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Pittsburgh PA 15222  
www.eqt.com

TEL: (412) 553-7848

Regina Henry  
Supervisor, Environmental

October 13, 2016

VIA FEDEX

WVDEP  
Division of Air Quality  
Attn: Mr. Robert Keatley  
601 57th Street, SE  
Charleston, WV 25304

RE: **R13-3095A Modification Application  
Pandora Compressor Station**



Dear Mr. Keatley,

EQM Gathering Opco, LLC is submitting a modification application for its Pandora Compressor Station currently operating in Doddridge County. The purpose of this application is to increase the emission limits on two compressor engines, update the permit regarding horsepower for two engines not yet constructed, revise the number of tanks at the site and include emissions from pigging operations.

The application forms and required supporting documents are provided in the associated reports and attachments to this letter.

The legal notice is scheduled to be advertised in the next few days. Upon receipt, the Affidavit of Publication will be submitted to your office. Please contact me for payment of the application fees.

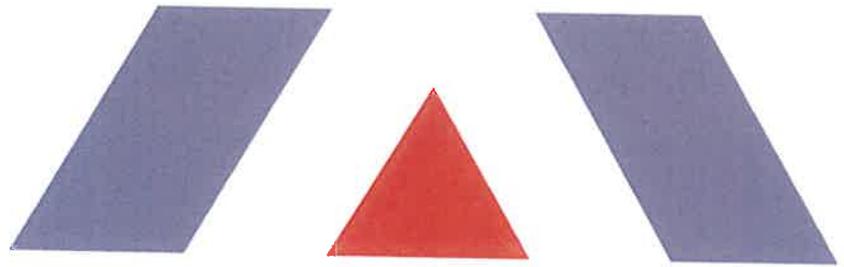
If you have any questions regarding this application, please feel free to contact me at (412) 553-7848 or by email at rhenry@eqt.com.

Sincerely,  
**EQM Gathering Opco, LLC**

  
Regina Henry  
Supervisor, Environmental

Cc: Kimberly Gissy, EQT

EQT Gathering, LLC  
Pandora Station  
017-00058  
R13-3095B  
Jon Carney



**PROJECT REPORT**  
**EQM Gathering Opco, LLC > Pandora Compressor Station**

**R13 Permit Modification**

**R13-3095A**

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

October 2016

**Trinity**   
**Consultants**

*Environmental solutions delivered uncommonly well*

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# 1. INTRODUCTION

EQM Gathering Opco, LLC (EQM) is submitting this modification application to the West Virginia Department of Environmental Protection (WVDEP) for a natural gas gathering facility located in Doddridge County, West Virginia (Pandora Station). Specifically, this application seeks to authorize an increase in the current emission limits for the two (2) existing Caterpillar G3616 compressor engines (permitted under R13 Permit No. R13-3095A as S1-S2), as well as increase the rated capacities of G3608 Caterpillar compressor engines (permitted under Permit no. R13-3095A as S3-S4), which have yet to be installed at the Pandora Station.

## 1.1. FACILITY DESCRIPTION

The Pandora Station is a natural gas gathering facility. Natural gas and liquids (mostly produced water) from nearby wells will undergo compression and dehydration before it is transported to a gas gathering line for additional processing. The produced fluid will be stored in storage vessels.

The Pandora Station is currently permitted under permit no: R13-3095A and consists of the following equipment:

- > Four natural gas fired compressor engines - Two (2) 4,735 HP Caterpillar 4-stroke lean burn compressor engines and two (2) 2,370 HP Caterpillar compressor engines. Each engine is equipped with an oxidation catalyst for carbon monoxide (CO), volatile organic compounds (VOC), and formaldehyde emissions control;
- > Two (2) natural gas fired fuel gas heaters (rated at 0.77MMBtu/hr);
- > Two (2) triethylene glycol (TEG) dehydration units (120 MMscfd) each controlled by a flare (each rated at 3 MMBtu/hr), with associated reboilers (each rated at 2.31 MMBtu/hr);
- > Nine (9) microturbine generators (each rated 65 KW);
- > Two (2) 210 bbl storage tanks for produced fluids controlled by one (1) enclosed ground flare (rated at 41 MMBtu/hr);
- > Eight (8) miscellaneous storage (each rated at 4,200 gallons or less);

As part of this application, EQM seeks to:

- > Increase the current emission limits of the existing Caterpillar G3616 compressor engines (S1 & S2) at the facility;
- > Replace the existing Caterpillar G3608 engines with a larger Caterpillar G3608 engine and update the associated emission limits;
- > Update the current permit to include one additional microturbine (S19) to the equipment list. This equipment was installed at the site last year and was determined to be exempt from permitting; and
- > Update the current permit to include four (4) lube oil tanks (each 300 gallon capacity) and three (3) methanol tanks (each 500 gallon capacity). The tanks are currently located at the facility.

A process flow diagram is included as Attachment F.

## 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 Pandora Station for air permitting purposes if and only if all three elements of the “stationary source” definition above are fulfilled. There are currently no facilities within a half-mile radius of the Pandora Station. Therefore, the Pandora Station should be considered a separate stationary source with respect to permitting programs, including Title V and Prevention of Significant Deterioration (PSD). As discussed in this application, the facility is a minor source of air emissions with respect to New Source Review (NSR) and Title V permitting. Refer to Attachment D for detailed discussion regarding applicable requirements and compliance demonstration methodology.

### 1.3. R-13 APPLICATION ORGANIZATION

This R-13 permit application is organized as follows:

- > Section 2: Sample Emission Source Calculations;
- > Section 3: R-13 Application Forms;
- > Attachment A: Business Certificate;
- > Attachment B: Map;
- > Attachment C: Installation and Start Up Schedule;
- > Attachment D: Regulatory Discussion;
- > Attachment E: Plot Plan;
- > Attachment F: Detailed Process Flow Diagram;
- > Attachment G: Process Description;
- > Attachment I: Emission Units Table;
- > Attachment J: Emission Points Data Summary Sheet;
- > Attachment K: Fugitive Emissions Data Summary Sheet;
- > Attachment L: Emissions Unit Data Sheets;
- > Attachment M: Air Pollution Control Device Sheet;
- > Attachment N: Supporting Emission Calculations;
- > Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans; and
- > Attachment P: Public Notice.

## 2. SAMPLE EMISSION SOURCE CALCULATIONS

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The characteristics of air emissions from the proposed project at the Pandora Station, along with the methodology for calculating emissions, are briefly described in this section of the application. Detailed emission calculations are presented in Appendix N of this application.

Emissions from the proposed project will result from natural gas combustion in the compressor engines and fugitive emissions from component leaks of the station. The project will not result in any emissions increase from the existing units (i.e. the fuel heaters, TEG dehydrator, microturbines). The methods by which emissions from each of these source types is calculated are summarized below.

- > **Compressor Engines:** Potential emissions from the compressor engines have been calculated using manufacturer's data and AP-42 emission factors where no manufacturer's data was available. Manufacturer's data was available for NO<sub>x</sub>, CO, VOC, formaldehyde, and methane and CO<sub>2</sub>. For PM/PM<sub>10</sub>/PM<sub>2.5</sub> and HAPs, the appropriate emission factors were chosen from AP-42 and were then multiplied by the maximum heat input (MMBtu/hr) of each engine in order to determine the tpy and lb/hr emissions.<sup>1</sup> These calculations assume a site-specific heat content of natural gas of 1,131 Btu/scf. Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.<sup>2</sup>
- > **Fugitive Equipment Leaks:** Emissions of VOC and HAPs from leaking equipment components have been estimated using project 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.<sup>3</sup>

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<sup>1</sup> U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 1.4, *Natural Gas Combustion*, Supplement D, July 1998.

<sup>2</sup> 40 CFR 98 Subpart C, *General Stationary Fuel combustion Sources*, Tables C-1 and C-2.

<sup>3</sup> 40 CFR 98 Subpart W, *Petroleum and Natural Gas Systems*, Section 98.233(r), *Population Count and Emission Factors*.

### 3. R-13 APPLICATION FORMS

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The WVDEP permit application forms contained in this application include all applicable R-13 application forms including the required attachments.

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION  
**DIVISION OF AIR QUALITY**



601 57<sup>th</sup> Street, SE  
 Charleston, WV 25304  
 (304) 926-0475  
[www.dep.wv.gov/daq](http://www.dep.wv.gov/daq)

**APPLICATION FOR NSR PERMIT  
 AND  
 TITLE V PERMIT REVISION  
 (OPTIONAL)**

PLEASE CHECK ALL THAT APPLY TO NSR (45CSR13) (IF KNOWN):

- CONSTRUCTION     MODIFICATION     RELOCATION  
 CLASS I ADMINISTRATIVE UPDATE     TEMPORARY  
 CLASS II ADMINISTRATIVE UPDATE     AFTER-THE-FACT

PLEASE CHECK TYPE OF 45CSR30 (TITLE V) REVISION (IF ANY):

- ADMINISTRATIVE AMENDMENT     MINOR MODIFICATION  
 SIGNIFICANT MODIFICATION

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS ATTACHMENT S TO THIS APPLICATION

**FOR TITLE V FACILITIES ONLY:** Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

**Section I. General**

1. Name of applicant (as registered with the WV Secretary of State's Office): EQM Gathering Opco, LLC		2. Federal Employer ID No. (FEIN): 32-0422322	
3. Name of facility (if different from above): Pandora Station		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: 625 Liberty Avenue, Suite 1700  Pittsburgh, PA 15222		5B. Facility's present physical address:	
6. <b>West Virginia Business Registration.</b> Is the applicant a resident of the State of West Virginia? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - If YES, provide a copy of the <b>Certificate of Incorporation/Organization/Limited Partnership</b> (one page) including any name change amendments or other Business Registration Certificate as <b>Attachment A</b> . - If NO, provide a copy of the <b>Certificate of Authority/Authority of L.L.C./Registration</b> (one page) including any name change amendments or other Business Certificate as <b>Attachment A</b> .			
7. If applicant is a subsidiary corporation, please provide the name of parent corporation:    EQT Corporation			
8. Does the applicant own, lease, have an option to buy or otherwise have control of the <i>proposed site</i> ? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - If YES, please explain:    Applicant owns the site - If NO, you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be <b>constructed, modified, relocated, administratively updated</b> or <b>temporarily permitted</b> (e.g., coal preparation plant, primary crusher, etc.):    Natural Gas Gathering Facility		10. North American Industry Classification System (NAICS) code for the facility:  211111	
11A. DAQ Plant ID No. (for existing facilities only): 017 - 00058		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): R13-3095A	

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



<p>12A.</p> <ul style="list-style-type: none"> <li>– For <b>Modifications, Administrative Updates or Temporary permits</b> at an existing facility, please provide directions to the <i>present location</i> of the facility from the nearest state road;</li> <li>– For <b>Construction or Relocation permits</b>, please provide directions to the <i>proposed new site location</i> from the nearest state road. Include a <b>MAP as Attachment B</b>.</li> </ul> <p>From New Milton WV, Head Northwest on WV-18 N toward Co Route 25/Meathouse Fork for 3.7 miles. Turn right onto Co route 50/16 and continue for 1.8 miles. Turn right onto US- 50 E and continue for 2.1 miles. Turn left onto Co Route 20/Morgans Run and Drive for 1.5 miles. Continue onto Route 30/Israels Fork for 2.7 miles. Make slight right onto Co Route 5/Riggins Run Rd/ Rock Run Rd. Stay on Riggins Run Road for 0.5 Miles and then turn left onto C Route 3/Big Flint Rd. Continue on Co Route 3/Big Flint Rd for 1.6 miles and then turn right on Co Route 3/1. Continue for 0.9 miles and then arrive at destination.</p>		
12.B. New site address (if applicable):	12C. Nearest city or town: Roberts	12D. County: Doddridge
12.E. UTM Northing (KM): 4357.155	12F. UTM Easting (KM): 525.316	12G. UTM Zone: 17
<p>13. Briefly describe the proposed change(s) at the facility: EQM is proposing to add one (1) 2,000 gallon methanol tank, one enclosed ground flare (rated at 41 MMBtu/hr), one fuel gas heater (0.77 MMBtu/hr), and increase the current permit liquid throughputs for the existing two (2) 210 bbl produced water storage tanks.</p>		
<p>14A. Provide the date of anticipated installation or change: Upon Issuance of Permit</p> <ul style="list-style-type: none"> <li>– If this is an <b>After-The-Fact</b> permit application, provide the date upon which the proposed change did happen:     /     /</li> </ul>	<p>14B. Date of anticipated Start-Up if a permit is granted: TBD</p>	
<p>14C. Provide a <b>Schedule</b> of the planned <b>Installation of/Change</b> to and <b>Start-Up</b> of each of the units proposed in this permit application as <b>Attachment C</b> (if more than one unit is involved).</p>		
<p>15. Provide maximum projected <b>Operating Schedule</b> of activity/activities outlined in this application:  Hours Per Day 24            Days Per Week 7            Weeks Per Year 52</p>		
<p>16. Is demolition or physical renovation at an existing facility involved?    <input type="checkbox"/> YES    <input checked="" type="checkbox"/> NO</p>		
<p>17. <b>Risk Management Plans.</b> If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see <a href="http://www.epa.gov/ceppo">www.epa.gov/ceppo</a>), submit your <b>Risk Management Plan (RMP)</b> to U. S. EPA Region III.</p>		
<p>18. <b>Regulatory Discussion.</b> List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (<i>if known</i>). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (<i>if known</i>). Provide this information as <b>Attachment D</b>.</p>		
<p><b>Section II. Additional attachments and supporting documents.</b></p>		
<p>19. Include a check payable to WVDEP – Division of Air Quality with the appropriate <b>application fee</b> (per 45CSR22 and 45CSR13).</p>		
<p>20. Include a <b>Table of Contents</b> as the first page of your application package.</p>		
<p>21. Provide a <b>Plot Plan</b>, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as <b>Attachment E</b> (Refer to <b>Plot Plan Guidance</b>) .</p> <ul style="list-style-type: none"> <li>– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).</li> </ul>		
<p>22. Provide a <b>Detailed Process Flow Diagram(s)</b> showing each proposed or modified emissions unit, emission point and control device as <b>Attachment F</b>.</p>		
<p>23. Provide a <b>Process Description</b> as <b>Attachment G</b>.</p> <ul style="list-style-type: none"> <li>– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (<i>if applicable</i>).</li> </ul>		
<p><b>All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.</b></p>		

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H**.  
 – For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I**.

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J**.

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K**.

28. Check all applicable **Emissions Unit Data Sheets** listed below:

<input type="checkbox"/> Bulk Liquid Transfer Operations	<input type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry
<input type="checkbox"/> Chemical Processes	<input type="checkbox"/> Hot Mix Asphalt Plant	<input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities
<input type="checkbox"/> Concrete Batch Plant	<input type="checkbox"/> Incinerator	<input type="checkbox"/> Storage Tanks
<input type="checkbox"/> Grey Iron and Steel Foundry	<input type="checkbox"/> Indirect Heat Exchanger	

General Emission Unit, Compressor Engines S1, S2, S3, S4.

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L**.

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

<input type="checkbox"/> Absorption Systems	<input type="checkbox"/> Baghouse	<input type="checkbox"/> Flare
<input type="checkbox"/> Adsorption Systems	<input type="checkbox"/> Condenser	<input type="checkbox"/> Mechanical Collector
<input type="checkbox"/> Afterburner	<input type="checkbox"/> Electrostatic Precipitator	<input type="checkbox"/> Wet Collecting System

Other Collectors, specify Oxidation Catalyst(s)

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M**.

30. Provide all **Supporting Emissions Calculations** as **Attachment N**, or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O**.

➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and **Example Legal Advertisement** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

YES       NO

➤ If **YES**, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's "**Precautionary Notice – Claims of Confidentiality**" guidance found in the **General Instructions** as **Attachment Q**.

### Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

<input type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership
<input type="checkbox"/> Authority of Governmental Agency	<input type="checkbox"/> Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R**.

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

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

**Certification of Truth, Accuracy, and Completeness**

I, the undersigned  **Responsible Official** /  **Authorized Representative**, hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

**Compliance Certification**

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE Diana M Charletta DATE: 10/13/16  
(Please use blue ink) (Please use blue ink)

35B. Printed name of signee: Diana Charletta		35C. Title: Sr. Vice President
35D. E-mail: dcharletta@eqt.com	36E. Phone:	36F. FAX:
36A. Printed name of contact person (if different from above): Regina Henry		36B. Title: Supervisor - Environmental
36C. E-mail: rhenry@eqt.com	36D. Phone: 412-553-7848	36E. FAX:

**PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Attachment A: Business Certificate<br><input checked="" type="checkbox"/> Attachment B: Map(s)<br><input checked="" type="checkbox"/> Attachment C: Installation and Start Up Schedule<br><input checked="" type="checkbox"/> Attachment D: Regulatory Discussion<br><input checked="" type="checkbox"/> Attachment E: Plot Plan<br><input checked="" type="checkbox"/> Attachment F: Detailed Process Flow Diagram(s)<br><input type="checkbox"/> Attachment G: Process Description<br><input type="checkbox"/> Attachment H: Material Safety Data Sheets (MSDS)<br><input checked="" type="checkbox"/> Attachment I: Emission Units Table<br><input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input checked="" type="checkbox"/> Attachment K: Fugitive Emissions Data Summary Sheet<br><input checked="" type="checkbox"/> Attachment L: Emissions Unit Data Sheet(s)<br><input checked="" type="checkbox"/> Attachment M: Air Pollution Control Device Sheet(s)<br><input checked="" type="checkbox"/> Attachment N: Supporting Emissions Calculations<br><input checked="" type="checkbox"/> Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans<br><input checked="" type="checkbox"/> Attachment P: Public Notice<br><input type="checkbox"/> Attachment Q: Business Confidential Claims<br><input type="checkbox"/> Attachment R: Authority Forms<br><input type="checkbox"/> Attachment S: Title V Permit Revision Information<br><input type="checkbox"/> Application Fee |
|---|---|

*Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.*

**FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:**

- Forward 1 copy of the application to the Title V Permitting Group and:
- For Title V Administrative Amendments:
  - NSR permit writer should notify Title V permit writer of draft permit,
- For Title V Minor Modifications:
  - Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,
  - NSR permit writer should notify Title V permit writer of draft permit.
- For Title V Significant Modifications processed in parallel with NSR Permit revision:
  - NSR permit writer should notify a Title V permit writer of draft permit,
  - Public notice should reference both 45CSR13 and Title V permits,
  - EPA has 45 day review period of a draft permit.

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



# ATTACHMENT A

## Business Certificate

**WEST VIRGINIA  
STATE TAX DEPARTMENT  
BUSINESS REGISTRATION  
CERTIFICATE**

ISSUED TO:  
**EQM GATHERING OPKO, LLC  
625 LIBERTY AVE 1700  
PITTSBURGH, PA 15222-3114**

BUSINESS REGISTRATION ACCOUNT NUMBER: **2311-9555**

This certificate is issued on: **04/8/2015**

*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.

# ATTACHMENT B

## Map

## ATTACHMENT B - AREA MAP



**Figure 1 - Map of Pandora Station**

UTM Northing (KM): 4,357.155  
UTM Easting (KM): 525.316  
Elevation: ~1,200 ft

## ATTACHMENT C

### Installation and Start Up Schedule

## ATTACHMENT C

### Schedule of Planned Installation and Start-Up

<b>Unit</b>	<b>Installation Schedule</b>	<b>Startup Schedule</b>
Caterpillar G3616 Compressor Engines 1&2 - <b>Modified emissions increase</b>	N/A	N/A
Caterpillar G3608 Compressor Engines 3&4 - <b>Increased rated capacity</b>	2017	Upon installation

## ATTACHMENT D

### Regulatory Discussion

## ATTACHMENT D - REGULATORY APPLICABILITY

This section documents the applicability determinations made for Federal and State air quality regulations. The monitoring, recordkeeping, reporting, and testing plan is presented in Attachment O. 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 R13 permit application forms, which fulfill the requirement to include citations and descriptions of applicable statutory and administrative code requirements.

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 Pandora Station. 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 Pandora Station. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

### 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) and new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NNSR). PSD and NNSR 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 Pandora Station is not a major source with respect to the NSR program since its potential emissions will remain below all the NSR/PSD thresholds. As such, NSR/PSD permitting is not triggered by this construction activity. EQM will monitor future construction activities at the site closely and will compare any future increase in emissions with the NSR/PSD thresholds to ensure these activities will not trigger this program.

### 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, and 100 tpy of all other regulated pollutants.<sup>1</sup> The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the Pandora Station is not a major source for Title V purposes.

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<sup>1</sup> 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.

## 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 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 Pandora Station.

### *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 greater than 10 MMBtu/hr, therefore the requirements of these subparts do not apply.

### *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. 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<sup>3</sup> (~19,813 gallons). The proposed project does not include the installation of any storage tanks.

### *NSPS Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*

Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, applies to manufacturers, owners and operators of stationary spark ignition (SI) engines that commence construction, reconstruction or modification after June 12, 2006. Applicability dates are based on the manufacture date for new engines. The applicability dates for new engines range from July 1, 2007 to January 1, 2009, depending upon the engine horsepower (hp) and application.

§60.4230(a)(4) states:

*Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:*

- (i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500-hp (except lean burn engines with a maximum engine power greater than or equal to 500-hp and less than 1,350-hp);*
- (ii) On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500-hp and less than 1,350-hp;*
- (iii) On or after July 1, 2008, for engines with a maximum engine power less than 500-hp; or*
- (iv) On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 kW (25-hp).*

The two (2) Caterpillar G3616 compressor engines and two (2) Caterpillar G3608 engines are new SI ICE that commenced construction after June 12, 2006 and therefore NSPS JJJJ is applicable to each engine. The compressor engines are equipped with an oxidation catalyst which is guaranteed by the manufacturer to achieve reductions of CO, VOC, and VOC (as non-methane, non-ethane hydrocarbon (NMNEHC), below the applicable NSPS JJJJ limitations of Table 1 of NSPS JJJJ.

Additionally, EQM is required to conduct compliance testing for the NSPS JJJJ engine every 8,760 hours or three years, whichever comes first, to demonstrate continued compliance. Testing will be conducted in accordance with 40 CFR

§60.4244. Records of all notifications submitted to comply with this subpart, maintenance conducted on the engines, and performance testing will be maintained in accordance with 40 CFR §60.4245(a). Performance testing results will be reported as required in 40 CFR §60.4245(d).

### *NSPS Subpart 0000—Crude Oil and Natural Gas Production, Transmission, and Distribution*

Subpart 0000 – *Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution*, applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011, and on or before September 18, 2015. This NSPS was published in the Federal Register on August 16, 2012, and subsequently amended.

The existing Caterpillar G3616 compressors at the Pandora Station are subject to NSPS 0000 as outlined in the current R13 permit. EQM will continue to comply with the requirements specified under 60.5385(a)(1)-(2).

### *NSPS Subpart 0000a—Crude Oil and Natural Gas Facilities*

Subpart 0000a, *Standards of Performance for Crude Oil and Natural Gas Facilities*, will apply to affected facilities that commenced construction, reconstruction, or modification after September 18, 2015. The regulation was published as final in the Federal Register on June 3, 2016.

Compressors: As part of this project, EQM is proposing to install the two (2) compressors, which will be an affected facility under this subpart. 40 CFR 60.5385a requires owners and operators of affected reciprocating compressors to change the rod packing prior to operating 26,000 hours or prior to 36 months since start up or the last packing replacement. EQM will comply with the requirements of this rule.

Equipment Leaks: The proposed project meets the definition of modification under 40 CFR 60.5365a(j) as two (2) additional compressors will be installed at the station. Therefore, EQM will be required to monitor all fugitive emission components (ex. connectors, flanges, etc.) with an optical gas imaging (OGI) device, and repair all sources of fugitive emissions in accordance with the rule. EQM must also develop a corporate-wide monitoring plan and a site specific monitoring plan (or one plan that incorporates all required elements), and conduct surveys on a quarterly basis. EQM is also subject to the applicable recordkeeping and reporting requirements of the rule.

### *Non-Applicability of All Other NSPS*

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas processing plants (Subparts 0000 and 0000a) and associated equipment (Subparts D-Dc and K-Kb), the applicability of a particular NSPS to the Pandora Station can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

## **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 Pandora Station is an Area (minor) source of HAP since its potential emissions of HAP are less than the 10/25 major source thresholds. 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 proposed project:

- > 40 CFR Part 63 Subpart HH – Oil and Natural Gas Production Facilities
- > 49 CFR Part 63 Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines

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

#### ***40 CFR 63 Subpart HH - Oil and Natural Gas Production Facilities***

This MACT standard contains requirements for both major and area sources of HAP. At area sources, the only affected source is each triethylene glycol (TEG) dehydration unit (§63.760(b)(2)). The Pandora Station meets the definition of a natural gas production facility per 40 CFR §63.761 and as such the dehydration unit will be subject to the requirements of Subpart HH. The proposed project does not include any affected sources under this rule.

#### ***40 CFR 63 Subpart ZZZZ - Stationary Reciprocating Internal Combustion Engines***

Stationary reciprocating internal combustion engines (RICE) at both area and major sources of HAP emissions are potentially subject to 40 CFR 63, Subpart ZZZZ – *NESHAP for Stationary Reciprocating Internal Combustion Engines (RICE)*. Stationary RICE at facilities that are major sources of HAP are considered existing if they are ordered on or before December 19, 2002.

The proposed Caterpillar G3608 compressor engines (S3-S4) and existing Caterpillar G3616 compressor engines (S1-S2) will be classified as a new stationary RICE > 500 HP located at an area source of HAP. In accordance with 40 CFR 63.6590 (c)(1), all new or reconstructed stationary RICE located at an area source of HAP meet the requirements of the RICE NESHAP by meeting the requirements of NSPS Subpart JJJJ. As discussed under NSPS Subpart JJJJ, these engines will be in compliance with the applicable NSPS subpart and as such, will be in compliance with the requirements of the RICE NESHAP as well.

#### **West Virginia SIP Regulations**

The Pandora Station 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).

#### ***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 Pandora Station is generally subject to this requirement. However, due to the nature of the process at the Pandora Station, production of objectionable odor from the Pandora Station during normal operation is unlikely.

#### ***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 CFR Part 60 by reference. As such, by complying with all applicable requirements of 40 CFR Part 60 at the Pandora Station, EQM will be complying with 45 CSR 16.

#### ***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 Pandora Station, it is unlikely that fugitive particulate matter emissions will be emitted under normal operating conditions. However, EQM will take measures to ensure any fugitive particulate matter emissions will not cross the property boundary should any such emissions occur.

#### *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 CFR Parts 61 and 63 by reference. As such, by complying with all applicable requirements of 40 CFR Parts 61 and 63 at the Pandora Station, EQM will be complying with 45 CSR 34.

#### *Non-Applicability of Other SIP Rules*

A thorough examination of the West Virginia SIP rules with respect to applicability at the Pandora Station 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 Pandora Station.

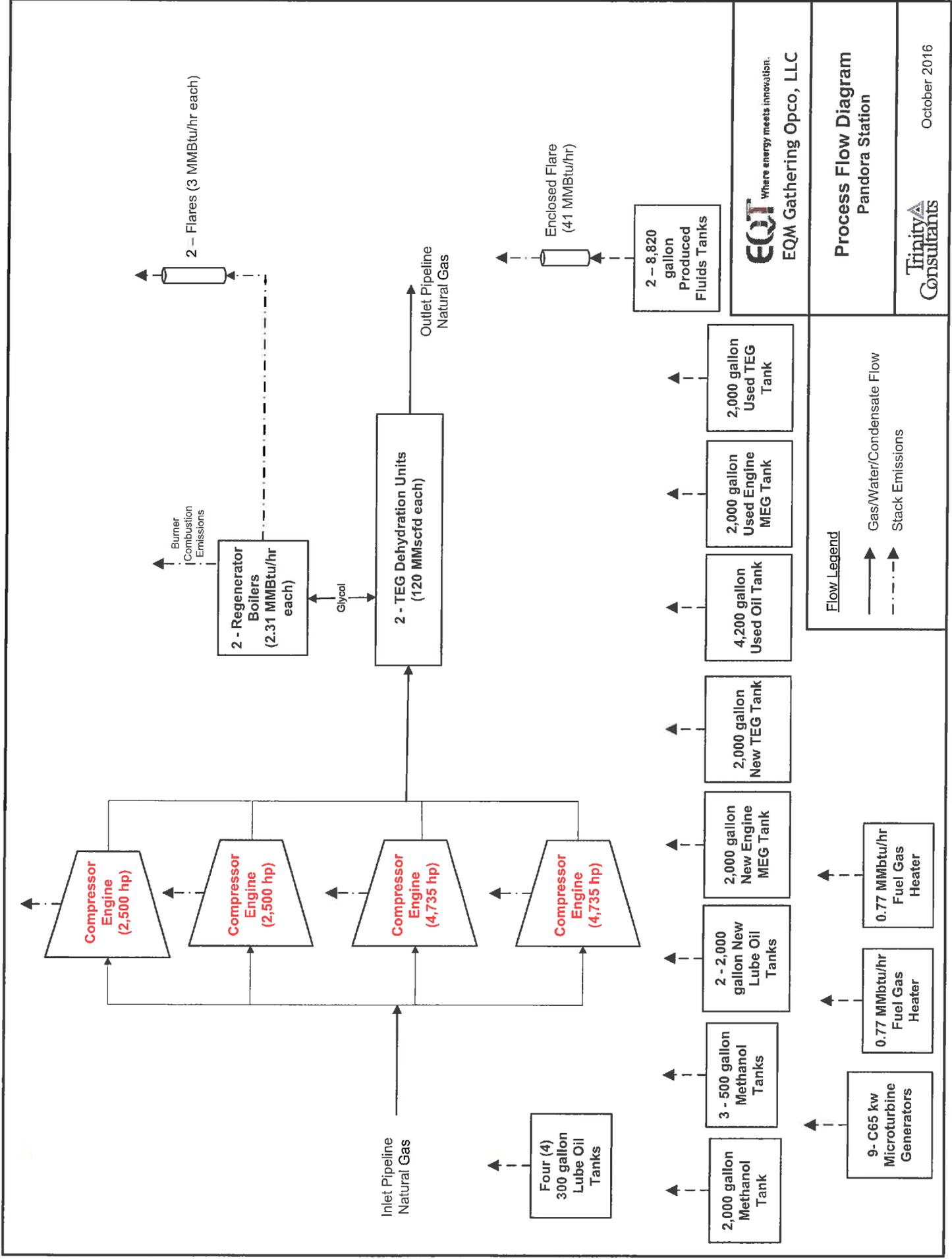
# ATTACHMENT E

## Plot Plan



# ATTACHMENT F

## Detailed Process Flow Diagram



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EQM Gathering Opco, LLC

**Process Flow Diagram**  
Pandora Station

**Trinity**  
Consultants

October 2016

# ATTACHMENT G

## Process Description

## ATTACHMENT G - PROCESS DESCRIPTION

EQM is submitting this application to increase the current permit emission limits (VOC, CO, and HCHO) for the Caterpillar G3616 compressor engines (S1 & S2) and to replace the currently permitted Caterpillar G3608 compression engines (S3 & S4) with larger engines (2,500 HP, each).

The Pandora Station is a natural gas gathering facility that is currently undergoing construction and will consist of compressors, two triethylene glycol (TEG) dehydrators, microturbine generators, fuel gas heaters, and storage tanks. Natural gas will enter the station via a distribution pipeline system and will first be compressed using one of four natural gas fired compressors, rated at 4,735 hp (2 units) and 2,500 hp (2 units). The compressed natural gas stream will then be processed through one of two (TEG) dehydration units (each rated at 120 MMscfd) with associated reboilers and controlled with enclosed flares (each rated at 3 MMBtu/hr). The dehydration unit introduces TEG to the gas stream in a contact tower to absorb water vapor from the gas to a level not exceeding 7 pounds per million cubic feet (lb/MMcf). The glycol is then sent to the natural gas-fired reboiler, rated at 2.31 MMBtu/hr of heat input (1.5 MMBtu/hr output). The water is evaporated from the glycol in the reboiler and exhausted and then the glycol is sent back to the contact tower. The natural gas stream from the contact tower will flow into the pipeline to be transported further along the distribution system via the sales pipeline. The station will also be equipped with seventeen (17) storage tanks for storage of liquids associated with the engines, dehydration unit, and pipeline fluids.

A process flow diagram is included as Attachment F.

# ATTACHMENT I

## Emission Units Table

## Attachment I

### 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 <sup>1</sup>	Emission Point ID <sup>2</sup>	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type <sup>3</sup> and Date of Change	Control Device <sup>4</sup>
S1	E1	Compressor Engine #1	2016	4,735 HP	Modified – Increased emission limits	Cat Ox (C1)
S2	E2	Compressor Engine #2	2016	4,735 HP	Modified – Increased emission limits	Cat Ox (C2)
S3	E3	Compressor Engine #3	2016	2,500 HP	Modified- Increased Rating	Cat Ox (C3)
S4	E4	Compressor Engine #4	2016	2,500 HP	Modified- Increased Rating	Cat Ox (C4)
S5	E5	Dehydration Unit	2015	120 MMscfd	Existing, No Change	Enclosed Combustor (C5)
S6	E6	Dehydration Unit Reboiler	2015	2.31 MMbtu/hr	Existing, No Change	None
S7	E7	Dehydration Unit	2015	120 MMscfd	Existing, No Change	Enclosed Combustor (C6)
S8	E8	Dehydration Unit Reboiler	2015	2.31 MMbtu/hr	Existing, No Change	None
S9	E9	Micro Turbine Generator #1	2015	65 KW	Existing, No Change	None
S10	E10	Micro Turbine Generator #2	2015	65 KW	Existing, No Change	None
S11	E11	Micro Turbine Generator #3	2015	65 KW	Existing, No Change	None
S12	E12	Micro Turbine Generator #4	2015	65 KW	Existing, No Change	None
S13	E13	Micro Turbine Generator #5	2015	65 KW	Existing, No Change	None
S14	E14	Micro Turbine Generator #6	2015	65 KW	Existing, No Change	None
S15	E15	Micro Turbine Generator #7	2015	65 KW	Existing, No Change	None
S16	E16	Micro Turbine Generator #8	2015	65 KW	Existing, No Change	None

S17	E17	Fuel Gas Heater	2015	0.77 MMbtu/hr	Existing, No Change	None
S18	E28	Fuel Gas Heater	2015	0.77 MMbtu/hr	Existing, No Change	None
S19	E29	Micro Turbine Generator #9	2016	65 KW	Existing, No Change	None
T001	E18	Produced Fluids Tank	2015	210 bbl	Existing, No Change	C7
T002	E19	Produced Fluids Tank	2015	210 bbl	Existing, No Change	C7
T003	E20	Engine Lube Oil Tank	2015	2,000 gallon	Existing, No Change	None
T004	E21	Compressor Lube Oil Tank	2015	2,000 gallon	Existing, No Change	None
T005	E22	Used Oil Tank	2015	4,200 gallon	Existing, No Change	None
T006	E23	New MEG Tank	2015	2,000 gallon	Existing, No Change	None
T007	E24	Used MEG Tank	2015	2,000 gallon	Existing, No Change	None
T008	E25	New TEG Tank	2015	2,000 gallon	Existing, No Change	None
T009	E26	Used TEG Tank	2015	2,000 gallon	Existing, No Change	None
T010	E27	Methanol Tank	2015	2,000 gallon	Existing, No Change	None
T011-T014	E30-E33	Four (4) Lube Oil Tanks	2015	300 gallon (each)	Existing, No Change	None
T015-T017	E34-E36	Three (3) Methanol Tanks	2015	500 gallon (each)	Existing, No Change	None
C5	E5	Enclosed Flare	2013	3 MMbtu/hr	Existing, No Change	None
C6	E6	Enclosed Flare	2013	3 MMbtu/hr	Existing, No Change	None
C7	E18 & E19	Enclosed Flare	2015	41 MMbtu/hr	Existing, No Change	None

<sup>1</sup> For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.

<sup>2</sup> For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

<sup>3</sup> New, modification, removal

<sup>4</sup> For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

**ATTACHMENT J**

**Emission Points Data Summary Sheet**

**Attachment J  
EMISSION POINTS DATA SUMMARY SHEET**

**Table 1: Emissions Data**

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used <sup>6</sup>	Emission Concentration <sup>7</sup> (ppmv or mg/m <sup>3</sup> )
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
E1	Upward Vertical stack	S1	Compressor engine	C1	Catalytic Oxidation Catalyst	NA	NA	NOx	5.22	22.86	5.22	22.86	Gas/Vapor	O <sup>A</sup>	
									28.71	125.73	2.87	12.57			
									10.86	47.55	4.86	21.31			
									0.02	0.09	0.02	0.09			
									0.35	1.55	0.35	1.55			
E2	Upward Vertical stack	S2	Compressor engine	C2	Catalytic Oxidation Catalyst	NA	NA	NOx	5.22	22.86	5.22	22.86	Gas/Vapor	O <sup>A</sup>	
									28.71	125.73	2.87	12.57			
									10.86	47.55	4.86	21.31			
									0.02	0.09	0.02	0.09			
									0.35	1.55	0.35	1.55			
E3	Upward Vertical stack	S3	Compressor engine	C3	Catalytic Oxidation Catalyst	NA	NA	NOx	1.65	7.24	1.65	7.24	Gas/Vapor	O <sup>A</sup>	
									14.72	64.45	1.38	6.04			
									3.86	16.90	1.82	7.97			
									0.01	0.05	0.01	0.05			
									0.83	3.86	0.19	0.83			
E4	Upward Vertical stack	S4	Compressor engine	C4	Catalytic Oxidation Catalyst	NA	NA	NOx	1.65	7.24	1.65	7.24	Gas/Vapor	O <sup>A</sup>	
									14.72	64.45	1.38	6.04			
									3.86	16.90	1.82	7.97			
									0.01	0.05	0.01	0.05			
									0.83	3.86	0.19	0.83			

<sup>A</sup> Manufacturer's specific pollutant emission factor.

<sup>B</sup> AP-42 Section 3.2, Table 3.2-2 "Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines" Supplement F, August 2000, except for Formaldehyde which is manufacturer's spec.

<sup>C</sup> 40 CFR 98, Subpart C for natural gas fired combustion.

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

- 1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- 2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS<sub>2</sub>, VOCs, H<sub>2</sub>S, Inorganics, Lead, Organics, O<sub>3</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, SO<sub>3</sub>, all applicable Greenhouse Gases (including CO<sub>2</sub> and methane), etc. **DO NOT LIST** H<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, and Noble Gases.
- 4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- 5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- 6 Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).
- 7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m<sup>3</sup>) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO<sub>2</sub>, use units of ppmv (See 45CSR10).



**ATTACHMENT K**

**Fugitive Emissions Data Summary Sheet**

## Attachment K

### FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS	
1.) Will there be haul road activities?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (no change to existing emissions) <input type="checkbox"/> If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations?	<input checked="" type="checkbox"/> Yes (no change to existing emissions) <input type="checkbox"/> No <input type="checkbox"/> If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."	

FUGITIVE EMISSIONS SUMMARY		All Regulated Pollutants - Chemical Name/CAS <sup>1</sup>	Maximum Potential Uncontrolled Emissions <sup>2</sup>		Maximum Potential Controlled Emissions <sup>3</sup>		Est. Method Used <sup>4</sup>
			lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads		NA	---	---	---	---	---
Unpaved Haul Roads		NA	---	---	---	---	---
Storage Pile Emissions		NA	---	---	---	---	---
Loading/Unloading Operations		VOC	0.01	0.05	0.01	0.05	B
Wastewater Treatment Evaporation & Operations		NA	---	---	---	---	---
Equipment Leaks (includes pigging)		VOC HAP CO <sub>2e</sub>	N/A	16.06 0.72 2,450	N/A	16.06 0.72 2,450	A
General Clean-up VOC Emissions		NA	---	---	---	---	---
Other		NA	---	---	---	---	---

A - Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, Table 2-1, November 1995, 40 CFR 98 Subpart W  
 B - AP-4.2 Table 5.2.1

<sup>1</sup> List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS<sub>2</sub>, VOCs, H<sub>2</sub>S, Inorganics, Lead, Organics, O<sub>3</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, SO<sub>3</sub>, all applicable Greenhouse Gases (including CO<sub>2</sub> and methane), etc. DO NOT LIST H<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, and Noble Gases.

<sup>2</sup> 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).  
<sup>3</sup> 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).

<sup>4</sup> Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

**ATTACHMENT L**

**Emissions Unit Data Sheet**

**Attachment L**  
**EMISSIONS UNIT DATA SHEET – Compressor Engines S1&S2**  
**GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*):

<p>1. Name or type and model of proposed affected source:</p> <p>Compressor Engines – Two (2) 4,735 HP Caterpillar 3616 Compressor Engines (natural gas fired)</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>NA</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Does not produce any materials. Compresses natural gas to maintain pipeline pressure.</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>Internal combustion of natural gas.</p>

\* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Pipeline quality natural gas – 31,290 scf/hr (each engine), 274.1 MMscf/yr (each engine)

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas with negligible H<sub>2</sub>S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@

°F and

psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

35.39 MMBtu/hr spark ignition reciprocating internal combustion engine (each).

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input:

35.39

× 10<sup>6</sup> BTU/hr.

7. Projected operating schedule:

Hours/Day

24

Days/Week

7

Weeks/Year

52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	857	°F and	14.7	psia
a. NO <sub>x</sub>	5.22	lb/hr		grains/ACF
b. SO <sub>2</sub>	0.02	lb/hr		grains/ACF
c. CO	28.71	lb/hr		grains/ACF
d. PM <sub>10</sub>	0.35	lb/hr		grains/ACF
e. Hydrocarbons		lb/hr		grains/ACF
f. VOCs (Includes CH <sub>2</sub> O)	10.86	lb/hr		grains/ACF
g. Pb	NA	lb/hr		grains/ACF
h. Specify other(s)				
Benzene	1.6E-02	lb/hr		grains/ACF
Toluene	1.4E-02	lb/hr		grains/ACF
Xylene	6.5E-03	lb/hr		grains/ACF
Formaldehyde	2.71	lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. 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**

Replace the reciprocating compressor rod packing before 26,000 hours or 36 months from the date of the most recent rod packing element or collect the methane and VOC emissions from the rod packing using a rod packing emissions collection system that operates under negative pressure and route the rod packing emissions to a process through a closed vent systems

Monitor the number of hours of operation or months for each reciprocating compressor

**RECORDKEEPING**

Maintain records of maintenance conducted on the engine

Maintain records of all notification submitted

Maintain documentation that the engine meets the emission standards of 40 CFR 60.4233(e)

Maintain records of the cumulative hours of operation or number of months since initial start up

Maintain records of the date and time of each reciprocating compressor rod packing element

Maintain records of the deviations in cases where the compressor was not operated in compliance with 60.5385(a)

**REPORTING**

Submission of an initial notification as required in 40 CFR 60.7(a)(1)

Submit a copy of each performance test

Submit an annual NSPS OOOO report one year from the initial annual report

**TESTING**

Initial performance test and subsequent performance testing every 8760 hours or every three years, whichever comes first.

**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.

**RECORDKEEPING.** PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

**REPORTING.** PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

**TESTING.** PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

See attached manufacturer specification sheet

**Attachment L**  
**EMISSIONS UNIT DATA SHEET – Compressor Engines S3&S4**  
**GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*):

<p>1. Name or type and model of proposed affected source:</p> <p>Compressor Engines – Two (2) 2,500 HP Caterpillar 3608 Compressor Engines (natural gas fired)</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>NA</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Does not produce any materials. Compresses natural gas to maintain pipeline pressure.</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>Internal combustion of natural gas.</p>

\* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Pipeline quality natural gas – 16,735 scf/hr (each engine), 146.6 MMscf/yr (each engine)

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas with negligible H<sub>2</sub>S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@

°F and

psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

18.93 MMBtu/hr spark ignition reciprocating internal combustion engine (each).

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input:

18.93

× 10<sup>6</sup> BTU/hr.

7. Projected operating schedule:

Hours/Day

24

Days/Week

7

Weeks/Year

52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:			
@	857	°F and	14.7 psia
a. NO <sub>x</sub>	1.65	lb/hr	grains/ACF
b. SO <sub>2</sub>	0.01	lb/hr	grains/ACF
c. CO	14.72	lb/hr	grains/ACF
d. PM <sub>10</sub>	0.19	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs (Includes CH <sub>2</sub> O)	3.86	lb/hr	grains/ACF
g. Pb	NA	lb/hr	grains/ACF
h. Specify other(s)			
Benzene	8.3E-03	lb/hr	grains/ACF
Toluene	7.7E-03	lb/hr	grains/ACF
Xylene	3.5E-03	lb/hr	grains/ACF
Formaldehyde	0.88	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. 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**

Replace the reciprocating compressor rod packing before 26,000 hours or 36 months from the date of the most recent rod packing element or collect the methane and VOC emissions from the rod packing using a rod packing emissions collection system that operates under negative pressure and route the rod packing emissions to a process through a closed vent systems

Monitor the number of hours of operation or months for each reciprocating compressor

**RECORDKEEPING**

Maintain records of maintenance conducted on the engine

Maintain records of all notification submitted

Maintain documentation that the engine meets the emission standards of 40 CFR 60.4233(e)

Maintain records of the cumulative hours of operation or number of months since initial start up

Maintain records of the date and time of each reciprocating compressor rod packing element

Maintain records of the deviations in cases where the compressor was not operated in compliance with 60.5385a(a)

**REPORTING**

Submission of an initial notification as required in 40 CFR 60.7(a)(1)

Submit a copy of each performance test

Submit an annual NSPS OOOOa report one year from the initial annual report

**TESTING**

Initial performance test and subsequent performance testing every 8760 hours or every three years, whichever comes first.

**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.

**RECORDKEEPING.** PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

**REPORTING.** PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

**TESTING.** PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

See attached manufacturer specification sheet

**ATTACHMENT M**

**Air Pollution Control Device Sheet**

**Attachment M**  
**Air Pollution Control Device Sheet**  
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): C1-C2

**Equipment Information**

1. Manufacturer: EMIT Technologies or equivalent Model No. RT-4815-H or equivalent	2. Control Device Name: C1-C2 (Oxidation Catalysts) Type: Oxidation Catalysts
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: CO – 90% NMNEHC – 44% Formaldehyde – 90%	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume:           31,985           SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.  NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

**Gas Stream Characteristics**

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	<b>Maximum</b>	<b>Typical</b>	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO <sub>x</sub> <input type="checkbox"/> Odor		<input checked="" type="checkbox"/> Other – NMNEHC, Formaldehyde and CO				
<input type="checkbox"/> Particulate (type):						
17. Inlet gas velocity: _____ ft/sec		18. Pollutant specific gravity:				
19. Gas flow into the collector: 31,985 ACF @ 857 °F and _____ PSIA		20. Gas stream temperature: Inlet: 856 °F Outlet: 900 (+/-)°F				
21. Gas flow rate: Design Maximum: _____ ACFM Average Expected: _____ ACFM		22. Particulate Grain Loading in grains/scf: Inlet: Outlet:				
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A CO	28.71		100	2.87		90
B NMNEHC	8.14		100	4.59		44
C Formaldehyde	2.71		100	0.27		90
D						
E						
24. Dimensions of stack: _____ Height _____ ft. _____ Diameter _____ ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

**Particulate Distribution**

26. Complete the table: Particulate Size Range (microns)	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
	Weight % for Size Range	Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system:

29. Have you included **Other Collectors Control Device** in the Emissions Points Data Summary Sheet?

**30. 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:**

Operate and maintain catalyst element according to the recommendations of the manufacturer

**RECORDKEEPING:**

Maintain records of all catalytic reduction device maintenance

**REPORTING:**

None

**TESTING:**

See engine testing

**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 or air control device.

**RECORDKEEPING:**

Please describe the proposed recordkeeping that will accompany the monitoring.

**REPORTING:**

Please describe any proposed emissions testing for this process equipment on air pollution control device.

**TESTING:**

Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.  
90% for CO, 44% for NMNEHC, and 90% for HCHO

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.  
90% for CO, 44% for NMNEHC, and 90% for HCHO

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

High temperature shutdowns have been installed in the engines. Engine will shut-down if exhaust temperatures get too high.

**Attachment M**  
**Air Pollution Control Device Sheet**  
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): C3-C4

**Equipment Information**

1. Manufacturer: Emit Technologies or equivalent Model No. RT-3615-Z or equivalent	2. Control Device Name: C3-C4 (Oxidation Catalysts) Type: Oxidation Catalysts
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: CO – 93% NMNEHC – 44% Formaldehyde – 81%	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.  NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

**Gas Stream Characteristics**

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	<b>Maximum</b>	<b>Typical</b>	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			



27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system:

29. Have you included **Other Collectores Control Device** in the Emissions Points Data Summary Sheet?

**30. 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:**

Operate and maintain catalyst element according to the recommendations of the manufacturer

**RECORDKEEPING:**

Maintain records of all catalytic reduction device maintenance

**REPORTING:**

None

**TESTING:**

See engine testing

**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 or air control device.

**RECORDKEEPING:**

Please describe the proposed recordkeeping that will accompany the monitoring.

**REPORTING:**

Please describe any proposed emissions testing for this process equipment on air pollution control device.

**TESTING:**

Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.  
93% for CO, 44% for NMNEHC, and 81% for HCHO

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.  
93% for CO, 44% for NMNEHC, and 81% for HCHO

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

High temperature shutdowns have been installed in the engines. Engine will shut-down if exhaust temperatures get too high.

## ATTACHMENT N

### Supporting Emission Calculations

Company Name: EOM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

		Pandora Station													Pandora Station TOTAL				
Fuel Type	Capacity	Unit	Status	Operating Hours (hrs)	# of Emission Units	Pollutant	Compressor Engine CAT 3616	Compressor Engine CAT 3608	Dehy with Associated Flare	Dehy Associated Reboiler	C65 Microturbine	Enclosed Flare	Fuel Gas Heater	Miscellaneous Storage Tanks	Produced Water Storage Tanks	Road Emissions	Liquid Loading	Fugitives Piggings & Blowdowns	
							Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	N/A	N/A	Existing	Existing	Existing	Existing
	4,735	HP	Modified	8,760	2	tpy	8,760	2,500	120	2.31	0.07	41	0.77	N/A	N/A	Existing	Existing	Existing	Existing
	8,760	HP	Modified	8,760	2	tpy	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	Existing	Existing	Existing	Existing
	2	tpy					2	2	2	2	9	1	2	8	2	2	N/A	N/A	N/A
	3.10						1.66	1.66	0.18	0.14	0.22	1.21	0.05	--	--	0.48	--	--	7.02
	3.10						1.66	1.66	0.18	0.14	0.22	1.21	0.05	--	--	0.05	--	--	6.59
	0.18						0.10	0.10	0.01	0.01	0.11	0.10	3.6E-03	--	--	--	--	--	0.52
	25.15						9.66	9.66	1.95	1.50	3.20	13.37	0.50	--	--	--	--	--	55.33
	45.72						14.48	14.48	2.32	1.79	1.18	15.92	0.60	--	--	--	--	--	82.01
	42.61						15.93	15.93	19.73	0.10	0.26	--	0.03	--	--	--	0.05	--	95.37
	40,144						20,761	20,761	3,094	2,365	3,895	21,062	788.38	--	0.02	--	0.05	16.06	92,109
	405.1						152.08	152.08	14.65	0.04	0.256	0.00	0.01	--	0.06	--	--	98.00	670
	0.07						0.04	0.04	0.01	0.00	0.01	0.04	1.5E-03	--	--	--	--	--	0.16
	50,291						24,574	24,574	3,462	2,368	3,903	21,073	789.20	--	1.42	--	--	2,450	108,912
	2.38						1.45	1.45	--	1.3E-03	0.024	--	4.5E-04	--	--	--	--	--	3.85
	8.39						4.66	4.66	9.96	0.03	0.03	--	0.01	0.02	0.01	--	--	0.72	23.84
Total HAPs (including HCHO)																			

1. Conversion to CO<sub>2e</sub> based on CH<sub>4</sub> GWP = 25 and N<sub>2</sub>O GWP = 298, per 40 CFR 98.  
 2. VOC includes Formaldehyde.

Company Name: EQM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Internal Combustion (IC) Engine Emissions Calculations**

**Engine Information:**

Source ID:	CE-1, CE-2	
Engine Manufacturer and Model	Caterpillar 3616LE	
Manufacturer's Rated bhp/rpm	4,735	
Source Status	NS	
Date Installed/Modified/Removed	2013	
Engine Manufactured/Reconstruction Date	TBD	
Is this a Certified Stationary Spark Ignition Engine according to 40 CFR60 Subpart JJJJ	Yes	
Engine Fuel and Combustion Data	Engine Type	4S-LB
	APCD Type	ARFC
	Fuel Type	PQ
	H <sub>2</sub> S (gr/100 scf)	0
	Operating bhp/rpm	4,735
	BSFC (Btu/bhp-hr)	7,474
	Fuel Throughpput (ft <sup>3</sup> /hr)	31,290
	Fuel Throughpput (MMft <sup>3</sup> /hr)	0.0313
	Operation (hrs/yr)	8,760

**Engine Fuel Information:**

Fuel Type:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,131
Heat Input (MMBtu/hr):	35.39
Max. Fuel Consumption (MMscf/yr):	274.1

**Engine Emissions Data:**

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO <sub>x</sub>	0.50	g/bhp-hr	5.22	22.86	Vendor Spec Sheet
NMNEHC	0.44	g/bhp-hr	4.59	20.12	Vendor Spec Sheet
VOC	0.47	g/bhp-hr	4.86	21.31	NMNEHC+HCHO
CO	0.28	g/bhp-hr	2.87	12.57	Vendor Spec Sheet
SO <sub>x</sub>	0.00	lb/MMBtu	0.02	0.09	AP-42, Table 3.2-2 (Aug-2000)
PM <sub>10</sub>	0.01	lb/MMBtu	0.35	1.55	AP-42, Table 3.2-2 (Aug-2000)
PM <sub>2.5</sub>	0.01	lb/MMBtu	0.35	1.55	AP-42, Table 3.2-2 (Aug-2000)
Formaldehyde (HCHO)	0.03	g/bhp-hr	0.27	1.19	Vendor Spec Sheet
GHG (CO <sub>2</sub> e)	See Table Below		5,741	25,146	40 CFR 98, Tables C-1 & C-2
Other (Total HAP except HCHO)	See Table Below		0.69	3.01	AP-42, Table 3.2-2 (Aug-2000)

**Notes:**

1. PM<sub>10</sub> and PM<sub>2.5</sub> are total values (filterable + condensable).
2. GHG (CO<sub>2</sub>e) is carbon dioxide equivalent, which is the summation of CO<sub>2</sub> (GWP = 1) + CH<sub>4</sub> (GWP = 25) + N<sub>2</sub>O (GWP = 298).
3. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this source type.
4. VOC includes Formaldehyde
5. CO assume 90% control, NMNEHC assumes 44% control, HCHO assumes 90% control.

Company Name: EOM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Internal Combustion (IC) Engine Emissions Calculations**

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

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
<b>GHGs:</b>					
CO <sub>2</sub>	439	g/bhp-hr	4,583	20,072	Vendor Spec Sheet
CH <sub>4</sub>	4.43	g/bhp-hr	46	203	Vendor Specs (=THC-NMHC)
N <sub>2</sub> O	0.0001	kg/MMBtu	0.01	0.03	40 CFR 98, Tables C-1 & C-2
THC	6.31	g/bhp-hr	66	289	Vendor Spec Sheet
NMHC	1.88	g/bhp-hr	20	86.0	Vendor Spec Sheet
<b>GHG (CO<sub>2</sub>e)</b>			<b>5,741</b>	<b>25,146</b>	

<b>Organic HAPs:</b>					
1,1,2,2-Tetrachloroethane	4.00E-05	lb/MMBtu	1.4E-03	6.2E-03	AP-42, Table 3.2-2 (Aug-2000)
1,1,2-Trichloroethane	3.18E-05	lb/MMBtu	1.1E-03	4.9E-03	AP-42, Table 3.2-2 (Aug-2000)
1,3-Butadiene	2.67E-04	lb/MMBtu	9.4E-03	4.1E-02	AP-42, Table 3.2-2 (Aug-2000)
1,3-Dichloropropene	2.64E-05	lb/MMBtu	9.3E-04	4.1E-03	AP-42, Table 3.2-2 (Aug-2000)
2-Methylnaphthalene	3.32E-05	lb/MMBtu	1.2E-03	5.1E-03	AP-42, Table 3.2-2 (Aug-2000)
2,2,4-Trimethylpentane	2.50E-04	lb/MMBtu	8.8E-03	3.9E-02	AP-42, Table 3.2-2 (Aug-2000)
Acenaphthlene	1.25E-06	lb/MMBtu	4.4E-05	1.9E-04	AP-42, Table 3.2-2 (Aug-2000)
Acenaphthylene	5.53E-06	lb/MMBtu	2.0E-04	8.6E-04	AP-42, Table 3.2-2 (Aug-2000)
Acetaldehyde	8.36E-03	lb/MMBtu	3.0E-01	1.3E+00	AP-42, Table 3.2-2 (Aug-2000)
Acrolein	5.14E-03	lb/MMBtu	1.8E-01	8.0E-01	AP-42, Table 3.2-2 (Aug-2000)
Benzene	4.40E-04	lb/MMBtu	1.6E-02	6.8E-02	AP-42, Table 3.2-2 (Aug-2000)
Benzo(e)pyrene	4.15E-07	lb/MMBtu	1.5E-05	6.4E-05	AP-42, Table 3.2-2 (Aug-2000)
Benzo(b)fluoranthene	1.66E-07	lb/MMBtu	5.9E-06	2.6E-05	AP-42, Table 3.2-2 (Aug-2000)
Benzo(g,h,i)perylene	4.14E-07	lb/MMBtu	1.5E-05	6.4E-05	AP-42, Table 3.2-2 (Aug-2000)
Biphenyl	2.12E-04	lb/MMBtu	7.5E-03	3.3E-02	AP-42, Table 3.2-2 (Aug-2000)
Carbon Tetrachloride	3.67E-05	lb/MMBtu	1.3E-03	5.7E-03	AP-42, Table 3.2-2 (Aug-2000)
Chlorobenzene	3.04E-05	lb/MMBtu	1.1E-03	4.7E-03	AP-42, Table 3.2-2 (Aug-2000)
Chloroform	2.85E-05	lb/MMBtu	1.0E-03	4.4E-03	AP-42, Table 3.2-2 (Aug-2000)
Chrysene	6.93E-07	lb/MMBtu	2.5E-05	1.1E-04	AP-42, Table 3.2-2 (Aug-2000)
Ethylbenzene	3.97E-05	lb/MMBtu	1.4E-03	6.2E-03	AP-42, Table 3.2-2 (Aug-2000)
Ethylene Dibromide	4.43E-05	lb/MMBtu	1.6E-03	6.9E-03	AP-42, Table 3.2-2 (Aug-2000)
Fluoranthene	1.11E-06	lb/MMBtu	3.9E-05	1.7E-04	AP-42, Table 3.2-2 (Aug-2000)
Fluorene	5.67E-06	lb/MMBtu	2.0E-04	8.8E-04	AP-42, Table 3.2-2 (Aug-2000)
Methanol	2.50E-03	lb/MMBtu	8.8E-02	3.9E-01	AP-42, Table 3.2-2 (Aug-2000)
Methylene Chloride	2.00E-05	lb/MMBtu	7.1E-04	3.1E-03	AP-42, Table 3.2-2 (Aug-2000)
n-Hexane	1.11E-03	lb/MMBtu	3.9E-02	1.7E-01	AP-42, Table 3.2-2 (Aug-2000)
Naphthalene	7.44E-05	lb/MMBtu	2.6E-03	1.2E-02	AP-42, Table 3.2-2 (Aug-2000)
PAH	2.69E-05	lb/MMBtu	9.5E-04	4.2E-03	AP-42, Table 3.2-2 (Aug-2000)
Phenanthrene	1.04E-05	lb/MMBtu	3.7E-04	1.6E-03	AP-42, Table 3.2-2 (Aug-2000)
Phenol	2.40E-05	lb/MMBtu	8.5E-04	3.7E-03	AP-42, Table 3.2-2 (Aug-2000)
Pyrene	1.36E-06	lb/MMBtu	4.8E-05	2.1E-04	AP-42, Table 3.2-2 (Aug-2000)
Styrene	2.36E-05	lb/MMBtu	8.4E-04	3.7E-03	AP-42, Table 3.2-2 (Aug-2000)
Tetrachloroethane	2.48E-06	lb/MMBtu	8.8E-05	3.8E-04	AP-42, Table 3.2-2 (Aug-2000)
Toluene	4.08E-04	lb/MMBtu	1.4E-02	6.3E-02	AP-42, Table 3.2-2 (Aug-2000)
Vinyl Chloride	1.49E-05	lb/MMBtu	5.3E-04	2.3E-03	AP-42, Table 3.2-2 (Aug-2000)
Xylene	1.84E-04	lb/MMBtu	6.5E-03	2.9E-02	AP-42, Table 3.2-2 (Aug-2000)
<b>Total HAP (except HCHO)</b>			<b>0.69</b>	<b>3.01</b>	

Company Name: EOM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Internal Combustion (IC) Engine Emissions Calculations**

**Engine Information:**

Source ID:	CE-3, CE-4	
Engine Manufacturer and Model	Caterpillar 3608	
Manufacturer's Rated bhp/rpm	2,500	
Source Status	NS	
Date Installed/Modified/Removed	TBD	
Engine Manufactured/Reconstruction Date	TBD	
Is this a Certified Stationary Spark Ignition Engine according to 40 CFR60 Subpart JJJJ	Yes	
Engine Fuel and Combustion Data	Engine Type	4S-LB
	APCD Type	ARFC
	Fuel Type	PQ
	H <sub>2</sub> S (gr/100 scf)	0
	Operating bhp/rpm	2,500
	BSFC (Btu/bhp-hr)	7,571
	Fuel Throughpput (ft <sup>3</sup> /hr)	16,735
	Fuel Throughpput (MMft <sup>3</sup> /hr)	0.0167
Operation (hrs/yr)	8,760	

**Engine Fuel Information:**

Fuel Type:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,131
Heat Input (MMBtu/hr):	18.93
Max. Fuel Consumption (MMscf/yr):	146.6

**Engine Emissions Data:**

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO <sub>x</sub>	0.30	g/bhp-hr	1.65	7.24	Vendor Spec Sheet
NMNEHC	0.30	g/bhp-hr	1.65	7.24	Vendor Spec Sheet
VOC	0.33	g/bhp-hr	1.82	7.97	NMNEHC+HCHO
CO	0.20	g/bhp-hr	1.10	4.83	Vendor Spec Sheet
SO <sub>x</sub>	0.00	lb/MMBtu	0.01	0.05	AP-42, Table 3.2-2 (Aug-2000)
PM <sub>10</sub>	0.01	lb/MMBtu	0.19	0.83	AP-42, Table 3.2-2 (Aug-2000)
PM <sub>2.5</sub>	0.01	lb/MMBtu	0.19	0.83	AP-42, Table 3.2-2 (Aug-2000)
Formaldehyde (HCHO)	0.03	g/bhp-hr	0.17	0.72	Vendor Spec Sheet
GHG (CO <sub>2</sub> e)	See Table Below		2,805	12,287	40 CFR 98, Tables C-1 & C-2
Other (Total HAP except HCHO)	See Table Below		1.16	5.08	AP-42, Table 3.2-2 (Aug-2000)

**Notes:**

1. PM<sub>10</sub> and PM<sub>2.5</sub> are total values (filterable + condensable).
2. GHG (CO<sub>2</sub>e) is carbon dioxide equivalent, which is the summation of CO<sub>2</sub> (GWP = 1) + CH<sub>4</sub> (GWP = 21) + N<sub>2</sub>O (GWP = 310).
3. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this source type.
4. VOC includes Formaldehyde
5. CO assume 93% control, NMNEHC assumes 44% control, HCHO assumes 81% control.

Company Name: EOM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Internal Combustion (IC) Engine Emissions Calculations**

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

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
<b>GHGs:</b>					
CO <sub>2</sub>	430	g/bhp-hr	2,370	10,380	Vendor Spec Sheet
CH <sub>4</sub>	3.15	g/bhp-hr	17	76	Vendor Specs (=THC-NMHC)
N <sub>2</sub> O	0.0001	kg/MMBtu	0.00	0.02	40 CFR 98, Tables C-1 & C-2
THC	4.48	g/bhp-hr	25	108	Vendor Spec Sheet
NMHC	1.33	g/bhp-hr	7	32.1	Vendor Spec Sheet
<b>GHG (CO<sub>2</sub>e)</b>			<b>2,805</b>	<b>12,287</b>	

Organic HAPs:	Emission Factor	Units	lbs/hr	tpy	Estimation Basis / Emission Factor Source
1,1,2,2-Tetrachloroethane	4.00E-05	lb/MMBtu	7.6E-04	3.3E-03	AP-42, Table 3.2-2 (Aug-2000)
1,1,2-Trichloroethane	3.18E-05	lb/MMBtu	6.0E-04	2.6E-03	AP-42, Table 3.2-2 (Aug-2000)
1,3-Butadiene	2.67E-04	lb/MMBtu	5.1E-03	2.2E-02	AP-42, Table 3.2-2 (Aug-2000)
1,3-Dichloropropene	2.64E-05	lb/MMBtu	5.0E-04	2.2E-03	AP-42, Table 3.2-2 (Aug-2000)
2-Methylnaphthalene	3.32E-05	lb/MMBtu	6.3E-04	2.8E-03	AP-42, Table 3.2-2 (Aug-2000)
2,2,4-Trimethylpentane	2.50E-04	lb/MMBtu	4.7E-03	2.1E-02	AP-42, Table 3.2-2 (Aug-2000)
Acenaphthlene	1.25E-06	lb/MMBtu	2.4E-05	1.0E-04	AP-42, Table 3.2-2 (Aug-2000)
Acenaphthylene	5.53E-06	lb/MMBtu	1.0E-04	4.6E-04	AP-42, Table 3.2-2 (Aug-2000)
Acetaldehyde	8.36E-03	lb/MMBtu	1.6E-01	6.9E-01	AP-42, Table 3.2-2 (Aug-2000)
Acrolein	5.14E-03	lb/MMBtu	9.7E-02	4.3E-01	AP-42, Table 3.2-2 (Aug-2000)
Benzene	4.40E-04	lb/MMBtu	8.3E-03	3.6E-02	AP-42, Table 3.2-2 (Aug-2000)
Benzo(e)pyrene	4.15E-07	lb/MMBtu	7.9E-06	3.4E-05	AP-42, Table 3.2-2 (Aug-2000)
Benzo(b)fluoranthene	1.66E-07	lb/MMBtu	3.1E-06	1.4E-05	AP-42, Table 3.2-2 (Aug-2000)
Benzo(g,h,i)perylene	4.14E-07	lb/MMBtu	7.8E-06	3.4E-05	AP-42, Table 3.2-2 (Aug-2000)
Biphenyl	2.12E-04	lb/MMBtu	4.0E-03	1.8E-02	AP-42, Table 3.2-2 (Aug-2000)
Carbon Tetrachloride	3.67E-05	lb/MMBtu	6.9E-04	3.0E-03	AP-42, Table 3.2-2 (Aug-2000)
Chlorobenzene	3.04E-05	lb/MMBtu	5.8E-04	2.5E-03	AP-42, Table 3.2-2 (Aug-2000)
Chloroform	2.85E-05	lb/MMBtu	5.4E-04	2.4E-03	AP-42, Table 3.2-2 (Aug-2000)
Chrysene	6.93E-07	lb/MMBtu	1.3E-05	5.7E-05	AP-42, Table 3.2-2 (Aug-2000)
Ethylbenzene	3.97E-05	lb/MMBtu	7.5E-04	3.3E-03	AP-42, Table 3.2-2 (Aug-2000)
Ethylene Dibromide	4.43E-05	lb/MMBtu	8.4E-04	3.7E-03	AP-42, Table 3.2-2 (Aug-2000)
Fluoranthene	1.11E-06	lb/MMBtu	2.1E-05	9.2E-05	AP-42, Table 3.2-2 (Aug-2000)
Fluorene	5.67E-06	lb/MMBtu	1.1E-04	4.7E-04	AP-42, Table 3.2-2 (Aug-2000)
Methanol	2.50E-03	lb/MMBtu	4.7E-02	2.1E-01	AP-42, Table 3.2-2 (Aug-2000)
Methylene Chloride	2.00E-05	lb/MMBtu	3.8E-04	1.7E-03	AP-42, Table 3.2-2 (Aug-2000)
n-Hexane	1.11E-03	lb/MMBtu	2.1E-02	9.2E-02	AP-42, Table 3.2-2 (Aug-2000)
Naphthalene	7.44E-05	lb/MMBtu	1.4E-03	6.2E-03	AP-42, Table 3.2-2 (Aug-2000)
PAH	2.69E-05	lb/MMBtu	5.1E-04	2.2E-03	AP-42, Table 3.2-2 (Aug-2000)
Phenanthrene	1.04E-05	lb/MMBtu	2.0E-04	8.6E-04	AP-42, Table 3.2-2 (Aug-2000)
Phenol	2.40E-05	lb/MMBtu	4.5E-04	2.0E-03	AP-42, Table 3.2-2 (Aug-2000)
Pyrene	1.36E-06	lb/MMBtu	2.6E-05	1.1E-04	AP-42, Table 3.2-2 (Aug-2000)
Styrene	2.36E-05	lb/MMBtu	4.5E-04	2.0E-03	AP-42, Table 3.2-2 (Aug-2000)
Tetrachloroethane	2.48E-06	lb/MMBtu	4.7E-05	2.1E-04	AP-42, Table 3.2-2 (Aug-2000)
Toluene	4.08E-04	lb/MMBtu	7.7E-03	3.4E-02	AP-42, Table 3.2-2 (Aug-2000)
Vinyl Chloride	1.49E-05	lb/MMBtu	2.8E-04	1.2E-03	AP-42, Table 3.2-2 (Aug-2000)
Xylene	1.84E-04	lb/MMBtu	3.5E-03	1.5E-02	AP-42, Table 3.2-2 (Aug-2000)
<b>Total HAP (except HCHO)</b>			<b>1.16</b>	<b>1.61</b>	

**Company Name:** EQM Gathering Opco, LLC  
**Facility Name:** Pandora Station  
**Project Description:** R-13 Permit Application

**Microturbine Generator Emissions Calculations**

<b>Source Designation:</b>	
Manufacturer:	Capstone
Model No.:	C65 NG Standard
Year Installed:	TBD
Type of Engine:	MicroTurbine
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,131
Rated Power Output (kW):	65
Rated Horsepower (bhp):	88
Heat Input (MMBtu/hr)	0.84
Specific Fuel Consumption (Btu/bhp-hr)	9,534
Maximum Fuel Consumption at 100% Load (MMscf/hr):	7.44E-04
Maximum Fuel Consumption at 100% Load (MMscf/yr):	6.5

**Operational Details:**

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMBtu/yr):	7,376

**Criteria and Manufacturer Specific Pollutant Emission Factors:**

Pollutant	Emission Factors	Units
NO <sub>x</sub> <sup>b</sup>	0.46	lb/MWh
CO <sup>b</sup>	1.25	lb/MWh
SO <sub>2</sub> <sup>a</sup>	0.003	lb/MMBtu
Total Particulate Matter (TSP) <sup>a</sup>	0.01	lb/MMBtu
PM (Filterable) <sup>a</sup>	0.002	lb/MMBtu
PM <sub>10</sub> (Filterable + Condensable) <sup>a</sup>	0.01	lb/MMBtu
PM <sub>2.5</sub> (Filterable + Condensable) <sup>a</sup>	0.01	lb/MMBtu
VOC <sup>b</sup>	0.10	lb/MWh
CO <sub>2</sub> <sup>b</sup>	1520	lb/MWh
CH <sub>4</sub> <sup>c</sup>	0.100	lb/MWh
N <sub>2</sub> O <sup>c</sup>	0.0001	kg/MMBtu

Company Name: EOM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Microturbine Generator Emissions Calculations**

**Criteria and Manufacturer Specific Pollutant Emission Rates:**

Pollutant	Potential Emissions	
	(lb/hr) <sup>d,e,f</sup>	(tons/yr) <sup>g</sup>
NO <sub>x</sub>	0.03	0.13
CO	0.08	0.36
SO <sub>2</sub>	2.9E-03	0.01
Total Particulate Matter (TSP)	0.01	0.02
PM (Filterable)	1.6E-03	0.01
PM <sub>10</sub> (Filterable + Condensable)	0.01	0.02
PM <sub>2.5</sub> (Filterable + Condensable)	0.01	0.02
VOC	0.01	0.03
CO <sub>2</sub>	98.80	432.74
CH <sub>4</sub>	0.01	0.03
N <sub>2</sub> O	1.9E-04	8.1E-04
GHG (CO <sub>2</sub> E)	99	434

**Hazardous Air Pollutant (HAP) Potential Emissions:**

Pollutant	Emission Factor (lb/MMBtu) <sup>a</sup>	Potential Emissions (lb/hr) <sup>c</sup>	Potential Emissions (tons/yr) <sup>g</sup>
<b>HAPs:</b>			
Acetaldehyde	4.0E-05	3.4E-05	1.5E-04
Acrolein	6.4E-06	5.4E-06	2.4E-05
Benzene	1.2E-05	1.0E-05	4.4E-05
1,3-Butadiene	4.3E-07	3.6E-07	1.6E-06
Ethylbenzene	3.2E-05	2.7E-05	1.2E-04
Formaldehyde	7.1E-04	6.0E-04	2.6E-03
Propylene Oxide	2.9E-05	2.4E-05	1.1E-04
Toluene	1.3E-04	1.1E-04	4.8E-04
Xylene	6.4E-05	5.4E-05	2.4E-04
<b>Polycyclic Organic Matter:</b>			
Naphthalene	1.3E-06	1.1E-06	4.8E-06
PAH	2.2E-06	1.9E-06	8.1E-06
<b>Total HAP</b>		<b>8.7E-04</b>	<b>3.8E-03</b>

<sup>a</sup> Emission factor from AP-42 Section 3.1, "Stationary Gas Turbines," Tables 3.1-1, 3.1-2a, and 3.1-3, April 2000.

<sup>b</sup> NO<sub>x</sub>, CO, VOC, and CO<sub>2</sub> emission factors from Capstone C65 Natural Gas Low NO<sub>x</sub> MicroTurbine Specification Sheet.

<sup>c</sup> Greenhouse gas emission factors are from 40 CFR Part 98 for natural gas combustion.

<sup>d</sup> Emission Rate (lb/hr) = Rated Horsepower (bhp) × Emission Factor (g/bhp-hr) × 2.2046 (lb/kg) / 1000 (g/kg)

<sup>e</sup> Emission Rate (lb/hr) = Rated Output (kW) × Emission Factor (lb/MWh) / 1000 (kW/MW).

<sup>f</sup> Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr) × Emission Factor (kg/MMBtu) × 2.2046 (lb/kg)

<sup>g</sup> Annual Emissions (tons/yr)<sub>Potential</sub> = (lb/hr)<sub>Emissions</sub> × (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

Company Name: EQM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Storage Tank Emissions Calculations**

Tank Description	Tank Contents	Number of Tanks	Tank Capacity (gal)	Tank Diameter (ft)	Tank Length (ft)	Turnovers Per Year	Annual Throughput (gal)	VOC Emissions Per Tank (lb/yr)	Total VOC Emissions (tpy)	HAP Emissions Per Tank (lb/yr)	Total HAP Emissions (tpy)
Produced Water Tank	Produced Water	2	8,820	10	15.0	12	105,000	578.16	0.290	8.76	0.01
Engine Lube Oil Tank	New Lube Oil	1	2,000	5.3	12.0	1	1,596	0.64	3.2E-04	<0.01	<0.01
Compressor Lube Oil Tank	Compressor Oil	1	2,000	5.3	12.1	3	5,460	0.71	3.6E-04	<0.01	<0.01
Used Oil Tank	Used Oil	1	4,200	7.8	11.7	1	4,200	1.31	6.6E-04	<0.01	<0.01
New Engine Mono-Ethylene Glycol (MEG)	New MEG	1	2,000	5.3	12.1	0	756	0.04	2.0E-05	<0.01	<0.01
Used Engine MEG	Used MEG	1	2,000	5.3	12.1	0	756	0.04	2.0E-05	<0.01	<0.01
New TEG Tank	New TEG	1	2,000	5.3	12.1	0	630	0.04	2.0E-05	<0.01	<0.01
Used TEG Tank	Used TEG	1	2,000	5.3	12.1	0	630	0.04	2.0E-05	<0.01	<0.01
Methanol Lube Oil	Methanol	1	2,000	5.3	12.1	4	8,400	33.83	0.02	33.83	0.02
Methanol	Lube Oil	4	300	3	5	12	3,600	0.48	0.00	<0.01	<0.01
Methanol	Methanol	3	500	4	5	12	6,000	19.87	0.01	19.87	0.01
<b>Total Potential Emissions (excluding PWT)</b>								<b>57.00</b>	<b>0.03</b>	<b>53.700</b>	<b>0.03</b>

Company Name: EQM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Storage Tank Emissions Calculations**

Produced Water Storage Tanks (210, bbl each) - T001 & T002  
 Operational Hours 8,760 hrs/yr  
 Annual Fluid Throughput (per tank) 105,000 gal/yr

Description	Potential Throughput <sup>1</sup> (gal/yr)
Produced Water	105,000

<sup>1</sup> Based on engineering estimate of produced water for the station.

Storage Tanks (210bbl, each) - Emissions (Per tank)

Constituent	Uncontrolled Total Emissions <sup>1</sup> lb/hr	Controlled Total Emissions <sup>1</sup> lb/hr	Controlled Total Emissions <sup>1</sup> tpy
Carbon Dioxide	0.002	0.002	0.009
Methane	0.126	0.006	0.028
Ethane	0.231	0.012	0.051
Propane	0.378	0.019	0.083
Isobutane	0.159	0.008	0.035
n-Butane	0.418	0.021	0.091
Isopentane	0.154	0.008	0.034
n-Pentane	0.121	0.006	0.027
n-Hexane	0.024	0.001	0.005
Other Hexanes	0.035	0.002	0.008
Heptanes	0.027	0.001	0.006
Benzene	<0.001	<0.001	<0.001
Toluene	0.001	<0.001	<0.001
Ethylbenzene	<0.001	<0.001	<0.001
Xylenes	<0.001	<0.001	<0.001
2,2,4-Trimethylpentane	<0.001	<0.001	<0.001
C8+ Heavies	0.008	<0.001	0.002
<b>Total Emissions:</b>	1.685	0.084	0.369
<b>Total VOC Emissions:</b>	1.326	0.066	0.290
<b>Total HAP Emissions:</b>	0.025	0.001	0.006

<sup>1</sup> E&P TANK v2.0 calculates working, breathing and flashing losses and reports the sum as one total.

Company Name: EOM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Fugitive Emissions Calculations**

**Fugitive Component Information:**

Component Type	Estimated Component Count	Gas Leak Emission Factor		Average Gas Leak Rate (lb/hr)	Max Gas Leak Rate (tpy)	Potential VOC Emissions (tpy)	Potential HAP Emissions (tpy)
		(lb/hr/component)	Factor Source				
Connectors	654	0.0004	EPA Protocol, Table 2-4	0.29	1.52	0.16	0.01
Flanges	600	0.001	EPA Protocol, Table 2-4	0.52	2.71	0.28	0.01
Open-Ended Lines	12	0.004	EPA Protocol, Table 2-4	0.05	0.28	0.03	0.00
Pump Seals	0	0.005	EPA Protocol, Table 2-4	<0.01	<0.01	<0.01	<0.01
Valves	308	0.010	EPA Protocol, Table 2-4	3.06	16.06	1.68	7.5E-02
Other	36	0.019	EPA Protocol, Table 2-4	0.70	3.67	0.38	0.02
<b>Total</b>				<b>4.61</b>	<b>24.24</b>	<b>2.54</b>	<b>0.11</b>

**Notes:**

1. The component type "Other" includes any equipment type other than connectors, flanges, open-ended lines, pumps and valves that have fugitive emissions.
2. The component count is a preliminary estimate based on the proposed design of a similar station.
3. *Table 2-4: Oil & Gas Production Operations Average Emission Factors*, Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995.
4. Assumes maximum leak rate 20% greater than measured average leak rate.

**VOC and HAP Vented Blowdown Emissions**

Blowdown Emissions Sources	Number of Units	Vented Gas Volume Per Blowdown Event (scf)	Number of Blowdown Events per year	Total Volume NG Emitted (scf/yr)	Potential VOC Emissions (tpy)	Potential HAP Emissions (tpy)
Station ESD Vent	1	550,000	1	550,000	1.44	0.06
Pig Receiver	1	1,181	75	88,575	0.23	0.01
Pig Receiver	1	673	75	50,475	0.13	0.01
Compressors	4	45,000	12	2,160,000	5.66	0.25
<b>Total</b>				<b>7.46</b>	<b>0.333</b>	

**Notes:**

1. Density of natural gas: 0.05 lb/ft<sup>3</sup> @ STP (www.engineeringtoolbox.com)
2. Volume of pigging vented volume is calculated at 250 psig for one 16 x 20 receiver and one 12 x 16 receiver.

**GHG Vented Blowdown Emissions**

Blowdown Emissions Sources	Number of Units	Volume Per Blowdown Event (scf)	Number of Blowdown Events per year	Total Volume NG Emitted (scf/yr)	Potential CH <sub>4</sub> Emissions <sup>1</sup> (tpy)	Potential CO <sub>2</sub> Emissions <sup>1</sup> (tpy)	Potential CO <sub>2e</sub> Emissions (tpy)
Station ESD Vent	1	550,000	1	550,000	10.2	0.04	255
Pig Receiver	1	1,181	75	88,575	1.6	0.01	41
Pig Receiver	1	673	75	50,475	0.9	0.00	23
Compressors	4	45,000	12	2,160,000	40.1	0.17	1002
<b>Total</b>				<b>52.8</b>	<b>0.221</b>	<b>1321</b>	

1. Calculated in accordance with Equations W-35, and W-36 in Subpart W of 40 CFR 98.

Company Name: EOM Gathering Opco, LLC  
 Facility Name: Pandora Station  
 Project Description: R-13 Permit Application

**Fugitive Emissions Calculations**

**Rod Packing Emissions**

Number of Compressors	Number of Rods Per Compressor	Leak Rate (scf/hr/rod)	Total Volume NG Emitted (scf/yr)	Potential VOC Emissions (tpy)	Potential HAP Emissions (tpy)	Potential CO <sub>2</sub> Emissions (tpy)	Potential CH <sub>4</sub> Emissions (tpy)	Potential CO <sub>2</sub> e Emissions (tpy)
4	6	11	2,312,640	6.06	0.27	0.18	42.88	1072.28
<b>Total</b>				<b>6.06</b>	<b>0.27</b>	<b>0.18</b>	<b>42.88</b>	<b>1,072.28</b>

**Notes:**

- Assumes a density of natural gas of 0.05 lb/scf
- Leak rate from [https://www3.epa.gov/gasstar/documents/11\\_rodpack.pdf](https://www3.epa.gov/gasstar/documents/11_rodpack.pdf)

**GHG Fugitive Emissions from Component Leaks:**

Component Type	Estimated Component Count	GHG Emission Factor		CH <sub>4</sub> Emissions (tpy)	CO <sub>2</sub> Emissions (tpy)	CO <sub>2</sub> e Emissions (tpy)
		(scf/hr/component)	Factor Source			
Connectors	654	0.004	40 CFR 98, Table W-1A	0.42	6.5E-04	10.62
Flanges	600	0.004	40 CFR 98, Table W-1A	0.39	5.9E-04	9.75
Open-Ended Lines	12	0.061	40 CFR 98, Table W-1A	0.12	1.8E-04	2.97
Pump Seals	0	13.3	40 CFR 98, Table W-1A	<0.01	<0.01	<0.01
Valves	308	0.03	40 CFR 98, Table W-1A	1.35	2.1E-03	33.77
Other	0	0.04	40 CFR 98, Table W-1A	<0.01	<0.01	<0.01
<b>Total</b>				<b>2.28</b>	<b>0.00</b>	<b>57.12</b>

**Notes:**

- The component count is a preliminary estimate based on the proposed design of a similar station.
- Table W-1 of Subpart W - Default Whole Gas Emission Factors for Onshore Production, 40 CFR 98, Subpart W, Pre-publication version, November 8, 2010.
- Calculated in accordance with Equations W-31, W-35 and W-36 in Subpart W of 40 CFR 98.
- GHG (CO<sub>2</sub>e) is carbon dioxide equivalent, which is the summation of CO<sub>2</sub> (GWP = 1) + CH<sub>4</sub> (GWP = 25) + N<sub>2</sub>O (GWP = 298).

**Fugitive Component Emissions Data:**

Pollutant	Atmospheric Emissions		Emissions Estimation Method
	lbs/hr	tpy	
VOC	3.67	16.06	EPA Protocol, Table 2-4 & Site-Specific Gas Analysis
HAPs	0.16	0.72	EPA Protocol, Table 2-4 and Site-Specific Gas Analysis
GHG (CO <sub>2</sub> e)	559	2450	40 CFR 98, Table W-1A and Site-Specific Gas Analysis

**Company Name:** EOM Gathering Opco, LLC  
**Facility Name:** Pandora Station  
**Project Description:** R-13 Permit Application

**Site-Specific Gas Analysis**

**Sample Location:** Mercury Gas Analysis  
**Sample Date:**  
**HHV (Btu/scf):** 1,131

Constituent	Natural Gas Stream Speciation (Vol. %)	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.13%	0.31%
Nitrogen	0.414%	0.619%
Methane	87.163%	74.443%
Ethane	8.810%	14.120%
Propane	2.101%	4.936%
Isobutane	0.322%	0.997%
n-Butane	0.468%	1.450%
Isopentane	0.154%	0.593%
n-Pentane	0.105%	0.405%
Cyclopentane	0.006%	0.022%
n-Hexane	0.041%	0.188%
Cyclohexane	0.005%	0.022%
Other Hexanes	0.082%	0.376%
Heptanes	0.071%	0.378%
Methylcyclohexane	0.013%	0.068%
2,2,4-Trimethylpentane	0.039%	0.237%
Benzene	0.002%	0.008%
Toluene	0.003%	0.015%
Ethylbenzene	0.001%	0.003%
Xylenes	0.003%	0.017%
C8 + Heavies	0.084%	0.763%
Totals	100%	100%

TOC (Total)	99.04%
VOC (Total)	10.48%
HAP (Total)	0.47%

GAS COMPRESSION APPLICATION

ENGINE SPEED (rpm): 1000  
 COMPRESSION RATIO: 9.2  
 AFTERCOOLER TYPE: SCAC  
 AFTERCOOLER WATER INLET (°F): 130  
 JACKET WATER OUTLET (°F): 190  
 ASPIRATION: TA  
 COOLING SYSTEM: JW, OC+AC  
 CONTROL SYSTEM: CIS/ADEM3  
 EXHAUST MANIFOLD: DRY  
 COMBUSTION: LOW EMISSION  
 NOx EMISSION LEVEL (g/bhp-hr NOx): 0.5

RATING STRATEGY:  
 RATING LEVEL:  
 FUEL SYSTEM:

STANDARD  
 CONTINUOUS  
 GAV  
 WITH AIR FUEL RATIO CONTROL

**SITE CONDITIONS:**

FUEL: Pandora  
 FUEL PRESSURE RANGE(psig): 42.8-47.0  
 FUEL METHANE NUMBER: 63.7  
 FUEL LHV (Btu/scf): 1056  
 ALTITUDE(ft): 1200  
 MAXIMUM INLET AIR TEMPERATURE(°F): 77  
 STANDARD RATED POWER: 4735 bhp@1000rpm

RATING	NOTES	LOAD	MAXIMUM	SITE RATING AT MAXIMUM		
			RATING	INLET AIR TEMPERATURE		
			100%	100%	75%	50%
ENGINE POWER (WITHOUT FAN)	(1)	bhp	4735	4735	3551	2368
INLET AIR TEMPERATURE		°F	77	77	77	77

ENGINE DATA							
FUEL CONSUMPTION (LHV)	(2)	Btu/bhp-hr	6766	6766	7061	7728	
FUEL CONSUMPTION (HHV)	(2)	Btu/bhp-hr	7474	7474	7800	8537	
AIR FLOW (@inlet air temp, 14.7 psia)	(3)(4)	ft <sup>3</sup> /min	12294	12294	9507	6528	
AIR FLOW (WET)	(3)(4)	lb/hr	54511	54511	42156	28947	
FUEL FLOW (60°F, 14.7 psia)	(3)(4)	scfm	506	506	396	289	
INLET MANIFOLD PRESSURE	(5)	in Hg(abs)	73.7	73.7	56.7	40.5	
EXHAUST TEMPERATURE - ENGINE OUTLET	(6)	°F	856	856	897	974	
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(7)(4)	ft <sup>3</sup> /min	31985	31985	25522	18565	
EXHAUST GAS MASS FLOW (WET)	(7)(4)	lb/hr	56035	56035	43349	29817	

EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)	(8)(9)	g/bhp-hr	0.50	0.50	0.50	0.50	
CO	(8)(9)	g/bhp-hr	2.75	2.75	2.75	2.75	
THC (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	6.31	6.31	6.57	6.81	
NMHC (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	1.88	1.88	1.95	2.03	
NMNEHC (VOCs) (mol. wt. of 15.84)	(8)(9)(10)	g/bhp-hr	0.78	0.78	0.81	0.84	
HCHO (Formaldehyde)	(8)(9)	g/bhp-hr	0.26	0.26	0.28	0.31	
CO2	(8)(9)	g/bhp-hr	439	439	458	502	
EXHAUST OXYGEN	(8)(11)	% DRY	12.0	12.0	11.8	11.4	

HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)	(12)	Btu/min	48295	48295	42064	34443	
HEAT REJ. TO ATMOSPHERE	(12)	Btu/min	18688	18688	17553	16771	
HEAT REJ. TO LUBE OIL (OC)	(12)	Btu/min	24028	24028	22986	22870	
HEAT REJ. TO AFTERCOOLER (AC)	(12)(13)	Btu/min	35763	35763	16238	3343	

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW)	(13)	Btu/min	53124
TOTAL AFTERCOOLER CIRCUIT (OC+AC)	(13)(14)	Btu/min	66384
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

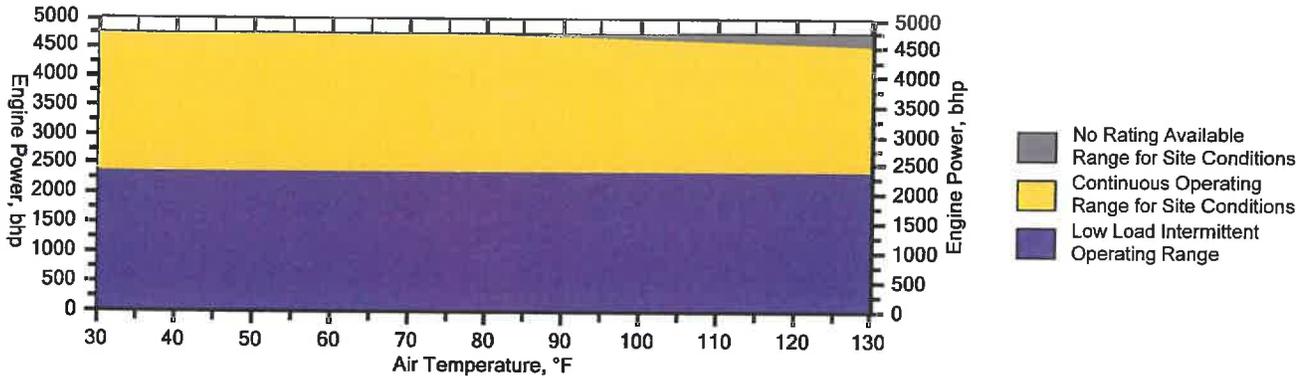
**CONDITIONS AND DEFINITIONS**

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

For notes information consult page three.

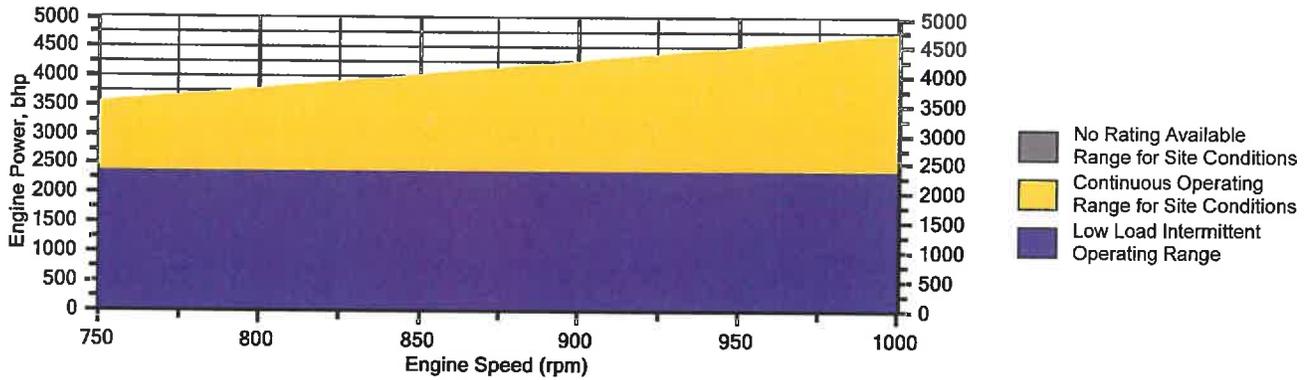
## Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1200 ft and 1000 rpm



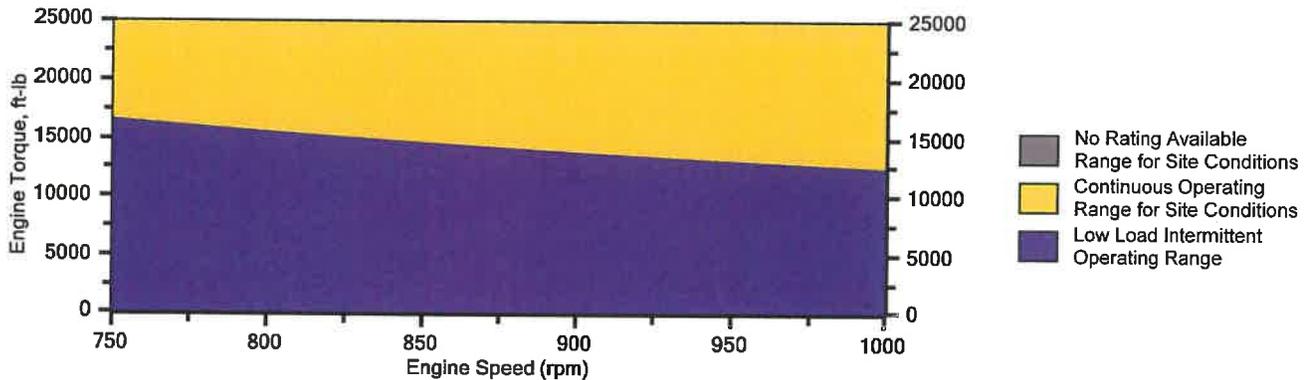
## Engine Power vs. Engine Speed

Data represents speed sweep at 1200 ft and 77 °F



## Engine Torque vs. Engine Speed

Data represents speed sweep at 1200 ft and 77 °F



Note: At site conditions of 1200 ft and 77°F inlet air temp., constant torque can be maintained down to 750 rpm. The minimum speed for loading at these conditions is 750 rpm.

**NOTES**

1. Engine rating is with two engine driven water pumps. Tolerance is  $\pm 3\%$  of full load.
2. Fuel consumption tolerance is  $\pm 2.5\%$  of full load data.
3. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of  $\pm 5\%$ .
4. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.
5. Inlet manifold pressure is a nominal value with a tolerance of  $\pm 5\%$ .
6. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
7. Exhaust flow value is on a "wet" basis. Flow is a nominal value for total flow rate with a tolerance of  $\pm 6\%$ . Exhaust gas vented through the wastegate flows only to the right exhaust outlet. The total flow through the wastegate may be as great as 15% of the total value for conditions under which the wastegate is open. For installations that use dual exhaust runs this difference must be taken into account when specifying any items to be connected to the exhaust outlets. The flow in the right exhaust outlet must be sized for at least 65% of the total flow to allow for the wastegate full open condition, while the left outlet must be sized for 50% of the total flow for the wastegate closed condition. Both runs must meet the allowable backpressure requirement as described in the Exhaust Systems A&I Guide.
8. Emissions data is at engine exhaust flange prior to any after treatment.
9. Emission values are based on engine operating at steady state conditions. Fuel methane number cannot vary more than  $\pm 3$ . Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.
10. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
11. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is  $\pm 0.5$ .
12. Heat rejection values are nominal. Tolerances, based on treated water, are  $\pm 10\%$  for jacket water circuit,  $\pm 50\%$  for radiation,  $\pm 20\%$  for lube oil circuit, and  $\pm 5\%$  for aftercooler circuit.
13. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.
14. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	84.6727	84.6727
Ethane	C2H6	10.4986	10.4986
Propane	C3H8	2.6903	2.6903
Isobutane	iso-C4H10	0.3539	0.3539
Norbutane	nor-C4H10	0.6007	0.6007
Isopentane	iso-C5H12	0.1692	0.1692
Norpentane	nor-C5H12	0.1481	0.1481
Hexane	C6H14	0.1870	0.1870
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.5395	0.5395
Carbon Dioxide	CO2	0.1100	0.1100
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0300	0.0300
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		100.0000	100.0000

Fuel Makeup: Pandora  
Unit of Measure: English

#### Calculated Fuel Properties

Caterpillar Methane Number: 63.7  
Lower Heating Value (Btu/scf): 1056  
Higher Heating Value (Btu/scf): 1167  
WOBBE Index (Btu/scf): 1300  
THC: Free Inert Ratio: 152.96  
Total % Inerts (% N2, CO2, He): 0.65%  
RPC (%) (To 905 Btu/scf Fuel): 100%  
Compressibility Factor: 0.997  
Stoich A/F Ratio (Vol/Vol): 10.98  
Stoich A/F Ratio (Mass/Mass): 16.64  
Specific Gravity (Relative to Air): 0.660  
Specific Heat Constant (K): 1.293

#### CONDITIONS AND DEFINITIONS

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

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

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

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

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

#### FUEL LIQUIDS

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

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



Prepared For:  
Willoughby Hill  
EQT

Date: September 13, 2016

### APPLICATION INFORMATION

#### DRIVER

Make: CATERPILLAR  
Model: G3616 A3  
Horsepower: 4735  
RPM: 1000  
Compression Ratio: 9.2  
Exhaust Flow Rate: 31985  
Exhaust Temperature: 856 °F  
Reference: DM8608-05-001  
Fuel: Fuel Analysis  
Annual Operating Hours: 8760

#### UNCONTROLLED EMISSIONS DATA

	<u>g/bhp-hr</u>	<u>lb/hr</u>	<u>Tons/Year</u>
NO <sub>x</sub> :	0.50	5.22	22.86
CO:	2.75	28.71	125.74
THC:	6.31	65.87	288.51
NMHC:	1.88	19.63	85.96
NMNEHC:	0.78	8.14	35.66
HCHO:	0.26	2.71	11.89
Oxygen:	12.00%		

#### CATALYST ELEMENT

Model: RT-4815-H  
Catalyst Type: Oxidation, Premium Precious Metal Group  
Substrate Type: BRAZED  
Element Size: 48"x15"x3.5"  
Element Quantity: 8

#### POST CATALYST EMISSIONS DATA

	<u>g/bhp-hr</u>	<u>lb/hr</u>
NO <sub>x</sub> :	Unaffected by Oxidation Catalyst	0.84
CO:	< 0.08	4.59
NMNEHC:	< 0.44	0.21
HCHO:	< 0.02	



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## WARRANTY

EMIT Technologies, Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of two (2) years from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance using an EMIT Air/Fuel ratio controller is dependent upon properly defined set-points, variable with engine and fuel gas composition. Air/fuel ratio controller performance is guaranteed, but not limited, to fuel gas with a HHV content of 1400 BTU/USCF.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures. In most cases, excluding thermal deactivation, catalyst performance is redeemable by means of proper washing (refer to EMIT Catalyst/Silencer Housing Manual for element wash information, or contact a local EMIT Sales representative).

The exhaust temperature operating range at the converter inlet is a minimum of 600°F for oxidation catalyst and 750 °F for NSCR catalyst, and a maximum of 1250°F.

If a properly functioning, high temperature shut down switch is not installed, thermal deactivation of catalyst at sustained temperatures above 1250°F is not covered. If excessive exposure to over oxygenation of NSCR catalyst occurs due to improperly functioning or non-existent Air/Fuel ratio control, then deactivation of catalyst is not warranted.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent. Standard Oxidation Catalyst conversion efficiencies (% reduction) will be guaranteed for fuel gas containing less than 1.5% mole fraction of non-methane, non-ethane hydrocarbons. Applications where fuel gas exceeds this level will require a Premium Oxidation Catalyst to maintain guaranteed VOC conversion efficiencies.

Engine lubrication oil shall contain less than 0.5 wt% Sulfated Ash with a maximum allowable specific oil consumption of 0.7 g/bhp-hr. The catalyst shall be limited to a maximum ash loading of 0.022 lb/ft<sup>3</sup>. Phosphorous and zinc additives are limited to 0.03 wt%. New or Reconstructed engines must operate for a minimum of 50 hours prior to catalyst installation, otherwise the warranty is void.

The catalyst must not be exposed to the following known poisoning agents, including: antimony, arsenic, chromium, copper, iron, lead, lithium, magnesium, mercury, nickel, phosphorous, potassium, silicon, sodium, sulfur, tin, and zinc. Total poison concentrations in the fuel gas must be limited to 0.25 ppm or less for catalyst to function properly.

Shipment - Promised shipping dates are approximate lead times from the point of manufacture and are not guaranteed. EMIT Technologies, Inc. will not be liable for any loss, damage or delay in manufacture or delivery resulting from any cause beyond its control including, but not limited to a period equal to the time lost by reason of that delay. All products will be crated as per best practice to prevent any damage during shipment. Unless otherwise specified, Buyer will pay for any special packing and shipping requirements. Acceptance of goods by common carrier constitutes delivery to Buyer. EMIT Technologies, Inc. shall not be responsible for goods damaged or lost in transit.

Terms: Credit is extended to purchaser for net 30 time period. If payment is not received in the net 30 timeframe, interest on the unpaid balance will accrue at a rate of 1.5% per month from the invoice date.

Order Cancellation Terms: Upon cancellation of an order once submittal of a Purchase Order has occurred, the customer will pay a 25% restocking fee for Catalyst Housings, Catalyst Elements, and Air/Fuel Ratio Controllers; 50% restocking fee for Cooler Top Solutions Exhaust System Accessories, and other Custom Built Products; 100% of all associated shipping costs incurred by EMIT; 100% of all project expenses incurred by EMIT for Field Services.

GAS COMPRESSION APPLICATION

ENGINE SPEED (rpm): 1000  
 COMPRESSION RATIO: 7.6  
 AFTERCOOLER TYPE: SCAC  
 AFTERCOOLER - STAGE 2 INLET (°F): 130  
 AFTERCOOLER - STAGE 1 INLET (°F): 174  
 JACKET WATER OUTLET (°F): 190  
 ASPIRATION: TA  
 COOLING SYSTEM: JW+1AC, OC+2AC  
 CONTROL SYSTEM: ADEM4  
 EXHAUST MANIFOLD: DRY  
 COMBUSTION: LOW EMISSION  
 NOx EMISSION LEVEL (g/bhp-hr NOx): 0.3  
 SET POINT TIMING: 17

RATING STRATEGY:  
 RATING LEVEL:  
 FUEL SYSTEM:  
**SITE CONDITIONS:**  
 FUEL:  
 FUEL PRESSURE RANGE(psig): (See note 1)  
 FUEL METHANE NUMBER:  
 FUEL LHV (Btu/scf):  
 ALTITUDE(ft):  
 MAXIMUM INLET AIR TEMPERATURE(°F):  
 STANDARD RATED POWER:

STANDARD  
 CONTINUOUS  
 GAV  
 WITH AIR FUEL RATIO CONTROL  
 Pandora  
 58.0-70.3  
 64.3  
 1054  
 1200  
 77  
 2500 bhp@1000rpm

RATING	NOTES	LOAD	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE			
			100%	100%	75%	50%
ENGINE POWER (WITHOUT FAN)	(2)	bhp	2500	2500	1875	1250
INLET AIR TEMPERATURE		°F	77	77	77	77

ENGINE DATA						
FUEL CONSUMPTION (LHV)	(3)	Btu/bhp-hr	6850	6850	7077	7576
FUEL CONSUMPTION (HHV)	(3)	Btu/bhp-hr	7571	7571	7822	8373
AIR FLOW (@inlet air temp, 14.7 psia)	(4)(5)	ft <sup>3</sup> /min	6300	6300	4775	3246
AIR FLOW (WET)	(4)(5)	lb/hr	27936	27936	21171	14393
FUEL FLOW (60°F, 14.7 psia)	(4)(5)	scfm	271	271	210	150
INLET MANIFOLD PRESSURE	(6)	in Hg(abs)	103.1	103.1	77.9	54.4
EXHAUST TEMPERATURE - ENGINE OUTLET	(7)	°F	826	826	869	933
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(8)(5)	ft <sup>3</sup> /min	16058	16058	12591	8997
EXHAUST GAS MASS FLOW (WET)	(8)(5)	lb/hr	28748	28748	21800	14842

EMISSIONS DATA - ENGINE OUT						
NOx (as NO2)	(9)(10)	g/bhp-hr	0.30	0.30	0.30	0.30
CO	(9)(10)	g/bhp-hr	2.67	2.67	2.67	2.67
THC (mol. wt. of 15.84)	(9)(10)	g/bhp-hr	4.48	4.48	4.75	4.82
NMHC (mol. wt. of 15.84)	(9)(10)	g/bhp-hr	1.33	1.33	1.41	1.43
NMNEHC (VOCs) (mol. wt. of 15.84)	(9)(10)(11)	g/bhp-hr	0.54	0.54	0.58	0.59
HCHO (Formaldehyde)	(9)(10)	g/bhp-hr	0.16	0.16	0.17	0.20
CO2	(9)(10)	g/bhp-hr	430	430	447	475
EXHAUST OXYGEN	(9)(12)	% DRY	11.6	11.6	11.3	10.9

HEAT REJECTION						
HEAT REJ. TO JACKET WATER (JW)	(13)	Btu/min	27633	27633	23029	18941
HEAT REJ. TO ATMOSPHERE	(13)	Btu/min	9198	9198	9687	9449
HEAT REJ. TO LUBE OIL (OC)	(13)	Btu/min	12846	12846	12215	11139
HEAT REJ. TO A/C - STAGE 1 (1AC)	(13)(14)	Btu/min	22015	22015	11150	3184
HEAT REJ. TO A/C - STAGE 2 (2AC)	(13)(14)	Btu/min	8134	8134	5244	2747

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+1AC)	(14)(15)	Btu/min	53512
TOTAL STAGE 2 AFTERCOOLER CIRCUIT (OC+2AC)	(14)(15)	Btu/min	23956

A cooling system safety factor of 0% has been added to the cooling system sizing criteria.

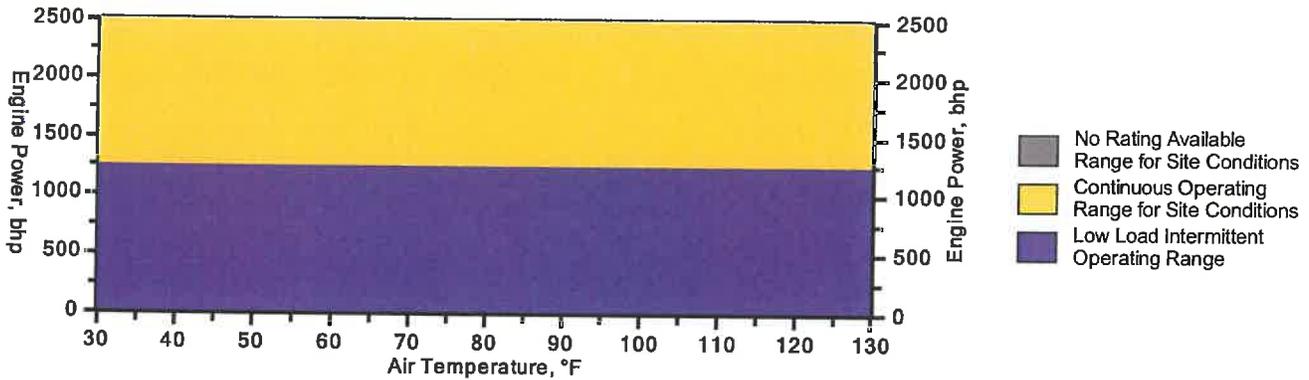
**CONDITIONS AND DEFINITIONS**

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

For notes information consult page three.

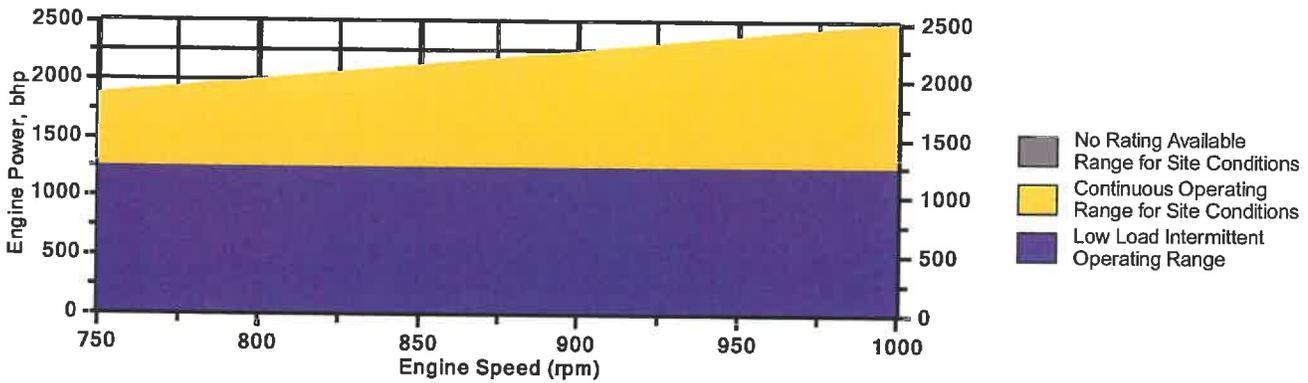
### Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1200 ft and 1000 rpm



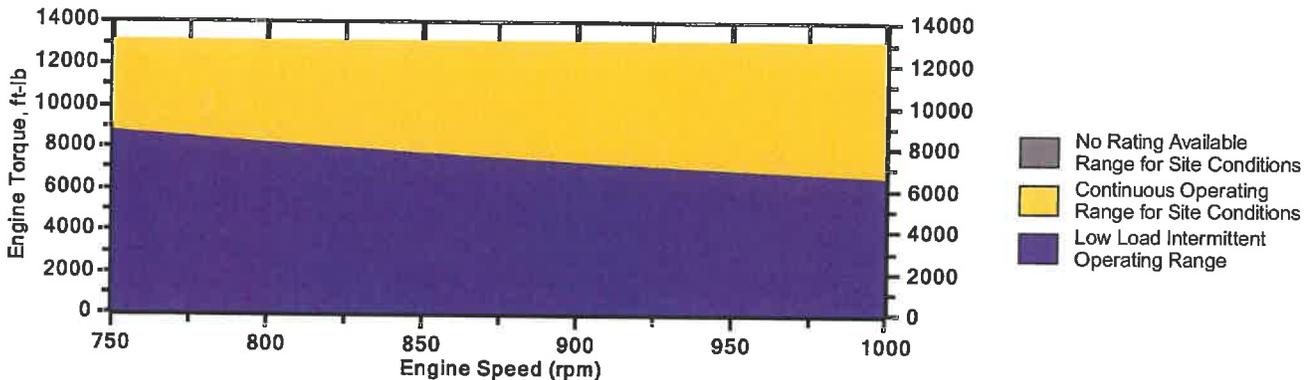
### Engine Power vs. Engine Speed

Data represents speed sweep at 1200 ft and 77 °F



### Engine Torque vs. Engine Speed

Data represents speed sweep at 1200 ft and 77 °F



Note: At site conditions of 1200 ft and 77°F inlet air temp., constant torque can be maintained down to 750 rpm. The minimum speed for loading at these conditions is 750 rpm.

### NOTES

1. Fuel pressure range specified is to the engine gas shutoff valve (GSOV). Additional fuel train components should be considered in pressure and flow calculations.
2. Engine rating is with two engine driven water pumps. Tolerance is  $\pm 3\%$  of full load.
3. Fuel consumption tolerance is  $\pm 2.5\%$  of full load data.
4. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of  $\pm 5\%$ .
5. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.
6. Inlet manifold pressure is a nominal value with a tolerance of  $\pm 5\%$ .
7. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
8. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of  $\pm 6\%$ .
9. Emissions data is at engine exhaust flange prior to any after treatment.
10. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate the maximum values expected under steady state conditions. Fuel methane number cannot vary more than  $\pm 3$ . THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.
11. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
12. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is  $\pm 0.5$ .
13. Heat rejection values are nominal. Tolerances, based on treated water, are  $\pm 10\%$  for jacket water circuit,  $\pm 50\%$  for radiation,  $\pm 20\%$  for lube oil circuit, and  $\pm 5\%$  for aftercooler circuit.
14. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.
15. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	84.6727	84.6731
Ethane	C2H6	10.4986	10.4987
Propane	C3H8	2.6903	2.6903
Isobutane	iso-C4H10	0.3539	0.3539
Norbutane	nor-C4H10	0.6007	0.6007
Isopentane	iso-C5H12	0.1692	0.1692
Norpentane	nor-C5H12	0.1481	0.1481
Hexane	C6H14	0.1871	0.1871
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.5395	0.5395
Carbon Dioxide	CO2	0.1333	0.1333
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0061	0.0061
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		99.9995	100.0000

Fuel Makeup: Pandora  
Unit of Measure: English

Calculated Fuel Properties

Caterpillar Methane Number:	64.3
Lower Heating Value (Btu/scf):	1054
Higher Heating Value (Btu/scf):	1165
WOBBE Index (Btu/scf):	1298
THC: Free Inert Ratio:	147.63
Total % Inerts (% N2, CO2, He):	0.67%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.997
Stoich A/F Ratio (Vol/Vol):	10.96
Stoich A/F Ratio (Mass/Mass):	16.64
Specific Gravity (Relative to Air):	0.659
Fuel Specific Heat Ratio (K):	1.293

CONDITIONS AND DEFINITIONS

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

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

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

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

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

FUEL LIQUIDS

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

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



Prepared For:  
Jacob Barry  
EQT

Date: October 3, 2016

### APPLICATION INFORMATION DRIVER

Make: CATERPILLAR  
Model: G3608 A4  
Horsepower: 2500  
RPM: 1000  
Compression Ratio: 7.6  
Exhaust Flow Rate: 16058  
Exhaust Temperature: 826 °F  
Reference: EM1410-03-001  
Fuel: Fuel Analysis  
Annual Operating Hours: 8760

### UNCONTROLLED EMISSIONS DATA

	<u>g/bhp-hr</u>	<u>lb/hr</u>	<u>Tons/Year</u>
NO <sub>x</sub> :	0.30	1.65	7.24
CO:	2.67	14.72	64.46
THC:	4.48	24.69	108.15
NMHC:	1.33	7.33	32.11
NMNEHC:	0.54	2.98	13.04
HCHO:	0.16	0.88	3.86
Oxygen:	11.60%		

### CATALYST ELEMENT

Model: RT-3615-Z  
Catalyst Type: Oxidation, Standard Precious Metals Group  
Substrate Type: BRAZED  
Element Size: Rectangle, 36"x15"x3.5"  
Element Quantity: 3

### POST CATALYST EMISSIONS DATA

	<u>g/bhp-hr</u>	<u>lb/hr</u>
NO <sub>x</sub> :	Unaffected by Oxidation Catalyst	
CO:	< 0.20	1.10
VOC:	< 0.30	1.65
HCHO:	< 0.03	0.17



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## WARRANTY

EMIT Technologies, Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of two (2) years from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance using an EMIT Air/Fuel ratio controller is dependent upon properly defined set-points, variable with engine and fuel gas composition. Air/fuel ratio controller performance is guaranteed, but not limited, to fuel gas with a HHV content of 1400 BTU/SCF.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures. In most cases, excluding thermal deactivation, catalyst performance is redeemable by means of proper washing (refer to EMIT Catalysts/Silencer Housing Manual for element wash information, or contact a local EMIT Sales representative).

The exhaust temperature operating range at the converter inlet is a minimum of 600°F for oxidation catalyst and 750 °F for NSCR catalyst, and a maximum of 1250 °F.

If a property functioning, high temperature shut down switch is not installed, thermal deactivation of catalyst at sustained temperatures above 1250°F is not covered. If excessive exposure to over oxygenation of NSCR catalyst occurs due to improperly functioning or non-existent Air/Fuel ratio control, then deactivation of catalyst is not warranted.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent. Standard Oxidation Catalyst conversion efficiencies (% reduction) will be guaranteed for fuel gas containing less than 1.5% mole fraction of non-methane, non-ethane hydrocarbons. Applications where fuel gas exceeds this level will require a Premium Oxidation Catalyst to maintain guaranteed VOC conversion efficiencies.

Engine lubrication oil shall contain less than 0.5 wt% Sulfated Ash with a maximum allowable specific oil consumption of 0.7 g/bhp-hr. The catalyst shall be limited to a maximum ash loading of 0.022 lb/ft<sup>3</sup>. Phosphorous and zinc additives are limited to 0.03 wt%. New or Reconstructed engines must operate for a minimum of 50 hours prior to catalyst installation, otherwise the warranty is void.

The catalyst must not be exposed to the following know poisoning agents, including: antimony, arsenic, chromium, copper, iron, lead, lithium, magnesium, mercury, nickel, phosphorous, potassium, silicon, sodium, sulfur, tin, and zinc. Total poison concentrations in the fuel gas must be limited to 0.25 ppm or less for catalyst to function properly.

Shipment - Promised shipping dates are approximate lead times from the point of manufacture and are not guaranteed. EMIT Technologies, Inc. will not be liable for any loss, damage or delay in manufacture or delivery resulting from any cause beyond its control including, but not limited to a period equal to the time lost by reason of that delay. All products will be crated as per best practice to prevent any damages during shipment. Unless otherwise specified, Buyer will pay for any special packing and shipping requirements. Acceptance of goods by common carrier constitutes delivery to Buyer. EMIT Technologies, Inc. shall not be responsible for goods damaged or lost in transit.

Terms: Credit is extended to purchaser for net 30 time period. If payment is not received in the net 30 timeframe, interest on the unpaid balance will accrue at a rate of 1.5% per month from the invoice date.

Order Cancellation Terms: Upon cancellation of an order once submittal of a Purchase Order has occurred, the customer will pay a 25% restocking fee for Catalyst Housings, Catalyst Elements, and Air/Fuel Ratio Controllers; 50% restocking fee for Cooler Top Solutions Exhaust System Accessories, and other Custom Built Products; 100% of all associated shipping costs incurred by EMIT; 100% of all project expenses incurred by EMIT for Field Services.

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification: Pandora - Lube Oil Tank  
 City:  
 State: West Virginia  
 Company: EQM Gathering Opco  
 Type of Tank: Horizontal Tank  
 Description: 300 gallon lube oil Tank

**Tank Dimensions**

Shell Length (ft): 5.10  
 Diameter (ft): 3.17  
 Volume (gallons): 300.00  
 Turnovers: 12.00  
 Net Throughput(gal/yr): 3,600.00  
 Is Tank Heated (y/n): N  
 Is Tank Underground (y/n): N

**Paint Characteristics**

Shell Color/Shade: White/White  
 Shell Condition: Good

**Breather Vent Settings**

Vacuum Settings (psig): -0.03  
 Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Liquid Contents of Storage Tank**

**Pandora - Lube Oil Tank - Horizontal Tank**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	56.67	51.31	62.04	55.00	0.0064	0.0049	0.0077	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0074

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Detail Calculations (AP-42)**

**Pandora - Lube Oil Tank - Horizontal Tank**

**Annual Emission Calculations**

Standing Losses (lb): 0.0530  
 Vapor Space Volume (cu ft): 25.6377  
 Vapor Density (lb/cu ft): 0.0002  
 Vapor Space Expansion Factor: 0.0375  
 Vented Vapor Saturation Factor: 0.9995

Tank Vapor Space Volume:  
 Vapor Space Volume (cu ft): 25.6377  
 Tank Diameter (ft): 3.1700  
 Effective Diameter (ft): 4.5382  
 Vapor Space Outage (ft): 1.5850  
 Tank Shell Length (ft): 5.1000

Vapor Density  
 Vapor Density (lb/cu ft): 0.0002  
 Vapor Molecular Weight (lb/lb-mole): 130.0000  
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.0064  
 Daily Avg. Liquid Surface Temp. (deg. R): 516.3441  
 Daily Average Ambient Temp. (deg. F): 54.9833  
 Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)): 10.731  
 Liquid Bulk Temperature (deg. R): 514.6733  
 Tank Paint Solar Absorptance (Shell): 0.1700  
 Daily Total Solar Insulation Factor (Btu/sqft day): 1,250.5726

Vapor Space Expansion Factor  
 Vapor Space Expansion Factor: 0.0375  
 Daily Vapor Temperature Range (deg. R): 21.4567  
 Daily Vapor Pressure Range (psia): 0.0028  
 Breather Vent Press. Setting Range(psia): 0.0600  
 Vapor Pressure at Daily Average Liquid  
 Surface Temperature (psia): 0.0064  
 Vapor Pressure at Daily Minimum Liquid  
 Surface Temperature (psia): 0.0049  
 Vapor Pressure at Daily Maximum Liquid  
 Surface Temperature (psia): 0.0077  
 Daily Avg. Liquid Surface Temp. (deg R): 516.3441  
 Daily Min. Liquid Surface Temp. (deg R): 510.9799  
 Daily Max. Liquid Surface Temp. (deg R): 521.7082  
 Daily Ambient Temp. Range (deg. R): 21.5333

Vented Vapor Saturation Factor  
 Vented Vapor Saturation Factor: 0.9995  
 Vapor Pressure at Daily Average Liquid:  
 Surface Temperature (psia): 0.0064  
 Vapor Space Outage (ft): 1.5850

Working Losses (lb): 0.0717  
 Vapor Molecular Weight (lb/lb-mole): 130.0000  
 Vapor Pressure at Daily Average Liquid  
 Surface Temperature (psia): 0.0064  
 Annual Net Throughput (gal/yr.): 3,600,000  
 Annual Turnovers: 12.0000  
 Turnover Factor: 1.0000  
 Tank Diameter (ft): 3.1700  
 Working Loss Product Factor: 1.0000

Total Losses (lb): 0.1247

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**Pandora - Lube Oil Tank - Horizontal Tank**

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Distillate fuel oil no. 2	0.07	0.05	0.12

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification: Methanol Tanks (500 gal)  
 City:  
 State:  
 Company:  
 Type of Tank: Horizontal Tank  
 Description: EQT Pandora Station - PTE for 500 gallon Methanol Tanks

**Tank Dimensions**

Shell Length (ft): 5.00  
 Diameter (ft): 4.00  
 Volume (gallons): 500.00  
 Turnovers: 12.00  
 Net Throughput(gal/yr): 6,000.00  
 Is Tank Heated (y/n): N  
 Is Tank Underground (y/n): N

**Paint Characteristics**

Shell Color/Shade: Gray/Medium  
 Shell Condition: Good

**Breather Vent Settings**

Vacuum Settings (psig): -0.03  
 Pressure Settings (psig): 0.03

Meteorologica! Data used in Emissions Calculations: Elkins, West Virginia (Avg Atmospheric Pressure = 13.73 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Liquid Contents of Storage Tank**

**Methanol Tanks (500 gal) - Horizontal Tank**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Methyl alcohol	All	57.20	47.16	67.23	52.14	1.3195	0.9508	1.8044	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Detail Calculations (AP-42)**

**Methanol Tanks (500 gal) - Horizontal Tank**

Annual Emission Calculations	
Standing Losses (lb):	13.8316
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0076
Vapor Space Expansion Factor:	0.1416
Vented Vapor Saturation Factor:	0.8773
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0076
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	
Daily Avg. Liquid Surface Temp. (deg. R):	516.8667
Daily Average Ambient Temp. (deg. F):	49.0583
Ideal Gas Constant R	
(psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.8083
Tank Paint Solar Absorptance (Shell):	0.6800
Daily Total Solar Insulation	
Factor (Btu/sqft day):	1,193.8870

Vapor Space Expansion Factor  
 Vapor Space Expansion Factor: 0.1416  
 Daily Vapor Temperature Range (deg. R): 40.1436  
 Daily Vapor Pressure Range (psia): 0.8536  
 Breather Vent Press. Setting Range (psia): 0.0600  
 Vapor Pressure at Daily Average Liquid  
 Surface Temperature (psia): 1.3195  
 Vapor Pressure at Daily Minimum Liquid  
 Surface Temperature (psia): 0.9508  
 Vapor Pressure at Daily Maximum Liquid  
 Surface Temperature (psia): 1.8044  
 Daily Avg. Liquid Surface Temp. (deg R): 516.8667  
 Daily Min. Liquid Surface Temp. (deg R): 506.8308  
 Daily Max. Liquid Surface Temp. (deg R): 526.9026  
 Daily Ambient Temp. Range (deg. R): 24.1833

Vented Vapor Saturation Factor  
 Vented Vapor Saturation Factor: 0.8773  
 Vapor Pressure at Daily Average Liquid:  
 Surface Temperature (psia): 1.3195  
 Vapor Space Outage (ft): 2.0000

Working Losses (lb): 6.0396  
 Vapor Molecular Weight (lb/lb-mole): 32.0400  
 Vapor Pressure at Daily Average Liquid  
 Surface Temperature (psia): 1.3195  
 Annual Net Throughput (gal/yr.): 6,000.0000  
 Annual Turnovers: 12.0000  
 Turnover Factor: 1.0000  
 Tank Diameter (ft): 4.0000  
 Working Loss Product Factor: 1.0000

Total Losses (lb): 19.8711

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**Methanol Tanks (500 gal) - Horizontal Tank**

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	6.04	13.83	19.87

## ATTACHMENT O

### Monitoring/Recordkeeping/Reporting/Testing Plans

## ATTACHMENT O

### MONITORING, RECORDING, REPORTING, AND TESTING PLANS

Emission unit	Pollutant	Requirements	Frequency	Method of Measurement	Regulatory Reference
Compressor Engines (S1-S4)	NO <sub>x</sub> , CO, VOC	Performance test	Initial and every three years or 8,760 hours of operation	EPA Test Methods	NSPS JJJJ
Compressor Engines (S1-S4)		Maintenance records	Each occurrence	N/A	NSPS JJJJ
Compressor Engines (S1-S4)		Hours of operation Amount of natural gas consumed	Monthly	N/A	
Compressors (S1-S4)	VOC	Change rod packing	Every 36 months or 26,000 hours of operation	N/A	NSPS 0000 and 0000a
Facility-Wide	VOC/GHG	LDAR Program	Quarterly	Optical Gas Imaging or equivalent	NSPS 0000a

**ATTACHMENT P**

**Public Notice**

## AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that EQM Gathering Opco, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a modification at an existing natural gas gathering station (Pandora Station) located 4 miles southwest Center Point, in Doddridge County, West Virginia. The latitude and longitude coordinates are 39.36349, -80.70613. The facility is permitted under R13-3095A.

The applicant estimates the potential increase to discharge the following Regulated Air Pollutants as a result of the change will be:

Particulate Matter (PM) = 0.11 tpy  
Sulfur Dioxide (SO<sub>2</sub>) = 0.02 tpy  
Volatile Organic Compounds (VOC) = 36.39 tpy  
Carbon Monoxide (CO) = <0.01 tpy  
Nitrogen Oxides (NO<sub>x</sub>) = <0.01 tpy  
Hazardous Air Pollutants (HAPs) = 0.74 tpy  
Formaldehyde = 0.26 tpy  
Greenhouse Gases (CO<sub>2</sub>e) = < 100 tpy

This application seeks to increase the emissions limits for the existing compressor engines (S1-S4) and increase the horsepower of two compressor engines (S3-S4) at the Pandora Station. Startup will begin upon issuance of the permit. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57<sup>th</sup> Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the XX day of October, 2016.

By: EQM Gathering Opco, LLC  
Diana Charletta, Vice President  
625 Liberty Avenue Suite 1700  
Pittsburgh, PA 15222