



Williams Ohio Valley Midstream LLC  
Park Place Corporate Center 2  
2000 Commerce Drive  
Pittsburgh, PA 15275  
(412) 787-7300  
(412) 787-6002 fax

May 27, 2015  
(Via Federal Express)

Beverly 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 Modification Permit**  
**Williams Ohio Valley Midstream LLC**  
**YOHO COMPRESSOR STATION**  
**Wetzel County, West Virginia**

Dear Ms. McKeone,

Williams Ohio Valley Midstream LLC (OVM) is submitting an Application for 45CSR13 New Source Review (NSR) Modification Permit for the existing Yoho Compressor Station, located approximately 3.0 Miles South-Southeast of New Martinsville, approximately 0.1 Mile Northwest of Slim Chance Road, Wetzel County, West Virginia.

This application for 45CSR13 NSR Modification Permit has been prepared and submitted to update the existing permit to reflect actual construction and operations, as follows:

- Updated the site's address, location, and directions data;
- Increased the Dehydrator's capacity from 1 MMscfd to 2 MMscfd;
- Reduced Flash Tank off-gas recycle from 85% to 50%;
- Used more conservative Dehydrator Operation parameters (temp and pressure);
- Corrected to show operation of the Dehydration Unit w/o Still Vent Condenser;
- Included Compressor Rod Packing and Engine Crankcase Emissions;
- Included Water/Oil Fugitive Emissions;
- Updated Extended Gas Analysis; and
- Updated emission factors and other emission estimating protocols.

The facility continues to qualify as a Minor Source under Non-Attainment New Source Review (NNSR), Prevention of Significant Deterioration (PSD), and Title V Operating Permits. The facility is also an Area Source for Hazardous Air Pollutants (HAP) under the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations.

Beverly McKeone  
WVDEP – Division of Air Quality  
May 27, 2015  
Page 02 of 02

If you have any questions concerning this submittal or need additional information, please contact me at (412) 787-4259 or [danell.zawaski@williams.com](mailto:danell.zawaski@williams.com).

Sincerely,



R. Danell Zawaski, P.E.  
Environmental Specialist

Enclosures:

Application for NSR Modifications Permit  
Attachments A through S  
Check for Application Fee

**APPLICATION FOR  
45CSR13 NEW SOURCE REVIEW  
MODIFICATION PERMIT**

*For the:*

Williams Ohio Valley Midstream LLC  
**YOHO COMPRESSOR STATION**  
Wetzel County, West Virginia

*Submitted to:*



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

*Submitted by:*



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

*Prepared by:*



**EcoLogic Environmental Consultants, LLC**  
864 Windsor Court  
Santa Barbara, CA 93111

**May 2015**

**APPLICATION FOR  
45CSR13 NEW SOURCE REVIEW  
MODIFICATION PERMIT**

Williams Ohio Valley Midstream LLC  
**YOHO COMPRESSOR STATION**  
Wetzel County, West Virginia

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**APPLICATION FEE**

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**APPLICATION FOR  
45CSR13 NEW SOURCE REVIEW  
MODIFICATION PERMIT**

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



WEST VIRGINIA DEPARTMENT OF  
ENVIRONMENTAL PROTECTION  
**DIVISION OF AIR QUALITY**  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
(304) 926-0475  
[www.dep.wv.gov/daq](http://www.dep.wv.gov/daq)

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

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

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

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

- ☐ ADMINISTRATIVE AMENDMENT    ☐ MINOR MODIFICATION  
☐ SIGNIFICANT MODIFICATION

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

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

**Section I. General**

1. Name of applicant (as registered with the WV Secretary of State's Office): <b>WILLIAMS OHIO VALLEY MIDSTREAM LLC</b>		2. Federal Employer ID No. (FEIN): <b>27-0856707</b>	
3. Name of facility (if different from above): <b>YOHO COMPRESSOR STATION</b>		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: <b>WILLIAMS OHIO VALLEY MIDSTREAM LLC 100 TELETECH DRIVE MOUNDSVILLE, WV 26041</b>		5B. Facility's present physical address: <b>WV-20 NEW MARTINSVILLE, WETZEL COUNTY, WV</b>	
6. <b>West Virginia Business Registration.</b> Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO – If <b>YES</b> , provide a copy of the <b>Certificate of Incorporation/Organization/Limited Partnership</b> (one page) including any name change amendments or other Business Registration Certificate as <b>Attachment A</b> . – If <b>NO</b> , provide a copy of the <b>Certificate of Authority/Authority of L.L.C./Registration</b> (one page) including any name change amendments or other Business Certificate as <b>Attachment A</b> .			
7. If applicant is a subsidiary corporation, please provide the name of parent corporation: <b>THE WILLIAMS COMPANIES, INC</b>			
8. Does the applicant own, lease, have an option to buy or otherwise have control of the <i>proposed site</i> ? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO – If <b>YES</b> , please explain: <b>APPLICANT OWNS THE SITE</b> – If <b>NO</b> , you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be <b>constructed, modified, relocated, administratively updated</b> or <b>temporarily permitted</b> (e.g., coal preparation plant, primary crusher, etc.): <b>NATURAL GAS PRODUCTION FACILITY</b>		10. North American Industry Classification System (NAICS) code for the facility: <b>213112 – SUPPORT ACTIVITIES FOR OIL AND GAS OPERATIONS</b>	
11A. DAQ Plant ID No. (for existing facilities only): <b>103-00060</b>		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): <b>R13-3063A</b>	
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.			

12A. – For <b>Modifications, Administrative Updates</b> or <b>Temporary permits</b> at an existing facility, please provide directions to the <i>present location</i> of the facility from the nearest state road; – For <b>Construction</b> or <b>Relocation permits</b> , please provide directions to the <i>proposed new site location</i> from the nearest state road. Include a <b>MAP</b> as <b>Attachment B</b> . <b>FROM NEW MARTINSVILLE, DEPART WV-2/WV-7/3RD ST. TOWARD FRIENDSHIP RIDGE RD./NORTH ST./CR-3. TURN LEFT ONTO WV-7 AND PROCEED 3 MILES. TURN RIGHT ONTO WV-20 AND IN APPROXIMATELY 1.5 TURN RIGHT ONTO UNNAMED ROAD AND ARRIVE AT YOHO COMPRESSOR STATION.</b>		
12.B. New site address (if applicable): <b>NA</b>	12C. Nearest city or town: <b>NEW MARTINSVILLE</b>	12D. County: <b>WETZEL</b>
12.E. UTM Northing (KM): <b>4,383.333</b>	12F. UTM Easting (KM): <b>514.862</b>	12G. UTM Zone: <b>17</b>
13. Briefly describe the proposed change(s) at the facility: <ul style="list-style-type: none"> <li><b>Reduced Flash Tank off-gas recycle from 85% to 50%;</b></li> <li><b>Increased the Dehydrator's capacity from 1 MMscfd to 2 MMscfd;</b></li> <li><b>Used more conservative Dehydrator Operating parameters (temp and pressure);</b></li> <li><b>Corrected to show no Still Vent Condenser on the Dehydration Unit;</b></li> <li><b>Included Rod Packing and Crankcase Emissions;</b></li> <li><b>Included Water/Oil Fugitive Emissions;</b></li> <li><b>Updated Extended Gas Analysis; and</b></li> <li><b>Updated emission factors and other emission estimating protocols.</b></li> </ul>		
14A. Provide the date of anticipated installation or change: – If this is an <b>After-The-Fact</b> permit application, provide the date upon which the proposed change did happen: <b>NA</b>		14B. Date of anticipated Start-Up if a permit is granted: <b>Immediate</b>
14C. Provide a <b>Schedule</b> of the planned <b>Installation of/Change</b> to and <b>Start-Up</b> of each of the units proposed in this permit application as <b>Attachment C</b> (if more than one unit is involved).		
15. Provide maximum projected <b>Operating Schedule</b> of activity/activities outlined in this application: Hours Per Day: <b>24</b> Days Per Week: <b>7</b> Weeks Per Year: <b>52</b>		
16. Is demolition or physical renovation at an existing facility involved? <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b>		
17. <b>Risk Management Plans.</b> If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see <a href="http://www.epa.gov/ceppo">www.epa.gov/ceppo</a> ), submit your <b>Risk Management Plan (RMP)</b> to U. S. EPA Region III.		
18. <b>Regulatory Discussion.</b> List all Federal and State air pollution control regulations that you believe are applicable to the proposed process ( <i>if known</i> ). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance ( <i>if known</i> ). Provide this information as <b>Attachment D</b> .		

## Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate <b>application fee</b> (per 45CSR22 and 45CSR13).
20. Include a <b>Table of Contents</b> as the first page of your application package.
21. Provide a <b>Plot Plan</b> , e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as <b>Attachment E</b> (Refer to <b>Plot Plan Guidance</b> ). – Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).
22. Provide a <b>Detailed Process Flow Diagram(s)</b> showing each proposed or modified emissions unit, emission point and control device as <b>Attachment F</b> .
23. Provide a <b>Process Description</b> as <b>Attachment G</b> . – Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).
<b>All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.</b>

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

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

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

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

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

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

☒ General Emission Unit, specify:

**NATURAL GAS FIRED COMPRESSOR ENGINE**

**TEG DEHYDRATION UNIT**

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

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

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

☒ Other Collectors, specify :

**NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

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

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

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

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

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

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

☐ YES      ☒ NO

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

### **Section III. Certification of Information**

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

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

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

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



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

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

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

**Compliance Certification**

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

SIGNATURE   
(Please use blue ink)

DATE: 5/20/2015  
(Please use blue ink)

35B. Printed name of signee:

**DON WICBURG**

35C. Title:

**VICE PRESIDENT AND  
GENERAL MANAGER**

35D. E-mail:

**DON WICBURG@WILLIAMS.COM**

36E. Phone:

**(304) 843-3158**

36F. FAX:

**(304) 843-3131**

36A. Printed name of contact person (if different from above):

**BILL THOMPSON**

36B. Title:

**ENVIRONMENTAL SPECIALIST**

36C. E-mail:

**BILL.THOMPSON@WILLIAMS.COM**

36D. Phone:

**(304) 843-3103**

36E. FAX:

**(304) 843-3131**

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

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

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

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

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

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

## **ATTACHMENT A**

### **Business Certificate**

---

“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
-



## 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

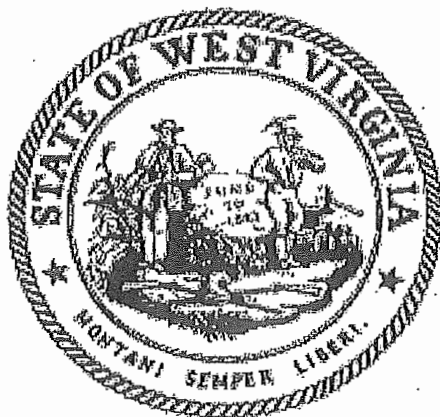
a limited liability company, organized under the laws of the State of Texas  
has filed its "Application for Certificate of Authority" in my office according to the provisions  
of West Virginia Code §31B-10-1002. I hereby declare the organization to be registered as a  
foreign limited liability company 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

### Location (Aerial) and Topographic Maps

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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.”

---

- **Address:**  
~3.0 Miles South-Southeast of New Martinsville  
~0.1 Mile Northwest of Slim Chance Road  
New Martinsville, Wetzel County, WV 26033
  - **Latitude and Longitude:**  
39°35'59.00"North x -80°49'41.50"West  
(39.6000°N and -80.8281°W)
  - **UTM:**  
514.75 km Easting x 4,383.35 km Northing x Zone 17S
  - **Elevation:**  
~865'
  - **Directions:**  
From Virginia St in **New Martinsville:**
    - a. Head south on 3rd St (WV-2/WV-7) ~0.5 Mi;
    - b. Turn left onto Mountaineer Hwy (WV-7) ~2.8 Mi;
    - c. Turn right onto Main St/Shortline Hwy (WV-20) ~1.6 Mi;
    - d. Turn right onto Slim Chance Rd ~0.2 Mi;
    - e. Slight right onto gravel access road ~0.1 Mi;
    - f. Site is on the left
  - **USGS:**  
7.5" Topographic – Porter Falls, WV (2014)
-







Williams Ohio Valley Midstream LLC  
**YOHO COMPRESSOR STATION**  
Application for 45CSR13 NSR Modification Permit  
**Attachment B**

**Location (Aerial) Map**

GOOGLE Earth

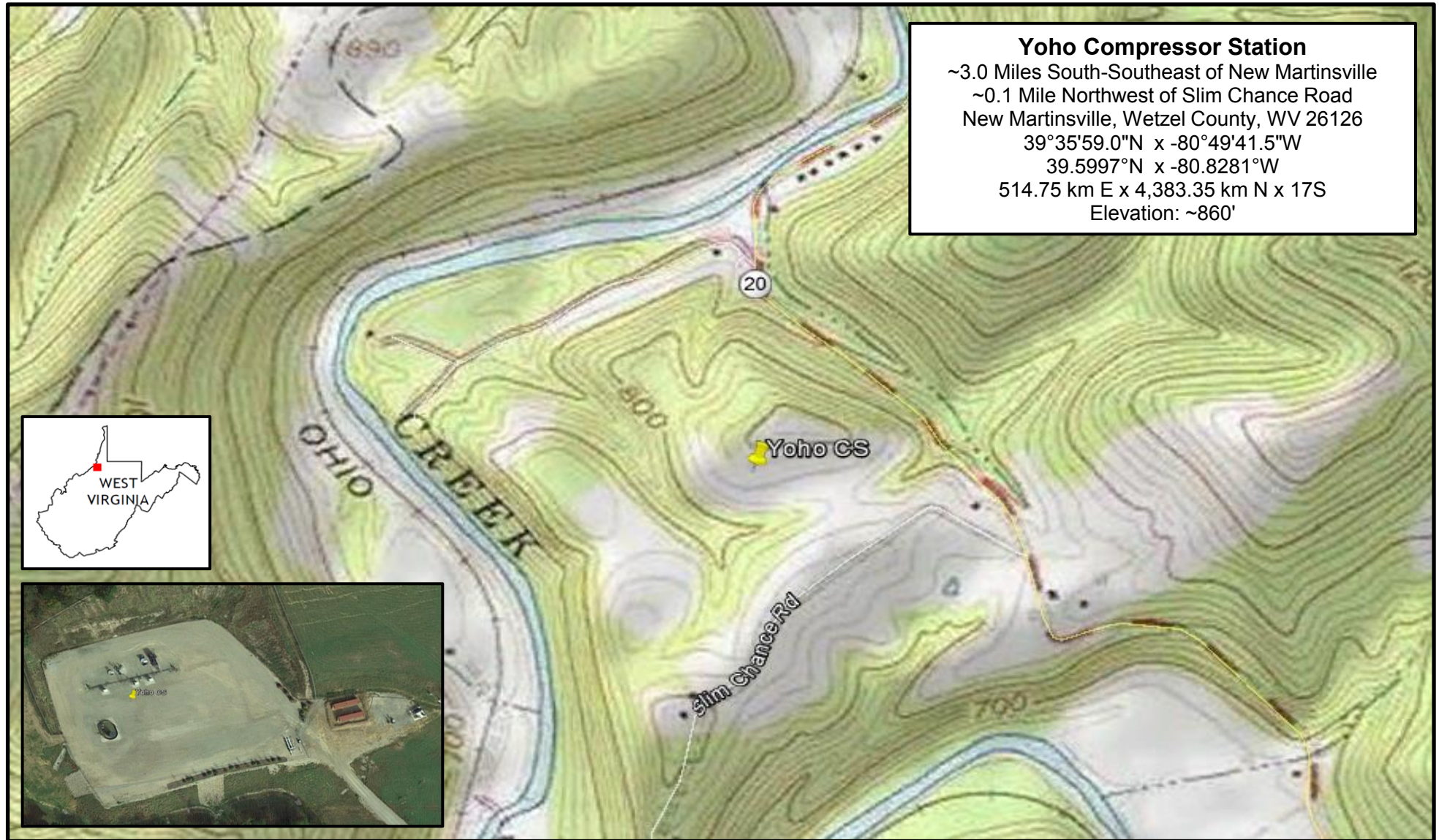




Williams Ohio Valley Midstream LLC  
**YOHO COMPRESSOR STATION**  
Application for 45CSR13 NSR Modification Permit  
**Attachment E**

**Topographic Map**

USGS TOPOGRAPHIC - 7.5-MINUTE SERIES, PORTERS FALLS QUADRANGLE, WEST VIRGINIA





## **ATTACHMENT C**

### **Installation and Start-Up Schedule**

---

“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.”

---

The OVM Yoho Compressor Station is an existing operation. This application is prepared and submitted to update the existing permit to reflect actual construction and operations, as follows:

- Reduced Flash Tank off-gas recycle from 85% to 50%;
  - Increased the Dehydrator's capacity from 1 MMscfd to 2 MMscfd;
  - Used more conservative Dehydrator Unit operation parameters (temp and pressure);
  - Corrected to show no Still Vent Condenser on the Dehydration Unit;
  - Included Water/Oil Fugitive Emissions;
  - Included Compressor Rod Packing and Engine Crankcase Emissions;
  - Updated Extended Gas Analysis; and
  - Updated emission factors and other emission estimating protocols
-

## **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
-

Williams Ohio Valley Midstream LLC  
**YOHO COMPRESSOR STATION**  
Application for 45CSR13 Modification Permit

**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 production facilities. Applicability to the subject facility has been determined as follows:

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

This rule does not apply. The facility is a “PSD Minor Source” for each regulated pollutant, as follows:

- NOx: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- VOC: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- SO<sub>2</sub>: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- PM<sub>10/2.5</sub>: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy

(Note: Fugitive emissions of criteria pollutants from natural gas compressor stations are excluded in the PSD and TVOP Major Source Determinations.)

(Note: On June 23, 2014, the U.S. Supreme Court said that EPA may not treat greenhouse gases (e.g., CO<sub>2</sub>e) as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD permit or TVOP.)

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

This rule does not apply. The facility is in a county that is classified as Non-Attainment for Fine Particulates and as Attainment for all other criteria pollutants. With the requested Federally Enforceable Limits (FEL) the facility qualifies as an “NNSR Minor Source” as follows:

- PM<sub>10/2.5</sub>: NNSR Natural Minor Source with Pre-Controlled PTE < 100 tpy
- NOx: NNSR Natural Minor Source with Pre-Controlled PTE < 100 tpy
- SO<sub>2</sub>: NNSR Natural Minor Source with Pre-Controlled PTE < 100 tpy

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

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

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

#### 4. Title V Operating Permit (TVOP)

[Not Applicable]

This rule does not apply. The facility qualifies as a "Title V Minor Source" as follows:

- NO<sub>x</sub>: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- CO: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- VOC: Title V Synthetic Minor Source with Controlled PTE < 100 tpy
- SO<sub>2</sub>: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- PM<sub>10/2.5</sub>: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- Each HAP: Title V Area Source with Controlled PTE < 10 tpy
- Total HAPs: Title V Area Source with Controlled PTE < 25 tpy

(Note: Fugitive emissions of criteria pollutants from natural gas compressor stations are excluded in the PSD and TVOP Major Source Determinations.)

(Note: On June 23, 2014, the U.S. Supreme Court said that EPA may not treat greenhouse gases (e.g., CO<sub>2</sub>e) as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD permit or TVOP.)

#### B. Applicability of Federal Regulations

The following federal regulations are potentially applicable to natural gas production facilities. 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), including the 203 bhp CAT G3306TA (4SRB) compressor engine (CE-01). Requirements include notification, monitoring, and recordkeeping.

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

40CFR§60.18(b)

[Not Applicable]

This rule does not apply because there is no flare at the facility.

##### 3. NSPS Dc, Steam Generating Units

40CFR§60.40c-§60.48c

[Not Applicable]

This rule does not apply because there is no steam generating unit (including line heaters) at the facility with a maximum design heat input capacity  $\geq 10$  MMBtu/hr and  $\leq 100$  MMBtu/hr (§60.40c(a)).

##### 4. NSPS Kb, Volatile Organic Liquid Storage Vessels

40CFR§60.110b-§60.117b

[Not Applicable]

This rule does not apply because there is no tank used to store volatile organic liquids (VOL) with a design capacity  $\geq 75$  m<sup>3</sup> (19,815 gal, 471.79 bbl) (§60.110b(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 (§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(b)).

**7. NSPS LLL, Onshore Natural Gas Processing: SO<sub>2</sub> 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 203 bhp CAT G3306TA (4SRB) compressor engine (CE-01) because its maximum engine power is less than 500 HP and manufactured on or after 07/01/08 (§60.4230(a)(4)(iii)).

Requirements include NO<sub>x</sub>, 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 (§60.4300).

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

40CFR§60.5360-§60.5430

[Not Applicable]

This rule does not apply to the reciprocating compressor (associated w/ engine CE-01) because it was constructed prior to 08/23/11 (§60.5360 and §60.5365(c)).

This rule does not apply to the storage vessel (TK-01) because it has a VOC PTE < 6 tpy (§60.5395). However, records of VOC emissions must be retained to demonstrate continuing exemption status (§60.5420(b)(6)(ii) and (§60.5420 (c)(5)(ii)).

This rule does not apply to the pneumatic controllers because they are located between the wellhead and point of custody transfer, are not located at a natural gas processing plant, and their bleed rate is  $\leq 6$  scfh (§60.5365(d)(i)).

**12. NESHAP, Designated Source Standards**

40CFR§61.01-§61.359

[Not Applicable]

This rule does not apply because the facility is not a designated facility (or source) subject to any requirements of the National Emissions Standards for Hazardous Air Pollutants (NESHAP).

**13. NESHAP A, General Provisions (aka MACT)**

40CFR§63.1-§63.16

[Applicable]

This rule does apply to the 203 bhp CAT G3306TA (4SRB) compressor engine (CE-01) and to the 2.0 MMscfd TEG Dehydrator (RSV-1) because they are subject to NESHAP ZZZZ and NESHAP HH, respectively. Requirements include notification, monitoring, and recordkeeping.

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

40CFR§63.760-§63.779

[Applicable]

This rule does apply to the 2.0 MMscfd TEG Dehydrator (RSV-1). However, because the dehydrator has an actual annual average flowrate of natural gas  $< 3$  MMscfd it is exempt from all requirements except to maintain records of actual annual average flowrate of natural gas 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 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)).

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

40CFR§63.6080-§63.6175

[Not Applicable]

This rule does not apply because there is no stationary gas turbine at the facility (§63.6080).

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

40CFR§63.6580-§63.6675

[Applicable]

This rule does apply to the compressor engine; however, because it 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 40CFR§60.4230-§60.4248 (NSPS JJJJ) for Spark Ignition Internal Combustion Engines

**18. 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 (§63.7485).

**19. NESHAP JJJJJJ, Industrial, Commercial, and Institutional Boilers – Area Sources**

40CFR§63.11193 – §63.11237

[Not Applicable]

This rule does not apply because gas-fired boilers are not subject to the requirements of this subpart (§63.11195(e)). 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.

**20. Chemical Accident Prevention Provisions**

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 (§68.115).

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

40CFR§64.1-§64.10

[Not Applicable]

This rule does not apply. Although there are pollutant specific emission units subject to an emissions limitation and a control device is used to achieve compliance, the potential pre-control emissions do not exceed 100 tpy.

**22. Mandatory Greenhouse Gases (GHG) Reporting**

40CFR§98.1-§98.9

[Not Applicable]

This rule does not apply. The facility is not subject to a listed source category and the aggregate maximum heat input capacity is < 30 MMBtu/hr from all stationary fuel combustion sources combined (§98.2(a)).

**C. Applicability of Source Aggregation**

For New Source Review (NSR) and Title V permitting, the three-part regulatory criteria to determine whether emissions from two or more facilities should be aggregated and treated as a single source is whether the activities:

- i) Belong to the same industrial grouping; and
- ii) Are located on one or more contiguous or adjacent properties; and
- iii) Are under control of the same person (or persons under common control).

**i) Same Industrial Grouping**

The subject facility shares the same two-digit major SIC code of 13 as the upstream gas production wells and other Williams’ facilities.

**ii) Contiguous or Adjacent**

The determination of whether two or more facilities are “contiguous” or “adjacent” is made on a case-by-case basis. This determination is proximity based, and it is important to focus on this

criterion and whether two contiguous or adjacent facilities, considered as a single source, meet the common sense notion of a plant. The functional interrelationship of the two or more facilities is not a relevant inquiry in determining whether the facilities are “contiguous” or “adjacent.”

Neither West Virginia nor federal regulations define the terms “contiguous” or “adjacent.” It is clear, however, that the determination of whether two or more facilities are “contiguous” or “adjacent” is based on the plain meaning of the terms “adjacent” and “contiguous”, which consider the physical distance between the facilities. The term contiguous is defined in the dictionary as being in actual contact; touching along a boundary or at a point. The term adjacent” is defined in the dictionary as not distant, nearby, having a common endpoint or border.

The closest Williams-owned facility to the Yoho Compressor Station is the Nice Compression Station, which is located 4.8 miles away. The Nice Compressor Station does not meet the common sense definition of being “contiguous” with or “adjacent” to the Yoho Compressor Station.

The Yoho Compressor Station compresses and dehydrates gas produced from an upstream production well located in northern West Virginia. The subject facility is located on a parcel that is directly adjacent to a pre-existing upstream production wellpad operated by Chevron and is located less than ½ mile from that wellpad.

The location of the subject facility was chosen because of suitable characteristics for construction and operation, such as the availability of a reasonably flat grade and accessibility for large trucks and equipment. Williams’ business model is to construct scalable capacity that contemplates additional production from multiple operators and the initial configuration is merely a foundation for additional opportunities in the area. The subject facility does not need to be located in the immediate vicinity of the upstream wells in order to operate properly. Had suitable land been available elsewhere, the subject facility could have been located farther from the upstream wells and could theoretically be moved farther from the wells without affecting operations. Therefore, despite the fact that the subject facility is located in close proximity to one or many upstream production sources, aggregation of the subject facility with upstream wells does not meet the common sense notion of a plant.

### **iii) Common Control**

Williams OVM operates under its parent company The Williams Companies, Inc. (Williams) and is the sole operator of the subject facility. The closest Williams-operated facility to the subject facility is the Nice Compressor Station, located approximately 4.8 miles away. This facility is the closest to Yoho to have common ownership but it is not “contiguous” with or “adjacent” to the Yoho facility.

The production wells, including the Chevron wellpad, that send natural gas to the subject facility are owned and operated by other companies, which are unaffiliated with Williams. Williams has no ownership stake in the Chevron wellpad or in any production well or company in West Virginia that may send natural gas to the subject facility.

Furthermore, neither Williams OVM, nor Williams, exercise operational control over any equipment owned or operated by any natural gas producer upstream of the subject facility. All employees at the subject facility are under the exclusive direction of Williams and are not under



the control of any other entity. Similarly, Williams has no authority over employees of the production wells. These companies operate wholly independent of one another. No employees are expected to shuttle back and forth between the subject facility and any production well.

At this time, contracts are in place for the subject facility to process natural gas produced from multiple upstream production wells located throughout the region. As future commercial opportunities are identified, the subject facility will potentially receive gas from other producers. Williams will not have ownership or control of any future wellhead facilities. The producers are, and will be responsible for, any decisions to produce or shut-in wellhead facilities and have no control over the equipment installed, owned, and operated by Williams. Similarly, Williams cannot control the installation or operation of any equipment located at a well site that may be considered an air contamination source.

For the reason above, it is clear that Williams does not have common control of any production wells including the Chevron well.

### **Summary**

The subject facility and the upstream production wells should not be aggregated and treated as a single source of emissions because the subject facility is not under common control with any of the upstream wells. Additionally, the subject facility and the upstream production wells, considered together, do not meet the common sense notion of a plant because the subject facility is expected to service multiple production wells and because the location of the facility was selected for reasons unrelated to the location of the production wells. Accordingly, the subject facility should not be aggregated with the upstream wells in determining major source or PSD status.

#### **D. Applicability of State Regulations**

The following State regulations are potentially applicable to natural gas production facilities. 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 the dehydrator reboiler (BLR-01) has a maximum design heat input (MDHI) rating < 10 MMBtu/hr, the only requirement is to limit visible emissions to < 10% opacity during normal operations (§45-02-3.1). The reboiler combusts 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. No odors have been deemed objectionable.

**3. Control of Air Pollution from Combustion of Refuse**

45CSR6

[Not Applicable]

This rule does not apply because there is no refuse combustion performed at the facility.

**4. Prevent and Control Air Pollution from the Emission of Sulfur Oxides**

45CSR10

[Not Applicable]

This rule does not apply because each “fuel burning unit” at the facility has a Maximum Design Heat Input (MDHI) rating < 10 MMBtu/hr.

**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]

This rule does apply. Williams OVM has received a 45CSR13 Permit for the subject facility and has published the required Class I legal advertisement notifying the public of this application to modify the existing permit; and paid the appropriate application fee.

**6. Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants**

45CSR14

[Not Applicable]

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

**7. Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60**

45CSR16

[Applicable]

This rule does apply by reference of §40CFR60, Subpart JJJJ. Williams OVM is subject to the recordkeeping, monitoring, and testing required of this Subpart.

**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. Furthermore, this rule does not apply because the facility location is designated as either “Maintenance” or “Attainment/Unclassified” for all criteria pollutants.

**9. Regulation of Volatile Organic Compounds (VOC)**

45CSR21

[Not Applicable]

This rule does not apply because the facility is not located in Putnam County, Kanawha County, Cabell County, Wayne County, or Wood County

**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**

45CSR27

[Not Applicable]

This rule does not apply because equipment used in the production and distribution of petroleum products is exempt, provided that the product contains no more than 5% benzene by weight (§45-22-2.4).

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

45CSR28

[Not Applicable]

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

**14. Requirements for Title V Operating Permits (TVOP)**

45CSR30

[Not Applicable]

This rule does not apply because the facility is a non-major (or “deferred”) source of all regulated pollutants.

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 subject 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

[Applicable]

This rule does apply by reference of §40CFR63, Subparts HH and ZZZZ. Williams OVM is subject to the recordkeeping, monitoring, and testing required of these Subparts.

## ATTACHMENT E

### Plot Plans

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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 – Yoho Compressor Station
-

## Application for 45CSR13 NSR Modification Permit

## ATTACHMENT F

### Detailed Process Flow Diagram

---

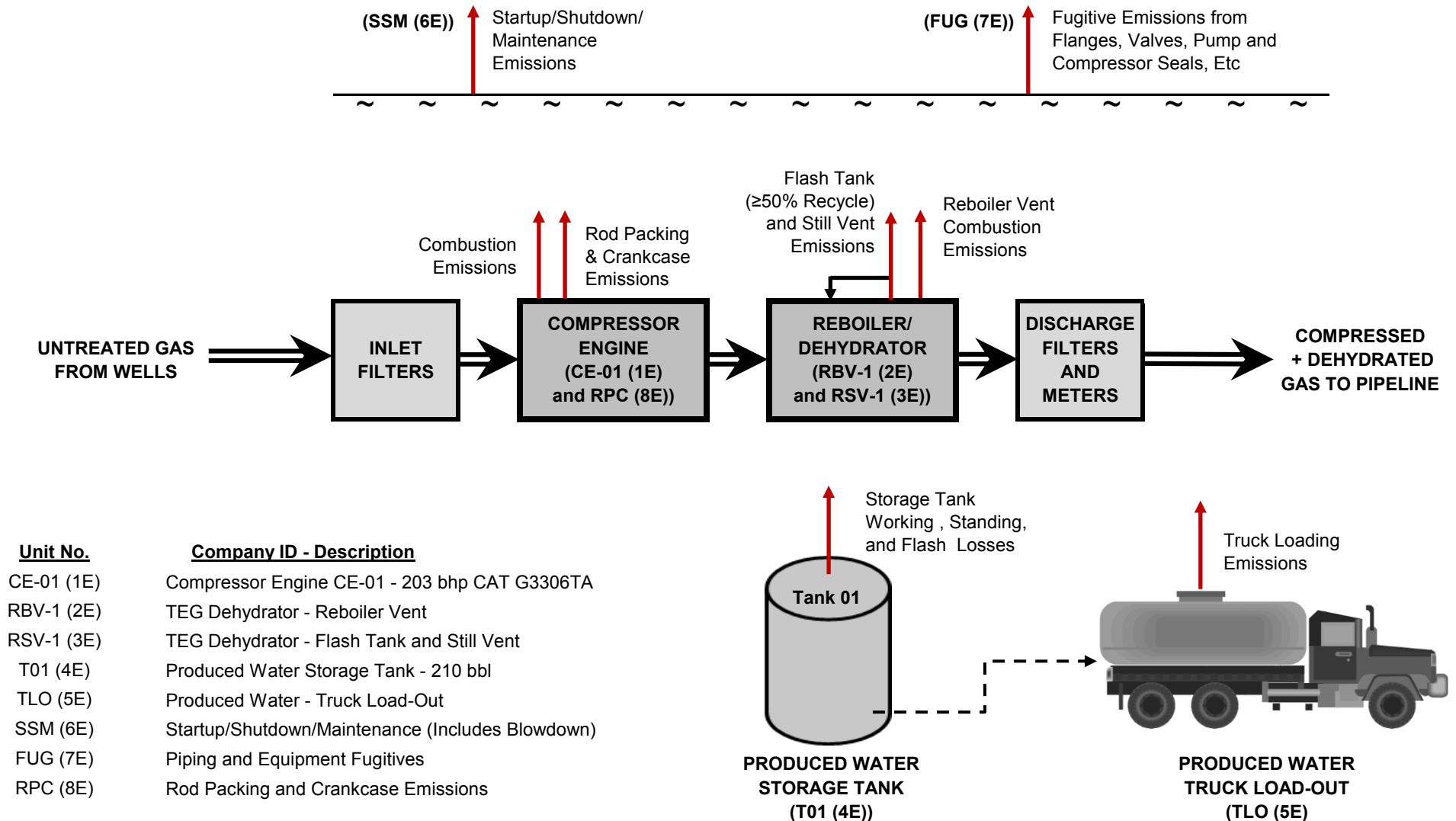
“22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as Attachment F.”

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- Process Flow Diagram (PFD) – Yoho Compressor Station
-

Williams Ohio Valley Midstream LLC  
**YOHO COMPRESSOR STATION**  
Application for 45CSR13 NSR Modification Permit  
**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**
    - A. Project Overview
    - B. Compressor Engine
    - C. Triethylene Glycol (TEG) Dehydrator
    - D. Triethylene Glycol (TEG) Reboiler
    - E. Storage Tanks
    - F. Truck Load-Out
    - G. Startup/Shutdown/Maintenance
    - H. Compressor Rod Packing and Crankcase Emission
    - I. Piping and Equipment Fugitive Emissions
-



**ATTACHMENT G**  
**Process Description**

**Williams Ohio Valley Midstream LLC**  
**YOHO COMPRESSOR STATION**  
**Application for 45CSR13 NSR Permit**

**A. Project Overview**

Williams Ohio Valley Midstream LLC is proposing to construct and operate the Yoho Compressor Station to be located along off WV-20 in Wetzel County (See Appendix B – Site Location Maps). The facility will receive natural gas from local production wells then compress and dehydrate the gas for delivery to a gathering pipeline.

This application has been prepared and submitted to provide for the following equipment and operations at the facility:

- One 203 bhp Caterpillar G3306TA Compressor Engine w/ NSCR (CE-01)
- One 2.0 MMscfd TEG dehydrator w/ 0.14 MMBtu/hr Reboiler (RBV-1 and RSV-1)
- One 210 bbl produced water storage tank (T01)
- Truck Load-out (TLO) emissions
- Startup/Shutdown/Maintenance (SSM) emissions.
- Fugitive emissions from process piping and equipment (FUG)
- Compressor Rad Packing and Engine Crankcase Leaks (RPC)
- Other ancillary equipment and operations with de minimis emissions

**B. Compressor Engine**

One (1) natural gas-fueled compressor engine will be utilized at the facility. The engine is equipped with state-of-the art emission control technology applicable to the operation. The rich-burn engine (CE-01) utilizes non-selective catalytic reduction (NSCR) to control pollutant emissions.

**C. Dehydrator**

One (1) Triethylene Glycol (TEG) Dehydrator is utilized at the facility. The dehydrator is comprised of a Contactor/Absorber Tower (no vented emissions), a Flash Tank, and a Regenerator/Still Vent.

The TEG Dehydrator is 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 the atmosphere.

#### **D. Reboiler**

A Reboiler is utilized to supply heat for the Triethylene Glycol (TEG) Regenerator/Still Vent.

#### **E. Produced Water Tank**

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 tank receives liquids from the dehydrator and inlet separator. Liquids removed through the dehydration process are cooled, condensed and sent to the 210 barrel atmospheric storage tank (T01). The inlet separator removes produced fluids (primarily water) and these liquids are also sent to the 210 bbl atmospheric storage tank.

#### **F. Truck Load-Out**

Loading of produced water into tanker trucks will produce small quantities of VOC emissions from the displacement of vapors inside the tanker trucks (TLO).

#### **G. Startup, Shutdown and Maintenance**

During routine operation of the facility the compressor engine will undergo periods of startup and shutdown. Often when the engine is shutdown, the natural gas contained within the compressor and associated piping is vented to atmosphere. Additionally, there will be other infrequent and (often) de-minimis emissions from various maintenance activities at the facility that are not necessarily associated with compressor blowdowns (e.g., pig launching). These emissions associated with startup, shutdown and maintenance are assigned a Unit ID of SSM.

#### **H. Compressor Rod Packing and Crankcase Emissions**

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

#### **I. 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 water/oil service.

# **ATTACHMENT H**

## **Material Safety Data Sheets (MSDS)**

### **(And Representative Gas Analysis)**

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“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.”

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- **NATURAL GAS**
    - Natural Gas Composition
    - Extended Gas Analysis
  
  - **MATERIAL SAFETY DATA SHEETS (MSDS):**
    - Natural Gas
    - Triethylene Glycol (TEG)
    - Produced Water/Condensate
-

Williams Ohio Valley Midstream LLC (OVM)  
**YOHO COMPRESSOR STATION**  
 Application for 45CSR13 NSR Modification Permit  
**Attachment H**

**Gas Analysis Summary**

**Representative Gas Analysis - Sampled 06/25/14**

Component	Formula	Molecular Weight (MW)	Mole % (M%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Oxygen	O2	32.00	0.0011	0.00001	0.0004	0.002	0.93
Nitrogen	N2	28.01	0.4580	0.00458	0.1283	0.606	338.10
Carbon Dioxide	CO2	44.01	0.1537	0.00154	0.0676	0.319	178.25
Carbon Monoxide	CO	28.01	---	---	---	---	---
Hydrogen Sulfide	H2S	34.08	---	---	---	---	---
Methane*	CH4	16.04	78.0288	0.78029	12.5177	59.114	32,986.38
Ethane*	C2H6	30.07	13.0780	0.13078	3.9324	18.570	10,362.62
Propane**	C3H8	44.10	5.1090	0.05109	2.2528	10.639	5,936.63
i-Butane**	C4H10	58.12	0.6003	0.00600	0.3489	1.648	919.43
n-Butane**	C4H10	58.12	1.4055	0.01406	0.8169	3.858	2,152.69
i-Pentane**	C5H12	72.15	0.3321	0.00332	0.2396	1.132	631.40
n-Pentane**	C5H12	72.15	0.3827	0.00383	0.2761	1.304	727.61
Cyclohexane**	C6H12	84.16	0.0130	0.00013	0.0109	0.052	28.83
i-Hexanes**	C6H14	86.18	---	---	---	---	---
i-Heptanes**	C7H16	100.20	---	---	---	---	---
n-Heptane**	C7H16	100.20	0.0252	0.00025	0.0253	0.119	66.54
i-Octanes**	C8H18	114.23	---	---	---	---	---
i-Nonanes**	C9H20	128.26	---	---	---	---	---
n-Nonane**	C9H20	128.26	---	---	---	---	---
i-Decanes**	C10H22	142.28	---	---	---	---	---
n-Decane**	C10H22	142.28	---	---	---	---	---
i-Undecanes+**	C11H24	156.31	0.2880	0.00288	0.4502	2.126	1,186.27
Benzene***	C6H6	78.11	0.0022	0.00002	0.0017	0.008	4.53
Ethylbenzene***	C8H10	106.17	0.0005	0.00001	0.0005	0.003	1.40
Toluene***	C7H8	92.14	0.0027	0.00003	0.0025	0.012	6.56
2,2,4-TMP***	C8H18	114.23	0.0033	0.00003	0.0038	0.018	9.93
n-Hexane***	C6H14	86.18	0.1154	0.00115	0.0994	0.470	262.06
Xylenes***	C8H10	106.17	0.0005	0.00001	0.0005	0.003	1.40
<b>Totals:</b>			<b>100.00</b>	<b>1.000</b>	<b>21.18</b>	<b>100.00</b>	<b>55,801.56</b>
<b>Total VOC:</b>			<b>8.28</b>	<b>0.083</b>	<b>4.53</b>	<b>21.39</b>	<b>11,935.28</b>
<b>Total HAP:</b>			<b>0.12</b>	<b>0.001</b>	<b>0.11</b>	<b>0.51</b>	<b>285.87</b>

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

#UGC (Universal Gas Constant) = 379.482 scf/lb-mol @ 60 °F and 14.696 psia.    Pound "X"/scf = M% of "X" \* MW of "X" / UGC

To be conservative, and to account for potential future changes in the gas quality, the following "worst-case" values were assumed:

Component	Formula	Representative Gas Analysis			Assumed "Worst-Case" Gas Analysis		
		Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	CO2	0.15	0.32	178	0.22	0.45	250
Methane	CH4	78.03	59.11	32,986	100.00	100.00	42,275
VOC	C3 thru C10+	8.28	21.39	11,935	10.00	25.00	15,000
Benzene	C6H6	0.002	0.01	5	0.01	0.04	20
Ethylbenzene	C8H10	0.001	0.003	1	0.01	0.04	20
n-Hexane	C6H14	0.12	0.47	262	0.25	0.90	500
Toluene	C7H8	0.003	0.01	7	0.01	0.04	20
2,2,4-TMP***	C8H10	0.003	0.018	10	0.01	0.04	20
Xylenes	C8H10	0.001	0.003	1	0.01	0.04	20
Total HAP	C6 thru C8	0.12	0.51	286	0.50	1.50	600

Williams Ohio Valley Midstream LLC (OVM)  
**YOHO COMPRESSOR STATION**  
Application for 45CSR13 NSR Modification Permit  
**Attachment H**

**Gas Analysis**

Legacy Measurement Solutions

Good

Canonsburg, PA  
724-749-5180

Customer : 2259 - WILLIAMS	Date Sampled : 06/25/2014
Station ID : 52214-50	Date Analyzed : 07/03/2014
Cylinder ID : W7080	Effective Date : 07/01/2014
Producer :	Cyl Pressure : 976
Lease : YOHO MASTER	Temp : 83
Area : 500 - OHIO VALLEY MID	Cylinder Type : Spot
State : WV	Sample By : MC

<u>COMPONENT</u>	<u>MOL%</u>	<u>GPM@14.73(PSIA)</u>	<u>WT%</u>
Oxygen	0.0011	0.000	0.002
Nitrogen	0.4580	0.000	0.611
Methane	78.0288	0.000	59.658
Carbon-Dioxide	0.1537	0.000	0.322
Ethane	13.0878	3.512	18.756
Propane	5.1094	1.412	10.738
Iso-Butane	0.6003	0.197	1.663
Normal-Butane	1.4055	0.445	3.893
Iso-Pentane	0.3321	0.122	1.142
Normal-Pentane	0.3827	0.139	1.316
2,2-Dimethylbutane	0.0083	0.003	0.034
2,3-Dimethylbutane/CycloC5	0.0186	0.006	0.076
2-methylpentane	0.0828	0.034	0.340
3-methylpentane	0.0483	0.020	0.198
Normal-Hexane	0.1154	0.048	0.474
2,2-Dimethylpentane	0.0000	0.000	0.000
Methylcyclopentane	0.0151	0.005	0.061
BENZENE	0.0022	0.001	0.008
3,3-Dimethylpentane	0.0000	0.000	0.000
CYCLOHEXANE	0.0130	0.004	0.052
2-Methylhexane	0.0530	0.025	0.253
2,3-Dimethylpentane	0.0000	0.000	0.000
3-Methylhexane	0.0349	0.016	0.167
1,t2-DMCYC5 / 2,2,4-TMC5	0.0000	0.000	0.000
1,t3-Dimethylcyclopentane	0.0003	0.000	0.001
N-Heptane	0.0252	0.012	0.120
METHYLCYCLOHEXANE	0.0150	0.007	0.070
2,5-Dimethylhexane	0.0000	0.000	0.000
2,3-Dimethylhexane	0.0000	0.000	0.000
TOLUENE	0.0027	0.001	0.012
2-Methylheptane	0.0000	0.000	0.000
4-Methylheptane	0.0000	0.000	0.000
3-Methylheptane	0.0000	0.000	0.000
1,t4-Dimethylcyclohexane	0.0025	0.001	0.013
N-OCTANE / 1,T2-DMCYC6	0.0033	0.002	0.018
1,t3-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCYC5	0.0000	0.000	0.000
2,4,4 TMC6	0.0000	0.000	0.000
2,6-Dimethylheptane / 1,C2-DMCYC6	0.0000	0.000	0.000
Ethylcyclohexane	0.0000	0.000	0.000
ETHYLBENZENE	0.0000	0.000	0.000
M-XYLENE	0.0000	0.000	0.000
P-XYLENE	0.0000	0.000	0.000
O-XYLENE	0.0000	0.000	0.000
NONANE	0.0000	0.000	0.000
N-DECANE	0.0000	0.000	0.000
N-UNDECANE	0.0000	0.000	0.000
<b>TOTAL</b>	<b>100.0000</b>	<b>6.012</b>	<b>99.998</b>



# SAFETY DATA SHEET

Att H - MSDS - Natural Gas - Page 1 of 7

## 1. Identification

**Product identifier** Natural Gas  
**Other means of identification** Not available.  
**Synonyms** Methane, Natural Gas Sweet, Fuel Gas, Petroleum Gas, Methyl Hydride  
**Recommended use** Fuel.  
**Recommended restrictions** None known.

### Manufacturer / Importer / Supplier / Distributor information

**Company name** Williams, Inc.  
**Address** One Williams Center  
Tulsa, OK 74172  
US  
**Telephone** 800-688-7507  
**E-mail** enterpriseehs@williams.com  
**Emergency phone number** 888-677-2370

## 2. Hazard(s) identification

**Physical hazards** Flammable gases Category 1  
Gases under pressure Compressed gas  
**Health hazards** Not classified.  
**OSHA hazard(s)** Simple asphyxiant

### Label elements

**Hazard symbol**



**Signal word** Danger

**Hazard statement** Extremely flammable gas. Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.

### Precautionary statement

**Prevention** Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

**Response** Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

**Storage** Protect from sunlight. Store in a well-ventilated place.

**Disposal** Dispose of contents/container in accordance with local/regional/national/international regulations.

**Hazard(s) not otherwise classified (HNO C)** Not classified.

## 3. Composition/information on ingredients

### Substance

#### Hazardous components

Chemical name	Common name and synonyms	CAS number	%
Natural gas		8006-14-2	100

**Composition comments** All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

## 4. First-aid measures

**Inhalation** Move injured person into fresh air and keep person calm under observation. If breathing is difficult, give oxygen. Get medical attention if any discomfort continues.

**Skin contact** Frostbite: Do not remove clothes, but flush with copious amounts of lukewarm water. Call an ambulance and continue to flush during transportation to hospital.

**Eye contact** Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists.

<b>Ingestion</b>	This material is a gas under normal atmospheric conditions and ingestion is unlikely.
<b>Most important symptoms/effects, acute and delayed</b>	Narcosis. Behavioral changes. Decrease in motor functions.
<b>Indication of immediate medical attention and special treatment needed</b>	Treat symptomatically.
<b>General information</b>	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

## 5. Fire-fighting measures

<b>Suitable extinguishing media</b>	Extinguish with foam, carbon dioxide, dry powder or water fog.
<b>Unsuitable extinguishing media</b>	None.
<b>Specific hazards arising from the chemical</b>	Extremely flammable gas. Closed containers can burst violently when heated, due to excess pressure build-up. Gas may travel considerable distance to a source of ignition and flash back. Gases may form explosive mixtures with air. Fire or high temperatures create: Carbon monoxide. Carbon oxides. Sulfur oxides.
<b>Special protective equipment and precautions for firefighters</b>	Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.
<b>Fire-fighting equipment/instructions</b>	Evacuate area. Move container from fire area if it can be done without risk. Stay away from ends of tanks. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect men attempting to stop a leak. Cool equipment exposed to flames with water, if it can be done without risk. Close the valve if no risk is involved. Do not extinguish a leaking gas fire unless leak can be stopped. If leak cannot be stopped and no danger to surrounding area allow the fire to burn out. Fight fire from a protected location. Prevent buildup of vapors or gases to explosive concentrations.

## 6. Accidental release measures

<b>Personal precautions, protective equipment and emergency procedures</b>	Extremely flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. Beware of accumulation in low areas or contained areas, where explosive concentrations may occur. Prevent from entering drains or any places where accumulation may occur. Ventilate well and allow to evaporate. Stay upwind. Avoid inhalation and contact with skin and eyes. For large spillages notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate personal protective equipment (See Section 8).
<b>Methods and materials for containment and cleaning up</b>	In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.
<b>Environmental precautions</b>	Stop leak if possible without any risk. Water may be useful in minimizing or dispersing vapors. If spill occurs on water notify appropriate authorities in accordance with all applicable regulations.

## 7. Handling and storage

<b>Precautions for safe handling</b>	<p>Keep away from sources of ignition - No smoking. Take precautionary measures against static discharges. Observe good industrial hygiene practices. Wear appropriate personal protective equipment (See Section 8).</p> <p>Contents under pressure. Gas can accumulate in confined spaces and limit oxygen available for breathing. Use only with adequate ventilation. Use non-sparking hand tools and explosion-proof electrical equipment. The product can accumulate electrostatic charges, which may cause an electrical spark (ignition source). Ground container and transfer equipment to eliminate static electric sparks. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulfide (H<sub>2</sub>S) and flammability. Cold burns may occur during filling operations. Containers and delivery lines may become cold enough to present cold burn hazard.</p> <p>The use hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of incomplete combustion products (e.g. carbon monoxide, oxides of sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels.</p>
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**Conditions for safe storage, including any incompatibilities**

Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post areas "No Smoking or Open Flame." Store away from incompatible materials. Protect against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

Empty containers may contain flammable product residues. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.

**8. Exposure controls/personal protection**
**Occupational exposure limits**
**US. ACGIH Threshold Limit Values**

Components	Type	Value
Natural gas (CAS 8006-14-2)	TWA	1000 ppm

**Biological limit values** No biological exposure limits noted for the ingredient(s).

**Exposure guidelines** No exposure standards allocated.

**Appropriate engineering controls** Provide shower facilities near the work place. In confined spaces, make sure the area is well-ventilated and sufficient oxygen (19.5%) exists before entry. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof equipment.

**Individual protection measures, such as personal protective equipment**

**Eye/face protection** Wear approved safety glasses as a good hygiene practice.

**Skin protection**

**Hand protection** Wear suitable gloves as a good hygiene practice.

**Other** Wear suitable protective clothing.

**Respiratory protection** A NIOSH approved, self-containing breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode should be used in situations of oxygen deficiency (oxygen content less than 19.5 percent), unknown exposure concentrations, or situations that are immediately dangerous to life or health (IDLH). A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use.

**Thermal hazards**

Wear appropriate thermal protective clothing, when necessary.

**General hygiene considerations**

Handle in accordance with good industrial hygiene and safety practice.

**9. Physical and chemical properties**

<b>Appearance</b>	Colorless gas.
<b>Physical state</b>	Gas Compressed.
<b>Form</b>	Gas.
<b>Color</b>	Colorless.
<b>Odor</b>	Odorless to slight, sweet.
<b>Odor threshold</b>	Not available.
<b>pH</b>	Not applicable.
<b>Melting point/freezing point</b>	Not available.
<b>Initial boiling point and boiling range</b>	-259.6 °F (-162 °C)
<b>Flash point</b>	-304.6 °F (-187 °C)
<b>Evaporation rate</b>	Not available.
<b>Flammability (solid, gas)</b>	Extremely flammable gas.

**Upper/lower flammability or explosive limits**

<b>Flammability limit - lower (%)</b>	5 %
<b>Flammability limit - upper (%)</b>	15 %
<b>Explosive limit - lower (%)</b>	Not available.
<b>Explosive limit - upper (%)</b>	Not available.



Vapor pressure	40 mm Hg (77°F/25°C)
Vapor density	0.55 Approximate.
Relative density	Not available.
Solubility(ies)	Slightly soluble in water.
Partition coefficient (n-octanol/water)	1.81
Auto-ignition temperature	> 550.4 °F (> 288 °C)
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Percent volatile	100

## 10. Stability and reactivity

Reactivity	The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions	Polymerization will not occur.
Conditions to avoid	Heat, sparks, flames, elevated temperatures. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.
Incompatible materials	Oxidizing agents.
Hazardous decomposition products	Carbon oxides. Sulfur oxides.

## 11. Toxicological information

### Information on likely routes of exposure

Ingestion	This material is a gas under normal atmospheric conditions and ingestion is unlikely.
Inhalation	High concentrations: Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. In high concentrations, vapors are narcotic and may cause headache, fatigue, dizziness and nausea.
Skin contact	Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.
Eye contact	Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.
Symptoms related to the physical, chemical and toxicological characteristics	Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn"). Contact with evaporating liquid may cause frostbite or freezing of skin. Symptoms of overexposure can include shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances and vomiting, and are reversible if exposure is stopped. Continued exposure can lead to hypoxia (inadequate oxygen), rapid breathing, cyanosis (bluish discoloration of skin), numbness of the extremities, unconsciousness and death.

### Information on toxicological effects

Acute toxicity	Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").
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Product	Species	Test Results
Natural gas (CAS 8006-14-2)		
Acute		
Oral		
LD50	Rat	> 5 g/kg
Skin corrosion/irritation	Not classified.	
Serious eye damage/eye irritation	Not classified.	
Respiratory sensitization	Not classified.	
Skin sensitization	Not a skin sensitizer.	
Germ cell mutagenicity	Not classified.	
Carcinogenicity	Not classified.	
Reproductive toxicity	Not classified.	
Specific target organ toxicity - single exposure	Not classified.	
Specific target organ toxicity - repeated exposure	Not classified.	

Aspiration hazard	Not applicable.
Chronic effects	Prolonged exposure may cause chronic effects.

## 12. Ecological information

Ecotoxicity	Not expected to be harmful to aquatic organisms.
Persistence and degradability	The hydrocarbons in this material are expected to be inherently biodegradable. In practice, hydrocarbon gases are not likely to remain in solution long enough for biodegradation to be a significant loss process. Hydrogen sulfide, if present in refinery gas streams, will be oxidized in water and insoluble sulfides precipitated from water when metallic radicals are present.
Bioaccumulative potential	The product is not expected to bioaccumulate.
Partition coefficient n-octanol / water (log Kow)	
Natural gas	1.81
Mobility in soil	Not relevant, due to the form of the product.
Mobility in general	The product is a volatile substance, which may spread in the atmosphere.
Other adverse effects	The product is a volatile organic compound which has a photochemical ozone creation potential.

## 13. Disposal considerations

Disposal instructions	This material is a gas and would not typically be managed as a waste.
Local disposal regulations	Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.
Hazardous waste code	D001
Waste from residues / unused products	Dispose of in accordance with local regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied.

## 14. Transport information

### DOT

UN number	UN1971
UN proper shipping name	Natural gas, compressed
Transport hazard class(es)	2.1
Subsidiary class(es)	Not available.
Packing group	Not available.
Special precautions for user	Not available.
Labels required	2.1
Packaging exceptions	306
Packaging non bulk	302
Packaging bulk	302

### IATA

UN number	UN1971
UN proper shipping name	Natural gas, compressed
Transport hazard class(es)	2.1
Subsidiary class(es)	-
Packaging group	Not available.
Environmental hazards	No
Labels required	2.1
ERG Code	10L
Special precautions for user	Not available.

### IMDG

UN number	UN1971
UN proper shipping name	NATURAL GAS, COMPRESSED
Transport hazard class(es)	2.1
Subsidiary class(es)	-
Packaging group	Not available.
Environmental hazards	
Marine pollutant	No
Labels required	2,1
EmS	F-D, S-U
Special precautions for user	Not available.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code No information available.

**15. Regulatory information**

**US federal regulations** This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.  
All components are on the U.S. EPA TSCA Inventory List.

**TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**

Not regulated.

**US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

Not on regulatory list.

**CERCLA Hazardous Substance List (40 CFR 302.4)**

Natural gas (CAS 8006-14-2)

LISTED

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

**Hazard categories** Immediate Hazard - Yes  
Delayed Hazard - No  
Fire Hazard - Yes  
Pressure Hazard - Yes  
Reactivity Hazard - No

**SARA 302 Extremely hazardous substance** No**SARA 311/312 Hazardous chemical** Yes**Other federal regulations****Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**

Not regulated.

**Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**

Not regulated.

**Safe Drinking Water Act (SDWA)** Not regulated.**Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number**

Not listed.

**Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))**

Not regulated.

**DEA Exempt Chemical Mixtures Code Number**

Not regulated.

**Food and Drug Administration (FDA)** Not regulated.

**US state regulations** This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

**US. Massachusetts RTK - Substance List**

Natural gas (CAS 8006-14-2)

**US. New Jersey Worker and Community Right-to-Know Act**

Not regulated.

**US. Pennsylvania RTK - Hazardous Substances**

Natural gas (CAS 8006-14-2)

**US. Rhode Island RTK**

Not regulated.

**US. California Proposition 65****US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance**

Not listed.

**International Inventories**

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

\*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

#### 16. Other information, including date of preparation or last version

Issue date	11-08-2012
Revision date	-
Version #	01
Further information	Not available.
References	Registry of Toxic Effects of Chemical Substances (RTECS)
Disclaimer	This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.



# MATERIAL SAFETY DATA SHEET

## 1 PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** Natural Gas Condensate

**Synonyms:** Condensate, Gas Condensate, Distillate, Pipeline Drip, Natural gasoline, Casinghead gasoline, Straight-run gasoline, Isoparaffin mixture, and Drip gas

**Manufacturer Name:**

Williams, Inc.  
One Williams Center  
Tulsa, OK 74172  
USA

**Emergency Telephone:**

888-677-2370

**Non-emergency Telephone:**

800-688-7507

**Intended Use:** Industrial use

## 2 HAZARDS IDENTIFICATION

**Emergency Overview**

**Physical State:** Liquid

**Color:** Colorless to brownish-black

**Odor:** Petroleum

**DANGER!**

Harmful if inhaled or absorbed through skin. Harmful if swallowed - may enter lungs if swallowed or vomited. Causes skin and eye irritation. High vapor concentrations may cause drowsiness and irritation of the eyes or respiratory tract.

Extremely flammable liquid and vapor - vapor may cause flash fire.

**Potential Health Effects**

**Inhalation:** Harmful if inhaled. May cause central nervous system effects.

**Eye Contact:** Causes eye irritation. High vapor concentrations may cause irritation.

**Skin Contact:** Harmful if absorbed through skin. Causes skin irritation.

**Ingestion:** Harmful if swallowed - may enter lungs if swallowed or vomited.

**Chronic Health Effects:** Long-term exposure to condensate vapor has caused kidney and liver cancer in laboratory animals. Case reports of chronic condensate abuse (such as sniffing) and chronic misuse as a solvent or as a cleaning agent have shown a range of nervous system effects, sudden deaths from heart attacks, blood effects and leukemia. These effects are not expected to occur at exposure levels encountered in the distribution and use of condensate as a motor fuel. Prolonged and repeated exposure to benzene may

cause serious injury to blood forming organs and is associated with anemia and to the later development of acute myelogenous leukemia (AML).

**Target Organ(s):** | Central nervous system | Eye | Kidney | Liver | Skin | Blood and/or blood-forming organs |

**OSHA Regulatory Status:** This product is hazardous according to OSHA 29CFR 1910.1200.

### 3 COMPOSITION / INFORMATION ON INGREDIENTS

**General Information:** Condensate is a complex mixture of volatile hydrocarbons, primarily in the C3 to C8 range. The composition varies depending on the natural gas source and processing, but typically includes some concentration of benzene.

Chemical Name	CAS-No.	Concentration*
†Natural gas condensates (petroleum)	68919-39-1	97.9 - 99.6%
†Benzene	71-43-2	0.4 - 2.1%

\* All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

† This chemical is hazardous according to OSHA/WHMIS criteria.

### 4 FIRST AID MEASURES

**Inhalation:** Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Eye Contact:** Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention. In case of irritation from airborne exposure, move to fresh air. Get medical attention if symptoms persist.

**Skin Contact:** Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

**Ingestion:** Call a physician or poison control center immediately. DO NOT induce vomiting. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head lower than the hips to help prevent aspiration.

### 5 FIRE-FIGHTING MEASURES

**Extinguishing Media:** Extinguish with foam, carbon dioxide, dry powder or water fog.

**Unsuitable Extinguishing Media:** Not applicable.

**Special Fire Fighting Procedures:** Self-contained breathing apparatus and full protective clothing should be worn when fighting chemical fires. Use water spray to keep fire-exposed containers cool.

**Unusual Fire & Explosion Hazards:** Material will float and may ignite on surface of water. Vapors may travel considerable distance to a source of ignition and flash back. Vapors may cause a flash fire or ignite explosively.

**Hazardous Combustion Products:** Carbon Oxides

**6 ACCIDENTAL RELEASE MEASURES**

**Personal Precautions:** Wear protective clothing as described in Section 8 of this safety data sheet.

**Spill Cleanup Methods:** Eliminate all ignition sources. Small Liquid Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Large Spillages: Use water spray to disperse vapors and flush spill area. Prevent runoff from entering drains, sewers, or streams. Dike for later disposal.

**7 HANDLING AND STORAGE**

**Handling:** Do not breathe mist or vapor. Do not get in eyes, on skin, on clothing. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling.

**Storage:** Keep away from heat, sparks and open flame. Keep container tightly closed and in a well-ventilated place. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids. Keep away from food, drink and animal feed. Store away from incompatible materials.

**8 EXPOSURE CONTROLS / PERSONAL PROTECTION****Exposure Limits:**

Chemical Name	Source	Type	Exposure Limits	Notes
Benzene	CA. Alberta OELs	STEL	16 mg/m <sup>3</sup> 5 ppm	Skin
Benzene	CA. Alberta OELs	TWA	3.2 mg/m <sup>3</sup> 1 ppm	Skin
Benzene	CA. British Columbia OELs	TWA	0.5 ppm	Skin
Benzene	CA. British Columbia OELs	STEL	2.5 ppm	Skin
Benzene	CA. Ontario OELs	STEL	2.5 ppm	
Benzene	CA. Ontario OELs	TWA	0.5 ppm	
Benzene	CA. Quebec OELs	TWA	3 mg/m <sup>3</sup> 1 ppm	
Benzene	CA. Quebec OELs	STEL	15.5 mg/m <sup>3</sup> 5 ppm	
Benzene	MEX. OELs	STEL	16 mg/m <sup>3</sup> 5 ppm	
Benzene	MEX. OELs	TWA	3.2 mg/m <sup>3</sup> 1 ppm	
Benzene	US. ACGIH TLV	STEL	2.5 ppm	Skin
Benzene	US. ACGIH TLV	TWA	0.5 ppm	Skin
Benzene	US. NIOSH Guide	IDLH	500 ppm	
Benzene	US. OSHA Spec. Reg.	OSHA Action level	0.5 ppm	
Benzene	US. OSHA Spec. Reg.	STEL	5 ppm	
Benzene	US. OSHA Spec. Reg.	TWA	1 ppm	
Benzene	US. OSHA Z-2 PEL	TWA	10 ppm	
Benzene	US. OSHA Z-2 PEL	Maximum concentration	50 ppm	
Benzene	US. OSHA Z-2 PEL	Ceiling	25 ppm	

**Engineering Controls:** Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits.

If exposure limits have not been established, maintain airborne levels to an acceptable level.

**Respiratory Protection:** If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information.

**Eye Protection:** Wear safety glasses with side shields (or goggles). Wear a full-face respirator, if needed.

**Hand Protection:** Wear chemical-resistant gloves. Contact glove manufacturer for specific information.

**Skin Protection:** Wear appropriate chemical resistant clothing to prevent any possibility of skin contact.

**Hygiene Measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

**Environmental Exposure Controls:** Environmental manager must be informed of all major spillages.

<b>9</b>	<b>PHYSICAL AND CHEMICAL PROPERTIES</b>
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**Color:** Colorless to brownish-black

**Odor:** Petroleum

**Odor Threshold:** No data available.

**Physical State:** Liquid

**pH:** Not applicable

**Melting Point:** No data available.

**Freezing Point:** No data available.

**Boiling Point:** 45°C (113°F) - 404°C (759°F)

**Flash Point:** <-18°C (0°F) (Approximate)

**Evaporation Rate:** >100 [vs. n-Butyl Acetate = 1]

**Flammability (Solid):** No data available.

**Flammability Limit - Upper (%):** 10 (Approximate)

**Flammability Limit - Lower (%):** 1 (Approximate)

**Vapor Pressure:** 51 mmHg - 857 mmHg @100°F [Reid]

**Vapor Density (Air=1):** > 1

**Specific Gravity:** 0.766 - 0.87

**Solubility in Water:** Negligible

**Solubility (Other):** No data available.

**Partition Coefficient (n-Octanol/water):** No data available.

**Autoignition Temperature:** No data available.

**Decomposition Temperature:** No data available.

**Viscosity:** < 1 cst @38°C

**Percent Volatile:** 100 %vol

**Explosive Properties:** No data available



**10 STABILITY AND REACTIVITY**

**Stability:** Stable under the prescribed storage conditions.

**Conditions to Avoid:** Keep away from heat, sparks and open flame. Prevent buildup of vapors or gases to explosive concentrations.

**Incompatible Materials:** Strong oxidizing agents.

**Hazardous Decomposition Products:** No data available.

**11 TOXICOLOGICAL INFORMATION****Specified Substance(s)****Acute Toxicity:****Test Results:**

Chemical Name	Test Results
Natural gas condensates (petroleum)	Dermal LD50 (Rabbit): > 3750 mg/kg
Natural gas condensates (petroleum)	Inhalation LC50 (Rat): > 5.2 mg/l
Natural gas condensates (petroleum)	Oral LD50 (Rat): > 5000 mg/kg

**Chronic Toxicity:** Contains benzene. Human epidemiology studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-producing system and serious blood disorders, including leukemia. Animal tests suggest that prolonged and/or repeated overexposure to benzene may damage the embryo/fetus. The relevance of these animal studies to humans has not been fully established.

**Listed Carcinogens:**

Chemical Name	IARC	NTP	OSHA	ACGIH
Benzene	1	Listed	Listed	A1

IARC: 1 = Carcinogenic to Humans; 2A = Probably Carcinogenic to Humans; 2B = Possibly Carcinogenic to Humans; 3 = Not classifiable as to carcinogenicity to humans; 4 = Probably not carcinogenic to humans; Not listed = Not evaluated by IARC.

ACGIH: A1 = Confirmed Human Carcinogen; A2 = Suspected Human Carcinogen; A3 = Confirmed Animal Carcinogen; A4 = Not classifiable as a human carcinogen; A5 = Not suspected to be a human carcinogen; Not listed = Not evaluated by ACGIH.

**Product Information****Acute Toxicity:**

**Test Results:** No test data available for the product.

**Other Acute:** Harmful if inhaled or absorbed through skin. Harmful if swallowed - may enter lungs if swallowed or vomited. Causes severe skin and eye irritation. High vapor concentrations may cause drowsiness and irritation of the eyes or respiratory tract.

**Chronic Toxicity:** Long-term exposure to gasoline vapor has caused kidney and liver cancer in laboratory animals. Case reports of chronic gasoline abuse (such as sniffing) and chronic misuse as a solvent or as a cleaning agent have shown a range of nervous system effects, sudden deaths from heart attacks, blood effects and leukemia. These effects are not expected to occur at exposure levels encountered in the distribution and use of gasoline as a motor fuel.

**12 ECOLOGICAL INFORMATION**

**Ecotoxicity:** There are no data on the ecotoxicity of this product.

**Mobility:** No data available.

**Persistence and Degradability:** No data available.

**Bioaccumulation Potential:** No data available.

<b>13</b>	<b>DISPOSAL CONSIDERATIONS</b>
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**General Information:** Dispose of waste and residues in accordance with local authority requirements.

**Disposal Methods:** No specific disposal method required.

**Container:** Since emptied containers retain product residue, follow label warnings even after container is emptied.

<b>14</b>	<b>TRANSPORT INFORMATION</b>
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**DOT**

**UN No.:** UN1993

**Proper Shipping Name:** Flammable liquids, n.o.s. (Natural gas condensates)

**Class:** 3

**Packing Group:** II

**Label(s):** 3

**TDG**

**UN No.:** UN1993

**Proper Shipping Name:** Flammable liquid, n.o.s. (Natural gas condensates)

**Class:** 3

**Packing Group:** II

**IATA**

**UN No.:** UN1993

**Proper Shipping Name:** Flammable liquid, n.o.s. (Natural gas condensates)

**Class:** 3

**Packing Group:** II

**Label(s):** 3

**IMDG**

**UN No.:** UN1993

**Proper Shipping Name:** Flammable liquid, n.o.s. (Natural gas condensates)

**Class:** 3

**Packing Group:** II

**EmS No.:** F-E, S-E

<b>15</b>	<b>REGULATORY INFORMATION</b>
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**Canadian Controlled Products Regulations:** This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33, and the MSDS contains all required information.

**WHMIS Classification:** B2, D2A, D2B

**Mexican Dangerous Statement:** This product is dangerous according to Mexican regulations.

**OSHA Specifically Regulated Substances (29 CFR 1910.1001-.1052):**

Chemical Name	CAS-No.
Benzene	71-43-2

**Inventory Status**

This product or all components are listed or exempt from listing on the following inventory: TSCA

**US Regulations**

**CERCLA Hazardous Substance List (40 CFR 302.4):**

Chemical Name	RQ
Benzene	10 lbs

**SARA Title III**

**Section 302 Extremely Hazardous Substances (40 CFR 355, Appendix A):** Not regulated.

**Section 311/312 (40 CFR 370):**

☒ Acute (Immediate)    ☒ Chronic (Delayed)    ☒ Fire    ☐ Reactive    ☐ Pressure Generating

**Section 313 Toxic Release Inventory (40 CFR 372):**

Chemical Name	CAS-No.	Reporting threshold for other users	Reporting threshold for manufacturing and processing
Benzene	71-43-2	10000 lbs	25000 lbs

For reporting purposes: the De Minimis Concentration for a toxic chemical in a mixture is 0.1% for carcinogens as defined in 29 CFR 1910.1200(d)(4) or 1% for others.

**Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):**

Not regulated.

**Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3):** Benzene

**Drug Enforcement Act:** Not regulated.

**TSCA**

**TSCA Section 4(a) Final Test Rules & Testing Consent Orders:** Not regulated.

**TSCA Section 5(a)(2) Final Significant New Use Rules (SNURs) (40CFR 721, Subpt. E):** Not regulated.

**TSCA Section 5(e) PMN-Substance Consent Orders:** Not regulated.

**TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D):** Not regulated.

**State Regulations****California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):** Benzene**Massachusetts Right-To-Know List:** Benzene**Michigan Critical Materials List (Michigan Natural Resources and Environmental Protection Act (Act. 451 of 1994)):** Benzene**Minnesota Hazardous Substances List:** Benzene**New Jersey Right-To-Know List:** Benzene**Pennsylvania Right-To-Know List:** Benzene**Rhode Island Right-To-Know List:** Benzene

<b>16</b>	<b>OTHER INFORMATION</b>
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**HAZARD RATINGS**

	Health Hazard	Fire Hazard	Instability	Special Hazard
<b>NFPA</b>	2	4	0	NONE

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

NFPA Label colored diamond code: Blue - Health; Red - Flammability; Yellow - Instability; White - Special Hazards

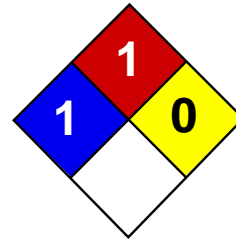
	Health Hazard	Flammability	Physical Hazard	Personal Protection
<b>HMIS</b>	2*	4	0	--

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe \*- Chronic Health Effect

HMIS Label colored bar code: Blue - Health; Red - Flammability; Orange - Physical Hazards; White - Special

**Issue Date:** 31-Mar-2009**Supersedes Date:** 28-Jul-1999**SDS No.:** 1023419

**Disclaimer:** This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.



Health	1
Fire	1
Reactivity	0
Personal Protection	J

## Material Safety Data Sheet

### Triethylene glycol MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Triethylene glycol

**Catalog Codes:** SLT2644

**CAS#:** 112-27-6

**RTECS:** YE4550000

**TSCA:** TSCA 8(b) inventory: Triethylene glycol

**CI#:** Not available.

**Synonym:** 2,2'-[1,2-Ethanediy]bis(oxy)]bisethanol

**Chemical Formula:** C<sub>6</sub>H<sub>14</sub>O<sub>4</sub>

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Triethylene glycol	112-27-6	100

**Toxicological Data on Ingredients:** Triethylene glycol: ORAL (LD50): Acute: 17000 mg/kg [Rat].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Very hazardous in case of eye contact (irritant), of ingestion. Slightly hazardous in case of inhalation. Inflammation of the eye is characterized by redness, watering, and itching.

**Potential Chronic Health Effects:**

Very hazardous in case of eye contact (irritant). Slightly hazardous in case of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system. Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

**Skin Contact:** No known effect on skin contact, rinse with water for a few minutes.

**Serious Skin Contact:** Not available.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 371°C (699.8°F)

**Flash Points:** CLOSED CUP: 177°C (350.6°F). OPEN CUP: 165.5°C (329.9°F).

**Flammable Limits:** LOWER: 0.9% UPPER: 9.2%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances:** Not available.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

## Section 7: Handling and Storage

**Precautions:**

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Avoid contact with eyes. If ingested, seek medical advice immediately and show the container or the label.

**Storage:**

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:** Splash goggles. Lab coat.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid. (Hygroscopic liquid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 150.18 g/mole

**Color:** Colorless.

**pH (1% soln/water):** Not available.

**Boiling Point:** 285°C (545°F)

**Melting Point:** -5°C (23°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.1274 (Water = 1)

**Vapor Pressure:** Not available.

**Vapor Density:** 5.17 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:** Easily soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

## Section 11: Toxicological Information

**Routes of Entry:** Eye contact. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 17000 mg/kg [Rat].

**Chronic Effects on Humans:** The substance is toxic to kidneys, the nervous system.

**Other Toxic Effects on Humans:**

Very hazardous in case of ingestion. Slightly hazardous in case of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

## Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Pennsylvania RTK: Triethylene glycol TSCA 8(b) inventory: Triethylene glycol

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).



**Other Classifications:****WHMIS (Canada):** Not controlled under WHMIS (Canada).**DSCL (EEC):** R41- Risk of serious damage to eyes.**HMIS (U.S.A.):****Health Hazard:** 1**Fire Hazard:** 1**Reactivity:** 0**Personal Protection:** j**National Fire Protection Association (U.S.A.):****Health:** 1**Flammability:** 1**Reactivity:** 0**Specific hazard:****Protective Equipment:**

Not applicable. Lab coat. Not applicable. Splash goggles.

**Section 16: Other Information****References:** Not available.**Other Special Considerations:** Not available.**Created:** 10/10/2005 08:31 PM**Last Updated:** 05/21/2013 12:00 PM

*The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.*

## **ATTACHMENT I**

### **Emission Units Table**

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

---

- **Emissions Unit Table**
-

Williams Ohio Valley Midstream LLC (OVM)  
**YOHO COMPRESSOR STATION**  
 Application for 45CSR13 NSR Modification Permit  
**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.)

Unit ID <sup>1</sup>	Point ID <sup>2</sup>	Description	Installed	Capacity	Type <sup>3</sup> and Date	Control <sup>4</sup>
CE-01	1E	CAT G3306TA Compressor Engine	2013	203 bhp	Existing	01-NSCR
RBV-1	2E	TEG Dehydrator - Reboiler	2013	0.14 MMBtu/hr	Existing	na
RSV-1	3E	TEG Dehydrator - Flash Tank and Still Column	2013	2.0 MMscfd	Modified	na
T01	4E	Produced Water - Storage Tank	2013	210 bbl	Existing	na
TLO	5E	Produced Water - Truck Loadout	2013	---	Existing	na
SSM	6E	Startup, Shutdown and Maintenance (Blowdown)	2013	---	Existing	na
FUG	7E	Process Piping and Equipment Fugitives	2013	---	Existing	na
RPC	8E	Compressor Rod Packing and Crankcase Leaks	2013	---	Existing	na

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

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

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

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

## **ATTACHMENT J**

### **Emission Points Data Summary Sheet**

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

---

- **Table 1 – Emissions Data**

- 203 bhp CAT G3306TA (4SRB@1800 rpm) Compressor Engine (CE-01 (1E))
- 0.14 MMBtu/hr TEG Dehydrator Reboiler (RBV (2E))
- 2.0 MMscfd TEG Dehydrator Flash Tank and Still Vent (RSV-1 (3E))
- 210 bbl Produced Water Storage Tank (T01 (4E))
- Produced Water Truck Load-Out (TLO (5E))
- Start-Up, Shut-Down, and Maintenance (Includes Blowdown) (SSM (6E))
- Process Piping and Equipment Fugitive Emissions (FUG(7E))
- Compressor Rod Packing and Engine Crankcase Leaks Emissions (RPC (8E))
- Facility-Wide Total Emissions (Including Fugitives)

- **Table 2 – Release Parameter Data**

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Williams Ohio Valley Midstream LLC (OVM)  
**YOHO COMPRESSOR STATION**  
 Application for 45CSR13 NSR Modification Permit  
**Attachment J**

**EMISSION POINTS DATA SUMMARY SHEET**

**CAT G3306TA Compressor Engine**

Table 1: Emissions Data

Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor))	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
CE-01	Upward Vertical Stack	1E	CAT G3306TA Compressor Engine	01-NSCR	NSCR	C	8,760								
								<b>203 bhp CAT G3306TA (4SRB@1800 rpm) Compressor Engine w/ NSCR (CE-01 (1E))</b>							
								NOx	7.42	32.48	0.89	3.90	Gas	O-Vendor	
								CO	7.42	32.48	1.78	7.80	Gas	O-Vendor	
								VOC	0.37	0.73	0.17	0.73	Gas	O-Vendor	
								SOx	2.4E-03	4.7E-03	1.1E-03	4.7E-03	Gas	O-AP-42	
								PM10/2.5	0.08	0.15	0.04	0.15	Solid/Gas	O-AP-42	
								Benzene	0.01	0.01	2.9E-03	0.01	Gas	O-AP-42	
								Ethylbenzene	1.0E-04	2.0E-04	4.5E-05	2.0E-04	Gas	O-AP-42	
								HCHO (HAP)	0.25	0.49	0.11	0.49	Gas	O-Vendor	
								n-Hexane	---	---	---	---	Gas	O-AP-42	
								Methanol	0.01	0.02	0.01	0.02	Gas	O-AP-42	
								Toluene	2.3E-03	4.5E-03	1.0E-03	4.5E-03	Gas	O-AP-42	
								2,2,4-TMP	---	---	---	---	Gas	O-AP-42	
								Xylenes	8.0E-04	1.6E-03	3.6E-04	1.6E-03	Gas	O-AP-42	
								Other HAP	0.03	0.05	0.01	0.05	Gas	O-AP-42	
								Total HAP	0.30	0.58	0.13	0.58	Gas	O-AP-42	
								CO2	229	1,002	229	1,002	Gas	O-Vendor	
								CH4	0.5	2	0.5	2	Gas	O-Vendor	
								N2O	4.0E-04	1.8E-03	4.0E-04	1.8E-03	Gas	O-EPA	
								CO2e	240	1,052	240	1,052	Gas	O-EPA	

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).

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**EMISSION POINTS DATA SUMMARY SHEET**

**TEG Dehydrator - Reboiler**

**Table 1: Emissions Data**

Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor))	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
RBV-1	Upward Vertical Stack	<b>0.14 MMBtu/hr TEG Dehydrator Reboiler (RBV-1 (2E))</b>						NOx	0.01	0.06	0.01	0.06	Gas	O-AP-42	
								CO	0.01	0.05	0.01	0.05	Gas	O-AP-42	
								VOC	7.5E-04	3.3E-03	7.5E-04	3.3E-03	Gas	O-AP-42	
								SOx	8.2E-05	3.6E-04	8.2E-05	3.6E-04	Gas	O-AP-42	
								PM10/2.5	1.0E-03	4.6E-03	1.0E-03	4.6E-03	Solid/Gas	O-AP-42	
								Benzene	2.9E-07	1.3E-06	2.9E-07	1.3E-06	Gas	O-AP-42	
		2E	TEG Dehydrator - Reboiler	na	na	C	8,760	Ethylbenzene	---	---	---	---	Gas	O-AP-42	
								HCHO (HAP)	1.0E-05	4.5E-05	1.0E-05	4.5E-05	Gas	O-AP-42	
								n-Hexane	2.5E-04	1.1E-03	2.5E-04	1.1E-03	Gas	O-AP-42	
								Methanol	---	---	---	---	Gas	O-AP-42	
								Toluene	4.7E-07	2.0E-06	4.7E-07	2.0E-06	Gas	O-AP-42	
								2,2,4-TMP	---	---	---	---	Gas	O-AP-42	
								Xylenes	---	---	---	---	Gas	O-AP-42	
								Other HAP	2.6E-07	1.1E-06	2.6E-07	1.1E-06	Gas	O-AP-42	
								Total HAP	2.6E-04	1.1E-03	2.6E-04	1.1E-03	Gas	O-AP-42	
								CO2	16	72	16	72	Gas	O-AP-42	
								CH4	3.1E-04	1.4E-03	3.1E-04	1.4E-03	Gas	O-AP-42	
								N2O	3.1E-05	1.4E-04	3.1E-05	1.4E-04	Gas	O-EPA	
								CO2e	16	72	16	72	Gas	O-EPA	

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).

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**EMISSION POINTS DATA SUMMARY SHEET**

**TEG Dehydrator - Flash Tank and Still Vent**

**Table 1: Emissions Data**

Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor))	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
RSV-1	Upward Vertical Stack	3E	TEG Dehydrator - Flash Tank and Still Vent	na	na	C	8,760	NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	5.15	22.55	5.15	22.55	Gas	O-GLYCalc	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	0.10	0.44	0.10	0.44	Gas	O-GLYCalc	
								Ethylbenzene	0.05	0.20	0.05	0.20	Gas	O-GLYCalc	
								HCHO (HAP)	---	---	---	---	Gas	O-GLYCalc	
								n-Hexane	0.14	0.61	0.14	0.61	Gas	O-GLYCalc	
								Methanol	---	---	---	---	Gas	---	
								Toluene	0.19	0.82	0.19	0.82	Gas	O-GLYCalc	
								2,2,4-TMP	0.00	0.02	0.00	0.02	Gas	O-GLYCalc	
								Xylenes	0.06	0.26	0.06	0.26	Gas	O-GLYCalc	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.54	2.34	0.54	2.34	Gas	O-GLYCalc	
								CO2	---	---	---	---	Gas	---	
								CH4	6	28	6.39	28	Gas	O-GLYCalc	
								N2O	---	---	---	---	Gas	---	
								CO2e	160	700	160	700	Gas	O-EPA	

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).



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**EMISSION POINTS DATA SUMMARY SHEET**

**Produced Water - Storage Tank**

**Table 1: Emissions Data**

Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor))	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
T01	Upward Vertical Stack	4E	Produced Water Storage Tank	na	na	C	8,760	NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	0.05	0.22	0.05	0.22	Gas	EE	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	0.00	0.01	0.00	0.01	Gas	EE	
								Ethylbenzene	0.00	0.01	0.00	0.01	Gas	EE	
								HCHO (HAP)	---	---	---	---	Gas	---	
								n-Hexane	0.00	0.01	0.00	0.01	Gas	EE	
								Methanol	---	---	---	---	Gas	---	
								Toluene	0.00	0.01	0.00	0.01	Gas	EE	
								2,2,4-TMP	0.00	0.01	0.00	0.01	Gas	EE	
								Xylenes	0.00	0.01	0.00	0.01	Gas	EE	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.01	0.03	0.01	0.03	Gas	EE	
								CO2	---	---	---	---	Gas	---	
								CH4	0.20	0.89	0.20	0.89	Gas	EE	
								N2O	---	---	---	---	Gas	---	
								CO2e	5.08	22.25	5.08	22.25	Gas	EE	

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).

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**EMISSION POINTS DATA SUMMARY SHEET**

**Produced Water - Truck Load-Out**

Table 1: Emissions Data

Table 1: Emissions Data																
Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor)	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)	
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr				
TLO								NOx	---	---	---	---	Gas	---		
	Produced Water - Truck Load-Out (TLO (5E))							CO	---	---	---	---	Gas	---		
	---	5E	Produced Water Truck Load-Out	na	na	I	---	VOC	---	0.55	---	0.55	Gas	EE		
								SOx	---	---	---	---	Gas	---		
								PM10/2.5	---	---	---	---	Solid/Gas	---		
								Benzene	---	0.01	---	0.01	Gas	EE		
								Ethylbenzene	---	0.01	---	0.01	Gas	EE		
								HCHO (HAP)	---	---	---	---	Gas	---		
								n-Hexane	---	0.01	---	0.01	Gas	EE		
								Methanol	---	---	---	---	Gas	---		
								Toluene	---	0.01	---	0.01	Gas	EE		
								2,2,4-TMP	---	0.01	---	0.01	Gas	EE		
								Xylenes	---	0.01	---	0.01	Gas	EE		
								Other HAP	---	---	---	---	Gas	---		
								Total HAP	---	0.08	---	0.08	Gas	EE		
								CO2	---	---	---	---	Gas	---		
								CH4	---	---	---	---	Gas	---		
								N2O	---	---	---	---	Gas	---		
								CO2e	---	---	---	---	Gas	---		

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).

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**EMISSION POINTS DATA SUMMARY SHEET**

**Start-Up, Shut-Down, and Maintenance (Includes Blowdown)**

**Table 1: Emissions Data**

Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor))	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
SSM	na	6E	Start-Up, Shut-Down, Maintenance	na	na	I	na								
								NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	---	1.53	---	1.53	Gas	EE	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	---	2.0E-03	---	2.0E-03	Gas	EE	
								Ethylbenzene	---	2.0E-03	---	2.0E-03	Gas	EE	
								HCHO (HAP)	---	---	---	---	Gas	---	
								n-Hexane	---	0.05	---	0.05	Gas	EE	
								Methanol	---	---	---	---	Gas	---	
								Toluene	---	2.0E-03	---	2.0E-03	Gas	EE	
								2,2,4-TMP	---	2.0E-03	---	2.0E-03	Gas	---	
								Xylenes	---	2.0E-03	---	2.0E-03	Gas	EE	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	---	0.06	---	0.06	Gas	EE	
								CO2	---	---	---	---	Gas	---	
								CH4	---	4	---	4	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	108	---	108	Gas	---	

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).

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**EMISSION POINTS DATA SUMMARY SHEET**

**Process Piping and Equipment Fugitive Emissions**

Table 1: Emissions Data

Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor))	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
FUG	Fugitive	7E	Process Piping and Equipment Fugitive Emissions	na	na	C	8,760	NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	1.50	6.55	1.50	6.55	Gas	EE	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	0.02	0.10	0.02	0.10	Gas	EE	
								Ethylbenzene	0.02	0.10	0.02	0.10	Gas	EE	
								HCHO (HAP)	---	---	---	---	Gas	---	
								n-Hexane	0.02	0.10	0.02	0.10	Gas	EE	
								Methanol	---	---	---	---	Gas	---	
								Toluene	0.02	0.10	0.02	0.10	Gas	EE	
								2,2,4-TMP	0.02	0.10	0.02	0.10	Gas	---	
								Xylenes	0.02	0.10	0.02	0.10	Gas	EE	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.14	0.63	0.14	0.63	Gas	EE	
								CO2	0.02	0.07	0.02	0.07	Gas	---	
								CH4	4	16	4	16	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	91	397	91	397	Gas	---	

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).

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**EMISSION POINTS DATA SUMMARY SHEET**

**Compressor Rod Packing and Engine Crankcase Leaks (RPC)**

**Table 1: Emissions Data**

Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor))	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
RPC	Fugitive	8E	Compressor Rod Packing and Engine Crankcase Leaks	na	na	C	8,760	NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	8.2E-04	3.6E-03	8.2E-04	3.6E-03	Gas	EE	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	EE	
								Ethylbenzene	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	EE	
								HCHO (HAP)	5.5E-04	2.4E-03	5.5E-04	2.4E-03	Gas	---	
								n-Hexane	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	EE	
								Methanol	---	---	---	---	Gas	---	
								Toluene	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	EE	
								2,2,4-TMP	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	---	
								Xylenes	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	EE	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	6.6E-04	2.9E-03	6.6E-04	2.9E-03	Gas	EE	
								CO2	1	5	1	5	Gas	---	
								CH4	3	13	3	13	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	74	325	74	325	Gas	---	

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).

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**EMISSION POINTS DATA SUMMARY SHEET**

**Facility-Wide Total Emissions**

**Table 1: Emissions Data**

Emission Point ID No. (Must match Emission Units Table & Plat Plan)	Emission Point Type <sup>1</sup>	Emission Unit Vented Through This Point (Must match Emission Units Table & Plat Plan)		Air Pollution Control Device (Must match Emission Units Table & Plat Plan)		Vent Time for the Emission Unit (Chemical Processes Only)		All Regulated Pollutants - Chemical Name/CAS <sup>3</sup> (Speciate VOC and HAPS)	Maximum Potential Uncontrolled Emissions <sup>4</sup>		Maximum Potential Controlled Emissions <sup>5</sup>		Emission Form or Phase (At exit conditions. (Solid, Liquid or Gas/Vapor))	Est. Method Used <sup>6</sup>	Emissions Concentration <sup>7</sup> (ppmv or mg/m3)
		ID No.	Source	ID No.	Device Type	Short Term <sup>2</sup>	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
		<b>Facility-Wide Total Emissions (Includes Fugitives)</b>						NOx	7.43	32.54	0.90	3.96	Gas		
								CO	7.43	32.53	1.79	7.85	Gas		
								VOC	7.07	32.13	6.86	32.13	Gas		
								SOx	2.5E-03	0.01	1.2E-03	0.01	Gas		
								PM10/2.5	0.08	0.16	0.04	0.16	Solid/Gas		
								Benzene	0.13	0.57	0.13	0.57	Gas		
								Ethylbenzene	0.07	0.33	0.07	0.33	Gas		
								HCHO (HAP)	0.25	0.49	0.11	0.49	Gas		
								n-Hexane	0.16	0.79	0.16	0.79	Gas		
								Methanol	0.01	0.02	0.01	0.02	Gas		
								Toluene	0.21	0.95	0.21	0.95	Gas		
								2,2,4-TMP	0.03	0.14	0.03	0.14	Gas		
								Xylenes	0.08	0.39	0.08	0.39	Gas		
								Other HAP	0.03	0.05	0.01	0.05	Gas		
								Total HAP	0.98	3.74	0.82	3.74	Gas		
								CO2	246	1,079	246	1,079	Gas		
								CH4	14	64	14	64	Gas		
								N2O	4.3E-04	1.9E-03	4.3E-04	1.9E-03	Gas		
								CO2e	586	2,675	586	2,675	Gas		

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.

- Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 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.
- 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).
- 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).
- 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).
- Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmvd). 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 ppmvd (See 45CSR10).

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**EMISSION POINTS DATA SUMMARY SHEET**

Table 2: Release Parameter Data								
Emission Point ID No. (Must match Emission Units Table)	Inner Diameter (ft)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temperature (oF)	Volumetric Flow <sup>1</sup> (acfm) (At operating conditions)	Velocity (fps)	Ground Level (Height above mean sea level)	Stack Height <sup>2</sup> (Release height above ground level)	Northing	Easting
CE-01 (1E)	0.5 ft	1,064 oF	970 acfm	na	860 ft	8 ft	4,383.35 km N	514.75 km E
RBV-1 (2E)	0.6 ft	na	na	na	860 ft	8 ft	4,383.35 km N	514.75 km E
RSV-1 (3E)	0.5 ft	212 oF	na	na	860 ft	8 ft	4,383.35 km N	514.75 km E
T01 (4E)	na	Ambient	na	na	860 ft	15 ft	4,383.35 km N	514.75 km E
TLO (5E)	na	Ambient	na	na	860 ft	8 ft	4,383.35 km N	514.75 km E
SSM (6E)	na	70 oF	na	na	860 ft	na	4,383.35 km N	514.75 km E
FUG (7E)	na	70 oF	na	na	860 ft	na	4,383.35 km N	514.75 km E
RPC (8E)	na	Varies	na	na	860 ft	na	4,383.35 km N	514.75 km E

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.”

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

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**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?

☐ Yes ☒ **No**

☐ If Yes, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.

2.) Will there be Storage Piles?

☐ Yes ☒ **No**

☐ If Yes, then complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.

3.) Will there be Liquid Loading/Unloading Operations?

☐ Yes ☒ **No** (( **Truck Load-Out (TLO (5E)) is include in the Point Source Emissions** ))

☐ 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?

☐ Yes ☒ **No**

☐ 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.)?

☒ **Yes** ☐ No

☒ **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?

☐ Yes ☒ **No**

☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.

7.) Will there be any other activities that generate fugitive emissions?

☐ Yes ☒ **No**

☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.

If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

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**FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued**

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS <sup>1</sup>	Maximum Potential Pre-Controlled Emissions <sup>2</sup>		Maximum Potential Controlled Emissions <sup>3</sup>		Est. Method Used <sup>4</sup>
		lb/hr	ton/yr	lb/hr	ton/yr	
Paved Haul Roads	na	---	---	---	---	---
Unpaved Haul Roads	na	---	---	---	---	---
Storage Pile Emissions	na	---	---	---	---	---
<b>Loading/Unloading Operations</b>	<b>(( Truck Load-Out (TLO (5E)) is include in the Point Source Emissions ))</b>					
Wastewater Treatment	na	---	---	---	---	---
<b>Process and Piping Fugitives (FUG-G (7E) and FUG-W (7E) (Total Combined)</b>	<b>VOC</b>	<b>1.50</b>	<b>6.55</b>	<b>1.50</b>	<b>6.55</b>	<b>O - AP-42</b>
	<b>Benzene</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>O - AP-42</b>
	<b>Ethylbenzene</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>O - AP-42</b>
	<b>Formaldehyde</b>	---	---	---	---	---
	<b>n-Hexane</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>O - AP-42</b>
	<b>Methanol</b>	---	---	---	---	---
	<b>Toluene</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>O - AP-42</b>
	<b>2,2,4-TMP</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>O - AP-42</b>
	<b>Xylenes</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>O - AP-42</b>
	<b>Other HAP</b>	---	---	---	---	---
	<b>Total HAP</b>	<b>0.14</b>	<b>0.63</b>	<b>0.14</b>	<b>0.63</b>	<b>O - AP-42</b>
	<b>CO2</b>	<b>0.02</b>	<b>0.1</b>	<b>0.02</b>	<b>0.1</b>	<b>O - AP-42</b>
	<b>CH4</b>	<b>4</b>	<b>16</b>	<b>4</b>	<b>16</b>	<b>O - AP-42</b>
	<b>N2O</b>	---	---	---	---	---
	<b>CO2e</b>	<b>91</b>	<b>397</b>	<b>91</b>	<b>397</b>	<b>O - GWP</b>
General Clean-up VOC Emissions	na	---	---	---	---	---
Other	na	---	---	---	---	---

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

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

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

<sup>4</sup> Indicate method used to determine emission rate as follows:

MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

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**FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued**

LEAK SOURCE DATA SHEET					
Source Category	Pollutant	Number of Source Components <sup>1</sup>	Number of Components Monitored by Frequency <sup>2</sup>	Average Time to Repair (Days) <sup>3</sup>	Estimated Annual Emission Rate (lb/yr) <sup>4</sup>
<b>Pumps<sup>5</sup></b>	Light Liquid VOC <sup>6,7</sup>				
	Heavy Liquid VOC <sup>8</sup>				
	Non-VOC <sup>9</sup>				
<b>Valves<sup>10</sup></b>	Gas VOC	<div> <p>*** NOT APPLICABLE ***</p> <p>FACILITY IS NOT SUBJECT TO LEAK DETECTION AND REPAIR REQUIREMENTS</p> </div>			
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
<b>Safety Relief Valves<sup>11</sup></b>	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
<b>Open Ended Lines<sup>12</sup></b>	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
<b>Sampling Connections<sup>13</sup></b>	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
<b>Compressors</b>	Gas VOC				
	Non-VOC				
<b>Flanges</b>	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
<b>Other (Connectors)</b>	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
				<b>TOTAL (lb/yr)</b>	<b>0</b>
				<b>TOTAL (tpy)</b>	<b>0.00</b>

**Attachment K**  
**FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued**

**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 liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20°C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20°C. then the fluid is defined as a heavy liquid.
9. LIST CO, H<sub>2</sub>S, mineral acids, NO, NO<sub>2</sub>, SO<sub>2</sub>, etc. DO NOT LIST CO, H, H<sub>2</sub>O, 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 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 Compressor/Generator Engine Data Sheet
    - 203 bhp Caterpillar G3306TA Compressor Engine – Vendor Data
  - Natural Gas Glycol Dehydration Unit Data Sheet
    - Glycol Dehydration Unit – 2.0 MMscfd w/ 0.14 MMBtu/hr Reboiler – Vendor Data
  - 40 CFR Part 63; Subpart HH & HHH Registration Form
  - Storage Tank Data Sheet
  - Bulk Liquid Transfer Operations
-

Williams Ohio Valley Midstream LLC (OVM)  
**YOHO COMPRESSOR STATION**  
 Application for 45CSR13 NSR Modification Permit  
**Attachment L**

**NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET**

Source Identification Number <sup>1</sup>		CE-01 (1E)					
Engine Manufacturer and Model		Caterpillar (CAT)					
Model		G3306TALE (4SRB)					
Manufacturer's Rated bhp/rpm		203	1,800				
Source Status <sup>2</sup>		ES					
Date Installed/Modified/Removed <sup>3</sup>		01/16/13					
Manufactured/Reconstruction Date <sup>4</sup>		07/03/08					
Certified Engine (40CFR60 NSPS JJJJ) <sup>5</sup>		NO					
Engine, Fuel and Combustion Data	Engine Type <sup>6</sup>	RB4S					
	APCD Type <sup>7</sup>	A/F and NSCR					
	Fuel Type <sup>8</sup>	PQ					
	H <sub>2</sub> S (gr/100 scf)	0.2					
	Operating bhp/rpm	203	1,800				
	BSFC (Btu/bhp-hr)	8,978					
	Fuel (ft <sup>3</sup> /hr)	1,787					
	Fuel (MMft <sup>3</sup> /yr)	15.7					
	Operation (hrs/yr)	8,760					
Reference <sup>9</sup>	PTE <sup>10</sup>	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NOX	0.89	3.90				
MD	CO	1.78	7.80				
MD	VOC w/o HCHO	0.05	0.24				
MD	VOC w/ HCHO	0.17	0.73				
AP	SOX	1.1E-03	4.7E-03				
AP	PM10/2.5	0.04	0.15				
AP	Benzene	2.9E-03	0.01				
AP	Ethylbenzene	4.5E-05	2.0E-04				
MD	Formaldehyde (HCHO)	0.11	0.49				
AP	n-Hexane	---	---				
AP	Methanol	5.6E-03	0.02				
AP	Toluene	1.0E-03	4.5E-03				
AP	2,2,4-TMP	---	---				
AP	Xylenes	3.6E-04	1.6E-03				
AP	Other HAP	0.01	0.05				
SUM	Total HAP	0.13	0.58				
40CFR98	CO2	229	1,002				
MD	CH4	0.5	2				
40CFR98	N2O	4.0E-04	1.8E-03				
40CFR98	CO2e	240	1,052				



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.

**From:** Chris Magee [<mailto:CMagee@usacompression.com>]  
**Sent:** Tuesday, September 03, 2013 9:30 AM  
**To:** Turchin, John; Thompson, Bill  
**Subject:** RE: Yoho Cat 3306  
**Importance:** High

Bill/ John,

Below is the information for the Yoho unit (USAC #2062). If there is anything else let me know.

Information needed if the unit was operated for another company other than Williams is when was it operated –

- **Company: Crimson Exploration**
- **Location: Liberty Co., TX**
- **Start date(s): 6/22/2009**
- **Duration or time of operation(s) and**
- **end date: 4/20/2011.**

Chris Magee  
Emissions Compliance, N.E. Region  
USA Compression  
21722 Route 6, LL East  
Warren, PA 16365  
814-746-6942– mobile  
814-723-2431 – fax  
[cmagee@usacompression.com](mailto:cmagee@usacompression.com)



**The gas compressor was operated at another location prior to 08/23/11 and as provided in the NSPS General Provisions at 40 CFR 60.14(e)(6), relocation of an existing facility is not a modification.**



### USA Compression Unit 2062 Caterpillar G3306TA Engine Emissions

Date of Manufacture	July 3, 2008	Engine Serial Number	G6X04853	Date Modified/Reconstructed	N/A
Driver Rated HP	203	Rated Speed in RPM	1800	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	6	Compression Ratio	10.5:1	Combustion Setting	Rich Burn
Displacement, in <sup>3</sup>	640	Fuel Delivery Method	Carburetor	Combustion Air Treatment	T.C/ Aftercooled

#### Raw Engine Emissions (905 LHV BTU/SCF Fuel Gas with little to no H2S)

Fuel Consumption 8098 LHV BTU/bhp-hr or 8908 HHV BTU/bhp-hr  
 Altitude 1500 ft  
 Maximum Air Inlet Temp 77 F

	<u>g/bhp-hr<sup>1</sup></u>	<u>lb/MMBTU<sup>2</sup></u>	<u>lb/hr</u>	<u>TPY</u>
Nitrogen Oxides (NOx)	16.57		7.416	32.480
Carbon Monoxide (CO)	16.57		7.416	32.480
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0.37		0.166	0.725
Formaldehyde (CH2O)	0.25		0.112	0.490
Particulate Matter (PM) <small>Filterable+Condensable</small>		1.94E-02	0.035	0.154
Sulfur Dioxide (SO2)		5.88E-04	0.001	0.005
	<u>g/bhp-hr<sup>1</sup></u>	<u>lb/MMBTU<sup>2</sup></u>	<u>lb/hr</u>	<u>Metric Tonne/yr</u>
Carbon Dioxide (CO2)	511	110.0	199	790
Methane (CH4)	1.02	0.23	0.416	1.652

<sup>1</sup> g/bhp-hr are based on Caterpillar Specifications. Note that g/bhp-hr values are based on 100% Load Operation.

It is recommended to add a safety margin to emissions to allow for operational flexibility and fuel gas composition variability.

<sup>2</sup> Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-3).

#### Catalytic Converter Emissions

Catalytic Converter Make and Model: Maxim, EAC4-290-5  
 Element Type: 3-Way  
 Number of Elements in Housing: 1  
 Air/Fuel Ratio Control: Compliance Controls, AFR-9

	<u>% Reduction</u>		<u>lb/hr</u>	<u>TPY</u>
Nitrogen Oxides (NOx)	88	or 2 g/bhp-hr	0.89	3.90
Carbon Monoxide (CO)	76.0	or 4 g/bhp-hr	1.78	7.80
Volatile Organic Compounds (VOC or NMNEHC)	0	or 1 g/bhp-hr	0.17	0.73
Formaldehyde (CH2O)	0		0.11	0.49
Particulate Matter (PM)	0		3.51E-02	1.54E-01
Sulfur Dioxide (SO2)	0		1.06E-03	4.66E-03
	<u>% Reduction</u>		<u>lb/hr</u>	<u>Metric Tonne/yr</u>
Carbon Dioxide (CO2)	0		199	790
Methane (CH4)	0		0.42	1.65

GAS COMPRESSION APPLICATION

ENGINE SPEED (rpm): 1800  
 COMPRESSION RATIO: 8:1  
 AFTERCOOLER TYPE: SCAC  
 AFTERCOOLER WATER INLET (°F): 130  
 JACKET WATER OUTLET (°F): 210  
 ASPIRATION: TA  
 COOLING SYSTEM: JW+OC, AC  
 IGNITION SYSTEM: MAG  
 EXHAUST MANIFOLD: WC  
 COMBUSTION: Catalyst Setting  
 EXHAUST OXYGEN (% O<sub>2</sub>): 0.5  
 SET POINT TIMING: 35

FUEL SYSTEM: HPG IMPCO  
 WITH CUSTOMER SUPPLIED AIR FUEL RATIO CONTROL  
**SITE CONDITIONS:**  
 FUEL: Nat Gas  
 FUEL PRESSURE RANGE (psig): 12.0-24.9  
 FUEL METHANE NUMBER: 84.8  
 FUEL LHV (Btu/scf): 905  
 ALTITUDE (ft): 1500  
 MAXIMUM INLET AIR TEMPERATURE (°F): 77  
 STANDARD RATED POWER: 203 bhp@1800rpm

RATING	NOTES	LOAD	MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
			100%	100%	75%	50%
ENGINE POWER (WITHOUT FAN)	(1)	bhp	203	203	152	101
INLET AIR TEMPERATURE		°F	77	77	77	77

ENGINE DATA						
FUEL CONSUMPTION (LHV)	(2)	Btu/bhp-hr	8098	8098	8442	9195
FUEL CONSUMPTION (HHV)	(2)	Btu/bhp-hr	8983	8983	9364	10199
AIR FLOW (@inlet air temp, 14.7 psia)	(3)(4)	ft <sup>3</sup> /min	305	305	243	178
AIR FLOW (WET)	(3)(4)	lb/hr	1351	1351	1080	788
FUEL FLOW (60°F, 14.7 psia)		scfm	30	30	24	17
INLET MANIFOLD PRESSURE	(5)	in Hg(abs)	38.5	38.5	32.3	24.9
EXHAUST TEMPERATURE - ENGINE OUTLET	(6)	°F	1064	1064	1030	988
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(7)(4)	ft <sup>3</sup> /min	970	970	756	536
EXHAUST GAS MASS FLOW (WET)	(7)(4)	lb/hr	1434	1434	1144	835

EMISSIONS DATA - ENGINE OUT						
NO <sub>x</sub> (as NO <sub>2</sub> )	(8)(9)	g/bhp-hr	16.57	16.57	16.26	13.78
CO	(8)(9)	g/bhp-hr	16.57	16.57	16.26	13.78
THC (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	1.20	1.20	1.39	1.67
NMHC (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	0.18	0.18	0.21	0.25
NMNEHC (VOCs) (mol. wt. of 15.84)	(8)(9)(10)	g/bhp-hr	0.12	0.12	0.14	0.17
HCHO (Formaldehyde)	(8)(9)	g/bhp-hr	0.25	0.25	0.25	0.25
CO <sub>2</sub>	(8)(9)	g/bhp-hr	511	511	548	607
EXHAUST OXYGEN	(8)(11)	% DRY	0.5	0.5	0.5	0.5

HEAT REJECTION						
HEAT REJ. TO JACKET WATER (JW)	(12)	Btu/min	9045	9044	7544	6039
HEAT REJ. TO ATMOSPHERE	(12)	Btu/min	1095	1095	856	622
HEAT REJ. TO LUBE OIL (OC)	(12)	Btu/min	1430	1430	1193	955
HEAT REJ. TO AFTERCOOLER (AC)	(12)(13)	Btu/min	593	593	241	35

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC)	(14)	Btu/min	11665
TOTAL AFTERCOOLER CIRCUIT (AC)	(13)(14)	Btu/min	623
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.

Williams Ohio Valley Midstream LLC (OVM)  
**YOHO COMPRESSOR STATION**  
 Application for 45CSR13 NSR Modification Permit  
**Attachment L**

**NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET**

General Glycol Dehydration Unit Data		Manufacturer and Model		KW International	
		Max Dry Gas Flow Rate (MMscf/day)		2.0	
		Design Heat Input (MMBtu/hr) - HHV		0.14	
		Design Type (DEG or TEG)		TEG	
		Source Status <sup>2</sup>		ES	
		Date Installed/Modified/Removed <sup>3</sup>		2013	
		Regenerator Still Vent APCD <sup>4</sup>		NA	
		Fuel HV (Btu/scf) - HHV		1,020	
		H <sub>2</sub> S Content (gr/100 scf)		0.2	
		Operation (hrs/yr)		8,760	
Source ID # <sup>1</sup>	Vent	Reference <sup>5</sup>	PTE <sup>6</sup>	lbs/hr	tons/yr
RBV-1 (2E)	Reboiler Vent	AP	NOX	0.01	0.06
		AP	CO	0.01	0.05
		AP	VOC	7.5E-04	3.3E-03
		AP	SOX	8.2E-05	3.6E-04
		AP	PM10/2.5	1.0E-03	4.6E-03
		AP	Benzene	2.9E-07	1.3E-06
		AP	Ethylbenzene	---	---
		AP	Formaldehyde	1.0E-05	4.5E-05
		AP	n-Hexane	2.5E-04	1.1E-03
		AP	Methanol	---	---
		AP	Toluene	4.7E-07	2.0E-06
		AP	2,2,4-TMP	---	---
		AP	Xylenes	---	---
		AP	Other HAP	2.6E-07	1.1E-06
		AP	Total HAP	2.6E-04	1.1E-03
		40CFR98	CO2	16	72
		40CFR98	CH4	3.1E-04	1.4E-03
		40CFR98	N2O	3.1E-05	1.4E-04
		40CFR98	CO2e	16	72
RSV-1 (3E)	Glycol Regenerator Still Vent	GR	VOC	5.15	22.55
		GR	Benzene	0.10	0.44
		GR	Ethylbenzene	0.05	0.20
		GR	Formaldehyde	---	---
		GR	n-Hexane	0.14	0.61
		GR	Methanol	---	---
		GR	Toluene	0.19	0.82
		GR	2,2,4-TMP	0.00	0.02
		GR	Xylenes	0.06	0.26
		GR	Other HAP	---	---
		GR	Total HAP	0.54	2.34
		GR	CH4	6	28
		40CFR98	CO2e	160	700

## 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-GLYCalc<sup>TM</sup>  
OT = Other (please list): \_\_\_\_\_

6. Enter the Reboiler Vent and glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc<sup>TM</sup> (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-GLYCalc<sup>TM</sup> 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-GLYCalc<sup>TM</sup> is available on our website.**



***KWI QUOTE # 1200382 REV 1***

October 18, 2012

Williams Midstream  
One Williams Center  
Tulsa, OK 74172

Attn: Brenda Rexroat

Dear Mrs. Rexroat,

KW International, LLC is pleased to offer the following firm proposal for your consideration.

Thank you for considering KW International, LLC and we look forward to working with you on this project.

Please contact me if you have any questions or require additional information.

Regards,

*Wee-Sim "Ni" Teoh*

Account Manager  
713-468-9581 | Office  
281-773-4765 | Mobile  
[wsteoh@kwintl.com](mailto:wsteoh@kwintl.com) | Email  
[www.kwintl.com](http://www.kwintl.com) | Web



**ITEM 9:****DESIGN DATA:**

Required Gas Flow: **2 MMSCFD**  
Operating Pressure: 1000 psig  
Operating Temp: 120 °F

**NEW, KWI 8 5/8" OD x 20'-0" S/S x 1440# MAWP X-PACKED ABSORBER / SCRUBBER**

**Vessel Data:**

Code: ASME Section VIII Division I & National Board Registered  
Packed section: 9' X 5/8" Pall rings  
Redistributor: Yes  
Mist Extractor: (2) 304 ss wire mesh  
Corrosion Allowance: None

**CONNECTIONS**

Gas Inlet		2" 3000# NPT
Gas Outlet		2" 3000# NPT
Liquid level controller		2" 3000# NPT
Oil Outlet		1" 3000# NPT
Glycol Inlet		3/4" 3000# NPT
Glycol Outlet		3/4" 3000# NPT
Pressure Gauge		1/2" 3000# NPT
Thermometer		3/4" 3000# NPT
Gauge Glass	(2)	3/4" 3000# NPT
Relief Valve		1" 3000# NPT
Drain	(2)	1" 3000# NPT

**HEAT EXCHANGER**

External Glycol/Gas Heat Exchanger

**Accessories**

2" NPT Norriseal 1001A Liquid Level Controller (Low Bleed Type)  
1" NPT Norriseal 2220 Diaphragm Operated Dump Valve  
0-2000# pressure gauge w/1/2" isolation valve  
Reflex gauge glass assembly with steel gauge cocks  
Relief Valve - 1" NPT steel Relief Valve, set at vessel MAWP  
1 - 1/4" Fisher 67AFR Regulator  
1 - 0-250 Degree F thermometer with thermowell

**PAINT:**

Primer and Williams Rainforest Green (SW #4071)

## **KWI 87,500 BTU/HR. SKID MOUNTED REGENERATION UNIT**

### **REBOILER**

20" x 6' w/ integral storage/surge tank

1 - 6 5/8" O.D. Flanged removable "U" firetube w/ 6 5/8" O.D. x 6'-0" removable stack (7000 Flux)

1 - 6 5/8" O.D. x 4'-3" flanged removable still column packed with ceramic saddles

### **ACCESSORIES**

Kimray T12M high temperature shutdown

Kimray T12 Temperature controller

Fisher 119 Temperature control valve

0-60# fuel gas pressure gauge

Fuel gas pressure regulator

High pressure fuel gas regulator

0-200# fuel gas pressure gauge

50-550 deg. F thermometer w/ss thermowell

2- "Y" Strainer (Rich & Lean)

One burner and pilot assembly with flame arrestor cell

5/8" tubular gauge glass assembly

1/2" NPT ball valve

One set fuel and instrument gas piping

### **GLYCOL/GLYCOL HEAT EXCHANGER**

1 - Section of panel coil, 22" x 47"

### **GLYCOL PUMP**

1 - Kimray 1720 PV Glycol Pump with piping manifold

### **GLYCOL FILTER**

2 – Sock type filter with bypass (Rich & Lean)

1 – Charcoal filter with bypass

### **PIPING**

1/2" glycol piping assembly complete for unit operation

### **INSULATION**

Reboiler shell insulated with Calcium Silicate w/ Aluminum Jacket

### **SKID**

3'-0" x 10'-0" approximate size

### **PAINT**

Uninsulated areas coated with Primer and Williams Rainforest Green (SW #4071)

**18" OD X 4' S/S X 125# MAWP, ASME CODE CONSTRUCTED AND STAMPED, HORIZONTAL 3  
PHASE PUMP GAS SEPARATOR WITH 2-PHASE ACCESSORIES**

**VESSEL OPENING**

Glycol Inlet	1" 3000# Threaded
Gas Outlet	1" 3000# Threaded
Glycol Outlet	1" 3000# Threaded
Liquid Level Controller (2)	2" 3000# Threaded
Gauge Glass (4)	1/2" 3000# Threaded
Pressure Gauge	1/2" 3000# Threaded
Thermometer	3/4" 3000# Threaded
Condensate Outlet	1" 3000# Threaded

**2-PHASE ACCESSORIES**

Liquid Level Control: 2" NPT Norriseal 1001A (Low Bleed Type)  
Glycol Dump Valve: 1" NPT Kimray 112 SMT with 1" NPT block valve  
Condensate Dump Valve: Manual  
Back Pressure Valve: 1-1" NPT Fisher 1805  
Relief Valve: 1-1" NPT relief valve set at 125#  
Gauge Glass: 5/8" tubular with gauge cocks  
Thermometer: 1- 20-240o F with ss thermowell  
Fuel Gas Scrubber: 10" x 2'2" x 250# ASME Code with relief valve set at 125#, pressure gauge 0-200# with isolation valve  
Instrument Gas Regulator  
Make-Up Gas Regulator  
Supply Gas: 1- 0-200# pressure gauge with 1/2" isolation valve, tubing and fittings

**PIPING**

As required for unit operation

**INSULATION**

Calcium Silicate w/ Aluminum Jacket

**PAINT**

Primer and Williams Rainforest Green (SW #4071)

Williams Ohio Valley Midstream LLC (OVM)  
**YOHO COMPRESSOR STATION**  
 Application for 45CSR13 NSR Modification Permit  
**Attachment L**

**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):	<b>2.0 MMscfd</b>
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day):	<b>na</b>
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> 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.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
The affected facility is:	<input checked="" type="checkbox"/> prior to a NG processing plant <input type="checkbox"/> NG processing plant <input type="checkbox"/> 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).	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
The affected facility exclusively processes, stores, or transfers black oil with an initial producing gas-to-oil ratio (GOR): <b>na</b> scf/bbl      API gravity: <b>na</b> degrees	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

**Section B: Dehydration Unit (if applicable)<sup>1</sup>**

Description: <b>2.0 MMscfd - TEG Dehy 01 (RSV-1 (3E))</b>			
Date of Installation:	<b>2013</b>	Annual Operating Hours:	<b>8,760</b>
Exhaust Stack Height (ft):	<b>10.0</b>	Stack Diameter (ft):	<b>0.6</b>
Burner rating (MMbtu/hr):		<b>0.14</b>	
Glycol Type:	<input checked="" type="checkbox"/> TEG <input type="checkbox"/> EG <input type="checkbox"/> Other: <b>na</b>		
Glycol Pump Type:	<input type="checkbox"/> Elect <input checked="" type="checkbox"/> Gas	If Gas, what is the volume ratio?: <b>0.08 acfm/gpm</b>	
Condenser installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Exit Temp:	<b>na</b>
Condenser Pressure:		<b>na</b>	
Incinerator/flare installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Destruction Eff.:	<b>na</b>
Other controls installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Describe:	<b>na</b>
Wet Gas <sup>2</sup> :	Gas Temperature: <b>70oF</b>	Gas Pressure:	<b>1,000 psig</b>
(Upstream of Contact Tower)	Saturated Gas?: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If no, water content?: <b>na</b>	
Dry Gas:	Gas Flowrate: Actual: <b>2.0 MMscfd</b>	Design:	<b>2.0 MMscfd</b>
(Downstream of Contact Tower)	Water Content: <b>7.0 lb/MMscf</b>		
Lean Glycol:	Circulation Rate: Actual <sup>3</sup> : <b>0.67 gpm</b>	Max <sup>4</sup> :	<b>0.67 gpm</b>
	Pump make/model: <b>Kimray 4020PV</b>		
Glycol Flash Tank (if applicable):	Temp: <b>120 oF</b>	Pressure: <b>60 psig</b>	Vented: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	If no, describe vapor control: <b>At least 50% of flash tank vapors used as reboiler fuel, the remainder is vented to atmosphere.</b>		
Stripping Gas (if applicable):	Source of Gas: <b>na</b>	Rate:	<b>na</b>

**YOHO COMPRESSOR STATION**  
Application for 45CSR13 NSR Modification Permit  
**Attachment L**

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

**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**

- ☒ 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).

Affected facility status:  
(choose only one)

- ☐ 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.

## STORAGE TANK DATA SHEET

Source ID # <sup>1</sup>	Status <sup>2</sup>	Content <sup>3</sup>	Volume <sup>4</sup> (gal)	Dia <sup>5</sup> (ft)	Throughput <sup>6</sup> (gal/yr)	Orientation <sup>7</sup>	Ave Liq Ht <sup>8</sup> (Ft)
<b>TK-01</b>		<b>Produced Water</b>	<b>8,820</b>	<b>10</b>	<b>105,840</b>	<b>VERT</b>	<b>8</b>
<b>TK-02</b>		<b>Lube Oil</b>	<b>500</b>	<b>4</b>	<b>6,000</b>	<b>HORZ</b>	<b>2</b>
<b>TK-03</b>		<b>Waste Oil</b>	<b>500</b>	<b>4</b>	<b>6,000</b>	<b>HORZ</b>	<b>2</b>
<b>TK-04</b>		<b>Glycol</b>	<b>225</b>	<b>4</b>	<b>2,700</b>	<b>HORZ</b>	<b>2</b>
<b>TK-05</b>		<b>Methanol</b>	<b>130</b>	<b>4</b>	<b>1,560</b>	<b>HORZ</b>	<b>2</b>
<b>TK-06</b>		<b>Methanol</b>	<b>130</b>	<b>4</b>	<b>1,560</b>	<b>HORZ</b>	<b>2</b>

### Notes to STORAGE TANK DATA SHEET

- 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.
- Enter storage tank Status using the following:  
 EXIST Existing Equipment  
 NEW Installation of New Equipment  
 REM Equipment Removed
- Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, etc.
- Enter storage tank volume in gallons.
- Enter storage tank diameter in feet.
- Enter storage tank throughput in gallons per year.
- Enter storage tank orientation using the following:  
 VERT Vertical Tank  
 HORZ Horizontal Tank
- Enter storage tank average liquid height in feet.

## Attachment L

# EMISSIONS UNIT DATA SHEET

## STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT [www.epa.gov/tnn/tanks.html](http://www.epa.gov/tnn/tanks.html)), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

### I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name 210 bbl Produced Water Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i> ) T01	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i> ) 5E
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.):	

### II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <div style="text-align: right;">210 barrels</div>	
9A. Tank Internal Diameter (ft) <div style="text-align: right;">10</div>	9B. Tank Internal Height (or Length) (ft) <div style="text-align: right;">15</div>
10A. Maximum Liquid Height (ft) <div style="text-align: right;">14</div>	10B. Average Liquid Height (ft) <div style="text-align: right;">8</div>
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <div style="text-align: right;">210 barrels</div>	

13A. Maximum annual throughput (gal/yr) <div style="text-align: center;">229,320</div>	13B. Maximum daily throughput (gal/day) <div style="text-align: center;">628</div>
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) <div style="text-align: center;">26</div>	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input checked="" type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input checked="" type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <div style="padding-left: 20px;"> <input type="checkbox"/> Fixed Roof    ___ vertical    ___ horizontal    ___ flat roof    ___ cone roof    ___ dome roof                                   ___ other (describe)  <input type="checkbox"/> External Floating Roof    ___ pontoon roof    ___ double deck roof  <input type="checkbox"/> Domed External (or Covered) Floating Roof  <input type="checkbox"/> Internal Floating Roof    ___ vertical column support    ___ self-supporting  <input type="checkbox"/> Variable Vapor Space    ___ lifter roof    ___ diaphragm  <input type="checkbox"/> Pressurized    ___ spherical    ___ cylindrical  <input type="checkbox"/> Underground  <input type="checkbox"/> Other (describe)         </div>	

### III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction: <input type="checkbox"/> Riveted <input type="checkbox"/> Gunitite lined <input type="checkbox"/> Epoxy-coated rivets <input type="checkbox"/> Other (describe)		
20A. Shell Color	20B. Roof Color	20C. Year Last Painted
21. Shell Condition (if metal and unlined): <input type="checkbox"/> No Rust <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input type="checkbox"/> Not applicable		
22A. Is the tank heated? <input type="checkbox"/> YES <input type="checkbox"/> NO		
22B. If YES, provide the operating temperature (°F)		
22C. If YES, please describe how heat is provided to tank.		
23. Operating Pressure Range (psig):                      to		
24. Complete the following section for <b>Vertical Fixed Roof Tanks</b> <input type="checkbox"/> Does Not Apply		
24A. For dome roof, provide roof radius (ft)		
24B. For cone roof, provide slope (ft/ft)		
25. Complete the following section for <b>Floating Roof Tanks</b> <input checked="" type="checkbox"/> Does Not Apply		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type: <input type="checkbox"/> Metallic (Mechanical) Shoe Seal <input type="checkbox"/> Liquid Mounted Resilient Seal <input type="checkbox"/> Vapor Mounted Resilient Seal <input type="checkbox"/> Other (describe):		
25C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO		
25D. If YES, how is the secondary seal mounted? (check one) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe):		
25E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO		



25F. Describe deck fittings; indicate the number of each type of fitting:		
ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:
LADDER WELL		
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:	
GAUGE-HATCH/SAMPLE PORT		
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:	
ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
VACUUM BREAKER		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
RIM VENT		
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
DECK DRAIN (3-INCH DIAMETER)		
OPEN:	90% CLOSED:	
STUB DRAIN		
1-INCH DIAMETER:		
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks <span style="float: right;"><input checked="" type="checkbox"/> Does Not Apply</span>	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: <ul style="list-style-type: none"> <li><input type="checkbox"/> Continuous sheet construction 5 feet wide</li> <li><input type="checkbox"/> Continuous sheet construction 6 feet wide</li> <li><input type="checkbox"/> Continuous sheet construction 7 feet wide</li> <li><input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide</li> <li><input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide</li> <li><input type="checkbox"/> Other (describe)</li> </ul>	
26D. Deck seam length (ft)	26E. Area of deck (ft <sup>2</sup> )
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

**IV. SITE INFORMATION** (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft <sup>2</sup> ·day))
33. Atmospheric Pressure (psia)

**V. LIQUID INFORMATION** (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:			
34A. Minimum (°F)	34B. Maximum (°F)		
35. Average operating pressure range of tank:			
35A. Minimum (psig)	35B. Maximum (psig)		
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)		
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)		
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)		
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia)			
39G. Reid (psia)			
Months Storage per Year 39H. From			
39I. To			

#### VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☒ Does Not Apply

☐ Carbon Adsorption<sup>1</sup>

☐ Condenser<sup>1</sup>

☐ Conservation Vent (psig)

Vacuum Setting

Pressure Setting

☐ Emergency Relief Valve (psig)

☐ Inert Gas Blanket of

☐ Insulation of Tank with

☐ Liquid Absorption (scrubber)<sup>1</sup>

☐ Refrigeration of Tank

☐ Rupture Disc (psig)

☐ Vent to Incinerator<sup>1</sup>

☐ Other<sup>1</sup> (describe):

<sup>1</sup> Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method <sup>1</sup>
		Amount	Units		
VOC				220	EPA-450/3-85-001a

<sup>1</sup> EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☐ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

**Attachment L**  
**EMISSIONS UNIT DATA SHEET**  
**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 <i>Equipment List Form</i> ): TLO				
1. Loading Area Name:				
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): <b>N/A</b>				
<input type="checkbox"/> Drums <input type="checkbox"/> Marine Vessels <input type="checkbox"/> Rail Tank Cars <input type="checkbox"/> Tank Trucks				
3. Loading Rack or Transfer Point Data:				
Number of pumps	1			
Number of liquids loaded	1			
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	1			
4. Does ballasting of marine vessels occur at this loading area?				
<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <b><u>Does not apply</u></b>				
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point: <b>N/A</b>				
6. Are cargo vessels pressure tested for leaks at this or any other location? <b>N/A</b>				
<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, describe:				
7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):				
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7
weeks/quarter	13	13	13	13

8. Bulk Liquid Data (add pages as necessary):						
Pump ID No.	1					
Liquid Name	Prod. H2O					
Max. daily throughput (1000 gal/day)	0.628					
Max. annual throughput (1000 gal/yr)	229.3					
Loading Method <sup>1</sup>	SP					
Max. Fill Rate (gal/min)	200					
Average Fill Time (min/loading)	60					
Max. Bulk Liquid Temperature (°F)	60					
True Vapor Pressure <sup>2</sup>	1.5					
Cargo Vessel Condition <sup>3</sup>	U					
Control Equipment or Method <sup>4</sup>	None					
Minimum control efficiency (%)	N/A					
Maximum Emission Rate (VOC)	Loading (lb/hr)	---				
	Annual (lb/yr)	1,100				
Estimation Method <sup>5</sup>	EPA					
<sup>1</sup> BF = Bottom Fill      SP = Splash Fill      SUB = Submerged Fill						
<sup>2</sup> At maximum bulk liquid temperature						
<sup>3</sup> B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)						
<sup>4</sup> List as many as apply (complete and submit appropriate <i>Air Pollution Control Device Sheets</i> ): 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)						
<sup>5</sup> EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance TM = Test Measurement based upon test data submittal O = other (describe)						

**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

REPORTING

TESTING

**MONITORING.** PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS

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

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

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

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

**ATTACHMENT M**  
**Air Pollution Control Device Sheet(s)**

---

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

---

- 203 bhp Caterpillar G3306TA Compressor Engine – EMIT NSCR
    - Non-Selective Catalytic Reduction (NSCR) – Vendor Data
-

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

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

**Equipment Information**

1. Manufacturer: EMIT Technologies Model No. EAH-1450T-0505F-20CEE (or equiv.)	2. Control Device Name: Catalytic Converter Type: NSCR
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:  NOx (≥88%) and CO (≥76%)	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: _____ SCFM	10. Capacity: _____
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

**Gas Stream Characteristics**

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



16. Type of pollutant(s) controlled:		<input type="checkbox"/> SO <sub>x</sub>	<input type="checkbox"/> Odor			
<input type="checkbox"/> Particulate (type):			<input checked="" type="checkbox"/> Other	NO <sub>x</sub> , CO, VOC and HCHO		
17. Inlet gas velocity:		ft/sec	18. Pollutant specific gravity:			
19. Gas flow into the collector: 970 ACFM @ 1064°F and PSIA			20. Gas stream temperature: Inlet: 1064 °F Outlet: °F			
21. Gas flow rate: Design Maximum: 970 ACFM Average Expected: 970 ACFM			22. Particulate Grain Loading in grains/scf: Inlet: Outlet:			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	g/bhp-hr	grains/acf		g/bhp-hr	grains/acf	
NO <sub>x</sub>	16.57		88	≤2.00		
CO	16.57		76	≤4.00		
NMNEHC	0.12		0	0.12		
HCHO	0.25		0	0.25		
24. Dimensions of stack:						
Height		ft.	Diameter		ft.	
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

## Particulate Distribution

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

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

28. Describe the collection material disposal system:

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

**30. Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:

RECORDKEEPING:

REPORTING:

TESTING:

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

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

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

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

NO<sub>x</sub> (≥88%) and CO (≥76%)

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

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



## Emission Control Application Data Sheet

### Maxim Silencers, Inc.

10035 Dighton Lane  
Stafford, Texas 77477  
Phone: 832 554-0990  
Fax: 832 554-0990

max 4.1.xls

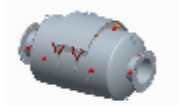
Customer: <b>USA COMPRESSION</b>	Project: _____	Date: <b>9/14/2012</b>
Sales Person: _____	Site Elevation: _____ ft	Contact: _____
Order/Quote #: <b>0</b>		

#### Engine Data:

Engine Model:	Caterpillar G3306TA	Speed:	1800	RPM
Fuel & Operating Type:	Natural Gas Rich Burn	Engine Power:	203	Hp
			152	KW
Exhaust Flow Rate:	970 acfm	Exhaust Temperature:	1064	°F
	1648 m <sup>3</sup> /hr		573	°C
	1512 lbs/hr			

#### QAC (Quick Access Catalyst) Data:

Number of Cores:	1	Inlet Size:	5	in
Model:	QAC4-29-5	Outlet Size:	5	in
Grade:	Super Critical	Body Length:	63	in
Body Diameter:	18 in	Estimated Back Pressure:	6.90	in of WC
Estimated weight:	147 lbs		16.9	mbar
	67 Kg	Speed through Inlet:	7499	ft/min



#### Emission:

Min. Temp. at Core Face:	1022 °F	550 °C	Catalyst Type:	3-Way
Max. Temp. at Core Face:	1094 °F	590 °C		

Engine Out / Pre Emission:	Pollutant				
	NOx	CO	NMHC/VOC	H <sub>2</sub> CO	
Post Emission:	16.57	16.57	0.12	0.25	g/bhp-hr
	2.000	2.000	0.066	0.200	g/bhp-hr
	87.9	87.9	20.0	20.0	% Reduction
	0.90	0.90	0.04	0.09	lb/hr
	3.93	3.93	0.19	0.39	tons/year operation
	367.2	367.2	17.6	36.6	ppmv
	117.1	117.1	5.6	11.7	ppmv @ 15% O <sub>2</sub>

#### Acoustics:

Frequency Band (Hz):	63	125	250	500	1000	2000	4000	8000	No Element One Element Layer Two Element(s) Layers
Estimated Attenuation (dB):	18	38	39	37	26	21	20	20	
Plus:	19	40	41	41	31	27	26	25	
Plus:	19	41	42	44	35	31	30	29	

#### Warranty & Notes:

- If Pre-Emission levels are not as noted above, contact Maxim for a re-quote.
- To achieve Post Emission levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1250°F.
- If applicable, the engine will require an exhaust ratio controller to meet above emission levels. For Rich Burn engines it must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- QAC is not designed to withstand a backfire, therefore measures should be taken prior to QAC unit to alleviate backfire pressure.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp-hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1000°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream: not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance with manufacturer's recommended practice.
- Under no condition will Maxim Silencers, Inc. assume any contingent liabilities.
- Operating manual is available online at [www.maxsilencers.com](http://www.maxsilencers.com) or contact a Maxim sales representative.
- Nomenclature: QAC4-292-5, 4 is grade (Super Critical), 29 is catalyst block size, 2 is no. of catalyst(s) and 5 is flange diameter.
- Maxim's standard one year warranty applies.

# **ATTACHMENT N**

## **Supporting Emissions Calculations**

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“30. Provide all **Supporting Emissions Calculations** as Attachment N.”

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- **Emission Summary Spreadsheets**
    - Controlled Emissions
    - PRE-Controlled Emissions
    - Greenhouse Gas Emissions
  - **Unit-Specific Emission Spreadsheets**
    - Compressor Engine – 203 bhp Caterpillar G3306TA Compressor Engine
    - Triethylene Glycol (TEG) Reboiler – 0.14 MMBtu/hr
    - Triethylene Glycol (TEG) Dehydrator – 2.0 MMscfd
    - Produce Water Storage Tank – 210 bbl capacity
    - Produced Water Truck Load-Out – 5,460 bbl/yr
    - Startup/Shutdown/Maintenance (SSM)
    - Process Piping Fugitives – Gas & Water/Oil
    - Compressor Rod Packing Leaks and Engine Crankcase Leaks
  - **AP-42 and GHG Emission Factors**
  - **Model Results**
    - Dehydrator - GRI-GLYCalc 4.0
      - Summary of Emissions
      - Summary of Input Values
      - Aggregate Calculations Report
    - Storage Tank - Promax
      - Plant Schematic
      - Process Stream Report
-

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**Controlled Emissions**

**Controlled Potential to Emit (PTE) Summary - Criteria Pollutants**

Unit ID	Point ID	Control ID	Description	Capacity	NOx		CO		VOC		SOx		PM10/2.5		CO2e	
					lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	1E	01-NSCR	Caterpillar Engine	203 bhp	0.89	3.90	1.78	7.80	0.17	0.73	1.1E-03	4.7E-03	0.04	0.15	240	1,052
RBV-1	2E	na	TEG Dehydrator - Reboiler	0.14 MMBtu/hr	0.01	0.06	0.01	0.05	7.5E-04	3.3E-03	8.2E-05	3.6E-04	1.0E-03	4.6E-03	16	72
RSV-1	3E	na	TEG Dehydrator - Flash Tank/Still Vent	2.0 MMscfd	---	---	---	---	5.15	22.55	---	---	---	---	160	700
T01	4E	na	Produced Water - Storage Tank	210 bbl	---	---	---	---	0.05	0.22	---	---	---	---	---	---
TLO	5E	na	Produced Water - Truck Loadout	5,460 bbl/yr	---	---	---	---	---	0.55	---	---	---	---	---	---
SSM	6E	na	Startup/Shutdown/Maintenance	---	---	---	---	---	---	1.53	---	---	---	---	---	108
FUG	7E	na	Piping and Equipment Fugitives	---	---	---	---	---	1.50	6.55	---	---	---	---	91	397
RPC	8E	na	Rod Packing/Crankcase Emissions	---	---	---	---	---	8.2E-04	3.6E-03	---	---	---	---	74	325
<b>TOTAL PTE:</b>					<b>0.90</b>	<b>3.96</b>	<b>1.79</b>	<b>7.85</b>	<b>6.86</b>	<b>32.13</b>	<b>1.2E-03</b>	<b>0.01</b>	<b>3.6E-02</b>	<b>0.16</b>	<b>581</b>	<b>2,653</b>
WV-DEP Permit Threshold:					6	AND 10	6	AND 10	6	AND 10	6	AND 10	6	AND 10	na	
Title V Permit Threshold:					---	100	---	100	---	100	---	100	---	100	na	

**Controlled Potential to Emit (PTE) Summary - Hazardous Air Pollutants (HAPs)**

Unit ID	Benzene		Ethylbenzene		HCHO (HAP)		n-Hexane		Methanol		Toluene		2,2,4-TMP		Xylenes		Other HAP		Total HAP	
	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	2.9E-03	0.01	4.5E-05	0.00	0.11	0.49	---	---	0.01	0.02	1.0E-03	4.5E-03	---	---	3.6E-04	1.6E-03	0.01	0.05	0.13	0.58
RBV-1	2.9E-07	1.3E-06	---	---	1.0E-05	4.5E-05	2.5E-04	1.1E-03	---	---	4.7E-07	2.0E-06	---	---	---	---	2.6E-07	1.1E-06	2.6E-04	1.1E-03
RSV-1	0.10	0.44	0.05	0.20	---	---	0.14	0.61	---	---	0.19	0.82	4.3E-03	0.02	0.06	0.26	---	---	0.54	2.34
T01	1.3E-03	0.01	1.3E-03	0.01	---	---	1.3E-03	0.01	---	---	1.3E-03	0.01	1.3E-03	0.01	1.3E-03	0.01	---	---	0.01	0.03
TLO	---	0.01	---	0.01	---	---	---	0.01	---	---	---	0.01	---	0.01	---	0.01	---	---	---	0.08
SSM	---	2.0E-03	---	2.0E-03	---	---	---	0.05	---	---	---	2.0E-03	---	2.0E-03	---	2.0E-03	---	---	---	0.06
FUG	0.02	0.10	0.02	0.10	---	---	0.02	0.10	---	---	0.02	0.10	0.02	0.10	0.02	0.10	---	---	0.14	0.63
RPC	1.1E-04	4.8E-04	1.1E-04	4.8E-04	5.5E-04	2.4E-03	1.1E-04	4.8E-04	---	---	1.1E-04	4.8E-04	1.1E-04	4.8E-04	1.1E-04	4.8E-04	---	---	6.6E-04	2.9E-03
PTE:	<b>0.13</b>	<b>0.57</b>	<b>0.07</b>	<b>0.33</b>	<b>0.11</b>	<b>0.49</b>	<b>0.16</b>	<b>0.79</b>	<b>5.6E-03</b>	<b>0.02</b>	<b>0.21</b>	<b>0.95</b>	<b>0.03</b>	<b>0.14</b>	<b>0.08</b>	<b>0.39</b>	<b>0.01</b>	<b>0.05</b>	<b>0.82</b>	<b>3.74</b>
WV-DEP:	<b>2</b>	<b>OR 0.5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 0.5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>
Title V:	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	25

- Notes:
- 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.
  - 2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
  - 3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
  - 4 - HCHO is formaldehyde
  - 5 - Other HAP includes acetaldehyde, acrolein, and traces of othr Hazardous air pollutants.

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**Attachment N - Supporting Emissions Calculations**

**PRE-Controlled Emissions**

**PRE-Controlled Potential to Emit (PTE) Summary - Criteria Polutants**

Unit ID	Point ID	Control ID	Description	Capacity	NOx		CO		VOC		SOx		PM10/2.5		CO2e	
					lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	1E	01-NSCR	Caterpillar Engine	203 bhp	7.42	32.48	7.42	32.48	0.17	0.73	1.1E-03	4.7E-03	0.04	0.15	240	1,052
RBV-1	2E	na	TEG Dehydrator - Reboiler	0.14 MMBtu/hr	0.01	0.06	0.01	0.05	7.5E-04	3.3E-03	8.2E-05	3.6E-04	1.0E-03	4.6E-03	16	72
RSV-1	3E	na	TEG Dehydrator - Flash Tank/Still Vent	2.0 MMscfd	---	---	---	---	5.15	22.55	---	---	---	---	160	700
T01	4E	na	Produced Water - Storage Tank	210 bbl	---	---	---	---	0.05	0.22	---	---	---	---	---	---
TLO	5E	na	Produced Water - Truck Loadout	5,460 bbl/yr	---	---	---	---	---	0.55	---	---	---	---	---	---
SSM	6E	na	Startup/Shutdown/Maintenance	---	---	---	---	---	---	1.53	---	---	---	---	---	108
FUG	7E	na	Piping and Equipment Fugitives	---	---	---	---	---	1.50	6.55	---	---	---	---	91	397
RPC	8E	na	Rod Packing/Crankcase Emissions	---	---	---	---	---	8.2E-04	3.6E-03	---	---	---	---	7.4E+01	3.2E+02
<b>TOTAL PTE:</b>					<b>7.43</b>	<b>32.54</b>	<b>7.43</b>	<b>32.53</b>	<b>6.86</b>	<b>32.13</b>	<b>1.2E-03</b>	<b>0.01</b>	<b>3.6E-02</b>	<b>0.16</b>	<b>581</b>	<b>2,653</b>
WV-DEP Permit Threshold:					<b>6</b>	<b>AND 10</b>	<b>6</b>	<b>AND 10</b>	<b>6</b>	<b>AND 10</b>	<b>6</b>	<b>AND 10</b>	<b>6</b>	<b>AND 10</b>	na	
Title V Permit Threshold:					---	100	---	100	---	100	---	100	---	100	na	

**PRE-Controlled Potential to Emit (PTE) Summary - Hazardous Air Pollutants (HAPs)**

Unit ID	Benzene		Ethylbenzene		HCHO (HAP)		n-Hexane		Methanol		Toluene		2,2,4-TMP		Xylenes		Other HAP		Total HAP	
	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	2.9E-03	0.01	4.5E-05	2.0E-04	0.11	0.49	---	---	0.01	0.02	1.0E-03	4.5E-03	---	---	3.6E-04	1.6E-03	0.01	0.05	0.13	0.58
RBV-1	2.9E-07	1.3E-06	---	---	1.0E-05	4.5E-05	2.5E-04	1.1E-03	---	---	4.7E-07	2.0E-06	---	---	---	---	2.6E-07	1.1E-06	2.6E-04	1.1E-03
RSV-1	0.10	0.44	0.05	0.20	---	---	0.14	0.61	---	---	0.19	0.82	0.00	0.02	0.06	0.26	---	---	0.54	2.34
T01	0.00	0.01	0.00	0.01	---	---	0.00	0.01	---	---	0.00	0.01	0.00	0.01	0.00	0.01	---	---	0.01	0.03
TLO	---	0.01	---	0.01	---	---	---	0.01	---	---	---	0.01	---	0.01	---	0.01	---	---	---	0.08
SSM	---	2.0E-03	---	2.0E-03	---	---	---	0.05	---	---	---	2.0E-03	---	0.00	---	2.0E-03	---	---	---	0.06
FUG	0.02	0.10	0.02	0.10	---	---	0.02	0.10	---	---	0.02	0.10	0.02	0.10	0.02	0.10	---	---	0.14	0.63
RPC	1.1E-04	4.8E-04	1.1E-04	4.8E-04	5.5E-04	2.4E-03	1.1E-04	4.8E-04	---	---	1.1E-04	4.8E-04	1.1E-04	4.8E-04	1.1E-04	4.8E-04	---	---	6.6E-04	2.9E-03
<b>PTE:</b>	<b>0.13</b>	<b>0.57</b>	<b>0.07</b>	<b>0.33</b>	<b>0.11</b>	<b>0.49</b>	<b>0.16</b>	<b>0.79</b>	<b>0.01</b>	<b>0.02</b>	<b>0.21</b>	<b>0.95</b>	<b>0.03</b>	<b>0.14</b>	<b>0.08</b>	<b>0.39</b>	<b>0.01</b>	<b>0.05</b>	<b>0.82</b>	<b>3.74</b>
WV-DEP:	<b>2</b>	<b>OR 0.5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 0.5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>	<b>2</b>	<b>OR 5</b>
Title V:	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	25

- Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.  
 2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).  
 3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.  
 4 - HCHO is formaldehyde  
 5 - Other HAP includes acetaldehyde, acrolein, and traces of othr Hazardous air pollutants.



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**Compressor Engine – 203 bhp CAT G3306TALE (4SRB w/ NSCR)**

Unit	Description	Reference	Pollutant	Pre-Controlled Emissions			Control Efficiency	Controlled Emissions		
				g/bhp-hr	lb/hr	tpy		g/bhp-hr	lb/hr	tpy
Compressor Engine  CE-01 (1E)	Caterpillar (CAT) <b>G3306TALE (4SRB)</b> <b>203 bhp</b> 1,800 rpm 107 in3/cyl	Vendor Data	NOx	16.57	7.42	32.48	88.0%	1.99	0.89	3.90
		Vendor Data	CO	16.57	7.42	32.48	76.0%	3.98	1.78	7.80
		Vendor Data	THC	1.20	0.54	2.35	---	1.20	0.54	2.35
		Vendor Data	NMHC	0.18	0.08	0.35	---	0.18	0.08	0.35
		Vendor Data	NMNEHC	0.12	0.05	0.24	---	0.12	0.05	0.24
	Three-Way Catalyst (NSCR) NSPS JJJJ Affected NESHAP ZZZZ - No Req'ts Constructed ≥ 06/12/06	NMNEHC+HCHO	VOC	0.37	0.17	0.73	---	0.37	0.17	0.73
		AP-42 Table 3.2-3	SOX	2.4E-03	1.1E-03	4.7E-03	---	2.4E-03	1.1E-03	4.7E-03
		AP-42 Table 3.2-3	PM10/2.5	0.08	0.04	0.15	---	0.08	0.04	0.15
		AP-42 Table 3.2-3	Benzene	0.01	2.9E-03	0.01	---	6.4E-03	2.9E-03	0.01
		AP-42 Table 3.2-3	Ethylbenzene	1.0E-04	4.5E-05	2.0E-04	---	1.0E-04	4.5E-05	2.0E-04
		Vendor Data	HCHO	0.25	0.11	0.49	---	0.25	0.11	0.49
		AP-42 Table 3.2-3	n-Hexane	---	---	---	---	---	---	---
		AP-42 Table 3.2-3	Methanol	0.01	0.01	0.02	---	0.01	5.6E-03	0.02
		AP-42 Table 3.2-3	Toluene	2.3E-03	1.0E-03	4.5E-03	---	2.3E-03	1.0E-03	4.5E-03
		AP-42 Table 3.2-3	2,2,4-TMP	---	---	---	---	---	---	---
		AP-42 Table 3.2-3	Xylene	8.0E-04	3.6E-04	1.6E-03	---	8.0E-04	3.6E-04	1.6E-03
		AP-42 Table 3.2-3	Other HAP	0.03	0.01	0.05	---	0.03	0.01	0.05
		SUM	Total HAP	0.30	0.13	0.58	---	0.30	0.13	0.58
		Vendor Data	CO2	511	229	1,002	---	511	229	1,002
		Vendor Data	CH4	1.02	0.46	2.00	---	1.02	0.46	2.00
		40CFR98 - Table C-2	N2O	9.0E-04	4.0E-04	1.8E-03	---	9.0E-04	4.0E-04	1.8E-03
		40CFR98 - Table A-1	CO2e	537	240	1,052	---	537	240	1,052
	8,760 hr/yr									
	920 Btu/scf (LHV)									
	1,020 Btu/scf (HHV)									
	<b>8,098 Btu/bhp-hr (LHV)</b>									
	8,978 Btu/bhp-hr (HHV)									
	1.64 MMBtu/hr (LHV)									
	1.82 MMBtu/hr (HHV)									
	1,787 scf/hr									
	15.65 MMBtu/yr									
	31.4% Nominal Efficiency									

- Notes:
- 1 - The Pre-Controlled emissions are based on operation at 100% of rated load for 8,760 hrs/yr.
  - 2 - As per vendor specifications, NMNEHC (non-methane non-ethane hydrocarbon) does not include HCHO. VOC is the sum of NMNEHC and HCHO.
  - 3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5
  - 4 - HCHO is formaldehyde.
  - 5 - Other HAP includes Acetaldehyde, Acrolein, 1,3-Butadiene, Chloride Methylene Chloride, and traces of other HAP.
  - 6 - The control efficiency (CE) for each HAP is assumed to be the same as the CE for NMNEHC, except for HCHO where the vendor provides specific data.
  - 7 - The fuel heating value will vary, 920 Btu/scf (LHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.
  - 8 - The emission estimates are based on operation at 100% of rated load.



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**Attachment N - Supporting Emissions Calculations**

**Dehydrator - 0.14 MMBtu/hr Reboiler**

Unit ID	Description	Capacity	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
					lb/MMscf	lb/MMBtu	lb/hr	tpy		lb/hr	tpy
RBV-1 (2E)	Reboiler 01 (RBV-1) Reboiler Combustion Emissions	Heat Input	EPA AP-42 Table 1.4-1	NOx	100.00	0.10	0.01	0.06	na	0.01	0.06
			EPA AP-42 Table 1.4-1	CO	84.00	0.08	0.01	0.05	na	0.01	0.05
		<b>0.125</b> MMBtu/hr (LHV)	EPA AP-42 Table 1.4-2	VOC	5.50	0.01	7.5E-04	3.3E-03	na	7.5E-04	3.3E-03
			EPA AP-42 Table 1.4-2	SOx	0.60	5.9E-04	8.2E-05	3.6E-04	na	8.2E-05	3.6E-04
			EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	1.0E-03	4.6E-03	na	1.0E-03	4.6E-03
			EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	2.9E-07	1.3E-06	na	2.9E-07	1.3E-06
		<b>0.140</b> MMBtu/hr (HHV)	EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	---	---
			EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	1.0E-05	4.5E-05	na	1.0E-05	4.5E-05
			EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	2.5E-04	1.1E-03	na	2.5E-04	1.1E-03
			EPA AP-42 Table 1.4-3	Methanol	---	---	---	---	---	---	---
		<b>8,760</b> hr/yr	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	4.7E-07	2.0E-06	na	4.7E-07	2.0E-06
			EPA AP-42 Table 1.4-3	2,2,4-TMP	---	---	---	---	---	---	---
			EPA AP-42 Table 1.4-3	Xylenes	---	---	---	---	---	---	---
			EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.9E-06	2.6E-07	1.1E-06	na	2.6E-07	1.1E-06
			EPA AP-42 Table 1.4-3	Tot HAP	1.88	1.8E-03	2.6E-04	1.1E-03	na	2.6E-04	1.1E-03
			40CFR98 - Table C-1	CO2	119,226	117	16	72	na	16	72
			40CFR98 - Table C-2	CH4	2.25	2.2E-03	3.1E-04	1.4E-03	na	3.1E-04	1.4E-03
			40CFR98 - Table C-2	N2O	0.22	2.2E-04	3.1E-05	1.4E-04	na	3.1E-05	1.4E-04
			40CFR98 - Table A-1	CO2e	119,349	117	16	72	na	16	72

- Notes:
- 1 - The combustion emission factors are based on a default fuel heat content of 1,020 Btu/scf (HHV).
  - 2 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
  - 3 - HCHO is formaldehyde.
  - 4 - Other HAP includes Acetaldehyde, Acrolein, 1,3-Butadiene, Chloride Methylene Chloride, and traces of other HAP.

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**Dehydrator - 2.0 MMscfd Capacity**

Unit ID	Description	Capacity	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
					lb/MMscf	lb/MMBtu	lb/hr	tpy		lb/hr	tpy
RSV-1 (3E)	Dehy 01 (RSV-1)  (Minimum of 50% of Flash Tank Off-Gas is Used as Reboiler Fuel)	Flow Rate <b>2.0</b> MMscfd  <b>8,760</b> hr/yr	GRI-GLYCalc 4.0	VOC	---	---	5.15	22.55	---	5.15	22.55
			GRI-GLYCalc 4.0	Benzene	---	---	0.10	0.44	---	0.10	0.44
			GRI-GLYCalc 4.0	Ethylbenzene	---	---	0.05	0.20	---	0.05	0.20
			GRI-GLYCalc 4.0	HCHO	---	---	---	---	---	---	---
			GRI-GLYCalc 4.0	n-Hexane	---	---	0.14	0.61	---	0.14	0.61
			GRI-GLYCalc 4.0	Methanol	---	---	---	---	---	---	---
			GRI-GLYCalc 4.0	Toluene	---	---	0.19	0.82	---	0.19	0.82
			GRI-GLYCalc 4.0	2,2,4-TMP	---	---	0.00	0.02	---	0.00	0.02
			GRI-GLYCalc 4.0	Xylenes	---	---	0.06	0.26	---	0.06	0.26
			GRI-GLYCalc 4.0	Other HAP	---	---	---	---	---	---	---
			GRI-GLYCalc 4.0	Tot HAP	---	---	0.54	2.34	---	0.54	2.34
			GRI-GLYCalc 4.0	CH4	---	---	6	28	---	6	28
			40CFR98 - Table A-1	CO2e	---	---	160	700	---	160	700

Notes: 1 - Dehydrator flash tank off-gases are usually burned as fuel in the reboiler. However, to be conservative, it is estimated 50% of the flash tank is vented to atmosphere.

2 - To be conservative, and to account for potential future changes in gas quality, the following worst-case emissions were assumed:

2.0 MMscfd Dehydrator 01	GRI-GLYCalc 4.0* Model Results	Worst-Case Assumption (120%)	*Dehydrator Operating Parameters (See Attachment N)			
VOC	18.79 tpy	22.55 tpy	Flow Rate:	2.0 MMscfd	Gas Analysis:	06/25/14
Benzene	0.36 tpy	0.44 tpy	Wet Gas Temperature:	70 oF	Flash Tank Temperature:	120 oF
Ethylbenzene	0.17 tpy	0.20 tpy	Wet Gas Pressure:	1,000 psig	Flash Tank Pressure:	60 psig
HCHO	--- tpy	--- tpy	Wet Gas Water Content:	Saturated	Flash Tank Off-Gas Control:	50% Recycle
n-Hexane	0.51 tpy	0.61 tpy	Dry Gas Water Content:	7.0 lb H2O/MMscf	Stripping Gas:	na
Methanol	--- tpy	--- tpy	Lean Glycol Water Content:	1.5 wt% H2O	Stripping Gas:	na
Toluene	0.68 tpy	0.82 tpy	Glycol Pump:	Gas Injection	Regen Off-Gas Control:	na
2,2,4-TMP	0.02 tpy	0.02 tpy	Glycol Pump:	Kimray 4020PV	Condenser Temperature:	na
Xylenes	0.22 tpy	0.26 tpy	Lean Glycol Flow Rate:	0.67 gpm	Condenser Pressure:	na
Other HAP	--- tpy	--- tpy	<b>Additional Model Results:</b>			
Total HAP	1.95 tpy	2.34 tpy	Regen Off-Gas Flow:	50 scfh	Wet Gas Water Content:	23.7 lb-H2O/MMscf
CH4	23.33 tpy	27.99 tpy	Flash Tank Off-Gas Flow:	334 scfh	Lean Glycol Recirc Ratio:	21.1 gal/lb-H2O

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

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**Attachment N - Supporting Emissions Calculations****Produced Water Storage Tank**

Unit ID	Tank ID	Material Stored	Capacity		Turnovers per Year	Throughput		EPA-450/3-85-001a VOC Emission Factor (Working and Breathing Losses)	ProMax VOC Emission Factor (Flashing Losses)	VOC		n-Hex, BTEX, 2,2,4-TMP (ea) 2.50% of VOC		Total HAP	
			gal	bbl		gal/yr	bbl/yr			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
T01 (4E)	Tank 01	Produced Water	8,820	210	26	229,320	5,460	0.039 lb/bbl	0.042 lb/bbl	0.05	0.22	0.00	0.01	0.01	0.03

TOTAL VOLUME: **8,820 210 26 229,320 5,460**TOTAL EMISSIONS: **0.05 0.22 0.00 0.01 0.01 0.03**

Unit ID	Tank ID	Material Stored	Capacity		Turnovers per Year	Throughput		Methane Emission Factor (ProMax Model)	Methane	
			gal	bbl		gal/yr	bbl/yr		lb/hr	tpy
T01 (4E)	Tank 01	Produced Water	8,820	210	26	229,320	5,460	0.326 lb/bbl	0.20	0.89

TOTAL VOLUME: **8,820 210 26 229,320 5,460**TOTAL EMISSIONS: **0.20 0.89**

- 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 losses. EPA-450/3-85-001a, page 3-39, gives a VOC emission factor of 420 kg/MMgal wastewater produced in an oil-water separator.  $(0.420 \text{ g/gal} * 0.0022 \text{ lb/g} * 42 \text{ gal/bbl} = 0.039 \text{ lb/bbl})$
- 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)	0.000006	0.000049
n-Hexane	NA	0.000987

- 3 - Total HAP is estimated at 30.0% of VOC emissions. This is a very conservative estimate based on an investigation of other produced water emission estimating protocols, as exemplified above (e.g.,  $(0.0001+0.0003+0.000006+0.000006)/0.01 = 4.7\%$ ).
- 4 - The ProMax simulation software is used to estimate flashing losses from the produced water storage tank.
- 5 - To be conservative, the following liquid characteristics were assumed:

Pollutant	Light Liquid
	Estimated
Carbon Dioxide	--- Wgt%
Methane	--- Wgt%
VOC	100.00 Wgt%
Total HAP	15.00 Wgt%

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**Produced Water Truck Load-Out**

Unit ID	Description	S	P	MW	T	CE	L <sub>L</sub>	T-Put	VOC AP-42 Sect 5.2	n-Hex, BTEX, 2,2,4-TMP (ea) 2.50% of VOC	Total HAP 15.00% of VOC
		sat. fac.	psia	lb/lb-mol	°R	%	lb/kgal	kgal/yr	tpy	tpy	tpy
TLO (5E)	Truck Load-Out	1.45	1.5	92	520	0.0%	4.79	229	0.55	0.01	0.08

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

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

where:

L<sub>L</sub> = Loading loss, lb/1000 gal of liquid loaded.

S = Saturation factor, use 1.45 for "splash loading".

P = True vapor pressure of liquid loaded, psia.

MW = molecular weight of vapors, lb/lb-mol. (Assumed MW of toluene as it has similar RVP and density as anticipated liquids.)

T = Temperature of bulk liquid loaded, °R = °F + 460. (Conservatively assumed 60 °F.)

CE = Overall emission reduction efficiency (collection efficiency x control efficiency).

2 - It is estimated that the tank will be emptied up to:

**26**

times per year.

3 - The total produced water storage tank capacity at the facility is:

**210**

bbl.

4 - Emissions adjusted to account for the high-water/low-oil content in the produced water. Further, it is anticipated that the majority of VOC (and HAP) constituents will evaporate in the storage tanks and be de minimis or negligible in the truck load-out operations.

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**Startup, Shutdown and Maintenance (SSM)**

Unit ID	Description	No of Units	Total bhp	a. "Cold-Start" Gas		b. Blowdown Gas		Site-Wide SSM Events	Total Gas Vented
				scf/Unit	scf/SSM	scf/bhp	scf/SSM	SSM/yr	MMscf/yr
SSM (6E)	a. Cold-Start Engine	1	na	700	700	na	na	104	0.07
	b. Compressor Blowdown	1	203	na	na	6.22	1,262	104	0.13

Unit ID	CO2 250 lb/MMscf tpy	CH4 42,275 lb/MMscf tpy	CO2e 1,057,125 lb/MMscf tpy	VOC 15,000 lb/MMscf tpy	Benzene 20 lb/MMscf tpy	Ethylbenzene 20 lb/MMscf tpy	n-Hexane 500 lb/MMscf tpy	Toluene 20 lb/MMscf tpy	2,2,4-TMP 20 lb/MMscf tpy	Xylenes 20 lb/MMscf tpy	Total HAP 600 lb/MMscf tpy
SSM (6E)	0.01	2	38	0.55	7.3E-04	7.3E-04	0.02	7.3E-04	7.3E-04	7.3E-04	0.02
	0.02	3	69	0.98	1.3E-03	1.3E-03	0.03	1.3E-03	1.3E-03	1.3E-03	0.04

<b>TOTAL:</b>	<b>0.03</b>	<b>4</b>	<b>108</b>	<b>1.53</b>	<b>2.0E-03</b>	<b>2.0E-03</b>	<b>0.05</b>	<b>2.0E-03</b>	<b>2.0E-03</b>	<b>2.0E-03</b>	<b>0.06</b>
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Notes: 1 - SSM Emissions are the sum of:  
 a. Unburned fuel resulting from "cold-start" of idle gas-fired engine; and  
 b. Natural gas that is purged (aka blowdown) from the compressor and associated piping and equipment.

2 - Starting gas quantity and blowdown (B-D) gas quantity as per engineering department.  
 (e.g., 8,577 scf/B-D of a compressor with a 1,380 bhp engine equals 6.22 scf/bhp/B-D.)

3 - To be conservative, the following gas characteristics were assumed:

Pollutant	Analysis	Assumed
CO2	178 lb/MMscf	250 lb/MMscf
CH4	32,986 lb/MMscf	42,275 lb/MMscf
VOC	11,935 lb/MMscf	15,000 lb/MMscf
Benzene	5 lb/MMscf	20 lb/MMscf
E-benzene	1 lb/MMscf	20 lb/MMscf
n-Hexane	262 lb/MMscf	500 lb/MMscf
Toluene	7 lb/MMscf	20 lb/MMscf
2,2,4-TMP	10 lb/MMscf	20 lb/MMscf
Xylenes	1 lb/MMscf	20 lb/MMscf
Total HAP	286 lb/MMscf	600 lb/MMscf

4 - To be conservative, these SSM estimates are based on **2.0** facility-wide blowdowns each week.

5 - This estimate of SSM emissions is sufficient to account for other infrequent and (often) de-minimis emissions from various activities (e.g., pig launching) at the facility that are not necessarily associated with compressor blowdowns.

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**Attachment N - Supporting Emissions Calculations****Process Piping and Equipment Fugitives – Gas and Water/Oil**

Unit	Description	Component (Unit) Type	Unit Count	THC Factor	Tot Hydrocarbons (THC)		VOC 25.00 Wgt%		Hex,BTEX,TMP-ea 0.25 Wgt%		Total HAP 1.50 Wgt%		CO2 0.45 Wgt%		CH4 100.00 Wgt%		CO2e GWP = 25	
		(Gas)		lb/hr/Unit	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG-G (7E)	Process Piping and Equipment Fugitives (Gas)	Valves	257	0.00992	2.55	11.17	0.64	2.79	6.4E-03	0.03	0.04	0.17	0.01	0.05	2.55	11.17	64	279
		Pump Seals	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Other	30	0.01940	0.58	2.55	0.15	0.64	1.5E-03	0.01	0.01	0.04	2.6E-03	0.01	0.58	2.55	15	64
		Connectors	737	0.00044	0.32	1.42	0.08	0.36	8.1E-04	0.00	0.00	0.02	1.5E-03	0.01	0.32	1.42	8	36
		Flanges	120	0.00086	0.10	0.45	0.03	0.11	2.6E-04	1.1E-03	1.5E-03	0.01	4.6E-04	2.0E-03	0.10	0.45	3	11
		Open-ended lines	14	0.00441	0.06	0.27	0.02	0.07	1.5E-04	6.8E-04	9.3E-04	0.00	2.8E-04	0.00	0.06	0.27	2	7
Total:			1,158		3.62	15.86	0.91	3.97	0.01	0.04	0.05	0.24	0.02	0.07	3.62	15.86	91	397

Unit	Description	Component (Unit) Type	Unit Count	THC Factor	Tot Hydrocarbons (THC)		VOC 100.00 Wgt%		Hex,BTEX,TMP(ea) 2.50 Wgt%		Total HAP 15.00 Wgt%		CO2 --- Wgt%		CH4 --- Wgt%		CO2e GWP = 25	
		(Light Liquid)		lb/hr/Unit	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG-W (7E)	Process Piping and Equipment Fugitives (Water/Oil)	Valves	150	0.00022	0.03	0.14	0.03	0.14	8.1E-04	3.5E-03	4.9E-03	0.02	---	---	---	---	---	---
		Pump Seals	5	0.00005	2.6E-04	1.2E-03	2.6E-04	1.2E-03	6.6E-06	2.9E-05	4.0E-05	1.7E-04	---	---	---	---	---	---
		Other	15	0.03086	0.46	2.03	0.46	2.03	0.01	0.05	0.07	0.30	---	---	---	---	---	---
		Connectors	369	0.00024	0.09	0.39	0.09	0.39	2.2E-03	0.01	0.01	0.06	---	---	---	---	---	---
		Flanges	120	0.00001	7.7E-04	3.4E-03	7.7E-04	3.4E-03	1.9E-05	8.4E-05	1.2E-04	5.0E-04	---	---	---	---	---	---
		Open-ended lines	7	0.00055	3.9E-03	0.02	3.9E-03	0.02	9.6E-05	4.2E-04	5.8E-04	2.5E-03	---	---	---	---	---	---
		Total:	666		0.59	2.58	0.59	2.58	0.01	0.06	0.09	0.39	---	---	---	---	---	---

<b>TOTAL FUGITIVE EMISSIONS:</b>	<b>4.21</b>	<b>18.44</b>	<b>1.50</b>	<b>6.55</b>	<b>0.02</b>	<b>0.10</b>	<b>0.14</b>	<b>0.63</b>	<b>0.02</b>	<b>0.07</b>	<b>3.62</b>	<b>15.86</b>	<b>91</b>	<b>397</b>
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Notes: 1 - Assumed 8,760 hours per year of fugitive emissions.

2 - Component in Gas Service are based on GRI-HAPCalc estimates

3 - Water/Oil Component counts are estimated at **50%** of Gas Components, except valves and flanges which are estimated at 150 and 120, respectively.

4 - Gas and Water/Oil emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995.

TABLE 2.4 O&G PROD (AVE)	Gas		Water/Oil	
	kg/hr	lb/hr	kg/hr	lb/hr
Valves	0.00450	0.00992	9.80E-05	0.00022
Pump Seals	na	na	2.40E-05	0.00005
Others	0.00880	0.01940	1.40E-02	0.03086
Connectors	0.00020	0.00044	1.10E-04	0.00024
Flanges	0.00039	0.00086	2.90E-06	0.00001
Open-Ended Lines	0.00200	0.00441	2.50E-04	0.00055

5 - "Other" components include compressor seals, relief valves, diaphragms, drains, meters, etc.

5 - To be conservative, the following gas and water/oil characteristics were assumed:

Pollutant	Gas (Inlet)		Water/Oil
	Analysis	Estimated	Estimated
Carbon Dioxide	0.32 Wgt%	0.45 Wgt%	--- Wgt%
Methane	59.11 Wgt%	100.00 Wgt%	--- Wgt%
VOC	21.39 Wgt%	25.00 Wgt%	100.00 Wgt%
n-Hex, BTEXm TMP (ea)	varies	0.25 Wgt%	2.50 Wgt%
Total HAP	0.51 Wgt%	1.50 Wgt%	15.00 Wgt%

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**Attachment N - Supporting Emissions Calculations**

**Compressor Rod Packing Leaks and Engine Crankcase Leaks (RPC)**

**Compressor Rod Packing Leaks (Natural Gas)**

Unit Description	No. of Recip Compressors	Cyl per Recip Compressor	scfh per Cylinder	Contingency	Total Leak Rate	VOC		HCHO		Hex, BTEX, TMP-Ea		Total HAP		CO2		CH4		CO2e	
						15,000		---		Fa		600		250		42,275		CH4 GWP = 25	
						lb/MMscf		lb/MMscf		lb/MMscf		lb/MMscf		lb/MMscf		lb/MMscf		lb/MMscf	
					MMscf/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Compressor Rod Packing	1	4.0	15	15%	0.60	---	---	---	---	---	---	---	---	---	---	2.92	12.78	73	319

**Engine Crankcase Emissions (Combustion Gas)**

Unit Description	CE-01 Horsepower	Leak Rate 0.50 scf/bhp-hr	Safety Factor	VOC 8.06 lb/MMscf	HCHO 5.45 lb/MMscf	Hex, BTEX, TMP-Ea 1.08 lb/MMscf	Total HAP 6.50 lb/MMscf	CO2 11,135 lb/MMscf	CH4 22 lb/MMscf	CO2e CH4 GWP = 25 lb/MMscf
	(bhp)	MMscf/yr		lb/hr tpy	lb/hr tpy	lb/hr tpy	lb/hr tpy	lb/hr tpy	lb/hr tpy	lb/hr tpy
Engine Crankcase	203	0.89	250%	8.2E-04 3.6E-03	5.5E-04 2.4E-03	1.1E-04 4.8E-04	6.6E-04 2.9E-03	1 5	2.3E-03 0.01	1 5

**Total Plant-Wide RPC Emissions:**

8.2E-04	3.6E-03	5.5E-04	2.4E-03	1.1E-04	4.8E-04	6.6E-04	2.9E-03	1	5	3	13	74	325
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**Notes:**

1 - Misc. equipment leaks is a broad category covering leaks of natural gas from sealed surfaces, such as packing and gaskets, resulting from the wear of mechanical joints, seals, and rotating surfaces over time. It also includes the crankcase emissions from reciprocating engines.

2 - To be conservative, and to account for potential future changes, the following "worst-case" Residue gas characteristics were assumed:

Pollutant	Representative Gas Analysis	Worst-Case Assumption
VOC	11,935 lb/MMscf	15,000 lb/MMscf
Total HAP	286 lb/MMscf	600 lb/MMscf
CH4	32,986 lb/MMscf	42,275 lb/MMscf
CO2	178 lb/MMscf	250 lb/MMscf

3 - Estimates of Recip Compressor Leaks are based on vendor data w/ an appropriate contingency.

4 - Engine crankcase emissions are based on vendor data: "As a general rule, blow-by (i.e., crankcase emissions) on a new engine is approximately 0.5 scf/bhp-hr." A "safety factor" is used to account for increasing blow-by as the engines "wear".

5 - Crankcase emissions, from compressor engine (CE-01 (1E)), are estimated as follows:

(Data from CAT G3306TA Data Sheet and Emissions Calculation Spreadsheet.)

Tot Engine Exhaust (TEEx) (Vol) 988 acf/min 180 MMscf/yr TEEx\*

Pollutant	GE-01 PTE	Crankcase Emission Factor**
Crankcase THC emissions (Mass)	2.35 tpy THC	26.15 lb THC / MMscf TEEx
Crankcase VOC emissions (Mass)	0.73 tpy VOC	8.06 lb VOC / MMscf TEEx
Crankcase HCHO emissions (Mass)	0.49 tpy HCHO	5.45 lb HCHO / MMscf TEEx
Crankcase BTEX (ea) emissions (Mass)	0.02 tpy BTEX	0.17 lb BTEX / MMscf TEEx
Crankcase HAP (tot) emissions (Mass)	0.58 tpy HAP	6.50 lb HAP / MMscf TEEx
Crankcase CO2 emissions (Mass)	1,002 tpy CO2	11,135 lb CO2 / MMscf TEEx
Crankcase CH4 emissions (Mass)	2 tpy CH4	22 lb CH4 / MMscf TEEx
Crankcase N2O emissions (Mass)	1.8E-03 tpy N2O	0 lb CH4 / MMscf TEEx
Crankcase CO2e emissions (Mass)	1,052 tpy CO2e	11,697 lb CO2e / MMscf TEEx

\* Conversion from acf/min to scf/yr based on 8,760 hr/yr, 1,064 oF exhaust temp, and 68 oF std temp.

\*\* Crankcase EmFact = PTE (tpy) from a G3306TA Engine ÷ Tot Engine Exhaust (TEEx) (MMscf/yr).

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	3.20E-01	1.30E-01	9.90E-02
	CO (≥ 90% Load)	3.86E-01	3.17E-01	3.72E+00	8.20E-02	3.00E-02	1.50E-02
	THC (TOC)	1.64E+00	1.47E+00	3.58E-01	1.10E-02	1.10E-02	1.10E-02
	NMHC (THC-CH4)	1.90E-01	2.20E-01	1.28E-01	2.40E-03	2.40E-03	2.40E-03
	NMNEHC (NMHC-C2H6)	1.19E-01	1.15E-01	5.76E-02	2.10E-03	2.10E-03	2.10E-03
	VOC	1.20E-01	1.18E-01	2.96E-02	2.10E-03	2.10E-03	2.10E-03
	SO2*** (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04
	PM10/2.5 (Filter+Cond)	4.83E-02	9.99E-03	1.94E-02	6.60E-03	6.60E-03	6.60E-03
HAPs	Benzene	1.94E-03	4.40E-04	1.58E-03	1.20E-05	1.20E-05	9.10E-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	2.48E-03	2.50E-03	3.06E-03	---	---	---
	Toluene	9.63E-04	4.08E-04	5.58E-04	1.30E-04	1.30E-04	1.30E-04
	TMP, 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
GHG	Other HAPs	1.72E-02	1.44E-02	6.36E-03	1.06E-04	1.06E-04	1.06E-04
	CO2**** (GWP=1)	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02
	CH4 (GWP=25)	1.45E+00	1.25E+00	2.30E-01	8.60E-03	8.60E-03	8.60E-03
	N2O (GWP=298)	2.20E-04	2.20E-04	2.20E-04	3.00E-03	3.00E-03	3.00E-03
GHG	CO2e	1.53E+02	1.48E+02	1.23E+02	1.18E+02	1.18E+02	1.18E+02

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

Pollutant		GAS-FIRED EXTERNAL COMBUSTION			FLARES	DIESEL ENGINES
		AP-42 Table 1.4-1; 1.4-2; 1.4-3 (<100 MMBtu/hr) 07/98			13.5-1 01/95	3.3-1; 3.3-2 10/96
		Uncontrolled lb/MMBtu	LoNOX Burners lb/MMBtu	Flue Gas Recirc lb/MMBtu	(Combustion) lb/MMBtu	Uncontrolled lb/MMBtu
CRITERIA	NOX	9.80E-02	4.90E-02	3.14E-02	6.80E-02	4.41E+00
	CO	8.24E-02	8.24E-02	8.24E-02	3.70E-01	9.50E-01
	THC (TOC)	1.08E-02	1.08E-02	1.08E-02	1.40E-01	3.60E-01
	NMHC (THC-CH4)	8.53E-03	8.53E-03	8.53E-03	1.38E-01	3.53E-01
	NMNEHC (NMHC-C2H6)	5.49E-03	5.49E-03	5.49E-03	5.49E-03	3.50E-01
	VOC	5.56E-03	5.56E-03	5.56E-03	5.56E-03	3.60E-01
	SO2 (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	5.88E-04	2.90E-01
	PM10/2.5 (Filter+Condense)	7.45E-03	7.45E-03	7.45E-03	7.45E-03	3.10E-01
HAPs	Benzene	2.06E-06	2.06E-06	2.06E-06	2.06E-06	9.33E-04
	Ethylbenzene	---	---	---	---	---
	HCHO (Formaldehyde)	7.35E-05	7.35E-05	7.35E-05	7.35E-05	1.18E-03
	n-Hexane	1.76E-03	1.76E-03	1.76E-03	1.76E-03	---
	Methanol	---	---	---	---	---
	Toluene	3.33E-06	3.33E-06	3.33E-06	3.33E-06	4.09E-04
	2,2,4-TMP (i-Octane)	---	---	---	---	---
	Xylenes	---	---	---	---	2.85E-04
GHG	Other HAPs	1.86E-06	1.86E-06	1.86E-06	1.86E-06	1.05E-03
	CO2 (GWP=1)	1.18E+02	1.18E+02	1.18E+02	1.18E+02	1.64E+02
	CH4 (GWP=25)	2.25E-03	2.25E-03	2.25E-03	2.25E-03	6.61E-03
	N2O (GWP=298)	2.16E-03	6.27E-04	6.27E-04	2.16E-03	1.32E-03
	CO2e	1.18E+02	1.18E+02	1.18E+02	1.18E+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	
	Default HHV	Carbon Dioxide lb CO2/MMBtu	Methane lb CH4/MMBtu	Nitrous Oxide lb N2O/MMBtu
Fuel Oil No. 2 (Diesel)	0.138 MMBtu/gal	1.61E+02	6.61E-03	1.32E-03
Natural Gas	1,026 Btu/scf	1.17E+02	2.20E-03	2.20E-04

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

#Revised by EPA on 11/29/13

**Conversion Factors**

<http://www.onlineconversion.com/>

1.0 lb	=	453.592 g
1.0 kg	=	2.205 lb
1.0 hp	=	2,544.433 Btu/hr
1.0 hp	=	745.700 Watt
1.0 kW	=	3,412.142 Btu/hr
1.0 kW-hr	=	1.340 hp-hr
1.0 cf	=	7.481 gal
1.0 gal H2O	=	8.338 gal
1.0 cf H2O	=	62.371 gal
1.0 m	=	3.281 gal
1.0 km	=	0.621 gal
1.0 acre	=	43560.174 gal
1.0 °F	=	(°C*9/5)+32
1.0 °R	=	°F+459.67
1.0 %	=	10,000 ppm
UGC (stp)	=	379.48 scf/lb-mol

\*Converted Ext Comb Emission Factors to lb/MMBtu by dividing lb/MMscf by AP-42 default HHV of 1,020 Btu/scf.

\*\*Converted GHG Emission Factors to lb/MMBtu by multiplying kg/MMBtu by 2.2046 lb/kg.

\*\*\*Assumes 100% conversion of fuel sulfur to SO2 (2,000 gr/MMscf).

\*\*\*\*Assumes 99.5% conversion of fuel carbon to CO2 for natural gas.



Case Name: Yoho CS - 2 MMscfd TEG Dehydrator

File Name: C:\projects2\wfs\OVM\Yoho\R13 Application #2\00 - Att-Nb - Yoho - NSR - GRIGLYCalc - 05.15.15.ddf

Date: May 15, 2015

## UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0800	1.920	0.3504
Ethane	0.1101	2.643	0.4823
Propane	0.1399	3.358	0.6128
Isobutane	0.0360	0.863	0.1575
n-Butane	0.1215	2.915	0.5321
Isopentane	0.0394	0.946	0.1726
n-Pentane	0.0628	1.508	0.2751
n-Hexane	0.0467	1.122	0.2047
Cyclohexane	0.0390	0.936	0.1709
Heptanes	0.0281	0.674	0.1231
2,2,4-Trimethylpentane	0.0015	0.036	0.0065
Benzene	0.0790	1.895	0.3459
Toluene	0.1515	3.636	0.6636
Ethylbenzene	0.0376	0.903	0.1647
Xylenes	0.0485	1.165	0.2126
C8+ Heavies	1.0993	26.383	4.8149
Total Emissions	2.1209	50.903	9.2897
Total Hydrocarbon Emissions	2.1209	50.903	9.2897
Total VOC Emissions	1.9308	46.340	8.4570
Total HAP Emissions	0.3648	8.756	1.5980
Total BTEX Emissions	0.3166	7.599	1.3868

## FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	5.2456	125.894	22.9757
Ethane	1.9263	46.231	8.4372
Propane	1.1801	28.322	5.1688
Isobutane	0.1946	4.669	0.8522
n-Butane	0.4971	11.931	2.1774
Isopentane	0.1384	3.321	0.6060
n-Pentane	0.1746	4.192	0.7650
n-Hexane	0.0692	1.662	0.3033
Cyclohexane	0.0139	0.334	0.0610
Heptanes	0.0194	0.466	0.0850
2,2,4-Trimethylpentane	0.0021	0.050	0.0091
Benzene	0.0040	0.096	0.0175
Toluene	0.0047	0.114	0.0208
Ethylbenzene	0.0007	0.016	0.0029
Xylenes	0.0006	0.014	0.0026
C8+ Heavies	0.0607	1.456	0.2658
Total Emissions	9.5320	228.768	41.7501
Total Hydrocarbon Emissions	9.5320	228.768	41.7501
Total VOC Emissions	2.3601	56.642	10.3372

			Page: 2
Total HAP Emissions	0.0813	1.951	0.3561
Total BTEX Emissions	0.0100	0.239	0.0437

#### FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	10.4912	251.788	45.9513
Ethane	3.8526	92.463	16.8745
Propane	2.3602	56.644	10.3376
Isobutane	0.3891	9.339	1.7043
n-Butane	0.9943	23.862	4.3549
Isopentane	0.2767	6.641	1.2120
n-Pentane	0.3493	8.383	1.5299
n-Hexane	0.1385	3.324	0.6066
Cyclohexane	0.0279	0.669	0.1220
Heptanes	0.0388	0.931	0.1699
2,2,4-Trimethylpentane	0.0041	0.099	0.0181
Benzene	0.0080	0.192	0.0350
Toluene	0.0095	0.227	0.0415
Ethylbenzene	0.0013	0.031	0.0057
Xylenes	0.0012	0.028	0.0052
C8+ Heavies	0.1214	2.913	0.5316
Total Emissions	19.0640	457.535	83.5002
Total Hydrocarbon Emissions	19.0640	457.535	83.5002
Total VOC Emissions	4.7202	113.284	20.6744
Total HAP Emissions	0.1626	3.902	0.7121
Total BTEX Emissions	0.0200	0.479	0.0874

#### COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	5.3256	127.814	23.3261
Ethane	2.0364	48.874	8.9195
Propane	1.3200	31.680	5.7816
Isobutane	0.2305	5.533	1.0097
n-Butane	0.6186	14.847	2.7095
Isopentane	0.1778	4.267	0.7786
n-Pentane	0.2375	5.699	1.0401
n-Hexane	0.1160	2.784	0.5080
Cyclohexane	0.0529	1.271	0.2319
Heptanes	0.0475	1.140	0.2080
2,2,4-Trimethylpentane	0.0036	0.085	0.0156
Benzene	0.0830	1.991	0.3634
Toluene	0.1563	3.750	0.6844
Ethylbenzene	0.0383	0.918	0.1676
Xylenes	0.0491	1.179	0.2151
C8+ Heavies	1.1600	27.840	5.0807
Total Emissions	11.6529	279.670	51.0398
Total Hydrocarbon Emissions	11.6529	279.670	51.0398
Total VOC Emissions	4.2909	102.982	18.7942
Total HAP Emissions	0.4461	10.707	1.9541
Total BTEX Emissions	0.3266	7.838	1.4305

Case Name: Yoho CS - 2 MMscfd TEG Dehydrator  
File Name: C:\projects2\wfs\OVM\Yoho\R13 Application #2\00 - Att-Nb - Yoho - NSR -  
GRIGLYCalc - 05.15.15.ddf  
Date: May 15, 2015

## DESCRIPTION:

Description: Wet Gas: 70 oF, 1,000 psig  
Pump: Gas Injection, 0.67 gpm  
Flash Tank: 120oF, 60 psig, 50% Recycle

Annual Hours of Operation: 8760.0 hours/yr

## WET GAS:

Temperature: 70.00 deg. F  
Pressure: 1000.00 psig  
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1537
Nitrogen	0.4580
Methane	78.0288
Ethane	13.0780
Propane	5.1090
Isobutane	0.6003
n-Butane	1.4055
Isopentane	0.3321
n-Pentane	0.3827
n-Hexane	0.1154
Cyclohexane	0.0130
Heptanes	0.0252
2,2,4-Trimethylpentane	0.0033
Benzene	0.0022
Toluene	0.0027
Ethylbenzene	0.0005
Xylenes	0.0005
C8+ Heavies	0.2880

## DRY GAS:

Flow Rate: 2.0 MMSCF/day  
Water Content: 7.0 lbs. H2O/MMSCF

## LEAN GLYCOL:

Glycol Type: TEG  
Water Content: 1.5 wt% H2O  
Flow Rate: 0.7 gpm

## PUMP:

Glycol Pump Type: Gas Injection  
Gas Injection Pump Volume Ratio: 0.080 acfm gas/gpm glycol

FLASH TANK:

---

Flash Control: Combustion device  
Flash Control Efficiency: 50.00 %  
Temperature: 120.0 deg. F  
Pressure: 60.0 psig

>50% Recycle

Case Name: Yoho CS - 2 MMscfd TEG Dehydrator

File Name: C:\projects2\wfs\OVM\Yoho\R13 Application #2\00 - Att-Nb - Yoho - NSR - GRIGLYCalc - 05.15.15.ddf

Date: May 15, 2015

## DESCRIPTION:

Description: Wet Gas: 70 oF, 1,000 psig  
 Pump: Gas Injection, 0.67 gpm  
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Annual Hours of Operation: 8760.0 hours/yr

## EMISSIONS REPORTS:

## UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0800	1.920	0.3504
Ethane	0.1101	2.643	0.4823
Propane	0.1399	3.358	0.6128
Isobutane	0.0360	0.863	0.1575
n-Butane	0.1215	2.915	0.5321
Isopentane	0.0394	0.946	0.1726
n-Pentane	0.0628	1.508	0.2751
n-Hexane	0.0467	1.122	0.2047
Cyclohexane	0.0390	0.936	0.1709
Heptanes	0.0281	0.674	0.1231
2,2,4-Trimethylpentane	0.0015	0.036	0.0065
Benzene	0.0790	1.895	0.3459
Toluene	0.1515	3.636	0.6636
Ethylbenzene	0.0376	0.903	0.1647
Xylenes	0.0485	1.165	0.2126
C8+ Heavies	1.0993	26.383	4.8149
Total Emissions	2.1209	50.903	9.2897
Total Hydrocarbon Emissions	2.1209	50.903	9.2897
Total VOC Emissions	1.9308	46.340	8.4570
Total HAP Emissions	0.3648	8.756	1.5980
Total BTEX Emissions	0.3166	7.599	1.3868

## FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	5.2456	125.894	22.9757
Ethane	1.9263	46.231	8.4372
Propane	1.1801	28.322	5.1688
Isobutane	0.1946	4.669	0.8522
n-Butane	0.4971	11.931	2.1774
Isopentane	0.1384	3.321	0.6060
n-Pentane	0.1746	4.192	0.7650
n-Hexane	0.0692	1.662	0.3033
Cyclohexane	0.0139	0.334	0.0610
Heptanes	0.0194	0.466	0.0850

2,2,4-Trimethylpentane	0.0021	0.050	0.0091
Benzene	0.0040	0.096	0.0175
Toluene	0.0047	0.114	0.0208
Ethylbenzene	0.0007	0.016	0.0029
Xylenes	0.0006	0.014	0.0026
C8+ Heavies	0.0607	1.456	0.2658
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Total Emissions	9.5320	228.768	41.7501
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Total Hydrocarbon Emissions	9.5320	228.768	41.7501
Total VOC Emissions	2.3601	56.642	10.3372
Total HAP Emissions	0.0813	1.951	0.3561
Total BTEX Emissions	0.0100	0.239	0.0437

## FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	10.4912	251.788	45.9513
Ethane	3.8526	92.463	16.8745
Propane	2.3602	56.644	10.3376
Isobutane	0.3891	9.339	1.7043
n-Butane	0.9943	23.862	4.3549
Isopentane	0.2767	6.641	1.2120
n-Pentane	0.3493	8.383	1.5299
n-Hexane	0.1385	3.324	0.6066
Cyclohexane	0.0279	0.669	0.1220
Heptanes	0.0388	0.931	0.1699
2,2,4-Trimethylpentane	0.0041	0.099	0.0181
Benzene	0.0080	0.192	0.0350
Toluene	0.0095	0.227	0.0415
Ethylbenzene	0.0013	0.031	0.0057
Xylenes	0.0012	0.028	0.0052
C8+ Heavies	0.1214	2.913	0.5316
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Total Emissions	19.0640	457.535	83.5002
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Total Hydrocarbon Emissions	19.0640	457.535	83.5002
Total VOC Emissions	4.7202	113.284	20.6744
Total HAP Emissions	0.1626	3.902	0.7121
Total BTEX Emissions	0.0200	0.479	0.0874

## COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	5.3256	127.814	23.3261
Ethane	2.0364	48.874	8.9195
Propane	1.3200	31.680	5.7816
Isobutane	0.2305	5.533	1.0097
n-Butane	0.6186	14.847	2.7095
Isopentane	0.1778	4.267	0.7786
n-Pentane	0.2375	5.699	1.0401
n-Hexane	0.1160	2.784	0.5080
Cyclohexane	0.0529	1.271	0.2319
Heptanes	0.0475	1.140	0.2080
2,2,4-Trimethylpentane	0.0036	0.085	0.0156
Benzene	0.0830	1.991	0.3634
Toluene	0.1563	3.750	0.6844

Ethylbenzene	0.0383	0.918	0.1676
Xylenes	0.0491	1.179	0.2151
C8+ Heavies	1.1600	27.840	5.0807
<hr/>			
Total Emissions	11.6529	279.670	51.0398
Total Hydrocarbon Emissions	11.6529	279.670	51.0398
Total VOC Emissions	4.2909	102.982	18.7942
Total HAP Emissions	0.4461	10.707	1.9541
Total BTEX Emissions	0.3266	7.838	1.4305

## COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
<hr/>			
Methane	46.3017	23.3261	49.62
Ethane	17.3568	8.9195	48.61
Propane	10.9504	5.7816	47.20
Isobutane	1.8619	1.0097	45.77
n-Butane	4.8870	2.7095	44.56
Isopentane	1.3847	0.7786	43.77
n-Pentane	1.8050	1.0401	42.38
n-Hexane	0.8113	0.5080	37.38
Cyclohexane	0.2929	0.2319	20.83
Heptanes	0.2930	0.2080	29.00
2,2,4-Trimethylpentane	0.0246	0.0156	36.81
Benzene	0.3808	0.3634	4.59
Toluene	0.7051	0.6844	2.94
Ethylbenzene	0.1705	0.1676	1.69
Xylenes	0.2177	0.2151	1.19
C8+ Heavies	5.3465	5.0807	4.97
<hr/>			
Total Emissions	92.7899	51.0398	44.99
Total Hydrocarbon Emissions	92.7899	51.0398	44.99
Total VOC Emissions	29.1314	18.7942	35.48
Total HAP Emissions	2.3101	1.9541	15.41
Total BTEX Emissions	1.4742	1.4305	2.96

## EQUIPMENT REPORTS:

## ABSORBER

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

Calculated Absorber Stages: 1.25  
Calculated Dry Gas Dew Point: 0.80 lbs. H2O/MMSCF

Temperature: 70.0 deg. F  
Pressure: 1000.0 psig  
Dry Gas Flow Rate: 2.0000 MMSCF/day

Glycol Losses with Dry Gas: 0.0202 lb/hr  
 Wet Gas Water Content: Saturated  
 Calculated Wet Gas Water Content: 23.65 lbs. H<sub>2</sub>O/MMSCF  
 Calculated Lean Glycol Recirc. Ratio: 21.10 gal/lb H<sub>2</sub>O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.37%	96.63%
Carbon Dioxide	99.41%	0.59%
Nitrogen	99.95%	0.05%
Methane	99.96%	0.04%
Ethane	99.89%	0.11%
Propane	99.84%	0.16%
Isobutane	99.79%	0.21%
n-Butane	99.72%	0.28%
Isopentane	99.74%	0.26%
n-Pentane	99.67%	0.33%
n-Hexane	99.50%	0.50%
Cyclohexane	97.56%	2.44%
Heptanes	99.14%	0.86%
2,2,4-Trimethylpentane	99.67%	0.33%
Benzene	77.32%	22.68%
Toluene	70.90%	29.10%
Ethylbenzene	66.99%	33.01%
Xylenes	57.73%	42.27%
C8+ Heavies	99.21%	0.79%

## FLASH TANK

Flash Control: Combustion device  
 Flash Control Efficiency: 50.00 %  
 Flash Temperature: 120.0 deg. F  
 Flash Pressure: 60.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.78%	0.22%
Carbon Dioxide	8.61%	91.39%
Nitrogen	0.74%	99.26%
Methane	0.76%	99.24%
Ethane	2.78%	97.22%
Propane	5.60%	94.40%
Isobutane	8.46%	91.54%
n-Butane	10.89%	89.11%
Isopentane	12.65%	87.35%
n-Pentane	15.45%	84.55%
n-Hexane	25.46%	74.54%
Cyclohexane	59.52%	40.48%
Heptanes	42.21%	57.79%
2,2,4-Trimethylpentane	26.93%	73.07%
Benzene	91.27%	8.73%
Toluene	94.57%	5.43%
Ethylbenzene	96.98%	3.02%
Xylenes	97.93%	2.07%
C8+ Heavies	90.92%	9.08%

## REGENERATOR



No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	74.88%	25.12%
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	1.68%	98.32%
n-Pentane	1.59%	98.41%
n-Hexane	1.17%	98.83%
Cyclohexane	4.73%	95.27%
Heptanes	0.85%	99.15%
2,2,4-Trimethylpentane	2.76%	97.24%
Benzene	5.40%	94.60%
Toluene	8.26%	91.74%
Ethylbenzene	10.63%	89.37%
Xylenes	13.09%	86.91%
C8+ Heavies	9.52%	90.48%

#### STREAM REPORTS:

#### WET GAS STREAM

Temperature: 70.00 deg. F  
 Pressure: 1014.70 psia  
 Flow Rate: 8.34e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.98e-002	1.97e+000
Carbon Dioxide	1.54e-001	1.49e+001
Nitrogen	4.58e-001	2.82e+001
Methane	7.80e+001	2.75e+003
Ethane	1.31e+001	8.64e+002
Propane	5.11e+000	4.95e+002
Isobutane	6.00e-001	7.67e+001
n-Butane	1.40e+000	1.80e+002
Isopentane	3.32e-001	5.27e+001
n-Pentane	3.83e-001	6.07e+001
n-Hexane	1.15e-001	2.19e+001
Cyclohexane	1.30e-002	2.40e+000
Heptanes	2.52e-002	5.55e+000
2,2,4-Trimethylpentane	3.30e-003	8.28e-001
Benzene	2.20e-003	3.78e-001
Toluene	2.70e-003	5.47e-001
Ethylbenzene	5.00e-004	1.17e-001
Xylenes	5.00e-004	1.17e-001
C8+ Heavies	2.88e-001	1.08e+002

Total Components 100.00 4.66e+003

# DRY GAS STREAM

Temperature: 70.00 deg. F  
 Pressure: 1014.70 psia  
 Flow Rate: 8.33e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.68e-003	6.66e-002
Carbon Dioxide	1.53e-001	1.48e+001
Nitrogen	4.58e-001	2.82e+001
Methane	7.81e+001	2.75e+003
Ethane	1.31e+001	8.63e+002
Propane	5.10e+000	4.94e+002
Isobutane	5.99e-001	7.65e+001
n-Butane	1.40e+000	1.79e+002
Isopentane	3.31e-001	5.25e+001
n-Pentane	3.82e-001	6.05e+001
n-Hexane	1.15e-001	2.17e+001
Cyclohexane	1.27e-002	2.35e+000
Heptanes	2.50e-002	5.50e+000
2,2,4-Trimethylpentane	3.29e-003	8.26e-001
Benzene	1.70e-003	2.92e-001
Toluene	1.92e-003	3.88e-001
Ethylbenzene	3.35e-004	7.82e-002
Xylenes	2.89e-004	6.74e-002
C8+ Heavies	2.86e-001	1.07e+002
Total Components	100.00	4.66e+003

# LEAN GLYCOL STREAM

Temperature: 70.00 deg. F  
 Flow Rate: 6.70e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	3.71e+002
Water	1.50e+000	5.66e+000
Carbon Dioxide	2.32e-012	8.74e-012
Nitrogen	3.59e-013	1.35e-012
Methane	9.56e-018	3.60e-017
Ethane	1.22e-007	4.62e-007
Propane	8.53e-009	3.22e-008
Isobutane	1.28e-009	4.81e-009
n-Butane	3.26e-009	1.23e-008
Isopentane	1.79e-004	6.75e-004
n-Pentane	2.70e-004	1.02e-003
n-Hexane	1.46e-004	5.51e-004
Cyclohexane	5.13e-004	1.94e-003
Heptanes	6.36e-005	2.40e-004
2,2,4-Trimethylpentane	1.12e-005	4.21e-005
Benzene	1.20e-003	4.51e-003
Toluene	3.62e-003	1.36e-002
Ethylbenzene	1.19e-003	4.47e-003
Xylenes	1.94e-003	7.31e-003

C8+ Heavies	3.07e-002	1.16e-001
-----		
Total Components	100.00	3.77e+002

# RICH GLYCOL AND PUMP GAS STREAM

Temperature: 70.00 deg. F  
 Pressure: 1014.70 psia  
 Flow Rate: 7.21e-001 gpm  
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
-----		
TEG	9.27e+001	3.71e+002
Water	1.89e+000	7.57e+000
Carbon Dioxide	3.46e-002	1.39e-001
Nitrogen	2.77e-002	1.11e-001
Methane	2.64e+000	1.06e+001
Ethane	9.90e-001	3.96e+000
Propane	6.24e-001	2.50e+000
Isobutane	1.06e-001	4.25e-001
n-Butane	2.79e-001	1.12e+000
Isopentane	7.91e-002	3.17e-001
n-Pentane	1.03e-001	4.13e-001
n-Hexane	4.64e-002	1.86e-001
Cyclohexane	1.72e-002	6.88e-002
Heptanes	1.68e-002	6.71e-002
2,2,4-Trimethylpentane	1.42e-003	5.67e-003
Benzene	2.28e-002	9.15e-002
Toluene	4.36e-002	1.75e-001
Ethylbenzene	1.08e-002	4.34e-002
Xylenes	1.42e-002	5.70e-002
C8+ Heavies	3.34e-001	1.34e+000
-----		
Total Components	100.00	4.00e+002

# FLASH TANK OFF GAS STREAM

Temperature: 120.00 deg. F  
 Pressure: 74.70 psia  
 Flow Rate: 3.34e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
-----		
Water	1.05e-001	1.67e-002
Carbon Dioxide	3.28e-001	1.27e-001
Nitrogen	4.47e-001	1.10e-001
Methane	7.44e+001	1.05e+001
Ethane	1.46e+001	3.85e+000
Propane	6.09e+000	2.36e+000
Isobutane	7.61e-001	3.89e-001
n-Butane	1.95e+000	9.94e-001
Isopentane	4.36e-001	2.77e-001
n-Pentane	5.51e-001	3.49e-001
n-Hexane	1.83e-001	1.38e-001
Cyclohexane	3.76e-002	2.79e-002
Heptanes	4.40e-002	3.88e-002
2,2,4-Trimethylpentane	4.12e-003	4.14e-003
Benzene	1.16e-002	7.99e-003

Toluene	1.17e-002	9.48e-003
Ethylbenzene	1.41e-003	1.31e-003
Xylenes	1.26e-003	1.18e-003
C8+ Heavies	8.10e-002	1.21e-001
-----		
Total Components	100.00	1.93e+001

## FLASH TANK GLYCOL STREAM

Temperature: 120.00 deg. F

Flow Rate: 6.78e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
-----		
TEG	9.74e+001	3.71e+002
Water	1.98e+000	7.55e+000
Carbon Dioxide	3.13e-003	1.19e-002
Nitrogen	2.15e-004	8.21e-004
Methane	2.10e-002	8.00e-002
Ethane	2.89e-002	1.10e-001
Propane	3.67e-002	1.40e-001
Isobutane	9.44e-003	3.60e-002
n-Butane	3.19e-002	1.21e-001
Isopentane	1.05e-002	4.01e-002
n-Pentane	1.68e-002	6.38e-002
n-Hexane	1.24e-002	4.73e-002
Cyclohexane	1.07e-002	4.10e-002
Heptanes	7.44e-003	2.83e-002
2,2,4-Trimethylpentane	4.01e-004	1.53e-003
Benzene	2.19e-002	8.35e-002
Toluene	4.33e-002	1.65e-001
Ethylbenzene	1.10e-002	4.21e-002
Xylenes	1.47e-002	5.58e-002
C8+ Heavies	3.19e-001	1.22e+000
-----		
Total Components	100.00	3.81e+002

## FLASH GAS EMISSIONS

Flow Rate: 8.02e+002 scfh

Control Method: Combustion Device

Control Efficiency: 50.00

Component	Conc. (vol%)	Loading (lb/hr)
-----		
Water	4.98e+001	1.90e+001
Carbon Dioxide	2.93e+001	2.73e+001
Nitrogen	1.86e-001	1.10e-001
Methane	1.55e+001	5.25e+000
Ethane	3.03e+000	1.93e+000
Propane	1.27e+000	1.18e+000
Isobutane	1.58e-001	1.95e-001
n-Butane	4.05e-001	4.97e-001
Isopentane	9.08e-002	1.38e-001
n-Pentane	1.15e-001	1.75e-001
n-Hexane	3.80e-002	6.92e-002
Cyclohexane	7.83e-003	1.39e-002
Heptanes	9.16e-003	1.94e-002

2,2,4-Trimethylpentane	8.58e-004	2.07e-003
Benzene	2.42e-003	3.99e-003
Toluene	2.43e-003	4.74e-003
Ethylbenzene	2.93e-004	6.56e-004
Xylenes	2.63e-004	5.89e-004
C8+ Heavies	1.69e-002	6.07e-002
-----		
Total Components	100.00	5.59e+001

# REGENERATOR OVERHEADS STREAM

-----

Temperature: 212.00 deg. F  
Pressure: 14.70 psia  
Flow Rate: 5.04e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
-----		
Water	7.93e+001	1.90e+000
Carbon Dioxide	2.04e-001	1.19e-002
Nitrogen	2.21e-002	8.21e-004
Methane	3.76e+000	8.00e-002
Ethane	2.76e+000	1.10e-001
Propane	2.39e+000	1.40e-001
Isobutane	4.66e-001	3.60e-002
n-Butane	1.57e+000	1.21e-001
Isopentane	4.11e-001	3.94e-002
n-Pentane	6.56e-001	6.28e-002
n-Hexane	4.08e-001	4.67e-002
Cyclohexane	3.49e-001	3.90e-002
Heptanes	2.11e-001	2.81e-002
2,2,4-Trimethylpentane	9.79e-003	1.48e-003
Benzene	7.61e-001	7.90e-002
Toluene	1.24e+000	1.52e-001
Ethylbenzene	2.67e-001	3.76e-002
Xylenes	3.44e-001	4.85e-002
C8+ Heavies	4.86e+000	1.10e+000
-----		
Total Components	100.00	4.03e+000

## TEG Plant Schematic

Client Name:

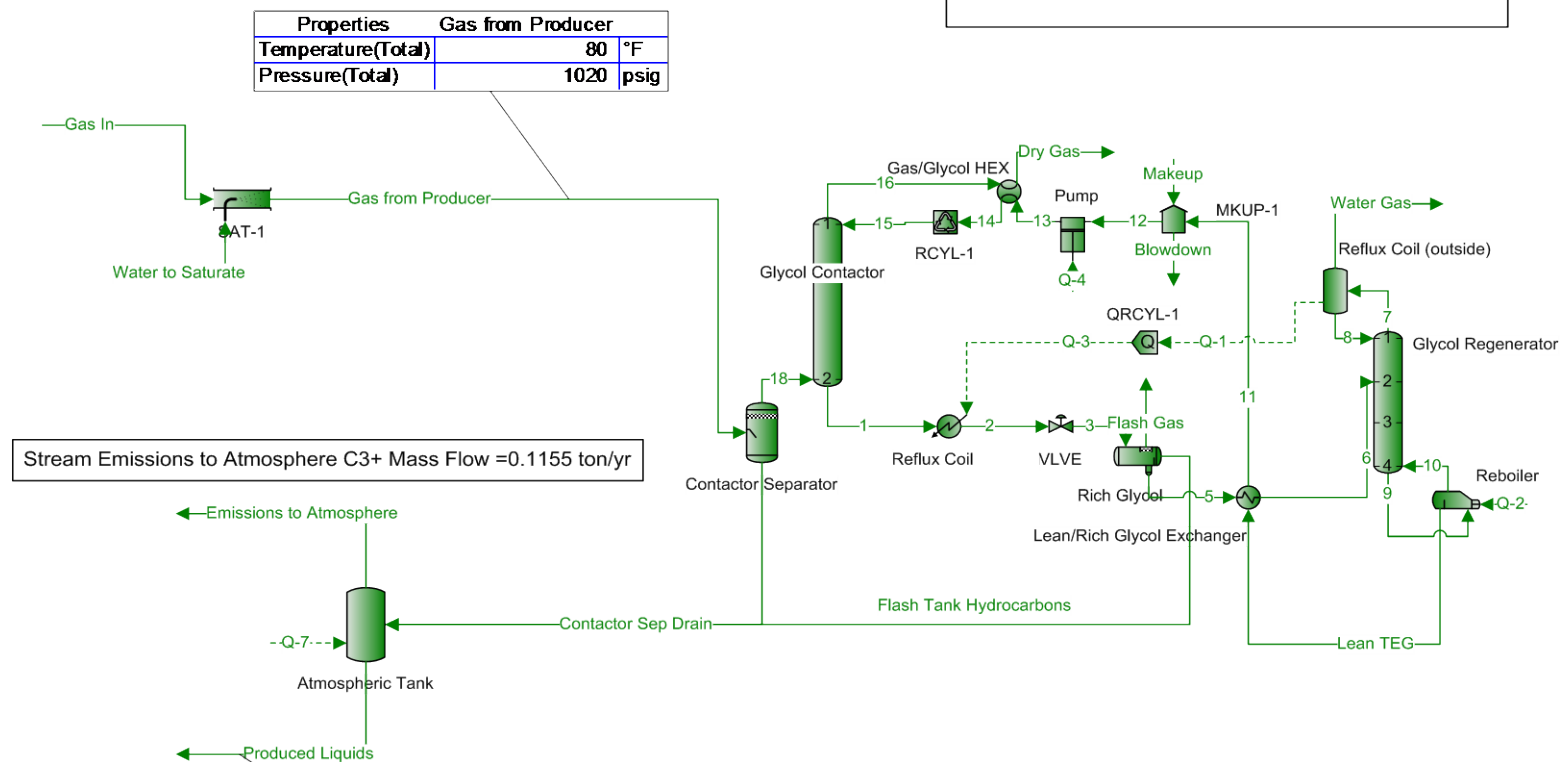
Job:

Location:

Flowsheet:

TEG

# Yoho CRP



This model shows the predicted flows of the Yoho CRP. The gas composition is from a sample taken at the Yoho CRP on 6/25/14. The temperature of 63 degrees F is an average high daily temperature for Morgantown, WV. Atmospheric pressure is assumed to be 14.7 psia.

## Process Streams Report

### All Streams

Tabulated by Total Phase

Client Name:		Job:	
Location:			
Flowsheet:	TEG		

### Connections

	Blowdown	Contact Sep Drain	Dry Gas	Emissions to Atmosphere	Flash Gas
From Block	MKUP-1	Contact Separator	Gas/Glycol HEX	Atmospheric Tank	Rich Glycol
To Block	--	Atmospheric Tank	--	--	--

### Stream Composition

Mass Flow	Blowdown lb/h	Contact Sep Drain lb/h	Dry Gas lb/h	Emissions to Atmosphere lb/h	Flash Gas lb/h
Water	0	220.129	4.69351	0.00544806	0.0241729
TEG	0	0	0.1552	0	6.30581E-05
Oxygen	0	6.85451E-06	2.31877	6.71397E-06	7.43035E-05
Nitrogen	0	0.00135173	845.206	0.00133826	0.0270288
Methane	0	0.209275	82455	0.205034	9.62299
CO2	0	0.0185501	444.966	0.0128468	0.345653
Ethane	0	0.0479087	25916.7	0.0467425	7.14572
Propane	0	0.0203544	14834.2	0.0197573	5.32394
i-Butane	0	0.000803333	2297.32	0.00079522	0.714712
n-Butane	0	0.00393712	5377.45	0.00385293	1.99922
i-Pentane	0	0.000528711	1576.77	0.000520489	0.545777
n-Pentane	0	0.000616595	1816.46	0.000607493	0.683166
2,2-Dimethylbutane	0	4.65458E-06	47.0525	4.62951E-06	0.0162946
2,3-Dimethylbutane	0	2.17624E-05	105.395	2.14861E-05	0.0371906
2-Methylpentane	0	5.87735E-05	469.248	5.83624E-05	0.15798
3-Methylpentane	0	9.14313E-05	273.597	8.96536E-05	0.0959928
Hexane	0	5.90469E-05	653.779	5.87144E-05	0.213071
2,2-Dimethylpentane	0	0	0	0	0
Methylcyclopentane	0	8.70056E-05	82.9338	8.15018E-05	0.0359888
Benzene	0	0.000668587	10.5751	0.000157937	0.00567251
Cyclohexane	0	0.000114417	71.5704	0.000104158	0.0281314
2-Methylhexane	0	2.38136E-05	348.865	2.36446E-05	0.0967282
2,3-Dimethylpentane	0	0	0	0	0
3-Methylhexane	0	1.66344E-05	229.59	1.65122E-05	0.0652996
1,t-2-Dimethylcyclopentane	0	0	5.41075E-06	0	2.10541E-10
1,t-3-Dimethylcyclopentane	0	1.13464E-06	1.70398	1.07213E-06	0.000658941
Heptane	0	1.06295E-05	165.789	1.05428E-05	0.0435432
Methylcyclohexane	0	4.81557E-05	96.274	4.62014E-05	0.0309311
Toluene	0	0.000553471	14.8541	0.000150734	0.00609163
1,t-4-Dimethylcyclohexane	0	1.36154E-10	17.0571	1.36154E-10	0.00439871
Octane	0	7.83848E-07	24.7205	7.8037E-07	0.00502988

### Remarks

↑  
**Total VOC = 0.1155 TPY**

**ATTACHMENT O**  
**Monitoring/Recordkeeping/Reporting/Testing Plans**  
**(NOT APPLICABLE)**

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

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- **Monitoring/Recordkeeping/Reporting/Testing Plans**

No changes to the current Monitoring/Recordkeeping/Reporting/Testing requirements are proposed.

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## ATTACHMENT P

### Public Notice

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“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.

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).

- 
- 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.
-

Williams Ohio Valley Midstream LLC (OVM)  
**YOHO COMPRESSOR STATION**  
Application for 45CSR13 NSR Modification Permit

**Attachment P**  
**LEGAL ADVERTISEMENT**

**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 New Source Review (NSR) Modification Permit for the existing Yoho Compressor Station, located ~3.0 Miles South-Southeast of New Martinsville, ~0.1 Mile Northwest of Slim Chance Road, New Martinsville, Wetzel County, WV.

Latitude and longitude coordinates are 39.5997 degrees North and -80.8281 degrees West, respectively.

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

- 1.95 tons of nitrogen oxides per year
- 3.90 tons of carbon monoxide per year
- 18.62 tons of volatile organic compounds per year
- 0.36 tons of benzene per year
- 0.20 tons of ethylbenzene per year
- 0.25 tons of formaldehyde per year
- 0.45 tons of n-hexane per year
- 0.02 tons of methanol per year
- 0.58 tons of toluene per year
- 0.14 tons of 2,2,4-trimethylpentane per year
- (0.23) tons of xylenes per year
- 0.05 tons of other hazardous air pollutants per year
- 1.62 tons of total hazardous air pollutants per year
- 866 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 1227, during normal business hours.

Dated this the \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_.

By: Mr. Don Wicburg, Vice President and General Manager  
**Williams Ohio Valley Midstream LLC**  
100 Teletech Drive, Suite 2  
Moundsville, WV 26041

**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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## APPLICATION FEE

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

- As per WV Rule 22 (45CSR22) filed on May 6, 1991, 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:
  - NSPS Requirements:                \$1,500      Not Applicable
  - NESHAP Requirements:            \$2,500      Not Applicable
- Total application fee is **\$1,000** [= \$1,000 minimum fee + \$0 additional charges]

The glycol dehydrator is an existing exempt source and the compressor engine is an existing NSPS JJJJ affected unit.

---

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



WILLIAMS FIELD SERVICES GROUP, INC  
PO BOX 21218  
TULSA, OK 74121-1218

COMPANY NUMBER: 4000  
CHECK NUMBER: 4000107785

PAY DATE	SUPPLIER NO.	SUPPLIER NAME	CHECK TOTAL
08-MAY-15	401733	STATE OF WEST VIRGINIA	1,000.00

Invoice Date	Invoice Or Credit Memo / Invoice Description	Gross	Discount	Net
07-MAY-15	07-MAY-2015 / AIR PERMIT APPLICATION FEE FOR YOHO	1,000.00	0.00	1,000.00
Supplier Support 1-866-778-2665		Page Totals	0.00	1,000.00



WILLIAMS FIELD SERVICES GROUP, INC  
PO BOX 21218  
TULSA, OK 74121-1218  
Company Number: 4000

JPMorgan Chase Bank, N.A. 70-2322/719  
Chicago, IL

Check Number: 4000107785  
Check Date: 08-MAY-15

One Thousand Dollars And Zero Cents

Pay To The Order Of:

STATE OF WEST VIRGINIA  
WV DEP - DIVISION OF AIR QUALITY  
601 57TH ST SE  
CHARLESTON, WV 25304 United States

PAY (USD) \$1,000.00

*Doula R Chappel*  
Authorized Signature

⑈4000 107785⑈ ⑆071923226⑆

00940 1167⑈

From: (412) 787-4197  
 Danell Zawaski  
 WILLIAMS  
 2000 Commerce Drive  
 Park Place 2  
 Pittsburgh, PA 15275

Origin ID: OLA



Ship Date: 27MAY15  
 ActWgt: 1.0 LB  
 CAD: 104269583/NET3610

Delivery Address Bar Code



SHIP TO: (304) 926 0459 X 1260

BILL SENDER

**Beverly McKeone**  
 WV Div of Air Quality - Permitting  
 601 57th Street, SE

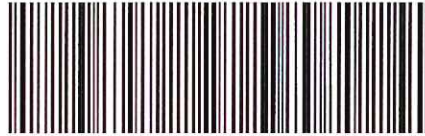
Charleston, WV 25304

Ref # 60000006200000034 6228 8325  
 Invoice #  
 PO #  
 Dept #

FRI - 29 MAY AA  
 \*\* 2DAY \*\*

TRK# 7736 8804 2500  
 0281

25304  
 WV US  
 HTS

**SH CRWA**

537J5/0915/EE4B

## After printing this label:

1. Use the "Print" button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.**

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