELL AFFECTED FACILITY DATA SHEET

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

Please provide the API number(s) for each NG well at this facility:
API Number
047-085-10086
047-085-10087
047-085-10085
TBD
TBD

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

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

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

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

Attachment G
Emission Source Data Sheets
STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **OXF-122 Storage Tank Area**	2. Tank Name **Produced Fluid Tanks (S006-S011)**
3. Emission Unit ID number **S006-S011**	4. Emission Point ID number **E012**
5. Date Installed or Modified *(for existing tanks)* **6/1/2015 (anticipated)**	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable): NA*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ **No**	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) **NA**	

II. TANK INFORMATION (required)

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) **3,571,890**	13B. Maximum daily throughput (gal/day) **9,786**
14. Number of tank turnovers per year **213**	15. Maximum tank fill rate (gal/min) **6.79**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ **Fixed Roof** **X vertical** ___ horizontal **X flat roof** __ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

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

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

Attachment G
Emission Source Data Sheets

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

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

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

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

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
Please Refer to Calculations Provided in Attachment I.									

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

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION		
19. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ **Other WELDED**		
20A. Shell Color: **Green**	20B. Roof Color: **Green**	20C. Year Last Painted: **NA**
21. Shell Condition (if metal and unlined):		

Attachment G
Emission Source Data Sheets

☒ **No Rust** ☐ Light Rust ☐ Dense Rust ☐ Not applicable		
22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): **-0.5 oz to 10 oz**		
24. Is the tank a **Vertical Fixed Roof Tank?** ☒ Yes ☐No	24A. If yes, for dome roof provide radius (ft): **NA**	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:
SITE INFORMATION:		
27. Provide the city and state on which the data in this section are based: **Charleston, WV**		
28. Daily Avg. Ambient Temperature (°F): **70 °F**	29. Annual Avg. Maximum Temperature (°F): **65.5 °F**	
30. Annual Avg. Minimum Temperature (°F): **44.0 °F**	31. Avg. Wind Speed (mph): **18 mph**	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): **1,123**	33. Atmospheric Pressure (psia): **14.70**	
LIQUID INFORMATION: Refer to ProMax Simulation Sheets in Attachment I.		

Attachment G
Emission Source Data Sheets

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **OXF-122 Storage Tank Area**	2. Tank Name **Sand Trap Blowdown Tank**
3. Emission Unit ID number **S017**	4. Emission Point ID number **E012**
5. Date Installed or Modified *(for existing tanks)* **6/1/2015 (Anticipated)**	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable)*: ***NA***	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ **No**	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) **NA**	

II. TANK INFORMATION (required)

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.) **10**	10B. Average Liquid Height (ft.) **5**
11A. Maximum Vapor Space Height (ft.) **10**	11B. Average Vapor Space Height (ft.) **5**
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as "working volume. **5,880 gallons**	
13A. Maximum annual throughput (gal/yr) **305,760**	13B. Maximum daily throughput (gal/day) **838**
14. Number of tank turnovers per year **52**	15. Maximum tank fill rate (gal/min) **14**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ **Fixed Roof** __vertical **_X_ horizontal** __ flat roof ___ cone roof __ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

Attachment G
Emission Source Data Sheets

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

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

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

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

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

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

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
Please Refer to Calculations Provided in Attachment I.									

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

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

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

Attachment G
Emission Source Data Sheets

TANK CONSTRUCTION AND OPERATION INFORMATION		
19. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ **Other WELDED**		
20A. Shell Color: **Green**	20B. Roof Color: **Green**	20C. Year Last Painted: **NA**
21. Shell Condition (if metal and unlined): ☒ **No Rust** ☐ Light Rust ☐ Dense Rust ☐ Not applicable		
22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): **-0.5 oz to 10 oz**		
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:
SITE INFORMATION:		
27. Provide the city and state on which the data in this section are based: **Charleston, WV**		
28. Daily Avg. Ambient Temperature (°F): **70 °F**	29. Annual Avg. Maximum Temperature (°F): **65.5 °F**	
30. Annual Avg. Minimum Temperature (°F): **44.0 °F**	31. Avg. Wind Speed (mph): **18 mph**	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): **1,123**	33. Atmospheric Pressure (psia): **14.70**	
LIQUID INFORMATION: Refer to ProMax Simulation Sheets in Attachment I.		

Attachment G
Emission Source Data Sheets

NATURAL GAS FIRED FUEL BURNING UNITS
EMISSION DATA SHEET

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

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
S001	**E001**	**Line Heater**	**2015**	**New**	**NA**	**1.00**	**1,088**
S002	**E002**	**Line Heater**	**2015**	**New**	**NA**	**1.00**	**1,088**
S003	**E003**	**Line Heater**	**2015**	**New**	**NA**	**1.00**	**1,088**
S004	**E004**	**Line Heater**	**2015**	**New**	**NA**	**1.00**	**1,088**
S005	**E005**	**Line Heater**	**2015**	**New**	**NA**	**1.00**	**1,088**
S015	**E015**	**TEG**	**2015**	**New**	**NA**	**0.013**	**1,088**
S016	**E016**	**TEG**	**2015**	**New**	**NA**	**0.013**	**1,088**

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

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

3 New, modification, removal

4 Complete appropriate air pollution control device sheet for any control device.

5 Enter design heat input capacity in mmBtu/hr.

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

Attachment G
Emission Source Data Sheets

TANK TRUCK LOADING
EMISSION UNIT DATA SHEET

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

1. Emission Unit ID: **S014**	2. Emission Point ID: **E012/E013**	3. Year Installed/ Modified: **2015**
4. Emission Unit Description: **Tank Truck Loading Rack**		
5. Loading Area Data:		
5A. Number of pumps: **1**	5B. Number of liquids loaded:**1**	5C. Maximum number of tank trucks loading at one time: **1**
6. Describe cleaning location, compounds and procedure for tank trucks: **NA**		
7. Are tank trucks pressure tested for leaks at this or any other location? ☐ Yes ☒ No If YES, describe: **NA**		

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

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

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

Liquid Name	**Produced Fluids**
Max. daily throughput (1000 gal/day)	**10.62**
Max. annual throughput (1000 gal/yr)	**3,877.65**
Loading Method [1]	**SP**
Max. Fill Rate (gal/min)	**100**
Average Fill Time (min/loading)	**42 min**
Max. Bulk Liquid Temperature (°F)	**85 °F**
True Vapor Pressure [2]	**NA**
Cargo Vessel Condition[3]	**U**
Control Equipment or Method [4]	**Enclosed Combustion Device (C012)**
Minimum collection efficiency (%)	**70 %**
Minimum control efficiency (%)	**98 %**

** Continued on next page*

Attachment G
Emission Source Data Sheets

Maximum Emission Rate	Loading (lb/hr)	**0.03**
	Annual (ton/yr)	**0.15**
Estimation Method [5]		**EPA AP-42, ProMax**

Notes:
[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill
[2] At maximum bulk liquid temperature
[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)
[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets as Attachment "H"*):
CA = Carbon Adsorption
VB = Dedicated Vapor Balance (closed system)
ECD = Enclosed Combustion Device
F = Flare
TO = Thermal Oxidation or Incineration
[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance
TM = Test Measurement based upon test data submittal
O = other (describe)

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

MONITORING *Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation/air pollution control device.* **EQT will comply with all monitoring requirements set forth in the permit that is issued.**	RECORDKEEPING *Please describe the proposed recordkeeping that will accompany the monitoring.* **EQT will comply with all recordkeeping requirements set forth in the permit that is issued.**
REPORTING *Please describe the proposed frequency of reporting of the recordkeeping.* **EQT will comply with all reporting requirements set forth in the permit that is issued.**	TESTING *Please describe any proposed emissions testing for this process equipment/air pollution control device.* **EQT will comply with all testing requirements set forth in the permit that is issued.**

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

Attachment G
Emission Source Data Sheets
LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	light liquid VOC[6,7]	--	--	--	--
	heavy liquid VOC[8]	--	--	--	--
	Non-VOC[9]	--	--	--	--
Valves[10]	Gas VOC	187	N/A	N/A	473.06
	Light Liquid VOC	--	--	--	--
	Heavy Liquid VOC	--	--	--	--
	Non-VOC	--	--	--	--
Safety Relief Valves[11]	Gas VOC	5	N/A	N/A	18.74
	Non VOC	--	--	--	--
Open-ended Lines[12]	VOC	12.5	N/A	N/A	71.4
	Non-VOC	--	--	--	--
Sampling Connections[13]	VOC	--	--	--	--
	Non-VOC	--	--	--	--
Compressors	VOC	--	--	--	--
	Non-VOC	--	--	--	--
Flanges	VOC	815	N/A	N/A	229.08
	Non-VOC	--	--	--	--
Other	VOC	--	--	--	--
	Non-VOC	--	--	--	--

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

Attachment G
Emission Source Data Sheets

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% w/w VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.

2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in ppm. Do not include monitoring by visual or soap-bubble leak detection methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows:

   Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)

   If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category "valves, gas service:" 0/50/0/75/0/50 (bimonthly).

3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.

4. Note the method used: MB - material balance; EE - engineering estimate, EPA - emission factors established by EPA (cite document used); O - other method, such as in-house emission factor (specify).

EPA emission factor and component counts as specified in 40 CFR Part 98, subpart W

5. Do not include in the equipment count sealless pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)

6. Volatile organic compounds (VOC) means the term as defined in 40 CFR □51.100 (s).

7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a light liquid.

8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a heavy liquid.

9. LIST CO, H_2S, mineral acids, NO, NO_2, SO_3, etc. DO NOT LIST CO_2, H_2, H_2O, N_2, O_2, and Noble Gases.

10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.

11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.

12 Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.

13. Do not include closed-purge sampling connections.

Attachment G

FUGITIVE EMISSIONS FROM UNPAVED HAULROADS

UNPAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

		PM	PM-10
k =	Particle size multiplier	4.9	1.5
s =	Silt content of road surface material (%)	4.8	4.8
p =	Number of days per year with precipitation >0.01 in.	150	150

Item Number	Description	Number of Wheels	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 (%)
1	**Liquids Hauling**	14	30	10	1.24	1	876	NA	NA
2	**Employee Vehicles**	4	3	10	1.24	1	200	NA	NA
3									
4									

Source: *AP-42 Fifth Edition – 13.2.2 Unpaved Roads*

$E = k \times 5.9 \times (s \div 12) \times (S \div 30) \times (W \div 3)^{0.7} \times (w \div 4)^{0.5} \times ((365 - p) \div 365) =$ lb/Vehicle Mile Traveled (VMT)

Where:

		PM		PM-10	
k =	Particle size multiplier	4.9		1.5	
s =	Silt content of road surface material (%)	4.8		4.8	
S =	Mean vehicle speed (mph)	5		5	
W =	Mean vehicle weight (tons)	30	3	30	3
w =	Mean number of wheels per vehicle	14	4	14	4
p =	Number of days per year with precipitation >0.01 in.	150		150	

For lb/hr: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr

For TPY: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = Tons/year

SUMMARY OF UNPAVED HAULROAD EMISSIONS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1	5.31	2.45	5.31	2.45	1.35	0.62	1.35	0.62
2	1.88	0.19	1.88	0.19	0.48	0.05	0.48	0.05
3								
4	**Note: AP-42 has been updated since the last revision of this form. The most recently published factors were used in preparing these emission calculations. See Attachment I for detailed calculation methodologies.**							
5								
6								
7								
8								
TOTALS:	7.19	2.64	7.19	2.64	1.83	0.67	1.83	0.67

Attachment H

AIR POLLUTION CONTROL DEVICE
Vapor Combustion Control Device Sheet

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

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS FORM BEFORE COMPLETING.

General Information

1. Control Device ID#: **C012**	2. Installation Date: **2015**	☒ New
3. Maximum Rated Total Flow Capacity: **~7,800 scfh 188,000 scfd**	4. Maximum Design Heat Input: **11.66 MMBtu/hr**	5. Design Heat Content: **1,088 BTU/scf**

Control Device Information

6. Select the type of vapor combustion control device being used: ☒ Enclosed Combustion Device

☐ Elevated Flare ☐ Ground Flare ☐ Thermal Oxidizer ☐ Completion Combustion Device

7. Manufacturer: **LEED Fabrication** Model No.: **Enclosed Combustor 48"**	8. Hours of operation per year: **8,760**

9. List the emission units whose emissions are controlled by this vapor combustion control device:
Emission Units: S06-S011, S013, S016

10. Emission Unit ID#	Emission Source Description:	Emission Unit ID#	Emission Source Description:
S006-S011	**Produced Fluid Tanks**	**S013**	**Loading Rack**
S016	**Sand Trap Blowdown Tank**		

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

11. Assist Type	12. Flare Height	13. Tip Diameter	14. Was the design per §60.18?
☐ Steam - ☐ Air - ☐ Pressure - ☒ Non -	~6 ft	4 ft	☐Yes ☐No NA

Waste Gas Information

15. Maximum waste gas flow rate (scfm):	16. Heat value of waste gas stream (BTU/ft3)	17. Temperature of the emissions stream (°F)	18. Exit Velocity of the emissions stream (ft/s)
81.25 lb/hr	**Variable**	**70**	

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

Pilot Information				
20. Type/Grade of pilot fuel:	21. Number of pilot lights:	22. Fuel flow rate to pilot flame per pilot (scf/hr):	23. Heat input per pilot (BTU/hr):	24. Will automatic re-ignition be used?
Pipeline quality Natural Gas	**1**	**~30**	**0.03 MMBtu/hr**	☐ Yes ☒ No

25. If automatic re-ignition will be used, describe the method: **N/A**

26. Describe the method of controlling flame:

There are 3 flame cells to stop the main flame front and two (2) 2" flame arrestors on the piping from the drip pot to the burner assembly.

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

29. Pollutant(s) Controlled	30. % Capture Efficiency	31. Manufacturer's Guaranteed Control Efficiency (%)
HC	100	>98
VOC	100	>98
HAP	100	>98

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

Yes – pending certification from EPA

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

See Attached

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

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

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

Client:		
Site:		
Unit/Lease:		

GENERAL

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

PROCESS DATA

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

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

Detailed Process Description / Process Notes

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

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

Available Utilities	
Fuel / Pilot Gas	Min. 30psig Natural Gas /Propane 40-50 SCFH
Instrument Air	NA
Power	120 V / 60 Hz or Solar Power
Steam	NA
Purge Gas	

DESIGN DATA

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

EQUIPMENT SPECIFICATION

35	Type:	☐ Elevated ☑ Enclosed	Equipment Design:	
36		☐ Above Ground	Component	Material / Size / Rating / Other
37		☑ Stack ☐ Multiple Stack	Burner	
38		☐ Portable / Trailer	Burner Tip / Assist Gas Burner	304 SS
39			Burner Body	Carbon Steel
40	Smokeless By:	☐ Steam ☐ Assist Air	Pilot	
41		☐ Gas Assist ☑ Staging	Pilot Tip	304 SS
42			Pilot Line(s)	Carbon Steel
43	Stack:	☑ Self Supporting	Firebox / Stack	
44	Flare Burner:	☐ Non-Smokeless ☑ Smokeless ☐ Gas Assist	Shell	Carbon Steel
45	Pilot:	☑ Intermittent ☐ Continuous	Piping	Carbon Steel
46	Pilot Air Inspirator:	☑ Local ☐ Remote	Nozzles	Carbon Steel
47	Pilot Flame Control:	☐ No ☑ Yes (Thermocouple)	Flanges	Carbon Steel
48			Insulation	Blanket
49	Pilot Ignition:	☐ Flamefront Generator ☑ Inspirating Ignitor	Insulation Pins	304 SS
50		☐ Electronic ☑ Automatic ☐ Manual	Refractory	NA
51		☐ With Pilot Flame Control	Refractory Anchors	NA
52		☐ With Auto Pilot Re-Ignition	Ladders and Platforms	NA
53			Stack Sample Connections	Per EPA requirements
54	Pilot Ignition Backup:	☐ Manual Specify: i.e Piezo-Electric	Sight Glass	2
55		☐ Battery Pack	Other	

Environmental Control Equipment Data Sheet	Item/Tag No.:		Page	2	of	3
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			By:	JS		
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	RFQ No.:	-	Approved:	MS		
Client:	Ref. P&ID:	-				
Site:	Remarks:	-	Supplier:	LEED FABRICATION		
Unit/Lease:			Model No.:	L30-0011-00		

EQUIPMENT SPECIFICATION

Flame Detection: ☐ Thermocouple ☑ Ionization Rod
☐ UV Scanner

General Configuration:

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

FABRICATION AND INSPECTION

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

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

Additional Notes:

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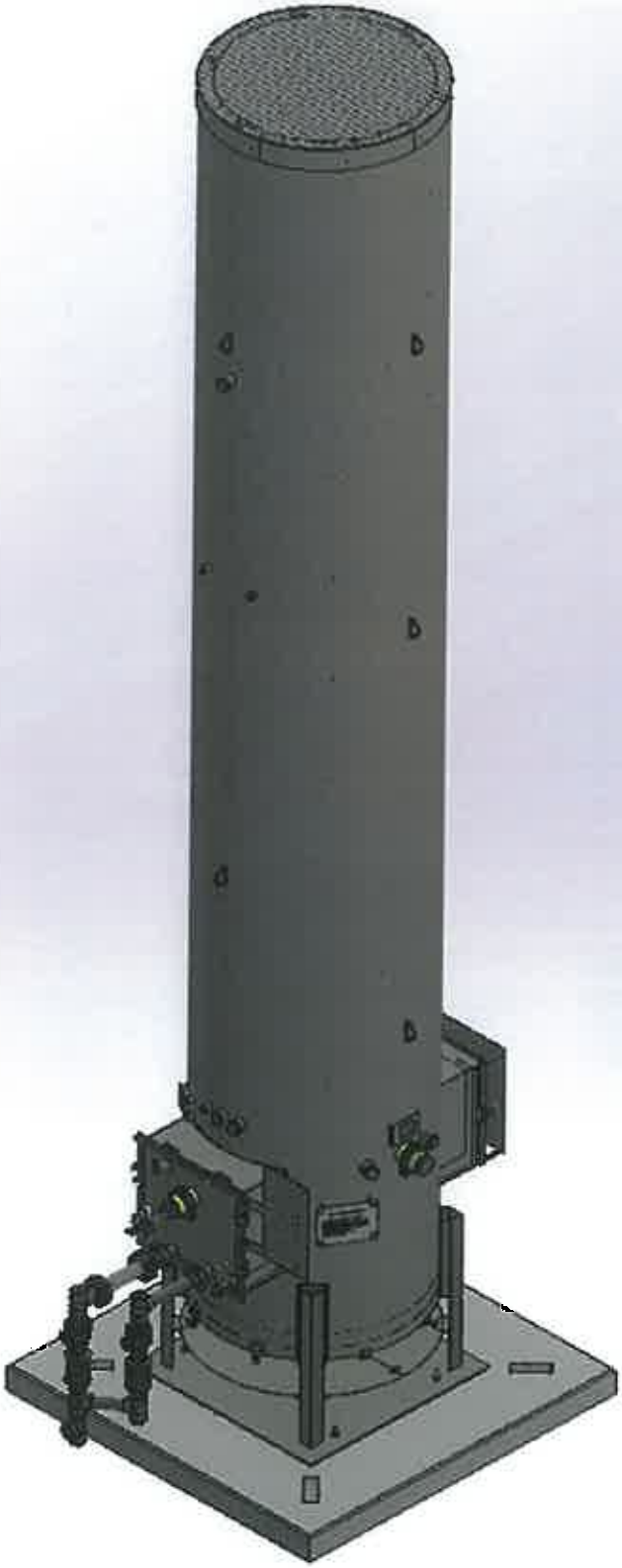
Client:		Ref. P&ID:	-	Supplier:	LEED FABRICATION		
Site:		Remarks:	-	Model No.:	L30-0011-00		
Unit/Lease:							

GENERAL ARRANGEMENT



Attachment I

Line Heater S001 - S005

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	1.00	1,088	8,760	0.005	0.02
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	0.002	0.007
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	<0.001	<0.001
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	<0.001	<0.001
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	<0.001	<0.001
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	<0.001	<0.001
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	0.08	0.34
NOx	100	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	0.09	0.40
PM_{10}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	0.007	0.03
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,088	8,760	<0.001	0.002
CO_2	53.06	kg CO_2 / MMBtu	40CFR98 Subpart C	1.00	1,088	8,760	116.98	512.36
CH_4	0.001	kg CH_4 / MMBtu	40CFR98 Subpart C	1.00	1,088	8,760	0.002	0.01
N_2O	0.0001	kg N_2O / MMBtu	40CFR98 Subpart C	1.00	1,088	8,760	<0.001	<0.001
Total HAPs							0.002	0.008
Total CO_2e							117.10	512.89

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for all 5 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 Generator S014 - S015

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	1,088	8,760	<0.001	<0.001
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	<0.001	<0.001
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	<0.001	<0.001
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	<0.001	<0.001
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	<0.001	<0.001
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	<0.001	<0.001
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	0.001	0.004
NOx	100	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	0.001	0.005
PM_{10}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	<0.001	<0.001
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	0.013	1,088	8,760	<0.001	<0.001
CO_2	53.06	kg CO_2 / MMBtu	40CFR98 Subpart C	0.013	1,088	8,760	1.52	6.66
CH_4	0.001	kg CH_4 / MMBtu	40CFR98 Subpart C	0.013	1,088	8,760	<0.001	<0.001
N_2O	0.0001	kg N_2O / MMBtu	40CFR98 Subpart C	0.013	1,088	8,760	<0.001	<0.001
Total HAPs							<0.001	<0.001
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)

Produced Fluid Tanks S006 - S011

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Yearly Emissions using ProMax (tons/yr)
VOCs	64.09	280.72
HAPs	3.17	13.90
CO_2	0.19	0.85
CH_4	10.21	44.73
Total CO_2e	255.51	1,119.14

Notes:

-Emission rates for Produced Fluid Tanks S006 - S011 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

-CO_2 and CH_4 emissions solved for using emissions rates (lb/hr) of "4" from the ProMax output sheets.

-For emission calculation purposes, the total throughput for tanks S006 - S011 is modeled as being received through a single tank. The throughput value represents the total throughput for all six (6) 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 Blowdown Tank S016

Pollutant	Max Hourly Emissions using ProMax (lb/hr)	Max Yearly Emissions using ProMax (tons/yr)
VOCs	5.50	24.08
HAPs	0.27	1.19
CO_2	0.02	0.07
CH_4	0.88	3.84
Total CO_2e	21.93	96.05

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 Blowdown Tank are routed to an enclosed combustion device. The values displayed above a pre-control emission rates.

-Emission rates for the Sand Trap Blowdown Tank were calculated using ProMax software. ProMax output sheets for the OFX-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

-CO_2 and CH_4 emissions solved for using emissions rates (lb/hr) of Stream "4" from the ProMax output sheets.

Tank Truck Loading Rack S013

Pollutant	Max Hourly Emissions (lb/hr)	Max Yearly Emissions (tons/yr)	Loading Rack Collection Efficiency	Enclosed Combustion Device Combustion Efficiency	Post-Control Max Yearly Emissions (lb/hr)	Post-Control Max Yearly Emissions (tons/yr)	Max Hourly Emissions Not Collected by Loading Rack (lb/hr)	Max Hourly Emissions Not Collected by Loading Rack (tons/yr)	Total Max Hourly Emissions (lb/hr)	Total Max Yearly Emissions (tons/yr)
VOCs	0.03	0.15	70%	93%	<0.001	0.00	0.01	0.04	0.01	0.05
HAPs	<0.001	<0.001	70%	98%	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CO_2	<0.001	0.001	70%	98%	0.14	0.62	<0.001	<0.001	0.14	0.62
CH_4	0.002	0.01	70%	98%	<0.001	<0.001	<0.001	0.003	<0.001	0.003
Total CO_2e	0.08	0.26	–	–	0.14	0.62	0.02	0.08	0.16	0.70

-CO_2 and CH_4 emissions solved for using emissions rates (lb/hr) of load out fluids from ProMax summary sheets.

Notes:

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

-The emission rates displayed above a pre-control emission rates.

Gas Composition of Vent Gas

Gas Stream	Mole Fraction
Methane	0.27
Ethane	0.22
Propane	0.19
Butane	0.15
Pentanes	0.09
Carbon Dioxide	0.002

Vent Gas Properties

Mass Flowrate (lb/hr)	Density (lb/ft³)
0.08	0.10

Enclosed Combustion Device C012

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 S021 - S044	VOCs	64.09	280.72	98%	1.28	5.61
	HAPs	3.17	13.90	98%	0.06	0.28
	CO_2	0.19	0.85	98%	233.24	1021.61
	CH_4	10.21	44.73	98%	0.20	0.89
Sand Trap Blowdown Tank - S017	VOCs	5.50	24.08	98%	0.11	0.48
	HAPs	0.27	1.19	98%	0.005	0.02
	CO_2	0.02	0.07	98%	20.55	90.01
	CH_4	0.88	3.84	98%	0.02	0.08
Tank Truck Loading Rack - S016	VOCs	0.033	0.15	98%	0.005	0.02
	HAPs	<0.001	<0.001	98%	<0.001	<0.001
	CO_2	<0.001	0.001	98%	0.07	0.31
	CH_4	0.002	0.01	98%	<0.001	0.002
Totals	VOCs	69.62	304.94	--	1.40	6.12
	HAPs	3.45	15.09	--	0.07	0.30
	CO_2	0.21	0.92	--	253.86	1111.92
	CH_4	11.09	48.58	--	0.22	0.97
	CO2e	277.50	1,215.45	--	259.42	1,136.25

Gas Composition of Vent Gas

Gas Stream	Mole Fraction
Methane	0.27
Ethane	0.22
Propane	0.19
Butane	0.15
Pentanes	0.08
Carbon Dioxide	0.00

Vent Gas Properties

Vent Gas Parameter	Mass Flow Rate (lb/hr)	Density (lb/ft^3)
Produced Fluid Tanks	91.49	0.10
Blowdown Tanks	8.06	0.10

Emissions from Pilot Operations

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factors (kg XX/MMBtu)	Heat Value of Natural Gas (Btu/scf)	Enclosed Combustion Device Pilot Rating (Btu/hr)	Enclosed Combustion Device Burner Rating (Btu/hr)	Pilot Max Hourly Emissions (lb/yr)	Pilot Max Hourly Emissions (tons/yr)	Burner Max Hourly Emissions (lb/hr)	Burner Max Hourly Emissions (tons/hr)	Max Hourly Emissions (lb/hr)	Max Yearly Emissions (tons/yr)
VOCs	5.5	--	1,088	30,000	11,660,000	<0.001	<0.001	--	--	<0.001	<0.001
Hexane	1.8	--	1,088	30,000	11,660,000	<0.001	<0.001	--	--	<0.001	<0.001
Formaldehyde	0.075	--	1,088	30,000	11,660,000	<0.001	<0.001	--	--	<0.001	<0.001
CO	84	--	1,088	30,000	11,660,000	0.002	0.01	0.90	3.94	0.90	3.95
NO_x	100	--	1,088	30,000	11,660,000	0.003	0.01	1.07	4.69	1.07	4.71
PM_{10}	7.6	--	1,088	30,000	11,660,000	<0.001	<0.001	0.08	0.36	0.08	0.36
SO_2	0.6	--	1,088	30,000	11,660,000	<0.001	<0.001	0.006	0.03	0.006	0.03
CO_2	--	53.06	1,088	30,000	11,660,000	3.51	15.37	1,363.95	5,974.12	1,367.46	5,989.49
CH_4	--	0.001	1,088	30,000	11,660,000	<0.001	<0.001	0.03	0.11	0.03	0.11
N_2O	--	<0.001	1,088	30,000	11,660,000	<0.001	<0.001	0.003	0.011	0.00	0.011
Total HAPs										<0.001	<0.001
CO_2e										1,368.88	5,995.67

Total Enclosed Combustion Device Emissions

Pollutant	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
VOCs	1.40	6.12
HAPs	0.07	0.30
CO	0.90	3.95
NOx	1.07	4.71
PM_{10}	0.08	0.36
SO_2	0.01	0.03
CO_2	1,621.33	7,101.41
CH_4	0.25	1.09
N_2O	0.00	0.011
CO_2e	1,628.29	7,131.92

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

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

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

$$E_{a,i,x}(combusted) = \sum_{i=1}^{n} (\eta * V_a * Y_i * R_i) \qquad \text{(Eq. W-21)}$$

Where:

$E_{a,CH4(un\text{-}combusted)}$ = Contribution of annual un-combusted CH4 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.

$E_{a,CO2(un\text{-}combusted)}$ = Contribution of annual un-combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions

$E_{a,CO2(combusted)}$ = Contribution of annual combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.

V_a = 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.

X_{CH4} = Mole fraction of CH4 in gas to the Enclosed Combustion Device.

X_{CO2} = 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).

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		Particle size multiplier [1]
s	4.8	Silt content of road surface material (%) [2]
p	150	Number of days per year with precipitation

Item Number	Description	Number of Wheels	W Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Year	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	1.24	923	NA	5.31	2.45	1.35	0.62	0.14	0.06
2	Employee Vehicles	4	3	1.24	200	NA	1.88	0.19	0.48	0.05	0.05	0.005
						Totals:	7.19	2.64	1.83	0.67	0.18	0.07

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	5
Separators	5
Meters/Piping	6
Compressors	0
In-line Heaters	5
Dehydrators	0

Gas Composition														
Emissions from Flaring Operations	Propane	Butane	Pentanes	Heptane	Octanes	Nonanes	Decanes	Hexane	Benzene	Toluene	Ethylbenzene	Xylene	CO_2	CH_4
Mole %	4.18	1.71	0.71	0.22	0.14	0.03	0.009	0.41	0.01	0.014	<0.001	0.007	0.19	78.57
MW	44	58	72	100	114	128	142	86.00	78.00	92.00	106.00	106.00	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	187	0.027	8760	0.05	0.24	0.005	0.02	0.001	0.005	0.16	0.72	4.12	18.03
Connectors	815	0.003	8760	0.03	0.11	0.002	0.01	<0.001	0.002	0.08	0.35	1.99	8.73
Open-ended Lines	13	0.06	8760	0.008	0.04	<0.001	0.003	<0.001	<0.001	0.02	0.11	0.62	2.72
Pressure Relief Valves	5	0.04	8760	0.002	0.009	<0.001	<0.001	<0.001	<0.001	0.01	0.03	0.16	0.71
			Total Emissions:	0.09	0.40	0.008	0.04	0.002	0.008	0.28	1.21	6.90	30.20

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

Notes:
-Gas Composition data for OXF-122 site was unavailable. Gas composition was used to determine fugitive emissions based upon a nearby similar natural gas production site operated by EQT.

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

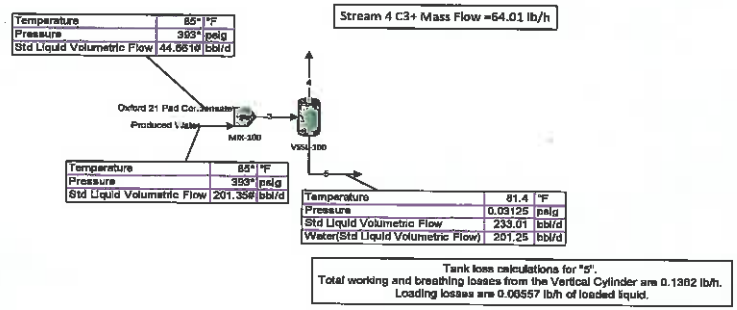
Total OXF 122 Site Emission Levels

	VOCs		HAPs		CO		NO_x		PM		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
Line Heater (S001)	0.005	0.02	0.002	0.008	0.08	0.34	0.09	0.40	0.007	0.0306	<0.001	0.002	116.98	512.36	0.002	0.01	<0.001	<0.001	117.10	512.89
Line Heater (S002)	0.005	0.02	0.002	0.008	0.08	0.34	0.09	0.40	0.007	0.03	<0.001	0.002	116.98	512.36	0.002	0.01	<0.001	<0.001	117.10	512.89
Line Heater (S003)	0.005	0.02	0.002	0.008	0.08	0.34	0.09	0.40	0.007	0.03	<0.001	0.002	116.98	512.36	0.002	0.01	<0.001	<0.001	117.10	512.89
Line Heater (S004)	0.005	0.02	0.002	0.008	0.08	0.34	0.09	0.40	0.007	0.03	<0.001	0.002	116.98	512.36	0.002	0.01	<0.001	<0.001	117.10	512.89
Line Heater (S005)	0.005	0.02	0.002	0.008	0.08	0.34	0.09	0.40	0.007	0.03	<0.001	0.002	116.98	512.36	0.002	0.01	<0.001	<0.001	117.10	512.89
TEG (S014)	<0.001	<0.001	<0.001	<0.001	0.001	0.004	0.001	0.005	<0.001	<0.001	<0.001	<0.001	1.52	6.66	<0.001	<0.001	<0.001	<0.001	1.52	6.67
TEG (S015)	<0.001	<0.001	<0.001	<0.001	0.001	0.004	0.001	0.005	<0.001	<0.001	<0.001	<0.001	1.52	6.66	<0.001	<0.001	<0.001	<0.001	1.52	6.67
Enclosed Combustion Unit (C012)	1.40	6.12	0.07	0.30	0.90	3.95	1.07	4.71	0.08	0.36	0.01	0.03	1,621.33	7,101.41	0.25	1.09	0.003	0.01	1,628.29	7,131.92
Haul Roads	–	–	–	–	–	–	–	–	7.19	2.64	–	–	–	–	–	–	–	–	–	–
Fugitives Leaks	0.09	0.40	0.008	0.04	–	–	–	–	–	–	–	–	0.002	0.008	0.28	1.21	–	–	6.90	30.20
Totals	**1.51**	**6.53**	**0.09**	**0.38**	**1.29**	**5.66**	**1.54**	**6.73**	**7.30**	**3.15**	**0.009**	**0.04**	**2,209.26**	**9,676.54**	**0.53**	**2.34**	**0.004**	**0.016**	**2,223.72**	**9,739.91**

Flowsheet1
Plant Schematic

Client Name:	EQT	Job:	
Location:	OXF 122 150% Case		
Flowsheet:	Flowsheet1		

EQT OFX 122 Well Pad
150% Contingency



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

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name	EQT	Job	
Location	OXF 122 150% Case		
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 *	0.381095	27.3797	0.00317
Carbon Dioxide	0.087 *	0 *	0.0027331	0.188522	0.000132449
Ethane	10.145 *	0 *	0.318705	22.1556	0.0130337
Propane	9.322 *	0 *	0.29285	18.5612	0.0371306
i-Butane	2.446 *	0 *	0.076841	4.10233	0.0204925
n-Butane	6.995 *	0 *	0.219748	10.571	0.074851
i-Pentane	3.988 *	0 *	0.125283	3.92754	0.0720592
n-Pentane	5.018 *	0 *	0.15764	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 *	0.000785375	0.00328405	0.000750398
Benzene	0.136 *	0 *	0.00427244	0.043334	0.00372566
Heptane	11.691 *	0 *	0.367273	1.42241	0.352503
Toluene	0.717 *	0 *	0.0225245	0.075928	0.021777
Octane	9.741 *	0 *	0.306013	0.394172	0.304779
Ethylbenzene	0.074 *	0 *	0.00232471	0.00255805	0.00232144
o-Xylene	0.878 *	0 *	0.0275824	0.0230132	0.0276463
Nonane	4.769 *	0 *	0.149818	0.0644626	0.151013
Decane	13.263 *	0 *	0.416657	0.0593386	0.421659
Water	0 *	100 *	96.8585	3.60199	98.1639

Mass Fraction	Oxford 21 Pad Condensate %	Produced Water %	3 %	4 %	5 %
Nitrogen	0 *	0 *	0	0	0
Methane	2.49009 *	0 *	0.307151	11.1692	0.0025903
Carbon Dioxide	0.0489906 *	0 *	0.00604297	0.210974	0.000296904
Ethane	3.90318 *	0 *	0.481456	16.9404	0.0199622
Propane	5.25959 *	0 *	0.648768	20.8125	0.0833965
i-Butane	1.81906 *	0 *	0.224379	6.06308	0.0606677
n-Butane	5.20208 *	0 *	0.641674	15.6236	0.221595
i-Pentane	3.68156 *	0 *	0.454118	7.2056	0.264813
n-Pentane	4.63241 *	0 *	0.571405	7.60885	0.374082
Isohexane	4.70052 *	0 *	0.579806	4.05059	0.482489
n-Hexane	4.75345 *	0 *	0.586335	3.12854	0.515054
2,2,4-Trimethylpentane	0.0365395 *	0 *	0.00450712	0.00953904	0.00436603
Benzene	0.135926 *	0 *	0.0167664	0.0860729	0.0148231
Heptane	14.9891 *	0 *	1.8489	3.62428	1.79912
Toluene	0.845293 *	0 *	0.104266	0.177895	0.102202
Octane	14.2372 *	0 *	1.75615	1.14494	1.77329
Ethylbenzene	0.100522 *	0 *	0.0123993	0.00690575	0.0125533
o-Xylene	1.19268 *	0 *	0.147116	0.0621267	0.149499
Nonane	7.82617 *	0 *	0.965354	0.210234	0.986527
Decane	24.1456 *	0 *	2.97835	0.214688	3.05584
Water	0 *	100 *	87.6651	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	10.293 *	0 *	10.293	10.2086	0.0844364

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job:	
Location:	OXF 122 150% Case		
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	0.202507 *	0 *	0.202507	0.192829	0.00967821
Ethane	16.1341 *	0 *	16.1341	15.4834	0.650711
Propane	21.7409 *	0 *	21.7409	19.0225	2.71849
i-Butane	7.51921 *	0 *	7.51921	5.54162	1.97759
n-Butane	21.5032 *	0 *	21.5032	14.2799	7.22337
i-Pentane	15.218 *	0 *	15.218	6.58587	8.63214
n-Pentane	19.1484 *	0 *	19.1484	6.95444	12.194
Isohexane	19.43 *	0 *	19.43	3.70221	15.7278
n-Hexane	19.6488 *	0 *	19.6488	2.85946	16.7893
2,2,4-Trimethylpentane	0.151039 *	0 *	0.151039	0.00871862	0.14232
Benzene	0.561862 *	0 *	0.561862	0.0786701	0.483192
Heptane	61.9586 *	0 *	61.9586	3.31257	58.646
Toluene	3.49409 *	0 *	3.49409	0.162595	3.33149
Octane	58.8507 *	0 *	58.8507	1.04646	57.8043
Ethylbenzene	0.415515 *	0 *	0.415515	0.00631182	0.409203
o-Xylene	4.93003 *	0 *	4.93003	0.0567834	4.87325
Nonane	32.3501 *	0 *	32.3501	0.192153	32.158
Decane	99.8078 *	0 *	99.8078	0.196223	99.6116
Water	0 *	2937.76 *	2937.76	1.50816	2936.25

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	0.0206342	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	57.8154	0.101023	59.5744
Molar Flow	lbmol/h	5.289	163.07	168.359	2.32415	166.035
Mass Flow	lb/h	413.358	2937.76	3351.11	91.3994	3259.72
Vapor Volumetric Flow	ft^3/h	11.853	47.2722	57.9624	904.738	54.7167
Liquid Volumetric Flow	gpm	1.47777	5.89368	7.22648	112.799	6.82182
Std Vapor Volumetric Flow	MMSCFD	0.0481703	1.48518	1.53335	0.0211675	1.51219
Std Liquid Volumetric Flow	sgpm	1.3026 *	5.87279 *	7.17539	0.37927	6.79612
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	-409872	-2.00138E+07	-2.04237E+07	-108004	-2.03157E+07
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	98.765
Net Liquid Heating Value	Btu/lb	19235.7	-1059.76	1443.68	19453.4	938.701
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	2041.77

Remarks

* User Specified Values
? Extrapolated or Approximate Values

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Blocks
MIX-100
Mixer/Splitter Report

Client Name	EQT	Job	
Location	OXF 122 150% Case	Modified	2:14 PM, 7/24/2014
Flowsheet	Flowsheet1	Status	Solved 3:35 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

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Blocks
VSSL-100
Separator Report

Client Name.	EQT	Job	
Location	OXF 122 150% Case	Modified 1 11 PM, 7/17/2014	
Flowsheet	Flowsheet1	Status Solved 3.35 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	1.8091	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	96.8104	%	Heat Release Curve Increments	5	

Remarks

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Flowsheet Environment
Environment1

Client Name	EQT	Job	
Location	OXF 122 150% 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

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Environments Report

Client Name	EQT	Job	
Location	OXF 122 150% Case		

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

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Calculator Report

Client Name	EQT	Job.	
Location	OXF 122 150% Case		

Simple Solver 1

Source Code

Residual Error (for CV1) = TP / 233 - 1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Oxford 21 Pad Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	44.6607
Unit	bbl/d

Measured Variable [TP]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!5!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	233.01
Unit	bbl/d

Solver Properties

Status Solved

Error	4.25675E-05		Iterations	2
Calculated Value	1.3026	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	201.353
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	-4.11888E-05		Iterations	2
Calculated Value	5.87279	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 Specified Values
? Extrapolated or Approximate Values

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User Value Sets Report

Client Name:	EQT	Job:	
Location:	OXF 122 150% Case		

Cn+ Flow/Frac.

User Value [CnPlusSum]

* Parameter	64.0064 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	232.673 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

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User Value Sets Report

Client Name	EQT	Job	
Location	OXF 122 150% Case		

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	0.136192 lb/h	Upper Bound	
Lower Bound	lb/h	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.0737673 ton/yr	Upper Bound	
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.0256531 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	0.0655659 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}

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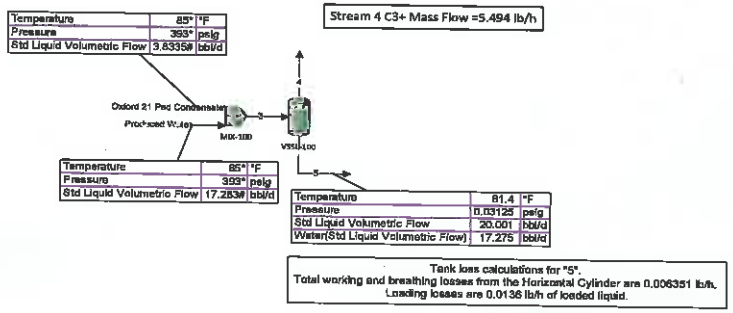
Flowsheet1
Plant Schematic

Client Name	EQT	Job	
Location	OXF 122 Blowdown Tank		
Flowsheet	Flowsheet1		

EQT OFX 122 Well Pad
Blowdown Tank



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

* User Specified Values
? Extrapolated or Approximate Values

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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

* User Specified Values
? Extrapolated or Approximate Values

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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

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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

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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

* User Specified Values
? Extrapolated or Approximate Values

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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

* User Specified Values
? Extrapolated or Approximate Values

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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

* User Specified Values
? Extrapolated or Approximate Values

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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 Specified Values
? Extrapolated or Approximate Values

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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

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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}

ProMax 3.2.13116.0
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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.

Certificate of Analysis

Number: 2030-13070164-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

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

July 17, 2013

Station Name: 512496
Station Location: EQT Midstream
Sample Point: Wellhead
Cylinder No: GAS
Analyzed: 07/16/2013 11:11:35 by CC

Sampled By: RM-GAS
Sample Of: Gas Spot
Sample Date: 07/08/2013 15:30
Sample Conditions: 402 psig
Method: GPA 2286

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.73 psia
Nitrogen	0.516	0.689	
Carbon Dioxide	0.188	0.395	
Methane	78.571	60.101	
Ethane	13.320	19.097	3.574
Propane	4.159	8.744	1.150
Iso-Butane	0.569	1.577	0.186
n-Butane	1.137	3.151	0.360
Iso-Pentane	0.353	1.214	0.129
n-Pentane	0.352	1.211	0.128
i-Hexanes	0.223	0.913	0.092
n-Hexane	0.157	0.647	0.065
Benzene	0.006	0.024	0.002
Cyclohexane	0.027	0.108	0.009
i-Heptanes	0.152	0.702	0.068
n-Heptane	0.066	0.320	0.031
Toluene	0.014	0.060	0.005
i-Octanes	0.119	0.618	0.053
n-Octane	0.021	0.113	0.011
Ethylbenzene	0.001	0.004	NIL
Xylenes	0.007	0.037	0.003
i-Nonanes	0.028	0.161	0.013
n-Nonane	0.005	0.028	0.003
Decane Plus	0.009	0.086	0.005
	100.000	100.000	5.887

GPM TOTAL C2+ 5.887

Attachment J

Attachment J

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 West Union, Ritchie County, West Virginia. The latitude and longitude coordinates are: 39.13226 and -80.83105. Startup of operation is scheduled to begin the 1st day of June 2015.

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

Particulate Matter (PM) = 3.15 tpy
Sulfur Dioxide (SO_2) = 0.04 tpy
Volatile Organic Compounds (VOC) = 6.63 tpy
Carbon Monoxide (CO) = 5.65 tpy
Nitrogen Oxides (NO_x) = 6.73 tpy
Hazardous Air Pollutants (HAPs) = 0.38 tpy
Carbon Dioxide Equivalents (CO_2e) = 9,739.91 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 29 day of January, 2015.

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

Attachment O

Attachment O
G70-A EMISSION SUMMARY SHEET

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
E001	Upward Vertical Stack	S001	NA	NA	NA	Total VOCs	0.005	0.02	0.005	0.02	Gas	AP-42, Subpart W
						NO_x	0.09	0.40	0.09	0.40		
						CO	0.08	0.34	0.08	0.34		
						PM_{10}	0.007	0.03	0.007	0.03		
						SO_2	<0.001	0.002	<0.001	0.002		
						Pb	<0.001	<0.001	<0.001	<0.001		
						Total HAPs	0.002	0.008	0.002	0.008		
						Benzene	<0.001	<0.001	<0.001	<0.001		
						Toluene	<0.001	<0.001	<0.001	<0.001		
						Formaldehyde	<0.001	<0.001	<0.001	<0.001		
						Hexane	0.002	0.007	0.002	0.007		
						CO_2	116.98	512.36	116.98	512.36		
						CH_4	0.002	1.01	0.002	1.01		
						N_2O	<0.001	<0.001	<0.001	<0.001		
						CO_2e	117.10	512.89	117.10	512.89		
E002	Upward Vertical Stack	S002	NA	NA	NA	Total VOCs	0.005	0.02	0.005	0.02	Gas	AP-42, Subpart W
						NO_x	0.09	0.40	0.09	0.40		
						CO	0.08	0.34	0.08	0.34		
						PM_{10}	0.007	0.03	0.007	0.03		
						SO_2	<0.001	0.002	<0.001	0.002		
						Pb	<0.001	<0.001	<0.001	<0.001		
						Total HAPs	0.002	0.008	0.002	0.008		
						Benzene	<0.001	<0.001	<0.001	<0.001		
						Toluene	<0.001	<0.001	<0.001	<0.001		
						Formaldehyde	<0.001	<0.001	<0.001	<0.001		
						Hexane	0.002	0.007	0.002	0.007		
						CO_2	116.98	512.36	116.98	512.36		
						CH_4	0.002	1.01	0.002	1.01		
						N_2O	<0.001	<0.001	<0.001	<0.001		
						CO_2e	117.10	512.89	117.10	512.89		

E003	Upward Vertical Stack	S003	NA	NA	NA	Total VOCs	0.005	0.02	0.005	0.02	Gas	AP-42, Subpart W
						NO_x	0.09	0.40	0.09	0.40		
						CO	0.08	0.34	0.08	0.34		
						PM_{10}	0.007	0.03	0.007	0.03		
						SO_2	<0.001	0.002	<0.001	0.002		
						Pb	<0.001	<0.001	<0.001	<0.001		
						Total HAPs	0.002	0.008	0.002	0.008		
						Benzene	<0.001	<0.001	<0.001	<0.001		
						Toluene	<0.001	<0.001	<0.001	<0.001		
						Formaldehyde	<0.001	<0.001	<0.001	<0.001		
						Hexane	0.002	0.007	0.002	0.007		
						CO_2	116.98	512.36	116.98	512.36		
						CH_4	0.002	1.01	0.002	1.01		
						N_2O	<0.001	<0.001	<0.001	<0.001		
						CO_2e	117.10	512.89	117.10	512.89		
E004	Upward Vertical Stack	S004	NA	NA	NA	Total VOCs	0.005	0.02	0.005	0.02	Gas	AP-42, Subpart W
						NO_x	0.09	0.40	0.09	0.40		
						CO	0.08	0.34	0.08	0.34		
						PM_{10}	0.007	0.03	0.007	0.03		
						SO_2	<0.001	0.002	<0.001	0.002		
						Pb	<0.001	<0.001	<0.001	<0.001		
						Total HAPs	0.002	0.008	0.002	0.008		
						Benzene	<0.001	<0.001	<0.001	<0.001		
						Toluene	<0.001	<0.001	<0.001	<0.001		
						Formaldehyde	<0.001	<0.001	<0.001	<0.001		
						Hexane	0.002	0.007	0.002	0.007		
						CO_2	116.98	512.36	116.98	512.36		
						CH_4	0.002	1.01	0.002	1.01		
						N_2O	<0.001	<0.001	<0.001	<0.001		
						CO_2e	117.10	512.89	117.10	512.89		
E005	Upward Vertical Stack	S005	NA	NA	NA	Total VOCs	0.005	0.02	0.005	0.02	Gas	AP-42, Subpart W
						NO_x	0.09	0.40	0.09	0.40		
						CO	0.08	0.34	0.08	0.34		
						PM_{10}	0.007	0.03	0.007	0.03		
						SO_2	<0.001	0.002	<0.001	0.002		
						Pb	<0.001	<0.001	<0.001	<0.001		
						Total HAPs	0.002	0.008	0.002	0.008		
						Benzene	<0.001	<0.001	<0.001	<0.001		
						Toluene	<0.001	<0.001	<0.001	<0.001		
						Formaldehyde	<0.001	<0.001	<0.001	<0.001		
						Hexane	0.002	0.007	0.002	0.007		
						CO_2	116.98	512.36	116.98	512.36		
						CH_4	0.002	1.01	0.002	1.01		
						N_2O	<0.001	<0.001	<0.001	<0.001		
						CO_2e	117.10	512.89	117.10	512.89		

E012	Upward Vertical Stack	S006 – S011, S014, S017	Produced Fluid Tanks, Tank Truck Loading Rack, Sand Trap Blowdown Tank	C012	Enclosed Combustion Device	Total VOCs	69.62	304.94	1.40	6.12	Gas	ProMax, AP-42, Subpart W
						Total HAPs	3.45	15.09	0.07	0.30		
						CO	<0.001	<0.001	0.90	3.95		
						NO_x	<0.001	<0.001	1.07	4.71		
						PM_{10}	<0.001	<0.001	0.08	0.36		
						SO_2	<0.001	<0.001	0.01	0.03		
						CO_2	0.21	0.92	1,621.33	7,101.41		
						CH_4	11.09	48.58	0.25	1.09		
						N_2O	<0.001	<0.001	0.003	0.01		
						CO_2e	277.50	1,215.45	1,628.29	7,131.92		
E014	Upward Vertical Stack	S015	TEG	NA	NA	Total VOCs	<0.001	<0.001	<0.001	<0.001	Gas	AP-42, Subpart W
						NO_x	0.001	0.005	0.001	0.005		
						CO	0.001	0.004	0.001	0.004		
						PM_{10}	<0.001	<0.001	<0.001	<0.001		
						SO_2	<0.001	<0.001	<0.001	<0.001		
						Pb	<0.001	<0.001	<0.001	<0.001		
						Total HAPs	<0.001	<0.001	<0.001	<0.001		
						Benzene	<0.001	<0.001	<0.001	<0.001		
						Toluene	<0.001	<0.001	<0.001	<0.001		
						Formaldehyde	<0.001	<0.001	<0.001	<0.001		
						Hexane	<0.001	<0.001	<0.001	<0.001		
						CO_2	1.52	6.66	1.52	6.66		
						CH_4	<0.001	<0.001	<0.001	<0.001		
						N_2O	<0.001	<0.001	<0.001	<0.001		
						CO_2e	1.52	6.67	1.52	6.67		
E015	Upward Vertical Stack	S016	TEG	NA	NA	Total VOCs	<0.001	<0.001	<0.001	<0.001	Gas	AP-42, Subpart W
						NO_x	0.001	0.005	0.001	0.005		
						CO	0.001	0.004	0.001	0.004		
						PM_{10}	<0.001	<0.001	<0.001	<0.001		
						SO_2	<0.001	<0.001	<0.001	<0.001		
						Pb	<0.001	<0.001	<0.001	<0.001		
						Total HAPs	<0.001	<0.001	<0.001	<0.001		
						Benzene	<0.001	<0.001	<0.001	<0.001		
						Toluene	<0.001	<0.001	<0.001	<0.001		
						Formaldehyde	<0.001	<0.001	<0.001	<0.001		
						Hexane	<0.001	<0.001	<0.001	<0.001		
						CO_2	1.52	6.66	1.52	6.66		
						CH_4	<0.001	<0.001	<0.001	<0.001		
						N_2O	<0.001	<0.001	<0.001	<0.001		
						CO_2e	1.52	6.67	1.52	6.67		

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

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

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

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

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

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

G70-A FUGITIVE EMISSIONS SUMMARY SHEET

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	NA	--	--	--	--	--
Unpaved Haul Roads	PM PM-10 PM-2.5	7.19 1.83 0.18	2.64 0.67 0.07	7.19 1.83 0.18	2.64 0.67 0.07	AP-42
Loading/Unloading Operations	Total VOC Total HAPs CO_2 CH_4 CO_2e	0.03 <0.001 <0.001 0.002 0.06	0.15 <0.001 0.001 0.01 0.26	0.01 <0.001 0.14 <0.001 0.16	0.05 <0.001 0.62 0.003 0.70	ProMax, 40CFR98 Subpart W
Equipment Leaks	Total VOC Total HAPs Hexane CO_2 CH_4 CO_2e	0.09 0.008 0.008 0.002 0.28 6.90	0.40 0.04 0.04 0.008 1.21 30.20	0.09 0.008 0.008 0.002 0.28 6.90	0.40 0.04 0.04 0.008 1.21 30.20	40CFR98 Subpart W
Other	NA	NA	NA	NA	NA	NA

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.
[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; M = modeling; O = other (specify).