Roy
G70-A145
103-00068

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PROJECT REPORT

EQT Production
BIG-57 Pad

G70-A Permit Application

EQT

Where energy meets innovation.

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

January 2015

Trinity Consultants

Environmental solutions delivered uncommonly well

TABLE OF CONTENTS

1. INTRODUCTION 4

1.1. FACILITY AND PROJECT DESCRIPTION 4

1.2. SOURCE STATUS 4

1.3. G70-A APPLICATION ORGANIZATION 5

2. SAMPLE EMISSION SOURCE CALCULATIONS 6

3. REGULATORY DISCUSSION 7

3.1. Prevention of Significant Deterioration (PSD) Source Classification 7

3.2. Title V Operating Permit Program 7

3.3. New Source Performance Standards 7

3.3.1. NSPS Subparts D, Da, Db, and Dc 8

3.3.2. NSPS Subparts K, Ka, and Kb 8

3.3.3. NSPS Subpart OOOO—Crude Oil and Natural Gas Production, Transmission, and Distribution 8

3.3.4. Non-Applicability of All Other NSPS 9

3.4. National Emission Standards for Hazardous Air Pollutants (NESHAP) 9

3.4.1. 40 CFR 63 Subpart HH – Oil and Natural Gas Production Facilities 9

3.4.2. 40 CFR 63 Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers 9

3.5. West Virginia SIP Regulations 9

3.5.1. 45 CSR 2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers 10

3.5.2. 45 CSR 4: To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor 10

3.5.3. 45 CSR 6: Control of Air Pollution from the Combustion of Refuse 10

3.5.4. 45 CSR 16: Standards of Performance for New Stationary Sources 10

3.5.5. 45 CSR 17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter 10

3.5.6. 45 CSR 34: Emissions Standards for Hazardous Air Pollutants 10

3.5.7. Non-Applicability of Other SIP Rules 11

4. G70-A APPLICATION FORMS 12

ATTACHMENT A: CURRENT BUSINESS CERTIFICATE

ATTACHMENT B: PROCESS DESCRIPTION

ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS

ATTACHMENT D: PROCESS FLOW DIAGRAM

ATTACHMENT E: PLOT PLAN

ATTACHMENT F: AREA MAP

ATTACHMENT G: EMISSION UNIT DATA SHEETS AND G70-A SECTION APPLICABILITY FORM

ATTACHMENT H: AIR POLLUTION CONTROL DEVICE DATA SHEET

ATTACHMENT I: EMISSION CALCULATIONS

ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT

ATTACHMENT K: ELECTRONIC SUBMITTAL (*NOT APPLICABLE*)

ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE

ATTACHMENT M: SITING CRITERIA WAIVER (*NOT APPLICABLE*)

ATTACHMENT N: MATERIAL SAFETY DATA SHEET (*NOT APPLICABLE*)

ATTACHMENT O: EMISSION SUMMARY SHEET

EQT Production Company (EQT) is submitting this Class II General Permit application to the West Virginia Department of Environmental Protection (WVDEP) for the BIG-57 facility, a natural gas production well pad, located in Wetzel County, West Virginia.

1.1. FACILITY AND PROJECT DESCRIPTION

The BIG-57 Pad is an existing natural gas production facility consisting of four (4) natural gas wells. Natural gas and liquids (including water and condensate) are extracted from deposits underneath the surface. Natural gas is transported from the well through a triethylene glycol dehydration unit (30 MMscfd) where the raw gas is dehydrated and then sent to a gas line for additional processing and compression, as necessary. The liquids produced are stored in storage vessels. The BIG-57 pad is currently permitted and operating under West Virginia permit R13-3088A.

This application seeks to authorize installation and operation of the following additional equipment at the BIG-57 Pad:

- One (1) 140 barrel (bbl) Sand Separator Tank for produced water and sand.
- One (1) 100 bbl Dehydrator Drip Tank associated with the existing dehydration unit.

Additionally, this application also seeks to increase the current permit liquid throughput limits for the produced fluid tanks and liquid loading at the facility

The following equipment is already permitted and installed at the BIG-57 Pad:

- One (1) triethylene glycol dehydrator with associated reboiler (0.58 MMBtu/hr)
- Four (4) 400 barrel (bbl) storage tanks for condensate/water;
- Four (4) line heaters, rated at 1.54 MMBtu/hr (heat input, each); and
- One (1) thermoelectric generator (TEG), rated at 0.029 MMBtu/hr (heat input, each).

A process flow diagram is included as Attachment D.

1.2. SOURCE STATUS

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

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

Other additional pollutant emitting facilities should be aggregated with the BIG-57 Pad for air permitting purposes if, and only if, all three elements of the "stationary source" definition above are fulfilled.

There are no Marcellus facilities within a quarter-mile radius of the BIG-57 Pad. The closest pad, BIG-182, is located 2,000 feet northeast of BIG-57.[1] Therefore, the BIG-57 Pad should be considered a separate stationary source with

[1] The BIG-182 pad produces "dry gas" and, as such, has emissions below the permitting thresholds in R13 (i.e., 6 lb/hr, 10 tpy).

respect to permitting programs, including Title V and Prevention of Significant Deterioration (PSD). The dehydrator also receives and processes wet gas from other wells in addition to gas from the BIG-57 wellpad. As discussed in this application, the facility is a minor source of air emissions with respect to New Source Review (NSR) and Title V permitting.

1.3. G70-A APPLICATION ORGANIZATION

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

- Section 2: Sample Emission Source Calculations;
- Section 3: Regulatory Discussion;
- Section 4: G70-A Application Forms;
- Attachment A: Current Business Certificate;
- Attachment B: Process Description;
- Attachment C: Description of Fugitive Emissions;
- Attachment D: Process Flow Diagram;
- Attachment E: Plot Plan;
- Attachment F: Area Map;
- Attachment G: Emission Unit Data Sheets and G70-A Section Applicability Form;
- Attachment H: Air Pollution Control Device Sheets (*not applicable*);
- Attachment I: Emission Calculations;
- Attachment J: Class I Legal Advertisement;
- Attachment K: Electronic Submittal (*not applicable*);
- Attachment L: General Permit Registration Application Fee;
- Attachment N: Material Safety Data Sheet (*not applicable*); and
- Attachment O: Emissions Summary Sheet;

2. SAMPLE EMISSION SOURCE CALCULATIONS

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

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

- **Dehydration Unit:** Potential emissions of hazardous air pollutants (HAPs), volatile organic compounds (VOC), and methane from the dehydration unit are calculated using GRI-GLYCalc.

- **Reboiler, TEG, and Line Heaters:** Potential emissions of all criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 factors for natural gas combustion equipment.[2] These calculations assume a site-specific heat content of natural gas. Greenhouse gas (GHG) emissions are calculated according to 40 CFR 98 Subpart C.[3]

- **Fugitive Equipment Leaks:** Emissions of VOC and HAPs from leaking equipment components have been estimated using facility estimated component counts and types along with *Table 2-4: Oil & Gas Production Operations Average Emission Factors, Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995.* Emission factors used are based on average measured TOC from component types indicated in gas service at O&G Production Operations. Greenhouse gas emissions from component leaks are calculated according to the procedures in 40 CFR 98 Subpart W.[4]

- **Storage Tanks, Dehydrator Drip Tank and Sand Separator Storage Tank:** Working, breathing and flashing emissions of VOC and HAPs from the condensate/water stored in the tanks at the facility are calculated using API E&P TANK v2.0.

- **Tank Truck Loading:** Emissions of VOC and HAPs from the loading of organic liquids from storage tanks to tank truck are calculated using U.S. EPA's AP-42 Chapter 5 Section 2 factors.[5]

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

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[2] U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 1.4, Natural Gas Combustion, Supplement D, July 1998.

[3] 40 CFR 98 Subpart C, *General Stationary Fuel combustion Sources*, Tables C-1 and C-2.

[4] 40 CFR 98 Subpart W, *Petroleum and Natural Gas Systems*, Section 98.233(r), *Population Count and Emission Factors.*

[5] U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 5.2, Transportation And Marketing Of Petroleum Liquids, June 2008.

[6] U.S. EPA, AP 42, Fifth Edition, Volume I, Section 13.2.2, Unpaved Roads, November 2006.

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

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

This review is presented to supplement and/or add clarification to the information provided in the WVDEP G70-A permit application forms. In addition to providing a summary of applicable requirements, this section of the application also provides non-applicability determinations for certain regulations, allowing the WVDEP to confirm that identified regulations are not applicable to the wellpad. Note that explanations of non-applicability are limited to those regulations for which there may be some question of applicability specific to the operations at the wellpad. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

3.1. PREVENTION OF SIGNIFICANT DETERIORATION (PSD) SOURCE CLASSIFICATION

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

3.2. TITLE V OPERATING PERMIT PROGRAM

Title 40 of the Code of Federal Regulations Part 70 (40 CFR 70) establishes the federal Title V operating permit program. West Virginia has incorporated the provisions of this federal program in its Title V operating permit program in West Virginia Code of State Regulations (CSR) 45-30. The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP, 100,000 tpy of greenhouse gas pollutants (on a carbon dioxide equivalent [CO_2e] basis), and 100 tpy of all other regulated pollutants.[7] The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the wellpad is not a major source for Title V purposes.

3.3. NEW SOURCE PERFORMANCE STANDARDS

New Source Performance Standards (NSPS), located in 40 CFR 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable

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

provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except where expressly noted. The following is a summary of applicability and non-applicability determinations for NSPS regulations of relevance to the wellpad.

3.3.1. NSPS Subparts D, Da, Db, and Dc

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

3.3.2. NSPS Subparts K, Ka, and Kb

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

3.3.3. NSPS Subpart OOOO—Crude Oil and Natural Gas Production, Transmission, and Distribution

Subpart OOOO – *Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution,* applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011. This NSPS was published in the Federal Register on August 16, 2012, and amended in the Federal Register on September 23, 2013[8]. The list of potentially affected facilities includes:

- Gas wellheads
- Centrifugal compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment
- Reciprocating compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment
- Continuous bleed natural gas-driven pneumatic controllers with a bleed rate of > 6 scfh located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment (excluding natural gas processing plants)
- Continuous bleed natural gas-driven pneumatic controllers located at natural gas processing plants
- Storage vessels in the production, processing, or transmission and storage segments
- Sweetening units located onshore that process natural gas produced from either onshore or offshore wells

There are currently four (4) produced fluid storage vessels at the wellpad. As part of this application, EQT is proposing to install one (1) new sand separator storage vessel and one (1) dehydrator drip fluid storage vessel. The storage vessels at the facility will each have potential VOC emissions less than 6 tpy based on the permit application materials and enforceable limits to be included in the G-70A permit. As such, per 60.5365(e), the tanks are not storage vessel affected facilities under the rule.

[8] 78 FR 54816 (*http://www.gpo.gov/fdsys/pkg/FR-2013-09-23/pdf/2013-22010.pdf*)

The pneumatic controllers were ordered and installed after August 23, 2011 and are therefore potentially subject to NSPS OOOO. Per 60.5365(d)(2), a pneumatic controller affected facility is a single continuous bleed natural gas driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh. No pneumatic controllers installed will meet the definition of a pneumatic controller affected facility. Therefore, these units are not subject to the requirements of Subpart OOOO.

3.3.4. Non-Applicability of All Other NSPS

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

3.4. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

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

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

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

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

Glycol dehydration units are potentially subject to Subpart HH, NESHAP from Natural Gas Production Facilities. This standard applies to such units at natural gas production facilities that are major or area sources of HAP emissions. The BIG57 wellpad is an area source of HAP emissions. Even though the TEG dehydration unit at the wellpad is considered an affected area source, it is exempt from the requirements of § 63.764(d)(2) since the actual average benzene emissions from the glycol dehydration unit process vent to the atmosphere is less than 0.90 Mg (1.0 TPY), as determined by the procedures specified in § 63.772(b)(2). However, the facility must maintain records as required in §63.774(d)(1).

3.4.2. 40 CFR 63 Subpart JJJJJJ - Industrial, Commercial, and Institutional Boilers

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

3.5. WEST VIRGINIA SIP REGULATIONS

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

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

45 CSR 2 applies to fuel burning units, defined as equipment burning fuel "for the primary purpose of producing heat or power by indirect heat transfer". The TEG, line heaters, and reboiler are fuel burning units and therefore must comply with this regulation. Per 45 CSR 2-3, opacity of emissions from units shall not exceed 10 percent. Per 45 CSR 2-4, PM emissions from units will not exceed a level of 0.09 multiplied by the heat design input in MMBtu/hr of the unit.

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

According to 45 CSR 4-3:

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

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

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

45 CSR 6 applies to activities involving incineration of refuse, defined as "the destruction of combustible refuse by burning in a furnace designed for that purpose. For the purposes of this rule, the destruction of any combustible liquid or gaseous material by burning in a flare or flare stack, thermal oxidizer or thermal catalytic oxidizer stack shall be considered incineration." There are no combustion or incineration devices at the wellpad. Therefore, the wellpad is not subject to this requirement.

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

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

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

According to 45 CSR 17-3.1:

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

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

3.5.6. 45 CSR 34: Emissions Standards for Hazardous Air Pollutants

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

3.5.7. Non-Applicability of Other SIP Rules

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

4. G70-A APPLICATION FORMS

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

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475 • www.dep.wv.gov/daq

APPLICATION FOR GENERAL PERMIT REGISTRATION

CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE A STATIONARY SOURCE OF AIR POLLUTANTS

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

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

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

SECTION I. GENERAL INFORMATION

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

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

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

4. Applicant's physical address:

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

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

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

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.): Natural gas production wellsite

8a. Standard Industrial Classification (SIC) code: 1311

AND

8b. North American Industry System (NAICS) code: 211111

9. DAQ Plant ID No. (for existing facilities only):
103-00068

10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only):
R13-3088A

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site:	12A. Address of primary operating site:
BIG-57 Pad	Mailing: 625 Liberty Avenue, Suite 1700, Pittsburgh, PA 15222 Physical:

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

- IF **YES**, please explain: Property is leased and held under production rights
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

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

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

From Hundred, WV, follow WV-7 South for ~3.1 miles. Make a slight left onto Wiley Fork Rd. and continue for ~2 miles. Turn left to stay on Wiley Fork Rd for another ~3.6 miles. BIG-57 will be on the left.

15A. Nearest city or town:	16A. County:	17A. UTM Coordinates:
Smithfield	Wetzel	Northing (KM): 4,378.265 Easting (KM): 540.606 Zone: 17

18A. Briefly describe the proposed new operation or change (s) to the facility:	19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Installation of well production support equipment and increase in produced water/condensate throughput at the existing wellpad.	Latitude: 39.55322 Longitude: -80.52688

B: 1ST ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)

11B. Name of 1st alternate operating site:	12B. Address of 1st alternate operating site.
N/A	Mailing: Physical:

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

- IF **YES**, please explain:
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

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

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

15B. Nearest city or town:	16B. County:	17B. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18B. Briefly describe the proposed new operation or change (s) to the facility:		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

C: 2ND ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits):

11C. Name of 2nd alternate operating site: _N/A_____	12C. Address of 2nd alternate operating site: Mailing:_____ Physical:_____

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

- IF **YES**, please explain: _____

- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

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

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

_____

_____

_____

15C. Nearest city or town:	16C. County:	17C. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18C. Briefly describe the proposed new operation or change (s) to the facility:		19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude. _____ Longitude: _____

20. Provide the date of anticipated installation or change: _____/_____/_____ ASAP ☐ If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: : _____/_____/_____	21. Date of anticipated Start-up if registration is granted: _____/_____/_____ ASAP

22. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).

Hours per day__24_____ Days per week ____7____ Weeks per year ___52_____ Percentage of operation ___100_____

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

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

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

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

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

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

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

SECTION IV. CERTIFICATION OF INFORMATION

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

FOR A CORPORATION (domestic or foreign)

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

FOR A PARTNERSHIP

☐ I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

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

FOR AN ASSOCIATION

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

FOR A JOINT VENTURE

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

FOR A SOLE PROPRIETORSHIP

☐ I certify that I am the Owner and Proprietor

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

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

Signature _____ 01/29/15
(please use blue ink) Responsible Official Date

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

Signature _____
(please use blue ink) Authorized Representative (if applicable) Date

Applicant's Name Alex Bosiljevac – Environmental Coordinator

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

Email abosiljevac@eqt.com

ATTACHMENT A

Current Business Certificate

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

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

BUSINESS REGISTRATION ACCOUNT NUMBER: **1022-3081**

This certificate is issued on: 08/4/2010

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

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

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

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

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

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

atL006 v.3
L0553297664

ATTACHMENT B

Process Description

ATTACHMENT B: PROCESS DESCRIPTION

This project involves the construction and operation of one (1) sand separator tank and one (1) dehydrator drip tank, and an increase in produced water/condensate throughput at an existing natural gas production wellpad operation

The BIG-57 wellpad currently consists of four (4) wells, each with the same basic operation. The incoming gas stream from the underground wells will pass through a sand separator, where sand, water and residual solids are displaced and transferred to the sand separator tank. The gas then flows into a separator which separates produced water from the gas stream. The produced water in the separator will be transferred to storage vessels. The wet gas is processed through a tri-ethylene glycol dehydrator prior to sending to the gas line. The dehydrator also receives and processes wet gas from other wells. Liquids from the dehydrator contact tower and flash gas tank are transferred to the dehydrator drip tank. Once the tanks (i.e sand separator, produced fluid, and dehydrator drip tank) are filled, the contents are loaded into trucks for transport. At the wellpad, heat is provided by line heaters, and electricity is provided by a thermoelectric generator.

A process flow diagram is included as Attachment D.

ATTACHMENT C

Description of Fugitive Emissions

G70-A FUGITIVE EMISSIONS SUMMARY SHEET

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants-Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	N/A	---	---	---	---	---
Unpaved Haul Roads	PM PM_{10} $PM_{2.5}$	0.87 0.22 0.02	3.81 0.97 0.10	0.87 0.22 0.02	3.81 0.97 0.10	O[A]
Loading/Unloading Operations	VOC HAP	0.42 0.01	1.84 0.04	0.42 0.01	1.84 0.04	O[B]
Equipment Leaks	VOC CO_2e HAP	Does not apply	2.46 469 0.01	Does not apply	2.46 469 0.01	O[C]
Blowdown Emissions	N/A	---	---	---	---	---
Other	N/A	---	---	---	---	---

[A] AP-42 Section 13.2.2

[B] AP-42 Section 5.2.

[C] Protocol for Equipment Leak Estimates (EPA-453/R-95-017), Table 2-1, Nov. 1995.

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

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

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

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

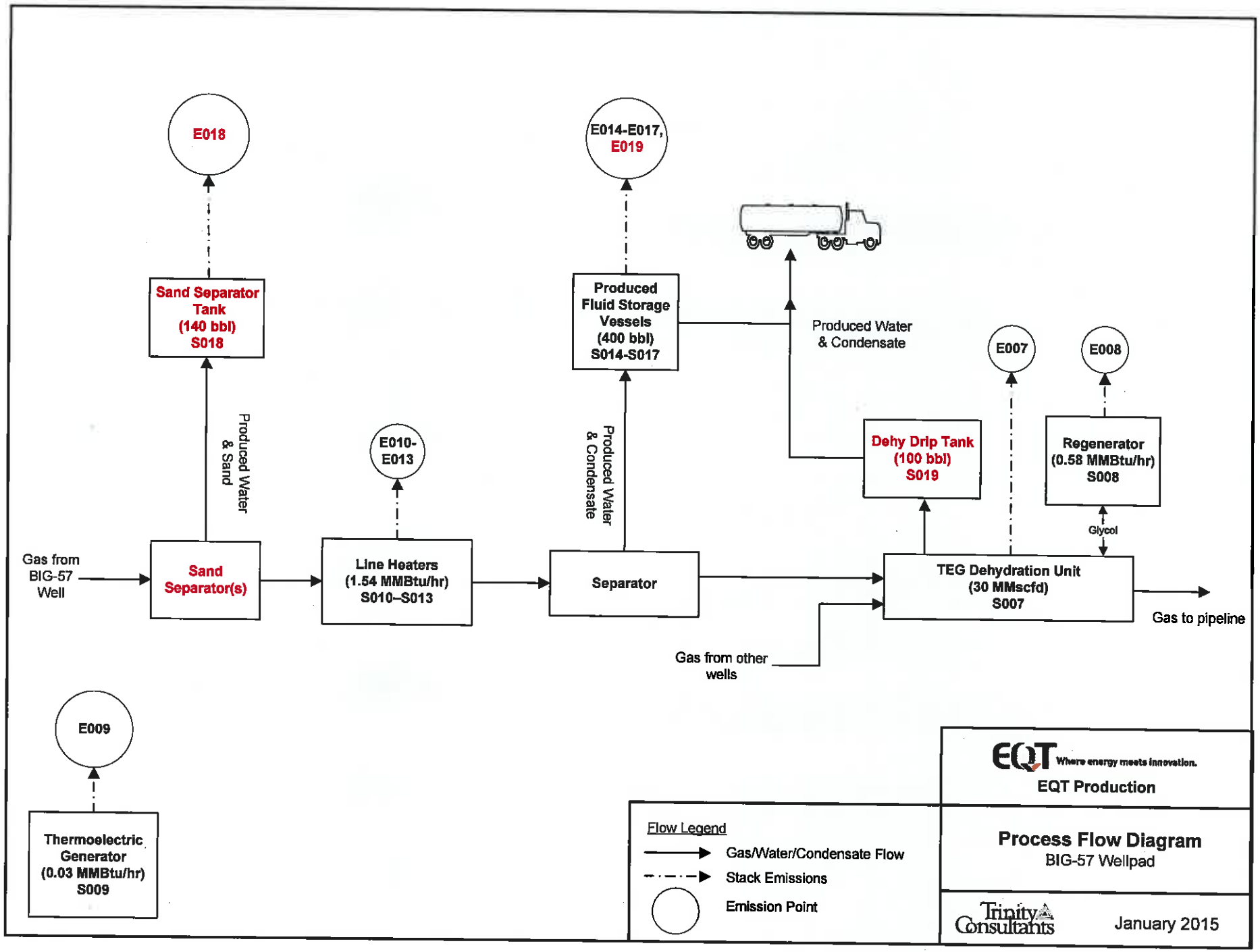
LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components	Number of Components Monitored by Frequency	Average Time to Repair (days)	Estimated Annual Emission Rate (lb/yr)[1]
Pumps	light liquid VOC	1	TBD	TBD	384
	heavy liquid VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---
Valves	Gas VOC	237	TBD	TBD	1,366
	Light Liquid VOC	---	TBD	TBD	---
	Heavy Liquid VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---
Safety Relief Valves	Gas VOC	14	TBD	TBD	1,406
	Non VOC	---	TBD	TBD	---
Open-ended Lines	VOC	12	TBD	TBD	20
	Non-VOC	---	TBD	TBD	---
Sampling Connections	VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---
Compressors	VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---
Flanges	VOC	982	TBD	TBD	1,735
	Non-VOC	---	TBD	TBD	---
Other	VOC	---	TBD	TBD	---
	Non-VOC	---	TBD	TBD	---

[1] U.S. EPA. Office of Air Quality Planning and Standards. Protocol for Equipment Leak Emission Estimates. Table 2-1. (Research Triangle Park, NC: U.S. EPA EPA-453/R-95-017, 1995). SOCMI factors were used as it was representative of natural gas liquids extraction

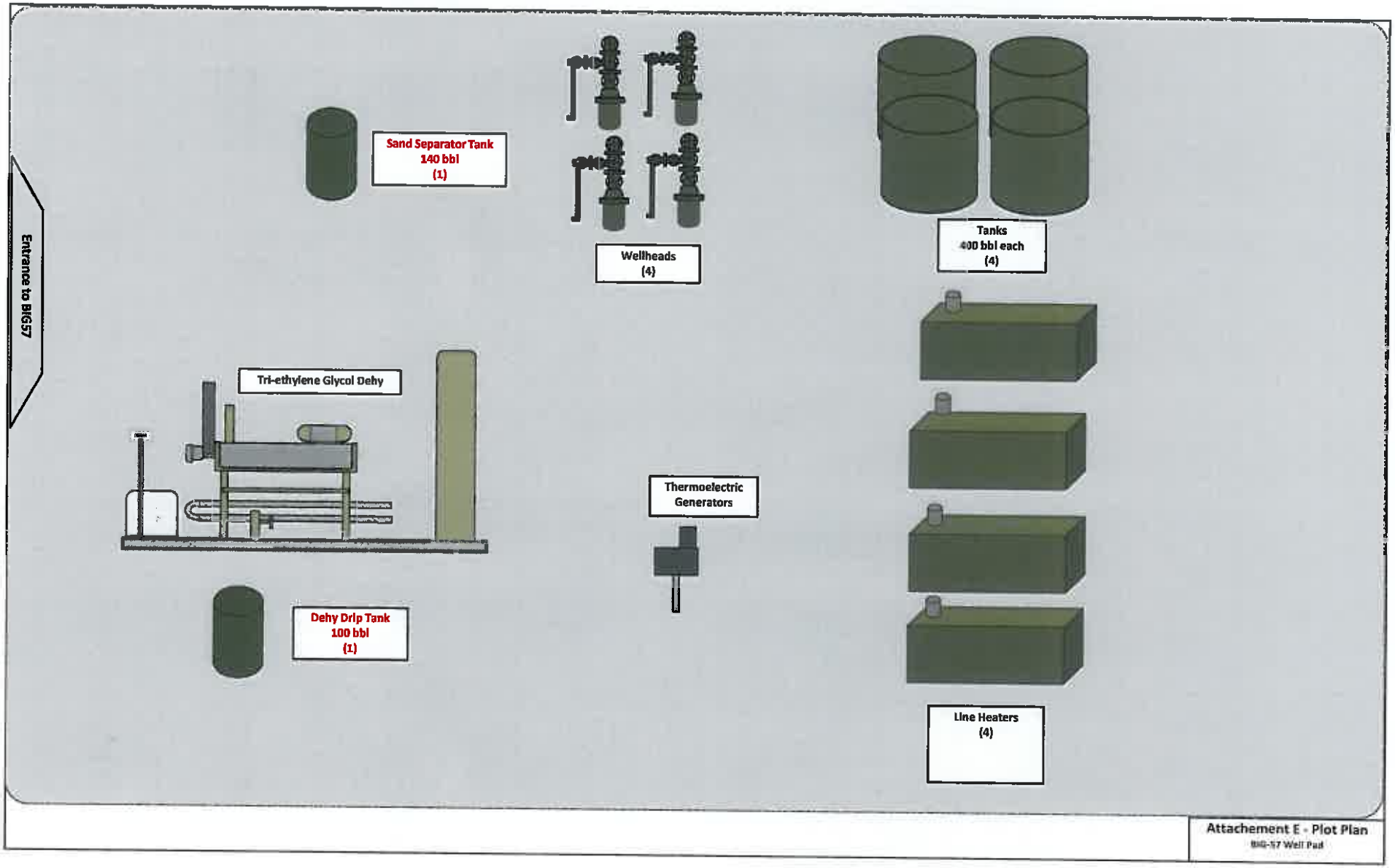
ATTACHMENT D

Process Flow Diagram


E018
Sand Separator Tank (140 bbl) S018
Produced Water & Sand
E010-E013
Line Heaters (1.54 MMBtu/hr) S010–S013
Gas from BIG-57 Well
Sand Separator(s)
E014-E017, E019
Produced Fluid Storage Vessels (400 bbl) S014-S017
Produced Water & Condensate
Separator
Produced Water & Condensate
Dehy Drip Tank (100 bbl) S019
E007
E008
Regenerator (0.58 MMBtu/hr) S008
Glycol
TEG Dehydration Unit (30 MMscfd) S007
Gas to pipeline
Gas from other wells
E009
Thermoelectric Generator (0.03 MMBtu/hr) S009
Flow Legend
Gas/Water/Condensate Flow
Stack Emissions
Emission Point
EQT Where energy meets innovation.
EQT Production
Process Flow Diagram
BIG-57 Wellpad
Trinity Consultants
January 2015

ATTACHMENT E

Plot Plan



Attachement E - Plot Plan

BIG-57 Well Pad

ATTACHMENT F

Area Map

ATTACHMENT F: AREA MAP

Figure 1 - Map of BIG-57 Location

UTM Northing (KM):	4,378.265
UTM Easting (KM):	540.606
Elevation:	921 ft

ATTACHMENT G

Emission Unit Data Sheets and G70-A Section Applicability Form

General Permit G70-A Registration
Section Applicability Form

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

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

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

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

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

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

Emission Units Table

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
S007	E007	Glycol Dehydration Unit Still Vent /Flash Tank	2014	30 MMscfd	Existing, No change	None
S008	E008	Reboiler	2012	0.58 MMBtu/hr input	Existing, No change	None
S009	E009	Thermoelectric Generator	2012	0.029 MMBtu/hr input	Existing, No change	None
S010	E010	Line Heaters	2012	1.54 MMBtu/hr Input	Existing, No change	None
S011	E011	Line Heaters	2012	1.54 MMBtu/hr Input	Existing, No change	None
S012	E012	Line Heaters	2014	1.54 MMBtu/hr Input	Existing, No change	None
S013	E013	Line Heaters	2014	1.54 MMBtu/hr Input	Existing, No change	None
S014	E014	Storage Tanks	2014	400 bbl each	Existing, No change	None
S015	E015	Storage Tanks	2014	400 bbl each	Existing, No change	None
S016	E016	Storage Tanks	2014	400 bbl each	Existing, No change	None
S017	E017	Storage Tanks	2014	400 bbl each	Existing, No change	None
S018	E018	Sand Separator Tank	TBD	140 bbl	New	None
S019	E019	Dehydrator Drip Tank	TBD	100 bbl	New	None
S020	E020	Liquid Loading	2012/2014	NA	Modified	None

Note: *Sources S001-S006 were removed in 2014, as noted in 2014 R-13 permit.*

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

NATURAL GAS WELL AFFECTED FACILITY DATA SHEET

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

Please provide the API number(s) for each NG well at this facility:	
4710302538	
4710302414	
4710302902	
4710302901	

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

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

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

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

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name BIG-57 Wellpad	2. Tank Name Produced Fluid Storage Tanks
3. Emission Unit ID number S014 through S017 (existing)	4. Emission Point ID number E014 through E017 (existing)
5. Date Installed or Modified *(for existing tanks)* 2014 /2015 Increased Throughput	6. Type of change: NA ☐ New construction ☐ New stored material ☒ Other (throughput increase)
7A. Description of Tank Modification *(if applicable)* NA	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) None	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 400 bbl	
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) ~21,159,936 (All Tanks: S014-S017, S019)	13B. Maximum daily throughput (gal/day) ~57.972 (All Tanks: S014-S017, S019)
14. Number of tank turnovers per year ~1,260 (All Tanks: S014-S017, S019)	15. Maximum tank fill rate (gal/min) TBD
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof _X__ vertical ___ horizontal __X_ flat roof ___ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

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

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

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

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

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

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

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
See Attached Emission Calculations									

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

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION

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

20A. Shell Color: Gray	20B. Roof Color: Gray	20C. Year Last Painted:

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

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

23. Operating Pressure Range (psig): -0.3 to 0.70 psig

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

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type *(check one)*: ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26 Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Elkins, West Virginia			
28. Daily Avg. Ambient Temperature (°F): 49.06		29. Annual Avg. Maximum Temperature (°F): 61.16	
30. Annual Avg. Minimum Temperature (°F): 36.97		31. Avg. Wind Speed (mph): 6.17	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): 1,193.89		33. Atmospheric Pressure (psia): 14.73	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 51.30	34A. Minimum (°F):	34B. Maximum (°F):	
35. Avg. operating pressure range of tank (psig): 0.2195	35A. Minimum (psig): 0.1638	35B. Maximum (psig): 0.2911	
36A. Minimum liquid surface temperature (°F): 46.54		36B. Corresponding vapor pressure (psia): 0.1638	
37A. Avg. liquid surface temperature (°F): 55.41		37B. Corresponding vapor pressure (psia): 0.2195	
38A. Maximum liquid surface temperature (°F): 64.27		38B. Corresponding vapor pressure (psia): 0.2911	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			

39A. Material name and composition:	Produced Water/Condensate		
39B. CAS number:	TBD		
39C. Liquid density (lb/gal):	TBD		
39D. Liquid molecular weight (lb/lb-mole):	TBD		
39E. Vapor molecular weight (lb/lb-mole):	18.7584		
39F. Maximum true vapor pressure (psia):	TBD		
39G. Maxim Reid vapor pressure (psia):	TBD		
39H. Months Storage per year. From: To:	12 (All year)		

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name BIG-57 Wellpad	2. Tank Name Sand Separator Tank
3. Emission Unit ID number S018	4. Emission Point ID number E018
5. Date Installed or Modified *(for existing tanks)* TBD	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable)* Installation of one new tank	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) None	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 140 bbl	
9A. Tank Internal Diameter (ft.) ~10	9B. Tank Internal Height (ft.) ~10
10A. Maximum Liquid Height (ft.) ~10	10B. Average Liquid Height (ft.) ~5
11A. Maximum Vapor Space Height (ft.) ~10	11B. Average Vapor Space Height (ft.) ~5
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume. 140 bbl	
13A. Maximum annual throughput (gal/yr) ~141,120	13B. Maximum daily throughput (gal/day) ~387
14. Number of tank turnovers per year ~24	15. Maximum tank fill rate (gal/min) TBD
16. Tank fill method ☐ Submerged ☒ Splash	☐ Bottom Loading
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☐ Fixed Roof __ vertical _X_ horizontal __ flat roof __ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

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

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

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

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

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

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

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss *(All tanks)*		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
See Attached Emission Calculations									

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

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION		
19. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) Welded		
20A. Shell Color: Gray	20B. Roof Color: Gray	20C. Year Last Painted:
21. Shell Condition (if metal and unlined): ☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable		
22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): -0.3 to 0.70 psig		
24. Is the tank a **Vertical Fixed Roof Tank**? ☐ Yes ☒No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type *(check one)*: ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal		

☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Elkins, West Virginia			
28. Daily Avg. Ambient Temperature (°F): 49.06		29. Annual Avg. Maximum Temperature (°F): 61.16	
30. Annual Avg. Minimum Temperature (°F): 36.97		31. Avg. Wind Speed (mph): 6.17	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): 1,193.89		33. Atmospheric Pressure (psia): 14.73	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 51.30	34A. Minimum (°F):	34B. Maximum (°F):	
35. Avg. operating pressure range of tank (psig): 0 2195	35A. Minimum (psig): 0.1638	35B. Maximum (psig): 0.2911	
36A. Minimum liquid surface temperature (°F): 46.54		36B. Corresponding vapor pressure (psia): 0.1638	
37A. Avg. liquid surface temperature (°F): 55.41		37B. Corresponding vapor pressure (psia): 0.2195	
38A. Maximum liquid surface temperature (°F): 64.27		38B. Corresponding vapor pressure (psia): 0.2911	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	Produced Water/Condensate		
39B. CAS number:	TBD		
39C. Liquid density (lb/gal):	TBD		
39D. Liquid molecular weight (lb/lb-mole):	TBD		
39E. Vapor molecular weight (lb/lb-mole):	18.7584		
39F Maximum true vapor pressure (psia):	TBD		
39G. Maxim Reid vapor pressure (psia):	TBD		
39H. Months Storage per year. From: To:	12 (All year)		

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name BIG-57 Wellpad	2. Tank Name Dehydrator Drip Tank
3. Emission Unit ID number S019	4. Emission Point ID number E019
5. Date Installed or Modified *(for existing tanks)* TBD	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable)* Installation of one new tank	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) None	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 100 bbl	
9A. Tank Internal Diameter (ft.) ~8	9B. Tank Internal Height (ft.) ~11
10A. Maximum Liquid Height (ft.) ~11	10B. Average Liquid Height (ft.) ~5.5
11A. Maximum Vapor Space Height (ft.) ~11	11B. Average Vapor Space Height (ft.) ~5.5
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume. 100 bbl	
13A. Maximum annual throughput (gal/yr) ~21,159,936 (All Tanks. S014-S017, S019)	13B. Maximum daily throughput (gal/day) ~57,972 (All Tanks: S014-S017, S019)
14. Number of tank turnovers per year ~1,260 (All Tanks: S014-S017, S019)	15. Maximum tank fill rate (gal/min) TBD
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof _X__ vertical ___ horizontal __ flat roof _X__ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

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

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

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

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

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

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

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss *(All tanks)*		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
See Attached Emission Calculations									

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

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION		
19. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) Welded		
20A. Shell Color: Gray	20B. Roof Color: Gray	20C. Year Last Painted:
21. Shell Condition (if metal and unlined): ☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable		
22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): -0.3 to 0.70 psig		
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒		
25A. Year Internal Floaters Installed:		

25B. Primary Seal Type *(check one)*: ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Elkins, West Virginia			
28. Daily Avg. Ambient Temperature (°F): 49.06		29. Annual Avg. Maximum Temperature (°F): 61.15	
30. Annual Avg. Minimum Temperature (°F): 36.97		31. Avg. Wind Speed (mph): 6.17	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): 1,193.89		33. Atmospheric Pressure (psia): 13.73	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 51.30	34A. Minimum (°F):	34B. Maximum (°F):	
35. Avg. operating pressure range of tank (psig): 0.2195	35A. Minimum (psig): 0.1638	35B. Maximum (psig): 0.2911	
36A. Minimum liquid surface temperature (°F): 45.54		36B. Corresponding vapor pressure (psia): 0.1638	
37A. Avg. liquid surface temperature (°F): 55.41		37B. Corresponding vapor pressure (psia): 0.2195	
38A. Maximum liquid surface temperature (°F): 64.27		38B. Corresponding vapor pressure (psia): 0.2911	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	Produced Water/Condensate		
39B. CAS number:	TBD		
39C. Liquid density (lb/gal):	TBD		
39D. Liquid molecular weight (lb/lb-mole):	TBD		
39E. Vapor molecular weight (lb/lb-mole):	18.7584		
39F. Maximum true vapor pressure (psia):	TBD		
39G. Maxim Reid vapor pressure (psia):	TBD		
39H. Months Storage per year. From: To:	12 (All year)		

NATURAL GAS FIRED FUEL BURNING UNITS
EMISSION DATA SHEET

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

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
S009	E009	Thermoelectric Generator	2012	No change	None	0.029	1,106
S010	E010	Line Heaters	2012	No change	None	1.54	1,106
S011	E011	Line Heaters	2012	No change	None	1.54	1,106
S012	E012	Line Heaters	2014	No change	None	1.54	1,106
S013	E013	Line Heaters	2014	No change	None	1.54	1,106

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

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

3 New, modification, removal

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

5 Enter design heat input capacity in mmBtu/hr.

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

GLYCOL DEHYDRATION EMISSION UNIT DATA SHEET

General Glycol Dehydration Unit Data					
		Manufacturer and Model		30 MMSCFD	
		Max Dry Gas Flow Rate (mmscf/day)		30	
		Design Heat Input (mmBtu/hr)		0.58	
		Design Type (DEG or TEG)		TEG	
		Source Status[2]		ES	
		Date Installed/Modified/Removed[3]		2014	
		Regenerator Still Vent APCD[4]		None	
		Control Device ID[4]		NA	
		Fuel HV (Btu/scf)		1,106	
		H_2S Content (gr/100 scf)		0	
		Operation (hrs/yr)		8760	
Emission Unit ID/ Emission Point ID[1]	Vent	Reference[5]	Potential Emissions[6]	lbs/hr	tons/yr
S007/E007	Glycol Regenerator Still Vent (Regenerator and Flash Tank Combined)	GRI-GLYCalc™	VOC	2.55	11.18
		GRI-GLYCalc™	Benzene	0.07	0.30
		GRI-GLYCalc™	Ethylbenzene	0.19	0.84
		GRI-GLYCalc™	Toluene	0.25	1.08
		GRI-GLYCalc™	Xylenes	0.28	1.22
		GRI-GLYCalc™	n-Hexane	0.01	0.03
S008/E008	Reboiler	AP-42 Section 1.4	NO_X	0.05	0.23
		AP-42 Section 1.4	CO	0.04	0.19
		AP-42 Section 1.4	VOC	<0.01	0.02
		AP-42 Section 1.4	SO_2	<0.01	<0.01
		AP-42 Section 1.4	PM	<0.01	0.01
		AP-42 Section 1.4	CO_{2e}	68	296

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

2. Enter the Source Status using the following codes:

NS	Construction of New Source	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source

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

4. Enter the Air Pollution Control Device (APCD) type designation using the following codes and the control device ID number:

NA	None	CD	Condenser
FL	Flare	CC	Condenser/Combustion Combination
TO	Thermal Oxidizer		

5. Enter the Potential Emissions Data Reference designation using the following codes:

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

6. Enter the Reboiler Vent and Glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The Glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc *Aggregate Calculations Report* to this *Glycol Dehydration Emission Unit Data Sheet(s)*. This PTE data shall be incorporated in the *Emissions Summary Sheet*.

Include a copy of the GRI-GLYCalc™ analysis. This includes a printout of the aggregate calculations report, which shall include emissions reports, equipment reports, and stream reports.

TANK TRUCK LOADING
EMISSION UNIT DATA SHEET

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

1. Emission Unit ID: S020	2. Emission Point ID: E020	3. Year Installed/ Modified. 2012
4. Emission Unit Description: Liquid Loading		
5. Loading Area Data:		
5A. Number of pumps: 1	5B. Number of liquids loaded:1	5C. Maximum number of tank trucks loading at one time:1
6. Describe cleaning location, compounds and procedure for tank trucks:		
7. Are tank trucks pressure tested for leaks at this or any other location? ☐ Yes ☒ No If YES, describe:		

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

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

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

Liquid Name	Produced Water and Condensate		
Max. daily throughput (1000 gal/day)	Variable		
Max. annual throughput (1000 gal/yr)	21,301		
Loading Method [1]	SP		
Max. Fill Rate (gal/min)			
Average Fill Time (min/loading)			
Max. Bulk Liquid Temperature (°F)	51.30		
True Vapor Pressure [2]	0.2911		
Cargo Vessel Condition[3]	Unknown		
Control Equipment or Method [4]	NA		
Minimum collection efficiency (%)	0		
Minimum control efficiency (%)	0		

* *Continued on next page*

Maximum Emission Rate	Loading (lb/hr)	VOC: 0.42 HAP: 0.01		
	Annual (ton/yr)	VOC: 1.84 HAP: 0.04		
Estimation Method [5]		EPA		

Notes:

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets as Attachment "H"*):
CA = Carbon Adsorption
VB = Dedicated Vapor Balance (closed system)
ECD = Enclosed Combustion Device
F = Flare
TO = Thermal Oxidation or Incineration

[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance
TM = Test Measurement based upon test data submittal
O = other (describe)

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

MONITORING *Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation/air pollution control device.* None	RECORDKEEPING *Please describe the proposed recordkeeping that will accompany the monitoring.* None
REPORTING *Please describe the proposed frequency of reporting of the recordkeeping.* None	TESTING *Please describe any proposed emissions testing for this process equipment/air pollution control device.* None

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

ATTACHMENT H

Air Pollution Control Device Data Sheets *(Not applicable)*

ATTACHMENT I

Emission Calculations

Company Name: EOT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Site Wide Summary

Emission Source	Value	Units	Emission Unit ID(s)	Emission Point ID(s)	Control Device
Well(s)	4	per pad	--	---	---
Storage Tank(s)	4	per pad	S014 - S017	S014 - S017	None
Sand Separator Tank	1	per pad	S018	E018	None
Line Heater(s)	4	per pad	S010 - S013	E010 - E013	None
Thermoelectric Generator(s) (TEGs)	1	per pad	S009	E009	None
Dehydrator(s)	1	per pad	S007	E007	None
Reboiler(s)	1	per pad	S008	E008	None
Dehy Drip Tank	1	per pad	S019	E019	None
Tank Combustor(s)	0	per pad	—	—	—
Dehy Combustor(s)	0	per pad	—	—	—
Length of lease road	870	feet	—	—	—

Constituent	Produced Fluid Storage Tanks & Dehy Drip Tank (tpy)	Sand Separator Tank (tpy)	Line Heaters (tpy)	TEGs (tpy)	Dehydrator (tpy)	Reboiler (tpy)	Fugitive Components (tpy)	Liquid Loading (tpy)	Haul Roads (tpy)	Total Emissions (tpy)
Criteria Pollutants										
NO_x	---	—	2.437	1.16E-02	---	0.228	---	---	—	2.68
CO	---	---	2.047	9.70E-03	---	0.192	---	---	---	2.25
PM Total	---	---	0.185	8.78E-04	---	0.017	---	---	3.81	4.01
PM_{10} Total	---	---	0.185	8.78E-04	---	0.017	---	---	0.97	1.17
$PM_{2.5}$ Total	---	---	0.185	8.78E-04	---	0.017	---	---	0.10	0.30
SO_2	---	---	0.015	6.93E-05	---	0.001	---	---	---	0.02
VOC	21.79	0.09	0.134	6.35E-04	11.18	0.013	2.46	1.84	---	37.51
Greenhouse Gases										
CO_2	---	---	3,153.53	14.95	0.75	295.64	0.14	---	---	3,465
CH_4	0.75	3.0E-03	0.06	0.00	8.17	0.01	16.77	---	---	27.75
N_2O	---	---	0.01	0.00	0.00	0.00	---	---	---	0.01
CO_2e	18.80	0.08	3,156.78	14.96	204.92	295.95	469.32	---	---	4,161
Hazardous Air Pollutants										
Methylnaphthalene (2-	---	---	5.8E-07	2.7E-09	---	5.5E-08	---	---	---	6.4E-07
Methylchloranthrene (3-	---	---	4.4E-08	2.1E-10	---	4.1E-09	---	---	---	4.8E-08
Dimethylbenz(a)anthracene (7,12-	---	---	3.9E-07	1.8E-09	---	3.7E-08	---	---	---	4.3E-07
Acenaphthene	---	---	4.4E-08	2.1E-10	---	4.1E-09	---	---	---	4.8E-08
Acenaphthylene	---	---	4.4E-08	2.1E-10	---	4.1E-09	---	---	---	4.8E-08
Anthracene	---	---	5.8E-08	2.8E-10	---	5.5E-09	---	---	---	6.4E-08
Benz(a)anthracene	---	---	4.4E-08	2.1E-10	---	4.1E-09	---	---	---	4.8E-08
Benzene	8.0E-03	<0.001	5.1E-05	2.4E-07	0.30	4.8E-06	0.02E+00	9.2E-04	---	3.1E-01
Benzo(a)pyrene	---	---	2.9E-08	1.4E-10	---	2.7E-09	---	---	---	3.2E-08
Benzo(b)fluoranthene	---	---	4.4E-08	2.1E-10	---	4.1E-09	---	---	---	4.8E-08
Benzo(g,h,i)perylene	---	---	2.9E-08	1.4E-10	---	2.7E-09	---	---	---	3.2E-08
Benzo(k)fluoranthene	---	---	4.4E-08	2.1E-10	---	4.1E-09	---	---	---	4.8E-08
Chrysene	---	---	4.4E-08	2.1E-10	---	4.1E-09	---	---	---	4.8E-08
Dibenzo(a,h)anthracene	---	---	2.9E-08	1.4E-10	---	2.7E-09	---	---	---	3.2E-08
Dichlorobenzene	---	---	2.9E-05	1.4E-07	---	2.7E-06	---	---	---	3.2E-05
Fluoranthene	---	---	7.3E-08	3.5E-10	---	6.9E-09	---	---	---	8.0E-08
Fluorene	---	---	6.8E-08	3.2E-10	---	6.4E-09	---	---	---	7.5E-08
Formaldehyde	---	---	1.5E-03	8.7E-06	---	1.7E-04	---	---	---	2.0E-03
Hexane, n-	2.6E-01	1.0E-03	4.4E-02	2.1E-04	0.03	4.1E-03	4.4E-03	3.8E-02	---	3.1E-01
Indeno(1,2,3-cd)pyrene	---	---	4.4E-08	2.1E-10	---	4.1E-09	---	---	---	4.8E-08
Naphthalene	---	---	1.5E-05	7.0E-08	---	1.4E-06	---	---	---	1.6E-05
Phenanthrene	---	---	4.1E-07	2.0E-09	---	3.9E-08	---	---	---	4.6E-07
Pyrene	---	---	1.2E-07	5.8E-10	---	1.1E-08	---	---	---	1.3E-07
Toluene	2.4E-02	0.001	8.3E-05	3.9E-07	1.08	7.8E-06	2.3E-03	1.7E-03	---	1.1E+00
Arsenic	---	---	4.9E-06	2.3E-08	---	4.6E-07	---	---	---	5.4E-06
Beryllium	---	---	2.9E-07	1.4E-09	---	2.7E-08	---	---	---	3.2E-07
Cadmium	---	---	2.7E-05	1.3E-07	---	2.5E-06	---	---	---	2.9E-05
Chromium	---	---	3.4E-05	1.6E-07	---	3.2E-06	---	---	---	3.7E-05
Cobalt	---	---	2.0E-06	9.7E-09	---	1.9E-07	---	---	---	2.2E-06
Manganese	---	---	9.5E-06	4.4E-08	---	8.7E-07	---	---	---	1.0E-05
Mercury	---	---	6.3E-06	3.0E-08	---	5.9E-07	---	---	---	7.0E-06
Nickel	---	---	5.1E-05	2.4E-07	---	4.8E-06	---	---	---	5.6E-05
Selenium	---	---	5.8E-07	2.8E-09	---	5.5E-08	---	---	---	6.4E-07
Ethylbenzene	4.0E-03	0.001	—	—	0.84	—	0.0E+00	9.7E-05	—	8.5E-01
Trimethylpentane (2,2,4-)	<0.001	0.001	—	—	0.01	—	2.9E-03	8.3E-05	—	1.7E-02
Xylene	5.2E-02	<0.001	—	—	1.22	—	0.0E+00	1.3E-03	—	1.3E+00
Total HAP	0.32	1.0E-03	0.05	2.1E-04	3.48	4.31E-03	0.01	0.04	—	3.90

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Produced Fluid Storage Tanks & Dehy Drip Tank

Throughput Parameter	Value	Units
Operational Hours	8,760	hrs/yr
Total Condensate Throughput for E&P	17.5	bbl/day
Total Produced Water Throughput	41,980	bbl/month

Description	Potential Throughput [1] (gal/yr)
Produced Water and Condensate	21,159,936

[1] Based on maximum historical produced water and condensate throughput for wellpad.

[2] Potential liquid throughput is representative of liquid produced from each well, and liquid accumulated in the dehydrator drip tank.

Storage Tanks (400 bbl, each) - Uncontrolled *(Per tank)*

Constituent	Total Emissions [1] lb/hr	tpy
Methane	0.043	0.188
Ethane	0.068	0.297
Propane	0.140	0.614
Isobutane	0.116	0.507
n-Butane	0.288	1.260
Isopentane	0.346	1.517
n-Pentane	0.247	1.080
n-Hexane	0.015	0.064
Cyclohexane	<0.001	<0.001
Other Hexanes	0.032	0.142
Heptanes	0.029	0.127
Benzene	<0.001	0.002
Toluene	0.001	0.006
Ethylbenzene	<0.001	0.001
Xylenes	0.003	0.013
2,2,4-Trimethylpentane	<0.001	<0.001
C8+ Heavies	0.026	0.115
Total Emissions:	1.356	5.939
Total VOC Emissions:	1.244	5.447
Total HAP Emissions:	0.018	0.080

[1] E&P TANK v2.0 calculates working, breathing and flashing losses and reports the sum as one total.

[2] E&P TANK v2.0 emission calculations are based on 5/16/2014 condensate sample from BIG-333 wellpad (well #514570).

Company Name:	**EOT Production, LLC**
Facility Name:	**BIG-57 Wellpad**
Project Description:	**G-70A Permit Application**

Sand Separator Tank

Throughput Parameter	Value	Units
Tank Capacity	5,880	gallons
Operational Hours	8,760	hrs/yr
Total Produced Water and Sand Throughput	280	bbl/month
Percent Produced Water	50%	
Total Produced Water Throughput	140	bbl/month

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

Description	Potential Throughput (gal/yr)
Produced Water and Sand	141,120

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

Constituent	Total Emissions [2] lb/hr	tpy
Methane	0.001	0.003
Ethane	0.001	0.005
Propane	0.003	0.011
Isobutane	0.002	0.009
n-Butane	0.005	0.022
Isopentane	0.006	0.026
n-Pentane	0.004	0.019
n-Hexane	<0.001	0.001
Cyclohexane	<0.001	<0.001
Other Hexanes	<0.001	0.002
Heptanes	<0.001	0.002
Benzene	<0.001	<0.001
Toluene	<0.001	<0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
2,2,4-Trimethylpentane	<0.001	<0.001
C8+ Heavies	<0.001	0.001
Total Emissions:	0.023	0.101
Total VOC Emissions:	0.021	0.093
Total HAP Emissions:	<0.001	<0.001

[1] E&P TANK 2.0 calculates working, breathing and flashing losses and reports the sum as one total.

[2] E&P TANK v2.0 emission calculations are based on 5/16/2014 condensate sample from BIG-333 wellpad (well #514570).

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Line Heaters

Parameter	Value	Units
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	1,106	BTU/scf
Heat Input	1.54	MMBtu/hr (each)
Fuel Consumption	1.39E-03	MMscf/hr (each)
Potential Annual Hours of Operation	8,760	hr/yr

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
NO_x	100	1.4E-01	6.1E-01
CO	84	1.2E-01	5.1E-01
SO_2	0.6	8.3E-04	3.7E-03
PM Total	7.6	1.1E-02	4.6E-02
PM Condensable	5.7	7.9E-03	3.5E-02
PM_{10} (Filterable)	1.9	2.6E-03	1.2E-02
$PM_{2.5}$ (Filterable)	1.9	2.6E-03	1.2E-02
VOC	5.5	7.7E-03	3.4E-02
Lead	5.00E-04	7.0E-07	3.0E-06
CO_2 (Natural Gas Firing)[4]	129,399	180	788
CH_4 (Natural Gas Firing)[4]	2.4	3.4E-03	1.5E-02
N_2O (Natural Gas Firing)[4]	0.24	3.4E-04	1.5E-03

Company Name:	**EQT Production, LLC**
Facility Name:	**BIG-57 Wellpad**
Project Description:	**G-70A Permit Application**

Line Heaters

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
Methylnaphthalene (2-)	2.4E-05	3.3E-08	1.5E-07
3-Methylchloranthrene	1.8E-06	2.5E-09	1.1E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	2.2E-08	9.7E-08
Acenaphthene	1.8E-06	2.5E-09	1.1E-08
Acenaphthylene	1.8E-06	2.5E-09	1.1E-08
Anthracene	2.4E-06	3.3E-09	1.5E-08
Benz(a)anthracene	1.8E-06	2.5E-09	1.1E-08
Benzene	2.1E-03	2.9E-06	1.3E-05
Benzo(a)pyrene	1.2E-06	1.7E-09	7.3E-09
Benzo(b)fluoranthene	1.8E-06	2.5E-09	1.1E-08
Benzo(g,h,i)perylene	1.2E-06	1.7E-09	7.3E-09
Benzo(k)fluoranthene	1.8E-06	2.5E-09	1.1E-08
Chrysene	1.8E-06	2.5E-09	1.1E-08
Dibenzo(a,h) anthracene	1.2E-06	1.7E-09	7.3E-09
Dichlorobenzene	1.2E-03	1.7E-06	7.3E-06
Fluoranthene	3.0E-06	4.2E-09	1.8E-08
Fluorene	2.8E-06	3.9E-09	1.7E-08
Formaldehyde	7.5E-02	1.0E-04	4.6E-04
Hexane	1.8E+00	2.5E-03	1.1E-02
Indo(1,2,3-cd)pyrene	1.8E-06	2.5E-09	1.1E-08
Naphthalene	6.1E-04	8.5E-07	3.7E-06
Phenanthrene	1.7E-05	2.4E-08	1.0E-07
Pyrene	5.0E-06	7.0E-09	3.0E-08
Toluene	3.4E-03	4.7E-06	2.1E-05
Arsenic	2.0E-04	2.8E-07	1.2E-06
Beryllium	1.2E-05	1.7E-08	7.3E-08
Cadmium	1.1E-03	1.5E-06	6.7E-06
Chromium	1.4E-03	1.9E-06	8.5E-06
Cobalt	8.4E-05	1.2E-07	5.1E-07
Manganese	3.8E-04	5.3E-07	2.3E-06
Mercury	2.6E-04	3.6E-07	1.6E-06
Nickel	2.1E-03	2.9E-06	1.3E-05
Selenium	2.4E-05	3.3E-08	1.5E-07
Total HAP		**2.6E-03**	**1.2E-02**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3, & 1.4-4.

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

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

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

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Thermoelectric Generators (TEGs)

Parameter	Value	Units
Manufacturer	Global Thermoelectric	
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	1,106	BTU/scf
Heat Input	0.03	MMBtu/hr (each)
Fuel Consumption [1]	2.64E-05	MMscf/hr (each)
Potential Annual Hours of Operation	8,760	hr/yr

[1] Global Themoelectric specification sheet states 700 ft^3/day at 1000 BTU/ft^3.

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
NO_x	100	2.6E-03	1.2E-02
CO	84	2.2E-03	9.7E-03
SO_2	0.6	1.6E-05	6.9E-05
PM Total	7.6	2.0E-04	8.8E-04
PM Condensable	5.7	1.5E-04	6.6E-04
PM_{10} (Filterable)	1.9	5.0E-05	2.2E-04
$PM_{2.5}$ (Filterable)	1.9	5.0E-05	2.2E-04
VOC	5.5	1.5E-04	6.4E-04
Lead	5.00E-04	1.3E-08	5.8E-08
CO_2 (Natural Gas Firing)[4]	129,399	3	15
CH_4 (Natural Gas Firing)[4]	2.4	6.4E-05	2.8E-04
N_2O (Natural Gas Firing)[4]	0.24	6.4E-06	2.8E-05

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Thermoelectric Generators (TEGs)

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
Methylnaphthalene (2-)	2.4E-05	6.3E-10	2.8E-09
3-Methylchloranthrene	1.8E-06	4.7E-11	2.1E-10
7,12-Dimethylbenz(a)anthracene	1.6E-05	4.2E-10	1.8E-09
Acenaphthene	1.8E-06	4.7E-11	2.1E-10
Acenaphthylene	1.8E-06	4.7E-11	2.1E-10
Anthracene	2.4E-06	6.3E-11	2.8E-10
Benz(a)anthracene	1.8E-06	4.7E-11	2.1E-10
Benzene	2.1E-03	5.5E-08	2.4E-07
Benzo(a)pyrene	1.2E-06	3.2E-11	1.4E-10
Benzo(b)fluoranthene	1.8E-06	4.7E-11	2.1E-10
Benzo(g,h,i)perylene	1.2E-06	3.2E-11	1.4E-10
Benzo(k)fluoranthene	1.8E-06	4.7E-11	2 1E-10
Chrysene	1.8E-06	4.7E-11	2.1E-10
Dibenzo(a,h) anthracene	1.2E-06	3.2E-11	1.4E-10
Dichlorobenzene	1 2E-03	3.2E-08	1.4E-07
Fluoranthene	3.0E-06	7.9E-11	3.5E-10
Fluorene	2.8E-06	7.4E-11	3.2E-10
Formaldehyde	7.5E-02	2.0E-06	8.7E-06
Hexane	1.8E+00	4.7E-05	2.1E-04
Indo(1,2,3-cd)pyrene	1.8E-06	4.7E-11	2.1E-10
Naphthalene	6.1E-04	1.6E-08	7.0E-08
Phenanthrene	1.7E-05	4.5E-10	2.0E-09
Pyrene	5.0E-06	1.3E-10	5.8E-10
Toluene	3.4E-03	9 0E-08	3.9E-07
Arsenic	2.0E-04	5.3E-09	2.3E-08
Beryllium	1.2E-05	3.2E-10	1.4E-09
Cadmium	1.1E-03	2.9E-08	1.3E-07
Chromium	1.4E-03	3.7E-08	1.6E-07
Cobalt	8.4E-05	2.2E-09	9.7E-09
Manganese	3.8E-04	1.0E-08	4.4E-08
Mercury	2.6E-04	6.9E-09	3.0E-08
Nickel	2.1E-03	5.5E-08	2.4E-07
Selenium	2.4E-05	6.3E-10	2.8E-09
Total HAP		**5.0E-05**	**2.2E-04**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3, & 1.4-4.

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

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

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

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Triethylene Glycol Dehydrator

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY
Uncontrolled Regenerator Emissions

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon Dioxide	0.08	1.82	0.33
Methane	0.1158	2.780	0.5074
Ethane	0.2036	4.887	0.8918
Propane	0.1518	3.644	0.6650
Isobutane	0.0403	0.968	0.1767
n-Butane	0.0724	1.738	0.3172
Isopentane	0.0235	0.564	0.1030
n-Pentane	0.0184	0.442	0.0807
n-Hexane*	0.0043	0.103	0.0188
Cyclohexane	0.0113	0.272	0.0496
Other Hexanes	0.0104	0.249	0.0455
Heptanes	0.0163	0.391	0.0714
2,2,4-Trimethylpentane*	0.0022	0.053	0.0096
Benzene*	0.0614	1.473	0.2688
Toluene*	0.2220	5.327	0.9722
Ethylbenzene*	0.1743	4.184	0.7635
Xylenes*	0.2526	6.063	1.1066
C8 + Heavier Hydrocarbons	0.8506	20.415	3.7258
Total Emissions	2.2314	53.553	9.7735
Total Hydrocarbon Emissions	2.2314	53.553	9.7735
Total VOC Emissions	1.9120	45.887	8.3743
Total HAP Emissions	0.7168	17.203	3.1395

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY
Flash Gas Emissions

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon Dioxide	0.08	1.92	0.35
Methane	1.5792	37.901	6.9170
Ethane	0.8110	19.463	3.5520
Propane	0.2522	6.053	1.1048
Isobutane	0.0442	1.061	0.1937
n-Butane	0.0600	1.441	0.2629
Isopentane	0.0170	0.408	0.0744
n-Pentane	0.0106	0.253	0.0462
n-Hexane*	0.0014	0.033	0.0060
Cyclohexane	0.0010	0.023	0.0042
Other Hexanes	0.0044	0.105	0.0192
Heptanes	0.0025	0.061	0.0111
2,2,4-Trimethylpentane*	0.0007	0.017	0.0030
Benzene*	0.0006	0.015	0.0028
Toluene*	0.0015	0.035	0.0064
Ethylbenzene*	0.0007	0.016	0.0029
Xylenes*	0.0006	0.015	0.0028
C8 + Heavier Hydrocarbons	0.0123	0.296	0.0541
Total Emissions	2.7999	67.197	12.2635
Total Hydrocarbon Emissions	2.7999	67.197	12.2635
Total VOC Emissions	0.4097	9.833	1.7945
Total HAP Emissions	0.0055	0.131	0.0239

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY[1]
Uncontrolled Total Emission Rates

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon Dioxide	0.17	4.11	0.75
Methane	1.8645	44.749	8.1668
Ethane	1.1161	26.785	4.8882
Propane	0.4444	10.667	1.9468
Isobutane	0.0930	2.232	0.4074
n-Butane	0.1456	3.497	0.6381
Isopentane	0.0446	1.069	0.1951
n-Pentane	0.0319	0.765	0.1396
n-Hexane*	0.0063	0.150	0.0273
Cyclohexane	0.0135	0.325	0.0592
Other Hexanes	0.0163	0.389	0.0712
Heptanes	0.0207	0.497	0.0908
2,2,4-Trimethylpentane*	0.0032	0.077	0.0139
Benzene*	0.0682	1.637	0.2988
Toluene*	0.2459	5.898	1.0765
Ethylbenzene*	0.1925	4.620	0.8430
Xylenes*	0.2785	6.686	1.2203
C8 + Heavier Hydrocarbons	0.9492	22.782	4.1579
Total Emissions	5.5342	132.821	24.2398
Total Hydrocarbon Emissions	5.5342	132.821	24.2398
Total VOC Emissions	2.5537	61.288	11.1850
Total HAP Emissions	0.7945	19.069	3.4800

Enclosed Combustor Emissions - *(Not Applicable)*

Pollutant	Emission Factors (lb/MMBtu)	Combustor Potential Emissions (lb/hr)	Combustor Potential Emissions (tpy)	Pilot Potential Emissions (lb/hr)	Pilot Potential Emissions (tpy)
NO_x	0.090	---	---	---	---
CO	0.076	---	---	---	---
PM/PM_{10}	0.007	---	---	---	---
SO_2	0.001	---	---	---	---
CO_2[4] (Natural Gas Firing)	116.997	---	---	---	---
CH_4[4] (Natural Gas Firing)	0.002	---	---	---	---
N_2O[4] (Natural Gas Firing)	0.000	---	---	---	---

* HAPs

[1] Based on GRI GlyCalc 4.0 run at dry gas flowrate of 30 MMscf/day and T and P of 70 °F and 800 psig, respectively. The flash tank operating parameters are 120 °F and 50 psig. A safety factor of 10% was added to the Total Emission Rates.

[2] All constituents that were below the detection limit were conservatively represented in the GLYCalc run as half of the detection limit.

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Reboiler

Parameter	Value	Units
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	1,106	BTU/scf
Heat Input	0.58	MMBtu/hr
Fuel Consumption	5.22E-04	MMscf/hr
Potential Annual Hours of Operation	8,760	hr/yr

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
NO_x	100	5.2E-02	2.3E-01
CO	84	4.4E-02	1.9E-01
SO_2	0.6	3.1E-04	1.4E-03
PM Total	7.6	4.0E-03	1.7E-02
PM Condensable	5.7	3.0E-03	1.3E-02
PM_{10} (Filterable)	1.9	9.9E-04	4.3E-03
$PM_{2.5}$ (Filterable)	1.9	9.9E-04	4.3E-03
VOC	5.5	2.9E-03	1.3E-02
Lead	5.00E-04	2.6E-07	1.1E-06
CO_2 (Natural Gas Firing)[4]	129,399	67	296
CH_4 (Natural Gas Firing)[4]	2.4	1.3E-03	5.6E-03
N_2O (Natural Gas Firing)[4]	0.24	1.3E-04	5.6E-04

Company Name:	**EQT Production, LLC**
Facility Name:	**BIG-57 Wellpad**
Project Description:	**G-70A Permit Application**

Reboiler

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
Methylnaphthalene (2-)	2.4E-05	1.3E-08	5.5E-08
3-Methylchloranthrene	1.8E-06	9.4E-10	4.1E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	8.3E-09	3.7E-08
Acenaphthene	1.8E-06	9.4E-10	4.1E-09
Acenaphthylene	1.8E-06	9.4E-10	4.1E-09
Anthracene	2.4E-06	1.3E-09	5.5E-09
Benz(a)anthracene	1.8E-06	9.4E-10	4.1E-09
Benzene	2.1E-03	1.1E-06	4.8E-06
Benzo(a)pyrene	1.2E-06	6.3E-10	2.7E-09
Benzo(b)fluoranthene	1.8E-06	9.4E-10	4.1E-09
Benzo(g,h,i)perylene	1.2E-06	6.3E-10	2.7E-09
Benzo(k)fluoranthene	1.8E-06	9.4E-10	4.1E-09
Chrysene	1.8E-06	9.4E-10	4.1E-09
Dibenzo(a,h) anthracene	1.2E-06	6.3E-10	2.7E-09
Dichlorobenzene	1.2E-03	6.3E-07	2.7E-06
Fluoranthene	3.0E-06	1.6E-09	6.9E-09
Fluorene	2.8E-06	1.5E-09	6.4E-09
Formaldehyde	7.5E-02	3.9E-05	1.7E-04
Hexane	1.8E+00	9.4E-04	4.1E-03
Indo(1,2,3-cd)pyrene	1.8E-06	9.4E-10	4.1E-09
Naphthalene	6.1E-04	3.2E-07	1.4E-06
Phenanthrene	1.7E-05	8.9E-09	3.9E-08
Pyrene	5.0E-06	2.6E-09	1.1E-08
Toluene	3.4E-03	1.8E-06	7.8E-06
Arsenic	2.0E-04	1.0E-07	4.6E-07
Beryllium	1.2E-05	6.3E-09	2.7E-08
Cadmium	1.1E-03	5.7E-07	2.5E-06
Chromium	1.4E-03	7.3E-07	3.2E-06
Cobalt	8.4E-05	4.4E-08	1.9E-07
Manganese	3.8E-04	2.0E-07	8.7E-07
Mercury	2.6E-04	1.4E-07	5.9E-07
Nickel	2.1E-03	1.1E-06	4.8E-06
Selenium	2.4E-05	1.3E-08	5.5E-08
Total HAP		**9.8E-04**	**4.3E-03**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3, & 1.4-4.

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

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

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

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Fugitive Components

Component Counts

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

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

Fugitive Emissions from Component Leaks

Equipment Type	Service	Emission Factors[1] (kg/hr/source)	Facility Equipment Count[2] (units)	TOC Total Fugitive Emissions (lb/hr)	TOC Annual Fugitive Emissions (tpy)
Valves	Gas	5.97E-03	237	3.12	13.66
Pump Seals	Light Liquid	1.99E-02	1	0.04	0.19
Pressure Relief Valves	Gas	1.04E-01	14	3.21	14.06
Connectors	All	1.83E-03	982	3.96	17.35
Open-Ended Lines	All	1.70E-03	12	0.04	0.20
			Emission Totals:	**10.38**	**45.46**

[1] U.S. EPA. Office of Air Quality Planning and Standards. *Protocol for Equipment Leak Emission Estimates.* Table 2-1. (Research Triangle Park, NC: U.S. EPA EPA-453/R-95-017, 1995). SOCMI factors were used as it was representative of natural gas liquids extraction.

[2] Assumes one pump for liquid loading, no compressors or dehydrators, and one meter per wellhead. Pressure relief valves count includes an Enardo valve and Emergency Pressure Relief valve for each storage tank.

VOC and HAP Weight Fractions [1]

Service	Weight Fraction VOC	Weight Fraction Hexane	Weight Fraction Benzene	Weight Fraction Toluene	Weight Fraction Ethylbenzene	Weight Fraction 2,2,4-trimethylpentane	Weight Fraction Xylene
Gas	0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Light Liquid	1.000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
All	0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

[1] All weight fractions from the same representative gas analyses used for other emission calculation

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Fugitive Components

VOC and HAP Fugitive Emissions

Pollutant	Hourly Fugitive Emissions (lb/hr)	Annual Fugitive Emissions (tpy)
VOC	0.561	2.46
Hexane	1.0E-03	4.4E-03
Benzene	<0.001	<0.001
Toluene	<0.001	2.3E-03
Ethylbenzene	<0.001	<0.001
2,2,4-trimethylpentane	<0.001	2.9E-03
Xylene	<0.001	<0.001
Total HAP	2.2E-03	9.6E-03

GHG Fugitive Emissions from Component Leaks

Component	Component Count[1]	GHG Emission Factor[2] (scf/hr/component)	CH_4 Emissions[3,4] (tpy)	CO_2 Emissions[3,4] (tpy)	CO_2e Emissions[5] (tpy)
Connectors	982	3.0E-03	4.2E-01	3.1E-03	1.1E+01
Open-Ended Lines	12	6.1E-02	1.1E-01	7.8E-04	2.6E+00
Pressure Relief Devices	14	4.0E-02	8.0E-02	6.0E-04	2.0E+00
Pneumatic Devices	20	6.0E+00	1.7E+01	1.3E-01	4.3E+02
Valves	237	2.7E-02	9.2E-01	6.8E-03	2.3E+01
Total			18.8	0.139	469

[1] The component count for pneumatics assumes 5 pneumatics per well
[2] Population emission factors for gas service in the Eastern U.S. from *Table W-1A of Subpart W - Default Whole Gas Emission Factors for Onshore Production*, 40 CFR 98, Subpart W, except for pneumatics, which are set at NSPS OOOO limits.
[3] Calculated in accordance with Equations W-31, W-35 and W-36 in Subpart W of 40 CFR 98.
[4] Mole fractions of CH_4 and CO_2 based on gas analysis:

CH_4: 77.49% CO_2: 0.21%

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

Carbon Dioxide (CO_2): 1 Methane (CH_4): 25

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Liquid Loading

Liquid Loading Losses:

Uncontrolled Loading Losses: L_L (lb/10^3 gal) = 12.46 (SPM)/T

Controlled Loading Losses: L_L (lb/10^3 gal) = 12.46 (SPM)/T * (1 - collection efficiency * control efficiency)

Parameter	Value	Description
S	1.45	saturation factor for splash loading (AP-42 Table 5.2-1)
Collection Efficiency	0%	no collection
Control Efficiency	0%	no control
P	0.26	max true vapor pressure of liquid loaded (psia) - EPA TANKS Data
M	18.76	molecular weight of vapors (lb/lb-mol) - EPA TANKS Data
T	511.0	temperature of liquids loaded (deg R) - EPA TANKS Data

Description	Loading Losses (lb/10^3 gal)	Maximum Throughput[1] (gal)	VOC Emissions Uncontrolled (tpy)	VOC Emissions Controlled (tpy)
Liquids Hauling	0.2	21,301,056	1.84	1.84

[1] Sum of the annual throughput from each well at the pad including the sand separator tank, and dehydrator drip tank

Speciated HAP Emission Potential:

Constituent	mol%[1]	True Vapor Pressure of Organic Compounds in liquid (psia)[2]	Partial Vapor Pressure (psia)	Mole Fraction	Molecular Weight	VOC Vapor Weight	Speciated Weight Fraction	Speciated Liquid Loading Emissions (tpy)[3]
Methane	0.095	---	---	---	---	---	---	---
Ethane	0.602	---	---	---	---	---	---	---
Propane	1.646	127.310	2.1E+00	3.2E-01	4.4E+01	1.4E+01	2.0E-01	3.6E-01
Isobutane	0.867	46.110	4.0E-01	6.1E-02	5.8E+01	3.6E+00	4.9E-02	9.1E-02
n-Butane	2.986	32.045	9.6E-01	1.5E-01	5.8E+01	8.5E+00	1.2E-01	2.2E-01
Isopentane	3.103	12.530	3.9E-01	5.9E-02	7.2E+01	4.3E+00	5.9E-02	1.1E-01
n-Pentane	3.943	8.433	3.3E-01	5.1E-02	7.2E+01	3.7E+00	5.1E-02	9.4E-02
n-Hexane	4.692	2.436	1.1E-01	1.7E-02	8.6E+01	1.5E+00	2.1E-02	3.8E-02
Other Hexanes	4.939	2.436	1.2E-01	1.8E-02	8.6E+01	1.6E+00	2.2E-02	4.1E-02
Heptanes	14.686	0.735	1.1E-01	1.7E-02	9.8E+01	1.6E+00	2.2E-02	4.1E-02
Benzene	0.200	1.508	3.0E-03	4.6E-04	7.8E+01	3.6E-02	5.0E-04	9.2E-04
Toluene	1.138	0.425	4.8E-03	7.4E-04	9.2E+01	6.8E-02	9.4E-04	1.7E-03
Ethylbenzene	0.155	0.151	2.3E-04	3.6E-05	1.1E+02	3.8E-03	5.3E-05	9.7E-05
Xylenes	1.763	0.180	3.2E-03	4.8E-04	1.1E+02	5.1E-02	7.1E-04	1.3E-03
2,2,4-Trimethylpentane	0.031	0.596	1.8E-04	2.8E-05	1.1E+02	3.2E-03	4.5E-05	8.3E-05
C8+ Heavies	59.154	3.400	2.0E+00	3.1E-01	1.1E+02	3.3E+01	4.6E-01	8.5E-01
	100.0		6.54			72.15	1.00	
Total Emissions:								1.84
Total HAP Emissions:								0.042

[1] An atmospheric analysis of a representative condensate sample (from wellpad OXF-131, Well #512441) is utilized to estimate the composition.

[2] Emission factors from AP-42 Section 7.1 "Liquid Storage Tanks" Tables 7.1-2, 7.1-3 and 7.1-5 (at 70 deg F or ~21 deg C) and Handbook of Chemistry and Physics: 84th Edition (at 295 K)

[3] Speciated emissions (tpy) = Speciated Weight Fraction x Calculated Controlled Liquid Loading Emissions (tpy). As methane and ethane will flash off prior to loading, the emissions from these constituents are not included in the speciation.

Company Name: EOT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Haul Roads

Estimated Potential Road Fugitive Emissions

Unpaved Road Emissions

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

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

Description	Weight of Empty Truck (tons)	Weight of Truck w/ Max Load (tons)	Mean Vehicle Weight (tons)	Length of Unpaved Road Traveled (mile/trip)	Trips Per Year	Mileage Per Year	Control (%)	Emissions (tpy) PM	PM_{10}	$PM_{2.5}$
Liquids Hauling	20	40	30	0.33	5,325	1,755	0	3.76	0.96	0.096
Employee Vehicles	3	3	3	0.33	200	66	0	0.05	0.01	0.001
Total Potential Emissions								**3.81**	**0.97**	**0.10**

Company Name: EQT Production, LLC
Facility Name: BIG-57 Wellpad
Project Description: G-70A Permit Application

Gas Analysis

Sample Location: BIG-57
HHV (Btu/scf): 1,106

Constituent	Natural Gas Stream Speciation (Mole %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt %)
Carbon Dioxide	0.1730	44.01	7.6E-02	4.3E-03	4.3E-01
Nitrogen	0.3310	28.01	9.3E-02	5.2E-03	5.2E-01
Methane	89.3700	16.04	1.4E+01	8.0E-01	8.0E+01
Ethane	8.4220	30.07	2.5E+00	1.4E-01	1.4E+01
Propane	1.2820	44.10	5.7E-01	3.2E-02	3.2E+00
Isobutane	0.1400	58.12	8.1E-02	4.5E-03	4.5E-01
n-Butane	0.1620	58.12	9.4E-02	5.3E-03	5.3E-01
Isopentane	0.0390	72.15	2.8E-02	1.6E-03	1.6E-01
n-Pentane	0.0210	72.15	1.5E-02	8.5E-04	8.5E-02
n-Hexane	0.002	86.18	1.7E-03	9.6E-05	9.6E-03
Cyclohexane	0.001	84.16	8.4E-04	4.7E-05	4.7E-03
Other Hexanes	0.007	86.18	6.0E-03	3.4E-04	3.4E-02
Heptanes	0.003	100.21	3.0E-03	1.7E-04	1.7E-02
2,2,4-Trimethylpentane	0.001	114.23	1.1E-03	6.4E-05	6.4E-03
Benzene*	<0.001	78.11	0	0	0
Toluene*	0.001	92.14	9.2E-04	5.2E-05	5.2E-03
Ethylbenzene*	<0.001	106.17	0	0	0
Xylenes*	<0.001	106.16	0	0	0
C8 + Heavies	0.045	114.23	5.1E-02	2.9E-03	2.9E-01
Totals	100.0		17.89	1.00	100

TOC (Total)	99.50	99.06
VOC (Total)	1.70	4.75
HAP (Total)	4.0E-03	0.02

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*************************************************************************************
******
*     Project Setup Information
    *
*************************************************************************************
******
Project File              : \\tsclient\Z\Client\EQT Corporation\West Virginia\WV
Production Wells\143901.0023\BIG 57\03 Draft\2014-1029 BIG-57 G70A
Application\Attach I - Emission Calcs\E&P Tank\20141106_EQT_BIG-57_Produced Water
Tanks.ept
Flowsheet Selection       : Oil Tank with Separator
Calculation Method        : RVP Distillation
Control Efficiency        : 100.0%
Known Separator Stream    : Low Pressure Oil
Entering Air Composition  : No

Filed Name                : BIG-57 Produced Water Storage Tanks
Date                      : 2014.11.06


*************************************************************************************
******
*     Data Input
    *
*************************************************************************************
******

Separator Pressure        : 50.00[psig]
Separator Temperature     : 60.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 55.00[F]
C10+ SG                   : 0.7860
C10+ MW                   : 175.925

-- Low Pressure Oil
-----------------------------------------------------------------------
   No.     Component              mol %
   1       H2S                    0.0000
   2       O2                     0.0000
   3       CO2                    0.0030
   4       N2                     0.0000
   5       C1                     0.2490
   6       C2                     0.2100
   7       C3                     0.2960
   8       i-C4                   0.1880
   9       n-C4                   0.4790
   10      i-C5                   0.7330
   11      n-C5                   0.7400
   12      C6                     1.0400
   13      C7                     5.2000
   14      C8                     9.7160
   15      C9                     7.8820
   16      C10+                  68.7410
   17      Benzene                0.0300
   18      Toluene                0.4910
   19      E-Benzene              0.1190
   20      Xylenes                3.1660
   21      n-C6                   0.7100
   22      224Trimethylp          0.0070

-- Sales Oil
-----------------------------------------------------------------------
```

Production Rate : 17.5[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 59.11
Reid Vapor Pressure : 0.60[psia]

****
******
* Calculation Results *
****
******

-- Emission Summary

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.080	0.018
Total HC	5.932	1.354

---------- E&P TANK

VOCs, C2+	5.744	1.311
VOCs, C3+	5.447	1.244

Uncontrolled Recovery Info.

Vapor	222.1800 x1E-3	[MSCFD]
HC Vapor	221.8900 x1E-3	[MSCFD]
GOR	12.70	[SCF/bbl]

-- Emission Composition

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.006	0.001
4	N2	0.000	0.000
5	C1	0.188	0.043
6	C2	0.297	0.068
7	C3	0.614	0.140
8	i-C4	0.507	0.116
9	n-C4	1.260	0.288
10	i-C5	1.517	0.346
11	n-C5	1.080	0.247
12	C6	0.142	0.032
13	C7	0.127	0.029
14	C8	0.075	0.017
15	C9	0.026	0.006
16	C10+	0.014	0.003
17	Benzene	0.002	0.000
18	Toluene	0.006	0.001
19	E-Benzene	0.001	0.000
20	Xylenes	0.013	0.003
21	n-C6	0.064	0.015
22	224Trimethylp	0.000	0.000
	Total	5.939	1.356

-- Stream Data

No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
			mol %	mol %	mol %	mol %	mol %	

mol %							
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000							
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000							
3	CO2	44.01	0.0030	0.0030	0.0000	0.0000	0.1320
0.1320							
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000							
5	C1	16.04	0.2490	0.2490	0.0000	0.0000	10.9582
10.9582							
6	C2	30.07	0.2100	0.2100	0.0000	0.0000	9.2407
9.2407							
7	C3	44.10	0.2960	0.2960	0.0003	0.0000	13.0113
13.0113							
8	i-C4	58.12	0.1880	0.1880	0.0029	0.0000	8.1486
8.1486							
9	n-C4	58.12	0.4790	0.4790	0.0188	0.0000	20.2651
20.2651							
10	i-C5	72.15	0.7330	0.7330	0.2928	0.0000	19.6579
19.6579							
11	n-C5	72.15	0.7400	0.7400	0.4318	0.0000	13.9893
13.9893							
12	C6	86.16	1.0400	1.0400	1.0274	0.0000	1.5807
1.5807							
13	C7	100.20	5.2000	5.2000	5.2925	0.0000	1.2232
1.2232							
14	C8	114.23	9.7160	9.7160	9.9273	0.0000	0.6288
0.6288							
15	C9	128.28	7.8820	7.8820	8.0607	0.0000	0.1990
0.1990							
16	C10+	175.93	68.7410	68.7410	70.3380	0.0000	0.0748
0.0748							
17	Benzene	78.11	0.0300	0.0300	0.0302	0.0000	0.0220
0.0220							
18	Toluene	92.13	0.4910	0.4910	0.5010	0.0000	0.0598
0.0598							
19	E-Benzene	106.17	0.1190	0.1190	0.1217	0.0000	0.0048
0.0048							
20	Xylenes	106.17	3.1660	3.1660	3.2370	0.0000	0.1120
0.1120							
21	n-C6	86.18	0.7100	0.7100	0.7104	0.0000	0.6906
0.6906							
22	224Trimethylp	114.24	0.0070	0.0070	0.0071	0.0000	0.0012
0.0012							
	MW		153.65	153.65	155.93	0.00	55.51
55.51							
	Stream Mole Ratio		1.0000	1.0000	0.9773	0.0000	0.0227
0.0227							
	Heating Value	[BTU/SCF]				0.00	3106.61
3106.61							
	Gas Gravity	[Gas/Air]				0.00	1.92
1.92							
	Bubble Pt. @ 100F	[psia]	11.40	11.40	0.52		
	RVP @ 100F	[psia]	3.18	3.18	0.51		
	Spec. Gravity @ 100F		0.734	0.734	0.736		

```
**********************************************************************************
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*     Project Setup Information
    *
**********************************************************************************
******
Project File              : \\tsclient\Z\Client\EQT Corporation\West Virginia\WV
Production Wells\143901.0023\BIG 57\03 Draft\2014-1029 BIG-57 G70A
Application\Attach I - Emission Calcs\E&P Tank\20141106_EQT_BIG-57_Sand Separator
Tank.ept
Flowsheet Selection       : Oil Tank with Separator
Calculation Method        : RVP Distillation
Control Efficiency        : 100.0%
Known Separator Stream    : Low Pressure Oil
Entering Air Composition  : No

Filed Name                : BIG-57 Sand Separator Tank
Date                      : 2014.11.06


**********************************************************************************
******
*     Data Input
    *
**********************************************************************************
******

Separator Pressure        : 50.00[psig]
Separator Temperature     : 60.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 55.00[F]
C10+ SG                   : 0.7860
C10+ MW                   : 175.925

-- Low Pressure Oil
--------------------------------------------------------------------------
   No.     Component             mol %
   1       H2S                   0.0000
   2       O2                    0.0000
   3       CO2                   0.0030
   4       N2                    0.0000
   5       C1                    0.2490
   6       C2                    0.2100
   7       C3                    0.2960
   8       i-C4                  0.1880
   9       n-C4                  0.4790
   10      i-C5                  0.7330
   11      n-C5                  0.7400
   12      C6                    1.0400
   13      C7                    5.2000
   14      C8                    9.7160
   15      C9                    7.8820
   16      C10+                 68.7410
   17      Benzene               0.0300
   18      Toluene               0.4910
   19      E-Benzene             0.1190
   20      Xylenes               3.1660
   21      n-C6                  0.7100
   22      224Trimethylp         0.0070

-- Sales Oil
--------------------------------------------------------------------------
```

Production Rate : 0.3[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 59.11
Reid Vapor Pressure : 0.60[psia]

****
******
* Calculation Results *
****
******

-- Emission Summary

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.000	0.000
Total HC	0.102	0.023

VOCs, C2+	0.098	0.022
VOCs, C3+	0.093	0.021

Uncontrolled Recovery Info.

Vapor	3.8100 x1E-3	[MSCFD]
HC Vapor	3.8000 x1E-3	[MSCFD]
GOR	12.70	[SCF/bbl]

-- Emission Composition

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.003	0.001
6	C2	0.005	0.001
7	C3	0.011	0.003
8	i-C4	0.009	0.002
9	n-C4	0.022	0.005
10	i-C5	0.026	0.006
11	n-C5	0.019	0.004
12	C6	0.002	0.000
13	C7	0.002	0.000
14	C8	0.001	0.000
15	C9	0.000	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.001	0.000
22	224Trimethylp	0.000	0.000
	Total	0.101	0.023

-- Stream Data

No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
			mol %	mol %	mol %	mol %	mol %	

mol %							
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000							
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000							
3	CO2	44.01	0.0030	0.0030	0.0000	0.0000	0.1320
0.1320							
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000							
5	C1	16.04	0.2490	0.2490	0.0000	0.0000	10.9582
10.9582							
6	C2	30.07	0.2100	0.2100	0.0000	0.0000	9.2407
9.2407							
7	C3	44.10	0.2960	0.2960	0.0003	0.0000	13.0113
13.0113							
8	i-C4	58.12	0.1880	0.1880	0.0029	0.0000	8.1486
8.1486							
9	n-C4	58.12	0.4790	0.4790	0.0188	0.0000	20.2651
20.2651							
10	i-C5	72.15	0.7330	0.7330	0.2928	0.0000	19.6579
19.6579							
11	n-C5	72.15	0.7400	0.7400	0.4318	0.0000	13.9893
13.9893							
12	C6	86.16	1.0400	1.0400	1.0274	0.0000	1.5807
1.5807							
13	C7	100.20	5.2000	5.2000	5.2925	0.0000	1.2232
1.2232							
14	C8	114.23	9.7160	9.7160	9.9273	0.0000	0.6288
0.6288							
15	C9	128.28	7.8820	7.8820	8.0607	0.0000	0.1990
0.1990							
16	C10+	175.93	68.7410	68.7410	70.3380	0.0000	0.0748
0.0748							
17	Benzene	78.11	0.0300	0.0300	0.0302	0.0000	0.0220
0.0220							
18	Toluene	92.13	0.4910	0.4910	0.5010	0.0000	0.0598
0.0598							
19	E-Benzene	106.17	0.1190	0.1190	0.1217	0.0000	0.0048
0.0048							
20	Xylenes	106.17	3.1660	3.1660	3.2370	0.0000	0.1120
0.1120							
21	n-C6	86.18	0.7100	0.7100	0.7104	0.0000	0.6906
0.6906							
22	224Trimethylp	114.24	0.0070	0.0070	0.0071	0.0000	0.0012
0.0012							
	MW		153.65	153.65	155.93	0.00	55.51
55.51							
	Stream Mole Ratio		1.0000	1.0000	0.9773	0.0000	0.0227
0.0227							
	Heating Value	[BTU/SCF]				0.00	3106.61
3106.61							
	Gas Gravity	[Gas/Air]				0.00	1.92
1.92							
	Bubble Pt. @ 100F	[psia]	11.40	11.40	0.52		
	RVP @ 100F	[psia]	3.18	3.18	0.51		
	Spec. Gravity @ 100F		0.734	0.734	0.736		

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: EQT BIG57
File Name: Z:\Client\EQT Corporation\West Virginia\WV Production Wells\143901.0023\BIG 57\03 Draft\2015-0116 BIG-57 G70A Application\Attach I - Emission Calcs\GLYCalc\20150126 EQT BIG-57 Dehy.ddf
Date: January 26, 2015

DESCRIPTION:

Description: 30 MMscfd dehy, no condenser, 800 psig, 70F, gas analysis from well 511391

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.1158	2.780	0.5074
Ethane	0.2036	4.887	0.8918
Propane	0.1518	3.644	0.6650
Isobutane	0.0403	0.968	0.1767
n-Butane	0.0724	1.738	0.3172
Isopentane	0.0235	0.564	0.1030
n-Pentane	0.0184	0.442	0.0807
n-Hexane	0.0043	0.103	0.0188
Cyclohexane	0.0113	0.272	0.0496
Other Hexanes	0.0104	0.249	0.0455
Heptanes	0.0163	0.391	0.0714
2,2,4-Trimethylpentane	0.0022	0.053	0.0096
Benzene	0.0614	1.473	0.2688
Toluene	0.2220	5.327	0.9722
Ethylbenzene	0.1743	4.184	0.7635
Xylenes	0.2526	6.063	1.1066
C8+ Heavies	0.8506	20.415	3.7258
Total Emissions	2.2314	53.553	9.7735
Total Hydrocarbon Emissions	2.2314	53.553	9.7735
Total VOC Emissions	1.9120	45.887	8.3743
Total HAP Emissions	0.7168	17.203	3.1395
Total BTEX Emissions	0.7103	17.047	3.1111

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.5792	37.901	6.9170
Ethane	0.8110	19.463	3.5520
Propane	0.2522	6.053	1.1048
Isobutane	0.0442	1.061	0.1937
n-Butane	0.0600	1.441	0.2629
Isopentane	0.0170	0.408	0.0744
n-Pentane	0.0106	0.253	0.0462
n-Hexane	0.0014	0.033	0.0060
Cyclohexane	0.0010	0.023	0.0042

Other Hexanes	0.0044	0.105	0.0192
Heptanes	0.0025	0.061	0.0111
2,2,4-Trimethylpentane	0.0007	0.017	0.0030
Benzene	0.0006	0.015	0.0028
Toluene	0.0015	0.035	0.0064
Ethylbenzene	0.0007	0.016	0.0029
Xylenes	0.0006	0.015	0.0028
C8+ Heavies	0.0123	0.296	0.0541
Total Emissions	2.7999	67.197	12.2635
Total Hydrocarbon Emissions	2.7999	67.197	12.2635
Total VOC Emissions	0.4097	9.833	1.7945
Total HAP Emissions	0.0055	0.131	0.0239
Total BTEX Emissions	0.0034	0.082	0.0149

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.6951	40.681	7.4243
Ethane	1.0146	24.350	4.4438
Propane	0.4040	9.697	1.7697
Isobutane	0.0846	2.030	0.3704
n-Butane	0.1325	3.179	0.5801
Isopentane	0.0405	0.972	0.1774
n-Pentane	0.0290	0.695	0.1269
n-Hexane	0.0057	0.136	0.0248
Cyclohexane	0.0123	0.295	0.0538
Other Hexanes	0.0148	0.355	0.0647
Heptanes	0.0188	0.452	0.0825
2,2,4-Trimethylpentane	0.0029	0.069	0.0126
Benzene	0.0620	1.488	0.2716
Toluene	0.2234	5.362	0.9786
Ethylbenzene	0.1750	4.200	0.7664
Xylenes	0.2533	6.079	1.1094
C8+ Heavies	0.8630	20.711	3.7798
Total Emissions	5.0313	120.751	22.0370
Total Hydrocarbon Emissions	5.0313	120.751	22.0370
Total VOC Emissions	2.3217	55.720	10.1689
Total HAP Emissions	0.7222	17.334	3.1634
Total BTEX Emissions	0.7137	17.129	3.1260

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	7.4243	7.4243	0.00
Ethane	4.4438	4.4438	0.00
Propane	1.7697	1.7697	0.00
Isobutane	0.3704	0.3704	0.00
n-Butane	0.5801	0.5801	0.00
Isopentane	0.1774	0.1774	0.00
n-Pentane	0.1269	0.1269	0.00
n-Hexane	0.0248	0.0248	0.00

Cyclohexane	0.0538	0.0538	0.00
Other Hexanes	0.0647	0.0647	0.00
Heptanes	0.0825	0.0825	0.00
2,2,4-Trimethylpentane	0.0126	0.0126	0.00
Benzene	0.2716	0.2716	0.00
Toluene	0.9786	0.9786	0.00
Ethylbenzene	0.7664	0.7664	0.00
Xylenes	1.1094	1.1094	0.00
C8+ Heavies	3.7798	3.7798	0.00
Total Emissions	22.0370	22.0370	0.00
Total Hydrocarbon Emissions	22.0370	22.0370	0.00
Total VOC Emissions	10.1689	10.1689	0.00
Total HAP Emissions	3.1634	3.1634	0.00
Total BTEX Emissions	3.1260	3.1260	0.00

EQUIPMENT REPORTS:

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages:	1.25	
Calculated Dry Gas Dew Point:	2.17	lbs. H2O/MMSCF
Temperature:	70.0	deg. F
Pressure:	800.0	psig
Dry Gas Flow Rate:	30.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0804	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	27.32	lbs. H2O/MMSCF
Specified Lean Glycol Recirc. Ratio:	3.00	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	7.95%	92.05%
Carbon Dioxide	99.94%	0.06%
Nitrogen	100.00%	0.00%
Methane	100.00%	0.00%
Ethane	99.99%	0.01%
Propane	99.98%	0.02%
Isobutane	99.97%	0.03%
n-Butane	99.96%	0.04%
Isopentane	99.96%	0.04%
n-Pentane	99.94%	0.06%
n-Hexane	99.90%	0.10%
Cyclohexane	99.56%	0.44%
Other Hexanes	99.93%	0.07%
Heptanes	99.81%	0.19%
2,2,4-Trimethylpentane	99.92%	0.08%
Benzene	95.18%	4.82%
Toluene	92.64%	7.36%
Ethylbenzene	89.99%	10.01%

Xylenes	85.51%	14.49%
C8+ Heavies	99.66%	0.34%

FLASH TANK

Flash Control: Vented to atmosphere
Flash Temperature: 120.0 deg. F
Flash Pressure: 50.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.98%	0.02%
Carbon Dioxide	48.56%	51.44%
Nitrogen	6.44%	93.56%
Methane	6.83%	93.17%
Ethane	20.07%	79.93%
Propane	37.57%	62.43%
Isobutane	47.71%	52.29%
n-Butane	54.68%	45.32%
Isopentane	58.28%	41.72%
n-Pentane	63.75%	36.25%
n-Hexane	76.04%	23.96%
Cyclohexane	92.46%	7.54%
Other Hexanes	70.65%	29.35%
Heptanes	86.58%	13.42%
2,2,4-Trimethylpentane	76.37%	23.63%
Benzene	99.03%	0.97%
Toluene	99.39%	0.61%
Ethylbenzene	99.66%	0.34%
Xylenes	99.78%	0.22%
C8+ Heavies	98.74%	1.26%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	25.43%	74.57%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.86%	99.14%
n-Pentane	0.78%	99.22%
n-Hexane	0.66%	99.34%
Cyclohexane	3.46%	96.54%
Other Hexanes	1.42%	98.58%
Heptanes	0.58%	99.42%
2,2,4-Trimethylpentane	1.96%	98.04%
Benzene	5.05%	94.95%
Toluene	7.96%	92.04%
Ethylbenzene	10.46%	89.54%

Xylenes	12.98%	87.02%
C8+ Heavies	12.22%	87.78%

STREAM REPORTS:

WET GAS STREAM

Temperature: 70.00 deg. F
Pressure: 814.70 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.75e-002	3.42e+001
Carbon Dioxide	1.73e-001	2.51e+002
Nitrogen	3.31e-001	3.05e+002
Methane	8.93e+001	4.72e+004
Ethane	8.42e+000	8.34e+003
Propane	1.28e+000	1.86e+003
Isobutane	1.40e-001	2.68e+002
n-Butane	1.62e-001	3.10e+002
Isopentane	3.90e-002	9.27e+001
n-Pentane	2.10e-002	4.99e+001
n-Hexane	2.00e-003	5.68e+000
Cyclohexane	9.99e-004	2.77e+000
Other Hexanes	7.00e-003	1.99e+001
Heptanes	3.00e-003	9.90e+000
2,2,4-Trimethylpentane	9.99e-004	3.76e+000
Benzene	5.00e-004	1.29e+000
Toluene	9.99e-004	3.04e+000
Ethylbenzene	5.00e-004	1.75e+000
Xylenes	5.00e-004	1.75e+000
C8+ Heavies	4.50e-002	2.53e+002
Total Components	100.00	5.90e+004

DRY GAS STREAM

Temperature: 70.00 deg. F
Pressure: 814.70 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.58e-003	2.72e+000
Carbon Dioxide	1.73e-001	2.51e+002
Nitrogen	3.31e-001	3.05e+002
Methane	8.94e+001	4.72e+004
Ethane	8.42e+000	8.34e+003
Propane	1.28e+000	1.86e+003
Isobutane	1.40e-001	2.68e+002
n-Butane	1.62e-001	3.10e+002
Isopentane	3.90e-002	9.27e+001
n-Pentane	2.10e-002	4.99e+001
n-Hexane	2.00e-003	5.67e+000

Cyclohexane	9.96e-004	2.76e+000
Other Hexanes	6.99e-003	1.99e+001
Heptanes	2.99e-003	9.89e+000
2,2,4-Trimethylpentane	9.99e-004	3.76e+000
Benzene	4.76e-004	1.22e+000
Toluene	9.26e-004	2.81e+000
Ethylbenzene	4.50e-004	1.57e+000
Xylenes	4.28e-004	1.50e+000
C8+ Heavies	4.48e-002	2.52e+002
Total Components	100.00	5.90e+004

LEAN GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 1.27e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	7.04e+002
Water	1.50e+000	1.07e+001
Carbon Dioxide	2.18e-012	1.56e-011
Nitrogen	1.70e-013	1.22e-012
Methane	7.97e-018	5.69e-017
Ethane	6.70e-008	4.79e-007
Propane	2.30e-009	1.64e-008
Isobutane	3.55e-010	2.54e-009
n-Butane	4.60e-010	3.28e-009
Isopentane	2.85e-005	2.04e-004
n-Pentane	2.04e-005	1.46e-004
n-Hexane	3.98e-006	2.84e-005
Cyclohexane	5.68e-005	4.06e-004
Other Hexanes	2.09e-005	1.49e-004
Heptanes	1.32e-005	9.47e-005
2,2,4-Trimethylpentane	6.13e-006	4.38e-005
Benzene	4.57e-004	3.26e-003
Toluene	2.68e-003	1.92e-002
Ethylbenzene	2.85e-003	2.04e-002
Xylenes	5.27e-003	3.77e-002
C8+ Heavies	1.66e-002	1.18e-001
Total Components	100.00	7.15e+002

RICH GLYCOL STREAM

Temperature: 70.00 deg. F
Pressure: 814.70 psia
Flow Rate: 1.34e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.37e+001	7.04e+002
Water	5.61e+000	4.22e+001
Carbon Dioxide	2.07e-002	1.56e-001
Nitrogen	1.62e-003	1.22e-002
Methane	2.26e-001	1.70e+000
Ethane	1.35e-001	1.01e+000

Propane	5.38e-002	4.04e-001
Isobutane	1.13e-002	8.46e-002
n-Butane	1.76e-002	1.32e-001
Isopentane	5.42e-003	4.07e-002
n-Pentane	3.88e-003	2.91e-002
n-Hexane	7.57e-004	5.69e-003
Cyclohexane	1.69e-003	1.27e-002
Other Hexanes	1.99e-003	1.49e-002
Heptanes	2.52e-003	1.89e-002
2,2,4-Trimethylpentane	3.89e-004	2.92e-003
Benzene	8.69e-003	6.53e-002
Toluene	3.23e-002	2.43e-001
Ethylbenzene	2.60e-002	1.95e-001
Xylenes	3.87e-002	2.91e-001
C8+ Heavies	1.31e-001	9.81e-001
Total Components	100.00	7.51e+002

FLASH TANK OFF GAS STREAM

Temperature: 120.00 deg. F
Pressure: 64.70 psia
Flow Rate: 5.17e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.60e-001	8.82e-003
Carbon Dioxide	1.34e+000	8.01e-002
Nitrogen	2.98e-001	1.14e-002
Methane	7.23e+001	1.58e+000
Ethane	1.98e+001	8.11e-001
Propane	4.20e+000	2.52e-001
Isobutane	5.58e-001	4.42e-002
n-Butane	7.58e-001	6.00e-002
Isopentane	1.73e-001	1.70e-002
n-Pentane	1.07e-001	1.06e-002
n-Hexane	1.16e-002	1.36e-003
Cyclohexane	8.35e-003	9.57e-004
Other Hexanes	3.73e-002	4.38e-003
Heptanes	1.86e-002	2.54e-003
2,2,4-Trimethylpentane	4.44e-003	6.91e-004
Benzene	5.95e-003	6.34e-004
Toluene	1.17e-002	1.47e-003
Ethylbenzene	4.59e-003	6.65e-004
Xylenes	4.45e-003	6.44e-004
C8+ Heavies	5.32e-002	1.23e-002
Total Components	100.00	2.90e+000

FLASH TANK GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 1.34e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.40e+001	7.04e+002
Water	5.63e+000	4.22e+001

Carbon Dioxide	1.01e-002	7.57e-002
Nitrogen	1.04e-004	7.82e-004
Methane	1.55e-002	1.16e-001
Ethane	2.72e-002	2.04e-001
Propane	2.03e-002	1.52e-001
Isobutane	5.39e-003	4.03e-002
n-Butane	9.68e-003	7.24e-002
Isopentane	3.17e-003	2.37e-002
n-Pentane	2.48e-003	1.86e-002
n-Hexane	5.78e-004	4.33e-003
Cyclohexane	1.57e-003	1.17e-002
Other Hexanes	1.41e-003	1.05e-002
Heptanes	2.19e-003	1.64e-002
2,2,4-Trimethylpentane	2.98e-004	2.23e-003
Benzene	8.64e-003	6.46e-002
Toluene	3.22e-002	2.41e-001
Ethylbenzene	2.60e-002	1.95e-001
Xylenes	3.88e-002	2.90e-001
C8+ Heavies	1.29e-001	9.69e-001
Total Components	100.00	7.48e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 6.75e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.81e+001	3.14e+001
Carbon Dioxide	9.66e-002	7.57e-002
Nitrogen	1.57e-003	7.82e-004
Methane	4.06e-001	1.16e-001
Ethane	3.80e-001	2.04e-001
Propane	1.93e-001	1.52e-001
Isobutane	3.90e-002	4.03e-002
n-Butane	7.00e-002	7.24e-002
Isopentane	1.83e-002	2.35e-002
n-Pentane	1.43e-002	1.84e-002
n-Hexane	2.80e-003	4.30e-003
Cyclohexane	7.56e-003	1.13e-002
Other Hexanes	6.77e-003	1.04e-002
Heptanes	9.14e-003	1.63e-002
2,2,4-Trimethylpentane	1.08e-003	2.19e-003
Benzene	4.41e-002	6.14e-002
Toluene	1.35e-001	2.22e-001
Ethylbenzene	9.22e-002	1.74e-001
Xylenes	1.34e-001	2.53e-001
C8+ Heavies	2.81e-001	8.51e-001
Total Components	100.00	3.37e+001

CERTIFICATE OF ANALYSIS

Number : 2010060257-001A

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

Gas Analytical Services
Chuck Honaker
PO Box 1028

Bridgeport, WV 26330

Field:	Equitable Production	**Report Date:**	06/25/10
Station:	Well 511391	**Sample Of:**	Gas
Location:	W511391	**Sample Date:**	06/21/2010 11.30
Sample Point:	Wellhead	**Sample Conditions:**	25 psi ,N.G.° F
Cylinder # :	GAS	**PO / Ref. No.:**	
Comments:			

Analytical Data

Components	Mol %	Wt%	GPM at 15.025 psia	Method	Lab Tech.	Date Analyzed
				GPA-2286		06/25/10
N2	0.331	0.519	0.037	(MC14)		
CO2	0.173	0.424	0.030			
METHANE	89.370	80.069	15.450			
ETHANE	8.422	14.141	2.297			
PROPANE	1.282	3.155	0.360			
I-BUTANE	0.140	0.452	0.047			
N-BUTANE	0.162	0.525	0.052			
I-PENTANE	0.039	0.156	0.015			
N-PENTANE	0.021	0.084	0.008			
I-HEXANES	0.007	0.031	0.003			
N-HEXANE	0.002	0.009	0.001			
BENZENE	NIL	0.001	NIL			
CYCLOHEXANE	0.001	0.003	NIL			
I-HEPTANES	0.002	0.015	0.001			
N-HEPTANE	0.001	0.003	NIL			
TOLUENE	0.001	0.003	NIL			
I-OCTANES	0.001	0.017	0.001			
N-OCTANE	NIL	0.003	NIL			
*E-BENZENE	NIL	0.001	NIL			
*m,o,&p-XYLENE	NIL	0.005	NIL			
I-NONANES	NIL	0.008	0.001			
N-NONANE	NIL	0.003	NIL			
I-DECANES	NIL	0.006	0.001			
N-DECANE	0.001	0.004	NIL			
UNDECANES	0.026	0.192	0.014			
DODECANES	0.016	0.157	0.012			
TRIDECANES	NIL	NIL	NIL			
TETRADECANES +	0.002	0.014	0.001			
TOTALS	100.000	100.000	18.331			

Brian Gaspard
Data Reviewer

CERTIFICATE OF ANALYSIS

Number : 2010060257-001A

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Field:	Equitable Production	**Report Date:**	06/25/10
Station:	Well 511391	**Sample Of:**	Gas
Location:	W511391	**Sample Date:**	06/21/2010 11:30
Sample Point:	Wellhead	**Sample Conditions:**	25 psi ,N.G.° F
Cylinder # :	GAS	**PO / Ref. No.:**	
Comments:			

Analytical Data

Components	Mol %	Wt%	GPM at 15.025 psia	Method	Lab Tech.	Date Analyzed
				GPA-2286		06/25/10
N2	0.331	0.519	0.037	(MC14)		
CO2	0.173	0.424	0.030			
METHANE	89.370	80.069	15.450			
ETHANE	8.422	14.141	2.297			
PROPANE	1.282	3.155	0.360			
I-BUTANE	0.140	0.452	0.047			
N-BUTANE	0.162	0.525	0.052			
I-PENTANE	0.039	0.156	0.015			
N-PENTANE	0.021	0.084	0.008			
HEXANES PLUS	0.060	0.475	0.035			
TOTALS	100.000	100.000	18.331			

CALCULATED VALUES	TOTAL	C6+	C7+
MOLECULAR WEIGHT	17.906	141.044	149.721
REAL DRY BTU AT 15.025 PSIA, 60 °F	1128.3	7778.6	8237.5
REAL WET BTU AT 15.025 PSIA, 60 °F	1109.9	7646.7	8097.8
RELATIVE DENSITY	0.6195	4.8591	5.1539

	TOTAL	C2+	IC5+
GPM's AT 15.025 PSIA, 60 °F	18.3314	2.8140	0.0580

COMPRESSIBILITY FACTOR 0.9975

CERTIFICATE OF ANALYSIS

Number : 2010060257-001A

LAFAYETTE LABORATORY
500 AMBASSADOR CAFFERY PKWY.
SCOTT, LOUISIANA 70563-1790
PHONE (337) 237-4775
FAX (337) 237-8005

Gas Analytical Services
Chuck Honaker
PO Box 1028

Bridgeport, WV 26330

Field:	Equitable Production	**Report Date:**	06/25/10
Station:	Well 511391	**Sample Of:**	Gas
Location:	W511391	**Sample Date:**	06/21/2010 11.30
Sample Point:	Wellhead	**Sample Conditions:**	25 psi ,N.G.° F
Cylinder # :	GAS	**PO / Ref. No.:**	
Comments:			

Analytical Data

Components	Mol %	Wt%	GPM at 15.025 psia	Method	Lab Tech.	Date Analyzed
				GPA-2286		06/25/10
N2	0.331	0.519	0.037	(MC14)		
CO2	0.173	0.424	0.030			
METHANE	89.370	80.069	15.450			
ETHANE	8.422	14.141	2.297			
PROPANE	1.282	3.155	0.360			
I-BUTANE	0.140	0.452	0.047			
N-BUTANE	0.162	0.525	0.052			
I-PENTANE	0.039	0.156	0.015			
N-PENTANE	0.021	0.084	0.008			
HEXANES	0.009	0.040	0.004			
HEPTANES PLUS	0.051	0.435	0.031			
TOTALS	100.000	100.000	18.331			

CALCULATED VALUES	TOTAL	C6+	C7+
MOLECULAR WEIGHT	17.906	141.044	149.721
REAL DRY BTU AT 14.73 PSIA, 60 °F	1106.0	7625.9	8075.7
REAL WET BTU AT 14.73 PSIA, 60 °F	1088.0	7494.1	7936.0
RELATIVE DENSITY	0.6195	4.8591	5.1539

	TOTAL	C2+	IC5+
GPM's AT 15.025 PSIA, 60 °F	18.331	2.814	0.058

COMPRESSIBILITY FACTOR 0.998

Certificate of Analysis

Number: 2030-14050222-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

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

June 04, 2014

Field: EQT Production
Station Name: 514570
Sample Point:
Cylinder No: GAS
Analyzed: 06/03/2014 14:49:42 by GR

Sampled By: JB-GAS
Sample Of: Liquid Spot
Sample Date: 05/16/2014 10:00
Sample Conditions: 50 psig
Method: GPA-2186M/GPA-2103

Analytical Data

Components	Mol. %	MW	Wt. %	Sp. Gravity	L.V. %
Nitrogen	NIL	NIL	NIL	NIL	NIL
Methane	0.249	16.043	0.026	0.300	0.067
Carbon Dioxide	0.003	44.010	0.001	0.817	0.001
Ethane	0.210	30.069	0.041	0.356	0.089
Propane	0.296	44.096	0.085	0.507	0.129
Iso-Butane	0.188	58.122	0.071	0.563	0.097
n-Butane	0.479	58.122	0.181	0.584	0.239
Iso-Pentane	0.733	72.149	0.344	0.625	0.426
n-Pentane	0.740	72.149	0.347	0.631	0.426
i-Hexanes	1.040	85.190	0.576	0.667	0.669
n-Hexane	0.710	86.175	0.398	0.664	0.464
2,2,4-Trimethylpentane	0.007	114.231	0.005	0.697	0.006
Benzene	0.030	78.114	0.015	0.885	0.013
Heptanes	5.200	98.621	3.336	0.700	3.686
Toluene	0.491	92.141	0.294	0.872	0.261
Octanes	9.716	111.038	7.017	0.728	7.455
Ethylbenzene	0.119	106.167	0.082	0.872	0.073
Xylenes	3.166	106.167	2.186	0.869	1.945
Nonanes	7.882	123.939	6.356	0.746	6.585
Decanes Plus	68.741	175.925	78.639	0.786	77.369
	100.000		100.000		100.000

Physical Properties	Total	C10+
Specific Gravity at 60°F	0.7733	0.7860
API Gravity at 60°F	51.493	48.525
Molecular Weight	153.770	175.925
Pounds per Gallon (in Vacuum)	6.447	6.553
Pounds per Gallon (in Air)	6.440	6.546
Cu. Ft. Vapor per Gallon @ 14.73 psia	15.873	14.103

Hydrocarbon Laboratory Manager

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

Certificate of Analysis

Number: 2030-14050222-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

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

June 04, 2014

Field: EQT Production
Station Name: 514570
Sample Point:
Cylinder No: GAS
Analyzed: 06/03/2014 14:49:42 by GR

Sampled By: JB-GAS
Sample Of: Liquid Spot
Sample Date: 05/16/2014 10:00
Sample Conditions: 50 psig
Method: GPA-2186M/GPA-2103

Analytical Data

Components	Mol. %	MW	Wt. %	Sp. Gravity	L.V. %
Nitrogen	NIL	NIL	NIL	NIL	NIL
Carbon Dioxide	0.003	44.010	0.001	0.817	0.001
Methane	0.249	16.043	0.026	0.300	0.067
Ethane	0.210	30.069	0.041	0.356	0.089
Propane	0.296	44.096	0.085	0.507	0.129
Iso-butane	0.188	58.122	0.071	0.563	0.097
n-Butane	0.479	58.122	0.181	0.584	0.239
Iso-pentane	0.733	72.149	0.344	0.625	0.426
n-Pentane	0.740	72.149	0.347	0.631	0.426
Hexanes	1.750	85.590	0.974	0.666	1.133
Heptanes Plus	95.352	157.930	97.930	0.778	97.393
	100.000		100.000		100.000

Physical Properties	Total	C7+
Specific Gravity at 60°F	0.7733	0.7776
API Gravity at 60°F	51.493	50.479
Molecular Weight	153.770	157.930
Pounds per Gallon (in Vacuum)	6.447	6.483
Pounds per Gallon (in Air)	6.440	6.476
Cu. Ft. Vapor per Gallon @ 14.73 psia	15.873	15.541

Hydrocarbon Laboratory Manager

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

Certificate of Analysis

Number: 2030-14050222-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

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

June 04, 2014

Field: EQT Production
Station Name: 514570
Sample Point:
Cylinder No: GAS

Sampled By: JB-GAS
Sample Of: Liquid Spot
Sample Date: 05/16/2014 10:00
Sample Conditions: 50 psig

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Color Visual	Proprietary	Straw			CM	06/03/2014
API Gravity @ 60° F	ASTM D-5002	56.52	°		CM	06/03/2014
Specific Gravity @ 60/60° F	ASTM D-5002	0.7526			CM	06/03/2014
Density @ 60° F	ASTM D-5002	0.7519	g/ml		CM	06/03/2014
Shrinkage Factor	Proprietary	0.9995			CM	06/03/2014
Flash Factor	Proprietary	2.9417	Cu. Ft./S.T. Bbl		CM	06/03/2014

Hydrocarbon Laboratory Manager

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

ATTACHMENT J

Class I Legal Advertisement

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that EQT Production has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Class II General Permit (G70-A) for the existing natural gas production wellpad BIG-57. The facility is located in Wetzel, West Virginia, about 4 miles north of Smithfield, WV at 39.55322, -80.52688.

The applicant estimates the potential to discharge the following Regulated Air Pollutants associated with this facility:

Pollutant	Emissions (tons per year)
NO_X	2.68
CO	2.25
VOC	37.51
SO_2	0.02
PM	4.01
Total HAPs	3.90
Carbon Dioxide Equivalents (CO_2e)	4,161

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

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

Dated this the 28th day of January, 2015.

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

ATTACHMENT O

Emission Summary Sheet

G70-A EMISSIONS SUMMARY SHEET

Emission Point ID No.	Emission Point Type[1]	Emission Unit Vented Through This Point		Air Pollution Control Device		All Regulated Pollutants - Chemical Name/CAS[2]	Maximum Potential Uncontrolled Emissions[3]		Maximum Potential Controlled Emissions[4]		Emission Form or Phase	Est. Method Used[5]
		ID No.	Source	ID No.	Device Type	*(Speciate VOCs & HAPS)*	lb/hr	ton/yr	lb/hr	ton/yr	*(At exit conditions, Solid, Liquid or Gas/Vapor)*	
E014 – E017, E019 (Total – All condensate tanks , Dehy Drip Tank)	Upward Vertical Stack	S014–S017, S019	Tanks	N/A	N/A	VOC HAPs	4.98 0.07	21.79 0.32	4.98 0.07	21.79 0.32	Gas/Vapor	O[A] O[A]
E010-E013 (Total – All heaters)	Upward Vertical Stack	S010-S013	Line Heaters	N/A	N/A	NOx CO $PM/PM_{10}/PM_{2.5}$ SO_2 VOC CO_{2e}	0.56 0.47 0.04 <0.01 0.03 721	2.44 2.05 0.19 0.01 0.13 3,157	0.56 0.47 0.04 <0.01 0.03 721	2.44 2.05 0.19 0.01 0.13 3,157	Gas/Vapor	O[B] O[B] O[B] O[B] O[B] O[C]
E009	Upward Vertical Stack	S009	Thermoelectric Generator	N/A	N/A	NOx CO $PM/PM_{10}/PM_{2.5}$ SO_2 VOC CO_{2e}	<0.01 <0.01 <0.01 <0.01 <0.01 3	0.01 0.01 <0.01 <0.01 <0.01 15	<0.01 <0.01 <0.01 <0.01 <0.01 3	0.01 0.01 <0.01 <0.01 <0.01 15	Gas/Vapor	O[B] O[B] O[B] O[B] O[B] O[C]
E007	Upward Vertical Stack	S007	Dehydrator	N/A	N/A	VOC HAP	2.55 0.79	11.18 3.48	2.55 0.79	11.18 3.48	Gas/Vapor	O[D] O[D]
E008	Upward Vertical Stack	S008	Reboiler	N/A	N/A	NOx CO $PM/PM_{10}/PM_{2.5}$ SO_2 VOC CO_{2e}	0.05 0.04 <0.01 <0.01 <0.01 68	0.23 0.19 0.02 <0.01 0.01 296	0.05 0.04 <0.01 <0.01 <0.01 68	0.23 0.19 0.02 <0.01 0.01 296	Gas/Vapor	O[B] O[B] O[B] O[B] O[B] O[C]
E018	Upward Vertical Stack	S018	Sand Separator Tank	N/A	N/A	VOC HAPs	0.02 <0.01	0.09 <0.01	0.02 <0.01	0.09 <0.01	Gas/Vapor	O[A] O[A]
E020	Upward Vertical Stack	S020	Liquid Loading	N/A	N/A	VOC HAP	0.42 0.01	1.84 0.04	0.42 0.01	1.84 0.04	Gas/Vapor	O[B] O[B]

A – E&P Tanks
B – Emissions calculated using AP-42 Section 1.4
C – Emissions calculated according to 40 CFR 98 Subpart C
D – GRI GlyCalc