625 Liberty Ave, Suite 1700
Pittsburgh PA 15222
www.eqt.com

TEL: (412) 395-3699

R. Alex Bosiljevac
Environmental Coordinator

June 7, 2017

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

RE: G70-D General Permit Registration Application
EQT Production Company
OXF 43 Natural Gas Production Site

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) complete PDFs included on CD-ROM of a G70-D General Permit Registration Application for the authority to construct the OXF 43 natural gas production site.

A legal advertisement will be published in the next few days and proof of publication will be forwarded as soon as it is received. Please contact me for payment of the application fee by credit card.

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

Sincerely,

RAB

R. Alex Bosiljevac
EQT Corporation

Enclosures

EQT Production Company

G70-D General Permit Application

OXF 43 Natural Gas Production Site

Coxs Mills, West Virginia

Prepared By:

ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.
Hurricane, West Virginia

June 2017

INTRODUCTION

EQT Production Company (EQT) submits this G70-D General Permit Application to the WVDEP's Department of Air Quality for the OXF 43 natural gas production site which will be located in Doddridge County, West Virginia. This application addresses the operational activities associated with the production of natural gas and condensates at the OXF 43 site.

FACILITY DESCRIPTION

The EQT OXF 43 natural gas production site will operate in Doddridge County, WV and will consist of ten (10) natural gas wells. Natural gas and liquids (including water and condensates) will be extracted from underground deposits. The natural gas will be transported from the wells to a gas line for compression and additional processing, as necessary. The produced liquids will be stored in storage vessels.

EQT would like to submit this G70-D permit to reflect the following:

- Ten (10) natural gas wells;
- Ten (11) line heaters each rated at 1.54 MMBtu/hr heat input;
- One (1) 100 barrel (bbl) sand trap blowdown tank for storage of condensate and water;
- Ten (10) 400 bbl tanks for storage of condensate and water;
- One (1) enclosed combustion device with a capacity of 19.22 MMBtu/hr heat input;
- One (1) enclosed combustion device with a capacity of 11.66 MMBtu/hr heat input;
- One (1) 110 HP stationary natural gas compressor engine; and
- One (1) 405 HP stationary natural gas compressor engine.

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

STATEMENT OF AGGREGATION

The OXF 43 site is located in Doddridge 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 43 site 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 43 site 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 43 site does share the same SIC codes as the surrounding wells and compressor stations.

EQT Production Company is the sole operator of the OXF 43 site. 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.

On August 18, 2016 the EPA Administrator signed the *Source Determination for Certain Emission Units in the Oil and Natural Gas Sector*. This notice clarified EPA's position regarding how properties in the oil and natural gas sector are determined to be adjacent in order to assist permitting authorities and permit applicants in making consistent source determinations. The following proposed regulatory text defines "adjacent" for the oil and gas sector in terms of proximity.

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

There are no EQT owned or operated sites within ¼ mile radius of the OXF 43 site. 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. The operations conducted at the OXF 43 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 43 site 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-D 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 43 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 43 site will be subject to this requirement. Based on the nature of the process at the site, the presence of objectionable odors is unlikely.

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

The enclosed combustion devices located on the OXF 43 natural gas production site will be 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.

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

19.22 MMBtu/hr Combustor

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

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

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

$$\frac{300{,}000\ scf}{day} * \frac{1\ day}{24\ hours} * \frac{0.042\ lb}{scf} = \frac{525\ lb}{hr} = \frac{2300\ ton}{year}$$

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

F = 5.43 * (0.26 tons per hour)

F = 1.43 lbs/hr

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

11.66 MMBtu/hr Combustor

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

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

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

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

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

F = 5.43 * (0.12 tons per hour)

F = 0.67 lbs / hour

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

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

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

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

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

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

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration (PSD). The G70-D 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 43 site 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)

45 CSR 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 OOOOa are included in the G70-D general permit.

This site is expected to contain gas well affected facilities and collection of fugitive components under Subpart OOOOa, as well as a spark ignition internal combustion engine subject to Subpart JJJJ. No additional NSPS are applicable for this site. Additional discussion is provided in the Federal Regulation section of this Introduction.

45 CSR 19 – 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 nonattainment pollutants under Non-Attainment New Source Review (NNSR). The G70-D 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.

Doddridge County, WV is in attainment for all pollutants with a National Ambient Air Quality Standard (NAAQS) and does not qualify as a source subject to 45 CSR 19. Therefore, this regulation would not apply to the OXF 43 site.

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 OXF 43 site 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-D general permit eligibility are any sources that are subject to NESHAP Subpart HHH.

The following NESHAP included in the G70-D permit are subject to the OXF 43 site:

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

The following NESHAP included in the G70-D permit are not subject to the OXF 43 facility:

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

No additional NESHAP are applicable for this facility. Additional discussion is provided in the Federal Regulations section below.

FEDERAL REGULATIONS

New Source Performance Standards

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

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

The Ford CSG-637 is a 110 HP EPA Certified 4 stroke rich burn (4SRB) spark ignition (SI) engine manufactured in 2015. Per 40CFR60.4230(a)(4)(iii), an engine manufactured on or after July 1, 2008 with a maximum engine power less than 500 HP must comply with the provisions of 40 CFR 60 Subpart JJJJ.

Emission standards contained in the EPA Certificate of Conformity issued to this engine conform to 40 CFR 60 Subpart JJJJ Table 1 - NOx, CO, VOC Emissions Standards for Stationary Non-Emergency SI Engines greater than 100 HP. Therefore, per 40CFR60.4243(a)(1), EQT must operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions to ensure applicable emission standards outlined in Part 60 Subpart JJJJ Table 1 are maintained. Additionally, performance testing is not required.

The Caterpillar G3408TA is a 405 HP 4 stroke rich burn (4SRB) spark ignition (SI) engine manufactured in 1999. Since the engine was manufactured in 1999, it is not subject to Subpart JJJJ.

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

Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO2) emissions from affected facilities that commence construction, modification or reconstruction between August 23, 2011 and September 18, 2015. The applicable provisions and requirements of Subpart OOOO are included under the G70-D permit.

Since the OXF 43 site will be constructed after September 18, 2015, the site will not have any affected facilities subject to Subpart OOOO.

40 CFR 60 Subpart OOOOa (Standards of Performance for Crude Oil and Natural Gas Facilities for Which Construction, Modification, or Reconstruction Commenced After September 18, 2015)

The OXF 43 site will commence construction after September 18, 2015 and, therefore, will qualify as an affected facility under Subpart OOOOa. The OXF 43 site will qualify as a collection of fugitive components affected facility. As a fugitive component affected facility, in order to comply, LDAR monitoring at the OXF 43 site must be performed within 60 days of startup of production and then semi-annually thereafter. The OXF 43 site will also qualify as a gas well affected facility for all production wells.

There are several equipment types that will be installed at the OXF 43 site that do not meet the affected facility definitions as specified by EPA. These include:

- Storage vessels: Emissions from each storage vessel were determined to be below 6 tons per year (tpy) of VOC. Therefore, the produced fluid tanks are not affected storage vessels.

- Pneumatic devices: All pneumatic devices installed at the OXF 43 facility are either low-continuous bleed or intermittent bleed and do not qualify as affected sources.

National Emissions Standards for Hazardous Air Pollutants

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

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

The Ford CSG-637 is a 110 HP EPA Certified 4 stroke rich burn (4SRB) spark ignition (SI) engine manufactured in 2015. The engine meets the requirements of 40 CFR 60 Subpart JJJJ. Per 40CFR63.6590(c)(1), no further requirements apply for a new stationary RICE located at an area source subject to regulation under 40 CFR 60 Subpart JJJJ.

The Caterpillar G3408TA is a 405 HP 4 stroke rich burn (4SRB) spark ignition (SI) engine manufactured in 1999. Per 40 CFR63.6585(a) A stationary RICE is any internal combustion engine which uses reciprocating motion to convert heat

energy into mechanical work and which is not mobile. A Stationary RICE differs from mobile RICE in that a stationary RICE is not a non-road engine as defined at 40 CFR 1068.30, and is not used to propel a motor vehicle or a vehicle used solely for competition.

In order to show compliance with Subpart ZZZZ, EQT must do all of the following:

a. Change oil and filter every 1,440 hours of operation or annually, whichever comes first

b. Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.

c. Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.

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

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

Pollutant	Maximum Annual Emission Limit (tons/year)	OXF 43 Potential to Emit (tons/year)
Nitrogen Oxides	50	28.99
Carbon Monoxide	80	27.51
Volatile Organic Compounds	80	56.22
Particulate Matter – 10/2.5	20	0.53
Sulfur Dioxide	20	0.12
Any Single Hazardous Air Pollutant	8	1.84 (as Hexane)
Total Hazardous Air Pollutants	20	2.50

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

west virginia department of environmental protection

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

G70-D GENERAL PERMIT REGISTRATION APPLICATION

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

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

SECTION 1. GENERAL INFORMATION

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

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

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

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

Facility Name: **OXF 43 Natural Gas Production Site**

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

City: **Coxs Mills** | Zip Code: **26342** | County: **Doddridge**

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: **39.15703**
Longitude: **-80.79285**

SIC Code: **1311**

NAICS Code: **211111**

DAQ Facility ID No. (For existing facilities)
N/A

CERTIFICATION OF INFORMATION

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

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

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

Responsible Official Signature: _____

Name and Title: **Michael Gavin – Vice President** Phone: Fax:

Email: **gavinm@eqt.com** Date: 6/7/17

If applicable:
Authorized Representative Signature: _____

Name and Title: Phone: Fax:

Email: Date:

west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25 4
Phone (304) 926-0475
Fax (304) 926-0479
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G70-D GENERAL PERMIT REGISTRATION APPLICATION

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

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

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

OPERATING SITE INFORMATION

Briefly describe the proposed new operation and/or any change(s) to the facility: **The OXF 43 Natural Gas Production Site will be a new production site containing ten (10) wells and associated well equipment.**

Directions to the facility: **Traveling North on WV Route 18 in southern Doddridge County, turn left onto Grove Summers Road for 3.4 miles. Turn right onto Mudlick Run Road for approximately 0.5 miles and take a left onto an unnamed service road. Take the unnamed road to the top of the ridge and turn right. The proposed site will then be on the left.**

ATTACHMENTS AND SUPPORTING DOCUMENTS

I have enclosed the following required documents:

Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22).

☐ Check attached to front of application.
☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address):
☒ I wish to pay by credit card. Contact for payment (incl. name and email address): **Alex Bosiljevac – abosiljevac@eqt.com**

☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update)
☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO and/or OOOOa [1]
☒$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2]

[1] Only one NSPS fee will apply.
[2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ.
NSPS and NESHAP fees apply to new construction or if the source is being modified.

☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-D Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	

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

G70-D GENERAL PERMIT REGISTRATION APPLICATION

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

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

☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N
☒ Tanker Truck/Rail Car Loading Data Sheet (if applicable) – Attachment O
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P
☒ Pneumatic Controllers Data Sheet – Attachment Q
☒ Pneumatic Pump Data Sheet – Attachment R
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment S
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment T
☒ Facility-wide Emission Summary Sheet(s) – Attachment U
☒ Class I Legal Advertisement – Attachment V
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments

Attachment A

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

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

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

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

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

Attachment B
(Not Applicable)

Attachment C

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

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

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

This certificate is issued on: 08/4/2010

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

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

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

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

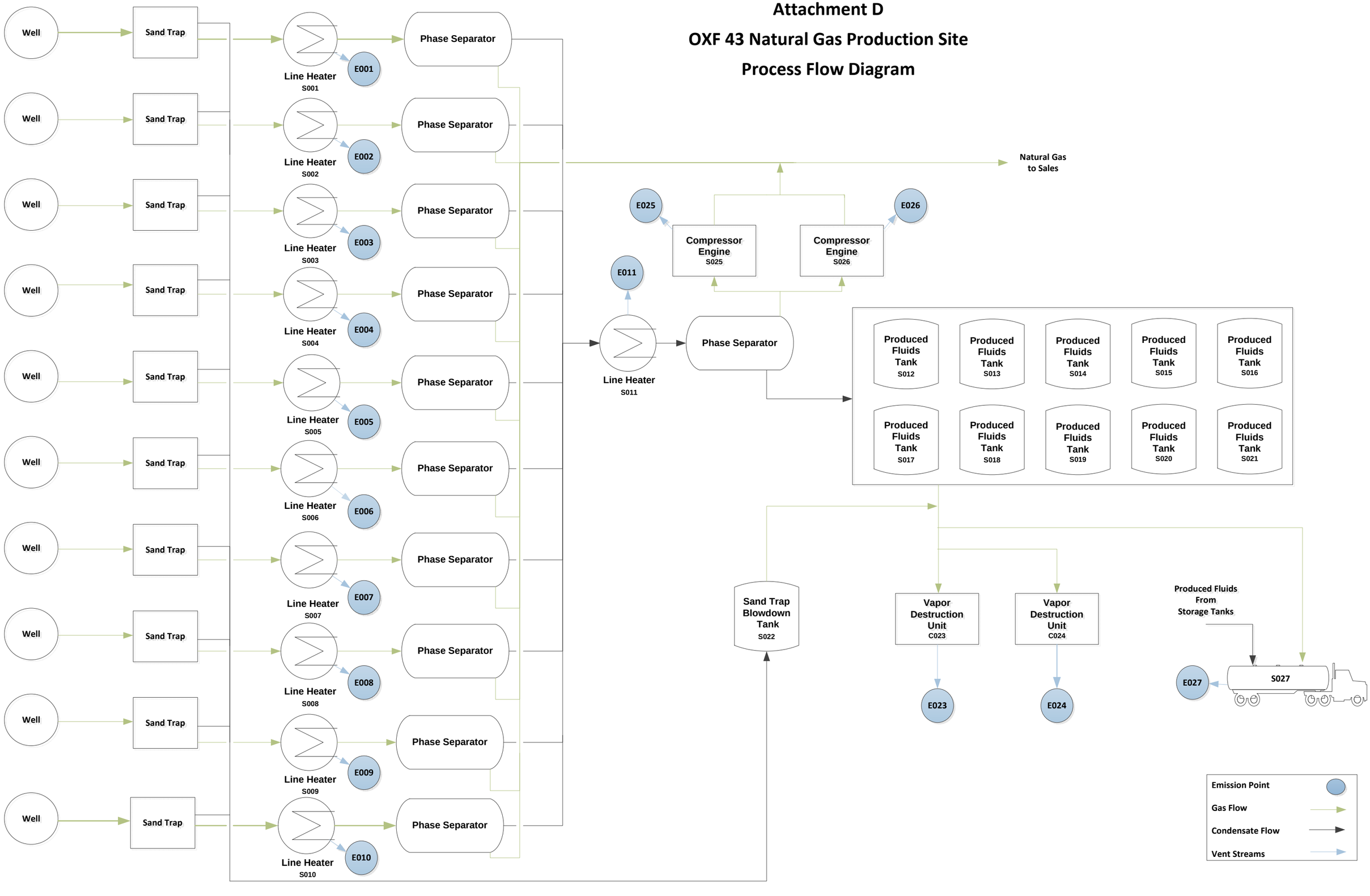
Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

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

atL006 v.3
L0553297664

Attachment D

Attachment D
OXF 43 Natural Gas Production Site
Process Flow Diagram



Attachment E

Attachment E
Process Description

This permit application is being filed for EQT Production Company and addresses operational activities associated with the OXF 43 natural gas production site. Incoming raw natural gas from the ten (10) natural gas wells enters the site through a pipeline. The raw gas is first routed through the sand traps to remove any sediment. Fluids from these sand traps are manually blown down to the sand trap blowdown tank (S022), as needed. From the sand traps, raw gas is routed through line heaters (S001-S010) to assist with the phase separation process in the downstream high pressure phase separators. In the high pressure phase separators, produced fluids are removed from the raw gas before being dumped to a second stage of fluid separation. The raw gas is then routed to the sales pipeline.

The produced fluids pass through a line heater (S011) to further assist in the separation process. At this low pressure separator, produced fluid pressure is reduced from 435 psig to 30 psig. Vapors realized at the low pressure separator will be directed to one of two compressor engines, one rated at 110 hp (S026) and the other rated at 405 hp (S025), based upon well production and will be routed to the sales gas pipeline. In order to provide a conservative estimate of the potential to emit (PTE) from the OXF 143 site, EQT has included the emissions from both of the engines in this permit application.

Produced fluids from the low pressure separator are routed to the produced fluids storage tanks (S012-S021). Emissions from the produced fluids tanks and sand trap blowdown tank are directed to one of the two enclosed combustion devices (C023 and C024) where the vapors will be combusted. In order to provide a conservative estimate of the PTE of VOCs from the storage tanks, EQT has modeled tank emissions without the low pressure separator described above.

Produced fluids are pumped into a tank truck (S027) on an as-needed basis and are disposed of off-site. Vapors during truck loading will be directed to either of the two enclosed combustion devices.

A process flow diagram is included as Attachment D.

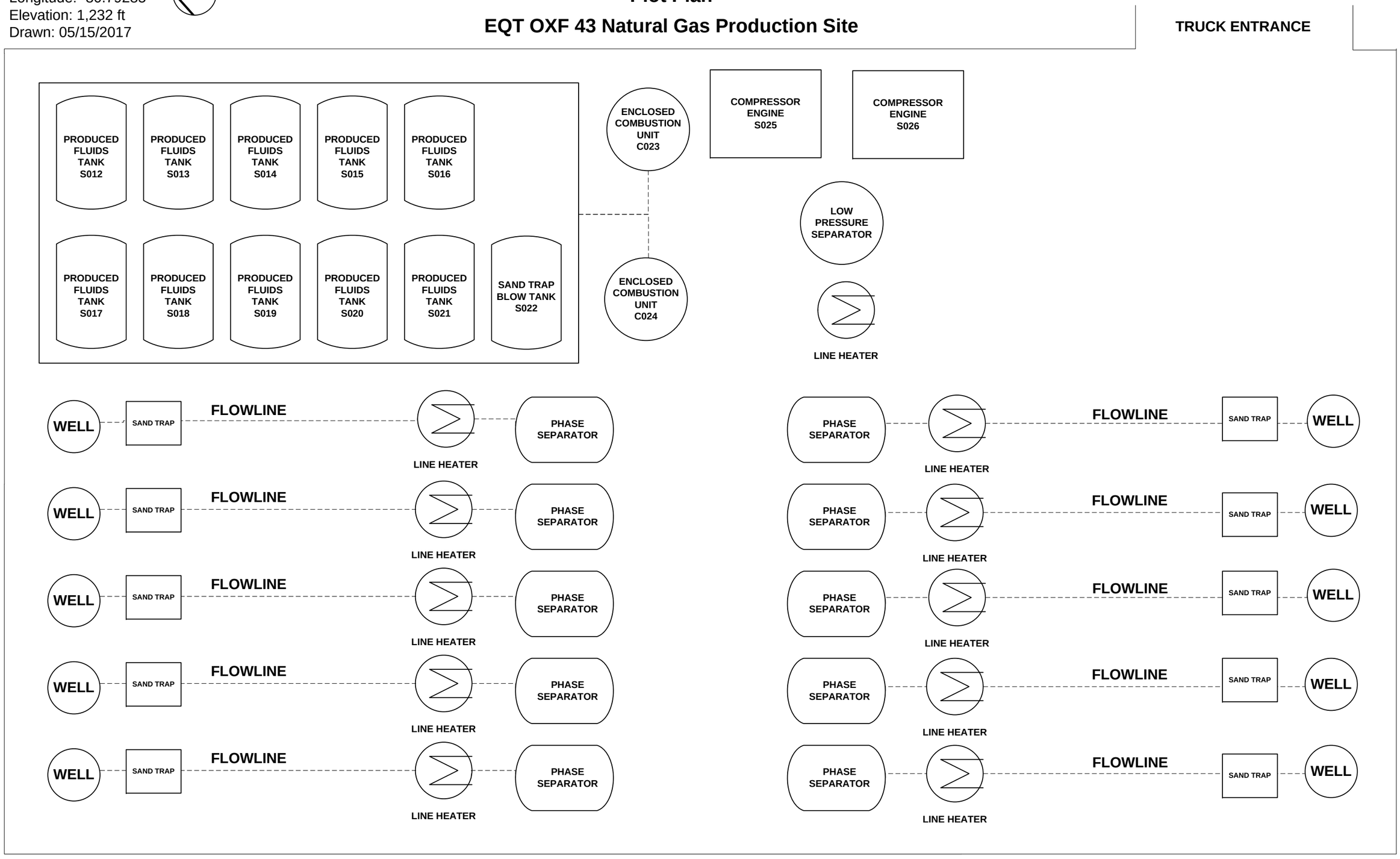
Attachment F

Coordinates
Latitude: 39.15703
Longitude: -80.79285
Elevation: 1,232 ft
Drawn: 05/15/2017

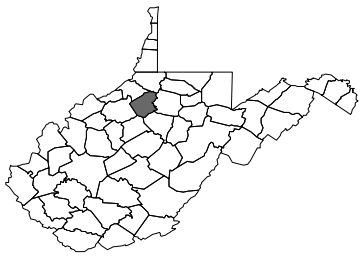
Attachment F

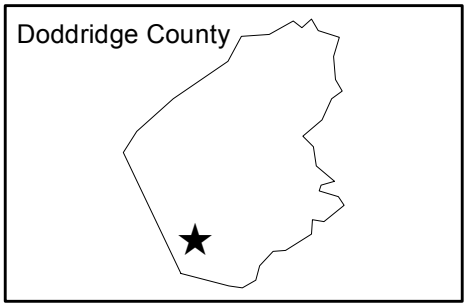
Plot Plan

EQT OXF 43 Natural Gas Production Site



Attachment G

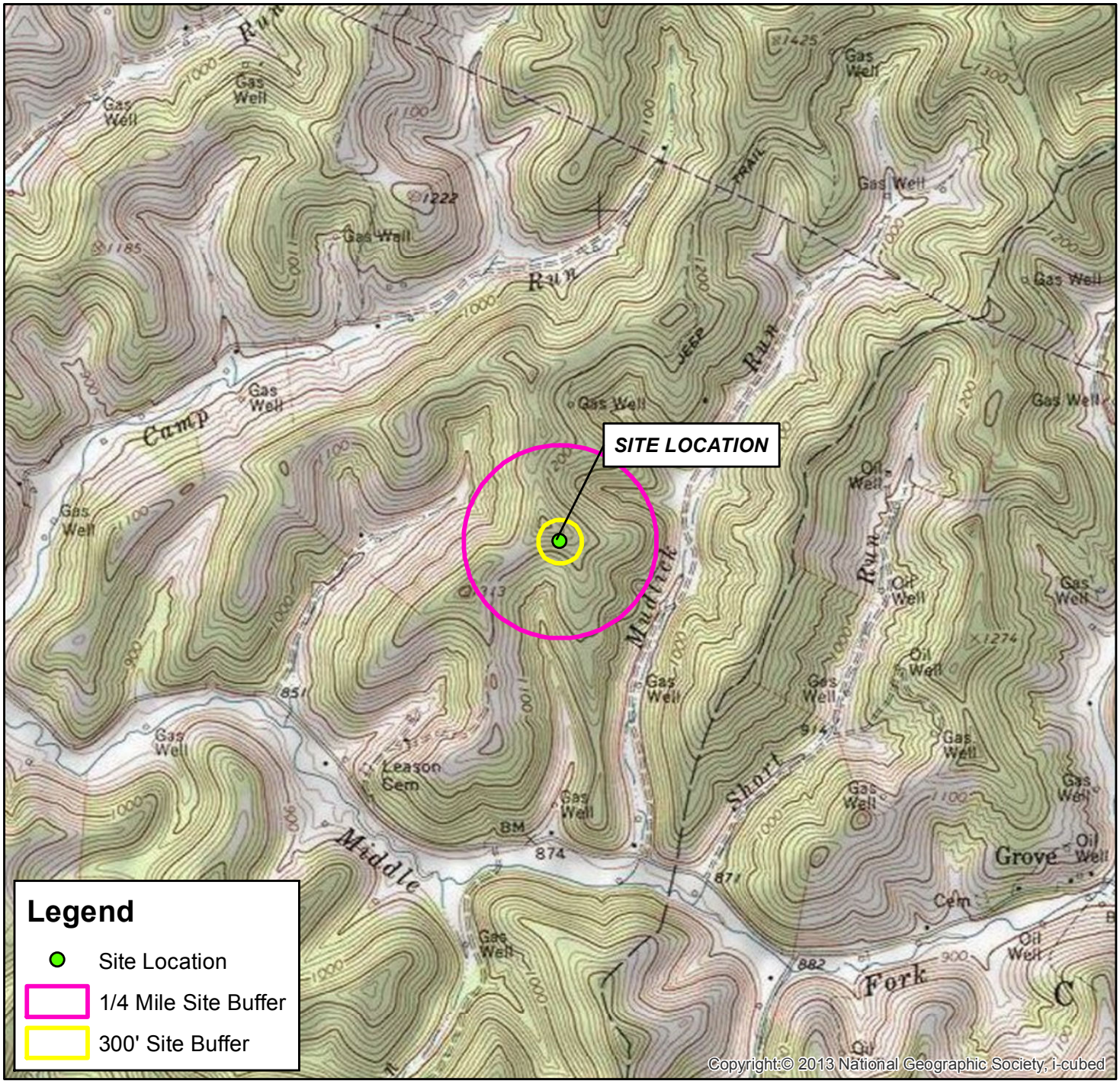




0 1,000 2,000 4,000 Feet

N

LAT. 39.157033 LON. -80.792855
DODDRIDGE COUNTY
WEST VIRGINIA



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

SITE LOCATION MAP

EQT PRODUCTION COMPANY

OXF-43 Well Pad
Doddridge County
West Virginia

ERM

Drawn By:
SRV-2/10/16

GIS Review: GM

CHK'D: GM

0250395

Environmental Resources Management

ATTACHMENT G

J:\Projects\EQT_MXD\OX43_Site_Location_Map.mxd - 5/9/2017\SRV

Attachment H

ATTACHMENT H – G70-D SECTION APPLICABILITY FORM

General Permit G70-D Registration
Section Applicability Form

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

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

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

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

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

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

Attachment I

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

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD(s)[6]
S001	E001	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S002	E002	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S003	E003	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S004	E004	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S005	E005	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S006	E006	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S007	E007	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S008	E008	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S009	E009	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S010	E010	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S011	E011	Line Heater	2017	2017	1.54 MMBtu/hr	New	N/A	N/A
S012	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S013	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024

S014	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S015	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S016	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S017	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S018	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S019	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S020	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S021	E023 or E024	Produced Fluids Tank	2017	2017	400 bbl	New	N/A	C023 or C024
S022	E023 or E024	Sand Trap Blowdown Tank	2017	2017	100 bbl	New	N/A	C023 or C024
C023	E023	Vapor Destruction Unit	2017	2017	19.22 MMBtu/hr	New	N/A	N/A
C024	E024	Vapor Destruction Unit	2017	2017	11.66 MMBtu/hr	New	N/A	N/A
S025	E025	Compressor Engine	2017	1999	405 HP	New	N/A	N/A
S026	E026	Compressor Engine	2017	2015	110 HP	New	N/A	N/A
S027	E027	Tank Truck Loading	2017	2017	689,840 bbl/yr	New	Loading Rack	C023 or C024

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

Attachment J

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

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

Source/Equipment: **OXF 43 Natural Gas Production Site**

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

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (methane, CO_2e)
Pumps	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Valves	☐ Yes ☒ No	**376**	**EPA**	☒ Gas ☐ Liquid ☐ Both	**0.36**	**0.03**	**1.49, 37.27**
Safety Relief Valves	☐ Yes ☒ No	**11**	**EPA**	☐ Gas ☐ Liquid ☐ Both	**0.02**	**<0.01**	**0.06, 1.62**
Open Ended Lines	☐ Yes ☒ No	**27**	**EPA**	☒ Gas ☐ Liquid ☐ Both	**0.06**	**<0.01**	**0.24, 6.05**
Sampling Connections	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Connections (Not sampling)	☐ Yes ☒ No	**1650**	**EPA**	☒ Gas ☐ Liquid ☐ Both	**0.17**	**0.01**	**0.73, 18.17**
Compressors	☐ Yes ☐ No		**40 CFR 98 Subpart W Table W-1B: Default average component counts are used for major equipment. Compressor components (12 valves and 57 connections) are included in valve and connection counts.**	☒ Gas ☐ Liquid ☐ Both			
Flanges	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Other[1]	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			

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

Please provide an explanation of the sources of fugitive emissions (e.g. pigging operations, equipment blowdowns, pneumatic controllers, etc.): **N/A**
Please indicate if there are any closed vent bypasses (include component): **N/A**
Specify all equipment used in the closed vent system (e.g. VRU, ERD, thief hatches, tanker truck/rail car loading, etc.) **N/A**

Attachment K

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

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

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device	Subject to OOOO or OOOOa?
047-017-06739	TBD	TBD	Green Completion	OOOOa
047-017-06740	TBD	TBD	Green Completion	OOOOa
047-017-06741	TBD	TBD	Green Completion	OOOOa
047-017-06742	TBD	TBD	Green Completion	OOOOa
047-017-06744	TBD	TBD	Green Completion	OOOOa
047-017-06745	TBD	TBD	Green Completion	OOOOa
047-017-06747	TBD	TBD	Green Completion	OOOOa
047-017-06746	TBD	TBD	Green Completion	OOOOa
047-017-06748	TBD	TBD	Green Completion	OOOOa
PLANNED	TBD	TBD	Green Completion	OOOOa

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

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

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

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

Where,

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

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

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

Attachment L

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

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

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

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name **OXF 43 Storage Tank Area**	2. Tank Name **Produced Fluids Tank (S012-S021)**
3. Emission Unit ID number **S012-S021**	4. Emission Point ID number **E023 or E024**
5. Date Installed , Modified or Relocated *(for existing tanks)* Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☐ Yes ☒ No Was the tank manufactured after September 18, 2015? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. **10 - 400 bbl tanks**	
9A. Tank Internal Diameter (ft.) **12**	9B. Tank Internal Height (ft.) **20**
10A. Maximum Liquid Height (ft.) **20**	10B. Average Liquid Height (ft.) **10**
11A. Maximum Vapor Space Height (ft.) **20**	11B. Average Vapor Space Height (ft.) **10**
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". **400 bbl**	
13A. Maximum annual throughput (gal/yr) **21,729,968.79**	13B. Maximum daily throughput (gal/day) **59,534.16**
14. Number of tank turnovers per year **518 (per tank)**	15. Maximum tank fill rate (gal/min) **41.34**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☐ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof ☒ vertical ☐ horizontal ☐ flat roof ☒ cone roof ☐ dome roof ☐ other (describe) ☐ External Floating Roof ☐ pontoon roof ☐ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting ☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm ☐ Pressurized ☐ spherical ☐ cylindrical ☐ Other (describe)	

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☐ Does Not Apply ☐ Rupture Disc (psig)

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

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

☒ Conservation Vent (psig) ☐ Condenser[1]

-0.5 oz Vacuum Setting **14.0 oz** Pressure Setting

☒ Emergency Relief Valve (psig)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
VOC (Pre-Control)	610.41	2673.57	0.05	0.20	0.20	0.87	610.65	2674.64	ProMax

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION		
21. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) **Welded**		
21A. Shell Color: **Green**	21B. Roof Color: **Green**	21C. Year Last Painted:
22. Shell Condition (if metal and unlined): ☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable		
22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): **Must be listed for tanks using VRUs with closed vent system.**		
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft): **5 ft**	24B. If yes, for cone roof, provide slop (ft/ft): **NA**
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):		
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No		
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):		
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No		
25F. Describe deck fittings:		
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply		
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)		
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☒ No		
28. Closed Vent System with Enclosed Combustor? ☒ Yes ☐ No		
SITE INFORMATION		
29. Provide the city and state on which the data in this section are based:		
30. Daily Avg. Ambient Temperature (°F):	31. Annual Avg. Maximum Temperature (°F):	
32. Annual Avg. Minimum Temperature (°F):	33. Avg. Wind Speed (mph):	
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	35. Atmospheric Pressure (psia):	
LIQUID INFORMATION		
36. Avg. daily temperature range of bulk liquid (°F):	36A. Minimum (°F):	36B. Maximum (°F):
37. Avg. operating pressure range of tank (psig):	37A. Minimum (psig):	37B. Maximum (psig):
38A. Minimum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):	
39A. Avg. liquid surface temperature (°F):	39B. Corresponding vapor pressure (psia):	
40A. Maximum liquid surface temperature (°F):	40B. Corresponding vapor pressure (psia):	
41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.		
41A. Material name and composition:		
41B. CAS number:		

41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-mole):			
41E. Vapor molecular weight (lb/lb-mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

STORAGE TANK DATA TABLE

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

Source ID #[1]	Status[2]	Content[3]	Volume[4]

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

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

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

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

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name **OXF 43 Storage Tank Area**	2. Tank Name **Sand Trap Blowdown Tank (S022)**
3. Emission Unit ID number **S022**	4. Emission Point ID number **E023 or E024**
5. Date Installed , Modified or Relocated *(for existing tanks)* Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☐ Yes ☒ No Was the tank manufactured after September 18, 2015? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. **5,880 gallons**	
9A. Tank Internal Diameter (ft.) **10**	9B. Tank Internal Height (ft.) **10**
10A. Maximum Liquid Height (ft.) **8**	10B. Average Liquid Height (ft.) **5**
11A. Maximum Vapor Space Height (ft.) **8**	11B. Average Vapor Space Height (ft.) **5**
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". **5,880 gallons**	
13A. Maximum annual throughput (gal/yr) **905,389.80**	13B. Maximum daily throughput (gal/day) **2,480.52**
14. Number of tank turnovers per year **154**	15. Maximum tank fill rate (gal/min) **4.08**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☐ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof ☒ vertical ☐ horizontal ☐ flat roof ☒ cone roof ☐ dome roof ☐ other (describe) ☐ External Floating Roof ☐ pontoon roof ☐ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting ☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm ☐ Pressurized ☐ spherical ☐ cylindrical ☐ Other (describe)	

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☐ Does Not Apply ☐ Rupture Disc (psig)

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

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

☐ Conservation Vent (psig) ☐ Condenser[1]

Vacuum Setting Pressure Setting

☒ Emergency Relief Valve (psig)

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

☐ Thief Hatch Weighted ☒ Yes ☐ No **– Two 16 oz. weighted emergency hatches.**

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
VOC (Pre-Control)	25.44	4.64	<0.01	<0.01	<0.01	<0.01	25.45	4.64	ProMax

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION			
21. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) **Welded**			
21A. Shell Color: **Green**	21B. Roof Color: **Green**	21C. Year Last Painted:	
22. Shell Condition (if metal and unlined): ☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable			
22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?	
23. Operating Pressure Range (psig): **Must be listed for tanks using VRUs with closed vent system.**			
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft): **5 ft**	24B. If yes, for cone roof, provide slop (ft/ft): **NA**	
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☒ No			
28. Closed Vent System with Enclosed Combustor? ☒ Yes ☐ No			
SITE INFORMATION			
29. Provide the city and state on which the data in this section are based:			
30. Daily Avg. Ambient Temperature (°F):	31. Annual Avg. Maximum Temperature (°F):		
32. Annual Avg. Minimum Temperature (°F):	33. Avg. Wind Speed (mph):		
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	35. Atmospheric Pressure (psia):		
LIQUID INFORMATION			
36. Avg. daily temperature range of bulk liquid (°F):	36A. Minimum (°F):	36B. Maximum (°F):	
37. Avg. operating pressure range of tank (psig):	37A. Minimum (psig):	37B. Maximum (psig):	
38A. Minimum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):		
39A. Avg. liquid surface temperature (°F):	39B. Corresponding vapor pressure (psia):		
40A. Maximum liquid surface temperature (°F):	40B. Corresponding vapor pressure (psia):		
41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
41A. Material name and composition:			
41B. CAS number:			
41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-			

mole):			
41E. Vapor molecular weight (lb/lb-mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

Attachment M

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

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

Emission Unit ID#[1]	Emission Point ID#[2]	Emission Unit Description (manufacturer, model #)	Year Installed/ Modified	Type[3] and Date of Change	Maximum Design Heat Input (MMBTU/hr)[4]	Fuel Heating Value (BTU/scf)[5]
S001	E001	Line Heater	2017	New	1.54	1,197
S002	E002	Line Heater	2017	New	1.54	1,197
S003	E003	Line Heater	2017	New	1.54	1,197
S004	E004	Line Heater	2017	New	1.54	1,197
S005	E005	Line Heater	2017	New	1.54	1,197
S006	E006	Line Heater	2017	New	1.54	1,197
S007	E007	Line Heater	2017	New	1.54	1,197
S008	E008	Line Heater	2017	New	1.54	1,197
S009	E009	Line Heater	2017	New	1.54	1,197
S010	E010	Line Heater	2017	New	1.54	1,197
S011	E011	Line Heater	2017	New	1.54	1,197

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

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

3 New, modification, removal.

4 Enter design heat input capacity in MMBtu/hr.

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

Attachment N

ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

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

Emission Unit ID#[1]		**S025**					
Engine Manufacturer/Model		**Caterpillar G3408TA**					
Manufacturers Rated bhp/rpm		**405/1800**					
Source Status[2]		**NS**					
Date Installed/ Modified/Removed/Relocated[3]		**2017**					
Engine Manufactured /Reconstruction Date[4]		**1999**					
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]		☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources		☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources		☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	
Engine Type[6]		**4SRB**					
APCD Type[7]		**NSCR**					
Fuel Type[8]		**PQ**					
H_2S (gr/100 scf)							
Operating bhp/rpm		**405/1800**					
BSFC (BTU/bhp-hr)		**8260**					
Hourly Fuel Throughput		ft^3/hr gal/hr		ft^3/hr gal/hr		ft^3/hr gal/hr	
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)		$MMft^3$/yr gal/yr		$MMft^3$/yr gal/yr		$MMft^3$/yr gal/yr	
Fuel Usage or Hours of Operation Metered		Yes ☒ No ☐		Yes ☐ No ☐		Yes ☐ No ☐	
Calculation Methodology[9]	**Pollutant[10]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
MD	NO_x	**2.13**	**9.31**				
MD	CO	**2.21**	**9.70**				
MD	VOC	**0.10**	**0.43**				
AP	SO_2	**<0.01**	**<0.01**				
AP	PM_{10}	**0.06**	**0.28**				
AP	Formaldehyde	**0.07**	**0.30**				
AP	Total HAPs	**0.08**	**0.33**				
AP	GHG (CO_2e)	**391.39**	**1,714.29**				

1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion engine/generator engine located at the well site. Multiple engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated

GE-1, GE-2, GE-3 etc. Microturbine generator engines should be designated MT-1, MT-2, MT-3 etc. If more than three (3) engines exist, please use additional sheets.

2 Enter the Source Status using the following codes:

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

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

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

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

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

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

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

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

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

8 Enter the Fuel Type using the following codes:

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

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

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

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

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

Engine Air Pollution Control Device
(Emission Unit ID# E025, use extra pages as necessary)

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

☒ NSCR ☐ SCR ☐ Oxidation Catalyst

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

Manufacturer: **Caterpillar**	Model #: **G3408TA**
Design Operating Temperature: °F	Design gas volume: scfm
Service life of catalyst:	Provide manufacturer data? ☐Yes ☐ No
Volume of gas handled: acfm at °F	Operating temperature range for NSCR/Ox Cat: From °F to °F
Reducing agent used, if any:	Ammonia slip (ppm):

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

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

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

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

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

ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

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

Emission Unit ID#[1]	**S026**		
Engine Manufacturer/Model	**Ford/CSG-637**		
Manufacturers Rated bhp/rpm	**110/3200**		
Source Status[2]	**NS**		
Date Installed/ Modified/Removed/Relocated[3]	**TBD**		
Engine Manufactured /Reconstruction Date[4]	**2015**		
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]	☒40CFR60 Subpart JJJJ ☒JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources
Engine Type[6]	**4SRB**		
APCD Type[7]	**NSCR**		
Fuel Type[8]	**PQ**		
H_2S (gr/100 scf)	**0.25**		
Operating bhp/rpm	**85.5/3,200**		
BSFC (BTU/bhp-hr)	**6,552.9**		
Hourly Fuel Throughput	**686.5** ft^3/hr gal/hr	ft^3/hr gal/hr	ft^3/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	**6.01** $MMft^3$/yr gal/yr	$MMft^3$/yr gal/yr	$MMft^3$/yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes ☒ No ☐	Yes ☐ No ☐	Yes ☐ No ☐

Calculation Methodology[9]	**Pollutant[10]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
MD	NO_x	**0.24**	**1.03**				
MD	CO	**0.49**	**2.14**				
MD	VOC	**0.16**	**0.71**				
AP	SO_2	**<0.01**	**<0.01**				
AP	PM_{10}	**0.02**	**0.08**				
AP	Formaldehyde	**0.02**	**0.08**				
AP	Total HAPs	**0.02**	**0.09**				
AP	GHG (CO_2e)	**106.30**	**465.61**				

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

2 Enter the Source Status using the following codes:

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

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

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

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

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

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

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

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

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

8 Enter the Fuel Type using the following codes:

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

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

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

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

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

Engine Air Pollution Control Device
(Emission Unit ID# E026, use extra pages as necessary)

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

☒ NSCR ☐ SCR ☐ Oxidation Catalyst

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

Manufacturer: **Ford**	Model #: **CSG-637**
Design Operating Temperature: °F	Design gas volume: scfm
Service life of catalyst:	Provide manufacturer data? ☐Yes ☐ No
Volume of gas handled: acfm at °F	Operating temperature range for NSCR/Ox Cat: From °F to °F
Reducing agent used, if any:	Ammonia slip (ppm):

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

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

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

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

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

USA COMPRESSION

USA Compression Unit 1407 Caterpillar G3408TA Engine Emissions

Date of Manufacture	October 7, 1999	Engine Serial Number	6NB02023	Date Modified/Reconstructed	N/A
Driver Rated HP	405	Rated Speed in RPM	1800	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	8	Compression Ratio	9.7:1	Combustion Setting	Rich Burn
Displacement, in^3	1099	Fuel Delivery Method	Carburetor	Combustion Air Treatment	T.C/ Aftercooled

Raw Engine Emissions (920 LHV BTU/SCF Fuel Gas with little to no H2S)

Fuel Consumption *7509* *LHV BTU/bhp-hr* *or* *8260* *HHV BTU/bhp-hr*
Altitude *500* *ft*
Maximum Air Inlet Temp *77* *F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	11.9		10.625	46.538
Carbon Monoxide (CO)	12.4		11.071	48.493
Volatile Organic Compounds (VOC or NMNEHC)		2.96E-02	0.099	0.434
Formaldehyde (CH2O)		2.05E-02	0.069	0.300
Particulate Matter (PM) Filterable+Condensable		1.94E-02	0.065	0.284
Sulfur Dioxide (SO2)		5.88E-04	0.002	0.009

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)		110.0	368	1462
Methane (CH4)		0.23	0.769	3.057

[1] g/bhp-hr are based on Caterpillar Specifications. Note that g/bhp-hr values are based on 100% Load Operation.
It is recommended to add a safety margin to emissions to allow for operational flexibility and fuel gas composition variability.
[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-3).

Catalytic Converter Emissions

Catalytic Converter Make and Model: *Miratech IQ-14-08*
Element Type: *NSCR 3-Way*
Number of Elements in Housing: *1*
Air/Fuel Ratio Control *Compliance Controls AFR-9*

	% Reduction	g/bhp-hr	lb/hr	TPY
Nitrogen Oxides (NOx)	80	2.4	**2.13**	**9.31**
Carbon Monoxide (CO)	80	2.5	**2.21**	**9.70**
Volatile Organic Compounds (VOC or NMNEHC)	0	0.11	**0.10**	**0.43**
Formaldehyde (CH2O)	0	0.08	**0.07**	**0.30**
Particulate Matter (PM)	0	0.07	**6.49E-02**	**2.84E-01**
Sulfur Dioxide (SO2)	0		**1.97E-03**	**8.62E-03**

	% Reduction	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	**368**	**1462**
Methane (CH4)	0	**0.77**	**3.06**

Proposal Number: MH-16-3157

Equipment Specification Report

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Caterpillar
Model Number:	G 3408 TA
Power Output:	405 bhp
Lubrication Oil:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	1587 acfm (cfm)
Exhaust Temperature:	995 F

System Details

Housing Model Number:	IQ-14-08-HSG
Element Model Number:	IQ-RE-14EC
Number of Catalyst Layers:	1
Number of Spare Catalyst Layers:	1
System Pressure Loss:	3.0 inches of WC (Clean)
Exhaust Temperature Limits:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number:	IQ-14-08-EC1
Material:	Carbon Steel
Inlet Pipe Size & Connection:	8 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	8 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	32 inches
Weight Without Catalyst:	89 lbs
Weight Including Catalyst:	107 lbs
Instrumentation Ports:	2 inlet/2 outlet (1/2" NPT)
Oxygen Sensor Ports:	1 inlet/1 outlet (18mm)

Emission Requirements

Exhaust Gases	Engine Outputs (g/bhp-hr)	Reduction (%)	Warranted Converter Ouputs (g/bhp-hr)	Requested Emissions Targets
NO_x*	11.9	80	2.4	2.4 g/bhp-hr
CO	12.4	80	2.5	2.5 g/bhp-hr
NMNEHC**	0.099			
CH_2O	0.24			
PM_{10}	0			
O2	0.4%			
H2O	18.5%			

† MIRATECH warrants the performance of the converter, as stated above, per the MIRATECH General Terms and Conditions of Sale.

*MW referenced as NO_2 **MW referenced as CH_4. Assumed as 100% unsaturated HCs. Average at steady state per EPA 40CFR60 Method 25A for HC or mutually agreed test method.

G3408

G3408 TA Gas Industrial Engine Performance

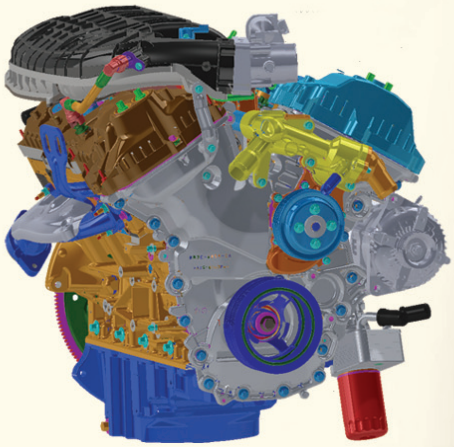
CATERPILLAR

Engine Speed (rpm)	1800	Fuel	NAT GAS
Compression Ratio	9.7:1	LHV of Fuel (Btu/SCF)	920
Aftercooler Inlet Temperature (°F)	90	Fuel System	HPG IMPCO
Jacket Water Outlet Temperature (°F)	210	Air Fuel Ratio Control Required	
Ignition System	CIS	Minimum Fuel Pressure (psig)	20.0
Exhaust Manifold	WATER COOLED	Methane Number at Conditions Shown	90
Combustion System Type	CATALYST	Rated Altitude (ft)	5000
		at 77°F Design Temperature	

Engine Rating Data	**% Load**	**100%**	**75%**	**50%**
Engine Power (w/o fan)	bhp	405	304	203
Engine Data				
Specific Fuel Consumption (BSFC) (1)	Btu/bhp-hr	7909	7854	8750
Air Flow (Wet, @77°F, 28.8 in Hg)	lb/hr	2488	1943	1435
Air Mass Flow (Wet)	scfm	538	424	320
Compressor Out Pressure	in. Hg (abs)	45.7	42.8	38.3
Compressor Out Temperature	°F	184	170	147
Inlet Manifold Pressure	in. Hg (abs)	39.7	31.7	26.2
Inlet Manifold Temperature (10)	°F	133	131	129
Timing (11)	°BTDC	25	25	25
Exhaust Stack Temperature	°F	995	941	884
Exhaust Gas Flow (Wet, @ stack temperature, 29.7 in Hg)	CFM	1687	1277	835
Exhaust Gas Mass Flow (Wet)	lb/hr	2620	2061	1553
Engine Emissions Data				
Nitrous Oxides (NOx as NO2) (9)	g/bhp-hr	11.9	12.2	12.4
(Corr. 15% O2)	ppm	872	850	734
Carbon Monoxide (CO) (9)	g/bhp-hr	12.4	12.1	12.4
(Corr. 15% O2)	ppm	1493	1391	1255
Total Hydrocarbons (THC) (9)	g/bhp-hr	2.9	2.9	2.9
(Corr. 15% O2)	ppm	616	580	525
Non-Methane Hydrocarbons (NMHC) (9)	g/bhp-hr	0.43	0.43	0.44
(Corr. 15% O2)	ppm	92	87	78
Exhaust Oxygen (9)	%	0.4	0.3	0.3
Lambda		1.05	1.05	1.05
Engine Heat Balance Data				
Input Energy (LHV (1)	Btu/min	50059	39760	29531
Work Output	Btu/min	17175	12881	8538
Heat Rejection to Jacket (2) (3)	Btu/min	19152	16084	13367
Heat Rejection to Atmosphere (Radiated) (4)	Btu/min	2026	1590	1131
Heat Rejection to Lube Oil (5)	Btu/min	0	0	0
Total Heat Rejection to Exhaust (to 77°F) (2)	Btu/min	11051	8164	5577
Heat Rejection to Exhaust (LHV to 350°F) (2)	Btu/min	7870	5856	3958
Heat Rejection to Aftercooler (3) (7) (8)	Btu/min	582	348	121

CSG-637 EFI

3.7 Liter
6-Cylinder



Options

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

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

Flywheel Housings
- SAE #3

Exhaust Manifold
- rear dump down

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

Electronic Instrument Panel, Gauges
Three Way Catalyst / Muffler Standard

Transmissions

6R80 electronic shift

Emissions Information

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

Warranty

Contact Engine Distributors, Inc
for warranty details.

Power Products

Powertrain Assemblies
& Components
Provided By Ford
Component Sales

Specifications

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

Gasoline (corrected per SAE J1349)

Unleaded 87 or 89 octane

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

Natural Gas (corrected per SAE J1349)

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

Liquefied Petroleum Gas (corrected per SAE J1349)

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

Standard Features / Benefits

Set-for-life valvetrain

Deep skirted, ribbed cylinder block casting for rigidity

150 AMP Alternator

Aluminum cylinder block and heads.

Chain driven dual camshafts with automatic tensioning system

Structural front cover and deep sump oil pan

Alternate fuel ready valvetrain components

Individual coil on plug electronic ignition

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

Gasoline Sequential Port Fuel Injection

Closed loop fuel control for all fuels

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

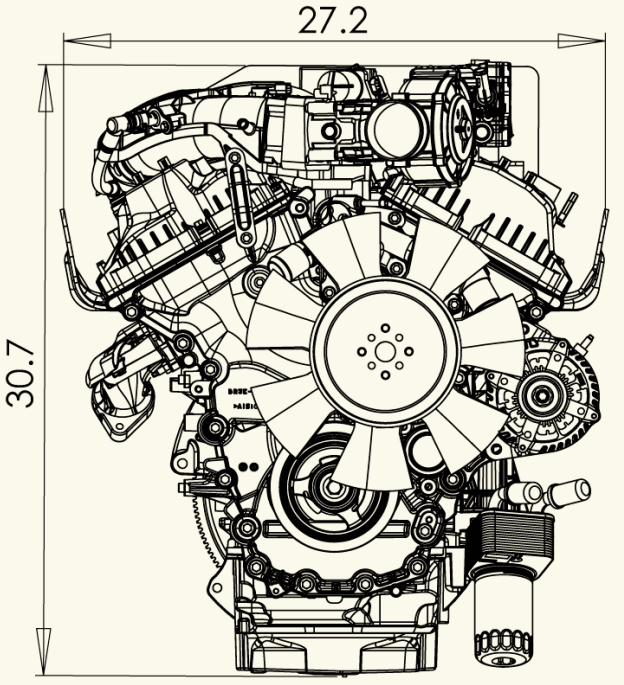
Next generation governing – discrete speeds, variable speeds, drive by wire – using the highest quality components.

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

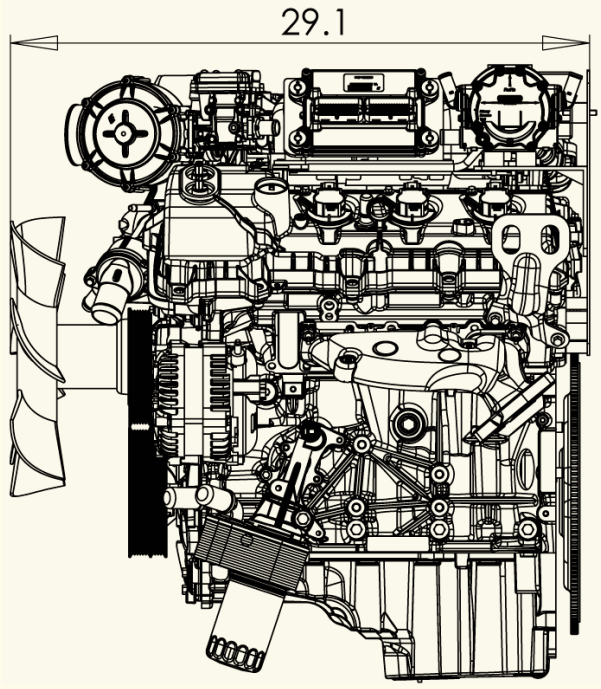
Forged steel crankshaft

Installation Drawings

Front End View

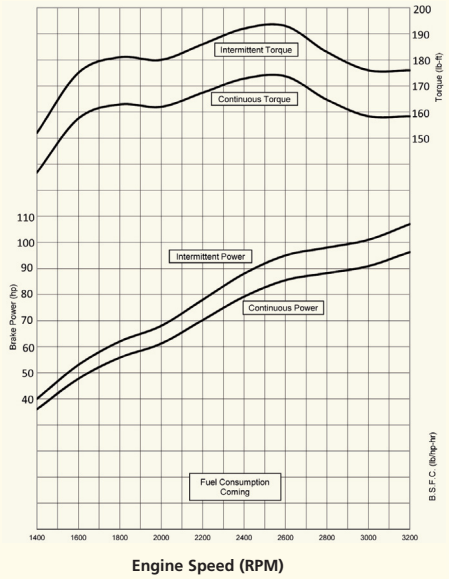


Left Side View

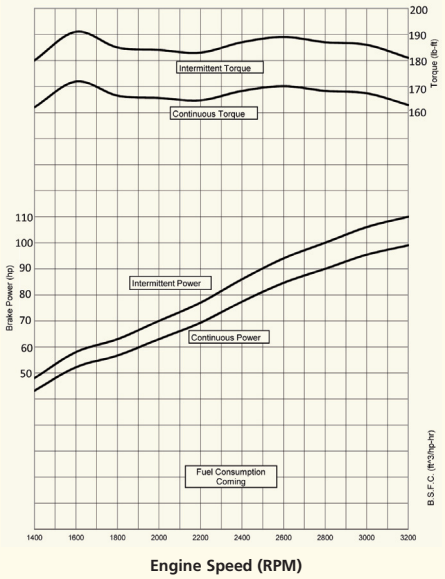


Power Curves (corrected per SAE J1349)

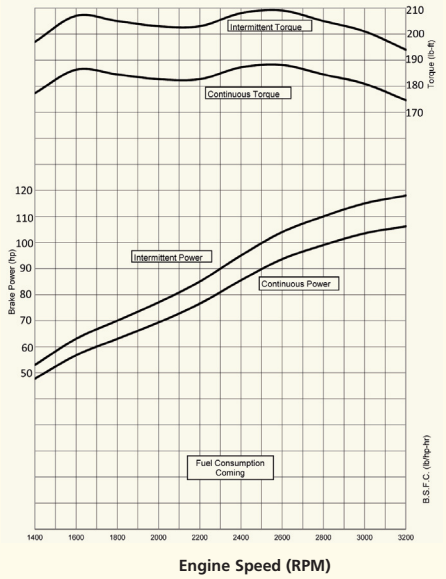
Gasoline



Natural Gas



Liquefied Petroleum Gas



Ford Power Products

Powertrain Assemblies & Components Provided By Ford Component Sales

For additional information Contact:

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

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

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

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

Certificate Number: FEDIB03.7CSG-006

Effective Date: 06/08/2015

Expiration Date: 12/31/2015

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 06/08/2015

Revision Date: N/A

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

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

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

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

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

Attachment O

ATTACHMENT O – TANKER TRUCK/RAIL CAR LOADING DATA SHEET

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

Truck/Rail Car Loadout Collection Efficiencies

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

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

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

Emission Unit ID#: **S027**	Emission Point ID#: **E027**	Year Installed/Modified: **New**
Emission Unit Description: **Tank Truck Loading**		
Loading Area Data		
Number of Pumps: **1**	Number of Liquids Loaded: **1**	Max number of trucks/rail cars loading at one (1) time: **1**
Are tanker trucks/rail cars pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ Not Required If Yes, Please describe:		
Provide description of closed vent system and any bypasses. **Vapors routed to two VDUs (C023 and C024)**		
Are any of the following truck/rail car loadout systems utilized? ☐ Closed System to tanker truck/rail car passing a MACT level annual leak test? ☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test? ☐ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return?		

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

Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	**24**	**24**	**24**	**24**
Days/week	**7**	**7**	**7**	**7**

Bulk Liquid Data (use extra pages as necessary)

Liquid Name	**Produced Fluid**		
Max. Daily Throughput (1000 gal/day)	**62.01**		
Max. Annual Throughput (1000 gal/yr)	**22,635.36**		
Loading Method[1]	**SP**		
Max. Fill Rate (gal/min)	**43.07**		
Average Fill Time (min/loading)	**120 min**		
Max. Bulk Liquid Temperature (^{o}F)	**57.77 °F**		
True Vapor Pressure[2]	**0.54 psia**		

Cargo Vessel Condition[3]		U		
Control Equipment or Method[4]		ECD		
Max. Collection Efficiency (%)		70		
Max. Control Efficiency (%)		98		
Max.VOC Emission Rate	Loading (lb/hr)	0.24		
	Annual (ton/yr)	1.05		
Max.HAP Emission Rate	Loading (lb/hr)	<0.01		
	Annual (ton/yr)	<0.01		
Estimation Method[5]		ProMax		

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

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

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

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

Attachment P

(Not Applicable)

Attachment Q

ATTACHMENT Q – PNEUMATIC CONTROLLERS DATA SHEET

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

☐ Yes ☒ No

Please list approximate number.

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

☐ Yes ☒ No

Please list approximate number.

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

☐ Yes ☒ No

Please list approximate number.

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

☐ Yes ☒ No

Please list approximate number.

Attachment R

ATTACHMENT R – PNEUMATIC PUMP DATA SHEET

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

☐ Yes ☒ No

Please list.

Source ID #	Date	Pump Make/Model	Pump Size

Attachment S

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

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

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

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

Emission Unit ID: **S012-S021, S022, S027**	Make/Model:
Primary Control Device ID: **C023**	Make/Model: **LEED Fabrication/Enclosed Combustor 60”**
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No
Secondary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **C023**	Installation Date:**2017** ☒ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity **~12,500** scfh **300,000** scfd	Maximum Design Heat Input (from mfg. spec sheet) **19.22** MMBTU/hr	Design Heat Content **1,500** BTU/scf

Control Device Information

Type of Vapor Combustion Control?

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

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

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# **S012-S021, S022, S027**)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
S012-S021	**Produced Fluid Tanks**		
S022	**Sand Trap Blowdown Tank**		
S027	**Tank Truck Loading Rack**		

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

Assist Type (Flares only)	Flare Height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☒ Non	**~30** feet	**4** feet	☐ Yes ☐ No Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate (scfm)	Heat Value of Waste Gas Stream **2013** BTU/ft^3	Exit Velocity of the Emissions Stream (ft/s)

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

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
1	**~30** scfh	**0.03** BTU/hr	☐ Yes ☒ No

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

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

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

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

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

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

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

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

Emission Unit ID: **S012-021, S022, S029**	Make/Model:
Primary Control Device ID: **C024**	Make/Model: **LEED Fabrication/Enclosed Combustor 48”**
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No
Secondary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **C024**	Installation Date: **2017** ☒ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity **~7,800** scfh **140,000** scfd	Maximum Design Heat Input (from mfg. spec sheet) **11.66** MMBTU/hr	Design Heat Content **1,088** BTU/scf

Control Device Information

Type of Vapor Combustion Control?

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

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

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# **S012-S021, S022, S029**)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
E012-E021	**Produced Fluids Tanks**		
E022	**Sand Trap Blowdown Tank**		
E027	**Tank Truck Loading Rack**		

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

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

Waste Gas Information

Maximum Waste Gas Flow Rate (scfm)	Heat Value of Waste Gas Stream **2013** BTU/ft^3	Exit Velocity of the Emissions Stream (ft/s)

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

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
1	**~30** scfh	**0.03** BTU/hr	☐ Yes ☐ No

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

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

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

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

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

GENERAL

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

PROCESS DATA

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

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

DESIGN DATA

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

EQUIPMENT SPECIFICATION

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

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

EQUIPMENT SPECIFICATION

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

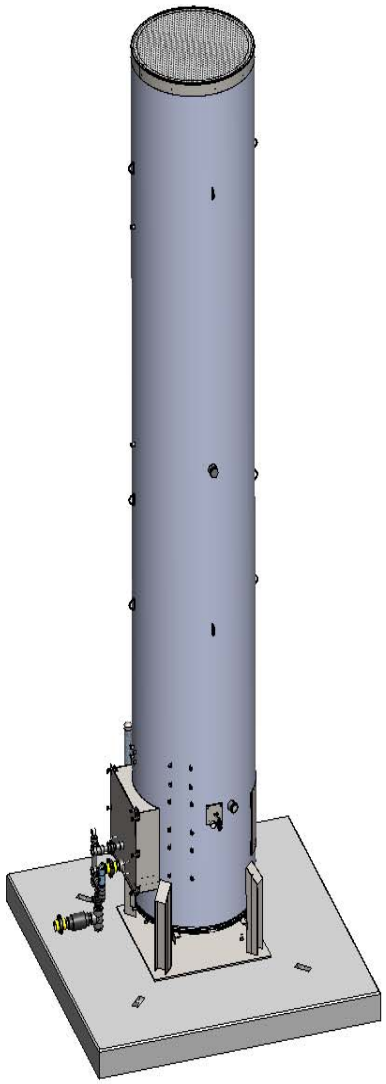
FABRICATION AND INSPECTION

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

Additional Notes:

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

GENERAL ARRANGEMENT



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

GENERAL

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

PROCESS DATA

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

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

DESIGN DATA

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

EQUIPMENT SPECIFICATION

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

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

EQUIPMENT SPECIFICATION

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

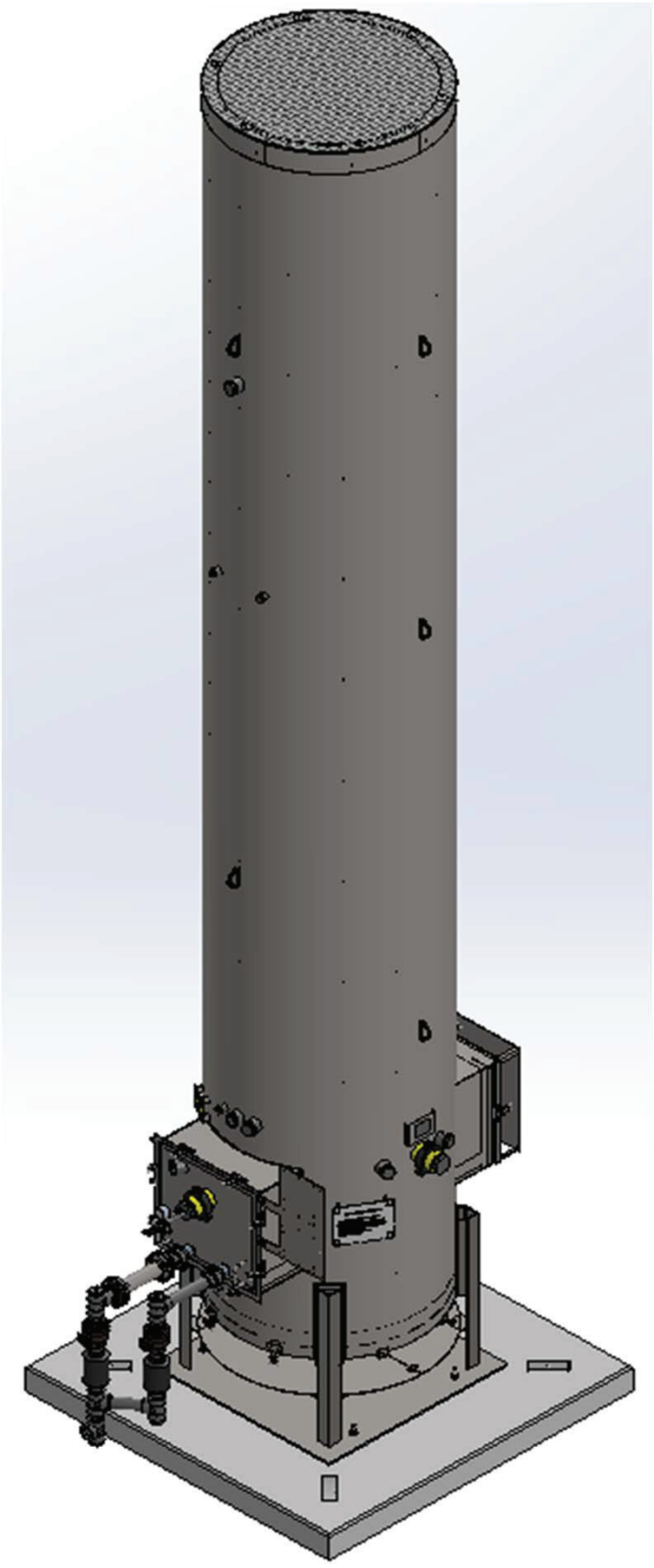
FABRICATION AND INSPECTION

76	**Special requirements**	☐ Skid Mounted ☑ Concrete Pad	**Equipment Info**	
77		☐ Other	**Component**	**Weight / Dimensions**
78			**Burner**	
79	**Inspection**	☑ Vendor Standard	Burner Assembly	
80		☐ Other. Specify:	**Stack**	
81	**Material Certification**	☑ Vendor Standard	Stack Assembly	48 " OD x 25 ' H
82		☐ MTR	Pilot Tip	
83		☐ Certificate of Compliance	Pilot Line(s)	
84		☐ Other (Specify):	Stack Assembly	
85	**NDE**	☑ Vendor Standard	**Auxiliary Equipment**	
86		☐ Radiography. Specify:	Blowers	
87		☐ Ultrasonic. Specify:	Inlet KO / Liquid Seal	
88		☐ Liquid Penetrant.	Flame / Detonation Arrestor	
89		☐ Magnetic Particles.	Skid	
90		☐ PMI. Specify:	**Instrumentation & Controls**	
91		☐ Other. Specify:	BMS	
92	**Surface Preparation**	☑ Vendor Standard	Control Panel	
93		☐ Other. Specify:		
94	**Paint System**	☑ Vendor Standard		
95		☐ Other. Specify:		
96	**Finished Color**	☑ Vendor Standard		
97		☐ Other. Specify:		
98				
99				

Additional Notes:

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

GENERAL ARRANGEMENT



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

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

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

Attachment T

Line Heaters S001 - S010

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Boiler Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.03
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.01
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	0.11	0.47
NO_x	100	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	0.13	0.56
$PM_{Filterable}$	1.9	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.01
$PM_{Condensable}$	5.7	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.03
PM_{Total}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.04
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40CFR98 Subpart C	1.54	1,197	8,760	180.14	789.03
CH_4	0.001	kg CH_4 / MMBtu	40CFR98 Subpart C	1.54	1,197	8,760	<0.01	0.015
N_2O	0.0001	kg N_2O / MMBtu	40CFR98 Subpart C	1.54	1,197	8,760	<0.01	<0.01
Total HAPs							<0.01	0.01
Total CO_2e							180.33	789.85

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for all line heaters are diplayed in the Total Site Emissions Table.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 1.4 references are from the July 1998 revision.
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

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

Line Heaters S011

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Boiler Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.03
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.01
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	0.11	0.47
NO_x	100	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	0.13	0.56
$PM_{Filterable}$	1.9	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.01
$PM_{Condensable}$	5.7	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.03
PM_{Total}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	0.04
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	1.54	1,197	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40CFR98 Subpart C	1.54	1,197	8,760	180.14	789.03
CH_4	0.001	kg CH_4 / MMBtu	40CFR98 Subpart C	1.54	1,197	8,760	<0.01	0.015
N_2O	0.0001	kg N_2O / MMBtu	40CFR98 Subpart C	1.54	1,197	8,760	<0.01	<0.01
Total HAPs							<0.01	0.01
Total CO_2e							180.33	789.85

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for all 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)**

Natural Gas Compressor Engine S025

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Engine Rating (kW)	Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC's	0.11	g/bhp-hr	Vendor Guarantee	405.00	302.01	8,260.00	1,196.65	8,760.00	0.10	0.43
Formaldehyde	0.02	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	0.07	0.30
Benzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	<0.01	0.02
Toluene	0.00	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	<0.01	<0.01
Ethylbenzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	<0.01	<0.01
Xylene	0.00	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	<0.01	<0.01
CO	2.48	g/bhp-hr	Vendor Guarantee	405.00	302.01	8,260.00	1,196.65	8,760.00	2.21	9.70
NO_x	2.38	g/bhp-hr	Vendor Guarantee	405.00	302.01	8,260.00	1,196.65	8,760.00	2.13	9.31
$PM_{Filterable}$	0.01	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	0.03	0.14
$PM_{Condensable}$	0.01	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	0.03	0.15
PM_{Total}	0.02	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	0.06	0.28
SO_2	0.00	lb/MMBtu	AP-42 Chapter 3.2	405.00	302.01	8,260.00	1,196.65	8,760.00	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	405.00	302.01	8,260.00	1,196.65	8,760.00	391.39	1,714.29
CH_4	0.00	kg CH_4 / MMBtu	40 CFR Subpart C	405.00	302.01	8,260.00	1,196.65	8,760.00	<0.01	0.03
N_2O	0.00	kg N_2O / MMBtu	40 CFR Subpart C	405.00	302.01	8,260.00	1,196.65	8,760.00	<0.01	<0.01
Total HAPs									0.08	0.33
Total CO_2e									391.80	1,716.06

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-3 - Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298
- Vendor Guarantee Emissions are listed in Attachment S

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/MMBtu)** x Fuel Consumption Rating **(Btu/bhp-hr)** x Engine Rating **(bhp)** x (1 **MMBtu**/10^6 **Btu**)

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(g/bhp-hr)** x Engine Rating **(bhp)** x (1 **lb**/453.6 **g**)

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(kg/MMBtu)** x Engine Rating **(bhp)** x (2.205 **lb**/**kg**) x Fuel Consumption Rating **(Btu/bhp-hr)** x (1 **MMBtu**/10^6 **Btu**)

Natural Gas Compressor Engine S026

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Engine Rating (kW)	Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC's	0.67	g/bhp-hr	Vendor Guarantee	110.00	82.03	8,260.00	1,196.65	8,760.00	0.16	0.71
Formaldehyde	0.02	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	0.02	0.08
Benzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	<0.01
Toluene	0.00	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	<0.01
Ethylbenzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	<0.01
Xylene	0.00	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	<0.01
CO	2.01	g/bhp-hr	Vendor Guarantee	110.00	82.03	8,260.00	1,196.65	8,760.00	0.49	2.14
NO_x	0.97	g/bhp-hr	Subpart JJJJ Table 1	110.00	82.03	8,260.00	1,196.65	8,760.00	0.24	1.03
$PM_{Filterable}$	0.01	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	0.04
$PM_{Condensable}$	0.01	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	0.04
PM_{Total}	0.02	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	0.02	0.08
SO_2	0.00	lb/MMBtu	AP-42 Chapter 3.2	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	110.00	82.03	8,260.00	1,196.65	8,760.00	106.30	465.61
CH_4	0.00	kg CH_4 / MMBtu	40 CFR Subpart C	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	<0.01
N_2O	0.00	kg N_2O / MMBtu	40 CFR Subpart C	110.00	82.03	8,260.00	1,196.65	8,760.00	<0.01	<0.01
Total HAPs									0.02	0.09
Total CO_2e									106.41	466.09

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-3 - Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298
- Vendor Guarantee Emissions are listed in Attachment S

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/MMBtu)** x Fuel Consumption Rating **(Btu/bhp-hr)** x Engine Rating **(bhp)** x (1 **MMBtu**/10^6 **Btu**)

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(g/bhp-hr)** x Engine Rating **(bhp)** x (1 **lb**/453.6 **g**)

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(kg/MMBtu)** x Engine Rating **(bhp)** x (2.205 **lb**/**kg**) x Fuel Consumption Rating **(Btu/bhp-hr)** x (1 **MMBtu/**10^6 **Btu**)

Produced Fluids Tanks S012 - S021

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Yearly Emissions using ProMax (tons/yr)
VOCs	610.65	2,674.64
HAPs	22.27	97.56
Hexane	19.73	86.43
Benzene	0.06	0.26
Toluene	1.27	5.54
Ethylbenzene	0.05	0.20
Xylene	0.38	1.67
CO_2	2.04	8.94
CH_4	101.45	444.36
Total CO_2e	2,538.36	11,118.03

Notes:

- Emission rates for Produced Fluid Tanks S012 - S021 were calculated using ProMax software. ProMax output sheets for the OXF 43 site are attached.
- The emission rates displayed above are pre-control device emissions.
- CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298
- For emission calculation purposes, the total throughput for tanks S012 - S021 is modeled as being received through a single tank. The throughput value represents the total throughput for all ten (10) 400-barrel tanks. Therefore, emission rates represent a total from all produced fluids tanks located on the well pad. Actual throughput for each tank will vary based on operations.

Sand Trap Blow Tank S022

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Yearly Emissions using ProMax (tons/yr)
VOCs	25.45	4.64
HAPs	0.93	0.17
Hexane	0.82	0.15
Benzene	<0.01	<0.01
Toluene	0.05	<0.01
Ethylbenzene	<0.01	<0.01
Xylene	0.02	<0.01
CO_2	0.09	0.02
CH_4	4.23	0.77
Total CO_2e	105.77	19.30

Notes:

- Blowdown operations are conducted on the OXF 43 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 (365 days per year).
- 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 OXF 43 site are attached.
- CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1. GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Tank Unloading Operations S027

Total Emissions from Tank Unloading Operations

Pollutant	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)	Loading Rack Collection Efficiency	Enclosed Combustion Device Combusion Efficiency	Post-Control Max. 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)
VOCs	0.80	3.50	0.70	0.98	0.01	0.05	0.24	1.05
HAPs	<0.01	0.01	0.70	0.98	<0.01	<0.01	<0.01	<0.01
CO_2	<0.01	0.02	0.70	0.98	2.81	12.29	<0.01	<0.01
CH_4	0.05	0.21	0.70	0.98	<0.01	<0.01	0.01	0.06
Total CO_2e	1.22	5.35	--	--	2.82	12.37	0.37	1.61

- 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.
- Vapors from tank unloading operations are vapor-balanced to the produced fluid tanks and realized at one of the two enclosed combustion devices. AP-42 calculation methods were used to estimate the collection efficiency from tank unloading operations. Emissions that are not collected during the unloading events are realized at the Loading Rack Emission Point, E027.

Enclosed Ground Flare (C023) - 19.22 MMBtu/hr

Emissions from Tanks

Input to Enclosed Combustion Device	Pollutant	Amount of Gas Sent to Enclosed Combustion Device (lbs/hr)	Amount of Gas Sent to Enclosed Combustion Device (tons/year)	Enclosed Combustion Device Combustion Efficiency	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
Produced Fluids Tanks S012-S021	VOCs	305.32	1337.32	98%	6.11	26.75
	HAPs	11.14	48.78	98%	0.22	0.98
	Hexane	9.87	43.21	98%	0.20	0.86
	Benzene	0.03	0.13	98%	<0.01	<0.01
	Toluene	0.63	2.77	98%	0.01	0.06
	Ethylbenzene	0.02	0.10	98%	<0.01	<0.01
	Xylene	0.19	0.83	98%	<0.01	0.02
	CO_2	1.02	4.47	98%	1,153.44	5,052.06
	CH_4	50.73	222.18	98%	1.01	4.44
Sand Trap Blowdown Tank - S022	VOCs	12.72	2.32	98%	0.25	0.05
	HAPs	0.46	0.08	98%	<0.01	<0.01
	Hexane	0.41	0.08	98%	<0.01	<0.01
	Benzene	<0.01	<0.01	98%	<0.01	<0.01
	Toluene	0.03	<0.01	98%	<0.01	<0.01
	Ethylbenzene	<0.01	<0.01	98%	<0.01	<0.01
	Xylene	<0.01	<0.01	98%	<0.01	<0.01
	CO_2	0.04	<0.01	98%	48.06	210.52
	CH_4	2.11	0.39	98%	0.04	<0.01
Truck Loading - S029	VOCs	0.40	1.75	98%	0.01	0.05
	HAPs	<0.01	<0.01	98%	<0.01	<0.01
	CO_2	<0.01	0.01	98%	2.81	12.29
	CH_4	0.02	0.11	98%	<0.01	<0.01
Totals	VOCs	318.45	1341.39	--	6.37	26.84
	HAPs	11.60	48.87	--	0.23	0.98
	Hexane	10.28	43.29	--	0.21	0.87
	Benzene	0.03	0.13	--	<0.01	<0.01
	Toluene	0.66	2.78	--	0.01	0.06
	Ethylbenzene	0.02	0.10	--	<0.01	<0.01
	Xylene	0.20	0.83	--	<0.01	0.02
	CO_2	1.07	4.49	--	1,204.31	5,274.87
	CH_4	52.86	222.67	--	1.06	4.45
	CO2e	1,322.68	5,571.34	--	1230.75	5,386.23

Gas Composition of Vent Gas

Gas Stream	Mole Fraction
Methane	0.28
Ethane	0.23
Propane	0.19
Butane	0.16
Pentanes	0.08
Carbon Dioxide	0.002

Vent Gas Properties

Vent Gas Properties	Mass Flow Rate (lb/hr)	Density (lb/ft^3)
Produced Fluids Tank	440.05	0.10
Blowdown Tank	18.34	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 Ground Flare Pilot Rating (Btu/hr)	Enclosed Ground Flare 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	5.50	--	1,088	30,000	19,220,000	<0.01	<0.01	--	--	<0.01	<0.01
Hexane	1.80	--	1,088	30,000	19,220,000	<0.01	<0.01	--	--	<0.01	<0.01
Formaldehyde	0.075	--	1,088	30,000	19,220,000	<0.01	<0.01	--	--	<0.01	<0.01
CO	84	--	1,088	30,000	19,220,000	<0.01	0.01	1.48	6.50	1.49	6.51
NO_x	100	--	1,088	30,000	19,220,000	<0.01	0.01	1.77	7.74	1.77	7.75
$PM_{Condensable}$	5.70	--	1,088	30,000	19,220,000	<0.01	<0.01	0.10	0.44	0.10	0.44
$PM_{Filterable}$	1.90	--	1,088	30,000	19,220,000	<0.01	<0.01	0.03	0.15	0.03	0.15
PM_{Total}	7.60	--	1,088	30,000	19,220,000	<0.01	<0.01	0.13	0.59	0.13	0.59
SO_2	0.60	--	1,088	30,000	19,220,000	<0.01	<0.01	0.01	0.05	0.01	0.05
CO_2	120,000	53.06	1,088	30,000	19,220,000	3.51	15.37	2,248.30	9,847.56	2,251.81	9,862.93
CH_4	2.3	0.001	1,088	30,000	19,220,000	<0.01	<0.01	0.04	0.19	0.04	0.19
N_2O	2.2	<0.001	1,088	30,000	19,220,000	<0.01	<0.01	<0.01	0.02	<0.01	0.02
Total HAPs										<0.01	<0.01
CO_2e										2,254.14	9,873.11

Total Enclosed Combustion Device Emissions

Pollutant	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
VOCs	6.37	26.84
HAPs	0.23	0.98
CO	1.49	6.51
NO_x	1.77	7.75
$PM_{Condensable}$	0.10	0.44
$PM_{Filterable}$	0.03	0.15
PM_{Total}	0.13	0.59
SO_2	0.01	0.05
CO_2	3,456.12	15,137.80
CH_4	1.10	4.64
N_2O	<0.01	0.02
CO_2e	3,484.88	15,259.35

Notes:

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

Example Calculations:

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

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

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

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

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

Where:

Ea,CH_4(un-combusted) = Contribution of annual un-combusted CH4 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Ea,CO_2(un-combusted) = Contribution of annual un-combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Ea,CO_2(combusted) = Contribution of annual combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.
Va = Volume of gas sent to Enclosed Combustion Device in cubic feet, during the year.
η = Fraction of gas combusted by a burning Enclosed Combustion Device (default is 0.98). For gas sent to an unlit Enclosed Combustion Device, η is zero.
XCH4 = Mole fraction of CH4 in gas to the Enclosed Combustion Device.
XCO2 = Mole fraction of CO2 in gas to the Enclosed Combustion Device.
Y_j = Mole fraction of gas hydrocarbon constituents j (such as methane, ethane, propane, butane, and pentanes-plus).
R_j = Number of carbon atoms in the gas hydrocarbon constituent j: 1 for methane, 2 for ethane, 3 for propane, 4 for butane, and 5 for pentanes plus).

Enclosed Ground Flare (C024) - 11.66 MMBtu/hr

Emissions from Tanks

Input to Enclosed Combustion Device	Pollutant	Amount of Gas Sent to Enclosed Combustion Device (lbs/hr)	Amount of Gas Sent to Enclosed Combustion Device (tons/year)	Enclosed Combustion Device Combustion Efficiency	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
Produced Fluids Tanks S012-S021	VOCs	305.32	1337.32	98%	6.11	26.75
	HAPs	11.14	48.78	98%	0.22	0.98
	Hexane	9.87	43.21	98%	0.20	0.86
	Benzene	0.03	0.13	98%	<0.01	<0.01
	Toluene	0.63	2.77	98%	0.01	0.06
	Ethylbenzene	0.02	0.10	98%	<0.01	<0.01
	Xylene	0.19	0.83	98%	<0.01	0.02
	CO_2	1.02	4.47	98%	1,153.44	5,052.06
	CH_4	50.73	222.18	98%	1.01	4.44
Sand Trap Blowdown Tank - S022	VOCs	12.72	2.32	98%	0.25	0.05
	HAPs	0.46	0.08	98%	<0.01	<0.01
	Hexane	0.41	0.08	98%	<0.01	<0.01
	Benzene	<0.01	<0.01	98%	<0.01	<0.01
	Toluene	0.03	<0.01	98%	<0.01	<0.01
	Ethylbenzene	<0.01	<0.01	98%	<0.01	<0.01
	Xylene	<0.01	<0.01	98%	<0.01	<0.01
	CO_2	0.04	<0.01	98%	48.06	210.52
	CH_4	2.11	0.39	98%	0.04	<0.01
Truck Loading - S029	VOCs	0.40	1.75	98%	0.01	0.05
	HAPs	<0.01	<0.01	98%	<0.01	<0.01
	CO_2	<0.01	0.01	98%	2.81	12.29
	CH_4	0.02	0.11	98%	<0.01	<0.01
Totals	VOCs	318.45	1341.39	--	6.37	26.84
	HAPs	11.60	48.87	--	0.23	0.98
	Hexane	10.28	43.29	--	0.21	0.87
	Benzene	0.03	0.13	--	<0.01	<0.01
	Toluene	0.66	2.78	--	0.01	0.06
	Ethylbenzene	0.02	0.10	--	<0.01	<0.01
	Xylene	0.20	0.83	--	<0.01	0.02
	CO_2	1.07	4.49	--	1,204.31	5,274.87
	CH_4	52.86	222.67	--	1.06	4.45
	CO2e	1,322.68	5,571.34	--	1230.75	5,386.23

Gas Composition of Vent Gas

Gas Stream	Mole Fraction
Methane	0.28
Ethane	0.23
Propane	0.19
Butane	0.16
Pentanes	0.08
Carbon Dioxide	0.002

Vent Gas Properties

Vent Gas Properties	Mass Flow Rate (lb/hr)	Density (lb/ft^3)
Produced Fluids Tank	440.05	0.10
Blowdown Tank	18.34	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 Ground Flare Pilot Rating (Btu/hr)	Enclosed Ground Flare 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	5.50	--	1,088	30,000	11,660,000	<0.01	<0.01	--	--	<0.01	<0.01
Hexane	1.80	--	1,088	30,000	11,660,000	<0.01	<0.01	--	--	<0.01	<0.01
Formaldehyde	0.075	--	1,088	30,000	11,660,000	<0.01	<0.01	--	--	<0.01	<0.01
CO	84	--	1,088	30,000	11,660,000	<0.01	0.01	0.90	3.94	0.90	3.95
NO_x	100	--	1,088	30,000	11,660,000	<0.01	0.01	1.07	4.69	1.07	4.71
$PM_{Condensable}$	5.70	--	1,088	30,000	11,660,000	<0.01	<0.01	0.06	0.27	0.06	0.27
$PM_{Filterable}$	1.90	--	1,088	30,000	11,660,000	<0.01	<0.01	0.02	0.09	0.02	0.09
PM_{Total}	7.60	--	1,088	30,000	11,660,000	<0.01	<0.01	0.08	0.36	0.08	0.36
SO_2	0.60	--	1,088	30,000	11,660,000	<0.01	<0.01	<0.01	0.03	<0.01	0.03
CO_2	120,000	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	2.3	0.001	1,088	30,000	11,660,000	<0.01	<0.01	0.03	0.11	0.03	0.11
N_2O	2.2	<0.001	1,088	30,000	11,660,000	<0.01	<0.01	<0.01	0.01	<0.01	0.01
Total HAPs										<0.01	<0.01
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	6.37	26.84
HAPs	0.23	0.98
CO	0.90	3.95
NO_x	1.07	4.71
$PM_{Condensable}$	0.06	0.27
$PM_{Filterable}$	0.02	0.09
PM_{Total}	0.08	0.36
SO_2	<0.01	0.03
CO_2	2,571.77	11,264.36
CH_4	1.08	4.57
N_2O	<0.01	0.01
CO_2e	2,599.62	11,381.91

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

$$E_{a,CH_4}(un-combusted) = V_a * (1-\eta) * X_{CH4} \qquad \text{(Eq. W-19)}$$

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

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

Where:

Ea,CH_4(un-combusted) = Contribution of annual un-combusted CH4 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.

Ea,CO_2(un-combusted) = Contribution of annual un-combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.

Ea,CO_2(combusted) = Contribution of annual combusted CO2 emissions from Enclosed Combustion Device stack in cubic feet, under actual conditions.

Va = Volume of gas sent to Enclosed Combustion Device in cubic feet, during the year.

η = Fraction of gas combusted by a burning Enclosed Combustion Device (default is 0.98). For gas sent to an unlit Enclosed Combustion Device, η is zero.

XCH4 = Mole fraction of CH4 in gas to the Enclosed Combustion Device.

XCO2 = Mole fraction of CO2 in gas to the Enclosed Combustion Device.

Y_j = Mole fraction of gas hydrocarbon constituents j (such as methane, ethane, propane, butane, and pentanes-plus).

R_j = Number of carbon atoms in the gas hydrocarbon constituent j: 1 for methane, 2 for ethane, 3 for propane, 4 for butane, and 5 for pentanes plus).

Fugitive Emissions from Unpaved Haul Roads

Constant	Industrial Roads		
	PM	PM-10	PM-2.5
k (lb/VMT)	4.90	1.50	0.15
a	0.70	0.90	0.90
b	0.45	0.45	0.45

where

k		Particle size multiplier [1]
s	4.80	Silt content of road surface material (%) [2]
p	150.00	Number of days per year with precipitation >0.01 in. [3]

Item Number	Description	Number of Wheels	W Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)	PM Emissions (lbs/hr)	PM Emissions (tons/yr)	PM-10 Emissions (lbs/hr)	PM-10 Emissions (tons/yr)	PM-2.5 Emissions (lbs/hr)	PM-2.5 Emissions (tons/yr)
1.00	Liquids Hauling	14.00	30.00	10.00	1.00	1.00	5,389.37	NA	NA	4.28	11.54	1.09	2.94	0.11	0.29
2.00	Employee Vehicles	4.00	3.00	10.00	1.00	1.00	200.00	NA	NA	1.52	0.15	0.39	0.04	0.04	<0.01
									Totals:	**5.80**	**11.69**	**1.48**	**2.98**	**0.15**	**0.30**

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 in^3 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	8.00	38.00	0.50	0.00
Separators	1.00	6.00	0.00	0.00
Meters/Piping	12.00	45.00	0.00	0.00
Compressors	12.00	57.00	0.00	0.00
In-line Heaters	14.00	65.00	2.00	1.00
Dehydrators	24.00	90.00	2.00	2.00

[1]- Table W-1B to 40CFR98 Subpart W

Well Specific Equipment Counts	
Facility Equipment Type	Count on Site
Wellheads	10.00
Separators	10.00
Meters/Piping	11.00
Compressors	2.00
In-line Heaters	11.00
Dehydrators	0.00

Gas Composition					
Emissions from Flaring Operations	Propane	Butane	Pentanes	Hexanes+	CO_2	CH_4
Mole %	3.82	1.45	0.46	0.29	0.10	80.77
MW	44.00	58.00	72.00	86.00	44.00	16.00

Fugitive Emissions															
Facility Equipment Type	Total Count	Emission Rate (scf/hr/component)[2]	Hours of Operation	VOCs (lbs/hr)	VOCs (tons/yr)	Hexane (lbs/hr)	Hexane (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	376.00	0.03	8,760.00	0.08	0.36	<0.01	0.03	<0.01	0.03	<0.01	<0.01	0.34	1.49	8.51	37.27
Connectors	1,650.00	0.00	8,760.00	0.04	0.17	<0.01	0.01	<0.01	0.01	<0.01	<0.01	0.17	0.73	4.15	18.17
Open-ended Lines	27.00	0.06	8,760.00	0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	0.24	1.38	6.05
Pressure Relief Valves	11.00	0.04	8,760.00	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.06	0.37	1.62
			Total Emissions:	**0.14**	**0.61**	**0.01**	**0.05**	**0.01**	**0.05**	**<0.01**	**<0.01**	**0.58**	**2.52**	**14.41**	**63.10**

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

Notes:
-Gas Composition data for PUL-96 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 43 Site Emission Levels

	VOCs		HAPs		CO		NO_x		PM_{Total}		$PM_{Filterable}$		$PM_{Condensable}$		SO_2		CO_2		CH_4		N_2O		CO_2e	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Line Heater (E001)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E002)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E003)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E004)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E005)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E006)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E007)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E008)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E009)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E010)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
Line Heater (E011)	<0.01	0.03	<0.01	0.01	0.11	0.47	0.13	0.56	<0.01	0.04	<0.01	0.01	<0.01	0.03	<0.01	<0.01	180.14	789.03	<0.01	0.01	<0.01	<0.01	180.33	789.85
VDU - 19.22 MMBtu/hr (C023)	6.37	26.84	0.23	0.98	1.49	6.51	1.77	7.75	0.13	0.59	0.03	0.15	0.10	0.44	0.01	0.05	3,456.12	15,137.80	1.10	4.64	<0.01	0.02	3,484.88	15,259.35
VDU - 11.66 MMBtu/hr (C024)	6.37	26.84	0.23	0.98	0.90	3.95	1.07	4.71	0.08	0.36	0.02	0.09	0.06	0.27	<0.01	0.03	2,571.77	11,264.36	1.08	4.57	<0.01	0.01	2,599.62	11,381.91
Compressor Engine (E025)	0.10	0.43	0.08	0.33	2.21	9.70	2.13	9.31	0.06	0.28	0.03	0.14	0.03	0.15	<0.01	<0.01	391.39	1,714.29	<0.01	0.03	<0.01	<0.01	391.80	1,716.06
Compressor Engine (E026)	0.16	0.71	0.02	0.09	0.49	2.14	0.24	1.03	0.02	0.08	0.01	0.04	0.01	0.04	<0.01	<0.01	106.30	465.61	<0.01	<0.01	<0.01	<0.01	106.41	466.09
*Tank Truck Loading Operations (E027)	0.24	1.05	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	<0.01	0.01	0.06	--	--	0.37	1.61
Haul Roads	--	--	--	--	--	--	--	--	5.80	11.69	5.80	11.69	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	0.14	0.61	0.01	0.05	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	<0.01	0.58	2.52	--	--	14.41	63.10
Totals	**13.46**	**56.83**	**0.60**	**2.55**	**6.28**	**27.51**	**6.62**	**28.99**	**6.21**	**13.47**	**5.92**	**12.23**	**0.28**	**1.25**	**0.03**	**0.12**	**8,507.18**	**37,261.46**	**2.82**	**12.00**	**0.01**	**0.05**	**8,581.13**	**37,576.46**

*Emissions from Tank Truck Loading Operations are routed to the vapor combustion unit. The collection efficiency of the vapors has been calculated using AP-42 methodologies. Emissions that are not collected and routed the VDU are realized at the Tank Truck Loading Operations Emission Point.

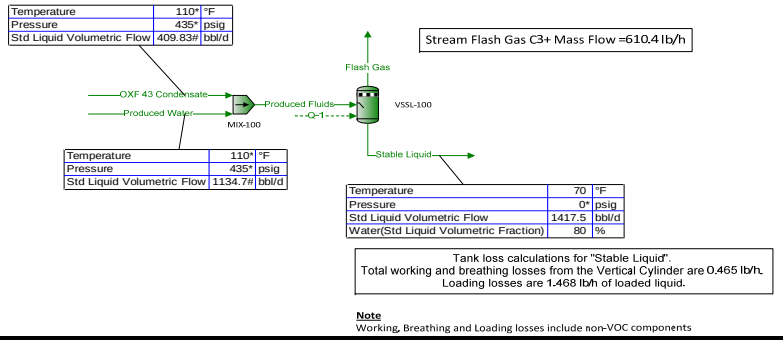
Total OXF 43 Site Emission Levels - HAP Speciation

	Total HAPs		Formaldehyde		Hexane		Benzene		Toluene		Ethylbenzene		Xylene	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Line Heater (E001)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E002)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E003)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E004)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E005)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E006)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E007)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E008)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E009)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E010)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Line Heater (E011)	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VDU - 19.22 MMBtu/hr (E023)	0.23	0.98	<0.01	<0.01	0.21	0.87	<0.01	<0.01	0.01	0.06	<0.01	<0.01	<0.01	0.02
VDU - 11.66 MMBtu/hr (E024)	0.23	0.98	<0.01	<0.01	0.21	0.87	<0.01	<0.01	0.01	0.06	<0.01	<0.01	<0.01	0.02
Compressor Engine (E025)	0.08	0.33	0.07	0.30	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Compressor Engine (E026)	0.02	0.09	0.02	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tank Truck Loading Activities (E027)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Haul Roads	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	0.01	0.05	<0.01	<0.01	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Totals	**0.60**	**2.55**	**0.09**	**0.39**	**0.42**	**1.89**	**<0.01**	**0.03**	**0.03**	**0.12**	**<0.01**	**<0.01**	**<0.01**	**0.04**

Flowsheet1
Plant Schematic

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

EQT OXF 43
Produced Fluid Tanks
50% Contingency
20% Condensate



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

Connections

	Flash Gas	OXF 43 Condensate	Produced Fluids	Produced Water	Stable Liquid
From Block	VSSL-100	--	MIX-100	--	VSSL-100
To Block	--	MIX-100	VSSL-100	MIX-100	--

Stream Composition

Mole Fraction	Flash Gas %	OXF 43 Condensate %	Produced Fluids %	Produced Water %	Stable Liquid %
Nitrogen	0	0 *	0	0 *	0
Methane	27.8189	12.828 *	0.657735	0 *	0.00505053
Carbon Dioxide	0.203987	0.097 *	0.00497352	0 *	0.000191219
Ethane	22.8408	10.896 *	0.558675	0 *	0.0232342
Propane	19.1946	10.116 *	0.518681	0 *	0.0698988
Isobutane	4.63775	2.935 *	0.150487	0 *	0.0426584
n-Butane	10.9503	7.83 *	0.40147	0 *	0.147983
Isopentane	4.15634	4.739 *	0.242984	0 *	0.148946
n-Pentane	4.00245	5.433 *	0.278568	0 *	0.189083
Isohexane	1.35967	3.719 *	0.190686	0 *	0.162595
n-Hexane	1.00737	3.757 *	0.192634	0 *	0.173056
2,2,4-Trimethylpentane	0.00232655	0.024 *	0.00123056	0 *	0.00120422
Benzene	0.0444491	0.17 *	0.00871647	0 *	0.00785782
Heptane	0.909608	10.112 *	0.518476	0 *	0.509077
Toluene	0.0604393	0.73 *	0.0374296	0 *	0.0368766
Octane	0.267738	9.545 *	0.489404	0 *	0.494731
Ethylbenzene	0.00189478	0.075 *	0.0038455	0 *	0.00389238
o-Xylene	0.0157569	0.78 *	0.0399932	0 *	0.0405756
Nonane	0.016223	1.901 *	0.0974707	0 *	0.099423
Decane	0.0385978	14.313 *	0.733876	0 *	0.750583
Water	2.47083	0 *	94.8727	100 *	97.0931

Molar Flow	Flash Gas lbmol/h	OXF 43 Condensate lbmol/h	Produced Fluids lbmol/h	Produced Water lbmol/h	Stable Liquid lbmol/h
Nitrogen	0	0 *	0	0 *	0
Methane	6.32311	6.37088 *	6.37088	0 *	0.047772
Carbon Dioxide	0.0463652	0.0481739 *	0.0481739	0 *	0.0018087
Ethane	5.1916	5.41137 *	5.41137	0 *	0.219768
Propane	4.36284	5.02399 *	5.02399	0 *	0.661159
Isobutane	1.05414	1.45763 *	1.45763	0 *	0.403497
n-Butane	2.48894	3.88868 *	3.88868	0 *	1.39974
Isopentane	0.944717	2.35357 *	2.35357	0 *	1.40885
n-Pentane	0.909738	2.69824 *	2.69824	0 *	1.7885
Isohexane	0.309046	1.847 *	1.847	0 *	1.53795
n-Hexane	0.22897	1.86587 *	1.86587	0 *	1.6369
2,2,4-Trimethylpentane	0.000528814	0.0119193 *	0.0119193	0 *	0.0113905
Benzene	0.0101031	0.0844285 *	0.0844285	0 *	0.0743255
Heptane	0.206749	5.02201 *	5.02201	0 *	4.81526
Toluene	0.0137376	0.362546 *	0.362546	0 *	0.348809
Octane	0.0608557	4.74041 *	4.74041	0 *	4.67956
Ethylbenzene	0.000430675	0.0372479 *	0.0372479	0 *	0.0368172
o-Xylene	0.00358148	0.387378 *	0.387378	0 *	0.383797
Nonane	0.0036874	0.94411 *	0.94411	0 *	0.940422
Decane	0.00877309	7.10839 *	7.10839	0 *	7.09961
Water	0.561609	0 *	918.945	918.945 *	918.384

Mass Fraction	Flash Gas %	OXF 43 Condensate %	Produced Fluids %	Produced Water %	Stable Liquid %
Nitrogen	0	0 *	0	0 *	0

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

Mass Fraction	Flash Gas %	OXF 43 Condensate %	Produced Fluids %	Produced Water %	Stable Liquid %
Methane	11.5257	2.72736 *	0.50341	0 *	0.00394587
Carbon Dioxide	0.231848	0.0565758 *	0.0104426	0 *	0.000409838
Ethane	17.7372	4.34209 *	0.801454	0 *	0.0340238
Propane	21.8589	5.91176 *	1.09118	0 *	0.150107
Isobutane	6.96151	2.2608 *	0.417294	0 *	0.120748
n-Butane	16.437	6.03137 *	1.11326	0 *	0.418877
Isopentane	7.74453	4.53136 *	0.836388	0 *	0.523351
n-Pentane	7.45778	5.19495 *	0.958872	0 *	0.66438
Isohexane	3.02601	4.24739 *	0.783974	0 *	0.682378
n-Hexane	2.24195	4.29079 *	0.791984	0 *	0.72628
2,2,4-Trimethylpentane	0.00686345	0.0363327 *	0.00670622	0 *	0.0066991
Benzene	0.0896674	0.175986 *	0.0324831	0 *	0.0298919
Heptane	2.35388	13.4284 *	2.47859	0 *	2.48424
Toluene	0.143819	0.891407 *	0.164534	0 *	0.165473
Octane	0.789841	14.4498 *	2.66712	0 *	2.75219
Ethylbenzene	0.00519512	0.105525 *	0.0194776	0 *	0.0201248
o-Xylene	0.0432024	1.09746 *	0.202567	0 *	0.209788
Nonane	0.0537352	3.23124 *	0.596415	0 *	0.621007
Decane	0.141829	26.9893 *	4.98163	0 *	5.20095
Water	1.14958	0 *	81.5422	100 *	85.1851

Mass Flow	Flash Gas lb/h	OXF 43 Condensate lb/h	Produced Fluids lb/h	Produced Water lb/h	Stable Liquid lb/h
Nitrogen	0	0 *	0	0 *	0
Methane	101.438	102.205 *	102.205	0 *	0.76638
Carbon Dioxide	2.04051	2.12011 *	2.12011	0 *	0.0796
Ethane	156.107	162.715 *	162.715	0 *	6.60821
Propane	192.382	221.536 *	221.536	0 *	29.1542
Isobutane	61.2688	84.7209 *	84.7209	0 *	23.4521
n-Butane	144.663	226.019 *	226.019	0 *	81.3558
Isopentane	68.1602	169.807 *	169.807	0 *	101.647
n-Pentane	65.6365	194.674 *	194.674	0 *	129.038
Isohexane	26.6321	159.166 *	159.166	0 *	132.534
n-Hexane	19.7316	160.792 *	160.792	0 *	141.061
2,2,4-Trimethylpentane	0.0604057	1.36153 *	1.36153	0 *	1.30112
Benzene	0.789169	6.59487 *	6.59487	0 *	5.8057
Heptane	20.7167	503.215 *	503.215	0 *	482.498
Toluene	1.26576	33.4044 *	33.4044	0 *	32.1387
Octane	6.95145	541.491 *	541.491	0 *	534.539
Ethylbenzene	0.0457226	3.95442 *	3.95442	0 *	3.9087
o-Xylene	0.380227	41.126 *	41.126	0 *	40.7458
Nonane	0.472928	121.087 *	121.087	0 *	120.614
Decane	1.24825	1011.39 *	1011.39	0 *	1010.14
Water	10.1175	0 *	16555.1	16555.1 *	16544.9

Stream Properties

Property	Units	Flash Gas	OXF 43 Condensate	Produced Fluids	Produced Water	Stable Liquid
Temperature	°F	69.9729	110 *	110.047	110 *	69.9729 *
Pressure	psia	14.6959	449.696 *	449.696	449.696 *	14.6959 *
Mole Fraction Vapor	%	100	4.15317	0.160672	0	0
Mole Fraction Light Liquid	%	0	95.8468	4.91808	100	2.90514
Mole Fraction Heavy Liquid	%	0	0	94.9212	0	97.0949
Molecular Weight	lb/lbmol	38.7209	75.4549	20.9604	18.0153	20.5336
Mass Density	lb/ft^3	0.101432	31.3533	53.2282	61.8438	58.5255
Molar Flow	lbmol/h	22.7295	49.6638	968.609	918.945	945.88
Mass Flow	lb/h	880.107	3747.38	20302.4	16555.1	19422.3

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Flash Gas	OXF 43 Condensate	Produced Fluids	Produced Water	Stable Liquid
Vapor Volumetric Flow	ft^3/h	8676.78	119.521	381.423	267.692	331.861
Liquid Volumetric Flow	gpm	1081.78	14.9014	47.554	33.3745	41.3749
Std Vapor Volumetric Flow	MMSCFD	0.207012	0.452319	8.82172	8.3694	8.61471
Std Liquid Volumetric Flow	sgpm	3.70497	11.9534 *	45.0481	33.0948 *	41.3432
Compressibility		0.987006	0.177026	0.0289637	0.0214278	0.000907135
Specific Gravity		1.33693			0.991579	0.938374
API Gravity					9.94617	18.9601
Enthalpy	Btu/h	-1.03433E+06	-3.70466E+06	-1.16075E+08	-1.1237E+08	-1.15658E+08
Mass Enthalpy	Btu/lb	-1175.24	-988.6	-5717.29	-6787.67	-5954.87
Mass Cp	Btu/(lb*°F)	0.416005	0.562843	0.903758	0.980145	0.912488
Ideal Gas CpCv Ratio		1.14171	1.06762	1.27122	1.32394	1.28233
Dynamic Viscosity	cP	0.00874484			0.634356	0.889196
Kinematic Viscosity	cSt	5.38213			0.640348	0.948487
Thermal Conductivity	Btu/(h*ft*°F)	0.0119824			0.363956	0.292234
Surface Tension	lbf/ft				0.00473609	0.00430704 ?
Net Ideal Gas Heating Value	Btu/ft^3	2013.14	3859.25	197.877	0	154.256
Net Liquid Heating Value	Btu/lb	19580.2	19255.1	2689.91	-1059.76	1924.54
Gross Ideal Gas Heating Value	Btu/ft^3	2192.97	4169.64	261.522	50.3101	215.109
Gross Liquid Heating Value	Btu/lb	21342.6	20816.2	3842.2	0	3049.19

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	Modified: 5:14 PM, 7/24/2014
Flowsheet:	Flowsheet1	Status: Solved 3:15 PM, 5/15/2017

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Water	Inlet		OXF 43 Condensate	Inlet	
Produced Fluids	Outlet	VSSL-100			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream Produced Fluids	100 %

Remarks

Blocks
VSSL-100
Separator Report

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	Modified: 1:57 PM, 5/13/2017
Flowsheet:	Flowsheet1	Status: Solved 3:15 PM, 5/15/2017

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Fluids	Inlet	MIX-100	Flash Gas	Vapor Outlet	
Stable Liquid	Light Liquid Outlet		Q-1	Energy	

Block Parameters

Pressure Drop	435	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	2.34661	%	Heat Duty	-617000	Btu/h
Mole Fraction Light Liquid	2.83697	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	94.8164	%	Heat Release Curve Increments	10	

Remarks

Flowsheet Environment
Environment1

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

Environment Settings

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

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
Isobutane	False	False	Ethylbenzene	False	False
n-Butane	False	False	o-Xylene	False	False
Isopentane	False	False	Nonane	False	False
n-Pentane	False	False	Decane	False	False
Isohexane	False	False	Water	False	True
n-Hexane	False	False			

Physical Property Method Sets

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

Remarks

Environments Report

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	

Project-Wide Constants

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

Environment [Environment1]

Environment Settings

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

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
Isobutane	False	False	Ethylbenzene	False	False
n-Butane	False	False	o-Xylene	False	False
Isopentane	False	False	Nonane	False	False
n-Pentane	False	False	Decane	False	False
Isohexane	False	False	Water	False	True
n-Hexane	False	False			

Physical Property Method Sets

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

Remarks

Calculator Report

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	

Simple Solver 1

Source Code

Residual Error (for CV1) = TotalFlow-1417.48

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!OXF 43 Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	409.83
Unit	

Measured Variable [TotalFlow]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Stable Liquid!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	1417.48
Unit	

Solver Properties

Status: Solved

Error	4.13199E-08		Iterations	3
Calculated Value	11.9534	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) = PercentWater-80

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	1134.68
Unit	

Measured Variable [PercentWater]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Stable Liquid!Phases!Total!Composition!Std Liquid Volumetric Fraction!Water
Value	80
Unit	

Solver Properties

Status: Solved

Error	7.62199E-08		Iterations	3
Calculated Value	33.0948	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

Calculator Report

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	

User Value Sets Report

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	

Cn+ Flow/Frac.

User Value [CnPlusSum]

* Parameter	610.404	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	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	1414.31	bbl/day	Upper Bound	
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

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

User Value [AtmPressure]

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

User Value Sets Report

Client Name:	EQT	Job: Produced Fluid Tanks, 50% Contingency, 20% Condensate
Location:	OXF 43	

User Value [TVP]

* Parameter	0.536198 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	0.464975 lb/h	Upper Bound	
Lower Bound	lb/h	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.165528 ton/yr	Upper Bound	
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.0381309 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	1.46849 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	0.031691 kg/mol	Upper Bound	
Lower Bound		* Enforce Bounds	False

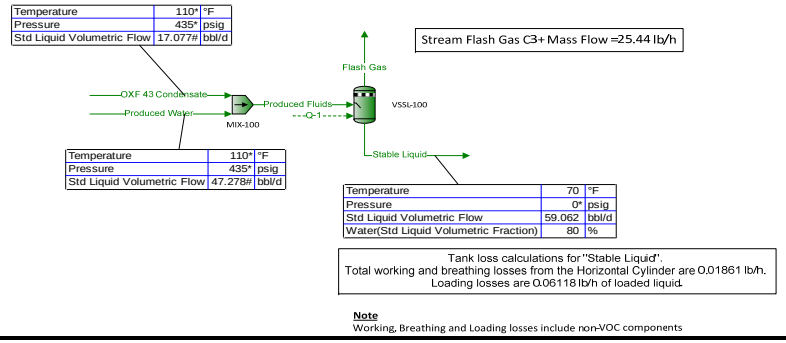
Remarks

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

Flowsheet1
Plant Schematic

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

EQT OXF 43
Blowdown Tank
50% Contingency
20% Condensate



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

Connections

	Flash Gas	OXF 43 Condensate	Produced Fluids	Produced Water	Stable Liquid
From Block	VSSL-100	--	MIX-100	--	VSSL-100
To Block	--	MIX-100	VSSL-100	MIX-100	--

Stream Composition

Mole Fraction	Flash Gas %	OXF 43 Condensate %	Produced Fluids %	Produced Water %	Stable Liquid %
Nitrogen	0	0 *	0	0 *	0
Methane	27.8173	12.828 *	0.657753	0 *	0.00504997
Carbon Dioxide	0.203976	0.097 *	0.00497366	0 *	0.000191189
Ethane	22.8396	10.896 *	0.55869	0 *	0.0232307
Propane	19.194	10.116 *	0.518696	0 *	0.0698869
Isobutane	4.6378	2.935 *	0.150492	0 *	0.0426516
n-Butane	10.9507	7.83 *	0.401482	0 *	0.147961
Isopentane	4.15684	4.739 *	0.242991	0 *	0.148933
n-Pentane	4.00303	5.433 *	0.278576	0 *	0.189069
Isohexane	1.35996	3.719 *	0.190691	0 *	0.162591
n-Hexane	1.00762	3.757 *	0.19264	0 *	0.173054
2,2,4-Trimethylpentane	0.00232725	0.024 *	0.0012306	0 *	0.00120424
Benzene	0.0444598	0.17 *	0.00871672	0 *	0.00785773
Heptane	0.90989	10.112 *	0.518491	0 *	0.509085
Toluene	0.0604578	0.73 *	0.0374306	0 *	0.0368772
Octane	0.267834	9.545 *	0.489418	0 *	0.494743
Ethylbenzene	0.00189545	0.075 *	0.00384561	0 *	0.00389248
o-Xylene	0.0157626	0.78 *	0.0399944	0 *	0.0405767
Nonane	0.0162295	1.901 *	0.0974734	0 *	0.0994259
Decane	0.0386146	14.313 *	0.733897	0 *	0.750606
Water	2.47168	0 *	94.8725	100 *	97.0931

Molar Flow	Flash Gas lbmol/h	OXF 43 Condensate lbmol/h	Produced Fluids lbmol/h	Produced Water lbmol/h	Stable Liquid lbmol/h
Nitrogen	0	0 *	0	0 *	0
Methane	0.263471	0.265461 *	0.265461	0 *	0.00199027
Carbon Dioxide	0.00193196	0.00200731 *	0.00200731	0 *	7.53508E-05
Ethane	0.216325	0.225481 *	0.225481	0 *	0.00915558
Propane	0.181796	0.209339 *	0.209339	0 *	0.0275436
Isobutane	0.0439269	0.0607366 *	0.0607366	0 *	0.0168097
n-Butane	0.103719	0.162033 *	0.162033	0 *	0.058314
Isopentane	0.0393714	0.0980684 *	0.0980684	0 *	0.0586969
n-Pentane	0.0379147	0.11243 *	0.11243	0 *	0.0745153
Isohexane	0.0128809	0.0769606 *	0.0769606	0 *	0.0640797
n-Hexane	0.00954365	0.077747 *	0.077747	0 *	0.0682033
2,2,4-Trimethylpentane	2.20425E-05	0.000496654 *	0.000496654	0 *	0.000474611
Benzene	0.000421101	0.00351796 *	0.00351796	0 *	0.00309686
Heptane	0.00861801	0.209257 *	0.209257	0 *	0.200639
Toluene	0.000572625	0.0151065 *	0.0151065	0 *	0.0145339
Octane	0.00253679	0.197523 *	0.197523	0 *	0.194986
Ethylbenzene	1.79527E-05	0.00155204 *	0.00155204	0 *	0.00153409
o-Xylene	0.000149295	0.0161412 *	0.0161412	0 *	0.0159919
Nonane	0.000153717	0.0393391 *	0.0393391	0 *	0.0391854
Decane	0.000365738	0.296192 *	0.296192	0 *	0.295826
Water	0.0234105	0 *	38.2894	38.2894 *	38.266

Mass Fraction	Flash Gas %	OXF 43 Condensate %	Produced Fluids %	Produced Water %	Stable Liquid %
Nitrogen	0	0 *	0	0 *	0

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

Mass Fraction	Flash Gas %	OXF 43 Condensate %	Produced Fluids %	Produced Water %	Stable Liquid %
Methane	11.5246	2.72736 *	0.503423	0 *	0.00394542
Carbon Dioxide	0.231828	0.0565758 *	0.0104429	0 *	0.000409774
Ethane	17.7357	4.34209 *	0.801474	0 *	0.0340185
Propane	21.8576	5.91176 *	1.09121	0 *	0.150081
Isobutane	6.96137	2.2608 *	0.417304	0 *	0.120729
n-Butane	16.437	6.03137 *	1.11329	0 *	0.418817
Isopentane	7.7452	4.53136 *	0.836409	0 *	0.523304
n-Pentane	7.45862	5.19495 *	0.958896	0 *	0.66433
Isohexane	3.02657	4.24739 *	0.783993	0 *	0.68236
n-Hexane	2.24244	4.29079 *	0.792003	0 *	0.72627
2,2,4-Trimethylpentane	0.00686528	0.0363327 *	0.00670639	0 *	0.00669919
Benzene	0.0896861	0.175986 *	0.0324839	0 *	0.0298915
Heptane	2.35454	13.4284 *	2.47865	0 *	2.48428
Toluene	0.143858	0.891407 *	0.164538	0 *	0.165475
Octane	0.790098	14.4498 *	2.66719	0 *	2.75225
Ethylbenzene	0.00519678	0.105525 *	0.019478	0 *	0.0201253
o-Xylene	0.0432164	1.09746 *	0.202572	0 *	0.209794
Nonane	0.0537551	3.23124 *	0.59643	0 *	0.621024
Decane	0.141886	26.9893 *	4.98176	0 *	5.2011
Water	1.14994	0 *	81.5418	100 *	85.1851

Mass Flow	Flash Gas lb/h	OXF 43 Condensate lb/h	Produced Fluids lb/h	Produced Water lb/h	Stable Liquid lb/h
Nitrogen	0	0 *	0	0 *	0
Methane	4.22672	4.25865 *	4.25865	0 *	0.0319289
Carbon Dioxide	0.0850245	0.0883406 *	0.0883406	0 *	0.00331615
Ethane	6.50469	6.77999 *	6.77999	0 *	0.2753
Propane	8.0164	9.23095 *	9.23095	0 *	1.21455
Isobutane	2.55313	3.53014 *	3.53014	0 *	0.977017
n-Butane	6.02839	9.41773 *	9.41773	0 *	3.38934
Isopentane	2.8406	7.07551 *	7.07551	0 *	4.23491
n-Pentane	2.7355	8.11168 *	8.11168	0 *	5.37619
Isohexane	1.11001	6.63211 *	6.63211	0 *	5.52209
n-Hexane	0.822428	6.69987 *	6.69987	0 *	5.87745
2,2,4-Trimethylpentane	0.00251789	0.056732 *	0.056732	0 *	0.0542141
Benzene	0.032893	0.274795 *	0.274795	0 *	0.241902
Heptane	0.863542	20.9679 *	20.9679	0 *	20.1044
Toluene	0.0527607	1.39189 *	1.39189	0 *	1.33913
Octane	0.289773	22.5628 *	22.5628	0 *	22.273
Ethylbenzene	0.00190595	0.164773 *	0.164773	0 *	0.162867
o-Xylene	0.0158499	1.71363 *	1.71363	0 *	1.69778
Nonane	0.019715	5.04544 *	5.04544	0 *	5.02573
Decane	0.0520378	42.1427 *	42.1427	0 *	42.0906
Water	0.421747	0 *	689.794	689.794 *	689.373

Stream Properties

Property	Units	Flash Gas	OXF 43 Condensate	Produced Fluids	Produced Water	Stable Liquid
Temperature	°F	69.9829	110 *	110.047	110 *	69.9829 *
Pressure	psia	14.6959	449.696 *	449.696	449.696 *	14.6959 *
Mole Fraction Vapor	%	100	4.15317	0.160679	0	0
Mole Fraction Light Liquid	%	0	95.8468	4.91822	100	2.90511
Mole Fraction Heavy Liquid	%	0	0	94.9211	0	97.0949
Molecular Weight	lb/lbmol	38.7222	75.4549	20.9605	18.0153	20.5336
Mass Density	lb/ft^3	0.101434	31.3533	53.228	61.8438	58.5253
Molar Flow	lbmol/h	0.947149	2.06939	40.3588	38.2894	39.4116
Mass Flow	lb/h	36.6756	156.146	845.94	689.794	809.264

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Flash Gas	OXF 43 Condensate	Produced Fluids	Produced Water	Stable Liquid
Vapor Volumetric Flow	ft^3/h	361.572	4.9802	15.8928	11.1538	13.8276
Liquid Volumetric Flow	gpm	45.0791	0.620908	1.98144	1.39061	1.72396
Std Vapor Volumetric Flow	MMSCFD	0.00862626	0.0188472	0.367572	0.348725	0.358946
Std Liquid Volumetric Flow	sgpm	0.154389	0.498072 *	1.87702	1.37895 *	1.72263
Compressibility		0.987006	0.177026	0.028964	0.0214278	0.00090712
Specific Gravity		1.33697			0.991579	0.938372
API Gravity					9.94617	18.9601
Enthalpy	Btu/h	-43102.2	-154366	-4.83646E+06	-4.68209E+06	-4.81906E+06
Mass Enthalpy	Btu/lb	-1175.23	-988.6	-5717.26	-6787.67	-5954.86
Mass Cp	Btu/(lb*°F)	0.416009	0.562843	0.903757	0.980145	0.912488
Ideal Gas CpCv Ratio		1.1417	1.06762	1.27122	1.32394	1.28233
Dynamic Viscosity	cP	0.00874492			0.634356	0.88909
Kinematic Viscosity	cSt	5.38211			0.640348	0.948377
Thermal Conductivity	Btu/(h*ft*°F)	0.0119826			0.363956	0.292237
Surface Tension	lbf/ft				0.00473609	0.00430698 ?
Net Ideal Gas Heating Value	Btu/ft^3	2013.2	3859.25	197.882	0	154.256
Net Liquid Heating Value	Btu/lb	19580.1	19255.1	2690	-1059.76	1924.55
Gross Ideal Gas Heating Value	Btu/ft^3	2193.02	4169.64	261.528	50.3101	215.11
Gross Liquid Heating Value	Btu/lb	21342.4	20816.2	3842.3	0	3049.19

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	Modified: 5:14 PM, 7/24/2014
Flowsheet:	Flowsheet1	Status: Solved 3:25 PM, 5/15/2017

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Water	Inlet		OXF 43 Condensate	Inlet	
Produced Fluids	Outlet	VSSL-100			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream Produced Fluids	100 %

Remarks

Blocks
VSSL-100
Separator Report

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	Modified: 1:57 PM, 5/13/2017
Flowsheet:	Flowsheet1	Status: Solved 3:25 PM, 5/15/2017

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Fluids	Inlet	MIX-100	Flash Gas	Vapor Outlet	
Stable Liquid	Light Liquid Outlet		Q-1	Energy	

Block Parameters

Pressure Drop	435	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	2.34682	%	Heat Duty	-25700	Btu/h
Mole Fraction Light Liquid	2.83694	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	94.8162	%	Heat Release Curve Increments	10	

Remarks

Flowsheet Environment
Environment1

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	
Flowsheet:	Flowsheet1	

Environment Settings

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

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
Isobutane	False	False	Ethylbenzene	False	False
n-Butane	False	False	o-Xylene	False	False
Isopentane	False	False	Nonane	False	False
n-Pentane	False	False	Decane	False	False
Isohexane	False	False	Water	False	True
n-Hexane	False	False			

Physical Property Method Sets

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

Remarks

Environments Report

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	

Project-Wide Constants

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

Environment [Environment1]

Environment Settings

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

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
Isobutane	False	False	Ethylbenzene	False	False
n-Butane	False	False	o-Xylene	False	False
Isopentane	False	False	Nonane	False	False
n-Pentane	False	False	Decane	False	False
Isohexane	False	False	Water	False	True
n-Hexane	False	False			

Physical Property Method Sets

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

Remarks

Calculator Report

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	

Simple Solver 1

Source Code

Residual Error (for CV1) = TotalFlow-59.06166772

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!OXF 43 Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	17.0768
Unit	

Measured Variable [TotalFlow]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Stable Liquid!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	59.0617
Unit	

Solver Properties

Status: Solved

Error	8.71579E-08		Iterations	3
Calculated Value	0.498072	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) = PercentWater-80

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	47.2782
Unit	

Measured Variable [PercentWater]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Stable Liquid!Phases!Total!Composition!Std Liquid Volumetric Fraction!Water
Value	80
Unit	

Solver Properties

Status: Solved

Error	3.89103E-06		Iterations	3
Calculated Value	1.37895	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

Calculator Report

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	

User Value Sets Report

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	

Cn+ Flow/Frac.

User Value [CnPlusSum]

* Parameter	25.4375	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	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	58.9295	bbl/day	Upper Bound	
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

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

User Value [AtmPressure]

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

User Value Sets Report

Client Name:	EQT	Job: Blowdown Tank, 50% Contingency, 20% Condensate
Location:	OXF 43	

User Value [TVP]

* Parameter	0.536154 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	0.0186069 lb/h	Upper Bound	
Lower Bound	lb/h	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.0625451 ton/yr	Upper Bound	
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.0189529 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	0.0611809 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	0.0316904 kg/mol	Upper Bound	
Lower Bound		* Enforce Bounds	False

Remarks

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

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

Certificate of Analysis : 13050161-001A

Company:	Gas Analytical Services	**For:**	Gas Analytical Services
Well:	OXF 152 Pad		Alan Ball
Field:	EQT Production		PO Box 1028
Sample of:	Condensate-Spot		
Conditions:	435 @ N.G.		Bridgeport, WV, 26330
Sampled by:	GR-GAS		
Sample date:	5/14/2013	**Report Date:**	5/28/2013
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	12.828	16.043	2.662	0.3000	5.771
Carbon Dioxide	0.097	44.010	0.055	0.8180	0.044
Ethane	10.896	30.070	4.238	0.3562	7.730
Propane	10.116	44.097	5.771	0.5070	7.393
Iso-butane	2.935	58.123	2.207	0.5629	2.548
N-butane	7.830	58.123	5.887	0.5840	6.552
Iso-pentane	4.739	72.150	4.423	0.6244	4.603
N-pentane	5.433	72.150	5.071	0.6311	5.222
i-Hexanes	3.719	86.177	4.092	0.6795	4.009
n-Hexane	3.757	85.684	4.195	0.6640	4.086
2,2,4 trimethylpentane	0.024	114.231	0.035	0.6967	0.033
Benzene	0.170	78.114	0.132	0.8846	0.127
Heptanes	10.112	97.409	12.820	0.7048	11.816
Toluene	0.730	92.141	0.672	0.8719	0.651
Octanes	9.545	107.484	13.615	0.7487	11.751
E-benzene	0.075	106.167	0.046	0.8718	0.078
M-,O-,P-xylene	0.780	106.167	1.072	0.8731	0.804
Nonanes	1.901	117.323	3.065	0.7990	2.521
Decanes Plus	14.313	161.720	29.942	0.8021	24.261
	100.000		100.000		100.000

Calculated Values	**Total Sample**	**Decanes Plus**
Specific Gravity at 60 °F	0.6499	0.8021
Api Gravity at 60 °F	86.221	44.905
Molecular Weight	77.303	161.720
Pounds per Gallon (in Vacuum)	5.419	6.688
Pounds per Gallon (in Air)	5.413	6.680
Cu. Ft. Vapor per Gallon @ 14.73 psia	26.662	15.657

Brian Hasspard

Southern Petroleum Laboratories, Inc.

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

Certificate of Analysis : 13050161-001A

Company:	Gas Analytical Services	**For:**	Gas Analytical Services
Well:	OXF 152 Pad		Alan Ball
Field:	EQT Production		PO Box 1028
Sample of:	Condensate-Spot		
Conditions:	435 @ N.G.		Bridgeport, WV, 26330
Sampled by:	GR-GAS		
Sample date:	5/14/2013	**Report Date:**	5/28/2013
Remarks:	Cylinder No.: GAS		
Remarks:			

Analysis: (*GPA 2103M*)	**Mol. %**	**MW**	**Wt. %**	**Sp. Gravity**	**L.V. %**
Nitrogen	0.000	28.013	0.000	0.8094	0.000
Methane	12.828	16.043	2.662	0.3000	5.771
Carbon Dioxide	0.097	44.010	0.055	0.8180	0.044
Ethane	10.896	30.070	4.238	0.3562	7.730
Propane	10.116	44.097	5.771	0.5070	7.393
Iso-butane	2.935	58.123	2.207	0.5629	2.548
N-butane	7.830	58.123	5.887	0.5840	6.552
Iso-pentane	4.739	72.150	4.423	0.6244	4.603
N-pentane	5.433	72.150	5.071	0.6311	5.222
Hexanes	7.476	85.684	8.287	0.6654	8.095
Heptanes Plus	37.650	97.409	61.399	0.7048	52.042
	100.000		100.000		100.000

Calculated Values	**Total Sample**	**Heptanes Plus**
Specific Gravity at 60 °F	0.6499	0.7689
Api Gravity at 60 °F	86.221	52.528
Molecular Weight	77.303	126.064
Pounds per Gallon (in Vacuum)	5.419	6.411
Pounds per Gallon (in Air)	5.413	6.404
Cu. Ft. Vapor per Gallon @ 14.73 psia	26.662	19.342
Standing-Katz Density (lb. / ft^3)		

Brian Hospard

Southern Petroleum Laboratories, Inc.

Certificate of Analysis

Number: 2030-13050161-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

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

May 22, 2013

Station Name: OXF 152 Pad
Station Number: 512496
Station Location: EQT Production
Sample Point: Wellhead

Sampled By: GR-GAS
Sample Of: Condensate Spot
Sample Date: 05/14/2013 14:00
Sample Conditions: 435 psig
Cylinder No: GAS

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Color-Visual	Proprietary	L STRAW			AR	05/22/2013
API Gravity @ 60° F	ASTM D-5002	66.58	°		AR	05/22/2013
Specific Gravity @ 60/60° F	ASTM D-5002	0.7144			AR	05/22/2013
Density @ 60° F	ASTM D-5002	0.7137	g/ml		AR	05/22/2013
Shrinkage Factor	Proprietary	0.7761			AR	05/22/2013
Flash Factor	Proprietary	508.5845	Cu. Ft./S.T. Bbl		AR	05/22/2013

Patti L. Perro

Hydrocarbon Laboratory Manager

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

GAS ANALYTICAL SERVICES

C6+ Gas Analysis Report

Gas Analytical

Report Date: Sep 12, 2016 8:21a

Client:	EQT PRODUCTION	Date Sampled:	Aug 25, 2016
Client Code:	0555	Analysis Date:	Sep 8, 2016 12:00a
Site:	OXF 114 512415	Collected By:	D SMITH
Field:	520-GLEN MCCONNELL	Date Effective:	Sep 1, 2016 12:00a
Meter:	512415	Sample Pressure (PSI):	120.0
Source Laboratory	Stonewood, WV	Sample Temp (°F):	60
Lab File No:	**516571983**	Field H2O (lb/MMSCFD):	
Cylinder No:	478	Field H2S (PPM):	
Sample Type:	Spot		
Reviewed By:	Ashley Free		
Analysis Status:	good		

Component	Mol %	Gal/MSCF
H2S		
Methane	80.7683	0.0000
Ethane	12.4936	3.3514
Propane	3.8198	1.0555
I-Butane	0.5407	0.1775
N-Butane	0.9063	0.2866
I-Pentane	0.2492	0.0914
N-Pentane	0.2070	0.0753
Nitrogen	0.6181	0.0000
Oxygen		
Carbon Dioxide	0.1034	0.0000
Hexanes+	0.2936	0.1278
TOTAL	100.0000	5.1655

Analytical Results at Base Conditions (Real)		
BTU/SCF (Dry):	1,217.4193	BTU/ft³
BTU/SCF (Saturated):	1,196.6532	BTU/ft³
PSIA:	14.696	PSI
Temperature (°F):	60.0	°F
Z Factor (Dry):	0.99674	
Z Factor (Saturated):	0.99635	

Analytical Results at Contract Conditions (Real)		
BTU/SCF (Dry):	1,220.2451	BTU/ft³
BTU/SCF (Saturated):	1,199.4799	BTU/ft³
PSIA:	14.730	PSI
Temperature (°F):	60.0	°F
Z Factor (Dry):	0.99674	
Z Factor (Saturated):	0.99635	

Calculated Specific Gravities			
Ideal Gravity:	0.6926	Real Gravity:	0.6946
Molecular Wt:	20.0607	lb/lbmol	

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

Source	Date	Notes

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

Attachment U

ATTACHMENT U – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		CH_4		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Line Heater (E001)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E002)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E003)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E004)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E005)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E006)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E007)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E008)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E009)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E010)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
Line Heater (E011)	**0.13**	**0.56**	**0.11**	**0.47**	**<0.01**	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**180.33**	**789.85**
VDU (E023)	**1.77**	**7.75**	**1.49**	**6.51**	**6.37**	**26.84**	**0.01**	**0.05**	**0.03**	**0.15**	**0.03**	**0.15**	**1.10**	**4.64**	**3,484.88**	**15,259.35**
VDU (E024)	**1.07**	**4.71**	**0.90**	**3.95**	**6.37**	**26.84**	**<0.01**	**0.03**	**0.01**	**0.04**	**0.01**	**0.04**	**1.08**	**4.57**	**2,599.62**	**11,381.91**
Compressor Engine (E025)	**2.13**	**9.31**	**2.21**	**9.70**	**0.10**	**0.43**	**<0.01**	**<0.01**	**0.03**	**0.14**	**0.03**	**0.15**	**<0.01**	**0.03**	**383.24**	**1,678.59**

Compressor Engine (E026)	**0.24**	**1.03**	**0.49**	**2.14**	**0.16**	**0.71**	**<0.01**	**<0.01**	**0.01**	**0.04**	**0.01**	**0.04**	**<0.01**	**<0.01**	**104.09**	**455.91**
Tank Truck Loading Operations (E027)	**--**	**--**	**--**	**--**	**0.24**	**1.05**	**--**	**--**	**--**	**--**	**--**	**--**	**0.01**	**0.06**	**0.37**	**1.61**
TOTAL	**6.62**	**28.99**	**6.28**	**27.51**	**13.32**	**56.22**	**0.03**	**0.12**	**0.12**	**0.53**	**0.12**	**0.53**	**2.24**	**9.48**	**8,566.72**	**37,513.35**

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

ATTACHMENT U – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Line Heater (E001)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E002)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E003)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E004)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E005)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E006)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E007)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E008)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E009)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E010)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
Line Heater (E011)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**
VDU (C023)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**0.06**	**<0.01**	**<0.01**	**<0.01**	**0.02**	**0.21**	**0.87**	**0.23**	**0.98**
VDU (C024)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**0.06**	**<0.01**	**<0.01**	**<0.01**	**0.02**	**0.21**	**0.87**	**0.23**	**0.98**
Compressor Engine (E025)	**0.07**	**0.30**	**<0.01**	**0.02**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.08**	**0.33**

Compressor Engine (E026)	**0.02**	**0.08**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.02**	**0.09**
Tank Truck Loading Operations (E027)	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
TOTAL	**0.09**	**0.39**	**<0.01**	**0.03**	**0.03**	**0.12**	**<0.01**	**<0.01**	**<0.01**	**0.04**	**0.41**	**1.84**	**0.59**	**2.50**

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

Attachment V

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that EQT Production Company has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-D General Permit Registration for the OXF 43 natural gas production site located in Coxs Mills, Doddridge County, West Virginia. The latitude and longitude coordinates are: 39.15703 and -80.79285.

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

Carbon Monoxide (CO) = 27.51 tpy
Nitrogen Oxides (NO_x) = 28.99 tpy
Particulate Matter (Filterable) = 12.23 tpy
Particulate Matter (Condensate) = 1.25 tpy
Sulfur Dioxide (SO_2) = 0.12 tpy
Volatile Organic Compounds (VOC) = 56.83 tpy
Formaldehyde = 0.39 tpy
Hexane = 1.89 tpy
Hazardous Air Pollutants (HAPs) = 2.55 tpy
Carbon Dioxide Equivalents (CO_2e) = 37,576.46 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 1250, during normal business hours.

Dated this the 17th day of May, 2017.

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