**Williams Ohio Valley Midstream LLC**
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275-1016

April 20, 2018
(Via Federal Express)

Beverly D. McKeone
New Source Review Program Manager
Division of Air Quality
West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, WV 25304-2345

**Subject:** **Application for 45CSR13 NSR Permit Modification**
**Williams Ohio Valley Midstream LLC**
**Conner Compressor Station**
**NSR Permit No. R13-3168B**
**Plant ID No 051-00195**
**Marshall County, West Virginia**

Dear Ms. McKeone:

Williams Ohio Valley Midstream LLC (OVM) is submitting one (1) original paper copy and two (2) CD-ROMs of an Application for 45CSR13 New Source Review (NSR) Permit Modification for the existing Conner Compressor Station (CCS), located ~800 ft South of Kull Ln (Airport Access), ~0.4 mi East of CR-21/Roberts Ridge Rd, Moundsville, in Marshall County, West Virginia.

This application for a Permit Modification has been prepared and submitted to amend PTE calculations to account for:

1) Emission **increase** due to increase in the number of fittings used to determine the **Process Piping Fugitive (FUG-G and FUG-L)** emissions.
2) Emission **increase** due to improved estimate of **Filter Change-Out (SSM/FCO)** emissions.
3) Emission **increase** due inclusion of aldehydes and methanol to determine total VOC emissions from the **Compressor Engines (CE-01 thru CE-03)**.
4) Emission **decrease** due to "leaner" wet gas analysis used with GRI-GLYCalc to determine emissions from the **Dehydrators (RSV-01 and RSV-02)**.
5) Emission **decrease** due to improved protocol to determine **Compressor Rod Packing (CRP) emissions**.
6) Emission **Increase** due to inclusion of **Engine Crankcase (ECC)** Emissions.

These changes, and other less substantive changes, are summarized below:

| Criteria Pollutants (ton per year (tpy)) | Potential Emissions (Including Fugitives) | | |
|---|---|---|---|
| | R13-3168B | Change | R13-3168C (Proposed) |
| Nitrogen Oxides (NOX) | 25.04 | **0.12** | 25.16 |
| Carbon Monoxide (CO) | 23.78 | **0.24** | 24.02 |
| Volatile Organic Compounds (VOC) | 132.12 | **31.82** | 163.94 |
| Particulate Matter (PM10/2.5) | 2.88 | **(0.91)** | 1.97 |
| Sulfur Dioxide (SO2) | 0.53 | **(0.40)** | 0.13 |
| **Hazardous Air Pollutants** | **Potential Emissions (Including Fugitives)** | | |
| | **R13-3168B** | **Change** | **R13-3168C (Proposed)** |
| Acetaldehyde | — | 0.16 | 0.16 |
| Acrolein | — | 0.11 | 0.11 |
| Benzene | 0.93 | (0.60) | 0.33 |
| Butadiene, 1,3- | — | 0.01 | 0.01 |
| Ethylbenzene | 0.80 | (0.62) | 0.18 |
| Formaldehyde (HCHO) | 2.83 | (0.07) | 2.76 |
| n-Hexane | 1.67 | 7.69 | 9.36 |
| Methanol (MeOH) | — | 0.07 | 0.07 |
| Polycyclic Organic Matter (POM/PAH) | — | 0.01 | 0.01 |
| Toluene | 1.01 | (0.23) | 0.78 |
| 2,2,4-Trimethylpentane (TMP) | — | 0.28 | 0.28 |
| Xylenes | 0.94 | 0.80 | 1.74 |
| Other/Trace HAP* | 4.68 | (4.68) | 0.01 |
| Total Hazardous Air Pollutants (HAPs) | 12.86 | **2.93** | 15.79 |
| **Other Regulated Pollutants (Other than Criteria and HAP)** | **Potential Emissions (Including Fugitives)** | | |
| | **R13-3168B** | **Change** | **R13-3168C (Proposed)** |
| Carbon Dioxide ($CO_2$) | 42,557 | (14,748) | 27,809 |
| Methane ($CH_4$) | 261.00 | (46) | 215 |
| Nitrous Oxide ($N_2O$) | 0.08 | (0.03) | 0.05 |
| $CO_2$ equivalent ($CO_2e$) | 49,098 | **(15,899)** | 33,199 |

*Other/Trace HAPs include: Carbon Tetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

If you have any questions concerning this submittal, or need additional information, please contact me by telephone at (304) 843-3188 or by e-mail at Joe.Marecic@Williams.com.

Sincerely,

Joe Marecic
Supervisor, EH&S

Enclosures:

Application for 45CSR13 NSR Permit Modification
Attachments A thru S
Supplements S1 thru S4
Check for Application Fee

# Application for
# 45CSR13 New Source Review (NSR)
# Permit Modification

*For the:*

Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Plant ID No. 051-00195

Marshall County, West Virginia

*Submitted to:*

**West Virginia**
**Department of Environmental Protection**
**Division of Air Quality**

*Submitted by:*

**Williams Ohio Valley Midstream LLC (OVM)**

Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275-1016

*Prepared by:*

**EcoLogic Environmental Consultants, LLC**

864 Windsor Court
Santa Barbara, CA 93111-1037

**April 2018**

**Application for**
**45CSR13 New Source Review (NSR)**
**Permit Modification**

Williams Ohio Valley Midstream LLC (OVM)

# Conner Compressor Station (CCS)

Plant ID No. 051-00195
Marshall County, West Virginia

## Table of Contents

# Application for
# 45CSR13 New Source Review (NSR) Permit Modification

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- **Section I. General**
- **Section II. Additional Attachments and Supporting Documents**
- **Section III. Certification of Information**

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NTAL PROTECTION

**DIVISION OF AIR QUALITY**

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
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" 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):*
**Williams Ohio Valley Midstream LLC (OVM)**

2. Federal Employer ID No. ***(FEIN):***
**2 7 – 0 8 5 6 7 0 7**

3. Name of facility *(if different from above):*
**Conner Compressor Station (CCS)**

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
**Park Place Corporate Center 2**
**2000 Commerce Dr**
**Pittsburgh, PA 15275-1016**

5B. Facility's present physical address:
**~800 ft South of Kull Ln (Airport Access)**
**~0.4 mi East of CR-21/Roberts Ridge Rd Proctor**
**Moundsville, in Marshall County, WV 26055**

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**
– If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**
– If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: **The Williams Companies, Inc.**

8. Does the applicant own, lease, have an option to buy, or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**
– If **YES,** please explain: **Applicant owns or has an option to purchase the compressor station.**
– If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.):
**Natural Gas Compressor Station**

10. North American Industry Classification System **(NAICS)** code for the facility:
**213112 – Support Activities for Oil and Gas Operations**

11A. DAQ Plant ID No. (existing facilities):
**0 5 1 – 0 0 1 9 5**

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (existing facilities):
**R13-3168B – Issued 10/10/17**

12A. Directions to the facility:
– For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
– For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

**From SR-872/12th Street in Moundsville:**
**1) Head South on SR-2/Lafayette Ave ~0.8 mi; 2) Turn Left onto SR-2 Alt ~250 ft;**
**3) Turn Left onto CR-21/Roberts Ridge Rd ~2.1 mi; 4) Turn Left onto Kull Ln Airport Acc ~0.4 mi;**
**5) Take slight Right onto access road ~800 ft; 6) Destination is on the Left.**

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

| 12.B. New site address (if applicable): | 12C. Nearest city or town: | 12D. County: |
|---|---|---|
| **~800 ft South of Kull Ln (Airport Acc)**<br>**~0.4 mi East of CR-21/Roberts Ridge Rd** | **Moundsville** | **Marshall** |
| 12.E. UTM Northing (KM): | 12F. UTM Easting (KM): | 12G. UTM Zone: |
| **4,414.45 km Northing** | **521.65 km Easting** | **17S** |

13. Briefly describe the proposed change(s) at the facility:

**This application is submitted to request modifications to the facility's potential-to-emit (PTE), resulting from:**

1) **Use of lesser "net" control efficiency to determine emissions from the Dehydrators (RSV-01 and RSV-02).**
2) **Emission increase due to improved estimate of Filter Change-Out (SSM/FCO) emissions.**
3) **Emission increase due to increase in the number of fittings used to determine the Process Piping Fugitive (FUG-G, FUG-L) emissions**

| 14A. Provide the date of anticipated installation or change:<br>– If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: **na** | 14B. Date of anticipated Start-Up if a permit is granted:<br>**na** |
|---|---|

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day: **24** Days Per Week: **7** Weeks Per Year: **52**

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U.S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* 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 *(if known).* Provide this information as **Attachment D**.

## *Section II. Additional attachments and supporting documents.*

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

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

**21.** Provide a **Plot Plan,** 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 **Attachment E** (Refer to ***Plot Plan Guidance***).
☐ Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

**22.** Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F**.

**23.** Provide a **Process Description** as **Attachment G**.
☐ Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

**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**.

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

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

| | | |
|---|---|---|
| ☒ **Bulk Liquid Transfer Operations (Ld)** | ☐ Haul Road Emissions | ☐ Quarry |
| ☒ **Chemical Processes* (Le)** | ☐ Hot Mix Asphalt Plant | ☐ Solid Materials Sizing, Handling and Storage Facilities |
| ☐ Concrete Batch Plant | ☐ Incinerator | ☒ **Storage Tanks (Lc)** |
| ☐ Grey Iron and Steel Foundry | ☐ Indirect Heat Exchanger | |

☒ **General Emission Unit, specify:**

- **Natural Gas Compressor/Generator Engine Data Sheet (La)**
- **Natural Gas Glycol Dehydration Unit Data Sheet (Lb)**

**(*) Leak Source Data Sheet Only**

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

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

| | | |
|---|---|---|
| ☐ Absorption Systems | ☐ Baghouse | ☒ **Flare (Mc)** |
| ☐ Adsorption Systems | ☐ Condenser | ☐ Mechanical Collector |
| ☐ Afterburner | ☐ Electrostatic Precipitator | ☐ Wet Collecting System |

☒ **Other Collectors, specify:**

- **OxCat (Ma)**
- **NSCR (Mb)**

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 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 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: **na**

| | |
|---|---|
| ☐ Authority of Corporation or Other Business Entity | ☐ Authority of Partnership |
| ☐ Authority of Governmental Agency | ☐ Authority of Limited Partnership |

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

***All 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 (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: Paul Hunter *(Please use blue ink)* DATE: 04/20/2018 *(Please use blue ink)*

| | | |
|---|---|---|
| 35B. Printed name of signee: **Paul V. Hunter** | 35C. Title: **Vice President** | |
| 35D. E-mail: **PaulV.Hunter@Williams.com** | 36E. Phone: **(412) 787-7300** | 36F. FAX: **(412) 787-6006** |
| 36A. Printed name of contact person: **Joe Marecic** | 36B. Title: **Supervisor, EH&S** | |
| 36C. E-mail: **Joe.Marecic@Williams.com** | 36D. Phone: **(304) 843-3188** | 36E. FAX: **(304) 843-3196** |

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

- ☒ Attachment A: Business Certificate
- ☒ Attachment B: Map(s)
- ☒ Attachment C: Installation and Start Up Schedule
- ☒ Attachment D: Regulatory Discussion
- ☒ Attachment E: Plot Plan
- ☒ Attachment F: Detailed Process Flow Diagram(s)
- ☒ Attachment G: Process Description
- ☒ Attachment H: Material Safety Data Sheets (MSDS)
- ☒ Attachment I: Emission Units Table
- ☒ Attachment J: Emission Points Data Summary Sheet
- ☒ Attachment K: Fugitive Emissions Data Summary Sheet
- ☒ Attachment L: Emissions Unit Data Sheet(s)
- ☒ Attachment M: Air Pollution Control Device Sheet(s)
- ☒ Attachment N: Supporting Emissions Calculations
- ☒ Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans
- ☒ Attachment P: Public Notice
- ☐ Attachment Q: Business Confidential Claims) (NA)
- ☐ Attachment R: Authority Forms) (NA)
- ☐ Attachment S: Title V Permit Revision Information (NA)
- ☒ 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 a 45-day review period of a draft permit.*

***All 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

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"6. **West Virginia Business Registration**. Provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A."

---

- **Certificate of Amendment to the Certificate of Authority**

  From: CAIMAN EASTERN MIDSTREAM, LLC

  To: WILLIAMS OHIO VALLEY MIDSTREAM LLC

  Date: May 15, 2012

- **Certificate of Authority of a Foreign Limited Liability Company**

  To: CAIMAN EASTERN MIDSTREAM, LLC

  Date: September 11, 2009

# State of West Virginia

# Certificate

*I, Natalie E. Tennant, Secretary of State of the State of West Virginia, hereby certify that*

the attached true and exact copy of the Articles of Amendment to the Articles of Organization of

**CAIMAN EASTERN MIDSTREAM, LLC**

are filed in my office, signed and verified, as required by the provisions of West Virginia Code §31B-2-204 and conform to law. Therefore, I issue this

## CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

**WILLIAMS OHIO VALLEY MIDSTREAM LLC**

*Given under my hand and the Great Seal of the State of West Virginia on this day of May 15, 2012*

Natalie E Tennant

*Secretary of State*

# State of West Virginia

# Certificate

*I, Natalie E. Tennant, Secretary of State of the State of West Virginia, hereby certify that*

**CAIMAN EASTERN MIDSTREAM, LLC**

**Control Number: 99GIS**

a limited liability company, organized under the laws of the State of Texas

has filed its "Application for Certificate of Authority" in my office according to the provisions of West Virginia Code §31B-10-1002. I hereby declare the organization to be registered as a foreign limited liability company from its effective date of September 11, 2009, until a certificate of cancellation is filed with our office.

Therefore, I hereby issue this

## CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY

to the limited liability company authorizing it to transact business in West Virginia

*Given under my hand and the Great Seal of the State of West Virginia on this day of September 11, 2009*

Natalie E. Tennant

*Secretary of State*

# Attachment B

# Map(s)

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"12A. For Modifications, Administrative Updates or Temporary permits at an existing facility, please **provide directions to the present location** of the facility from the nearest state road. Include a MAP as Attachment B."

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- **Location:**
  Conner Compressor Station (CCS)
  ~800 ft South of Kull Ln (Airport Access)
  ~0.4 mi East of CR-21/Roberts Ridge Rd
  Moundsville, Marshall County, WV 26041

- **Latitude and Longitude:**
  Lat: 39°52'47.5" N Lon: -80°44'48.0" W
  Lat: 39.880° N Lon: -80.747° W

- **UTM:**
  521.65 km E x 4,414.45 km N x 17S

- **Elevation:**
  ~1,200'

- **USGS:**
  2016 USGS US Topo 7.5 - minute map for MOUNDSVILLE, OH-WV

- **Directions:**

From SR-872/12th Street in Moundsville:

| | |
|---|---|
| 1) Head South on SR-2/Lafayette Ave | ~0.8 mi; |
| 2) Turn Left onto SR-2 Alt | ~250 ft; |
| 3) Turn Left onto CR-21/Roberts Ridge Rd | ~2.1 mi; |
| 4) Turn Left onto Kull Ln Airport Acc | ~0.4 mi; |
| 5) Take slight Right onto access road | ~800 ft; |
| 6) Destination is on the Left. | |

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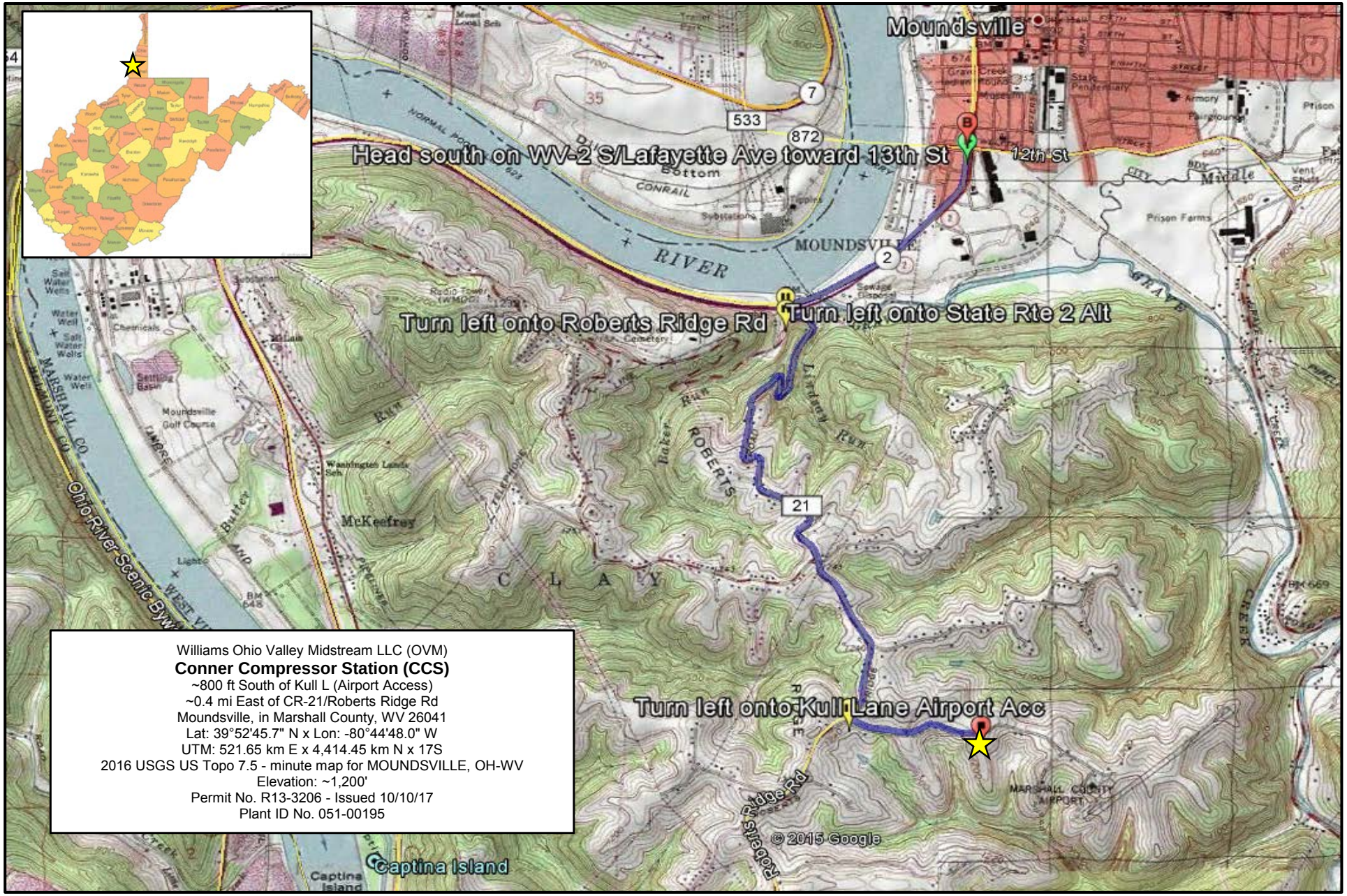
## Attachment B - Location Map / Topographic Map




Williams Ohio Valley Midstream LLC (OVM)
**Conner Compressor Station (CCS)**
~800 ft South of Kull L (Airport Access)
~0.4 mi East of CR-21/Roberts Ridge Rd
Moundsville, in Marshall County, WV 26041
Lat: 39°52'45.7" N x Lon: -80°44'48.0" W
UTM: 521.65 km E x 4,414.45 km N x 17S
2016 USGS US Topo 7.5 - minute map for MOUNDSVILLE, OH-WV
Elevation: ~1,200'
Permit No. R13-3206 - Issued 10/10/17
Plant ID No. 051-00195

# Attachment C

# Installation and Start-Up Schedule

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"14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as Attachment C."

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**NOTE: This application does not include installation of any new equipment or operations. Accordingly, Start-Up will be immediate upon permit issuance.**

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# Attachment D

# Regulatory Discussion

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"18. **Regulatory Discussion**. List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (if known). Discuss applicability and proposed demonstration(s) of compliance (if known). Provide this information as Attachment D."

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- **Regulatory Discussion**
  - A. Applicability of New Source Review (NSR) Regulations
  - B. Applicability of Federal Regulations
  - C. Applicability of Source Aggregation
  - D. Applicability of State Regulations

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Williams Ohio Valley Midstream LLC (OVM)
**Conner Compressor Station (CCS)**
Application for 45CSR13 NSR Permit Modification

**Attachment D**
# Regulatory Discussion

A. Applicability of New Source Review (NSR) Regulations

The following New Source Review (NSR) regulations are potentially applicable to natural gas compressor stations. Applicability to the subject facility has been determined as follows:

**1. Prevention of Significant Deterioration (PSD)** [Not Applicable]

This rule does not apply because the facility is a "PSD Minor Source" for each regulated pollutant, as follows:

- NOx: PSD Natural Minor Source with Pre-Controlled PTE less than 250 tpy
- CO: PSD Natural Minor Source with Pre-Controlled PTE less than 250 tpy
- VOC: PSD Synthetic Minor Source with Controlled PTE less than 250 tpy
- PM10/2.5: PSD Natural Minor Source with Pre-Controlled PTE less than 250 tpy
- SO2: PSD Natural Minor Source with Pre-Controlled PTE less than 250 tpy

**2. Non-Attainment New Source Review (NNSR)** [Not Applicable]

This rule does not apply. The facility is in Franklin Tax District of Marshall County, WV, an area designated at "non-attainment" for the 1-Hour 2010 Sulfur Dioxide National Ambient Air Quality Standard (NAAQS). Further, the area is included in the federal Clean Air Interstate Rule (CAIR) boundary for PM2.5 and ozone. Notwithstanding the foregoing area designations, the facility qualifies as an "NNSR Minor Source" as follows:

- NOx: NNSR Natural Minor Source with Pre-Controlled PTE less than 100 tpy
- VOC: NNSR Synthetic Minor Source with Controlled PTE less than 100 tpy
- PM2.5: NNSR Natural Minor Source with Pre-Controlled PTE less than 100 tpy
- SO2: NNSR Natural Minor Source with Pre-Controlled PTE less than 100 tpy

(http://www3.epa.gov/airquality/greenbook/ancl.html).

**3. Major Source of Hazardous Air Pollutants (HAPs)** [Not Applicable]

This rule does not apply. The entire facility qualifies as a "HAP Area Source" as follows:

- Each HAP: HAP Area Source with Controlled Individual HAP PTE less than 10 tpy
- Total HAPs: HAP Area Source with Controlled Total of All HAPs PTE less than 25 tpy

**4. Title V Operating Permit (TVOP)** [Not Applicable]

This rule does not apply. With the requested Federally Enforceable Limits (FEL), the facility qualifies as a "Title V Natural Minor Source" as follows:

- NOx: Title V Natural Minor Source with Pre-Controlled PTE less than 100 tpy
- CO: Title V Synthetic Minor Source with Controlled PTE less than 100 tpy
- VOC: Title V Synthetic Minor Source with Controlled PTE less than 100 tpy

- PM10/2.5 Title V Natural Minor Source with Pre-Controlled PTE less than 100 tpy
- SO2: Title V Natural Minor Source with Pre-Controlled PTE less than 100 tpy
- Each HAP: Title V Synthetic Minor Source with Controlled PTE less than 10 tpy
- Total HAPs: Title V Synthetic Minor Source with Controlled PTE less than 25 tpy

B. Applicability of Federal Regulations

The following federal regulations are potentially applicable to natural gas compressor stations. Applicability to the facility has been determined as follows:

**1. NSPS A, General Provisions**

40CFR§60.1-§60.19 [Applicable]

This rule does apply to all sources subject to an NSPS (unless a specific provision is excluded within the source NSPS). Requirements include notification (§60.7); recordkeeping and reporting (§60.7); source testing (§60.8, §60.11); and control device requirements (§60.18).

**2. NSPS A, Control Devices - Flares**

40CFR§60.18(b) [Not Applicable]

This rule does not apply to the Thermal Oxidizer (COMB-1) because it is not subject to any New Source Performance Standard.

**3. NSPS D (also Da, Db, and Dc), Steam Generating Units**

40CFR§60.40-§60.48 [Not Applicable]

These rules do not apply because there are no steam generating units (including line heaters) at the facility with a maximum design heat input capacity equal to or greater than 10 MMBtu/hr (§60.40c(a)).

**4. NSPS K (also Ka and Kb), Volatile Organic Liquid Storage Vessels**

40CFR§60.40-§60.48 [Not Applicable]

This rule does not apply because there is no Storage Vessel/Tank with capacity equal to or greater than 75 m3 (471.7 bbl or 19,813 gal) that is used to store volatile organic liquids (VOL) at the facility (§60.110(a)).

**5. NSPS GG, Stationary Gas Turbines**

40CFR§60.330-§60.335 [Not Applicable]

This rule does not apply because there is no stationary gas turbine at the facility with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired (§60.330).

**6. NSPS KKK, Leaks from Natural Gas Processing Plants**

40CFR§60.630-§60.636 [Not Applicable]

This rule does not apply because the facility is not a natural gas processing plant (§60.630(a)).

**7. NSPS LLL, Onshore Natural Gas Processing: SO2 Emissions**

40CFR§60.640-§60.648 [Not Applicable]

This rule does not apply because there is no gas sweetening operation at the facility (§60.640(a)).

**8. NSPS IIII, Compression Ignition Reciprocating Internal Combustion Engines**

40CFR§60.4200-§60.4219 [Not Applicable]

This rule does not apply because there is no stationary compression ignition engine at the facility (§60.4200(a)).

**9. NSPS JJJJ, Stationary Spark Ignition (SI) Internal Combustion Engines (ICE)**

40CFR§60.4230-§60.4248 [Applicable]

This rule does apply to the 1,380 bhp Caterpillar G3516B compressor engines (CE-01 and CE-02) because the maximum engine power is greater than 500 bhp and each engine was manufactured or reconstructed on or after 07/01/07 (§60.4230(a)(4)(i)).

The rule does apply to the 203 bhp Caterpillar G3306B TA compressor engine (CE-03) because the maximum engine power is less than 500 HP and the engine was manufactured or reconstructed on or after 07/01/08 (§60.4230(a)(4)(iii)).

Requirements include NOx, CO and VOC emission limits (§60.4233(e-f)); operating limits (§60.4243); performance testing (§60.4244); and notification and recordkeeping (§60.4245).

**10. NSPS KKKK, Stationary Combustion Turbines**

40CFR§60.4300-§60.4420 [Not Applicable]

This rule does not apply because there is no stationary combustion turbine at the facility with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, based on the higher heating value of the fuel (§60.4305).

**11. NSPS OOOO, Crude Oil and Natural Gas Production**

40CFR§60.5360-§60.5430 [Applicable]

This rule does apply to the reciprocating compressors driven by the CAT G3516B engines (CE-01 and CE-02) and the CAT G3306B TA (CE-03) engines because the facility is identified within the natural gas production segment and the compressors each commenced construction after 08/23/11 (§60.5360 and §60.5365(c)).

Requirements include replacing rod packing systems on a specified schedule (§60.5385(a)) and notification, monitoring, recordkeeping and reporting (§60.5410(c), §60.5415(c), §60.5420(b)(1) and §60.5420(b)(4)).

This rule does not apply to the produced water/condensate storage tanks (T01 and T02) (or any other tank) at the facility because each tank does not have the potential to emit more than 6 tpy of VOCs. Note, however, there is a requirement to document that the VOC PTE is less than 6 tpy per tank (§60.5420).

This rule does not apply to the pneumatic controllers because they are compressed air driven, else they have a bleed rate ≤ 6 scfh, are located between the wellhead and point

of custody transfer, and they are not located at a natural gas processing plant (§60.5365(d)(1)).

**12. NSPS OOOOa, Crude Oil and Natural Gas Production**

40CFR§60.5360a-§60.5430a [Not Applicable]

This rule does not apply because the facility was constructed prior to September 18, 2015 (§60.5360a) and has not been modified since that time per the definition of "modification" (§60.5365a).

**13. NESHAP Part 61 - Designated Source Standards**

40CFR§61.01-§61.359 [Not Applicable]

This rule does not apply because the facility is not a NESHAP Designated Facility (or Source).

Specifically, NESHAP J - Equipment Leaks (Fugitive Emission Sources) of Benzene and NESHAP V - Equipment Leaks (Fugitive Emission Sources) do not apply because all the fluids (liquid or gas) at the facility are less than 10 wt% volatile hazardous air pollutant (VHAP) ((§61.111 and §61.241).

**14. NESHAP Part 63 (aka: MACT) - General Provisions**

40CFR§63.1-§63.16 [Applicable]

This rule does apply because the dehydrators (RSV-01 and RSV-02) are subject to NESHAP HH–Oil and Natural Gas Production Facilities. However, because each dehydrator has the potential annual average benzene emissions less than 0.9 megagrams per year, they are exempt from all requirements except to maintain records of actual annual average benzene emissions to demonstrate continuing exemption status (§63.764(e)(1)).

This rule does not apply to storage vessels (tanks), compressors, or ancillary equipment because the facility is an area source of HAP emissions (§63.760(b)(2)). In no case does this rule apply to engines or turbines.

**15. NESHAP HH, Oil and Natural Gas Production Facilities**

40CFR§63.760-§63.779 [Applicable/Exempt]

This rule does apply to the dehydrators (RSV-01 and RSV-02). However, because the facility is an area source of HAP emissions, and the actual average emissions of benzene from each glycol dehydration unit process vent to the atmosphere is less than 0.90 megagram per year (1.0 tpy), the dehydration units are exempt. The only requirement is to maintain records of the actual average benzene emissions per year (§63.774(d)(1)(i)).

This rule does not apply to storage vessels (tanks), compressors, or ancillary equipment because the facility is an area source of HAP emissions (§63.760(b)(2)). In no case does this rule apply to engines or turbines.

**16. NESHAP HHH, Natural Gas Transmission and Storage Facilities**

40CFR§63.1270-§63.1289 [Not Applicable]

This rule does not apply because the facility is not a natural gas transmission or storage facility transporting or storing natural gas prior to local distribution (§63.1270(a)).

**17. NESHAP YYYY, Stationary Combustion Turbines**

40CFR§63.6080-§63.6175 [Not Applicable]

This rule does not apply because the facility is not a major source of HAP emissions and there is no stationary gas turbine at the subject facility (§63.6080).

**18. NESHAP ZZZZ, Stationary Reciprocating Internal Combustion Engines (RICE)**

40CFR§63.6580-§63.6675 [Applicable]

This rule does apply to the 1,380 bhp CAT G3516B (CE-01 and CE-02) and the 203 bhp CAT G3306B TA (CE-03) compressor engines. However, because each engine is "new" (i.e., commenced construction or reconstruction on or after 06/12/06) (§63.6590(a)(2)(iii)); the only requirement is compliance with §60.4230-§60.4248 (NSPS JJJJ) for Spark Ignition Internal Combustion Engines.

**19. NESHAP DDDDD, Industrial, Commercial, and Institutional Boilers and Process Heaters – Major Sources**

40CFR§63.7480 – §63.7575 [Not Applicable]

This rule does not apply because the facility is not a major source of HAP emissions (§63.7485).

**20. NESHAP JJJJJJ, Industrial, Commercial, and Institutional Boilers and Process Heaters – Area Sources**

40CFR§63.11193 – §63.11237 [Not Applicable]

This rule does not apply because the gas-fired reboilers (RBV-01/-02) do not meet the definition of "boiler" in §63.11237. Specifically, "boiler" is defined as an enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam and/or hot water. Furthermore, waste heat boilers, process heaters, and autoclaves are excluded from the definition of "boiler".

**21. Compliance Assurance Monitoring (CAM)**

40CFR§64.1-§64.10 [Not Applicable]

This rule does not apply because the facility is not a major source required to obtain a Title V Operating Permit (§64.2(a)).

**22. Chemical Accident Prevention Provisions (Risk Management Plan (RMP))**
40CFR§68.1-§68.220 [Not Applicable]

This rule does not apply because the facility does not store more than a threshold quantity of a regulated substance in a process. Specifically, "Prior to entry into a natural gas processing plant or a petroleum refining process unit, regulated substances in naturally occurring hydrocarbon mixtures need not be considered when determining whether more than a threshold quantity is present at a stationary source" (§68.115(b)(2)(iii)).

**23. Mandatory Greenhouse Gases (GHG) Reporting**
40CFR§98.1-§98.9 [Applicable]

This rule does apply because the CO2e emissions from all stationary sources combined within the hydrocarbon basin as defined in 40 CFR Part 98 is ≥ 25,000 metric ton/yr (§98.2(a)(3)).

Requirements include monitoring, recordkeeping, and annual reporting of GHG from stationary fuel combustion sources (§98.2(a)(3)).

C. Applicability of Source Aggregation

The operations of the facility have not been aggregated with any other gas production, midstream service facilities, or transportation operations because there are no other oil and gas facilities or operations that are both a) "contiguous and adjacent" and b) "under common control" to the facility.

D. Applicability of State Regulations

The following state regulations are potentially applicable to natural gas compressor stations. Applicability to the facility has been determined as follows:

**1. Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers**
§45CSR2 [Applicable]

This rule does apply; however, because each reboiler (RBV-01 and -02) has a maximum design heat input (MDHI) rating less than 10 MMBtu/hr, the only requirement is to limit visible emissions to less than 10% opacity during normal operations (§45-02-3.1). The reboilers combust only natural gas which inherently conforms to the visible emission standards.

**2. Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors**
§45CSR4 [Applicable]

This rule does apply and states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly authorized representative of the Air Pollution Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable.

3. **Control of Air Pollution from Combustion of Refuse**
§45CSR6 [Applicable]

This rule does apply to the Thermal Oxidizer (COMB-1); however, the Thermal Oxidizer (COMB-1) combusts waste gas from natural gas operations which inherently conforms to the particulate emission and opacity standards.

4. **Prevent and Control Air Pollution from the Emission of Sulfur Oxides**
§45CSR10 [Not Applicable]

This rule does not apply to the Compressor Engines (CE-01 thru CE-03), Reboilers (RBV-01 and RBV-02), Thermal Oxidizer (COMB-1) or other fuel burning units, manufacturing process sources, or combustion sources because each combust only natural gas (§45-10A-3.1.b).

5. **Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation**
§45CSR13 [Applicable]

The rule does apply as Williams OVM is seeking a NSR Permit Modification for the facility. Williams OVM has published the required Class I legal advertisement notifying the public of the permit application and paid the appropriate application fee.

6. **Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants for Prevention of Significant Deterioration**
45CSR14 [Not Applicable]

The rule does not apply because the facility is neither a new PSD major source of pollutants nor is the proposed facility a modification to an existing PSD major source.

7. **Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60**
45CSR16 [Applicable]

The rule does apply to this source by reference to §40CFR60 Subparts JJJJ and OOOO. The facility is subject to the notification, testing, monitoring, recordkeeping and reporting requirements of these Subparts.

8. **Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution Which Cause or Contribute to Nonattainment**
45CSR19 [Not Applicable]
This rule does not apply because the facility is a minor (or “deferred”) source of all regulated pollutants.

9. **Regulation of Volatile Organic Compounds (VOC)**
45CSR21 [Not Applicable]

This rule does not apply because facility is not located in Putnam, Kanawha, Cabell, Wayne, Wood, or Greenbrier Counties (§45-29-1).

**10. Air Quality Management Fees Program**

45CSR22 [Applicable]

This rule does apply. It establishes a program to collect fees for certificates to operate and for permits to construct, modify or relocate sources of air pollution.

**11. Prevent and Control Emissions of Toxic Air Pollutants (Best Available Control Technology (BAT))**

45CSR27 [Not Applicable]

This rule does not apply because the equipment used in the production and distribution of petroleum products is exempt, provided the product contains no more than 5% benzene by weight (§45-27-2.4).

**12. Air Pollution Emissions Banking and Trading**

45CSR28 [Not Applicable]

This rule does not apply because the facility does not choose to participate in the voluntarily statewide air pollutant emissions trading program.

**13. Emission Statements for VOC and NOX**

45CSR29 [Not Applicable]

This rule does not apply because the facility is not located in Putnam, Kanawha, Cabell, Wayne, Wood, or Greenbrier Counties (§45-29-1).

**14. Requirements for Operating Permits**

45CSR30 [Not Applicable]

This rule does not apply because the facility qualifies as a "Title V Synthetic Minor Source".

Pursuant to the authority granted in West Virginia 45CSR§30-3.2 and 45CSR§30A-3.1, the DAQ is extending the deferral, which was set to expire December 15, 2000, of non-major sources to West Virginia 45CSR30 (Title V Program) from the obligation to submit an operating permit application.

**15. Emission Standards for Hazardous Air Pollutants (HAP)**

45CSR34 [Not Applicable]

This rule does not apply because the facility is an area source of HAP emissions. Note: The provisions under Subparts HH and ZZZZ of 40 CFR Part 63 which apply to non-major area sources of hazardous air pollutants are excluded.

# Attachment E

# Plot Plan

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"21. Provide a **Plot Plan**, 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 Attachment E."

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- **Plot Plan – Conner Compressor Station (CCS)**

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Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

**Attachment E - Plot Plan**


| Unit No. | Description |
|---|---|
| CE-01 | Compressor Engine 01 - CAT G3516B |
| CE-02 | Compressor Engine 02 - CAT G3516B |
| CE-03 | Compressor Engine 01 - CAT G3306B TA |
| RBV-1 | Dehydrator Reboiler 01 |
| RSV-1 | Dehydrator 01 - Still Vent (DSV-1) |
| | Dehydrator 01 - Flash Tank (DFT-1) |
| RBV-2 | Dehydrator Reboiler 02 |
| RSV-2 | Dehydrator 02 - Still Vent (DSV-2) |
| | Dehydrator 02 - Flash Tank (DFT-2) |
| COMB-1 | Thermal Oxidizer (98% T-Ox) |

| Unit No. | Description |
|---|---|
| HTR-01 | Heater Treater 01 |
| HTR-02 | Condensate Stabilizer Heater 01 |
| T01 | Produced Water Storage Tank 01 |
| TLO-1 | Produced Water Truck Load-Out |
| TLO-2 | Condensate Truck Load-Out |
| SSM | Compressor Blowdown (CBD) |
| CRP | Compressor Rod Packing (x-RPC) |
| HTR-03 | Station Recycle Line Heater 01 |
| HTR-04 | Condensate Stabilizer Heater 02 |
| T02 | Produced Water Storage Tank 02 |

# Attachment F

# Process Flow Diagram(s) (PFD)

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"22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as Attachment F."

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- **Process Flow Diagram (PFD) – Conner Compressor Station (CCS)**

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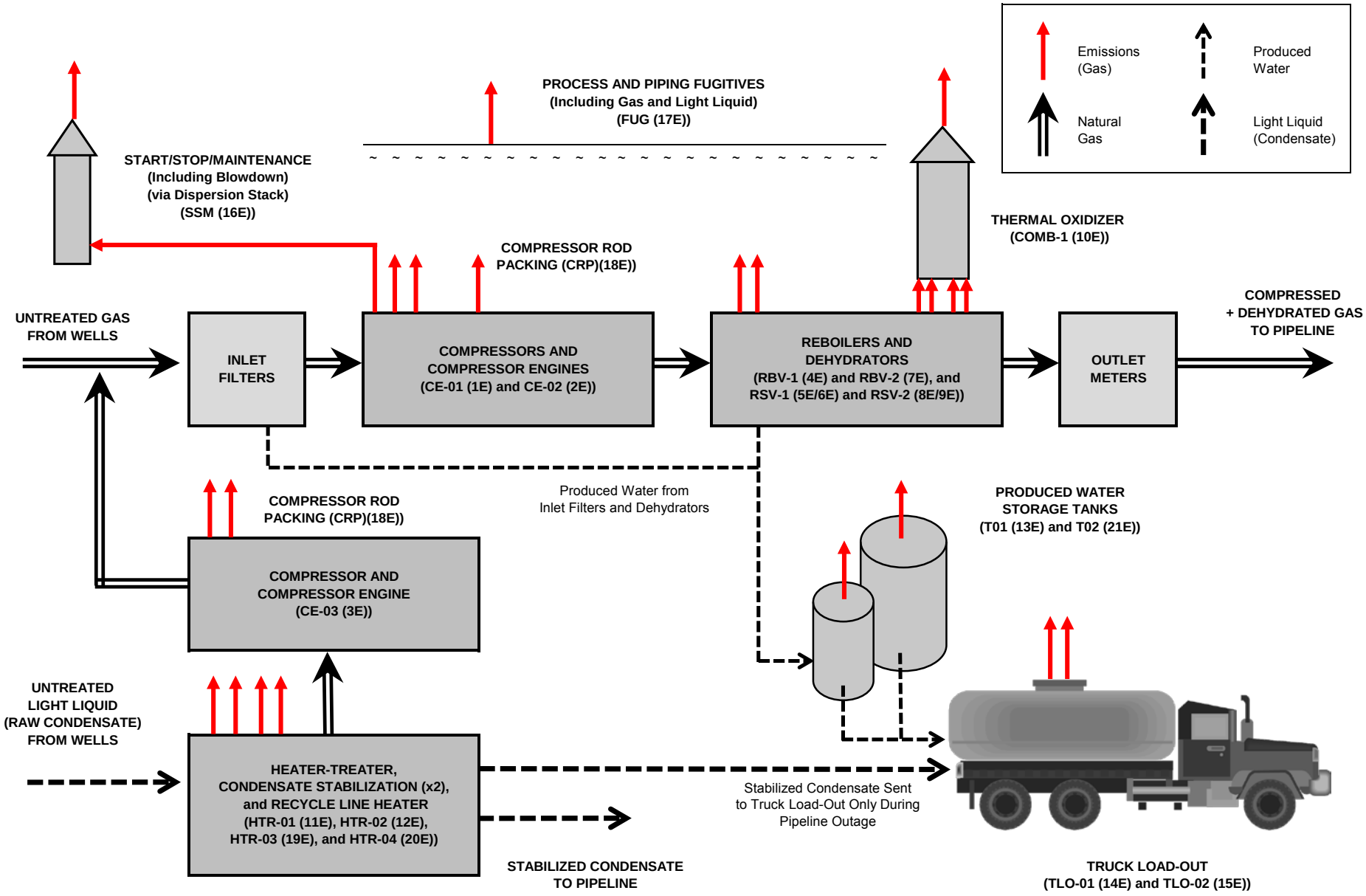
## Attachment F - Process Flow Diagram (PFD)



# Attachment G

# Process Description

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"23. Provide a **Process Description** as Attachment G. Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable)."

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- **Process Description – Conner Compressor Station (CCS)**

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Williams Ohio Valley Midstream LLC

**CONNER COMPRESSOR STATION**

Application for 45CSR13 NSR Permit Modification

## Attachment G
## PROCESS DESCRIPTION

A. Project Overview

Williams Ohio Valley Midstream LLC owns and operates the existing Conner Compressor Station located east of Roberts Ridge Road, approximately 2.3 miles south-southwest of Moundsville (See Appendix B – Site Location Map). The facility receives natural gas from local production wells then compresses and dehydrates the gas for delivery to a gathering pipeline. Additionally, raw field condensate is received at the site, stabilized and then sent offsite via pipeline.

B. Reciprocating Engines

Two (2) natural gas-fueled CAT G3516B Compressor Engines (CE-01 and CE-02) are utilized. These are lean burn engines with oxidation catalysts (01-OxCat and 02-OxCat) to control CO, VOC, and HAP emissions.

One (1) natural gas-fueled CAT G3306B TA Compressor Engines (CE-03) is utilized. This is a rich burn engine with non-selective catalytic reduction (01-NSCR) to control NOx and CO emissions.

C. Compressor Rod Packing and Crankcase Emissions

The compressor and engine operations result in emissions from the wear of mechanical joints, seals, and rotating surfaces over time.

D. Startup/Shutdown/Maintenance

During routine operation of the facility the compressor engines will undergo periods of startup and shutdown. Often when the engines are shutdown, the natural gas contained within the compressor and associated piping is vented to atmosphere (CBD).

The Emergency Shutdown (ESD) system is periodically tested, resulting in venting natural gas to the atmosphere.

Purge Gas (PG) is used in the dispersion stack to prevent and explosive condition from occurring.

Three condensate vessels at the site are periodically opened to replace the filters inside. A portion of the condensate inside each vessel flashes to atmosphere during maintenance. These filter changeouts (FCO) result in VOC and HAP emissions.

The SSM emissions are generally vented through the dispersion stack.

E. Tri-Ethylene Glycol (TEG) Dehydrators

Two (2) Triethylene Glycol (TEG) Dehydrators are utilized at the facility. Each dehydrator is comprised of a Contactor/Absorber Tower (no vented emissions), a Flash Tank, and a Regenerator/Still Vent.

The TEG Dehydrators are used to remove water vapor from the inlet wet gas stream to meet pipeline specifications. In the dehydration process, the wet inlet gas stream flows through a contactor tower where the gas is contacted with lean glycol. The lean glycol absorbs the water in the gas stream and becomes rich glycol laden with water and trace amounts of hydrocarbons.

The rich glycol is then routed to a flash tank where the glycol pressure is reduced to liberate the lighter end hydrocarbons (especially methane). Whenever practical, the lighter end hydrocarbons are routed from the flash tank to the Reboiler for use as fuel; otherwise these off-gases are vented to a thermal oxidizer.

The rich glycol is then sent from the flash tank to the regenerator/still where the TEG is heated to drive off the water vapor and any remaining hydrocarbons. The off-gases from the regenerator/still are vented to a thermal oxidizer.

Once boiled, the glycol is returned to a lean state and used again in the process.

F. Tri-Ethylene Glycol (TEG) Reboilers

Two (2) natural gas-fired reboilers are associated with the dehydrators (RSV-01 and RSV 02).

G. Thermal Oxidizer

Emissions from the Dehydrators (RSV-01 and RSV-02) are controlled by the Frederick Logan Company Thermal Oxidizer (COMB-1).

H. Heaters

One (1) 1.55 MMBtu/hr heater-treater (HTR-01), one (1) 2.55 MMBtu/hr condensate stabilizer heater (HTR-02), One (1) 1.66 MMBtu/hr station recycle line heater (HTR-03), and one (1) 9.7 MMBtu/hr condensate stabilizer heater (HTR-04) will be used at the site.

I. Storage Tanks

There are tanks at the facility used to store various materials, including produced water, lube oil, fresh and spent TEG, etc. All of these tanks, except for the produced water storage tanks, generate de-minimis (insignificant) emissions.

The produced water tanks receive liquids from the dehydrator and inlet separator. Liquids removed through the dehydration process are cooled, condensed and sent to the atmospheric storage tanks (T01 and T02).

A ProMax simulation of was completed to determine the presence of flash emissions from the storage tanks. The ProMax process simulation showed minimal tank flash emissions and these losses are included in the emission estimates.

J. Truck Load-Out

Produced water will be loaded into tanker trucks (TLO-01) and produce small quantities of VOC emissions. Additionally, under normal operating conditions, stabilized condensate will be sent offsite via pipeline; however, during unforeseen periods of pipeline outage, the stabilized condensate will be offloaded into tanker trucks (TLO-02), which will also create VOC emissions.

K. Piping and Equipment Fugitive Emissions

Piping and process equipment generate from leaks from different component types (connectors, valves, pumps, etc.) in gas-vapor service and light-liquid (condensate) service.

# Attachment H

## Safety Data Sheets (SDS)
## (And Representative Gas Analysis)

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

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- **SAFETY DATA SHEETS (SDS):**

  Williams Safety Data Sheets (SDS) provide detailed information needed to use the products in a safe and environmentally acceptable manner and meet local, state and federal requirements.

  Copies of SDS can be accessed at: http://co.williams.com/safety/safety-data-sheets/

  - Butane, Normal
  - Carbon Dioxide
  - Crude Butadiene
  - Debutanized Aromatic Concentrate
  - Demethanized-Mix Y Grade
  - Ethane/Propane Mix
  - Ethane Purity
  - Ethylene
  - Isobutane
  - Liquid Natural Gas LNG
  - Mixed Butane
  - Natural Gas Condensate Sour
  - Natural Gas Condensate Sweet
  - Natural Gas Liquids NGL
  - Natural Gas
  - Natural Gasoline
  - Propane
  - Propylene Polymer Grade
  - Reclaimed Methanol
  - Rich Water
  - Wellhead Natural Gas

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# Attachment I

# Emission Units Table

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

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- **Emission Unit Table – Conner Compressor Station (CCS)**

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**Attachment I**

## EMISSION UNITS TABLE

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

| Emission Unit ID[1] | Emission Point ID[2] | Control ID | Emission Unit Description | Installed/ Modified | Design Capacity | Type[3] and Date of Change | Control Device[4] |
|---|---|---|---|---|---|---|---|
| CE-01 | 1E | 01-OxCat | Compressor Engine 01 - CAT G3516B | '14/'18 | 1,380 bhp | MOD | 01-OxCat |
| CE-02 | 2E | 02-OxCat | Compressor Engine 02 - CAT G3516B | '14/'18 | 1,380 bhp | MOD | 02-OxCat |
| CE-03 | 3E | 01-NSCR | Compressor Engine 03 - CAT G3306B TA | '14/'18 | 203 bhp | MOD | 01-NSCR |
| RBV-1 | 4E | --- | Dehydrator Reboiler 01 | 2014 | 1.66 MMBtu/hr | EXIST | --- |
| RSV-1 | 5E | 01-COMB | Dehydrator 01 - Still Vent (DSV-1) | '14/'18 | 60.0 MMscfd | MOD | 01-COMB |
| | 6E | 01-COMB | Dehydrator 01 - Flash Tank (DFT-1) | | | | |
| RBV-2 | 7E | --- | Dehydrator Reboiler 02 | 2016 | 1.66 MMBtu/hr | EXIST | --- |
| RSV-2 | 8E | 01-COMB | Dehydrator 02 - Still Vent (DSV-2) | '16/'18 | 60.0 MMscfd | MOD | 01-COMB |
| | 9E | 01-COMB | Dehydrator 02 - Flash Tank (DFT-2) | | | | |
| COMB-1 | 10E | --- | Thermal Oxidizer (98% T-Ox) | '14/'17 | 6.41 MMBtu/hr | EXIST | --- |
| HTR-01 | 11E | --- | Heater Treater 01 | 2014 | 1.55 MMBtu/hr | EXIST | --- |
| HTR-02 | 12E | --- | Condensate Stabilizer Heater 01 | 2014 | 2.55 MMBtu/hr | EXIST | --- |
| T01 | 13E | --- | Produced Water Storage Tank 01 | 2014 | 48 bbl | EXIST | --- |
| TLO-1 | 14E | --- | Produced Water Truck Load-Out | 2014 | 563 Mgal/yr | EXIST | --- |
| TLO-2 | 15E | --- | Condensate Truck Load-Out | 2014 | 250 Mgal/yr | EXIST | --- |
| SSM | 16E | --- | Compressor Blowdown (CBD) | '14/'18 | 516 Events/yr | MOD | --- |
| | | --- | Emergency Shutdown (ESD) Testing | | 1 Event/yr | | |
| | | --- | Purge Gas (PG) | | 35 scf/hr | | |
| | | --- | Filter Change-Out (FCO) | | 146 Events/yr | | |
| CRP | 18E | --- | Compressor Rod Packing | '14/'18 | 5 Compressors | MOD | --- |
| HTR-03 | 19E | --- | Station Recycle Line Heater 01 | 2015 | 1.66 MMBtu/hr | EXIST | --- |
| HTR-04 | 20E | --- | Condensate Stabilizer Heater 02 | 2015 | 9.70 MMBtu/hr | EXIST | --- |
| T02 | 21E | --- | Produced Water Storage Tank 02 | 2015 | 210 bbl | EXIST | --- |
| FUG-G | 17E | --- | Process Piping Fugitives - Gas | 14/'18 | 5,050 Fittings | MOD | --- |
| FUG-L | | --- | Process Piping Fugitives - Light Liquid | 14/'18 | 4,556 Fittings | | |
| ECC | 22E | --- | Engine Crankcase Leaks | 14/'18 | 3 Engines | MOD | --- |
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[1] For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S, ... or other appropriate designation.
[2] For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal, etc.
[4] For Control Devices use the following numbering system: 1C, 2C, 3C, ... or other appropriate designation.

# Attachment J

# Emission Points Data Summary Sheet

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

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- **Table 1 – Emissions Data**
  - Compressor Engines (CE-01/1E thru CE-03)
  - Reboilers (RBV-01 and RBV-02)
  - Dehydrators (RSV-01 and RSV-02)
  - Thermal Oxidizer (Combustion Only) (COMB-1/10E)
  - Heater Treater 01 (HTR-01/11E)
  - Condensate Stabilizer Heater 01 (HTR-02/12E)
  - Produced Water Storage Tanks (T01/13E and T02/21E)
  - Produced Water Truck Load-Out (TLO-1/14E)
  - Stabilized Condensate Truck Load-Out (TLO-2/15E)
  - Start/Stop/Maintenance (SSM/16E)
    - Compressor Blowdown (CBD)
    - Emergency Shutdown (ESD) Testing
    - Purge Gas (PG)
    - Filter Change-Out (FCO)
  - Compressor Rod Packing (CRP/18E) (X-Rod Packing/Crankcase (RPC))
  - Station Recycle Line Heater 01 (HTR-03/19E)
  - Condensate Stabilizer Heater 02 (HTR-04/20E)
  - Process Piping Fugitives
    - Gas (FUG-G/17E)
    - Light Liquid (FUG-L/17E)
  - Engine Crankcase (ECC/22E) (X-Rod Packing/Crankcase (RPC))
  - Plant-Wide Summary (w/o Fugitives)
  - Plant-Wide Summary (w/ Fugitives)
- **Table 2 – Release Parameter Data**

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | **Compressor Engines 01 and 02 (CE-01 and CE-02) 1,380 bhp CAT G3516B (w/ OxCat) (Each)** | | | | | | NOX | 1.52 | 6.66 | 1.52 | 6.66 | Gas | Vendor | |
| | | | | | | | | CO | 9.37 | 41.04 | 0.50 | 2.20 | Gas | Vendor | |
| | | | | | | | | NMNEHC | 3.22 | 14.13 | 0.53 | 2.33 | Gas | Vendor | |
| | | | | | | | | VOC | 4.50 | 19.71 | 0.83 | 3.63 | Gas | Vendor | |
| | | | | | | | | PM10/2.5 | 0.11 | 0.49 | 0.11 | 0.49 | S/L/G | AP-42 | |
| | | | | | | | | SO2 | 0.01 | 0.03 | 0.01 | 0.03 | Gas | AP-42 | |
| | | | | | | | | Acetaldehyde | 0.09 | 0.41 | 0.02 | 0.07 | Gas | AP-42 | |
| | | | | | | | | Acrolein | 0.06 | 0.25 | 0.01 | 0.04 | Gas | AP-42 | |
| | | | | | | | | Benzene | 0.00 | 0.02 | 8E-04 | 4E-03 | Gas | AP-42 | |
| | | | | | | | | Butadiene | 3E-03 | 0.01 | 5E-04 | 2E-03 | Gas | AP-42 | |
| | | | | | | | | Ethylbenzene | 4E-04 | 2E-03 | 7E-05 | 3E-04 | Gas | AP-42 | |
| | | | | | | | | HCHO | 1.10 | 4.80 | 0.27 | 1.17 | Gas | Vendor | |
| CE-01<br>CE-02<br>(Each) | Upward Vertical Stack<br>(Each) | 1E<br>2E<br>(Each) | CE-01<br>CE-02<br>(Each) | 01-OxCat<br>02-OxCat<br>(Each) | OxCat<br>(Each) | C<br>(Each) | 8,760<br>(Each) | n-Hexane | 0.01 | 0.05 | 2E-03 | 0.01 | Gas | AP-42 | |
| | | | | | | | | Methanol | 0.03 | 0.12 | 5E-03 | 0.02 | Gas | AP-42 | |
| | | | | | | | | POM/PAH | 4E-03 | 0.02 | 6E-04 | 3E-03 | Gas | AP-42 | |
| | | | | | | | | Toluene | 5E-03 | 0.02 | 8E-04 | 3E-03 | Gas | AP-42 | |
| | | | | | | | | 2,2,4-TMP | 3E-03 | 0.01 | 5E-04 | 2E-03 | Gas | AP-42 | |
| | | | | | | | | Xylenes | 2E-03 | 0.01 | 3E-04 | 1E-03 | Gas | AP-42 | |
| | | | | | | | | Other HAP | 4E-03 | 0.02 | 6E-04 | 3E-03 | Gas | AP-42 | |
| | | | | | | | | Total HAP | 1.31 | 5.75 | 0.30 | 1.32 | Gas | Sum | |
| | | | | | | | | CO2 | 1,570 | 6,876 | 1,570 | 6,876 | Gas | Vendor | |
| | | | | | | | | CH4 | 5.99 | 26.25 | 5.99 | 26.25 | Gas | Vendor | |
| | | | | | | | | N2O | 2E-03 | 0.01 | 2E-03 | 0.01 | Gas | 40CFR98 | |
| | | | | | | | | CO2e | 1,720 | 7,536 | 1,720 | 7,536 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | **Compressor Engine 03 (CE-03) (203 bhp Cat G3306B TA)** | | | | | | NOX | 6.83 | 29.91 | 0.22 | 0.98 | Gas | AP-42 | |
| | | | | | | | | CO | 6.83 | 29.91 | 0.90 | 3.92 | Gas | AP-42 | |
| | | | | | | | | NMNEHC | 0.11 | 0.47 | 0.11 | 0.47 | Gas | AP-42 | |
| | | | | | | | | VOC | 0.21 | 0.93 | 0.21 | 0.93 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | 0.04 | 0.16 | 0.04 | 0.16 | S/L/G | AP-42 | |
| | | | | | | | | SO2 | 1E-03 | 5E-03 | 1E-03 | 5E-03 | Gas | AP-42 | |
| | | | | | | | | Acetaldehyde | 5E-03 | 0.02 | 5E-03 | 0.02 | Gas | AP-42 | |
| | | | | | | | | Acrolein | 5E-03 | 0.02 | 5E-03 | 0.02 | Gas | AP-42 | |
| | | | | | | | | Benzene | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | AP-42 | |
| | | | | | | | | Butadiene | 1E-03 | 5E-03 | 1E-03 | 5E-03 | Gas | AP-42 | |
| | | | | | | | | Ethylbenzene | 5E-05 | 2E-04 | 5E-05 | 2E-04 | Gas | AP-42 | |
| | | | | | | | | HCHO | 0.09 | 0.39 | 0.09 | 0.39 | Gas | AP-42 | |
| | | | | | | | | n-Hexane | 0.01 | 0.02 | 0.01 | 0.02 | Gas | AP-42 | |
| CE-03 | Upward Vertical Stack | 3E | CE-03 | 01-NSCR | NSCR | C | 8,760 | Methanol | 0.01 | 0.02 | 0.01 | 0.02 | Gas | AP-42 | |
| | | | | | | | | POM/PAH | 2E-04 | 8E-04 | 2E-04 | 8E-04 | Gas | AP-42 | |
| | | | | | | | | Toluene | 1E-03 | 4E-03 | 1E-03 | 4E-03 | Gas | AP-42 | |
| | | | | | | | | 2,2,4-TMP | 1E-03 | 5E-03 | 1E-03 | 5E-03 | Gas | AP-42 | |
| | | | | | | | | Xylenes | 4E-04 | 2E-03 | 4E-04 | 2E-03 | Gas | AP-42 | |
| | | | | | | | | Other HAP | 3E-04 | 1E-03 | 3E-04 | 1E-03 | Gas | AP-42 | |
| | | | | | | | | Total HAP | 0.12 | 0.52 | 0.12 | 0.52 | Gas | Sum | |
| | | | | | | | | CO2 | 254 | 1,113 | 254 | 1,113 | Gas | 40CFR98 | |
| | | | | | | | | CH4 | 0.19 | 0.84 | 0.19 | 0.84 | Gas | 40CFR98 | |
| | | | | | | | | N2O | 4E-04 | 2E-03 | 4E-04 | 2E-03 | Gas | 40CFR98 | |
| | | | | | | | | CO2e | 259 | 1,135 | 259 | 1,135 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | **Reboiler 01 and 02 (RBV-01 and RBV-02) 1.66 MMBtu/hr (Each)** | | | | | | NOX | 0.16 | 0.71 | 0.16 | 0.71 | Gas | AP-42 | |
| | | | | | | | | CO | 0.14 | 0.60 | 0.14 | 0.60 | Gas | AP-42 | |
| | | | | | | | | NMNEHC | 9E-03 | 0.04 | 9E-03 | 0.04 | Gas | AP-42 | |
| | | | | | | | | VOC | 9E-03 | 0.04 | 9E-03 | 0.04 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | 0.01 | 0.05 | 0.01 | 0.05 | S/L/G | AP-42 | |
| | | | | | | | | SO2 | 1E-03 | 4E-03 | 1E-03 | 4E-03 | Gas | AP-42 | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Benzene | 3E-06 | 1E-05 | 3E-06 | 1E-05 | Gas | AP-42 | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Ethylbenzene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | HCHO | 1E-04 | 5E-04 | 1E-04 | 5E-04 | Gas | AP-42 | |
| | | | | | | | | n-Hexane | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | AP-42 | |
| RBV-01<br>RBV-02<br><br>(Each) | Upward Vertical Stack | 4E<br>7E<br><br>(Each) | RBV-01<br>RBV-02<br><br>(Each) | na | na | C | 8760<br><br>(Each) | Methanol | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | POM/PAH | 1E-06 | 5E-06 | 1E-06 | 5E-06 | Gas | AP-42 | |
| | | | | | | | | Toluene | 6E-06 | 2E-05 | 6E-06 | 2E-05 | Gas | AP-42 | |
| | | | | | | | | 2,2,4-TMP | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Xylenes | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Other HAP | 2E-06 | 9E-06 | 2E-06 | 9E-06 | Gas | AP-42 | |
| | | | | | | | | Total HAP | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | Sum | |
| | | | | | | | | CO2 | 194.18 | 851 | 194.18 | 851 | Gas | 40CFR98 | |
| | | | | | | | | CH4 | 4E-03 | 0.02 | 4E-03 | 0.02 | Gas | 40CFR98 | |
| | | | | | | | | N2O | 4E-04 | 2E-03 | 4E-04 | 2E-03 | Gas | 40CFR98 | |
| | | | | | | | | CO2e | 194.38 | 851 | 194.38 | 851 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | **Dehydrator 01 and 02 (RSV-01 and RSV-02) 60.0 MMscfd (w/ Combustor and Condenser) (Each)** | | | | | | NOX | --- | | | | | | |
| | | | | | | | | CO | --- | | | | | | |
| | | | | | | | | NMNEHC | 68.82 | 301.44 | 0.69 | 3.01 | Gas | GLYCalc | |
| | | | | | | | | VOC | 68.82 | 301.44 | 0.69 | 3.01 | Gas | GLYCalc | |
| | | | | | | | | PM10/2.5 | --- | | | | | | |
| | | | | | | | | SO2 | --- | | | | | | |
| | | | | | | | | Acetaldehyde | --- | | | | | | |
| | | | | | | | | Acrolein | --- | | | | | | |
| | | | | | | | | Benzene | 2.15 | 9.42 | 0.02 | 0.09 | Gas | GLYCalc | |
| | | | | | | | | Butadiene | --- | | | | | | |
| | | | | | | | | Ethylbenzene | 0.29 | 1.27 | 3E-03 | 0.01 | Gas | GLYCalc | |
| | | | | | | | | HCHO | --- | | | | | | |
| RSV-01<br>RSV-02<br><br>(Each) | Upward Vertical Stack<br><br>(Each) | 5E<br>6E<br>(Total)<br><br>8E<br>9E<br>(Total)<br><br>(Each) | RSV-01<br>RSV-02<br><br>(Each) | 01-COMB | T-Ox | C | 8760<br><br>(Each) | n-Hexane | 3.29 | 14.39 | 0.03 | 0.14 | Gas | GLYCalc | |
| | | | | | | | | Methanol | --- | | | | | | |
| | | | | | | | | POM/PAH | --- | | | | | | |
| | | | | | | | | Toluene | 3.98 | 17.43 | 0.04 | 0.17 | Gas | GLYCalc | |
| | | | | | | | | 2,2,4-TMP | 0.04 | 0.15 | 4E-04 | 2E-03 | Gas | GLYCalc | |
| | | | | | | | | Xylenes | 0.29 | 1.27 | 3E-03 | 0.01 | Gas | GLYCalc | |
| | | | | | | | | Other HAP | --- | | | | | | |
| | | | | | | | | Total HAP | 10.03 | 43.93 | 0.10 | 0.44 | Gas | GLYCalc | |
| | | | | | | | | CO2 | --- | | | | | | |
| | | | | | | | | CH4 | 22.89 | 100.26 | 0.23 | 1.00 | Gas | GLYCalc | |
| | | | | | | | | N2O | --- | | | | | | |
| | | | | | | | | CO2e | 572 | 2,506 | 5.72 | 25.06 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | --- | --- | 0.63 | 2.75 | Gas | AP-42 | |
| | **Thermal Oxidizer (Combustion Only) (COMB-1) (Controls Dehydrators RSV-01 and RSV-02)** | | | | | | | CO | --- | --- | 1.99 | 8.70 | Gas | AP-42 | |
| | | | | | | | | NMNEHC | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | VOC | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | PM10/2.5 | --- | --- | 0.05 | 0.21 | S/L/G | AP-42 | |
| | | | | | | | | SO2 | --- | --- | 4E-03 | 0.02 | Gas | AP-42 | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Benzene | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Ethylbenzene | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | HCHO | --- | --- | 5E-04 | 2E-03 | Gas | AP-42 | |
| COMB-1 | | | | | | | | n-Hexane | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | Methanol | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| (Comb-ustion Only) | Upward Vertical Stack | 10E | COMB-1 | na | na | C | 8,760 | POM/PAH | --- | --- | 4E-06 | 2E-05 | Gas | AP-42 | |
| | | | | | | | | Toluene | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | 2,2,4-TMP | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | Xylenes | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | Other HAP | --- | --- | 8E-06 | 3E-05 | Gas | AP-42 | |
| | | | | | | | | Total HAP | --- | --- | 5E-04 | 2E-03 | Gas | Sum | |
| | | | | | | | | CO2 | --- | --- | 750 | 3,284 | Gas | 40CFR98 | |
| | | | | | | | | CH4 | (99% Control: See RSV-01 and RSV-02) | | | | | | |
| | | | | | | | | N2O | --- | --- | 1E-03 | 6E-03 | Gas | 40CFR98 | |
| | | | | | | | | CO2e | --- | --- | 750 | 3,286 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | 0.15 | 0.67 | 0.15 | 0.67 | Gas | AP-42 | |
| | **Heater Treater 01 (HTR-01) 1.55 MMBtu/hr (Each)** | | | | | | | CO | 0.13 | 0.56 | 0.13 | 0.56 | Gas | AP-42 | |
| | | | | | | | | NMNEHC | 8E-03 | 0.04 | 8E-03 | 0.04 | Gas | AP-42 | |
| | | | | | | | | VOC | 8E-03 | 0.04 | 8E-03 | 0.04 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | 1E-02 | 0.05 | 1E-02 | 0.05 | S/L/G | AP-42 | |
| | | | | | | | | SO2 | 9E-04 | 4E-03 | 9E-04 | 4E-03 | Gas | AP-42 | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Benzene | 3E-06 | 1E-05 | 3E-06 | 1E-05 | Gas | AP-42 | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Ethylbenzene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | HCHO | 1E-04 | 5E-04 | 1E-04 | 5E-04 | Gas | AP-42 | |
| | | | | | | | | n-Hexane | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | AP-42 | |
| HTR-01 | Upward Vertical Stack | 11E | HTR-01 | na | na | C | 8,760 | Methanol | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | POM/PAH | 1E-06 | 5E-06 | 1E-06 | 5E-06 | Gas | AP-42 | |
| | | | | | | | | Toluene | 5E-06 | 2E-05 | 5E-06 | 2E-05 | Gas | AP-42 | |
| | | | | | | | | 2,2,4-TMP | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Xylenes | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Other HAP | 2E-06 | 8E-06 | 2E-06 | 8E-06 | Gas | AP-42 | |
| | | | | | | | | Total HAP | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | Sum | |
| | | | | | | | | CO2 | 181 | 794 | 181 | 794 | Gas | AP-42 | |
| | | | | | | | | CH4 | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | AP-42 | |
| | | | | | | | | N2O | 3E-04 | 1E-03 | 3E-04 | 1E-03 | Gas | AP-42 | |
| | | | | | | | | CO2e | 182 | 795 | 182 | 795 | Gas | CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | 0.25 | 1.10 | 0.25 | 1.10 | Gas | AP-42 | |
| | **Condensate Stabilizer Heater 01 (HTR-02) 2.55 MMBtu/hr (Each)** | | | | | | | CO | 0.21 | 0.92 | 0.21 | 0.92 | Gas | AP-42 | |
| | | | | | | | | NMNEHC | 1E-02 | 0.06 | 1E-02 | 0.06 | Gas | AP-42 | |
| | | | | | | | | VOC | 1E-02 | 0.06 | 1E-02 | 0.06 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | 2E-02 | 0.08 | 2E-02 | 0.08 | S/L/G | AP-42 | |
| | | | | | | | | SO2 | 2E-03 | 7E-03 | 2E-03 | 7E-03 | Gas | AP-42 | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Benzene | 5E-06 | 2E-05 | 5E-06 | 2E-05 | Gas | AP-42 | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Ethylbenzene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | HCHO | 2E-04 | 8E-04 | 2E-04 | 8E-04 | Gas | AP-42 | |
| | | | | | | | | n-Hexane | 5E-03 | 2E-02 | 5E-03 | 2E-02 | Gas | AP-42 | |
| HTR-02 | Upward Vertical Stack | 12E | HTR-02 | na | na | C | 8,760 | Methanol | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | POM/PAH | 2E-06 | 8E-06 | 2E-06 | 8E-06 | Gas | AP-42 | |
| | | | | | | | | Toluene | 9E-06 | 4E-05 | 9E-06 | 4E-05 | Gas | AP-42 | |
| | | | | | | | | 2,2,4-TMP | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Xylenes | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Other HAP | 3E-06 | 1E-05 | 3E-06 | 1E-05 | Gas | AP-42 | |
| | | | | | | | | Total HAP | 5E-03 | 2E-02 | 5E-03 | 2E-02 | Gas | Sum | |
| | | | | | | | | CO2 | 298 | 1,307 | 298 | 1,307 | Gas | AP-42 | |
| | | | | | | | | CH4 | 6E-03 | 2E-02 | 6E-03 | 2E-02 | Gas | AP-42 | |
| | | | | | | | | N2O | 6E-04 | 2E-03 | 6E-04 | 2E-03 | Gas | AP-42 | |
| | | | | | | | | CO2e | 299 | 1,308 | 299 | 1,308 | Gas | CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | **Produced Water Storage Tanks (T01 - 48 bbl and T02 - 210 bbl)** | | | | | | NOX | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | NMNEHC | 0.17 | 0.75 | 0.17 | 0.75 | Gas | ProMax | |
| | | | | | | | | VOC | 0.17 | 0.75 | 0.17 | 0.75 | Gas | ProMax | |
| | | | | | | | | PM10/2.5 | --- | --- | --- | --- | S/L/G | --- | |
| | | | | | | | | SO2 | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Benzene | 2E-04 | 8E-04 | 2E-04 | 8E-04 | Gas | ProMax | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Ethylbenzene | 3E-04 | 1E-03 | 3E-04 | 1E-03 | Gas | ProMax | |
| | | | | | | | | HCHO | --- | --- | --- | --- | Gas | --- | |
| T01<br>T02<br><br>(Total) | Upward Vertical Stack | 13E<br>21E<br><br>(Total) | T01<br>T02<br><br>(Total) | na | na | C | 8760<br><br>(Each) | n-Hexane | 0.01 | 0.06 | 0.01 | 0.06 | Gas | ProMax | |
| | | | | | | | | Methanol | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | POM/PAH | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Toluene | 7E-04 | 3E-03 | 7E-04 | 3E-03 | Gas | ProMax | |
| | | | | | | | | 2,2,4-TMP | 5E-04 | 2E-03 | 5E-04 | 2E-03 | Gas | ProMax | |
| | | | | | | | | Xylenes | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | ProMax | |
| | | | | | | | | Other HAP | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Total HAP | 0.02 | 0.08 | 0.02 | 0.08 | Gas | Sum | |
| | | | | | | | | CO2 | 1E-03 | 0.01 | 1E-03 | 5E-03 | Gas | ProMax | |
| | | | | | | | | CH4 | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | ProMax | |
| | | | | | | | | N2O | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO2e | 0.07 | 0.30 | 0.07 | 0.30 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO | --- | --- | --- | --- | Gas | --- | |
| | | **Produced Water Truck Load-Out (TLO-1)** | | | | | | NMNEHC | --- | 0.45 | --- | 0.45 | Gas | AP-42 | |
| | | | | | | | | VOC | --- | 0.45 | --- | 0.45 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | --- | --- | --- | --- | S/L/G | --- | |
| | | | | | | | | SO2 | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Benzene | --- | 5E-04 | --- | 5E-04 | Gas | MB | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Ethylbenzene | --- | 8E-04 | --- | 8E-04 | Gas | MB | |
| | | | | | | | | HCHO | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | n-Hexane | --- | 0.04 | --- | 0.04 | Gas | MB | |
| | | | | | | | | Methanol | --- | --- | --- | --- | Gas | --- | |
| TLO-1 | Upward Vertical Stack | 14E | TLO-1 | na | na | --- | --- | POM/PAH | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Toluene | --- | 2E-03 | --- | 2E-03 | Gas | MB | |
| | | | | | | | | 2,2,4-TMP | --- | 1E-03 | --- | 1E-03 | Gas | MB | |
| | | | | | | | | Xylenes | --- | 0.01 | --- | 0.01 | Gas | MB | |
| | | | | | | | | Other HAP | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Total HAP | --- | 0.05 | --- | 0.05 | Gas | Sum | |
| | | | | | | | | CO2 | --- | 3E-03 | --- | 3E-03 | Gas | --- | |
| | | | | | | | | CH4 | --- | 0.01 | --- | 0.01 | Gas | MB | |
| | | | | | | | | N2O | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO2e | --- | 0.18 | --- | 0.18 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO | --- | --- | --- | --- | Gas | --- | |
| | **Stabilized Condensate Truck Load-Out (TLO-2)** | | | | | | | NMNEHC | --- | 2.47 | --- | 2.47 | Gas | AP-42 | |
| | | | | | | | | VOC | --- | 2.47 | --- | 2.47 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | --- | --- | --- | --- | S/L/G | --- | |
| | | | | | | | | SO2 | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Benzene | --- | 3E-03 | --- | 3E-03 | Gas | MB | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Ethylbenzene | --- | 0.00 | --- | 0.00 | Gas | MB | |
| | | | | | | | | HCHO | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | n-Hexane | --- | 0.21 | --- | 0.21 | Gas | MB | |
| TLO-2 | Upward Vertical Stack | 15E | TLO-2 | na | na | --- | --- | Methanol | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | POM/PAH | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Toluene | --- | 0.01 | --- | 0.01 | Gas | MB | |
| | | | | | | | | 2,2,4-TMP | --- | 0.01 | --- | 0.01 | Gas | MB | |
| | | | | | | | | Xylenes | --- | 0.05 | --- | 0.05 | Gas | --- | |
| | | | | | | | | Other HAP | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Total HAP | --- | 0.28 | --- | 0.28 | Gas | Sum | |
| | | | | | | | | CO2 | --- | 0.02 | --- | 0.02 | Gas | --- | |
| | | | | | | | | CH4 | --- | 0.04 | --- | 0.04 | Gas | MB | |
| | | | | | | | | N2O | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO2e | --- | 0.97 | --- | 0.97 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO | --- | --- | --- | --- | Gas | --- | |
| | **Start/Stop/Maintenance (SSM) (aka, Compressor Blowdown (CBD) and Emergency Shutdown (ESD) Testing)** | | | | | | | NMNEHC | --- | 62.14 | --- | 62.14 | Gas | MB | |
| | | | | | | | | VOC | --- | 62.14 | --- | 62.14 | Gas | MB | |
| | | | | | | | | PM10/2.5 | --- | --- | --- | --- | S/L/G | --- | |
| | | | | | | | | SO2 | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Benzene | --- | 0.05 | --- | 0.05 | Gas | MB | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Ethylbenzene | --- | 0.07 | --- | 0.07 | Gas | MB | |
| | | | | | | | | HCHO | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | n-Hexane | --- | 3.69 | --- | 3.69 | Gas | MB | |
| SSM | Upward Vertical Stack | 16E | CBD-01<br>CBD-02<br>CBD-03<br>ESD<br>PG<br>FCO | na | na | --- | --- | Methanol | --- | --- | --- | --- | Gas | --- | |
| (Total) | | | (Total) | | | | | POM/PAH | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Toluene | --- | 0.17 | --- | 0.17 | Gas | MB | |
| | | | | | | | | 2,2,4-TMP | --- | 0.11 | --- | 0.11 | Gas | MB | |
| | | | | | | | | Xylenes | --- | 0.71 | --- | 0.71 | Gas | MB | |
| | | | | | | | | Other HAP | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Total HAP | --- | 4.81 | --- | 4.81 | Gas | Sum | |
| | | | | | | | | CO2 | --- | 0.29 | --- | 0.29 | Gas | MB | |
| | | | | | | | | CH4 | --- | 69.94 | --- | 69.94 | Gas | MB | |
| | | | | | | | | N2O | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO2e | --- | 1,749 | --- | 1,749 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| CRP (x-RPC) | Upward Vertical Stack | 18E | CRP-01 CRP-02 CRP-03 (Total) | na | na | C | 8,760 (Each) | NOX | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | NMNEHC | 4.10 | 17.94 | 4.10 | 17.94 | Gas | --- | |
| | | | | | | | | VOC | 4.10 | 17.94 | 4.10 | 17.94 | Gas | Vendor | |
| | | | | | | | | PM10/2.5 | --- | --- | --- | --- | S/L/G | --- | |
| | | | | | | | | SO2 | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Benzene | 1E-03 | 6E-03 | 1E-03 | 6E-03 | Gas | MB | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Ethylbenzene | 1E-04 | 5E-04 | 1E-04 | 5E-04 | Gas | MB | |
| | | | | | | | | HCHO | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | n-Hexane | 0.10 | 0.43 | 0.10 | 0.43 | Gas | MB | |
| | | | | | | | | Methanol | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | POM/PAH | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Toluene | 2E-03 | 0.01 | 2E-03 | 0.01 | Gas | MB | |
| | | | | | | | | 2,2,4-TMP | 1E-03 | 0.01 | 1E-03 | 0.01 | Gas | MB | |
| | | | | | | | | Xylenes | 1E-04 | 5E-04 | 1E-04 | 5E-04 | Gas | MB | |
| | | | | | | | | Other HAP | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Total HAP | 0.10 | 0.45 | 0.10 | 0.45 | Gas | Sum | |
| | | | | | | | | CO2 | 0.04 | 0.19 | 0.04 | 0.19 | Gas | MB | |
| | | | | | | | | CH4 | 10.47 | 45.88 | 10.47 | 45.88 | Gas | MB | |
| | | | | | | | | N2O | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO2e | 262 | 1147 | 262 | 1,147 | Gas | 40CFR98 | |

**Compressor Rod Packing (CRP) (x-Rod Packing/Crankcase (RPC))**

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | **Station Recycle Line Heater 01 (HTR-03) 1.66 MMBtu/hr (Each)** | | | | | | NOX | 0.16 | 0.71 | 0.16 | 0.71 | Gas | AP-42 | |
| | | | | | | | | CO | 0.14 | 0.60 | 0.14 | 0.60 | Gas | AP-42 | |
| | | | | | | | | NMNEHC | 0.01 | 0.04 | 0.01 | 0.04 | Gas | AP-42 | |
| | | | | | | | | VOC | 0.01 | 0.04 | 0.01 | 0.04 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | 0.01 | 0.05 | 0.01 | 0.05 | S/L/G | AP-42 | |
| | | | | | | | | SO2 | 1E-03 | 4E-03 | 1E-03 | 4E-03 | Gas | AP-42 | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Benzene | 3E-06 | 1E-05 | 3E-06 | 1E-05 | Gas | AP-42 | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Ethylbenzene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | HCHO | 1E-04 | 5E-04 | 1E-04 | 5E-04 | Gas | AP-42 | |
| | | | | | | | | n-Hexane | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | AP-42 | |
| HTR-03 | Upward Vertical Stack | 19E | HTR-03 | na | na | C | 8,760 | Methanol | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | POM/PAH | 1E-06 | 5E-06 | 1E-06 | 5E-06 | Gas | AP-42 | |
| | | | | | | | | Toluene | 6E-06 | 2E-05 | 6E-06 | 2E-05 | Gas | AP-42 | |
| | | | | | | | | 2,2,4-TMP | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Xylenes | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Other HAP | 2E-06 | 9E-06 | 2E-06 | 9E-06 | Gas | AP-42 | |
| | | | | | | | | Total HAP | 3E-03 | 0.01 | 3E-03 | 0.01 | Gas | Sum | |
| | | | | | | | | CO2 | 194 | 851 | 194 | 851 | Gas | AP-42 | |
| | | | | | | | | CH4 | 4E-03 | 0.02 | 4E-03 | 0.02 | Gas | AP-42 | |
| | | | | | | | | N2O | 4E-04 | 2E-03 | 4E-04 | 2E-03 | Gas | AP-42 | |
| | | | | | | | | CO2e | 194 | 851 | 194 | 851 | Gas | CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | **Condensate Stabilizer Heater 02 (HTR-04) 9.70 MMBtu/hr (Each)** | | | | | | | NOX | 0.95 | 4.17 | 0.95 | 4.17 | Gas | AP-42 | |
| | | | | | | | | CO | 0.80 | 3.50 | 0.80 | 3.50 | Gas | AP-42 | |
| | | | | | | | | NMNEHC | 0.05 | 0.23 | 0.05 | 0.23 | Gas | AP-42 | |
| | | | | | | | | VOC | 0.05 | 0.23 | 0.05 | 0.23 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | 0.07 | 0.32 | 0.07 | 0.32 | S/L/G | AP-42 | |
| | | | | | | | | SO2 | 0.01 | 0.02 | 0.01 | 0.02 | Gas | AP-42 | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Benzene | 2E-05 | 9E-05 | 2E-05 | 9E-05 | Gas | AP-42 | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Ethylbenzene | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | HCHO | 7E-04 | 3E-03 | 7E-04 | 3E-03 | Gas | AP-42 | |
| | | | | | | | | n-Hexane | 0.02 | 0.07 | 0.02 | 0.07 | Gas | AP-42 | |
| HTR-04 | Upward Vertical Stack | 20E | HTR-04 | na | na | C | 8,760 | Methanol | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | POM/PAH | 7E-06 | 3E-05 | 7E-06 | 3E-05 | Gas | AP-42 | |
| | | | | | | | | Toluene | 3E-05 | 1E-04 | 3E-05 | 1E-04 | Gas | AP-42 | |
| | | | | | | | | 2,2,4-TMP | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Xylenes | --- | --- | --- | --- | Gas | AP-42 | |
| | | | | | | | | Other HAP | 1E-05 | 5E-05 | 1E-05 | 5E-05 | Gas | AP-42 | |
| | | | | | | | | Total HAP | 0.02 | 0.08 | 0.02 | 0.08 | Gas | Sum | |
| | | | | | | | | CO2 | 1,135 | 4,970 | 1,135 | 4,970 | Gas | AP-42 | |
| | | | | | | | | CH4 | 0.02 | 0.09 | 0.02 | 0.09 | Gas | AP-42 | |
| | | | | | | | | N2O | 2E-03 | 0.01 | 2E-03 | 0.01 | Gas | AP-42 | |
| | | | | | | | | CO2e | 1,136 | 4,975 | 1,136 | 4,975 | Gas | CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical Processes 0nly)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concen-tration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO | --- | --- | --- | --- | Gas | --- | |
| | | **Process Piping Fugitives - Gas (FUG-G)**<br>**Process Piping Fugitives - Liquid (FUG-L)** | | | | | | NMNEHC | 14.94 | 65.43 | 14.94 | 65.43 | Gas | AP-42 | |
| | | | | | | | | VOC | 14.94 | 65.43 | 14.94 | 65.43 | Gas | AP-42 | |
| | | | | | | | | PM10/2.5 | --- | --- | --- | --- | S/L/G | --- | |
| | | | | | | | | SO2 | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acetaldehyde | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Acrolein | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Benzene | 0.06 | 0.06 | 0.06 | 0.06 | Gas | AP-42 | |
| | | | | | | | | Butadiene | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Ethylbenzene | 0.09 | 0.09 | 0.09 | 0.09 | Gas | AP-42 | |
| | | | | | | | | HCHO | --- | --- | --- | --- | Gas | --- | |
| FUG-G<br>FUG-L<br><br>(Total) | Upward Vertical Stack | 17E<br><br>(Total) | FUG-G<br>FUG-L<br><br>(Total) | na | na | C | 8,760 | n-Hexane | 4.46 | 4.46 | 4.46 | 4.46 | Gas | AP-42 | |
| | | | | | | | | Methanol | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | POM/PAH | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Toluene | 0.22 | 0.22 | 0.22 | 0.22 | Gas | AP-42 | |
| | | | | | | | | 2,2,4-TMP | 0.14 | 0.14 | 0.14 | 0.14 | Gas | AP-42 | |
| | | | | | | | | Xylenes | 0.93 | 0.93 | 0.93 | 0.93 | Gas | AP-42 | |
| | | | | | | | | Other HAP | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | Total HAP | 5.90 | 5.90 | 5.90 | 5.90 | Gas | Sum | |
| | | | | | | | | CO2 | 0.12 | 0.52 | 0.12 | 0.52 | Gas | AP-42 | |
| | | | | | | | | CH4 | 9.93 | 43.48 | 9.93 | 43.48 | Gas | AP-42 | |
| | | | | | | | | N2O | --- | --- | --- | --- | Gas | --- | |
| | | | | | | | | CO2e | 248 | 1087 | 248 | 1087 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | 0.01 | 0.04 | 0.01 | 0.04 | Gas | --- | |
| | **Engine Crankcase (ECC) (x-Rod Packing/Crankcase (RPC))** | | | | | | | CO | 0.05 | 0.22 | 0.05 | 0.22 | Gas | --- | |
| | | | | | | | | NMNEHC | 0.02 | 0.11 | 0.02 | 0.11 | Gas | --- | |
| | | | | | | | | VOC | 0.02 | 0.11 | 0.02 | 0.11 | Gas | Vendor | |
| | | | | | | | | PM10/2.5 | 3E-03 | 3E-03 | 3E-03 | 3E-03 | S/L/G | --- | |
| | | | | | | | | SO2 | 4E-05 | 2E-04 | 4E-05 | 2E-04 | Gas | --- | |
| | | | | | | | | Acetaldehyde | 5E-04 | 2E-03 | 5E-04 | 2E-03 | Gas | --- | |
| | | | | | | | | Acrolein | 3E-04 | 1E-03 | 3E-04 | 1E-03 | Gas | --- | |
| | | | | | | | | Benzene | 3E-05 | 1E-04 | 3E-05 | 1E-04 | Gas | MB | |
| | | | | | | | | Butadiene | 2E-05 | 7E-05 | 2E-05 | 7E-05 | Gas | --- | |
| | | | | | | | | Ethylbenzene | 1E-04 | 1E-05 | 1E-04 | 1E-05 | Gas | MB | |
| | | | | | | | | HCHO | 0.01 | 0.03 | 0.01 | 0.03 | Gas | --- | |
| | | | | | | | | n-Hexane | 7E-05 | 0.00 | 7E-05 | 3E-04 | Gas | MB | |
| ECC (x-RPC) | Upward Vertical Stack | 22E | ECC | na | na | C | 8,760 | Methanol | 2E-04 | 7E-04 | 2E-04 | 7E-04 | Gas | --- | |
| | | | | | | | | POM/PAH | 2E-05 | 9E-05 | 2E-05 | 9E-05 | Gas | --- | |
| | | | | | | | | Toluene | 2E-05 | 1E-04 | 2E-05 | 1E-04 | Gas | MB | |
| | | | | | | | | 2,2,4-TMP | 2E-05 | 7E-05 | 2E-05 | 7E-05 | Gas | MB | |
| | | | | | | | | Xylenes | 1E-05 | 5E-05 | 1E-05 | 5E-05 | Gas | MB | |
| | | | | | | | | Other HAP | 2E-05 | 8E-05 | 2E-05 | 8E-05 | Gas | --- | |
| | | | | | | | | Total HAP | 0.01 | 0.03 | 0.01 | 0.03 | Gas | Sum | |
| | | | | | | | | CO2 | 8.36 | 36.64 | 8.36 | 36.64 | Gas | MB | |
| | | | | | | | | CH4 | 0.03 | 0.14 | 0.03 | 0.14 | Gas | MB | |
| | | | | | | | | N2O | 1E-05 | 6E-05 | 1E-05 | 6E-05 | Gas | --- | |
| | | | | | | | | CO2e | 9.17 | 40.15 | 9.17 | 40.15 | Gas | 40CFR98 | |

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | 11.71 | 51.30 | 5.74 | 25.12 | Gas | Varies | |
| | | | | | | | | CO | 27.12 | 118.77 | 5.44 | 23.81 | Gas | Varies | |
| | | | | | | | | NMNEHC | 149 | 716 | 6.92 | 95.35 | Gas | Varies | |
| | | | | | | | | VOC | 151 | 727 | 7.61 | 98.40 | Gas | Varies | |
| | | | | | | | | PM10/2.5 | 0.40 | 1.76 | 0.45 | 1.97 | S/L/G | Varies | |
| | | | | | | | | SO2 | 0.03 | 0.11 | 0.03 | 0.13 | Gas | Varies | |
| | | | | | | | | Acetaldehyde | 0.19 | 0.85 | 0.04 | 0.16 | Gas | Varies | |
| | | | | | | | | Acrolein | 0.12 | 0.53 | 0.02 | 0.10 | Gas | Varies | |
| | | | | | | | | Benzene | 4.31 | 18.95 | 0.05 | 0.27 | Gas | Varies | |
| | | | | | | | | Butadiene | 0.01 | 0.03 | 2E-03 | 0.01 | Gas | Varies | |
| | | | | | | | | Ethylbenzene | 0.58 | 2.61 | 0.01 | 0.10 | Gas | Varies | |
| | | | | | | | | HCHO | 2.28 | 9.99 | 0.62 | 2.73 | Gas | Varies | |
| | | | | | | | | n-Hexane | 6.75 | 33.48 | 0.22 | 4.90 | Gas | Varies | |
| | | | | | | | | Methanol | 0.06 | 0.27 | 0.01 | 0.07 | Gas | Varies | |
| | | | | | | | | POM/PAH | 0.01 | 0.04 | 1E-03 | 0.01 | Gas | Varies | |
| | | | | | | | | Toluene | 7.97 | 35.11 | 0.08 | 0.56 | Gas | Varies | |
| | | | | | | | | 2,2,4-TMP | 0.08 | 0.47 | 5E-03 | 0.14 | Gas | Varies | |
| | | | | | | | | Xylenes | 0.59 | 3.34 | 0.01 | 0.81 | Gas | Varies | |
| | | | | | | | | Other HAP | 0.01 | 0.03 | 2E-03 | 0.01 | Gas | Varies | |
| | | | | | | | | Total HAP | 22.96 | 106 | 1.08 | 9.86 | Gas | SUM | |
| | | | | | | | | CO2 | 5,591 | 24,488 | 6,341 | 27,772 | Gas | Varies | |
| | | | | | | | | CH4 | 68 | 370 | 23.16 | 171 | Gas | Varies | |
| | | | | | | | | N2O | 0.01 | 0.04 | 0.01 | 0.05 | Gas | Varies | |
| | | | | | | | | CO2e | 7,306 | 33,748 | 6,923 | 32,072 | Gas | 40CFR98 | |

**Plant-Wide Summary (w/o Fugitives)**

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# 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[1] | Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)* | | Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* | | Vent Time for Emission Unit *(Chemical processes only)* | | All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)* | Maximum Potential Uncontrolled Emissions[4] | | Maximum Potential Controlled Emissions[5] | | Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)* | Est. Method Used[6] | Emission Concentration[7] *(ppmvd or mg/m$^3$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ID No. | Source | ID No. | Device Type | Short Term[2] | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| | | | | | | | | NOX | 11.72 | 51.34 | 5.74 | 25.16 | Gas | Varies | |
| | | | | | | | | CO | 27.17 | 118.99 | 5.49 | 24.02 | Gas | Varies | |
| | | | | | | | | NMNEHC | 164 | 781 | 21.88 | 161 | Gas | Varies | |
| | | | | | | | | VOC | 166 | 793 | 22.58 | 164 | Gas | Varies | |
| | | | | | | | | PM10/2.5 | 0.40 | 1.76 | 0.45 | 1.97 | S/L/G | Varies | |
| | | | | | | | | SO2 | 0.03 | 0.11 | 0.03 | 0.13 | Gas | Varies | |
| | | | | | | | | Acetaldehyde | 0.19 | 0.85 | 0.04 | 0.16 | Gas | Varies | |
| | | | | | | | | Acrolein | 0.12 | 0.53 | 0.02 | 0.11 | Gas | Varies | |
| | | | | | | | | Benzene | 4.38 | 19.01 | 0.11 | 0.33 | Gas | Varies | |
| | | | | | | | | Butadiene | 0.01 | 0.03 | 2E-03 | 0.01 | Gas | Varies | |
| | | | | | | | | Ethylbenzene | 0.67 | 2.70 | 0.09 | 0.18 | Gas | Varies | |
| | | | | | | | | HCHO | 2.29 | 10.02 | 0.63 | 2.76 | Gas | Varies | |
| | | | | | | | | n-Hexane | 11.21 | 37.95 | 4.68 | 9.36 | Gas | Varies | |
| | | | | | | | | Methanol | 0.06 | 0.27 | 0.02 | 0.07 | Gas | Varies | |
| | | | | | | | | POM/PAH | 0.01 | 0.04 | 2E-03 | 0.01 | Gas | Varies | |
| | | | | | | | | Toluene | 8.19 | 35.33 | 0.30 | 0.78 | Gas | Varies | |
| | | | | | | | | 2,2,4-TMP | 0.22 | 0.61 | 0.15 | 0.28 | Gas | Varies | |
| | | | | | | | | Xylenes | 1.52 | 4.27 | 0.94 | 1.74 | Gas | Varies | |
| | | | | | | | | Other HAP | 0.01 | 0.03 | 2E-03 | 0.01 | Gas | Varies | |
| | | | | | | | | Total HAP | 28.87 | 112 | 6.99 | 15.79 | Gas | SUM | |
| | | | | | | | | CO2 | 5,599 | 24,525 | 6,349 | 27,809 | Gas | Varies | |
| | | | | | | | | CH4 | 78 | 414 | 33.11 | 215 | Gas | Varies | |
| | | | | | | | | N2O | 0.01 | 0.04 | 0.01 | 0.05 | Gas | Varies | |
| | | | | | | | | CO2e | 7,563 | 34,876 | 7,180 | 33,199 | Gas | 40CFR98 | |

**Plant-Wide Summary (w/ Fugitives)**

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# Attachment J
# EMISSION POINTS DATA SUMMARY SHEET - Continued

**Table 1: Emissions Data - Continued**

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, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, 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/m3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO2, use units of ppmv (See 45CSR10).

## Attachment J
## EMISSION POINTS DATA SUMMARY SHEET - Continued

**Table 2: Release Parameter Data**

| Emission Unit ID | Emission Point ID No. *(Must match Emission Units Table)* | Inner Diameter (ft.) | Exit Gas | | | Emission Point Elevation (ft) | | UTM Coordinates (km) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Temp. (oF) | Volumetric Flow[1] (acfm) (A*t operating conditions)* | Velocity (fps) | Ground Level *(Height above mean sea level)* | Stack Height[2] *(Height of emissions above ground level)* | Northing | Easting |
| CE-01 | 1E | 1.0 | 1,016 | 9,268 | 200.0 | 1,200 ft | 15 ft | 4,414.5 | 517.7 |
| CE-02 | 2E | 1.0 | 1,016 | 9,268 | 198.0 | 1,200 ft | 15 ft | 4,414.5 | 517.7 |
| CE-03 | 3E | 0.4 | 1,064 | 990 | --- | 1,200 ft | 15 ft | 4,414.5 | 517.7 |
| RBV-1 | 4E | 0.6 | 120 | --- | --- | 1,200 ft | 10 ft | 4,414.5 | 517.7 |
| RSV-1 | 5E | See Thermal Oxidizer (COMB-1 (10E)) | | | | | | | |
| | 6E | | | | | | | | |
| RBV-2 | 7E | 0.6 | 120 | --- | --- | 1,200 ft | 10 ft | 4,414.5 | 517.7 |
| RSV-2 | 8E | See Thermal Oxidizer (COMB-1 (10E)) | | | | | | | |
| | 9E | | | | | | | | |
| COMB-1 | 10E | 3.0 | 1,500 | 6,188 | 24.1 | 1,200 ft | 20 ft | 4,414.5 | 517.7 |
| HTR-01 | 11E | --- | 600 | --- | --- | 1,200 ft | 10 ft | 4,414.5 | 517.7 |
| HTR-02 | 12E | --- | 600 | --- | --- | 1,200 ft | 10 ft | 4,414.5 | 517.7 |
| T01 | 13E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| TLO-1 | 14E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| TLO-2 | 15E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| SSM | 16E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| | | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| | | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| | | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| CRP | 18E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| HTR-03 | 19E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| HTR-04 | 20E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| T02 | 21E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| FUG-G | 17E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| FUG-L | | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
| ECC | 22E | --- | --- | --- | --- | 1,200 ft | --- | 4,414.5 | 517.7 |
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| | | | | | | | | | |

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

# Attachment K

# Fugitive Emissions Data Summary Sheet

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

---

- **Application Forms Checklist**
- **Fugitive Emissions Data Summary Sheet**

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Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

**Attachment K - Fugitive Emissions**

## 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 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?<br>☐ Yes ☑ No<br>☐ If Yes, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET. |
| 2.) Will there be Storage Piles?<br>☐ Yes ☑ No<br>☐ If Yes, then complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET. |
| 3.) Will there be Liquid Loading/Unloading Operations?<br>☐ Yes ☑ No (( Truck Load-Out (TLO-1 and TLO-2) emissions are included in the Point Source Emissions ))<br>☐ If Yes, then complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET. |
| 4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?<br>☐ Yes ☑ No<br>☐ If Yes, then 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.)?<br>☑ Yes ☐ No<br>☑ If Yes, then complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS DATA SHEET. |
| 6.) Will there be General Clean-up VOC Operations?<br>☐ Yes ☑ No<br>☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET. |
| 7.) Will there be any other activities that generate fugitive emissions?<br>☐ Yes ☑ No<br>☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.<br><br>If you answered “NO” to all of the items above, it is not necessary to complete the following table, “Fugitive Emissions Summary.” |

## Fugitive Emissions Data Summary Sheet - Continued

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 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.

| FUGITIVE EMISSIONS SUMMARY | All Regulated Pollutants Chemical Name/CAS[1] | Maximum Potential Pre-Controlled Emissions[2] | | Maximum Potential Controlled Emissions[3] | | Est. Method Used[4] |
|---|---|---|---|---|---|---|
| | | lb/hr | ton/yr | lb/hr | ton/yr | |
| Paved Haul Roads | na | --- | --- | --- | --- | --- |
| Unpaved Haul Roads | na | --- | --- | --- | --- | --- |
| Storage Pile Emissions | na | --- | --- | --- | --- | --- |
| Loading/Unloading Operations | (( Truck Load-Out (TLO-1 and TLO-2) emissions are included in the Point Source Emissions )) | | | | | |
| Wastewater Treatment | na | --- | --- | --- | --- | --- |
| Process and Piping Fugitives-Gas (FUG-G) rocess and Piping Fugitives-Liquid (FUG-L) Engine Crankcase (ECC) (Total Combined) | NOX | 0.01 | 0.04 | 0.01 | 0.04 | Vendor |
| | CO | 0.05 | 0.22 | 0.05 | 0.22 | Vendor |
| | VOC | 14.96 | 65.53 | 14.96 | 65.53 | AP-42/Vendor |
| | PM10/2.5 | 6E-04 | 3E-03 | 6E-04 | 3E-03 | Vendor |
| | SO2 | 4E-05 | 2E-04 | 4E-05 | 2E-04 | Vendor |
| | Total HAPs | 5.91 | 5.93 | 5.91 | 5.93 | Sum |
| | Carbon Dioxide Equivalent (CO2e) | 0 | 0 | 257 | 1,128 | 40CFR98 |
| General Clean-up VOC Emissions | na | --- | --- | --- | --- | --- |
| Other | na | --- | --- | --- | --- | --- |

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

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

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

[4] 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(s)

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"28. Fill out the **Emissions Unit Data Sheet(s**) as Attachment L."

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- **Natural Gas-Fired Compressor/Generator Engine Data Sheet**
  - 1,380 bhp CAT G3516B Compressor Engines – CE-01/1E and CE-02/2E
  - 203 bhp CAT G3306B TA Compressor Engine – CE-03/3E
- **Natural Gas Glycol Dehydrator Unit Data Sheet**
  - 60.0 MMscfd Dehydrators – RSV-01/5E,6E and RSV-02/8E,9E)
  - 1.66 MMBtu/hr Reboilers – RBV-01/4E, RBV-02/7E
  - Dehydrators – 40 CFR Part 63; Subpart HH & HHH Registration Form
  - Dehydrators – Subpart HH Exemption Status
- **Natural Gas-Fired Boiler/Line Heater Data Sheet**
  - 1.55 MMBtu/hr Heater Treater 01 – HTR-01/11E
  - 2.55 MMBtu/hr Condensate Stabilizer Heater 01 – HTR-02/12E
  - 1.66 MMBtu/hr Station Recycle Line Heater 01 – HTR-03/19E
  - 9.70 MMBtu/hr Condensate Stabilizer Heater 02 – HTR-04/20E
- **Storage Tank Data Sheet**
  - Produced Water Storage Tanks – T01/13E and T02/21E
  - Misc (Oil, TEG, Etc) Storage Tanks – T03 thru T12
- **Bulk Liquid Transfer Operations Data Sheet**
  - Produced Water Truck Loadout – TLO-01/14E
  - Stabilized Condensate Truck Loadout – TLO-02/15E
- **Fugitive Emissions Data Summary Sheet**

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Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

**Attachment L - Emission Unit Data Sheet**

## NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

| Description | | Compressor Engine | | Compressor Engine | | Compressor Engine | |
|---|---|---|---|---|---|---|---|
| Source Identification Number[1] | | CE-01/1E | | CE-02/2E | | CE-03/3E | |
| Engine Manufacturer and Model | | CAT G3516B | | CAT G3516B | | CAT G3306B TA | |
| Manufacturer's Rated bhp/rpm | | 1,380 / 1,400 | | 1,380 / 1,400 | | 203 / 1,800 | |
| Source Status[2] | | MOD | | MOD | | MOD | |
| Date Installed/Modified/Removed[3] | | 2015 / 2018 | | 2015 / 2018 | | 2015 / 2018 | |
| Manufactured/Reconstruction Date[4] | | > 08/23/11 | | > 08/23/11 | | > 08/23/11 | |
| Certified Engine (40CFR60 NSPS JJJJ)[5] | | No | | No | | No | |
| Engine, Fuel and Combustion Data | Engine Type[6] | 4SLB | | 4SLB | | 4SRB | |
| | APCD Type[7] | OxCat | | OxCat | | NSCR | |
| | Fuel Type[8] | RG | | RG | | RG | |
| | $H_2S$ (gr/100 scf) | 0.20 | | 0.20 | | 0.20 | |
| | Operating bhp/rpm | 1,380 / 1,400 | | 1,380 / 1,400 | | 203 / 1,800 | |
| | BSFC (Btu/bhp-hr) | 8,171 | | 8,171 | | 9,070 | |
| | Fuel ($ft^3$/hr) | 11,055 | | 11,055 | | 1,805 | |
| | Fuel ($MMft^3$/yr) | 96.84 | | 96.84 | | 15.81 | |
| | Operation (hrs/yr) | 8,760 | | 8,760 | | 8,760 | |
| Reference[9] | PTE[10] | lbs/hr | tons/yr | lbs/hr | tons/yr | lbs/hr | tons/yr |
| MD | NOX | 1.52 | 6.66 | 1.52 | 6.66 | 0.22 | 0.98 |
| MD | CO | 0.50 | 2.20 | 0.50 | 2.20 | 0.90 | 3.92 |
| MD | NMNEHC | 0.53 | 2.33 | 0.53 | 2.33 | 0.11 | 0.47 |
| MD | VOC | 0.83 | 3.63 | 0.83 | 3.63 | 0.21 | 0.93 |
| AP | PM10/2.5 | 0.11 | 0.49 | 0.11 | 0.49 | 0.04 | 0.16 |
| AP | SO2 | 0.01 | 0.03 | 0.01 | 0.03 | 1E-03 | 5E-03 |
| AP | Acetaldehyde | 0.02 | 0.07 | 0.02 | 0.07 | 0.01 | 0.02 |
| AP | Acrolein | 0.01 | 0.04 | 0.01 | 0.04 | 5E-03 | 0.02 |
| AP | Benzene | 8E-04 | 4E-03 | 8E-04 | 4E-03 | 3E-03 | 0.01 |
| AP | Butadiene, 1,3- | 5E-04 | 2E-03 | 5E-04 | 2E-03 | 1E-03 | 0.01 |
| AP | Ethylbenzene | 7E-05 | 3E-04 | 7E-05 | 3E-04 | 5E-05 | 2E-04 |
| MD | Formaldehyde | 0.27 | 1.17 | 0.27 | 1.17 | 0.09 | 0.39 |
| AP | n-Hexane | 2E-03 | 0.01 | 2E-03 | 0.01 | 0.01 | 0.02 |
| AP | Methanol (MeOH) | 5E-03 | 0.02 | 5E-03 | 0.02 | 0.01 | 0.02 |
| AP | POM/PAH | 6E-04 | 3E-03 | 6E-04 | 3E-03 | 2E-04 | 8E-04 |
| AP | Toluene | 8E-04 | 3E-03 | 8E-04 | 3E-03 | 1E-03 | 4E-03 |
| AP | 2,2,4-TMP (i-Octane) | 5E-04 | 2E-03 | 5E-04 | 2E-03 | 1E-03 | 0.01 |
| AP | Xylenes | 3E-04 | 1E-03 | 3E-04 | 1E-03 | 4E-04 | 2E-03 |
| AP | Other/Trace HAP | 6E-04 | 3E-03 | 6E-04 | 3E-03 | 3E-04 | 1E-03 |
| SUM | Total HAP | 0.30 | 1.32 | 0.30 | 1.32 | 0.12 | 0.52 |
| MD | CO2 | 1,570 | 6,876 | 1,570 | 6,876 | 254 | 1,113 |
| MD | CH4 | 5.99 | 26.25 | 5.99 | 26.25 | 0.19 | 0.84 |
| 40CFR98 | N2O | 2E-03 | 0.01 | 2E-03 | 0.01 | 4E-04 | 2E-03 |
| 40CFR98 | CO2e | 1,720 | 7,536 | 1,720 | 7,536 | 259 | 1,135 |

## Notes to NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

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

2. Enter the Source Status using the following codes:
   NS = Construction of New Source (installation)
   ES = Existing Source
   MS = Modification of Existing Source
   RS = Removal of Source

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

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

5. Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate.

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

6. Enter the Engine Type designation(s) using the following codes:
   LB2S = Lean Burn Two Stroke
   RB4S = Rich Burn Four Stroke
   LB4S = Lean Burn Four Stroke

7. Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:
   A/F = Air/Fuel Ratio
   IR = Ignition Retard
   HEIS = High Energy Ignition System
   SIPC = Screw-in Precombustion Chambers
   PSC = Prestratified Charge
   LEC = Low Emission Combustion
   NSCR = Non-Selective Catalytic Reduction
   SCR = Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:
   PQ = Pipeline Quality Natural Gas
   RG = Raw Natural Gas

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this Compressor/Generator Data Sheet(s).
   MD = Manufacturer's Data
   AP = AP-42
   GR = GRI-HAPCalcTM
   OT = Other (please list) _____

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

## NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

| General Glycol Dehydration Unit Data | | Company ID | | RSV-1 | | RSV-2 | |
|---|---|---|---|---|---|---|---|
| | | Manufacturer and Model | | Frederick Logan Co, Inc. | | Frederick Logan Co, Inc. | |
| | | Max Dry Gas Flow Rate (MMscfd) | | 60.0 | | 60.0 | |
| | | Heat Input (MMBtu/hr) - HHV | | 1.66 | | 1.66 | |
| | | Design Type (DEG or TEG) | | TEG | | TEG | |
| | | Source Status[2] | | MOD | | MOD | |
| | | Date Installed/Modified/Removed[3] | | 2014 | | 2016 | |
| | | Regenerator Still Vent APCD[4] | | TO | | TO | |
| | | Fuel HV (Btu/scf) - HHV | | 1,020 | | 1,020 | |
| | | $H_2S$ Content (gr/100 scf) | | 0.20 | | 0.20 | |
| | | Operation (hrs/yr) | | 8,760 | | 8,760 | |
| Source ID #[1] | Vent | Reference[5] | PTE[6] | lbs/hr | tons/yr | lbs/hr | tons/yr |
| RSV-1<br>RSV-2 | Dehydrator 01 and 02<br>Regenerator Still Vent (5E,8E) and Flash Tank Off-Gas (6E,9E)<br>(Vents thru COMB-1) | GRI-GLYCalc | VOC | 0.69 | 3.01 | 0.69 | 3.01 |
| | | GRI-GLYCalc | Benzene | 0.02 | 0.09 | 0.02 | 0.09 |
| | | GRI-GLYCalc | E-Benzene | 3E-03 | 0.01 | 3E-03 | 0.01 |
| | | GRI-GLYCalc | n-Hexane | 0.03 | 0.14 | 0.03 | 0.14 |
| | | GRI-GLYCalc | Toluene | 0.04 | 0.17 | 0.04 | 0.17 |
| | | GRI-GLYCalc | 2,2,4-TMP | 4E-04 | 2E-03 | 4E-04 | 2E-03 |
| | | GRI-GLYCalc | Xylenes | 3E-03 | 0.01 | 3E-03 | 0.01 |
| | | GRI-GLYCalc | Total HAP | 0.10 | 0.44 | 0.10 | 0.44 |
| | | GRI-GLYCalc | CO2e | 5.72 | 25.06 | 5.72 | 25.06 |
| RBV-1/5E<br>RBV-2/8E | Reboiler 01 and 02 | AP-42 | NOX | 0.16 | 0.71 | 0.16 | 0.71 |
| | | AP-42 | CO | 0.14 | 0.60 | 0.14 | 0.60 |
| | | AP-42 | VOC | 9E-03 | 0.04 | 9E-03 | 0.04 |
| | | AP-42 | PM10/2.5 | 0.01 | 0.05 | 0.01 | 0.05 |
| | | AP-42 | SO2 | 1E-03 | 4E-03 | 1E-03 | 4E-03 |
| | | AP-42 | Acetaldehyde | --- | --- | --- | --- |
| | | AP-42 | Acrolein | --- | --- | --- | --- |
| | | AP-42 | Benzene | 3E-06 | 1E-05 | 3E-06 | 1E-05 |
| | | AP-42 | Butadiene, 1,3- | --- | --- | --- | --- |
| | | AP-42 | Ethylbenzene | --- | --- | --- | --- |
| | | AP-42 | Formaldehyde | 1E-04 | 5E-04 | 1E-04 | 5E-04 |
| | | AP-42 | n-Hexane | 3E-03 | 0.01 | 3E-03 | 0.01 |
| | | AP-42 | Methanol | --- | --- | --- | --- |
| | | AP-42 | POM/PAH | 1E-06 | 5E-06 | 1E-06 | 5E-06 |
| | | AP-42 | Toluene | 6E-06 | 2E-05 | 6E-06 | 2E-05 |
| | | AP-42 | TMP, 2,2,4- | --- | --- | --- | --- |
| | | AP-42 | Xylenes | --- | --- | --- | --- |
| | | AP-42 | Other HAP | 2E-06 | 9E-06 | 2E-06 | 9E-06 |
| | | AP-42 | Total HAP | 3E-03 | 0.01 | 3E-03 | 0.01 |
| | | AP-42 | CO2 | 194.18 | 851 | 194 | 851 |
| | | AP-42 | CH4 | 4E-03 | 0.02 | 4E-03 | 0.02 |
| | | AP-42 | N2O | 4E-04 | 2E-03 | 4E-04 | 2E-03 |
| | | 40CFR98 | CO2e | 194.38 | 851 | 194 | 851 |

## Notes to NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

1. Enter the appropriate Source Identification Numbers for the glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent. The glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent should be designated RBV-1 and RSV-1, respectively. If the compressor station incorporates multiple glycol dehydration units, a Glycol Dehydration Unit Data Sheet shall be completed for each, using Source Identification #s RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

2. Enter the Source Status using the following codes:
NS = Construction of New Source
ES = Existing Source
MS = Modification of Existing Source
RS = Removal of Source

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

4. Enter the Air Pollution Control Device (APCD) type designation using the following codes:
NA = None
CD = Condenser
FL = Flare
CC = Condenser/Combustion Combination
TO = Thermal Oxidizer

5. Enter the Potential Emissions Data Reference designation using the following codes:
MD = Manufacturer's Data
AP = AP-42
GR = GRI-GLYCalcTM
OT = Other (please list): _____ .

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

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

***An explanation of input parameters and examples, when using GRI-GLYCalcTM is available on our website.**

# 40 CFR Part 63; Subpart HH & HHH Registration Form

**West Virginia Department of Environmental Protection**
**Division of Air Quality**
**40 CFR Part 63; Subpart HH & HHH Registration Form**

DIVISION OF AIR QUALITY : (304) 926-0475
WEB PAGE: http:\\www.wvdep.org

*Complete this form for any oil and natural gas production or natural gas transmission and storage facility that uses an affected unit under HH/HHH, whether subject or not.*

| **Section A: Facility Description** | | |
|---|---|---|
| Affected facility actual annual average natural gas throughput (scf/day): | **60.0 MM** | |
| Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day): | **na** | |
| The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer. | ☑ Yes | ☐ No |
| The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user. | ☑ Yes | ☐ No |
| The affected facility is: ☑ prior to a NG processing plant ☐ NG processing plant<br>☐ prior to the point of custody transfer and there is no NG processing plant | | |
| The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company). | ☐ Yes | ☑ No |
| The affected facility exclusively processes, stores, or transfers black oil with an initial producing gas-to-oil ratio (GOR): **na** scf/bbl API gravity: **na** degrees | ☐ Yes | ☑ No |

| **Section B: Dehydration Unit (if applicable)**[1] | | | | | | |
|---|---|---|---|---|---|---|
| Description: **60.0 MMscfd - Dehydrator 01 and 02 (Each)** | | | | | | |
| Date of Installation: | **'14/'16** | Annual Operating Hours: | **8,760** | Burner rating (MMBtu/hr): | **1.66** | |
| Exhaust Stack Height (ft): | **---** | Stack Diameter (ft): | **---** | Stack Temp. (oF): | **---** | |
| Glycol Type: | ☑ TEG | ☐ EG | ☐ Other: **na** | | | |
| Glycol Pump Type: | ☑ Elect | ☐ Gas | If Gas, what is the volume ratio?: **na** | | | |
| Condenser installed? | ☐ Yes | ☑ No | Exit Temp: **na** | Condenser Pressure: **na** | | |
| Incinerator/flare installed? | ☑ Yes | ☐ No | Destruction Eff.: **99% Thermal Oxidizer (COMB-1 (10E))** | | | |
| Other controls installed? | ☐ Yes | ☑ No | Describe: **na** | | | |
| Wet Gas[2]: (Upstream of Contact Tower) | Gas Temperature: **70.00 oF** | | Gas Pressure: **900.00 psig** | | | |
| | Saturated Gas?: | ☑ Yes | ☐ No | If no, water content?: **na** | | |
| Dry Gas: (Downstream of Contact Tower) | Gas Flowrate: | Actual: **60.0 MMscfd** | | Design: **60.0 MMscfd** | | |
| | Water Content: **7.00 lb/MMscf** | | | | | |
| Lean Glycol: | Circulation Rate: | Actual[3]: **13.7 gpm** | | Max[4]: **13.7 gpm** | | |
| | Pump make/model: **na - Electric** | | | | | |
| Glycol Flash Tank (if applicable): | Temp: **150.00 oF** | Pressure: **50.00 psig** | Vented: | ☐ Yes | ☑ No | |
| | If no, describe vapor control: **99% Thermal Oxidizer (COMB-1 (10E)) (Vapors may also be used as fuel gas)** | | | | | |
| Stripping Gas (if applicable): | Source of Gas **na** | Rate: **na** | | | | |

## 40 CFR Part 63; Subpart HH & HHH Registration Form - Continued

## Applicable to Dehydrator RSV-1 (5E,6E) and Dehydrator RSV-2 (8E,9E)

**Please attach the following required dehydration unit information:**

1. System map indicating the chain of custody information. See Page 43 of this document for an example of a gas flow schematic. It is not intended that the applicant provide this level of detail for all sources. The level of detail that is necessary is to establish where the custody transfer points are located. This can be accomplished by submitting a process flow diagram indicating custody transfer points and the natural gas flow. However, the DAQ reserves the right to request more detailed information in order to make the necessary decisions.

2. Extended gas analysis from the Wet Gas Stream, including mole percent of C1-C8, benzene, ethylbenzene, toluene, xylene and n-hexane, using Gas Processors Association (GPA) 2286 (or similar). A sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard 2166 reference method or a modified version of EPA Method TO-14, (or similar) should be used.

3. GRI-GLYCalc Ver. 3.0 aggregate report based on maximum Lean Glycol circulation rate and maximum throughput.

4. Detailed calculations of gas or hydrocarbon flow rate.

**Section C: Facility NESHAPS Subpart HH/HHH status**

Affected facility status: (choose only one)

☑ Subject to Subpart HH -- However, ***EXEMPT*** because the facility is an area source of HAP emissions ***and*** the actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere is < 0.90 megagram per year (1.0 tpy). (see 40CFR§63.764(e)(1)(ii))

☐ Subject to Subpart HHH

☐ Not Subject Because:

- ☐ < 10/25 TPY
- ☐ Affected facility exclusively handles black oil.
- ☐ Facility-wide actual annual average NG throughput is < 650 thousand scf/day and facility-wide actual annual average hydrocarbon liquid is < 250 bpd.
- ☐ No affected source is present.

## NATURAL GAS-FIRED BOILER/LINE HEATER DATA SHEET

| Source ID | Point ID | Description | Status | Heat Input (MMBtu/hr) | Operation (hrs/yr) | Heating Value (Btu/scf) |
|---|---|---|---|---|---|---|
| HTR-01 | 11E | Heater Treater 01 | EXIST | 1.55 HHV | 8,760 | 1,020 HHV |
| HTR-02 | 12E | Condensate Stabilizer Heater 01 | EXIST | 2.55 HHV | 8,760 | 1,020 HHV |
| HTR-03 | 19E | Station Recycle Line Heater 01 | EXIST | 1.66 HHV | 8,760 | 1,020 HHV |
| HTR-04 | 20E | Condensate Stabilizer Heater 02 | EXIST | 9.70 HHV | 8,760 | 1,020 HHV |
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**Notes to NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET**

1. Enter the appropriate Source Identification Numbers (Source ID #) for each boiler or line heater located at the compressor station. Boilers should be designated BLR-1, BLR-2, BLR-3, etc. Heaters or Line Heaters should be designated HTR-1, HTR-2, HTR-3, etc. Enter glycol dehydration unit reboiler vent data on the Glycol Dehydration Unit Data Sheet.
2. Enter the Status for each boiler or line heater using the following:
   EXIST Existing Equipment  NEW Installation of New Equipment  REM Equipment Removed
3. Enter boiler or line heater design heat input in MMBtu/hr.
4. Enter the annual hours of operation in hours/year for each boiler or line heater.
5. Enter the fuel heating value in Btu/standard cubic foot.

## STORAGE TANK DATA SHEET

| Source ID | Point ID | Contents | Status | Volume (gal) | Diameter (ft) | Thru-Put (gal/yr) | Orientation | Ave Liq Height (ft) |
|---|---|---|---|---|---|---|---|---|
| T01 | 13E | Produced Water | EXIST | 2,000 | 5.5 | 104,000 | Horiz | 3.0 |
| T02 | 21E | Produced Water | EXIST | 8,820 | 10.0 | 458,640 | Vert | 7.0 |
| T03 | --- | Slop Oil | EXIST | 2,000 | --- | 24,000 | Horiz | 3.0 |
| T04 | --- | Make-Up Oil | EXIST | 3,000 | --- | 36,000 | Horiz | 4.0 |
| T05 | --- | Lube Oil | EXIST | 55 | --- | 660 | --- | --- |
| T06 | --- | Engine Oil | EXIST | 520 | --- | 6,240 | --- | --- |
| T07 | --- | Engine Oil | EXIST | 520 | --- | 6,240 | --- | --- |
| T08 | --- | Engine Oil | EXIST | 520 | --- | 6,240 | --- | --- |
| T09 | --- | Engine Oil | EXIST | 520 | --- | 6,240 | --- | --- |
| T10 | --- | Triethylene Glycol | EXIST | 1,000 | --- | 12,000 | --- | --- |
| T11 | --- | Monoethylene Glycol | EXIST | 1,000 | --- | 12,000 | --- | --- |
| T12 | --- | Monoethylene Glycol | EXIST | 2,000 | --- | 24,000 | --- | --- |
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**Notes to STORAGE TANK DATA SHEET**

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the compressor station. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:
   - EXIST Existing Equipment
   - NEW Installation of New Equipment
   - REM Equipment Removed
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, etc.
4. Enter storage tank volume in gallons.
5. Enter storage tank diameter in feet.
6. Enter storage tank throughput in gallons per year.
7. Enter storage tank orientation using the following:
   - VERT Vertical Tank
   - HORZ Horizontal Tank
8. Enter storage tank average liquid height in feet.

## Bulk Liquid Transfer Operations

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the Equipment List Form and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks

| | |
|---|---|
| Identification Number (as assigned on Equipment List Form): | **TLO-1 and TLO-2** |
| 1. Loading Area Name: | **Conner Compressor Station (CCS)** |

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):

☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ **Tank Trucks**

3. Loading Rack or Transfer Point Data:

| | |
|---|---|
| Number of Pumps | **Two (2)** |
| Number of Liquids Loaded | **Two (2)** |
| Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time: | **One (1)** |

4. Does ballasting of marine vessels occur at this loading area?:

☐ Yes ☐ No ☒ **Does Not Apply**

5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:

**na**

6. Are cargo vessels pressure tested for leaks at this or any other location?

☐ Yes ☒ **No**

If YES, describe: **na**

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

| Maximum | Jan - Mar | Apr - Jun | Jul - Sep | Oct - Dec |
|---|---|---|---|---|
| hours/day | **24** | **24** | **24** | **24** |
| days/week | **7** | **7** | **7** | **7** |
| weeks/quarter | **13** | **13** | **13** | **13** |

## Bulk Liquid Transfer Operations - Continued

8. Bulk Liquid Data (add pages as necessary):

| | | | |
|---|---|---|---|
| Pump ID No. | | **1** | **2** |
| Liquid Name | | **Produced Water** | **Stabilized Condensate** |
| Max daily thruput (1,000 gal/day) | | **7** | **7** |
| Max annual thruput (1,000 gal/yr) | | **563** | **250*** |
| Loading Method[1] | | **SP** | **SP** |
| Max Fill Rate (gal/min) | | **200** | **200** |
| Ave Fill Time (min/load) | | **60** | **60** |
| Max Bulk Liquid Temperature (oF) | | **60** | **60** |
| True Vapor Pressure[2] | | **1.50** | **10.00** |
| Cargo Vessel Condition[3] | | **U** | **U** |
| Control Equipment or Method[4] | | **None** | **None** |
| Minimum Control Efficiency | | **na** | **na** |
| Maximum Emission Rate: | Loading (lb/hr) | **---** | **---** |
| | Annual (lb/yr) | **896** | **4,933** |
| Estimation Method[5] | | **EPA** | **EPA** |

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

[2] At maximum bulk liquid temperature

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

[4] List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets):
CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation
SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption
TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation
VB = Dedicated Vapor Balance (closed system) O = other (describe)

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

***Note: The stabilized condensate will be loaded into tanker trucks only in when there is a disruption in the pipeline operations. The normal operating mode is to send the stabilized condensate offsite via pipeline.**

## Bulk Liquid Transfer Operations - Continued

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:** | **RECORDKEEPING:** |
|---|---|
| **As per Current Permit** | **As per Current Permit** |
| **REPORTING:** | **TESTING:** |
| **As per Current Permit** | **As per Current Permit** |

| | |
|---|---|
| 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. |

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

**na**

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

**Attachment L - Emission Unit Data Sheet**

## Fugitive Emissions Data Summary Sheet

## Leak Source Data Sheet

| Source Category | Pollutant | Number of Source Components[1] | Number of Components Monitored by Frequency[2] | Average Time to Repair (Days)[3] | Estimated Annual Emission Rate (lb/yr)[4] |
|---|---|---|---|---|---|
| **Pumps[5]** | Light Oil VOC[6,7] | 28 | na | na | 6,929 |
| | Heavy Liquid VOC[8] | --- | --- | --- | --- |
| | Non-VOC[9] | --- | --- | --- | --- |
| **Valves[10]** | Gas VOC | 1,199 | na | na | 26,046 |
| | Light Oil VOC | 1,472 | na | na | 71,089 |
| | Heavy Liquid VOC | --- | --- | --- | --- |
| | Non-VOC | --- | --- | --- | --- |
| **Safety Relief Valves[11]** | Gas VOC | See "Other" | na | na | --- |
| | Light Oil VOC | See "Other" | na | na | --- |
| | Non-VOC | --- | --- | --- | --- |
| **Open Ended Lines[12]** | Gas VOC | 6 | na | na | 58 |
| | Light Oil VOC | 7 | na | na | 195 |
| | Non-VOC | --- | --- | --- | --- |
| **Sampling Connections[13]** | Gas VOC | See "Open Ended Lines" | na | na | --- |
| | Light Oil VOC | See "Open Ended Lines" | na | na | --- |
| | Non-VOC | --- | --- | --- | --- |
| **Compressors** | Gas VOC | See "Other" | na | na | --- |
| | Non-VOC | --- | --- | --- | --- |
| **Flanges** | Gas VOC | 1,012 | na | na | 1,905 |
| | Light Oil VOC | 1,074 | na | na | 2,282 |
| | Non-VOC | --- | --- | --- | --- |
| **Connectors** | Gas VOC | 3,803 | na | na | 3,672 |
| | Light Oil VOC | 2,849 | na | na | 11,554 |
| | Non-VOC | --- | --- | --- | --- |
| **Other** | Gas VOC | 41 | na | na | 1,733 |
| | Light Oil VOC | 37 | na | na | 5,388 |
| | Non-VOC | --- | --- | --- | --- |

65.43

## Notes for Leak Source Data Sheet

**Notes for Leak Source Data Sheet**

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

2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in visual or soap-bubble leak detection ppm. Do not include monitoring by methods. "M/Q(M)/Q/SA/A/0" means the time period between inspections as follows:
Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/other (specify time period)

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

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

4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); 0 - other method, such as in-house emission factor (specify).

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

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

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

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

9. LIST CO, H2S, mineral acids, NO, NO, SO, etc. DO NOT LIST CO, H, H20, N, O, and Noble Gases.

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

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

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

13. Do not include closed-purge sampling connections.

# Attachment M

# Air Pollution Control Device Sheet(s)

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

---

- **Oxidation Catalysts – 01-OxCat-01 and 02-OxCat (CE-01/1E and CE-02/2E)**
- **Non-Selective Catalytic Reduction – 01-NSCR (CE-03/3E)**
- **Thermal Oxidizer – COMB-1 (RSV-01/5E,6E and RSV-02/8E,9E)**

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Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

**Attachment M**

## Air Pollution Control Device (APCD) Sheet (OxCat)

**Control Device Unit No. (must match Emission Units Table):** 01-OxCat and 02-OxCat (Each)

## Equipment Information

| | |
|---|---|
| 1. Manufacturer:<br>**EMIT Technologies**<br>**Model RE-3050-H (or equivalent)** | 2. Control Device Name:<br>**Oxidation Catalyst (OxCat) (Each of 2)**<br>**(Controls CE-01/1E and CE-02/2E)** |
| 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:<br>**CO 100%** **NMNEHC 100%** **HCHO 100%** | |
| 8. Attached efficiency curve and/or other efficiency information. | |
| 9. Design inlet volume: **9,268 ACFM** | 10. Capacity: **na** |
| 11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.<br>**na** | |
| 12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. **na** | |
| 13. Description of method of handling the collected material(s) for reuse of disposal.<br>**na** | |

## Gas Stream Characteristics

| | | |
|---|---|---|
| 14. Are halogenated organics present? | ☐ Yes | ☑ No |
| Are particulates present? | ☐ Yes | ☑ No |
| Are metals present? | ☐ Yes | ☑ No |

| 15. Inlet emission stream parameters: | Maximum | Typical |
|---|---|---|
| Pressure (mmHg): | **na** | **na** |
| Heat Content (BTU/scf): | **na** | **na** |
| Oxygen Content (%): | **na** | **na** |
| Moisture Content (%): | **na** | **na** |
| Relative Humidity (%): | **na** | **na** |

## Air Pollution Control Device (APCD) Sheet (OxCat)

**Control Device Unit No. (must match Emission Units Table):** **01-OxCat and 02-OxCat (Each)**

## Equipment Information - Continued

16. Type of pollutant(s) controlled: ☐ SO2 ☐ Odor ☐ PM ☑ Other: **CO, NMNEHC/VOC, HCHO**

17. Inlet gas velocity: **na**

18. Pollutant specific gravity: **varies**

19. Gas flow into the collector: **9,268 ACFM**

20. Gas stream temperature: Inlet: **1,016 oF** Outlet: **na oF**

21. Gas flow rate: Design Maximum: **9,268 ACFM** Average Expected: **9,268 ACFM**

22. Particulate Grain Loading: Inlet: **na grains/scf** Outlet: **na grains/scf**

23. Emission rate of each pollutant (specify) into and out of collector:

| Pollutant | IN Pollutant g/bhp-hr | IN Pollutant lb/hr | Capture Efficiency | OUT Pollutant g/bhp-hr | OUT Pollutant lb/hr | Control Efficiency |
|---|---|---|---|---|---|---|
| **NOx** | **0.50** | **1.52** | **---** | **0.50** | **1.52** | **---** |
| **CO** | **3.08** | **9.37** | **100%** | **0.17** | **0.50** | **94.6%** |
| **NMNEHC (VOC w/o HCHO)*** | **1.06** | **3.22** | **100%** | **0.17** | **0.53** | **83.5%** |
| **VOC (including aldehydes/MeOH)** | **1.48** | **4.50** | **100%** | **0.27** | **0.83** | **81.6%** |
| **HCHO** | **0.36** | **1.10** | **100%** | **0.09** | **0.27** | **75.7%** |

***Note: The vendor guarantee on NMNEHC emissions cannot be achieved. The rates above are based on source test data and are well below applicable NSPS JJJJ emission standards.**

24. Dimensions of stack: Height: **15.0 ft** Diameter: **1.0 ft**

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

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

## Air Pollution Control Device (APCD) Sheet (OxCat)

**Control Device Unit No. (must match Emission Units Table):** 01-OxCat and 02-OxCat (Each)

## Equipment Information - Continued

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

na

28. Describe the collection material disposal system:

na

29. Describe the collection material disposal system: **na**

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:** | **RECORDKEEPING:** |
|---|---|
| As per NSPS JJJJ and Current Permit | As per NSPS JJJJ and Current Permit |
| **REPORTING:** | **TESTING:** |
| As per NSPS JJJJ and Current Permit | As per NSPS JJJJ and Current Permit |

| | |
|---|---|
| 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 Collection Efficiency for each air pollutant.

| | | | | | |
|---|---|---|---|---|---|
| CO | 100% | NMNEHC | 100% | HCHO | 100% |

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

| | | | | | |
|---|---|---|---|---|---|
| CO | 94.6% | NMNEHC | 83.5% | HCHO | 75.7% |

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

**na**

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

**Attachment M**

## Air Pollution Control Device (APCD) Sheet (NSCR)

**Control Device Unit No. (must match Emission Units Table):** 01-NSCR

## Equipment Information

| | |
|---|---|
| 1. Manufacturer:<br>**Miratech**<br>**Model VXC-1610-05-XC1 (or Equivalent)** | 2. Control Device Name:<br>**Non-Selective Catalytic Reduction (01-NSCR)**<br>**(Controls CE-03/3E)** |
| 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:<br>**NOx 100%** **CO 100%** | |
| 8. Attached efficiency curve and/or other efficiency information. | |
| 9. Design inlet volume: **990 ACFM** | 10. Capacity: **na** |
| 11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.<br>**na** | |
| 12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. **na** | |
| 13. Description of method of handling the collected material(s) for reuse of disposal.<br>**na** | |

## Gas Stream Characteristics

| | | |
|---|---|---|
| 14. Are halogenated organics present? | ☐ Yes | ☑ No |
| Are particulates present? | ☐ Yes | ☑ No |
| Are metals present? | ☐ Yes | ☑ No |

| 15. Inlet emission stream parameters: | Maximum | Typical |
|---|---|---|
| Pressure (mmHg): | **na** | **na** |
| Heat Content (BTU/scf): | **na** | **na** |
| Oxygen Content (%): | **na** | **na** |
| Moisture Content (%): | **na** | **na** |
| Relative Humidity (%): | **na** | **na** |

## Air Pollution Control Device (APCD) Sheet (NSCR)

**Control Device Unit No. (must match Emission Units Table):** 01-NSCR

## Equipment Information - Continued

16. Type of pollutant(s) controlled: ☐ SO2 ☐ Odor ☐ PM ☑ Other: **NOX, CO**

17. Inlet gas velocity: **na**

18. Pollutant specific gravity: **varies**

19. Gas flow into the collector: **990 ACFM**

20. Gas stream temperature: Inlet: **1,064 oF** Outlet: **na oF**

21. Gas flow rate: Design Maximum: **990 ACFM** Average Expected: **990 ACFM**

22. Particulate Grain Loading: Inlet: **na grains/scf** Outlet: **na grains/scf**

23. Emission rate of each pollutant (specify) into and out of collector:

| Pollutant | IN Pollutant g/bhp-hr | IN Pollutant lb/hr | Capture Efficiency | OUT Pollutant g/bhp-hr | OUT Pollutant lb/hr | Control Efficiency |
|---|---|---|---|---|---|---|
| NOx | 15.26 | 6.83 | 100% | 0.50 | 0.22 | 96.7% |
| CO | 15.26 | 6.83 | 100% | 2.00 | 0.90 | 86.9% |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

24. Dimensions of stack: Height: **10.0 ft** Diameter: **0.6 ft**

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

26. Complete the table:

| Particulate Size Range (microns) | Particle Size Distribution Weight % for Size Range | Fraction Efficiency of Collector Weight % for Size Range |
|---|---|---|
| 0 – 2 | na | na |
| 2 – 4 | na | na |
| 4 – 6 | na | na |
| 6 – 8 | na | na |
| 8 – 10 | na | na |
| 10 – 12 | na | na |
| 12 – 16 | na | na |
| 16 – 20 | na | na |
| 20 – 30 | na | na |
| 30 – 40 | na | na |
| 40 – 50 | na | na |
| 50 – 60 | na | na |
| 60 – 70 | na | na |
| 70 – 80 | na | na |
| 80 – 90 | na | na |
| 90 – 100 | na | na |
| >100 | na | na |

**Attachment M**

## Air Pollution Control Device (APCD) Sheet (NSCR)

**Control Device Unit No. (must match Emission Units Table):** 01-NSCR

## Equipment Information - Continued

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

na

28. Describe the collection material disposal system:

na

29. Describe the collection material disposal system: **na**

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:** | **RECORDKEEPING:** |
|---|---|
| As per Current Permit | As per Current Permit |
| **REPORTING:** | **TESTING:** |
| As per Current Permit | As per Current Permit |

| | |
|---|---|
| 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 Collection Efficiency for each air pollutant.

NOx 100% CO 100%

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

NOx 96.7% CO 86.9%

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

na

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

**Attachment M**

## Air Pollution Control Device (APCD) Sheet (Flare System)

**Control Device Unit No. (must match Emission Units Table):** 01-COMB

## Equipment Information

| | |
|---|---|
| 1. Manufacturer: **Frederick Logan Company, Inc.** Model No.: **36" Vapor Oxidizer** | 2. Method: ☐ Elevated Flare ☑ **Ground Flare (aka, thermal oxidizer)** ☐ Other Describe: |
| 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. ☐ Steam Assisted ☐ Air Assisted ☐ Pressure assisted ☑ **Non-assisted** | |
| 5. Maximum Capacity of flare: **60 scf/min** **3,600 scf/hr** | 6. Dimensions of stack: Diameter: **3.0 ft** Height: **20.0 ft** |
| 7. Estimated combustion efficiency: (Waste Gas Destruction Efficiency Estimated: **99 %** Guaranteed: **99 %** | 8. Fuel Used in burners: ☑ **Natural Gas** ☐ Fuel Oil ☐ Other, Specify: na |
| 9. Number of burners: | 11. Describe method of controlling flame: |
| 10. Will preheat be used?: ☑ **Yes** ☐ No | |
| 12. Flame Height: **na (Enclosed) ft** | 14. Natural gas flow rate to flare pilot: **8.3 scf/min** **500 scf/hr** |
| 13. Flare tip inside diameter: **--- ft** | |
| 13. Number of pilot lights: **One (1)** Total: **510,000 Btu/hr** | 16. Will automatic re-ignition be used?: ☑ **Yes** ☐ No |
| 17. If automatic re-ignition will be used, describe the method: | |
| 18. Is the pilot flame equipped with a monitor? ☑ **Yes** ☐ No If yes, what type? ☑ **Thermocouple** ☐ Infra-Red ☐ Ultra Violet ☐ Camera w/ monitoring control room ☐ Other | |
| 19. Hours of unit operation per year: **8,760** | |

## Air Pollution Control Device (APCD) Sheet
## (Flare System)

**Control Device Unit No. (must match Emission Units Table):** 01-COMB

## Equipment Information - Continued

| Steam Injection | | | |
|---|---|---|---|
| 20. Will steam injection be used?" ☐ Yes ☑ No | | 21. Steam Pressure: Minimum Expected: | na psig |
| | | Design Maximum: | na psig |
| 22. Total Steam flow rate: | na lb/hr | 23. Temperature: | na oF |
| 24. Velocity: | na ft/sec | 25. Number of jest streams: | na |
| 26. Diameter of stream jets: | na ft | 27. Design basis for steam injection: | na |
| 28. How will steam flow be controlled? | | | |

**Characteristics of the Waste Gas Stream to be Burned**

29.

| Name | Quantity Grains of H2S/100 ft3 | Quantity (lb/hr,ft3/hr, etc) | Source of Material |
|---|---|---|---|
| Still Vent Off Gas | na | 1,804 scf/hr | RSV-1 and RSV-2 |
| Flash Tank Off-Gas | na | 2,980 scf/hr | RSV-1 and RSV-3 |
| | | | |
| | | | |

| | | |
|---|---|---|
| 30. Estimate total combustible to flare: (Maximum mass flow rate of waste gas) | --- lb/hr or acf/hr | 5,284 scfm |
| 31. Estimate total flow rate to flare including material to be burned, carrier gas, auxiliary fuel, etc.: | --- lb/hr or acf/hr | |
| 32. Give composition of carrier gas: na | | |
| 33. Temperature of emissions stream: 212 oF<br>Heating value of emission stream 1,213 Btu/ft3<br>Mean molecular weight of emission stream: 80.00 lb/lb-mole (Estimate) | 34. Identify and describe all auxiliary fuels to be burned: Natural gas | |
| 35. Temperature of flare gas: | 212 oF | 36. Flare gas flow rate: 88 scfm |
| 37. Flare gas heat content: | 1,213 Btu/scf | 38. Flare gas exit velocity: --- scfm |
| 39. Maximum rate during emergency for one major piece of equipment or process unit: | | --- scfm |
| 40. Maximum rate during emergency for one major piece of equipment or process unit: | | --- Btu/min |
| 41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): na | | |
| 42. Describe the collection material disposal system: na | | |
| 43. Have you included Flare Control Device in the Emissions Points Data Summary Sheet? | ☑ Yes ☐ No | |

## Air Pollution Control Device (APCD) Sheet
## (Flare System)

**Control Device Unit No. (must match Emision Units Table):** **01-COMB**

## Equipment Information - Continued

44. **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:** | **RECORDKEEPING:** |
|---|---|
| **As per Current Permit** | **As per Current Permit** |
| **REPORTING:** | **TESTING:** |
| **As per Current Permit** | **As per Current Permit** |

| | |
|---|---|
| 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. |

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

**VOC** **100%**

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

**VOC** **99.0%**

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

**na**

# Attachment N

# Emissions Calculations

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"30. Provide all **Supporting Emissions Calculations** as Attachment N."

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Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

## Criteria Pollutants - Controlled

| Unit ID | Point ID | Control ID | Description | Site Rating | NOX | | CO | | VOC (w/HCHO) | | PM10/2.5 | | SO2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy |
| **Conner Compressor Station (CCS) - Point Sources** | | | | | | | | | | | | | | |
| CE-01 | 1E | 01-OxCat | Compressor Engine 01 - CAT G3516B | 1,380 bhp | 1.52 | 6.66 | 0.50 | 2.20 | 0.83 | 3.63 | 0.11 | 0.49 | 0.01 | 0.03 |
| CE-02 | 2E | 02-OxCat | Compressor Engine 02 - CAT G3516B | 1,380 bhp | 1.52 | 6.66 | 0.50 | 2.20 | 0.83 | 3.63 | 0.11 | 0.49 | 0.01 | 0.03 |
| CE-03 | 3E | 01-NSCR | Compressor Engine 03 - CAT G3306B TA | 203 bhp | 0.22 | 0.98 | 0.90 | 3.92 | 0.21 | 0.93 | 0.04 | 0.16 | 1E-03 | 5E-03 |
| RBV-1 | 4E | --- | Dehydrator Reboiler 01 | 1.66 MMBtu/hr | 0.16 | 0.71 | 0.14 | 0.60 | 0.01 | 0.04 | 0.01 | 0.05 | 1E-03 | 4E-03 |
| RSV-1 | 5E | 01-COMB | Dehydrator 01 - Still Vent (DSV-1) | 60.0 MMscfd | --- | --- | --- | --- | 0.32 | 1.39 | --- | --- | --- | --- |
| | 6E | 01-COMB | Dehydrator 01 - Flash Tank (DFT-1) | | --- | --- | --- | --- | 0.37 | 1.62 | --- | --- | --- | --- |
| RBV-2 | 7E | --- | Dehydrator Reboiler 02 | 1.66 MMBtu/hr | 0.16 | 0.71 | 0.14 | 0.60 | 0.01 | 0.04 | 0.01 | 0.05 | 1E-03 | 4E-03 |
| RSV-2 | 8E | 01-COMB | Dehydrator 02 - Still Vent (DSV-2) | 60.0 MMscfd | --- | --- | --- | --- | 0.32 | 1.39 | --- | --- | --- | --- |
| | 9E | 01-COMB | Dehydrator 02 - Flash Tank (DFT-2) | | --- | --- | --- | --- | 0.37 | 1.62 | --- | --- | --- | --- |
| COMB-1 | 10E | --- | Thermal Oxidizer (98% T-Ox) | 6.41 MMBtu/hr | 0.63 | 2.75 | 1.99 | 8.70 | 5E-04 | 2E-03 | 0.05 | 0.21 | 4E-03 | 0.02 |
| HTR-01 | 11E | --- | Heater Treater 01 | 1.55 MMBtu/hr | 0.15 | 0.67 | 0.13 | 0.56 | 0.01 | 0.04 | 0.01 | 0.05 | 9E-04 | 4E-03 |
| HTR-02 | 12E | --- | Condensate Stabilizer Heater 01 | 2.55 MMBtu/hr | 0.25 | 1.10 | 0.21 | 0.92 | 0.01 | 0.06 | 0.02 | 0.08 | 2E-03 | 0.01 |
| T01 | 13E | --- | Produced Water Storage Tank 01 | 48 bbl | --- | --- | --- | --- | 0.03 | 0.14 | --- | --- | --- | --- |
| TLO-1 | 14E | --- | Produced Water Truck Load-Out | 563 Mgal/yr | --- | --- | --- | --- | --- | 0.45 | --- | --- | --- | --- |
| TLO-2 | 15E | --- | Condensate Truck Load-Out | 250 Mgal/yr | --- | --- | --- | --- | --- | 2.47 | --- | --- | --- | --- |
| SSM | 16E | --- | Compressor Blowdown (CBD) | 516 Events/yr | --- | --- | --- | --- | --- | 21.78 | --- | --- | --- | --- |
| | | --- | Emergency Shutdown (ESD) Testing | 1 Event/yr | --- | --- | --- | --- | --- | 0.93 | --- | --- | --- | --- |
| | | --- | Purge Gas (PG) | 35 scf/hr | --- | --- | --- | --- | --- | 2.28 | --- | --- | --- | --- |
| | | --- | Filter Change-Out (FCO) | 146 Events/yr | --- | --- | --- | --- | --- | 37.15 | --- | --- | --- | --- |
| CRP | 18E | --- | Compressor Rod Packing | 5 Compressors | --- | --- | --- | --- | 4.10 | 17.94 | --- | --- | --- | --- |
| HTR-03 | 19E | --- | Station Recycle Line Heater 01 | 1.66 MMBtu/hr | 0.16 | 0.71 | 0.14 | 0.60 | 0.01 | 0.04 | 0.01 | 0.05 | 1E-03 | 4E-03 |
| HTR-04 | 20E | --- | Condensate Stabilizer Heater 02 | 9.70 MMBtu/hr | 0.95 | 4.17 | 0.80 | 3.50 | 0.05 | 0.23 | 0.07 | 0.32 | 0.01 | 0.02 |
| T02 | 21E | --- | Produced Water Storage Tank 02 | 210 bbl | --- | --- | --- | --- | 0.14 | 0.62 | --- | --- | --- | --- |
| **Conner Compressor Station (CCS) - Point Sources** | | | | | **5.74** | **25.12** | **5.44** | **23.81** | **7.62** | **98.41** | **0.45** | **1.97** | **0.03** | **0.13** |
| **Conner Compressor Station (CCS) - Fugitives** | | | | | | | | | | | | | | |
| FUG-G | 17E | --- | Process Piping Fugitives - Gas | 5,050 Fittings | --- | --- | --- | --- | 3.81 | 16.71 | --- | --- | --- | --- |
| FUG-L | | --- | Process Piping Fugitives - Light Liquid | 4,556 Fittings | --- | --- | --- | --- | 11.12 | 48.72 | --- | --- | --- | --- |
| ECC | 22E | --- | Engine Crankcase Leaks | 3 Engines | 0.01 | 0.04 | 0.05 | 0.22 | 0.02 | 0.11 | 6E-04 | 3E-03 | 4E-05 | 2E-04 |
| **Conner Compressor Station (CCS) - Fugitives** | | | | | **0.01** | **0.04** | **0.05** | **0.22** | **14.96** | **65.53** | **6E-04** | **3E-03** | **4E-05** | **2E-04** |
| **Conner Compressor Station (CCS) - Total** | | | | | | | | | | | | | | |
| **Conner Compressor Station (CCS) - Total** | | | | | **5.74** | **25.16** | **5.49** | **24.02** | **22.58** | **163.94** | **0.45** | **1.97** | **0.03** | **0.13** |

* = lb/hr is based on 8,760 hr/yr, except Truck Load-Out (TLO) and Start/Stop/Maintenance (SSM) which operate less frequent.

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

## Hazardous Air Pollutants (HAP) - Controlled

| Unit ID | Acetaldehyde | | Acrolein | | Benzene | | Butadiene, 1,3- | | Ethylbenzene | | HCHO | | n-Hexane | | Methanol | | POM/PAH | | Toluene | | TMP, 2,2,4- | | Xylenes | | Other HAP | | TOTAL HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy |
| **Conner Compressor Station (CCS) - Point Sources** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CE-01 | 0.02 | 0.07 | 0.01 | 0.04 | 8E-04 | 4E-03 | 5E-04 | 2E-03 | 7E-05 | 3E-04 | 0.27 | 1.17 | 2E-03 | 0.01 | 5E-03 | 0.02 | 6E-04 | 3E-03 | 8E-04 | 3E-03 | 5E-04 | 2E-03 | 3E-04 | 1E-03 | 6E-04 | 3E-03 | **0.30** | **1.32** |
| CE-02 | 0.02 | 0.07 | 0.01 | 0.04 | 8E-04 | 4E-03 | 5E-04 | 2E-03 | 7E-05 | 3E-04 | 0.27 | 1.17 | 2E-03 | 0.01 | 5E-03 | 0.02 | 6E-04 | 3E-03 | 8E-04 | 3E-03 | 5E-04 | 2E-03 | 3E-04 | 1E-03 | 6E-04 | 3E-03 | **0.30** | **1.32** |
| CE-03 | 5E-03 | 0.02 | 5E-03 | 0.02 | 3E-03 | 0.01 | 1E-03 | 5E-03 | 5E-05 | 2E-04 | 0.09 | 0.39 | 0.01 | 0.02 | 0.01 | 0.02 | 2E-04 | 8E-04 | 1E-03 | 4E-03 | 1E-03 | 5E-03 | 4E-04 | 2E-03 | 3E-04 | 1E-03 | **0.12** | **0.52** |
| RBV-1 | --- | --- | --- | --- | 3E-06 | 1E-05 | --- | --- | --- | --- | 1E-04 | 5E-04 | 3E-03 | 0.01 | --- | --- | 1E-06 | 5E-06 | 6E-06 | 2E-05 | --- | --- | --- | --- | 2E-06 | 9E-06 | **3E-03** | **0.01** |
| RSV-1 | --- | --- | --- | --- | 0.02 | 0.09 | --- | --- | 3E-03 | 0.01 | --- | --- | 0.02 | 0.08 | --- | --- | --- | --- | 0.04 | 0.17 | 2E-04 | 9E-04 | 3E-03 | 0.01 | --- | --- | **0.09** | **0.37** |
| | --- | --- | --- | --- | 6E-04 | 3E-03 | --- | --- | 3E-05 | 1E-04 | --- | --- | 0.01 | 0.06 | --- | --- | --- | --- | 7E-04 | 3E-03 | 1E-04 | 6E-04 | 3E-05 | 1E-04 | --- | --- | **0.02** | **0.07** |
| RBV-2 | --- | --- | --- | --- | 3E-06 | 1E-05 | --- | --- | --- | --- | 1E-04 | 5E-04 | 3E-03 | 0.01 | --- | --- | 1E-06 | 5E-06 | 6E-06 | 2E-05 | --- | --- | --- | --- | 2E-06 | 9E-06 | **3E-03** | **0.01** |
| RSV-2 | --- | --- | --- | --- | 0.02 | 0.09 | --- | --- | 3E-03 | 0.01 | --- | --- | 0.02 | 0.08 | --- | --- | --- | --- | 0.04 | 0.17 | 2E-04 | 9E-04 | 3E-03 | 0.01 | --- | --- | **0.09** | **0.37** |
| | --- | --- | --- | --- | 6E-04 | 3E-03 | --- | --- | 3E-05 | 1E-04 | --- | --- | 0.01 | 0.06 | --- | --- | --- | --- | 7E-04 | 3E-03 | 1E-04 | 6E-04 | 3E-05 | 1E-04 | --- | --- | **0.02** | **0.07** |
| COMB-1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 5E-04 | 2E-03 | --- | --- | --- | --- | 4E-06 | 2E-05 | --- | --- | --- | --- | --- | --- | 8E-06 | 3E-05 | **5E-04** | **2E-03** |
| HTR-01 | --- | --- | --- | --- | 3E-06 | 1E-05 | --- | --- | --- | --- | 1E-04 | 5E-04 | 3E-03 | 0.01 | --- | --- | 1E-06 | 5E-06 | 5E-06 | 2E-05 | --- | --- | --- | --- | 2E-06 | 8E-06 | **3E-03** | **0.01** |
| HTR-02 | --- | --- | --- | --- | 5E-06 | 2E-05 | --- | --- | --- | --- | 2E-04 | 8E-04 | 5E-03 | 0.02 | --- | --- | 2E-06 | 8E-06 | 9E-06 | 4E-05 | --- | --- | --- | --- | 3E-06 | 1E-05 | **5E-03** | **0.02** |
| T01 | --- | --- | --- | --- | 4E-05 | 2E-04 | --- | --- | 6E-05 | 2E-04 | --- | --- | 3E-03 | 0.01 | --- | --- | --- | --- | 1E-04 | 6E-04 | 9E-05 | 4E-04 | 6E-04 | 3E-03 | --- | --- | **4E-03** | **0.02** |
| TLO-1 | --- | --- | --- | --- | --- | 5E-04 | --- | --- | --- | 8E-04 | --- | --- | --- | 0.04 | --- | --- | --- | --- | --- | 2E-03 | --- | 1E-03 | --- | 0.01 | --- | --- | **---** | **0.05** |
| TLO-2 | --- | --- | --- | --- | --- | 3E-03 | --- | --- | --- | 4E-03 | --- | --- | --- | 0.21 | --- | --- | --- | --- | --- | 0.01 | --- | 0.01 | --- | 0.05 | --- | --- | **---** | **0.28** |
| SSM | --- | --- | --- | --- | --- | 0.01 | --- | --- | --- | 6E-04 | --- | --- | --- | 0.52 | --- | --- | --- | --- | --- | 0.01 | --- | 0.01 | --- | 6E-04 | --- | --- | **---** | **0.54** |
| | --- | --- | --- | --- | --- | 3E-04 | --- | --- | --- | 3E-05 | --- | --- | --- | 0.02 | --- | --- | --- | --- | --- | 4E-04 | --- | 3E-04 | --- | 3E-05 | --- | --- | **---** | **0.02** |
| | --- | --- | --- | --- | --- | 8E-04 | --- | --- | --- | 6E-05 | --- | --- | --- | 0.05 | --- | --- | --- | --- | --- | 1E-03 | --- | 8E-04 | --- | 6E-05 | --- | --- | **---** | **0.06** |
| | --- | --- | --- | --- | --- | 0.04 | --- | --- | --- | 0.06 | --- | --- | --- | 3.10 | --- | --- | --- | --- | --- | 0.16 | --- | 0.10 | --- | 7E-01 | --- | --- | **---** | **4.18** |
| CRP | --- | --- | --- | --- | 1E-03 | 0.01 | --- | --- | 1E-04 | 5E-04 | --- | --- | 0.10 | 0.43 | --- | --- | --- | --- | 2E-03 | 0.01 | 1E-03 | 0.01 | 1E-04 | 5E-04 | --- | --- | **0.10** | **0.45** |
| HTR-03 | --- | --- | --- | --- | 3E-06 | 1E-05 | --- | --- | --- | --- | 1E-04 | 5E-04 | 3E-03 | 0.01 | --- | --- | 1E-06 | 5E-06 | 6E-06 | 2E-05 | --- | --- | --- | --- | 2E-06 | 9E-06 | **3E-03** | **0.01** |
| HTR-04 | --- | --- | --- | --- | 2E-05 | 9E-05 | --- | --- | --- | --- | 7E-04 | 3E-03 | 0.02 | 0.07 | --- | --- | 7E-06 | 3E-05 | 3E-05 | 1E-04 | --- | --- | --- | --- | 1E-05 | 5E-05 | **0.02** | **0.08** |
| T02 | --- | --- | --- | --- | 2E-04 | 7E-04 | --- | --- | 2E-04 | 1E-03 | --- | --- | 0.01 | 0.05 | --- | --- | --- | --- | 6E-04 | 3E-03 | 4E-04 | 2E-03 | 3E-03 | 0.01 | --- | --- | **0.02** | **0.07** |
| **CCS-PS** | **0.04** | **0.16** | **0.02** | **0.10** | **0.05** | **0.27** | **2E-03** | **0.01** | **0.01** | **0.10** | **0.62** | **2.73** | **0.22** | **4.90** | **0.01** | **0.07** | **0.00** | **0.01** | **0.08** | **0.56** | **0.00** | **0.14** | **0.01** | **0.81** | **2E-03** | **0.01** | **1.08** | **9.86** |
| **Conner Compressor Station (CCS) - Fugitives** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FUG-G | --- | --- | --- | --- | 6E-03 | 0.01 | --- | --- | 5E-04 | 5E-04 | --- | --- | 0.40 | 0.40 | --- | --- | --- | --- | 8E-03 | 0.01 | 6E-03 | 0.01 | 5E-04 | 5E-04 | --- | --- | **0.42** | **0.42** |
| FUG-L | --- | --- | --- | --- | 0.05 | 0.05 | --- | --- | 0.08 | 0.08 | --- | --- | 4.07 | 4.07 | --- | --- | --- | --- | 0.21 | 0.21 | 0.13 | 0.13 | 0.93 | 0.93 | --- | --- | **5.48** | **5.48** |
| ECC | 5E-04 | 2E-03 | 3E-04 | 1E-03 | 3E-05 | 1E-04 | 2E-05 | 7E-05 | 2E-06 | 1E-05 | 0.01 | 0.03 | 7E-05 | 3E-04 | 2E-04 | 7E-04 | 2E-05 | 9E-05 | 2E-05 | 1E-04 | 2E-05 | 7E-05 | 1E-05 | 5E-05 | 2E-05 | 8E-05 | **0.01** | **0.03** |
| **CCS-FUG** | **5E-04** | **2E-03** | **3E-04** | **1E-03** | **0.06** | **0.06** | **2E-05** | **7E-05** | **0.09** | **0.09** | **0.01** | **0.03** | **4.46** | **4.46** | **2E-04** | **7E-04** | **2E-05** | **9E-05** | **0.22** | **0.22** | **0.14** | **0.14** | **0.93** | **0.93** | **2E-05** | **8E-05** | **5.91** | **5.93** |
| **Conner Compressor Station (CCS) - Total** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **CCS-TOT** | **0.04** | **0.16** | **0.02** | **0.11** | **0.11** | **0.33** | **2E-03** | **0.01** | **0.09** | **0.18** | **0.63** | **2.76** | **4.68** | **9.36** | **0.02** | **0.07** | **2E-03** | **0.01** | **0.30** | **0.78** | **0.15** | **0.28** | **0.94** | **1.74** | **2E-03** | **0.01** | **6.99** | **15.79** |

* = lb/hr is based on 8,760 hr/yr, except Truck Load-Out (TLO) and Start/Stop/Maintenance (SSM) which operate less frequent.

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

## Greenhouse Gas (GHG) Pollutants - Controlled

| Unit ID | Control ID | Description | Site Rating | Heat Input MMBtu/hr (HHV) | Hours of Operation hr/yr* | CO2 GWP: 1.00 tpy | CO2e 1.00 tpy | CH4 GWP: 25.00 tpy | CO2e 25.00 tpy | N2O GWP: 298.00 tpy | CO2e 298.00 tpy | TOTAL CO2e lb/hr* | TOTAL CO2e tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Conner Compressor Station (CCS) - Point Sources** | | | | | | | | | | | | | |
| CE-01 | 01-OxCat | Compressor Engine 01 - CAT G3516B | 1,380 bhp | 11.28 | 8,760 | 6,876 | 6,876 | 26.25 | 656 | 0.01 | 3.24 | **1,720** | **7,536** |
| CE-02 | 02-OxCat | Compressor Engine 02 - CAT G3516B | 1,380 bhp | 11.28 | 8,760 | 6,876 | 6,876 | 26.25 | 656 | 0.01 | 3.24 | **1,720** | **7,536** |
| CE-03 | 01-NSCR | Compressor Engine 03 - CAT G3306B TA | 203 bhp | 1.84 | 8,760 | 1,113 | 1,113 | 0.84 | 21.07 | 2E-03 | 0.53 | **259** | **1,135** |
| RBV-1 | --- | Dehydrator Reboiler 01 | 1.66 MMBtu/hr | 1.66 | 8,760 | 851 | 851 | 0.02 | 0.40 | 2E-03 | 0.48 | **194** | **851** |
| RSV-1 | 01-COMB | Dehydrator 01 - Still Vent (DSV-1) | 60.0 MMscfd | --- | 8,760 | --- | --- | 0.05 | 1.18 | --- | --- | **0.27** | **1.18** |
| | 01-COMB | Dehydrator 01 - Flash Tank (DFT-1) | | --- | 8,760 | --- | --- | 0.96 | 23.89 | --- | --- | **5.45** | **23.89** |
| RBV-2 | --- | Dehydrator Reboiler 02 | 1.66 MMBtu/hr | 1.66 | 8,760 | 851 | 851 | 0.02 | 0.40 | 2E-03 | 0.48 | **194** | **851** |
| RSV-2 | 01-COMB | Dehydrator 02 - Still Vent (DSV-2) | 60.0 MMscfd | --- | 8,760 | --- | --- | 0.05 | 1.18 | --- | --- | **0.27** | **1.18** |
| | 01-COMB | Dehydrator 02 - Flash Tank (DFT-2) | | --- | 8,760 | --- | --- | 0.96 | 23.89 | --- | --- | **5.45** | **23.89** |
| COMB-1 | --- | Thermal Oxidizer (98% T-Ox) | 6.41 MMBtu/hr | 6.41 | 8,760 | 3,284 | 3,284 | --- | --- | 0.01 | 1.84 | **750** | **3,286** |
| HTR-01 | --- | Heater Treater 01 | 1.55 MMBtu/hr | 1.55 | 8,760 | 794 | 794 | 0.01 | 0.37 | 1E-03 | 0.45 | **182** | **795** |
| HTR-02 | --- | Condensate Stabilizer Heater 01 | 2.55 MMBtu/hr | 2.55 | 8,760 | 1,307 | 1,307 | 0.02 | 0.62 | 2E-03 | 0.73 | **299** | **1,308** |
| T01 | --- | Produced Water Storage Tank 01 | 48 bbl | --- | 8,760 | 1E-03 | 1E-03 | 2E-03 | 0.05 | --- | --- | **0.01** | **0.06** |
| TLO-1 | --- | Produced Water Truck Load-Out | 563 Mgal/yr | --- | --- | 3E-03 | 3E-03 | 0.01 | 0.17 | --- | --- | **---** | **0.18** |
| TLO-2 | --- | Condensate Truck Load-Out | 250 Mgal/yr | --- | --- | 0.02 | 0.02 | 0.04 | 0.96 | --- | --- | **---** | **0.97** |
| SSM | --- | Compressor Blowdown (CBD) | 516 Events/yr | --- | --- | 0.23 | 0.23 | 55.69 | 1,392 | --- | --- | **---** | **1,392** |
| | --- | Emergency Shutdown (ESD) Testing | 1 Event/yr | --- | --- | 0.01 | 0.01 | 2.38 | 59.54 | --- | --- | **---** | **59.55** |
| | --- | Purge Gas (PG) | 35 scf/hr | --- | --- | 0.02 | 0.02 | 5.82 | 145 | --- | --- | **---** | **145** |
| | --- | Filter Change-Out (FCO) | 146 Events/yr | --- | --- | 0.02 | 0.02 | 6.05 | 151 | --- | --- | **---** | **151** |
| CRP | --- | Compressor Rod Packing | 5 Compressors | --- | 8,760 | 0.19 | 0.19 | 45.88 | 1,147 | --- | --- | **262** | **1,147** |
| HTR-03 | --- | Station Recycle Line Heater 01 | 1.66 MMBtu/hr | 1.66 | 8,760 | 851 | 851 | 0.02 | 0.40 | 2E-03 | 0.48 | **194** | **851** |
| HTR-04 | --- | Condensate Stabilizer Heater 02 | 9.70 MMBtu/hr | 9.70 | 8,760 | 4,970 | 4,970 | 0.09 | 2.34 | 0.01 | 2.79 | **1,136** | **4,975** |
| T02 | --- | Produced Water Storage Tank 02 | 210 bbl | --- | 8,760 | 4E-03 | 4E-03 | 1E-02 | 0.24 | --- | --- | **0.06** | **0.24** |
| | | **Conner Compressor Station (CCS) - Point Sources** | | | | **27,772** | **27,772** | **171** | **4,285** | **0.05** | **14.27** | **6,923** | **32,072** |
| | | | | | | | | | | | | | |
| **Conner Compressor Station (CCS) - Fugitives** | | | | | | | | | | | | | |
| FUG-G | --- | Process Piping Fugitives - Gas | 5,050 Fittings | --- | 8,760 | 0.18 | 0.18 | 42.72 | 1,068 | --- | --- | **244** | **1,068** |
| FUG-L | --- | Process Piping Fugitives - Light Liquid | 4,556 Fittings | --- | 8,760 | 0.34 | 0.34 | 0.76 | 19 | --- | --- | **4.39** | **19.23** |
| ECC | --- | Engine Crankcase Leaks | 3 Engines | --- | --- | 36.64 | 36.64 | 0.14 | 3.50 | 6E-05 | 0.02 | **9.17** | **40.15** |
| | | **Conner Compressor Station (CCS) - Fugitives** | | | | **37.16** | **37.16** | **43.62** | **1,090** | **6E-05** | **0.02** | **257** | **1,128** |
| **TOTAL (Stationary Fuel Combustion (sans COMB-1)):** | | | | **43.17** | | | | | | | | **TOTAL (Stationary Fuel Combustion (sans COMB-1)):** | **28,786** |
| **Conner Compressor Station (CCS) - Total** | | | | | | | | | | | | | |
| | | **Conner Compressor Station (CCS) - Total** | | | | **27,809** | **27,809** | **215** | **5,376** | **0.05** | **14.29** | **7,180** | **33,199** |

* = lb/hr is based on 8,760 hr/yr, except Truck Load-Out (TLO) and Start/Stop/Maintenance (SSM) which operate less frequent.

Williams Ohio Valley Midstream LLC

**Conner Compressor Station**

Application for 45CSR13 NSR Permit Modification

## Criteria Pollutants - PRE-Controlled

| Unit ID | Point ID | Control ID | Description | Site Rating | NOX | | CO | | VOC (w/HCHO) | | PM10/2.5 | | SO2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy |
| **Conner Compressor Station (CCS) - Point Sources** | | | | | | | | | | | | | | |
| CE-01 | 1E | 01-OxCat | Compressor Engine 01 - CAT G3516B | 1,380 bhp | 1.52 | 6.66 | 9.37 | 41.04 | 4.50 | 19.71 | 0.11 | 0.49 | 0.01 | 0.03 |
| CE-02 | 2E | 02-OxCat | Compressor Engine 02 - CAT G3516B | 1,380 bhp | 1.52 | 6.66 | 9.37 | 41.04 | 4.50 | 19.71 | 0.11 | 0.49 | 0.01 | 0.03 |
| CE-03 | 3E | 01-NSCR | Compressor Engine 01 - CAT G3306B TA | 203 bhp | 6.83 | 29.91 | 6.83 | 29.91 | 0.21 | 0.93 | 0.04 | 0.16 | 1E-03 | 5E-03 |
| RBV-1 | 4E | --- | Dehydrator Reboiler 01 | 1.66 MMBtu/hr | 0.16 | 0.71 | 0.14 | 0.60 | 0.01 | 0.04 | 0.01 | 0.05 | 1E-03 | 4E-03 |
| RSV-1 | 5E | 01-COMB | Dehydrator 01 - Still Vent (DSV-1) | 60.0 MMscfd | --- | --- | --- | --- | 31.73 | 138.98 | --- | --- | --- | --- |
| | 6E | 01-COMB | Dehydrator 01 - Flash Tank (DFT-1) | | --- | --- | --- | --- | 37.09 | 162.46 | --- | --- | --- | --- |
| RBV-2 | 7E | --- | Dehydrator Reboiler 02 | 1.66 MMBtu/hr | 0.16 | 0.71 | 0.14 | 0.60 | 0.01 | 0.04 | 0.01 | 0.05 | 1E-03 | 4E-03 |
| RSV-2 | 8E | 01-COMB | Dehydrator 02 - Still Vent (DSV-2) | 60.0 MMscfd | --- | --- | --- | --- | 31.73 | 138.98 | --- | --- | --- | --- |
| | 9E | 01-COMB | Dehydrator 02 - Flash Tank (DFT-2) | | --- | --- | --- | --- | 37.09 | 162.46 | --- | --- | --- | --- |
| COMB-1 | 10E | --- | Thermal Oxidizer (99% T-Ox) | 6.41 MMBtu/hr | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HTR-01 | 11E | --- | Heater Treater 01 | 1.55 MMBtu/hr | 0.15 | 0.67 | 0.13 | 0.56 | 0.01 | 0.04 | 0.01 | 0.05 | 9E-04 | 4E-03 |
| HTR-02 | 12E | --- | Condensate Stabilizer Heater 01 | 2.55 MMBtu/hr | 0.25 | 1.10 | 0.21 | 0.92 | 0.01 | 0.06 | 0.02 | 0.08 | 2E-03 | 0.01 |
| T01 | 13E | --- | Produced Water Storage Tank 01 | 48 bbl | --- | --- | --- | --- | 0.03 | 0.14 | --- | --- | --- | --- |
| TLO-1 | 14E | --- | Produced Water Truck Load-Out | 563 Mgal/yr | --- | --- | --- | --- | --- | 0.45 | --- | --- | --- | --- |
| TLO-2 | 15E | --- | Condensate Truck Load-Out | 250 Mgal/yr | --- | --- | --- | --- | --- | 2.47 | --- | --- | --- | --- |
| SSM | 16E | --- | Compressor Blowdown (CBD) | 516 Events/yr | --- | --- | --- | --- | --- | 21.78 | --- | --- | --- | --- |
| | | --- | Emergency Shutdown (ESD) Testing | 1 Event/yr | --- | --- | --- | --- | --- | 0.93 | --- | --- | --- | --- |
| | | --- | Purge Gas (PG) | 35 scf/hr | --- | --- | --- | --- | --- | 2.28 | --- | --- | --- | --- |
| | | --- | Filter Change-Out (FCO) | 146 Events/yr | --- | --- | --- | --- | --- | 37.15 | --- | --- | --- | --- |
| CRP | 18E | --- | Compressor Rod Packing (x-RPC) | 5 Compressors | --- | --- | --- | --- | 4.10 | 17.94 | --- | --- | --- | --- |
| HTR-03 | 19E | --- | Station Recycle Line Heater 01 | 1.66 MMBtu/hr | 0.16 | 0.71 | 0.14 | 0.60 | 0.01 | 0.04 | 0.01 | 0.05 | 1E-03 | 4E-03 |
| HTR-04 | 20E | --- | Condensate Stabilizer Heater 02 | 9.70 MMBtu/hr | 0.95 | 4.17 | 0.80 | 3.50 | 0.05 | 0.23 | 0.07 | 0.32 | 0.01 | 0.02 |
| T02 | 21E | --- | Produced Water Storage Tank 02 | 210 bbl | --- | --- | --- | --- | 0.14 | 0.62 | --- | --- | --- | --- |
| **Conner Compressor Station (CCS) - Point Sources** | | | | | **11.71** | **51.30** | **27.12** | **118.77** | **151.23** | **727.43** | **0.40** | **1.76** | **0.03** | **0.11** |
| | | | | | | | | | | | | | | |
| **Conner Compressor Station (CCS) - Fugitives** | | | | | | | | | | | | | | |
| FUG-G | 17E | --- | Process Piping Fugitives - Gas | 5,050 Fittings | --- | --- | --- | --- | 3.81 | 16.71 | --- | --- | --- | --- |
| FUG-L | | --- | Process Piping Fugitives - Light Liquid | 4,556 Fittings | --- | --- | --- | --- | 11.12 | 48.72 | --- | --- | --- | --- |
| ECC | 22E | --- | Engine Crankcase (x-RCP) | 3 Engines | 0.01 | 0.04 | 0.05 | 0.22 | 0.02 | 0.11 | 6E-04 | 3E-03 | 4E-05 | 2E-04 |
| **Conner Compressor Station (CCS) - Fugitives** | | | | | **0.01** | **0.04** | **0.05** | **0.22** | **14.96** | **65.53** | **6E-04** | **3E-03** | **4E-05** | **2E-04** |
| | | | | | | | | | | | | | | |
| **Conner Compressor Station (CCS) - Total** | | | | | | | | | | | | | | |
| **Conner Compressor Station (CCS) - Total** | | | | | **11.72** | **51.34** | **27.17** | **118.99** | **166.19** | **792.96** | **0.40** | **1.76** | **0.03** | **0.11** |

* = lb/hr is based on 8,760 hr/yr, except Truck Load-Out (TLO) and Start/Stop/Maintenance (SSM) which operate less frequent.

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

## Hazardous Air Pollutants (HAP) - PRE-Controlled

| Unit ID | Acetaldehyde | | Acrolein | | Benzene | | Butadiene, 1,3- | | Ethylbenzene | | HCHO | | n-Hexane | | Methanol | | POM/PAH | | Toluene | | TMP, 2,2,4- | | Xylenes | | Other HAP | | TOTAL HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy | lb/hr* | tpy |
| **Conner Compressor Station (CCS) - Point Sources** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CE-01 | 0.09 | 0.41 | 0.06 | 0.25 | 5E-03 | 0.02 | 3E-03 | 0.01 | 4E-04 | 2E-03 | 1.10 | 4.80 | 0.01 | 0.05 | 0.03 | 0.12 | 4E-03 | 0.02 | 5E-03 | 0.02 | 3E-03 | 0.01 | 2E-03 | 0.01 | 4E-03 | 0.02 | **1.31** | **5.75** |
| CE-02 | 0.09 | 0.41 | 0.06 | 0.25 | 5E-03 | 0.02 | 3E-03 | 0.01 | 4E-04 | 2E-03 | 1.10 | 4.80 | 0.01 | 0.05 | 0.03 | 0.12 | 4E-03 | 0.02 | 5E-03 | 0.02 | 3E-03 | 0.01 | 2E-03 | 0.01 | 4E-03 | 0.02 | **1.31** | **5.75** |
| CE-03 | 0.01 | 0.02 | 5E-03 | 0.02 | 3E-03 | 0.01 | 1E-03 | 0.01 | 5E-05 | 2E-04 | 0.09 | 0.39 | 0.01 | 0.02 | 0.01 | 0.02 | 2E-04 | 8E-04 | 1E-03 | 4E-03 | 1E-03 | 0.01 | 4E-04 | 2E-03 | 3E-04 | 1E-03 | **0.12** | **0.52** |
| RBV-1 | --- | --- | --- | --- | 3E-06 | 1E-05 | --- | --- | --- | --- | 1E-04 | 5E-04 | 3E-03 | 0.01 | --- | --- | 1E-06 | 5E-06 | 6E-06 | 2E-05 | --- | --- | --- | --- | 2E-06 | 9E-06 | **3E-03** | **0.01** |
| RSV-1 | --- | --- | --- | --- | 2.09 | 9.16 | --- | --- | 0.29 | 1.25 | --- | --- | 1.93 | 8.46 | --- | --- | --- | --- | 3.91 | 17.11 | 0.02 | 0.09 | 0.29 | 1.25 | --- | --- | **8.52** | **37.34** |
| | --- | --- | --- | --- | 0.06 | 0.26 | --- | --- | 3E-03 | 0.01 | --- | --- | 1.35 | 5.93 | --- | --- | --- | --- | 0.07 | 0.32 | 0.01 | 0.06 | 3E-03 | 0.01 | --- | --- | **1.51** | **6.59** |
| RBV-2 | --- | --- | --- | --- | 3E-06 | 1E-05 | --- | --- | --- | --- | 1E-04 | 5E-04 | 3E-03 | 0.01 | --- | --- | 1E-06 | 5E-06 | 6E-06 | 2E-05 | --- | --- | --- | --- | 2E-06 | 9E-06 | **3E-03** | **0.01** |
| RSV-2 | --- | --- | --- | --- | 2.09 | 9.16 | --- | --- | 0.29 | 1.25 | --- | --- | 1.93 | 8.46 | --- | --- | --- | --- | 3.91 | 17.11 | 0.02 | 0.09 | 0.29 | 1.25 | --- | --- | **8.52** | **37.34** |
| | --- | --- | --- | --- | 0.06 | 0.26 | --- | --- | 3E-03 | 0.01 | --- | --- | 1.35 | 5.93 | --- | --- | --- | --- | 0.07 | 0.32 | 0.01 | 0.06 | 3E-03 | 0.01 | --- | --- | **1.51** | **6.59** |
| COMB-1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **---** | **---** |
| HTR-01 | --- | --- | --- | --- | 3E-06 | 1E-05 | --- | --- | --- | --- | 1E-04 | 5E-04 | 3E-03 | 0.01 | --- | --- | 1E-06 | 5E-06 | 5E-06 | 2E-05 | --- | --- | --- | --- | 2E-06 | 8E-06 | **3E-03** | **0.01** |
| HTR-02 | --- | --- | --- | --- | 5E-06 | 2E-05 | --- | --- | --- | --- | 2E-04 | 8E-04 | 5E-03 | 0.02 | --- | --- | 2E-06 | 8E-06 | 9E-06 | 4E-05 | --- | --- | --- | --- | 3E-06 | 1E-05 | **5E-03** | **0.02** |
| T01 | --- | --- | --- | --- | 4E-05 | 2E-04 | --- | --- | 6E-05 | 2E-04 | --- | --- | 3E-03 | 0.01 | --- | --- | --- | --- | 1E-04 | 6E-04 | 9E-05 | 4E-04 | 6E-04 | 3E-03 | --- | --- | **4E-03** | **0.02** |
| TLO-1 | --- | --- | --- | --- | --- | 5E-04 | --- | --- | --- | 8E-04 | --- | --- | --- | 0.04 | --- | --- | --- | --- | --- | 2E-03 | --- | 1E-03 | --- | 0.01 | --- | --- | **---** | **0.05** |
| TLO-2 | --- | --- | --- | --- | --- | 3E-03 | --- | --- | --- | 4E-03 | --- | --- | --- | 0.21 | --- | --- | --- | --- | --- | 0.01 | --- | 0.01 | --- | 0.05 | --- | --- | **---** | **0.28** |
| SSM | --- | --- | --- | --- | --- | 0.01 | --- | --- | --- | 6E-04 | --- | --- | --- | 0.52 | --- | --- | --- | --- | --- | 0.01 | --- | 0.01 | --- | 6E-04 | --- | --- | **---** | **0.54** |
| | --- | --- | --- | --- | --- | 3E-04 | --- | --- | --- | 3E-05 | --- | --- | --- | 0.02 | --- | --- | --- | --- | --- | 4E-04 | --- | 3E-04 | --- | 3E-05 | --- | --- | **---** | **0.02** |
| | --- | --- | --- | --- | --- | 8E-04 | --- | --- | --- | 6E-05 | --- | --- | --- | 0.05 | --- | --- | --- | --- | --- | 1E-03 | --- | 8E-04 | --- | 6E-05 | --- | --- | **---** | **0.06** |
| | --- | --- | --- | --- | --- | 0.04 | --- | --- | --- | 0.06 | --- | --- | --- | 3.10 | --- | --- | --- | --- | --- | 0.16 | --- | 0.10 | --- | 7E-01 | --- | --- | **---** | **4.18** |
| CRP | --- | --- | --- | --- | 1E-03 | 0.01 | --- | --- | 1E-04 | 5E-04 | --- | --- | 0.10 | 0.43 | --- | --- | --- | --- | 2E-03 | 0.01 | 1E-03 | 0.01 | 1E-04 | 5E-04 | --- | --- | **0.10** | **0.45** |
| HTR-03 | --- | --- | --- | --- | 3E-06 | 1E-05 | --- | --- | --- | --- | 1E-04 | 5E-04 | 3E-03 | 0.01 | --- | --- | 1E-06 | 5E-06 | 6E-06 | 2E-05 | --- | --- | --- | --- | 2E-06 | 9E-06 | **3E-03** | **0.01** |
| HTR-04 | --- | --- | --- | --- | 2E-05 | 9E-05 | --- | --- | --- | --- | 7E-04 | 3E-03 | 0.02 | 0.07 | --- | --- | 7E-06 | 3E-05 | 3E-05 | 1E-04 | --- | --- | --- | --- | 1E-05 | 5E-05 | **0.02** | **0.08** |
| T02 | --- | --- | --- | --- | 2E-04 | 7E-04 | --- | --- | 2E-04 | 1E-03 | --- | --- | 0.01 | 0.05 | --- | --- | --- | --- | 6E-04 | 3E-03 | 4E-04 | 2E-03 | 3E-03 | 0.01 | --- | --- | **0.02** | **0.07** |
| **CCS-PS** | **0.19** | **0.85** | **0.12** | **0.53** | **4.31** | **18.95** | **7E-03** | **0.03** | **0.58** | **2.61** | **2.28** | **9.99** | **6.75** | **33.48** | **0.06** | **0.27** | **0.01** | **0.04** | **7.97** | **35.11** | **0.08** | **0.47** | **0.59** | **3.34** | **8E-03** | **0.03** | **22.96** | **105.70** |
| **Conner Compressor Station (CCS) - Fugitives** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FUG-G | --- | --- | --- | --- | 6E-03 | 0.01 | --- | --- | 5E-04 | 5E-04 | --- | --- | 0.40 | 0.40 | --- | --- | --- | --- | 8E-03 | 0.01 | 6E-03 | 0.01 | 5E-04 | 5E-04 | --- | --- | **0.42** | **0.42** |
| FUG-L | --- | --- | --- | --- | 0.05 | 0.05 | --- | --- | 0.08 | 0.08 | --- | --- | 4.07 | 4.07 | --- | --- | --- | --- | 0.21 | 0.21 | 0.13 | 0.13 | 0.93 | 0.93 | --- | --- | **5.48** | **5.48** |
| ECC | 5E-04 | 2E-03 | 3E-04 | 1E-03 | 3E-05 | 1E-04 | 2E-05 | 7E-05 | 2E-06 | 1E-05 | 0.01 | 0.03 | 7E-05 | 3E-04 | 2E-04 | 7E-04 | 2E-05 | 9E-05 | 2E-05 | 1E-04 | 2E-05 | 7E-05 | 1E-05 | 5E-05 | 2E-05 | 8E-05 | **0.01** | **0.03** |
| **CCS-FUG** | **5E-04** | **2E-03** | **3E-04** | **1E-03** | **0.06** | **0.06** | **2E-05** | **7E-05** | **0.09** | **0.09** | **0.01** | **0.03** | **4.46** | **4.46** | **2E-04** | **7E-04** | **2E-05** | **9E-05** | **0.22** | **0.22** | **0.14** | **0.14** | **0.93** | **0.93** | **2E-05** | **8E-05** | **5.91** | **5.93** |
| **Conner Compressor Station (CCS) - Total** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **CCS-TOT** | **0.19** | **0.85** | **0.12** | **0.53** | **4.38** | **19.01** | **7E-03** | **0.03** | **0.67** | **2.70** | **2.29** | **10.02** | **11.21** | **37.95** | **0.06** | **0.27** | **8E-03** | **0.04** | **8.19** | **35.33** | **0.22** | **0.61** | **1.52** | **4.27** | **8E-03** | **0.03** | **28.87** | **111.64** |

* = lb/hr is based on 8,760 hr/yr, except Truck Load-Out (TLO) and Start/Stop/Maintenance (SSM) which operate less frequent.

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

## Greenhouse Gas (GHG) Pollutants - PRE-Controlled

| Unit ID | Control ID | Description | Site Rating | Heat Input MMBtu/hr (HHV) | Hours of Operation hr/yr* | CO2 GWP: 1.00 tpy | CO2e 1.00 tpy | CH4 GWP: 25.00 tpy | CO2e 25.00 tpy | N2O GWP: 298.00 tpy | CO2e 298.00 tpy | TOTAL CO2e lb/hr* | TOTAL CO2e tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Conner Compressor Station (CCS) - Point Sources** | | | | | | | | | | | | | |
| CE-01 | 01-OxCat | Compressor Engine 01 - CAT G3516B | 1,380 bhp | 11.28 | 8,760 | 6,876 | 6,876 | 26.25 | 656 | 0.01 | 3.24 | **1,720** | **7,536** |
| CE-02 | 02-OxCat | Compressor Engine 02 - CAT G3516B | 1,380 bhp | 11.28 | 8,760 | 6,876 | 6,876 | 26.25 | 656 | 0.01 | 3.24 | **1,720** | **7,536** |
| CE-03 | 01-NSCR | Compressor Engine 03 - CAT G3306B TA | 203 bhp | 1.84 | 8,760 | 1,113 | 1,113 | 0.84 | 21.07 | 2E-03 | 0.53 | **259** | **1,135** |
| RBV-1 | --- | Dehydrator Reboiler 01 | 1.66 MMBtu/hr | 1.66 | 8,760 | 851 | 851 | 0.02 | 0.40 | 2E-03 | 0.48 | **194** | **851** |
| RSV-1 | 01-COMB | Dehydrator 01 - Still Vent (DSV-1) | 60.0 MMscfd | --- | 8,760 | --- | --- | 4.71 | 118 | --- | --- | **26.89** | **118** |
| | 01-COMB | Dehydrator 01 - Flash Tank (DFT-1) | | --- | 8,760 | --- | --- | 95.55 | 2,389 | --- | --- | **545** | **2,389** |
| RBV-2 | --- | Dehydrator Reboiler 02 | 1.66 MMBtu/hr | 1.66 | 8,760 | 851 | 851 | 0.02 | 0.40 | 2E-03 | 0.48 | **194** | **851** |
| RSV-2 | 01-COMB | Dehydrator 02 - Still Vent (DSV-2) | 60.0 MMscfd | --- | 8,760 | --- | --- | 4.71 | 118 | --- | --- | **26.89** | **118** |
| | 01-COMB | Dehydrator 02 - Flash Tank (DFT-2) | | --- | 8,760 | --- | --- | 95.55 | 2,389 | --- | --- | **545** | **2,389** |
| COMB-1 | --- | Thermal Oxidizer (98% T-Ox) | 6.41 MMBtu/hr | --- | --- | --- | --- | --- | --- | --- | --- | **---** | **---** |
| HTR-01 | --- | Heater Treater 01 | 1.55 MMBtu/hr | 1.55 | 8,760 | 794 | 794 | 0.01 | 0.37 | 1E-03 | 0.45 | **182** | **795** |
| HTR-02 | --- | Condensate Stabilizer Heater 01 | 2.55 MMBtu/hr | 2.55 | 8,760 | 1,307 | 1,307 | 0.02 | 0.62 | 2E-03 | 0.73 | **299** | **1,308** |
| T01 | --- | Produced Water Storage Tank 01 | 48 bbl | --- | 8,760 | 1E-03 | 1E-03 | 2E-03 | 0.05 | --- | --- | **0.01** | **0.06** |
| TLO-1 | --- | Produced Water Truck Load-Out | 563 Mgal/yr | --- | --- | 3E-03 | 3E-03 | 0.01 | 0.17 | --- | --- | **---** | **0.18** |
| TLO-2 | --- | Condensate Truck Load-Out | 250 Mgal/yr | --- | --- | 0.02 | 0.02 | 0.04 | 0.96 | --- | --- | **---** | **0.97** |
| SSM | --- | Compressor Blowdown (CBD) | 516 Events/yr | --- | --- | 0.23 | 0.23 | 55.69 | 1,392 | --- | --- | **---** | **1,392** |
| | --- | Emergency Shutdown (ESD) Testing | 1 Event/yr | --- | --- | 0.01 | 0.01 | 2.38 | 59.54 | --- | --- | **---** | **59.55** |
| | --- | Purge Gas (PG) | 35 scf/hr | --- | --- | 0.02 | 0.02 | 5.82 | 145 | --- | --- | **---** | **145** |
| | --- | Filter Change-Out (FCO) | 146 Events/yr | --- | --- | 0.02 | 0.02 | 6.05 | 151 | --- | --- | **---** | **151** |
| CRP | --- | Compressor Rod Packing | 5 Compressors | --- | 8,760 | 0.19 | 0.19 | 45.88 | 1,147 | --- | --- | **262** | **1,147** |
| HTR-03 | --- | Station Recycle Line Heater 01 | 1.66 MMBtu/hr | 1.66 | 8,760 | 851 | 851 | 0.02 | 0.40 | 2E-03 | 0.48 | **194** | **851** |
| HTR-04 | --- | Condensate Stabilizer Heater 02 | 9.70 MMBtu/hr | 9.70 | 8,760 | 4,970 | 4,970 | 0.09 | 2.34 | 0.01 | 2.79 | **1,136** | **4,975** |
| T02 | --- | Produced Water Storage Tank 02 | 210 bbl | --- | 8,760 | 4E-03 | 4E-03 | 1E-02 | 0.24 | --- | --- | **0.06** | **0.24** |
| | | **Conner Compressor Station (CCS) - Point Sources** | | | | **24,488** | **24,488** | **370** | **9,248** | **0.04** | **12.42** | **7,306** | **33,748** |
| | | | | | | | | | | | | | |
| **Conner Compressor Station (CCS) - Fugitives** | | | | | | | | | | | | | |
| FUG-G | --- | Process Piping Fugitives - Gas | 5,050 Fittings | --- | 8,760 | 0.18 | 0.18 | 42.72 | 1,068 | --- | --- | **244** | **1,068** |
| FUG-L | --- | Process Piping Fugitives - Light Liquid | 4,556 Fittings | --- | 8,760 | 0.34 | 0.34 | 0.76 | 19 | --- | --- | **4.39** | **19.23** |
| ECC | --- | Engine Crankcase Leaks | 3 Engines | --- | --- | 36.64 | 36.64 | 0.14 | 3.50 | 6E-05 | 0.02 | **9.17** | **40.15** |
| | | **Conner Compressor Station (CCS) - Fugitives** | | | | **37.16** | **37.16** | **43.62** | **1,090** | **6E-05** | **0.02** | **257** | **1,128** |
| **TOTAL (Stationary Fuel Combustion (sans COMB-1)):** | | | | **43.17** | | | | | | | **TOTAL (Stationary Fuel Combustion (sans COMB-1)):** | | **33,748** |
| **Conner Compressor Station (CCS) - Total** | | | | | | | | | | | | | |
| | | **Conner Compressor Station (CCS) - Total** | | | | **24,525** | **24,525** | **414** | **10,338** | **0.04** | **12.44** | **7,563** | **34,876** |

* = lb/hr is based on 8,760 hr/yr, except Truck Load-Out (TLO) and Start/Stop/Maintenance (SSM) which operate less frequent.

## Compressor Engine (CE-01 and CE-02) Emissions

| Source ID | Description | Reference | Pollutant | Pre-Controlled Emissions g/bhp-hr | Pre-Controlled Emissions lb/MMBtu | Pre-Controlled Emissions lb/hr | Pre-Controlled Emissions tpy | Control Efficiency | Controlled Emissions g/bhp-hr | Controlled Emissions lb/hr | Controlled Emissions tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CE-01 (1E)<br>CE-02 (2E)<br>(Each) | Compressor Engines 01 and 02 (Each) (OxCat-01 and OxCat-02)<br>Caterpillar (CAT) G3516B (4SLB)<br>1,380 bhp (Each)<br>8,760 hr/yr (Each)<br>1,400 rpm, 16 cyl<br>264 in3/cyl<br>1,016 Exhaust Temp (oF)<br>9,268 Exhaust Flow (acfm)<br>MFD: > 08/23/11<br>NSPS JJJJ Affected<br>8,171 Btu/bhp-hr (HHV)<br>11.28 MMBtu/hr (HHV) (Each)<br>11,055 scf/hr (Each)<br>**96.84 MMscf/yr (Each)**<br>1,020 Btu/scf (HHV) | Vendor Data | NOX | 0.50 | 0.13 | 1.52 | 6.66 | --- | **0.50** | **1.52** | **6.66** |
| | | Vendor Data | CO | 3.08 | 0.83 | 9.37 | 41.04 | 94.6% | **0.17** | **0.50** | **2.20** |
| | | Stack Test + 20% | NMNEHC | 1.06 | 0.29 | 3.22 | 14.13 | 83.5% | **0.17** | **0.53** | **2.33** |
| | | Sum | VOC (w/Aldehydes)* | 1.48 | 0.40 | 4.50 | 19.71 | 81.6% | **0.27** | **0.83** | **3.63** |
| | | AP-42 Table 3.2-2 | PM10/2.5 | 3.70E-02 | 9.99E-03 | 0.11 | 0.49 | --- | **0.04** | **0.11** | **0.49** |
| | | AP-42 Table 3.2-2 | SO2 | 2.18E-03 | 5.88E-04 | 0.01 | 0.03 | --- | **2E-03** | **0.01** | **0.03** |
| | | AP-42 Table 3.2-2 | *Acetaldehyde | 3.10E-02 | 8.36E-03 | 0.09 | 0.41 | 83.5% | **0.01** | **0.02** | **0.07** |
| | | AP-42 Table 3.2-2 | *Acrolein | 1.91E-02 | 5.14E-03 | 0.06 | 0.25 | 83.5% | **3E-03** | **0.01** | **0.04** |
| | | AP-42 Table 3.2-2 | Benzene | 1.63E-03 | 4.40E-04 | 0.00 | 0.02 | 83.5% | **3E-04** | **8E-04** | **4E-03** |
| | | AP-42 Table 3.2-2 | Butadiene, 1,3- | 9.90E-04 | 2.67E-04 | 3E-03 | 0.01 | 83.5% | **2E-04** | **5E-04** | **2E-03** |
| | | AP-42 Table 3.2-2 | Ethylbenzene | 1.47E-04 | 3.97E-05 | 4E-04 | 2E-03 | 83.5% | **2E-05** | **7E-05** | **3E-04** |
| | | Vendor Data | *Formaldehyde | 0.36 | 0.10 | 1.10 | 4.80 | 75.7% | **0.09** | **0.27** | **1.17** |
| | | AP-42 Table 3.2-2 | n-Hexane | 4.11E-03 | 1.11E-03 | 0.01 | 0.05 | 83.5% | **7E-04** | **2E-03** | **0.01** |
| | | AP-42 Table 3.2-2 | *Methanol | 9.27E-03 | 2.50E-03 | 0.03 | 0.12 | 83.5% | **0.00** | **5E-03** | **0.02** |
| | | AP-42 Table 3.2-2 | POM/PAH | 1.28E-03 | 3.47E-04 | 4E-03 | 0.02 | 83.5% | **2E-04** | **6E-04** | **3E-03** |
| | | AP-42 Table 3.2-2 | Toluene | 1.51E-03 | 4.08E-04 | 5E-03 | 0.02 | 83.5% | **2E-04** | **8E-04** | **3E-03** |
| | | AP-42 Table 3.2-2 | TMP, 2,2,4- | 9.90E-04 | 2.67E-04 | 3E-03 | 0.01 | 83.5% | **2E-04** | **5E-04** | **2E-03** |
| | | AP-42 Table 3.2-2 | Xylenes | 6.82E-04 | 1.84E-04 | 2E-03 | 0.01 | 83.5% | **1E-04** | **3E-04** | **1E-03** |
| | | AP-42 Table 3.2-2 | Other/Trace HAP | 1.19E-03 | 3.21E-04 | 4E-03 | 0.02 | 83.5% | **2E-04** | **6E-04** | **3E-03** |
| | | AP-42 Table 3.2-2 | Total HAP | 0.43 | 0.12 | 1.31 | 5.75 | 77.0% | **0.10** | **0.30** | **1.32** |
| | | Vendor Data | CO2 (GWP=1) | 516 | 139.22 | 1,570 | 6,876 | --- | **516** | **1,570** | **6,876** |
| | | Vendor Data | CH4 (GWP=25) | 1.97 | 0.53 | 5.99 | 26.25 | --- | **1.97** | **5.99** | **26.25** |
| | | 40CFR98 - Table C2 | N2O (GWP=298) | 8.17E-04 | 2.20E-04 | 2E-03 | 0.01 | --- | **8E-04** | **2E-03** | **0.01** |
| | | Weighted Sum | CO2e | 565 | 153 | 1,720 | 7,536 | --- | **565** | **1,720** | **7,536** |

* = Aldehyde/MeOH added to NMNEHC to get VOC

**Bold Red Font** Indicates Proposed Permit Limitation

Notes:

1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - As per vendor specifications, NMNEHC (non-methane/non-ethane hydrocarbons) do NOT include aldehydes. VOC is the sum of NMNEHC, Acetaldehyde, Acrolein, Formaldehyde, and Methanol.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

5 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

6 - Total NMNEHC, VOC, HCHO, HAP and CO2e emissions include Compressor Rod Packing (CRP), Compressor Blowdown (CBD), Engine Start-up (ESU), and Engine Crankcase (ECC) Emissions:

| Description (Each Engine w/ Compressor) | NMNEHC | VOC | HCHO | Tot HAP | CO2e |
|---|---|---|---|---|---|
| Engine Operations (See Above) | 2.33 tpy | 3.63 tpy | 1.17 tpy | 1.32 tpy | 7,536 tpy |
| Compressor Rod Packing (CRP) | 3.59 tpy | 3.59 tpy | --- | 0.09 tpy | 229 tpy |
| Compressor Blowdown (CBD) | 9.94 tpy | 9.94 tpy | --- | 0.25 tpy | 635 tpy |
| Engine Start-up (ESU) | Electric or Pneumatic Starters are utilized | | | | |
| Engine Crankcase (ECC) | 0.04 tpy | 0.05 tpy | 0.01 tpy | 0.01 tpy | 18.70 tpy |
| **TOTAL:** | **15.89 tpy** | **17.20 tpy** | **1.18 tpy** | **1.68 tpy** | **8,419 tpy** |

7 - The vendor guarantee on NMNEHC emissions cannot be achieved. The rates above are based on source test data and are well below applicable NSPS JJJJ emission standards.

## Compressor Engine (CE-03) Emissions

| Source ID | Description | Reference | Pollutant | Pre-Controlled Emissions | | | | Control Efficiency | Controlled Emissions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | g/bhp-hr | lb/MMBtu | lb/hr | tpy | | g/bhp-hr | lb/hr | tpy |
| CE-03 (3E) | Compressor Engine 03 (NSCR-01)<br>Caterpillar (CAT) G3306B TA (4SRB)<br>203 bhp<br>8,760 hr/yr<br>1,800 rpm, 6 cyl<br>106 in3/cyl<br>1,064 Exhaust Temp (oF)<br>990 Exhaust Flow (acfm)<br>MFD: > 08/23/11<br>NSPS JJJJ Affected<br>9,070 Btu/bhp-hr (HHV)<br>1.84 MMBtu/hr (HHV)<br>1,805 scf/hr<br>**15.81 MMscf/yr**<br>1,020 Btu/scf (HHV) | Vendor Data | NOX | 15.26 | 3.71 | 6.83 | 29.91 | 96.7% | **0.50** | **0.22** | **0.98** |
| | | Vendor Data | CO | 15.26 | 3.71 | 6.83 | 29.91 | 86.9% | **2.00** | **0.90** | **3.92** |
| | | Vendor Data | NMNEHC | 0.24 | 0.06 | 0.11 | 0.47 | --- | **0.24** | **0.11** | **0.47** |
| | | Sum | VOC (w/Aldehydes)* | 0.47 | 0.12 | 0.21 | 0.93 | --- | **0.47** | **0.21** | **0.93** |
| | | AP-42 Table 3.2-2 | PM10/2.5 | 7.99E-02 | 1.94E-02 | 0.04 | 0.16 | --- | **0.08** | **0.04** | **0.16** |
| | | AP-42 Table 3.2-2 | SO2 | 2.42E-03 | 5.88E-04 | 1E-03 | 5E-03 | --- | **2E-03** | **1E-03** | **5E-03** |
| | | AP-42 Table 3.2-2 | *Acetaldehyde | 1.15E-02 | 2.79E-03 | 0.01 | 0.02 | --- | **0.01** | **0.01** | **0.02** |
| | | AP-42 Table 3.2-2 | *Acrolein | 1.08E-02 | 2.63E-03 | 5E-03 | 0.02 | --- | **0.01** | **5E-03** | **0.02** |
| | | AP-42 Table 3.2-2 | Benzene | 6.50E-03 | 1.58E-03 | 3E-03 | 0.01 | --- | **7E-03** | **3E-03** | **0.01** |
| | | AP-42 Table 3.2-2 | Butadiene, 1,3- | 2.73E-03 | 6.63E-04 | 1E-03 | 5E-03 | --- | **3E-03** | **1E-03** | **5E-03** |
| | | AP-42 Table 3.2-2 | Ethylbenzene | 1.02E-04 | 2.48E-05 | 5E-05 | 2E-04 | --- | **1E-04** | **5E-05** | **2E-04** |
| | | Vendor Data | *Formaldehyde | 0.20 | 0.05 | 0.09 | 0.39 | --- | **0.20** | **0.09** | **0.39** |
| | | AP-42 Table 3.2-2 | n-Hexane | 1.26E-02 | 3.06E-03 | 0.01 | 0.02 | --- | **1E-02** | **0.01** | **0.02** |
| | | AP-42 Table 3.2-2 | *Methanol | 1.26E-02 | 3.06E-03 | 0.01 | 0.02 | --- | **0.01** | **0.01** | **0.02** |
| | | AP-42 Table 3.2-2 | POM/PAH | 3.99E-04 | 9.71E-05 | 2E-04 | 0.00 | --- | **4E-04** | **2E-04** | **8E-04** |
| | | AP-42 Table 3.2-2 | Toluene | 2.30E-03 | 5.58E-04 | 1E-03 | 0.00 | --- | **2E-03** | **1E-03** | **4E-03** |
| | | AP-42 Table 3.2-2 | TMP, 2,2,4- | 2.73E-03 | 6.63E-04 | 1E-03 | 0.01 | --- | **3E-03** | **1E-03** | **5E-03** |
| | | AP-42 Table 3.2-2 | Xylenes | 8.02E-04 | 1.95E-04 | 4E-04 | 0.00 | --- | **8E-04** | **4E-04** | **2E-03** |
| | | AP-42 Table 3.2-2 | Other/Trace HAP | 7.37E-04 | 1.79E-04 | 3E-04 | 0.00 | --- | **7E-04** | **3E-04** | **1E-03** |
| | | AP-42 Table 3.2-2 | Total HAP | 0.26 | 0.06 | 0.12 | 0.52 | --- | **0.26** | **0.12** | **0.52** |
| | | Vendor Data | CO2 (GWP=1) | 568 | 138.06 | 254 | 1,113 | --- | **568** | **254** | **1,113** |
| | | Vendor Data | CH4 (GWP=25) | 0.43 | 0.10 | 0.19 | 0.84 | --- | **0.43** | **0.19** | **0.84** |
| | | 40CFR98 - Table C2 | N2O (GWP=298) | 9.07E-04 | 2.20E-04 | 4E-04 | 2E-03 | --- | **9E-04** | **4E-04** | **2E-03** |
| | | Weighted Sum | CO2e | 579 | 141 | 259 | 1,135 | --- | **579** | **259** | **1,135** |

* = Aldehyde/MeOH added to NMNEHC to get VOC

**Bold Red Font** Indicates Proposed Permit Limitation

Notes:

1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - As per vendor specifications, NMNEHC (non-methane/non-ethane hydrocarbons) do NOT include aldehydes. VOC is the sum of NMNEHC, Acetaldehyde, Acrolein, Formaldehyde, and Methanol.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

5 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

6 - Total NMNEHC, VOC, HCHO, HAP and CO2e emissions include Compressor Rod Packing (CRP), Compressor Blowdown (CBD), Engine Start-up (ESU), and Engine Crankcase (ECC) Emissions:

| Description (Each Engine w/ Compressor) | NMNEHC | VOC | HCHO | Tot HAP | CO2e |
|---|---|---|---|---|---|
| Engine Operations (See Above) | 0.47 tpy | 0.93 tpy | 0.39 tpy | 0.52 tpy | 1,135 tpy |
| Compressor Rod Packing (CRP) | 3.59 tpy | 3.59 tpy | --- | 0.09 tpy | 229 tpy |
| Compressor Blowdown (CBD) | 1.46 tpy | 1.46 tpy | --- | 0.04 tpy | 93 tpy |
| Engine Start-up (ESU) | Electric or Pneumatic Starters are utilized | | | | |
| Engine Crankcase (ECC) | 0.01 tpy | 0.01 tpy | 2E-03 tpy | 2E-03 tpy | 2.75 tpy |
| **TOTAL:** | **5.53 tpy** | **5.99 tpy** | **0.39 tpy** | **0.65 tpy** | **1,461 tpy** |

## Reboiler (RBV-01.-02) Emissions

| Source ID | Description | Reference | Pollutant | Emission Factor | | Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | lb/MMscf | lb/MMBtu | lb/hr | tpy |
| RBV-1 (4E)<br>RBV-2 (7E)<br><br>(Each) | Dehydrator Reboiler 01<br>Dehydrator Reboiler 02<br><br>**1.66 MMBtu/hr (HHV) (Each)**<br><br>1,020 Btu/scf (HHV)<br><br>8,760 hr/yr (Each)<br><br>1,627 scf/hr<br>**14.26 MMscf/yr (Each)** | EPA AP-42 Table 1.4-1 | NOX | 100 | 9.80E-02 | **0.16** | **0.71** |
| | | EPA AP-42 Table 1.4-1 | CO | 84 | 8.24E-02 | **0.14** | **0.60** |
| | | EPA AP-42 Table 1.4-2 | NMNEHC | 5.5 | 5.39E-03 | **0.01** | **0.04** |
| | | EPA AP-42 Table 1.4-2 | VOC | 5.5 | 5.39E-03 | **0.01** | **0.04** |
| | | EPA AP-42 Table 1.4-2 | PM10/2.5 | 7.6 | 7.45E-03 | **0.01** | **0.05** |
| | | EPA AP-42 Table 1.4-2 | SO2 | 0.6 | 5.88E-04 | **1E-03** | **4E-03** |
| | | EPA AP-42 Table 1.4-3 | Acetaldehyde | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Acrolein | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Benzene | 2.10E-03 | 2.06E-06 | **3E-06** | **1E-05** |
| | | EPA AP-42 Table 1.4-4 | Butadiene, 1,3- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Ethylbenzene | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Formaldehyde | 0.08 | 7.35E-05 | **1E-04** | **5E-04** |
| | | EPA AP-42 Table 1.4-3 | n-Hexane | 1.80 | 1.76E-03 | **3E-03** | **0.01** |
| | | EPA AP-42 Table 1.4-3 | Methanol | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | POM/PAH | 6.98E-04 | 6.85E-07 | **1E-06** | **5E-06** |
| | | EPA AP-42 Table 1.4-3 | Toluene | 3.40E-03 | 3.33E-06 | **6E-06** | **2E-05** |
| | | EPA AP-42 Table 1.4-3 | TMP, 2,2,4- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Xylenes | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Other/Trace HAP | 1.20E-03 | 1.18E-06 | **2E-06** | **9E-06** |
| | | SUM | Total HAP | 1.88 | 1.85E-03 | **3E-03** | **0.01** |
| | | 40CFR98 - Table C-1 | CO2 (GWP=1) | 119,317 | 117 | **194** | **851** |
| | | 40CFR98 - Table C-2 | CH4 (GWP=25) | 2.25 | 2.20E-03 | **4E-03** | **0.02** |
| | | 40CFR98 - Table C-2 | N2O (GWP=298) | 0.22 | 2.20E-04 | **4E-04** | **2E-03** |
| | | 40CFR98 - Table A-1 | CO2e | 119,440 | 117 | **194** | **851** |

**Bold Red Font** Indicates Proposed Permit Limitation

Notes:

1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

## Dehydrator (RSV-01 and RSV-02) Emissions

| Unit ID | Description | Capacity | Reference | Pollutant | GRI-GLYCalc Pre-Controlled Emissions | | Worst-Case VOC/CH4: 20% Margin HAP: 50% Margin | | Net Control Efficiency | Controlled Emissions | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lb/hr | tpy | lb/hr | tpy | % | lb/hr | tpy |
| RSV-01 (5E)<br>RSV-02 (8E) | Dehy 01 Still Vent(DSV-01)<br>Dehy 02 Still Vent (DSV-02)<br><br>(Still Vent Off-Gas Controlled by 99% T-Ox (COMB-1) | Flow Rate<br>**60.0**<br>MMscfd<br>(Each)<br><br>**8,760**<br>hr/yr | GRI-GLYCalc 4.0 | VOC | 26.4419 | 115.82 | 31.73 | 138.98 | 99.0% | **0.32** | **1.39** |
| | | | GRI-GLYCalc 4.0 | Benzene | 1.3946 | 6.11 | 2.09 | 9.16 | 99.0% | **0.02** | **0.09** |
| | | | GRI-GLYCalc 4.0 | Ethylbenzene | 0.1909 | 0.84 | 0.29 | 1.25 | 99.0% | **3E-03** | **0.01** |
| | | | GRI-GLYCalc 4.0 | n-Hexane | 1.2882 | 5.64 | 1.93 | 8.46 | 99.0% | **0.02** | **0.08** |
| | | | GRI-GLYCalc 4.0 | Toluene | 2.6045 | 11.41 | 3.91 | 17.11 | 99.0% | **0.04** | **0.17** |
| | | | GRI-GLYCalc 4.0 | 2,2,4-TMP | 0.0139 | 0.06 | 2E-02 | 0.09 | 99.0% | **2E-04** | **9E-04** |
| | | | GRI-GLYCalc 4.0 | Xylenes | --- | --- | 0.29 | 1.25 | 99.0% | **3E-03** | **0.01** |
| | | | GRI-GLYCalc 4.0 | Tot HAP | 5.4921 | 24.06 | 8.52 | 37.34 | 99.0% | **0.09** | **0.37** |
| | | | GRI-GLYCalc 4.0 | CH4 | 0.8964 | 3.93 | 1.08 | 4.71 | 99.0% | **0.01** | **0.05** |
| | | | 40CFR98 - Table A-1 | CO2e | 22.41 | 98.16 | 26.89 | 117.79 | --- | **0.27** | **1.18** |
| RSV-01 (6E)<br>RSV-02 (9E) | Dehy 01 Flash Tank (DFT-01)<br>Dehy 02 Flash Tank (DFT-02)<br><br>(Flash Tank Off-Gas Controlled by 99% T-Ox (COMB-1) | Flow Rate<br>**60.0**<br>MMscfd<br>(Each)<br><br>**8,760**<br>hr/yr | GRI-GLYCalc 4.0 | VOC | 30.9102 | 135.39 | 37.09 | 162 | 99.0% | **0.37** | **1.62** |
| | | | GRI-GLYCalc 4.0 | Benzene | 0.0389 | 0.17 | 0.06 | 0.26 | 99.0% | **0.00** | **3E-03** |
| | | | GRI-GLYCalc 4.0 | Ethylbenzene | 0.0021 | 0.01 | 0.00 | 0.01 | 99.0% | **3E-05** | **1E-04** |
| | | | GRI-GLYCalc 4.0 | n-Hexane | 0.9020 | 3.95 | 1.35 | 5.93 | 99.0% | **0.01** | **0.06** |
| | | | GRI-GLYCalc 4.0 | Toluene | 0.0488 | 0.21 | 0.07 | 0.32 | 99.0% | **7E-04** | **3E-03** |
| | | | GRI-GLYCalc 4.0 | 2,2,4-TMP | 0.0096 | 0.04 | 0.01 | 0.06 | 99.0% | **1E-04** | **6E-04** |
| | | | GRI-GLYCalc 4.0 | Xylenes | --- | --- | 3E-03 | 0.01 | 99.0% | **3E-05** | **1E-04** |
| | | | GRI-GLYCalc 4.0 | Tot HAP | 1.0014 | 4.39 | 1.51 | 6.59 | 99.0% | **0.02** | **0.07** |
| | | | GRI-GLYCalc 4.0 | CH4 | 18.1787 | 80 | 21.81 | 96 | 99.0% | **0.22** | **0.96** |
| | | | 40CFR98 - Table A-1 | CO2e | 454 | 1,991 | 545 | 2,389 | --- | **5.45** | **23.89** |
| RSV-01<br>RSV-02 | Dehy 01 (Total)<br>and<br>Dehy-02 (Total)<br><br>(Each) | **Flow Rate**<br>**60.0**<br>**MMscfd**<br>(Each)<br><br>**8,760**<br>hr/yr | GRI-GLYCalc 4.0 | VOC | 57.3521 | 251.20 | 68.82 | 301.44 | 99.00% | **0.69** | **3.01** |
| | | | GRI-GLYCalc 4.0 | Benzene | 1.4335 | 6.28 | 2.15 | 9.42 | 99.00% | **0.02** | **0.09** |
| | | | GRI-GLYCalc 4.0 | Ethylbenzene | 0.1930 | 0.85 | 0.29 | 1.27 | 99.00% | **3E-03** | **0.01** |
| | | | GRI-GLYCalc 4.0 | n-Hexane | 2.1902 | 9.59 | 3.29 | 14.39 | 99.00% | **0.03** | **0.14** |
| | | | GRI-GLYCalc 4.0 | Toluene | 2.6533 | 11.62 | 3.98 | 17.43 | 99.00% | **0.04** | **0.17** |
| | | | GRI-GLYCalc 4.0 | 2,2,4-TMP | 0.0235 | 0.10 | 0.04 | 0.15 | 99.00% | **4E-04** | **2E-03** |
| | | | GRI-GLYCalc 4.0 | Xylenes | --- | --- | 0.29 | 1.27 | 99.00% | **3E-03** | **0.01** |
| | | | GRI-GLYCalc 4.0 | Tot HAP | 6.4935 | 28.44 | 10.03 | 43.93 | 99.00% | **0.10** | **0.44** |
| | | | GRI-GLYCalc 4.0 | CH4 | 19.0751 | 84 | 22.89 | 100.26 | 99.00% | **0.23** | **1.00** |
| | | | 40CFR98 - Table A-1 | CO2e | 476.8775 | 2,089 | 572 | 2,506 | --- | **5.72** | **25.06** |

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Notes: 1 - Used GRI-GLYCalc V4.0 to calculate Flash Tank and Regenerator/Still Vent emissions.

2 - GRI-GLYCalc 4.0 Model Results are based on the following input:

| | | | |
|---|---|---|---|
| Wet Gas: | 70 oF and 900 psig, H2O Saturated | Glycol Pump: | Electric/Pneumatic Pump |
| Wet Gas Analysis: | See Supplement S1 - Wet Gas Summary | Flash Tank: | 150 oF, 50 psig, 99% Combustion |
| Dry Gas: | 60.0 MMscfd, 7.0 lb-H2O/MMscf | Stripping Gas: | None |
| Lean Glycol: | 1.5 wt% H2O, 13.7 gpm | Regen Control: | 99% Combustion |

3 - Total HAP includes n-hexane, benzene, toluene, ethylbenzene, xylene, and other components.

4 - A 20% contingency has been added to the GRI-GLYCalc model results to account for potential future changes in gas components.

## Thermal Oxidizer (COMB-1) Emissions

| Source ID | Description | Reference | Pollutant | Emission Factor | | Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | lb/MMscf | lb/MMBtu | lb/hr | tpy |
| COMB-1 (10E) | **Thermal Oxidizer (Combustion Only)**<br>Frederick Logan (FLCo) (or equivalent)<br>Capacity<br>>20 MMBtu/hr (HHV)<br>Site Rating<br>**6.41** MMBtu/hr (HHV)<br>100.0% Capture Efficiency<br>99.0% Destruction Efficiency | EPA AP-42 Table 1.4-1 | NOX | 119 | 0.10 | **0.63** | **2.75** |
| | | EPA AP-42 Table 13.5-1 | CO | 376 | 0.31 | **1.99** | **8.70** |
| | | See RSV-01 and RSV-02 | NMNEHC | See RSV-01 and RSV-02 | | | |
| | | Combustion Related HAPs | VOC | 0.09 | 7.54E-05 | **5E-04** | **2E-03** |
| | | EPA AP-42 Table 1.4-2 | PM10/2.5 | 9.04 | 7.45E-03 | **0.05** | **0.21** |
| | | EPA AP-42 Table 1.4-2 | SO2 | 0.71 | 5.88E-04 | **4E-03** | **0.02** |
| | | EPA AP-42 Table 1.4-3 | Acetaldehyde | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Acrolein | --- | --- | **---** | **---** |
| | | See RSV-01 and RSV-02 | Benzene | See RSV-01 and RSV-02 | | | |
| | | EPA AP-42 Table 1.4-4 | Butadiene, 1,3- | --- | --- | **---** | **---** |
| | | See RSV-01 and RSV-02 | Ethylbenzene | See RSV-01 and RSV-02 | | | |
| | | EPA AP-42 Table 1.4-3 | Formaldehyde | 0.09 | 7.35E-05 | **5E-04** | **2E-03** |
| | | See RSV-01 and RSV-02 | n-Hexane | See RSV-01 and RSV-02 | | | |
| | | See RSV-01 and RSV-02 | Methanol | See RSV-01 and RSV-02 | | | |
| | 99.0% Net Control Efficiency<br>1,213 Btu/scf (HHV)<br>8,760 hr/yr<br>5,284 scf/hr<br>46.29 MMscf/yr | EPA AP-42 Table 1.4-3 | POM/PAH | 8E-04 | 6.85E-07 | **4E-06** | **2E-05** |
| | | See RSV-01 and RSV-02 | Toluene | See RSV-01 and RSV-02 | | | |
| | | See RSV-01 and RSV-02 | TMP, 2,2,4- | See RSV-01 and RSV-02 | | | |
| | | See RSV-01 and RSV-02 | Xylenes | See RSV-01 and RSV-02 | | | |
| | | EPA AP-42 Table 1.4-3 | Other/Trace HAP | 1E-03 | 1.18E-06 | **8E-06** | **3E-05** |
| | | SUM | Total HAP | 0.09 | 7.54E-05 | **5E-04** | **2E-03** |
| | | 40CFR98 - Table C-1 | CO2 (GWP=1) | 141,904 | 117 | **750** | **3,284** |
| | | See RSV-01 and RSV-02 | CH4 (GWP=25) | See RSV-01 and RSV-02 | | | |
| | | 40CFR98 - Table C-2 | N2O (GWP=298) | 0.27 | 2.20E-04 | **1E-03** | **0.01** |
| | | 40CFR98 - Table A-1 | CO2e | 141,984 | 117 | **750** | **3,286** |

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Notes:

1 - Dehydrator flash tank off-gases are sometimes burned as fuel in the reboilers. However, to be conservative, all flash tank off-gases are shown as being routed to the Thermal Oxidizer (T-Ox).

2 - Heat Input to the T-Ox was determined as follows:

| Waste/Pilot Gas Stream | scf/hr | Btu/scf (HHV) | MMBtu/hr |
|---|---|---|---|
| RSV-01 - Still Vent (DSV-1) | 1,490 | 500 | 0.75 |
| RSV-01 - Flash Tank Off-Gas (DFT-1) | 902 | 1,800 | 1.62 |
| RSV-02 - Still Vent (DSV-2) | 1,490 | 500 | 0.75 |
| RSV-02 - Flash Tank Off-Gas (DFT-2) | 902 | 1,800 | 1.62 |
| Pilot/Fuel Gas | 500 | 1,200 | 0.60 |
| 20% Contingency | --- | --- | 1.07 |
| **Total Waste/Pilot Gas to the T-Ox:** | **5,284** | **1,213** | **6.41** |

3 - Reference: GRI-GLYCalc Results, Worst-Case Gas Analysis, and Engineering Judgement.

Frederick Logan (FLCo)
36" Thermal Oxidizer

## Heater Treater (HTR-01) Emissions

| Source ID | Description | Reference | Pollutant | Emission Factor | | Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | lb/MMscf | lb/MMBtu | lb/hr | tpy |
| HTR-01 (11E) | Heater Treater 02<br>**1.55 MMBtu/hr (HHV)**<br>1,020 Btu/scf (HHV)<br>8,760 hr/yr<br>1,520 scf/hr<br>**13.31 MMscf/yr** | EPA AP-42 Table 1.4-1 | NOX | 100 | 9.80E-02 | **0.15** | **0.67** |
| | | EPA AP-42 Table 1.4-1 | CO | 84 | 8.24E-02 | **0.13** | **0.56** |
| | | EPA AP-42 Table 1.4-2 | NMNEHC | 5.5 | 5.39E-03 | **0.01** | **0.04** |
| | | EPA AP-42 Table 1.4-2 | VOC | 5.5 | 5.39E-03 | **0.01** | **0.04** |
| | | EPA AP-42 Table 1.4-2 | PM10/2.5 | 7.6 | 7.45E-03 | **0.01** | **0.05** |
| | | EPA AP-42 Table 1.4-2 | SO2 | 0.6 | 5.88E-04 | **9E-04** | **4E-03** |
| | | EPA AP-42 Table 1.4-3 | Acetaldehyde | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Acrolein | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Benzene | 2.10E-03 | 2.06E-06 | **3E-06** | **1E-05** |
| | | EPA AP-42 Table 1.4-4 | Butadiene, 1,3- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Ethylbenzene | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Formaldehyde | 7.50E-02 | 7.35E-05 | **1E-04** | **5E-04** |
| | | EPA AP-42 Table 1.4-3 | n-Hexane | 1.80 | 1.76E-03 | **3E-03** | **0.01** |
| | | EPA AP-42 Table 1.4-3 | Methanol | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | POM/PAH | 6.98E-04 | 6.85E-07 | **1E-06** | **5E-06** |
| | | EPA AP-42 Table 1.4-3 | Toluene | 3.40E-03 | 3.33E-06 | **5E-06** | **2E-05** |
| | | EPA AP-42 Table 1.4-3 | TMP, 2,2,4- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Xylenes | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Other/Trace HAP | 1.20E-03 | 1.18E-06 | **2E-06** | **8E-06** |
| | | SUM | Total HAP | 1.88 | 1.85E-03 | **3E-03** | **0.01** |
| | | 40CFR98 - Table C-1 | CO2 (GWP=1) | 119,317 | 117 | **181** | **794** |
| | | 40CFR98 - Table C-2 | CH4 (GWP=25) | 2.25 | 2.20E-03 | **3E-03** | **0.01** |
| | | 40CFR98 - Table C-2 | N2O (GWP=298) | 0.22 | 2.20E-04 | **3E-04** | **1E-03** |
| | | 40CFR98 - Table A-1 | CO2e | 119,440 | 117 | **182** | **795** |

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Notes:

1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

## Condensate Stabilizer (HTR-02) Emissions

| Source ID | Description | Reference | Pollutant | Emission Factor | | Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | lb/MMscf | lb/MMBtu | lb/hr | tpy |
| HTR-02 (12E) | Condensate Stabilizer 01<br>**2.55 MMBtu/hr (HHV)**<br>1,020 Btu/scf (HHV)<br>8,760 hr/yr<br>2,500 scf/hr<br>**21.90 MMscf/yr** | EPA AP-42 Table 1.4-1 | NOX | 100 | 9.80E-02 | **0.25** | **1.10** |
| | | EPA AP-42 Table 1.4-1 | CO | 84 | 8.24E-02 | **0.21** | **0.92** |
| | | EPA AP-42 Table 1.4-2 | NMNEHC | 5.5 | 5.39E-03 | **0.01** | **0.06** |
| | | EPA AP-42 Table 1.4-2 | VOC | 5.5 | 5.39E-03 | **0.01** | **0.06** |
| | | EPA AP-42 Table 1.4-2 | PM10/2.5 | 7.6 | 7.45E-03 | **0.02** | **0.08** |
| | | EPA AP-42 Table 1.4-2 | SO2 | 0.6 | 5.88E-04 | **2E-03** | **7E-03** |
| | | EPA AP-42 Table 1.4-3 | Acetaldehyde | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Acrolein | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Benzene | 2.10E-03 | 2.06E-06 | **5E-06** | **2E-05** |
| | | EPA AP-42 Table 1.4-4 | Butadiene, 1,3- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Ethylbenzene | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Formaldehyde | 7.50E-02 | 7.35E-05 | **2E-04** | **8E-04** |
| | | EPA AP-42 Table 1.4-3 | n-Hexane | 1.80 | 1.76E-03 | **5E-03** | **0.02** |
| | | EPA AP-42 Table 1.4-3 | Methanol | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | POM/PAH | 6.98E-04 | 6.85E-07 | **2E-06** | **8E-06** |
| | | EPA AP-42 Table 1.4-3 | Toluene | 3.40E-03 | 3.33E-06 | **9E-06** | **4E-05** |
| | | EPA AP-42 Table 1.4-3 | TMP, 2,2,4- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Xylenes | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Other/Trace HAP | 1.20E-03 | 1.18E-06 | **3E-06** | **1E-05** |
| | | SUM | Total HAP | 1.88 | 1.85E-03 | **5E-03** | **0.02** |
| | | 40CFR98 - Table C-1 | CO2 (GWP=1) | 119,317 | 117 | **298** | **1,307** |
| | | 40CFR98 - Table C-2 | CH4 (GWP=25) | 2.25 | 2.20E-03 | **0.01** | **0.02** |
| | | 40CFR98 - Table C-2 | N2O (GWP=298) | 0.22 | 2.20E-04 | **6E-04** | **2E-03** |
| | | 40CFR98 - Table A-1 | CO2e | 119,440 | 117 | **299** | **1,308** |

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Notes:

1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

## Produced Water Storage Tank (T01 and T02) Emissions

| Unit ID | Material Stored | Capacity bbl | Turnovers per Year | Throughput bbl/yr | EPA-450/3-85-001a VOC Emission Factor (Working and Breathing Losses) | ProMax VOC Emission Factor (Flashing Losses) | VOC lb/hr | VOC tpy | CO2 0.704% VOC lb/hr | CO2 0.704% VOC tpy | CH4 1.551% VOC lb/hr | CH4 1.551% VOC tpy | CO2e CH4 GWP = 25 lb/hr | CO2e CH4 GWP = 25 tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T01 (13E) | Produced Water | 48 | 52 | 2,476 | 0.039 lb/bbl | 0.074 lb/bbl | 0.03 | 0.14 | 2E-04 | 1E-03 | 5E-04 | 2E-03 | 0.01 | 0.06 |
| T02 (21E) | Produced Water | 210 | 52 | 10,920 | 0.039 lb/bbl | 0.074 lb/bbl | 0.14 | 0.62 | 1E-03 | 4E-03 | 2E-03 | 0.01 | 0.06 | 0.24 |
| | **TOTAL:** | **258** | **52** | **13,396** | | **TOTAL:** | **0.17** | **0.75** | **1E-03** | **0.01** | **3E-03** | **0.01** | **0.07** | **0.30** |

| Unit ID | Benzene 0.112% VOC lb/hr | Benzene 0.112% VOC tpy | Ethylbenzene 0.174% VOC lb/hr | Ethylbenzene 0.174% VOC tpy | n-Hexane (C6) 8.345% VOC lb/hr | n-Hexane (C6) 8.345% VOC tpy | Methanol (MeOH) lb/hr | Methanol (MeOH) tpy | Toluene (C7) 0.434% VOC lb/hr | Toluene (C7) 0.434% VOC tpy | 2,2,4-TMP 0.277% VOC lb/hr | 2,2,4-TMP 0.277% VOC tpy | Xylenes (C8) 1.913% VOC lb/hr | Xylenes (C8) 1.913% VOC tpy | Total HAP 11.255% VOC lb/hr | Total HAP 11.255% VOC tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T01 (13E) | 4E-05 | 2E-04 | 6E-05 | 2E-04 | 3E-03 | 0.01 | --- | --- | 1E-04 | 6E-04 | 9E-05 | 4E-04 | 6E-04 | 3E-03 | 4E-03 | 2E-02 |
| T02 (21E) | 2E-04 | 7E-04 | 2E-04 | 1E-03 | 0.01 | 0.05 | --- | --- | 6E-04 | 3E-03 | 4E-04 | 2E-03 | 3E-03 | 0.01 | 2E-02 | 7E-02 |
| **TOTAL:** | **2E-04** | **8E-04** | **3E-04** | **1E-03** | **0.01** | **0.06** | **---** | **---** | **7E-04** | **3E-03** | **5E-04** | **2E-03** | **3E-03** | **0.01** | **0.02** | **0.08** |

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Notes:

1 - EPA-450/3-85-001a – "Volatile Organic Compound Emissions from Petroleum Refinery Wastewater Systems - Background Information for Proposed Standards" is a reasonable protocol for estimating potential produced water storage tank working and breathing emissions. EPA-450/3-85-001a, page 3-39, gives a VOC emission factor of 420 kg/MMgal wastewater produced in an oil-water separator. (0.420 g/gal * 0.0022 lb/g * 42 gal/bbl = 0.039 lb/bbl)

2 - These emission estimates are nearly 4X more conservative than emission factors required by the TCEQ on the Barnett Shale produced water tanks at gas-only sites. (http://www.tceq.texas.gov/assets/public/implementation/air/ie/pseiforms/producedwaterstoragetank.pdf):

**Table 1. Produced Water Storage Tank Flash Loss Emissions Factors for Barnett Shale Special Inventory Purposes ONLY**

| Pollutant | Average Produced Water Emission Factor (lb/bbl) | |
|---|---|---|
| | Gas Production Only Sites | Liquid Hydrocarbon and Gas Production Sites |
| VOC | 0.01 | 0.0402 |
| Benzene | 0.0001 | 0.000054 |
| Toluene | 0.0003 | 0.000130 |
| Ethylbenzene | 0.000006 | 0.000003 |
| Xylene(s) | 0.00006 | 0.000049 |
| n-Hexane | NA | 0.000987 |

3 - Produced water storage tank flashing losses are estimated using the ProMax process simulation software.

4 - Produced water storage tanks are heated to approximately 60 degrees Fahrenheit to prevent freezing.

5 - The results of a representative **Condensate Analysis** were used to determine the following worst-case components (See Appendix S1 - Condensate Summary):

| | Min. Contingency: | 20% VOC 50% HAP | | |
|---|---|---|---|---|
| **Pollutant** | **Raw Condensate** | **Worst Case** | **%Total** | **%VOC** |
| CO2 | 1,642 lb/MMscf | 1,642 lb/MMscf | 0.670 | 0.704 |
| Methane (CH4) | 3,012 lb/MMscf | 3,615 lb/MMscf | 1.475 | 1.551 |
| N2/Water/Ethane/Etc | 6,679 lb/MMscf | 6,679 lb/MMscf | 2.725 | 2.865 |
| VOC | 194,277 lb/MMscf | 233,133 lb/MMscf | 95.130 | 100.000 |
| TOTAL Gas | 205,611 lb/MMscf | 245,069 lb/MMscf | 100.000 | --- |
| Benzene | 174.56 lb/MMscf | 262 lb/MMscf | 0.107 | 0.112 |
| Ethylbenzene | 270.89 lb/MMscf | 406 lb/MMscf | 0.166 | 0.174 |
| n-Hexane | 12,969 lb/MMscf | 19,454 lb/MMscf | 7.938 | 8.345 |
| Toluene | 674.81 lb/MMscf | 1,012 lb/MMscf | 0.413 | 0.434 |
| 2,2,4-TMP | 429.75 lb/MMscf | 645 lb/MMscf | 0.263 | 0.277 |
| Xylenes | 2,973 lb/MMscf | 4,459 lb/MMscf | 1.820 | 1.913 |
| Total HAP | 17,492 lb/MMscf | 26,238 lb/MMscf | 10.706 | 11.255 |

## Produced WaterTruck Load-Out (TLO-1) Emissions

| Source ID | Description | S | P | M | T | CE | $L_L$ | T-Put | VOC 100.00% | | CO2 0.70% VOC | | CH4 1.55% VOC | | CO2e CH4 GWP = 25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | sat. fac. | psia | lb/lb-mol | °R | % | lb/Mgal | Mgal/yr | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| TLO-1 (14E) | Produced Water | 1.45 | 1.50 | 30.00 | 510 | --- | 1.59 | **563** | --- | 0.45 | --- | 3E-03 | --- | 0.01 | --- | 0.18 |
| | | | | | | | | **TOTAL:** | **---** | **0.45** | **---** | **3E-03** | **---** | **0.01** | **---** | **0.18** |

| Source ID | Benzene 0.112% VOC | | Ethylbenzene 0.174% VOC | | n-Hexane (C6) 8.345% VOC | | Methanol (MeOH) | | Toluene (C7) 0.434% VOC | | 2,2,4-TMP 0.277% VOC | | Xylenes (C8) 1.913% VOC | | Total HAP 11.255% VOC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| TLO-1 (14E) | --- | 5E-04 | --- | 8E-04 | --- | 0.04 | --- | --- | --- | 2E-03 | --- | 1E-03 | --- | 9E-03 | --- | 0.05 |
| **TOTAL:** | **---** | **5E-04** | **---** | **8E-04** | **---** | **0.04** | **---** | **---** | **---** | **2E-03** | **---** | **1E-03** | **---** | **9E-03** | **---** | **0.05** |

**Bold Red Font** Indicates Proposed Permit Limitation

Notes: 1 - Emission factors and formulas are from AP-42 Section 5.2 "Transportation and Marketing of Petroleum Liquids":

$L_L = 12.46 \times S \times P \times M / T \times (1 - CE)$

where: $L_L$ = loading loss, lb/1000 gal of liquid loaded; M = molecular weight of vapors, lb/lb-mol.; S = saturation factor, use 1.45 for splash loading.; T = temperature of bulk liquid loaded, °R = °F + 460; P = true vapor pressure of liquid loaded, psia.; CE = overall emission reduction efficiency (collection efficiency x control efficiency).

2 - Produced water vapor pressure, molecular weight, and temperature are based on operator experience and sampling data at similar locations.

3 - The total produced water storage tank capacity at the facility is: **258** bbl = **10,820** gal.

4 - The maxium produced water throughput at the facility is: **13,396** bbl/yr = **562,640** gal/yr = **52.0** t-o/yr

5 - It is assumed each tanker truck holds 7,000 gallons and can be loaded in one hour: **80** hr/yr

6 - The results of a representative **Condensate Analysis** were used to determine the following worst-case components (See Appendix S1 - Condensate Summary):

| | Min. Contingency: | 20% VOC 50% HAP | | |
|---|---|---|---|---|
| **Pollutant** | **Raw Condensate** | **Worst Case** | **%Total** | **%VOC** |
| CO2 | 1,642 lb/MMscf | 1,642 lb/MMscf | 0.670 | 0.704 |
| Methane (CH4) | 3,012 lb/MMscf | 3,615 lb/MMscf | 1.475 | 1.551 |
| N2/Water/Ethane/Etc | 6,679 lb/MMscf | 6,679 lb/MMscf | 2.725 | 2.865 |
| VOC | 194,277 lb/MMscf | 233,133 lb/MMscf | 95.130 | 100.000 |
| TOTAL Gas | 205,611 lb/MMscf | 245,069 lb/MMscf | 100.000 | --- |
| Benzene | 174.56 lb/MMscf | 262 lb/MMscf | 0.107 | 0.112 |
| Ethylbenzene | 270.89 lb/MMscf | 406 lb/MMscf | 0.166 | 0.174 |
| n-Hexane | 12,969 lb/MMscf | 19,454 lb/MMscf | 7.938 | 8.345 |
| Toluene | 674.81 lb/MMscf | 1,012 lb/MMscf | 0.413 | 0.434 |
| 2,2,4-TMP | 429.75 lb/MMscf | 645 lb/MMscf | 0.263 | 0.277 |
| Xylenes | 2,973 lb/MMscf | 4,459 lb/MMscf | 1.820 | 1.913 |
| Total HAP | 17,492 lb/MMscf | 26,238 lb/MMscf | 10.706 | 11.255 |

## CondensateTruck Load-Out (TLO-2) Emissions

| Source ID | Description | S | P | M | T | CE | $L_L$ | T-Put | VOC 100.00% | | CO2 0.70% VOC | | CH4 1.55% VOC | | CO2e CH4 GWP = 25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | sat. fac. | psia | lb/lb-mol | °R | % | lb/Mgal | Mgal/yr | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| TLO-2 (15E) | Condensate | 1.45 | 10.00 | 55.70 | 510 | --- | 19.73 | **250** | --- | 2.47 | --- | 0.02 | --- | 0.04 | --- | 0.97 |
| | | | | | | | | **TOTAL:** | **---** | **2.47** | **---** | **0.02** | **---** | **0.04** | **---** | **0.97** |

| Source ID | Benzene 0.112% VOC | | Ethylbenzene 0.174% VOC | | n-Hexane (C6) 8.345% VOC | | Methanol (MeOH) | | Toluene (C7) 0.434% VOC | | 2,2,4-TMP 0.277% VOC | | Xylenes (C8) 1.913% VOC | | Total HAP 11.255% VOC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| TLO-2 (15E) | --- | 3E-03 | --- | 4E-03 | --- | 0.21 | --- | --- | --- | 1E-02 | --- | 7E-03 | --- | 5E-02 | --- | 0.28 |
| **TOTAL:** | **---** | **3E-03** | **---** | **4E-03** | **---** | **0.21** | **---** | **---** | **---** | **1E-02** | **---** | **7E-03** | **---** | **5E-02** | **---** | **0.28** |

**Bold Red Font** Indicates Proposed Permit Limitation

Notes: 1 - Emission factors and formulas are from AP-42 Section 5.2 "Transportation and Marketing of Petroleum Liquids":

$L_L = 12.46 \times S \times P \times M / T \times (1 - CE)$

where: $L_L$ = loading loss, lb/1000 gal of liquid loaded; M = molecular weight of vapors, lb/lb-mol.; S = saturation factor, use 1.45 for splash loading.; T = temperature of bulk liquid loaded, °R = °F + 460; P = true vapor pressure of liquid loaded, psia.; CE = overall emission reduction efficiency (collection efficiency x control efficiency).

2 - Produced water vapor pressure, molecular weight, and temperature are based on operator experience and sampling data at similar locations.

| | | | | |
|---|---|---|---|---|
| 3 - The total condensate tank capacity at the facility is: | **0** | bbl = | **0** | gal. |
| 4 - The maxium condensate throughput at the facility is: | **5,952** | bbl/yr = | **250,000** | gal/yr |
| 5 - It is assumed each tanker truck holds 7,000 gallons and can be loaded in one hour: | | | **36** | hr/yr |

6 - The results of a representative **Condensate Analysis** were used to determine the following worst-case components (See Appendix S1 - Condensate Summary):

| | Min. Contingency: | 20% VOC 50% HAP | | |
|---|---|---|---|---|
| **Pollutant** | **Raw Condensate** | **Worst Case** | **%Total** | **%VOC** |
| CO2 | 1,642 lb/MMscf | 1,642 lb/MMscf | 0.670 | 0.704 |
| Methane (CH4) | 3,012 lb/MMscf | 3,615 lb/MMscf | 1.475 | 1.551 |
| N2/Water/Ethane/Etc | 6,679 lb/MMscf | 6,679 lb/MMscf | 2.725 | 2.865 |
| VOC | 194,277 lb/MMscf | 233,133 lb/MMscf | 95.130 | 100.000 |
| TOTAL Gas | 205,611 lb/MMscf | 245,069 lb/MMscf | 100.000 | --- |
| Benzene | 174.56 lb/MMscf | 262 lb/MMscf | 0.107 | 0.112 |
| Ethylbenzene | 270.89 lb/MMscf | 406 lb/MMscf | 0.166 | 0.174 |
| n-Hexane | 12,969 lb/MMscf | 19,454 lb/MMscf | 7.938 | 8.345 |
| Toluene | 674.81 lb/MMscf | 1,012 lb/MMscf | 0.413 | 0.434 |
| 2,2,4-TMP | 429.75 lb/MMscf | 645 lb/MMscf | 0.263 | 0.277 |
| Xylenes | 2,973 lb/MMscf | 4,459 lb/MMscf | 1.820 | 1.913 |
| Total HAP | 17,492 lb/MMscf | 26,238 lb/MMscf | 10.706 | 11.255 |

7 - Density of condensate is 5.38 lb/gal and MW is 79.51 lb/lb-mol (based on 01/16/18 analysis).

8 - The stabilized condensate product will be pumped down a pipeline for transport off-site. In the event of a pipline stoppage, the stabilized condensate will be loaded into tanker trucks for transport off-site.

## Start/Stop/Maintenance (SSM (CBD/ESD/PG/CFC)) Emissions

| Source ID | Unit Description | Site Rating | Emission Factor | Blowdown Gas | Blowdown and ESD | Total Gas Vented | Control % | VOC 14,841 Gas 233,133 Cond. lb/MMscf | | CO2 156 Gas 1,642 Cond. lb/MMscf | | CH4 37,952 Gas 3,615 Cond. lb/MMscf | | CO2e CH4 GWP = 25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | bhp | scf/bhp | scf/Event | Events/yr | Mscf/yr | | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| SSM (6E) | Recip Compressor - 01 (Engine) | 1,380 | 6.22 | 8,584 | 156 | 1,339 | na | --- | 9.94 | --- | 0.10 | --- | 25.41 | --- | 635 |
| | Recip Compressor - 02 (Engine) | 1,380 | 6.22 | 8,584 | 156 | 1,339 | | --- | 9.94 | --- | 0.10 | --- | 25.41 | --- | 635 |
| | Recip Compressor - 03 (Engine) | 203 | 6.22 | 1,263 | 156 | 197 | | --- | 1.46 | --- | 0.02 | --- | 3.74 | --- | 93.46 |
| | Recip Compressor - 04 (Electric) | 200 | 6.22 | 1,244 | 24 | 30 | | --- | 0.22 | --- | 2E-03 | --- | 0.57 | --- | 14.17 |
| | Recip Compressor - 05 (Electric) | 200 | 6.22 | 1,244 | 24 | 30 | | --- | 0.22 | --- | 2E-03 | --- | 0.57 | --- | 14.17 |
| | Emergency Shutdown (ESD) Testing | 3,363 | 37.32 | 125,507 | 1 | 126 | | --- | 0.93 | --- | 0.01 | --- | 2.38 | --- | 59.55 |
| | Purge Gas (PG) - Continuous 35 scf/hr | --- | --- | 35 | 8,760 | 307 | | --- | 2.28 | --- | 0.02 | --- | 5.82 | --- | 145 |
| | Condenser Fliter Change - F6004 | --- | --- | 3,609 | 12 | 43 | | --- | 5.05 | --- | 3E-03 | --- | 0.82 | --- | 20.55 |
| | Condenser Fliter Change - VF-060C01 | --- | --- | 1,951 | 122 | 238 | | --- | 27.74 | --- | 0.02 | --- | 4.52 | --- | 113 |
| | Condenser Fliter Change - VF-6008 | --- | --- | 3,121 | 12 | 37 | | --- | 4.37 | --- | 3E-03 | --- | 0.71 | --- | 17.77 |
| Assumes 1 hr/CBD | | | | **TOTAL:** | **9,423** | **3,686** | **TOTAL:** | **---** | **62.14** | **---** | **0.29** | **---** | **69.94** | **---** | **1,749** |

| Source ID | Unit Description | Benzene 4.94 Gas 262 Cond. lb/MMscf | | Ethylbenzene 0.42 Gas 406 Cond. lb/MMscf | | n-Hexane 352.55 Gas 19,454 Cond. lb/MMscf | | Toluene 6.92 Gas 1,012 Cond. lb/MMscf | | 2,2,4-TMP 5.42 Gas 645 Cond. lb/MMscf | | Xylene 0.42 Gas 4,459 Cond. lb/MMscf | | Total HAP 371 Gas 26,238 Cond. lb/MMscf | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| SSM (6E) | Recip Compressor - 01 (Engine) | --- | 3E-03 | --- | 3E-04 | --- | 0.24 | --- | 0.00 | --- | 4E-03 | --- | 3E-04 | --- | 0.25 |
| | Recip Compressor - 02 (Engine) | --- | 3E-03 | --- | 3E-04 | --- | 0.24 | --- | 0.00 | --- | 4E-03 | --- | 3E-04 | --- | 0.25 |
| | Recip Compressor - 03 (Engine) | --- | 5E-04 | --- | 4E-05 | --- | 0.03 | --- | 7E-04 | --- | 5E-04 | --- | 4E-05 | --- | 0.04 |
| | Recip Compressor - 04 (Electric) | --- | 7E-05 | --- | 6E-06 | --- | 0.01 | --- | 1E-04 | --- | 8E-05 | --- | 6E-06 | --- | 0.01 |
| | Recip Compressor - 05 (Electric) | --- | 7E-05 | --- | 6E-06 | --- | 0.01 | --- | 1E-04 | --- | 8E-05 | --- | 6E-06 | --- | 0.01 |
| | Emergency Shutdown (ESD) Testing | --- | 3E-04 | --- | 3E-05 | --- | 0.02 | --- | 4E-04 | --- | 3E-04 | --- | 3E-05 | --- | 0.02 |
| | Purge Gas (PG) - Continuous 35 scf/hr | --- | 8E-04 | --- | 6E-05 | --- | 0.05 | --- | 1E-03 | --- | 8E-04 | --- | 6E-05 | --- | 0.06 |
| | Condenser Fliter Change - F6004 | --- | 0.01 | --- | 0.01 | --- | 0.42 | --- | 0.02 | --- | 0.01 | --- | 0.10 | --- | 0.57 |
| | Condenser Fliter Change - VF-060C01 | --- | 0.03 | --- | 0.05 | --- | 2.31 | --- | 0.12 | --- | 0.08 | --- | 0.53 | --- | 3.12 |
| | Condenser Fliter Change - VF-6008 | --- | 0.00 | --- | 0.01 | --- | 0.36 | --- | 0.02 | --- | 0.01 | --- | 0.08 | --- | 0.49 |
| Assumes 1 hr/CBD | **TOTAL:** | **---** | **0.05** | **---** | **0.07** | **---** | **3.69** | **---** | **0.17** | **---** | **0.11** | **---** | **0.71** | **---** | **4.81** |

Notes: 1 - The results of a representative **Wet Gas Analysis** were used to determine the following worst-case components (See Appendix S1 - Wet Gas Summary):

| Pollutant | Min. Contingency: Wet Gas | 20% VOC 50% HAP: Worst Case | %Total | %VOC |
|---|---|---|---|---|
| CO2 | 156 lb/MMscf | 156 lb/MMscf | 0.238 | 1.050 |
| Methane (CH4) | 31,626 lb/MMscf | 37,952 lb/MMscf | 57.910 | 255.717 |
| N2/Water/Ethane/Etc | 12,587 lb/MMscf | 12,587 lb/MMscf | 19.206 | 84.811 |
| VOC | 12,368 lb/MMscf | 14,841 lb/MMscf | 22.646 | 100.000 |
| TOTAL Gas | 56,737 lb/MMscf | 65,536 lb/MMscf | 100.000 | --- |
| Benzene | 3.29 lb/MMscf | 4.94 lb/MMscf | 0.008 | 0.033 |
| Ethylbenzene | 0.28 lb/MMscf | 0.42 lb/MMscf | 0.001 | 0.003 |
| n-Hexane | 235 lb/MMscf | 353 lb/MMscf | 0.538 | 2.375 |
| Toluene | 4.61 lb/MMscf | 6.92 lb/MMscf | 0.011 | 0.047 |
| 2,2,4-TMP | 3.61 lb/MMscf | 5.42 lb/MMscf | 0.008 | 0.037 |
| Xylenes | --- lb/MMscf | 0.42 lb/MMscf | 0.001 | 0.003 |
| Total HAP | 247 lb/MMscf | 371 lb/MMscf | 0.566 | 2.498 |

2 - The results of a representative **Raw Condensate Analysis** were used to determine the following worst-case components (See Appendix S1 - Raw Condensate Summary):

| Pollutant | Min. Contingency: Raw Condensate | 20% VOC 50% HAP: Worst Case | %Total | %VOC |
|---|---|---|---|---|
| CO2 | 1,642 lb/MMscf | 1,642 lb/MMscf | 0.670 | 0.704 |
| Methane (CH4) | 3,012 lb/MMscf | 3,615 lb/MMscf | 1.475 | 1.551 |
| N2/Water/Ethane/Etc | 6,679 lb/MMscf | 6,679 lb/MMscf | 2.725 | 2.865 |
| VOC | 194,277 lb/MMscf | 233,133 lb/MMscf | 95.130 | 100.000 |
| TOTAL Gas | 205,611 lb/MMscf | 245,069 lb/MMscf | 100.000 | --- |
| Benzene | 175 lb/MMscf | 262 lb/MMscf | 0.107 | 0.112 |
| Ethylbenzene | 271 lb/MMscf | 406 lb/MMscf | 0.166 | 0.174 |
| n-Hexane | 12,969 lb/MMscf | 19,454 lb/MMscf | 7.938 | 8.345 |
| Toluene | 675 lb/MMscf | 1,012 lb/MMscf | 0.413 | 0.434 |
| 2,2,4-TMP | 430 lb/MMscf | 645 lb/MMscf | 0.263 | 0.277 |
| Xylenes | 2,973 lb/MMscf | 4,459 lb/MMscf | 1.820 | 1.913 |
| Total HAP | 17,492 lb/MMscf | 26,238 lb/MMscf | 10.706 | 11.255 |

## Compressor Rod Packing (CRP) Emissions

| Source ID | Unit Description (Compressor Rod Packing) | No of Cylinders | scfh per Cylinder | Contin-gency | Total Fugitive Leak Rate | | Control Efficiency | VOC 14,841 lb/MMscf | | CO2 156 lb/MMscf | | CH4 37,952 lb/MMscf | | CO2e CH4 GWP = 25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | scfh | MMscfy | | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| CRP (18E) | Recip Compressor - 01 (CRP) | 4 | 12.0 | 15% | 55.20 | 0.48 | na | 0.82 | 3.59 | 0.01 | 0.04 | 2.09 | 9.18 | 52 | 229 |
| | Recip Compressor - 02 (CRP) | 4 | 12.0 | 15% | 55.20 | 0.48 | | 0.82 | 3.59 | 0.01 | 0.04 | 2.09 | 9.18 | 52 | 229 |
| | Recip Compressor - 03 (CRP) | 4 | 12.0 | 15% | 55.20 | 0.48 | | 0.82 | 3.59 | 0.01 | 0.04 | 2.09 | 9.18 | 52 | 229 |
| | Recip Compressor - Electric | 4 | 12.0 | 15% | 55.20 | 0.48 | | 0.82 | 3.59 | 0.01 | 0.04 | 2.09 | 9.18 | 52 | 229 |
| | Recip Compressor - Electric | 4 | 12.0 | 15% | 55.20 | 0.48 | | 0.82 | 3.59 | 0.01 | 0.04 | 2.09 | 9.18 | 52 | 229 |
| | | | | | | | **TOTAL:** | **4.10** | **17.94** | **0.04** | **0.19** | **10.47** | **45.88** | **262** | **1,147** |

| Source ID | Unit Description (Compressor Rod Packing) | Benzene 4.94 lb/MMscf | | E-Benzene 0.42 lb/MMscf | | n-Hexane 353 lb/MMscf | | Toluene 6.92 lb/MMscf | | 2,2,4-TMP 5.42 lb/MMscf | | Xylene 0.42 lb/MMscf | | Tot HAP 371 lb/MMscf | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| CRP (18E) | Recip Compressor - 01 (CRP) | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 | 4E-04 | 2E-03 | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 |
| | Recip Compressor - 02 (CRP) | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 | 4E-04 | 2E-03 | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 |
| | Recip Compressor - 03 (CRP) | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 | 4E-04 | 2E-03 | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 |
| | Recip Compressor - Electric | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 | 4E-04 | 2E-03 | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 |
| | Recip Compressor - Electric | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 | 4E-04 | 2E-03 | 3E-04 | 1E-03 | 2E-05 | 1E-04 | 0.02 | 0.09 |
| | **TOTAL:** | **1E-03** | **6E-03** | **1E-04** | **5E-04** | **0.10** | **0.43** | **2E-03** | **8E-03** | **1E-03** | **7E-03** | **1E-04** | **5E-04** | **0.10** | **0.45** |

Notes:

1 - As per the manufacturer (Ariel): "Packing in new and broken-in condition will leak 5-10 scfh through the vent. This leakage rate will increase over time due to wear of the non-metallic sealing rings." The Williams' engineering department provides a conservative leak rate estimate of 12 scfh/cylinder (equal to 48 scfh/compressor). In this instance, an additional 15% contingency was added to yield 55.20 scfh/compressor.

2 - The results of a representative **Wet Gas Analysis** were used to determine the following worst-case components (See Appendix S1 - Wet Gas Summary):

| | Min. Contingency: | 20% VOC 50% HAP | | |
|---|---|---|---|---|
| **Pollutant** | **Wet Gas** | **Worst Case** | **%Total** | **%VOC** |
| CO2 | 156 lb/MMscf | 156 lb/MMscf | 0.238 | 1.050 |
| Methane (CH4) | 31,626 lb/MMscf | 37,952 lb/MMscf | 57.910 | 255.717 |
| N2/Water/Ethane/Etc | 12,587 lb/MMscf | 12,587 lb/MMscf | 19.206 | 84.811 |
| VOC | 12,368 lb/MMscf | 14,841 lb/MMscf | 22.646 | 100.000 |
| TOTAL Gas | 56,737 lb/MMscf | 65,536 lb/MMscf | 100.000 | --- |
| Benzene | 3.29 lb/MMscf | 4.94 lb/MMscf | 0.008 | 0.033 |
| Ethylbenzene | 0.28 lb/MMscf | 0.42 lb/MMscf | 0.001 | 0.003 |
| n-Hexane | 235 lb/MMscf | 353 lb/MMscf | 0.538 | 2.375 |
| Toluene | 4.61 lb/MMscf | 6.92 lb/MMscf | 0.011 | 0.047 |
| 2,2,4-TMP | 3.61 lb/MMscf | 5.42 lb/MMscf | 0.008 | 0.037 |
| Xylenes | --- lb/MMscf | 0.42 lb/MMscf | 0.001 | 0.003 |
| Total HAP | 247 lb/MMscf | 371 lb/MMscf | 0.566 | 2.498 |

## Station Recycle Line Heater (HTR-03) Emissions

| Source ID | Description | Reference | Pollutant | Emission Factor | | Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | lb/MMscf | lb/MMBtu | lb/hr | tpy |
| HTR-03 (19E) | Station Recycle Line Heater<br>**1.66 MMBtu/hr (HHV)**<br>1,020 Btu/scf (HHV)<br>8,760 hr/yr<br>1,627 scf/hr<br>**14.26 MMscf/yr** | EPA AP-42 Table 1.4-1 | NOX | 100 | 9.80E-02 | **0.16** | **0.71** |
| | | EPA AP-42 Table 1.4-1 | CO | 84 | 8.24E-02 | **0.14** | **0.60** |
| | | EPA AP-42 Table 1.4-2 | NMNEHC | 5.5 | 5.39E-03 | **0.01** | **0.04** |
| | | EPA AP-42 Table 1.4-2 | VOC | 5.5 | 5.39E-03 | **0.01** | **0.04** |
| | | EPA AP-42 Table 1.4-2 | PM10/2.5 | 7.6 | 7.45E-03 | **0.01** | **0.05** |
| | | EPA AP-42 Table 1.4-2 | SO2 | 0.6 | 5.88E-04 | **1E-03** | **4E-03** |
| | | EPA AP-42 Table 1.4-3 | Acetaldehyde | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Acrolein | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Benzene | 2.10E-03 | 2.06E-06 | **3E-06** | **1E-05** |
| | | EPA AP-42 Table 1.4-4 | Butadiene, 1,3- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Ethylbenzene | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Formaldehyde | 7.50E-02 | 7.35E-05 | **1E-04** | **5E-04** |
| | | EPA AP-42 Table 1.4-3 | n-Hexane | 1.80 | 1.76E-03 | **3E-03** | **0.01** |
| | | EPA AP-42 Table 1.4-3 | Methanol | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | POM/PAH | 6.98E-04 | 6.85E-07 | **1E-06** | **5E-06** |
| | | EPA AP-42 Table 1.4-3 | Toluene | 3.40E-03 | 3.33E-06 | **6E-06** | **2E-05** |
| | | EPA AP-42 Table 1.4-3 | TMP, 2,2,4- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Xylenes | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Other/Trace HAP | 1.20E-03 | 1.18E-06 | **2E-06** | **9E-06** |
| | | SUM | Total HAP | 1.88 | 1.85E-03 | **3E-03** | **0.01** |
| | | 40CFR98 - Table C-1 | CO2 (GWP=1) | 119,317 | 117 | **194** | **851** |
| | | 40CFR98 - Table C-2 | CH4 (GWP=25) | 2.25 | 2.20E-03 | **4E-03** | **0.02** |
| | | 40CFR98 - Table C-2 | N2O (GWP=298) | 0.22 | 2.20E-04 | **4E-04** | **0.00** |
| | | 40CFR98 - Table A-1 | CO2e | 119,440 | 117 | **194** | **851** |

**Bold Red Font** Indicates Proposed Permit Limitation

Notes:

1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

## Condensate Stabilizer Heater (HTR-04) Emissions

| Source ID | Description | Reference | Pollutant | Emission Factor | | Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | lb/MMscf | lb/MMBtu | lb/hr | tpy |
| HTR-04 (20E) | Condensate Stabilizer Heater<br>**9.70 MMBtu/hr (HHV)**<br>1,020 Btu/scf (HHV)<br>8,760 hr/yr<br>9,510 scf/hr<br>**83.31 MMscf/yr** | EPA AP-42 Table 1.4-1 | NOX | 100 | 9.80E-02 | **0.95** | **4.17** |
| | | EPA AP-42 Table 1.4-1 | CO | 84 | 8.24E-02 | **0.80** | **3.50** |
| | | EPA AP-42 Table 1.4-2 | NMNEHC | 5.5 | 5.39E-03 | **0.05** | **0.23** |
| | | EPA AP-42 Table 1.4-2 | VOC | 5.5 | 5.39E-03 | **0.05** | **0.23** |
| | | EPA AP-42 Table 1.4-2 | PM10/2.5 | 7.6 | 7.45E-03 | **0.07** | **0.32** |
| | | EPA AP-42 Table 1.4-2 | SO2 | 0.6 | 5.88E-04 | **6E-03** | **2E-02** |
| | | EPA AP-42 Table 1.4-3 | Acetaldehyde | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Acrolein | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Benzene | 2.10E-03 | 2.06E-06 | **2E-05** | **9E-05** |
| | | EPA AP-42 Table 1.4-4 | Butadiene, 1,3- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Ethylbenzene | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Formaldehyde | 7.50E-02 | 7.35E-05 | **7E-04** | **3E-03** |
| | | EPA AP-42 Table 1.4-3 | n-Hexane | 1.80 | 1.76E-03 | **2E-02** | **0.07** |
| | | EPA AP-42 Table 1.4-3 | Methanol | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | POM/PAH | 6.98E-04 | 6.85E-07 | **7E-06** | **3E-05** |
| | | EPA AP-42 Table 1.4-3 | Toluene | 3.40E-03 | 3.33E-06 | **3E-05** | **1E-04** |
| | | EPA AP-42 Table 1.4-3 | TMP, 2,2,4- | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Xylenes | --- | --- | **---** | **---** |
| | | EPA AP-42 Table 1.4-3 | Other/Trace HAP | 1.20E-03 | 1.18E-06 | **1E-05** | **5E-05** |
| | | SUM | Total HAP | 1.88 | 1.85E-03 | **2E-02** | **0.08** |
| | | 40CFR98 - Table C-1 | CO2 (GWP=1) | 119,317 | 117 | **1,135** | **4,970** |
| | | 40CFR98 - Table C-2 | CH4 (GWP=25) | 2.25 | 2.20E-03 | **2E-02** | **0.09** |
| | | 40CFR98 - Table C-2 | N2O (GWP=298) | 0.22 | 2.20E-04 | **2E-03** | **0.01** |
| | | 40CFR98 - Table A-1 | CO2e | 119,440 | 117 | **1,136** | **4,975** |

**Bold Red Font** Indicates Proposed Permit Limitation

Notes:

1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

## Process Piping and Equipment Leak (FUG-G) Emissions – Gas

| Source ID | Description | Component (Unit) Type (Gas) | Unit Count | Cons'tive Multiplier 120% | Leak Factor lb/hr/Unit | LDAR Control Credit | Controlled Leaks lb/hr | Controlled Leaks tpy | VOC 25.00 Wgt% lb/hr | VOC 25.00 Wgt% tpy | CO2 1.05% VOC lb/hr | CO2 1.05% VOC tpy | CH4 256% VOC lb/hr | CH4 256% VOC tpy | CO2e CH4 GWP = 25 lb/hr | CO2e CH4 GWP = 25 tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FUG-G (17E) | Process Piping and Equipment Leaks (Gas) | Valves | 999 | 1,199 | 9.92E-03 | --- | 11.89 | 52.09 | 2.97 | 13.02 | 0.03 | 0.14 | 7.60 | 33.30 | 190.11 | 833 |
| | | Pump Seals | --- | --- | 5.29E-03 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Other | 34 | 41 | 1.94E-02 | --- | 0.79 | 3.47 | 0.20 | 0.87 | 0.00 | 0.01 | 0.51 | 2.22 | 12.65 | 55.42 |
| | | Connectors | 3,169 | 3,803 | 4.41E-04 | --- | 1.68 | 7.34 | 0.42 | 1.84 | 0.00 | 0.02 | 1.07 | 4.70 | 26.80 | 117 |
| | | Flanges | 843 | 1,012 | 8.60E-04 | --- | 0.87 | 3.81 | 0.22 | 0.95 | 0.00 | 0.01 | 0.56 | 2.44 | 13.90 | 60.90 |
| | | Open-ended Lines | 5 | 6 | 4.41E-03 | --- | 0.03 | 0.12 | 0.01 | 0.03 | 0.00 | 0.00 | 0.02 | 0.07 | 0.42 | 1.85 |
| | | **TOTAL:** | **5,050** | **6,060** | | | | **TOTAL:** | **3.81** | **16.71** | **TOTAL:** | **0.04** | **0.18** | **9.75** | **42.72** | **244** | **1,068** |

Worst-Case VOC wgt% is: 22.65%
Assumed 25% to be Conservative

| Source ID | Description | Component (Unit) Type (Gas) | Benzene 0.033% VOC lb/hr | Benzene 0.033% VOC tpy | Ethylbenzene 0.003% VOC lb/hr | Ethylbenzene 0.003% VOC tpy | n-Hexane (C6) 2.38% VOC lb/hr | n-Hexane (C6) 2.38% VOC tpy | Methanol (MeOH) lb/hr | Methanol (MeOH) tpy | Toluene (C7) 0.047% VOC lb/hr | Toluene (C7) 0.047% VOC tpy | 2,2,4-TMP 0.037% VOC lb/hr | 2,2,4-TMP 0.037% VOC tpy | Xylenes (C8) 0.003% VOC lb/hr | Xylenes (C8) 0.003% VOC tpy | Total HAP 2.498% VOC lb/hr | Total HAP 2.498% VOC tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FUG-G (17E) | Process Piping and Equipment Leaks (Gas) | Valves | 4E-03 | 4E-03 | 4E-04 | 4E-04 | 0.31 | 0.31 | --- | --- | 6E-03 | 6E-03 | 5E-03 | 5E-03 | 4E-04 | 4E-04 | 0.33 | 0.33 |
| | | Pump Seals | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Other | 3E-04 | 3E-04 | 2E-05 | 2E-05 | 2E-02 | 0.02 | --- | --- | 4E-04 | 4E-04 | 3E-04 | 3E-04 | 2E-05 | 2E-05 | 2E-02 | 0.02 |
| | | Connectors | 6E-04 | 6E-04 | 5E-05 | 5E-05 | 4E-02 | 0.04 | --- | --- | 9E-04 | 9E-04 | 7E-04 | 7E-04 | 5E-05 | 5E-05 | 5E-02 | 0.05 |
| | | Flanges | 3E-04 | 3E-04 | 3E-05 | 3E-05 | 0.02 | 0.02 | --- | --- | 4E-04 | 4E-04 | 3E-04 | 3E-04 | 3E-05 | 3E-05 | 0.02 | 0.02 |
| | | Open-ended Lines | 1E-05 | 1E-05 | 8E-07 | 8E-07 | 7E-04 | 7E-04 | --- | --- | 1E-05 | 1E-05 | 1E-05 | 1E-05 | 8E-07 | 8E-07 | 7E-04 | 7E-04 |
| | | **TOTAL:** | **6E-03** | **6E-03** | **5E-04** | **5E-04** | **0.40** | **0.40** | **---** | **---** | **8E-03** | **0.01** | **6E-03** | **6E-03** | **5E-04** | **5E-04** | **0.42** | **0.42** |

Notes: 1 - Assumed 8,760 hours per year of fugitive emissions.

2 - Gas/Vapor emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995; Table 2-4, Oil and Gas Production Operations:

| Equipment Type | Gas kg/hr | Gas lb/hr/unit | Light Oil kg/hr | Light Oil lb/hr/unit | Water/Oil kg/hr | Water/Oil lb/hr/unit |
|---|---|---|---|---|---|---|
| Valves | 4.5E-03 | 9.92E-03 | 2.5E-03 | 5.51E-03 | 9.8E-05 | 2.16E-04 |
| Pump Seals | 2.4E-03 | 5.29E-03 | 1.3E-02 | 2.87E-02 | 2.4E-05 | 5.29E-05 |
| Others | 8.8E-03 | 1.94E-02 | 7.5E-03 | 1.65E-02 | 1.4E-02 | 3.09E-02 |
| Connectors | 2.0E-04 | 4.41E-04 | 2.1E-04 | 4.63E-04 | 1.1E-04 | 2.43E-04 |
| Flanges | 3.9E-04 | 8.60E-04 | 1.1E-04 | 2.43E-04 | 2.9E-06 | 6.39E-06 |
| Open-Ended Lines | 2.0E-03 | 4.41E-03 | 1.4E-03 | 3.09E-03 | 2.5E-04 | 5.51E-04 |

3 - "Other" components include pressure relief devices (PRD), compressors, diaphragms, drains, meters, etc.

4 - The results of a representative **Wet Gas Analysis** were used to determine the following worst-case components (See Appendix S1 - Wet Gas Summary):

| | Min. Contingency: | 20% VOC 50% HAP | | |
|---|---|---|---|---|
| **Pollutant** | **Wet Gas** | **Worst Case** | **%Total** | **%VOC** |
| CO2 | 156 lb/MMscf | 156 lb/MMscf | 0.238 | 1.050 |
| Methane (CH4) | 31,626 lb/MMscf | 37,952 lb/MMscf | 57.910 | 255.717 |
| N2/Water/Ethane/Etc | 12,587 lb/MMscf | 12,587 lb/MMscf | 19.206 | 84.811 |
| VOC | 12,368 lb/MMscf | 14,841 lb/MMscf | 22.646 | 100.000 |
| TOTAL Gas | 56,737 lb/MMscf | 65,536 lb/MMscf | 100.000 | --- |
| Benzene | 3.29 lb/MMscf | 4.94 lb/MMscf | 0.008 | 0.033 |
| Ethylbenzene | 0.28 lb/MMscf | 0.42 lb/MMscf | 0.001 | 0.003 |
| n-Hexane | 235 lb/MMscf | 353 lb/MMscf | 0.538 | 2.375 |
| Toluene | 4.61 lb/MMscf | 6.92 lb/MMscf | 0.011 | 0.047 |
| 2,2,4-TMP | 3.61 lb/MMscf | 5.42 lb/MMscf | 0.008 | 0.037 |
| Xylenes | --- lb/MMscf | 0.42 lb/MMscf | 0.001 | 0.003 |
| Total HAP | 247 lb/MMscf | 371 lb/MMscf | 0.566 | 2.498 |

## Process Piping and Equipment Leak (FUG-L) Emissions – Light Oil

| Source ID | Description | Component (Unit) Type (Light Oil) | Unit Count | Cons'tive Multiplier 120% | Leak Factor lb/hr/Unit | LDAR Control Credit | Controlled Leaks lb/hr | Controlled Leaks tpy | VOC 100.00 Wgt% lb/hr | VOC 100.00 Wgt% tpy | CO2 0.70% VOC lb/hr | CO2 0.70% VOC tpy | CH4 1.55% VOC lb/hr | CH4 1.55% VOC tpy | CO2e CH4 GWP = 25 lb/hr | CO2e CH4 GWP = 25 tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FUG-L (17E) | Process Piping and Equipment Leaks (Light Liquid) | Valves | 1,227 | 1,472 | 5.51E-03 | --- | 8.12 | 35.54 | 8.12 | 35.54 | 0.06 | 0.25 | 0.13 | 0.55 | 3.20 | 14.03 |
| | | Pump Seals | 23 | 28 | 2.87E-02 | --- | 0.79 | 3.46 | 0.79 | 3.46 | 0.01 | 0.02 | 0.01 | 0.05 | 0.31 | 1.37 |
| | | Other | 31 | 37 | 1.65E-02 | --- | 0.62 | 2.69 | 0.62 | 2.69 | 4E-03 | 0.02 | 0.01 | 0.04 | 0.24 | 1.06 |
| | | Connectors | 2,374 | 2,849 | 4.63E-04 | --- | 1.32 | 5.78 | 1.32 | 5.78 | 0.01 | 0.04 | 0.02 | 0.09 | 0.52 | 2.28 |
| | | Flanges | 895 | 1,074 | 2.43E-04 | --- | 0.26 | 1.14 | 0.26 | 1.14 | 2E-03 | 0.01 | 4E-03 | 0.02 | 0.10 | 0.45 |
| | | Open-ended Lines | 6 | 7 | 3.09E-03 | --- | 0.02 | 0.10 | 0.02 | 0.10 | 2E-04 | 7E-04 | 3E-04 | 2E-03 | 0.01 | 0.04 |
| | | **TOTAL:** | **4,556** | **5,467** | | | | | **TOTAL:** **11.12** | **48.72** | **TOTAL:** **0.08** | **0.34** | **0.17** | **0.76** | **4.39** | **19.23** |

Worst-Case VOC wgt% is: 95.13%
Assumed 100% to be Conservative

| Source ID | Description | Component (Unit) Type (Light Oil) | Benzene 0.112% VOC lb/hr | Benzene 0.112% VOC tpy | Ethylbenzene 0.174% VOC lb/hr | Ethylbenzene 0.174% VOC tpy | n-Hexane (C6) 8.34% VOC lb/hr | n-Hexane (C6) 8.34% VOC tpy | Methanol (MeOH) lb/hr | Methanol (MeOH) tpy | Toluene (C7) 0.434% VOC lb/hr | Toluene (C7) 0.434% VOC tpy | 2,2,4-TMP 0.277% VOC lb/hr | 2,2,4-TMP 0.277% VOC tpy | Xylenes (C8) 1.913% VOC lb/hr | Xylenes (C8) 1.913% VOC tpy | Total HAP 11.255% VOC lb/hr | Total HAP 11.255% VOC tpy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FUG-L (17E) | Process Piping and Equipment Leaks (Light Liquid) | Valves | 0.04 | 0.04 | 0.06 | 0.06 | 2.97 | 2.97 | --- | --- | 0.15 | 0.15 | 0.10 | 0.10 | 0.68 | 0.68 | 4.00 | 4.00 |
| | | Pump Seals | 4E-03 | 4E-03 | 0.01 | 0.01 | 0.29 | 0.29 | --- | --- | 0.02 | 0.02 | 0.01 | 0.01 | 0.07 | 0.07 | 0.39 | 0.39 |
| | | Other | 3E-03 | 3E-03 | 5E-03 | 5E-03 | 0.22 | 0.22 | --- | --- | 0.01 | 0.01 | 0.01 | 0.01 | 0.05 | 0.05 | 0.30 | 0.30 |
| | | Connectors | 0.01 | 0.01 | 0.01 | 0.01 | 0.48 | 0.48 | --- | --- | 0.03 | 0.03 | 0.02 | 0.02 | 0.11 | 0.11 | 0.65 | 0.65 |
| | | Flanges | 1E-03 | 1E-03 | 2E-03 | 2E-03 | 0.10 | 0.10 | --- | --- | 5E-03 | 5E-03 | 3E-03 | 3E-03 | 0.02 | 0.02 | 0.13 | 0.13 |
| | | Open-ended Lines | 1E-04 | 1E-04 | 2E-04 | 2E-04 | 0.01 | 0.01 | --- | --- | 4E-04 | 4E-04 | 3E-04 | 3E-04 | 2E-03 | 2E-03 | 0.01 | 0.01 |
| | | **TOTAL:** | **0.05** | **0.05** | **0.08** | **0.08** | **4.07** | **4.07** | **---** | **---** | **0.21** | **0.21** | **0.13** | **0.13** | **0.93** | **0.93** | **5.48** | **5.48** |

Notes: 1 - Assumed 8,760 hours per year of fugitive emissions.

2 - Light oil emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995; Table 2-4, Oil and Gas Production Operations:

| Equipment Type | Gas kg/hr | Gas lb/hr/unit | Light Oil kg/hr | Light Oil lb/hr/unit | Water/Oil kg/hr | Water/Oil lb/hr/unit |
|---|---|---|---|---|---|---|
| Valves | 4.5E-03 | 9.92E-03 | 2.5E-03 | 5.51E-03 | 9.8E-05 | 2.16E-04 |
| Pump Seals | 2.4E-03 | 5.29E-03 | 1.3E-02 | 2.87E-02 | 2.4E-05 | 5.29E-05 |
| Others | 8.8E-03 | 1.94E-02 | 7.5E-03 | 1.65E-02 | 1.4E-02 | 3.09E-02 |
| Connectors | 2.0E-04 | 4.41E-04 | 2.1E-04 | 4.63E-04 | 1.1E-04 | 2.43E-04 |
| Flanges | 3.9E-04 | 8.60E-04 | 1.1E-04 | 2.43E-04 | 2.9E-06 | 6.39E-06 |
| Open-Ended Lines | 2.0E-03 | 4.41E-03 | 1.4E-03 | 3.09E-03 | 2.5E-04 | 5.51E-04 |

3 - "Other" components include pressure relief devices (PRD), diaphragms, drains, meters, etc.

4 - The results of a representative **Raw Condensate Analysis** were used to determine the following worst-case components (See Appendix S1 - Raw Condensate Summary):

| Pollutant | Min. Contingency: Raw Condensate | 20% VOC 50% HAP: Worst Case | %Total | %VOC |
|---|---|---|---|---|
| CO2 | 1,642 lb/MMscf | 1,642 lb/MMscf | 0.670 | 0.704 |
| Methane (CH4) | 3,012 lb/MMscf | 3,615 lb/MMscf | 1.475 | 1.551 |
| N2/Water/Ethane/Etc | 6,679 lb/MMscf | 6,679 lb/MMscf | 2.725 | 2.865 |
| VOC | 194,277 lb/MMscf | 233,133 lb/MMscf | 95.130 | 100.000 |
| TOTAL Raw Cond. | 205,611 lb/MMscf | 245,069 lb/MMscf | 100.000 | --- |
| Benzene | 174.56 lb/MMscf | 261.85 lb/MMscf | 0.107 | 0.112 |
| Ethylbenzene | 270.89 lb/MMscf | 406.33 lb/MMscf | 0.166 | 0.174 |
| n-Hexane | 12,969 lb/MMscf | 19,454 lb/MMscf | 7.938 | 8.345 |
| Toluene | 674.81 lb/MMscf | 1,012.21 lb/MMscf | 0.413 | 0.434 |
| 2,2,4-TMP | 429.75 lb/MMscf | 644.63 lb/MMscf | 0.263 | 0.277 |
| Xylenes | 2,973 lb/MMscf | 4,459.15 lb/MMscf | 1.820 | 1.913 |
| Total HAP | 17,492 lb/MMscf | 26,238 lb/MMscf | 10.706 | 11.255 |

## Engine Crankcase (ECC) Emissions

| Unit ID | Source ID | Site Rating | Operations | CAT G3516B Emission Rates | | NOx | | CO | | VOC | | PM | | SO2 | | | CO2 | | CH4 | | N2O | | CO2e | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.36 scf/bhp-hr | | 1.52 lb/hr | | 9.37 lb/hr | | 4.50 lb/hr | | 0.11 lb/hr | | 0.01 lb/hr | | | 1,570 lb/hr | | 5.99 lb/hr | | 2.49E-03 lb/hr | | 1,720 lb/hr | |
| | | | | MMscf/yr | | 7.65 lb/MMscf | | 47.13 lb/MMscf | | 22.63 lb/MMscf | | 0.57 lb/MMscf | | 0.03 lb/MMscf | | | 7,895 lb/MMscf | | 30.14 lb/MMscf | | 1.25E-02 lb/MMscf | | 8,652 lb/MMscf | |
| | | | | | | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| ECC (37E) | CE-01 | 1,380 bhp | 8,760 hr/yr | 4.32 | | 4E-03 | 0.02 | 0.02 | 0.10 | 0.01 | 0.05 | 3E-04 | 1E-03 | 2E-05 | 7E-05 | | 3.90 | 17.06 | 0.01 | 0.07 | 6E-06 | 3E-05 | 4.27 | 18.70 |
| | CE-02 | 1,380 bhp | 8,760 hr/yr | 4.32 | | 4E-03 | 0.02 | 0.02 | 0.10 | 0.01 | 0.05 | 3E-04 | 1E-03 | 2E-05 | 7E-05 | | 3.90 | 17.06 | 0.01 | 0.07 | 6E-06 | 3E-05 | 4.27 | 18.70 |
| | CE-03 | 203 bhp | 8,760 hr/yr | 0.64 | | 6E-04 | 2E-03 | 0.00 | 0.01 | 2E-03 | 0.01 | 4E-05 | 2E-04 | 2E-06 | 1E-05 | | 0.57 | 2.51 | 0.00 | 0.01 | 9E-07 | 4E-06 | 0.63 | 2.75 |
| | **TOT:** | **2,963 bhp** | **26,280 hr/yr** | **9.28** | **TOT:** | **0.01** | **0.04** | **0.05** | **0.22** | **0.02** | **0.11** | **6E-04** | **3E-03** | **4E-05** | **2E-04** | **TOT:** | **8.36** | **36.64** | **0.03** | **0.14** | **1E-05** | **6E-05** | **9.17** | **40.15** |

| Source ID | Acetaldehyde | | Acrolein | | Benzene | | Butadiene | | Ethylbenzene | | HCHO | | n-Hexane | | Methanol | | POM/PAH | | Toluene | | TMP, 2,2,4- | | Xylenes | | Other/Trace | | Total HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9.43E-02 lb/hr | | 5.80E-02 lb/hr | | 4.96E-03 lb/hr | | 3.01E-03 lb/hr | | 4.48E-04 lb/hr | | 1.10E+00 lb/hr | | 1.25E-02 lb/hr | | 2.82E-02 lb/hr | | 3.91E-03 lb/hr | | 4.60E-03 lb/hr | | 3.01E-03 lb/hr | | 2.07E-03 lb/hr | | 3.62E-03 lb/hr | | 1.31 lb/hr | |
| | 4.74E-01 lb/MMscf | | 2.91E-01 lb/MMscf | | 2.50E-02 lb/MMscf | | 1.51E-02 lb/MMscf | | 2.25E-03 lb/MMscf | | 5.51E+00 lb/MMscf | | 6.29E-02 lb/MMscf | | 1.42E-01 lb/MMscf | | 1.97E-02 lb/MMscf | | 2.31E-02 lb/MMscf | | 1.51E-02 lb/MMscf | | 1.04E-02 lb/MMscf | | 1.82E-02 lb/MMscf | | 6.61 lb/MMscf | |
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| CE-01 | 2E-04 | 1E-03 | 1E-04 | 6E-04 | 1E-05 | 5E-05 | 7E-06 | 3E-05 | 1E-06 | 5E-06 | 3E-03 | 0.01 | 3E-05 | 1E-04 | 7E-05 | 3E-04 | 1E-05 | 4E-05 | 1E-05 | 5E-05 | 7E-06 | 3E-05 | 5E-06 | 2E-05 | 9E-06 | 4E-05 | 3E-03 | 0.01 |
| CE-02 | 2E-04 | 1E-03 | 1E-04 | 6E-04 | 1E-05 | 5E-05 | 7E-06 | 3E-05 | 1E-06 | 5E-06 | 3E-03 | 0.01 | 3E-05 | 1E-04 | 7E-05 | 3E-04 | 1E-05 | 4E-05 | 1E-05 | 5E-05 | 7E-06 | 3E-05 | 5E-06 | 2E-05 | 9E-06 | 4E-05 | 3E-03 | 0.01 |
| CE-03 | 3E-05 | 2E-04 | 2E-05 | 9E-05 | 2E-06 | 8E-06 | 1E-06 | 5E-06 | 2E-07 | 7E-07 | 4E-04 | 2E-03 | 5E-06 | 2E-05 | 1E-05 | 5E-05 | 1E-06 | 6E-06 | 2E-06 | 7E-06 | 1E-06 | 5E-06 | 8E-07 | 3E-06 | 1E-06 | 6E-06 | 5E-04 | 2E-03 |
| **TOTAL:** | **5E-04** | **2E-03** | **3E-04** | **1E-03** | **3E-05** | **1E-04** | **2E-05** | **7E-05** | **2E-06** | **1E-05** | **0.01** | **0.03** | **7E-05** | **3E-04** | **2E-04** | **7E-04** | **2E-05** | **9E-05** | **2E-05** | **1E-04** | **2E-05** | **7E-05** | **1E-05** | **5E-05** | **2E-05** | **8E-05** | **0.01** | **0.03** |

Notes: 1 - As per Caterpillar's Application & Installation Guide - Crankcase Ventilation Systems:
"[B]low-by on a new engine is approx. 0.5 ft3 /bhp-hr
and design for a worn engine should be 1.0 ft3 /bhp-hr."
http://s7d2.scene7.com/is/content/Caterpillar/CM20160713-53120-62603

2 - Blowby emission rates converted from "actual" cubic feet to "standard" cubic feet:
scf = acf * [(P+14.6959)/14.6959] * [527.67/(T+459.67)]

| Actual to Standard Conversions (@ 1,016 oF vs. 68 oF (Ignore Δ psi): | 1.0 acf = | 0.36 scf |
|---|---|---|

3 - Engine Exhaust Flow Rates converted from "actual" cubic feet per minute to "standard" cubic feet per minute:
scf = acf * [(P+14.6959)/14.6959] * [527.67/(T+459.67)]

| Actual to Standard Conversions (@ 1,016 oF vs. 68 oF (Ignore Δ psi): | 9,268 acfm = | 3,314 scfm |
|---|---|---|

# Attachment O

## Monitoring/Recordkeeping/Reporting/Testing Plans

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

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**NOTE: Williams OVM is not submitting any special recommendations for monitoring, recordkeeping, reporting, or testing plans other than those typically established for the emissions units in this application.**

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# Attachment P

# Public Notice

"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."

The applicant shall cause such legal advertisement to appear a minimum of one (1) day in the newspaper most commonly read in the area where the facility exists or will be constructed. The notice must be published no earlier than five (5) working days of receipt by this office of your application. The original affidavit of publication must be received by this office no later than the last day of the public comment period.

The advertisement shall contain, at a minimum, the name of the applicant, the type and location of the source, the type and amount of air pollutants that will be discharged, the nature of the permit being sought, the proposed start-up date for the source and a contact telephone number for more information.

The location of the source should be as specific as possible starting with:

1) the street address of the source;
2) the nearest street or road;
3) the nearest town or unincorporated area;
4) the county; and
5) latitude and longitude coordinates.

Types and amounts of pollutants discharged must include all regulated pollutants (PM, PM10, VOC, SO2, Xylene, etc.) and their potential to emit or the permit level being sought in units of tons per year (including fugitive emissions).

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- Legal Advertisement (as shown) will be placed in a newspaper of general circulation in the area where the source is located (See 45CSR§13-8.3 thru 45CSR§13-8.5).
- An Affidavit of Publication shall be submitted immediately upon receipt.

## ATTACHMENT P
## Public Notice

## AIR QUALITY PUBLIC NOTICE
## Notice of Application

Notice is given that Williams Ohio Valley Midstream, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 NSR Permit Modification for the existing Conner Compressor Station, ~800 ft South of Kull Ln (Airport Access), ~0.4 mi East of CR-21/Roberts Ridge Rd, Moundsville, in Marshal County, WV 86041.

The latitude and longitude coordinates are 39°52'47.5" North and -80°44'48.0" West.

The applicant estimates the increase/(decrease) in the potential to discharge the following regulated air pollutants will be:

| | |
|---|---|
| 0.12 | tons of nitrogen oxides per year |
| 0.24 | tons of carbon monoxide per year |
| 31.82 | tons of volatile organic compounds per year |
| (0.91) | tons of particulate matter per year |
| (0.40) | tons of sulfur dioxide per year |
| 2.93 | tons of total hazardous air pollutants per year |
| (15,899) | tons of carbon dioxide equivalent per year |

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

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

Dated this the _____ day of _____ 2018.

By: Williams Ohio Valley Midstream LLC
Mr. Paul V. Hunter
Vice President
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275

## Attachment Q
## Business Confidential Claims
## (Not Applicable)

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also

## Attachment R
## Authority Forms
## (Not Applicable)

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also

## Attachment S
## Title V Permit Revision Information
## (Not Applicable)

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# Supplement S1

# Lab Analysis (Inlet Gas)

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- **Wet Gas – Summary – Conner Compressor Station (CCS)**
- **Wet Gas – Lab Analysis – Conner Compressor Station (CCS)**
- **Raw Condensate – Summary – Conner Compressor Station (CCS)**
- **Raw Condensate – Lab Analysis – Conner Compressor Station (CCS)**

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## Wet Gas - Summary

**Sampled:** 10/13/17

GPSA-Sec 23

| Component | CAS | Formula | Molecular Weight (MW) | Mole % (M% = V%) | Mole Fraction (MF) | lb/MMscf (WS/UGC#) | Weight % Total | Weight % THC | Weight % VOC | Component Btu/scf (HHV) | Btu/scf (HHV) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Water** | 109-86-4 | H2O | 18.015 | --- | --- | --- | --- | --- | --- | --- | --- |
| **Carbon Dioxide** | 124-38-9 | CO2 | 44.010 | 0.1344 | 0.059 | 155.87 | 0.2747 | --- | --- | --- | --- |
| **Hydrogen Sulfide** | 2148-87-8 | H2S | 34.086 | --- | --- | --- | --- | --- | --- | 638 | --- |
| **Nitrogen** | 7727-37-9 | N2 | 28.013 | 0.5769 | 0.162 | 425.87 | 0.7506 | --- | --- | --- | --- |
| **Methane*** | 75-82-8 | CH4 | 16.042 | 74.8125 | 12.002 | 31,626.48 | 55.7422 | 56.3196 | --- | 1,010 | 755.606 |
| **Ethane*** | 74-84-0 | C2H6 | 30.069 | 15.3479 | 4.615 | 12,161.14 | 21.4342 | 21.6562 | --- | 1,770 | 271.612 |
| **Propane**** | 74-98-6 | C3H8 | 44.096 | 5.8898 | 2.597 | 6,843.87 | 12.0624 | 12.1874 | 55.3364 | 2,516 | 148.199 |
| **iso-Butane**** | 75-28-5 | i-C4H10 | 58.122 | 0.5636 | 0.328 | 863.21 | 1.5214 | 1.5372 | 6.9796 | 3,252 | 18.328 |
| **n-Butane**** | 106-97-8 | n-C4H10 | 58.122 | 1.6326 | 0.949 | 2,500.50 | 4.4072 | 4.4528 | 20.2179 | 3,262 | 53.262 |
| **iso-Pentane**** | 78-78-4 | i-C5H12 | 72.149 | 0.2868 | 0.207 | 545.27 | 0.9611 | 0.9710 | 4.4088 | 4,001 | 11.475 |
| **n-Pentane**** | --- | n-C5H12 | 72.149 | 0.4155 | 0.300 | 789.96 | 1.3923 | 1.4067 | 6.3873 | 4,009 | 16.657 |
| **Cyclopentane**** | 287-92-3 | C5H10 | 70.100 | --- | --- | --- | --- | --- | --- | 3,764 | --- |
| **Cyclohexane**** | --- | C6H12 | 84.162 | 0.0222 | 0.019 | 49.24 | 0.0868 | 0.0877 | 0.3981 | 4,482 | 0.995 |
| **Other Hexanes**** | --- | C6H14 | 86.175 | 0.1200 | 0.103 | 272.50 | 0.4803 | 0.4853 | 2.2033 | 4,750 | 5.700 |
| **Heptanes**** | 142-82-5 | C7H16 | 100.205 | 0.0572 | 0.057 | 151.04 | 0.2662 | 0.2690 | 1.2212 | 5,503 | 3.147 |
| **Methylcyclohexane**** | 108-87-2 | C7H14 | 98.186 | 0.0140 | 0.014 | 36.22 | 0.0638 | 0.0645 | 0.2929 | 5,216 | 0.730 |
| **C8+ Heavies**** | Various | C8+ | 138.00 est. | 0.0190 | 0.026 | 69.09 | 0.1218 | 0.1230 | 0.5587 | 7,000 | 1.330 |
| **Benzene***** | 71-43-2 | C6H6 | 78.112 | 0.0016 | 0.001 | 3.29 | 0.0058 | 0.0059 | 0.0266 | 3,742 | 0.060 |
| **Ethylbenzene***** | 100-41-4 | C8H10 | 106.165 | 0.0001 | 0.000 | 0.28 | 0.0005 | 0.0005 | 0.0023 | 5,222 | 0.005 |
| **n-Hexane***** | 110-54-3 | C6H14 | 86.175 | 0.1035 | 0.089 | 235.03 | 0.4142 | 0.4185 | 1.9004 | 4,756 | 4.922 |
| **Toluene***** | 108-88-3 | C7H8 | 92.138 | 0.0019 | 0.002 | 4.61 | 0.0081 | 0.0082 | 0.0373 | 4,475 | 0.085 |
| **2,2,4-Trimethylpentane***** | 540-84-1 | C8H18 | 114.229 | 0.0012 | 0.001 | 3.61 | 0.0064 | 0.0064 | 0.0292 | 6,214 | 0.075 |
| **Xylenes***** | 1330-20-7 | C8H10 | 106.165 | --- | --- | --- | --- | --- | --- | 5,209 | --- |
| **Totals:** | | | | **100.0007** | **21.53** | **56,737** | **100.00** | **---** | **---** | | |
| **THC:** | | | | **99.2894** | **21.31** | **56,155** | **98.97** | **100.00** | **---** | | |
| **Total VOC:** | | | | **9.1290** | **4.69** | **12,368** | **21.80** | **22.02** | **100.00** | | |
| **Total HAP:** | | | | **0.1083** | **0.09** | **247** | **0.44** | **0.44** | **2.00** | | |

#UGC (Universal Gas Constant)
= 379.482 scf/lb-mol @ 60 oF and 14.6959 psia.

lb "X"/scf =
(M% of "X") x (MW of "X") / #UGC

**Calculated Btu/scf (HHV):** 1,292

**Worst-Case Btu/scf (HHV):** 1,020

| Component | Representative Wet Gas Analysis | | | Assumed "Worst-Case" 120% VOC 150% HAP | | Margin for Changes in Future Gas Composition |
|---|---|---|---|---|---|---|
| | Mole % | Wgt % | lb/MMscf | Wgt % | lb/MMscf | |
| **CO2** | 0.134 | 0.2747 | 155.87 | 0.2378 | 155.87 | **0% Margin** |
| **Methane*** | 74.813 | 55.7422 | 31,626.48 | 57.9099 | 37,951.78 | **20% Margin** |
| **Other (N2, C2, O2, CO, H2O)** | 15.925 | 22.1848 | 12,587.01 | 19.2063 | 12,587.01 | **0% Margin** |
| **VOC**** | 9.129 | 21.7983 | 12,367.75 | 22.6460 | 14,841.30 | **20% Margin** |
| **TOTAL GAS** | **100.001** | **100.0000** | **56,737.10** | **100.0000** | **65,535.95** | |
| **Benzene***** | 0.002 | 0.0058 | 3.29 | 0.0116 | 4.94 | **50% Margin** |
| **Ethylbenzene***** | 1E-04 | 0.0005 | 0.28 | 0.0006 | 0.42 | **50% Margin** |
| **n-Hexane***** | 0.104 | 0.4142 | 235.03 | 0.5379 | 352.55 | **50% Margin** |
| **Toluene***** | 0.002 | 0.0081 | 4.61 | 0.0106 | 6.92 | **50% Margin** |
| **2,2,4-Trimethylpentane***** | 0.001 | 0.0064 | 3.61 | 0.0083 | 5.42 | **50% Margin** |
| **Xylenes***** | --- | --- | --- | 0.0006 | 0.42 | **--- Margin** |
| **Total HAP***** | **0.108** | **0.4350** | **246.83** | **0.5656** | **370.67** | |

* = Hydrocarbon (HC)
** = also Volatile Organic Compound (VOC)
*** = also Hazardous Air Pollutant (HAP)

## Wet Gas - Lab Analysis

# Williams Quality Control Facility
## Extended Analysis by GPA 2286

### Sample Information

| | Sample Information |
|---|---|
| Sample Name | CONNER DEHY INLET |
| Sample Number | N/A |
| Meter Number | N/A |
| Cylinder # | 7072 |
| Sampled By | H. Fox |
| Sample Date & Time | 10/13/17 1650 |
| Temperature, deg F. | 95.0 |
| Pressure, psig | 870.0 |
| Eagle WO# | N/A |
| Analyzed By | AS |
| Reported By | AS |
| Method Name | GPA 2286 Ext Gas Analysis - LOW C1 |
| Injection Date | 2017-10-13 21:32:00 |
| Report Date | 2017-10-13 22:15:34 |
| EZReporter Configuration File | ORSH Gas Extended Analysis - May 2016.1.cfgx |

### Component Results

| Component Name | Ret. Time | Peak Area | Norm Mole% | |
|---|---|---|---|---|
| Nitrogen | 3.58 | 5.700 | 0.5769 | |
| Methane | 3.46 | 407.246 | 74.8125 | |
| Carbon Dioxide | 4.44 | 1.500 | 0.1344 | |
| Ethane | 3.60 | 165.583 | 15.3479 | |
| Propane | 3.91 | 94.983 | 5.8898 | |
| iso-Butane | 4.39 | 12.078 | 0.5636 | |
| n-Butane | 4.78 | 35.187 | 1.6326 | |
| Neopentane | 4.99 | 0.170 | 0.0062 | |
| iso-Pentane | 6.15 | 7.783 | 0.2868 | |
| n-Pentane | 6.79 | 11.151 | 0.4093 | |
| Hexanes Plus | 0.00 | 0.000 | 0.3400 | |
| Total: | | | 100.0000 | |

### Results Summary

| Result | Dry | |
|---|---|---|
| Pressure Base (psia) | 14.73 | |
| Temperature Base | 60.0 | |
| Gross Heating Value (BTU / Ideal cu.ft.) | 1294.3 | |
| Gross Heating Value (BTU / Real cu.ft.) | 1299.2 | |
| Specific Gravity, Ideal | 0.7429 | |
| Specific Gravity, Real | 0.7454 | |
| BTEX, mol% | 0.0036 | |

*All results calculated at 14.696 psia and 60F

## Wet Gas - Lab Analysis - Continued

### Total Component Results

| Component | Weight% | Mole% | Volume% | |
|---|---|---|---|---|
| Nitrogen | 0.7509 | 0.5769 | 0.3239 | |
| Methane | 55.7657 | 74.8125 | 64.7330 | |
| Carbon Dioxide | 0.2748 | 0.1344 | 0.1171 | |
| Ethane | 21.4434 | 15.3479 | 20.9552 | |
| Propane | 12.0676 | 5.8898 | 8.2853 | |
| iso-Butane | 1.5221 | 0.5636 | 0.9413 | |
| n-Butane | 4.4090 | 1.6326 | 2.6278 | |
| Neopentane | 0.0208 | 0.0062 | 0.0121 | |
| iso-Pentane | 0.9614 | 0.2868 | 0.5359 | |
| n-Pentane | 1.3721 | 0.4093 | 0.7568 | |
| 2,2-Dimethylbutane | 0.0232 | 0.0058 | 0.0123 | |
| 2,3-Dimethylbutane/Cyclopentane | 0.0483 | 0.0133 | 0.0238 | |
| 2-Methylpentane | 0.2350 | 0.0647 | 0.1158 | |
| 3-Methylpentane | 0.1449 | 0.0362 | 0.0753 | |
| n-Hexane | 0.4144 | 0.1035 | 0.2172 | |
| 2,2-Dimethylpentane | 0.0056 | 0.0012 | 0.0029 | |
| Methylcyclopentane/2,4-Dimethylpentane | 0.0465 | 0.0119 | 0.0215 | |
| Benzene | 0.0058 | 0.0016 | 0.0023 | |
| 3,3-Dimethylpentane | 0.0033 | 0.0007 | 0.0016 | |
| Cyclohexane | 0.0403 | 0.0103 | 0.0179 | |
| 2-Methylhexane | 0.0596 | 0.0128 | 0.0303 | |
| 2,3-Dimethylpentane | 0.0140 | 0.0030 | 0.0070 | |
| 3-Methylhexane | 0.0656 | 0.0141 | 0.0330 | |
| cis-1,3-Dimethylcyclopentane | 0.0084 | 0.0018 | 0.0042 | |
| 2,2,4-Trimethylpentane | 0.0064 | 0.0012 | 0.0032 | |
| 3-Ethylpentane | 0.0116 | 0.0025 | 0.0057 | |
| n-Heptane | 0.1066 | 0.0229 | 0.0539 | |
| cis-1,2-Dimethylcyclopentane | 0.0541 | 0.0102 | 0.0267 | |
| 2,5-Dimethylhexane | 0.0027 | 0.0005 | 0.0013 | |
| 2,4-Dimethylhexane/Ethylcyclopentane/2,2,3-Trimethylpentane | 0.0074 | 0.0014 | 0.0037 | |
| 3,3-Dimethylhexane | 0.0032 | 0.0006 | 0.0016 | |
| trans-1,2-cis-3-Trimethylcyclopentane | 0.0011 | 0.0002 | 0.0005 | |
| Toluene | 0.0081 | 0.0019 | 0.0032 | |
| 1,1,2-Trimethylcyclopentane | 0.0027 | 0.0005 | 0.0013 | |
| 2-Methylheptane/4-Methylheptane | 0.0265 | 0.0050 | 0.0131 | |
| 3-Ethylhexane | 0.0186 | 0.0035 | 0.0092 | |
| trans-1,2-Dimethylcyclohexane | 0.0027 | 0.0005 | 0.0013 | |
| 1,1-Dimethylcyclohexane | 0.0021 | 0.0004 | 0.0010 | |
| 2,2,4-Trimethylhexane | 0.0011 | 0.0002 | 0.0005 | |
| n-Octane | 0.0234 | 0.0044 | 0.0115 | |
| trans-1,3-Dimethylcyclohexane | 0.0021 | 0.0004 | 0.0009 | |
| 2,4-Dimethylheptane | 0.0012 | 0.0002 | 0.0006 | |
| cis-1,2-Dimethylcyclohexane | 0.0016 | 0.0003 | 0.0007 | |
| 3,3-Dimethylheptane | 0.0006 | 0.0001 | 0.0003 | |
| 1,1,4-Trimethylcyclohexane | 0.0006 | 0.0001 | 0.0003 | |
| Ethylbenzene | 0.0005 | 0.0001 | 0.0002 | |
| 3-Methyloctane | 0.0018 | 0.0003 | 0.0009 | |
| 1,1,2-Trimethylcyclohexane | 0.0060 | 0.0010 | 0.0029 | |
| iso-Propylcyclohexane | 0.0006 | 0.0001 | 0.0003 | |
| m-Ethyltoluene | 0.0007 | 0.0001 | 0.0003 | |
| p-Ethyltoluene | 0.0007 | 0.0001 | 0.0003 | |
| 2-Methylnonane | 0.0007 | 0.0001 | 0.0003 | |
| 1,2,4-Trimethylbenzene/tert-Butylbenzene/Methylcyclooctane | 0.0006 | 0.0001 | 0.0002 | |
| n-Decane | 0.0013 | 0.0002 | 0.0006 | |
| Total: | 100.0000 | 100.0000 | 100.0000 | |

Williams Ohio Valley Midstream LLC (OVM)

**Conner Compressor Station (CCS)**

Application for 45CSR13 NSR Permit Modification

## Raw Condensate - Summary

**Sampled:** 01/16/18

GPSA-Sec 23

| Component | CAS | Formula | Molecular Weight (MW) | Mole % (M% = V%) | Mole Fraction (MF) | lb/MMscf (WS/UGC#) | Weight % Total | Weight % THC | Weight % VOC | Component Btu/scf (HHV) | Btu/scf (HHV) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Water** | 109-86-4 | H2O | 18.015 | --- | --- | --- | --- | --- | --- | --- | --- |
| **Carbon Dioxide** | 124-38-9 | CO2 | 44.010 | 1.4160 | 0.623 | 1,642.17 | 0.7987 | --- | --- | --- | --- |
| **Nitrogen** | 7727-37-9 | N2 | 28.013 | 0.0309 | 0.009 | 22.81 | 0.0111 | --- | --- | --- | --- |
| **Methane*** | 75-82-8 | CH4 | 16.042 | 7.1258 | 1.143 | 3,012.40 | 1.4651 | 1.4771 | --- | 1,010 | 71.971 |
| **Ethane*** | 74-84-0 | C2H6 | 30.069 | 8.3998 | 2.526 | 6,655.75 | 3.2371 | 3.2635 | --- | 1,770 | 148.651 |
| **Propane**** | 74-98-6 | C3H8 | 44.096 | 11.9412 | 5.266 | 13,875.61 | 6.7485 | 6.8036 | 7.1422 | 2,516 | 300.464 |
| **iso-Butane**** | 75-28-5 | i-C4H10 | 58.122 | 2.5778 | 1.498 | 3,948.21 | 1.9202 | 1.9359 | 2.0323 | 3,252 | 83.830 |
| **n-Butane**** | 106-97-8 | n-C4H10 | 58.122 | 11.3331 | 6.587 | 17,357.99 | 8.4422 | 8.5111 | 8.9346 | 3,262 | 369.731 |
| **iso-Pentane**** | 78-78-4 | i-C5H12 | 72.149 | 4.2437 | 3.062 | 8,068.30 | 3.9241 | 3.9561 | 4.1530 | 4,001 | 169.786 |
| **n-Pentane**** | --- | n-C5H12 | 72.149 | 8.4136 | 6.070 | 15,996.30 | 7.7799 | 7.8434 | 8.2337 | 4,009 | 337.293 |
| **Cyclopentane**** | 287-92-3 | C5H10 | 70.100 | --- | --- | --- | --- | --- | --- | 3,764 | --- |
| **Cyclohexane**** | --- | C6H12 | 84.162 | 0.8248 | 0.694 | 1,829.22 | 0.8897 | 0.8969 | 0.9416 | 4,482 | 36.964 |
| **Other Hexanes**** | --- | C6H14 | 86.175 | 4.4300 | 3.818 | 10,060.03 | 4.8928 | 4.9327 | 5.1782 | 4,750 | 210.440 |
| **Heptanes**** | 142-82-5 | C7H16 | 100.205 | 8.4252 | 8.442 | 22,247.42 | 10.8202 | 10.9085 | 11.4514 | 5,503 | 463.598 |
| **Methylcyclohexane**** | 108-87-2 | C7H14 | 98.186 | 1.8282 | 1.795 | 4,730.18 | 2.3006 | 2.3193 | 2.4348 | 5,216 | 95.356 |
| **C8+ Heavies**** | Various | C8+ | 138.00 est. | 21.6338 | 29.855 | 78,672.04 | 38.2626 | 38.5750 | 40.4947 | 7,000 | 1514.366 |
| **Benzene***** | 71-43-2 | C6H6 | 78.112 | 0.0848 | 0.066 | 174.56 | 0.0849 | 0.0856 | 0.0899 | 3,742 | 3.173 |
| **Ethylbenzene***** | 100-41-4 | C8H10 | 106.165 | 0.0968 | 0.103 | 270.89 | 0.1317 | 0.1328 | 0.1394 | 5,222 | 5.056 |
| **n-Hexane***** | 110-54-3 | C6H14 | 86.175 | 5.7112 | 4.922 | 12,969.34 | 6.3077 | 6.3592 | 6.6757 | 4,756 | 271.624 |
| **Toluene***** | 108-88-3 | C7H8 | 92.138 | 0.2779 | 0.256 | 674.81 | 0.3282 | 0.3309 | 0.3473 | 4,475 | 12.437 |
| **2,2,4-Trimethylpentane***** | 540-84-1 | C8H18 | 114.229 | 0.1428 | 0.163 | 429.75 | 0.2090 | 0.2107 | 0.2212 | 6,214 | 8.871 |
| **Xylenes***** | 1330-20-7 | C8H10 | 106.165 | 1.0626 | 1.128 | 2,972.77 | 1.4458 | 1.4576 | 1.5302 | 5,209 | 55.347 |
| **Totals:** | | | | **100.0000** | **78.03** | **205,610.55** | **100.0000** | **---** | **---** | | |
| **THC:** | | | | **98.5531** | **77.39** | **203,945.57** | **99.1902** | **100.0000** | **---** | | |
| **Total VOC:** | | | | **83.0275** | **73.72** | **194,277.41** | **94.4881** | **95.2594** | **100.0000** | | |
| **Total HAP:** | | | | **7.3761** | **6.64** | **17,492.11** | **8.5074** | **8.5769** | **9.0037** | | |

**Calculated Btu/scf (HHV):** **4,159**

#UGC (Universal Gas Constant)
= 379.482 scf/lb-mol @ 60 oF and 14.6959 psia.

lb "X"/scf =
(M% of "X") x (MW of "X") / #UGC

| Component | Representative Raw Condensate Analysis | | | Assumed "Worst-Case" | | Margin for Changes in Future Condensate Composition |
|---|---|---|---|---|---|---|
| | | | | 120% VOC | 150% HAP | |
| | Mole % | Wgt % | lb/MMscf | Wgt % | lb/MMscf | |
| **CO2** | 1.416 | 0.7987 | 1,642.17 | 0.6701 | 1,642.17 | **0% Margin** |
| **Methane*** | 7.126 | 1.4651 | 3,012.40 | 1.4751 | 3,614.88 | **20% Margin** |
| **Other (N2, C2, O2, CO, H2O)** | 8.431 | 3.2482 | 6,678.56 | 2.7252 | 6,678.56 | **0% Margin** |
| **VOC**** | 83.028 | 94.4881 | 194,277.41 | 95.1297 | 233,132.89 | **20% Margin** |
| **TOTAL RAW CONDENSATE** | **100.000** | **100.0000** | **205,610.55** | **100.0000** | **245,068.51** | |
| **Benzene***** | 0.085 | 0.0849 | 174.56 | 0.1698 | 261.85 | **50% Margin** |
| **Ethylbenzene***** | 0.097 | 0.1317 | 270.89 | 0.1658 | 406.33 | **50% Margin** |
| **n-Hexane***** | 5.711 | 6.3077 | 12,969.34 | 7.9382 | 19,454.01 | **50% Margin** |
| **Toluene***** | 0.278 | 0.3282 | 674.81 | 0.4130 | 1,012.21 | **50% Margin** |
| **2,2,4-Trimethylpentane***** | 0.143 | 0.2090 | 429.75 | 0.2630 | 644.63 | **50% Margin** |
| **Xylenes***** | 1.063 | 1.4458 | 2,972.77 | 1.8196 | 4,459.15 | **50% Margin** |
| **Total HAP***** | **7.376** | **8.5074** | **17,492.11** | **10.7065** | **26,238.17** | |

* = Hydrocarbon (HC)

** = also Volatile Organic Compound (VOC)

*** = also Hazardous Air Pollutant (HAP)

## Raw Condensate - Lab Analysis

# Williams Quality Control Facility
## C24+ Analysis by ASTM D8003

### Sample Information

| | Sample Information |
|---|---|
| Sample Name | CONNER BERGER CONDENSATE INLET 011618 |
| Analyzed By | R Dibble |
| Reported By | R Dibble |
| Station No. | 52255-55 |
| County | Marshall |
| State | WV |
| Sample Date & Time | 01/16/18 1400 |
| Sampled By | H Fox |
| Sample Type | Composite (01/02/18-01/16/18) |
| Pressure (psig) | 625.0 |
| Temperature (deg F.) | 50.0 |
| Cylinder No. | 96065 |
| Vapor Pressure (psig), ASTM 6897 | N/A |
| Water Content (ppmw), ASTM 6304 | N/A |
| Calibration Name | 7890 HPLIS |
| Injection Date | 2018-01-16 18:35:00 |
| Report Date | 2018-01-16 19:15:57 |
| EZReporter Configuration File | Williams ORSH Liquid Custody Samples - May 2017.cfgx |

### Component Results

| Component Name | Peak Area | Norm Mole% | Norm Weight% | Norm Volume% | |
|---|---|---|---|---|---|
| Nitrogen | 0.400 | 0.0309 | 0.0109 | 0.0087 | |
| Methane | 16.200 | 7.1258 | 1.4378 | 3.0930 | |
| Carbon Dioxide | 62.800 | 1.4160 | 0.7837 | 0.6186 | |
| Ethane | 37.000 | 8.3998 | 3.1767 | 5.7531 | |
| Propane | 79.800 | 11.9412 | 6.6225 | 8.4262 | |
| iso-Butane | 23.400 | 2.5778 | 1.8844 | 2.1596 | |
| n-Butane | 100.700 | 11.3331 | 8.2845 | 9.1504 | |
| Neopentane | 0.900 | 0.0972 | 0.0711 | 0.0785 | |
| iso-Pentane | 46.600 | 4.2437 | 3.8508 | 3.9782 | |
| n-Pentane | 89.800 | 8.3164 | 7.5464 | 7.7136 | |
| Hexanes Plus | 0.000 | 44.5181 | 66.3312 | 59.0201 | |
| Total: | | 100.0000 | 100.0000 | 100.0000 | |

## Raw Condensate - Lab Analysis

| # | Component | C6+ Wt% | C6+ Mol% | C6+ Vol% |
|---|---|---|---|---|
| 14 | C6 Unknown 2 | 0.0246 | 0.0338 | 0.0269 |
| 16 | 2-2-Dimethylbutane | 0.2067 | 0.2841 | 0.2291 |
| 17 | 2-3-Dimethylbutane/2-Methylpentane | 4.4104 | 6.0633 | 4.7757 |
| 18 | 3-Methylpentane | 2.5967 | 3.5699 | 2.8590 |
| 19 | n-Hexane | 9.3315 | 12.8289 | 10.1874 |
| 22 | 2-2-Dimethylpentane/Methylcyclopentane/2-4-Dimethylpentane | 1.4347 | 1.6963 | 1.5324 |
| 24 | Benzene | 0.1256 | 0.1905 | 0.1029 |
| 25 | 3-3-Dimethylpentane | 0.1039 | 0.1229 | 0.1080 |
| 26 | Cyclohexane | 1.3161 | 1.8527 | 1.2170 |
| 27 | 2-Methylhexane | 2.6489 | 3.1318 | 2.8086 |
| 28 | 2-3-Dimethylpentane | 0.5223 | 0.6175 | 0.5410 |
| 29 | 3-Methylhexane | 3.2845 | 3.8833 | 3.4401 |
| 30 | 3-Ethylpentane/cis-1-3-Dimethylcyclopentane | 0.3057 | 0.3614 | 0.3151 |
| 31 | C7 Unknown 4 | 0.5075 | 0.6001 | 0.5346 |
| 32 | 2-2-4-Trimethylpentane/trans-1-3-Dimethylcyclopentane | 0.3092 | 0.3207 | 0.3217 |
| 33 | n-Heptane | 7.1993 | 8.5121 | 7.5836 |
| 34 | C8 Unknown 1 | 0.0275 | 0.0285 | 0.0282 |
| 35 | Methylcyclohexane/1-1-3-Trimethylcyclopentane/2-2-Dimethylhexane | 3.4035 | 4.1066 | 3.1862 |
| 36 | 2-5-Dimethylhexane | 0.4202 | 0.4358 | 0.4361 |
| 37 | 2-4-Dimethylhexane/Ethylcyclopentane | 0.4453 | 0.4618 | 0.4578 |
| 38 | C8 Unknown 2 | 0.2581 | 0.2677 | 0.2648 |
| 39 | C8 Unknown 3 | 0.1012 | 0.1050 | 0.1038 |
| 40 | Toluene | 0.4855 | 0.6243 | 0.4035 |
| 41 | C8 Unknown 4 | 0.4764 | 0.4941 | 0.4888 |
| 42 | 2-methylheptane/4-Methylheptane/3-Methylheptane | 4.8968 | 5.0787 | 5.0519 |
| 43 | C8 Unknown 5 | 0.1861 | 0.1930 | 0.1909 |
| 44 | trans-1-2-Dimethylcyclohexane | 0.5015 | 0.5201 | 0.5146 |
| 45 | cis-1-2-Dimethylcyclohexane | 1.4104 | 1.4891 | 1.3264 |
| 47 | C8 Unknown 7 | 0.1974 | 0.2047 | 0.2025 |
| 48 | C8 Unknown 8 | 0.0733 | 0.0760 | 0.0752 |
| 49 | n-Octane | 4.9201 | 5.1029 | 5.0483 |
| 50 | C9 Unknown 1 | 0.0661 | 0.0611 | 0.0663 |
| 51 | trans-1-3-Dimethylcyclohexane | 0.4171 | 0.3853 | 0.4187 |
| 52 | C9 Unknown 2 | 0.0377 | 0.0348 | 0.0378 |
| 53 | C9 Unknown 3 | 0.1298 | 0.1199 | 0.1303 |
| 54 | C9 Unknown 4 | 0.8315 | 0.7681 | 0.8346 |
| 55 | C9 Unknown 5 | 1.6380 | 1.5131 | 1.6442 |
| 56 | cis-1-3-Dimethylcyclohexane | 0.5442 | 0.5746 | 0.4997 |
| 57 | C9 Unknown 6 | 0.0710 | 0.0656 | 0.0713 |
| 59 | C9 Unknown 8 | 0.4628 | 0.4275 | 0.4645 |
| 60 | C9 Unknown 9 | 0.1117 | 0.1032 | 0.1121 |
| 62 | Ethylcyclohexane | 0.6671 | 0.7043 | 0.6100 |
| 63 | Ethylbenzene | 0.1949 | 0.2175 | 0.1620 |
| 64 | m-Xylene/p-Xylene | 1.9484 | 2.1742 | 1.6249 |
| 65 | C9 Unknown 11 | 0.0468 | 0.0432 | 0.0470 |
| 66 | C9 Unknown 12 | 0.3357 | 0.3101 | 0.3370 |
| 68 | o-Xylene | 0.1906 | 0.2127 | 0.1561 |
| 69 | C9 Unknown 14 | 0.0319 | 0.0295 | 0.0320 |
| 70 | C9 Unknown 15 | 1.5796 | 1.4591 | 1.5856 |
| 72 | n-Nonane | 3.1533 | 2.9128 | 3.1652 |
| 73 | C10 Unknown 1 | 0.2433 | 0.2026 | 0.2401 |
| 74 | C10 Unknown 2 | 0.2433 | 0.2026 | 0.2401 |
| 75 | Isopropylbenzene | 0.2596 | 0.2559 | 0.2171 |
| 76 | Cyclooctane | 0.3447 | 0.3639 | 0.2972 |
| 77 | C10 Unknown 3 | 0.3761 | 0.3132 | 0.3712 |
| 78 | n-Propylcyclohexane | 0.5421 | 0.5087 | 0.4924 |
| 79 | C10 Unknown 4 | 0.4631 | 0.3856 | 0.4570 |
| 80 | C10 Unknown 5 | 0.1703 | 0.1418 | 0.1681 |
| 81 | n-propylbenzene | 0.1549 | 0.1527 | 0.1295 |
| 82 | C10 Unknown 6 | 0.7334 | 0.6107 | 0.7238 |
| 83 | C10 Unknown 7 | 0.1040 | 0.0866 | 0.1026 |
| 84 | 1-3-5-Trimethylbenzene | 1.1397 | 1.1234 | 0.9495 |
| 85 | C10 Unknown 8 | 0.7691 | 0.6404 | 0.7590 |
| 86 | C10 Unknown 9 | 0.0291 | 0.0242 | 0.0287 |
| 87 | C10 Unknown 10 | 0.1573 | 0.1310 | 0.1552 |
| 88 | C10 Unknown 11 | 0.7889 | 0.6569 | 0.7786 |
| 89 | 1-2-4-Trimethylbenzene/Tert-Butylbenzene | 0.4009 | 0.3952 | 0.3300 |
| 90 | C10 Unknown 12 | 0.2458 | 0.2047 | 0.2426 |
| 91 | tert-Butylcyclohexane | 0.0693 | 0.0585 | 0.0614 |
| 92 | n-decane | 2.5138 | 2.0932 | 2.4809 |
| 93 | C11s | 5.1604 | 3.9113 | 5.0250 |
| 94 | C12s | 5.3335 | 3.7095 | 5.1365 |
| 95 | C13s | 4.0445 | 2.5991 | 3.8491 |
| 96 | C14s | 2.4931 | 1.4888 | 2.3678 |
| 97 | C15s | 2.8051 | 1.5645 | 2.6335 |
| 98 | C16s | 1.8809 | 0.9841 | 1.7544 |
| 99 | C17s | 1.4854 | 0.7318 | 1.3812 |
| 100 | C18s | 1.0300 | 0.4795 | 0.9550 |
| 101 | C19s | 0.7434 | 0.3280 | 0.6848 |
| 102 | C20s | 0.4212 | 0.1766 | 0.3859 |
| 103 | C21s | 0.1264 | 0.0505 | 0.1152 |
| 104 | C22s | 0.0661 | 0.0252 | 0.0600 |
| 106 | C24+ | 0.0720 | 0.0252 | 0.0650 |
| | Total: | 100.0000 | 100.0000 | 100.0000 |

Potentially Applicable

## AP-42 and GHG EMISSION FACTORS

(Preferentially use test data or vendor data where available)

| | Pollutant | GAS-FIRED ENGINES | | | GAS-FIRED TURBINES | | |
|---|---|---|---|---|---|---|---|
| | | AP-42 Table 3.2-1; 3.2-2; 3.2-3 07/00 | | | AP-42 Table 3.1-1; 3.1-2a; 3.1-3 04/00 | | |
| | | 2SLB lb/MMBtu | 4SLB lb/MMBtu | 4SRB lb/MMBtu | Uncontrolled lb/MMBtu | Water Injection lb/MMBtu | Lean Pre-Mix# lb/MMBtu |
| CRITERIA | NOX (≥ 90% Load) | 3.17E+00 | 4.08E+00 | 2.21E+00 | 3.23E-01 | 1.28E-01 | 9.91E-02 |
| | CO (≥ 90% Load) | 3.86E-01 | 3.17E-01 | 3.72E+00 | 8.23E-02 | 2.95E-02 | 1.51E-02 |
| | VOC | 1.20E-01 | 1.18E-01 | 2.96E-02 | 2.10E-03 | 2.10E-03 | 2.10E-03 |
| | PM10/2.5 (Total) | 4.83E-02 | 9.99E-03 | 1.94E-02 | 6.63E-03 | 6.63E-03 | 6.63E-03 |
| | SO2 | 5.88E-04 | 5.88E-04 | 5.88E-04 | 3.40E-03 | 3.40E-03 | 3.40E-03 |
| HAPs | Acetaldehyde | 7.76E-03 | 8.36E-03 | 2.79E-03 | 4.00E-05 | 4.00E-05 | 4.00E-05 |
| | Acrolein | 7.78E-03 | 5.14E-03 | 2.63E-03 | 6.40E-06 | 6.40E-06 | 6.40E-06 |
| | Benzene | 1.94E-03 | 4.40E-04 | 1.58E-03 | 1.20E-05 | 1.20E-05 | 9.10E-07 |
| | Butadiene, 1,3- | 8.20E-04 | 2.67E-04 | 6.63E-04 | 4.30E-07 | 4.30E-07 | 4.30E-07 |
| | Ethylbenzene | 1.08E-04 | 3.97E-05 | 2.48E-05 | 3.20E-05 | 3.20E-05 | 3.20E-05 |
| | Formaldehyde (HCHO) | 5.52E-02 | 5.28E-02 | 2.05E-02 | 7.10E-04 | 7.10E-04 | 2.00E-05 |
| | n-Hexane | 4.45E-04 | 1.11E-03 | --- | --- | --- | --- |
| | Methanol (MeOH) | 2.48E-03 | 2.50E-03 | 3.06E-03 | --- | --- | --- |
| | Polycyclic Organic Matter (POM/PAH) | 1.34E-04 | 3.47E-04 | 9.71E-05 | 3.25E-05 | 3.25E-05 | 3.25E-05 |
| | Toluene | 9.63E-04 | 4.08E-04 | 5.58E-04 | 1.30E-04 | 1.30E-04 | 1.30E-04 |
| | Trimethylpentane, 2,2,4- (i-Octane) | 8.46E-04 | 2.50E-04 | --- | --- | --- | --- |
| | Xylenes | 2.68E-04 | 1.84E-04 | 1.95E-04 | 6.40E-05 | 6.40E-05 | 6.40E-05 |
| | Other/Trace HAP* | 6.57E-04 | 3.21E-04 | 1.79E-04 | 2.90E-05 | 2.90E-05 | 2.90E-05 |
| | TOTAL HAP | 7.94E-02 | 7.22E-02 | 3.23E-02 | 1.06E-03 | 1.06E-03 | 3.55E-04 |
| GHG | CO2 (GWP=1) | 1.10E+02 | 1.10E+02 | 1.10E+02 | 1.10E+02 | 1.10E+02 | 1.10E+02 |
| | CH4 (GWP=25) | 1.45E+00 | 1.25E+00 | 2.30E-01 | 8.64E-03 | 8.64E-03 | 8.64E-03 |
| | N2O (GWP=298) (*40CFR98*) | *2.20E-04* | *2.20E-04* | *2.20E-04* | 3.00E-03 | 3.00E-03 | 3.00E-03 |
| | CO2e (*40CFR98*) | *1.46E+02* | *1.41E+02* | *1.16E+02* | *1.11E+02* | *1.11E+02* | *1.11E+02* |

(#Lean Pre-Mix - aka: Dry Low Emissions (DLE or DLN) or SoLoNOx)

| | Pollutant | GAS-FIRED EXTERNAL COMBUSTION | | | FLARE | DIESEL ENGINES | DIESEL ENGINES |
|---|---|---|---|---|---|---|---|
| | | AP-42 Table 1.4-1; 1.4-2; 1.4-3 (<100 MMBtu/hr) 07/98 | | | 13.5-1 06/17 | 3.3-1; 3.3-2 10/96 | Tier 4 ≥ 751 bhp |
| | | Uncontrolled lb/MMBtu | LoNOx Burners lb/MMBtu | Flue Gas Recirc lb/MMBtu | Combustion lb/MMBtu | Uncontrolled lb/MMBtu | Controlled lb/MMBtu |
| CRITERIA | NOX (≥ 90% Load) | 9.80E-02 | 4.90E-02 | 3.14E-02 | External Comb. | 4.41E+00 | 4.18E+00 |
| | CO (≥ 90% Load) | 8.24E-02 | 8.24E-02 | 8.24E-02 | 3.10E-01 | 9.50E-01 | 2.35E+00 |
| | VOC | 5.39E-03 | 5.39E-03 | 5.39E-03 | 98% Control | 3.53E-01 | 1.28E-01 |
| | PM10/2.5 (Total) | 7.45E-03 | 7.45E-03 | 7.45E-03 | External Comb. | 3.10E-01 | 1.35E-01 |
| | SO2 | 5.88E-04 | 5.88E-04 | 5.88E-04 | External Comb. | 2.90E-01 | 2.90E-01 |
| HAPs | Acetaldehyde | --- | --- | --- | Use External Combustion or 98% Control, As Appropriate | 7.67E-04 | 2.77E-04 |
| | Acrolein | --- | --- | --- | | 9.25E-05 | 3.35E-05 |
| | Benzene | 2.06E-06 | 2.06E-06 | 2.06E-06 | | 9.33E-04 | 3.38E-04 |
| | Butadiene, 1,3- | --- | --- | --- | | 3.91E-05 | 1.41E-05 |
| | Ethylbenzene | --- | --- | --- | | --- | --- |
| | Formaldehyde (HCHO) | 7.35E-05 | 7.35E-05 | 7.35E-05 | | 1.18E-03 | 4.27E-04 |
| | n-Hexane | 1.76E-03 | 1.76E-03 | 1.76E-03 | | --- | --- |
| | Methanol (MeOH) | --- | --- | --- | | --- | --- |
| | Polycyclic Organic Matter (POM/PAH) | 6.85E-07 | 6.85E-07 | 6.85E-07 | | 1.68E-04 | 6.08E-05 |
| | Toluene | 3.33E-06 | 3.33E-06 | 3.33E-06 | | 4.09E-04 | 1.48E-04 |
| | Trimethylpentane, 2,2,4- (i-Octane) | --- | --- | --- | | --- | --- |
| | Xylenes | --- | --- | --- | | 2.85E-04 | 1.03E-04 |
| | Other/Trace HAP* | 1.18E-06 | 1.18E-06 | 1.18E-06 | | --- | --- |
| | TOTAL HAP | 1.85E-03 | 1.85E-03 | 1.85E-03 | | 3.87E-03 | 1.40E-03 |
| GHG | CO2 (GWP=1) | 1.18E+02 | 1.18E+02 | 1.18E+02 | | 1.64E+02 | 1.64E+02 |
| | CH4 (GWP=25) | 2.25E-03 | 2.25E-03 | 2.25E-03 | | *6.61E-03* | *6.61E-03* |
| | N2O (GWP=298) (*40CFR98*) | 2.16E-03 | 6.27E-04 | 6.27E-04 | | *1.32E-03* | *1.32E-03* |
| | CO2e (*40CFR98*) | *1.18E+02* | *1.18E+02* | *1.18E+02* | | *1.65E+02* | *1.65E+02* |

| 40 CFR 98 - DEFAULT EMISSION FACTORS | | | | | |
|---|---|---|---|---|---|
| Fuel Type | Table C-1 to Subpart C of Part 98 | | Table C-2 to Subpart C of Part 98 | | Weighted Sum |
| | Default HHV | Carbon Dioxide lb CO2/MMBtu | Methane lb CH4/MMBtu | Nitrous Oxide lb N2O/MMBtu | CO2e lb CO2e/MMBtu |
| Fuel Oil No. 2 (Diesel) | 138,000 Btu/gal | 1.63E+02 | 6.61E-03 | 1.32E-03 | 1.64E+02 |
| Propane | 91,000 Btu/gal | 1.39E+02 | 6.61E-03 | 1.32E-03 | 1.39E+02 |
| Natural Gas | 1,026 Btu/scf | 1.17E+02 | 2.20E-03 | 2.20E-04 | 1.17E+02 |

*Other/Trace HAPs include: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

| Global Warming Potential (100 Yr) (GWP) | | |
|---|---|---|
| Table A-1 to Subpart A of Part 98 | | |
| CO2 | CH4 | N2O |
| 1 | 25 | 298 |

Reviewed and Revised: 02/28/18 - CAR

United States Environmental Protection Agency | Office of Air Quality Planning and Standards Research Triangle Park NC 27711 | EPA-453/R-95-017 November 1995

Air

EPA

# Protocol for Equipment Leak Emission Estimates

TABLE 2-4. OIL AND GAS PRODUCTION OPERATIONS AVERAGE EMISSION FACTORS (kg/hr/source)

| Equipment Type | Service[a] | Emission Factor (kg/hr/source)[b] |
|---|---|---|
| Valves | Gas | 4.5E-03 |
| | Heavy Oil | 8.4E-06 |
| | Light Oil | 2.5E-03 |
| | Water/Oil | 9.8E-05 |
| Pump seals | Gas | 2.4E-03 |
| | Heavy Oil | NA |
| | Light Oil | 1.3E-02 |
| | Water/Oil | 2.4E-05 |
| Others[c] | Gas | 8.8E-03 |
| | Heavy Oil | 3.2E-05 |
| | Light Oil | 7.5E-03 |
| | Water/Oil | 1.4E-02 |
| Connectors | Gas | 2.0E-04 |
| | Heavy Oil | 7.5E-06 |
| | Light Oil | 2.1E-04 |
| | Water/Oil | 1.1E-04 |
| Flanges | Gas | 3.9E-04 |
| | Heavy Oil | 3.9E-07 |
| | Light Oil | 1.1E-04 |
| | Water/Oil | 2.9E-06 |
| Open-ended lines | Gas | 2.0E-03 |
| | Heavy Oil | 1.4E-04 |
| | Light Oil | 1.4E-03 |
| | Water/Oil | 2.5E-04 |

[a]Water/Oil emission factors apply to water streams in oil service with a water content greater than 50%, from the point of origin to the point where the water content reaches 99%. For water streams with a water content greater than 99%, the emission rate is considered negligible.

[b]These factors are for total organic compound emission rates (including non-VOC's such as methane and ethane) and apply to light crude, heavy crude, gas plant, gas production, and off shore facilities. "NA" indicates that not enough data were available to develop the indicated emission factor.

[c]The "other" equipment type was derived from compressors, diaphrams, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

# Supplement S2

# Vendor Data

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- **1380 bhp CAT G3516B w/ Emit OxCat (CE-01/1E-OxCAT and CE-02/2E)**
- **203 bhp CAT G3306B TA w/ Miratech NSCR (GE-03/3E)**
- **6.41 MMBtu/hr Frederick Logan Thermal Oxidizer (COMB-1/10E)**

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# G3516B

GAS COMPRESSION APPLICATION

## GAS ENGINE SITE SPECIFIC TECHNICAL DATA

CATERPILLAR®

| | | | |
|---|---|---|---|
| ENGINE SPEED (rpm): | 1400 | FUEL SYSTEM: | CAT WIDE RANGE WITH AIR FUEL RATIO CONTROL |
| COMPRESSION RATIO: | 8:1 | | |
| AFTERCOOLER - STAGE 2 INLET (°F): | 130 | **SITE CONDITIONS:** | |
| AFTERCOOLER - STAGE 1 INLET (°F): | 201 | FUEL: | Gas Analysis |
| JACKET WATER OUTLET (°F): | 210 | FUEL PRESSURE RANGE(psig): | 7.0-50.0 |
| ASPIRATION: | TA | FUEL METHANE NUMBER: | 50.5 |
| COOLING SYSTEM: | JW+OC+1AC, 2AC | FUEL LHV (Btu/scf): | 1170 |
| IGNITION SYSTEM: | ADEM3 | ALTITUDE(ft): | 1311 |
| EXHAUST MANIFOLD: | DRY | MAXIMUM INLET AIR TEMPERATURE(°F): | 100 |
| COMBUSTION: | Ultra Lean Burn | STANDARD RATED POWER: | 1380 bhp@1400rpm |
| NOx EMISSION LEVEL (g/bhp-hr NOx): | 0.5 | | |
| SET POINT TIMING: | 28 | | |

| | | | | MAXIMUM RATING | SITE RATING AT MAXIMUM INLET AIR TEMPERATURE | | |
|---|---|---|---|---|---|---|---|
| **RATING** | | **NOTES** | **LOAD** | **100%** | **100%** | **75%** | **50%** |
| ENGINE POWER | (WITHOUT FAN) | (1) | bhp | 1380 | 1380 | 1035 | 690 |
| INLET AIR TEMPERATURE | | | °F | 100 | 100 | 100 | 100 |
| **ENGINE DATA** | | | | | | | |
| FUEL CONSUMPTION (LHV) | | (2) | Btu/bhp-hr | 7415 | 7415 | 7942 | 8530 |
| FUEL CONSUMPTION (HHV) | | (2) | Btu/bhp-hr | 8171 | 8171 | 8751 | 9400 |
| AIR FLOW (77°F, 14.7 psia) | (WET) | (3)(4) | scfm | 3147 | 3147 | 2469 | 1726 |
| AIR FLOW | (WET) | (3)(4) | lb/hr | 13954 | 13954 | 10946 | 7653 |
| INLET MANIFOLD PRESSURE | | (5) | in Hg(abs) | 92.8 | 92.8 | 75.4 | 53.0 |
| EXHAUST TEMPERATURE - ENGINE OUTLET | | (6) | °F | 1016 | 1016 | 1009 | 1029 |
| EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) | (WET) | (7)(4) | ft3/min | 9268 | 9268 | 7248 | 5142 |
| EXHAUST GAS MASS FLOW | (WET) | (7)(4) | lb/hr | 14445 | 14445 | 11341 | 7935 |
| **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 | 3.02 | 3.02 | 3.24 | 3.18 |
| THC (mol. wt. of 15.84) | | (8)(9) | g/bhp-hr | 4.29 | 4.29 | 4.59 | 4.66 |
| NMHC (mol. wt. of 15.84) | | (8)(9) | g/bhp-hr | 1.95 | 1.95 | 2.09 | 2.12 |
| NMNEHC (VOCs) (mol. wt. of 15.84) | | (8)(9)(10) | g/bhp-hr | 0.94 | 0.94 | 1.01 | 1.03 |
| HCHO (Formaldehyde) | | (8)(9) | g/bhp-hr | 0.38 | 0.38 | 0.37 | 0.37 |
| CO2 | | (8)(9) | g/bhp-hr | 516 | 516 | 550 | 598 |
| EXHAUST OXYGEN | | (8)(11) | % DRY | 9.1 | 9.1 | 8.8 | 8.4 |
| **HEAT REJECTION** | | | | | | | |
| HEAT REJ. TO JACKET WATER (JW) | | (12) | Btu/min | 21892 | 21892 | 20445 | 19118 |
| HEAT REJ. TO ATMOSPHERE | | (12) | Btu/min | 6110 | 6110 | 5092 | 4074 |
| HEAT REJ. TO LUBE OIL (OC) | | (12) | Btu/min | 4475 | 4475 | 3978 | 3363 |
| HEAT REJ. TO A/C - STAGE 1 (1AC) | | (12)(13) | Btu/min | 12060 | 12060 | 9999 | 3481 |
| HEAT REJ. TO A/C - STAGE 2 (2AC) | | (12)(13) | Btu/min | 5601 | 5601 | 5265 | 3419 |

| **COOLING SYSTEM SIZING CRITERIA** | | | |
|---|---|---|---|
| TOTAL JACKET WATER CIRCUIT (JW+OC+1AC) | (13)(14) | Btu/min | 42114 |
| TOTAL AFTERCOOLER CIRCUIT (2AC) | (13)(14) | Btu/min | 5881 |
| A cooling system safety factor of 0% has been added to the cooling system sizing criteria. | | | |

**CONDITIONS AND DEFINITIONS**

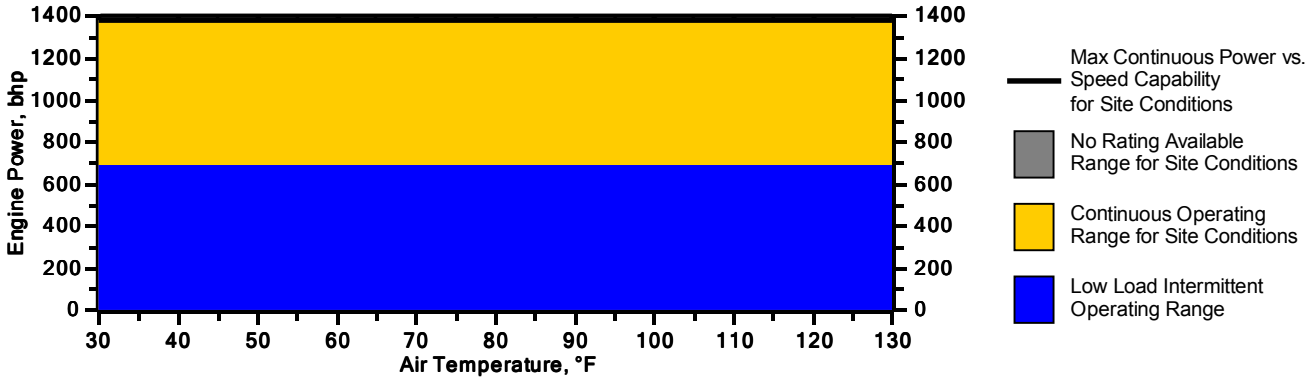
Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Max. rating is the maximum capability 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.

PREPARED BY:
Data generated by Gas Engine Rating Pro Version 4.01.02
Ref. Data Set DM8800-05-001, Printed 02Aug2012

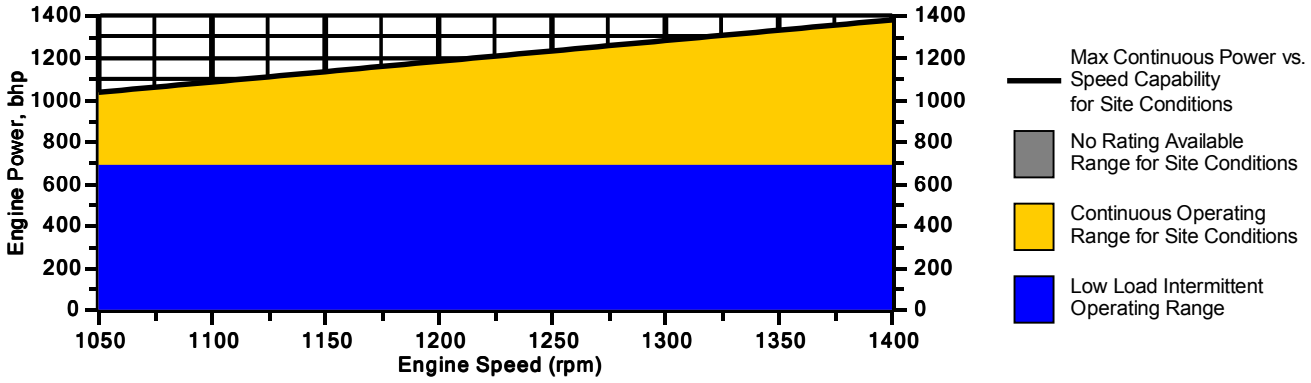
## Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1311 ft and 1400 rpm



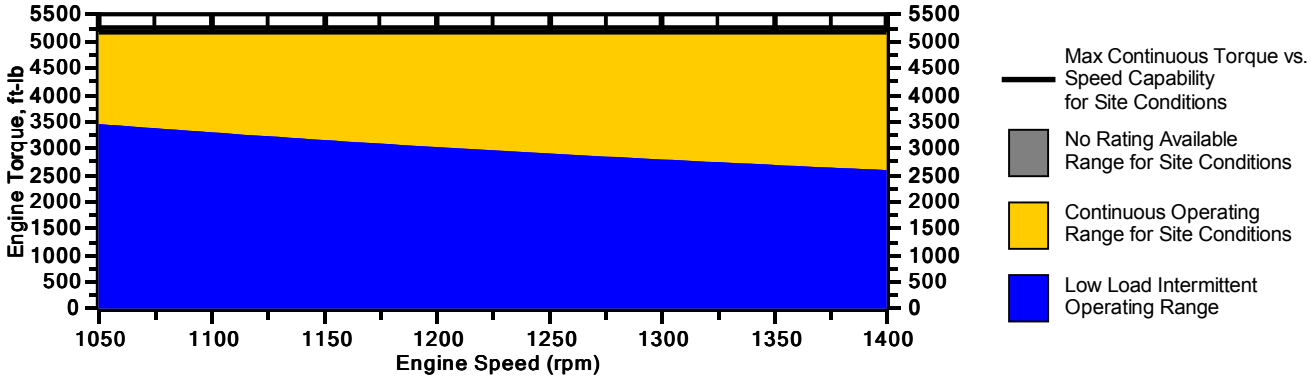

## Engine Power vs. Engine Speed

Data represents speed sweep at 1311 ft and 100 ºF




## Engine Torque vs. Engine Speed

Data represents speed sweep at 1311 ft and 100 ºF




Note: At site conditions of 1311 ft and 100°F inlet air temp., constant torque can be maintained down to 1050 rpm. The minimum speed for loading at these conditions is 1050 rpm.

**NOTES**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

| Constituent | Abbrev | Mole % | Norm |
|---|---|---|---|
| Water Vapor | H2O | 0.0000 | 0.0000 |
| Methane | CH4 | 71.4260 | 71.4260 |
| Ethane | C2H6 | 17.0270 | 17.0270 |
| Propane | C3H8 | 6.8190 | 6.8190 |
| Isobutane | iso-C4H1O | 0.7220 | 0.7220 |
| Norbutane | nor-C4H1O | 1.9740 | 1.9740 |
| Isopentane | iso-C5H12 | 0.3660 | 0.3660 |
| Norpentane | nor-C5H12 | 0.5030 | 0.5030 |
| Hexane | C6H14 | 0.2150 | 0.2150 |
| Heptane | C7H16 | 0.1360 | 0.1360 |
| Nitrogen | N2 | 0.4650 | 0.4650 |
| Carbon Dioxide | CO2 | 0.1880 | 0.1880 |
| 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 | 0.1040 | 0.1040 |
| Nonane | C9H20 | 0.0550 | 0.0550 |
| Ethylene | C2H4 | 0.0000 | 0.0000 |
| Propylene | C3H6 | 0.0000 | 0.0000 |
| TOTAL (Volume %) | | 100.0000 | 100.0000 |

| | |
|---|---|
| Fuel Makeup: | OVM Gas |
| Unit of Measure: | English |

**Calculated Fuel Properties**

| | |
|---|---|
| Caterpillar Methane Number: | 38.7 |
| Lower Heating Value (Btu/scf): | 1227 |
| Higher Heating Value (Btu/scf): | 1351 |
| WOBBE Index (Btu/scf): | 1392 |
| THC: Free Inert Ratio: | 152.14 |
| Total % Inerts (% N2, CO2, He): | 0.65% |
| RPC (%) (To 905 Btu/scf Fuel): | 100% |
| Compressibility Factor: | 0.996 |
| Stoich A/F Ratio (Vol/Vol): | 12.70 |
| Stoich A/F Ratio (Mass/Mass): | 16.35 |
| Specific Gravity (Relative to Air): | 0.777 |
| Specific Heat Constant (K): | 1.271 |

**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.

10497 Town & Country Way, Ste. 940
Houston, TX 77024
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cparisi@emittechnologies.com

**Prepared For:**
Jose Parilli
WILLIAMS FIELD SERVICES

**QUOTE:** QUO-10943-S3Z0
**Expires:** December 14, 2013

## INFORMATION PROVIDED BY CATERPILLAR

| | |
|---|---|
| Engine: | G3516B |
| Horsepower: | 1343 |
| RPM: | 1400 |
| Compression Ratio: | 8.0 |
| Exhaust Flow Rate: | 8996 CFM |
| Exhaust Temperature: | 1026 °F |
| Reference: | DM8800-07-001 |
| Fuel: | Natural Gas |
| Annual Operating Hours: | 8760 |

### Uncontrolled Emissions

| | g/bhp-hr | Lb/Hr | Tons/Year |
|---|---|---|---|
| NOx: | 0.50 | 1.48 | 6.48 |
| CO: | 3.08 | 9.12 | 39.94 |
| THC: | 3.97 | 11.75 | 51.48 |
| NMHC | 2.00 | 5.92 | 25.94 |
| NMNEHC: | 1.06 | 3.14 | 13.75 |
| HCHO: | 0.36 | 1.07 | 4.67 |
| O2: | 9.10 % | | |

## POST CATALYST EMISSIONS

| | g/bhp-hr | Lb/Hr | Tons/Year |
|---|---|---|---|
| NOx: | Unaffected by Oxidation Catalyst | | |
| CO: | <0.17 | <0.50 | <2.20 |
| VOC: | <0.10 | <0.30 | <1.30 |
| HCHO: | <0.09 | <0.27 | <1.17 |

## CONTROL EQUIPMENT

### Catalyst Element

| | |
|---|---|
| Model: | RE-3050-H |
| Catalyst Type: | Oxidation, Premium Precious Group Metals |
| Substrate Type: | BRAZED |
| Manufacturer: | EMIT Technologies, Inc |
| Element Quantity: | 2 |
| Element Size: | Round 30.5" x 3.25" |
| Estimated Lead Time: | In Stock |

# G3306B

GAS COMPRESSION APPLICATION

## GAS ENGINE SITE SPECIFIC TECHNICAL DATA

CATERPILLAR®

| | | | |
|---|---|---|---|
| ENGINE SPEED (rpm): | 1800 | RATING STRATEGY: | STANDARD |
| COMPRESSION RATIO: | 8:1 | RATING LEVEL: | CONTINUOUS |
| AFTERCOOLER TYPE: | SCAC | FUEL SYSTEM: | HPG IMPCO |
| AFTERCOOLER WATER INLET (°F): | 130 | | WITH AIR FUEL RATIO CONTROL |
| JACKET WATER OUTLET (°F): | 210 | **SITE CONDITIONS:** | |
| ASPIRATION: | TA | FUEL: | OVM Gas |
| COOLING SYSTEM: | JW+OC, AC | FUEL PRESSURE RANGE(psig): | 12.0-24.9 |
| CONTROL SYSTEM: | ADEM4 | FUEL METHANE NUMBER: | 38.7 |
| EXHAUST MANIFOLD: | WC | FUEL LHV (Btu/scf): | 1227 |
| COMBUSTION: | CATALYST SETTING | ALTITUDE(ft): | 1000 |
| EXHAUST OXYGEN (% O2): | 0.3 | MAXIMUM INLET AIR TEMPERATURE(°F): | 77 |
| SET POINT TIMING: | 22 | STANDARD RATED POWER: | 203 bhp@1800rpm |

| | | | | MAXIMUM RATING | SITE RATING AT MAXIMUM INLET AIR TEMPERATURE | | |
|---|---|---|---|---|---|---|---|
| **RATING** | **NOTES** | **LOAD** | **100%** | **100%** | **75%** | **50%** |
| ENGINE POWER (WITHOUT FAN) | (1) | bhp | 202 | 202 | 152 | 101 |
| INLET AIR TEMPERATURE | | °F | 77 | 77 | 77 | 77 |
| **ENGINE DATA** | | | | | | |
| FUEL CONSUMPTION (LHV) | (2) | Btu/bhp-hr | 8240 | 8240 | 8618 | 9467 |
| FUEL CONSUMPTION (HHV) | (2) | Btu/bhp-hr | 9070 | 9070 | 9486 | 10420 |
| AIR FLOW (@inlet air temp, 14.7 psia) (WET) | (3)(4) | ft3/min | 295 | 295 | 239 | 177 |
| AIR FLOW (WET) | (3)(4) | lb/hr | 1307 | 1307 | 1058 | 783 |
| FUEL FLOW (60ºF, 14.7 psia) | | scfm | 23 | 23 | 18 | 13 |
| INLET MANIFOLD PRESSURE | (5) | in Hg(abs) | 38.2 | 38.2 | 31.1 | 23.7 |
| EXHAUST TEMPERATURE - ENGINE OUTLET | (6) | °F | 1160 | 1160 | 1118 | 1048 |
| EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET) | (7)(4) | ft3/min | 990 | 990 | 778 | 550 |
| EXHAUST GAS MASS FLOW (WET) | (7)(4) | lb/hr | 1387 | 1387 | 1121 | 830 |
| **EMISSIONS DATA - ENGINE OUT** | | | | | | |
| NOx (as NO2) | (8)(9) | g/bhp-hr | 15.26 | 15.26 | 15.75 | 13.98 |
| CO | (8)(9) | g/bhp-hr | 15.26 | 15.26 | 15.76 | 13.98 |
| THC (mol. wt. of 15.84) | (8)(9) | g/bhp-hr | 0.87 | 0.87 | 0.91 | 1.24 |
| NMHC (mol. wt. of 15.84) | (8)(9) | g/bhp-hr | 0.44 | 0.44 | 0.46 | 0.63 |
| NMNEHC (VOCs) (mol. wt. of 15.84) | (8)(9)(10) | g/bhp-hr | 0.24 | 0.24 | 0.25 | 0.34 |
| HCHO (Formaldehyde) | (8)(9) | g/bhp-hr | 0.20 | 0.20 | 0.20 | 0.21 |
| CO2 | (8)(9) | g/bhp-hr | 568 | 568 | 608 | 672 |
| EXHAUST OXYGEN | (8)(11) | % DRY | 0.3 | 0.3 | 0.3 | 0.3 |
| **HEAT REJECTION** | | | | | | |
| HEAT REJ. TO JACKET WATER (JW) | (12) | Btu/min | 9110 | 9110 | 7602 | 6263 |
| HEAT REJ. TO ATMOSPHERE | (12) | Btu/min | 1112 | 1112 | 872 | 640 |
| HEAT REJ. TO LUBE OIL (OC) | (12) | Btu/min | 1359 | 1359 | 1134 | 934 |
| HEAT REJ. TO AFTERCOOLER (AC) | (12)(13) | Btu/min | 539 | 539 | 270 | 71 |
| **COOLING SYSTEM SIZING CRITERIA** | | | | | | |
| TOTAL JACKET WATER CIRCUIT (JW+OC) | (13) | Btu/min | 11652 | | | |
| TOTAL AFTERCOOLER CIRCUIT (AC) | (13)(14) | Btu/min | 566 | | | |
| A cooling system safety factor of 0% has been added to the cooling system sizing criteria. | | | | | | |

**CONDITIONS AND DEFINITIONS**

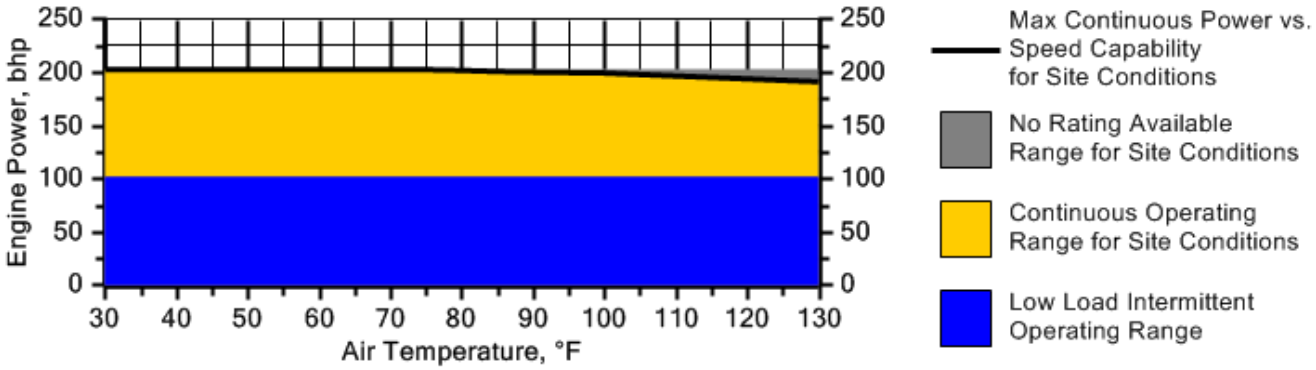
Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Max. rating is the maximum capability 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.

PREPARED BY:
Data generated by Gas Engine Rating Pro Version 4.06.00
Ref. Data Set DM9445-01-001, Printed 08Jan2014

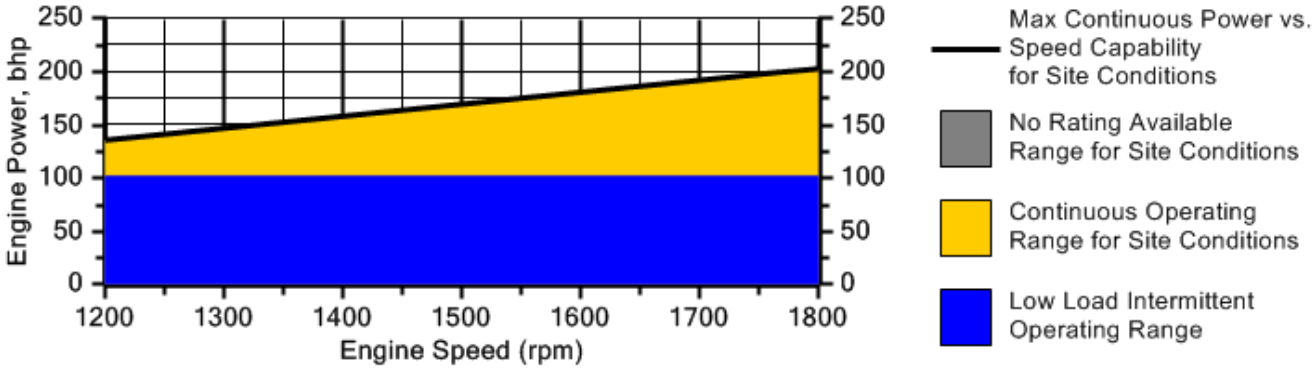
## Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1000 ft and 1800 rpm



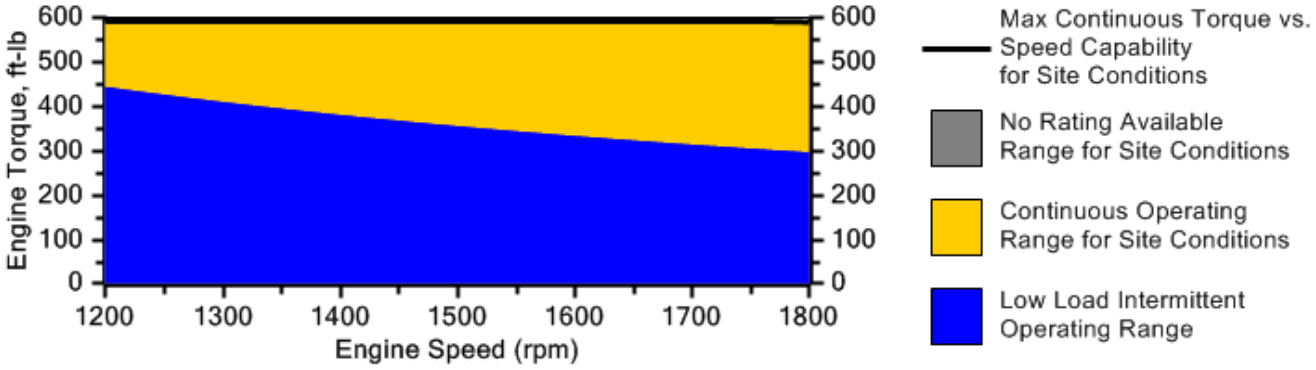

## Engine Power vs. Engine Speed

Data represents speed sweep at 1000 ft and 77 ºF




## Engine Torque vs. Engine Speed

Data represents speed sweep at 1000 ft and 77 ºF




Note: At site conditions of 1000 ft and 77°F inlet air temp., constant torque can be maintained down to 1200 rpm. The minimum speed for loading at these conditions is 1200 rpm.

**NOTES**

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

2. Fuel consumption tolerance is ± 5.0% of full load data.

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

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

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

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

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

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

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

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

11. Exhaust Oxygen tolerance is ± 0.2.

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

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

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

| Constituent | Abbrev | Mole % | Norm |
|---|---|---|---|
| Water Vapor | H2O | 0.0000 | 0.0000 |
| Methane | CH4 | 71.4260 | 71.4260 |
| Ethane | C2H6 | 17.0270 | 17.0270 |
| Propane | C3H8 | 6.8190 | 6.8190 |
| Isobutane | iso-C4H1O | 0.7220 | 0.7220 |
| Norbutane | nor-C4H1O | 1.9740 | 1.9740 |
| Isopentane | iso-C5H12 | 0.3660 | 0.3660 |
| Norpentane | nor-C5H12 | 0.5030 | 0.5030 |
| Hexane | C6H14 | 0.2150 | 0.2150 |
| Heptane | C7H16 | 0.1360 | 0.1360 |
| Nitrogen | N2 | 0.4650 | 0.4650 |
| Carbon Dioxide | CO2 | 0.1880 | 0.1880 |
| 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 | 0.1040 | 0.1040 |
| Nonane | C9H20 | 0.0550 | 0.0550 |
| Ethylene | C2H4 | 0.0000 | 0.0000 |
| Propylene | C3H6 | 0.0000 | 0.0000 |
| TOTAL (Volume %) | | 100.0000 | 100.0000 |

| | |
|---|---|
| Fuel Makeup: | OVM Gas |
| Unit of Measure: | English |

**Calculated Fuel Properties**

| | |
|---|---|
| Caterpillar Methane Number: | 38.7 |
| Lower Heating Value (Btu/scf): | 1227 |
| Higher Heating Value (Btu/scf): | 1351 |
| WOBBE Index (Btu/scf): | 1392 |
| THC: Free Inert Ratio: | 152.14 |
| Total % Inerts (% N2, CO2, He): | 0.65% |
| RPC (%) (To 905 Btu/scf Fuel): | 100% |
| Compressibility Factor: | 0.996 |
| Stoich A/F Ratio (Vol/Vol): | 12.70 |
| Stoich A/F Ratio (Mass/Mass): | 16.35 |
| Specific Gravity (Relative to Air): | 0.777 |
| Specific Heat Constant (K): | 1.271 |

**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.

# MIRATECH Emissions Control Equipment Specification Summary

Proposal Number: JC-13-2686 Rev(2)

## Engine Data

| | |
|---|---|
| Number of Engines: | 1 |
| Application: | Gas Compression |
| Engine Manufacturer: | Caterpillar |
| Model Number: | G 3306 TA HCR |
| Power Output: | 203 bhp |
| Lubrication Oil: | 0.6 wt% sulfated ash or less |
| Type of Fuel: | Natural Gas |
| Exhaust Flow Rate: | 970 acfm (cfm) |
| Exhaust Temperature: | 1,064°F |

## System Details

| | |
|---|---|
| Housing Model Number: | VXC-1610-05-HSG |
| Element Model Number: | VX-RE-10XC |
| Number of Catalyst Layers: | 1 |
| Number of Spare Catalyst Layers: | 1 |
| System Pressure Loss: | 4.0 inches of WC (Fresh) |
| Sound Attenuation: | 28-32 dBA insertion loss |
| Exhaust Temperature Limits: | 750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet) |

## NSCR Housing & Catalyst Details

| | |
|---|---|
| Model Number: | VXC-1610-05-XC1 |
| Material: | Carbon Steel |
| Approximate Diameter: | 16 inches |
| Inlet Pipe Size & Connection: | 5 inch FF Flange, 150# ANSI standard bolt pattern |
| Outlet Pipe Size & Connection: | 5 inch FF Flange, 150# ANSI standard bolt pattern |
| Overall Length: | 65 inches |
| Weight Without Catalyst: | 191 lbs |
| Weight Including Catalyst: | 205 lbs |
| Instrumentation Ports: | 1 inlet/1 outlet (1/2" NPT) |

## Emission Requirements

| Exhaust Gases | Engine Outputs (g/ bhp-hr) | Reduction (%) | Warranted Converter Outputs (g/ bhp-hr) | Requested Emissions Targets |
|---|---|---|---|---|
| NOx | 15.26 | 97% | 0.50 | 0.50 g/bhp-hr |
| CO | 15.26 | 87% | 2.00 | 2.00 g/bhp-hr |
| NMNEHC | 0.12 | 0% | 0.70 | 0.70 g/bhp-hr |
| Oxygen | 0.5% | | | |

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

Williams

Thermal Oxidizer Proposal

**FREDERICK LOGAN COMPANY, INC**

**Typical Regenerator, Contactor, and Thermal Oxidizer, provided by Frederick Logan Company, Inc.**

**FREDERICK LOGAN COMPANY, INC. -** 140 COMMONWEALTH DR. - WARRENDALE, PA. 15086
Phone: 724-776-9300 Fax: 724-776-0355 E-mail: Info@FrederickLoganCo.com

September 26, 2013

Williams
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh PA 15275

**Attention:** Mr. Tom Kunkel

**Reference:** Thermal Oxidizer for (2) 60 MMSCFD Dehydration Units

**File:** 10-0345-2

Dear Mr. Kunkel,

In reference to your request and subsequent discussions/emails, we are pleased to propose the following equipment for your application:

# 120 MMSCFD FLOW RATE DEHYDRATOR VAPOR OXIDIZER

## 120 MMSCFD DEHYDRATOR OPERATING PARAMETERS

| | |
|---|---|
| Process Fluid | Natural Gas |
| Process Flow | 120 MMSCFD |
| Operating Temperature | 120°F |
| Operating Pressure | 1000 PSIG |
| Specific Gravity | 0.72 |
| Glycol Pump: | Electric |
| Flash Gas Separator | 40 PSIG Operating, 120°F |
| Electrical Service Available at Site | Unknown |

Based upon the design conditions stated on the previous page, we are pleased to offer as follows:

**Scope of Supply**

- Engineering and design of equipment
- Procurement, Fabrication, and assembly of equipment
- Inspection and testing of package at the factory
- Surface prep and painting of equipment.
- Packaging for shipment
- Manuals and supporting documentation

**Exclusions**

- Anchoring hardware
- Field process hook ups
- Field electrical hook ups
- Third party inspections
- Post weld heat treatment
- Hydro-testing
- Start up or Commissioning ( Available for additional charge)
- Heat tracing and insulating.

**Equipment Description**

| ITEM | QTY | DESCRIPTION | PRICE |
|---|---|---|---|
| **1** | **1** | **This unit is designed to handle the flows from two TEG reboiler systems. There are four waste stream inlets to the combustion chamber. Two for Flash Gas the others for Off Gas.**<br>➢ 36" Dia. Combustion Chamber<br>➢ 36" x 20' Tall Exhaust Stack<br>➢ (2) Type K thermocouples with Thermowells<br>➢ (2) 4" Flanged Sample Ports @ 90º Orientation<br>➢ Combustion Chamber and Exhaust Stack Lined with 4" 2300 deg. Folded Blank Refractory Modules<br>➢ (1) Sight Glass<br>➢ Stack Material – A-36 Carbon Steel<br>➢ Surface prep and paint:<br>o Surface Prep – SSPC SP-6 Commercial Blast<br>o Sherwin Williams Primer<br>o Sherwin Williams Enamel<br>➢ 3" RFSO 150# BTEX Gas inlet.<br>➢ 1" RFSO 150# Flash Gas Inlet.<br>➢ (4) Lifting lugs on skid, (2) Lifting lug mounted on top | |

stack section.
- Equipment is skid mounted. All conduit and wiring will be pre-installed on skid
- Area Electrical Classification Class 1, Div. 2

**2** **1** **3.0 MMBTU/HR Burner**
- Burner Tip Material Stainless Steel
- Direct Spark Ignition

**3** **1** **Combustion Air Pressure Blower**
- High Efficiency, 7.5 HP, Class 1 Div 2. Motor
- Inlet Guard
- 1000 SCFM

**4** **1** **Burner Control Panel**
- NEMA 7/4X Main Enclosure.
- PLC – AB MicroLogix
- Honeywell Flame Safety Controller
- Honeywell High Limit Controller
- NEMA 7/4X Enclosure for Ignition Transformer
- System shut down for the following events:
  - High Limit Temperature
  - Loss of Flame
  - Low/High Gas Pressure
  - Low Combustion Air Pressure
  - Logic to interface with re-boiler
  - 7.5 HP VFD

**5** **4** **Inlet/Vent Valves**
- (2) 3" Butterfly Valves C/W:
  - Pneumatic Actuator, Spring Return N.O.
  - N.O. / N.C. Limit Switch

- (2) 3" Butterfly Valves C/W:
  - Pneumatic Actuator, Spring Return N.C.
  - N.O. / N.C. Limit Switch

- (2) 1" NPT Stainless Steel Ball valve C/W:
  - Pneumatic Actuator, Spring Return N.O.
  - N.O. / N.C. Limit Switch

- (2) 1" NPT Stainless Steel Ball valve C/W:
  - Pneumatic Actuator, Spring Return N.C.
  - N.O. / N.C. Limit Switch

## Technical Summary

### Process inlet stream:

| | |
|---|---|
| Inlet Temperature: | 212.0°F |
| Overhead Stream Flow: | 10,480.0 SCFH |
| Overhead Stream BTU | 151 BTU/FT |
| Flash Gas Stream Flow: | 1,656 SCFH |
| Flash Gas Stream BTU | 1630 BTU/FT |
| Combustion Chamber Temp: | 1450 – 1600 deg F |
| Residence Time: | ≥0.75 Sec. |
| Destruction Efficiency: | ≥99.0% |
| Max Design Loading: | 4.78 MMBTU/HR |
| Turn Down | 10 : 1 |
| Combustion Chamber ID | 28” |
| Chamber Mass Flow | 371,290 ACFH @ 1450°F |
| Combustion Chamber Velocity | 24.13 FT/SEC |
| CO Emissions: | <.02 Lbs/MMBTU |
| NOx Emissions: | <.06 Lbs/MMBTU |

### Site Conditions:

| | |
|---|---|
| Wind Speed | 90 MPH |
| Seismic Zone | 1 |
| Elevation | 1500 ft. |
| Humidity | High |
| Temp. | 0°F to 100°F |

### Utilities:

| | |
|---|---|
| Gas Service Required for Pre-Heat | 1500 SCFH – Natural Gas @ Min. 20 – 150 PSIG Max |
| Gas Service Required at full load | 500 SCFH – Natural Gas for Pilot |
| Electrical Service Required | 480 VAC, 3Ø, 60 Hz, 30 Amps |
| Compressed Air if available or Clean dry fuel gas | 80 – 120 PSIG Intermittent use to operate valves |

# Supplement S3

# Emission Program Data

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- **GRI-GLYCalc – Dehydrators (RSV-01 (5E, 6E) and RSV-02 (8E, 9E))**
- **ProMax Simulation – Produced Water/Condensate Tanks (T01/13E and T02/21E)**

---

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: CCS-Class II-S3a-60.0 MMscfd Dehy-033018
File Name: D:\Projects2\wfs\OVM\Conner\45CSR13#2\CCS-45CSR13-Mod-S3a-60.0 MMscfd Dehy-033018.ddf
Date: April 04, 2018

DESCRIPTION:

Description: Wet Gas: 70 oF, 900 psig
Pump: Electric, 13.7 gpm
Flash Tank: 150.0 oF, 50 psig
Flash Tank/Still Vent Controlled by 99% T-Ox

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 70.00 deg. F
Pressure: 900.00 psig
Wet Gas Water Content: Saturated

| Component | Conc. (vol %) |
|---|---|
| Carbon Dioxide | 0.1344 |
| Nitrogen | 0.5769 |
| Methane | 74.8125 |
| Ethane | 15.3479 |
| Propane | 5.8898 |
| Isobutane | 0.5636 |
| n-Butane | 1.6326 |
| Isopentane | 0.2869 |
| n-Pentane | 0.4155 |
| n-Hexane | 0.1035 |
| Cyclohexane | 0.0222 |
| Other Hexanes | 0.1200 |
| Heptanes | 0.0572 |
| Methylcyclohexane | 0.0140 |
| 2,2,4-Trimethylpentane | 0.0012 |
| Benzene | 0.0016 |
| Toluene | 0.0019 |
| Ethylbenzene | 0.0001 |
| C8+ Heavies | 0.0189 |

DRY GAS:

Flow Rate: 60.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 13.7 gpm

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

| | |
|---|---|
| Flash Control: | Combustion device |
| Flash Control Efficiency: | 99.00 % |
| Temperature: | 150.0 deg. F |
| Pressure: | 50.0 psig |

REGENERATOR OVERHEADS CONTROL DEVICE:

| | |
|---|---|
| Control Device: | Combustion Device |
| Destruction Efficiency: | 99.0 % |
| Excess Oxygen: | 5.0 % |
| Ambient Air Temperature: | 50.0 deg. F |

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: CCS-Class II-S3a-60.0 MMscfd Dehy-033018
File Name: D:\Projects2\wfs\OVM\Conner\45CSR13#2\CCS-45CSR13-Mod-S3a-60.0 MMscfd Dehy-033018.ddf
Date: April 04, 2018

DESCRIPTION:

Description: Wet Gas: 70 oF, 900 psig
Pump: Electric, 13.7 gpm
Flash Tank: 150.0 oF, 50 psig
Flash Tank/Still Vent Controlled by 99% T-Ox

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

| Component | lbs/hr | lbs/day | tons/yr |
|---|---|---|---|
| Methane | 0.0090 | 0.215 | 0.0393 |
| Ethane | 0.0314 | 0.753 | 0.1375 |
| Propane | 0.0456 | 1.094 | 0.1997 |
| Isobutane | 0.0101 | 0.242 | 0.0441 |
| n-Butane | 0.0456 | 1.096 | 0.1999 |
| Isopentane | 0.0101 | 0.243 | 0.0443 |
| n-Pentane | 0.0216 | 0.518 | 0.0945 |
| n-Hexane | 0.0129 | 0.309 | 0.0564 |
| Cyclohexane | 0.0189 | 0.453 | 0.0826 |
| Other Hexanes | 0.0101 | 0.244 | 0.0444 |
| Heptanes | 0.0184 | 0.441 | 0.0805 |
| Methylcyclohexane | 0.0147 | 0.353 | 0.0645 |
| 2,2,4-Trimethylpentane | 0.0001 | 0.003 | 0.0006 |
| Benzene | 0.0139 | 0.335 | 0.0611 |
| Toluene | 0.0260 | 0.625 | 0.1141 |
| Ethylbenzene | 0.0019 | 0.046 | 0.0084 |
| C8+ Heavies | 0.0144 | 0.345 | 0.0630 |
| Total Emissions | 0.3048 | 7.315 | 1.3349 |
| Total Hydrocarbon Emissions | 0.3048 | 7.315 | 1.3349 |
| Total VOC Emissions | 0.2644 | 6.346 | 1.1582 |
| Total HAP Emissions | 0.0549 | 1.318 | 0.2406 |
| Total BTEX Emissions | 0.0419 | 1.006 | 0.1835 |

UNCONTROLLED REGENERATOR EMISSIONS

| Component | lbs/hr | lbs/day | tons/yr |
|---|---|---|---|
| Methane | 0.8964 | 21.514 | 3.9264 |
| Ethane | 3.1394 | 75.345 | 13.7505 |
| Propane | 4.5591 | 109.418 | 19.9688 |
| Isobutane | 1.0077 | 24.184 | 4.4135 |
| n-Butane | 4.5646 | 109.551 | 19.9931 |
| Isopentane | 1.0108 | 24.258 | 4.4271 |
| n-Pentane | 2.1574 | 51.779 | 9.4496 |
| n-Hexane | 1.2882 | 30.918 | 5.6424 |

| | | | |
|---|---|---|---|
| Cyclohexane | 1.8856 | 45.255 | 8.2590 |
| Other Hexanes | 1.0147 | 24.353 | 4.4443 |
| Heptanes | 1.8390 | 44.137 | 8.0549 |
| Methylcyclohexane | 1.4728 | 35.347 | 6.4508 |
| 2,2,4-Trimethylpentane | 0.0139 | 0.334 | 0.0610 |
| Benzene | 1.3946 | 33.470 | 6.1084 |
| Toluene | 2.6045 | 62.507 | 11.4076 |
| Ethylbenzene | 0.1909 | 4.581 | 0.8360 |
| C8+ Heavies | 1.4381 | 34.514 | 6.2989 |
| Total Emissions | 30.4777 | 731.465 | 133.4923 |
| Total Hydrocarbon Emissions | 30.4777 | 731.465 | 133.4923 |
| Total VOC Emissions | 26.4419 | 634.605 | 115.8155 |
| Total HAP Emissions | 5.4921 | 131.810 | 24.0554 |
| Total BTEX Emissions | 4.1899 | 100.559 | 18.3519 |

FLASH GAS EMISSIONS

| Component | lbs/hr | lbs/day | tons/yr |
|---|---|---|---|
| Methane | 0.1818 | 4.363 | 0.7962 |
| Ethane | 0.1895 | 4.547 | 0.8299 |
| Propane | 0.1396 | 3.350 | 0.6113 |
| Isobutane | 0.0213 | 0.511 | 0.0932 |
| n-Butane | 0.0753 | 1.808 | 0.3300 |
| Isopentane | 0.0150 | 0.361 | 0.0658 |
| n-Pentane | 0.0261 | 0.626 | 0.1143 |
| n-Hexane | 0.0090 | 0.216 | 0.0395 |
| Cyclohexane | 0.0032 | 0.078 | 0.0141 |
| Other Hexanes | 0.0092 | 0.221 | 0.0404 |
| Heptanes | 0.0065 | 0.157 | 0.0286 |
| Methylcyclohexane | 0.0020 | 0.049 | 0.0089 |
| 2,2,4-Trimethylpentane | 0.0001 | 0.002 | 0.0004 |
| Benzene | 0.0004 | 0.009 | 0.0017 |
| Toluene | 0.0005 | 0.012 | 0.0021 |
| Ethylbenzene | <0.0001 | 0.001 | 0.0001 |
| C8+ Heavies | 0.0007 | 0.018 | 0.0033 |
| Total Emissions | 0.6804 | 16.328 | 2.9799 |
| Total Hydrocarbon Emissions | 0.6804 | 16.328 | 2.9799 |
| Total VOC Emissions | 0.3091 | 7.418 | 1.3539 |
| Total HAP Emissions | 0.0100 | 0.240 | 0.0439 |
| Total BTEX Emissions | 0.0009 | 0.022 | 0.0039 |

FLASH TANK OFF GAS

| Component | lbs/hr | lbs/day | tons/yr |
|---|---|---|---|
| Methane | 18.1787 | 436.288 | 79.6225 |
| Ethane | 18.9464 | 454.713 | 82.9850 |
| Propane | 13.9564 | 334.953 | 61.1290 |
| Isobutane | 2.1285 | 51.083 | 9.3226 |
| n-Butane | 7.5346 | 180.830 | 33.0015 |
| Isopentane | 1.5033 | 36.080 | 6.5847 |
| n-Pentane | 2.6098 | 62.634 | 11.4307 |
| n-Hexane | 0.9020 | 21.648 | 3.9507 |
| Cyclohexane | 0.3229 | 7.750 | 1.4144 |
| Other Hexanes | 0.9214 | 22.115 | 4.0359 |

| | | | |
|---|---|---|---|
| Heptanes | 0.6534 | 15.681 | 2.8617 |
| Methylcyclohexane | 0.2038 | 4.892 | 0.8927 |
| 2,2,4-Trimethylpentane | 0.0096 | 0.230 | 0.0419 |
| Benzene | 0.0389 | 0.934 | 0.1704 |
| Toluene | 0.0488 | 1.171 | 0.2137 |
| Ethylbenzene | 0.0021 | 0.052 | 0.0094 |
| C8+ Heavies | 0.0747 | 1.793 | 0.3272 |
| Total Emissions | 68.0352 | 1632.845 | 297.9942 |
| Total Hydrocarbon Emissions | 68.0352 | 1632.845 | 297.9942 |
| Total VOC Emissions | 30.9102 | 741.844 | 135.3866 |
| Total HAP Emissions | 1.0014 | 24.034 | 4.3861 |
| Total BTEX Emissions | 0.0898 | 2.156 | 0.3935 |

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

| Component | lbs/hr | lbs/day | tons/yr |
|---|---|---|---|
| Methane | 0.1908 | 4.578 | 0.8355 |
| Ethane | 0.2209 | 5.301 | 0.9674 |
| Propane | 0.1852 | 4.444 | 0.8110 |
| Isobutane | 0.0314 | 0.753 | 0.1374 |
| n-Butane | 0.1210 | 2.904 | 0.5299 |
| Isopentane | 0.0251 | 0.603 | 0.1101 |
| n-Pentane | 0.0477 | 1.144 | 0.2088 |
| n-Hexane | 0.0219 | 0.526 | 0.0959 |
| Cyclohexane | 0.0221 | 0.530 | 0.0967 |
| Other Hexanes | 0.0194 | 0.465 | 0.0848 |
| Heptanes | 0.0249 | 0.598 | 0.1092 |
| Methylcyclohexane | 0.0168 | 0.402 | 0.0734 |
| 2,2,4-Trimethylpentane | 0.0002 | 0.006 | 0.0010 |
| Benzene | 0.0143 | 0.344 | 0.0628 |
| Toluene | 0.0265 | 0.637 | 0.1162 |
| Ethylbenzene | 0.0019 | 0.046 | 0.0085 |
| C8+ Heavies | 0.0151 | 0.363 | 0.0663 |
| Total Emissions | 0.9851 | 23.643 | 4.3149 |
| Total Hydrocarbon Emissions | 0.9851 | 23.643 | 4.3149 |
| Total VOC Emissions | 0.5735 | 13.764 | 2.5120 |
| Total HAP Emissions | 0.0649 | 1.558 | 0.2844 |
| Total BTEX Emissions | 0.0428 | 1.027 | 0.1875 |

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

| Component | Uncontrolled tons/yr | Controlled tons/yr | % Reduction |
|---|---|---|---|
| Methane | 83.5489 | 0.8355 | 99.00 |
| Ethane | 96.7355 | 0.9674 | 99.00 |
| Propane | 81.0978 | 0.8110 | 99.00 |
| Isobutane | 13.7361 | 0.1374 | 99.00 |
| n-Butane | 52.9946 | 0.5299 | 99.00 |
| Isopentane | 11.0118 | 0.1101 | 99.00 |
| n-Pentane | 20.8803 | 0.2088 | 99.00 |
| n-Hexane | 9.5932 | 0.0959 | 99.00 |
| Cyclohexane | 9.6734 | 0.0967 | 99.00 |

| | | | |
|---|---|---|---|
| Other Hexanes | 8.4802 | 0.0848 | 99.00 |
| Heptanes | 10.9167 | 0.1092 | 99.00 |
| Methylcyclohexane | 7.3435 | 0.0734 | 99.00 |
| 2,2,4-Trimethylpentane | 0.1029 | 0.0010 | 99.00 |
| Benzene | 6.2788 | 0.0628 | 99.00 |
| Toluene | 11.6213 | 0.1162 | 99.00 |
| Ethylbenzene | 0.8454 | 0.0085 | 99.00 |
| C8+ Heavies | 6.6261 | 0.0663 | 99.00 |
| Total Emissions | 431.4865 | 4.3149 | 99.00 |
| Total Hydrocarbon Emissions | 431.4865 | 4.3149 | 99.00 |
| Total VOC Emissions | 251.2021 | 2.5120 | 99.00 |
| Total HAP Emissions | 28.4415 | 0.2844 | 99.00 |
| Total BTEX Emissions | 18.7455 | 0.1875 | 99.00 |

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature: 50.00 deg. F
Excess Oxygen: 5.00 %
Combustion Efficiency: 99.00 %
Supplemental Fuel Requirement: 1.53e-001 MM BTU/hr

| Component | Emitted | Destroyed |
|---|---|---|
| Methane | 1.00% | 99.00% |
| Ethane | 1.00% | 99.00% |
| Propane | 1.00% | 99.00% |
| Isobutane | 1.00% | 99.00% |
| n-Butane | 1.00% | 99.00% |
| Isopentane | 1.00% | 99.00% |
| n-Pentane | 1.00% | 99.00% |
| n-Hexane | 1.00% | 99.00% |
| Cyclohexane | 1.00% | 99.00% |
| Other Hexanes | 1.00% | 99.00% |
| Heptanes | 1.00% | 99.00% |
| Methylcyclohexane | 1.00% | 99.00% |
| 2,2,4-Trimethylpentane | 1.00% | 99.00% |
| Benzene | 1.00% | 99.00% |
| Toluene | 1.00% | 99.00% |
| Ethylbenzene | 1.00% | 99.00% |
| C8+ Heavies | 1.00% | 99.00% |

ABSORBER

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

Calculated Absorber Stages: 1.25
Calculated Dry Gas Dew Point: 0.92 lbs. H2O/MMSCF

| | |
|---|---|
| Temperature: | 70.0 deg. F |
| Pressure: | 900.0 psig |
| Dry Gas Flow Rate: | 60.0000 MMSCF/day |
| Glycol Losses with Dry Gas: | 0.4333 lb/hr |
| Wet Gas Water Content: | Saturated |
| Calculated Wet Gas Water Content: | 25.33 lbs. H2O/MMSCF |
| Calculated Lean Glycol Recirc. Ratio: | 13.46 gal/lb H2O |

| Component | Remaining in Dry Gas | Absorbed in Glycol |
|---|---|---|
| Water | 3.62% | 96.38% |
| Carbon Dioxide | 99.63% | 0.37% |
| Nitrogen | 99.97% | 0.03% |
| Methane | 99.98% | 0.02% |
| Ethane | 99.93% | 0.07% |
| Propane | 99.89% | 0.11% |
| Isobutane | 99.85% | 0.15% |
| n-Butane | 99.81% | 0.19% |
| Isopentane | 99.82% | 0.18% |
| n-Pentane | 99.76% | 0.24% |
| n-Hexane | 99.63% | 0.37% |
| Cyclohexane | 98.21% | 1.79% |
| Other Hexanes | 99.72% | 0.28% |
| Heptanes | 99.34% | 0.66% |
| Methylcyclohexane | 98.15% | 1.85% |
| 2,2,4-Trimethylpentane | 99.74% | 0.26% |
| Benzene | 82.60% | 17.40% |
| Toluene | 77.01% | 22.99% |
| Ethylbenzene | 72.42% | 27.58% |
| C8+ Heavies | 99.29% | 0.71% |

FLASH TANK

---

| | |
|---|---|
| Flash Control: | Combustion device |
| Flash Control Efficiency: | 99.00 % |
| Flash Temperature: | 150.0 deg. F |
| Flash Pressure: | 50.0 psig |

| Component | Left in Glycol | Removed in Flash Gas |
|---|---|---|
| Water | 99.92% | 0.08% |
| Carbon Dioxide | 33.02% | 66.98% |
| Nitrogen | 4.61% | 95.39% |
| Methane | 4.70% | 95.30% |
| Ethane | 14.21% | 85.79% |
| Propane | 24.62% | 75.38% |
| Isobutane | 32.13% | 67.87% |
| n-Butane | 37.73% | 62.27% |
| Isopentane | 40.50% | 59.50% |
| n-Pentane | 45.53% | 54.47% |
| n-Hexane | 59.02% | 40.98% |
| Cyclohexane | 85.85% | 14.15% |
| Other Hexanes | 52.88% | 47.12% |
| Heptanes | 73.92% | 26.08% |
| Methylcyclohexane | 88.33% | 11.67% |
| 2,2,4-Trimethylpentane | 59.89% | 40.11% |
| Benzene | 97.42% | 2.58% |
| Toluene | 98.31% | 1.69% |
| Ethylbenzene | 99.00% | 1.00% |

| | | |
|---|---|---|
| C8+ Heavies | 95.65% | 4.35% |

REGENERATOR

No Stripping Gas used in regenerator.

| Component | Remaining in Glycol | Distilled Overhead |
|---|---|---|
| Water | 65.49% | 34.51% |
| Carbon Dioxide | 0.00% | 100.00% |
| Nitrogen | 0.00% | 100.00% |
| Methane | 0.00% | 100.00% |
| Ethane | 0.00% | 100.00% |
| Propane | 0.00% | 100.00% |
| Isobutane | 0.00% | 100.00% |
| n-Butane | 0.00% | 100.00% |
| Isopentane | 1.23% | 98.77% |
| n-Pentane | 1.10% | 98.90% |
| n-Hexane | 0.85% | 99.15% |
| Cyclohexane | 3.73% | 96.27% |
| Other Hexanes | 1.89% | 98.11% |
| Heptanes | 0.68% | 99.32% |
| Methylcyclohexane | 4.53% | 95.47% |
| 2,2,4-Trimethylpentane | 2.50% | 97.50% |
| Benzene | 5.13% | 94.87% |
| Toluene | 8.04% | 91.96% |
| Ethylbenzene | 10.51% | 89.49% |
| C8+ Heavies | 12.56% | 87.44% |

STREAM REPORTS:

WET GAS STREAM

Temperature: 70.00 deg. F
Pressure: 914.70 psia
Flow Rate: 2.50e+006 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 5.34e-002 | 6.34e+001 |
| Carbon Dioxide | 1.34e-001 | 3.90e+002 |
| Nitrogen | 5.77e-001 | 1.07e+003 |
| Methane | 7.48e+001 | 7.91e+004 |
| Ethane | 1.53e+001 | 3.04e+004 |
| Propane | 5.89e+000 | 1.71e+004 |
| Isobutane | 5.63e-001 | 2.16e+003 |
| n-Butane | 1.63e+000 | 6.25e+003 |
| Isopentane | 2.87e-001 | 1.36e+003 |
| n-Pentane | 4.15e-001 | 1.98e+003 |
| n-Hexane | 1.03e-001 | 5.88e+002 |
| Cyclohexane | 2.22e-002 | 1.23e+002 |
| Other Hexanes | 1.20e-001 | 6.82e+002 |
| Heptanes | 5.72e-002 | 3.78e+002 |
| Methylcyclohexane | 1.40e-002 | 9.06e+001 |

| | | |
|---|---|---|
| 2,2,4-Trimethylpentane | 1.20e-003 | 9.04e+000 |
| Benzene | 1.60e-003 | 8.24e+000 |
| Toluene | 1.90e-003 | 1.15e+001 |
| Ethylbenzene | 9.99e-005 | 7.00e-001 |
| C8+ Heavies | 1.89e-002 | 2.12e+002 |
| Total Components | 100.00 | 1.42e+005 |

DRY GAS STREAM

Temperature: 70.00 deg. F
Pressure: 914.70 psia
Flow Rate: 2.50e+006 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 1.93e-003 | 2.30e+000 |
| Carbon Dioxide | 1.34e-001 | 3.88e+002 |
| Nitrogen | 5.77e-001 | 1.06e+003 |
| Methane | 7.48e+001 | 7.91e+004 |
| Ethane | 1.53e+001 | 3.04e+004 |
| Propane | 5.89e+000 | 1.71e+004 |
| Isobutane | 5.63e-001 | 2.16e+003 |
| n-Butane | 1.63e+000 | 6.24e+003 |
| Isopentane | 2.86e-001 | 1.36e+003 |
| n-Pentane | 4.15e-001 | 1.97e+003 |
| n-Hexane | 1.03e-001 | 5.86e+002 |
| Cyclohexane | 2.18e-002 | 1.21e+002 |
| Other Hexanes | 1.20e-001 | 6.80e+002 |
| Heptanes | 5.68e-002 | 3.75e+002 |
| Methylcyclohexane | 1.37e-002 | 8.89e+001 |
| 2,2,4-Trimethylpentane | 1.20e-003 | 9.01e+000 |
| Benzene | 1.32e-003 | 6.80e+000 |
| Toluene | 1.46e-003 | 8.89e+000 |
| Ethylbenzene | 7.24e-005 | 5.07e-001 |
| C8+ Heavies | 1.88e-002 | 2.11e+002 |
| Total Components | 100.00 | 1.42e+005 |

LEAN GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 1.37e+001 gpm

| Component | Conc. (wt%) | Loading (lb/hr) |
|---|---|---|
| TEG | 9.85e+001 | 7.60e+003 |
| Water | 1.50e+000 | 1.16e+002 |
| Carbon Dioxide | 1.89e-012 | 1.46e-010 |
| Nitrogen | 4.01e-013 | 3.09e-011 |
| Methane | 8.31e-018 | 6.41e-016 |
| Ethane | 1.35e-007 | 1.04e-005 |
| Propane | 9.77e-009 | 7.53e-007 |
| Isobutane | 1.22e-009 | 9.41e-008 |
| n-Butane | 3.89e-009 | 3.00e-007 |
| Isopentane | 1.64e-004 | 1.26e-002 |
| n-Pentane | 3.11e-004 | 2.40e-002 |
| n-Hexane | 1.43e-004 | 1.10e-002 |

| | | |
|---|---|---|
| Cyclohexane | 9.46e-004 | 7.30e-002 |
| Other Hexanes | 2.54e-004 | 1.96e-002 |
| Heptanes | 1.62e-004 | 1.25e-002 |
| Methylcyclohexane | 9.06e-004 | 6.98e-002 |
| 2,2,4-Trimethylpentane | 4.64e-006 | 3.58e-004 |
| Benzene | 9.78e-004 | 7.54e-002 |
| Toluene | 2.95e-003 | 2.28e-001 |
| Ethylbenzene | 2.91e-004 | 2.24e-002 |
| C8+ Heavies | 2.68e-003 | 2.07e-001 |
| Total Components | 100.00 | 7.71e+003 |

RICH GLYCOL STREAM

Temperature: 70.00 deg. F
Pressure: 914.70 psia
Flow Rate: 1.40e+001 gpm
NOTE: Stream has more than one phase.

| Component | Conc. (wt%) | Loading (lb/hr) |
|---|---|---|
| TEG | 9.65e+001 | 7.60e+003 |
| Water | 2.25e+000 | 1.77e+002 |
| Carbon Dioxide | 1.85e-002 | 1.46e+000 |
| Nitrogen | 3.94e-003 | 3.10e-001 |
| Methane | 2.42e-001 | 1.91e+001 |
| Ethane | 2.81e-001 | 2.21e+001 |
| Propane | 2.35e-001 | 1.85e+001 |
| Isobutane | 3.98e-002 | 3.14e+000 |
| n-Butane | 1.54e-001 | 1.21e+001 |
| Isopentane | 3.21e-002 | 2.53e+000 |
| n-Pentane | 6.09e-002 | 4.79e+000 |
| n-Hexane | 2.80e-002 | 2.20e+000 |
| Cyclohexane | 2.90e-002 | 2.28e+000 |
| Other Hexanes | 2.48e-002 | 1.96e+000 |
| Heptanes | 3.18e-002 | 2.50e+000 |
| Methylcyclohexane | 2.22e-002 | 1.75e+000 |
| 2,2,4-Trimethylpentane | 3.03e-004 | 2.39e-002 |
| Benzene | 1.92e-002 | 1.51e+000 |
| Toluene | 3.66e-002 | 2.88e+000 |
| Ethylbenzene | 2.74e-003 | 2.15e-001 |
| C8+ Heavies | 2.18e-002 | 1.72e+000 |
| Total Components | 100.00 | 7.87e+003 |

FLASH TANK OFF GAS STREAM

Temperature: 150.00 deg. F
Pressure: 64.70 psia
Flow Rate: 9.03e+002 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 3.19e-001 | 1.37e-001 |
| Carbon Dioxide | 9.32e-001 | 9.75e-001 |
| Nitrogen | 4.44e-001 | 2.96e-001 |
| Methane | 4.76e+001 | 1.82e+001 |
| Ethane | 2.65e+001 | 1.89e+001 |

| | | |
|---|---|---|
| Propane | 1.33e+001 | 1.40e+001 |
| Isobutane | 1.54e+000 | 2.13e+000 |
| n-Butane | 5.45e+000 | 7.53e+000 |
| Isopentane | 8.76e-001 | 1.50e+000 |
| n-Pentane | 1.52e+000 | 2.61e+000 |
| n-Hexane | 4.40e-001 | 9.02e-001 |
| Cyclohexane | 1.61e-001 | 3.23e-001 |
| Other Hexanes | 4.50e-001 | 9.21e-001 |
| Heptanes | 2.74e-001 | 6.53e-001 |
| Methylcyclohexane | 8.73e-002 | 2.04e-001 |
| 2,2,4-Trimethylpentane | 3.52e-003 | 9.57e-003 |
| Benzene | 2.09e-002 | 3.89e-002 |
| Toluene | 2.23e-002 | 4.88e-002 |
| Ethylbenzene | 8.51e-004 | 2.15e-003 |
| C8+ Heavies | 1.84e-002 | 7.47e-002 |
| Total Components | 100.00 | 6.94e+001 |

FLASH TANK GLYCOL STREAM

Temperature: 150.00 deg. F
Flow Rate: 1.39e+001 gpm

| Component | Conc. (wt%) | Loading (lb/hr) |
|---|---|---|
| TEG | 9.73e+001 | 7.60e+003 |
| Water | 2.26e+000 | 1.77e+002 |
| Carbon Dioxide | 6.16e-003 | 4.81e-001 |
| Nitrogen | 1.83e-004 | 1.43e-002 |
| Methane | 1.15e-002 | 8.96e-001 |
| Ethane | 4.02e-002 | 3.14e+000 |
| Propane | 5.84e-002 | 4.56e+000 |
| Isobutane | 1.29e-002 | 1.01e+000 |
| n-Butane | 5.85e-002 | 4.56e+000 |
| Isopentane | 1.31e-002 | 1.02e+000 |
| n-Pentane | 2.80e-002 | 2.18e+000 |
| n-Hexane | 1.66e-002 | 1.30e+000 |
| Cyclohexane | 2.51e-002 | 1.96e+000 |
| Other Hexanes | 1.33e-002 | 1.03e+000 |
| Heptanes | 2.37e-002 | 1.85e+000 |
| Methylcyclohexane | 1.98e-002 | 1.54e+000 |
| 2,2,4-Trimethylpentane | 1.83e-004 | 1.43e-002 |
| Benzene | 1.88e-002 | 1.47e+000 |
| Toluene | 3.63e-002 | 2.83e+000 |
| Ethylbenzene | 2.73e-003 | 2.13e-001 |
| C8+ Heavies | 2.11e-002 | 1.64e+000 |
| Total Components | 100.00 | 7.80e+003 |

FLASH GAS EMISSIONS

Flow Rate: 4.29e+003 scfh
Control Method: Combustion Device
Control Efficiency: 99.00

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|

| | | |
|---|---|---|
| Water | 6.00e+001 | 1.22e+002 |
| Carbon Dioxide | 3.97e+001 | 1.98e+002 |
| Nitrogen | 9.34e-002 | 2.96e-001 |
| Methane | 1.00e-001 | 1.82e-001 |
| Ethane | 5.57e-002 | 1.89e-001 |
| Propane | 2.80e-002 | 1.40e-001 |
| Isobutane | 3.24e-003 | 2.13e-002 |
| n-Butane | 1.15e-002 | 7.53e-002 |
| Isopentane | 1.84e-003 | 1.50e-002 |
| n-Pentane | 3.20e-003 | 2.61e-002 |
| n-Hexane | 9.25e-004 | 9.02e-003 |
| Cyclohexane | 3.39e-004 | 3.23e-003 |
| Other Hexanes | 9.45e-004 | 9.21e-003 |
| Heptanes | 5.76e-004 | 6.53e-003 |
| Methylcyclohexane | 1.84e-004 | 2.04e-003 |
| 2,2,4-Trimethylpentane | 7.41e-006 | 9.57e-005 |
| Benzene | 4.40e-005 | 3.89e-004 |
| Toluene | 4.68e-005 | 4.88e-004 |
| Ethylbenzene | 1.79e-006 | 2.15e-005 |
| C8+ Heavies | 3.88e-005 | 7.47e-004 |
| Total Components | 100.00 | 3.21e+002 |

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.49e+003 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 8.59e+001 | 6.10e+001 |
| Carbon Dioxide | 2.77e-001 | 4.81e-001 |
| Nitrogen | 1.30e-002 | 1.43e-002 |
| Methane | 1.42e+000 | 8.96e-001 |
| Ethane | 2.65e+000 | 3.14e+000 |
| Propane | 2.62e+000 | 4.56e+000 |
| Isobutane | 4.40e-001 | 1.01e+000 |
| n-Butane | 1.99e+000 | 4.56e+000 |
| Isopentane | 3.56e-001 | 1.01e+000 |
| n-Pentane | 7.59e-001 | 2.16e+000 |
| n-Hexane | 3.79e-001 | 1.29e+000 |
| Cyclohexane | 5.69e-001 | 1.89e+000 |
| Other Hexanes | 2.99e-001 | 1.01e+000 |
| Heptanes | 4.66e-001 | 1.84e+000 |
| Methylcyclohexane | 3.81e-001 | 1.47e+000 |
| 2,2,4-Trimethylpentane | 3.10e-003 | 1.39e-002 |
| Benzene | 4.53e-001 | 1.39e+000 |
| Toluene | 7.18e-001 | 2.60e+000 |
| Ethylbenzene | 4.56e-002 | 1.91e-001 |
| C8+ Heavies | 2.14e-001 | 1.44e+000 |
| Total Components | 100.00 | 9.19e+001 |

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.06e+000 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Methane | 1.03e+001 | 8.96e-003 |
| Ethane | 1.92e+001 | 3.14e-002 |
| Propane | 1.91e+001 | 4.56e-002 |
| Isobutane | 3.20e+000 | 1.01e-002 |
| n-Butane | 1.45e+001 | 4.56e-002 |
| Isopentane | 2.58e+000 | 1.01e-002 |
| n-Pentane | 5.51e+000 | 2.16e-002 |
| n-Hexane | 2.76e+000 | 1.29e-002 |
| Cyclohexane | 4.13e+000 | 1.89e-002 |
| Other Hexanes | 2.17e+000 | 1.01e-002 |
| Heptanes | 3.38e+000 | 1.84e-002 |
| Methylcyclohexane | 2.77e+000 | 1.47e-002 |
| 2,2,4-Trimethylpentane | 2.25e-002 | 1.39e-004 |
| Benzene | 3.29e+000 | 1.39e-002 |
| Toluene | 5.21e+000 | 2.60e-002 |
| Ethylbenzene | 3.31e-001 | 1.91e-003 |
| C8+ Heavies | 1.56e+000 | 1.44e-002 |
| Total Components | 100.00 | 3.05e-001 |

Conner Produced Water Tank ProMax Summary

| Produced Liquids | | |
|---|---|---|
| Temperature | °F | 111.92 |
| Pressure | psig | 0.60 |
| Std Liquid Volumetric Flow | bbl/d | 2.81 |

| Emissions to Atmosphere | |
|---|---|
| **Component** | **tons/year** |
| Nitrogen | 0.0001 |
| Carbon Dioxide | 0.0009 |
| Methane | 0.0105 |
| Ethane | 0.0230 |
| Propane | 0.0262 |
| Isobutane | 0.0017 |
| n-Butane | 0.0080 |
| Propane, 2,2-Dimethyl- | 0.0000 |
| Isopentane | 0.0008 |
| n-Pentane | 0.0008 |
| 2-2-Dimethylbutane | 0.0000 |
| 2-3-Dimethylbutane | 0.0000 |
| 2-Methylpentane | 0.0000 |
| 3-Methylpentane | 0.0001 |
| n-Hexane | 0.0000 |
| Methylcyclopentane | 0.0000 |
| Benzene | 0.0000 |
| Cyclohexane | 0.0000 |
| 2-Methylhexane | 0.0000 |
| 3-Methylhexane | 0.0000 |
| n-Heptane | 0.0000 |
| Methylcyclohexane | 0.0000 |
| Toluene | 0.0000 |
| n-Octane | 0.0000 |
| Ethylbenzene | 0.0000 |
| o-Xylene | 0.0000 |
| n-Nonane | 0.0000 |
| n-Decane | 0.0000 |
| Undecane | 0.0000 |
| Water | 0.003898961 |

# Supplement S4

# AP-42 / EPA Emission Factors

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- **AP-42 – Combustion Emission Factor Summary**
- **EPA Protocol for Equipment Leak Emission Estimates**

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Potentially Applicable

## AP-42 and GHG EMISSION FACTORS

(Preferentially use test data or vendor data where available)

| | Pollutant | GAS-FIRED ENGINES | | | GAS-FIRED TURBINES | | |
|---|---|---|---|---|---|---|---|
| | | AP-42 Table 3.2-1; 3.2-2; 3.2-3 07/00 | | | AP-42 Table 3.1-1; 3.1-2a; 3.1-3 04/00 | | |
| | | 2SLB lb/MMBtu | 4SLB lb/MMBtu | 4SRB lb/MMBtu | Uncontrolled lb/MMBtu | Water Injection lb/MMBtu | Lean Pre-Mix# lb/MMBtu |
| CRITERIA | NOX (≥ 90% Load) | 3.17E+00 | 4.08E+00 | 2.21E+00 | 3.23E-01 | 1.28E-01 | 9.91E-02 |
| | CO (≥ 90% Load) | 3.86E-01 | 3.17E-01 | 3.72E+00 | 8.23E-02 | 2.95E-02 | 1.51E-02 |
| | VOC | 1.20E-01 | 1.18E-01 | 2.96E-02 | 2.10E-03 | 2.10E-03 | 2.10E-03 |
| | PM10/2.5 (Total) | 4.83E-02 | 9.99E-03 | 1.94E-02 | 6.63E-03 | 6.63E-03 | 6.63E-03 |
| | SO2 | 5.88E-04 | 5.88E-04 | 5.88E-04 | 3.40E-03 | 3.40E-03 | 3.40E-03 |
| HAPs | Acetaldehyde | 7.76E-03 | 8.36E-03 | 2.79E-03 | 4.00E-05 | 4.00E-05 | 4.00E-05 |
| | Acrolein | 7.78E-03 | 5.14E-03 | 2.63E-03 | 6.40E-06 | 6.40E-06 | 6.40E-06 |
| | Benzene | 1.94E-03 | 4.40E-04 | 1.58E-03 | 1.20E-05 | 1.20E-05 | 9.10E-07 |
| | Butadiene, 1,3- | 8.20E-04 | 2.67E-04 | 6.63E-04 | 4.30E-07 | 4.30E-07 | 4.30E-07 |
| | Ethylbenzene | 1.08E-04 | 3.97E-05 | 2.48E-05 | 3.20E-05 | 3.20E-05 | 3.20E-05 |
| | Formaldehyde (HCHO) | 5.52E-02 | 5.28E-02 | 2.05E-02 | 7.10E-04 | 7.10E-04 | 2.00E-05 |
| | n-Hexane | 4.45E-04 | 1.11E-03 | --- | --- | --- | --- |
| | Methanol (MeOH) | 2.48E-03 | 2.50E-03 | 3.06E-03 | --- | --- | --- |
| | Polycyclic Organic Matter (POM/PAH) | 1.34E-04 | 3.47E-04 | 9.71E-05 | 3.25E-05 | 3.25E-05 | 3.25E-05 |
| | Toluene | 9.63E-04 | 4.08E-04 | 5.58E-04 | 1.30E-04 | 1.30E-04 | 1.30E-04 |
| | Trimethylpentane, 2,2,4- (i-Octane) | 8.46E-04 | 2.50E-04 | --- | --- | --- | --- |
| | Xylenes | 2.68E-04 | 1.84E-04 | 1.95E-04 | 6.40E-05 | 6.40E-05 | 6.40E-05 |
| | Other/Trace HAP* | 6.57E-04 | 3.21E-04 | 1.79E-04 | 2.90E-05 | 2.90E-05 | 2.90E-05 |
| | TOTAL HAP | 7.94E-02 | 7.22E-02 | 3.23E-02 | 1.06E-03 | 1.06E-03 | 3.55E-04 |
| GHG | CO2 (GWP=1) | 1.10E+02 | 1.10E+02 | 1.10E+02 | 1.10E+02 | 1.10E+02 | 1.10E+02 |
| | CH4 (GWP=25) | 1.45E+00 | 1.25E+00 | 2.30E-01 | 8.64E-03 | 8.64E-03 | 8.64E-03 |
| | N2O (GWP=298) (*40CFR98*) | *2.20E-04* | *2.20E-04* | *2.20E-04* | 3.00E-03 | 3.00E-03 | 3.00E-03 |
| | CO2e (*40CFR98*) | *1.46E+02* | *1.41E+02* | *1.16E+02* | *1.11E+02* | *1.11E+02* | *1.11E+02* |

(#Lean Pre-Mix - aka: Dry Low Emissions (DLE or DLN) or SoLoNOx)

| | Pollutant | GAS-FIRED EXTERNAL COMBUSTION | | | FLARE | DIESEL ENGINES | DIESEL ENGINES |
|---|---|---|---|---|---|---|---|
| | | AP-42 Table 1.4-1; 1.4-2; 1.4-3 (<100 MMBtu/hr) 07/98 | | | 13.5-1 06/17 | 3.3-1; 3.3-2 10/96 | Tier 4 ≥ 751 bhp |
| | | Uncontrolled lb/MMBtu | LoNOx Burners lb/MMBtu | Flue Gas Recirc lb/MMBtu | Combustion lb/MMBtu | Uncontrolled lb/MMBtu | Controlled lb/MMBtu |
| CRITERIA | NOX (≥ 90% Load) | 9.80E-02 | 4.90E-02 | 3.14E-02 | External Comb. | 4.41E+00 | 4.18E+00 |
| | CO (≥ 90% Load) | 8.24E-02 | 8.24E-02 | 8.24E-02 | 3.10E-01 | 9.50E-01 | 2.35E+00 |
| | VOC | 5.39E-03 | 5.39E-03 | 5.39E-03 | 98% Control | 3.53E-01 | 1.28E-01 |
| | PM10/2.5 (Total) | 7.45E-03 | 7.45E-03 | 7.45E-03 | External Comb. | 3.10E-01 | 1.35E-01 |
| | SO2 | 5.88E-04 | 5.88E-04 | 5.88E-04 | External Comb. | 2.90E-01 | 2.90E-01 |
| HAPs | Acetaldehyde | --- | --- | --- | Use External Combustion or 98% Control, As Appropriate | 7.67E-04 | 2.77E-04 |
| | Acrolein | --- | --- | --- | | 9.25E-05 | 3.35E-05 |
| | Benzene | 2.06E-06 | 2.06E-06 | 2.06E-06 | | 9.33E-04 | 3.38E-04 |
| | Butadiene, 1,3- | --- | --- | --- | | 3.91E-05 | 1.41E-05 |
| | Ethylbenzene | --- | --- | --- | | --- | --- |
| | Formaldehyde (HCHO) | 7.35E-05 | 7.35E-05 | 7.35E-05 | | 1.18E-03 | 4.27E-04 |
| | n-Hexane | 1.76E-03 | 1.76E-03 | 1.76E-03 | | --- | --- |
| | Methanol (MeOH) | --- | --- | --- | | --- | --- |
| | Polycyclic Organic Matter (POM/PAH) | 6.85E-07 | 6.85E-07 | 6.85E-07 | | 1.68E-04 | 6.08E-05 |
| | Toluene | 3.33E-06 | 3.33E-06 | 3.33E-06 | | 4.09E-04 | 1.48E-04 |
| | Trimethylpentane, 2,2,4- (i-Octane) | --- | --- | --- | | --- | --- |
| | Xylenes | --- | --- | --- | | 2.85E-04 | 1.03E-04 |
| | Other/Trace HAP* | 1.18E-06 | 1.18E-06 | 1.18E-06 | | --- | --- |
| | TOTAL HAP | 1.85E-03 | 1.85E-03 | 1.85E-03 | | 3.87E-03 | 1.40E-03 |
| GHG | CO2 (GWP=1) | 1.18E+02 | 1.18E+02 | 1.18E+02 | | 1.64E+02 | 1.64E+02 |
| | CH4 (GWP=25) | 2.25E-03 | 2.25E-03 | 2.25E-03 | | *6.61E-03* | *6.61E-03* |
| | N2O (GWP=298) (*40CFR98*) | 2.16E-03 | 6.27E-04 | 6.27E-04 | | *1.32E-03* | *1.32E-03* |
| | CO2e (*40CFR98*) | *1.18E+02* | *1.18E+02* | *1.18E+02* | | *1.65E+02* | *1.65E+02* |

| 40 CFR 98 - DEFAULT EMISSION FACTORS | | | | | |
|---|---|---|---|---|---|
| Fuel Type | Table C-1 to Subpart C of Part 98 | | Table C-2 to Subpart C of Part 98 | | Weighted Sum |
| | Default HHV | Carbon Dioxide lb CO2/MMBtu | Methane lb CH4/MMBtu | Nitrous Oxide lb N2O/MMBtu | CO2e lb CO2e/MMBtu |
| Fuel Oil No. 2 (Diesel) | 138,000 Btu/gal | 1.63E+02 | 6.61E-03 | 1.32E-03 | 1.64E+02 |
| Propane | 91,000 Btu/gal | 1.39E+02 | 6.61E-03 | 1.32E-03 | 1.39E+02 |
| Natural Gas | 1,026 Btu/scf | 1.17E+02 | 2.20E-03 | 2.20E-04 | 1.17E+02 |

*Other/Trace HAPs include: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

| Global Warming Potential (100 Yr) (GWP) | | |
|---|---|---|
| Table A-1 to Subpart A of Part 98 | | |
| CO2 | CH4 | N2O |
| 1 | 25 | 298 |

Reviewed and Revised: 02/28/18 - CAR

United States Environmental Protection Agency | Office of Air Quality Planning and Standards Research Triangle Park NC 27711 | EPA-453/R-95-017 November 1995

Air

EPA

# Protocol for Equipment Leak Emission Estimates

TABLE 2-4. OIL AND GAS PRODUCTION OPERATIONS AVERAGE EMISSION FACTORS (kg/hr/source)

| Equipment Type | Service[a] | Emission Factor (kg/hr/source)[b] |
|---|---|---|
| Valves | Gas | 4.5E-03 |
| | Heavy Oil | 8.4E-06 |
| | Light Oil | 2.5E-03 |
| | Water/Oil | 9.8E-05 |
| Pump seals | Gas | 2.4E-03 |
| | Heavy Oil | NA |
| | Light Oil | 1.3E-02 |
| | Water/Oil | 2.4E-05 |
| Others[c] | Gas | 8.8E-03 |
| | Heavy Oil | 3.2E-05 |
| | Light Oil | 7.5E-03 |
| | Water/Oil | 1.4E-02 |
| Connectors | Gas | 2.0E-04 |
| | Heavy Oil | 7.5E-06 |
| | Light Oil | 2.1E-04 |
| | Water/Oil | 1.1E-04 |
| Flanges | Gas | 3.9E-04 |
| | Heavy Oil | 3.9E-07 |
| | Light Oil | 1.1E-04 |
| | Water/Oil | 2.9E-06 |
| Open-ended lines | Gas | 2.0E-03 |
| | Heavy Oil | 1.4E-04 |
| | Light Oil | 1.4E-03 |
| | Water/Oil | 2.5E-04 |

[a]Water/Oil emission factors apply to water streams in oil service with a water content greater than 50%, from the point of origin to the point where the water content reaches 99%. For water streams with a water content greater than 99%, the emission rate is considered negligible.

[b]These factors are for total organic compound emission rates (including non-VOC's such as methane and ethane) and apply to light crude, heavy crude, gas plant, gas production, and off shore facilities. "NA" indicates that not enough data were available to develop the indicated emission factor.

[c]The "other" equipment type was derived from compressors, diaphrams, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

## Application Fee

Include a check payable to WVDEP – Division of Air Quality.

- As per WV Rule 22 (45CSR22), a **Minimum fee of $1,000** must be submitted for each 45CSR13 permit application filed with the WVDEP-DAQ.
- **Additional Charges** may apply, depending on the nature of the application as outlined in Section 3.4.b. of Regulation 22, and shown below:

| | | | |
|---|---|---|---|
| o | NSPS Requirements: | $1,000 | Not Applicable |
| o | NESHAP Requirements: | $2,500 | Not Applicable |
| o | New Major Source: | $10,000 | Not Applicable |
| o | Major Modifications: | $5,000 | Not Applicable. |

- Total application fee is **$1,000**.
  [= $1,000 Minimum Fee + $0 Add'l Charges]

**** End of Application for 45CSR13 NSR Permit Modification ****